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Service Manual

GOLDONI

an ARBOS Company

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1.1 Reading this manual

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1.1.1 Introduction

The purpose of this workshop manual is to provide all the essential information necessary, explain operating principles and describe the settings which must be made to the different parts and assemblies of our tractors.

The information and disassembly sequences given in this manual are not exhaustive as the manual itself is intended for use by technical service personnel who have attended training courses on the product. As a result, the theoretical knowledge and practical experience acquired during the training course are required in order to follow the instructions given in this manual.

To prevent the risk of operator error or distraction which could put the technical personnel working in the service centre at risk, the section "2- Safety rules" must be read before reading any other part of this manual.

The information contained in this manual is up to date at the time of publication. GOLDONI reserves the right to modify the contents of this document without notification. If any discrepancies are noted or for any other queries, contact your area dealer or importer.

1.1.2 Structure of this manual

This manual is subdivided into chapters, which are subdivided in turn into sections.

Pages are numbered from 1 at the start of each chapter, with the page number indicated after the chapter number.
Example: For example, 3-9 indicates page 9 of chapter 3.

Figures are numbered from 1 at the start of each chapter, with the figure number indicated after the chapter number.
Example: For example, 8.16 indicates figure 16 of chapter 8.

The special tools deemed necessary to disassemble, reassemble and adjust the respective parts and assemblies are indicated at the end of each chapter.

The main tightening torques for assembling the parts of the tractor correctly are indicated at the end of each chapter. For all unspecified tightening torque values, refer to the section "Tightening Torques" in chapter "1-Introduction"

1.1.3 Identifying the tractor

Always cite the identification details of the machine when contacting the Technical Support Service or ordering a part from the Spare Parts Warehouse. Specifically, the following information is needed:

- Commercial name;
- Production series;
- Machine type;
- Variant/Version;
- Identification number (serial number).

All the aforementioned details are stamped on a metal plate fixed to the machine in an easily accessible place for reference whenever needed.

1 - Commercial name
2 - Category
3 - EU Homologation
4 - Identification number (serial number)

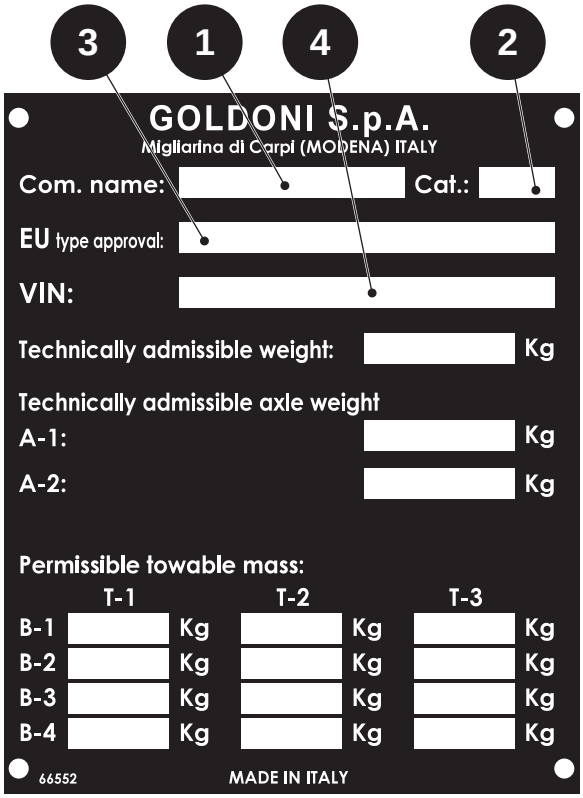

Fig. 1.1

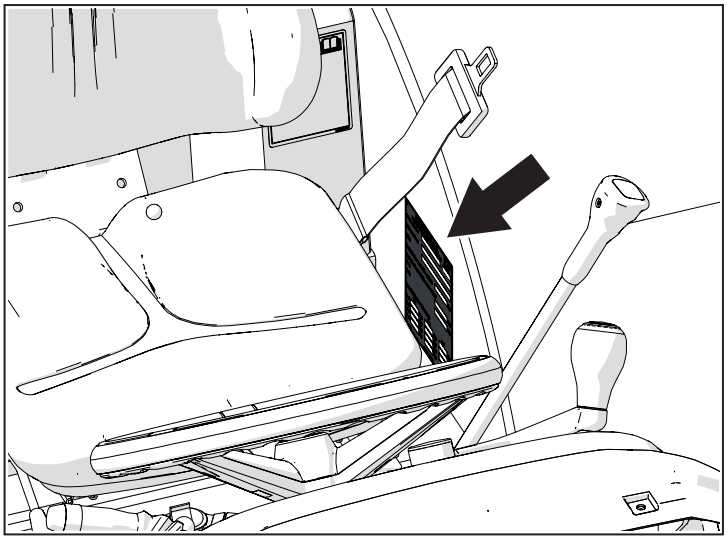

Fig. 1.2

The chassis number is also stamped on the chassis itself.

The identification data is punched onto the front right hand side of the tractor.

Note

See the workshop manual provided by the respective manufacturer for instructions on identifying the engine installed in the tractor.

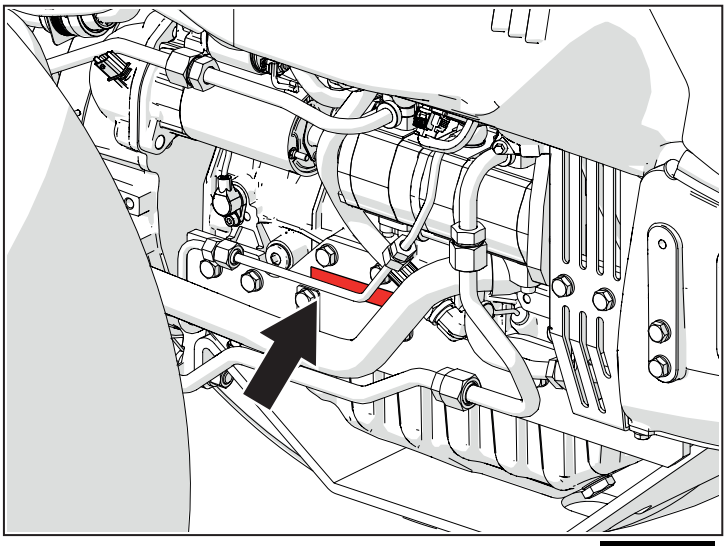

Fig. 1.3

1 - Constructor brand code

2 - Production series

3 - Variant
- Y1/Y2- Engine power
- Y3- Protective structure

4 - Version
- Y4- Speed
- Y5- Engine emissions compliance stage
- Y6- Brand

5 - Chassis number (serial number)

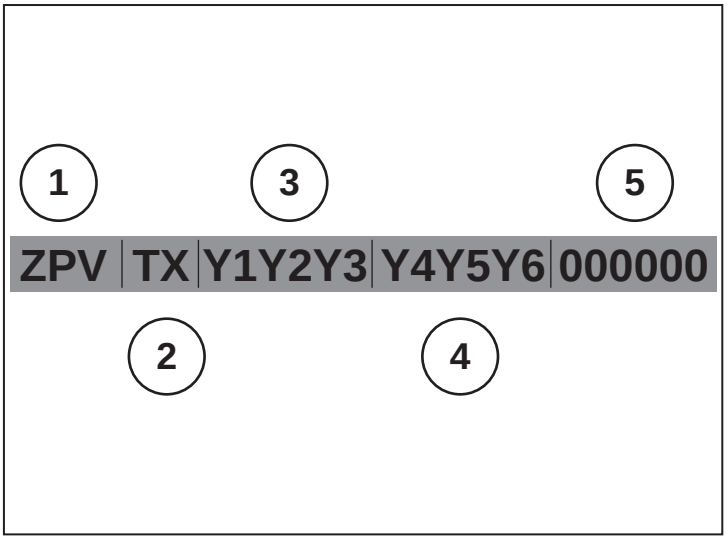

Fig. 1.4

1.2 Safety rules

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1.2.1 Essential preventive guidelines

The premises, installations and equipment of the repair workshop must all be compliant with applicable work safety legislation to ensure the health and safety of all persons working in the workshop.

While clearly not exhaustive, the safety rules given in this section provide important information for workers on the hazards they may encounter while carrying out their jobs.

Your own safety and the safety of others must always be the first priority when working on any machine of any type.

To work in complete safety, it is essential that personnel understand the nature of the work to be done, use the right tools and materials for the job correctly, and act with good common sense. Read all the safety messages in this introduction of this manual and take note of all "**Caution**", "**Warning**" and "**Danger**" notices in this document.

	This symbol means: **NOTE!** This symbol is used to draw attention to specific methods or procedures which must be applied in order to perform maintenance on the tractor correctly.

	This symbol means: **WARNING** This symbol is used to draw attention to operations which must be performed with particular caution as they may put the structure of the tractor or its components at risk.

	This symbol means: **ATTENTION!** This symbol is used to draw attention to safety related information. Read these messages with particular care. Make sure that you have fully understood what may cause potentially dangerous or fatal accidents.

	This symbol means: **DANGER!** This symbol is used to identify a situation of danger for yourself and for others. Read these messages with particular care. Make sure that you have fully understood what may cause potentially dangerous or fatal accidents.

1.2.1.1 General rules

1.2.1.1.1 Preliminary guidelines

- always follow the directions given by your superiors;
- always comply with safety signs;
- do not use machines or installations without the proper authorisation and do not attempt to perform any operation that you are not authorised or qualified to do;
- use all safety and protection devices and measures properly;
- notify your superiors of any defective or missing safety and protection devices, and of any hazardous situations that come to your attention;
- do not remove or modify any safety or protection devices unless specifically authorised to do so;
- notify your superiors immediately of any injury sustained by yourself or others, describing the situation as clearly and completely as possible;
- keep your work space clean and tidy, keep the floor clear of any materials or objects not directly required for your job and avoid spilling greasy or oily products (clean any spillage immediately with appropriate absorbent cleaning products).

Fig. 1.5

1.2.1.1.2 Work Garments

- Do not wear loose-fitting garments or garments with loose or hanging elements which may become tangled in moving parts. Only wear garments with tight-fitting cuffs;
- do not wear necklaces, rings, bracelets or other jewellery;
- do not clean garments with flammable or harmful substances or with compressed air;
- do not wear sandals, flip-flops, clogs or high-heeled footwear;
- use the required personal protective devices at all times (eyewear - face shield - gloves - shoes etc.).

1.2.1.1.3 Machines and Installations

- Before starting work, check that the protective devices and guards are fitted correctly in place and in proper working order, and that all safety devices are working correctly;
- check that any fume extraction and/or ventilation systems in place are working correctly;
- the protective guards and safety devices of machines and installations must never be removed except when strictly necessary for a specific task and only with prior authorisation from your superiors, who will inform you of the substitute safety measures to adopt;
- protective guards and safety devices must be refitted correctly and reactivated as soon as the reason for their temporary removal no longer exists;
- never clean, oil or grease the moving parts of machines and installations by hand;
- never work on or adjust moving parts.

1.2.1.1.4 Lifting and transporting

By hand

- keep your back straight when lifting loads;
- hold the load as safely as possible using the most accessible and comfortable grip points;
- do not carry loads with oil or grease on your hands;
- hand trolleys with no tow bar must always be pushed and not pulled;
- do not place loads near staircases, firefighting installations, first aid stations and transit areas.

When working with motorised machinery,

- comply with load limits and drive at an appropriately safe speed in relation to the route taken and the load carried and to be sure that the machine can be stopped safely;
- ensure that loads are fastened safely with straps and securely attached;
- do not drive with a suspended load in places where a falling load may constitute a hazard - if this is unavoidable, ensure that all persons in the area are adequately warned of your manoeuvres or keep persons out of the area;

1.2.1.1.5 Driving in indoor spaces

Persons

- use permitted and designated walkways (pedestrian crossings, walkways etc.);
- do not run;
- do not walk or stand under suspended loads and keep out of areas which may be subject to the risk of falling loads;
- do not ride on transport or lifting machinery intended for handling materials only.

Vehicles

drive at moderate speed and take all precautions necessary for the route taken - observe all company regulations and signage.

1.2.1.1.6 Electricity

- Do not make makeshift connections. In particular, never make a connection by inserting the bare ends of wires into socket holes;
- always disconnect a plug from the socket by gripping the outer casing of the plug itself, never pull the cord;
- avoid twisted wires;
- take care not to damage the insulating sheath of wires and the insulated housings of electrical equipment, and check frequently that they are undamaged;
- report any damage to electrical devices and, in particular, to earth conductors;
- never open electrical cabinets or the casings of electrical equipment and do not attempt to perform maintenance on electrical cabinets and electrical equipment unless trained and authorised to do so;
- take all precautions to avoid contact with overhead power lines when manoeuvring or working in the vicinity.

1.2.1.1.7 Fire

In areas and in operations subject to the risk of fire due to the proximity or use of flammable substances:

- do not smoke;
- do not use equipment involving naked flames and do not handle incandescent materials;
- keep flammable materials away from sources of heat;
- do not place materials in front of extinguishers and fire hydrants.

1.2.1.1.8 Dangerous substances and products

When using dangerous chemical products (fire hazard, explosion hazard, irritant, caustic burn hazard, burn hazard or poisoning hazard), always observe the following precautions:

- keep recipients containing dangerous products open only for the time strictly necessary to use them;
- do not use or transfer dangerous products into containers not intended for use with them or without the necessary labelling indicating the contents and safety markings;
- when using chemical products, follow the instructions given on the respective labels.

1.2.1.1.9 Protection against exposure to harmful gas, fumes and dust:

- check that any fume extraction systems in place are working correctly;
- use personal protective devices;
- place mobile extractor ducts as close as possible to the source of emissions;
- avoid closing using doors which will obstruct the air flow carrying emissions generated by the extractor system.

1.2.1.1.10 Biological agents

- in case of fermentation (due to proliferation of algae), avoid direct contact and use appropriate protective measures to eliminate the problem;
- only enter areas subject to anaerobic fermentation producing harmful gases (e.g. ammonia) with appropriate protective breathing equipment.

1.2.1.1.11 Guidelines for choosing the correct fire extinguishing measures

Agente estinguente					
Classe di fuoco	Acqua	Polvere	CO^2	Schiuma	Polveri speciali
combustibili solidi ordinari	✓	✓	✓ Solo per incendi di piccole dimensioni	✓	✗
liquidi infiammabili	✗ Tranne che utilizzando attrezzature adatte	✓	✓	✓	✗
gas infiammabili	✗	✓	✓	✗	✗
metalli combustibili	✗ Possono reagire con l'acqua	✗	✗	✗	✓
Apparecchiature elettriche	✗	✓	✓	✗	✗

Fig. 1.6

1.2.1.2 Implements

Makeshift, unsuitable and faulty tools can cause problems and accidents. Never use the wrong tools, as these may put you at risk and compromise the work done.

Only use the special tools recommended by the manufacturer to disassemble, service and refit the components of the tractor.

Using the correct specific tools will make work less tiring and quicker, letting you save costs while being sure that the job has been done correctly.

Never use:

- A hammer with a loose head or a damaged handle.
- Pliers or pieces of metal instead of a hammer;
- Drill bits or screws instead of pin punches;
- Worn wrenches or wrenches repaired with welds;
- A steel hammer to tap bearings or heat-treated components (use a bronze or brass hammer).

Certain procedures on components of the tractor require the engine to be separated from the gearbox and the separation of the front and rear transmission casings. These operations are facilitated and made safer by using the specific separator trolley kit.

When lifting heavy parts, make sure that all chains, brackets, hooks, cables and ropes used for lifting are compliant with EC standards. Unless specified otherwise, an adjustable hoisting bracket must be used when lifting all heavy parts.

All chains and cables used must be parallel to each other and maintained as close as possible to vertical with respect to the object lifted.

1.2.1.3 First Aid

Mechanics are exposed to a number of risks in the workplace.

Treat injuries with disinfectant products and sterile materials, which must be kept in a specific first aid box equipped in accordance with applicable legislation.

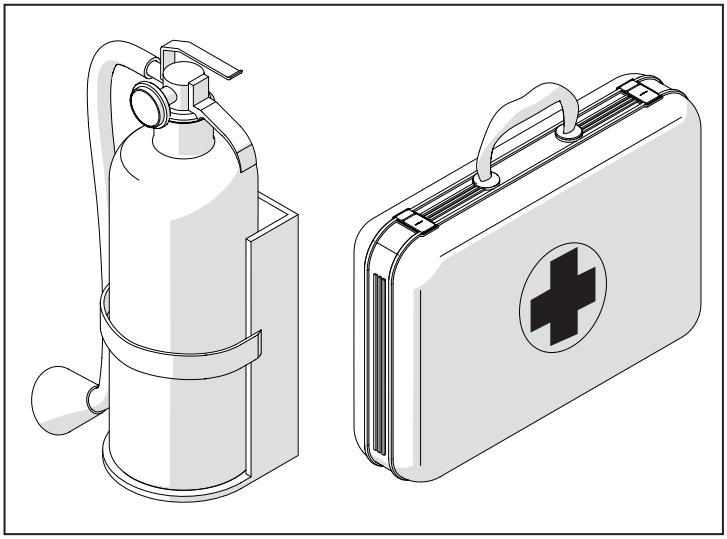

Fig. 1.7

1.2.1.4 Safety rules regarding the tractor

Attention
Read the use and maintenance manually thoroughly before boarding the tractor, and follow the instructions given precisely.

1.2.1.4.1 Start

- Never run the engine in an enclosed space without adequate ventilation or extraction systems for evacuating the exhaust gas.
- Keep your head, body, limbs, feet, hands and fingers away from rotating fans and belts at all times.

1.2.1.4.2 Engine

- Unscrew the radiator cap very slowly before removing to release pressure from the system.

  Only top up with coolant with the engine off or, if still hot, idling.
- To prevent the risk of fire caused by spilt fuel, never refuel the machine while the engine is running, especially if the engine is hot.
- Never attempt to check or adjust the tension of fan belts while the engine is running. Do not adjust the fuel injection pump settings while the engine is running.
- Do not lubricate the machine while the engine is running.

1.2.1.4.3 Electrical system

- If it is necessary to use an auxiliary battery, connect the cable terminals correctly: connect (+) to (+) and connect (-) to (-). Never short-circuit the terminals.

Danger
The gas released by batteries is highly flammable.

When charging a battery, leave the battery compartment uncovered to ensure more effective ventilation. Never check battery charge by jumpering the terminals with a metal object. Avoid sparks and flame in the vicinity of batteries. Do not smoke - explosion hazard!

- Check for fuel leaks before starting any work, and rectify any leaks found before continuing.
- Never charge batteries in an enclosed space: ensure that the area is adequately ventilated to prevent the risk of explosion caused by the build-up of gas released by the batteries during charging.
- Always disconnect the battery before starting any work on the electrical system.
- If the electrolyte in the battery freezes, the battery may explode if you attempt to charge the battery or push-start the vehicle. Keep the battery fully charged at all times to prevent the electrolyte from freezing.
- Batteries release corrosive fumes and flammable gases. Sparks, naked flame and incorrectly connected cables may cause explosions.

1.2.1.4.4 Hydraulic system

- Pressurised hydraulic fluid escaping from a very small hole may be practically invisible and yet be projected with sufficient force to penetrate the skin. use a piece of cardboard or wood to search for leaks. **Never search for leaks with your hands**. in the event of skin contact with the fluid, seek immediate medical assistance. Failure to treat a fluid injection injury immediately may lead to severe infection or skin disease.
- Use specific instruments to check the pressure of the system.

1.2.1.4.5 Disassembly and reassembly

- Lift and handle all heavy parts with lifting equipment of sufficient capacity. Use appropriate straps and hooks to secure parts when lifting. Use the specific hoisting eye-bolts. Be aware of any persons in the vicinity of the load being lifted.
- Handle all parts with extreme caution. Never place your hands or fingers between two parts. Wear approved accident prevention garments and equipment such as safety eyewear, gloves and shoes.
- Do not allow chains or metal cables to twist. Always wear safety gloves when handling cables or chains.

1.2.2 Using the tractor safely

You need to be suitably qualified and authorised to operate an agricultural tractor safely. To be qualified to use this tractor, you must also have read and understood the complete contents of the use and maintenance manual and observe the instructions given precisely.

You must be aware of and understand all applicable work safety regulations. Note that in certain countries, persons under the age of 18 years are not permitted to operate a tractor.

It is your responsibility to learn these regulations and apply them in the workplace. These regulations include the following instructions for using the tractor safely.

ATTENTION
The operator must not consume alcohol or take drugs which could impair concentration and/or coordination.

Observe the following precautions

- Never let minors or unqualified persons drive the tractor.
- Fasten the seat belt if the tractor is equipped with an ROPS safety roll bar.
- If possible, avoid using the tractor near excavation sites or large ditches.
- Reduce speed when steering and when driving across hilly, uneven, slippery or muddy terrain.
- Keep away from steep slopes as they are dangerous.
- Always watch where you are going, especially during headland turns and around trees.
- Never allow anyone to climb onto the tractor or implement.
- Use the tractor calmly, avoiding rushed or sudden manoeuvres: do not steer, start or stop suddenly.
- Only use the drawbar or other specific hitching points to tow. Never attach a towed load above the centreline of the rear axle.
- Engage the parking brake when the tractor is parked.
- Do not modify or remove any part of component of the original equipment of the tractor.
- Keep others out of your work area.
- Do not use hitching or towing devices that are not intended for your tractor.

1.2.2.1 ROPS

The tractor may be equipped with an ROPS safety roll bar and a seat belt. If the ROPS structure has been removed, the tractor must be equipped with a new ROPS and seat belt. The ROPS reduces the risk of injury in the event of a roll-over. A roll-over without the ROPS roll bar may cause serious damage and injury.

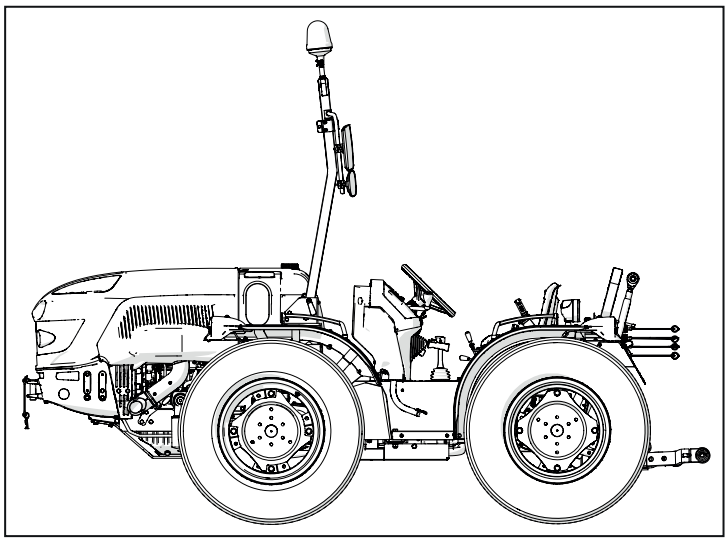

Fig. 1.8

Usage

- Before using the tractor, make sure that the ROPS is not damaged and is fastened correctly to the tractor.

- Never attach chains, cables etc. to the ROPS or cab to tow a load, as this may cause the tractor to overturn: always use the drawbar to tow.

- Always fasten your seat belt. Do not use the seat belt if the tractor is not equipped with an ROPS safety roll bar.

- Check the seat belt for damage. Replace the seat belt if damaged.

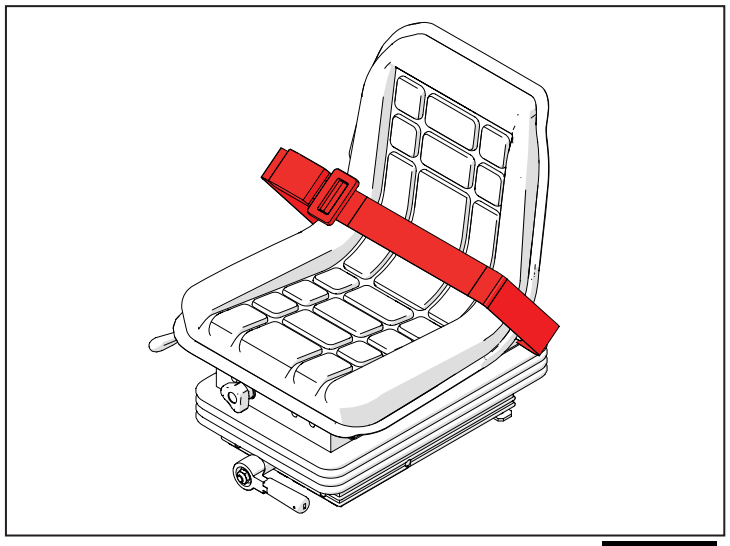

Fig. 1.9

Damage to ROPS safety roll bar

If the tractor has rolled over or if the ROPS safety roll bar has been damaged (e.g. due to collision with a bridge), it must be replaced to ensure the same degree of safety originally offered by the tractor.

After an accident, check that the ROPS safety roll bar, the driver seat, the seat belt and the seat belt anchor points. Replace all damaged parts before using the tractor again.

Do not weld, drill, bend or straighten the ROPS safety roll bar or parts of the cab: these actions will compromise the original safety of the tractor.

Precautions for working safely

- Protect yourself against injury

- Wear appropriate protective garments and use the personal protective devices required for the task.

- Do not take risks.

Use the following personal protective equipment and garments (Fig. 1.10):

- A safety helmet;

- Safety glasses or a protective face mask;

- Hearing defenders;

- A protective breathing mask or filter;

- Appropriate garments to protect against bad weather;

- Reflective garments;

- Heavy work gloves (in neoprene for handling chemical products, in leather for heavy duty work).

- Safety footwear.

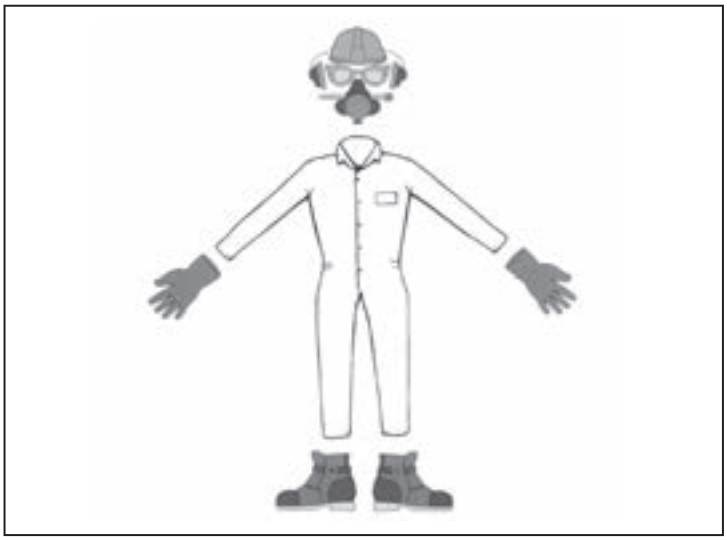

Fig. 1.10

1.2.2.2 Cab safety

- The safety cab is specifically designed to be installed on this series of tractors and is compliant with all safety and noise requisites of applicable legislation.
- The safety cab is conformant with international safety standards. Never drill or modify the cab to install accessories or implements.
- Do not attempt to repair damaged parts of the cab by welding.
- Never attach chains or cables to the main chassis of the cab for towing loads.

1.3 General

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1.3.1 Spare parts

If it is necessary to replace a part, ask for and make sure that you use original spare parts only

Using non-original spare parts will void the warranty.

Always provide the following information when ordering spare parts:

- Tractor model and commercial name;
- Chassis number;
- Order code of required part (this can be found in the Spare Parts Catalogue).

1.3.2 Specific tools

The tools and equipment specified and illustrated in this manual have been developed specifically by the manufacturer to make working on the tractor quicker, simpler and more effective.

These tools and equipment will ensure the best results possible with minimum operator strain, and let you avoid any operations which could compromise the successful outcome of the job.

Note
The wear limits indicated are recommended only and not mandatory. The indications “front”, “rear”, “right” and “left” are with respect to the operator facing towards the front of the vehicle and seated in the drive seat.

1.3.3 Oil seals for rotating shafts

Observe the following precautions and instructions to ensure that oil seals are installed correctly:

- Clean the shaft thoroughly and check that the contact surfaces of the shaft itself are undamaged.
- Fit with the seal lip facing towards the fluid; when fitting hydrodynamic lip seals, the grooves must be oriented correctly in relation to the direction of rotation of the shaft so that they will carry fluid towards the interior of the seal.
- Spread a film of lubricant (preferably use oil and not grease) on the seal lip and, with double lip seals, fill the gap between the oil seal lip and the dust seal lip with grease;
- Install the oil seal in its seat with a flat tipped punch; never hit the seal directly with a hammer.
- While installing the seal, make sure that the oil seal remains perpendicular relative to its seat. Once the seal is installed, where applicable, check that it fits completely against the relative shoulder.
- To prevent the shaft from damaging the seal lip, place suitable protection between the two parts during assembly.

1.3.4 Adjuster shims

Each time an adjustment with shims is necessary, measure each adjuster shim with a micrometer and assemble a pack of the required thickness on the basis of the values measured.

Note
Do not rely on the measurement of the assembled pack and do not base your calculations on the measurements indicated on each shim, as they may be incorrect.

1.3.5 O-ring seals

Lubricate O-rings before fitting in their respective seats to prevent them from twisting and seating incorrectly, compromising the integrity of the seal itself.

1.3.6 Sealants used

A number of different sealants must be used during assembly, with specific characteristics to suit different applications.

Sealants

LOCTITE 518 mastic sealant must be used where a hermetic seal is required between two or more components.

Usage:

- Remove any encrusted residue from both mating surfaces with a wire brush.
- Degrease the surfaces thoroughly with one of the following cleaners: trichloroethylene, petroleum spirit, acetone or a solution of hot water and caustic soda.
- Spread the product evenly onto just one of the contact surfaces and assemble.

Thread lock compound

LOCTITE 243 and LOCTITE 270 thread lock compounds are used when it is necessary to impede a screw or nut from loosening.

Usage:

- Clean as described previously.
- Spread one or two drops of the product onto the thread of the screw or in the threaded hole.
- Fit the screw or nut and tighten.

1.3.7 Spring pins

When fitting split spring pins, ensure that the split in the pin itself is facing in the same direction as the force exerted on the pin.

Coiled spring pins can be fitted in any orientation.

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1.4.1 Engine

E 70 - E 80

Tractor		E 70	E 80
Manufacturer		VM	VM
Model		R753 IE4	R753 IE4
Fuel system		Direct diesel injection	Direct diesel injection
Emissions compliance		Stage 3B	Stage 3B
Number of cylinders		3	3
Intake		Turbocharged, intercooled	Turbocharged, intercooled
Rated speed	rpm	2600	2600
Rated Power	kW / CV @ rpm	44.8 / 61 @ 2600	52.2 / 71 @ 2600
Cooling		Liquid	Liquid
Displacement	cm^3	2200	2200
Specific fuel consumption (at max. torque engine speed)	g/kWh	226	222
Maximum torque	Nm	208	246
maximum torque speed	rpm	1800	1800
Torque rise		25%	28%
Tank capacity	l	70	70
Engine cowl		RTM	RTM

E 90 - E 100

Tractor		E 90	E 100
Manufacturer		VM	VM
Model		R754 IE417	R754 IE417
Fuel system		Direct diesel injection	Direct diesel injection
Emissions compliance		Stage 3B	Stage 3B
Number of cylinders		4	4
Intake		Turbocharged, intercooled	Turbocharged, intercooled
Rated speed	rpm	2600	2600
Rated Power	kW / CV @ rpm	60 / 81.6 @ 2600	68 / 92.5 @ 2600
Cooling		Liquid	Liquid
Displacement	cm^3	2970	2970
Specific fuel consumption (at max. torque engine speed)	g/kWh	217	217
Maximum torque	Nm	340	380
maximum torque speed	rpm	1100	1100
Torque rise		54%	52%
Tank capacity	l	70	70
Engine cowl		RTM	RTM

1.4.2 Transmission

Transmission type		Mechanical transmission, four wheel drive
Gearbox type		16+16 synchronised
Optional gearbox type		12+12 o 8+8 synchronised
Shift control system		Mechanical with central levers
Clutch		Single plate dry clutch, 11" (280 mm) diametre
Clutch control		Hydraulic
Reverse shuttle type		Mechanical, synchronised
Reverse shuttle control		Lever
4WD engagement control		Permanent 4WD
Rear differential lock		Electrohydraulic
Front differential lock		Electrohydraulic
Front axle swing angle		15° right + 15° left
Minimum speed	km/h	0.58
Maximum speed (homologated)	km/h	40

1.4.3 Brakes

Rear brake type		Hydraulically operated multi-disc wet brakes
Front brake type		-
Emergency and parking brake		Mechanically operated independently
Trailer brake mechanical lever mount		Type CUNA

1.4.4 Steering wheel

Steering type		Hydrostatic
Steering angle		40°

1.4.5 Rear power take off

Type		Single shaft, independent and synchronised
PTO speed independent of ground speed	rpm	540-540E
Other speeds independent of forward speed		-
Ground speed synchronised		Yes
Direction of rotation (looking at PTO)		Clockwise
Profile		1-3/8" with 6 splines
Clutch		Multi-disc wet brakes
Clutch control		Electrohydraulic

1.4.6 Rear lift

Type		Hydraulic with position and draft control and LOM
Lift capacity at lower link ends	kg	2100
3-point linkage category		Category 1 and -2N
Mechanical top link arm		Category 1 and -2N
Hydraulic top link arm		Category 1 and -2N / 1 and -2N with quick hitch
Lower link arm type		Telescopic with fixed lower link ends
Optional lower link arm type		Telescopic with quick hitches
Right hand stabiliser bar type		Mechanical
Right hand stabiliser bar type		Hydraulic

1.4.7 Hydraulic System

Type		Open-centre
Pump delivery	l/min	55 with dual pumps (distributors) 22 (hydraulic steering)
Rear hydraulic distributors		3 in single block
Front hydraulic distributors		-
Free oil return coupling		1/2 NPTF quick coupler

1.4.8 Electrical system

Battery		12 V 850 A 95 Ah
Safety		Battery master switch
Instrument		Digital / analogue
1-pole socket	Volts	12
7 pole socket	Volts	12
Rear work light		Adjustable
Rotating beacon		Orange

1.4.9 Driver zone

Platform	Full size, suspended
Platform carrier	Silent-block
Front mudguards	Integrated in bodywork
Rear mudguard protection	Rubber profile
Front mudguard protection	Rubber profile
ROPS	Central fully foldable
Standard cab	-
Low profile cab	-
Left and right hand rear view mirrors	Adjustable
Seat	With elastic suspension, seat belts and OPS
Seat adjustment	Fore/aft, up/down and driver weight
Toolbox	Yes
Use and maintenance manual	Yes

1.4.10 Vehicle's maximum operating inclination

Forward	Degrees	25°
Reversing	Degrees	25°
Left	Degrees	20°
Right	Degrees	20°

1.4.11 Towing devices

Rear towing hitch	CEE/CEE-X category pin adjusting
SLIDER rear towing hitch	-
Front towing hitch	Fixed
Drawbar	-

Vertical loads

	Maximum permitted vertical load on hitch (Kg)	Maximum hitch height (mm) declared
X250_xx type hitch	1325	230.66
GTF30 type hitch	1475	182.16

1.4.12 Towable masses

Category R and S vehicle brake system	Drawbar (kg)	Rigid drawbar (kg)	Centreline (kg)
Unbraked	1200	1200	1200
Inertia braking	6000	6000	6000

1.4.13 Ballast weights

Front	-
Water ballast in tyre	With air / water valve

1.4.14 Weights and dimensions

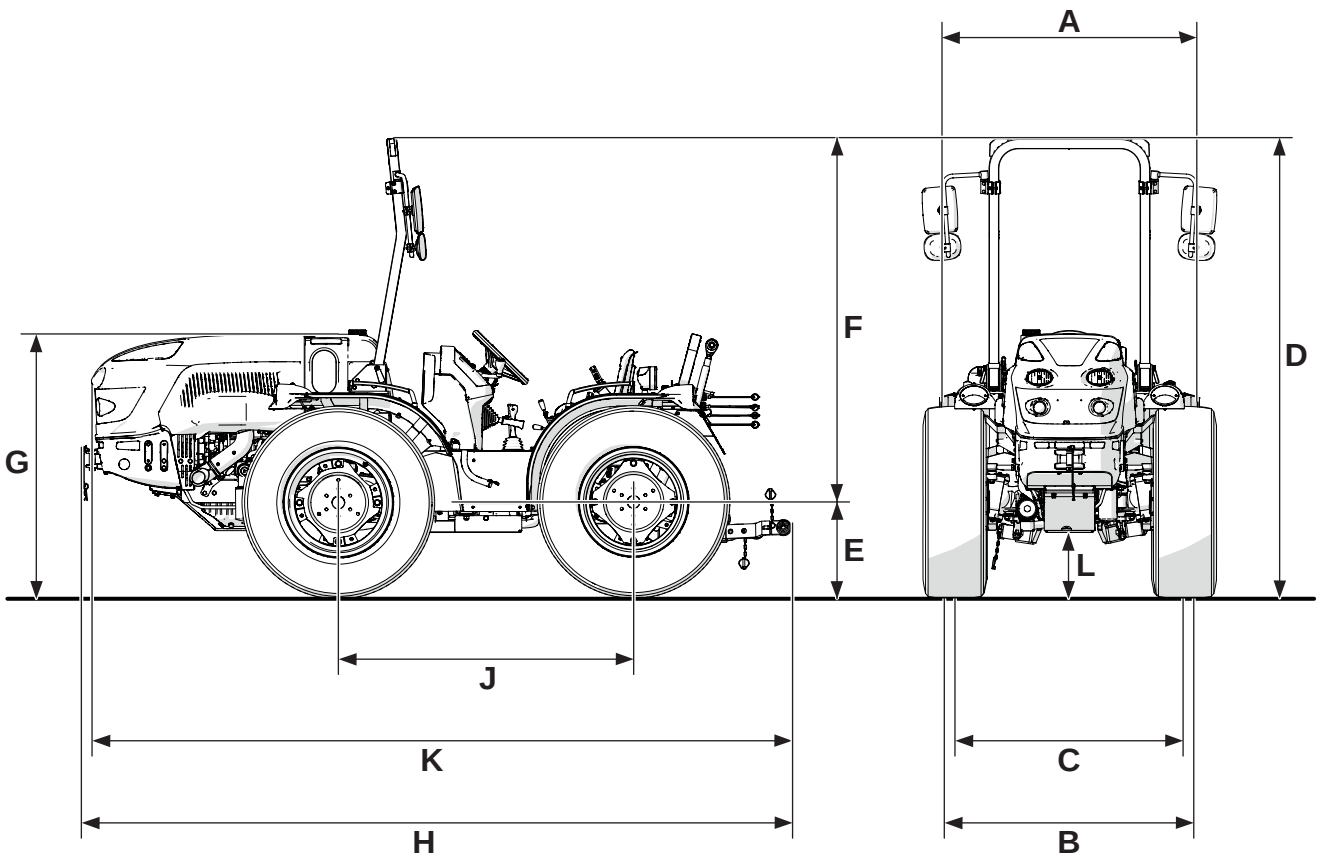

Fig. 1.11

Model			E 70	E 80	E 90	E 100
A	Mudguard footstep	Width at mudguards, without extensions	1165 mm			
		Width at mudguards, with extensions	1325 mm			
B	Width at rear wheels	2 wheel drive	N/A			
		4 wheel drive	1015-1255 mm			
C	Width at front wheels	2 wheel drive	N/A			
		4 wheel drive	937-1339 mm			
D	Overall height	Cab version	N/A			
		ROPS structure version	2268 mm (min) 2333 mm (max)			
E	ETRTO tyre radius		410 mm (min) 475 mm (max)			
F	Vehicle overall height, from the axle's centre line	Cab version	N/A			
		ROPS structure version	1858 mm			
G	Cowl height		1268 mm (min) 1333 mm (max)			
H	Length with ballast weights		N/A			
K	Length without ballast weights		3245 mm	3245 mm	3450 - 3590 mm	
J	Wheelbase	2 wheel drive	N/A			
		4 wheel drive	1505 mm			
L	Ground clearance	4 wheel drive standard axle	268 mm (min) 333 mm (max)			

Vehicle's kerb masses

Model		E 70	E 80	E 90	E 100
Overall unladen weight		2050 kg	2050 kg	2050 kg	2050 kg
Distribution over the axles	1st axle	1240 kg	1240 kg	1240 kg	1240 kg
	2nd axle	810 kg	810 kg	810 kg	810 kg

Maximum permitted axle weights

1st axle	kg	1300
2nd axle	kg	2000
Total	kg	2700

1.4.15 Lubricants, fuels, coolant and refrigerant

Assembly	Lubricants, fuels, coolant and refrigerant	Capacity	Recommended products	Specifications
Engine	Engine oil	9,8 l	SAE 10W-40	ACEA E6 API CJ4
	Fuel	70 l	-	DIN EN 590
	Coolant	9 l	GLICOLE MONOETILENICO (1)	ASTM D 3306 TYPE 1
Transmission	Transmission oil - rear differential - Rear PTO	20 l	UNIVERSAL 15W-40	API CE - API GL 4
	Front axle oil - Front differential	9 l	UNIVERSAL 15W-40	API CE - API GL 4
	Front Final Drive Units Oil	2,2 l	TRW 90	API GL-5
	Rear Final Drive Units Oil	1,9 l	TRW 90	API GL-5
Hydraulic steering valve	Brake Oil	1,5 l	ATF	ATF DEXRON II D, ZF TE-ML 04D, VOITH G607, CAT TO-2, ALLISON C4, MASSEY FERGUSON M-1110
Brakes	Brake Oil	0,3 l	ATF	ATF DEXRON II D, ZF TE-ML 04D, VOITH G607, CAT TO-2, ALLISON C4, MASSEY FERGUSON M-1110
Transmission clutch	Brake Oil	0,3 l	ATF	ATF DEXRON II D, ZF TE-ML 04D, VOITH G607, CAT TO-2, ALLISON C4, MASSEY FERGUSON M-1110
Other	Grease	-	MULTIUSO E.P.	NLGI 2

(1) - mixture of 50% concentrated monoethylene glycol based radiator protection liquid and 50% demineralised or distilled water

1.4.15.1 Fuel

The engine is designed to run with standard fuels available throughout Europe (compliant with DIN EN 590 specifications).

Attention
Do not use fuels with characteristics differing from those indicated. The use of non-recommended fuel may damage the engine. Do not use contaminated fuel or diesel fuel mixed with water as this may cause serious engine malfunctions. The warranty does not cover any malfunctions caused by the use of fuels other than those of the recommended type.

Warning
Using correctly filtered fuel will prevent damage to the injection system. Clean any fuel spilt when refuelling immediately. Do not keep fuel in galvanised (zinc plated) containers. Fuel reacts chemically with the zinc coating of the container, producing compounds which will quickly clog the filters or cause injection pump and/or injector malfunction.

1.4.15.1.1 Fuel for low temperatures

When operating the engine at temperatures below, 0°C use the specific low temperature fuels commercialised normally by fuel manufacturers for cold weather usage and conforming with the specifications given in the fuel compatibility table.

These fuels limit the formation of paraffin wax at low temperatures.

When paraffin wax forms in fuel, it clogs the fuel filter and stops the flow of fuel to the engine.

1.4.15.1.2 Biodiesel

BIODIESEL (compliant with the specifications of UNI EN 14214) may be used in proportions up to 7% mixed in a standard fuel type available in Europe (as defined by the standard DIN EN 590).

1.4.15.2 Engine oil

Warning
Operating the engine with too high or too low an oil level may cause damage to the engine itself. Never fill to beyond the MAX level, as excess oil combusting in the cylinder may cause a sudden increase in engine speed. Use only the specified oil type to ensure that the engine is protected adequately and maximise the performance and durability of the engine itself. Using oils of lower quality than indicated by the specifications will significantly shorten the lifespan of the engine. The viscosity of the oil must meet the requirements specified at the normal engine operating temperature.

Danger
Prolonged skin contact with used engine oil may cause skin cancer. If contact with oil cannot be avoided, wash your hands thoroughly with soap and water as soon as possible. For guidelines on disposing correctly of used oil, see the section "Decommissioning and scrapping" in the chapter "General safety rules".

1.4.15.2.1 SAE oil classification

This system classifies oils on the basis of viscosity only and does not take any other characteristic into account.

The classification code consists of two numbers separated by the letter "W", where the first number indicates the viscosity grade in cold conditions and the second number indicates the grade in high temperature conditions.

1.4.16 Speed

1.4.16.1 16x16 tractor speed (km/h)

Speeds with following tyre type/s: 8.25x16" - 250/80R18" - 280/70R18 - 320/65R18"

Radius index	0.410 m

Range	Gear	Forward Speed (km/h)	Reversing Speed (km/h)
Fast	1	8.98	8.93
	2	13.97	13.89
	3	21.56	21.44
	4	33.38	33.19
Medium/Fast	1	2.89	2.87
	2	4.49	4.46
	3	6.93	6.89
	4	10.72	10.66
Medium/Slow	1	2.34	2.33
	2	3.64	3.62
	3	5.61	5.58
	4	8.69	8.64
Slow	1	0.59	0.58
	2	0.91	0.91
	3	1.41	1.40
	4	2.18	2.16

Speeds with following tyre type/s: 400/55 R17.5"

Radius index	0.415 m

Range	Gear	Forward Speed (km/h)	Reversing Speed (km/h)
Fast	1	9.09	9.04
	2	14.14	14.06
	3	21.82	21.70
	4	33.79	33.60
Medium/Fast	1	2.92	2.90
	2	4.54	4.52
	3	7.01	6.97
	4	10.85	10.79
Medium/Slow	1	2.37	2.35
	2	3.68	3.66
	3	5.68	5.65
	4	8.80	8.75
Slow	1	0.59	0.59
	2	0.92	0.92
	3	1.42	1.41
	4	2.20	2.19

Speeds with following tyre type/s: 340/65R18" - 425/55R17"

Radius index	0.425 m

Range	Gear	Forward Speed (km/h)	Reversing Speed (km/h)
Fast	1	9.31	9.26
	2	14.48	14.40
	3	22.35	22.22
	4	34.60	34.40
Medium/Fast	1	2.99	2.97
	2	4.65	4.63
	3	7.18	7.14
	4	11.12	11.05
Medium/Slow	1	2.42	2.41
	2	3.77	3.75
	3	5.82	5.79
	4	9.01	8.96
Slow	1	0.61	0.60
	2	0.94	0.94
	3	1.46	1.45
	4	2.26	2.24

Speeds with following tyre type/s: 300/70R20"

Radius index	0.450 m

Range	Gear	Forward Speed (km/h)	Reversing Speed (km/h)
Fast	1	9.86	9.80
	2	15.34	15.25
	3	23.66	23.53
	4	36.64	36.43
Medium/Fast	1	3.17	3.15
	2	4.93	4.90
	3	7.60	7.56
	4	11.77	11.70
Medium/Slow	1	2.57	2.55
	2	3.99	3.97
	3	6.16	6.13
	4	9.54	9.48
Slow	1	0.64	0.64
	2	1.00	0.99
	3	1.54	1.53
	4	2.39	2.37

Speeds with following tyre type/s: 320/70R20"

Radius index	0.475 m

Range	Gear	Forward Speed (km/h)	Reversing Speed (km/h)
Fast	1	10.41	10.35
	2	16.19	16.10
	3	24.98	24.83
	4	38.67	38.45
Medium/Fast	1	3.34	3.32
	2	5.20	5.17
	3	8.02	7.98
	4	12.42	12.35
Medium/Slow	1	2.71	2.69
	2	4.21	4.19
	3	6.50	6.47
	4	10.07	10.01
Slow	1	0.68	0.67
	2	1.06	1.05
	3	1.63	1.62
	4	2.52	2.51

1.4.17 Conversion tables

1 mm	= 3.28 ft
1 cm	= 0.39 in
1 mm	= 0.039 in
1 km	= 0.62 ml
1 Km/h	= 0.62 mph
1 l	= 0.21 UK gal
1 l	= 0.26 US gal lqd
1 kg	= 2.20 lb
1 hp	= 735.49 W
1 hp	= 0.98 hp
1 kW	= 1.35 hp
1 bar	= 14.50 psi
1 bar	= 100 kPa
1 psi	= 6.89 kPa

1.5 Tightening torques and sealants

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1.5.1 Tightening torques for nuts

Type	Nm	kgm
M 8x8	30	3
M 10x10	50	5
M 10x10 self-locking	50	5
M 12x1.25x12 (fastening gearbox selector forks)	80	8
M 12x1.5x8	80	8
M 12x10	90	9
M 12x12	90	9
M 12x12 self-locking	80	8
M 12x14	90	9
M 12x18	90	9
M 12x14.6	90	9
M 12x1.25x8 (fastening hydraulic pump gear)	50	5
M 12x1.25x8	90	9
M 14x14	120	12
M 16x1.5x8 (fastening gearbox selector forks)	80	8
M 16x1.5x14	140	14
M 16x16	120	12
M 16x16	100	10
M 18x15	180	18
M 20x1.5x9	65	6.5
M 30x1.25x10	250	25

1.5.2 Tightening torques for ring nuts

Type	Nm	kgm
M 20x1.5	35	3.5
M 20x1x9	80	8
M 25x1.5 (PTO)	35	3.5
M 25x1.5 (steering cylinder)	130	13
M 30x1.5x10	240-250	24-25
M 30x1.5x10	160	16
M 30x1.5	150	15
M 35x1.5x10	200	20
M 40x1.5	150	15
M 50x1.5	250	25

1.5.3 Tightening torques for hex head screws

Type	Nm	kgm
M 6	13	1.3
M 8	30	3
M 10	60	6
M 10 x 1.25	70	7
M 12	90	9
M 14	120	12
M 14 (front track chain leaf spring carrier)	180	18
M 18 x 1.5	250	25
M 16	130	13
M 16 x 1.5	130	13

1.5.4 Tightening torques for stud bolts

Type	Nm	kgm
M 10	30	3
M 12	40	4
M 14	50	5
M 16	60	6
M 18	70	7
M 20	80	8

1.5.5 Tightening torques for tapered plugs

Type	Nm	kgm
1/2"	30	3

1.5.6 Loctite sealant types

	Description	Type	Usage
Thread lock	Weak thread lock	Loctite 222	Weak thread lock and sealing action for screws and adjuster screws
	Medium strength thread lock	Loctite 243 (replaces 242)	Medium strength thread lock and sealing action for threaded parts in general.
	High strength thread lock	Loctite 271 (replaces 270)	High strength thread lock and sealing action for stud bolts, nuts and screws.
	Penetrating thread lock adhesive	Loctite 290	Thread locking and sealant action achieved by wicking between previously assembled parts. Micro-porosity sealant.
Assembling parts	Locking adhesive	Loctite 603 (replaces 601)	High bonding strength retaining compound.
	Retaining compound	Loctite 641	Medium strength retaining compound for bushes, bearings etc. . Permits disassembly with normal tools.
	High strength retaining compound	Loctite 638	Rapid, heat resistant, high strength retaining compound for cylindrical parts. For dynamic applications.
	High temperature retaining compound	Loctite 648	Rapid, heat resistant, high strength retaining compound for cylindrical parts.
Thread sealant	Hydraulic and pneumatic	Loctite 542	For sealing threaded connectors of hydraulic or pneumatic lines up to 3/4" in diameter.
	Slow curing	Loctite 572	For sealing threaded connectors in general.
Liquid gaskets	Dense gasketing compound for surfaces	Loctite 510	Sealing surfaces. Applied manually.
	Gasketing compound for surfaces	Loctite 573	Sealing precise surfaces. Applied manually or with screen printing system.
Cleaning	Cleaner/degreaser	Loctite 7063	Prepares components for application of an adhesive sealant.
	Gasket remover	Loctite 7200	Removes all residue of sealants and gaskets.

1.6 General assembly instructions

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1.6.1 Oil seals

1.6.1.1 General instructions and guidelines

Normally, one gasket is sufficient to ensure seal tightness. The seal lip must face towards the fluid retained or the pressurised side.

Do not allow mechanical parts to come into contact with the seal lip as this would compromise seal tightness and significantly reduce the lifespan of the gasket.

Lubricate the seal ring thoroughly before installing to prevent the seal from operating dry during the first revolutions of the shaft.

Grooved seal rings must be lubricated with oil and not grease, as grease would fill the grooves and render them ineffective.

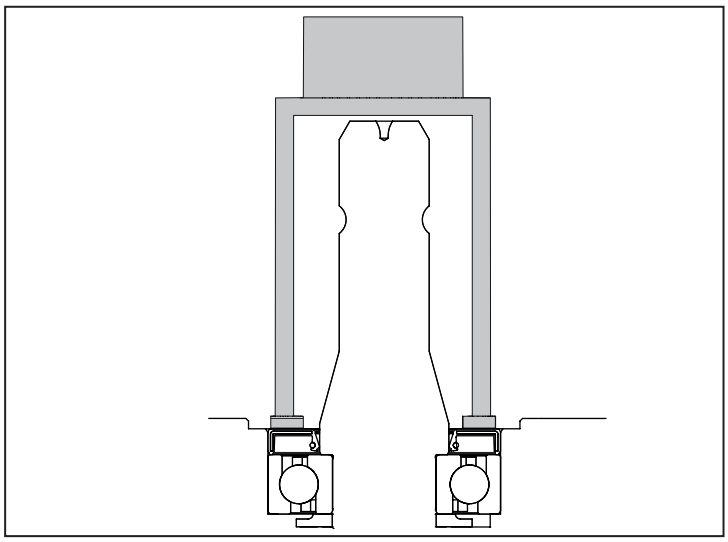

Fig. 1.12

1.6.1.2 Assembly

1 - When fitting gaskets on the shaft, check that there is a bevelled guide edge on the shaft.

2 - Protect the seal lip against damage caused by threads, recesses, sharp edges, keying slots etc; cover these parts of the shaft appropriately when fitting the gasket.

3 - Preferably use a hydraulic or mechanical press to install the gasket in its seat.

4 - The installing force must be applied as closely as possible to the outer diameter of the gasket, ensuring that the gasket itself remains perfectly perpendicular to the hole during installation.

5 - Do not use adhesive to fix the gasket in its seat. Even if all possible precautions are taken, there is a risk of adhesive fouling the seal lip, causing damage to the gasket and fluid leakage even from the first revolutions of the shaft.

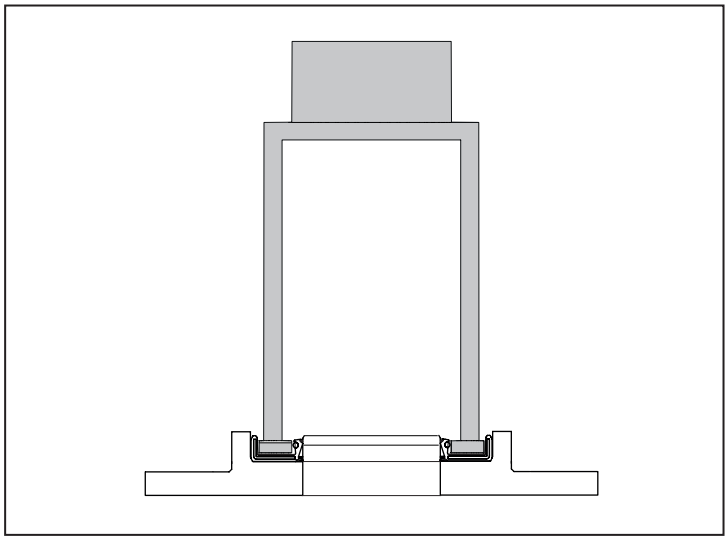

Fig. 1.13

1.6.1.3 Replacement

When servicing an assembly, replace all seal rings on rotating shafts and all gaskets in general.

Make sure that the seal lip of the new ring does not run against the same surface on the shaft as the previous ring.

1.6.2 O-Rings

1.6.2.1 Assembly

1 - Do not force O-rings over sharp edges, threads or splines. In cases where, due to construction constraints, this cannot be avoided, use a conical installation bush or an equivalent solution.

2 - Before fitting an O-ring, check that it is the correct type specified for the application. Clean the seat of the O-ring very carefully. Any remaining contaminants could damage both the O-ring and the sliding surfaces.

3 - To facilitate installation and ensure effective lubrication immediately after fitting, immerse the O-ring in the same type of oil with which it will be in contact, or apply a light film of grease compatible with the material from which the O-ring itself is made.

4 - Take care not to twist the O-ring when installing in its seat.

5 - Take care not to damage the O-ring when assembling components.

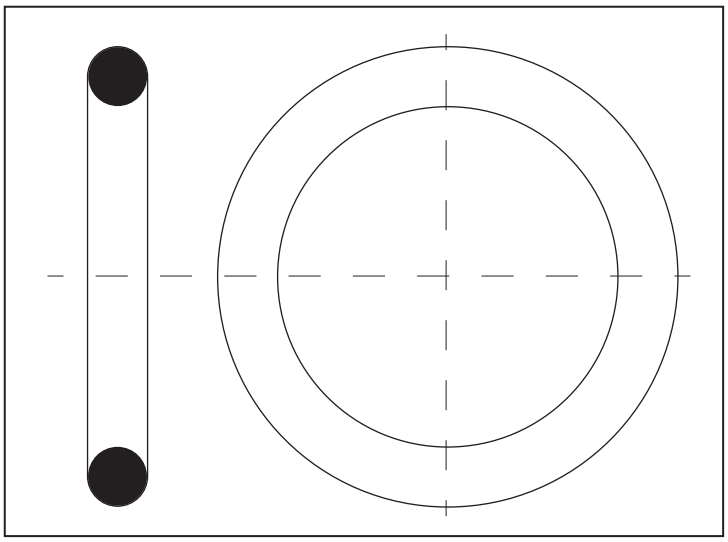

Fig. 1.14

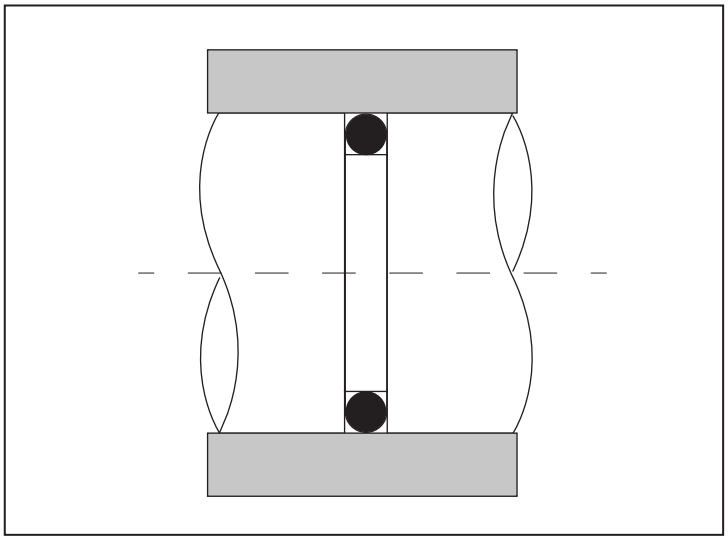

Fig. 1.15

1.6.3 Bearings

1.6.3.1 Introduction

Expertise and maintaining cleanliness are the two most important factors when installing bearings to ensure that the bearings function correctly and to prevent premature bearing failure. Bearings should be installed in a dust-free, dry place away from machining tools or machines which produce dust.

1.6.3.2 Preparing for assembly

1 - Before installing a bearing, ensure that all the parts, tools and equipment needed are at hand, and that all parts are arranged in the same order in which they will be installed, as indicated in the instructions or drawings.

2 - All parts involved in the installation of a bearing (seats, shafts etc.) must be thoroughly cleaned to remove all machining residue. The unfinished inner surfaces of cast iron housings must be free of any casting sand residue. Before installation, check the dimensions and forms of all bearing-related components. Bearings will only work correctly if the specified tolerances are observed.

3 - To prevent contamination with foreign objects, only remove bearings from the original packaging immediately before fitting.

4 - Usually, the anti-corrosion coating applied to the cylindrical outer surface and the inner hole of new bearings before they leave the factory must be removed before installing

If it is necessary to lubricate a bearing with a special grease for very high or very low temperatures, wash and dry the bearing before application to prevent any loss in the temperature resistant properties of the grease used.

5 - Any bearings contaminated by improper handling (damaged packaging etc.) must also be washed and dried before installing. Bearings which are coated in a thick and greasy layer of corrosion inhibitor product when removed from their original packaging must be washed and dried before installation, as this coating has been applied with a hot-dip bath (a method still used for large bearings in particular).

Bearings shipped ready-lubricated and with sealed or protective shielding on both sides must NOT be washed before installation.

1.6.3.3 Assembly

1 - Never hit the shell, race or rotating elements of a bearing directly during installation, as this will damage the bearing itself. Never apply pressure to one bearing shell to facilitate installation of another bearing shell. Lubricate the surfaces of the bearing seats lightly with oil before installing bearings.

Never hit the shell, race or rotating elements of a bearing directly during installation, as this will damage the bearing itself. Never apply pressure to one bearing shell to facilitate installation of another bearing shell. Lubricate the surfaces of the bearing seats lightly with oil before installing bearings.

2 - As a guideline, install the bearing shell with the greatest interference first. Smaller bearings with only a small degree of assembly interference may be seated by tapping gently into place using a mallet and a soft punch or, preferably, a piece of pipe placed with its end against the circumference of the bearing shell. Tap uniformly around the entire circumference of the bearing shell to ensure that it remains perfectly perpendicular relative to its seat. The cup tool illustrated in Fig. 1.16 ensures that force is applied perfectly perpendicularly and distributed evenly around the entire circumference of the bearing shell. Mechanical or hydraulic presses are generally used to install bearings on the production line.

3 - When installing a non-disassemblable bearing on the shaft and in its respective seat simultaneously, place a disc (Fig.) between the bearing and the tubular tool to distribute the installation force even more evenly over the circumferences of the two bearing shells. This method is recommended in particular for swivelling bearings to prevent misalignment of the outer shell relative to the seat. As a alternative, a cup tool with two contact surfaces (one for the inner shell and one for the outer shell) may be used (Fig.): these two surfaces must be coplanar.

4 - The inner and outer shells of disassemblable bearings may be installed separately. this significantly facilitates assembly, especially in cases where both shells must be forced into their seats. When mating two parts of a bearing that have already been installed in their seats, ensure that the two rings of rotating bearing elements remain perpendicularly aligned, as the bearing races may be damaged if they are misaligned.

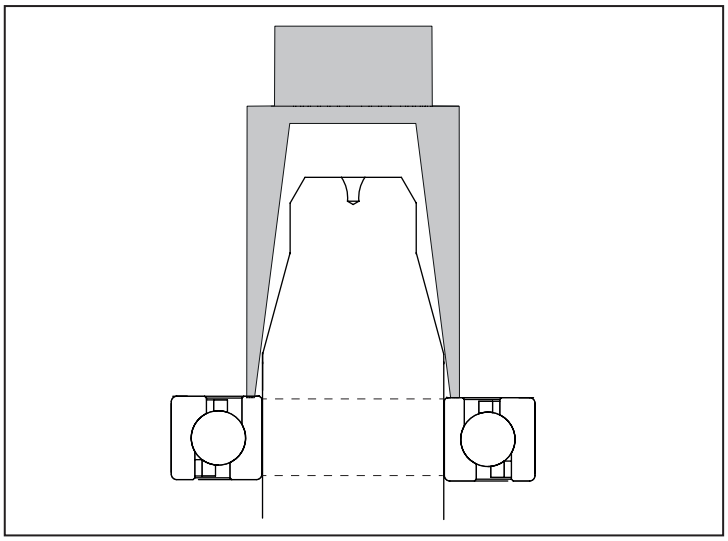

Fig. 1.16

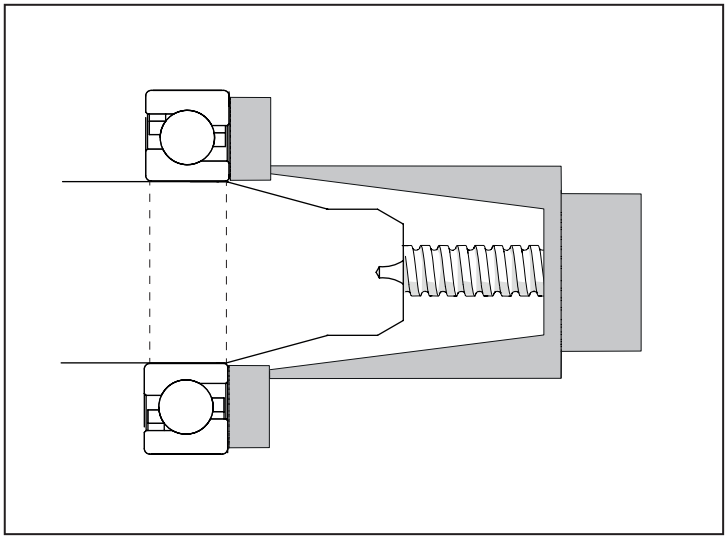

Fig. 1.17

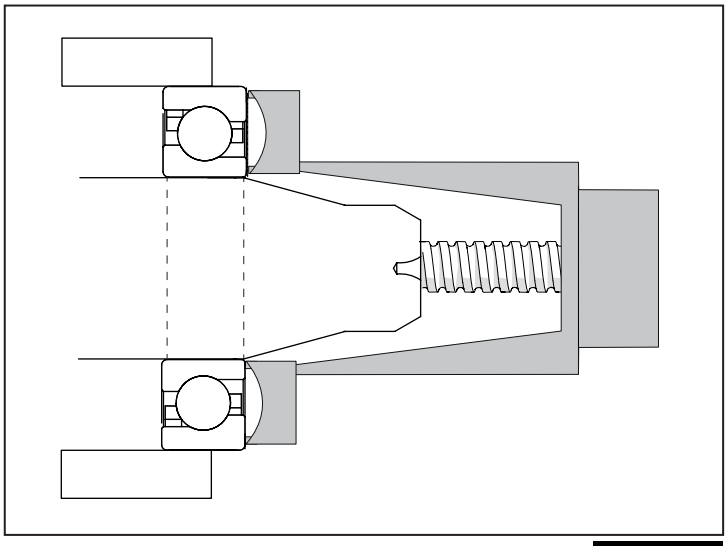

Fig. 1.18

- It may not be possible to install larger bearings onto the shaft or in their seats without heating, as the force necessary to install a bearing increases with its size. In this case, bearings, bearing shells and bearing mounts (hubs etc.) must be heated before installing.
- The temperature difference necessary between the bearing shell and the receiving component depends on the degree of interference required and the diameter of the bearing seat.
- Heat bearings in an oil bath or muffle furnace. if using electrical heating plates, turn the bearings over several times to ensure that they are heated uniformly.

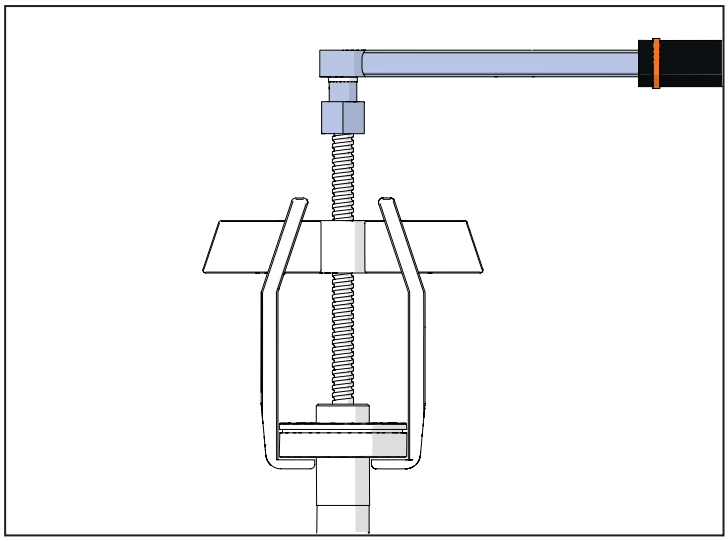

Fig. 1.19

Warning

Do not heat bearings to above 125°C, as this may alter the structure of the material, causing variations in dimension and a loss of hardness.

Avoid localised heating of a bearing.

Warning

Bearings with protective shielding and sealed bearings must not be heated before installation as this may compromise the properties of the lubricant.

1.6.3.4 Disassembly

- If a bearing is to be used, do not apply force via the revolving bearing elements to remove. In the case of non-disassemblable bearings, detach the bearing shell with the least assembly interference first. Depending on the type and size of the bearing itself, the tools and equipment described as follows must be used to extract bearing shells with a high degree of assembly interference.
- Smaller bearings may be removed from their seats with:
  - A mallet and a punch in soft metal;
    Tap gently around the entire circumference of the bearing shell.
  - A mechanical puller tool;
    Apply the puller tool directly onto the bearing shell to be removed, or to an adjacent component.

  Removal will be significantly facilitated if the shoulders of the shaft and bearing seat include notches for the grippers of a puller tool or threaded holes for extractor screws.
- To remove the inner shells of cylindrical roller bearings with no lip or with only one small lip, special tools have been developed which heat the bearing shells rapidly before the shaft has sufficient time to heat significantly and expand.

2 : Engine

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2.1 Safety rules

Attention
Never fill the engine with lubricant oil beyond the marking on the dipstick as this may damage the engine.
To prevent damage to the engine, if the lubrication system has been drained, lubricate the rocker pins and the camshaft before starting the engine.
Only use these engines for their specifically intended applications. Do not modify the technical characteristics of the engine.
Clean any spilt fuel. Materials contaminated with fuel must be moved away to a safe place.
Unless absolutely necessary, do not pour fuel into the tank while the engine is running.
Do not clean, add oil to or adjust the engine while it is running unless you are specifically trained to do so. even if you are specifically trained, use the utmost caution to prevent accidents.
Do not attempt to make adjustments that you do not understand.
Do not run the engine in a place in which harmful emissions may accumulate.
Keep all persons not involved in the task at a safe distance while the engine or any ancillary equipment are running.
Do not run the engine with any of the protective guards removed.
Disconnect the battery terminals before performing any repair work on the electrical system.
The engine must only be operated from the control panel or driver area.
Check that the gear lever is in neutral before starting the engine.
Dispose of used oil correctly to prevent the risk of contaminating the enviroN·ment.
Work with the utmost caution when performing emergency repairs in difficult conditions.
Never clean the engine while it is running. Using cold cleaning products on a hot engine may damage a number of components.
Use only original spare parts.

Danger
Do not smoke when refuelling.
The combustible materials used for certain components of the engine (such as seals, for example) may produce extremely dangerous substances when burnt. Avoid all contact between burnt materials and the skin or eyes.
Never remove the coolant system filler cap while the engine is hot and the coolant is under pressure, as this may cause boiling liquid to escape violently from the filler.
Seek immediate medical assistance in the event of skin contact with pressurised fuel. Diesel and lubricant oil (especially if used) may be harmful to the skin. Protect the hands with gloves or with specific protective cream. Do not wear garments contaminated with lubricant oil. Do not put materials contaminated with lubricant oil in your pockets.
Avoid contact between compressed air and the skin. Seek immediate medical assistance in the event of compressed air breaking or penetrating the skin.
Keep away from moving parts while the engine is running. Danger! Some moving parts are not clearly visible when the engine is running.
Keep loose clothing and long hair well away from moving parts.
Turbochargers operate at high speed and high temperature. Keep fingers, tools and other objects away from the inlet and outlet ports of the turbocharger and avoid contact with hot surfaces.
Avoid sparks and naked flame in the vicinity of batteries (especially when charging), as the gas released by electrolyte is extremely flammable. Battery fluid is dangerous for the skin and extremely dangerous for the eyes.
The gas contained in the air conditioning system is harmful to the health. Open the doors and ventilate the area adequately once the procedure is complete.

Lifting the engine safely

Danger
Ensure that there are no persons in the vicinity of the load being handled.
The engine is very heavy. Work with due caution and observe all safety rules.

Attention
Always use an approved engine hoist of adequate load capacity to lift the engine.
Preferably use the hoisting equipment recommended by the manufacturer.
Check that the hoisting brackets used are undamaged and are securely fastened before lifting the engine.
Check that there is sufficient clear space between the lift hooks and the rocker cover to prevent damage to the rocker cover.
Use appropriate lifting equipment or work with the assistance of another mechanic to lift heavy engine components such as the cylinder block, cylinder head, flywheel housing, crankshaft and flywheel.

2.1.1 Replacing parts

To avoid the risk of voiding the engine warranty and of damaging the engine itself, only use original spare parts specified by the manufacturer.

Attention
When working on the electrical and injection systems, it is extremely important that are components are installed correctly and securely fastened. Any poorly fastened components of these systems may cause electrical sparking and fuel leakage from the injection system, which may result in fire due to the ignition of fuel vapour.

2.1.2 Cleaning and caring for the engine

The engine produced by VM Motori consists of parts with machined, honed, polished and lapped surfaces with tolerances measurable in hundredths of a mm. Working with the utmost care and maintaining absolute cleanliness are vital when servicing any component.

Maintaining adequate cleanliness and protecting machined surfaces and areas subject to fretting must be standard procedure whenever performing any repair work. These measures must be taken always, even if not specifically stated.

Whenever components are removed, keep them in the correct order and number them for identification. When refitting, components must be installed in their original positions with the same mating surfaces in contact as before.

The apertures of the exhaust and induction system are subject to the risk of ingress of foreign objects and contamination throughout the entire repair procedure. These apertures must be covered and protected adequately to prevent contamination or foreign objects from causing damage to the engine when it is started. All clamps removed during regular maintenance must be replaced with components of the same length and stiffness.

The tensile strength of bolts and nuts with metric threads is indicated by numbers on the head of the screw or on the surface of the nut. The tensile strength of bolts with American threads is indicated by radial lines, whereas the majority of nuts with American threads bear no reference markings. Using the wrong fastener clamps may cause engine malfunction or damage. Any clamps removed must be refitted correctly in the original position, if reused. If a fastener clamp is not in good enough condition for reuse, it must be replaced with a clamp with the same characteristics.

Never work on or underneath a suspended engine. During repair work, the engine must be secured to the original carrier or to a suitable trolley or, if necessary, lowered to the ground.

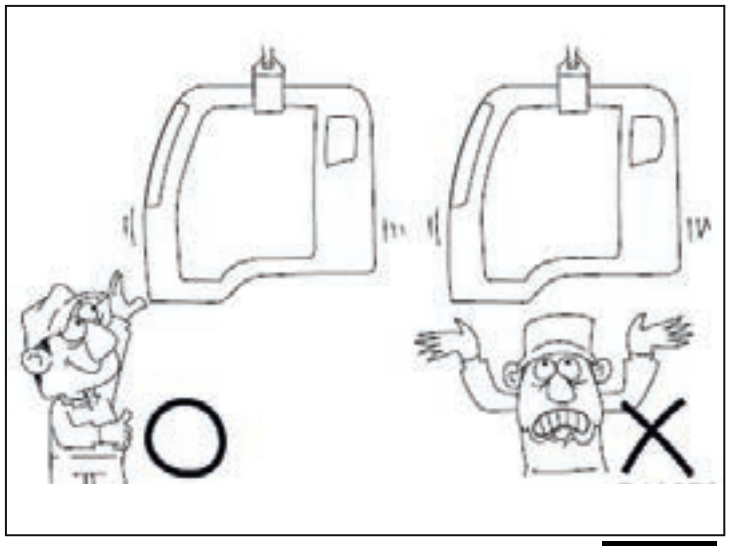

Fig. 2.1

2.1.3 Precautions for electrical circuits

2.1.3.1 Electronic engine control unit

OBSERVE THE FOLLOWING PRECAUTIONS TO PREVENT DAMAGE TO THE ELECTRONIC ENGINE CONTROL UNIT:

Attention

NEVER DISCONNECT THE ELECTRICAL POWER SUPPLY TO THE ENGINE WHILE THE ENGINE IS RUNNING

Attention

AFTER SWITCHING OFF THE ENGINE, WAIT AT LEAST 30 SECONDS BEFORE DISCONNECTING ELECTRICAL POWER WITH AN ELECTRICAL DEVICE (SWITCH, DISCONNECTOR ETC.) TO ALLOW THE ELECTRONIC CONTROL UNIT TO COMPLETE THE "AFTER-RUN" PROCEDURE

Attention

DO NOT USE BOOSTERS OR QUICK STARTERS TO START THE ENGINE

When working on the engine, always bear in mind that the currents and voltages involved in the electrical system may cause violent, damaging short circuits and dangerous electric shocks. Note that there is a risk of accidentally grounding electric terminals when performing any procedure on the engine. As a general precaution, always disconnect the battery cables before starting any work.

Disconnect the negative cable (–) from the battery before starting any work on the electrical system to prevent the risk of short circuit.

Caution

Make sure that the ignition switch and lights switches are turned to OFF before disconnecting or connecting the battery cable.

Failure to do so may cause damage to components containing semiconductors.

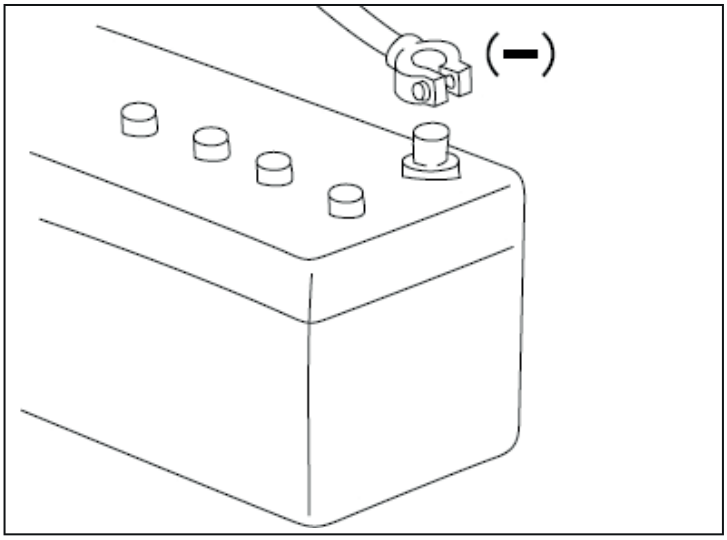

Fig. 2.2

Grip the connectors and the cables securely when separating connectors. To separate connectors with lock tabs, press the tabs and then pull in the direction indicated by the arrows. To reconnect, push the connectors together until they audibly click.

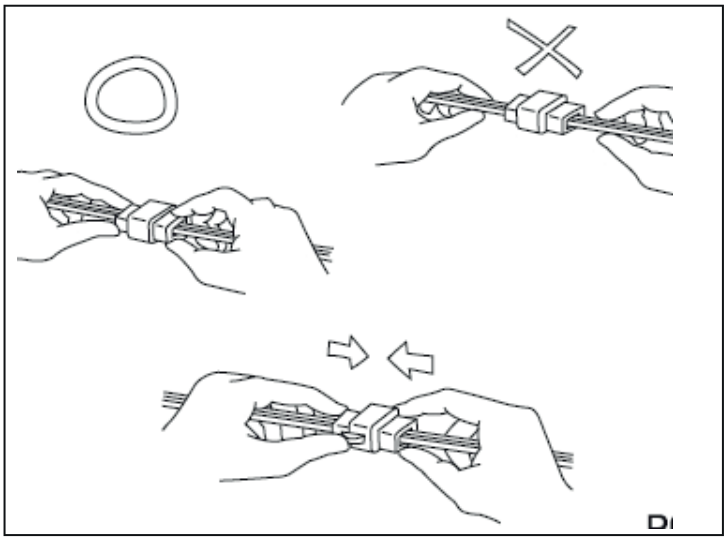

Fig. 2.3

Cover electrical parts to keep them dry before washing the engine (use plastic sheeting or other similar materials). Keep water away from the wiring harness, connectors and sensors and dry or wipe off any remaining water immediately.

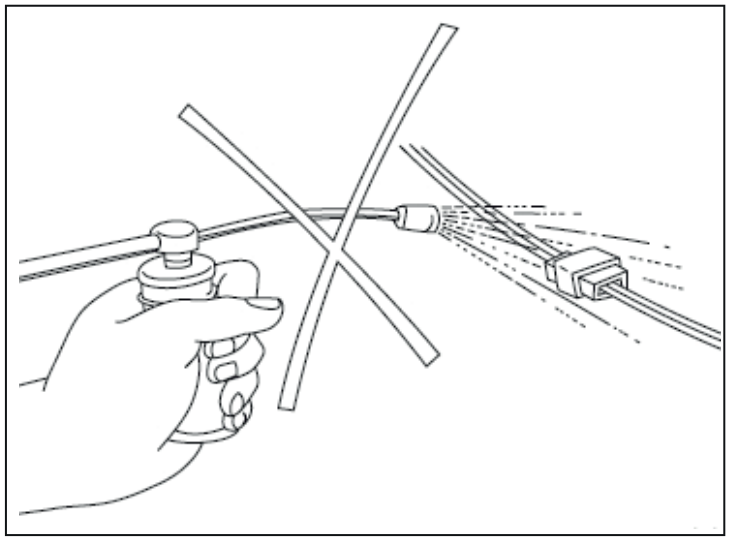

Fig. 2.4

When applying voltage to a circuit to test it, check that the (+) and (–) cables are connected properly and increase the voltage gradually from zero. NEVER exceed the specified voltage.

Bear in mind that ECUs and sensors may not necessarily operate at battery voltage only.

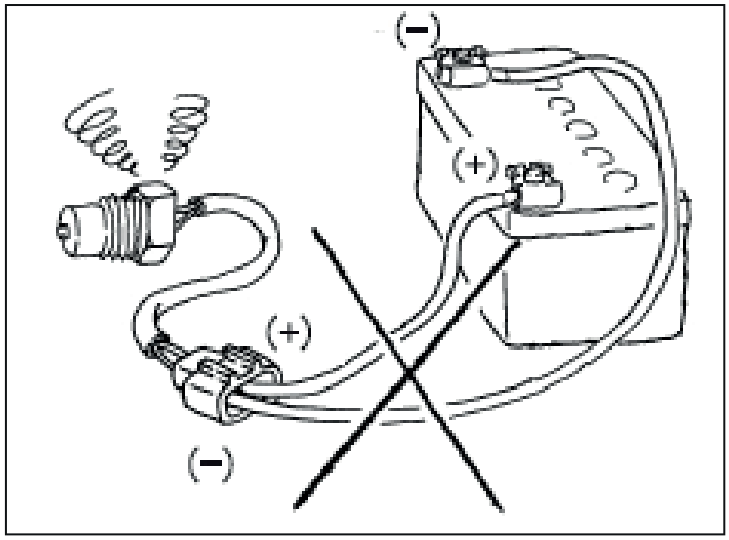

Fig. 2.5

Caution

Do not perforate the insulation with probe tips or clips when performing electrical tests.

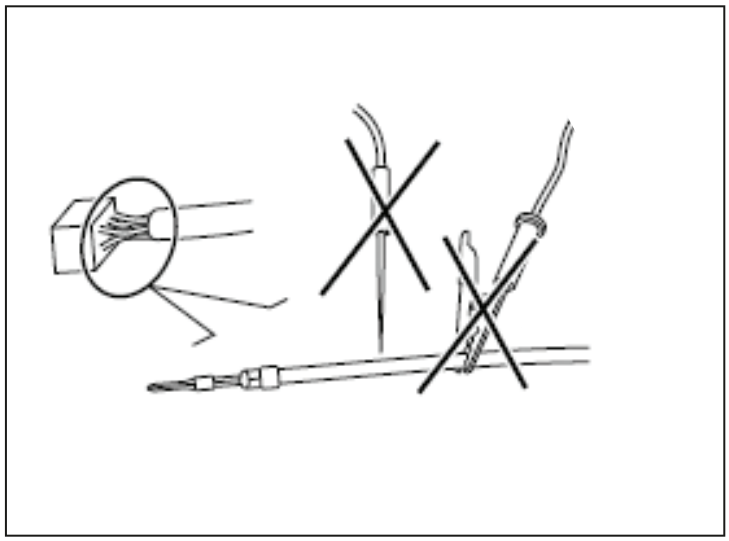

Fig. 2.6

2.1.3.2 Inspecting wiring harness

2.1.3.2.1 Inspecting with connected connectors

Waterproof connectors

Connect a test wiring harness and a connector A between the connectors of the circuit being tested. Test by applying a test probe C to the connectors of the test wiring harness. Do not push the probe C into the sides where the wires enter the connector as this will damage the waterproofing of the connector itself.

Caution

Connect the test wiring harness BETWEEN the connectors (1).

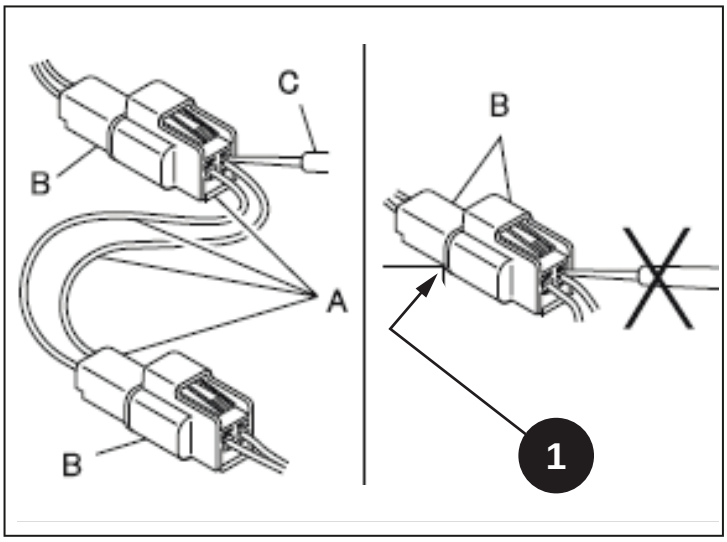

Fig. 2.7

Non-waterproof connectors

Test by inserting a probe C into the interior of the connector. A narrower probe must be used to test the engine control unit connectors, which are narrower than other connector types. Do not try to force a larger probe into the aperture of an engine control unit connector, as this will cause damage to the system.

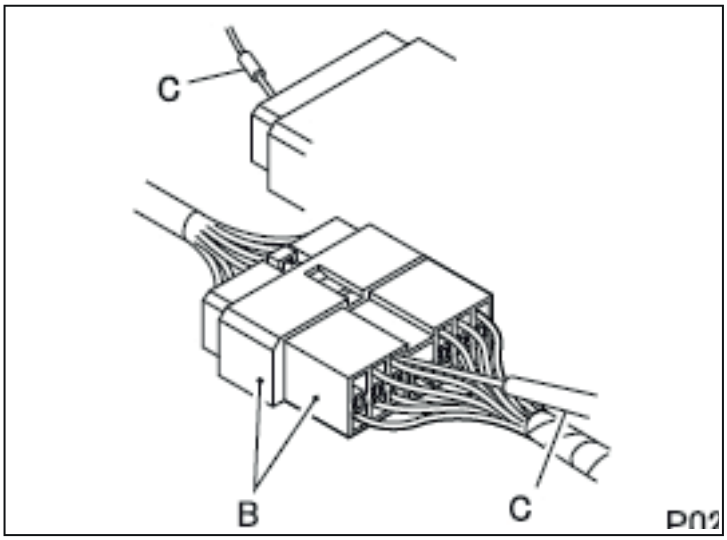

Fig. 2.8

2.1.3.2.2 Testing disconnected connectors

Testing female terminal

Test by inserting a test probe carefully into the terminals. Do not force the prove into the terminals as this will bend the terminals and result in poor connection.

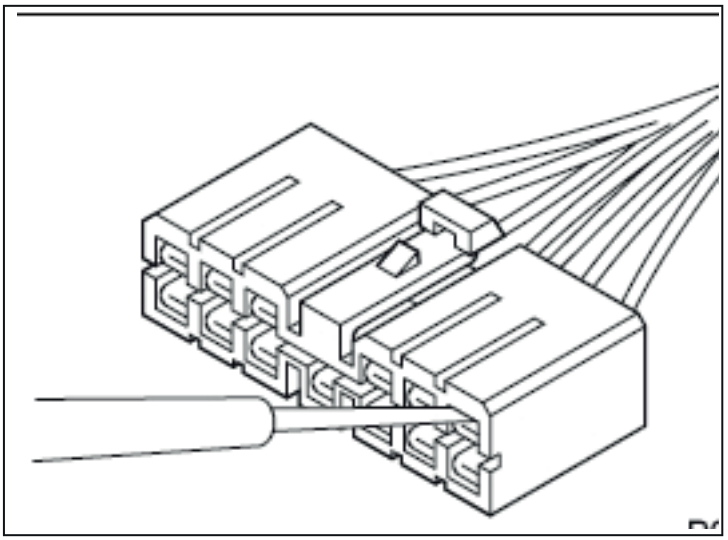

Fig. 2.9

Testing male terminal

Test by touching a test probe directly onto the pins.

> **Caution**
>
> Take care not to short circuit pins with the test probe. Short circuiting the pins of an electronic control unit connector may cause internal damage to the electronic control unit.

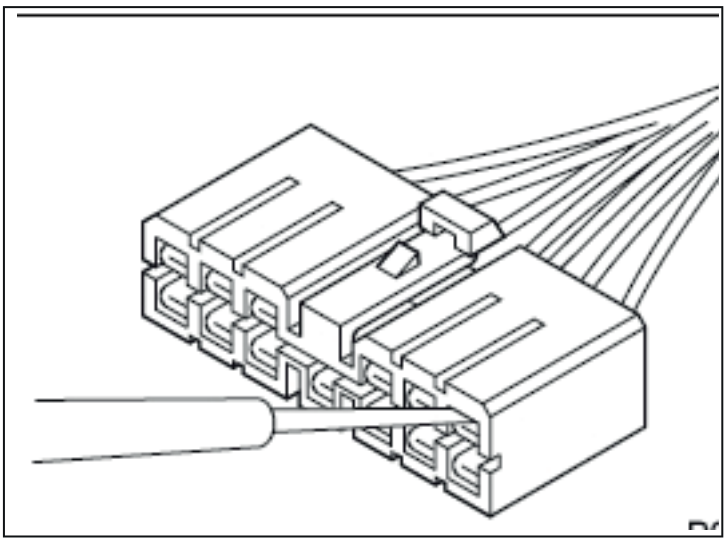

Fig. 2.10

When using a multimeter to test for electrical continuity, take care that the probe does not accidentally touch any terminals other than those tested.

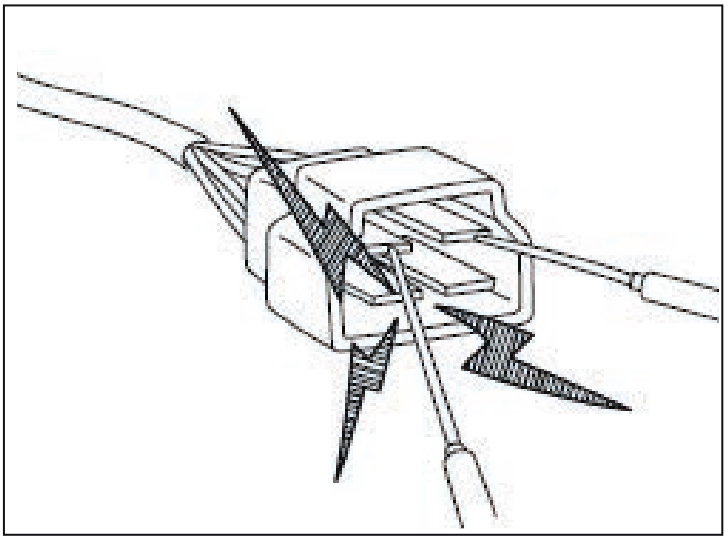

Fig. 2.11

2.1.3.3 Inspecting connectors

Visual inspection

Check that the connectors are securely connected together.

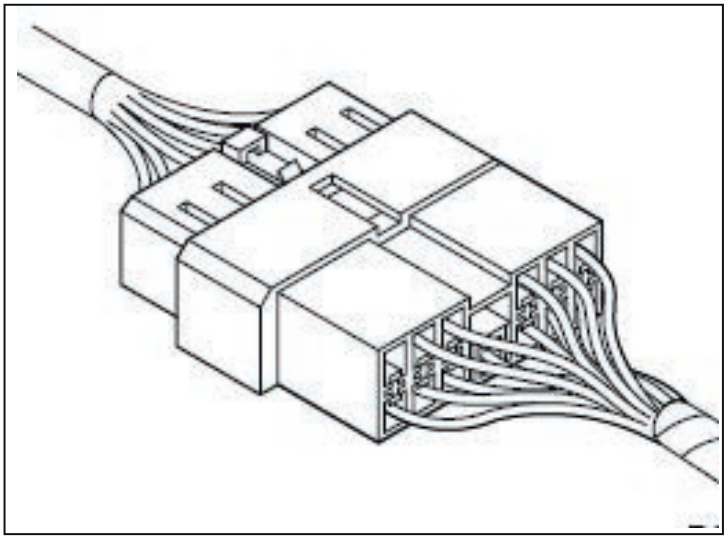

Fig. 2.12

Check if any wires are detached from their respective terminals. Wires may be detached if the connector is disconnected by pulling the respective cable

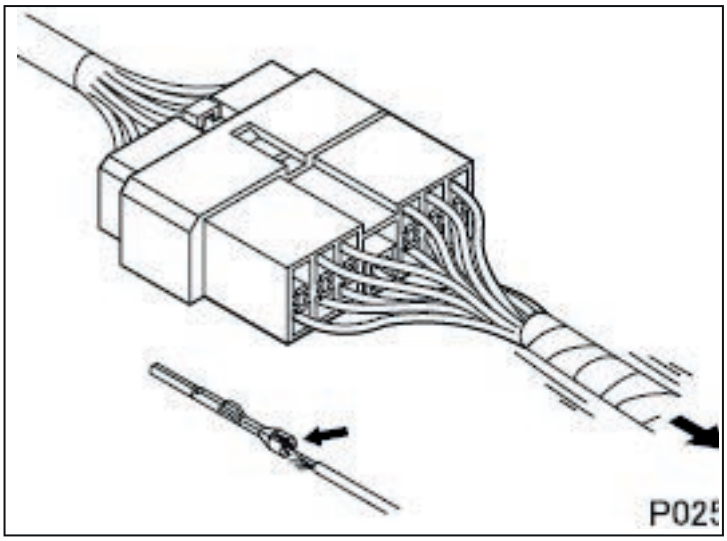

Fig. 2.13

Check that male and female terminals are securely connected

Check for poor connections caused by loosened terminals, corrosion on terminals or contamination of the terminals by foreign matter

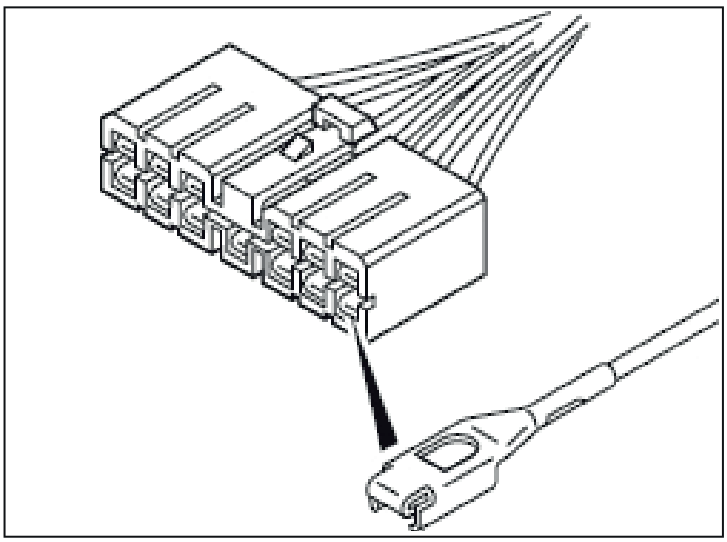

Fig. 2.14

Checking for loose terminals (spurious contact)

If the lugs of pins are damaged, the male and female terminals may not form a correct connection when the connector housings are coupled together. Pull each wire with care and check if any of the terminals come out of the connector.

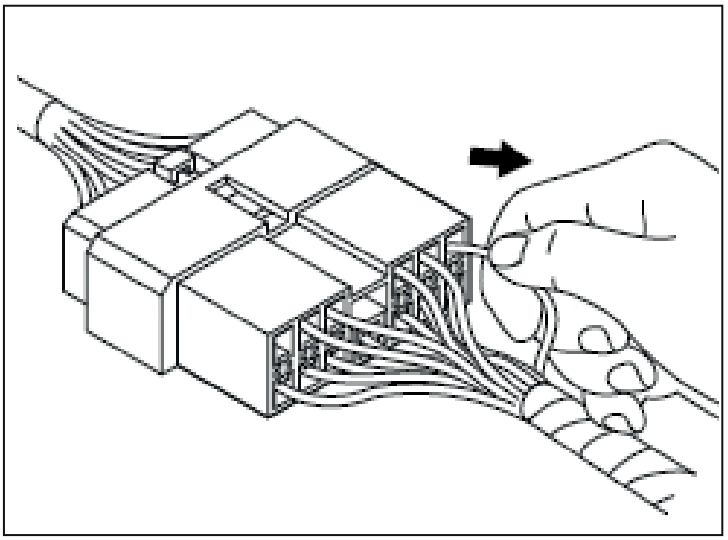

Fig. 2.15

2.1.4 Precautions for arc welding

Checking for loose terminals (spurious contact)

If the lugs of pins are damaged, the male and female terminals may not form a correct connection when the connector housings are coupled together. Pull each wire with care and check if any of the terminals come out of the connector.

PREFERABLY REMOVE THE ENGINE CONTROL UNIT FROM THE VEHICLE

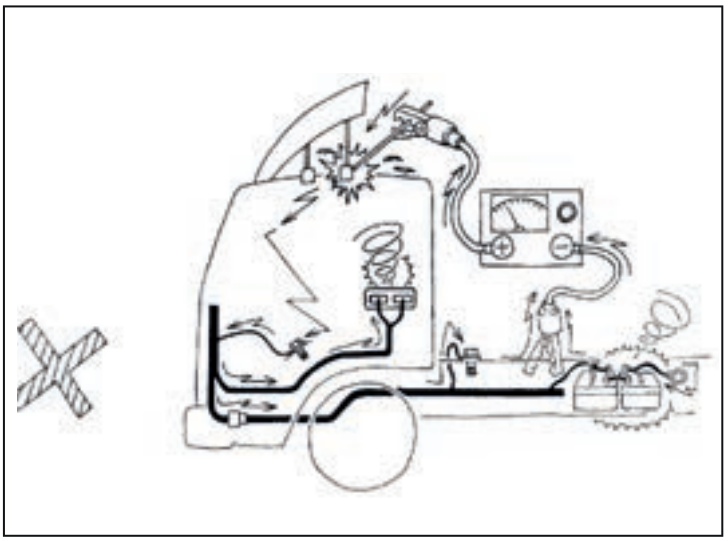

Fig. 2.16

Any electrical device in the vicinity of the point where the negative cable (–) of the welder is connected may be damaged.

Current flows back from the electrode to the negative connection as shown in this figure

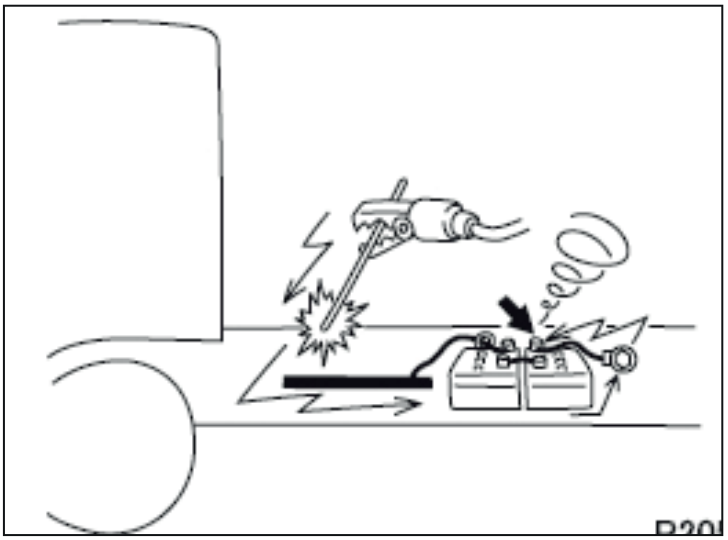

Fig. 2.17

From the negative cable of the battery (–)

To prevent damage to the battery and to any electrical devices connected to the battery, always disconnect the negative cable of the battery (–).

Procedure

1 - Disconnect the negative cable of the battery (–).

2 - Disconnect the negative cable of the battery (–).

3 - Cover all parts of the vehicle which may be damaged by the electric arc.

4 - Connect the negative cable of the welder (–) to the vehicle as closely a possible to the zone being welded. Do not connect the negative cable of the welder (–) to the cab when welding the chassis, and do not connect to the chassis when welding the cab.

5 - Set the current of the welder appropriately for the parts being welded.

2.2 General information

2.2.1 Engine serial number and identification plate

2.2.1.1 Engine serial number

1 - VM engine serial number punched on crankcase
P) - Engine serial number punched on crankcase
q) - Engine code
r) - Production serial number

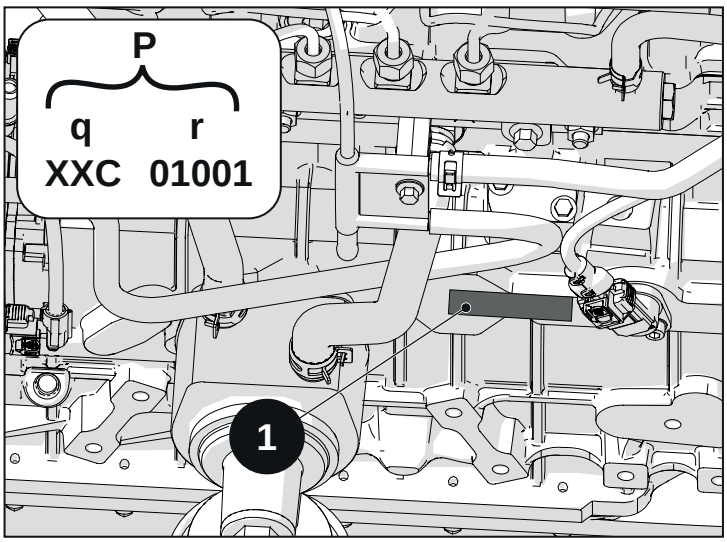

Fig. 2.18

This table may be used to identify the engine model from the engine code.

56C	R754EU4
79C	R756EU4
79C	R756IE3
05D	R754EU5
06D	R756EU5
20D	R754IE3
34D	R754IE4
39D	R754ISE4
45D	R754TE4
50D	R753IE4
60D	R754EU6
61D	R756EU6

2.2.1.2 Identification plate

A) - Manufacturer identification
B) - Engine serial number
C) - Dry weight
D) - Engine Type
E) - Family
F) - Model
G) - Version
H) - Max. power [kW]
L) - Max. rpm
M) - Homologation
N) - Characteristics of engine lubricant oil

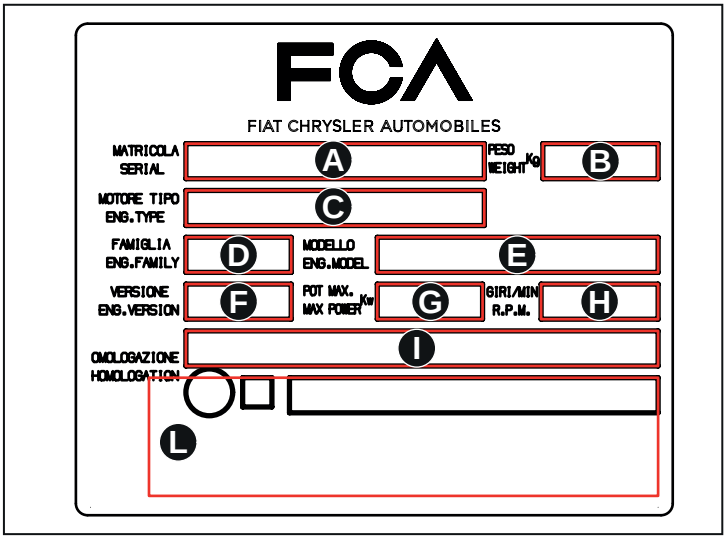

Fig. 2.19

Flywheel side

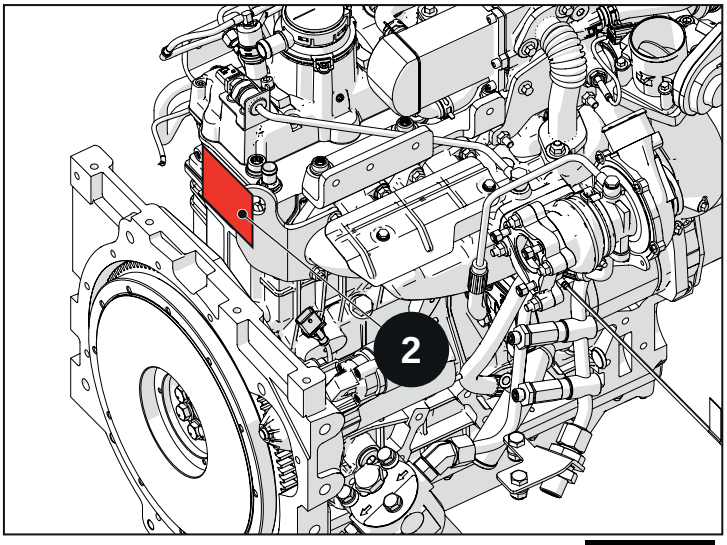

Fig. 2.20

Timing side

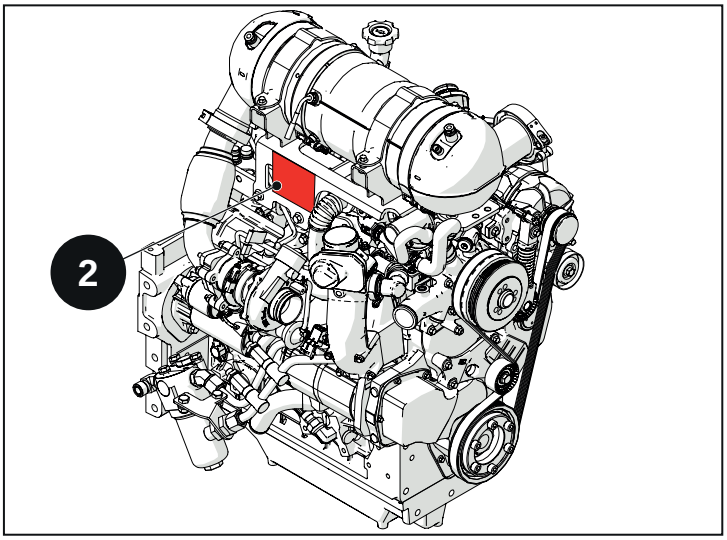

Fig. 2.21

2.3 Maintenance

2.3.1 Engine specifications

General specifications

Engine Type		Inline, 4-cylinders
Cylinder	Bore	94 mm
	Stroke	107 mm
Firing order		1 - 3 - 4 - 2
Displacement		2,970 litres
Compression ratio		17,5 ± 0.5 : 1
Injection system type		Common Rail direct injection
Cooling system type		Forced circulation water-cooled
Induction system type		Turbocharged with intercooler
Max. power - (HP)		(108.8) @ 2600 rpm
Max. torque		420 N·m @ 1100 rpm
Crankshaft direction of rotation (viewed from flywheel side)		anticlockwise
Idle speed		800 ± 50
Dry weight		260 kg
Maximum continuous longitudinal inclination angle (with flywheel on uphill side)		30°/57%
Maximum continuous longitudinal inclination angle (with flywheel on downhill side)		35°/70%
Maximum continuous transverse inclination angle		30°/57%
Valve clearance - intake and exhaust		Hydraulic
Max. difference in compression pressure between cylinders		500 kPa (72 PSI)

Fuel

Fuel	Specifications	The engine is designed to run with standard fuels available throughout Europe (compliant with DIN EN 590/2004 specifications). BIODIESEL (compliant with the specifications of UNI EN 14214) may be used in proportions up to 7% mixed in a standard fuel type available in Europe (as defined by the standard DIN EN 590). Use low-sulphur content fuel (not exceeding 10-50 ppm) for R750 models

Injection system

Low pressure line	Pump type	Gear
	Flow rate	
	Pressure	5 bar
	Fuel filter	Filtration efficiency compliant with Bosch specification KM 45 110 004_ en / Water separation compliant with ISO 16332
High pressure line	Pump type	piston
	Pump flow rate/speed	
	Common Rail pressure	
	Injection pressure	max 1800 bar
	Injector type	with solenoid

Engine oil

Specifications	SAE 10W40
	ACEA E6 - API CJ4
Oil sump capacity STANDARD SUMP	9.8 L (8.7 Kg)
Oil change (with filter) LARGE CAPACITY SUMP	model R754IE4.05A - 13L (11.5Kg)
Oil sump capacity ENGINE VERSION WITH COUNTER-ROTATING WEIGHTS	/
Oil pump type	Rotor
Oil thermostat	
Maximum consumption	0.2 g/KWh
Max temperature (alarm)	135°
Oil pressure (with engine warmed to 80°C)	2 bar (engine idle speed)
	4 bar (max engine speed, 2600 rpm)

Coolant

Operating temperature	80-85°C
Thermostat	starts opening at 80 ± 2 °C / fully open at 90°C
Capacity	5 litres (without radiator and pipes)
Cooling circuit pressure	1.0 - 1.1 bar
Specifications	ASTM D 3306 type 1

Induction system

Induction system	max 30 mbar - with new air filter
Air consumption m3/h	

Exhaust system

Max. backpressure	250 mbar with new, cleaned or regenerated DPF (diesel particulate filter)
Exhaust temperature after turbo	616°C @ 2600 rpm

Electrical system

Battery	12 V (CCA) 950 A EN Capacity 140 Ah
Alternator	14V - 2.3 kW - 110 A
Starter motor	12V, 2.5 kW

2.4 External views of engine

2.4.1 View from exhaust side

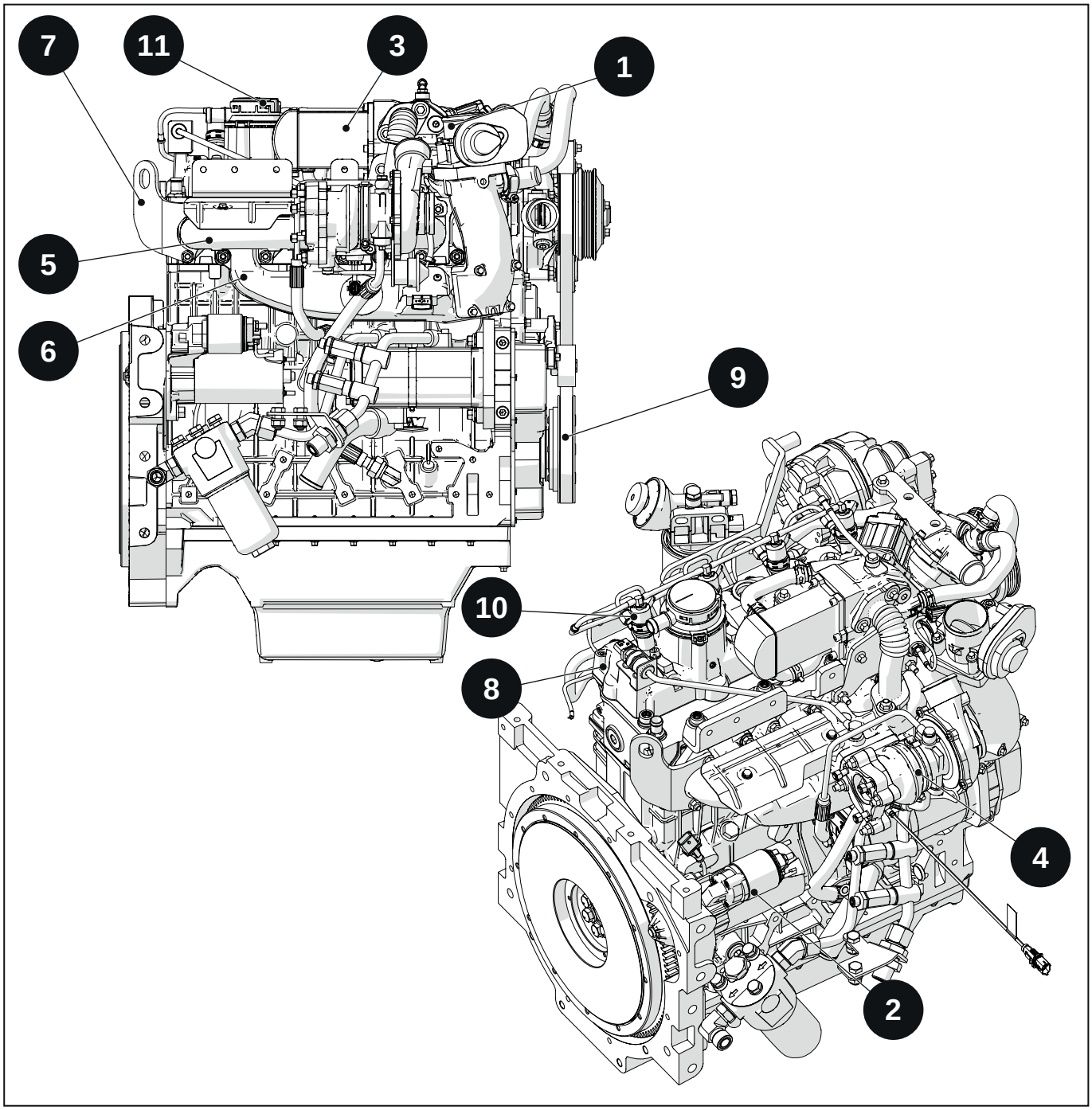

Fig. 2.22

1 - Electric throttle valve (TVA)
2 - Starter motor
3 - Exhaust gas heat exchanger
4 - Turbocharger
5 - Exhaust manifold
6 - Intake manifold
7 - Rear engine lifting lug
8 - Rocker cover
9 - Crankshaft pulley
10 - Injector
11 - Engine oil vapour separator

1 - Exhaust gas pressure sensor
2 - Exhaust gas temperature sensor
3 - exhaust recirculation system temperature sensor

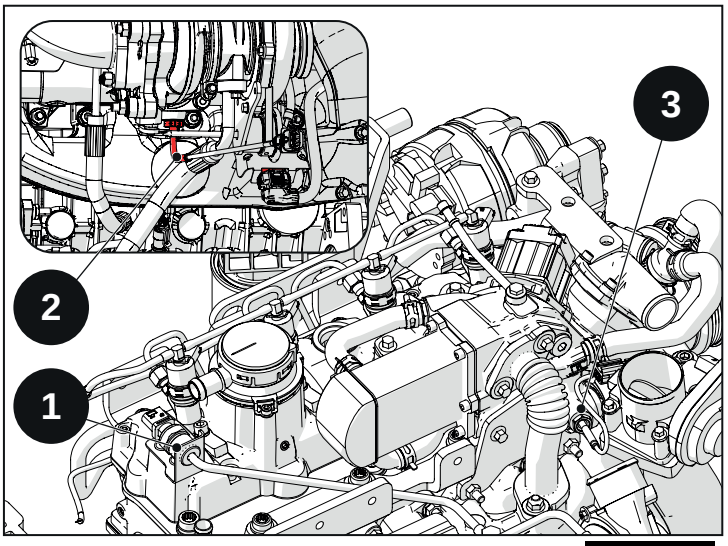

Fig. 2.23

2.4.2 View from timing side

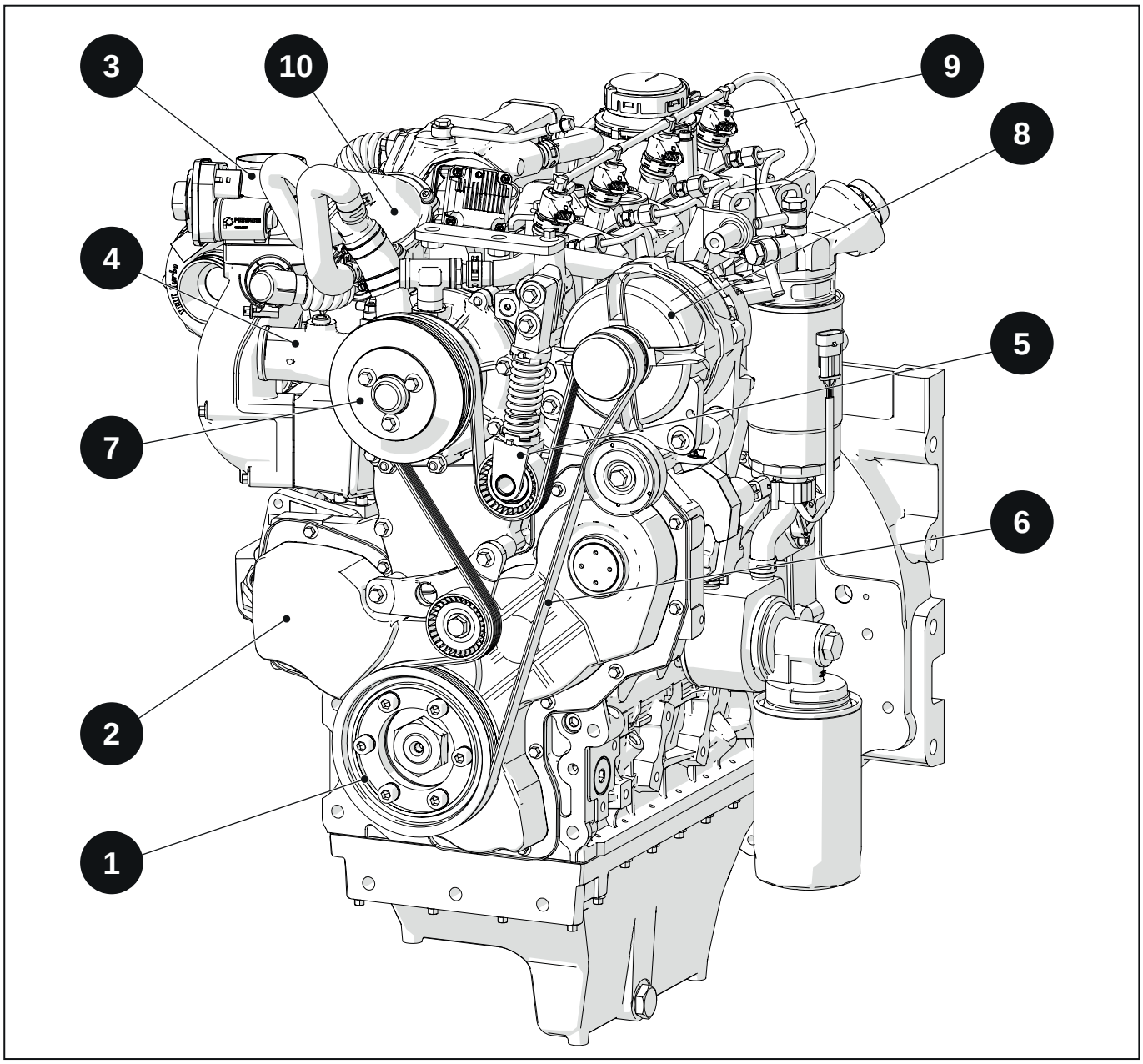

Fig. 2.24

1 - Crankshaft pulley
2 - Timing cover
3 - Electric throttle valve (TVA)
4 - Water pump
5 - Poly-V belt tensioner
6 - Alternator Poly-V belt
7 - Water pump pulley
8 - Alternator
9 - Injector
10 - Thermostat valve cover

2.4.3 View from injection side

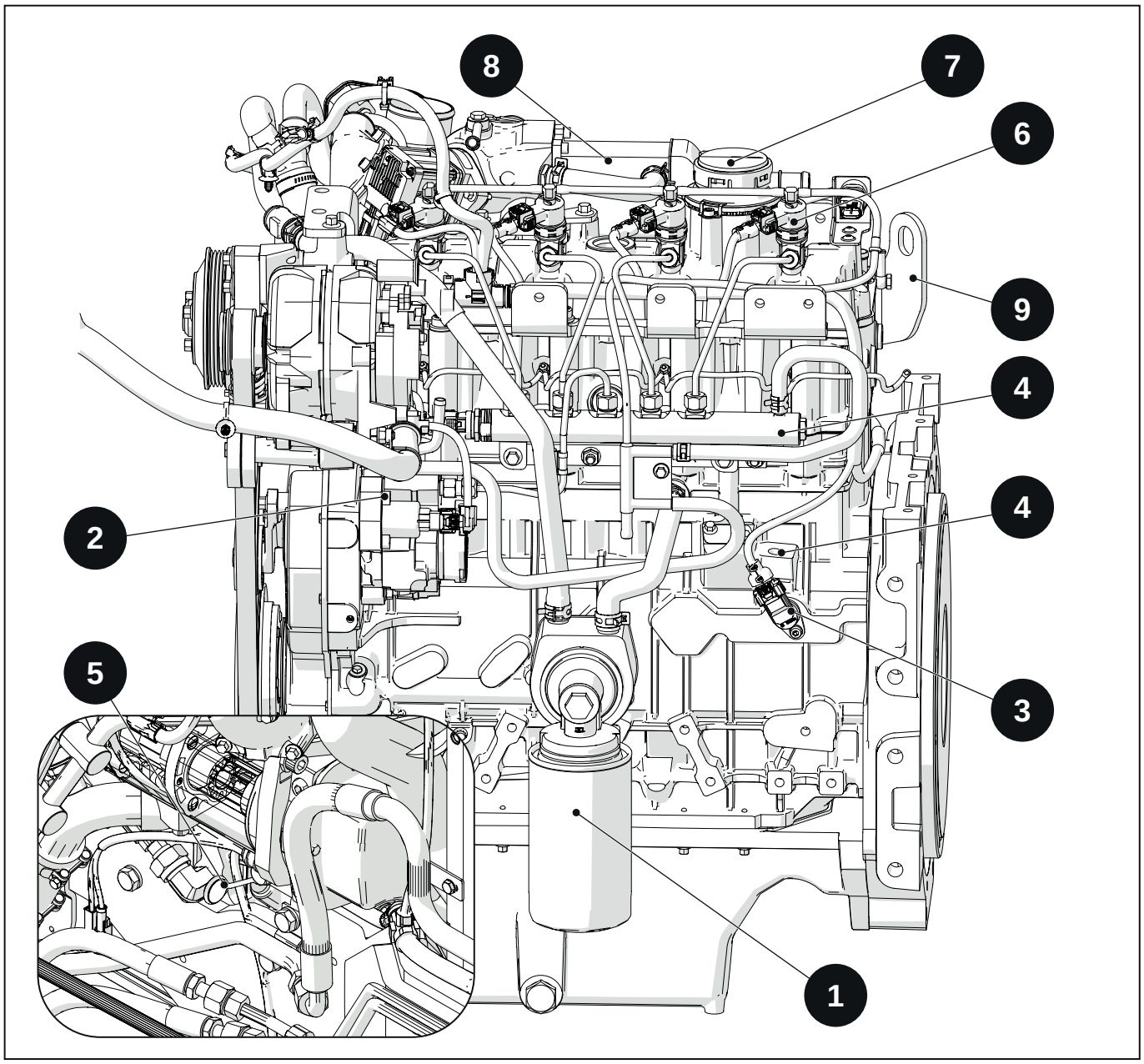

Fig. 2.25

1 - Oil filter
2 - High pressure injection pump
3 - Camshaft timing sensor
4 - Rail
5 - Oil level
6 - Injector
7 - Oil separator
8 - Exhaust gas heat exchanger (EGR cooler)
9 - Rear lifting lug

2.4.4 Top view

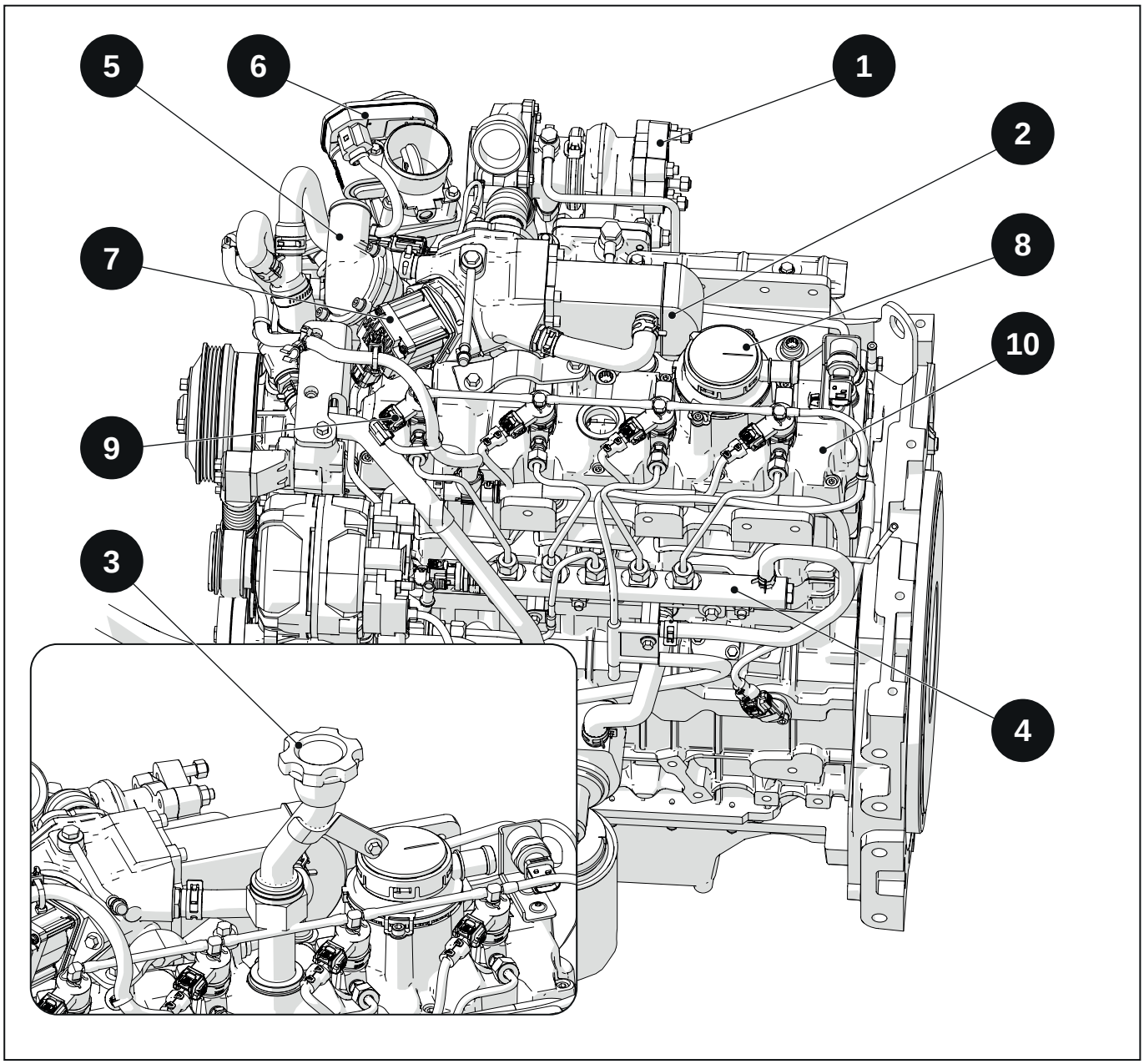

Fig. 2.26

1 - Turbocharger
2 - Exhaust gas heat exchanger (EGR cooler)
3 - Engine oil filler cap
4 - Rail
5 - Thermostat valve cover
6 - Electric throttle valve (TVA)
7 - Electrical EGR (exhaust gas recirculation) valve
8 - Oil separator
9 - Injector
10 - Valve-rocker cover

2.5 Engine oil

2.5.1 Specifications

To ensure the best possible performance and protection, only engine oil meeting ACEA-SAE-API specifications must be used. GOLDONI recommends the following engine oil specifications:

SAE	10W - 40 (semi synthetic)

R750 EU5 / EU6 - R750TE4, IE4, ISE4	
ACEA	E6, E9
API	CJ-4

Warning

the engine oil specifications for the R750 EU5 / EU6 engine are also applicable for R750EU4 engines.

2.5.2 Engine oil level

Warning

R750 engines may be equipped with two (2) different types of oil sump with different oil capacities. See the section “Engine Technical Specifications” for the relative oil capacity.

When changing oil, fill with the smallest quantity of oil needed to reach the MIN level on the oil dipstick. If the oil level does not reach the MIN marking, add 100 - 200 ml of oil at a time until the correct level is reached. Now add 100-200 ml of oil at a time until the level reaches the MAX marking.

Caution

ENVIRON·mENTAL POLLUTION HAZARD! Pollution caused by oil spillage or by the incorrect disposal of used oil is prohibited by law. When repairing the engine, do not contaminate the enviroN·ment with spilt oil or by incorrectly disposing of used oil. Keep and store new and used oil in accordance with applicable legislation.

Overfilling the engine to beyond the maximum level marking may cause fluctuations in oil pressure or a loss of oil pressure. If the engine is run with an excessive oil level, the oil in the sump will be agitated by the crankshaft, causing aeration of the oil. Aeration causes loss lost oil performance and increased overpressure in the crankcase. Extreme overfilling may cause oil to be aspirated into the induction system. Check the engine oil level carefully. The oil level must be maintained between the minimum and maximum markings on the dipstick. To be sure that the oil level reading is correct, follow these guidelines before checking the level.

Make sure that the vehicle or engine is in a stable position on a level surface.

If the engine has just been switched off or if oil has just been added, wait 5 minutes to allow the oil to drain into the sump.

2.5.3 Check

Warning

The oil level must be checked at the intervals indicated in the maintenance schedule.

Check the engine oil level every day before starting the engine.

Attention

Take care not to damage the dipstick and internal components of the engine. Never remove the dipstick when the engine is running. Switch off the engine and wait for it to come to a complete stop before removing or inserting the engine oil dipstick.

- Switch off the engine if it is running. Wait approximately 5 minutes to allow the oil to drain into the sump.
- Pull out the dipstick. Wipe it clean and push it completely into its tube.
- Pull out the dipstick and check the level. The level of the engine oil must be between the MIN and MAX markings on the dipstick.
- Add oil if necessary to reach the maximum level, but never fill beyond the MAX marking on the dipstick.

A - engine oil dipstick
B - engine oil dipstick tube

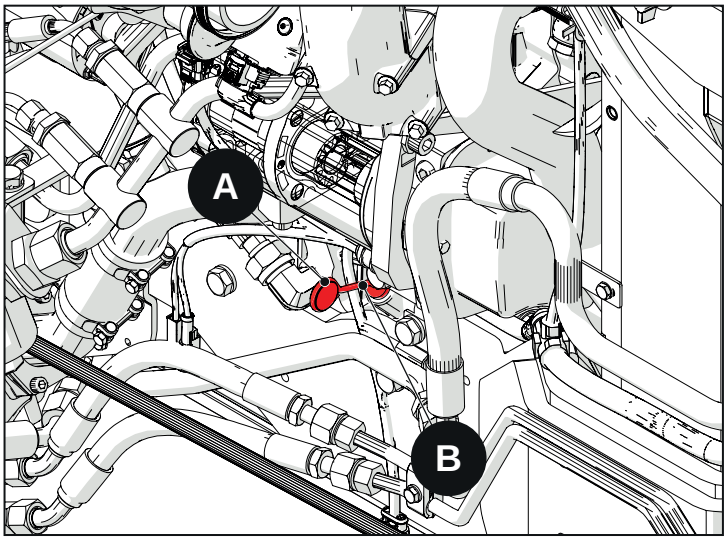

Fig. 2.27

Note

Refer to the section Engine Specifications - Engine oil capacity for engine oil quantities and specifications.

Warning

R750 engines may be equipped with two (2) different types of oil sump with different oil capacities. See the section “Engine Technical Specifications” for the relative oil capacity.

When changing oil, fill with the smallest quantity of oil needed to reach the MIN level on the oil dipstick. If the oil level does not reach the MIN marking, add 100 - 200 ml of oil at a time until the correct level is reached. Now add 100-200 ml of oil at a time until the level reaches the MAX marking.

2.5.4 Filling

Warning

Never fill beyond the MAX marking on the engine oil dipstick. Refer to the section Engine Specifications - Engine oil capacity for engine oil quantities and specifications.

R750 engines may be equipped with two (2) different types of oil sump with different oil capacities. See the section “Engine Technical Specifications” for the relative oil capacity. When changing oil, fill with the smallest quantity of oil needed to reach the MIN level on the oil dipstick. If the oil level does not reach the MIN marking, add 100 - 200 ml of oil at a time until the correct level is reached. Now add 100-200 ml of oil at a time until the level reaches the MAX marking.

- Remove the engine oil filler cap.
- Add oil if necessary to reach the maximum level, but never fill beyond the MAX marking on the dipstick
- Refit and tighten the engine oil filler cap.

A - Engine oil filler cap

Note

Always use the dipstick to determine the quantity of oil to be added.

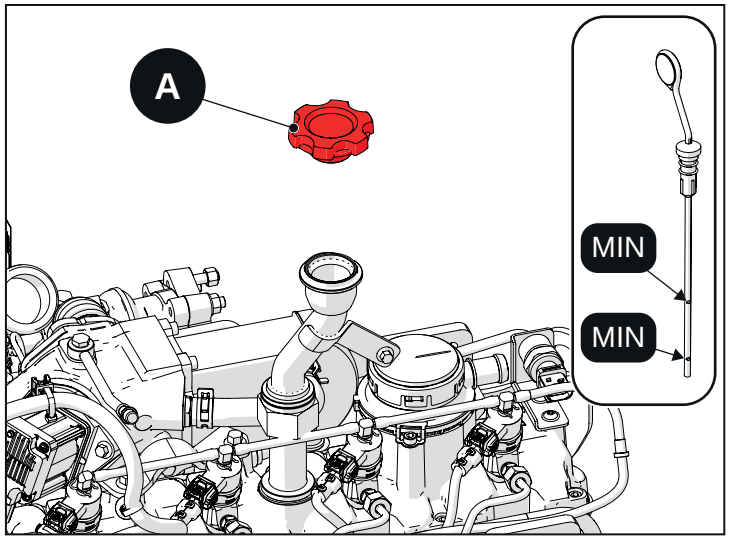

Fig. 2.28

2.5.5 Changing the engine oil

See the paragraph "scheduled maintenance" for the engine oil change intervals.

Attention

On R750EU5/EU6 - R750IE4 engines, the oil dilution calculation function must be reset after each engine oil change (see the following paragraph ENGINE OIL DILUTION).

Attention

If the error code 252F “engine oil critical mass” is generated, change the engine oil even if the oil change interval specified in the maintenance schedule has not been reached.

Attention

Change the oil with a hot engine, after the engine has been running. Hot oil flows more quickly, carrying much more contamination with it. Only use engine oils with the recommended specifications (see the paragraph Engine Specifications - Engine oil/Specifications).

Threaded plug at bottom of sump: 78.5 N·m

A - Engine oil filler cap
B - Threaded plug at bottom of sump

- Start the engine and wait for it to reach normal operating temperature.
- Stop the engine and wait approximately 10 minutes to allow the oil to drain into the sump.
- Pull out the oil dipstick and unscrew the oil filler cap
- Remove the threaded plug at the bottom of sump.
- Refit and tighten the threaded plug at the bottom of sump, fitting a new seal.

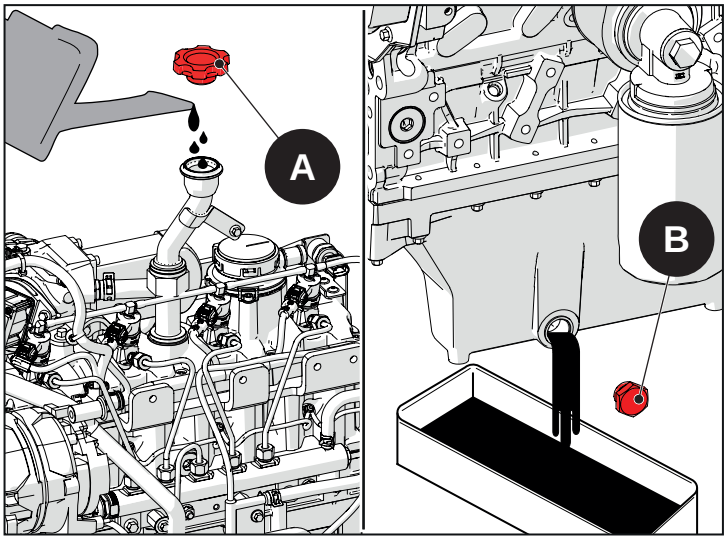

Fig. 2.29

- Use a commercially available tool to loosen the oil filter cartridge.
- Remove the oil filter cartridge.
- Dispose of the old cartridge correctly.
- Fit a new O-ring. Apply lubricant to the O-ring.
- Fit the new oil filter.

Warning

Overtightening will deform the filter and cause oil leakage.

Oil filter cartridge: 12.7 N·m

A - Commercially available tool
B - O-ring
C - Oil filter cartridge

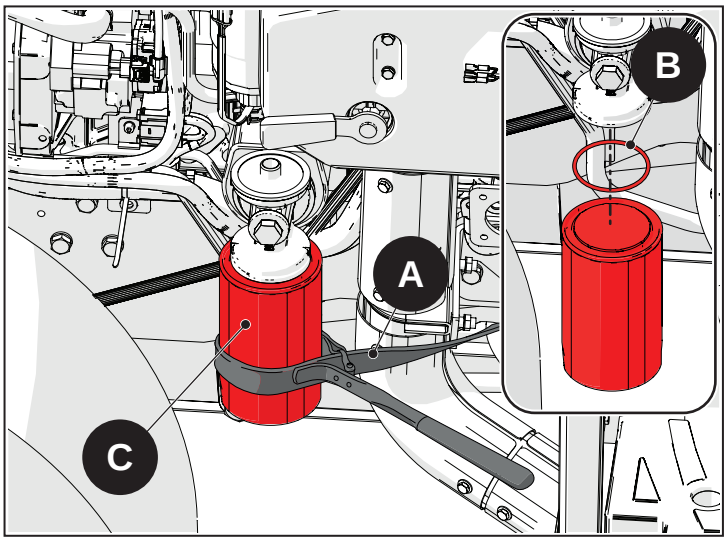

Fig. 2.30

- Hand-tighten the cartridge to bring the surface of the filter with the O-ring into contact with the base of the oil filter.
- Tighten the cartridge onto the respective base using a commercially available tool.
- Dispose of the old cartridge correctly.
- Fill the engine will new engine oil.
  See the paragraph “Filling”.
- Start the engine and check for oil leaks

Warning
ENVIRON·mENTAL POLLUTION HAZARD! During operation and maintenance, take all precautions necessary to prevent enviroN·mental pollution with substances such as oil, and dispose of these substances correctly in accordance with applicable legislation.

2.5.6 Engine oil dilution

During the DPF filter regeneration cycle, additional fuel is introduced as multiple post-injection quantities to increase the temperature of the exhaust.

The additional fuel dilutes the oil in the sump, reducing the viscosity and lubricating properties of the oil. This means that it may be necessary to change the oil after a DPF service regeneration cycle.

As a general rule, changing the engine oil after a service regeneration cycle is recommended if the engine operating hour count since the last oil change is greater than 80% of the scheduled oil change interval.

Always remember to reset the oil dilution algorithm after each engine oil change using the diagnostic tool, as the degree of oil dilution is calculated by the engine ECU and not measured directly.

The **“Oil dilution calculation”** parameter must be reset after every oil change.

Note
The Oil dilution calculation function may be reset with the electronic diagnostic tool.

The function is reset with the diagnostic tool.

CHECK: If the procedure has been performed successfully, the low engine oil pressure warning lamp flashes three times with a flash duration of 1 second and intervals of 0.5 seconds. This procedure is not possible with certain tractor configurations.

2.6 Coolant

2.6.1 Specifications

Warning
Antifreeze products containing propylene glycol, ethyl alcohol or methanol may not be used in the cooling system. When not using a prediluted antifreeze product, use only deionised or distilled water to dilute to the correct concentration.

Diesel engines have high compression ratios and generate high operating temperatures. The cooling system and engine must be kept as clean as possible to ensure the effective cooling. Adequate cooling performance can only be ensured by using a specific antifreeze product diluted in water. GOLDONI recommends filling the cooling system with a low silicate ethylene glycol based product diluted in deionised or distilled water. Low silicate formulas prevent separation of the antifreeze liquid, which causes the formation of silica gel.

This gel obstructs the passages of the coolant circuit, causing the engine to overheat.

When not using a premixed coolant, the system must be filled with a solution of antifreeze and deionised or distilled water, mixed before adding to the circuit. Normal tap water, even if a water softener is used, contains minerals which may form deposits in the circuit, reducing the efficacy of the cooling system. The cooling system must be topped up at least once a year with a correct mixture of water and antifreeze product. Do not drain the cooling circuit before putting the machine into storage, as this may cause corrosion within the cooling system itself. If the engine is exposed to very cold temperatures, make sure that the cooling circuit is filled with a mixture of appropriate low temperature antifreeze and water to ensure adequate protection for the engine and the cooling circuit itself.

Warning
the coolant mixture must consists of a low silicate ethylene glycol based antifreeze product diluted in deionised or distilled water. Using any other coolants may cause damage to the heat exchangers and lead to engine overheating. Do not mix different types of antifreeze product, or top the circuit up with a different type of antifreeze than the product already in the circuit, unless you are certain that they are compatible with each other. Always refer to the instructions provided by the manufacturer of the antifreeze product.

GOLDONI approves the use of coolants consisting as follows:

Mixture	50% antifreeze + 50% deionised or distilled water	The antifreeze used must comply with the following specifications: ASTM D 3306 type 1.

Refer to the maintenance schedule to determine the correct coolant replacement intervals.

See the paragraph Engine specifications - cooling circuit capacity to determine the capacity of the cooling system/ circuit

Note
In September 2011, the antifreeze used previously was replaced by a new antifreeze denominated Petronas Paraflu Up (red), with an ethylene glycol based formula containing OAT (organic acid technology) corrosion inhibitors. The specifications of this antifreeze are analogous to those of the product used previously.

2.6.2 Checking coolant level

Attention
Take all precautions necessary to prevent scalding. No not loosen the filler cap when the engine is hot. The coolant may release hot steam when the cap is opened.

Note
Check the coolant level before starting the engine, while the engine itself is still cold.

- Wait for the engine to cool.
- Remove the filler cap on the expansion tank and check the level.
- The level must not exceed the base of the filler neck onto which the radiator filler cap is fitted. On vehicles with an expansion tank, the level must always be between the MAX and MIN markings. Refer to the user manual provided by the manufacturer of the vehicle.
- If the level is correct, refit and tighten the filler cap.
- If the level is low, top up with the coolant mixture specified.
- Refer to the section Filling - cooling circuit capacity to determine the capacity of the cooling system/circuit.
- Refit and tighten the filler cap.

A - Filler cap
B - Radiator

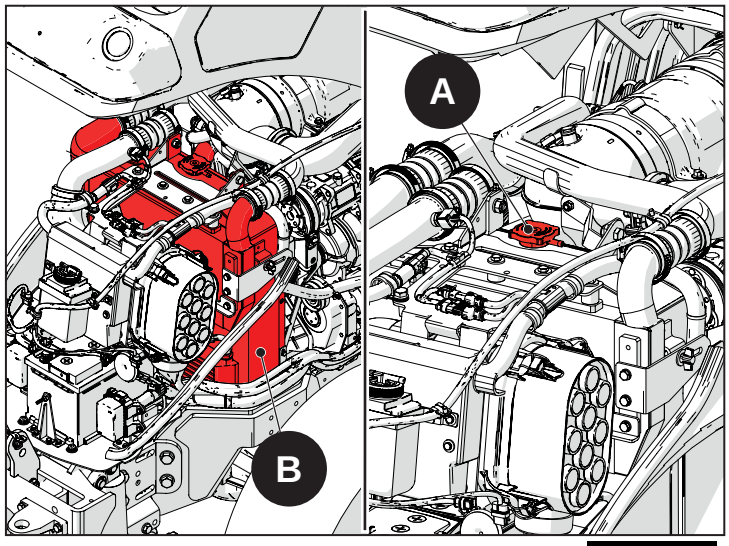

Fig. 2.31

2.6.3 Filling the cooling circuit

- Only remove the filler cap when the engine is cold.

Warning
Use only the specified coolant (see the specifications for coolant)

- If it is necessary to change the coolant or if the coolant level is too low, add the specified coolant mixture slowly to reach the correct level as described in the section “Checking coolant level”.

Warning
Overheating due to insufficient coolant will cause engine damage. Check that the coolant level is sufficient every day before starting the engine.

- Do not fit the filler cap. Start the engine and run at accelerated idle speed (1500-1800 rpm). Add coolant if necessary to keep the coolant in the system at the correct level indicated previously.

Warning
When refitting the filler cap, tighten securely to prevent the risk of coolant leakage.

- Only fit the filler cap once the engine has reached normal operating temperature (thermostat valve fully open) and the level has stabilised correctly, as indicated previously (see the section Engine specifications).
- Test the engine while it is running. Monitor the operating temperature and check for any coolant leaks. If the indicated temperature is too high or if any leaks are noted, stop the engine immediately and identify the cause of the problem.
- Wait for the engine to cool.
- Remove the filler cap and add coolant mixture to reach the correct level (see the section “Checking coolant level”).
- Refit the filler cap and tighten securely.

2.6.4 Draining the cooling circuit

Warning

ENVIRON·mENTAL POLLUTION HAZARD! During operation and maintenance, take all precautions necessary to prevent enviroN·mental pollution with substances such as coolant, and dispose of these substances correctly in accordance with applicable legislation.

Attention

Take all precautions necessary to prevent scalding. No not loosen the filler cap when the engine is hot. The coolant may release hot steam when the cap is opened.

- Wait for the engine to cool.
- Remove the filler cap on the expansion tank or on the radiator.

Note

Drain the coolant into a container. Dispose of the drained coolant correctly.

- Loosen the radiator drain plug or cock. If neither of these are available, loosen the fastener clamp of the lowest pipe on the radiator.

A - Filler cap
B - Drain plug

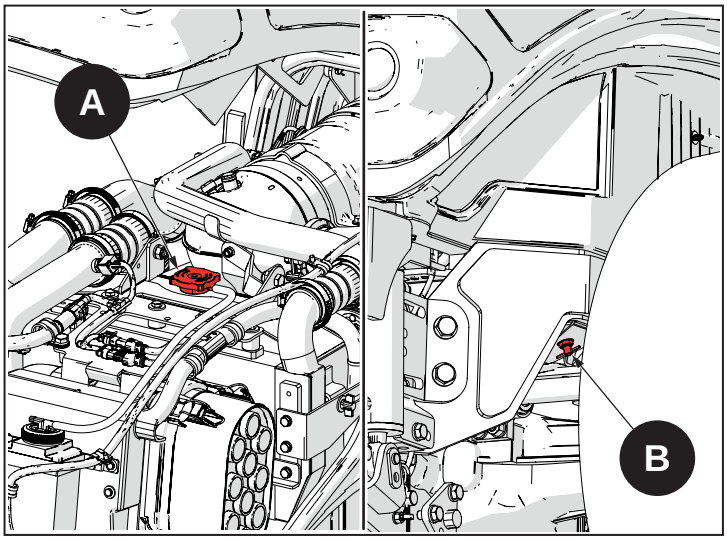

Fig. 2.32

- Once all the coolant has drained, refit the drain plug, close the drain cock or retighten the fastener clamp of the pipe loosened previously on the radiator. Tighten the drain plug or cock securely.
- Clean the cooling circuit if necessary. See the section “Cleaning the cooling circuit”.
- Fill the circuit with the coolant mixture specified. See the section "Filling the cooling circuit".

2.6.5 Cleaning the cooling circuit

The cooling system must be cleaned at the intervals specified in the maintenance schedule or whenever a loss in cooling system performance is noted.

2.7 Air filter

Note

To clean the air filter, refer to the instructions given in the user manual provided by the manufacturer of the vehicle.

Cleaning and replacing the air filter

Attention

Stop the engine and wait until it has cooled down before starting any maintenance procedure.

Note

The filter clogging indicator lamp is situated on the dashboard instrument.

This lamp illuminates to indicate that the air filter is clogged and must be serviced or replaced.

- Release the clips (1) and remove the cover (2).
- Remove the main filter cartridge (3) and clean with compressed air directed outwards from the inner side of the cartridge.
- Check the state of wear of the cartridge (3) and replace if necessary.
- Remove the safety cartridge (4) and clean both the cartridge and in the interior of the housing with compressed air.
- Check the state of wear of the cartridge (4) and replace if necessary.
- Refit the cartridge (4).
- Refit the cartridge (3) and the cover (2).

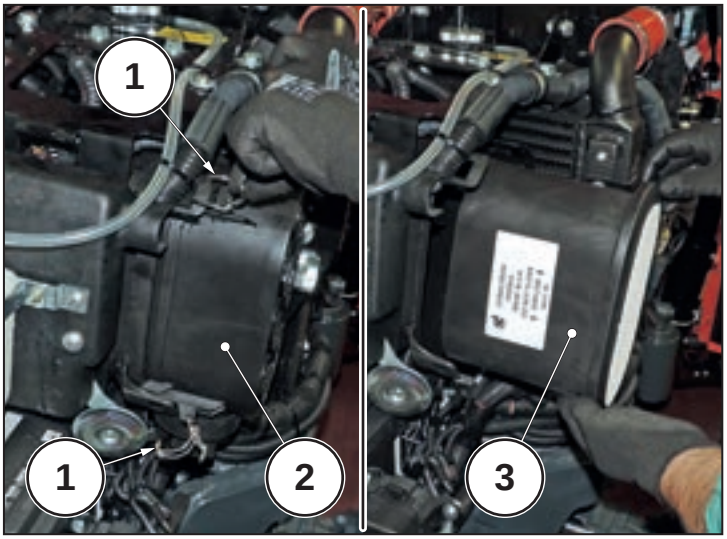

Fig. 2.33

Warning

Also replace the safety cartridge (4) every second or third time that the main cartridge (3) is replaced.

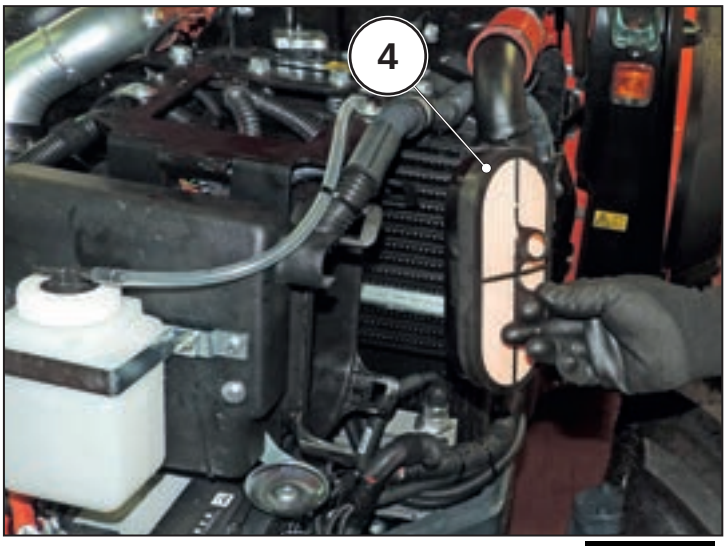

Fig. 2.34

2.8 Injection system

2.8.1 General information

Attention

To prevent the risk of fire or explosion, always disconnect the battery cable terminal clamps before starting repair work.

Attention

EXPLOSION AND/OR FIRE HAZARD: fuel leaks from any part of the injection system may initiate a fire or explosion, causing severe or even fatal injury. The entire injection system must be thoroughly inspected on a regular bases and, in particular, if the vehicle has been in storage. Check all components for leaks, softening, hardening, swelling and signs of corrosion. Replace any component with any signs of deterioration before starting the engine.

Attention

Using incorrect, unsuitable or contaminated fuel will damage the engine. The use of unsuitable fuel constitutes improper usage of the engine. Any damage resulting from the use of nonconformant fuel will not be covered by the warranty.

2.8.2 Fuel specifications

The engine is designed to run with standard fuels available throughout Europe (compliant with DIN EN 590 specifications). BIODIESEL (compliant with the specifications of UNI EN 14214) may be used in proportions up to 7% mixed in a standard fuel type available in Europe (as defined by the standard DIN EN 590). Use low-sulphur content fuel (not exceeding 10-50 ppm) for R750 engine models.

2.8.3 Using the engine at low temperatures

UN·modified diesel fuel thickens and gels at very low temperatures unless specific additives are used. Practically all diesel fuels are already climate-modified to permit their usage in the specific region of sale during winter. If further fuel treatment is necessary, the owner and/or operator of the vehicle are responsible for adding an appropriate standard, commercially available additive to the diesel fuel, in accordance with the instructions of the producer of the additive.

GOLDONI cannot be held responsible for any engine malfunction or damage caused by using fuel additives. Any engine damage resulting from the use of fuel additives will not be covered by the warranty.

2.9 Fuel filter

2.9.1 Draining

The water and particles separated/filtered from the fuel may be drained from the fuel filter by unscrewing the drain plug at the bottom of the filter itself.

Attention
Open the drain plug every day before starting the engine. The drain plug must only be opened in cool conditions, to prevent the risk of fire or explosion. In very cold conditions, which may cause the separated water in the filter to freeze, drain the filter at the end of the working day.

Note
Place a container under the filter to collect the fuel.

- After placing a container under the filter, open the drain plug situated at the bottom of the filter.
- Drain the filter until the fuel draining from the plug is clear and clean.
- Retighten the plug.
- If the filter has been drained completely, refill it with fuel. See the section "Filling".

A - Filter
B - Water drain plug

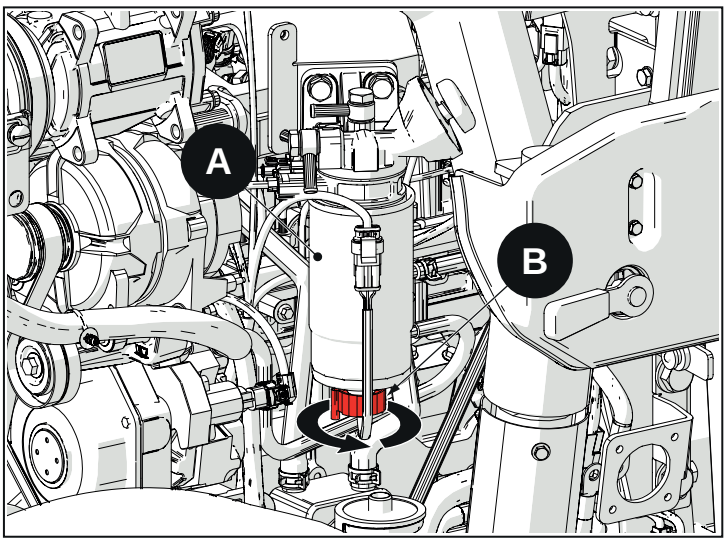

Fig. 2.35

2.9.2 Filling and bleeding

Follow this procedure after installing a new filter or if the filter has been emptied completely when draining water.

Note

The filter is equipped with a hand-operated plunger for priming the filter itself with fuel.

- Loosen the bleed screw on the filter housing.
- Push the plunger up and down repeatedly. The filter is filled correctly and contains no air when no air bubbles can be seen in the fuel escaping from the bleed screw.
- Tighten the bleed screw.
- Start the engine and check for leaks. Stop the engine immediately if any leaks are noted. Check that the filter is fitted correctly.

Warning

Make sure that there are no leaks before closing the bonnet of the vehicle.

A - Bleed valve
B - Plunger

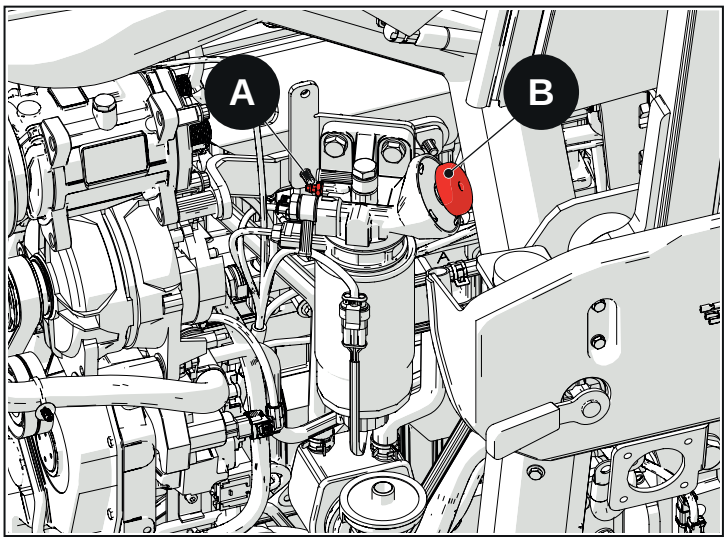

Fig. 2.36

2.9.3 Replacement

Warning

As the injection pumps and injectors are very sensitive components, extreme cleanliness must be maintained when working on the injection system. Even the most minuscule particles of dirt or quantities of water may damage the injection system.

- Disconnect both battery cables.
- Disconnect the cable of the water in filter sensor from the bleed plug.

A - Water drain plug
B - Water in fuel sensor

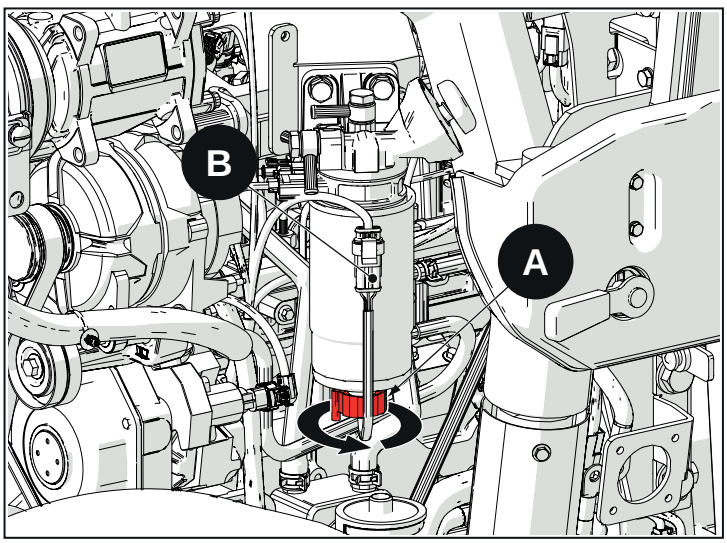

Fig. 2.37

Warning

replace the filter with a new component after removal; the filter cannot be cleaned and/or reused.

- Loosen the fastener ring if applicable. If there is no fastener ring, remove the filter by hand or using a commercially available tool.

A - Fuel filter
B - Fastener ring

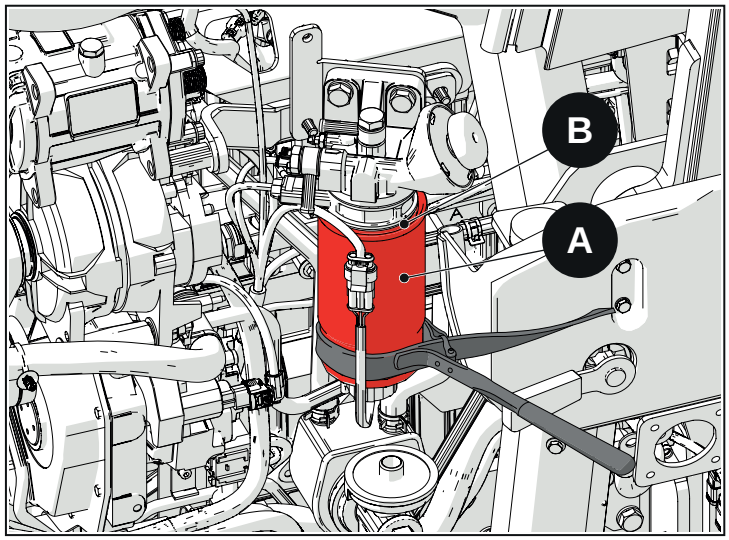

Fig. 2.38

2.9.4 Installation

- Lubricate the filter gasket with engine oil
- Fill the new fuel filter with clean diesel fuel
- Align the filter correctly with its housing. Hand-tighten the fastener ring or the filter cartridge. Use a commercially available tool if necessary. Fill and bleed the filter. See the section "Filling and bleeding"
- Connect the cable to the water in filter sensor and connect the battery cables disconnected previously.
- Start the engine and check for leaks. If any leaks are noted, stop the engine immediately and identify and rectify the problem, repeating the procedure to fit the filter if necessary.

2.10 Alternator Poly-V belt

2.10.1 Inspection

Check that the belt tension is correct and also check for:

- Excessive wear
- Cracks
- Cuts

⚠ Warning
Minor, transverse cuts or cracks (across the width of the belt) may be acceptable. Longitudinal cuts or cracks (along the length of the belt) intersecting transverse cracks or cuts are not acceptable.

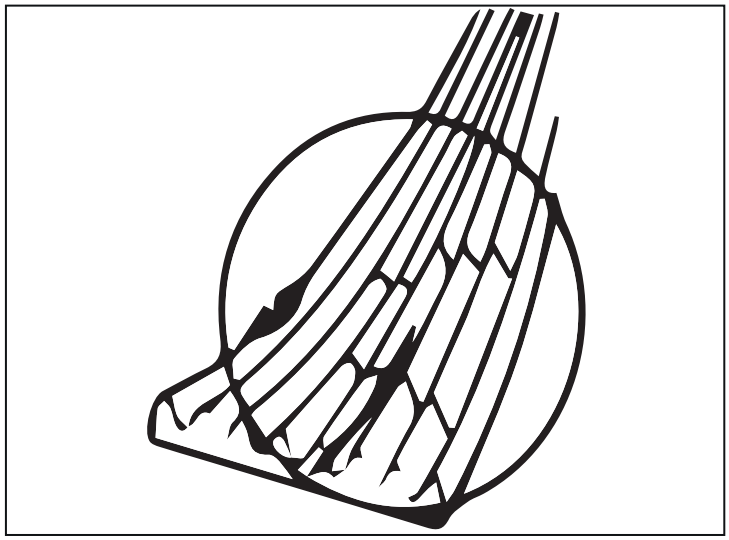

Fig. 2.39

2.10.2 Replacement/installation (with Hutchinson TS 21 linear tensioner)

2.10.2.1 Procedure used on assembly line

- Fit the tensioner, leaving the screws X untightened.
- Fit the belt.

> **Warning**
>
> To align the belt correctly, it must be seated in the innermost grooves of the alternator pulley.

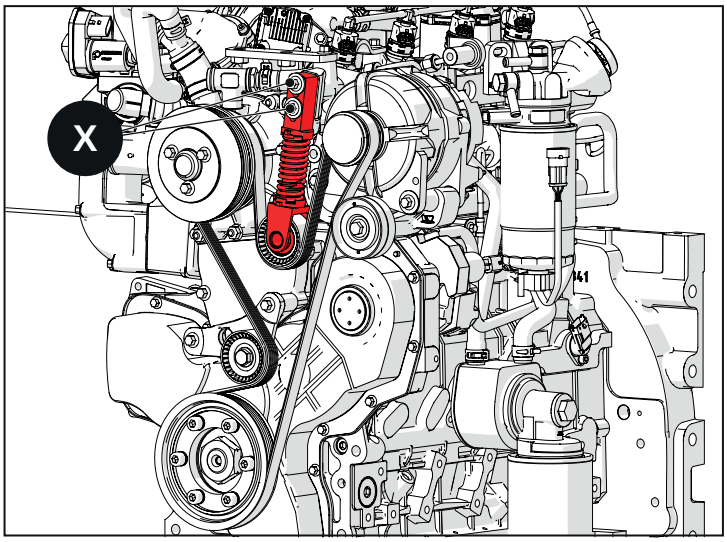

Fig. 2.40

A - alternator pulley
A1 - alternator pulley - remaining outer grooves

- Bring the pulley of the tensioner into contact with the belt.
- Tighten the screws X of the tensioner.

Screws X: 32.4 N·m

Remove the retainer Y from the tensioner with a screwdriver.

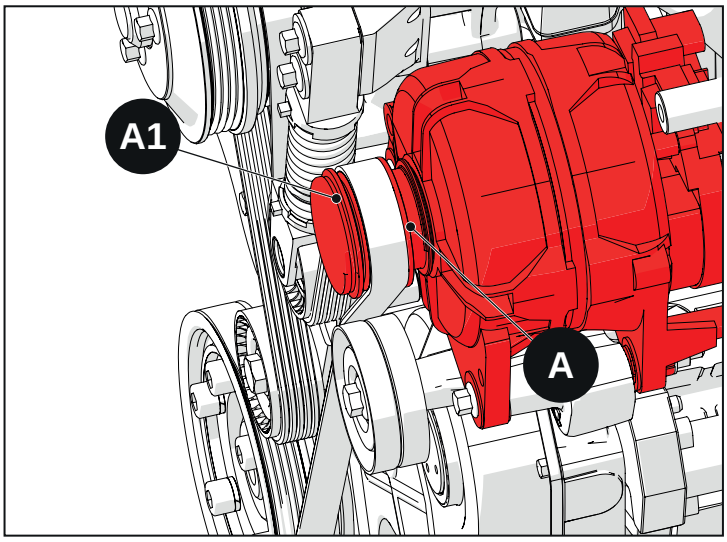

Fig. 2.41

2.10.2.2 Replacement procedure for service network

- Rotate the special tool (1) anticlockwise to compress the tensioner (2) (2.42).
- Fit the retainer bracket (3) as shown in the photo (2.42).
- Remove the belt.
- Install the new belt, routing correctly as shown in the photo (2.40).
- Rotate the special tool (1) anticlockwise to compress the tensioner (2) and remove the retainer bracket (3)

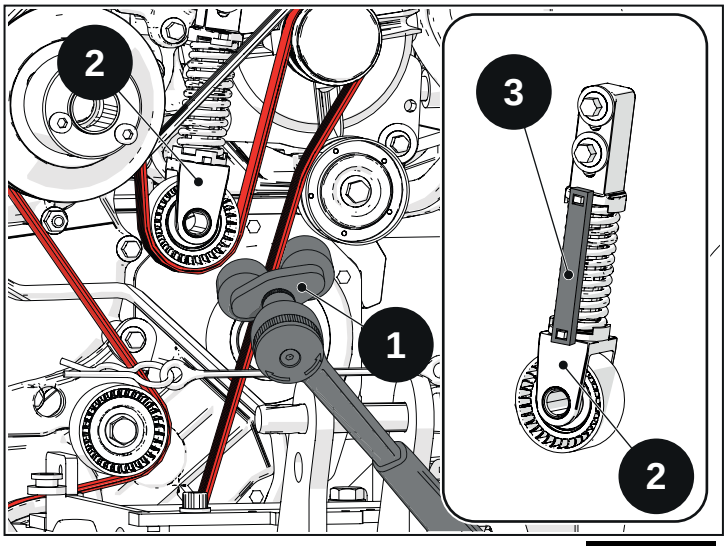

Fig. 2.42

If it is difficult to remove the belt with the special tool applied to the belt, another tool may be applied to the tensioner

- Fit the tool (1) on the tensioner
- Tighten the screw (2) until the retainer bracket (3) can be fitted
- Remove the belt.

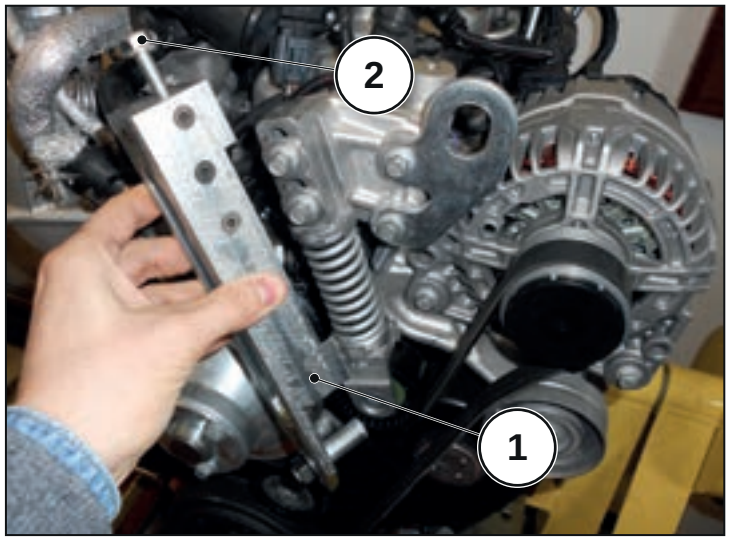

Fig. 2.43

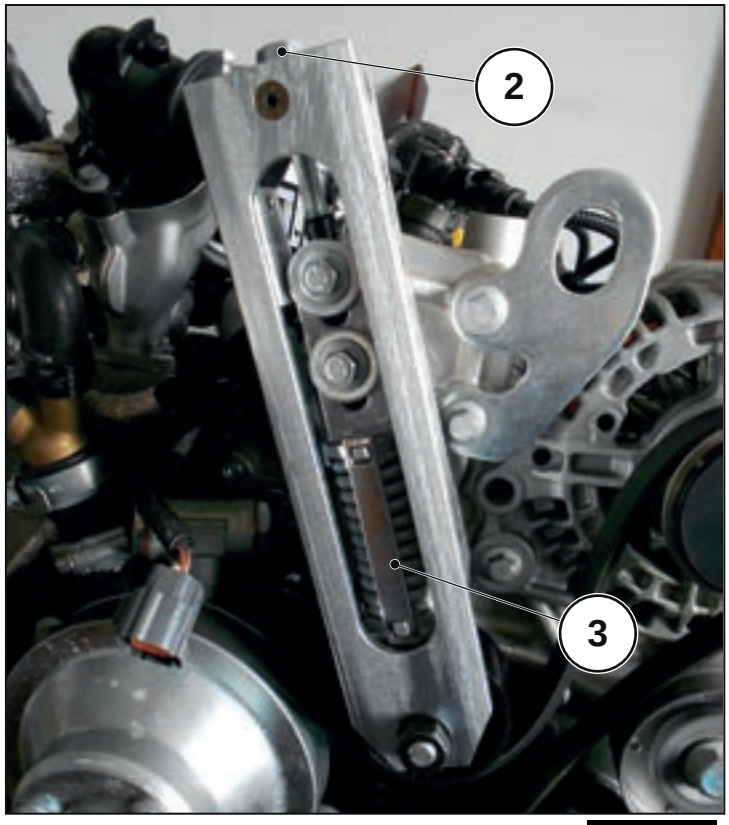

Fig. 2.44

2.11 Diesel particulate filter (DPF)

Diesel particulate filters capture the particulate and inorganic ash contained in exhaust gas. In normal operating conditions, the filter burns off accumulated particulate with regeneration cycles. The inorganic ash produced by the combustion of engine oil does not burn, however, and will slowly build up in the filter. This ash must be removed from the filter periodically with a specific cleaning process.

2.11.1 Maintenance intervals

See the intervals indicated in the maintenance schedule. In certain cases, such as on vehicles with older engines, more frequent maintenance may be necessary.

An indicator lamp or alarm on the instrument panel notifies the user of the vehicle when the DPF filter is excessively clogged.

2.11.2 Diesel particulate filter regeneration and cleaning

Warning
before starting a DPF regeneration cycle, clean the pipes between the differential pressure sensor and the DPF filter.

Clean the pipes as follows:

- mark each pipe (the pipes differ in diameter)
- disconnect the pipes
- blow compressed air through the pipes (blow towards the DPF filter - correct direction is indicated by the arrows)

The DPF filter must be regenerated to remove accumulated particulate and cleaned to remove ash:

- every 1500 hours or 50,000 km, during scheduled maintenance services, using compressed air or an electric furnace (see the specific procedures applicable).
- whenever error 2463 (soot max) is generated in the ECU engine control unit, using compressed air and performing the service regeneration cycle with the diagnostic tool (see the specific procedures applicable).

Warning
Ash must be disposed of in accordance with local law and regulations.

2.11.3 Process for cleaning filter with compressed air to remove ash

2.11.3.1 Safety equipment

Cleaning process with “COMPRESSED AIR”:

- A compressed air supply (80-100 psi / 5.5-7 bar) with a standard compressed air gun
- Dust mask, gloves, protective eyewear
- An industrial extractor system or a device for collecting dust/ash.

Mark the "exhaust out" side of the filter before removing the central filter canister. Remove the central filter canister.

With an extractor on the exhaust "in" side to collect the ash and holding the compressed air gun at a distance of approximately 10 cm, blow compressed air (5.5-7 bar) through the cells of the filter core from the exhaust "out" side. To ensure effective results, move the compressed air gun slowly and direct the air through all the cells in the core.

Continue for approximately 30-40 minutes. Do not allow the compressed air gun to come into contact with the cells of the filter core.

Refit the central filter canister the opposite way around relative to its original position with respect to the direction of flow of the exhaust: the exhaust "out" side marked before removal must now be the exhaust "in" side.

Do not clean with steam and/or cleaning products. Cleaning products may damage the filter.

2.11.4 DPF filter regeneration process with electric furnace

Clean the DPF filter with compressed air (see the procedure “Process for cleaning filter with compressed air").

Mark the "exhaust out" side of the filter before removing the central filter canister. Place the central canister in the furnace.

Perform a heating cycle with the steps indicated in this table:

STEP	TEMPERATURE °C	DURATION (min)	TEMPERATURE RAMP	
start	ambient temperature in furnace	/	/	increase
1	0 - 200	60 min	linear	10°C / min
2	200 - 500	120 min	linear	5°C / min
3	500 - 600	30 min	linear	2°C / min
4	600	360 min	constant	
5	600 - 500	30 min	linear	
6	500 - 200	120 min	linear	
7	200 - 120	60 min	linear	
8	120	60 min	constant	
9	shut-off	/	/	

Fig. 2.45

Remove the central filter canister from the furnace.

Refit the central filter canister the opposite way around relative to its position before removal with respect to the direction of flow of the exhaust:

the exhaust "out" side marked before removal must now be the exhaust "in" side.

Do not clean with steam and/or cleaning products. Cleaning products may damage the filter.

Tightening torque for diesel particulate filter clamp screws: 30 N·m

Warning

The filter requires no maintenance other than normal regeneration and cleaning. If the filter clogs, the central canister must be cleaned, regenerated and, if necessary, replaced.

The engine service intervals indicated in the maintenance schedule must be observed to ensure that the filter functions correctly.

Excessive engine oil consumption will increase the frequency at which cleaning and regeneration are needed.

ALWAYS replace the fastener clamps and spacer rings with new components after removing the central filter canister.

Attention

In certain situations, such as in the case of rapid accumulation of ash causing the filter to clog, it may be necessary to service the filter before the next scheduled service. The rapid accumulation of ash may be caused by a faulty engine component (e.g. EGR valve stuck open) or in certain engine operating conditions, such as continuous use at low engine load, prolonged operation at idle speed etc.

In this case, the indicator lamp on the instrument panel will illuminate to notify the operator.

Attention
The filter may clog more quickly if the pneumatic outlets or electrical connections of the throttle valve and the EGR valve are swapped (see the paragraph “Throttle valve”). Mark the connections on the aforementioned components for subsequent identification before disconnecting.

2.11.5 Disposing of ash

Ash must be disposed of in accordance with applicable legislation in the country of use.

2.11.6 Cleaning and regeneration process with diagnostic tool - Error 242F "SOOT MAX"

Warning
Do not launch the DPF regeneration cycle unless the DPF filter has been cleaned beforehand with compressed air (see the procedure for cleaning with compressed air).

Warning
before starting a DPF regeneration cycle, clean the pipes between the differential pressure sensor and the DPF filter. Clean the pipes as follows: mark each pipe (the pipes differ in diameter) disconnect the pipes blow compressed air through the pipes (blow towards the DPF filter - correct direction is indicated by the arrows)

Launch the regeneration cycle from the diagnostic tool.

Follow the instructions shown on the display of the diagnostic tool. The engine speed is increased to 1700 rpm during the regeneration cycle. After approximately 60 minutes, the regeneration cycle ends and the engine returns to normal idle speed.

Cancel the errors stored in the engine control unit.

Warning
The regeneration cycle may be interrupted automatically at any time by the safety system In an emergency, the cycle may be stopped manually by the operator by switching off the engine.

2.11.7 Diesel particulate filter regeneration

The DPF filter must be regenerated to remove accumulated particulate:

- every 4000 hours, during scheduled engine services.
- when the error 242F (soot max) is generated in the ECU engine control unit - in this case, the process is usually denominated 'service regeneration cycle'

A) PROCEDURE every 4000 hours

- 1- Connect the diagnostic tool to the engine control unit and check for errors.
  - Do not start the service regeneration procedure if there are any errors in the ECU memory. Launching the regeneration cycle while there are active errors may result in damage to the engine or exhaust system due to faulty or malfunctioning components.
  - Identify and rectify the causes of any errors before launching the regeneration cycle.
- 2- Tilt the DPF and check that no loose particulate falls out of either end before starting the service regeneration procedure.
  - Check for particulate residue in the exhaust pipe. If any residue is found, inspect the exhaust pipe. Particulate found at the outlet side of the DPF filter is indicative of a significant loss in filtration performance.
  - Do not start the service regeneration procedure if any particulate is found at the outlet side of the DPF. Replace the filter and reset the particulate count parameter in the ECU using the diagnostic tool.
- 3- Use compressed air to clean the pipes connecting the differential pressure sensor to the DPF.

Warning

before starting a DPF regeneration cycle, clean the pipes between the differential pressure sensor and the DPF filter.

Clean the pipes as follows:

mark each pipe (the pipes differ in diameter)

disconnect the pipes

blow compressed air through the pipes (blow towards the DPF filter - correct direction is indicated by the arrows)

- 4- Warm the engine to above 70°C

Warning

During the service regeneration cycle, the exhaust pipe may reach temperatures exceeding 550°C (1022°F). Ensure that all personnel remains at a safe distance from the exhaust pipe.

The cycle must be performed outdoors with the vehicle standing on a heat resistant surface.

- 5- Select service regeneration
- 6- Follow the instructions shown on the display of the diagnostic tool. Engine speed is increased to 1700 rpm during the regeneration cycle. After approximately 15 minutes, the regeneration cycle ends and the engine returns to normal idle speed.

Warning

The service regeneration cycle may be interrupted automatically at any time by the engine safety system.

In an emergency, the cycle may be stopped manually by the operator by switching off the engine.

- 7- Repeat steps 5 and 6

Note

the procedure is complete once 2 consecutive regeneration cycles are completed successfully.

- 8- Remove the filter from the vehicle.
- 9- Clean the filter with compressed air. See the section “Cleaning process with compressed air”.

B) PROCEDURE in case of error 242F “soot max”

- Connect the diagnostic tool to the ECU engine control unit and check for error codes
  - Reset the particulate count parameter from the diagnostic tool.
  - Identify and rectify the causes of any errors before launching the regeneration cycle.
- Tilt the DPF and check that no loose particulate falls out of either end before starting the service regeneration procedure.
  - Check for particulate residue in the exhaust pipe. If any residue is found, inspect the exhaust pipe. Particulate found at the outlet side of the DPF filter is indicative of a significant loss in filtration performance.
  - Do not start the service regeneration procedure if any particulate is found at the outlet side of the DPF. Replace the filter and reset the particulate count parameter in the ECU using the diagnostic tool.
- Use compressed air to clean the pipes connecting the differential pressure sensor to the DPF.

Warning

before starting a DPF regeneration cycle, clean the pipes between the differential pressure sensor and the DPF filter.

Clean the pipes as follows:

mark each pipe (the pipes differ in diameter)

disconnect the pipes

blow compressed air through the pipes (blow towards the DPF filter - correct direction is indicated by the arrows)

- Warm the engine to above 70°C

Warning

During the service regeneration cycle, the exhaust pipe may reach temperatures exceeding 550°C (1022°F). Ensure that all personnel remains at a safe distance from the exhaust pipe.

The cycle must be performed outdoors with the vehicle standing on a heat resistant surface.

- Select service regeneration
- Follow the instructions shown on the display of the diagnostic tool.
  Engine speed is increased to 1700 rpm during the regeneration cycle. After approximately 15 minutes, the regeneration cycle ends and the engine returns to normal idle speed.
- Check engine oil dilution.
  Engine speed is increased to 1700 rpm during the regeneration cycle. After approximately 15 minutes, the regeneration cycle ends and the engine returns to normal idle speed.

Warning

The service regeneration cycle may be interrupted automatically at any time by the engine safety system.

In an emergency, the cycle may be stopped manually by the operator by switching off the engine.

2.12 Diesel particulate filter (DPF)

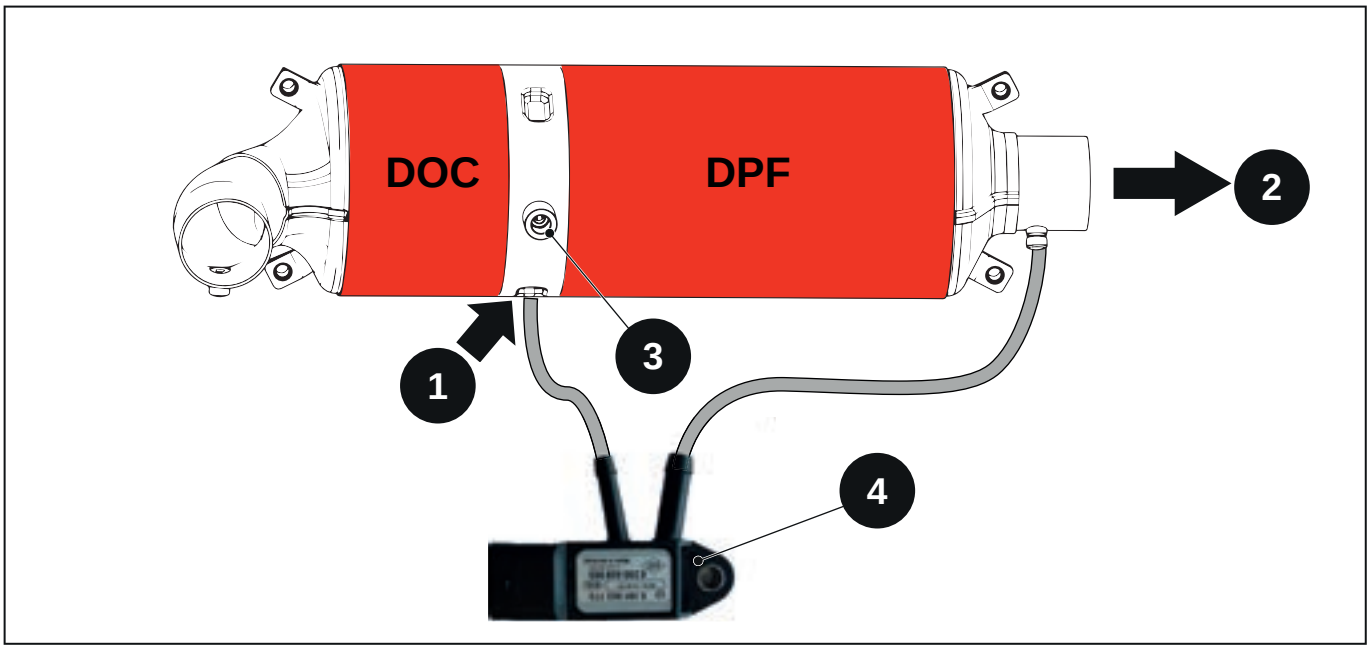

Fig. 2.46

1 - Exhaust In
2 - Exhaust out
3 - Exhaust gas temperature sensor
4 - Exhaust differential pressure sensor (Delta P)

Warning
The DPF filter is not an inspectable component.

Control strategies/signals from engine control unit for DPF diesel particulate filter regeneration:

- Physical model / map in engine control unit for determining particulate map (DPF filter DeltaP - differential pressure - sensor)
- Engine operating time 75 h

Regeneration target:

- DOC inlet side temperature > 300°C
- DPF inlet side temperature = 630°C

Regeneration time:

- 10-25 minutes if cycle is launched in accordance with physical model in engine ECU for determining particulate mass
- 15 minutes if cycle is launched in accordance with engine operating time intervals

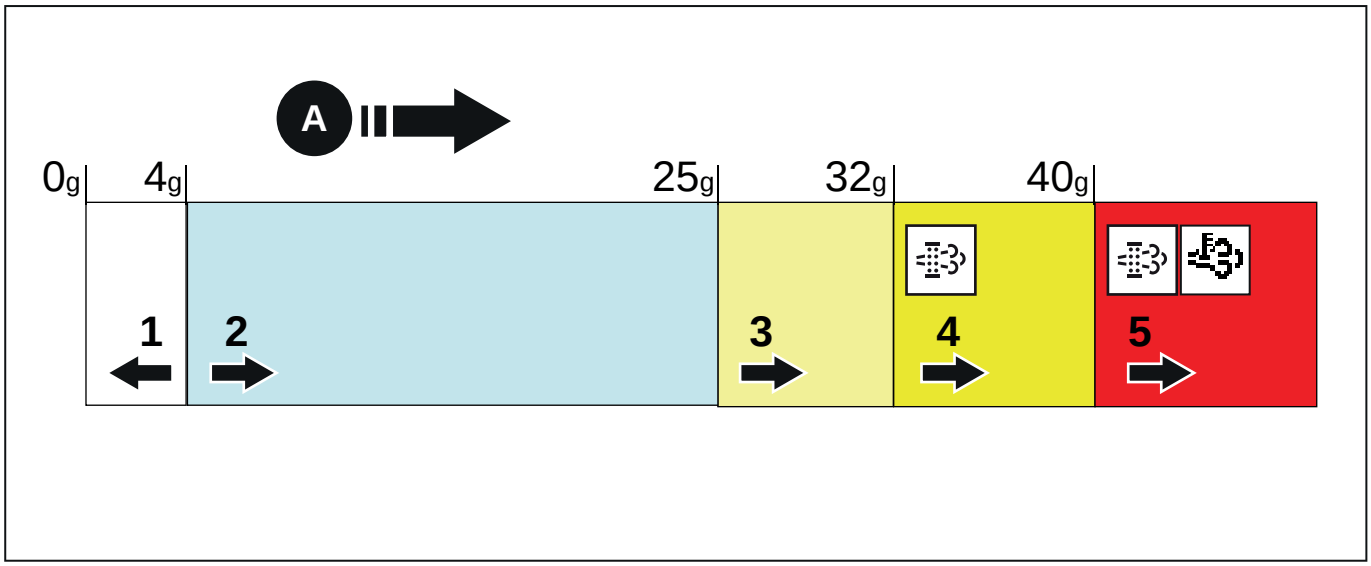

Fig. 2.47

- A- Particulate mass (g)
- 1- Regeneration
  - DPF indicator lamp off
- 2- Particulate model
- 3- Request for DPF regeneration
- 4- DPF indicator lamp on
  - drive the vehicle to permit regeneration
  - Manually launched service regeneration cycle
- 5- P242F- max accumulation
  - Engine warning lamp on
  - Performance limiting
  - Service regeneration launched from diagnostic tool

DPF filter regeneration - DPF filter regeneration request threshold value: 25g

DPF indicator lamp - indicator lamp on threshold value: 32g

- continuous engine operating time at idle speed: regeneration cannot be completed.
- The DPF indicator lamp lights to prompt the operator to drive the vehicle at medium/high engine load (75-100 %) to permit regeneration, and extinguishes once this is no longer required.

Regeneration may also be launched with the following manual method (in the case of a manually launched service regeneration cycle): Manual service regeneration cycle button.

Max. permissible particulate level - threshold value: 40g

- In this case, the DPF has reached the maximum permissible particulate content and, in the majority of cases, only service regeneration is permitted: Service regeneration launched from diagnostic tool

2.12.1 Manually launched service regeneration cycle

Purpose

when the DPF indicator lamp illuminates, the operator must drive the vehicle at medium/high engine load (75-100 %) to permit regeneration.

Alternatively, regeneration may be launched manually by pressing a specific button in the vehicle. The constructor of the vehicle is responsible for including this button.

Manually launched service regeneration cycle - Procedure:

- engine coolant temperature > 65°C
- stop the vehicle in a safe location, with the engine running at idle speed: make sure that there is no flammable material (e.g. dry leaves, bushes) underneath or near the vehicle
- engage the parking brake
- press and hold the manual service regeneration button for 3 seconds. Engine speed increases to 2000 rpm. The regeneration cycle lasts approximately 20-30 minutes. Engine speed returns to normal idle speed once the cycle is complete
- The procedure MUST be performed under the constant supervision of the operator
- Once the regeneration cycle is complete, the vehicle may be used as normal
- If the button is kept pressed for more than 2 minutes or in the event of a short circuit, the system generates a specific error code, stops the regeneration cycle and disables the button itself.

2.13 Removal and installation

2.13.1 Engine lifting lugs

Attach a hoisting device as shown in the figure.

Loosen the screws (A) and remove the mounts (B).

Carry the engine to the installation area.

More information is available in the engine use and maintenance manual.

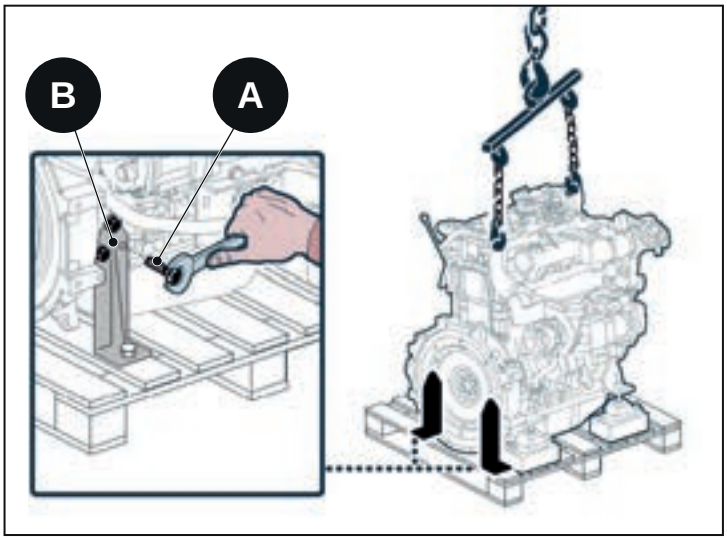

Fig. 2.48

A- front hoisting lug - screws (front side)

screw (A): 27.5 N·m

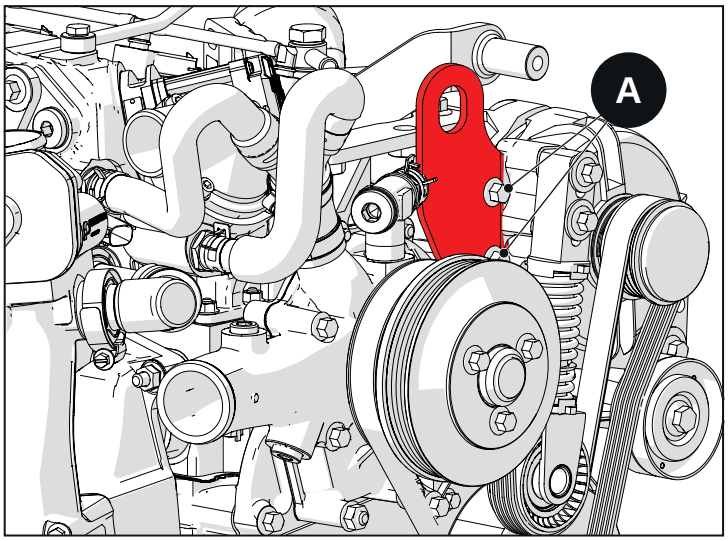

Fig. 2.49

B- rear hoisting lug (rear side)

see procedure for tightening exhaust manifold fasteners

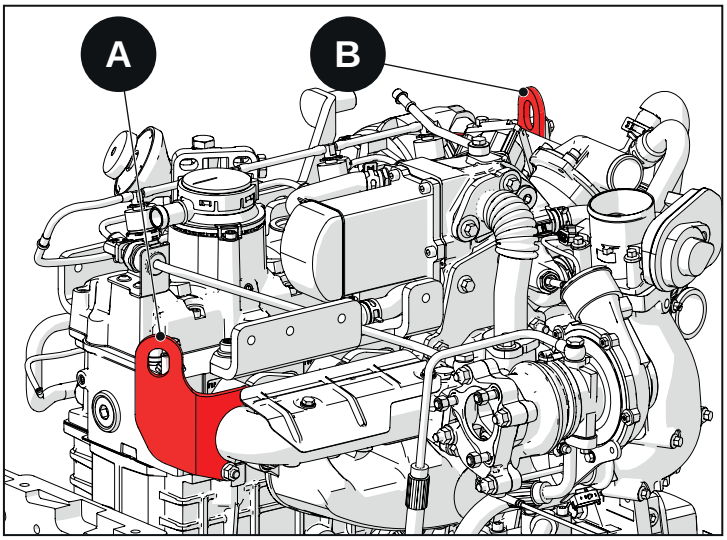

Fig. 2.50

2.14 Tightening torques

COMPONENT	N·m	SYSTEM
CENTRAL MAIN JOURNAL BEARING - SCREW	44,1	CRANKCASE
MAIN JOURNAL BEARING OIL DELIVERY FITTINGS	53,9	CRANKCASE
CAMSHAFT FLANGE	27,5	CRANKCASE
PISTON COOLING OIL JET VALVE - SCREW	12,7	CRANKCASE
IDLER GEAR (BETWEEN CRANKSHAFT AND CAMSHAFT) - SCREW	32,4	TIMING SIDE
IDLER GEAR (BETWEEN CAMSHAFT AND INJECTION PUMP) - SCREW	SEE PROCEDURE	TIMING SIDE
OIL PUMP - SCREW	27,5	TIMING SIDE
WATER PUMP - SCREW	32,4	TIMING SIDE
FRONT CRANKSHAFT HUB	SEE PROCEDURE	TIMING SIDE
FRONT CRANKSHAFT PULLEY - SCREW	45,1	TIMING SIDE
RAIL - SCREW	SEE PROCEDURE	INJECTION SIDE
RAIL MOUNTING BRACKET - SCREW	SEE PROCEDURE	INJECTION SIDE
INJECTOR - CLAMP SCREW	SEE PROCEDURE	INJECTION SIDE
HIGH PRESSURE INJECTION PUMP - NUT	27,5	INJECTION SIDE
HIGH PRESSURE INJECTION PUMP GEAR - NUT	86,3	INJECTION SIDE
ENGINE OIL EXCHANGER (INSTALLED ON HEAT EXCHANGER CASING) - BOLT	60.1	INJECTION SIDE
OIL FILTER MOUNT - BOLT	39,2	INJECTION SIDE
WATER MANIFOLD - SCREW	11,8	INJECTION SIDE
ROCKER LUBRICATION PIPE - FITTING ON HEAD	14	INJECTION SIDE
ROCKER LUBRICATION PIPE - FITTING ON CRANKSHAFT	23,5	INJECTION SIDE
EXHAUST MANIFOLD - NUT	SEE PROCEDURE	EXHAUST SIDE
INTAKE MANIFOLD - NUT	SEE PROCEDURE	EXHAUST SIDE
TURBOCHARGER - NUT	32,4	EXHAUST SIDE
OIL DELIVERY PIPE TO TURBO - FITTING ON TURBO	24,5	EXHAUST SIDE
OIL DELIVERY PIPE TO TURBO - NUT ON CRANKCASE	32,4	EXHAUST SIDE

EGR HEAT EXCHANGER (INSTALLED ON HEAT EXCHANGER CASING) - SCREW	14.7	EXHAUST SIDE
EGR HEAT EXCHANGER (INSTALLED ON CRANKCASE) - SCREW	32,4	EXHAUST SIDE
EGR HEAT EXCHANGER CASING (INSTALLED ON EXHAUST MANIFOLD) - NUT	32,4	EXHAUST SIDE
EGR UNIT AND INTAKE THROTTLE VALVE - SCREW	10,8	EXHAUST SIDE
EGR VALVE (R754IE4-TE4-ISE4)	13.7	EXHAUST SIDE
EGR UNIT AND INTAKE THROTTLE VALVE ELBOW UNION - SCREW	10,8	EXHAUST SIDE
VACUUM PUMP OIL DELIVERY FITTING (ON CRANKCASE)	27,5	ELECTRICAL SYSTEM SIDE
ALTERNATOR - NUT	45,1	ELECTRICAL SYSTEM SIDE
ALTERNATOR PULLEY (IDLER)	80 ± 5	ELECTRICAL SYSTEM SIDE
STARTER MOTOR - SCREW	83,4	ELECTRICAL SYSTEM SIDE
VACUUM PUMP OIL DELIVERY FITTING (ON VACUUM PUMP)	27,5	ELECTRICAL SYSTEM SIDE
REAR MOUNT - NUT	24,5	FLYWHEEL SIDE
FLYWHEEL HOUSING - SCREW	68,6	FLYWHEEL SIDE
FLYWHEEL	SEE PROCEDURE	FLYWHEEL SIDE
OIL FILTER	12,7	MAINTENANCE
CONNECTING ROD - SCREW	SEE PROCEDURE	BASE ENGINE
HEAD	SEE PROCEDURE	BASE ENGINE
ROCKER - NUT	29	BASE ENGINE
GLOW PLUG OR PLUG INSTALLED ON HEAD	14,2	BASE ENGINE
ALTERNATOR BRACKET - SCREW	68,6	REMOVAL AND INSTALLATION
FRONT HOISTING LUG (INSTALLED ON ALTERNATOR BRACKET)	27,5	REMOVAL AND INSTALLATION
REAR HOISTING LUG (INSTALLED ON EXHAUST MANIFOLD)	SEE PROCEDURE	EXHAUST SIDE

2.15 Wiring harness connector kit

	33002164
engine control unit	O
differential pressure sensor	O
EGR/TVA valve vacuum modulator	/
electrical power feed for TVA valve	O
electrical power feed for EGR valve	O
fuel temperature sensor	O
fuel heater	O
alternator	/
water in fuel sensor	O
EGR/TVA control signal output	/
diagnostic EOBD	O
foot throttle pedal	O
exhaust gas temperature sensor (pre-DPF)	/
exhaust gas temperature sensor (pre-DOC)	/
DPF exhaust gas temperature sensor	O
T3 exhaust gas temperature sensor (exhaust manifold)	/
exhaust gas pressure sensor	/
EGR cooler outlet side exhaust gas temperature sensor	/
LAMBDA probe	/
ambient temperature sensor	/
flow meter	/
CAN-BUS for SCR system	/
TENNECO DCU box (14 pin)	/
urea level and temp. sensor	/
SCR inlet side temperature sensor	/
DOC inlet side NOx sensor	/
DOC outlet side NOx sensor	/
urea injector	/
heated lines	/
urea tank heater	/
Tenneco ACU (62 pin)	/

O - Present
/ - Not present

2.16 Timing side

2.16.1 Overall views

Timing side

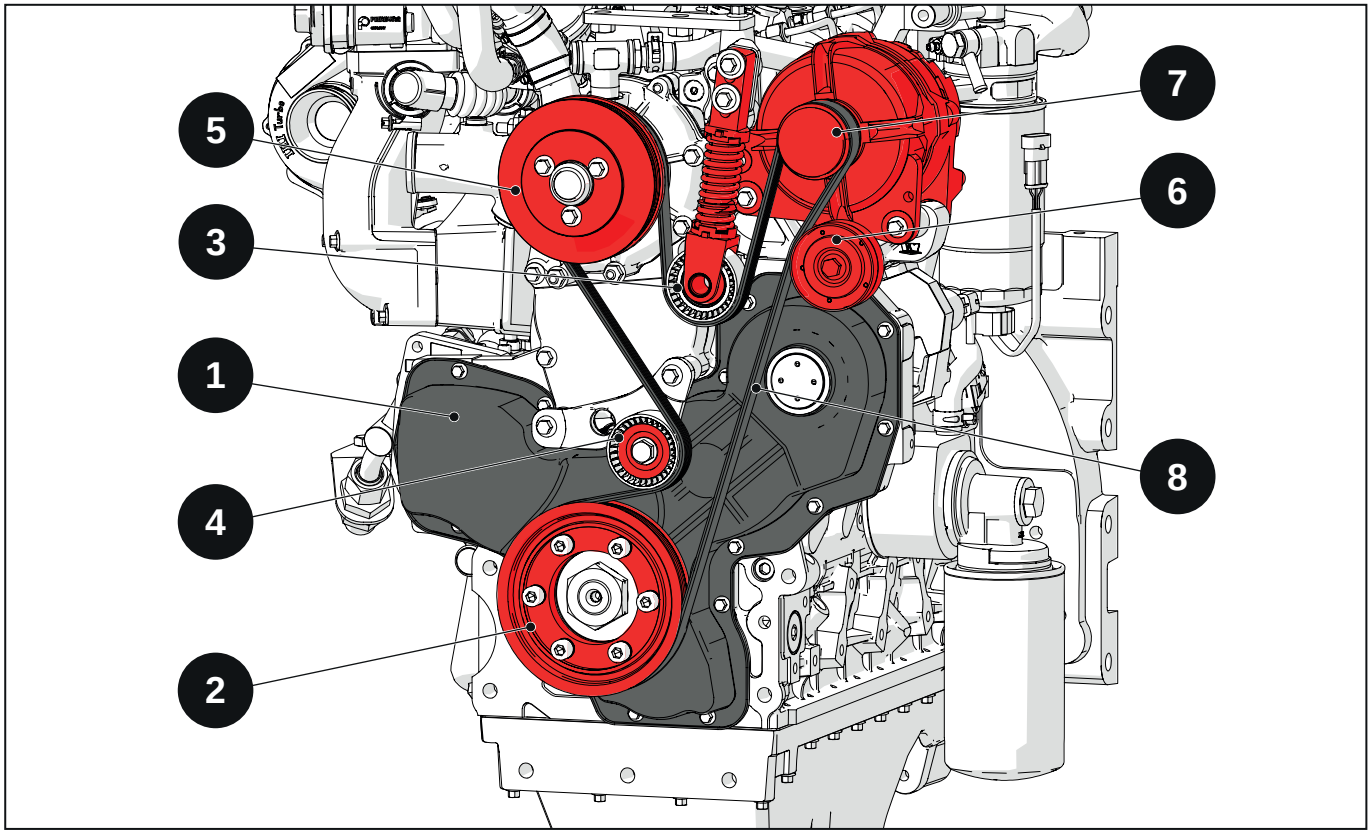

Fig. 2.51

1 - Timing cover (metal)
2 - Crankshaft pulley
3 - Automatic tensioner
4 - Plastic idler pulley
5 - Water pump pulley
6 - Metal idler pulley
7 - Alternator
8 - Alternator Poly-V belt

Timing gears

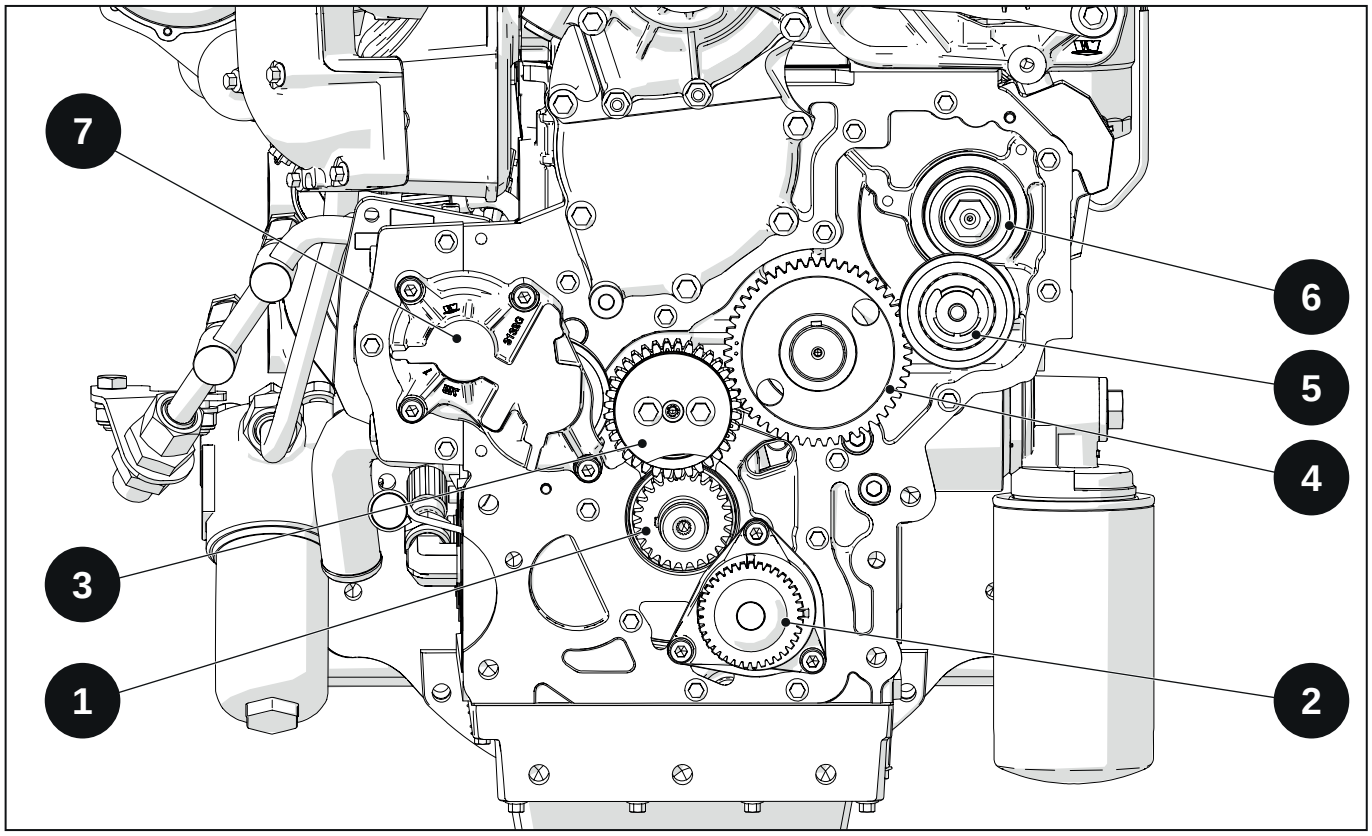

Fig. 2.52

1 - Crankshaft gear
2 - Oil pump
3 - Idler
4 - Camshaft gear
5 - Idler
6 - Injection pump gear
7 - Hydraulic pump

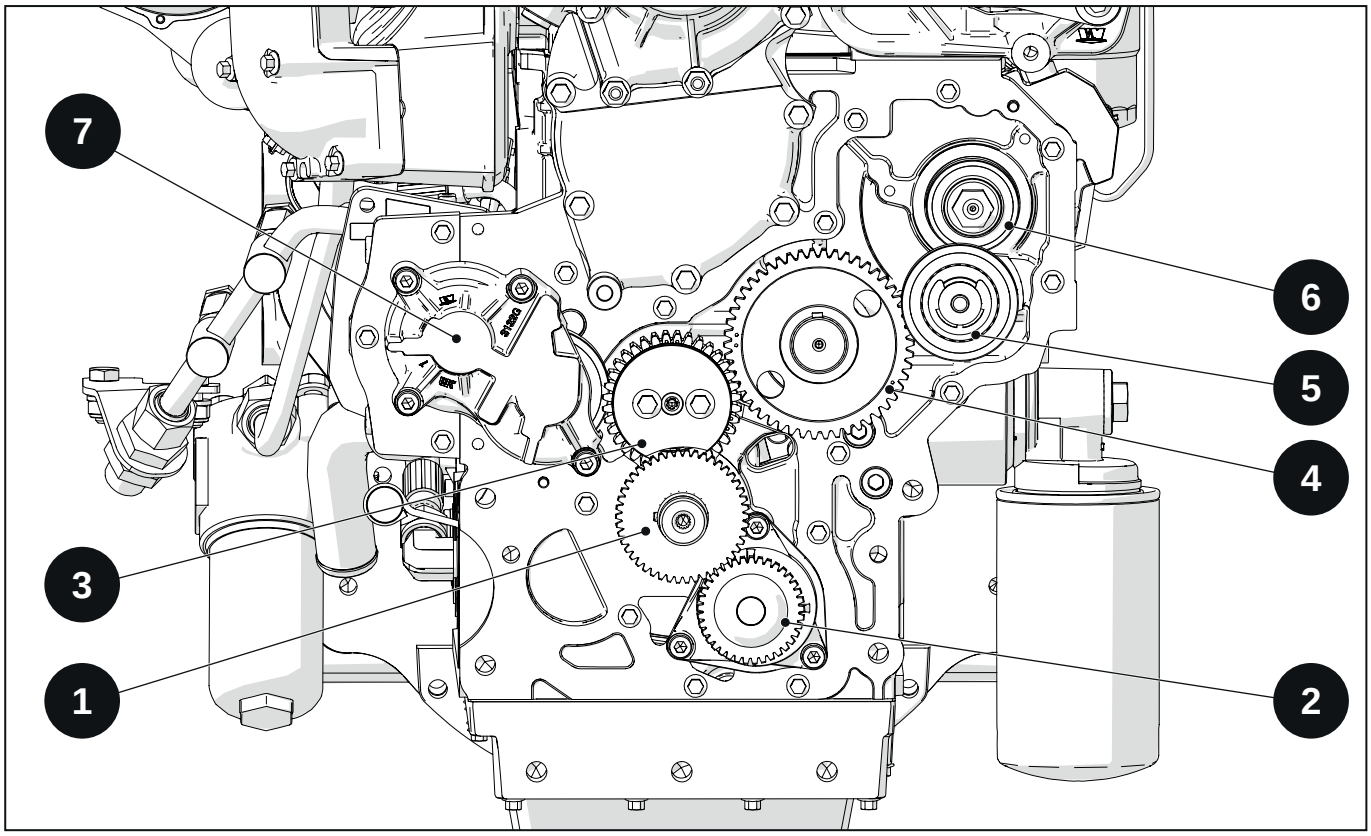

Fig. 2.53

1 - Oil pump drive gear (crankshaft gear not visible)
2 - Oil pump
3 - Idler
4 - Camshaft gear
5 - Idler
6 - Injection pump gear
7 - Hydraulic pump

Timing gears aligned with piston 1 at TDC on ignition stroke

1 - Hydraulic pump gear
2 - Idler
3 - Crankshaft gear
4 - Camshaft gear
5 - Reference markings

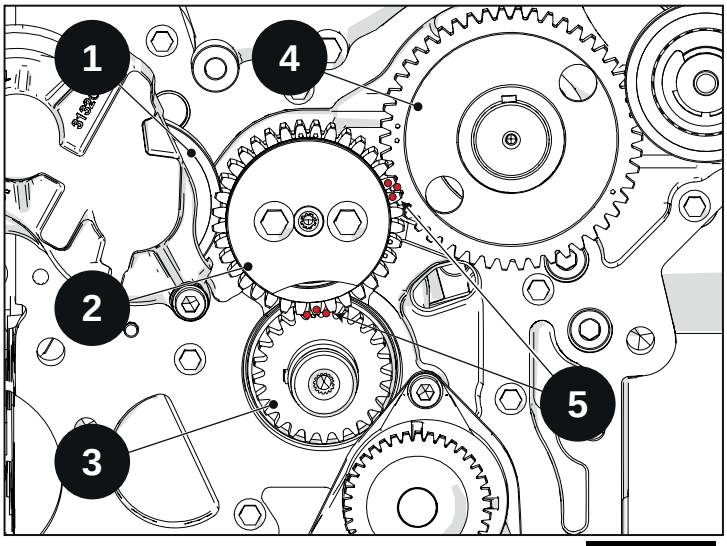

Fig. 2.54

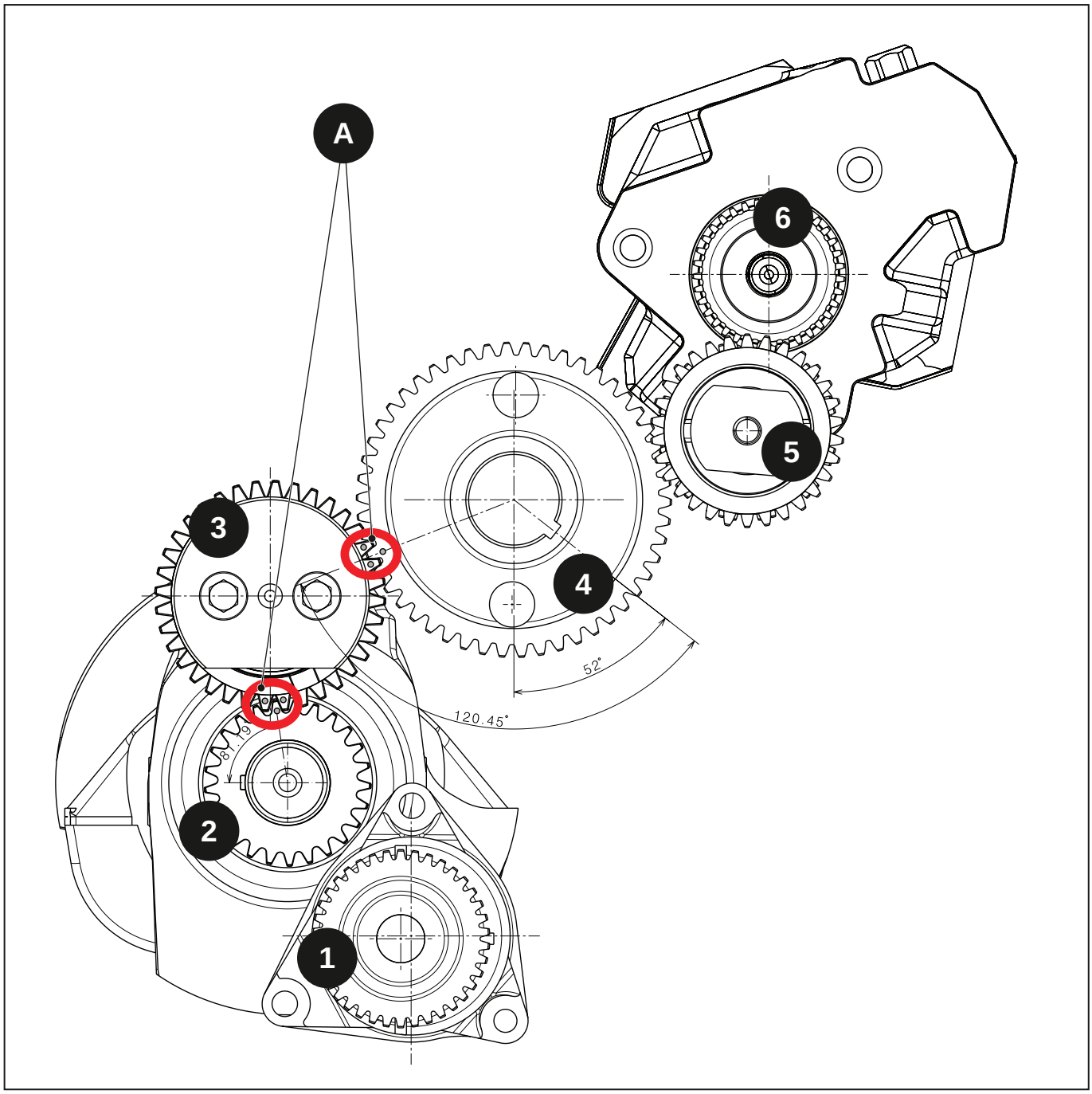

Fig. 2.55

A - timing reference markers - dots punched onto gears
1 - Oil pump gear
2 - Crankshaft gear
3 - Idler gear
4 - Camshaft gear
5 - Idler gear
6 - High pressure injection pump gear

2.17 Oil pump

2.17.1 Removal

Remove the oil pump drive gear

Remove the 3 screws together with the gaskets (note the positions of the screws).

A - Oil pump drive gear
B - oil pump and respective gear
C - screws with gaskets

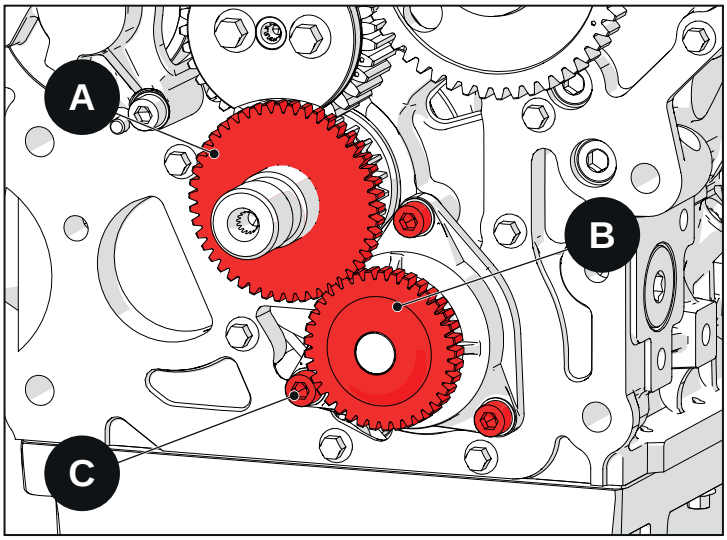

Fig. 2.56

2.17.2 Cleaning

1 - Dismantle all parts and clean with solvent.

2 - Place the parts on a surface and dry with compressed air.

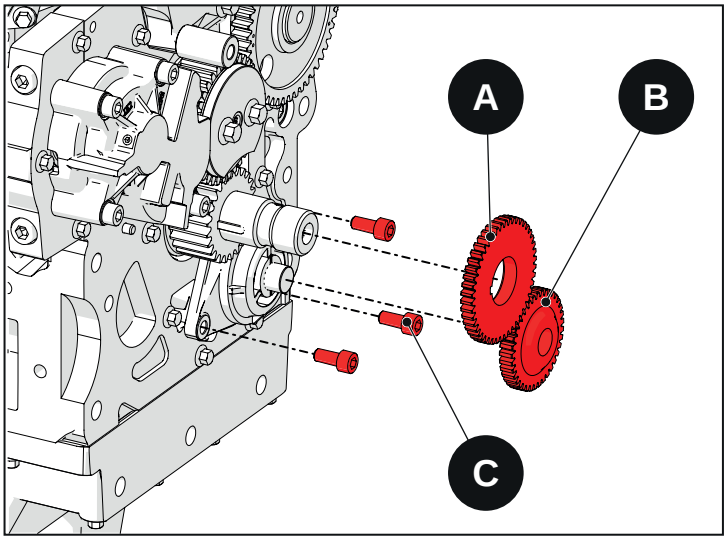

Fig. 2.57

2.17.3 Inspection

1 - Inspect the pump shaft, the rotors and the pump casing to check for excessive wear or damage. Replace the complete oil pump if damaged or excessively worn.

2 - Measure the clearance between the internal rotor and the external rotor.

3 - Measure the clearance between the external rotor and the casing.

4 - Measure the recession of the external rotor relative to the internal rotor (recession of external rotor relative to pump casing)

5 - If the values measured exceed the specified limits, the complete pump unit must be replaced.

6 - Check the fastening torque between the rotor and the gear.

2.17.4 Specifications

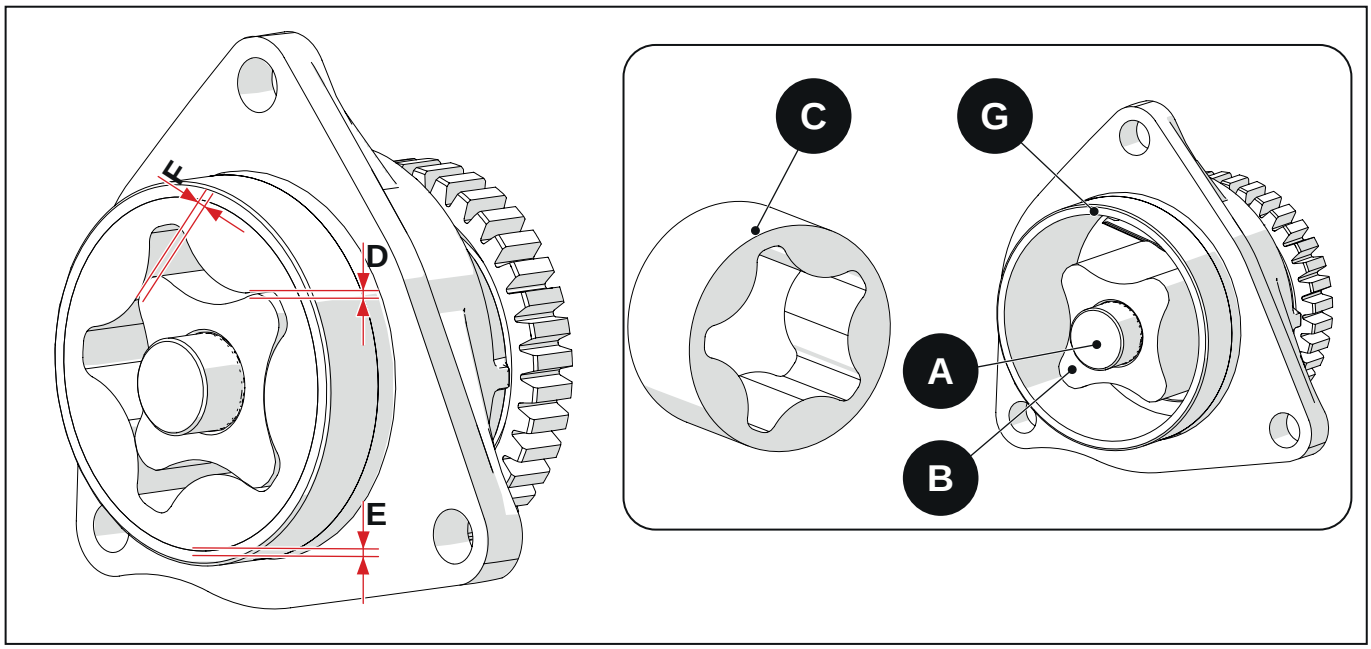

Fig. 2.58

A - Shaft
B - Internal rotor
C - External rotor
D - Clearance between rotors (see external rotor)
E - Clearance between casing and external rotor (see oil pump casing)
F - Recession of external rotor relative to internal rotor (recession of external rotor relative to pump casing - see figure below)
G - Oil pump casing

1 - Oil pump gear
2 - Housing
3 - External rotor
4 - Internal rotor
5 - Shaft

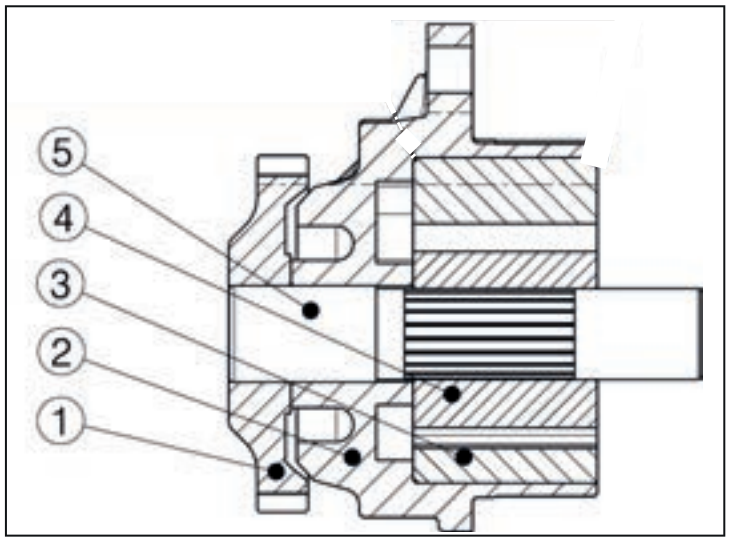

Fig. 2.59

Endfloat between gear and casing	0.150 - 0.250 mm
Fastening torque between rotor and gear	9 kg·m
Recession of the external rotor relative to the internal rotor	0.030 - 0.087 mm

2.17.5 External rotor

a	57.95 - 58 mm
b	49.3 - 49.4 mm
c- Clearance between rotors	0.07 - 0.20 mm
Rotor length	32.483 - 32.5 mm

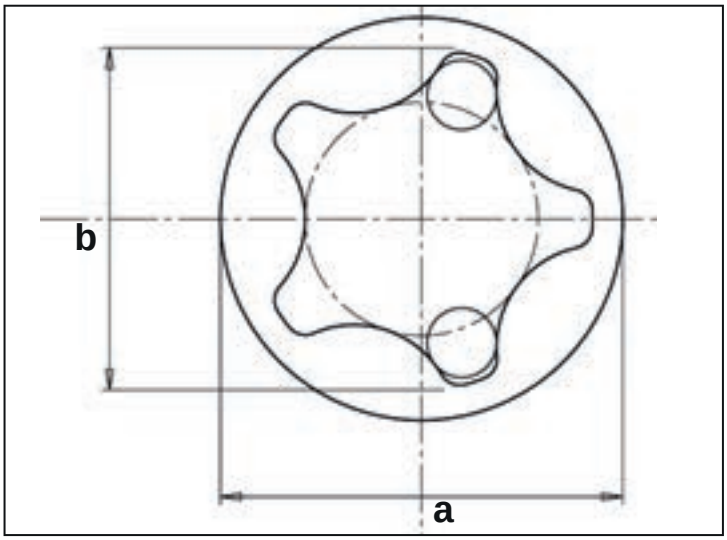

Fig. 2.60

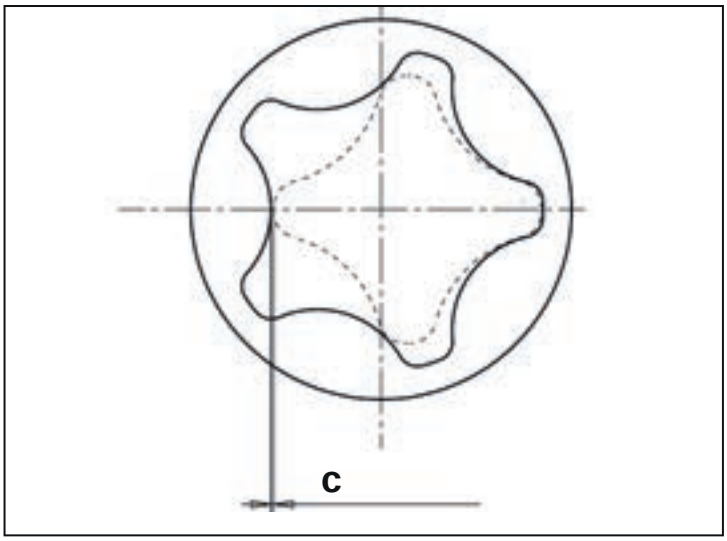

Fig. 2.61

2.17.6 Internal rotor

a	25.92 - 25.97 mm
b	41.12 - 41.15 mm
c	32.045 - 32.075 mm
Rotor length	32.483 - 32.5 mm

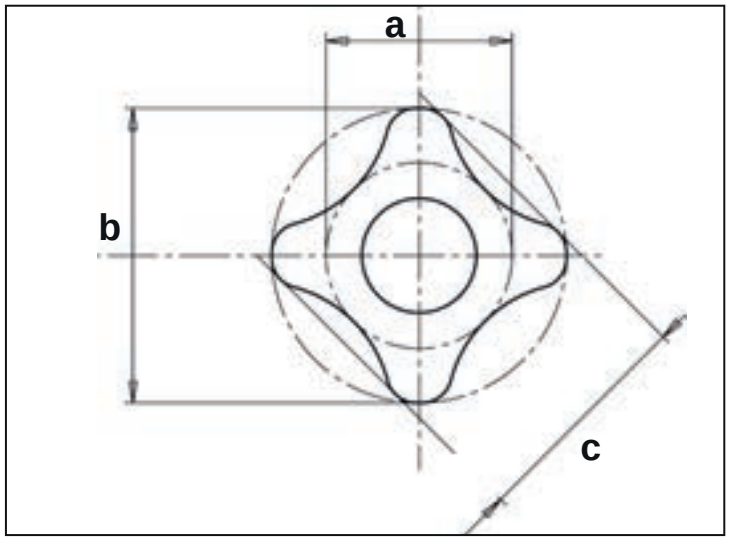

Fig. 2.62

2.17.7 Oil pump casing

a - Internal diameter of casing	58.13 - 58.18 mm
Clearance between casing and external rotor	0.13 - 0.23 mm
b - Depth of seat in casing	32.53 - 32.57 mm
c - depth	22.06 - 22.10 mm

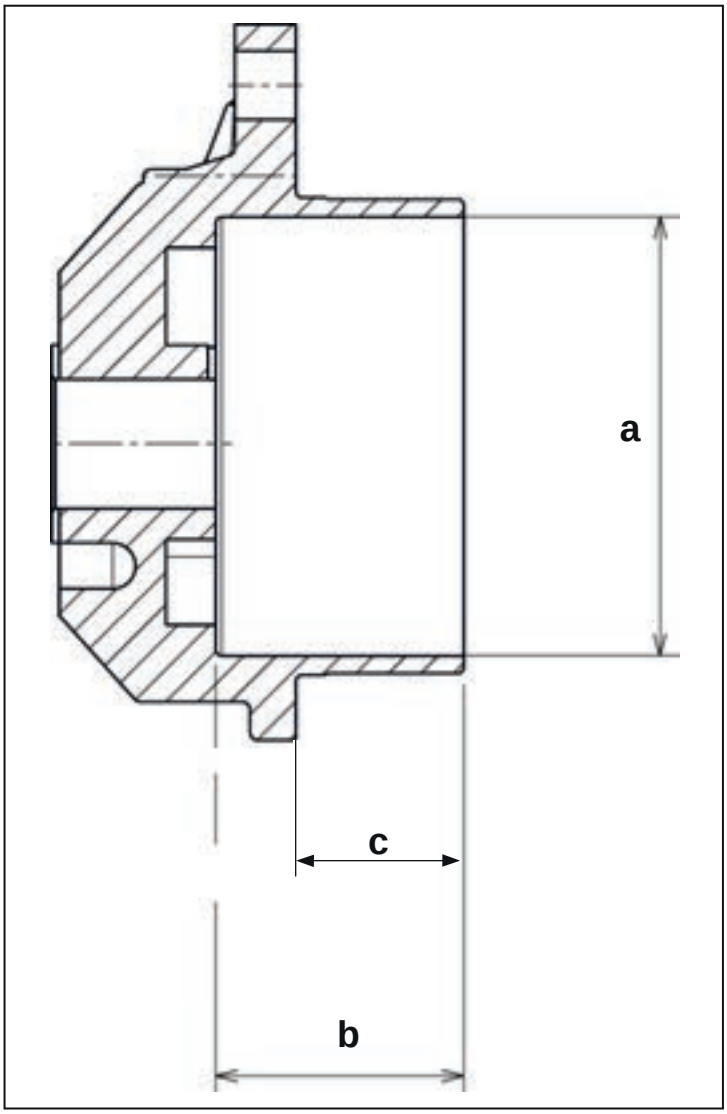

Fig. 2.63

2.17.8 Oil pump seat in crankcase

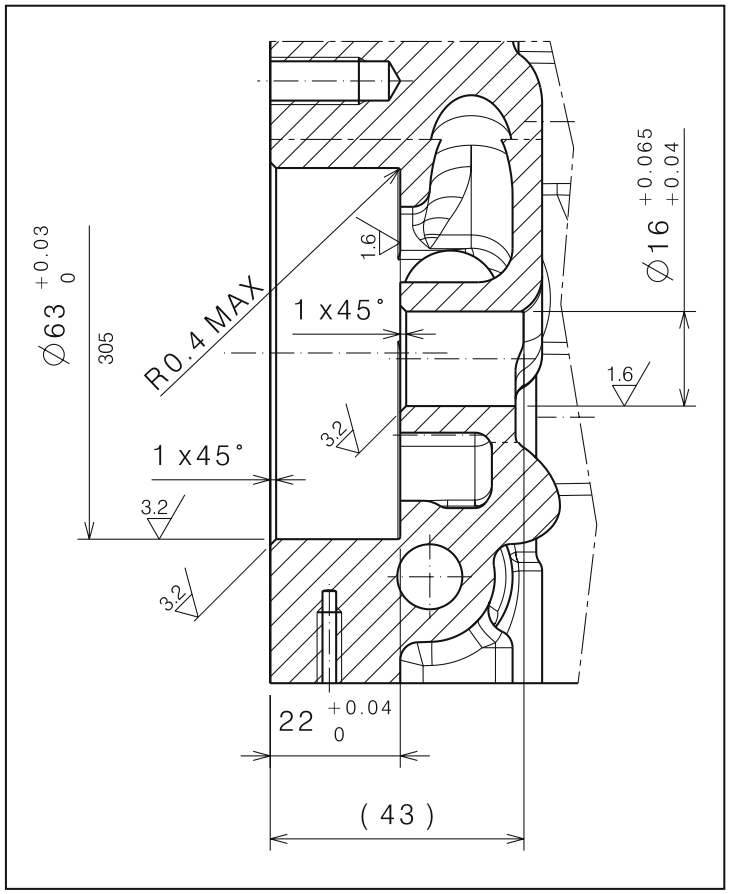

Fig. 2.64

2.17.9 Installation

- Lubricate the casing and the internal and external rotors with engine oil.
- Install the external rotor with the bevelled side facing towards the seat in the casing (interior).
- Install the pump in the cylinder block, fitting the 3 screws and washers into the holes on the pump.
- Tighten the 3 screws in a crossed pattern.

  Oil pump screws: 27.5 N·m

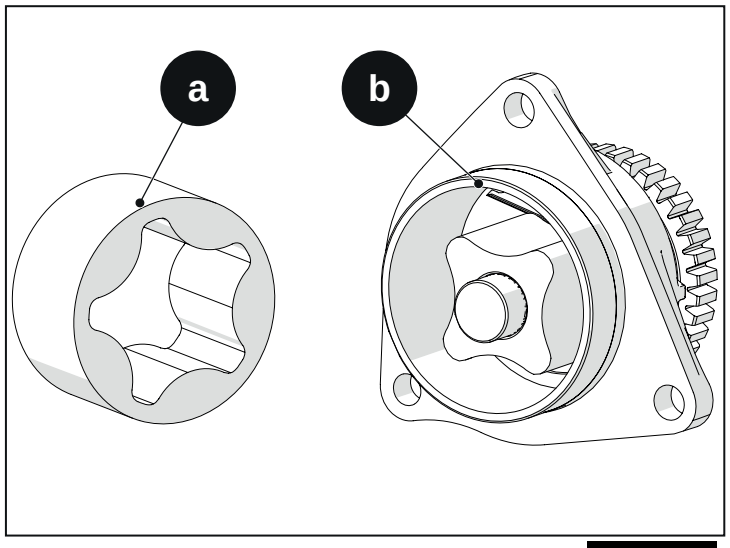

Fig. 2.65

1 - Install the oil pump drive gear, aligning the key seat in the gear with the key on the crankshaft, and with the side with the flange facing towards the crankshaft gear (inwards relative to engine). The flat surface must face outwards relative to the engine.

2 - Check that the oil pump gear is free to turn by checking that there is backlash between the teeth of the crankshaft gear and the teeth of the oil pump gear. Check that the parts have been installed correctly if there is no backlash between the teeth of the gears.

3 - Fit the timing cover.

4 - Complete assembly of the engine

5 - Start the engine and check the oil pressure and for oil leaks.

a - Bevelled side of rotor
b - Pump casing
c - Oil pump screws
d - Flanged side
e - Key seat

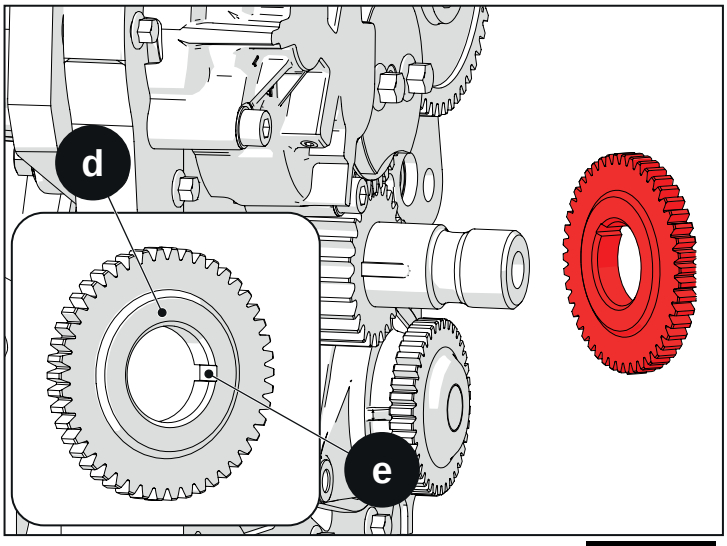

Fig. 2.66

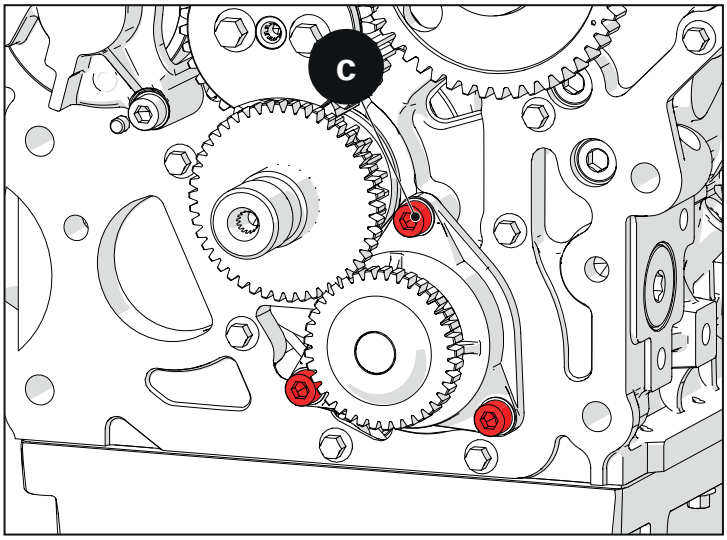

Fig. 2.67

2.18 Crankshaft gear

2.18.1 Removal

Note
Only replace the timing cover if it is damaged.

Before removing the gear, mark corresponding teeth on the gear itself and on the idler gear with a marker pen to facilitate synchronisation of the gears during reassembly

Remove the oil pump drive gear. Remove the oil pump and, if necessary, the idler gear.

Fit the puller tool onto the gear as shown in the photo. Tighten the 4 screws of the puller tool securely. Tighten the rod of the puller tool to remove the gear.

A - puller tool with 4 screws
B - crankshaft gear

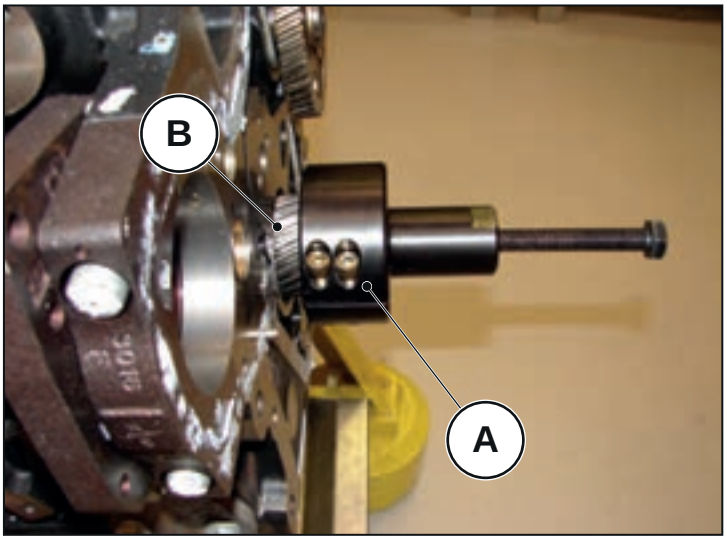

Fig. 2.68

2.18.2 Installation

Install the gear, aligning the seat key with the key on the shank of the crankshaft.

Copy the reference marking made previously on the replaced gear onto the new gear and align with the marking on the idler gear. If this is not possible, synchronise the crankshaft gear, idler gear and camshaft gear correctly (see “Timing gears aligned with piston 1 at TDC on ignition stroke”).

Note
Heat the crankshaft gear to 70°C and install on the crankshaft, pushing completely into its seat and holding in place for at least 10 seconds.

2.19 Hydraulic pump idler gear (between crankshaft and camshaft gears)

2.19.1 Removal

- Remove the 2 screws fastening the idler gear bush.
- Before removing the gear, make reference markings on all 3 gears (crankshaft, idler and camshaft gears), or align the 3 gears as shown in the photo, with the timing reference dots stamped onto each gear aligned correctly.
- Remove the bush and the idler gear together as a complete assembly.
- Separate the bush from the idler gear.

Note

TIMING GEARS ALIGNED WITH PISTON 1 AT TDC ON IGNITION STROKE

REFERENCE MARKERS ON GEARS COVERED WITH DOT OF WHITE MARKER INK APPLIED DURING ASSEMBLY.

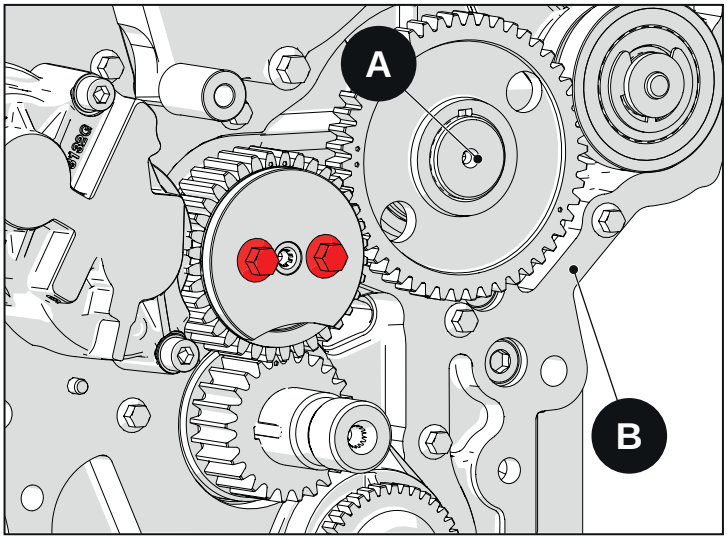

Fig. 2.69

A - idler gear bush
B - idler gear (assembly)
C - Idler gear fastener screws
D - reference markers aligned on crankshaft and idler gear (marks punched onto gears)
E - reference markers aligned on idler gear and camshaft gear (marks punched onto gears)
F - reference markers punched onto gears (facing outwards)

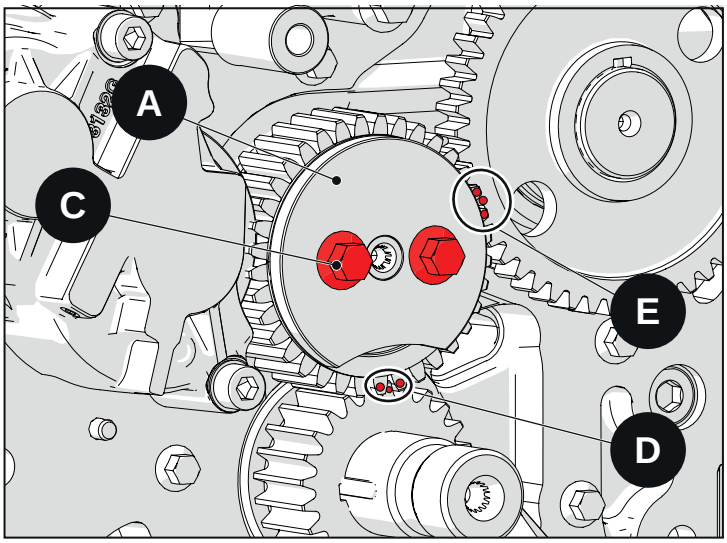

Fig. 2.70

2.19.2 Installation

- Lubricate the idler gear assembly (bearing, bush and shim C).
- Install the bush in the idler gear. Check that the bush rotates freely.
- Make sure that the reference markers on the gears are facing outwards and not inwards (towards centre of cylinder block).
- Install the idler gear assembly. Make sure that the punched markers on the adjacent gears (crankshaft and camshaft gears) are aligned correctly, or that the markings made previously are aligned correctly.
- To permit correct installation of the oil pump drive gear, the cut-out in the circumference of the bush must face towards the crankshaft gear.
- Ensure that the bevelled part C1 of the shim C faces towards the gear (inwards, towards the engine).
- Tighten the 2 fastener screws.

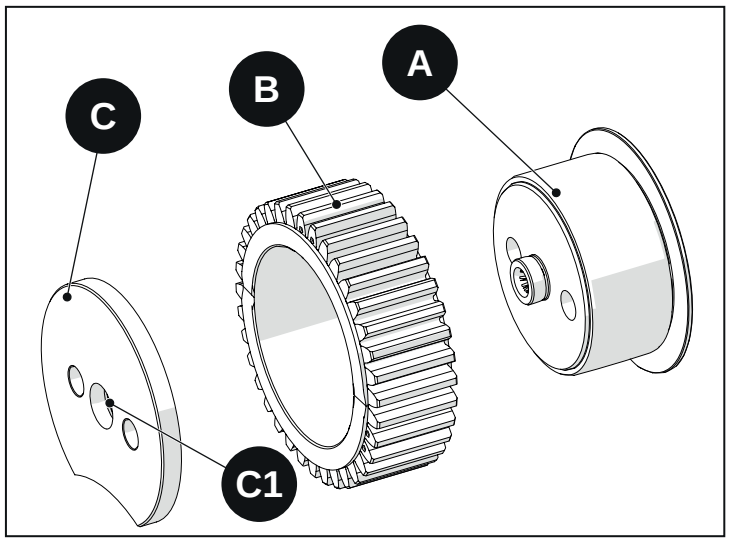

Fig. 2.71

x = idler gear fastener screws (32.4 N·m)

X - idler gear fastener screws
A - bush
B - idler gear
C - shim
C1 - bevelled part of shim

Specifications - old type

Internal diameter of bush	53.465 - 53.480 mm
Internal diameter of gear bearing	53.500 - 53.519 mm
Free play after initial assembly	0.02 - 0.054 mm
Wear limit	0.2 mm

Specifications - new type

Internal diameter of bush	53.445 - 53.475 mm
Internal diameter of gear bearing	53.500 - 53.519 mm
Free play after initial assembly	0.025 - 0.074 mm
Wear limit	0.2 mm

X - idler gear fastener screws
A - bush
B - idler gear
C - shim (on EU5 and EU6 engines)
C1 - bevelled part of shim (on EU5 and EU6 engines)
F - reference markers punched onto gear (facing outwards)
G - cut-out portion of bush circumference facing towards crankshaft gear.
H - oil pump drive gear

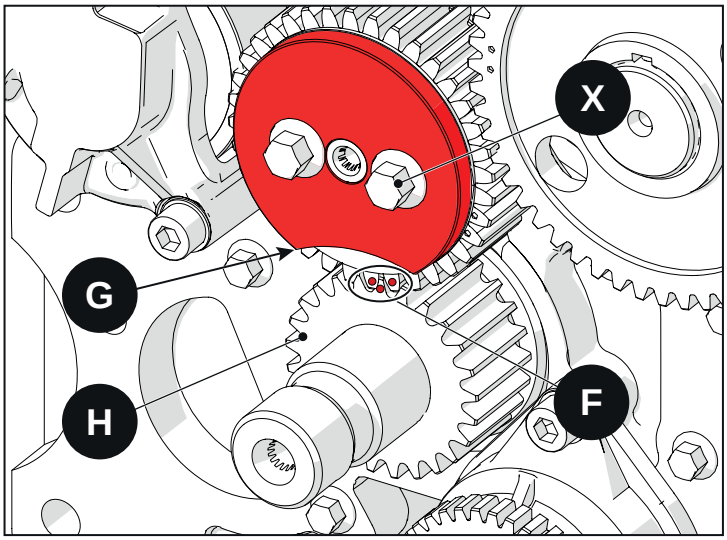

Fig. 2.72

2.20 high pressure pump idler gear (between camshaft gear and injection pump gear)

2.20.1 Removal

Remove the screw fastening the idler gear, situated underneath the injection pump.

A - Idler gear (between injection pump and camshaft gears)
B - Camshaft gear
C - Injection pump gear
D - High pressure injection pump
E - Idler gear fastener screw

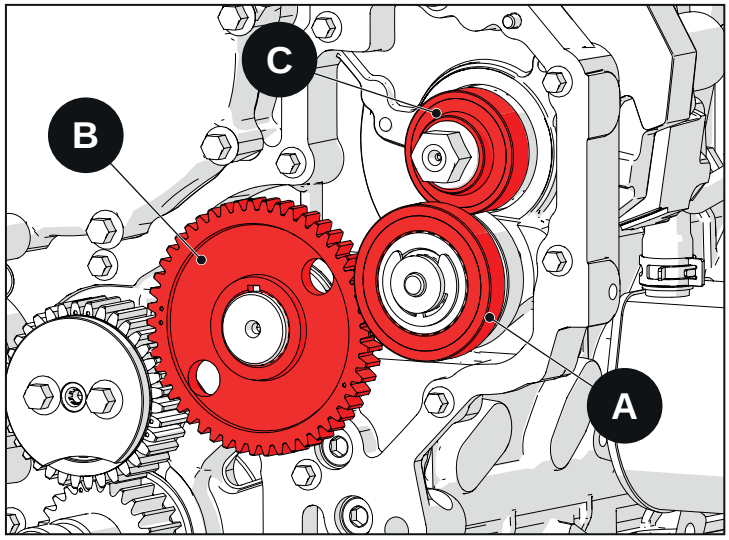

Fig. 2.73

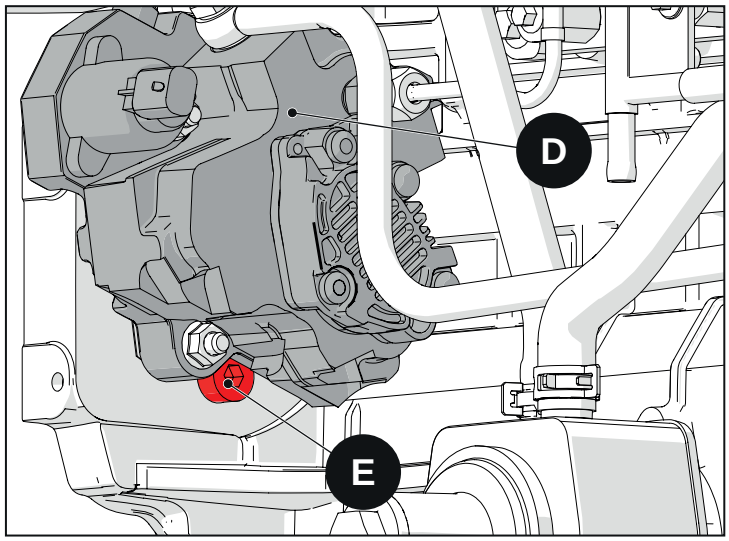

Fig. 2.74

2.20.2 Installation

Install the idler gear between camshaft and injection pump gears.

Note
The idler gear does NOT require synchronisation with the other gears.

Fit and hand-tighten the screw with a new O-ring, and lubricate with Molykote 111. Tighten the screw definitively with the following procedure:

Step 1 - tighten to	**35 N·m**
Loosen the screw by an angle between	**30 and 90°**
Step 2 - retighten to	**35 N·m**

F - O-ring
G - Idler gear fastener screw

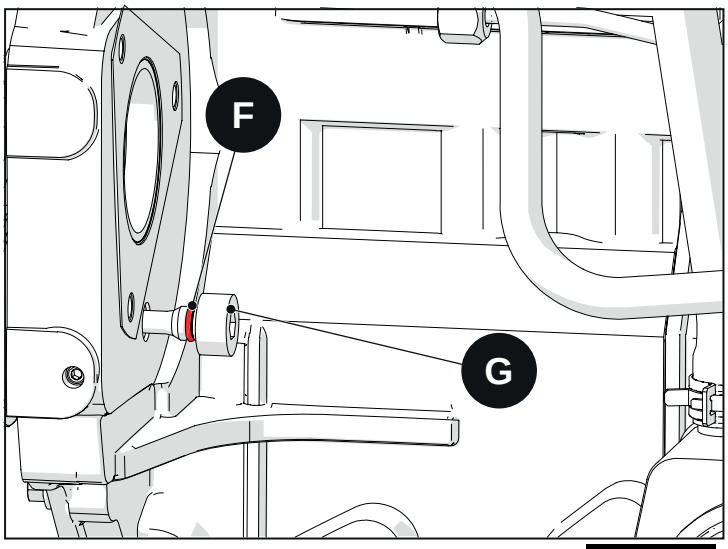

Fig. 2.75

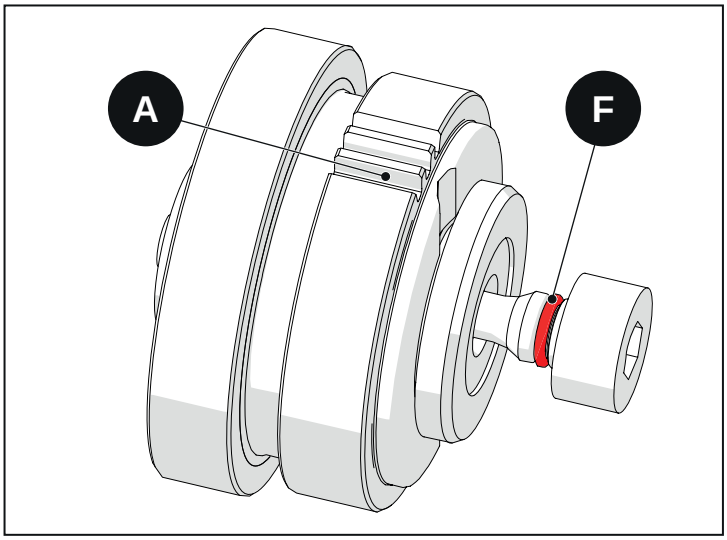

Fig. 2.76

2.21 Hydraulic pump gear

2.21.1 Removal

Loosen the rear screws and remove the rear flange.

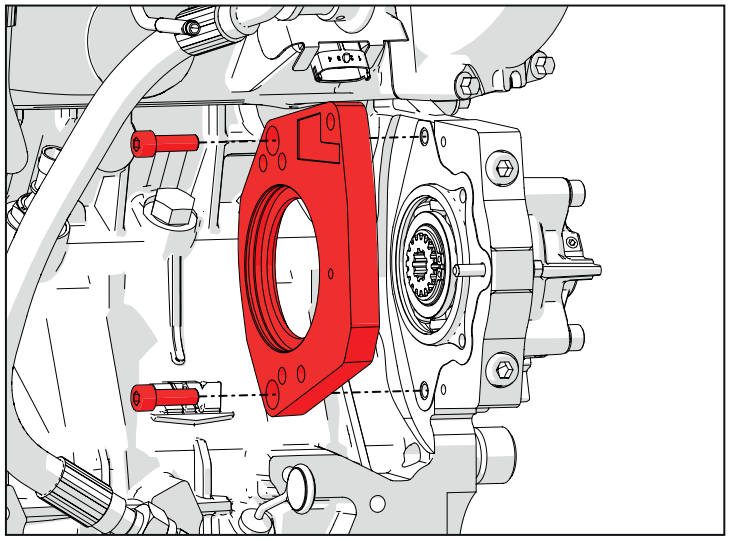

Fig. 2.77

Loosen the front screws and remove the cover.

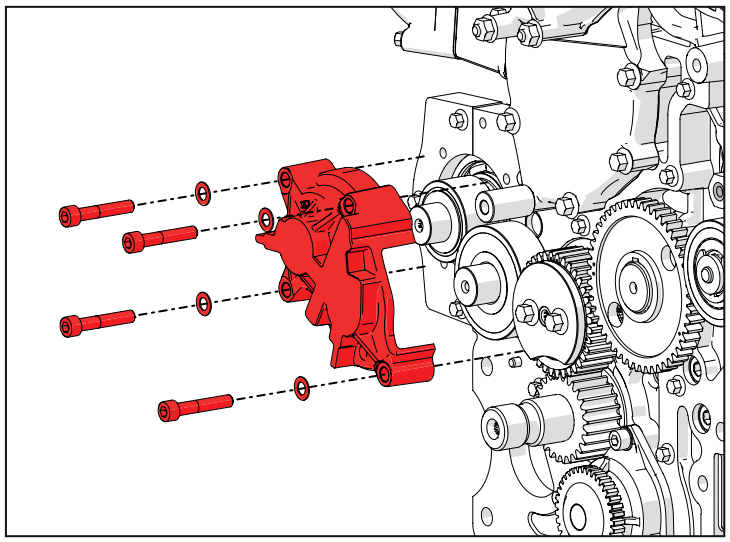

Fig. 2.78

Remove the complete hydraulic pump drive gear assembly (gear + ball bearing)

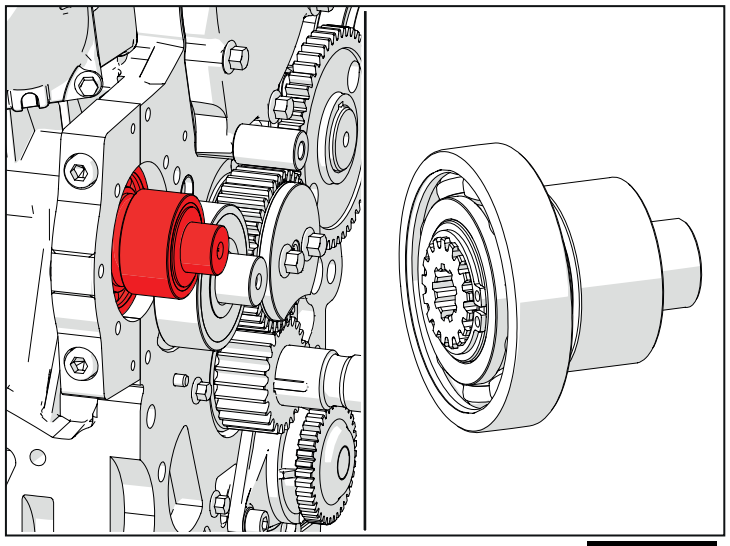

Fig. 2.79

Remove the hydraulic pump drive gear idler gear

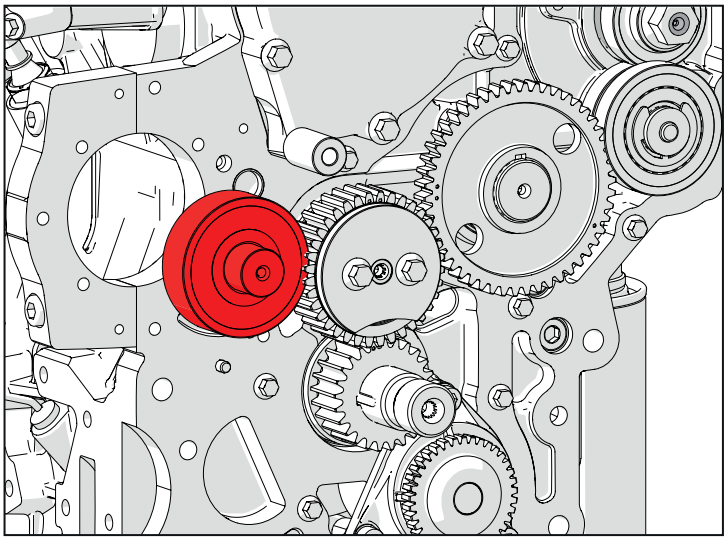

Fig. 2.80

2.21.2 Installation

- Install the idler on the crankcase.
- Oil the idler pin.
- The notch must face towards the crankcase.
  a - notch

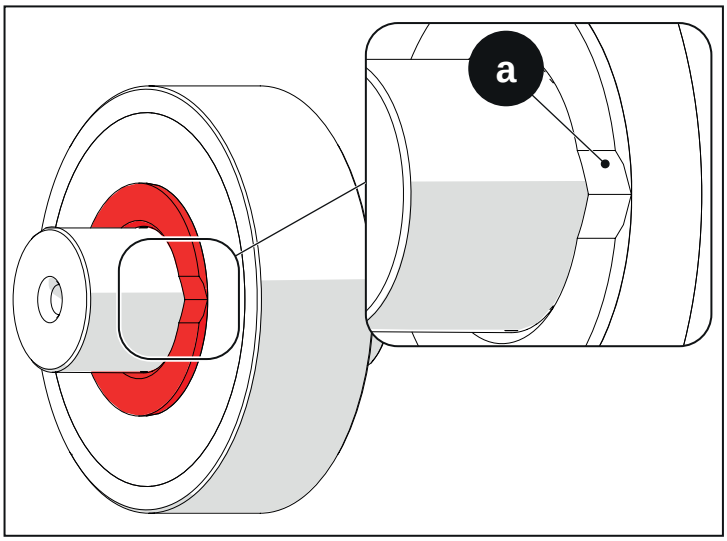

Fig. 2.81

- Install the complete hydraulic pump drive gear assembly (gear + ball bearing) on the crankcase.
- Oil the outer surface of the ball bearing.

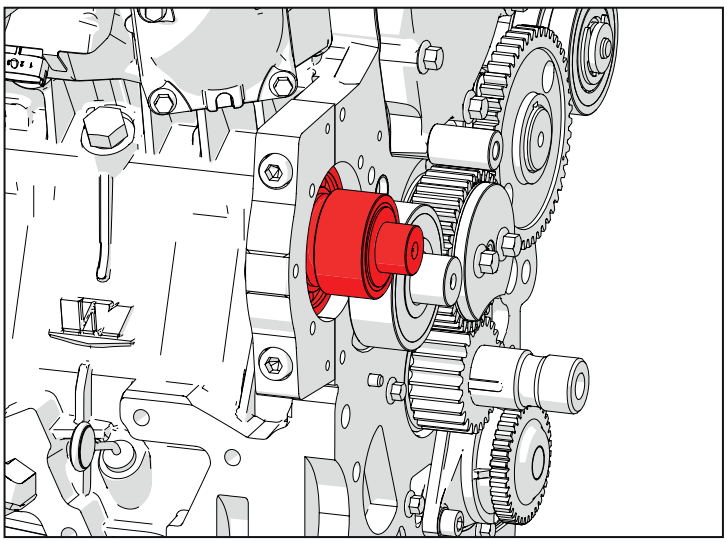

Fig. 2.82

- Install the cover, aligning the pins with the holes in the crankcase.
- Apply Loctite 572 to the threads of the screws and then tighten the screws.

Front cover fastener screw 24.5 N·m

a - pin
b - front cover fastener screws

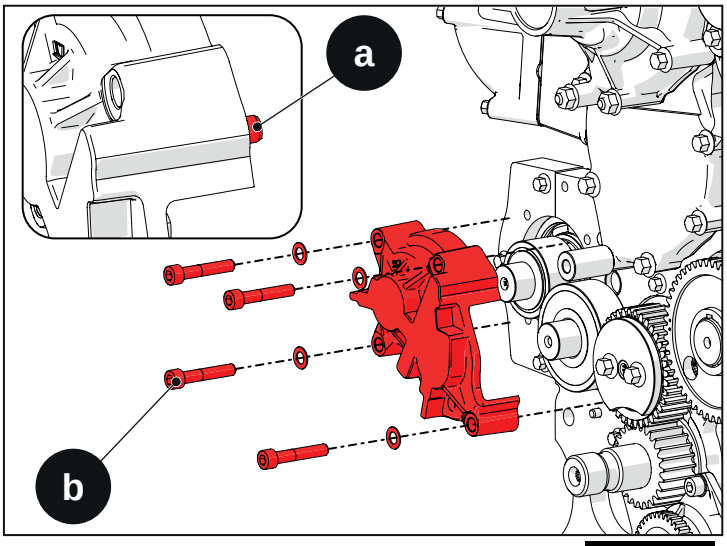

Fig. 2.83

- Install the rear flange
- Apply Loctite 572 to the threads of the screws and then tighten the screws.

rear flange screws 19.6 N·m

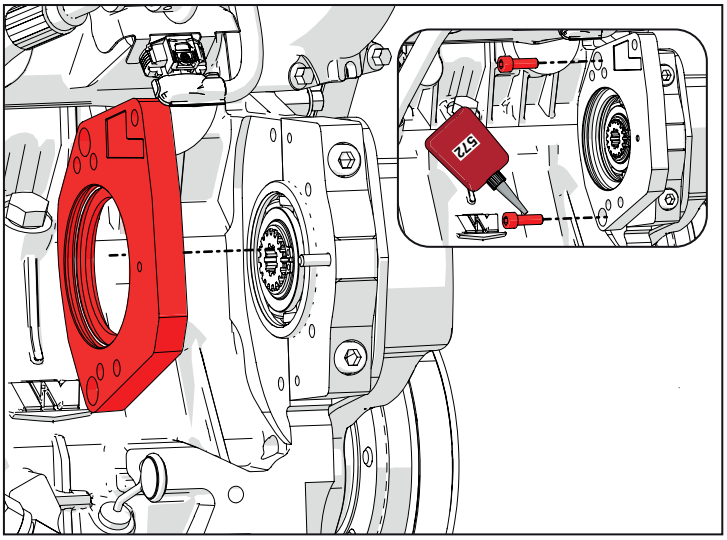

Fig. 2.84

Note

Fit the gasket with the cut side in the position shown in the figure

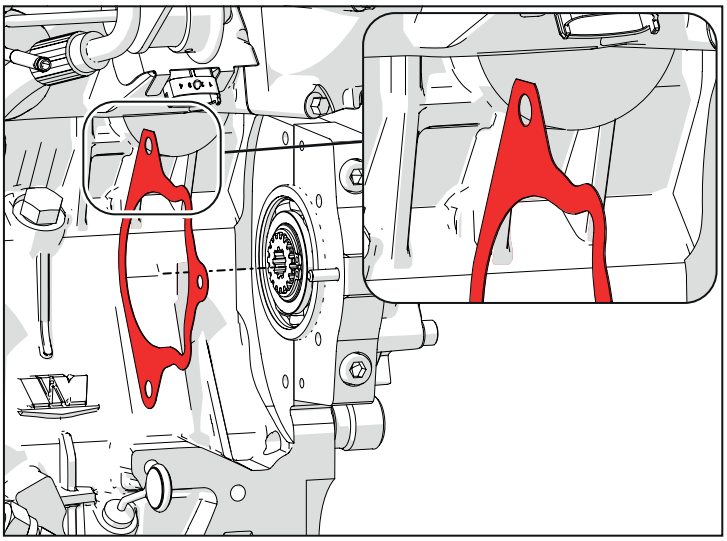

Fig. 2.85

2.22 Idler pulley

2.22.1 Removal

- Remove the alternator belt (see the section Alternator Belt)
- Remove the LH screw of the metal idler pulley.

A - metal pulley

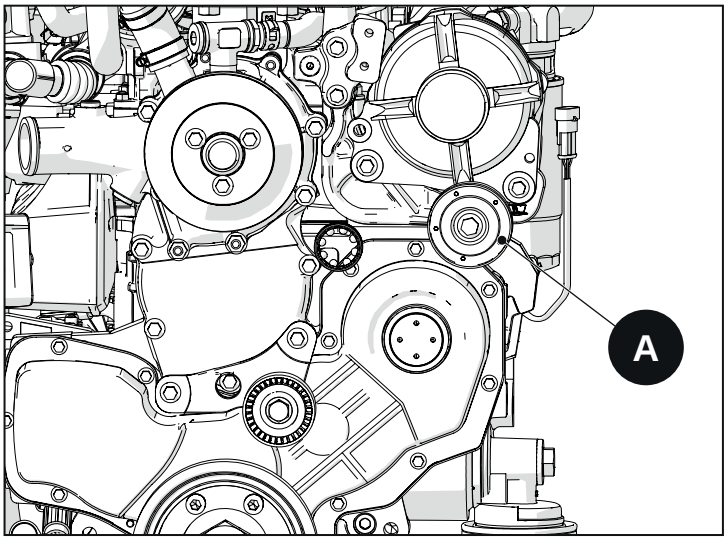

Fig. 2.86

2.22.2 Installation

- Fit and tighten the LH screw

C - Plastic pulley

LH screw of metal idler pulley 53 N·m

LH screw of idler pulley 53 N·m

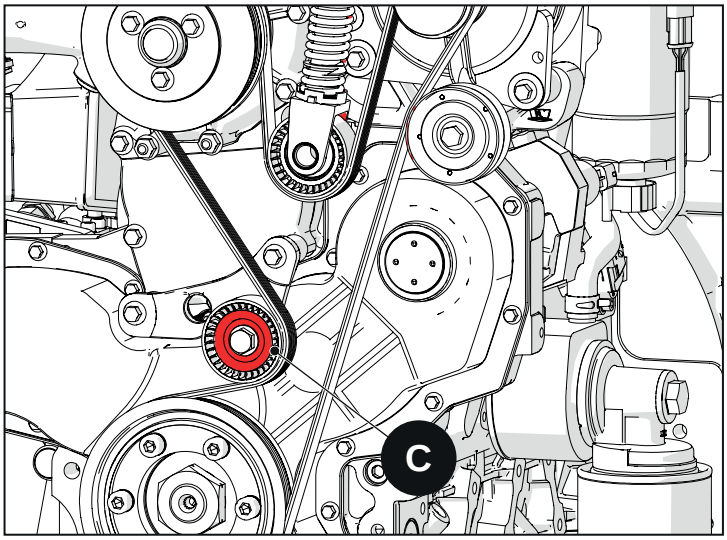

Fig. 2.87

2.23 Crankshaft hub and pulley

2.23.1 Removal

- Remove the alternator belt (see the section Alternator Belt).
- Install the special tool for immobilising the crankshaft (fitted in place of the starter motor).
- Remove the 6 screws of the pulley and remove the pulley.
- Use a 46 mm socket bit to remove the LH nut of the crankshaft pulley.

Note

The hub may also be removed together with the pulley as an assembly without separating the pulley from the hub.

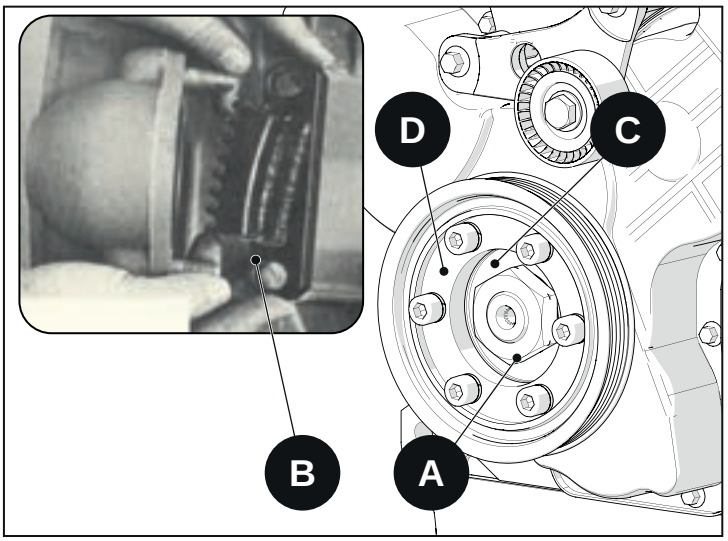

Fig. 2.88

A - crankshaft hub nut
B - crankshaft pulley
C - crankshaft hub
D - special tool

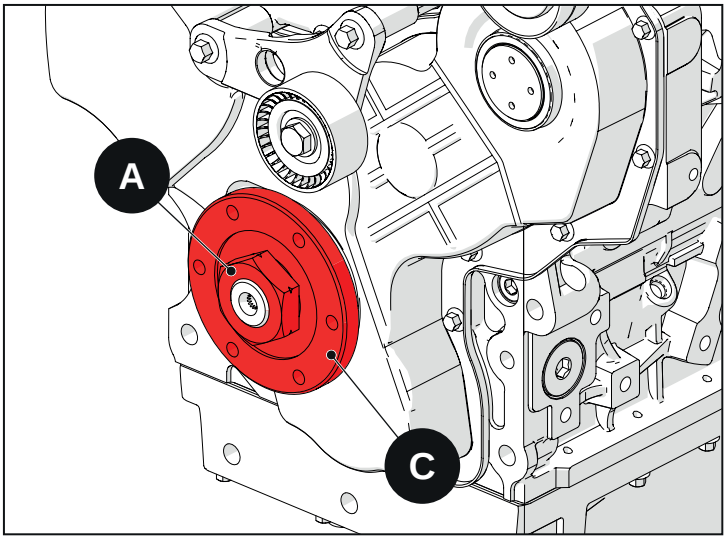

Fig. 2.89

Assembled hub and pulley.

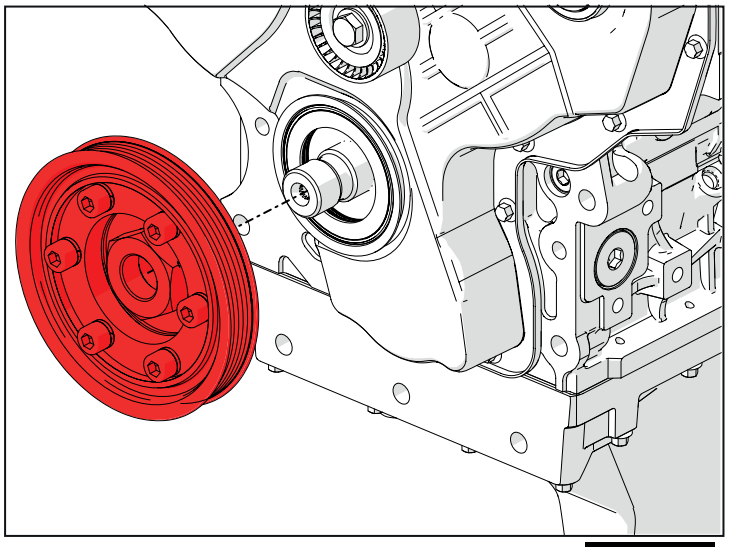

Fig. 2.90

If the pulley has been separated from the hub, install the hub onto the pulley as shown in the photo.

The raised edge of the pulley must face outwards.

A - crankshaft pulley
B - crankshaft hub
C - raised edge of pulley

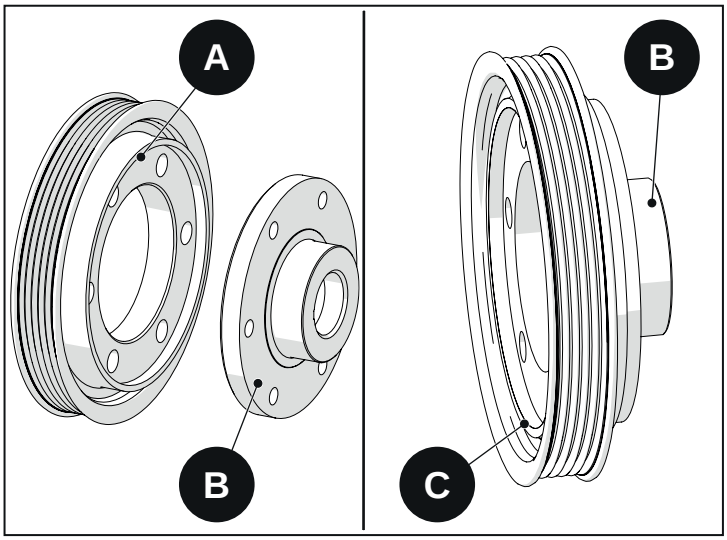

Fig. 2.91

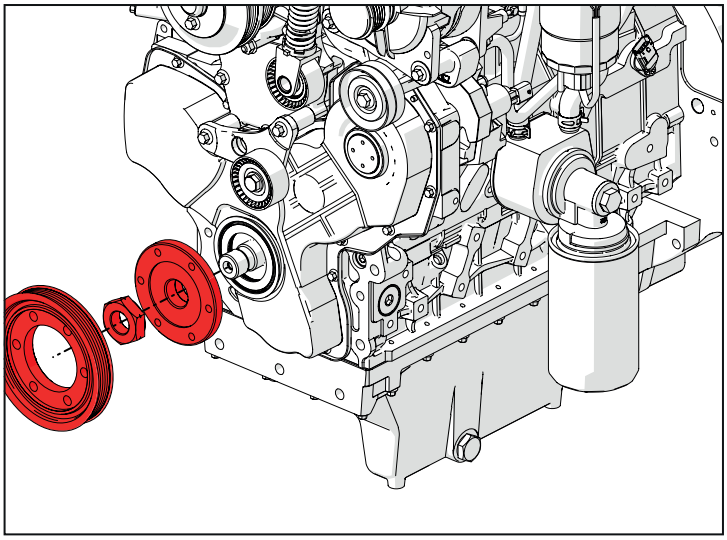

Fig. 2.92

- Clean the mating surfaces between the hub and the nut with solvent and dry with compressed air.
- Clean the thread of the crankshaft.
- Clean the surface of the hub in contact with the oil pump idler gear.
- If the front oil seal has been removed in order to be replaced, clean the oil seal seat in the cover.

The front oil seal and the lip of the oil seal may be damaged by natural skin oil if handled with bare hands, or by dirt transferred from gloves. Damage to the oil seal or lip may cause an oil leak. Do not touch the oil seal or lip when installing or replacing the crankshaft hub.

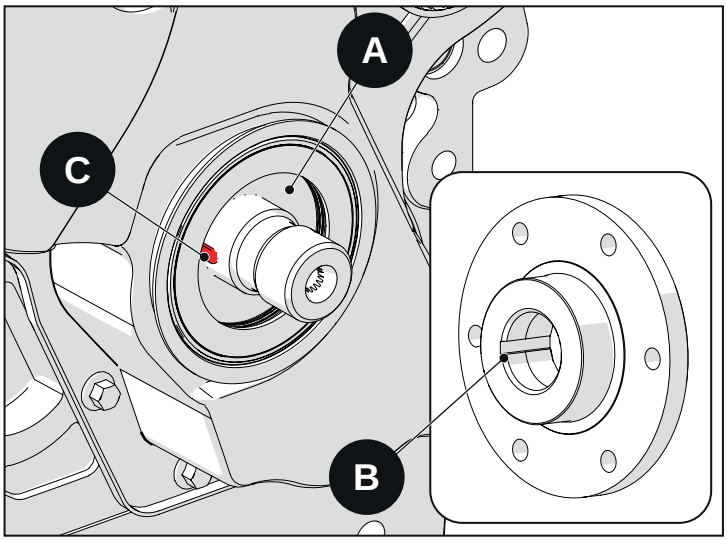

Fig. 2.93

- Install the tool for immobilising the crankshaft (fitted in place of the starter motor).
- Apply “Molykote G Rapid Plus Paste” grease to the left-handed thread of the crankshaft hub nut and to the surface of the hub which will be in contact with the nut
- Align the key seat on the hub with the key on the crankshaft and hand-tighten the nut

Attention

The flanged side of the nut must face towards the crankshaft gear (inwards, towards engine)

Tightening procedure

- Tighten the nut to 400 N·m.
- Loosen the nut and retighten to 600 N·m.

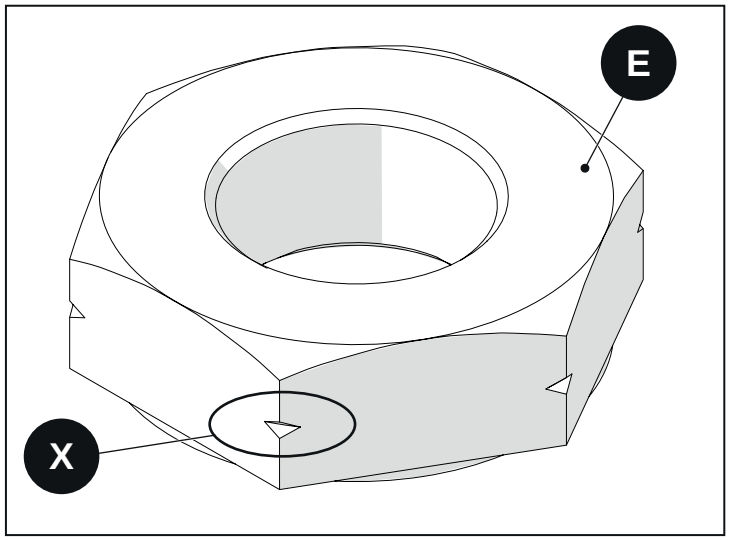

Fig. 2.94

- Fit the 6 screws with the respective washers and tighten to fasten the crankshaft pulley.

Crankshaft pulley screw 45.1 N·m

- Remove the tool for immobilising the crankshaft (fitted in place of the starter motor).

A - contact surface of hub with oil pump drive gear
B - key seat on hub
C - key on crankshaft
D - contact surface of hub with nut
E - crankshaft hub fastener nut (flanged side)
X - UNI marking identifying nut with left-handed thread

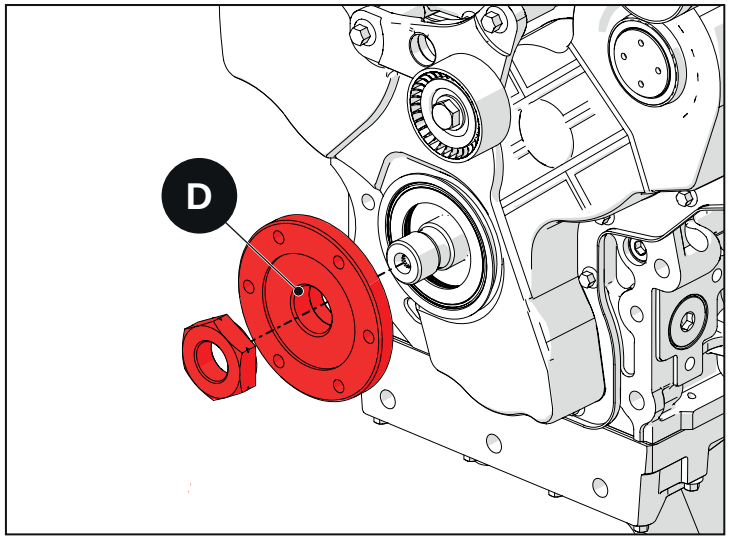

Fig. 2.95

2.24 Water pump and pulley

2.24.1 Removal

- Disconnect all pipes or hoses from the pump.
- Remove the alternator belt (see the section Alternator Belt).
- Remove the water pump pulley screws or the screws of the water pump casing in order to remove the water pump assembly.
- Remove the old gasket from the pump. Take care not to damage the sealing surface.

A - water pump casing
B - water pump casing screws
C - water pump pulley screws

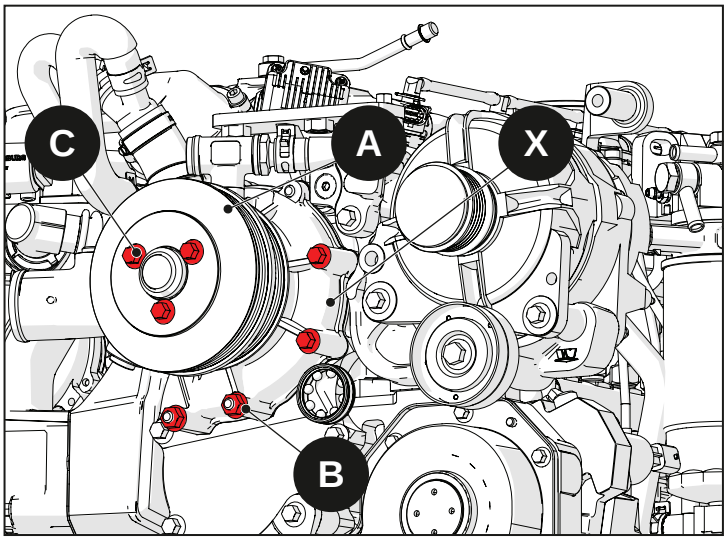

Fig. 2.96

2.24.2 Installation

- Inspect the water pump casing for signs of seizing, cracks, corrosion or other damage.
- Inspect the rotor for signs of cracks, corrosion or other damage.
- Inspect the rotor shaft and bushes to check for excessive endfloat, abnormal noise or wear.
- Inspect the pulley to check for warping, cracks, corrosion, excessive eccentricity or other defects/damage.
- Apply Loctite sealant to both sides of the new pump
- Install a new gasket.
- Tighten the fastener screws following the correct procedure indicated.
- Tighten the screws of the water pump pulley.

X - water pump in high mounting position

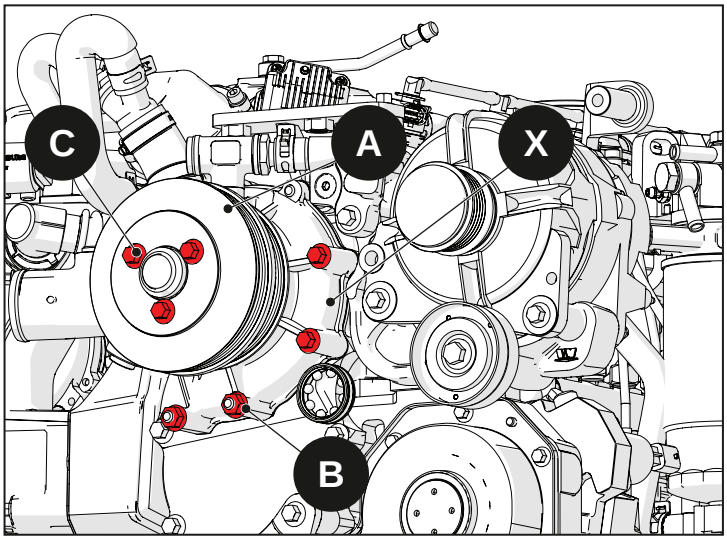

Fig. 2.97

Pretightening torque for screws 1-3-6-4-2-5 (1-3-6-4-2-5-14-13 for water pump in high mounting position)	6 N·m
Final tightening torque for screws 1-3-6-4-2-5 (1-3-6-4-2-5-14-13 for water pump in high mounting position)	32.4 N·m
Pretightening torque for screws 7-9-12-10-8-11	6 N·m
Final tightening torque for screws 7-9-12-10-8-11	32.4 N·m
Water pump pulley fastener screw	27.5 N·m

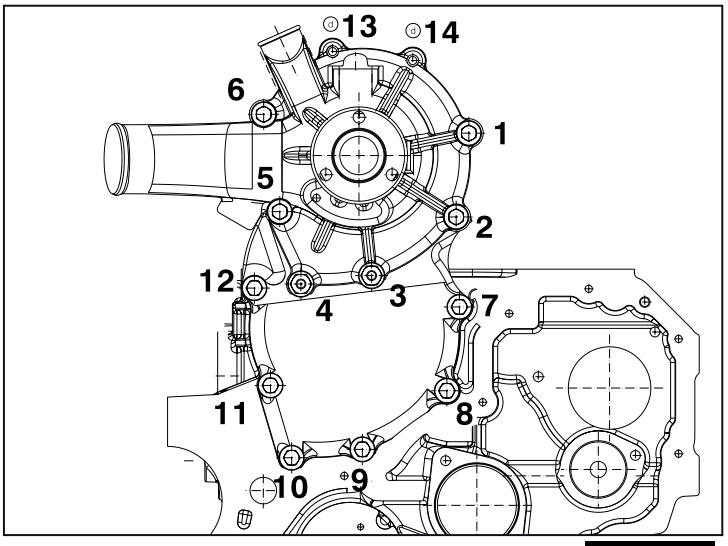

Fig. 2.98

2.25 Timing cover

2.25.1 Removal

- Remove any components impeding removal of the cover.
- Remove the screws fastening the cover.
- Use a knife or cutter blade to cut the silicone sealant. Separate the cover from the crankcase, taking care not to bend it.

2.25.2 Installation

- Check the condition of the front oil seal installed on the cover. Replace if necessary. (see the section Front Oil Seal).
- Remove the old silicone sealant from the crankcase and the cover. Take care not to damage the sealing surfaces.
- Apply a uniform bead of sealant (Dow Corning 7091 silicone) as shown in the photo around the perimeter of the cover, in the grooves and around the inner sides of the holes for the cover fastener screws.
- Align the cover with the pins fitted into the crankcase.

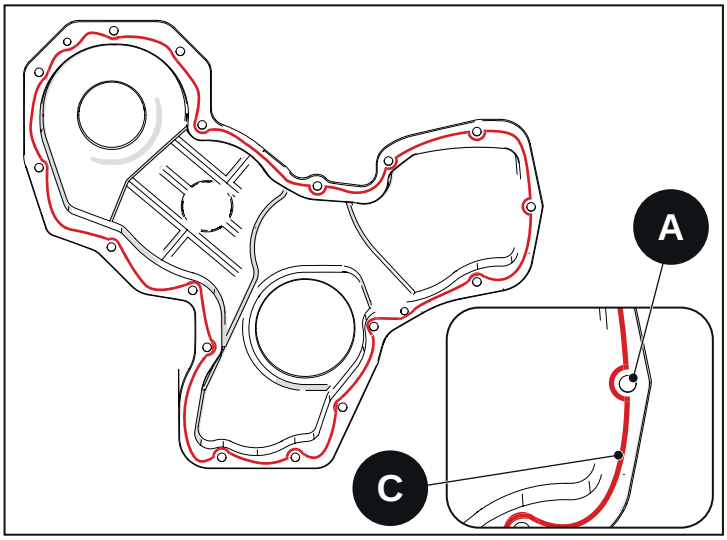

Fig. 2.99

- Tighten the screws in a crossed pattern:

  Timing cover screws: 12.7 N·m

Warning
wait at least 20 minutes before starting the engine to allow the silicone to cure

A - holes
B - grooves
C - bead of silicone sealant

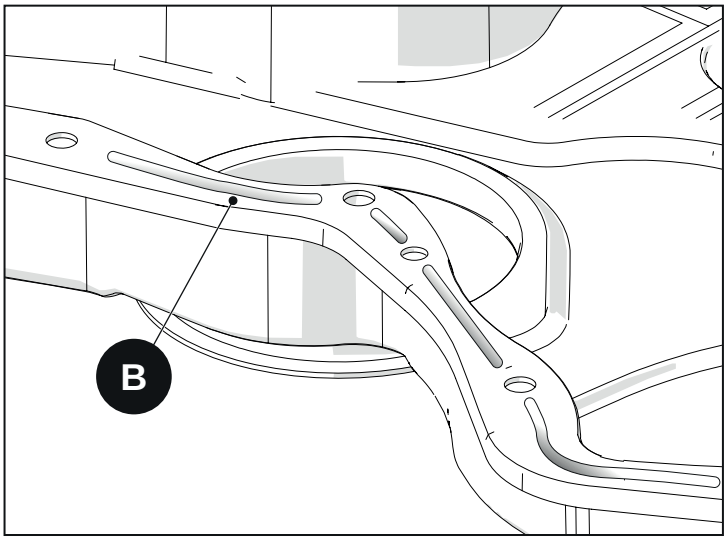

Fig. 2.100

2.26 Front oil seal

2.26.1 Removal

Warning

The front oil seal and the lip of the oil seal may be damaged by natural skin oil if handled with bare hands, or by dirt transferred from gloves. Damage to the oil seal or to the lip of the seal may cause an oil leak. When fitting or replacing an oil seal, do not touch the oil seal or the lip of the oil seal with bare hands or dirty gloves.

The oil seal consists of special components; do not touch or handle the lip of the oil seal. Do not use a hammer or a punch to attempt to drive the oil seal into its seat. This may cause damage to the oil seal or timing cover.

- Lubricate the outer perimeter of the oil seal. Do not touch or handle the lip of the oil seal.
- Fit a new oil seal in the special tool.

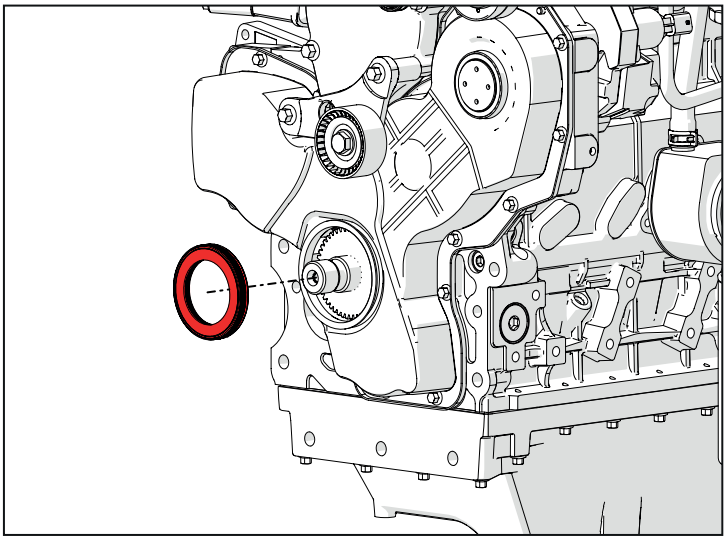

Fig. 2.101

- Tighten the screw of the special tool.
- The oil seal stops and will go no further once it is installed correctly in its seat.

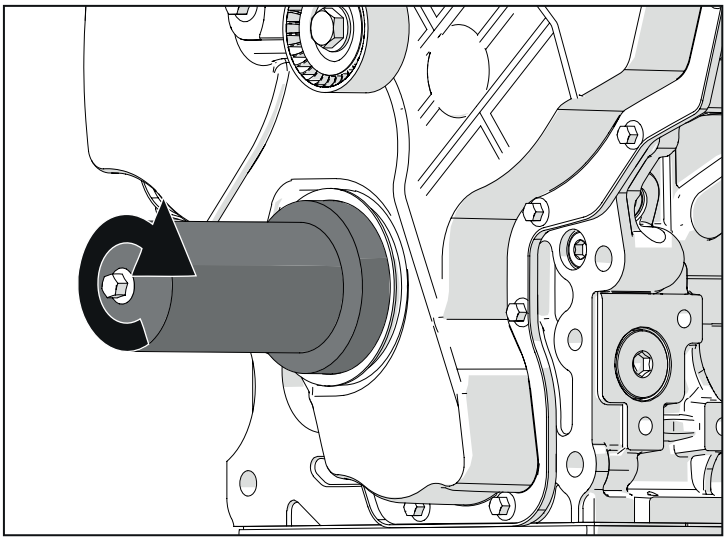

Fig. 2.102

2.27 Turbocharger

2.27.1 Removal

Warning

In the event of turbocharger failure resulting in an oil leak from the exhaust side, the diesel particulate filter must also be cleaned (see the section “Maintenance - Diesel particulate filter”).

- Loosen the turbo oil delivery line connector.
- Loosen the clamp fastening the turbo oil drain line.
- Remove the nuts fastening the turbo.
- Remove the old gasket.

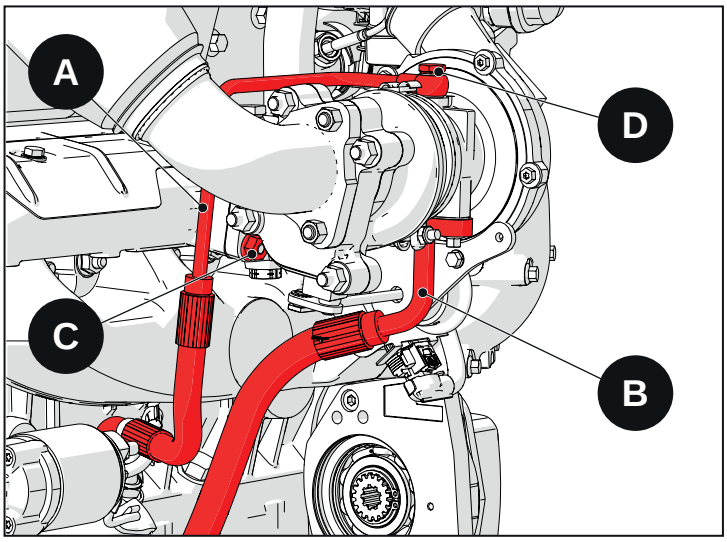

Fig. 2.103

A - turbo oil delivery line
B - turbo oil drain line
C - turbo fastener nuts
D - turbo oil delivery line connector
E - connector for oil delivery line to turbo from crankcase
F - connector for oil drain line from turbo to crankcase

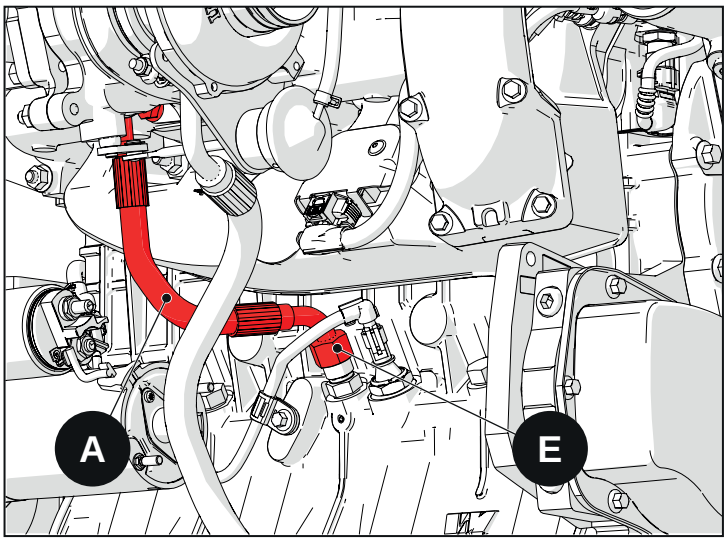

Fig. 2.104

2.27.2 Installation

- Install a new gasket between the exhaust manifold and the turbo.
- Install the turbo and tighten the nuts in alternating order in a diagonal pattern.
- Install the turbo oil drain line.
- Hand tighten the oil delivery line connectors onto the turbo and onto the crankcase, fitting new washers.
- Definitively tighten both connectors.

Turbo oil delivery line connector (D): 24.5 N·m

Connector for oil delivery line to turbo from crankcase (E): 32.4 N·m

Connector for oil drain line from turbo to crankcase (F): 49 N·m

Turbo exhaust flange (G): 32.4 N·m

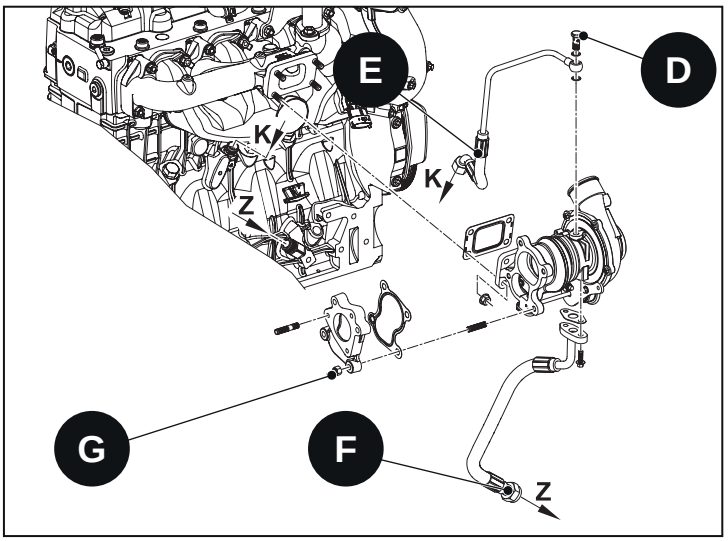

Fig. 2.105

2.28 EGR heat exchanger

2.28.1 Removal

- Loosen the clamps of the hoses and disconnect the hoses.
- Loosen and remove the screws fastening the EGR heat exchanger unit and remove the EGR heat exchanger unit and the relative gasket.

1 - screw fastening EGR heat exchanger
2 - EGR heat exchanger
3-6 - EGR heat exchanger hoses

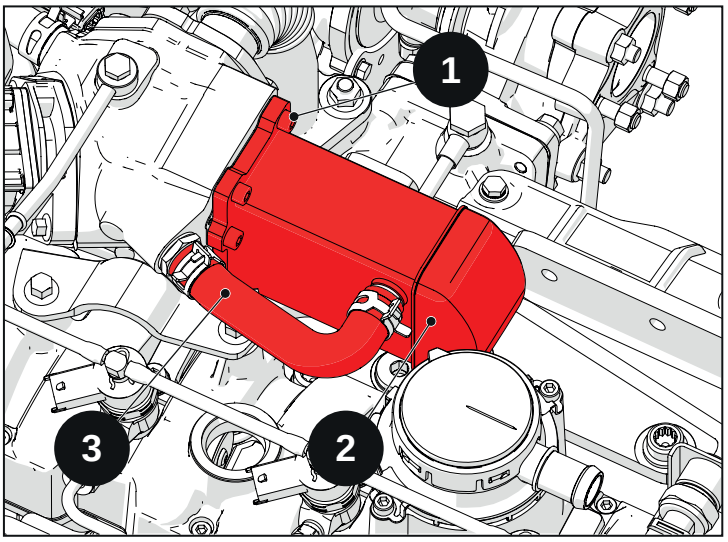

Fig. 2.106

Warning

Do not use alkaline products to clean, as this will corrode the aluminium. Never use brushes which could damage the fins or sealing surfaces.

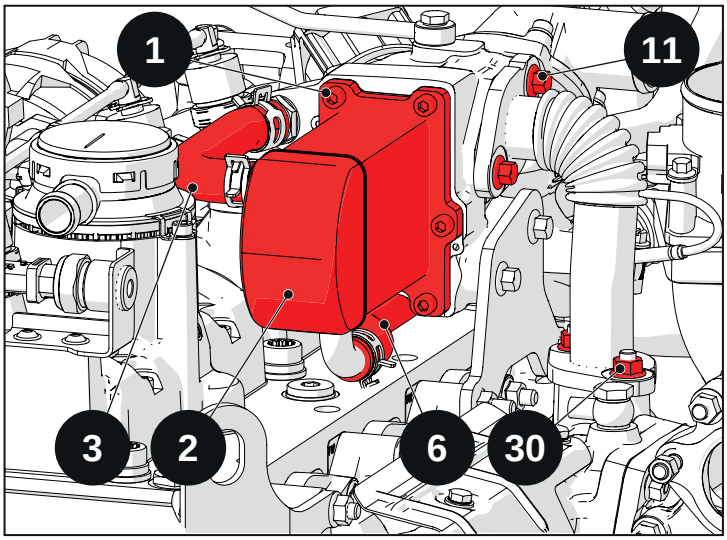

Fig. 2.107

2.28.2 Installation

- Fit the EGR heat exchanger, using a new gasket.
- Connect the hoses and fasten the respective clamps.

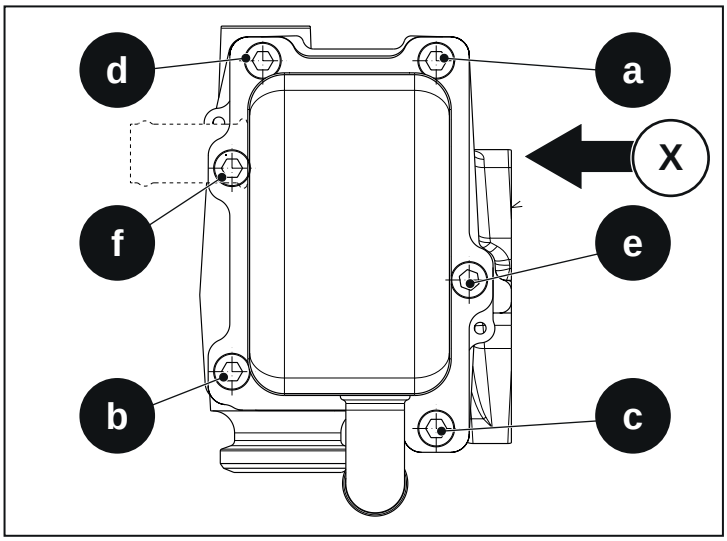

Fig. 2.108

- 1 = screw fastening EGR heat exchanger
  - **pre-tightening torque (tightening order: a, b, c, d, e, f): 5 N·m**
  - **definitive tightening torque (tightening order: a, b, c, d, e, f): 14.7 N·m**
-
  - **11, 30 = EGR pipe nut and screw 32.4 N·m**
  - **12 = EGR heat exchanger unit 32.4 N·m**

X - Exhaust manifold side

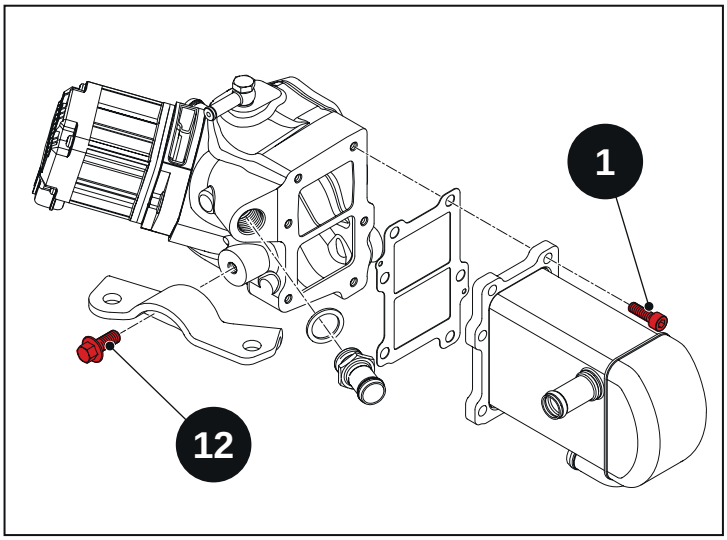

Fig. 2.109

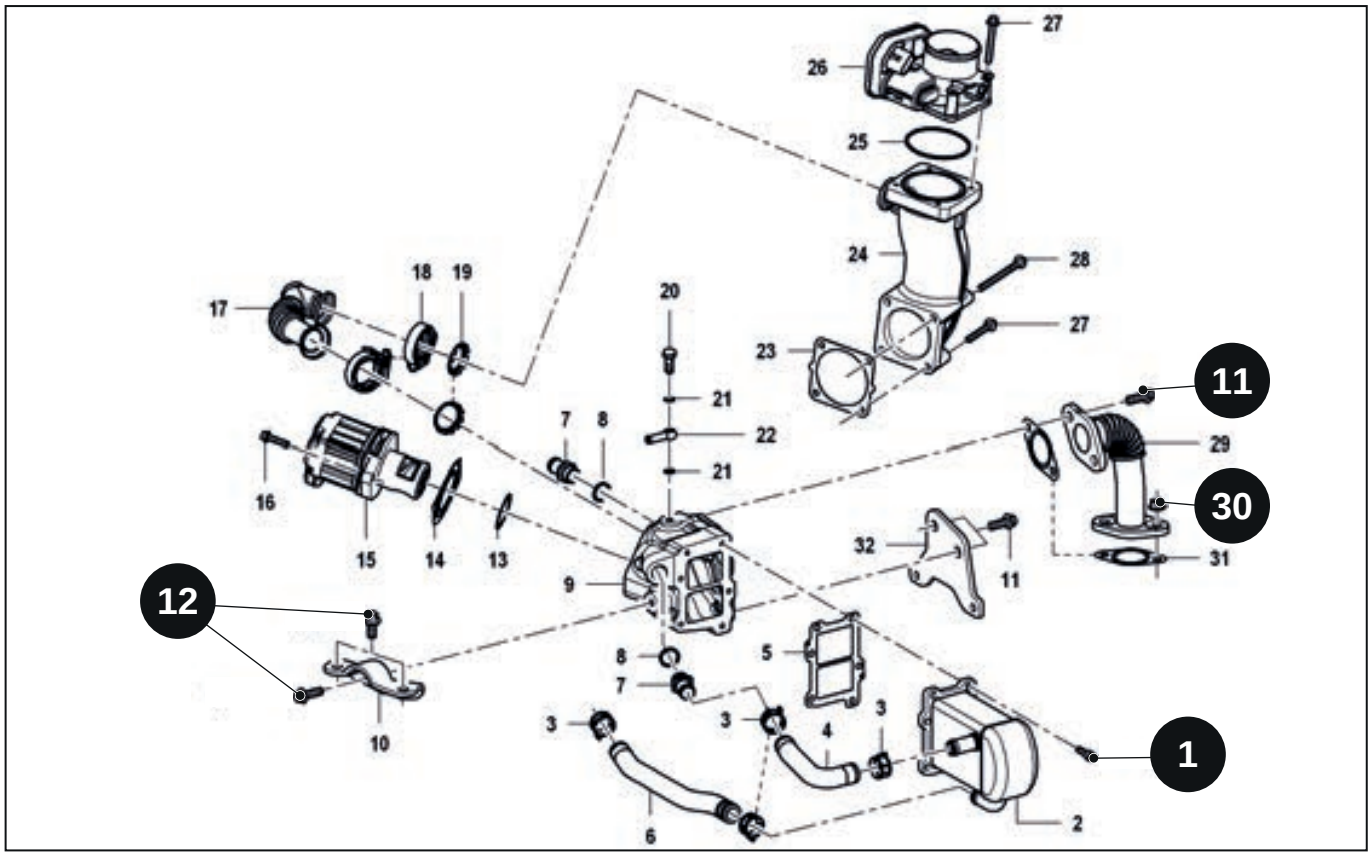

Fig. 2.110

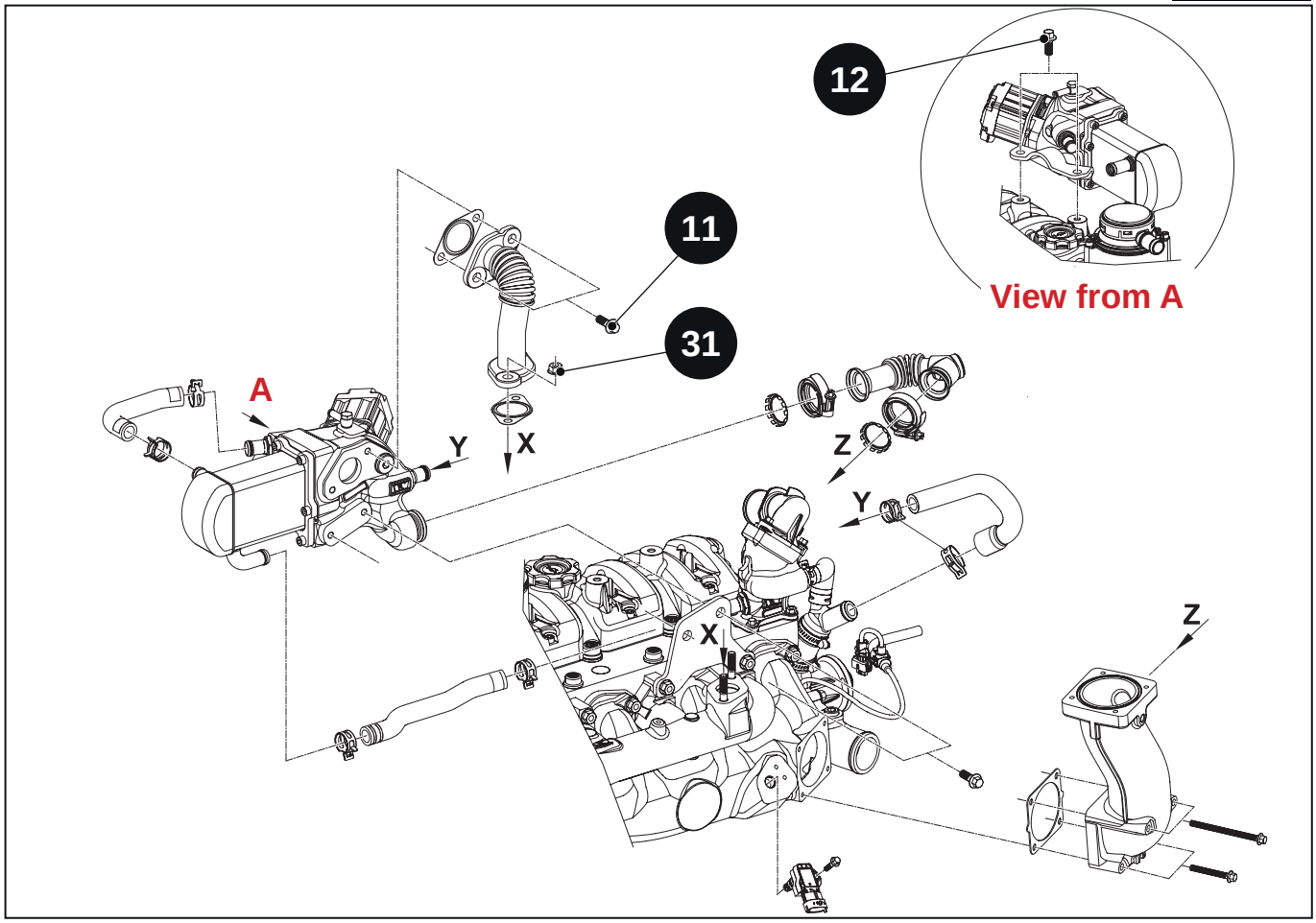

Fig. 2.111

2.29 Exhaust gas temperature and pressure sensors

Warning

handle with care. The ends of the temperature sensors “A” and “B” are made from ceramic material.

- Fit the sensor A on the EGR heat exchanger.
  - **A - tightening torque for temperature sensor: 24.5 N·m**
- Fit the sensor B on the exhaust manifold
  - **B - tightening torque for temperature sensor: 45.1 N·m**

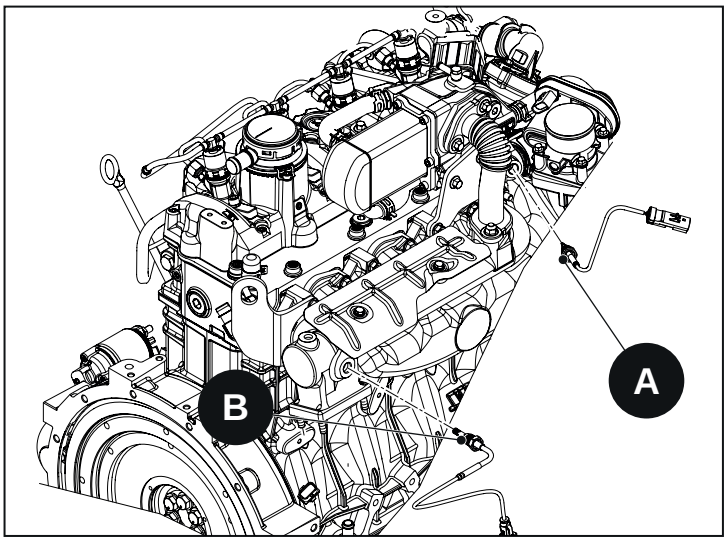

Fig. 2.112

Warning

follow the tightening sequence indicated for the exhaust gas pressure sensor (12).

To assemble correctly, pre-fit the union and the relative seals onto the banjo bolt of the pipe: spread ORAPI HT 900 anti-seize paste on the thread of the union and position the pipe correctly by hand-tightening the union to bring it towards the manifold and hand-tightening the screws fastening the pipe bracket to bring the bracket towards the rocker cover. Now tighten definitively in the following sequence to the torque values indicated:

1- Screws (13)	10.8 N·m
2- Union (15)	27.5 N·m
3- Sensor (12)	14 N·m

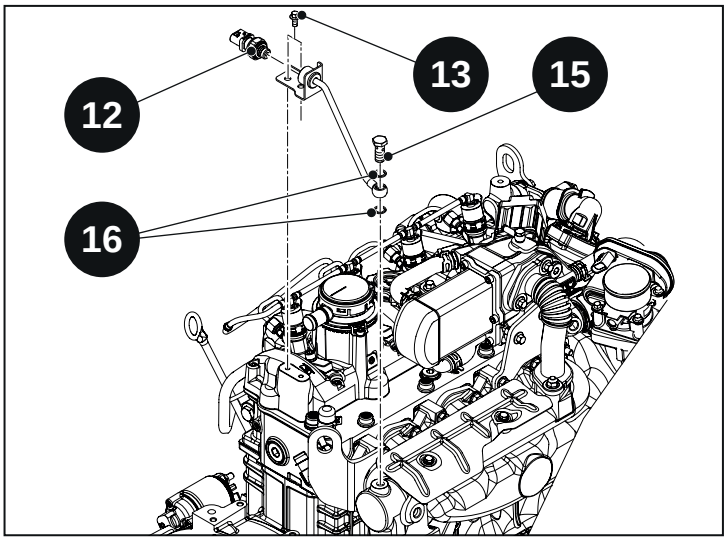

Fig. 2.113

2.30 Throttle valve

The throttle valve installed on R750TE4-IE4-ISE4 engines is an electric unit controlled by the engine control unit.

2.30.1 Removal

Remove the bolts fastening the valve to the intake duct. Replace the O-ring.

24 - intake duct
25 - throttle valve O-ring
26 - throttle valve
27 - bolts fastening the valve to the intake duct

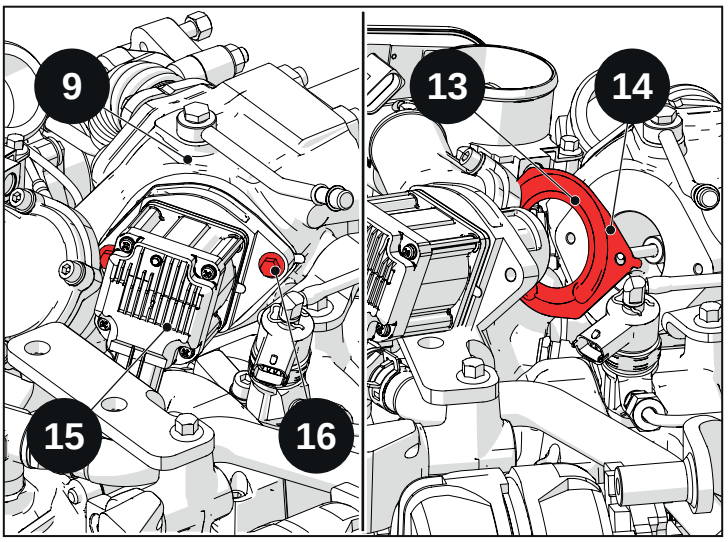

Fig. 2.114

2.30.2 Installation

- Fitting new gaskets, install the valve onto the EGR heat exchanger casing.
- Tighten the screws
  - **16 = screw fastening the EGR valve: 13.7 N·m**

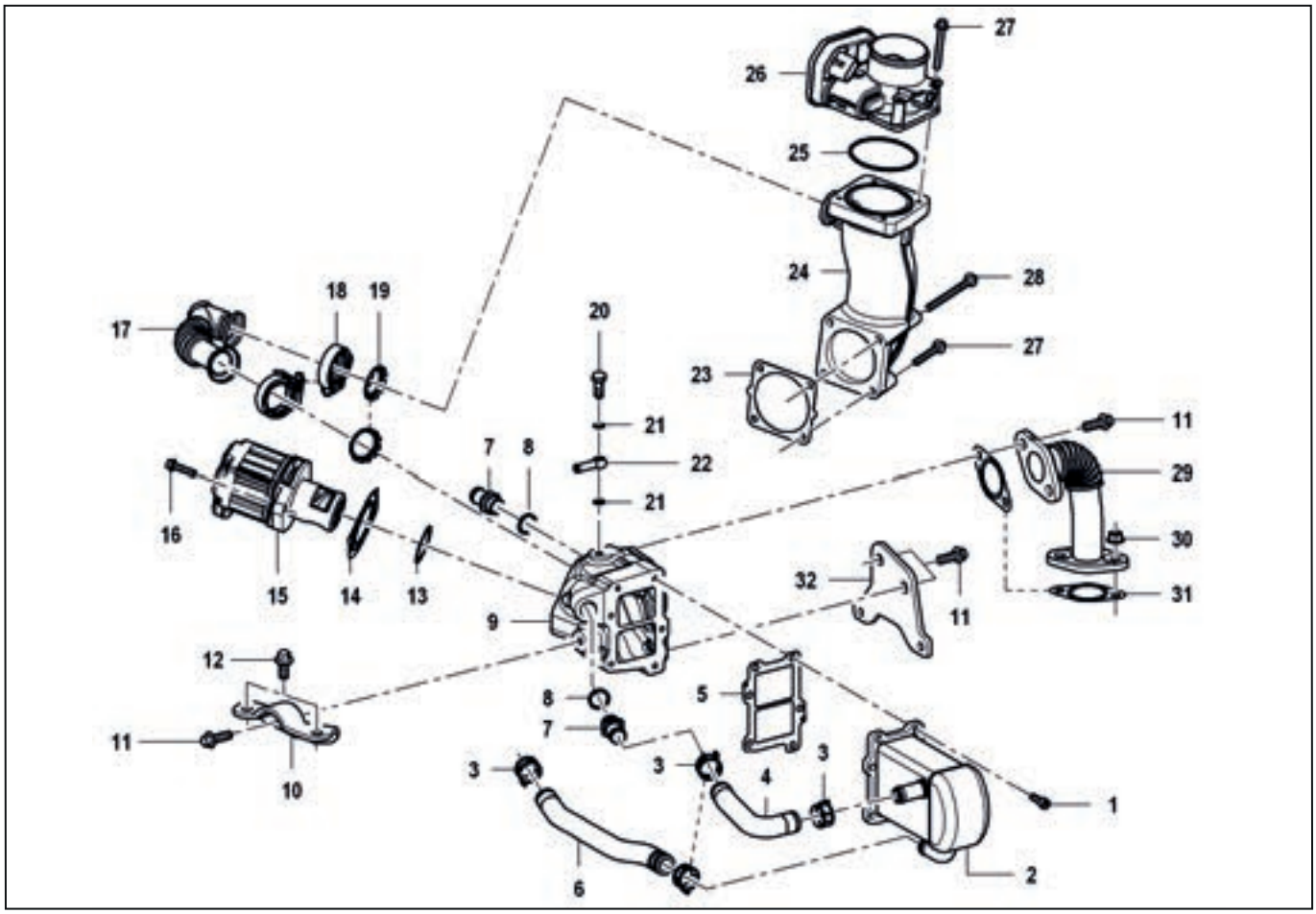

Fig. 2.115

2.31 Exhaust manifold

2.31.1 Removal

- Loosen the 2 screws fastening the heat shield and remove the heat shield.
- Remove any components impeding replacement of the turbocharger.
- Loosen and remove the fastener nuts.
- Remove any spacers installed on the stud bolts and remove the exhaust manifold and each individual gasket.

A - heat shield
B - exhaust manifold fastener nuts
C - spacer

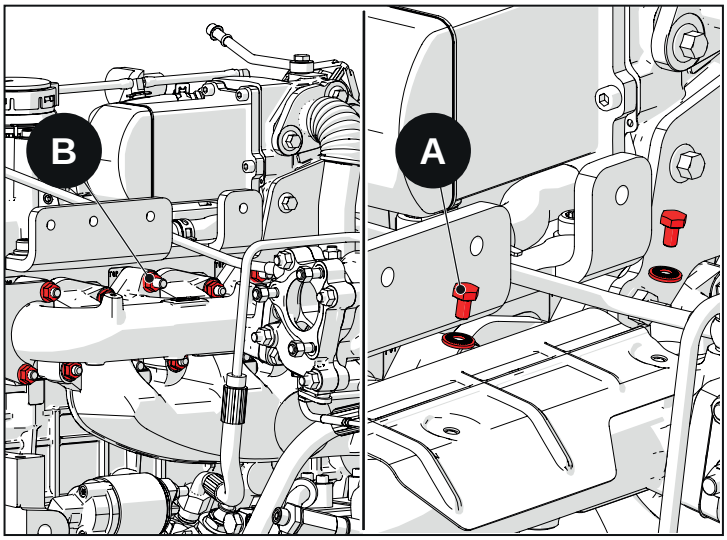

Fig. 2.116

2.31.2 Installation

- Fit new individual gaskets on the stud bolts.
- Fit the spacers on the stud bolts and install the exhaust manifold.
- Fit the fastener nuts and tighten with the following procedure.

Exhaust manifold fastener nuts	
tightening order 1, 2, 3, 4, 5, 6, 7, 8 - pre-tightening torque	36 N·m
tightening order 1, 2, 3, 4, 5, 6, 7, 8 - definitive tightening torque	36 N·m

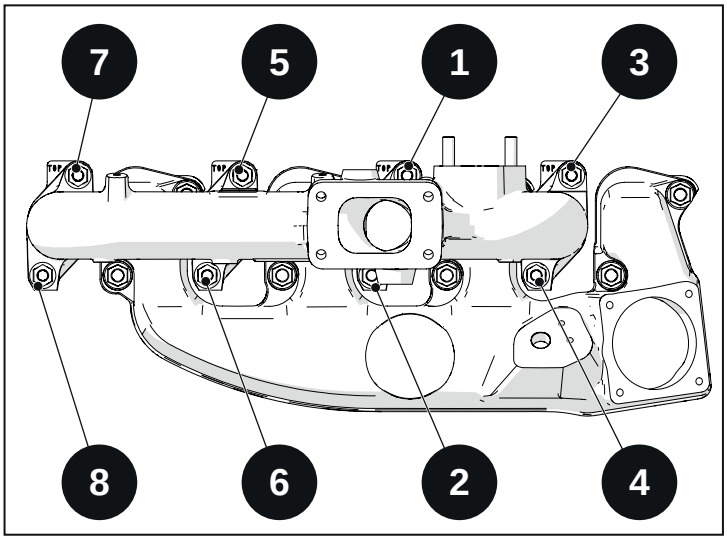

Fig. 2.117

2.32 Intake manifold

2.32.1 Removal

- Remove the exhaust manifold and any other components impeding removal of the intake manifold.
- If necessary, remove the EGR valve/throttle valve unit.
- Remove the nuts fastening the intake manifold and detach the intake manifold.
- Replace the manifold gasket if necessary.

A - intake manifold fastener nut

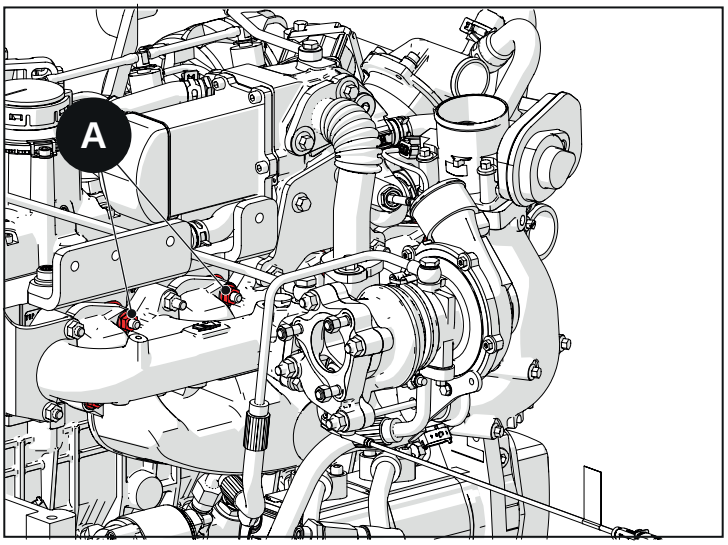

Fig. 2.118

2.32.2 Installation

- Fit a new gasket if necessary.
- Fit the nuts fastening the manifold and tighten in a cross pattern as indicated.

intake manifold fastener nuts	
tightening order 1, 2, 3, 4, 5, 6, 7, 8 - pre-tightening torque	27.5 N·m
tightening order 1, 2, 3, 4, 5, 6, 7, 8 - definitive tightening torque	27.5 N·m

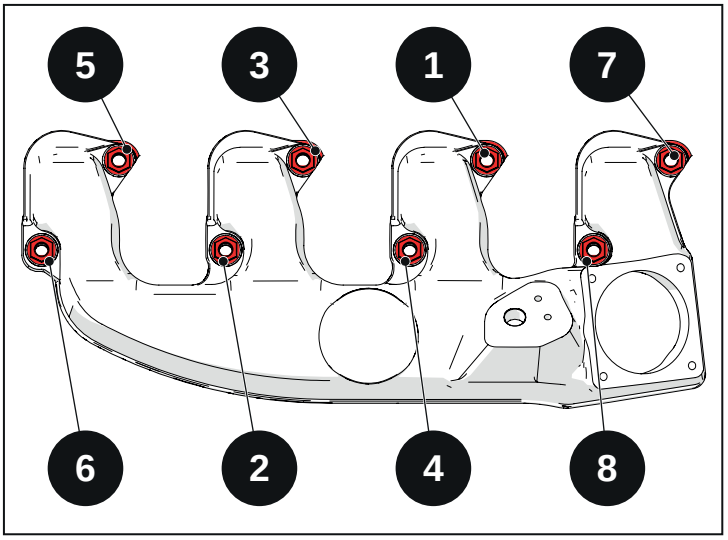

Fig. 2.119

2.33 Crankshaft endfloat

- Install the flywheel. See the section Engine Flywheel.
- Install a dial gauge on the crankshaft to measure the endfloat of the crankshaft once it is installed.
- Measure by placing the probe of the dial gauge against a crank web or against the outer face of the flywheel.
- Apply leverage to push the crankshaft towards the flywheel. Note the value measured.
- Apply leverage to push the crankshaft towards the timing side. Note the value measured.
- Calculate the difference between the measurements by subtraction to determine the endfloat of the crankshaft.

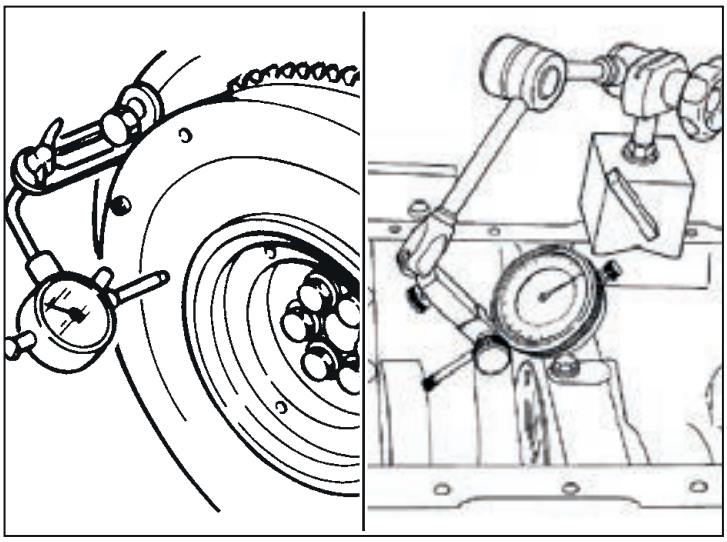

Fig. 2.120

Crankshaft endfloat: 0.080 - 0.230mm

If the endfloat of the crankshaft is incorrect, calculate the thickness of the rear shim necessary to correct the value.

- Replace the rear shim on the rear crankshaft bearing with the corrective shim and measure the endfloat of the crankshaft again.
- See the section “Rear Crankshaft Bearing” for the correct rear shim thicknesses.
- Repeat the steps described above as necessary until the endfloat is correct.

2.34 Engine flywheel

2.34.1 Removal

- Measure and note the crankshaft endfloat before removing the flywheel. (see the section Crankshaft Endfloat).
- Remove the starter motor and fit the special tool for immobilising the crankshaft.
- Remove 2 screws from the flywheel and fit 2 pins in their place (see the section Special Tools).
- Remove the remaining screws fastening the flywheel.
- Remove the flywheel and the special tool immobilising the crankshaft

A - flywheel fastener screws
B - flywheel

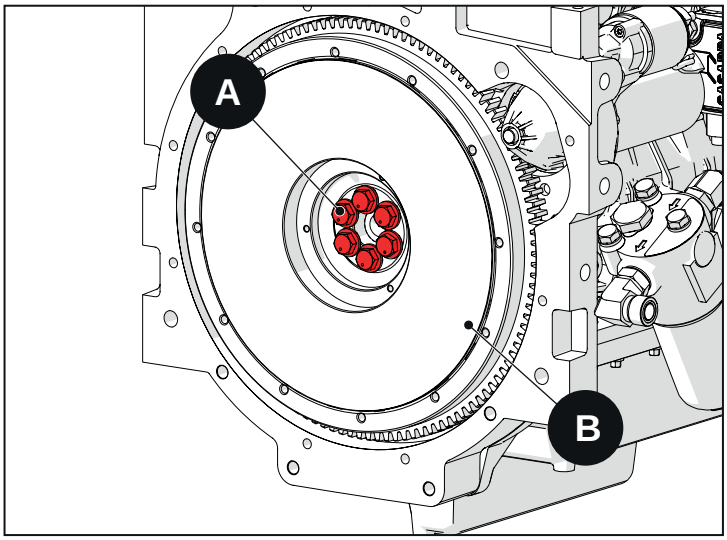

Fig. 2.121

- When removing the flywheel, check if a separate spacer is fitted.
- If there is no separate spacer, the spacer is incorporated in the casting of the flywheel. In this case, check that the O-ring is fitted correctly.

A - separate spacer (NOT incorporated in flywheel casting)
B - rear oil seal
C - seat for spacer O-ring

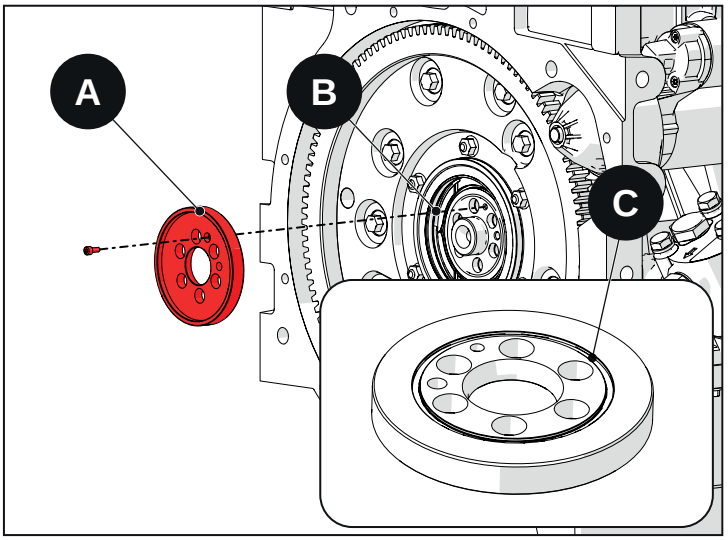

Fig. 2.122

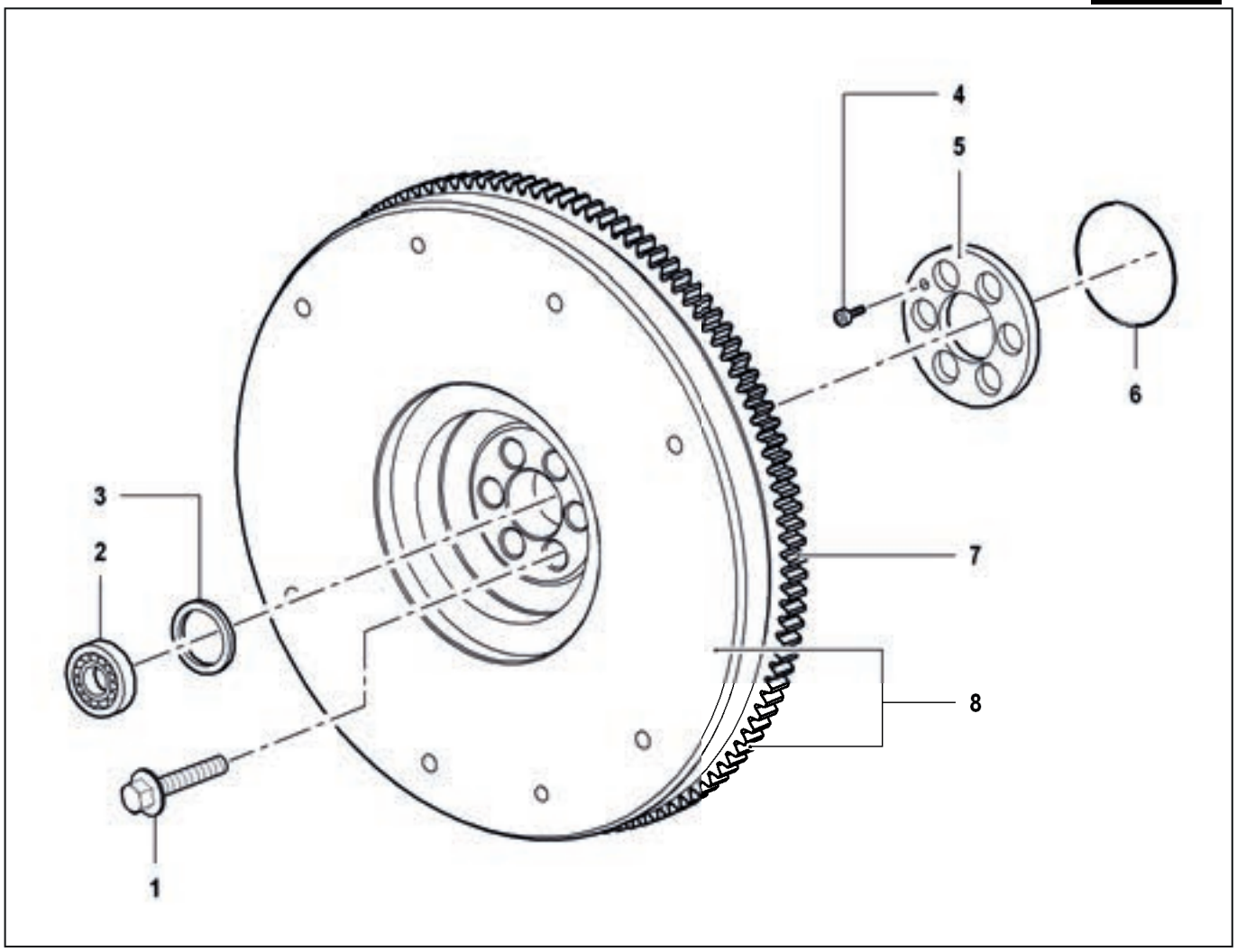

Fig. 2.123

2.34.2 Installation

- Fit a new O-ring on the spacer. A little grease may be used to keep the O-ring in place on the spacer during installation. Replace the O-ring each time the flywheel is removed.
- Install the spacer with the new O-ring, with the O-ring facing towards the crankshaft.
- Check that there are no signs of scratching, scoring, cracks or seizing on the mating surface of the flywheel.
- Only minor scratches, scoring, cracks or signs of seizing may be removed. Replace the flywheel if damaged.
- When installing the flywheel, do not touch or handle the lip of the rear oil seal. Check that the oil seal is in good condition. Replace if in any doubt. (See the section “Rear Crankshaft Bearing”).
- Check that the rear shims are not damaged or worn and are installed correctly in the rear bearing
- Replace if in any doubt (see the section “Rear Crankshaft Bearing”).
- Fit the 2 guide pins on the rear shank of the crankshaft to facilitate installation of the flywheel.
- Install the flywheel (on flywheels with spacer incorporated in the casting, install the O-ring in its seat).

Note

Preferably replace the screws with new components after removal. Replace with new components if in any doubt whether they can be reused. When reusing the same screws, lubricate the threads and underneath the heads of the screws with engine oil. Do NOT lubricate new screws.

- Fit and hand-tighten 4 of the 6 screws.
- Remove the flywheel assembly guide pins and fit the remaining screws.
- Remove the starter motor and fit the special tool for immobilising the crankshaft.
- Tighten the screws in a crossed pattern to 50 N·m.
- Loosen the screws completely one at a time and then retighten in a cross pattern to 20 N·m + 75°.

Note

Measure the crankshaft endfloat. See the section “Crankshaft Endfloat” for the procedure for determining endfloat.

- Remove the special tool for immobilising the crankshaft and fit the starter motor.

2.34.3 Flywheel specifications

a	70 mm
b	58.75 - 60.25 mm

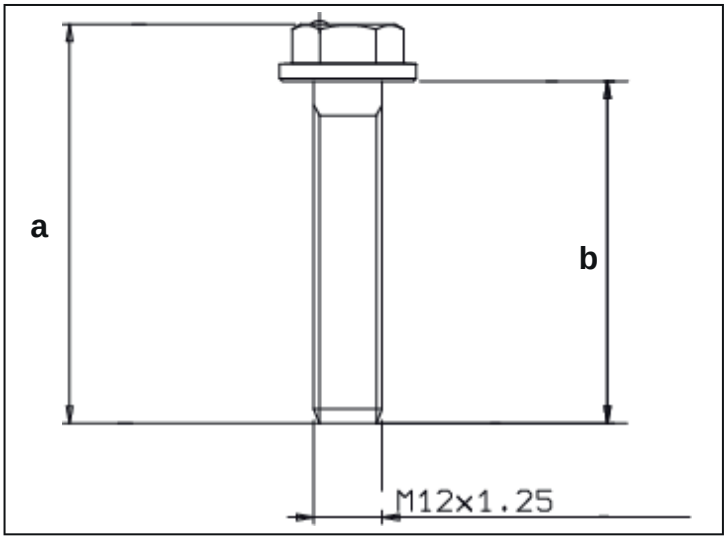

Fig. 2.124

2.35 Engine flywheel ring gear

- Heat the flywheel ring gear with a blow torch held on the engine side of the ring gear.
- Once heated, tap the ring gear to detach it from the flywheel. Take care not to hit the flywheel when removing the ring gear.

Warning

Some components are made from steel treated to increase hardness.

Applying excessive heat to treated steel will alter its hardness and weaken the component. Do not heat any part of any component in treated steel, such as the flywheel ring gear, to above 210°C.

- Heat the new ring gear for 20 minutes in an oven preheated to 190 - 210° C, or heat uniformly with other means until the ring gear has expanded enough to fit onto the flywheel. Do not overheat the ring gear.

Warning

Install the ring gear with the bevelled side facing towards the engine side of the flywheel.

- Install the ring gear. The ring gear must be seated correctly against the abutment on the flywheel. Any gap between the ring gear and the abutment on the flywheel must not exceed 0.50 mm.

1 - flywheel
2 - ring gear
3 - protective cap
4 - meshing point for starter motor (bevelled edge)

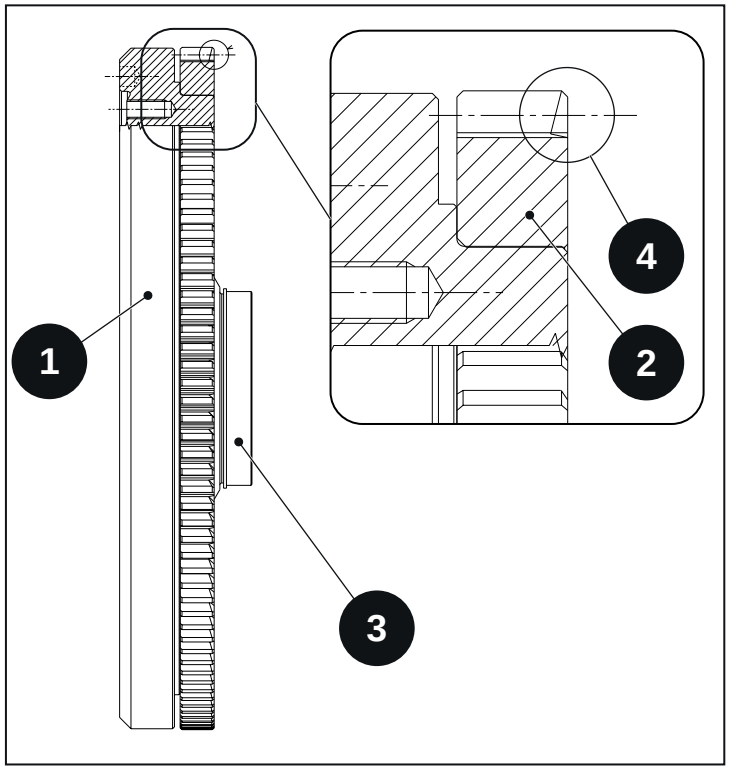

Fig. 2.125

2.36 Flywheel housing

2.36.1 Removal

- Remove the flywheel housing (see the section “Flywheel”).
- Remove the spacer from the flywheel, if fitted
- Remove the screws fastening the housing.
- Tap around the perimeter of the housing with a rubber mallet. This will detach the flywheel, complete with rear crankshaft bearing, from the crankcase.
- When removing the housing, do not touch or handle the oil seal lip and take care not to damage the O-ring of the rear bearing.

A - housing fastener screws
B - rear oil seal
C - rear shim rings

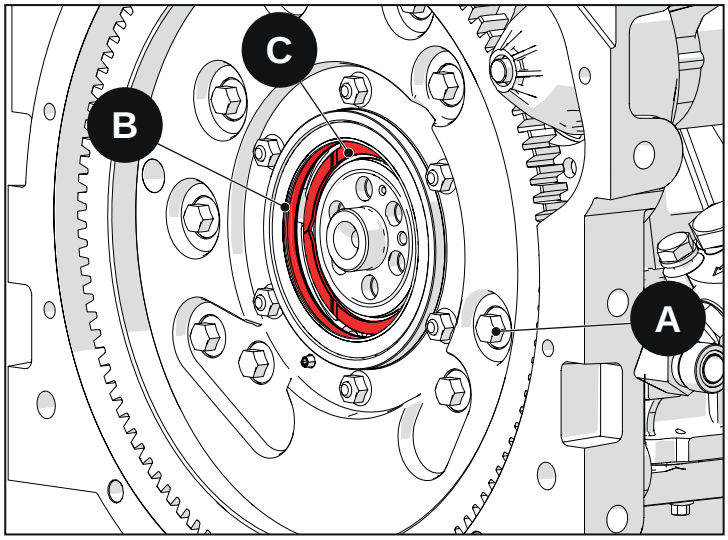

Fig. 2.126

A - O-ring in seat on housing
B - Seat
C - Clutch housing

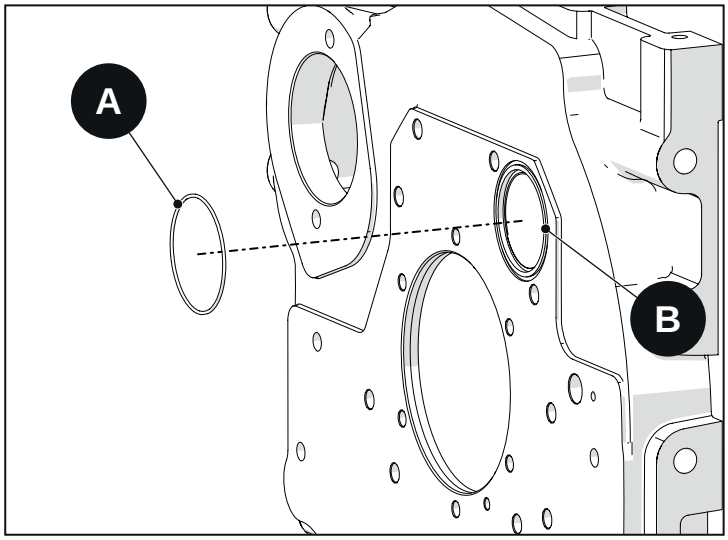

Fig. 2.127

A - nuts fastening the rear bearing to the housing
B - Housing after removal of rear bearing
C - Rear bearing

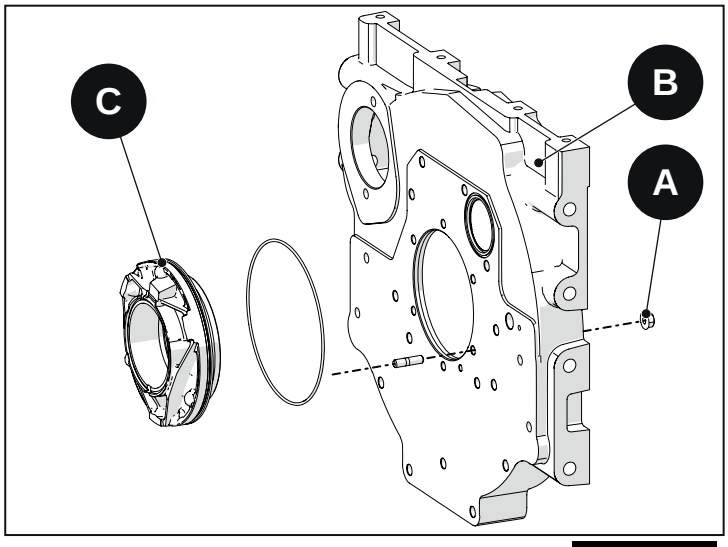

Fig. 2.128

2.36.2 Installation

Warning
Replace all the O-rings whenever the flywheel or housing are removed.

- Check that the rear shim is not damaged or worn and that it is seated correctly in the rear bearing.
- Replace the rear shim if in any doubt (see the section “Rear bearing”).
- Apply Dow Corning 7091 silicone in the O-ring seat on the housing (fig.2.129).
- Fit a new O-ring in the seat on the housing.

A - O-ring

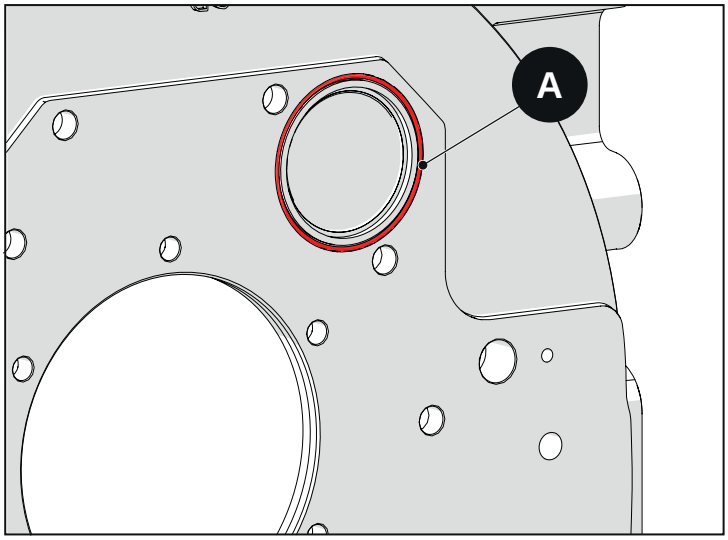

Fig. 2.129

- Apply a 2 mm thick bead of silicone sealant around the O-ring as shown in fig.2.130.
- Fit a new O-ring in the seat around the outer circumference of the rear bearing.
- Apply a 2 mm thick bead of silicone sealant around the O-ring as shown in fig.2.131.

B - Bead of silicone sealant

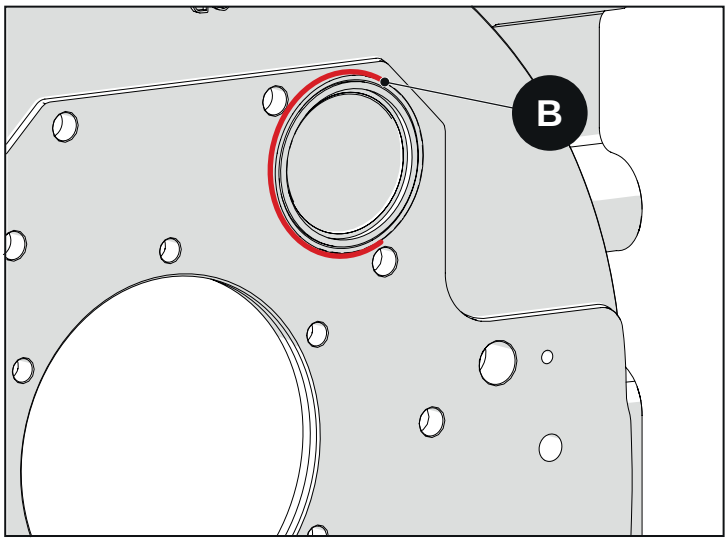

Fig. 2.130

- Lubricate the rear shank of the crankshaft and the bush of the rear bearing (main bearing bush).
- Fit the housing and tighten the screws fastening it in a crossed pattern.

C - Bead of silicone sealant

housing fastener screws: 68.6 N·m

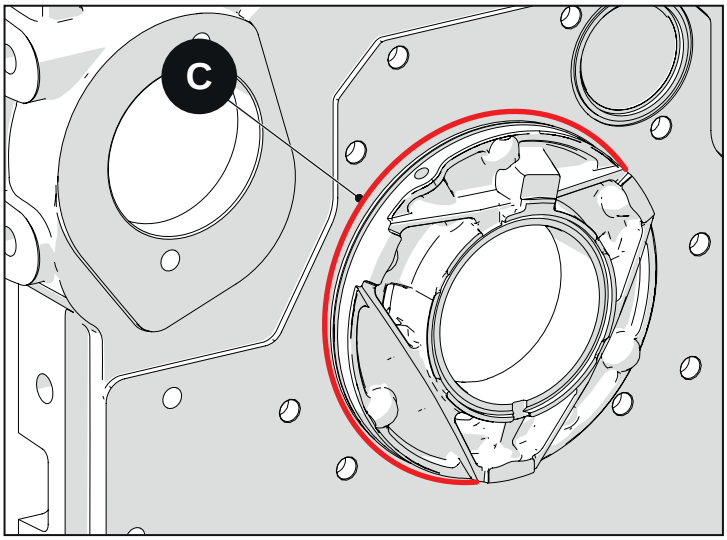

Fig. 2.131

2.37 Rear crankshaft bearing

2.37.1 Removal

- Remove the flywheel and the housing. (See the respective section).
- Separate the bearing from the housing, removing the nuts fastening the bearing itself

2.37.2 Installation

- Check the condition of the rear shim and that it is seated correctly on the bearing.
- Replace the rear shim if in any doubt.
- Fit a new O-ring around the outer circumference of the rear bearing and apply silicone sealant (see the section Flywheel Housing).
- Align the housing with the pin installed in the rear bearing.
- Fit and tighten the nuts fastening the rear bearing.

Rear bearing fastener nuts: 24.5 N·m

A - Rear bearing fastener nuts
B - Pin installed in the rear bearing

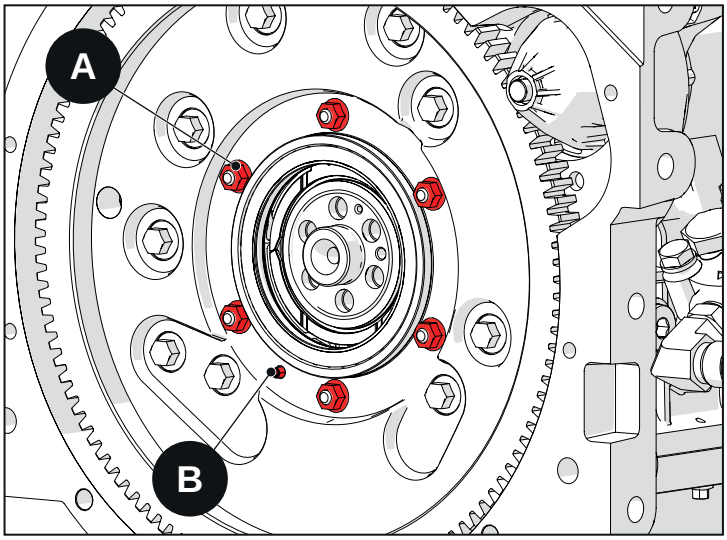

Fig. 2.132

2.38 Shim

2.38.1 Removal

- Using a commercially available tool, carefully prise out and remove the 2 half-rings of the rear shim. Take care not to damage the rear bearing and the rear oil seal.

2.38.2 Installation

- Ensure that the 2 half-rings are installed correctly in the rear bearing and that the oil passages face outward, as shown in the figure. Engage the lug on one of the two half-rings in the seat in the rear bearing.
- Press the 2 half-rings simultaneously into the bearing.

A - lug
B-C - 2 half-rings
D - oil passages (grooves)

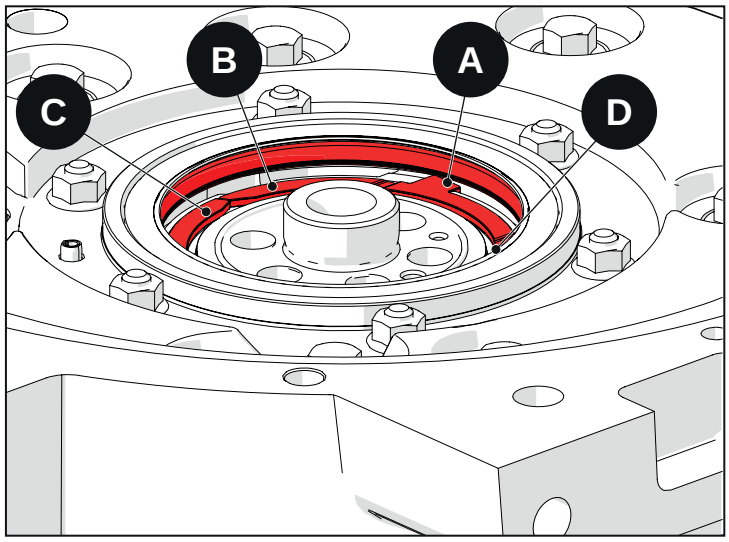

Fig. 2.133

2.38.3 Specifications

Rear shim	
Standard	2.310 - 2.360 mm
1st oversized class (+0.1)	2.410 - 2.460 mm
2nd oversized class (+0.2)	2.510 - 2.560 mm

2.39 Rear main bearing bush

2.39.1 Removal

- Drive the bush out from the bearing with a press.

2.39.2 Installation

- Align the hole in the new main bearing bush with the oil passage hole in the rear bearing and press the new bush into the bearing.

A - Lubrication oil passage

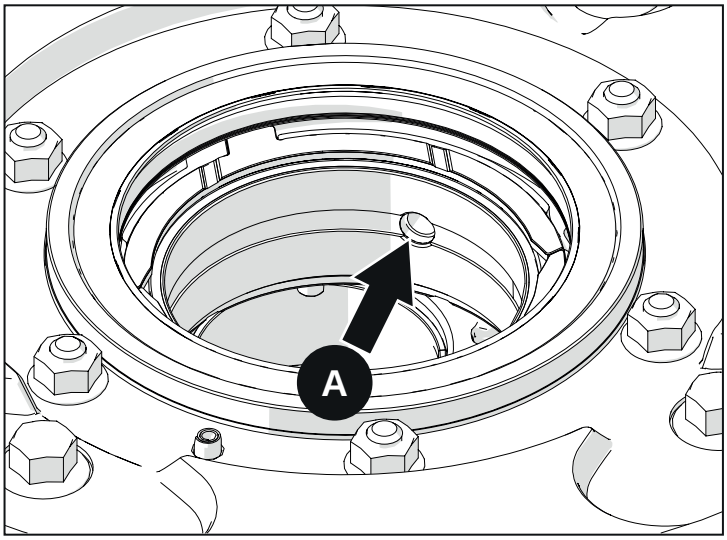

Fig. 2.134

2.39.3 Specifications

Internal diameter of bush (installed in bearing)	80.045 - 80.07 mm
1st bush size reduction class	0.25 mm

Warning
See the section Crankshaft for the procedure for determining the correct free play between the rear main bearing bush and the rear crankshaft bearing.

2.40 Rear oil seal

2.40.1 Removal

Using a commercially available tool, carefully prise out and remove the oil seal. Take care not to damage the rear shim and the main bearing bush.

2.40.2 Installation

Warning
The rear oil seal consists of special components; do not touch or handle the lip of the oil seal. Do not use a hammer to attempt to drive the rear oil seal into its seat. This may cause damage to the oil seal or to the rear bearing.

Lubricate the outer circumference of the oil seal. Do not touch the lip of the oil seal.

Install the new oil seal in the rear bearing using the special tool. The rear oil seal is seated correctly once the tool stops and can go no further.

2.41 Tone wheel

2.41.1 Removal

- Remove the engine flywheel and the flywheel housing complete with rear bearing.
- Loosen and remove the 3 screws fastening the tone wheel.

A - Tone wheel

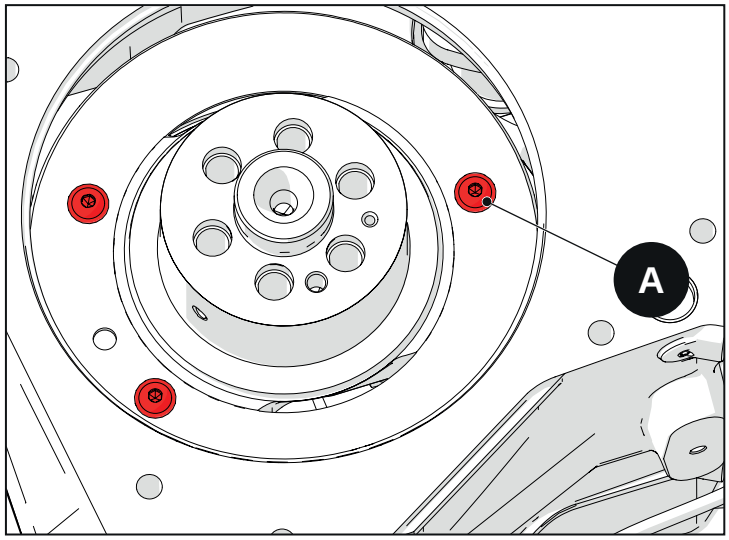

Fig. 2.135

2.41.2 Installation

- Replace the screws with new components, or, if possible, reuse the same screws, applying Loctite 510 to the threads.
- Fit the screws and tighten them

tone wheel fastener screws: 14.7 N·m

2.42 Head gasket - Piston-to-head clearance

Warning

When the heads are removed for servicing and the pistons and cylinder sleeves are not removed, when reassembling, use a head gasket of the same thickness as the component removed. See the section Head gasket identification

Follow the procedure described below when reassembling a complete engine or if the pistons and cylinder liners have been removed.

- Use a dial gauge and a mounting block (special tool) (see the section Special Tools) to measure the piston protrusion relative to the top deck of the cylinder block/crankcase at TDC.
- Place the block with the dial gauge on the top deck of the cylinder block/crankcase and set the dial gauge needle to zero.
- Slide the mounting block towards the piston at TDC as shown in the figure. Note the value measured.
- Repeat the procedure to measure the protrusion of the other pistons. Calculate the average of the values measured for all cylinders to determine the head gasket thickness necessary.

A - special tool - block
B - dial gauge
C - piston

Piston protrusion - AVERAGE	Required gasket thickness
0.60 - 0.72 mm	1.42 mm
0.73 - 0.82 mm	1.52 mm
0.83 - 0.95 mm	1.62 mm

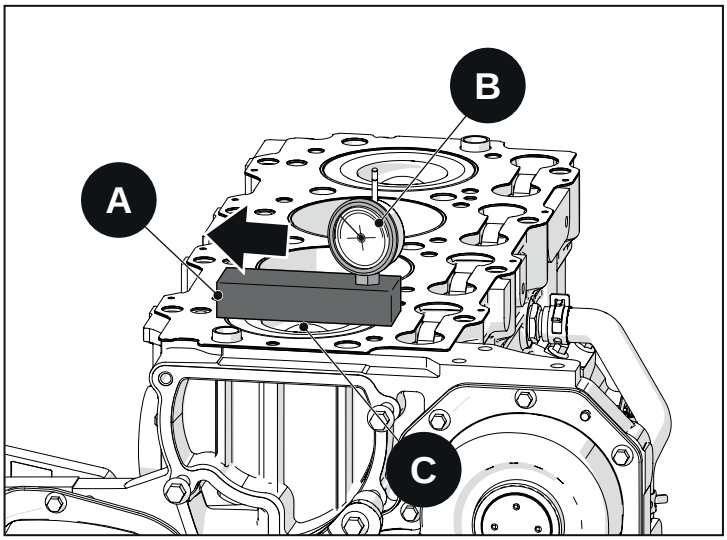

Fig. 2.136

After determining the gasket thickness required, identify and select the appropriate gasket.

Note the identification markings (notches or holes) in the corner of the gasket, as shown in the figure.

No markings indicate a thickness of:	1.42 mm
2 markings indicate a thickness of:	1.52 mm
1 marking indicates a thickness of:	1.62 mm

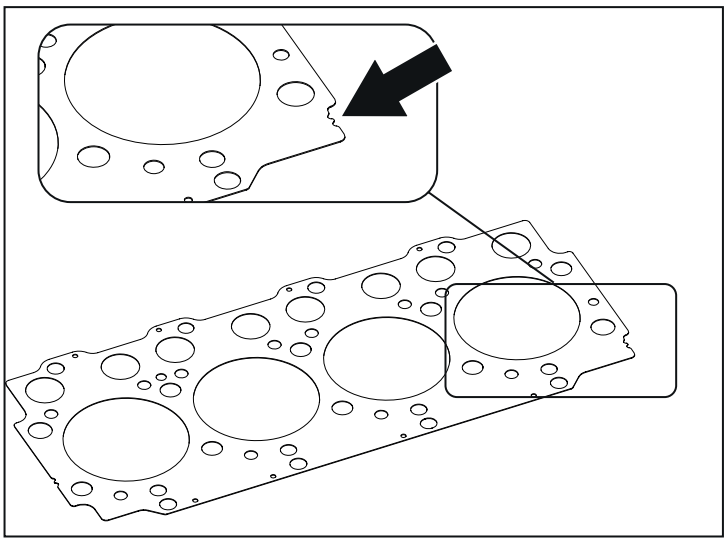

Fig. 2.137

2.43 Head - single head for all cylinders

2.43.1 Installation

- Clean the threaded holes in the cylinder block/crankcase into which the head fastener screws will be tightened.
- Clean the mating surfaces between the cylinder block/crankcase and the head.

Warning
Always replace the bolts with new components after removal

Warning
Do not lubricate new screws as they are pre-coated with anti-friction lubricant by the manufacturer.

Warning
Reusing the same screws is not recommended: however, if using the same screws, lubricate the threads and under the heads of all the M12 (12 mm) lateral screws and all the M14 (14 mm) central screws with Molykote G Rapid Plus grease.

Warning
The head gasket must be installed as it is, with no additional sealant or adhesive applied to the gasket itself.

- Place the head gasket on the cylinder block/crankcase.
- Fit the centring pins (see Special Tools) into the holes for the M12 lateral screws of each cylinder. These pins align the gasket correctly with the head.
- Fit the M12 screws and the M14 central screws and hand-tighten them all.
    - a = single head
    - b = lateral screw
    - c = central screw

2.43.1.1 Tightening screws

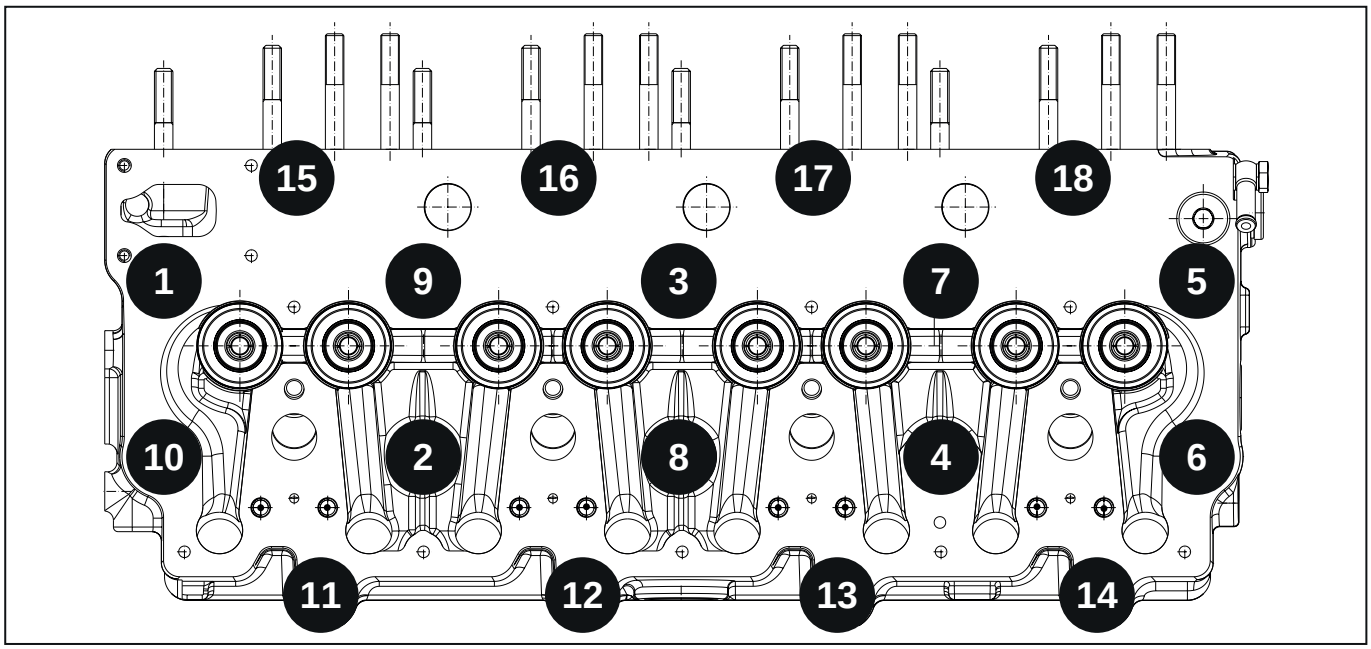

Fig. 2.138

Central screws

- a.: Tightening torque - 30 N·m
  - Order: 3-2-1-4-5-8-9-10-7-6
- b. : Additional tightening angle + 65°
  - Order: 1-2-3-4-5-6-7-8-9-10
- c. : Additional tightening angle + 65°
  - Order: 1-2-3-4-5-6-7-8-9-10

Now tighten the lateral screws in the order indicated, following steps a, b, c and d.

Lateral screws

- a.: Tightening torque - 30 N·m
  - Order 11, 12, 13, and 14
- b. : Additional tightening angle + 85°
  - Order 11, 12, 13, and 14
- c. : Tightening torque - 30 N·m
  - Order 15, 16, 17, and 18
- d. : Additional tightening angle + 85°
  - Order 15, 16, 17, and 18

1 - lubrication hole
2 - oil drain hole from rockers

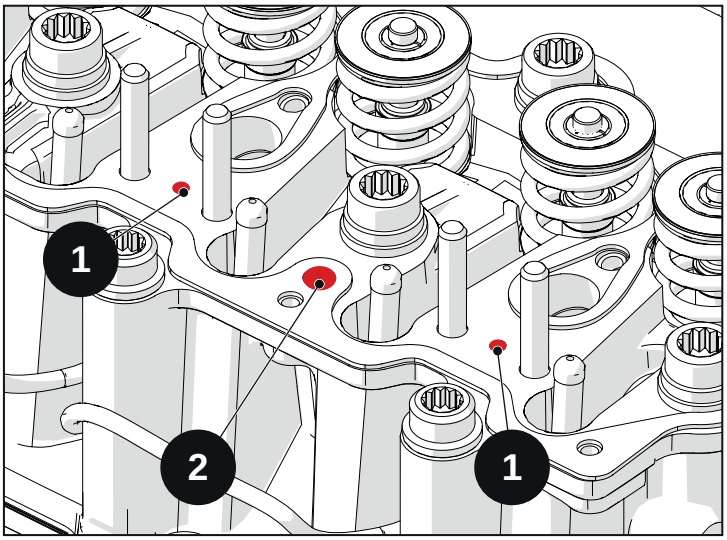

Fig. 2.139

1 - oil delivery hole to rockers
2 - oil drain hole from rockers
3 - water ducts

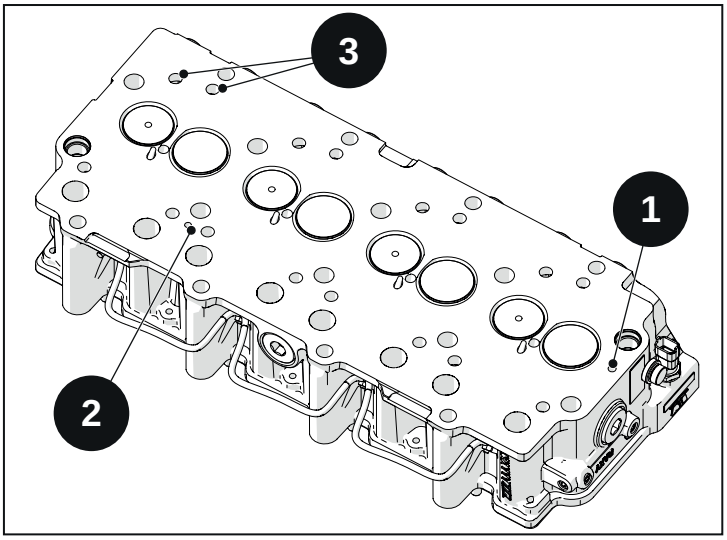

Fig. 2.140

2.44 Retightening heads

Warning

The procedure to retighten the heads must be performed whenever the head or heads are removed and irrespective of the type of head installed on the engine

Warning

A specific retightening procedure must be performed whenever the heads are replaced or removed. Retighten the head fasteners as indicated after the first 20-30 minutes of operation, with a cold engine.

- Run the engine at accelerated idle speed for one minute and then run at 1/3 maximum engine speed for approximately 20-30 minutes, until the coolant temperature reaches operating temperature (70-80 °C).
- Switch off the engine and wait for it to cool to a temperature below 40°C, measured on cylinder head 1.
- Follow the steps in the procedure one by one, loosening each M14 central bolt and retightening as indicated.

Central screws - M14

Working on one screw at a time, loosen each screw completely and retighten to 30 N·m + 120° (or 60°+60°) in the order indicated below.

- Loosening order
  - 1-2-3-4-5-6-7-8-9-10
  - Torque 30 N·m + additional angle of 120° (or 60°+60°)
- Tightening order
  - 1-2-3-4-5-6-7-8-9-10

Lateral screws - M12

Note

the retightening procedure is not required for the M12 lateral screws from number 11 to 18 (4 cylinder engines) or from number 15 to 26 (6 cylinder engines). If necessary, check the M12 lateral screws with a torque wrench set to the indicated torque value.

- Torque wrench setting for checking tightness 90 N·m
- Checking order
  - 11-12-13-14-15-16-17-18

2.45 Valve guides

- Inspect the valve guides to check for chipping or cracks.
- Inspect the valve guides to check for signs of seizing, carbon deposits or scoring.
- Check the height of the valve guides
- Remove the oil seals from the valve stems.
- Install a new valve in the guide.
- Measure valve guide free play as follows:
    - Mount a dial gauge on the surface of the head. Place the probe of the dial gauge against a point on the valve stem close to the valve guide.
    - While holding the top end of the valve approximately 2 mm outside the guide, push the stem backwards and forwards in as shown by the arrows. Compare the valve stem free play against the values indicated in the following specifications.
    - Measure the inner diameter of the valve guide. If the free play measured is not within the permitted range specified, replace the valve guide.

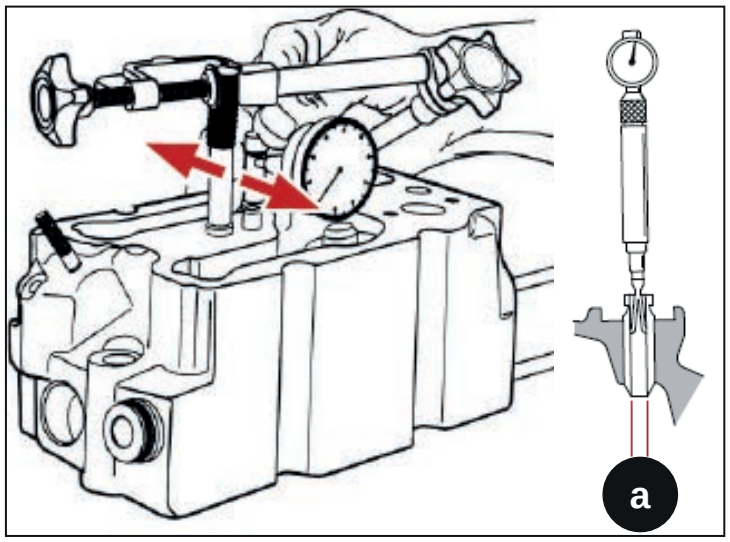

Fig. 2.141

2.45.1 Specifications

Valve stem - diameter (see chapter “Valves”)	
Exhaust	7.921 - 7.939 mm
Intake	7.94 - 7.96 mm

Valve stem free play - production specifications	
Exhaust	(0.04 - 0.073) mm
Intake	(0.03 - 0.065) mm

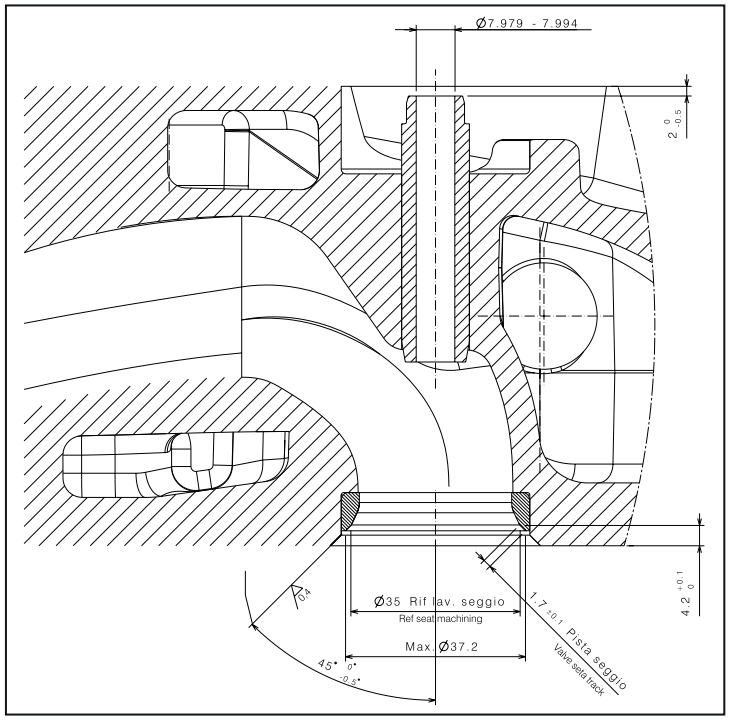

Fig. 2.142

Inner valve guide diameter - production specifications.	
Exhaust	7.979 - 7.994 mm
Intake	7.99 - 8.005 mm

Valve guide height	
Exhaust	54.75 - 55.25 mm
Intake	54.75 - 55.25 mm

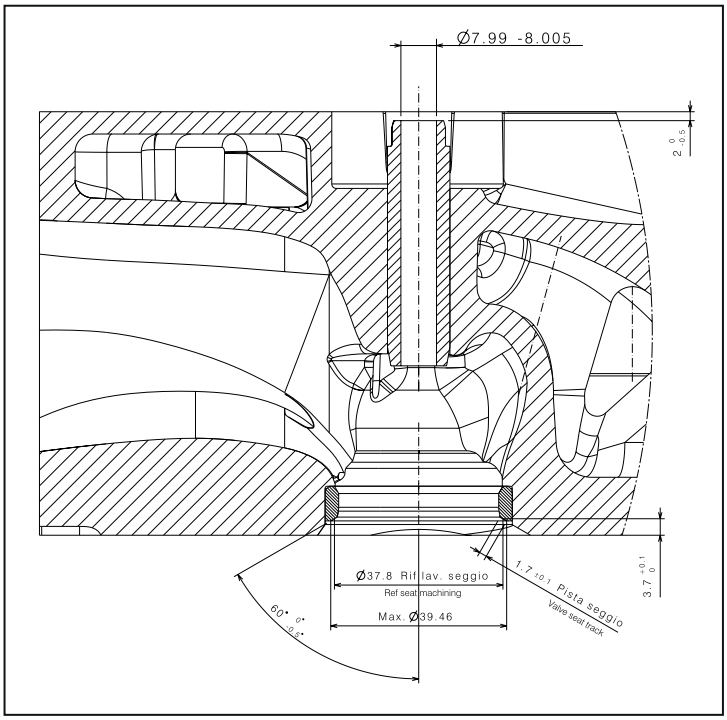

Fig. 2.143

2.45.2 Replacement

Warning

The heads are manufactured from aluminium. This material may warp or melt if heated inappropriately.

Using a blow torch will heat an aluminium head excessively and unevenly. Never use a blow torch to heat a cylinder head. Use a specific workshop oven for heating mechanical components to heat an aluminium cylinder head in order to replace a valve guide or valve seat.

- Remove the oil seal.
- Heat the head in an oven to 85°C (185°F).
- Remove the old guide.
- With the head heated to 85°C (185°F), press the new guide into the head to attain the measurement specified.

A - Valve guide protrusion (relative to upper surface of head) (EXHAUST/INTAKE)

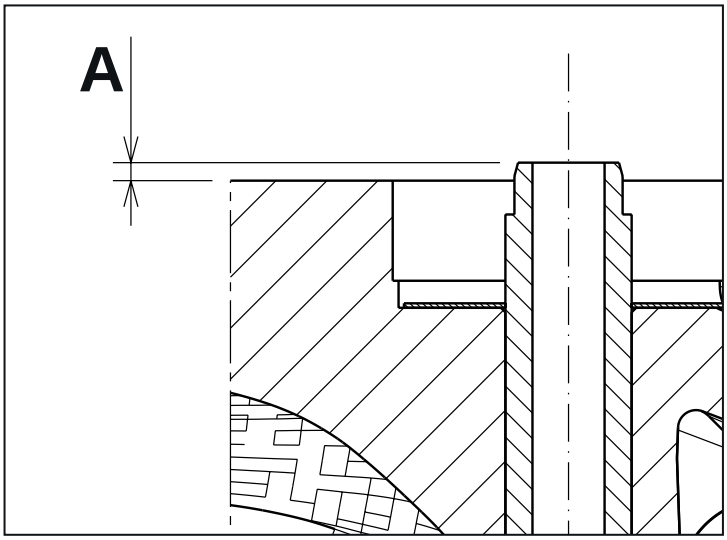

Fig. 2.144

A	1.5 - 2 mm
b (for R754IE4- TE4-ISE4-R754EU6 engines with single head for all cylinders)	1.5 - 2 mm

Warning

If the valve guide has been removed, both the valves and the valve guides must be replaced as sets.

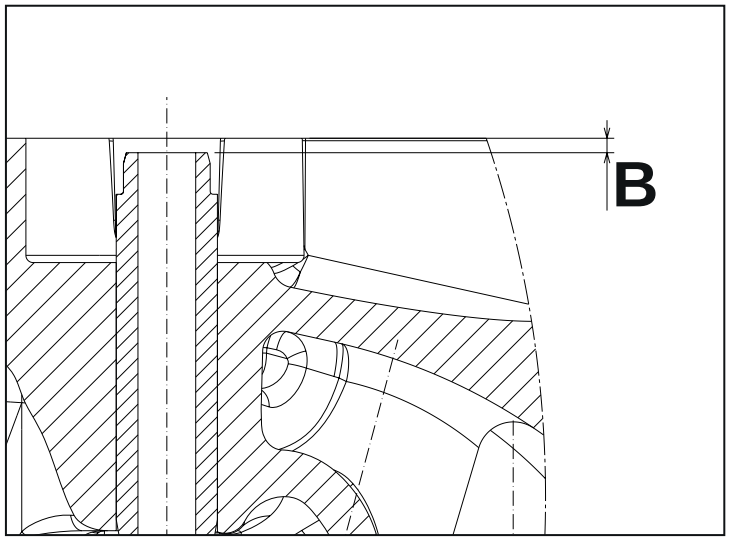

Fig. 2.145

2.46 Valve seat

- Inspect the valve seats to check for excessive wear.
- Measure the valve seats. See the specifications for the valve seats.
- If the values measured are not within specifications, recondition the seats. If the valve seats can no longer be reconditioned, the head must be replaced. See the section Repair - Reconditioning Valve Seats.

Measurements

A - Valve recession
B - Inner diameter

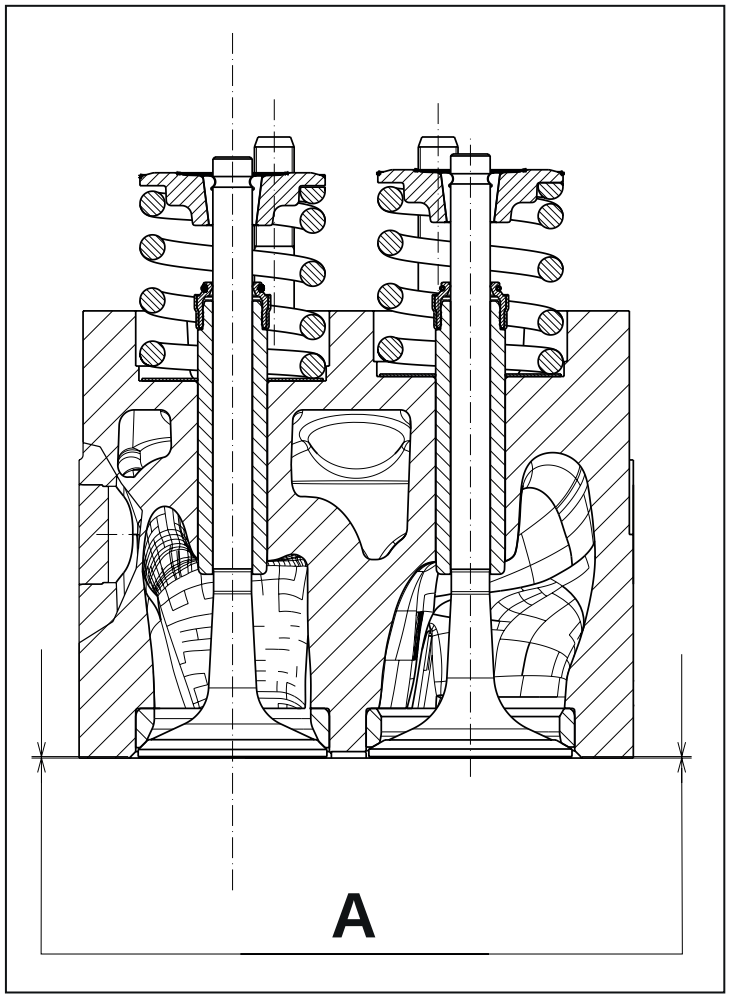

Fig. 2.146

Valve recession (service limit) (A)	
Exhaust	0 - 0.3 mm
Intake	0 - 0.3 mm

Inner diameter (B)	
Exhaust	38.964 - 38.988 mm
Intake	41.962 - 41.985 mm

Height (B1)	
Exhaust	11 - 11.1 mm
Intake	11 - 11.1 mm

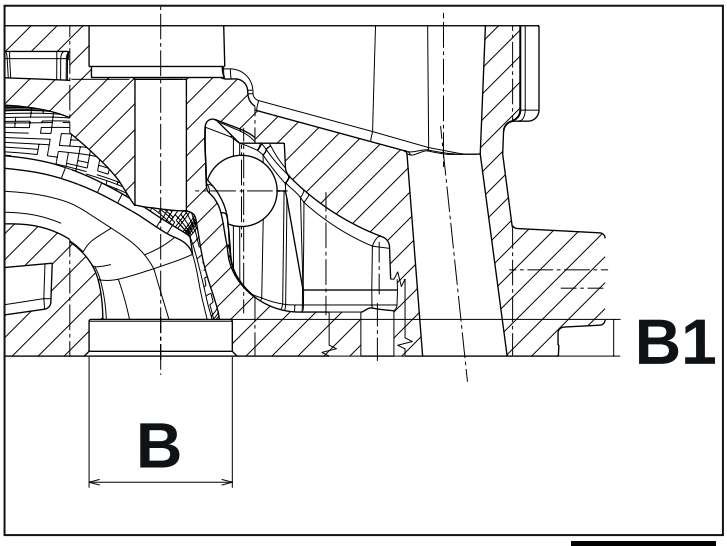

Fig. 2.147

Exhaust

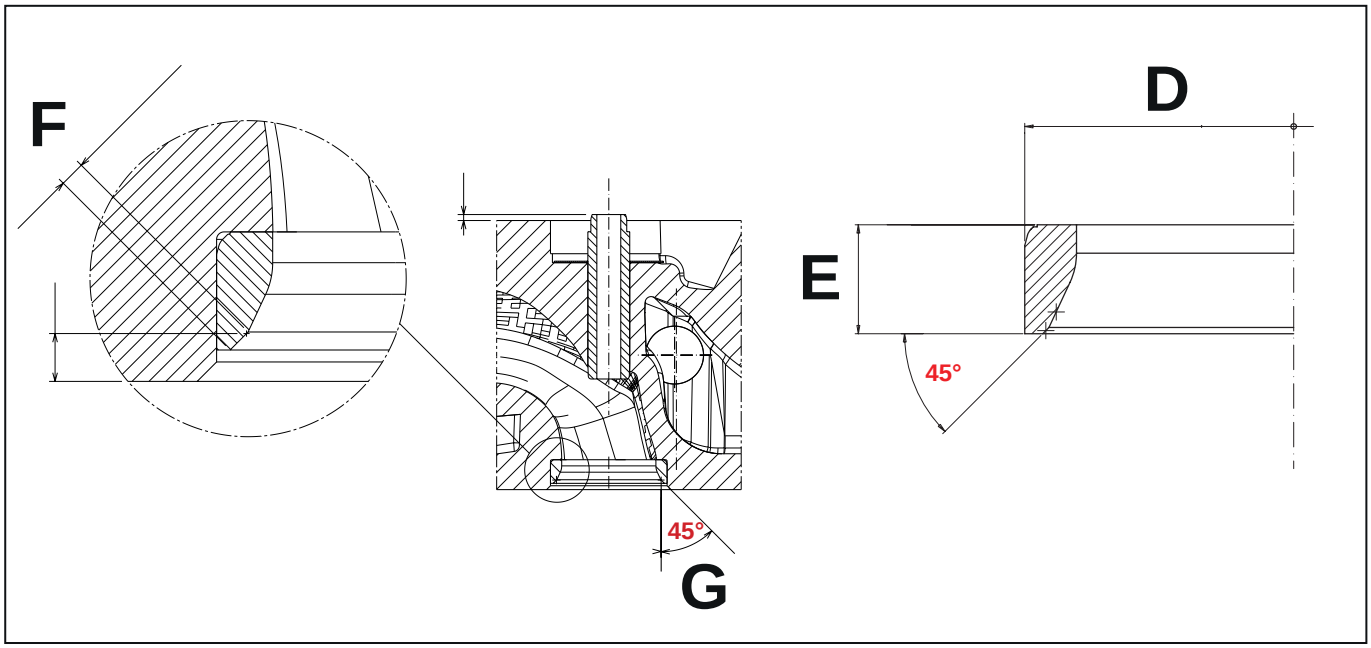

Fig. 2.148

External diameter of seat (D)	39.050 - 39.066 mm
Seat height (E)	7.85 - 7.95 mm
Seat bevel (F)	1.6 - 1.8 mm

Intake

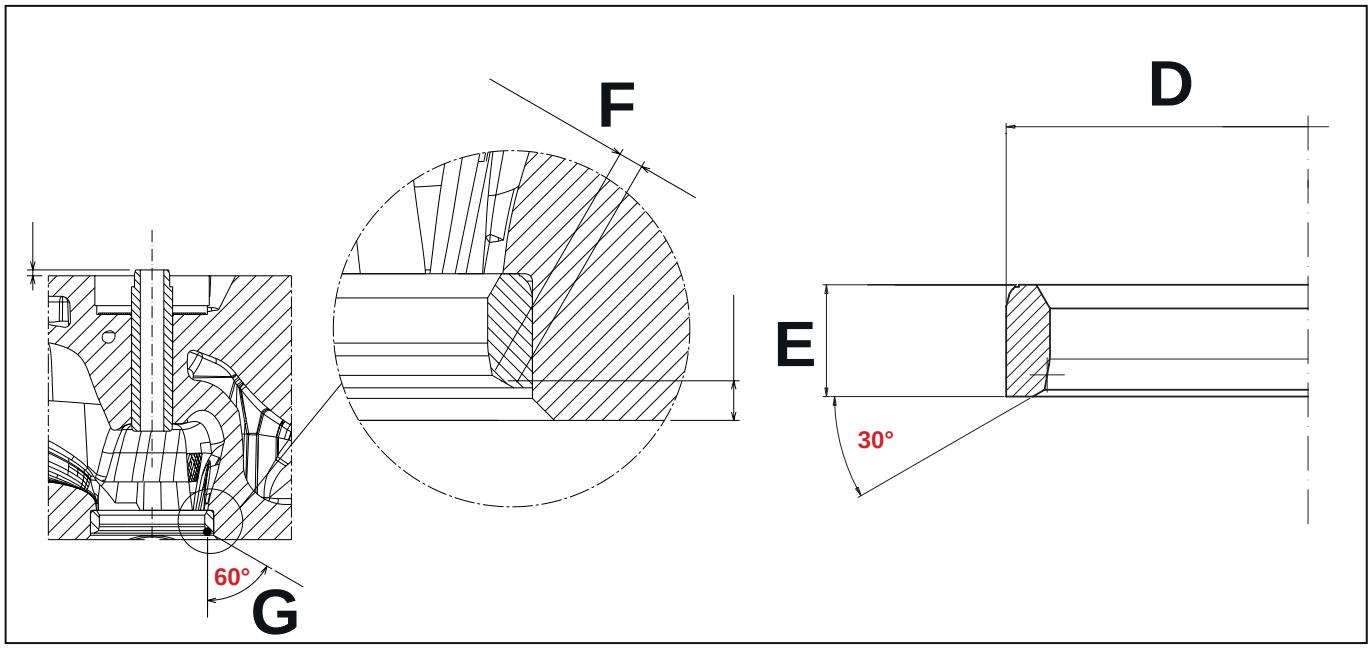

Fig. 2.149

External diameter of seat (D)	42.070 - 42.086 mm
Seat height (E)	7.73 - 7.83 mm
Seat bevel (F)	1.6 - 1.8 mm

2.46.1 Reconditioning valve seats

Note

A number of different products are available for reconditioning valve seats.

To ensure the best possible results, follow the instructions given by the manufacturer of the product used precisely.

Warning

It is imperative that the valve seats are completely clean and not fouled with any carbon residue to ensure that the valve, the valve guide and the respective seat are aligned precisely and ensure correct concentricity of the components when reconditioning the valve seats.

The original bevel angle must be maintained when reconditioning valve seats.

If reconditioning removes excessive material and thickness from the seats themselves, causing excessive valve recession, or results in an excessively large bevelled surface, replace the valve seat with a new component. During replacement, take particular care not to damage the inner diameter of the bore in the head in which the seat is installed.

Before installing the seat, heat the head to 150°C in an oven or cool the seat to -170°C in liquid nitrogen.

If the conditions for installation described above are met correctly, the seat will fit directly into the head without requiring any force.

2.47 Valves

- Inspect the valves to check for signs of damage and/or deformation. Replace if necessary.
- Measure the valves. Recondition the valves if the values measured are not within the specified limits. See the section Reconditioning Valves. Replace the valves if they cannot be repaired/reconditioned.

	Intake (mm)	Exhaust (mm)
A - Valve stem diameter valve (production, new)	7.94 - 7.96	7.921 - 7.939
F - Face width (production, new)	3.57 - 3.85	2.640 - 2.992
D - Margin (production, new)	1.82	1.73
Service limit	1.30	1.30
E - Angle (production, new)	29 deg. 30 min.	44 deg. 30 min.
B - Head diameter (production, new)	40.8 - 41	37.9 - 38.1

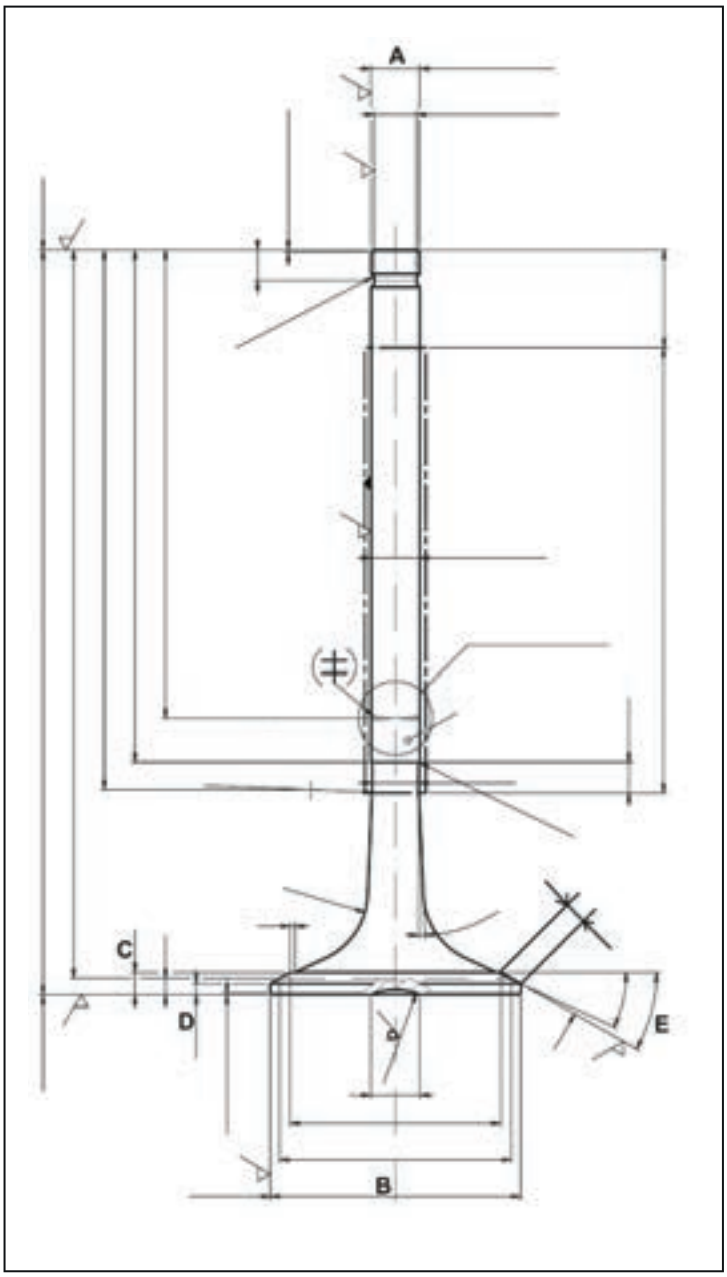

Fig. 2.150

2.47.1 Reconditioning valves

Pitted valves may be reconditioned to restore the correct angle with a valve refacer machine, which ensures the correct ratio/angle between the mating surfaces of the valve seat and the valve.

- Replace valves with excessively worn stems or which are excessively deformed.
- Measure the valves after refacing, and replace if not within specifications.
- Reface work or pitted valves to the correct .

Note
When refacing valves, ensure that the margin does not exceed 1.30 mm.

Measure the margin after refacing. If excessive material has been removed from the valve, resulting in a margin exceeding the specified limit, replace the valve.

2.47.2 Assembly

Note
Oil seals are fitted on both valves.

- Lubricate the valve guides and the valve stems with engine oil.
- Refit each valve in its original position
- Fit the oil seal on the stem and push down to bring it into contact with the guide.
- Fit the bottom collar, the spring, the split cones and the upper spring retainer cap.
- Compress the spring with a commercially available tool.

A - oil seal
B - oil seal seated against guide

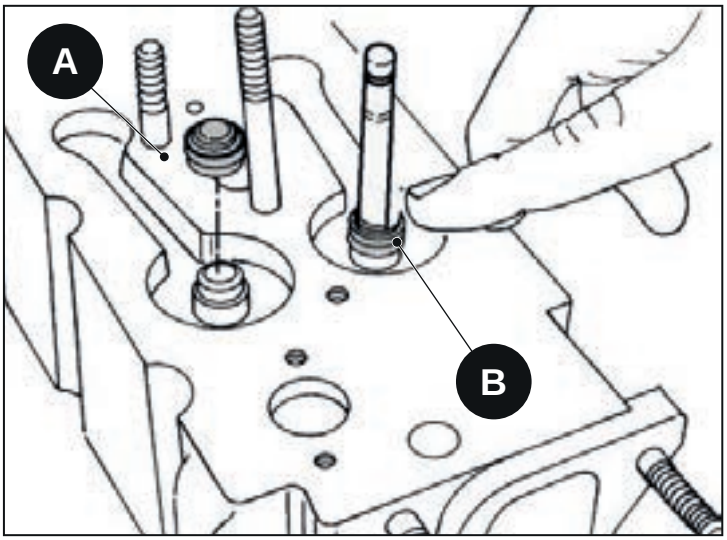

Fig. 2.151

Note
Lubricant may be used to hold the split cones in place when releasing the valve compressor tool.

- Grease the split cones to hold them in place.
- Install the split cones.
- Slowly release the valve compressor tool, ensuring that the split cones seat correctly in the groove on the valve stem.

A - Lower collet
B - Valve spring
C - Upper spring retainer cap
D - Split cones

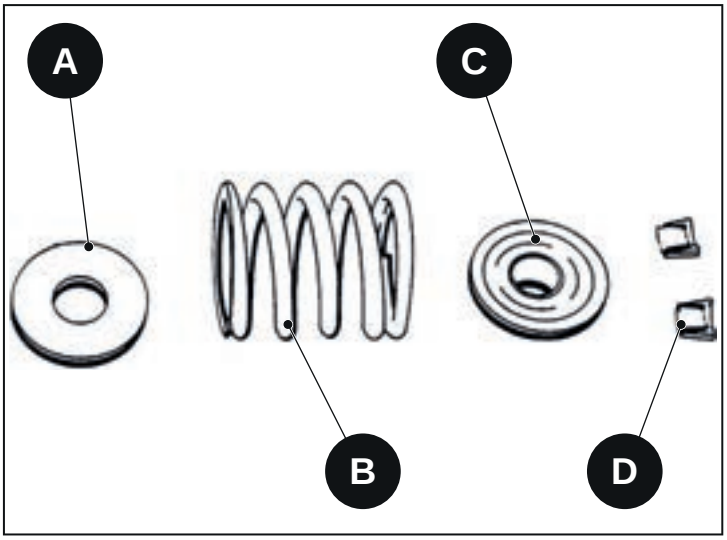

Fig. 2.152

2.48 Valve spring

- Inspect the springs to check for signs of discolouration caused by overheating.
- Inspect the split cones, the bottom collars, the upper retainer caps and the springs for wear, deformation or cracks.
- Measure the free length of each valve. Replace the valve if the value measured is not within specifications.
- Measure the distortion angle. Replace the valve if the value measured exceeds the specified limit.

Free length (A)	Intake - Exhaust	48 mm
Distortion angle (B)	Intake - Exhaust	Service limit 2 mm

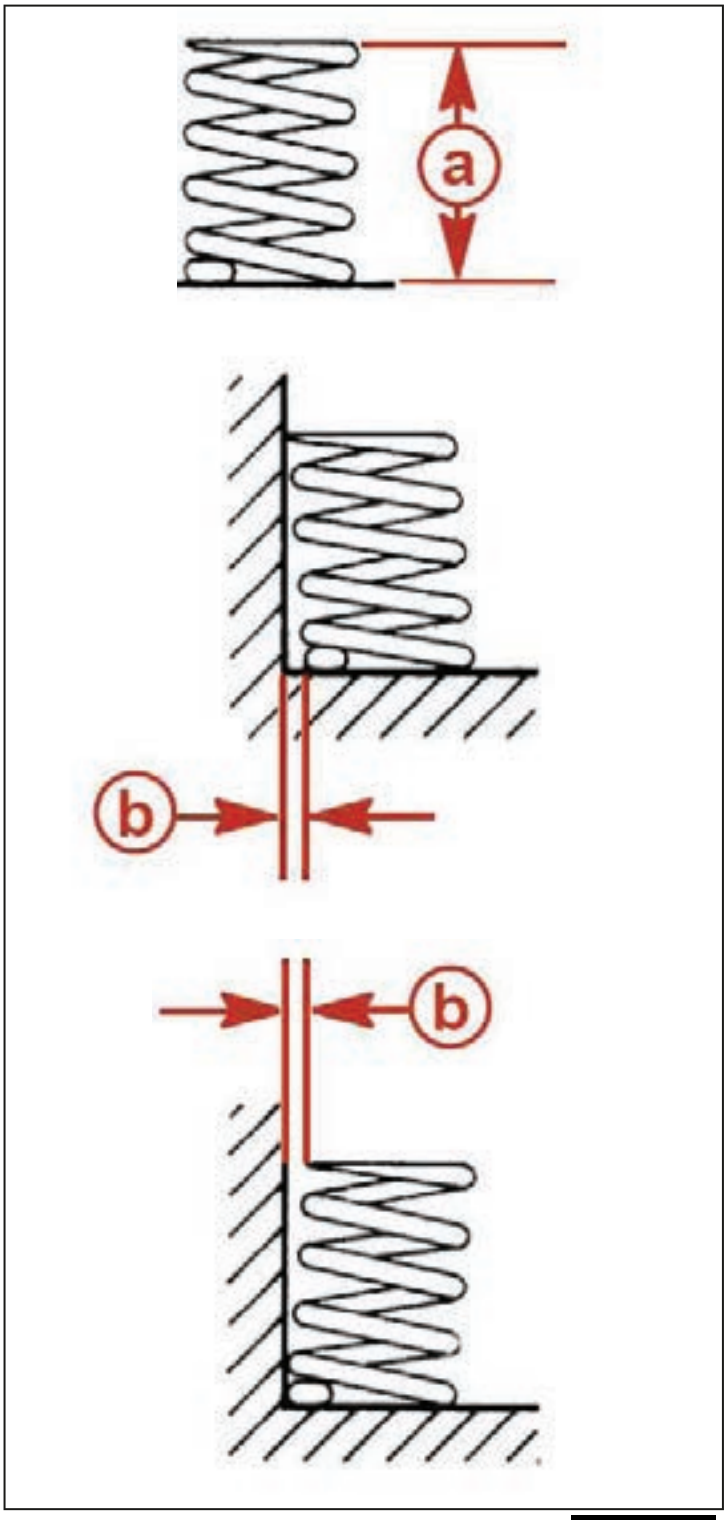

Fig. 2.153

Valve open

a - pressure applied
b - height

Pressure applied: 294 N ± 6%

Height: 38.5 mm

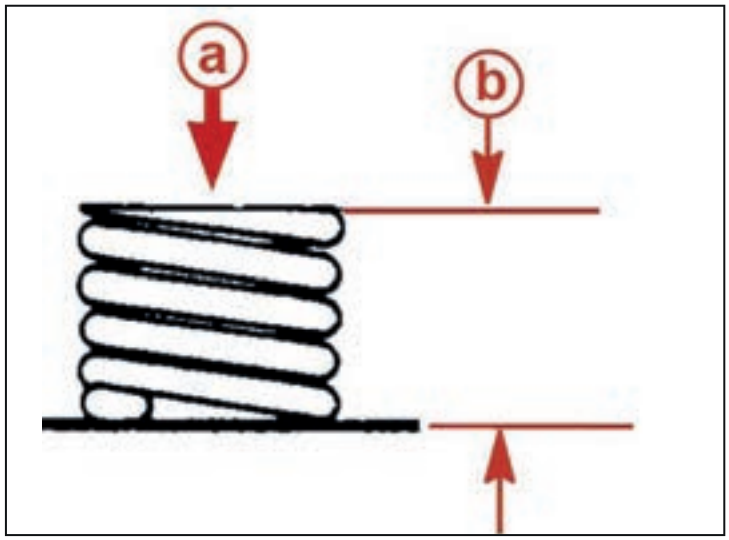

Fig. 2.154

Valve closed

a - pressure applied
b - height

Pressure applied: 635 N ± 4%

Height: 28.2 mm

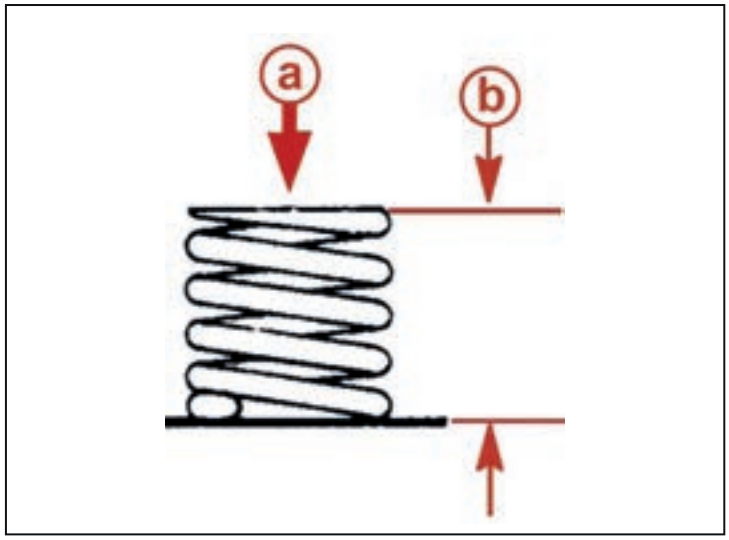

Fig. 2.155

2.49 Rockers

2.49.1 Removal

- Remove the rocker cover.

Warning
During removal, mark the components or keep them the order of removal to ensure that they are refitted correctly in the original positions.

- Remove the rocker assemblies and rocker rods. Number the components according to their original positions in the engine, or mark them appropriately, to ensure that they are refitted correctly in their original positions.

2.49.2 Cleaning

- Clean the components with solvent.
- Dry with compressed air.

2.49.3 Inspection

- Inspect the components to check for excessive wear, cracks or other damage.

Note
An oil passage is drilled through the entire length of the rocker rods to deliver oil to each rocker assembly.

- Visually inspect each rod to check for wear and deposits. Check that the oil passages in the rods are not obstructed or restricted.
- Roll each rod on a flat surface to check if it is bent.
- Replace any damaged parts.
- Use a micrometer to measure the outer diameter of the rocker pins.
- Replace the rocker carrier if the outer diameter is not within the following limits.

Outer diameter of rocker carrier (a)	21.979 - 22 mm

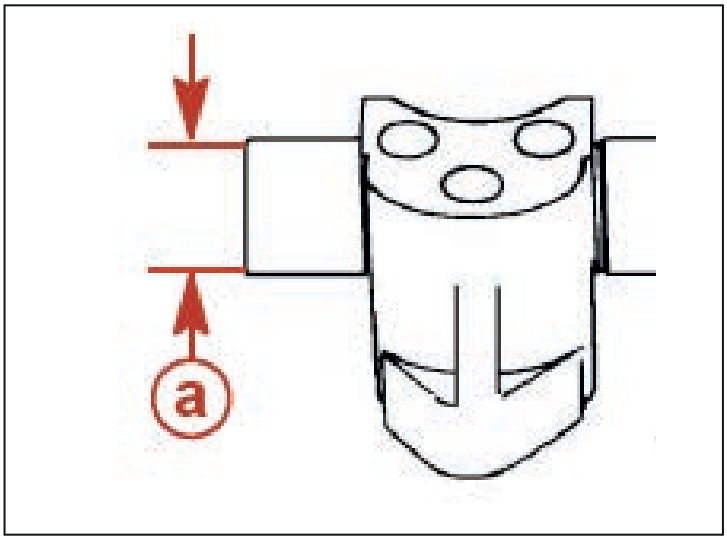

Fig. 2.156

Use a micrometer to measure the inner diameter of the rocker bush.

Inner diameter (production) (a)	22.03 - 22.05 mm
Free play after initial assembly	0.030 - 0.071 mm
Wear limit	

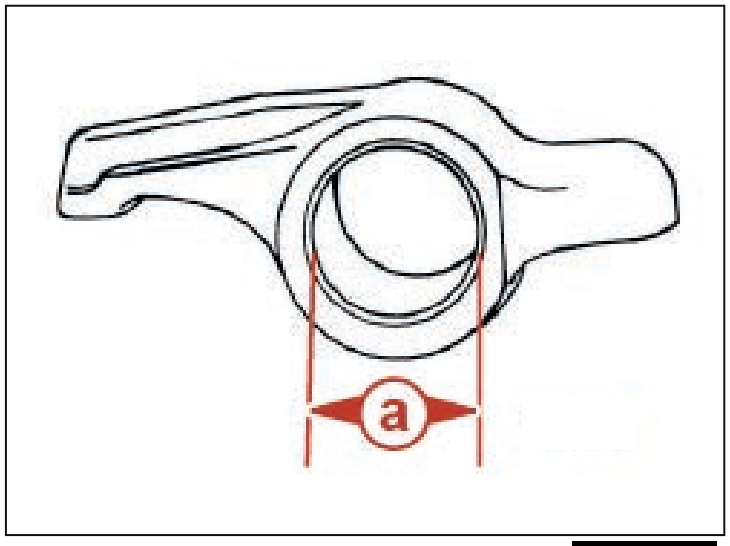

Fig. 2.157

2.49.4 Assembly

1 - Rocker carrier pin
2 - Exhaust rocker
3 - Intake rocker
4 - Stop washer
5 - Screw
6 - Wear pad
7 - Rocker bush

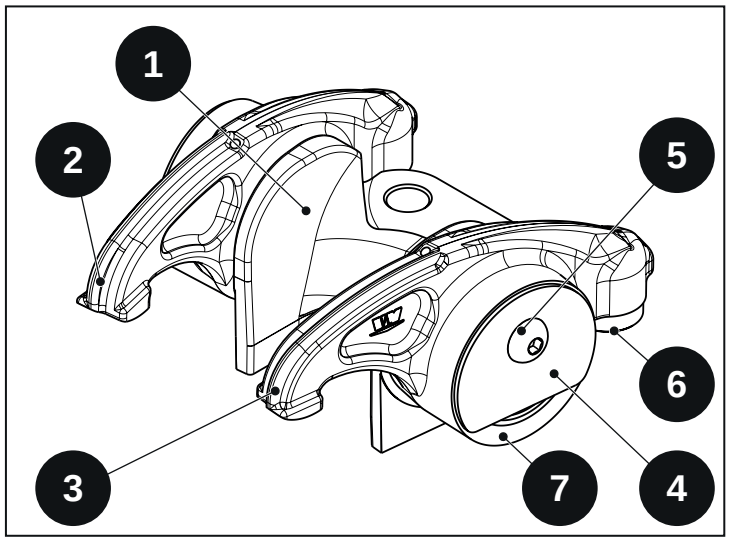

Fig. 2.158

1 - Rocker carrier pin
2 - Exhaust rocker
3 - Intake rocker
4 - Stop washer
5 - Screw
6 - Wear pad
7 - Rocker bush

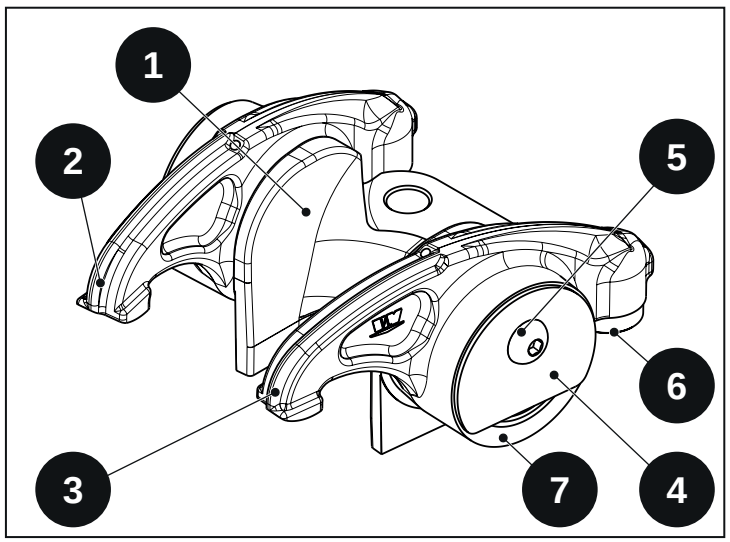

Fig. 2.159

Warning

Drain all residual oil from the tappets via the drain holes on the tappets themselves before assembling the rocker assembly, using the special tool (see the section Hydraulic Tappets) to compress the tappet.

- Lubricate the rocker bushes and the rocker carrier pins with engine oil.
- Install the rocker pins on the rocker carrier. Install the parts in the positions shown in the figure.
- Install the stop washer as shown in the figure and tighten the screw.
- Lubricate the outer surfaces and ends of the rocker rods.
- Fit the rods in their original positions. Ensure that the rods are installed correctly in the seats of the hydraulic tappets.
- Lubricate the contact surfaces of the rocker assembly.
- Lubricate the threads of the rocker assembly mounting stud bolts.
- Fit the rocker assembly on the stud bolts. Align the rods with the rocker seats while installing the assembly on the stud bolts.
- Fit both nuts fastening the rocker assembly. Tighten the nuts.
  rocker carrier fastener nuts: 29 N·m

X - rocker carrier fastener nuts
Y - rocker carrier

Warning

valve clearance is adjusted automatically when the complete rocker assembly is installed and fastened correctly.

Repeat the steps indicated for the rocker assembly of each cylinder.

No valve clearance adjustment is necessary.

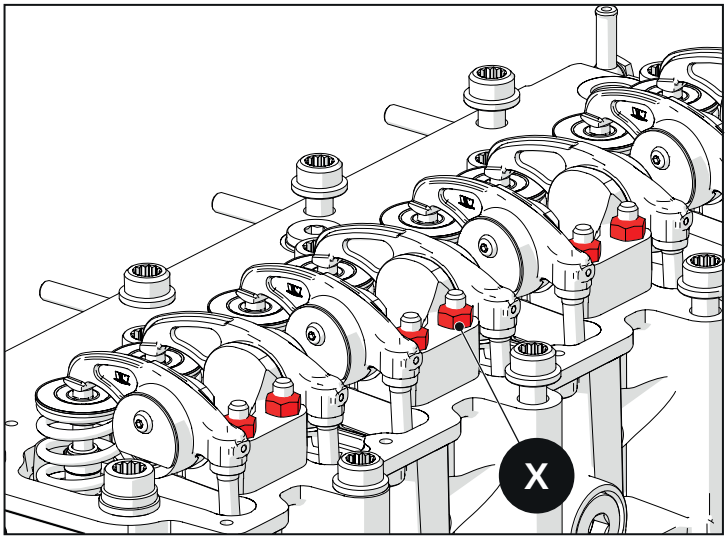

Fig. 2.160

2.50 Hydraulic tappets

Warning

The camshafts and tappets cause mutual wear to each other during operation of the engine.

Refitting a worn camshaft and worn tappets without matching them correctly in the original positions, or using worn components together with new components may cause accelerated, excessive wear and engine damage. Whenever it is necessary to replace any component, the camshaft and tappets must all be replaced together as a set with new components.

The hydraulic tappets are held in position and prevented from rotating by a special bracket. Each cylinder has its own individual bracket. Take particular care when installing these brackets to ensure that the flat surface of the tappet is engaged correctly in the anti-rotation bracket.

Warning

when installing the brackets, make sure that the flat surface of the tappet is engaged correctly in the anti-rotation bracket, and that the drain hole facing towards the engine.

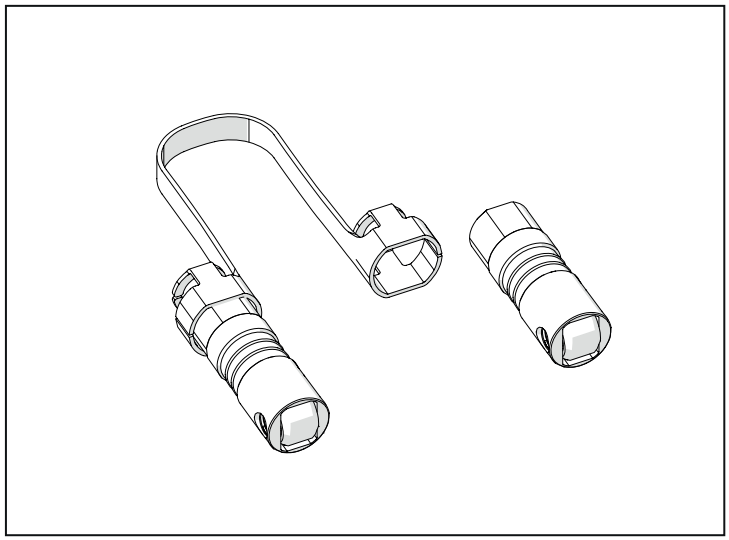

Fig. 2.161

2.50.1 Removal

- Remove the rocker cover.

Warning

keep the components of each individual rocker assembly in separate containers, marking them appropriately, to ensure that all the parts are reinstalled correctly in their original positions.

- Remove the rocker assemblies and the rods. Mark all components appropriately for identification.

Warning

tappets must be refitted in their original positions so that the tappet roller rotates in the same direction and against the same camshaft lobe, if the previous camshaft is reused.

- Make assembly reference markings on all the brackets and tappets to clearly identify the relative positions and orientation of the components in the seat on the cylinder block/crankcase.
- Raise the brackets into a vertical position, without disturbing the positions of or removing the tappets.
- Fit the special tool on the tappet. Compress the inner spring of the tappet, rotate by 90° and lift the tappet.
- Remove the remaining tappets, numbering them and keeping them in order of removal to ensure that they are reinstalled in the correct positions.

a - rocker rod
b - anti-rotation bracket
c - tappet
d - roller
e - drain hole
f - special tool

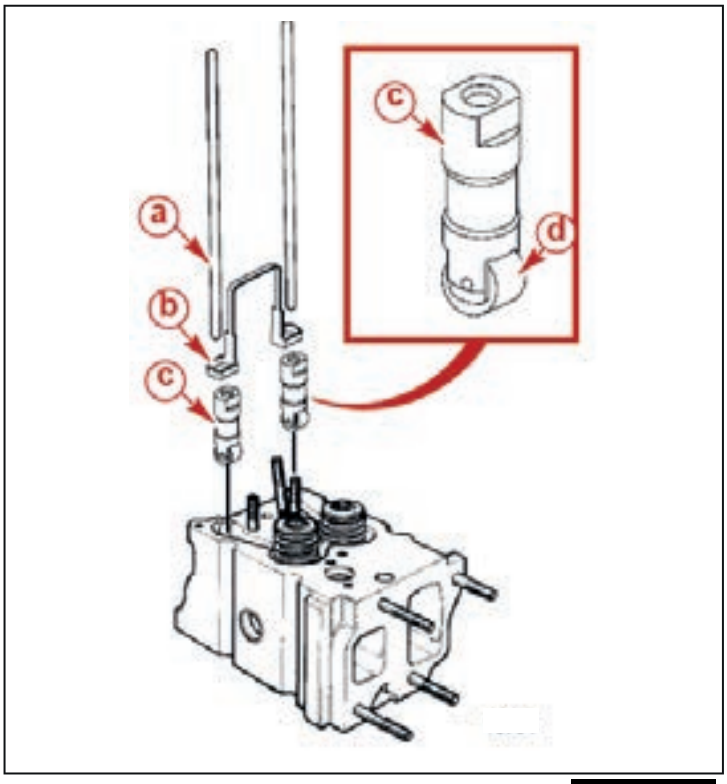

Fig. 2.162

a - drain hole
b - special tool

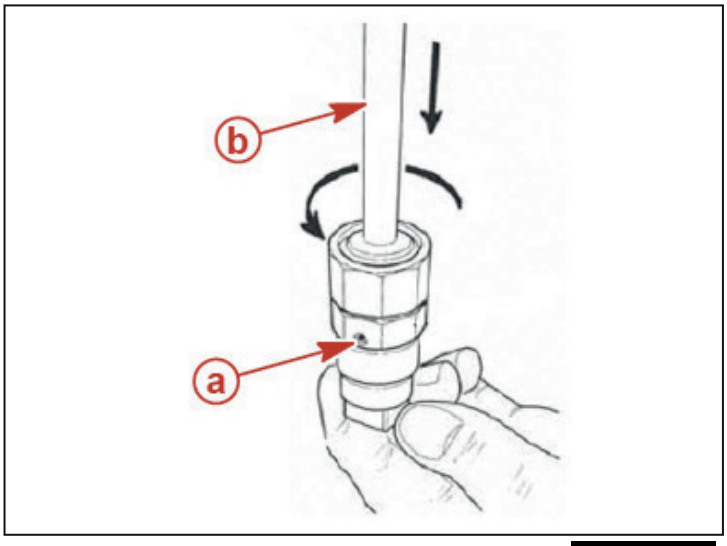

Fig. 2.163

2.50.2 Cleaning

- Inspect the contact surface with the rod A. If the seat is worn, also inspect the rods. Check that the seat shows no signs of seizing or pitting.
- Inspect the outer surface of the tappet. If the surface is worn or scratched, inspect the tappet seating bores in the cylinder block/ crankshaft.
- Inspect the tappet roller. If the roller is worn or scratched, also inspect the camshaft lobes.
- Measure the outer diameter of the tappet B. Replace the tappet if the value measured is below the specified limit.
  Outer diameter: 22.195 - 22.212 mm
- Inspect all parts carefully. If any parts are damaged or worn, the entire tappet must be replaced

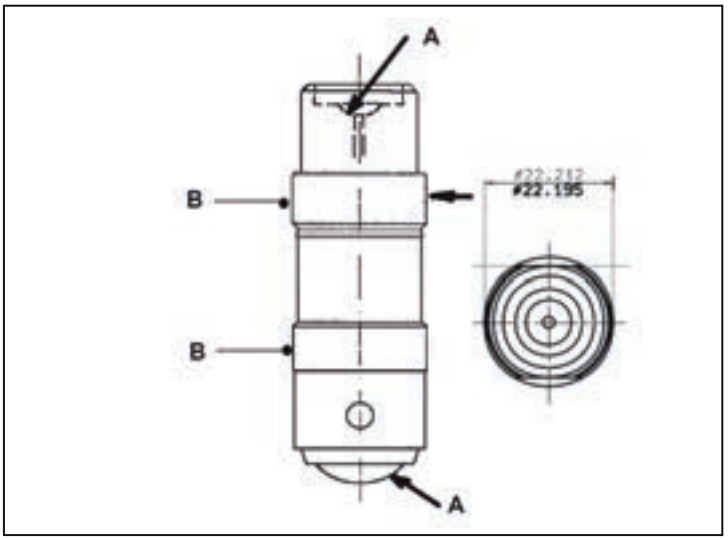

Fig. 2.164

2.50.3 Installation

Warning

The camshafts and tappets cause mutual wear to each other during operation of the engine.

Refitting a worn camshaft and worn tappets without matching them correctly in the original positions, or using worn components together with new components may cause accelerated, excessive wear and engine damage. Whenever it is necessary to replace any component, the camshaft and tappets must all be replaced together as a set with new components.

Warning

Lubricate each tappet completely before installing the hydraulic tappets. When installing a new camshaft and tappets, pour engine oil over the tappet rollers and the camshaft lobes.

Warning

Drain all residual oil from the tappets via the drain holes on the tappets themselves before assembling the rocker assembly, using the special tool to compress the tappet.

Install the tappets in the cylinder block/crankcase in order of removal, using the special tool. Align the assembly reference markings made between removal. Make sure that the oil drain hole of the tappet is facing towards the crankshaft.

Install the anti-rotation brackets, ensuring that the flattened surfaces of the brackets engage correctly with the flattened surfaces of the tappets to prevent the tappets themselves from rotating.

A - bracket (flattened surface)
B - tappet (flattened surface)
C - tappet

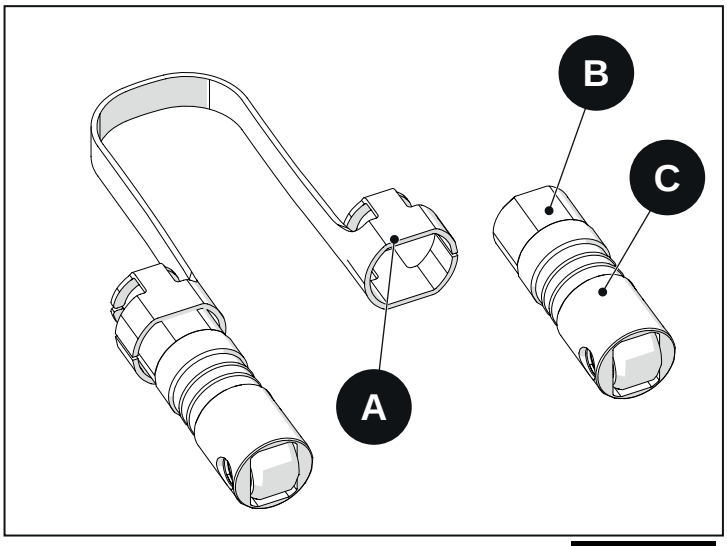

Fig. 2.165

Lubricate and install the rocker rods. Ensure that the rods engage correctly with the seats on the tappets.

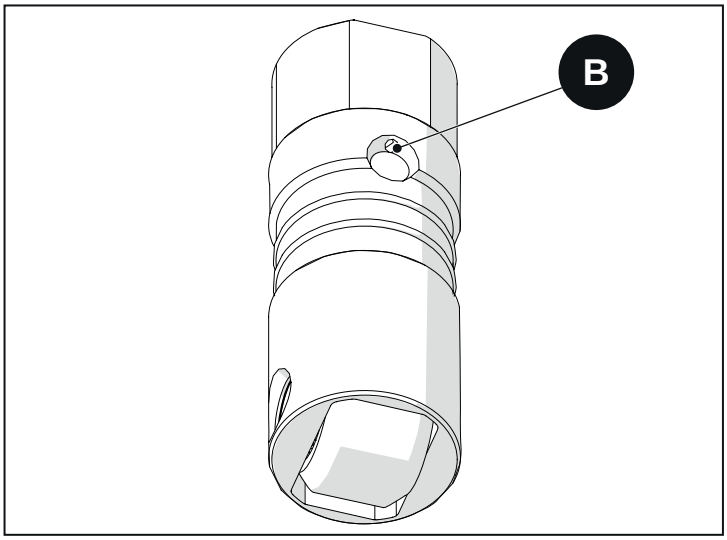

Fig. 2.166

2.51 Rocker rods

2.51.1 Removal

- Removing the rocker cover.
- Remove the rocker assemblies.
- Remove the rocker rods.

Warning

Number the rocker rods and the respective rods to ensure that they are reinstalled in the original positions.

A - Rocker rods
B - Rocker seat (not visible)

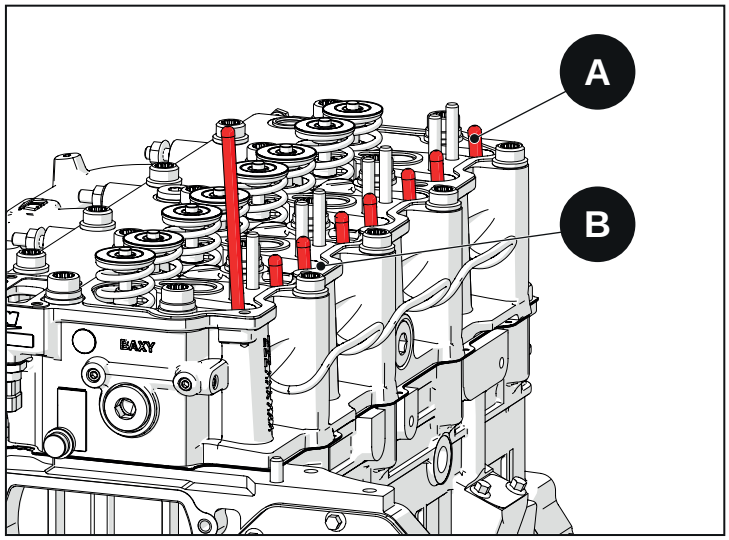

Fig. 2.167

2.51.2 Cleaning

- Clean the rocker assemblies and the rods.
- Clean the rods and the relative through holes for lubricating the rockers.
- Dry with compressed air.

2.51.3 Inspection

- Inspect all the contact surfaces to check for excessive wear or signs of incipient seizing.
- Check that the through holes in the rods for lubricating the rockers are not obstructed or restricted.
- Roll the rods on a flat surface to check that they are not bent.
- Replace any damaged parts.

2.51.4 Installation

Warning

Drain all residual oil from the tappets via the drain holes on the tappets themselves before assembling the rocker assembly, using the special tool to compress the tappet.

- Lubricate the outer surfaces and ends of the rods.
- Install the rods in their original positions
  Ensure that the ends of the rods engage correctly with the seats on the tappets.
- Fit the rocker assemblies.

2.52 Fracture-split connecting rod

2.52.1 Removal

Warning

Each connecting rod-cap assembly must be reinstalled in its original position.

Mark or identify each connecting rod-cap assembly to ensure that it is reinstalled in the original position and in the same cylinder. Keep the cap and bushes together with the connecting rod-piston assembly. Do not mix components from different assemblies.

Remove the connecting rod bushes. Keep the bushes together with the original connecting rod and cap.

Warning

Connecting rods may cause damage to the crankpins, cylinder sleeves and oil jets. Take care not to damage any other components when removing the connecting rods.

Taking adequate measures to protect the crankpins, cylinder sleeves and oil jets, push the piston and the connecting rod out of the cylinder.

Warning

As the fracture split process creates a unique mating surface pattern for each individual connecting rod shank/cap assembly, connecting rod shanks and caps from different assemblies cannot be swapped. To avoid damage, never set a connecting rod shank or cap down on its mating surface.

2.52.2 Disassembly

- Secure the connecting rod in a vice.
- Use a commercially available tool to compress and remove the 1st and 2nd compression rings and the oil scraper ring.
- Remove the circlip retaining the piston pin. Push the piston pin out from the connecting rod and the piston.
- Note the orientation of the piston bowl and of the valve recesses relative to the orientation of the identification paint dot on the connecting rod shank and the connecting rod shank/cap identification number.

X - oil jet

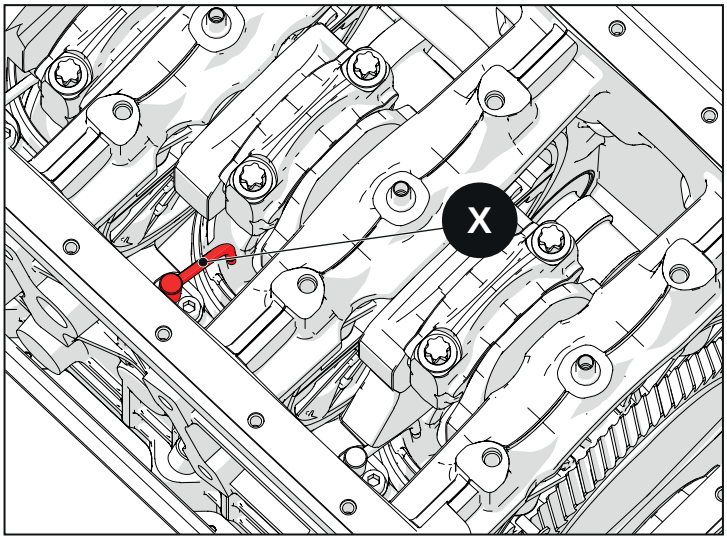

Fig. 2.168

X - piston bowl
X1 - piston identification number
B - connecting rod identification number
B1 - connecting rod identification number
C - dot

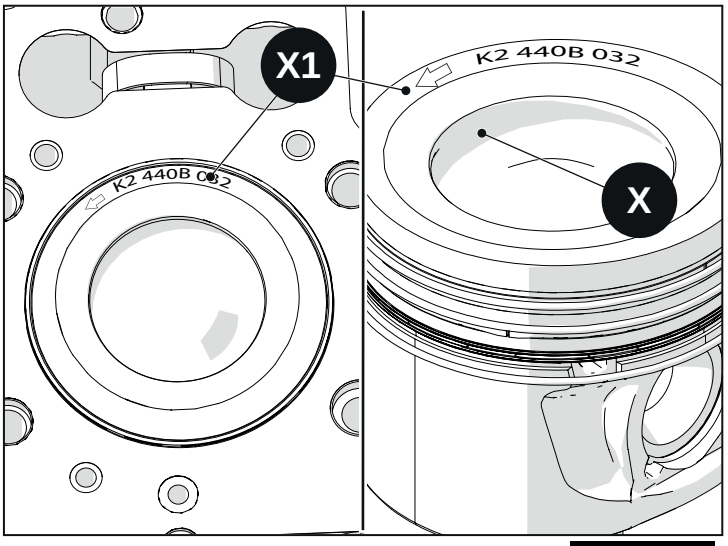

Fig. 2.169

b - Connecting rod identification number

Example: 1st line, AI0712

- AI= supplier
- 07= week of production
- 12= year of production

2nd line, 1996

- 1996= production serial number

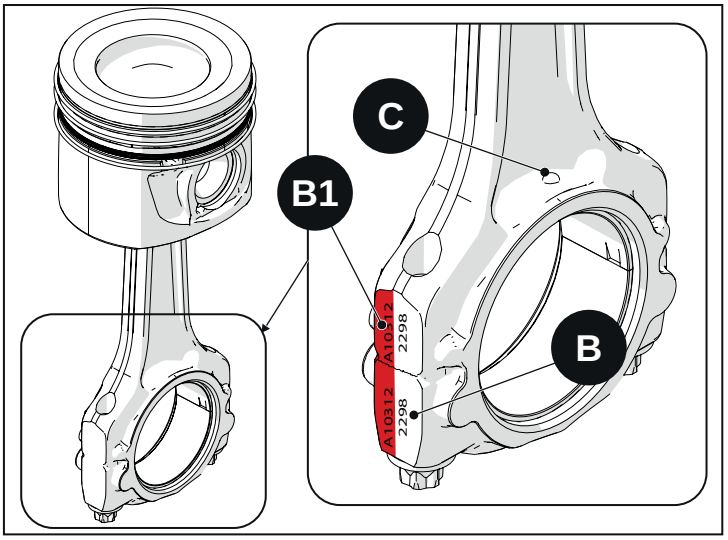

Fig. 2.170

b1 - Connecting rod identification number

Example: 1st line: C3

- **Example: 1st line: C3**
  - C3: C= seat diameter / 3= weight class
- **2nd line, 2057F**
  - 2057F= VM code

2.52.3 Fracture-split connecting rod

Warning

All measurements must be made with the components at ambient temperature.

Warning

The weight class of the connecting rod is identified by paint markings on the shank. Check that the colour of the paint dot on the shank is the same on all the connecting rods. Replace any connecting rods with a paint dot of a different colour than the other connecting rods or with no paint dot on the shank. Note that if it is necessary to replace a connecting rod, all the connecting rods in the engine must be replaced together as a set.

Check the connecting rods for signs of twisting or bending. In case of any doubt, test all the connecting rods with the Magnaflux magnetic particle testing system.

Tighten the connecting rod screws temporarily to 88 N·m (see CONNECTING ROD ASSEMBLY for the correct tightening procedure and tightening torques).

Warning

Tighten the connecting rod screws temporarily to 88 N·m (see CONNECTING ROD ASSEMBLY for the correct tightening procedure and tightening torques).

IDENTIFICAZIONE BIELLE IN FUNZIONE
DELLA SELEZIONE PESI
Connecting rods identification
in function of masses selection

≥gr.990	>gr.1004.9	>gr.1019.9	>gr.1034.9
↓	↓	↓	↓
≤gr.1004.9	≤gr.1019.9	≤gr.1034.9	≤gr.1050
VERDE Green	BLU Blue	BIANCO White	GIALLO Yellow

Fig. 2.171

Parallelism/deviation between connecting rod small and big ends	0.15 mm
x - length	162.975 - 163.025 mm

Use a dial bore gauge to measure the inner diameter of the big end.

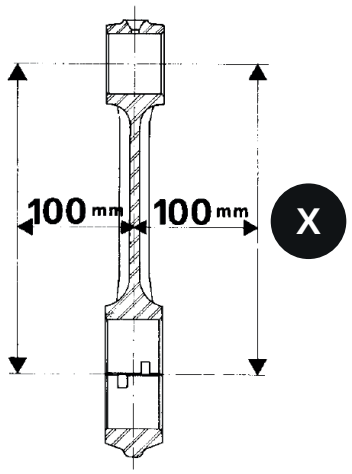

Fig. 2.172

a - Inner diameter of big end

Inner diameter (without bushes)	57.563 - 57.582 mm
Maximum wear	0.02 mm

Warning

See the section “Crankshaft” for the procedure for determining free play between the crankpin and the big end bushes.

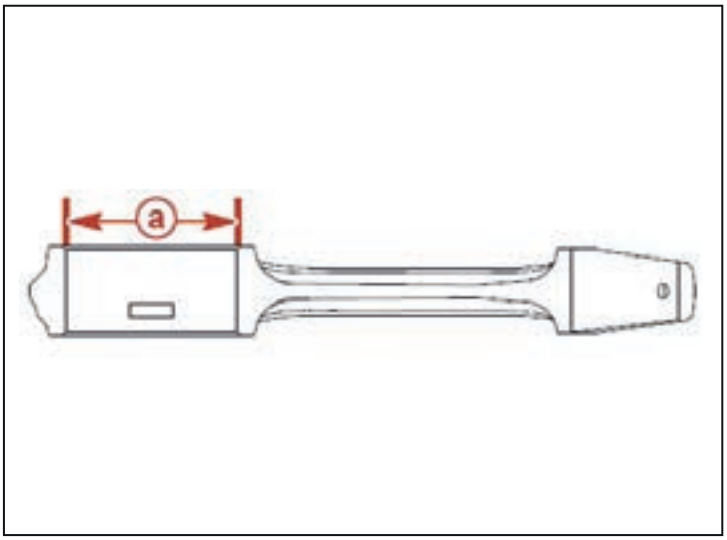

Fig. 2.173

Inspect the big end bushes and the connecting rod cap screws for damage. Measure the inner diameter of the small end bush and the outer diameter of the piston pin. Replace the bush if the free play exceeds the specified limits.

a - Internal diameter of bush

b - Outer diameter of piston pin

Warning

When replacing the piston pin bush during servicing, the new bush must be bored to the correct diameter after installation in the connecting rod. Install the bush with the engine oil passage hole in the bush for lubrication aligned with the hole in the connecting rod.

Internal diameter of bush	30.035 - 30.050 mm
Outer diameter of piston pin	29.992 - 29.996 mm
Bush seat in small end of connecting rod	34 - 34.025 mm
Maximum wear	0.01 mm
Free play after initial assembly	0.039 - 0.058 mm

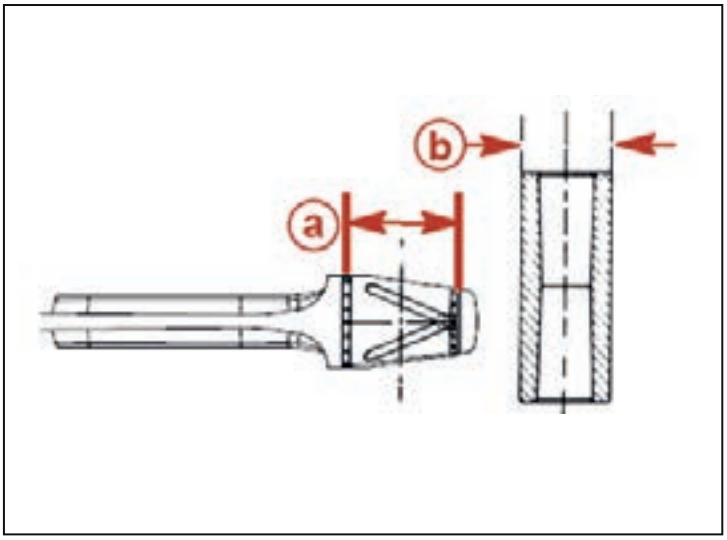

Fig. 2.174

2.52.4 Assembly (fracture-split connecting rod)

Lubricate the small end bush, the small end and the piston pin with engine oil.

Assemble the piston and connecting rod, with the piston bowl, the valve recesses, the paint marking on the shank identifying the weight class and the connecting rod shank/cap identification numbers oriented as shown in the figure.

Assemble the piston and the connecting rod with the valve recesses facing towards the respective intake and exhaust sides of the engine, and with the connecting rod shank/cap identification numbers oriented as shown in the figure. Fit the piston pin with the respective circlip.

Install the connecting rod/piston assembly in the cylinder, taking care not to damage the cylinder sleeve and the crankpin.

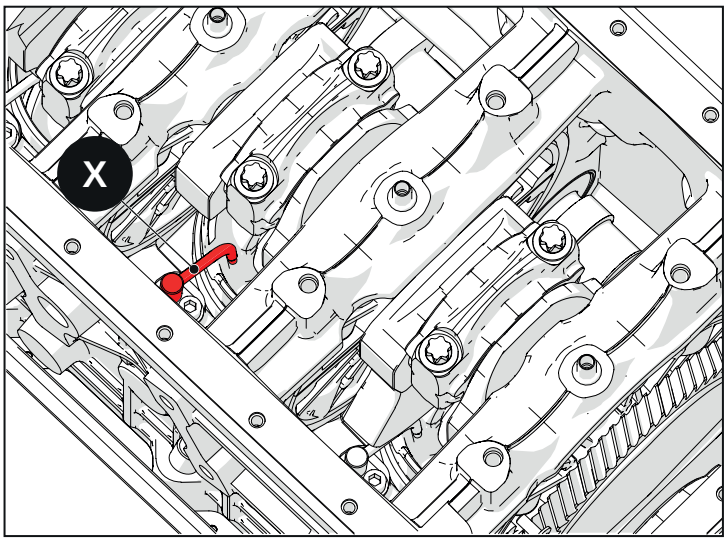

Fig. 2.175

Warning

Connecting rods may cause damage to the crankpins, cylinder sleeves and oil jets. Take care not to damage any other components when installing the connecting rods.

X - oil jet

Align the connecting rod with the crankpin and press the piston into the cylinder to bring the connecting rod shank and the relative bushes into contact with the crankpin. Make sure that the assembly reference markings made on the connecting rod shank and cap are matched correctly, and that the connecting rod shank/cap identification numbers face towards the injection/camshaft side.

X - piston bowl
X1 - piston identification number
B - connecting rod identification number
B1 - connecting rod identification number
C - dot

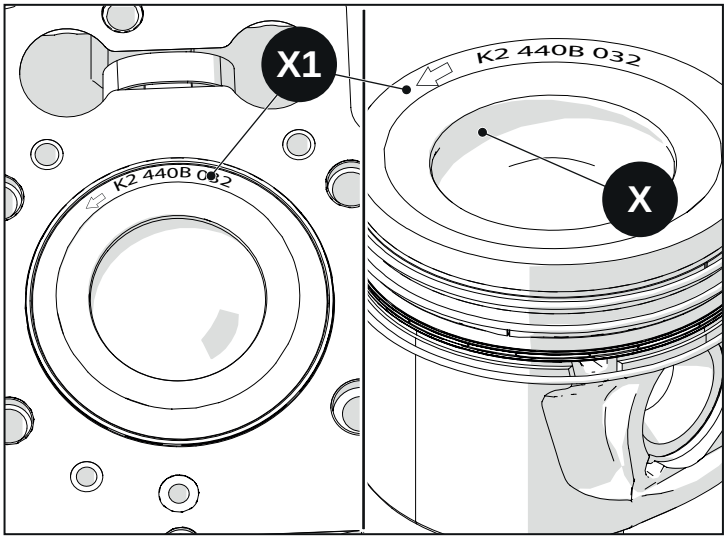

Fig. 2.176

b - Connecting rod identification number

Example: 1st line, AI0712

- AI= supplier
- 07= week of production
- 12= year of production

2nd line, 1996

- 1996= production serial number

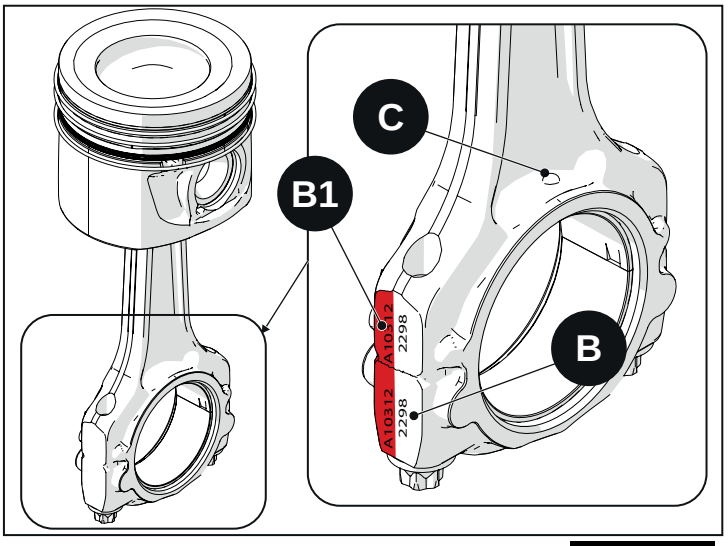

Fig. 2.177

b1 - Connecting rod identification number

Example: 1st line: C3

- **Example: 1st line: C3**
  - C3: C= seat diameter / 3= weight class
- **2nd line, 2057F**
  - 2057F= VM code

Warning
Do not lubricate new connecting rod cap screws, as they have an anti-friction coating applied by the manufacturer. The screws must usually be replaced: however, if the threads of the screws have not stretched and there are no signs of damage on the head and under the head, the screws may be reused. When reusing the screws, lubricate the thread and under the heads with engine oil.

- Lubricate the heads and under the heads with engine oil only when reusing the original screws. New screws do not need to be lubricated.
- Apply engine oil to the crankpins and the connecting rod bushes.
- Fit the connecting rod cap.
- Fit and hand-tighten the connecting rod cap screws, and then tighten definitively as follows:

Connecting rod cap screws - fracture-split connecting rod

Step 1	10 N·m

Connecting rod cap screws - fracture-split connecting rod

Step 2	30 N·m
Final step (angle)	+ 40°

Using a torque wrench set to the value indicated in the following table, check that the screws are tightened correctly. Do not tighten the screws any further while checking the tightening torque.

Torque for checking tighten connecting rod cap screw tightness	88 N·m

Check that there is the correct degree of lateral free play between the crankshaft assembly and the crankpins.

Warning

See the section “Crankshaft” for the procedure for determining the free play between the crankpins and the connecting rod bushes with the connecting rods assembled with the crankshaft.

Install the remaining piston and connecting rod assemblies

2.52.5 Connecting rod cap screws - specifications (fracture-split connecting rod)

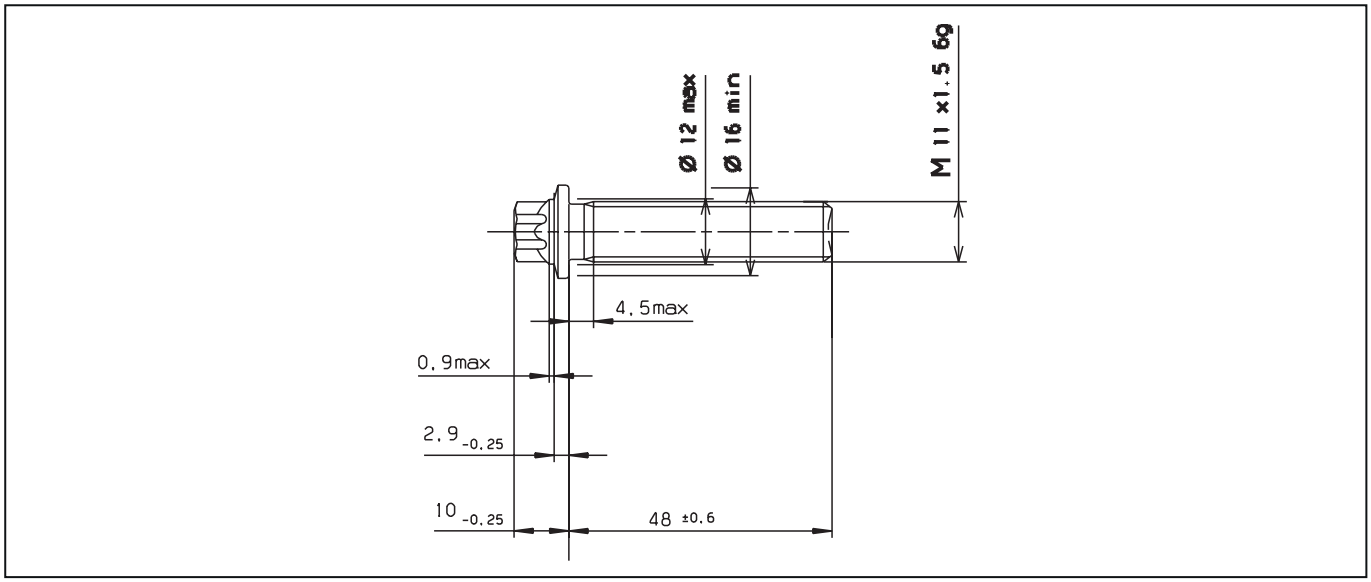

Fig. 2.178

2.53 Piston

2.53.1 Disassembly

- Secure the connecting rod in a vice.
- Use a commercially available tool to compress and remove the 1st and 2nd compression rings and the oil scraper ring.
- Remove the circlip retaining the piston pin. Push the piston pin out from the connecting rod and the piston.
- Note the orientation of the piston bowl and of the valve recesses relative to the orientation of the identification paint dot on the connecting rod shank (for fracture-split connecting rods only) and the connecting rod shank/cap identification number. (See the section “Connecting rod”).

2.53.2 Cleaning

Warning
Do not clean any part of the piston with a brush.

- Wash the components with solvent.
- Clean the piston skirt and the piston pin with solvent.
- Clean the piston ring seats on the piston.
- Clean the oil passages of the piston.
- Dry with compressed air.

2.53.3 Inspection

Inspect the piston to check for signs of damage or cracking on the piston ring seats and skirt. Replace any piston with signs of damage or excessive wear.

Note
The first piston ring as a keystone cross section. The upper and lower surfaces of this ring have specific profiles. These profiles are reflected in the shape of the seat for the first compression ring. The second compression ring and the oil scraper ring have conventional profiles and are similar to the components used by other manufacturers.

A - First compression ring
B - Seat for first compression ring
C - Outer edge of first compression ring

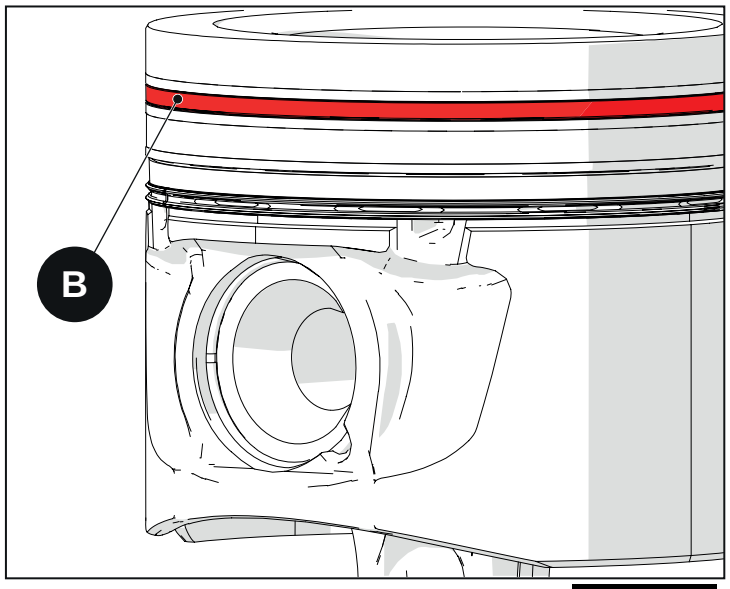

Fig. 2.179

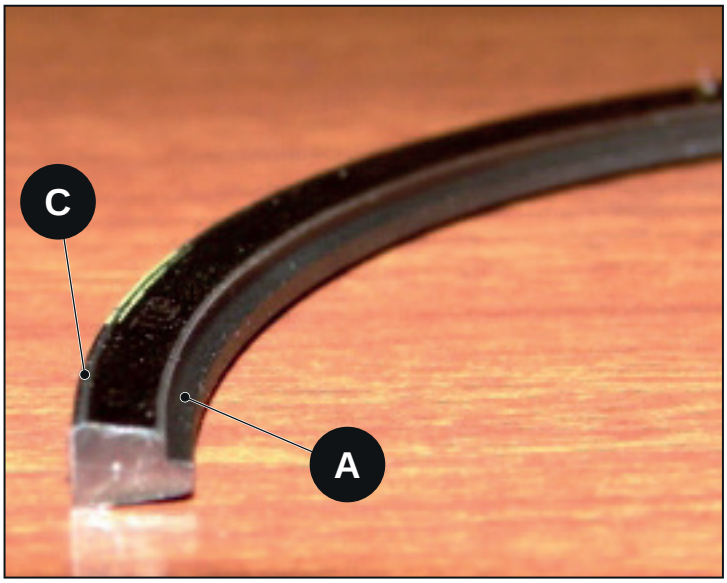

Fig. 2.180

Measure the piston skirt in a position 17 mm from the bottom edge of the skirt itself and at 90° around the circumference of the piston relative to the piston pin. Replace the piston if the value measured is not within specifications

a - Measurement position

Diameter	
Wear limit	0.10 mm

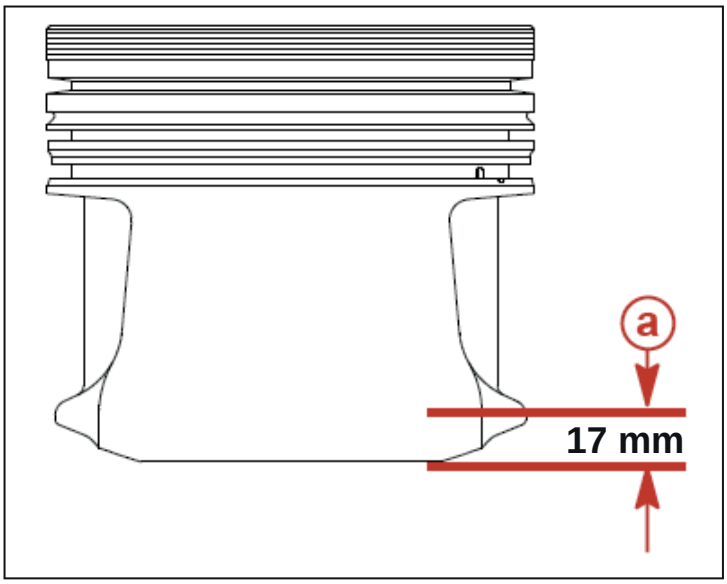

Fig. 2.181

Fit the respective rings in the second and third ring seats on the piston, and rotate them to check that they are free to turn. If any resistance to rotation or sticking is noted at any position around the circumference, identify the cause.

1 - If the ring cannot turn freely because the ring itself is distorted, try a different ring and check again.

2 - If the ring cannot turn freely because of a defect of the piston ring seat, file the piston ring seat carefully to eliminate the cause.

Warning
Take care not to file too much material from the ring seat. Measure the dimensions with a gauge and compare against the specifications.

Measure the thickness of the piston rings. Replace all the piston rings as a set if any are not within specifications.

First compression ring

Piston ring thickness (production)

First piston ring " X"	2.575 - 2.595 mm
Second piston ring	0.10 mm
Oil scraper ring	2.97 - 2.99 mm

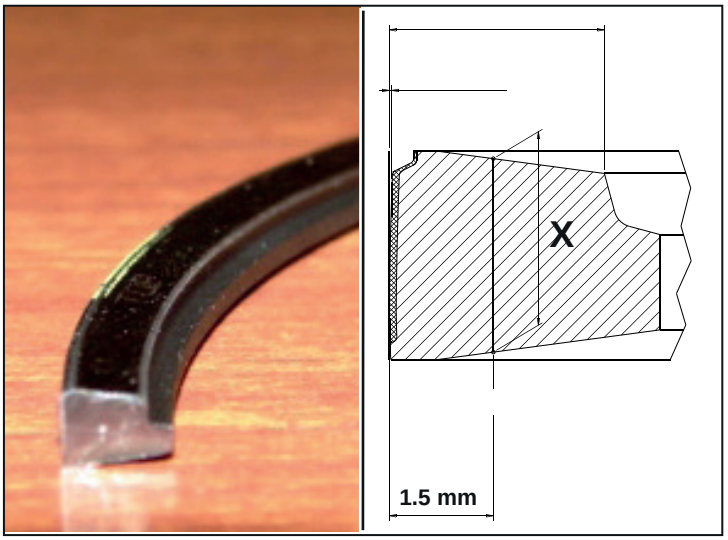

Fig. 2.182

Second compression ring

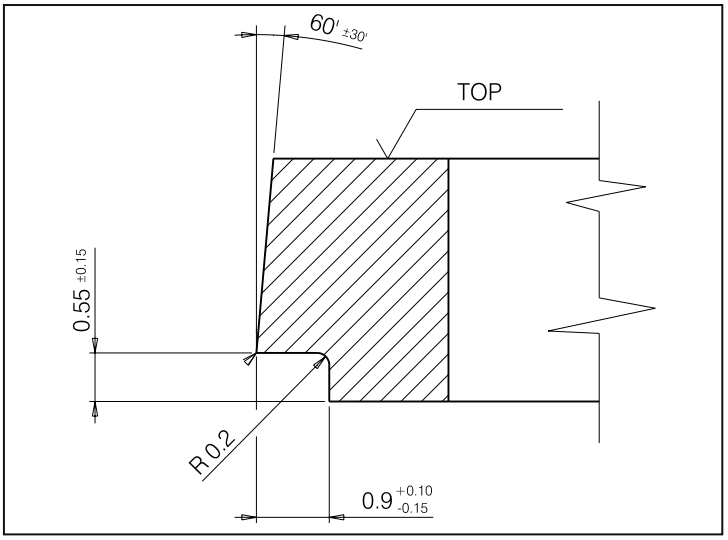

Fig. 2.183

Measure the height of the piston ring seats

Piston ring seat height (production)	
First compression ring	3 mm (nominal)
Second compression ring	2.06 - 2.08 mm
Oil scraper ring	3.03 - 3.05 mm

Measure the free play between the second compression ring and oil scraper ring relative to the respective seats in several positions around the circumference of the piston. Replace the piston if any of the values measured exceed the specified limits.

Piston ring seats (free play)	
First piston ring	Not measurable
Second piston ring	0.07 - 0.11 mm
Oil scraper ring	0.04 - 0.08 mm

2 - Not measurable - First compression ring and respective seat
3 - Second compression ring and respective seat
4 - Oil scraper ring and respective seat

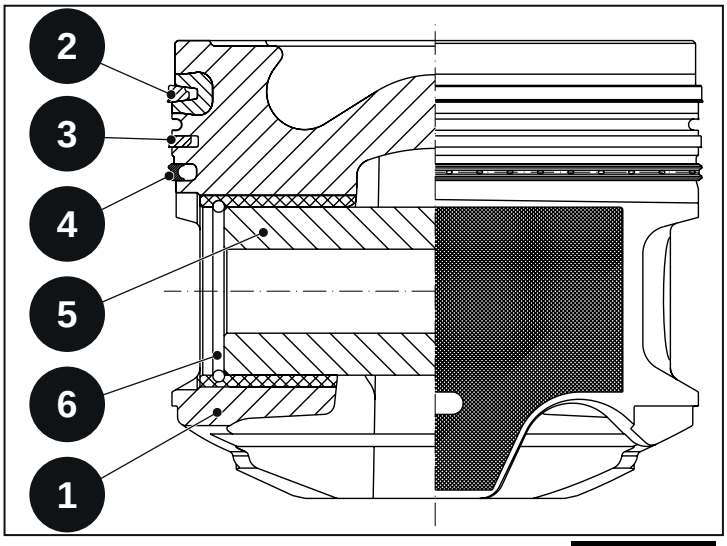

Fig. 2.184

Measure the size of the piston ring gap:

- Fit the piston ring to be checked in the cylinder.
- Measure the gap between the ends of the piston ring with a feeler gauge.

Note

Measure the gap with the piston ring in a perfectly level position in the cylinder. Push the piston ring 6 mm into the cylinder.

Piston ring gap (production)	
First piston ring	0.30 - 0.42 mm
Second piston ring	0.65 - 0.85 mm
Oil scraper ring	0.30 - 0.60 mm

Piston ring gap	
First piston ring	0.5 mm maximum
Second piston ring	0.9 mm maximum
Oil scraper ring	0.7 mm maximum

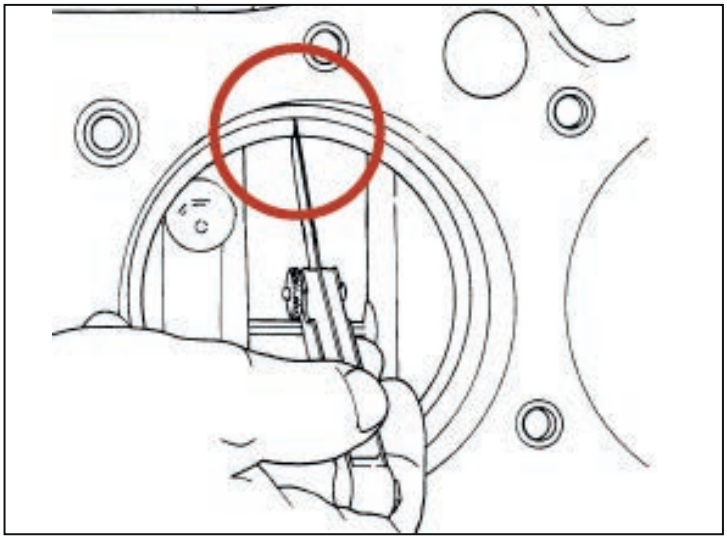

Fig. 2.185

- If the gap measured exceeds the specified limit, replace the segment with a different component. If a gap within the specified limit cannot be attained even if new piston rings are used, check the cylinder sleeve. See the section “Cylinder sleeves”.
- Fit each segment in the cylinder in which it is to be installed.

2.53.4 Assembly

- Lubricate the interior of the piston pin bush and the piston pin.
- Assemble the piston onto the connecting rod. (See the section “Connecting rod”).
- Fit the piston pin in the piston and fit the circlip.
- Secure the assembled connecting rod and piston in a vice

Warning

Always fit the piston rings with any identification codes or markings (“CTOP”, “PIP” or a reference dot) facing towards the top of the piston.

A - identification codes or markings on piston rings
B - First compression ring

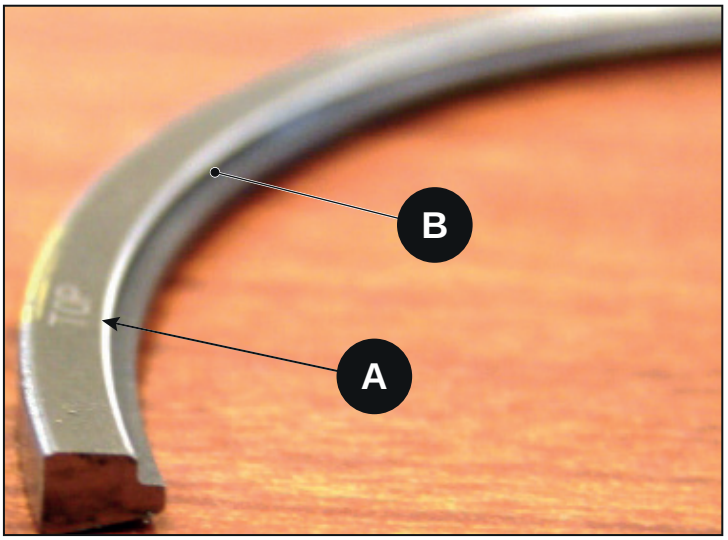

Fig. 2.186

- Install the oil scraper ring in the bottom seat on the piston.
- Use a commercially available tool to install the oil scraper ring.
- Press the ring by hand to fit it correctly in the seat, and rotate the ring to check that it turns freely without sticking.
- Use the same tool to fit the second compression ring in the middle seat. The shorter end of the bevel must face towards the bottom of the piston.
- Press the ring by hand to fit it correctly in the seat, and rotate the ring to check that it turns freely without sticking. 10. Use the same tool to fit the first compression ring in the top seat.
- Press the ring by hand to fit it correctly in the seat, and rotate the ring to check that it turns freely without sticking.

A - identification codes or markings on piston rings
B - Second compression ring

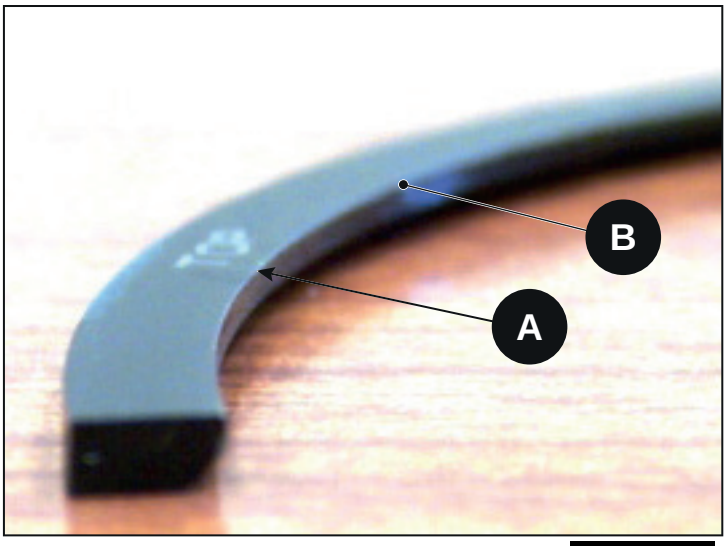

Fig. 2.187

A - identification codes or markings on piston rings
B - Oil scraper ring

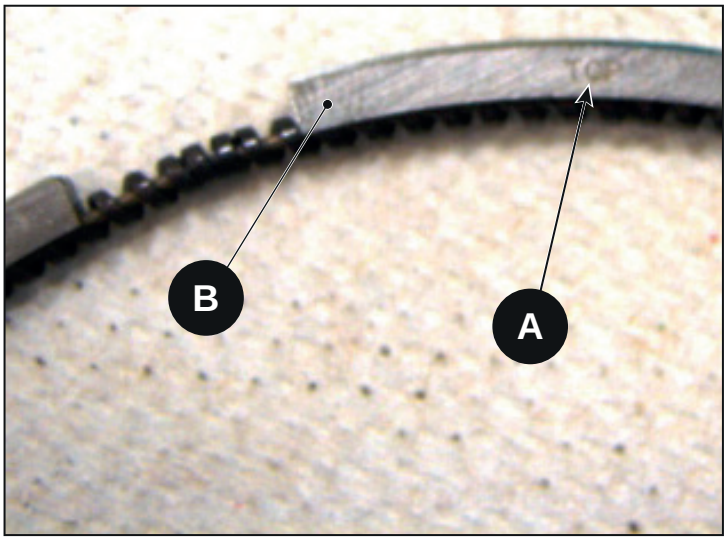

Fig. 2.188

2.53.5 Installation

Before installing the pistons in the cylinders, rotate the rings to orient the gaps in the positions shown in the figure:

a - Gap in first piston ring
b - Gap in second piston ring
c - Gap in oil scraper ring

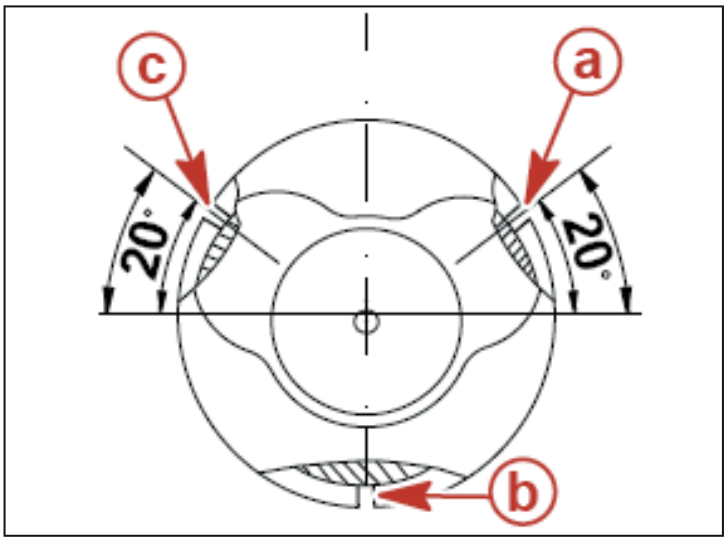

Fig. 2.189

- Rotate the crankshaft to move the crankpins away from the cylinders, so that the connecting rods do not damage the cylinders during installation.
- Using a commercially available piston ring compression tool, install the piston in the cylinder by tapping the crown gently with a plastic punch tool.
- Fit the connecting rod bushes. Lubricate the connecting rod bushes and the crankpins with engine oil.

Z - arrow on piston indicating side which must face towards timing side

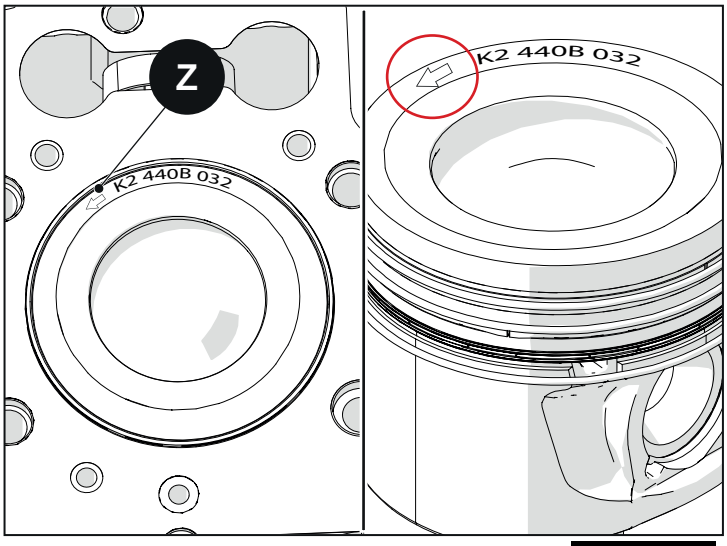

Fig. 2.190

Warning
The connecting rods may damage the crankpins, cylinders and oil jets during installation. Work carefully to ensure that no components are damaged when installing connection rods.

- Align the connecting rod with the crankpin and tap the piston crown to bring the connecting rod shank bush into contact with the relative crankpin.
- Fit the connecting rod cap.
- Fit and tighten the connecting rod cap screws. (See the section “Connecting rod”)

2.54 Engine oil sump and transmission pipe

2.54.1 Removal

- Drain the engine oil. See the section “Maintenance”.
- Remove the oil sump screws.
- Cut the silicone sealant around the sump, taking care not to bend the edges of the sump itself.
- Remove the sump.

A - tool
B - mallet
C - oil sump

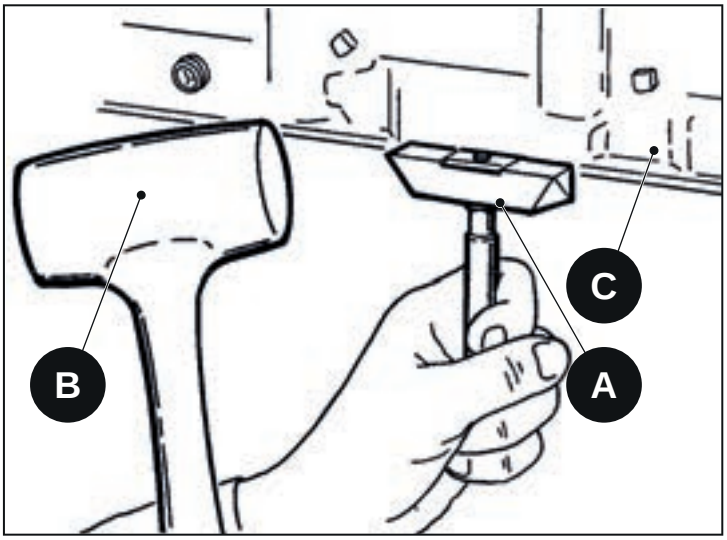

Fig. 2.191

2.55 Oil suction pipe

2.55.1 Removal

- Remove the screws of the oil suction pipe.
- Remove the pipe.
- Replace the O-ring of the oil suction pipe

A - oil suction pipe
B - screws fastening oil suction pipe
C - filter on pipe

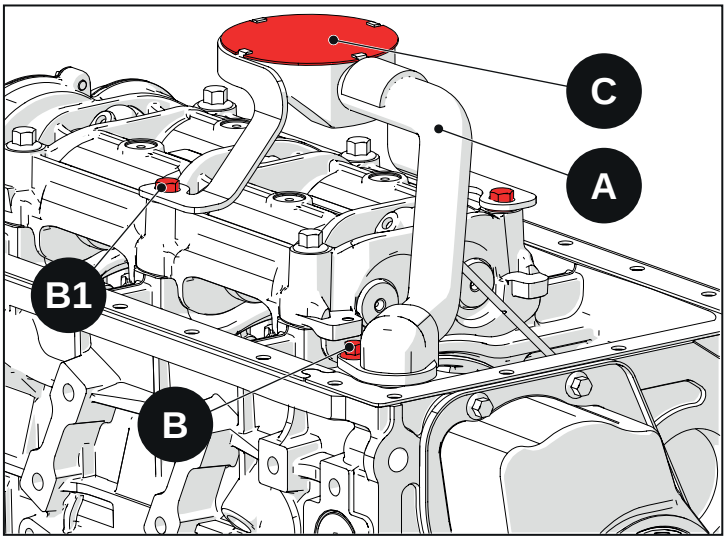

Fig. 2.192

2.55.2 Installation

- Replace the O-ring of the oil suction pipe, lubricate the ring and fit the pipe in the crankcase.
- Fit and tighten the screws:
  screws fastening oil suction pipe (B): 12.7 N·m
  screws fastening oil suction pipe (B1): 32.4 N·m

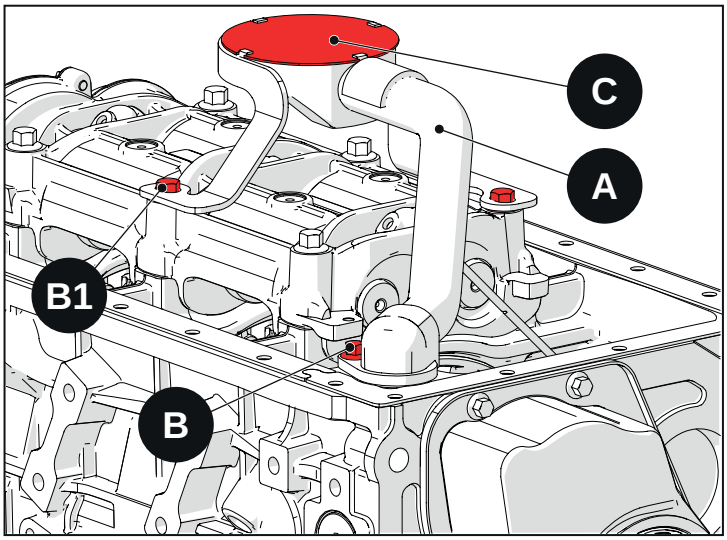

Fig. 2.193

- Clean the mating surfaces between the crankcase and the oil sump to remove all excess oil and foreign material. Degrease the surfaces before applying the silicone sealant.
- Apply a uniform bead of Dow Corning 7091 silicone around the perimeter of the sump flange, passing around the inner sides of the holes, as shown in the figure.
- Fit the sump.
- Fit the screws and tighten in a crossed pattern.
  Oil sump screws: 12.7 N·m

A - oil sump flange
B - uniform bead of sealant

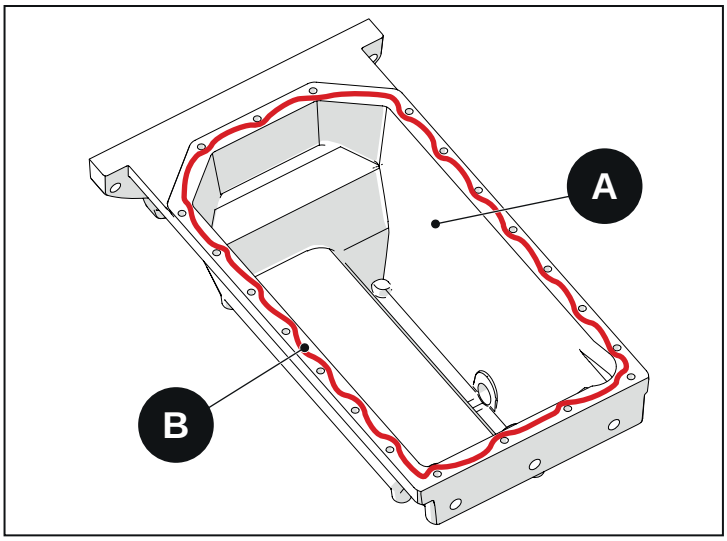

Fig. 2.194

2.56 Engine oil pressure relief valve

The engine oil pressure relief valve (engine oil pressure regulator valve) is installed in a vertical position at the bottom of the crankcase.

2.56.1 Removal

- Remove the oil sump.
- Remove all residue of sealant from the surface around the pressure relief valve.
- If removing the valve and spring or the springs only: follow the procedure described for removal. Take all the precautions indicated and follow the entire procedure with the exception of step 1

To remove the entire pressure relief valve:

- unscrew the complete valve from the crankcase using a commercially available tool. The tool must engage in the 2 slots.
- Remove the valve from the crankcase.
- Follow the procedure described for disassembly.

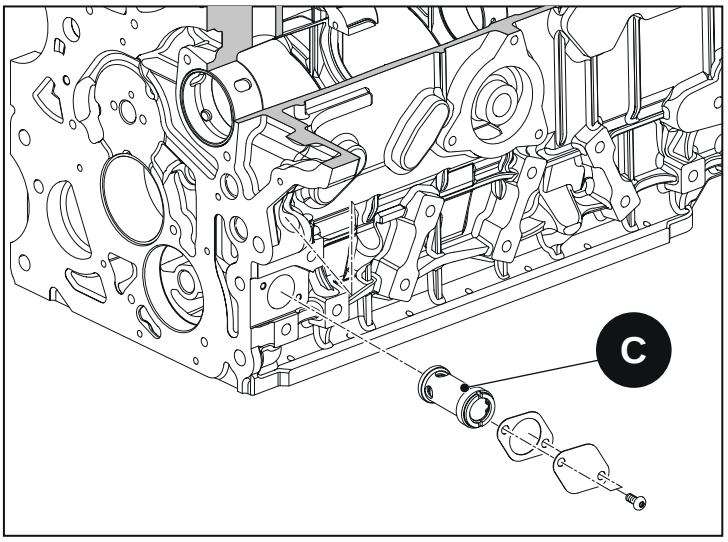

Fig. 2.195

2.56.2 Disassembly

Warning

The plate of the pressure relief valve and the inner spring are held in place by a circlip. If released suddenly, the spring may be projected from the valve with sufficient force to cause injury.

Take particular care when removing or refitting the circlip.

Wear safety eyewear.

- Secure the valve in a vice, if the overpressure valve has been removed from the engine.
- Push the plate against the spring and hold in this position. Remove the circlip.
- Release the spring gradually.

A - plate
B - circlip
C - valve housing

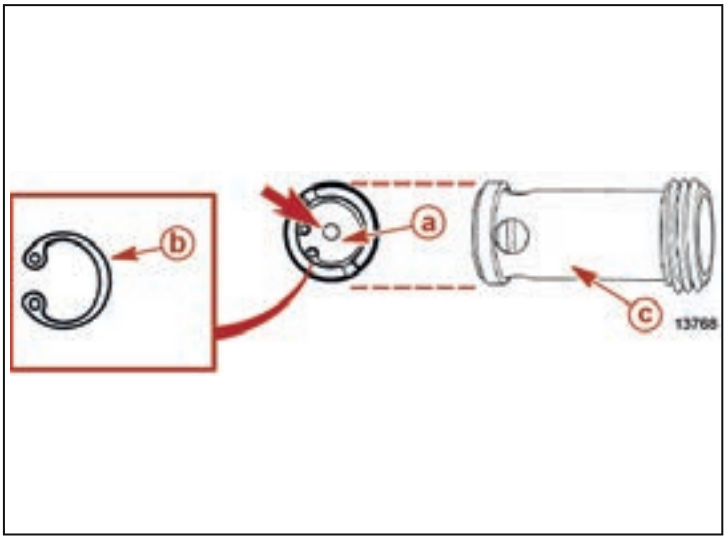

Fig. 2.196

- Remove the plate, the springs and the valve from the valve housing cylinder.

Note

Some pressure relief valves have one internal spring only.

A - Plate
B - Spring (innermost - if applicable)
C - Spring (outermost - if applicable)
D - Valve

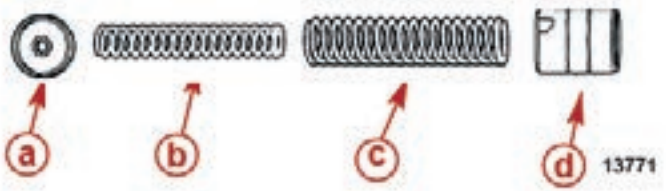

Fig. 2.197

2.56.3 Cleaning

- Clean the crankcase and oil sump to remove all residue of sealant.
- Clean the components with solvent.
- Dry with compressed air.

2.56.4 Inspection

- Replace the entire valve if the spring is broken.
- Replace the entire valve if the spring is worn or seized.
- If necessary to restore pressure tightness, the valve may be lapped with lapping compound.
- Check that the valve slides freely in its seat and the housing once lubricated with oil.

a - Valve
b - Spring - (innermost - if applicable)
c - Spring - (outermost - if applicable)
d - Plate
e - Circlip
f - Valve seat and housing

2.56.5 Assembly

- Lubricate the interior of the seat and the cylinder of the housing with engine oil.
- Assemble the spring and the plate. Install the parts in the valve seat and housing.
- Push the plate against the spring and hold in this position.
- Fit the circlip.

2.56.6 Installation

- If installing the valve and spring only: see the section Assembly.

  Take all the precautions indicated and follow all the steps described with the valve housing installed in the crankcase.
- If installing the complete valve:
  - Apply Loctite 510 to the thread of the valve housing when replacing the complete valve. Tighten the valve into the crankcase.
  - Use a suitable tool to tighten the complete valve into the crankcase.

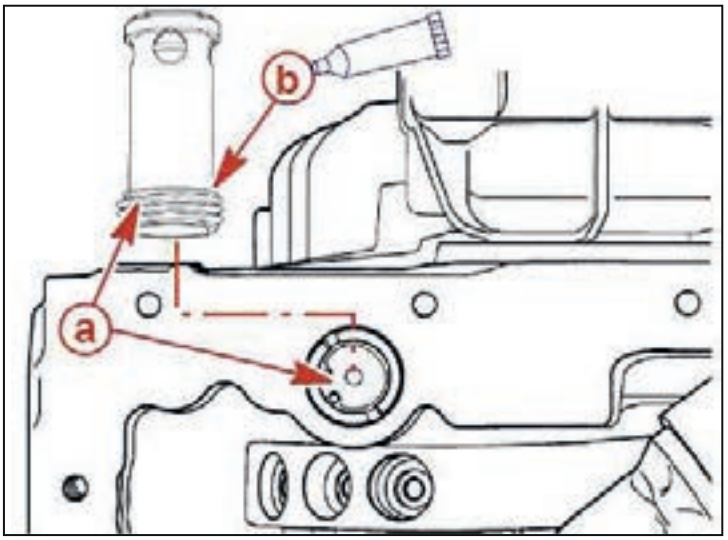

Fig. 2.198

Complete valve: 53.9 N·m

A - Complete valve
B - Thread

Valve cover: 5.9 N·m

Warning
Apply Loctite 510 to both surfaces of the gasket “D”.

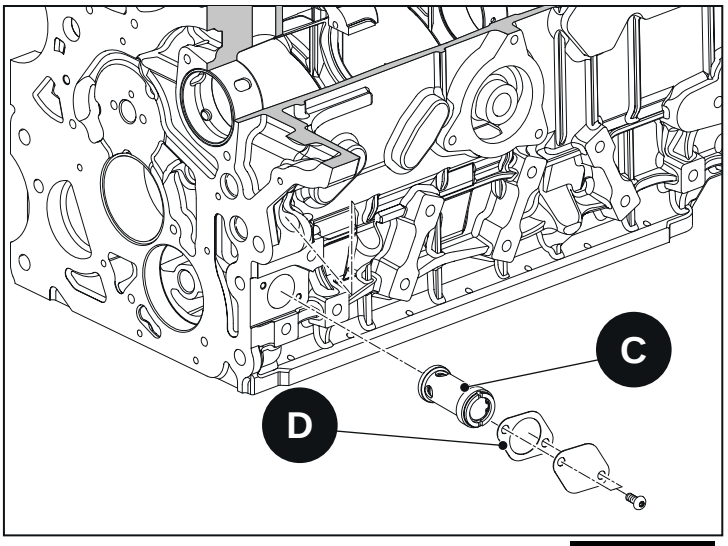

Fig. 2.199

2.57 Separator oil drain valve

The engines of this series are equipped with a valve for draining oil from the separator, installed in the crankcase.

The complete valve consists of a housing and a valve.

Valve screws: 14 N·m

A - valve housing
A1 - valve

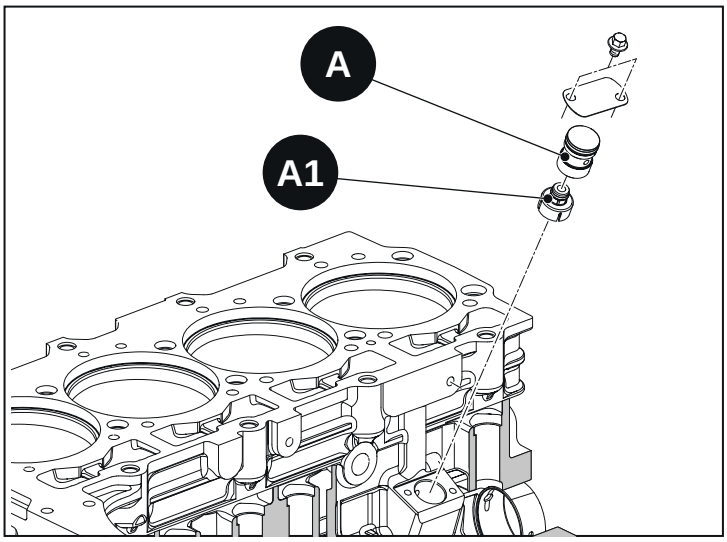

Fig. 2.200

A - valve housing
A1 - valve

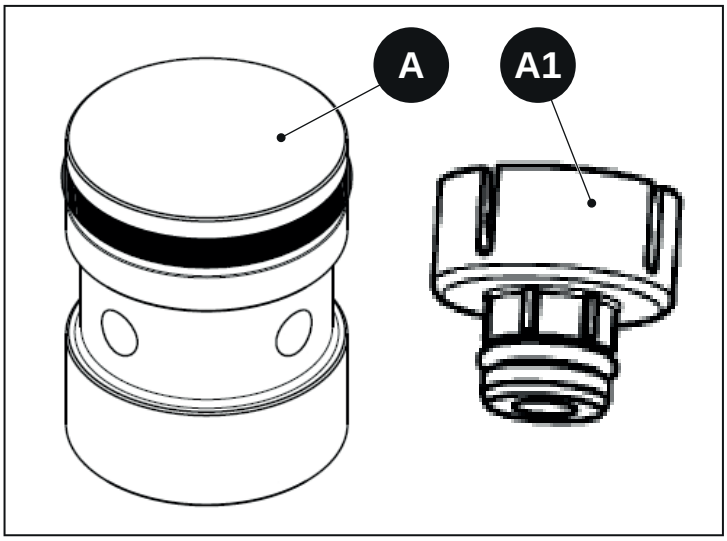

Fig. 2.201

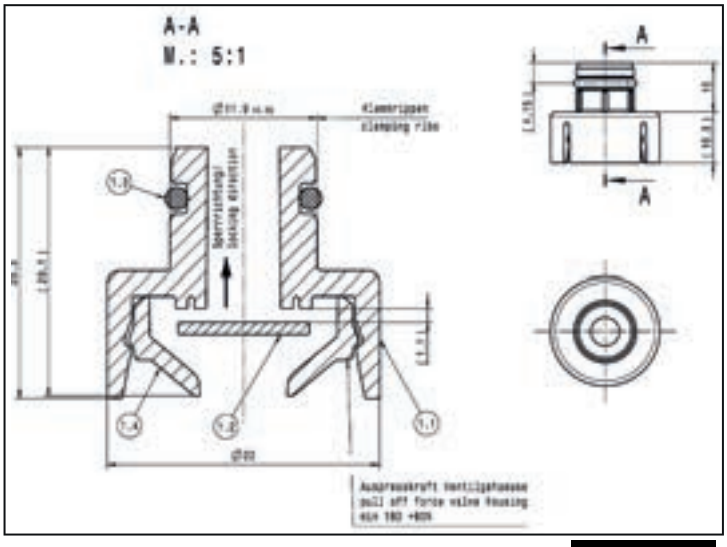

Fig. 2.202

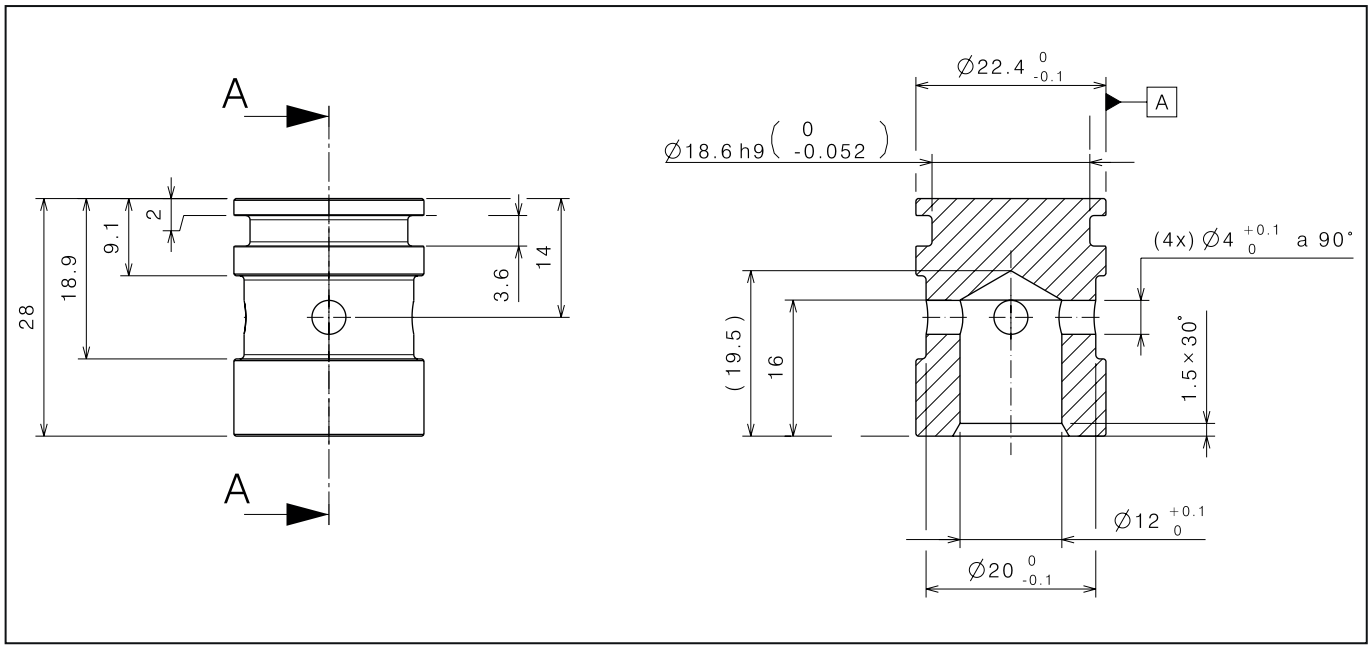
A
A
28
18.9
9.1
2
3.6
14
Ø22.4 0 -0.1
A
Ø18.6 h9 (0 -0.052)
(4x) Ø4 +0.1 0 a 90°
(19.5)
16
1.5×30°
Ø12 +0.1 0
Ø20 0 -0.1

Fig. 2.203

2.58 Crankshaft balancer weights

2.58.1 Removal

> **Warning**
>
> bring piston 1 to TDC before removing or installing the counter-rotating counterweights. In this position, the special tool 68480013F (B) may be fitted to immobilise the counterweights (A): the pins of the tool must be engaged in the holes (A) of the counterweights to prevent then from rotating.

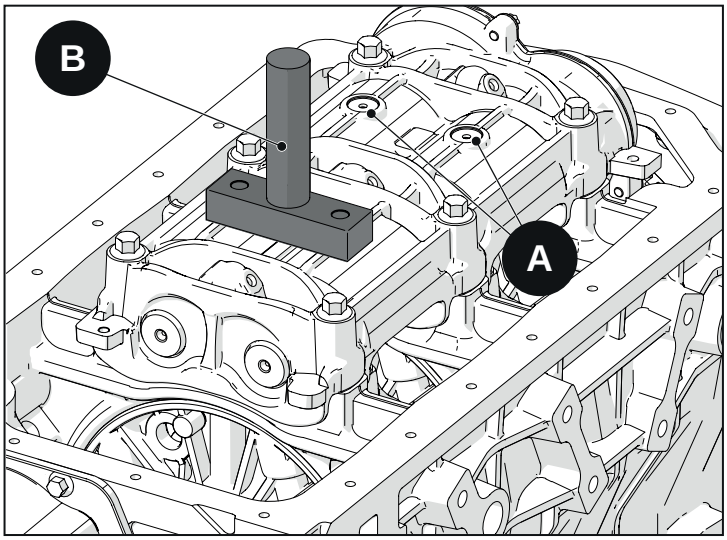

Fig. 2.204

Undo the bolts fastening the counterweights and remove the counterweights themselves, taking care not to damage the O-rings on the guides (C) carrying lubricant oil to the counterweights.

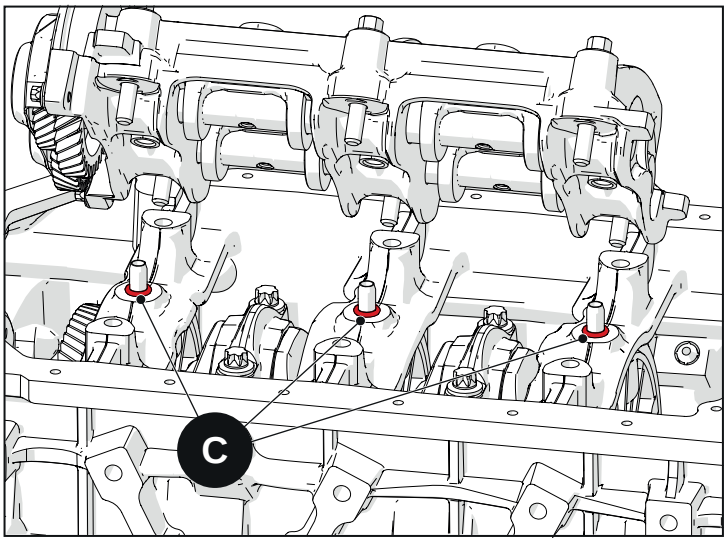

Fig. 2.205

2.58.2 Installation

- Bring piston 1 to TDC.
- Align the counterweights (d) as shown in the figure, and engage the pins of the special tool 68480013F in the holes of the counterweights (A): **The counterweights must NOT be visible.**
- With the counterweights in this position, the special tool 68480013F (B) may be fitted to immobilise the counterweights (A): the pins of the tool must be engaged in the holes (A) of the counterweights to prevent then from rotating.
- With the special tool in place, install the counterweights in the cylinder block, taking care not to damage the O-rings on the guides (C) carrying lubricant oil to the counterweights.
- Remove the special tool and tighten the bolts of the counterweights
  Counterweight fastener bolts: 32.4 N·m

COUNTERWEIGHTS ALIGNED INCORRECTLY (counterweights visible)

A - counter-rotating counterweights
D - counterweights visible

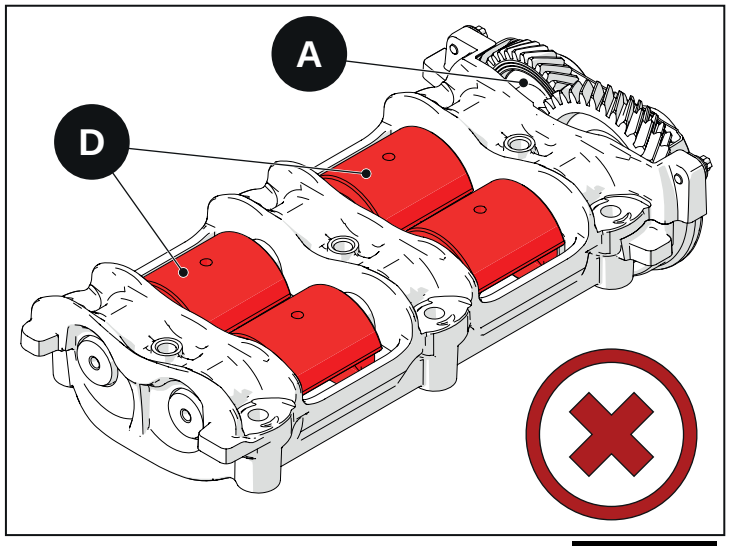

Fig. 2.206

COUNTERWEIGHTS ALIGNED CORRECTLY (counterweights NOT visible)

A - counter-rotating counterweights
B - special tool
D - counterweights NOT visible

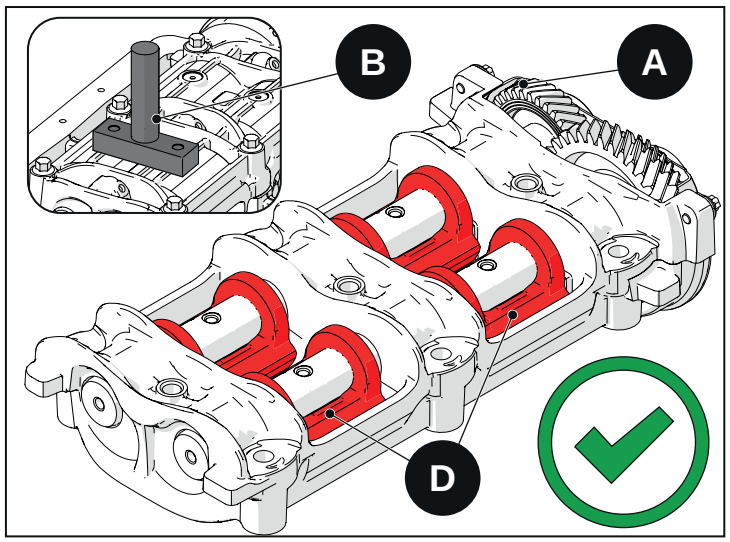

Fig. 2.207

2.59 Crankcase

When overhauling the engine or removing the oil sump, check that the plugs sealing the lubrication holes for the counter-rotating counterweights (on engines with counter-rotating counterweights) are correctly in place and have been punched to prevent loosening.

2.59.1 Inspection

Certain engine versions may not be equipped with counter-rotating counterweights. The lubrication holes for the counter-rotating counterweights situated in the crankcase are sealed with plugs.

A - Plugs

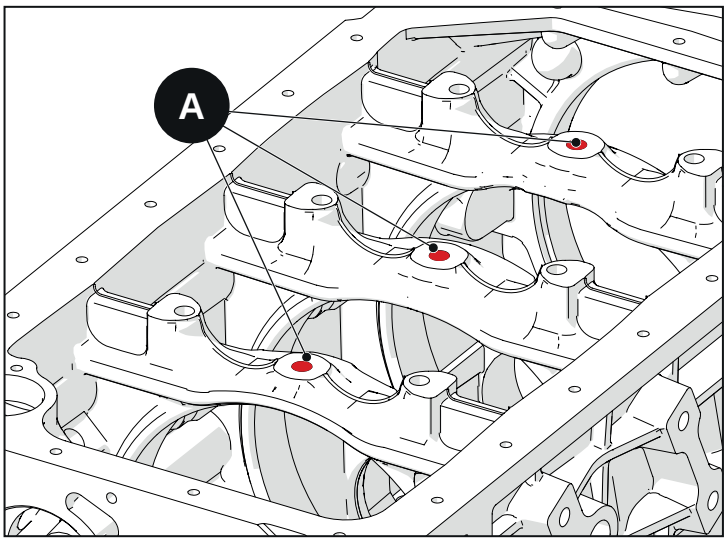

Fig. 2.208

When overhauling the engine, check that the plugs have been chamfered correctly (see figure 2.211).

In the example shown in figure 2.209, the plug “B” is either working free from the crankcases or has not been installed correctly. This plug must be refitted correctly and punched (see figure 2.211) to prevent it from loosening.

B - Plug working loose from crankcase or not installed correctly

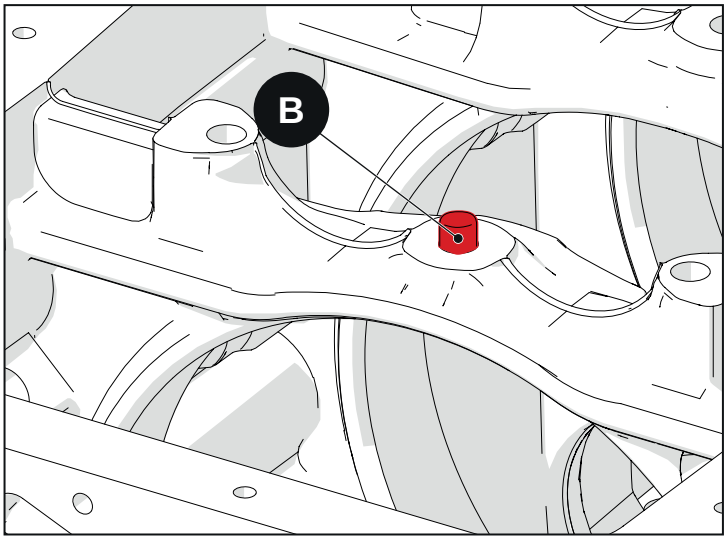

Fig. 2.209

Warning

punch the all the plugs to prevent them from loosening - tighten the plug until it is flush with the surface of the crankcase and then punch in opposing positions at 180°.. See the photo 2.211

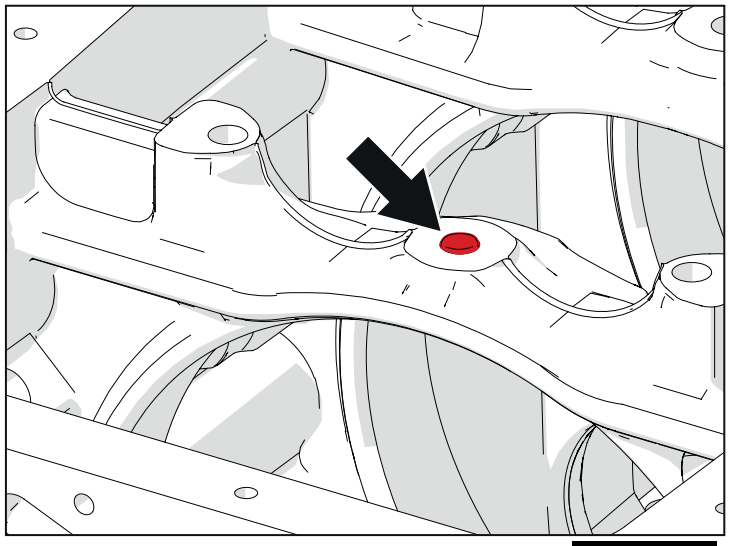

Fig. 2.210

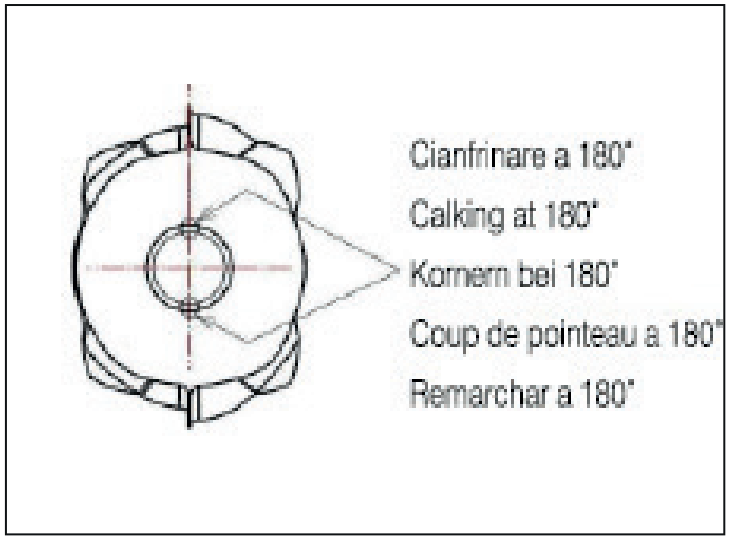

Fig. 2.211

2.59.2 Rocker lubrication

There are two oil passages in the crankcase: a delivery passage feeding lubricant oil to the rockers and an oil return passage from the rockers.

A - oil drain from rockers
B - oil delivery to rockers
C - Flywheel side
D - Timing side

Also see the section BASE ENGINE - CYLINDER HEAD

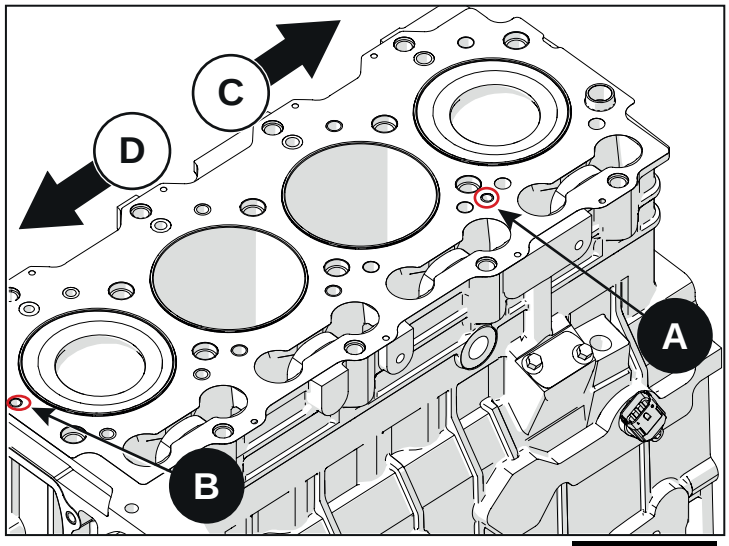

Fig. 2.212

2.60 Cylinder sleeve

2.60.1 Removal

- Remove the sleeves with the special tool.
- Remove all components impeding removal of the sleeves, including the pistons.
- Remove the oil jets.
- Remove the disc from the special tool.

A - special tool
B - plate

Warning

To prevent mismatching the cylinder sleeves with the pistons during reassembly, mark the cylinder sleeves during removal to identify their original positions in the cylinder block/crankcase.

- Install the tool in the cylinder sleeve and fit the disc onto the tool at the bottom of the cylinder sleeve.
- Tighten the nut of the tool to pull the cylinder sleeve out from the cylinder. Note the positions of the O-rings at the bottom of the cylinder sleeve.

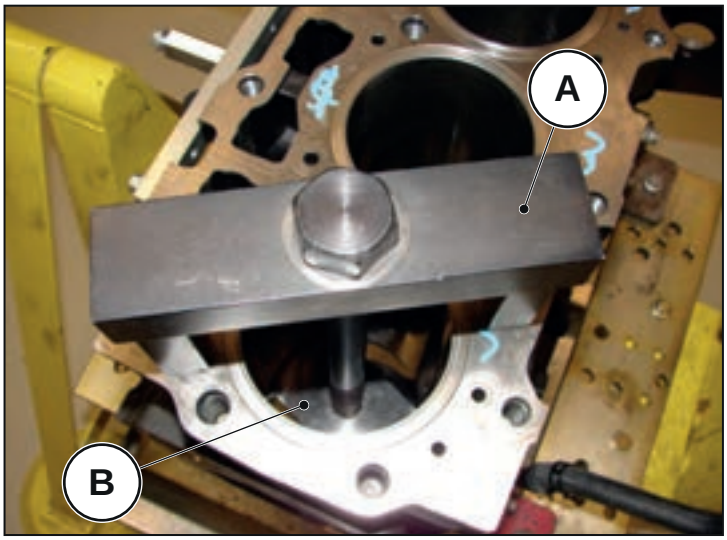

Fig. 2.213

2.60.2 Specifications

- Remove all residue of old sealant from the cylinder sleeve.
- Clean the cylinder sleeves, especially in the area shown and in the areas where the O-rings are installed.
- Wash the cylinder sleeve with solvent.
- Dry with compressed air.
- Inspect the cylinder sleeves to check for abnormal wear or cracking.
- Measure the cylinder sleeve with a bore gauge to check for conicity. Replace the cylinder sleeve if worn beyond the specified limits.

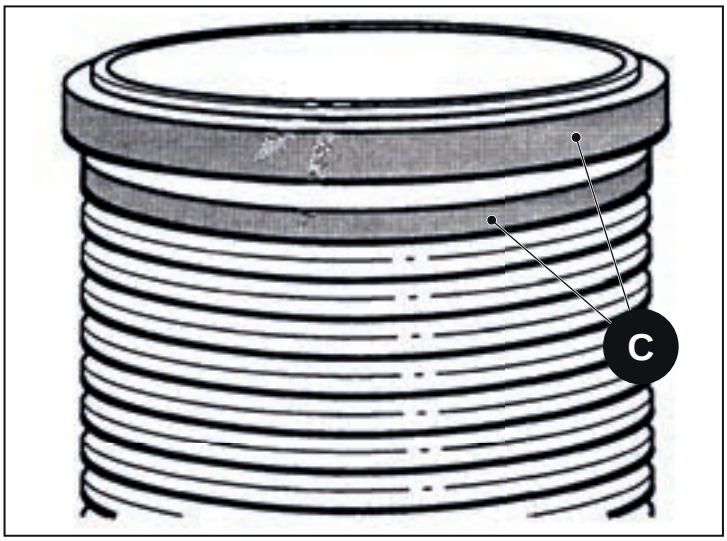

Fig. 2.214

Note
Move the bore gauge very carefully up and down the cylinder sleeve to check for conicity.

- Measure in three different positions along the length of the cylinder sleeve and on opposite sides. Rotate the bore gauge into different positions around the circumference of the cylinder sleeve to check cylindricity.

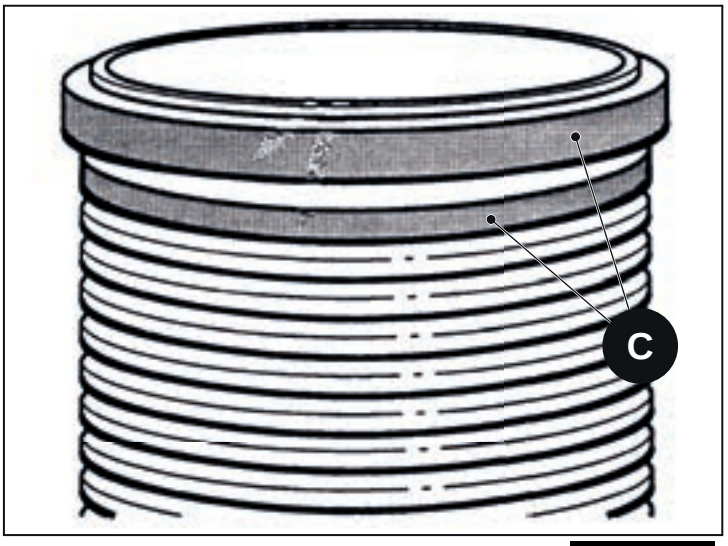

Fig. 2.215

Maximum measurement depth: 108 mm below cylinder sleeve collar.

Cylinder sleeve	
Inner diameter	93.995 - 94.015 mm
Wear limit	0.10
Conicity - Cylindricity	0.008 mm
Maximum conicity - Cylindricity	0.10 mm

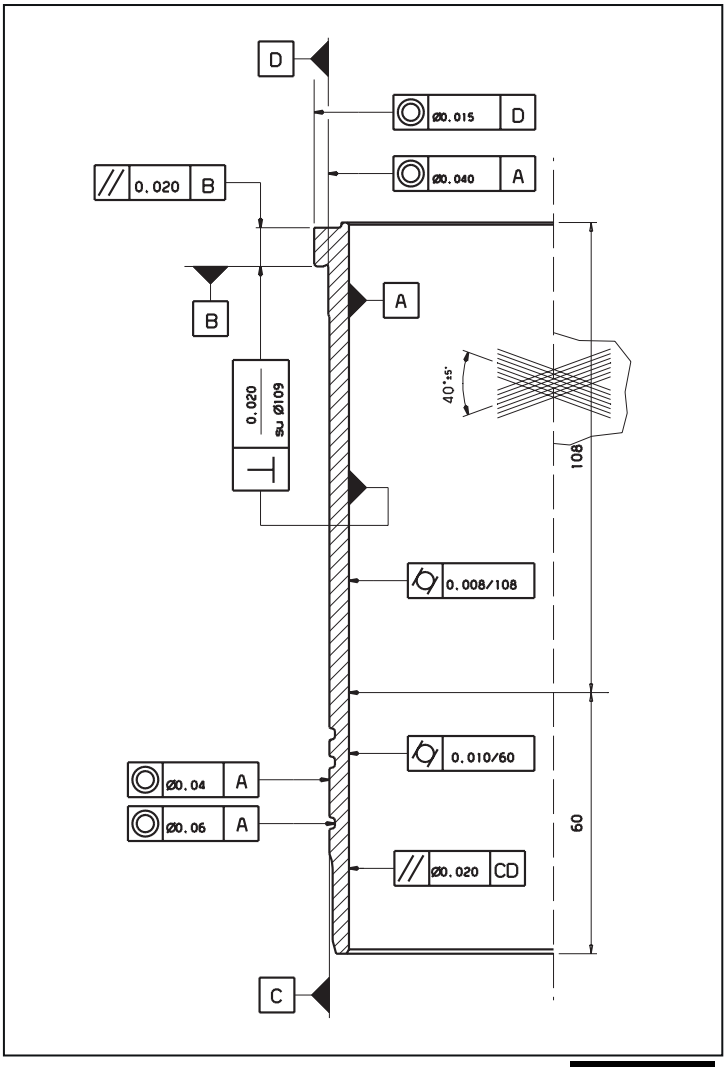

Fig. 2.216

2.60.3 Installation

Warning

The protrusion of the cylinder sleeve from the cylinder block/crankcase must only be measured with the cylinder sleeve installed correctly in the cylinder block/crankcase.

Measuring this value incorrectly may cause a loss in engine performance or severe engine damage. Make sure that the cylinder sleeves are installed correctly in the cylinder block/crankcase before measuring protrusion.

Note

Before measuring, check that the cylinder sleeve can turn freely in the cylinder block/crankcase.

a. If not replacing the cylinder sleeves with new components, the cylinder sleeves must be refitted in their original positions **without the O-rings.**

O-rings. b. Use a dial gauge to measure protrusion (the depth/protrusion of the top of the cylinder sleeve relative to the top deck of the cylinder block/crankcase) for each cylinder sleeve, and note the value measured.

a - protrusion
b - cylinder sleeve
c - cylinder block/crankcase
d - top deck of cylinder block/crankcase - head mating surface

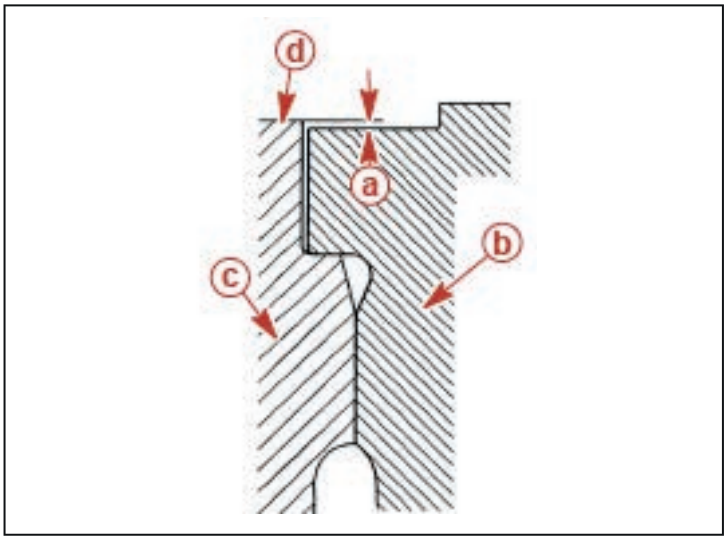

Fig. 2.217

- Use a dial gauge and the special tool to measure protrusion
- Place the tool, complete with dial gauge, so that the probe of the dial gauge is in contact with the cylinder block/crankcase.
- Set the dial gauge needle to zero (0).
- Move the tool towards the cylinder sleeve collar. Note the value measured.
- Measure the protrusion of all the cylinder sleeves
- Check that the protrusion measured for each cylinder sleeve is within the specified limits: **Cylinder sleeve protrusion - 0.01 ÷ + 0.07 mm**

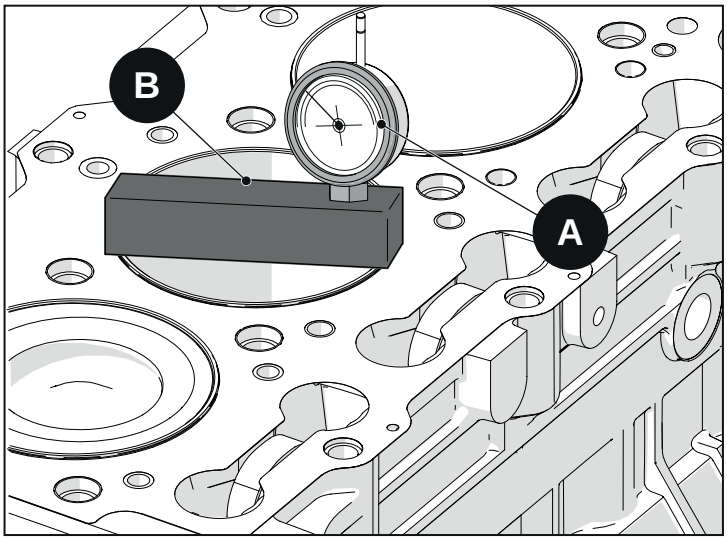

Fig. 2.218

If the protrusion measured is not within specifications, remove the cylinder sleeve and install a different sleeve.

If the value measured is correct, install all the cylinder sleeves as follows:

- Fit the 2 coloured O-rings of the same colour in the second and third lowest seats on the cylinder sleeve, and fit the differently coloured O-ring in the bottom seat (see photo).
- Lubricate the collars in the cylinder block/crankcase (zone where the O- rings seal against the collar of the cylinder block/crankcase) with lubricant.
- Apply LOCTITE 986 to the surface indicated in the figures.

Warning

the first two O-rings are different in thickness and colour from the third O-ring. Do not swap the O-rings.

Warning

Do not lubricate the upper part of the cylinder block/crankcase, where LOCTITE 986 will be applied in the next step in the procedure (step 9).

X - 2 O-rings of the same colour installed in second and third lowest seats on the cylinder sleeve
Y - O-ring installed in bottom seat on cylinder sleeve (with different colour than the other 2 O-rings)

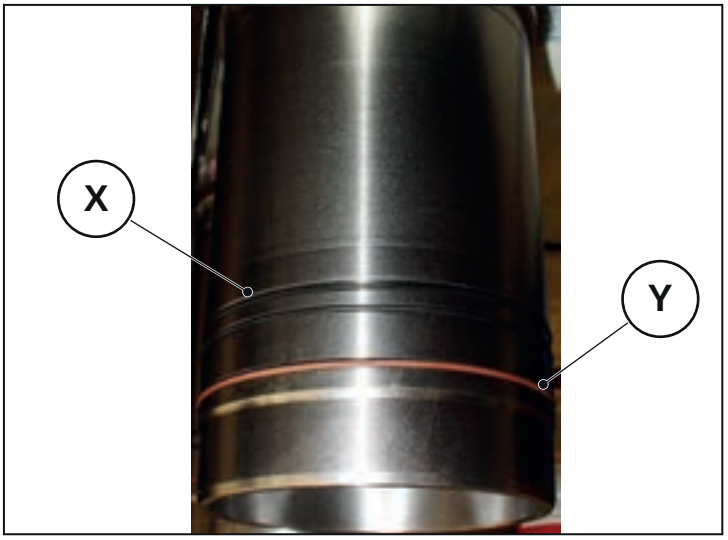

Fig. 2.219

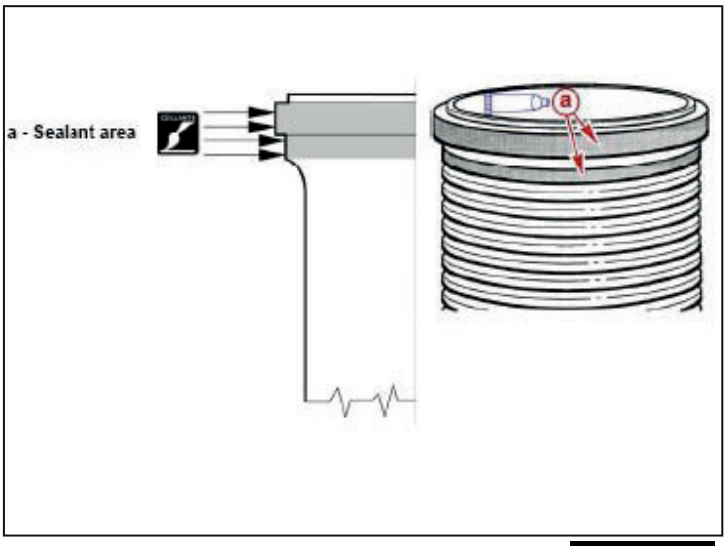

Fig. 2.220

- Install the cylinder sleeves in the cylinder block/crankcase, taking care not to damage the O-rings.
- After installing the cylinder sleeves, secure in place with the bolts and spacers
- Tighten the bolts temporarily to allow the Loctite adhesive to cure.

A - Cylinder sleeves
B - bolt
C - spacers

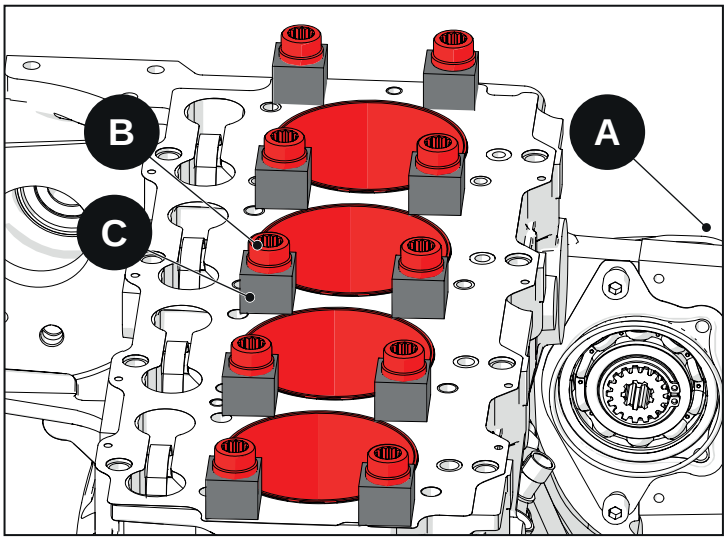

Fig. 2.221

Warning

If the heads are not installed within 1 hour, the cylinder sleeves must be kept secured by the bolts and spacers for 8 hours to allow the Loctite adhesive to cure. After 8 hours, the bolts and the relative spacers may be removed and the heads may be installed.

- Once the Loctite adhesive has cured, check the cylinder sleeve protrusion as described previously
- If the protrusion is correct, continue with assembly of the engine.

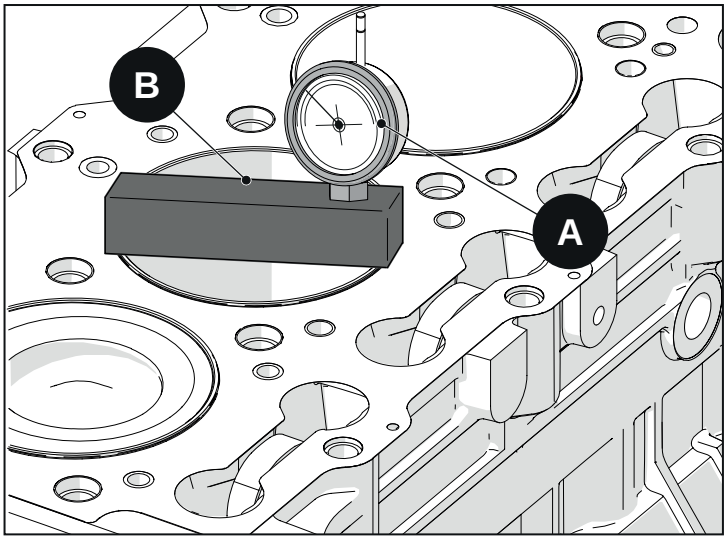

Fig. 2.222

2.61 Camshaft

2.61.1 Test - Measuring lobes

- Remove the rocker assemblies.
- Mount a dial gauge on the head, with the probe of the dial gauge taking the place of the rocker rod.
- Rotate the crankshaft to bring the lobe into rest position.
- Set the dial gauge needle to zero (0).
- Rotate the crankshaft by 2 complete turns while reading the dial gauge.
- Follow the same procedure to measure all the camshaft lobes.

Warning
The camshaft must be replaced if the any of the lobe lift values measured are more than 0.05 mm below the following values.

Lobe lift

Exhaust	7.303 mm
Intake	6.850 mm
Wear limit	0.05 mm

2.61.2 Lobe diameter

- Measure the total height of the lobe (base circle + lobe lift). Subtract the base circle of the lobe from the total height. The difference is the lobe lift. The camshaft must be replaced if the lobe lift is less than the values specified below.

Lobe diameter

Exhaust	38.550 - 38.650 mm
Intake	39.450 - 39.550 mm
Wear limit	0.05 mm

a - Lobe lift
b - Lobe diameter
c - Lobe lift

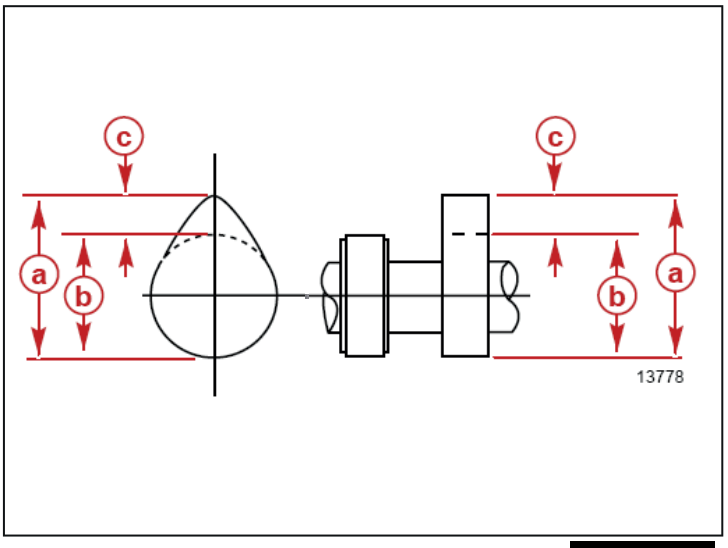

Fig. 2.223

2.61.3 Pin diameter

- Use a micrometer to measure each pin in the 2 directions (“X-X”) and (“Y-Y”). Replace the camshaft if the value measures is less than the specified limit.

Note

0.250 mm bushes are available as a first size reduction class. See the section “Camshaft bushes" for the procedure to determine the free play between the camshaft pins and the relative bushes.

Camshaft	Pin diameter
Front	53.495 - 53.510 mm
Centre	53.450 - 53.470 mm
Rear	53.480 - 53.500 mm
Wear limit	0.200 m

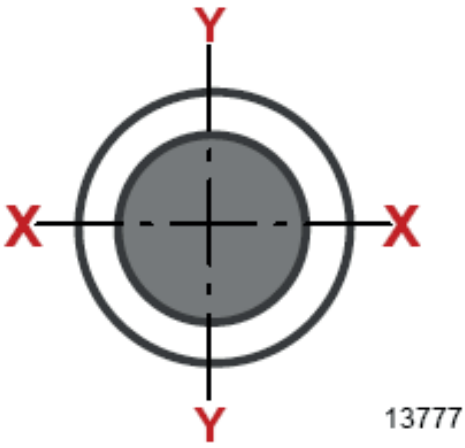

Fig. 2.224

2.61.4 Free play between camshaft and flange

- Measure the free play between the flange and the camshaft.
  - **Free play between flange and camshaft: 0.030-0.095 mm**

Warning

The camshaft gear is press-fit onto the shaft. If it is necessary to replace the gear, heat the gear in the oven at 180-200°C (360-390°F) for 10 minutes and then install it onto the shaft with a press. Fit the flange and the key, and then press the gear onto the shaft to bring it into contact with the abutment of the flange.

- If the value measured exceeds the specified limits, remove the flange and measure its thickness in 4 positions spaced by 90°. Replace the flange if the free play is less than the specified limit.
  - **Flange thickness (S): 3.95 - 4.05mm**

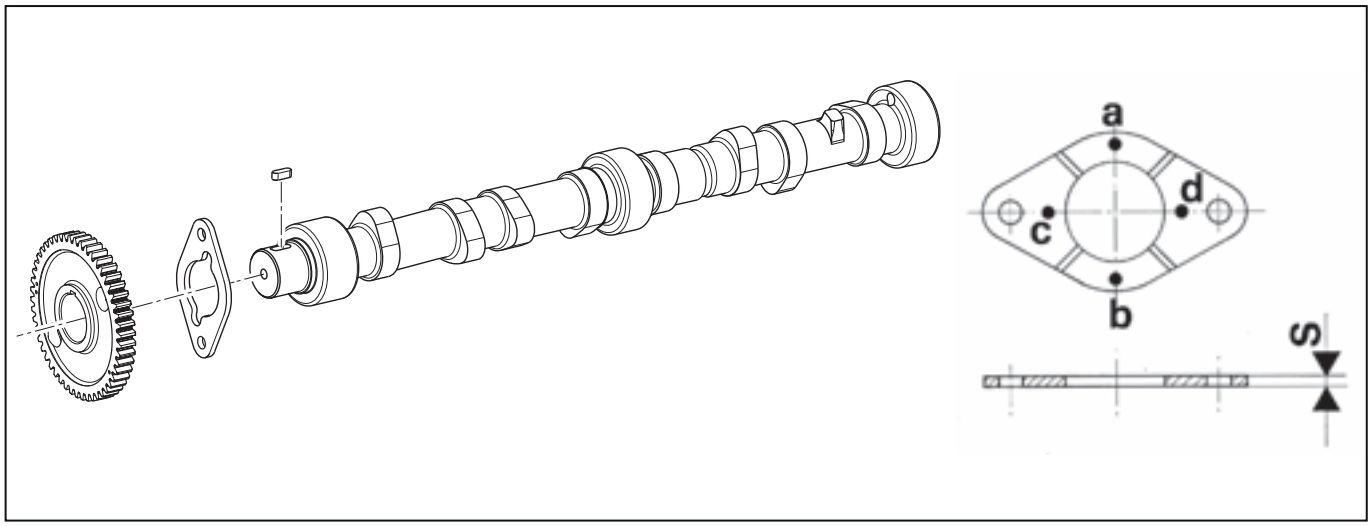

Fig. 2.225

s - flange thickness
a,b,c,d, -flange thickness measured in 4 positions spaced by 90°

e - flange
f - Camshaft gear

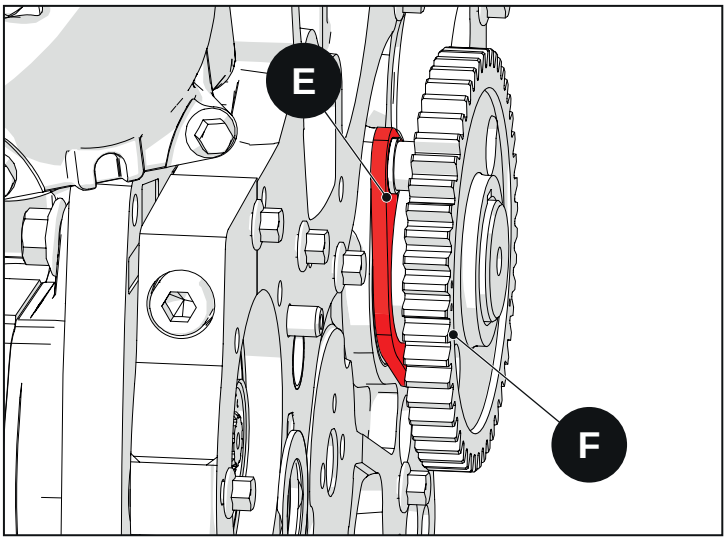

Fig. 2.226

2.61.5 Removal

- Turn the crankshaft to bring the piston of cylinder 1 to its ignition stroke, aligning the reference markers on the camshaft gear and the idler gear as shown in the figure.

Warning
Keep the rocker assemblies, rocker rods and tappets in order of removal and number the parts to facilitate reassembly in the original positions.

- Remove the rocker assemblies, rocker rods and tappets.
- Remove the heads.
- Remove the engine oil dipstick.
- Remove the screws fastening the camshaft flange.
- Remove the camshaft carefully. Do not damage the camshaft bushes.

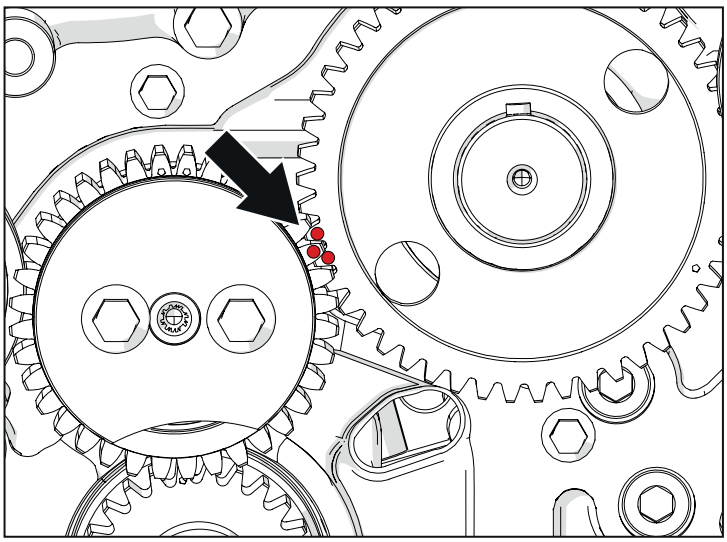

Fig. 2.227

A - screws fastening the camshaft flange
B - camshaft flange
C - Camshaft gear

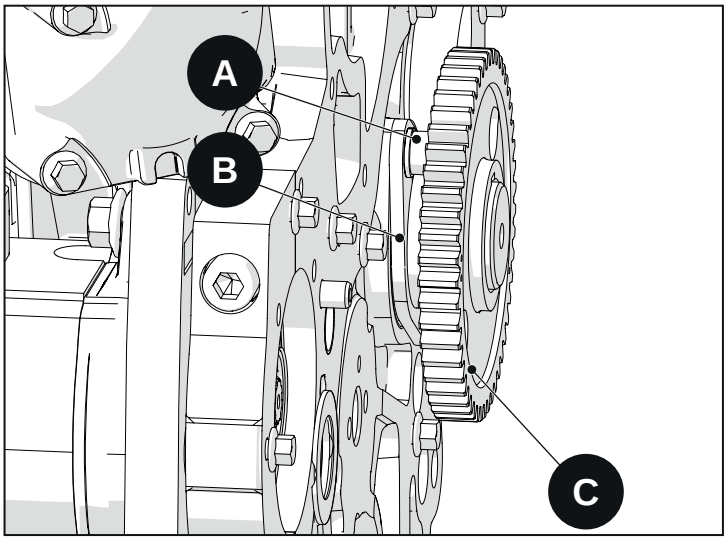

Fig. 2.228

2.61.6 Installation

- Lubricate the camshaft lobes with engine oil.
- Lubricate the camshaft bushes.
- Fit the camshaft. Do not damage the bushes.
- Align the reference markers stamped on the idler and camshaft gears as shown previously.
- Fit the screws and the relative washers. Tighten the screws.
  - **screws fastening camshaft flange: 27.5 N·m**

2.62 Camshaft bushes

2.62.1 Inspection

- Remove the camshaft.
- Inspect the bushes. Replace the bushes if damaged or worn.
- Measure the inner diameters of the camshaft bushes and compare against the diameters of the pins. Calculate the free play.

Warning
When replacing the front camshaft bearing bush during servicing, the new bush must be bored to the correct diameter after installation in its seat in the cylinder block/crankshaft. Install the bush with the engine oil passage hole in the cylinder block/crankshaft for lubrication aligned with the hole in the bush. See the figure for the correct angle.

2.62.2 Specifications

Front camshaft bush

Inner diameter (bush bored in cylinder block/crankshaft)	53.59 - 53.62 mm
Bush-pin free play	0.08 - 0.125

Centre and rear camshaft bushes

Internal diameter of bush (installed in bearing)	53.550 - 53.600 mm
Free play (centre bush)	0.08 - 0.15
Free play (rear bush)	0.05 - 0.12
1st bush size reduction class	0.25 mm

A - camshaft seat
B - idler gear seat
C - crankshaft seat
D - oil pump seat

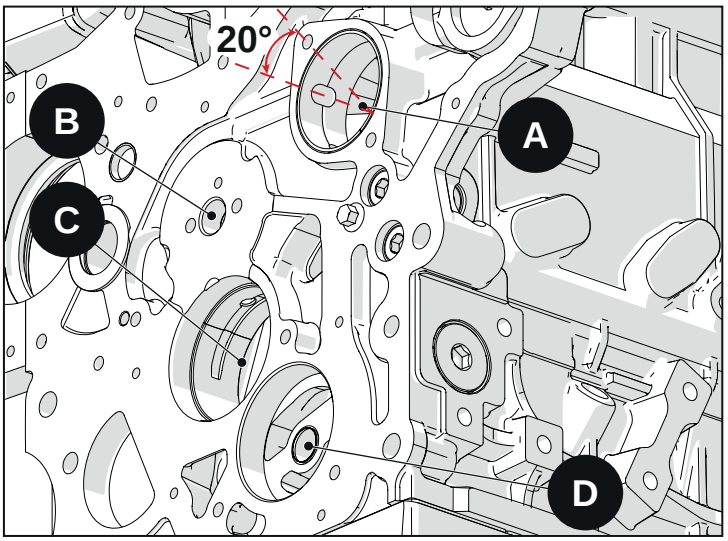

Fig. 2.229

2.63 Front camshaft bush

- Fit a new bush on the special tool.
- Align the oil passage hole in the cylinder block/crankcase with the hole in the bush.
- Install the front bush with the special tool.

Note

To facilitate installation, hold the 2 half bearings on the special tool with an elastic band or another equivalent solution.

A - special tool
B - Front camshaft bush (new)

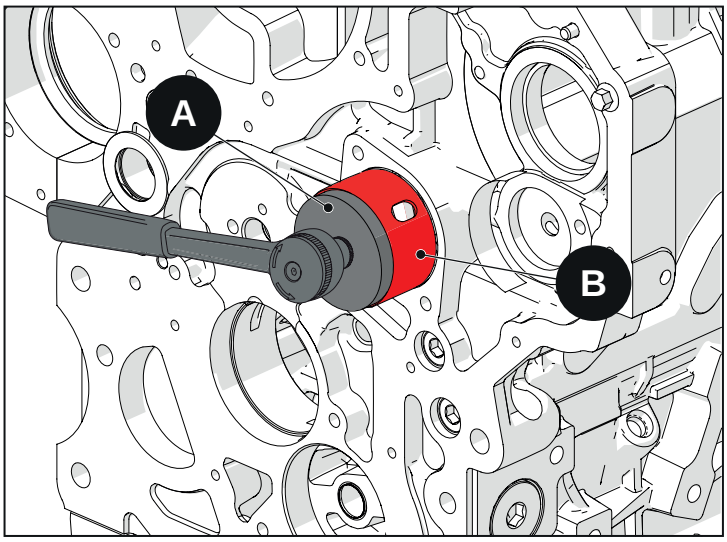

Fig. 2.230

- Apply Loctite 601 to the outer surface of the bush.
- Tighten the nut on the special tool to drive the old bush out of the cylinder block/crankcase.

Warning

When removing an old bush or fitting a new bush (front camshaft bush or front crankshaft bush), make sure that the oil passage hole for lubricating the bush is oriented correctly. The hole in the bush must be aligned with the hole in the cylinder block/crankcase to ensure correct lubrication.

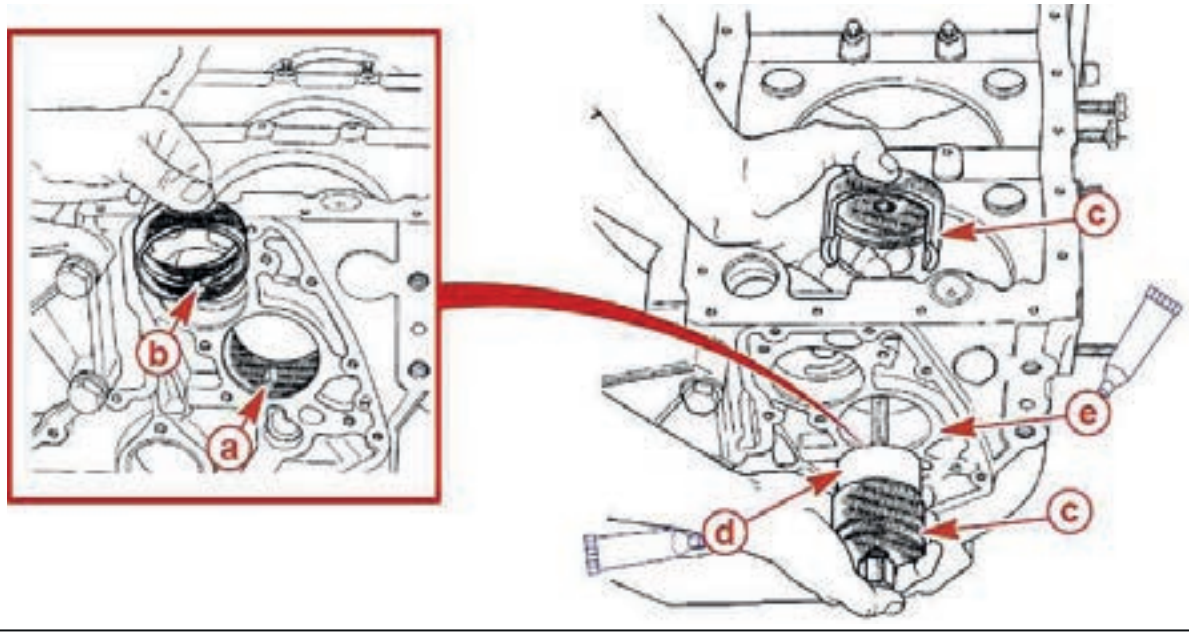

Fig. 2.231

A - Oil passage in cylinder block/crankcase
B - Oil passage in bush
C - Front camshaft bush and special tool
D - 2 half bearings (on tool)
E - bush seat bore in cylinder block/crankcase

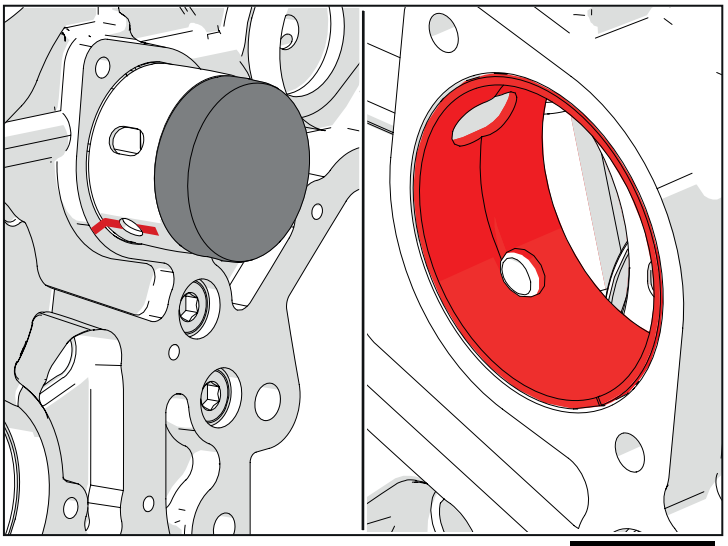

Fig. 2.232

2.64 Piston cooling oil jets

The oil jets cool and lubricate the pistons and other engine components. Incorrectly installed oil jets may cause engine damage. Make sure that the oil jets are clean and correctly installed.

- Remove the oil jets near the bottom of the cylinder sleeve.
- Replace the O-ring on the jet valve.

A - Oil jet valve
B - Nozzle
C - Flange
D - Screw

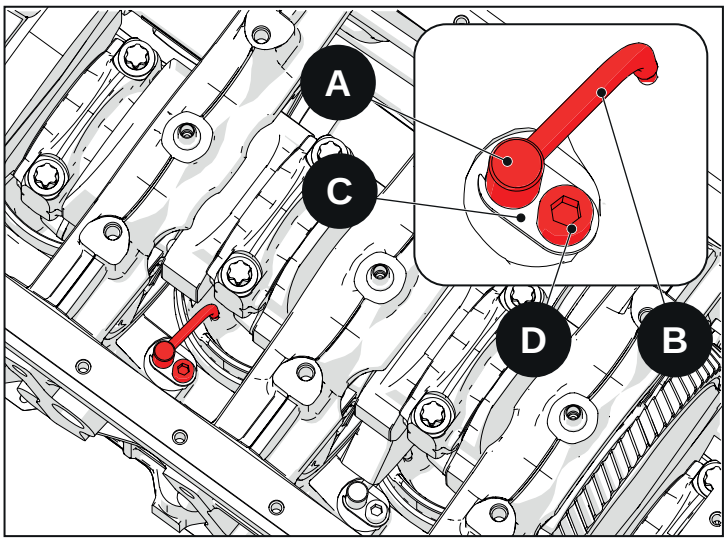

Fig. 2.233

- Check that the ball moves freely against the spring in the valve.
- Check the oil jet for cracks and check if the delivery pipe or nozzle are bent.

X - Spring
Y - Ball valve

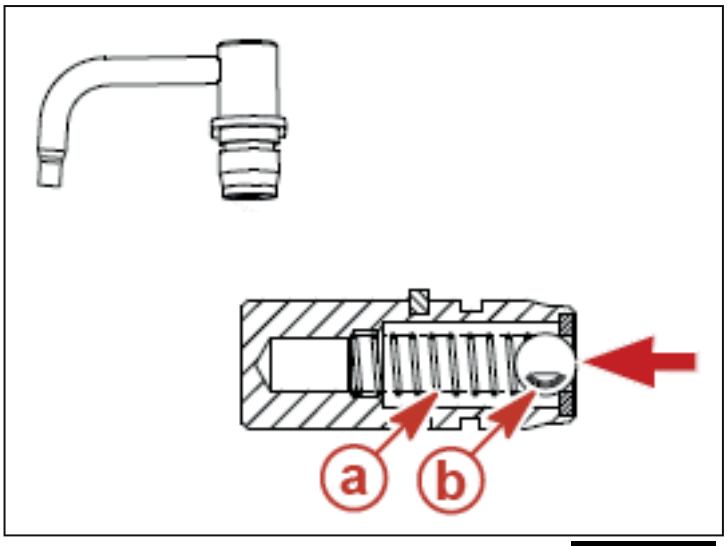

Fig. 2.234

- Fit and lubricate a new O-ring in the jet valve
- Fit the jet valve in the cylinder block/crankcase.
- Check that it is fitted in the correct position.
- Apply sealant to the thread of the screw.
- Fit and tighten the screw.
  - **Screw fastening oil jet valve: 12.7 N·m**

2.65 Crankshaft

2.65.1 Removal

- Remove the banjo bolts fastening the central main bearing journals and delivering oil to lubricate the crankshaft bushes.

A - Banjo bolt - standard
B - Special banjo bolt (delivers oil to turbo)
C - Rocker lubrication pipe

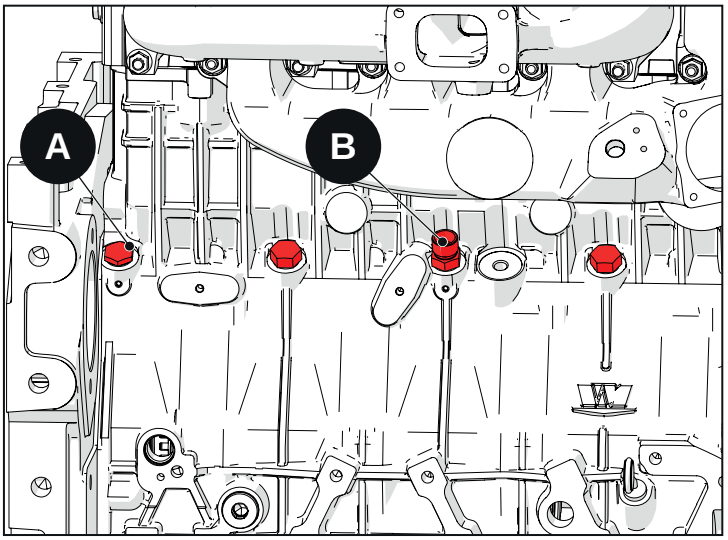

Fig. 2.235

- Fit the special tool on the crankshaft gear to protect the front crankshaft bush.

D - special tool
E - Crankshaft gear

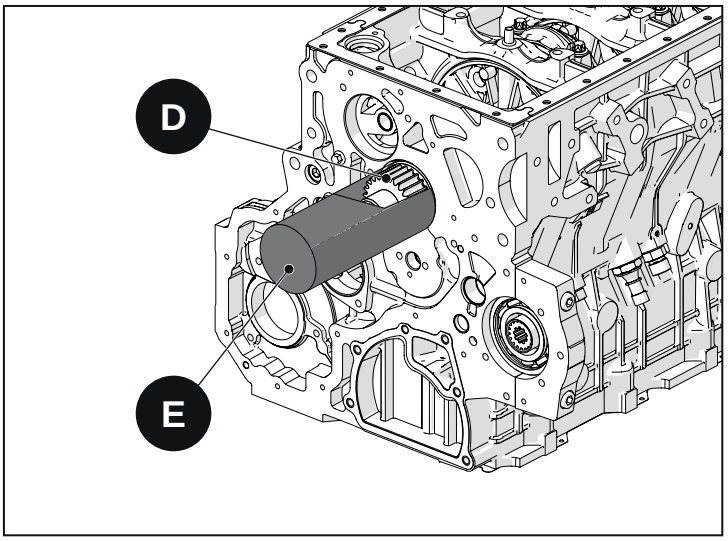

Fig. 2.236

Warning

Before removing the crankshaft from the crankcase, number or mark the centre bearings to identify the respective main journals with which they are matched. Make reference markings on the half-bearings to ensure correct reassembly.

Warning

Do not damage the oil jets when removing the crankshaft. Remove the oil jets beforehand. (See the section “Piston cooling oil jets”)

X - assembly reference markings on half bearings
Y - reference markings on all centre bearings (between centre bearing and crankshaft)
Z - number all the centre bearings to identify the main journals they are matched with.

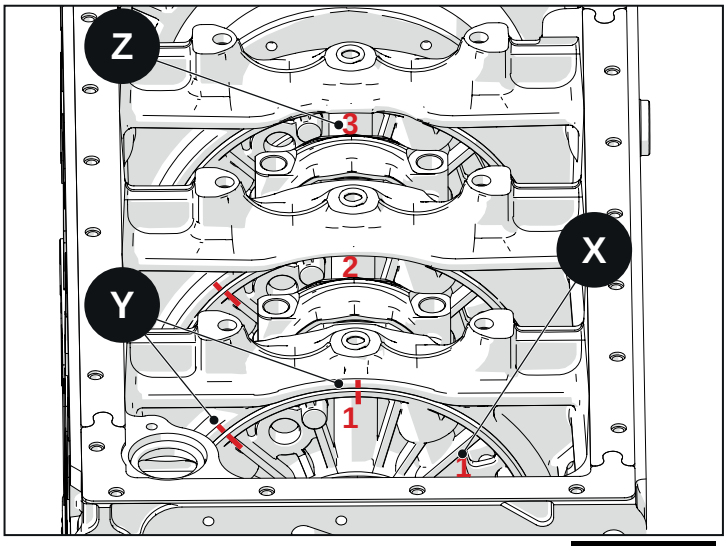

Fig. 2.237

Gently lift the crankshaft to detach all the central main bearing journals from their seats. Once they are detached, remove the crankshaft completely from the crankcase.

W - central main bearing journals detached from respective seats in crankcase

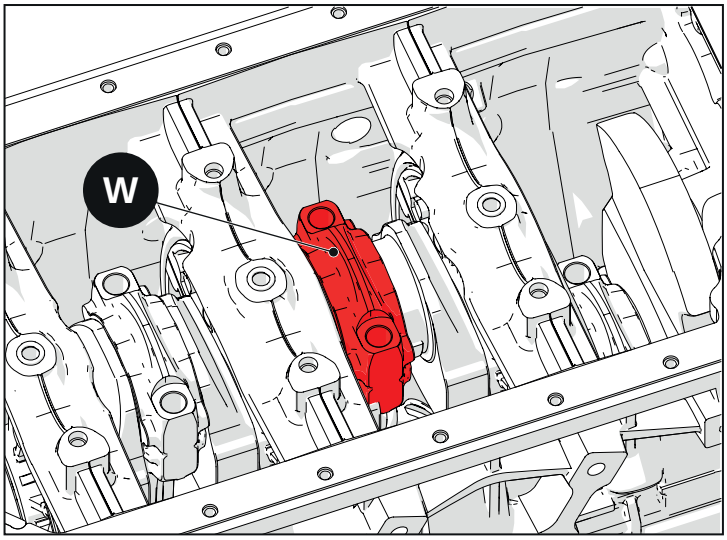

Fig. 2.238

2.65.2 Inspection

- Inspect the shaft to check for scoring, scratching, pitting or irregular wear.
- Inspect the rear journal for signs of seizing or damage.
- Inspect the lubrication oil passages to check for restriction.
- Inspect the threaded holes to check for damage.
- Inspect the key and the key seat of the front shank.
- If the crankshaft has been seized or overheated or has been ground, it must be checked for surface cracks with a Magnaflux magnetic particle testing system.

After grinding, the crankshaft must be treated with a “SURSULF” bath (to attain a surface hardness of HV 587 with a test load of 500 g. equivalent to HRc 53). After the “SURSULF” treatment, lap all surfaces to attain a roughness of Ra 0.18 / 0.22. IMPORTANT: Never attempt to straighten the crankshaft after application of the SURSULF treatment. Do not remove any material, either by hand or with a grinding machine, from the surfaces of the rear shims and from the rear shank of the shank, which the shims come into contact with. Replace the crankshaft if the machined surfaces of the front and rear shanks or the area with the threaded holes are not within the permitted tolerance for cylindricity or if they are worn or damaged.

- Measure the main journals to determine if replacement or grinding is necessary.

2.65.3 Specifications

Length (4 cylinder)	595.1 mm
Length (6 cylinder)	819.1 mm
Front shank - diameter	62.985 - 63.005 mm
1st size reduction class for front crankshaft bush	0.25 mm
Centre main journals - diameter	63.005 - 63.02 mm
1st size reduction class for centre main bearing bush	0.25 mm
Rear shank - diameter	79.985 - 80 mm
1st size reduction class for rear crankshaft bush	0.25 mm
Main journals - diameter	53.940 - 53.955 mm
1st size reduction class for connecting rod bush	0.25 mm
Wear limit	0.10 mm
Free play between front shank and front main journal bush	0.023 - 0.083 mm
Free play between centre main journal and main journal bearing bush	0.008 - 0.051 mm
Free play between rear shank and rear main journal bearing bush	0.045 - 0.085 mm
Free play between crankpin and connecting rod bush	0.012 - 0.066 mm

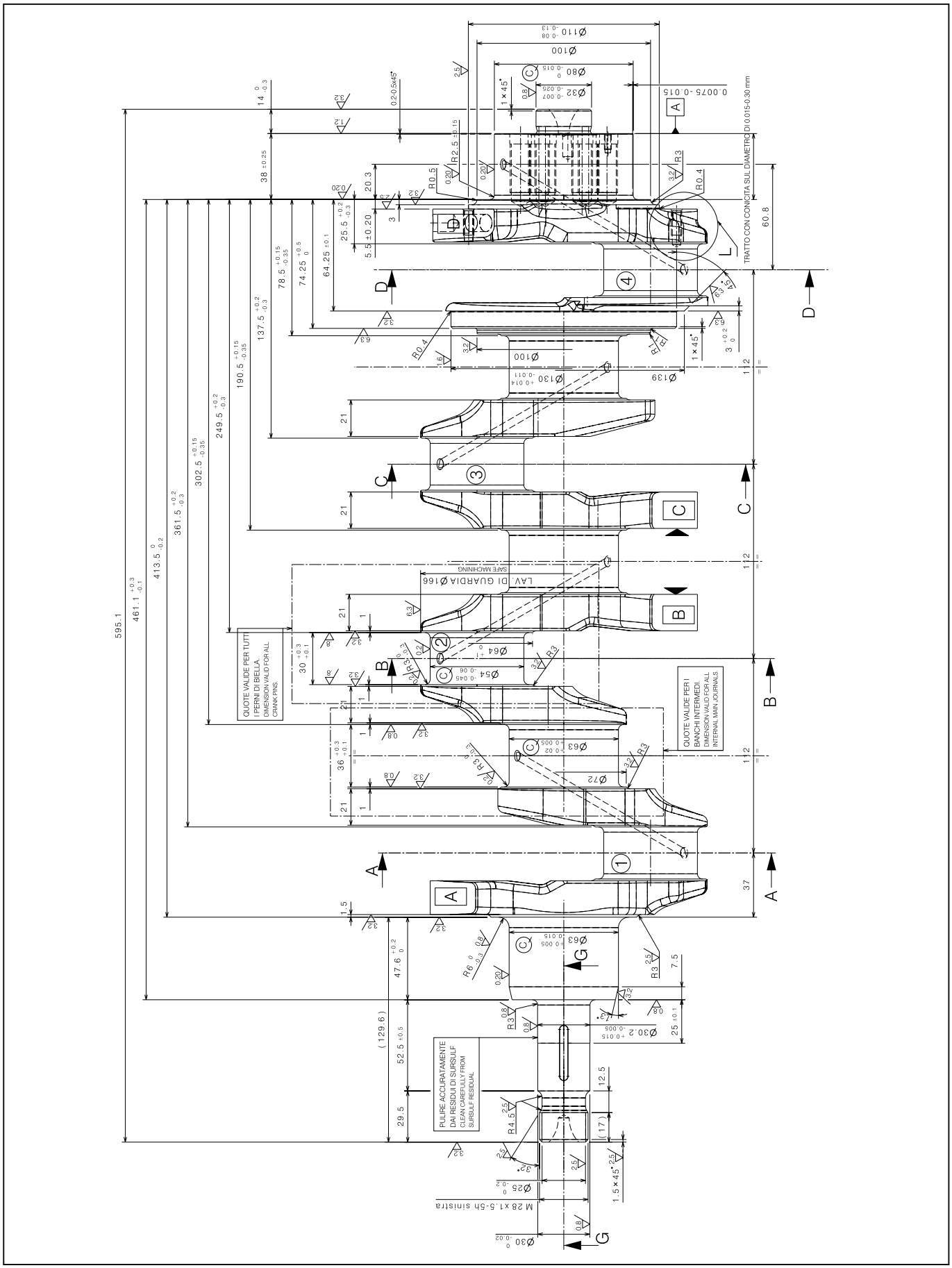
QUOTE VALIDE PER TUTTI I PERNI DI BIELLA
DIMENSION VALID FOR ALL CRANK PINS.
QUOTE VALIDE PER I BANCHI INTERMEDI
DIMENSION VALID FOR ALL INTERNAL MAIN JOURNALS.
PULIRE ACCURATAMENTE DAI RESIDUI DI SURSOLF
CLEAN CAREFOLLY FROM SURSULF RESIDUAL
TRATTO CON CONICITÀ SUL DIAMETRO DI 0.015÷0.30 mm
LAV. DI GUARDIA Ø166
SAFE MACHINING
M 28 x1.5-5h sinistra

Fig. 2.239

2.65.4 Installation

Lubricate the seats of the bearings in the crankcase or grease the outer surfaces of the centre bearings. Fit the respective centre bearings on the main journals in their original positions, referring to the marks made during disassembly, or to the identification markings applied on one side by the manufacturer.

Ensure that all the centre bearings are oriented with the front side of the bearing itself facing towards the timing side after installation on the respective main journals.

Lubricate the threads and under the heads of the screws with MOLYguard LMP 180 grease and tighten the screws.

centre main journal bearing screw: 44.1 N·m

a - brush with grease
b - bearing seats in crankcase

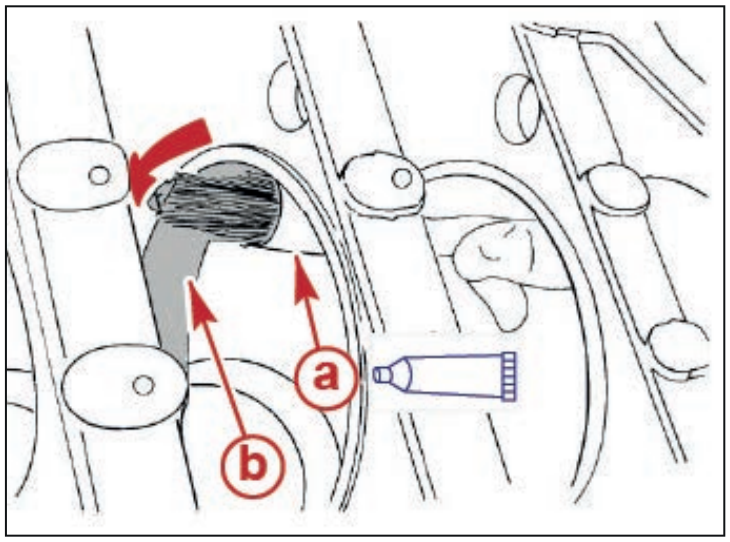

Fig. 2.240

A - reference mark applied by manufacturer or applied during disassembly
B - reference marker identifying the front side of the centre main journal bearing, which must face towards the timing side.
C - crankshaft gear (timing side)

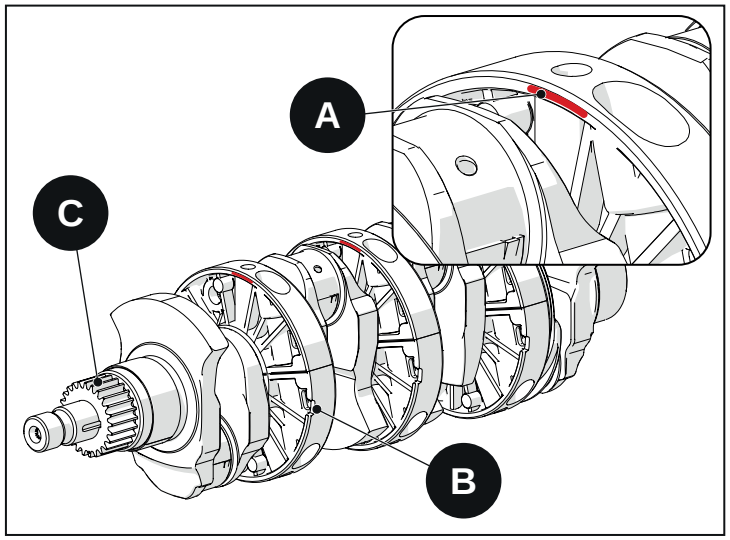

Fig. 2.241

- Fit the special tool on the crankshaft gear to prevent damage to the front crankshaft bush.
- Install the crankshaft carefully, with the central main journal bearings fastened to the crankshaft itself.

A - crankshaft complete with central main journal bearings
B - central main journal bearing during insertion into crankcase

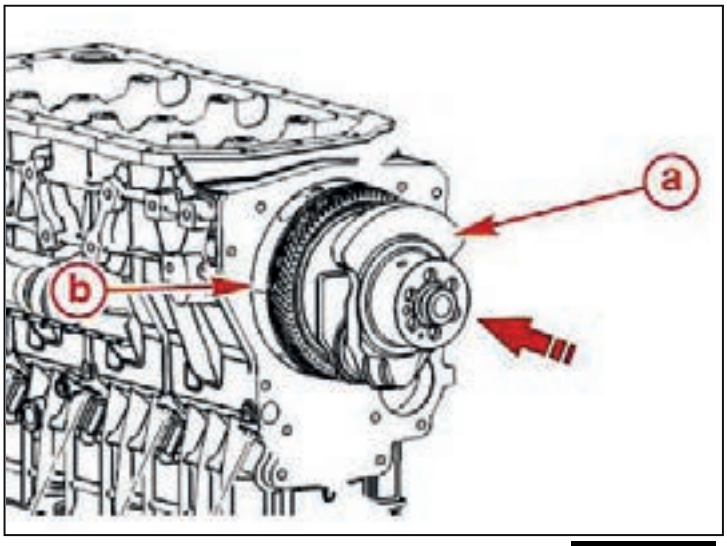

Fig. 2.242

- Turn the centre main journal bearings to align them with the reference markings made during disassembly; if there are no reference markings, turn the bearings so that the hole faces towards the oil sump.

X - assembly reference markings on half bearings
Y - bearing/crankcase assembly reference markings
Z - holes in bearings

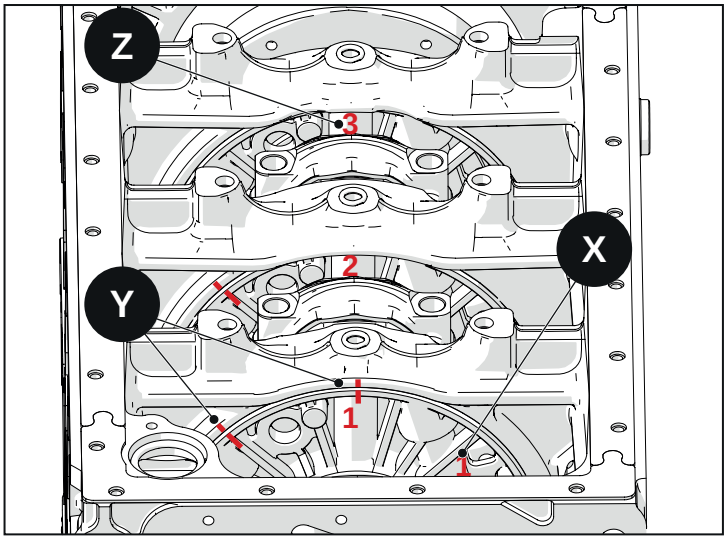

Fig. 2.243

- Fit the banjo bolts.
- To prevent damage to the threads, hand-tighten the banjo bolts into the crankcase.
- Tighten the banjo bolts.

A - banjo bolt - standard
B - banjo bolt - standard

Banjo bolt: 53.9 N·m

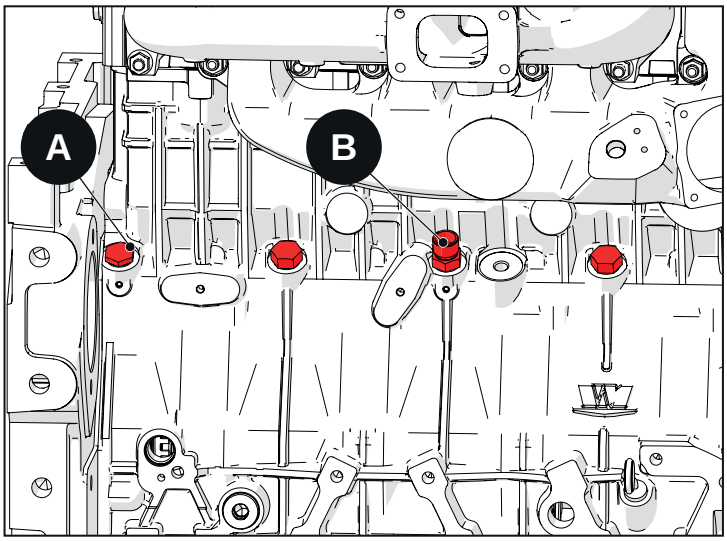

Fig. 2.244

2.66 Front crankshaft bush

- Fit a new bush on the special tool.
- Align the oil passage holes in the crankcase with the hole in the new bush.

Note

To facilitate installation, hold the 2 half bearings on the special tool with an elastic band.

- Fit the tool, complete with the new bush, into the crankshaft as shown in the figure.

A - special tool
B - front crankshaft bush

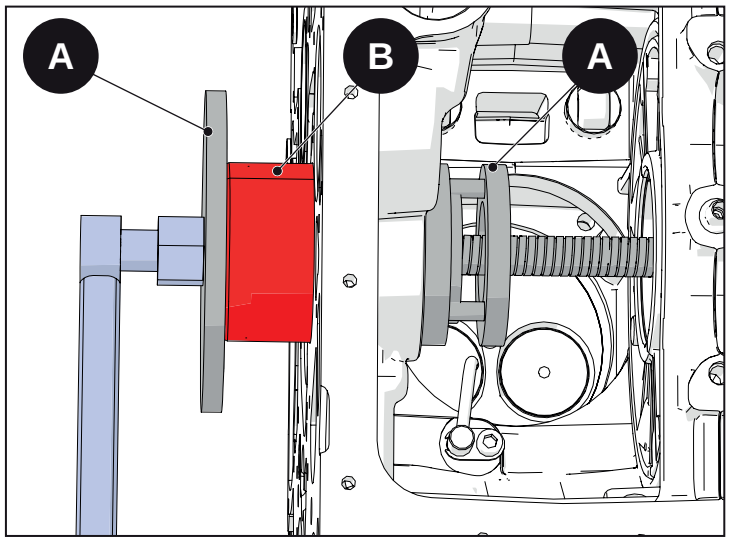

Fig. 2.245

- Apply Loctite 601 to the outer surface of the new bush.
- Tighten the nut on the tool to simultaneously install the new bush correctly in its seat and push out the old bush.

Warning

When removing a bush or installing a new bush, make sure that the oil passage hole of the bush is oriented correctly. The oil passage hole in the bush must be aligned with the hole in the cylinder block/crankcase.

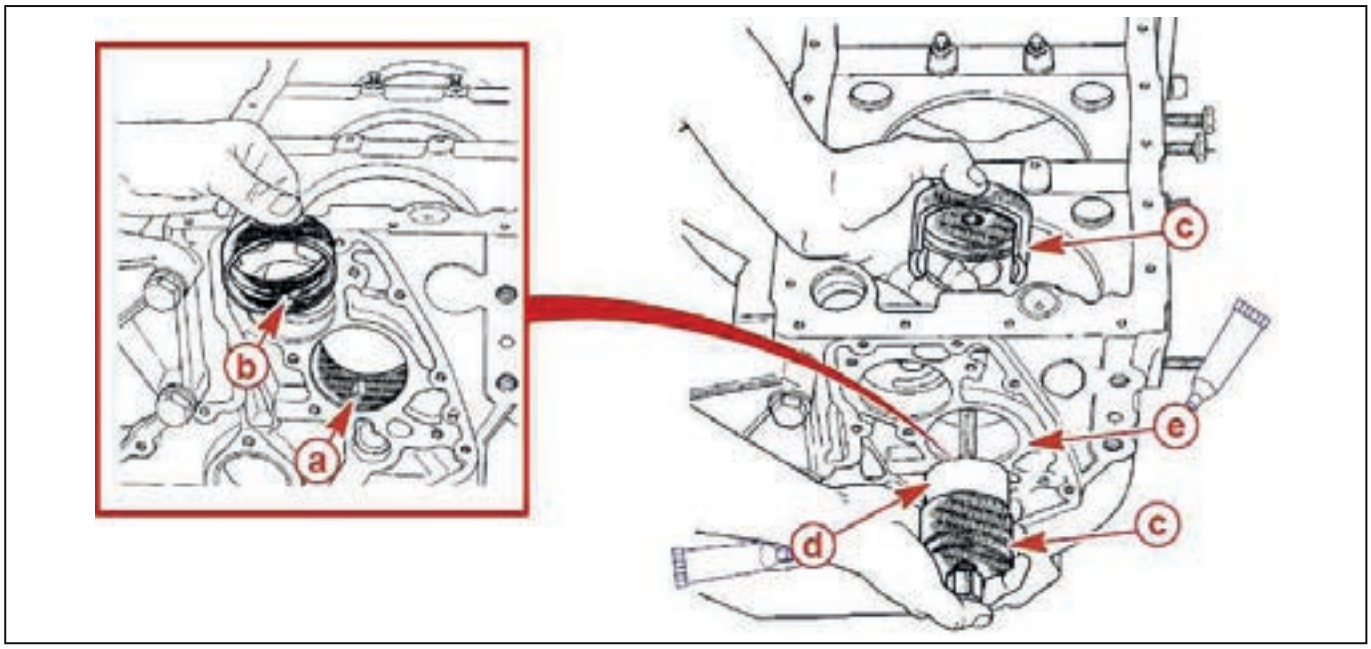

Fig. 2.246

A - Oil passage in cylinder block/crankcase
B - Oil passage in bush
C - Front camshaft bush and special tool
D - 2 half bearings (on tool)
E - bush seat bore in cylinder block/crankcase

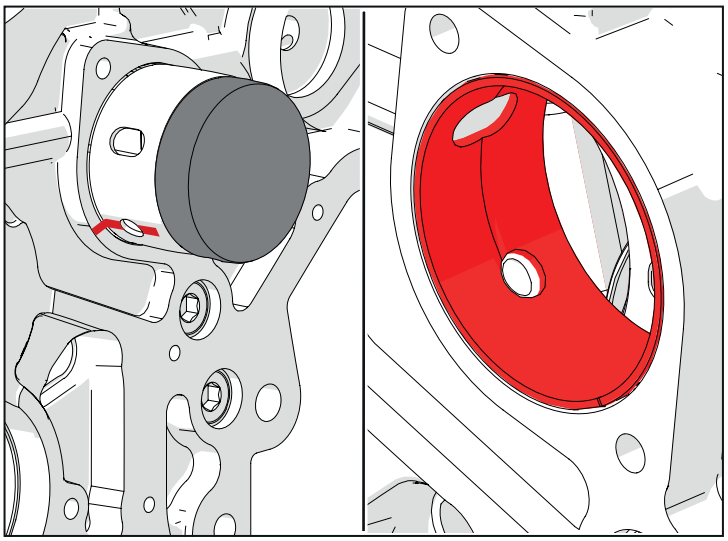

Fig. 2.247

2.67 Injection system

2.67.1 Layout

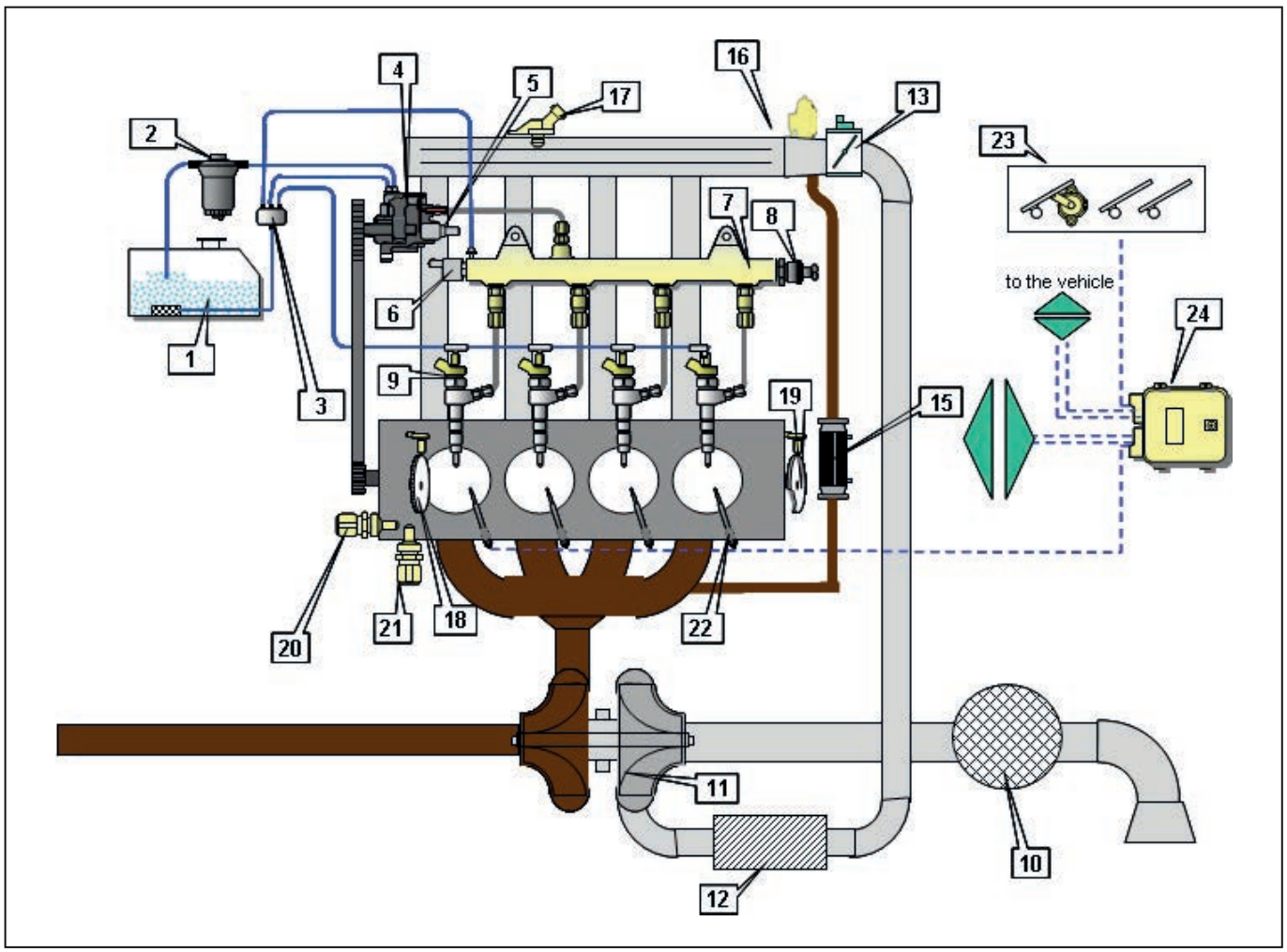

Fig. 2.248

1 - Fuel tank
2 - Fuel filter
3 - Fuel return valve block
4 - High pressure injection pumps
5 - Fuel pressure regulator valve
6 - Rail fuel pressure regulator valve
7 - Pressure accumulator (rail)
8 - Rail pressure sensor
9 - Injectors
10 - Air filter
11 - Turbocharger
12 - Intercooler
13 - Throttle valve
14 - EGR Valve
15 - EGR heat exchanger
16 - EGR manifold
17 - Intake manifold/intake air pressure sensor
18 - Crankshaft position/speed sensor
19 - Camshaft timing sensor
20 - Coolant temperature sensor
21 - Engine oil pressure and temperature sensor
22 - Glow plugs
23 - Foot throttle pedal
24 - Engine control unit

2.68 Low pressure injection system - Specifications

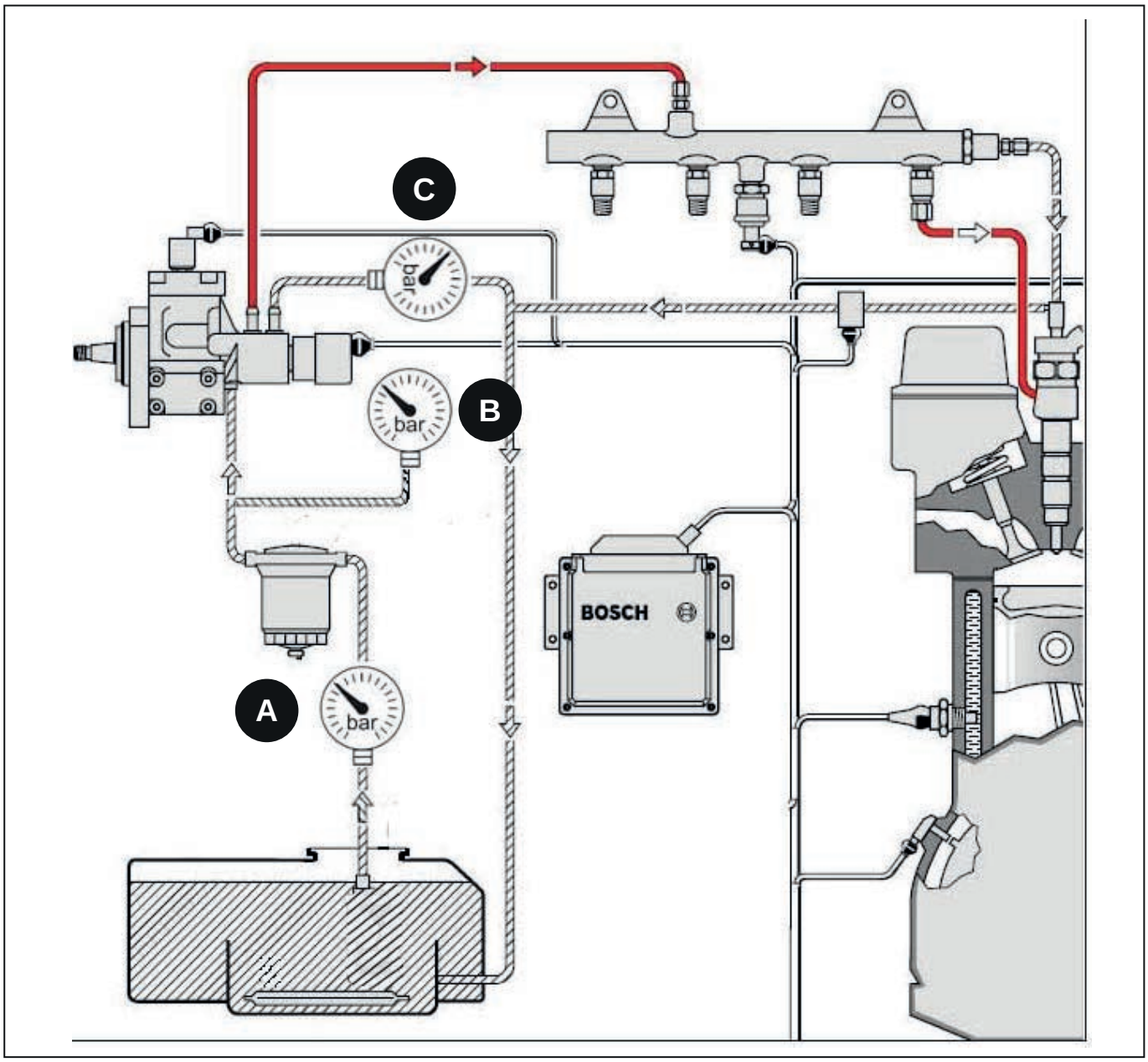

Fig. 2.249

A - Vacuum at fuel filter inlet - 0.4 bar
B - Vacuum at fuel filter outlet
B - Maximum vacuum
Difference between A and B - (max. bar)
C - Fuel return from high pressure injection pump
C - ≤ 0.6 bar

2.69 High pressure pump

2.69.1 Removal

- Release the clamp and disconnect the fuel delivery pipe from the pump.
- Loosen and remove the fuel return pipe from the pump.
- Loosen and remove the fuel delivery pipe to the rail.
- Loosen and remove the 3 nuts fastening the pump.
- Remove the pump. Replace the gasket fitted on the stud bolts.

A - fuel delivery pipe (clamp)
B - fuel return pipe to pump with relative banjo bolt
C - rail delivery pipe
D - nut fastening high pressure pump

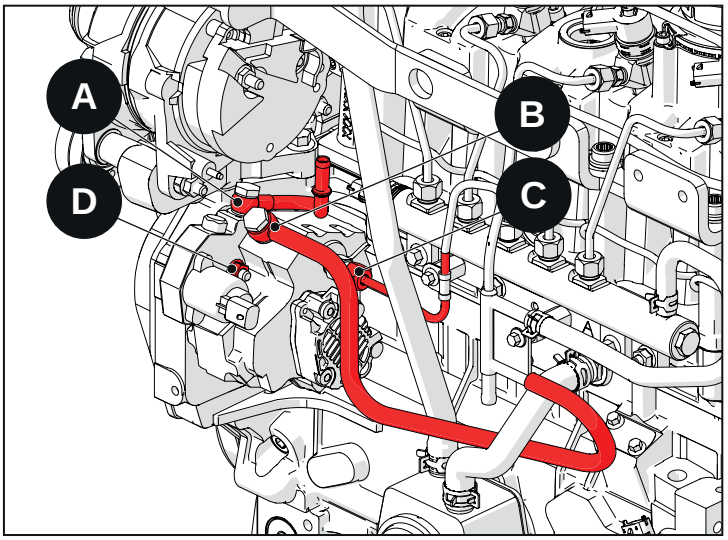

Fig. 2.250

- Loosen one of the nuts fastening the pump gear and use a commercially available puller tool to remove the pump gear.
- Remove the collar from the pump without damaging the pump housing. The new replacement pump is supplied complete with a new collar.

E - collar

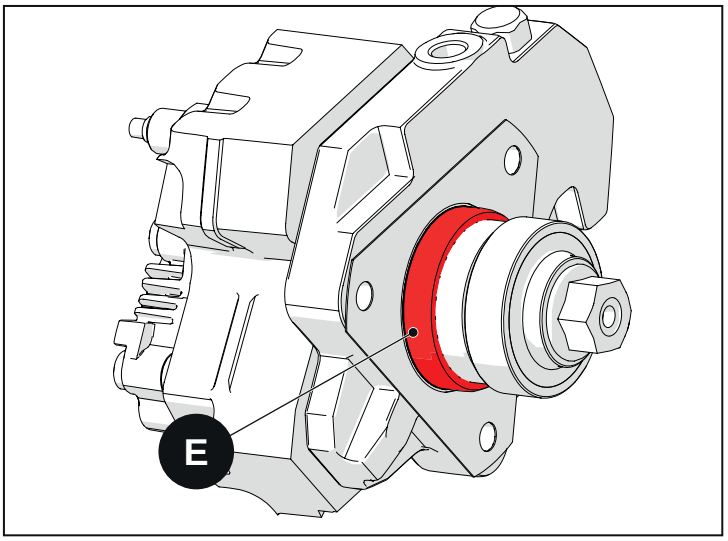

Fig. 2.251

2.69.2 Installation

- Fit the collar with the bevelled side facing outward.
- Press the collar into place to bring it into contact with the pump housing.

A - bevel

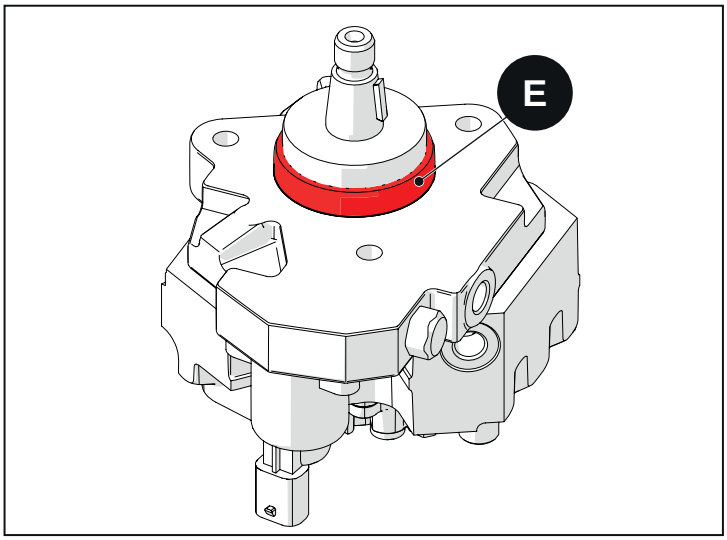

Fig. 2.252

- Fit the gear on the pump shaft.
- Fit and tighten the nut.
  - **nut: 86.4 N·m**

B - key seat on injection pump shaft

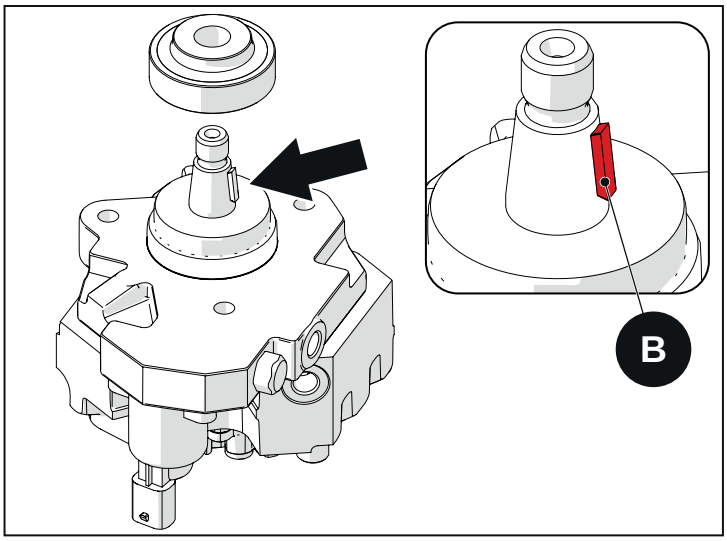

Fig. 2.253

- Fit a new gasket on the stud bolts.
- Fit the pump on the stud bolts, and then fit and tighten the 3 flanged nuts.
  - **flanged injection pump fastener nut: 27.5 N·m**

C - key seat on injection pump shaft

D - key seat on injection pump shaft

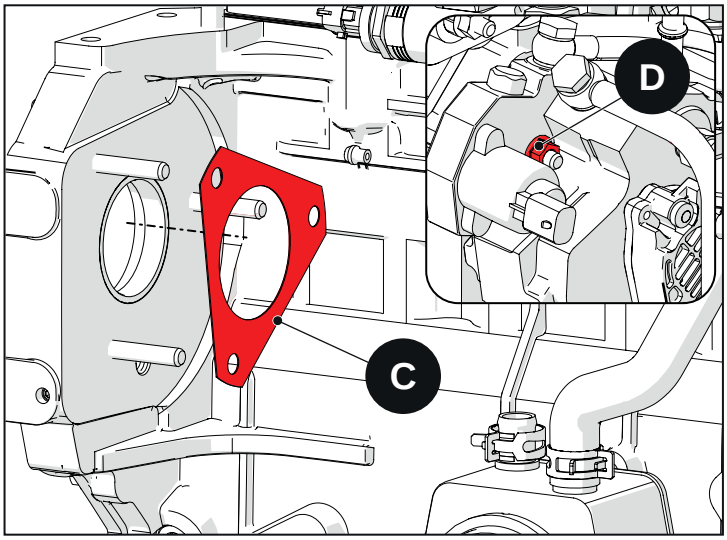

Fig. 2.254

- Fit the banjo bolt and the relative pump fuel return pipe onto the pump.
- Fit the banjo bolt and the relative pump fuel return pipe onto the pump.
  - **delivery pipe - banjo bolt: 27.5 N·m**
  - **fuel return pipe - banjo bolt: 27.5 N·m**

X - delivery pipe - banjo bolt
Y - fuel return pipe - banjo bolt

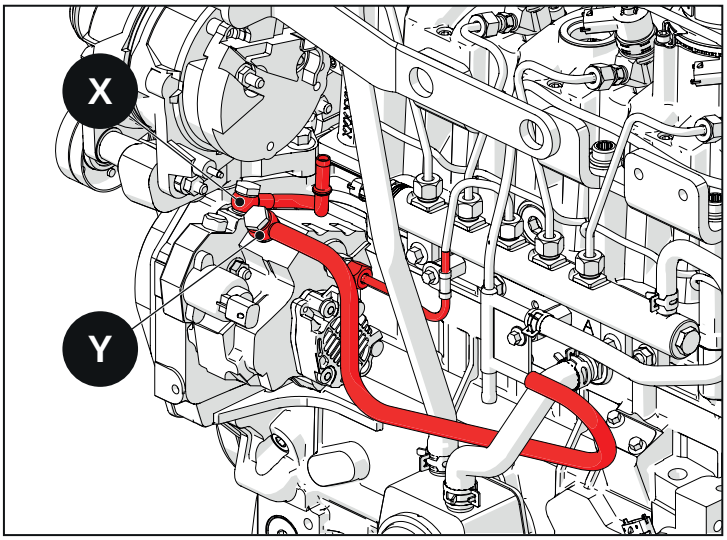

Fig. 2.255

Warning

When the pump has been removed, a specific procedure must be carried out to ensure that the high pressure fuel pipes are refitted correctly.

A specific procedure must be carried out before fitting the high pressure pipes from the pump to the rail and from the rail to the injectors. (See section High pressure injection system components - Tightening procedure)

Note

Whenever any of the high pressure injection system components (high pressure pump, electro-injectors and rail) and/or any of the high pressure pipes (pipe from pump to rail and pipe from rail to injectors) are removed, a specific procedure must be carried out to prevent fuel leakage from the high pressure pipes

(SEE SECTION HIGH PRESSURE INJECTION SYSTEM COMPONENT - TIGHTENING PROCEDURE)

2.69.3 Synchronising the high pressure injection pump gear

Place the pump on the specific servicing tool with the shaft in a vertical position. Clean the cone and the thread with degreaser.

Mark the position of the key seat (1) with a marker pen so that the position can be identified once the gear is installed on the pump.

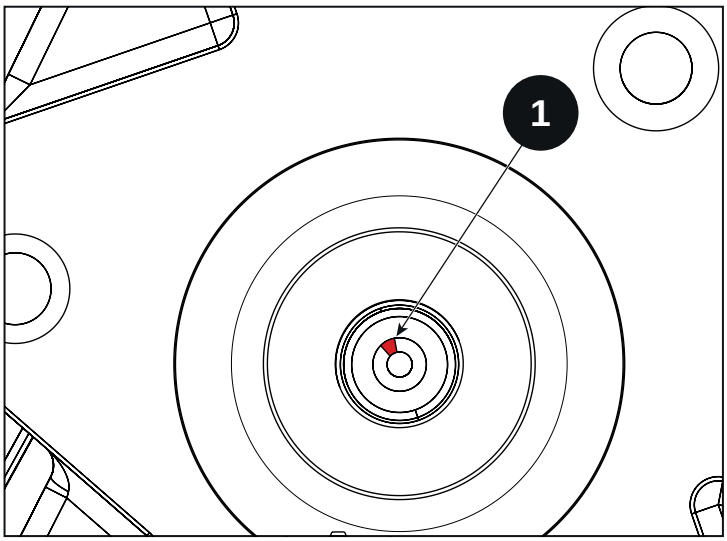

Fig. 2.256

Fit the gear on the pump. Mark the two teeth (2) immediately before the radial position of the key seat.

Pre-tighten the fastener nut (3) to a torque not exceeding 10 N·m. Tighten the nut definitively to a torque of 86.3 N·m.

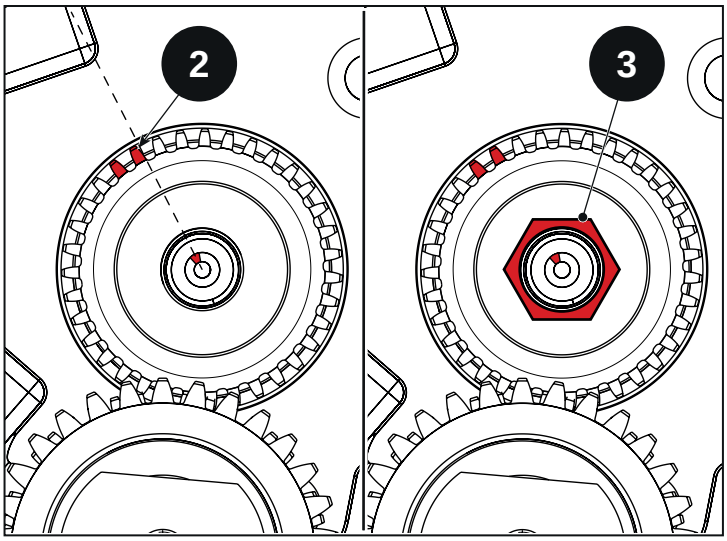

Fig. 2.257

Bring cylinder 1 to TDC, ensuring that the centreline between the two teeth marked previously is vertical (4).

Fasten the pump and install the remaining components.

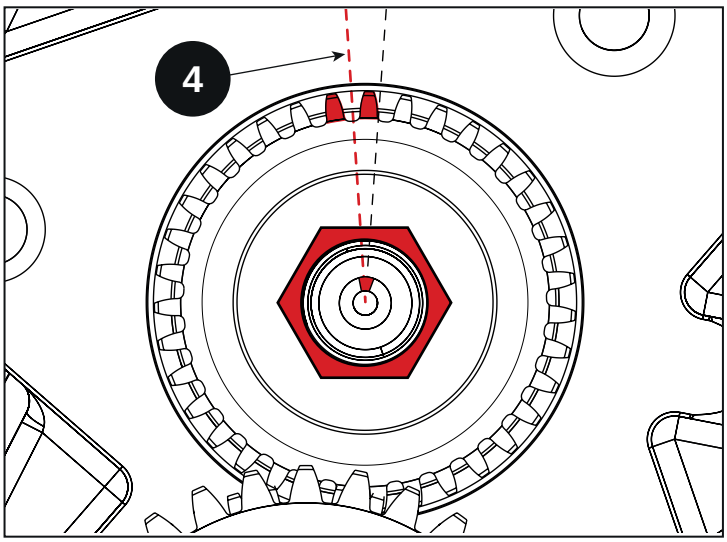

Fig. 2.258

2.70 Injectors

2.70.1 Removal

Warning

Whenever the injectors are removed, keep them in the correct order of removal and number them for identification. Injectors must always be reinstalled in their original positions as each injector has a unique IMA code will not function correctly in a different position.

- Loosen the screw fastening the injector and remove the clamp.
- Loosen and remove the pipe from the rail to the injector.

A - screw and clamp fastening the injector
B - clip fastening the injector fuel return pipe
C - nut fastening the injector pipe (from rail to injector)

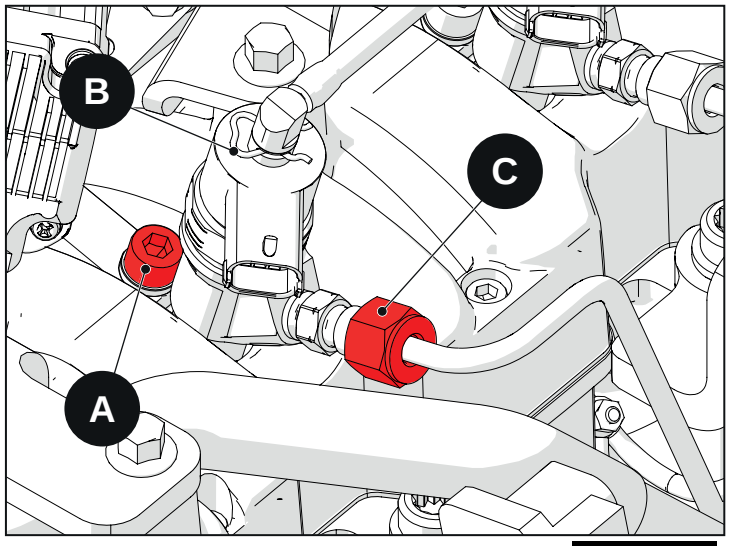

Fig. 2.259

Warning

When loosening the injector pipe on the injector, restrain the fitting on the injector with a 13 mm wrench to prevent it from turning.

- Press the tab to release and remove the injector fuel return line
- Remove the injector.

B - clip fastening the injector fuel return pipe
E - nut fastening the injector pipe (from rail to injector)

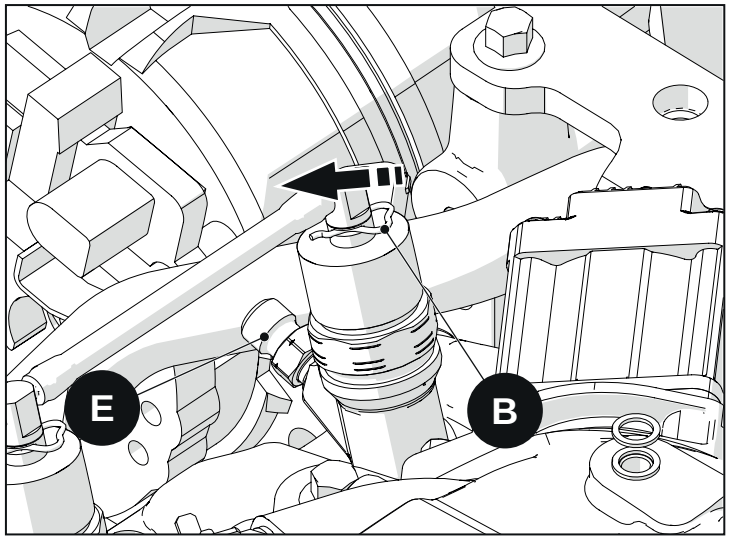

Fig. 2.260

Warning

The IMA code for R750EURO 5/6 engines consists of 7 characters.

D - IMA code

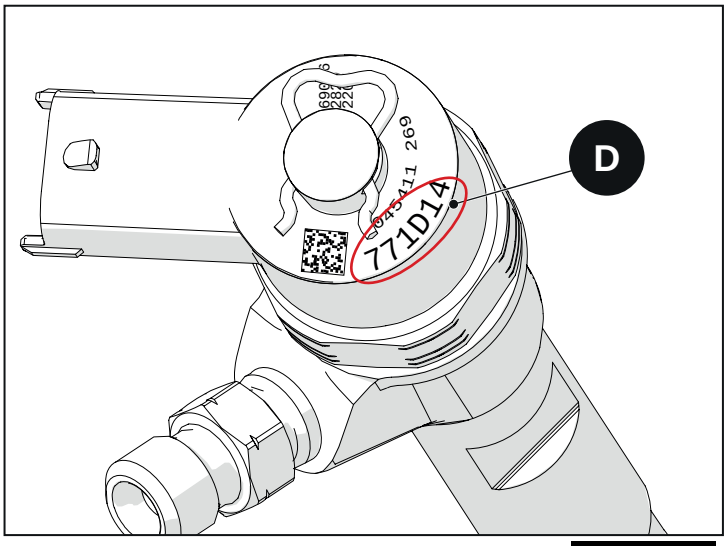

Fig. 2.261

2.70.2 Installation

- Check that the injector seat in the head is clean.
- Install a new O-ring in the seat on the injector and apply Molykote P 1500 grease to the O-ring as shown in the figure.
- Check that the shim at the bottom end of the injector is installed correctly.
- Fit the injector in the head.
- Fit the clamp and the screw with the respective spherical washer, installing correctly as shown in the figure

A - injector clamp
B - injector shim
C - screw with spherical washer
E - injector O-ring with Molykote P 1500 grease
F - injector seat
G - IMA code

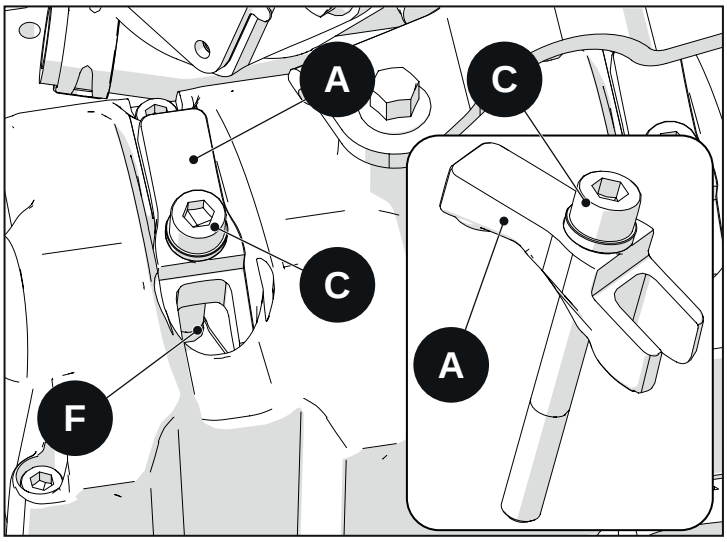

Fig. 2.262

- Hand-tighten the screw fastening the injector and then tighten definitively.
  - **injector fastener screw: 21 - 25 N·m**

Warning

When an injector has been removed, a specific procedure must be carried out to ensure that the high pressure fuel pipes are refitted correctly.

A specific procedure must be carried out before fitting the high pressure pipes from the rail to the injectors. (See section High pressure injection system components - Tightening procedure)

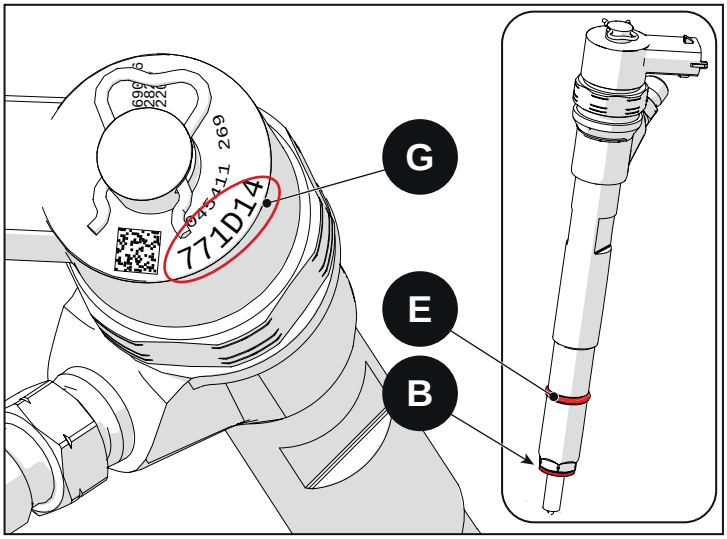

Fig. 2.263

Note

Whenever any of the high pressure injection system components (high pressure pump, electro-injectors and rail) and/or any of the high pressure pipes (pipe from pump to rail and pipe from rail to injectors) are removed, a specific procedure must be carried out to prevent fuel leakage from the high pressure pipes

(SEE SECTION HIGH PRESSURE INJECTION SYSTEM COMPONENT - TIGHTENING PROCEDURE)

Warning

Whenever one or all of the injectors are replaced, the new IMA code/s must be written in the electronic control unit memory using the diagnostic tool.

2.71 Rail

2.71.1 Removal

- Remove any components impeding removal of the rail.
- Remove the high pressure injection pipes from the rail to the injectors and from the pump to the rail.
- Remove the screws fastening the rail to the rail bracket.
- Remove the rail.

A - high pressure injection pipes (from rail to injectors)
B - high pressure injection pipes (from pump to rail)
C - screws fastening rail to bracket

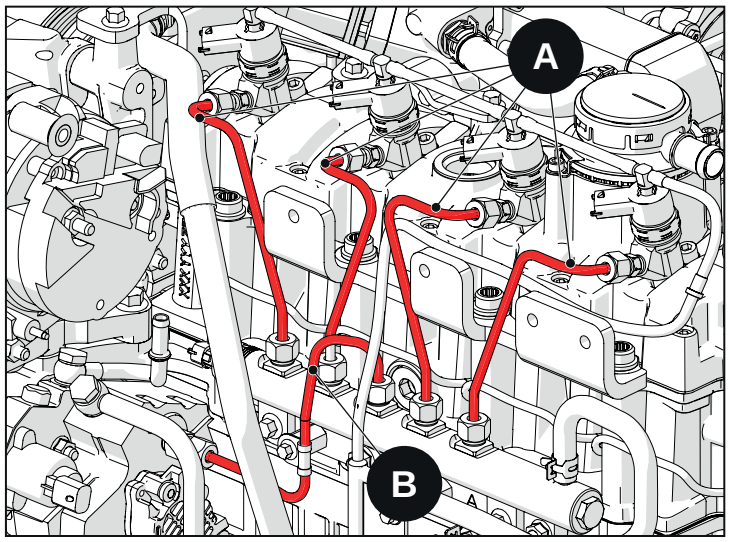

Fig. 2.264

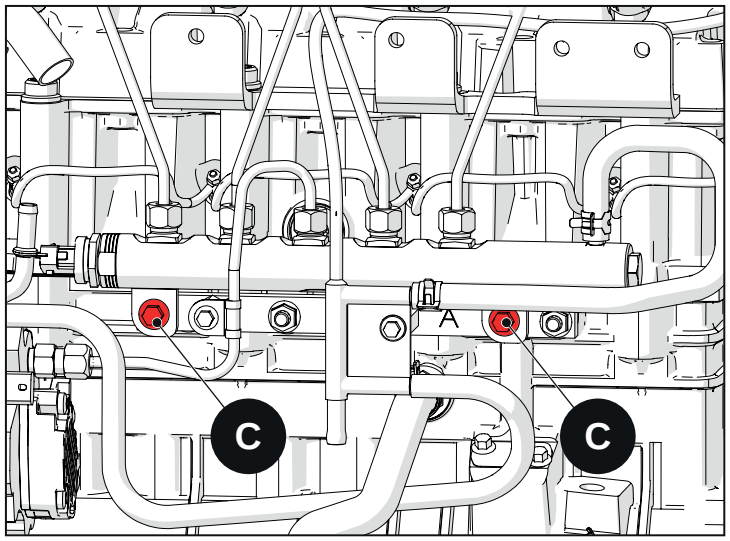

Fig. 2.265

2.71.2 Installation

Warning

When the rail has been removed, a specific procedure must be carried out to ensure that the high pressure fuel pipes are refitted correctly.

A specific procedure must be carried out before fitting the high pressure pipes from the pump to the rail and from the rail to the injectors. (See section High pressure injection system components - Tightening procedure)

Note

Whenever any of the high pressure injection system components (high pressure pump, electro-injectors and rail) and/or any of the high pressure pipes (pipe from pump to rail and pipe from rail to injectors) are removed, a specific procedure must be carried out to prevent fuel leakage from the high pressure pipes

(SEE SECTION HIGH PRESSURE INJECTION SYSTEM COMPONENT - TIGHTENING PROCEDURE)

2.72 High pressure injection system components - Tightening procedure

Note

Whenever any of the high pressure injection system components (high pressure pump, electro-injectors and rail) and/or any of the high pressure pipes (pipe from pump to rail and pipe from rail to injectors) are removed, a specific procedure must be carried out to prevent fuel leakage from the high pressure pipes. This procedure is necessary to ensure that the high pressure pipes are aligned correctly and prevent the possibility of leaks caused by misaligN·ment.

Warning

Whenever any of the high pressure injections pipes (pipe from high pressure pump to rail and pipes from rail to injectors) is removed, it must be replaced with a new pipe to prevent the risk of fuel leaks from the high pressure injection system.

- Check that the injectors are fastened correctly. (See section “Injectors”).
- Check that the high pressure pump is fastened correctly. (See section “High pressure pump”).
- Even if tightened previously, the following screws must also be loosened:
  - screws fastening the rail to the relative bracket
  - screws fastening the rail bracket to the cylinder block/crankcase.
- Hand-tighten all the nuts of the high pressure injection pipes simultaneously and completely.
- Fit the clamp on the pipe from the rail to the high pressure pump and hand-tighten the screw.
- Tighten the nut of pipe No. 3 (for 4 cylinder engines) or pipe No. 4 (for 6 cylinder engines) on the **RAIL SIDE 19 ± 2 N·m**
- Tighten the remaining nuts of the pipes on the **RAIL SIDE** (No. 1, 2, 4 and 5 for 4 cylinder engines and No. 1, 2, 3, 5, 6 and 7 for 6 cylinder engines) **19 ± 2 N·m**
- Tighten the nuts of the pipes on the **INJECTOR SIDE** (No. 1, 2, 3 and 4 for 4 cylinder engines and No. 1, 2, 3, 4, 5 and 6 for 6 cylinder engines) **27 ± 2 N·m**
- Tighten the nut of the high pressure pipe on the **HIGH PRESSURE PUMP 20.5 ± 2.5 N·m**
- Tighten the screw of the clamp fastening the pipe from the rail to the high pressure pump **14.7 ± 2 N·m**
- Tighten the screws fastening the rail to the bracket and the screws fastening the bracket to the cylinder block/crankcase **33 ± 2 N·m**

A - nut of pipe No. 3 (for 4 cylinder engines) or pipe No. 4 (for 6 cylinder engines) on RAIL SIDE
B - nuts of pipes on INJECTION SIDE
C - nut of high pressure pipe on HIGH PRESSURE PUMP
D - screw of clamp fastening pipe from rail to high pressure pump
E - screws fastening rail to bracket and screws fastening bracket to cylinder block/crankcase

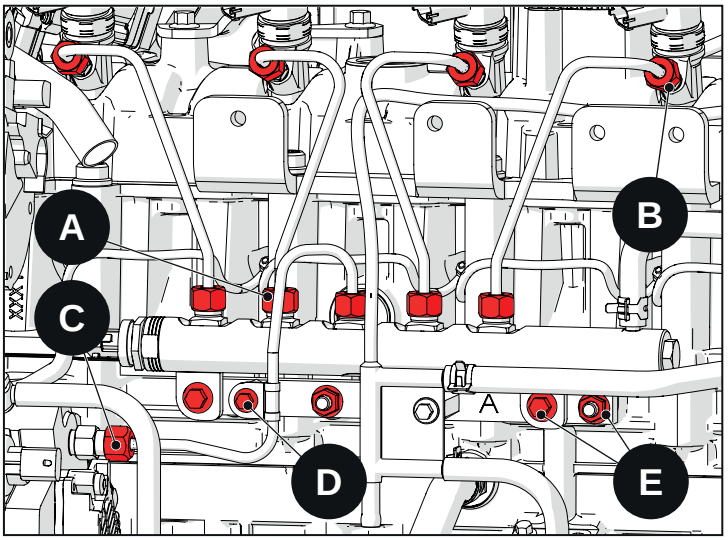

Fig. 2.266

2.73 Oil filter housing

2.73.1 Removal

- See the section "Maintenance" for the procedure to remove the oil filter cartridge.
- Loosen the bolt fastening the oil filter assembly (filter cartridge and oil filter housing) to the heat exchanger.
- Remove the oil filter assembly.
- Loosen the special bolt fastening the heat exchanger to the cylinder block/crankcase. Loosen the clamp fastening the rubber hose to the heat exchanger.

A - bolt fastening oil filter assembly to heat exchanger.
B - special bolt fastening heat exchanger to cylinder block/crankcase.

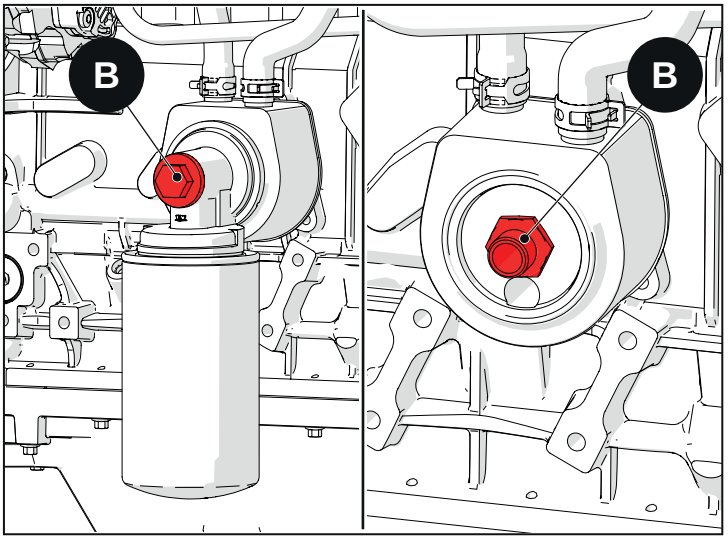

Fig. 2.267

2.73.2 Installation

- Replace the old O-ring installed in the seat of the heat exchanger with a new O-ring. Grease the O-ring with Molykote 111.
- Fit the heat exchanger and tighten the special fastening the heat exchanger to the cylinder block/crankcase
  - "B" special bolt fastening heat exchanger to cylinder block/crankcase. 60 N·m
- Replace the old O-ring installed in the seat on the oil filter assembly with a new O-ring. Grease the O-ring with Molykote 111.
- Replace the O-ring in the seat of the bolt fastening the oil filter assembly and grease the new O-ring with Molykote 111.
- Tighten by hand and then with a torque wrench.
  - "A" Bolt fastening oil filter assembly 39.2 N·m

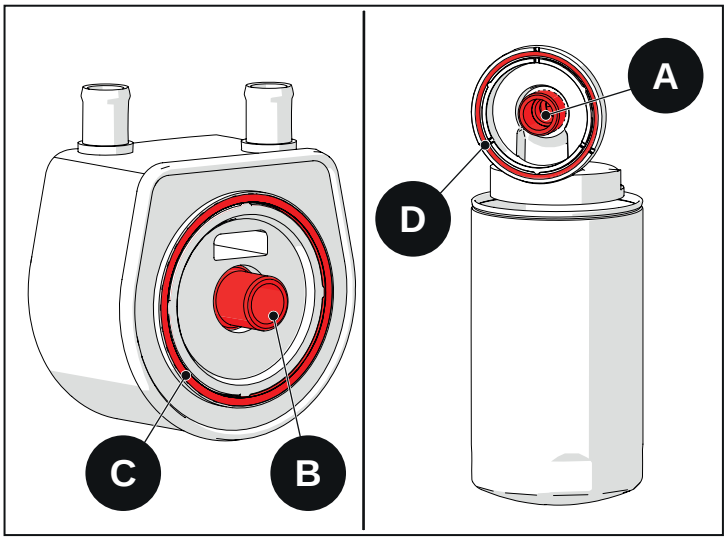

Fig. 2.268

C - O-ring in seat on heat exchanger
D - O-ring in seat on oil filter assembly
E - O-ring in seat of bolt fastening oil filter assembly to heat exchanger.

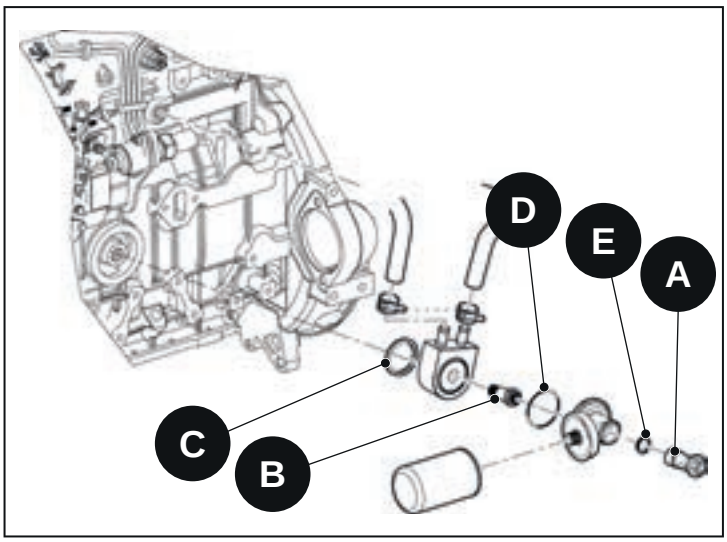

Fig. 2.269

2.74 Rocker cover

2.74.1 Removal

- Remove any components impeding removal of the cover.
- Loosen and remove the screws fastening the cover
- Remove the gasket

A - cover fastener screws

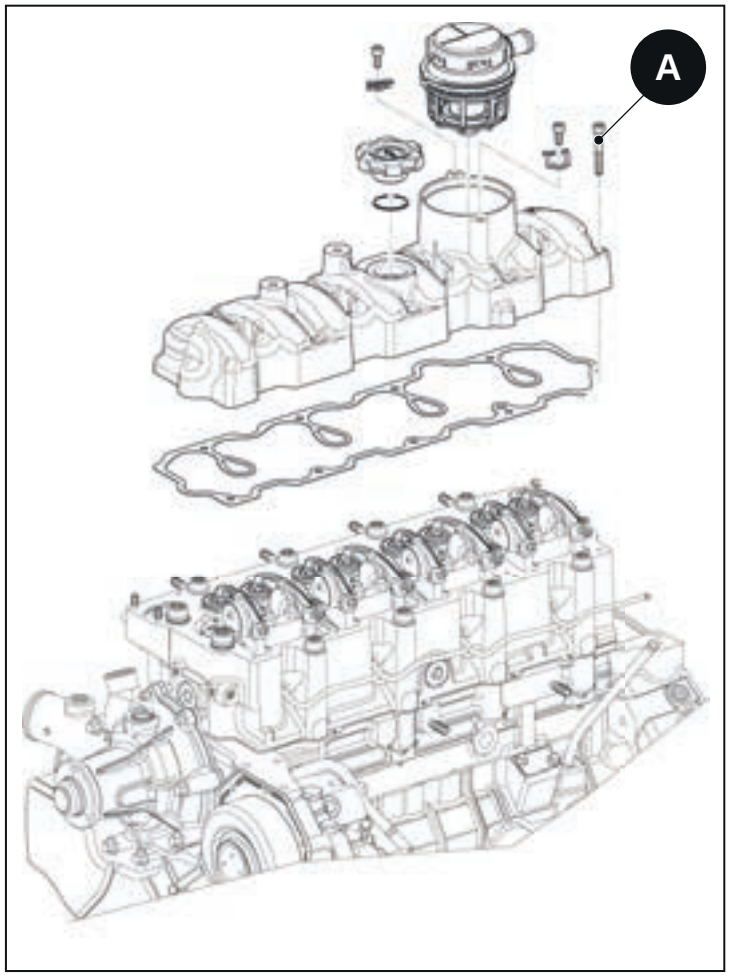

Fig. 2.270

2.74.2 Installation

- Fit a new gasket if necessary.
- Fit the cover and tighten the screws in a crossed pattern
  - **cover fastener screws: 11.8 N·m**

2.75 Thermostat valve

2.75.1 Removal

- Remove the screws of the thermostat valve cover.

X - thermostat valve cover screws
Y - thermostat valve

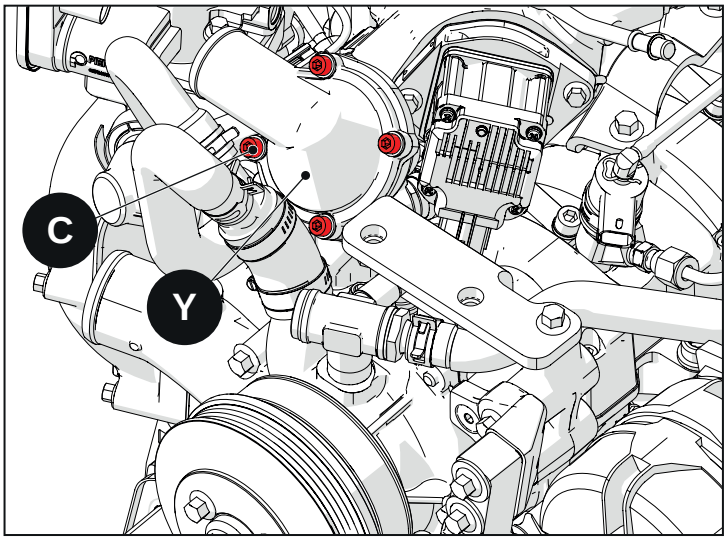

Fig. 2.271

2.75.2 Installation

> **Warning**
> The thermostat valve is supplied as an assembled unit.

- **screw (A): 11.8 N·m**
- **nut (b): 11.8 N·m**
- **screw (c): 13.7 N·m**

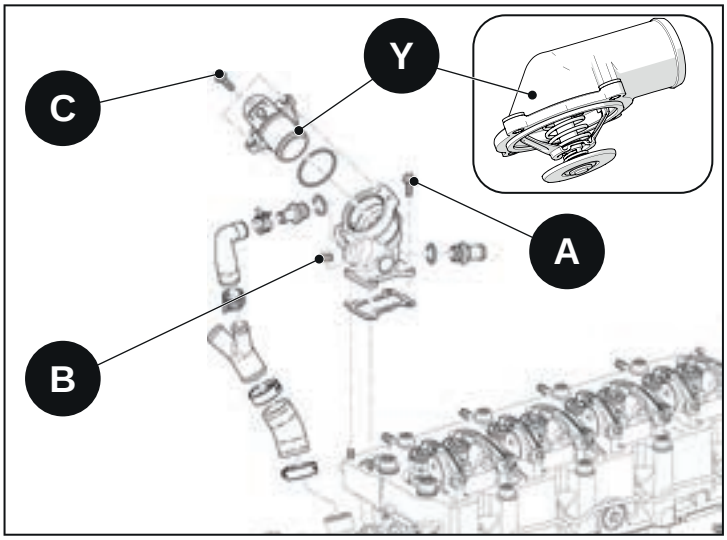

Fig. 2.272

2.76 Alternator

2.76.1 Removal

- Remove the alternator drive belt.
- Disconnect the electrical connectors from the alternator.
- Disconnect any pipes connected to the vacuum pump
- Loosen and remove the screws fastening the alternator.

A - Alternator
C - alternator fastener screws

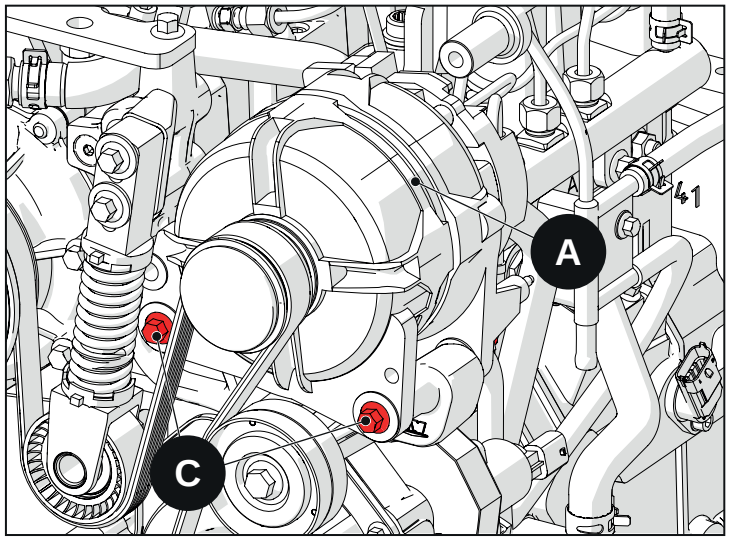

Fig. 2.273

2.76.2 Installation

- Fit the alternator on the alternator bracket.
- Fit the bolts into the alternator and tighten the nuts fastening the alternator.
  - **Alternator fastener nuts: 45.1 N·m**

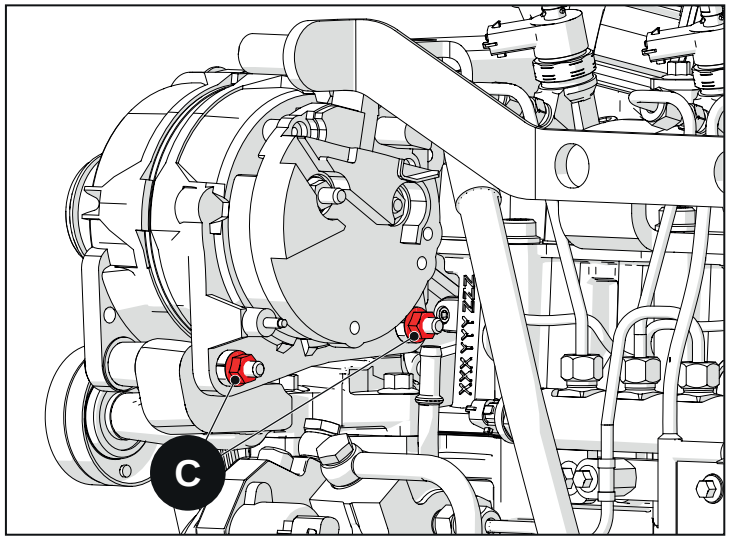

Fig. 2.274

2.77 Alternator pulley

2.77.1 Removal

- If a protective cover is fitted, the engine is equipped with idler alternator pulley and the special tool 68420022F must be used for removal.
- Remove the cover, fit the special tool 68420022F and remove the pulley.

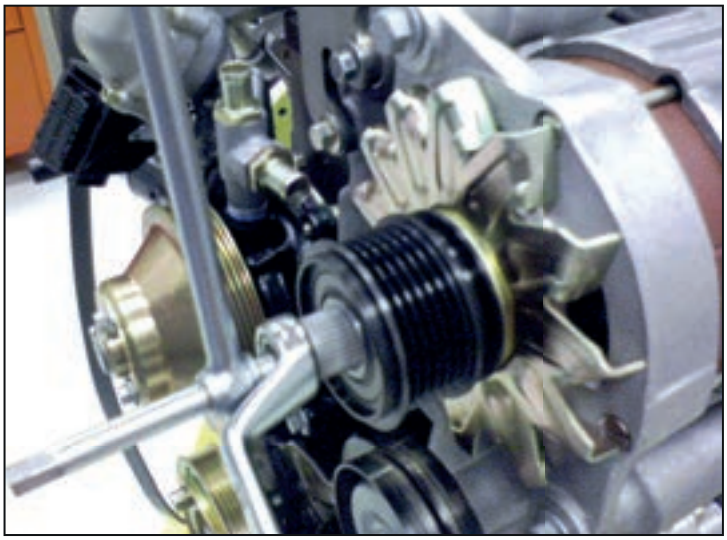

Fig. 2.275

2.77.2 Assembly

- Hand-tighten the pulley onto the alternator shaft.
- Tighten the pulley definitively.
  - **Alternator pulley: 80 ± 5 N·m**

Warning

Fit the alternator fan with the arrow stamped on the fan pointing in the correct direction as shown in the photo

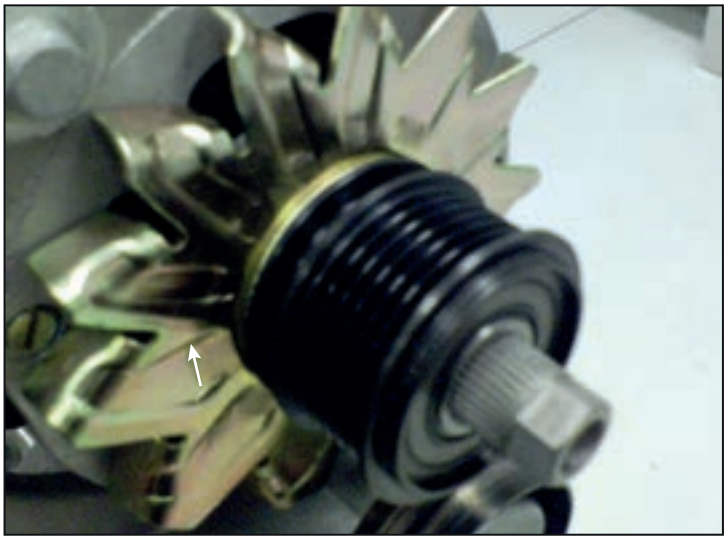

Fig. 2.276

2.77.3 Test

W - output current
D+ - battery charging / battery charge indicator lamp

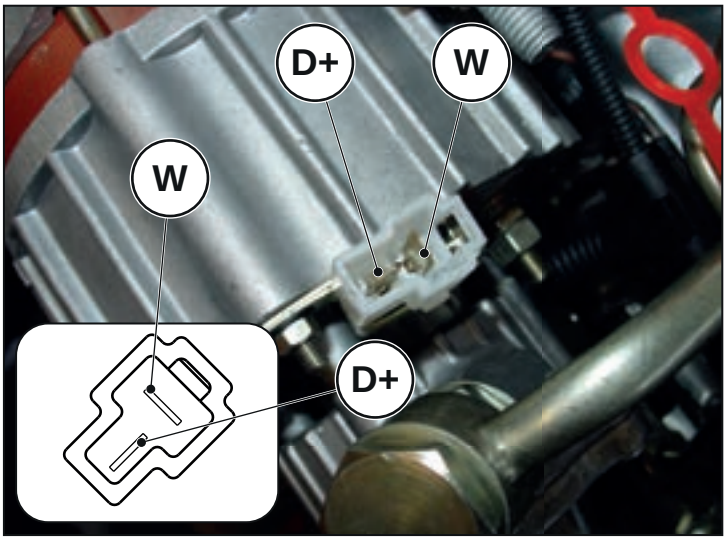

Fig. 2.277

Wiring diagram for testing alternator

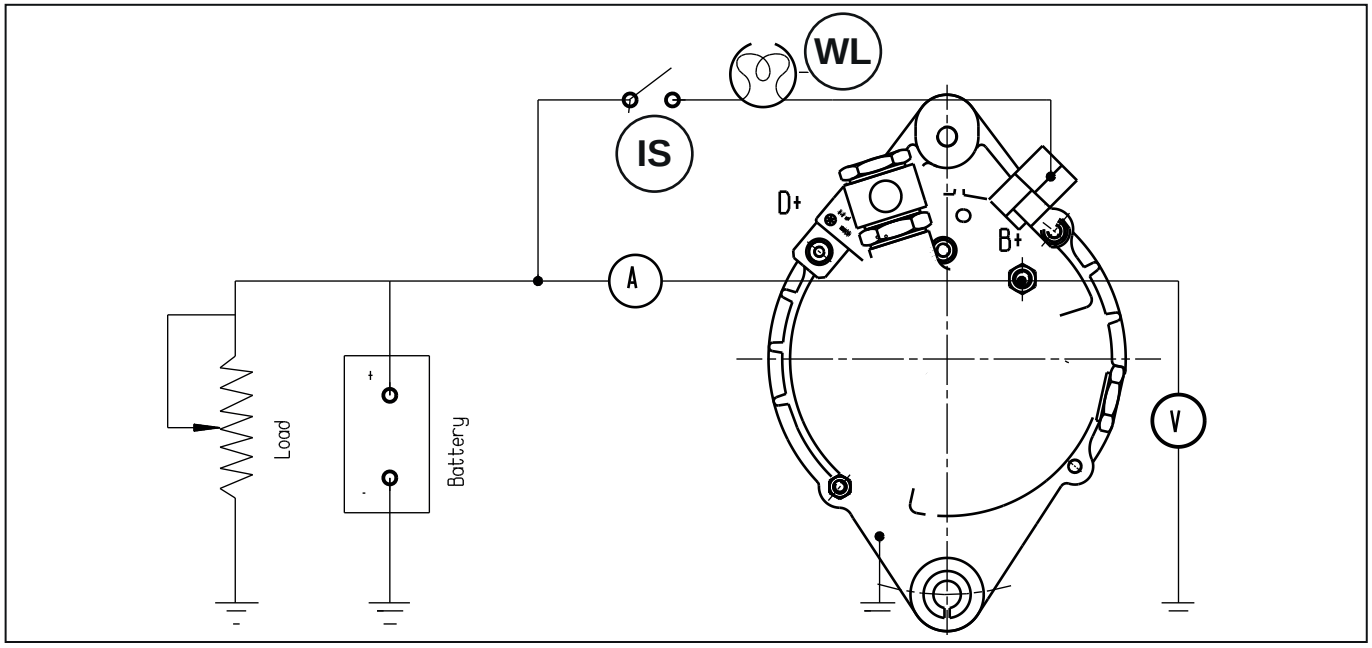

Fig. 2.278

WL - Alternator charge indicator lamp, 2 to 4 W, 12 V
IS - Ignition switch

Electrical wiring diagram

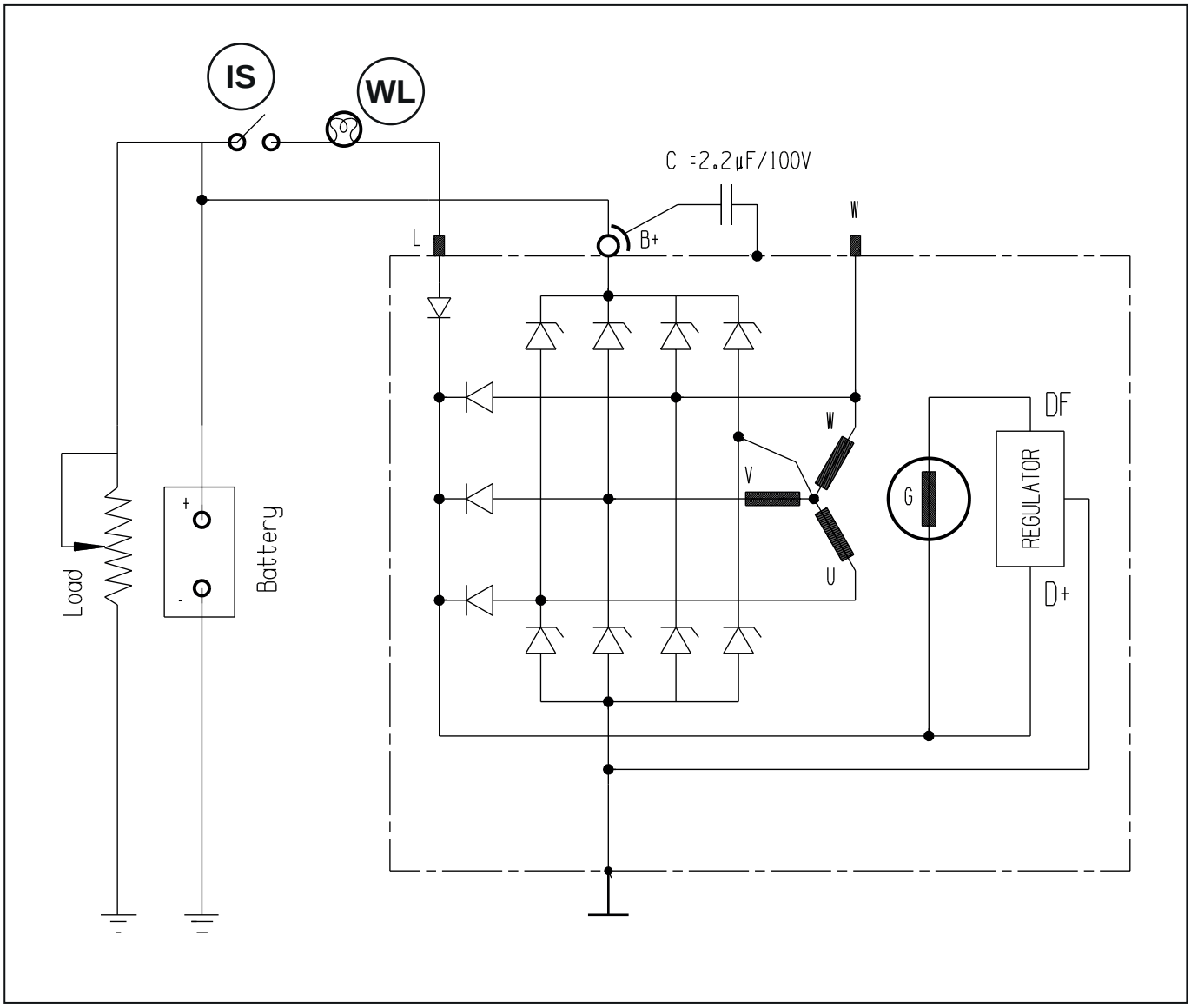

Fig. 2.279

WL - Alternator charge indicator lamp, 2 to 4 W, 12 V
IS - Ignition switch

A - alternator speed (rpm)
B - Output current

Crankshaft pulley/alternator pulley ratio = 2.63

Constant voltage	Amperes	Alternator rpm
13.5V	0 Amps	1000 rpm
	23 Amps	1500 rpm
	105 Amps	6000 rpm

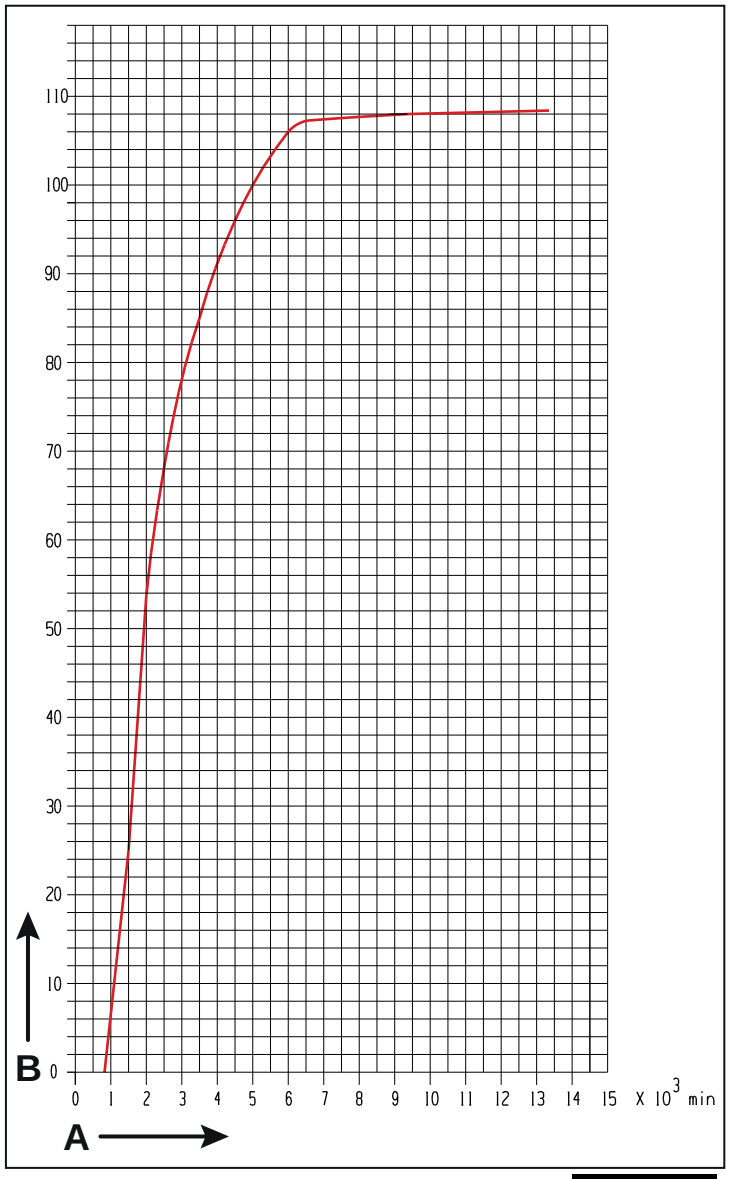

Fig. 2.280

2.78 Alternator regulator

2.78.1 Removal

- Remove the alternator from the engine.
B - regulator fastener screws
C - alternator regulator

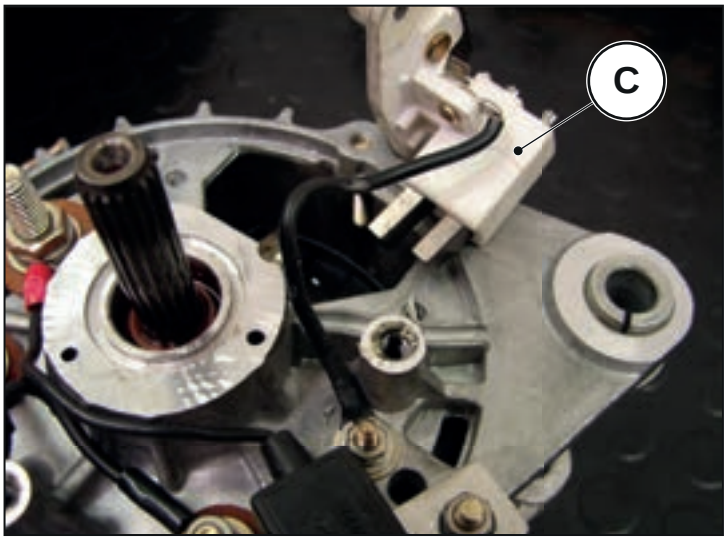

Fig. 2.281

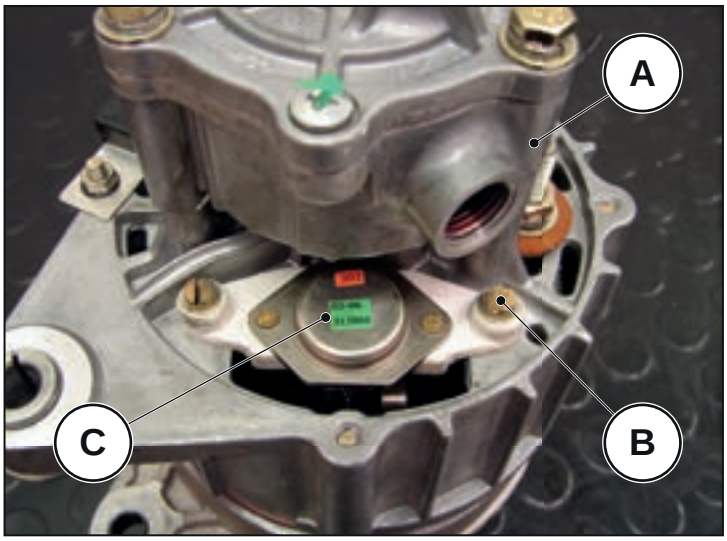

Fig. 2.282

2.79 Alternator bracket

2.79.1 Removal

- Undo the bolts of the alternator bracket.
- Remove the bracket

A - alternator bracket fastener bolts

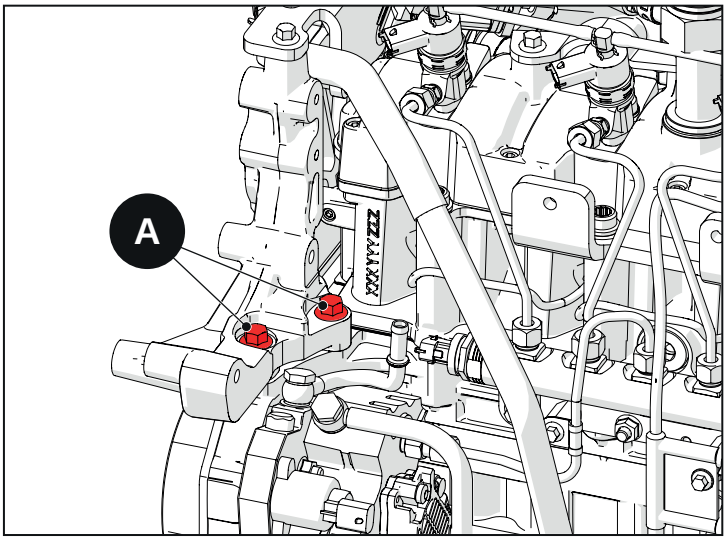

Fig. 2.283

2.79.2 Installation

- Fit the bracket on the cylinder block/crankcase
- Fit and tighten the bolts.
  - **Alternator bracket bolts: 68.6 N·m**

2.80 Starter motor

2.80.1 Removal

- Undo the bolts fastening the starter motor.
- Remove the starter motor

A - starter motor fastener bolts

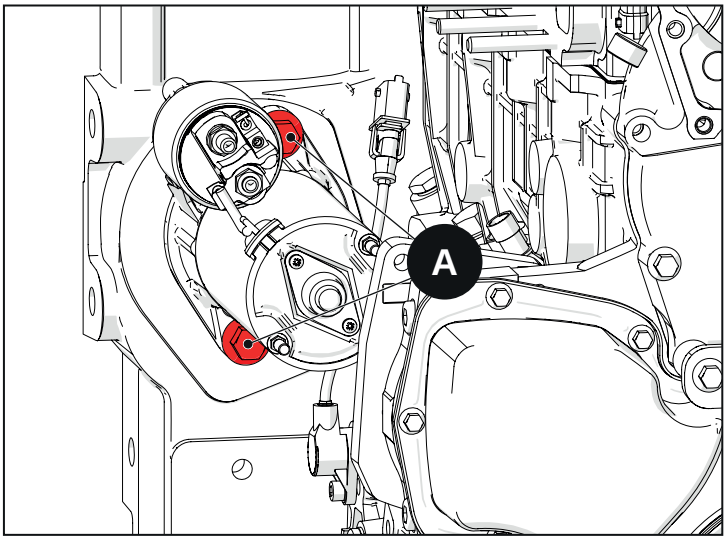

Fig. 2.284

2.80.2 Installation

- Fit the starter motor in the flywheel housing
- Fit and tighten the bolts.
  - **starter motor bolts: 83.4 N·m**

2.81 Electric sensors

2.81.1 Positions

1 - Fuel pressure regulator valve
2 - Camshaft / timing sensor

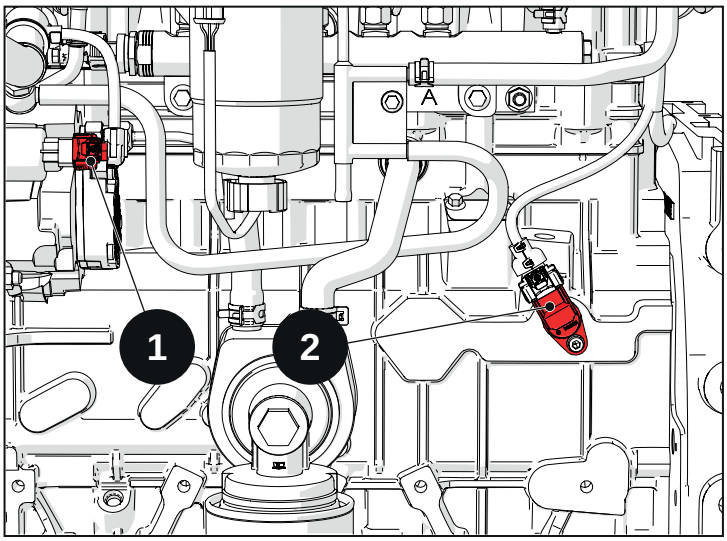

Fig. 2.285

3 - Engine position / speed sensor
4 - Engine oil pressure sensor (34.3 N·m)
5 - Intake air pressure / temperature sensor

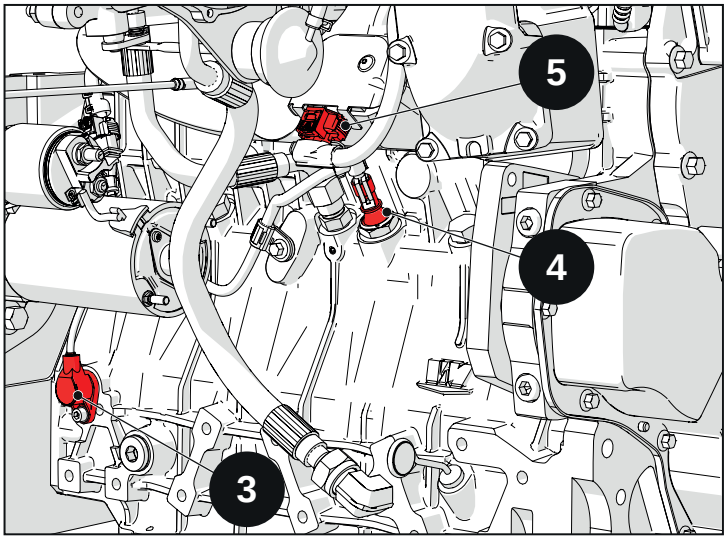

Fig. 2.286

6 - Engine coolant temperature sensor

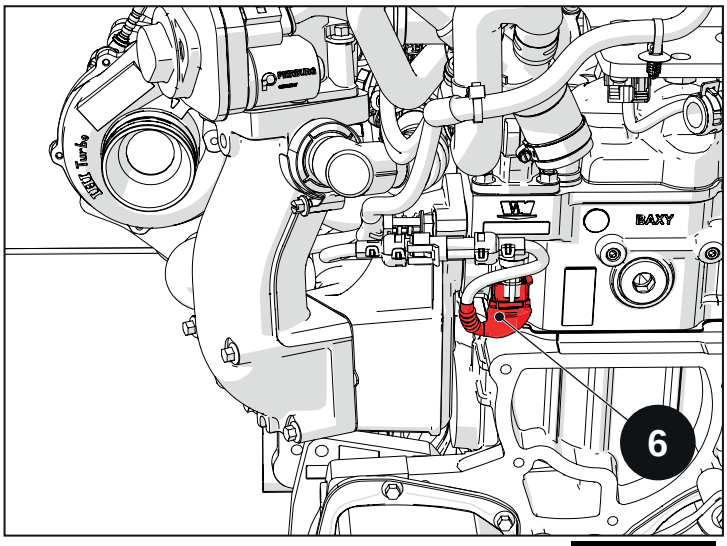

Fig. 2.287

7 - P3 exhaust gas pressure sensor
Exhaust manifold

A- 27.5 N·m

B- 14 N·m

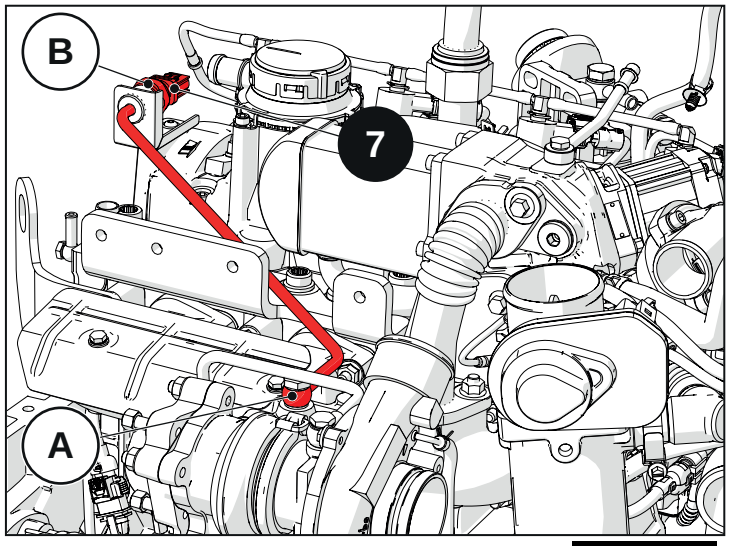

Fig. 2.288

8 - EGR valve exhaust gas temperature sensor (24.5 N·m)

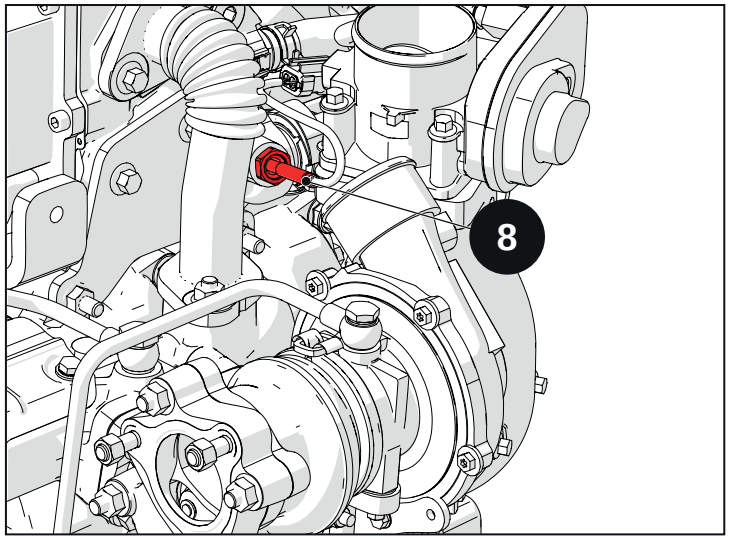

Fig. 2.289

9 - T3 exhaust gas temperature sensor - Exhaust manifold (45.1 N·m)

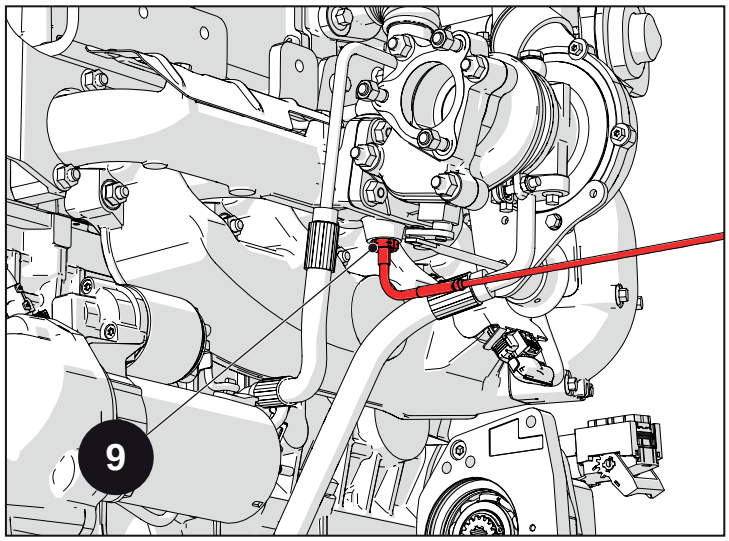

Fig. 2.290

2.81.2 Crankshaft speed and position sensor

This sensor is used to measure engine speed and determine the position of the crankshaft or of the pistons. See figure “cross section of engine speed sensor”.

The sensor (separated from the tone wheel by an air gap) is mounted directly on the tone wheel . See figure “inductive speed sensor, magnetic flux”. The sensor consists of a soft ferrite core (pole pin), around which a coil is wound. The pole is connected to a permanent magnet. The magnetic flux flows through the pole and impinges on the tone wheel. The magnetic flux through the coil varies depending on whether there is a gap or a tooth of the tone wheel in front of the sensor.

As a tone wheel teeth and gaps pass through the magnetic field dispersed by the magnet, As a tone wheel teeth and gaps pass through the magnetic field dispersed by the magnet, they effect a change in this flux. The flux in the coil increases when a tooth passes in front of the sensor and weakens when a gap passes in front of the sensor.

Cross section of engine speed sensor.

1 - Magnet
2 - Housing
3 - Coil
4 - Permanent magnet
5 - Cable
6 - Sensor casing
7 - Soft ferrite core

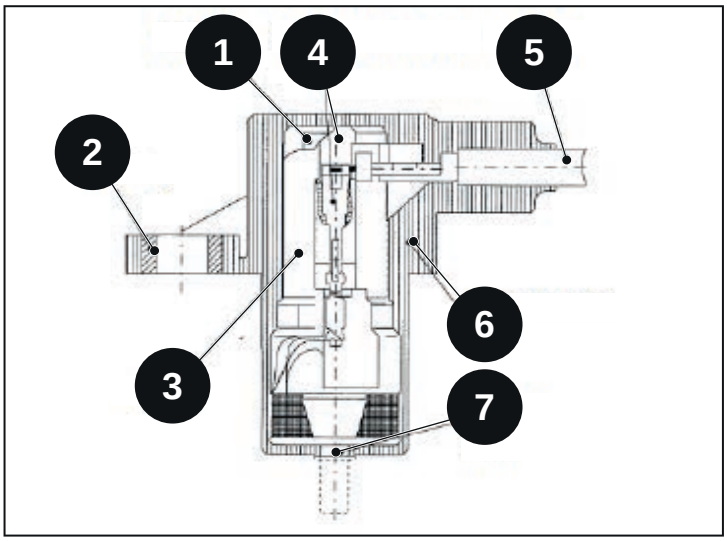

Fig. 2.291

This variation in magnetic flux induces a sinusoid voltage in the coil proportional to the rate of change of the flux and, therefore to the engine speed (see the figure “engine speed sensor signal acquisition”).

The amplitude of this voltage increases with increasing engine speed (from a few mV to over 100 V).

A sufficient amplitude for signal acquisition is reached at an engine speed of 30 rpm.

Inductive speed sensor, magnetic flux

1 - Effective flux
2 - Dispersed flux
3 - permanent magnet
4 - element conducting flux
5 - end of pole
6 - coil
7 - gap
8 - tone wheel

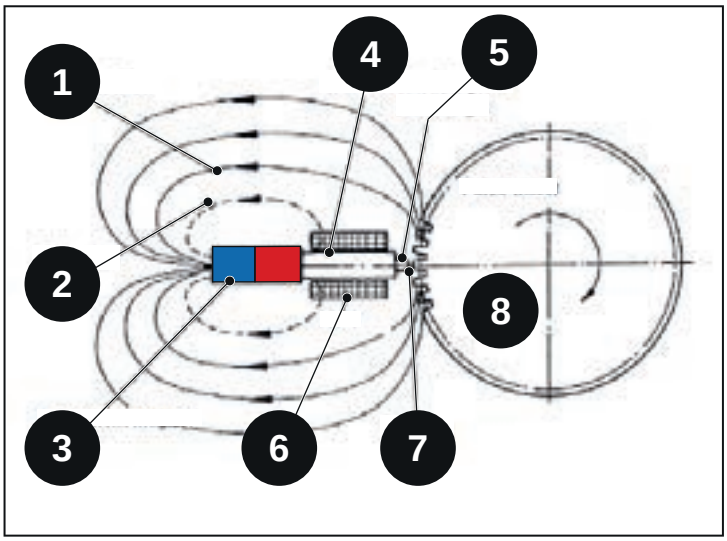

Fig. 2.292

The number of teeth of the tone wheel depends on the engine application. For engines with solenoid valve management, a 60 tooth tone wheel with a gap formed by two missing teeth is used.

This means that the tone wheel has 60 - 2 = 58 teeth in all. The gap is used a reference point assigned to a specific crankshaft position. The sensor is used for synchronisation by the engine control unit.

Engine speed sensor signal acquisition

1 - Damage
2 - gap between teeth

- tone wheel with 60 – 2 teeth
- amplitude error due to damaged tooth
- signal from section with damaged teeth similar to missing tooth signal

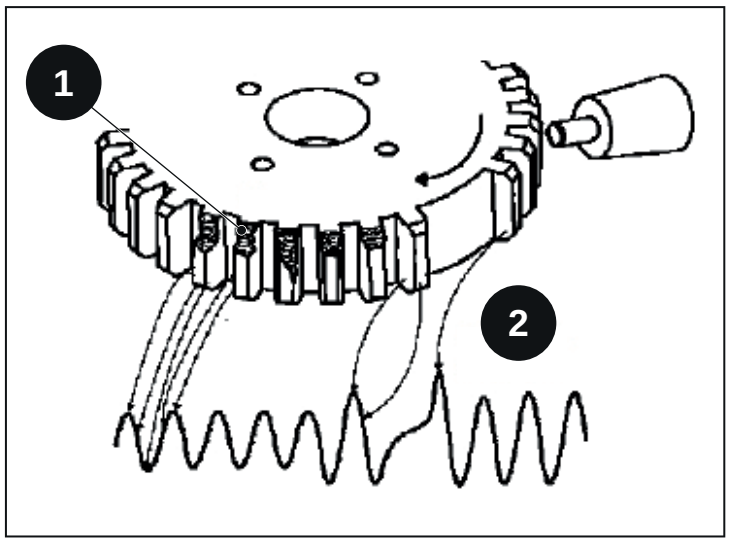

Fig. 2.293

Typical waveform of the engine speed sensor

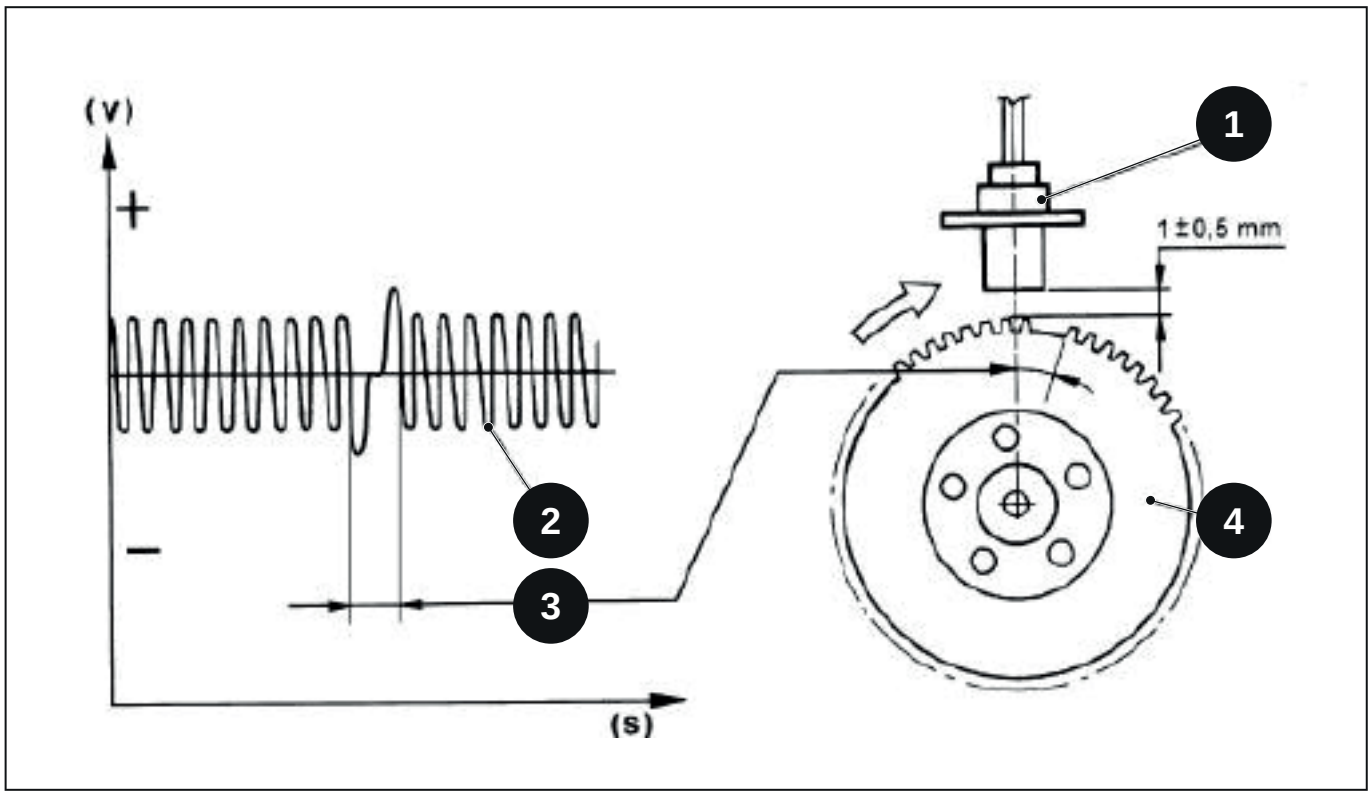

Fig. 2.294

1 - speed sensor
2 - waveform
3 - signal corresponding to zone with two missing teeth
4 - tone wheel

Incorrect speed sensor waveform

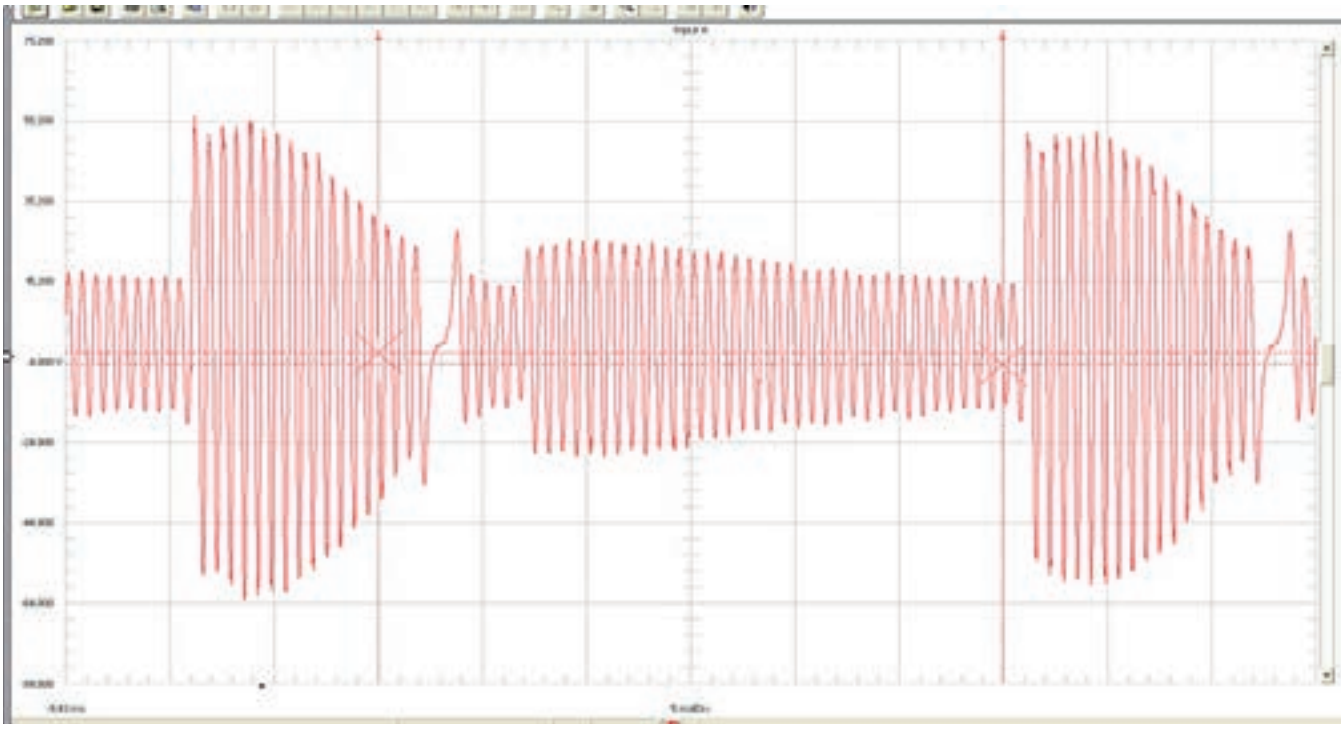

Fig. 2.295

2.81.3 Camshaft timing sensor

The rotational speed ratio between the crankshaft and the camshaft is 1:2. The function of this sensor is to identify whether a piston moving towards TDC is on the compression stroke or the exhaust stroke. The sensor acquires this information from the camshaft and provides it to the ECU.

This is a Hall effect sensor (see the figure Hall effect principle).

When a semiconductor layer carrying a current is traversed by a magnetic field with force lines perpendicular to the direction of the current, this produces a difference in voltage (known as the "Hall" voltage) across the semiconductor layer itself T.

If the current remains constant, the voltage generated depends solely on the intensity of the magnetic field; periodical variations in the intensity of the magnetic field alone are therefore sufficient to produce a modulated electrical signal, the frequency of which is proportional to the rate at which the magnetic field changes.

This variation in magnetic field is achieved by varying the distance between the sensor and a tooth on the camshaft. This distance varies as the tooth rotates, generating a high voltage signal at the position corresponding to the reference notch.

A tooth on the camshaft rotates together with the camshaft itself.

The sensor is situated between the tooth on the camshaft and a permanent magnet contained within the housing of the sensor itself. The permanent magnet produces a magnetic field perpendicular to the Hall element.

When the tooth passes in front of the semiconductor element of the sensor, this alters the intensity of the magnetic field perpendicular to the Hall element. This produces a greater deviation, at right angles to the direction of the current, of the electrons guided by the longitudinal stress applied to the element.

This generates a voltage signal (Hall voltage), measurable in millivolts and independent of relative speed between the sensor and the tooth. The electronic circuit integrated in the Hall element of the sensor processes this voltage to produce a square wave signal.

Uh - Hall voltage
Is - feed current
B - magnetic field
t - Hall element thickness
Rh - Hall constant

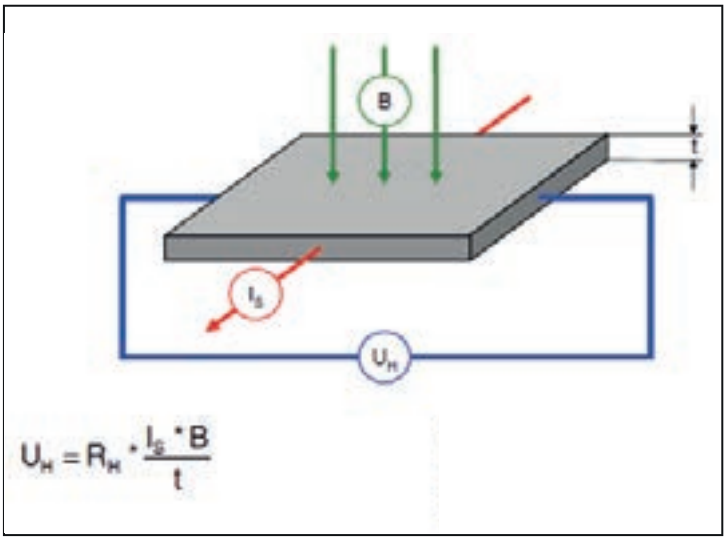

Fig. 2.296

Typical waveform of the timing sensor

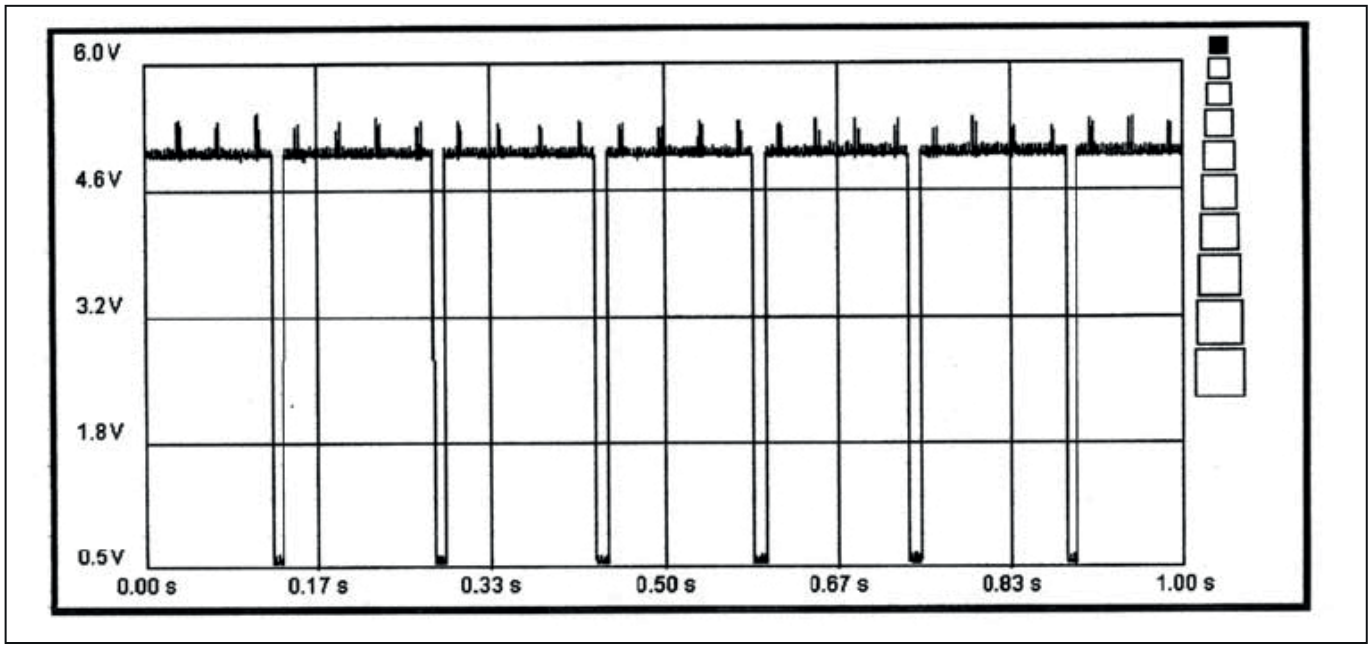

Fig. 2.297

Engine speed sensor error, engine will not start

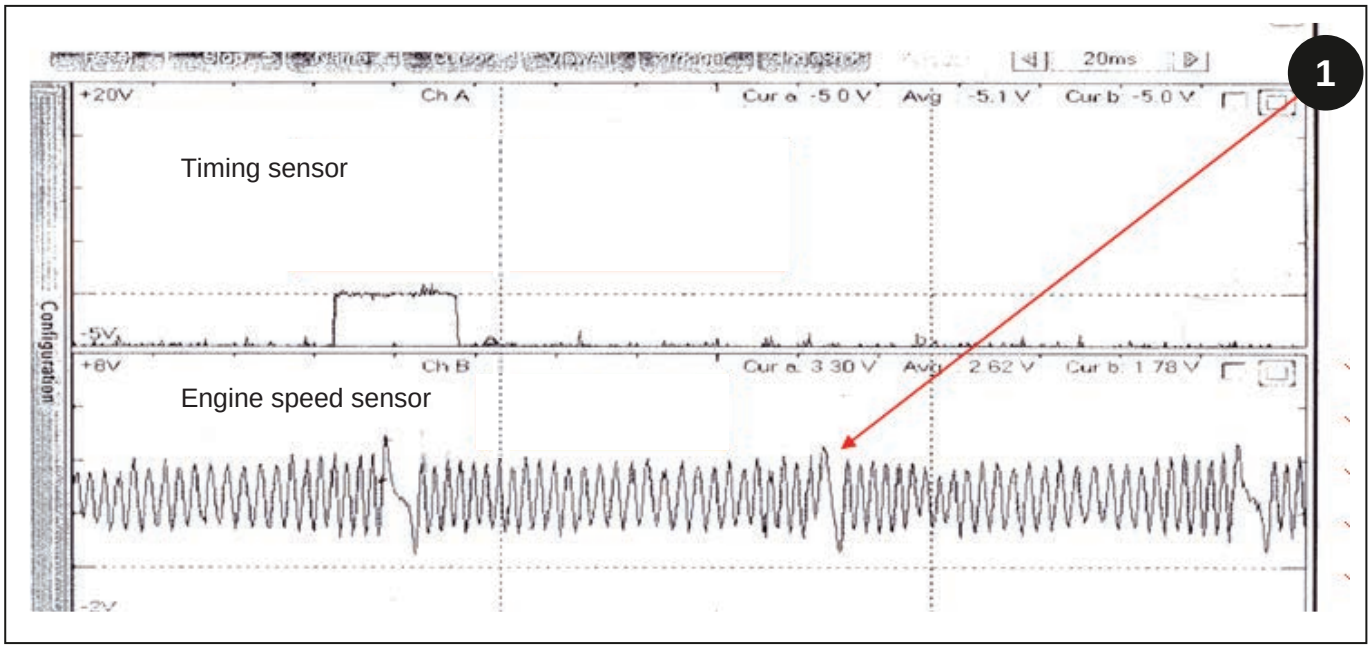

Fig. 2.298

1 - damaged tooth

2.82 Special tools

2.82.1 Special tools

code	Description	Quantity
07008422	Cylinder sleeve puller tool	1
07008423	Tool for installing/removing camshaft and crankshaft bushes	1
07008424	Crankshaft installation tool	1
07008425	Tool for removing/installing hydraulic tappets	1
07008426	XZN wrench for lateral head screws (12 mm)	1
07008427	XZN wrench for centre head screws (14 mm)	
07008428	Tool for angular wrench	1
07008429	Head aligN·ment pins	1
07008430	Crankshaft immobiliser tool (installed in place of starter motor)	1
07008431	Cylinder sleeve height measurement tool	1
07008432	Flywheel aligN·ment pins	1
07008433	Crankshaft gear extractor tool (for crankshafts with conical front shank)	1
07008434	Tool for installing front crankshaft oil seal	1
07008435	Injector puller tool (complete)	1
07008436	Housing	
07008437	Pin	
07008438	Fork R750 EURO 4 / IE3	
07008439	Fork R750 EURO 5	
07008440	Tool for installing rear crankshaft oil seal	1
07008441	Tool for synchronising counter-rotating counterweights (only for engine versions with counter-rotating counterweights)	1
07008442	Plate for testing hydraulic seal tightness of heads	1
07008443	Plate for testing hydraulic seal tightness of heads complete with O-rings	
07008444	Tool for removing alternator idler pulley	1
07008445	**FOR EURO 4 ENGINES ONLY**	1
	Furnace for cleaning diesel particulate filter	
	3kW - 220V	
07008446	Engine test wiring harness R750EU4-EU5 / TE3 / IE3 / TE4/ ISE4/IE4	1
07008447	(without throttle potentiometer and engine control unit)	
07008448	(with throttle potentiometer and without engine control unit)	
07008449	(with throttle potentiometer and with engine control unit)	
	Engine test wiring harness R750EU6	
07008450	Adapter for engine compression testing	1
	Break out box	1
07008451	(without jumpers)	
07008452	(complete with jumpers)	

	Oscilloscope (recommended type “PicoScope”) Tool usable for viewing waveform of timing and crankshaft position sensor signals	1
07008453	Belt installation tool (to be applied onto belt) (R750IE4-TE4-ISE4- R754EU6) A: setting belt tension B: restraining tensioner spring	1
07008454	Belt installation tool (to be applied onto tensioner) (R750IE4-TE4-ISE4- R754EU6)	1

3 : Clutch housing

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3.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

3.2 General introduction

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3.2.1 Assembly drawing

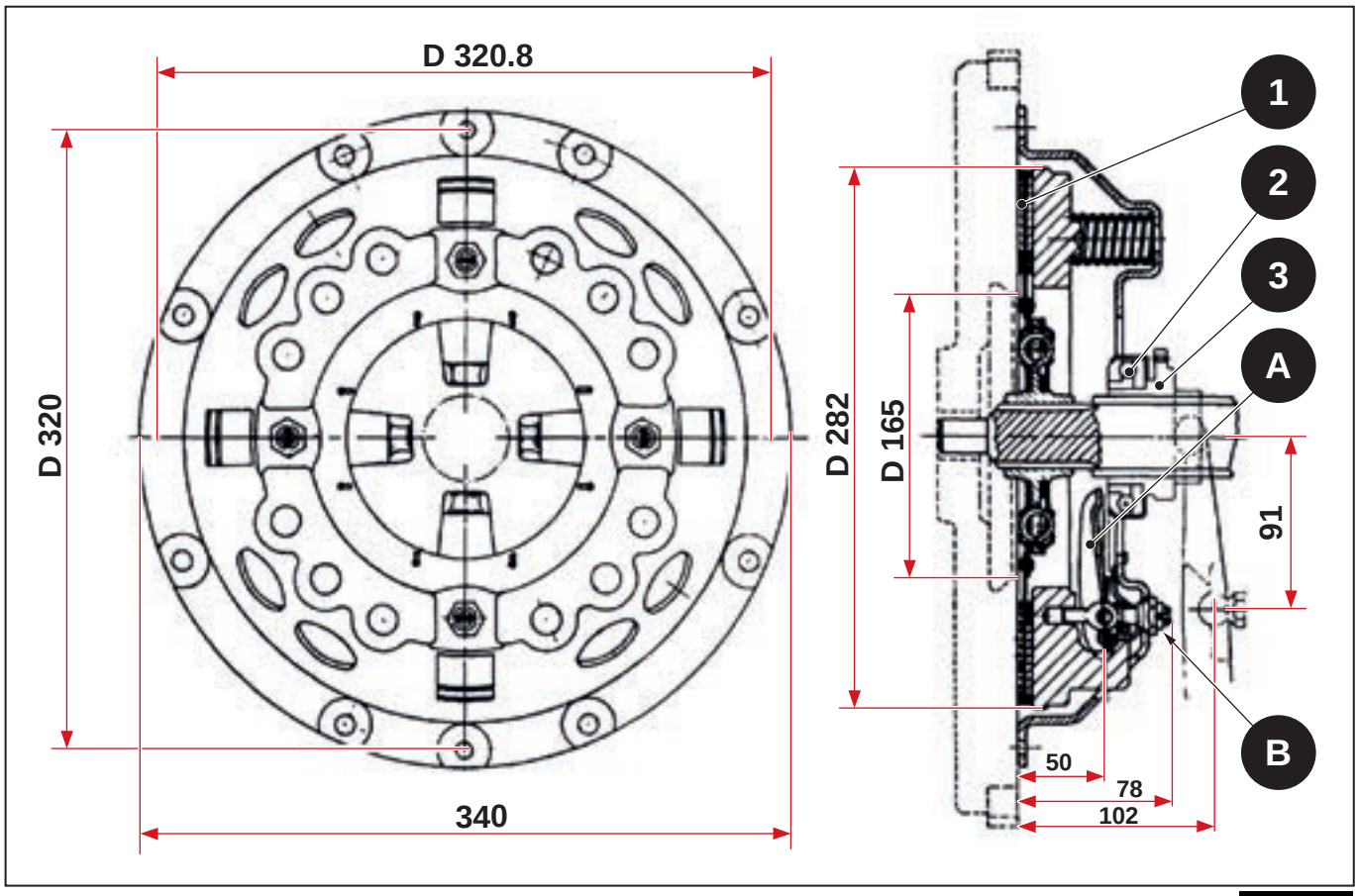

Fig. 3.1

1 - Transmission clutch plate
2 - Thrust bearing
3 - Thrust plate support
A - Transmission clutch lever
B - Lever adjuster screw

3.3 Technical characteristics

Indice

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3.3.1 Technical characteristics

Type	Single plate dry clutch, 11" (280 mm) diametre
Operation	Hydraulic

3.4 Disassembly

Indice

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3.4.1 Preliminary operations

The main operations necessary to access the assembly are indicated as follows.

Attention
Always make sure that the assemblies are completely disconnected before separation to prevent damage to components.

- Removing the platform (see chapter "13-Platform")
- Draining the transmission oil
- Removing the battery (see chapter "17 - Electrical system")
- Removing the air filter (see chapter "13 - Platform")

Disconnect the connectors of the hydraulic pipes shown in the figure and the relative spring.

Undo the fastener screws (1) of the oil radiator mount.

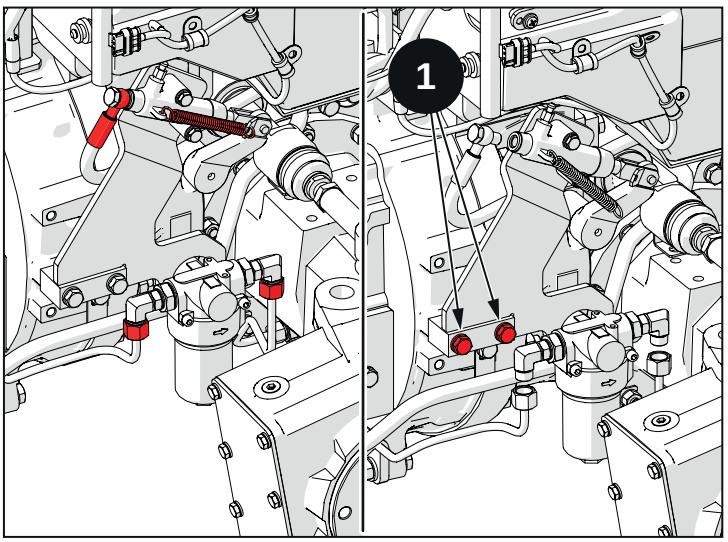

Fig. 3.2

Remove the oil filter mount complete with transmission clutch actuator.

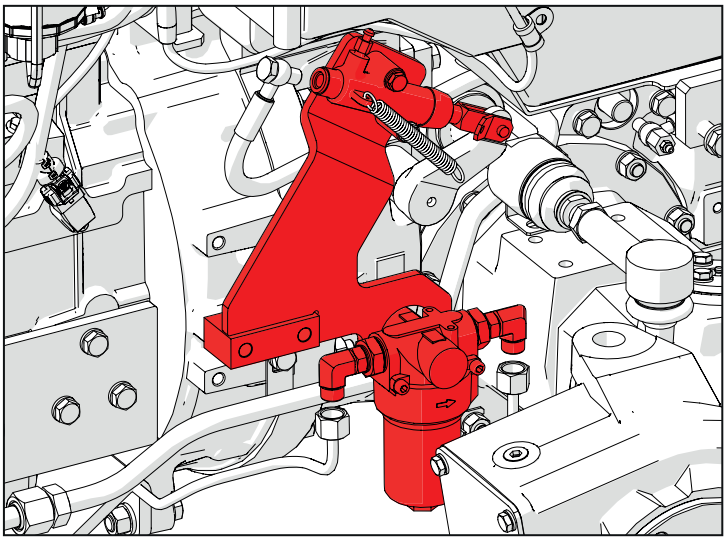

Fig. 3.3

Remove the nuts and screws fastening the clutch housing to the engine.

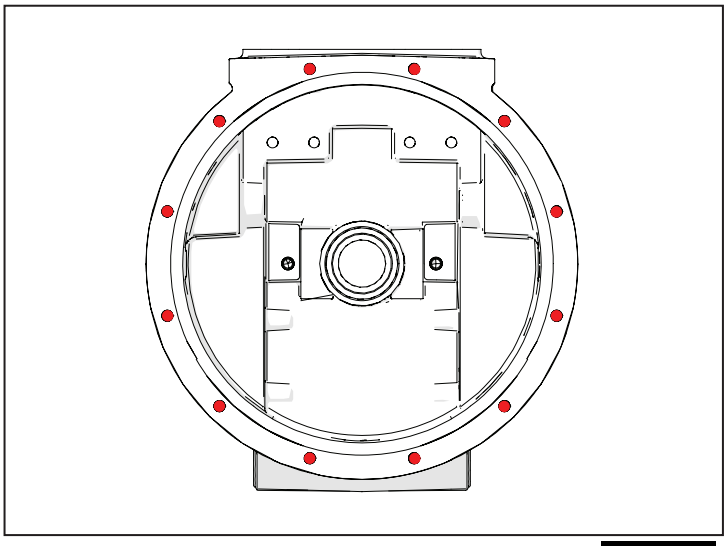

Fig. 3.4

Remove the engine from the clutch housing.

Danger

Secure the engine safely with a hoist of adequate lifting capacity.

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

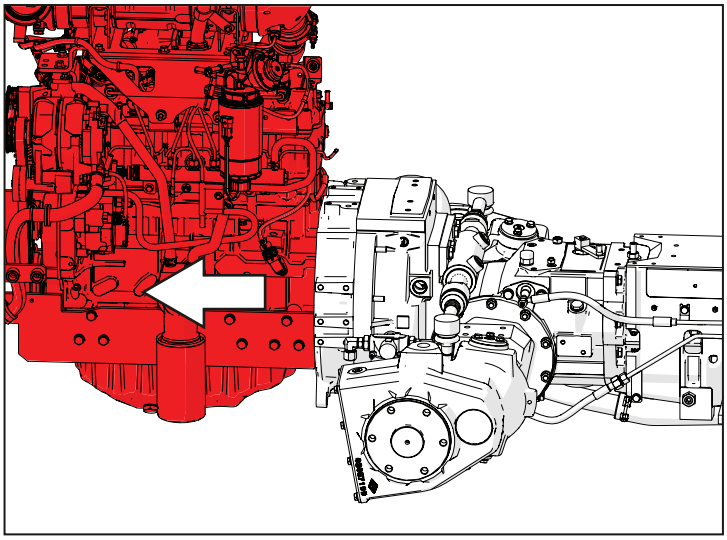

Fig. 3.5

3.4.2 Removing the Clutch

Fit the tool (07007171) and secure the clutch assembly safely with a hoist.

Undo the screws fastening the clutch.

Remove the complete clutch assembly.

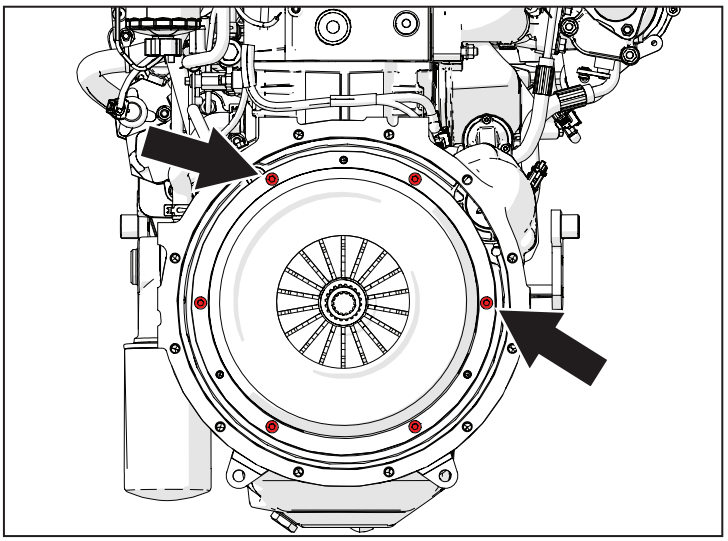

Fig. 3.6

Use the pin punch to drive out the smaller pins (19) first and then the larger pins (7), and then detach the lever (6) from the fork (5).

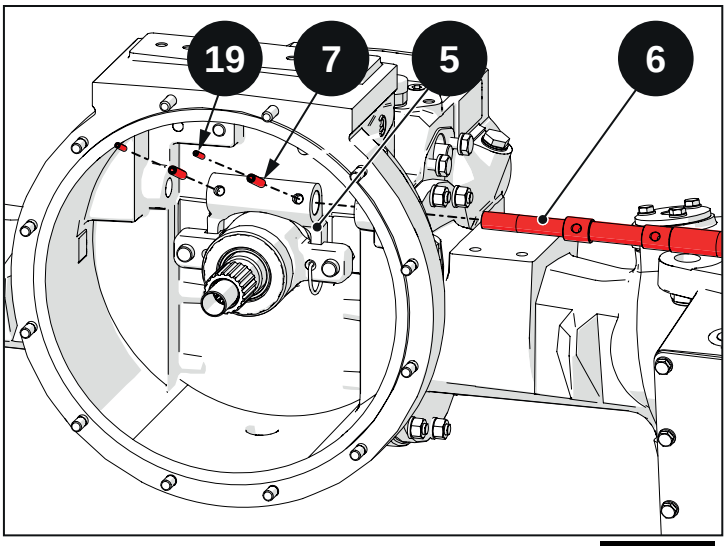

Fig. 3.7

Release the thrust plate support (3) from the fork (5).

Remove the thrust bearing (2), the thrust plate carrier (3) and the fork (5).

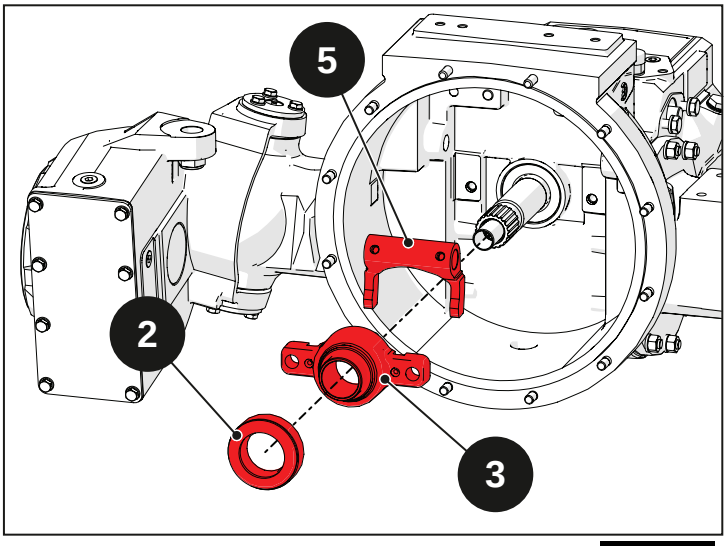

Fig. 3.8

Remove oil seal (8).

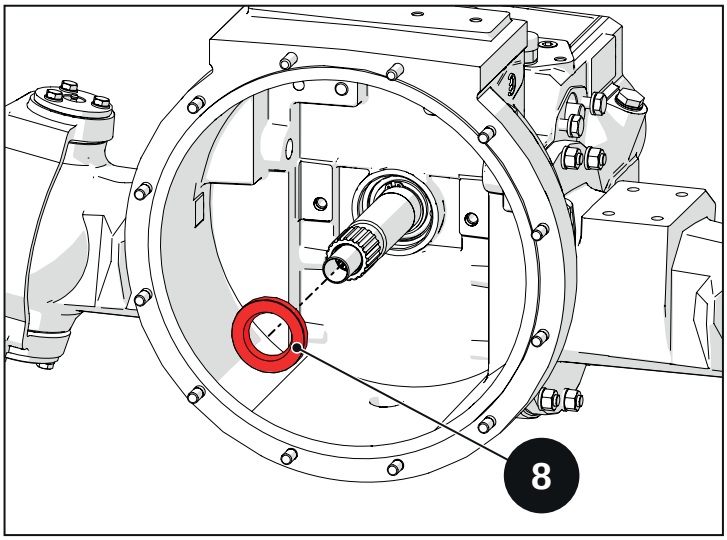

Fig. 3.9

3.5 Main inspection, reassembly and adjustment procedures

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3.5.1 Inspection

3.5.1.1 Inspecting and checking clutch components

The thrust plate rings must be in good condition for the clutch to work correctly. Check that the rings show no signs of scoring or overheating. If any scoring or signs of overheating are found, the thrust surfaces of the rings must be reground.

Grind 0.5 mm of material from the thrust surfaces of the rings.

If it is necessary to grind more material, remove the same amount from the clutch mating surface on the flywheel.

Warning

Do not remove more than 1 mm in total. If more material must be removed to rectify wear, replace the assembly.

Warning

Mark the components before removing to make sure that they are reassembled in their original positions.

The wear thickness of the disc (see figure 3.10) is:

X = 10.3 to 6.3 mm.

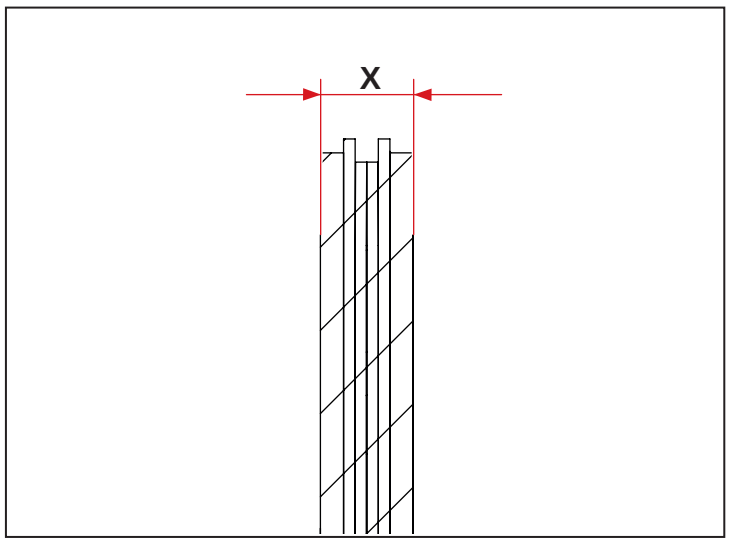

Fig. 3.10

Check the height the springs at rest. There are two types of spring to achieve the required load:

- 8 springs, height 68 ± 1.5 mm
- 4 springs, height 61.5 ± 1 mm

If not, the springs must be replaced as they will not exert the correct thrust against the clutch plate.

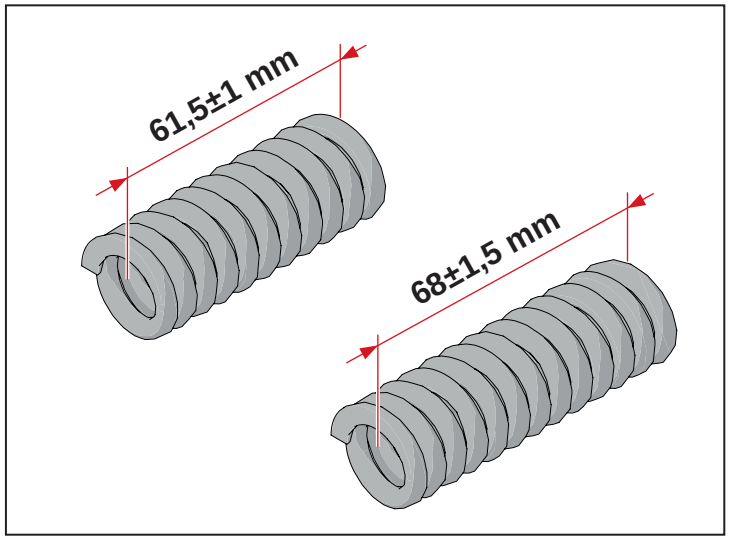

Fig. 3.11

3.5.1.2 Adjusting the clutch levers

To set the transmission clutch correctly, adjust the levers (A) to obtain a measurement X of 28.5 mm.

Loosen the check nuts and tighten or loosen the nuts (B) as necessary to obtain a measurement X of 28.5 mm.

Tighten the check nuts after adjusting.

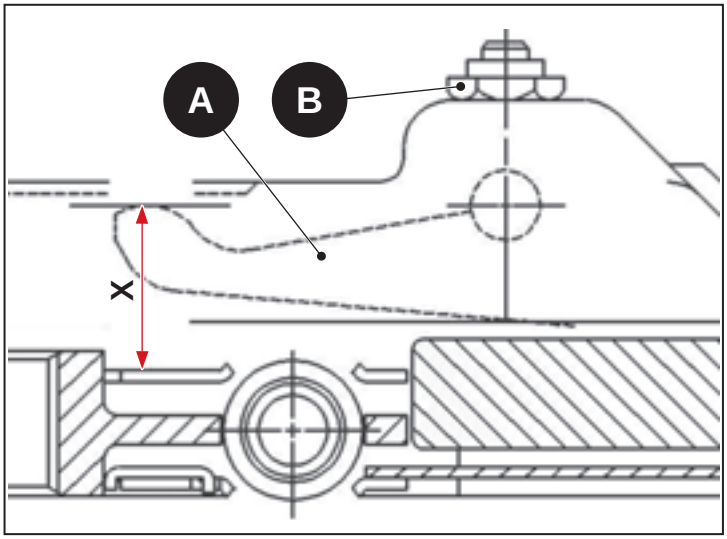

Fig. 3.12

3.5.2 Reassembly and adjustment

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

3.5.2.1 Refitting the clutch

Use a press and a guide tool to install the oil seal (8).

Warning
Lubricate the oil seal (8) before fitting it.

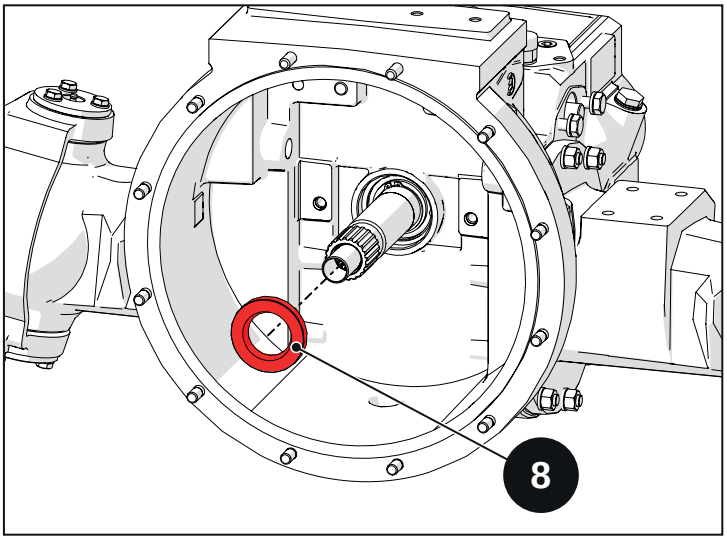

Fig. 3.13

Drive the bearing with a bearing punch tool of suitable diameter.

Warning
Fit the bearing (2) with the protected part facing the opposite side of the thrust plate support (3).

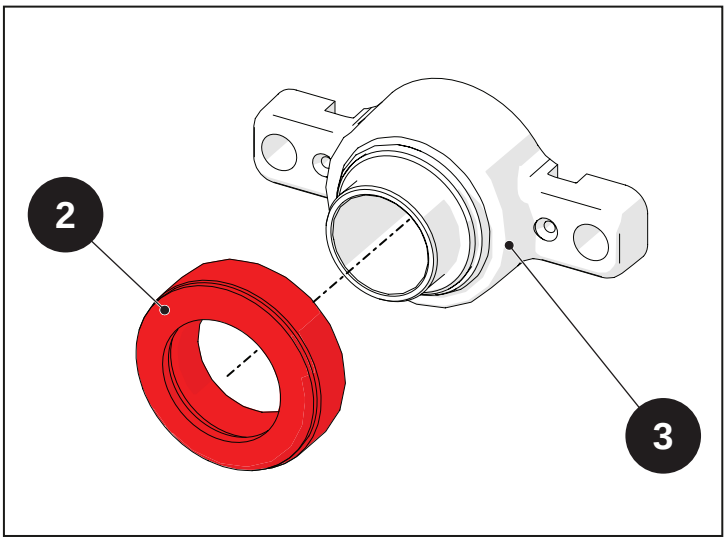

Fig. 3.14

Attach one end of each of the return springs (4) to the thrust plate carrier (3), and then attach the other end of each spring to one of the holes in the clutch fork (5).

Turn the clutch fork (5) in the indicated direction to fasten the return springs (4) completely.

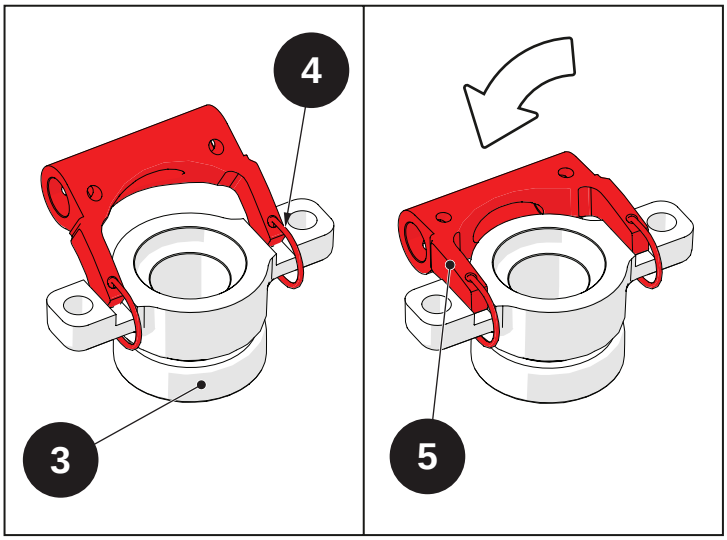

Fig. 3.15

Fit the complete thrust plate assembly (3) on the shaft and pins with the clutch fork (5) facing up.

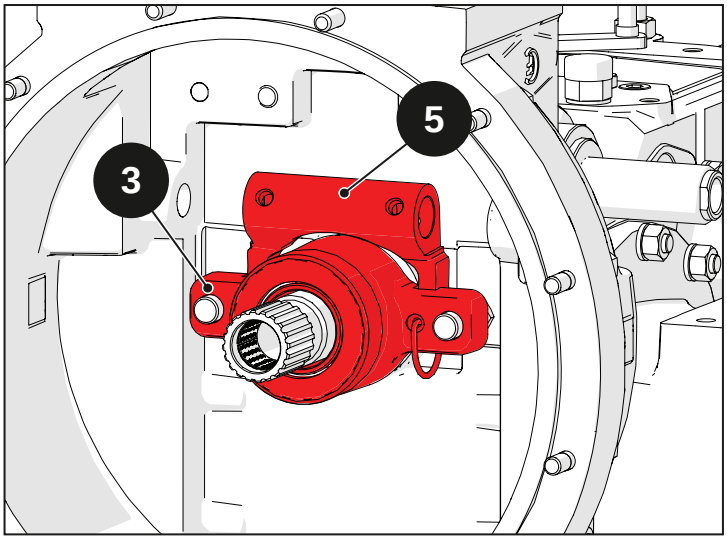

Fig. 3.16

Fit the clutch control lever (6), fitting onto the clutch fork (5).

Align the holes on the control lever (6) with the holes on the fork (5), and then fit the larger pins first (7) followed by the smaller pins (19) to secure the components.

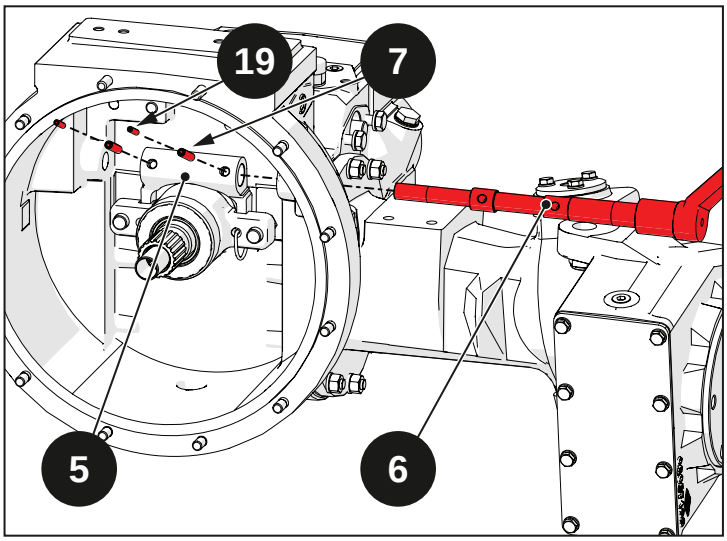

Fig. 3.17

Fit the tool (07007171) and lift the clutch assembly with a hoist.

Fasten the clutch assembly to the engine, tightening the screws to a torque of 60 Nm (6 kgm).

Warning
Use new M8 screws at each reassembly.

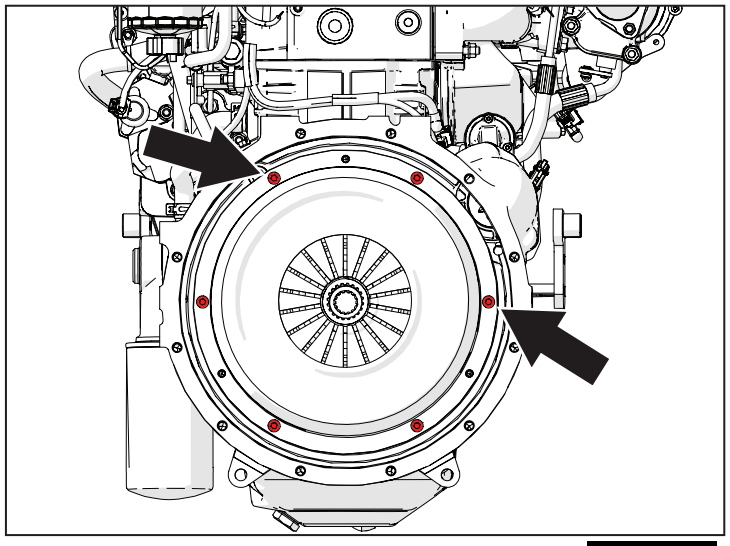

Fig. 3.18

Mate the engine assembly with the clutch housing.

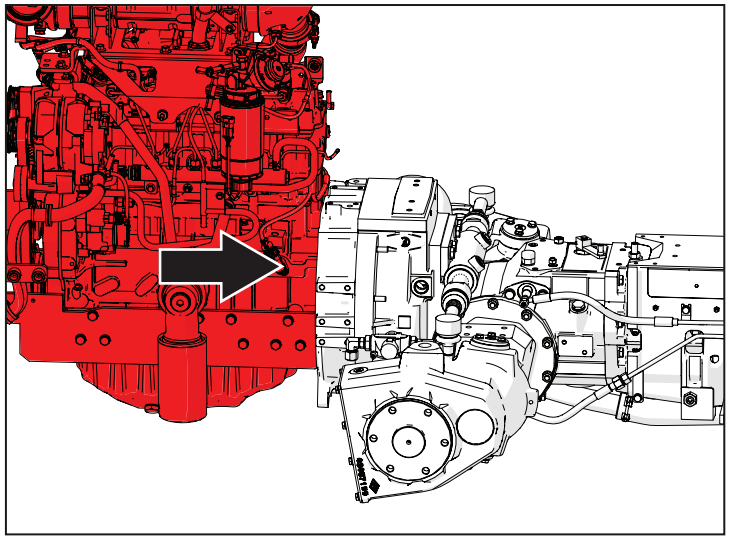

Fig. 3.19

Tighten the nuts and screws fastening the engine to the clutch housing to a torque of 82 Nm (8.2 kgm).

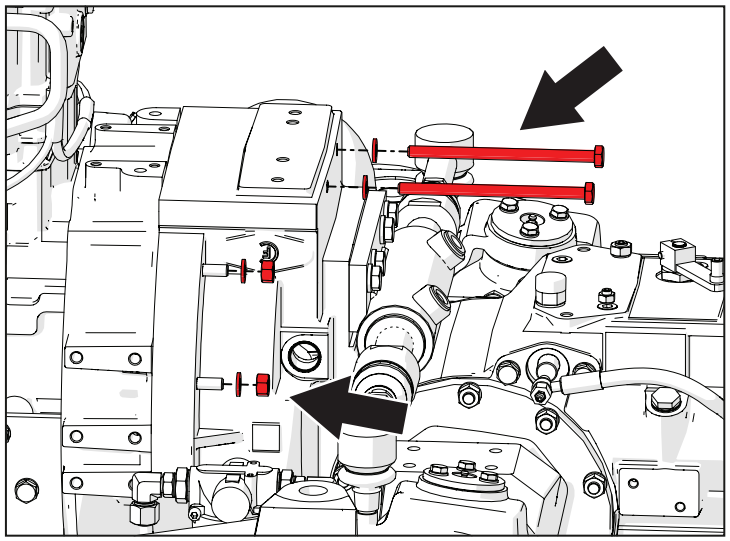

Fig. 3.20

Fit the oil filter mount complete with transmission clutch actuator.

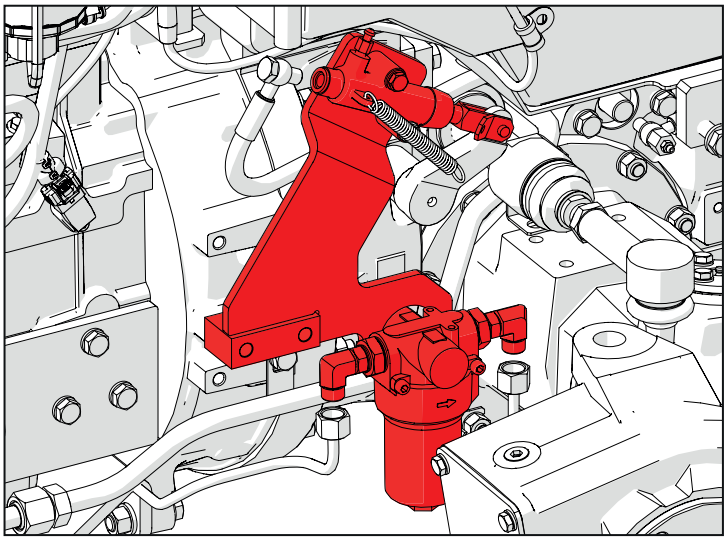

Fig. 3.21

Tighten the fastener screws (1) of the oil radiator mount.

Connect the connectors of the hydraulic pipes shown in the figure and the relative spring.

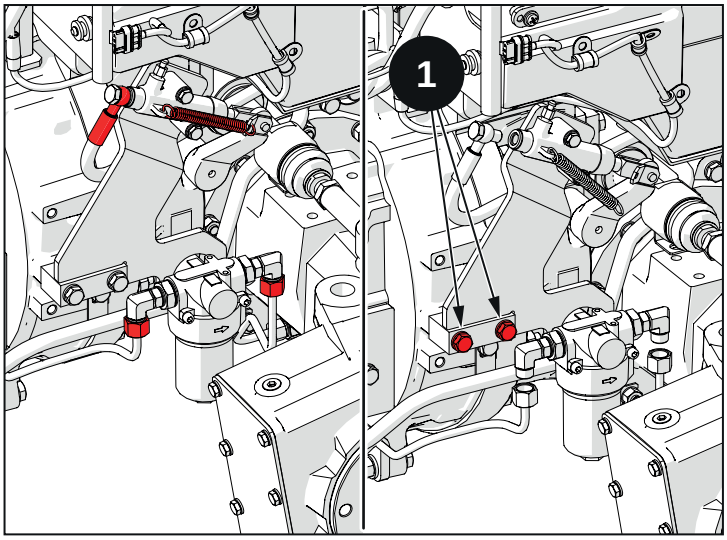

Fig. 3.22

Continue reassembly, following the preliminary operations in reverse order.

3.5.2.2 Checking oil level

Periodically check the oil level in the expansion tank.

Remove the fastener screws from the front part of the dashboard and then remove the front part of the dashboard.

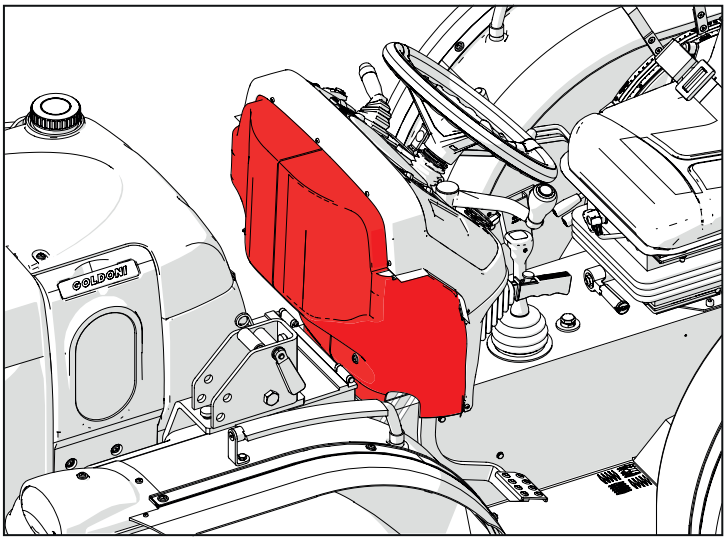

Fig. 3.23

Check the oil level in the expansion tank.

Note

The dedicated hydraulic circuit for operating and adjusting the clutch is filled with approximately 400 grammes of mineral oil.

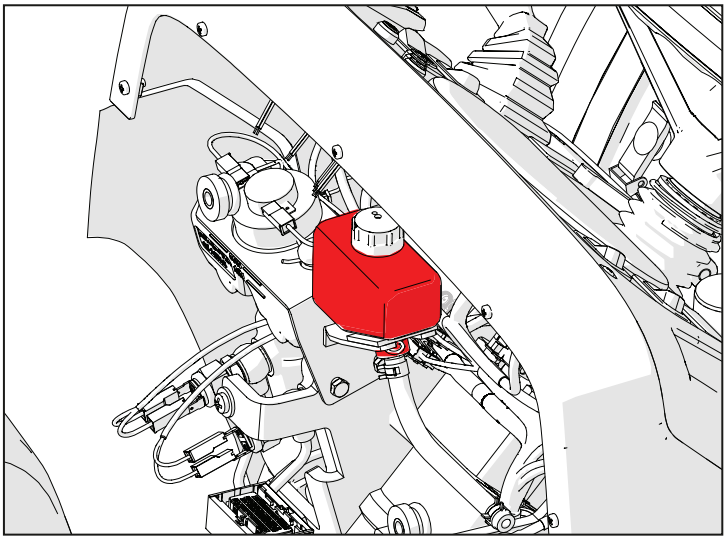

Fig. 3.24

3.5.2.3 Clutch pedal adjustment

The clutch pedal travel must be set correctly for the transmission clutch to engage and disengage correctly.

The pump (9) actuated by the clutch pedal is equipped with the supply tank (10) through which the circuit is filled .

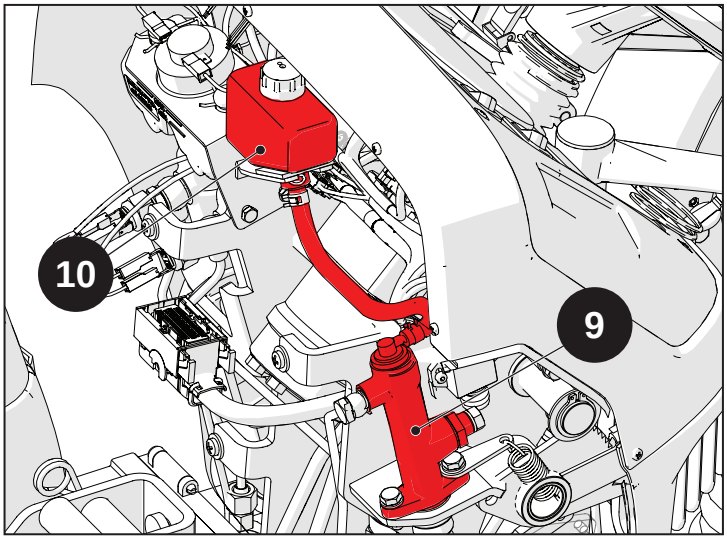

Fig. 3.25

A bleed screw (12) is situated on the actuator cylinder (11) for bleeding air from the system.

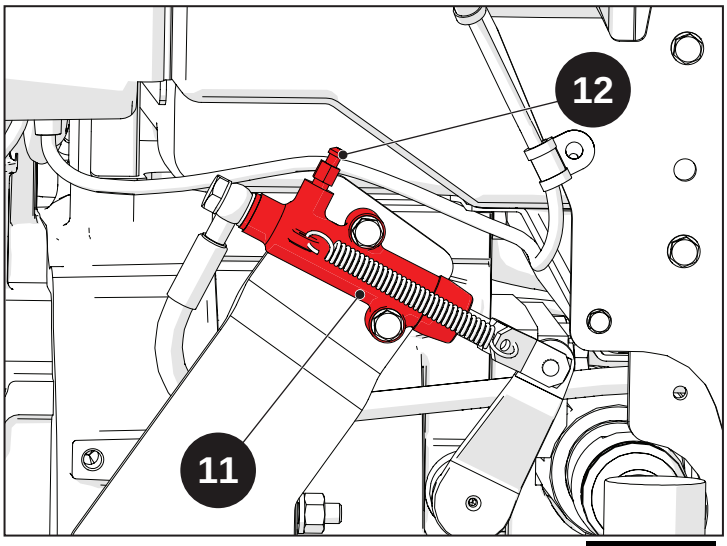

Fig. 3.26

Screw the pin (15) in or out to leave minimal free play (approx. 1-1.5 mm) on the clutch pedal so that the clutch pump (9) does not remain packed.

Screw in the check nut (16) once the adjustment is completed.

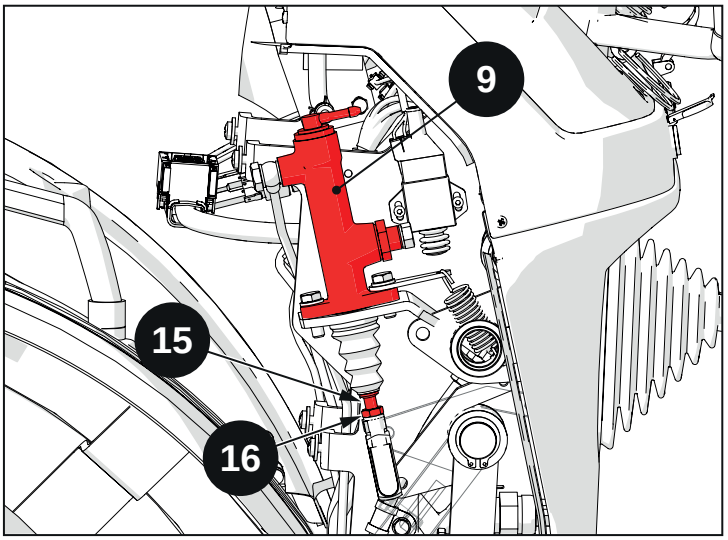

Fig. 3.27

Once the clutch unit is adjusted, the travel of the clutch pedal, starting from the predetermined uppermost position, is as shown in the figure.

Pedal in rest position (A)	182 mm
Kiss point (B)	235 mm
End of travel (C)	325 mm

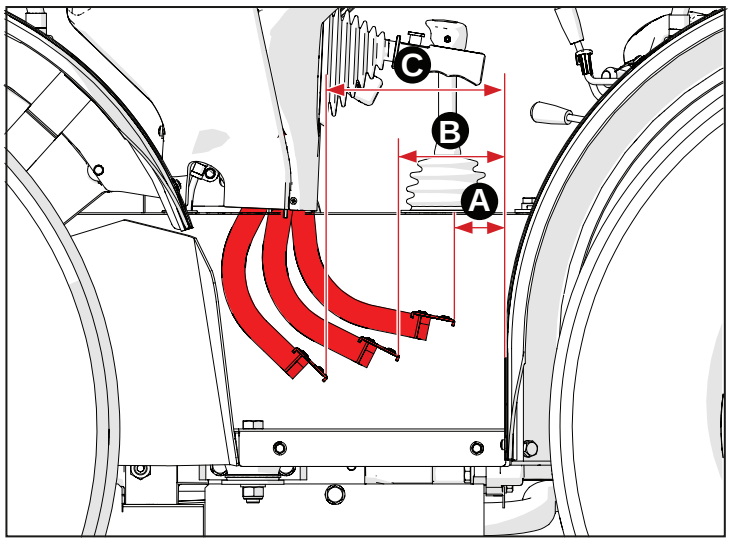

Fig. 3.28

3.6 Tightening torques

Indice

3.6.1 Tightening torques 3-24

3.6.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Clutch assembly - engine flywheel fastener screw	60	6
Engine - clutch housing fastener screw	82	8.2
Cored screw 1/4" clutch hydraulic pump	20	2
Clutch hydraulic pump fastener screw	50	5

3.7 Tools necessary

Indice

3.7.1 Tools necessary 3-26

3.7.1 Tools necessary

p/n	Description	Quantity
07000245	Tractor separation support frame	1
07007171	Clutch alignment pin	1
07008478	Bearing punch	1

4 : Front differential

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4.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

4.2 General introduction

Index

4.2.1 Assembly drawing 4-4

4.2.1 Assembly drawing

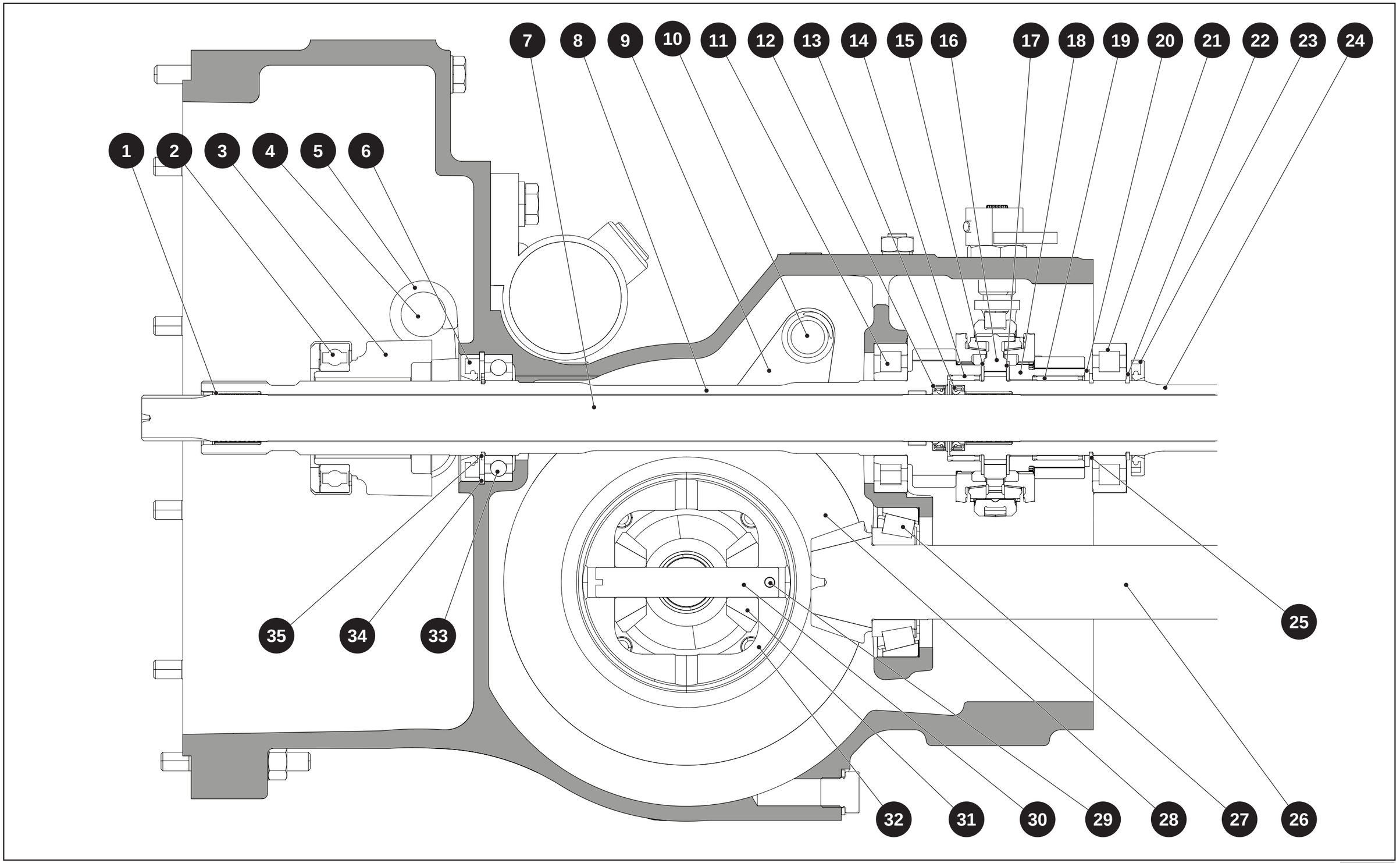

Fig. 4.1

1 - Roller bearing cage
2 - Bearing
3 - Thrust plate support
4 - Clutch control lever
5 - Clutch fork
6 - Oil seal
7 - PTO shaft
8 - Primary shaft
9 - Fork
10 - Control spindle
11 - Bearing
12 - Oil seal
13 - Oil seal
14 - Roller bearing cage
15 - Spacer
16 - Synchroniser
17 - Spacer
18 - Gear
19 - Roller bearing cage
20 - Spacer
21 - Bearing
22 - Circlip
23 - Oil seal
24 - Gearbox primary shaft
25 - Circlip
26 - Pinion
27 - Bearing
28 - Differential crown wheel
29 - Pin
30 - Planet gear spindle
31 - Planet gear
32 - Differential case
33 - Bearing
34 - Circlip
35 - Circlip

4.3 Technical characteristics

Indice

4.3.1 Technical characteristics 4-8

4.3.1 Technical characteristics

Differential lock	Mechanical
Differential lock control	Hydraulic
Reverse shuttle type	Mechanical, synchronised
Reverse shuttle control	Lever
4WD engagement control	-

4.4 Disassembly

Indice

4.4.1 Preliminary operations 4-10
4.4.1.1 Removing the differential case cover 4-10
4.4.1.2 Disassembling/Assembling the differential crown wheel 4-21

4.4.1 Preliminary operations

Carry out the following procedures to access the gearbox assembly:

Danger
Secure the assemblies to lifting equipment of adequate load capacity before disassembly. If suitable lifting equipment is not available, assemblies may be secured with a support stand.

- Removing the platform (see chapter "13-Platform")
- Separating engine/clutch (see chapter "3 - Clutch")
- Separating front differential/centre housing (see chapter "6 - Centre housing")
- Removing front lateral final drive units (see chapter "7 - Front lateral final drive units")

4.4.1.1 Removing the differential case cover

Undo the screw (1) and then remove the washer (2) and plate (3).

Remove the spacer (4) and the O-ring (5) from the reverse shuttle rod (6).

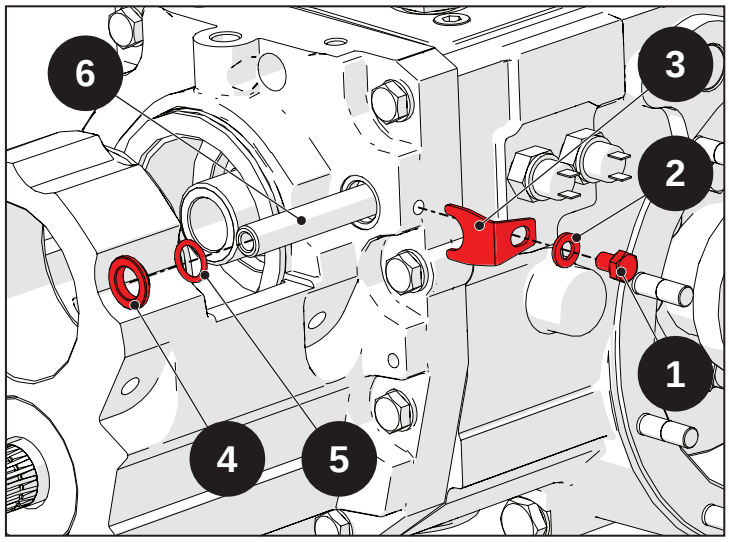

Fig. 4.2

Remove the circlip (7) from the bevel pinion (8).

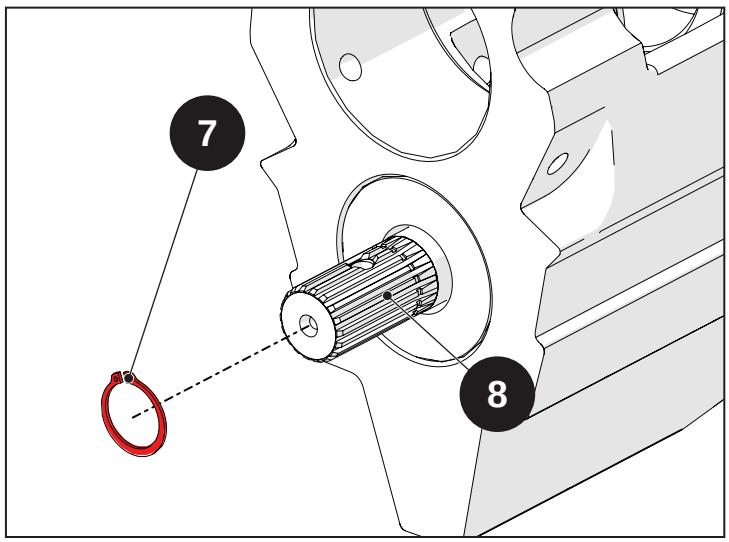

Fig. 4.3

Remove the circlip (9) from the primary shaft (10).

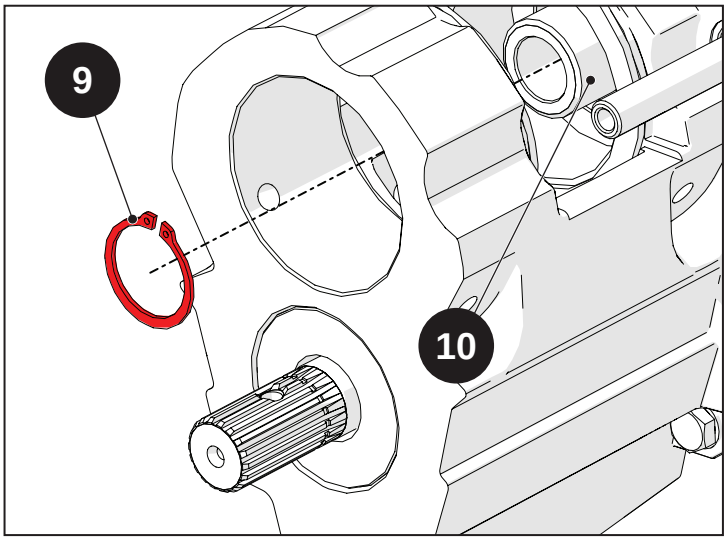

Fig. 4.4

Remove the oil seal (11) and the circlip (12) from the primary shaft (10).

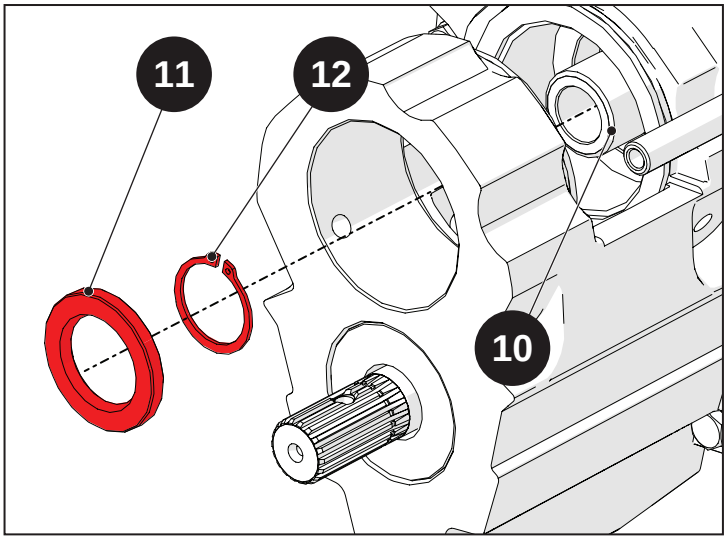

Fig. 4.5

Remove the oil seal (13).

Undo the screw (14) and remove together with the washer (15).

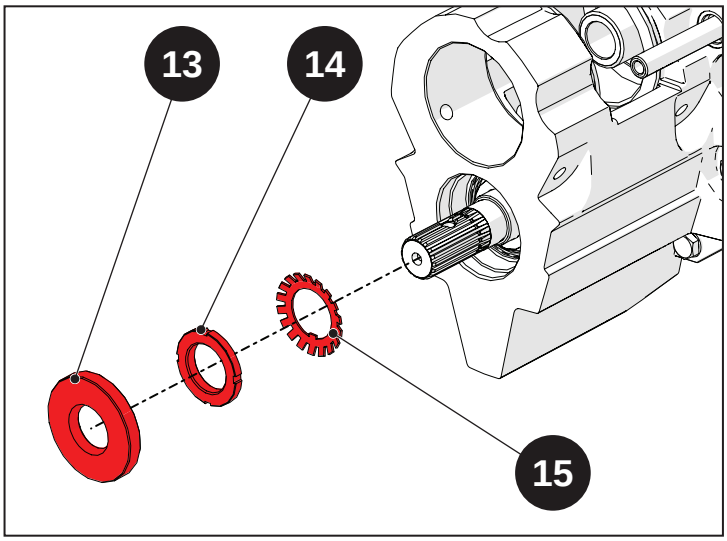

Fig. 4.6

Undo the screws (17) and the screw (16).

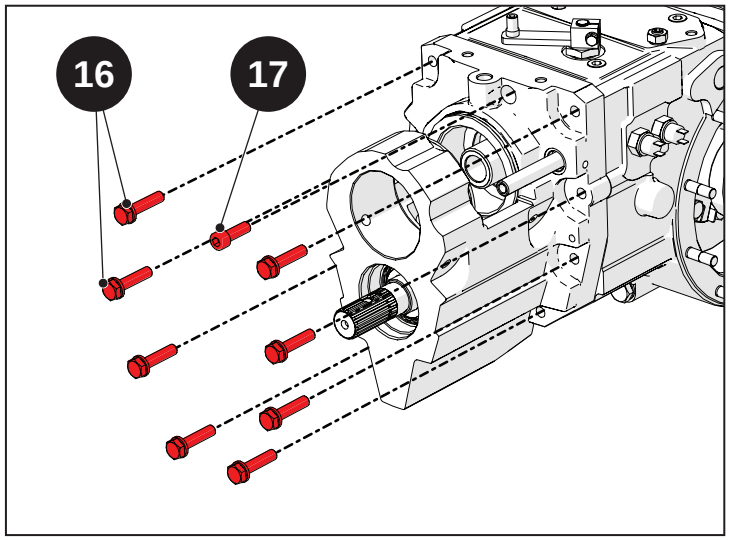

Fig. 4.7

Secure the cover to a hoist using the tool (_____).

Tighten two screws into the extraction holes and remove the cover.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Warning

While separating the components, tap the shaft with a pin to prevent it from detaching together with the cover.

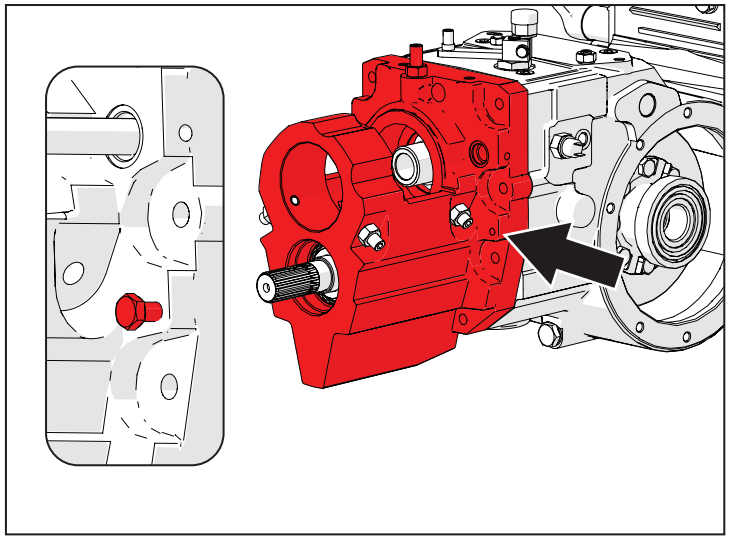

Fig. 4.8

Undo the screws (18) and remove the bracket (19).

Remove the bearings (20) and (21).

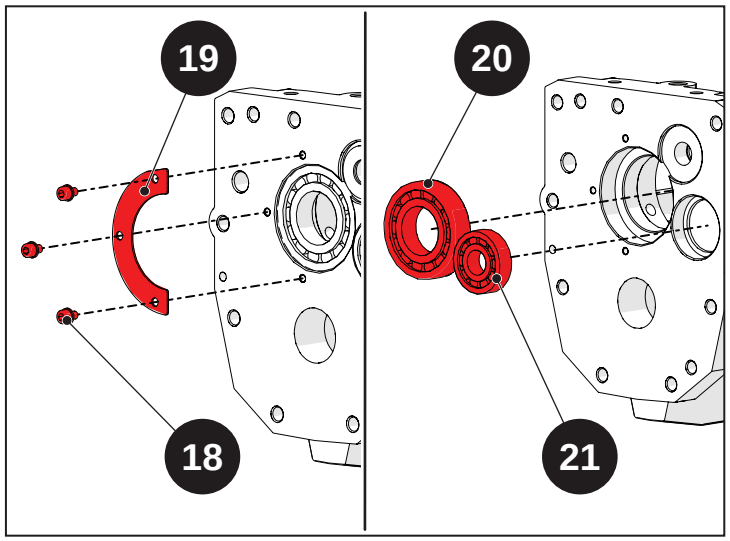

Fig. 4.9

Release the thrust plate carrier (25) from the fork (26).

Remove the pins (22).

Remove the lever (23).

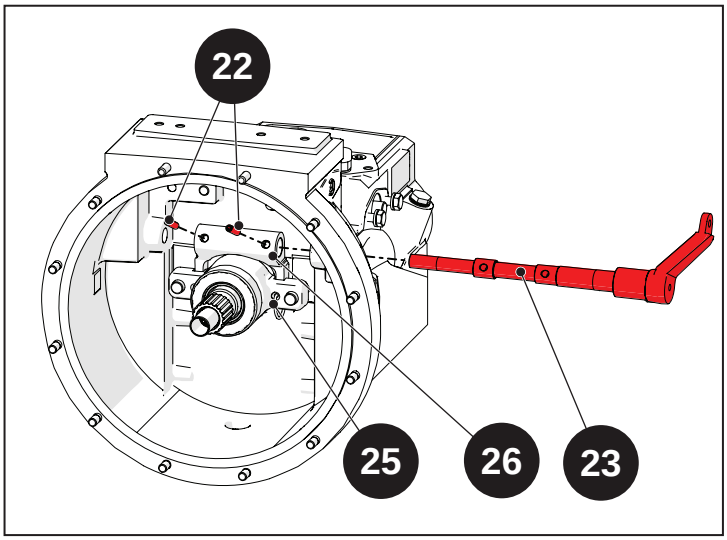

Fig. 4.10

Separate the thrust bearing (24) from the thrust plate carrier (25).

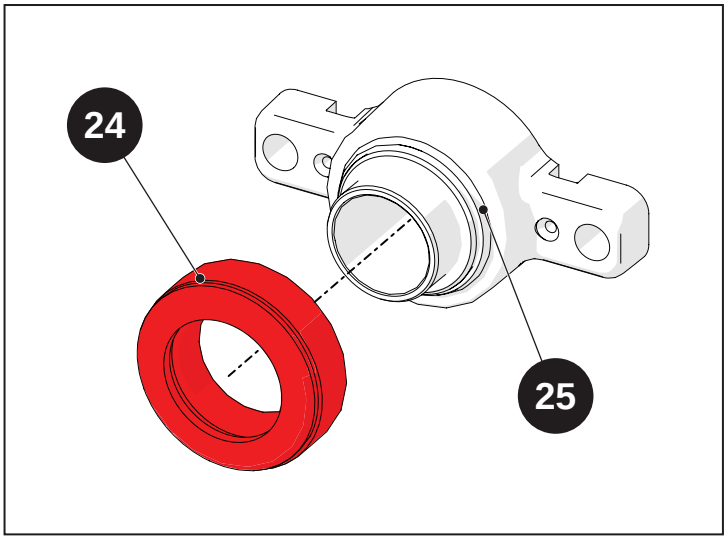

Fig. 4.11

Remove oil seal (26).

Remove the circlip (27).

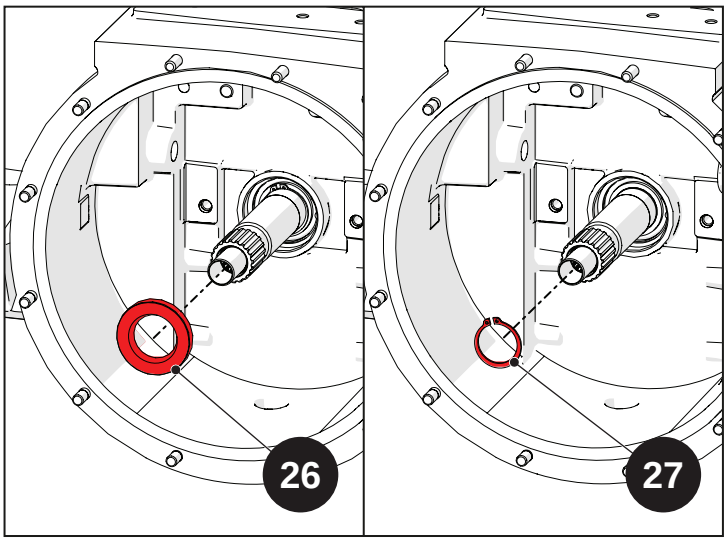

Fig. 4.12

Remove the spacer (28) and the gear (29) from the reverse shuttle pin (30).

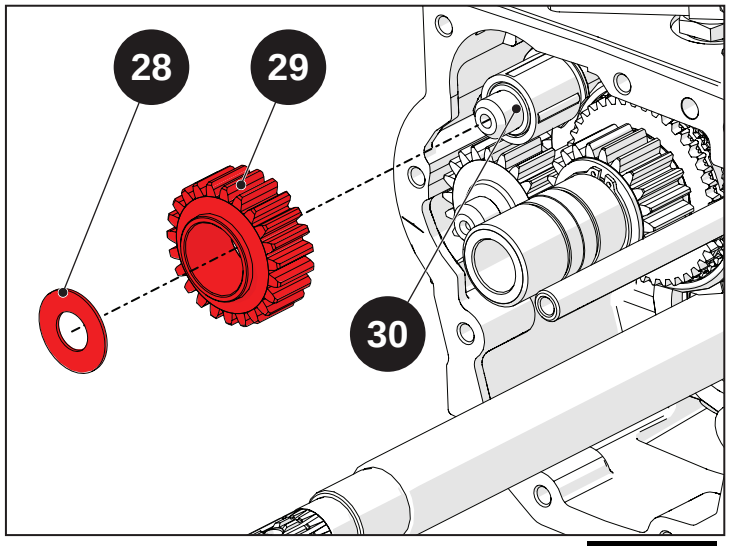

Fig. 4.13

Remove the roller bearing cage (31) from the reverse shuttle pin (30).

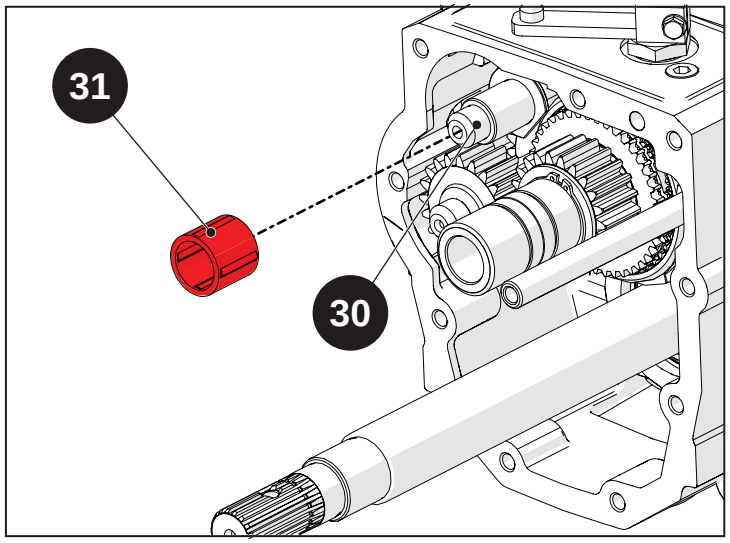

Fig. 4.14

Undo the adjuster nut (32) of the reverse shuttle rod together with the check nut (33), and then remove the washer (72) and retrieve the spring (34) and the ball (35).

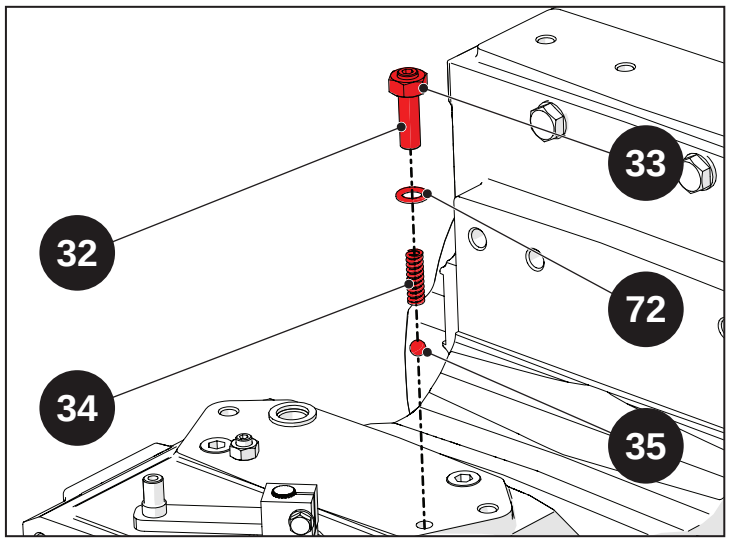

Fig. 4.15

Undo the retainer (36) together with the check nut (37) and remove the reverse shuttle pin (30).

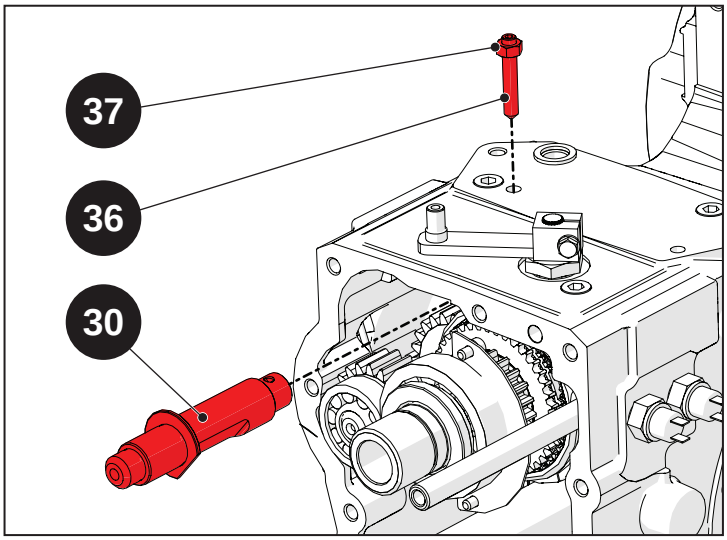

Fig. 4.16

Tap the primary shaft (10) from the front side of the clutch housing casing and then pull it out from the rear together with the reverse shuttle fork (38) and the transfer case gear (39).

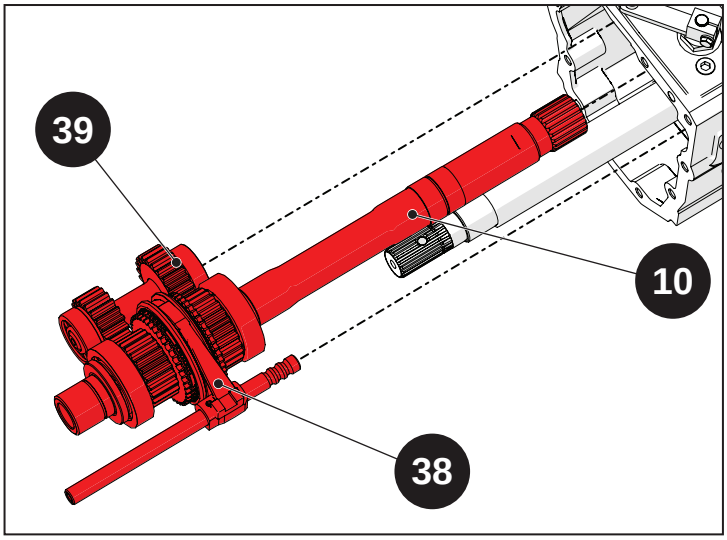

Fig. 4.17

Remove the pin (41) to separate the reverse shuttle fork (38) from the rod (40).

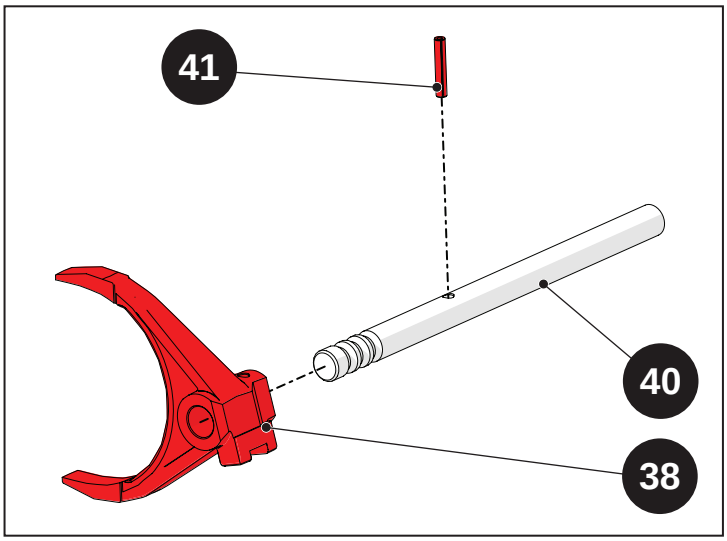

Fig. 4.18

Remove the circlip (42).

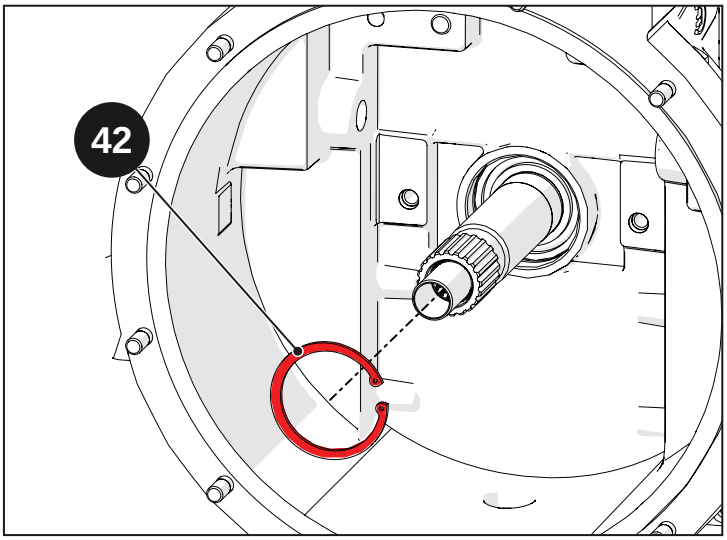

Fig. 4.19

Remove the bevel pinion (8) complete with bearing (43).

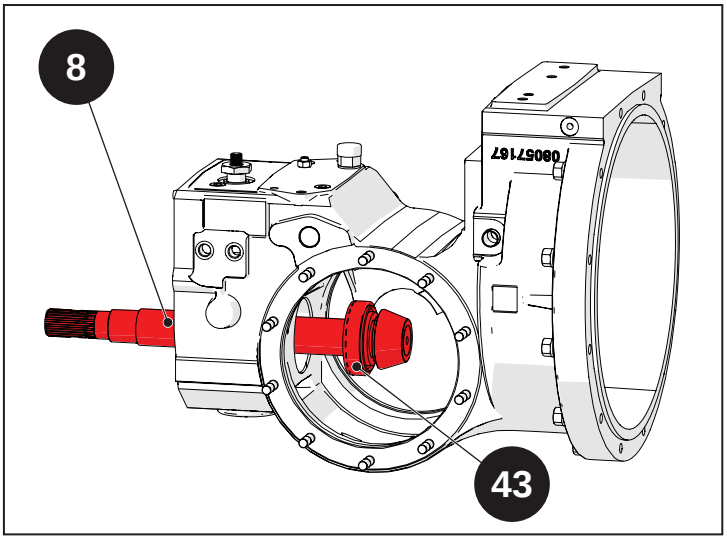

Fig. 4.20

Remove the differential crown wheel assembly.

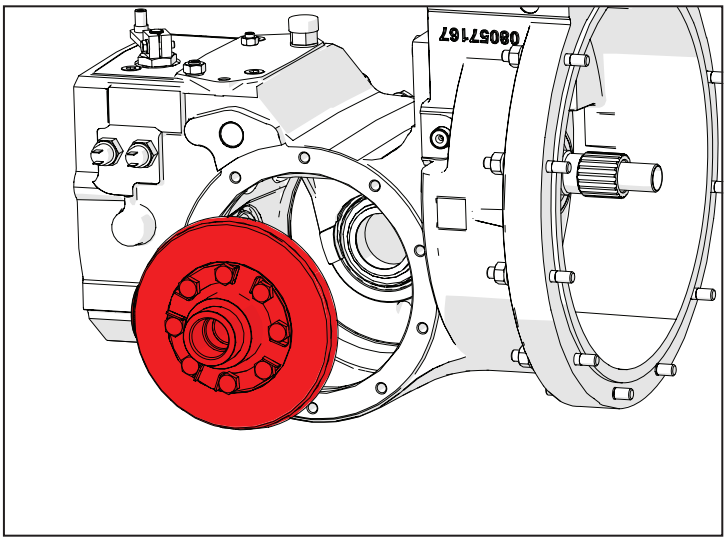

Fig. 4.21

Remove the bearing (43) from the bevel pinion (8).

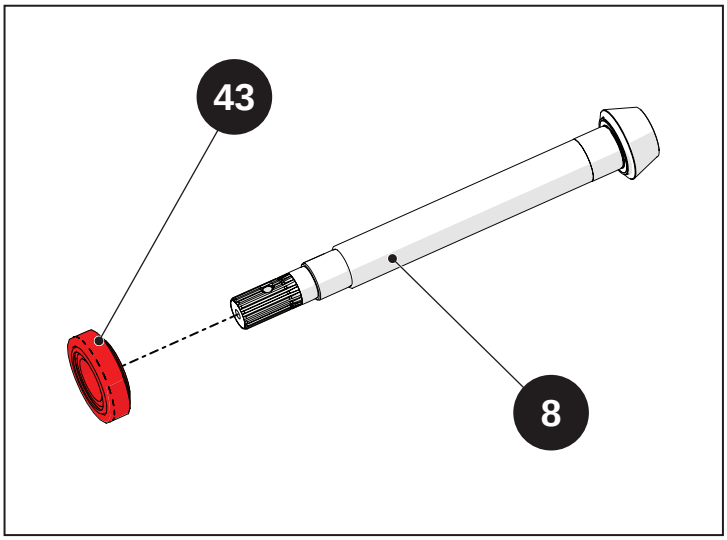

Fig. 4.22

Disassembly of the primary shaft

Pull out the complete spindle (44) from the primary shaft (10).

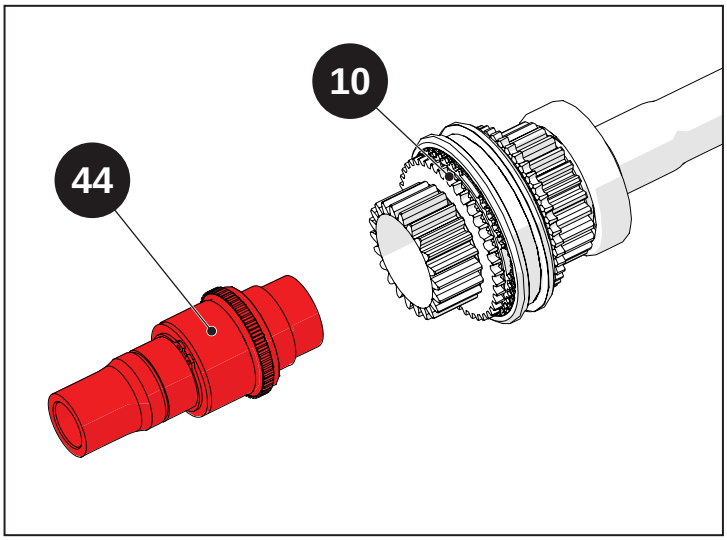

Fig. 4.23

Remove the circlip (45) from the spindle (44).

Remove the spacer (46), the gear (47) and the roller bearing cage (48).

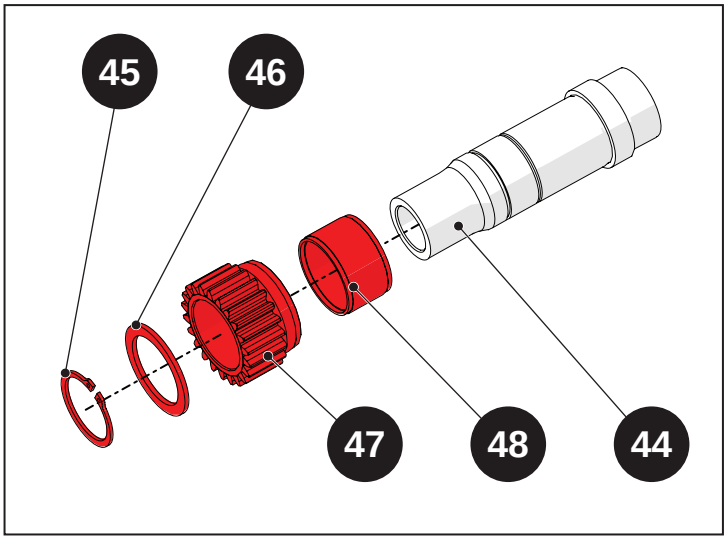

Fig. 4.24

Remove the synchroniser gear (49) and synchroniser ring (50) from the primary shaft (10).

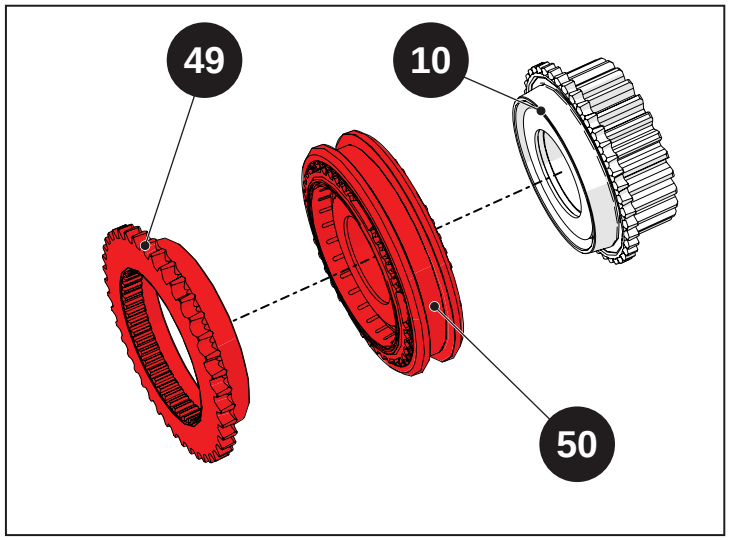

Fig. 4.25

Remove the spacer (51), the roller bearing cage (52), the oil seals (53) and the guide ring (76) from the primary shaft (10).

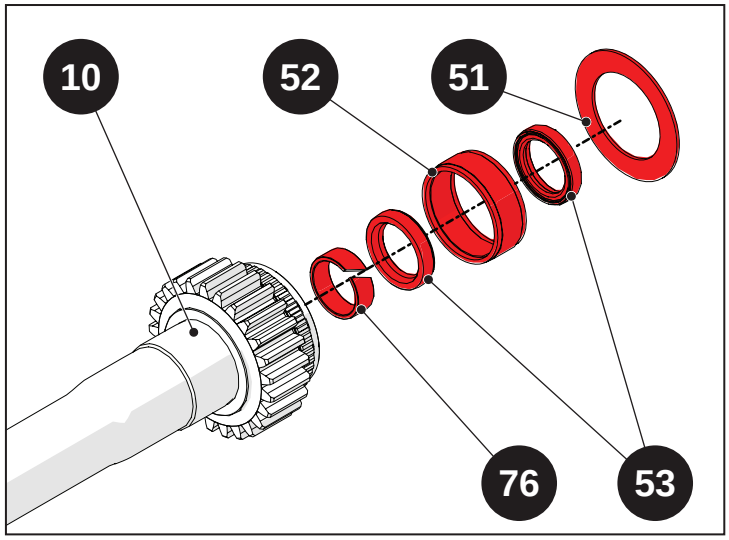

Fig. 4.26

Remove the bush (77) from the primary shaft (10).

Remove the oil seal (78), the circlip (79) the bearing (54) and the bearing (80) from the primary shaft (10).

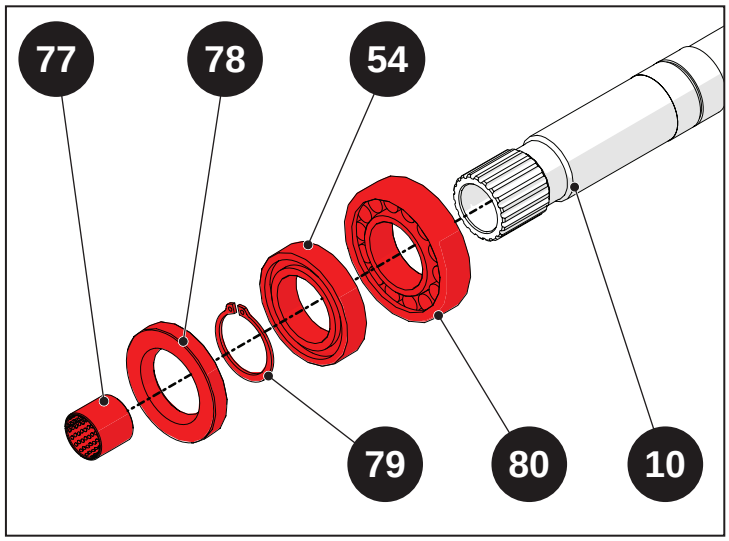

Fig. 4.27

Remove the bush (55) from the primary shaft (10).

Remove the bush (56) from the spindle (44).

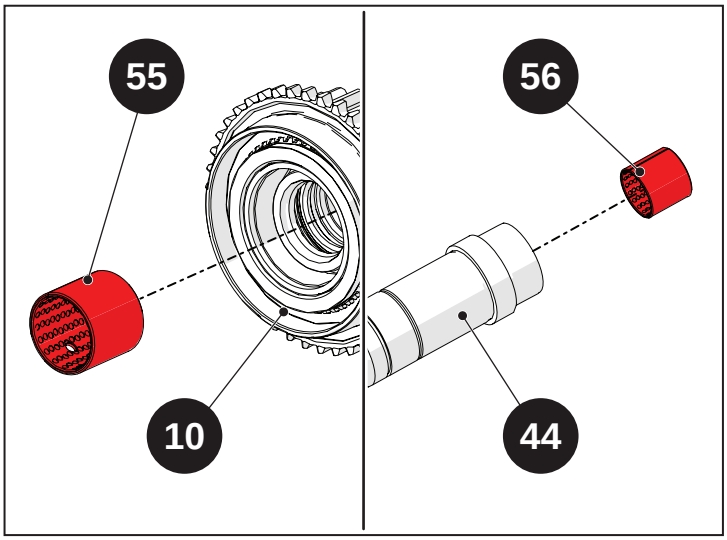

Fig. 4.28

Disassembling the hydraulic differential lock control lever

Undo the screws (57) and remove the hydraulic actuator of the differential lock.

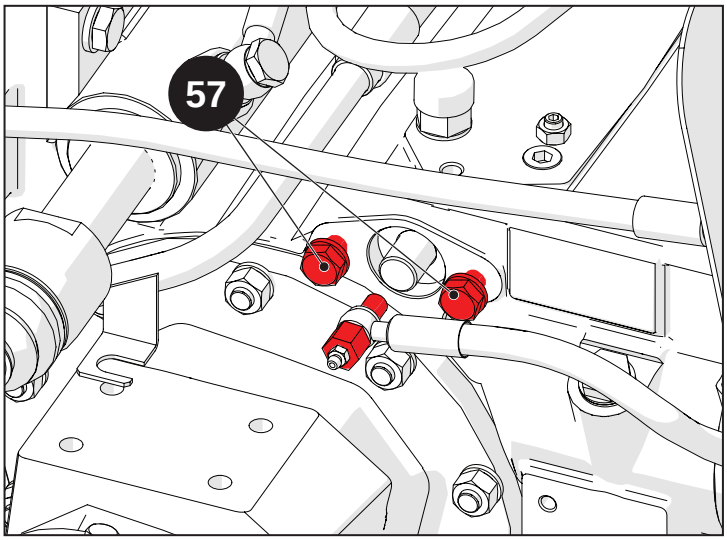

Fig. 4.29

Undo the plug (58) and remove the washer (59).

Remove the pins (60) and (61).

> **Note**
>
> The pins will drop into the front differential case and must be removed.

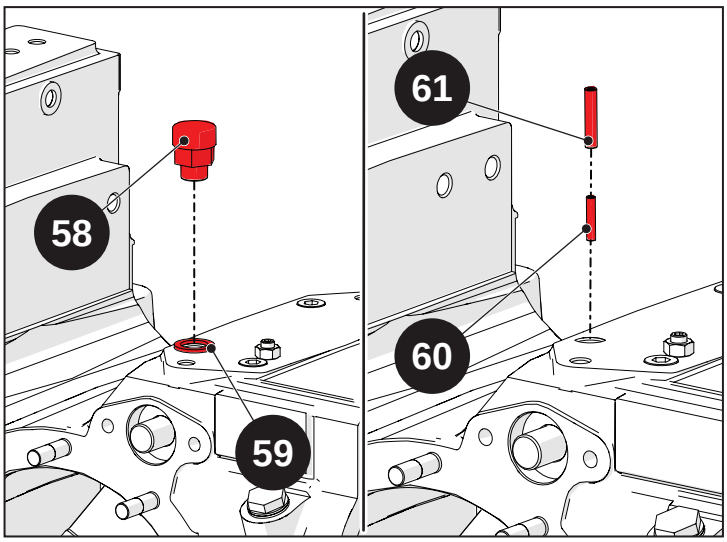

Fig. 4.30

Remove the differential lock rod (62).

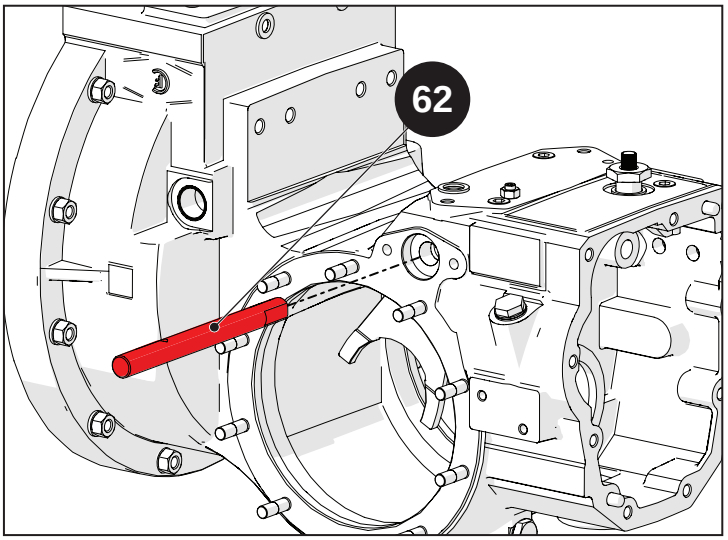

Fig. 4.31

Retrieve the fork (63) and the spring (64) from inside the differential case.

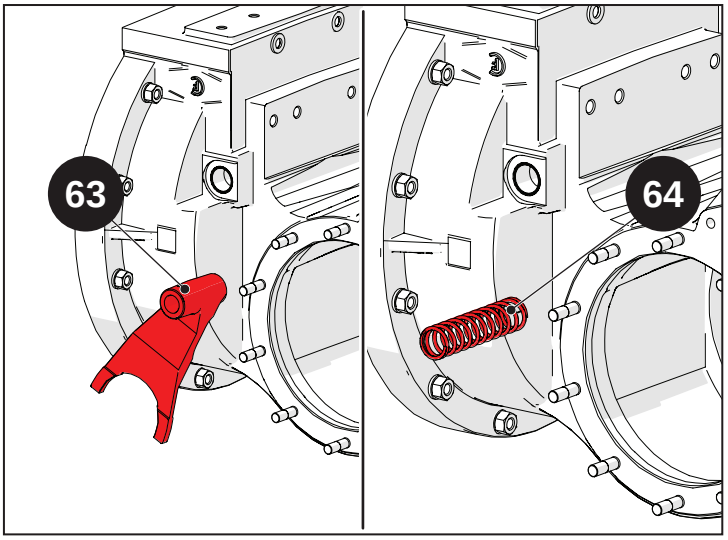

Fig. 4.32

4.4.1.2 Disassembling/Assembling the differential crown wheel

Disassembly

Remove the differential lock ring (65).

Remove the balls (66) from the differential casing.

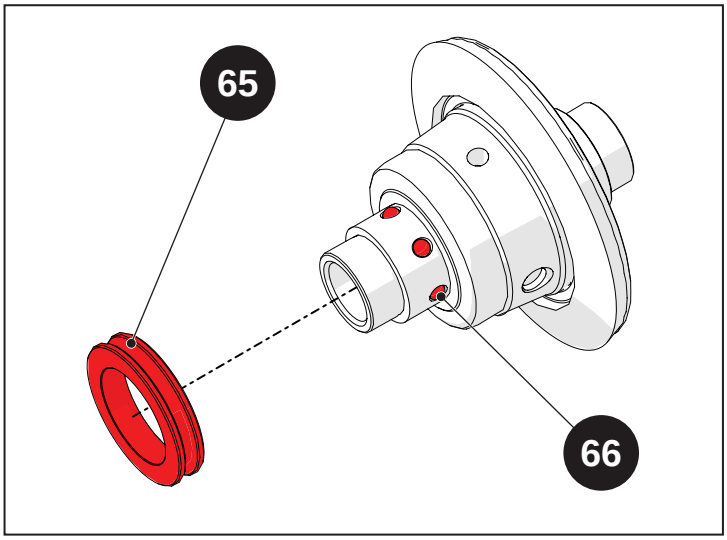

Fig. 4.33

Use a scalpel to bend back the plates (68) and free the screws (67).

Undo the screws (67) and remove the plates (68).

Remove la bevel crown wheel (69).

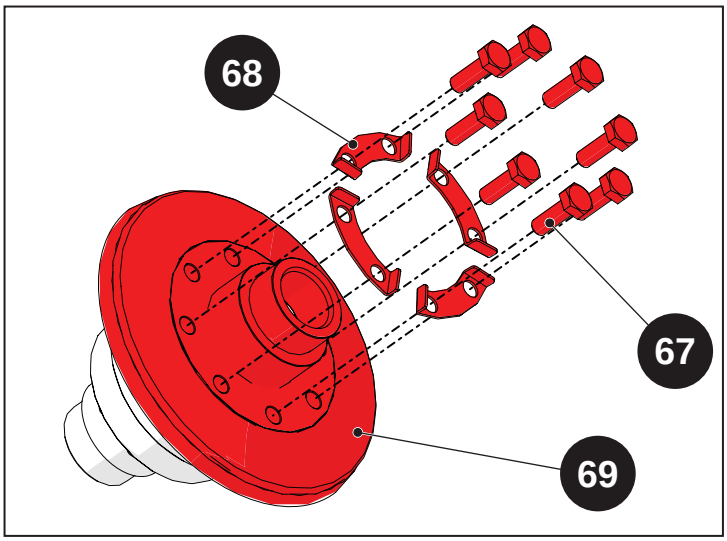

Fig. 4.34

Remove the sun gear (70) from the differential case (71).

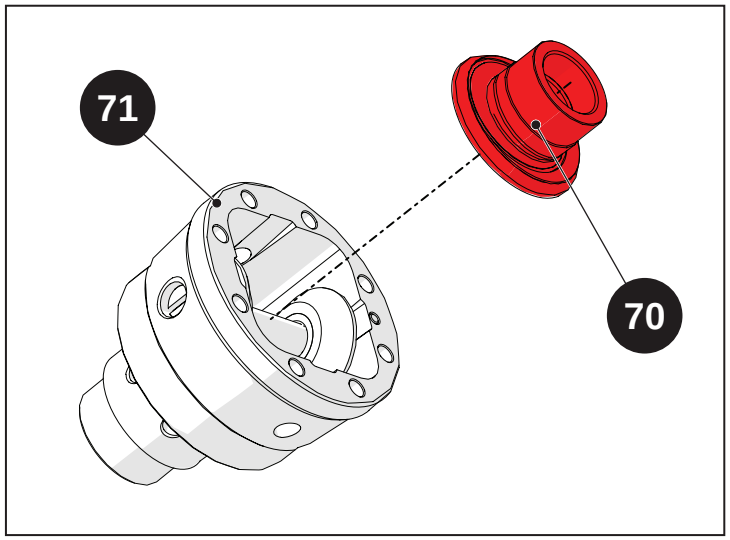

Fig. 4.35

Remove the pin (72).

Remove the planet gear spindle (73).

Remove the planet gears (74).

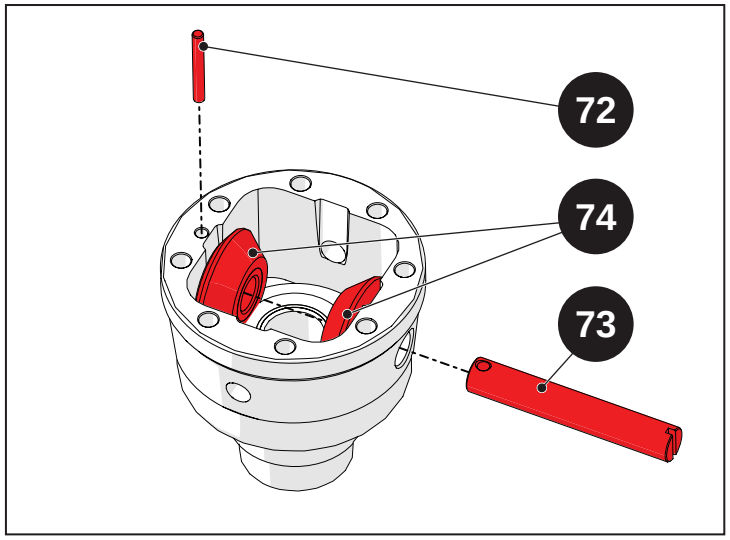

Fig. 4.36

Remove the sun gear (75) from the differential case (71).

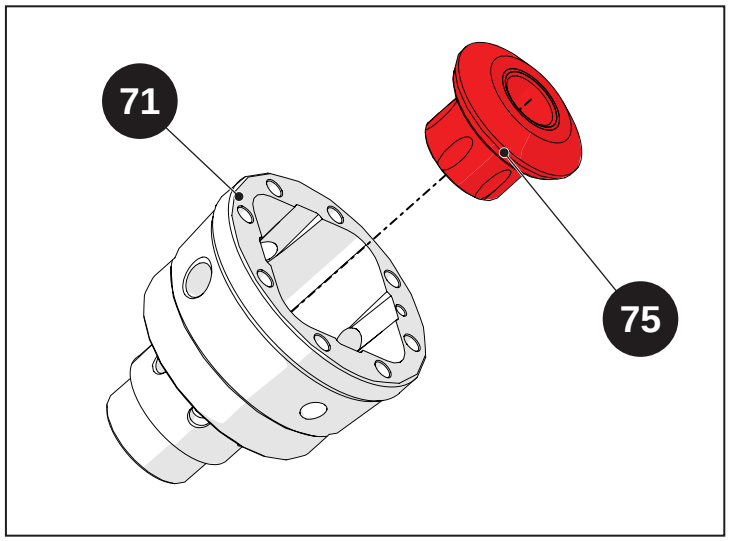

Fig. 4.37

Assembly

Fit the sun gear (75) in the differential case (71).

> **Warning**
>
> Make sure that the sun gear has splines for balls.

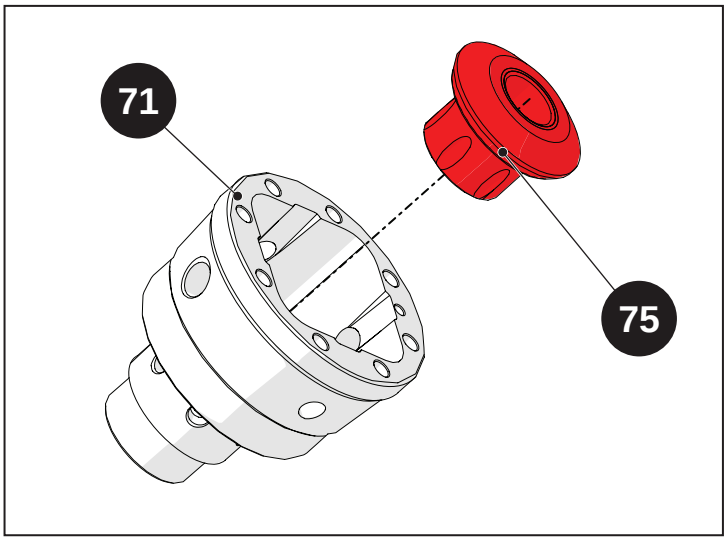

Fig. 4.38

Fit the planet gears (74) and the respective spindle (73).

Fit the retainer pin (72) to secure the planet gear spindle (73).

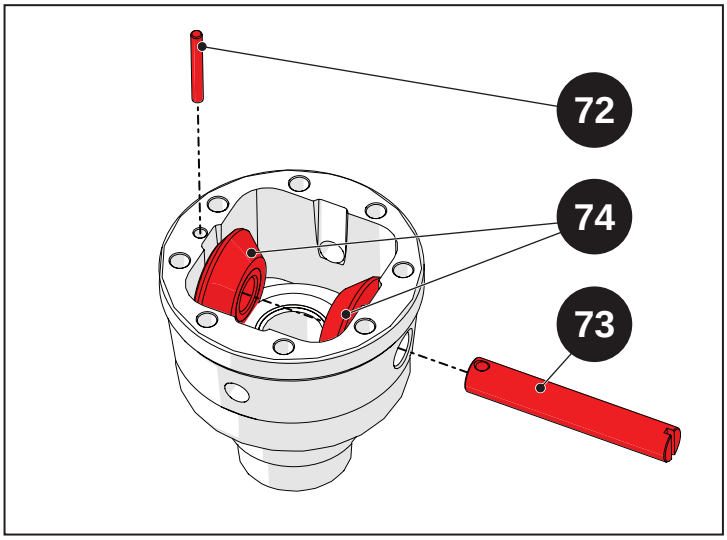

Fig. 4.39

Fit the sun gear (70) on the differential case (71).

Secure the gear set by tapping on the sun gear with a rubber mallet and check that everything turns smoothly.

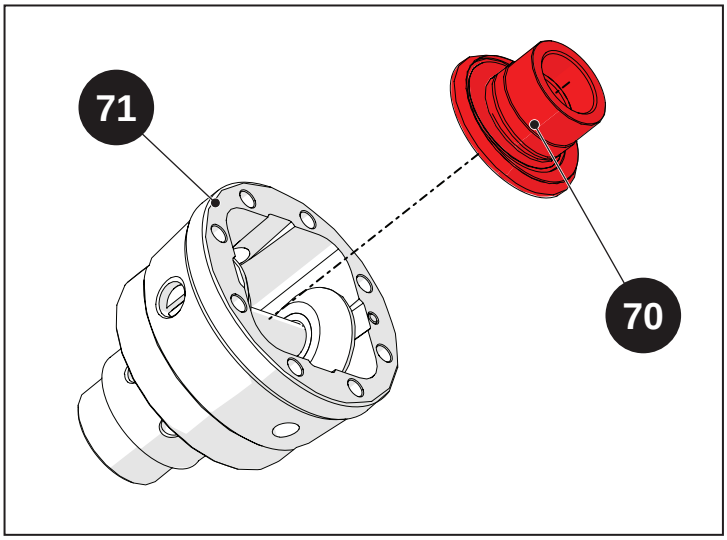

Fig. 4.40

Tighten the screws (67) together with the plates (68) to fasten the bevel crown wheel (69) to the differential case. Apply a tightening torque of 90 Nm (9 kgm).

Bend over the lock plates (68) to definitively secure the screws (67).

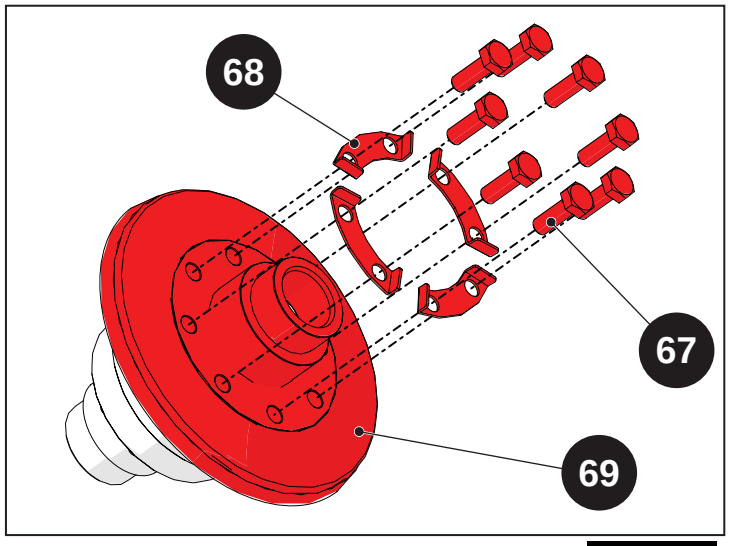

Fig. 4.41

Grease the seats of the balls on the differential case (71) and then fit the balls (66).

Fit the differential lock ring (65) with the bevelled side facing the crown wheel.

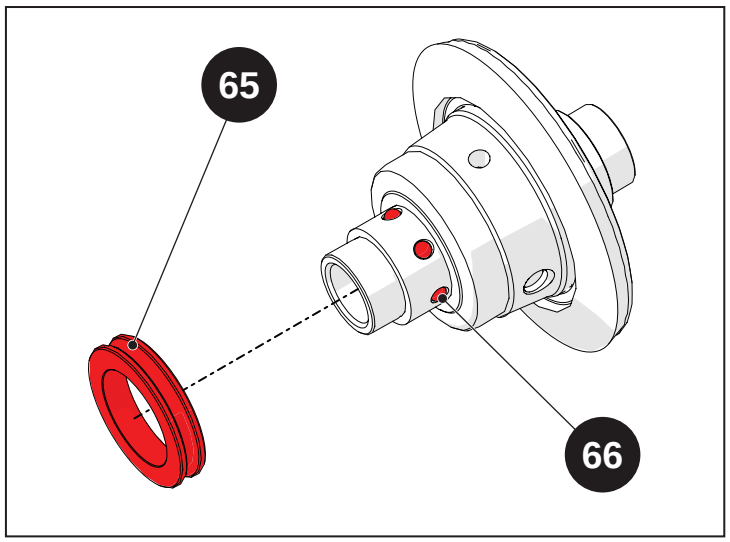

Fig. 4.42

4.5 Main inspection, reassembly and adjustment procedures

Indice

4.5.1 Main inspection, reassembly and adjustment procedures.....4-26
4.5.1.1 Reassembly 4-26

4.5.1 Main inspection, reassembly and adjustment procedures

Warning

Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working.

Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction".

Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

4.5.1.1 Reassembly

Assembling the hydraulic differential lock control lever

Fit the fork (63) and the spring (64) inside the differential case.

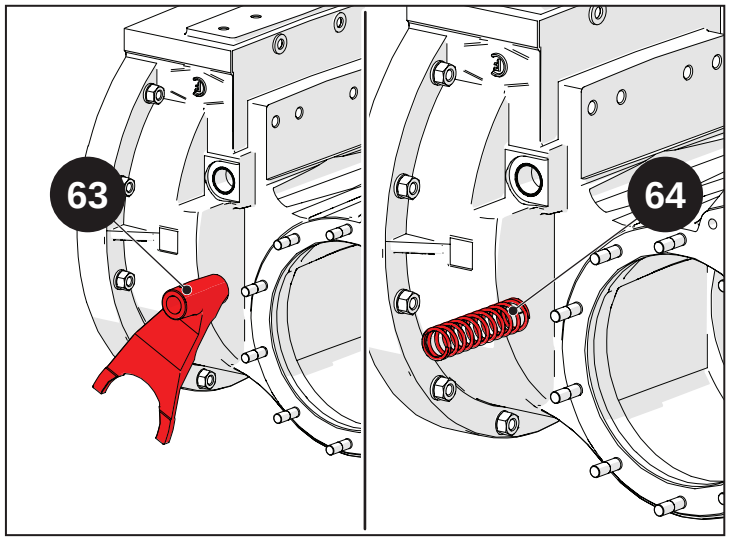

Fig. 4.43

Fit the differential lock rod (62).

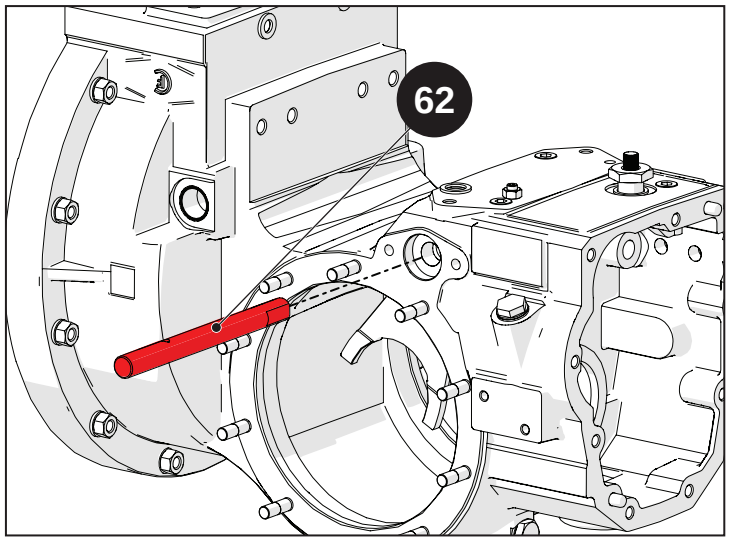

Fig. 4.44

Fit the larger pin (61) and then the smaller pin (60), ensuring that the splits in the pins are on opposite sides.

Fit the washer (59) and fit and tighten the plug (58).

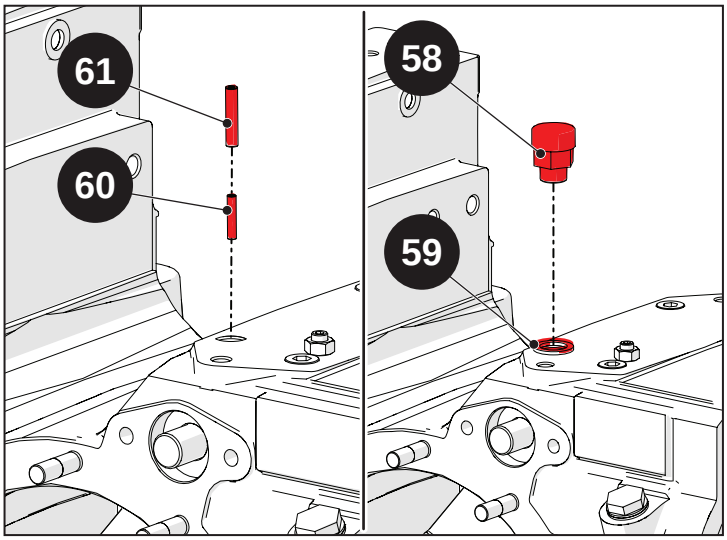

Fig. 4.45

Fit the hydraulic actuator of the differential lock and then fit and tighten the screws (57).

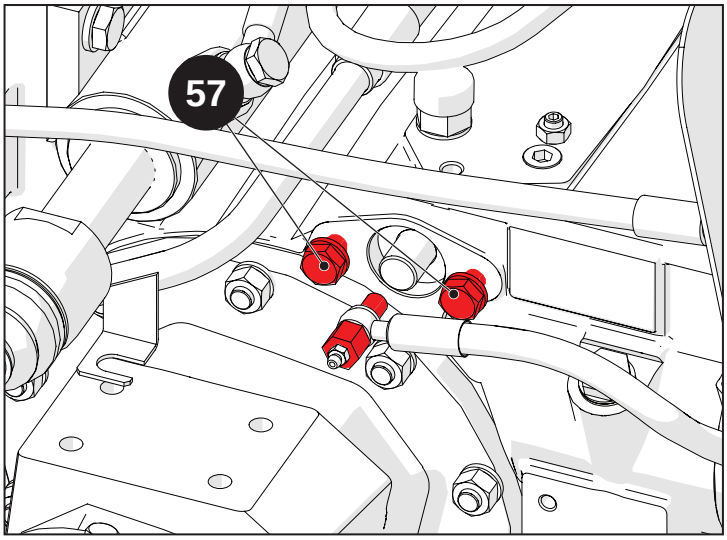

Fig. 4.46

Assembling the primary shaft

Fit the bush (55) on the primary shaft (10).

Fit the bush (56) on the spindle (44).

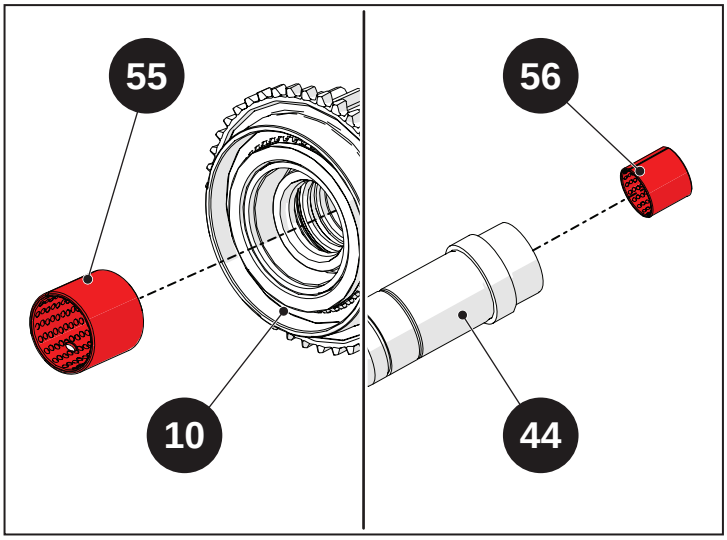

Fig. 4.47

Fit the bearing (80), the bearing (54), the circlip (79) and the oil seal (78) on the primary shaft (10).

Fit the bush (77) on the primary shaft (10).

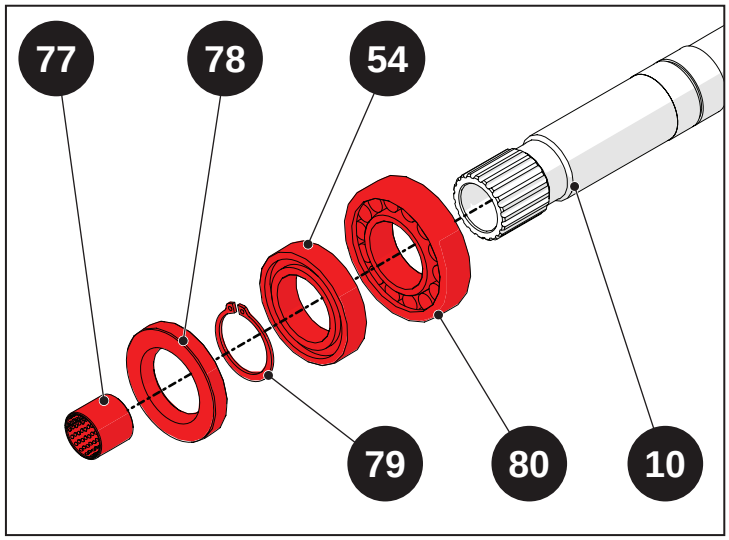

Fig. 4.48

Fit the guide ring (76), the oil seals (53), the roller bearing cage (52) and the spacers (51) on the primary shaft (10).

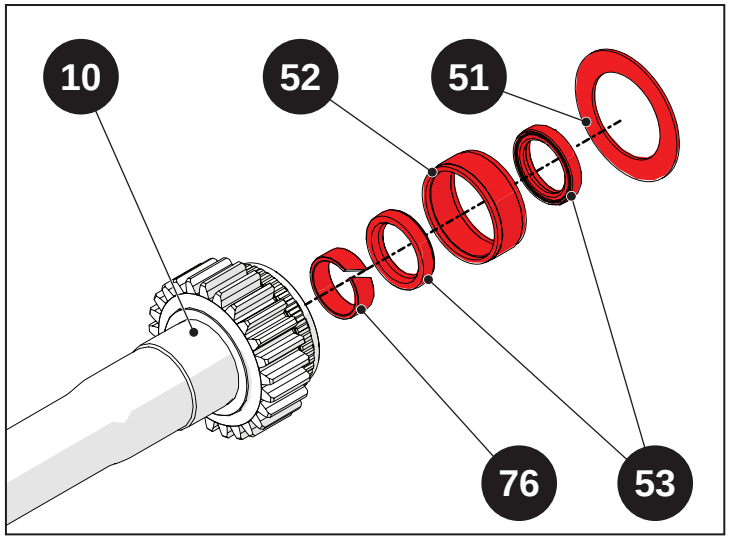

Fig. 4.49

Fit the synchroniser ring (50) and the synchroniser gear (49) on the primary shaft (10).

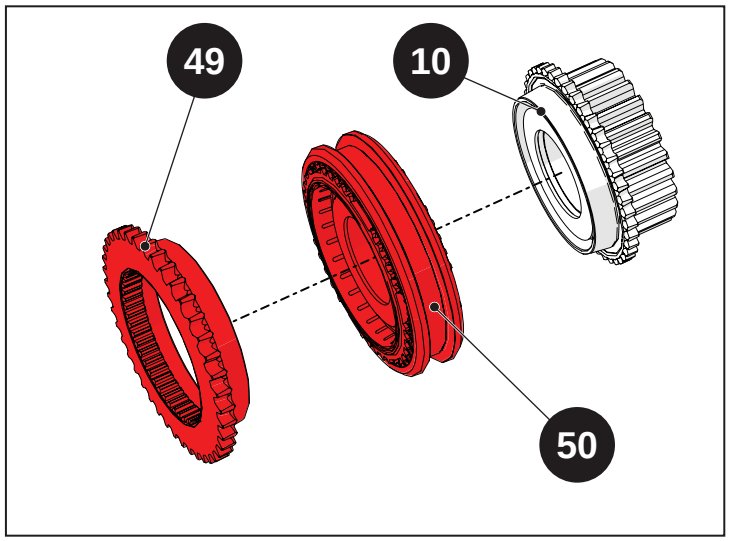

Fig. 4.50

Fit the roller bearing cage (48), the gear (47) and the spacer (46).

Fit the circlip (45) on the spindle (44).

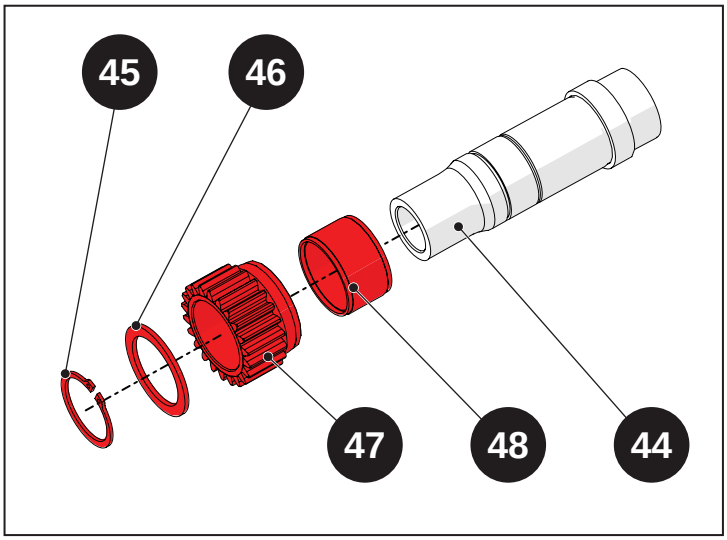

Fig. 4.51

Fit the complete spindle (44) in the primary shaft (10).

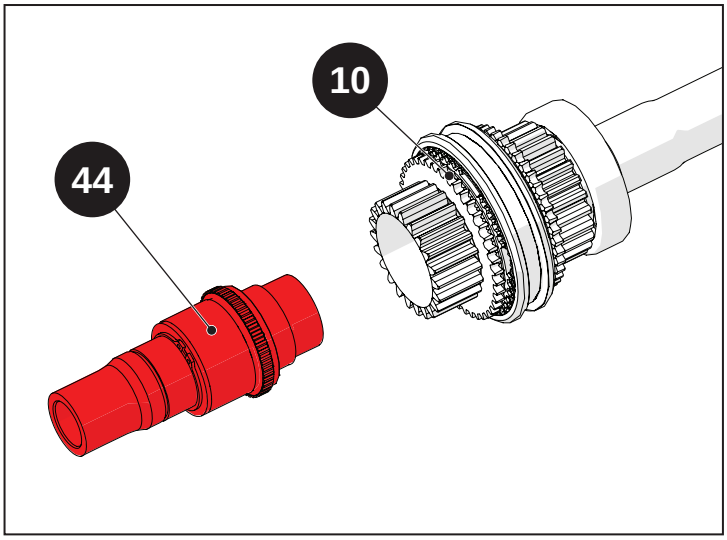

Fig. 4.52

Fit the bearing (43) on the bevel pinion (8).

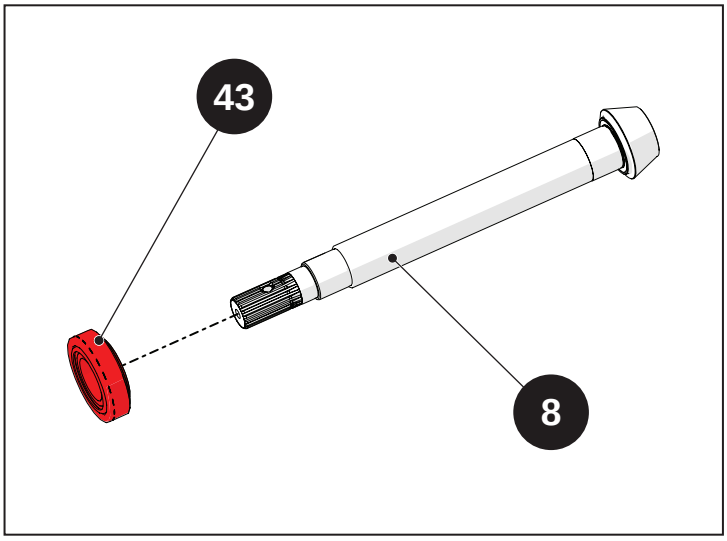

Fig. 4.53

Fit the bevel pinion (8) complete with bearing (43).

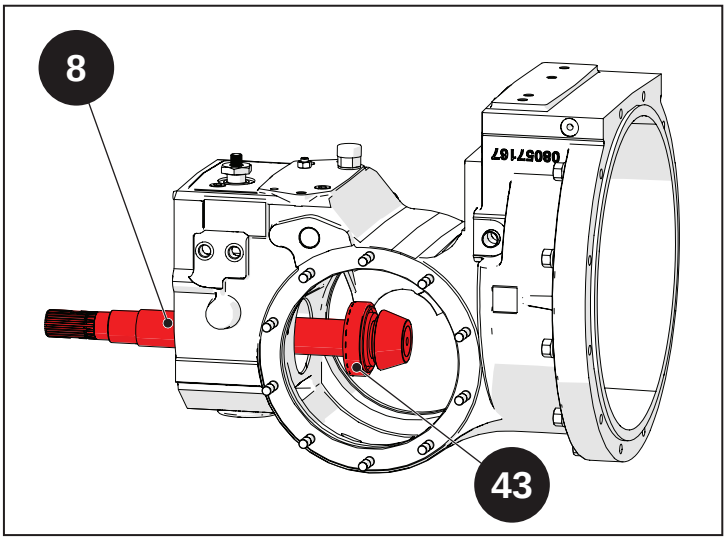

Fig. 4.54

Fit the differential crown wheel assembly.

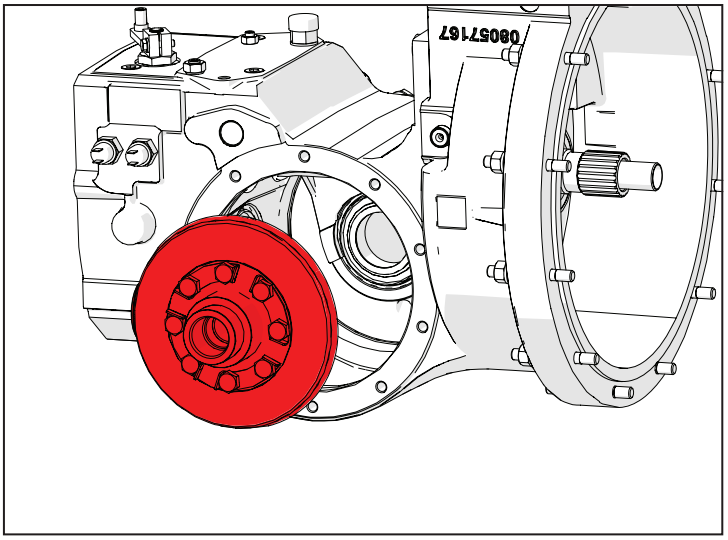

Fig. 4.55

Fit the circlip (42).

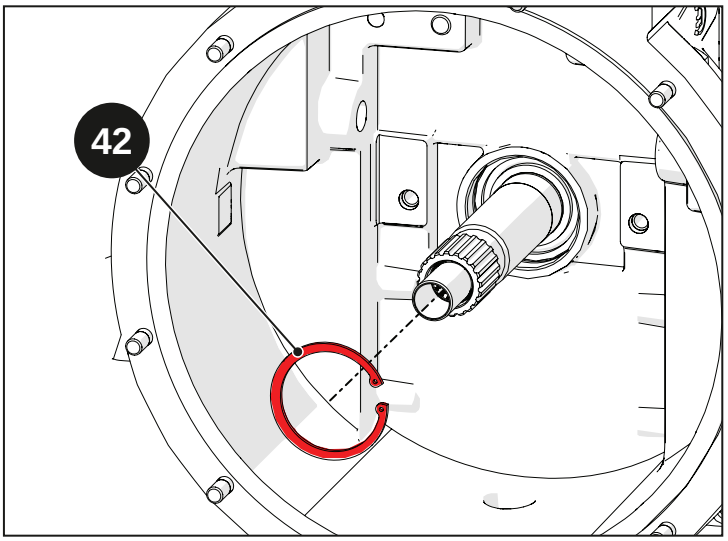

Fig. 4.56

Fit the primary shaft (10) from the rear side of the clutch housing casing together with the reverse shuttle fork (38) and the transfer case gear (39).

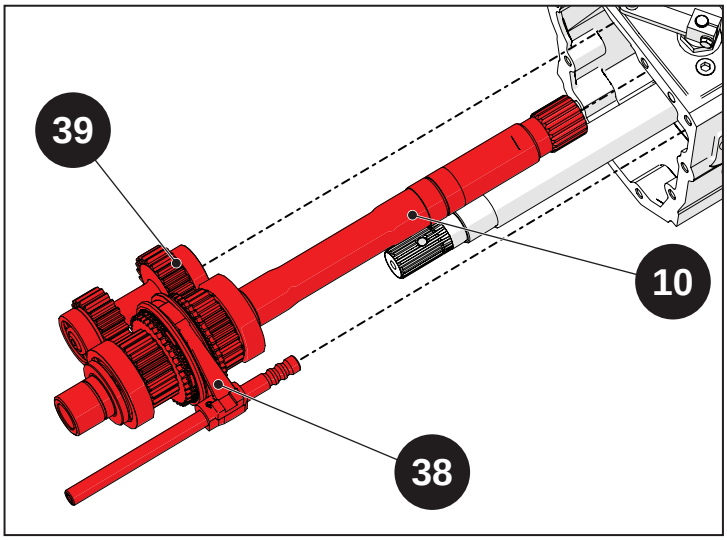

Fig. 4.57

Secure the reverse shuttle fork (38) onto the rod (40) by fitting the pin (41), and then fit the plug.

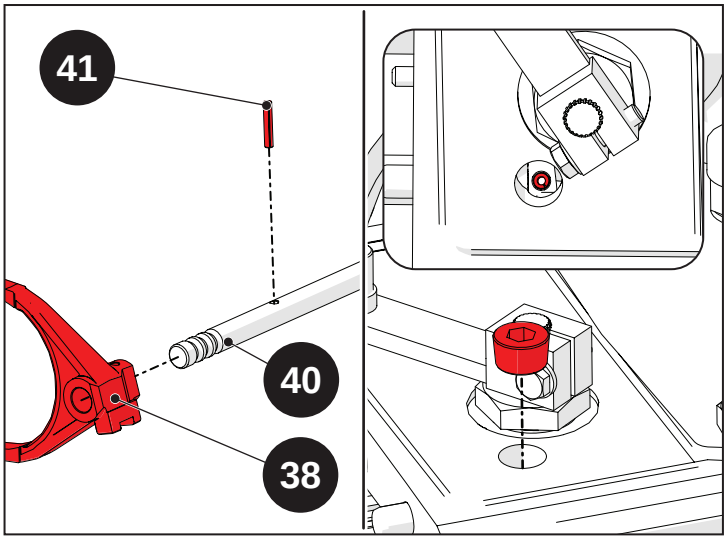

Fig. 4.58

Fit the reverse shuttle pin (30).

Tighten the retainer (36) together with the check nut (37).

Tighten the check nut (37) to secure the retainer (36) in position, applying a torque of 25 Nm (2.5 kgm).

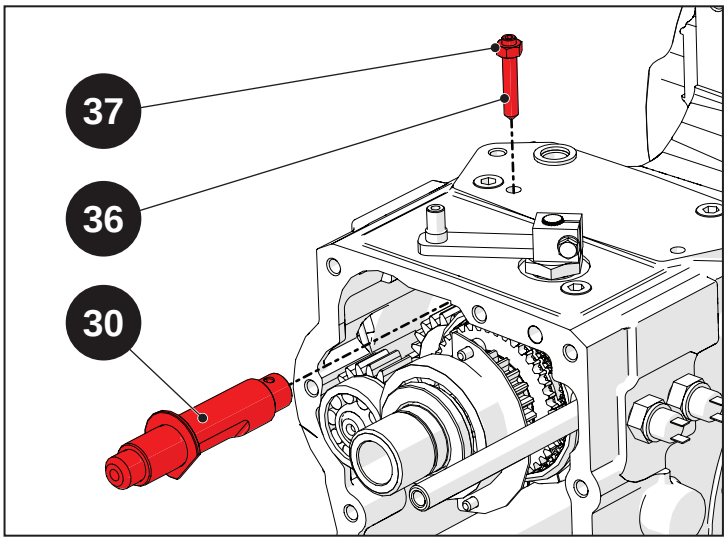

Fig. 4.59

Fit the ball (35) and the spring (34).

Fit the washer (72), tighten the adjuster pin (32), and then secure the adjuster pin in position by tightening the check nut (33) to a torque of 50 Nm (5 Kgm).

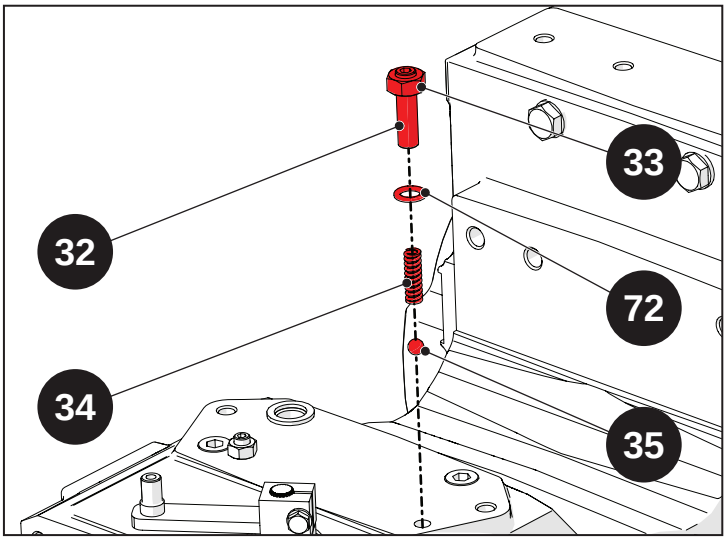

Fig. 4.60

Fit the roller bearing cage (31) on the reverse shuttle pin (30).

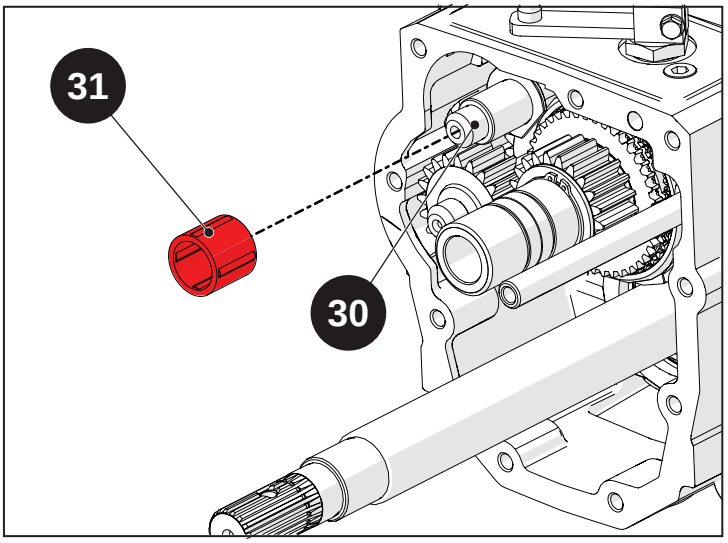

Fig. 4.61

Fit the gear (29) and the spacer (28) on the reverse shuttle pin (30).

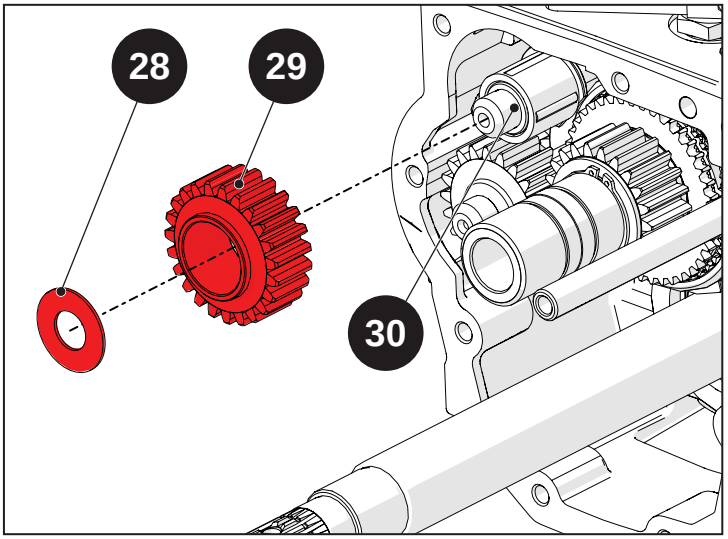

Fig. 4.62

Fit the circlip (27).

Fit the oil seal (26).

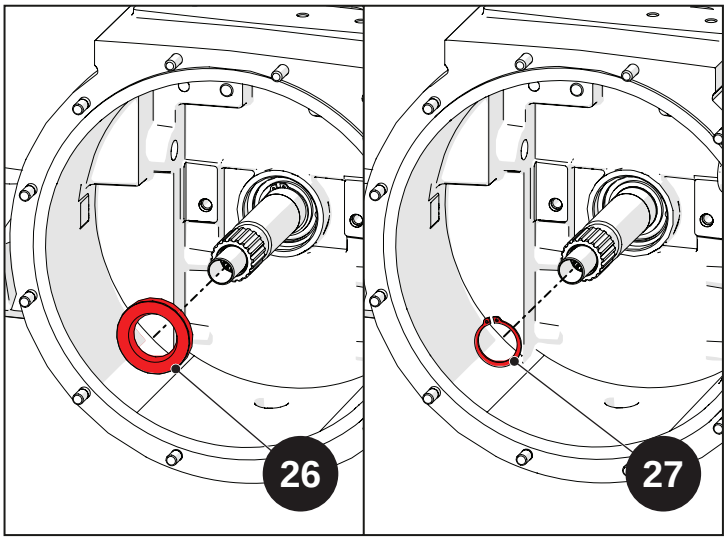

Fig. 4.63

Fit the thrust bearing (24) on the thrust plate carrier (25).

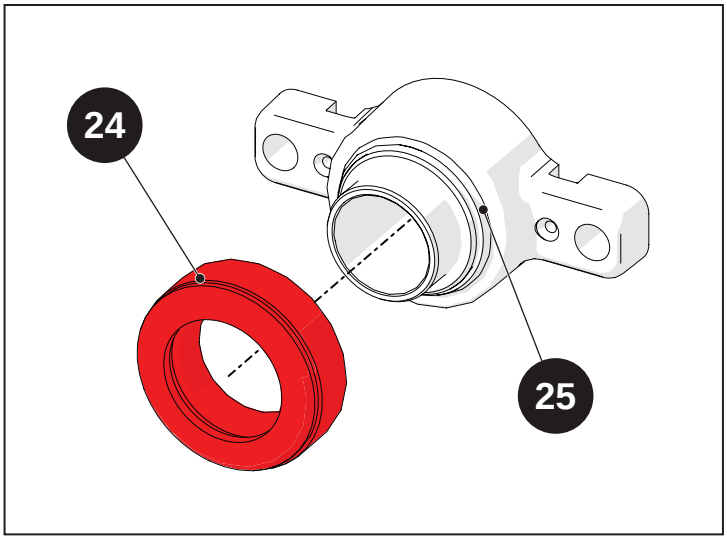

Fig. 4.64

Fit the lever (23).

Fit the pins (22) to secure the position of the fork (26) on the lever.

Attach the thrust plate carrier (25) to the fork (26).

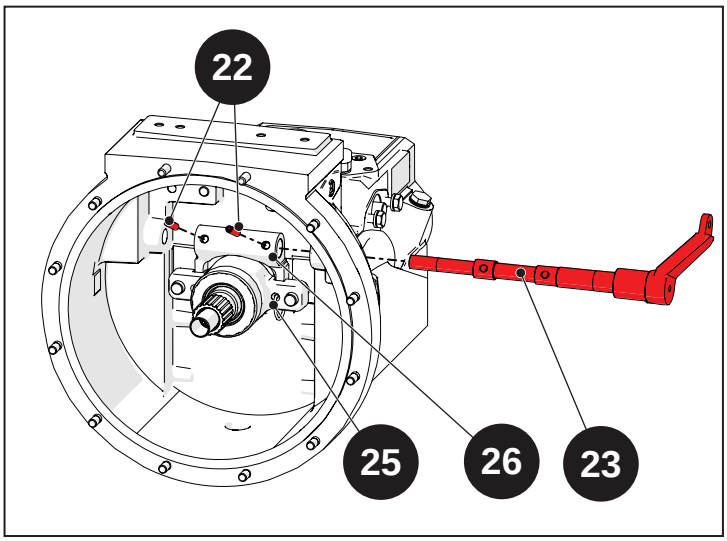

Fig. 4.65

Fit the bearings (20) and (21).

Fit the bracket (19) and fit and tighten the screws (18) to a torque of 9.5 Nm (0.95 kgm).

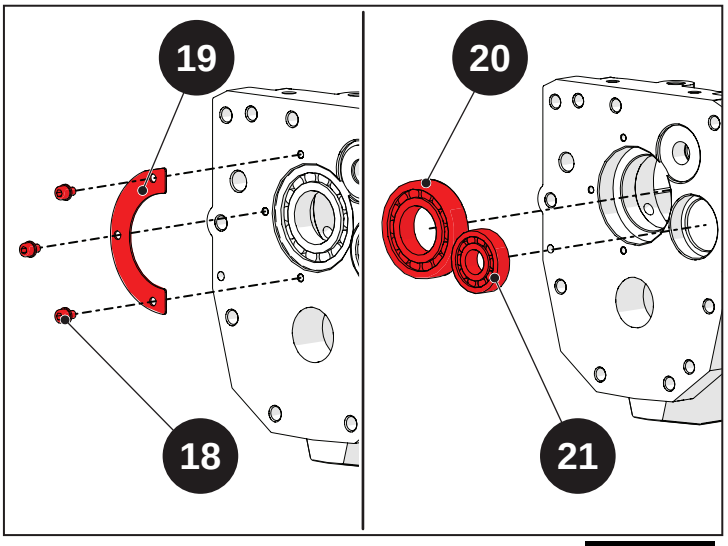

Fig. 4.66

Secure the cover to a hoist using the tool (_____), and then mate the cover with the front differential cover.

Attention
Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

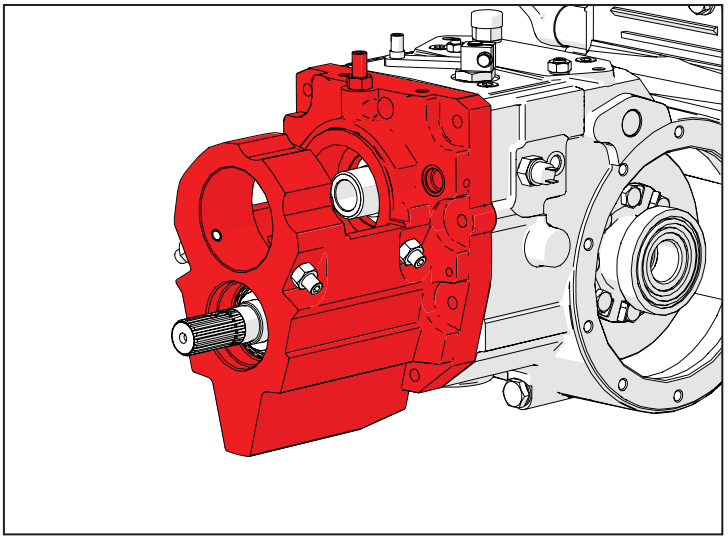

Fig. 4.67

Tighten the screws (16) and the screw (17) to a torque of 50 Nm (5 Kgm).

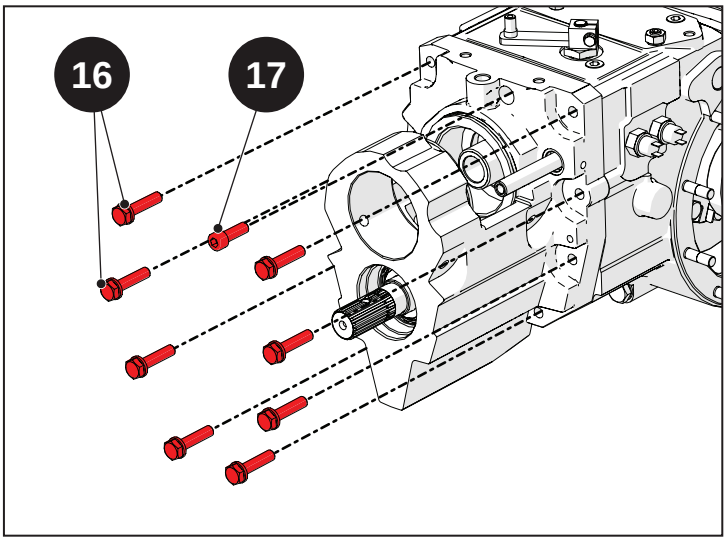

Fig. 4.68

Fit the washer (15).

Fit and tighten the ring nut (14).

Fit the oil seal (13).

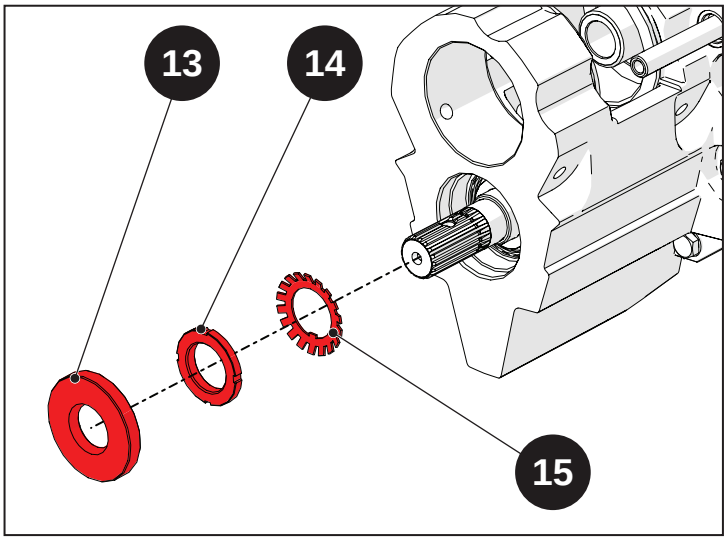

Fig. 4.69

Fit the circlip (12) and the oil seal (11) on the primary shaft (10).

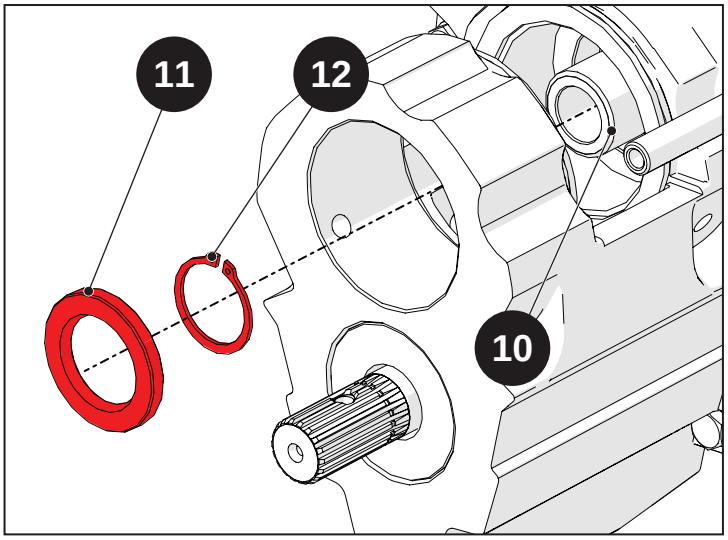

Fig. 4.70

Fit the circlip (9) on the primary shaft (10).

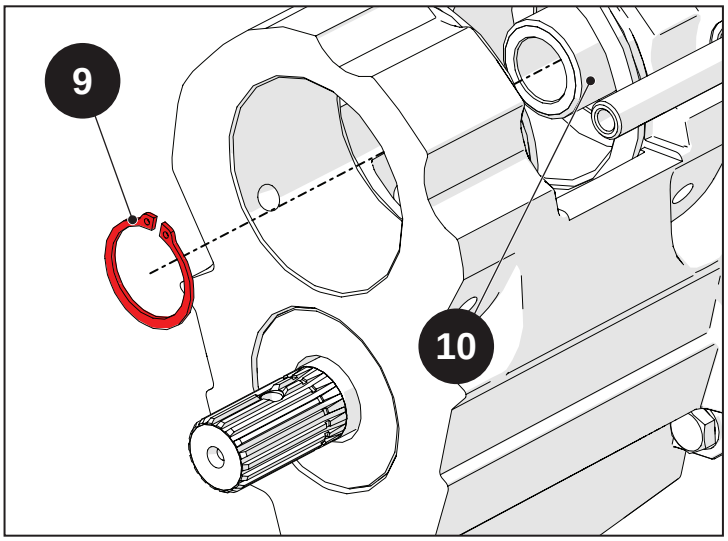

Fig. 4.71

Fit the circlip (7) on the bevel pinion (8).

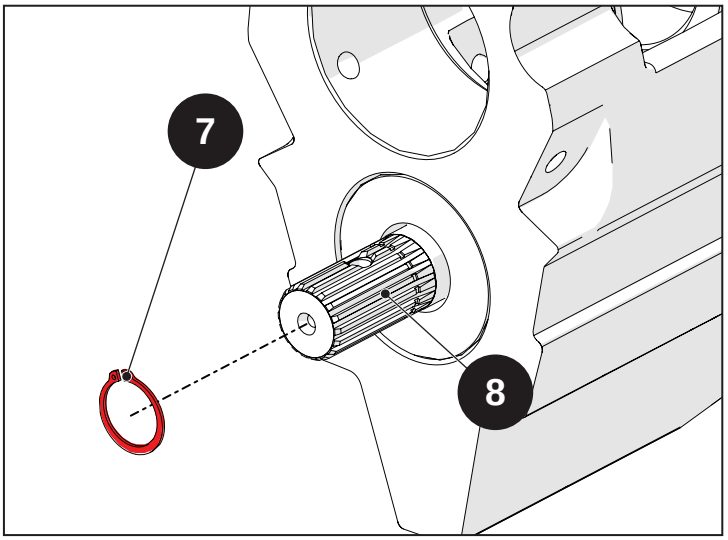

Fig. 4.72

Fit the O-ring (5) and the spacer (4) on the reverse shuttle rod (6).

Fit the plate (3) and the washer (2) and then fit and tighten the screw (1) to a torque of 25 Nm (2.5 Kgm).

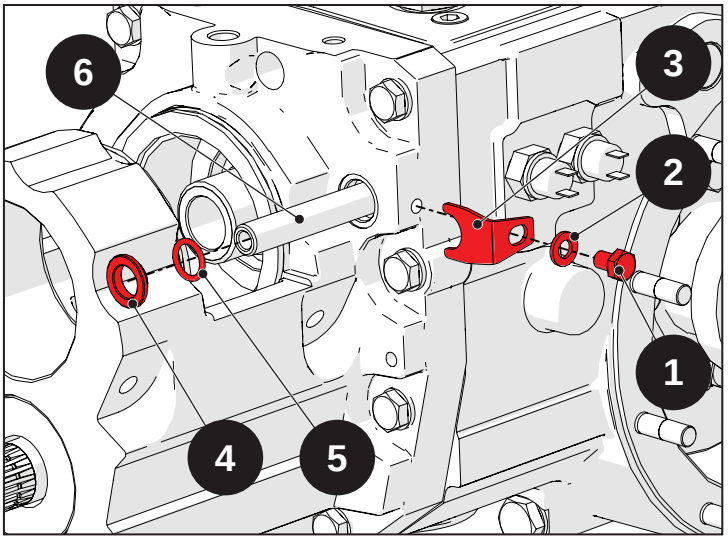

Fig. 4.73

4.6 Tightening torques

Indice

4.6.1 Tightening torques 4-38

4.6.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Clutch thrust plate pin	55	5.5
Cover-differential case fastener screw	50	5
Hub-differential case fastener screw	70	7

4.7 Tools necessary

Indice

4.7.1 Tools necessary 4-40

4.7.1 Tools necessary

p/n	Description	Quantity
_____	Special tool for lifting the differential case cover	1

5 : Transmission and Rear Power Take Off

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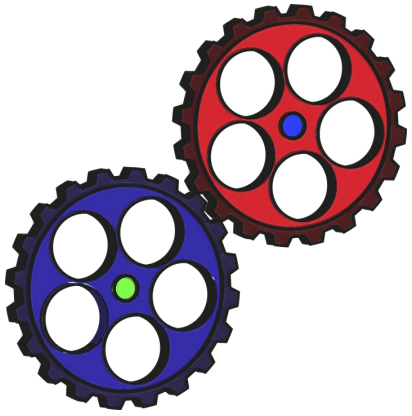

5.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

5.2 General introduction

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5.2.2 Assembly drawing of rear PTO 5-6

5.2.1 Assembly drawing of gearbox

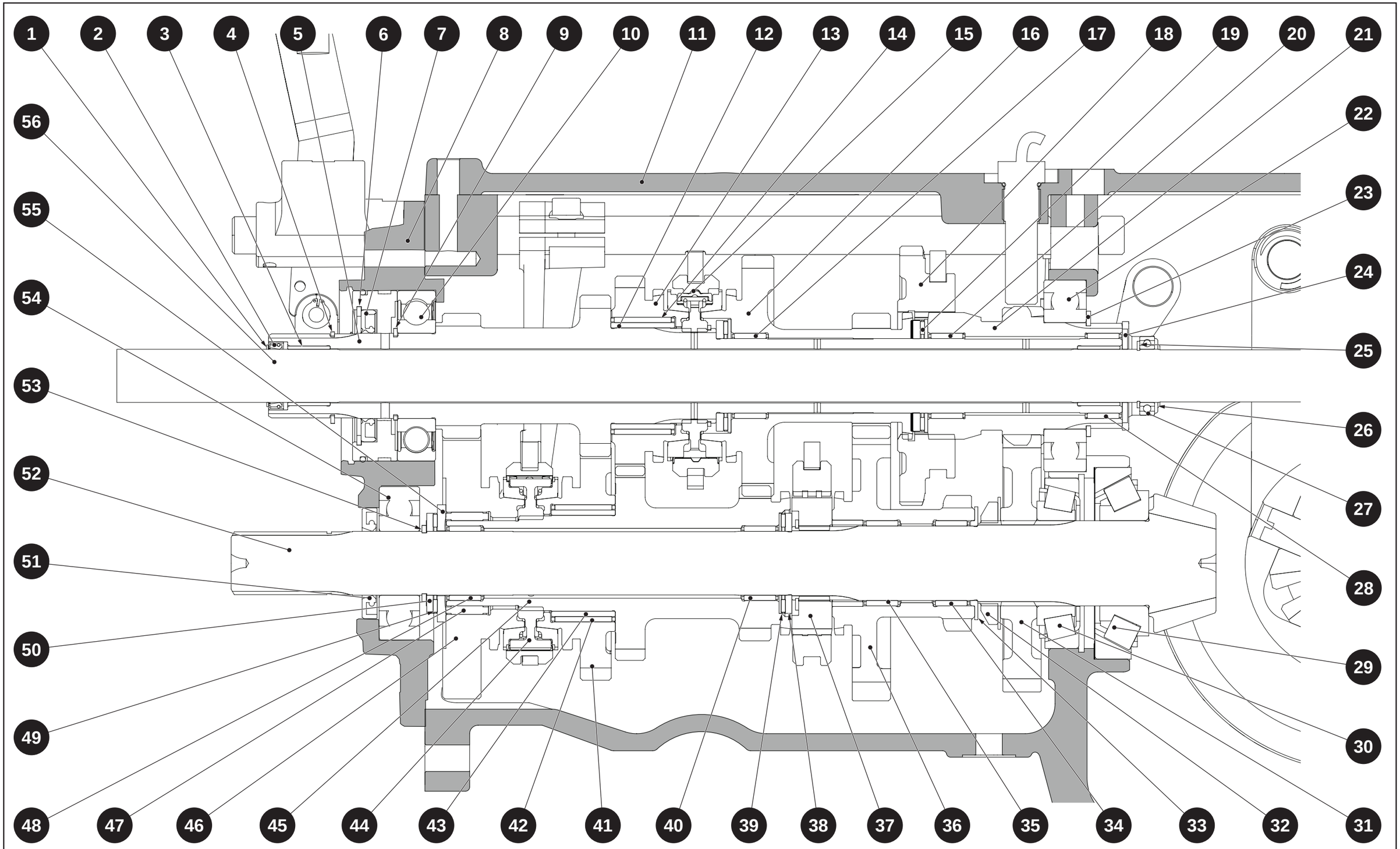

Fig. 5.1

1 - Spacer
2 - Oil seal
3 - Bush
4 - Circlip
5 - Front primary shaft
6 - Circlip
7 - Oil seal
8 - Transmission casing
9 - Circlip
10 - Bearing
11 - Transmission cover
12 - Bush
13 - 3rd speed gear
14 - Roller bearing cage
15 - Synchroniser
16 - 4th speed gear
17 - Roller bearing cage
18 - Medium slow-slow range gear
19 - Roller bearing cage
20 - Roller bearing cage
21 - Splined hub
22 - Bearing
23 - Circlip
24 - Spacer
25 - Circlip
26 - Circlip
27 - Bearing
28 - Roller bearing cage
29 - Bearing
30 - Bearing
31 - Medium-Fast range gear
32 - Threaded ring
33 - Spacer
34 - Roller bearing cage
35 - Roller bearing cage
36 - Medium slow-slow range gear
37 - Selector sleeve
38 - Spacer
39 - Roller bearing cage
40 - Roller bearing cage
41 - 2nd speed gear
42 - Roller bearing cage
43 - Bush
44 - Synchroniser
45 - 3rd and 4th speed gear
46 - 1st speed gear
47 - Roller bearing cage
48 - Roller bearing cage
49 - Roller bearing cage
50 - Spacer
51 - Oil seal
52 - Bevel pinion
53 - Circlip
54 - Bearing
55 - Spacer
56 - Independent PTO shaft

5.2.2 Assembly drawing of rear PTO

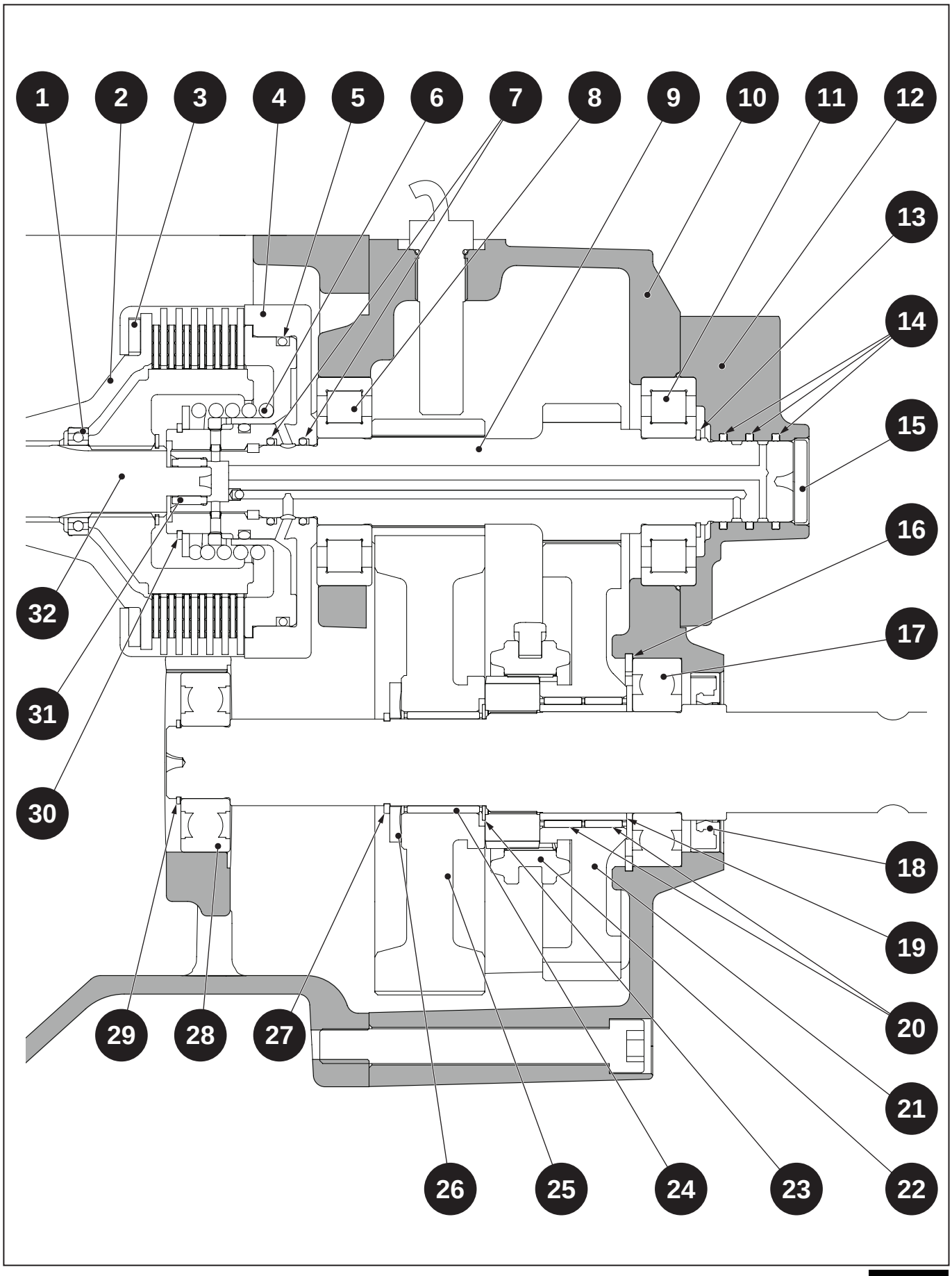

Fig. 5.2

1 - Bearing
2 - Shaft
3 - Circlip
4 - PTO clutch
5 - O-ring
6 - Coil spring
7 - O-ring
8 - Bearing
9 - Splined shaft
10 - PTO casing
11 - Bearing
12 - Rear cover
13 - Circlip
14 - Quad ring
15 - Plug
16 - Circlip
17 - Bearing
18 - Oil seal
19 - Bush
20 - Roller bearing cage
21 - PTO gear
22 - Selector
23 - Spacer
24 - Roller bearing cage
25 - PTO gear
26 - Spacer
27 - Circlip
28 - Bearing
29 - Circlip
30 - Circlip
31 - Roller bearing cage
32 - Independent PTO shaft

5.3 Technical characteristics

Indice

5.3.1 Transmission.....5-10

5.3.2 Power Take Off.....5-10

5.3.1 Transmission

Transmission type	Mechanical transmission, four wheel drive		
Gearbox type	16+16 synchronised	12+12 synchronised	8+8 synchronised
Shift control system	Mechanical with central levers		
Reverse shuttle type	Mechanical, synchronised		
Reverse shuttle control	Lever		
Rear differential lock	Electrohydraulic		
Rear differential lock	Electrohydraulic		
Minimum speed	0.58 Km/h		
Maximum speed (homologated)	40 Km/h		
Quantity of oil	20 litres		
Oil type	SAE 15-40W		

5.3.2 Power Take Off

Type	Single shaft, independent and synchronised
PTO speed independent of ground speed	540/750 rpm
Other speeds independent of forward speed	–
Ground speed synchronised	Yes
Direction of rotation (looking at PTO)	Clockwise
Profile	1-3/8" with 6 splines
Clutch	Multi-disc wet brakes
Clutch control	Electrohydraulic

5.4 Disassembly

Indice

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5.4.3 Disassembling the PTO 5-37

5.4.1 Preliminary operations

The main operations necessary to access the components/assemblies are indicated as follows.

Danger
Secure the assemblies to lifting equipment of adequate load capacity before disassembly. If suitable lifting equipment is not available, assemblies may be secured with a support stand.

Attention
Always make sure that the assemblies are completely disconnected before separation to prevent damage to components.

Note
See the relative chapters for specific disassembly and reassembly procedures.

- Removing the platform (see chapter "13-Platform")
- Separating centre housing/transmission (see chapter "6 - Centre housing")

5.4.2 Disassembling the transmission

5.4.2.1 Disassembly of clutch cover, rods and levers

Undo the plugs (1) and remove the washers (2) and the springs (3).

Attention
The springs (3) may be projected at high speed and cause injury when the plugs (1) are removed.

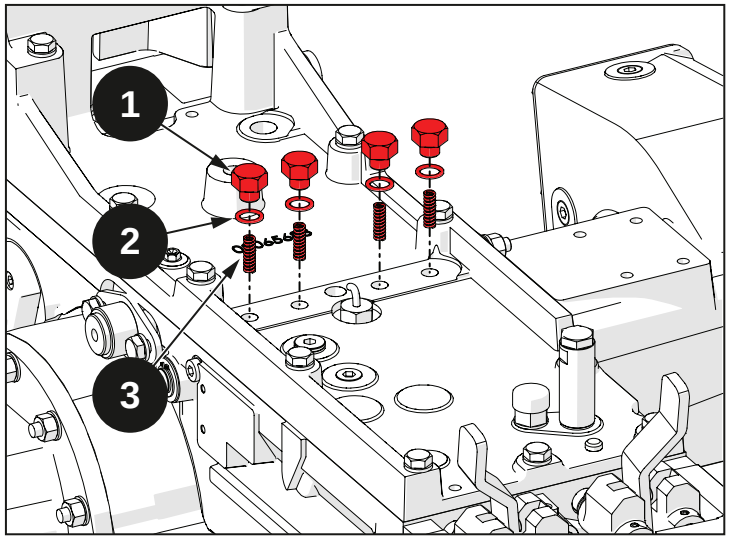

Fig. 5.3

Unscrew the oil filler plug with dipstick (4) and the oil filler spacer (5), and remove the copper washer (6).

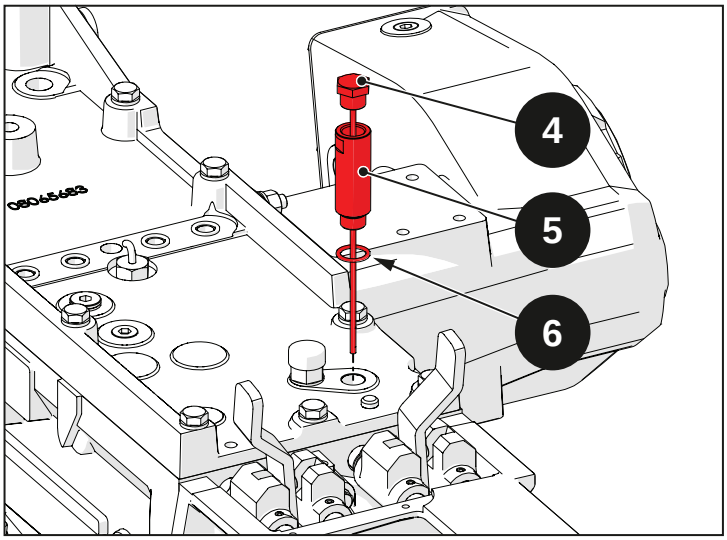

Fig. 5.4

Undo the screws (7), (8) and (9) and remove the washers (10).

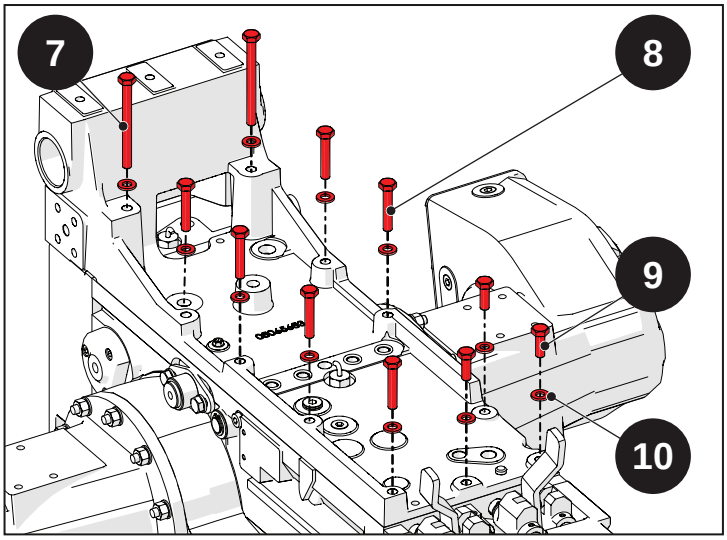

Fig. 5.5

Separate the cover (11) from the gearbox casing (12).

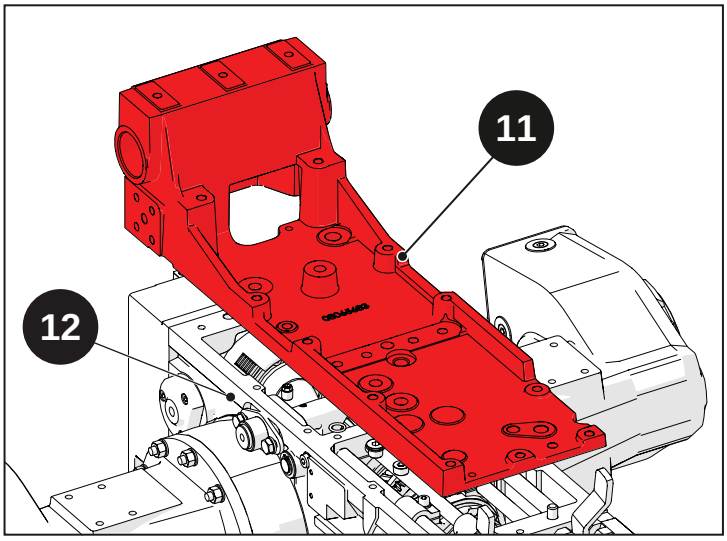

Fig. 5.6

Release the spring (15).

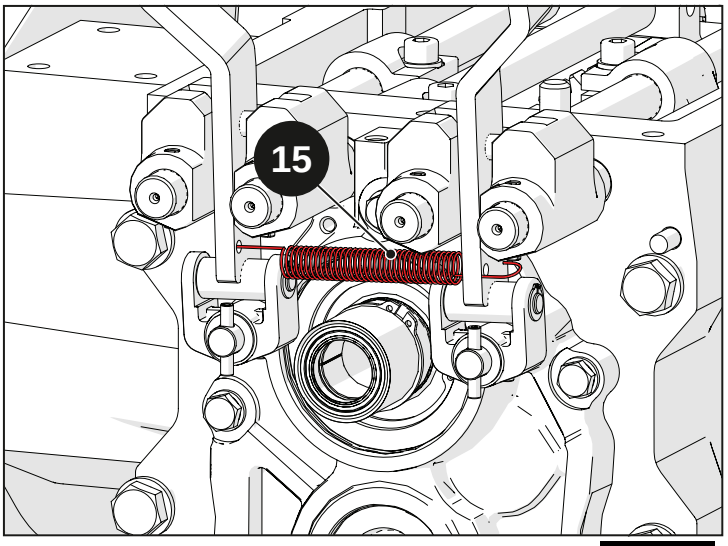

Fig. 5.7

Remove the pins (16) and the spacers (17) on the pins (18) to free the forks (19).

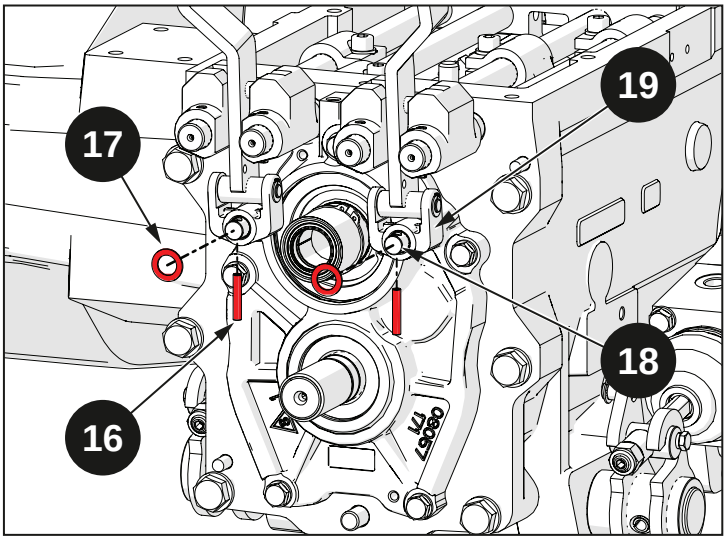

Fig. 5.8

Remove the levers (20) from the respective pins (18).

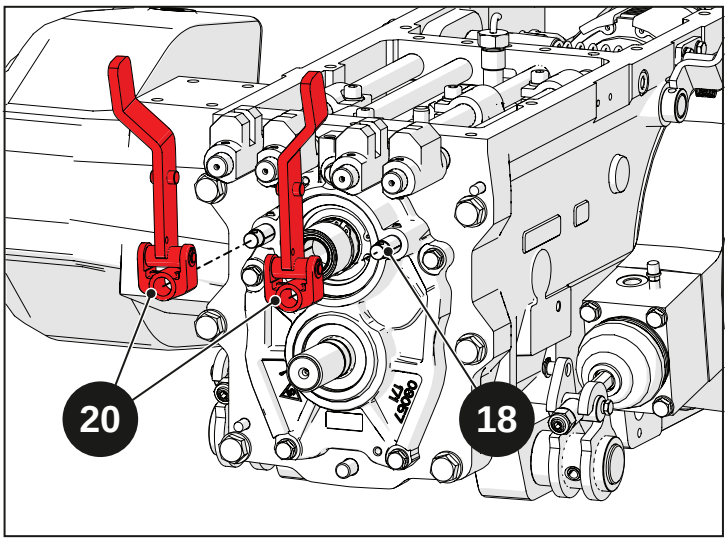

Fig. 5.9

Disassemble the levers (20), removing the circlips (21), the pins (22) and the forks (23).

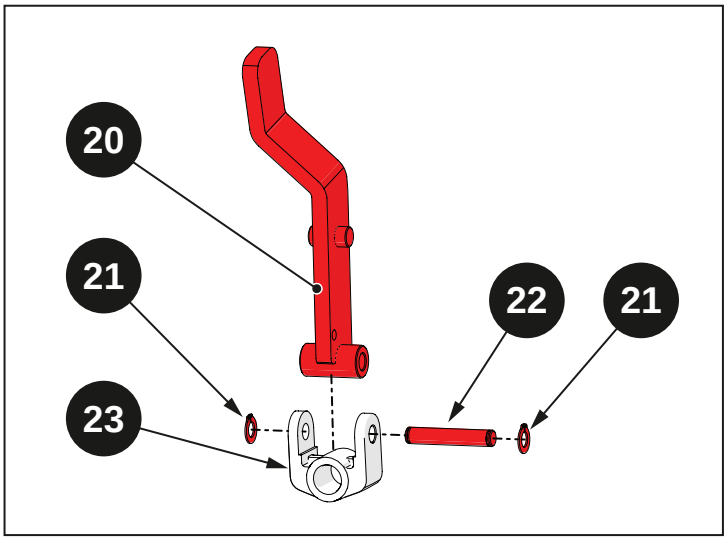

Fig. 5.10

Remove the pins (24) and remove the guide bushes (25).

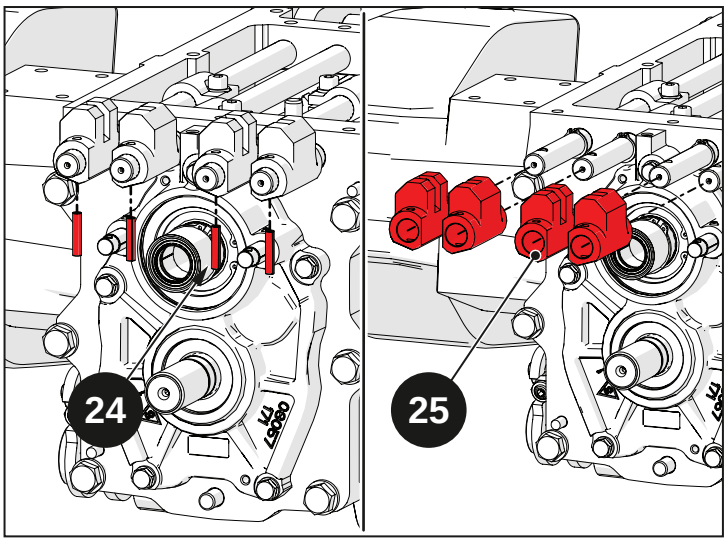

Fig. 5.11

Remove the balls (26).

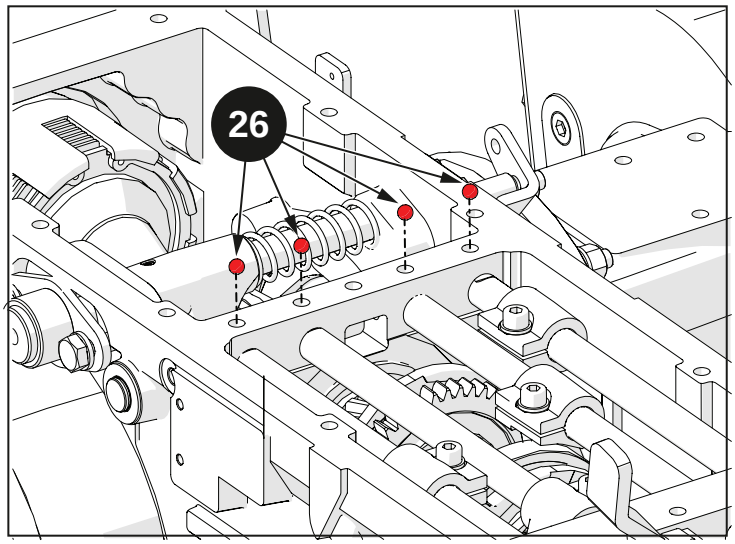

Fig. 5.12

Undo the screws (27) and remove the washers (28).

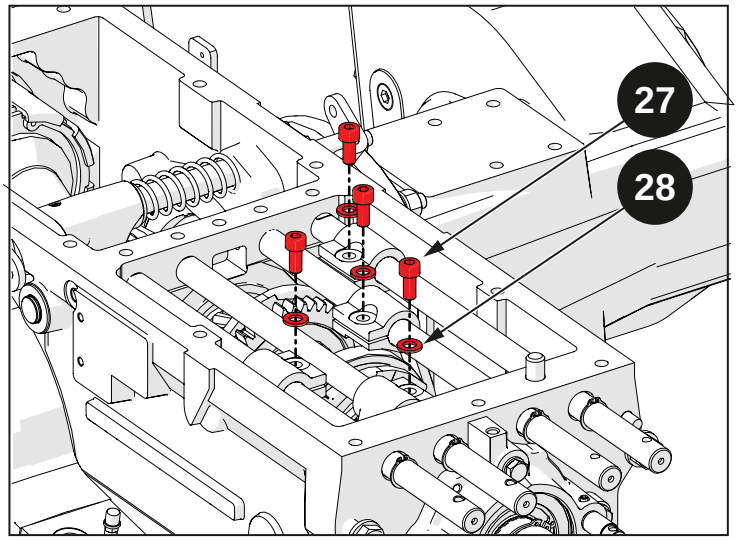

Fig. 5.13

Remove the circlips (29) and the O-rings (30), and then remove the rods.

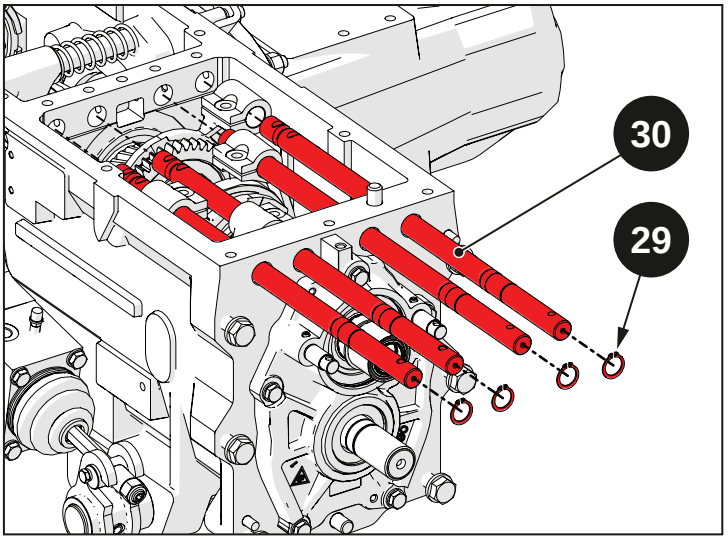

Fig. 5.14

Undo the impediment fastener screw (13) and remove the washer (14). Carry out this step on both sides of the gearbox casing.

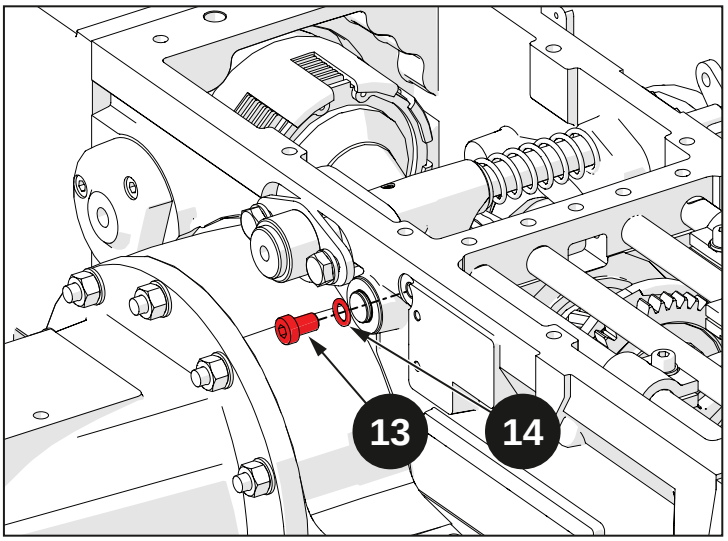

Fig. 5.15

Remove the impediment stops (31).

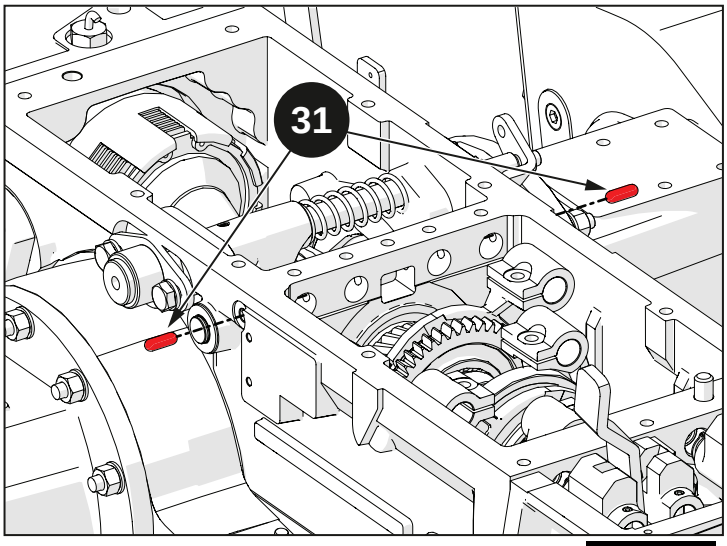

Fig. 5.16

5.4.2.2 Removing the differential lock

Undo the screws (32) and remove the washers (33).

Remove the guide bush (34).

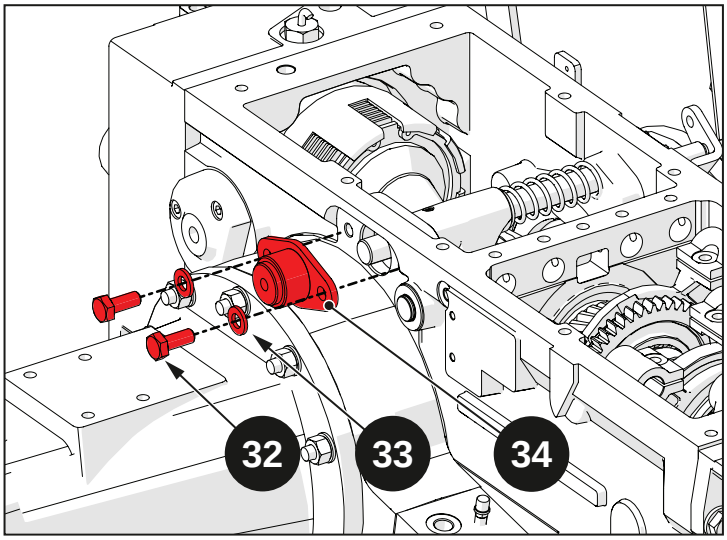

Fig. 5.17

Drive out the pin (35) with a pin punch.

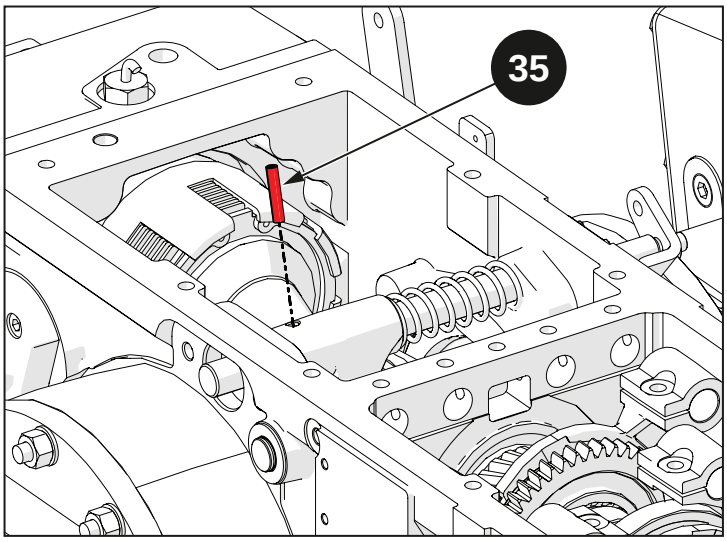

Fig. 5.18

Remove the rod (36).

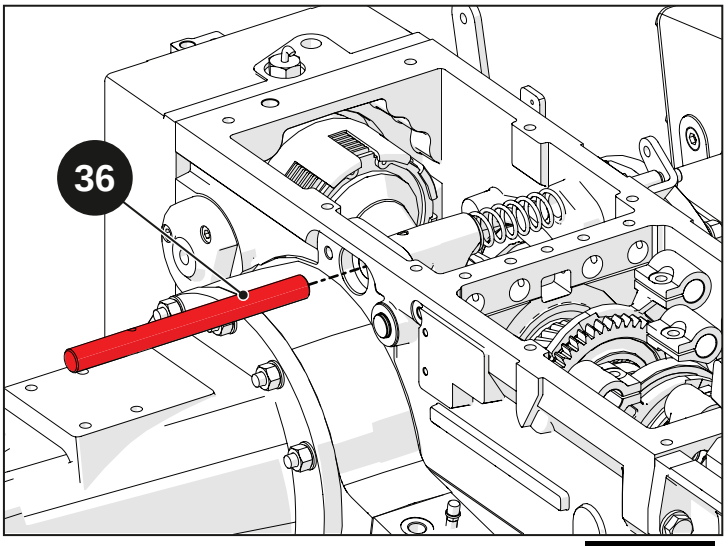

Fig. 5.19

Remove the fork (37) and the spring (38).

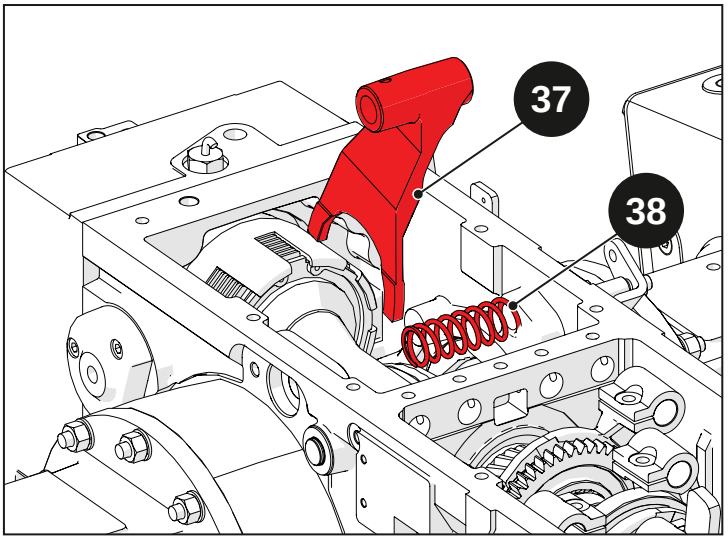

Fig. 5.20

5.4.2.3 Removing the differential

Carry out the following procedures before continuing with disassembly:

- Removing rear lateral final drive units (see chapter "07 - Rear lateral final drive units")
- Removing the brakes (see chapter "09 - Brakes")

Unscrew and remove the ring nut retainer (39) and then unscrew the ring nut (40). Carry out this step on both sides of the gearbox casing.

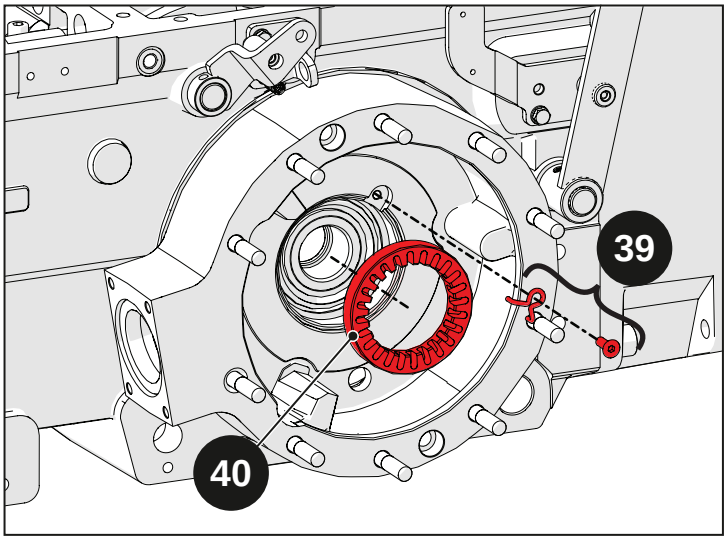

Fig. 5.21

Undo the screws (41) and remove the brake casing (42). Carry out this step on both sides of the gearbox casing.

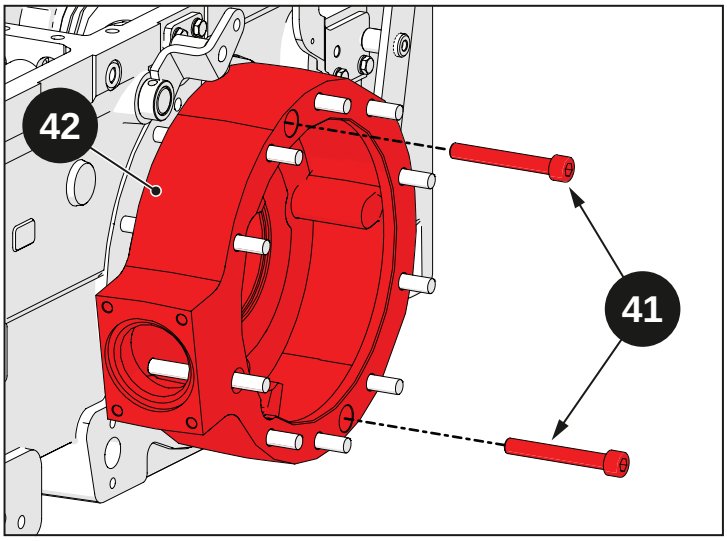

Fig. 5.22

Remove the outer bearing races (43) from the brake casings (42).

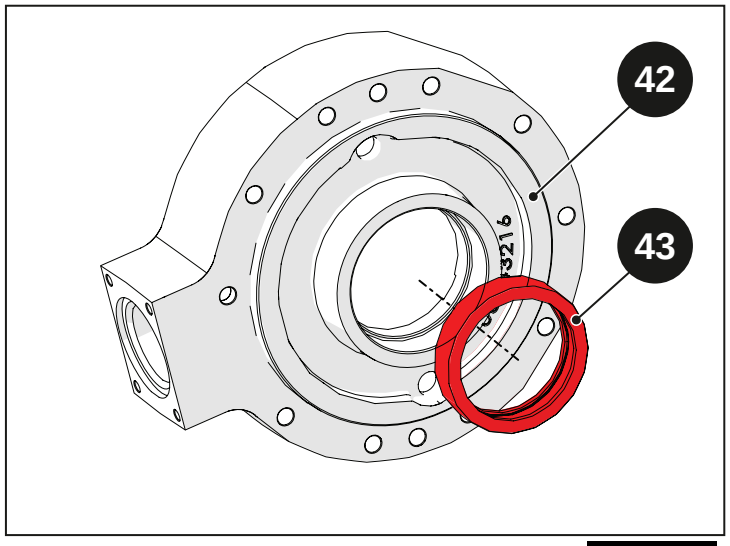

Fig. 5.23

Remove the complete crown wheel assembly (44) from the gearbox casing.

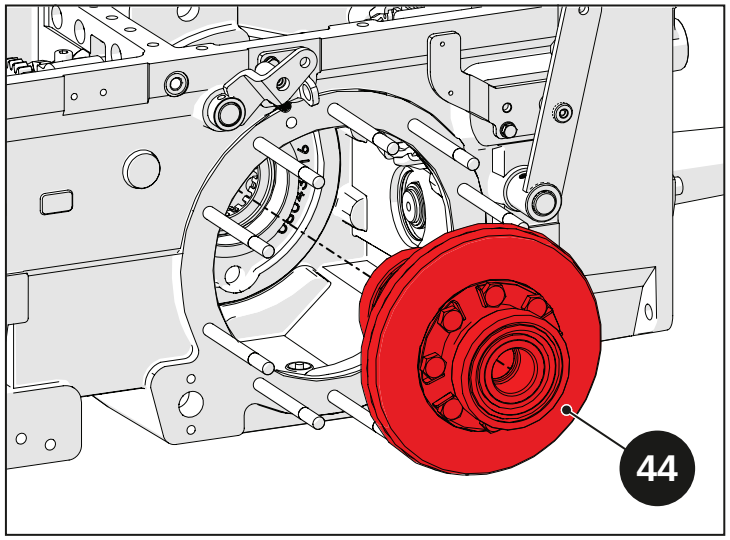

Fig. 5.24

Remove the inner bearing races (43) on the crown wheel assembly (44).

Warning

To remove the complete crown wheel assembly (44), see the Chapter “Disassembling/Assembling the differential crown wheel".

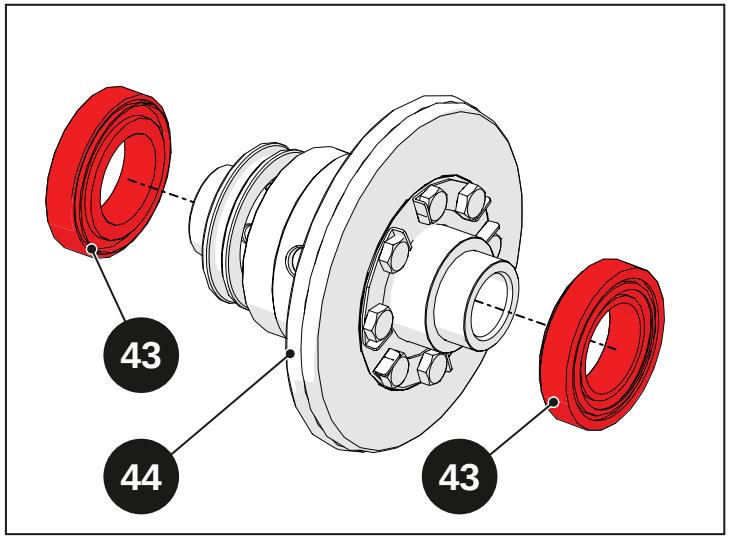

Fig. 5.25

5.4.2.4 Disassembling the gearbox front cover

Carry out the following procedures before continuing with disassembly:

- Removing the rear PTO (see section "Disassembling the PTO")

Remove the pins (128) and remove the pins (18).

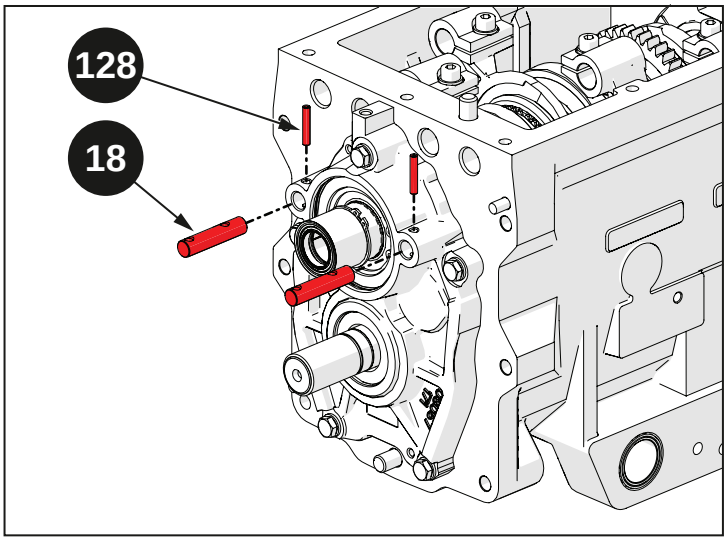

Fig. 5.26

Remove the spacer (130) and the oil seal (129).

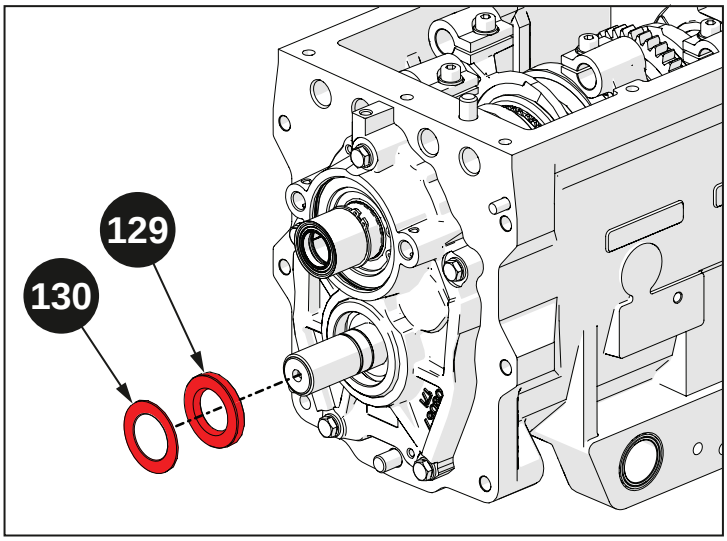

Fig. 5.27

Remove the two circlips (131) and (132).

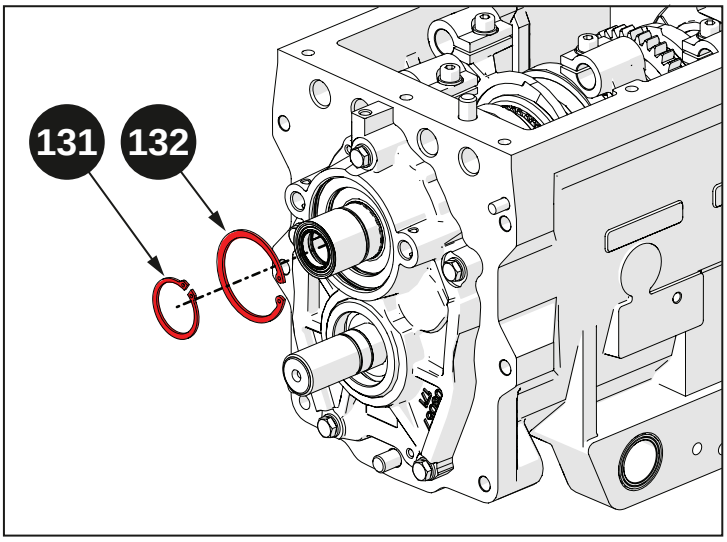

Fig. 5.28

Remove the bush (134) and then remove the circlip (136).

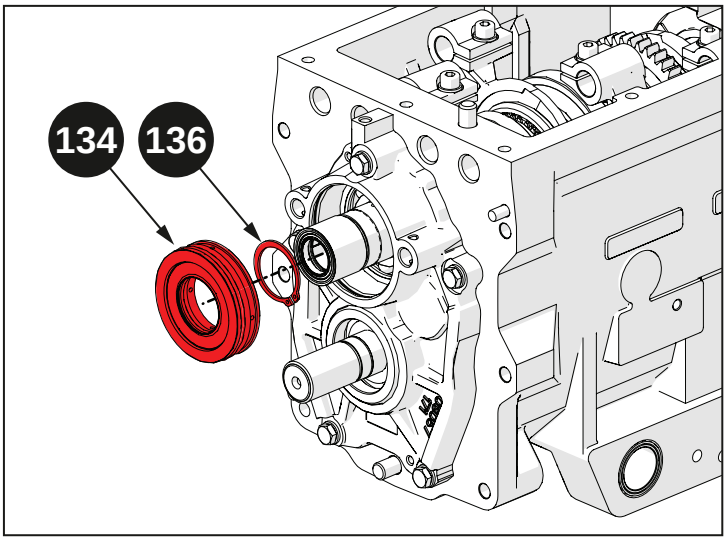

Fig. 5.29

Remove the O-ring (135) and the oil seal (137) from the bush (134).

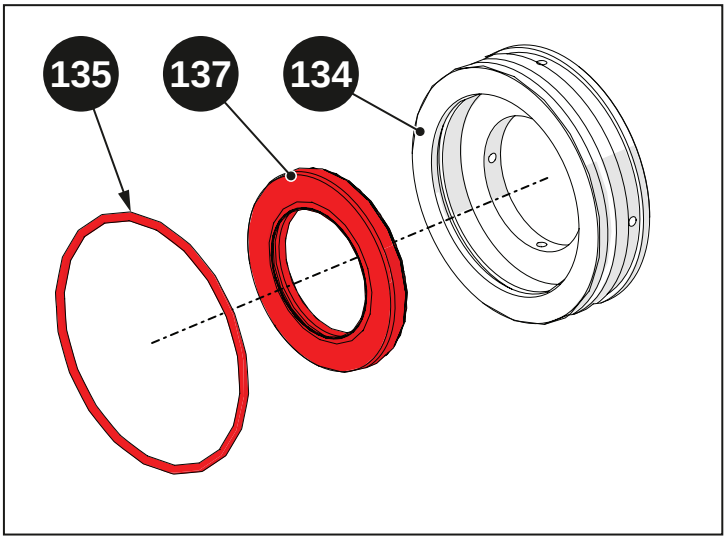

Fig. 5.30

Undo the screws (138) and (139) and remove the washers (140).

Remove the gearbox cover (141).

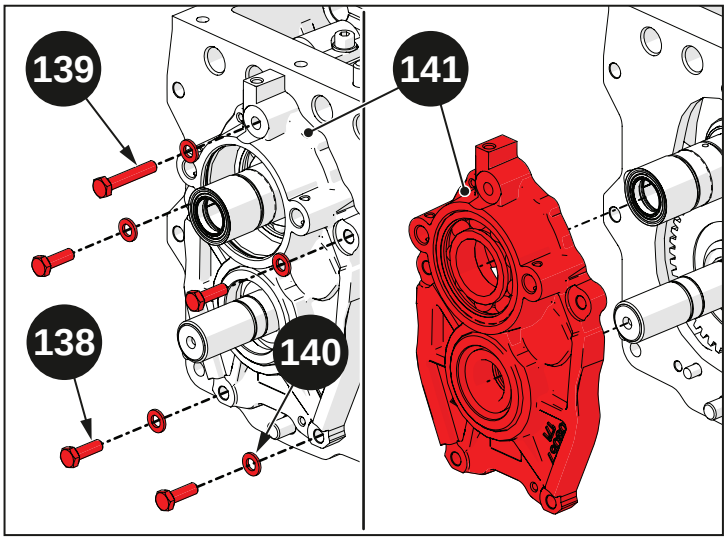

Fig. 5.31

Remove the bearings (142) and (143) from the gearbox cover (141).

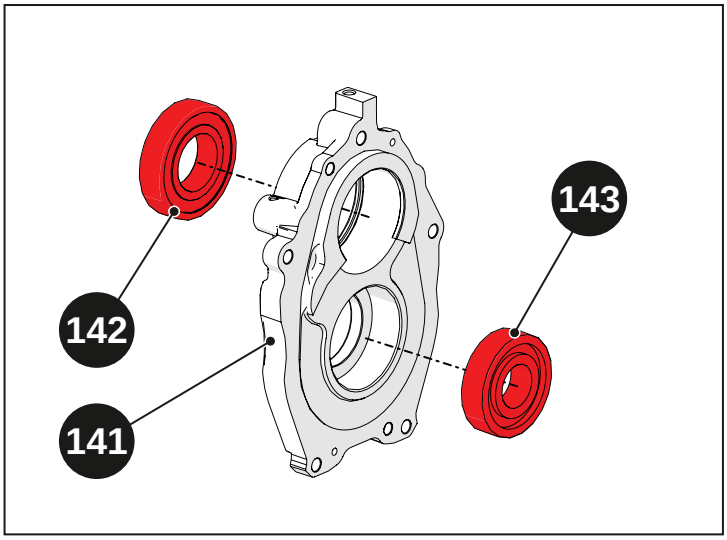

Fig. 5.32

5.4.2.5 Removing the gearbox

Remove the following components from the bevel pinion:

- circlip (144);
- spacer (145);
- roller spacer (146);
- spacer (147).

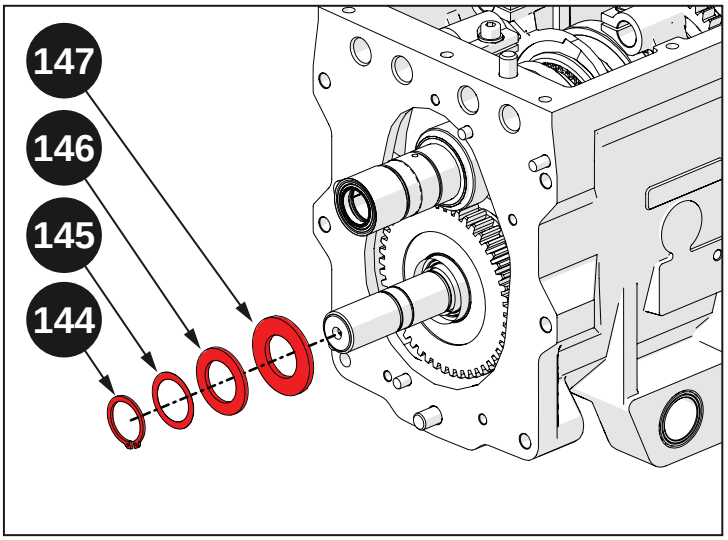

Fig. 5.33

Remove the 1st speed gear (148) from the bevel pinion and remove the roller bearing cage (149).

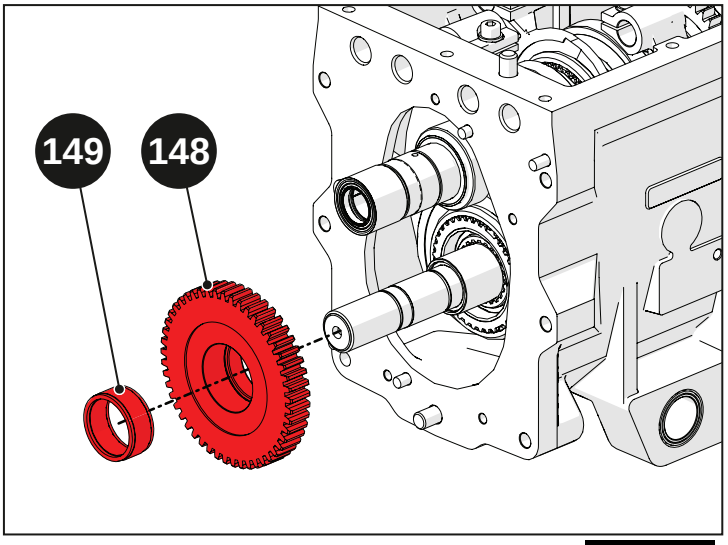

Fig. 5.34

Remove the fork (150) and then remove the complete 3rd and 4th speed gear (151) from the bevel pinion (152).

Remove la fork (153) engaged on the synchroniser (154).

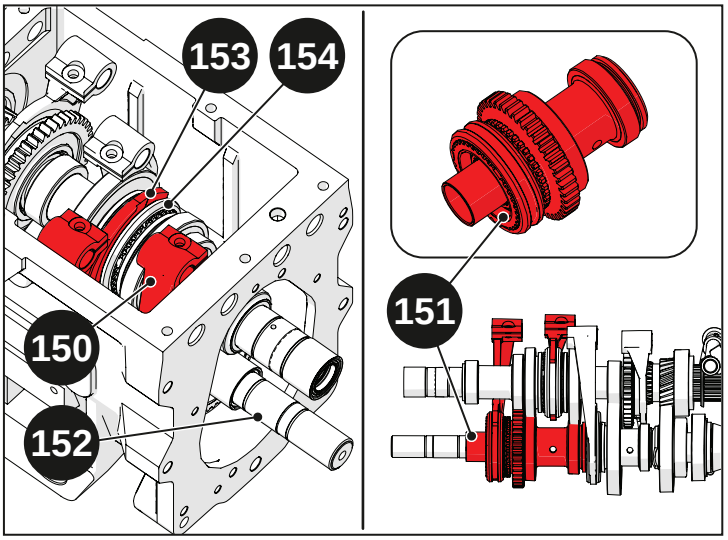

Fig. 5.35

Disassemble the 3rd and 4th speed gear (151):

- front roller bearing cage (155);
- synchroniser (156);
- 2nd speed gear (157);
- roller bearing cage (158);
- bush (159).
- rear roller bearing cage (160);

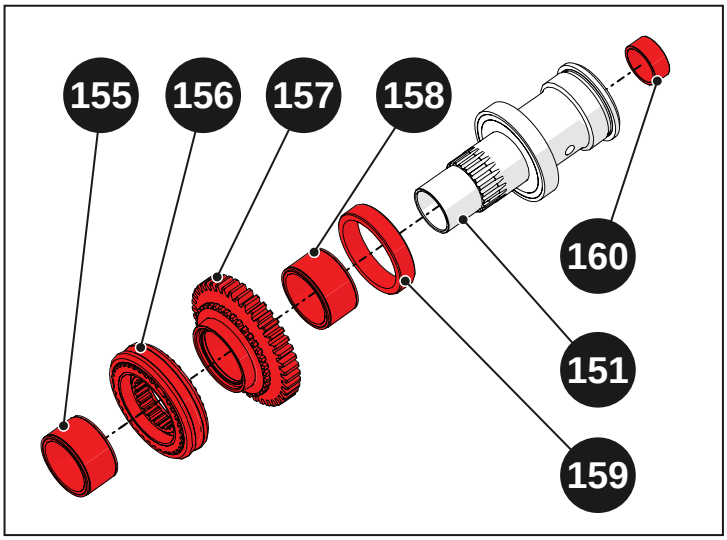

Fig. 5.36

Remove the complete primary shaft (161) by pulling it out from the gear (162).

Note

To remove the primary shaft (161), see the Chapter “Disassembling/Assembling the primary shaft".

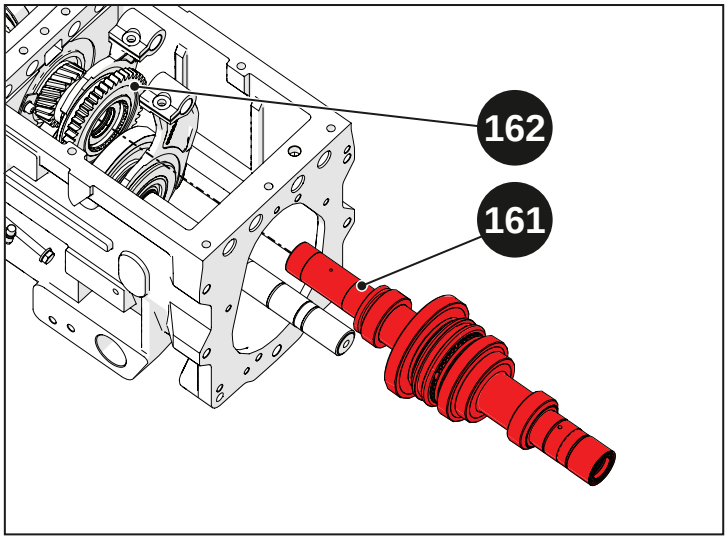

Fig. 5.37

Remove the fork (163) and the fork (164).

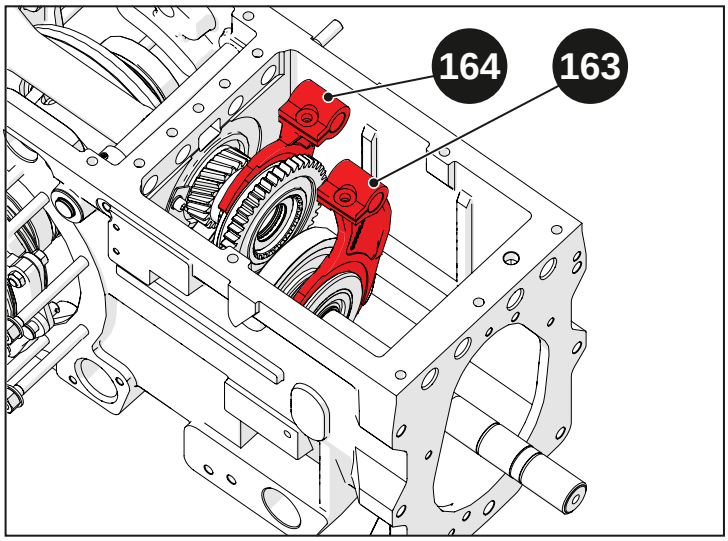

Fig. 5.38

Remove the following components from the bevel pinion (152):

- spacer (165);
- roller spacer (166);
- spacer (167);
- circlip (168);
- splined ring (169);
- selector sleeve (170);

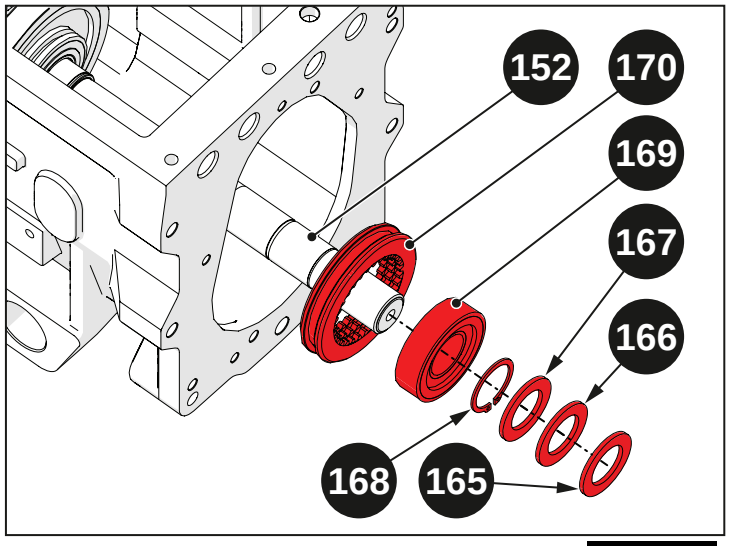

Fig. 5.39

Remove the bush (171), the roller bearing cage (172), the ML-L gear (173) and the roller bearing cage (174) from the pinion (152).

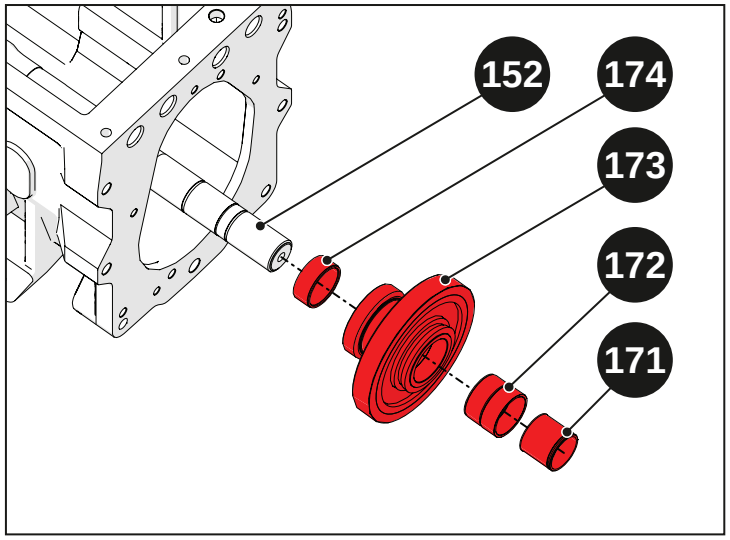

Fig. 5.40

Remove the spacer (176) and the rear roller bearing cage (177) from the splined hub (175).

Remove the front roller bearing cage (178) from the splined hub (175).

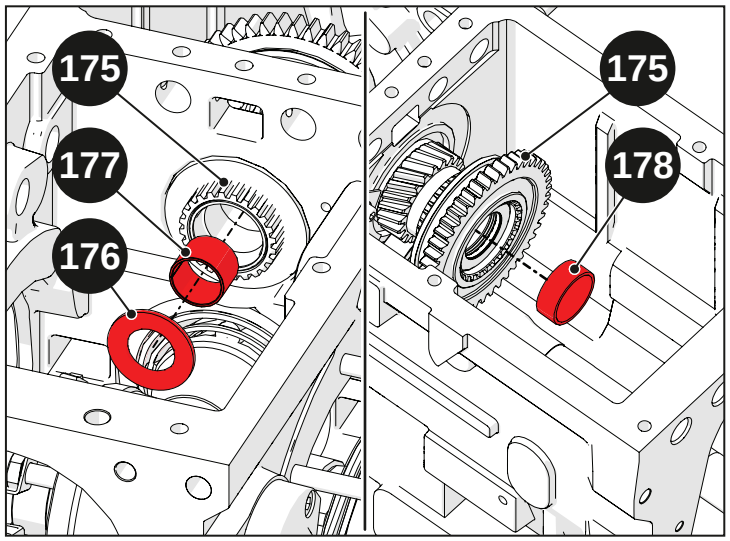

Fig. 5.41

Remove the circlip (179) from the splined hub (175).

Separate the splined hub (175) from the ML-L gear (180).

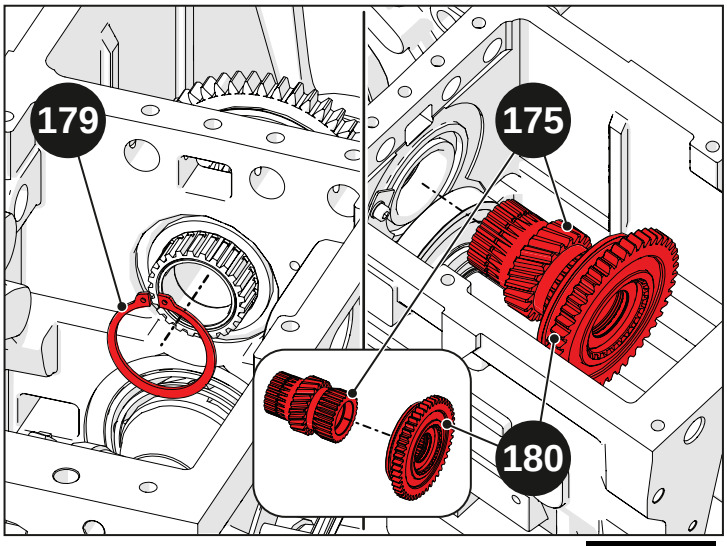

Fig. 5.42

Remove the following components from the bevel pinion (152):

- spacer (181);
- ring nut (182);
- ring nut retainer washer (183);
- gear (184).

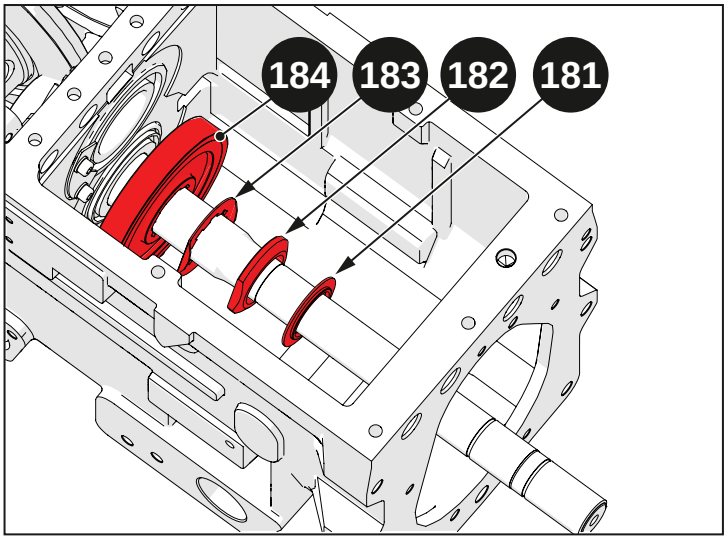

Fig. 5.43

Tap the bevel pinion (152) to drive it out from the opposite side together with the inner bearing race (185).

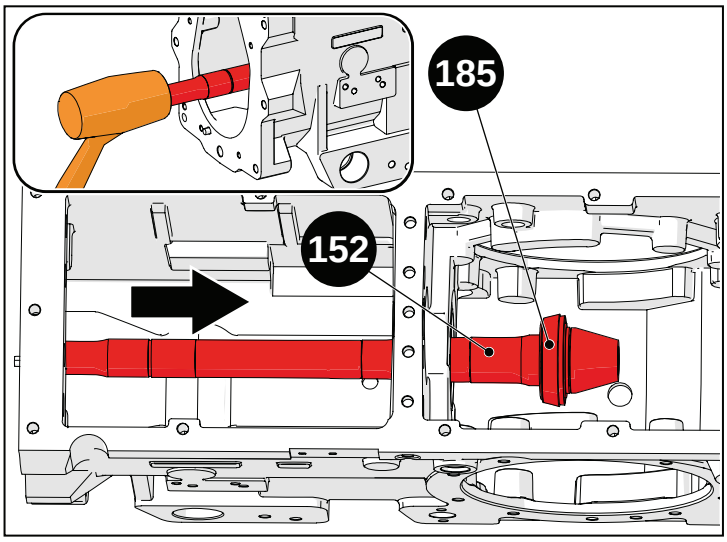

Fig. 5.44

Remove the outer bearing race (185), the circlip (186) and the bearing (187).

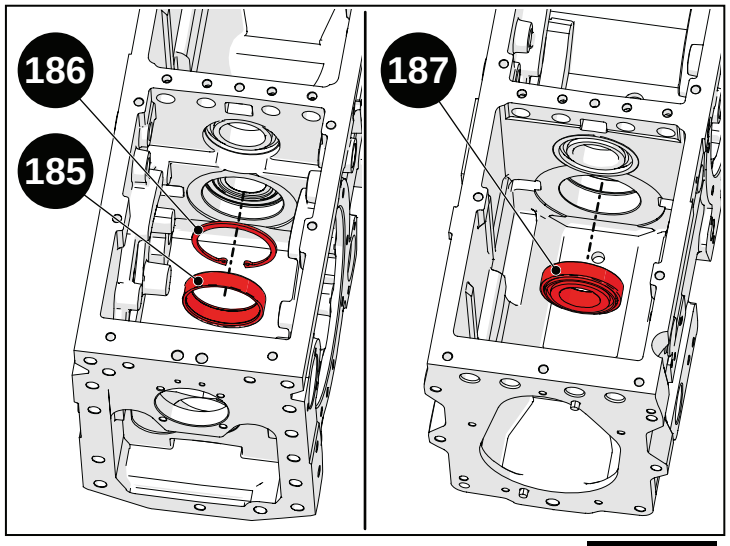

Fig. 5.45

Undo the screws (188) and remove the washers (189) and the retainer (190).

Remove the bearing (191).

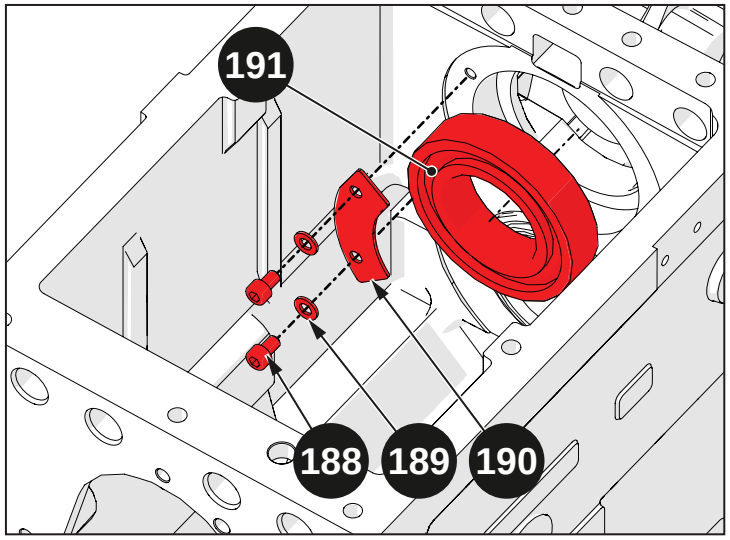

Fig. 5.46

Undo the plug (192) and the plug (193), together with the washer (194).

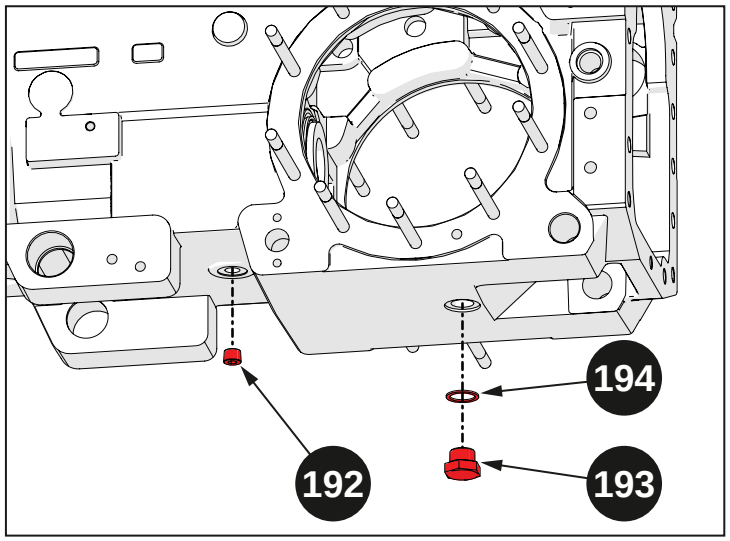

Fig. 5.47

5.4.2.6 Disassembling/Assembling the differential crown wheel

Disassembly

Remove the differential lock ring (1).

Remove the balls (2) from the differential case (3).

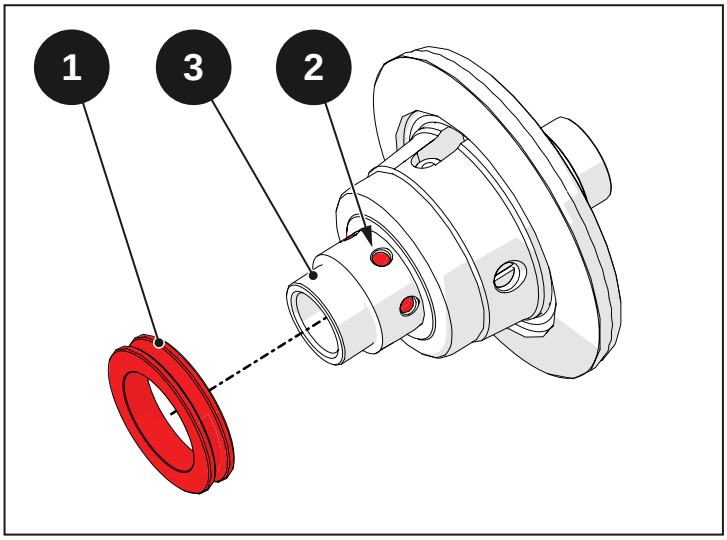

Fig. 5.48

Use a scalpel to bend back the plates (5) and free the screws (4).

Undo the screws (4) and remove the plates (5).

Remove the bevel crown wheel (6).

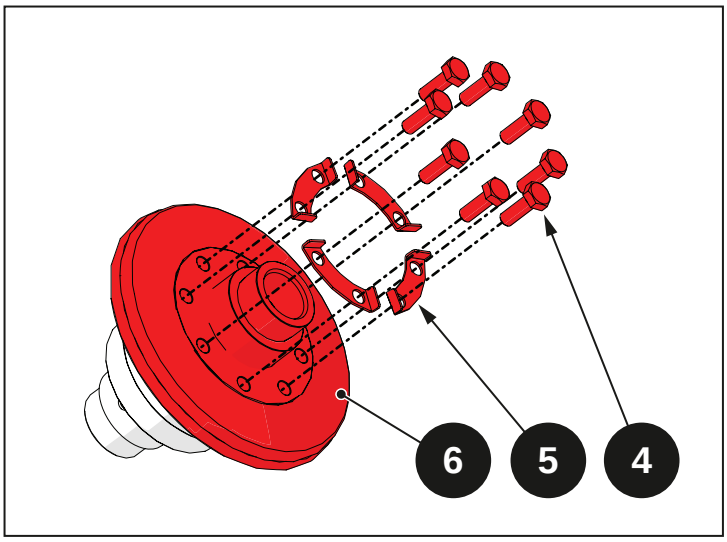

Fig. 5.49

Remove the sun gear (7) from the differential case (3).

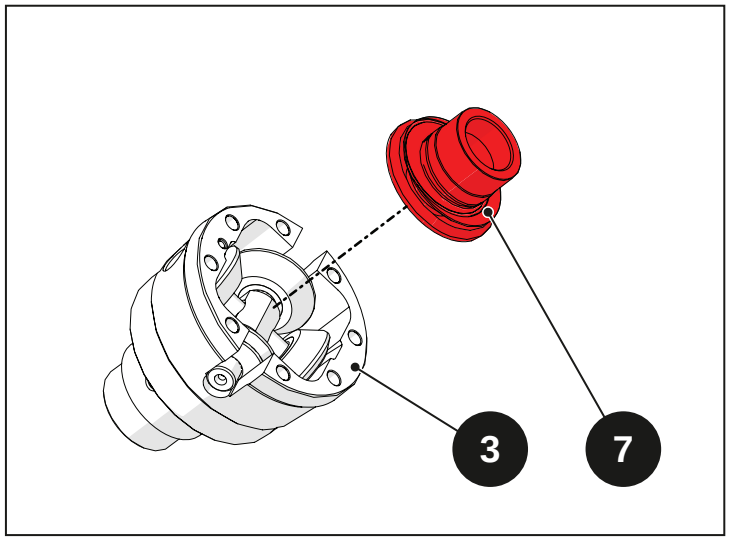

Fig. 5.50

Remove the pin (8) and remove the spindle (9).

Remove the planet gears (10) and the planet gear spindle (11).

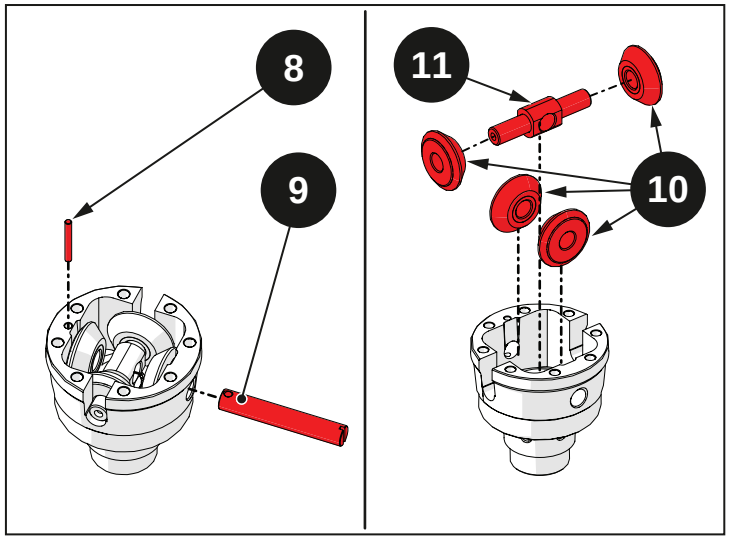

Fig. 5.51

Remove the sun gear (12) from the differential case (3).

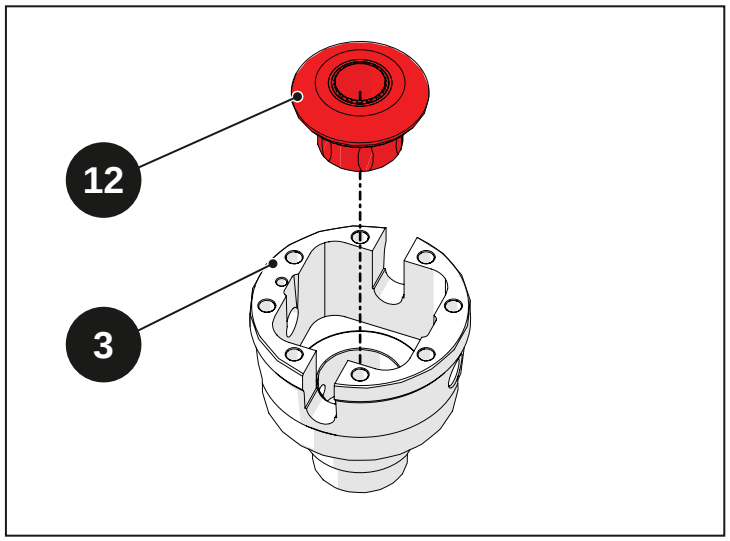

Fig. 5.52

Assembly

Fit the sun gear (12) in the differential case (3).

Warning
Make sure that the sun gear has splines for balls.

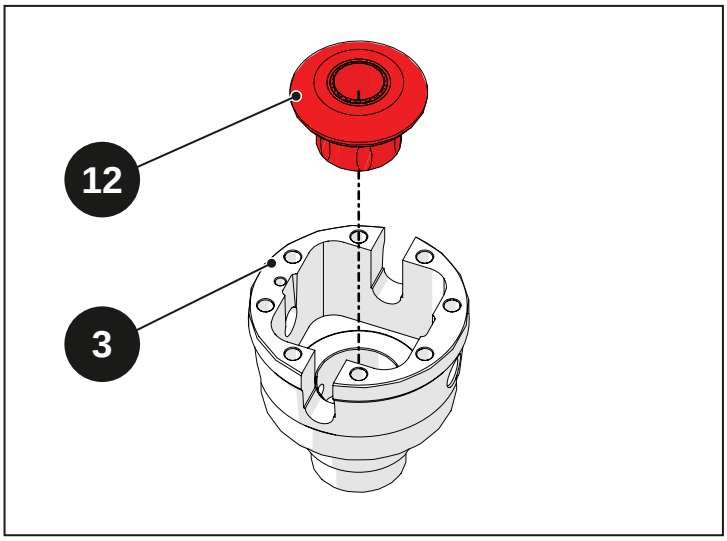

Fig. 5.53

Fit two planet gears (10) on the planet gear spindle (11) and fit the spindle in the seats in the differential case (3).

Fit the other two planet gears in the differential case (3).

Fit the spindle (9) and fasten with the pin (8).

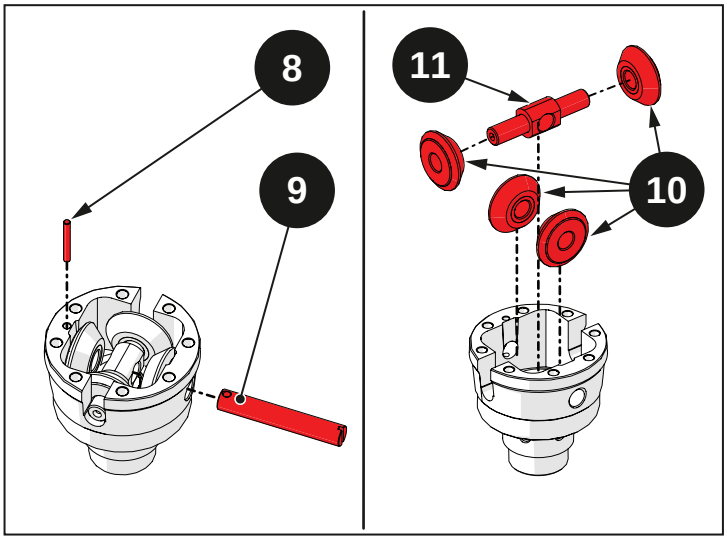

Fig. 5.54

Fit the sun gear (7) in the differential case (3).

Secure the gear set by tapping on the sun gear with a rubber mallet and check that everything turns smoothly.

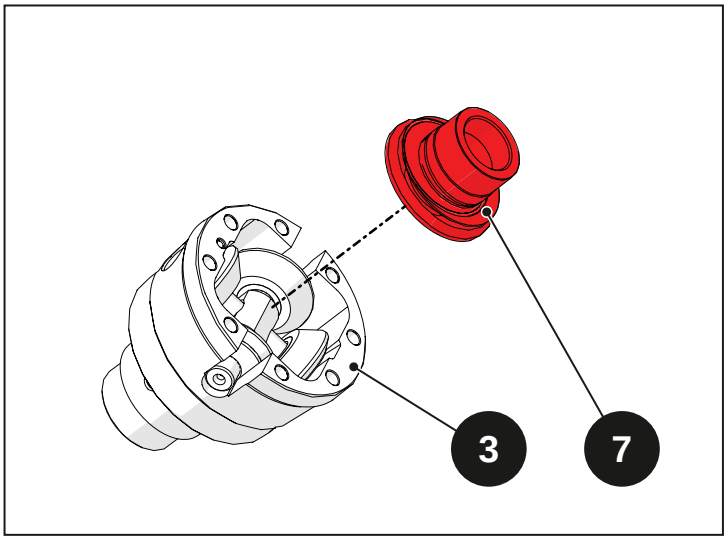

Fig. 5.55

Fit and tighten the screws (4), together with the plates (5), to fasten the bevel crown wheel (6) to the differential case. Apply a tightening torque of 90 Nm (9 kgm).

Bend the plates (5) to secure the screws (4) definitively.

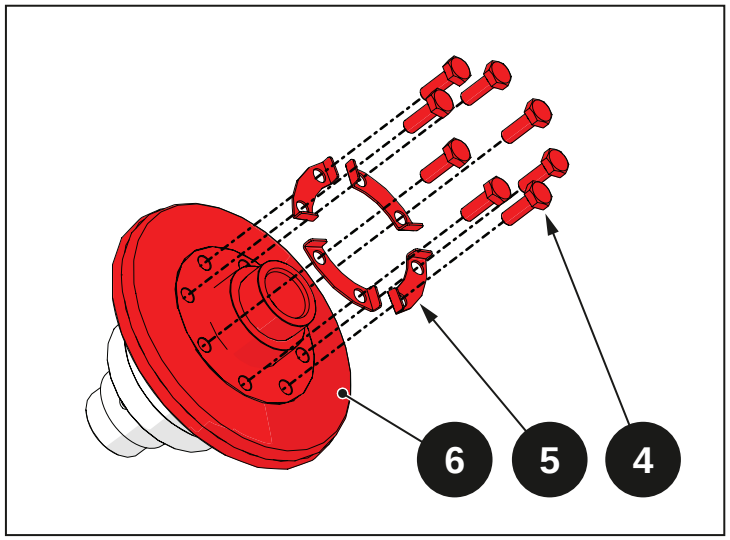

Fig. 5.56

Grease the housing of the balls on the differential case (3) and then fit the balls (2).

Fit the differential lock ring (1) with the bevelled side facing the crown wheel.

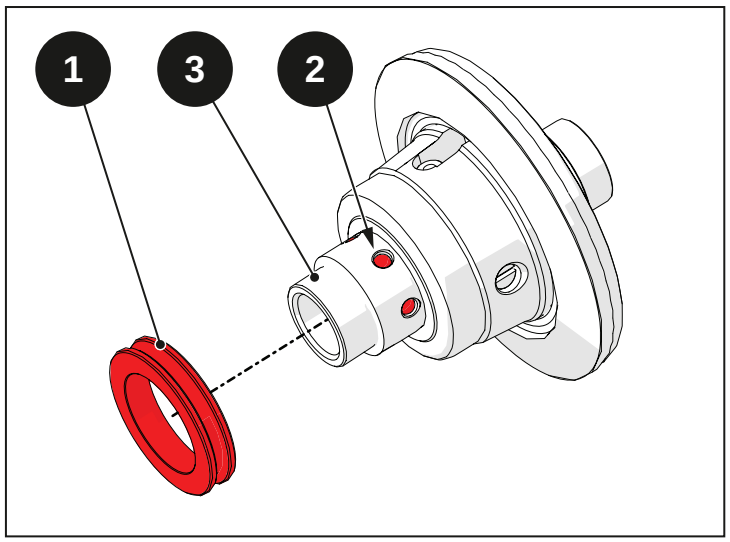

Fig. 5.57

5.4.2.7 Disassembling/Assembling the primary shaft

Disassembly

Remove the following components from the rear end of the primary shaft (1):

- gear (3);
- roller bearing cage (2);

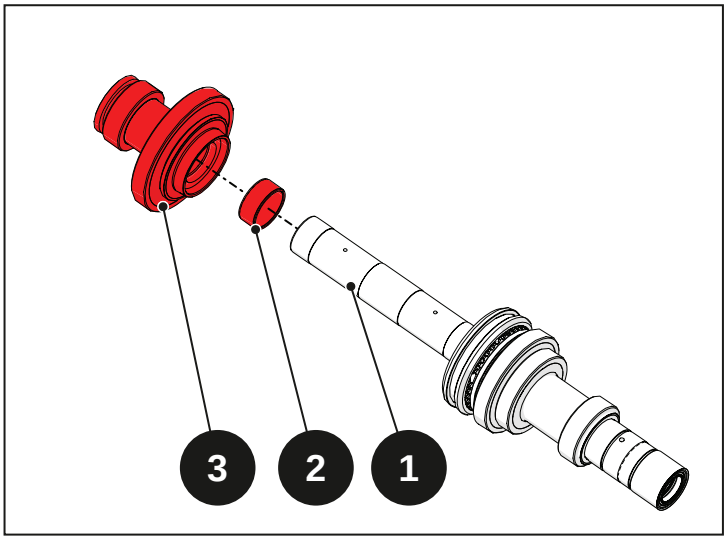

Fig. 5.58

- spacer (4);
- roller spacer (5);
- spacer (6).

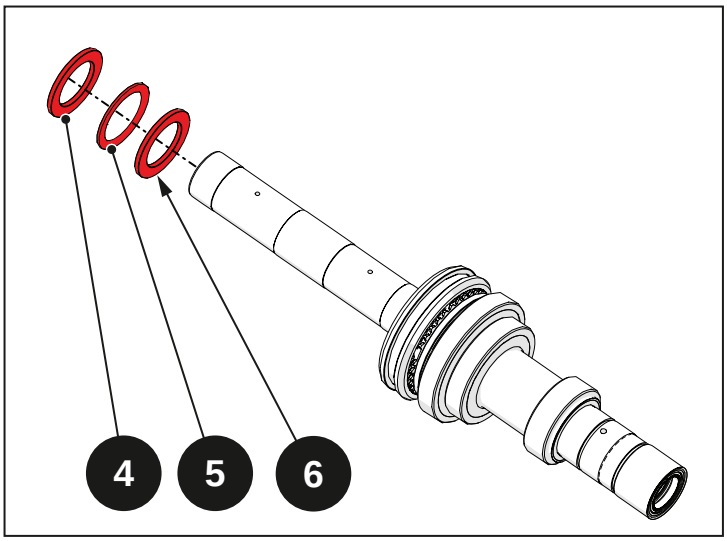

Fig. 5.59

- synchroniser (7);

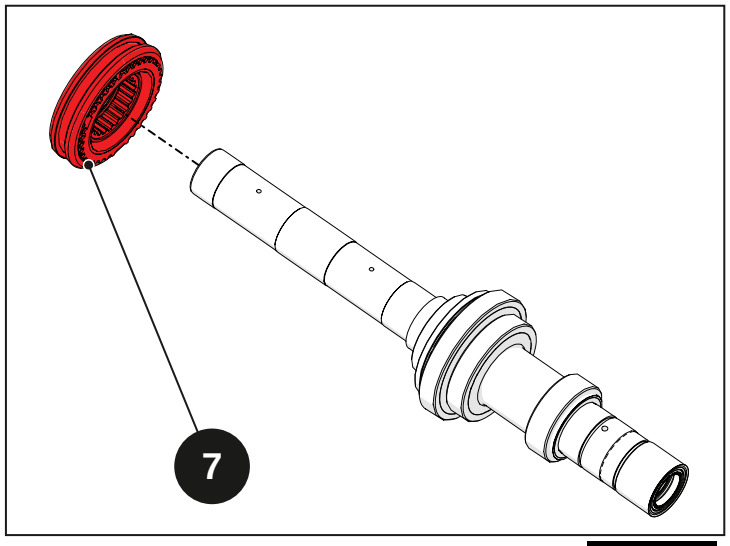

Fig. 5.60

- gear (8).
- roller bearing cage (9);
- bush (10);

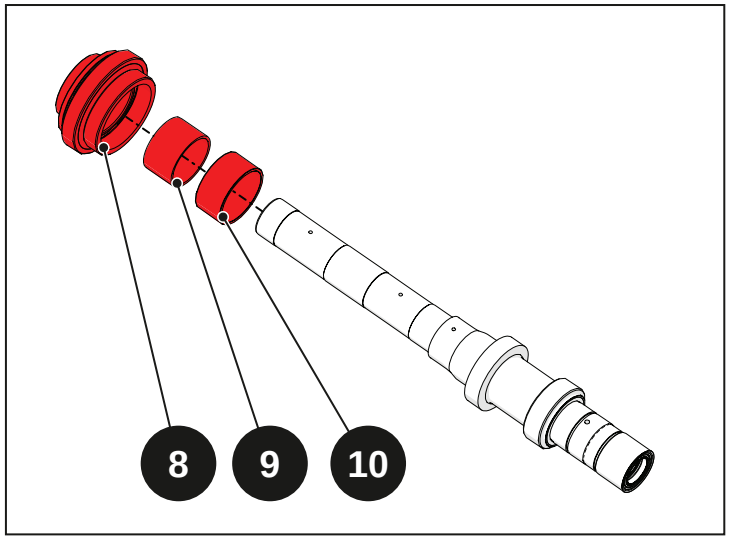

Fig. 5.61

Remove the following components from the front end of the primary shaft (1):

- oil seal (12);
- bush (11);

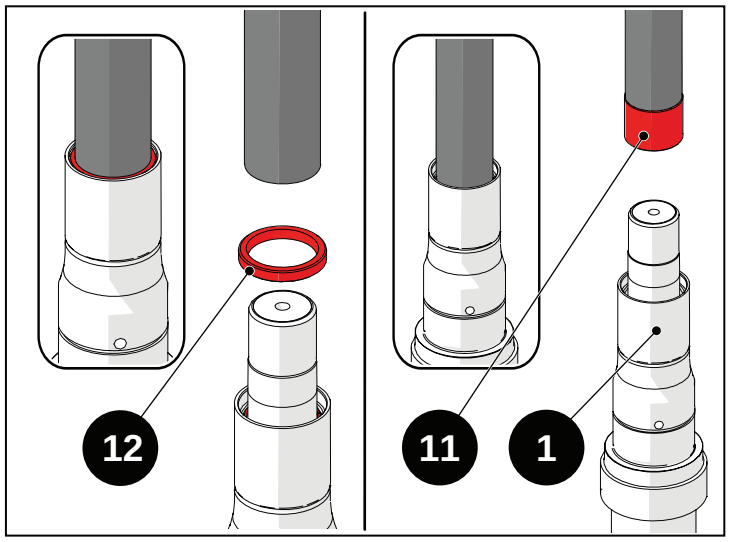

Fig. 5.62

Assembly

Fit the following components on the front end of the primary shaft (1) in the order indicated:

- bush (11);
- oil seal (12), driving it into its seat with a punch tool of suitable diameter.

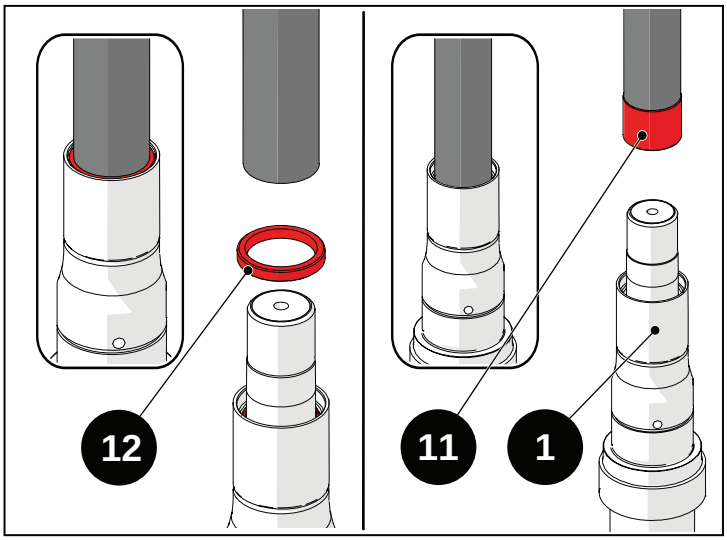

Fig. 5.63

Fit the following components on the rear end of the primary shaft in the order indicated:

- bush (10);
- roller bearing cage (9);
- gear (8).

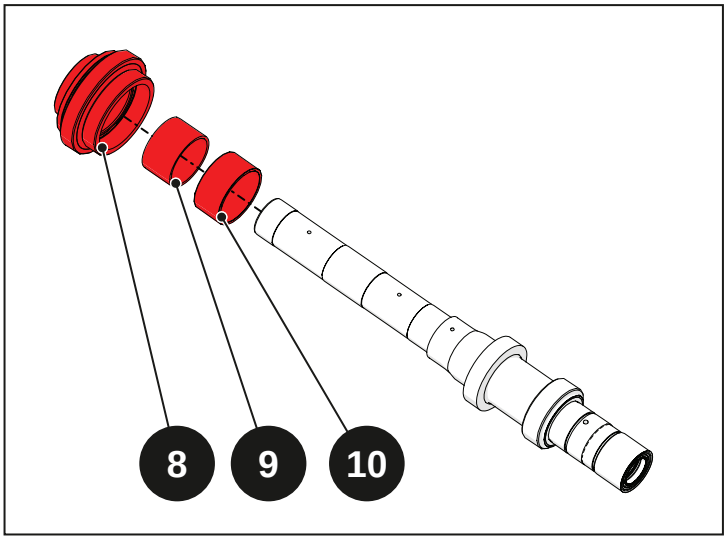

Fig. 5.64

- synchroniser (7);

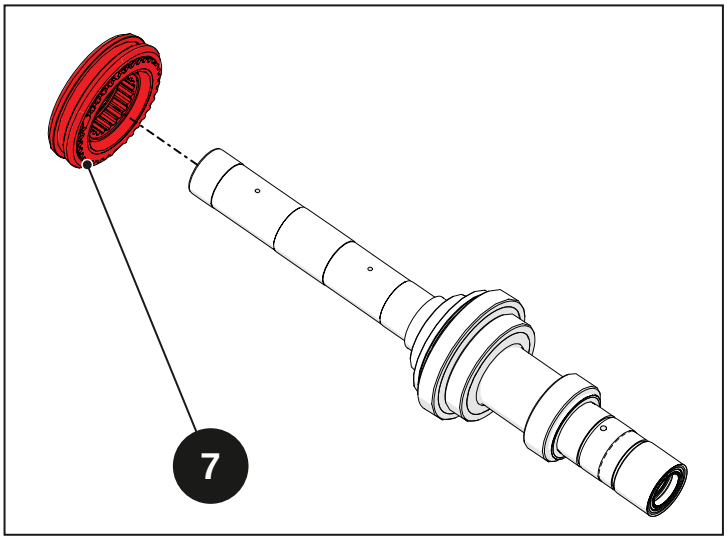

Fig. 5.65

- spacer (6).
- roller spacer (5);
- spacer (4);

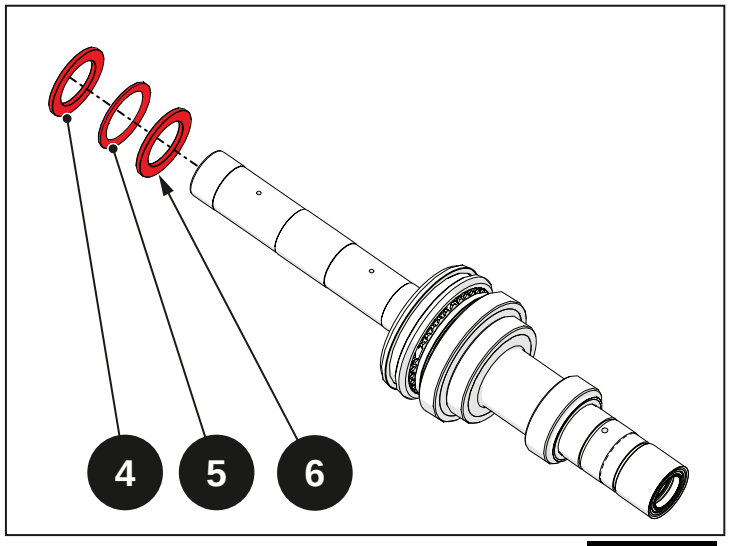

Fig. 5.66

- roller bearing cage (2);
- gear (3);

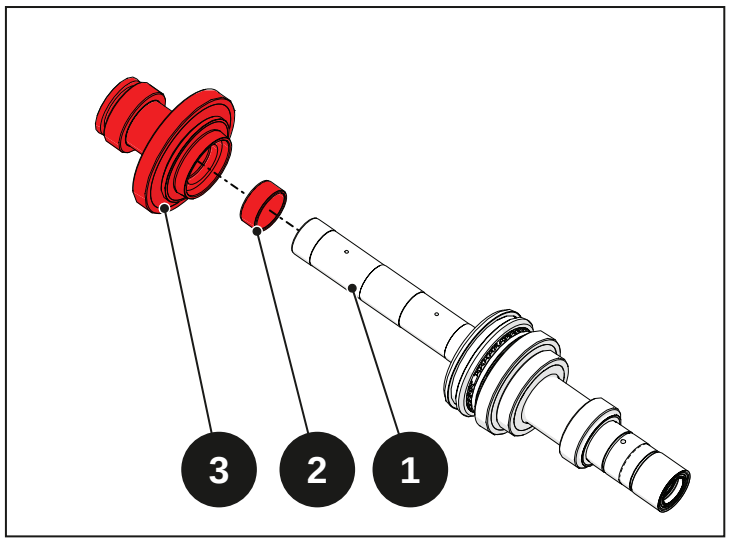

Fig. 5.67

5.4.3 Disassembling the PTO

Carry out the following procedures before continuing with disassembly:

- Removing rear left hand lateral final drive unit (see chapter "07 - Rear lateral final drive units")

Remove la pin (45) to free the lever (46).

Remove the lever (46) and the: engagement pin (47), spring (48) and O-ring (49).

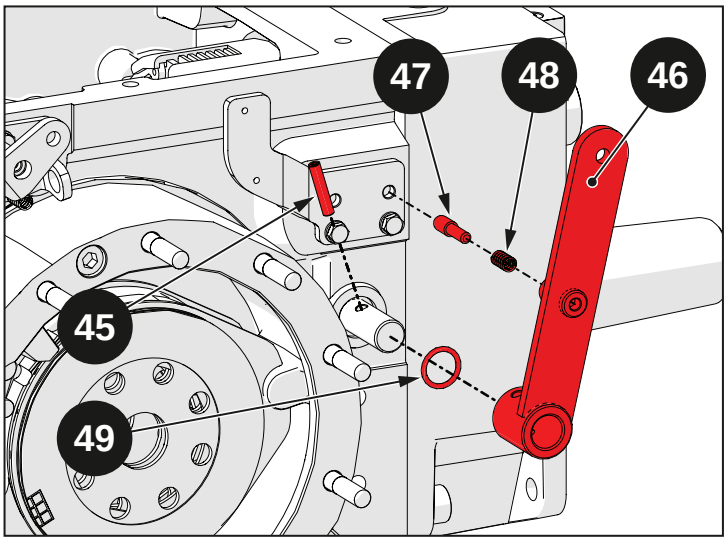

Fig. 5.68

Undo the screws (50) and remove the washers (51).

Remove the bracket (52).

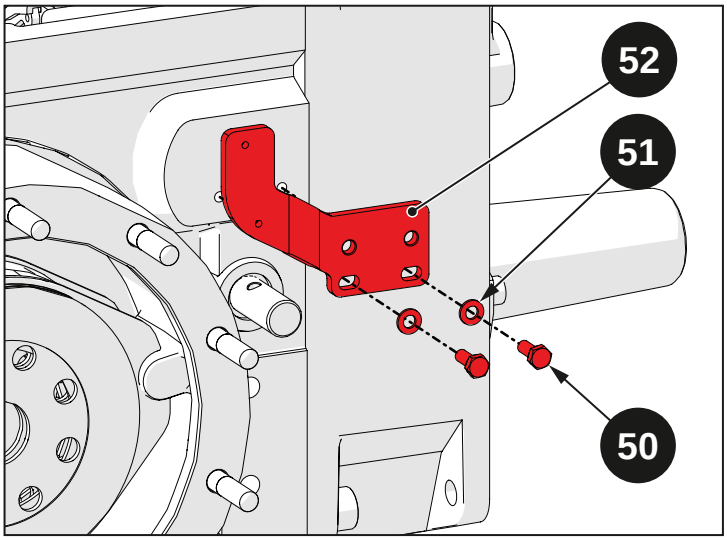

Fig. 5.69

Undo the screws (62) and (63).

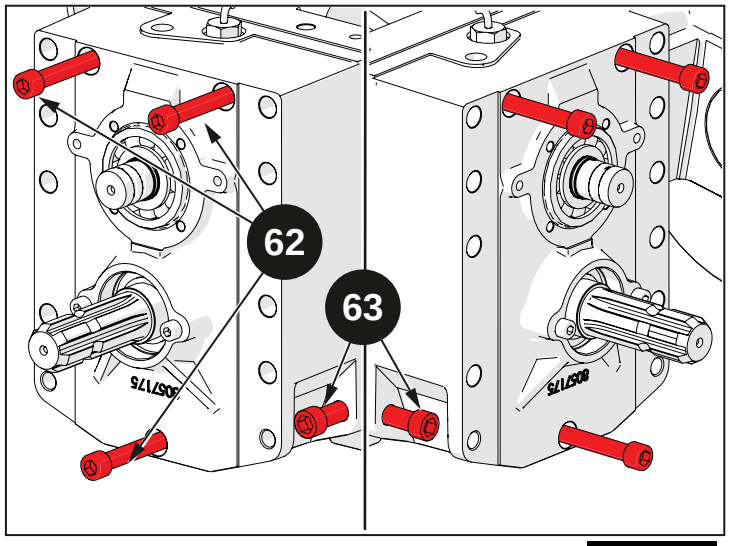

Fig. 5.70

Separate the complete rear cover (64) from the gearbox casing.

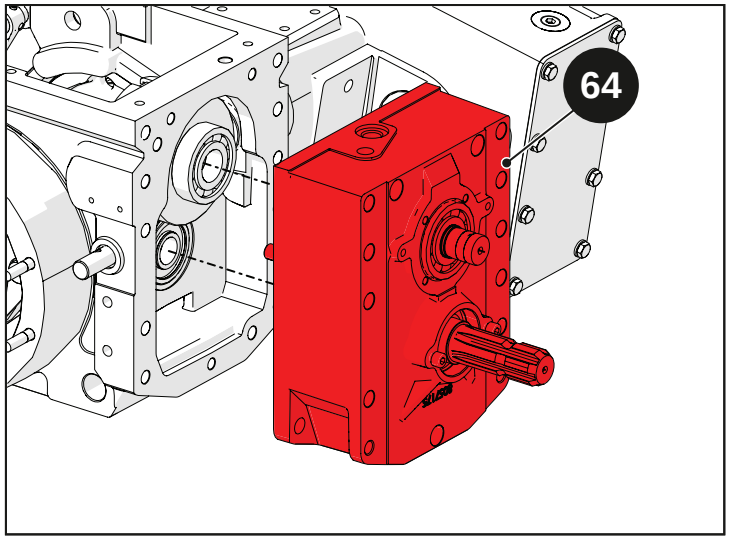

Fig. 5.71

Undo the screws (53) and remove the washers (54).

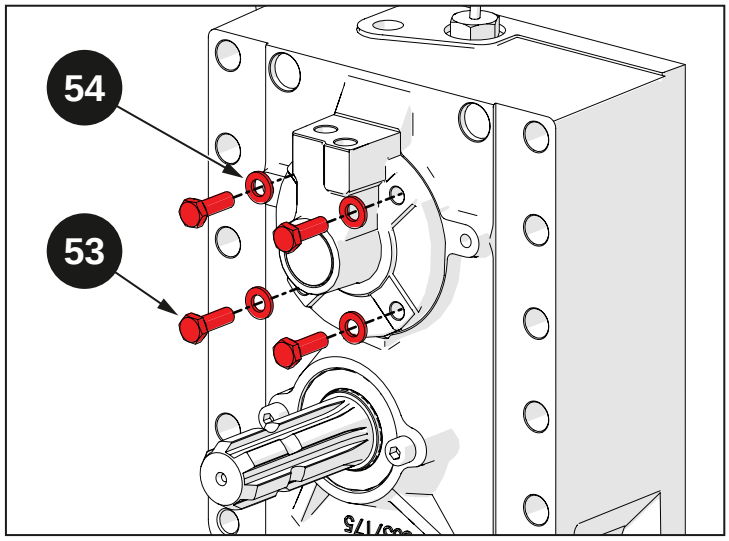

Fig. 5.72

Remove the shaft carrier (55), the plug (57) and the quad rings (58).

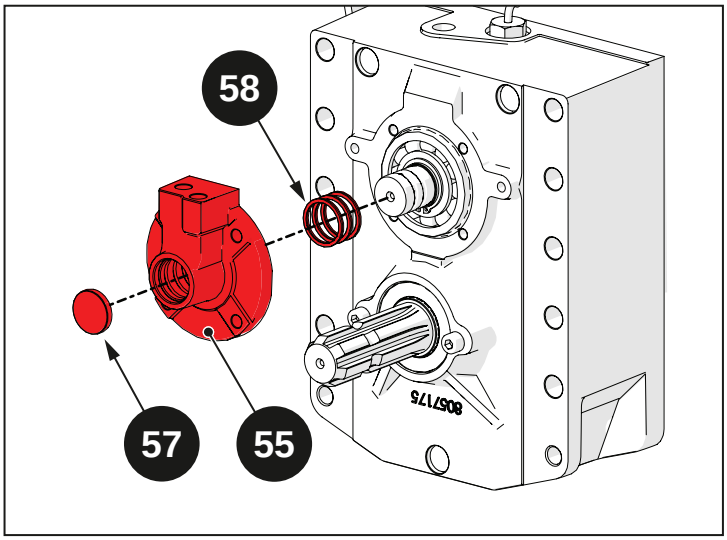

Fig. 5.73

Remove oil seal (59).

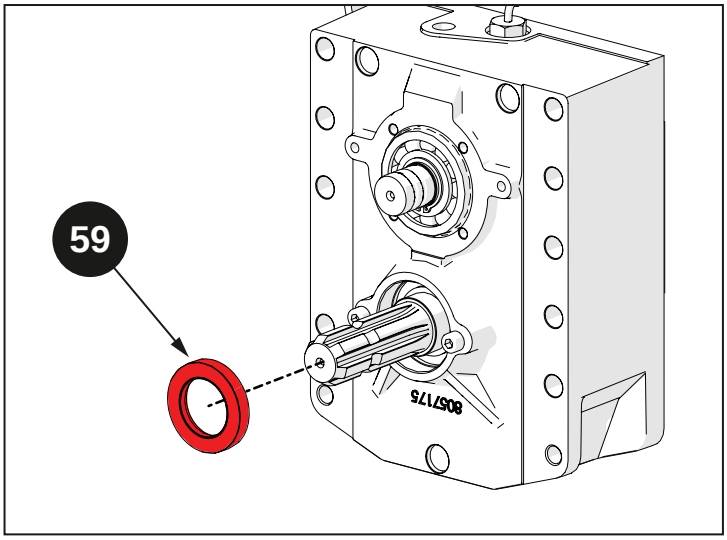

Fig. 5.74

Remove the circlip (60) to release the bearing (61).

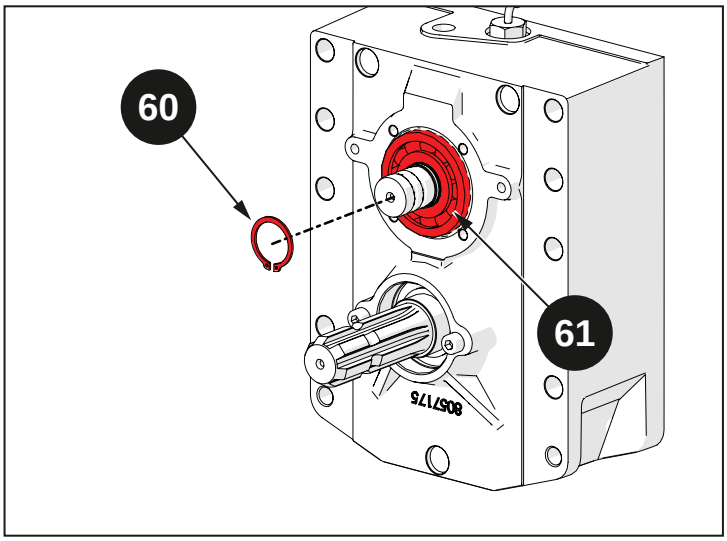

Fig. 5.75

Remove the bearing (61) from the rear cover.

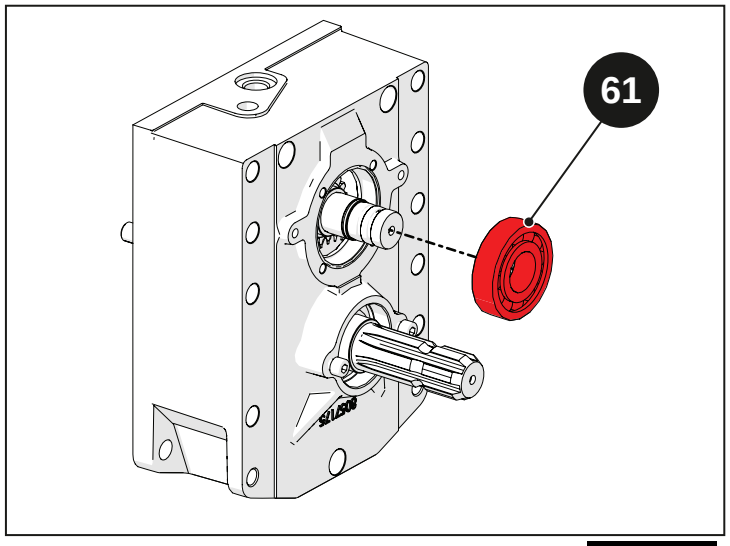

Fig. 5.76

Remove the final PTO shaft (65).

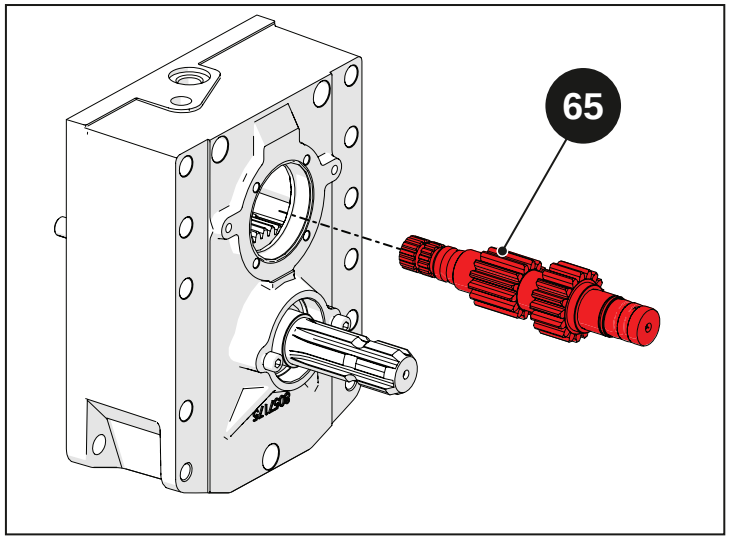

Fig. 5.77

Remove the bearing (66).

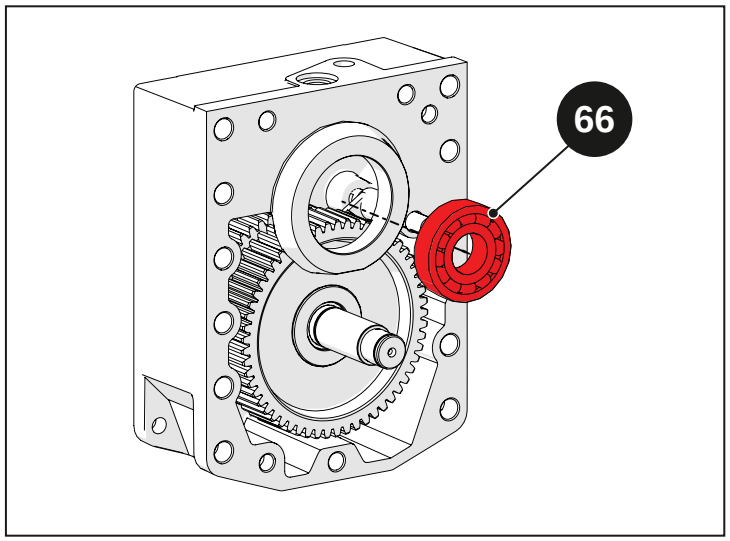

Fig. 5.78

Remove the circlip (68) and the spacer (67).

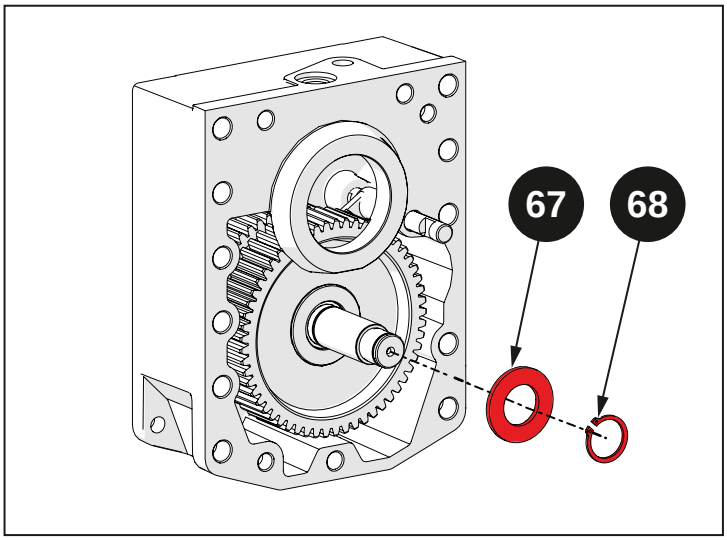

Fig. 5.79

Remove the PTO sleeve (69).

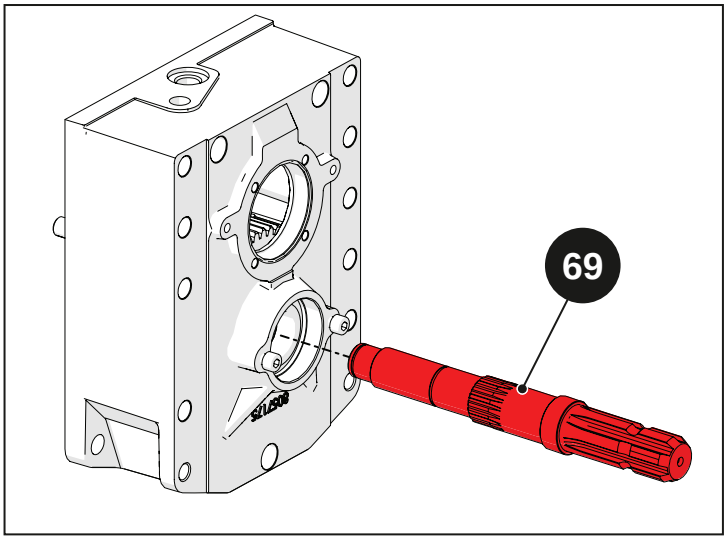

Fig. 5.80

Remove the two roller bearing cages (74) and the bush (70).

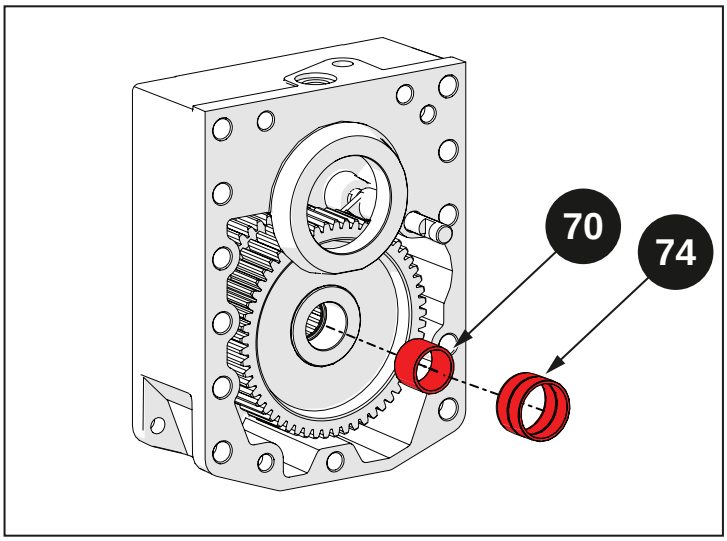

Fig. 5.81

Remove the gear (71).

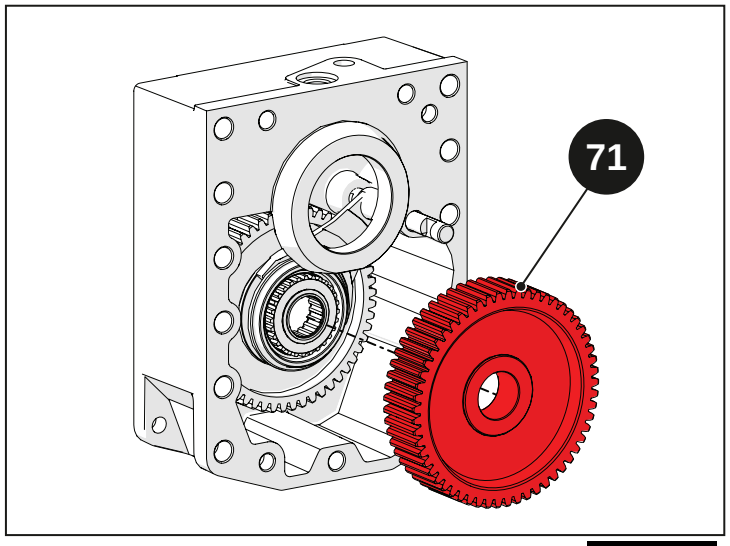

Fig. 5.82

Remove the PTO speed selector (73).

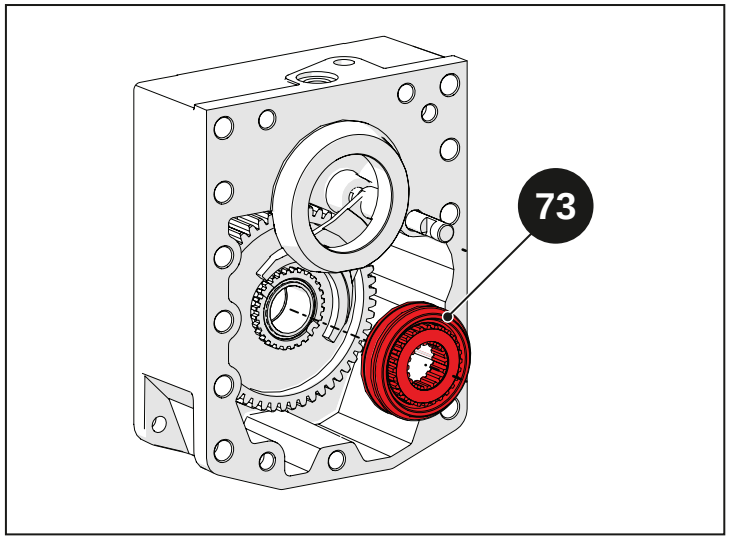

Fig. 5.83

Remove the roller bearing cage (72), the spacer (75) and the gear (76).

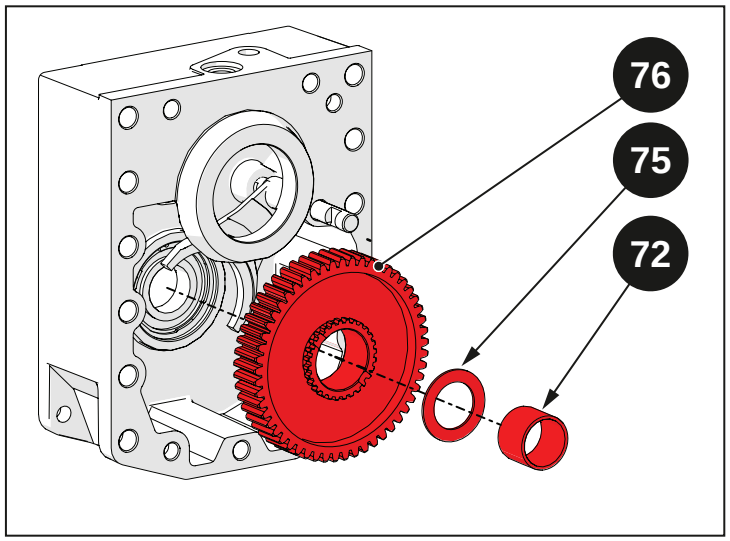

Fig. 5.84

Remove the spacer (77), the circlip (78) and the bearing (79).

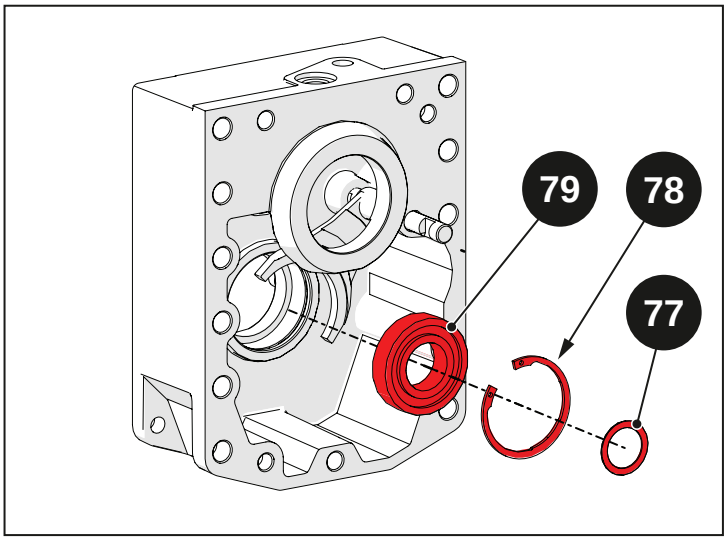

Fig. 5.85

Remove the pin (80) and then remove the rod (81) and fork (82).

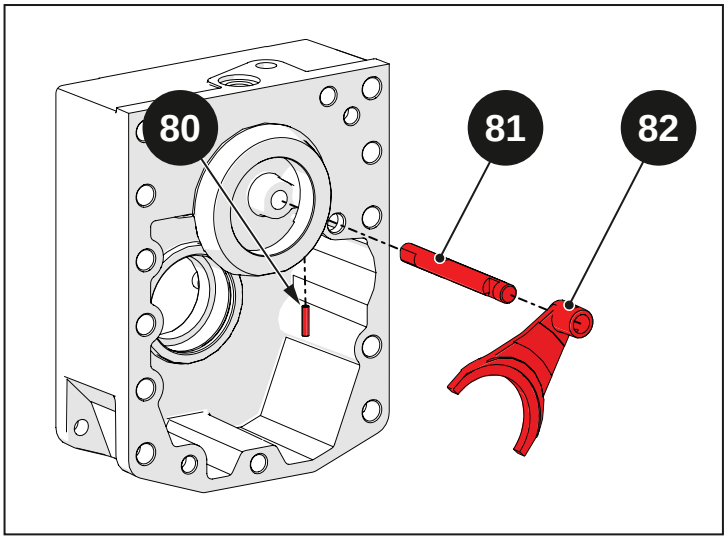

Fig. 5.86

Undo the screws (83) and remove the washers (84).

Remove the clutch cylinder (85).

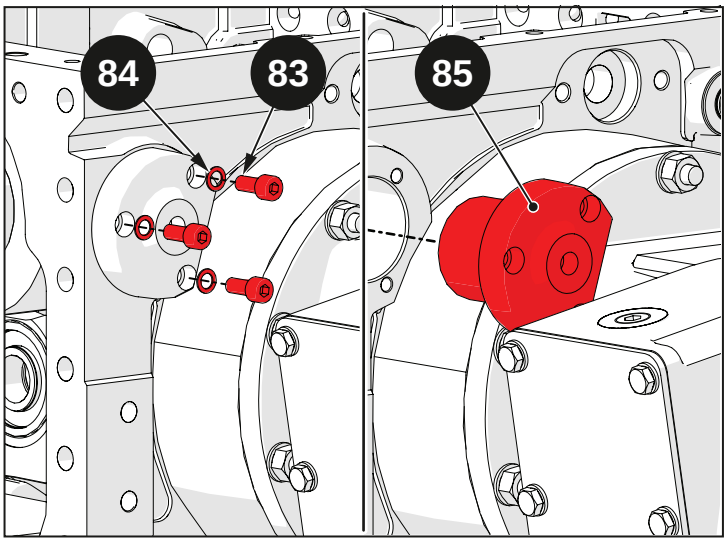

Fig. 5.87

Disassemble the PTO clutch cylinder:

- remove the complete piston (86) from the cylinder (85);
- remove the pin (87) from the piston (86);
- remove the O-ring (88) from the piston (86);
- remove the O-ring (89) from the cylinder (85);

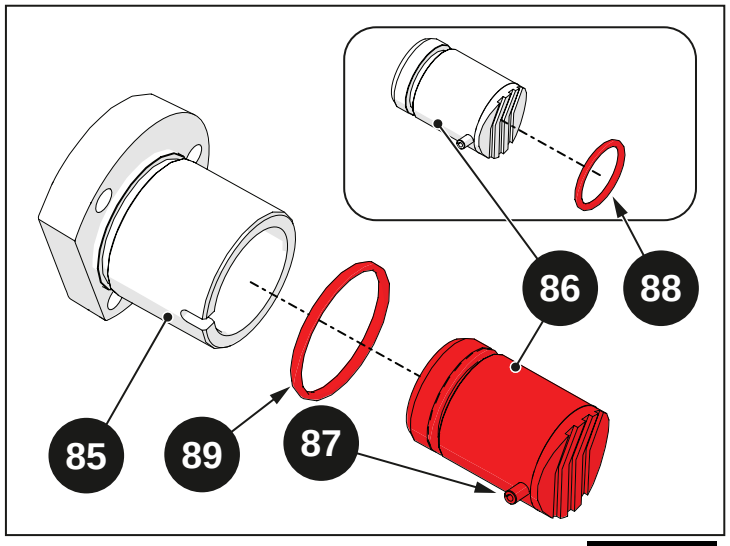

Fig. 5.88

Remove the smaller pins (94).

Remove the larger pins (93).

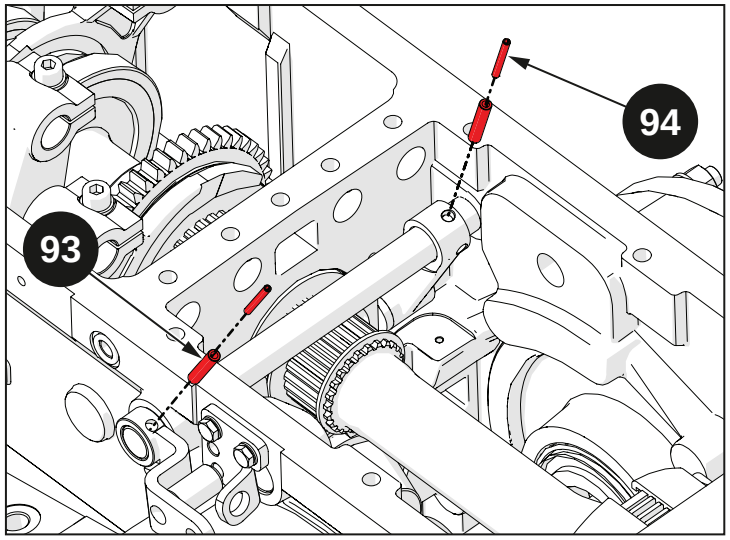

Fig. 5.89

Remove the PTO selector lever (95), the spring (96) and selector pin (97).

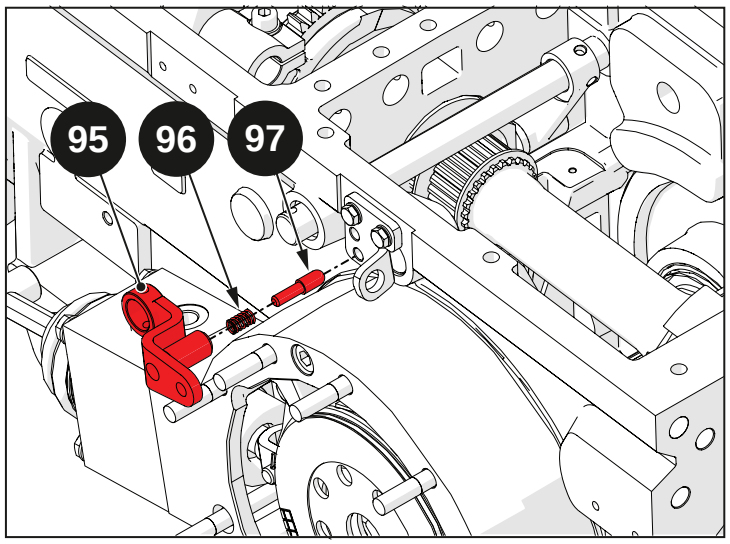

Fig. 5.90

Remove the rod (98) and remove the complete lever (99) from the PTO engagement sleeve. Separate the (99) and the fork (100).

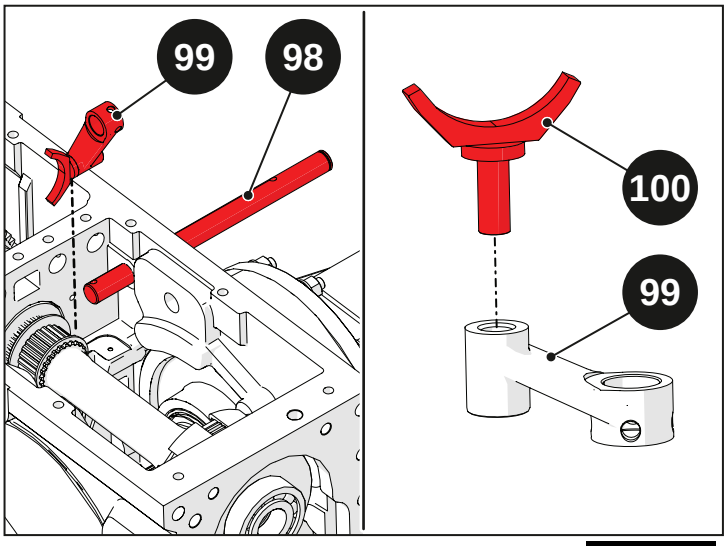

Fig. 5.91

Remove the circlip (101), the spacer (102) and the O-ring (103) from the rod (98).

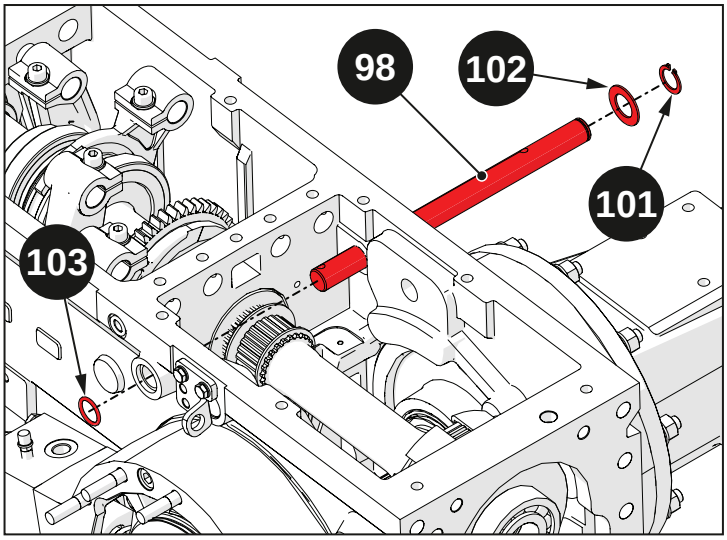

Fig. 5.92

Undo the screws (104) and remove the washers (105) and the PTO selector plate (106).

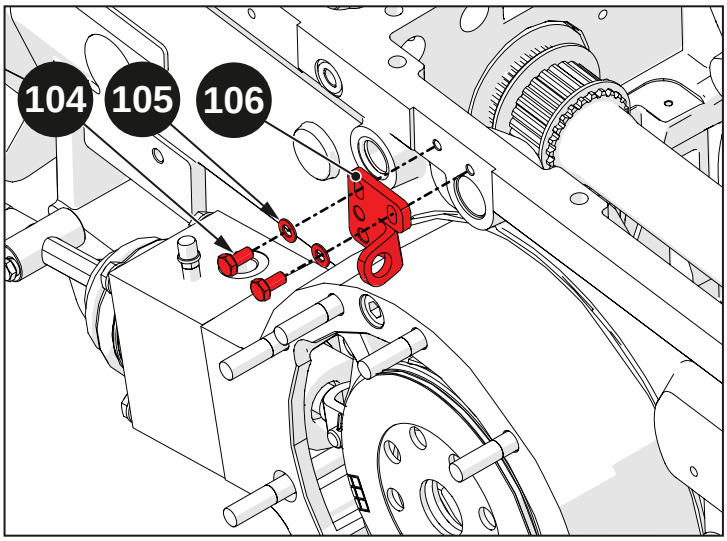

Fig. 5.93

Free the circlips (107) and (108).

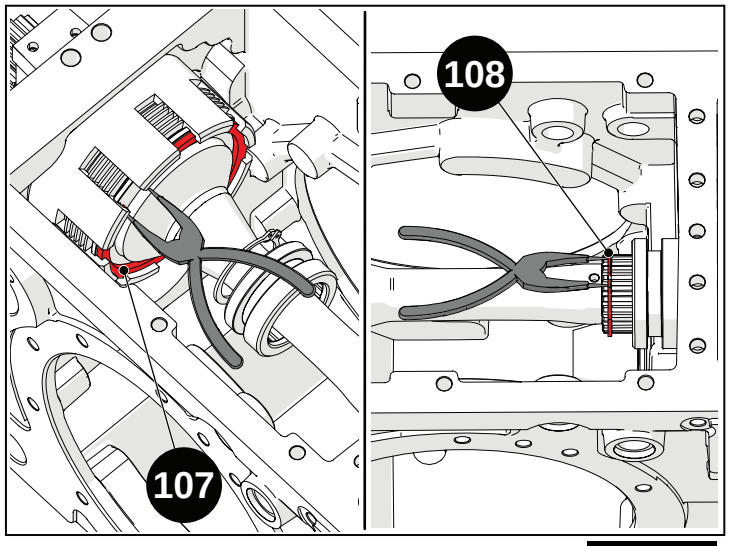

Fig. 5.94

Remove the Quad rings (109) and the O-ring (110) from the PTO shaft carrier (55).

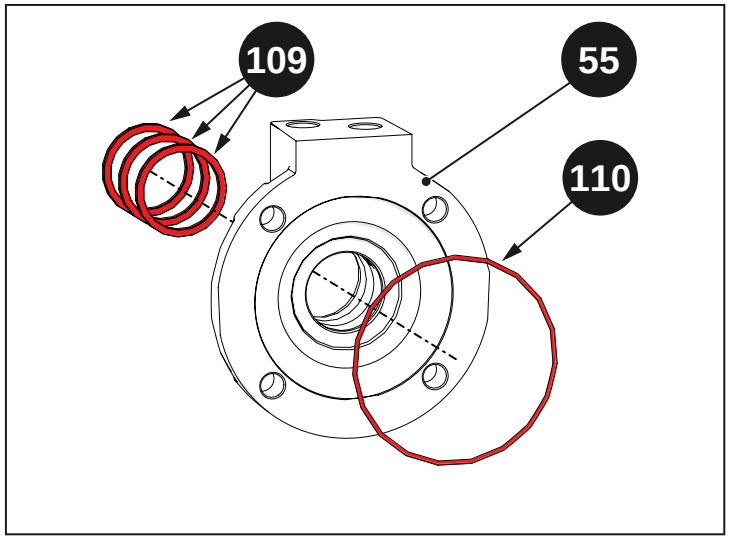

Fig. 5.95

Remove the PTO shaft (111).

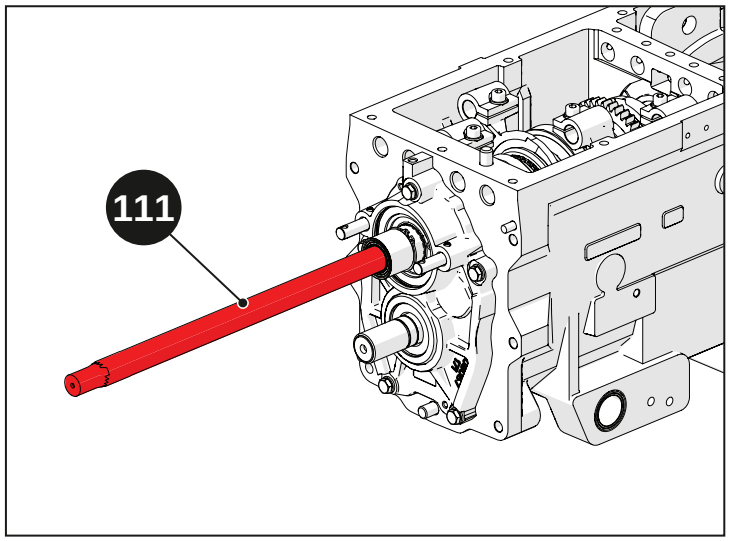

Fig. 5.96

Remove the trumpet housing (112) complete with PTO clutch.

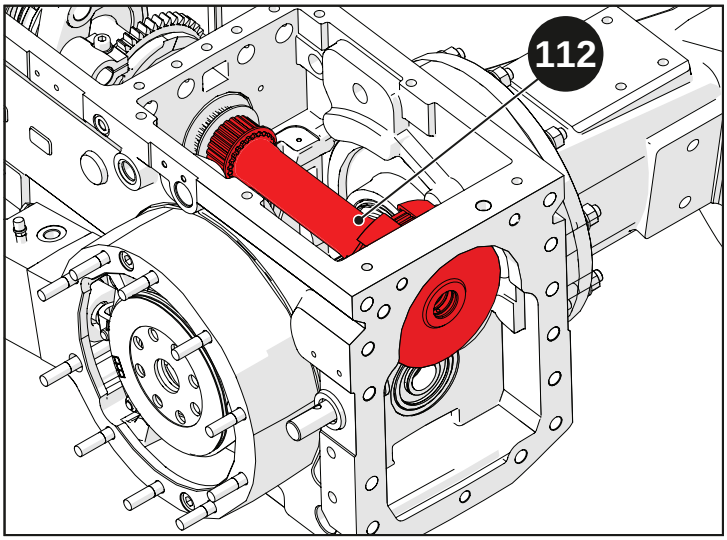

Fig. 5.97

Separate the trumpet housing (112) from the PTO clutch (113).

Remove the bearing (114).

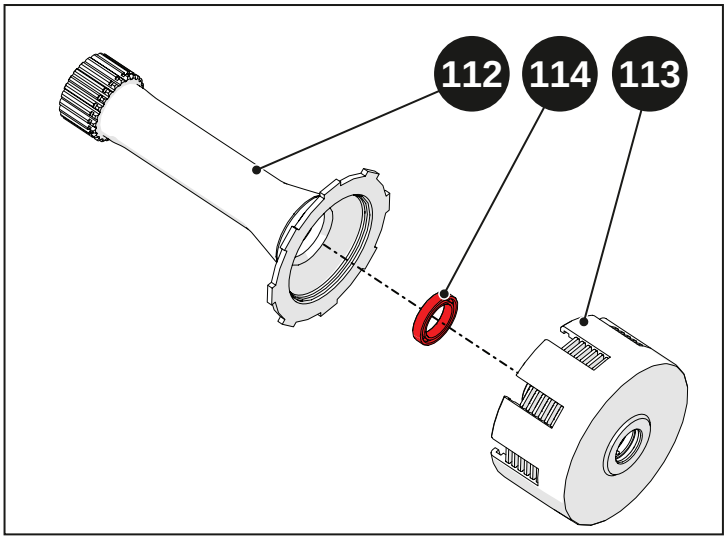

Fig. 5.98

Remove the first friction disc (115) and then remove the five steel discs (116) and the four friction discs (117).

Remove the toothed hub (118) from the clutch basket housing (113).

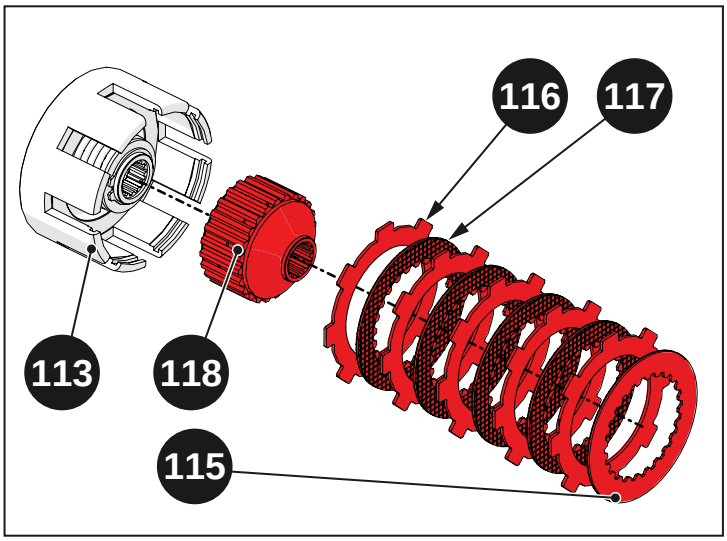

Fig. 5.99

Remove the circlip (119), the spacer (120) and the spring (121) from the clutch basket housing (113).

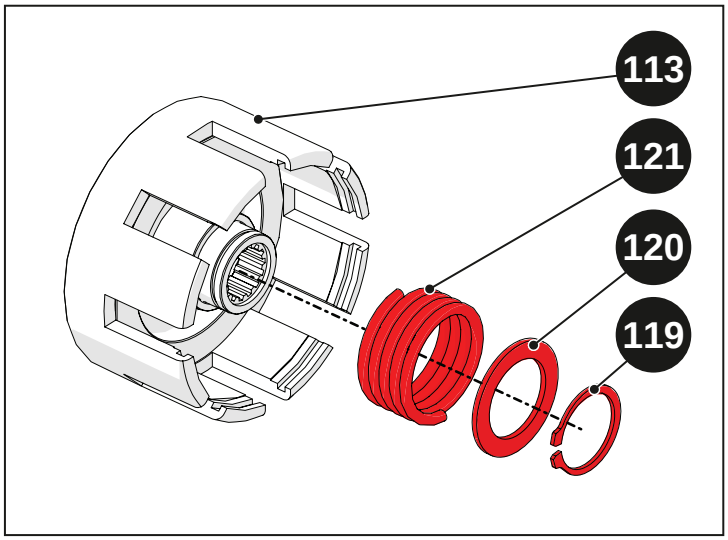

Fig. 5.100

Remove the piston (122) from the clutch basket housing (113), and then remove the O-ring (123) from the piston (122).

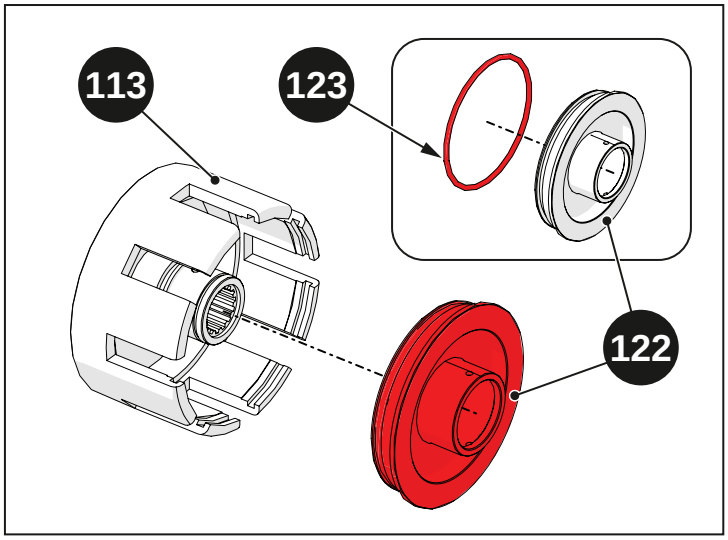

Fig. 5.101

Remove the two O-rings (124) from the clutch basket housing (113).

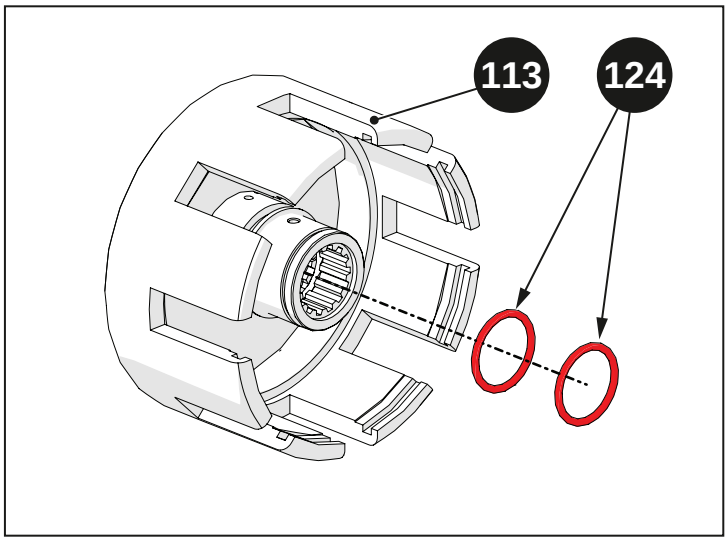

Fig. 5.102

Remove the sleeve (125) and the circlips (107) and (108) from the trumpet housing (112).

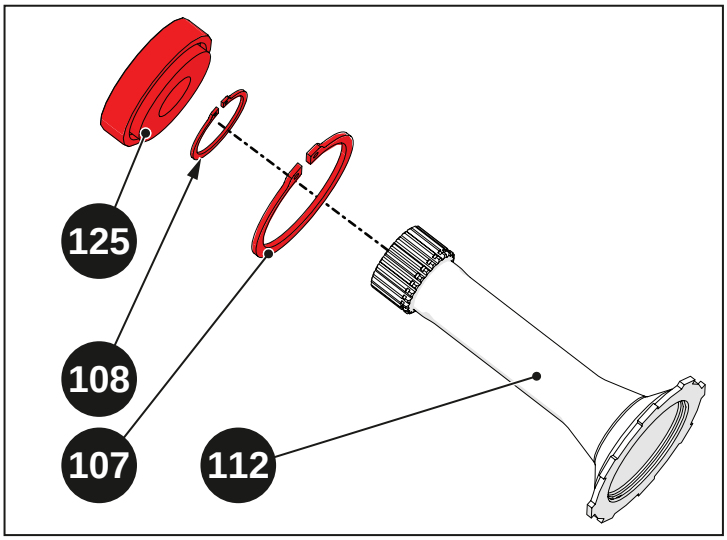

Fig. 5.103

Remove the circlip (126) and the bearing (127) from the trumpet housing (112).

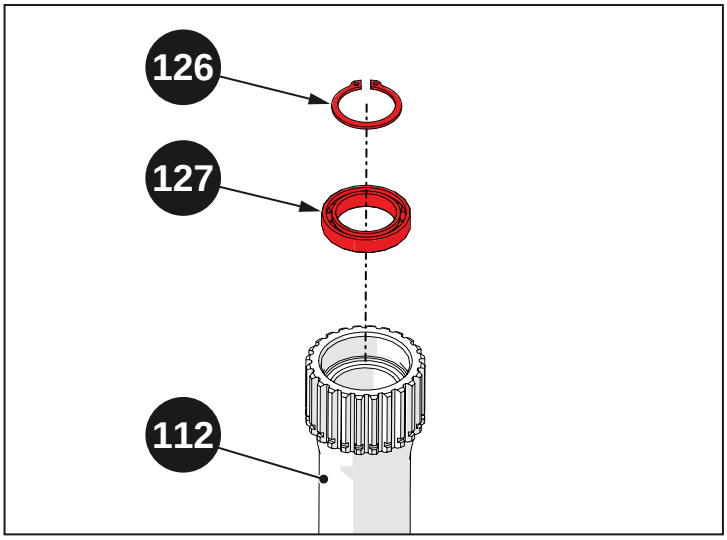

Fig. 5.104

5.5 Main inspection, reassembly and adjustment procedures

Indice

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5.5.1.1 Refitting the gearbox 5-52
5.5.1.2 Reassembling the gearbox front cover 5-58
5.5.1.3 Reassembling the differential 5-62
5.5.1.4 Reassembling the differential lock 5-66
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5.5.1 Reassembling the transmission

Warning

Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working.

Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction".

Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

5.5.1.1 Refitting the gearbox

Apply a coating of Teflon to the thread of the plug (192) and fit and tighten it underneath the gearbox casing.

Fit and tighten the plug (193) with the washer (194).

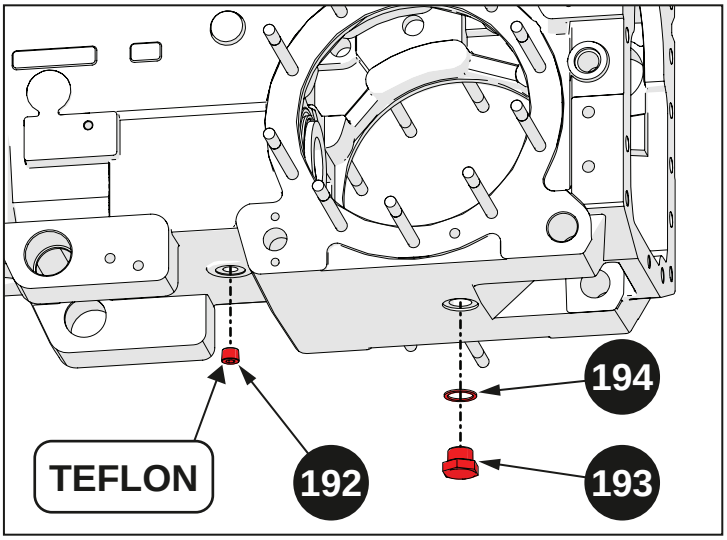

Fig. 5.105

Fit the bearing (191) and drive it fully into its seat with a bearing punch tool of suitable diameter.

Fit the retainer (190) and the washers (189) and then fit and tighten the screws (188).

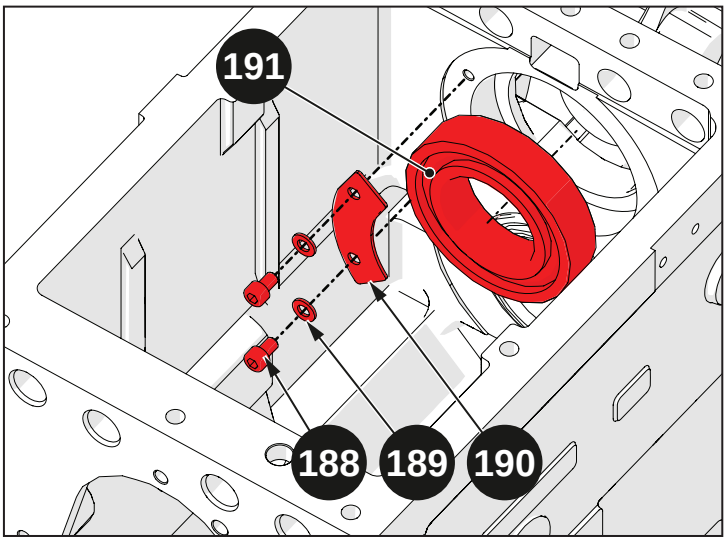

Fig. 5.106

Fit the bearing race (187), and then fit the circlip (186).

Fit the outer bearing race (185).

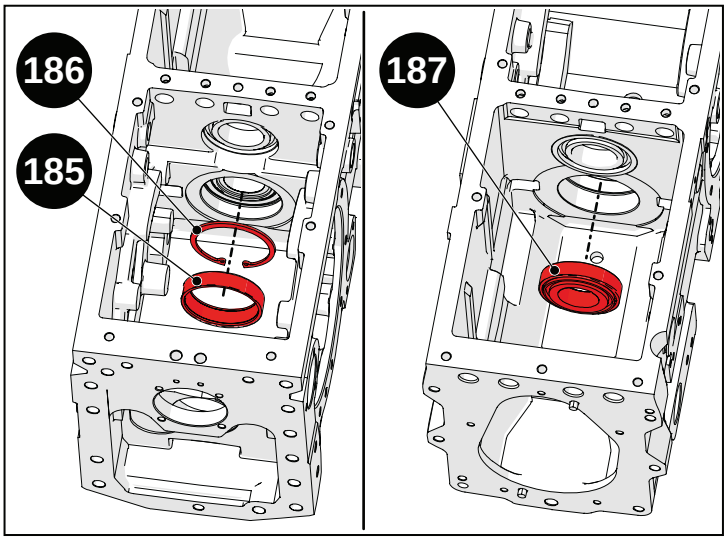

Fig. 5.107

Pre-assemble the bevel pinion (152) with the inner bearing race (185).

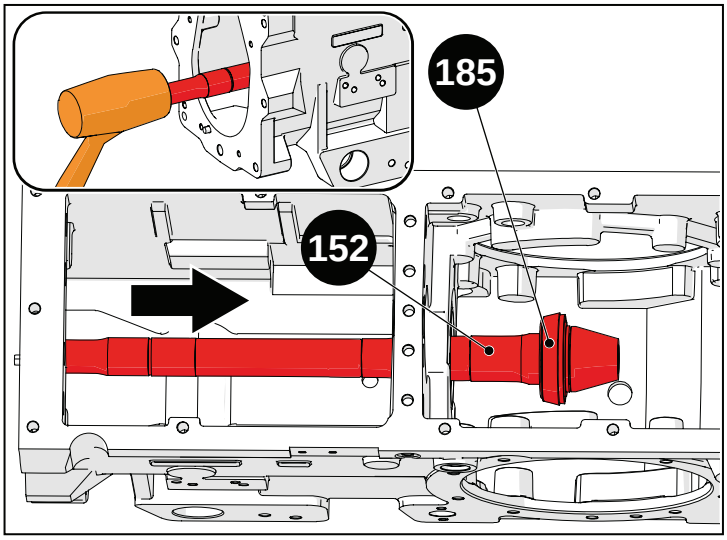

Fig. 5.108

Fit the pinion guide tool (A-p/n 07008471).

Fit the bevel pinion (152) in the gearbox casing and drive it fully into its seat with a punch tool of suitable diameter.

Remove the tool (A-p/n 07008471).

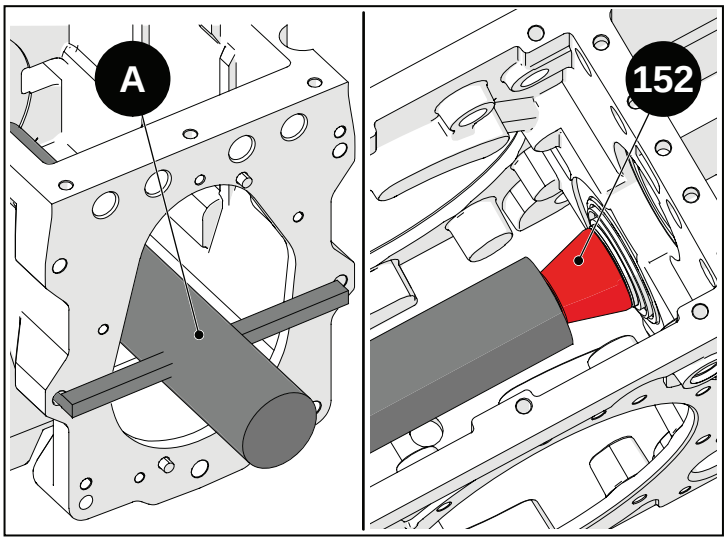

Fig. 5.109

Secure the bevel pinion (152) in place by fitting the tool (B-p/n 07008472).

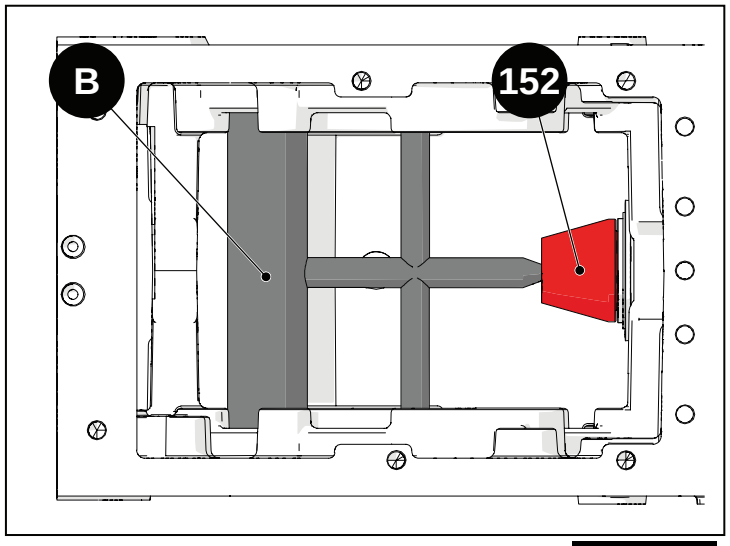

Fig. 5.110

Fit the inner bearing race (187) on the bevel pinion (152) with a punch tool of suitable diameter, driving it fully into its seat on the gearbox casing.

Remove the tool (B-p/n 07008472).

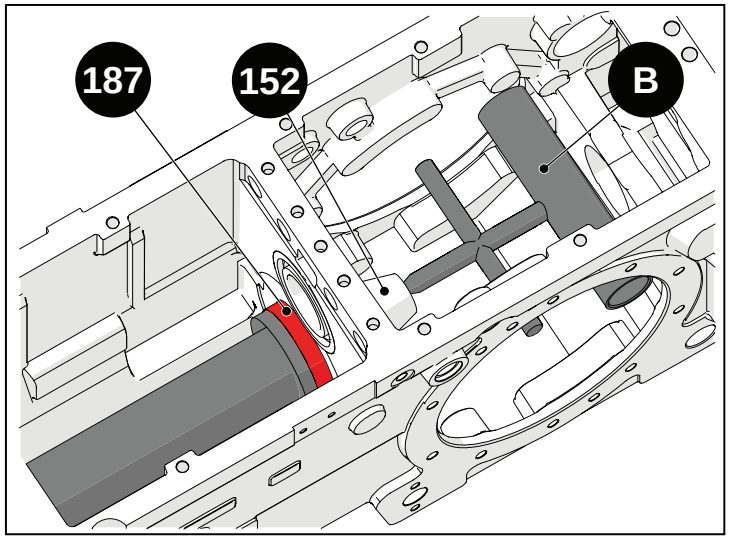

Fig. 5.111

Fit the following components on the bevel pinion (152) in the order indicated:

- Gear (184), with the protruding face towards the interior of the gearbox casing;
- ring nut retainer washer (183);
- ring nut (182);
- spacer (181).

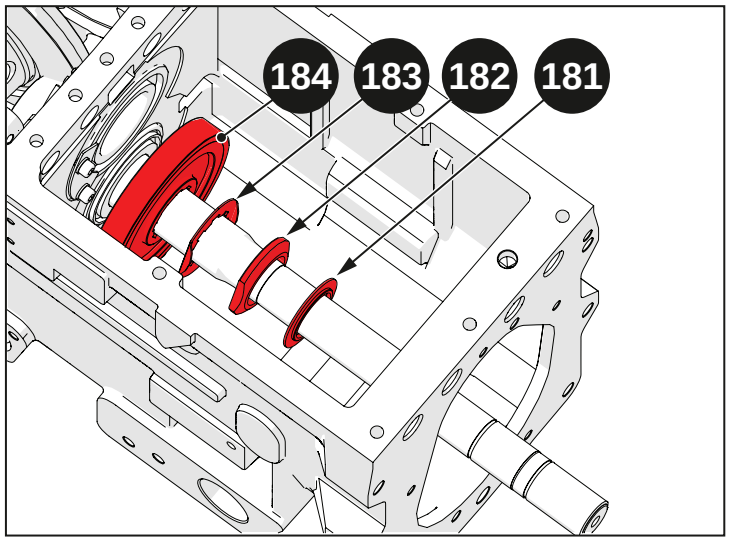

Fig. 5.112

Tighten the ring nut (182) and seat the bevel pinion correctly by tapping it with a rubber mallet. Loosen the ring nut until the right degree of bevel pinion rolling is obtained.

Bend up the ring nut retainer washer (183).

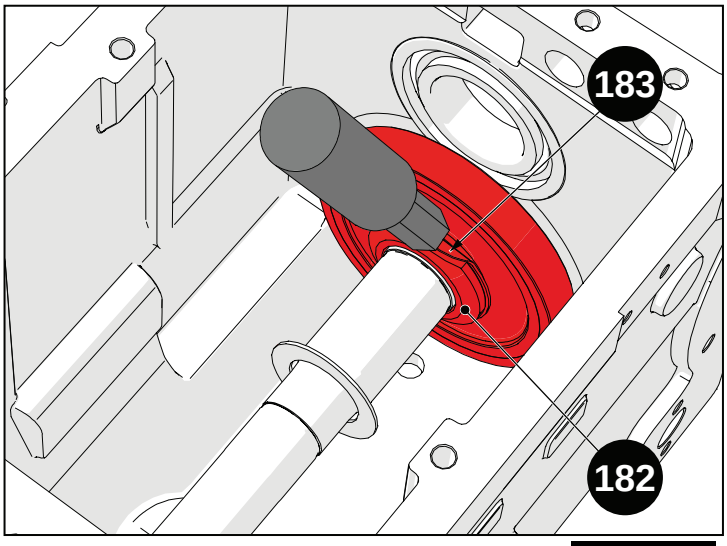

Fig. 5.113

Pre-assemble the splined hub (175) with the ML-L gear (180), with the groove for engaging with the fork facing towards the rear of the tractor.

Fit the splined hub (175) against the respective stop and then fit the circlip (179).

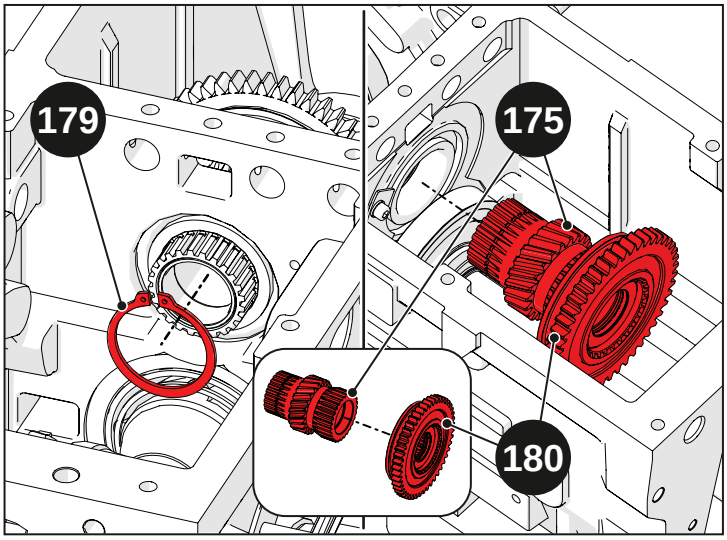

Fig. 5.114

Grease the seats on both sides of the splined hub (175).

Fit the rear roller bearing cage (177) and the spacer (176) on the splined hub (175).

Fit the front roller bearing cage (178) on the splined hub (175).

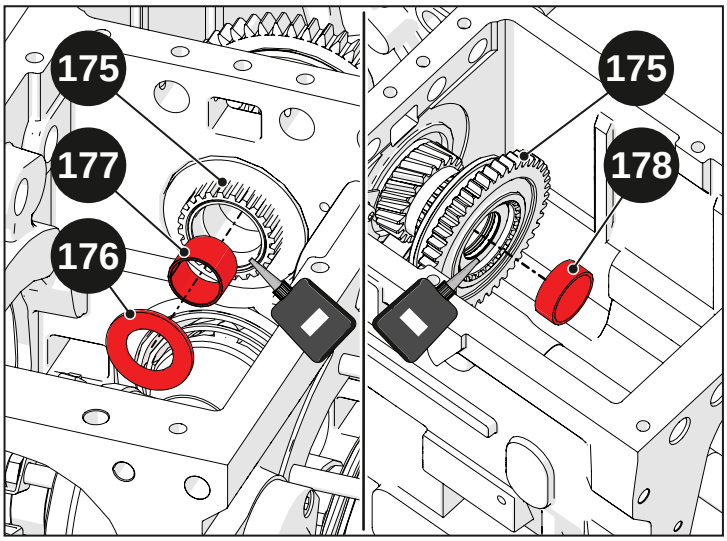

Fig. 5.115

Pre-assemble the ML-L gear (173), fitting the roller bearing cages (172) and (174) and the bush (171).

Fit the complete ML-L gear (173) on the bevel pinion (152), with the smaller diameter side facing towards the rear of the tractor.

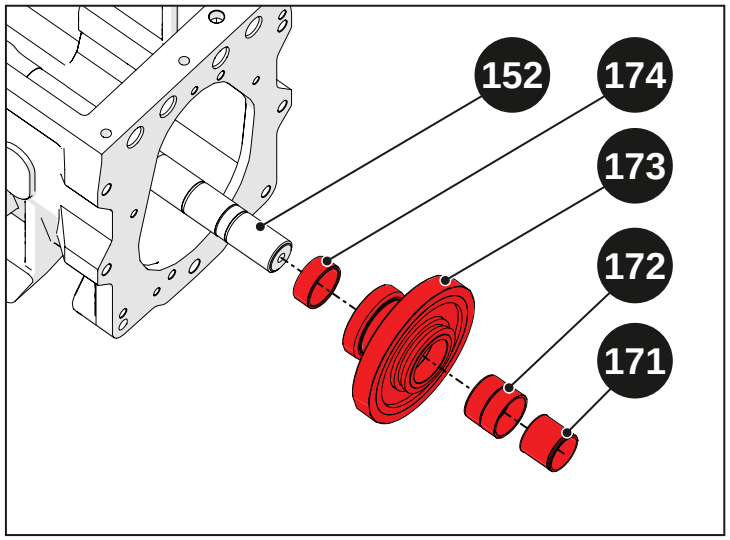

Fig. 5.116

Fit the following components on the bevel pinion (152) in the order indicated:

- selector sleeve (170);
- splined ring (169);
- circlip (168);
- spacer (167);
- roller spacer (166);
- spacer (165);

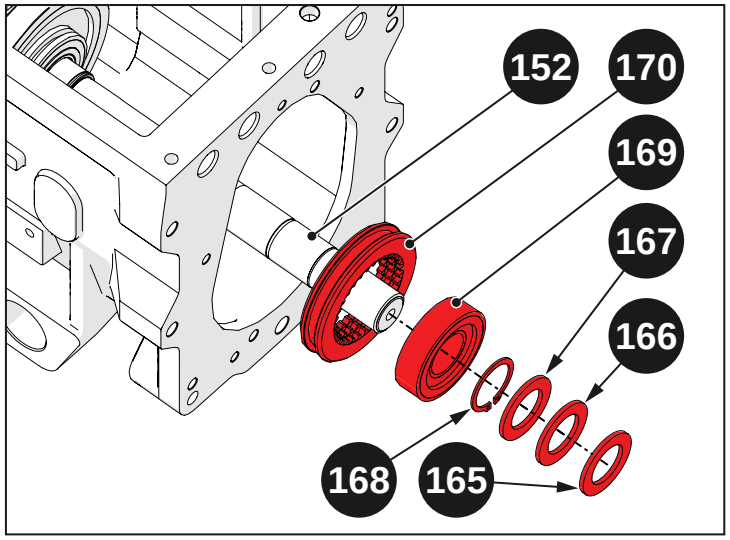

Fig. 5.117

Fit the fork (163) and the fork (164).

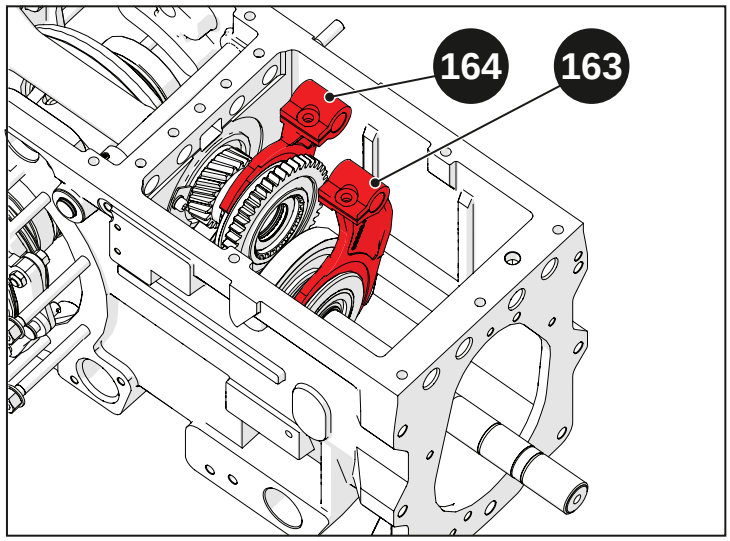

Fig. 5.118

Fit the complete primary shaft (161), pushing it through the gear (162).

> **Note**
>
> To pre-assemble the primary shaft (161), see the Chapter “Disassembling/Assembling the primary shaft".

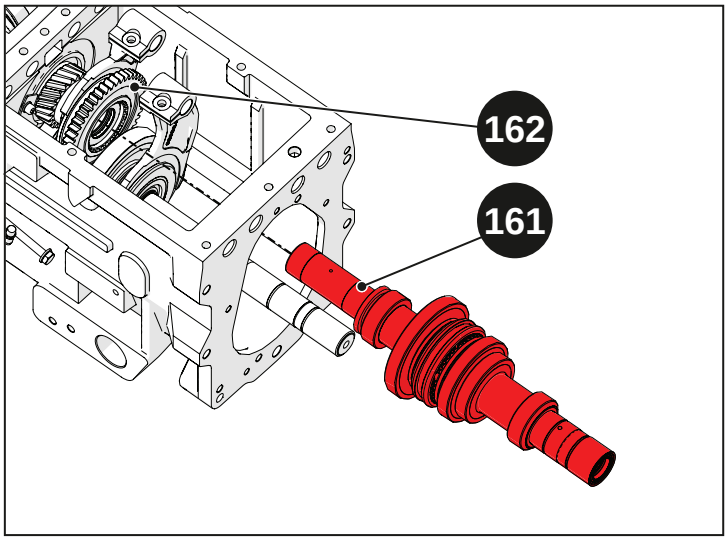

Fig. 5.119

Pre-assemble the 3rd and 4th speed gear (151), fitting the following components:

- rear roller bearing cage (160);
- bush (159).
- roller bearing cage (158);
- 2nd speed gear (157);
- synchroniser (156);
- front roller bearing cage (155);

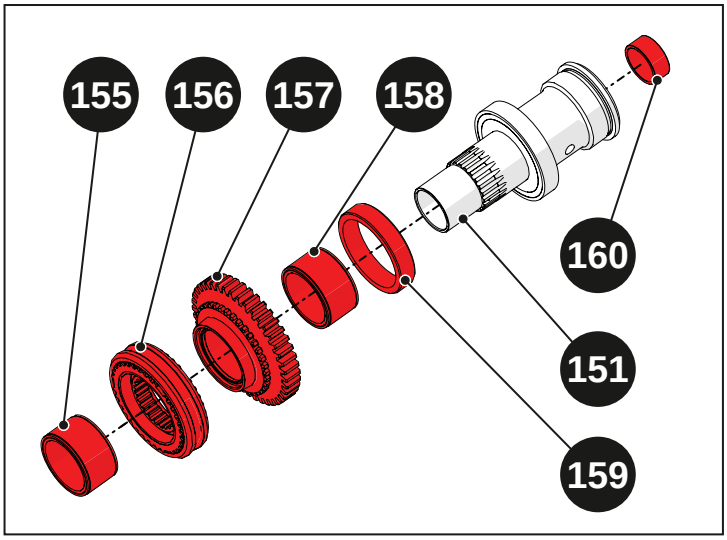

Fig. 5.120

Fit la fork (153), engaging with the synchroniser (154).

Fit the fork (150) and then fit the complete 3rd and 4th speed gear (151) on the bevel pinion (152).

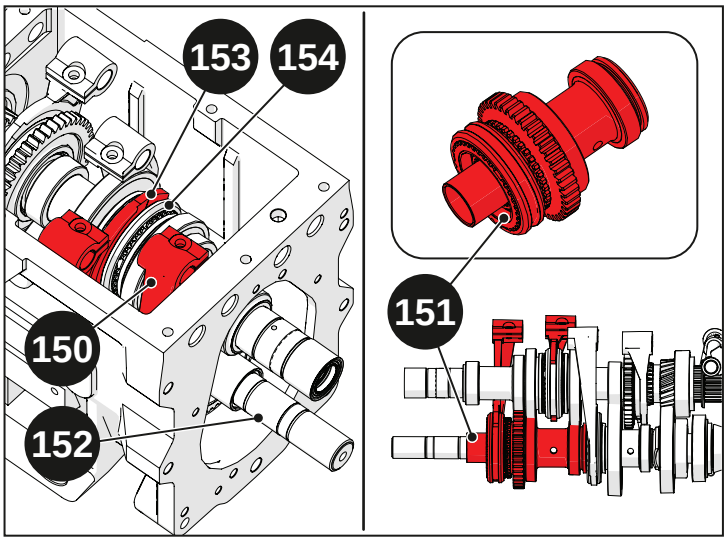

Fig. 5.121

Pre-assemble the 1st speed gear (148) with the roller bearing cage (149).

Fit the 1st speed gear (148) on the bevel pinion.

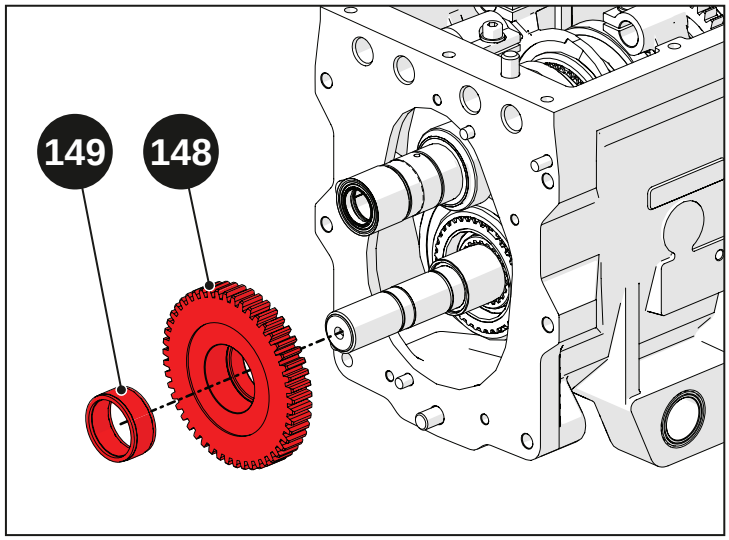

Fig. 5.122

Fit the following components on the bevel pinion:

- the spacer (147), with the lubrication channels facing the gear (148);
- roller spacer (146);
- the spacer (145), with bevelled side facing the gear (148);
- circlip (144).

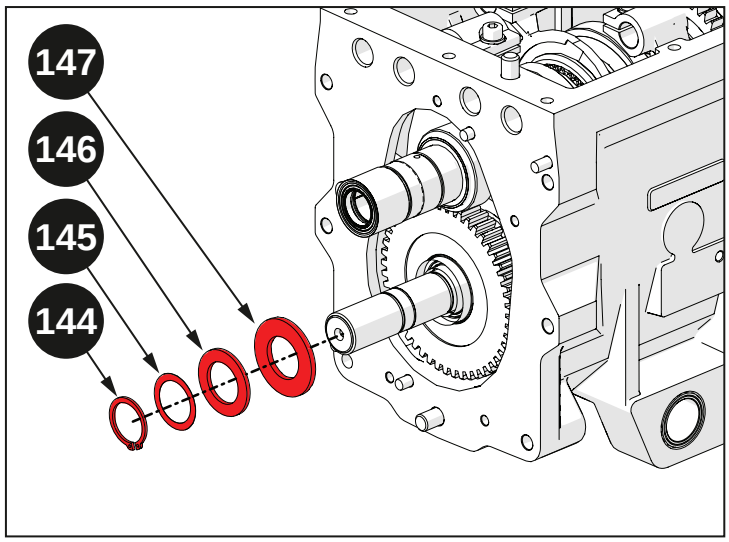

Fig. 5.123

5.5.1.2 Reassembling the gearbox front cover

Fit the bearings (142) and (143) in the gearbox cover (141).

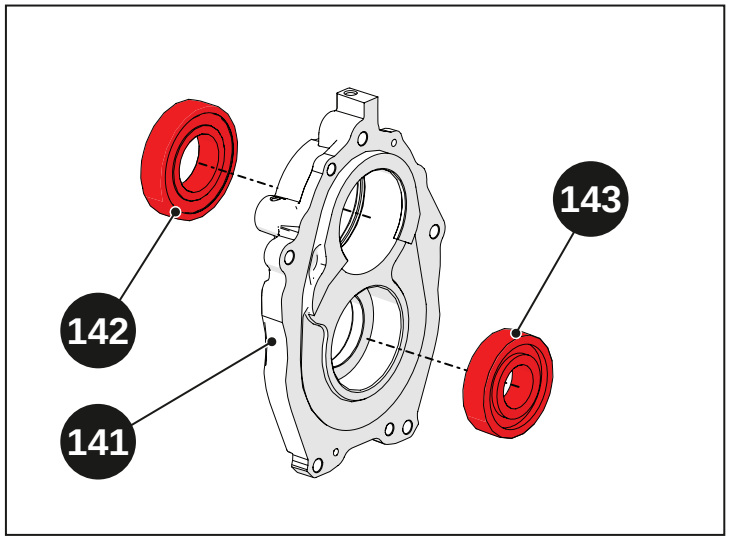

Fig. 5.124

Apply a coating of silicone sealant to the holes of the gearbox cover (141) shown in the figure.

Apply a layer of silicone sealant on the mating surface of the cover on the gearbox casing.

Warning
Apply the silicone sealant as instructed.

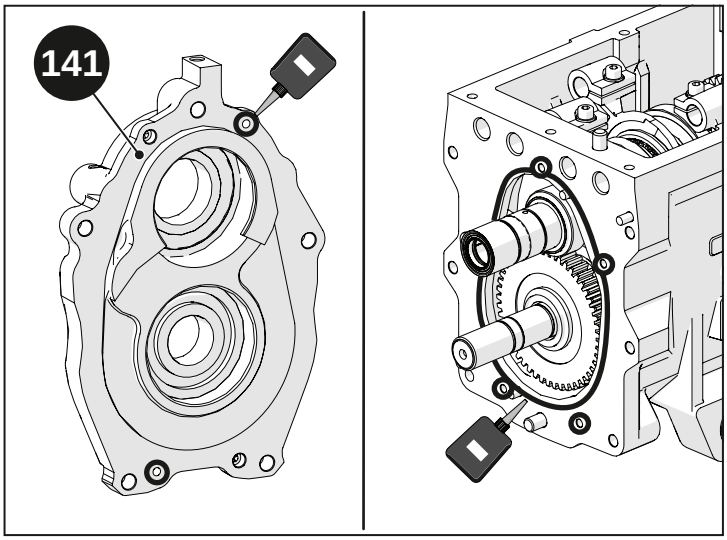

Fig. 5.125

Fit the gearbox cover (141).

Fit the washers (140), and then tighten the screws (138) and (139).

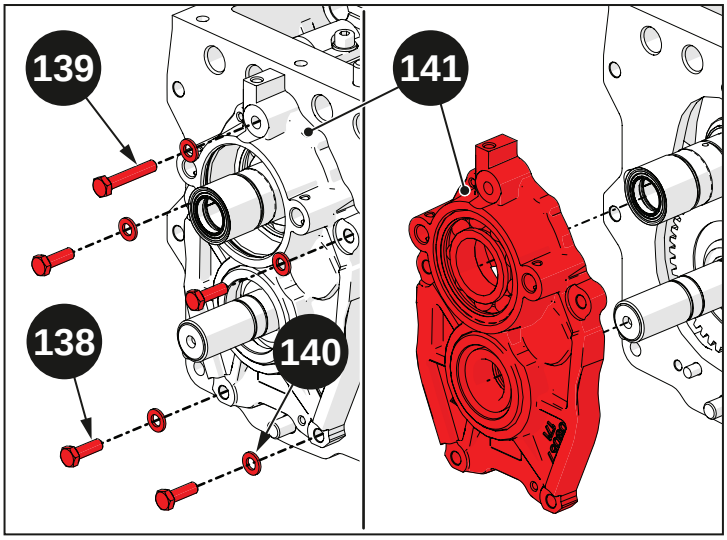

Fig. 5.126

Pre-assemble the bush (134) with the oil seal (137) and the O-ring (135).

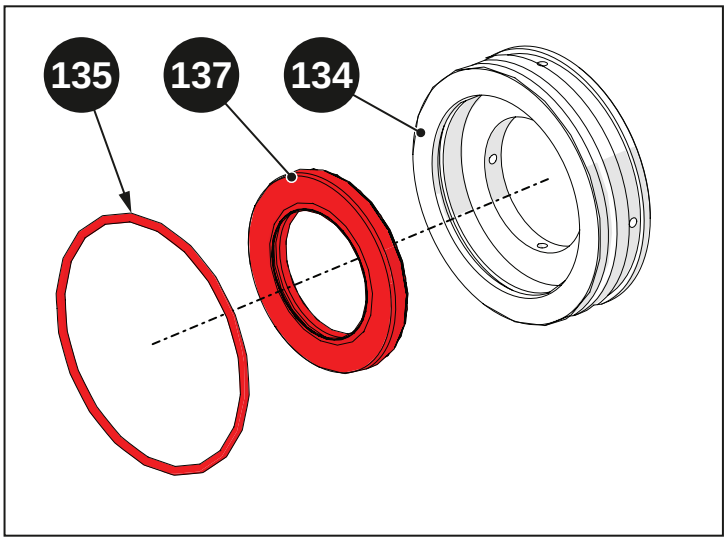

Fig. 5.127

Fit the circlip (136).

Fit the bush (134).

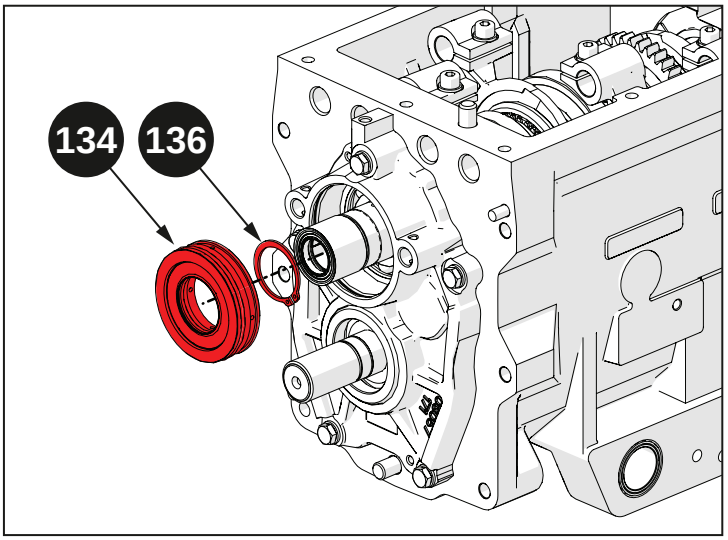

Fig. 5.128

Fit the two circlips (131) and (132).

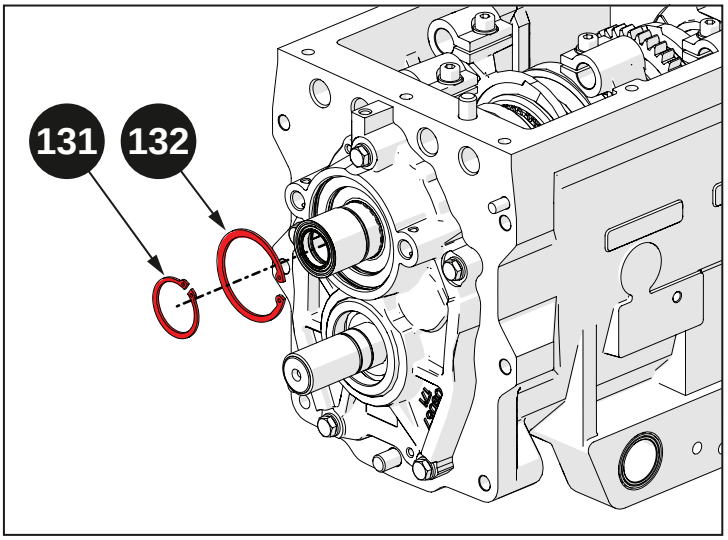

Fig. 5.129

Fit the oil seal (129) and the spacer (130).

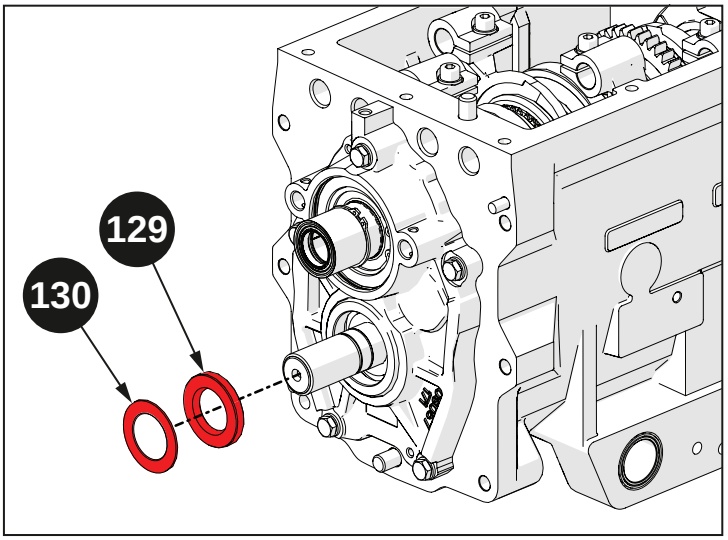

Fig. 5.130

Fit the pins (18) and then fasten in place with the lock pins (128).

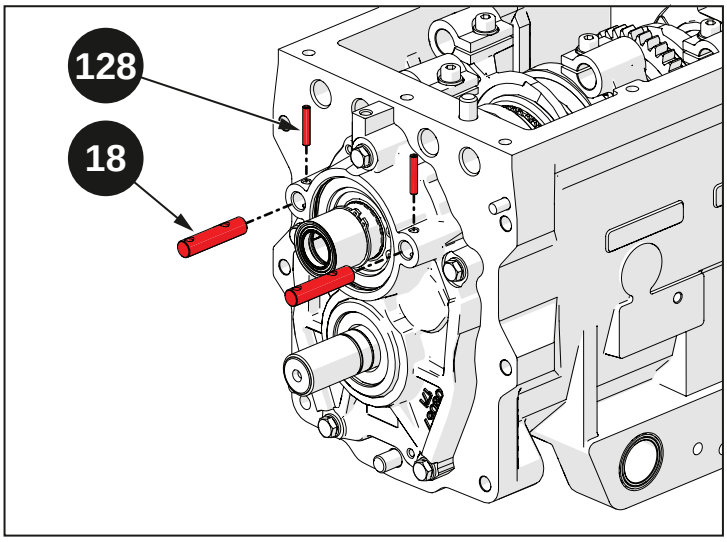

Fig. 5.131

5.5.1.3 Reassembling the differential

Before reassembling, carry out the procedure to reassemble the PTO (see section "Reassembling the PTO")

Grease the sun gear of the complete crown wheel assembly (44) and fit the inner bearing races (43) using a punch of suitable diameter.

> **Warning**
>
> To reassemble the complete crown wheel assembly (44), see the Chapter “Disassembling/ Assembling the differential crown wheel".

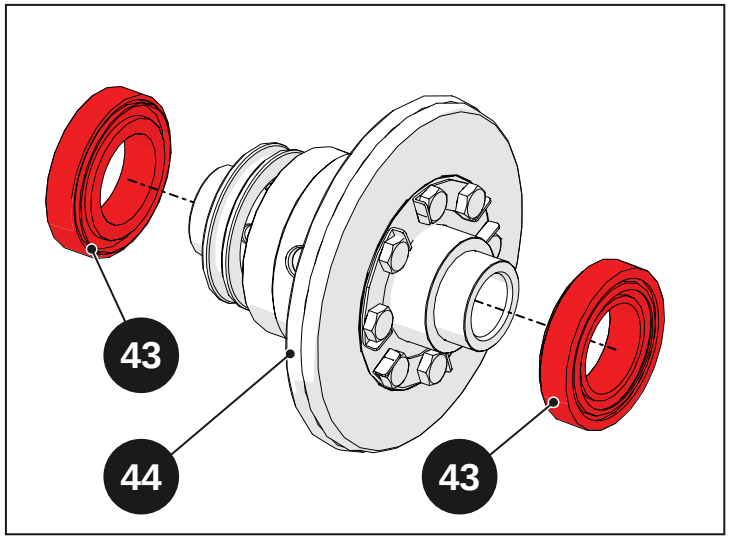

Fig. 5.132

Fit the complete crown wheel assembly (44) in the gearbox casing.

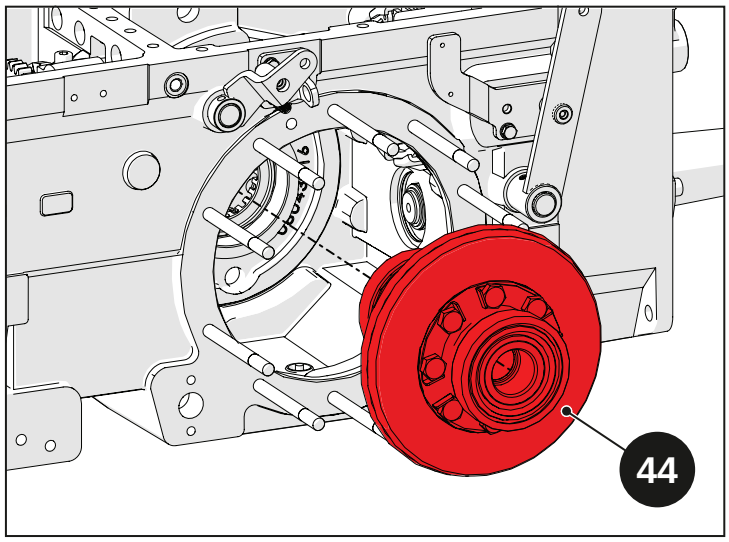

Fig. 5.133

Fit the outer bearing races (43) in the brake casings (42).

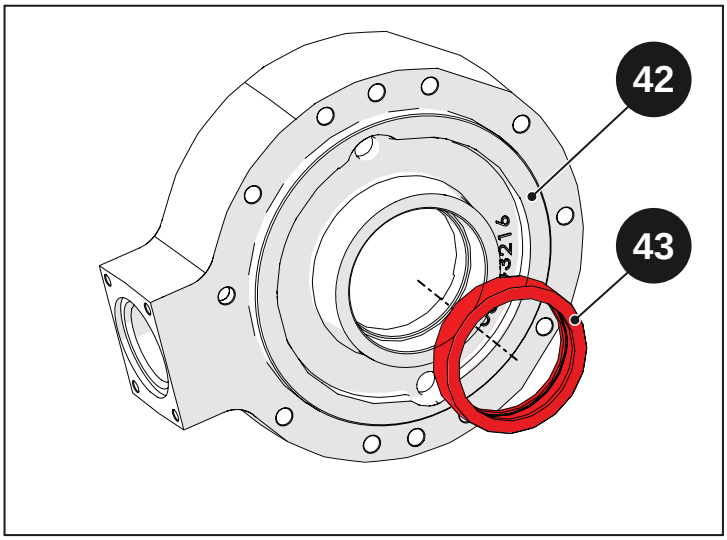

Fig. 5.134

Apply a layer of silicone sealant on the mating surfaces of the gearbox casing and brake casings.

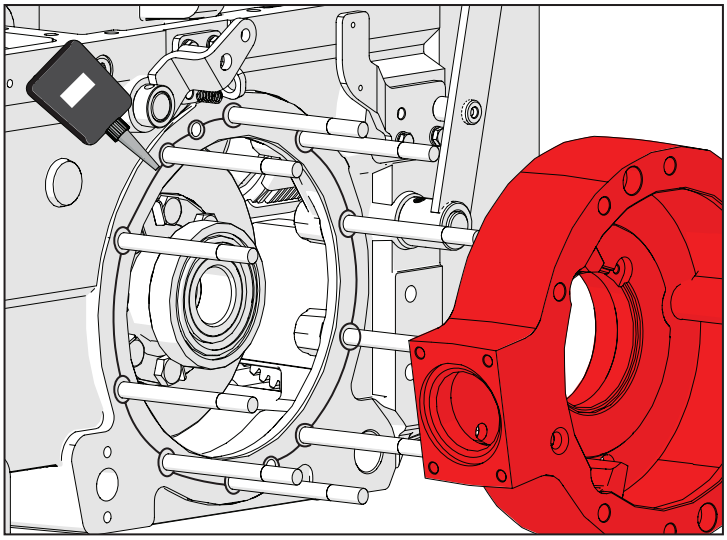

Fig. 5.135

Align the complete crown wheel assembly (44) correctly and then fit the brake casings (42) **without bringing them completely into contact with the respective mating surfaces**.

Match the inner bearing races (43) mounted on the complete crown wheel assembly (44), with the outer races mounted on the brake casings.

Tighten the screws (41) to a torque of 55 Nm (5.5 Kgm). Carry out this step on both sides of the gearbox casing.

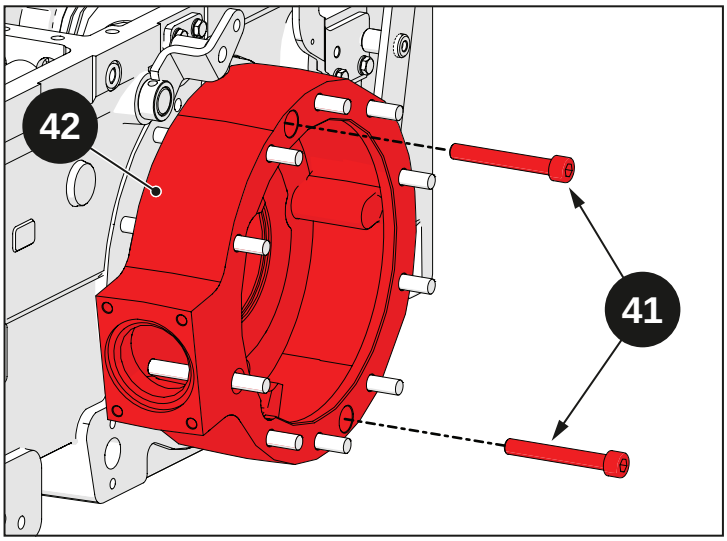

Fig. 5.136

Use the tool (C-p/n 07008470) to tighten the ring nut (40) on the crown wheel into its seat, and then loosen by three notches, using the ring nut retainer hole as reference.

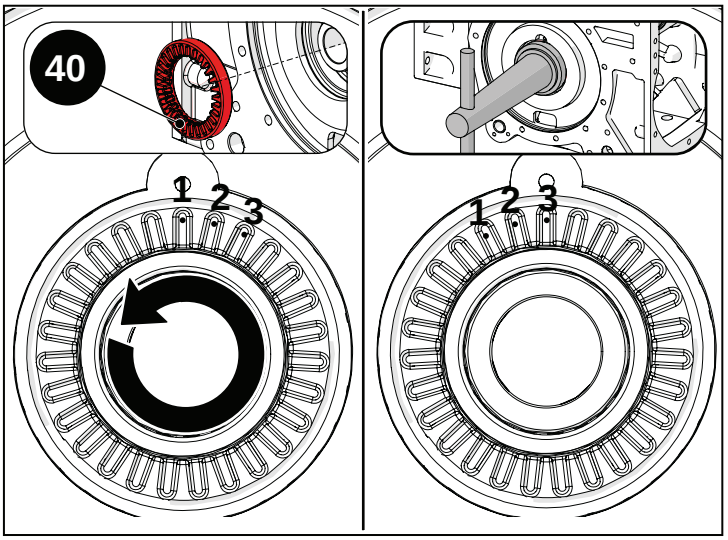

Fig. 5.137

Use the tool (C-p/n 07008470) to tighten the ring nut (40) on the side opposite the crown wheel into its seat, and then tighten by an additional 1-2 notches to preload the assembly.

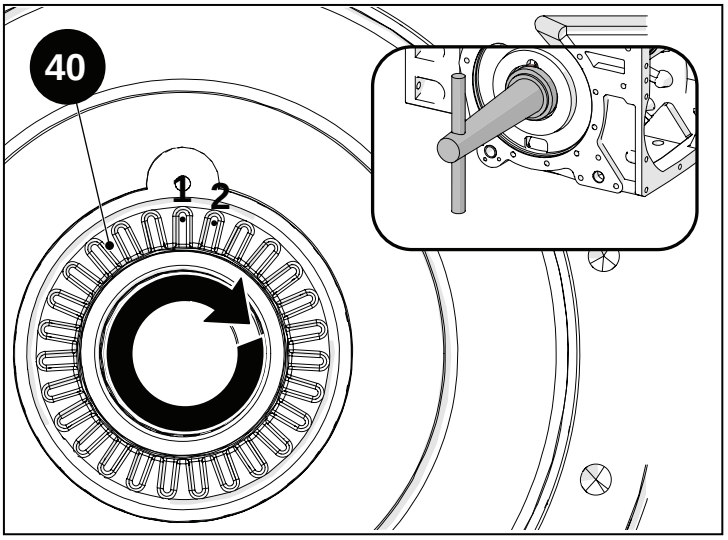

Fig. 5.138

Secure the bevel gear set using a punch tapping first on the crown wheel side and then on the opposite side.

Lock the crown wheel side ring nut retainer (40) by tightening the ring nut retainer (39).

Use the tool (C-p/n 07008470) to loosen the ring nut (40) on the side opposite the crown wheel and then tighten into its seat. Tighten it by another spline.

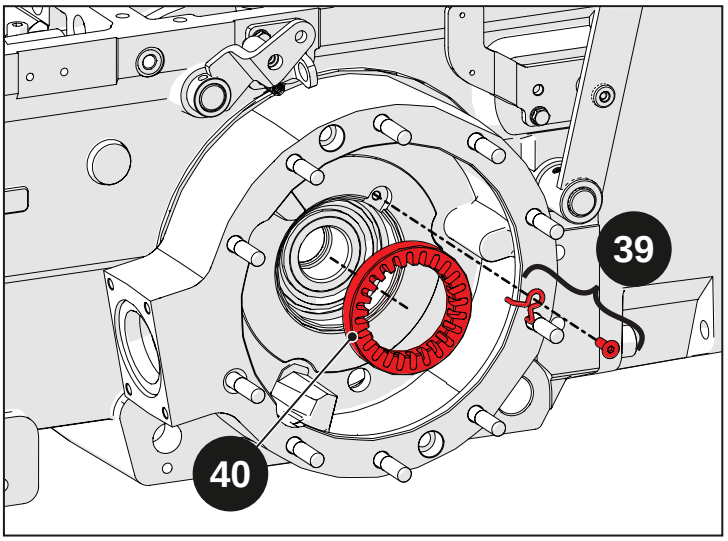

Fig. 5.139

Apply the probe of a dial gauge with a magnetic base against one of the teeth of the crown wheel (44) and reset the dial gauge.

Move the crown wheel (44) gently to measure the backlash relative to the pinion teeth. The backlash between the teeth of the crown wheel and the pinion must be 0.10 to 0.20 mm.

Warning

Measure in at least 4 different positions on the crown wheel.

If the backlash is less than the correct value: undo the ring nut (40) on the crown wheel side and tighten the ring nut on the opposite side by the same number of splines.

If the backlash is greater than the correct value: tighten the ring nut (40) on the crown wheel side and undo the ring nut on the opposite side by the same number of splines.

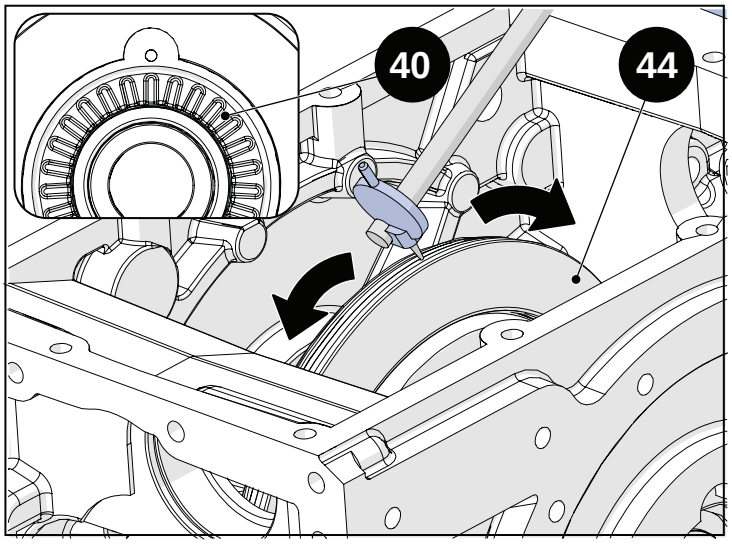

Fig. 5.140

Tighten the ring nut retainers (39) on both sides.

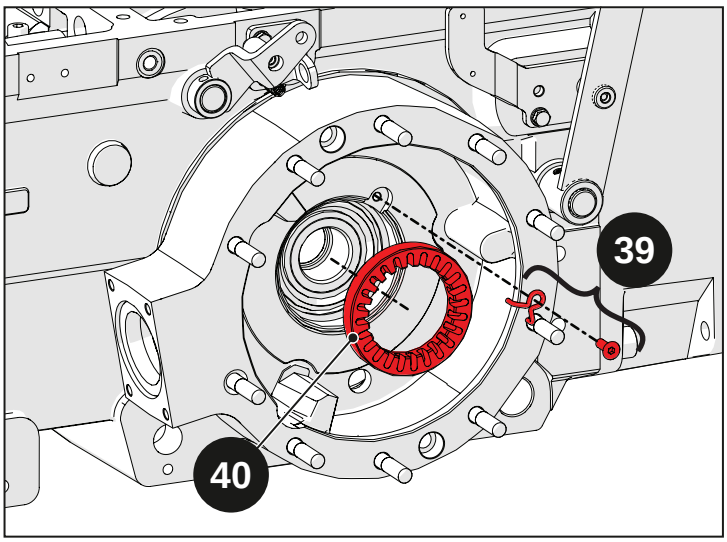

Fig. 5.141

Carry out the following procedures before continuing with reassembly:

- Refitting the brakes (see chapter "09 - Brakes")
- Refitting rear lateral final drive units (see chapter "07 - Rear lateral final drive units")

5.5.1.4 Reassembling the differential lock

Fit the spring (38) and the fork (37).

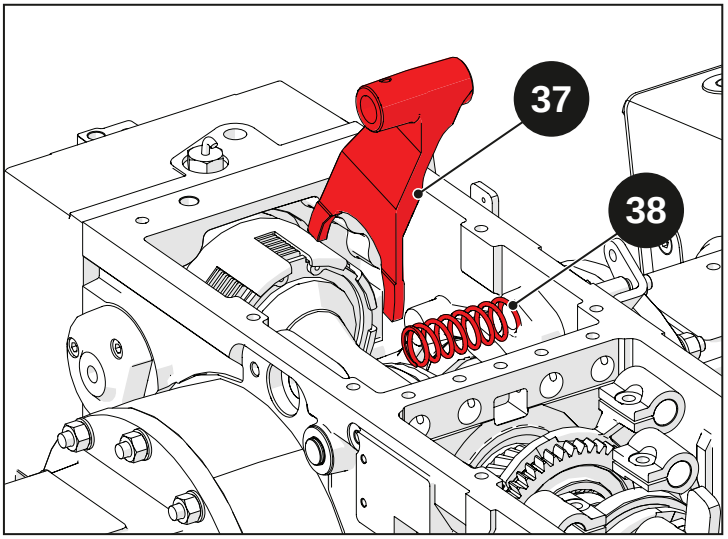

Fig. 5.142

Fit the rod (36).

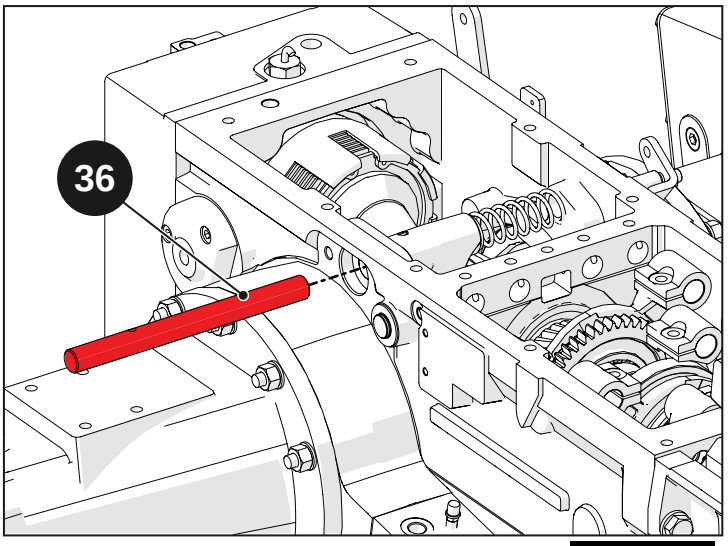

Fig. 5.143

Install the pin (35) with a pin punch.

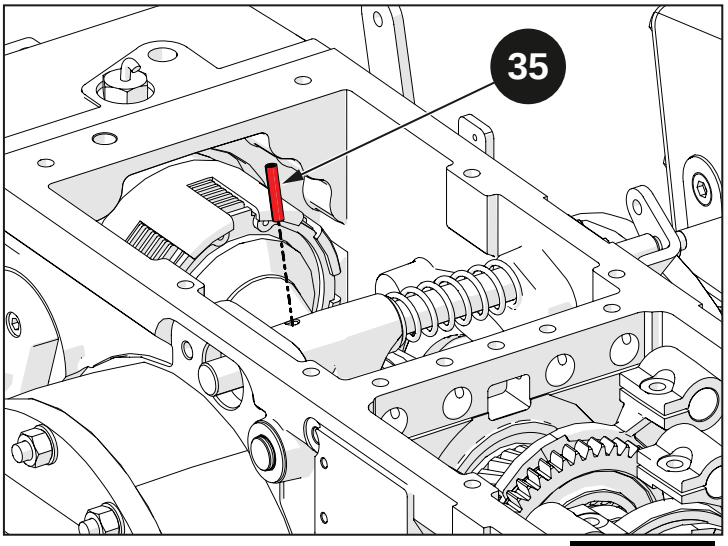

Fig. 5.144

Fit the guide bush (34).

Fit the washers (33) and tighten the screws (32).

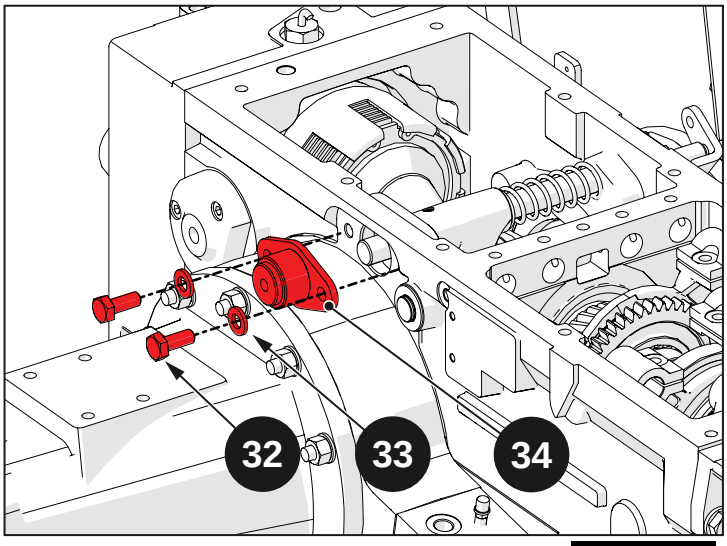

Fig. 5.145

5.5.1.5 Reassembling the clutch cover, rods and levers

Fit the impediment stops (31).

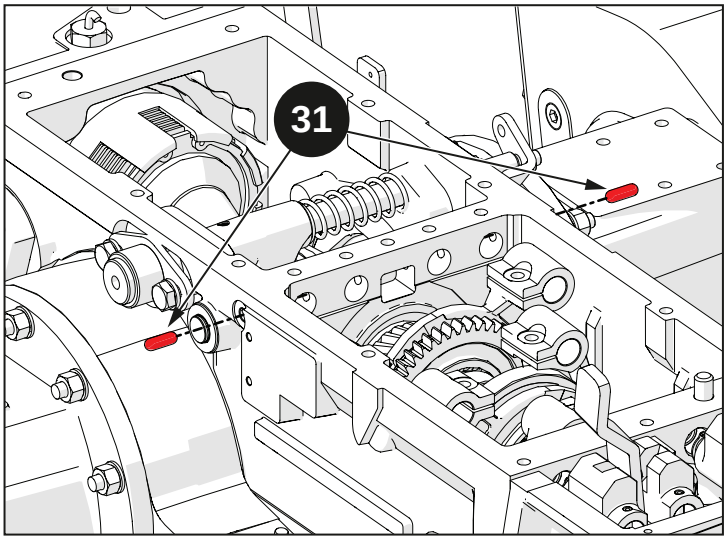

Fig. 5.146

Apply grease in the seats for the rods on the forks.

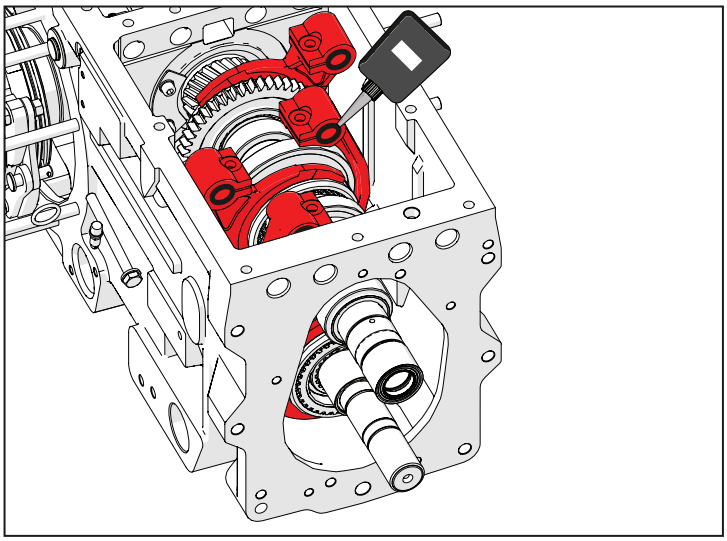

Fig. 5.147

Fit the rods partially, without engaging them in the forks yet.

Warning
Make sure that the rods are inserted in the correct position.

Use a guide tool to fit the O-rings (30) and circlips (29) on the rods.

Fit the rods in the forks.

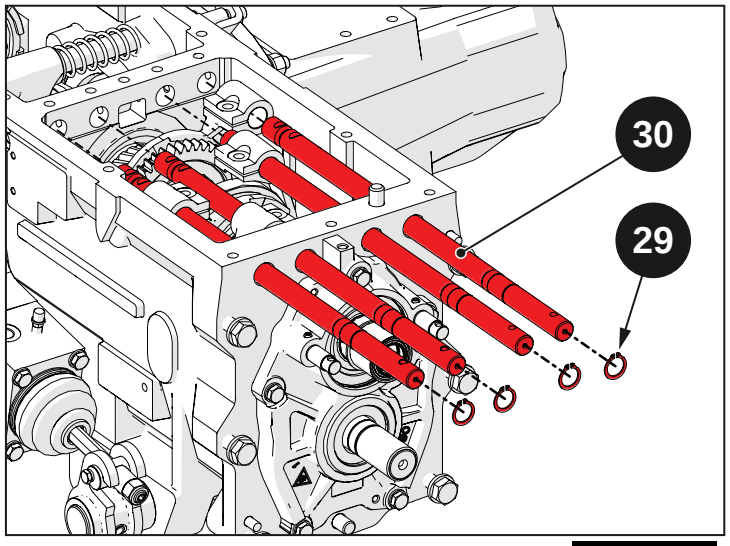

Fig. 5.148

Fit the washers (28) and tighten the screws (27).

Warning
Do not tighten the screws completely (27).

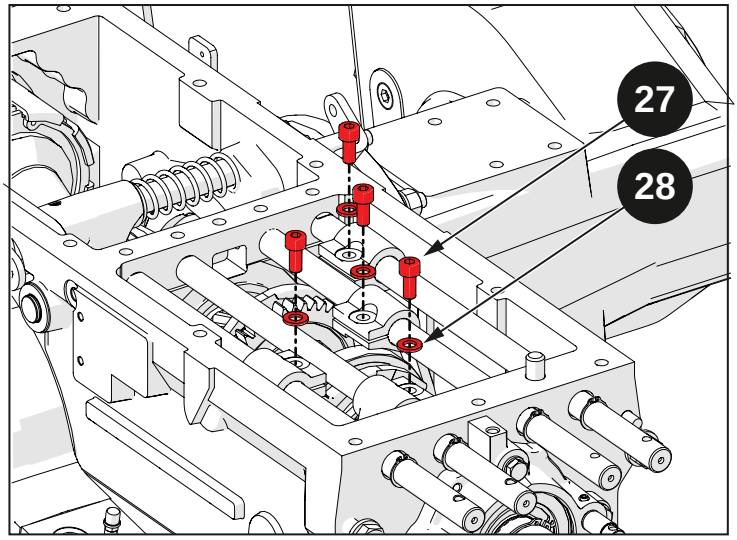

Fig. 5.149

Fit the balls (26).

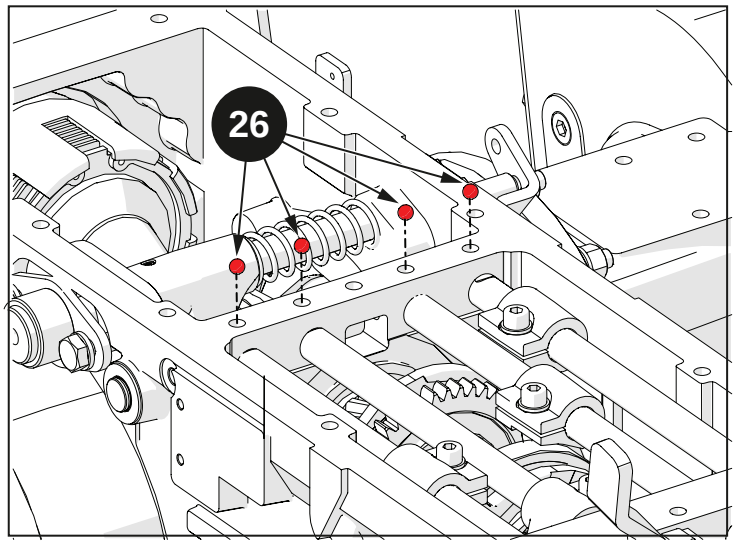

Fig. 5.150

Fit the guide bushes (25) on the rods and fasten with the pins (24).

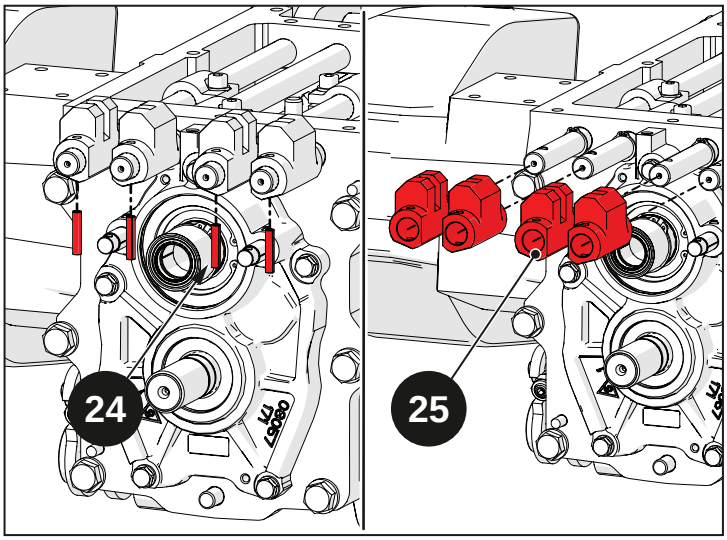

Fig. 5.151

Assemble the levers (20), fitting the forks (23), the pins (22) and the circlips (21).

> **Note**
>
> The steps for preassembling the gear levers apply to both levers.

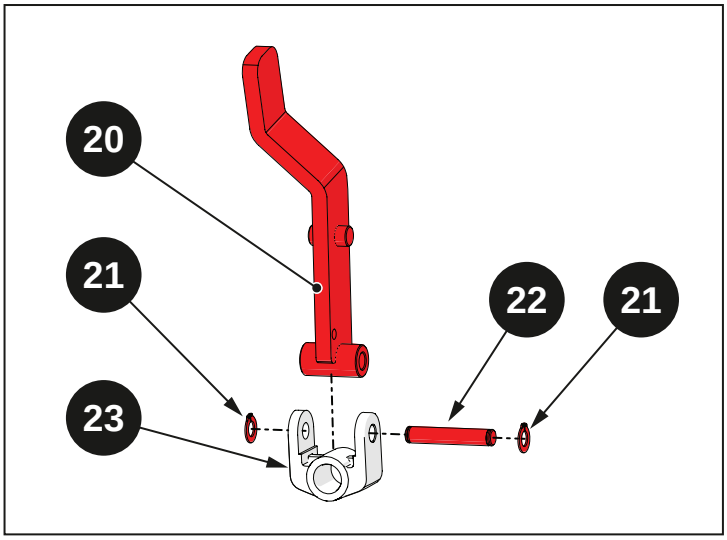

Fig. 5.152

Fit the levers (20) in the respective pins (18).

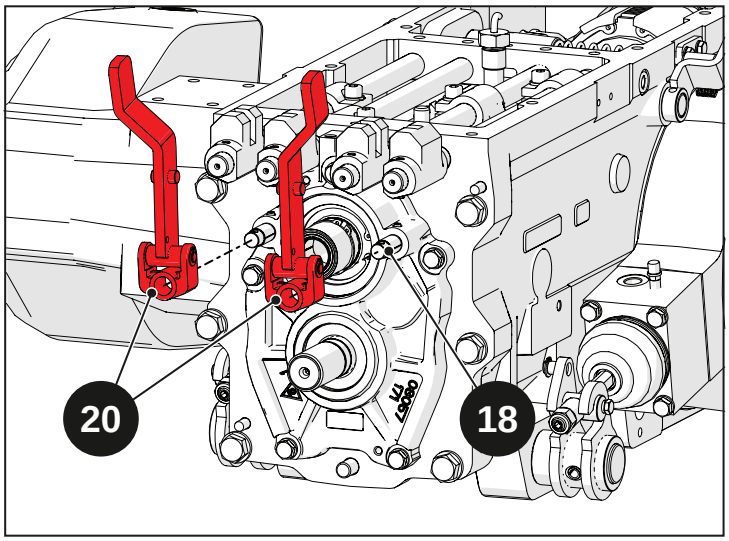

Fig. 5.153

Fit the forks (19) on the pins (18).

Fit spacers (17) of the same thickness as the distance between the forks (19) and the inner edges of the holes on the pins (18) to eliminate free play in the gear lever assemblies.

Fit the pins (16).

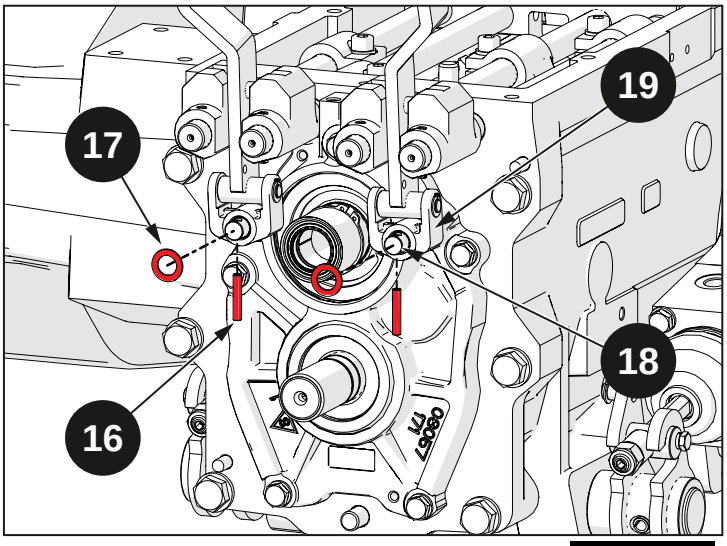

Fig. 5.154

Adjust the position of the forks on the rods.

There must be between 0.5 and 1 mm of free play between the fork and the engagement sleeve on both sides of the fork. The free play must be present both with the lever engaged and not engaged.

Once the fork is positioned correctly, tighten the screw (27) to lock it in position.

Note
The adjustment procedure needs to be done for each fork.

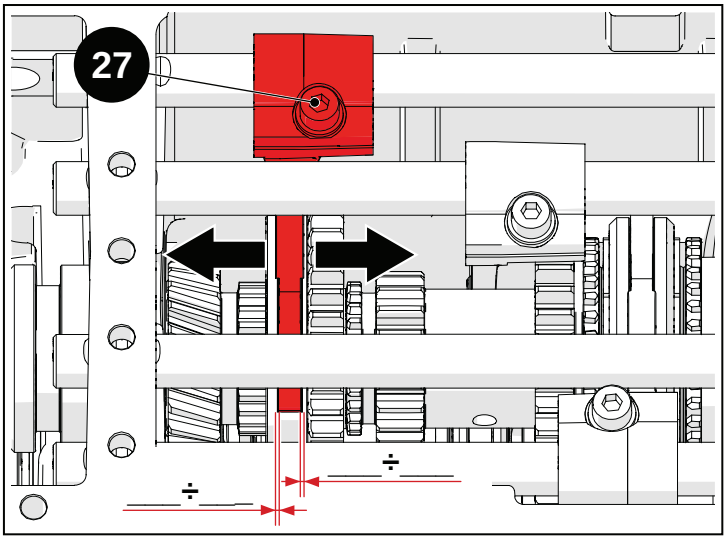

Fig. 5.155

Attach the spring (15).

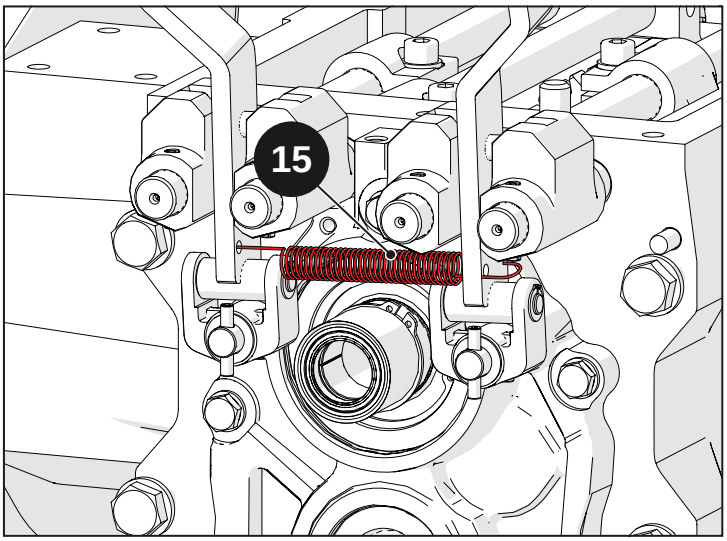

Fig. 5.156

Fit the washer (14) and tighten the impediment stop fastener screws (13). Carry out this step on both sides of the gearbox casing.

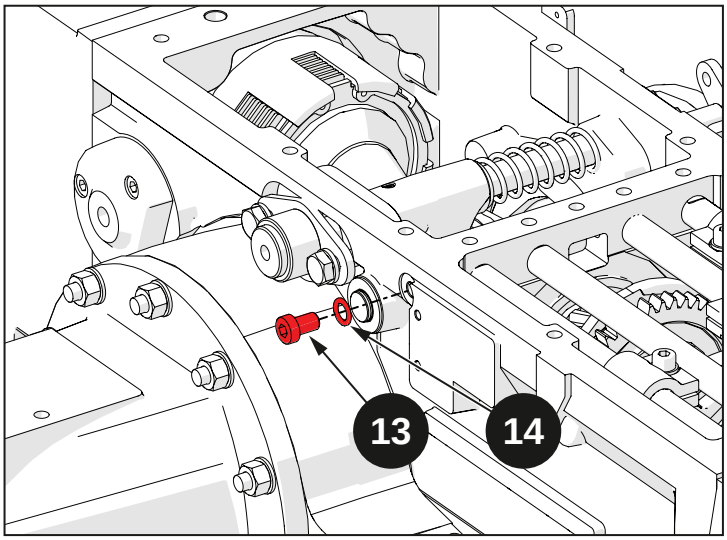

Fig. 5.157

Apply a layer of silicone sealant on the resting surface of the cover making sure to fill the indicated holes.

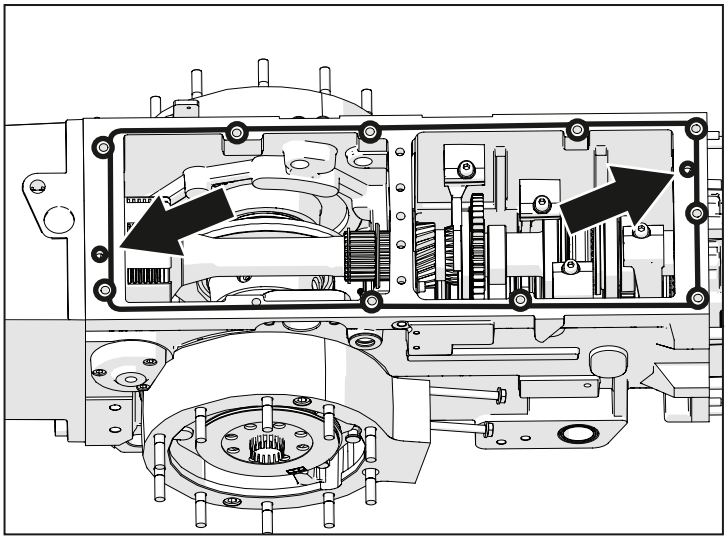

Fig. 5.158

Fit the cover (11) on the gearbox casing (12).

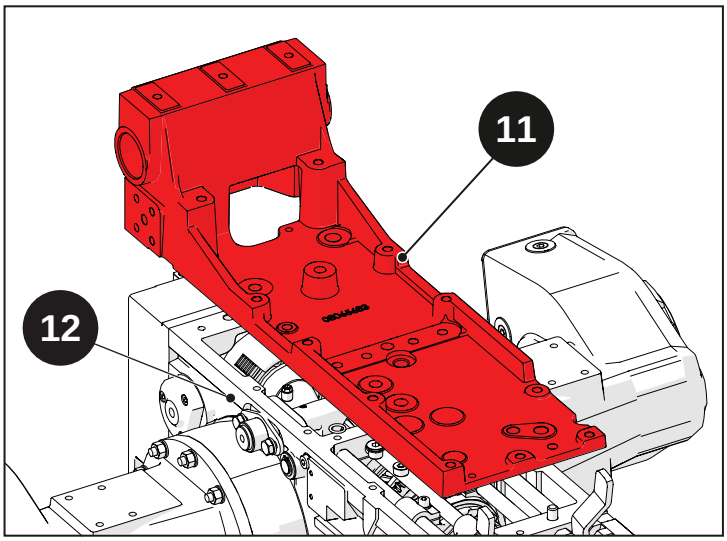

Fig. 5.159

Fit the washers (10), and then tighten the screws (7), (8) and (9).

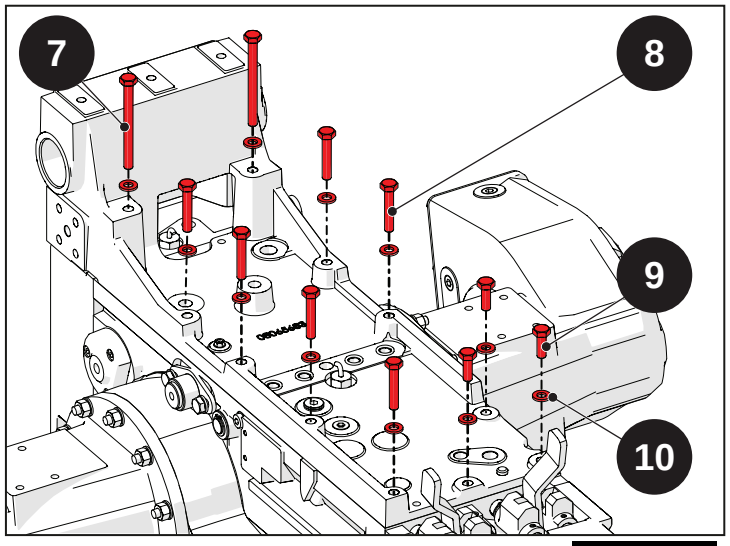

Fig. 5.160

Fit and tighten the oil filler spacer (5), fitting the copper washer (6), and then fit and tighten the oil plug with dipstick (4).

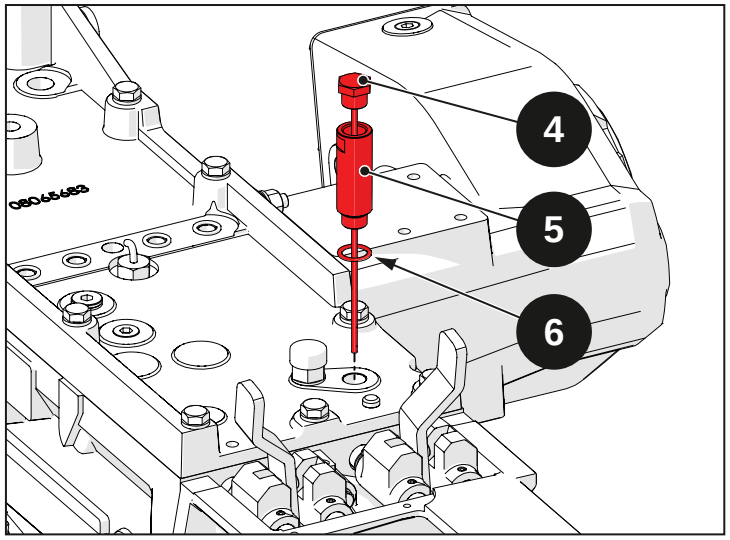

Fig. 5.161

Fit the springs (3) and the washers (2), and then fit and tighten the plugs (1).

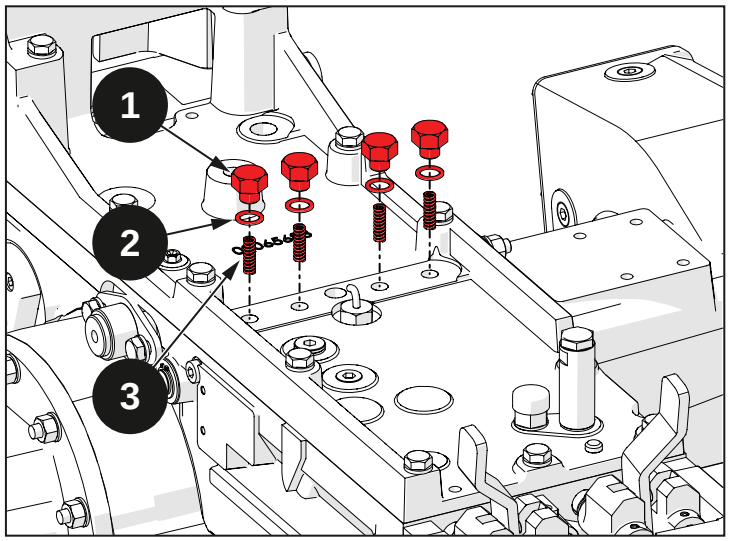

Fig. 5.162

5.5.2 Reassembling the PTO

Fit the bearing (127) and the circlip (126) on the trumpet housing (112).

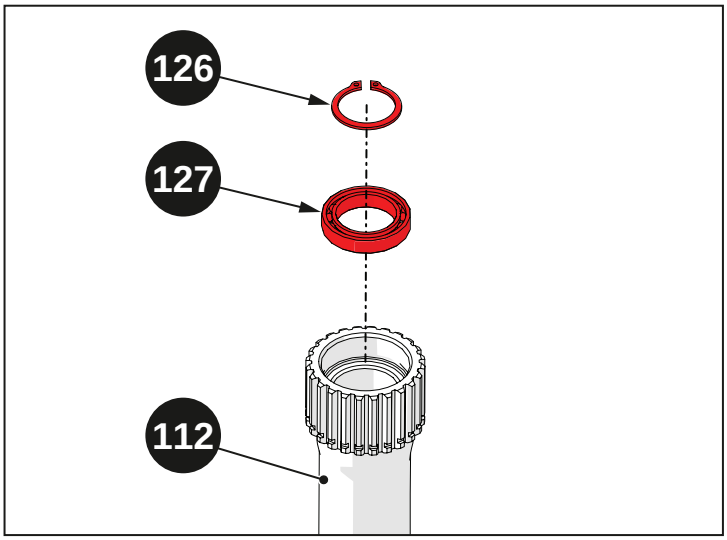

Fig. 5.163

Fit the circlips (107) and (108) on the trumpet housing (112), and then fit the sleeve (125).

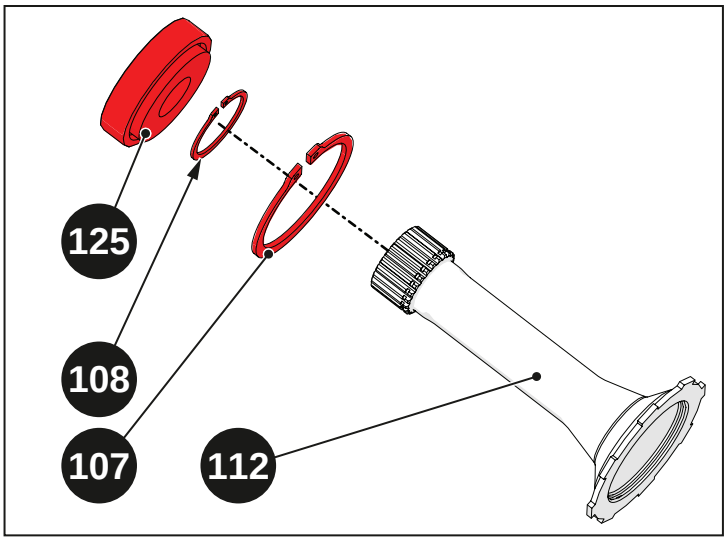

Fig. 5.164

Fit the two O-rings (124) on the clutch basket housing (113).

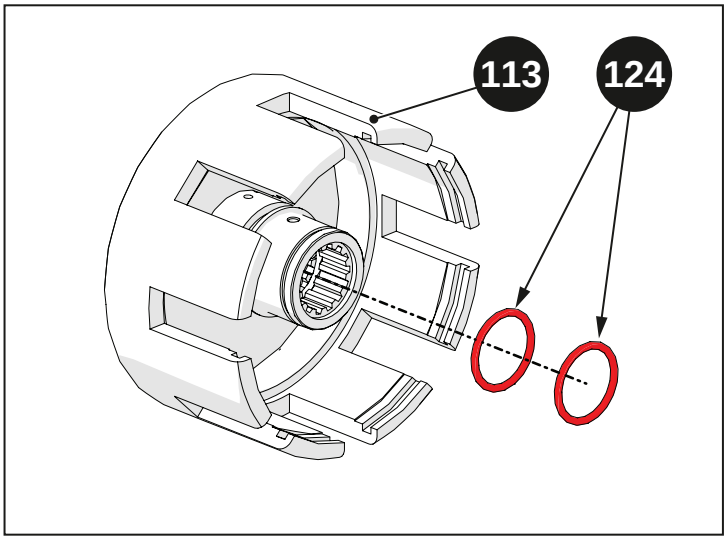

Fig. 5.165

Pre-assemble the O-ring (123) on the piston (122).

Fit the piston (122) in the clutch basket housing (113).

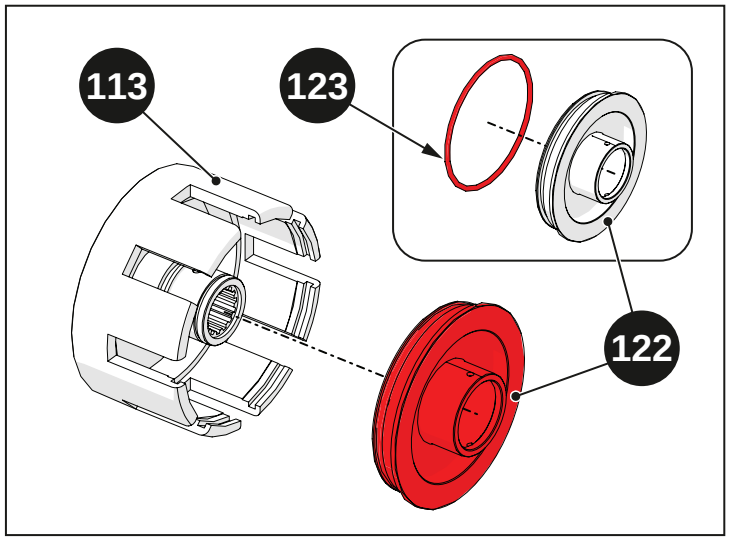

Fig. 5.166

Fit the spring (121), the spacer (120) and the circlip (119) in the clutch basket housing (113).

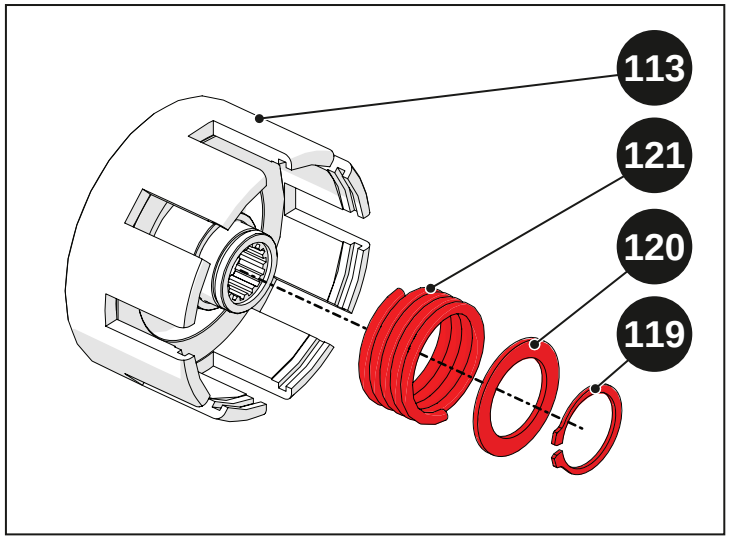

Fig. 5.167

Fit the toothed hub (118) in the clutch basket housing (113).

Fit a steel disc (116) and a friction disc (117). Repeat four times.

Fit a steel disc (116) and then the first friction disc (115).

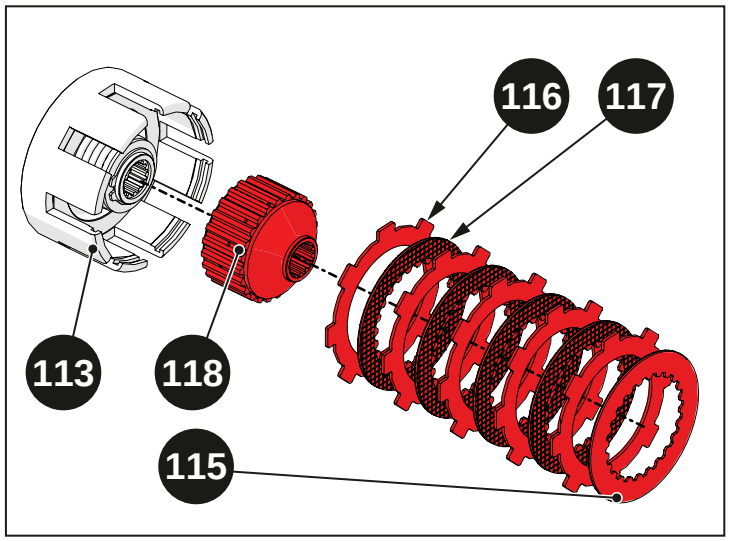

Fig. 5.168

Fit the bearing (114).

Assemble the trumpet housing (112) with the PTO clutch (113).

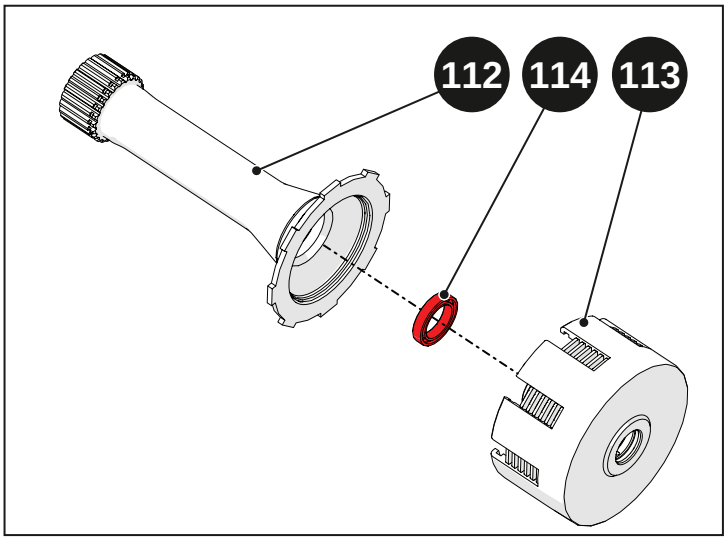

Fig. 5.169

Fit the trumpet housing (112) complete with PTO clutch.

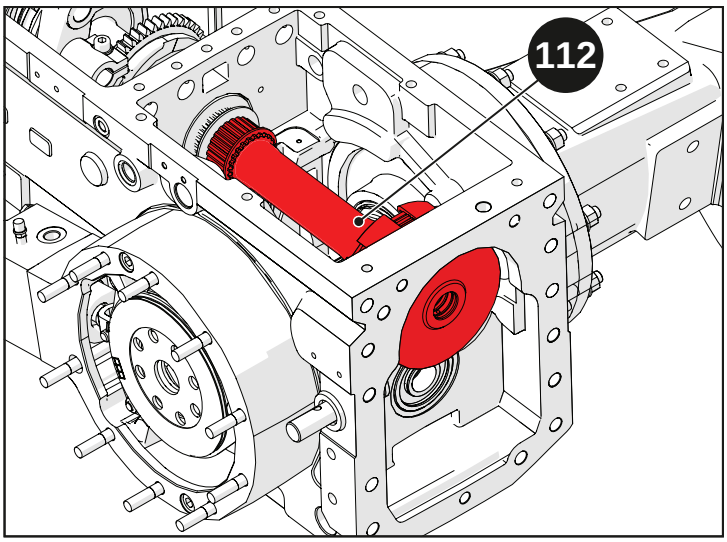

Fig. 5.170

Fit the PTO shaft (111).

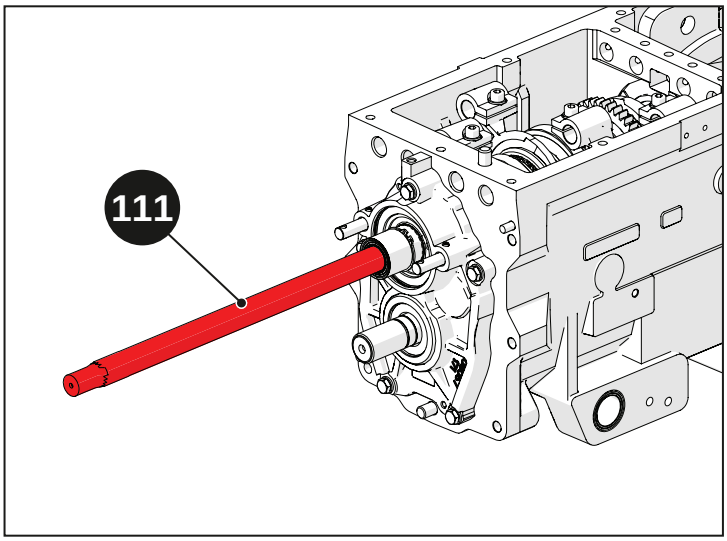

Fig. 5.171

Fit the Quad rings (109) and the O-ring (110) on the PTO shaft carrier (55).

Warning

Fit the Quad rings (109) starting from the outermost groove.

Make sure that the Quad rings are completely fit into the respective grooves.

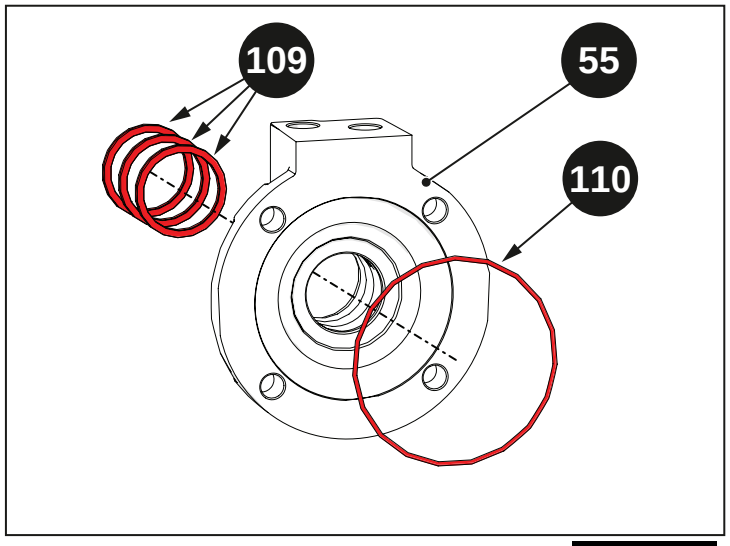

Fig. 5.172

Secure the circlips (107) and (108).

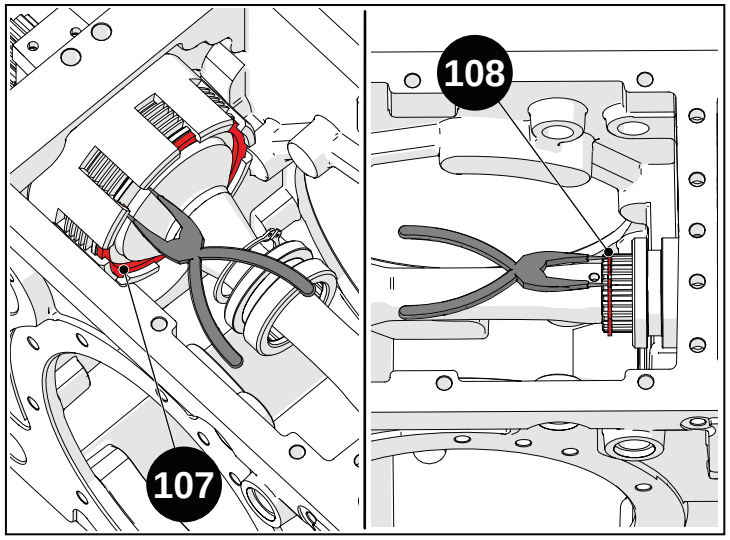

Fig. 5.173

Fit the PTO selector plate (106) and the washers (105), and then tighten the screws (104).

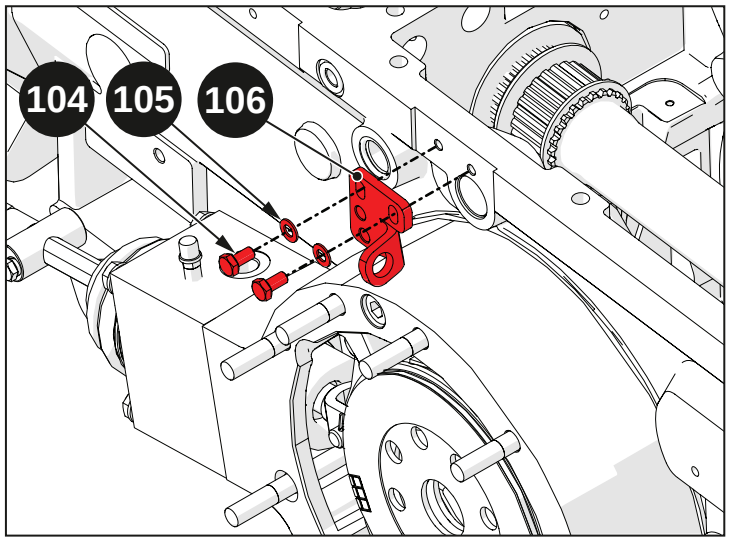

Fig. 5.174

Fit the O-ring (103), the spacer (102) and the circlip (101) on the rod (98).

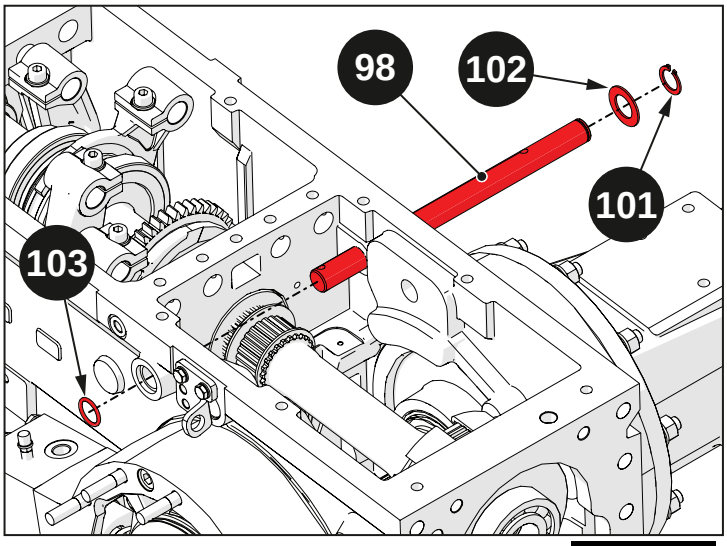

Fig. 5.175

Pre-assemble the lever (99) with the fork (100).

Fit the complete lever (99) on the PTO engagement sleeve.

Fit the rod (98).

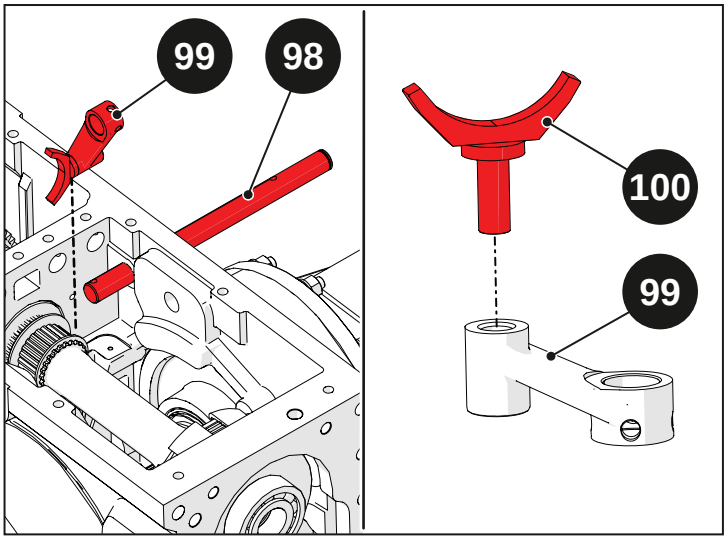

Fig. 5.176

Fit the selector pin (97), the spring (96) and the PTO selector lever (95).

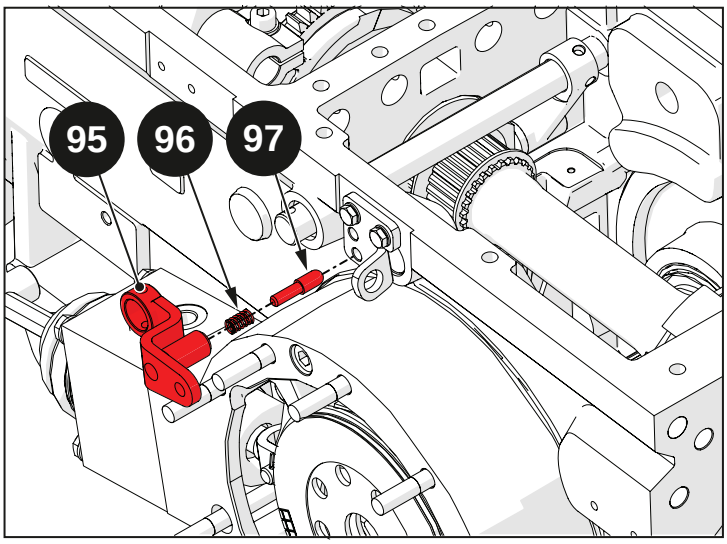

Fig. 5.177

Fit the larger pins (93).

Fit the smaller pins (94), ensuring that the splits in the pins (93) and (94) are on opposite sides.

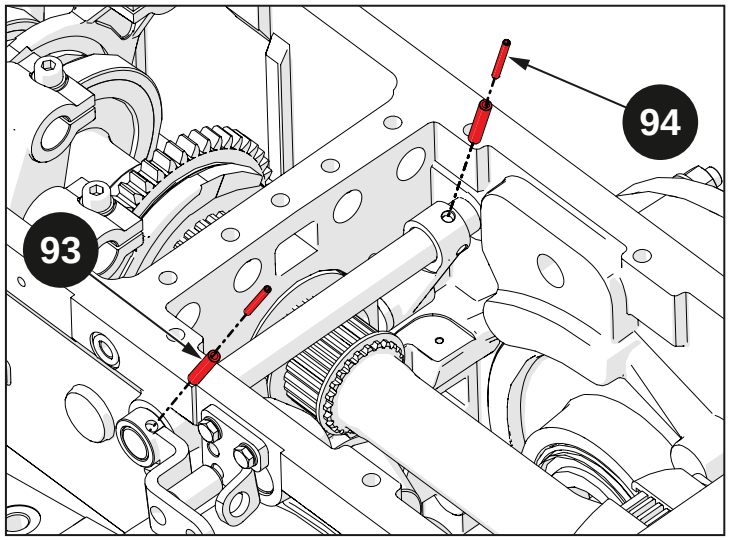

Fig. 5.178

Pre-assemble the PTO clutch cylinder:

- fit the O-ring (89) on the cylinder (85);
- fit the O-ring (88) on the piston (86);
- fit the pin (87) in the piston (86);
- Fit the complete piston (86) in the cylinder (85).

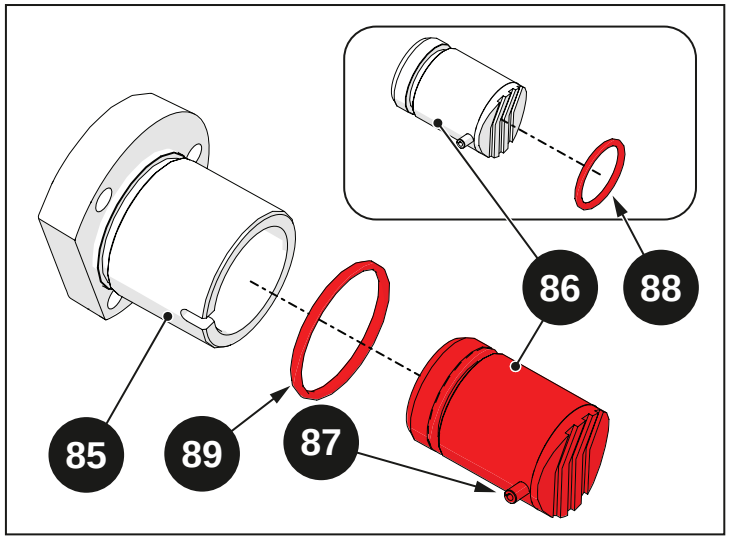

Fig. 5.179

Fit the complete clutch cylinder (85) on the gearbox casing, aligning the fastener screw holes correctly.

Warning

The cylinder cannot be installed if the pin (87) is protruding.

Drive in the pin with a hammer to eliminate the protrusion.

Fit the washers (84) and tighten the screws (83).

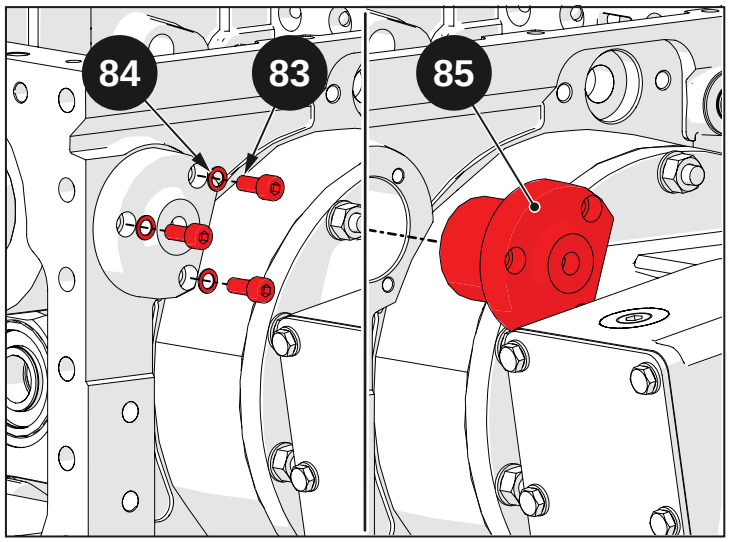

Fig. 5.180

Check the operation of the clutch cylinder (85) and the PTO clutch assembly (113): blow air into the holes shown in the figure, the components must engage correctly at the air inlet.

Warning

If any air leaks are noted, check all the O-rings of the PTO clutch (113) and the clutch cylinder (85).

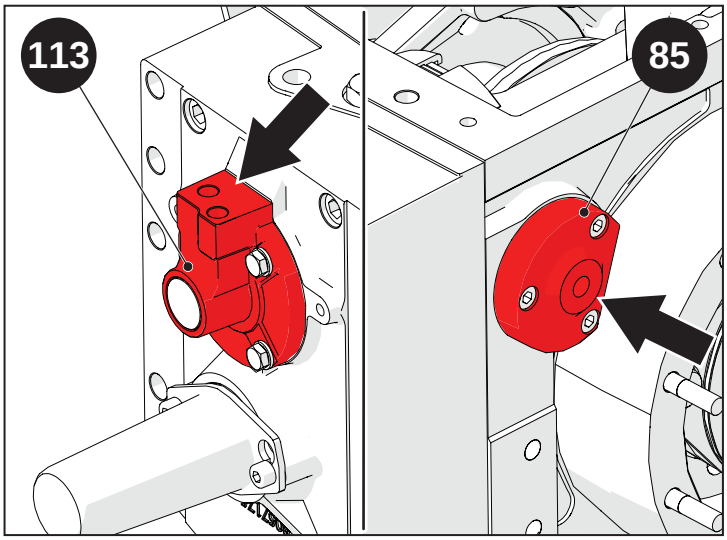

Fig. 5.181

Fit the fork (82), fit the rod (81) and then fit the pin (80).

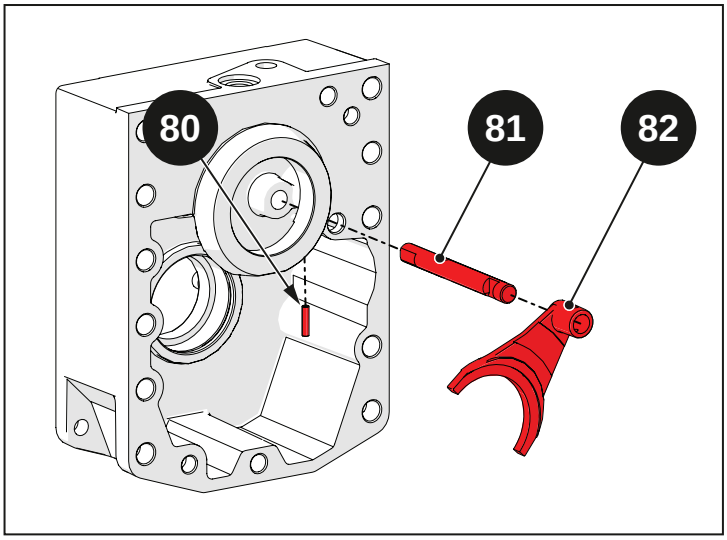

Fig. 5.182

Fit the bearing (79), the circlip (78) and the spacer (77).

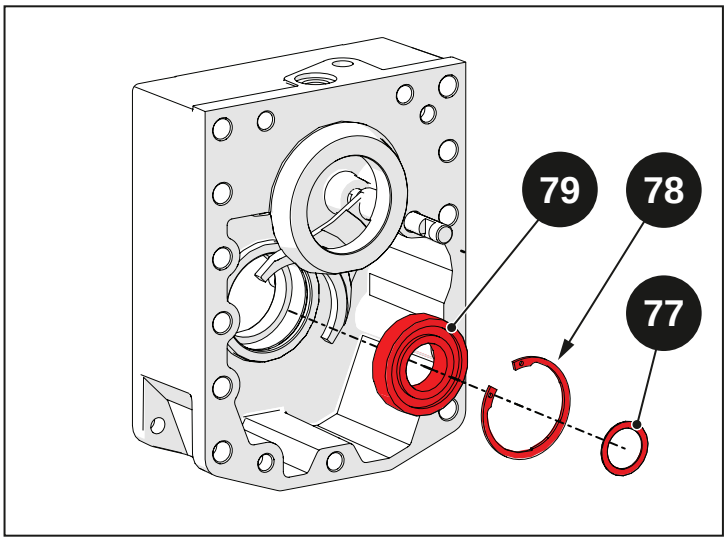

Fig. 5.183

Fit the gear (76), the spacer (75) and the roller bearing cage (72).

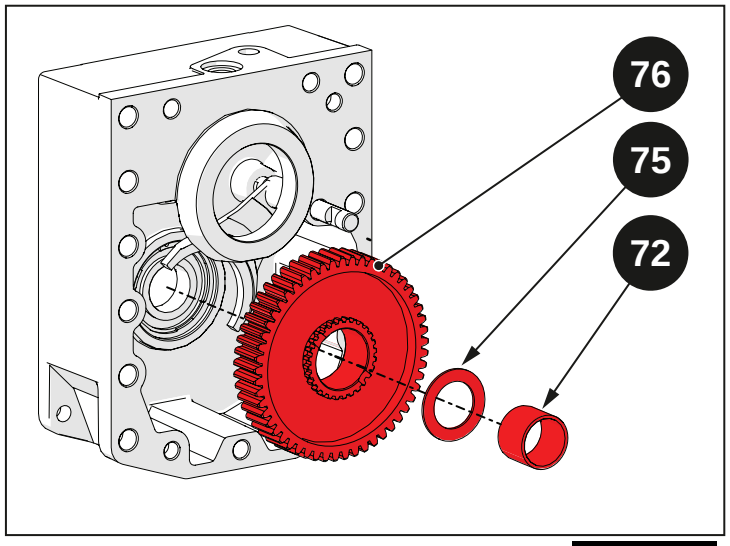

Fig. 5.184

Fit the selector (73).

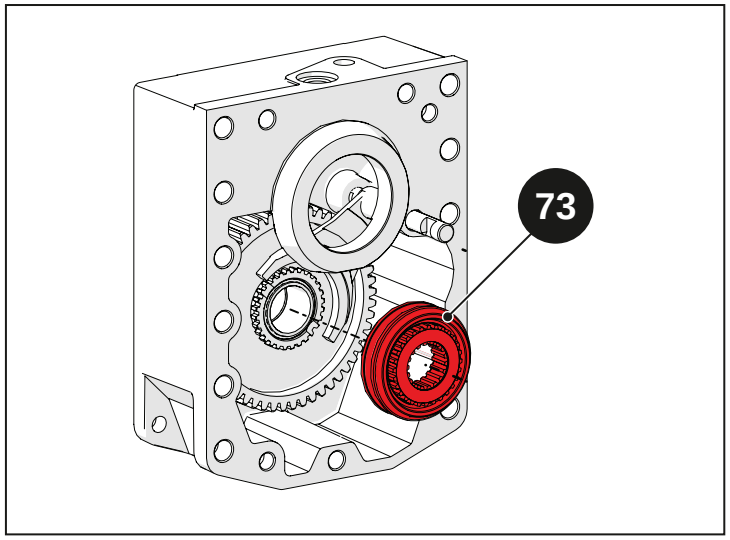

Fig. 5.185

Fit the gear (71).

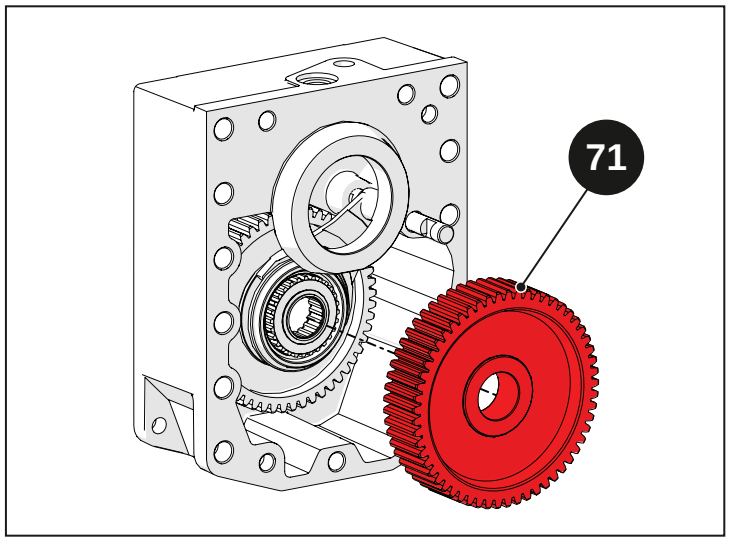

Fig. 5.186

Fit the bush (70) and the two roller bearing cages (74).

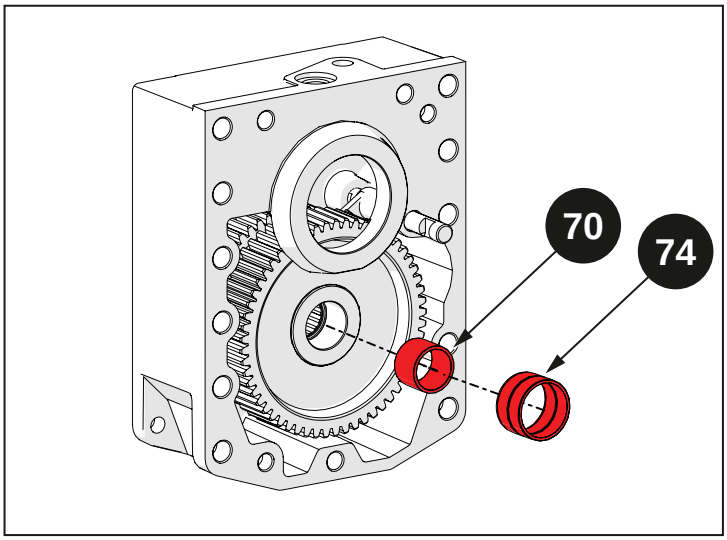

Fig. 5.187

Fit the PTO sleeve (69).

Warning

Check that the sleeve (69) engages smoothly and without impediment by rotating and meshing the sleeve with the gear (71) in several positions.

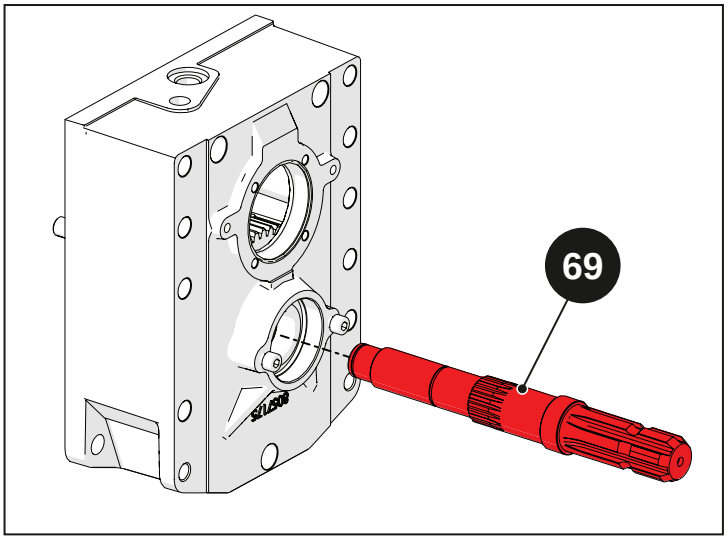

Fig. 5.188

Fit the spacer (67) and the circlip (68).

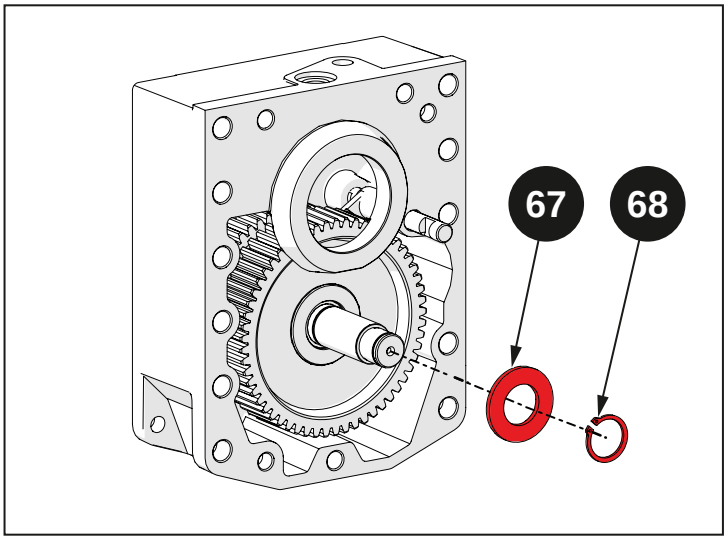

Fig. 5.189

Fit the bearing (66).

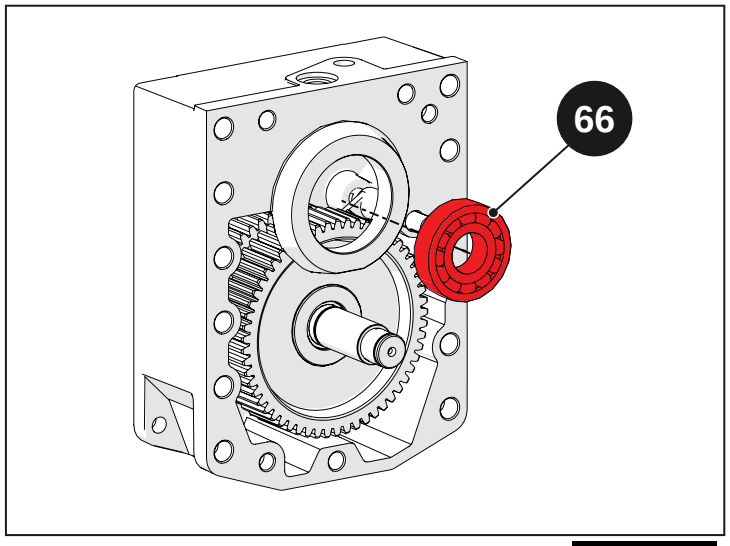

Fig. 5.190

Fit the final PTO shaft (65).

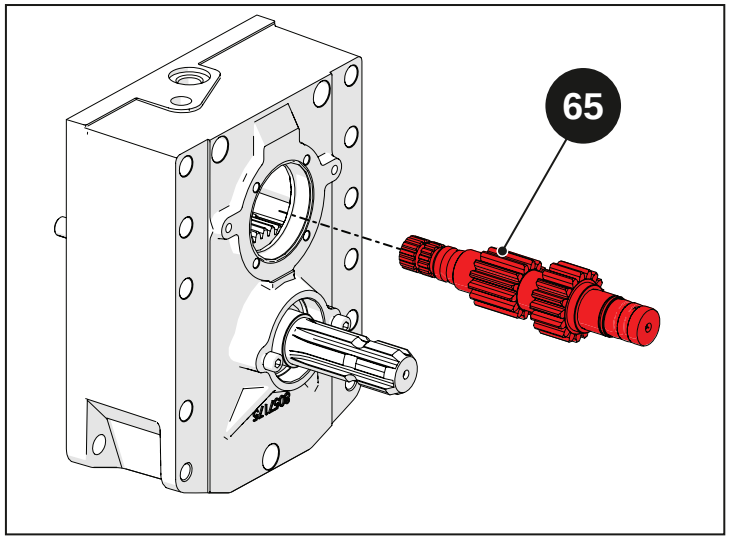

Fig. 5.191

Fit the bearing (61) in the rear cover.

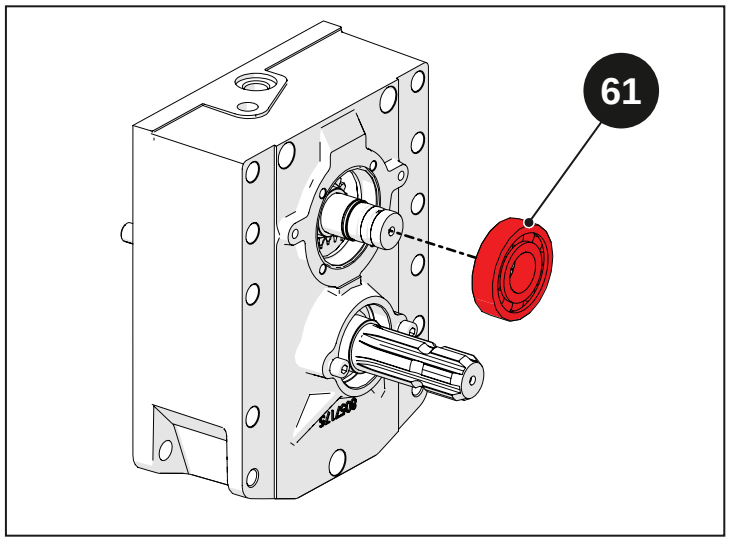

Fig. 5.192

Apply a layer of silicone sealant to the mating surface of the complete rear cover (64).

Apply a thread of silicone sealant on the mating surface of the gearbox casing near the splines.

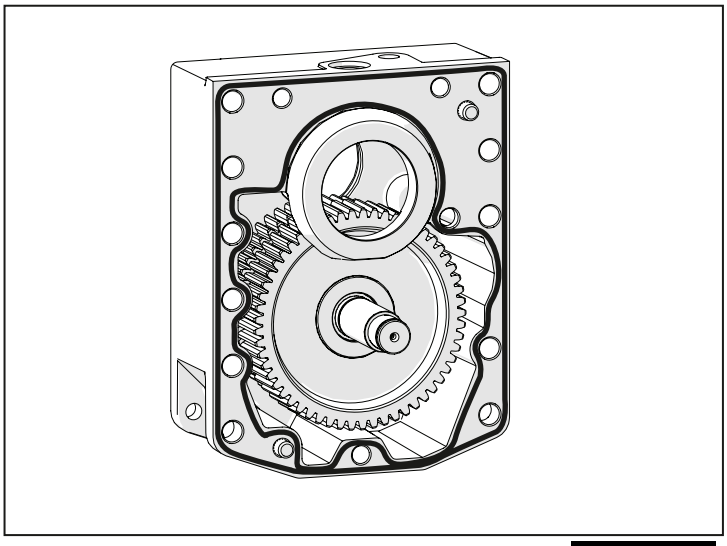

Fig. 5.193

Fit the complete rear cover (64) on the gearbox casing.

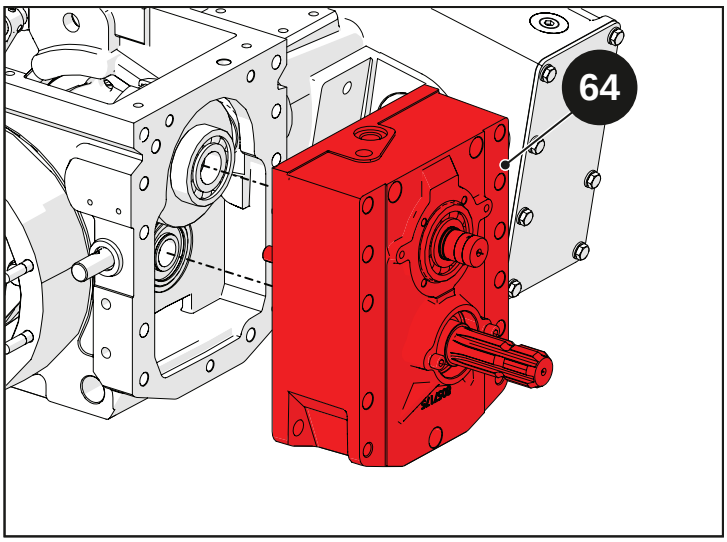

Fig. 5.194

Tighten the screws (62) and (63).

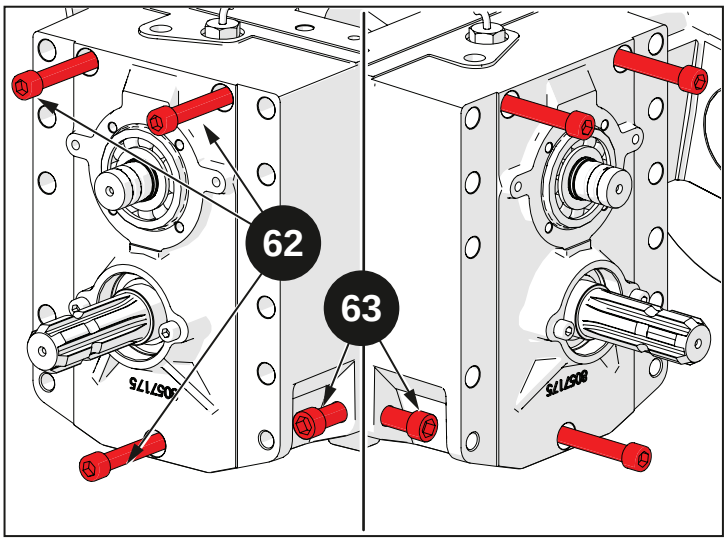

Fig. 5.195

Fit the circlip (60) to secure the bearing (61).

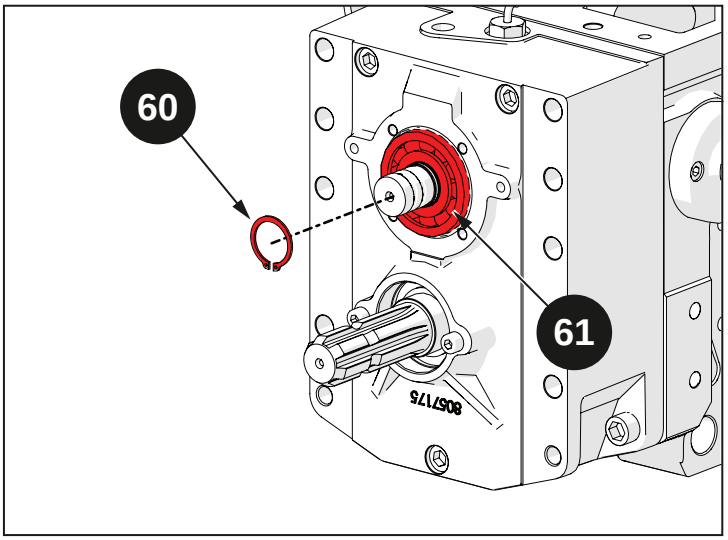

Fig. 5.196

Fit the oil seal (59).

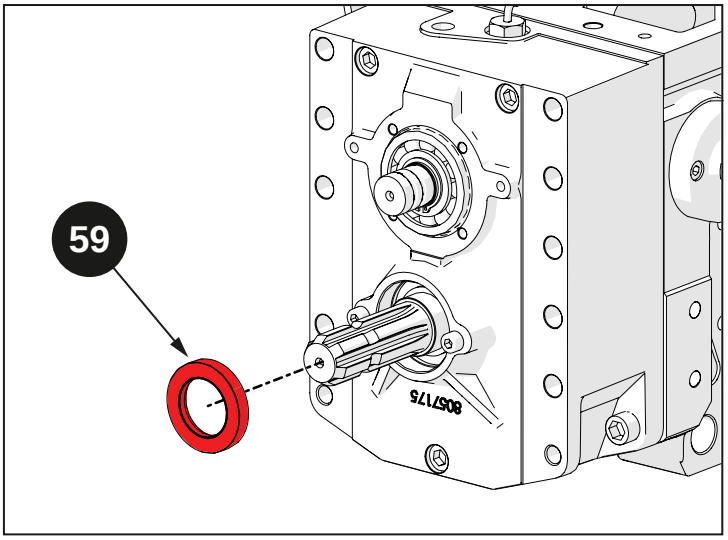

Fig. 5.197

Pre-fit the quad rings (58) on the shaft.

Fit the shaft carrier (55) and the plug (57).

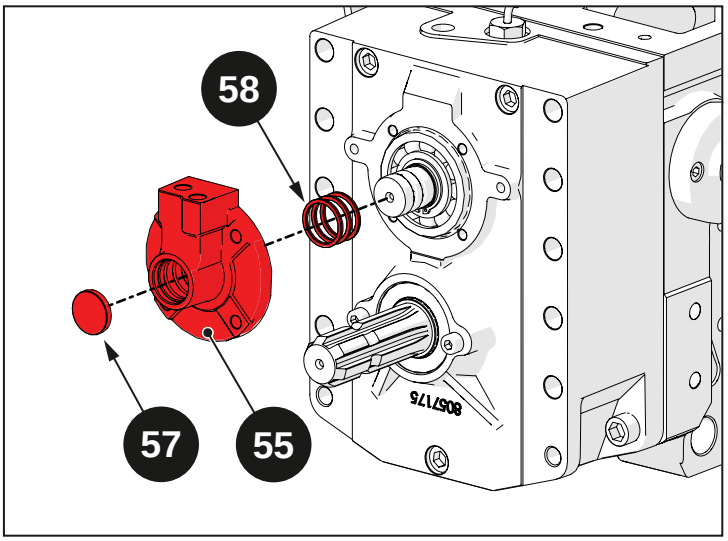

Fig. 5.198

Fit the washers (54) and tighten the screws (53).

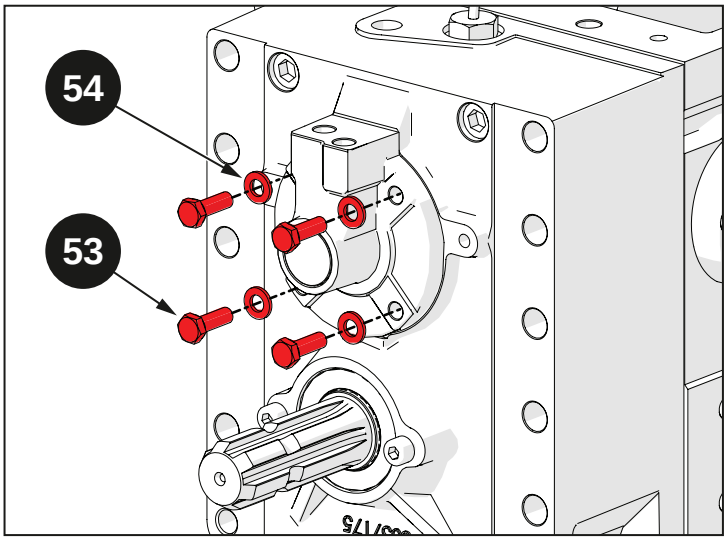

Fig. 5.199

Fit the bracket (52).

Fit the washers (51) and tighten the screws (50).

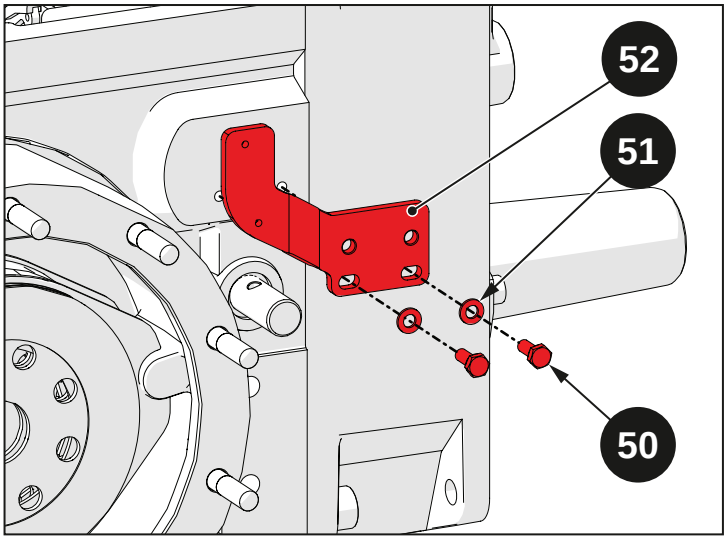

Fig. 5.200

Fit the lever (46) with the engagement pin (47), the spring (48) and the O-ring (49).

Fasten the lever (46) with the pin (45).

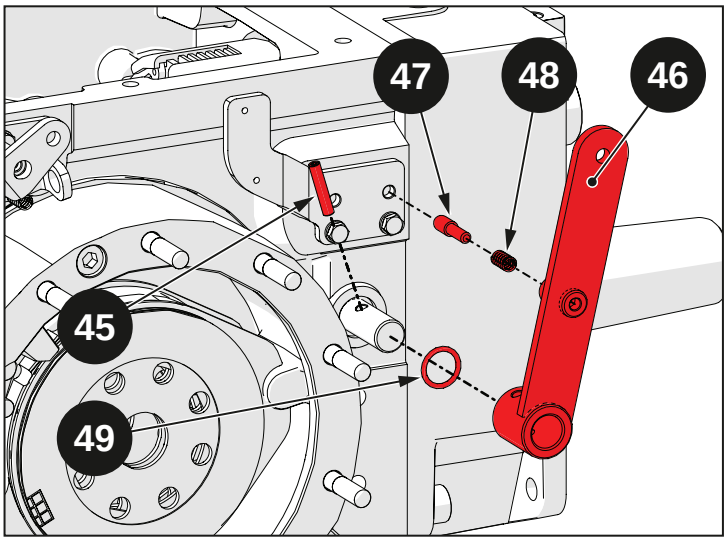

Fig. 5.201

5.6 Tightening torques

Indice

5.6.1 Tightening torques 5-88

5.6.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
PTO clutch cylinder — gearbox casing fastener screws	25	2.5
Gearbox case cover fastener screws	55	5.5
Rear PTO cover - gearbox casing fastener screws	85	8.5
Conical crown wheel -differential case fastener screws	90	9
Brake casing - gearbox casing hex socket fastener screws	55	5.5
PTO shaft mount - gearbox casing hex socket fastener screws	25	2.5

5.7 Tools necessary

Indice

5.7.1 Tools necessary 5-90

5.7.1 Tools necessary

p/n	Description	Quantity
07008471	Bevel pinion support rod	1
07008472	Bevel pinion retainer	1
07008470	Crown wheel assembly ring nut key	1
07008473	Bearing punch	1
07008474	Punch for installing gear	1
07008476	Tool for installing PTO clutch spring	1
07008477	Punch for inner oil seal	1
07008478	Bearing punch	1
07008480	Bearing punch	1
07008481	Punch for PTO cover	1
07008482	Punch for PTO clutch piston	1
07008467	Pinion lock sleeve	1

6 : Central body

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6.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

6.2 Technical characteristics

Index

6.2.1 Technical characteristics 6-4

6.2.1 Technical characteristics

Front swing angle	15° right + 15° left

6.3 Disassembly

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6.3.1 Preliminary operations 6-6

6.3.2 Disassembly 6-6

6.3.1 Preliminary operations

Carry out the following procedures to access the centre housing:

Danger
Secure the assemblies to lifting equipment of adequate load capacity before disassembly. If suitable lifting equipment is not available, assemblies may be secured with a support stand.

- Removing the platform (see chapter "13-Platform")
- Separating engine/clutch (see chapter "3 - Clutch")
- Removing the wheels

6.3.2 Disassembly

Undo the screws (1) and remove the conical washers (2).

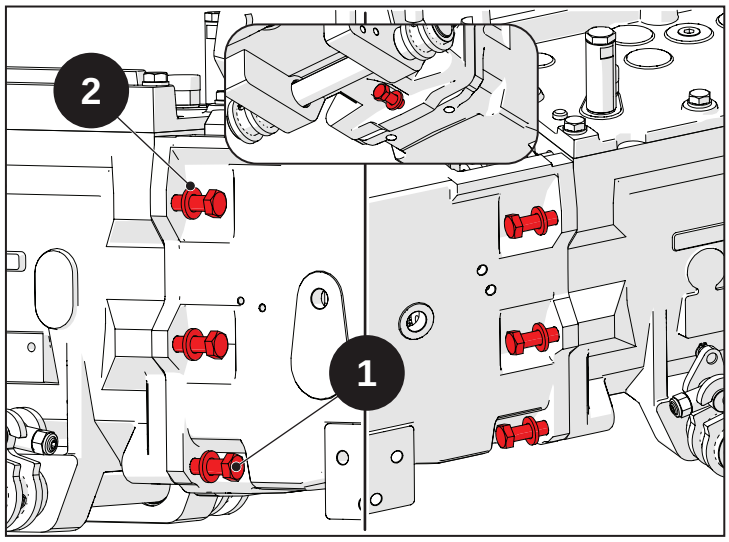

Fig. 6.1

Remove the gearbox assembly from the central body.

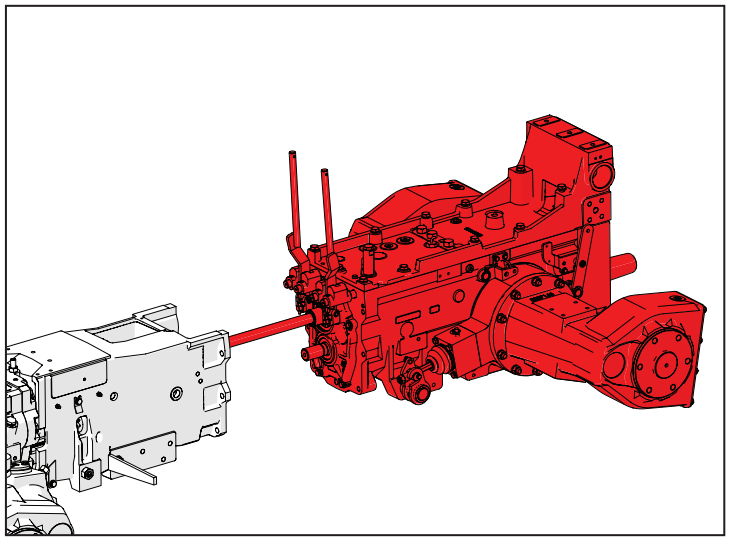

Fig. 6.2

Remove the pin (4) of the coupling (5) with a pin punch to free the coupling.

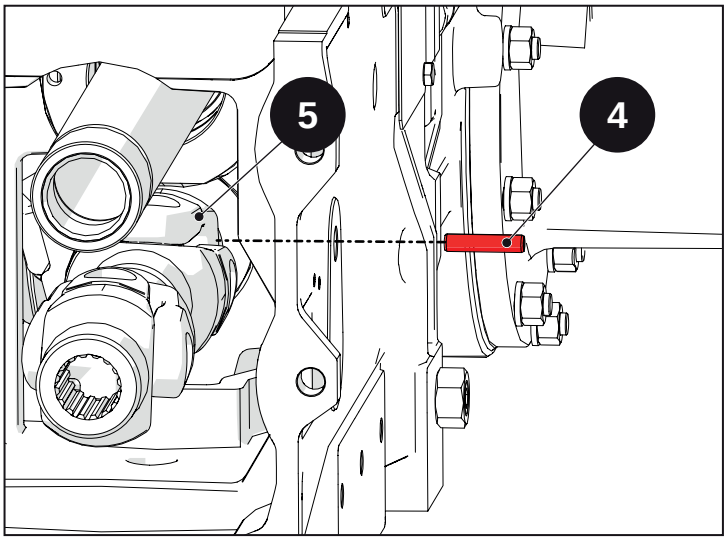

Fig. 6.3

Remove the coupling (4).

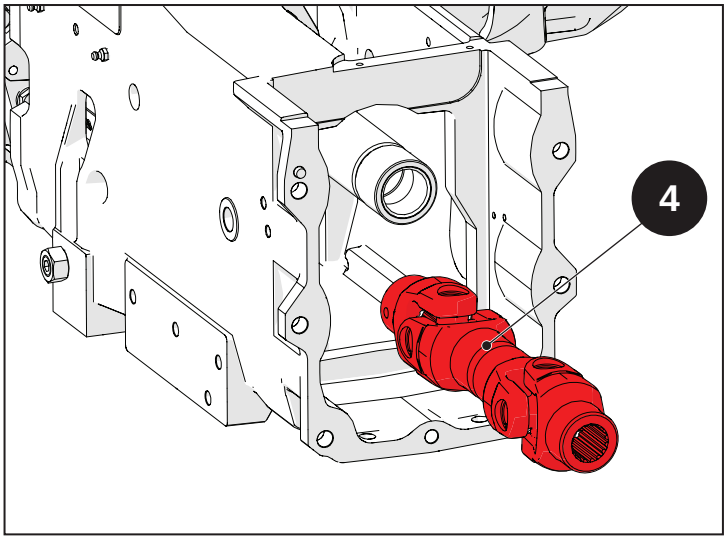

Fig. 6.4

Remove the driveshaft (3).

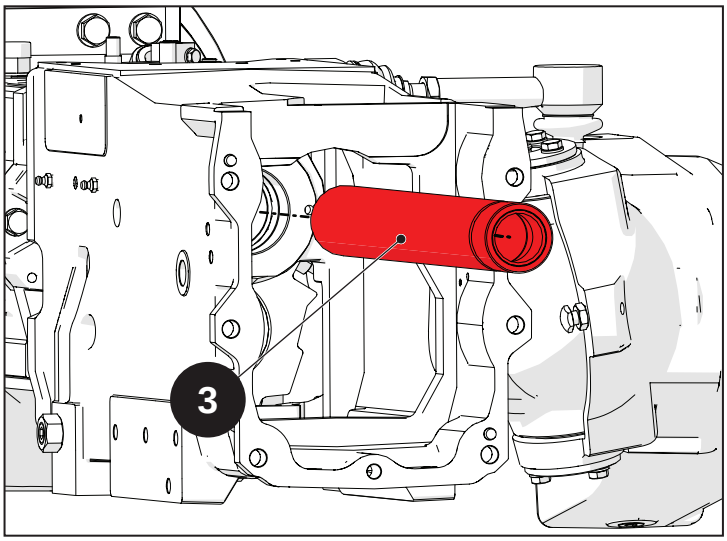

Fig. 6.5

Loosen the nuts (6) and then undo the swinging travel stop pegs (7).

Note
It is not necessary to remove the pegs (7).

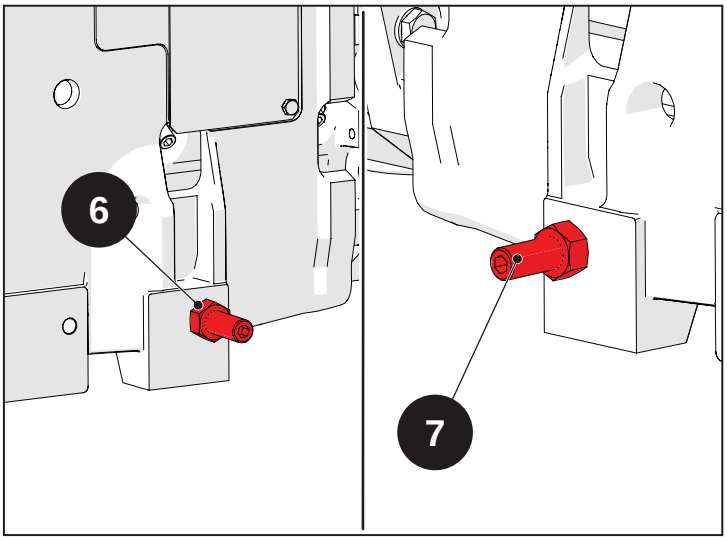

Fig. 6.6

Loosen the nuts (8) and then undo the rear lateral pegs (9).

Loosen the nuts (15) and then undo the front lateral pegs (16).

Loosen the nut (10) and then undo the peg (11).

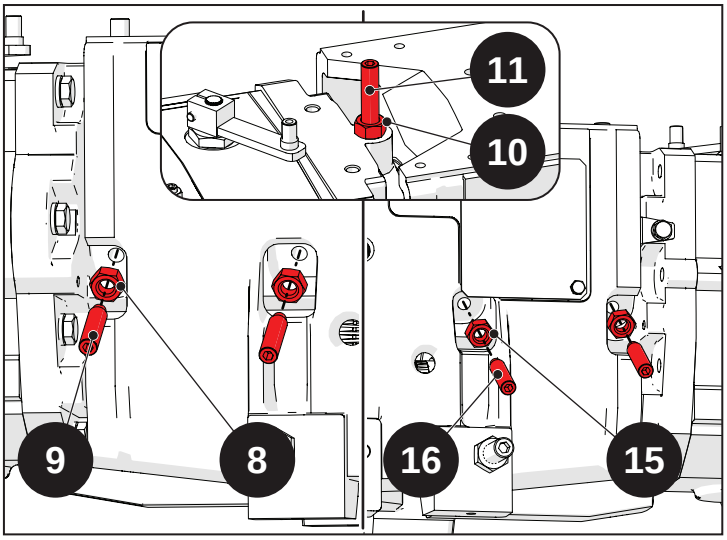

Fig. 6.7

Use a slide hammer extractor to remove the coupling cylinder (12).

Remove the bush (13).

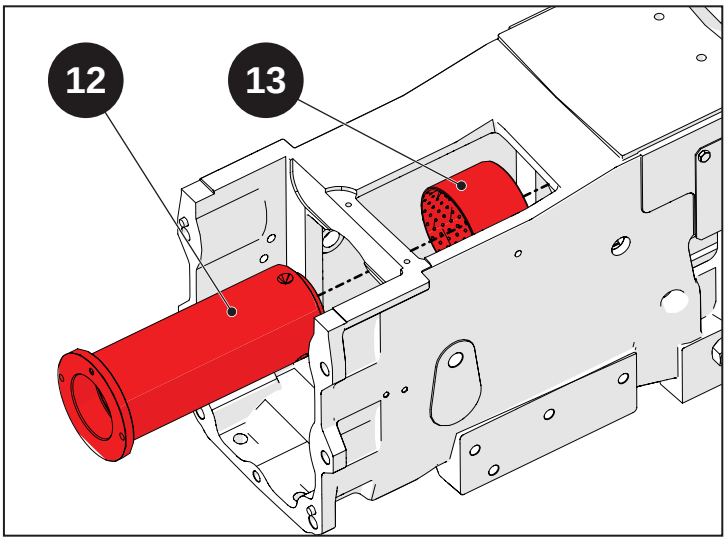

Fig. 6.8

Secure the centre housing to a suitable hoist, and then lift and separate it from the front differential.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

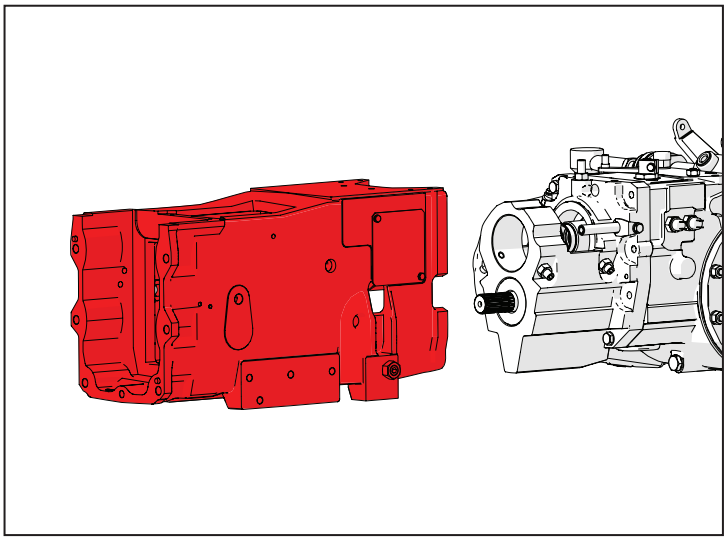

Fig. 6.9

Remove the front bush (14).

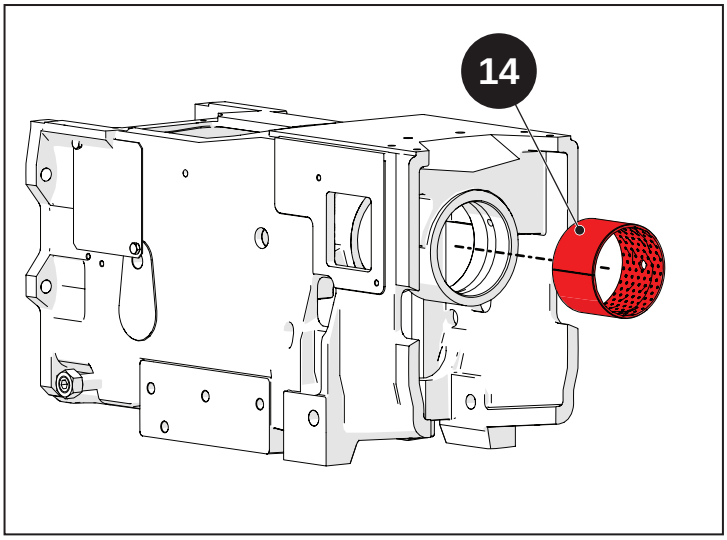

Fig. 6.10

6.4 Main inspection, reassembly and adjustment procedures

Index

6.4.1 Main inspection, reassembly and adjustment procedures.....6-12

6.4.1 Main inspection, reassembly and adjustment procedures

Warning

Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working.

Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction".

Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

Fit the front bush (14) and drive it fully into its seat.

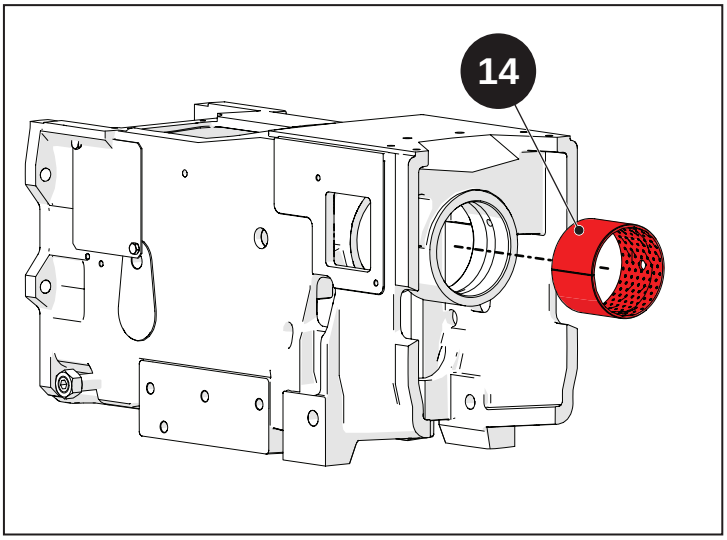

Fig. 6.11

Secure the centre housing to a suitable hoist, and then lift and mate it with the front differential.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

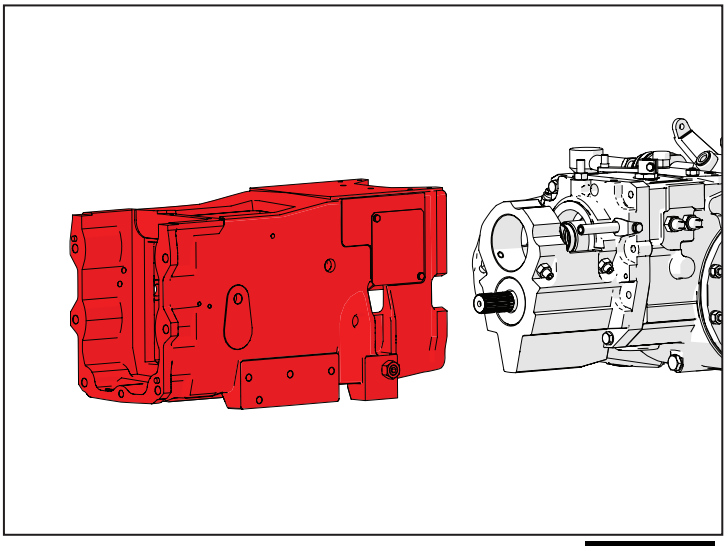

Fig. 6.12

Grease the bush (13) and then fit it fully into its seat.

Grease the outer surface of the knuckle cylinder (12) and fit it to the end on the casing.

Note

The notch on the cylinder collar (12) must be oriented vertically to ensure correct alignment with the retainer pegs.

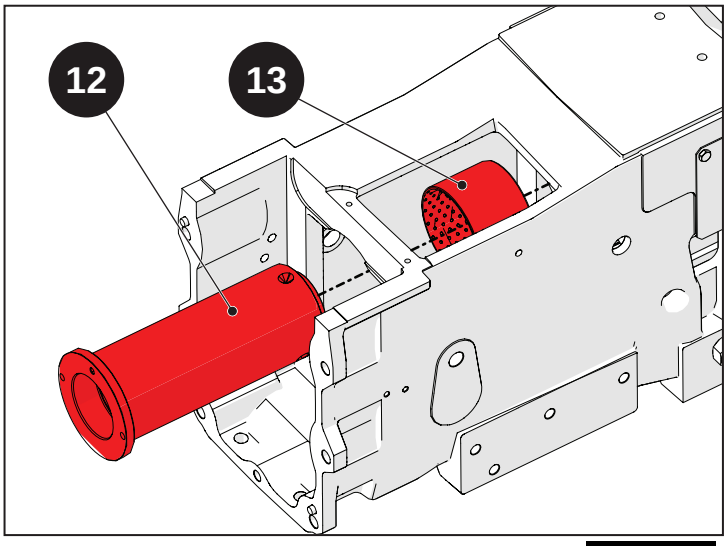

Fig. 6.13

Tighten the front lateral (16) pegs fully into their seats and then tighten the check nuts (15).

Tighten the rear lateral (9) pegs fully into their seats and then tighten the check nuts (8).

Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Note

Bear in mind the difference between the grub screws.

The nuts (15) on the front lateral pegs are thinner than the nuts (8) on the rear lateral pegs.

The rear lateral pegs (9) have flat heads.

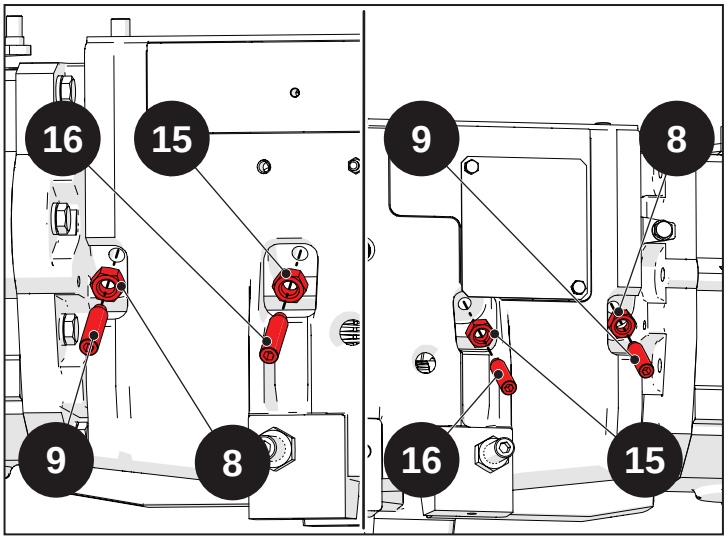

Fig. 6.14

Tighten the peg (11) fully into its seat and then fasten with the check nut (10). Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Warning

Make sure that the peg (11) is engaged completely in the knuckle cylinder.

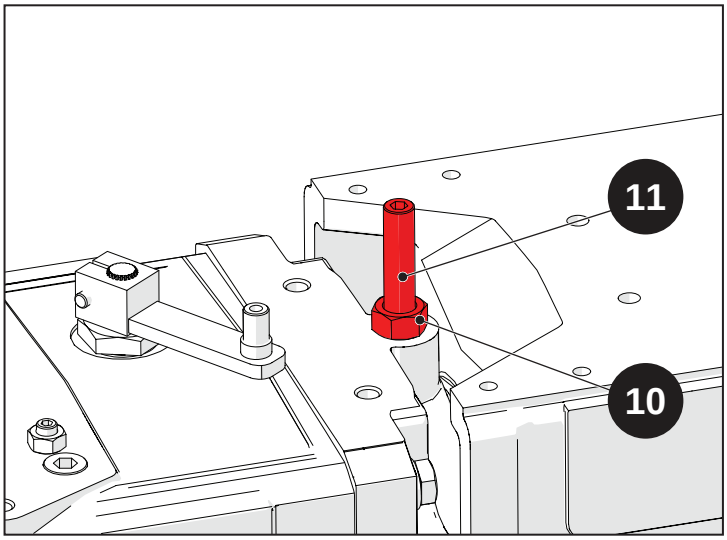

Fig. 6.15

Tighten the swing travel stop pegs (7) completely into the threads of the nuts (6), and then tighten the nuts (6) to a torque of 200 Nm (20 kgm).

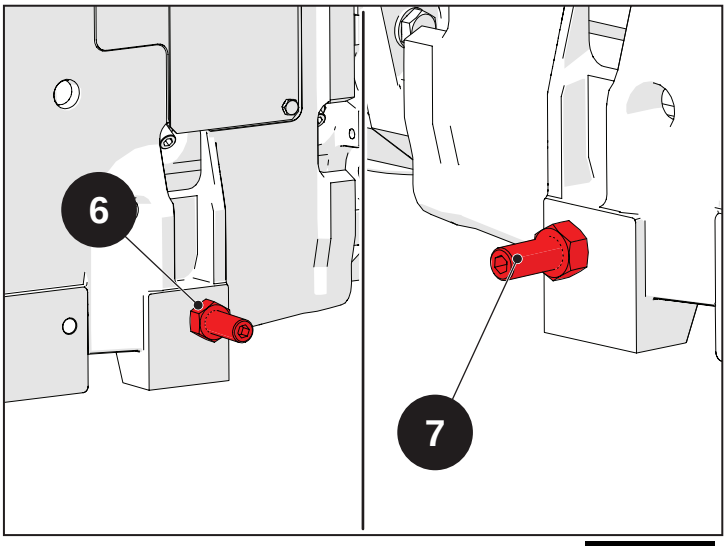

Fig. 6.16

Fit the driveshaft (3).

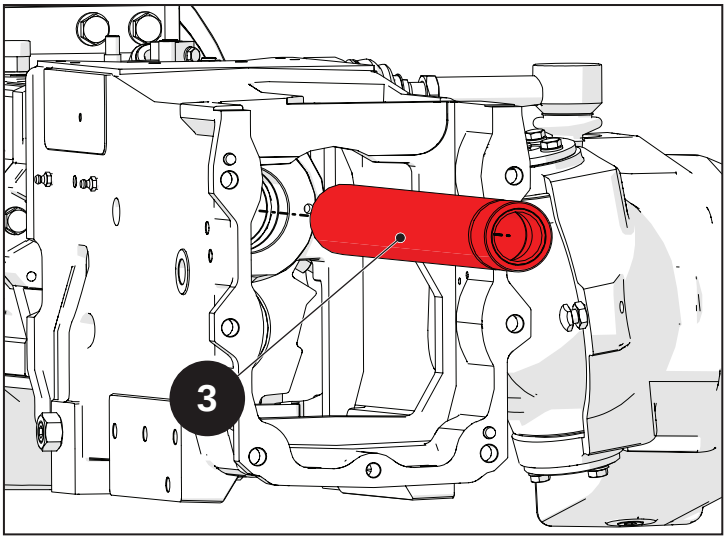

Fig. 6.17

Fit the coupling (4).

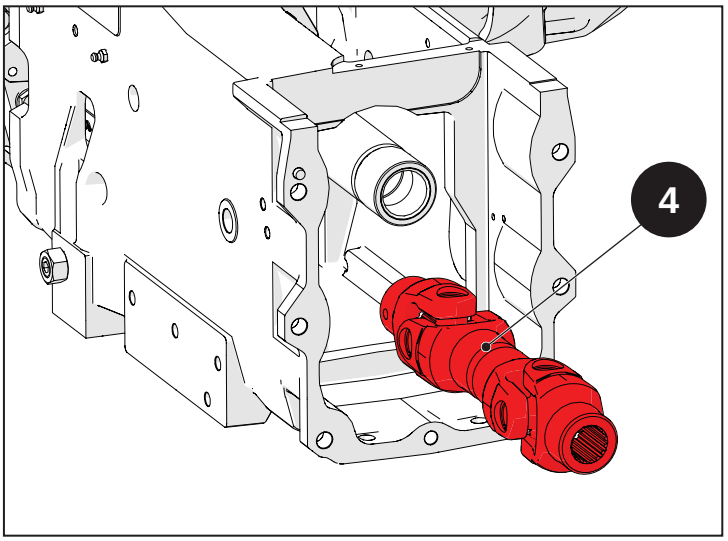

Fig. 6.18

Install the pin (4) of the coupling (5) with a pin punch to secure the coupling.

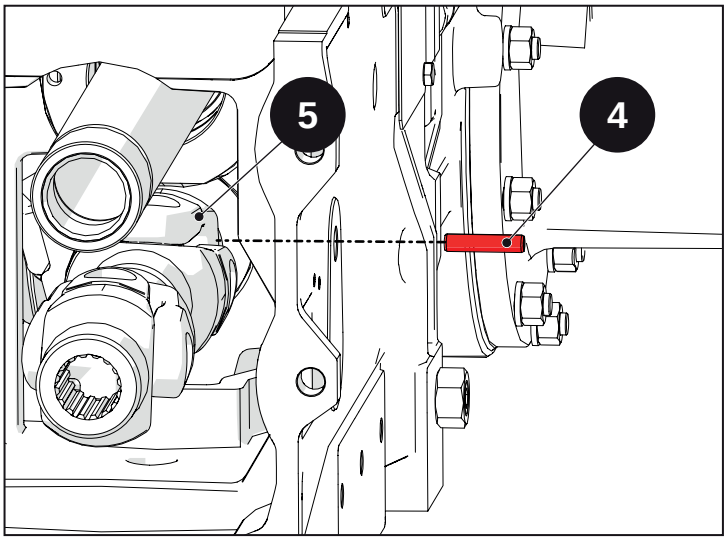

Fig. 6.19

Mate the gearbox with the centre housing.

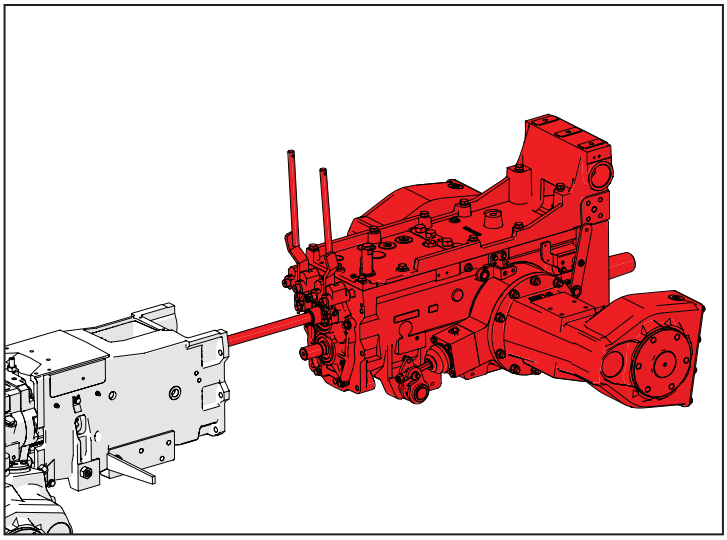

Fig. 6.20

Fit the conical washers (2) and tighten the screws (1).

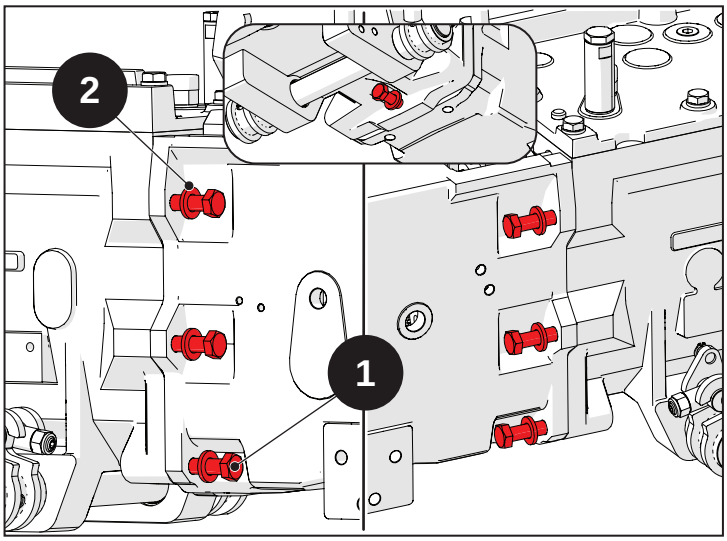

Fig. 6.21

6.5 Tightening torques

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6.5.1 Tightening torques 6-18

6.5.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Fastener nut for the knuckle cylinder lateral grub screw	85	8.5
Fastener nut for the knuckle cylinder upper grub screw	85	8.5
Fastener nut for the swing end stop grub screw	200	20
Central body - gearbox casing fastener screw	90	9

6.6 Tools necessary

Index

6.6.1 Tools necessary 6-20

6.6.1 Tools necessary

p/n	Description	Quantity
07008475	Wrench for ring nut	1
07003519	Punch for oil seal	1
07008479	Punch for oil seal	1

7 : Rear final drive units

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7.6.1 Tools necessary 7-28

7.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

7.2 General introduction

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7.2.1 Assembly drawing for reduction gear cover.....7-4

7.2.1 Assembly drawing for reduction gear cover

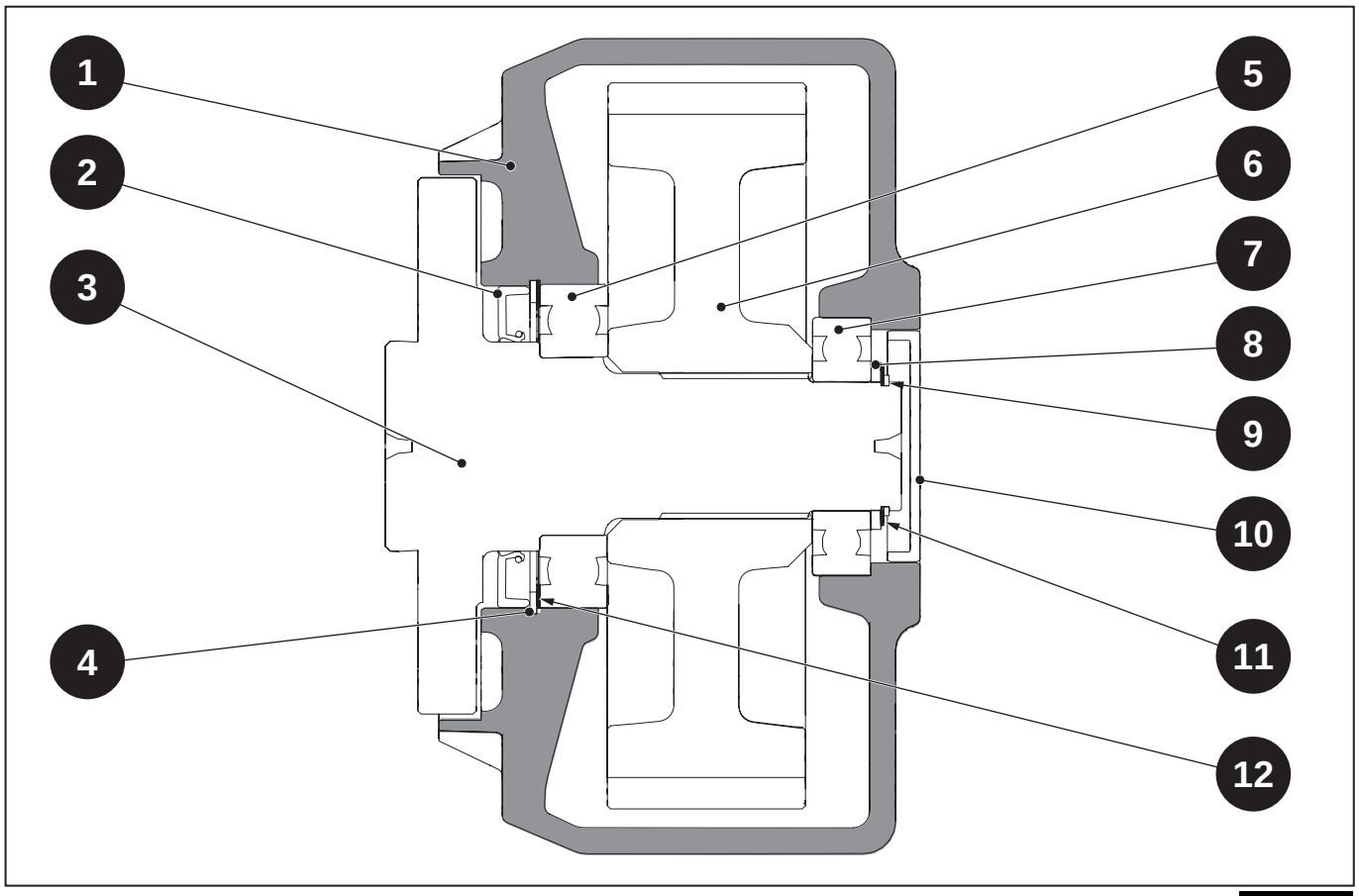

Fig. 7.1

1 - Final drive reduction gear unit casing
2 - Oil seal
3 - Half-axle
4 - Circlip
5 - Bearing
6 - Reduction gear
7 - Bearing
8 - Spacer
9 - Circlip
10 - Plug
11 - Spacer
12 - Spacer

7.3 Disassembly

Indice

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7.3.1 Preliminary operations

The main operations necessary to access the final drive reduction gear units are indicated as follows.

- Removing the platform (see chapter "13-Platform")
- Draining the transmission oil
- Draining final drive unit oil

Left hand final drive unit

Disconnect all the hydraulic connections of the hydraulic unit.

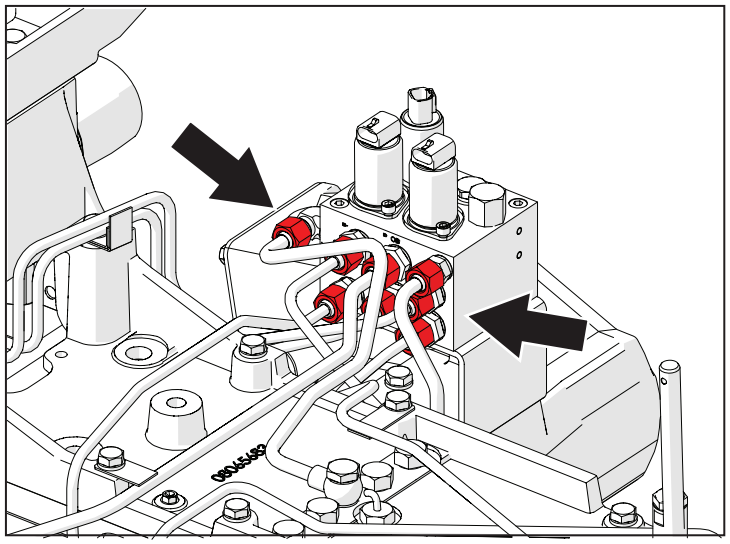

Fig. 7.2

Remove the screws (1) and the washers (2) and then remove the hydraulic unit and the mount.

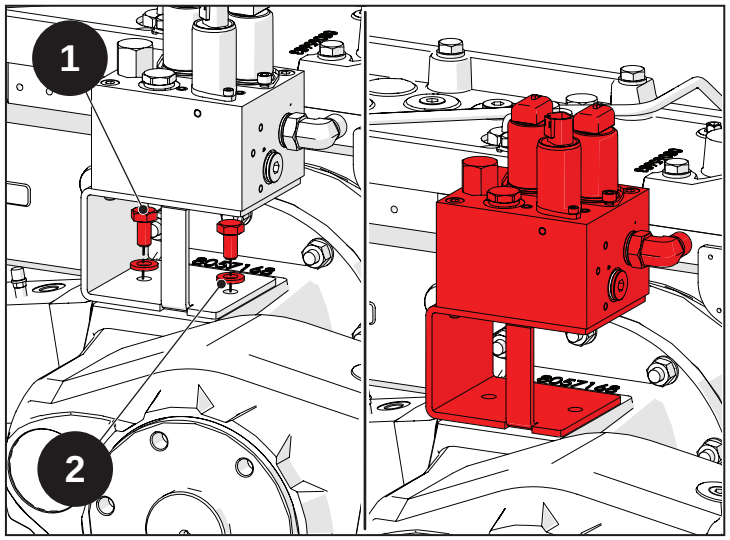

Fig. 7.3

Remove the nuts (3) and the washers (4).

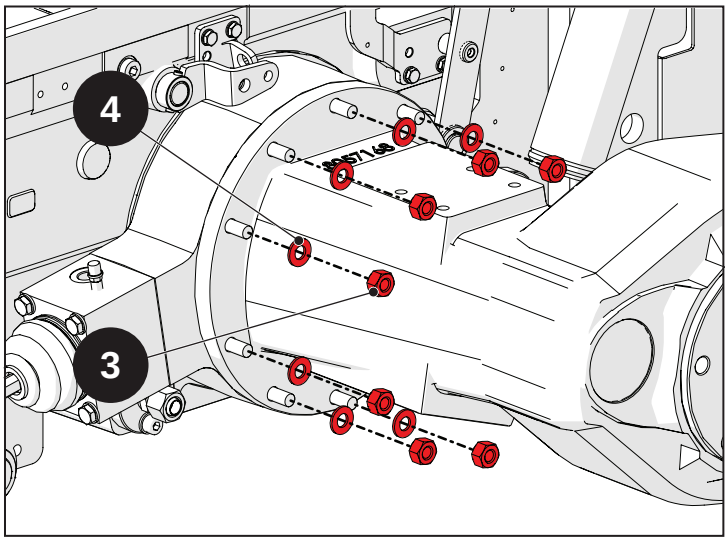

Fig. 7.4

Remove the left hand final drive unit.

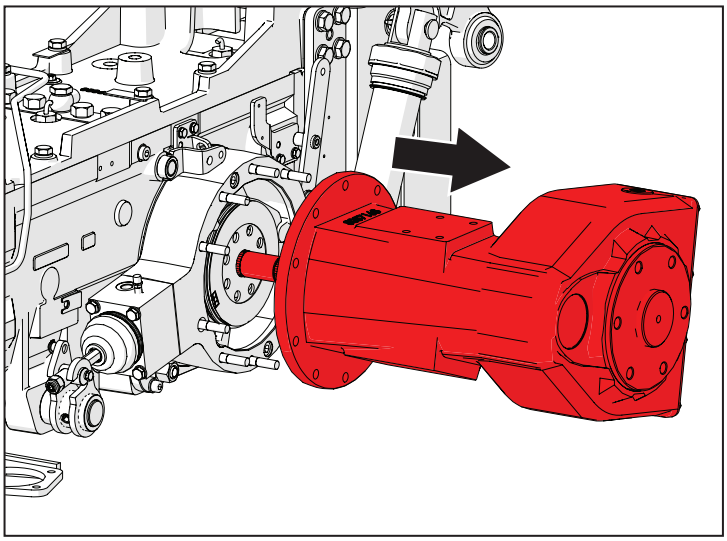

Fig. 7.5

Right hand final drive unit

Undo the hydraulic connections from the distributors, the diverter and the quick connectors.

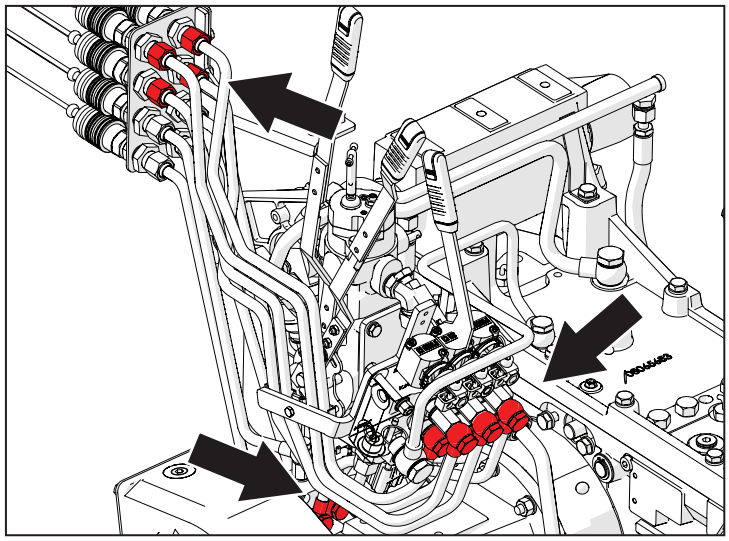

Fig. 7.6

Undo the screws and remove the hydraulic pipe retainer clamp.

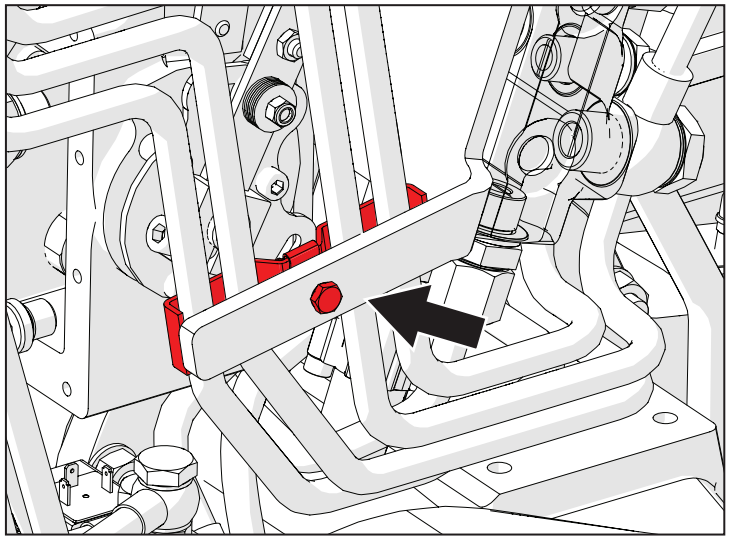

Fig. 7.7

Disconnect the hydraulic pipes connected to the distributors.

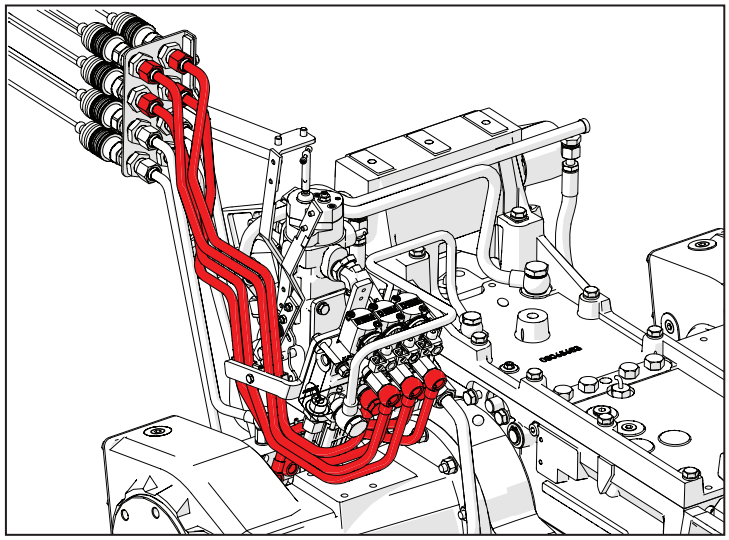

Fig. 7.8

Remove the nuts (3) and the washers (4).

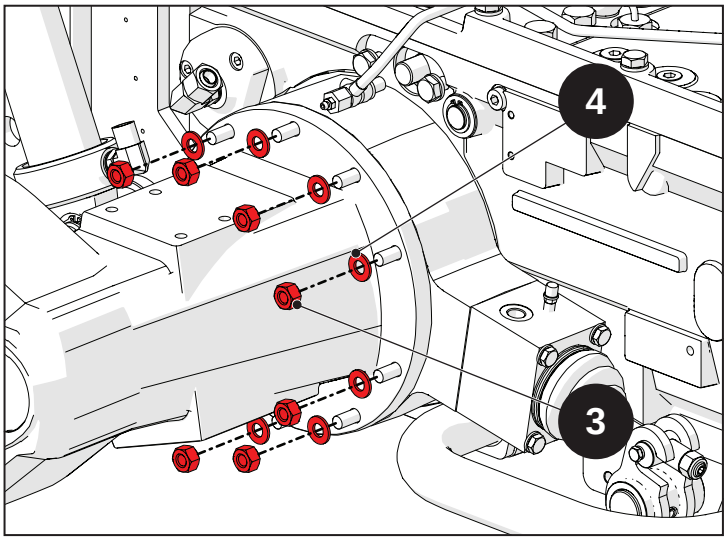

Fig. 7.9

Remove the right hand final drive unit.

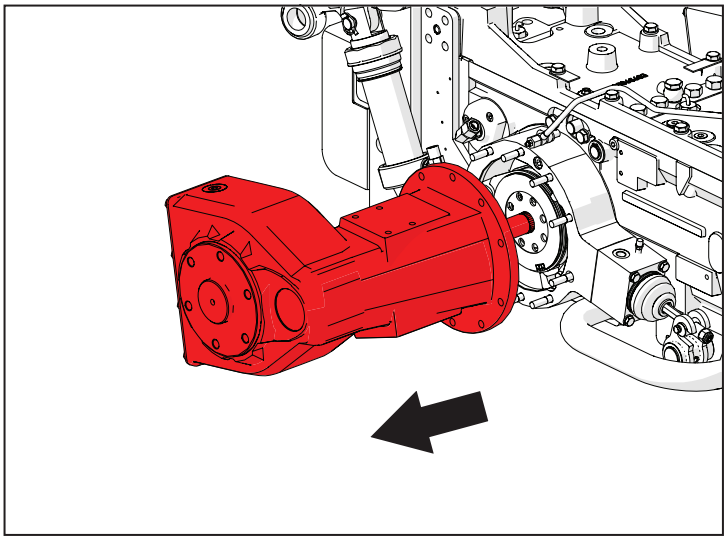

Fig. 7.10

7.3.2 Disassembly

Attention
The following instructions are applicable for both final drive units.

Remove the plug (5).

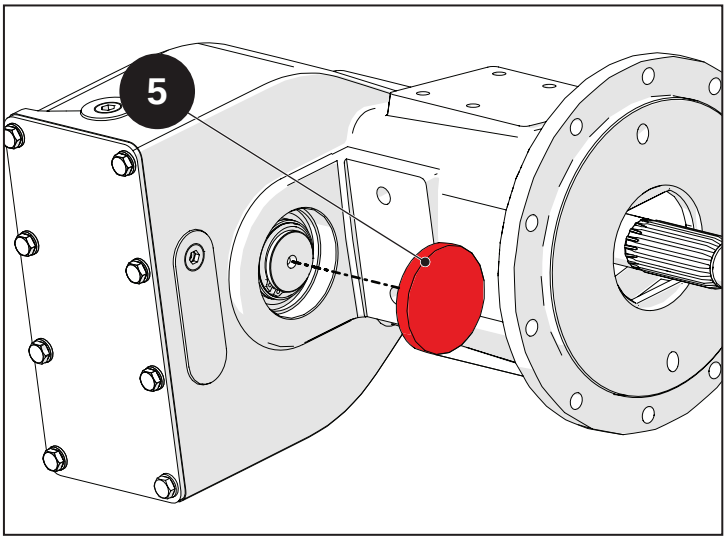

Fig. 7.11

Remove the circlip (6).

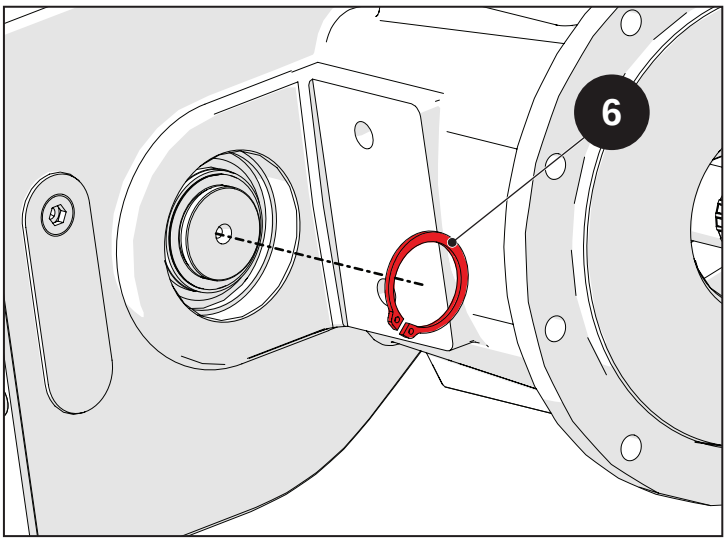

Fig. 7.12

Remove the spacers (19).

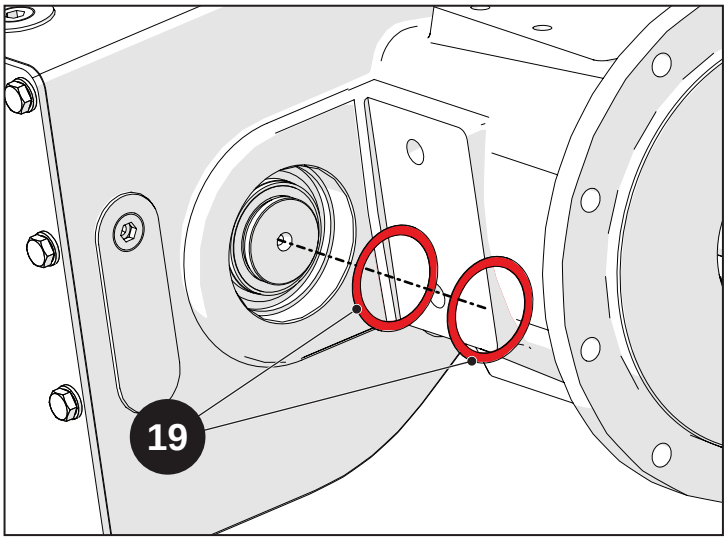

Fig. 7.13

Tap the axle shaft (7) with a soft punch and a mallet to drive it out and remove it.

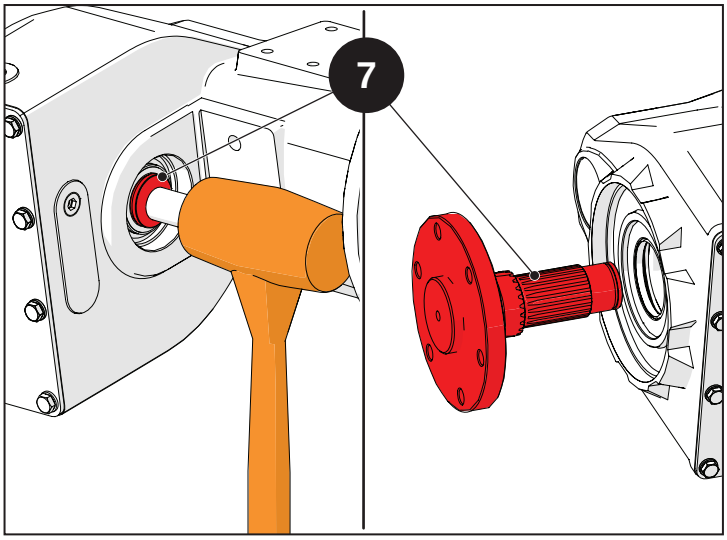

Fig. 7.14

Undo the screws (8) and remove the washers (9).

Remove the final drive unit cover (10).

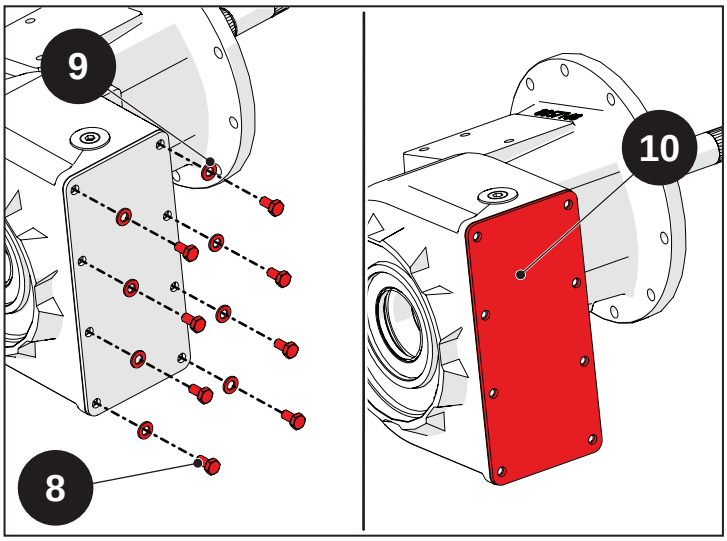

Fig. 7.15

Remove the final drive unit gear (11).

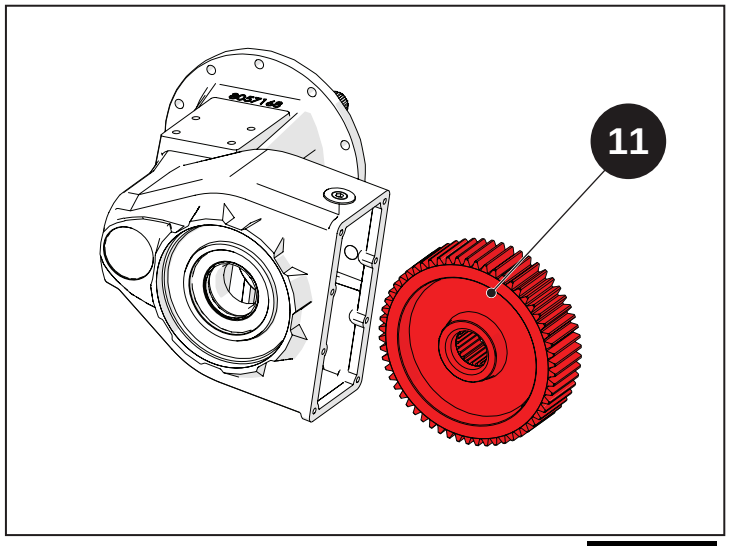

Fig. 7.16

Remove the plug (12).

Remove the circlip (13).

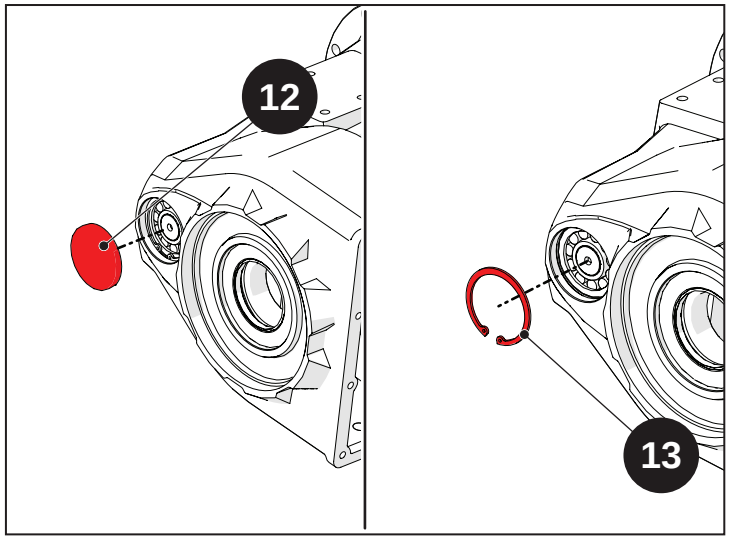

Fig. 7.17

Tap the hub (14) with a soft mallet to remove it.

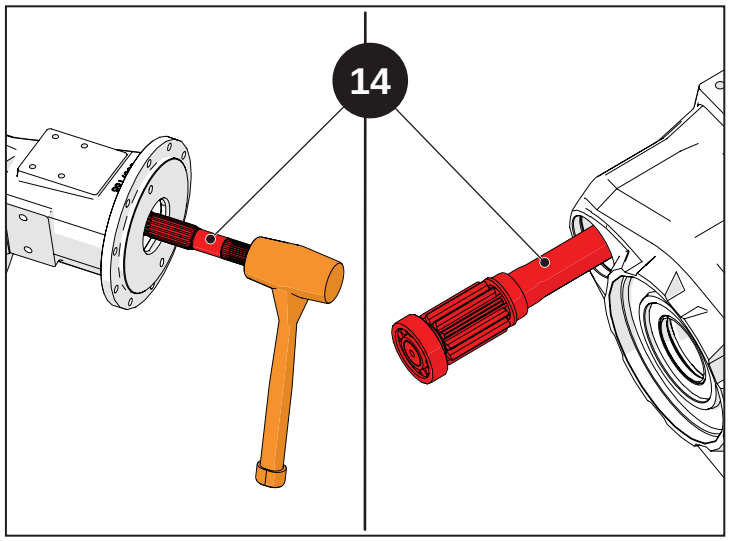

Fig. 7.18

Remove the bearing (15) and the inner bearing race (16) from the hub (14).

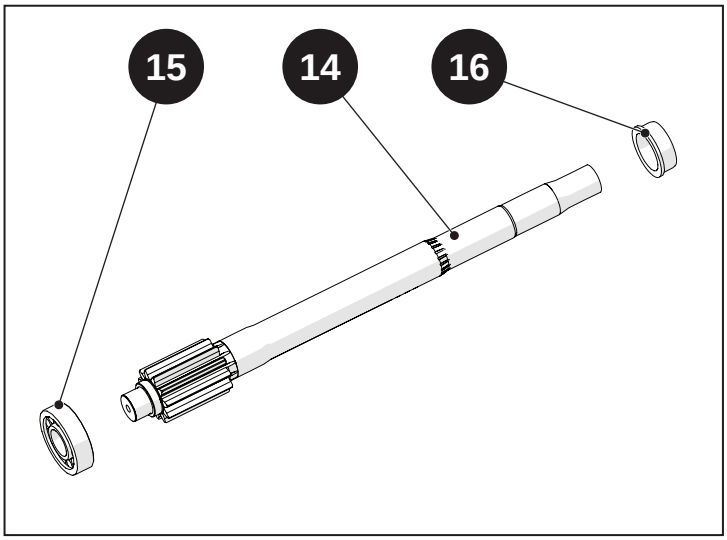

Fig. 7.19

Remove the outer bearing race (16).

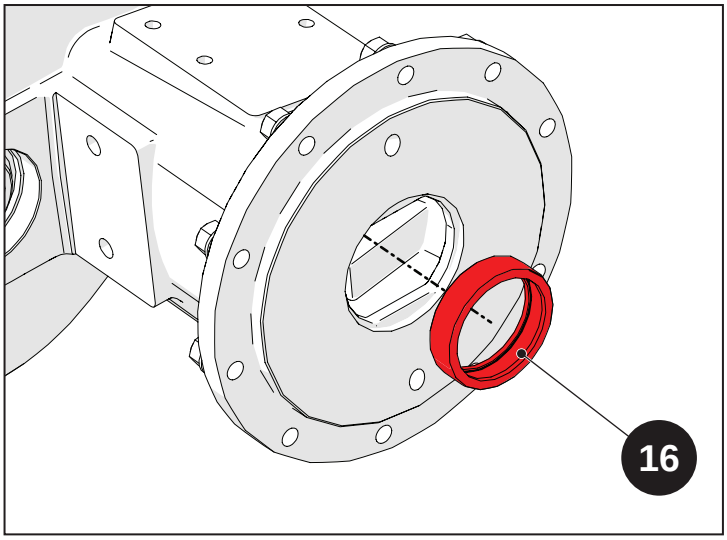

Fig. 7.20

Remove the oil seal (17) remaining in the final drive unit case.

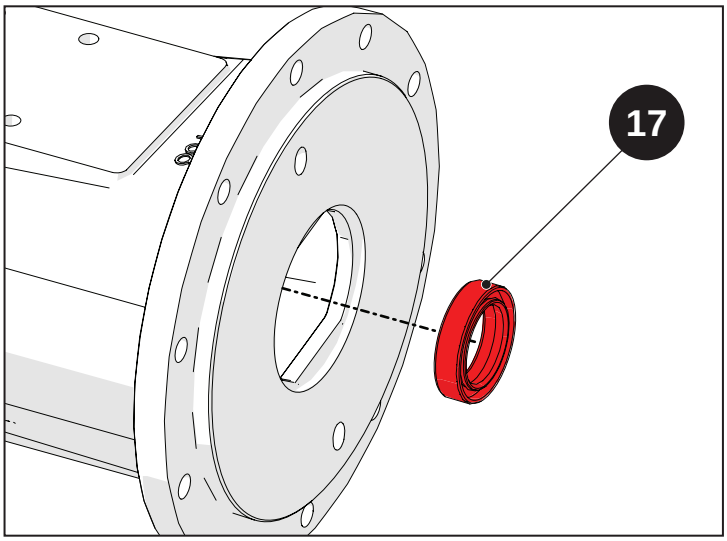

Fig. 7.21

7.4 Main inspection, reassembly and adjustment procedures

Indice

7.4.1 Main inspection, reassembly and adjustment procedures.....7-16
7.4.1.1 Refitting.....7-20

7.4.1 Main inspection, reassembly and adjustment procedures

Attention
The following instructions are applicable for both final drive units.

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

Fit the bearing (16).

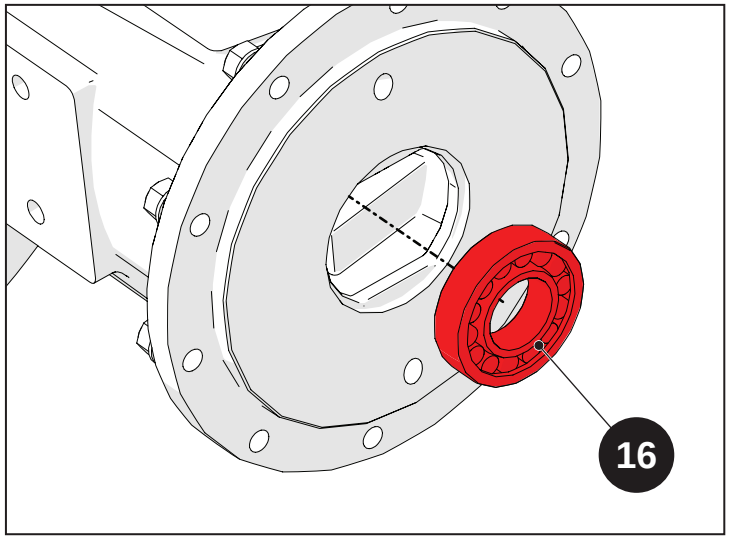

Fig. 7.22

Apply a coating of grease to the oil seal (17).

Fit the oil seal (17) and drive it into its seat.

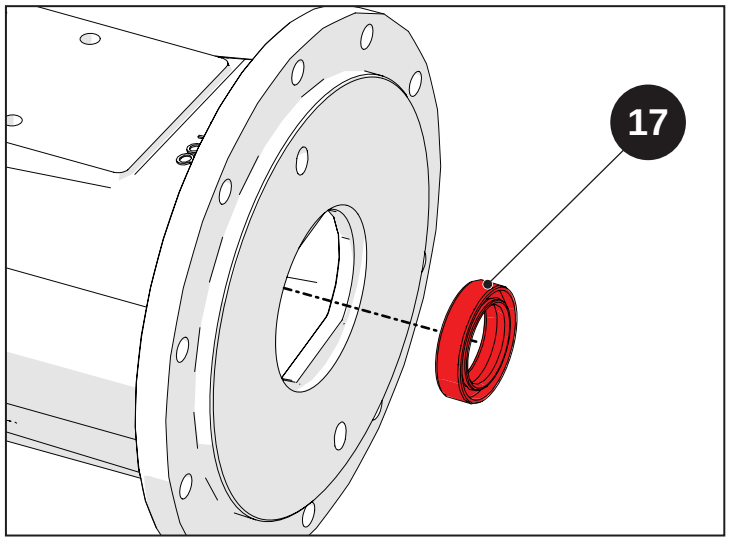

Fig. 7.23

Pre-assemble the bearing (15) and the inner bearing race (16) on the hub (14).

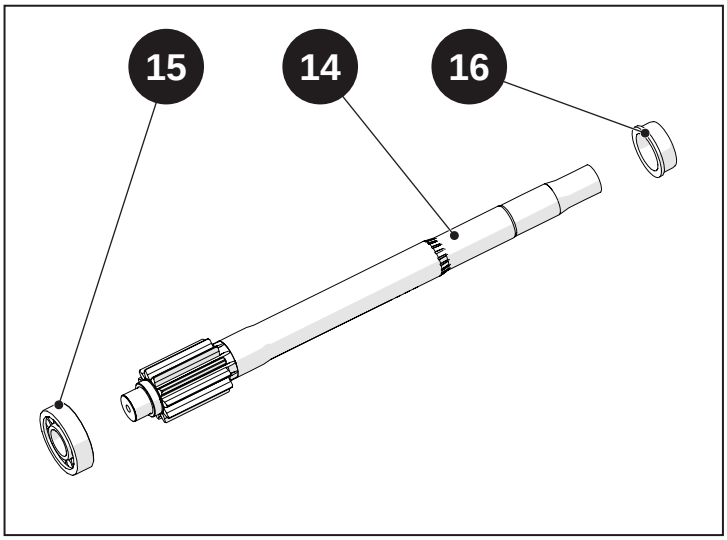

Fig. 7.24

Fit the hub (14).

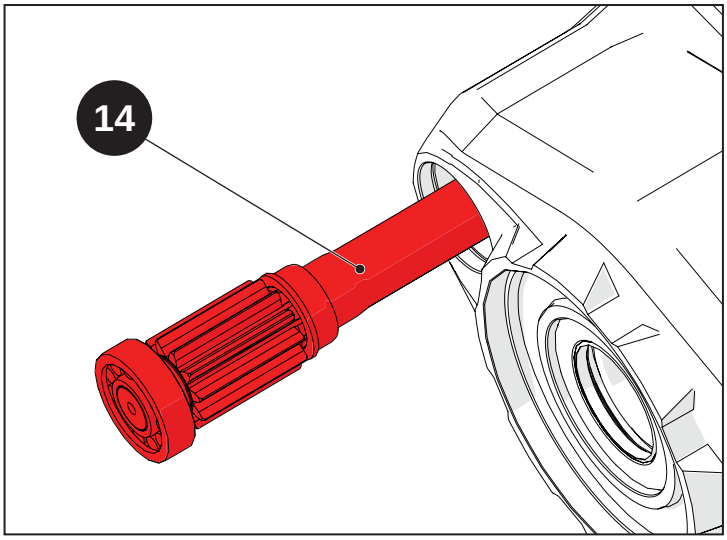

Fig. 7.25

Fit the circlip (13).

Apply a coating of mastic sealant on the outer edge of the plug (12).

Fit the plug (12) and drive it into its seat with a soft punch.

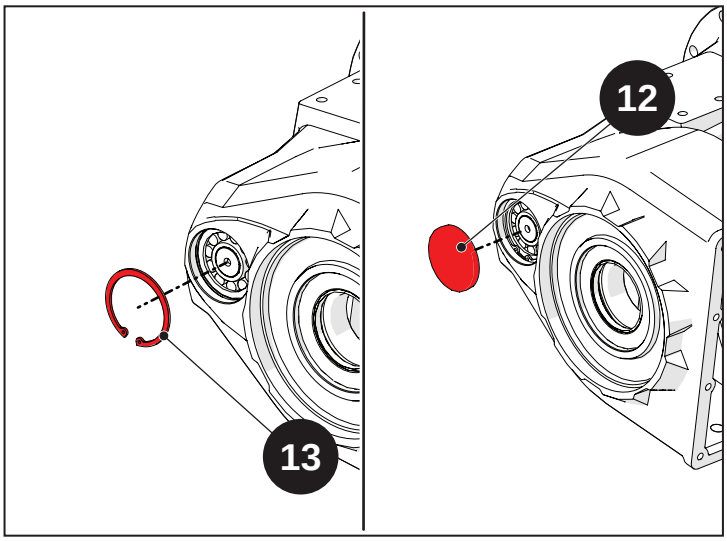

Fig. 7.26

Fit the final drive unit gear (11).

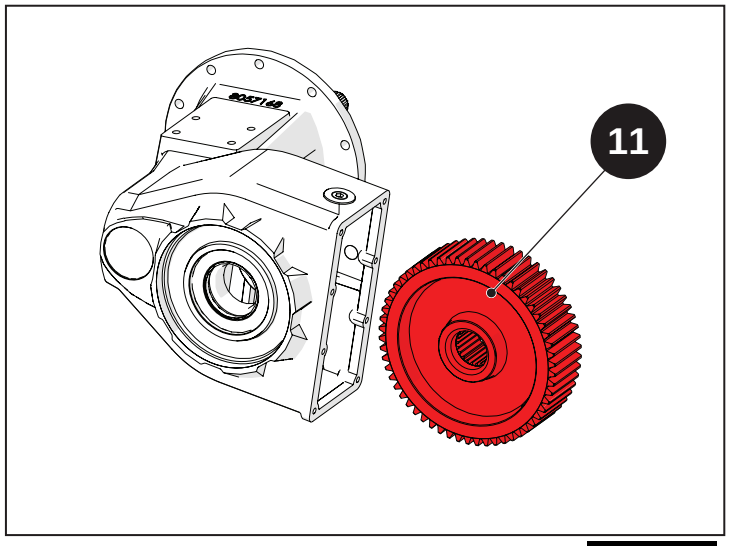

Fig. 7.27

Fit the axle shaft (7).

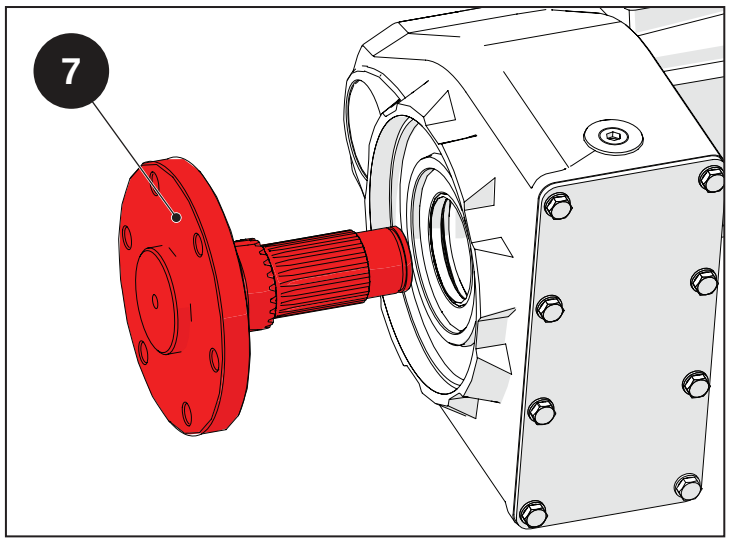

Fig. 7.28

Fit the final drive unit cover (10).

Fit the washers (9) and fit and tighten the screws (8) to a torque of 25 Nm (2.5 kgm).

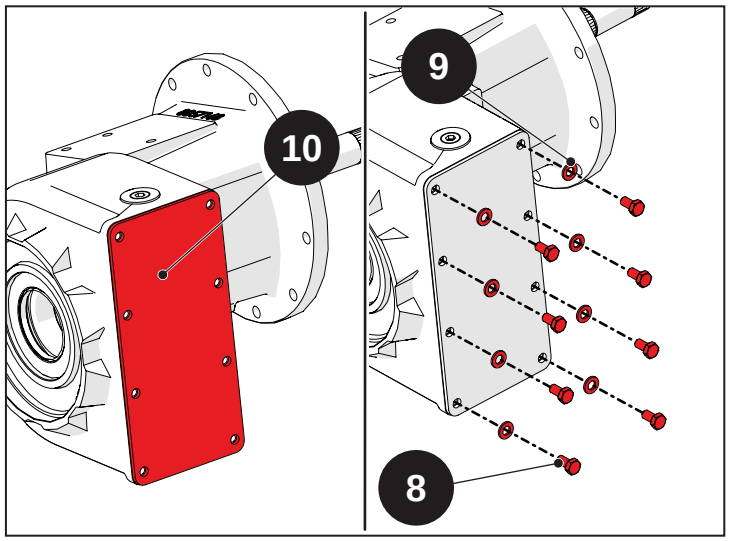

Fig. 7.29

Fit the spacers (19).

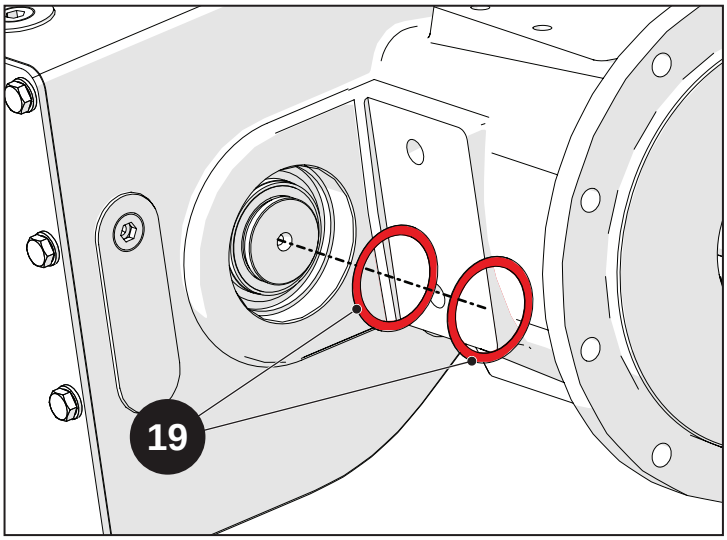

Fig. 7.30

Fit the circlip (6).

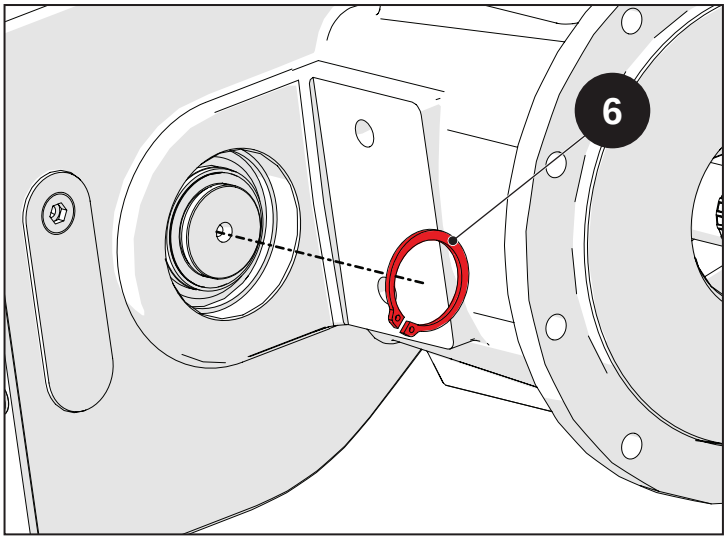

Fig. 7.31

Apply a coating of mastic sealant on the outer edge of the plug (5).

Fit the plug (5) and drive it into its seat with a soft punch.

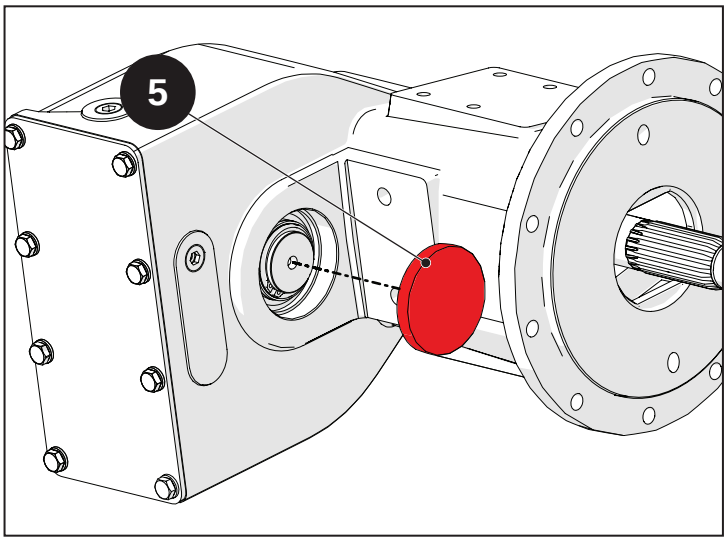

Fig. 7.32

7.4.1.1 Refitting

Apply silicone sealant on the mating surface of the final drive unit.

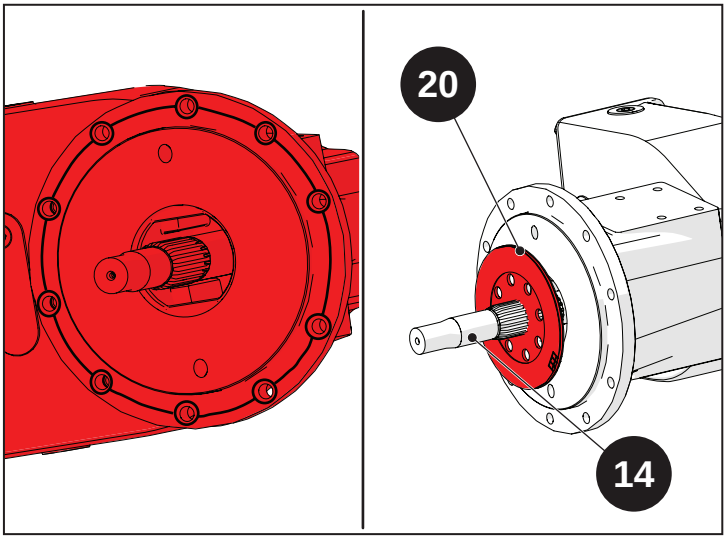

Fig. 7.33

Mate the assemblies. Wiggle the hub (14) to engage it with the brake discs and the rear differential.

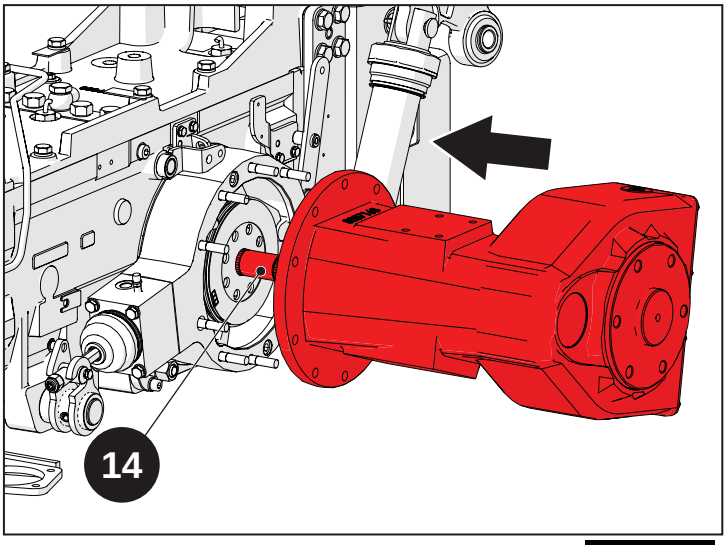

Fig. 7.34

Left hand final drive unit

Fit the left hand final drive unit.

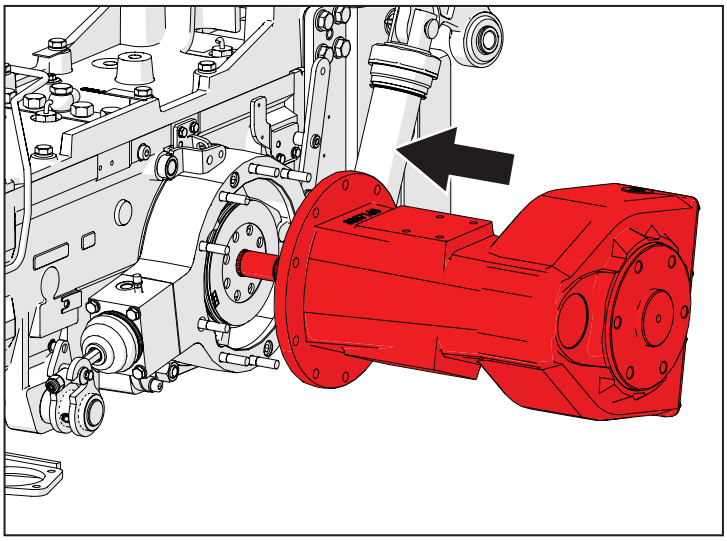

Fig. 7.35

Apply a coating of Loctite 243 to the threads of the stud bolts.

Fit the washers (4) and then tighten the nuts (3).

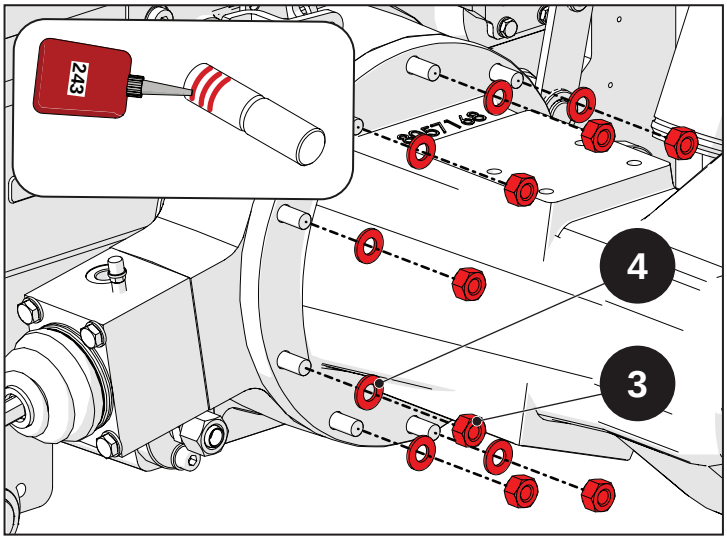

Fig. 7.36

Mate the hydraulic unit with its mount onto the final drive unit.

Fit the washers (2) and tighten the screws (1).

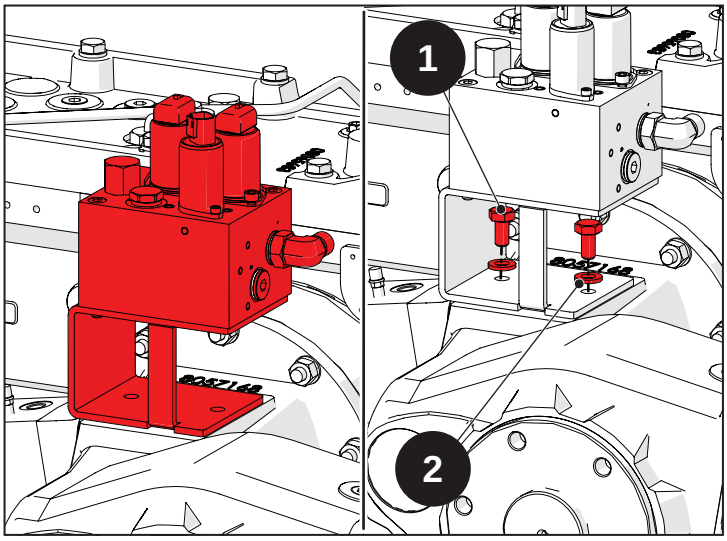

Fig. 7.37

Reconnect all the hydraulic pipes to the hydraulic unit.

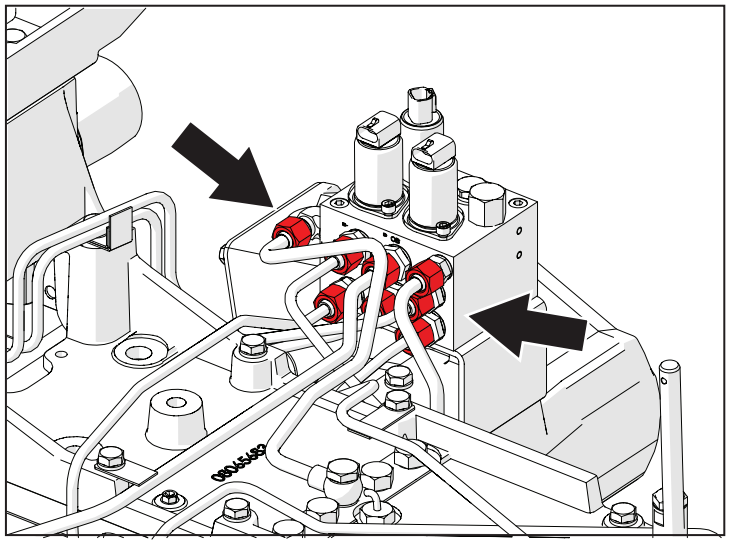

Fig. 7.38

Right hand final drive unit

Fit the right hand final drive unit.

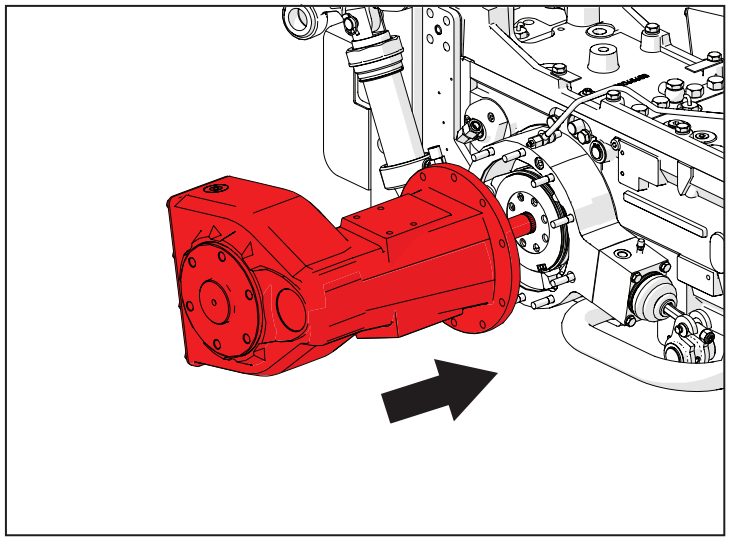

Fig. 7.39

Apply a coating of Loctite 243 to the threads of the stud bolts.

Fit the washers (4) and then tighten the nuts (3).

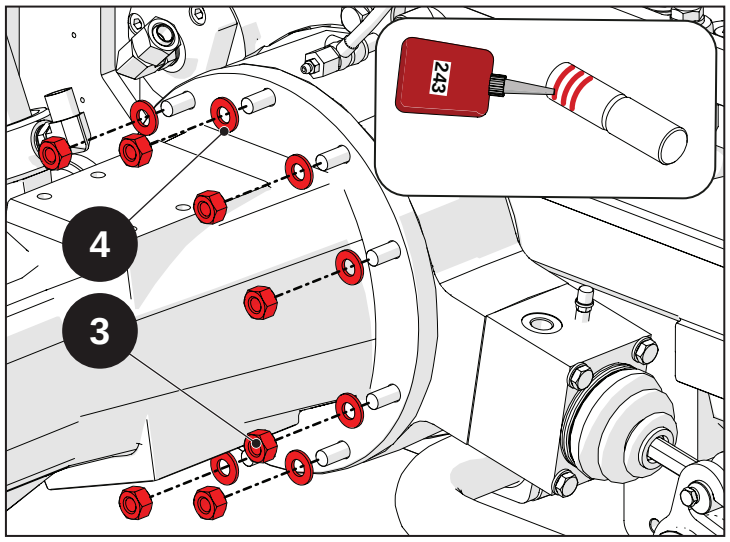

Fig. 7.40

Reconnect the hydraulic pipes to the distributors.

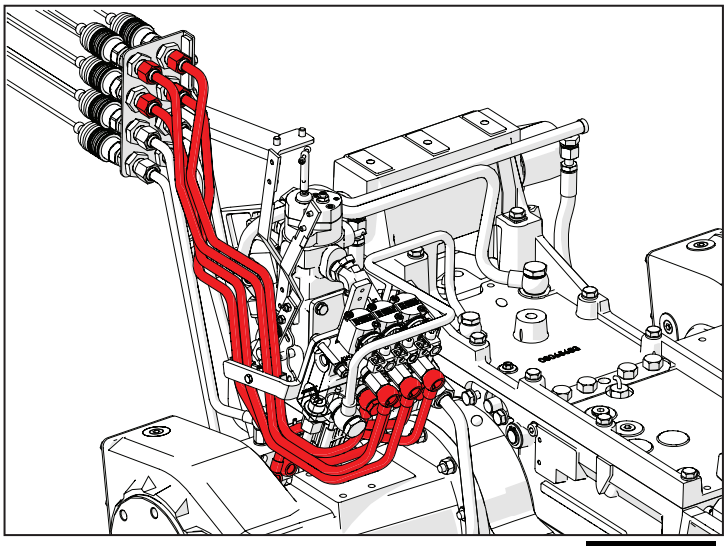

Fig. 7.41

7.5 Tightening torques

Indice

7.5.1 Tightening torques 7-26

7.5.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Hub - brake casing fastener nuts	60	6

7.6 Tools necessary

Indice

7.6.1 Tools necessary 7-28

7.6.1 Tools necessary

p/n	Description	Quantity
A-p/n _____	Hub lifting tool	1

8 : Front final drive units

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8.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

8.2 General introduction

Index

8.2.1 Assembly drawing of final drive unit.....8-4

8.2.1 Assembly drawing of final drive unit

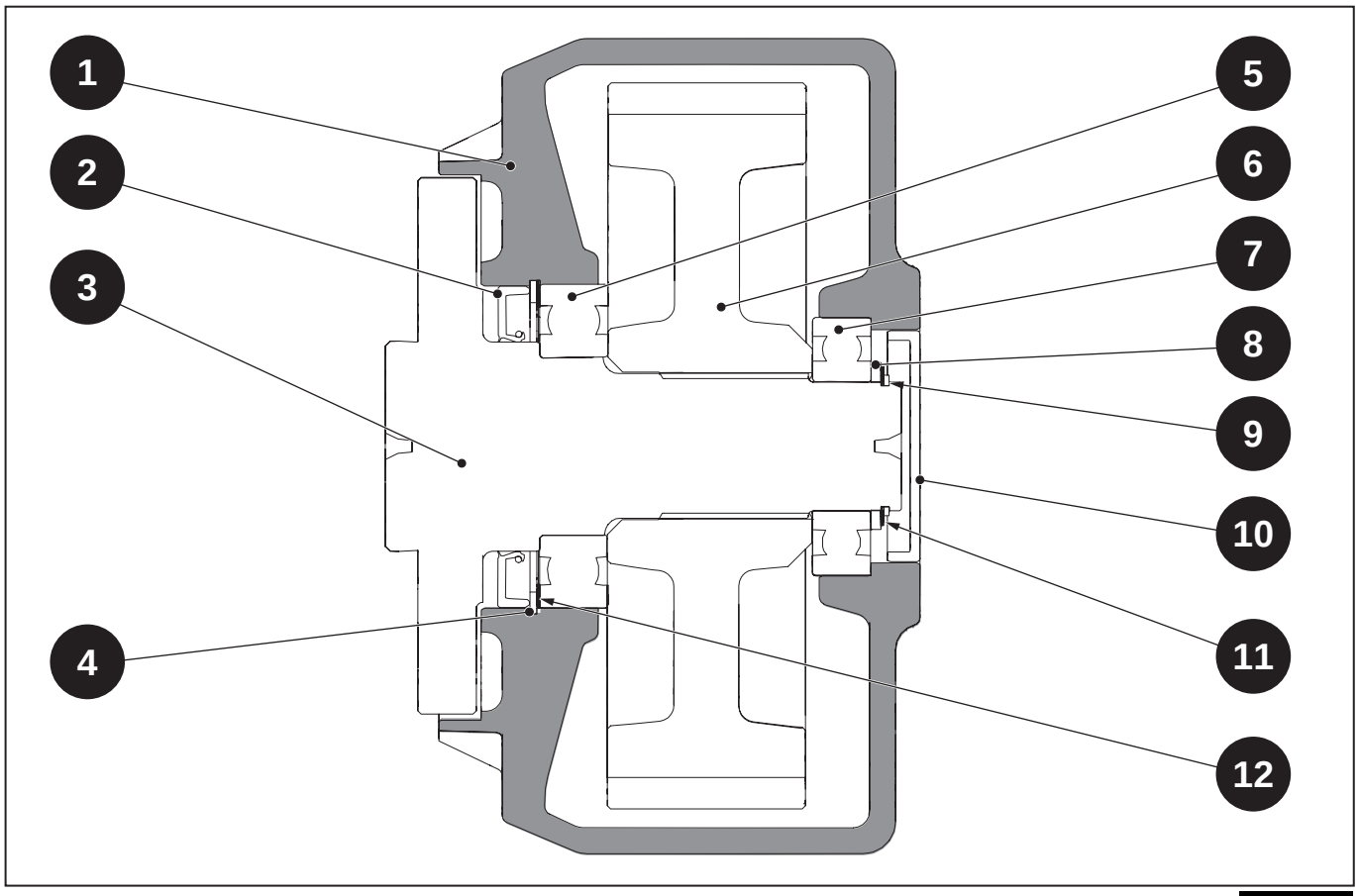

Fig. 8.1

1 - Final drive reduction gear unit casing
2 - Oil seal
3 - Half-axle
4 - Circlip
5 - Bearing
6 - Reduction gear
7 - Bearing
8 - Spacer
9 - Circlip
10 - Plug
11 - Spacer
12 - Spacer

8.3 Disassembly

Indice

8.3.1 Preliminary operations 8-6

8.3.2 Disassembly 8-10

8.3.1 Preliminary operations

The main operations necessary to access the final drive reduction gear units are indicated as follows.

- Draining the front differential oil
- Removing the wheels
- Removing the roll bar (see chapter "13 - Platform")

Left hand final drive unit

Undo the nut (1) and pull out the steering cylinder pin (2) from the knuckle flange (3).

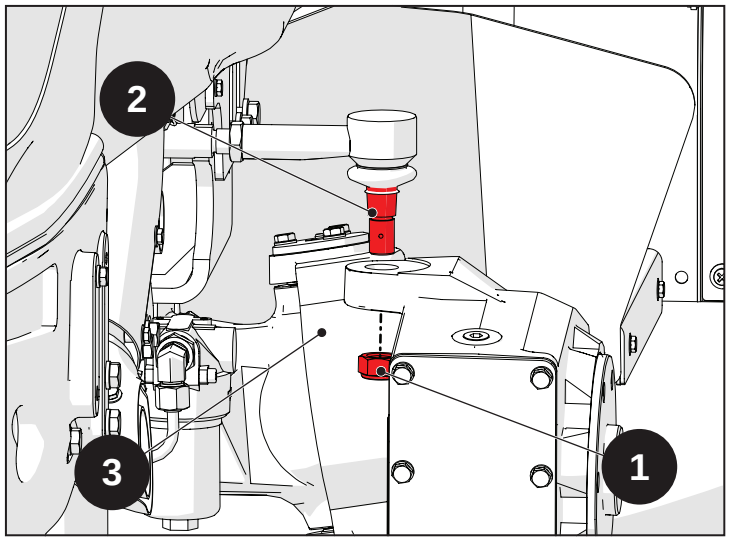

Fig. 8.2

Undo the hydraulic connectors.

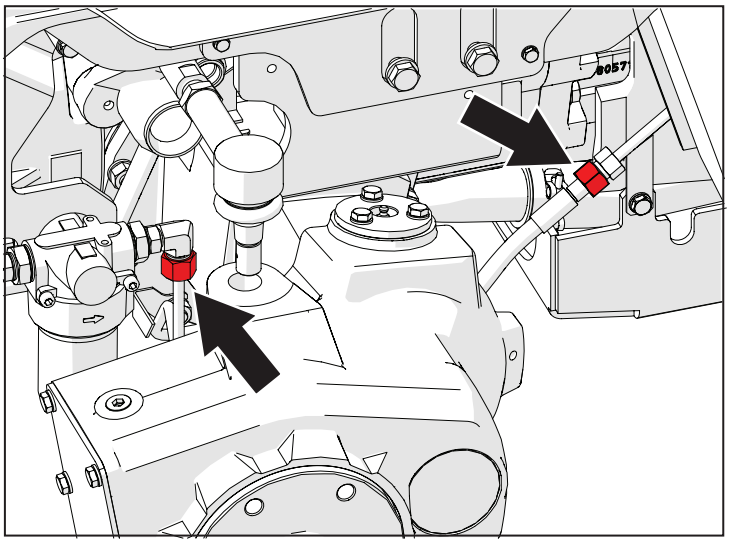

Fig. 8.3

Remove the hydraulic pipe.

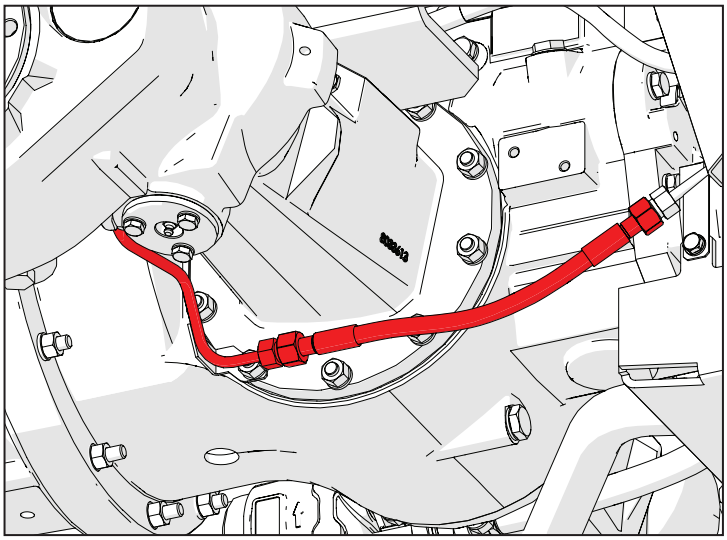

Fig. 8.4

Undo the nuts (4) and remove the washers (5).

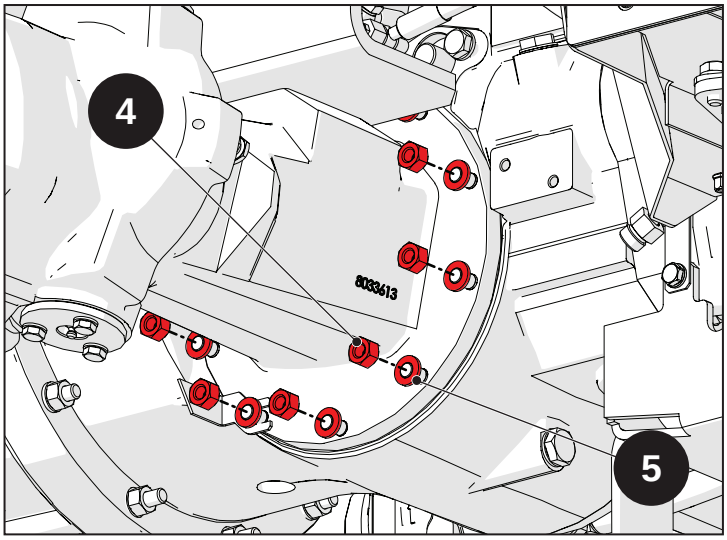

Fig. 8.5

Secure the complete final drive unit to a suitable hoist.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Separate the final drive unit from the front differential.

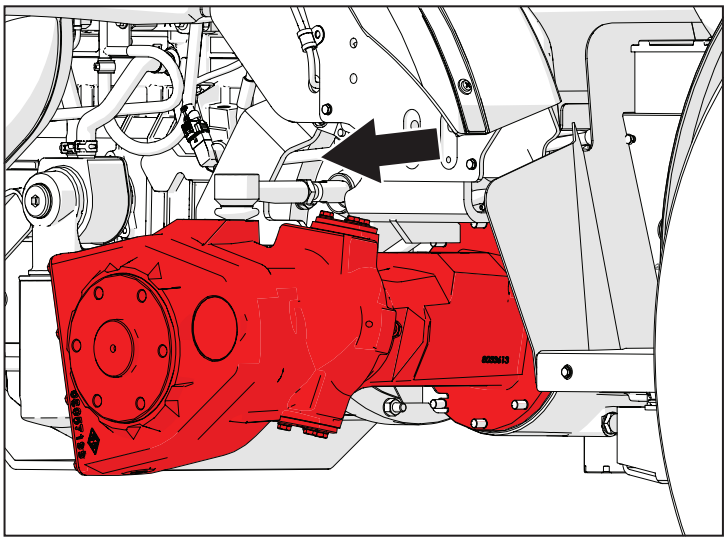

Fig. 8.6

Right hand final drive unit

- Drain the oil from the transmission

Undo the screws (6) fastening the oil suction pipe to the inlet line filter.

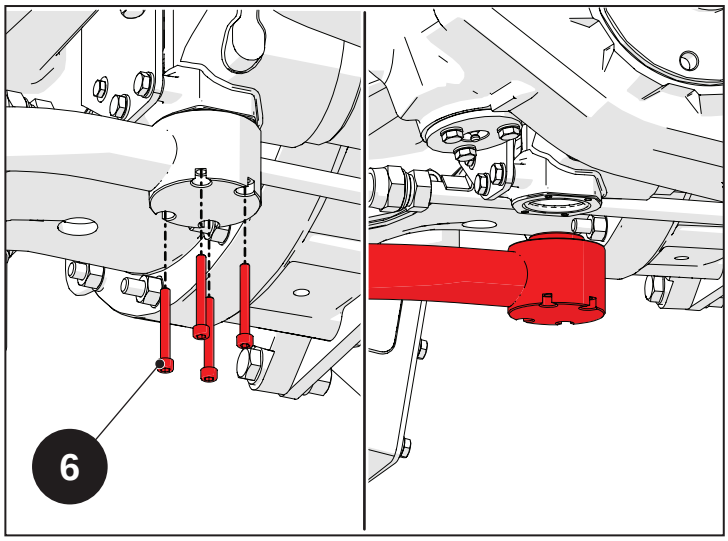

Fig. 8.7

Undo the hydraulic connectors.

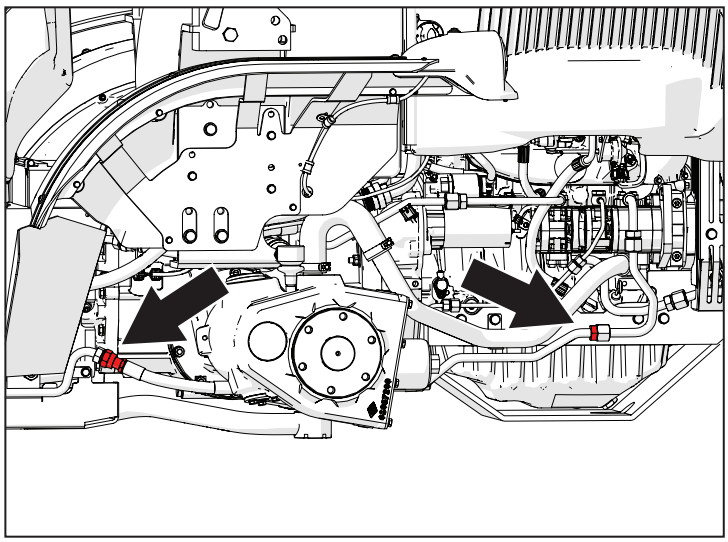

Fig. 8.8

Remove the hydraulic pipe.

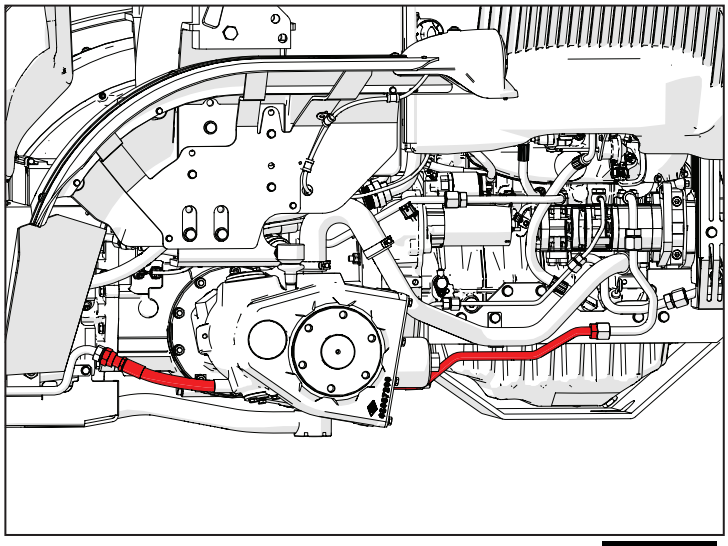

Fig. 8.9

Undo the nut (1) and pull out the steering cylinder pin (2) from the knuckle flange (3).

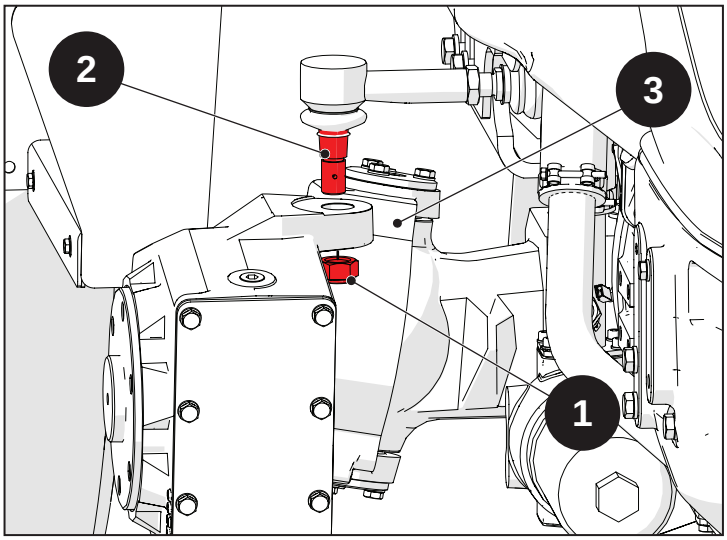

Fig. 8.10

Undo the nuts (7) fastening the inlet line filter to the final drive unit.

Undo the nuts (4) and remove the washers (5).

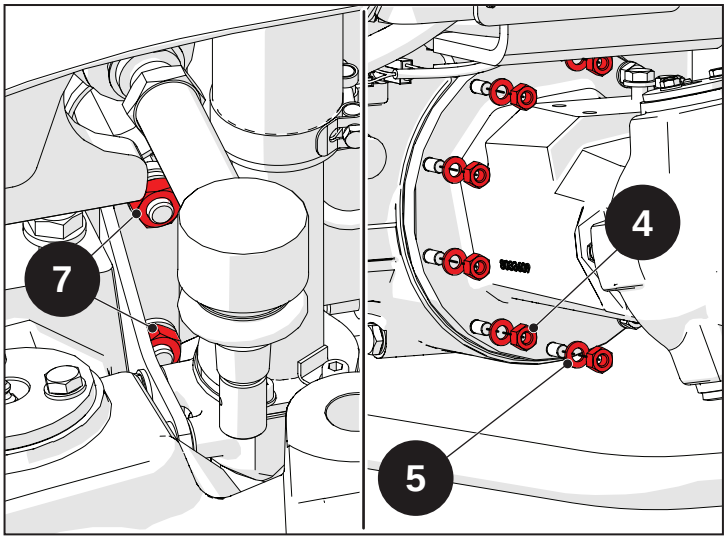

Fig. 8.11

Secure the complete final drive unit to a suitable hoist.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Separate the final drive unit from the front differential.

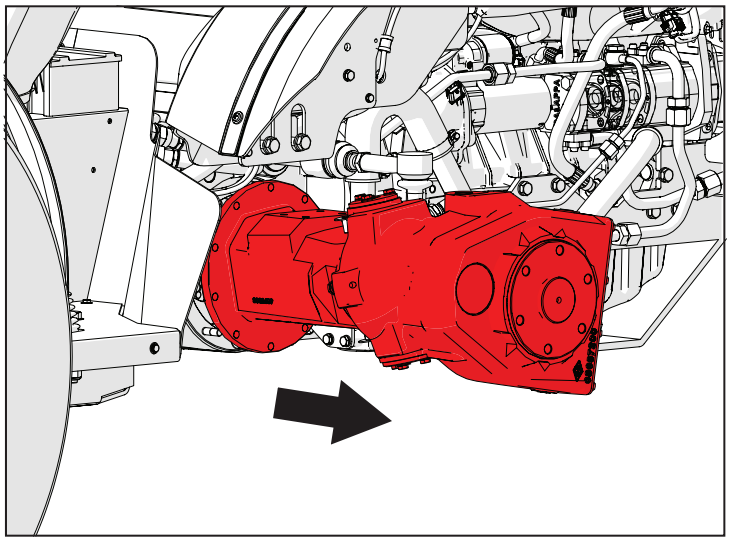

Fig. 8.12

8.3.2 Disassembly

Attention
The following instructions are applicable for both final drive units.

Undo and remove the screws (8) and washers (9) fastening the pivot pins (10).

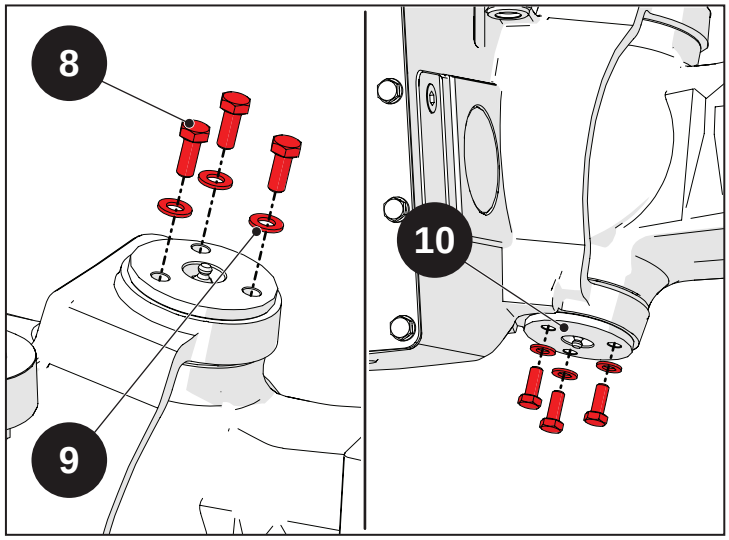

Fig. 8.13

Remove the pivot pins (10)

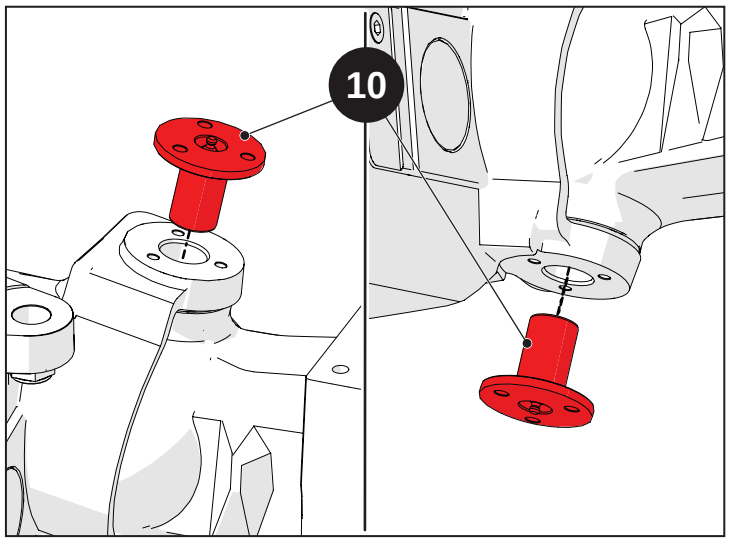

Fig. 8.14

Separate the hub from the front final drive unit.

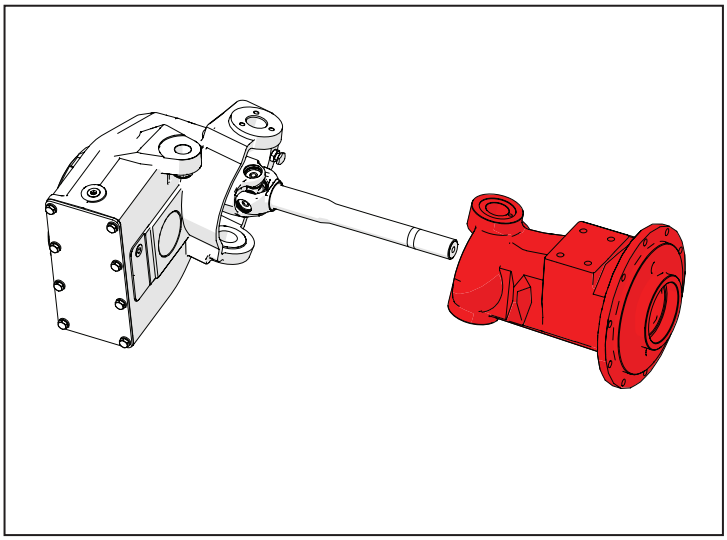

Fig. 8.15

Remove the plug (11).

Remove the circlip (12).

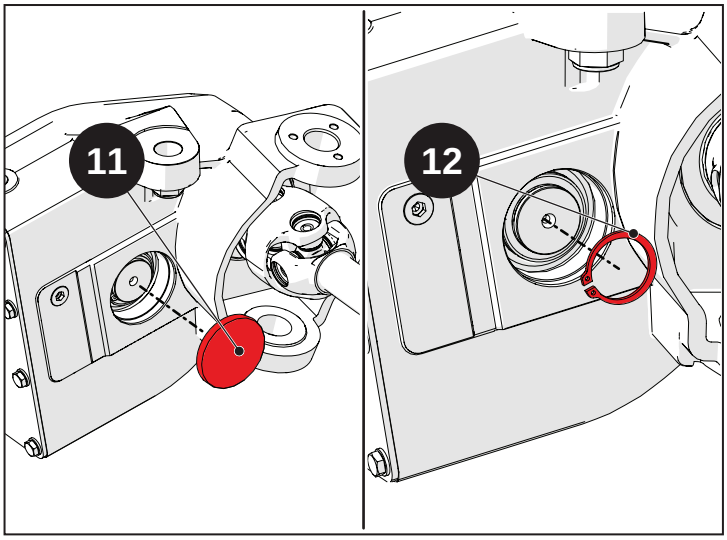

Fig. 8.16

Remove the spacers (14) and (13).

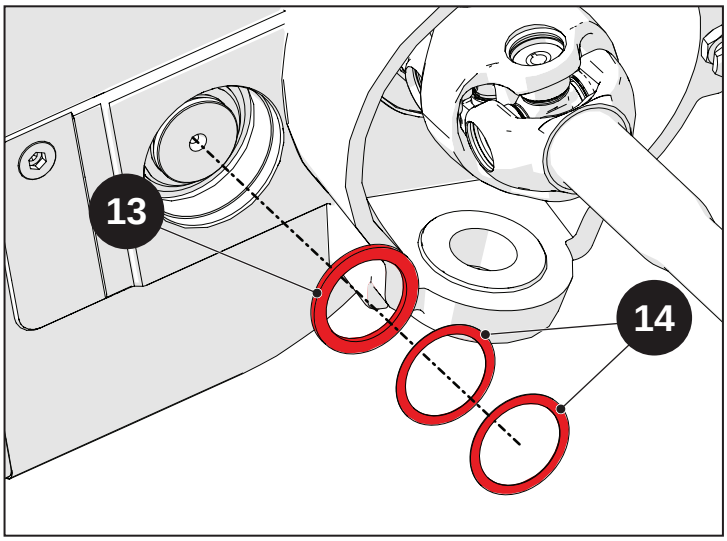

Fig. 8.17

Tap the axle shaft (15) with a soft punch and a mallet to facilitate removal.

Remove the axle shaft (15) and the oil seal (16).

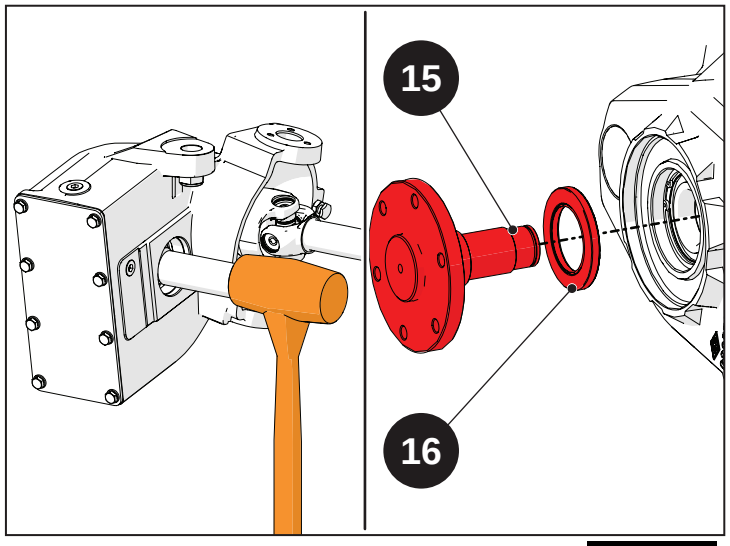

Fig. 8.18

Undo the screws (17) and remove the washers (18).

Remove the final drive unit cover (19).

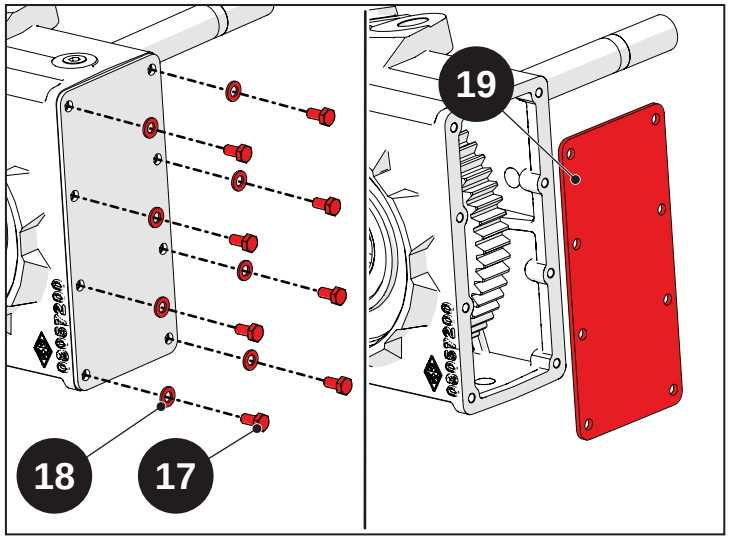

Fig. 8.19

Remove the final drive unit gear (20).

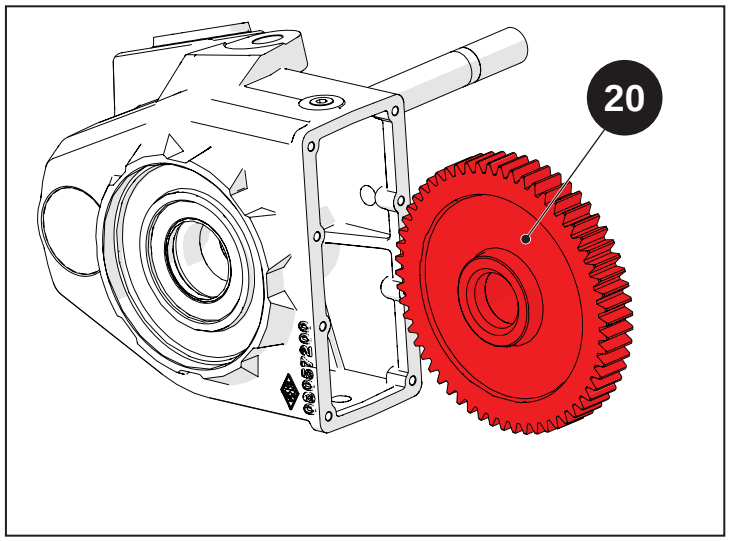

Fig. 8.20

Remove the plug (21) and then remove the circlip (22).

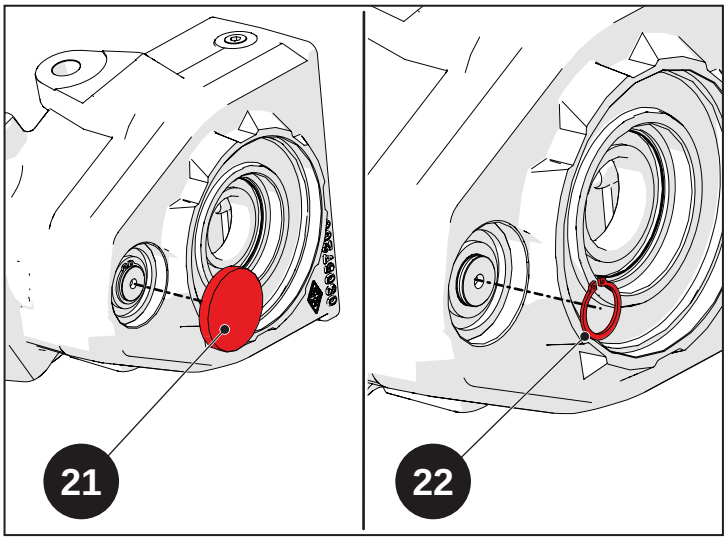

Fig. 8.21

Tap the U-joint (23) with a soft punch and a mallet to remove it.

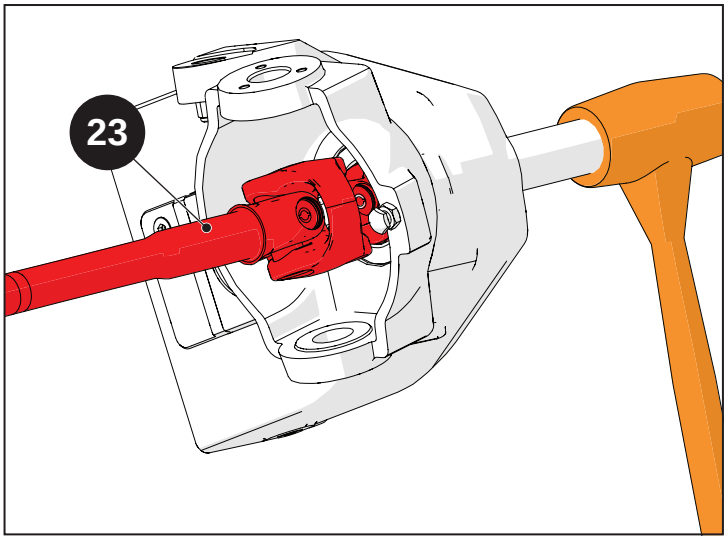

Fig. 8.22

Remove the oil seal (24) and the bearing (25).

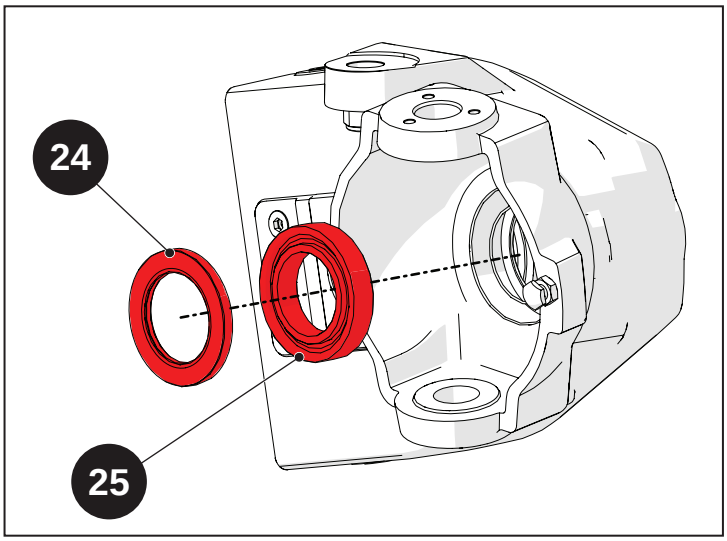

Fig. 8.23

8.4 Main inspection, reassembly and adjustment procedures

Indice

8.4.1 Main inspection, reassembly and adjustment procedures.....8-16
8.4.1.1 Refitting.....8-20
8.4.1.2 Adjusting steering wheel end stop screw.....8-24

8.4.1 Main inspection, reassembly and adjustment procedures

Attention
The following instructions are applicable for both final drive units.

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

Fit the bearing (25) and drive it into its seat with a press.

Lubricate the seat on the final drive unit, fit the oil seal (24) and then drive it into its seat with a press.

Apply a coating of grease to the oil seal (24).

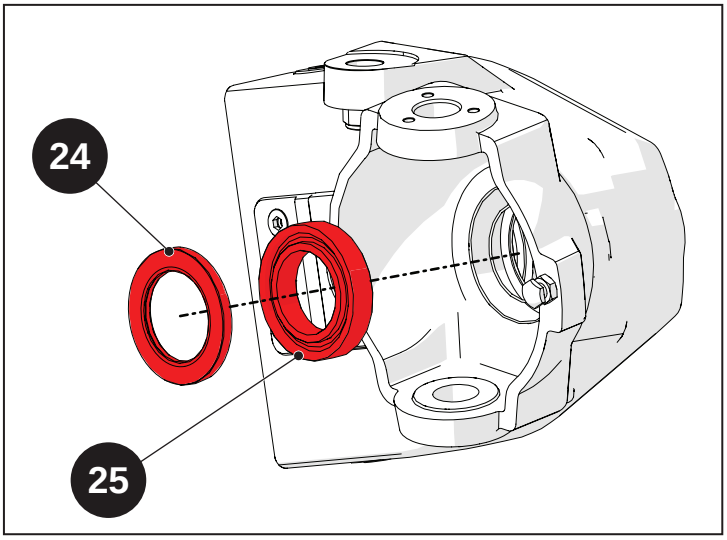

Fig. 8.24

Fit the U-joint (23).

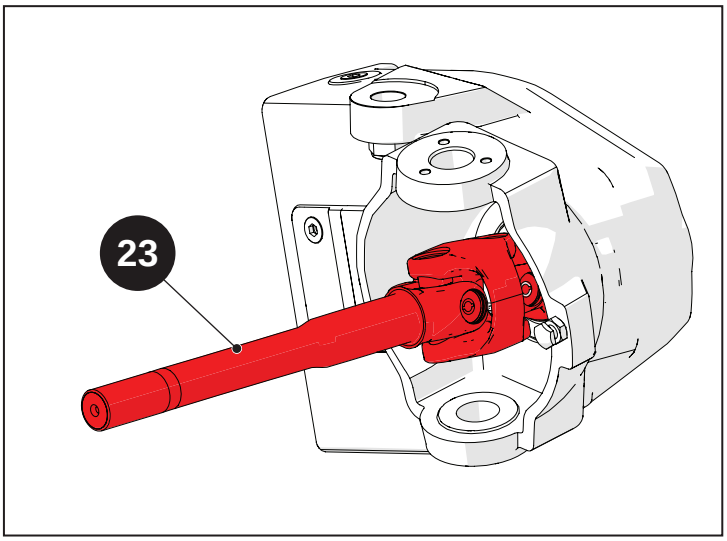

Fig. 8.25

Fit the circlip (22), and then fit the plug (21) and drive it into its seat with a soft punch.

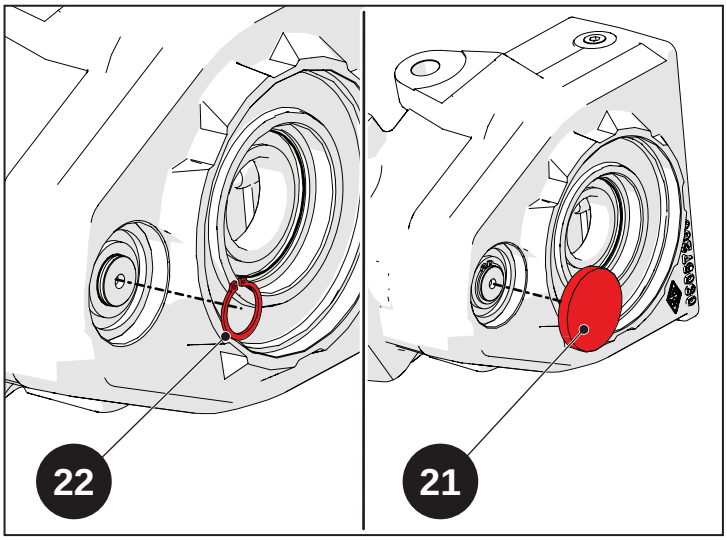

Fig. 8.26

Fit the final drive unit gear (20).

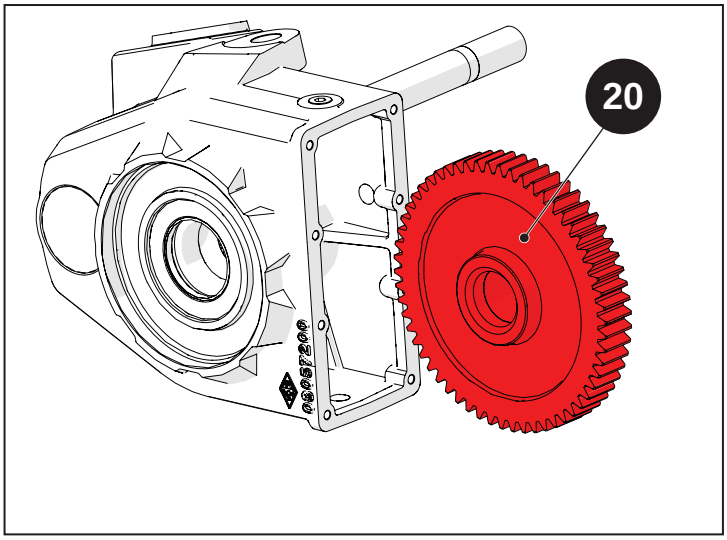

Fig. 8.27

Fit the oil seal (16) and drive it into its seat with a press.

Fit the axle shaft (15).

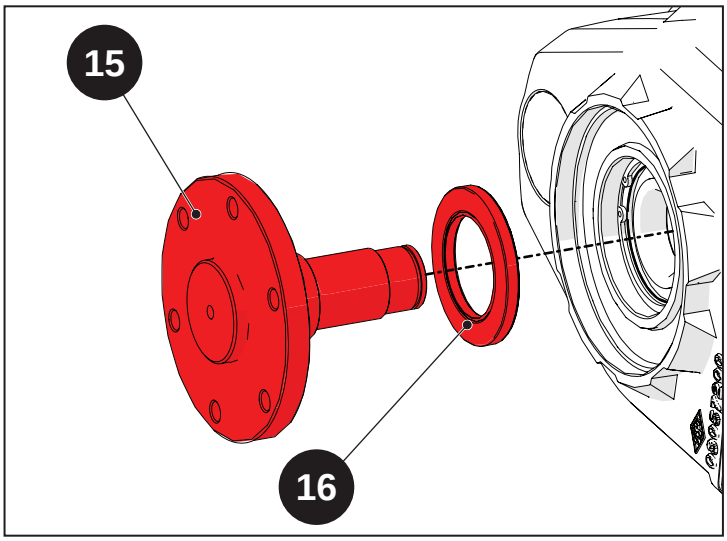

Fig. 8.28

Fit the spacers (13) and (14).

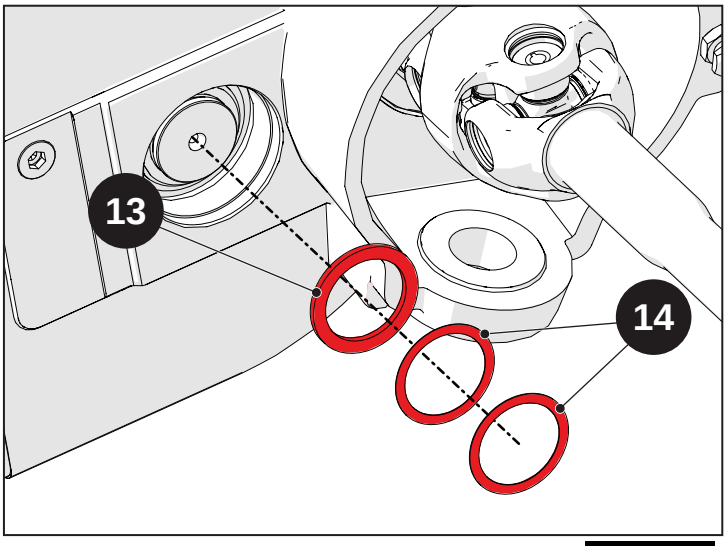

Fig. 8.29

Fit the circlip (12).

Fit the plug (11) and drive it into its seat with a soft punch.

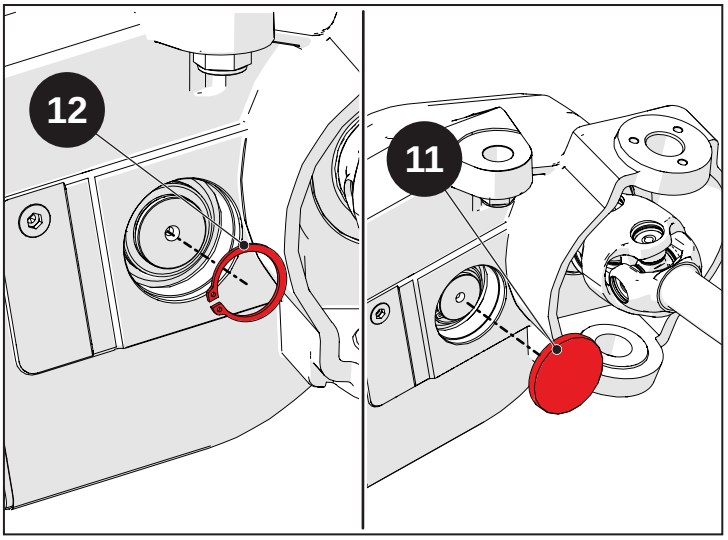

Fig. 8.30

Apply a coating of silicone sealant to the final drive unit and then fit the final drive unit cover (19).

Fit the washers (18) and tighten the screws (17).

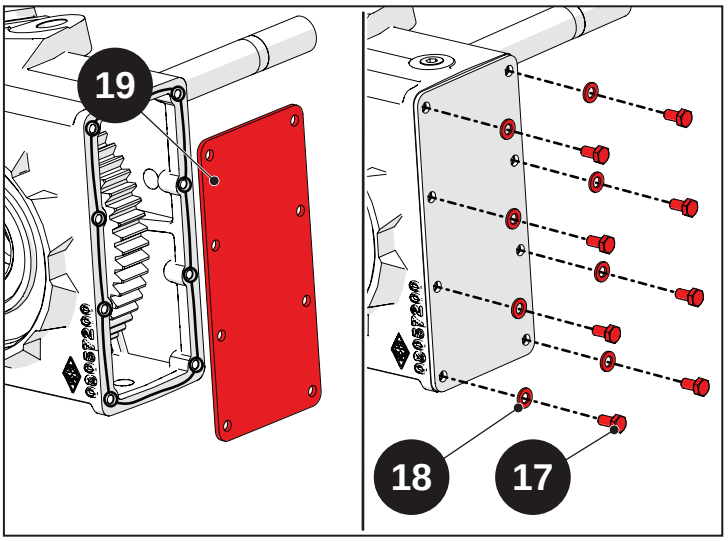

Fig. 8.31

Mate the hub with the front final drive unit.

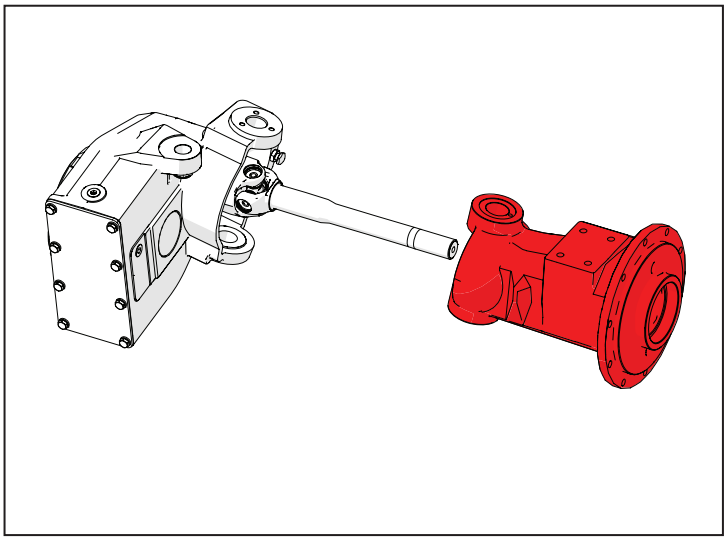

Fig. 8.32

Fit the pivot pins (10)

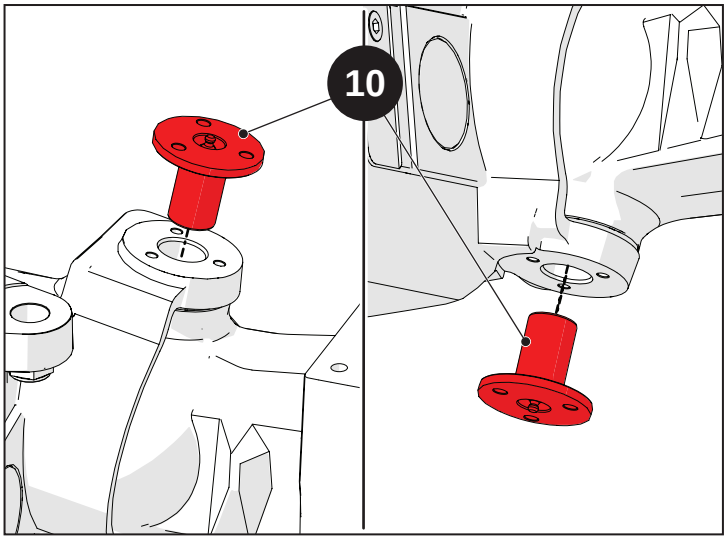

Fig. 8.33

Fit the washers (9) and fit and tighten the (8) fastener screws of the pivot pins (10) to a torque of 25 Nm.

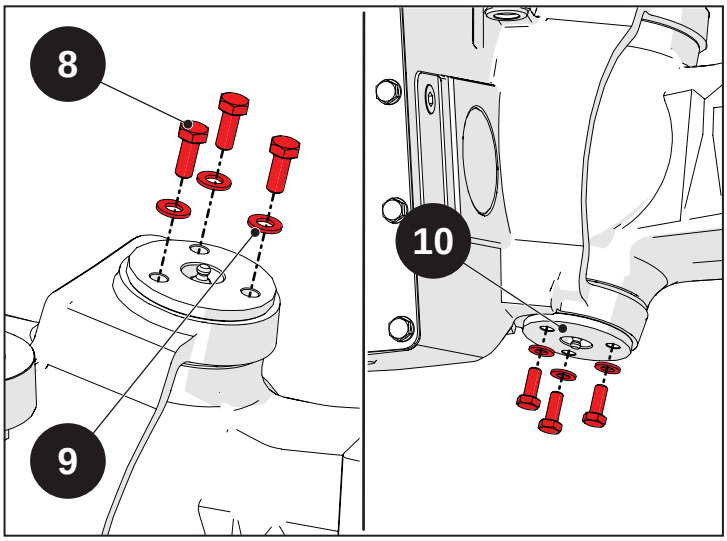

Fig. 8.34

8.4.1.1 Refitting

Left hand final drive unit

Apply a coating of silicone to the mating surface between the front differential and the lateral final drive unit.

Secure the complete final drive unit to a suitable hoist.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Mate the final drive unit with the front differential.

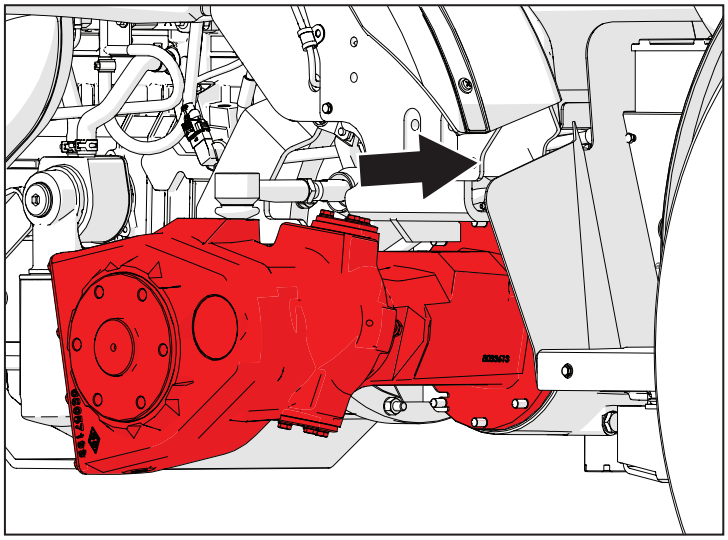

Fig. 8.35

Apply a coating of Loctite 243 to the threads of the stud bolts.

Fit the washers (5) and tighten the nuts (4) to a torque of 70 Nm.

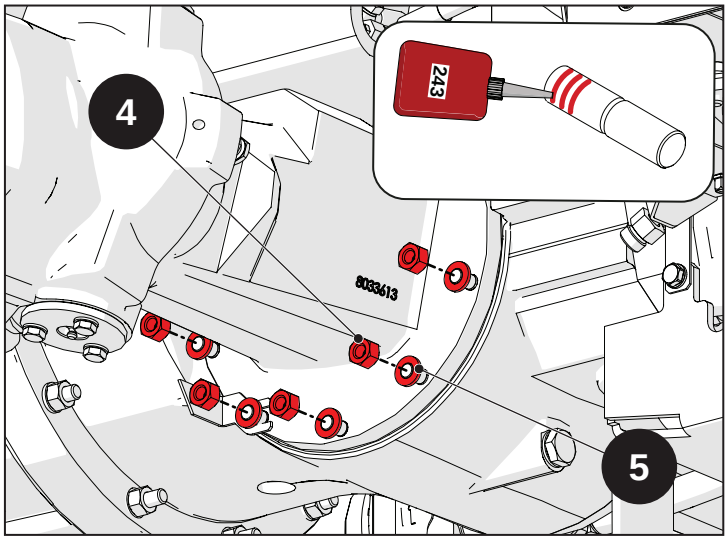

Fig. 8.36

Fit the hydraulic pipe.

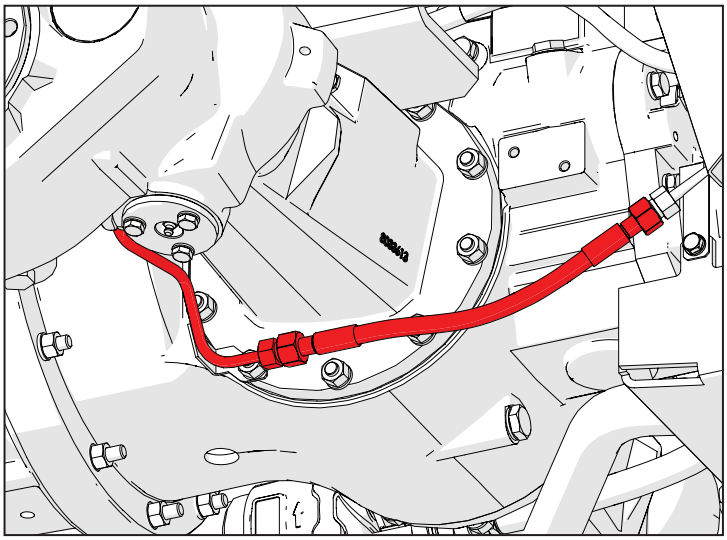

Fig. 8.37

Tighten the hydraulic connectors.

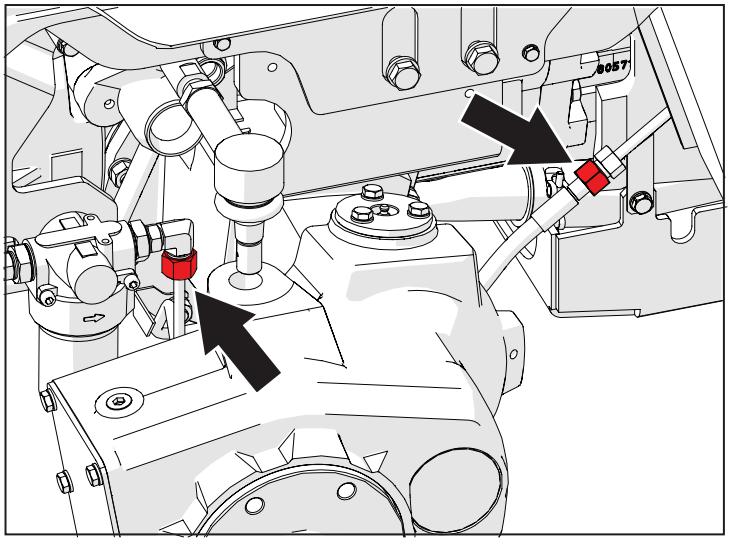

Fig. 8.38

Fit the steering cylinder pin (2) in the knuckle flange (3) and tighten the nut (1).

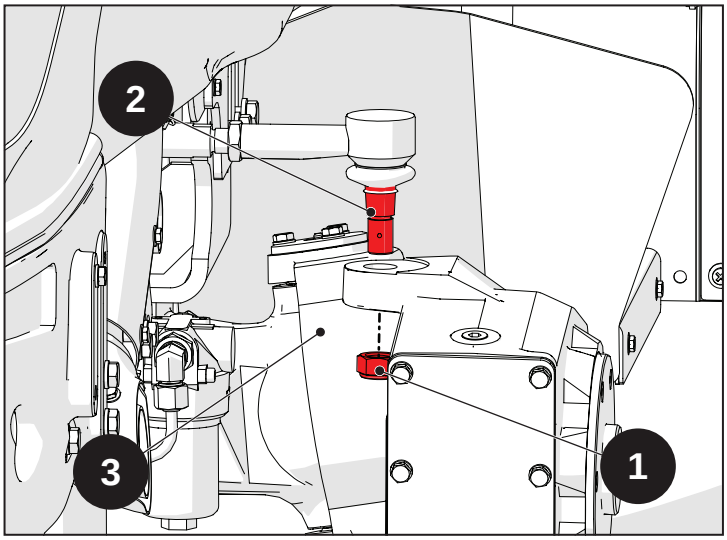

Fig. 8.39

Right hand final drive unit

Apply a coating of silicone to the mating surface between the front differential and the lateral final drive unit.

Secure the complete final drive unit to a suitable hoist.

Attention
Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Mate the final drive unit with the front differential.

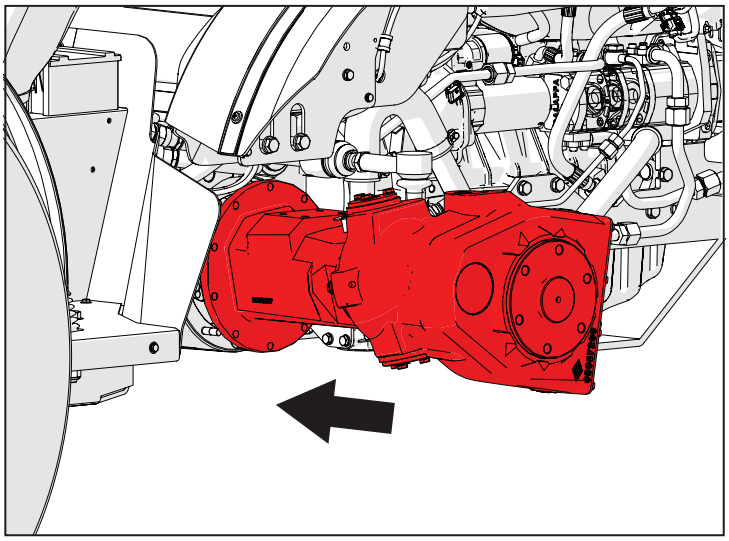

Fig. 8.40

Apply a coating of Loctite 243 to the threads of the stud bolts.

Fit the washers (5) and tighten the nuts (4) to a torque of 70 Nm.

Tighten the nuts (7) fastening the inlet line filter to the final drive unit.

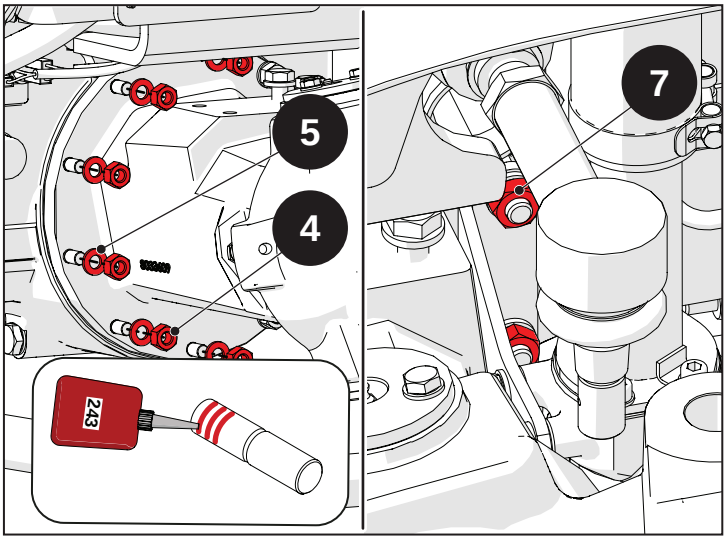

Fig. 8.41

Fit the steering cylinder pin (2) in the knuckle flange (3) and tighten the nut (1).

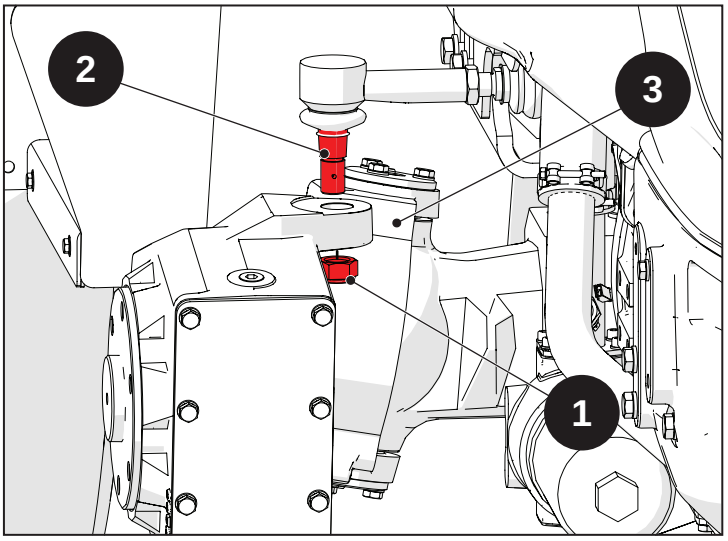

Fig. 8.42

Fit the hydraulic pipe.

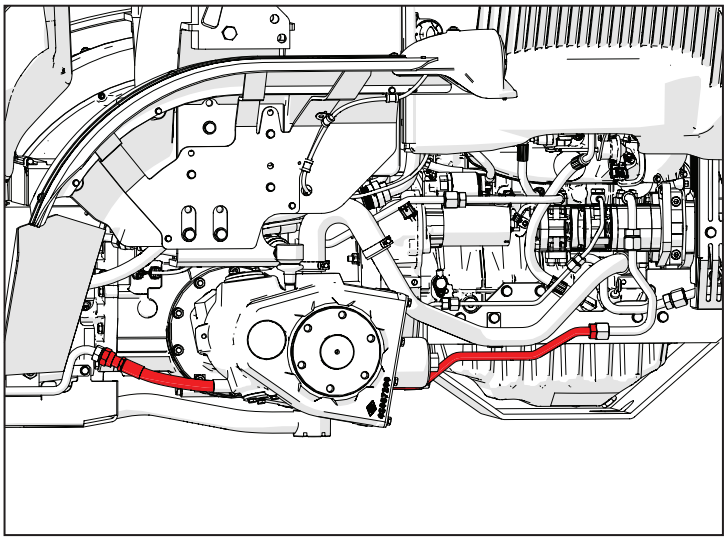

Fig. 8.43

Tighten the hydraulic connectors.

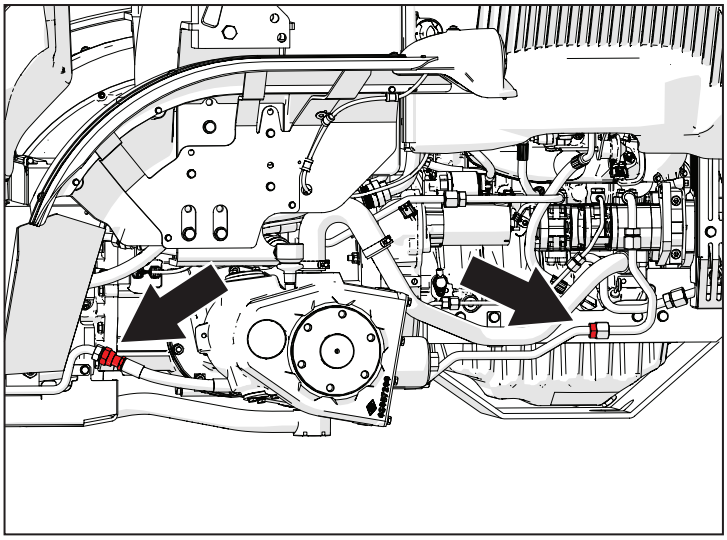

Fig. 8.44

Tighten the screws (6) fastening the oil suction pipe to the inlet line filter.

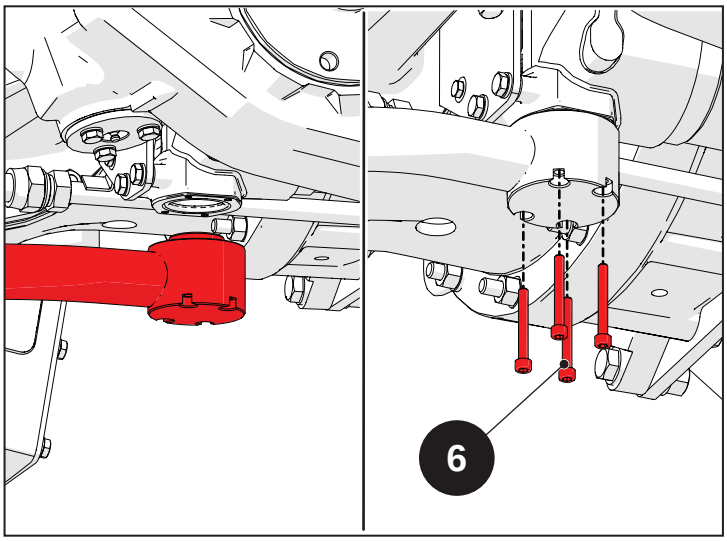

Fig. 8.45

- Fill the transmission with oil

Reassemble by following the procedure for disassembly in reverse order.

8.4.1.2 Adjusting steering wheel end stop screw

Tighten the steering wheel end stop screw (26), complete with the check nut (27), on the knuckle flange.

Leave a distance of about 20 mm between the head of the screw (26) and the knuckle flange wall , and then tighten the check nut (27) to secure the position of the screw (26).

Do this for both drive final drive units.

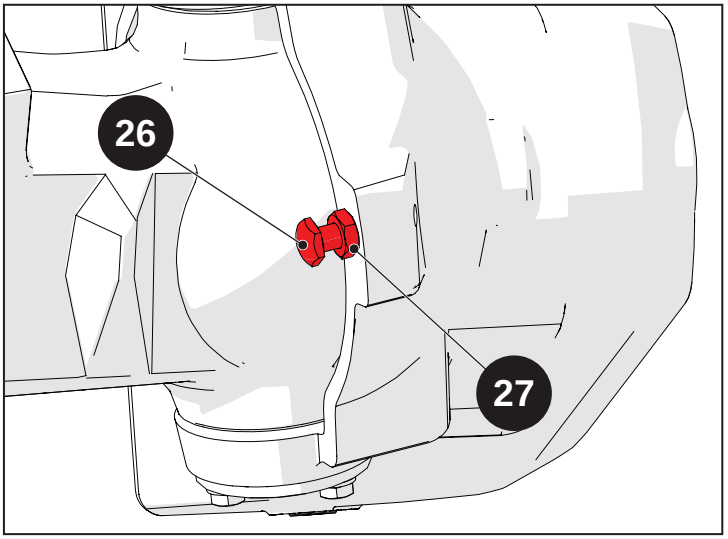

Fig. 8.46

8.5 Tightening torques

Indice

8.5.1 Tightening torques 8-26

8.5.1 Tightening torques

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Steering cylinder pin - knuckle flange fastener nut	270	27
Steering cylinder — differential case fastener screws	85	8.5
Hub-differential case fastener screws	70	7
Reduction gear cover fastener screws	25	2.5
Knuckle pin fastener screws	25	2.5

8.6 Tools necessary

Indice

8.6.1 Tools necessary 8-28

8.6.1 Tools necessary

p/n	Description	Quantity
A-p/n _____	Knuckle flange lifting tool	1
C-p/n _____	Hub lifting tool	1

9 : Brakes

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9.4.2 Adjusting the service brakes.....9-16

9.4.3 Adjusting the emergency and parking brake.....9-18

9.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners at the top of the gearbox housing.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

9.2 Technical characteristics

Index

9.2.1 Technical characteristics 9-4

9.2.1 Technical characteristics

Rear brake type	Multi-disc wet brakes
Operation	Hydraulic control
Front brake type	-
Emergency and parking brake	Independently and mechanically controlled. Braking action on rear wheels.
Trailer hydraulic braking	-

9.3 Disassembly

Indice

9.3.1 Preliminary operations 9-6

9.3.2 Disassembly 9-6

9.3.1 Preliminary operations

The main operations necessary to access the brakes indicated as follows.

- Removing the platform (see chapter "13-Platform")
- Draining the transmission oil
- Draining oil from the rear lateral final drive units
- Removing rear lateral final drive units (see chapter "7 - Rear lateral final drive units")
- Draining the brake oil

9.3.2 Disassembly

Undo the screw and remove the banjo bolt (1) of the brake bleed pipe and the two copper washers.

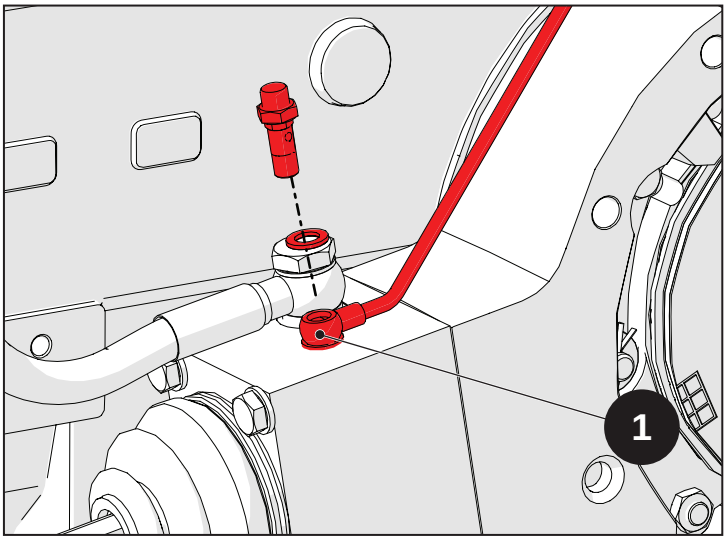

Fig. 9.1

Undo the screw and remove the banjo bolt (2) of the hydraulic brake pipe and the two copper washers.

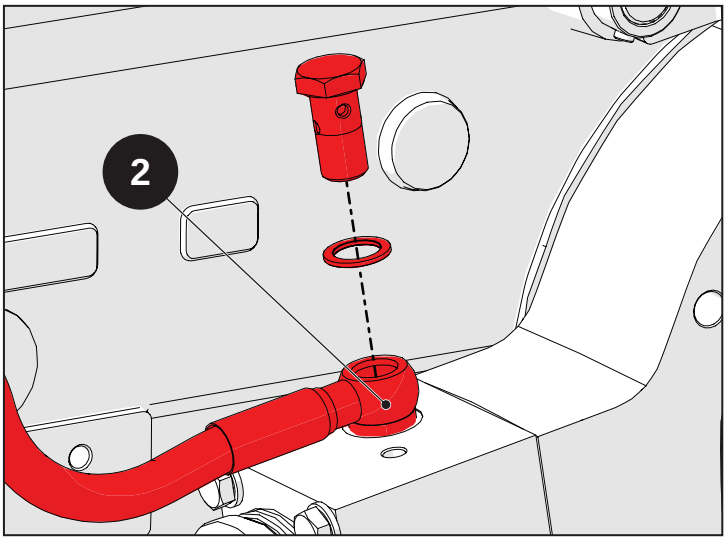

Fig. 9.2

Undo the nut (3) from the link rod (4).

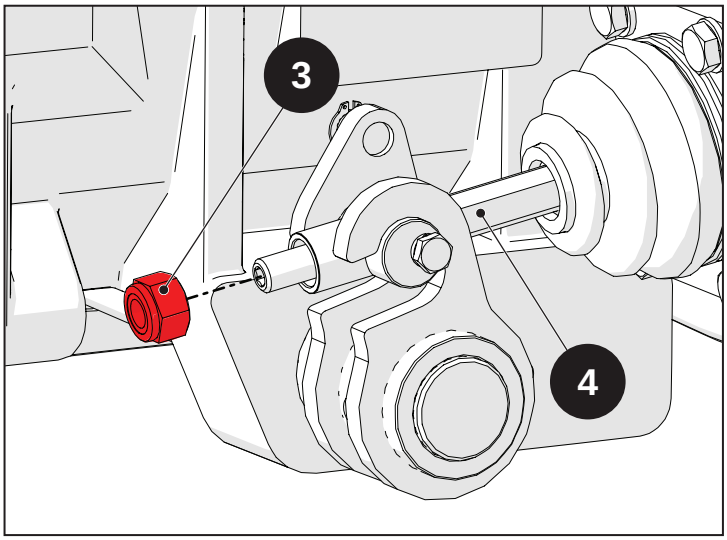

Fig. 9.3

Undo the screw (5) and remove the split washer (6).

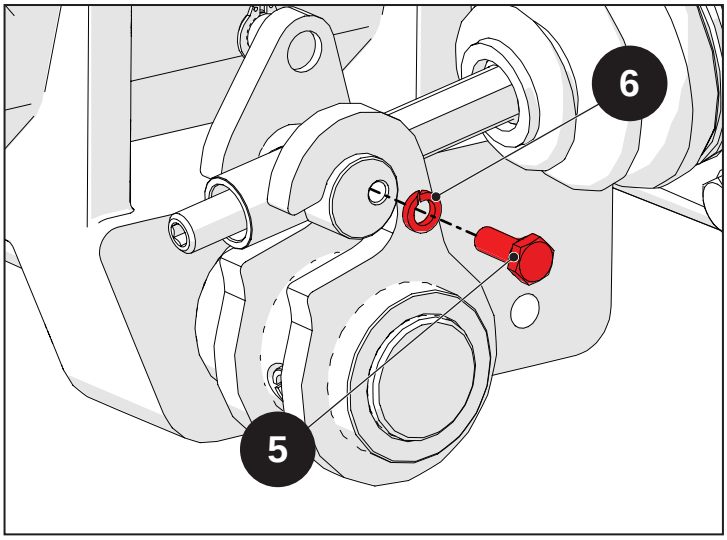

Fig. 9.4

Remove the ferrule (7).

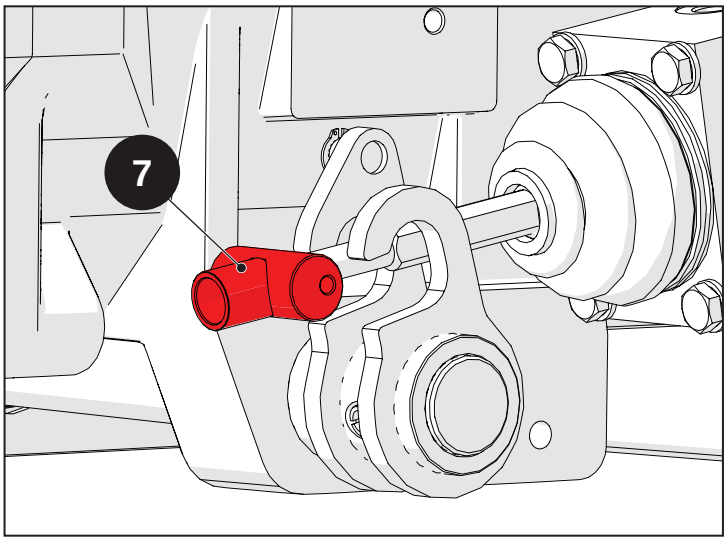

Fig. 9.5

Undo the screws (8) and remove the washers (9).

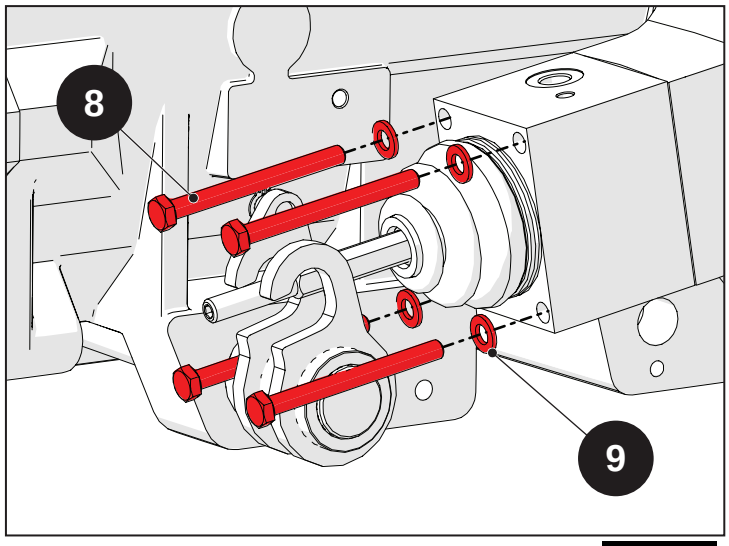

Fig. 9.6

Undo the link rod (4) completely to free the annular piston, and then remove the entire block (10) complete with the gaiter (11).

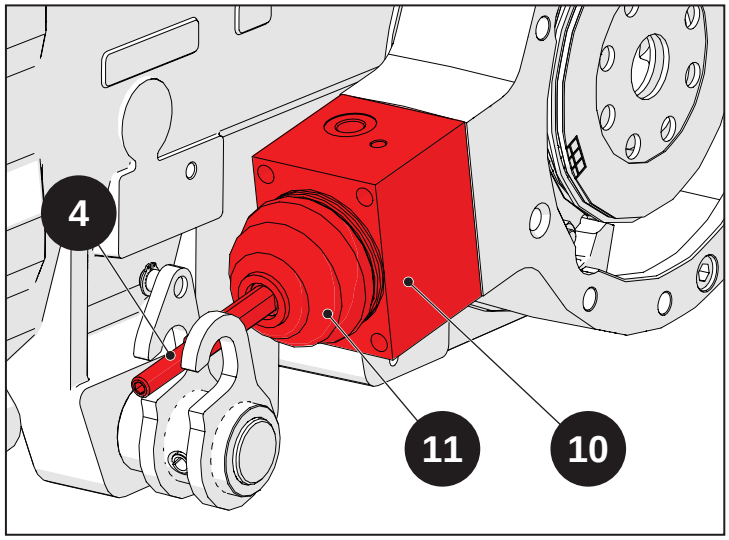

Fig. 9.7

Remove the two friction discs (13) and the steel disc (14).

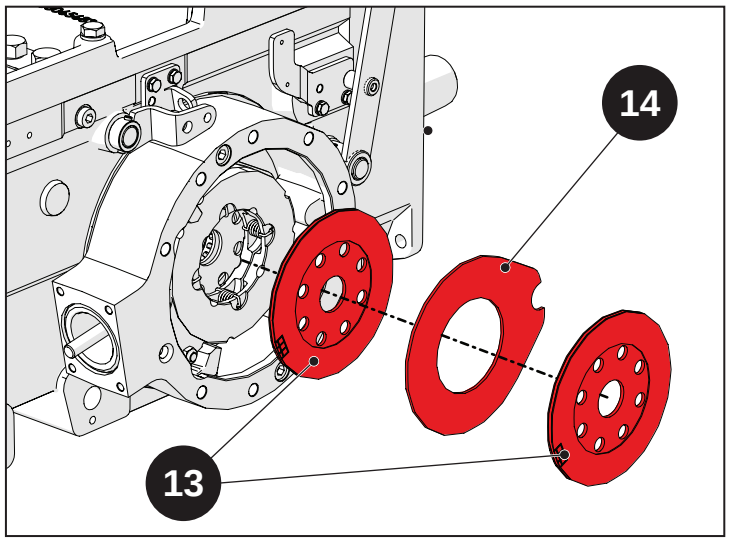

Fig. 9.8

Remove the annular piston (15).

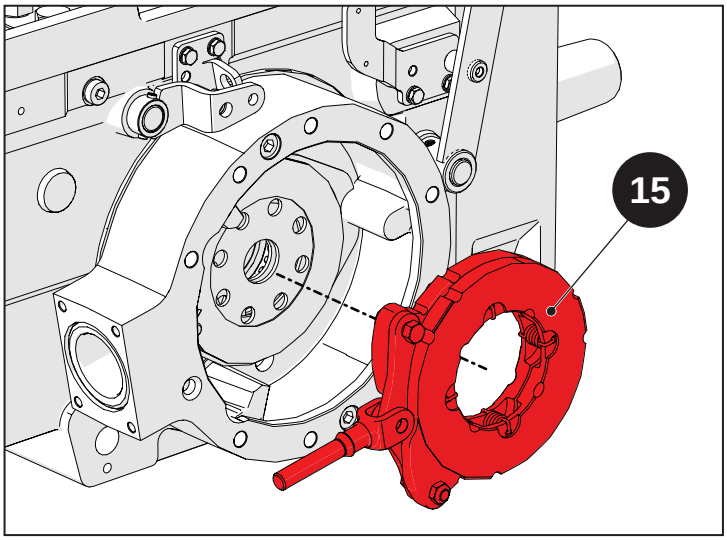

Fig. 9.9

Remove the last two friction discs (13) and the steel disc (14).

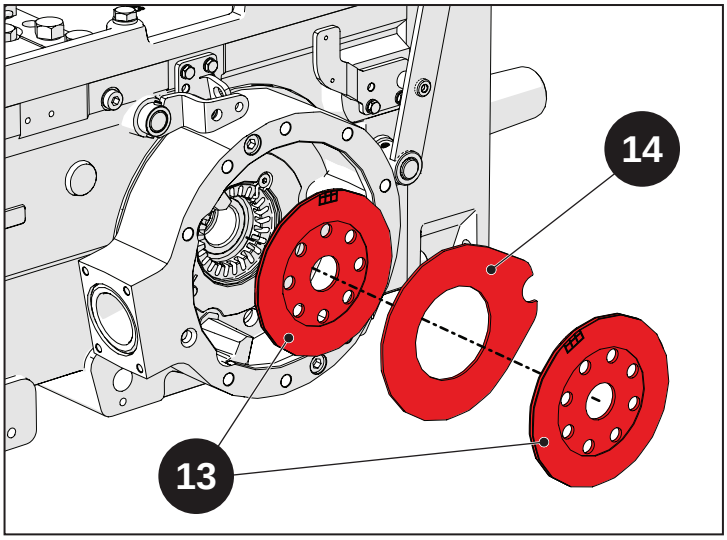

Fig. 9.10

Disassemble the annular piston by removing the split pin (16) and the pin (17), and then the link rod (18).

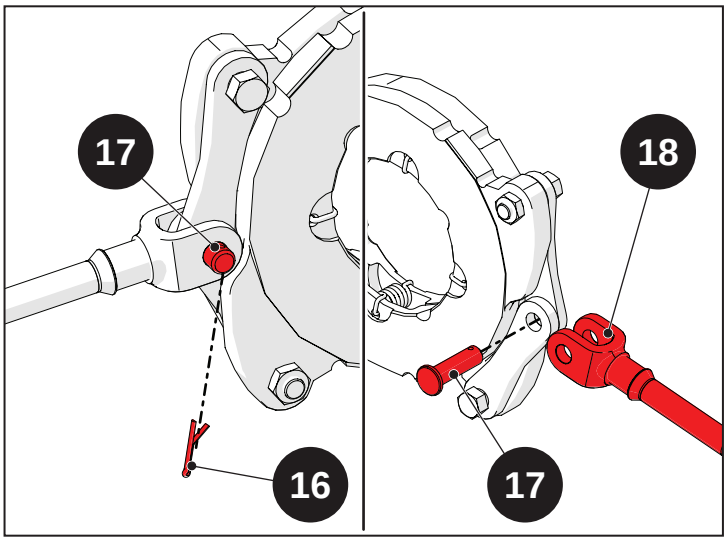

Fig. 9.11

9.4 Main inspection, reassembly and adjustment procedures

Indice

9.4.1 Reassembly 9-12
9.4.1.1 Reassembling the brake assembly 9-12
9.4.2 Adjusting the service brakes 9-16
9.4.3 Adjusting the emergency and parking brake 9-18

9.4.1 Reassembly

Attention
The following instructions are applicable for both brakes.

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

9.4.1.1 Reassembling the brake assembly

Fasten the link rod (18) to the annular piston with the pin (17), and then secure with the circlip (16).

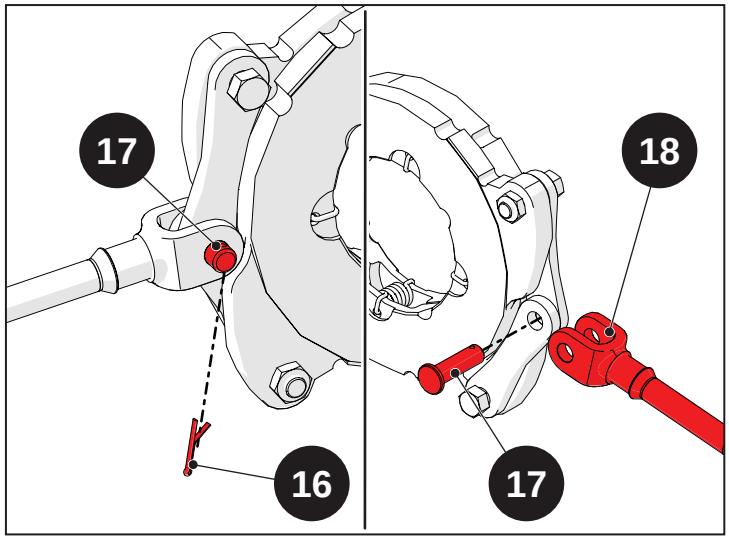

Fig. 9.12

Mount the brake discs and braking plate. The fitting sequence is the following:

- friction disc (13);
- steel disc (14);
- friction disc (13);
- annular piston (15);
- friction disc (13);
- steel disc (14);
- friction disc (13).

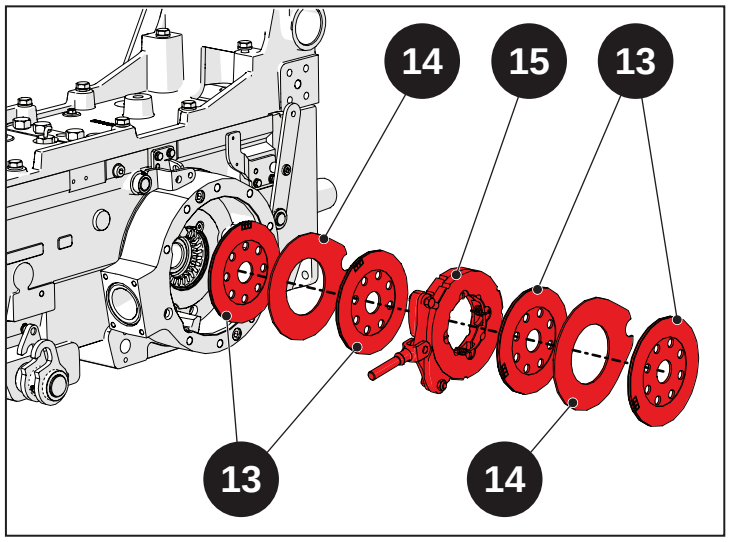

Fig. 9.13

Fit the entire block (10) complete with gaiter (11), and then tighten the link-rod (4) to its end of travel to expand the annular piston.

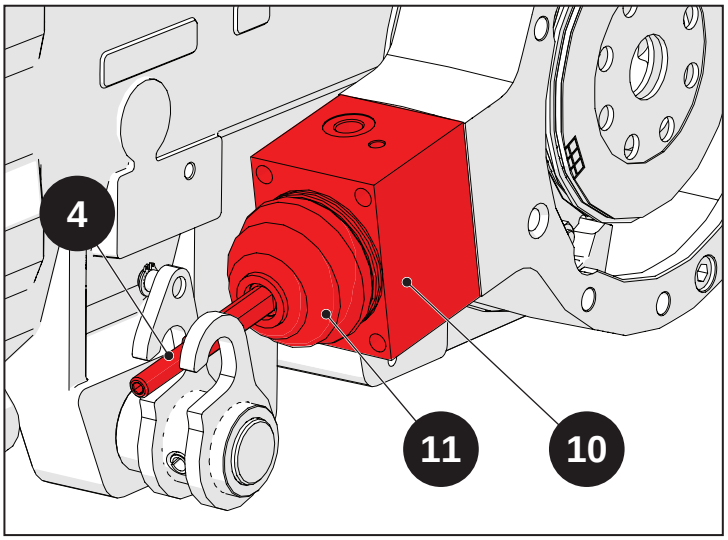

Fig. 9.14

Fit the washers (9) and tighten the screws (8) to a torque of 25 Nm (2.5 kgm).

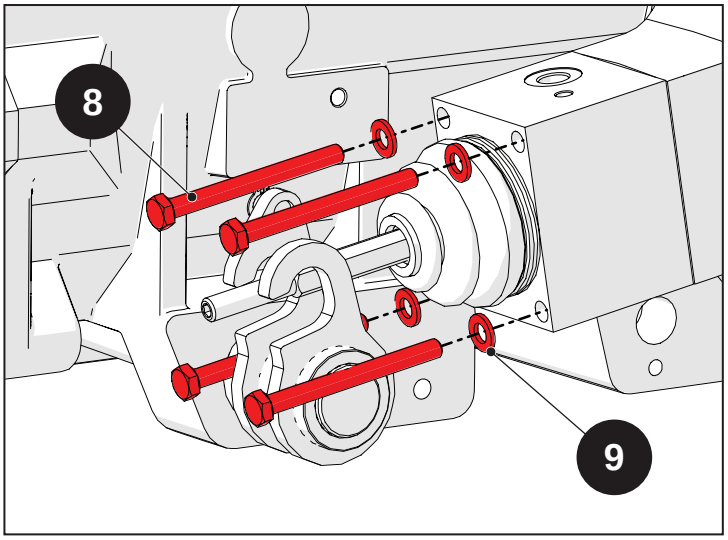

Fig. 9.15

Fit the ferrule (7).

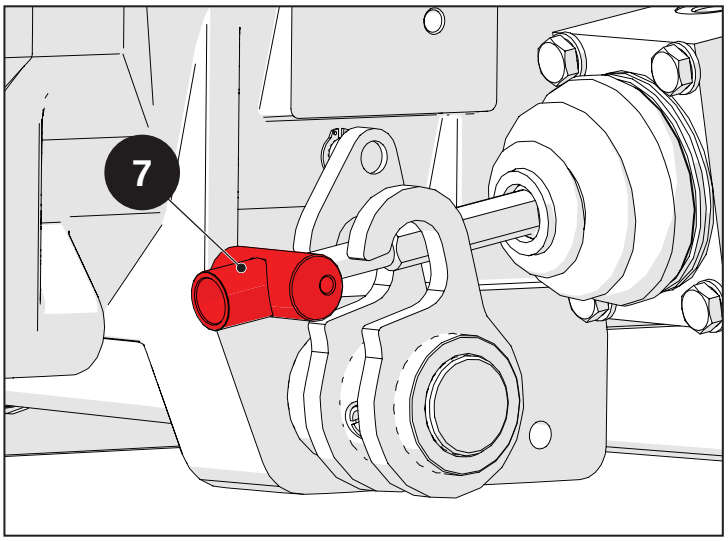

Fig. 9.16

Fit the split washer (6) and fit and tighten the screw (5).

Tighten the screw (5) onto one of the two flat surfaces on the link rod (4).

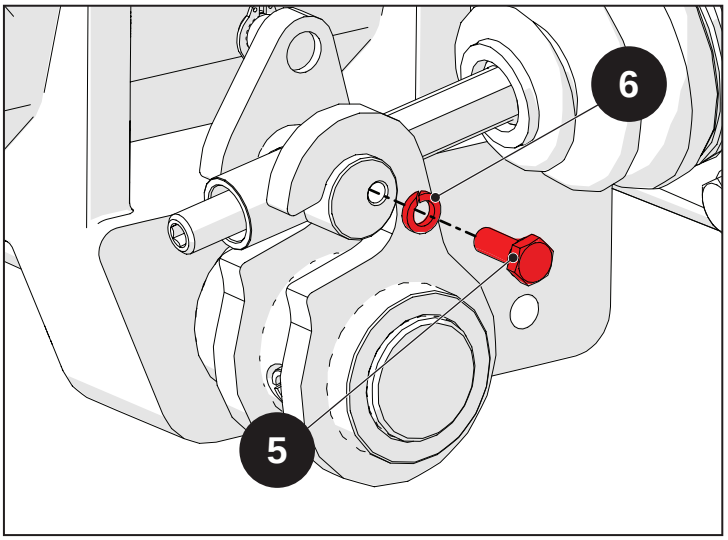

Fig. 9.17

Tighten the nut (3) on the link rod (4).

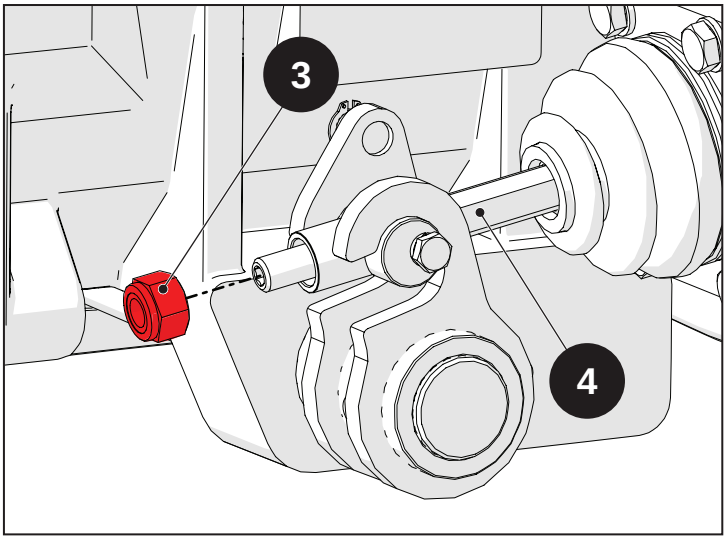

Fig. 9.18

Fit a copper washer, the banjo bolt (2) of the hydraulic brake pipe and another copper washer, and then fit and tighten the screw.

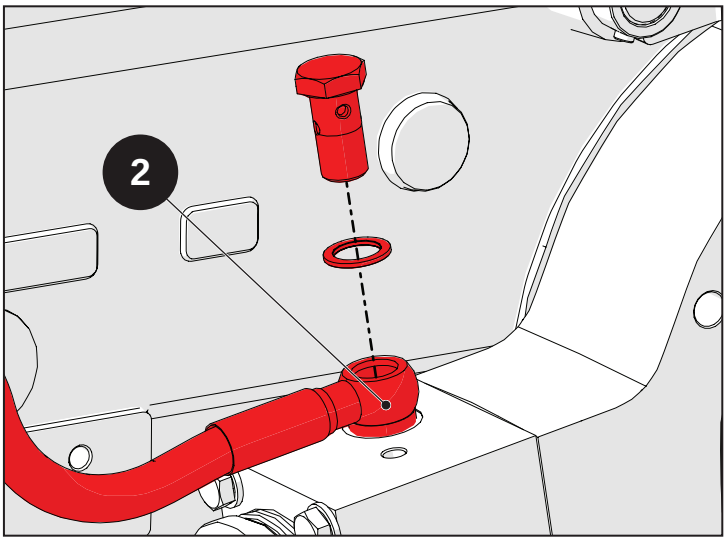

Fig. 9.19

Fit a copper washer, the banjo bolt (1) of the brake bleed pipe and another copper washer, and then fit and tighten the screw.

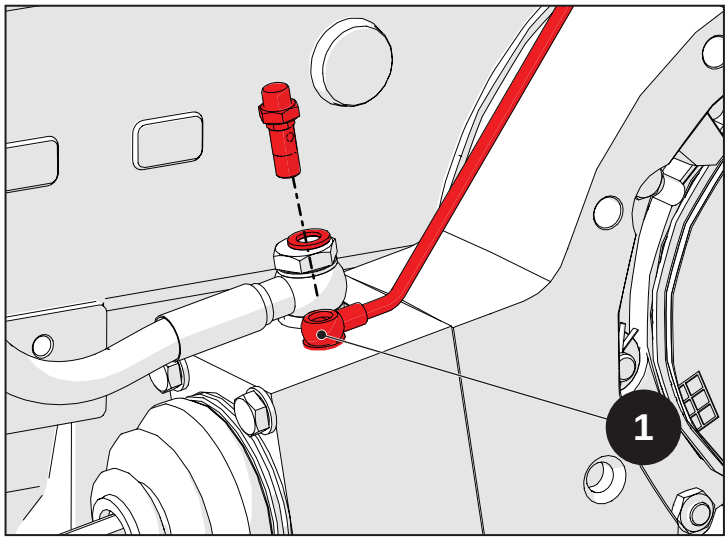

Fig. 9.20

9.4.2 Adjusting the service brakes

For the service brakes to function correctly, the braking action must only begin after a pedal dead zone of 35 to 40 mm.

Loosen the screw (5) to free the anti-rotation ferrule.

Tighten the link rod (4) to expand the annular piston until it starts to compress the discs.

Turn the link rod back by between 2 and 3 turns to create the dead zone necessary, ensuring that one of the two flat surfaces on the link rod (4) is aligned with the screw (5).

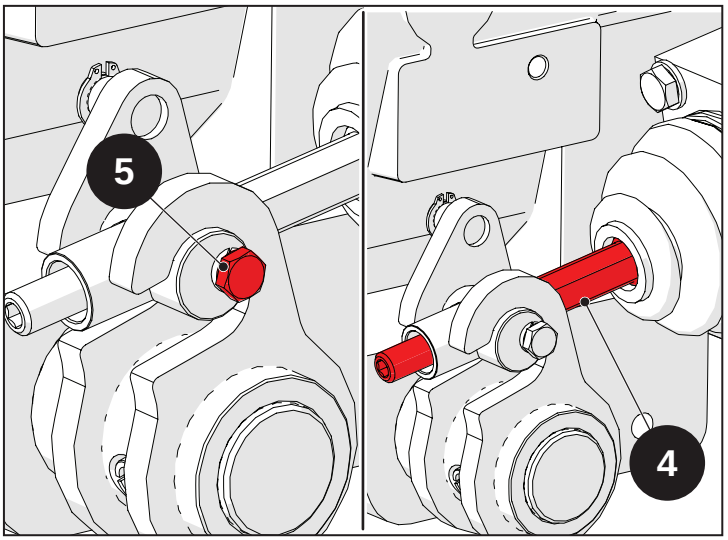

Fig. 9.21

Tighten the screw (5) onto one of the two flat surfaces.

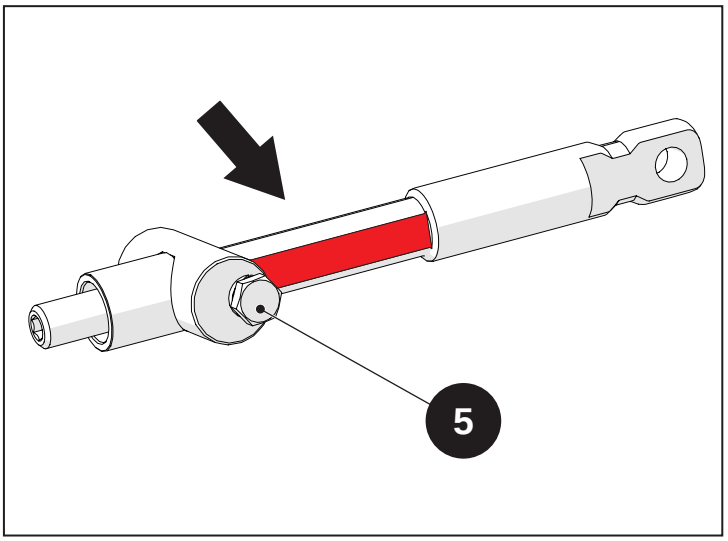

Fig. 9.22

After adjusting, perform the procedure to bleed the braking system.

The screws (A) must not be fitted during the bleeding procedure.

After bleeding, refit and tighten the screws (A).

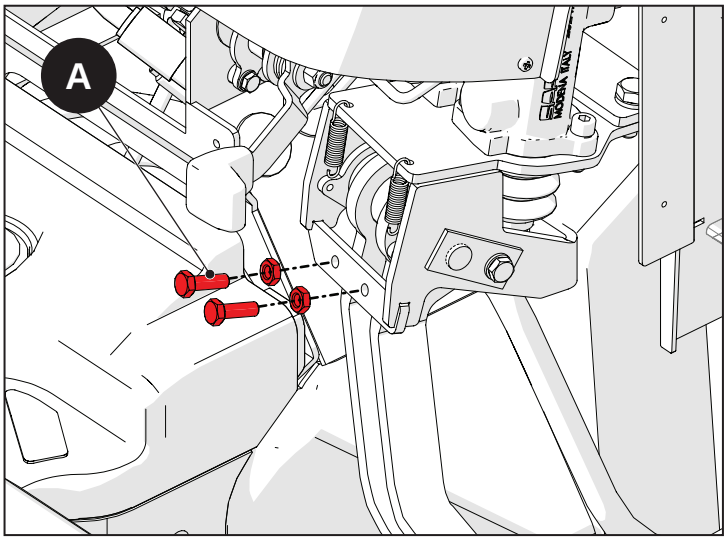

Fig. 9.23

After tightening the screws, adjust the gap (Q) to between 2 and 8 mm.

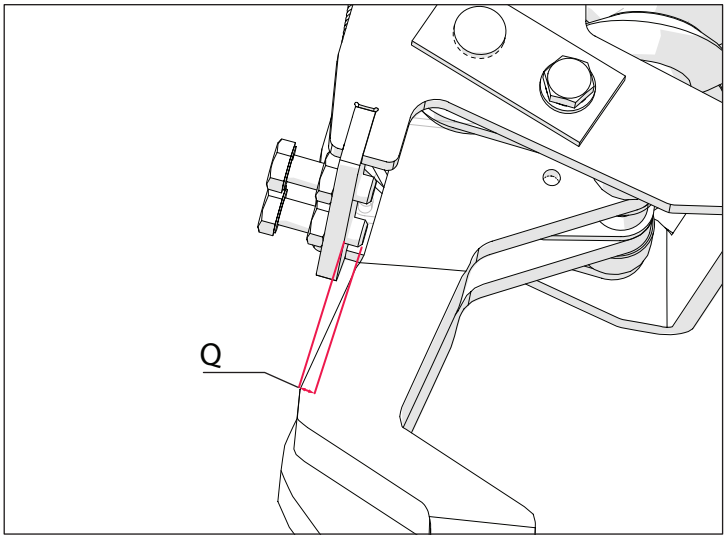

Fig. 9.24

Note
Leave a little free space at the end of the brake master cylinder rod before adjusting.

Note
Check that the machine is not braked.

9.4.3 Adjusting the emergency and parking brake

The relative control lever must be adjusted correctly to ensure that the emergency brake works correctly.

Pull the parking brake lever (C) up to the third ratchet notch.

Loosen the check nut (A).

Tighten the adjuster screw (B) completely.

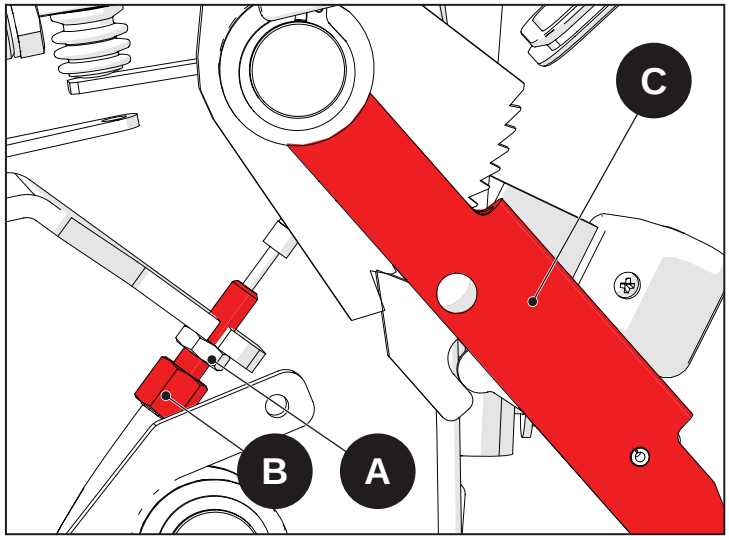

Fig. 9.25

Tighten the adjuster screw (D) to create a 5 mm gap between the screw and its check nut.

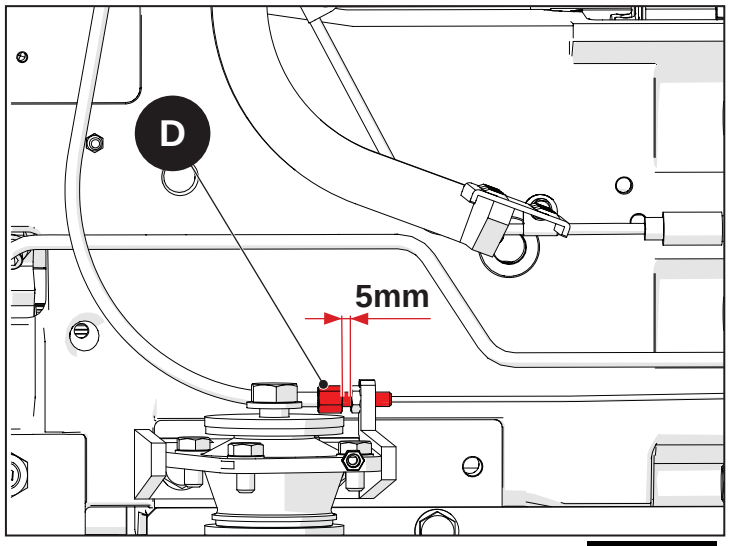

Fig. 9.26

Use an Allen wrench to restrain the link rod (F) on the left hand wheel.

Tighten the nut (E) to tauten the cable (G), and then continue tightening to brake the wheel.

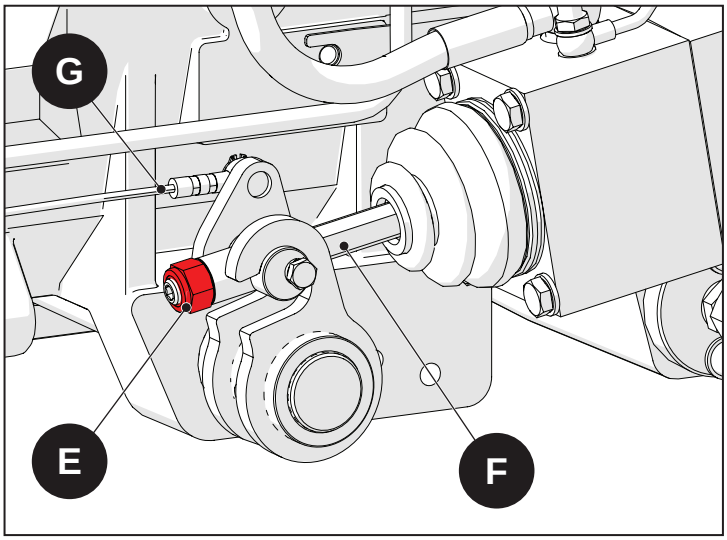

Fig. 9.27

Use an Allen wrench to restrain the link rod (F) on the right hand wheel.

Tighten the nut (E) to push the ferrule (H) against the lever (I), and then continue tightening to brake the wheel.

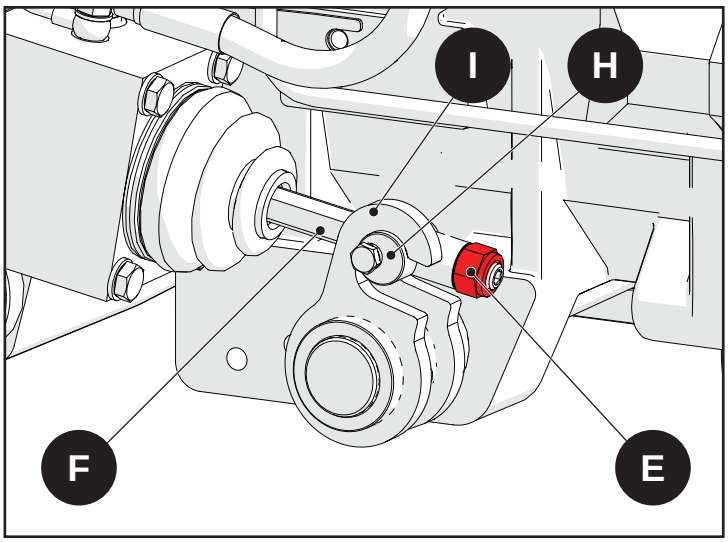

Fig. 9.28

Release the parking brake lever (C) and check that the wheels are free to turn.

Pull the parking brake lever (C) forcefully and check that both wheels are braked with even force.

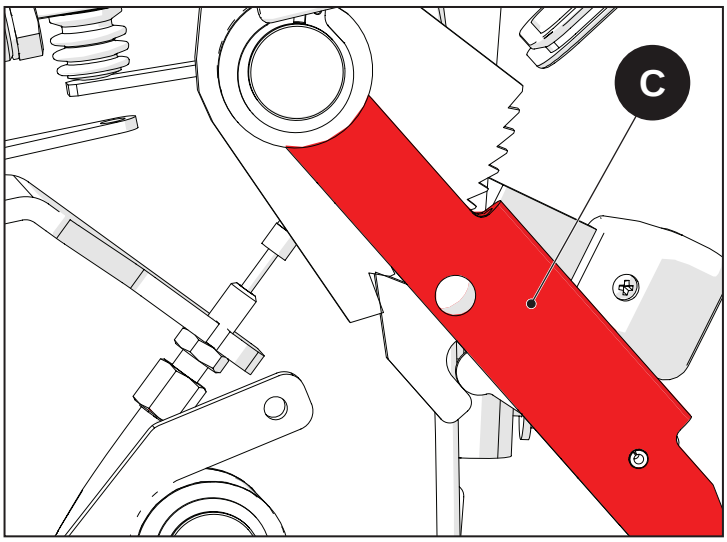

Fig. 9.29

If necessary, increase the parking brake lever travel by tightening the adjuster screw (D).

If necessary, reduce the parking brake lever travel by loosening the adjuster screw (D).

If it is necessary to reduce the parking brake lever travel even further, loosen the adjuster screw (B).

After adjusting, check that the parking brake works correctly.

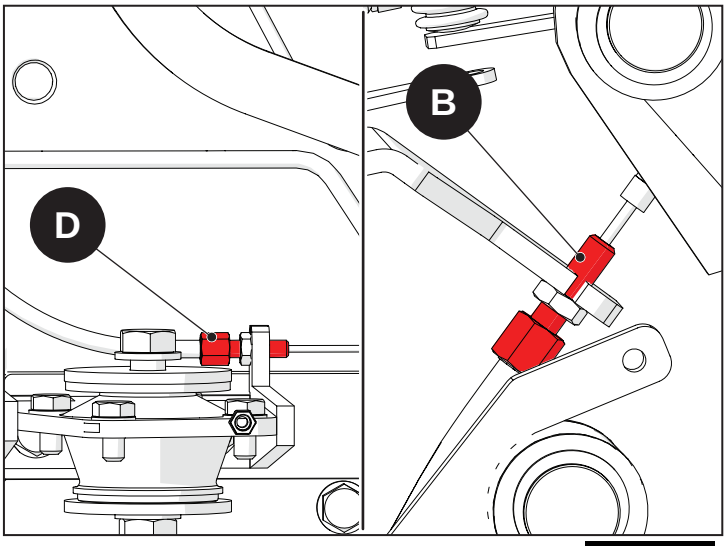

Fig. 9.30

10 : Rear lift

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10.4.1 Main inspection, reassembly and adjustment procedures.....10-10

10.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area. Avoid vibration when loosening screws.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame or cab are loosened, or if the frame or cab is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

10.2 Technical characteristics

Index

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10.2.1 Technical characteristics

Type	Hydraulic with position and draft control and LOM
Lift capacity at lower link ends	2100 kg
3-point linkage category	Category 1 and -2N
Mechanical top link arm	Category 1 and -2N
Hydraulic top link arm	Category 1 and -2N / 1 and -2N with quick hitch
Lower link arm type	Telescopic with fixed lower link ends
Optional lower link arm type	Telescopic with quick hitches
Right hand stabiliser bar type	Mechanical
Right hand stabiliser bar type	Hydraulic

10.3 Disassembly

Indice

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10.3.2 Disassembly 10-6

10.3.1 Preliminary operations

The main operations necessary to access the assembly are indicated as follows.

- Removing the rear wheels
- Removing the rear mudguards (see chapter "13-Platform")
- Removing the platform (see chapter "13-Platform")

10.3.2 Disassembly

Remove the draft control rod.

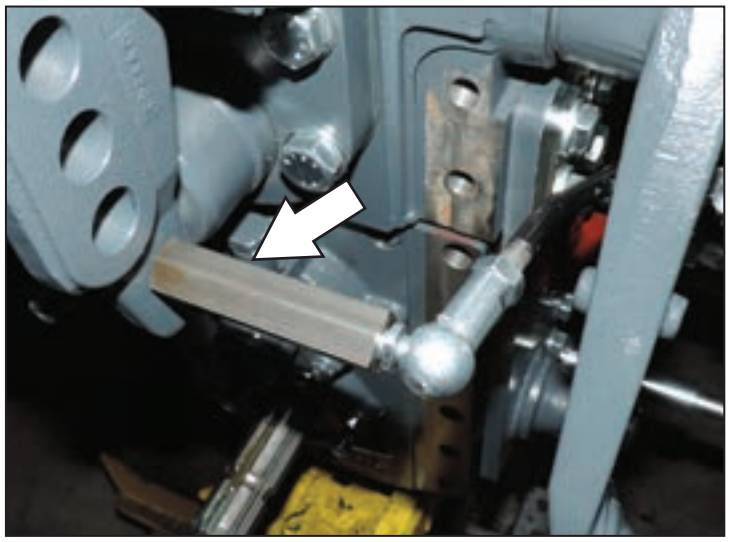

Fig. 10.1

Undo the screws (1) and remove the washers (2).

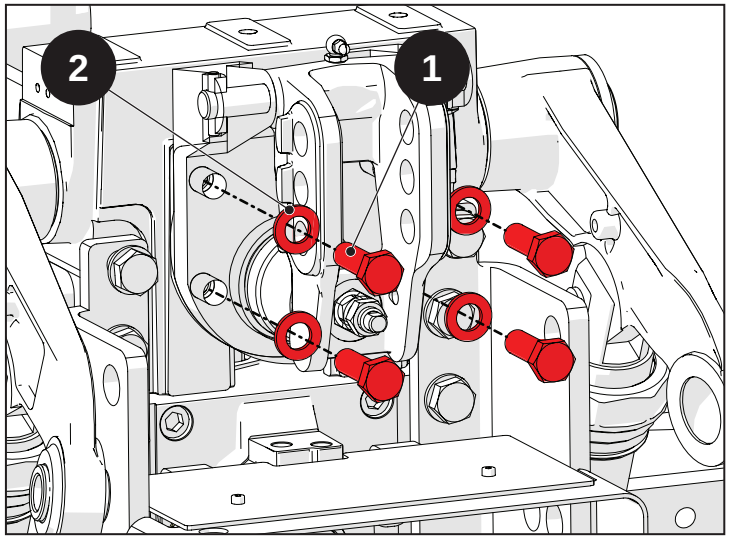

Fig. 10.2

Remove the swinging drawbar carrier (3) and the plate (4).

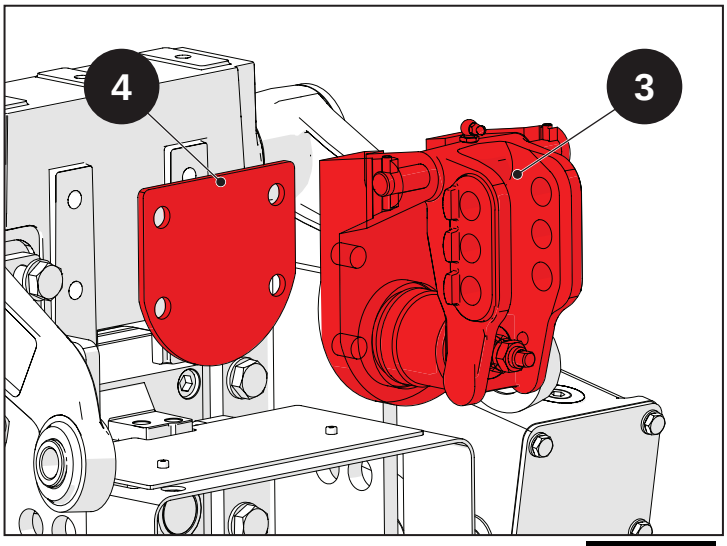

Fig. 10.3

Remove the circlip (5).

Remove the circlip (6) and the plate (7).

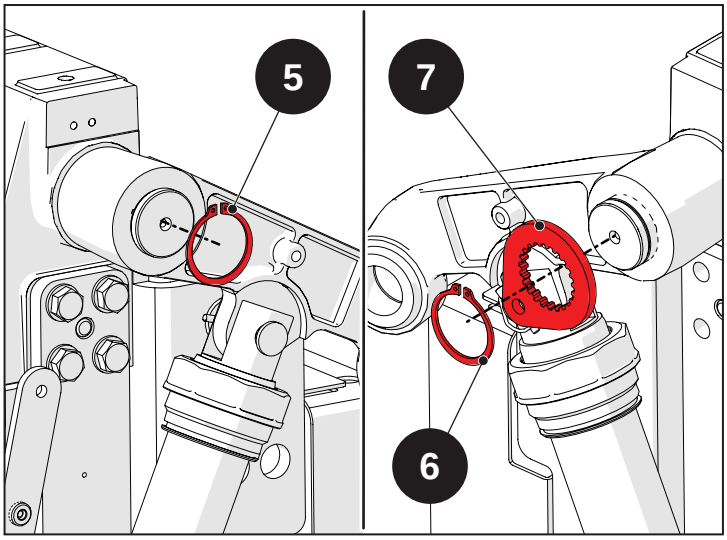

Fig. 10.4

Remove the retainer (8).

Remove the pin (9).

Carry out this step on both sides of the machine.

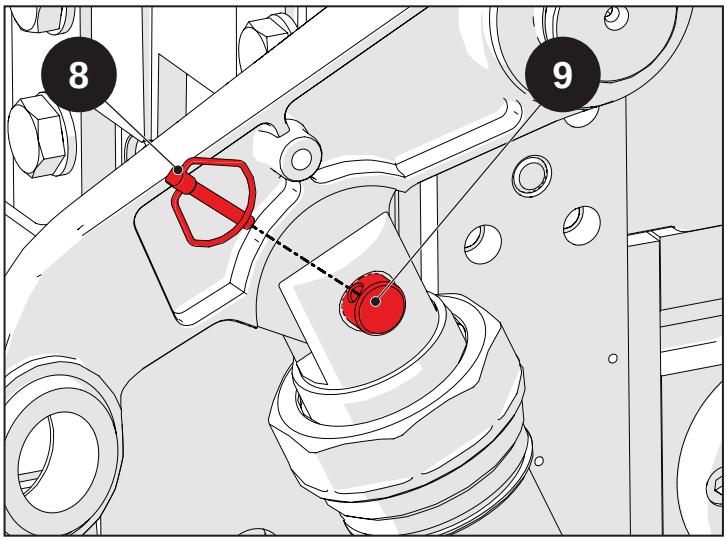

Fig. 10.5

Remove the lift arm (10).

Carry out this step on both sides of the machine.

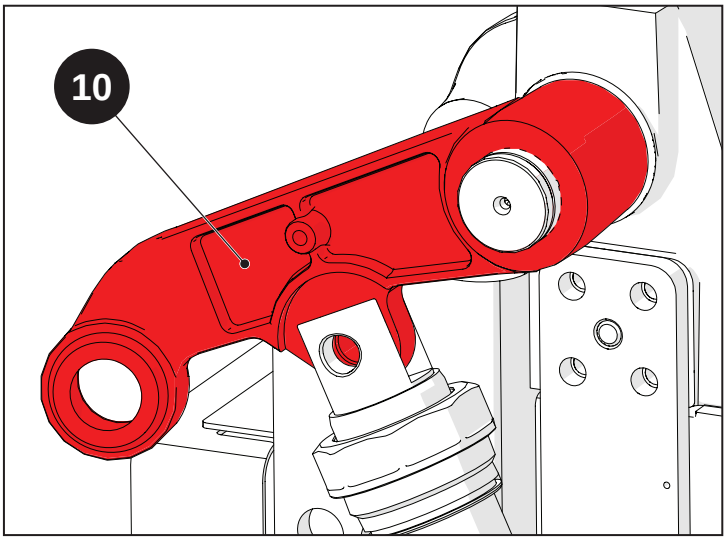

Fig. 10.6

Remove the spacers (11).

Remove the shaft (12).

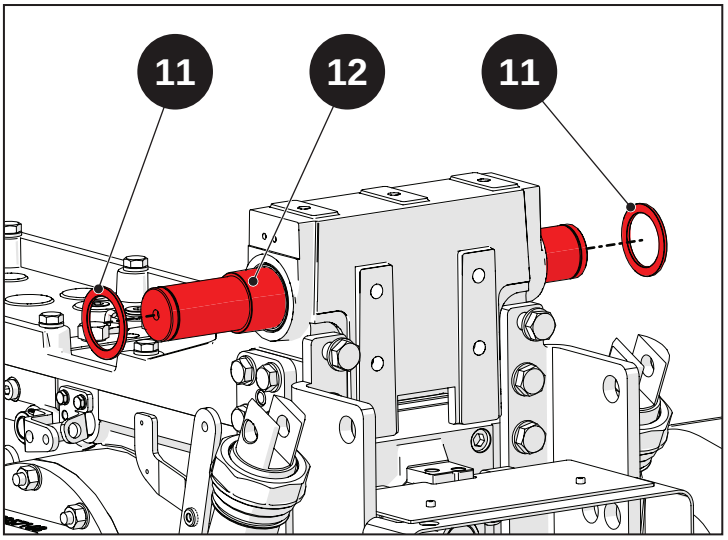

Fig. 10.7

Remove the bushes (13).

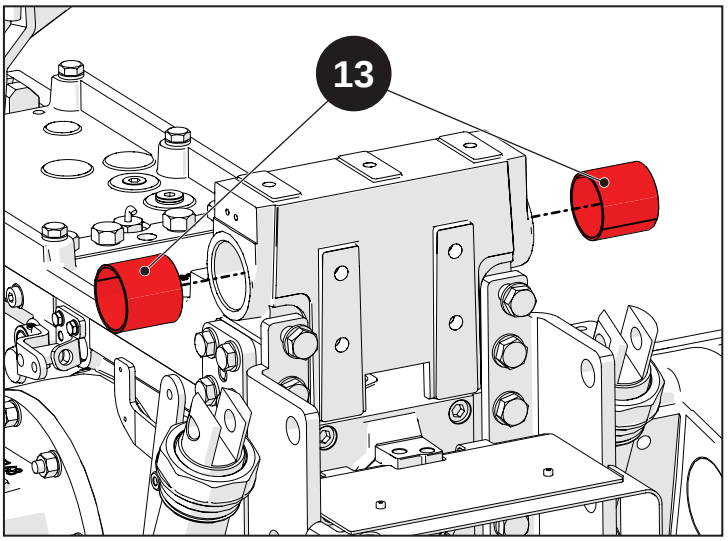

Fig. 10.8

10.4 Main inspection, reassembly and adjustment procedures

Indice

10.4.1 Main inspection, reassembly and adjustment procedures.....10-10

10.4.1 Main inspection, reassembly and adjustment procedures

Warning

Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working.

Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction".

Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

Fit the bushes (13).

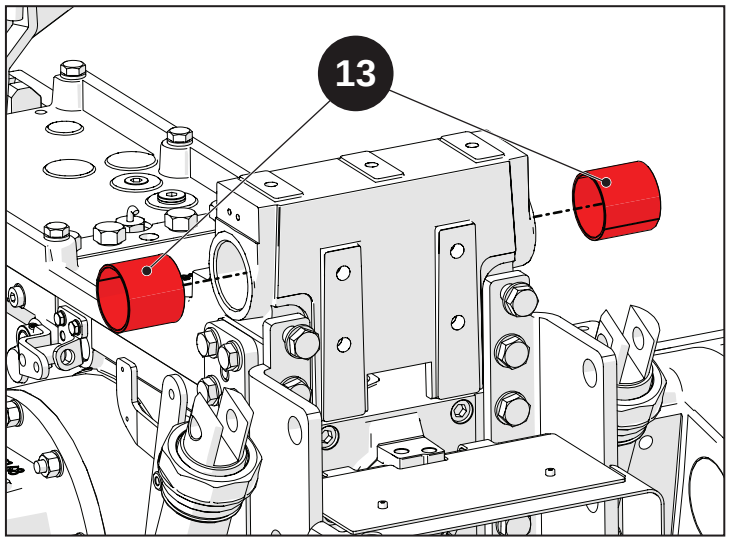

Fig. 10.9

Fit the lift arm (12).

Warning

Ensure that the shaft is installed the right way around. The end with the longer splines must be on the right.

Fit the spacers (11).

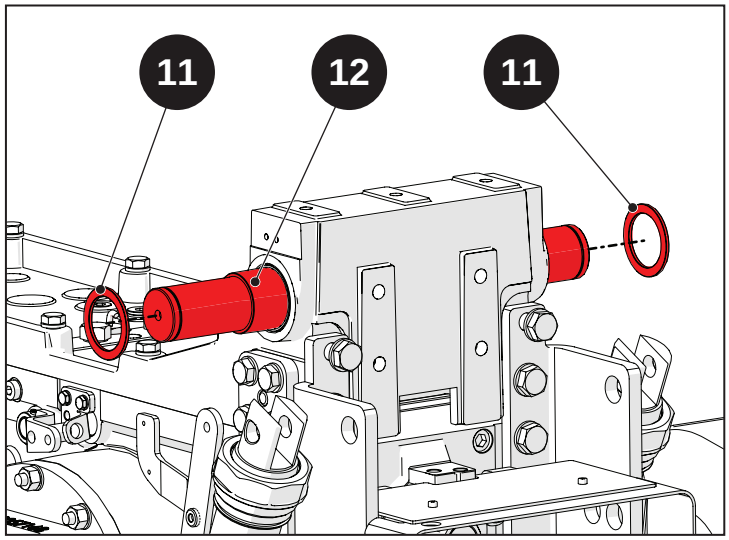

Fig. 10.10

Engage the splines of the lift arms (10) in the relative seats.

Warning
The lift arms must be at the same angle on both sides.

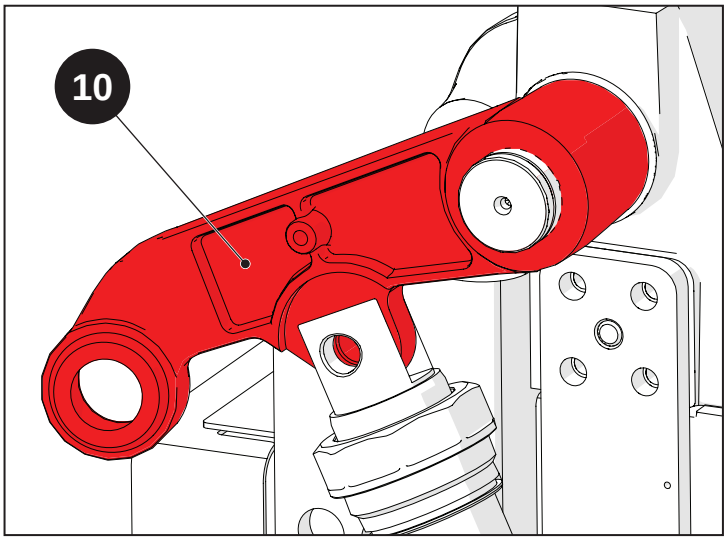

Fig. 10.11

Fit the circlip (5).

Tip the lift arms over to the other side.

Fit the position plate (7).

Fasten the right arm by fitting the circlip (6).

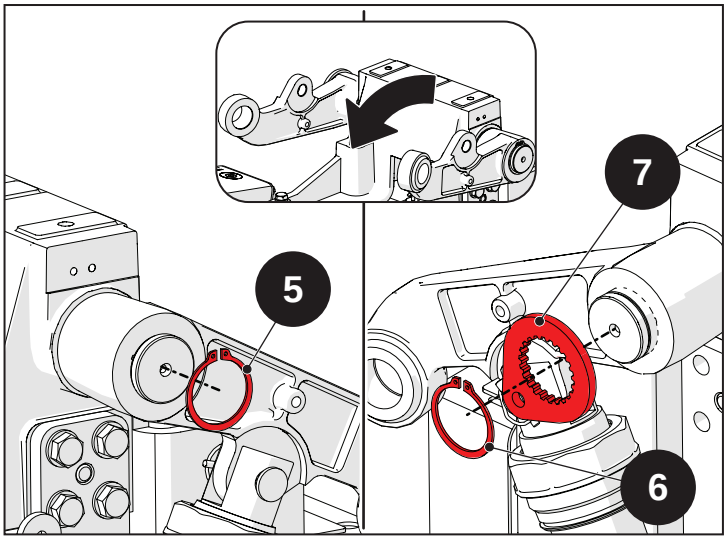

Fig. 10.12

Fit the pin (9).

Fit the retainer (8).

Carry out this step on both sides of the machine.

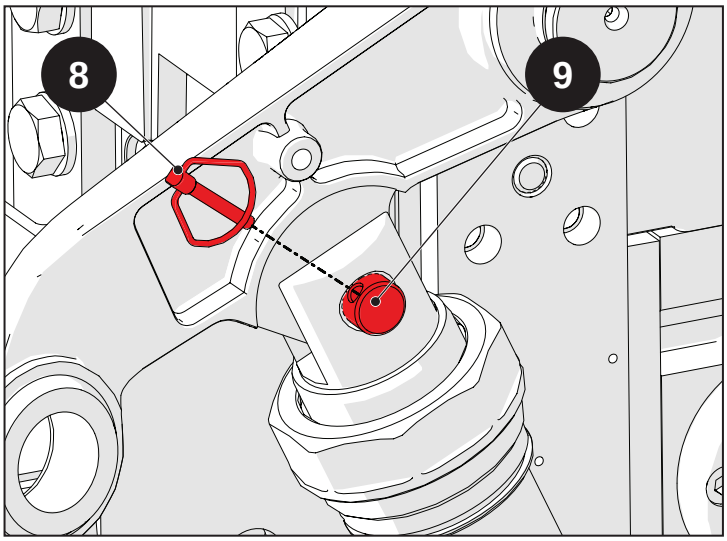

Fig. 10.13

Fit the swinging drawbar carrier (3) with the plate (4).

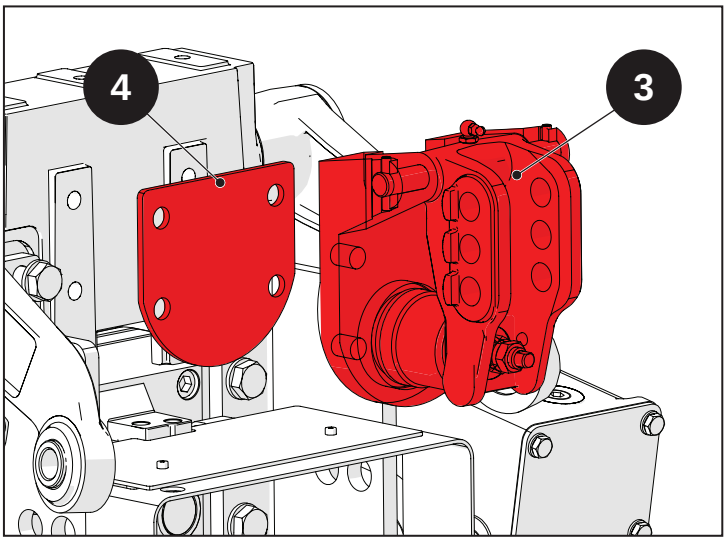

Fig. 10.14

Fit the washers (2) and tighten the screws (1).

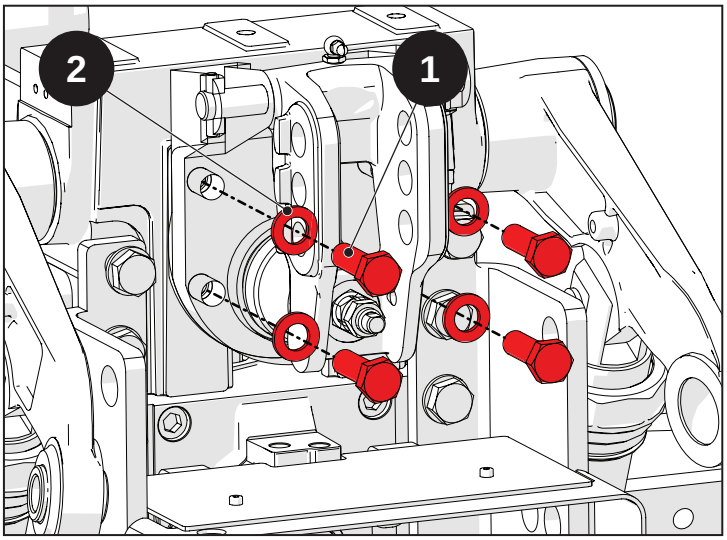

Fig. 10.15

Fit and connect the draft control rod.

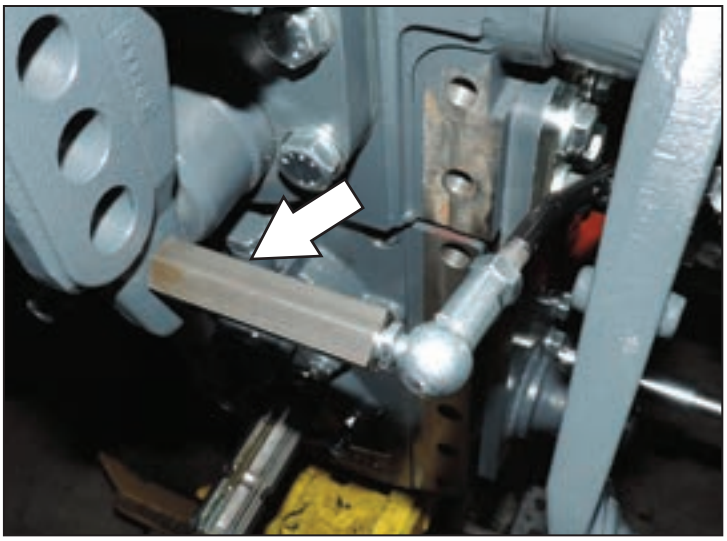

Fig. 10.16

11 : Hydraulic System

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11.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
Do not start work until the pressure in the hydraulic system has dropped to zero.

Danger
Jets of escaping pressurised fluid may penetrate the skin and cause severe injury. In the event of an accident involving pressurised fluid, seek immediate medical attention to avoid the risk of severe infection.

Danger
When using adhesives or detergents, follow the safety and usage instructions provided by the manufacturer.

Danger
Take all precautions necessary to avoid burns when working with hot oil. Never heat oil to above 190°C, as the oil vapour may suddenly and spontaneously ignite.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

11.2 Main hydraulic circuit

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11.2.1 RS version

11.2.1.1 Hydraulic circuit diagram, hydraulic steering system

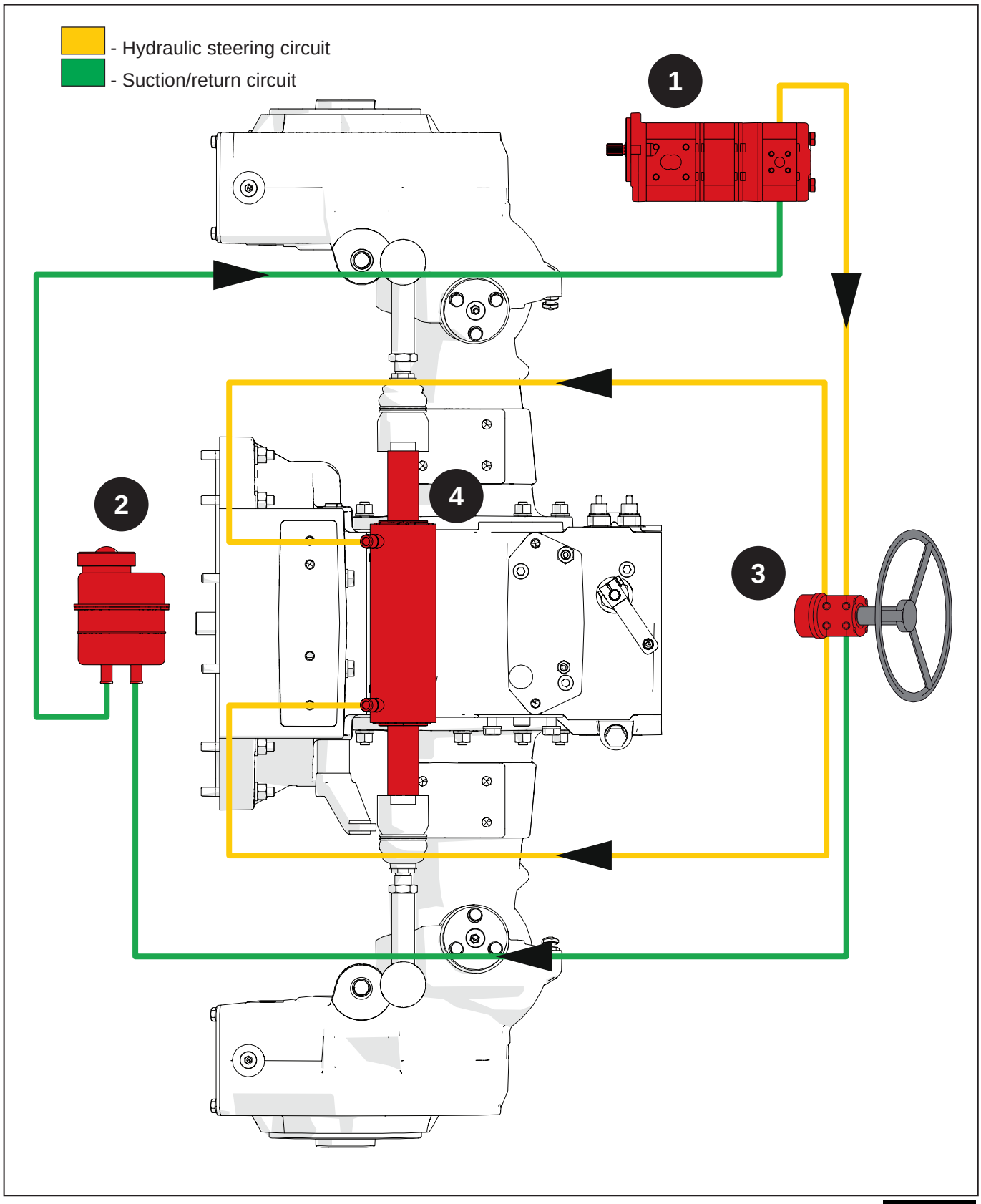

Fig. 11.1

1 - Pump
2 - Hydraulic steering system tank
3 - Hydraulic steering valve
4 - Steering cylinder

11.2.1.2 General hydraulic circuit diagram

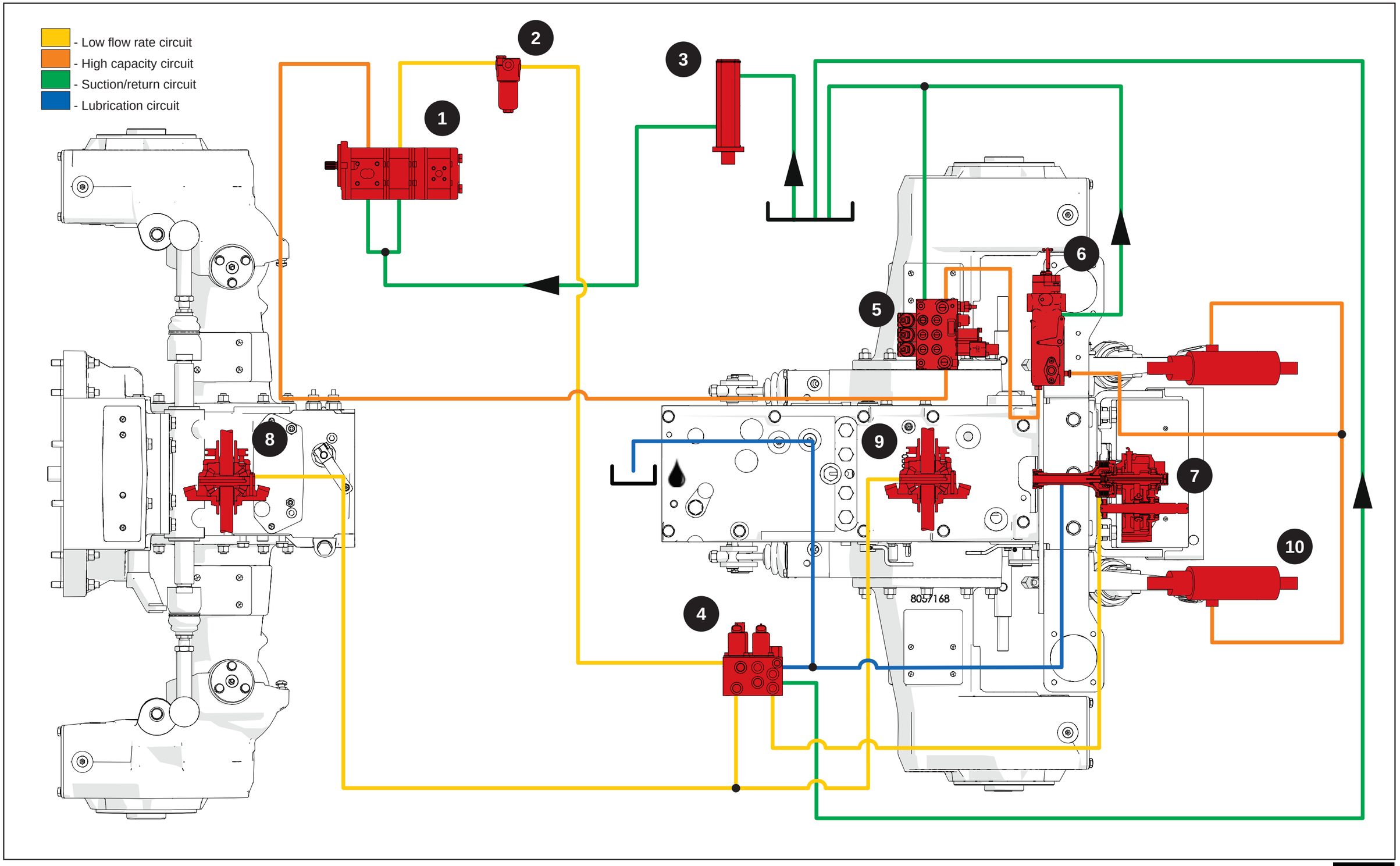

Fig. 11.2

1 - Pump
2 - Delivery line filter
3 - Suction line filter
4 - Hydraulic unit
5 - Rear distributors
6 - Lift distributor
7 - PTO clutch
8 - Front differential
9 - Rear differential
10 - Lift cylinder

11.2.1.3 General description

The hydraulic system consists of three circuits fed by a triple pump driven by the engine. A suction line filter cleans the oil aspirated by the pump.

The hydraulic steering unit has its own dedicated circuit. The pump aspirates oil from a tank separate from the gearbox, situated at the front of the vehicle.

The low flow rate pump sends oil to a hydraulic unit which engages and disengages the rear PTO. This unit also controls engagement and disengagement of the front and rear differential locks.

The high flow rate pump delivers oil directly to the rear auxiliary distributors. Oil not used by these distributors is sent to the distributor of the "Liftomatic" lift.

Transmission clutch control is of the mechanically engaged hydraulic type. By means of a separate circuit, pressing the pedal sends oil to a cylinder that disengages the transmission clutch.

11.2.2 Technical characteristics

11.2.2.1 RS version

Pump

	High flow rate	Low flow rate	Hydraulic steering valve
Direction of rotation (looking at drive shaft)	Left		
Displacement	21.139 [cm3/rev]	4.955 [cm3/rev]	8.258 [cm3/rev]
Pump delivery pressure range	0.7 - 3 [bar abs.]		
Max. continuous pressure	200 [bar]	250 [bar]	250 [bar]
Max. intermittent pressure	220 [bar]	280 [bar]	280 [bar]
Max. peak pressure	240 [bar]	300 [bar]	300 [bar]
Maximum speed	3000 [rpm]		
Minimum speed	600 [rpm]		
Minimum operating temperature	-25 [°C]		
Maximum continuous temperature	+110 [°C]		
Maximum peak pressure	+125 [°C]		

Hydraulic steering valve

Hydraulic steering type	dynamic
Maximum steering wheel pressure	100/105 bar
Antishock valve	200/220 bar

Rear auxiliary distributors

Coupler type	Rear quick couplings
Rear distributor pressure relief valve	180 bar

Rear lift

Type	Hydraulic with position and draft control and quick lift function
Lift capacity at lower link ends	2100 kg
3-point linkage category	Category 1 - 2N

Suction line filter

Filtration rating	90 µm

Delivery line filter

Filtration rating	16 µm

11.3 Lift circuit

Indice

11.3.1 Hydraulic circuit diagram 11-10

11.3.2 Using the control levers 11-11

11.3.3 Functions of control distributor 11-12

11.3.1 Hydraulic circuit diagram

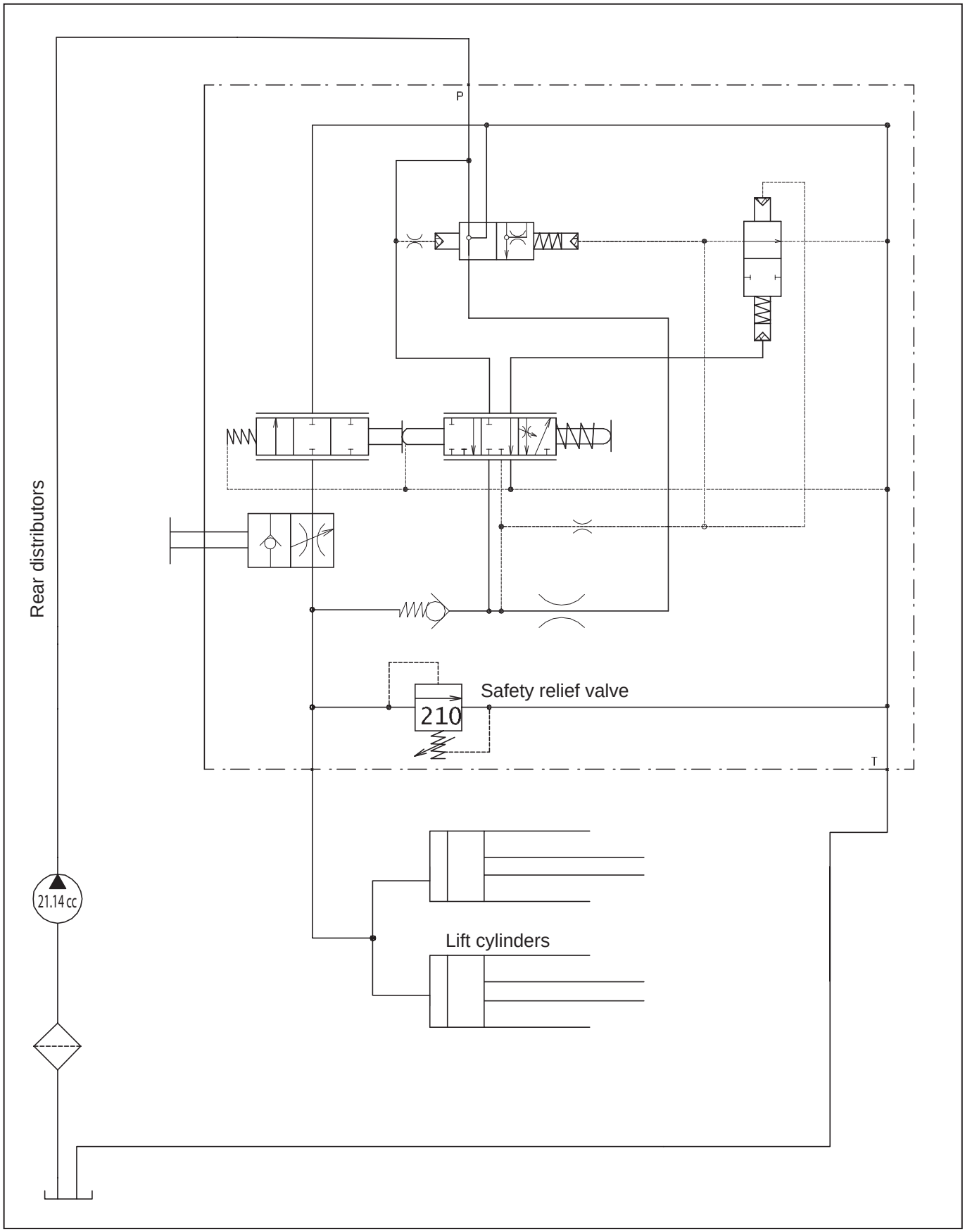

Fig. 11.3

11.3.2 Using the control levers

The two control levers may be used to obtain the following operating modes:

- position control;
- draft control;
- mixed position/draft control.

The mode used must be selected in accordance with the task, the type of implement and the hardness of the surface of the soil.

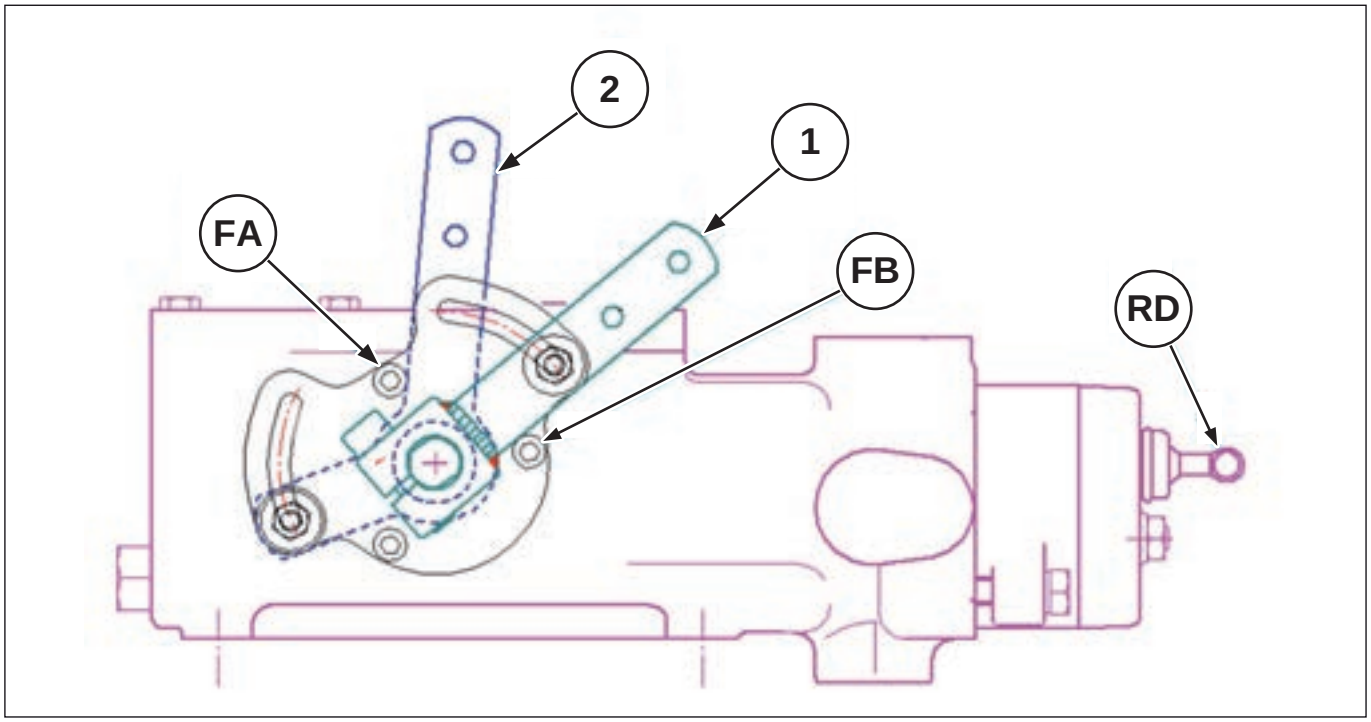

Fig. 11.4

A - Position control (lever 1)

In POSITION CONTROL mode, the position of the lift arms reflects the position of control lever (1).

To use this mode, move the draft control lever (2) against the stop FB. To set the implement position (engaged or disengaged with soil), move lever (1) towards the stop FA to raise the implement, or towards the stop FB to lower the implement.

B - Draft control (lever 2)

To use this mode, move control the position control lever (1) against the stop FB, and then engage the implement to the required working depth by gradually moving lever (2) towards the stop FB. In this mode, each position of the lever (2) corresponds to a specific draft or compression force exerted on the top link.

C - Mixed position/draft control

MIXED POSITION/DRAFT CONTROL mode is particularly useful when working in uneven terrain conditions. In this mode, the lift functions as if it were in draft control mode but also prevents the implement from engaging excessively when softer soil is encountered, ensuring more uniform results.

Engage the implement in the soil and set the average working depth required as described for draft control mode. Once at the required depth, move lever (1) gradually towards the stop FA until the lift arms lift slightly.

11.3.3 Functions of control distributor

The control distributor has three operating states:

- A) NEUTRAL
- B) DELIVERY
- C) RETURN

A) NEUTRAL

In this state, the control distributor keeps the oil in the cylinder under pressure, supporting the load, while oil from the pump drains freely to the tank.

In this state, the control spool (1) connects the chamber (26) of the pilot valve (27) directly with the drain line via the port (16). The pilot valve (27) opens port (28), which connects the chamber (15) of the regulator piston (2) to the drain line via the channel (29). In this condition, oil from the pump is delivered to the chamber (22), allowing the regulator piston (2) to open the ports (17), through which the oil drains to the tank.

The oil in the cylinder chamber (23) remains under pressure and sustains the load applied to the lift arms. The oil is retained by check valve (3), the drain valve (4) and the safety relief valve (5), which are all connected to the cylinder by the annular channel (18).

The safety relief valve (5) protects the cylinder against overpressure produced by the load oscillating while driving on the road.

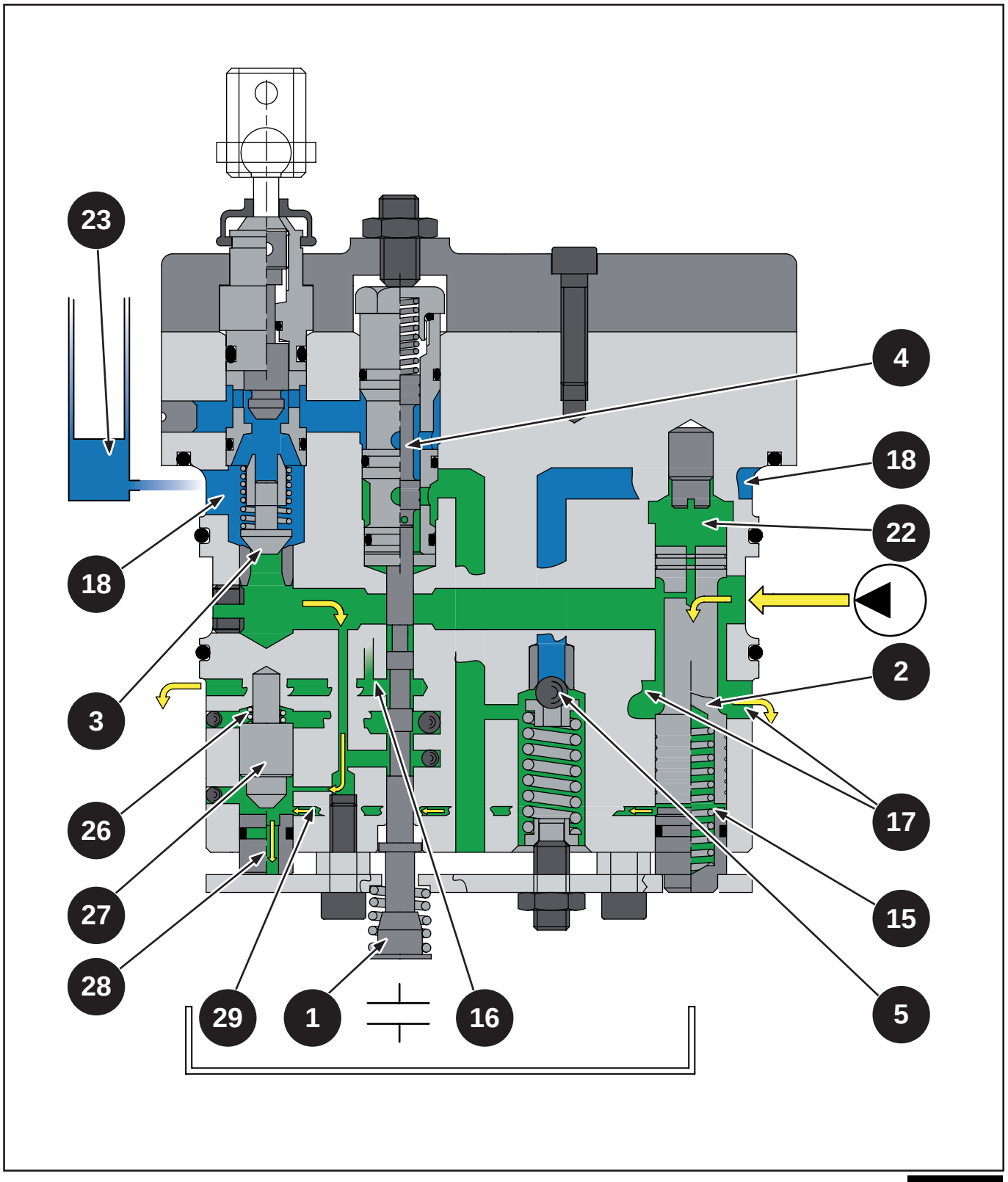

Fig. 11.5

B) DELIVERY

In delivery state, the control distributor sends pressurised oil to the cylinder chamber (23), causing the arms to lift.

The position occupied by the control spool (1) in this state allows oil to reach the chamber (26) via the annular channel (19) and ports (21), (20) and (30), and close the pilot valve (27).

Oil from the pump is now delivered at the same pressure to chamber (22) and chamber (15) (via channel the 29) of the regulator piston (2), which closes the drain holes (17) due to the action of the return spring.

Pressurised oil reaches the cylinder via the annular channel (19), enters the port (20) via the fixed throttle (6) and the variable throttle passage created by the control spool (1) and port (21), opens the check valve (3), enters the annular channel (18) and feeds chamber (23) of the cylinder.

To regulate the flow of oil delivered to the cylinder, the regulator piston (2) uses the difference in pressure exerted on chambers (15) and (22) generated by the flow of oil through the variable throttle passage (31), which is opened or closed by the control spool (1) as it is moved by the internal linkages of the lift.

Oil flow in excess of the pressure required to lift the arms is exhausted via the ports (17), limiting the maximum lift rate and ensuring a damped action when the arms start and stop.

The maximum operating pressure is controlled by a safety relief valve in the hydraulic circuit outside the CR90 unit (this valve may be installed on the auxiliary distributor block, for example).

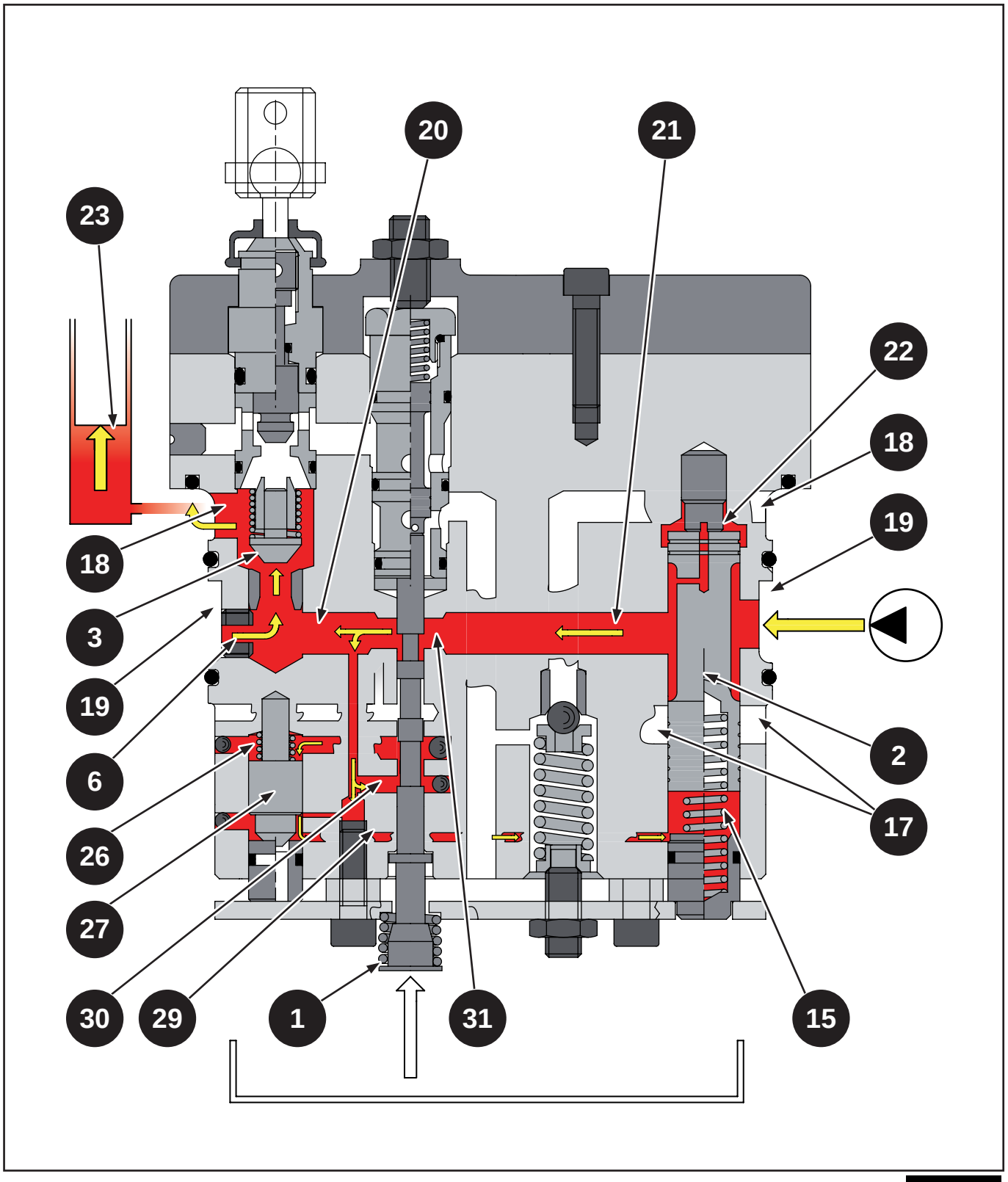

Fig. 11.6

C) RETURN

In return state, the control distributor directs oil flow received from the pump and from the cylinder chamber (23) to the drain line, causing the lift arms to lower.

The position occupied by the control spool (1) in this state connects chamber (26) of the pilot valve (27) directly to the drain line via port (16). This causes the pilot valve to open port (28), connecting chamber (15) of the regulator piston (2) to the drain line via channel (29).

As in the neutral state, the oil pressure from the pump now pushes the regulator piston towards chamber (15), causing the piston to open the drain ports (17) and drain the oil back to the tank.

Simultaneously, pressurised oil from the cylinder (chamber (23) enters the annular channel (18), flows out from the ports (32) of the drop rate regulator (8) and from port (24), and enters the drain valve (4), from which it drains to the tank via port (25), causing the arms to drop.

In return state, the drop rate of the arms may be adjusted with the manual lever (RD: tighten to reduce drop rate).

As a safety measure to prevent the lift control levers from being operated unintentionally when driving on the road, tighten the lever (RD) completely; this brings the valve (8) against its seat, sealing off the passage between the chamber (23) of the cylinder and the drain valve (4).

When the safety lock is in use, the cylinder is still protected against accidental overpressure by the safety relief valve (5).

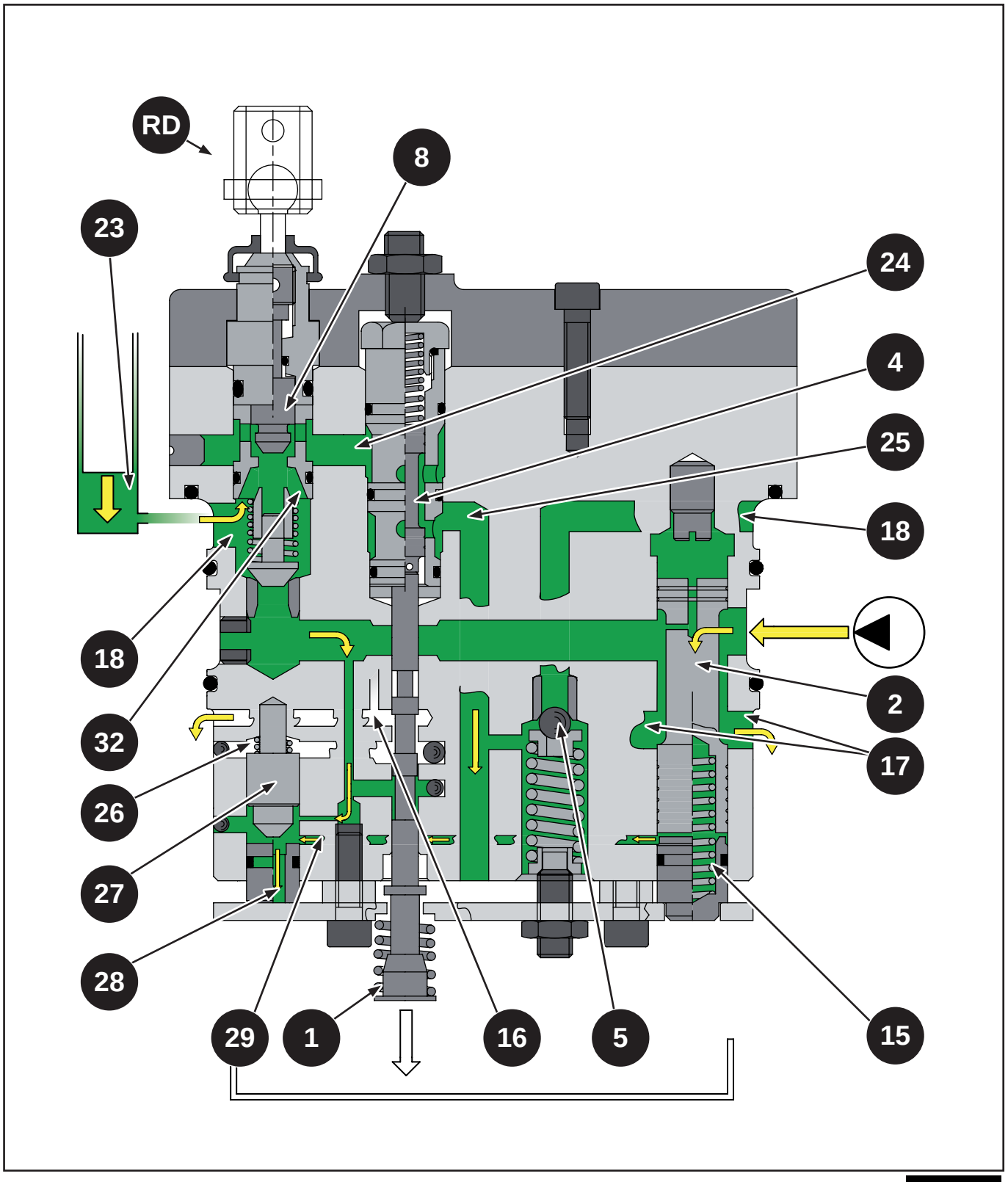

Fig. 11.7

11.4 Lift with position and draft control

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11.4.1.5 Adjusting lift speed and sensitivity.....11-27
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11.4.1 General introduction

11.4.1.1 General system diagram

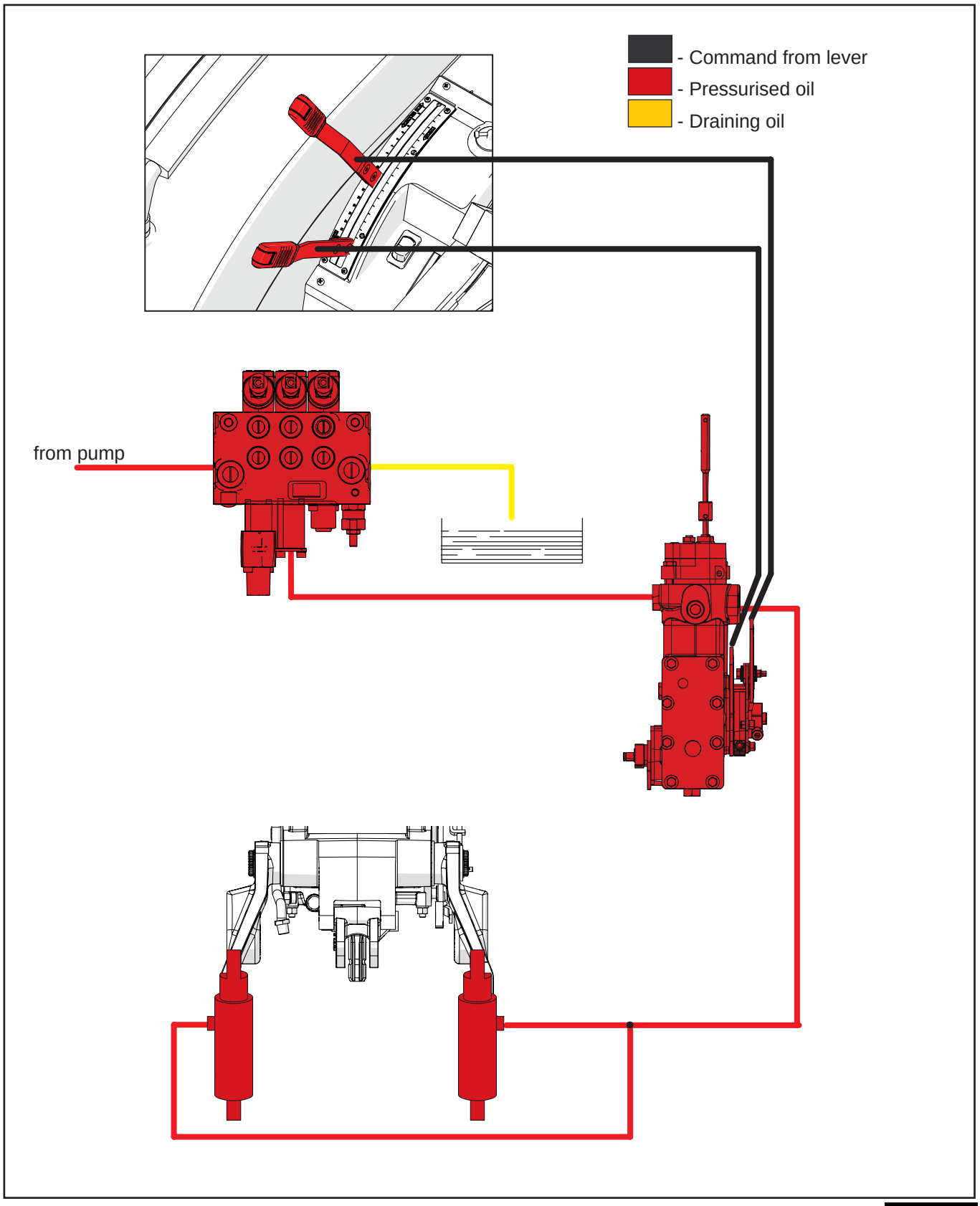

Fig. 11.8

11.4.1.2 Removing the lift distributor

Carry out the following operations before removing the distributor:

- Draining the hydraulic oil
- Removing the rear auxiliary distributors (see paragraph "Rear hydraulic distributors")

Disconnect the hydraulic connections to the lift distributor.

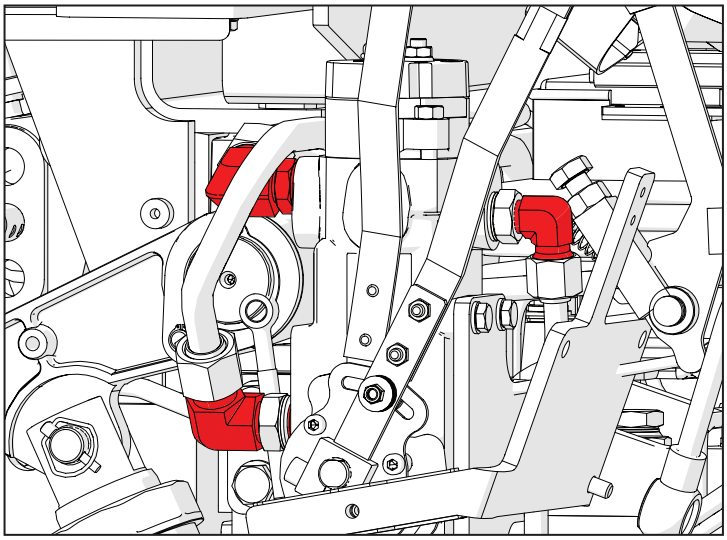

Fig. 11.9

Undo the screws (1) and remove the washers (2).

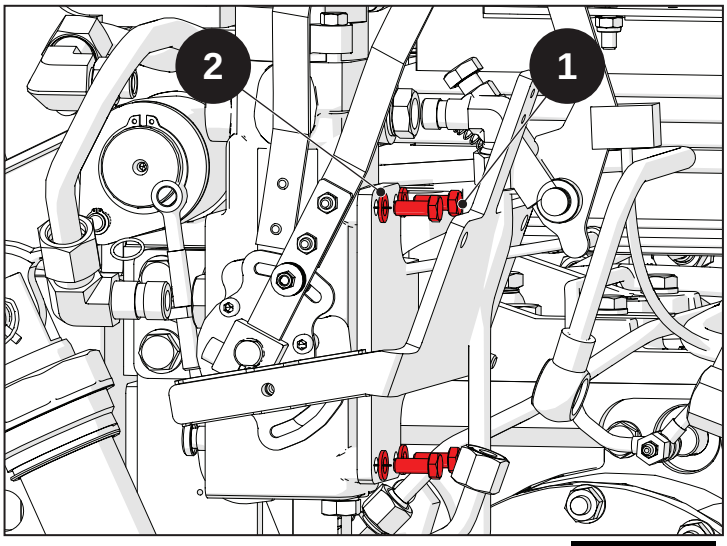

Fig. 11.10

Remove the lift distributor.

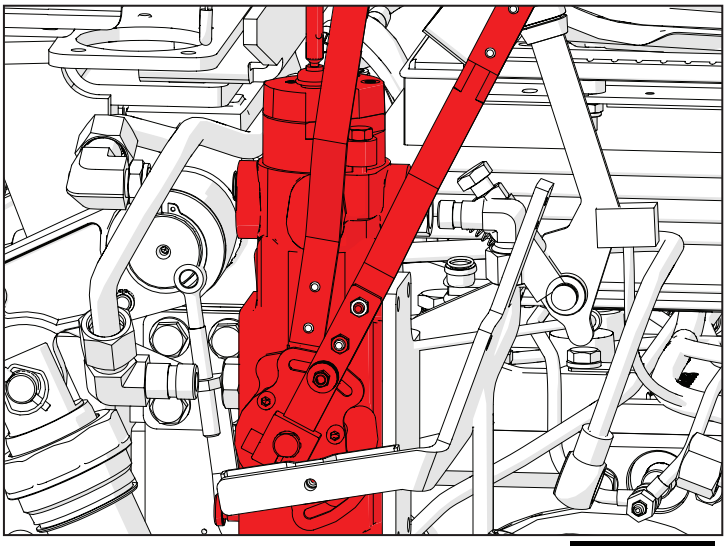

Fig. 11.11

11.4.1.3 Control levers

The lift with draft and position control may be used in the following modes:

- position control;
- draft control;
- mixed position/draft control.
- float mode.

The required mode is set by using the position control lever (1) and the draft control lever (2) in combination.

The control levers for the position and draft control lift are situated to the right of the driver, next to the seat.

(1) - Position control lever.
(2) - Draft control lever.
(3) - Lift arm drop rate setting lever. Turn clockwise to reduce drop rate; turn anticlockwise to increase drop rate.

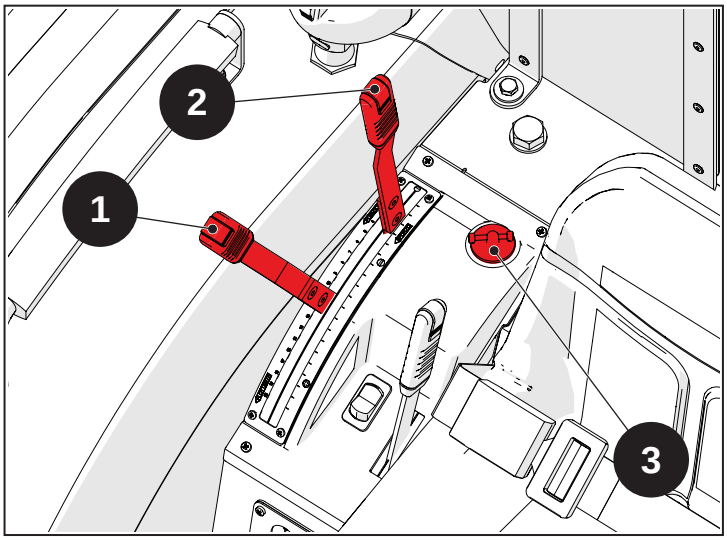

Fig. 11.12

11.4.1.4 Operating mode

POSITION CONTROL

Position control mode may be used to set and maintain the implement in any position between fully raised and fully lowered, either engaged in the soil or above the ground, by moving the control lever (1) into the required position.

Proceed as follows:

- The lever (1) controls the position of the arms; each position of the lever corresponds to a position of the lift arms from fully raised (lever pulled back fully) to fully lowered (lever pushed fully forwards).
- Push the draft control lever (2) fully forwards.
- Move the position control lever (1) forwards to lower the arms or back to raise the arms.

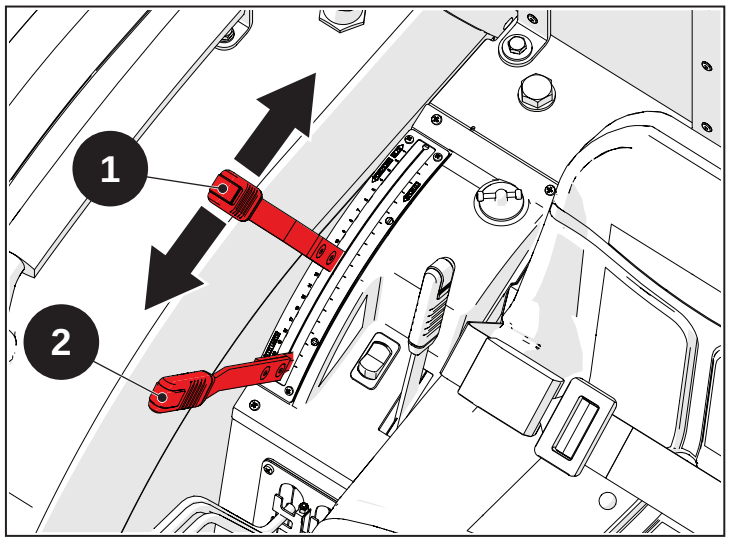

Fig. 11.13

The implement remains at the same working depth even if the consistency of the terrain changes (e.g.: zone c = clay soil; zone d = sandy soil; zone e = compacted soil)

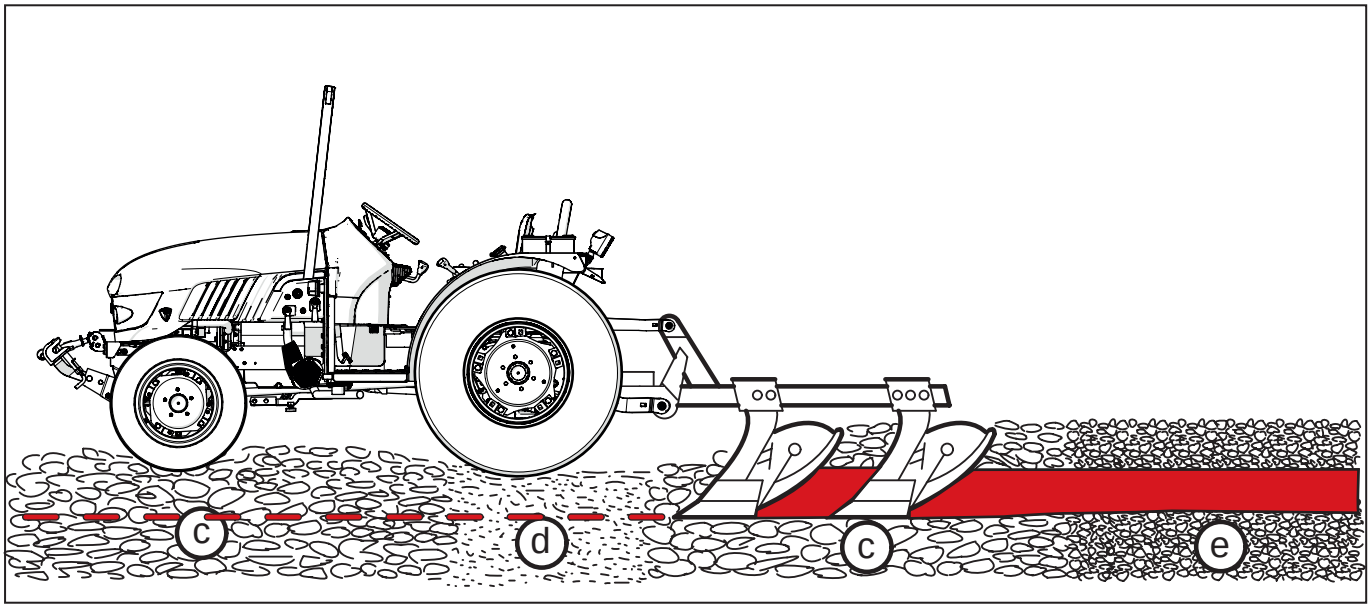

Fig. 11.14

DRAFT CONTROL

The draft control function is particularly useful for tasks with high draft demands performed with mounted implements, as the weight of the implement shifts much of the draft force to the rear wheels and increases the traction of the tractor relative to the terrain.

With this mode, the working depth of the implement may vary significantly when the implement itself encounters differences in terrain consistency (e.g.: zone c = clay soil; zone d = sandy soil; zone e = compacted soil), whether flat or with dips and humps.

Proceed as follows:

- Move the position control lever (1) fully forwards.
- Move the draft control lever (2) forwards gradually to engage the implement at the required working depth. The working depth attained by the implement is proportional to the draft force and dependent on the consistency of the soil. In this mode, the draft force requested by the lift from the tractor remains constant.
- At the end of each pass, use the position control lever (1) to raise the implement.

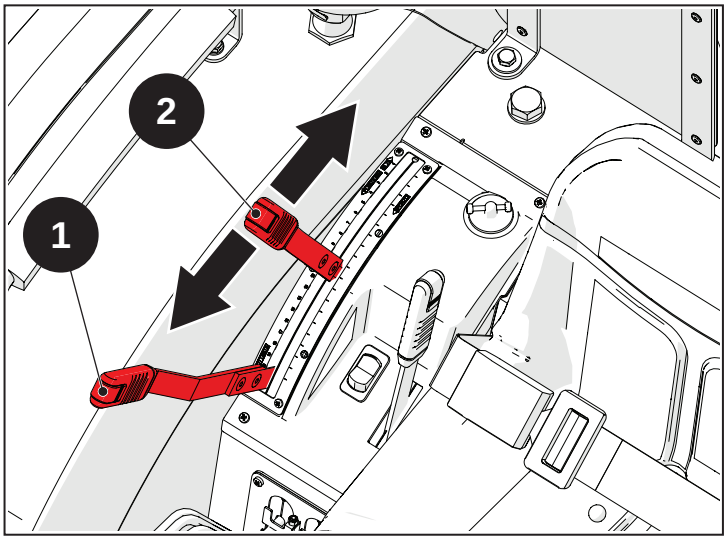

Fig. 11.15

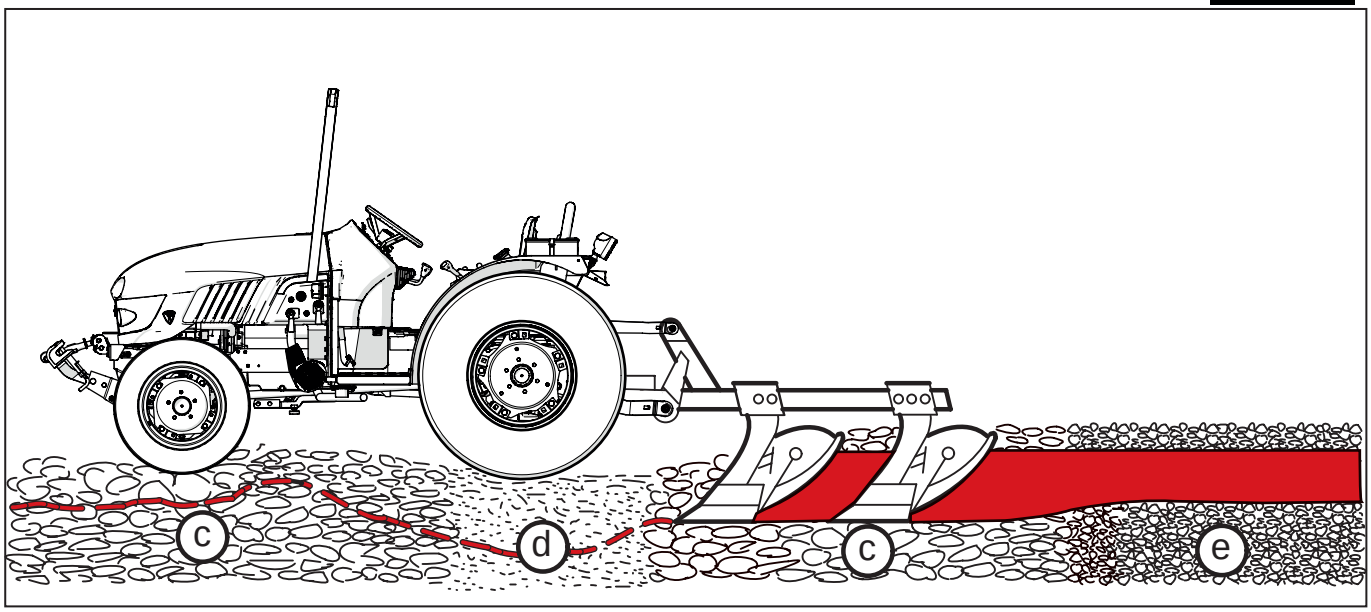

Fig. 11.16

MIXED POSITION/DRAFT CONTROL

Using the draft control function may produce excessive variations in working depth for certain crop applications

In these cases, mixed position/draft control mode may be used instead.

- Engage the implement in the soil and set the required working depth as described for draft control mode.
- Once the implement stabilises at the desired depth, move the position control lever (1) backwards until the lift arms start to rise.
- With these settings, the lift controls draft but prevents the implement from engaging too deeply if it encounters softer terrain.
- Use the position control lever (1) to lower and raise the implement at the start and end of each pass.

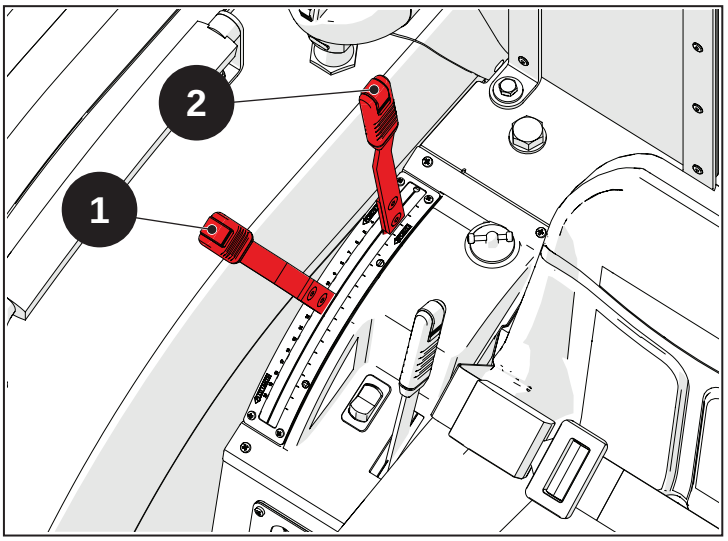

Fig. 11.17

Adjust the lever while working to determine the ideal position which offers the best compromise between variations in draft and variations in depth.

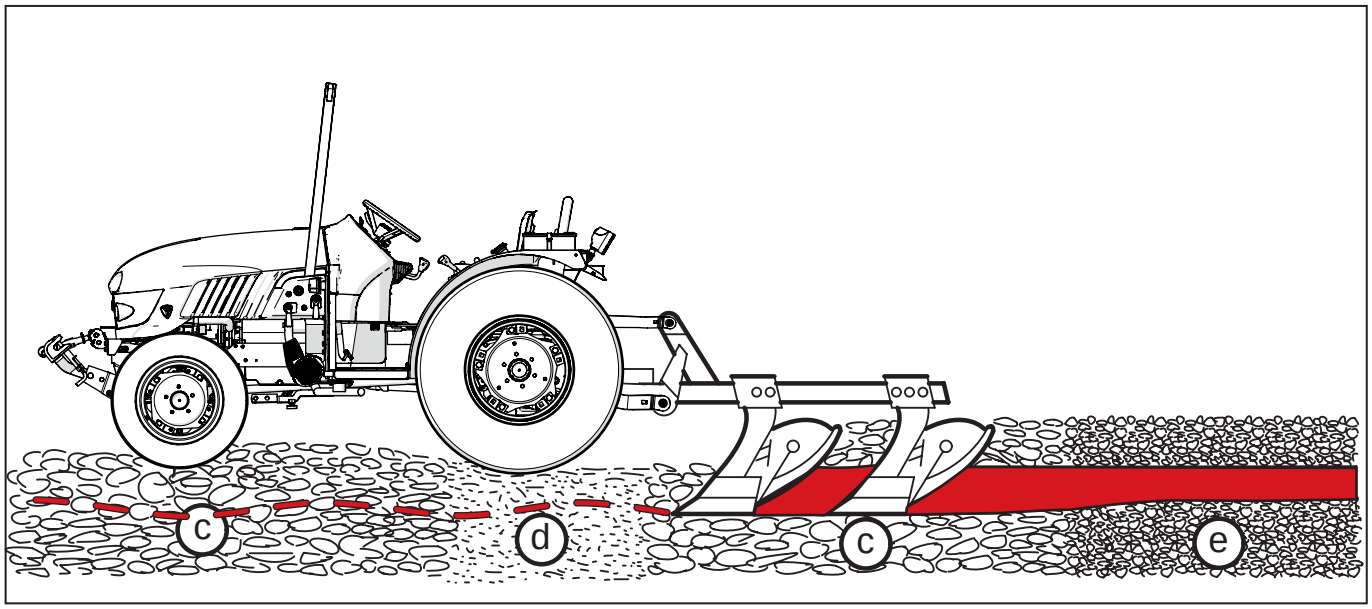

Fig. 11.18

FLOAT MODE

- Push the position control lever (1) and the draft control lever (2) fully forwards.
- Use the position control lever (1) to lower and raise the implement at the start and end of each pass.

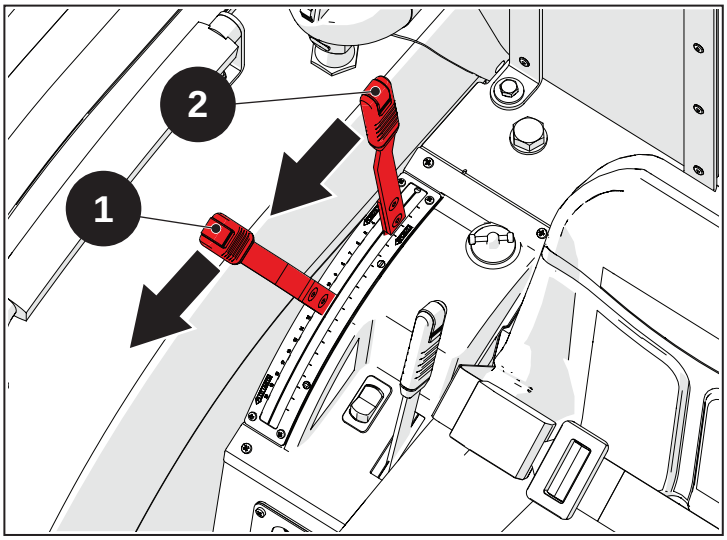

Fig. 11.19

11.4.1.5 Adjusting lift speed and sensitivity

Turning the adjuster valve (3) clockwise the lift's drop rate is reduced. Turning it anti-clockwise the lift's drop rate is increased.

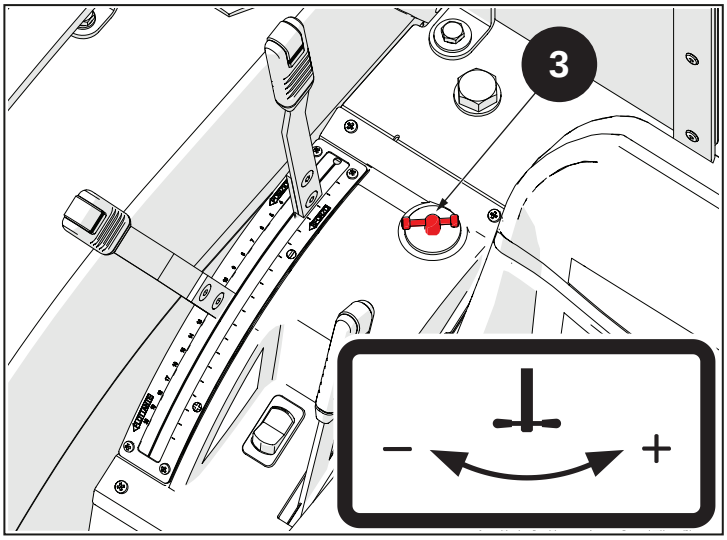

Fig. 11.20

11.4.1.6 Fast lift and drop operating mode (liftomatic)

Once the lever (1) has been used to select the working position of the lift, the lever (4) may be used to raise the lift and return it to the preselected position rapidly.

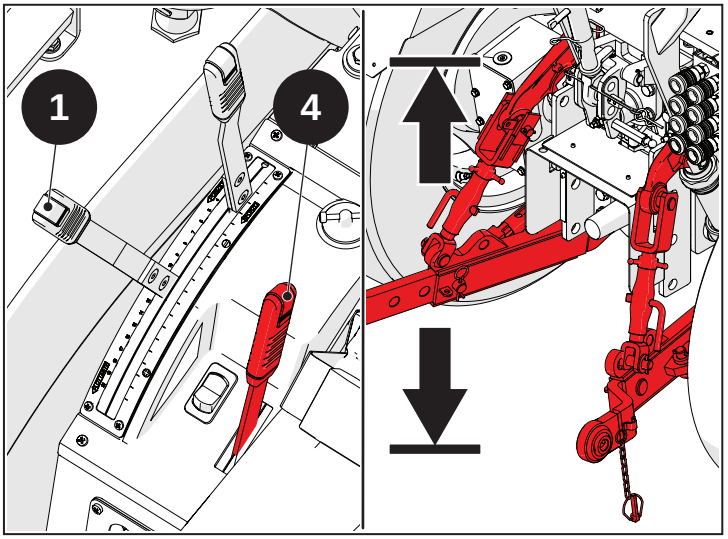

Fig. 11.21

11.5 Main components

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11.5.3 Hydraulic steering valve 11-31

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11.5.5 Hydraulic unit 11-35

11.5.6 Transmission clutch 11-36

11.5.7 Hydraulic brakes 11-36

11.5.1 Hydraulic pump

The hydraulic pump is situated in front. The pump is driven by the camshaft timing gear and delivers oil to the hydraulic system of the tractor. Oil from the gearbox and filtered by the suction line filter flows into the suction pipe (A). The suction pipe (B), on the other hand, aspirates oil from the hydraulic steering system tank. Oil from the pump is delivered via (C) to the rear distributors and then to the lift; while oil is delivered to the hydraulic unit via (D). Oil is delivered to the hydraulic steering unit via (E).

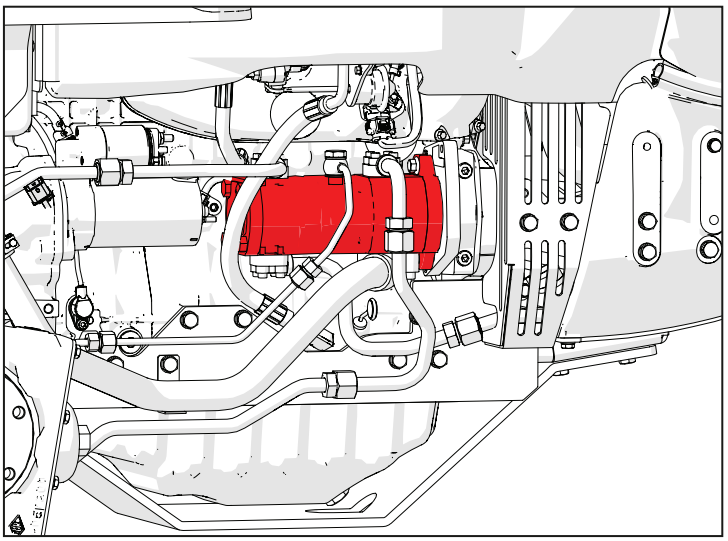

Fig. 11.22

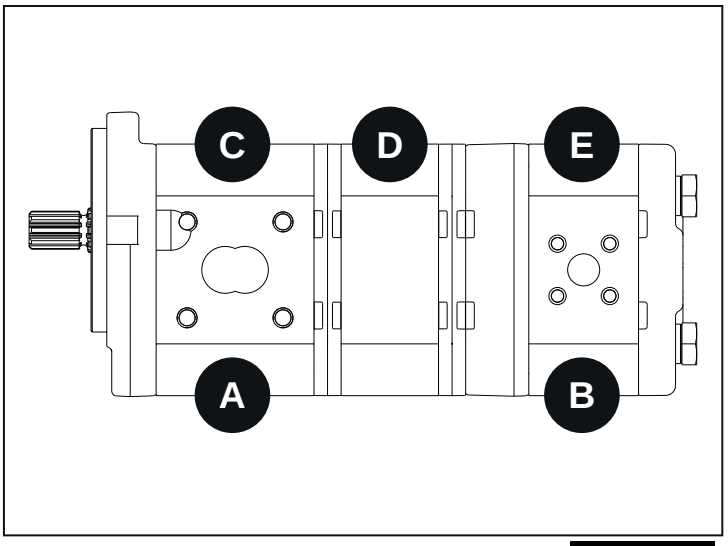

Fig. 11.23

11.5.2 Suction line filter

The suction line filter is situated at the front right of the tractor. The filter protects the hydraulic system and its components against damage caused by contaminants contained in the oil.

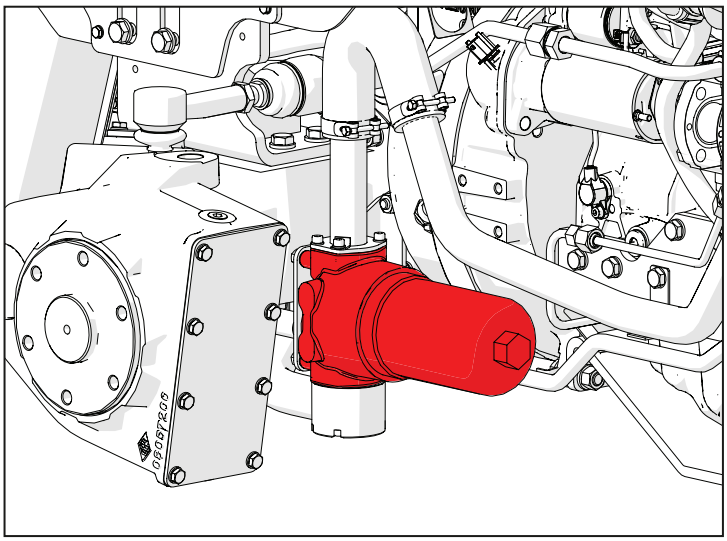

Fig. 11.24

11.5.3 Hydraulic steering valve

The hydraulic steering circuit receives the oil necessary to operate the double acting steering cylinder. The circuit includes a pressure relief valve and two overpressure safety valves protecting the cylinder and the hydraulic steering valve against accidental damage.

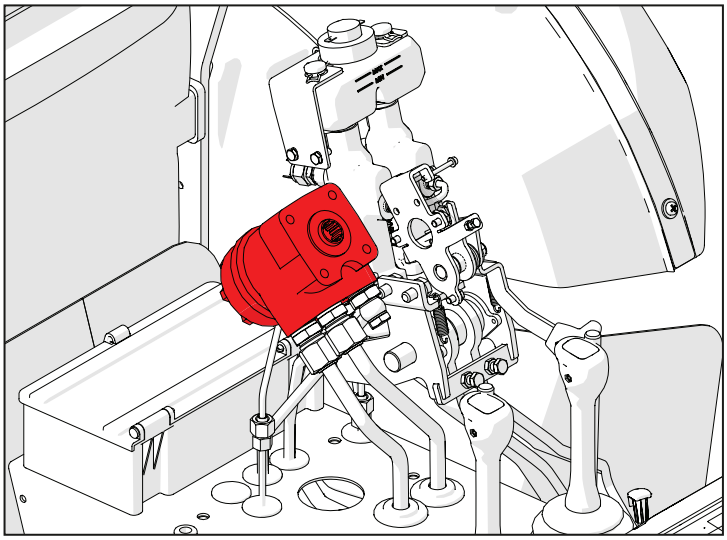

Fig. 11.25

11.5.4 Rear hydraulic distributors

The tractor is equipped with auxiliary hydraulic distributors situated on the rear right hand side of the tractor for operating external hydraulic cylinders. The distributors are fed by the high flow rate pump.

The machine is equipped with three distributors: two distributors with float mode and one double acting distributor with kick-out.

Oil from the high flow rate pump flows directly into the inlet head (A), which is equipped with a pressure relief valve calibrated to 180 bar. In response to movements of the distributor levers, oil is sent to the delivery (C) or return (D) hydraulic couplers, and then to the drain line (B). When the distributors are not in use, the oil is sent to the lift distributor (E).

Note

While the distributors are fed simultaneously, operating one disables oil feed to the other distributors in the system and the lift, impeding simultaneous usage.

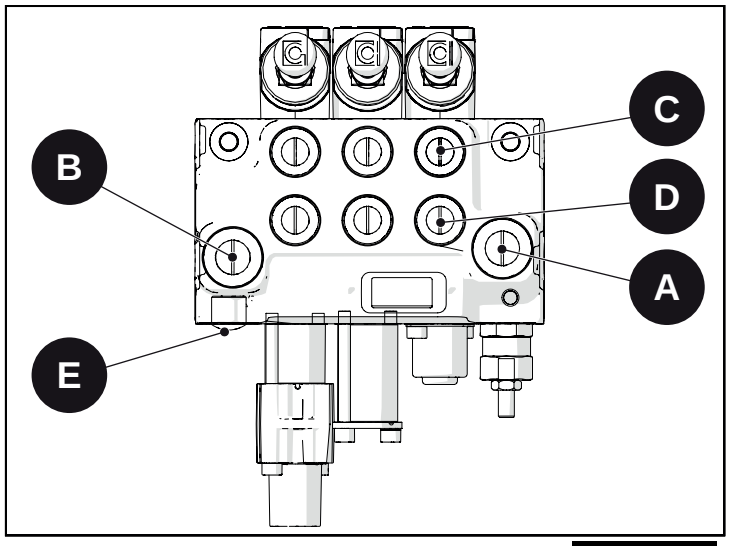

Fig. 11.26

Removing the rear hydraulic distributors

Undo all the hydraulic connections to the distributors.

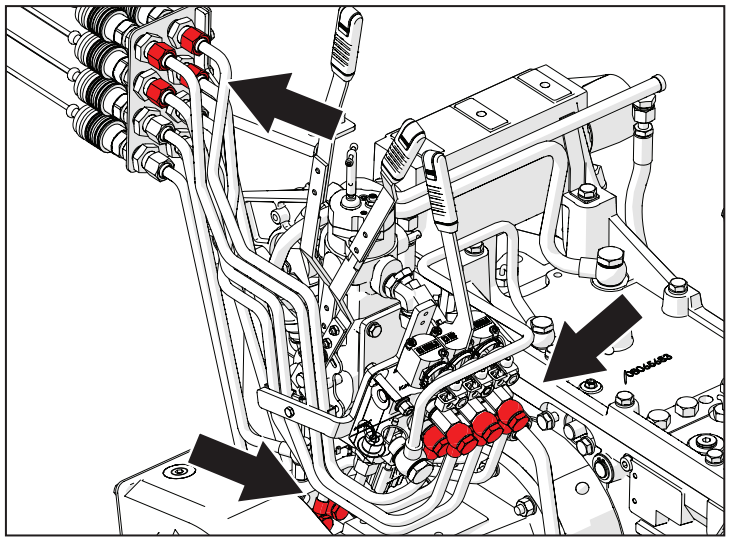

Fig. 11.27

Undo the screw and remove the retainer.

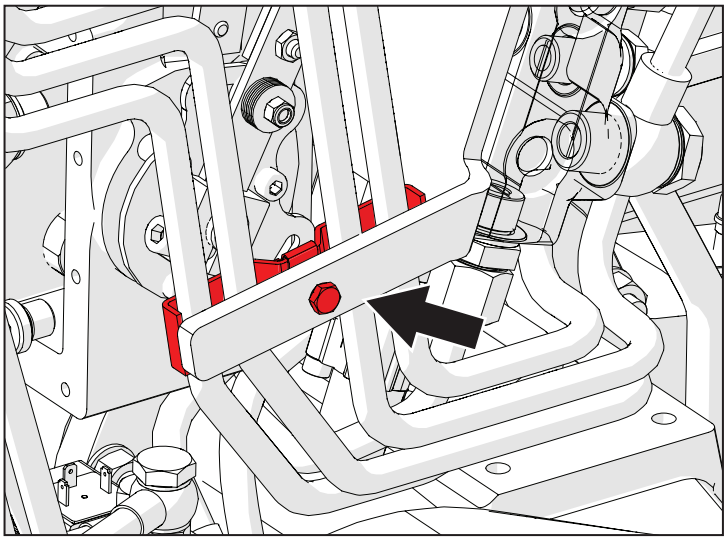

Fig. 11.28

Remove the pipes leading from the rear hydraulic distributors.

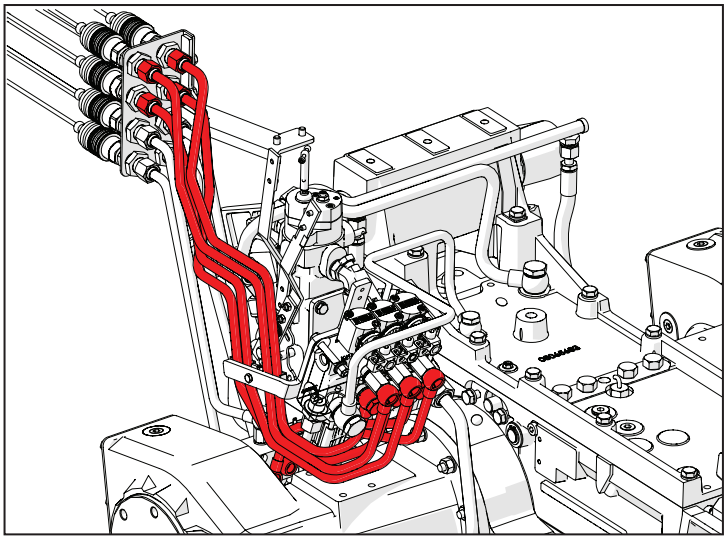

Fig. 11.29

Disconnect the remaining hydraulic connectors.

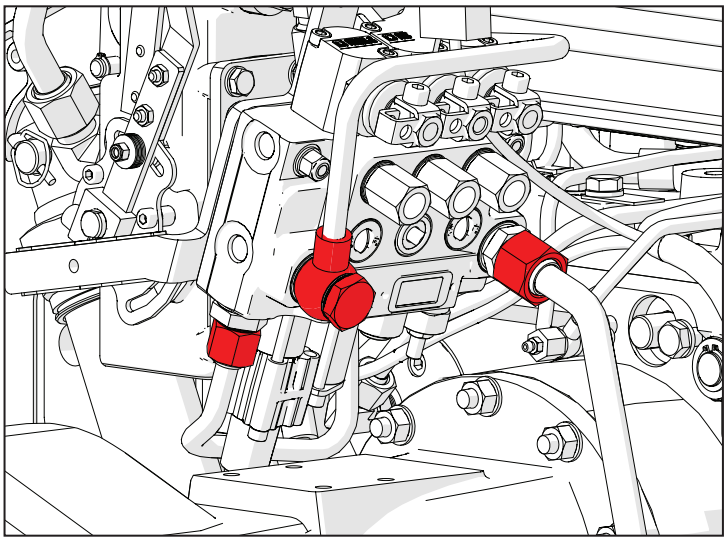

Fig. 11.30

Undo the nuts (1) and remove the washers (2) and the screws (3).

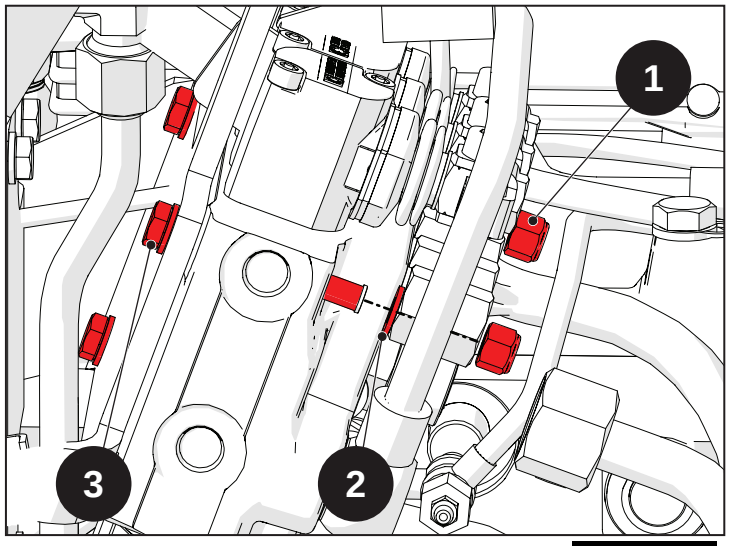

Fig. 11.31

Remove the hydraulic distributor block.

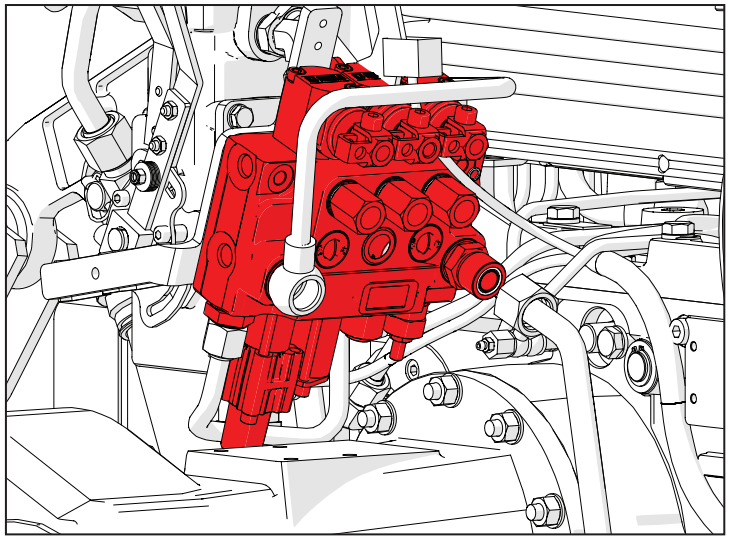

Fig. 11.32

11.5.5 Hydraulic unit

The hydraulic unit controls engagement and disengagement of the rear PTO and of the front and rear differential locks. A pressure relief valve integrated in the unit limits the pressure delivered to the utilities to 23 bar.

Oil feed from the pump is received via (P1) and drained via (T1).

The hydraulic unit controls the rear PTO clutch via output port PTOC and controls the PTO brake via outlet port PTOB. The PTO clutch is activated by a proportional solenoid valve (B) and an ON/OFF solenoid valve (C). The proportional valve (B) permits gradual engagement of the PTO clutch.

The differential locks are engaged and disengaged from the respective button on the dashboard. Pressing the button energises the solenoid valve (A), which sends oil to both differentials via the delivery port (DL).

Two forced lubrication lines lead from the hydraulic unit. One of these is for the primary shaft (L2) while the other is for the rear PTO (L1).

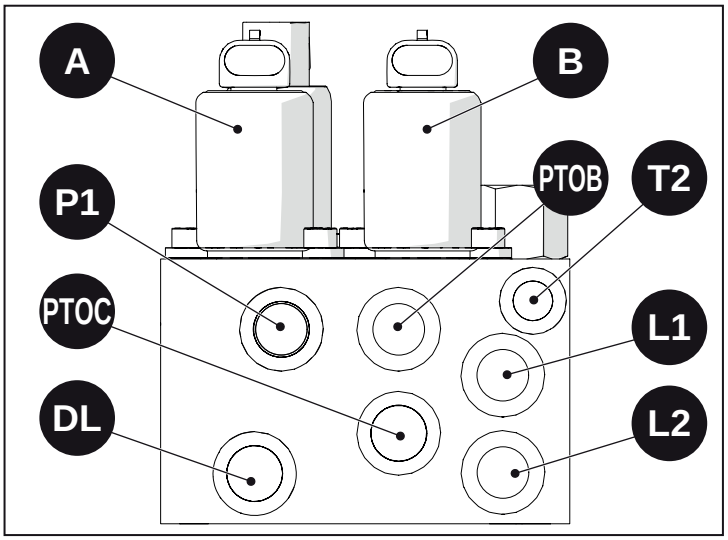

Fig. 11.33

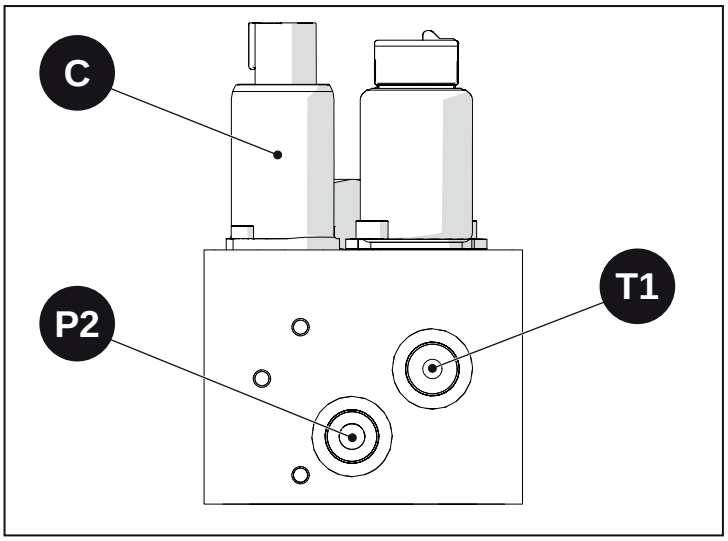

Fig. 11.34

11.5.6 Transmission clutch

Transmission clutch control is of the mechanically engaged hydraulic type. When the driver presses the clutch pedal, oil is aspirated from the tank via (A) and delivered via (B) to the actuator (C), which disengages the transmission clutch.

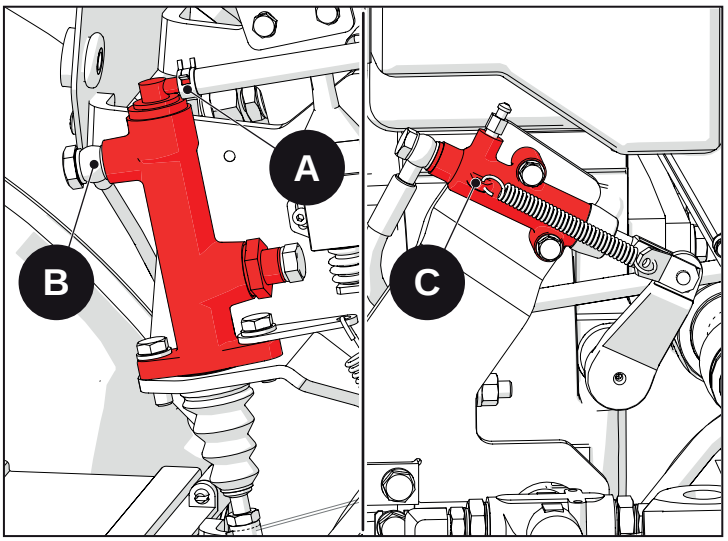

Fig. 11.35

11.5.7 Hydraulic brakes

The machine is equipped with a mechanically operated hydraulic braking system. When the driver presses the brake pedals, oil is delivered from the pumps (A) and (B) to an actuator (C) which applies the respective brake.

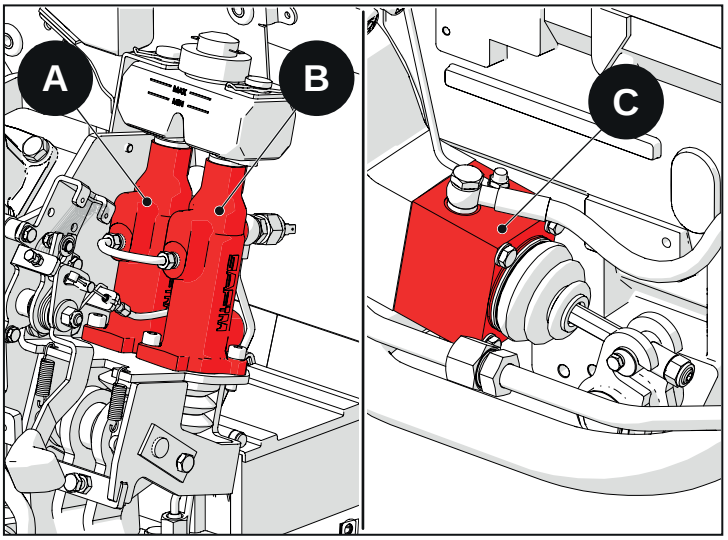

Fig. 11.36

11.6 Checking operating pressure values

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11.6.2 Checking the hydraulic steering unit pressure relief valve calibration pressure 11-39

11.6.3 Checking the pressure of the rear auxiliary distributors 11-40

11.6.1 Introduction

The operating pressure values must be checked if any problems are experienced with any utilities and during a general check of the tractor itself.

Excessively low calibration settings for the pressure relief valves in the circuit may cause the hydraulic clutches to slip and unsatisfactory performance of the steering system, auxiliary distributors and lift.

Excessively high calibration settings for the pressure relief valves will stress all the components in the system.

After checking the values, correct the calibration settings if necessary with the relative adjuster screws.

Danger
Jets of escaping pressurised fluid may penetrate the skin and cause severe injury. In the event of an accident involving pressurised fluid, seek immediate medical attention to avoid the risk of severe infection

Danger
Take all precautions necessary to avoid burns when working with hot oil. Never heat oil to above 190°C, as the oil vapour may suddenly and spontaneously ignite.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

Attention
Do not start work until the pressure in the hydraulic system has dropped to zero.

11.6.2 Checking the hydraulic steering unit pressure relief valve calibration pressure

The hydraulic steering unit pressure relief valve is calibrated to 105 bar. To check the calibration pressure of pressure relief valve, connect the pressure gauge (A-p/n 07000303) to the hydraulic steering valve/cylinder delivery pipe and move the steering cylinder to the end stops on the right and left hand sides.

Warning

An incorrect pressure value measured on the steering cylinder is not necessarily indicative of a hydraulic steering valve malfunction.

Before servicing the hydraulic steering valve, check for blow-by inside the cylinder or leaks from the connectors on the hydraulic pipe.

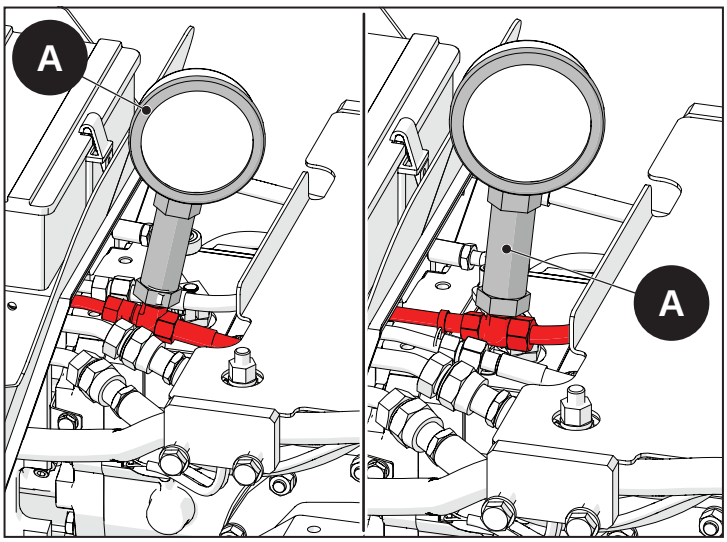

Fig. 11.37

Open the plug (R) to adjust the calibration pressure of the hydraulic steering unit pressure relief valve.

Tighten or loosen the pressure relief valve to attain the correct pressure value.

Calibration of pressure relief valve: 105 bar

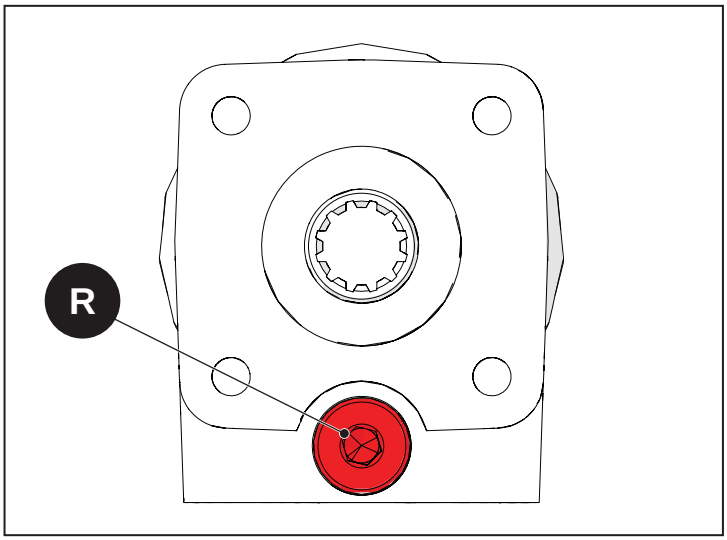

Fig. 11.38

11.6.3 Checking the pressure of the rear auxiliary distributors

Connect a pressure gauge with end-scale of at least 250 bar to the outlet of the quick connector of one of the hydraulic couplers. With the engine running, use the relative control lever.

A value of 180 bar should be read on the pressure gauge.

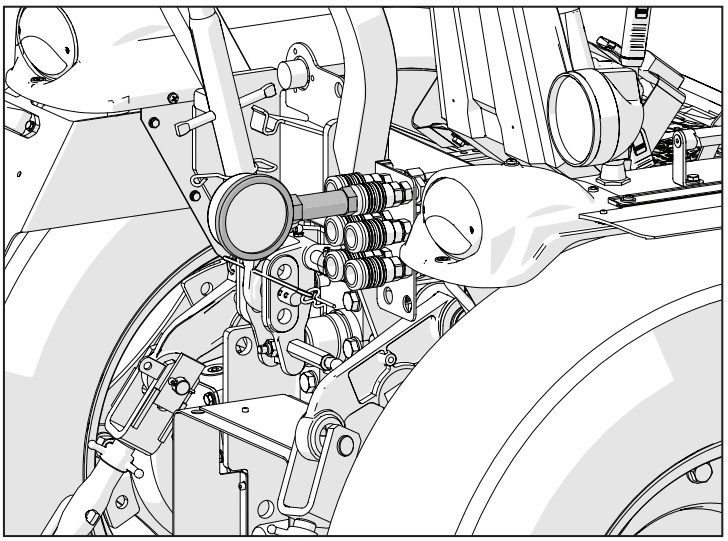

Fig. 11.39

11.7 Tools necessary

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11.7.1 Tools necessary

p/n	Description	Quantity
07000303	Pressure gauge	1

12 : Electrical system

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12.1 Safety rules

A number of safety precautions and warnings are indicated in this paragraph; these must be observed to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must be applied at all times.

Observe all safety rules with the following symbol with particular care:

Attention
Always read the instructions in the relative use and maintenance manual when working on the battery.

Attention
Take all the necessary precautions when installing batteries containing sulphuric acid. In the event of acid coming into contact with the skin or eyes, rinse the affected parts of the body immediately with clean water.

Attention
When mixing acid with water, POUR THE ACID SLOWLY INTO THE WATER. NEVER POUR WATER INTO ACID.

Attention
The battery releases explosive gas when charging. Ensure that the area is well ventilated and keep away from naked flame and sources of sparking.

Attention
Always switch the battery charger off before disconnecting the cables.

Attention
Keep the battery out of the reach of children.

Attention
Do not smoke when checking or handling batteries.

Attention
Disconnect the negative terminal first. When refitting the battery, connect the positive terminal first. Take particular care not to connect the terminals to the wrong battery poles.

Attention
Before working on the electrical system, always disconnect the earth cable (-) from the battery.

12.2 Introduction

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12.2.1 Cable colour table

The abbreviations used to identify cable colours are explained in the following table.

Rd	Red
Bn	Brown
Gn	Green
Wh	White
Bk	Black
Lgn	Light green
Ye	Yellow
Pu	Pink
Or	Orange
Bu	Blue

12.2.2 Component key

Refer to the following table to identify component types by the code letter used.

A	Starting and charging
B	Valves and fuses
C	Plates
D	Intermediate junctions
E	On board instrument and visual and audible indicator/ warning devices
F	External lights
G	Internal lights
H	Manual electric controls
I	Switches
J	Relays / relay switches
K	Sensors and transmitters
L	Electromagnets
M	Electric/electronic devices, flasher units and timer units
N	Electric motors and actuators
O	Resistors and rheostats
P	Other utilities
Q	Safety devices
R	Diagnostics

12.3 Fuse box

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12.3.1 Fuses

All the electrical circuits are protected by fuses. Each fuse bears a label showing its amperage. Use the colour code to distinguish the various types of fuse and easily select the right spare part.

Warning
Identify and resolve the cause of the short circuit before replacing a fuse.

Warning
Do not replace the old fuse with a new one with a higher rated value. This may damage the machine. Contact an authorised service centre if replacement fuses with the correct rating blow continuously.

12.3.2 Glow plug fuse and relay

They are placed on the upper side of the fuel tank, close to the battery.

1	Glow plug relay	-
2	Glow plug fuse	60A

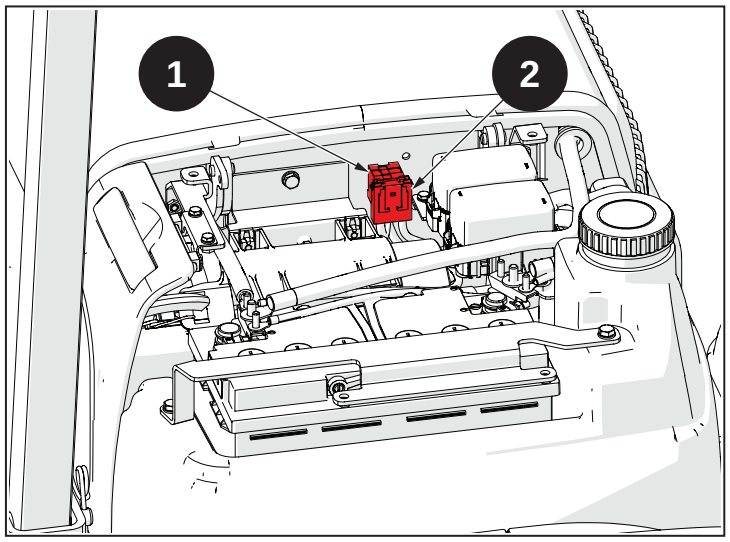

Fig. 12.1

12.3.3 Fuse box

The entire electrical system is protected by dual fuse boxes (1) and (2).

They are placed on the upper side of the fuel tank, close to the battery.

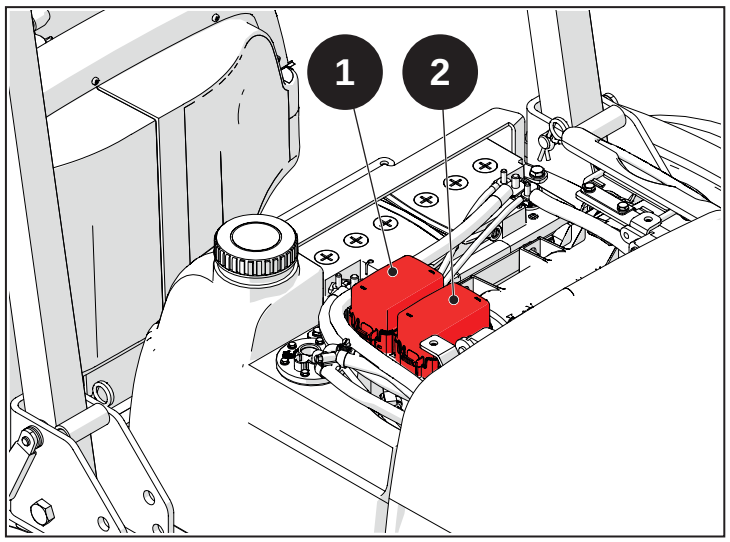

Fig. 12.2

Functions of fuse box (1), figure 12.2:

A	Main relay	30A
B	Main fuse	70A
C	Starter relay	20A
D	Fuel heater	20A
E	Trailer socket	30A
F	Engine control unit (battery)	15A
G	Engine control unit (battery)	10A
H	Accessories	15A
I	Fuel heater	20A
L	Trailer socket	15A
M	Diagnostic port	10A

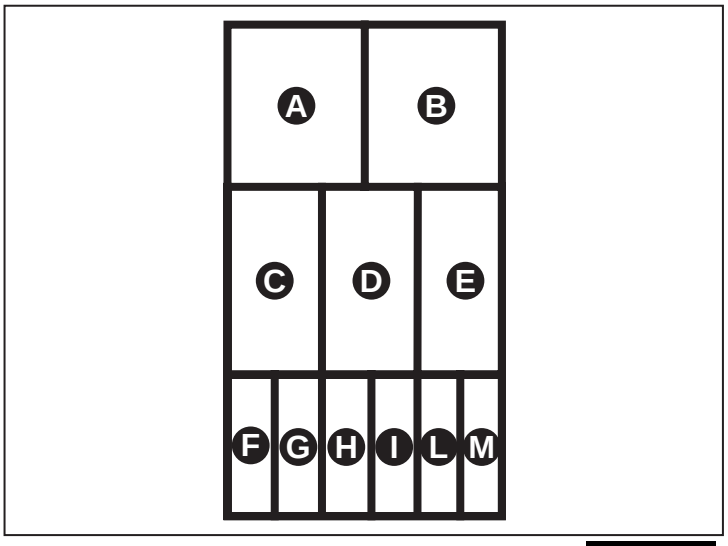

Fig. 12.3

Functions of fuse box (2), figure 12.2:

A	Hazard warning lights	10A
B	Sensor switch	10A
C	Horn, solenoid valves, rotating beacon	10A
D	Dashboard (battery)	10A
E	Turn indicator lights	10A
F	Dashboard (ignition switch)	5A
G	Vehicle ECU (battery)	10A
H	Engine ECU (ignition switch)	5A
I	Vehicle ECU (ignition switch)	5A
J	Charge sockets	10A
L	LH parking light	10A
M	High beam headlights	10A
N	RH parking light	10A
O	LH low beam headlight	10A
P	Brake light	10A
Q	RH low beam headlight	10A
R	Brake light relay	-
S	Low beam relay	-
T	High beam relay	-
U	Dashboard LED relay	-
V	Start enable relay	-

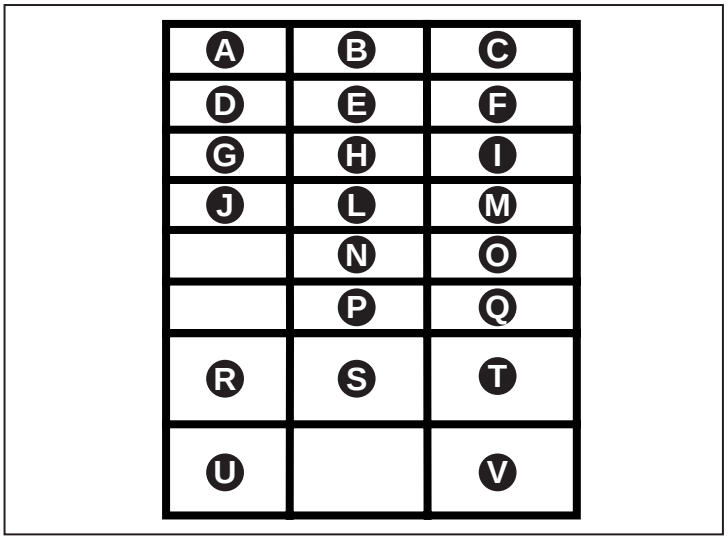

Fig. 12.4

12.4 Wiring looms

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12.4.1 02050989 - Battery ground

12.4.1.1 Installation of battery ground cable

Fig. 12.5

12.4.1.2 Location of battery ground wiring loom E90/E100

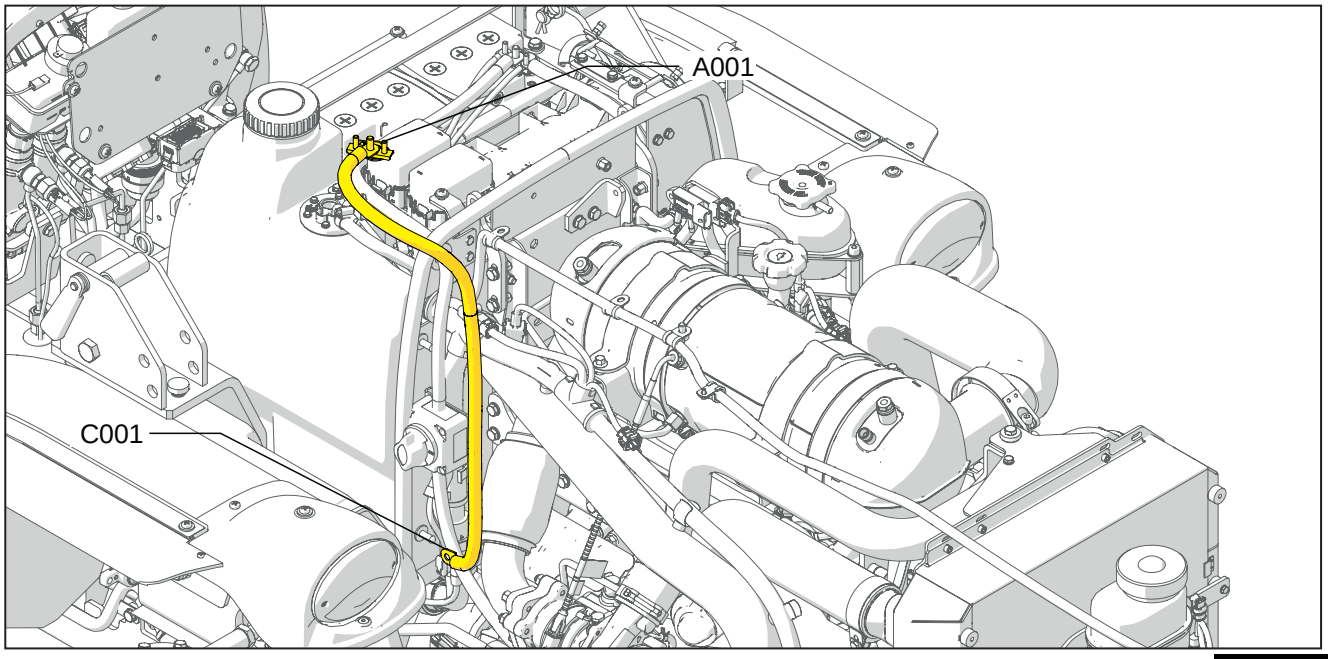

Fig. 12.6

12.4.1.3 Component identification codes

System code	Source code	Description
A001	P11	Negative battery terminal
C001	P66	Battery ground

12.4.1.4 Location of battery ground wiring loom E70/E80

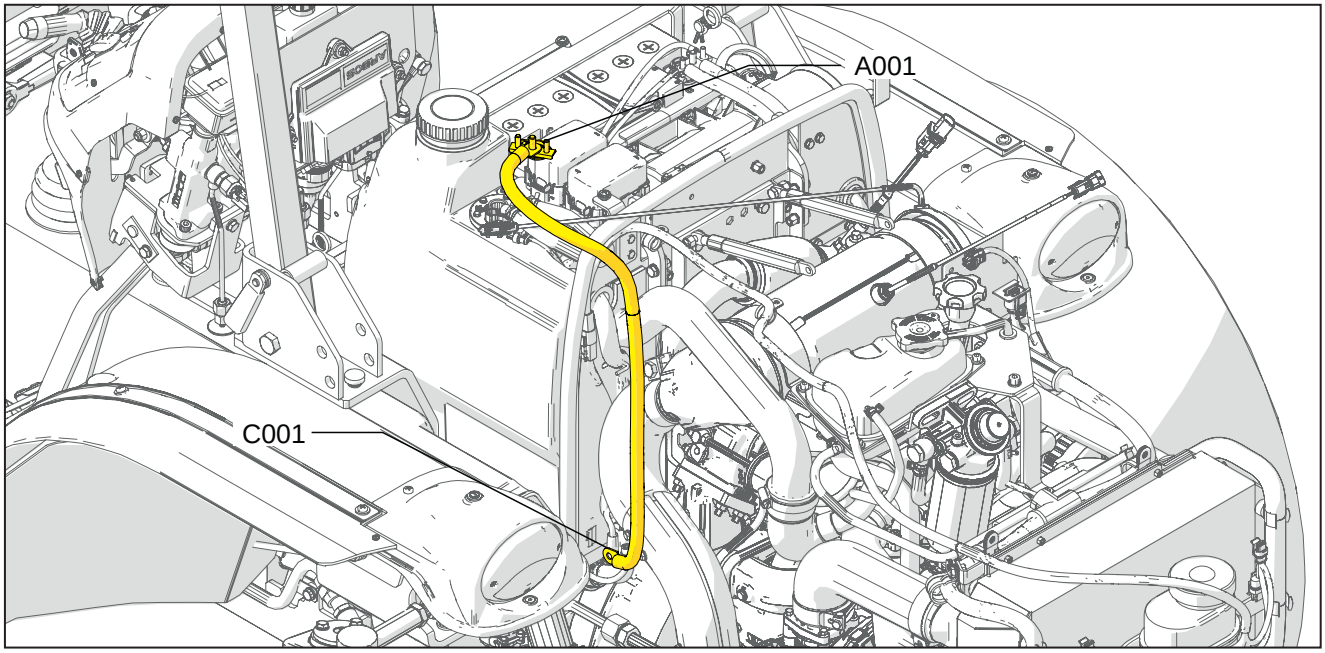

Fig. 12.7

12.4.1.5 Component identification codes

System code	Source code	Description
A001	P11	Negative battery terminal
C001	P66	Battery ground

12.4.2 02050990 - Battery-Battery master switch E90/E100

12.4.2.1 Installation of battery positive cable

Fig. 12.8

12.4.2.2 Location of battery positive cable

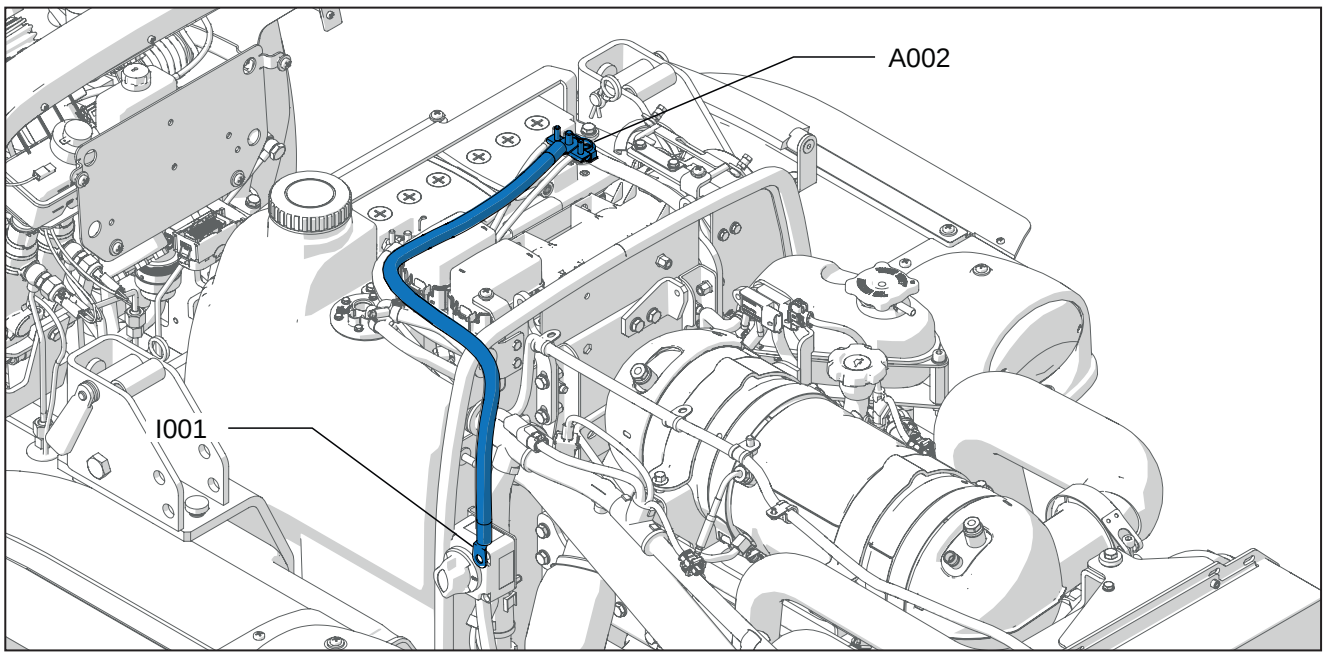

Fig. 12.9

12.4.2.3 Component identification codes

System code	Source code	Description
A002	P55	Positive battery terminal
I001	P39	Battery master relay switch (input terminal)

12.4.3 02051018 - Battery-Battery master switch E70/E80

12.4.3.1 Installation of battery positive cable

Fig. 12.10

12.4.3.2 Location of battery positive cable

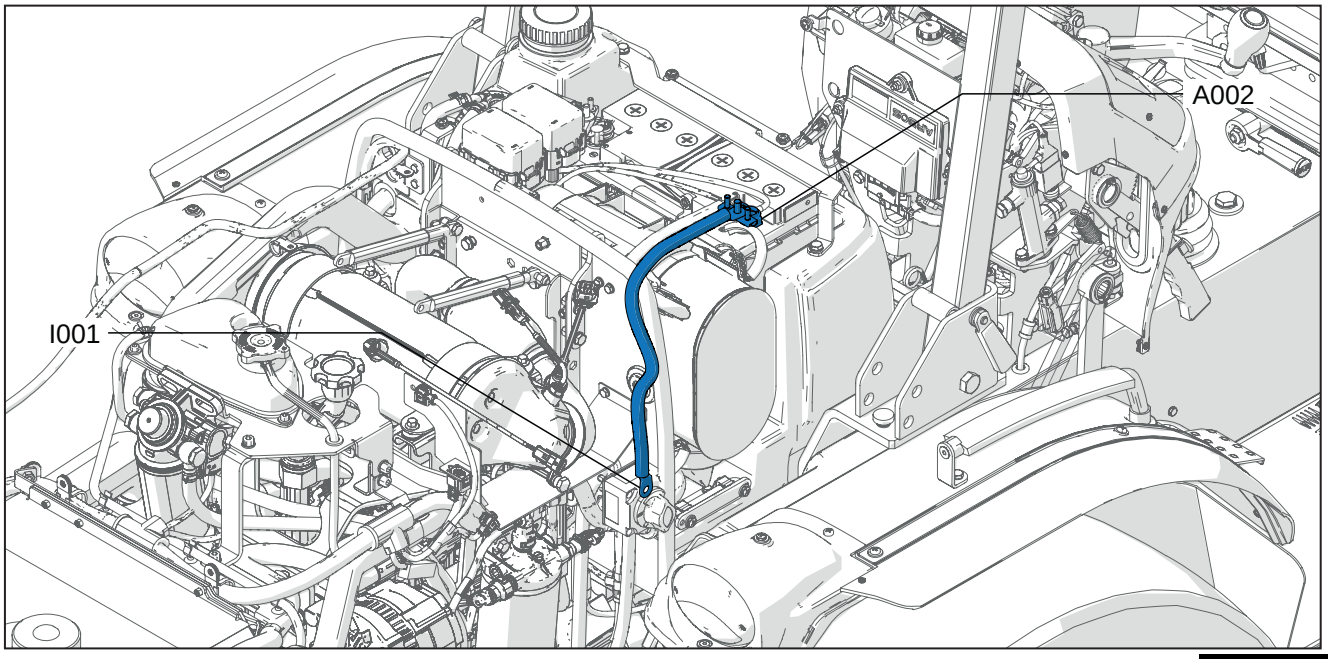

Fig. 12.11

12.4.3.3 Component identification codes

System code	Source code	Description
A002	P55	Positive battery terminal
I001	P39	Battery master relay switch (input terminal)

12.4.4 02050991 - Battery-Alternator E90/E100

12.4.4.1 Installation of battery - alternator cable

Fig. 12.12

12.4.4.2 Location of battery - alternator cable

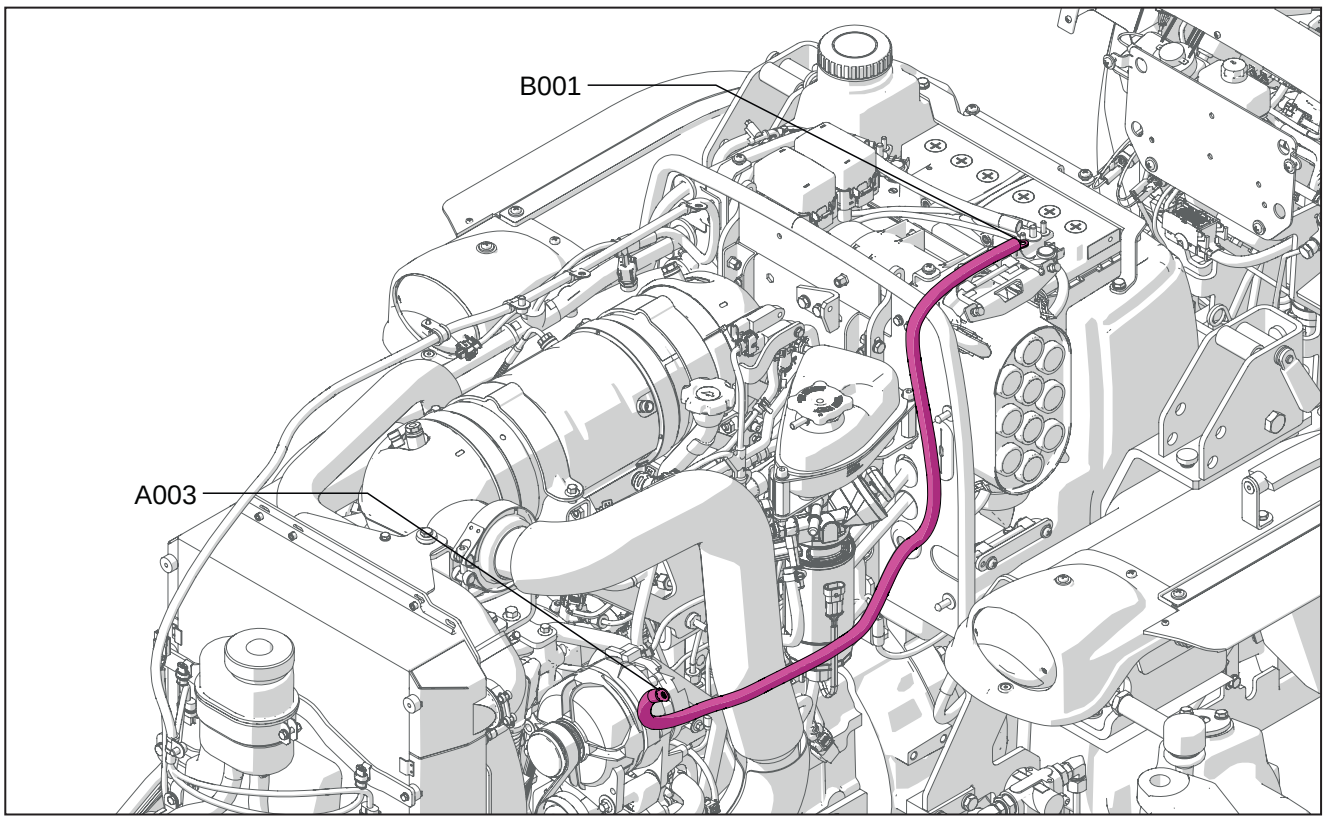

Fig. 12.13

12.4.4.3 Component identification codes

System code	Source code	Description
B001	P64	Battery fuse input
A003	P65	Alternator

12.4.5 02051019 - Battery-Alternator E70/E80

12.4.5.1 Installation of battery - alternator cable

Fig. 12.14

12.4.5.2 Location of battery - alternator cable

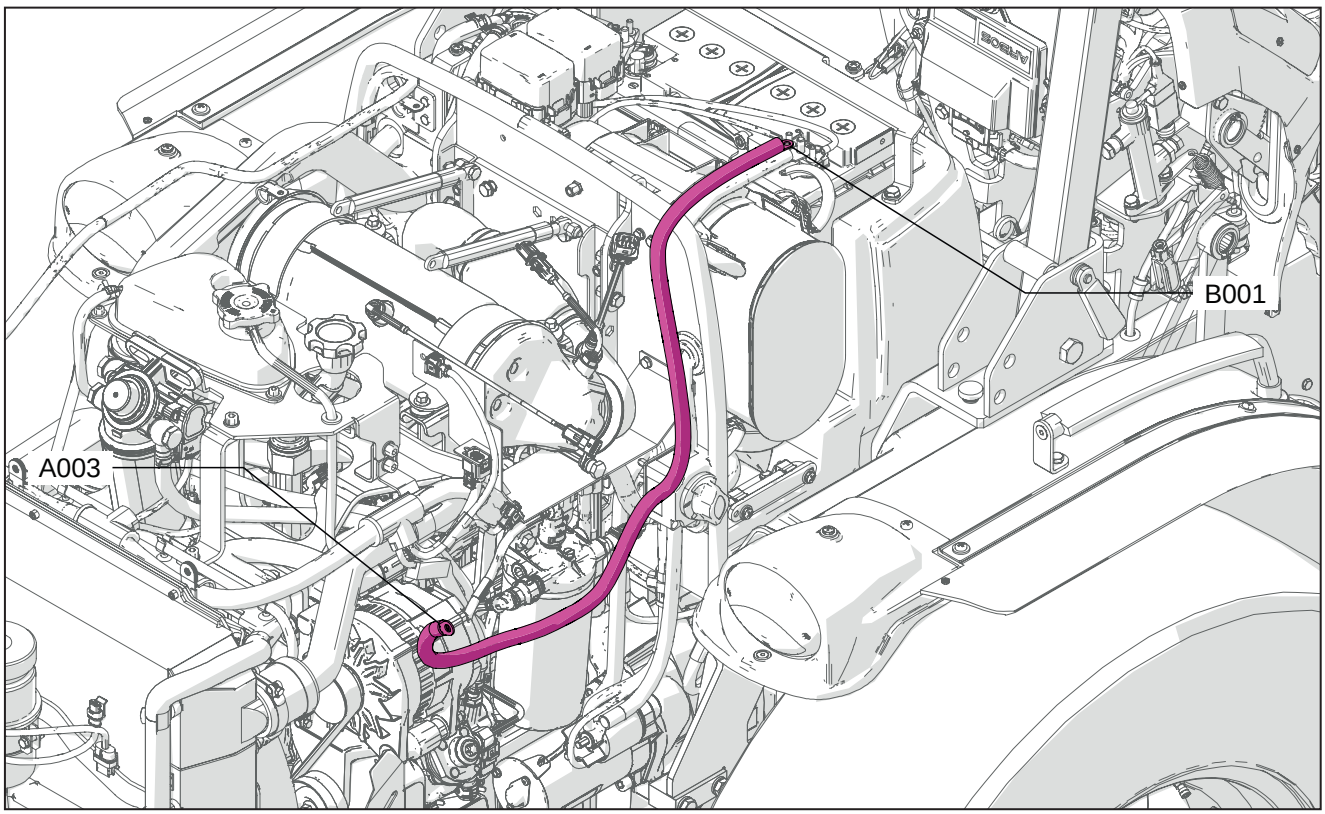

Fig. 12.15

12.4.5.3 Component identification codes

System code	Source code	Description
B001	P64	Battery fuse input
A003	P65	Alternator

12.4.6 02050992 - Battery master switch - Engine start E90/E100

12.4.6.1 Installation of battery master switch - engine start cable

Fig. 12.16

12.4.6.2 Location of battery master switch - engine start cable

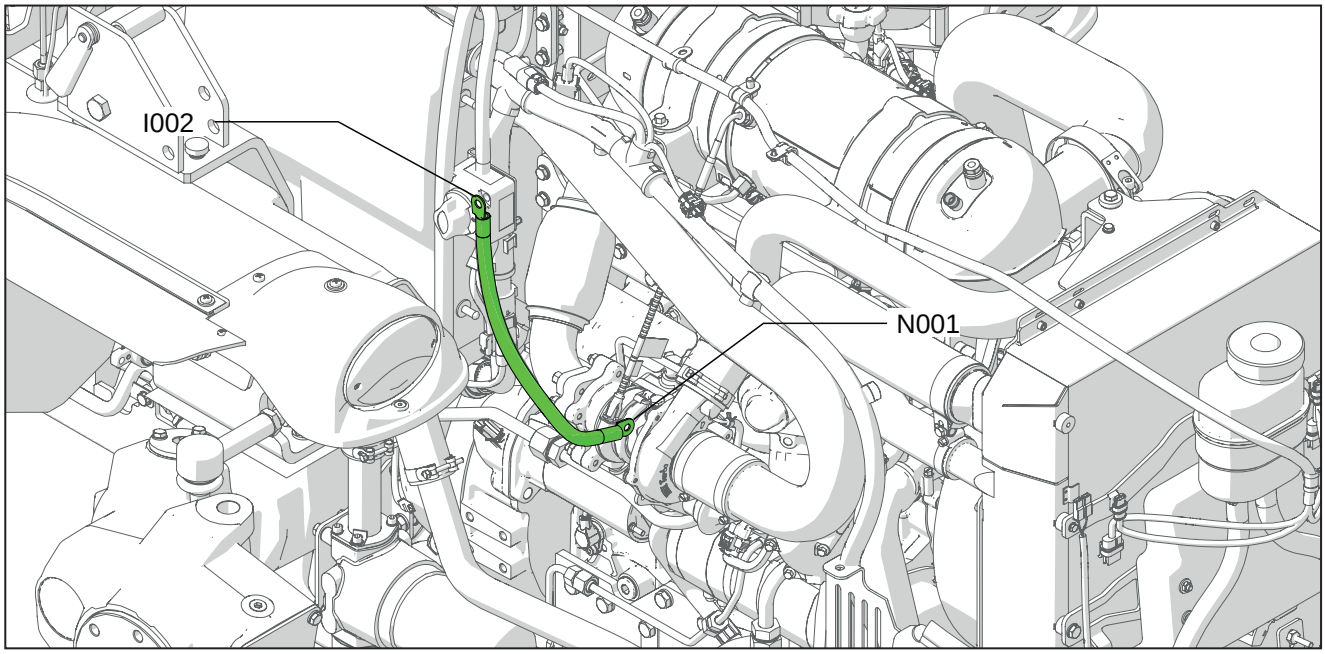

Fig. 12.17

12.4.6.3 Component identification codes

System code	Source code	Description
I002	P23	Battery master relay switch (output terminal)
N001	P10	Starter motor "30"

12.4.7 02051020 - Battery master switch - Engine start E70/E80

12.4.7.1 Installation of battery master switch - engine start cable

Fig. 12.18

12.4.7.2 Location of battery master switch - engine start cable

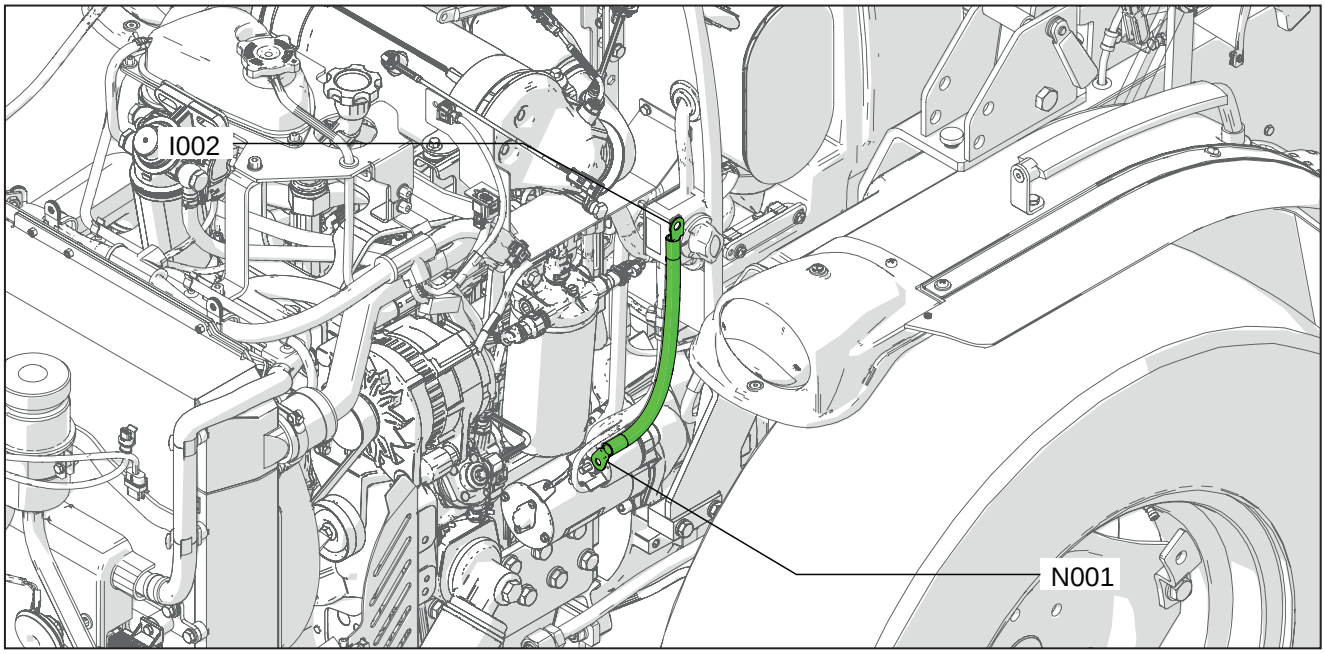

Fig. 12.19

12.4.7.3 Component identification codes

System code	Source code	Description
I002	P23	Battery master relay switch (output terminal)
N001	P10	Starter motor "30"

12.4.8 02050996 - Front lights

12.4.8.1 Installation of front lights wiring loom

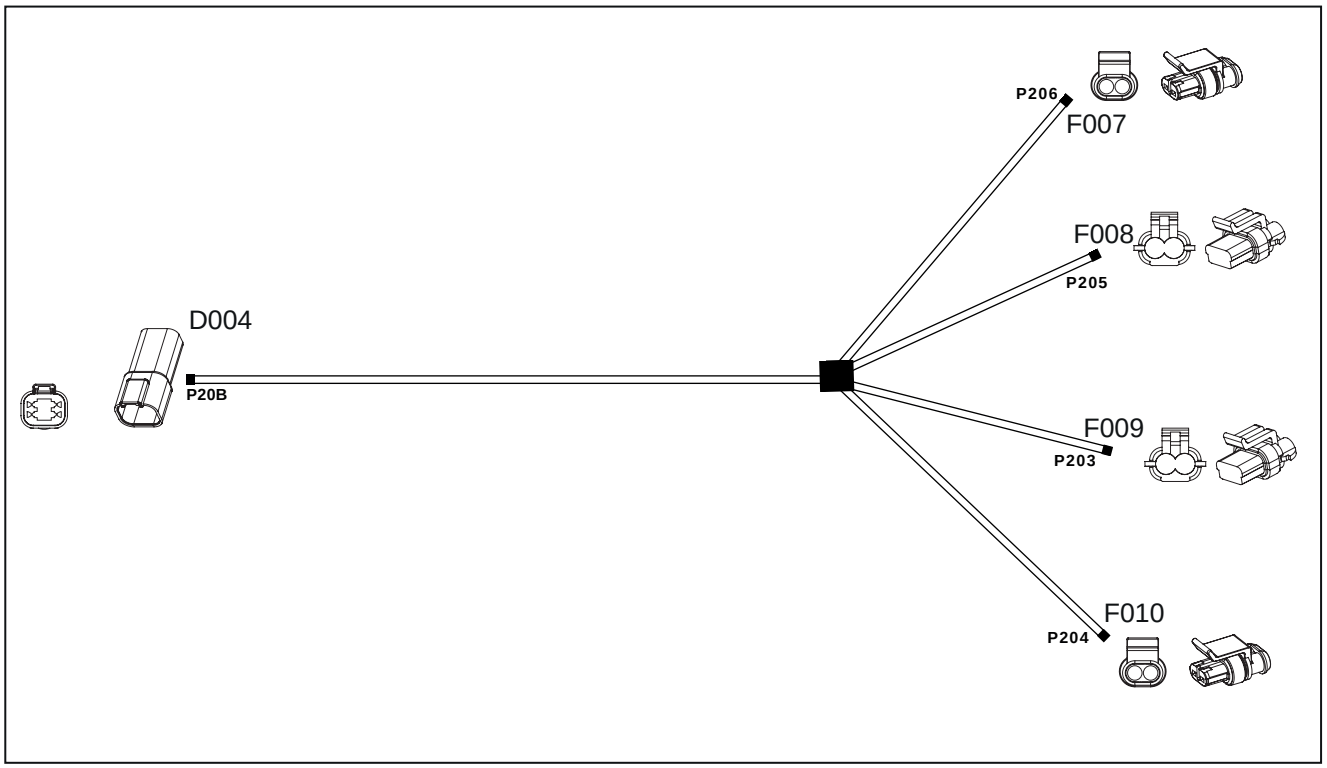

Fig. 12.20

12.4.8.2 Front lights wiring loom wiring diagram

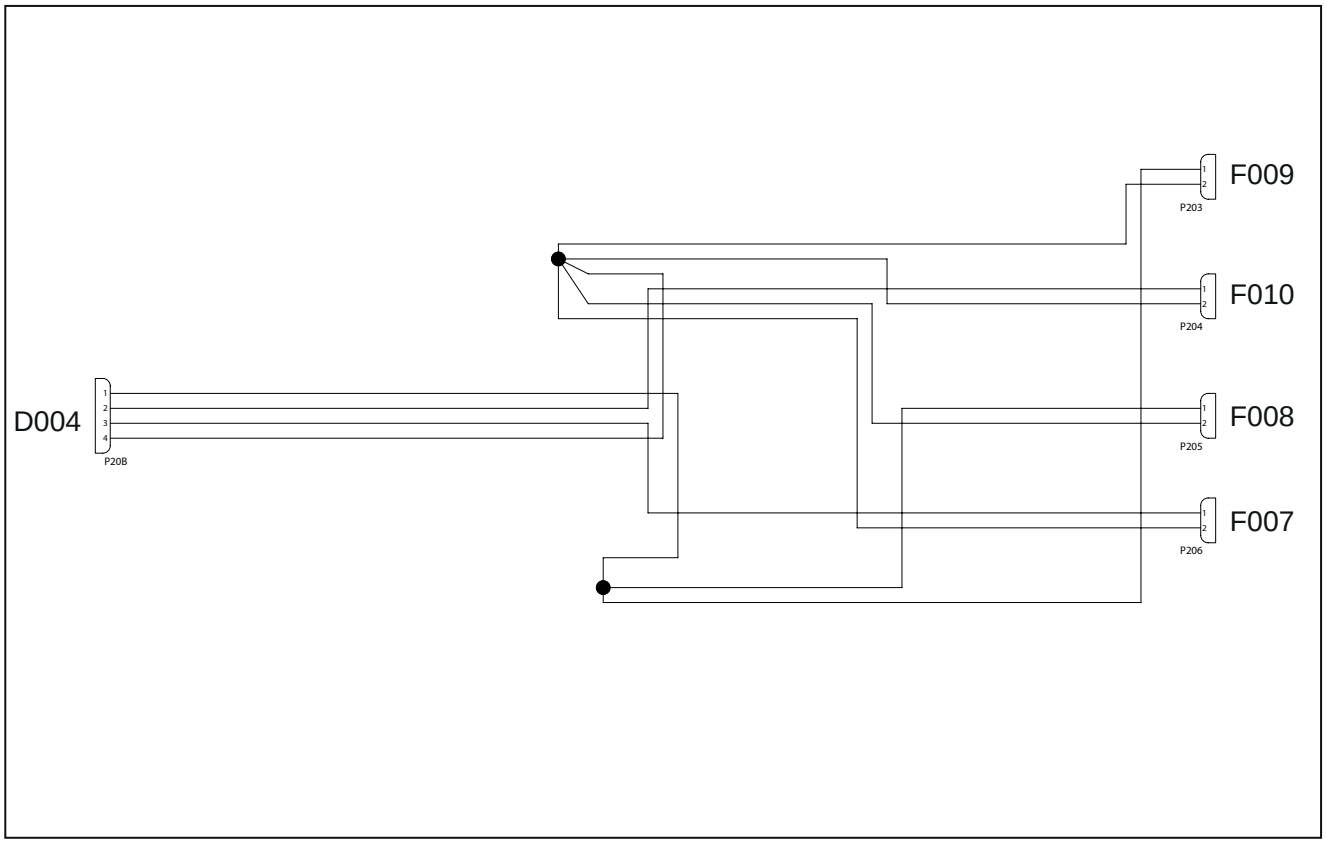

Fig. 12.21

12.4.8.3 Location of front lights wiring loom E90/E100

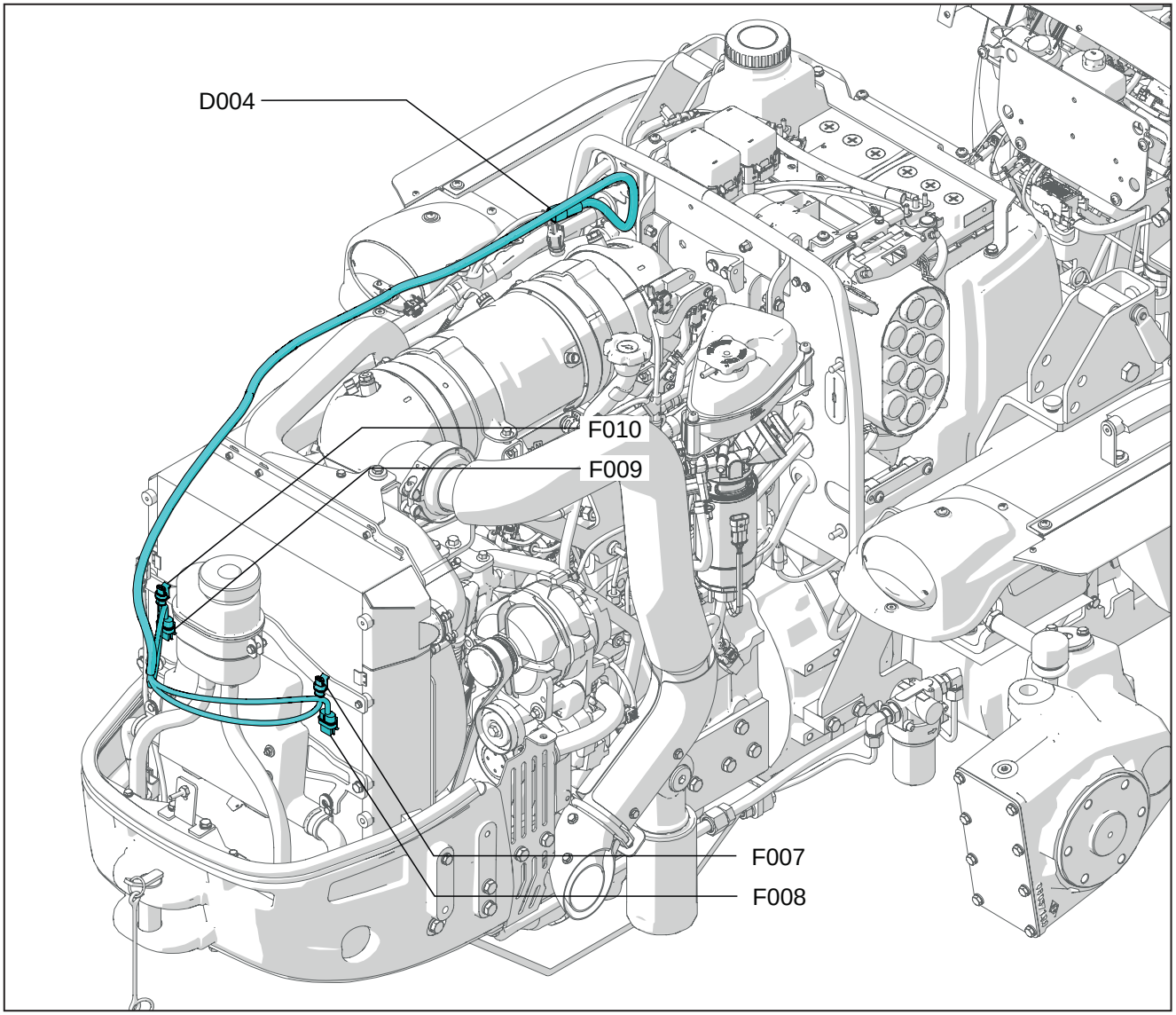

Fig. 12.22

12.4.8.4 Component identification codes

System code	Source code	Description
D004	P20B	Wiring connector for engine wiring loom
F007	P206	LH low beam headlight
F008	P205	LH high beam headlight
F009	P203	RH high beam headlight
F010	P204	RH low beam headlight

12.4.8.5 Location of front lights wiring loom E70/E80

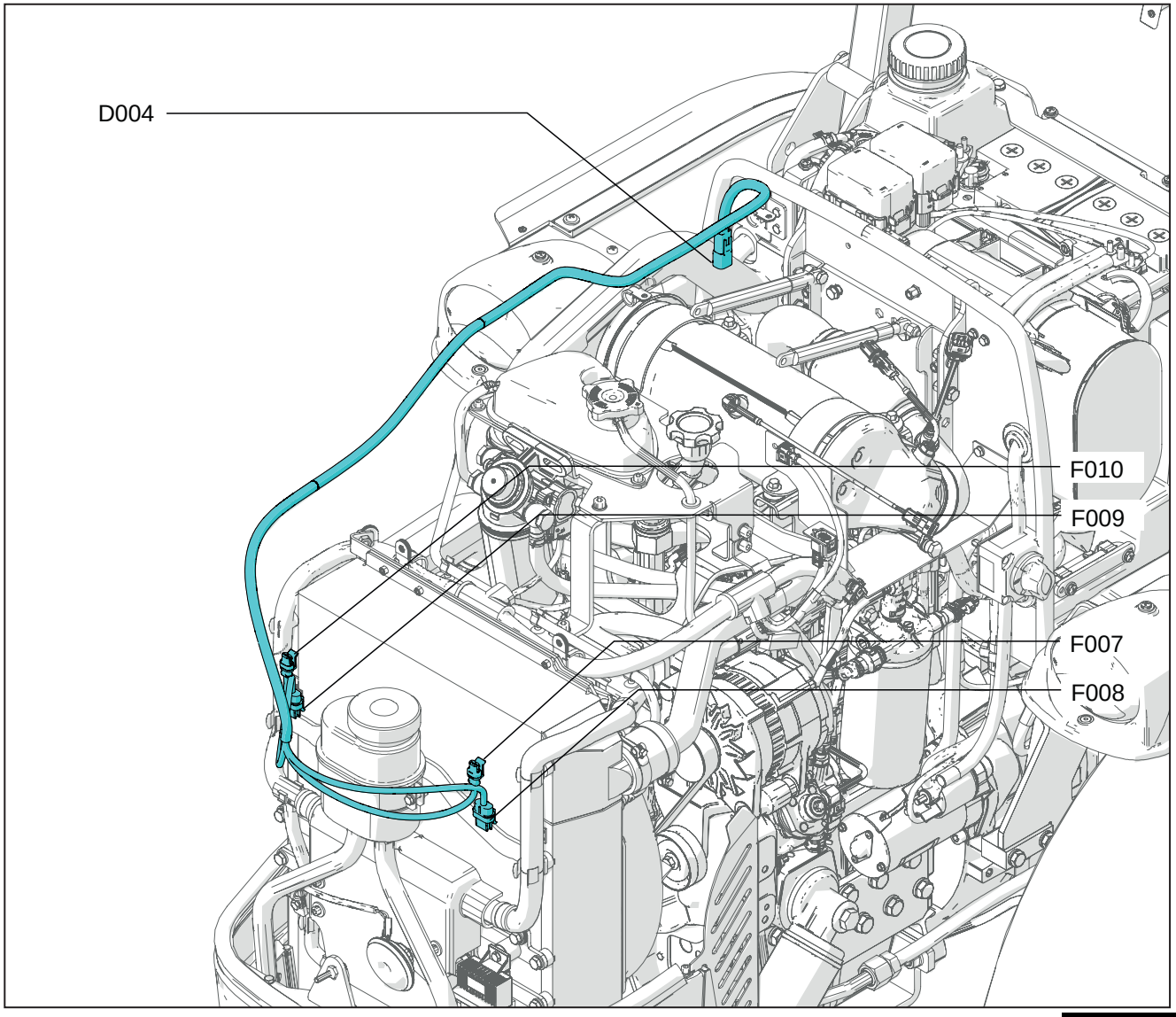

Fig. 12.23

12.4.8.6 Component identification codes

System code	Source code	Description
D004	P20B	Wiring connector for engine wiring loom
F007	P206	LH low beam headlight
F008	P205	LH high beam headlight
F009	P203	RH high beam headlight
F010	P204	RH low beam headlight

12.4.9 02050997 - Left hand turn indicator

12.4.9.1 Installation of left hand turn indicator wiring loom

Fig. 12.24

12.4.9.2 Left hand turn indicator wiring loom wiring diagram

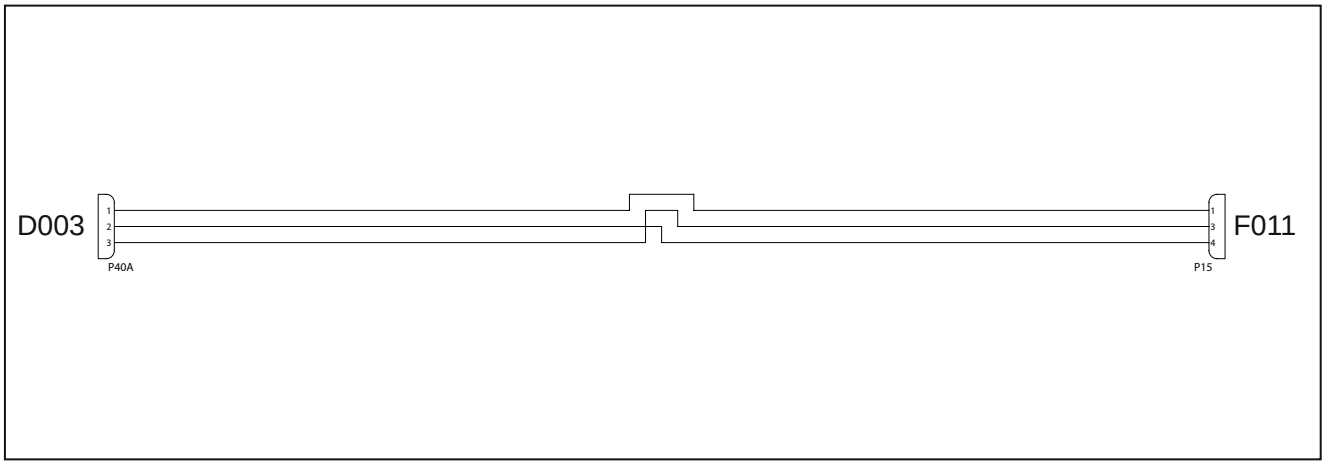

Fig. 12.25

12.4.9.3 Location of left hand turn indicator wiring loom E90/E100

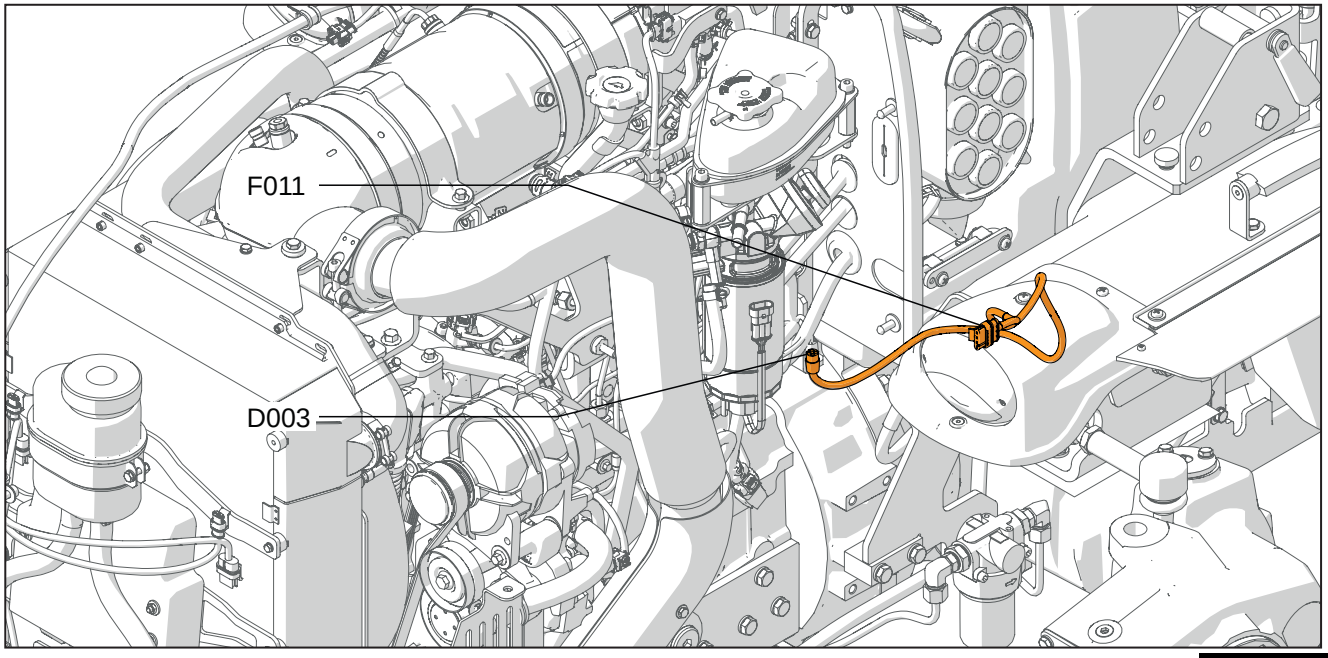

Fig. 12.26

12.4.9.4 Component identification codes

System code	Source code	Description
D003	P40A	Wiring connector for engine wiring loom
F011	P15	LH turn indicator

12.4.9.5 Location of left hand turn indicator wiring loom E70/E80

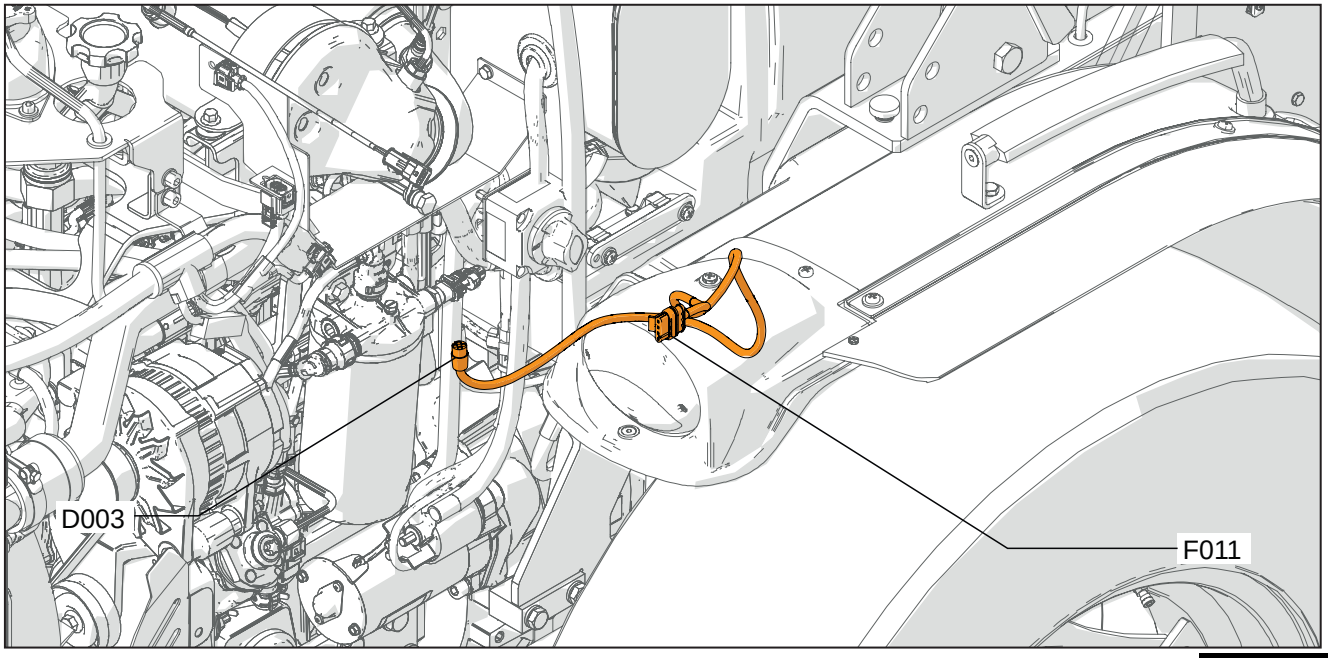

Fig. 12.27

12.4.9.6 Component identification codes

System code	Source code	Description
D003	P40A	Wiring connector for engine wiring loom
F011	P15	LH turn indicator

12.4.10 02050998 - Right hand turn indicator

12.4.10.1 Installation of right hand turn indicator wiring loom

Fig. 12.28

12.4.10.2 Right hand turn indicator wiring loom wiring diagram

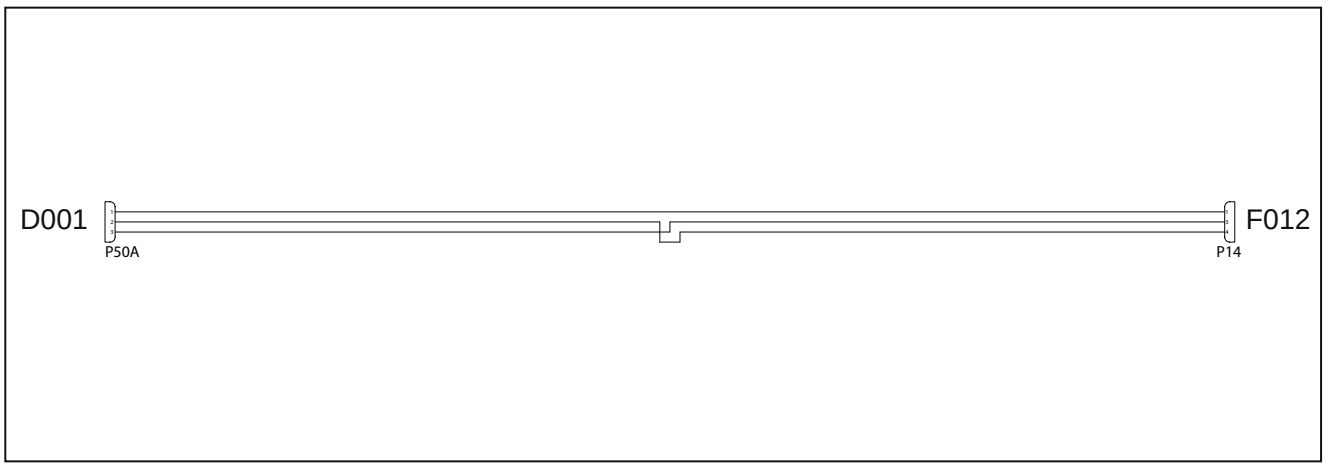

Fig. 12.29

12.4.10.3 Location of right hand turn indicator wiring loom E90/E100

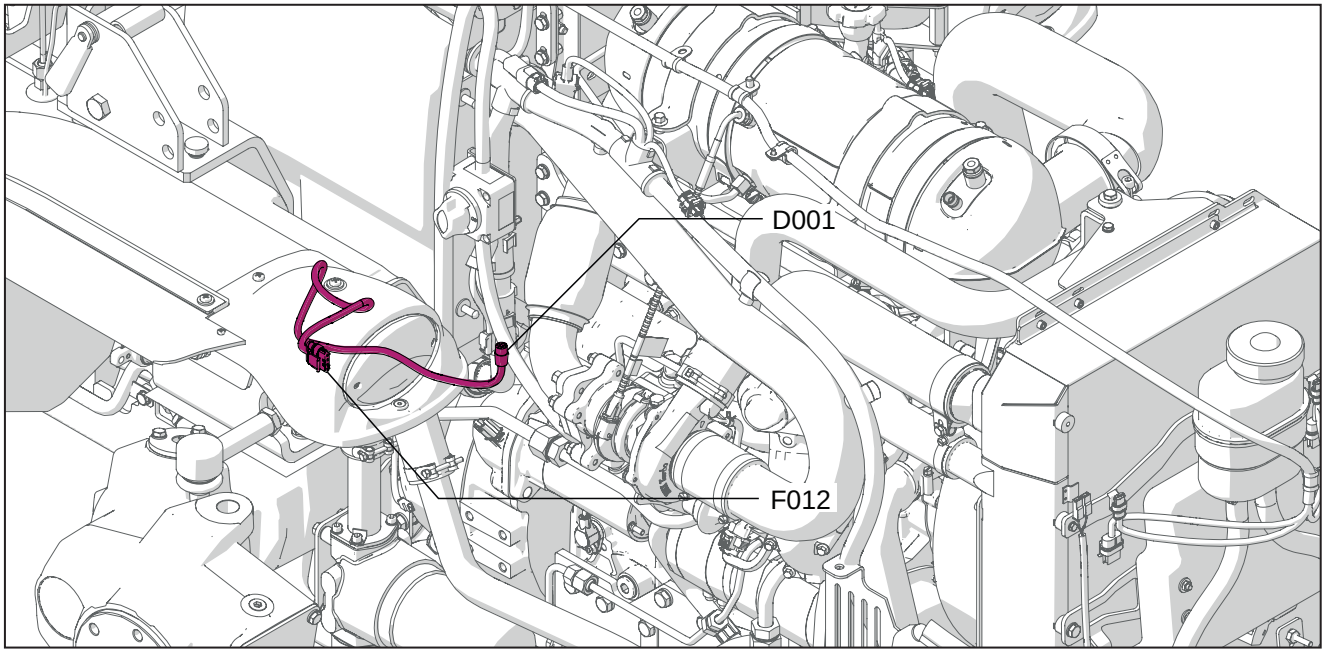

Fig. 12.30

12.4.10.4 Component identification codes

System code	Source code	Description
D001	P50A	Wiring connector for engine wiring loom
F012	P14	RH turn indicator

12.4.10.5 Location of right hand turn indicator wiring loom E70/E80

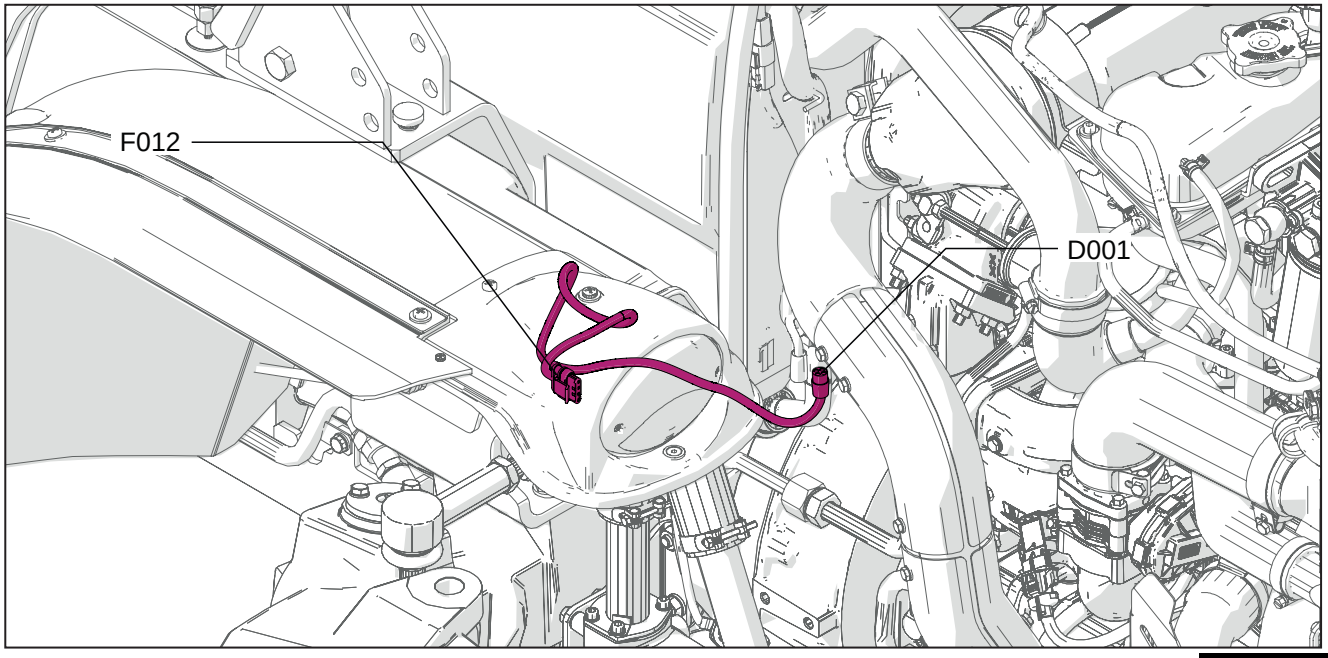

Fig. 12.31

12.4.10.6 Component identification codes

System code	Source code	Description
D001	P50A	Wiring connector for engine wiring loom
F012	P14	RH turn indicator

12.4.11 02050999 - LH rear lights

12.4.11.1 Installation of LH rear lights wiring loom

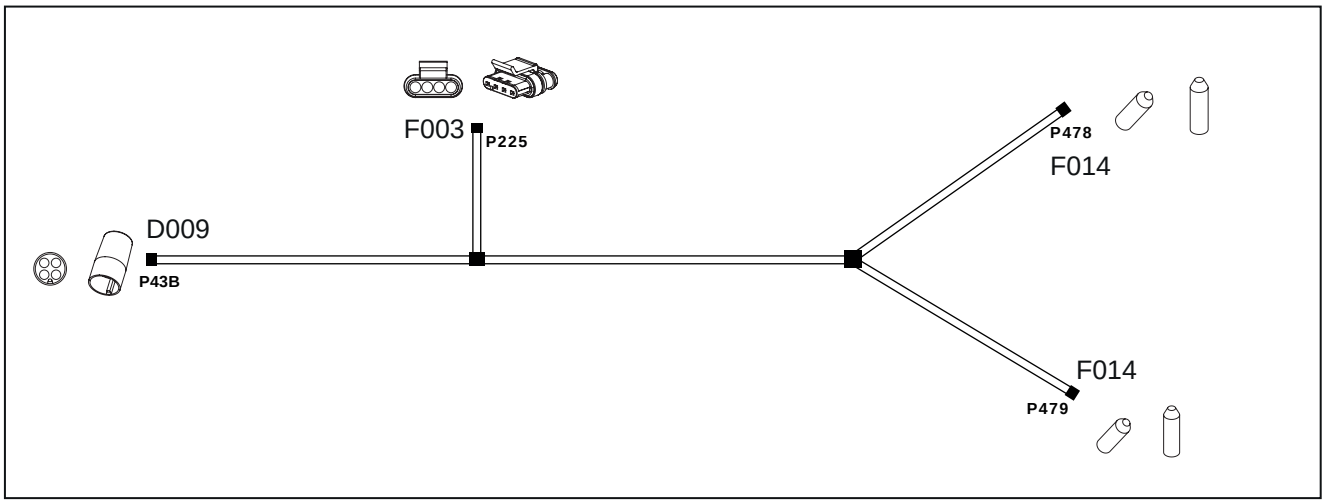

Fig. 12.32

12.4.11.2 LH rear lights wiring loom wiring diagram

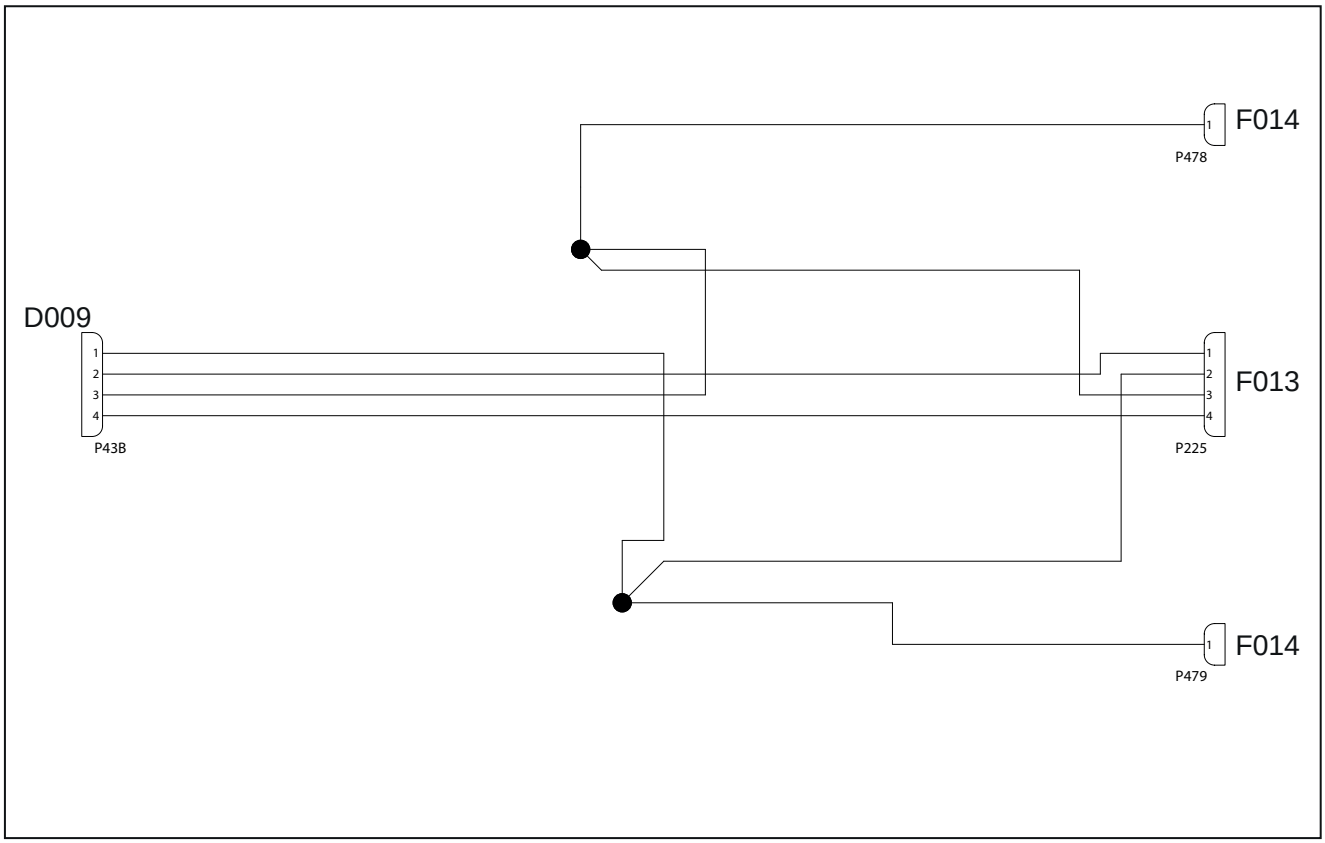

Fig. 12.33

12.4.11.3 Location of LH rear lights wiring loom E90/E100

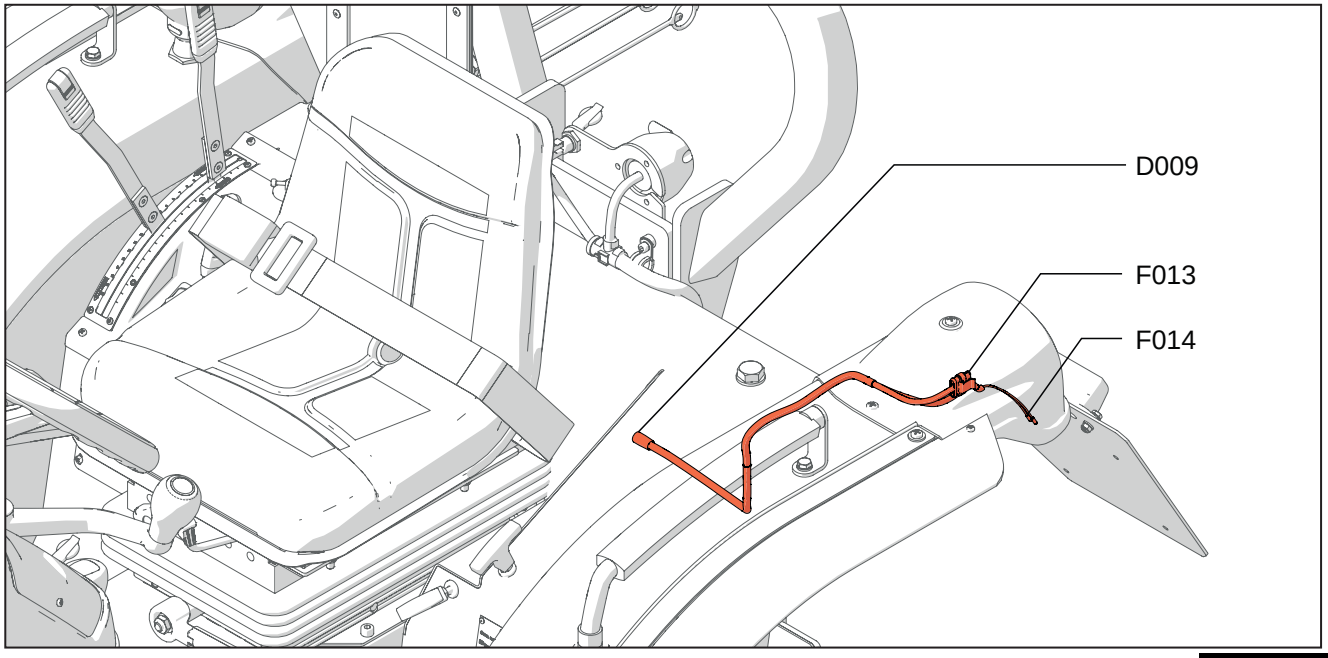

Fig. 12.34

12.4.11.4 Component identification codes

System code	Source code	Description
D009	P43B	Wiring connector for main wiring loom
F013	P225	LH mudguard light
F014	P478, P479	Number plate light

12.4.11.5 Location of LH rear lights wiring loom E70/E80

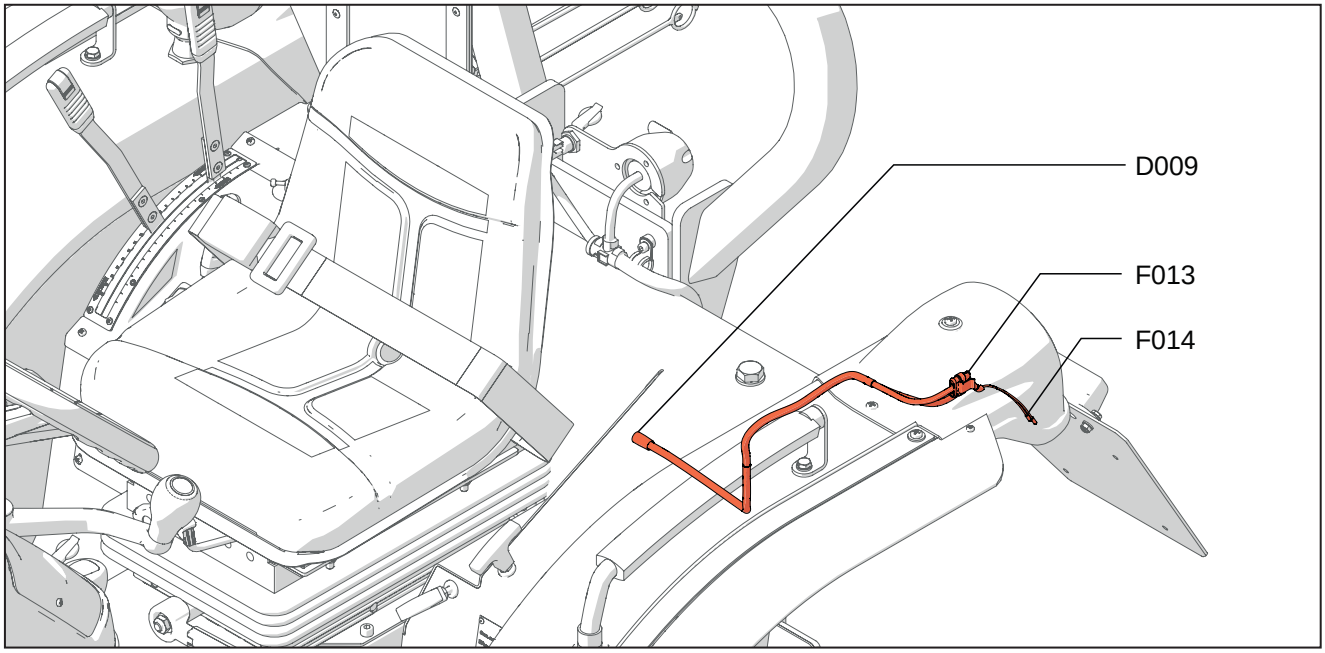

Fig. 12.35

12.4.11.6 Component identification codes

System code	Source code	Description
D009	P43B	Wiring connector for main wiring loom
F013	P225	LH mudguard light
F014	P478, P479	Number plate light

12.4.12 02051000 - RH rear lights

12.4.12.1 Installation of RH rear lights wiring loom

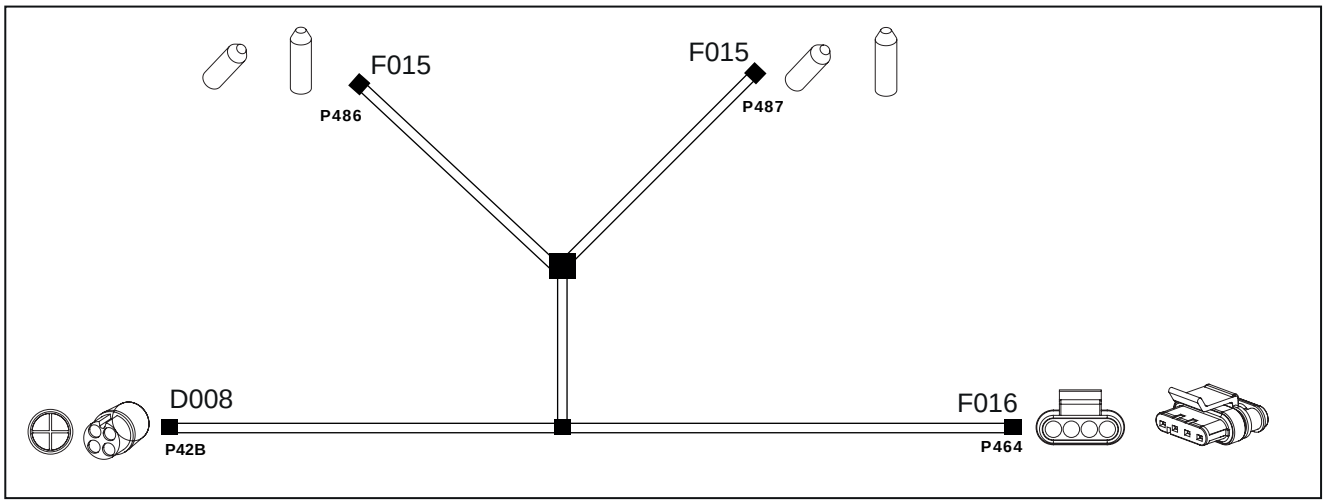

Fig. 12.36

12.4.12.2 RH rear lights wiring loom wiring diagram

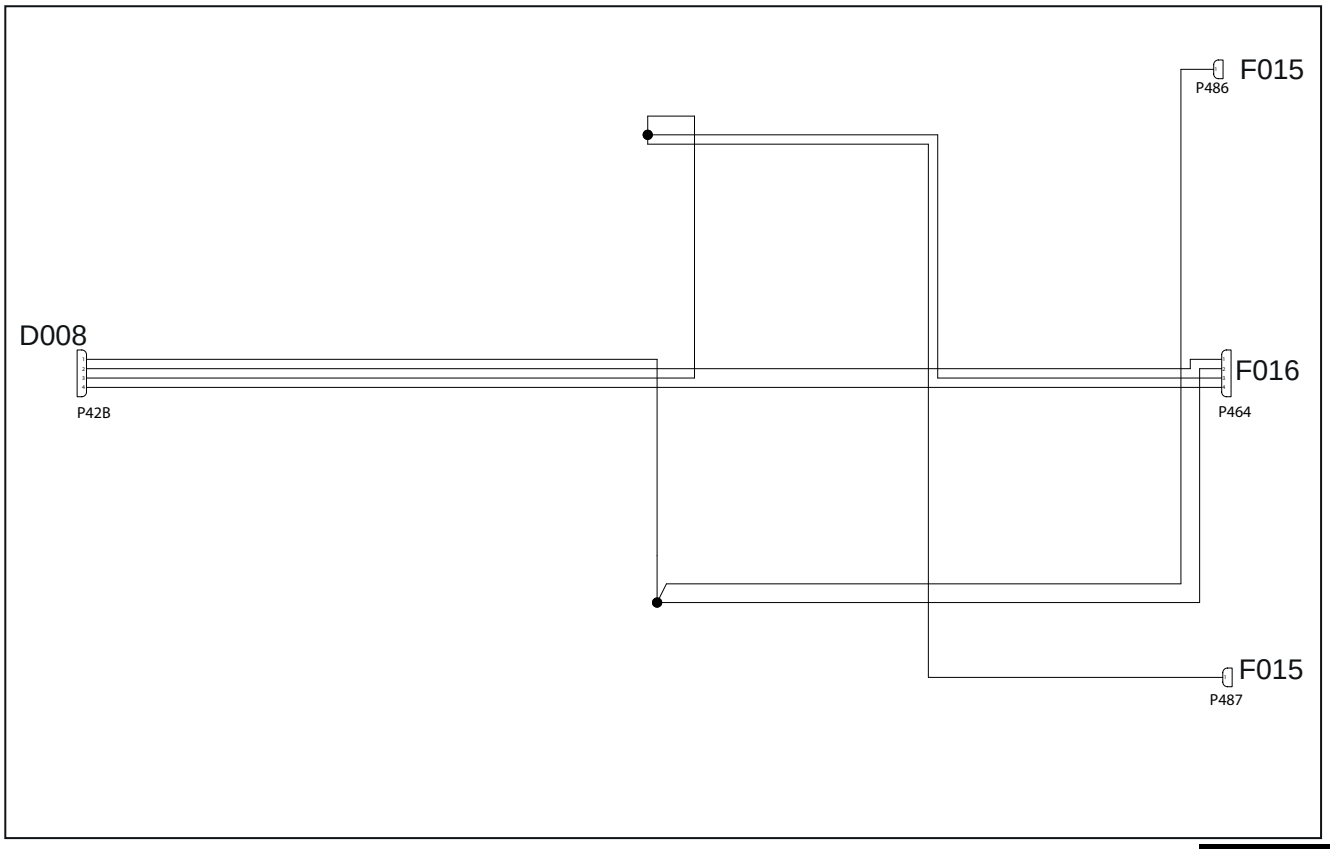

Fig. 12.37

12.4.12.3 Location of RH rear lights wiring loom E90/E100

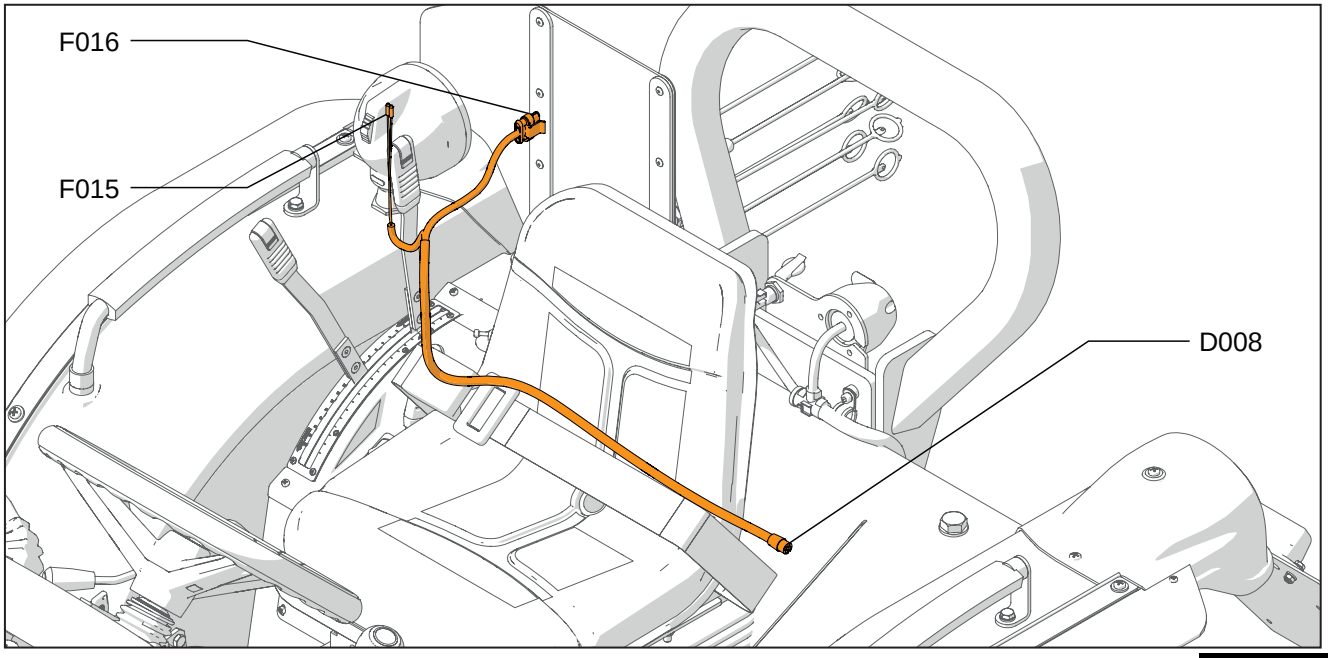

Fig. 12.38

12.4.12.4 Component identification codes

System code	Source code	Description
D008	P42B	Wiring connector for main wiring loom
F015	P486, P487	RH work lights
F016	P464	Rear lights

12.4.12.5 Location of RH rear lights wiring loom E70/E80

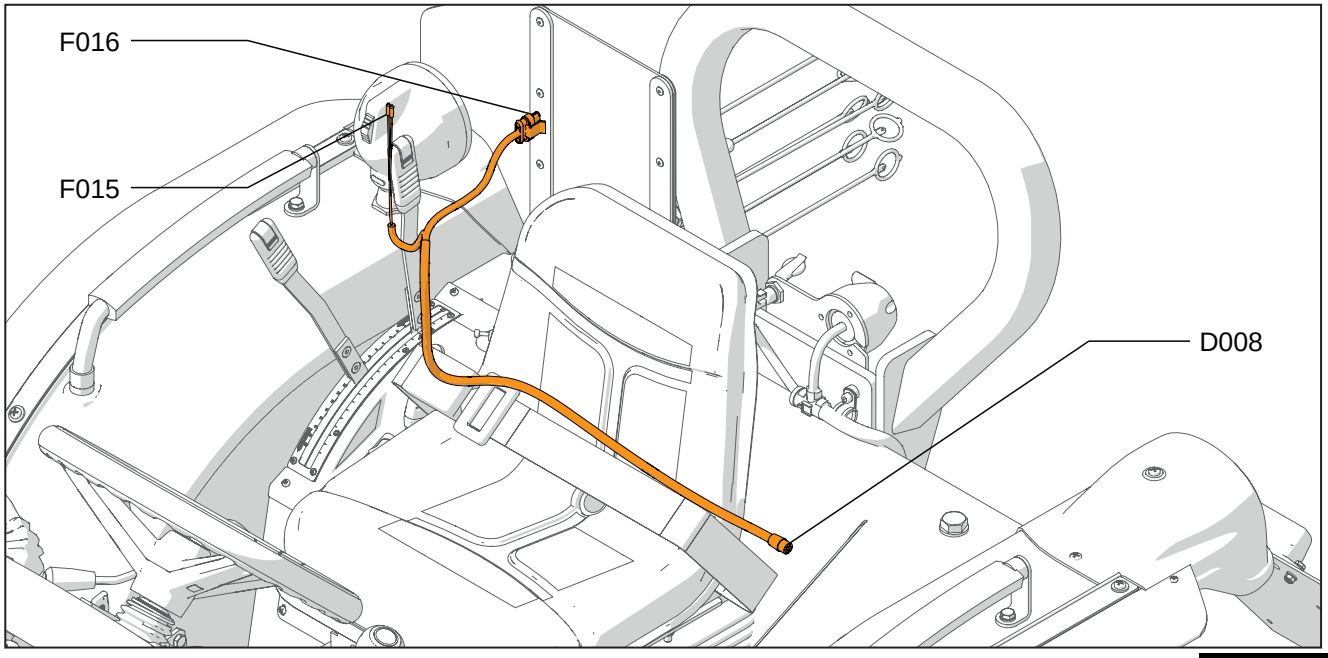

Fig. 12.39

12.4.12.6 Component identification codes

System code	Source code	Description
D008	P42B	Wiring connector for main wiring loom
F015	P486, P487	RH work lights
F016	P464	Rear lights

12.4.13 02051071 - Dashboard E90/E100

12.4.13.1 Installation of dashboard wiring loom

Table 1

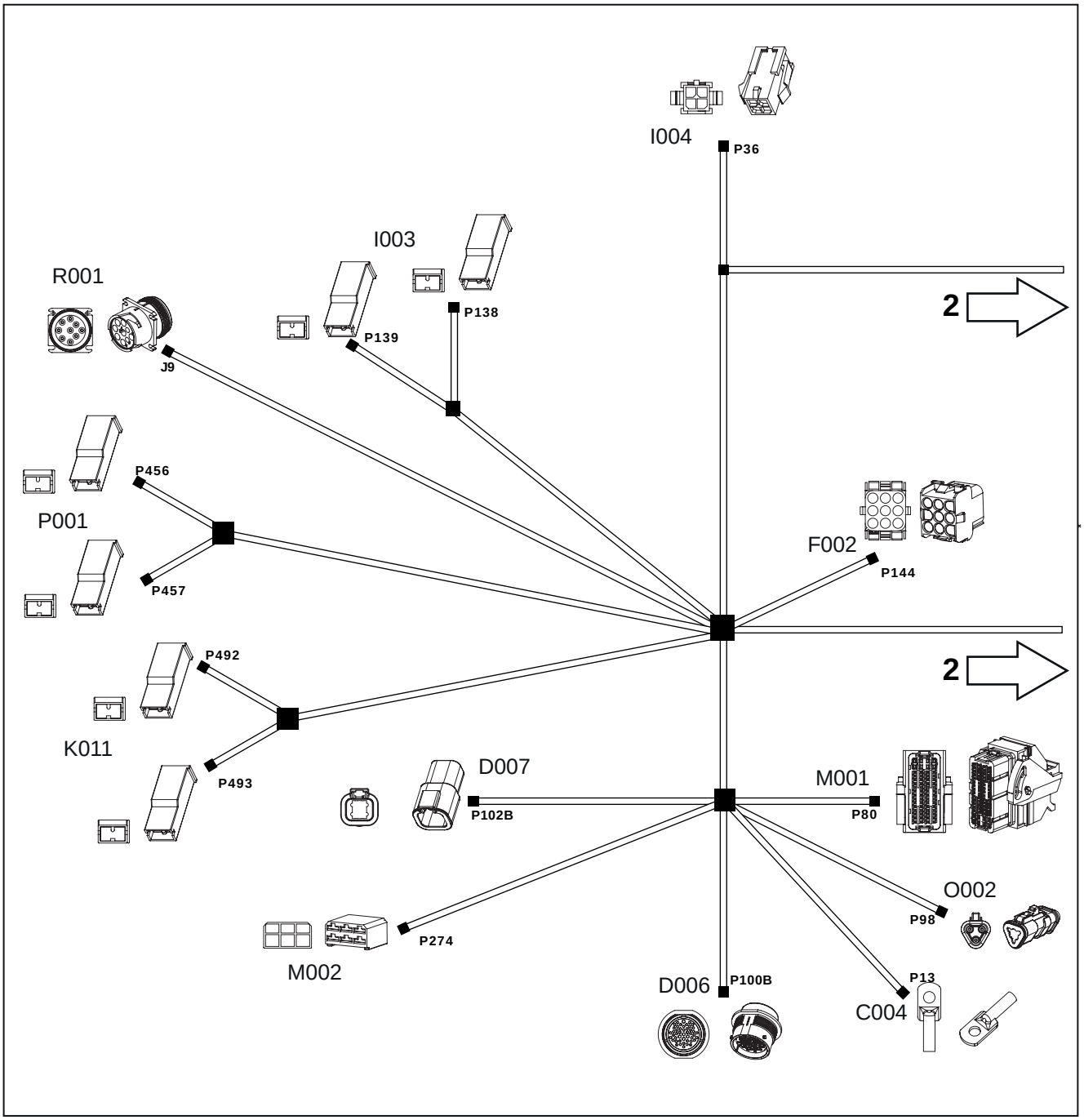

Fig. 12.40

Table 2

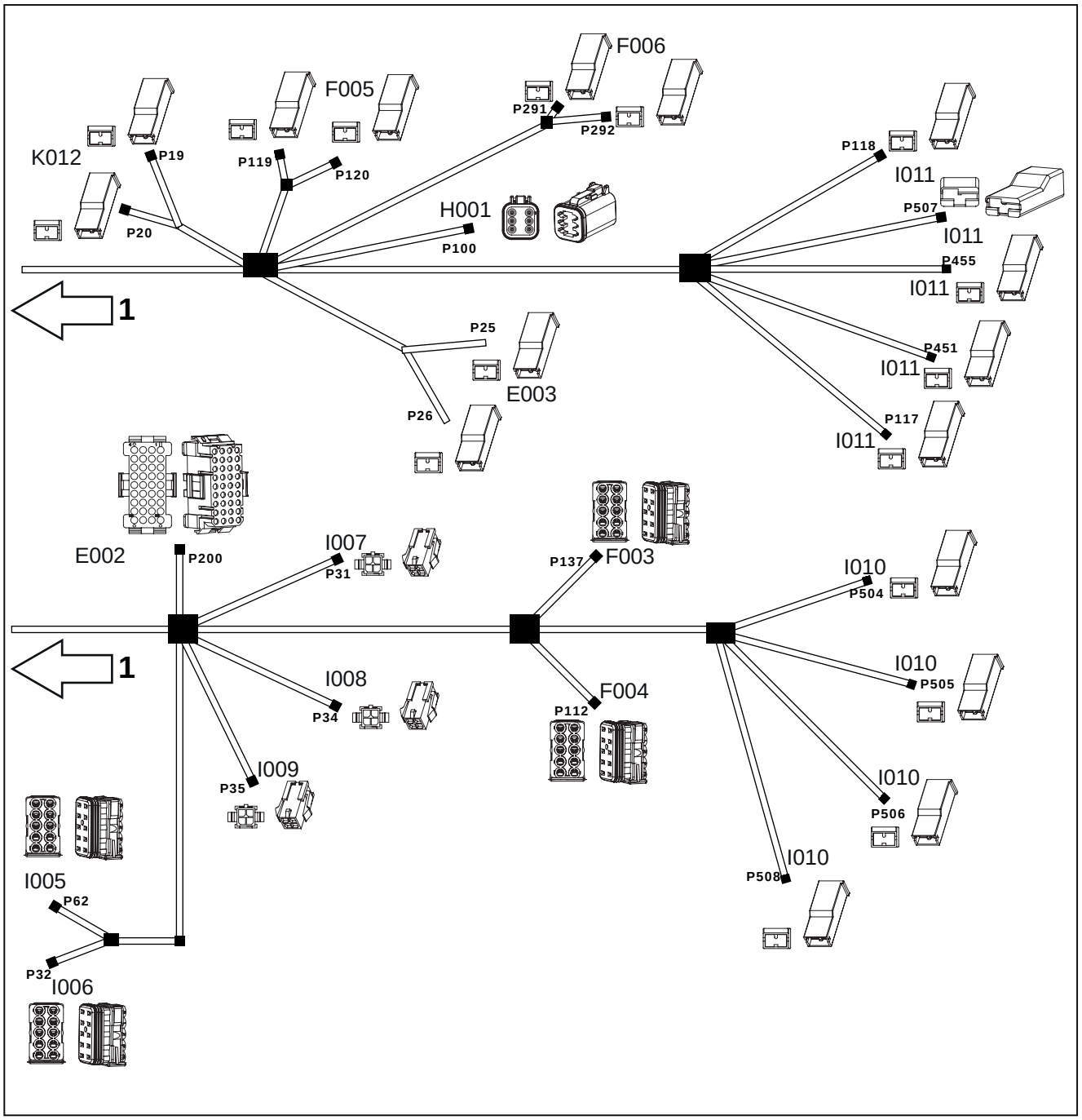

Fig. 12.41

12.4.13.2 Dashboard wiring loom wiring diagram

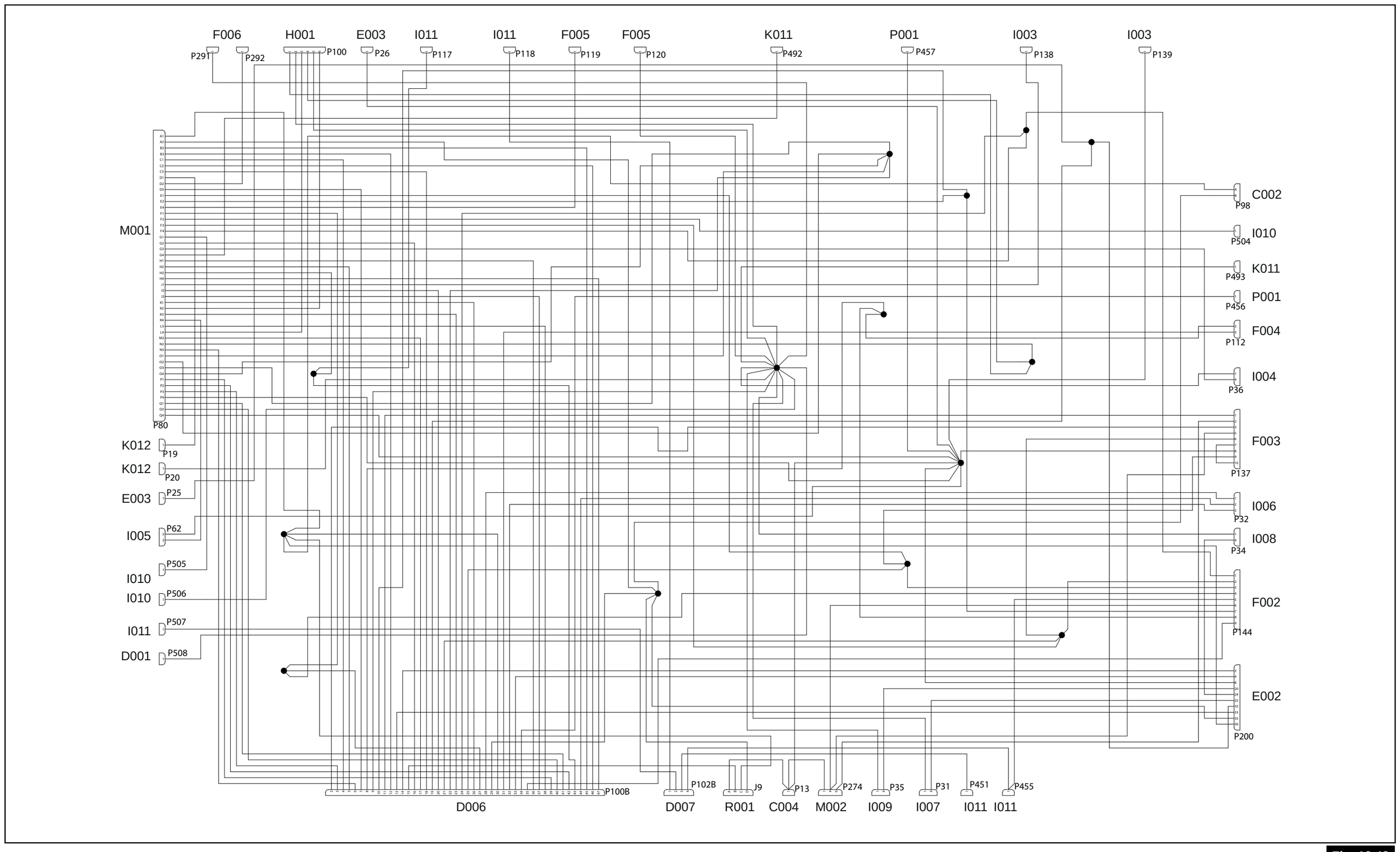

Fig. 12.42

12.4.13.3 Location of dashboard wiring loom

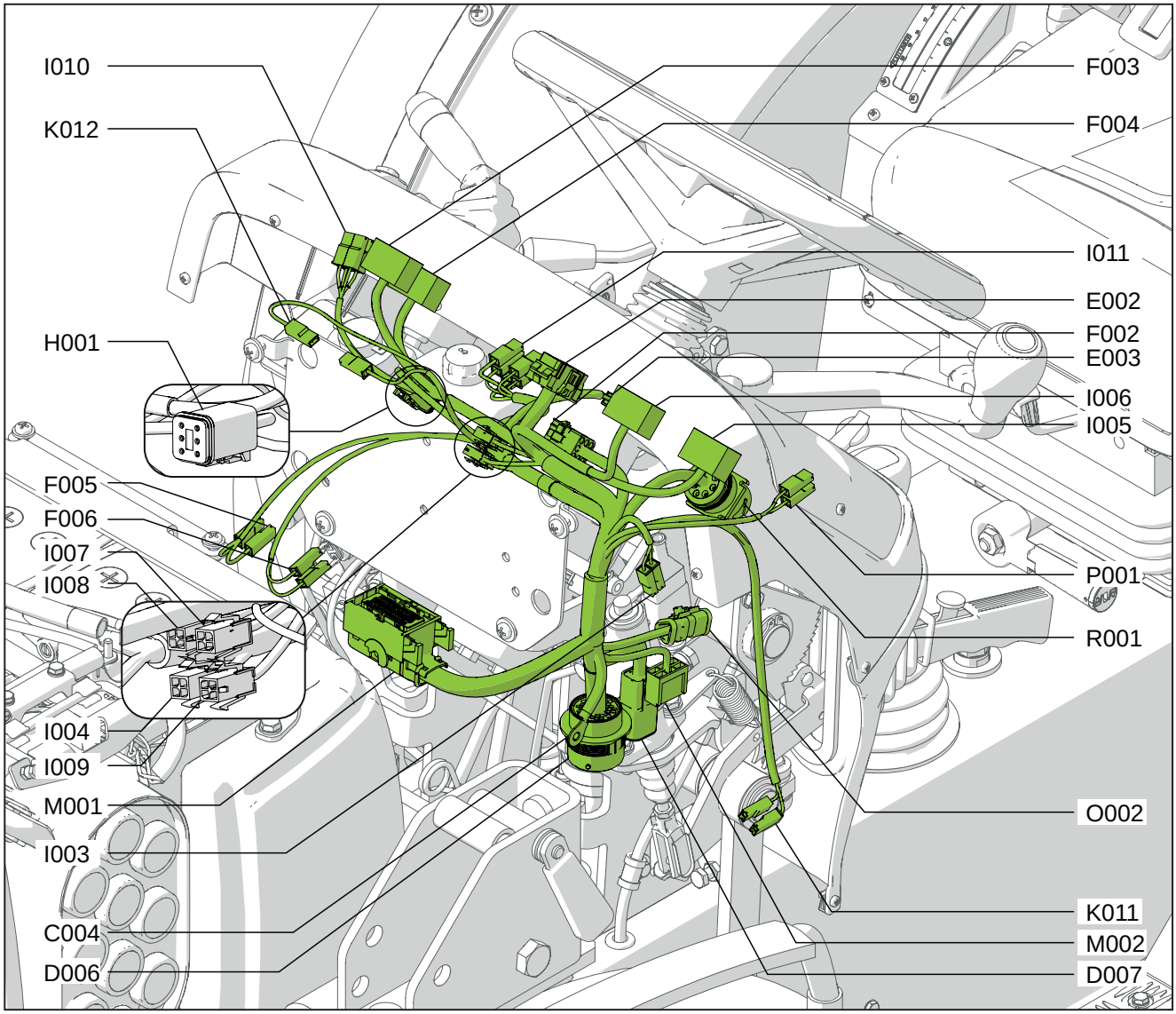

Fig. 12.43

12.4.13.4 Component identification codes

System code	Source code	Description
C004	P13	Cab ground
D006	P100B	Dashboard-main wiring loom connector
D007	P102B	Dashboard-main wiring loom connector
E002	P200	Dashboard
E003	P25/P26	Buzzer
F002	P144	Lights selector switch
F003	P137	Hazard warning lights
F004	P112	Headlamp
F005	P119/P120	RH brake signal
F006	P291/P292	LH brake signal
H001	P100	Throttle
I003	P138/P139	Parking brake
I004	P36	Front/Rear PTO bypass
I005	P62	Differential lock
I006	P32	Regeneration disable button
I007	P31	Dashboard ENTER button
I008	P34	Dashboard PB+ button
I009	P35	Dashboard PB- button
I010	P504/P505/P506/P508	PTO selector
I011	P118/P507/P455/P451/ P117	Ignition switch
K011	P492/ P493	Clutch sensor
K012	P19/P20	Brake oil sensor
M001	P80	Vehicle ECU
M002	P274	Flasher unit
O002	P98	CAN line termination
P001	P456/ P457	1-pole socket
R001	J9	Diagnostic port

12.4.14 02051074 - Dashboard E70/E80

12.4.14.1 Installation of dashboard wiring loom

Table 1

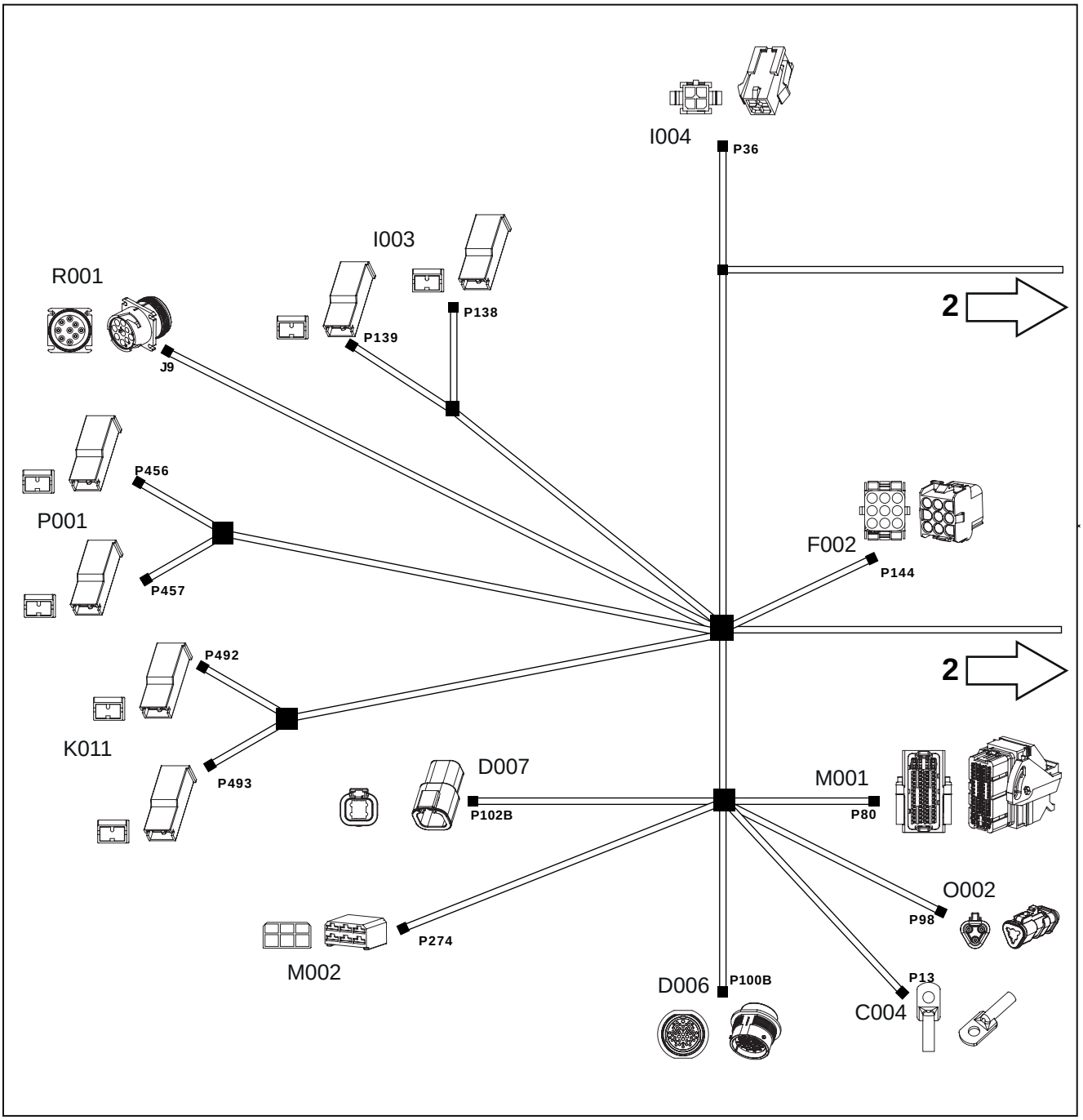

Fig. 12.44

Table 2

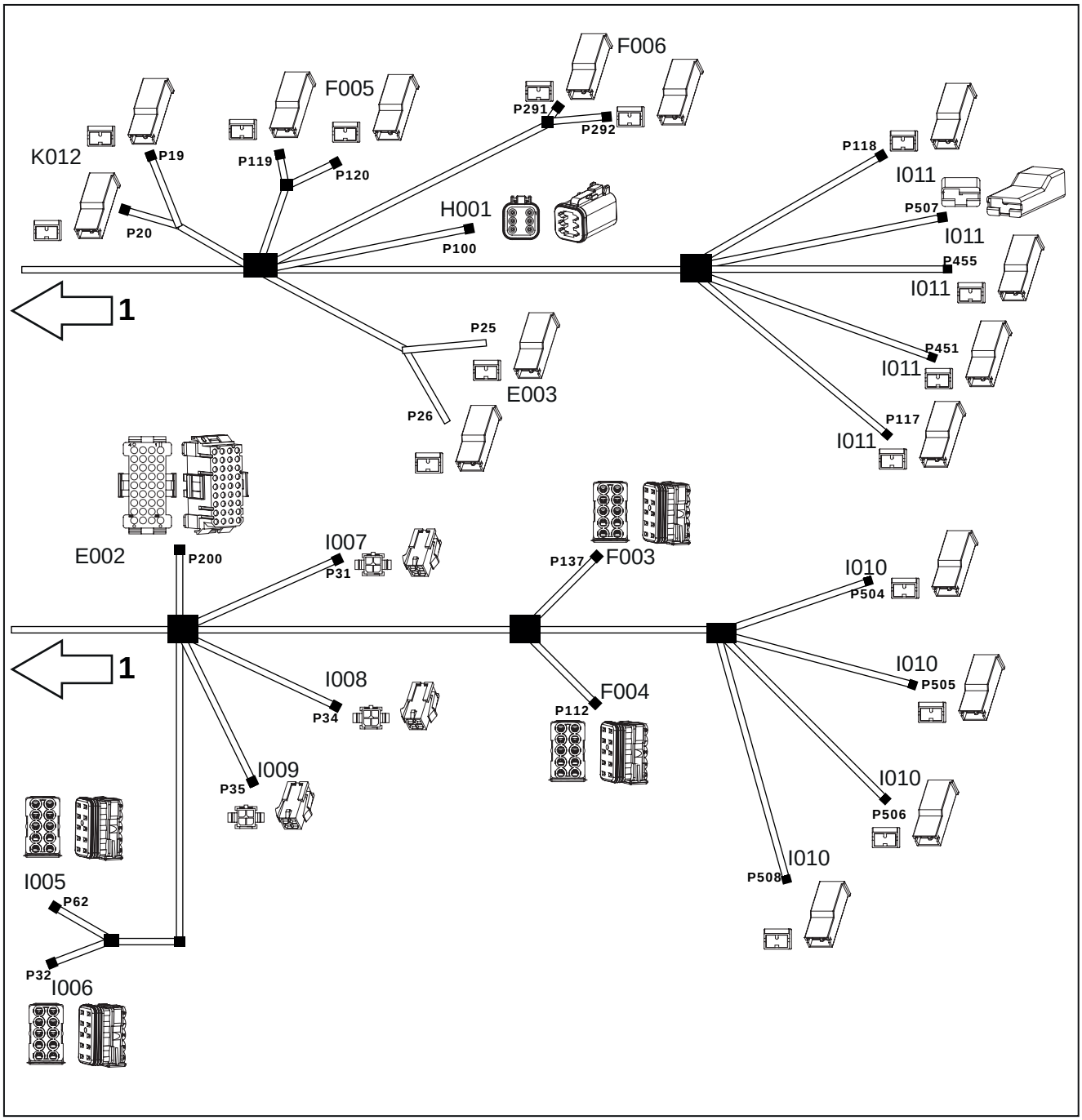

Fig. 12.45

12.4.14.2 Dashboard wiring loom wiring diagram

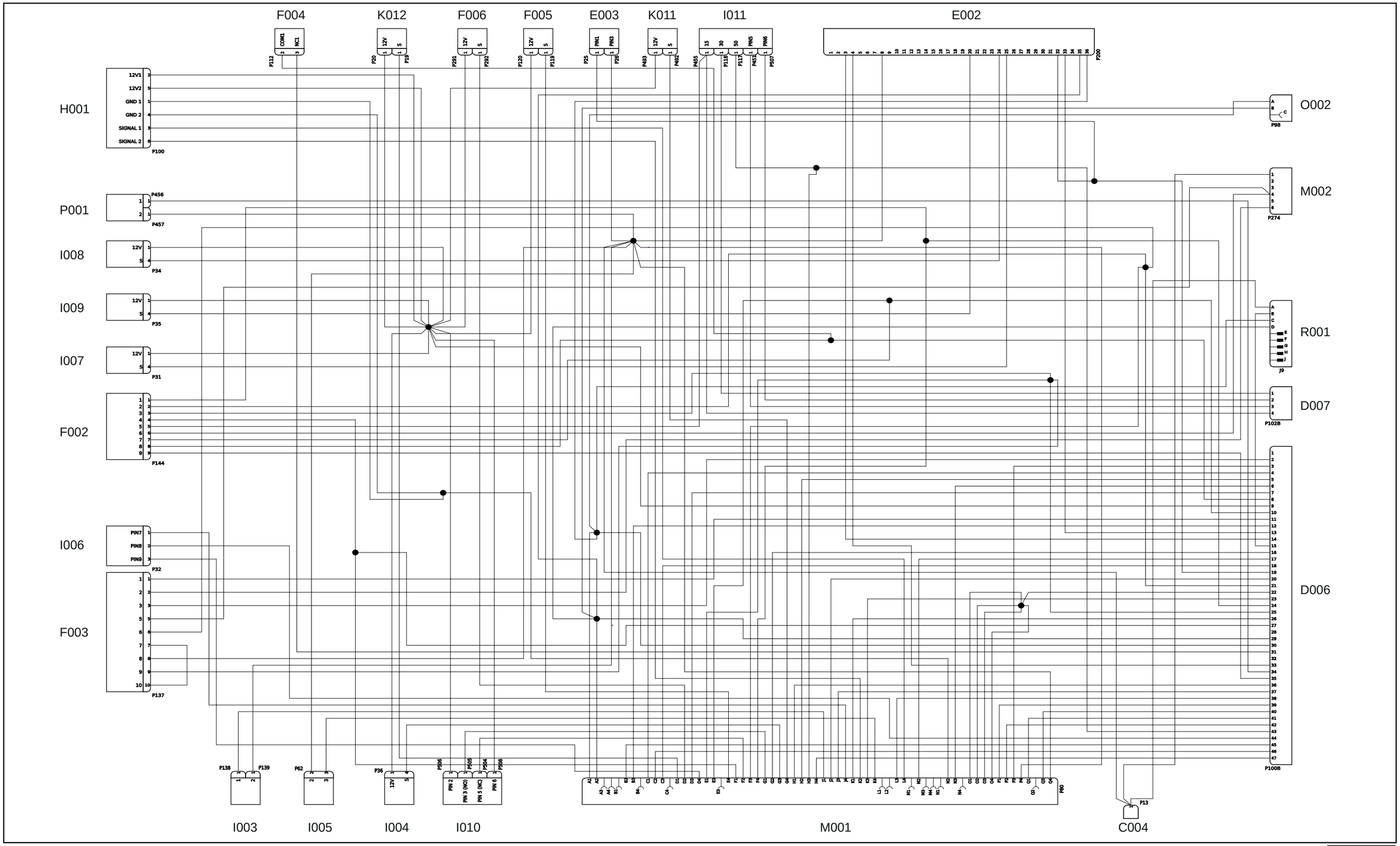

Fig. 12.46

12.4.14.3 Location of dashboard wiring loom

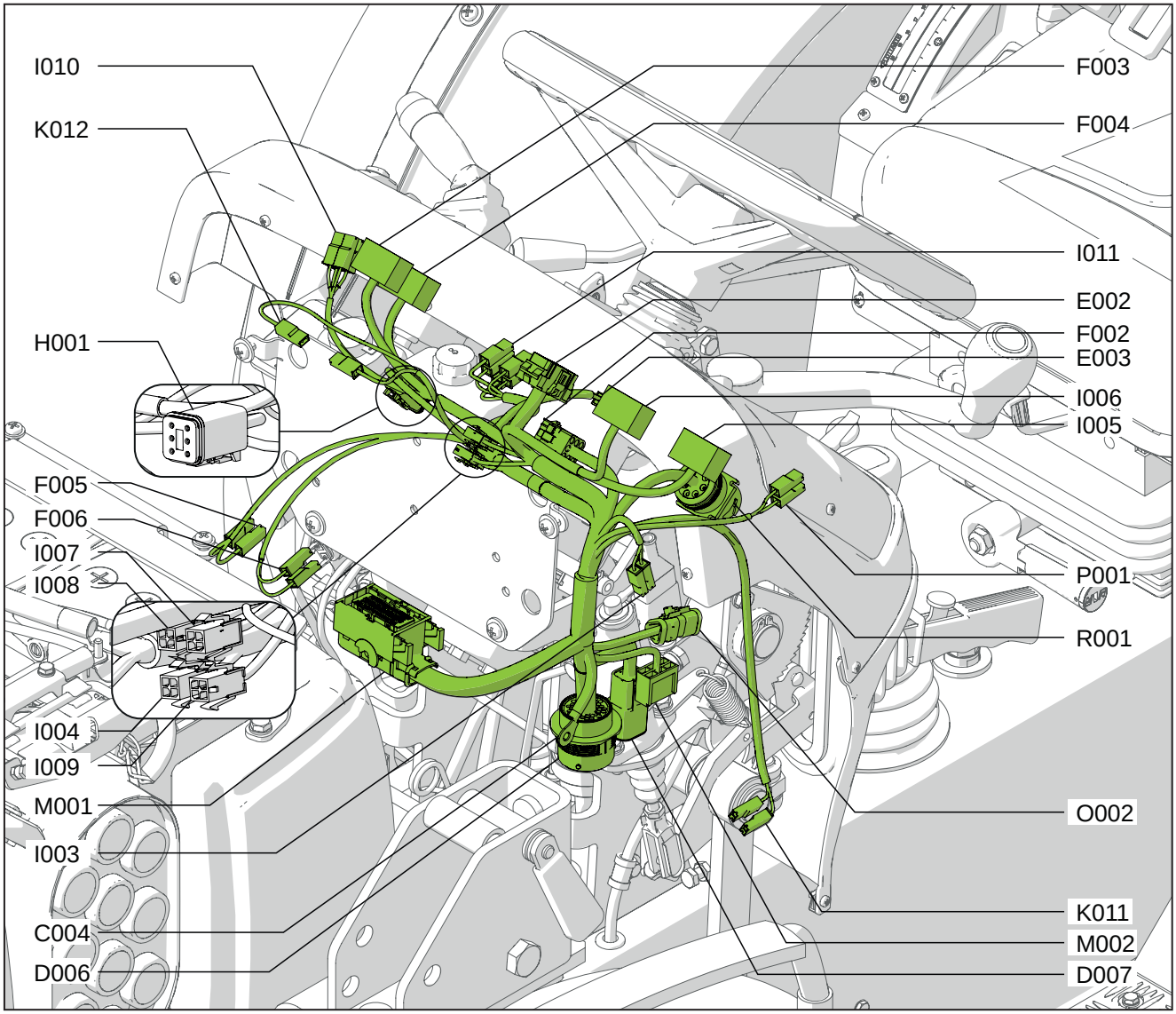

Fig. 12.47

12.4.14.4 Component identification codes

System code	Source code	Description
C004	P13	Cab ground
D006	P100B	Dashboard-main wiring loom connector
D007	P102B	Dashboard-main wiring loom connector
E002	P200	Dashboard
E003	P25/P26	Buzzer
F002	P144	Lights selector switch
F003	P137	Hazard warning lights
F004	P112	Headlamp
F005	P119/P120	RH brake signal
F006	P291/P292	LH brake signal
H001	P100	Throttle
I003	P138/P139	Parking brake
I004	P36	Front/Rear PTO bypass
I005	P62	Differential lock
I006	P32	Regeneration disable button
I007	P31	Dashboard ENTER button
I008	P34	Dashboard PB+ button
I009	P35	Dashboard PB- button
I010	P504/P505/P506/P508	PTO selector
I011	P118/P507/P455/P451/ P117	Ignition switch
K011	P492/ P493	Clutch sensor
K012	P19/P20	Brake oil sensor
M001	P80	Vehicle ECU
M002	P274	Flasher unit
O002	P98	CAN line termination
P001	P456/ P457	1-pole socket
R001	J9	Diagnostic port

12.4.15 02051070 - Engine E90/E100

12.4.15.1 Installation of engine wiring loom

Table 1

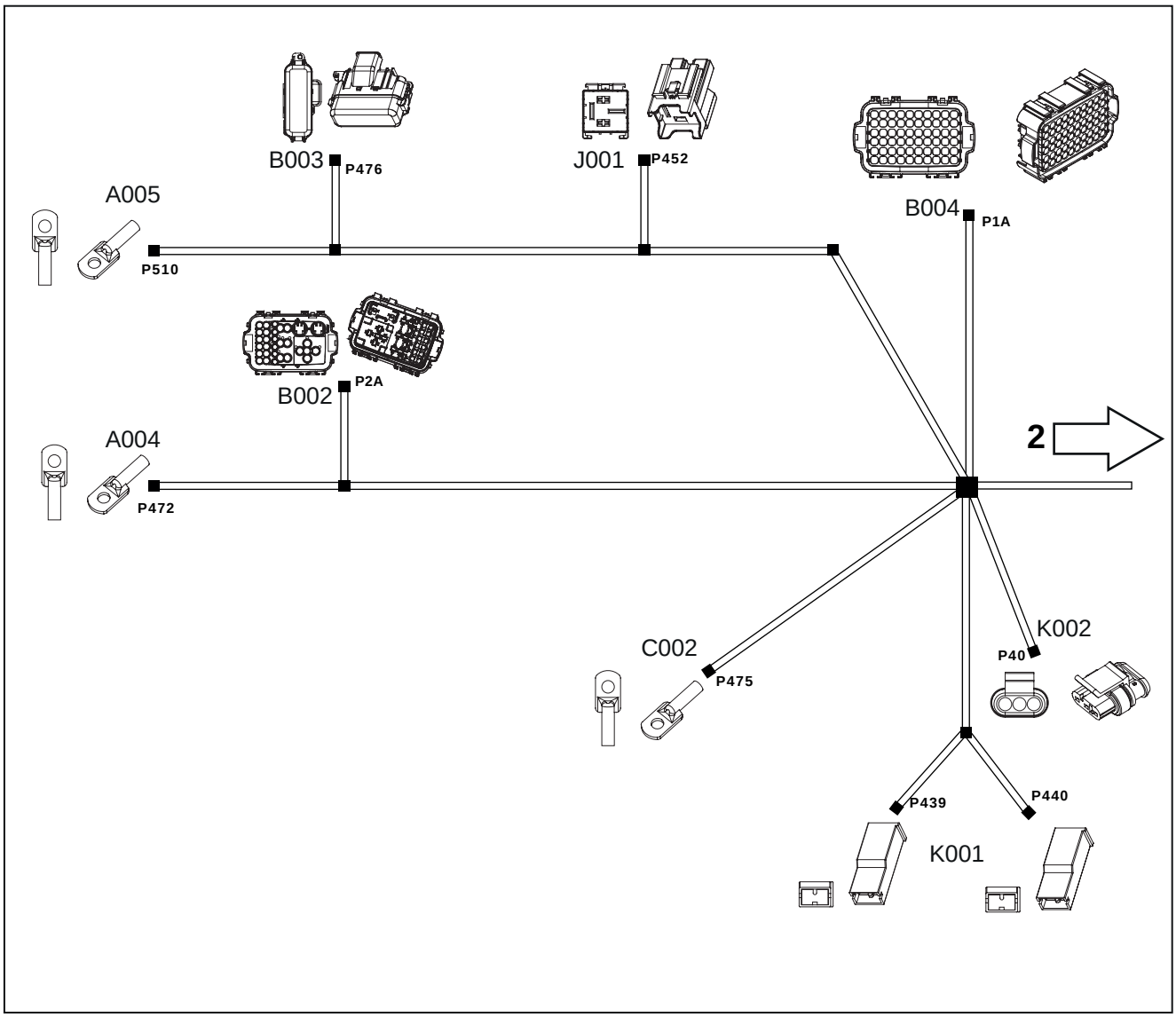

Fig. 12.48

Table 2

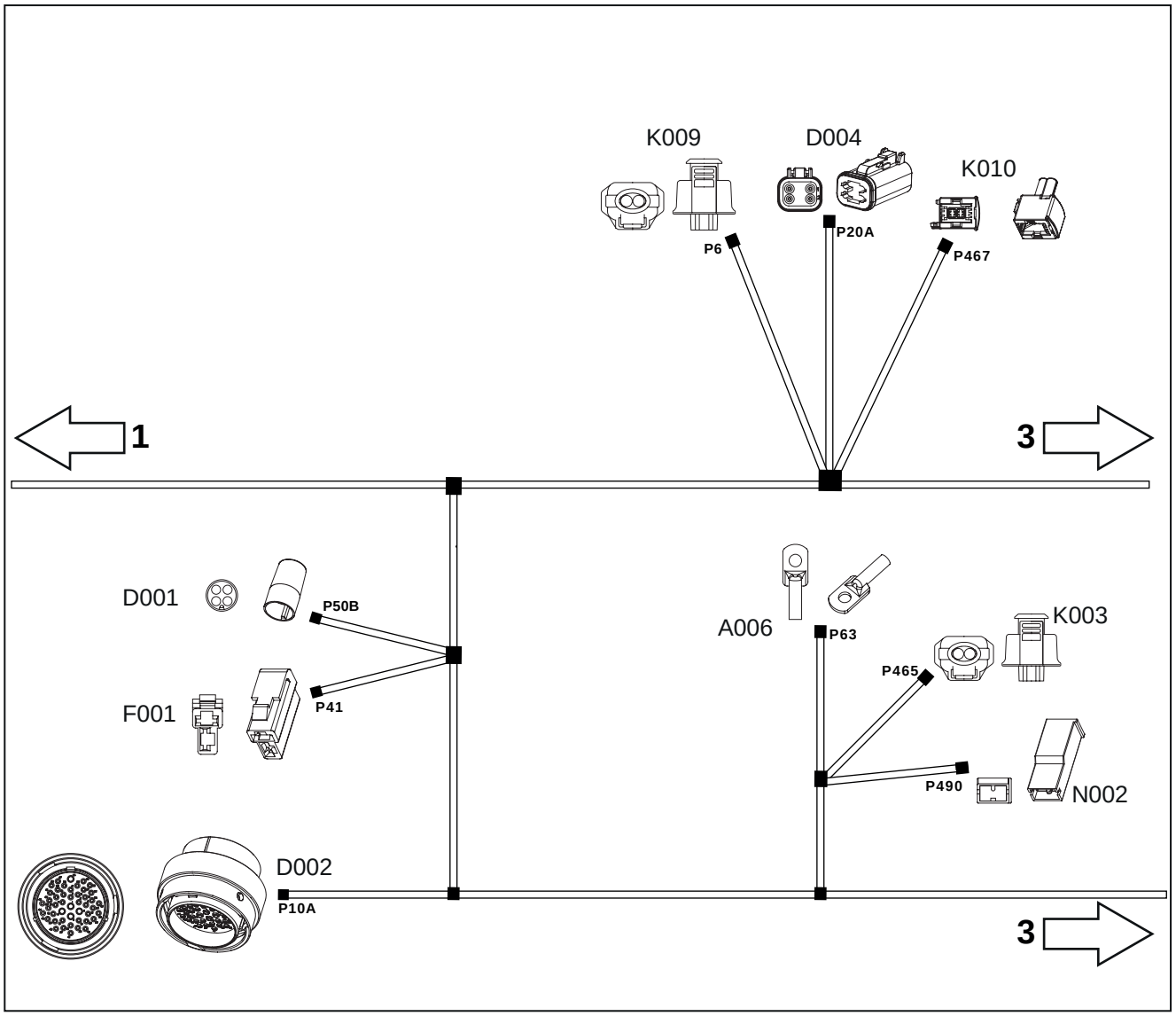

Fig. 12.49

Table 3

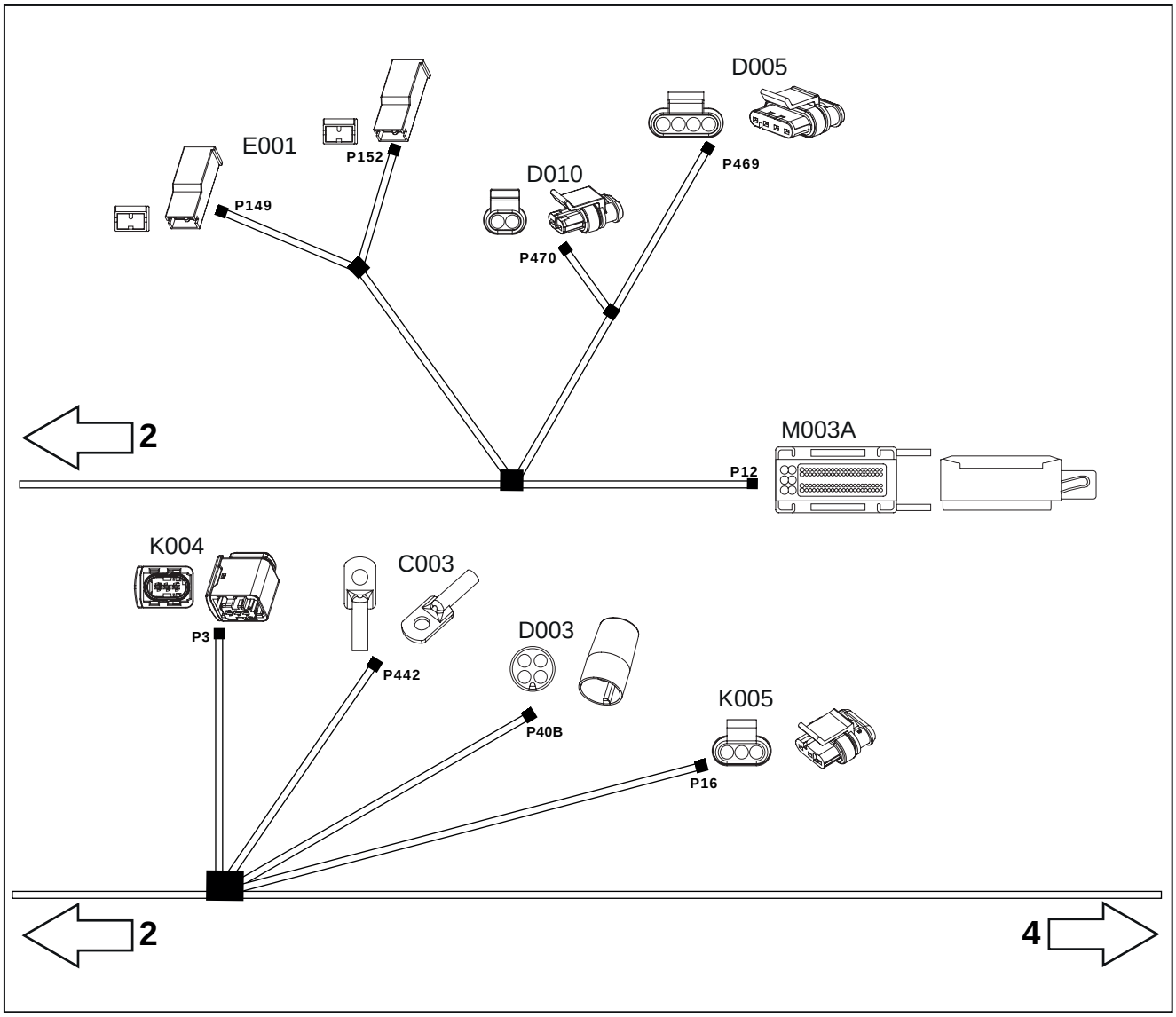

Fig. 12.50

Table 4

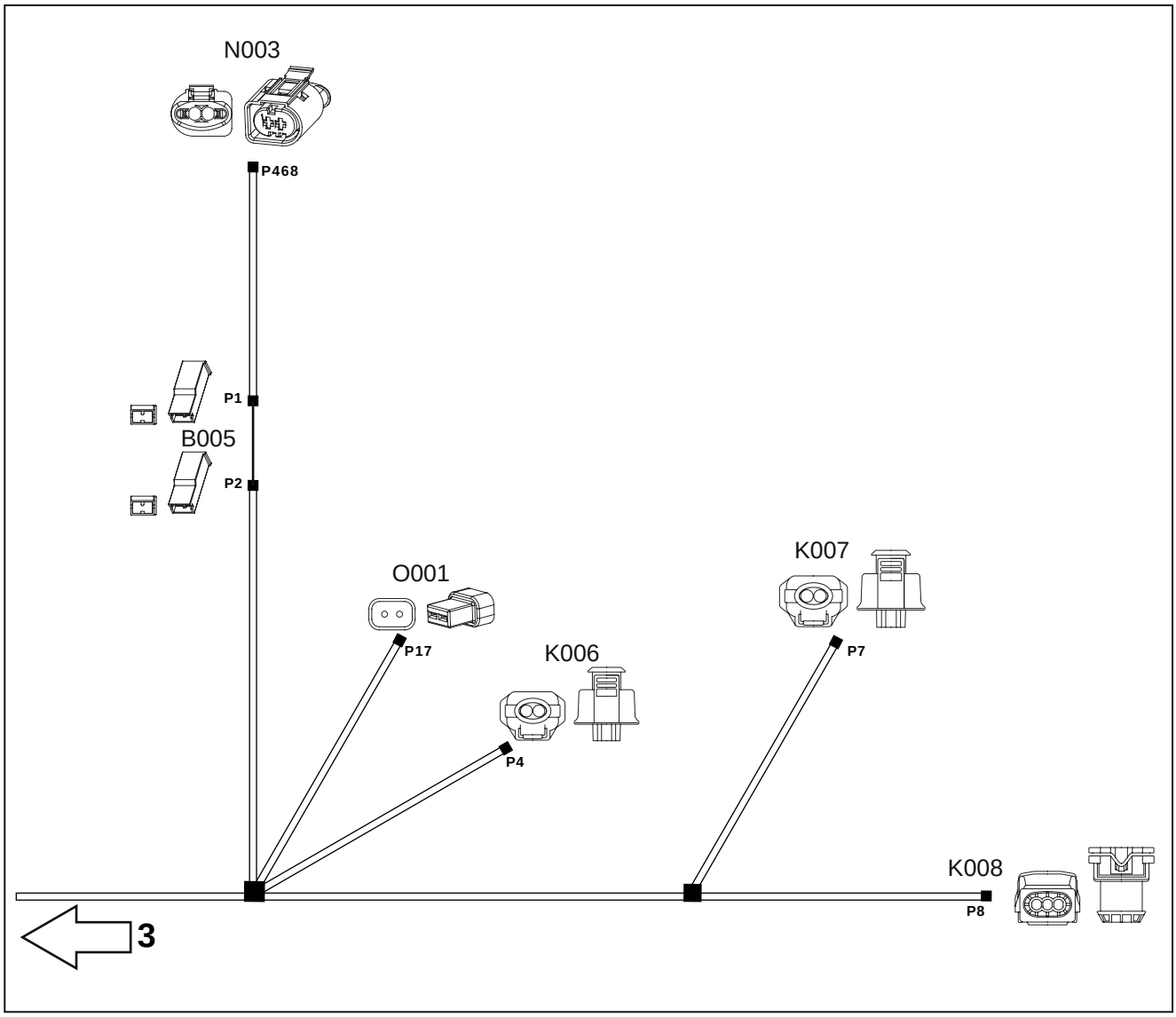

Fig. 12.51

12.4.15.2 Engine wiring loom wiring diagram

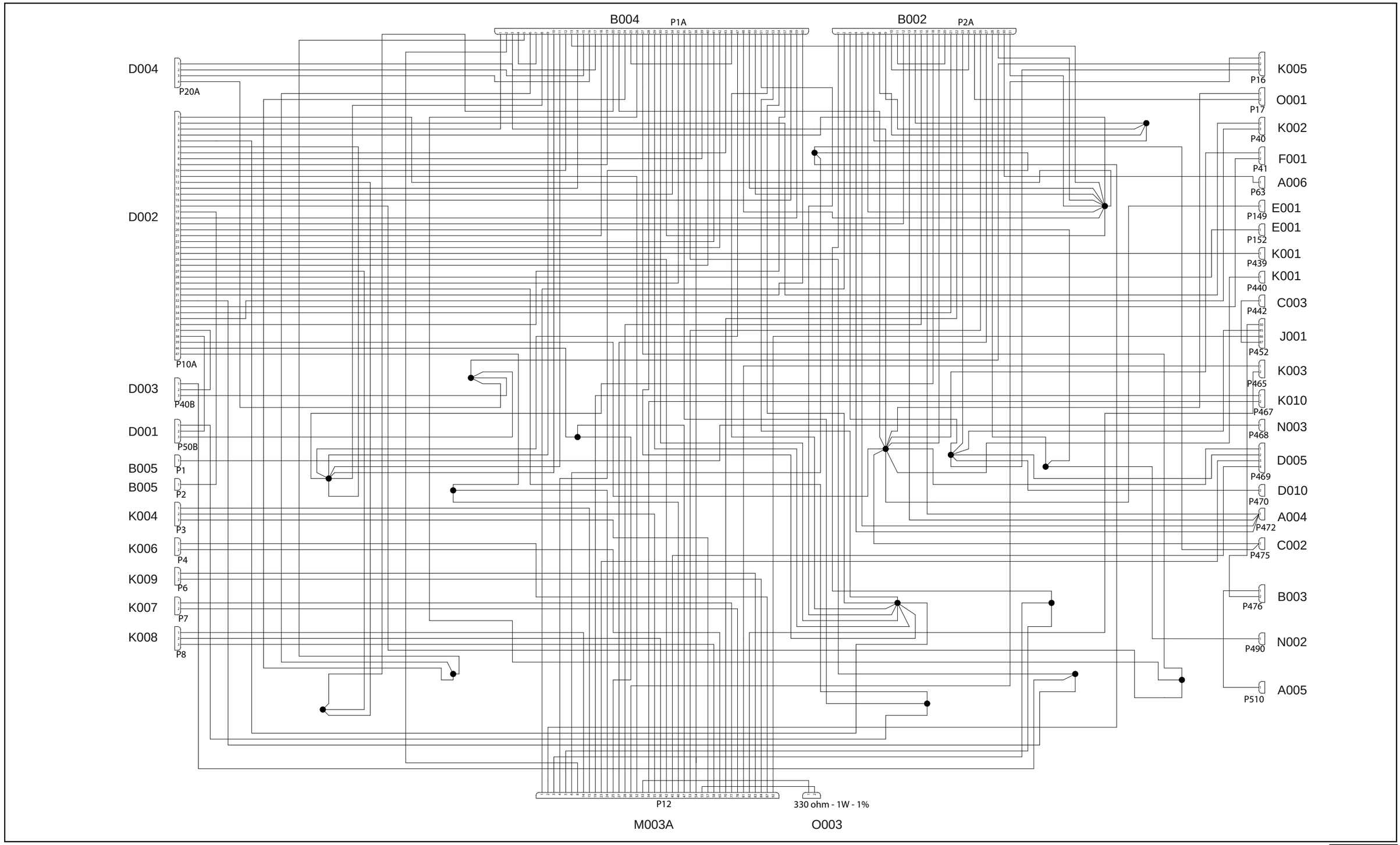

Fig. 12.52

12.4.15.3 Location of engine wiring loom

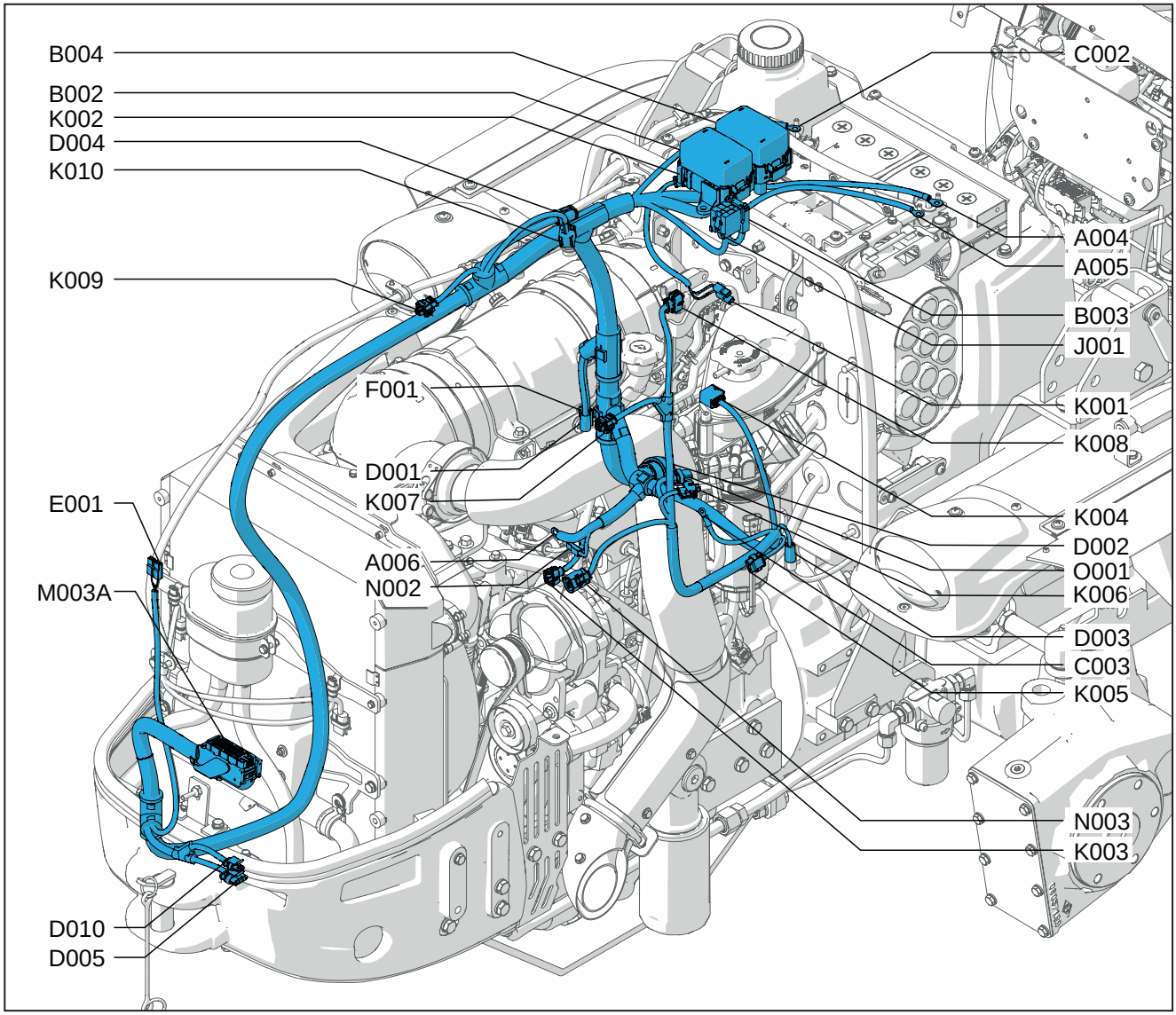

Fig. 12.53

12.4.15.4 Component identification codes

System code	Source code	Description
A004	P472	Battery positive
A005	P510	Glow plug power feed
A006	P63	Starter motor power feed
B002	P2A	Fuse box 1
B003	P476	Glow plug fuse
B004	P1A	Fuse box 2
B005	P1/P2	Diode
C002	P475	Battery ground
C003	P442	Glow plug ground
D001	P50B	Engine-Right front lights connector
D002	P10A	Engine-Main connector
D003	P40B	Engine-Left front lights connector
D004	P20A	Engine-Front lights connector
D005	P469	EGR connector
D010	P470	Throttle valve power feed
E001	P149/ P152	Horn
F001	P41	Headlamp
J001	P452	Glow plug relay
K001	P439/P440	Air filter
K002	P40	Fuel sensor
K003	P465	Exhaust gas temperature
K004	P3	Sensor P3 - Exhaust gas pressure
K005	P16	Water in fuel sensor
K006	P4	Fuel temperature sensor
K007	P7	DOC exhaust gas temperature sensor
K008	P8	DPF differential pressure sensor
K009	P6	DPF exhaust gas temperature sensor
K010	P467	Intake air temperature sensor
N002	P490	Starter motor
N003	P468	Alternator
N004	P5/P9	Starter motor 50
O001	P17	Fuel filter heater
O003	330 Ohms	330 Ohm - 1W resistor

12.4.16 02051073 - Engine E70/E80

12.4.16.1 Installation of engine wiring loom

Table 1

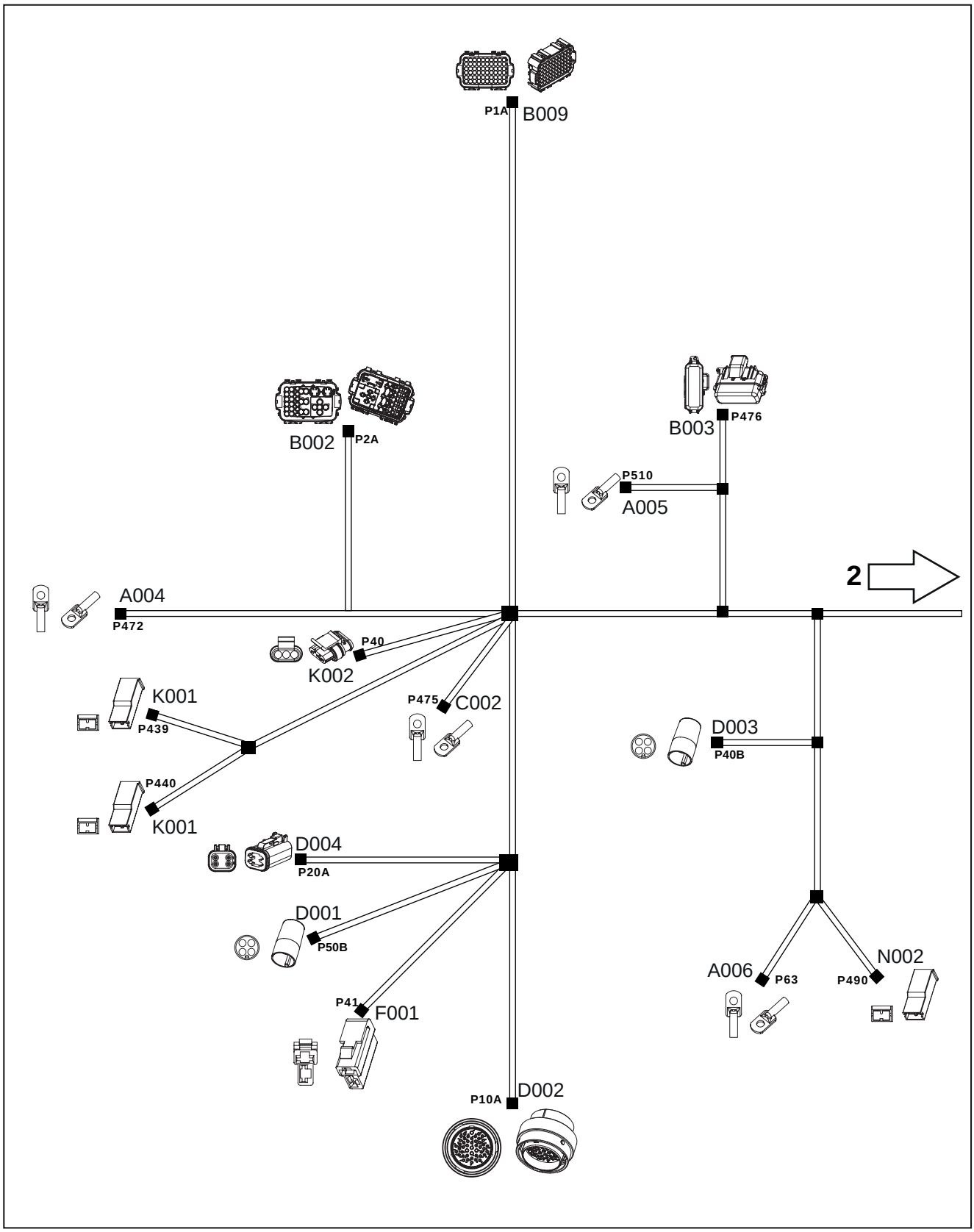

Fig. 12.54

Table 2

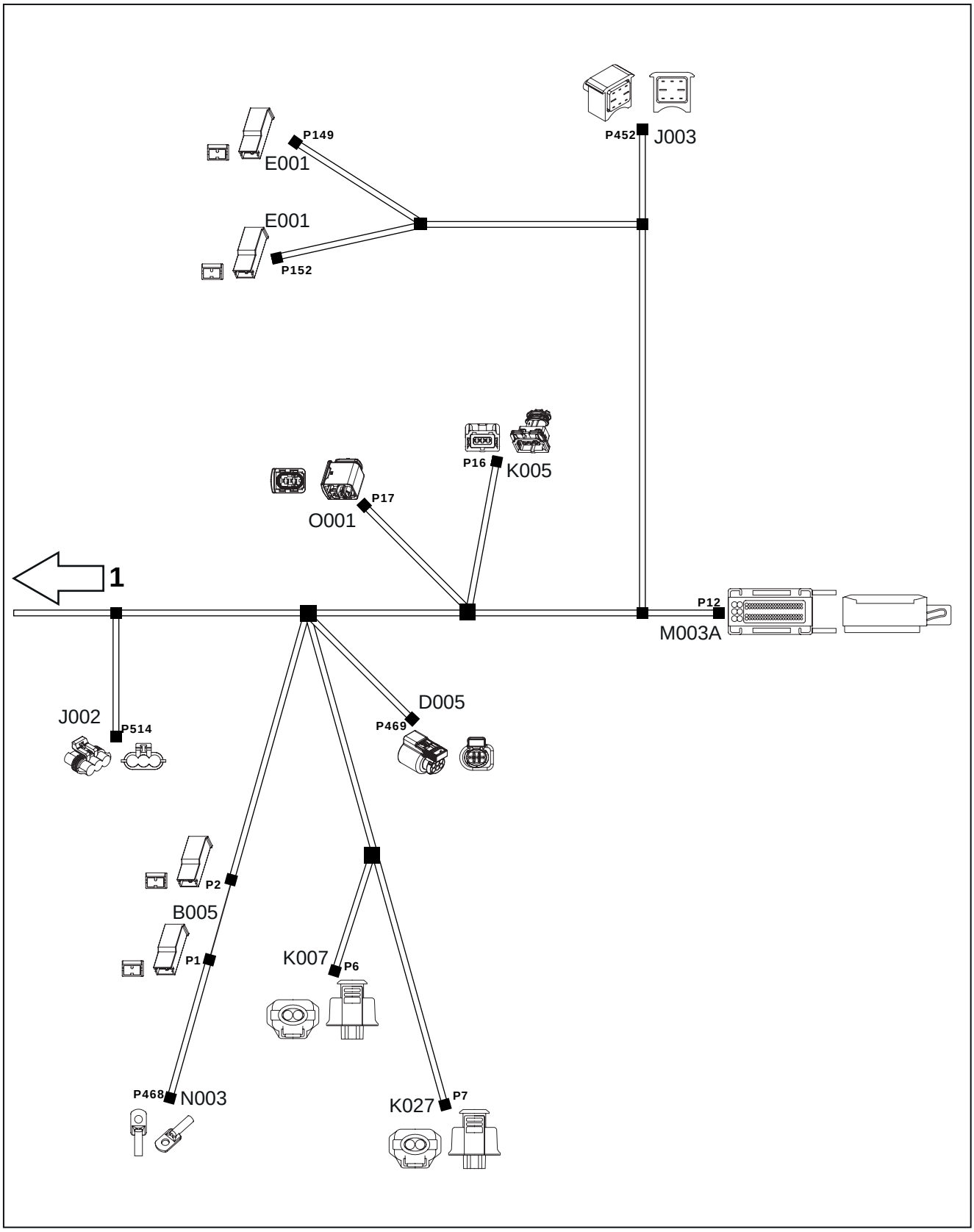

Fig. 12.55

12.4.16.2 Engine wiring loom wiring diagram

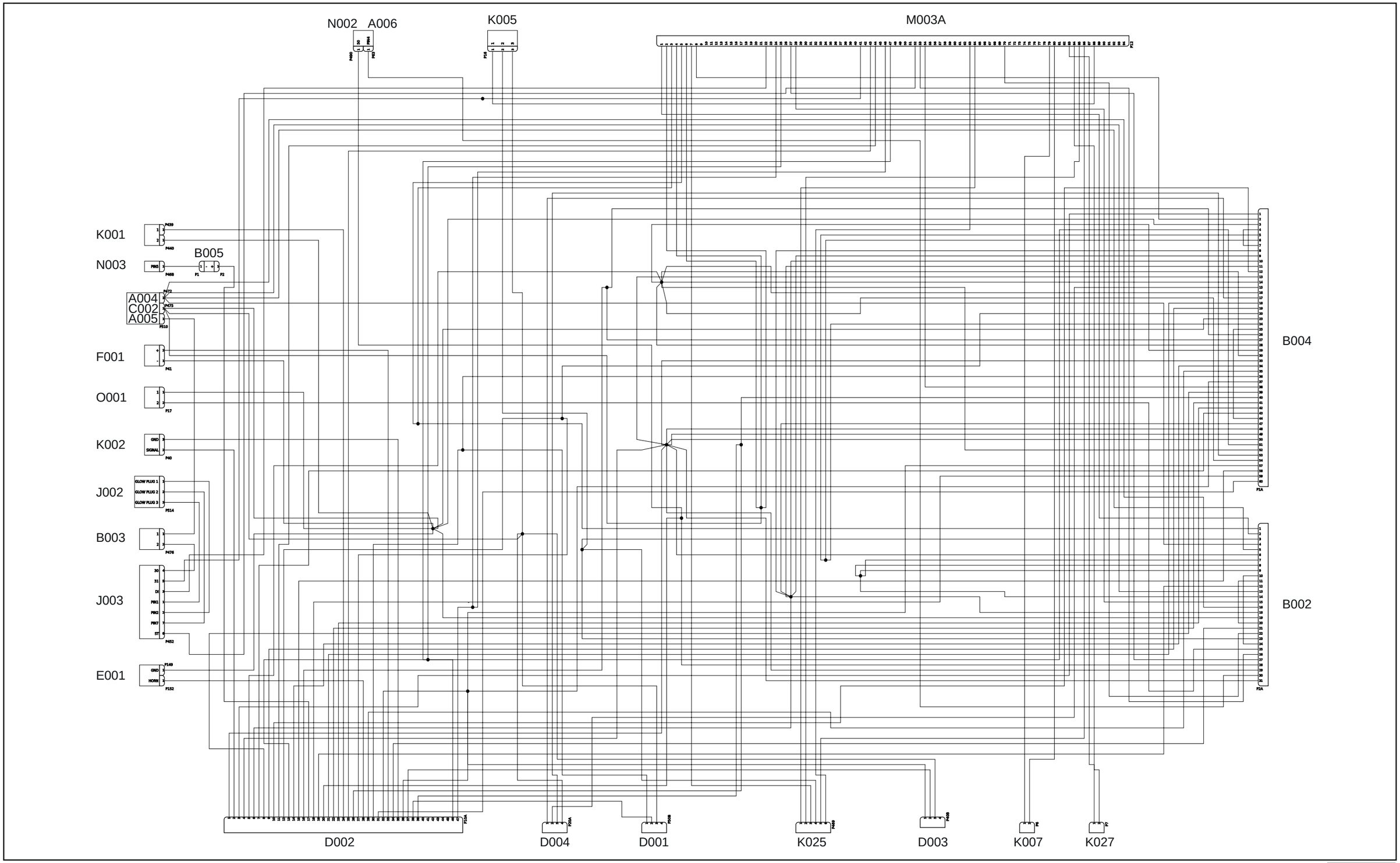

Fig. 12.56

12.4.16.3 Location of engine wiring loom

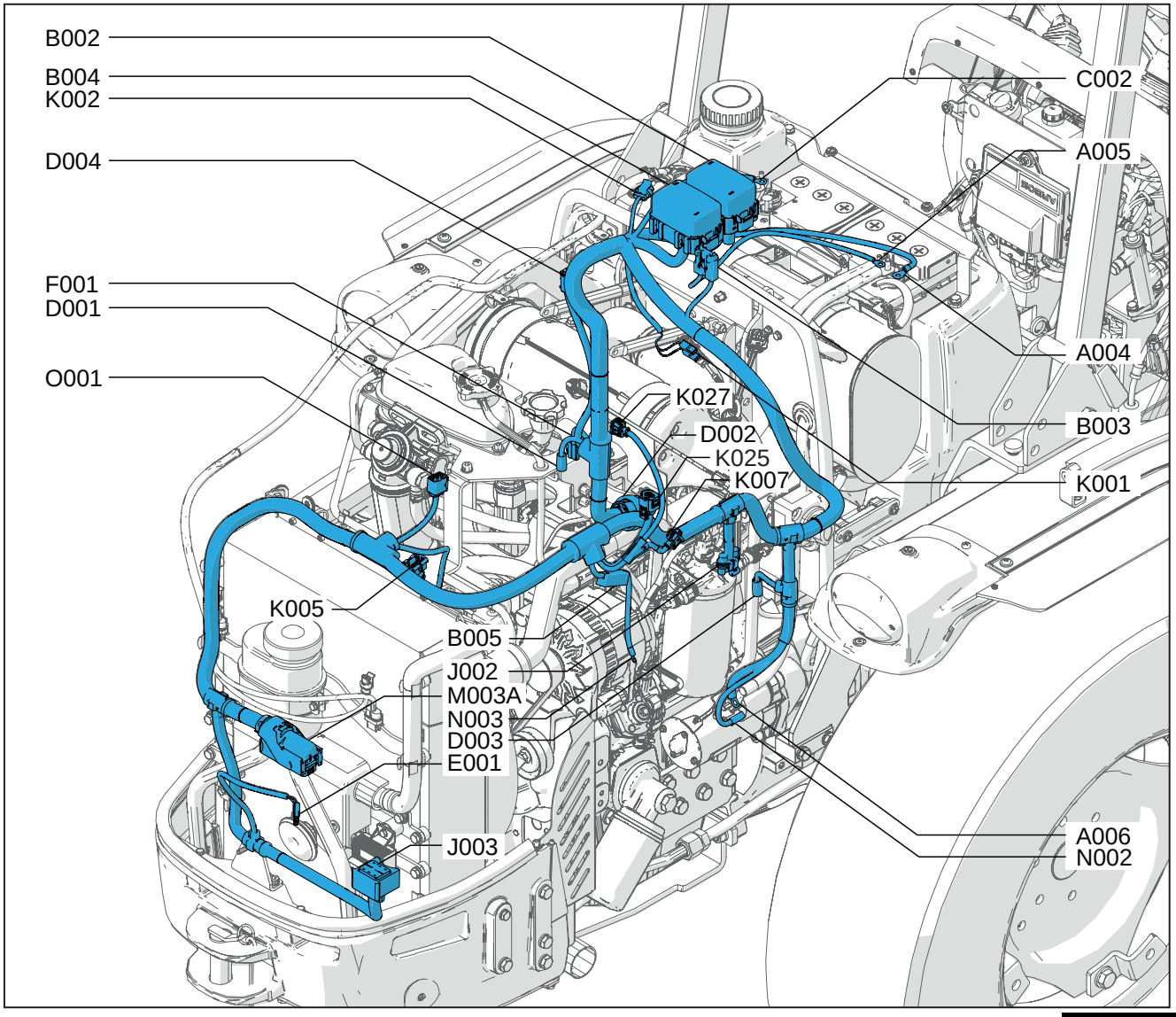

Fig. 12.57

12.4.16.4 Component identification codes

System code	Source code	Description
A004	P472	Battery positive
A005	P510	Glow plug power feed
A006	P63	Starter motor power feed
B002	P2A	Fuse box 1
B003	P476	Glow plug fuse
B004	P1A	Fuse box 2
B005	P1/P2	Diode
C002	P475	Battery ground
D001	P50B	Engine-Right front lights connector
D002	P10A	Engine-Main connector
D003	P40B	Engine-Left front lights connector
D004	P20A	Engine-Front lights connector
E001	P149/ P152	Horn
F001	P41	Headlamp
J002	P514	Glow plugs
J003	P452	Glow plug control unit
K001	P439/P440	Air filter
K002	P40	Fuel sensor
K005	P16	Water in fuel sensor
K007	P6	DOC exhaust gas temperature sensor
K025	P469	Lambda sensor
K027	P7	POC exhaust gas temperature sensor
N002	P490	Starter motor
N003	P468	Alternator
O001	P17	Fuel filter heater

12.4.17 02051072 - Main

12.4.17.1 Installation of main wiring loom

Table 1

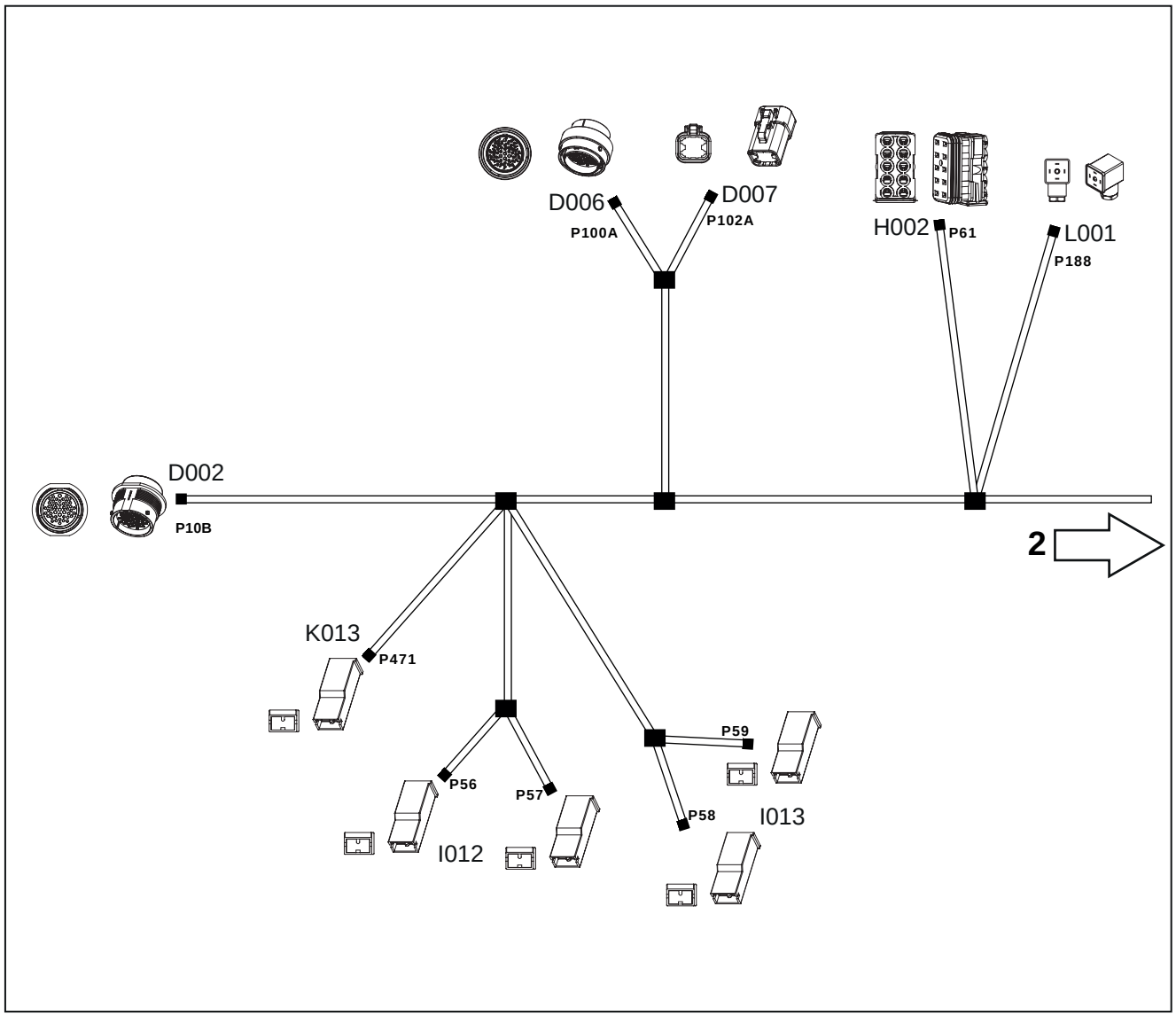

Fig. 12.58

Table 2

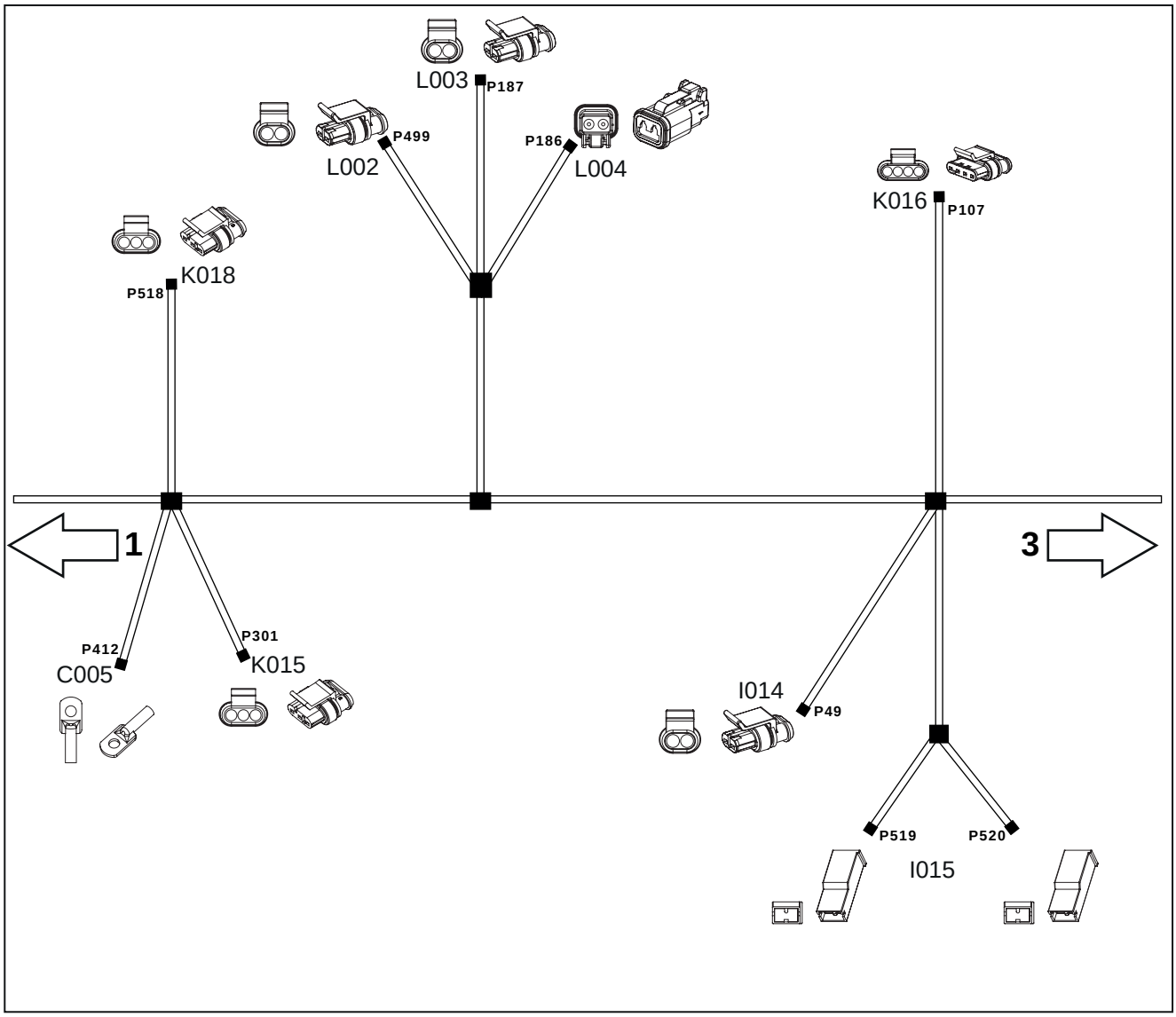

Fig. 12.59

Table 3

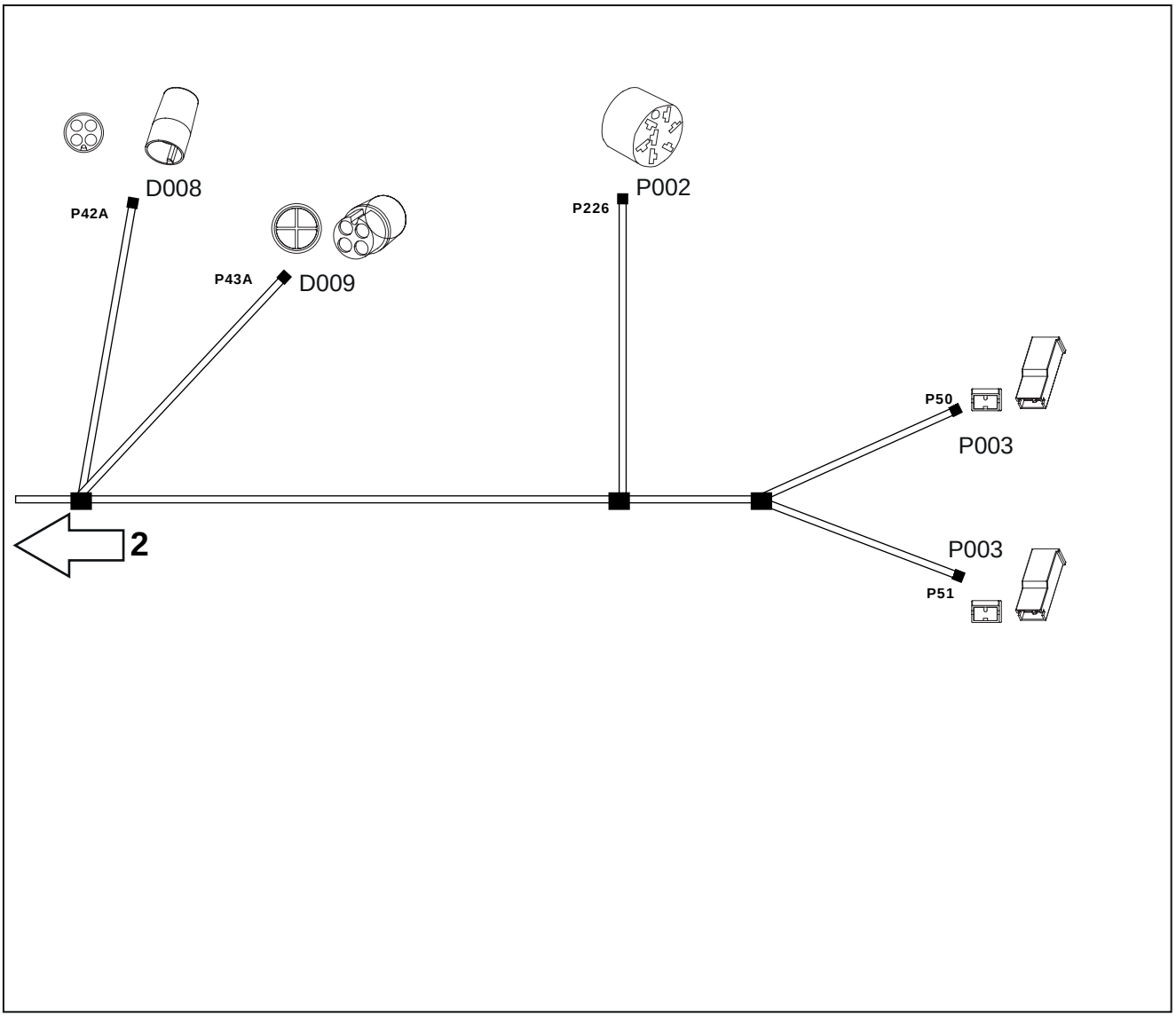

Fig. 12.60

12.4.17.2 Main wiring loom wiring diagram

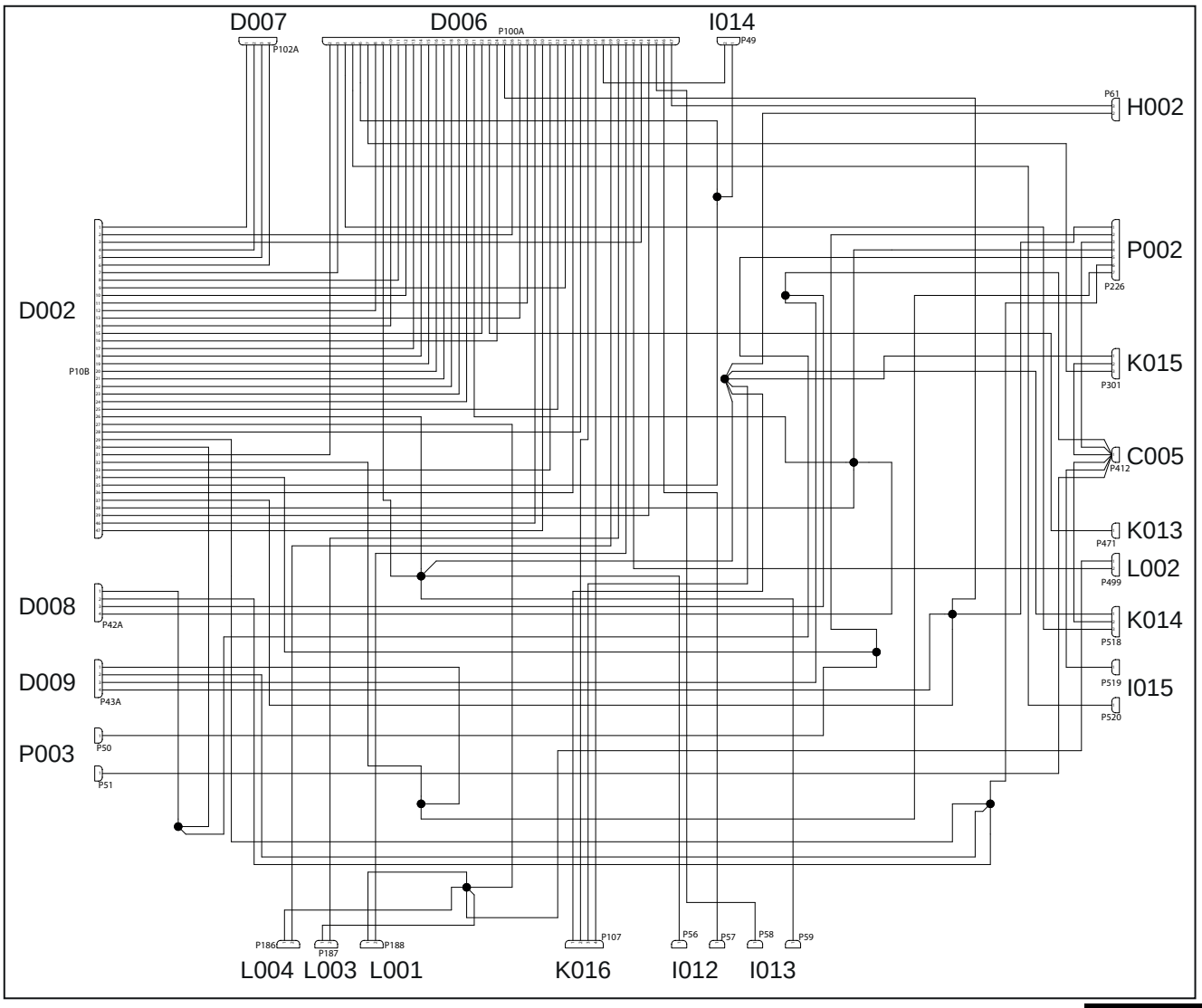

Fig. 12.61

12.4.17.3 Location of main wiring loom E90/E100

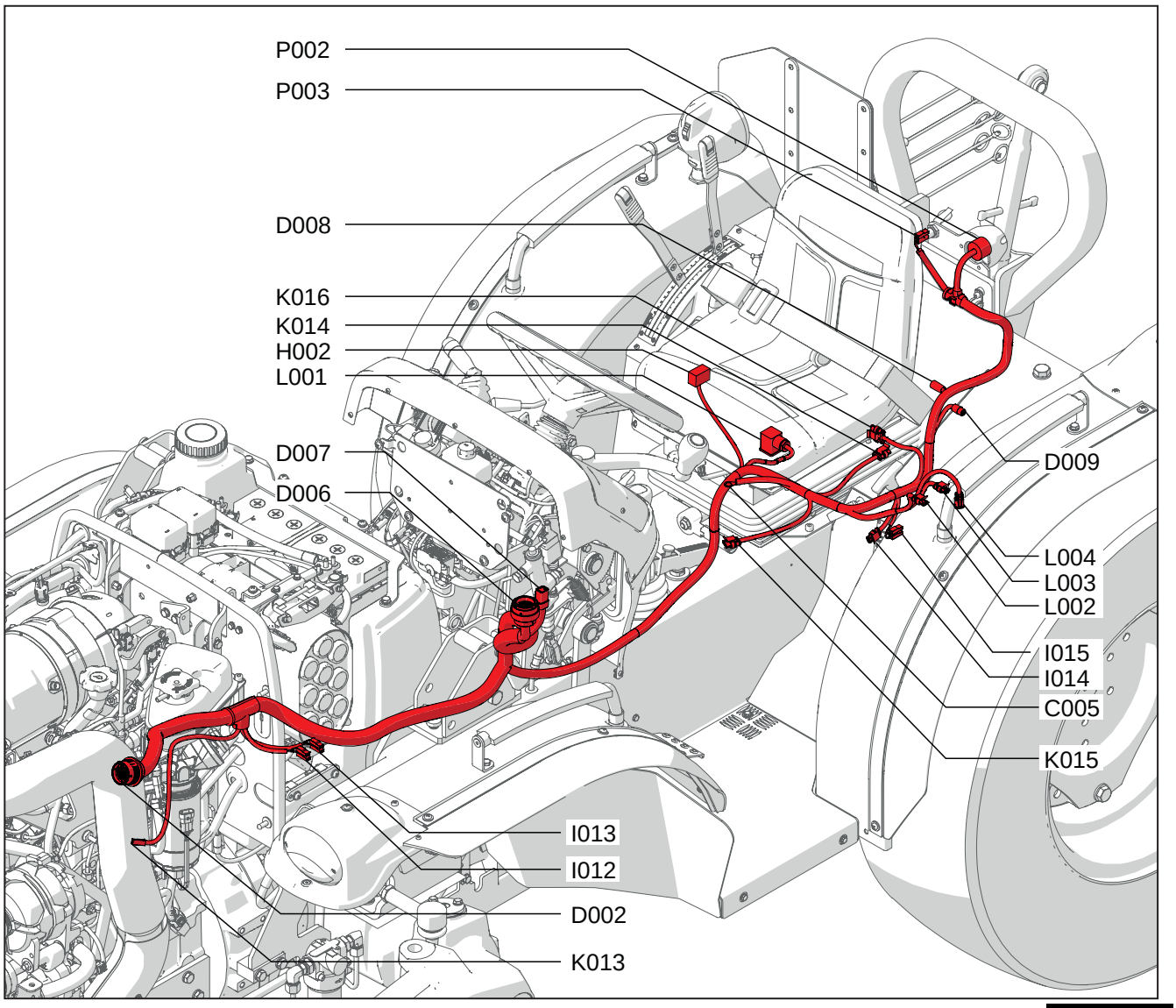

Fig. 12.62

12.4.17.4 Component identification codes

System code	Source code	Description
C005	P412	Main ground
D002	P10B	Main-Engine connector
D006	P100A	Main-dashboard connector
D007	P102A	Main-dashboard connector
D008	P42A	Main-Right rear lights connector
D009	P43A	Main-Left rear lights connector
H002	P61	Diverter
I012	P56/P57	RH reverse shuttle lever
I013	P58/P59	LH reverse shuttle lever
I014	P49	PTO safety synchro switch
I015	P519/P520	PTO speed selector
K013	P471	Hydraulic oil pressure
K014	P518	PTO speed sensor
K015	P301	Wheel speed
K016	P107	Seat start enable signal
K024	P302/P303	Wiring harness for transmission speed sensor
L001	P188	Diverter valve
L002	P499	PTO directional valve
L003	P187	Differential lock valve
L004	P186	4WD valve
P002	P226	7 pole power socket
P003	P50/P51	1 pole power socket

12.4.17.5 Location of main wiring loom E70/E80

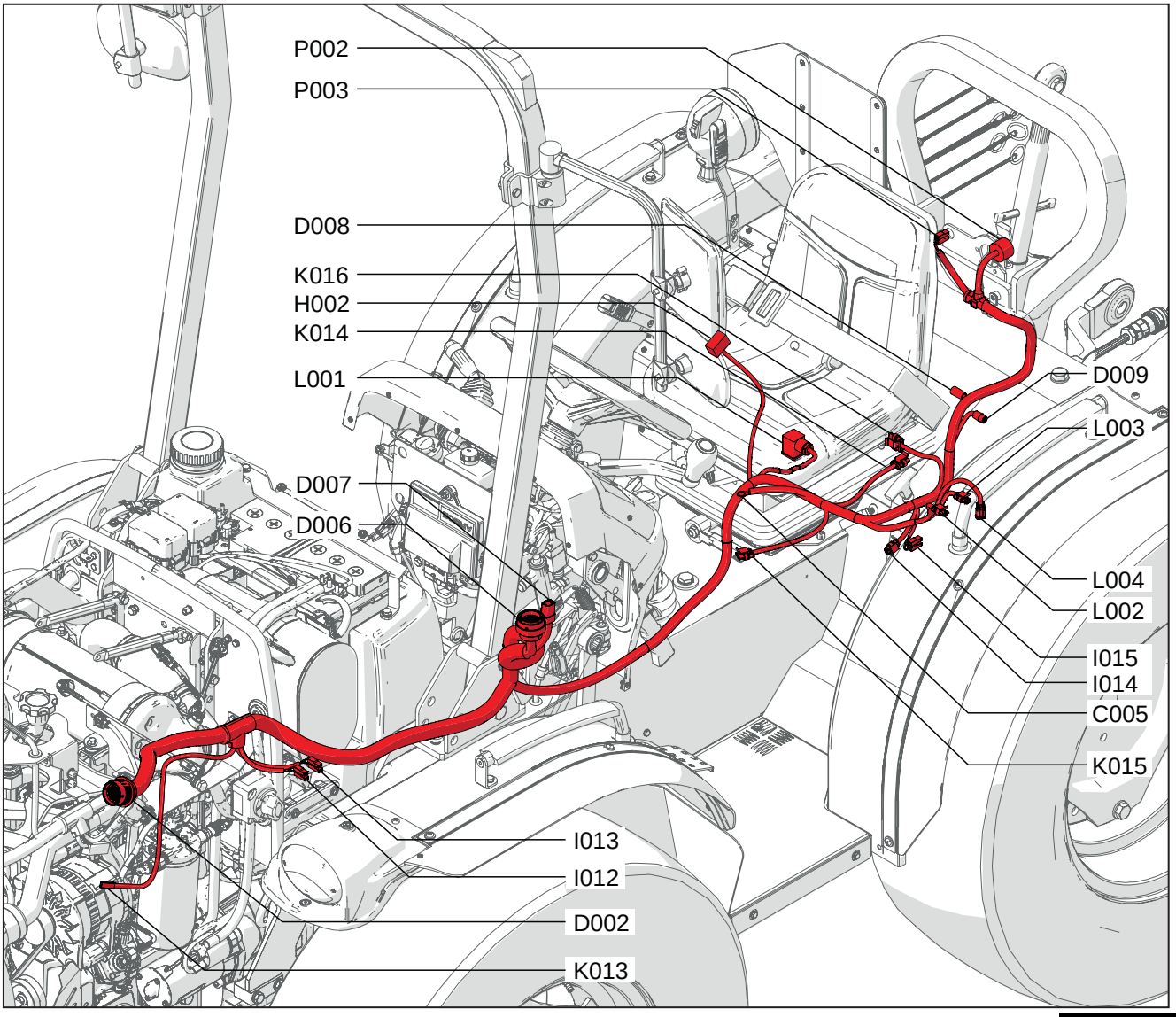

Fig. 12.63

12.4.17.6 Component identification codes

System code	Source code	Description
C005	P412	Main ground
D002	P10B	Main-Engine connector
D006	P100A	Main-dashboard connector
D007	P102A	Main-dashboard connector
D008	P42A	Main-Right rear lights connector
D009	P43A	Main-Left rear lights connector
H002	P61	Diverter
I012	P56/P57	RH reverse shuttle lever
I013	P58/P59	LH reverse shuttle lever
I014	P49	PTO safety synchro switch
I015	P519/P520	PTO speed selector
K013	P471	Hydraulic oil pressure
K014	P518	PTO speed sensor
K015	P301	Wheel speed
K016	P107	Seat start enable signal
K024	P302/P303	Wiring harness for transmission speed sensor
L001	P188	Diverter valve
L002	P499	PTO directional valve
L003	P187	Differential lock valve
L004	P186	4WD valve
P002	P226	7 pole power socket
P003	P50/P51	1 pole power socket

12.4.18 46335436 - Prewired engine wiring loom, 4 cylinder engine, for E90/ E100

12.4.18.1 Installation of prewired engine wiring loom

Table 1

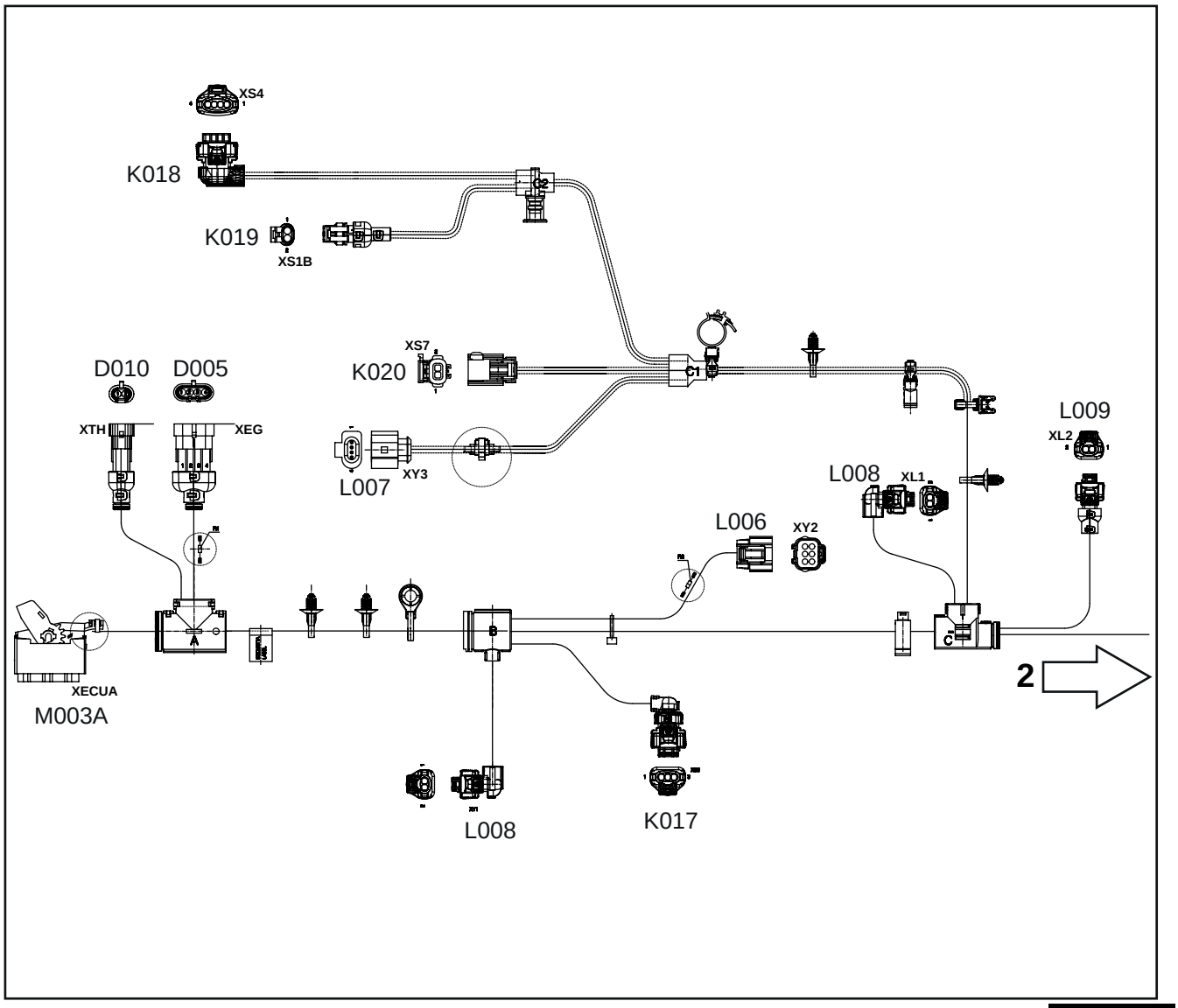

Fig. 12.64

Table 2

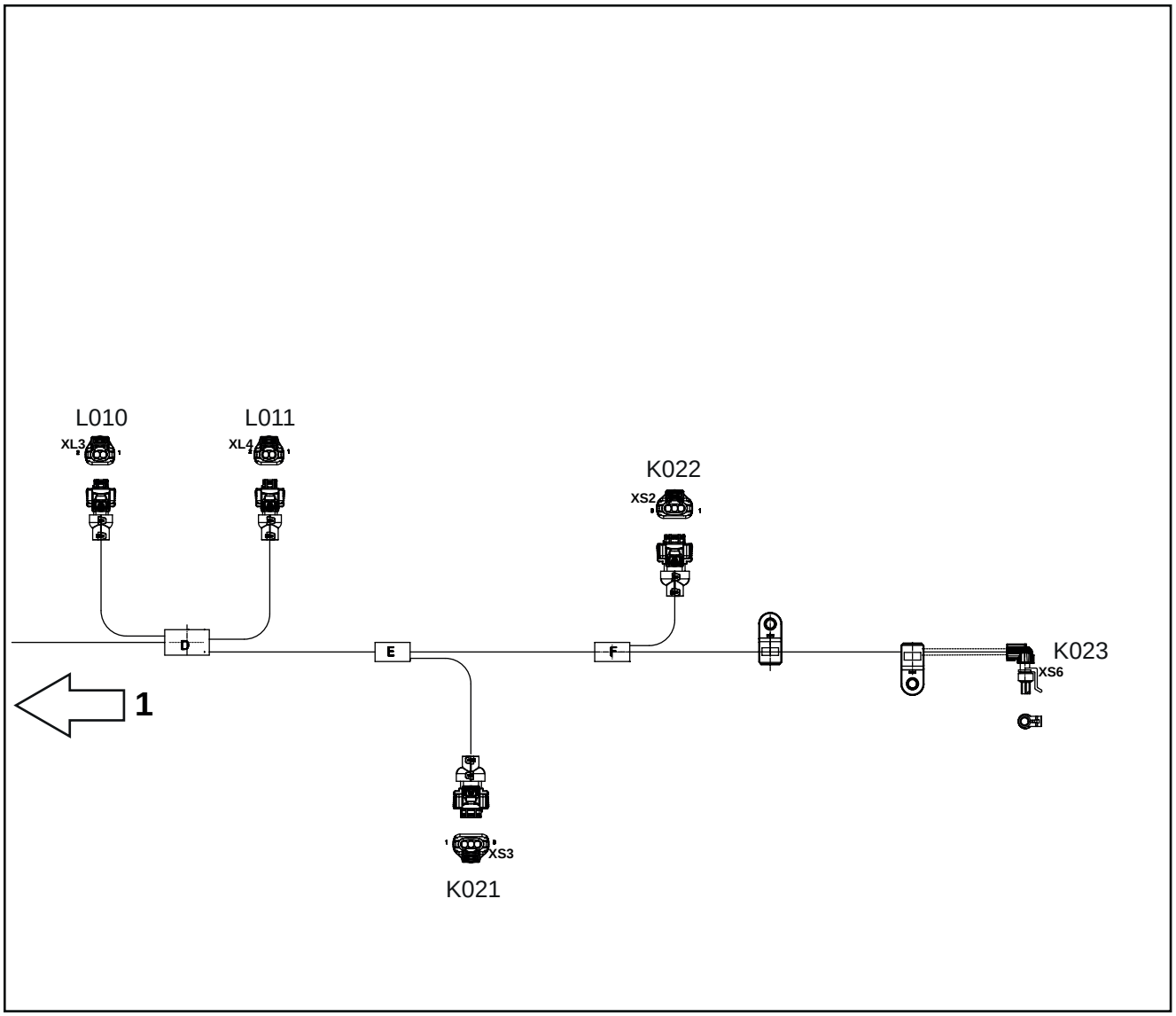

Fig. 12.65

12.4.18.2 Prewired engine wiring loom wiring diagram

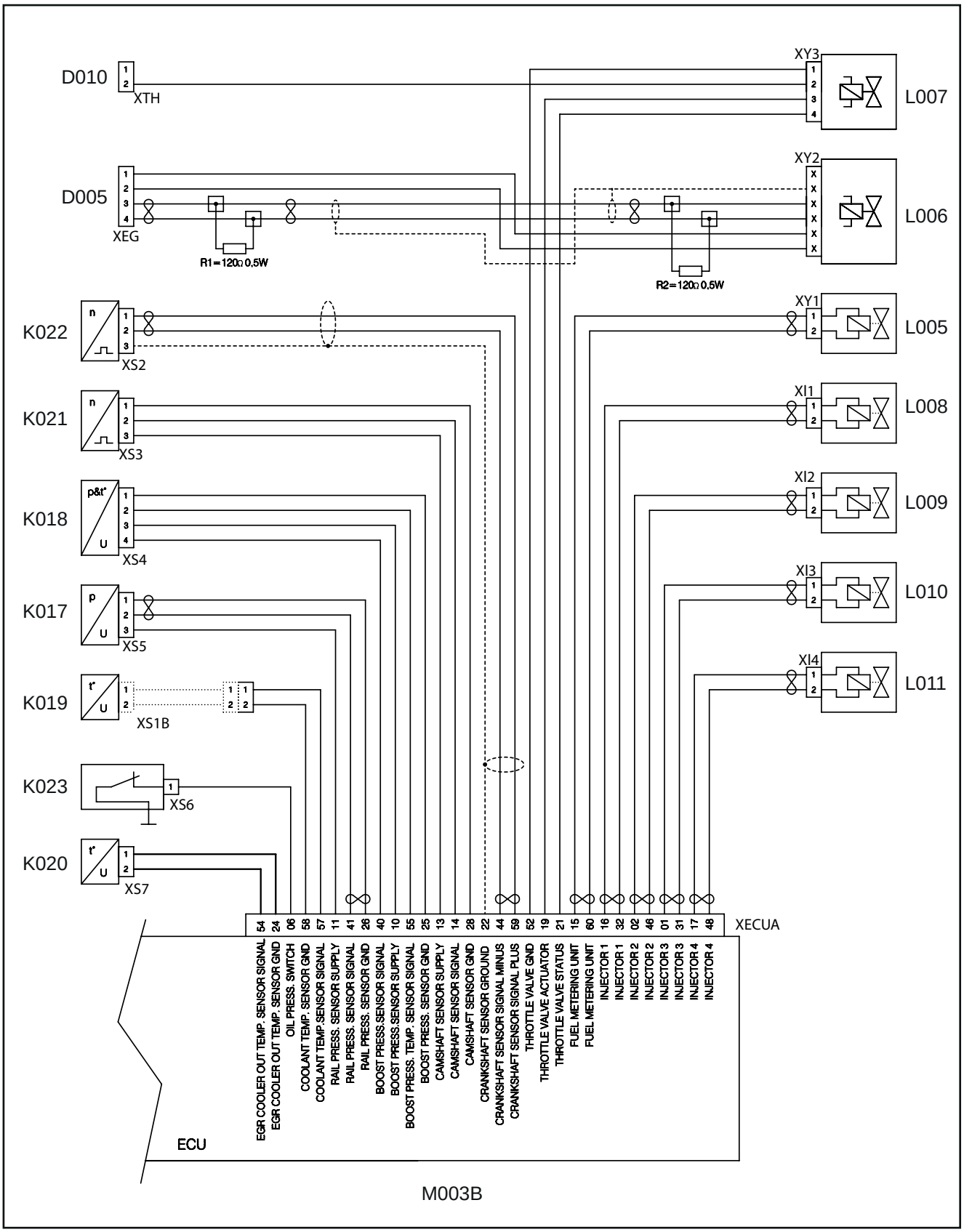

Fig. 12.66

12.4.18.3 Location of prewired engine wiring loom

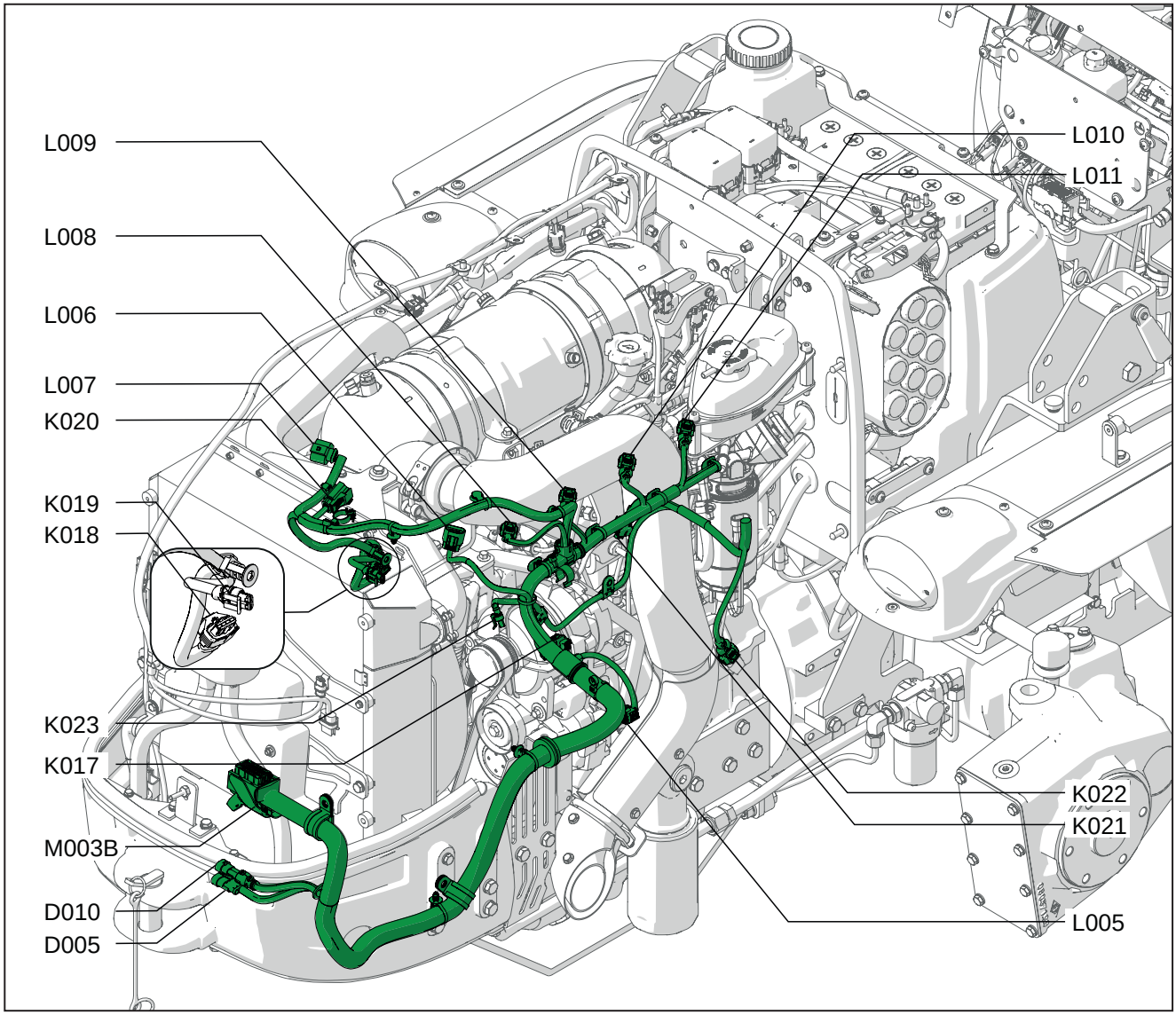

Fig. 12.67

12.4.18.4 Component identification codes

System code	Source code	Description
D010	XTH	Throttle valve power feed
D005	XEG	Exhaust gas recirculation solenoid valve power feed
K017	XS5	Common Rail fuel pressure sensor
K018	XS4	Temperature and pressure sensor (BOOST)
K019	XS1B	Coolant temperature sensor
K020	XS7	EGR temperature sensor
K021	XS3	Camshaft timing sensor
K022	XS2	Crankshaft speed sensor
K023	XS6	Oil pressure switch
L005	XY1	High pressure pump
L006	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007	XY3	Throttle valve
L008	XI1	Fuel electro-injector 1
L009	XI2	Fuel electro-injector 2
L010	XI3	Fuel electro-injector 3
L011	XI4	Fuel electro-injector 4
M003B	XECUA	Engine control unit

12.4.19 18852290 - Prewired engine wiring loom, 3 cylinder engine, for E70/ E80

12.4.19.1 Installation of prewired engine wiring loom

Table 1

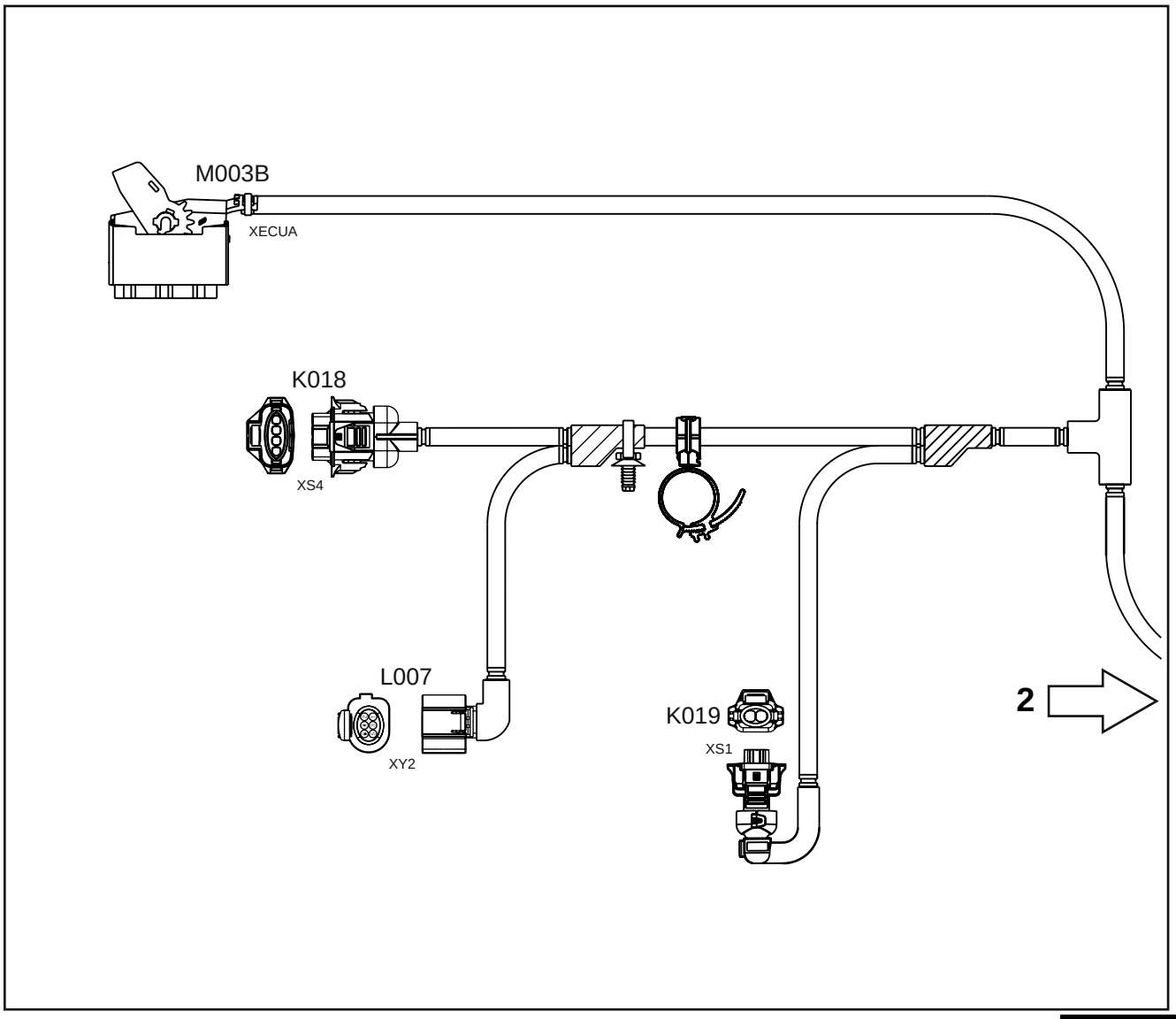

Fig. 12.68

Table 2

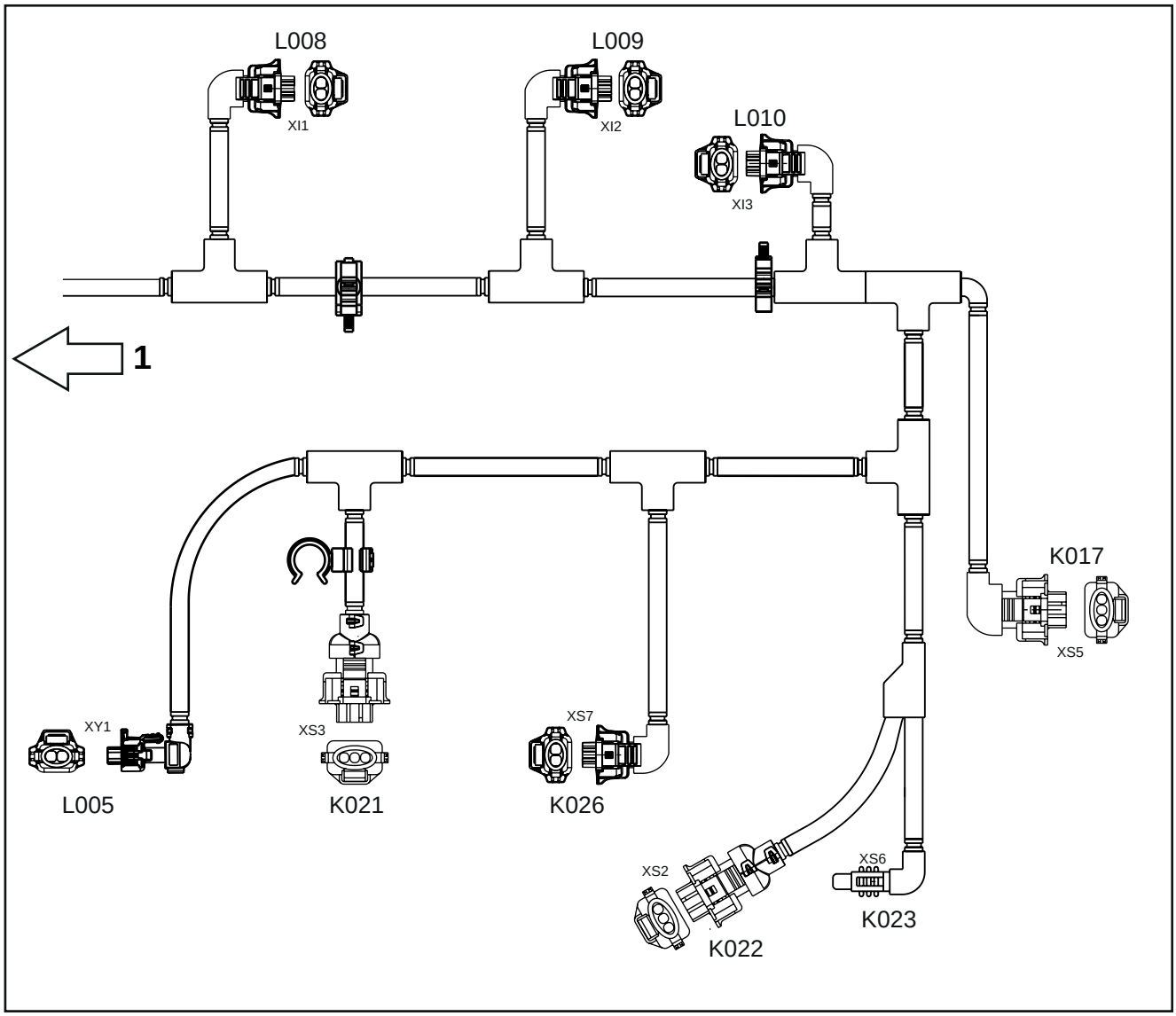

Fig. 12.69

12.4.19.2 Prewired engine wiring loom wiring diagram

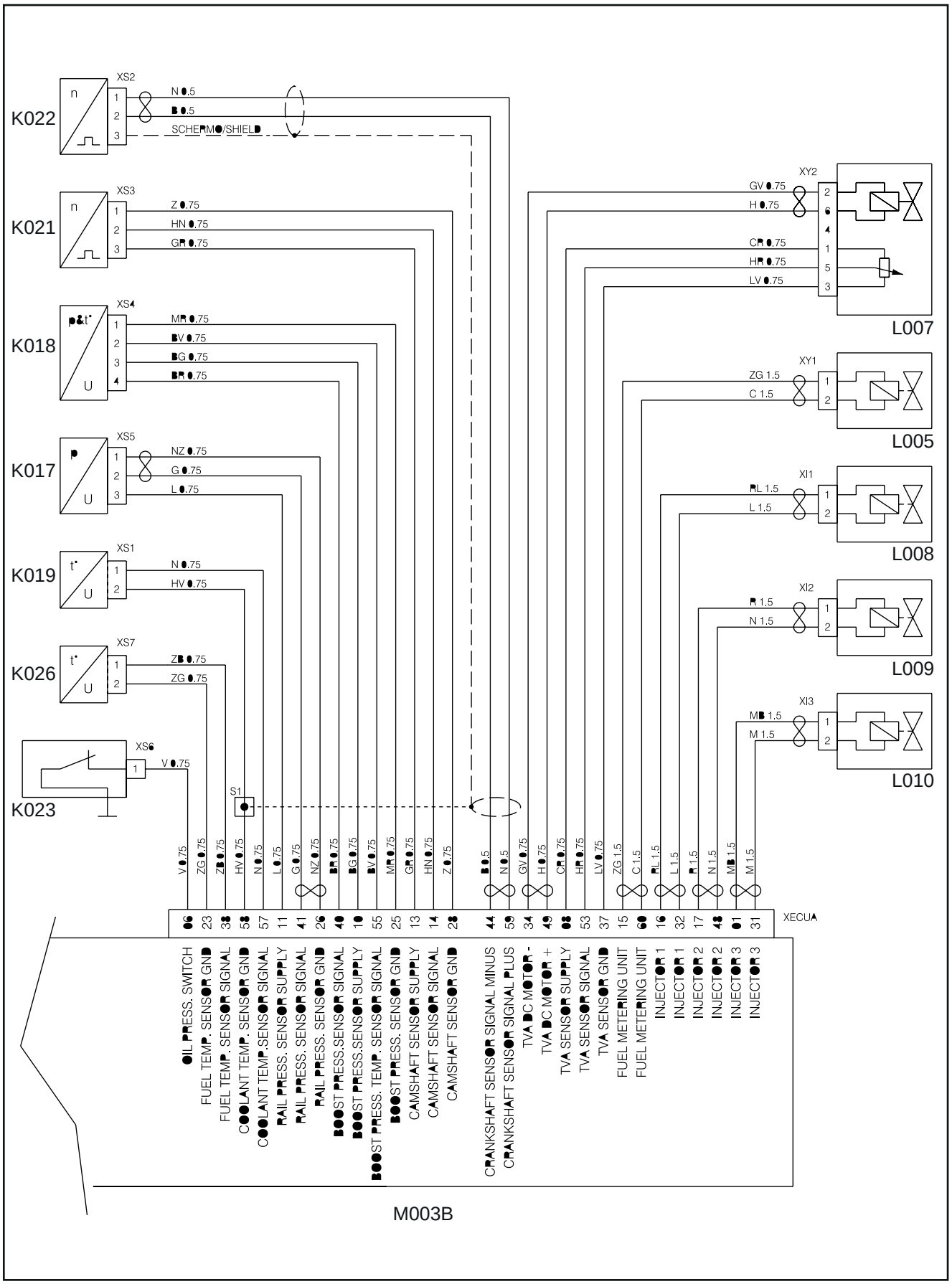

Fig. 12.70

12.4.19.3 Location of prewired engine wiring loom

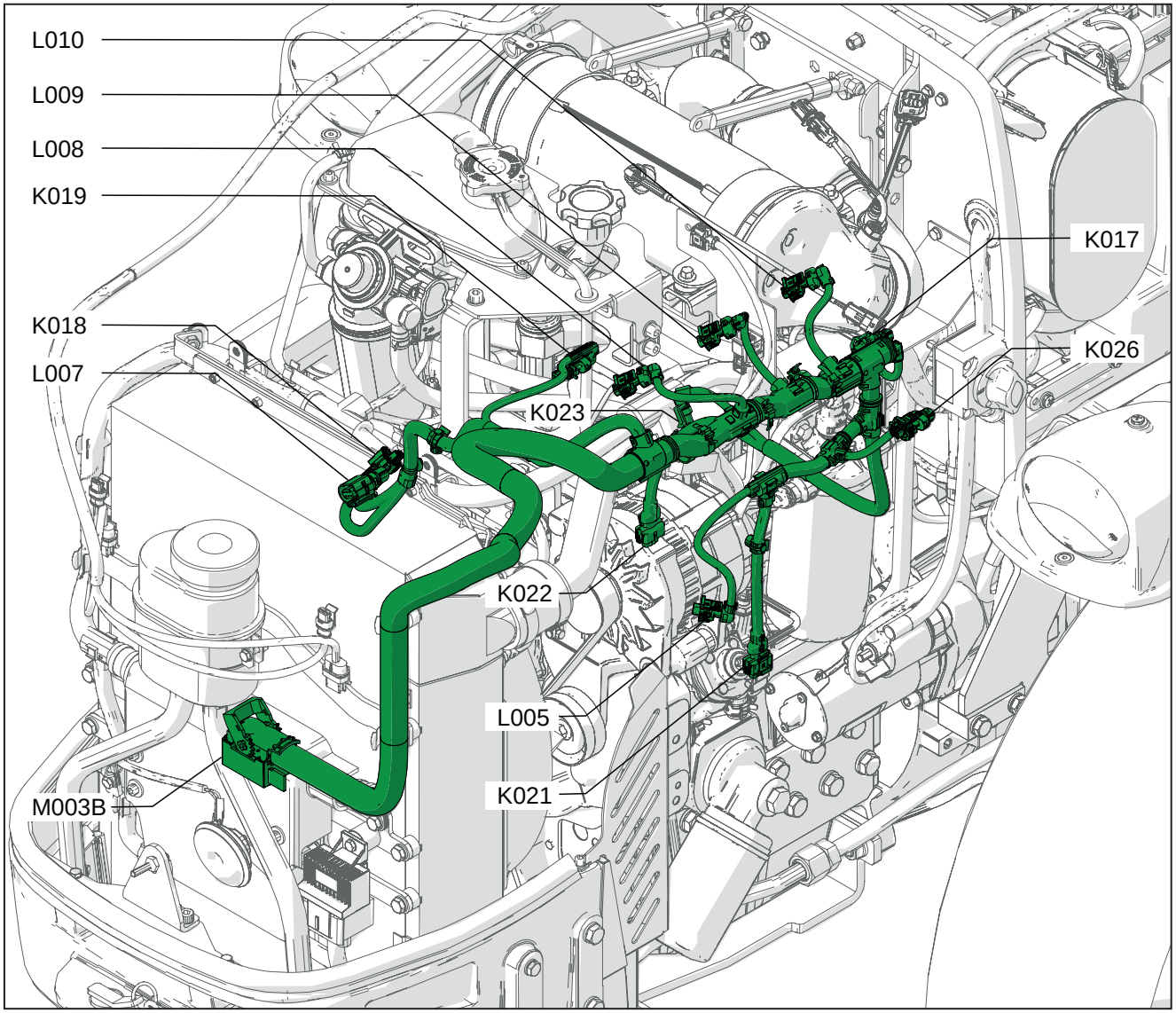

Fig. 12.71

12.4.19.4 Component identification codes

System code	Source code	Description
K017	XS5	Common Rail fuel pressure sensor
K018	XS4	Temperature and pressure sensor (BOOST)
K019	XS1	Coolant temperature sensor
K021	XS3	Camshaft timing sensor
K022	XS2	Crankshaft speed sensor
K023	XS6	Oil pressure switch
L005	XY1	High pressure pump
L007	XY2	Throttle valve
L008	XI1	Fuel electro-injector 1
L009	XI2	Fuel electro-injector 2
L010	XI3	Fuel electro-injector 3
M003B	XECUA	Engine control unit

12.5 Systems, E90/E100

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12.5.8 S008 - Transmission 12-105

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12.5.1 S001 - Power feed and starting

Electrical wiring diagram: Power feed and starting

Table 1

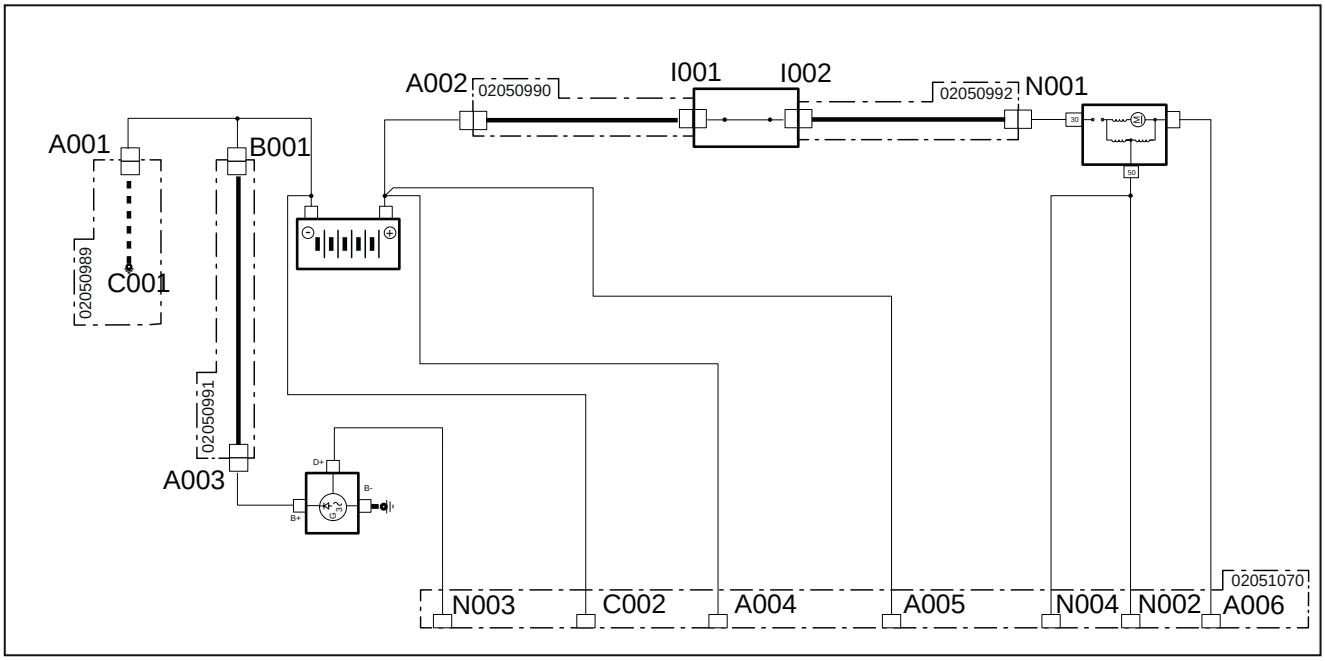

Fig. 12.72

Table 2

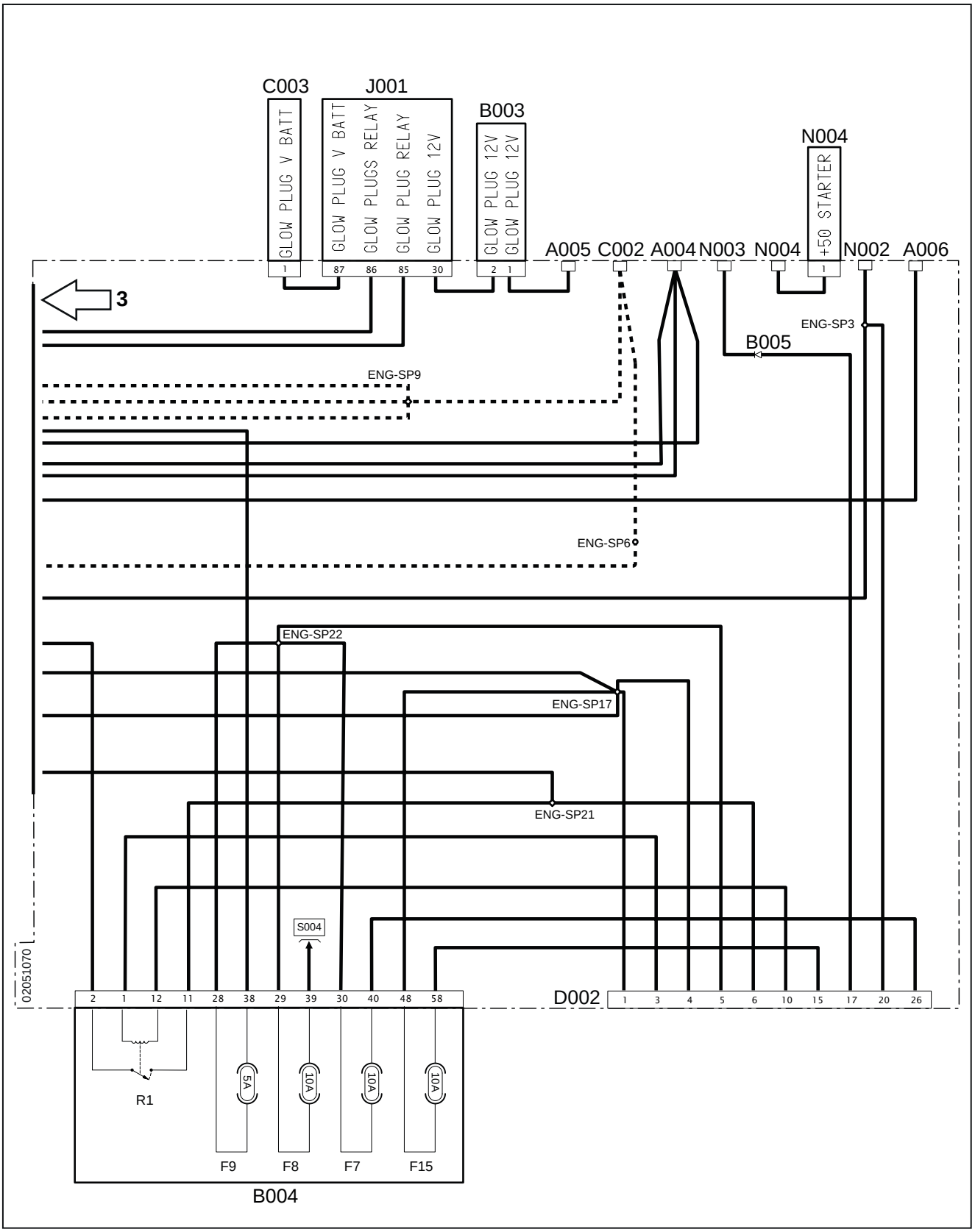

Fig. 12.73

Table 3

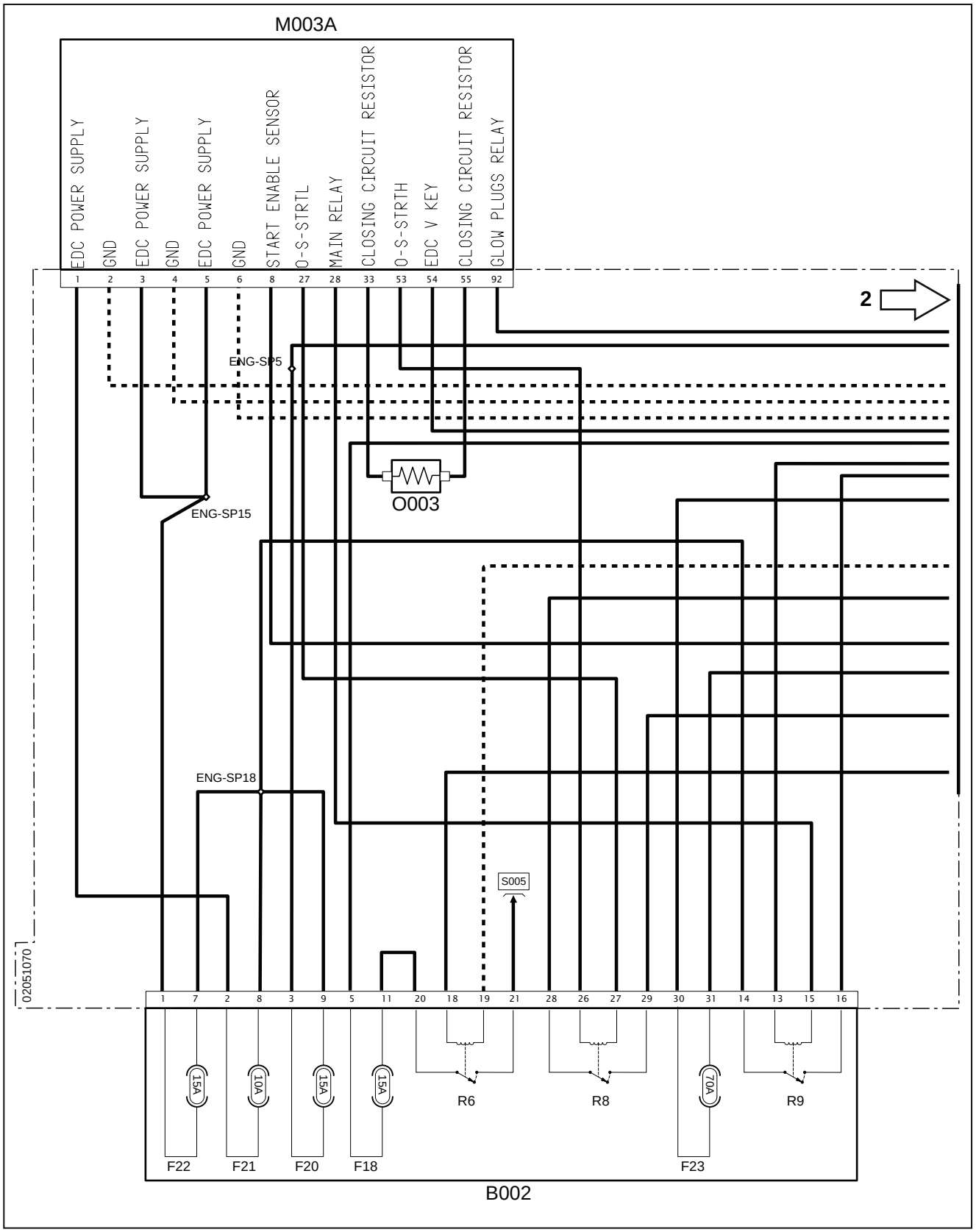

Fig. 12.74

Table 4

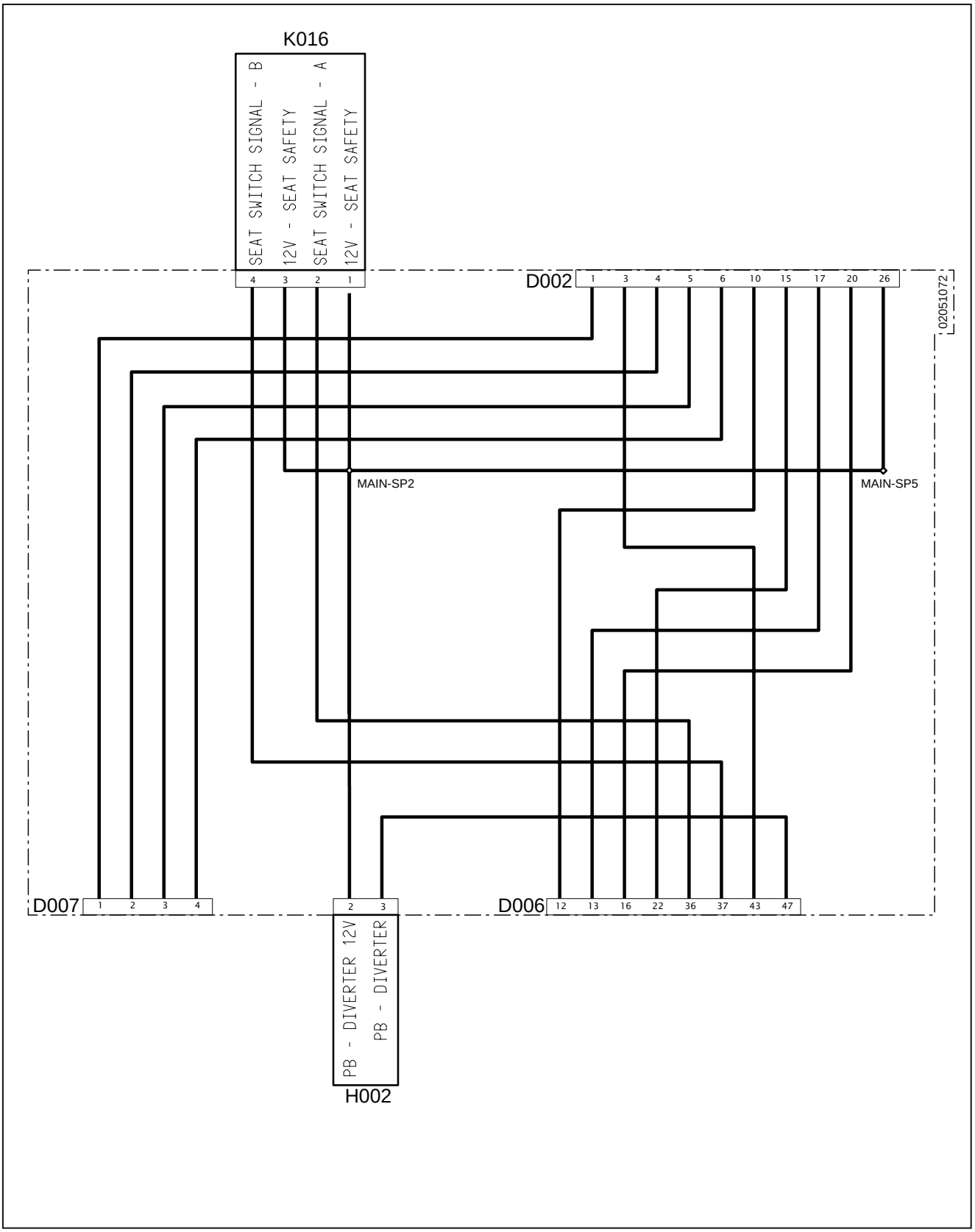

Fig. 12.75

Table 5

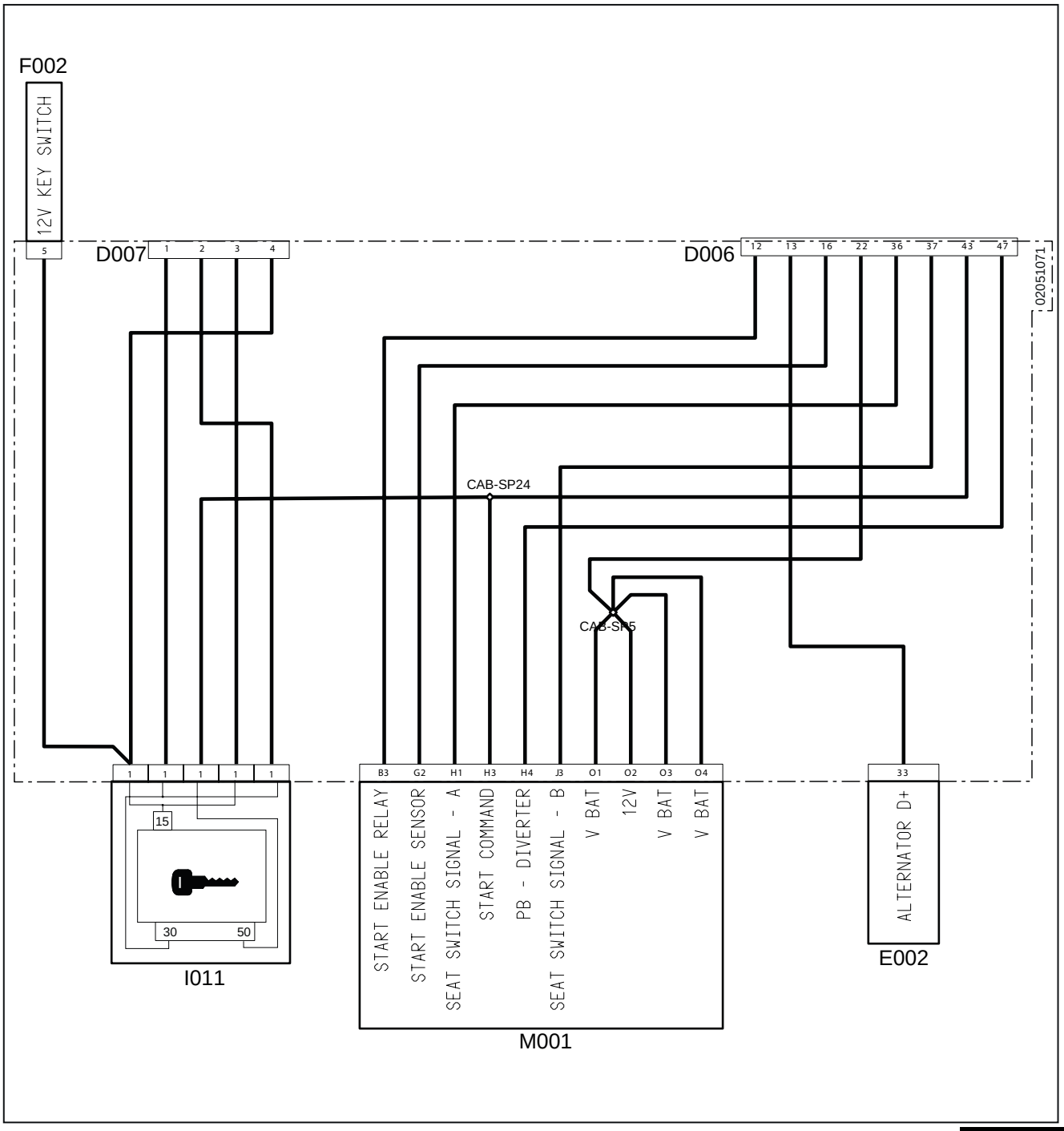

Fig. 12.76

A001 - Battery negative
A002 - Battery positive
A003 - Alternator power feed
A004 - Battery positive
A005 - Glow plug power feed
A006 - Starter motor power feed
B001 - Battery fuse input
B002 - Fuse box 1
F18(B002) - Trailer socket (15A)
F20(B002) - Accessories (15A)
F21(B002) - 12V ECU power feed (10A)
F22(B002) - 12V ECU power feed (15A)
F23(B002) - Main maxi fuse (70A)
R6(B002) - Trailer socket relay (30A)
R8(B002) - Start relay (20A)
R9(B002) - Main relay (30A)
B003 - Glow plug fuse
B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
F8(B004) - Turn indicators (10A)
F9(B004) - Key-on power feed for ECU (5A)
F15(B004) - 12V VCU power feed (10A)
R1(B004) - Start enable relay
C001 - Battery ground
C002 - Battery ground
C003 - Glow plug ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D007 - Main-dashboard connector
E002 - Dashboard
F002 - Lights selector switch
H002 - Diverter
I001 - Battery master relay switch (input terminal)
I002 - Battery master relay switch (output terminal)
I011 - Ignition switch
J001 - Glow plug relay
K016 - Seat start enable signal
M001 - Vehicle ECU
M003A - Engine control unit
N001 - Starter motor input terminal
N002 - Starter motor
N003 - Alternator
N004 - Starter motor 50
O003 - 330 Ohm - 1W resistor

Location in vehicle: Power feed and starting

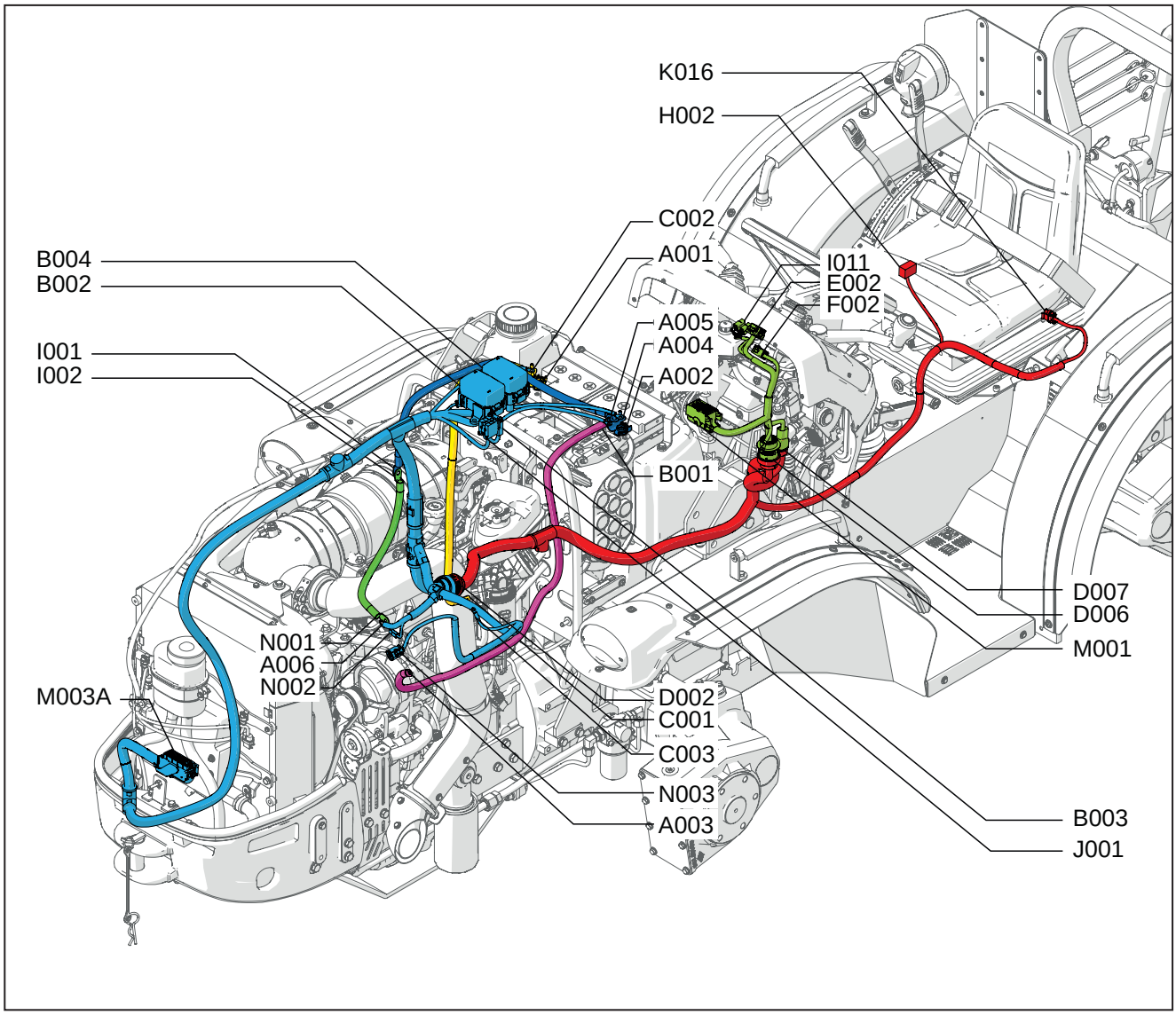

Fig. 12.77

A001 - Battery negative
A002 - Battery positive
A003 - Alternator power feed
A004 - Battery positive
A005 - Glow plug power feed
A006 - Starter motor power feed
B001 - Battery fuse input
B002 - Fuse box 1
B003 - Glow plug fuse
B004 - Fuse box 2
C001 - Battery ground
C002 - Battery ground
C003 - Glow plug ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D007 - Main-dashboard connector
E002 - Dashboard
F002 - Lights selector switch
H002 - Diverter
I001 - Battery master relay switch (input terminal)
I002 - Battery master relay switch (output terminal)
I011 - Ignition switch
J001 - Glow plug relay
K016 - Seat start enable signal
M001 - Vehicle ECU
M003A - Engine control unit
N001 - Starter motor input terminal
N002 - Starter motor
N003 - Alternator

12.5.2 S002 - DPF

Electrical wiring diagram: DPF

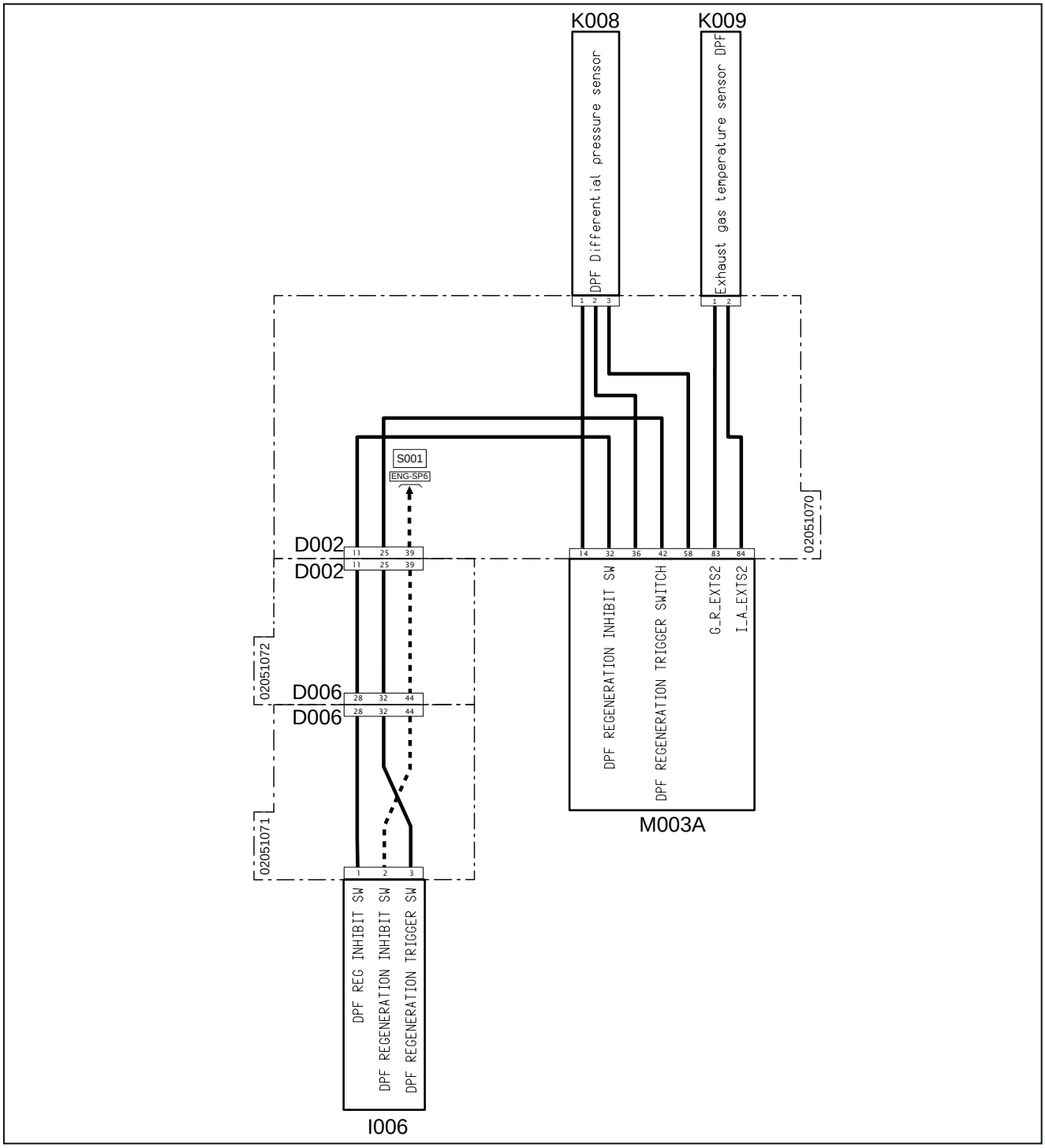

Fig. 12.78

D002 - Main-engine connector
D006 - Main-dashboard connector
I006 - DPF regeneration disable button
K008 - DPF differential pressure sensor
K009 - DPF exhaust gas temperature sensor
M003A - Engine control unit

Location in vehicle: DPF

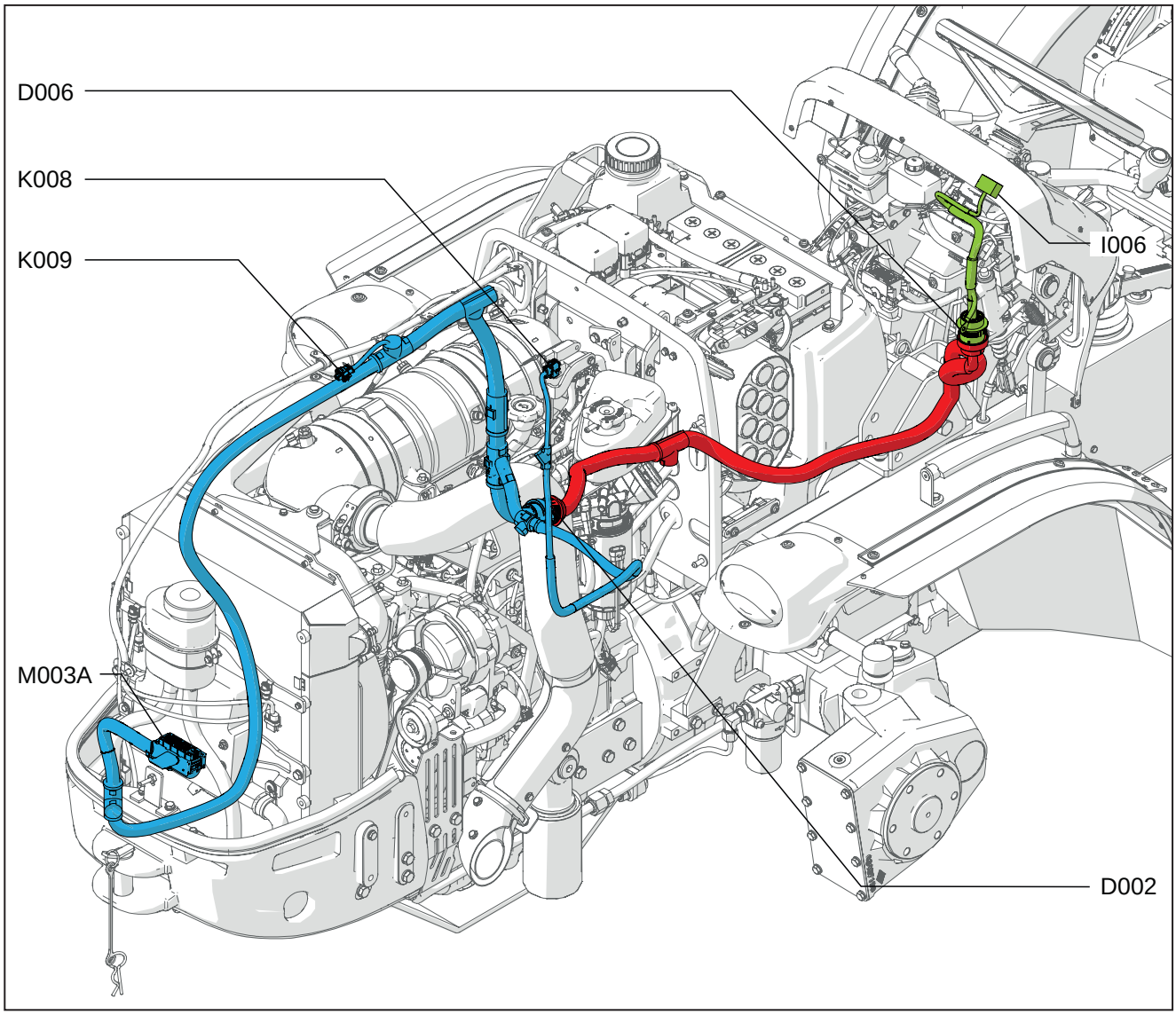

Fig. 12.79

D002 - Main-engine connector
D006 - Main-dashboard connector
I006 - DPF regeneration disable button
K008 - DPF differential pressure sensor
K009 - DPF exhaust gas temperature sensor
M003A - Engine control unit

12.5.3 S003 - Electronic engine management

Electrical wiring diagram: Electronic engine management

Table 1

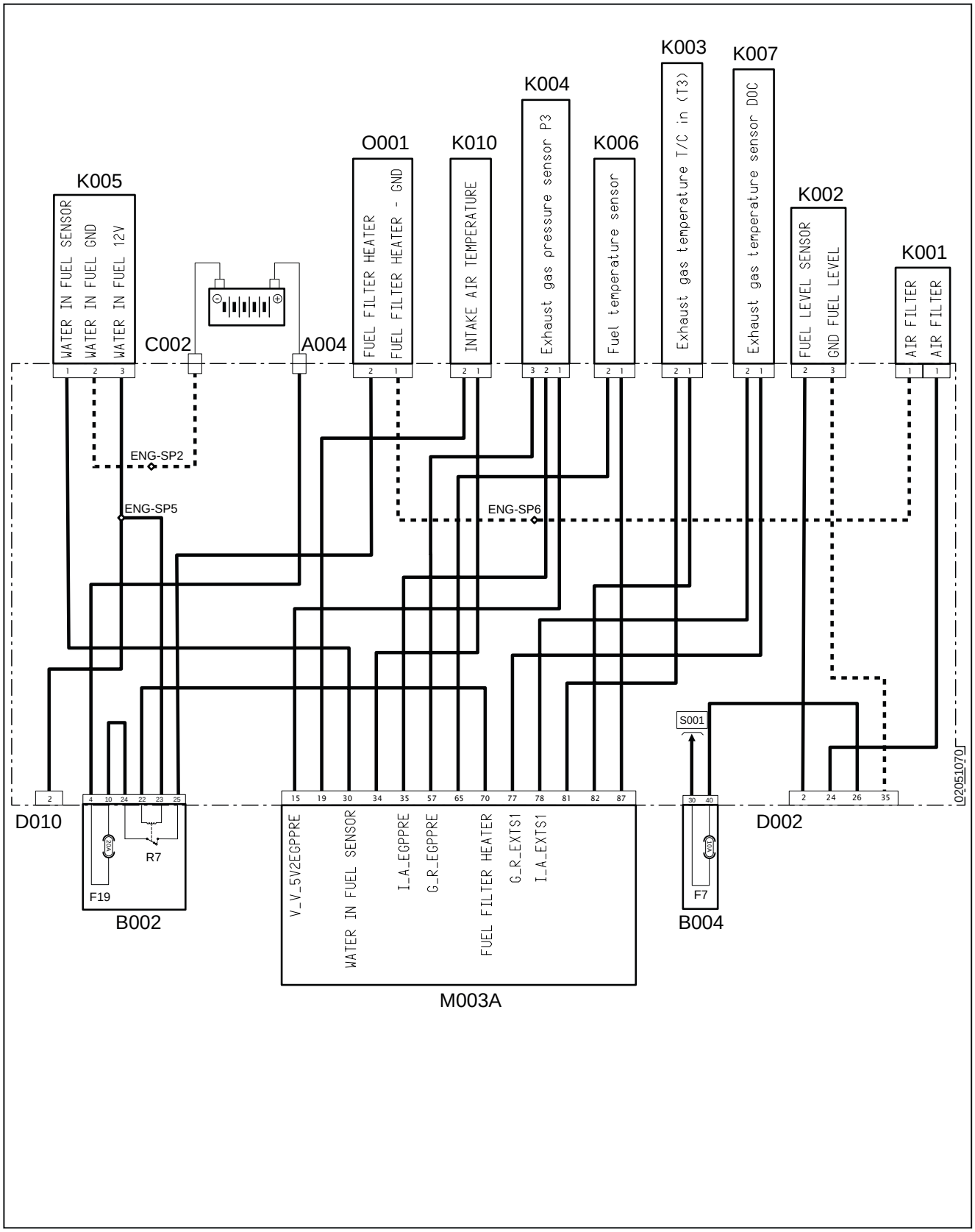

Fig. 12.80

Table 2

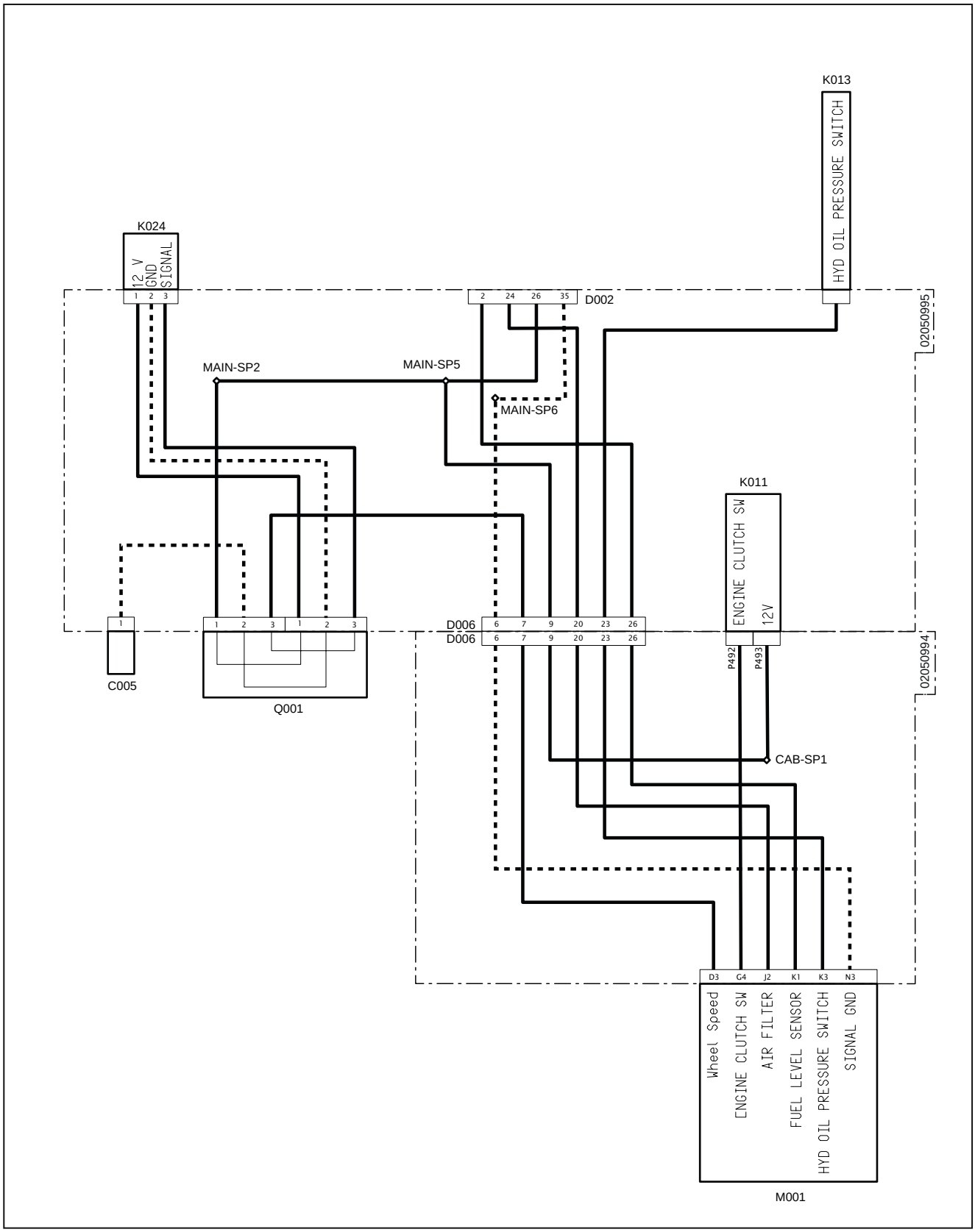

Fig. 12.81

Table 3

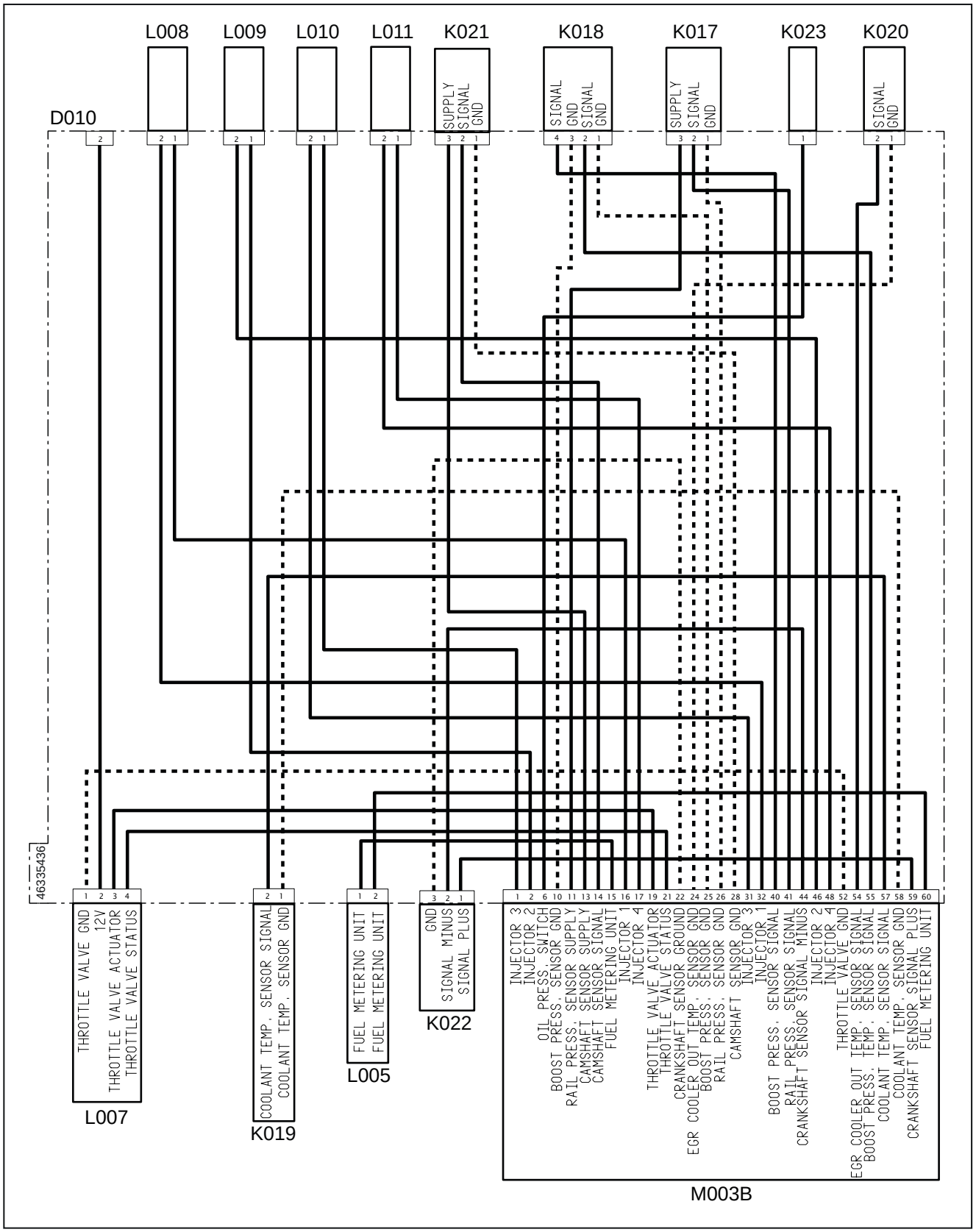

Fig. 12.82

A004 - Battery positive
B002 - Fuse box 1
F19(B002) - Fuel pre-heat (20A)
R7(B002) - Fuel pre-heat relay (20A)
B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D010 - Throttle valve power feed
K001 - Air filter
K002 - Fuel sensor
K003 - Exhaust gas temperature
K004 - Sensor P3 - Exhaust gas pressure
K005 - Water in fuel sensor
K006 - Fuel temperature sensor
K007 - DOC exhaust gas temperature sensor
K010 - Intake air temperature sensor
K011 - Clutch sensor
K013 - Hydraulic oil pressure
K015 - Wheel speed
K017 - Common Rail fuel pressure sensor
K018 - Temperature and pressure sensor (BOOST)
K019 - Coolant temperature sensor
K020 - EGR temperature sensor
K021 - Camshaft timing sensor
K022 - Crankshaft speed sensor
K023 - Oil pressure switch
K024 - Wiring harness for transmission speed sensor
L005 - High pressure pump
L007 - Throttle valve
L008 - Fuel electro-injector 1
L009 - Fuel electro-injector 2
L010 - Fuel electro-injector 3
L011 - Fuel electro-injector 4
M001 - Vehicle ECU
M003A - Engine control unit
M003B - Engine control unit
O001 - Fuel filter heater

Location in vehicle: Electronic engine management

Fig. 12.83

A004 - Battery positive
B002 - Fuse box 1
B004 - Fuse box 2
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D010 - Throttle valve power feed
K001 - Air filter
K002 - Fuel sensor
K003 - Exhaust gas temperature
K004 - Sensor P3 - Exhaust gas pressure
K005 - Water in fuel sensor
K006 - Fuel temperature sensor
K007 - DOC exhaust gas temperature sensor
K010 - Intake air temperature sensor
K011 - Clutch sensor
K013 - Hydraulic oil pressure
K015 - Wheel speed
K017 - Common Rail fuel pressure sensor
K018 - Temperature and pressure sensor (BOOST)
K019 - Coolant temperature sensor
K020 - EGR temperature sensor
K021 - Camshaft timing sensor
K022 - Crankshaft speed sensor
K023 - Oil pressure switch
K024 - Wiring harness for transmission speed sensor
L005 - High pressure pump
L007 - Throttle valve
L008 - Fuel electro-injector 1
L009 - Fuel electro-injector 2
L010 - Fuel electro-injector 3
L011 - Fuel electro-injector 4
M001 - Vehicle ECU
M003A - Engine control unit
M003B - Engine control unit
O001 - Fuel filter heater

12.5.4 S004 - Lights and horn

Electrical wiring diagram: Lights and horn

Table 1

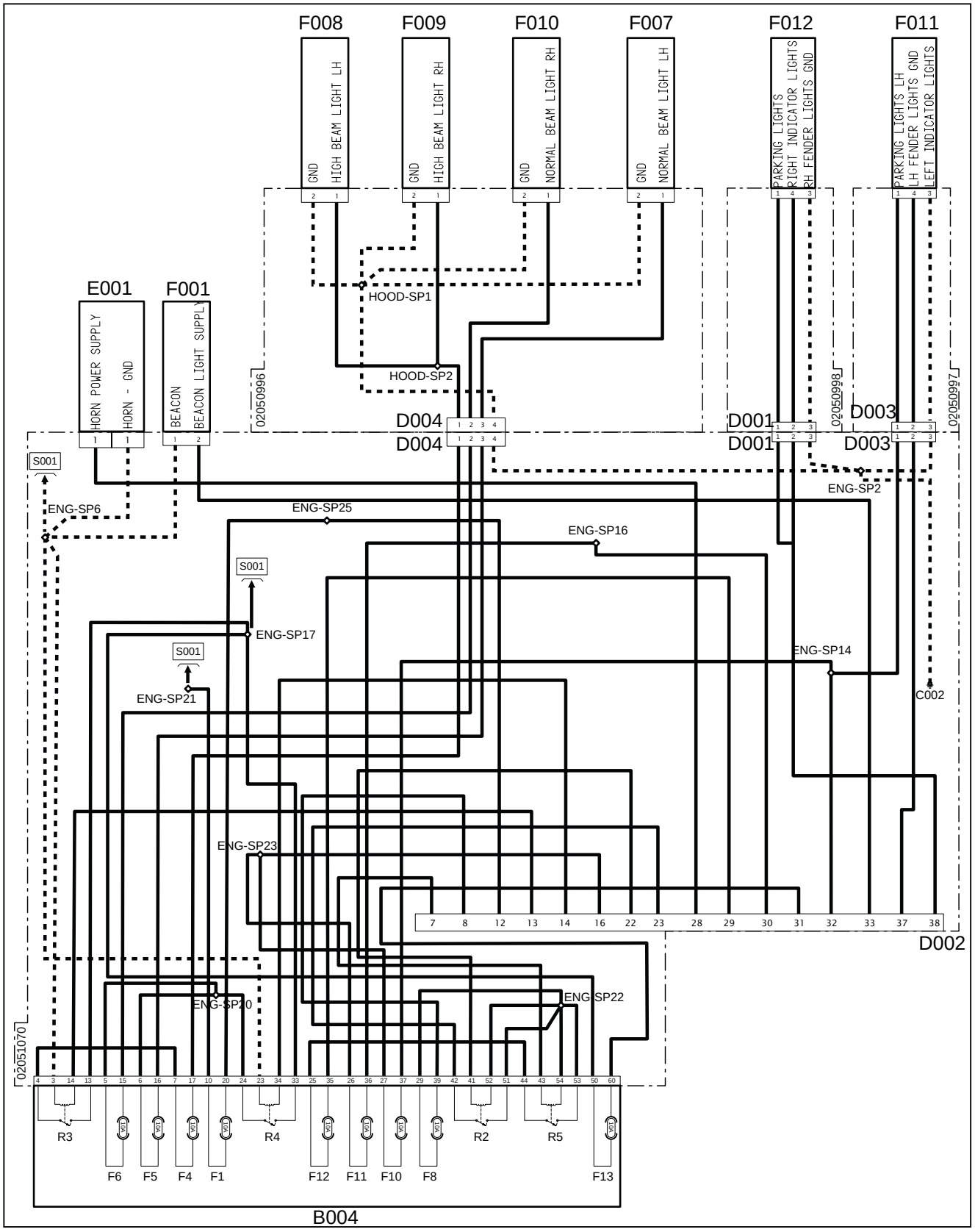

Fig. 12.84

Table 2

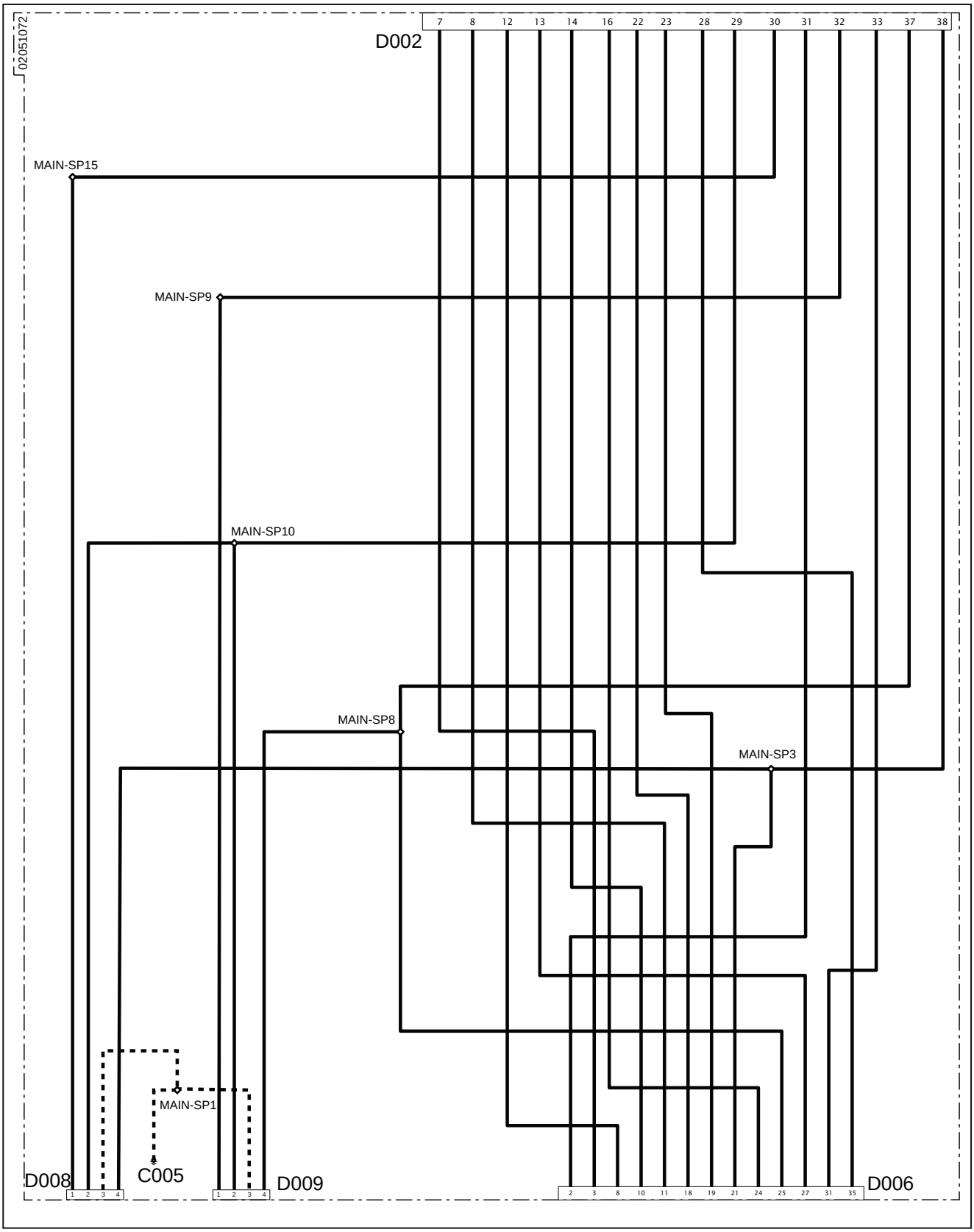

Fig. 12.85

Table 3

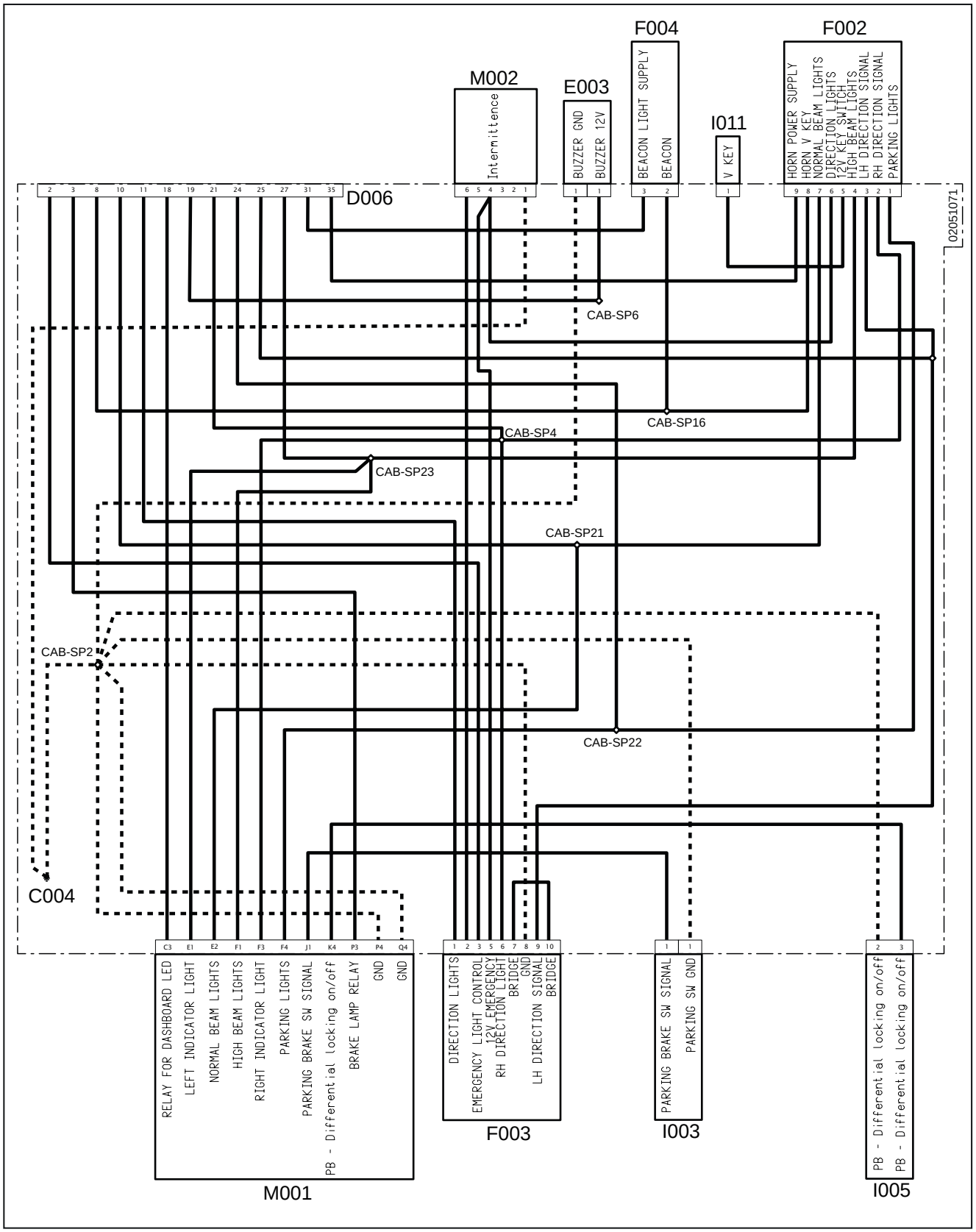

Fig. 12.86

Table 4

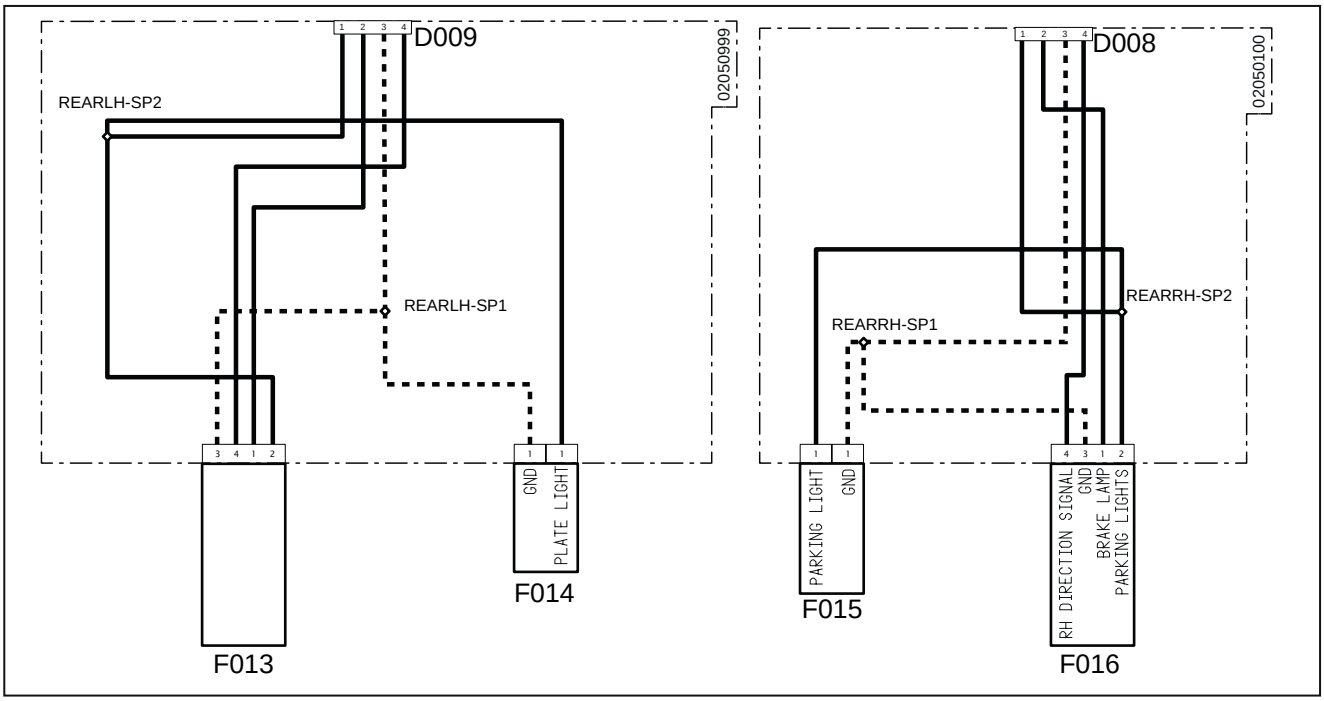

Fig. 12.87

B004 - Fuse box 2
F1(B004) - Rotating beacon (10A)
F4(B004) - High beam (10A)
F5(B004) - LH low beams (10A)
F6(B004) - RH low beams (10A)
F8(B004) - Turn indicators (10A)
F10(B004) - LH sidelights (10A)
F11(B004) - RH sidelights (10A)
F12(B004) - Brake lights (10A)
F13(B004) - Hazard warning lights (10A)
R2(B004) - Dashboard LED relay
R3(B004) - High beam relay
R4(B004) - Low beam relay
R5(B004) - Brake light relay
C002 - Battery ground
C004 - Cab ground
C005 - Main ground
D001 - Right front lights-Engine connector
D002 - Main-engine connector
D003 - Left front lights-Engine connector
D004 - Front lights-Engine connector
D006 - Main-dashboard connector
D008 - Right rear lights-main connector
D009 - Left rear lights-main connector
E001 - Horn
E003 - Buzzer
F001 - Headlamp
F002 - Lights selector switch
F003 - Hazard warning lights
F004 - Headlamp
F007 - LH low beam headlight
F008 - LH high beam headlight
F009 - RH high beam headlight
F010 - RH low beam headlight
F011 - LH turn indicator
F012 - RH turn indicator
F013 - LH mudguard light
F014 - Number plate light
F015 - RH work lights
F016 - Rear lights
I003 - Parking brake
I005 - Differential lock
I011 - Ignition switch
M001 - Vehicle ECU
M002 - Flasher unit

Location in vehicle: Lights and horn

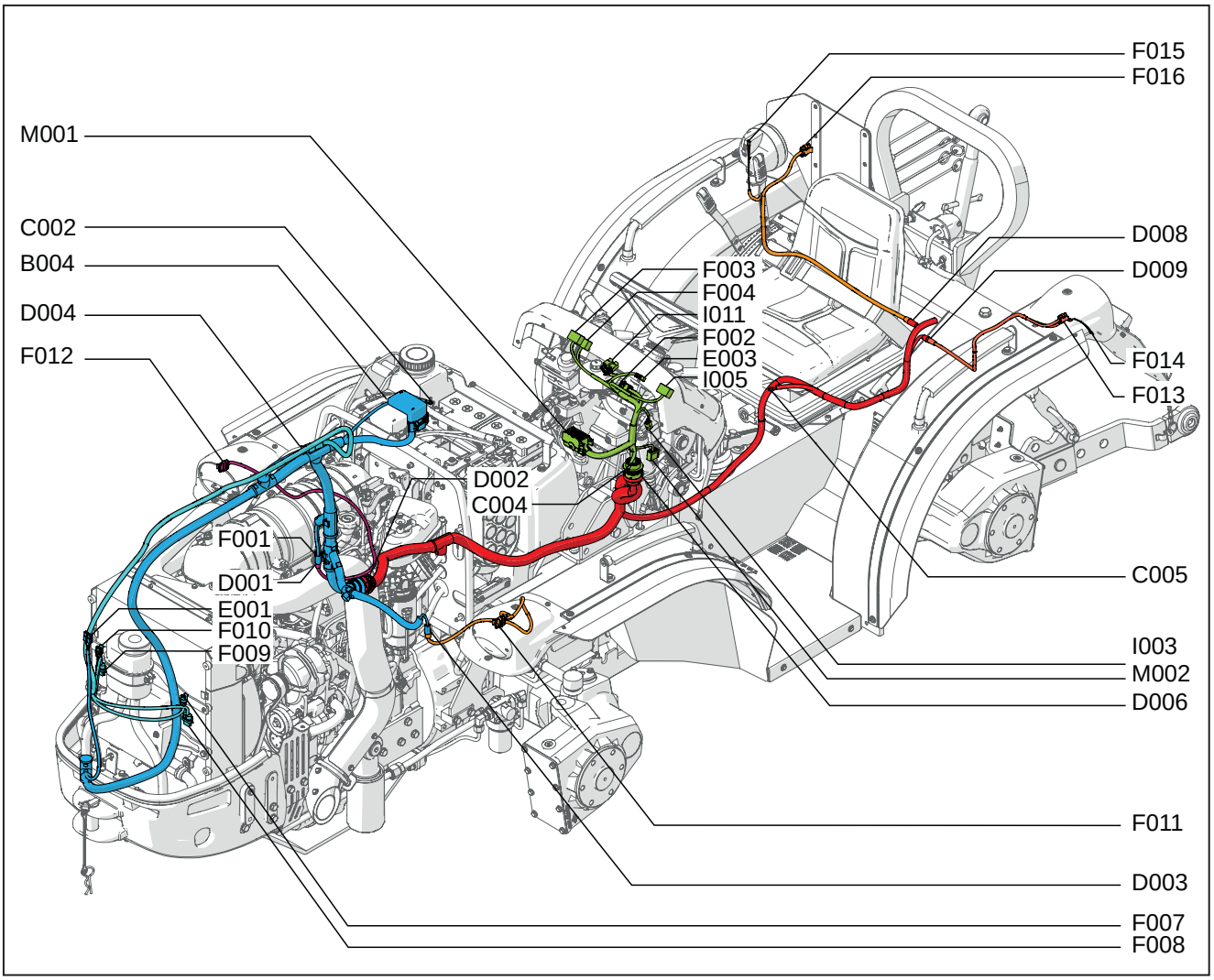

Fig. 12.88

B004 - Fuse box 2
C002 - Battery ground
C004 - Cab ground
C005 - Main ground
D001 - Right front lights-Engine connector
D002 - Main-engine connector
D003 - Left front lights-Engine connector
D004 - Front lights-Engine connector
D006 - Main-dashboard connector
D008 - Right rear lights-main connector
D009 - Left rear lights-main connector
E001 - Horn
E003 - Buzzer
F001 - Headlamp
F002 - Lights selector switch
F003 - Hazard warning lights
F004 - Headlamp
F007 - LH low beam headlight
F008 - LH high beam headlight
F009 - RH high beam headlight
F010 - RH low beam headlight
F011 - LH turn indicator
F012 - RH turn indicator
F013 - LH mudguard light
F014 - Number plate light
F015 - RH work lights
F016 - Rear lights
I003 - Parking brake
I005 - Differential lock
I011 - Ignition switch
M001 - Vehicle ECU
M002 - Flasher unit

12.5.5 S005 - Power sockets and accessories

Electrical wiring diagram: Power sockets and accessories

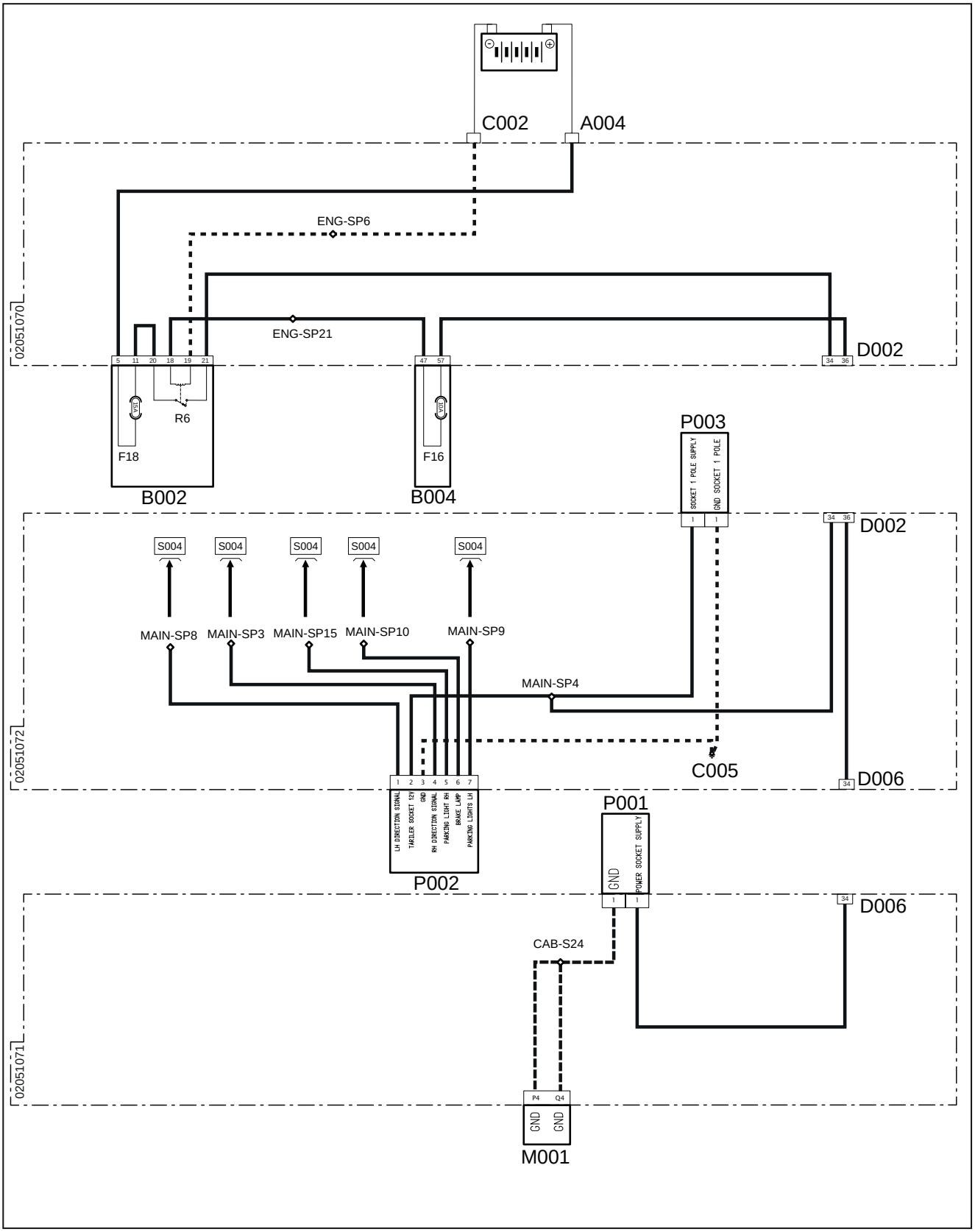

Fig. 12.89

A004 - Battery positive
B002 - Fuse box 1
F18(B002) - Trailer socket (15A)
R6(B002) - Trailer socket relay (30A)
B004 - Fuse box 2
F16(B004) - Socket (10A)
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
M001 - Vehicle ECU
P001 - 1-pole socket
P002 - 7 pole power socket
P003 - 1 pole power socket

Location in vehicle: Power sockets and accessories

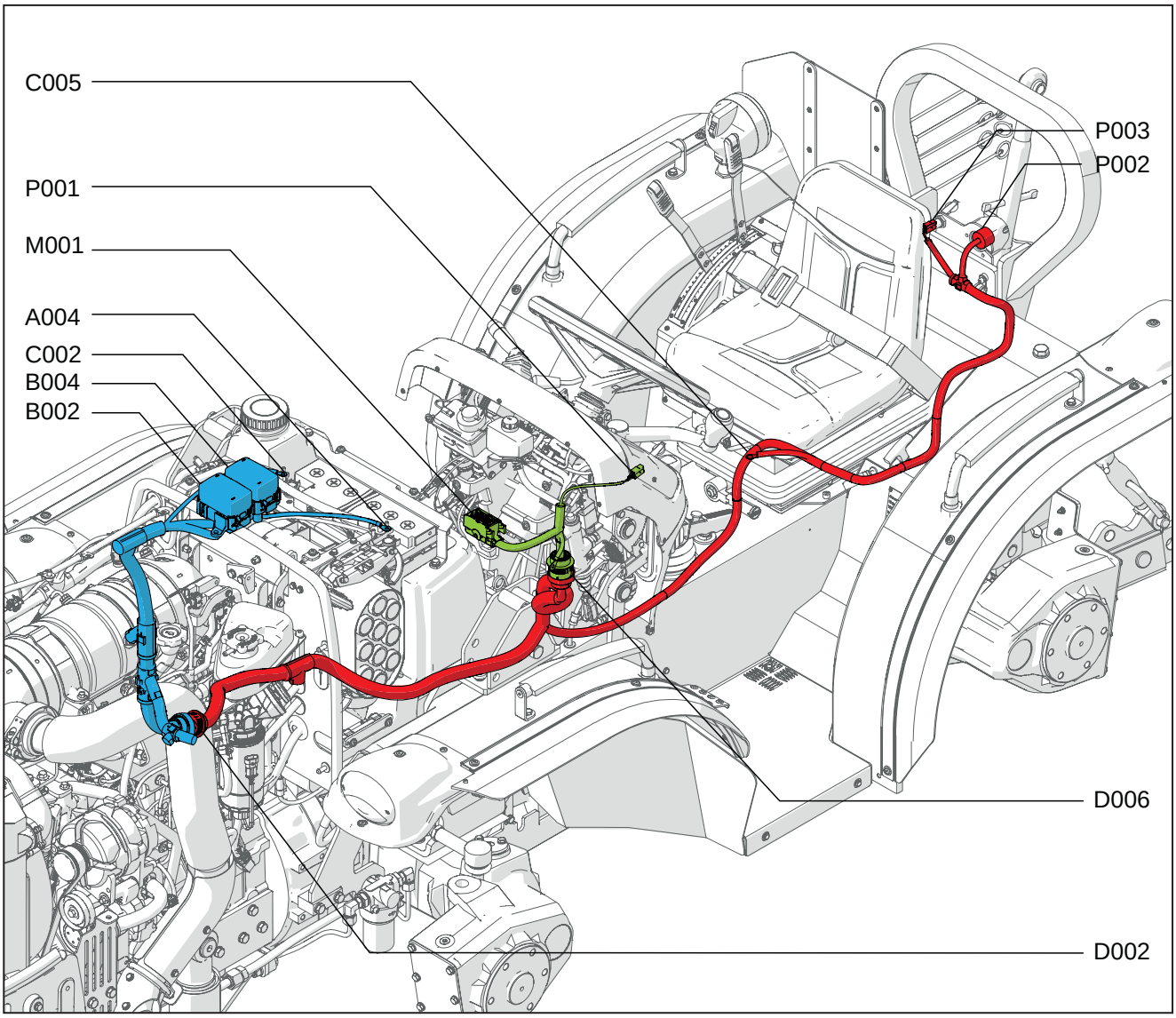

Fig. 12.90

A004 - Battery positive
B002 - Fuse box 1
B004 - Fuse box 2
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
M001 - Vehicle ECU
P001 - 1-pole socket
P002 - 7 pole power socket
P003 - 1 pole power socket

12.5.6 S006 - Diagnostics and CAN lines

Electrical wiring diagram: Diagnostics and CAN lines

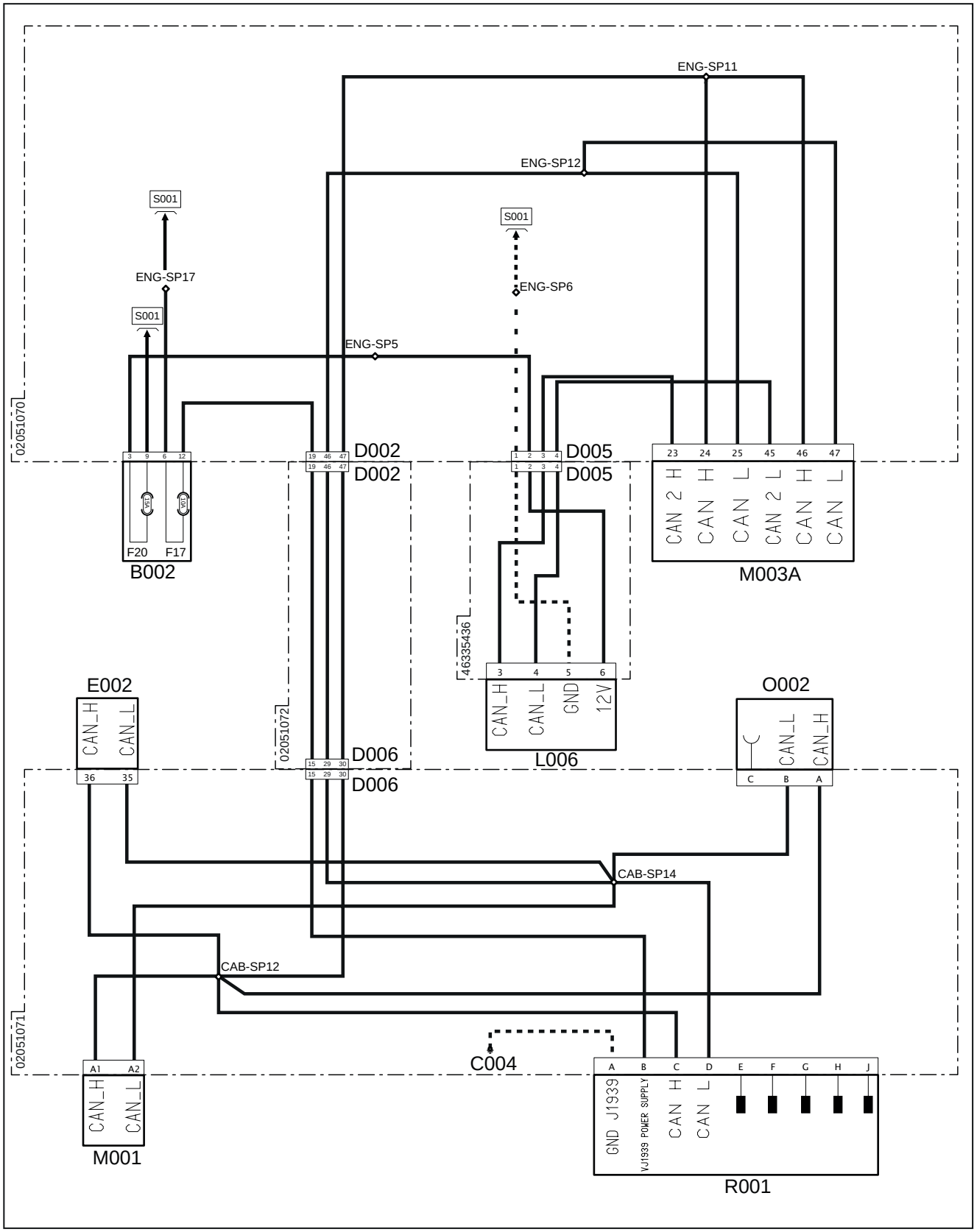

Fig. 12.91

B002 - Fuse box 1
F17(B002) - Diagnostic socket (10A)
F20(B002) - Accessories (15A)
C004 - Cab ground
D002 - Main-engine connector
D005 - Exhaust gas recirculation solenoid valve power feed
D006 - Main-dashboard connector
E002 - Dashboard
L006 - Exhaust gas recirculation solenoid valve (EGR)
M001 - Vehicle ECU
M003A - Engine control unit
O002 - CAN line termination
R001 - Diagnostic port

Location in vehicle: Diagnostics and CAN lines

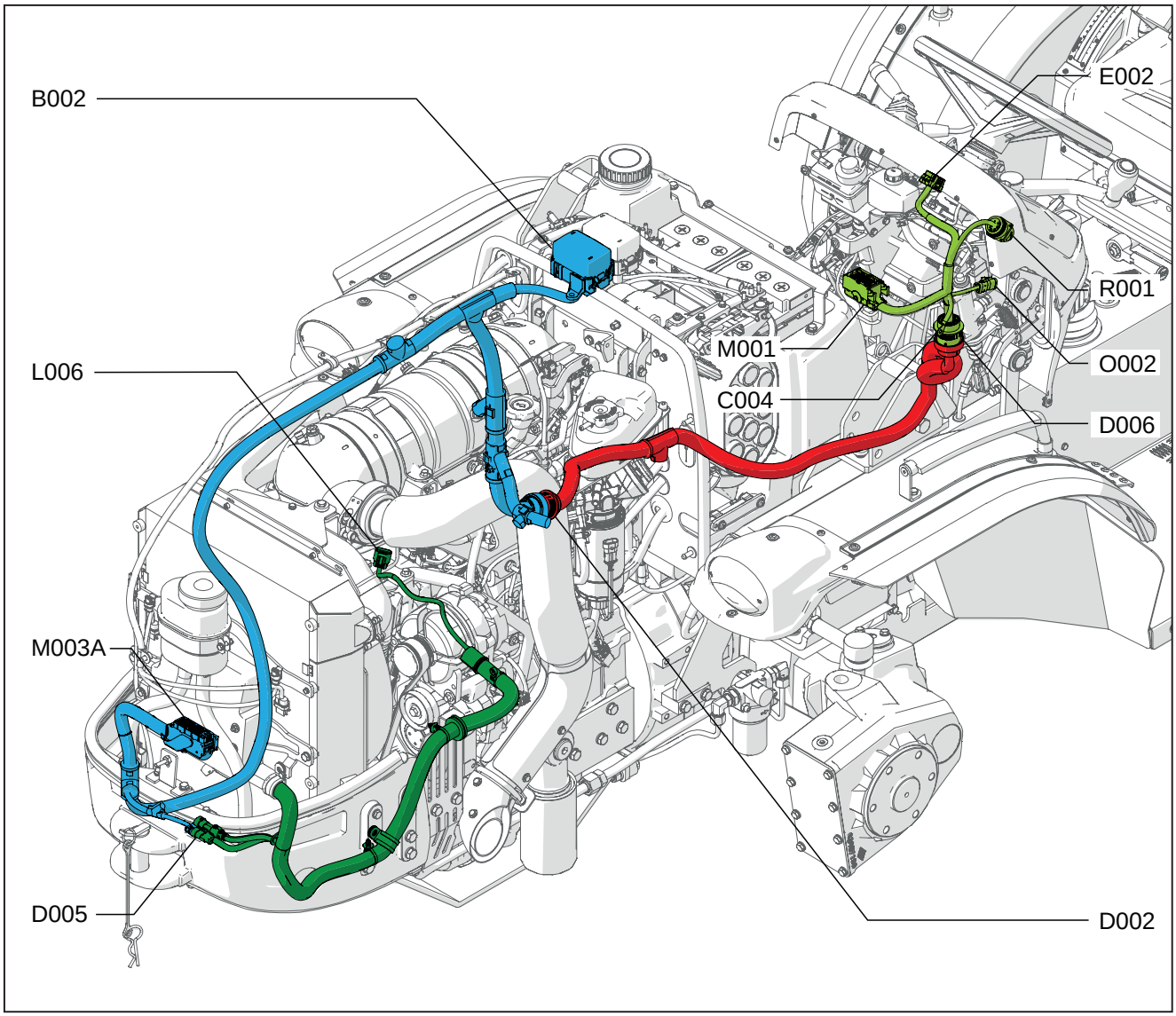

Fig. 12.92

B002 - Fuse box 1
C004 - Cab ground
D002 - Main-engine connector
D005 - Exhaust gas recirculation solenoid valve power feed
D006 - Main-dashboard connector
E002 - Dashboard
L006 - Exhaust gas recirculation solenoid valve (EGR)
M001 - Vehicle ECU
M003A - Engine control unit
O002 - CAN line termination
R001 - Diagnostic port

12.5.7 S007 - Dashboard

Electrical wiring diagram: Dashboard

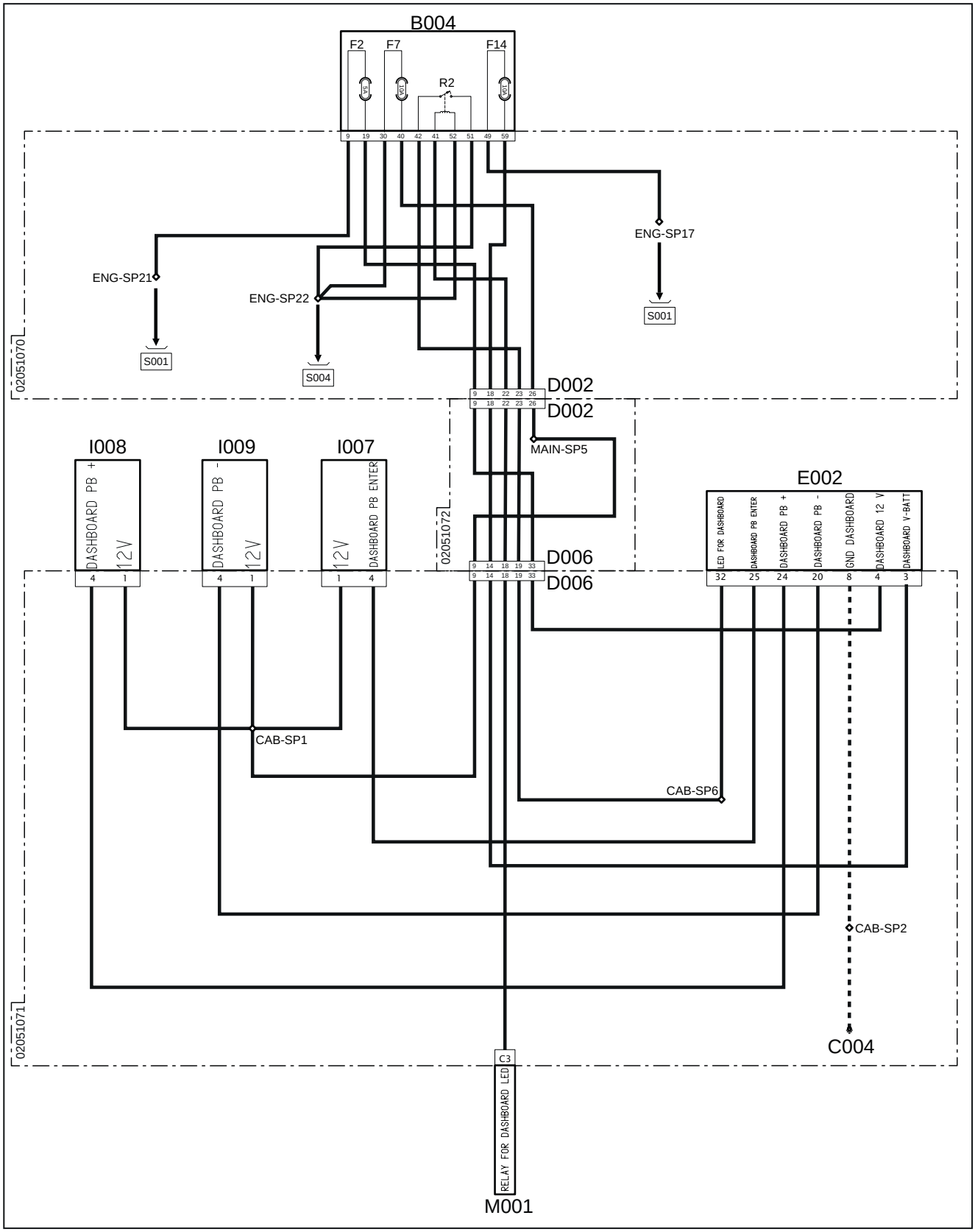

Fig. 12.93

B004 - Fuse box 2
F2(B004) - Key-on power feed for dashboard (5A)
F7(B004) - Sensors/switches (10A)
F14(B004) - 12V dashboard power feed (10A)
R2(B004) - Dashboard LED relay
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
I007 - Dashboard ENTER button
I008 - Dashboard PB+ button
I009 - Dashboard PB- button
M001 - Vehicle ECU

Location in vehicle: Dashboard

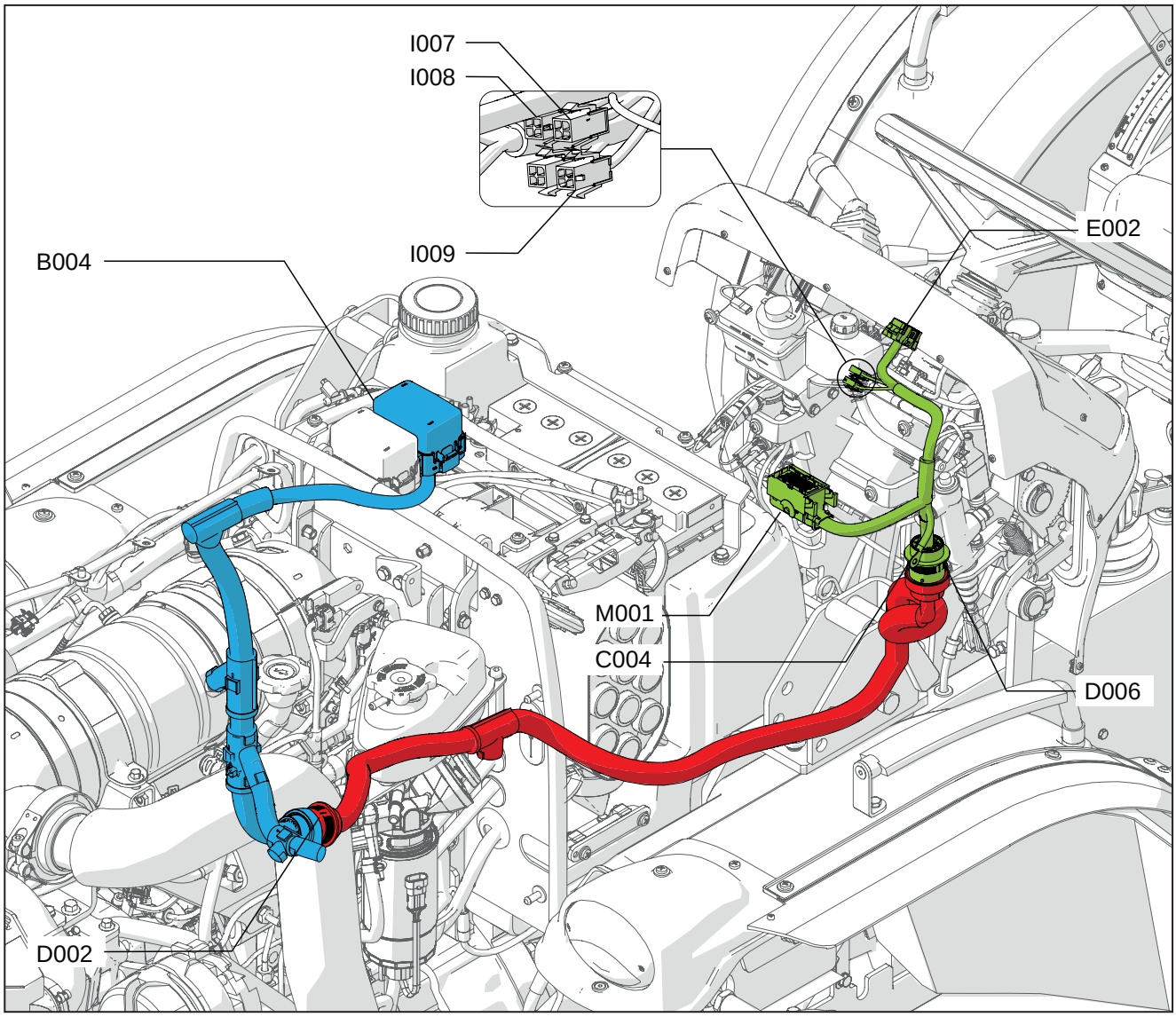

Fig. 12.94

B004 - Fuse box 2
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
I007 - Dashboard ENTER button
I008 - Dashboard PB+ button
I009 - Dashboard PB- button
M001 - Vehicle ECU

12.5.8 S008 - Transmission

Electrical wiring diagram: Transmission

Table 1

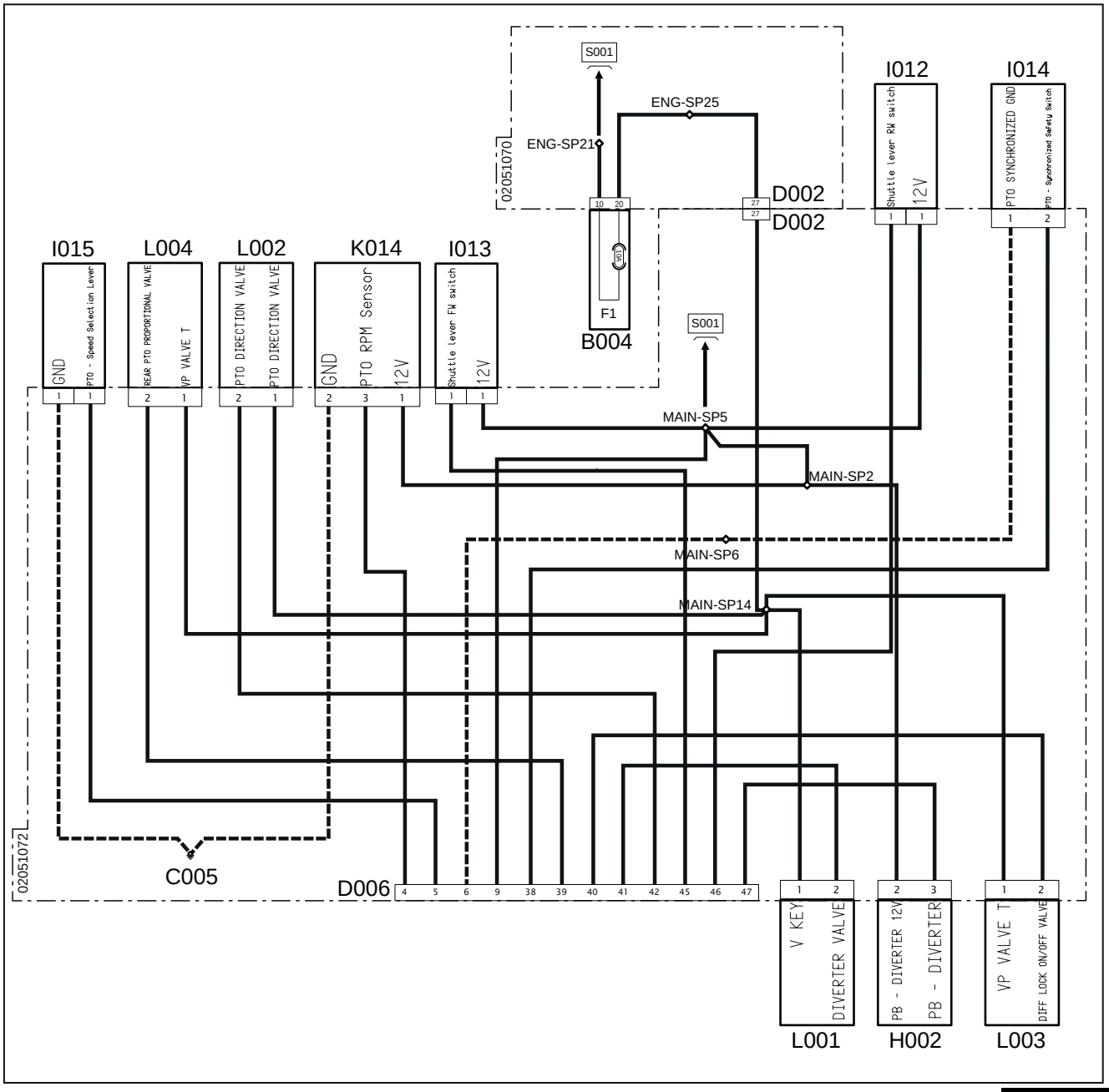

Fig. 12.95

Table 2

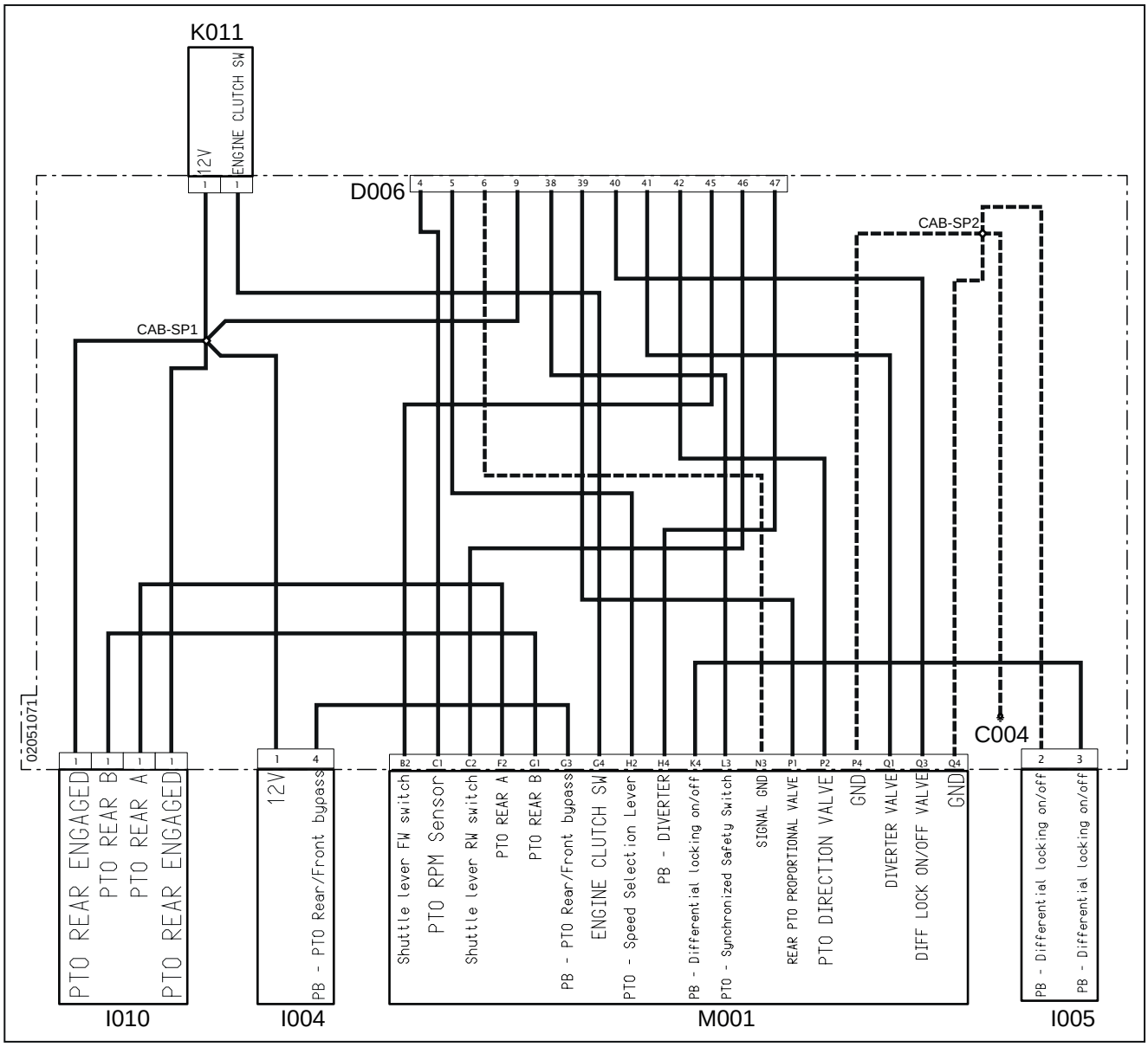

Fig. 12.96

B004 - Fuse box 2
F1(B004) - Rotating beacon (10A)
C004 - Cab ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
H002 - Diverter
I004 - Front/Rear PTO bypass
I005 - Differential lock
I010 - PTO selector
I012 - RH reverse shuttle lever
I013 - LH reverse shuttle lever
I014 - PTO safety synchro switch
I015 - PTO speed selector
K011 - Clutch sensor
K014 - PTO speed sensor
L001 - Diverter valve
L002 - PTO directional valve
L003 - Differential lock valve
L004 - 4WD valve
M001 - Vehicle ECU

Location in vehicle: Transmission

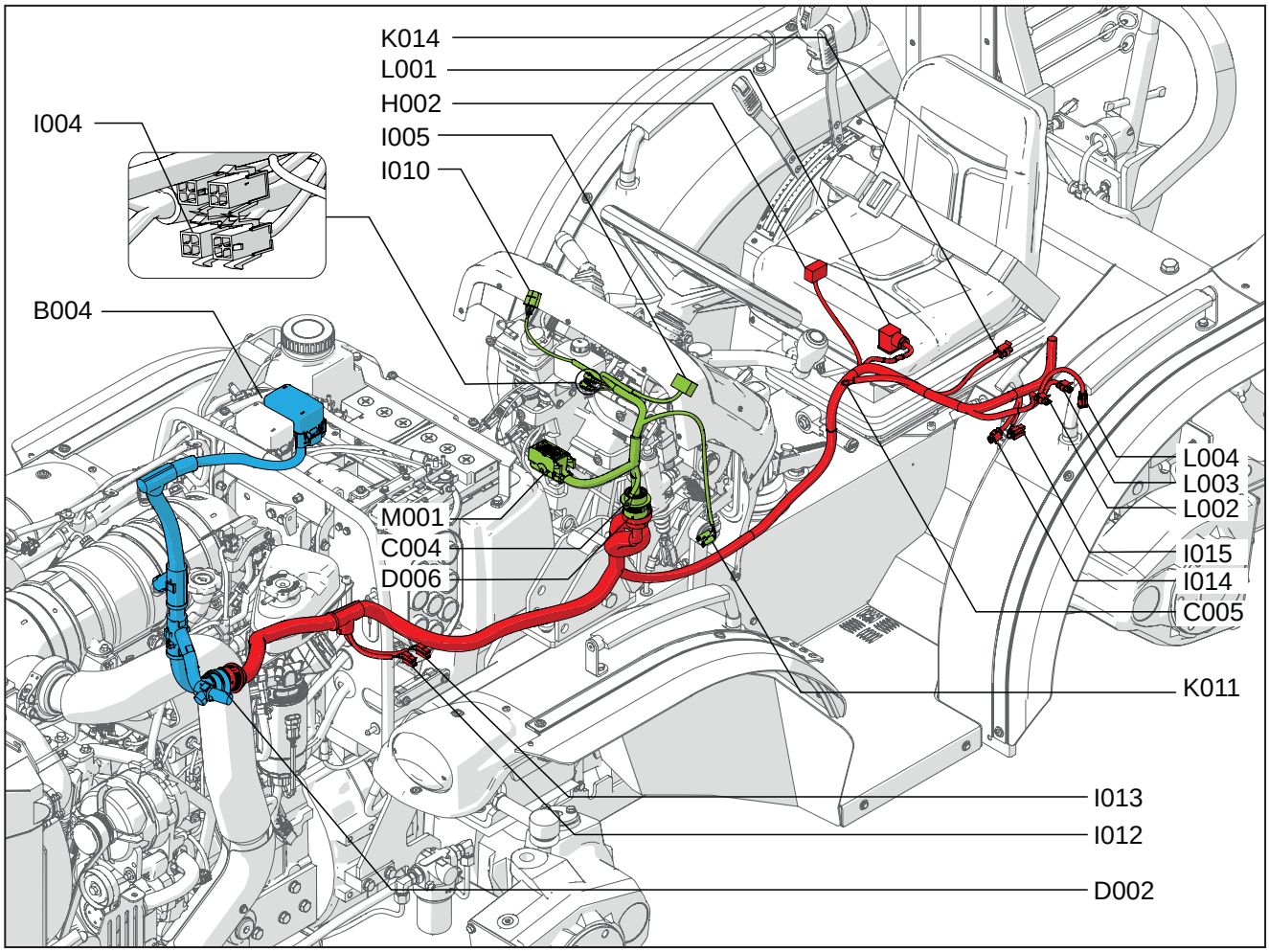

Fig. 12.97

B004 - Fuse box 2
C004 - Cab ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
H002 - Diverter
I004 - Front/Rear PTO bypass
I005 - Differential lock
I010 - PTO selector
I012 - RH reverse shuttle lever
I013 - LH reverse shuttle lever
I014 - PTO safety synchro switch
I015 - PTO speed selector
K011 - Clutch sensor
K014 - PTO speed sensor
L001 - Diverter valve
L002 - PTO directional valve
L003 - Differential lock valve
L004 - 4WD valve
M001 - Vehicle ECU

12.5.9 S009 - Brakes

Electrical wiring diagram: Brakes

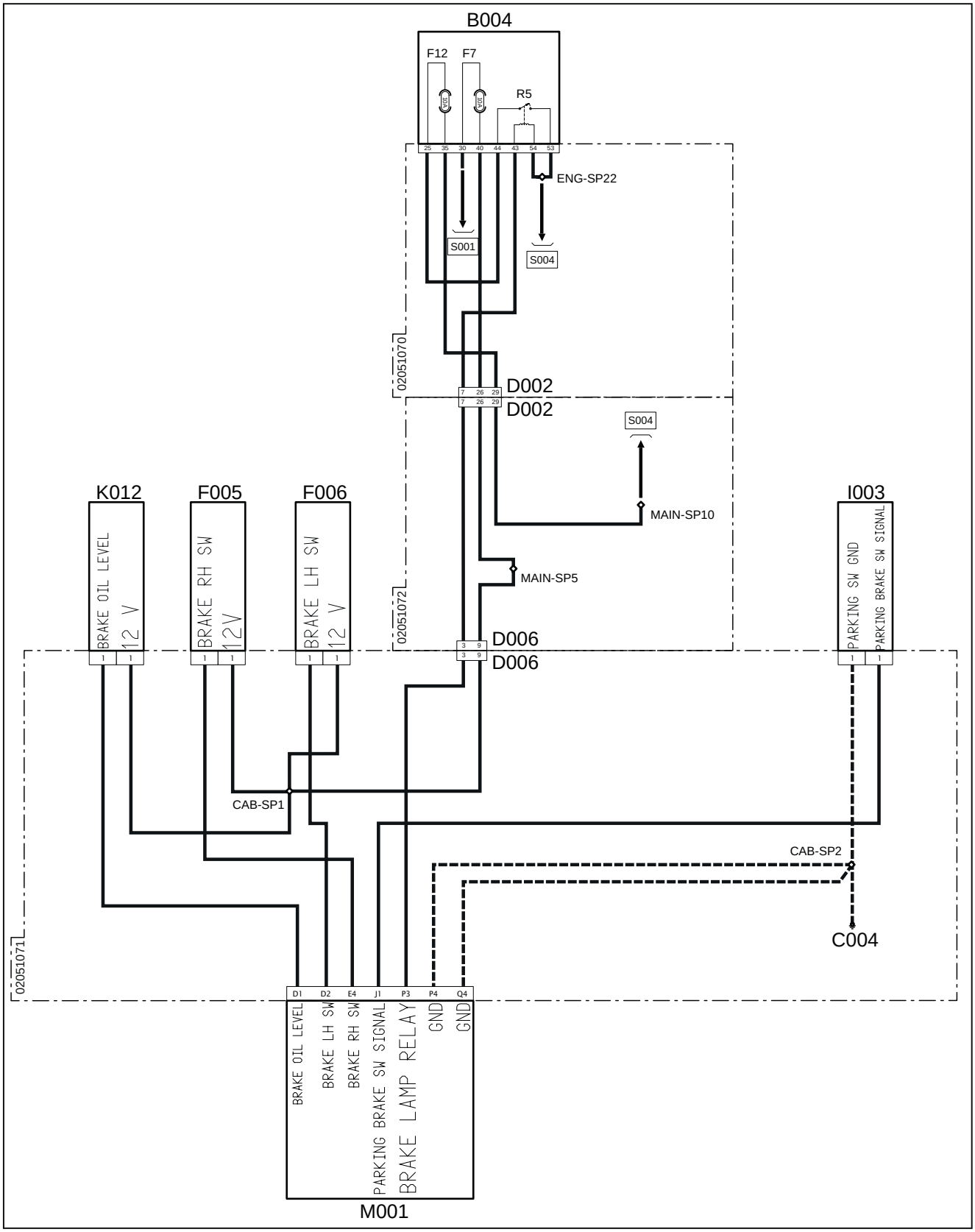

Fig. 12.98

B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
F12(B004) - Brake lights (10A)
R5(B004) - Brake light relay
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
F005 - RH brake signal
F006 - LH brake signal
I003 - Parking brake
K012 - Brake oil sensor
M001 - Vehicle ECU

Location in vehicle: Brakes

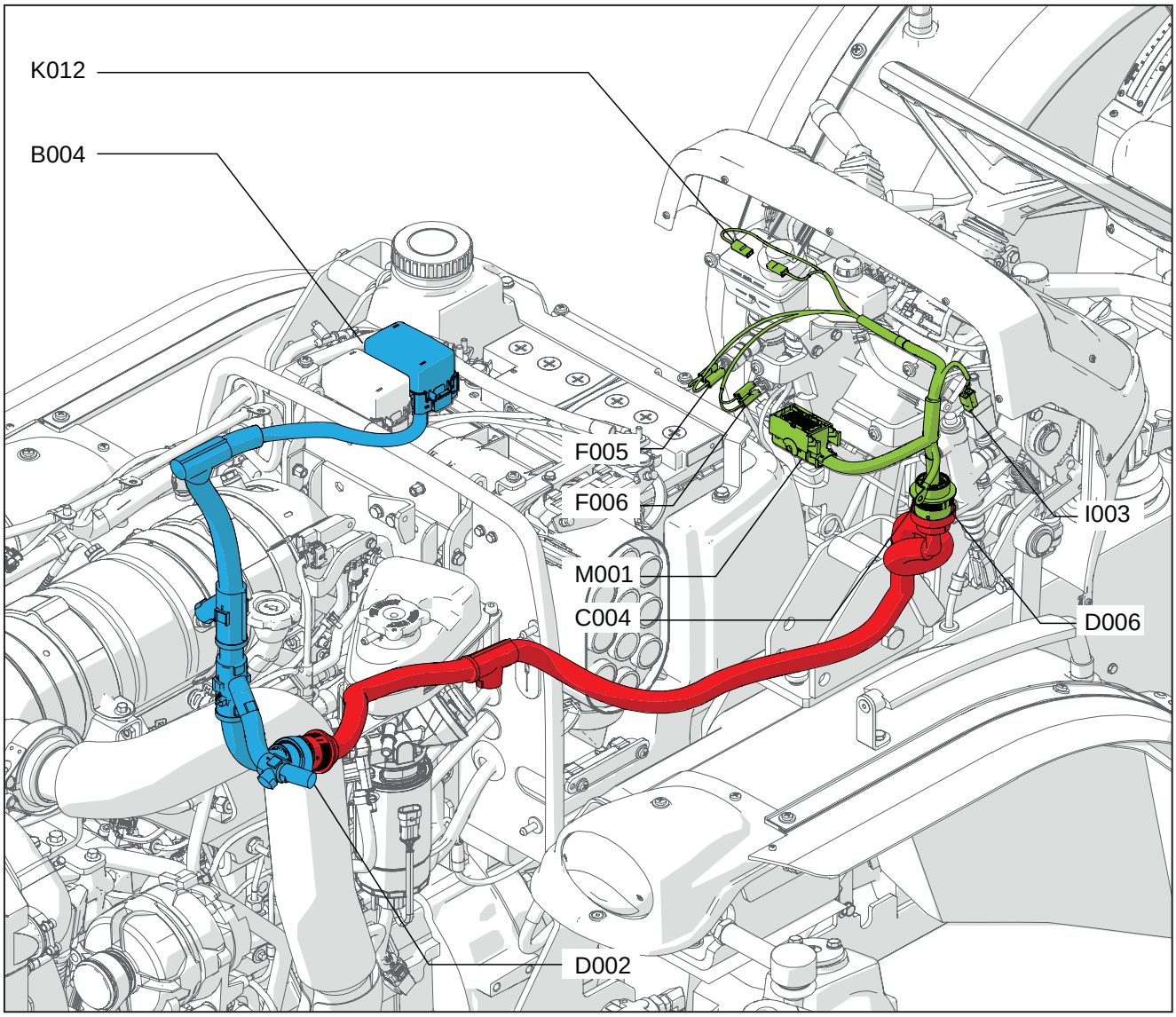

Fig. 12.99

B004 - Fuse box 2
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
F005 - RH brake signal
F006 - LH brake signal
I003 - Parking brake
K012 - Brake oil sensor
M001 - Vehicle ECU

12.6 Systems, E70/E80

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12.6.1 S001 - Power feed and starting

Electrical wiring diagram: Power feed and starting

Table 1

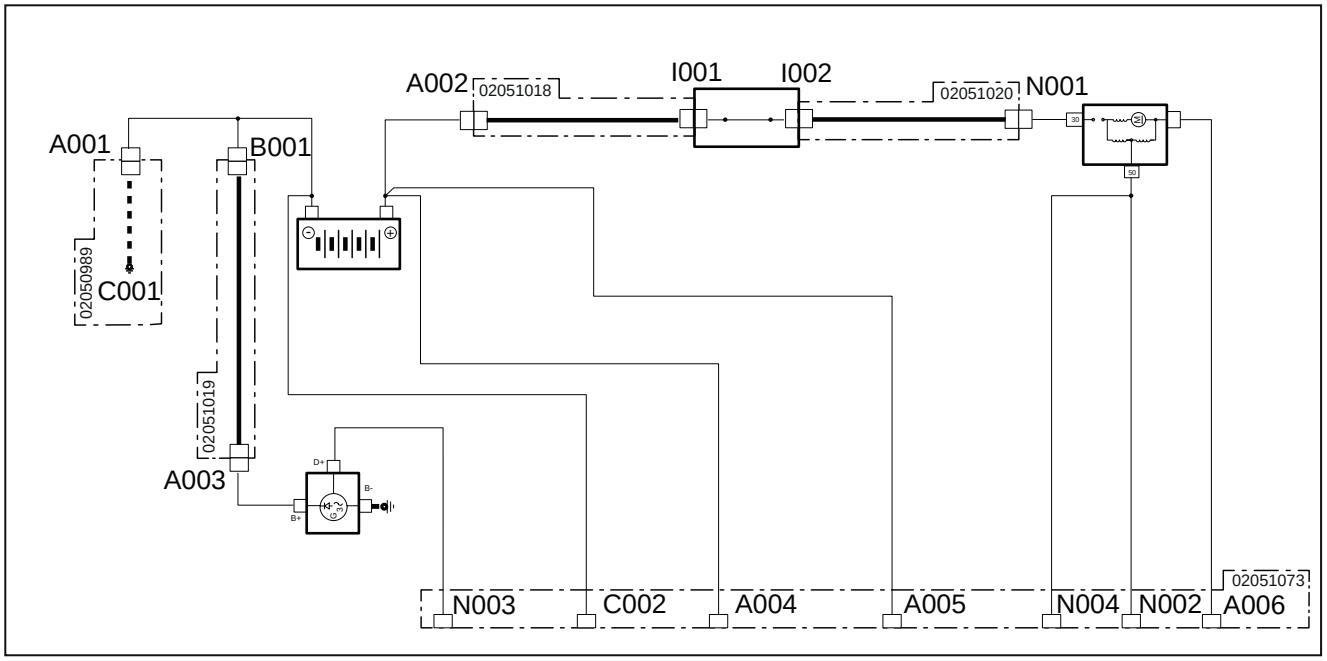

Fig. 12.100

Table 2

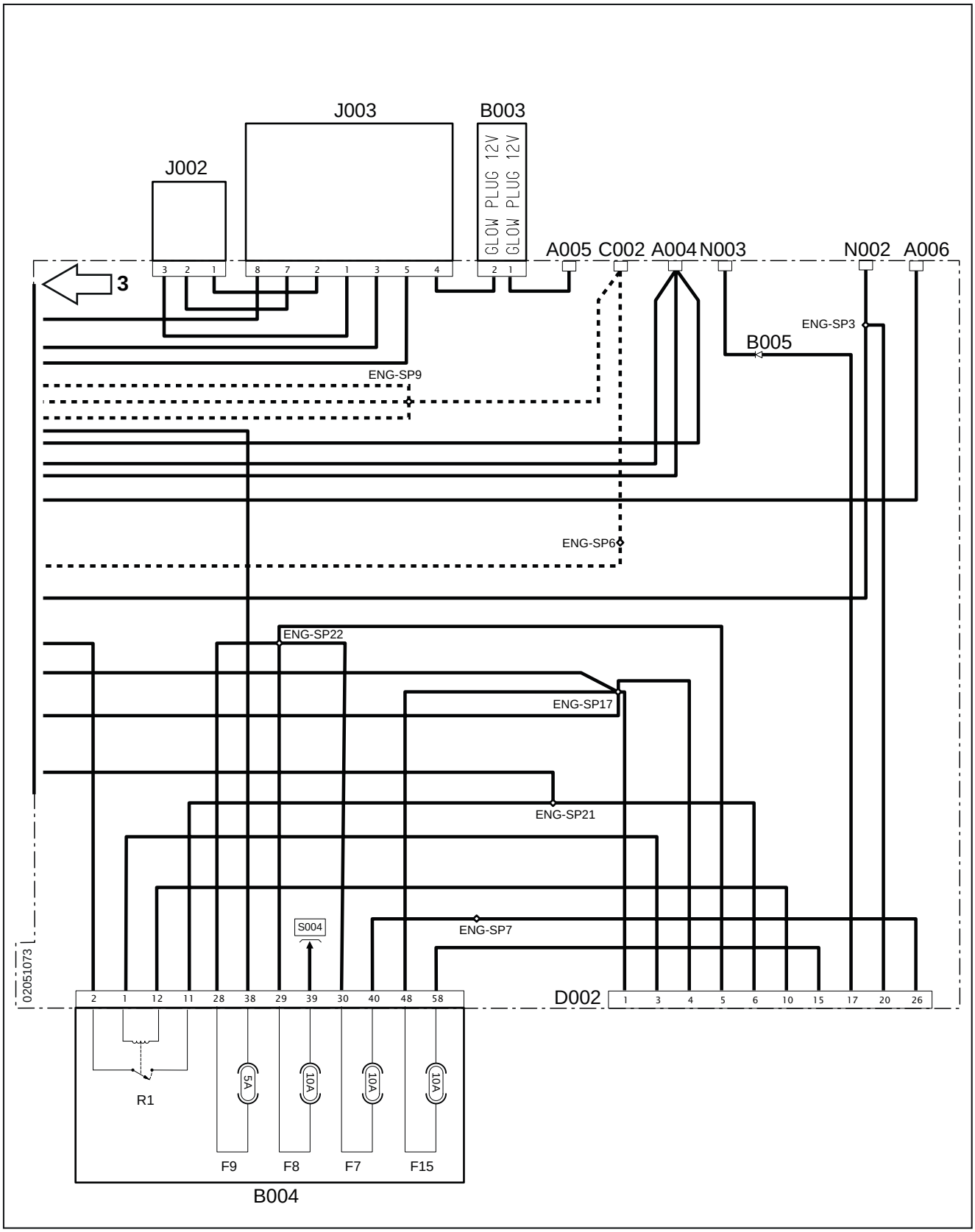

Fig. 12.101

Table 3

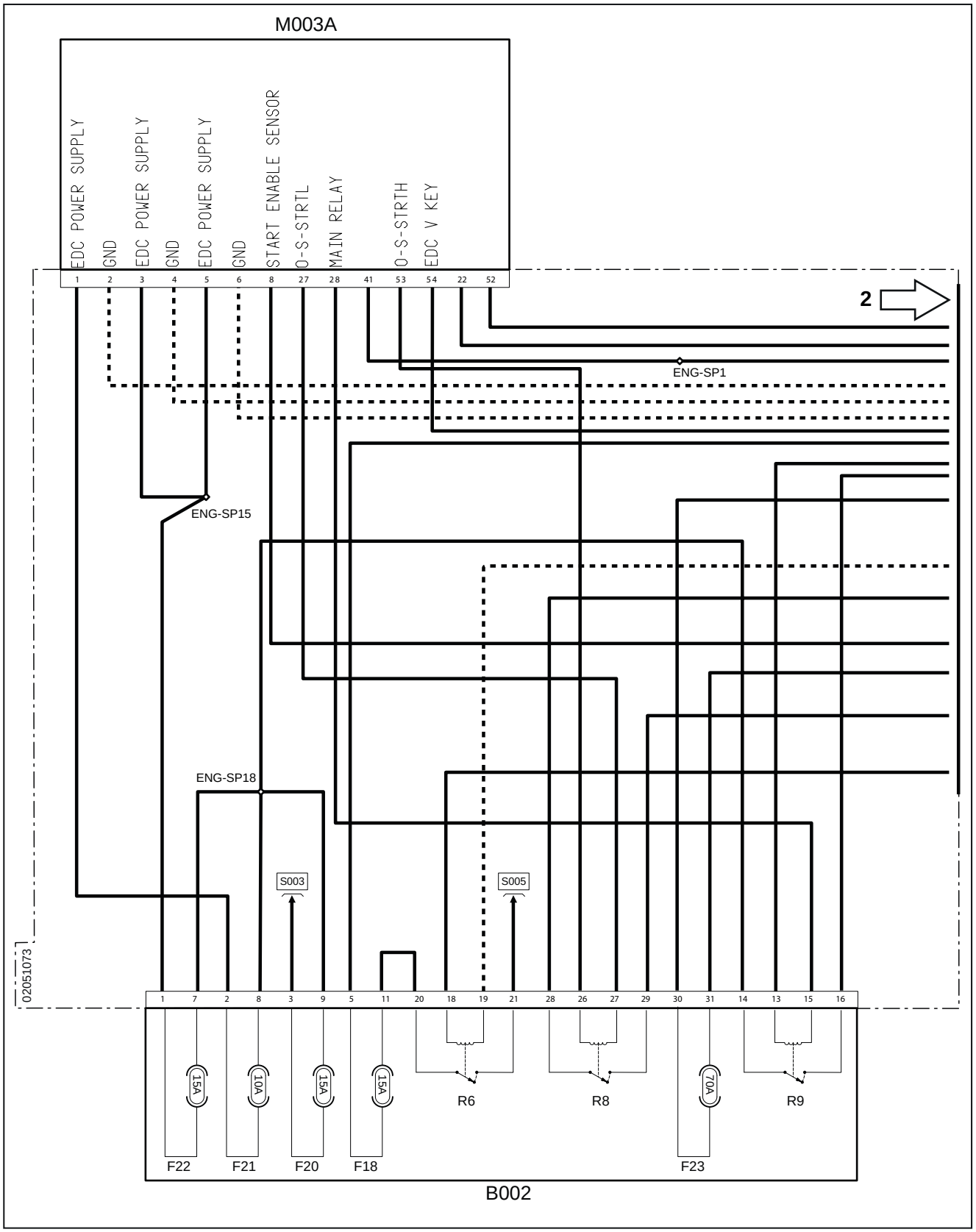

Fig. 12.102

Table 4

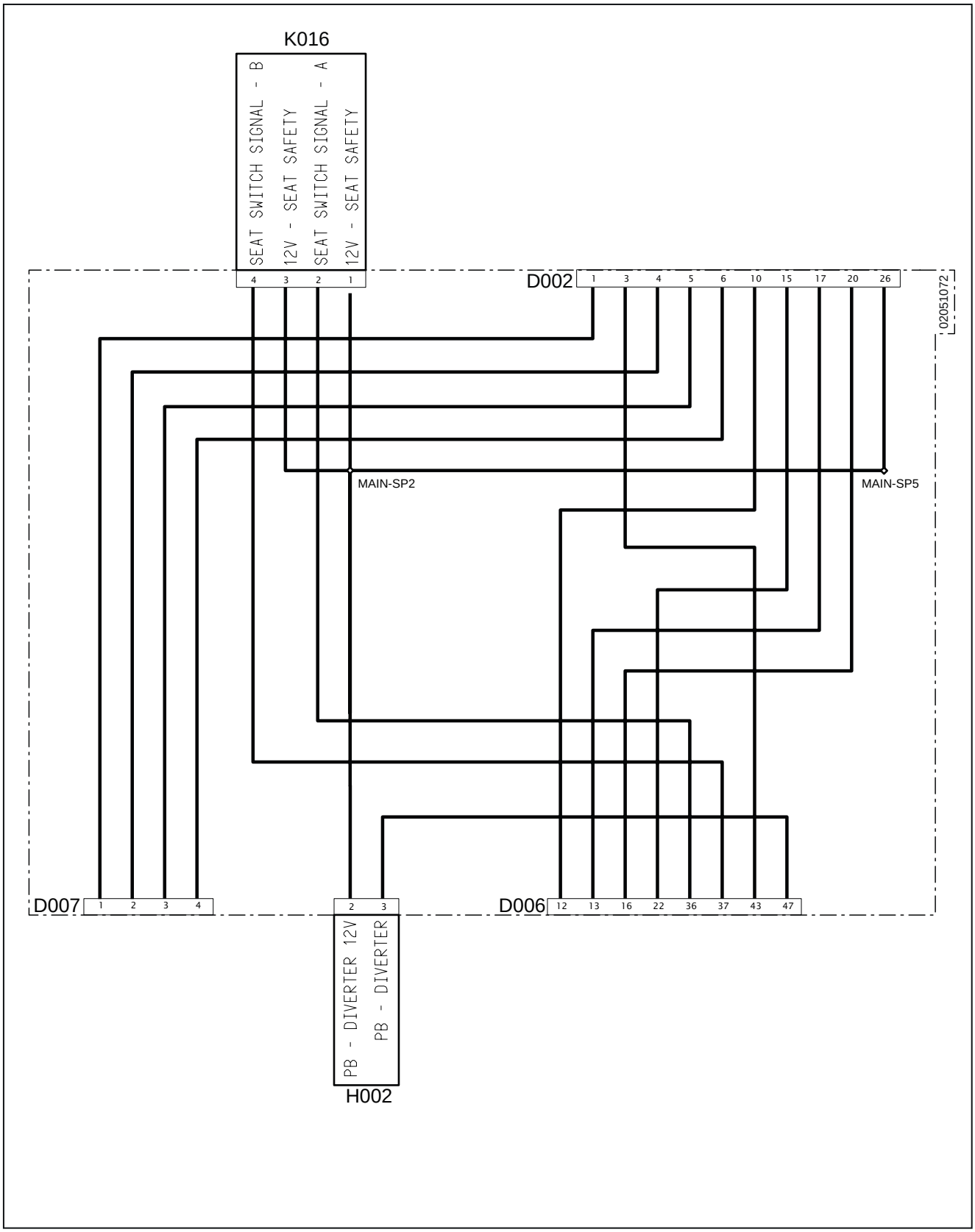

Fig. 12.103

Table 5

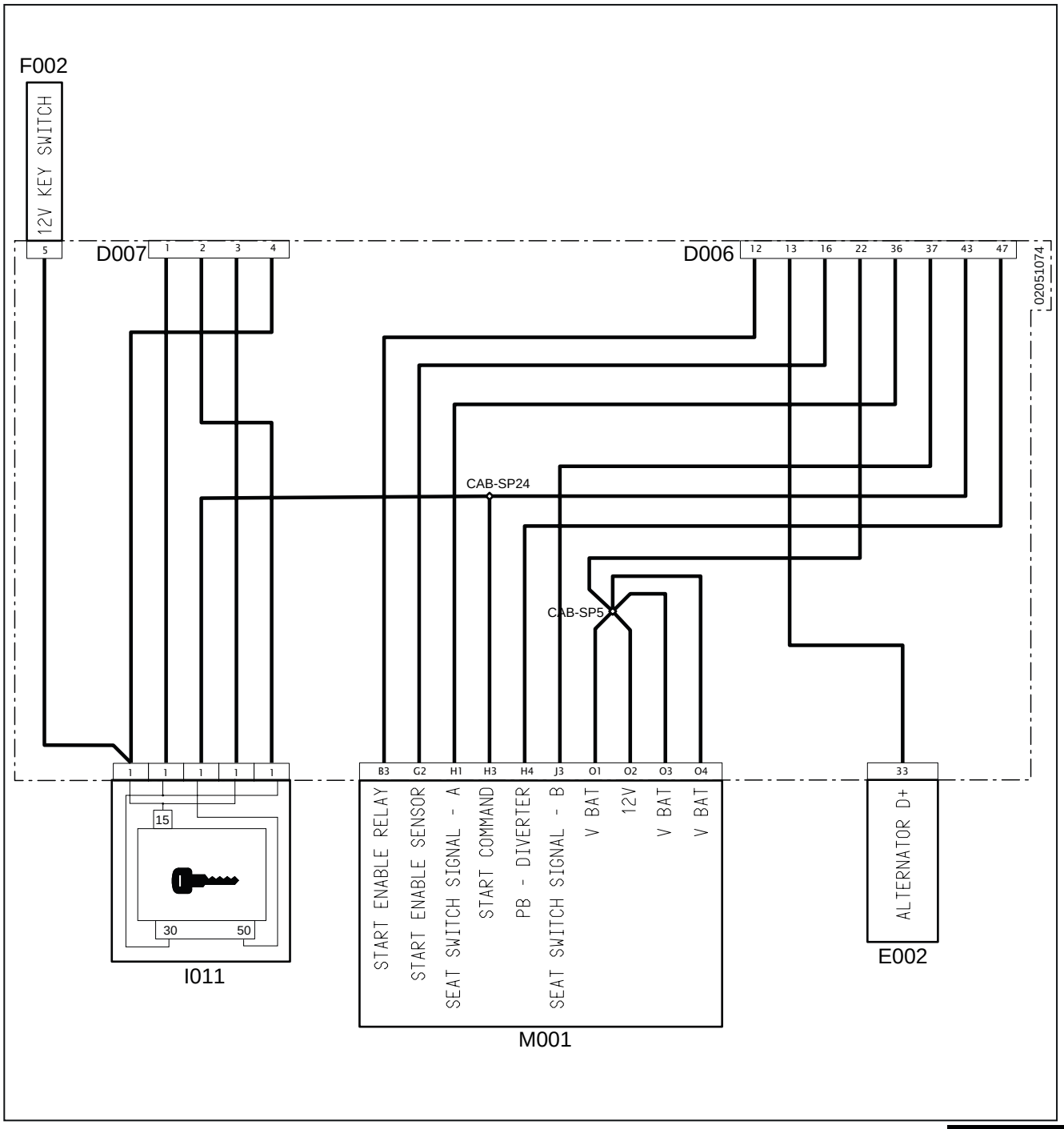

Fig. 12.104

A001 - Battery negative
A002 - Battery positive
A003 - Alternator power feed
A004 - Battery positive
A005 - Glow plug power feed
A006 - Starter motor power feed
B001 - Battery fuse input
B002 - Fuse box 1
F18(B002) - Trailer socket (15A)
F20(B002) - Accessories (15A)
F21(B002) - 12V ECU power feed (10A)
F22(B002) - 12V ECU power feed (15A)
F23(B002) - Main maxi fuse (70A)
R6(B002) - Trailer socket relay (30A)
R8(B002) - Start relay (20A)
R9(B002) - Main relay (30A)
B003 - Glow plug fuse
B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
F8(B004) - Turn indicators (10A)
F9(B004) - Key-on power feed for ECU (5A)
F15(B004) - 12V VCU power feed (10A)
R1(B004) - Start enable relay
B005 - Diode
C001 - Battery ground
C002 - Battery ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D007 - Main-dashboard connector
E002 - Dashboard
F002 - Lights selector switch
H002 - Diverter
I001 - Battery master relay switch (input terminal)
I002 - Battery master relay switch (output terminal)
I011 - Ignition switch
J002 - Glow plugs
J003 - Glow plug control unit
K016 - Seat start enable signal
M001 - Vehicle ECU
M003A - Engine control unit
N001 - Starter motor input terminal
N002 - Starter motor
N003 - Alternator
N004 - Starter motor 50

Location in vehicle: Power feed and starting

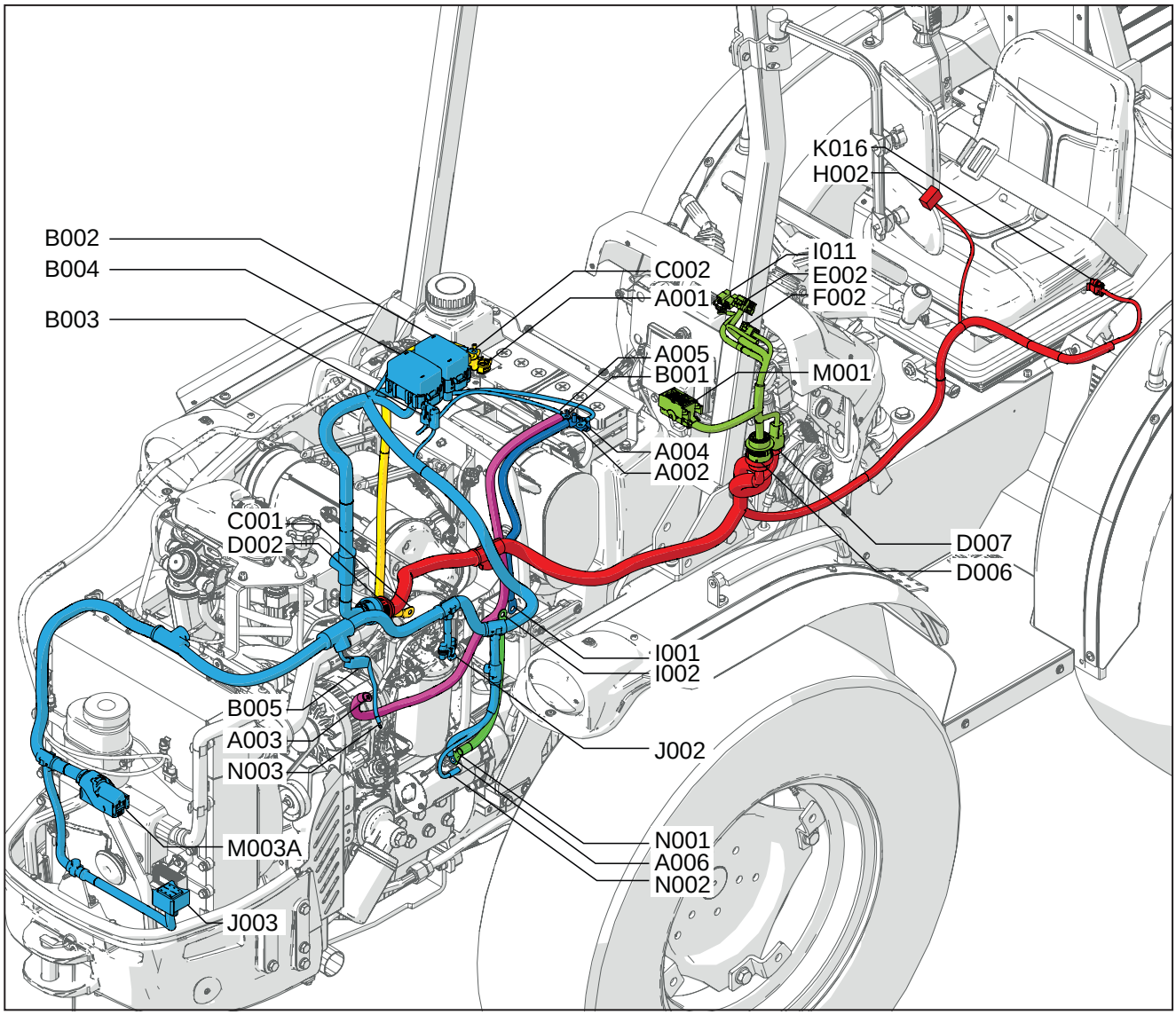

Fig. 12.105

A001 - Battery negative
A002 - Battery positive
A003 - Alternator power feed
A004 - Battery positive
A005 - Glow plug power feed
A006 - Starter motor power feed
B001 - Battery fuse input
B002 - Fuse box 1
B003 - Glow plug fuse
B004 - Fuse box 2
B005 - Diode
C001 - Battery ground
C002 - Battery ground
D002 - Main-engine connector
D006 - Main-dashboard connector
D007 - Main-dashboard connector
E002 - Dashboard
F002 - Lights selector switch
H002 - Diverter
I001 - Battery master relay switch (input terminal)
I002 - Battery master relay switch (output terminal)
I011 - Ignition switch
J002 - Glow plugs
J003 - Glow plug control unit
K016 - Seat start enable signal
M001 - Vehicle ECU
M003A - Engine control unit
N001 - Starter motor input terminal
N002 - Starter motor
N003 - Alternator
N004 - Starter motor 50

12.6.2 S002 - POC and DOC

Electrical wiring diagram: DPF

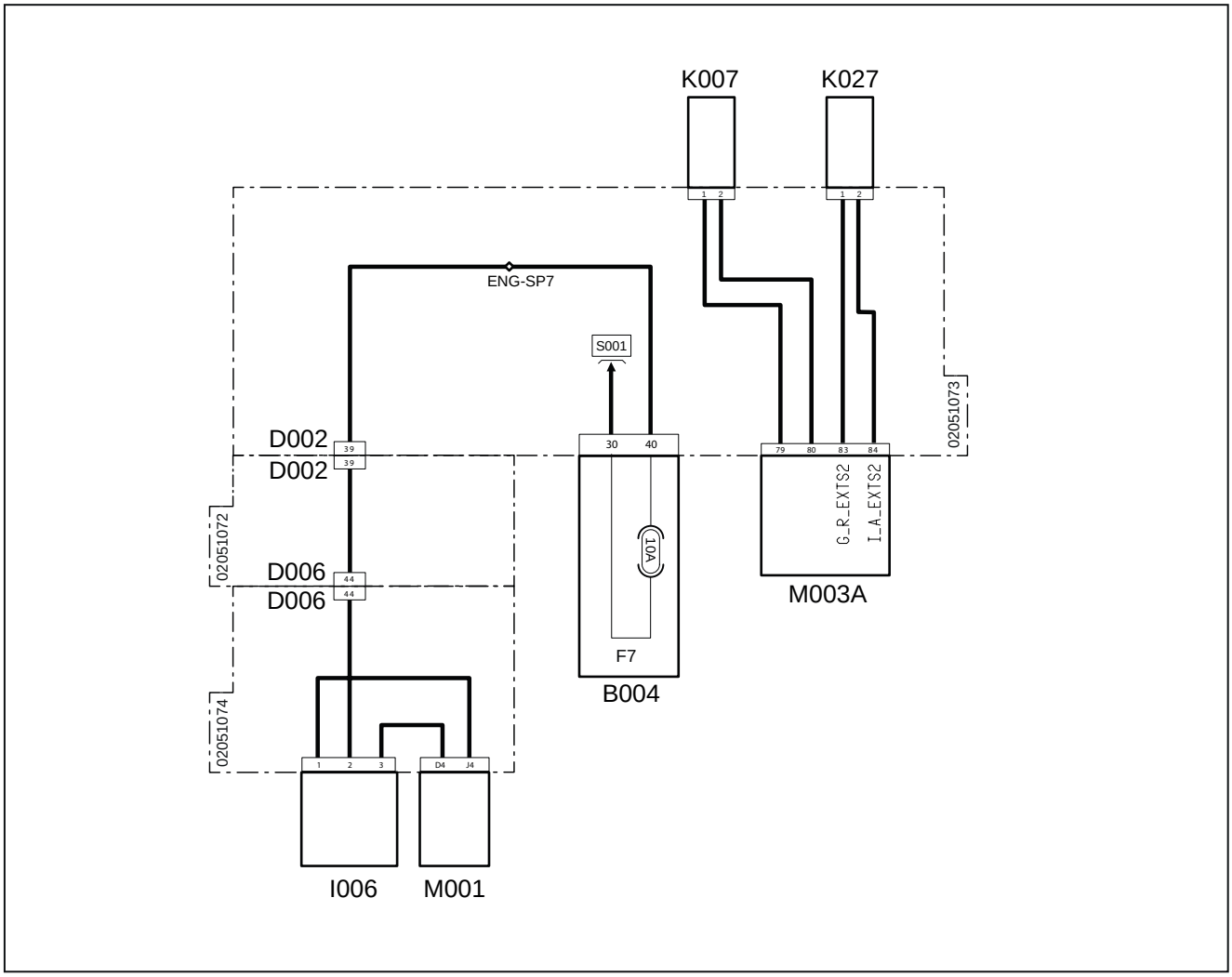

Fig. 12.106

D002 - Main-engine connector
D006 - Main-dashboard connector
I006 - Regeneration disable button
K007 - DOC exhaust gas temperature sensor
K027 - POC exhaust gas temperature sensor
M003A - Engine control unit

Location in vehicle: DPF

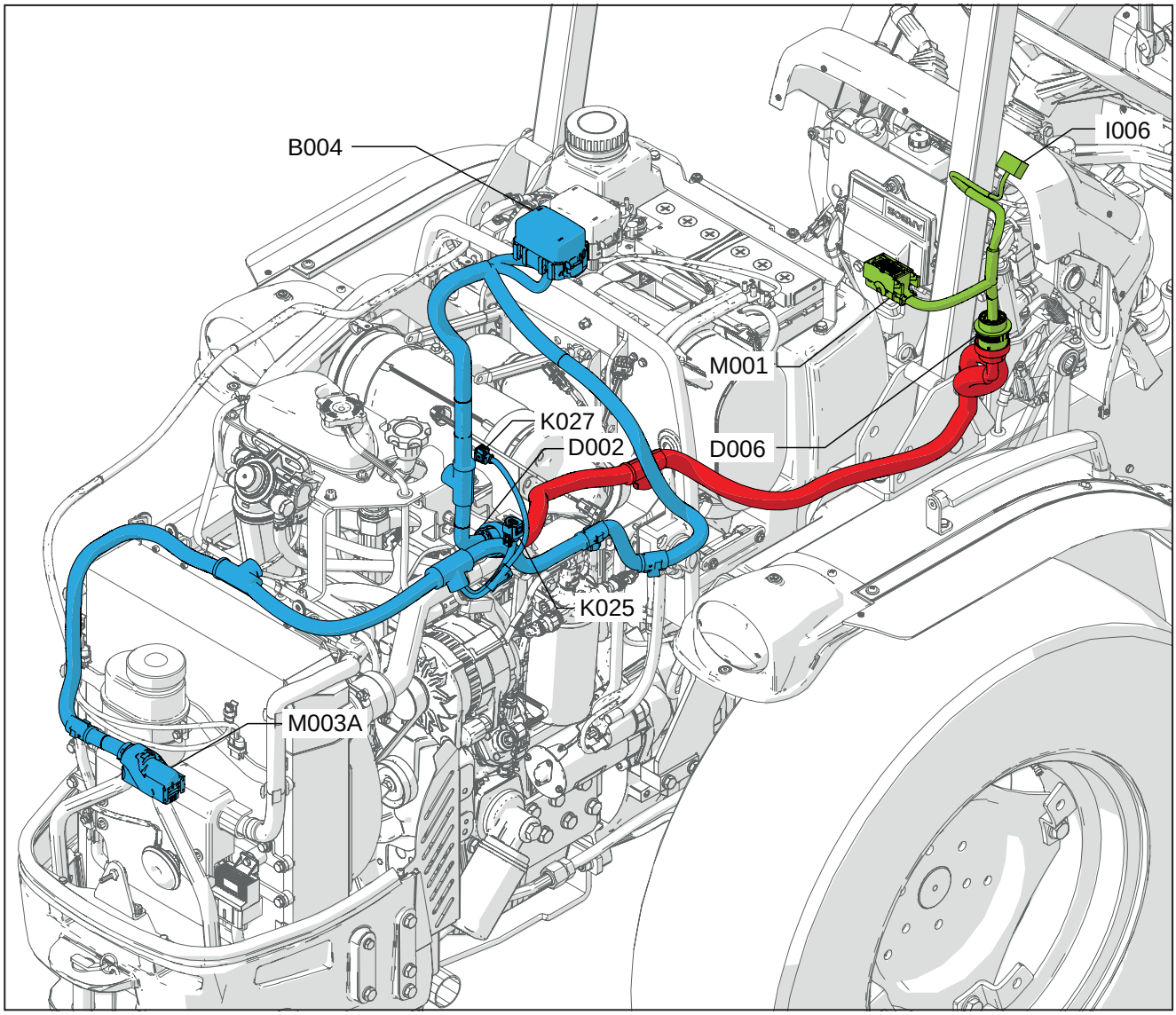

Fig. 12.107

D002 - Main-engine connector
D006 - Main-dashboard connector
I006 - Regeneration disable button
K007 - DOC exhaust gas temperature sensor
K027 - POC exhaust gas temperature sensor
M003A - Engine control unit

12.6.3 S003 - Electronic engine management

Electrical wiring diagram: Electronic engine management

Table 1

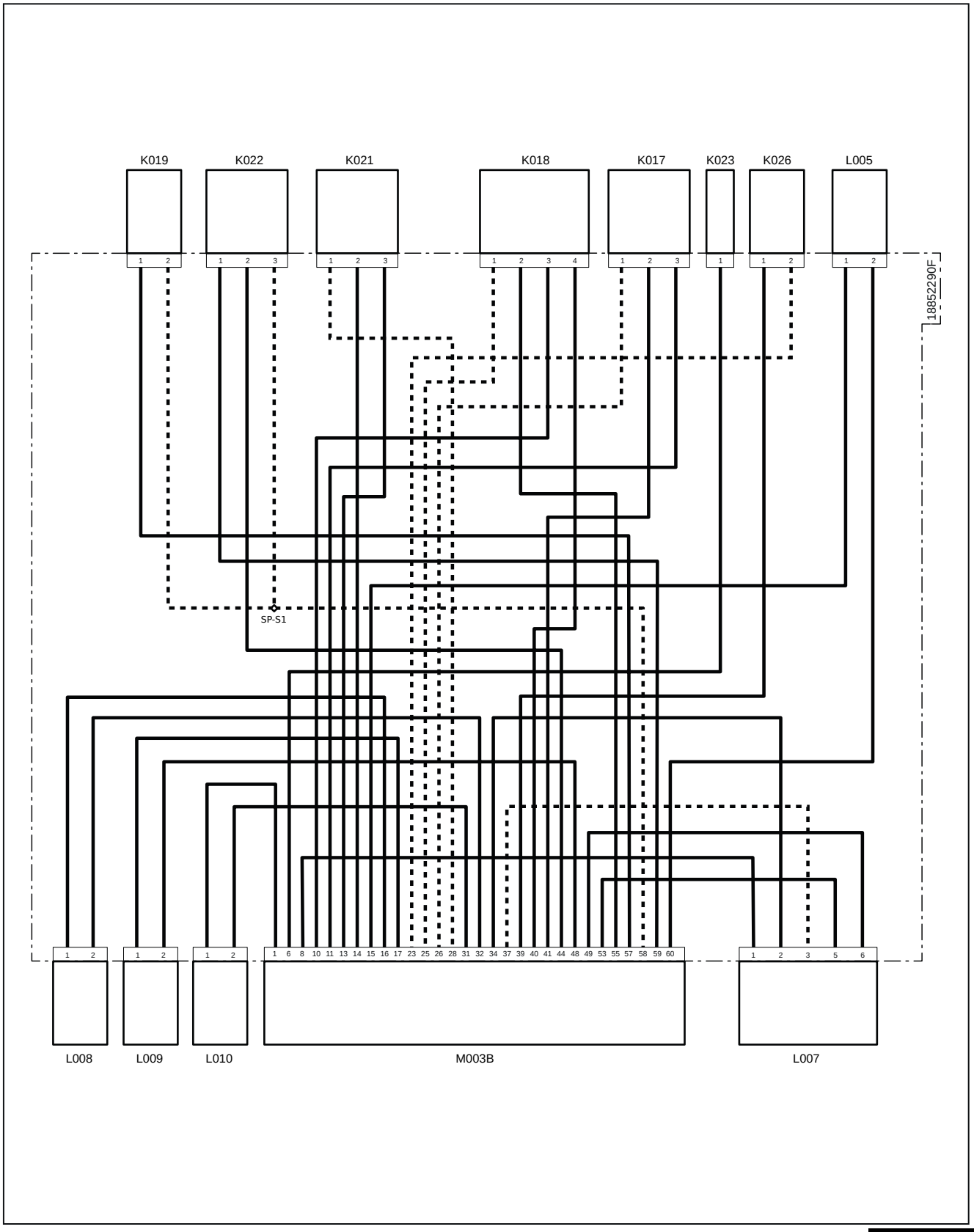

Fig. 12.108

Table 2

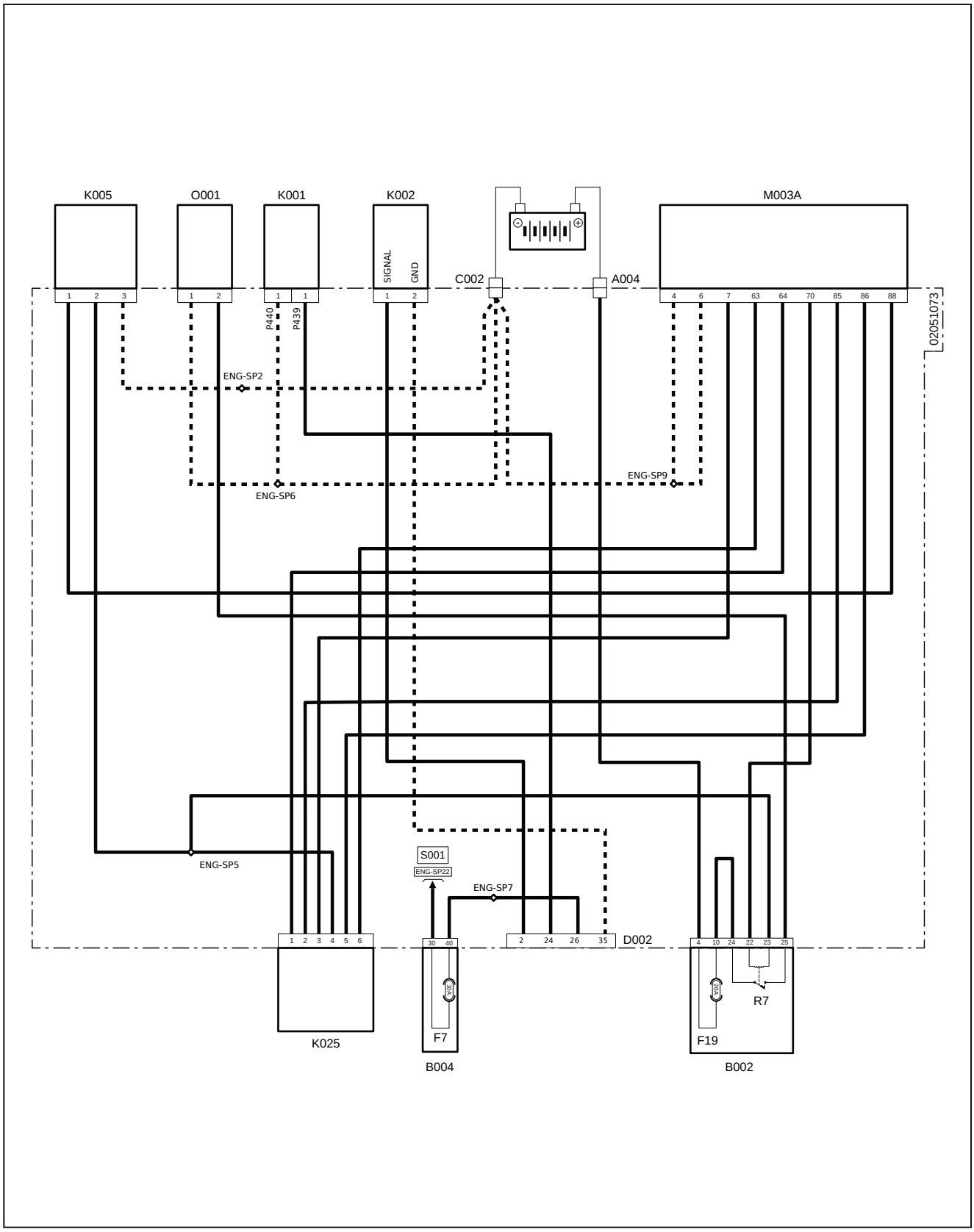

Fig. 12.109

Table 3

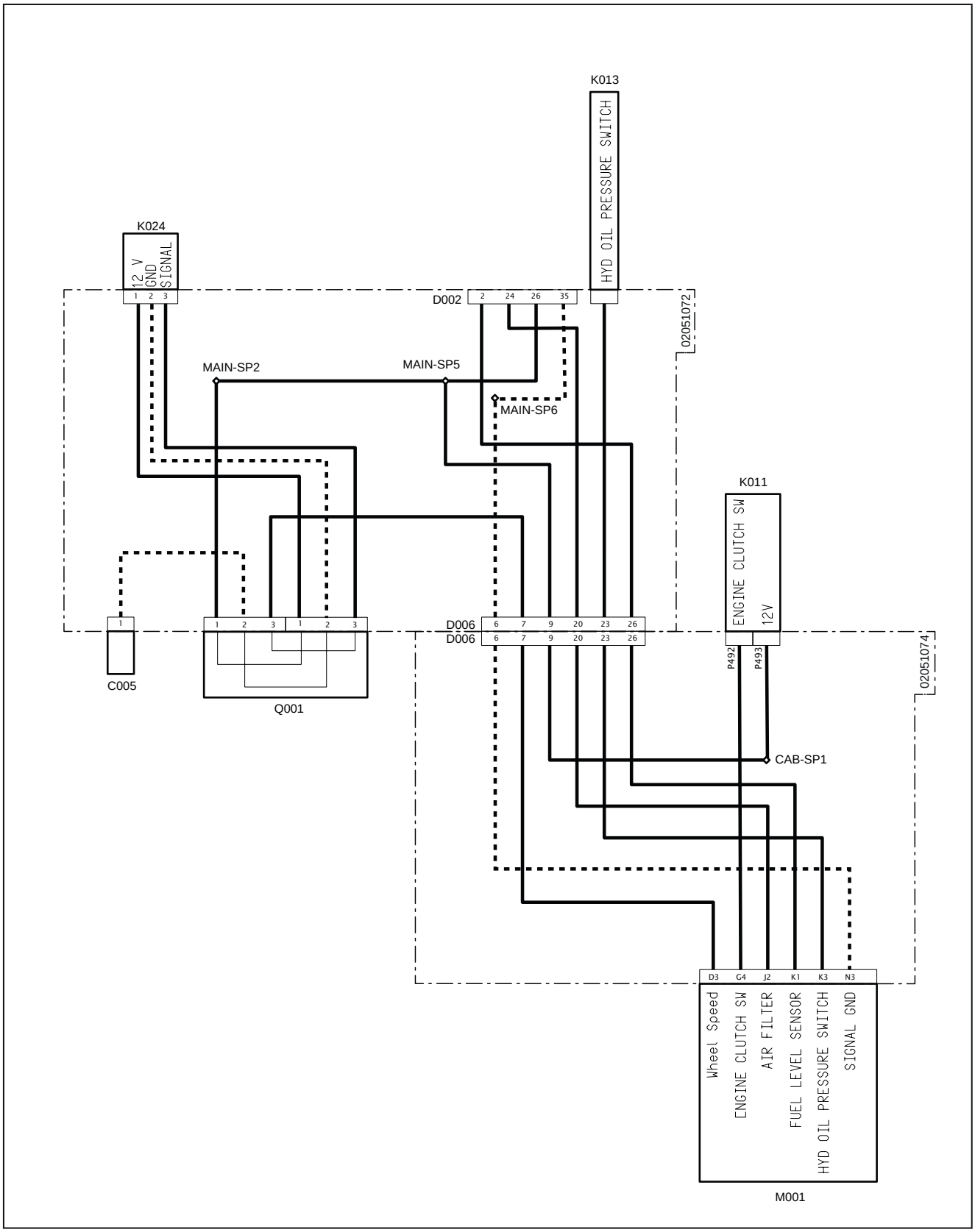

Fig. 12.110

A004 - Battery positive
B002 - Fuse box 1
F19(B002) - Fuel pre-heat (20A)
F20(B002) - Accessories (15A)
R7(B002) - Fuel pre-heat relay (20A)
B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
K002 - Fuel sensor
K005 - Water in fuel sensor
K011 - Clutch sensor
K013 - Hydraulic oil pressure
K017 - Common Rail fuel pressure sensor
K018 - Temperature and pressure sensor (BOOST)
K019 - Coolant temperature sensor
K021 - Camshaft timing sensor
K022 - Crankshaft speed sensor
K023 - Oil pressure switch
K024 - Wiring harness for transmission speed sensor
K025 - Lambda sensor
K026 - Fuel temperature sensor
L005 - High pressure pump
L007 - Throttle valve
L008 - Fuel electro-injector 1
L009 - Fuel electro-injector 2
L010 - Fuel electro-injector 3
M001 - Vehicle ECU
M003A - Engine control unit
M003B - Engine control unit
O001 - Fuel filter heater

Location in vehicle: Electronic engine management

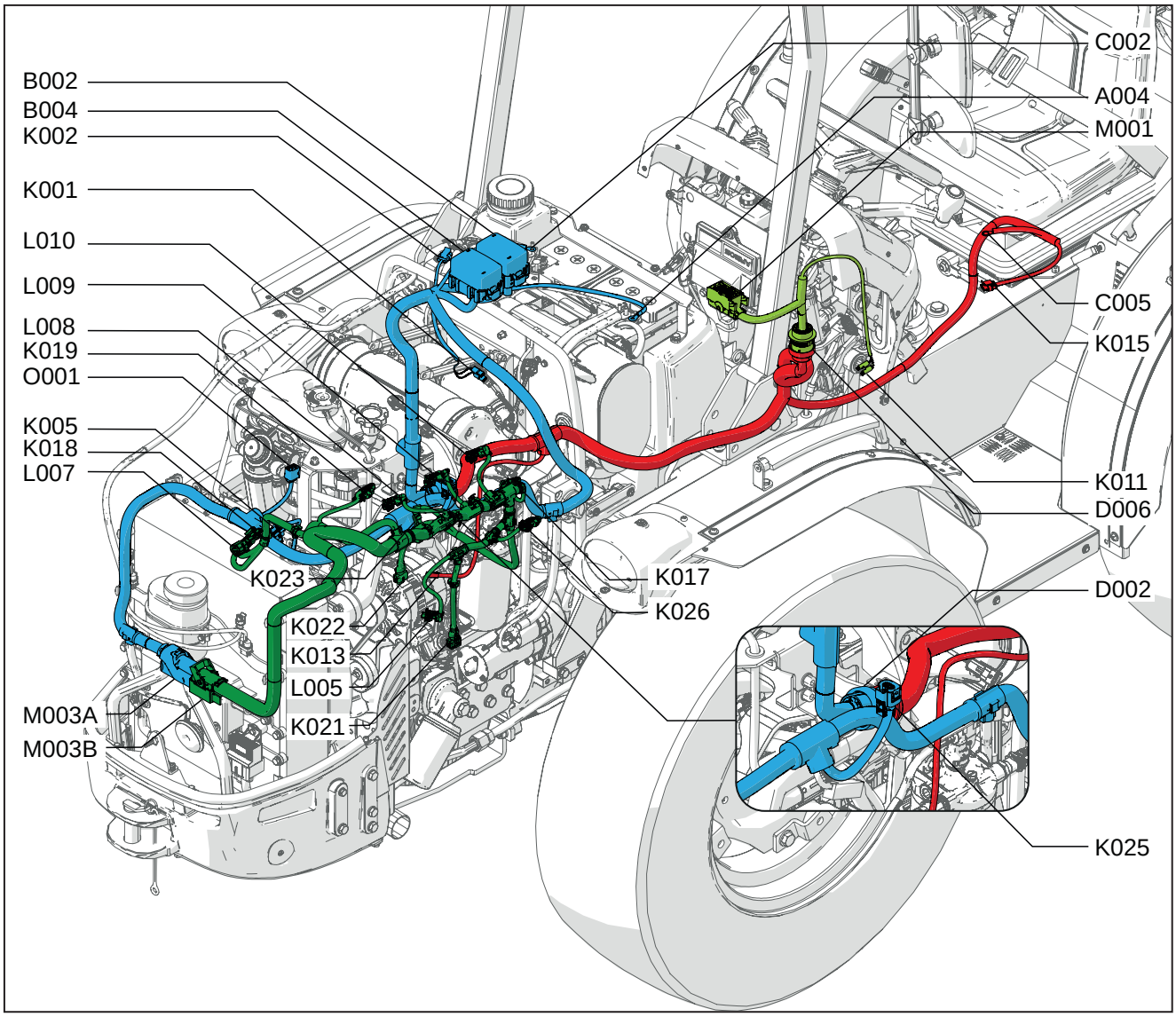

Fig. 12.111

A004 - Battery positive
B002 - Fuse box 1
B004 - Fuse box 2
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
K002 - Fuel sensor
K005 - Water in fuel sensor
K011 - Clutch sensor
K013 - Hydraulic oil pressure
K017 - Common Rail fuel pressure sensor
K018 - Temperature and pressure sensor (BOOST)
K019 - Coolant temperature sensor
K021 - Camshaft timing sensor
K022 - Crankshaft speed sensor
K023 - Oil pressure switch
K024 - Wiring harness for transmission speed sensor
K025 - Lambda sensor
K026 - Fuel temperature sensor
L005 - High pressure pump
L007 - Throttle valve
L008 - Fuel electro-injector 1
L009 - Fuel electro-injector 2
L010 - Fuel electro-injector 3
M001 - Vehicle ECU
M003A - Engine control unit
M003B - Engine control unit
O001 - Fuel filter heater

12.6.4 S004 - Lights and horn

Electrical wiring diagram: Lights and horn

Table 1

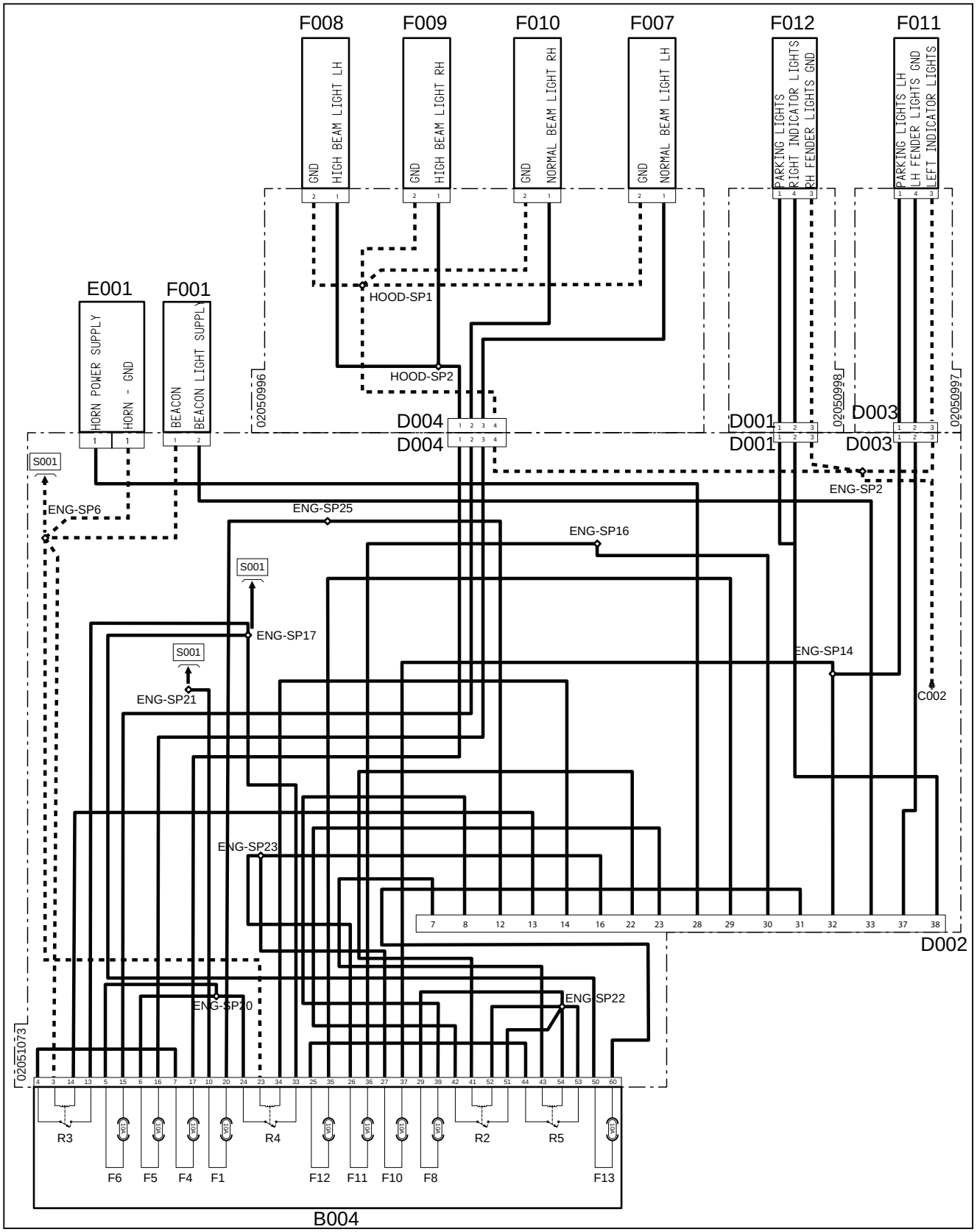

Fig. 12.112

Table 2

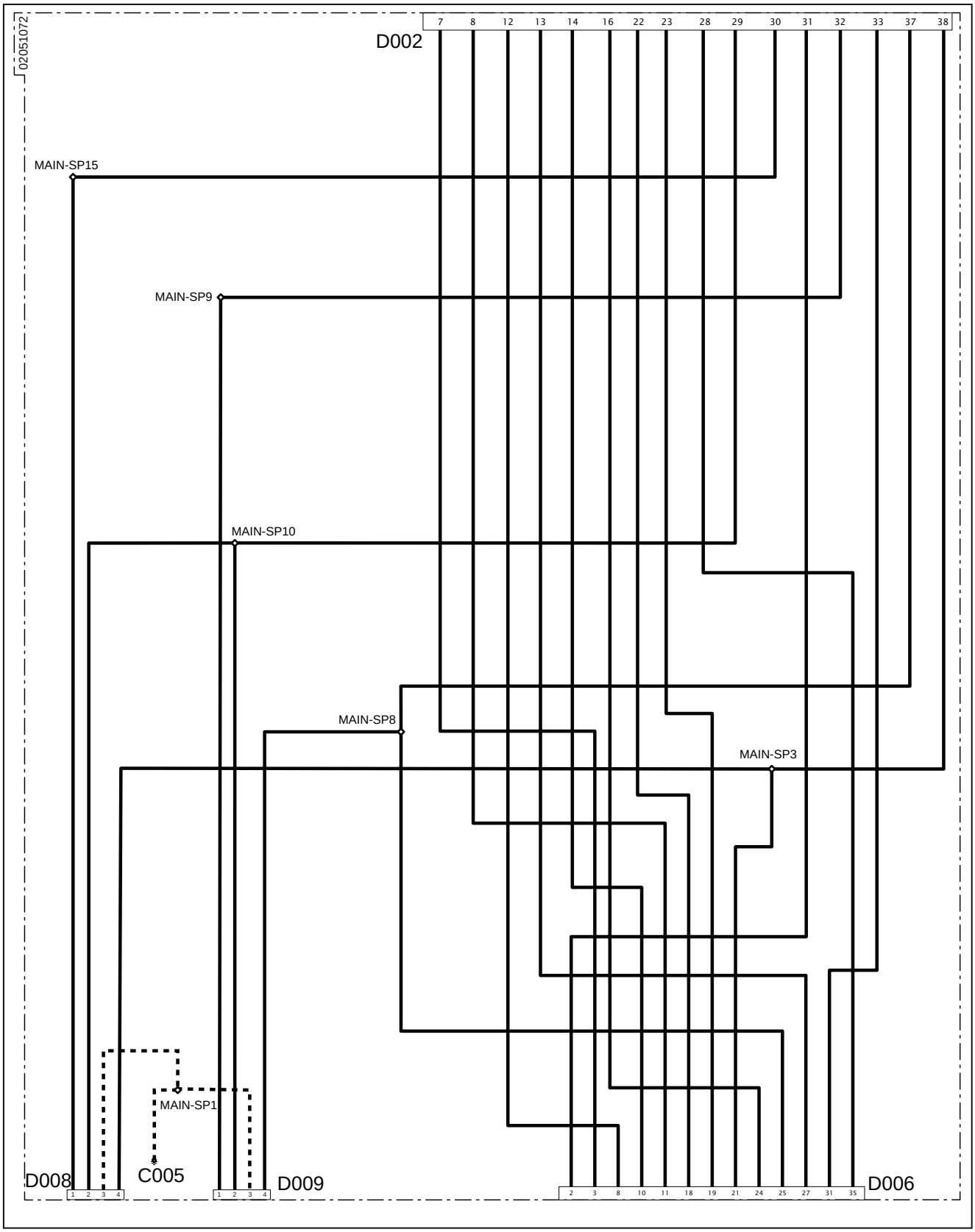

Fig. 12.113

Table 3

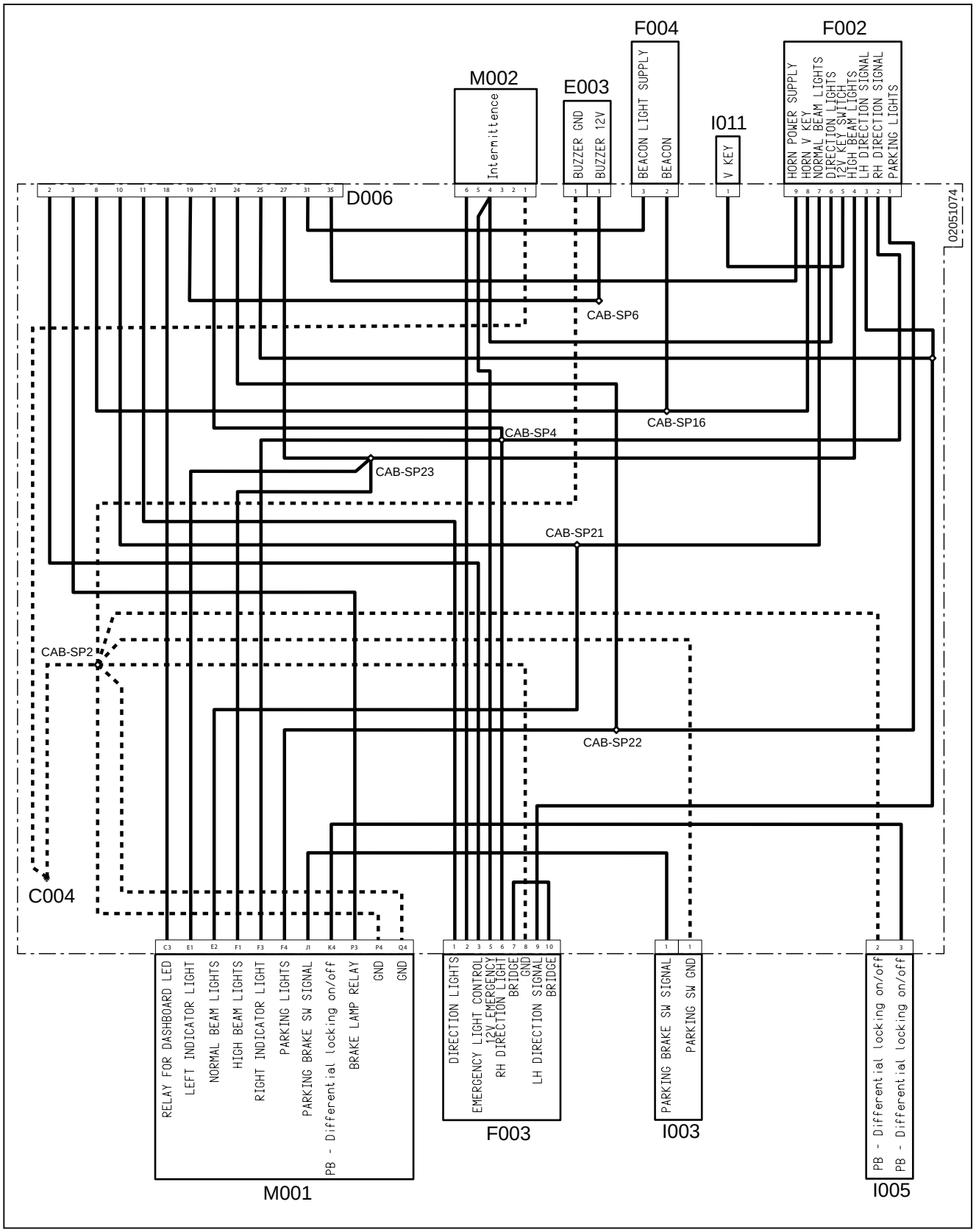

Fig. 12.114

Table 4

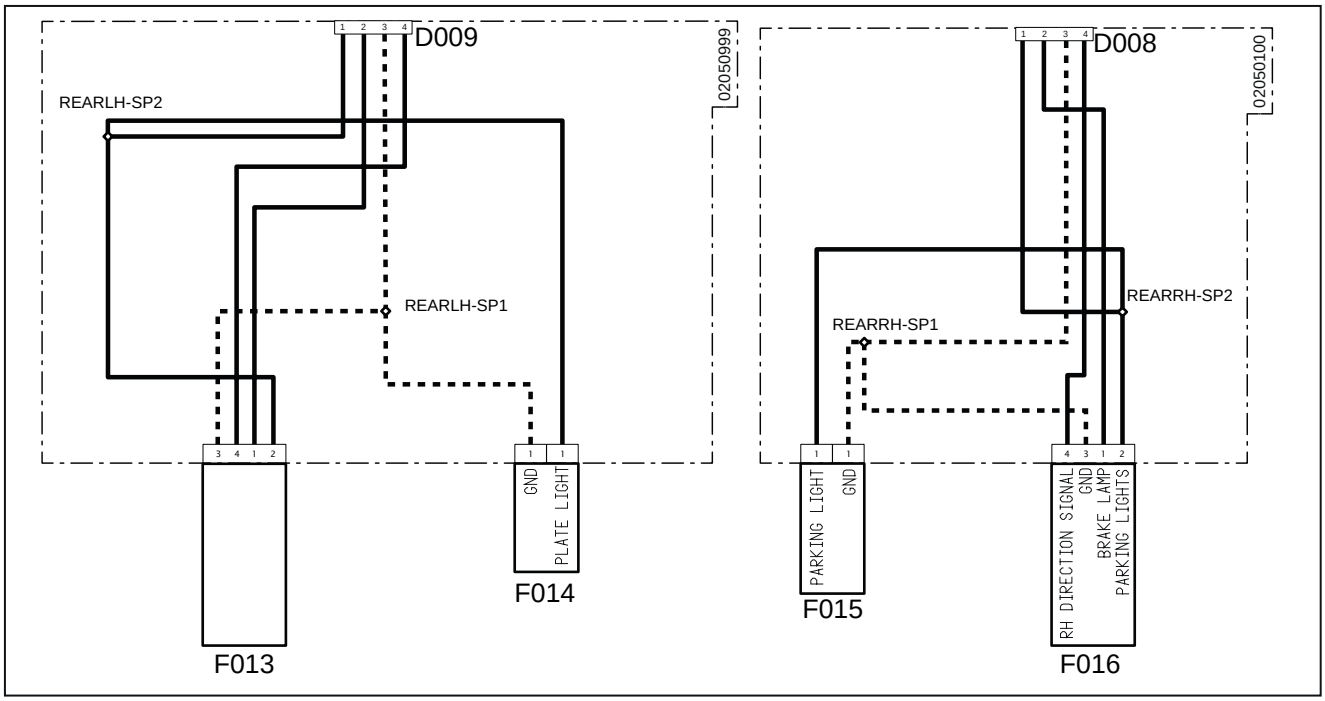

Fig. 12.115

B004 - Fuse box 2
F1(B004) - Rotating beacon (10A)
F4(B004) - High beam (10A)
F5(B004) - LH low beams (10A)
F6(B004) - RH low beams (10A)
F8(B004) - Turn indicators (10A)
F10(B004) - LH sidelights (10A)
F11(B004) - RH sidelights (10A)
F12(B004) - Brake lights (10A)
F13(B004) - Hazard warning lights (10A)
R2(B004) - Dashboard LED relay
R3(B004) - High beam relay
R4(B004) - Low beam relay
R5(B004) - Brake light relay
C002 - Battery ground
C004 - Cab ground
C005 - Main ground
D001 - Right front lights-Engine connector
D002 - Main-engine connector
D003 - Left front lights-Engine connector
D004 - Front lights-Engine connector
D006 - Main-dashboard connector
D008 - Right rear lights-main connector
D009 - Left rear lights-main connector
E001 - Horn
E003 - Buzzer
F001 - Headlamp
F002 - Lights selector switch
F003 - Hazard warning lights
F004 - Headlamp
F007 - LH low beam headlight
F008 - LH high beam headlight
F009 - RH high beam headlight
F010 - RH low beam headlight
F011 - LH turn indicator
F012 - RH turn indicator
F013 - LH mudguard light
F014 - Number plate light
F015 - RH work lights
F016 - Rear lights
I003 - Parking brake
I005 - Differential lock
I011 - Ignition switch
M001 - Vehicle ECU
M002 - Flasher unit

Location in vehicle: Lights and horn

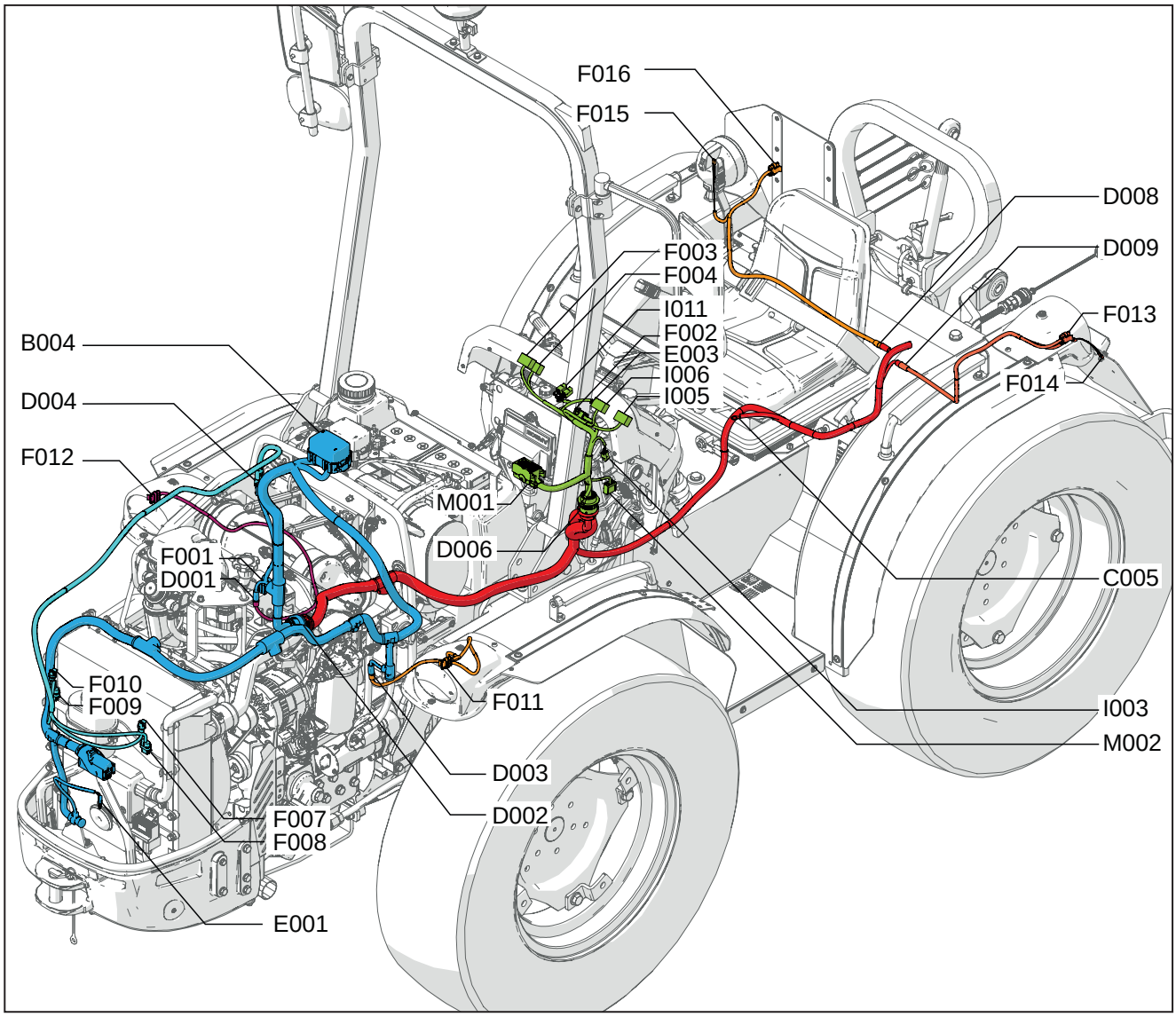

Fig. 12.116

B004 - Fuse box 2
C002 - Battery ground
C004 - Cab ground
C005 - Main ground
D001 - Right front lights-Engine connector
D002 - Main-engine connector
D003 - Left front lights-Engine connector
D004 - Front lights-Engine connector
D006 - Main-dashboard connector
D008 - Right rear lights-main connector
D009 - Left rear lights-main connector
E001 - Horn
E003 - Buzzer
F001 - Headlamp
F002 - Lights selector switch
F003 - Hazard warning lights
F004 - Headlamp
F007 - LH low beam headlight
F008 - LH high beam headlight
F009 - RH high beam headlight
F010 - RH low beam headlight
F011 - LH turn indicator
F012 - RH turn indicator
F013 - LH mudguard light
F014 - Number plate light
F015 - RH work lights
F016 - Rear lights
I003 - Parking brake
I005 - Differential lock
I011 - Ignition switch
M001 - Vehicle ECU
M002 - Flasher unit

12.6.5 S005 - Power sockets and accessories

Electrical wiring diagram: Power sockets and accessories

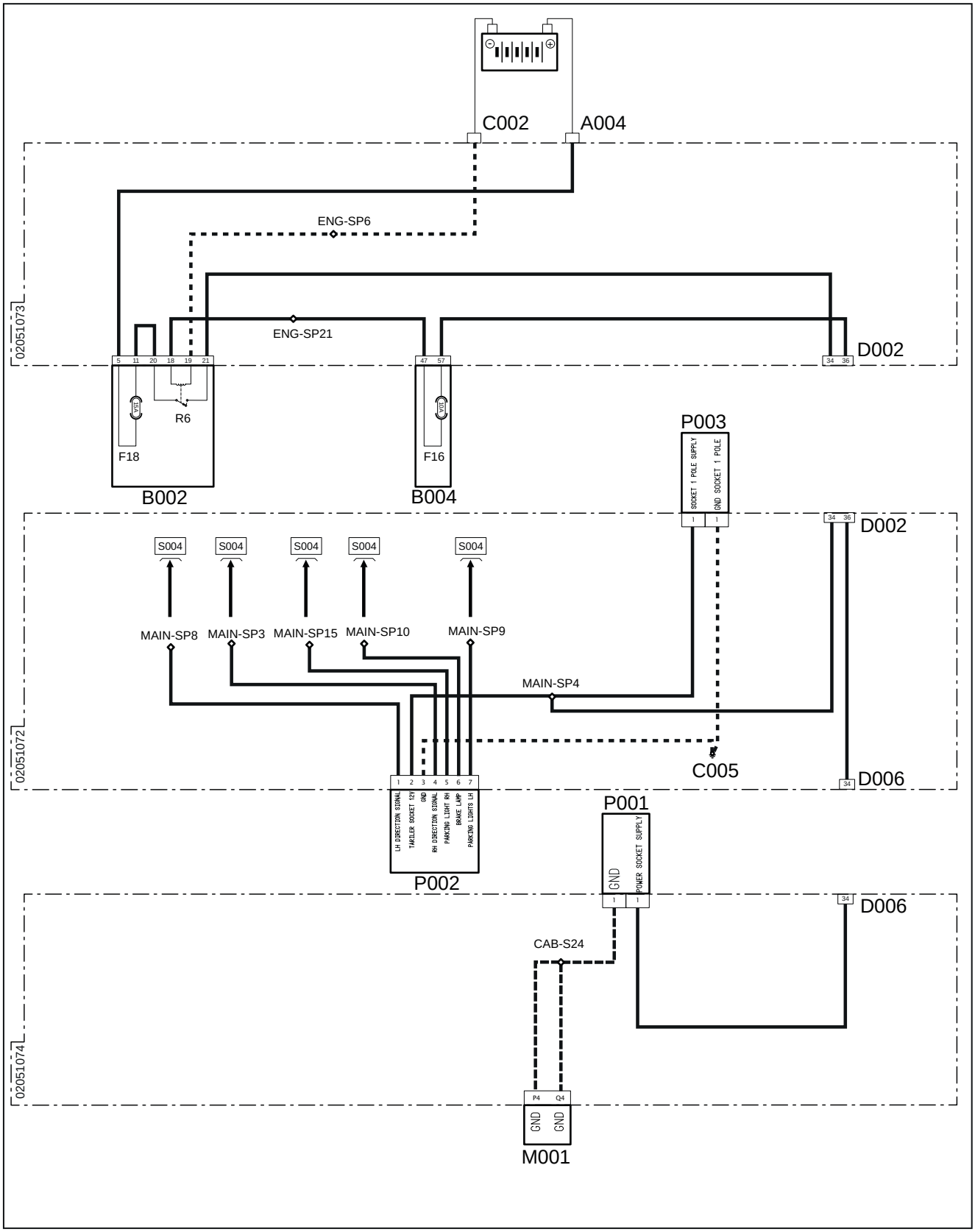

Fig. 12.117

A004 - Battery positive
B002 - Fuse box 1
F18(B002) - Trailer socket (15A)
R6(B002) - Trailer socket relay (30A)
B004 - Fuse box 2
F16(B004) - Socket (10A)
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
M001 - Vehicle ECU
P001 - 1-pole socket
P002 - 7 pole power socket
P003 - 1 pole power socket

Location in vehicle: Power sockets and accessories

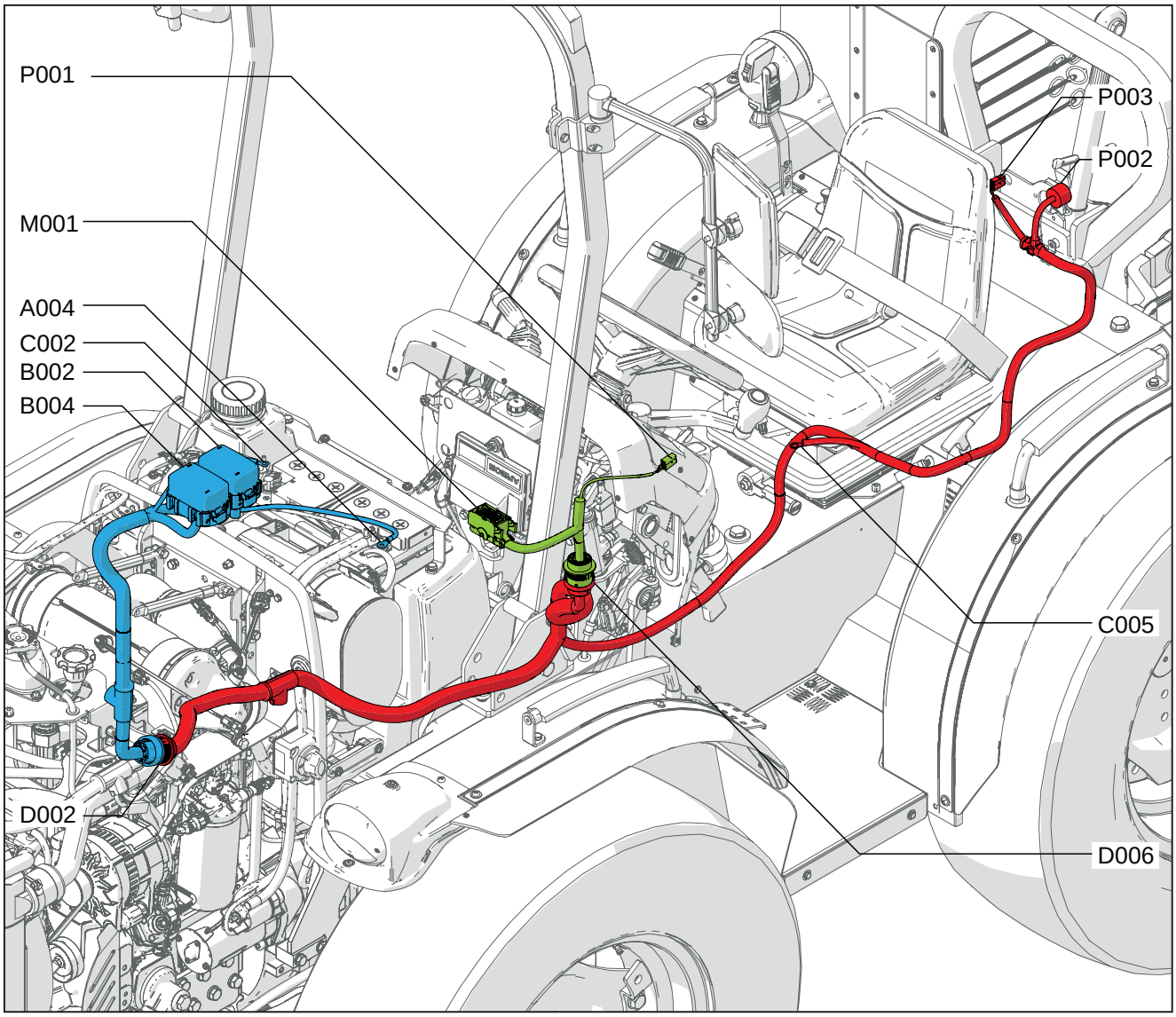

Fig. 12.118

A004 - Battery positive
B002 - Fuse box 1
B004 - Fuse box 2
C002 - Battery ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
M001 - Vehicle ECU
P001 - 1-pole socket
P002 - 7 pole power socket
P003 - 1 pole power socket

12.6.6 S006 - Diagnostics and CAN lines

Electrical wiring diagram: Diagnostics and CAN lines

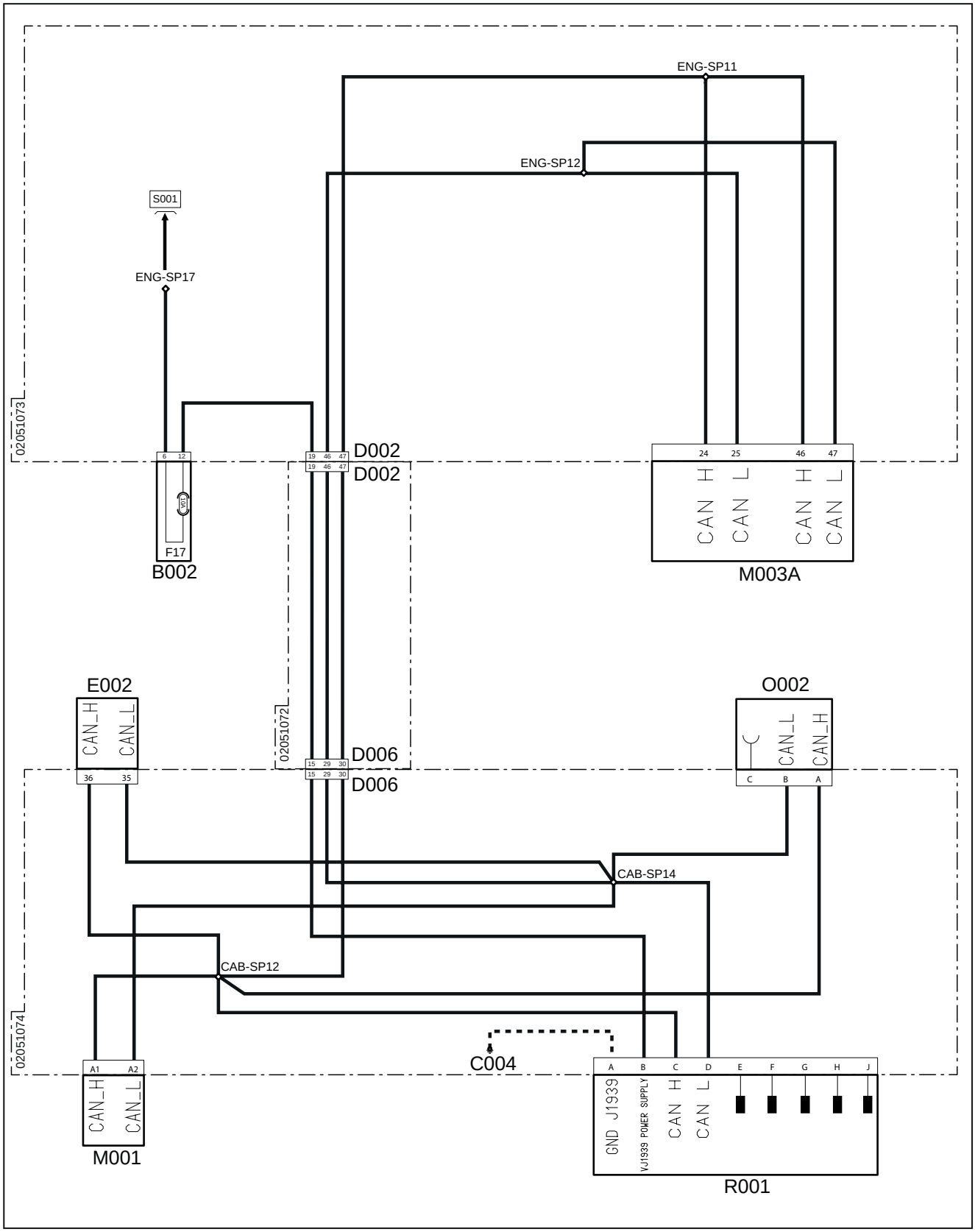

Fig. 12.119

B002 - Fuse box 1
F17(B002) - Diagnostic socket (10A)
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
M001 - Vehicle ECU
M003A - Engine control unit
O002 - CAN line termination
R001 - Diagnostic port

Location in vehicle: Diagnostics and CAN lines

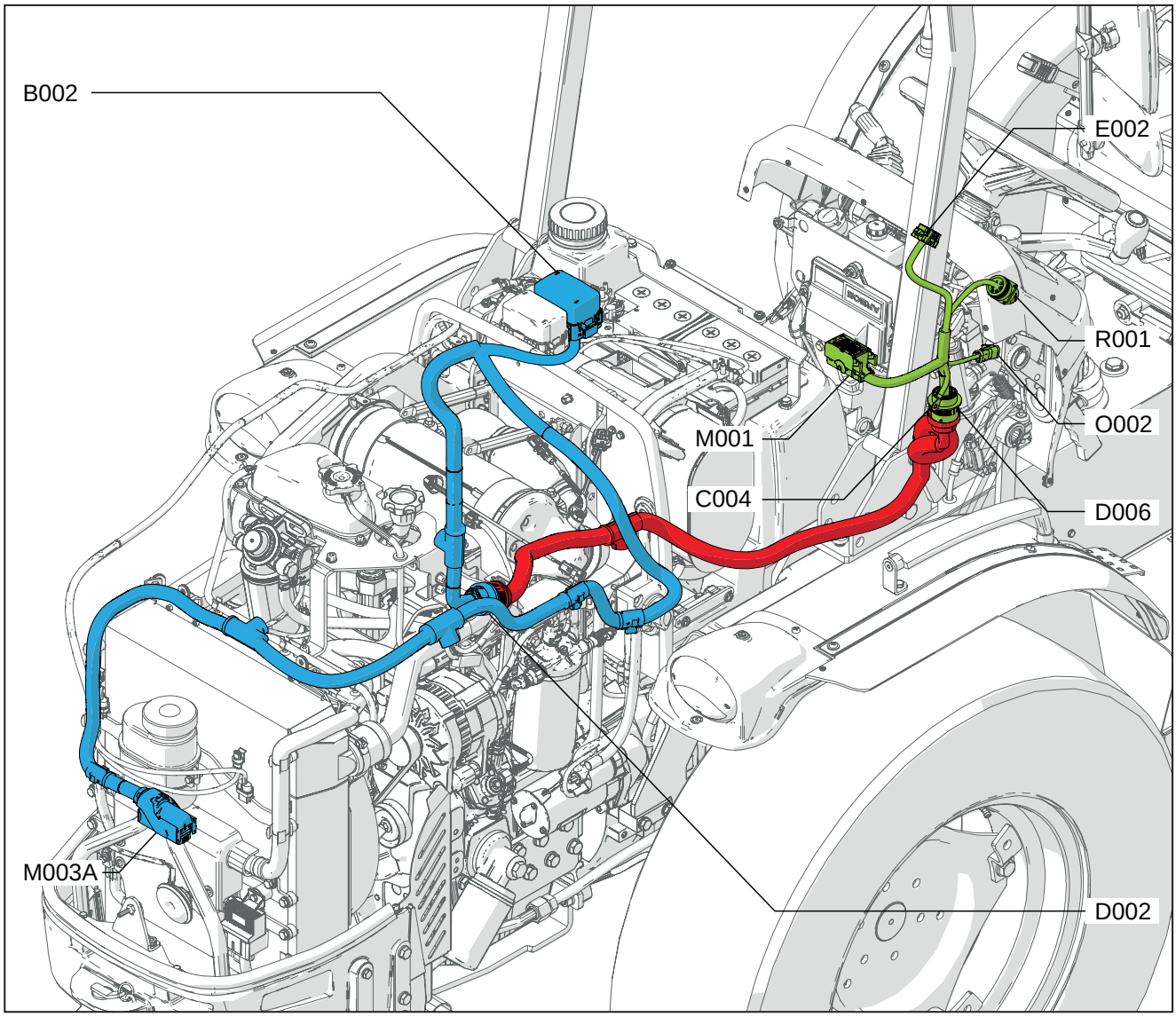

Fig. 12.120

B002 - Fuse box 1
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
M001 - Vehicle ECU
M003A - Engine control unit
O002 - CAN line termination
R001 - Diagnostic port

12.6.7 S007 - Dashboard

Electrical wiring diagram: Dashboard

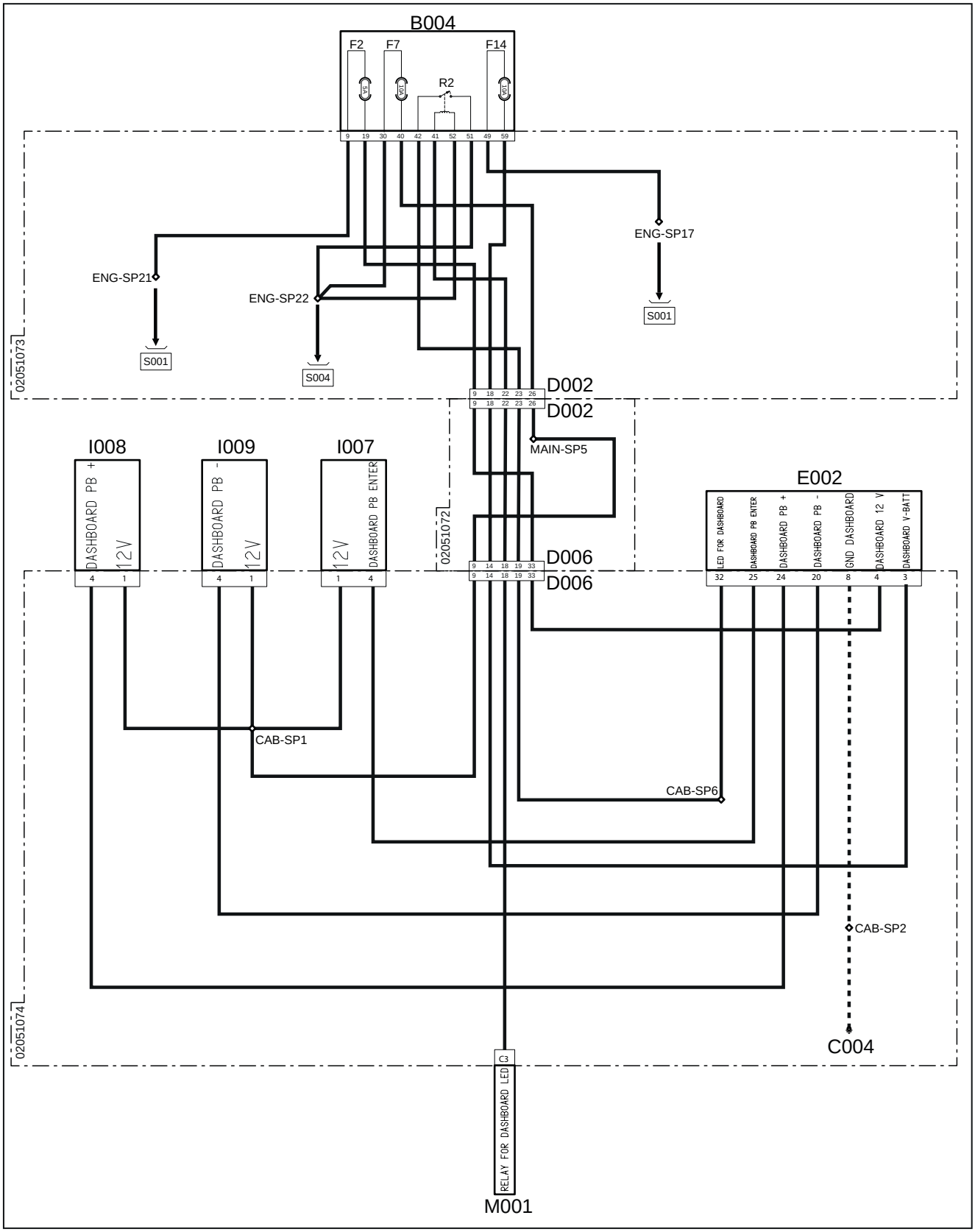

Fig. 12.121

B004 - Fuse box 2
F2(B004) - Key-on power feed for dashboard (5A)
F7(B004) - Sensors/switches (10A)
F14(B004) - 12V dashboard power feed (10A)
R2(B004) - Dashboard LED relay
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
I007 - Dashboard ENTER button
I008 - Dashboard PB+ button
I009 - Dashboard PB- button
M001 - Vehicle ECU

Location in vehicle: Dashboard

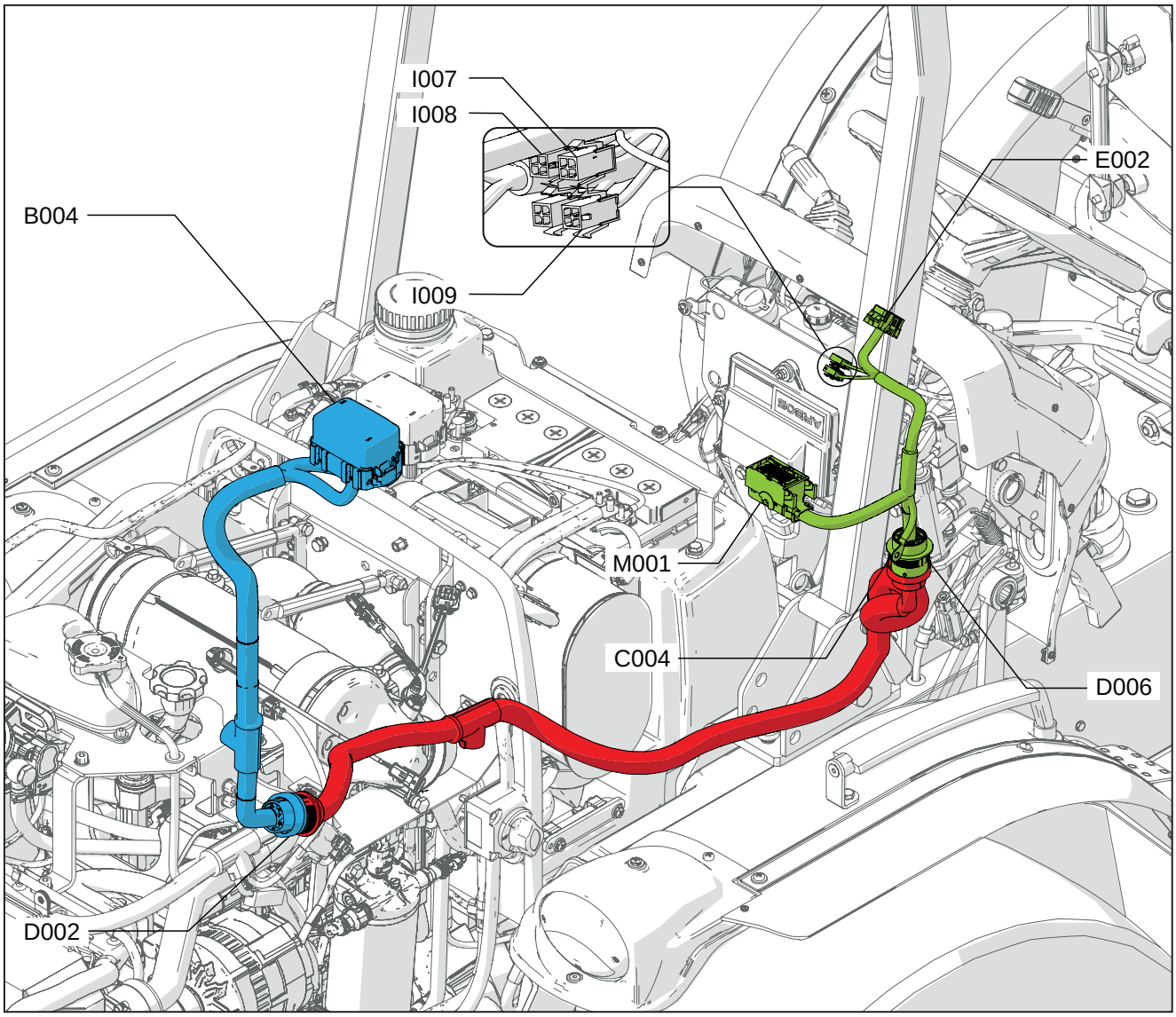

Fig. 12.122

B004 - Fuse box 2
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
E002 - Dashboard
I007 - Dashboard ENTER button
I008 - Dashboard PB+ button
I009 - Dashboard PB- button
M001 - Vehicle ECU

12.6.8 S008 - Transmission

Electrical wiring diagram: Transmission

Table 1

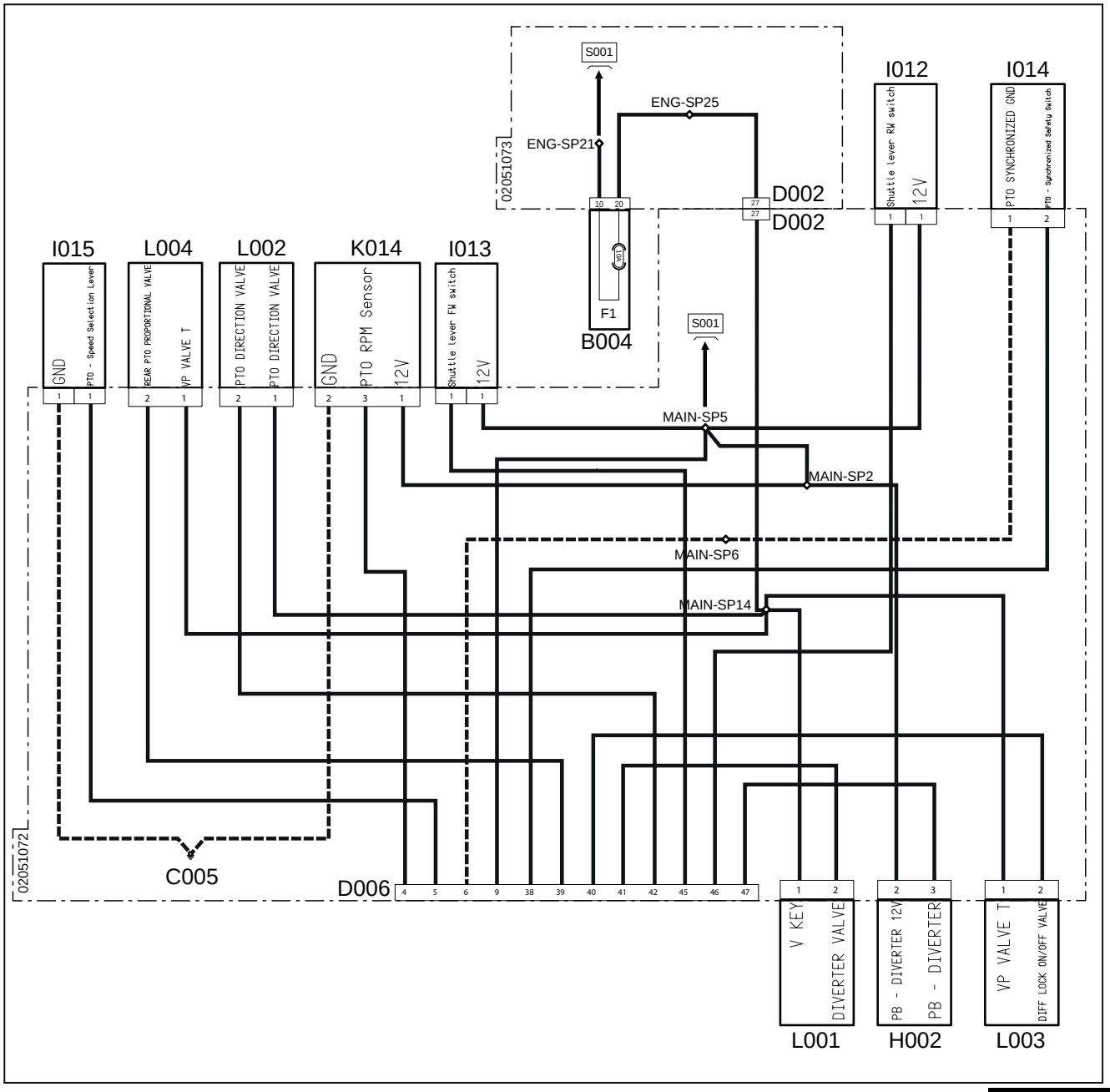

Fig. 12.123

Table 2

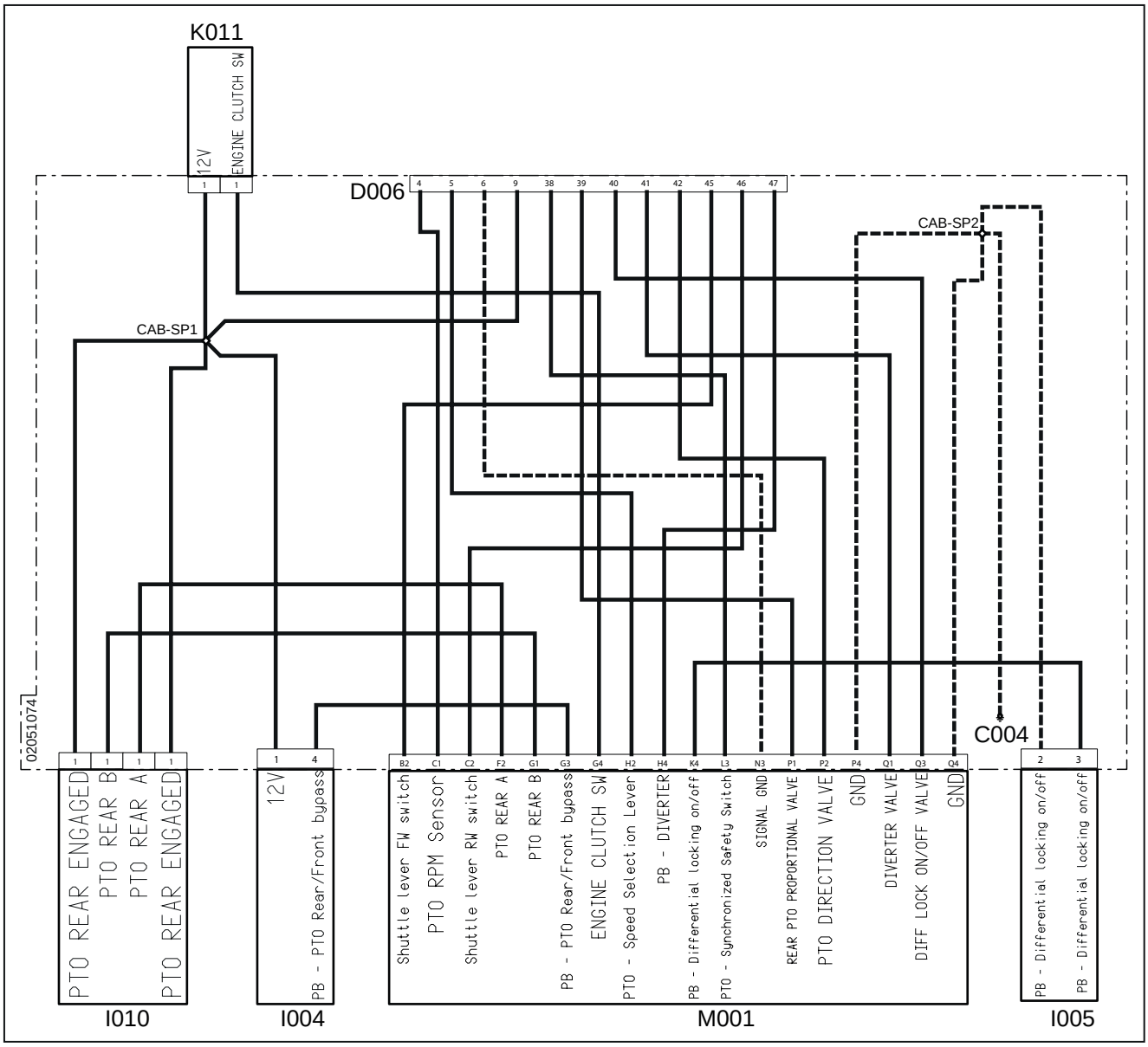

Fig. 12.124

B004 - Fuse box 2
F1(B004) - Rotating beacon (10A)
C004 - Cab ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
H002 - Diverter
I004 - Front/Rear PTO bypass
I005 - Differential lock
I010 - PTO selector
I012 - RH reverse shuttle lever
I013 - LH reverse shuttle lever
I014 - PTO safety synchro switch
I015 - PTO speed selector
K011 - Clutch sensor
K014 - PTO speed sensor
L001 - Diverter valve
L002 - PTO directional valve
L003 - Differential lock valve
L004 - 4WD valve
M001 - Vehicle ECU

Location in vehicle: Transmission

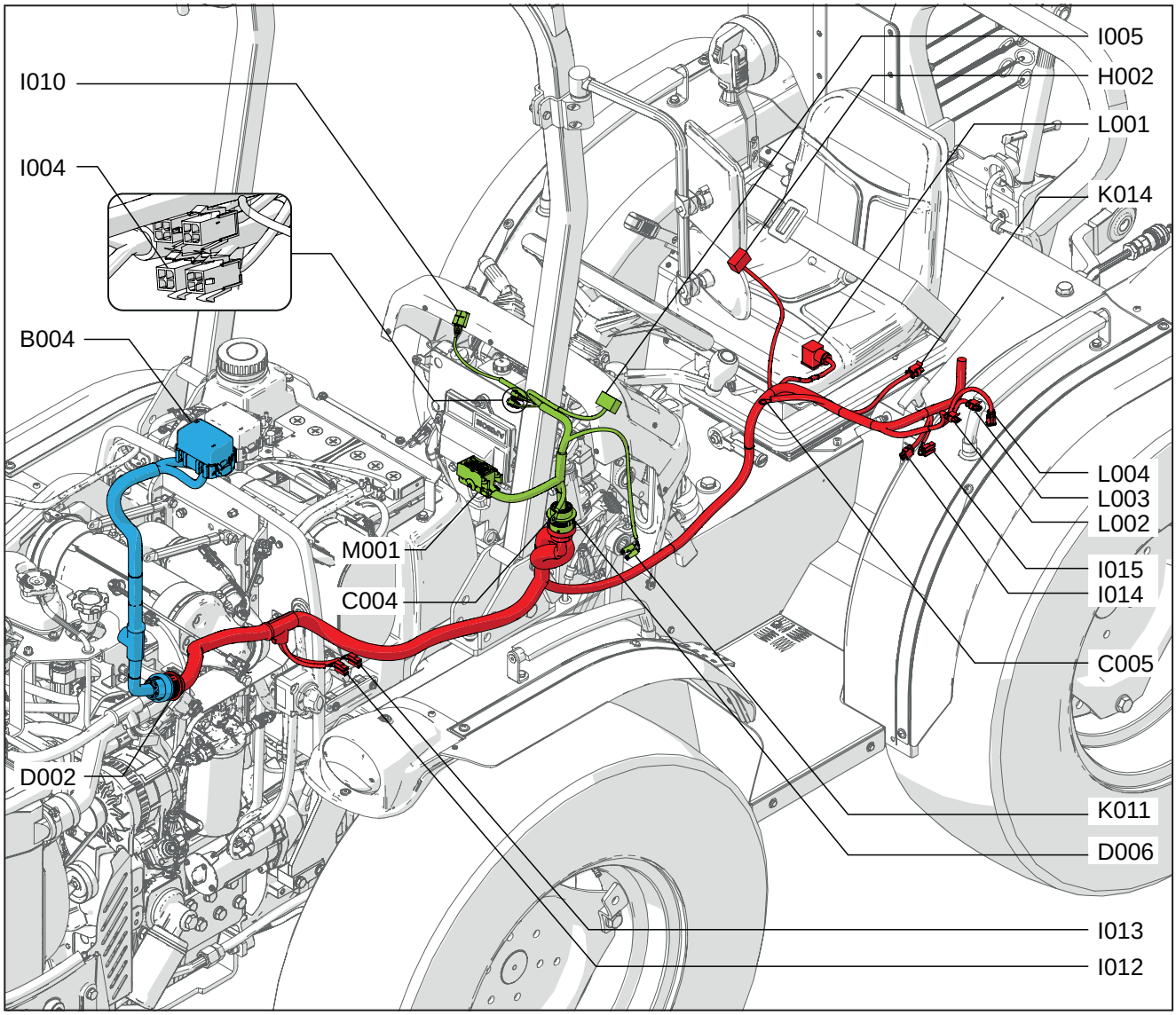

Fig. 12.125

B004 - Fuse box 2
C004 - Cab ground
C005 - Main ground
D002 - Main-engine connector
D006 - Main-dashboard connector
H002 - Diverter
I004 - Front/Rear PTO bypass
I005 - Differential lock
I010 - PTO selector
I012 - RH reverse shuttle lever
I013 - LH reverse shuttle lever
I014 - PTO safety synchro switch
I015 - PTO speed selector
K011 - Clutch sensor
K014 - PTO speed sensor
L001 - Diverter valve
L002 - PTO directional valve
L003 - Differential lock valve
L004 - 4WD valve
M001 - Vehicle ECU

12.6.9 S009 - Brakes

Electrical wiring diagram: Brakes

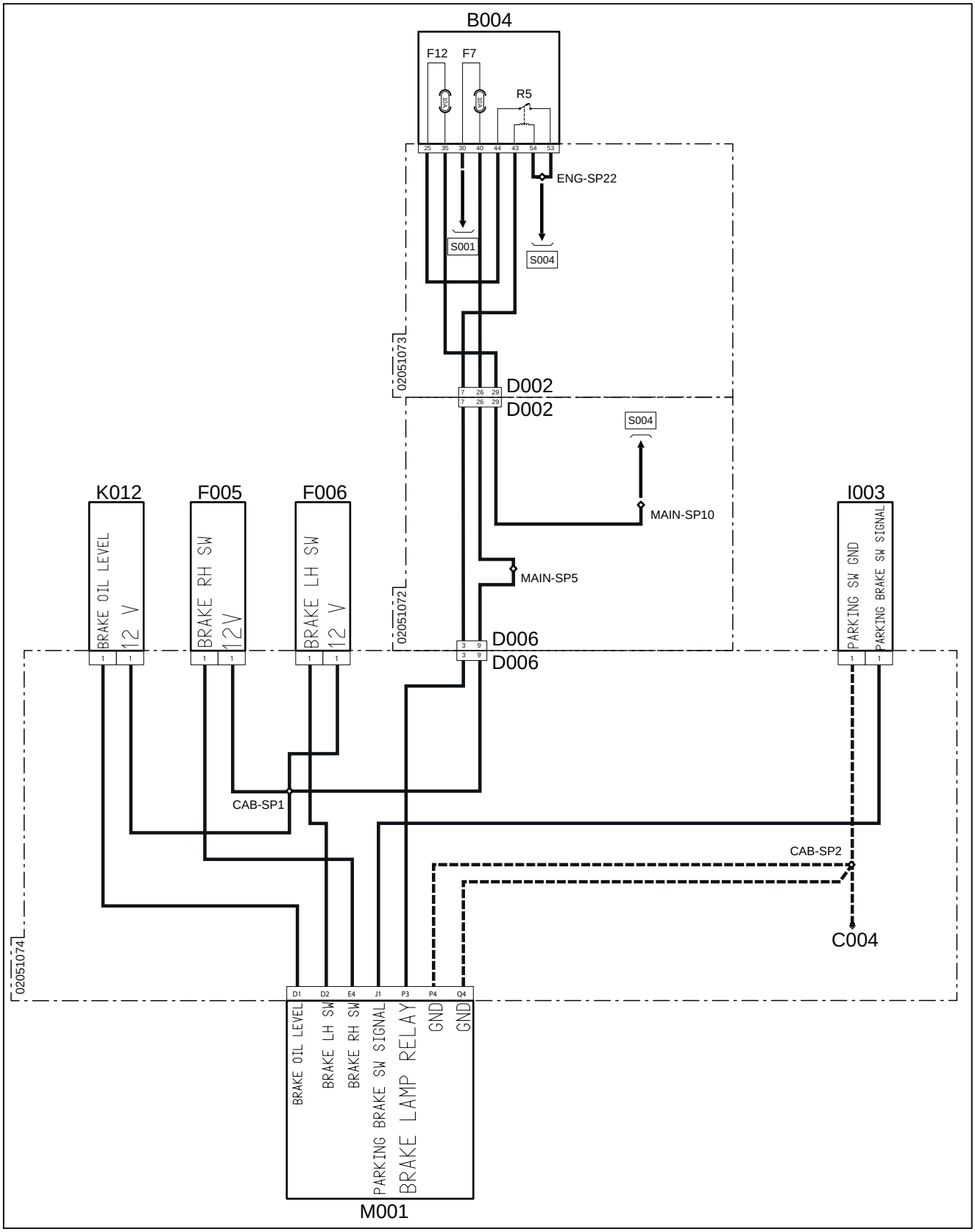

Fig. 12.126

B004 - Fuse box 2
F7(B004) - Sensors/switches (10A)
F12(B004) - Brake lights (10A)
R5(B004) - Brake light relay
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
F005 - RH brake signal
F006 - LH brake signal
I003 - Parking brake
K012 - Brake oil sensor
M001 - Vehicle ECU

Location in vehicle: Brakes

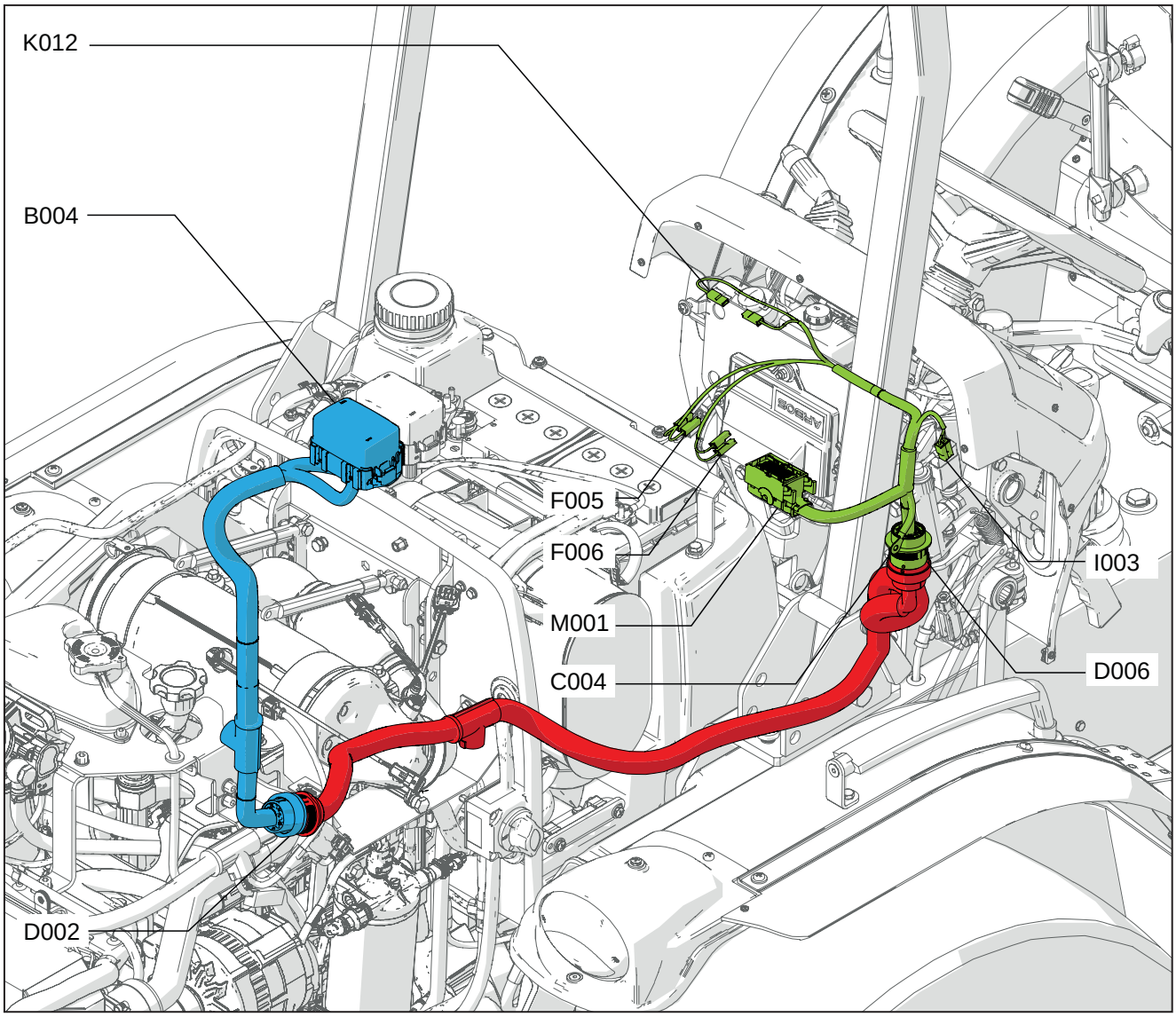

Fig. 12.127

B004 - Fuse box 2
C004 - Cab ground
D002 - Main-engine connector
D006 - Main-dashboard connector
F005 - RH brake signal
F006 - LH brake signal
I003 - Parking brake
K012 - Brake oil sensor
M001 - Vehicle ECU

12.7 Error code list, E90/E100

Index

12.7.1 Engine 12-150

12.7.2 Vehicle 12-155

12.7.3 Front/rear PTO 12-156

12.7.1 Engine

Error IDN	SPN	FMI	DESCRIPTION
3001	27	0	Invalid Data Received From Exhaust Gas Recirculation Control
3002	27	1	Exhaust Gas Recirculation Control Circuit Range/Performance
3003	27	2	TimeOut from EGR message
3004	27	3	EGR High battery supply voltage error
3005	27	4	EGR Low battery supply voltage error
3006	27	6	Diagnostic fault check for EGR Over current.
3007	27	7	EGR low flow
3008	27	11	Lost communication with EGR module (internal temperature)
3009	27	12	Exhaust Gas Recirculation Control valve Stuck Closed
3010	27	13	EGR Drive Motor Position Sensor Circuit High
3011	27	17	EGR valve stuck closed position
3012	27	18	EGR valve stuck open position
3013	27	19	Lost communication from ECM to EGR
3014	81	0	Diesel Particulate Filter overloaded - Soot Accumulation
3015	81	1	PFltDiff pressure --> Hoseline error
3016	81	3	Diesel Particulate Filter Regeneration Frequency too high
3017	81	11	Differential pressure sensor --> Fault check for pressure sensor plausibility
3018	81	12	PFltDiff pressure --> Hoseline frozen
3019	97	3	Water in fuel detection or sensor open load
3020	98	0	Lubricant --> Fluidity critical below minimal default oil level
3021	100	0	Engine Oil low level
3022	100	1	Engine oil switch not plausible. Oil pressure above 1.8 bar (abs) with engine not running
3023	102	0	Intake pressure (P5) above threshold (overpressure)
3024	102	3	Intake pressure sensor short circuit to battery or open load
3025	102	4	Intake pressure sensor short circuit to ground
3026	102	16	Manifold Absolute Pressure - Barometric Pressure Correlation
3027	102	18	Manifold Absolute Pressure - Barometric Pressure Correlation
3028	105	3	SRC High for Charge air cooler downstream Temperature
3029	105	4	SRC low for Charge air cooler downstream Temperature
3030	108	3	Ambient pressure sensor SRC high
3031	108	4	Ambient pressure sensor SRC low
3032	110	0	Engine coolant over temperature
3033	110	3	Coolant Temperature sensor --> raw signal above maximum threshold
3034	110	4	Coolant Temperature sensor --> raw signal below minimum threshold
3035	131	0	Diesel Particulate Filter Differential Pressure Too high. DPF overloaded.
3036	131	1	Diesel Particulate Filter Differential Pressure Too Low. Internal substrate broken
3037	131	3	DPF Differential pressure sensor --> SRC max
3038	131	4	DPF Differential pressure sensor --> SRC min
3039	157	0	Rail pressure --> maximum positive deviation exceeded
3040	157	2	Rail pressure --> maximum negative rail pressure deviation with metering unit on lower limit is exceeded
3041	157	4	Rail pressure --> maximum positive deviation exceeded
3042	157	12	Rail pressure --> minimum positive deviation exceeded

3043	164	3	Rail pressure sensor --> voltage SRC max
3044	164	4	Rail pressure sensor --> voltage SRC min
3045	164	12	rail pressure --> pressure gradient too excessive
3046	164	16	Rail pressure --> raw value is above maximum offset
3047	164	18	Rail pressure --> raw value is below minimum offset
3048	168	3	System Voltage High
3049	168	4	System Voltage Low
3050	171	3	Ambient temp --> SRC Max
3051	171	4	Ambient temp --> SRC Min
3052	174	3	Fuel temperature sensor --> short to battery or open load
3053	174	4	Fuel temperature sensor --> short to ground
3054	190	1	Crankshaft signal diagnose --> disturbed signal
3055	190	5	Crankshaft signal diagnose --> no signal
3056	228	0	Camshaft signal diagnose --> offset angle exceeded
3057	275	13	Internal Control Module Fuel Injector Control Performance
3058	412	3	SRC high for EGR cooler downstream temperature sensor
3059	412	4	SRC low for EGR cooler downstream temperature sensor
3060	627	2	Operation Condition of WDA/ABE shut-off --> Diagnostic fault check to report "WDA active" due to errors in query-/response communication
3061	627	3	Operation Condition of WDA/ABE shut-off --> Diagnostic fault check to report "ABE active" due to overvoltage detection
3062	627	4	Operation Condition of WDA/ABE shut-off --> Diagnostic fault check to report "ABE active" due to undervoltage detection
3063	627	12	Operation Condition of WDA/ABE shut-off --> Diagnostic fault check to report "WDA or ABE active" due to unknown reason
3064	628	2	EEP Write Error based on the error for more blocks
3065	628	3	EEP Erase Error based on the error for more blocks
3066	628	4	EEP Read Error based on the error for more blocks
3067	629	0	Monitoring level 2 --> Diagnosis of set path limitation forced by ECU
3068	629	3	Monitoring function --> Reported OverVoltage of Supply
3069	629	4	Monitoring function --> Reported UnderVoltage of Supply
3070	629	11	Visibility of SoftwareResets in DSM
3071	629	12	Visibility of SoftwareResets in DSM
3072	629	13	Visibility of SoftwareResets in DSM
3073	629	14	Internal Control Module A/D Processing Performance
3074	630	2	Monitoring Function --> Plausib error between level 1 energizing time and level 2 information
3075	630	4	Monitoring Function --> non plausib in ZFC
3076	630	5	Monitoring Function --> Engine speed error
3077	630	6	Monitoring Function --> plausib error between the injection begin and injection type
3078	630	7	Monitoring Function --> error due to overrun
3079	630	8	Monitoring level 2 --> Diagnosis of curr path limitation forced by ECU
3080	630	10	Monitoring Function --> plaus error in rail pressure monitoring
3081	630	11	Monitoring Function --> Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI3 efficiency factor
3082	630	12	Monitoring Function --> error due to torque comparison
3083	630	13	Internal Control Module Vehicle Speed Performance

3084	630	15	Monitoring Function --> Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI2 shut-off
3085	630	16	Monitoring Function --> error due to quantity correction
3086	630	17	Internal Control Module Torque Calculation Performance
3087	630	19	Monitoring level 2 --> Diagnosis of lead path limitation forced by ECU
3088	630	21	Monitoring Function --> Diagnosis fault check to report the demand for normal mode due to an error in the PoI2 quantity
3089	631	0	Internal Control Module Fuel Injector Control Performance
3090	631	1	ADC Monitoring --> Implausible ADC test errors
3091	631	2	ADC Monitoring --> Implausible voltage ratio
3092	631	3	Query-response communic Monitoring --> Error in the plausibility of the function controller and the monitoring module
3093	631	4	Monitoring ROM check --> multiple error in complete ROM-test during postdrive detected
3094	631	5	Monitoring of redundant shut-off paths --> Error during the execution of the shut-off path test; uncertain cause (defective injector or shut-off path)
3095	631	6	Monitoring of redundant shut-off paths --> Error trying to set MM Response time
3096	631	7	Monitoring of redundant shut-off paths --> Error detected in the SPI communication
3097	631	8	Monitoring of redundant shut-off paths --> Error in the check of the shut-off path test of the under voltage detection
3098	631	9	Monitoring of redundant shut-off paths --> Error in the check of the shut-off path of the monitoring module
3099	631	10	Monitoring of redundant shut-off paths --> Time out error trying to set or cancelling the alarm task
3100	631	11	Monitoring of redundant shut-off paths --> Error during positive test
3101	631	12	Query-response communic Monitoring --> interrupted SPI communication
3102	631	13	Monitoring of redundant shut-off paths --> Error in the check of the shut-off path test of the over voltage detection
3103	631	14	Internal Control Module A/D Processing Performance
3104	631	15	Monitoring of redundant shut-off paths --> Too less bytes received by MM from CPU as response
3105	631	18	Monitoring of redundant shut-off paths --> Time out error trying to set or cancelling the alarm task
3106	632	0	Injection cut off demand (ICO) for shut off coordinator
3107	634	0	Intake Throttle valve stuck
3108	634	1	Intake Throttle valve feedback line open load or short circuit
3109	634	2	Intake Throttle valve feedback line not plausible during initialization
3110	634	3	Intake Throttle valve short circuit to battery
3111	634	4	Intake Throttle valve SCG
3112	634	5	Intake Throttle valve open load circuit
3113	634	6	Intake Throttle valve Over Temperature
3114	639	3	CAN Bus Off node A - active error
3115	639	4	CAN Bus Off node A - passive error
3116	641	0	PCR underboost
3117	641	1	PCR overboost
3118	651	3	A general cylinder short circuit is detected by the pattern detection
3119	651	4	A HS/LS short circuit is detected by the pattern detection

3120	651	5	An open load error is detected by the pattern detection
3121	651	13	Monitoring for missing or faulty programming of the injector adjustment values (%= cylinder index)
3122	652	3	A general cylinder short circuit is detected by the pattern detection
3123	652	4	A HS/LS short circuit is detected by the pattern detection
3124	652	5	An open load error is detected by the pattern detection
3125	652	13	Monitoring for missing or faulty programming of the injector adjustment values (%= cylinder index)
3126	653	3	A general cylinder short circuit is detected by the pattern detection
3127	653	4	A HS/LS short circuit is detected by the pattern detection
3128	653	5	An open load error is detected by the pattern detection
3129	653	13	Monitoring for missing or faulty programming of the injector adjustment values (%= cylinder index)
3130	654	3	A general cylinder short circuit is detected by the pattern detection
3131	654	4	A HS/LS short circuit is detected by the pattern detection
3132	654	5	An open load error is detected by the pattern detection
3133	654	13	Monitoring for missing or faulty programming of the injector adjustment values (%= cylinder index)
3134	657	0	Piezo injector Bank 0 --> short circuit
3135	657	1	Piezo injector Bank 1 --> short circuit
3136	677	0	Defective T50 switch
3137	677	1	Starter relay over current
3138	677	3	Starter relay high side short circuit to battery
3139	677	4	Starter relay high side short circuit to ground
3140	677	5	Starter relay low side open load circuit
3141	677	15	Starter relay low side short to battery
3142	677	16	Starter relay low side short to ground
3143	723	0	Camshaft signal diagnose --> disturbed signal
3144	723	1	Camshaft signal diagnose --> no signal
3145	898	0	TSC1 Rx message time out error
3146	898	2	TSC1VE Rx message passive error
3147	898	3	TSC1VE Rx message active error
3148	898	12	TSC1 Rx message DLC error
3149	1079	0	Error Sensor supplies 1
3150	1079	1	Error Sensor supplies 2
3151	1079	2	Error Sensor supplies 3
3152	1180	3	Temperature sensor upstream turbine voltage above threshold high
3153	1180	4	Temperature sensor upstream turbine voltage below threshold low
3154	1209	0	Exhaust pressure sensor Ds turbine drifted compare to ambient pressure.
3155	1209	1	Exhaust pressure sensor Ds turbine drifted compare to ambient pressure.
3156	1209	3	Exhaust pressure sensor Ds turbine short circuit to battery or open load.
3157	1209	4	Exhaust pressure sensor Ds turbine short circuit to ground.
3158	1231	3	CAN Bus Off node B - active error
3159	1231	4	CAN Bus Off node B - passive error
3160	1347	0	Metering Unit --> Error check for loose contact between metering unit (MeUn) and ECU
3161	1347	3	Metering Unit --> SCB

3162	1347	4	Metering Unit --> SCG
3163	1347	5	Metering Unit --> OL
3164	1347	12	Metering Unit --> Over Temperature
3165	1485	4	Main relay --> Stuck
3166	1485	5	Main relay --> Early opening defect
3167	3058	5	EGR Drive Motor terminal open error (internal error)
3168	3241	3	Oxidation Catalyst upstream temperature sensor --> SRC max
3169	3241	4	Oxidation Catalyst upstream temperature sensor --> SRC min
3170	3242	3	Temperature sensor upstream DPF --> SRC max
3171	3242	4	Temperature sensor upstream DPF voltage below threshold low
3172	4752	0	Low EGR cooler efficiency
3173	4754	0	The calculated conversion rate of the DOC is lower than the limiting value or the inlet/outlet DOC temperature sensor are Swapped
3174	5571	0	Fuel Pressure Regulator 2 Performance
3175	5571	1	Fuel Pressure Regulator 2 Performance
3176	5571	2	Fuel Pressure Regulator 2 Performance
3177	5571	3	Opened pressure relief valve.
3178	5571	4	Monitoring for maximum rail pressure in limp home mode with PRV.
3179	5571	6	Open time of PRV for over pressure monitoring had exceeded
3180	5571	12	Fuel Pressure Regulator 2 Performance
3181	5571	13	Force Opening of PRV with a Pressure shock is not possible because in RED corridor.
3182	5765	15	Diagnostic fault check for EGR high internal temperature thermistor failure
3183	5765	16	Diagnostic fault check for EGR low internal temperature thermistor failure
3184	5829	15	Maximum deviation of EGR valve duty cycle
3185	5829	16	Minimum deviation of EGR valve duty cycle

12.7.2 Vehicle

Error IDN	SPN	FMI	DESCRIPTION
1001	170	0	ECU temperature too high
1002	170	1	ECU temperature too low
1003	168	0	Battery voltage too high
1004	168	1	Battery voltage too low
1005	3509	0	Sensors voltage too high
1006	3509	1	Sensors voltage too low
1007	520192	31	HW boot request
1008	520193	31	SW boot request
1009	520194	31	CAN BUS 0 (TRACTORBUS_CHAN) went off
1010	520195	31	ECU watchdog signal
1011	520196	31	ECU Low Voltage detector signal
1012	520197	31	ECU Clock Supervisor signal
1013	96	3	High Level of FUEL
1014	96	4	Low Level of FUEL
1015	3645	6	4WD valve overload (high current)
1016	3645	5	4WD valve open circuit (low current)
1017	569	6	Diff.lock valve overload (high current)
1018	569	5	Diff.lock valve open circuit (low current)
1019	904	8	Abnormal frequency of RPM
1020	91	3	Short to Battery pedal1 of ACC
1021	91	4	Short to Ground pedal1 of ACC
1022	29	3	Short To Battery pedal2 of ACC
1023	29	4	Short to Ground pedal2 of ACC
1024	91	2	Accelerator Missing Calibration
1025	29	2	Signal Not Congruent
1026	1504	2	Invalid Seat_Switch_Status of SEAT
1027	626	2	Invalid Start_Enab_Sens of START
1028	708	6	Overload of DIVERTER
1029	708	5	Opencircuit of DIVERTER
1030	707	6	Overload of TRAILER Brake
1031	707	5	Opencircuit of Trailer Brake
1032	167	4	Alternator not Charging
1033	524287	13	Anti-Tampering
1034	524286	19	Missing Configuration VCM
1053	237	31	VIN not present in VCM

12.7.3 Front/rear PTO

Error IDN	SPN	FMI	DESCRIPTION
5001	3452	2	PTO Pushbutton Invalid
5002	705	6	Proportional PTO valve overload (high current)
5003	705	5	Proportional PTO valve open circuit (low current)
5004	706	6	PTO-BRAKE mux valve overload (high current)
5005	706	5	PTO-BRAKE mux valve open circuit (low current)
5006	520198	31	PTO clutch Slipping When locked
5007	520205	31	PTO BRAKE Slipping When engaged
5008	520206	31	PTO cannot engage (reaching clutch sync speed during engagement)
5009	186	8	PTO rpm sensor abnormal frequency
5010	3460	2	Front PTO_engagement invalid
5011	3462	4	PTO ENGAGED Rear Safety Sw Short To Ground
5012	3462	3	PTO ENGAGED Rear Safety Sw Short to Battery

12.8 Error code list, E70/E80

Index

12.8.1 Engine 12-158

12.8.2 Vehicle 12-162

12.8.3 Front/rear PTO 12-163

12.8.1 Engine

Error IDN	SPN	FMI	DESCRIPTION
3001	65562	3	Engine cranked for too long or key switch failure
3003	65564	2	Water in fuel sensor or sensor circuit failure
3002	65564	3	Water in fuel detected or water in fuel circuit failure
3004	65585	3	Engine coolant temperature sensor voltage is higher than expected
3005	65585	4	Engine coolant temperature sensor voltage is lower than expected
3006	65587	3	Intake manifold temperature sensor voltage is higher than expected
3007	65587	4	Intake manifold temperature sensor voltage is lower than expected
3008	65588	0	Intake manifold pressure sensor drifted high
3009	65588	1	Intake manifold pressure sensor drifted low
3010	65588	3	Intake manifold pressure sensor voltage is higher than expected
3011	65588	4	Intake manifold pressure sensor voltage is lower than expected
3012	65589	3	Fuel temperature sensor voltage is higher than expected
3013	65589	4	Fuel temperature sensor voltage is lower than expected
3014	65590	3	Fuel rail pressure sensor voltage is higher than expected
3015	65590	4	Fuel rail pressure sensor voltage is lower than expected
3016	65591	2	Fuel pressure relief valve reached maximum allowed opening count
3018	65591	3	Fuel pressure relief valve is open
3017	65591	4	Fuel pressure relief valve is forced to open, perform pressure increase
3019	65591	12	Averaged rail pressure is outside the expected tolerance range
3021	65601	2	Crankshaft speed sensor values are not plausible
3020	65601	4	Crankshaft speed sensor pattern is not plausible
3022	65609	2	Fuel filter heater control circuit open
3024	65609	3	Fuel filter heater control circuit shorted to battery
3025	65609	4	Fuel filter heater control circuit shorted to ground
3023	65609	12	Fuel filter heater control circuit over temperature
3026	65617	3	Fuel rail pressure has exceeded maximum positive deviation limits
3027	65619	3	Fuel rail pressure has exceeded maximum negative deviation limits
3028	65620	3	Fuel rail pressure has dropped below the minimum limit
3029	65621	3	Fuel rail pressure has exceeded maximum limit
3030	65623	3	High pressure pump fuel delivery quantity in over run exceeds a maximum threshold
3031	65624	3	Fuel pump pressure has exceeded desired pressure limits
3032	65625	2	Fuel metering unit has an open load error
3033	65633	2	Short circuit error of injector in cylinder 1
3034	65633	3	Short circuit of low side to high source of injector in cylinder 1
3035	65634	2	Short circuit error of injector in cylinder 2
3036	65634	3	Short circuit of low side to high source of injector in cylinder 2
3037	65635	2	Short circuit error of injector in cylinder 3
3038	65635	3	Short circuit of low side to high source of injector in cylinder 3
3039	65639	2	Open load error of injector in cylinder 1
3040	65640	2	Open load error of injector in cylinder 2
3041	65641	2	Open load error of injector in cylinder 3
3042	65649	3	Injection bank 1 short circuit failure (all injectors of the same bank can be affected)

3043	65651	3	Injection bank 2 short circuit failure (all injectors of the same bank can be affected)
3044	65660	12	ECU internal failure - Injector CY33x component
3045	65663	12	Missing adjustment value programming for injector in cylinder 1
3046	65689	2	Turbocharger boost pressure is higher than expected
3048	65713	3	CAN A Bus off failure
3047	65713	4	CAN A Bus off passive failure
3049	65716	2	CAN communication failure between vehicle controller and ECU - BC2ECU1 message
3050	65717	2	CAN communication error between vehicle controller to ECU
3051	65719	2	CAN transmit error - EEC1 message (Electronic Engine Control 1 message - Torque, accelerator pedal, engine speed, and other signals)
3052	65734	3	CAN communication failure between vehicle controller and ECU controller - TSC1_PE message
3053	65736	3	CAN communication failure between vehicle controller and ECU controller - TSC1_VE message
3054	65745	3	ECU internal failure
3055	65748	12	ECU internal failure - Query/response communication errors
3056	65752	12	ECU internal failure - SPI communication error
3058	65753	2	ECU internal failure - ADC test
3059	65753	3	ECU internal failure - Voltage ratio in ADC monitoring
3057	65753	12	ECU internal failure - NTP error in ADC monitoring
3060	65761	3	Starter relay high side driver circuit shorted to battery
3061	65761	4	Starter relay high side driver circuit shorted to ground
3062	65763	3	Fuel injection requested during overrun
3063	65764	3	ECU internal failure - Calculated engine speed
3064	65766	12	ECU 5 volt sensor supply 1 out of range
3065	65767	3	ECU 5 volt sensor supply 2 out of range
3066	65768	3	ECU 5 volt sensor supply 3 out of range
3067	65771	3	ECU internal failure - Ambient pressure sensor voltage is higher than expected
3068	65771	4	ECU internal failure - Ambient pressure sensor voltage is lower than expected
3069	65783	3	PMCat inlet temperature sensor voltage is higher than expected
3070	65783	4	PMCat inlet temperature sensor voltage is lower than expected
3072	131109	3	Main relay stuck error
3071	131109	4	ECU after run power interruption
3073	131110	3	Battery voltage is higher than expected
3074	131110	4	Battery voltage is lower than expected
3077	131127	3	Fuel pressure relief valve has reached maximum allowed open time
3075	131127	4	Fuel pressure relief valve is forced to open, perform pressure shock
3076	131127	12	Quantity balance check if a successful PRV opening is ensured
3079	131128	3	Oil pressure switch active with engine off
3078	131128	4	Low oil pressure
3080	131158	3	Engine speed limitation via fuel injection cut off is active
3081	131161	3	Fuel metering unit is shorted to battery voltage at the low side
3082	131199	12	Missing adjustment value programming for injector in cylinder 2
3083	131225	4	Turbocharger boost pressure is lower than expected

3084	131252	2	CAN communication failure between vehicle controller and ECU - BC2ECU2 message
3085	131270	2	CAN communication failure between vehicle controller and ECU controller - TSC1_PE message
3086	131284	4	ECU internal failure - ROM error
3087	131297	2	Starter relay low side driver circuit open
3089	131297	3	Starter relay low side driver circuit shorted to battery
3090	131297	4	Starter relay low side driver circuit shorted to ground
3088	131297	12	Starter relay low side ECU driver circuit over temperature
3091	196651	2	Glow plug control circuits open
3093	196651	3	Glow plug control circuits shorted to battery
3094	196651	4	Glow plug control circuits shorted to ground
3092	196651	12	Glow plug control circuits shorted
3095	196697	4	Fuel metering unit is shorted to ground at the low side
3096	196735	12	Missing adjustment value programming for injector in cylinder 3
3097	196808	2	CAN communication failure between vehicle controller and ECU controller - TSC1_VE message
3099	196820	2	ECU internal failure - ECU shutdown test failure
3100	196820	3	ECU internal failure - Wrong set response time
3101	196820	4	ECU internal failure - SPI errors during MoCSOP execution
3098	196820	12	ECU internal failure - Loss of synchronization to MM from CPU
3102	196835	0	ECU internal failure - Fuel injection energizing time is not plausible
3103	196835	1	ECU internal failure - Fuel injection energizing phase is not plausible
3104	196835	2	Fuel injection correction has exceeded a minimum limit
3105	196835	3	ECU internal failure - Injection quantity correction
3106	196835	4	ECU internal failure - Rail pressure plausibility
3107	196835	12	ECU internal failure - Torque request comparison
3108	196854	3	DOC inlet temperature sensor voltage is higher than expected
3109	196854	4	DOC inlet temperature sensor voltage is lower than expected
3110	196859	3	PM Catalyst load high
3111	262182	3	ECU 5 volt supply voltage is higher than expected
3112	262182	4	ECU 5 volt supply voltage is lower than expected
3113	262194	3	Engine coolant temperature has exceeded the pre-warning threshold
3114	262229	3	High pressure pump fuel delivery quantity at low idle is too high
3115	262285	2	Throttle valve actuator control circuit open
3116	262285	3	Throttle valve actuator control circuit over current
3117	262285	12	Throttle valve actuator control circuit over temperature
3119	262356	3	ECU internal failure - Overvoltage monitoring error
3118	262356	4	ECU internal failure - Undervoltage monitoring error
3120	262371	3	ECU internal failure - Post injection quantity
3121	262371	4	ECU internal failure - Post injection shut-off failure
3122	262371	12	Post injection efficiency failure
3123	262395	3	PM Catalyst load very high
3124	327724	1	Glow Control Unit (GCU) data error
3125	327730	3	Engine coolant temperature has exceeded the warning threshold
3126	327733	3	Maximum rail pressure exceeded
3127	327769	12	Fuel metering unit has an over-temperature error

3128	327820	3	Throttle valve actuator will not open to commanded position
3129	327820	4	Throttle valve actuator will not close to commanded position
3130	327821	3	Throttle valve actuator H-bridge control circuit shorted to battery
3131	327821	4	Throttle valve actuator H-bridge control circuit shorted to ground
3132	327892	2	ECU internal failure - WDA is not working correctly
3133	327892	3	ECU internal failure - Alarm task period error
3134	327892	4	ECU internal failure - Positive test failed
3135	327892	12	ECU internal failure - Timeout in the shut off path test error
3136	327907	3	ECU internal failure - Torque request due to fuel pressure exceeds maximum torque limit
3137	327907	4	ECU internal failure - Torque request due to air control exceeds maximum torque limit
3138	327907	12	ECU internal failure - Torque request exceeds maximum torque limit
3139	393357	3	Throttle valve actuator H-bridge control circuit shorted to battery
3140	393357	4	Throttle valve actuator H-bridge control circuit shorted to ground
3141	393428	2	ECU internal failure - 'WDA active' reported due to errors in query/response communication
3143	393428	3	ECU internal failure - 'ABE active' reported due to overvoltage detection
3142	393428	4	ECU internal failure - 'ABE active' reported due to undervoltage detection
3144	393428	12	ECU internal failure - 'WDA/ABE active' reported
3145	393460	12	PMCat / Oxicat removal detection
3146	458796	0	Glow plug 1 control circuit shorted to ground
3147	458796	1	Glow plug 3 control circuit shorted to ground
3148	458796	2	Glow plug 2 control circuit shorted to ground
3149	458891	3	Throttle valve actuator position sensor voltage is higher than expected
3150	458891	4	Throttle valve actuator position sensor voltage is lower than expected
3151	458893	3	Throttle valve actuator control circuit over load
3152	458893	4	Throttle valve actuator control circuit supply voltage too low

12.8.2 Vehicle

Error IDN	SPN	FMI	DESCRIPTION
1001	170	0	ECU temperature too high
1002	170	1	ECU temperature too low
1003	168	0	Battery voltage too high
1004	168	1	Battery voltage too low
1005	3509	0	Sensors voltage too high
1006	3509	1	Sensors voltage too low
1007	520192	31	HW boot request
1008	520193	31	SW boot request
1009	520194	31	CAN BUS 0 (TRACTORBUS_CHAN) went off
1010	520195	31	ECU watchdog signal
1011	520196	31	ECU Low Voltage detector signal
1012	520197	31	ECU Clock Supervisor signal
1013	96	3	High Level of FUEL
1014	96	4	Low Level of FUEL
1015	3645	6	4WD valve overload (high current)
1016	3645	5	4WD valve open circuit (low current)
1017	569	6	Diff.lock valve overload (high current)
1018	569	5	Diff.lock valve open circuit (low current)
1019	904	8	Abnormal frequency of RPM
1020	91	3	Short to Battery pedal1 of ACC
1021	91	4	Short to Ground pedal1 of ACC
1022	29	3	Short To Battery pedal2 of ACC
1023	29	4	Short to Ground pedal2 of ACC
1024	91	2	Accelerator Missing Calibration
1025	29	2	Signal Not Congruent
1026	1504	2	Invalid Seat_Switch_Status of SEAT
1027	626	2	Invalid Start_Enab_Sens of START
1028	708	6	Overload of DIVERTER
1029	708	5	Opencircuit of DIVERTER
1030	707	6	Overload of TRAILER Brake
1031	707	5	Opencircuit of Trailer Brake
1032	167	4	Alternator not Charging
1033	524287	13	Anti-Tampering
1034	524286	19	Missing Configuration VCM
1053	237	31	VIN not present in VCM

12.8.3 Front/rear PTO

Error IDN	SPN	FMI	DESCRIPTION
5001	3452	2	PTO Pushbutton Invalid
5002	705	6	Proportional PTO valve overload (high current)
5003	705	5	Proportional PTO valve open circuit (low current)
5004	706	6	PTO-BRAKE mux valve overload (high current)
5005	706	5	PTO-BRAKE mux valve open circuit (low current)
5006	520198	31	PTO clutch Slipping When locked
5007	520205	31	PTO BRAKE Slipping When engaged
5008	520206	31	PTO cannot engage (reaching clutch sync speed during engagement)
5009	186	8	PTO rpm sensor abnormal frequency
5010	3460	2	Front PTO_engagement invalid
5011	3462	4	PTO ENGAGED Rear Safety Sw Short To Ground
5012	3462	3	PTO ENGAGED Rear Safety Sw Short to Battery

TROUBLESHOOTING E 70-80

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K022 (XS2) Crankshaft speed sensor R1-412
K021 (XS3) Camshaft timing sensor R1-412
K018 (XS4) Temperature and pressure sensor (BOOST) R1-413
K017 (XS5) Common Rail fuel pressure sensor R1-414
K023 (XS6) Oil pressure switch R1-414
L005 (XY1) High pressure pump R1-415
L007 (XY2) Throttle valve R1-416

Engine control unit (ECU)

3001 - Starter motor powered for more than 25 seconds

Description of fault

The ECU engine control unit detects that the start relay has been powering the starter motor for more than 25 seconds

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

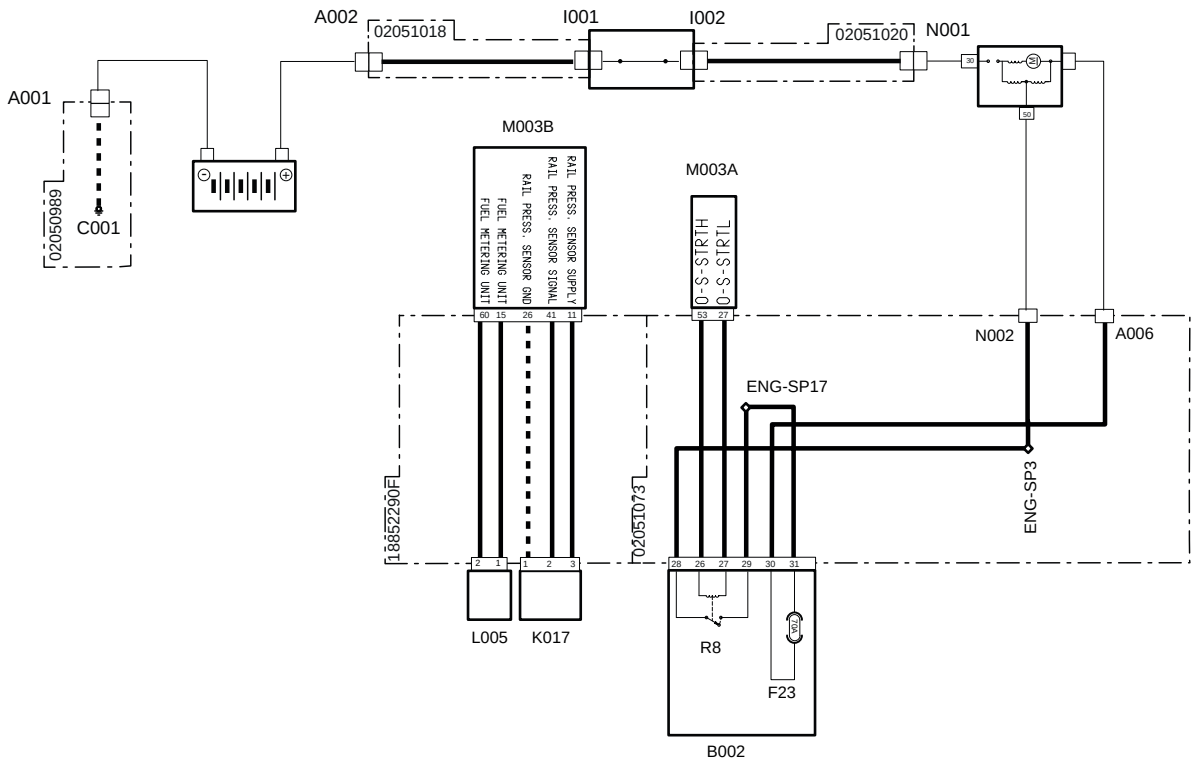
The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check the state of starter motor circuit "50"
- Check the condition of lug terminal N002 connected to the starter motor
- Check that the starter motor works correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
K017 (pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005 (pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3002 - Water in fuel or water in fuel sensor open circuit

Description of fault

The ECU engine control unit detects water in the fuel. This error may also be generated by an open circuit on the water in fuel sensor line

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

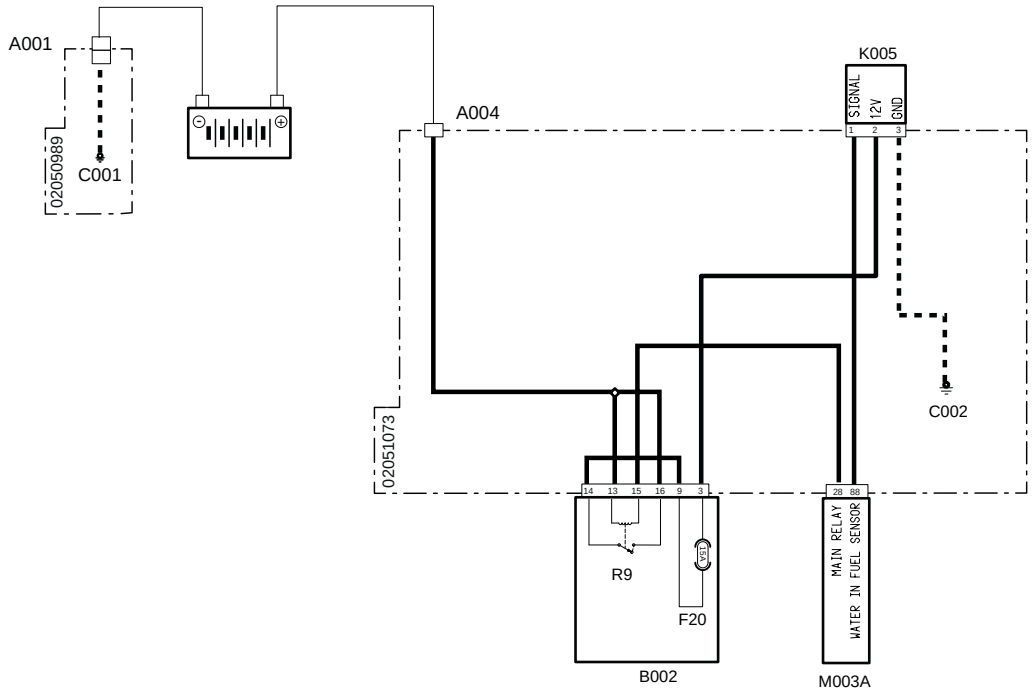
2 - Drain the water from the fuel filter
- See the use and maintenance of the vehicle for the procedure to drain water from the filter.
- If the problem persists after draining the water from the filter, proceed to the next step

3 - Check that the connectors of the water in fuel sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A004 (pag.R1-388)	P472	Positive battery terminal
C001 (pag.R1-328)	P66	Battery ground
C002 (pag.R1-383)	P475	Engine ground point
F20(B002)(pag.R1-370)	F20	Accessories (15A)
K005 (pag.R1-377)	P16	Water in fuel sensor
M003A (pag.R1-375)	P12	Engine control unit
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3003 - Water in fuel sensor error or open circuit

Description of fault

The ECU engine control unit detects an error relative to the water in the fuel sensor. This error may also be generated by an open circuit on the water in fuel sensor line

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

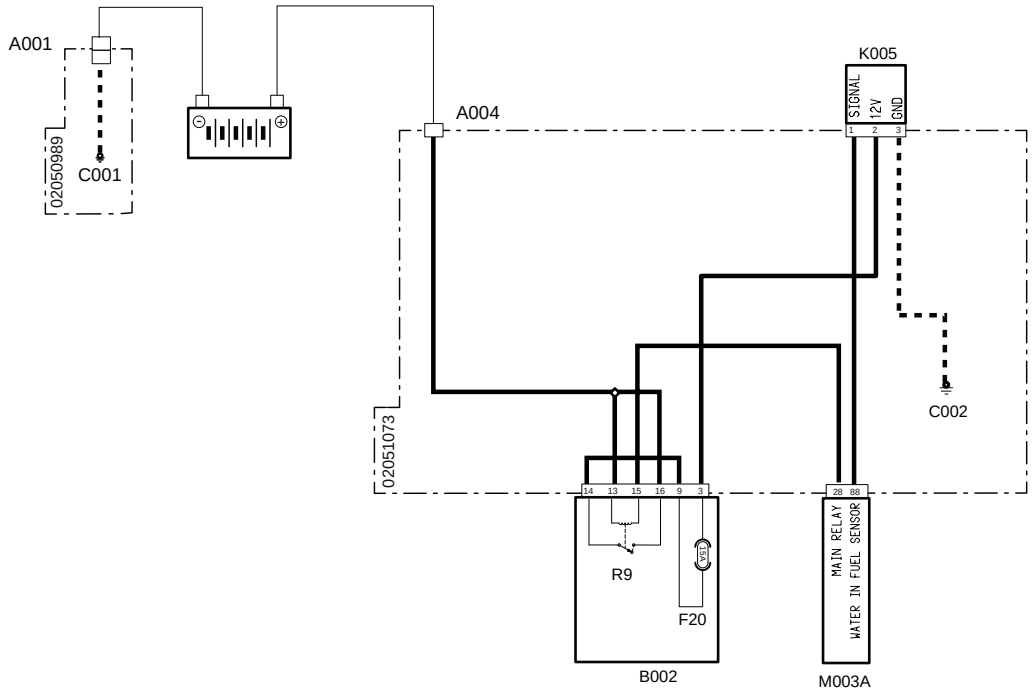
2 - Check that the connectors of the water in fuel sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the sensor is working correctly and replace if necessary. Proceed to next step if this does not resolve the problem.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A004 (pag.R1-388)	P472	Positive battery terminal
C001 (pag.R1-328)	P66	Battery ground
C002 (pag.R1-383)	P475	Engine ground point
F20(B002) (pag.R1-370)	F20	Accessories (15A)
K005 (pag.R1-377)	P16	Water in fuel sensor
M003A (pag.R1-375)	P12	Engine control unit
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3004 - Coolant temperature sensor: short circuit to positive or open circuit

Description of fault

The ECU engine control unit detects a short circuit to positive or open circuit fault on the coolant temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible

Checks necessary

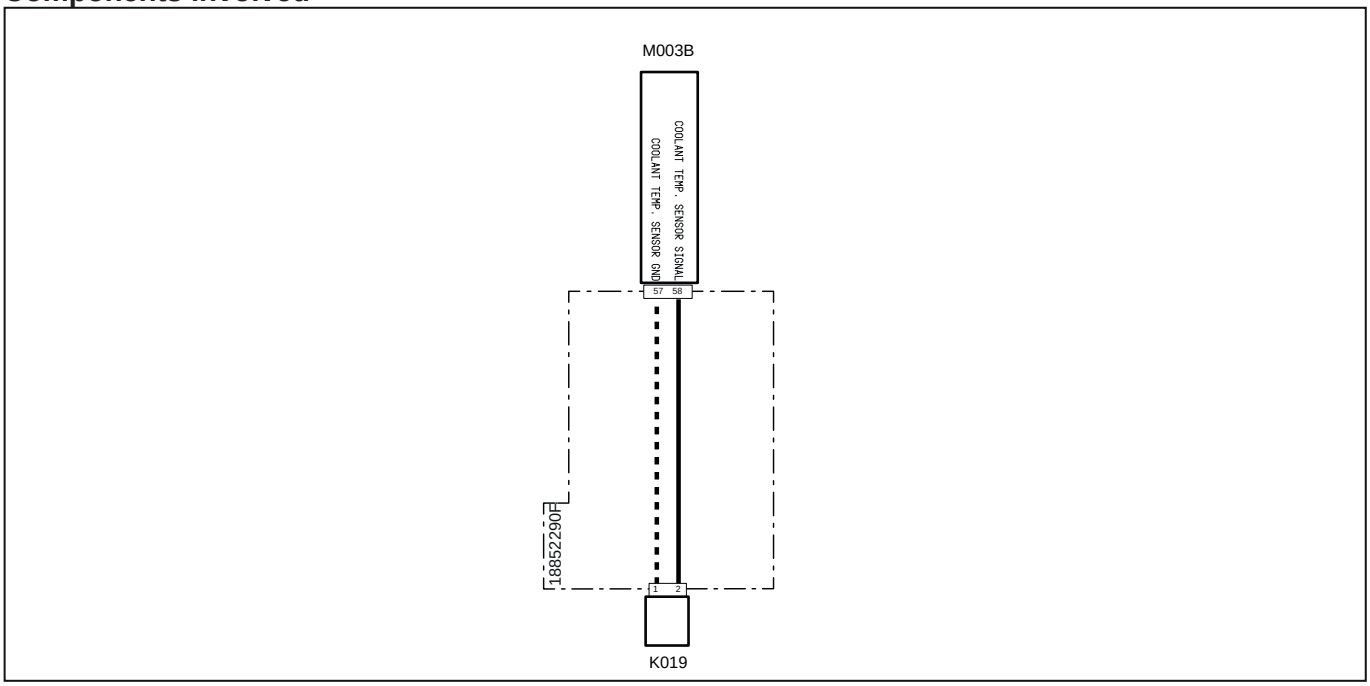
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K019 (pag.R1-411)	XS1	Coolant temperature sensor

3005 - Coolant temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the coolant temperature sensor

Severity of error

Medium

Amber lamp illuminated

Behaviour of system

Engine start possible

Checks necessary

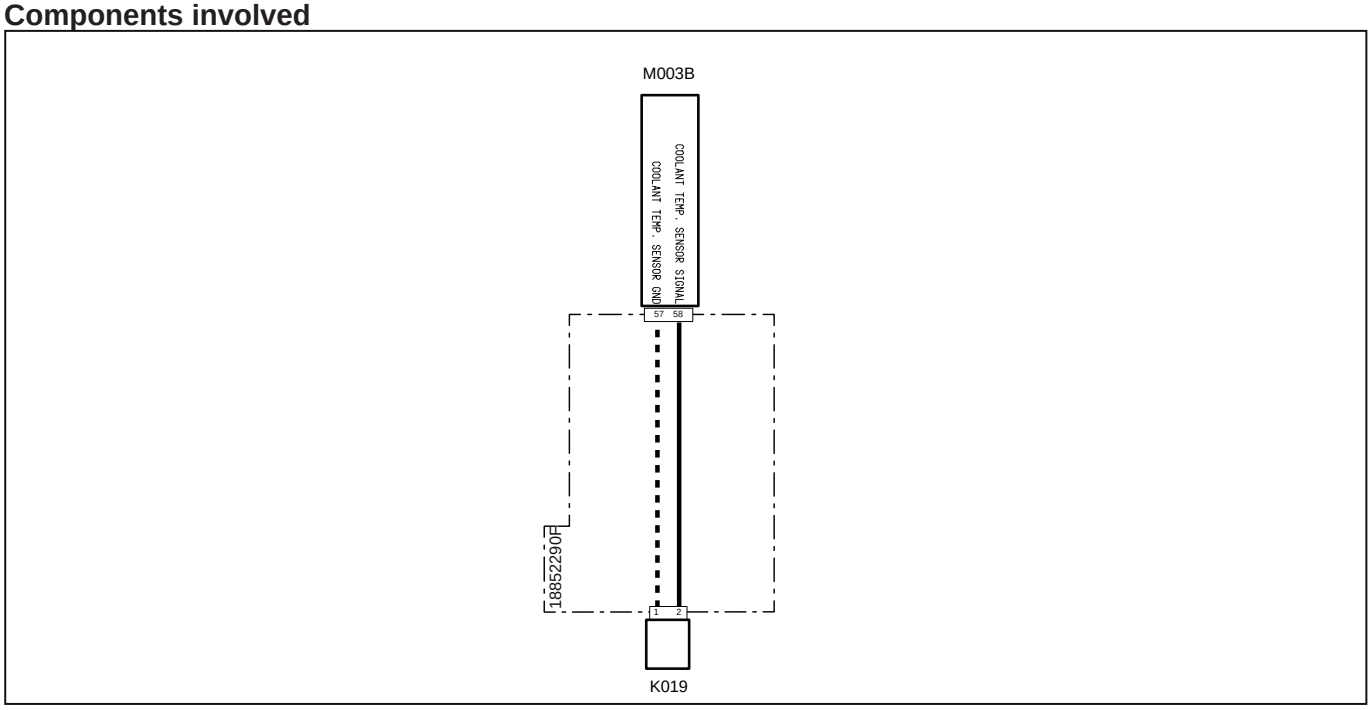
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K019 (pag.R1-411)	XS1	Coolant temperature sensor

3006 - Temperature and pressure sensor (BOOST): short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the temperature and pressure sensor (BOOST)

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

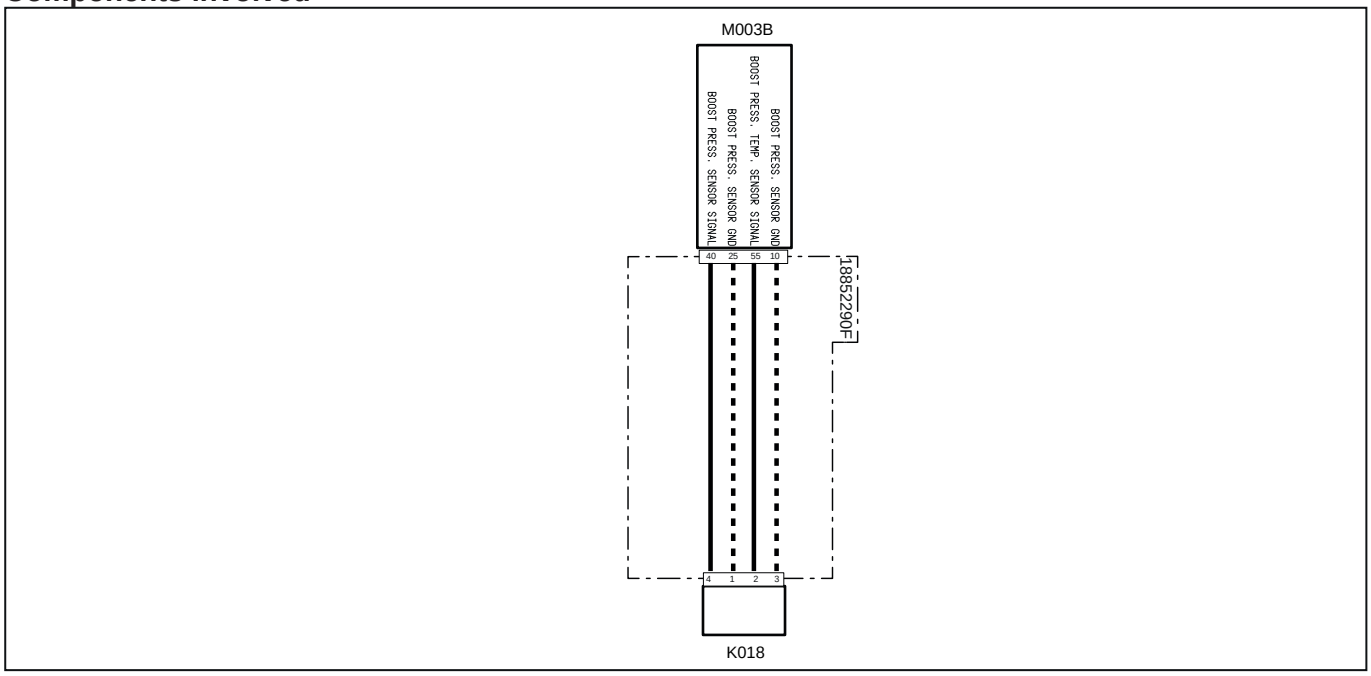
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018 (pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R1-407)	XECUA	Engine control unit

3007 - Temperature and pressure sensor (BOOST): short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the temperature and pressure sensor (BOOST)

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

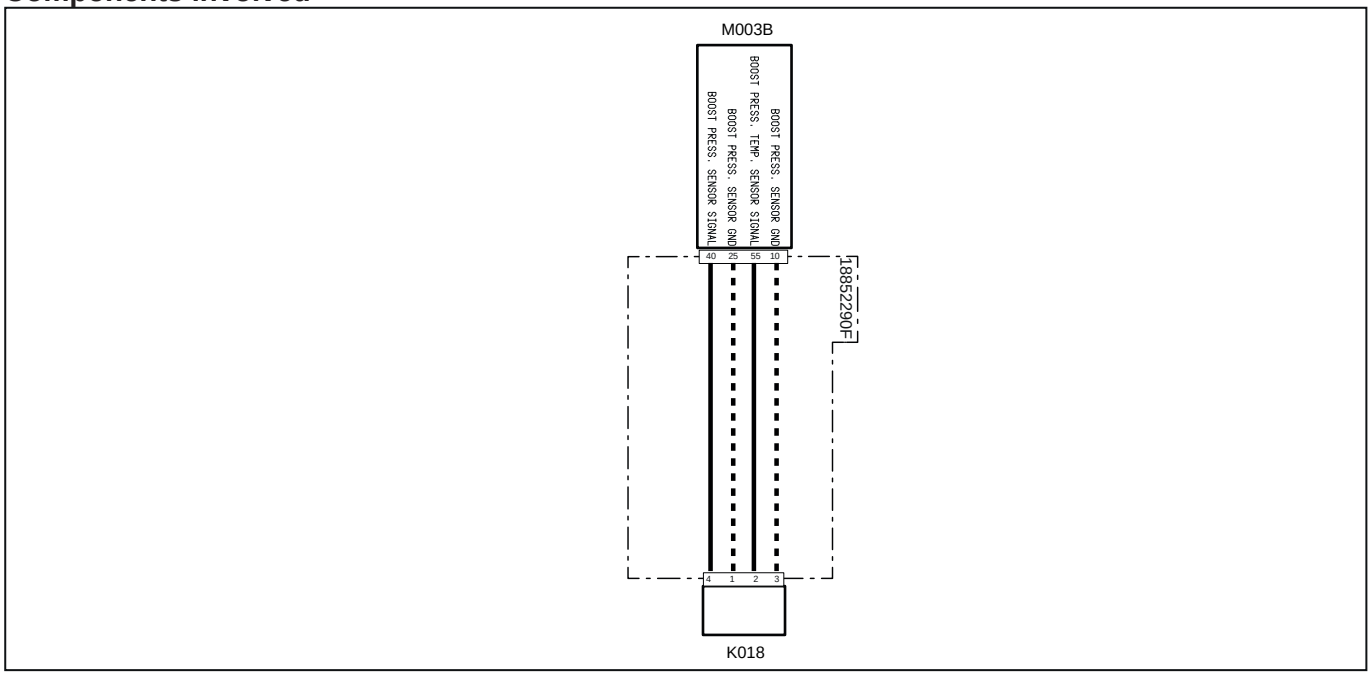
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R1-407)	XECUA	Engine control unit

3008 - Boost pressure too high relative to barometric pressure

Description of fault

The ECU engine control unit detects that the pressure measured by the temperature and pressure sensor (BOOST) is much higher than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

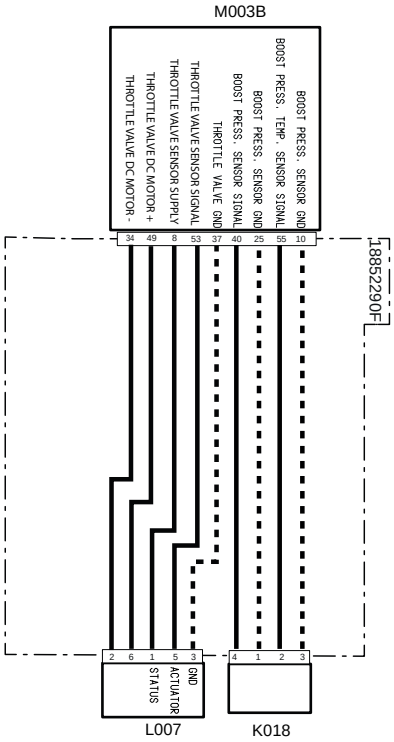
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018 (pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007 (pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3009 - Boost pressure too low relative to barometric pressure

Description of fault

The ECU engine control unit detects that the pressure measured by the temperature and pressure sensor (BOOST) is much lower than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

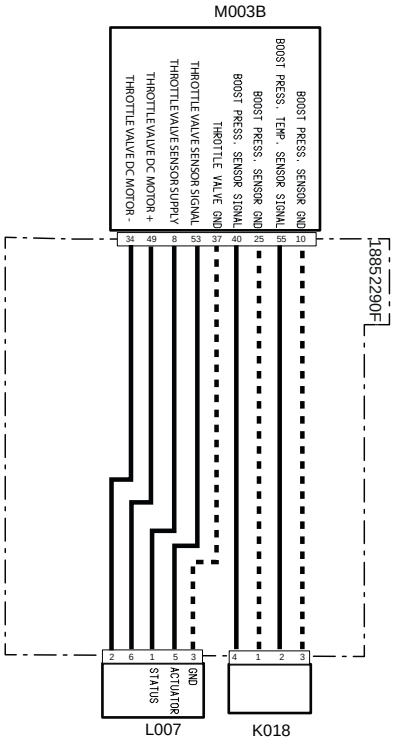
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018 (pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007 (pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3010 - Temperature and pressure sensor (BOOST): short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the temperature and pressure sensor (BOOST)

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

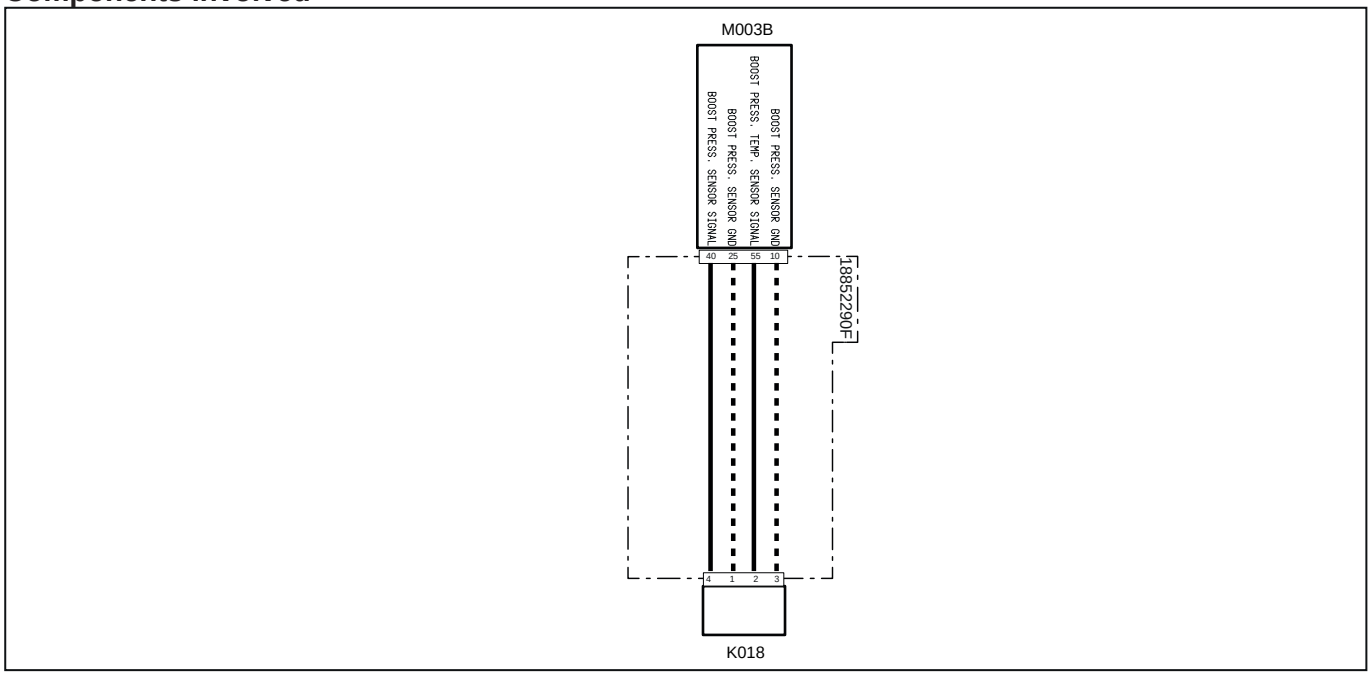
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018 (pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
M003B(pag.R1-407)	XECUA	Engine control unit

3011 - Temperature and pressure sensor (BOOST): short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the temperature and pressure sensor (BOOST)

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

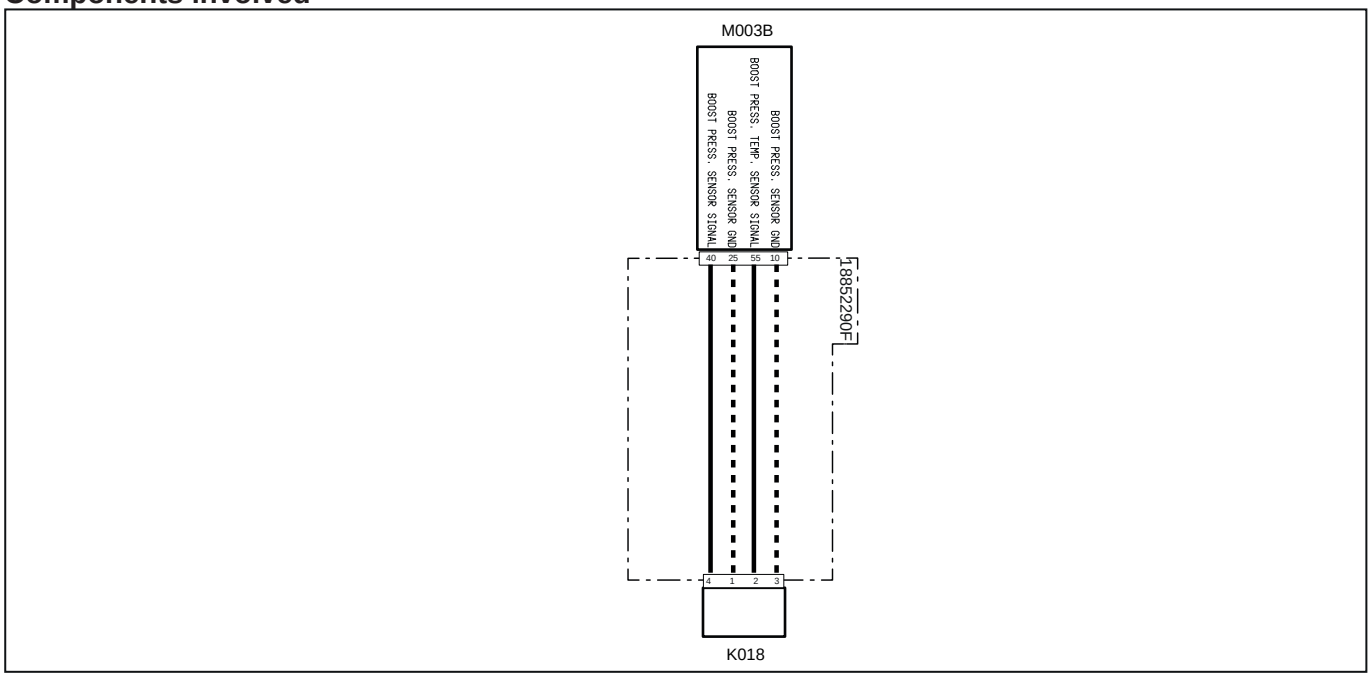
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R1-407)	XECUA	Engine control unit

3012 - Fuel temperature sensor: short circuit or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the fuel temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

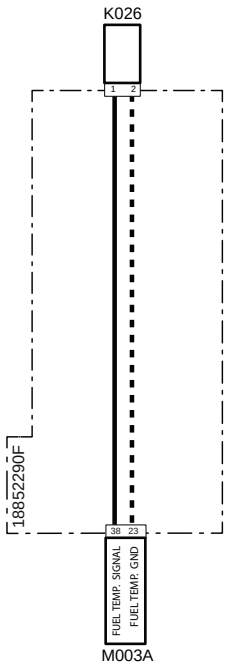
2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K026 (pag.R1-373)	XS7	Fuel temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3013 - Short circuit: fuel temperature sensor

Description of fault

The ECU engine control unit detects a short circuit on the fuel temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

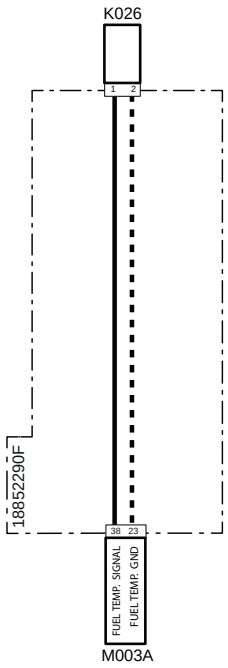
2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K026 (pag.R1-373)	XS7	Fuel temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3014 - Rail pressure sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the rail pressure sensor

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

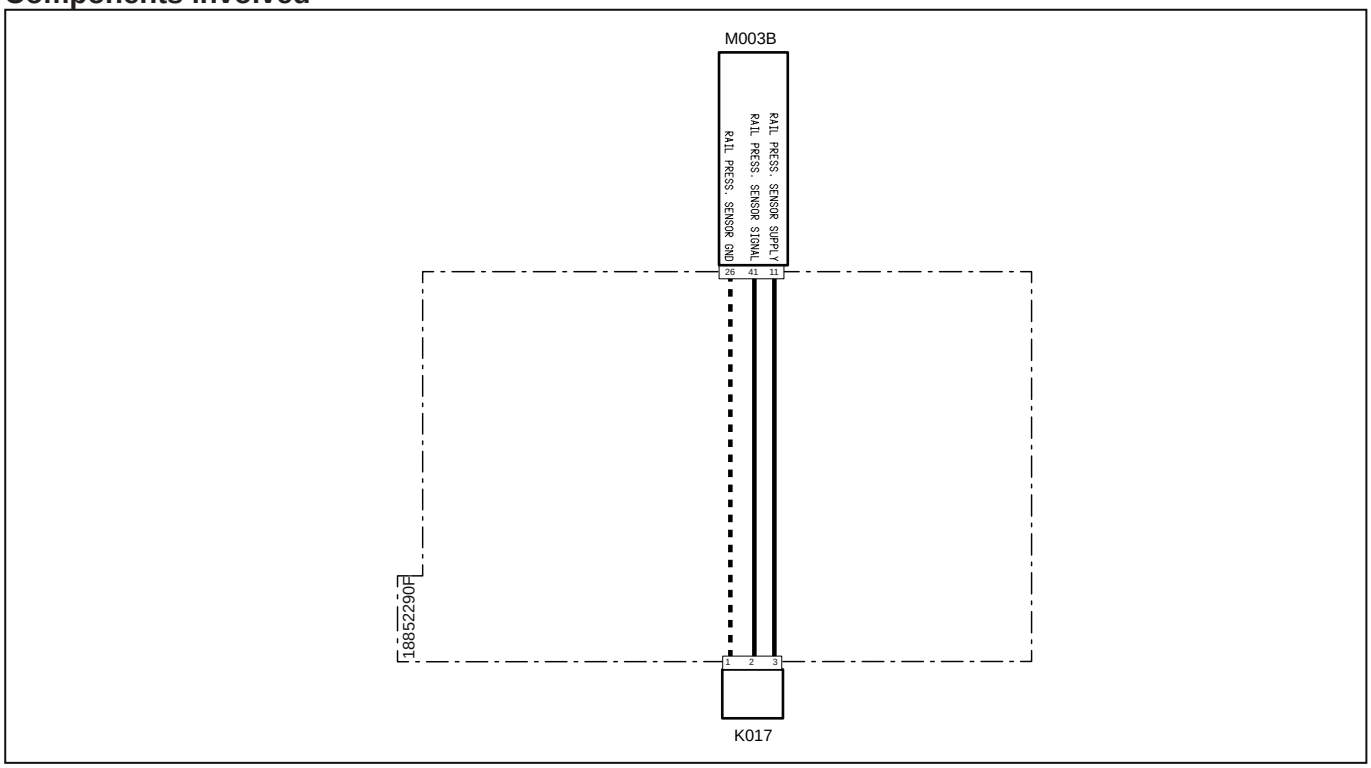
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
M003B (pag.R1-407)	XECUA	Engine control unit

3015 - Rail pressure sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the rail pressure sensor

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

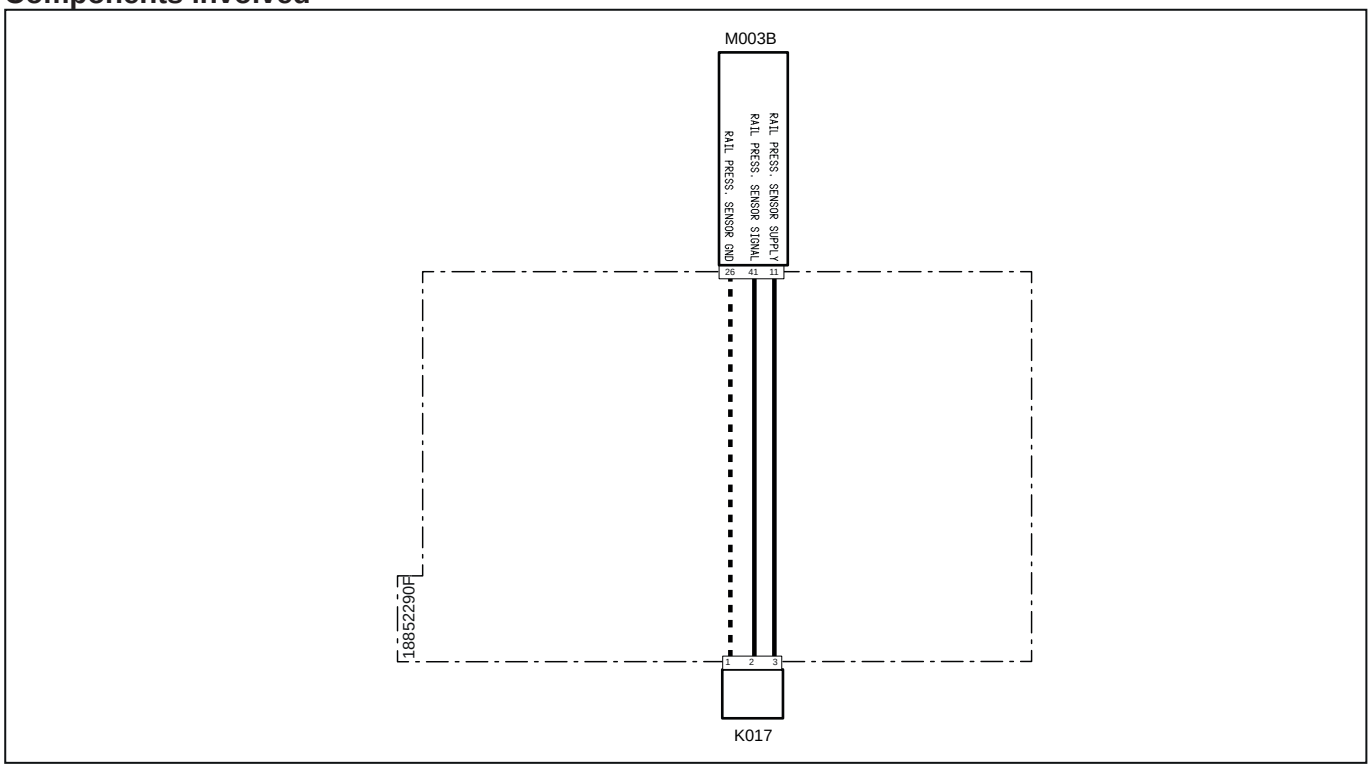
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
M003B (pag.R1-407)	XECUA	Engine control unit

3016 - Maximum permitted number of rail pressure relief valve apertures reached

Description of fault

The ECU engine control unit detects that the maximum permitted number of rail pressure relief valve apertures has been reached

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

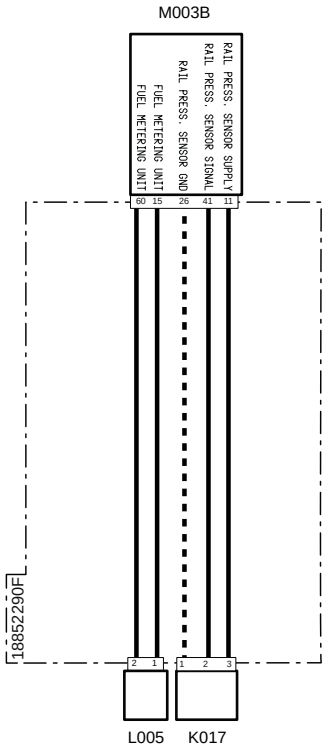
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3017 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

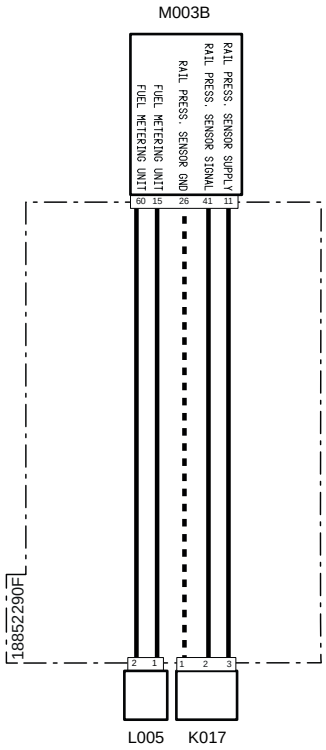
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3018 - Pressure relief valve opened before 1200 bar

Description of fault

The ECU engine control unit detects a drastic reduction in rail pressure before the 1200 bar limit is reached, due to the aperture of the pressure relief valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

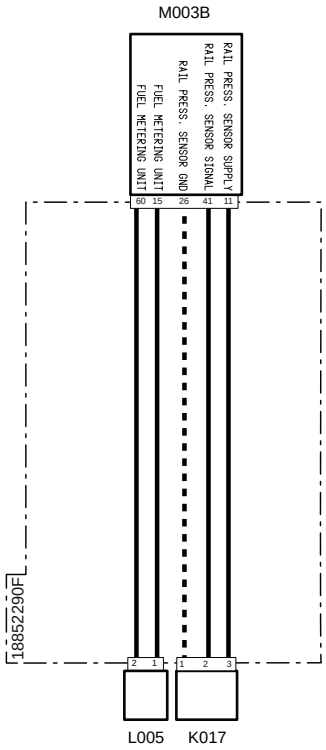
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3019 - Average pressure value in rail outside permitted range

Description of fault

The ECU engine control unit detects that the average pressure in the rail is not within the permitted range

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

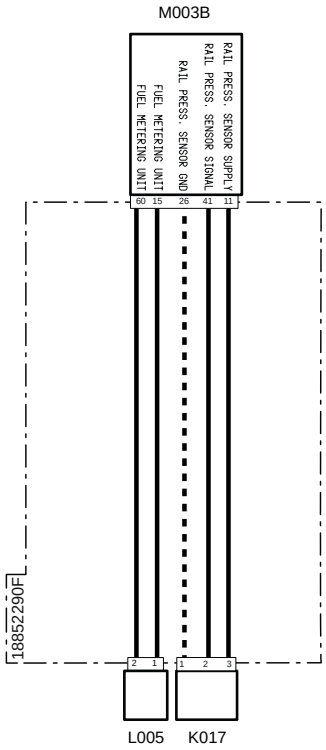
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3020 - Crankshaft speed sensor: disturbed signal or spurious contact

Description of fault

The ECU engine control unit detects a disturbed signal from, or a spurious contact fault on, the crankshaft speed sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The crankshaft speed sensor reads the speed of the crankshaft from a tone wheel mounted on the crankshaft itself. If the tone wheel is damaged, the sensor will read the speed incorrectly and transmit an erroneous signal to the ECU engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the crankshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

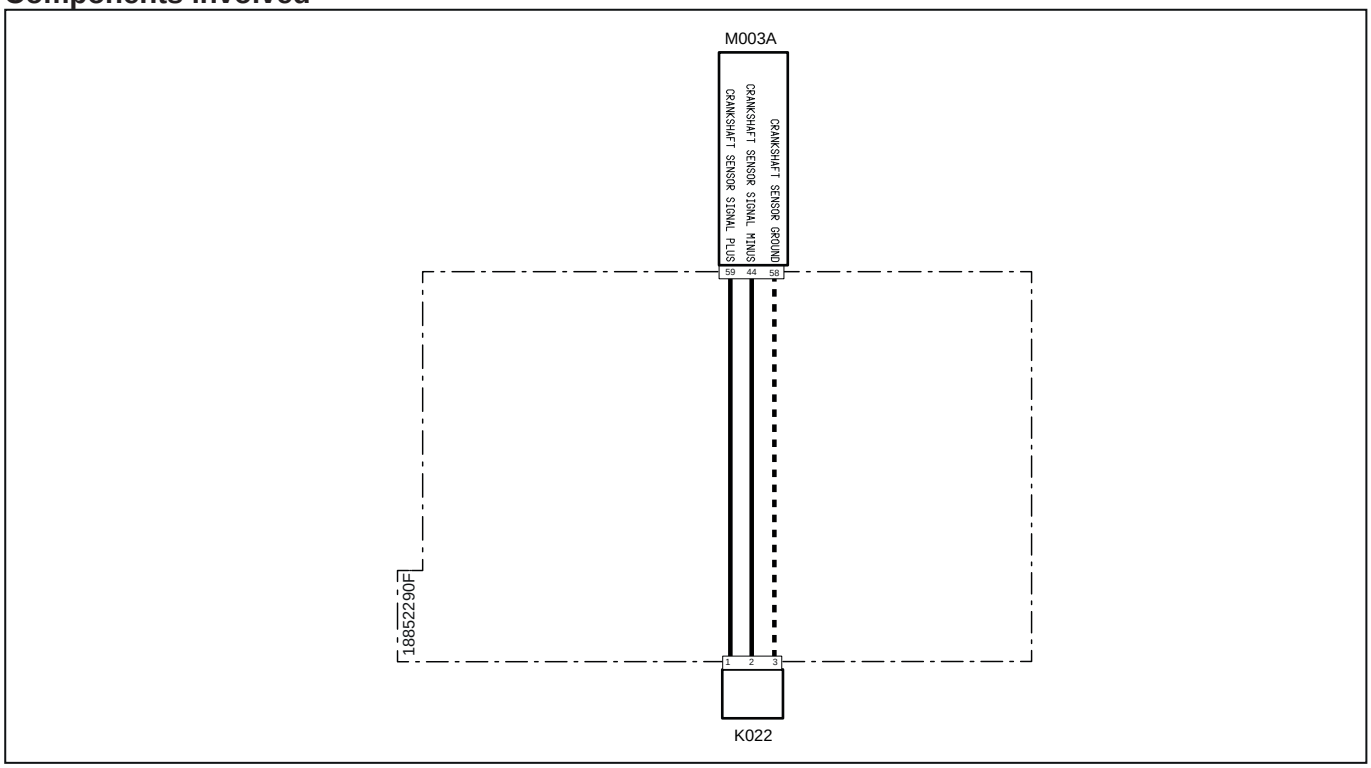
3 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check the condition of the tone wheel on the crankshaft
- Remove the crankshaft speed sensor
- Turn the crankshaft and, using a light, visually inspect the tone wheel to check if it is damaged
- An oscilloscope may also be used to check the tone wheel for damage which may not be noted with a visual inspection
- If the tone wheel is damaged, remove the engine and replace the tone wheel
- Proceed to the next step if the tone wheel is not damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K022 (pag.R1-412)	XS2	Crankshaft speed sensor
M003A (pag.R1-375)	P12	Engine control unit

3021 - Open circuit: crankshaft speed sensor

Description of fault

The ECU engine control unit detects an open circuit fault on the crankshaft speed sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

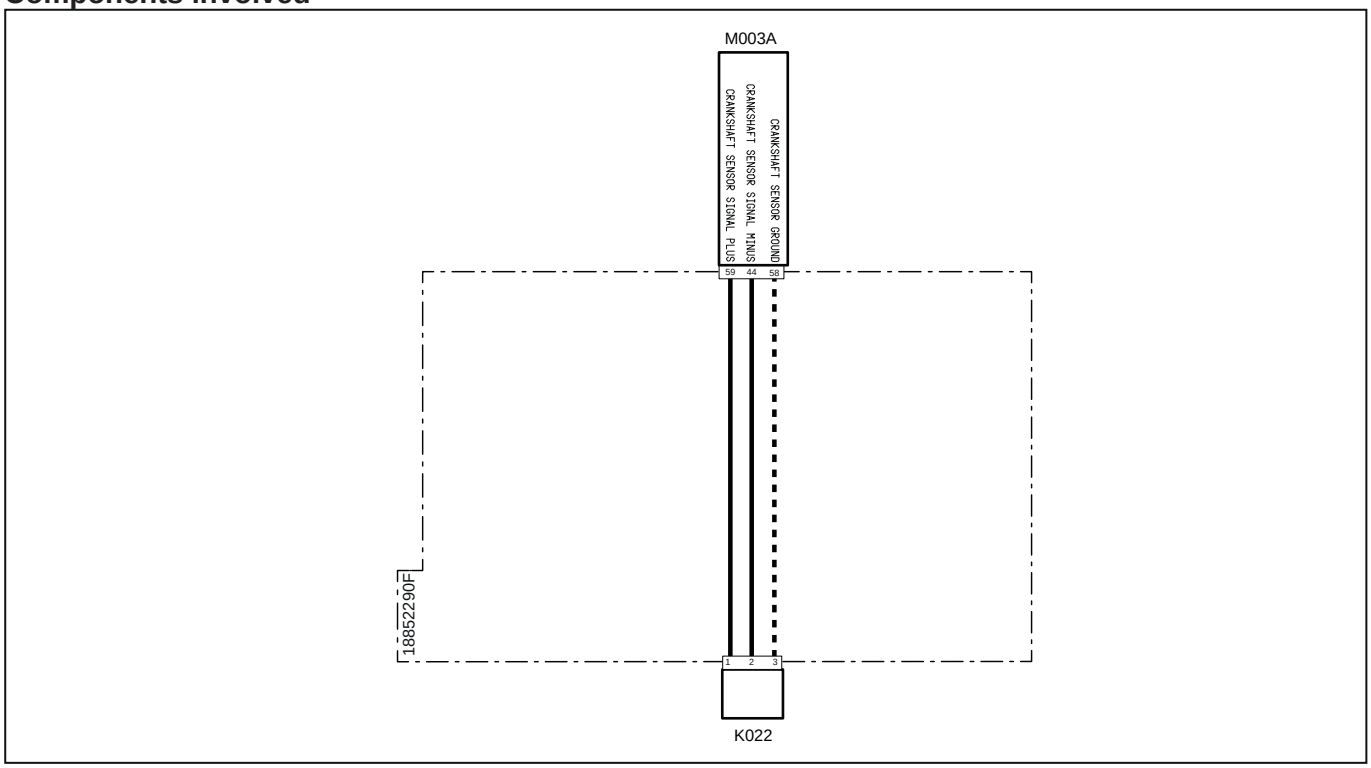
2 - Check that the connectors of the crankshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K022 (pag.R1-412)	XS2	Crankshaft speed sensor
M003A (pag.R1-375)	P12	Engine control unit

3022 - Fuel heater, open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the fuel heater inside the filter

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

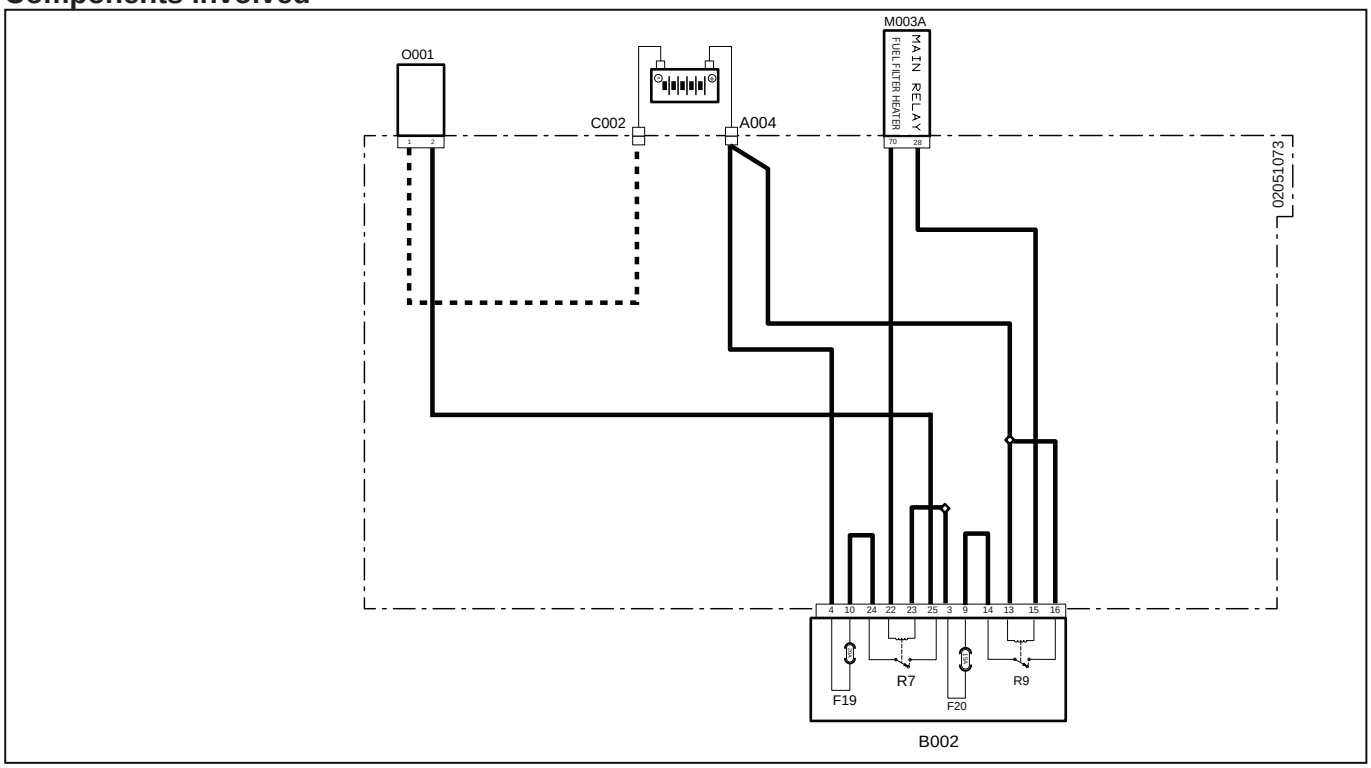
2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
O001 (pag.R1-378)	P17	Fuel filter heater
C002 (pag.R1-383)	P475	Battery ground
A004 (pag.R1-388)	P472	Battery positive
M003A (pag.R1-375)	P12	Engine control unit
B002 (pag.R1-370)	P2A	Fuse box "1"
F19(B002) (pag.R1-370)	F19	Fuel pre-heat (20A)
R7(B002) (pag.R1-370)	R7	Fuel pre-heat relay (20A)
F20(B002) (pag.R1-370)	F20	Accessories (15A)
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3023 - Fuel heater circuit, temperature too high

Description of fault

The ECU engine control unit detects an excessively high temperature in the fuel heater circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

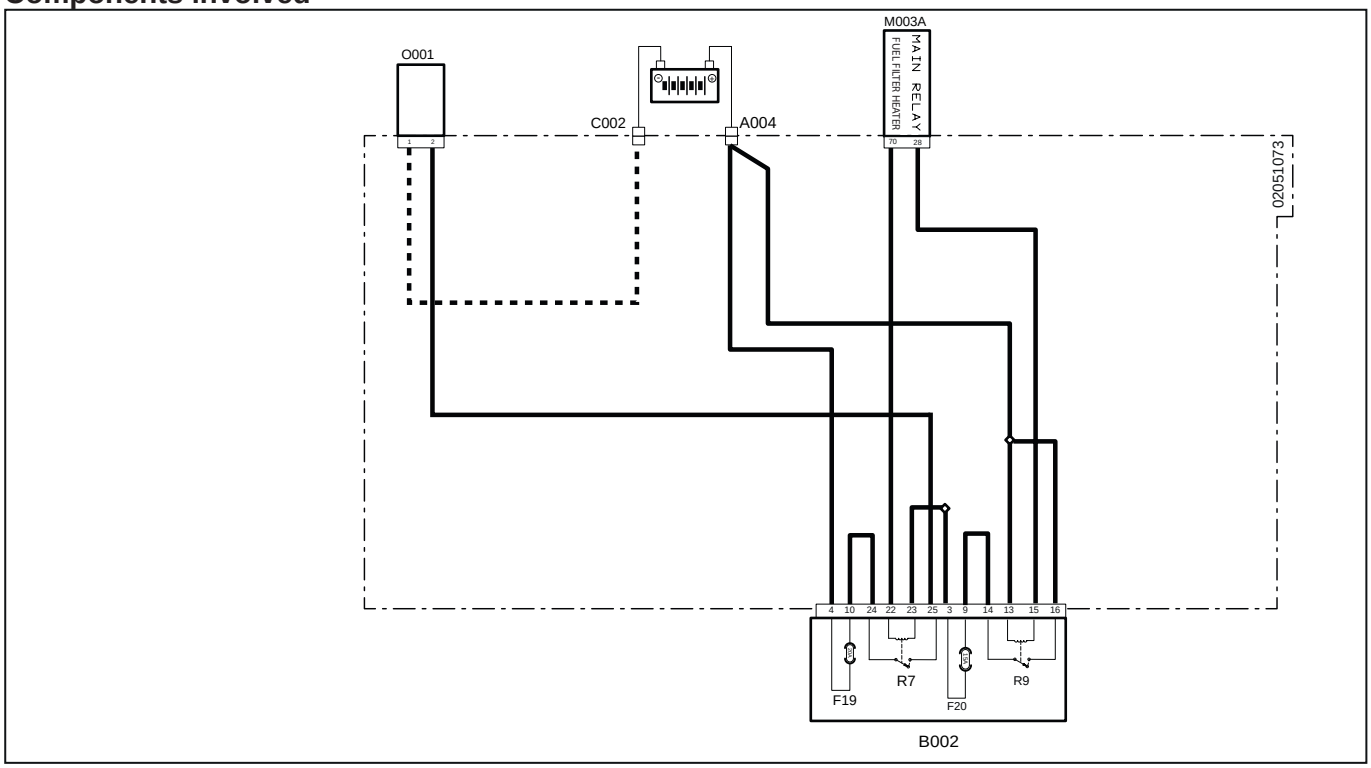
3 - Check the condition of the fuel heater fuse (20A) and replace if necessary

4 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
O001 (pag.R1-378)	P17	Fuel filter heater
C002 (pag.R1-383)	P475	Battery ground
A004 (pag.R1-388)	P472	Battery positive
M003A (pag.R1-375)	P12	Engine control unit
B002 (pag.R1-370)	P2A	Fuse box "1"
F19(B002) (pag.R1-370)	F19	Fuel pre-heat (20A)
R7(B002) (pag.R1-370)	R7	Fuel pre-heat relay (20A)
F20(B002) (pag.R1-370)	F20	Accessories (15A)
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3024 - Fuel heater circuit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the fuel heater circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

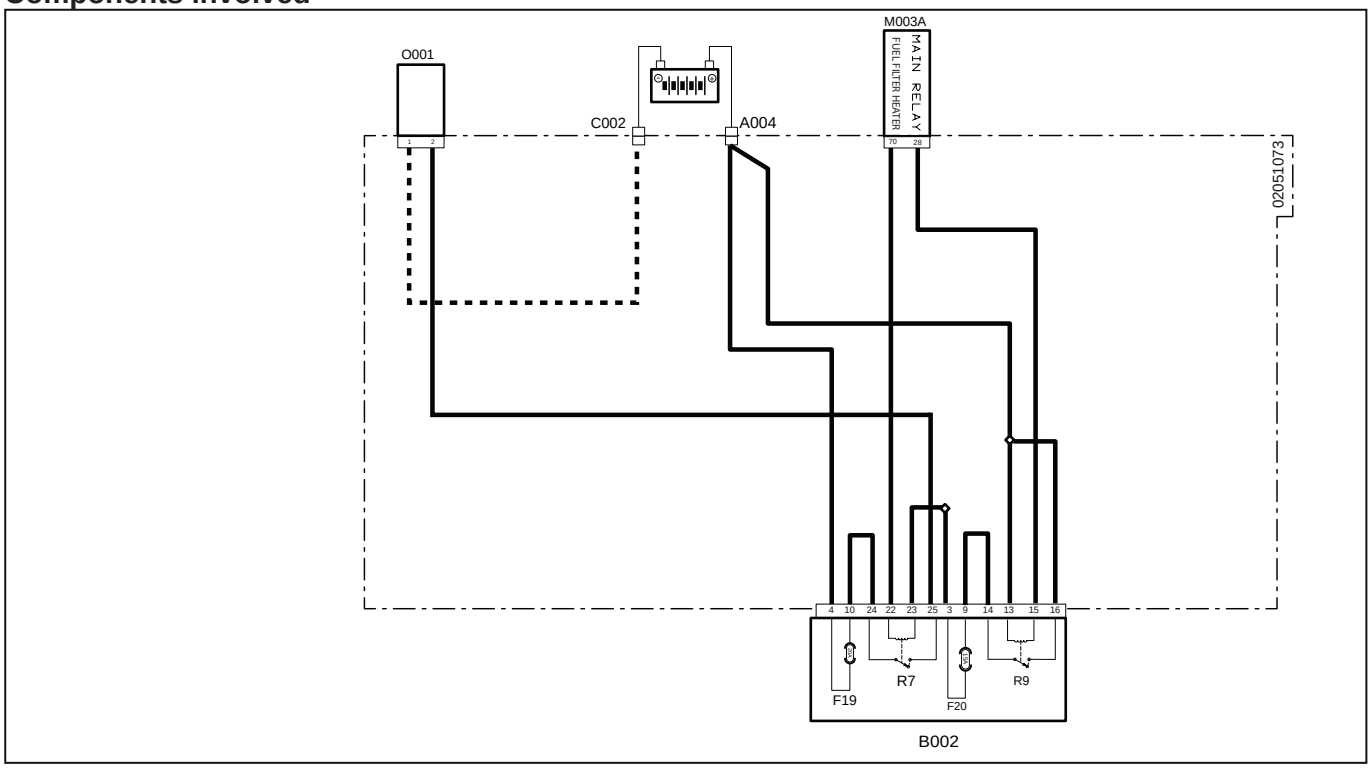
3 - Check the condition of the fuel heater fuse (20A) and replace if necessary

4 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
O001 (pag.R1-378)	P17	Fuel filter heater
C002 (pag.R1-383)	P475	Battery ground
A004 (pag.R1-388)	P472	Battery positive
M003A (pag.R1-375)	P12	Engine control unit
B002 (pag.R1-370)	P2A	Fuse box "1"
F19(B002) (pag.R1-370)	F19	Fuel pre-heat (20A)
R7(B002) (pag.R1-370)	R7	Fuel pre-heat relay (20A)
F20(B002) (pag.R1-370)	F20	Accessories (15A)
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3025 - Fuel heater circuit, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the fuel heater circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

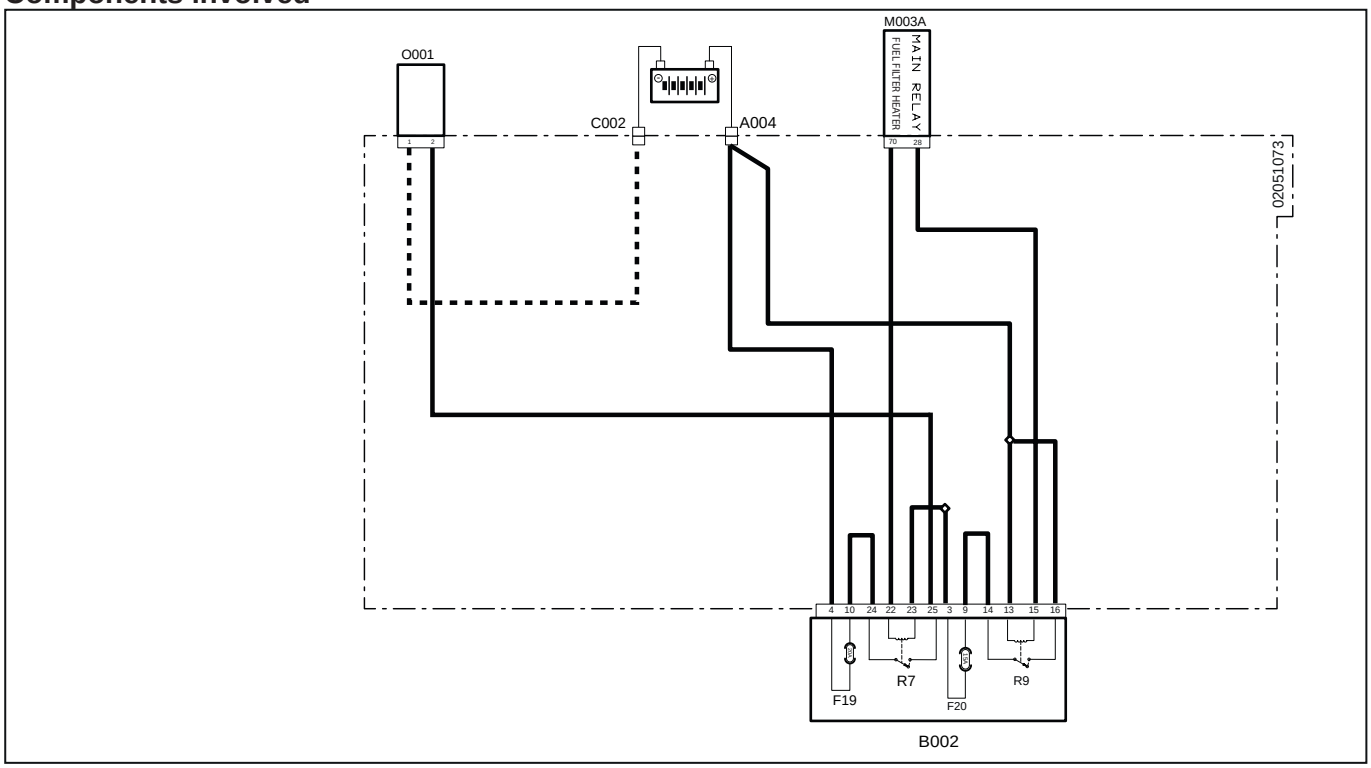
3 - Check the condition of the fuel heater fuse (20A) and replace if necessary

4 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the fuel temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
O001 (pag.R1-378)	P17	Fuel filter heater
C002 (pag.R1-383)	P475	Battery ground
A004 (pag.R1-388)	P472	Battery positive
M003A (pag.R1-375)	P12	Engine control unit
B002 (pag.R1-370)	P2A	Fuse box "1"
F19(B002) (pag.R1-370)	F19	Fuel pre-heat (20A)
R7(B002) (pag.R1-370)	R7	Fuel pre-heat relay (20A)
F20(B002) (pag.R1-370)	F20	Accessories (15A)
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3026 - Low rail pressure

Description of fault

The ECU engine control unit detects insufficient pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

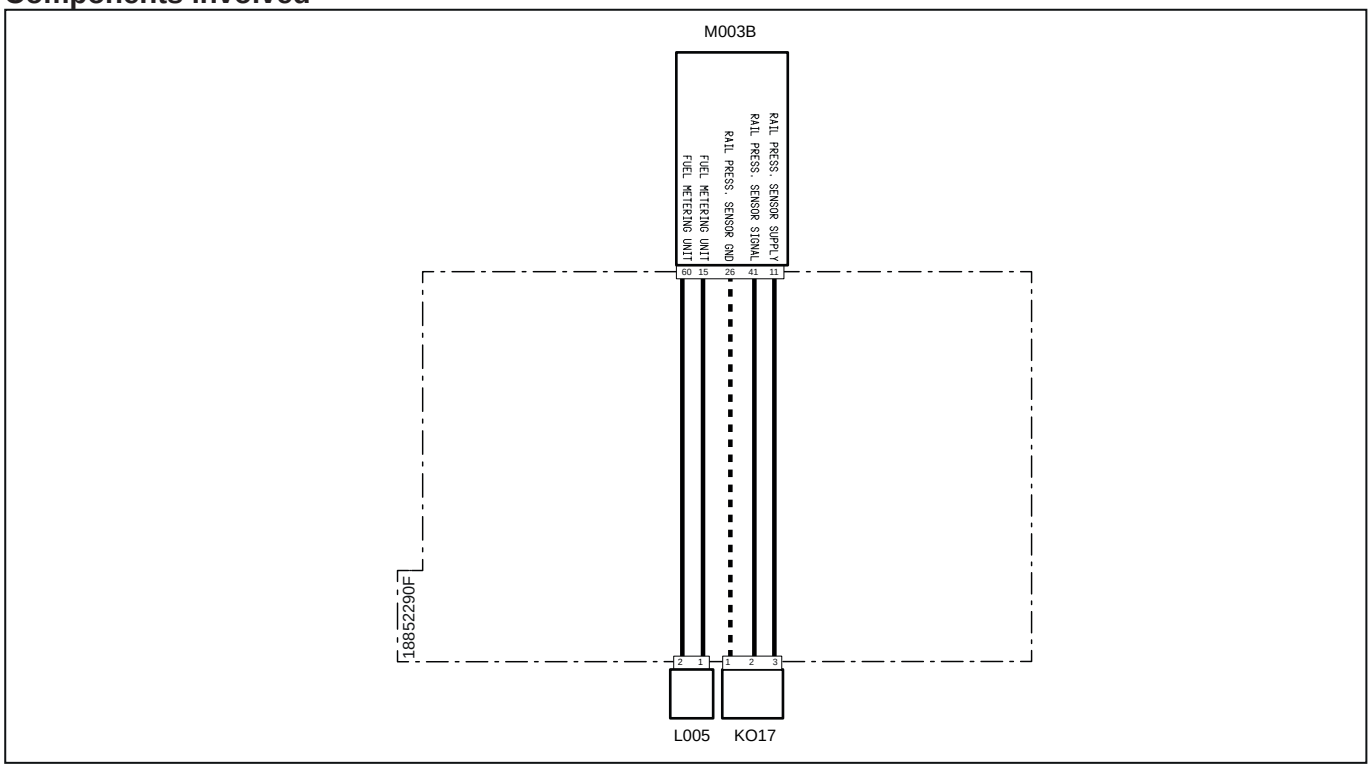
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3027 - High rail pressure

Description of fault

The ECU engine control unit detects excessively high pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

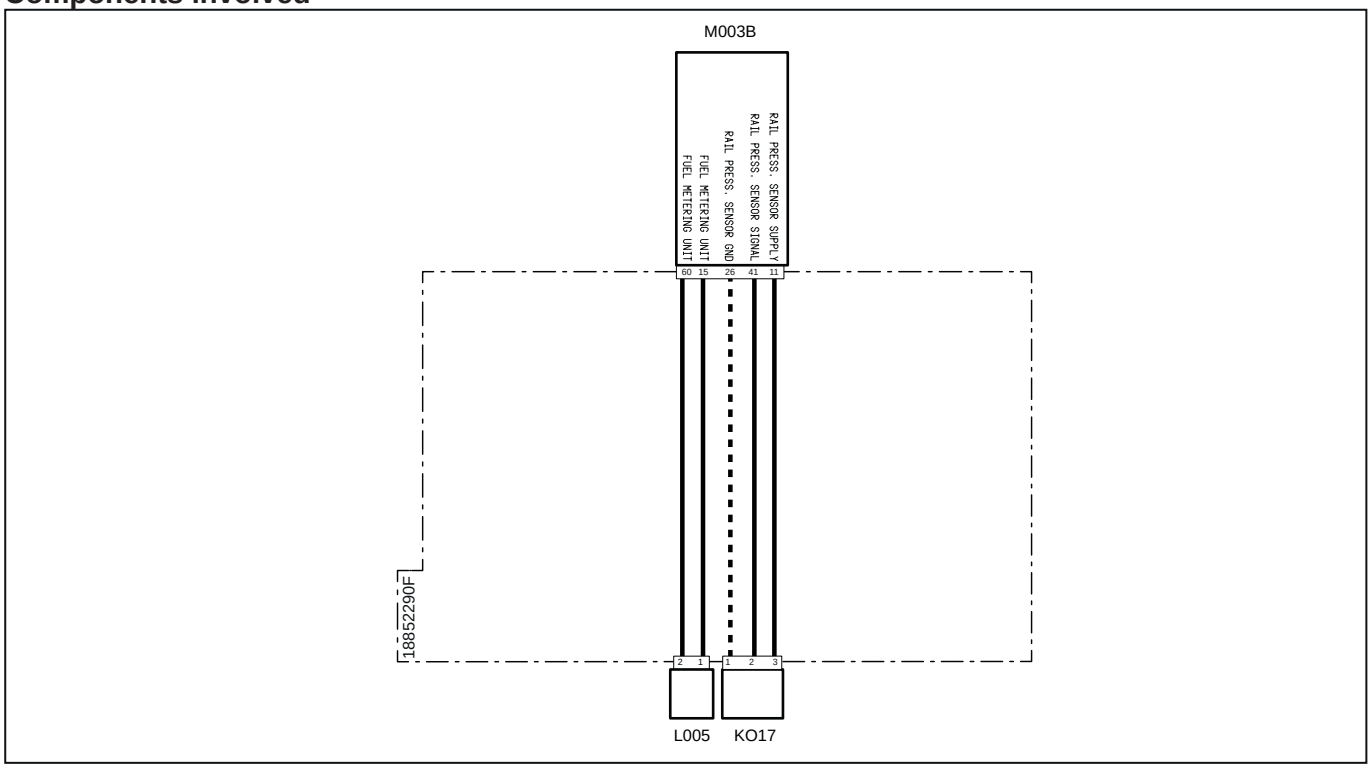
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3028 - Low rail pressure

Description of fault

The ECU engine control unit detects insufficient pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

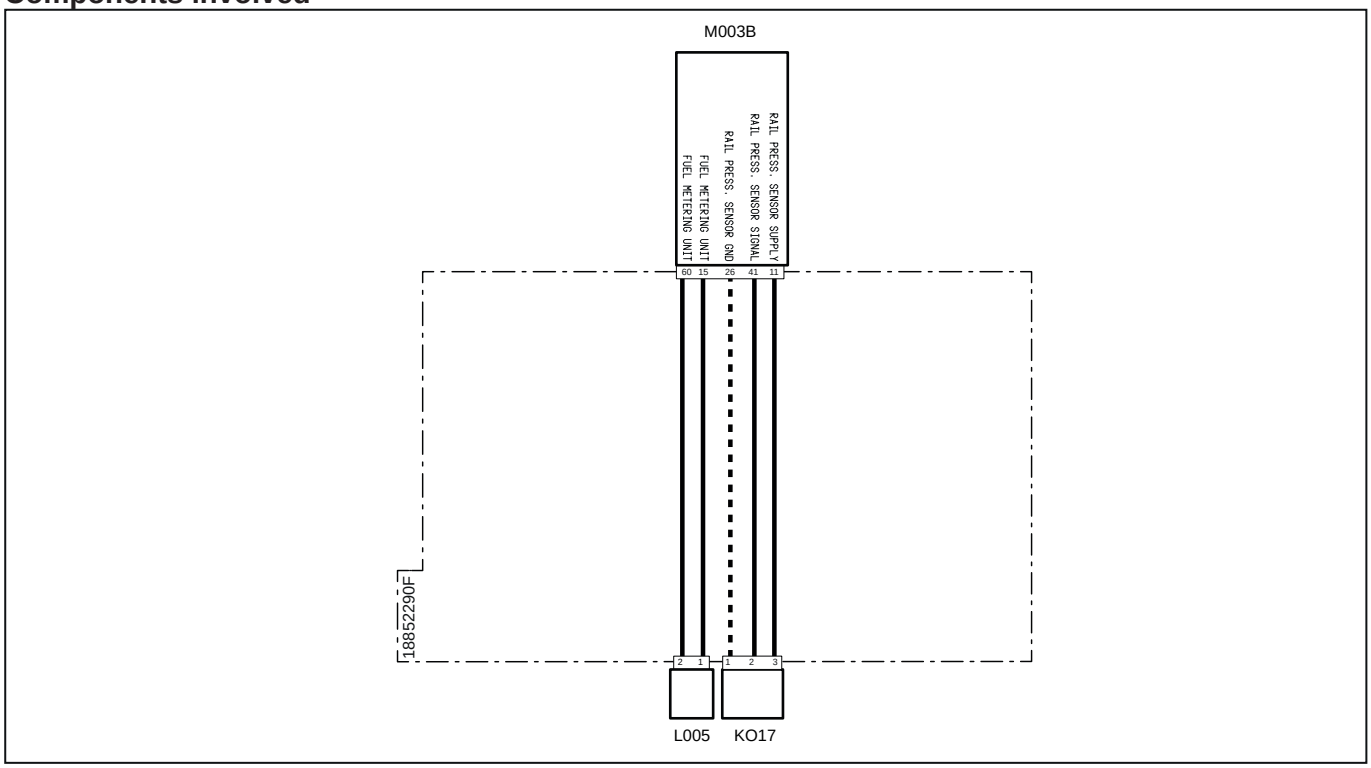
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3029 - High rail pressure

Description of fault

The ECU engine control unit detects excessively high pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

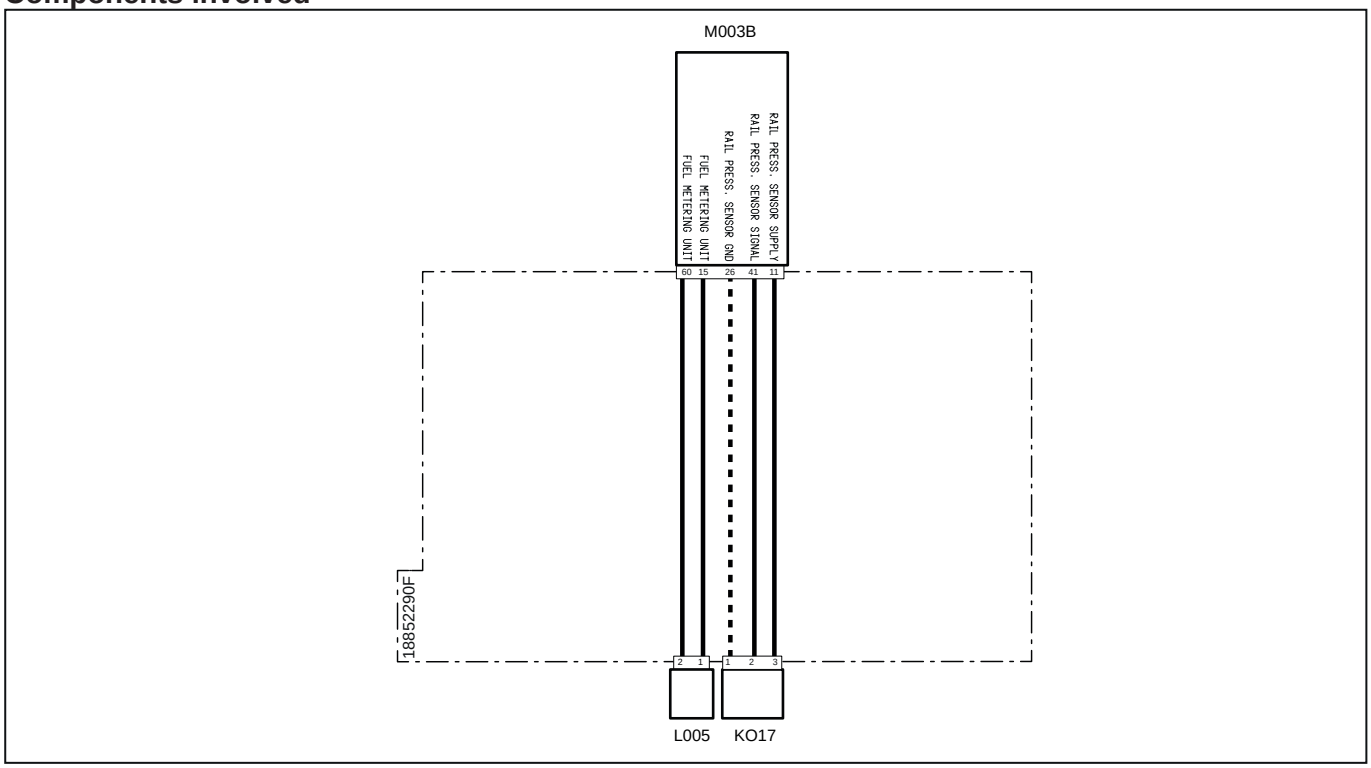
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3030 - High pressure pump metering valve: overcurrent

Description of fault

The ECU engine control unit detects an excessively high current in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

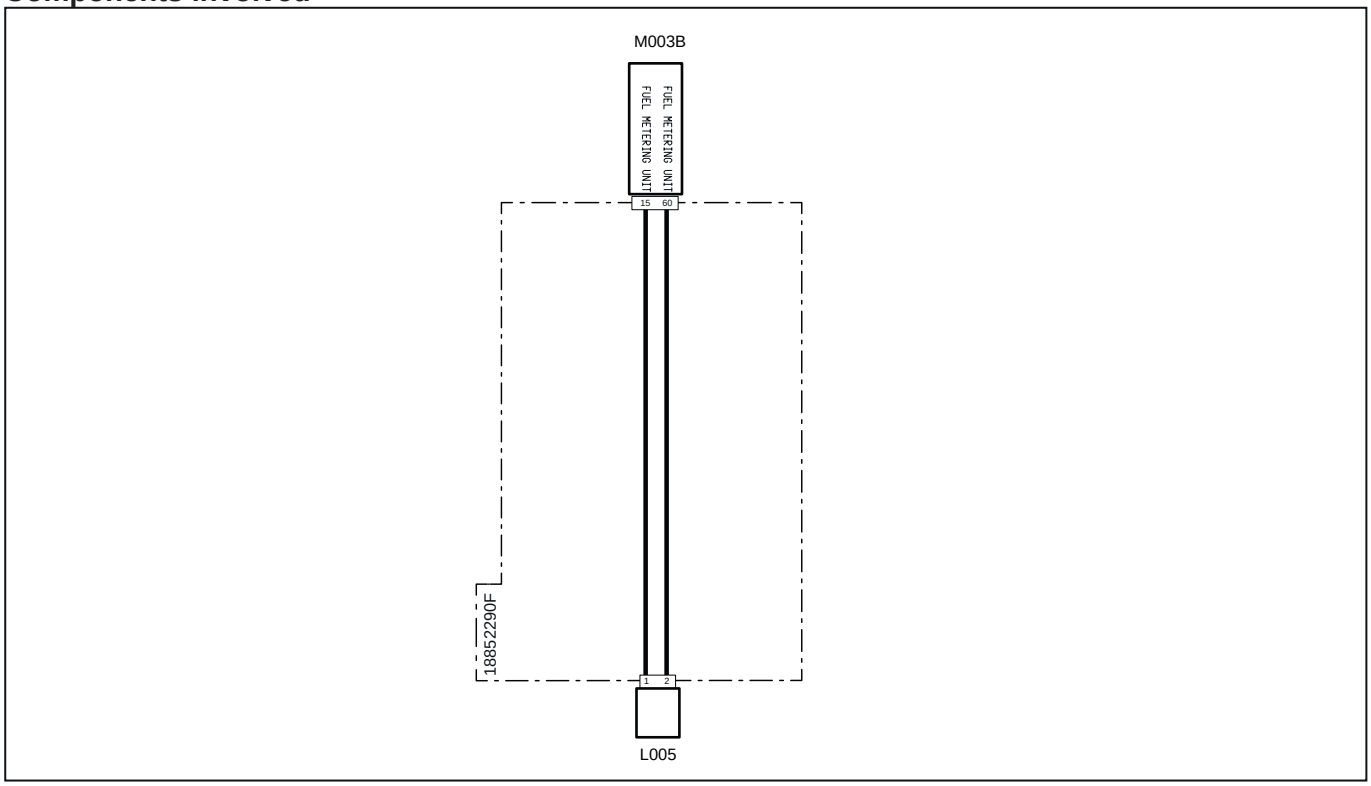
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3031 - High pressure pump valve: disturbed signal or spurious contact

Description of fault

The ECU engine control unit detects a disturbed signal from, or a spurious contact fault on, the high pressure pump valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

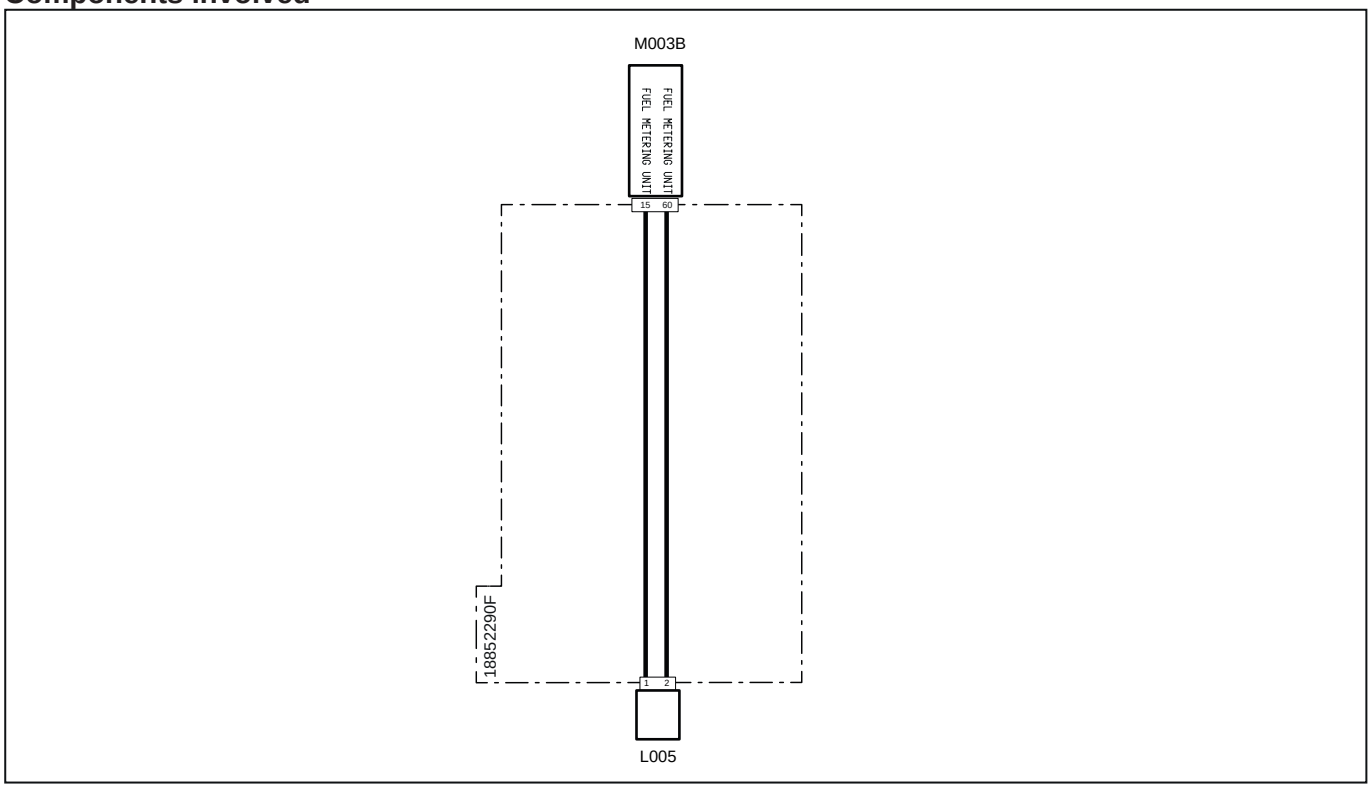
3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3032 - High pressure pump metering valve: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

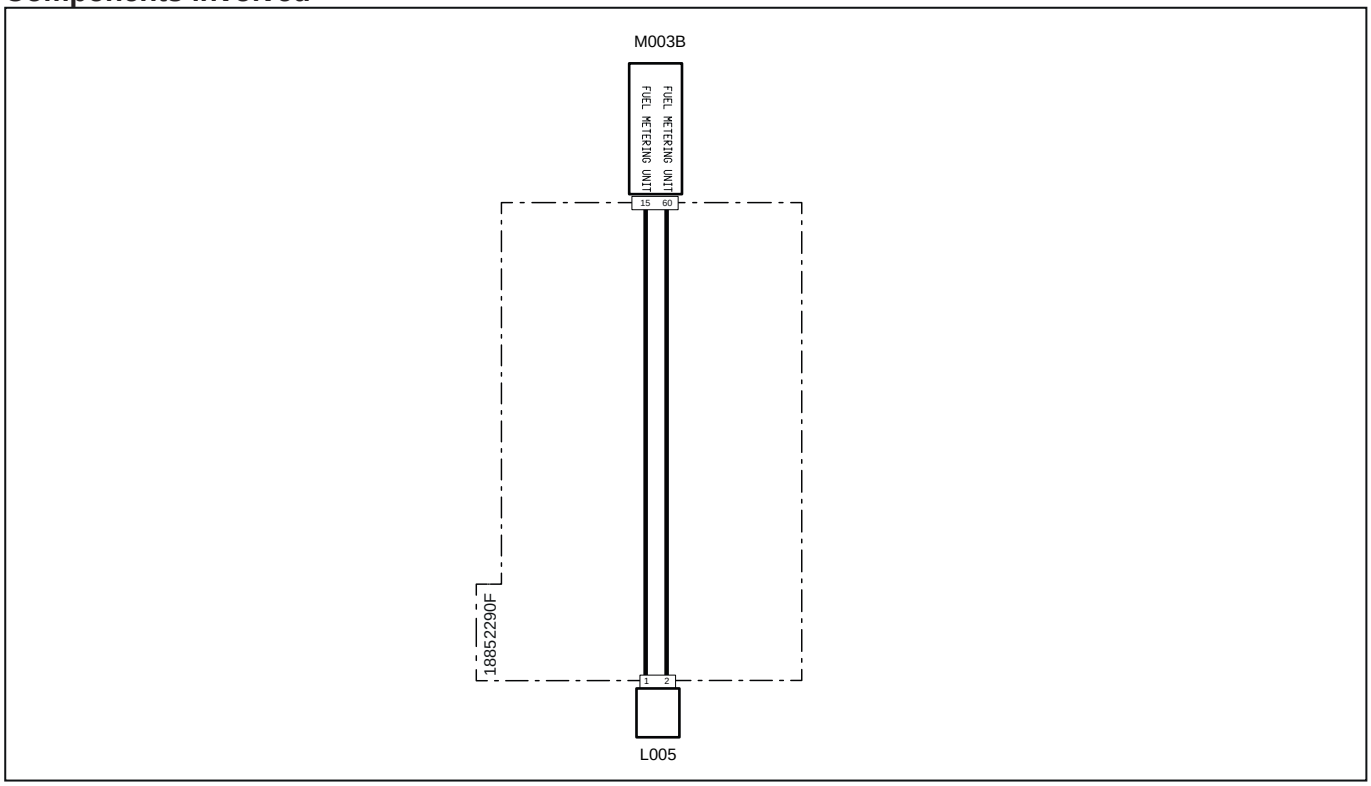
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3033 - Injector 1 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

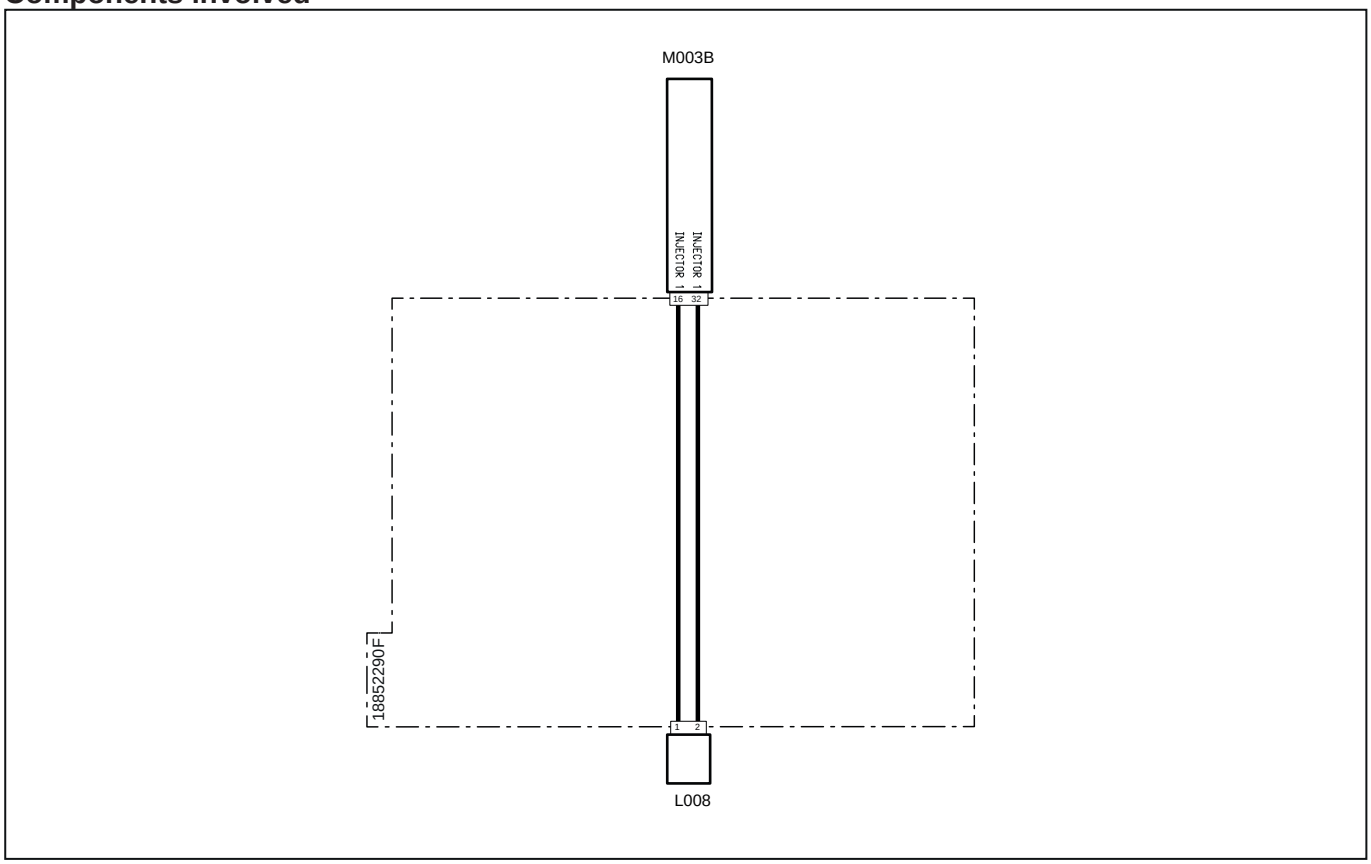
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R1-409)	XI1	Fuel electro-injector 1
M003B (pag.R1-407)	XECUA	Engine control unit

3034 - Injector 1 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

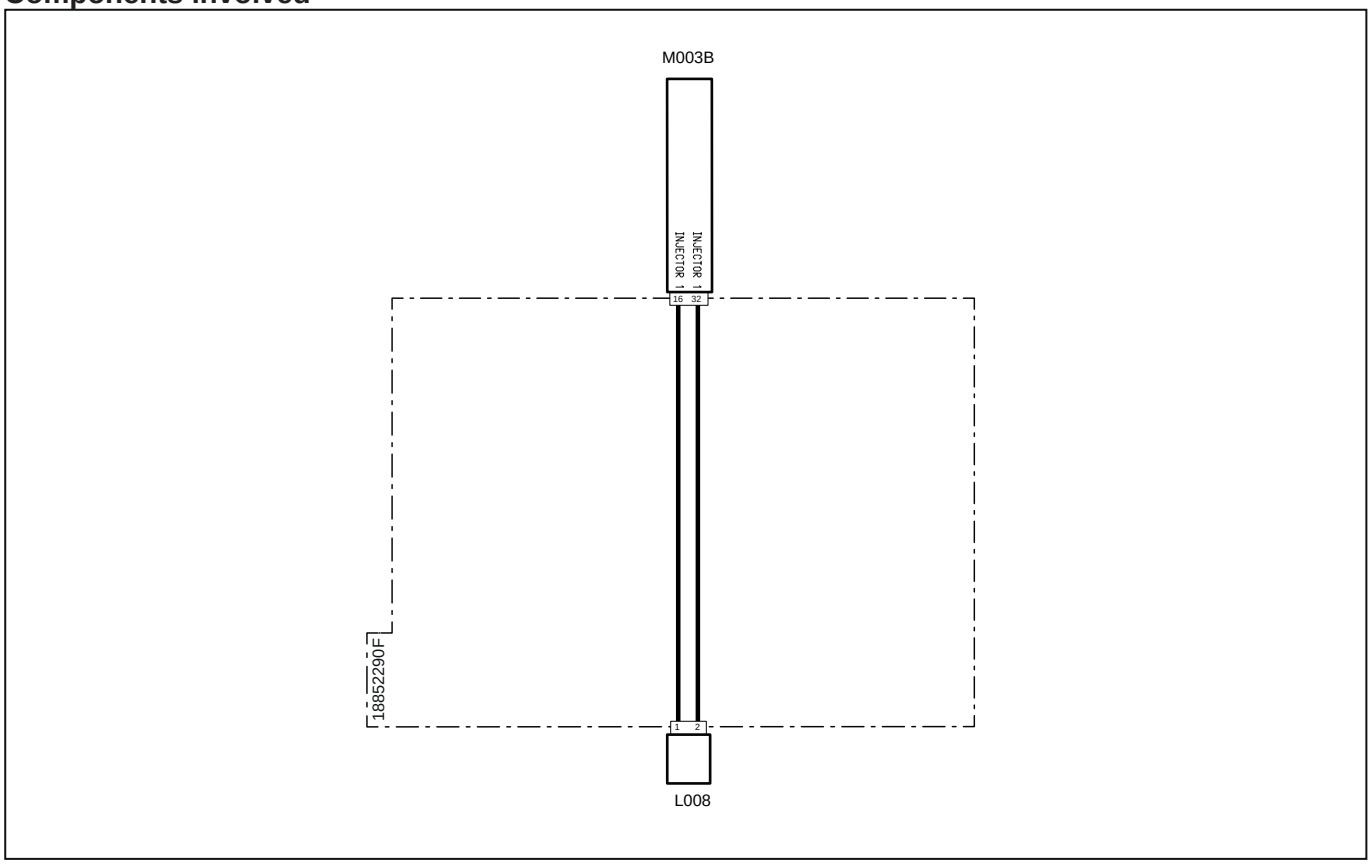
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R1-409)	XI1	Fuel electro-injector 1
M003B (pag.R1-407)	XECUA	Engine control unit

3035 - Injector 2 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

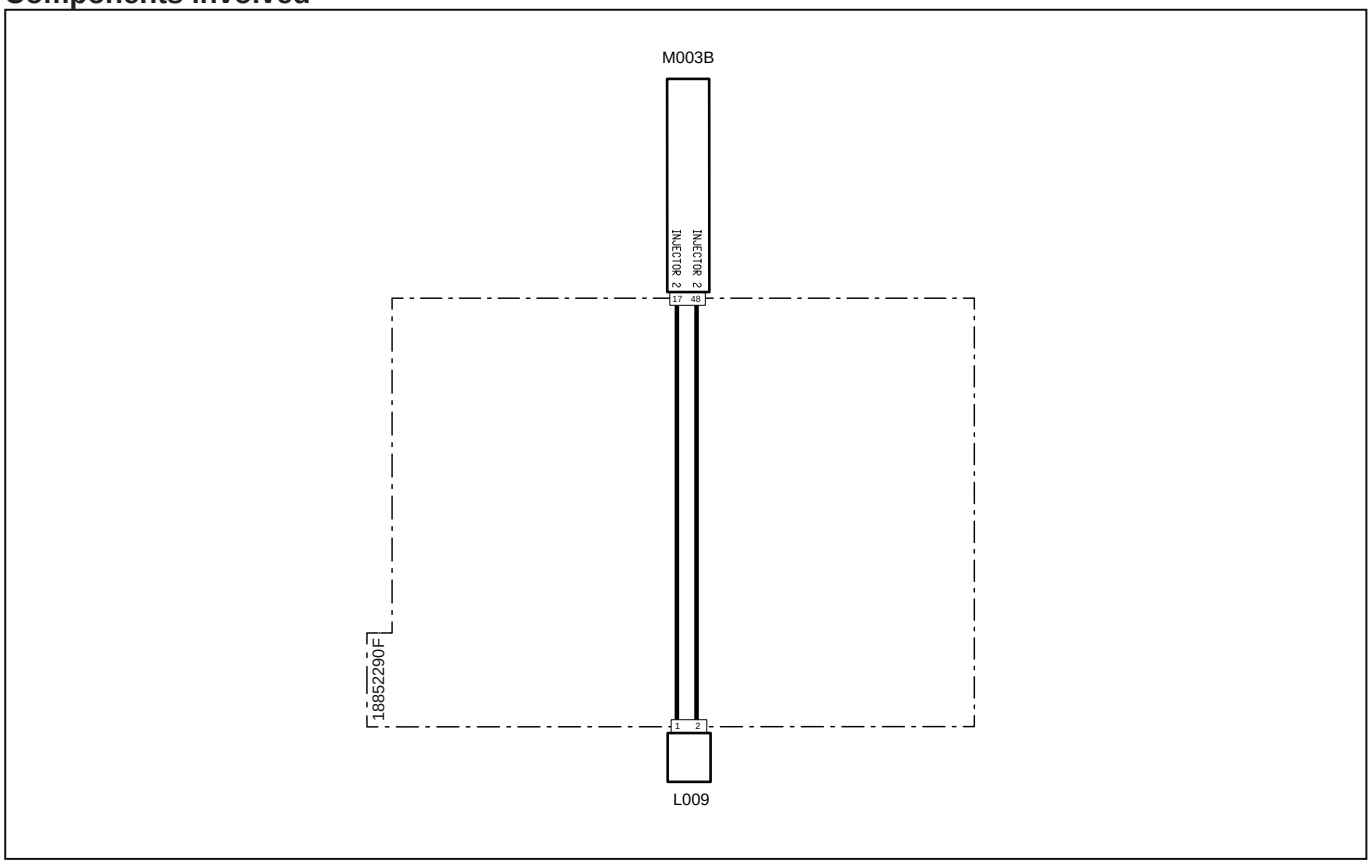
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R1-410)	XI2	Fuel electro-injector 2
M003B (pag.R1-407)	XECUA	Engine control unit

3036 - Injector 2 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

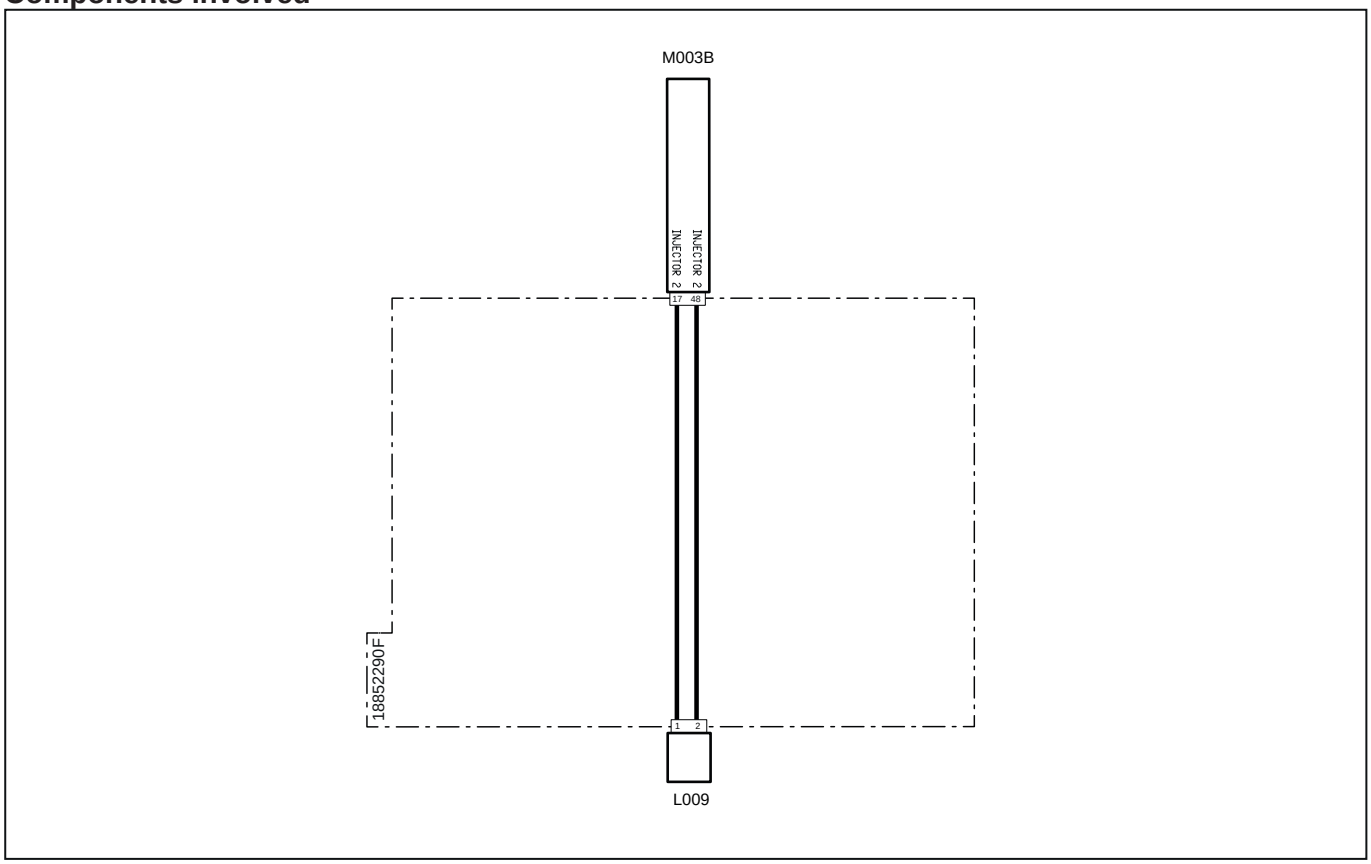
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R1-410)	XI2	Fuel electro-injector 2
M003B (pag.R1-407)	XECUA	Engine control unit

3037 - Injector 3 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

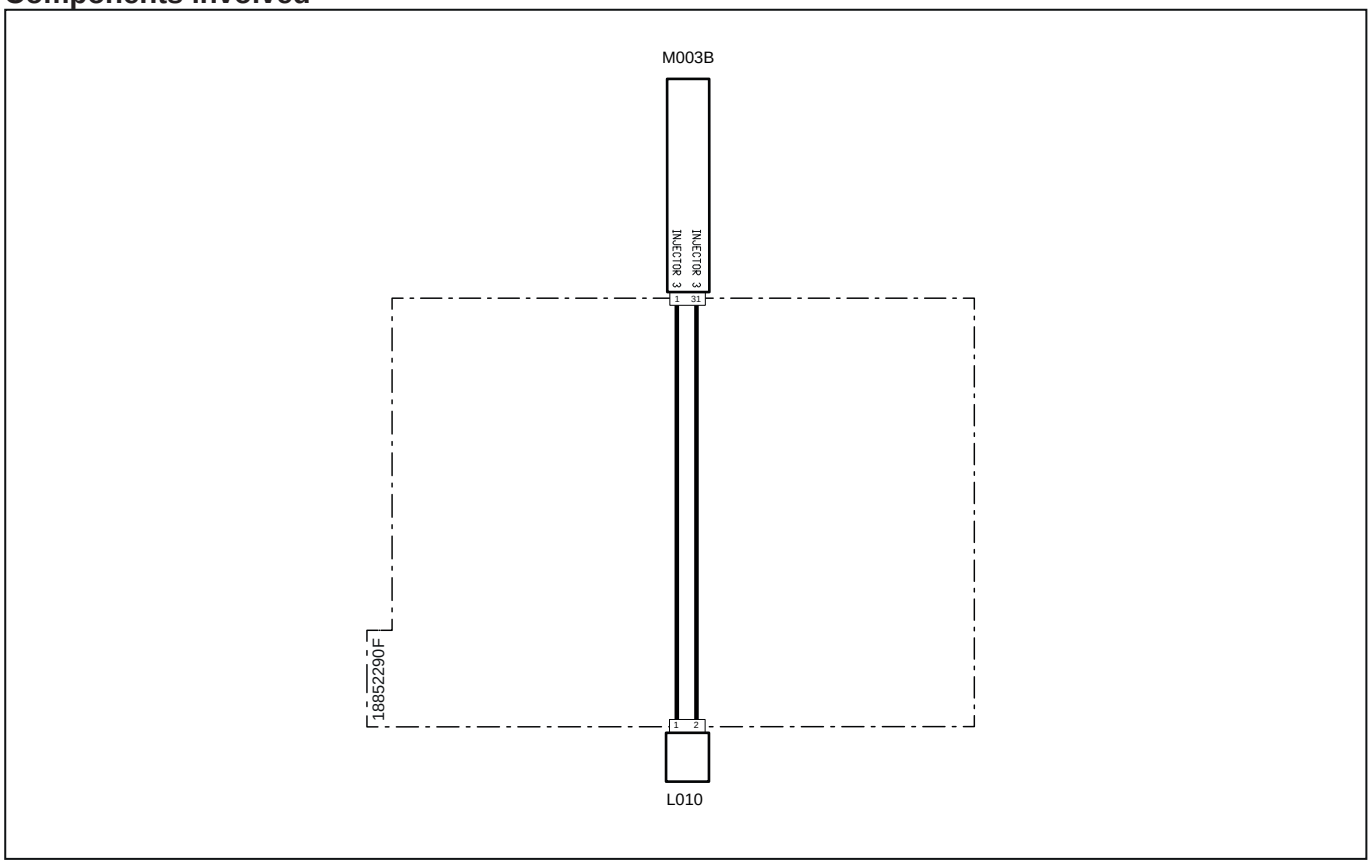
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R1-410)	XI3	Fuel electro-injector 3
M003B (pag.R1-407)	XECUA	Engine control unit

3038 - Injector 3 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

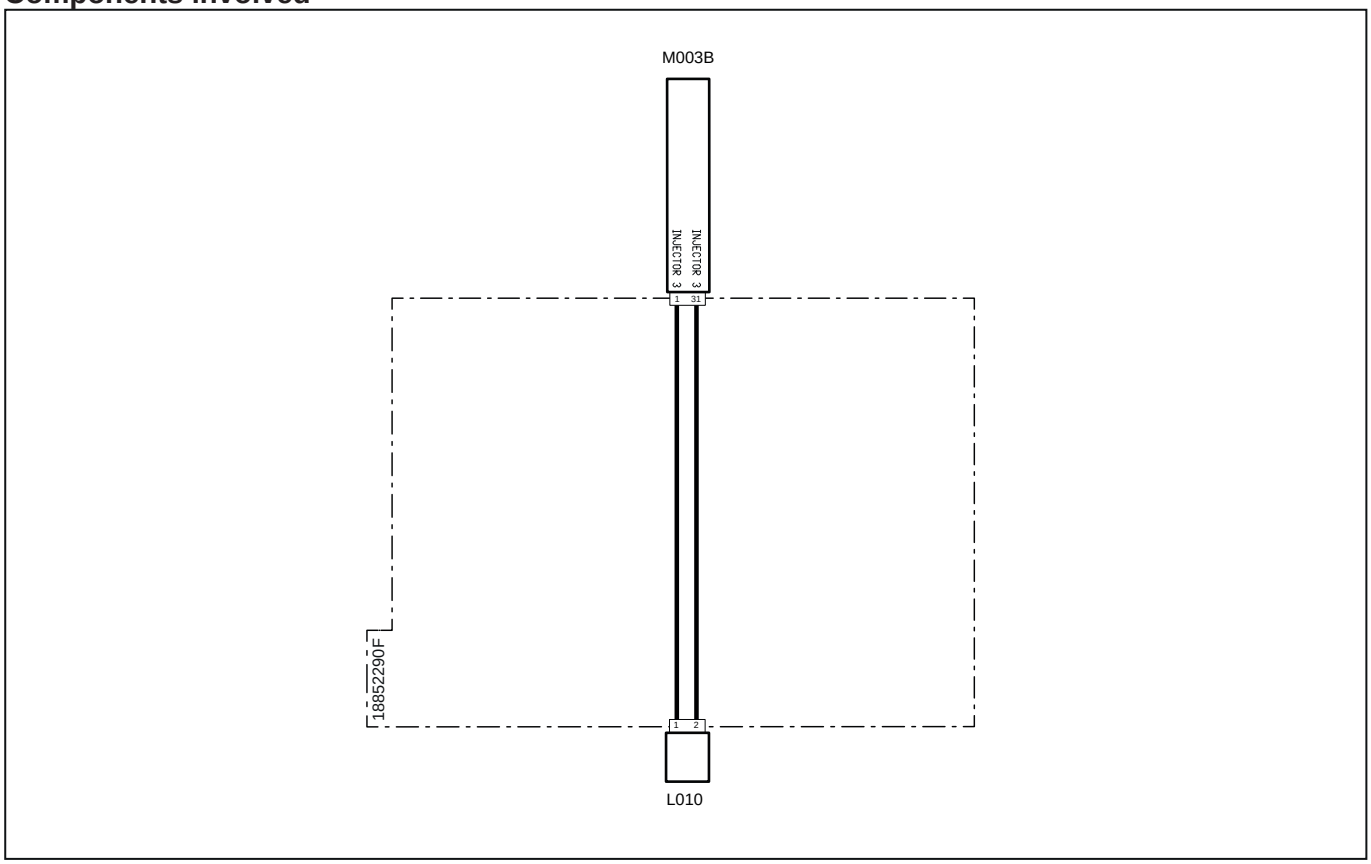
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R1-410)	XI3	Fuel electro-injector 3
M003B (pag.R1-407)	XECUA	Engine control unit

3039 - Injector 1 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

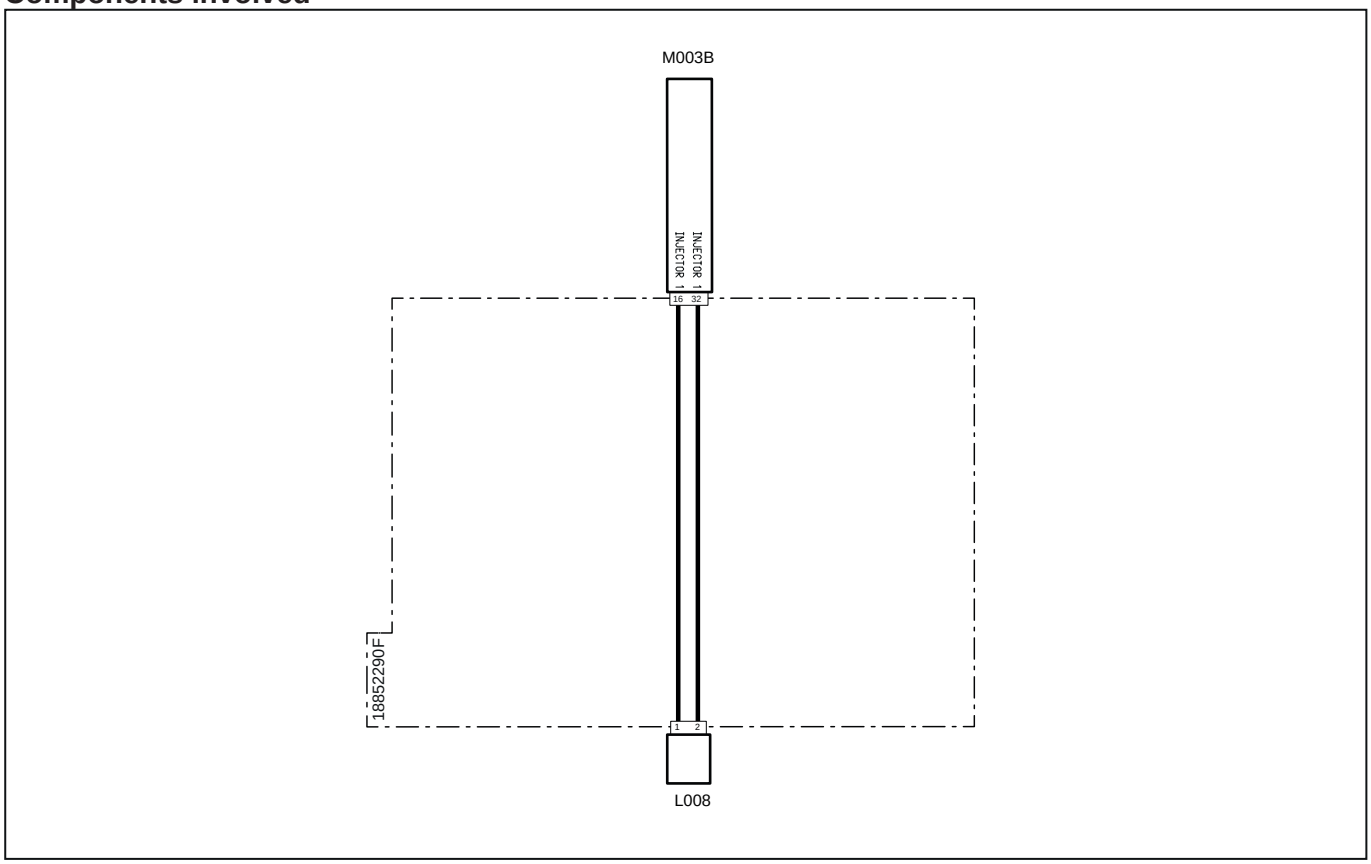
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R1-409)	XI1	Fuel electro-injector 1
M003B (pag.R1-407)	XECUA	Engine control unit

3040 - Injector 2 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

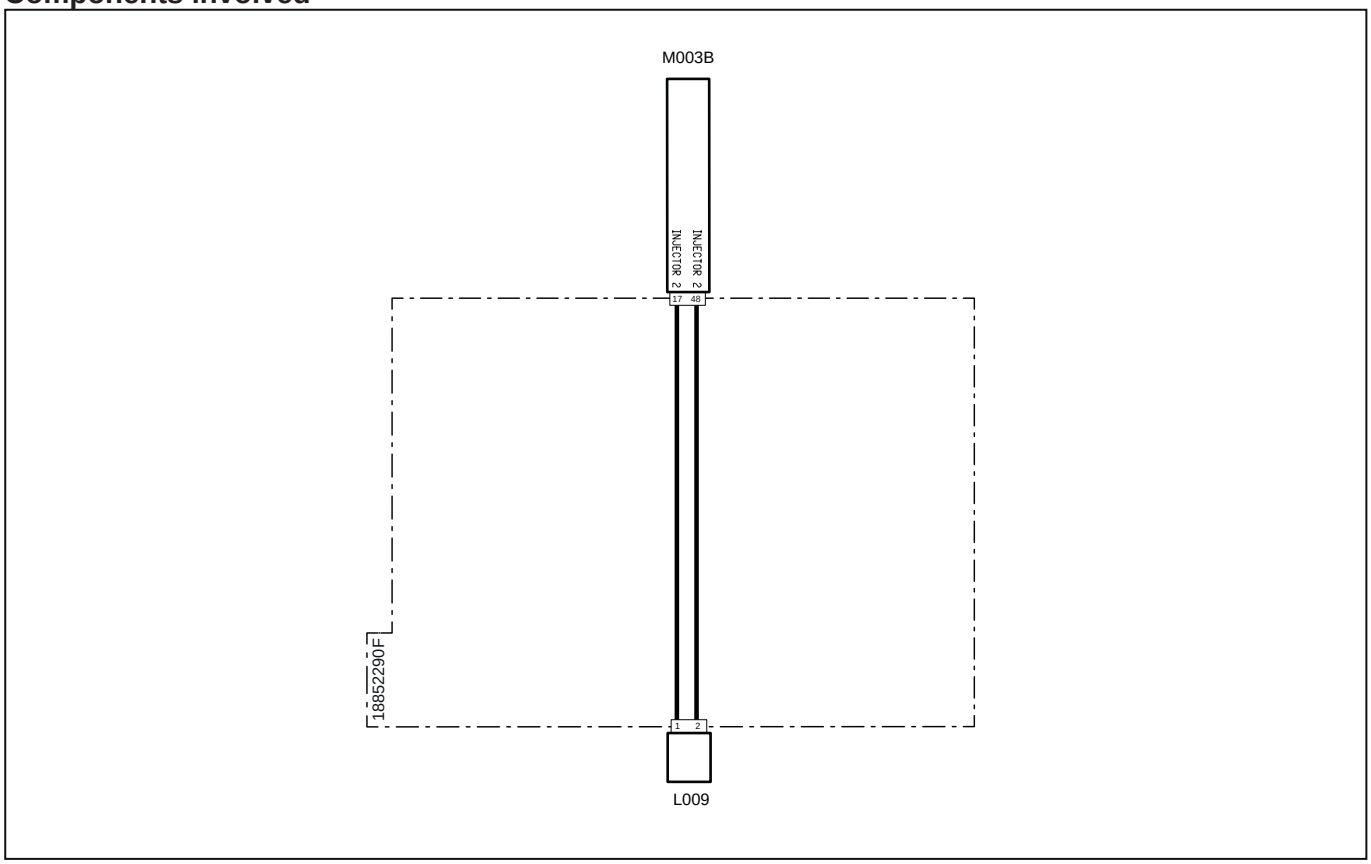
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009 (pag.R1-410)	XI2	Fuel electro-injector 2
M003B (pag.R1-407)	XECUA	Engine control unit

3041 - Injector 3 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

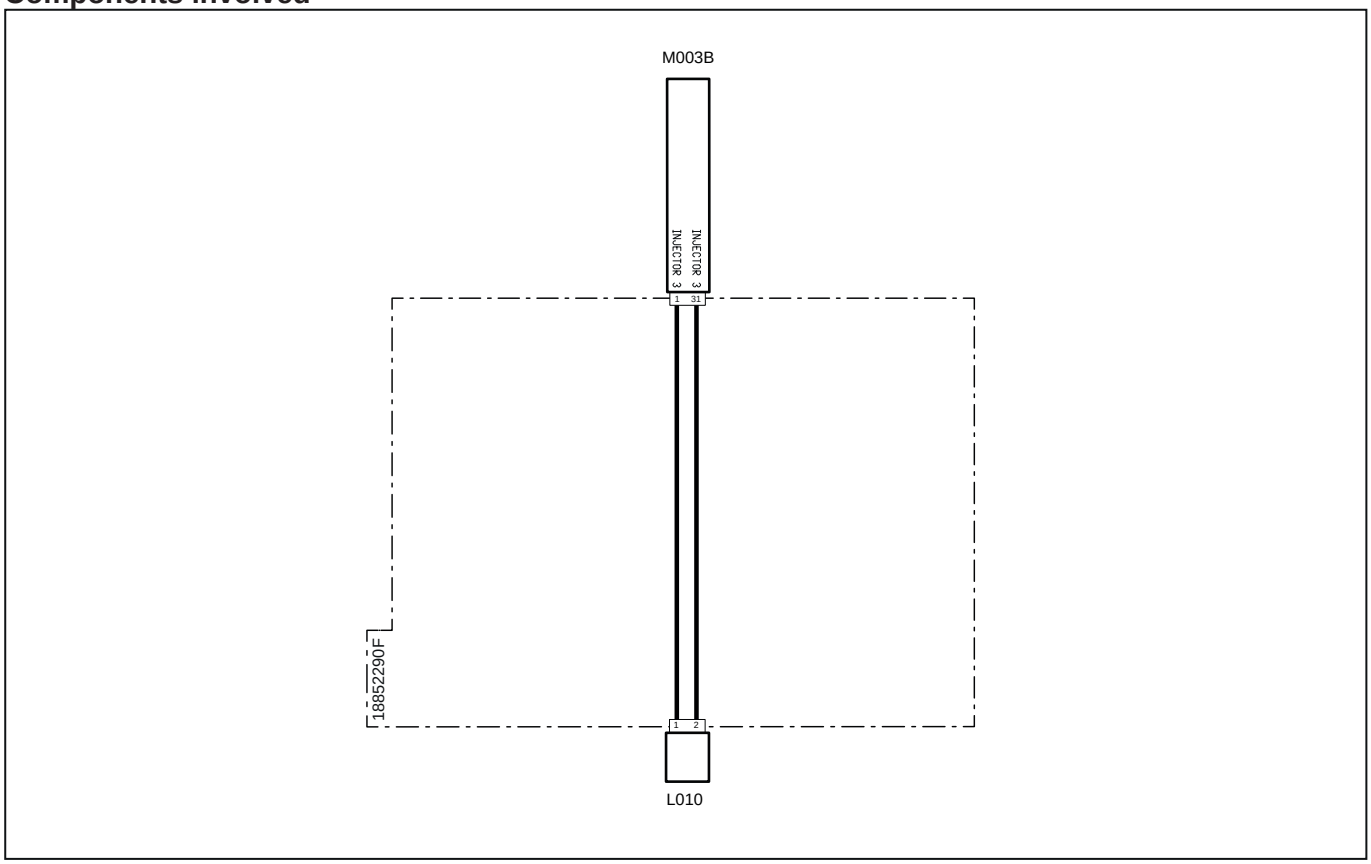
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R1-410)	XI3	Fuel electro-injector 3
M003B (pag.R1-407)	XECUA	Engine control unit

3042 - Injector 1 and 2 solenoids: short circuit

Description of fault

The control unit detects a short circuit fault simultaneously on the solenoids of injector 1 and injector 2

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool) The new IMA must always be written in the engine control unit memory whenever an injector is replaced

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

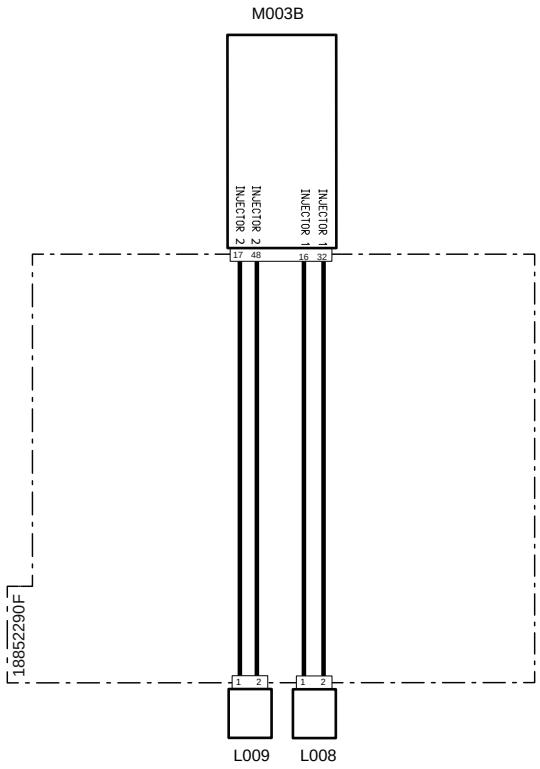
2 - Check that the connectors of injector 1, injector 2 and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R1-409)	XI1	Fuel electro-injector 1
L009(pag.R1-410)	XI2	Fuel electro-injector 2
M003B (pag.R1-407)	XECUA	Engine control unit

3043 - Injector 3 solenoids, short circuit

Description of fault

The electronic control unit also detects a short circuit on the solenoid of injector 3

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool) The new IMA must always be written in the engine control unit memory whenever an injector is replaced

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

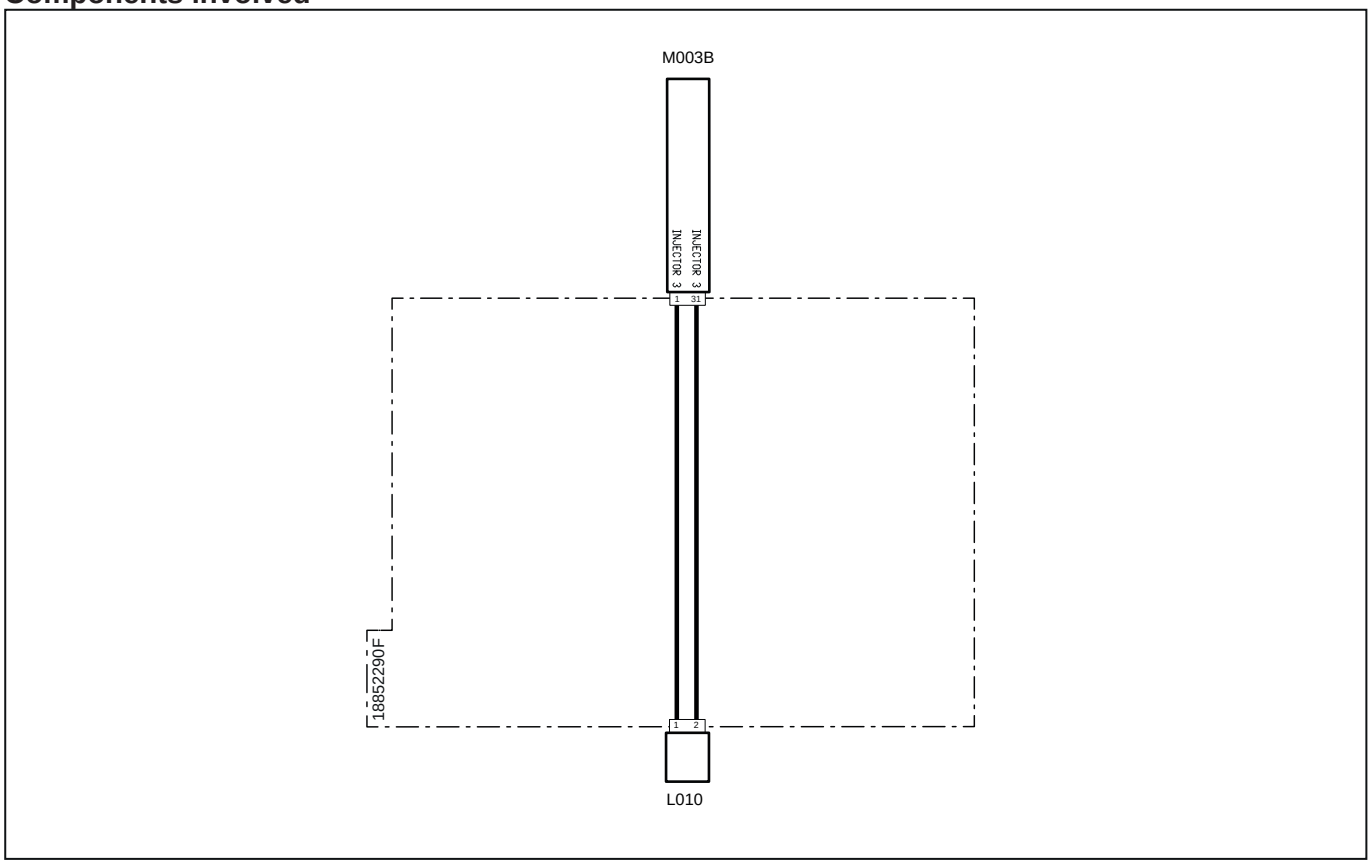
2 - Check that the connectors of injector 3 and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R1-410)	XI3	Fuel electro-injector 3
M003B (pag.R1-407)	XECUA	Engine control unit

3044 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3045 - Injector 1 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 1 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

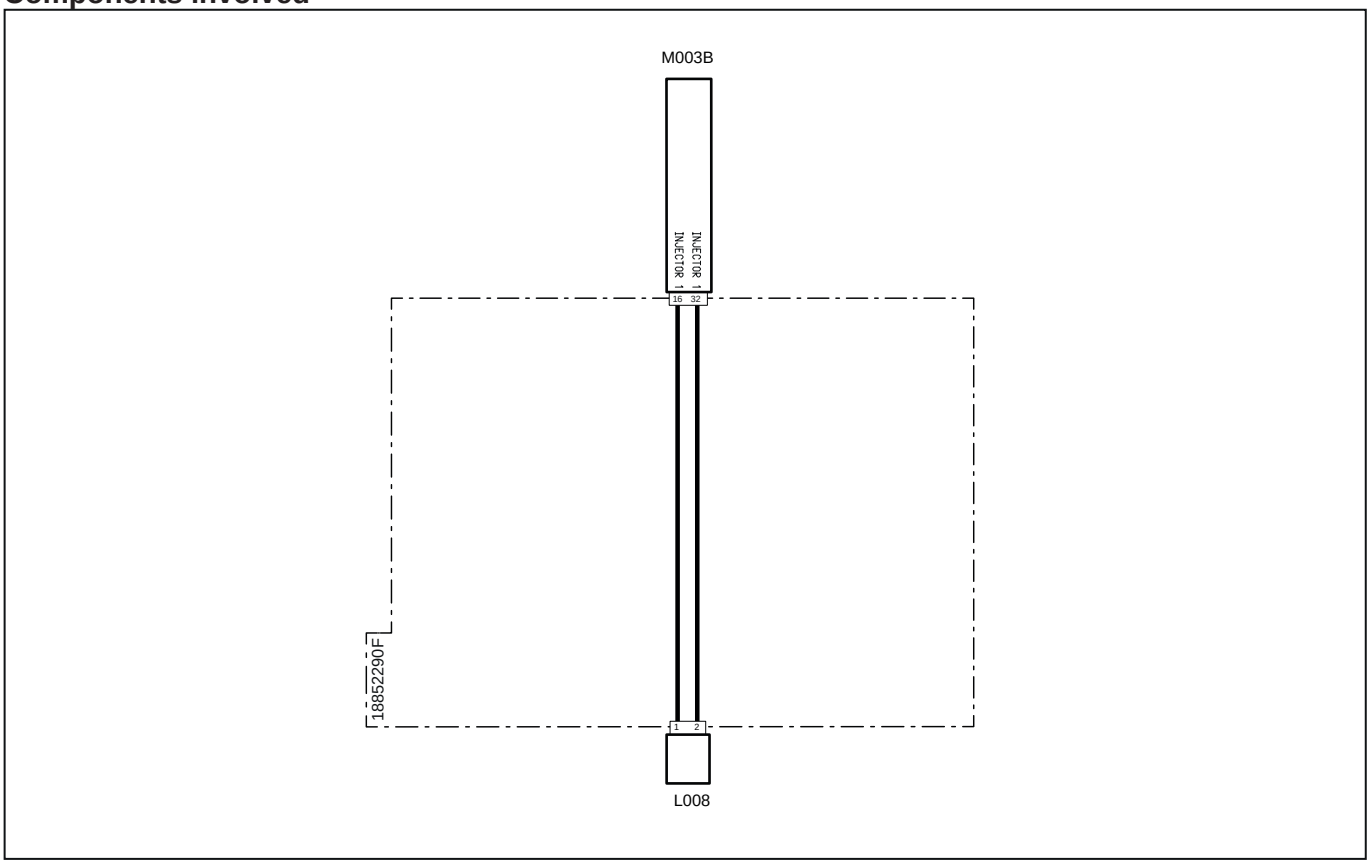
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R1-409)	XI1	Fuel electro-injector 1
M003B (pag.R1-407)	XECUA	Engine control unit

3046 - High boost pressure

Description of fault

The pressure value received by the ECU engine control unit from the temperature and pressure sensor (BOOST) is very high

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine may be started, but engine operates with limited torque, regeneration is disabled and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

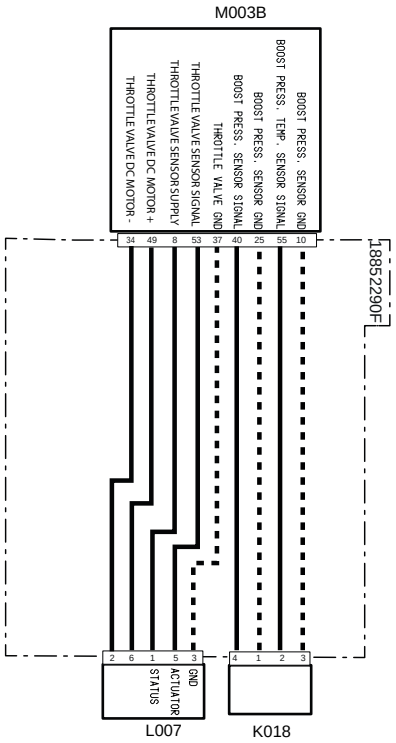
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3047 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the engine control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved

System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A002 (pag.R1-330)	P55	Positive battery terminal
M003B (pag.R1-407)	XECUA	Engine control unit

3048 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the engine control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M003B (pag.R1-407)	XECUA	Engine control unit

3049 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

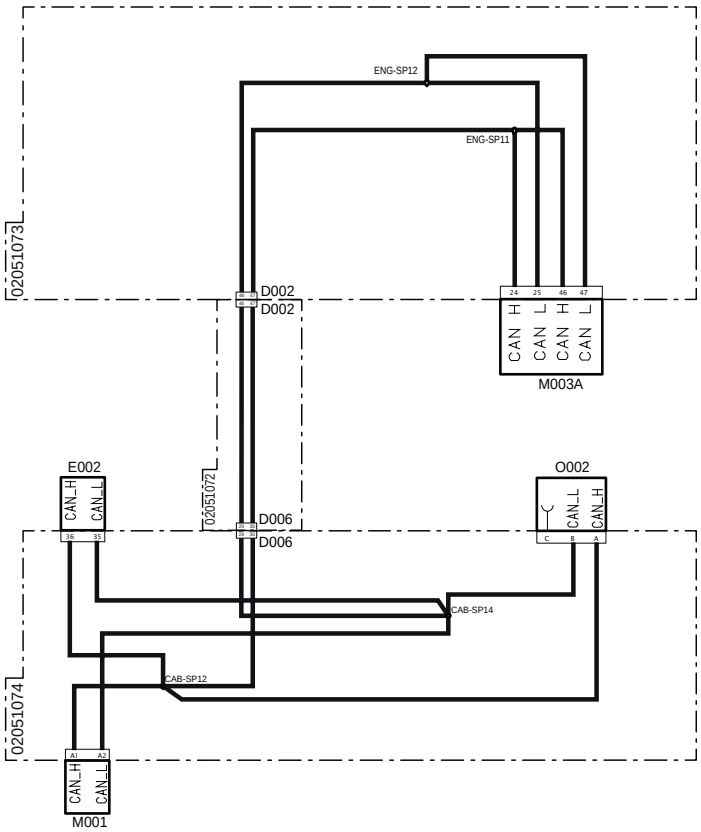
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3050 - Invalid message transmitted between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control receives an invalid message from the VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

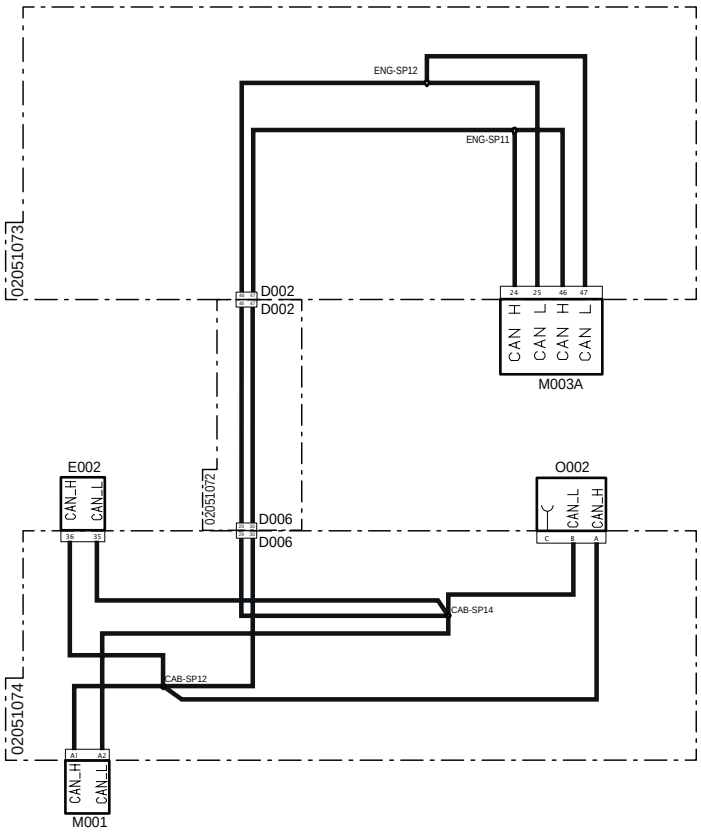
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3051 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the engine control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M003B (pag.R1-407)	XECUA	Engine control unit

3052 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

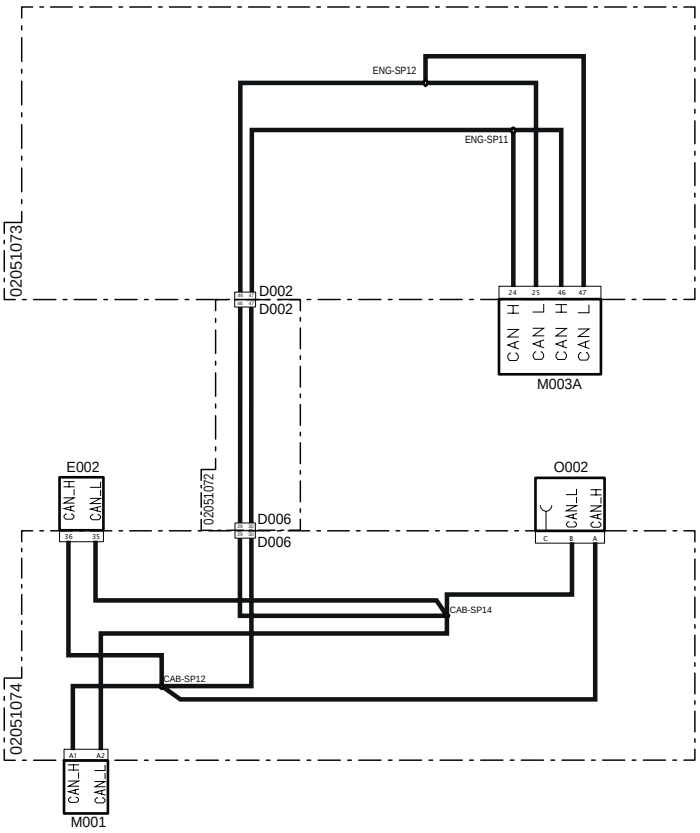
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3053 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

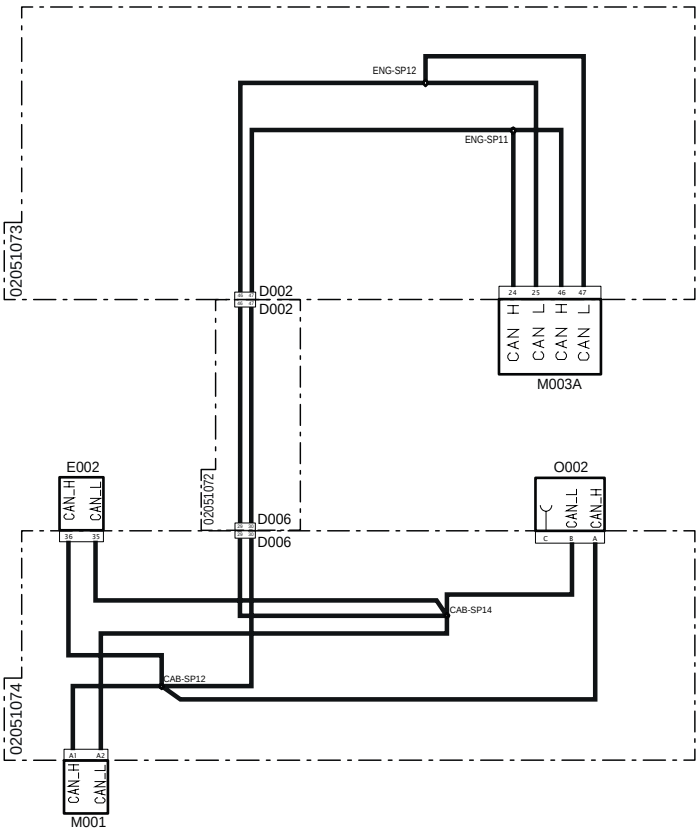
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3054 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3055 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3056 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3057 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3058 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3059 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3060 - Start relay: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

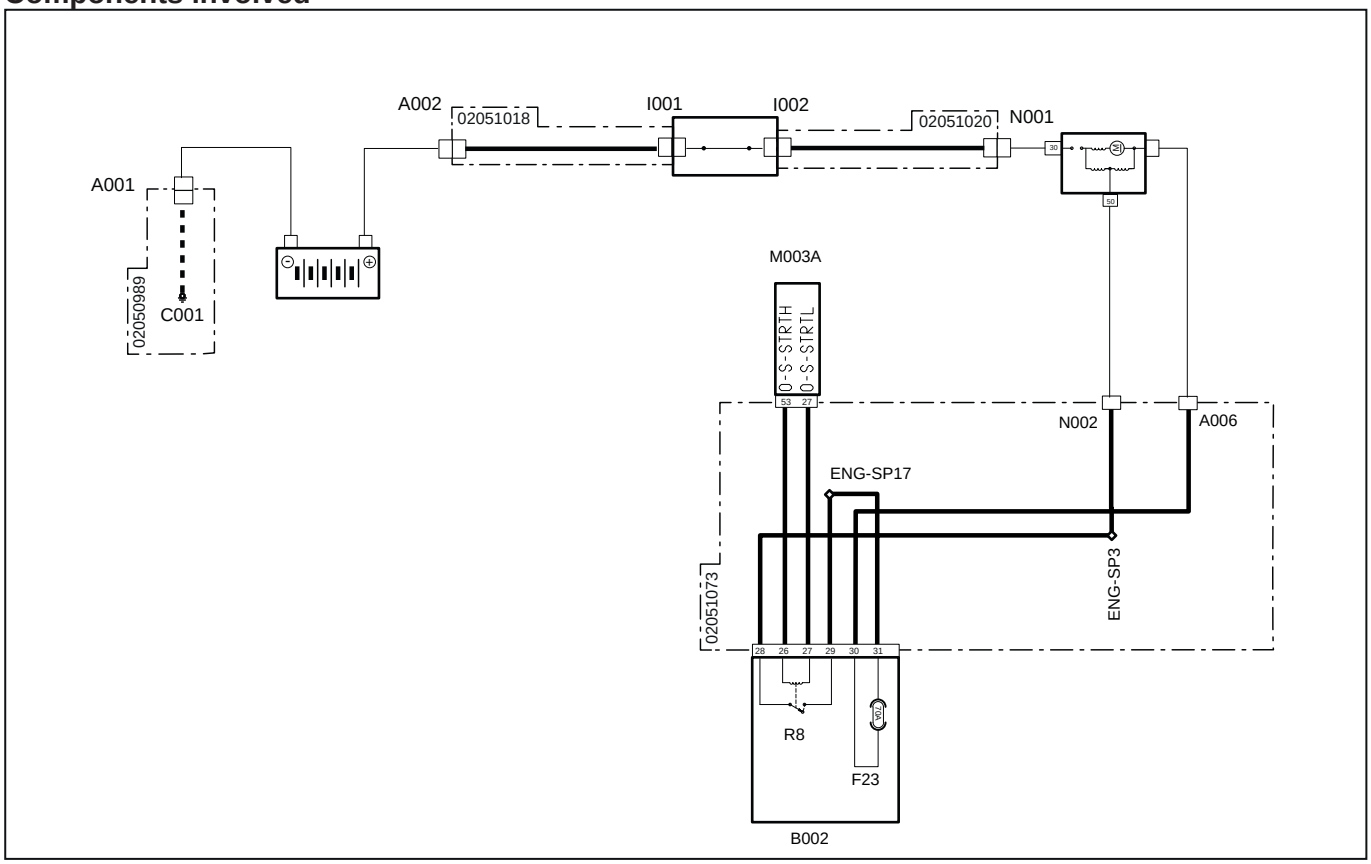
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3061 - Start relay: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

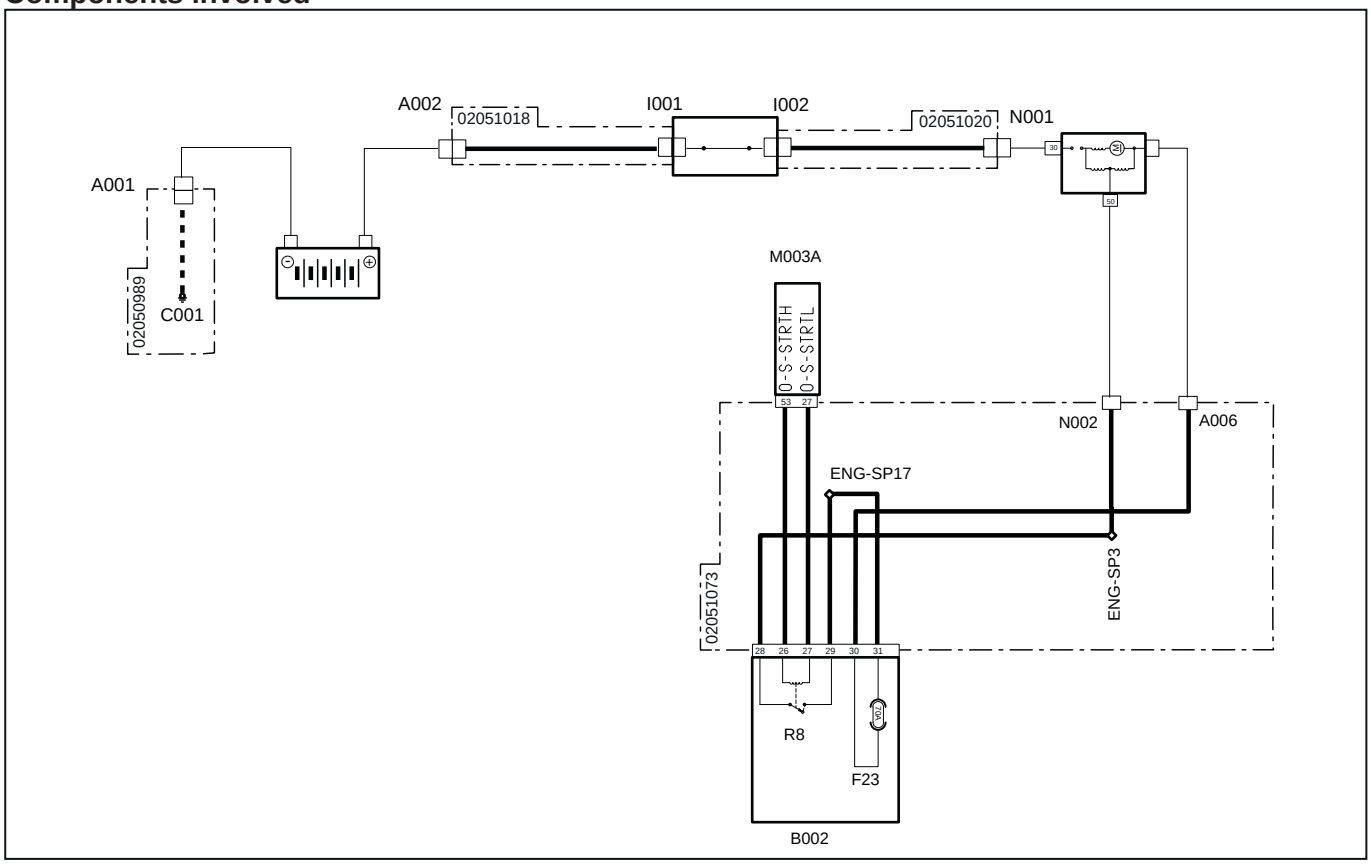
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
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F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3062 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3063 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3064 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3065 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3066 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3066 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3067 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3068 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3069 - POC temperature sensor, short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault in the circuit of the POC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and POC (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the POC sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

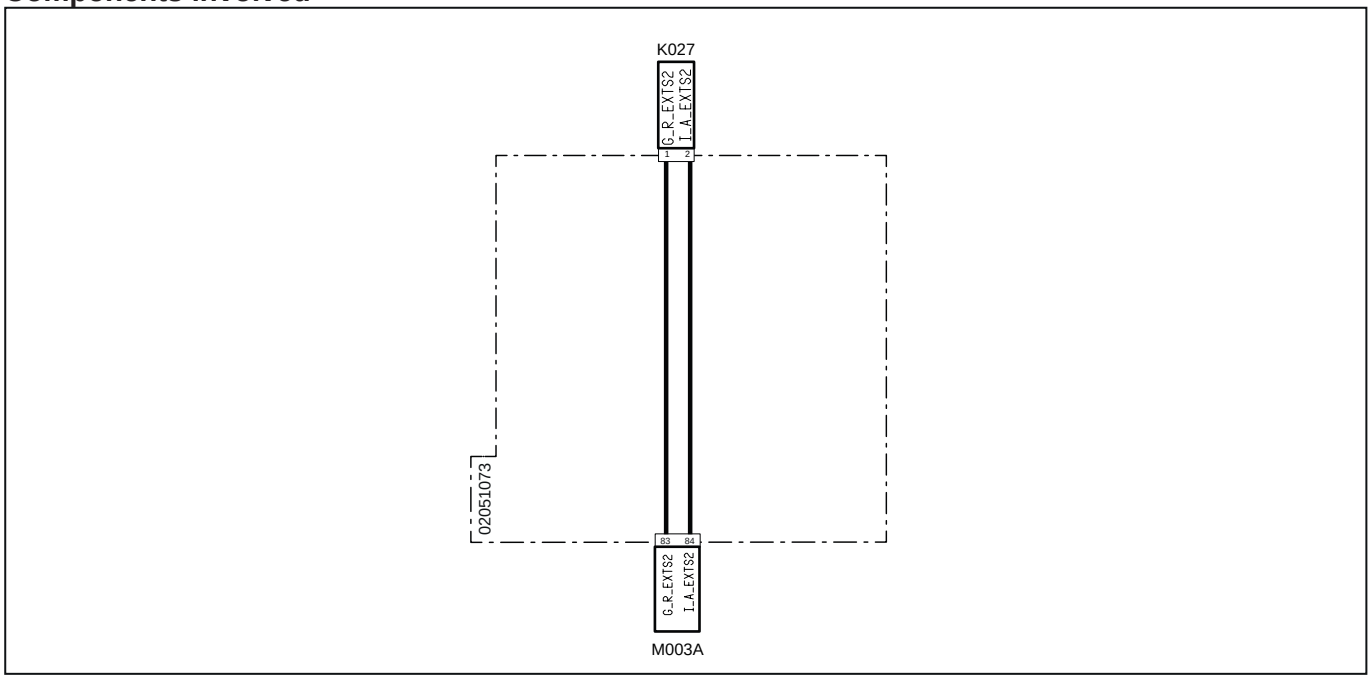
2 - Use the diagnostic tool to monitor the POC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the exhaust manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the POC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K027 (pag.R1-374)	P7	POC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3070 - POC temperature sensor, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the POC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and POC (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the POC sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

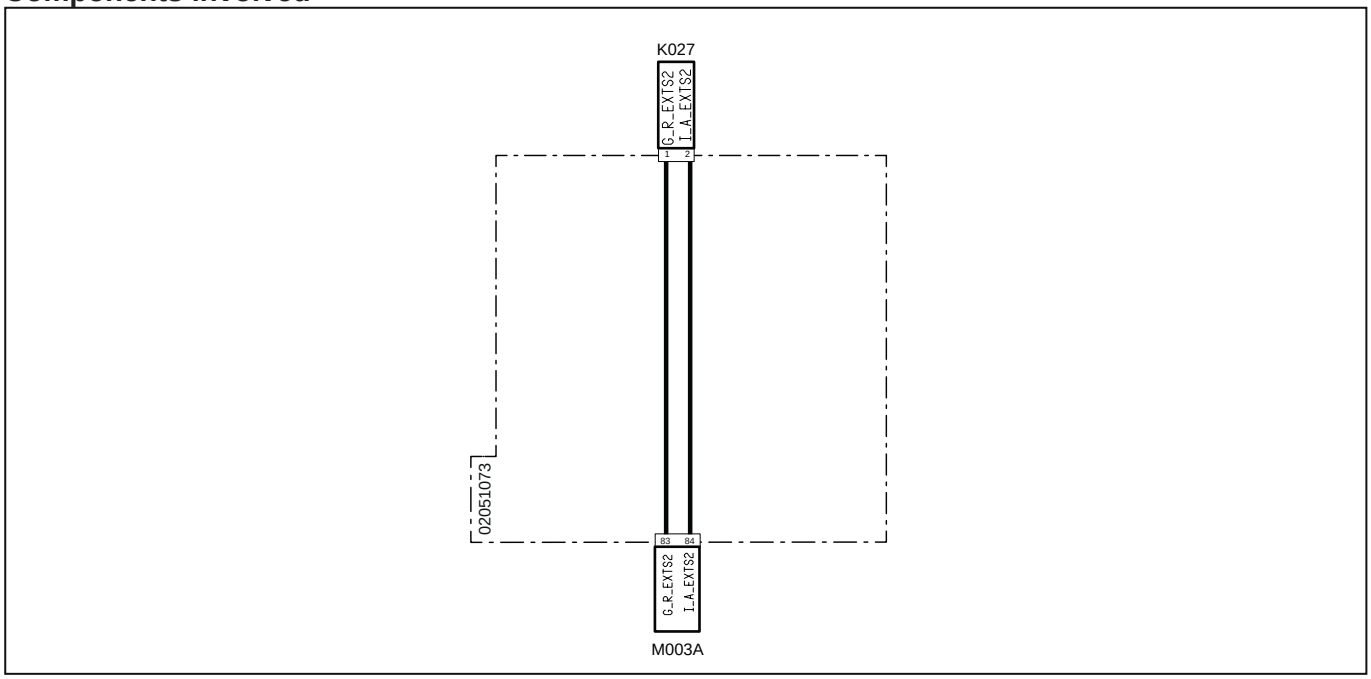
2 - Use the diagnostic tool to monitor the POC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the exhaust manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the POC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K027 (pag.R1-374)	P7	POC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3071 - Premature main relay aperture fault at end of After Run

Description of fault

The contact of the main relay opens earlier than it should relative to the After Run time of the ECU engine control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Each time the instrument panel is switched off by turning the ignition switch to off, the control unit continues to receive power for the period of time necessary to save all the parameters acquired during operation of the tractor

Always wait a few minutes after turning the tractor off before physically disconnecting the battery or using the battery master switch

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the main relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

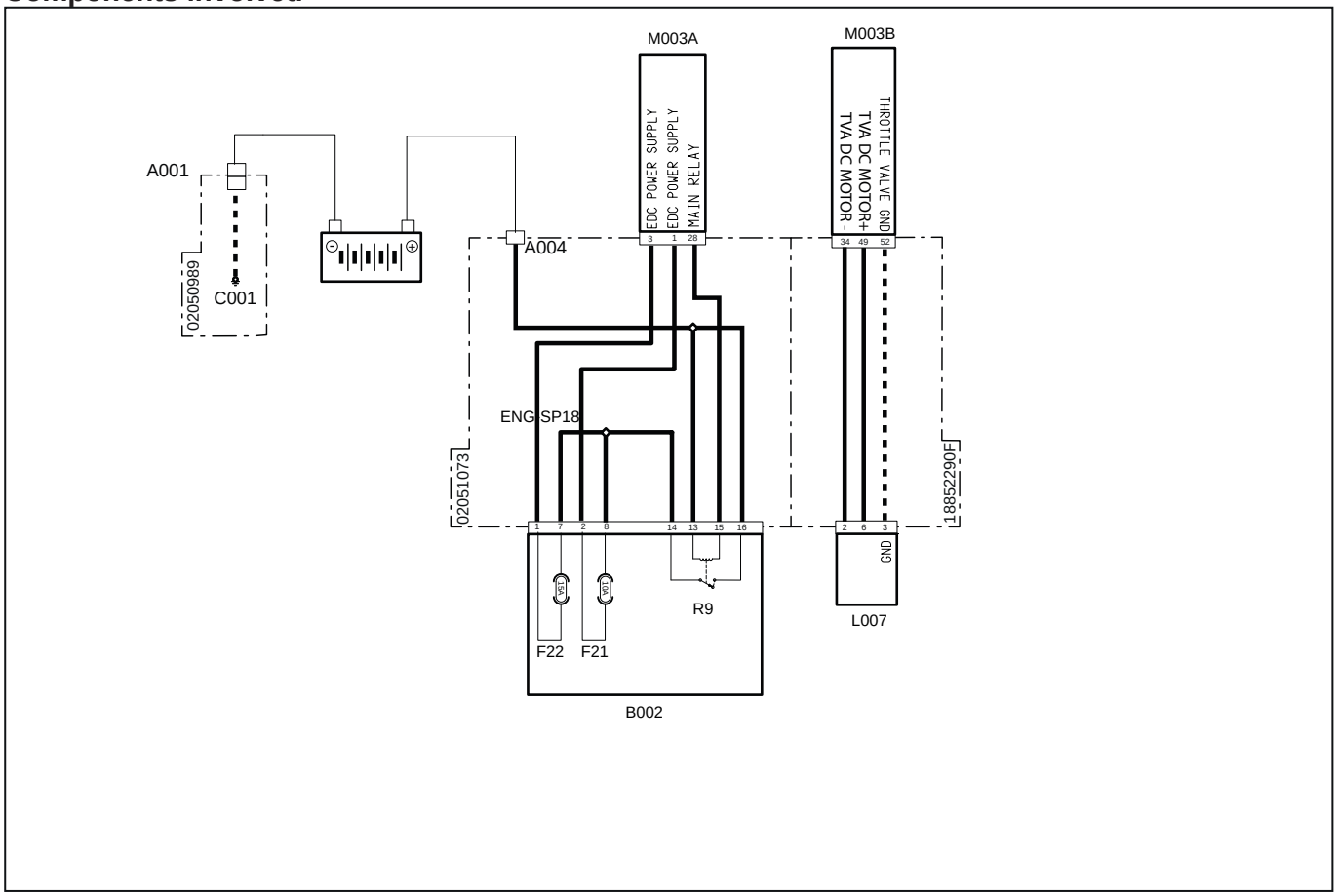
3 - Visually inspect the main relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A004 (pag.R1-388)	P472	Positive battery terminal
C001 (pag.R1-328)	P66	Battery ground
F21(B002) (pag.R1-370)	F21	12V ECU power feed (10A)
F22(B002) (pag.R1-370)	F22	12V ECU power feed (15A)
B002 (pag.R1-370)	P2A	Fuse box "1"
L007 (pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit
M003A (pag.R1-375)	P12	Engine control unit
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3072 - Main relay contact permanently closed and ECU control unit permanently powered

Description of fault

The contact of the main relay remains permanently closed and, as a result, the ECU engine control unit remains powered at all times

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the main relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

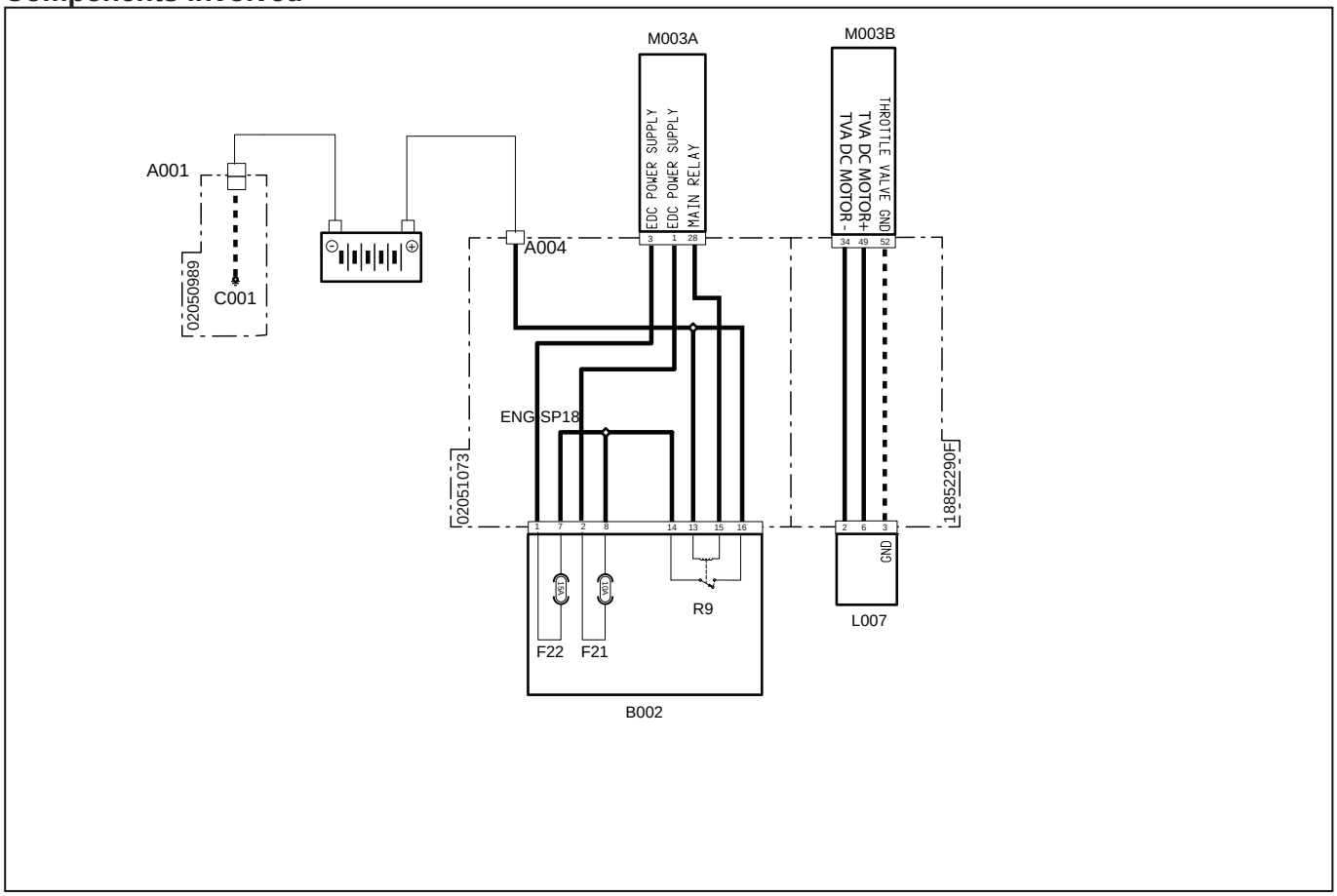
3 - Visually inspect the main relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A004 (pag.R1-388)	P472	Positive battery terminal
C001 (pag.R1-328)	P66	Battery ground
F21(B002) (pag.R1-370)	F21	12V ECU power feed (10A)
F22(B002) (pag.R1-370)	F22	12V ECU power feed (15A)
B002 (pag.R1-370)	P2A	Fuse box "1"
L007 (pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit
M003A (pag.R1-375)	P12	Engine control unit
R9(B002) (pag.R1-370)	R9	Main relay (30A)

3073 - Battery voltage high

Description of fault

The electronic control unit detects a power feed voltage received from the battery exceeding 16 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

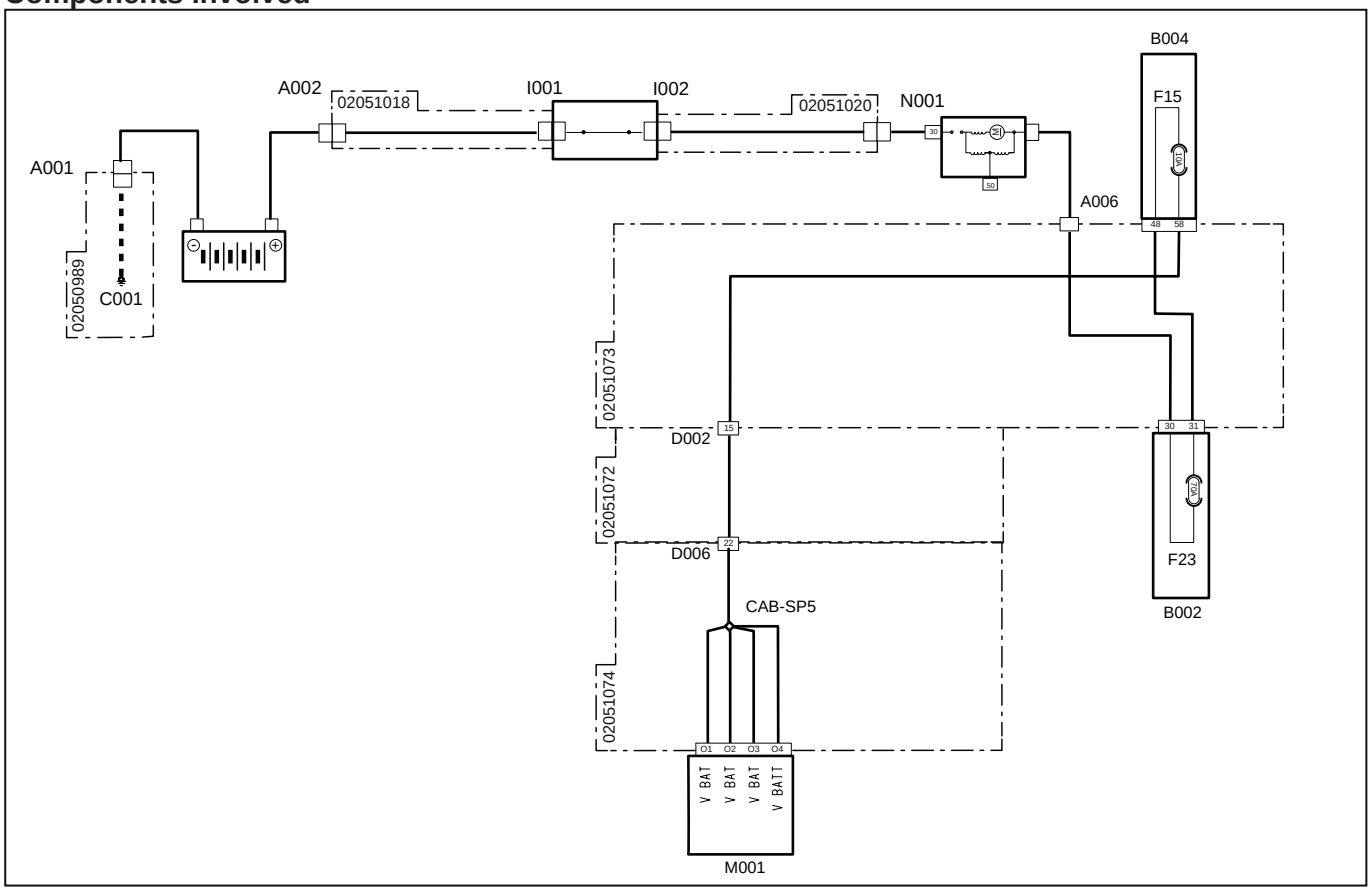
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
B004 (pag.R1-367)	P1A	Fuse box "2"
B002 (pag.R1-370)	P2A	Fuse box "1"
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F15(B004) (pag.R1-367)	F15	12V VCU power feed (10A)
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M001 (pag.R1-397)	P80	Vehicle ECU
N001 (pag.R1-330)	P10	Starter motor "30"
A006 (pag.R1-382)	P63	Starter motor

3074 - Battery voltage too low

Description of fault

The electronic control unit detects a power feed voltage received from the battery below 7 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

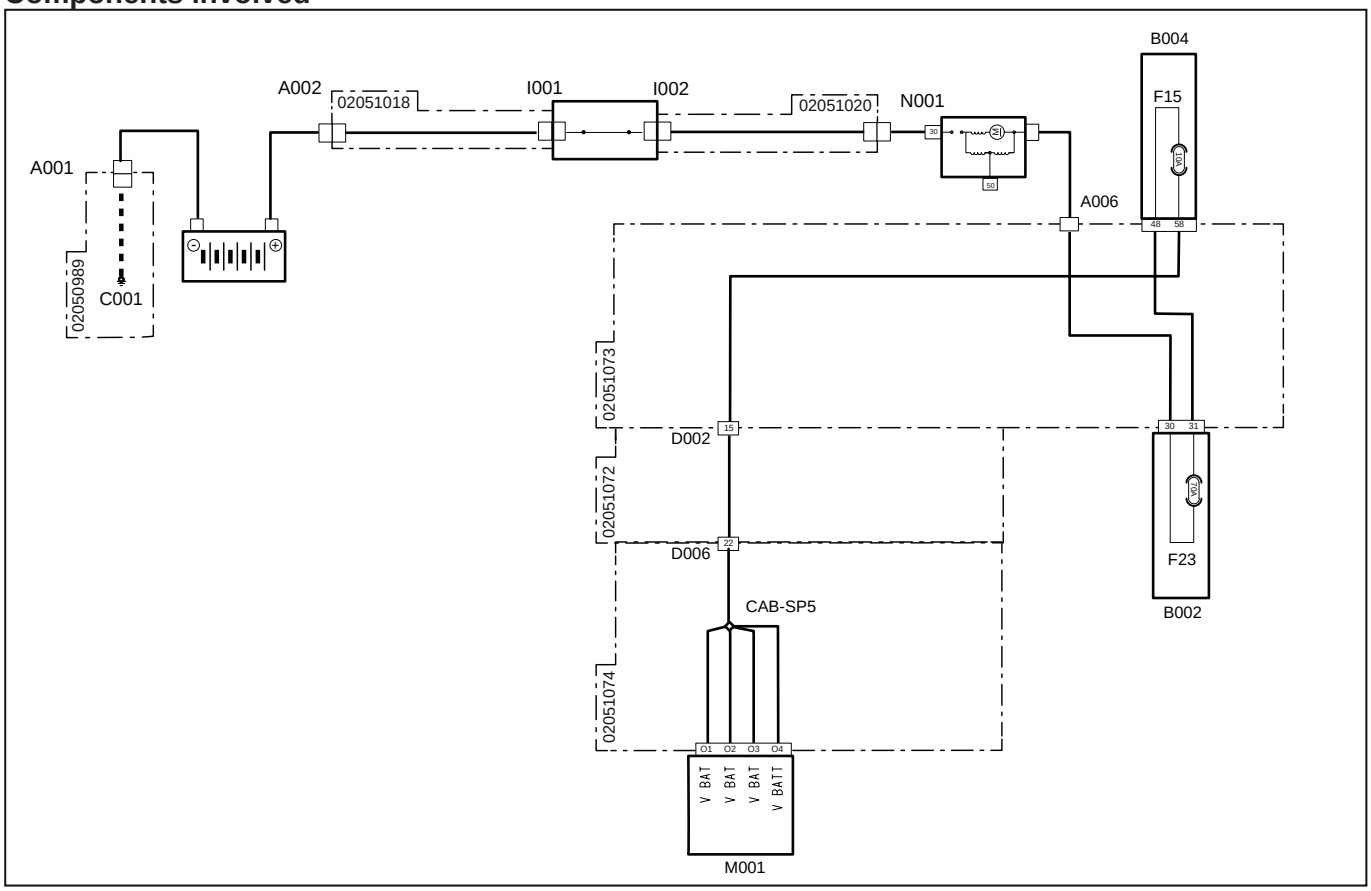
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
B004 (pag.R1-367)	P1A	Fuse box "2"
B002 (pag.R1-370)	P2A	Fuse box "1"
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F15(B004)(pag.R1-367)	F15	12V VCU power feed (10A)
F23(B002)(pag.R1-370)	F23	Main maxi fuse (70A)
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M001 (pag.R1-397)	P80	Vehicle ECU
N001 (pag.R1-330)	P10	Starter motor "30"
A006 (pag.R1-382)	P63	Starter motor

3075 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

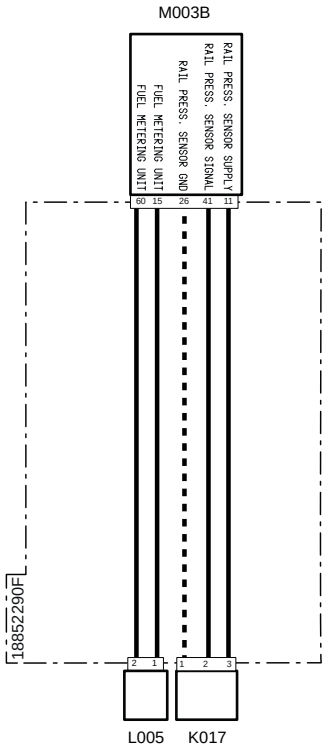
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3076 - Quantity balance control when correct aperture of rail overpressure valve is ensured

Description of fault

The ECU engine control unit detects that the maximum permitted aperture time of the rail pressure relief valve has been reached

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

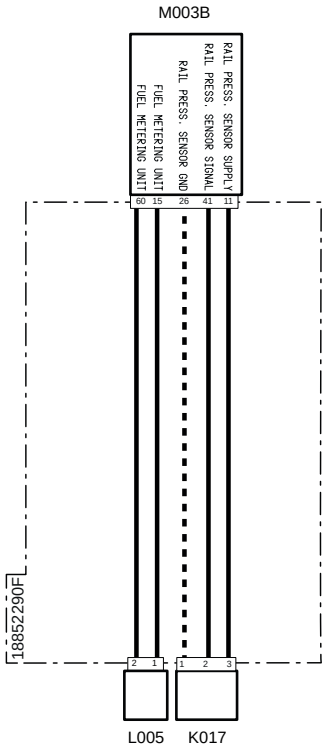
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3077 - Maximum permitted aperture time of rail pressure relief valve reached

Description of fault

The ECU engine control unit detects that the maximum permitted aperture time of the rail pressure relief valve has been reached

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

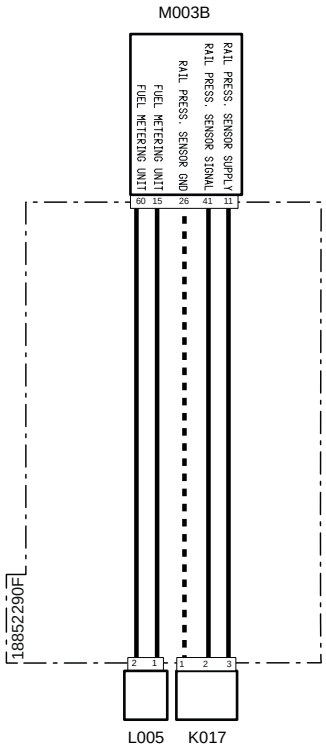
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3078 - Low oil pressure

Description of fault

The ECU engine control unit detects insufficient engine oil pressure

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the engine oil level is correct and top up if necessary.
- See the use and maintenance manual of the vehicle for the correct procedure for topping up the engine oil
- Reset the oil dilution parameter (see the documentation of the diagnostic tool)

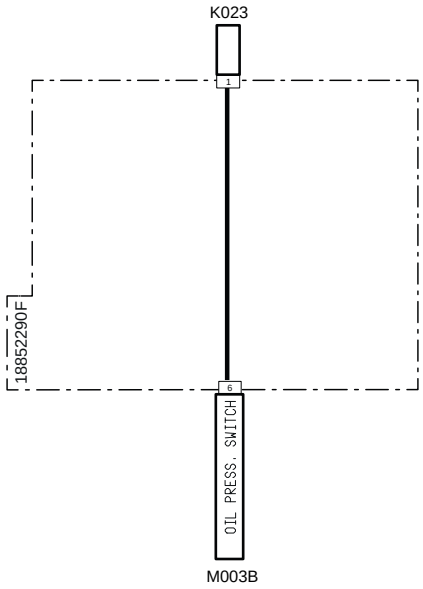
3 - Check that the connectors of the engine oil pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check the condition of the single contact oil pressure sensor switch

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K023(pag.R1-414)	XS6	Oil pressure switch

3079 - Engine oil pressure switch malfunction or short circuit

Description of fault

The ECU engine control unit detects a malfunction or an open circuit state of the engine oil pressure switch

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

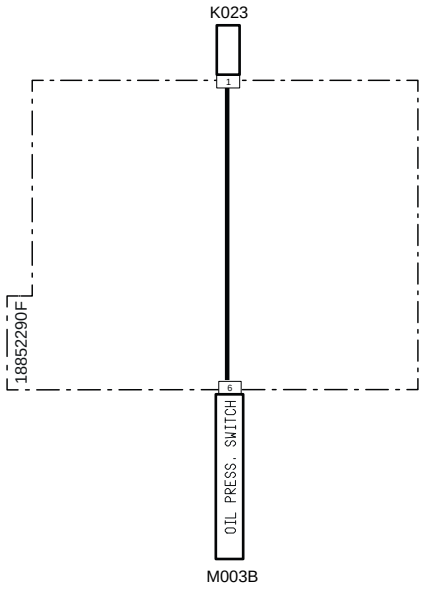
2 - Check that the connectors of the engine oil pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check the condition of the single contact oil pressure sensor switch

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K023(pag.R1-414)	XS6	Oil pressure switch

3080 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3081 - High pressure pump metering valve: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

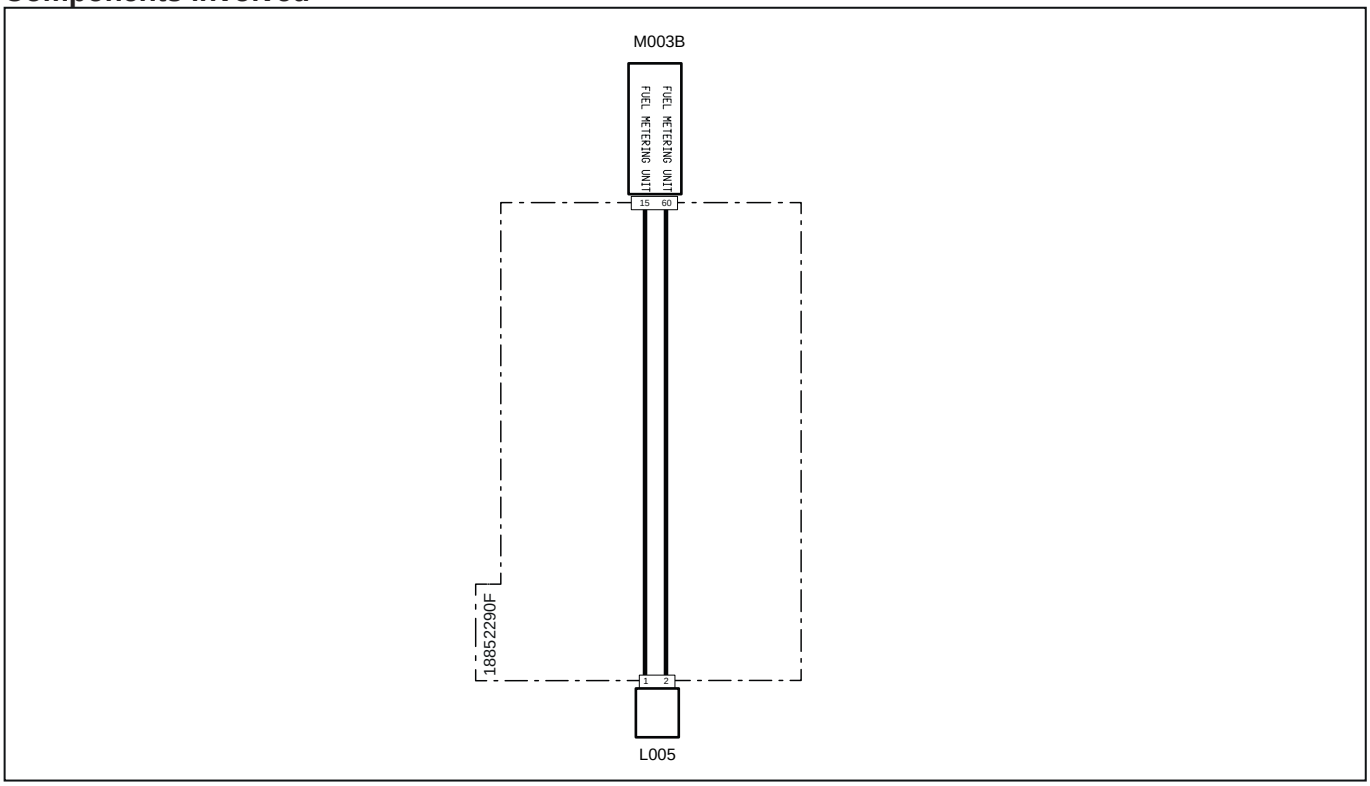
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3082 - Injector 2 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 2 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

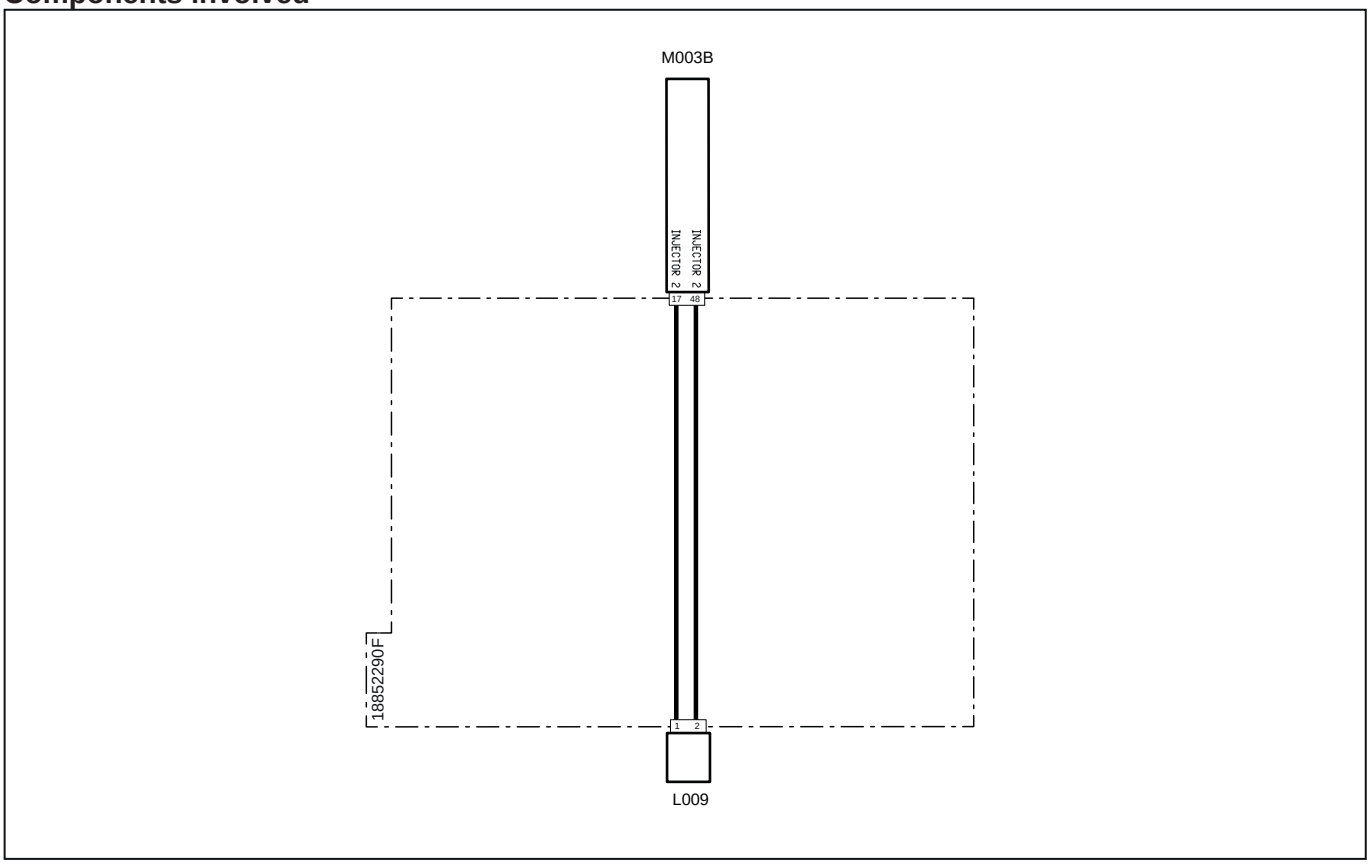
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R1-410)	XI2	Fuel electro-injector 2
M003B (pag.R1-407)	XECUA	Engine control unit

3083 - Low boost pressure

Description of fault

The pressure value received by the ECU engine control unit from the temperature and pressure sensor (BOOST) is too low

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine may be started, but engine operates with limited torque, regeneration is disabled and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

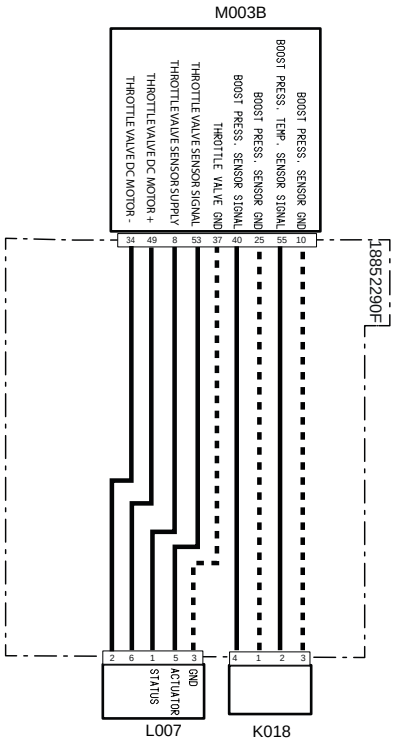
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3084 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

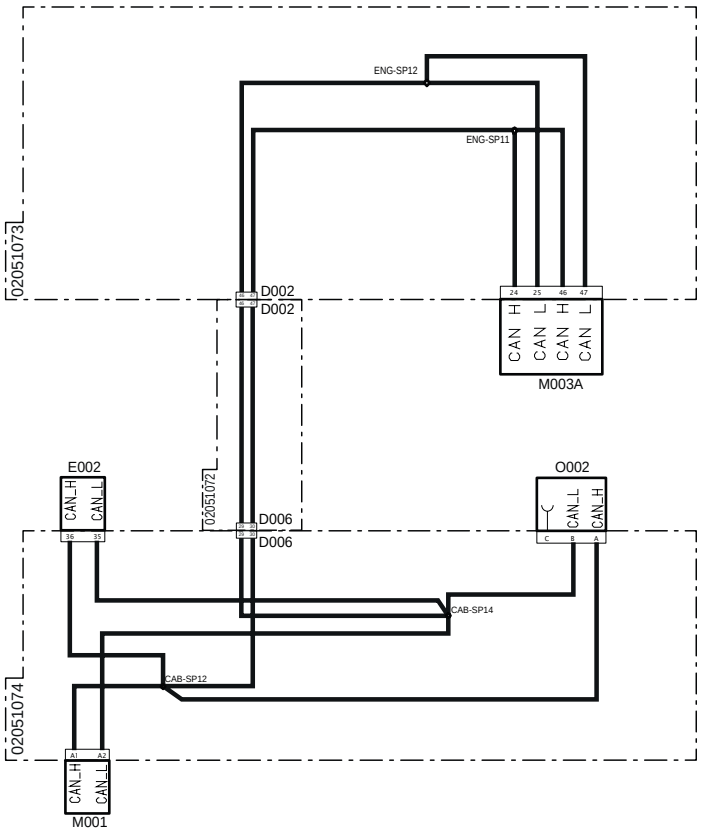
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3085 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

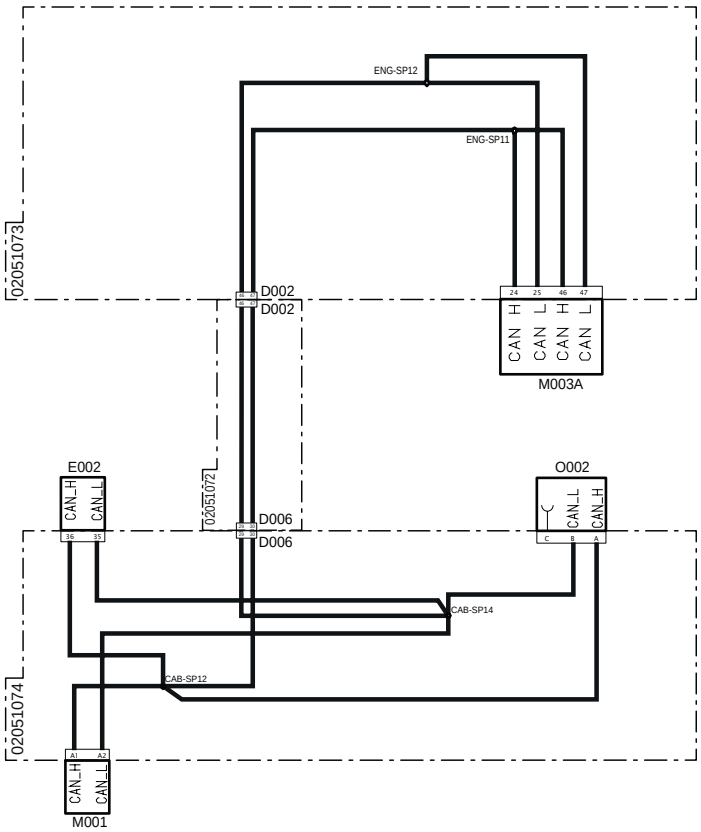
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3086 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3087 - Start relay: open circuit

Description of fault

The ECU engine control unit detects a open circuit fault in the start relay circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

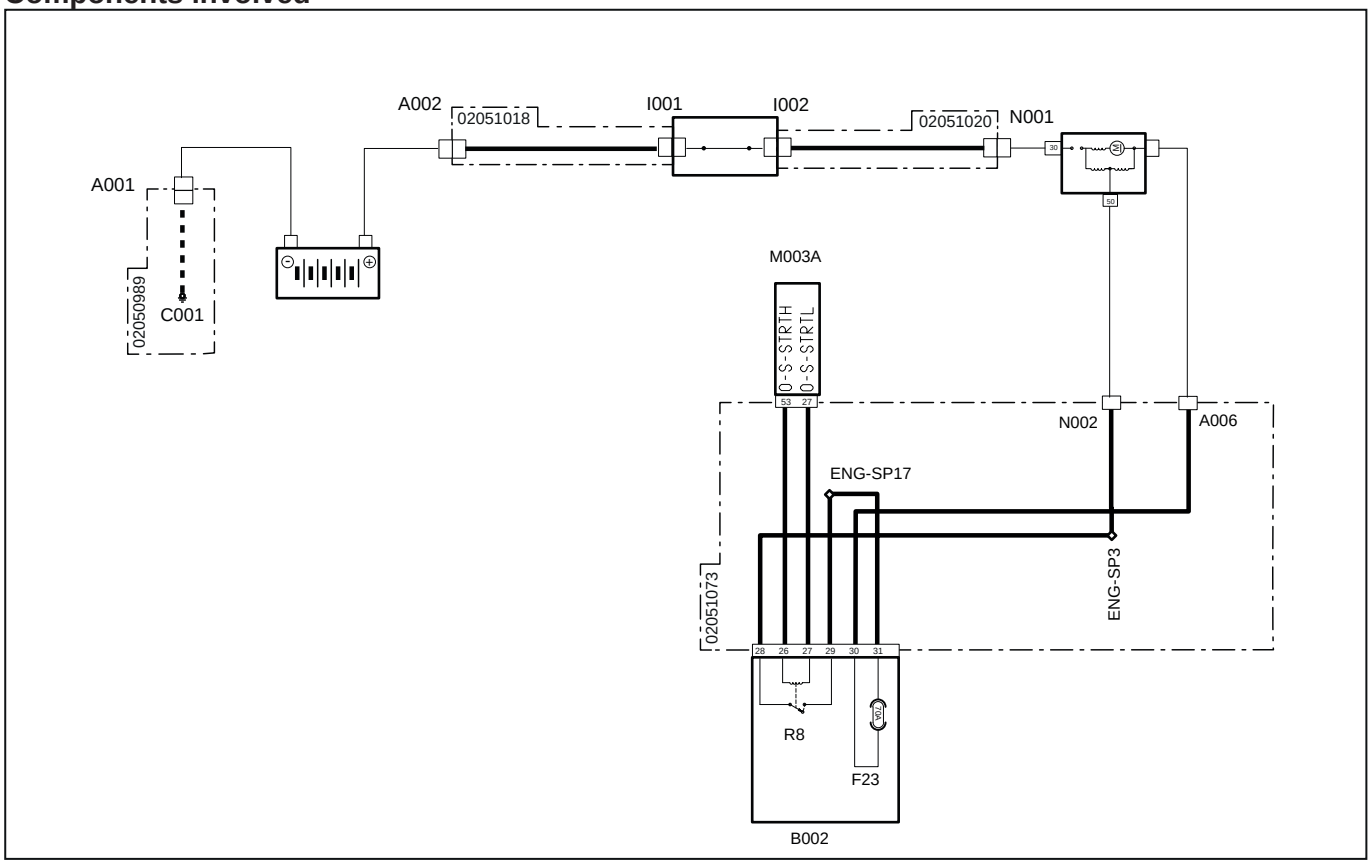
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3088 - Start relay overcurrent

Description of fault

The ECU engine control unit detects a overcurrent fault in the start relay circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

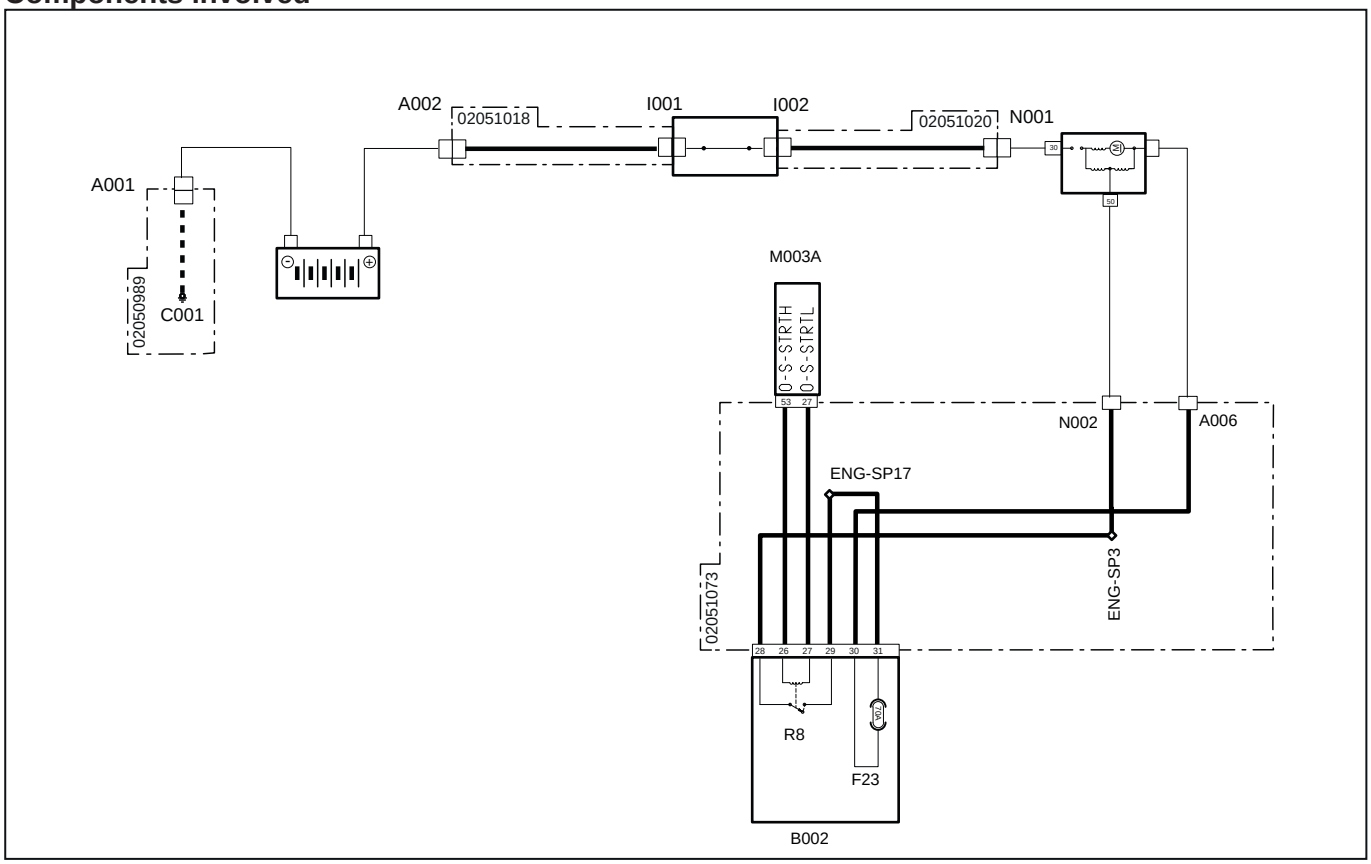
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3089 - Start relay: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

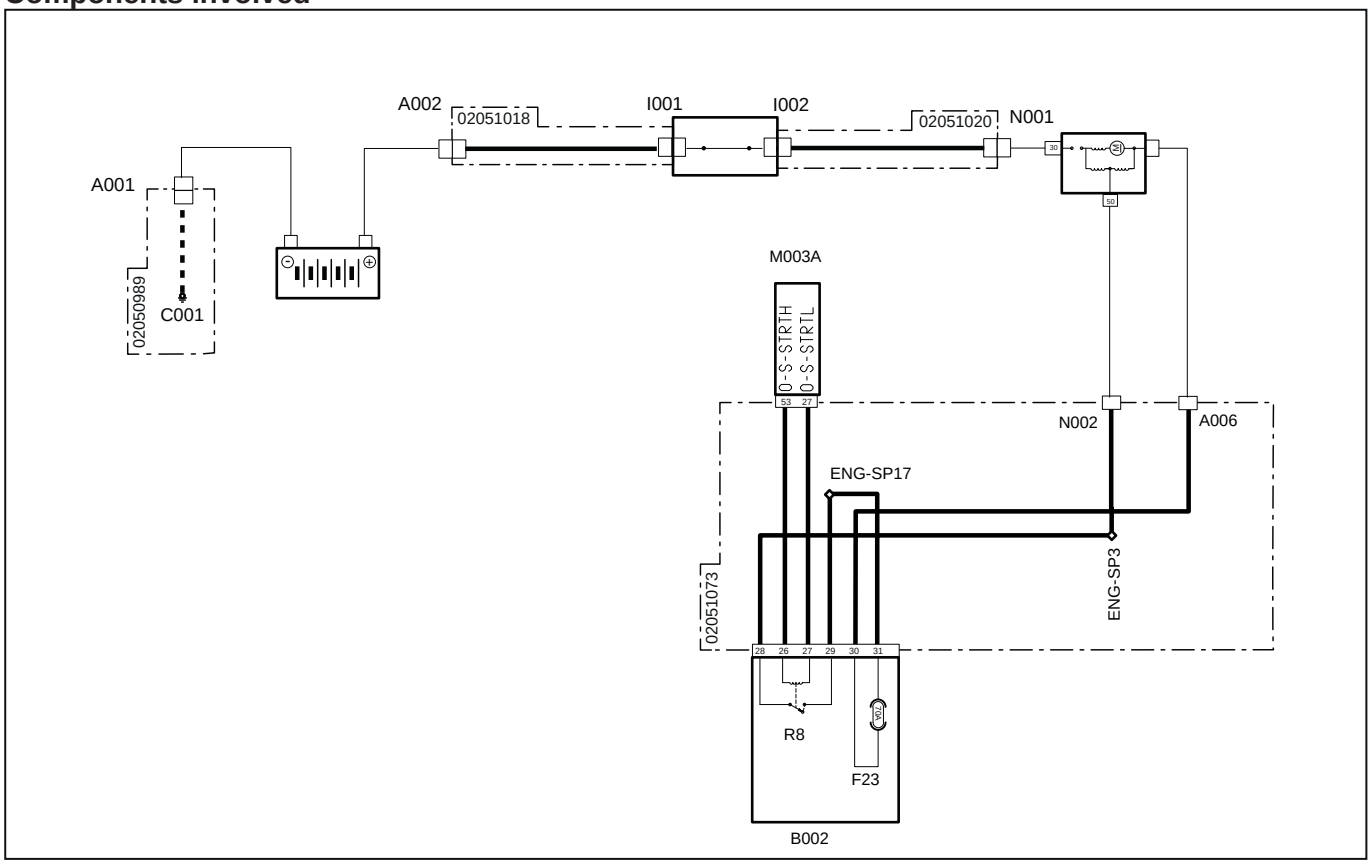
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3090 - Start relay: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

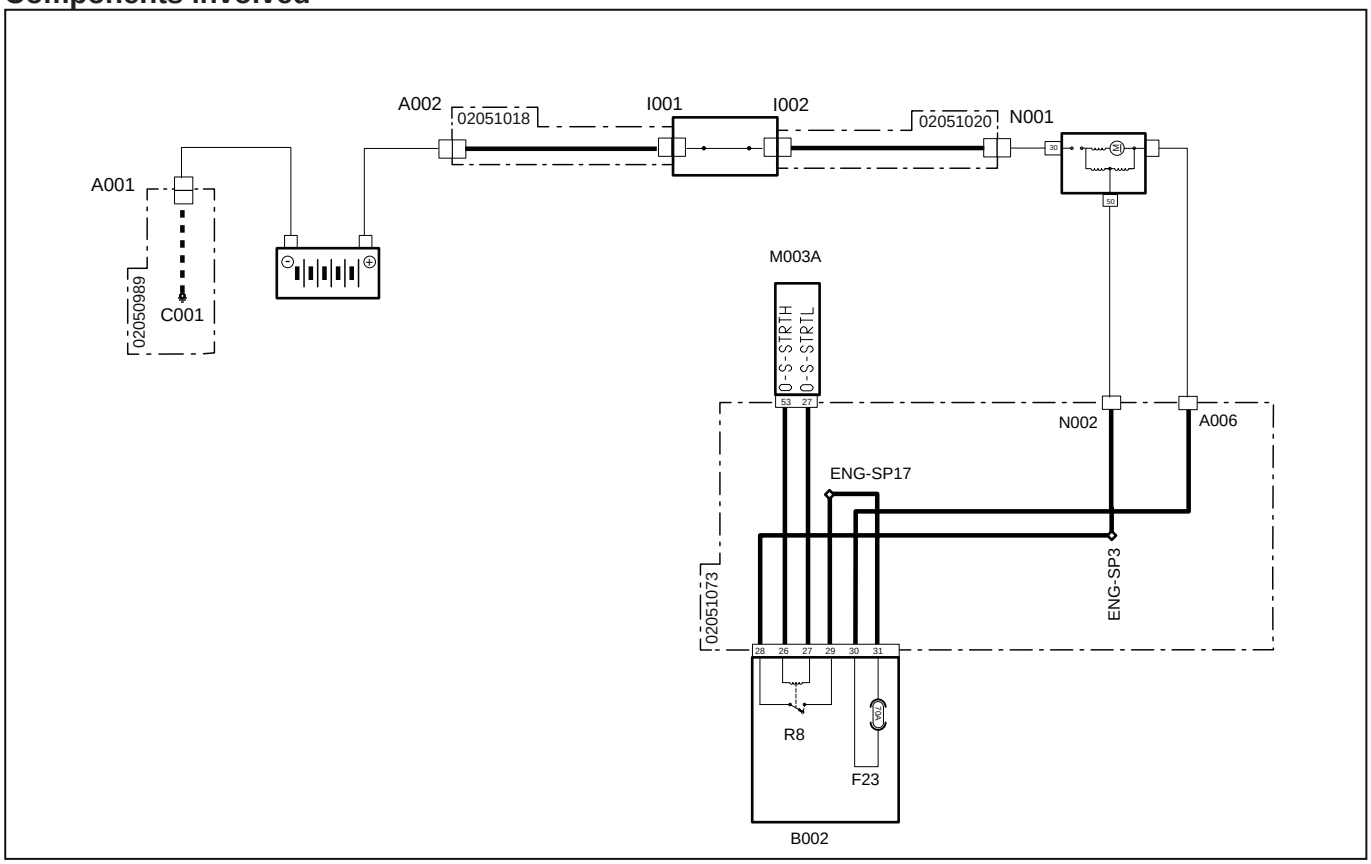
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
C001 (pag.R1-328)	P66	Battery ground
A002 (pag.R1-330)	P55	Positive battery terminal
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
B002 (pag.R1-370)	P2A	Fuse box "1"
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I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M003A (pag.R1-375)	P12	Engine control unit
N001 (pag.R1-330)	P10	Starter motor "30"
N002 (pag.R1-390)	P490	Starter motor 50
A006 (pag.R1-382)	P63	Starter motor
R8(B002) (pag.R1-370)	R8	Start relay (20A)

3091 - Glow plug control unit, open circuit

Description of fault

The ECU engine control unit detects an open circuit in the glow plug control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit, of the glow plug fuse, of the glow plugs and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

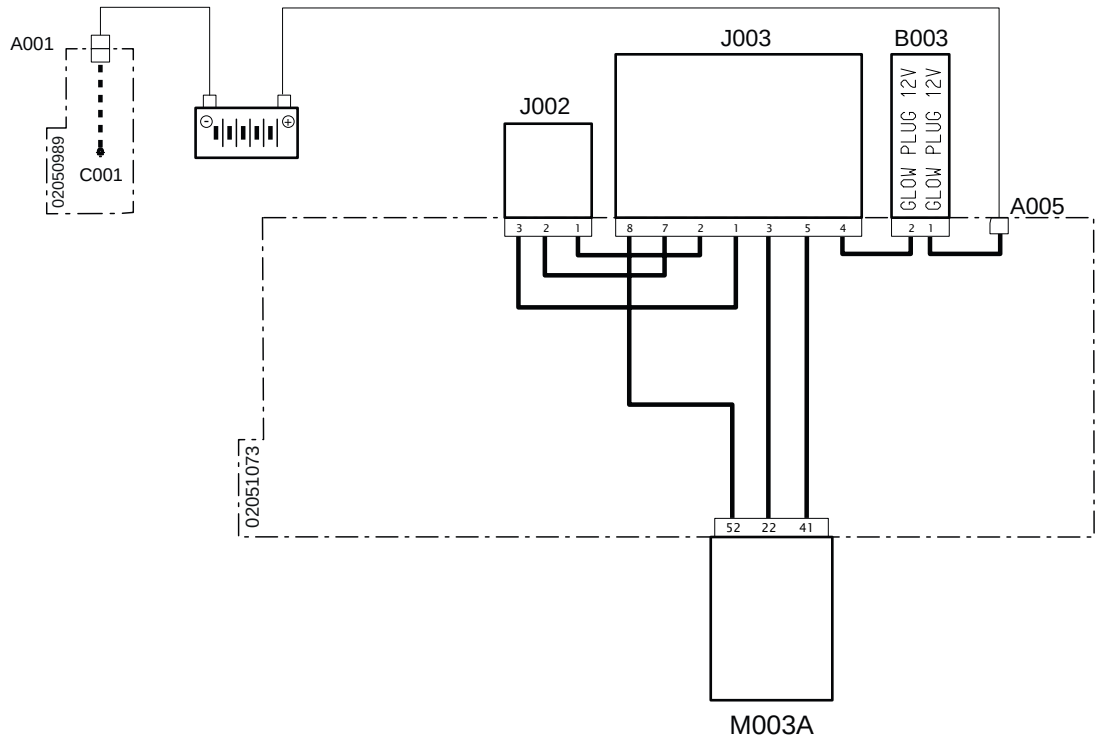
4 - Check the condition of the glow plug fuse and replace if damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3092 - Glow plug control unit, short circuit

Description of fault

The ECU engine control unit detects a short circuit in the glow plug control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit, of the glow plug fuse, of the glow plugs and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

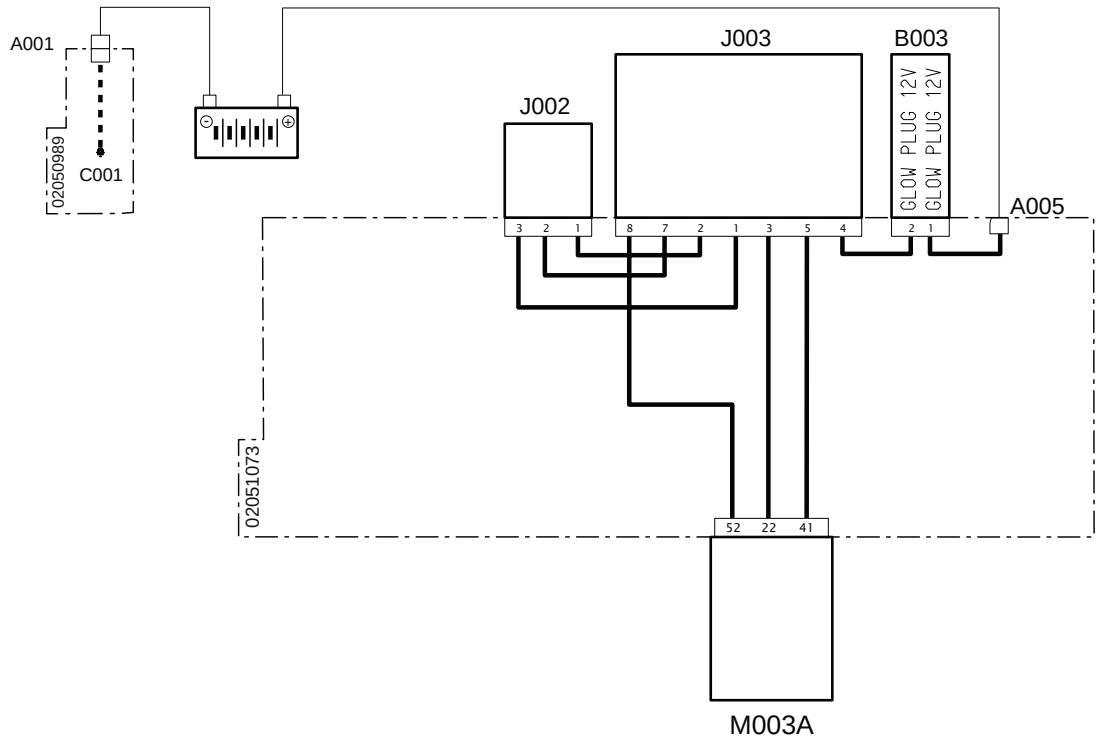
4 - Check the condition of the glow plug fuse and replace if damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3093 - Glow plug control unit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the glow plug control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit, of the glow plug fuse, of the glow plugs and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

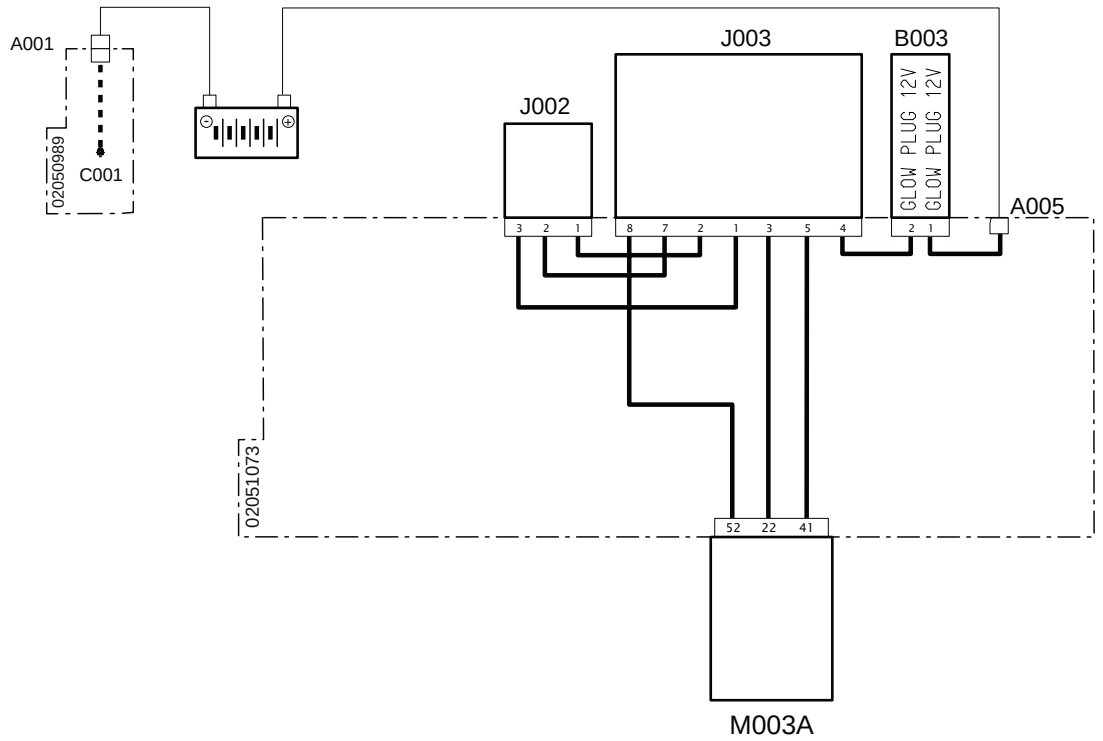
4 - Check the condition of the glow plug fuse and replace if damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3094 - Glow plug control unit, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the glow plug control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit, of the glow plug fuse, of the glow plugs and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

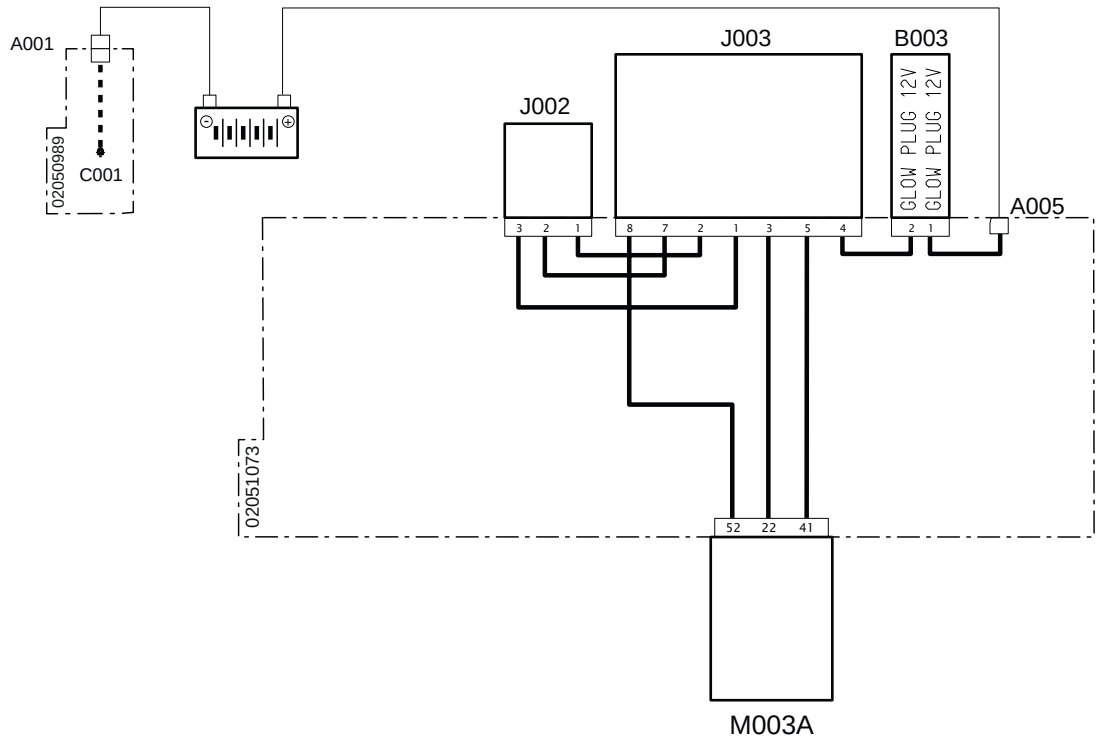
4 - Check the condition of the glow plug fuse and replace if damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3095 - High pressure pump metering valve: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

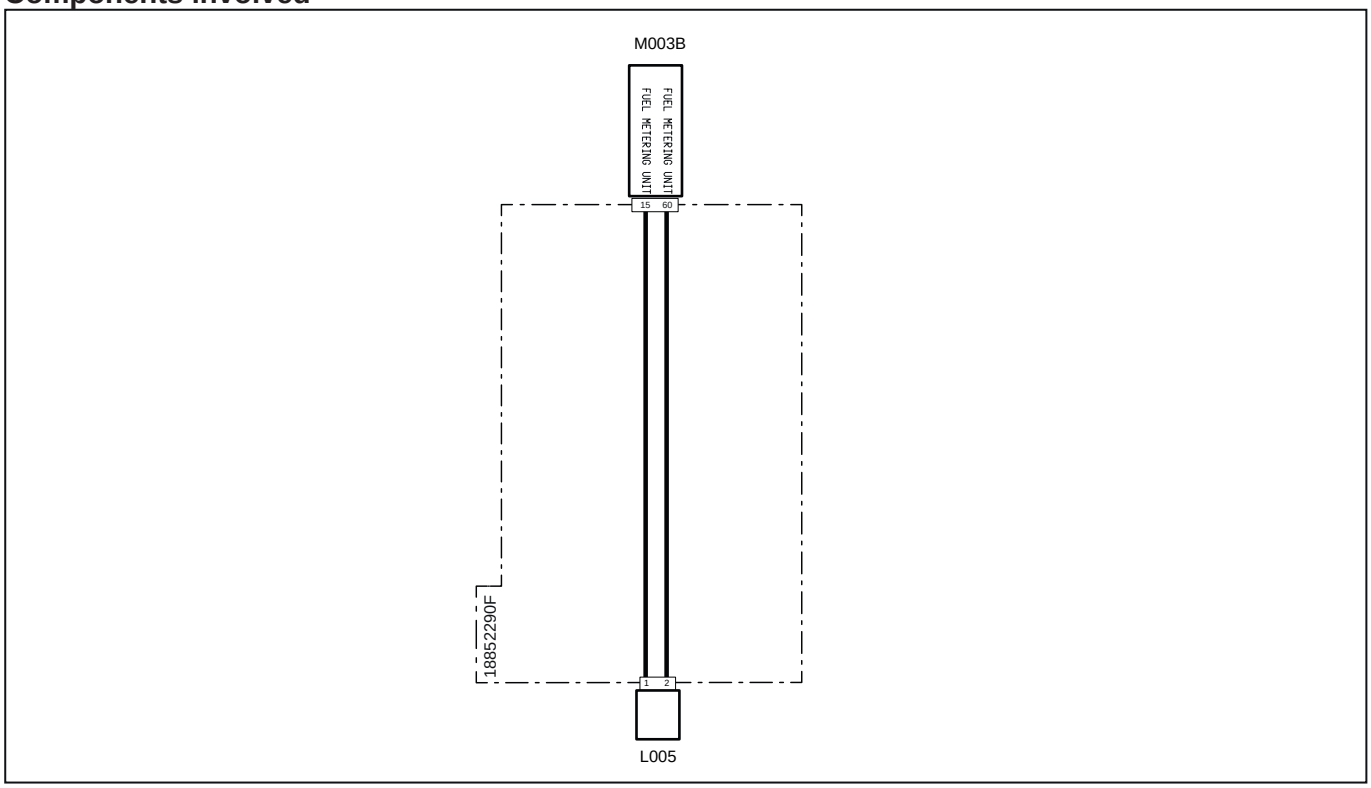
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3096 - Injector 3 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 3 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

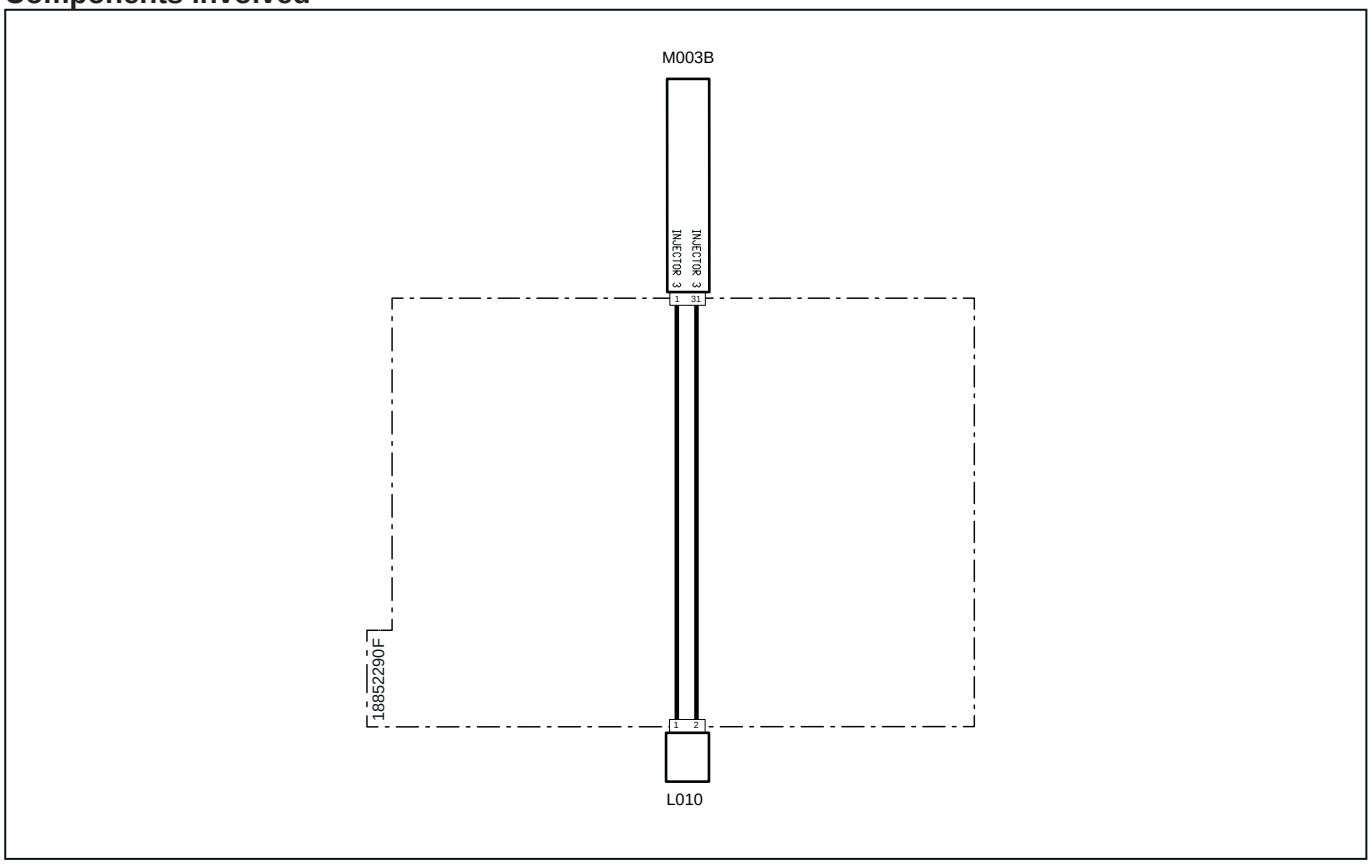
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R1-410)	XI3	Fuel electro-injector 3
M003B (pag.R1-407)	XECUA	Engine control unit

3097 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

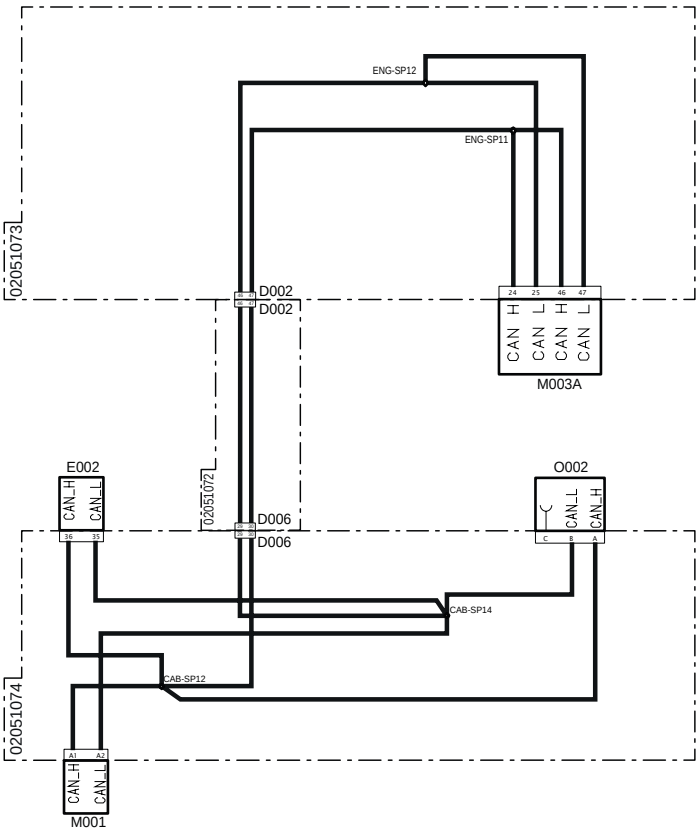
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P30A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P30B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
E002 (pag.R1-361)	P200	Dashboard
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
O002 (pag.R1-400)	P98	CAN line termination

3098 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3099 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3100 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3101 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3102 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3103 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3104 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3105 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3106 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3107 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3108 - DOC temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault in the circuit of the DOC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and POC (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the POC sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

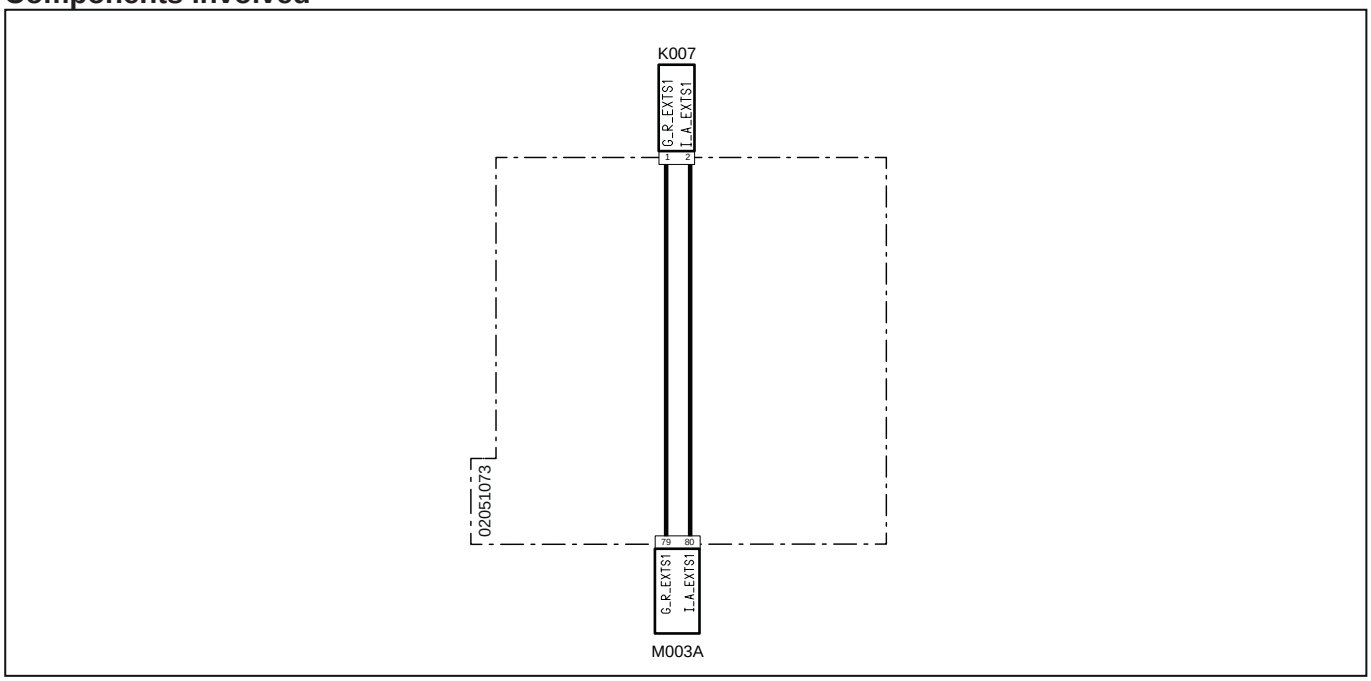
2 - Use the diagnostic tool to monitor the DOC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the exhaust manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the DOC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K007 (pag.R1-375)	P6	DOC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3109 - DOC temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the DOC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and POC (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the POC sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

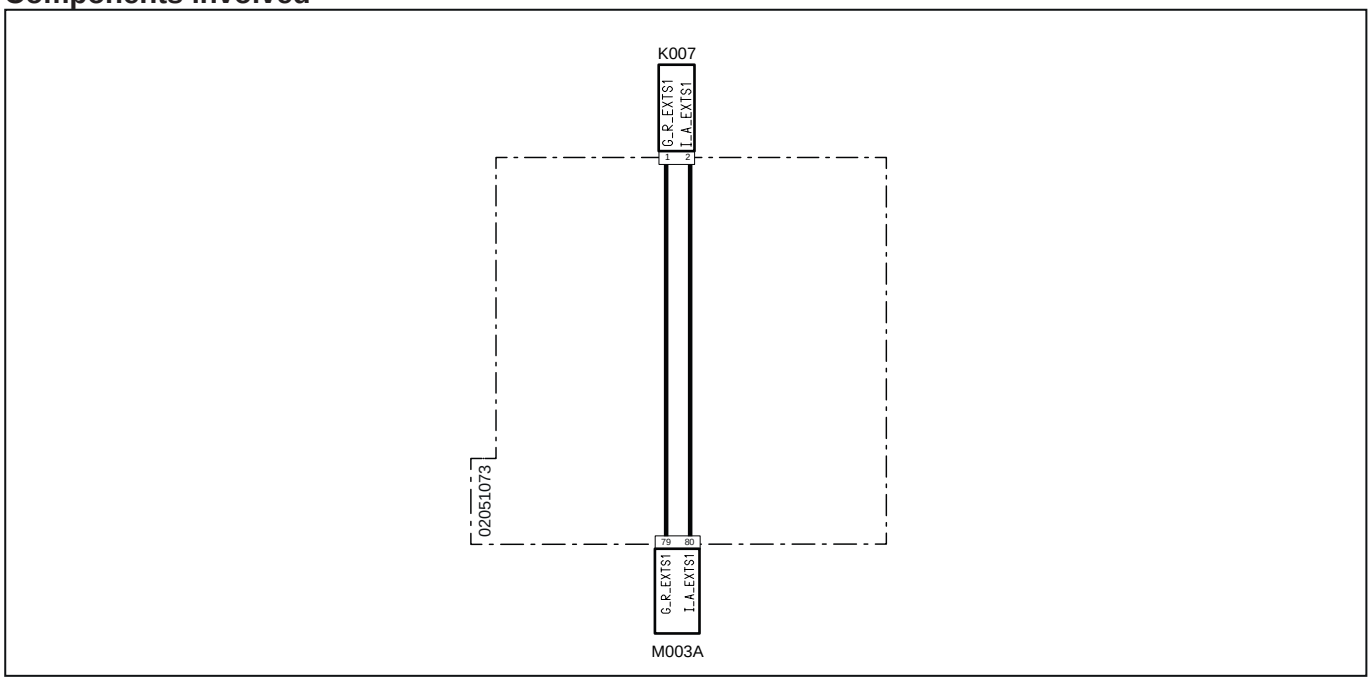
2 - Use the diagnostic tool to monitor the DOC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the exhaust manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the DOC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K007 (pag.R1-375)	P6	DOC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3110 - POC temperature high

Description of fault

The electronic control unit detects a high temperature at the inlet side of the particulate filter

Severity of error

Medium

Additional information

Red indicator lamp flashing

The degree of clogging of the POC is monitored by the ECU unit via the signal received from the POC temperature sensor, which measures the temperature ahead of the filter. If the temperature reading is above normal, this is indicative of excess back-pressure due to clogging of the filter itself.

The POC-in temperature sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

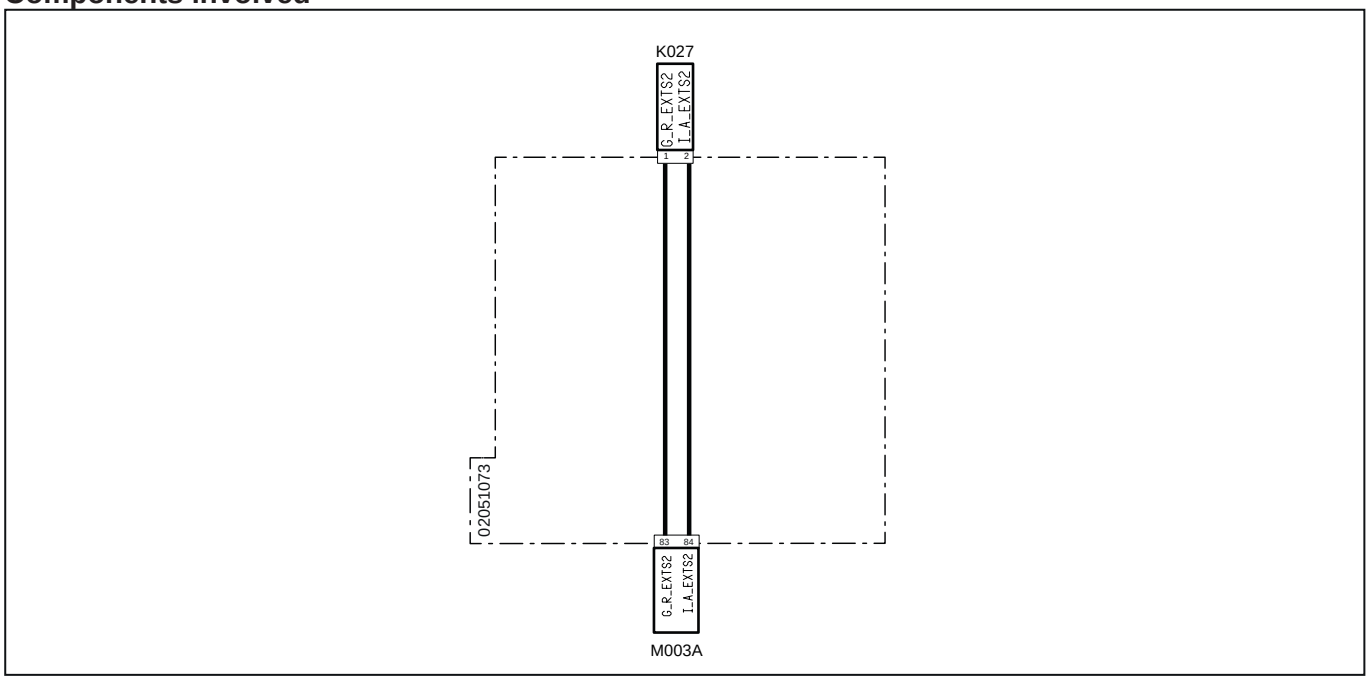
2 - Check that the POC-in temperature sensor is installed correctly

3 - Perform the service regeneration procedure for the POC filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the POC-in temperature sensor reading (see the documentation of the diagnostic tool)
- Check if the POC-in temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K027 (pag.R1-374)	P7	POC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3111 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3112 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3113 - Coolant temperature high

Description of fault

The ECU engine control unit detects a coolant temperature exceeding the pre-warning threshold

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the coolant level in the radiator and top up if necessary
- See the use and maintenance manual of the vehicle for the correct procedure for topping up coolant
- If the problem persists, proceed to the next step

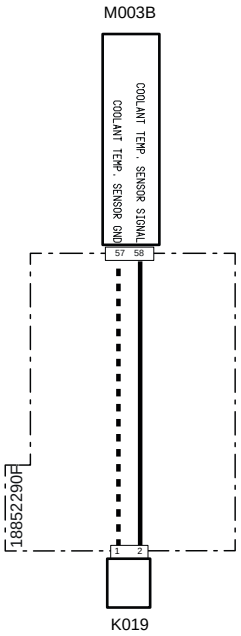
3 - Check for leaks from the coolant circuit
- Place a sheet of cardboard under the engine and start the engine. Any leaks in the circuit will wet the cardboard
  Even if no leaks are found, check the coolant level again after a couple of hours at work. If the level has dropped, this means that there is a leak somewhere in the circuit
- Check the condition of the radiator and hoses and check that the hose clamps are fastened correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K019(pag.R1-411)	XS1	Coolant temperature sensor

3114 - High pressure pump metering valve: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

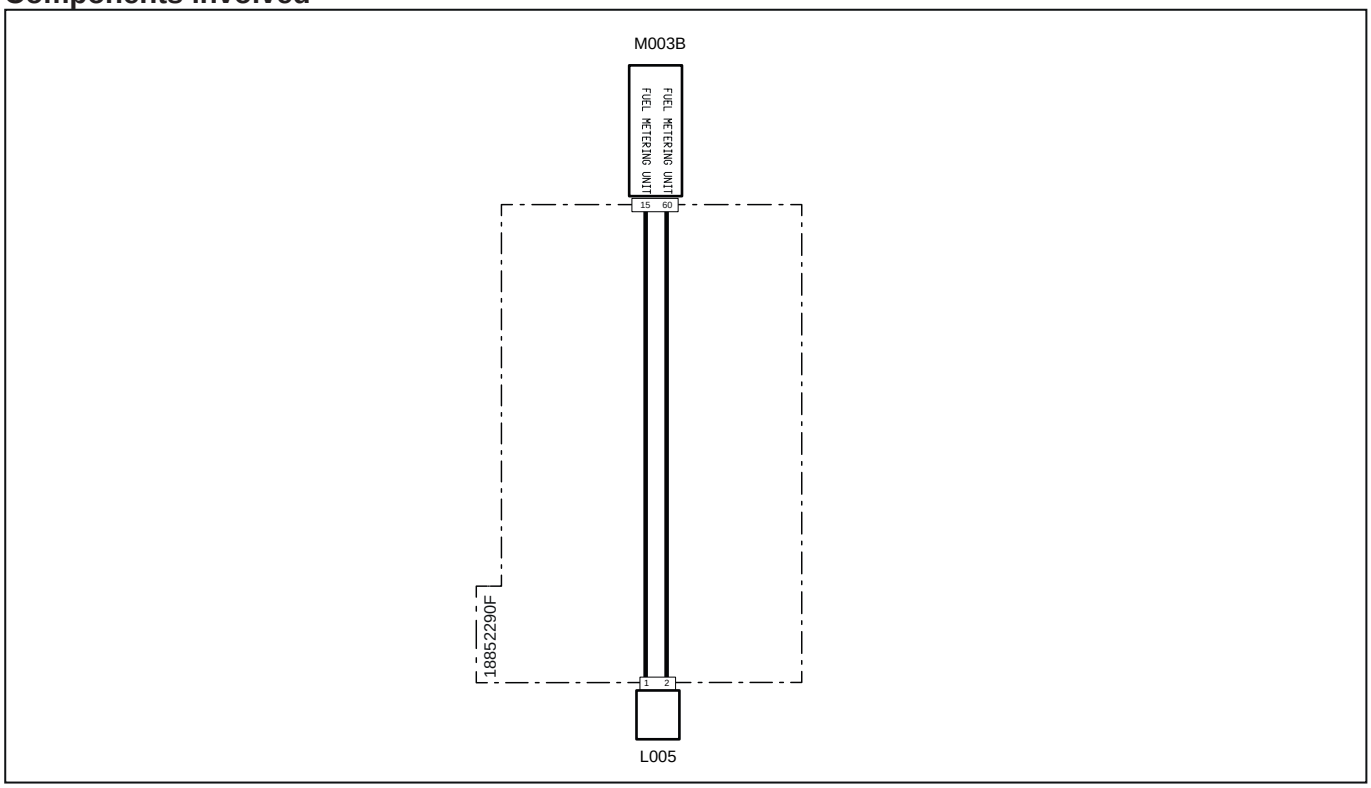
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3115 - Throttle valve circuit: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

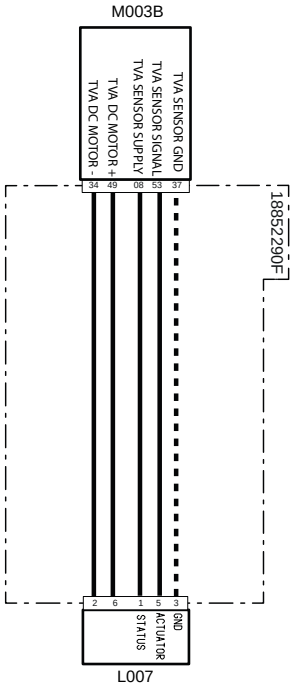
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3116 - Throttle valve, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

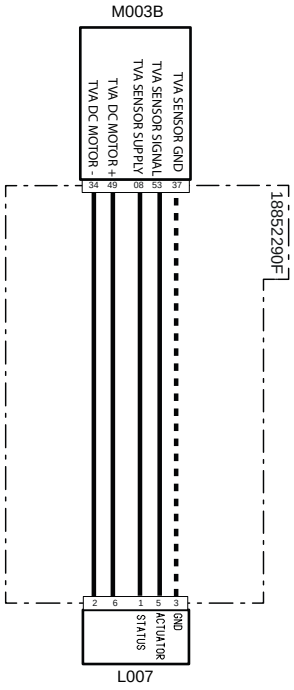
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3117 - Throttle valve temperature high

Description of fault

The ECU engine control unit detects a high temperature on the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

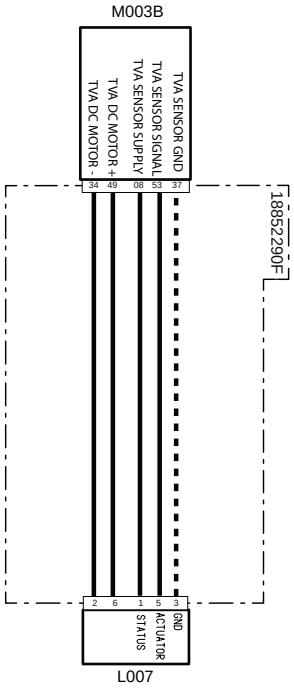
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3118 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3119 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3120 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3121 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3122 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3123 - POC temperature very high

Description of fault

The electronic control unit detects a very high temperature at the inlet side of the particulate filter

Severity of error

Medium

Additional information

Red indicator lamp flashing

The degree of clogging of the POC is monitored by the ECU unit via the signal received from the POC temperature sensor, which measures the temperature ahead of the filter. If the temperature reading is above normal, this is indicative of excess back-pressure due to clogging of the filter itself.

The POC-in temperature sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

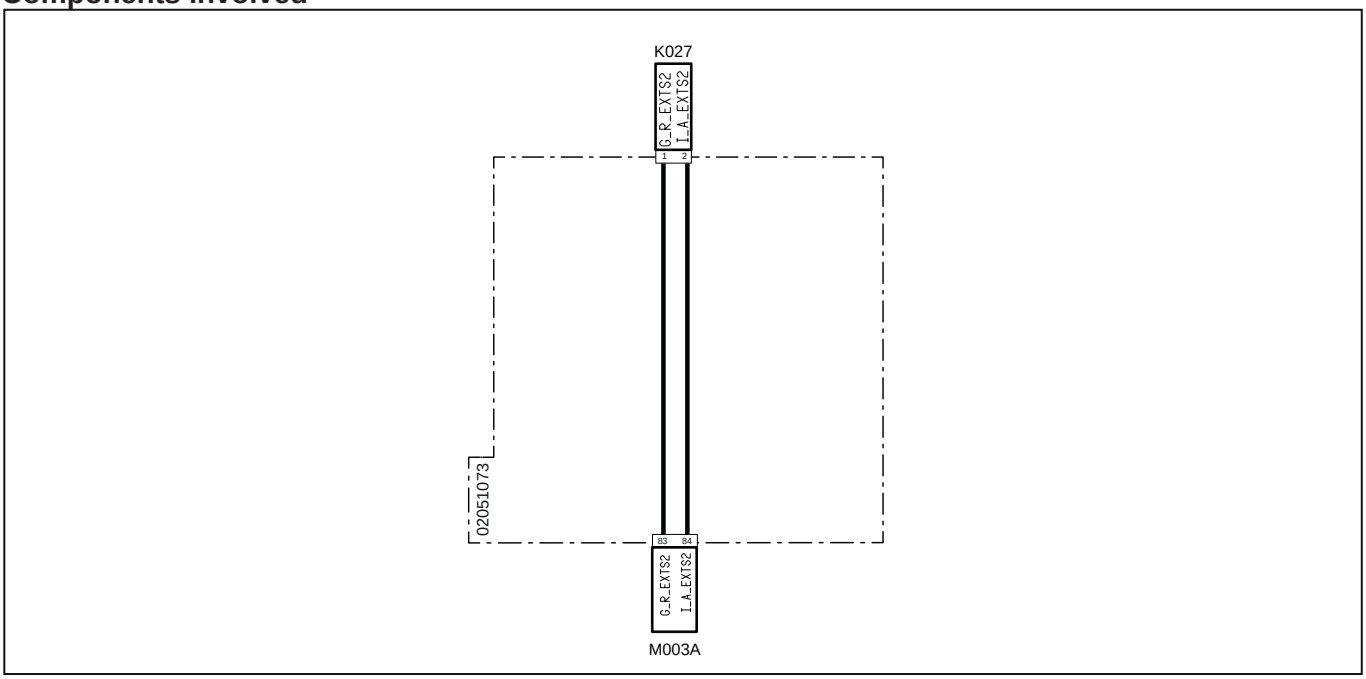
2 - Check that the POC-in temperature sensor is installed correctly

3 - Perform the service regeneration procedure for the POC filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the POC-in temperature sensor reading (see the documentation of the diagnostic tool)
- Check if the POC-in temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K027 (pag.R1-374)	P7	DOC temperature sensor
M003A (pag.R1-375)	P12	Engine control unit

3124 - Glow plug control unit data read error

Description of fault

The ECU engine control unit detects a data read error in the glow plug control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

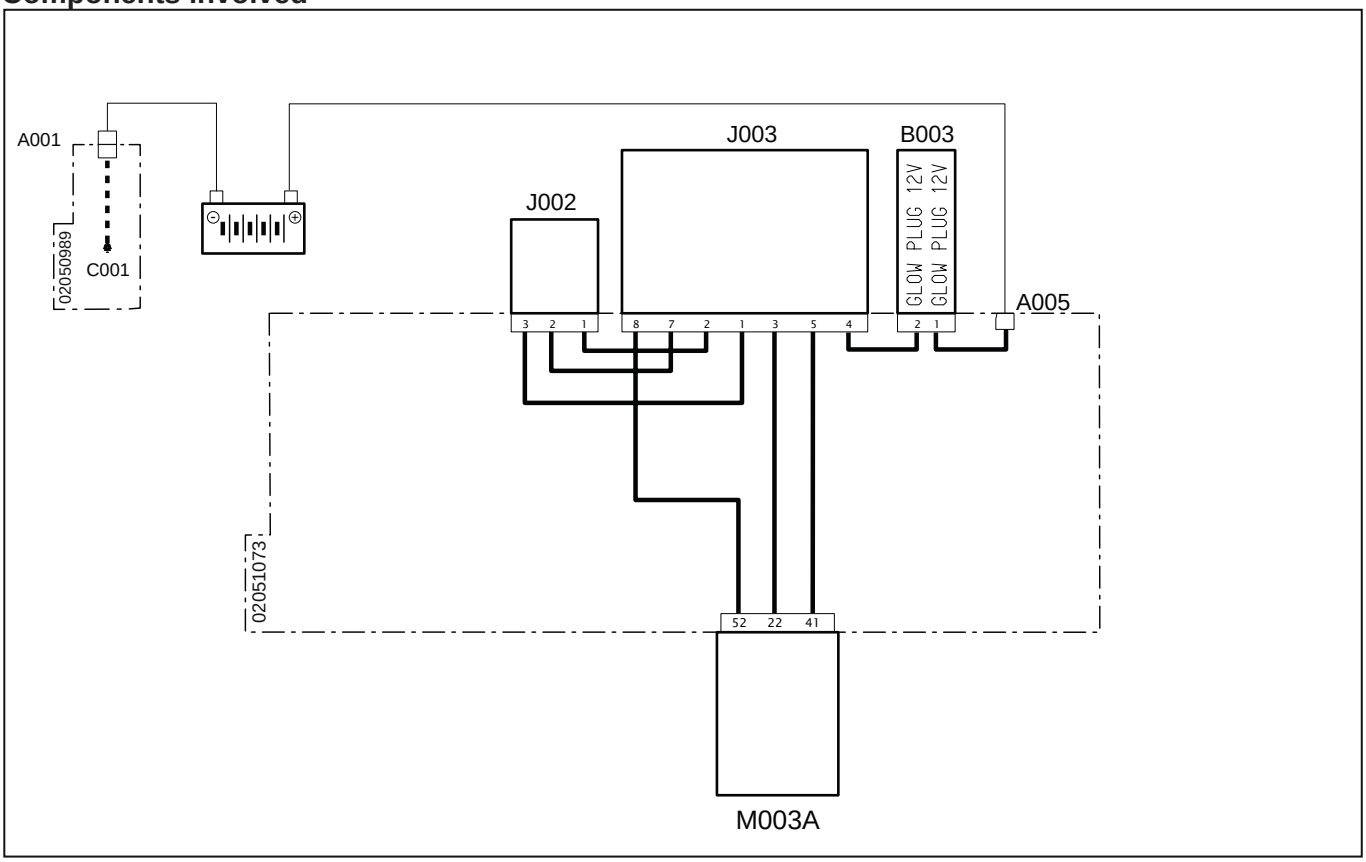
3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3125 - Coolant temperature very high

Description of fault

The ECU engine control unit detects a very high coolant temperature (above maximum limit)

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the coolant level in the radiator and top up if necessary
- See the use and maintenance manual of the vehicle for the correct procedure for topping up coolant
- If the problem persists, proceed to the next step

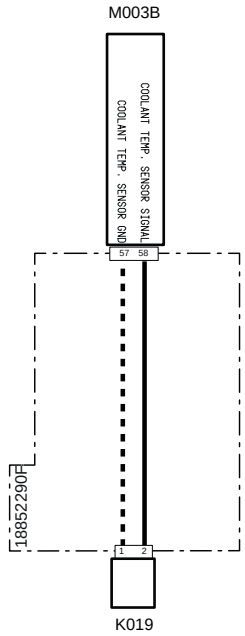
3 - Check for leaks from the coolant circuit
- Place a sheet of cardboard under the engine and start the engine. Any leaks in the circuit will wet the cardboard
  Even if no leaks are found, check the coolant level again after a couple of hours at work. If the level has dropped, this means that there is a leak somewhere in the circuit
- Check the condition of the radiator and hoses and check that the hose clamps are fastened correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R1-407)	XECUA	Engine control unit
K019(pag.R1-411)	XS1	Coolant temperature sensor

3126 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

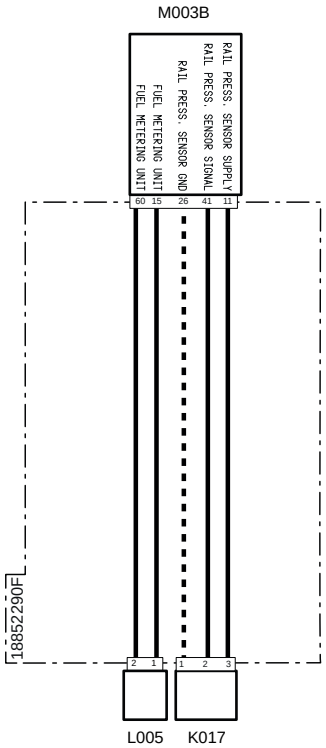
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R1-414)	XS5	Common Rail fuel pressure sensor
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3127 - High pressure pump metering valve, high temperature

Description of fault

The ECU engine control unit detects a high temperature in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

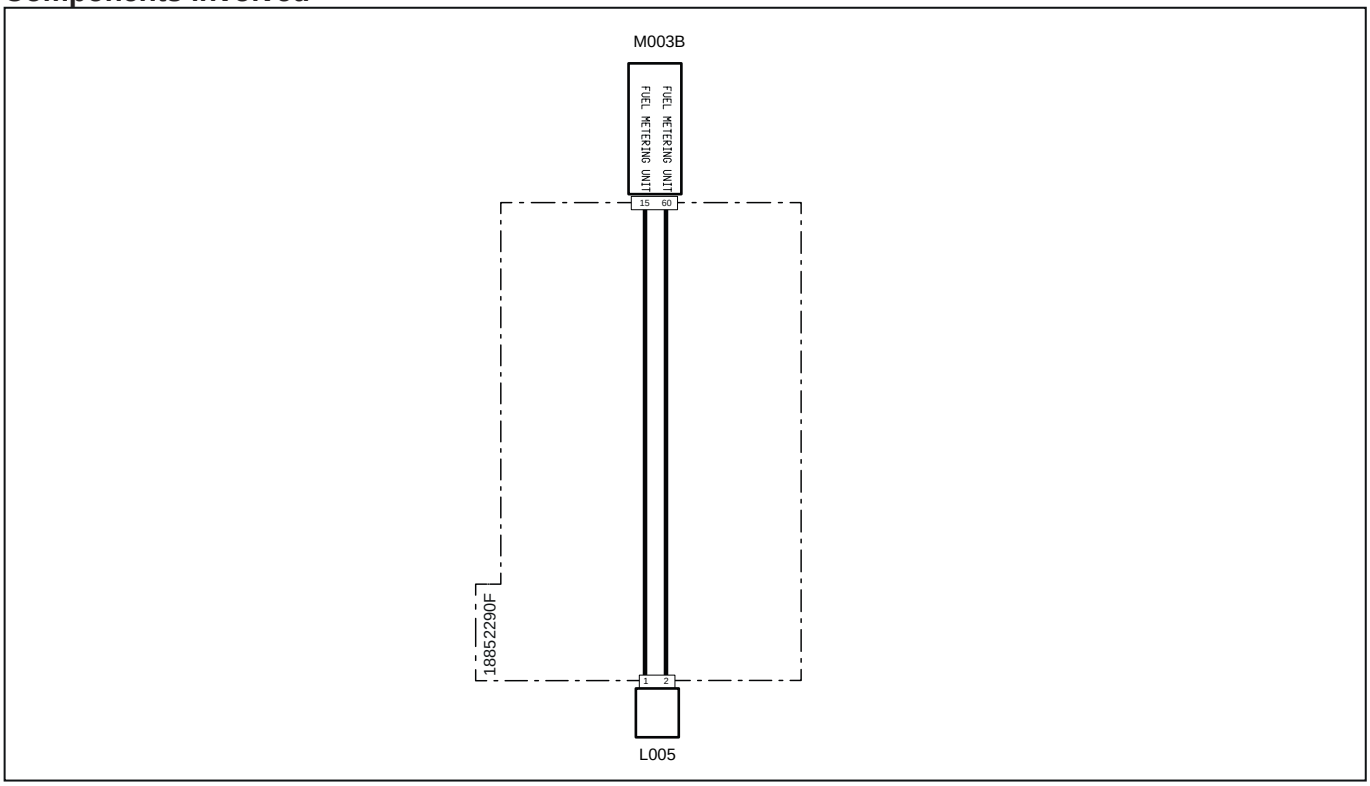
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R1-415)	XY1	High pressure pump
M003B (pag.R1-407)	XECUA	Engine control unit

3128- Throttle valve stuck closed

Description of fault

The ECU engine control unit detects that the throttle valve is stuck permanently in the same position

Severity of error

High

Additional information

Red indicator lamp flashing

The aperture of the throttle valve affects the pressure in the intake manifold. As a result, it is also necessary to check that the BOOST temperature and pressure sensor is working correctly

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the throttle valve is working correctly
- Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- If any abnormal values are noted, visually check if the throttle valve is effectively stuck. Now clean the valve to remove all dirt and encrusted residue
  Replace the throttle valve if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

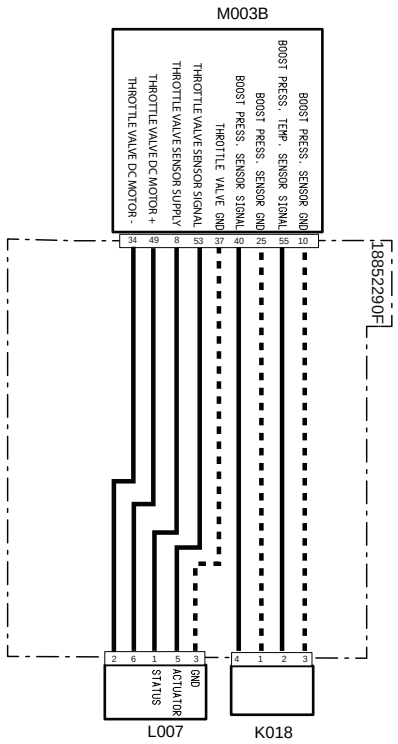
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3129- Throttle valve stuck open

Description of fault

The ECU engine control unit detects that the throttle valve is stuck permanently in the same position

Severity of error

High

Additional information

Red indicator lamp flashing

The aperture of the throttle valve affects the pressure in the intake manifold. As a result, it is also necessary to check that the BOOST temperature and pressure sensor is working correctly

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the throttle valve is working correctly
- Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- If any abnormal values are noted, visually check if the throttle valve is effectively stuck. Now clean the valve to remove all dirt and encrusted residue
  Replace the throttle valve if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

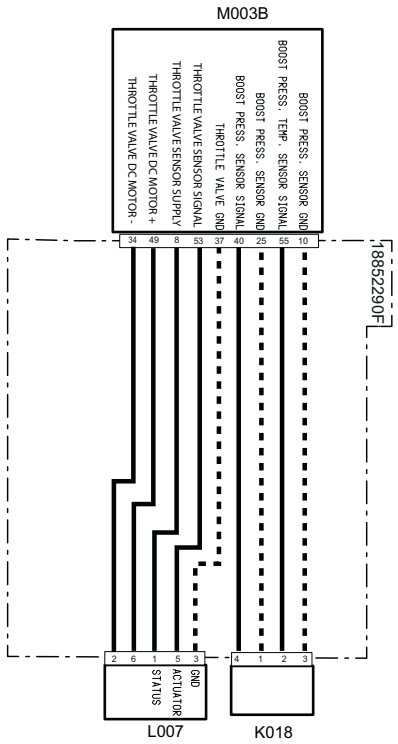
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R1-413)	XS4	Temperature and pressure sensor (BOOST)
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3130 - Throttle valve bridge-H, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

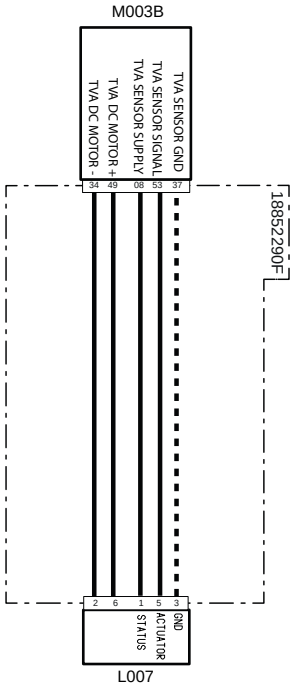
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3131 - Throttle valve bridge-H, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

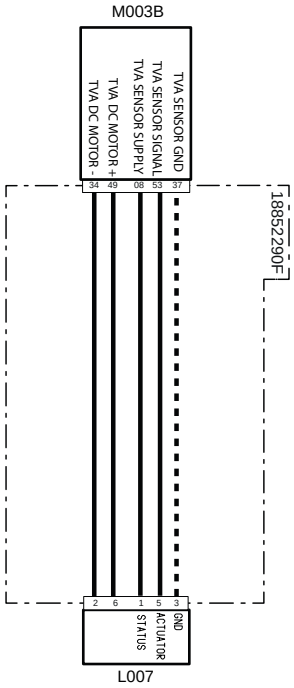
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3132 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3133 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3134 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3135 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3136 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3137 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3138 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3139 - Throttle valve bridge-H, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

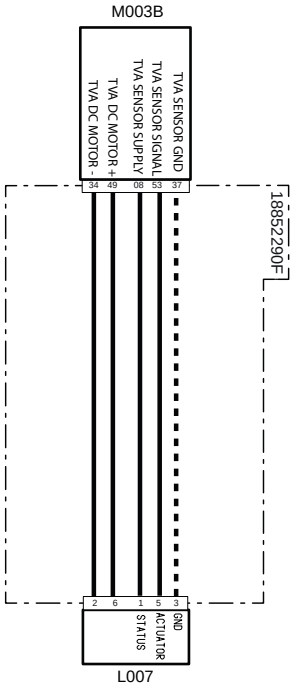
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3140 - Throttle valve bridge-H, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

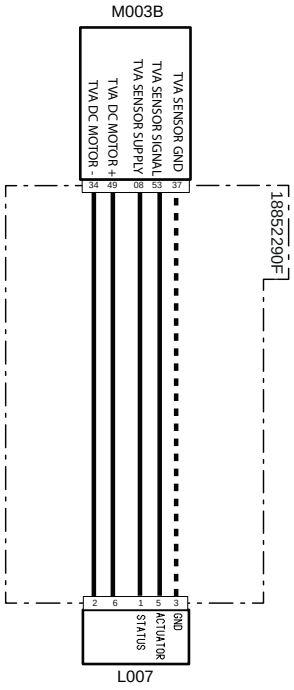
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3141 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3142 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3143 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3144 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3145 - Excessive soot levels in POC filter

Description of fault

The control unit detects excessive levels of soot trapped in the diesel particulate filter.

Severity of error

High

Additional information

Red indicator lamp flashing

The degree of clogging of the POC is monitored by the ECU unit via the signal received from the POC temperature sensor, which measures the temperature ahead of the filter. The ECU interprets a high temperature at the inlet side of the filter as a sign of increased back-pressure due to clogging of the filter.

The POC-in temperature sensor reading may be viewed with the diagnostic tool

Behaviour of system

Engine start is possible, but engine operates with limited torque and regeneration is disabled

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the POC-in temperature sensor is installed correctly

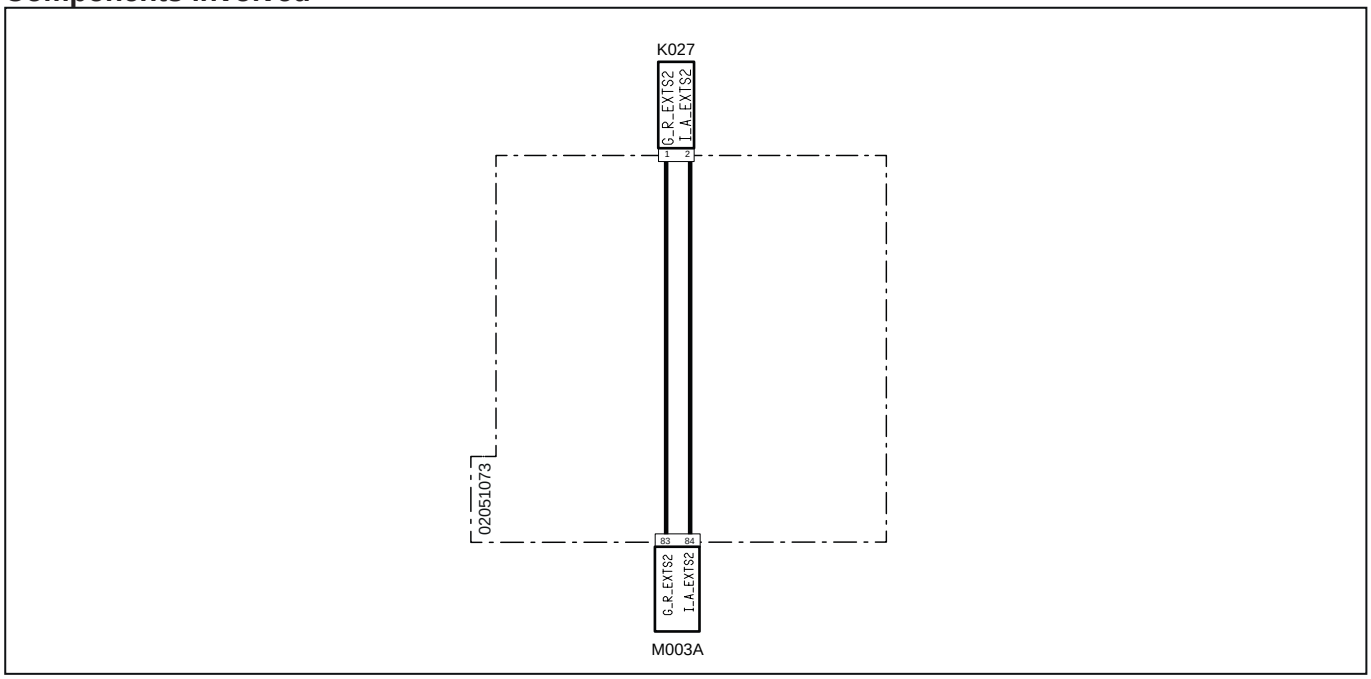
3 - Perform the service regeneration procedure for the POC filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the POC-in temperature sensor reading (see the documentation of the diagnostic tool)
- Check if the sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K027 (pag.R1-374)	P7	POC temperature sensor
M003A(pag.R1-375)	P12	Engine control unit

3146 - Glow plug 1 circuit, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of glow plug 1

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

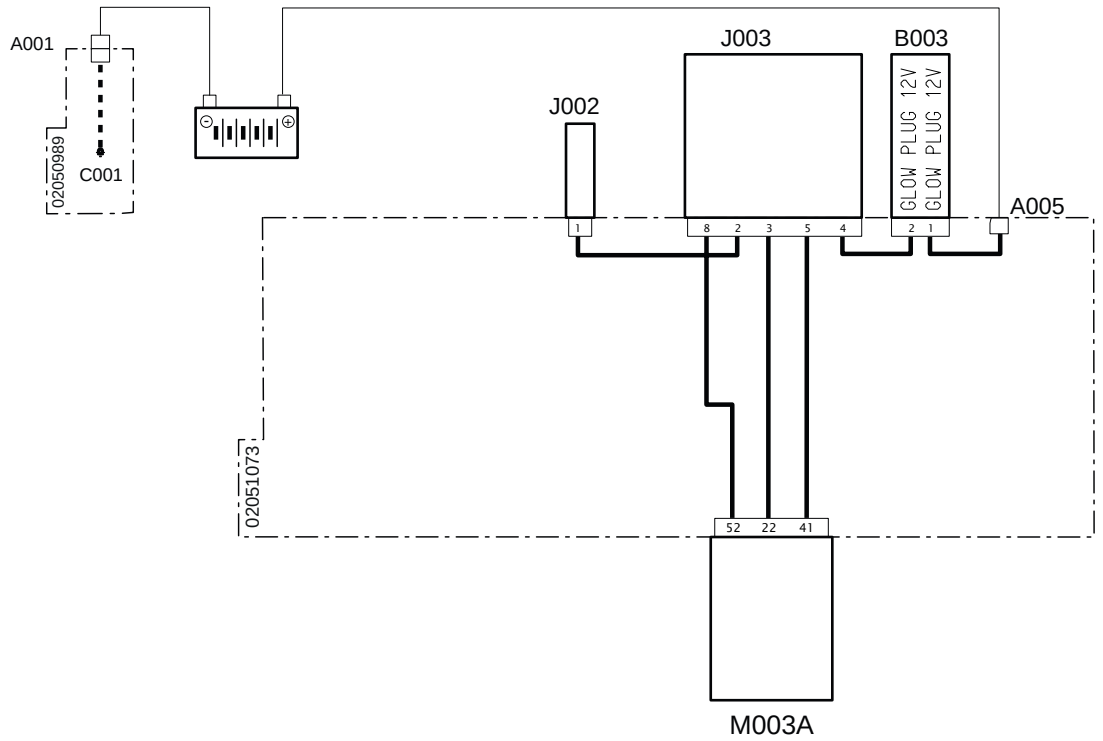
3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3147 - Glow plug 3 circuit, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of glow plug 3

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

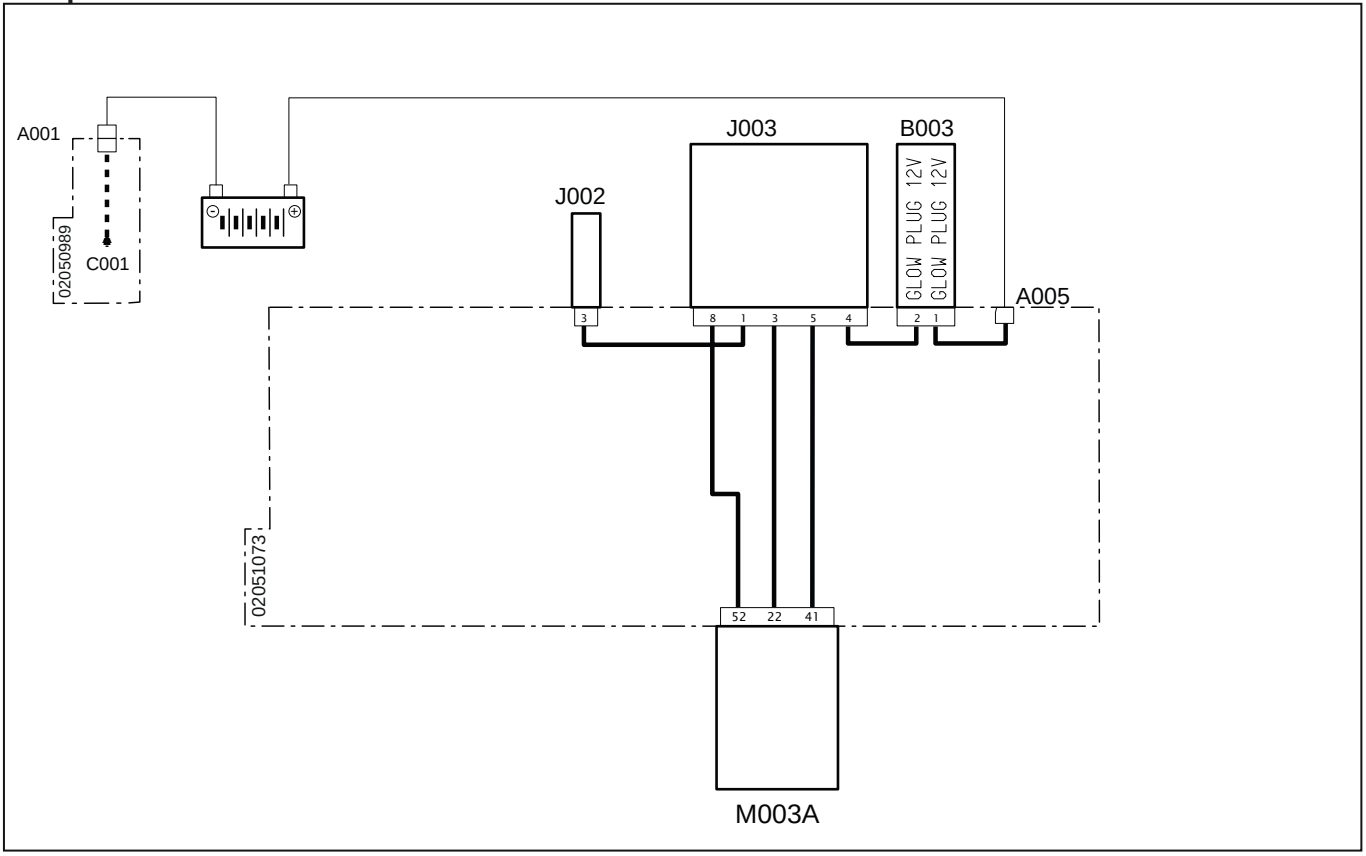
3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3148 - Glow plug 2 circuit, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of glow plug 2

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the glow plug control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

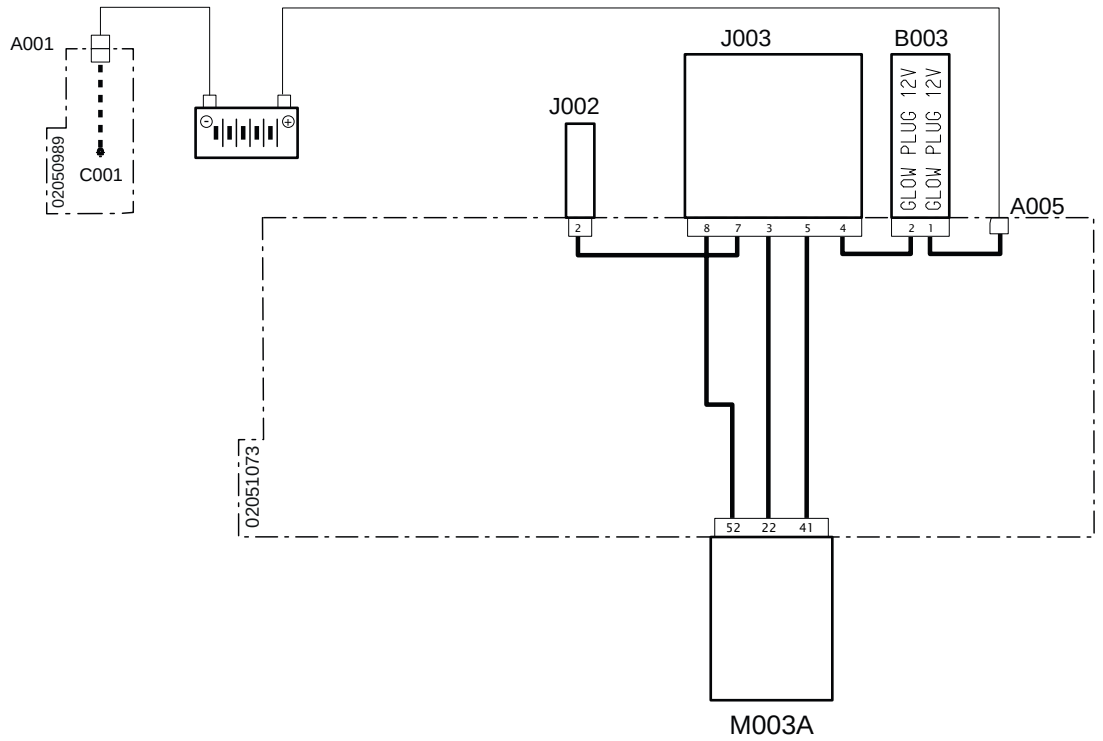
3 - Use the diagnostic tool to check function of the glow plug control unit (see the documentation of the diagnostic tool)
- Check that the glow plug control unit is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Battery negative
C001 (pag.R1-328)	P66	Battery ground
A005 (pag.R1-382)	P510	Glow plug power feed
B003 (pag.R1-389)	P476	Glow plug fuse
J003 (pag.R1-386)	P452	Glow plug control unit
J002 (pag.R1-386)	P514	Glow plugs
M003A (pag.R1-375)	P12	Engine control unit

3149 - Throttle valve position sensor, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the throttle valve position sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check function of the throttle valve position sensor (see the documentation of the diagnostic tool)
- Check that the throttle valve position sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

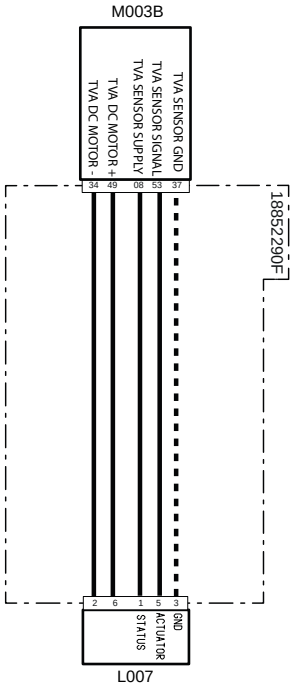
3 - Check that the connectors of the throttle valve position sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3150 - Throttle valve position sensor, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the throttle valve position sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible, but throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check function of the throttle valve position sensor (see the documentation of the diagnostic tool)
- Check that the throttle valve position sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

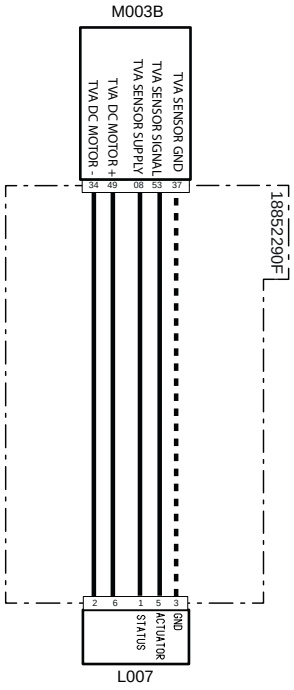
3 - Check that the connectors of the throttle valve position sensor, of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3151 - Throttle valve circuit, current too high

Description of fault

The ECU engine control unit detects an excessively high current in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

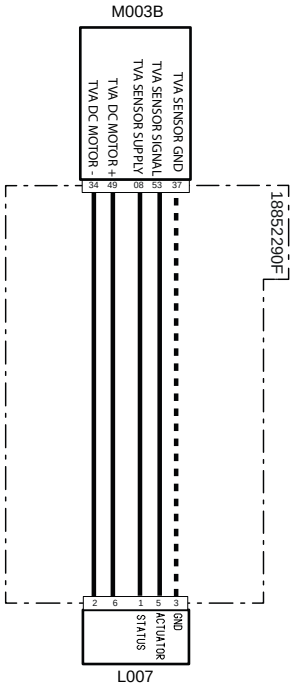
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

3152 - Throttle valve circuit, current too low

Description of fault

The ECU engine control unit detects an excessively low current in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

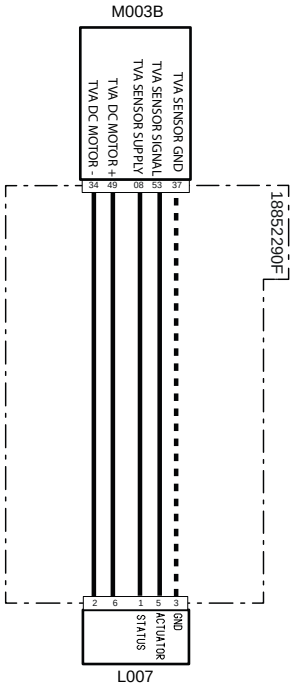
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L007(pag.R1-415)	XY2	Throttle valve
M003B (pag.R1-407)	XECUA	Engine control unit

Vehicle control unit (VCU)

1003 - Battery voltage high

Description of fault

The electronic control unit detects a power feed voltage received from the battery exceeding 16 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

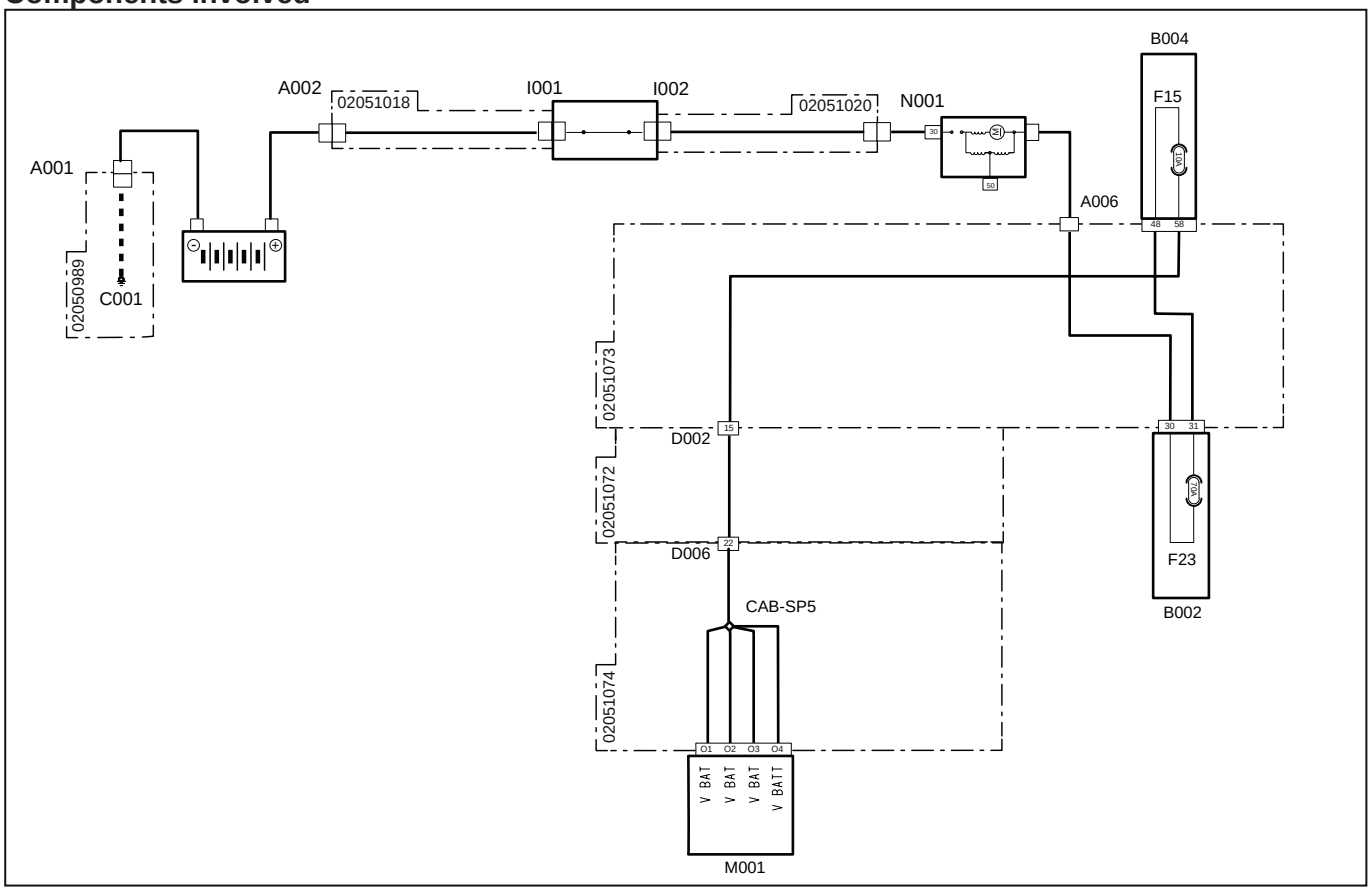
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A002 (pag.R1-330)	P55	Positive battery terminal
B004 (pag.R1-367)	P1A	Fuse box "2"
B002 (pag.R1-370)	P2A	Fuse box "1"
D002 (pag.R1-344)	P10A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F15(B004) (pag.R1-367)	F15	12V VCU power feed (10A)
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M001 (pag.R1-397)	P80	Vehicle ECU
N001 (pag.R1-330)	P10	Starter motor "30"
A006 (pag.R1-382)	P63	Starter motor

1004 - Battery voltage too low

Description of fault

The electronic control unit detects a power feed voltage received from the battery below 7 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

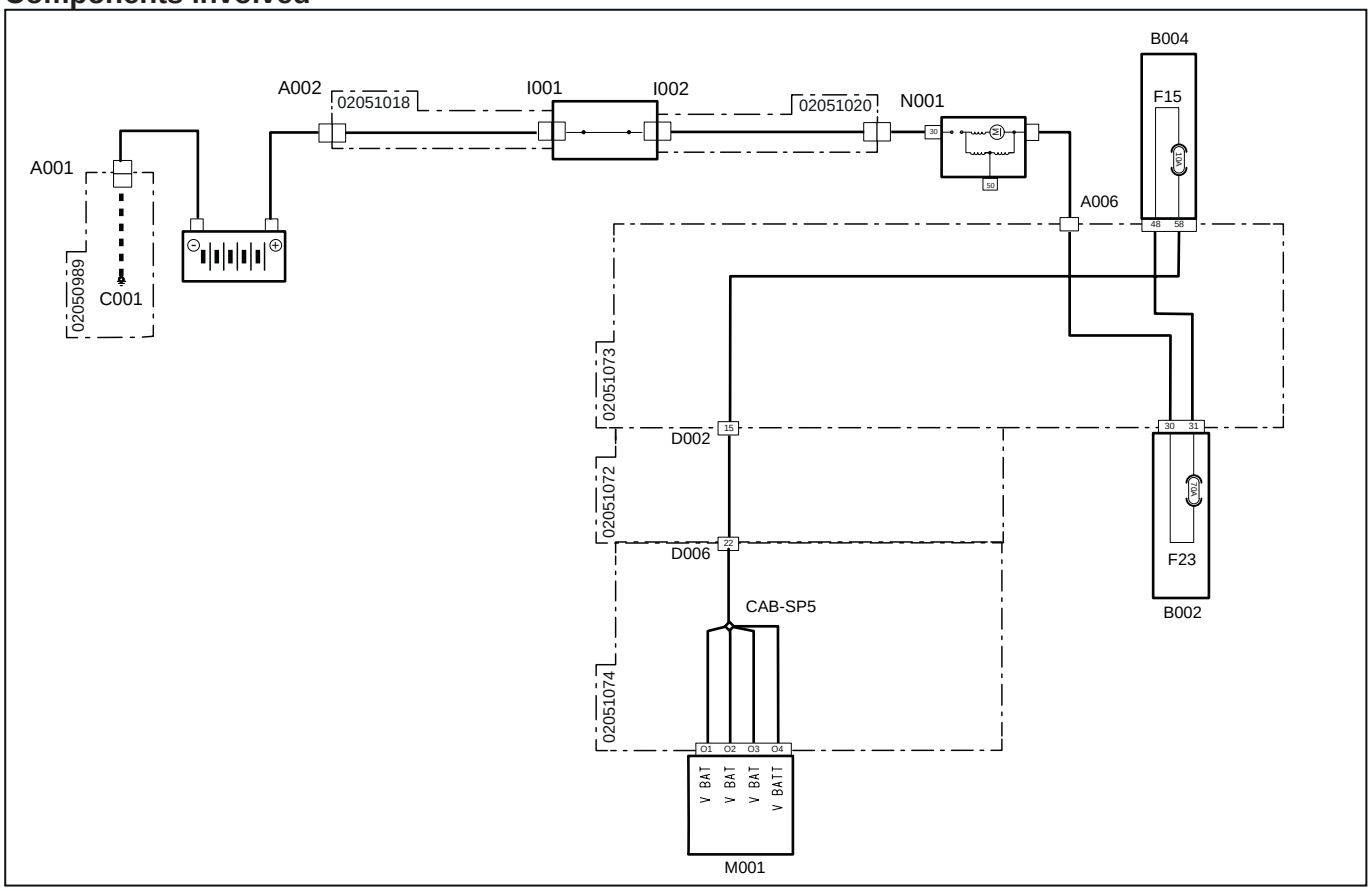
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R1-328)	P11	Negative battery terminal
A002 (pag.R1-330)	P55	Positive battery terminal
B004 (pag.R1-367)	P1A	Fuse box "2"
B002 (pag.R1-370)	P2A	Fuse box "1"
D002 (pag.R1-344)	P10A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F15(B004) (pag.R1-367)	F15	12V VCU power feed (10A)
F23(B002) (pag.R1-370)	F23	Main maxi fuse (70A)
I001 (pag.R1-329)	P39	Battery master relay switch (input terminal)
I002 (pag.R1-331)	P23	Battery master relay switch (output terminal)
M001 (pag.R1-397)	P80	Vehicle ECU
N001 (pag.R1-330)	P10	Starter motor "30"
A006 (pag.R1-382)	P63	Starter motor

1005 - Sensor power feed voltage too high

Description of fault

The electronic control unit detects a sensor power feed voltage exceeding the maximum limit of 5.6 V

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel may be switched on (ignition on) and the engine starts.

Checks necessary

1 - Check for other error codes. If no other error codes exist, proceed to the next step.

2 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

3 - Check the ECU output powering the sensors with +5V voltage
- Check pin: N4
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

4 - Check the condition of the sensor fuse (10A) and replace if necessary
- Disconnect the sensor fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - If not faulty, problem is caused by an ECU hardware fault. Replace vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1006 - Sensor power feed voltage too low

Description of fault

The electronic control unit detects a sensor power feed voltage below the minimum limit of 4.4 V

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel may be switched on (ignition on) and the engine starts.

Checks necessary

1 - Check for other error codes. If no other error codes exist, proceed to the next step.

2 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

3 - Check the ECU output powering the sensors with +5V voltage
- Check pin: N4
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

4 - Check the condition of the sensor fuse (10A) and replace if necessary
- Disconnect the sensor fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

5 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - If not faulty, replace the vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1009 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the vehicle control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1010 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1011 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1012 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R1-328)	P11	Negative battery terminal
A002(pag.R1-330)	P55	Positive battery terminal
M001(pag.R1-397)	P80	Vehicle ECU

1013 - Fuel level sensor voltage not within permitted range

Description of fault

The control unit detects an excessively high voltage or a short circuit to positive on the fuel level sensor

Severity of error

Medium

Additional information

The fuel level sensor produces a voltage signal exceeding 4600 mV. This voltage signal may be checked with the diagnostic tool

Amber indicator lamp flashing

Behaviour of system

The engine may be started but the fuel gauge needle remains at 0.

Checks necessary

1 - Check that the connectors of the fuel level sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Use the diagnostic tool to check that the fuel level sensor is working correctly (see documentation of diagnostic tool)
- Replace the sensor if it is faulty
- Proceed to the next step if the sensor is working correctly

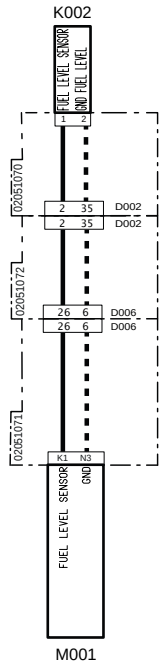
3 - Check the general condition of the wiring loom
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If no problems are found, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Replace the fuel level sensor if the problem persists

Components involved



System code	Source code	Description
K002(pag.R1-392)	P40	Fuel level sensor
D002(pag.R1-344)	P10A	Engine-Main connector
D002(pag.R1-390)	P10B	Main-Engine connector
D006(pag.R1-352)	P100A	Main-dashboard connector
D006(pag.R1-354)	P100B	Dashboard-main connector
M001(pag.R1-397)	P80	Vehicle ECU

1014 - Fuel level sensor voltage not within permitted range

Description of fault

The control unit detects an excessively low voltage or a short circuit to ground on the fuel level sensor

Severity of error

Medium

Additional information

The fuel level sensor produces a voltage signal below 1 mV. This voltage signal may be checked with the diagnostic tool

Amber indicator lamp flashing

Behaviour of system

The engine may be started but the fuel gauge needle remains at 0.

Checks necessary

1 - Check that the connectors of the fuel level sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Use the diagnostic tool to check that the fuel level sensor is working correctly (see documentation of diagnostic tool)
- Replace the sensor if it is faulty
- Proceed to the next step if the sensor is working correctly

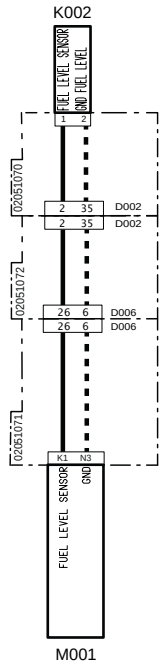
3 - Check the general condition of the wiring loom
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If no problems are found, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Replace the fuel level sensor if the problem persists

Components involved



System code	Source code	Description
K002(pag.R1-392)	P40	Fuel level sensor
D002(pag.R1-344)	P10A	Engine-Main connector
D002(pag.R1-390)	P10B	Main-Engine connector
D006(pag.R1-352)	P100A	Main-dashboard connector
D006(pag.R1-354)	P100B	Dashboard-main connector
M001(pag.R1-397)	P80	Vehicle ECU

1017 - Differential lock solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state in the circuit of the differential lock solenoid valve. The signal current is above 2400 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the differential lock cannot be engaged

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

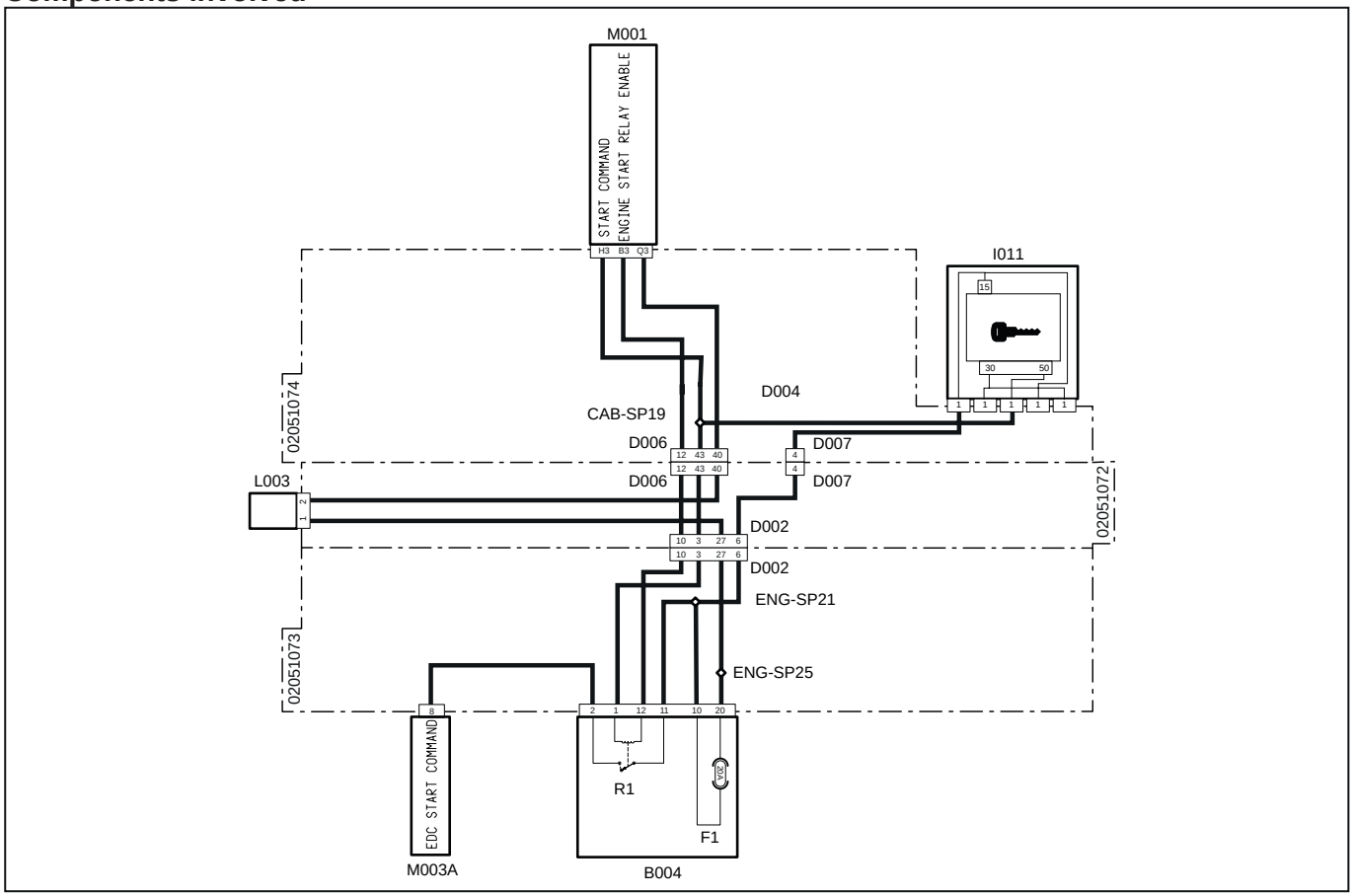
2 - Check if the DL solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve
- Proceed to the next step if the component is working correctly

3 - Check that the connectors of the DL solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the DL solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F1(B004) (pag.R1-367)	F1	Socket - Rotating beacon (10A)
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
D007 (pag.R1-356)	P102A	Main-dashboard connector
D007 (pag.R1-357)	P102B	Dashboard-main connector
L003 (pag.R1-403)	P187	Differential lock "ON/OFF" solenoid valve
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
R1(B004) (pag.R1-367)	R1	Start enable relay

1018 - Differential lock solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state in the circuit of the differential lock solenoid valve. The signal current is below 75 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the differential lock cannot be engaged

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

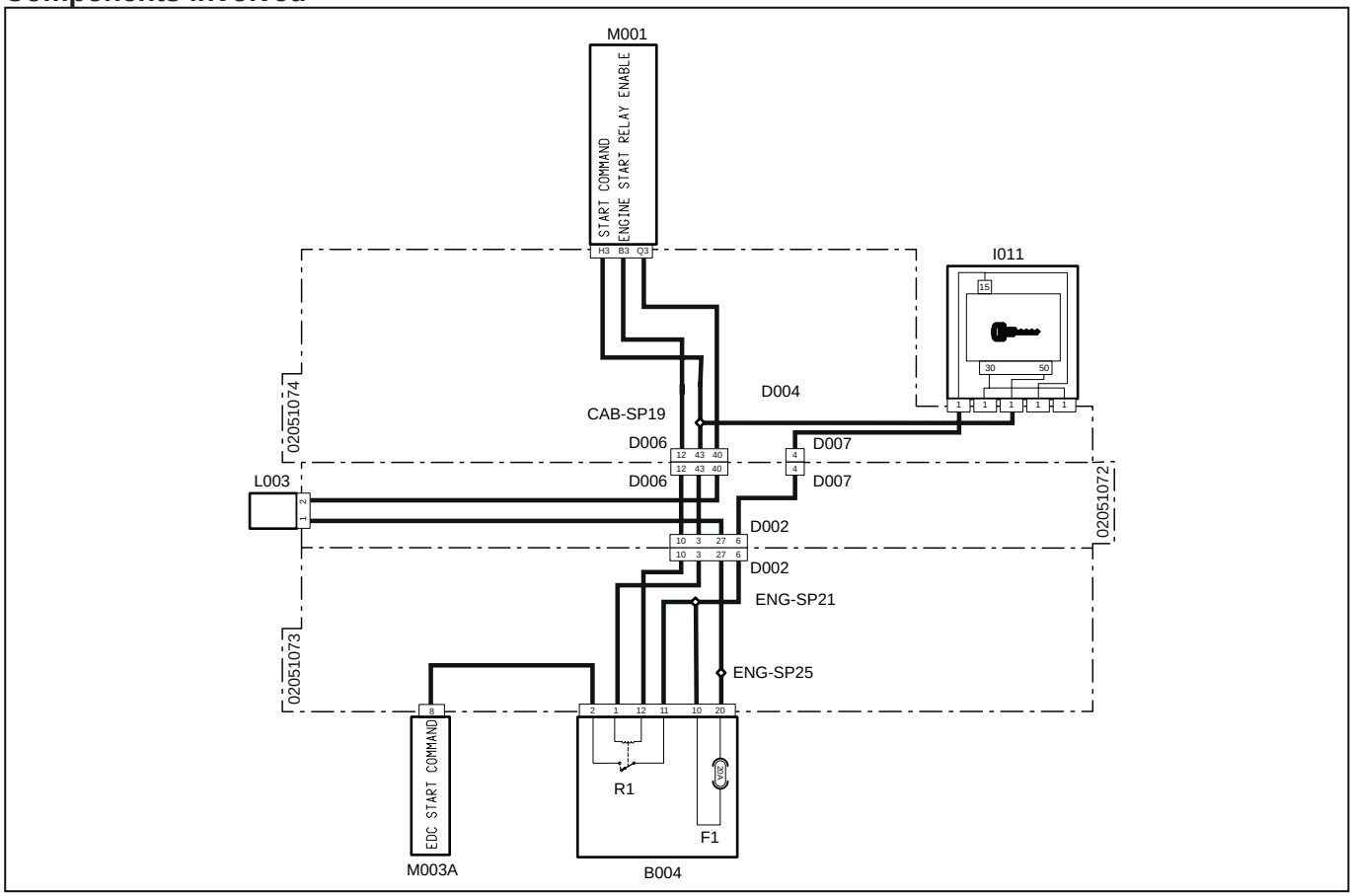
2 - Check if the DL solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve
- Proceed to the next step if the component is working correctly

3 - Check that the connectors of the DL solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the DL solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Wiring connector for main wiring loom
D002 (pag.R1-390)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F1(B004) (pag.R1-367)	F1	Socket - Rotating beacon (10A)
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
D007 (pag.R1-356)	P102A	Main-dashboard connector
D007 (pag.R1-357)	P102B	Dashboard-main connector
L003 (pag.R1-403)	P187	Differential lock "ON/OFF" solenoid valve
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
R1(B004) (pag.R1-367)	R1	Start enable relay

1019 - Tractor speed sensor reading error

Description of fault

The ECU engine control unit detects a tractor speed sensor reading error.

Severity of error

High

Additional information

The speed sensor reads the speed from a gear mounted onto the splined hub at the top of the transmission, and produces a signal with a frequency value in Hertz

Red indicator lamp flashing

Behaviour of system

The tractor may be started but the tractor speed will not be displayed on the digital display

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

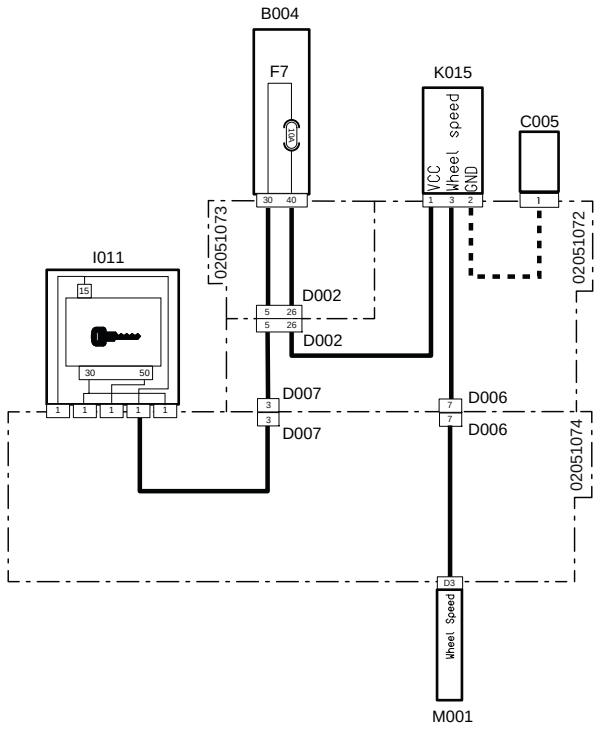
2 - Check if the sensor is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the sensor
- Proceed to the next step if the component is working correctly

3 - Check that the sensor is installed in the correct position relative to the gear

4 - Check that the connectors of the tractor speed sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.
- Check that the wiring loom connectors are connected correctly and not damaged
- Replace the wheel speed sensor if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R1-405)	P412	Main ground
D007 (pag.R1-356)	P102A	Main-dashboard connector
D007 (pag.R1-357)	P102B	Dashboard-main connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
K005 (pag.R1-377)	P301	Wheel speed sensor
M001 (pag.R1-397)	P80	Vehicle ECU

1020 - Throttle potentiometer: short circuit in power feed line

Description of fault

The control units detects a short circuit in the throttle potentiometer power feed line. The power feed voltage exceeds 4.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

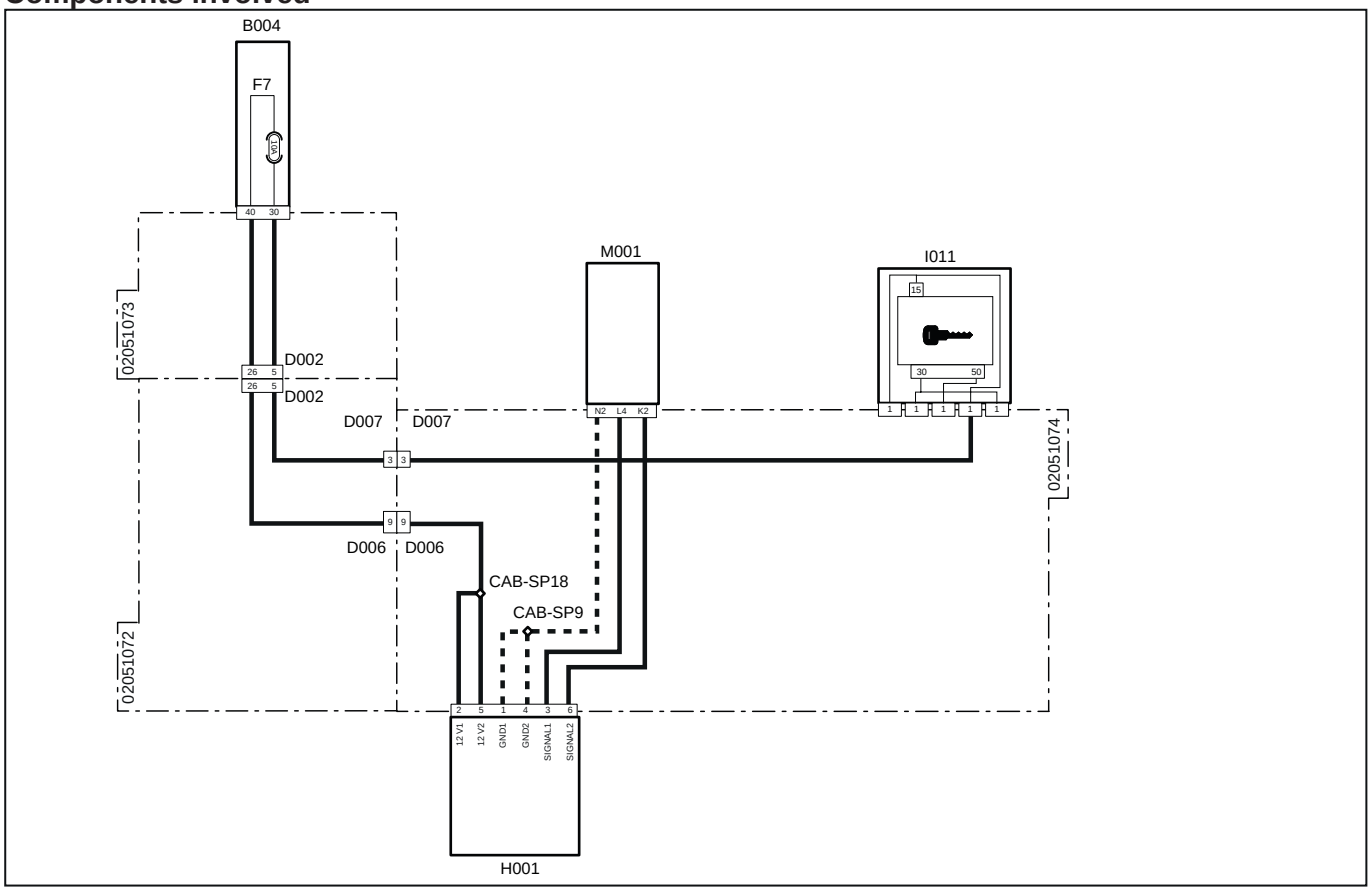
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1021 - Throttle potentiometer: short circuit to ground

Description of fault

The control unit detects a short circuit to ground on the throttle potentiometer. Power feed voltage is less than 0.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

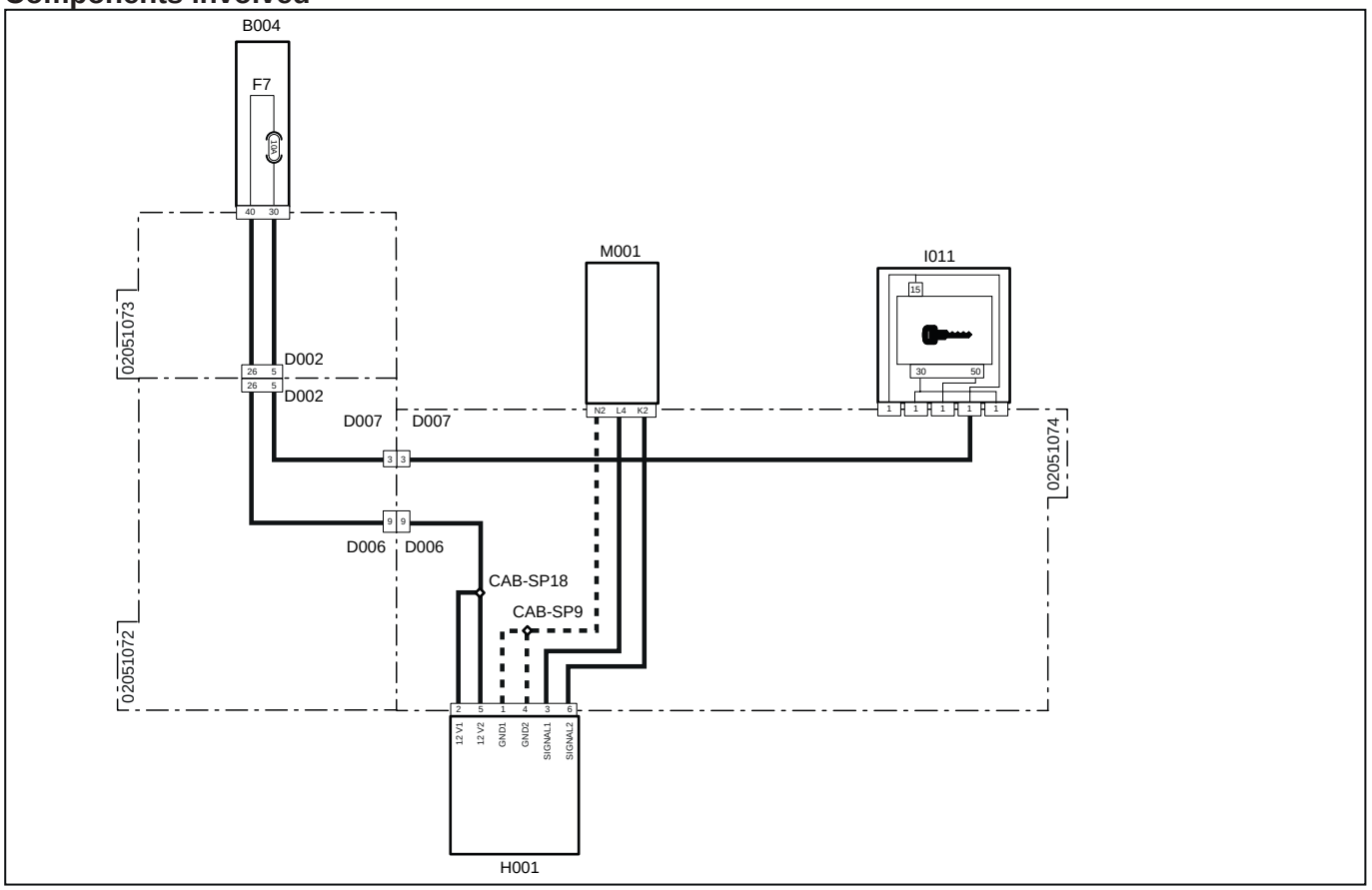
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1022 - Throttle potentiometer: short circuit in power feed line

Description of fault

The control units detects a short circuit in the throttle potentiometer power feed line. The power feed voltage exceeds 4.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

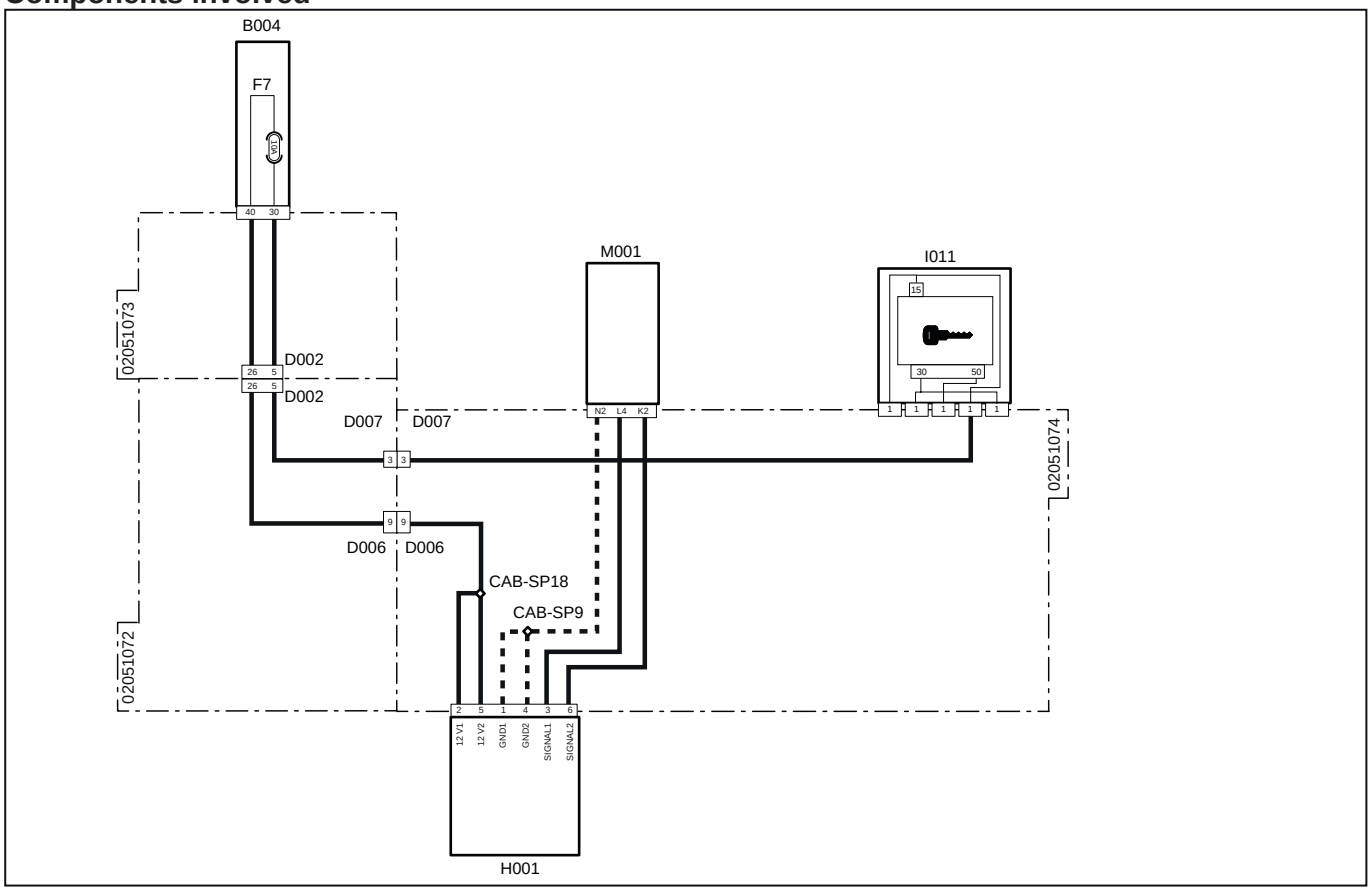
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1023 - Throttle potentiometer: short circuit to ground

Description of fault

The control unit detects a short circuit to ground on the throttle potentiometer. Power feed voltage is less than 0.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

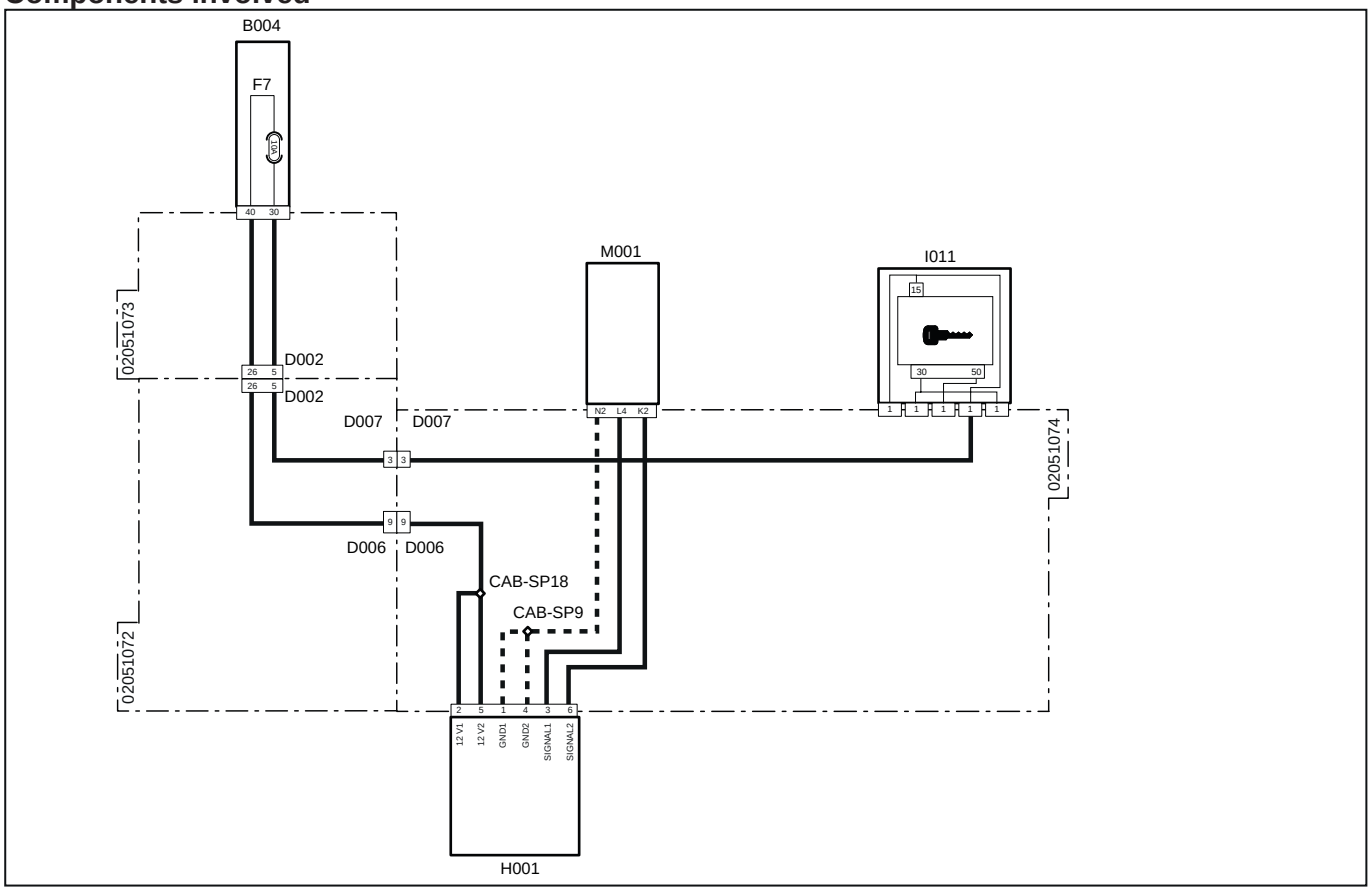
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004)(pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1024 - Signal 1 value not correct

Description of fault

The control unit detects that the value of signal 1 of the throttle potentiometer is not correct

Severity of error

High

Additional information

During calibration of the throttle potentiometer, a travel of at least 10% between the minimum and maximum positions must be detected. If not, the error code is generated. This may also occur if the potentiometer has not been calibrated

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the potentiometer receives a power feed voltage of 12V
- This may be done with a tester.
- Proceed to the next step if the component is powered correctly

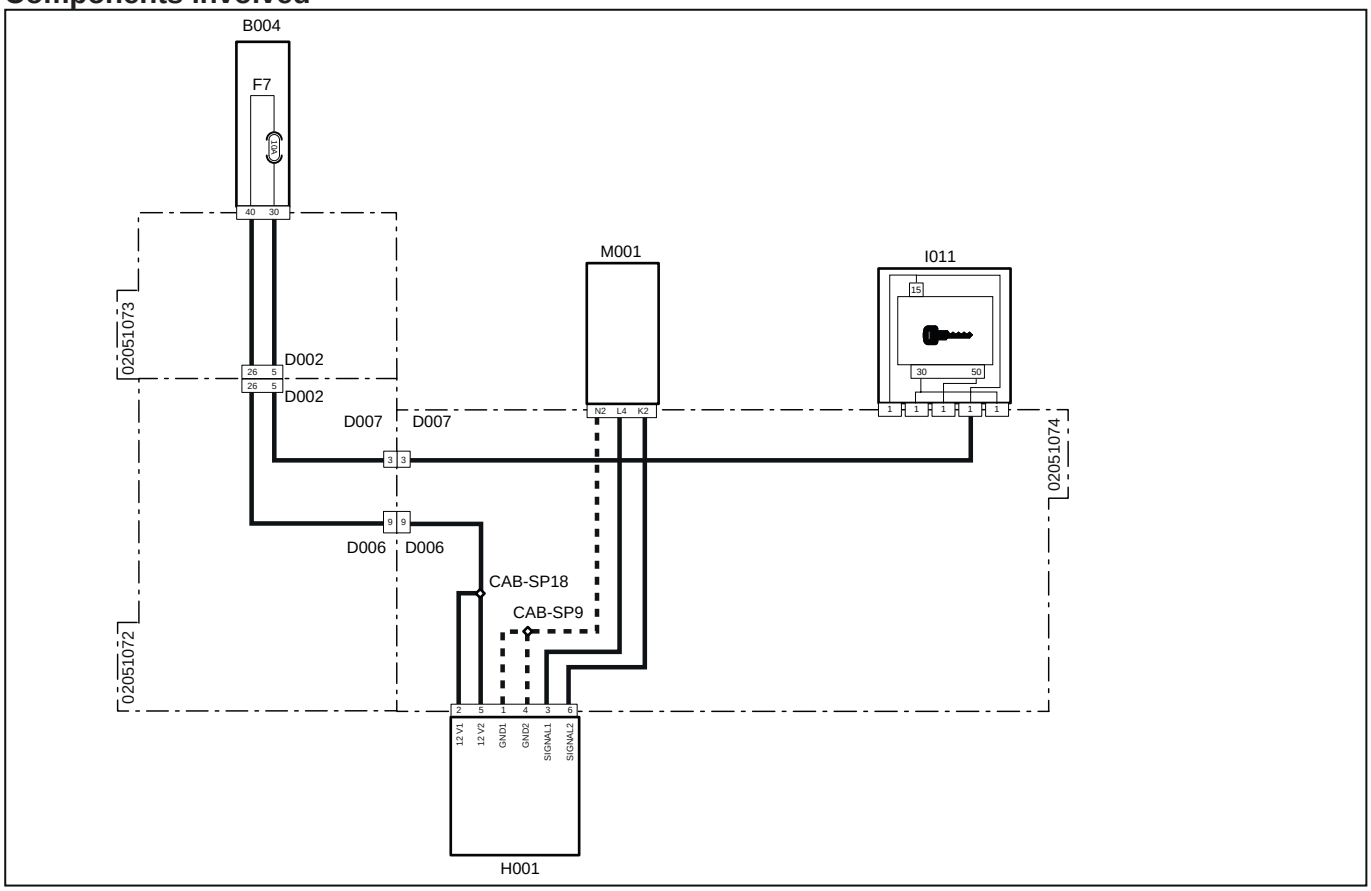
3 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

4 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

5 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

6 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1025 - Signal 2 value not correct

Description of fault

The control unit detects that the value of signal 2 of the throttle potentiometer is not correct

Severity of error

High

Additional information

During calibration of the throttle potentiometer, a travel of at least 10% between the minimum and maximum positions must be detected. If not, the error code is generated. This may also occur if the potentiometer has not been calibrated

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the potentiometer receives a power feed voltage of 12V
- This may be done with a tester.

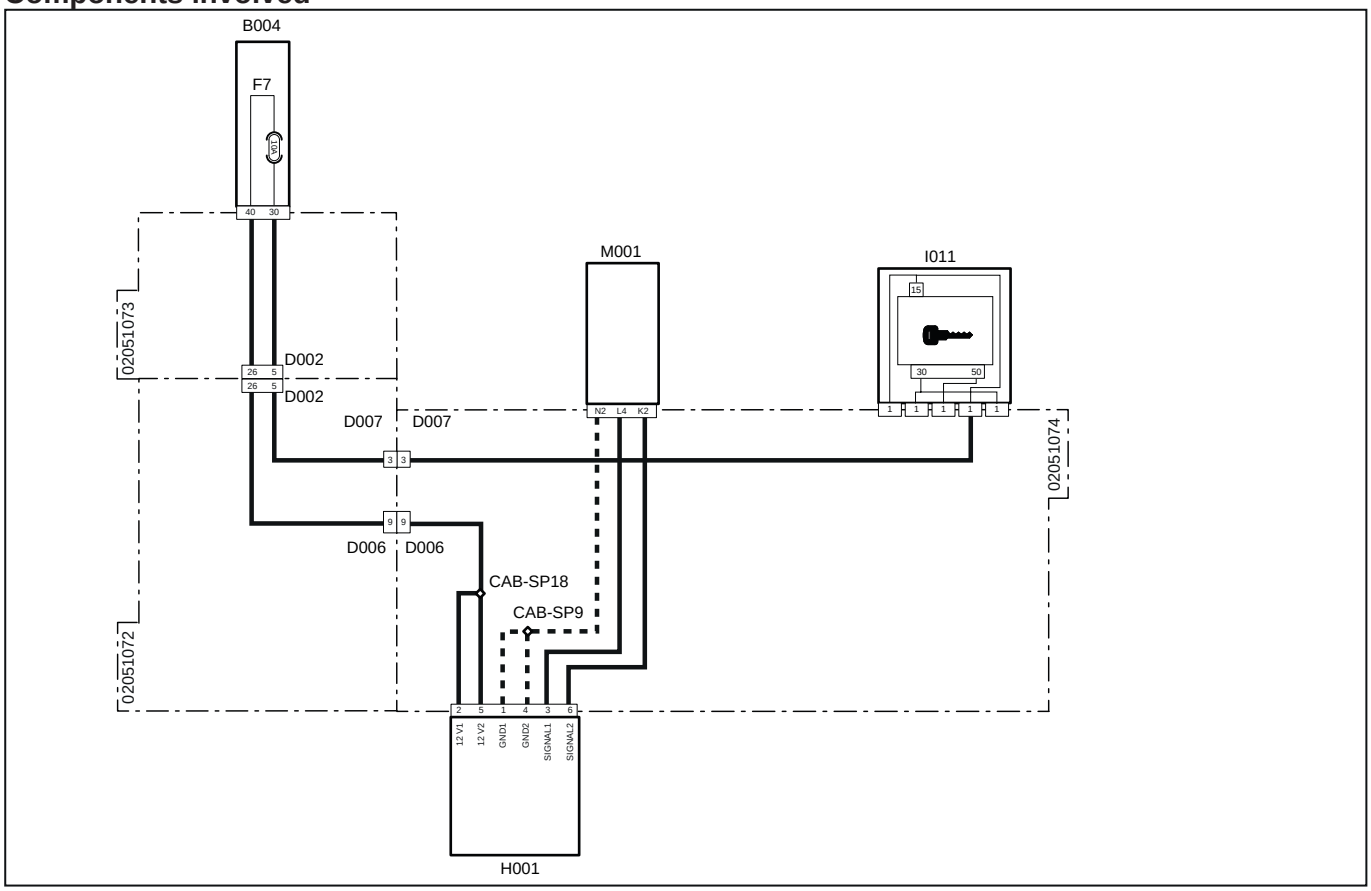
3 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

4 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

5 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

6 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring loom connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D006 (pag.R1-352)	P100A	Main-dashboard wiring connector
D006 (pag.R1-354)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R1-367)	F7	Turn indicators (10A)
H001 (pag.R1-351)	P100	Throttle
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU

1026 - Invalid operated seated sensor state

Description of fault

The control unit detects that the operator seated sensor is disconnected or malfunctioning

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

Once the tractor is switched off, it will no longer be possible to switch it on again

Checks necessary

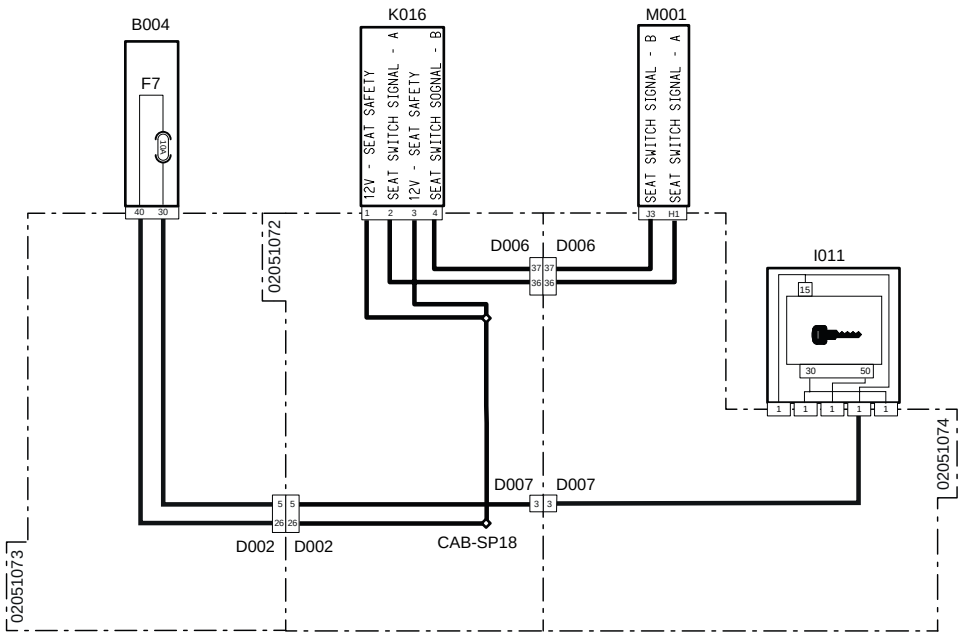
1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the sensor receives a power feed voltage of 12V
- This may be done with a tester.
- Proceed to the next step if the sensor is powered correctly

3 - Check if the sensor is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the sensor
- Proceed to the next step if the sensor is working correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly

Components involved



System code	Source code	Description
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
D002 (pag.R1-344)	P10A	Engine-Main connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D007 (pag.R1-356)	P102A	Main-dashboard connector
D007 (pag.R1-357)	P102B	Dashboard-main connector
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
K016 (pag.R1-401)	P107	Seat start enable signal
M001 (pag.R1-397)	P80	Vehicle ECU

1027 - Failed engine start

Description of fault

The control unit detects a condition lasting more than 2 seconds in which the start relay contact is closed but the engine does not start

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

Tractor does not start

Checks necessary

1 - Check that the start relay is connected correctly

- the relay may be tested with a tester.
- Proceed to the next step if the component is connected correctly

2 - Check that the starter motor is connected correctly

- Proceed to the next step if the component is connected correctly

3 - Check if the components are working correctly and replace if necessary

- See the section "Components" for information on the functional states of the start system components
- Proceed to the next step if the components are working correctly

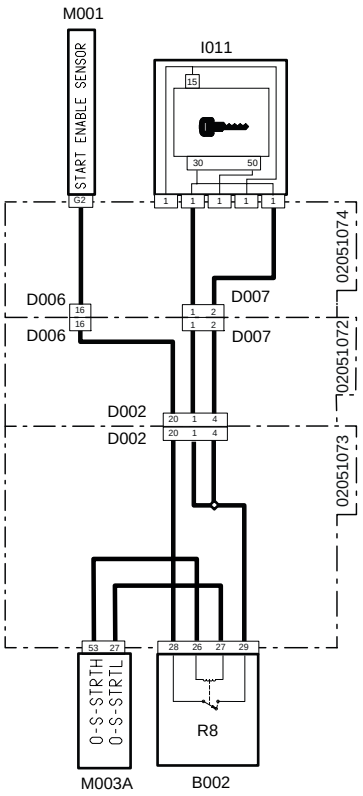
4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Check the peak battery voltage during starting

- the voltage may be measured with a tester.

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring connector
D006 (pag.R1-354)	P100B	Dashboard-engine wiring loom wiring connector
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
R8(B002)(pag.R1-370)	R8	Start relay (20A)

1028 - Diverter solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state on the diverter solenoid valve. The signal current is above 2400 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the diverter cannot be used

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

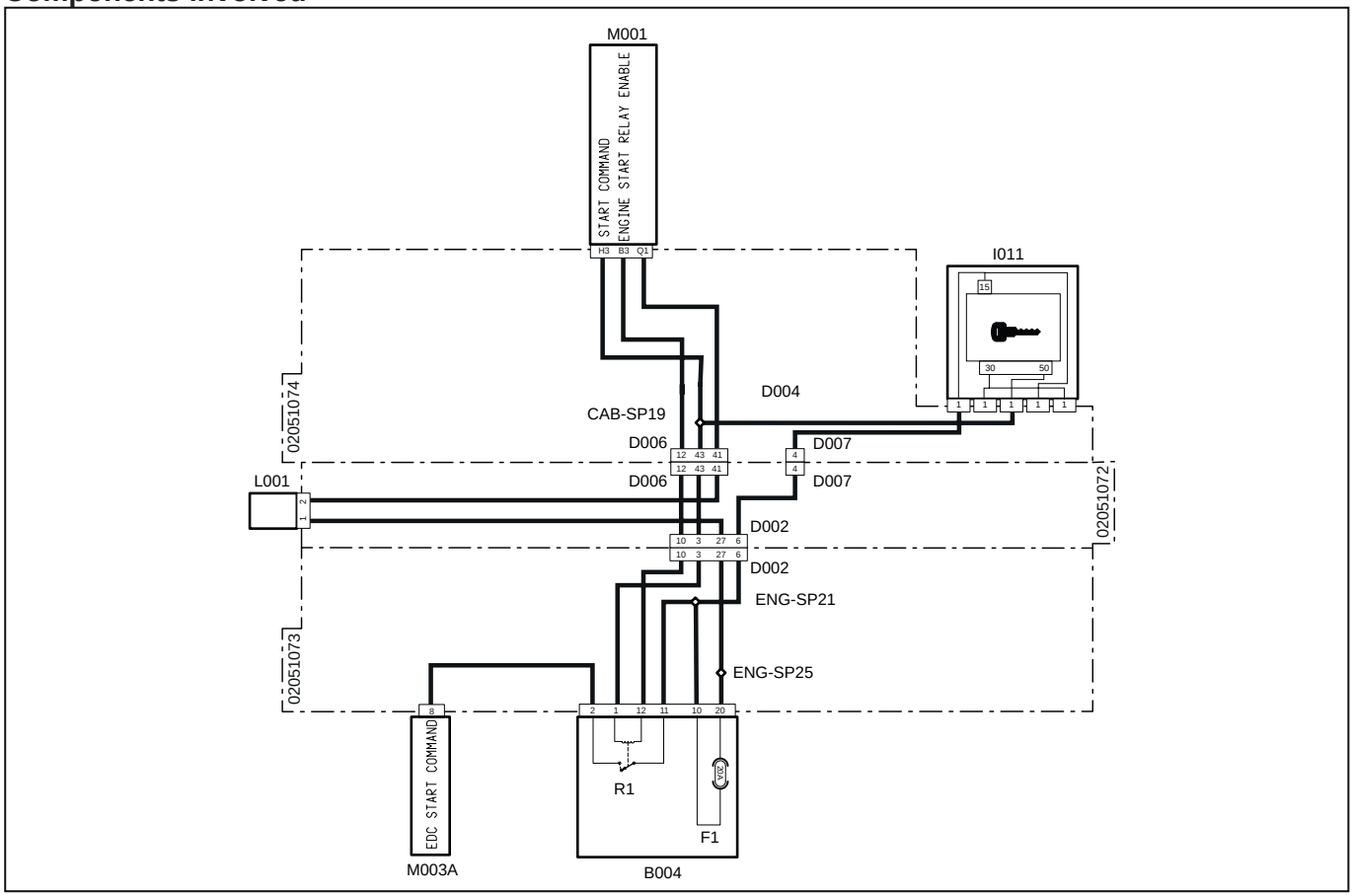
2 - Check if the diverter solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve

3 - Check that the connectors of the diverter solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the diverter solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring connector
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F1(B004)(pag.R1-367)	F1	Socket - Rotating beacon (10A)
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
L001 (pag.R1-404)	P188	"Diverter" solenoid valve
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
R1(B004)(pag.R1-367)	R1	Start enable relay

1029 - Diverter solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state on the diverter solenoid valve. The signal current is below 75 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the diverter cannot be used

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

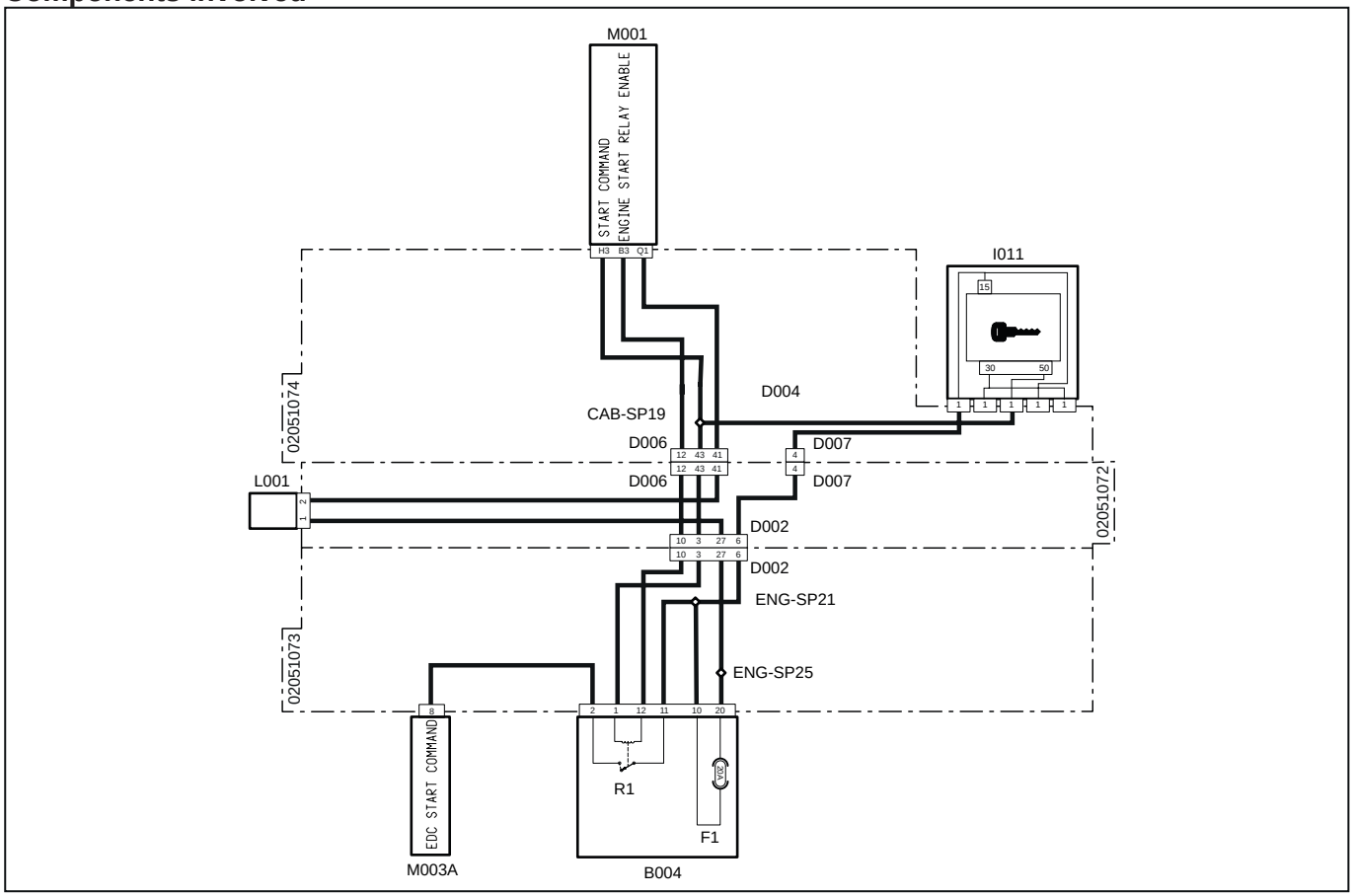
2 - Check if the diverter solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve

3 - Check that the connectors of the diverter solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the diverter solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R1-344)	P10A	Engine-main wiring connector
D002 (pag.R1-390)	P10B	Main-engine wiring connector
D007 (pag.R1-356)	P102A	Main-dashboard wiring connector
D007 (pag.R1-357)	P102B	Dashboard-main wiring connector
D006 (pag.R1-354)	P100B	Wiring connector for engine wiring loom
D006 (pag.R1-352)	P100A	Wiring connector for dashboard wiring loom
F1(B004)(pag.R1-367)	F1	Socket - Rotating beacon (10A)
I011 (pag.R1-364)	P117,P118, P451,P455,P501	Ignition switch
L001 (pag.R1-404)	P188	"Diverter" solenoid valve
M001 (pag.R1-397)	P80	Vehicle ECU
M003A (pag.R1-375)	P12	Engine control unit
R1(B004)(pag.R1-367)	R1	Start enable relay

1032 - Alternator not charging

Description of fault

The vehicle control unit (VCU) detects an excessively low alternator voltage (below 2 V) or a short circuit to ground

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

An alternator malfunction may cause a loss of tractor power and subsequent engine cut-out due to a drained battery

Checks necessary

1 - Check battery charge

- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

2 - Check the condition of the alternator and that it is working correctly

- the alternator may be tested with a tester.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

3 - Replace the components if necessary.

Components involved

Alternator	Battery	

1034 - Vehicle control unit not calibrated

Description of fault

The vehicle control unit has not been calibrated correctly

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel switches on but the engine cannot be started

Checks necessary

1 - Use the diagnostic tool to calibrate the vehicle control unit (see the documentation of the diagnostic tool)

Power Take Off

5001 - PTO on/off button malfunction

Description of fault

The electronic control unit detects a malfunction of the PTO on/off button

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO on/off button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

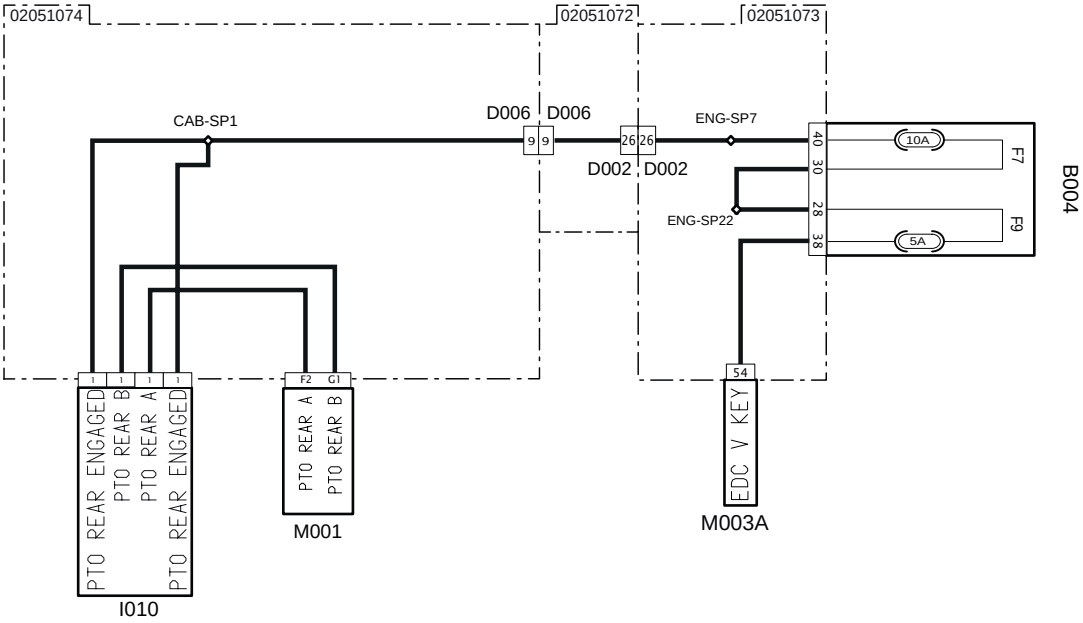
5 - Use the diagnostic tool to check function of the PTO on/off button (see the documentation of the diagnostic tool)
- Check if the PTO on/off button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
I010 (pag.R1-350)	P504/P505/ P506/P508	PTO on/off button
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
F9(B004) (pag.R1-367)	F9	Key-on power feed for ECU (5A)
M003A (pag.R1-375)	P12	Engine control unit

5002 - PTO proportional valve circuit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the PTO proportional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO proportional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

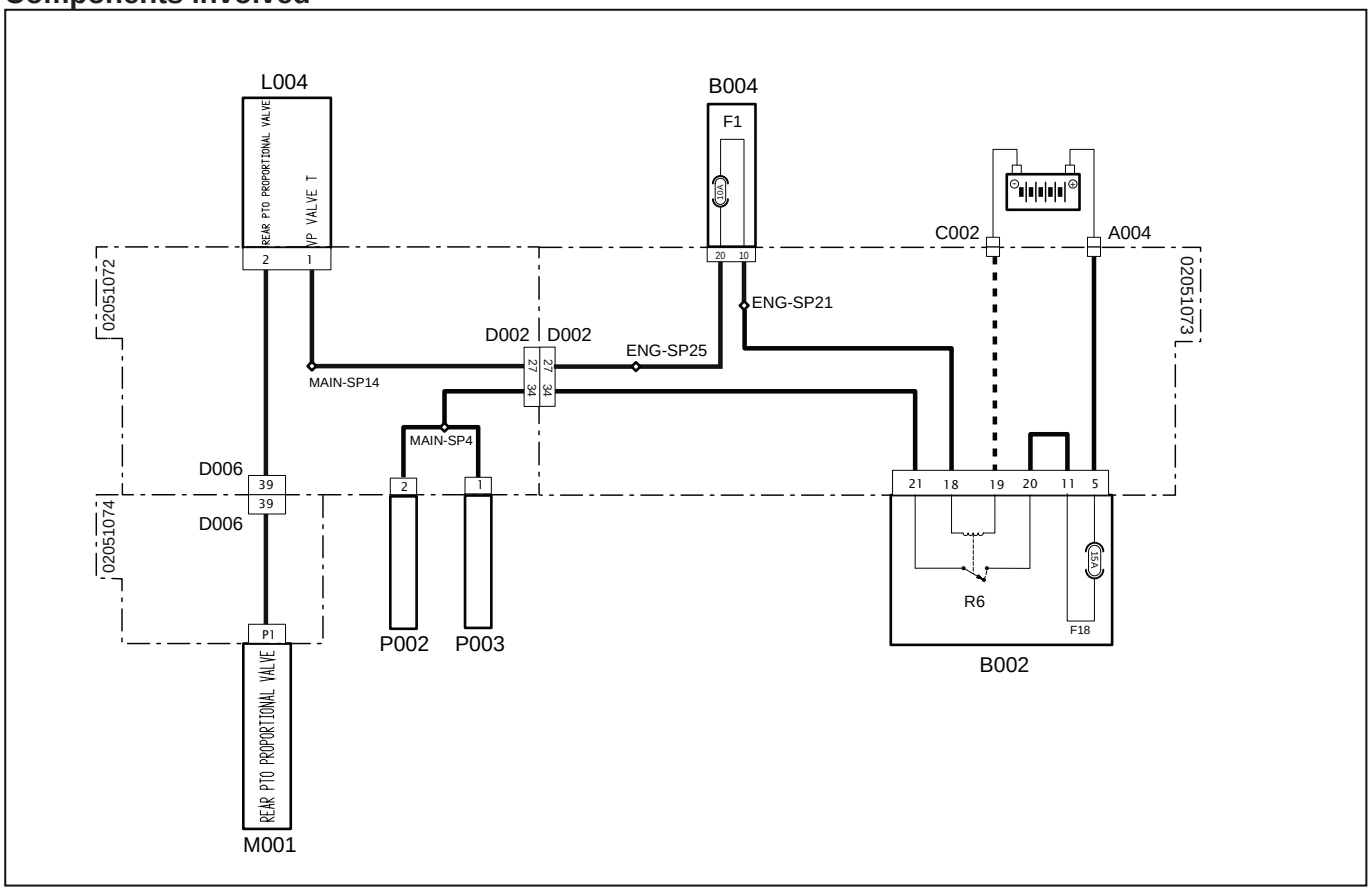
5 - Use the diagnostic tool to monitor the PTO proportional valve (see documentation of diagnostic tool)
- Check that the PTO proportional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R1-388)	P472	Battery positive
C002 (pag.R1-383)	P475	Battery ground
L004 (pag.R1-403)	P186	PTO proportional valve
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F1(B004) (pag.R1-367)	F1	Rotating beacon (10A)
F18(B002) (pag.R1-370)	F18	Trailer socket (5A)
R6(B002) (pag.R1-370)	R6	Trailer socket relay (30A)
P002 (pag.R1-405)	P226	7 pole power socket
P003 (pag.R1-394)	P50/P51	1 pole power socket

5003 - PTO proportional valve circuit, short circuit to ground or open circuit

Description of fault

The ECU engine control unit detects a short circuit to ground or open circuit fault in the circuit of the PTO proportional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO proportional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

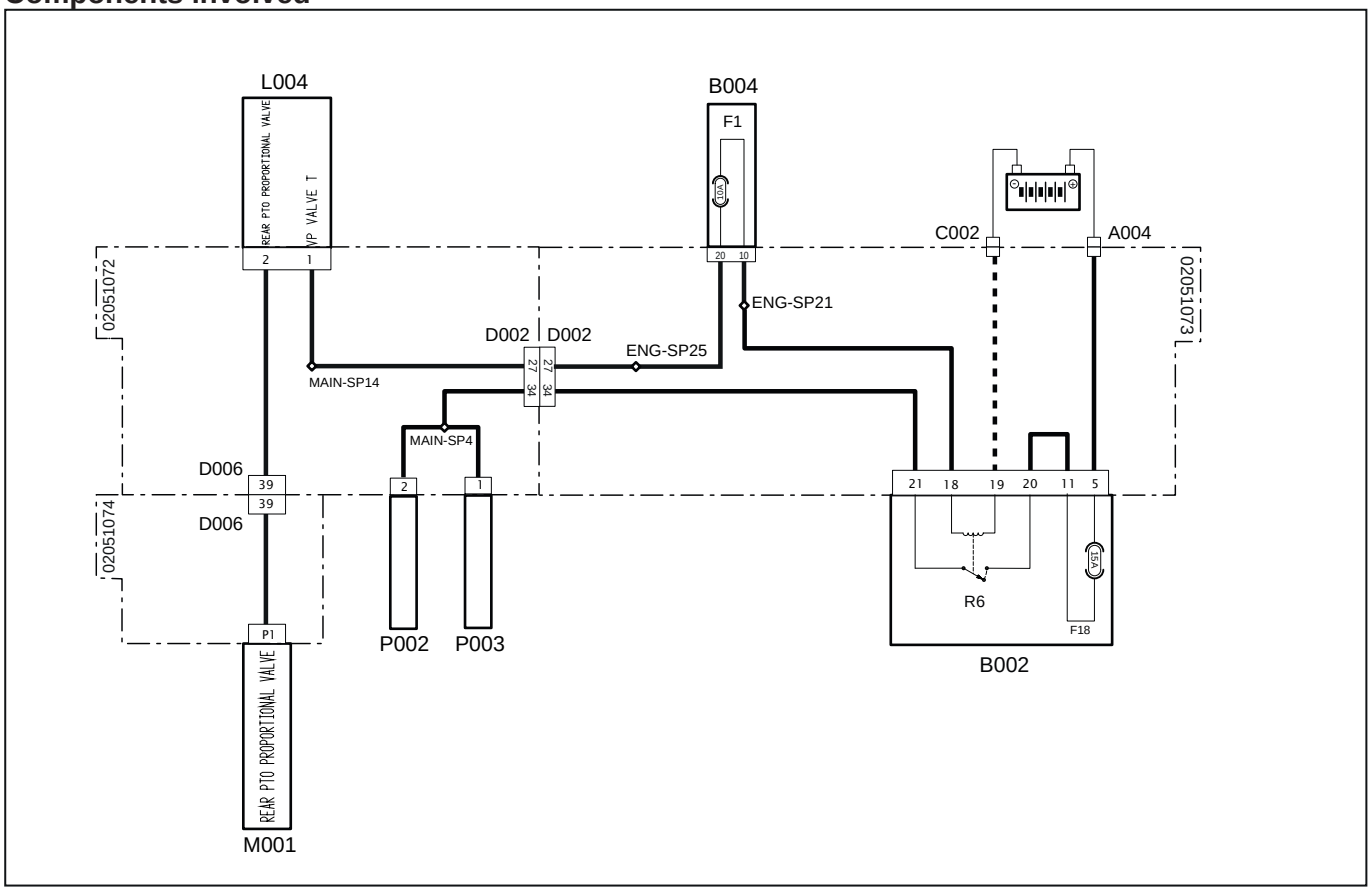
5 - Use the diagnostic tool to monitor the PTO proportional valve (see documentation of diagnostic tool)
- Check that the PTO proportional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R1-388)	P472	Battery positive
C002 (pag.R1-383)	P475	Battery ground
L004 (pag.R1-403)	P186	PTO proportional valve
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F1(B004) (pag.R1-367)	F1	Rotating beacon (10A)
F18(B002) (pag.R1-370)	F18	Trailer socket (5A)
R6(B002) (pag.R1-370)	R6	Trailer socket relay (30A)
P002 (pag.R1-405)	P226	7 pole power socket
P003 (pag.R1-394)	P50/P51	1 pole power socket

5004 - PTO directional valve circuit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the PTO directional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO directional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

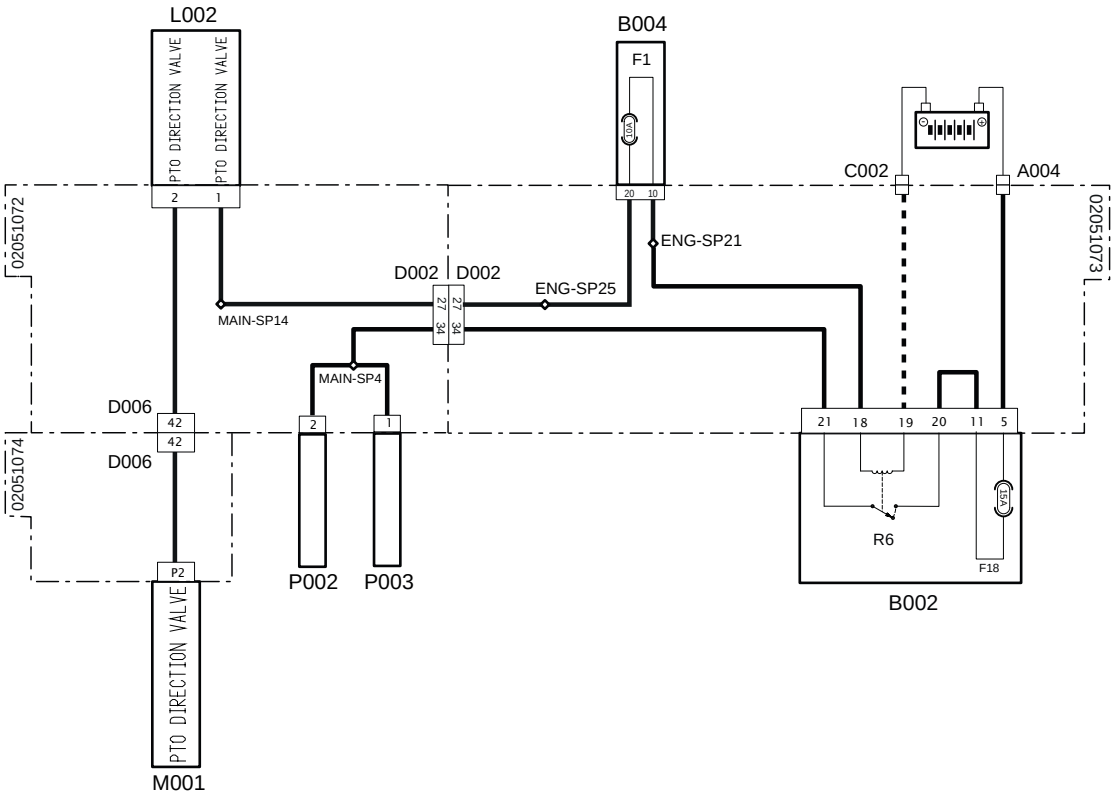
5 - Use the diagnostic tool to monitor the PTO directional valve (see documentation of diagnostic tool)
- Check that the PTO directional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R1-388)	P472	Battery positive
C002 (pag.R1-383)	P475	Battery ground
L002 (pag.R1-402)	P499	PTO directional valve
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F1(B004) (pag.R1-367)	F1	Rotating beacon (10A)
F18(B002) (pag.R1-370)	F18	Trailer socket (5A)
R6(B002) (pag.R1-370)	R6	Trailer socket relay (30A)
P002 (pag.R1-405)	P226	7 pole power socket
P003 (pag.R1-394)	P50/P51	1 pole power socket

5005 - PTO directional valve circuit, short circuit to ground or open circuit

Description of fault

The ECU engine control unit detects a short circuit to ground or open circuit fault in the circuit of the PTO directional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO directional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

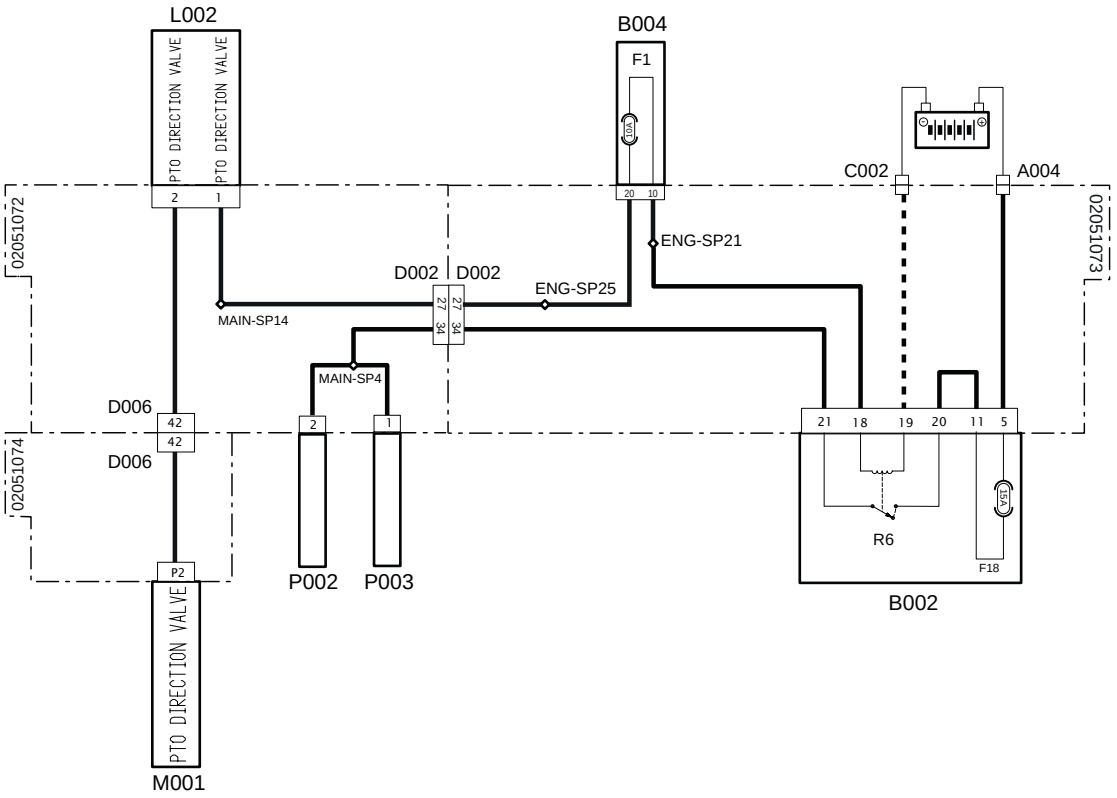
5 - Use the diagnostic tool to monitor the PTO directional valve (see documentation of diagnostic tool)
- Check that the PTO directional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R1-388)	P472	Battery positive
C002 (pag.R1-383)	P475	Battery ground
L002 (pag.R1-402)	P499	PTO directional valve
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F1(B004)(pag.R1-367)	F1	Rotating beacon (10A)
F18(B002) (pag.R1-370)	F18	Trailer socket (5A)
R6(B002)(pag.R1-370)	R6	Trailer socket relay (30A)
P002 (pag.R1-405)	P226	7 pole power socket
P003 (pag.R1-394)	P50/P51	1 pole power socket

5006 - PTO clutch slipping when engaged

Description of fault

The electronic control unit detects that the PTO clutch slips when it is engaged

Severity of error

Medium

Additional information

Amber indicator lamp flashing

The electronic control unit detects a difference in the speed readings received from the PTO and crankshaft speed sensors, which should return the same speed value. This may be due to a read error of the sensors, or to slippage between the discs of the PTO clutch.

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the crankshaft speed sensor, of the engine control unit, of the vehicle control unit and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

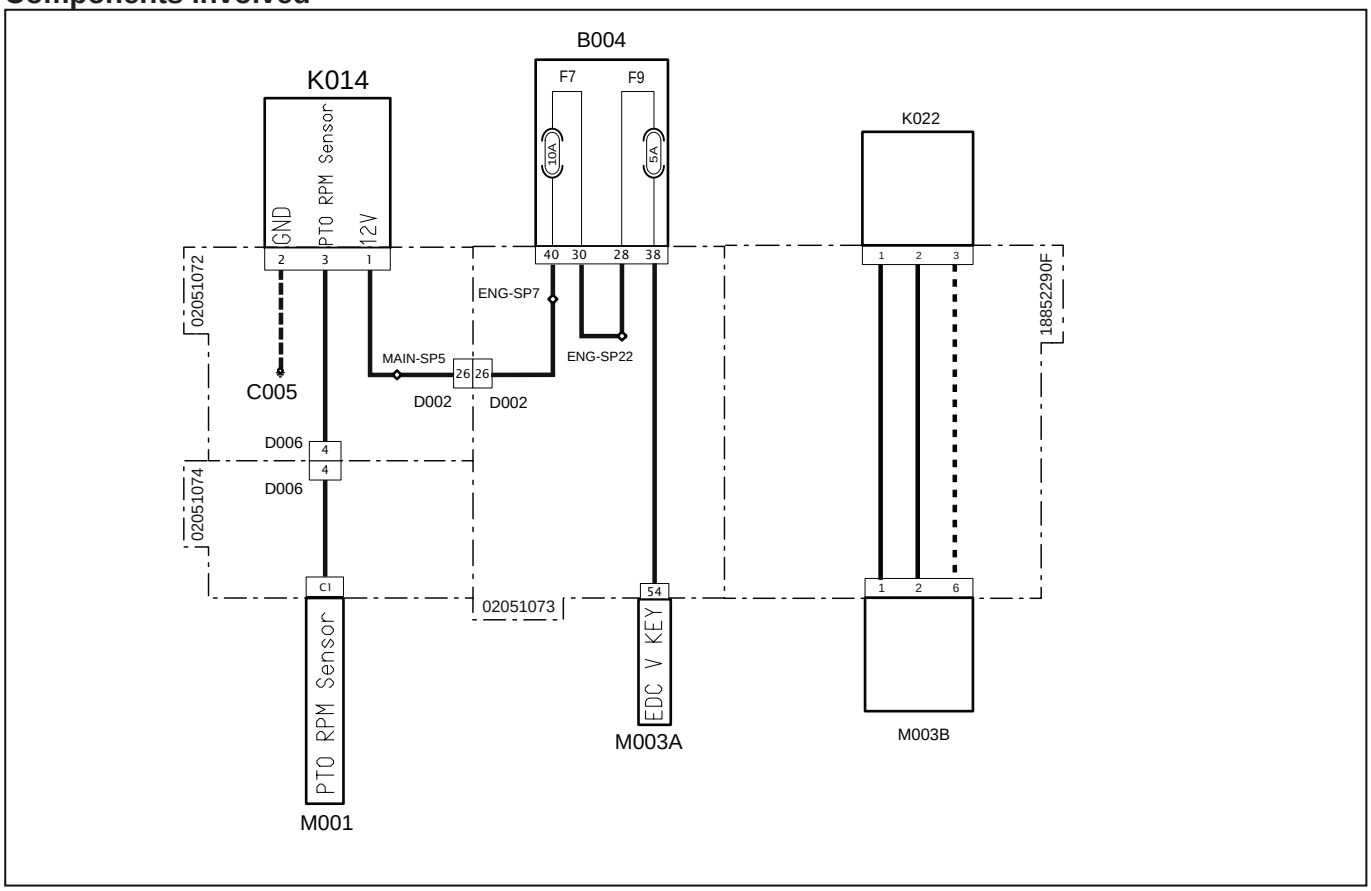
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check the condition of the PTO clutch
- Check for clutch disc wear and replace the discs if necessary
- Check the condition of the spring washer and replace if necessary
- Check the hydraulic clutch actuator system and check that the oil pressure in the system is around 20 bar

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R1-405)	P412	Main ground
K014 (pag.R1-381)	P518	PTO speed sensor
K022 (pag.R1-412)	XS2	Crankshaft speed sensor
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
F9(B004) (pag.R1-367)	F9	Key-on power feed for ECU (5A)
M003A (pag.R1-375)	P12	Engine control unit
M003B (pag.R1-407)	XECUA	Engine control unit

5007 - Clutch PTO slips when PTO brake is engaged

Description of fault

The electronic control unit detects that the hydraulic brake of the PTO is not working correctly and the PTO clutch is slipping

Severity of error

High

Additional information

Red indicator lamp flashing

The electronic control unit detects a difference in the speed readings received from the PTO and crankshaft speed sensors, which should return the same speed value. This may be due to a read error of the sensors, or to slippage between the discs of the PTO clutch.

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the crankshaft speed sensor, of the engine control unit, of the vehicle control unit and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

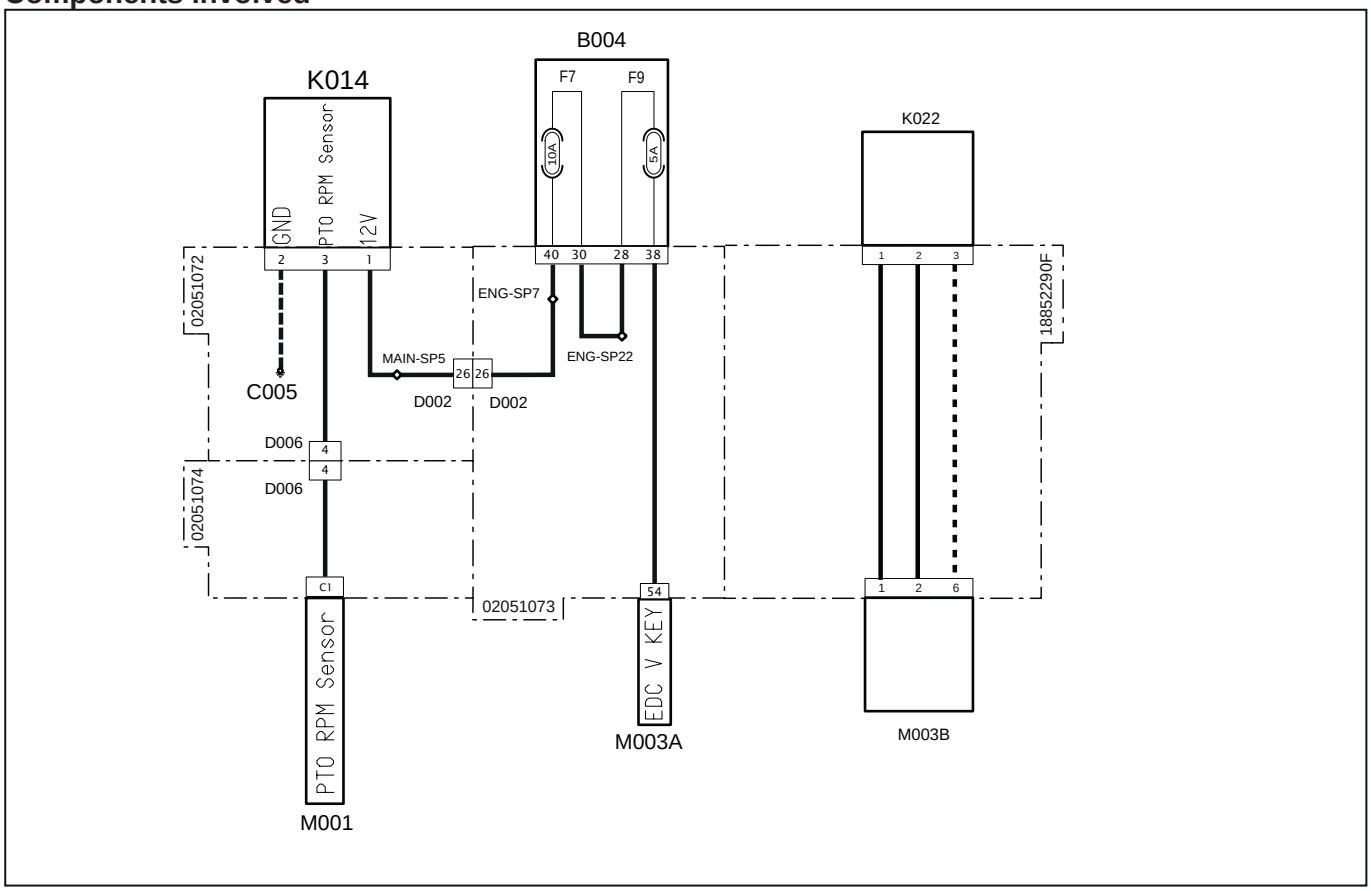
8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - If the problem persists, proceed to the next step

10 - Check the condition of the PTO brake
- Check the brake piston for wear and replace if necessary

11 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R1-405)	P412	Main ground
K014 (pag.R1-381)	P518	PTO speed sensor
K022 (pag.R1-412)	XS2	Crankshaft speed sensor
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
F9(B004) (pag.R1-367)	F9	Key-on power feed for ECU (5A)
M003A (pag.R1-375)	P12	Engine control unit
M003B (pag.R1-407)	XECUA	Engine control unit

5009 - Abnormal PTO speed sensor signal frequency

Description of fault

The electronic control unit detects an abnormal PTO speed sensor signal frequency or pulsing in the signal

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO speed sensor, the vehicle control unit and the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

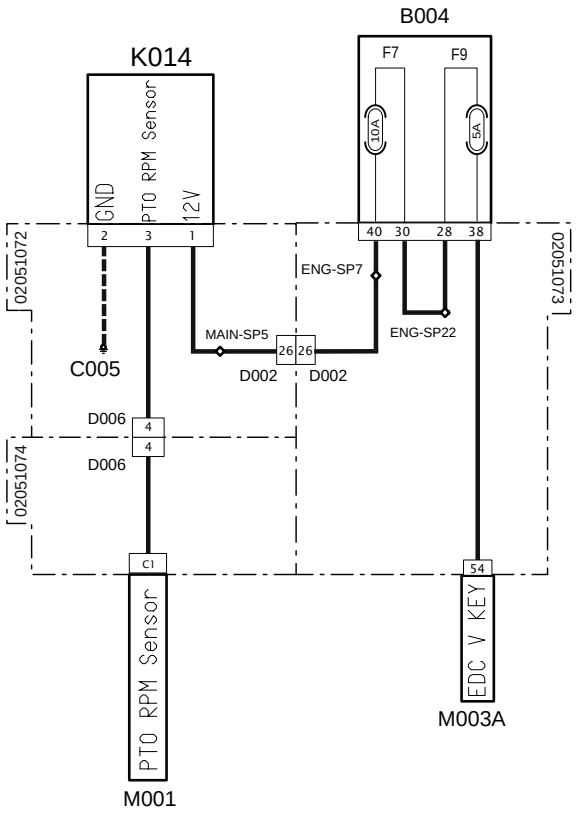
5 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R1-405)	P412	Main ground
K014 (pag.R1-381)	P518	PTO speed sensor
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
M003A (pag.R1-375)	P12	Engine control unit
F7(B004)(pag.R1-367)	F7	Sensors/switches (10A)
F9(B004)(pag.R1-367)	F9	Key-on power feed for ECU (5A)

5011 - PTO bypass circuit, short circuit to ground

Description of fault

The electronic control unit detects a short circuit to ground in the PTO bypass circuit

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO bypass button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

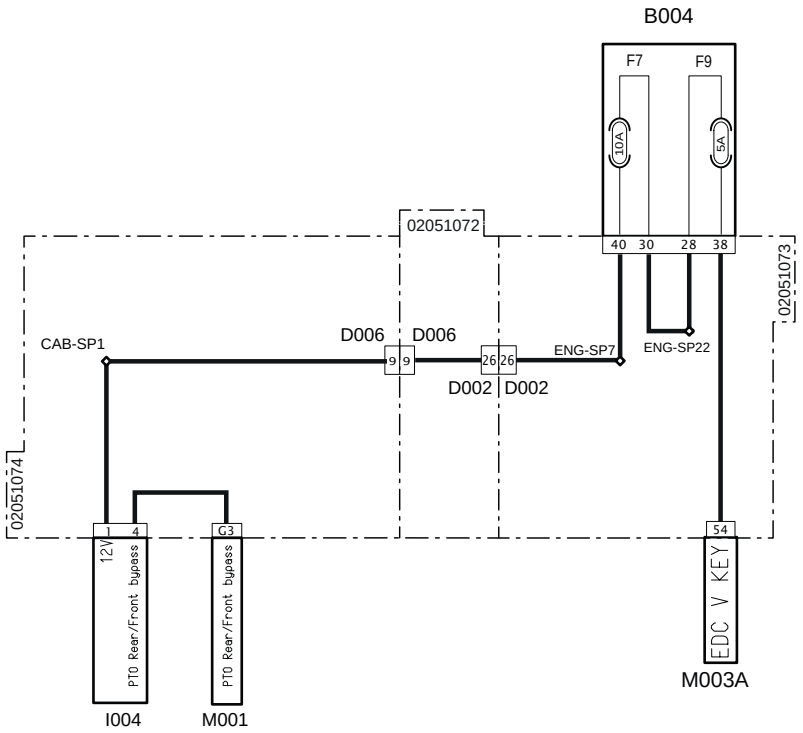
5 - Use the diagnostic tool to check function of the PTO bypass button (see the documentation of the diagnostic tool)
- Check if the PTO bypass button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
I004 (pag.R1-349)	P36	Front/Rear PTO bypass
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
F9(B004) (pag.R1-367)	F9	Key-on power feed for ECU (5A)
M003A (pag.R1-375)	P12	Engine control unit

5012 - PTO bypass circuit, short circuit to battery

Description of fault

The electronic control unit detects a short circuit to battery in the PTO bypass circuit

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO bypass button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

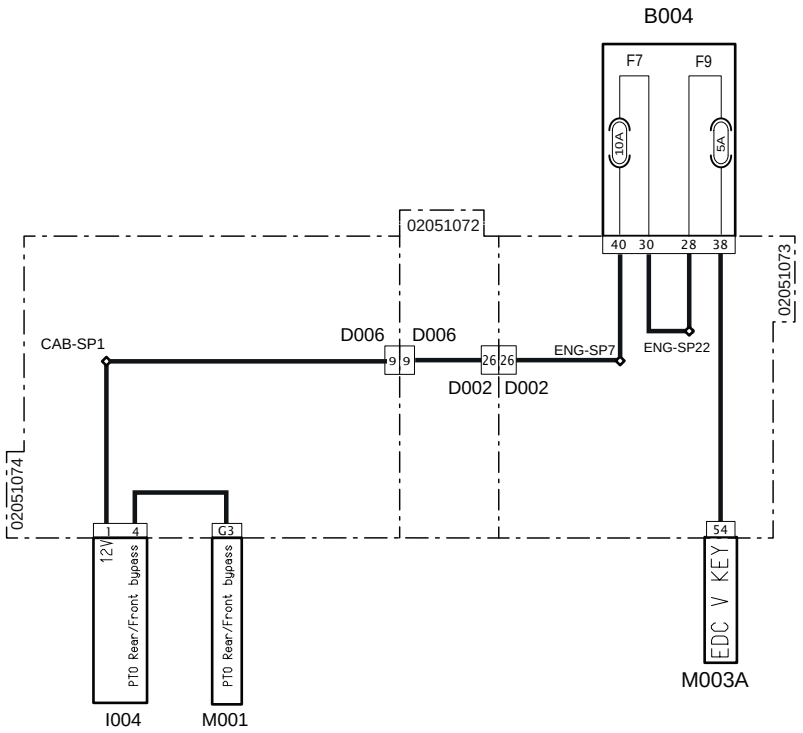
5 - Use the diagnostic tool to check function of the PTO bypass button (see the documentation of the diagnostic tool)
- Check if the PTO bypass button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved

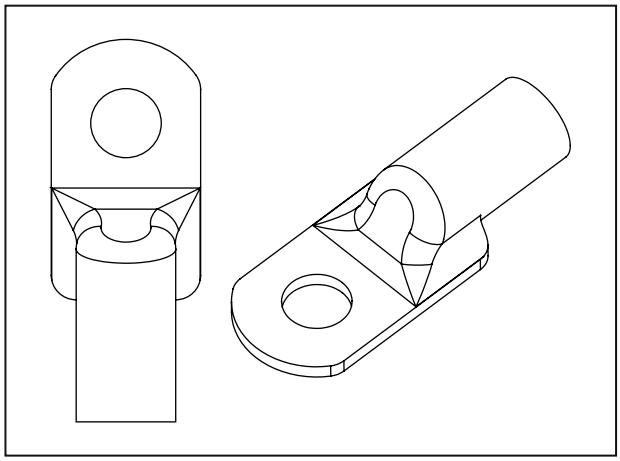


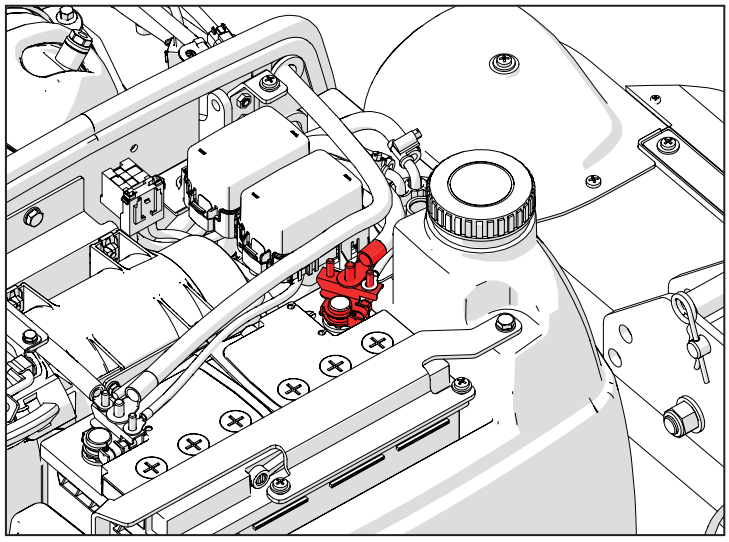
System code	Source code	Description
I004 (pag.R1-349)	P36	Front/Rear PTO bypass
M001 (pag.R1-397)	P80	Vehicle control unit
D006 (pag.R1-354)	P100B	Dashboard-main connector
D006 (pag.R1-352)	P100A	Main-dashboard connector
D002 (pag.R1-390)	P10B	Main-Engine connector
D002 (pag.R1-344)	P10A	Engine-Main connector
F7(B004) (pag.R1-367)	F7	Sensors/switches (10A)
F9(B004) (pag.R1-367)	F9	Key-on power feed for ECU (5A)
M003A (pag.R1-375)	P12	Engine control unit

Connector List

A001 (P11) Negative battery terminal

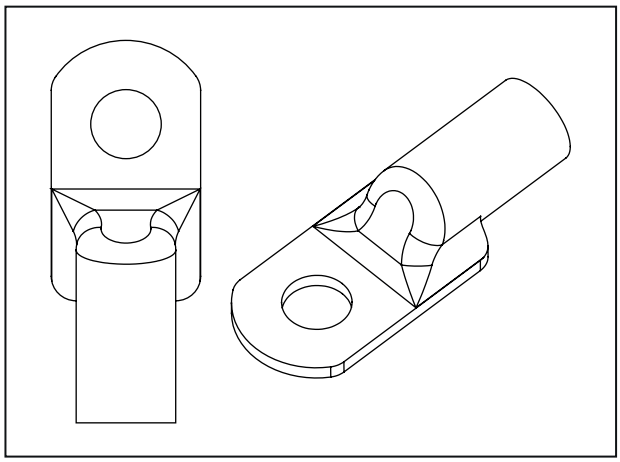
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	B-GND	BK	50	P66	1

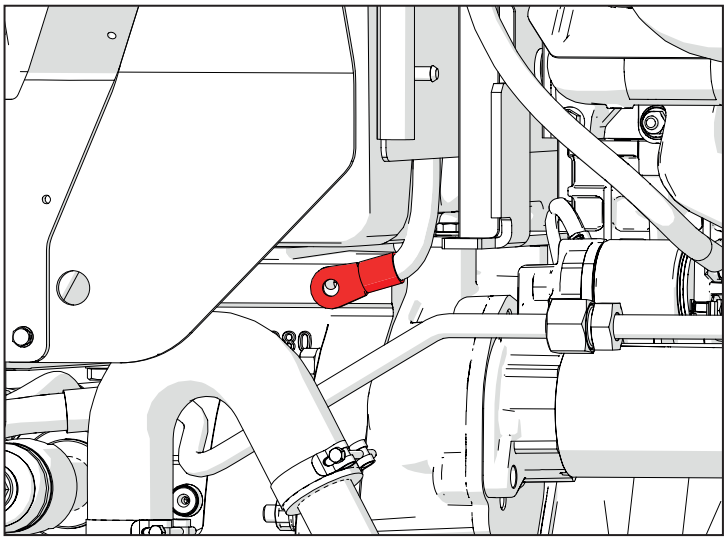




C001 (P66) Battery ground

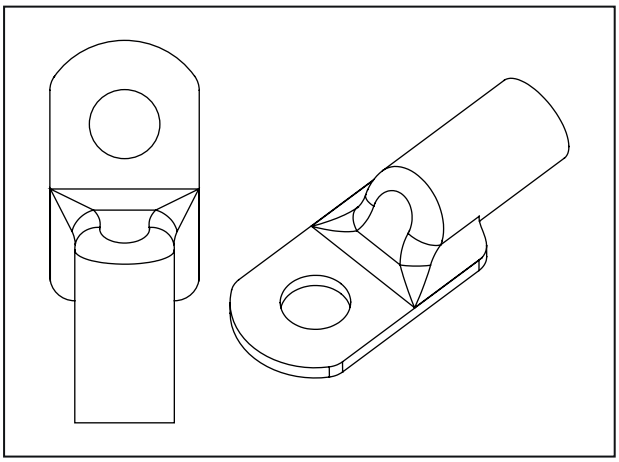
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	B-GND	BK	50	P11	1

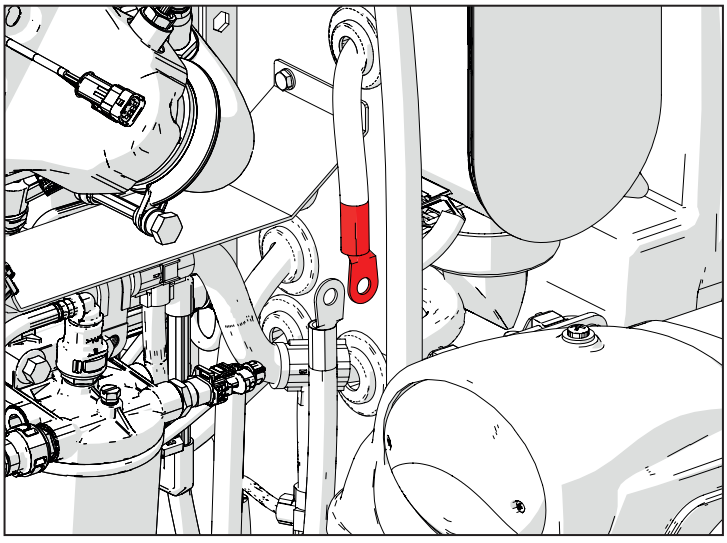




I001 (P39) Battery master switch (input terminal)

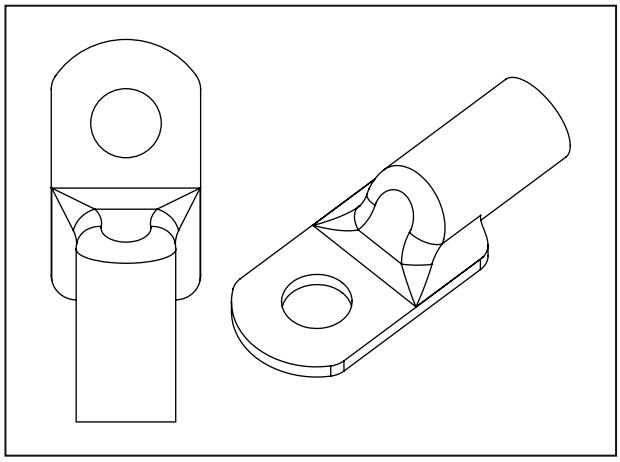
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BATTERY POSITIVE	Rd	50	P55	1

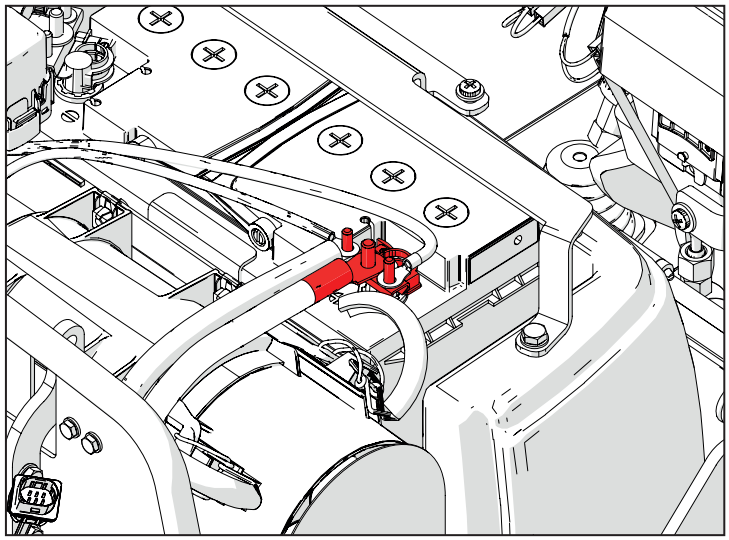




A002 (P55) Positive battery terminal

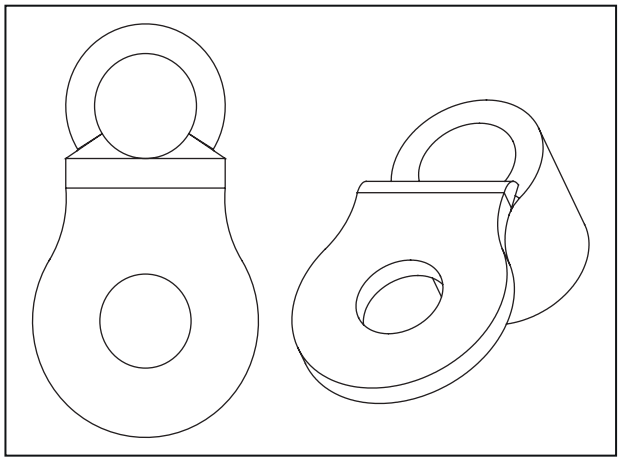
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BATTERY POSITIVE	Rd	50	P39	1

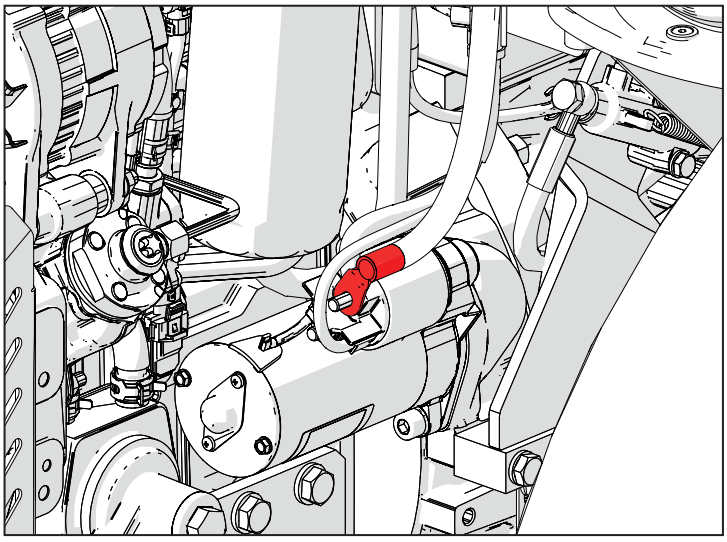




N001 (P10) Starter motor "30"

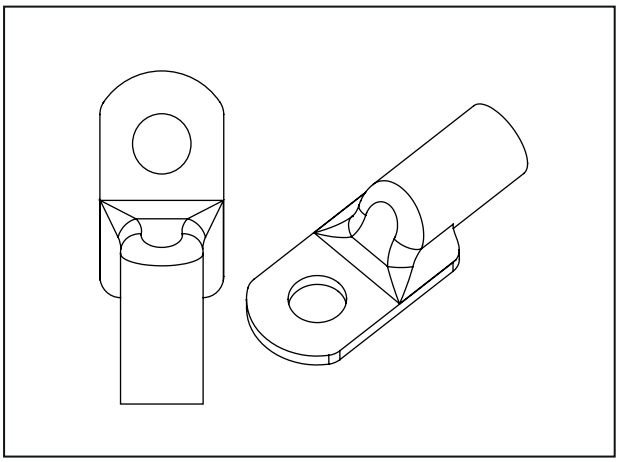
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	STARTER MOTOR INPUT	Rd	50	P23	1

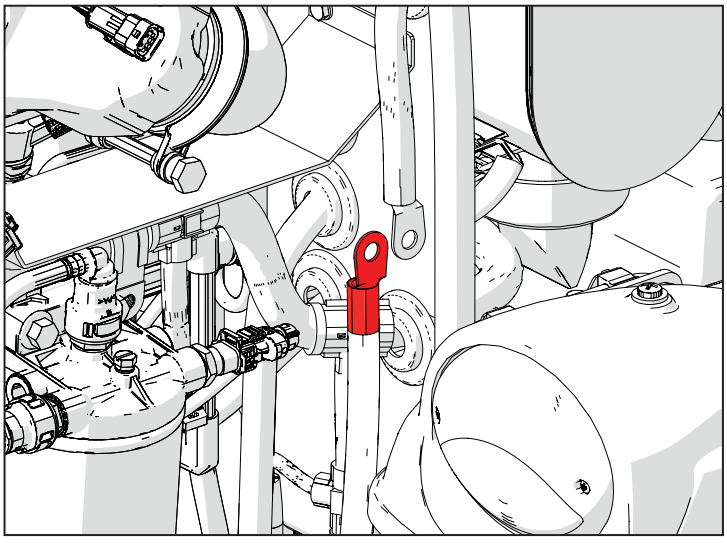




I002 (P23) Battery master switch (output terminal)

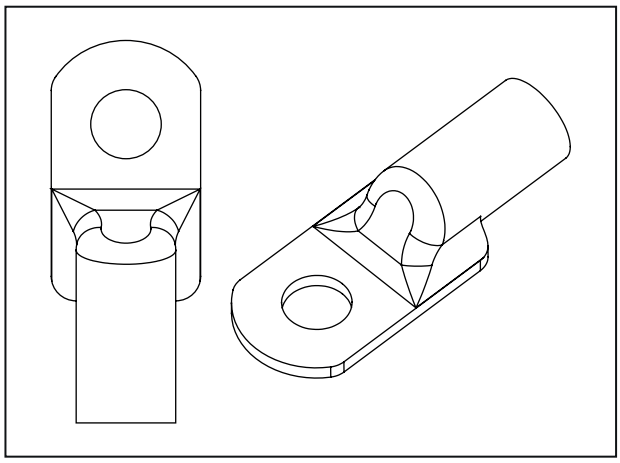
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	STARTER MOTOR INPUT	Rd	50	P10	1

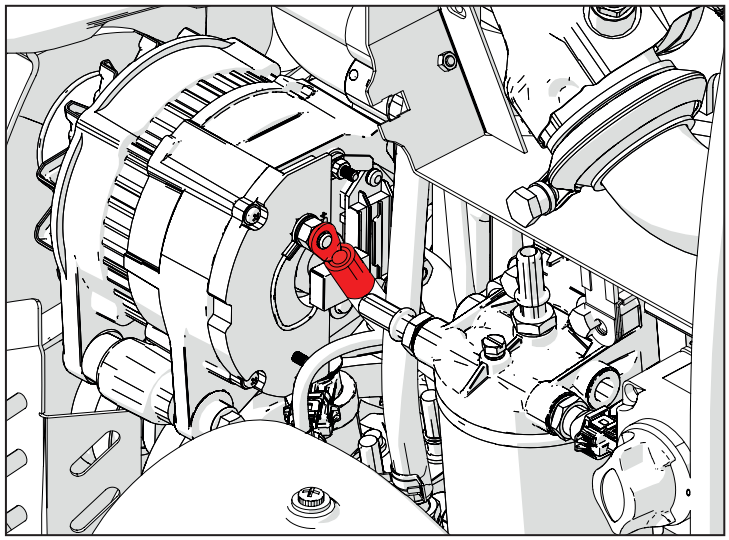




A003 (P65) Alternator power feed

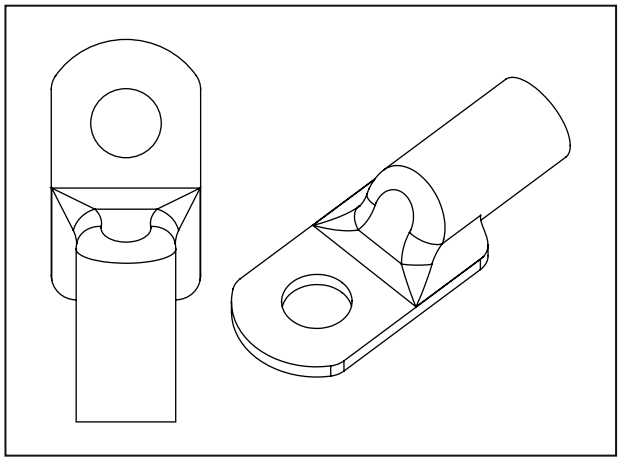
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR POWER FEED	Rd	25	P64	1

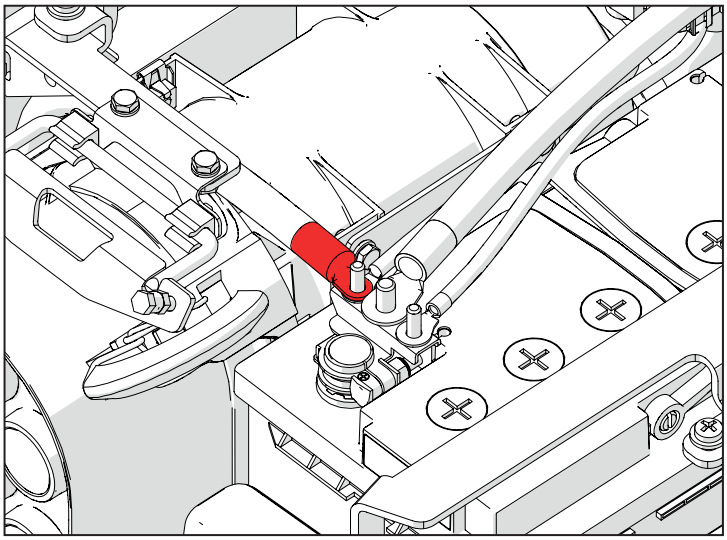




B001 (P64) Battery fuse input

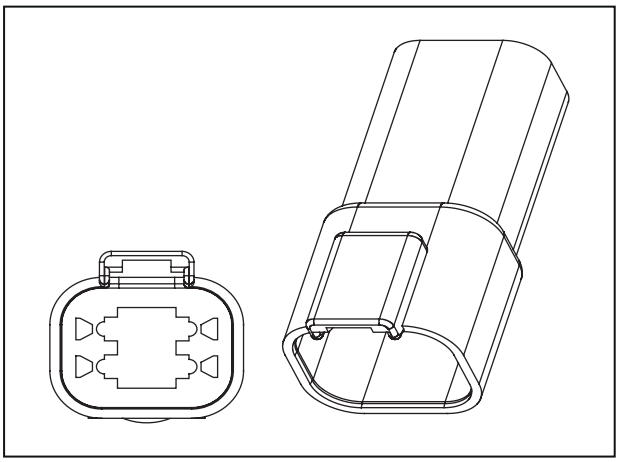
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR POWER FEED	Rd	25	P65	1

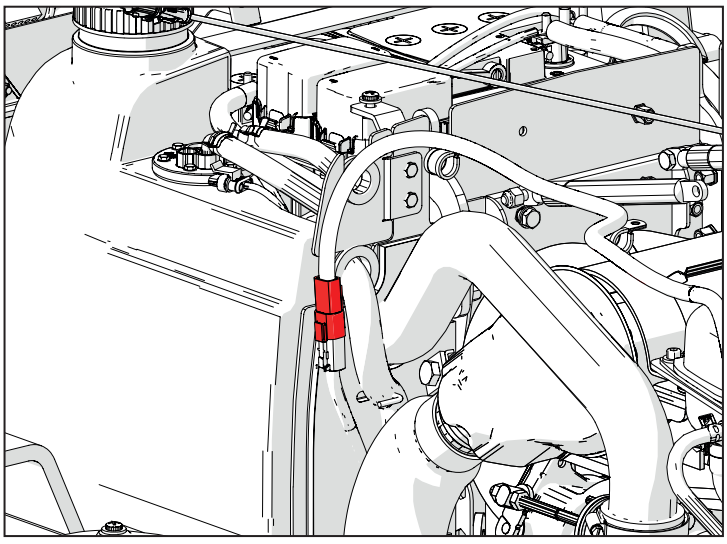




D004 (P20B) Wiring connector for engine wiring loom

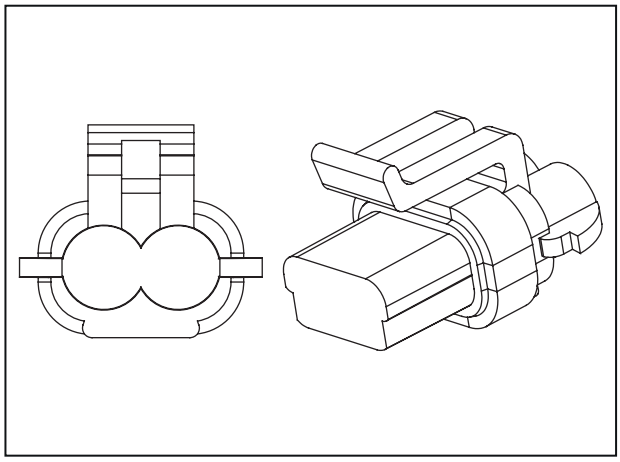
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HIGH BEAM LIGHTS	Pu	1.5	HOOD-SP2	
2	NORMAL BEAM LIGHT RH	Pu	1	P204	1
3	NORMAL BEAM LIGHT LH	Pu	1	P206	1
4	FRONT LIGHTS GND	BK	1.5	HOOD-SP1	

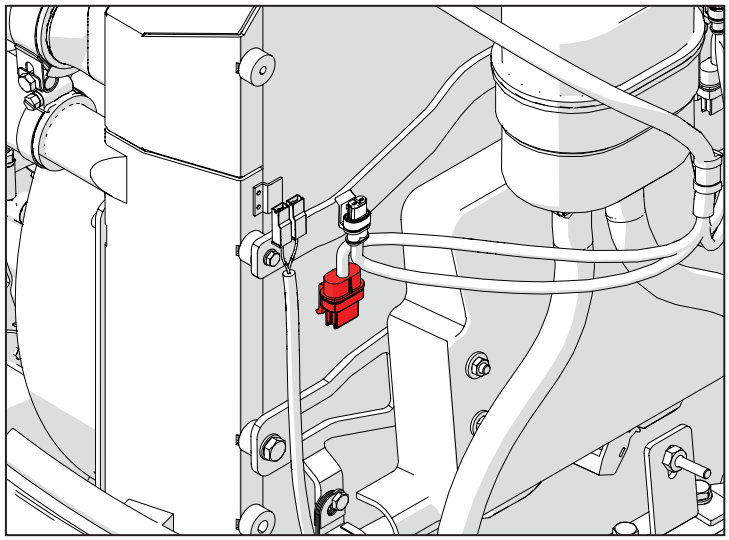




F009 (P203) RH high beam

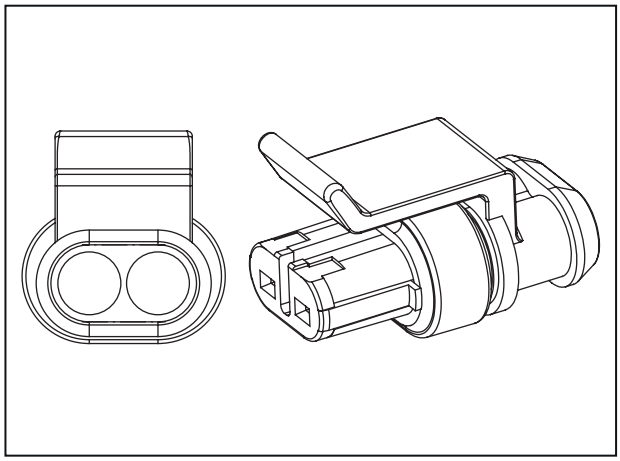
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	RH HIGH BEAM LIGHT	Pu	1	HOOD-SP2	
2	GND	BK	1	HOOD-SP1	

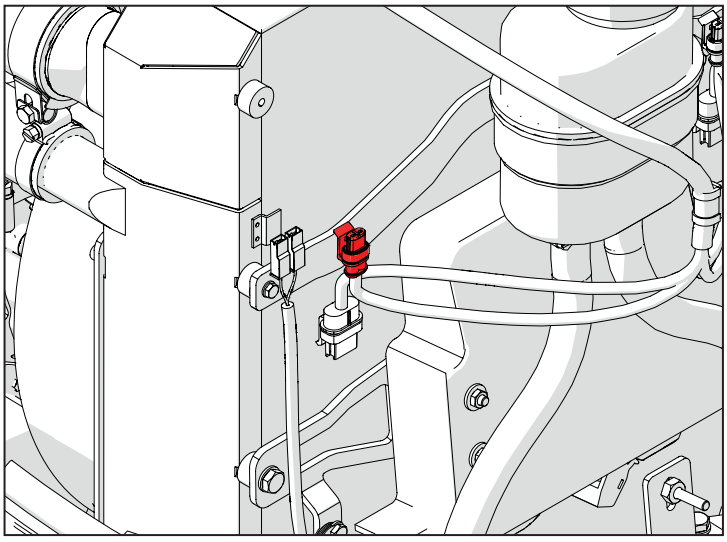




F010 (P204) RH low beam

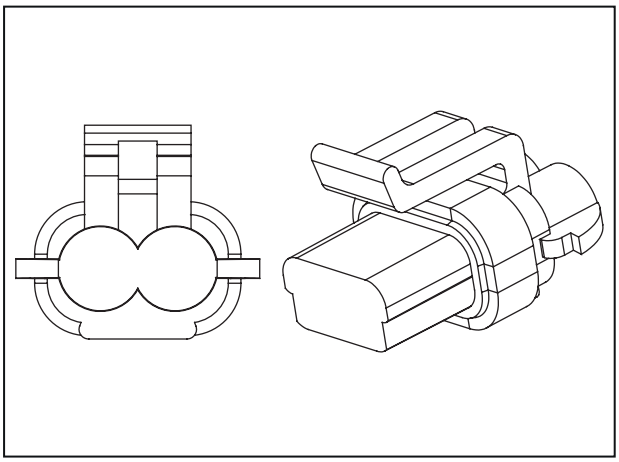
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	NORMAL BEAM LIGHT RH	Pu	1	P20B	2
2	GND	BK	1	HOOD-SP1	

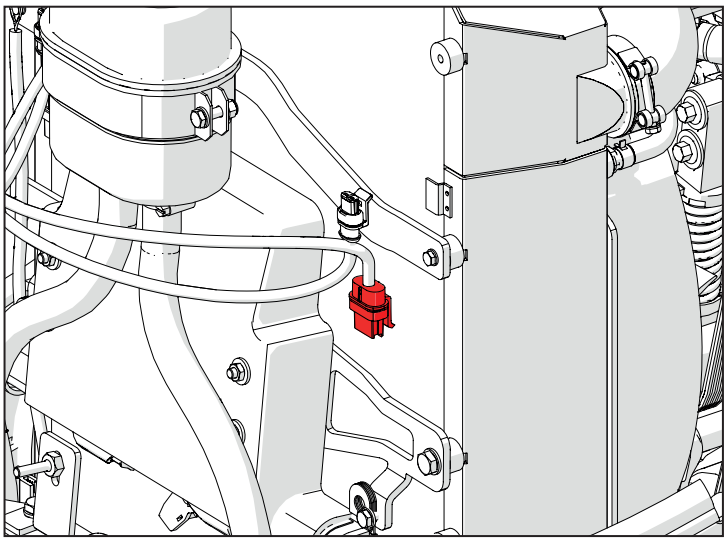




F008 (P205) LH high beam

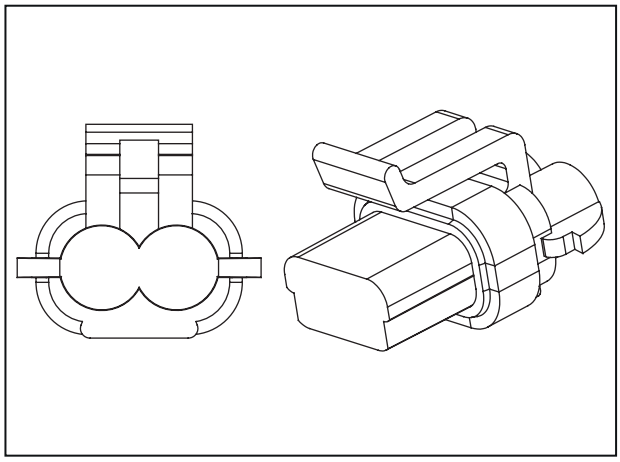
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	LH HIGH BEAM LIGHT	Pu	1	HOOD-SP2	
2	GND	BK	1	HOOD-SP1	

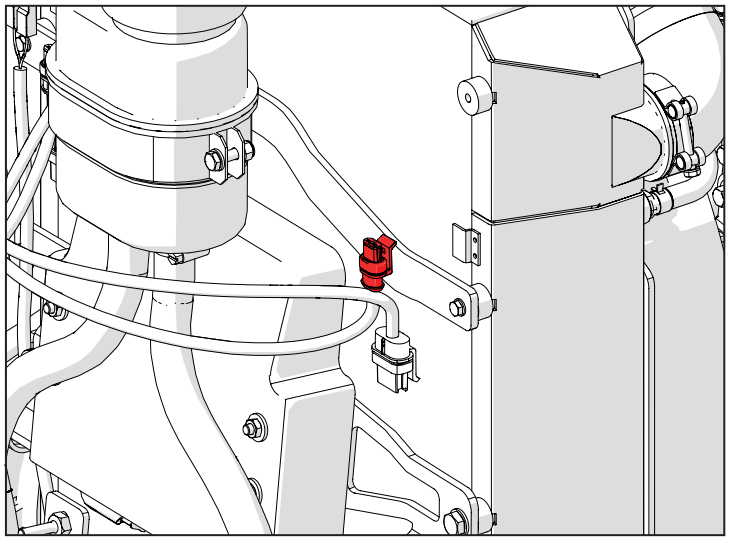




F007 (P206) LH low beam

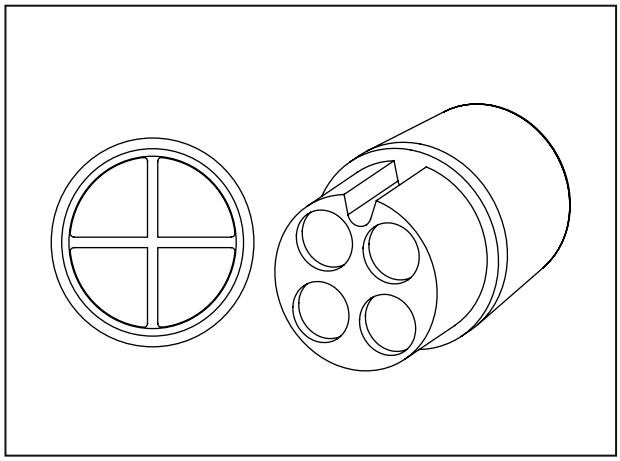
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	NORMAL BEAM LIGHT LH	Pu	1	P20B	3
2	GND	BK	1	HOOD-SP1	

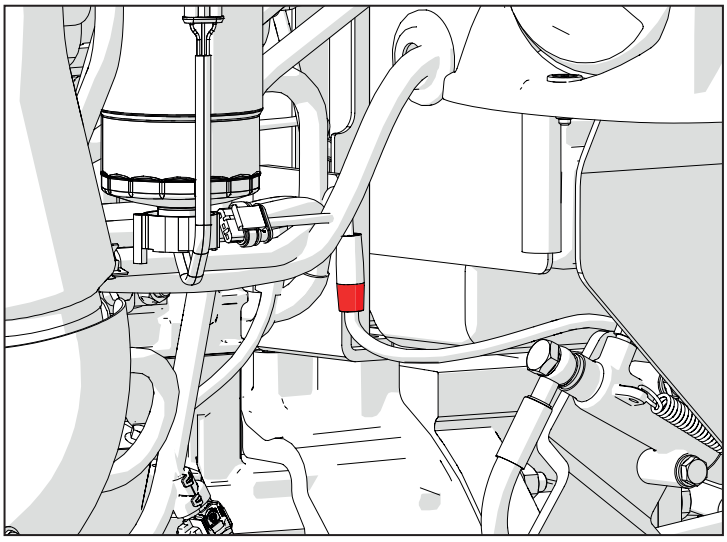




D003 (P40A) Wiring connector for engine wiring loom

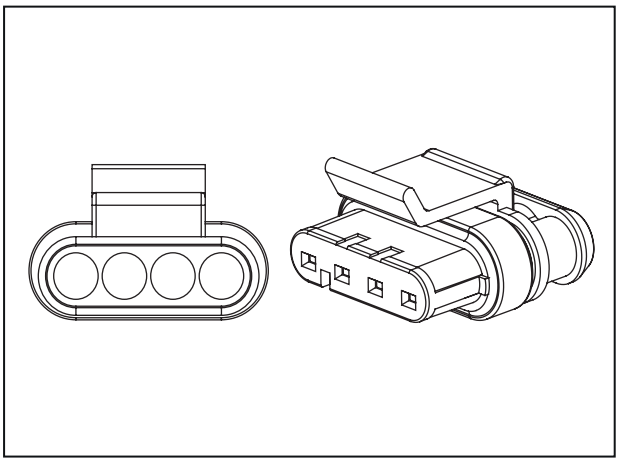
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS LH	Ye	0,75	P15	1
2	LEFT INDICATOR LIGHTS	Gn	0,75	P15	4
3	LH FENDER LIGHTS GND	BK	0,75	P15	3

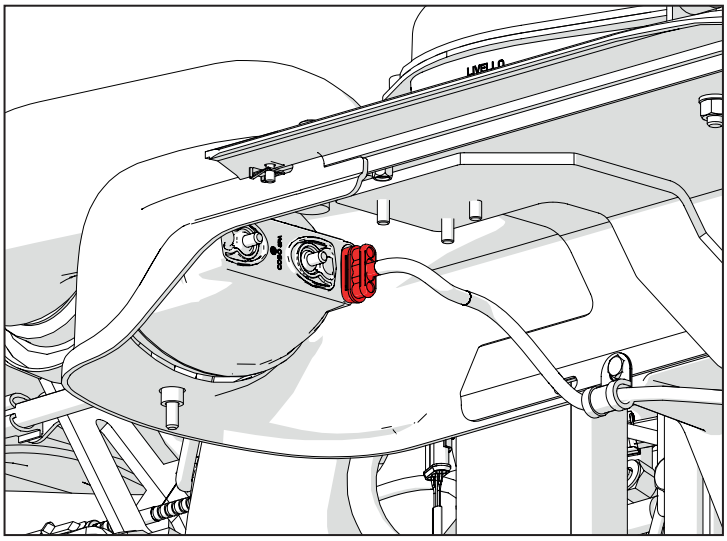




F011 (P15) LH turn indicator

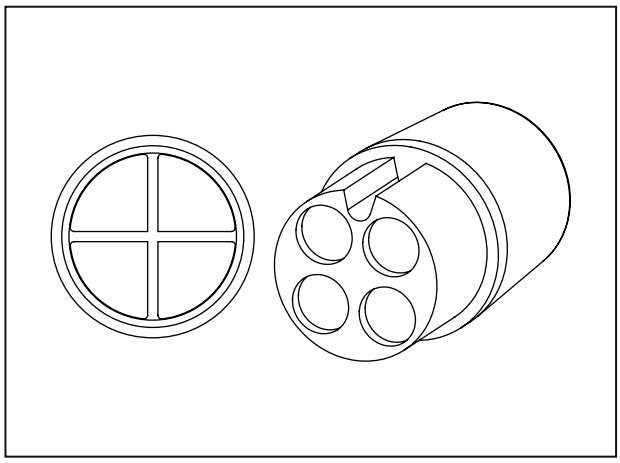
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS LH	Ye	0,75	P40A	1
3	LH FENDER LIGHTS GND	BK	0,75	P40A	3
4	LEFT INDICATOR LIGHTS	Gn	0,75	P40A	2

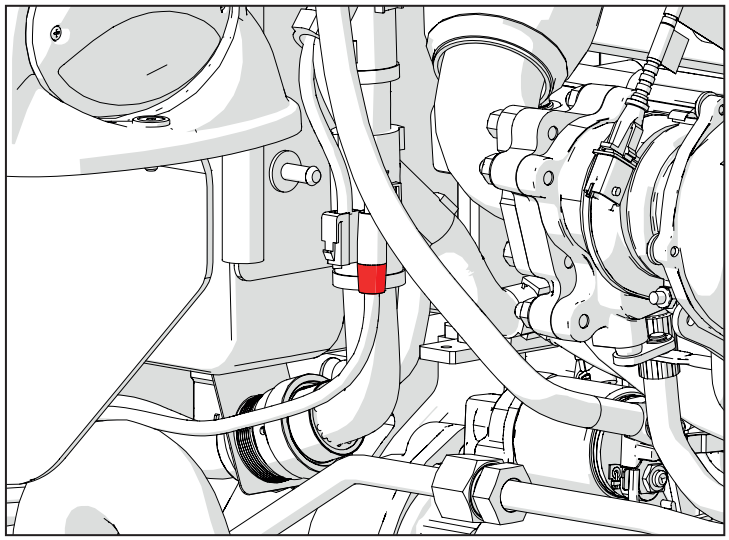




D001 (P50A) Wiring connector for engine wiring loom

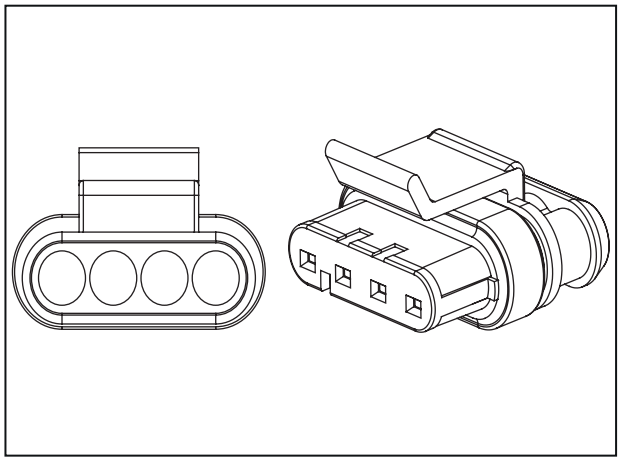
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	0,75	P14	1
2	RIGHT INDICATOR LIGHTS	Bu	0,75	P14	4
3	RH FENDER LIGHTS GND	BK	0,75	P14	3

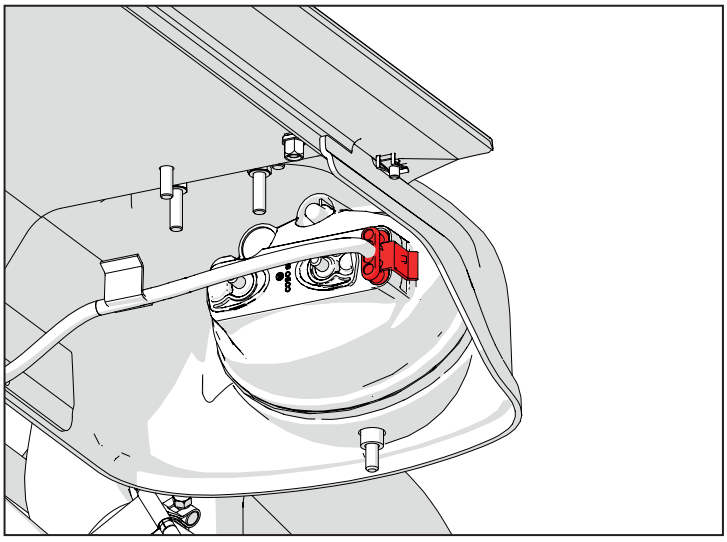




F012 (P14) RH turn indicator

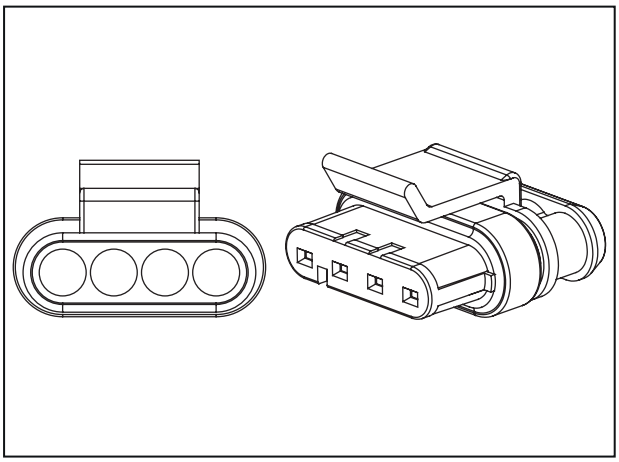
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	0,75	P50A	1
3	RH FENDER LIGHTS GND	BK	0,75	P50A	3
4	RIGHT INDICATOR LIGHTS	Bu	0,75	P50A	2

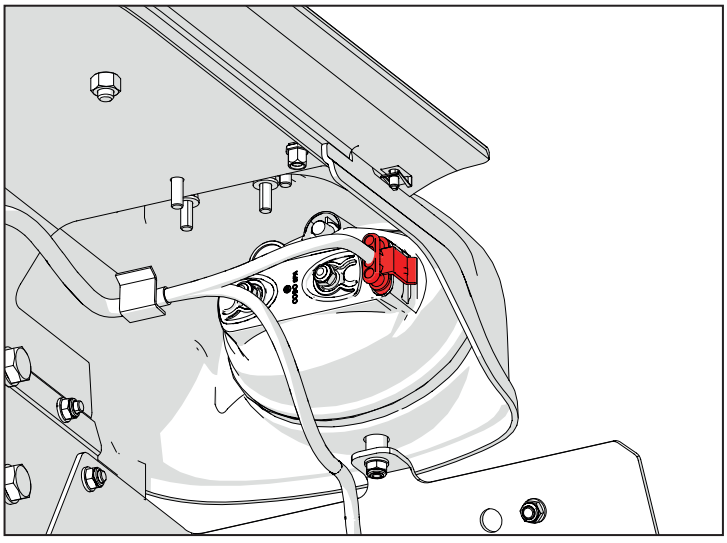




F013 (P225) LH rear mudguard lights

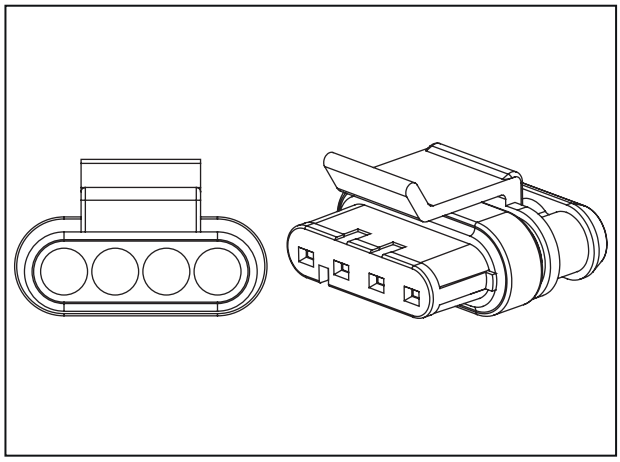
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LAMP	Rd	0,75	P43B	2
2	PARKING LIGHT	Ye	0,75	REARLH-SP2	
3	GND	BK	0,75	REARLH-SP1	
4	LH TURN SIGNAL	Gn	0,75	P43B	4

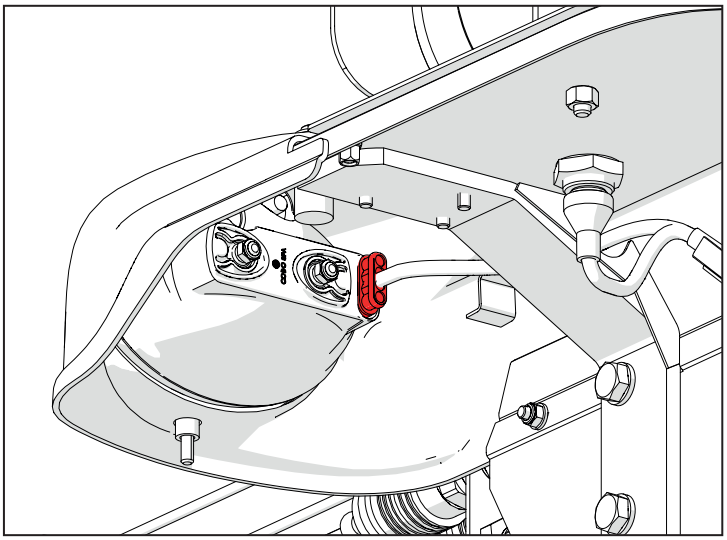




F016 (P464) RH rear mudguard lights

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LAMP	Rd	0,75	P42B	2
2	PARKING LIGHTS	Ye	0,75	REARRH-SP2	
3	GND REAR LIGHTS	BK	0,75	REARRH-SP1	
4	RH TURN SIGNAL	Bu	0,75	P42B	4

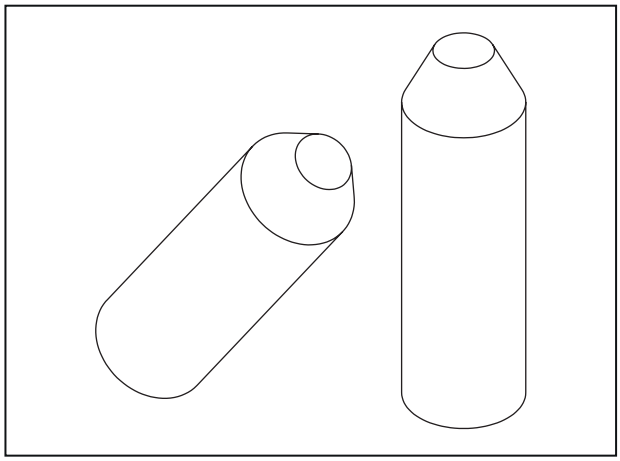


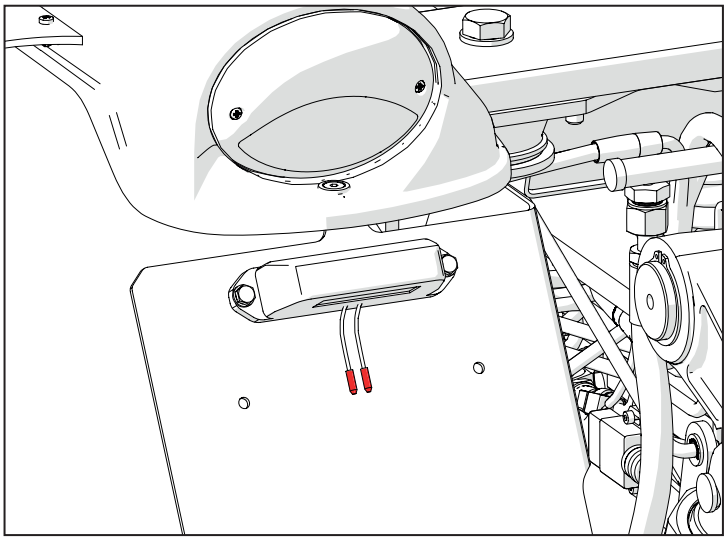


F014 (P478-P479) License plate light

Pin	Description	Colour	Sect.	Input Conn.	Pin.
1	GND	BK	0,75	REARLH-SP1	

Pin	Description	Colour	Sect.	Input Conn.	Pin.
1	PLATE LIGHT	Ye	0,75	REARLH-SP2	

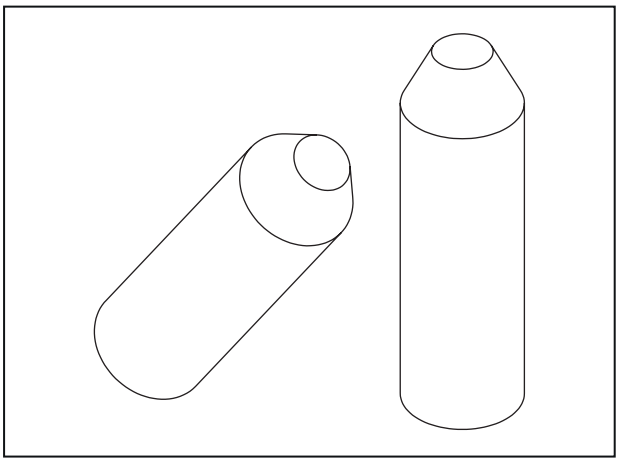


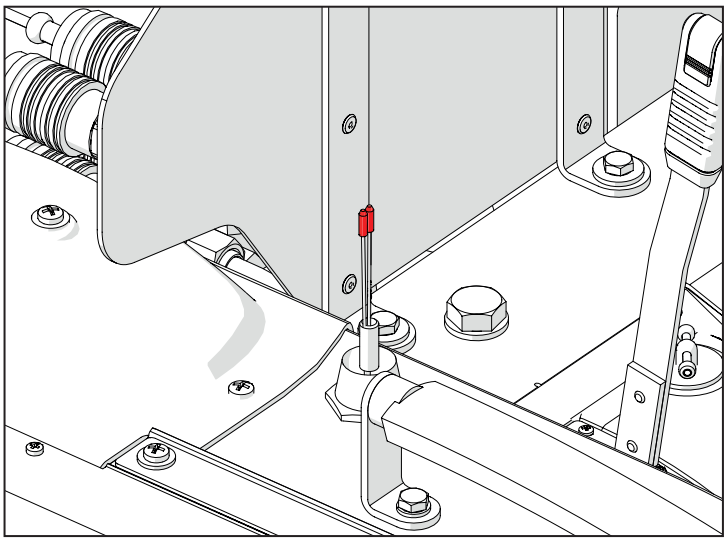


F015 (P486-P487) RH work lights

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	0.75	REARRH-SP1	

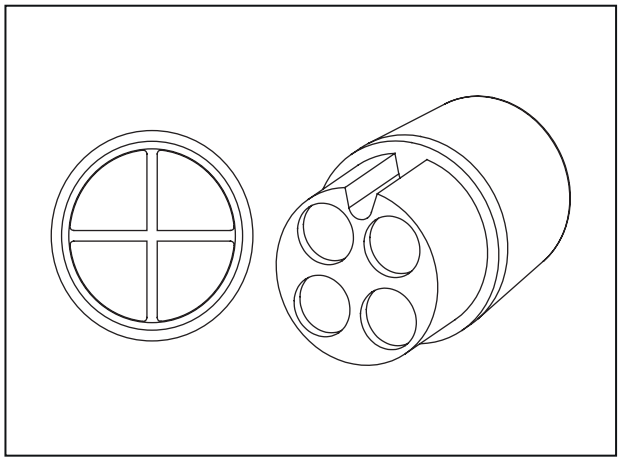
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	WORKING LIGHT	Ye	0,75	REARRH-SP2 .	

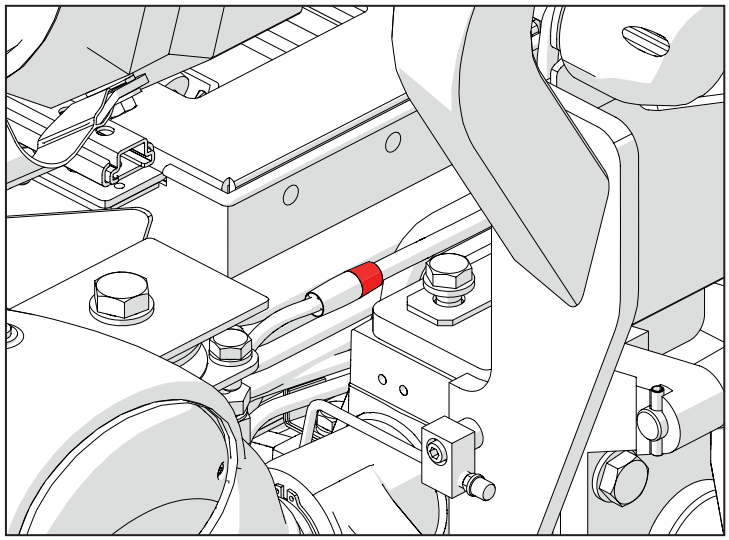




D008 (P42B) Right rear lights-main connector

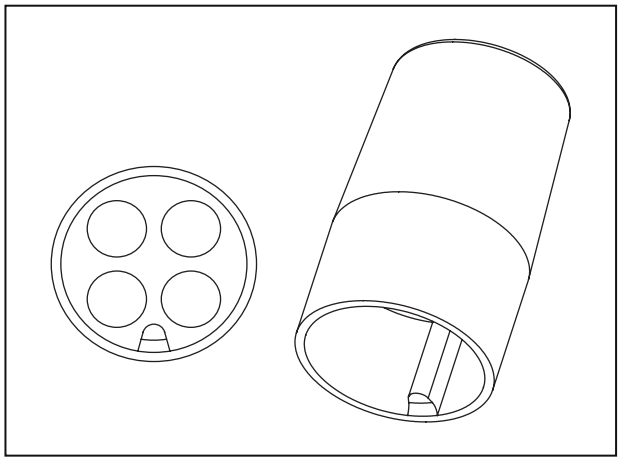
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT RH	Ye	0,75	REARRH-SP2	
2	BRAKE LAMP	Rd	0,75	P464	1
3	GND	BK	1	REARRH-SP1	
4	RH TURN SIGNAL	Bu	0,75	P464	4

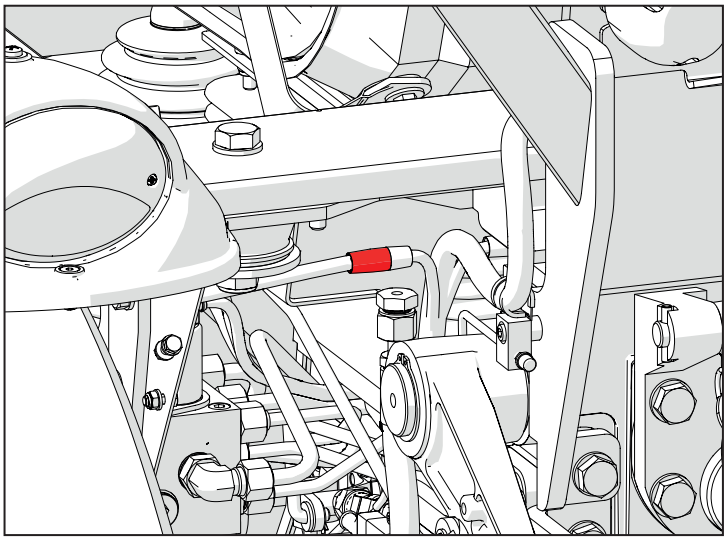




D009 (P43B) Left rear lights-main connector

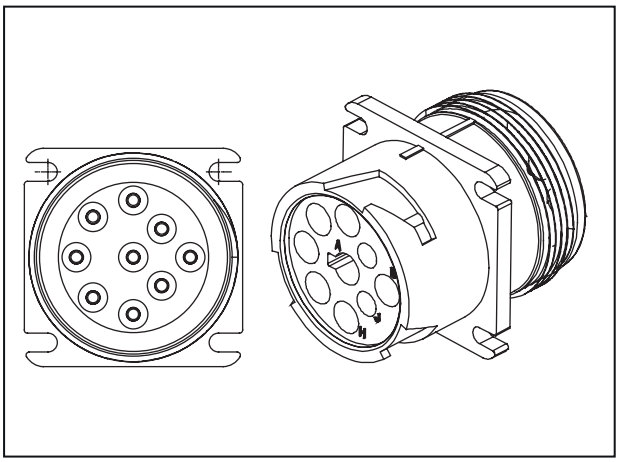
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT LH	Ye	0,75	REARLH-SP2	
2	BRAKE LAMP	Rd	0,75	P225	1
3	GND	BK	1	REARLH-SP1	
4	LH TURN SIGNAL	Gn	0,75	P225	4

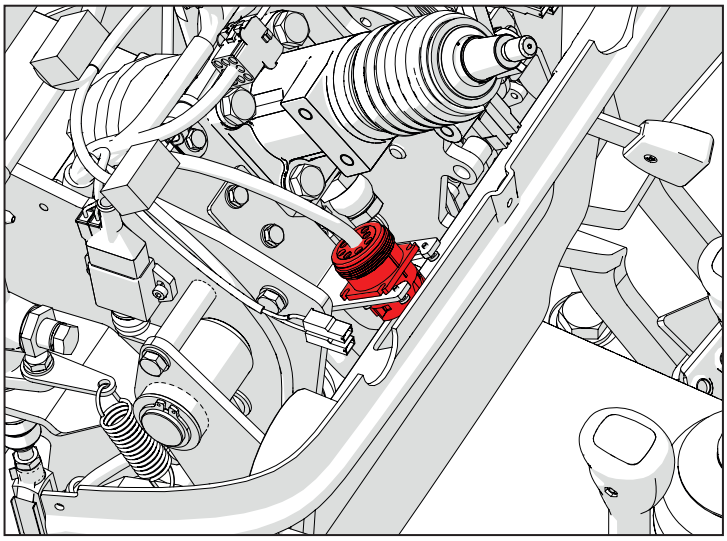




R001 (j9) Diagnostic port

Pin	Description	Colour	Sect.	Input Conn.	Pin
A	GND J1939	BK	1.5	P13	1
B	VJ1939 POWER SUPPLY	Rd	1.5	P100B	15
C	CAN H	Ye	0.5	CAB-SP12	
D	CAN L	Gn	0.5	CAB-SP14	

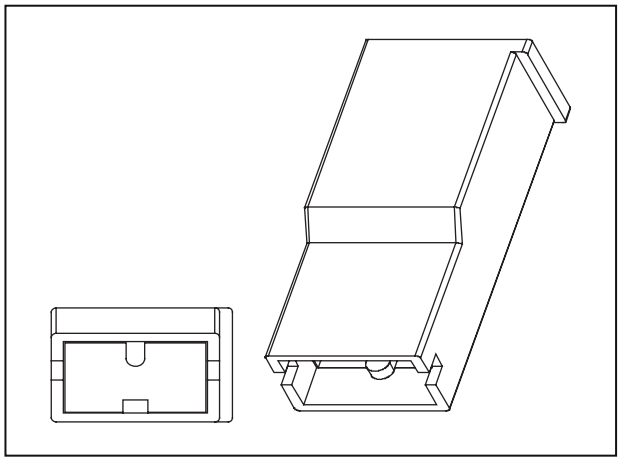


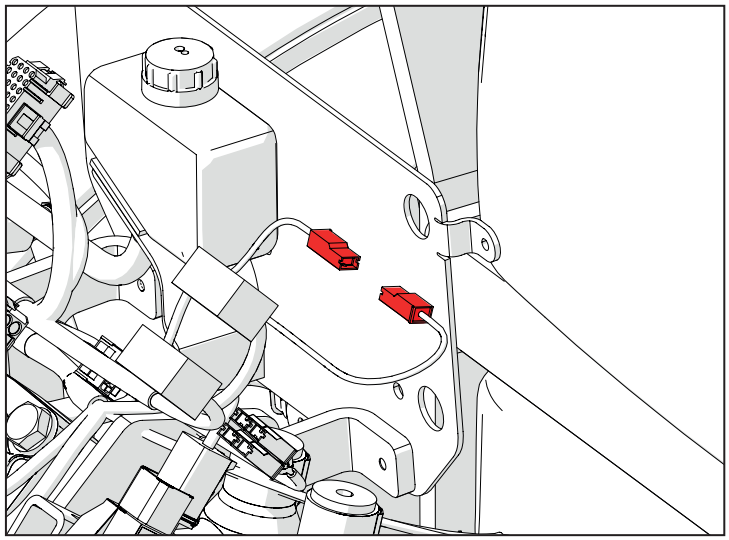


K012 (P19-P20) Brake oil level sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE OIL LEVEL	Gn	0.5	P80	D1

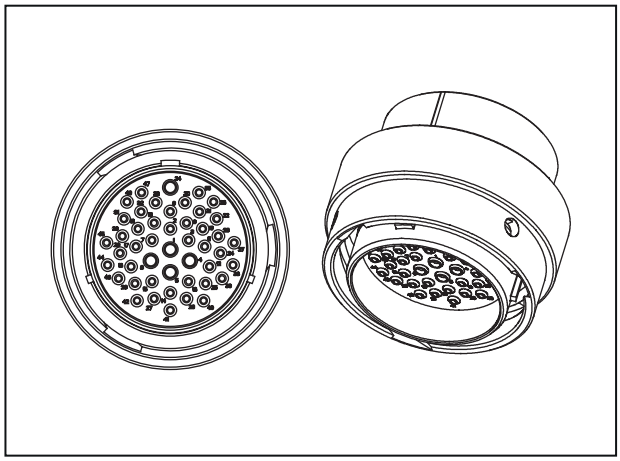
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	





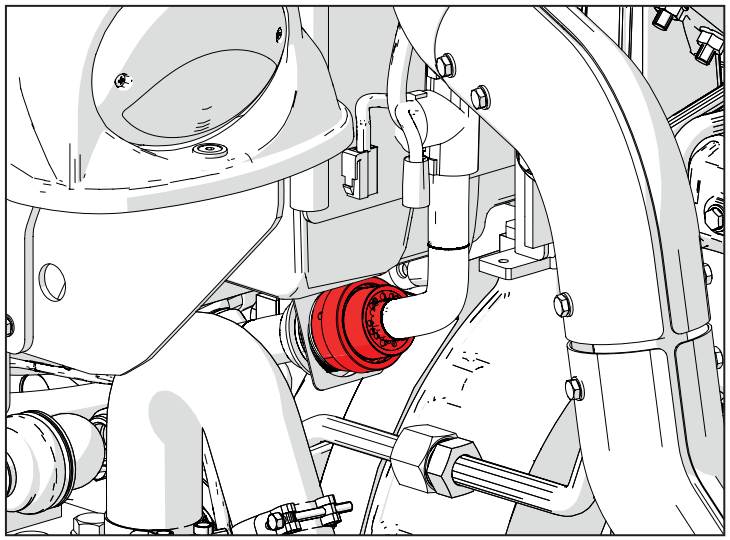
D002 (P10A) Wiring connector for main wiring loom

Pin	Description	Colour	Sect.	.Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	ENG-SP17	
2	FUEL LEVEL SENSOR	Bu	0.5	P40	2
3	START COMMAND	Bu	0.5	P1A	1
4	12V BATT SUPPLY	Rd	2.5	ENG-SP17	
5	V KEY	Bn	2.5	ENG-SP22	
6	V KEY	Bn	2.5	ENG-SP21	
7	BRAKE LAMP RELAY	WH	0.5	P1A	43
8	TURN INDICATORS	Or	0.75	P1A	39
9	V-KEY DASH	Bn	0.5	P1A	19



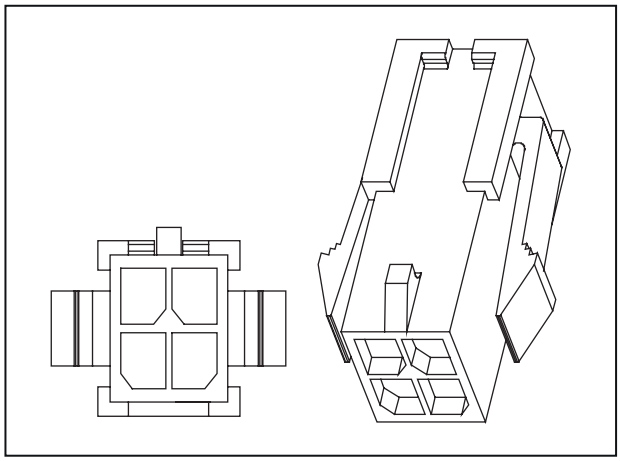
10	START ENABLE RELAY	Or	0.5	P1A	12
11	DPF REGENERATION INHIBIT SW	BK	0.5	P12	44
12	HORN/SOCKET V KEY	Pu	1.0	ENG-SP25	
13	HIGH BEAM	Gn	0.5	P1A	14
14	NORMAL BEAM LIGHTS	Gy	0.5	P1A	34
15	VCU V BATT	Rd	1.5	P1A	58
16	PARKING LIGHTS	Ye	1.5	ENG-SP23	
17	ALTERNATOR D+	Bu	0.75	P2	1
18	DASHBOARD V-BATT	Rd	0.75	P1A	59
19	VJ1939 POWER SUPPLY	Rd	1.5	P2A	12
20	START ENABLE SENSOR	Rd	0.5	ENG-SP3	
21	VCU V KEY	Bn	0.5	P1A	18
22	RELAY FOR DASHBOARD LED	Or	0.5	P1A	41
23	LED FOR DASH	Gn	0.5	P1A	42
24	AIR FILTER	Gn	0.5	P439	1
25	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P12	43
26	SENSORS V-KEY	Bn	1.5	ENG-SP7	
27	VALVES V KEY	Pu	1.0	ENG-SP25	
28	HORN POWER SUPPLY	Pu	0.75	P152	1
29	BRAKE LAMP	Rd	0.75	P1A	35
30	PARKING LIGHTS RH	Ye	1.0	ENG-SP16	
31	HAZARD LIGHTS CONTROL	Rd	0.75	P1A	60
32	REAR PARKING LIGHT LH	Ye	1.0	ENG-SP14	
33	BEACON LIGHT SUPPLY	Pu	1.0	P41	2
34	POWER SOCKET SUPPLY	Rd	2.5	P2A	21
35	GND	BK	0.5	P40	3
36	V KEY	Bn	1.5	P1A	57
37	LEFT INDICATOR LIGHT	Gn	0.75	P40B	2
38	RIGHT INDICATOR LIGHT	Bu	0.75	P50B	2

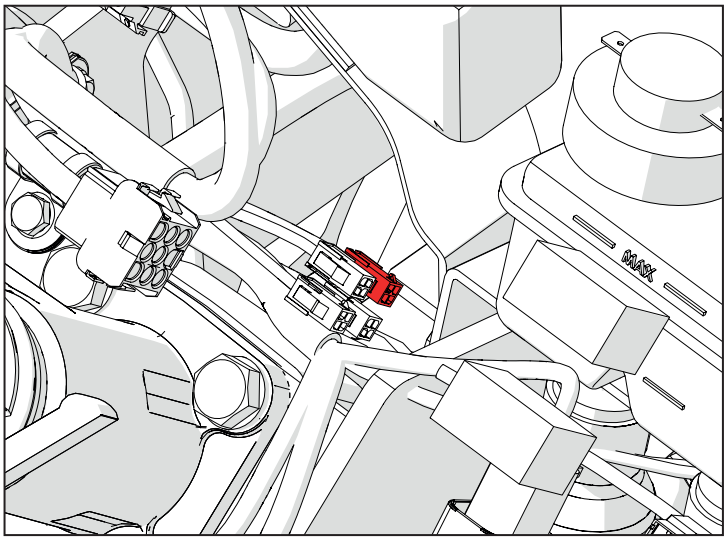
39	DPF REGENERATION INHIBIT SW	Bn	0.5	ENG-SP7	
46	CAN L	Gn	0.5	ENG-SP12	
47	CAN H	Ye	0.5	ENG-SP11	



I007 (P31) Instrument panel ENTER button

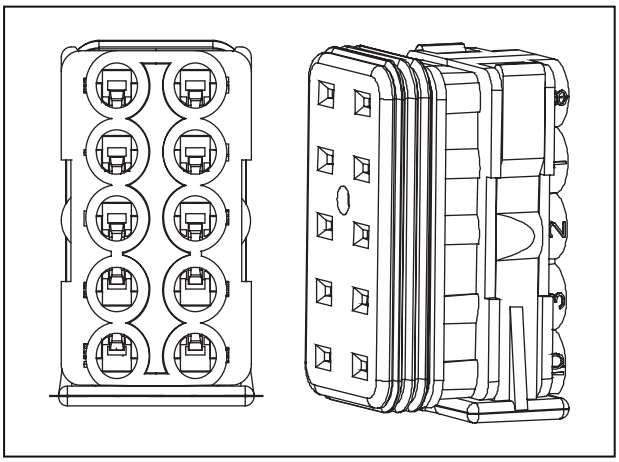
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	DASHBOARD PB ENTER	Bu	0.5	P200	25

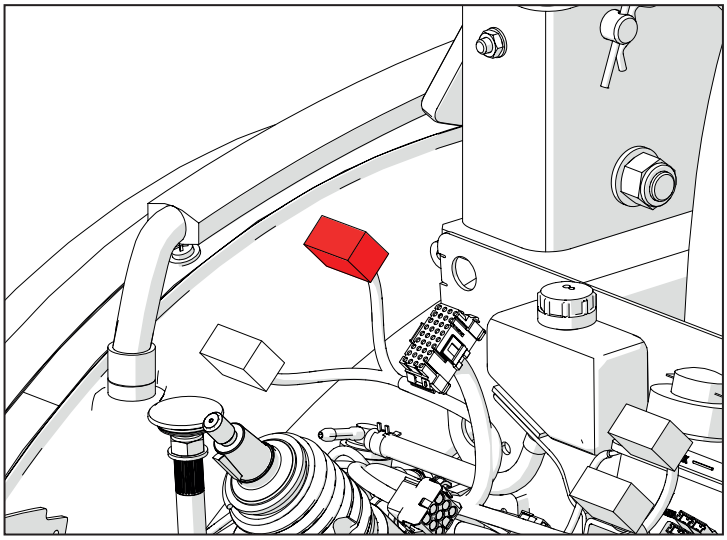




I006 (P32) Regeneration cycle disable switch

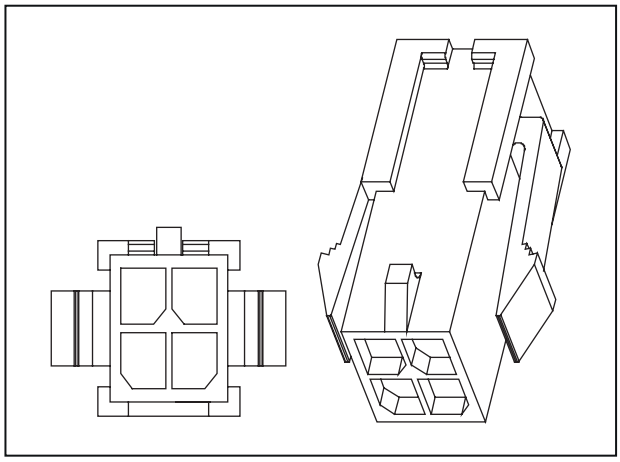
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	DPF REGENERATION INHIBIT SW	Or	0.5	P80	J4
2	DPF REGENERATION INHIBIT SW	Bu	0.5	P100B	44
3	DPF REGENERATION TRIGGER SWITCH	Gn	0.5	P80	D4

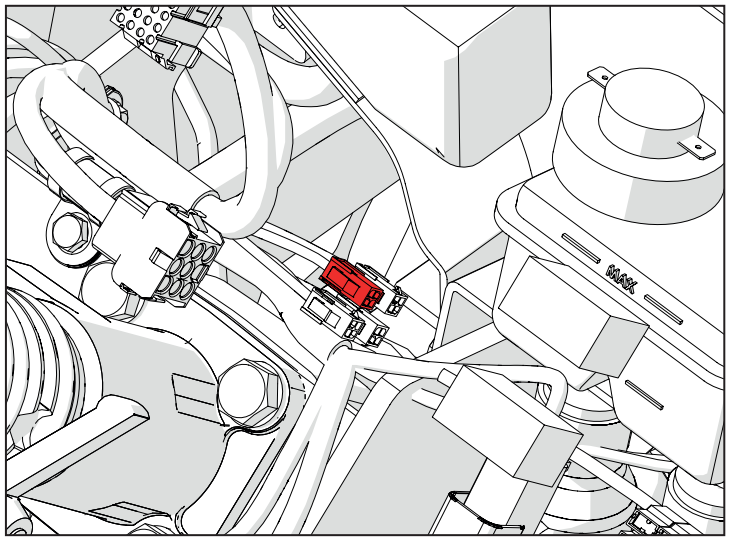




I008 (P34) Instrument panel + button

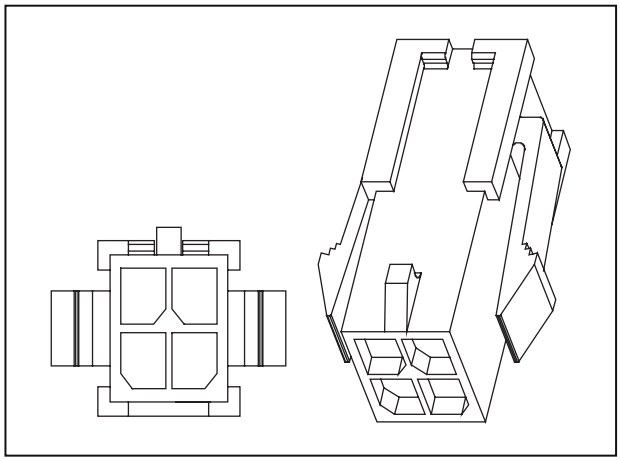
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	DASHBOARD PB +	Bu	0.5	P200	24

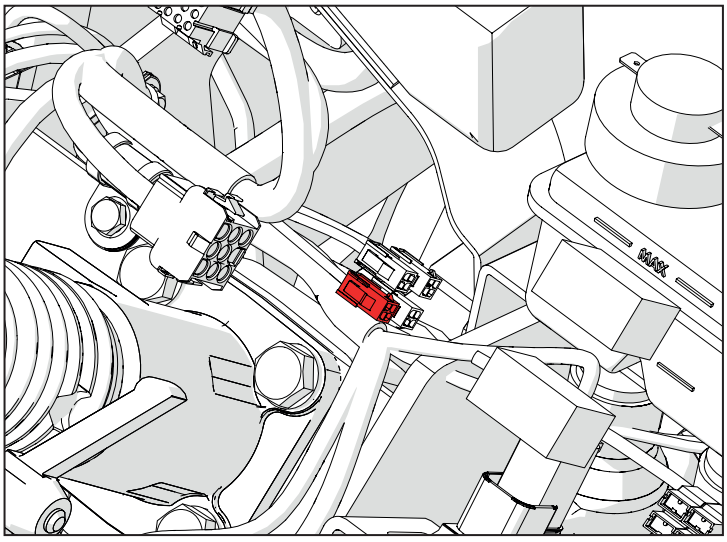




I009 (P35) Instrument panel - button

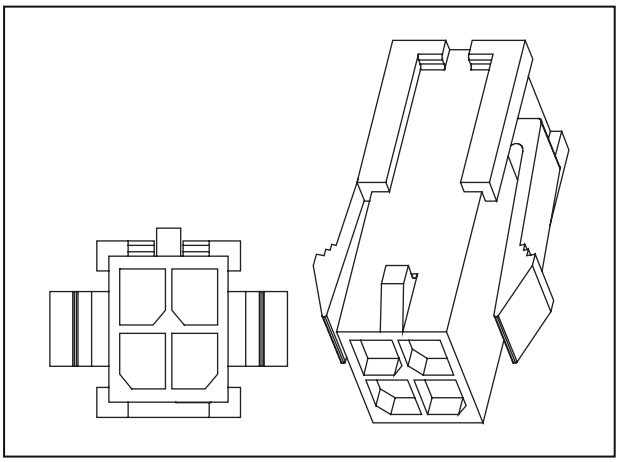
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	DASHBOARD PB -	Bu	0.5	P200	20

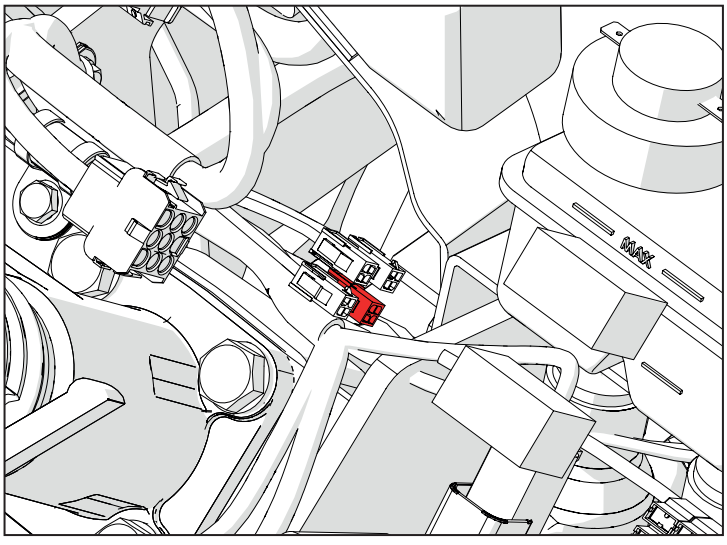




I004 (P36) Auto PTO switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	PB - PTO Rear/ Front bypass	Bu	0.5	P80	G3





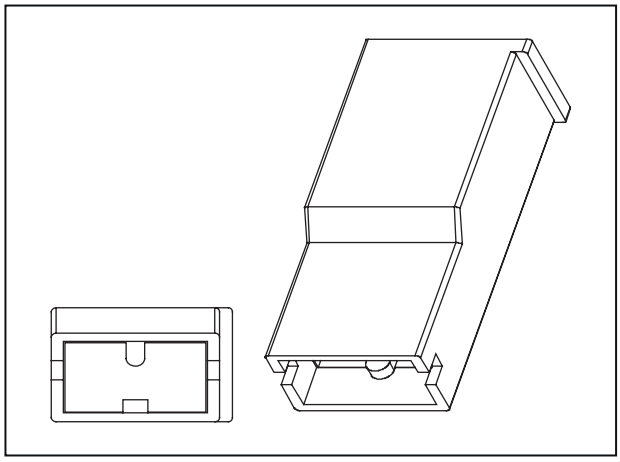
I010 (P504-P505-P506-P508) PTO start enable signal / dashboard indicator signal

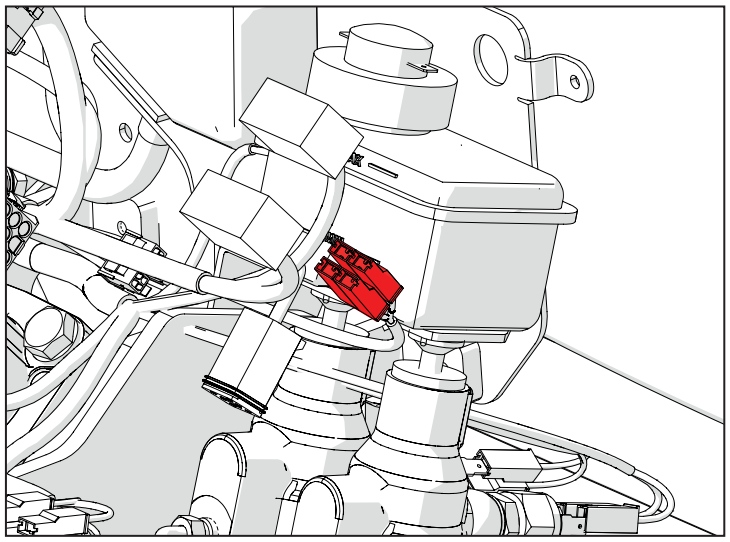
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear A	Pu	0.5	P80	F2

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear B	Pu	0.5	P80	G1

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear ENGAGED	Bn	0.5	CAB-SP1	

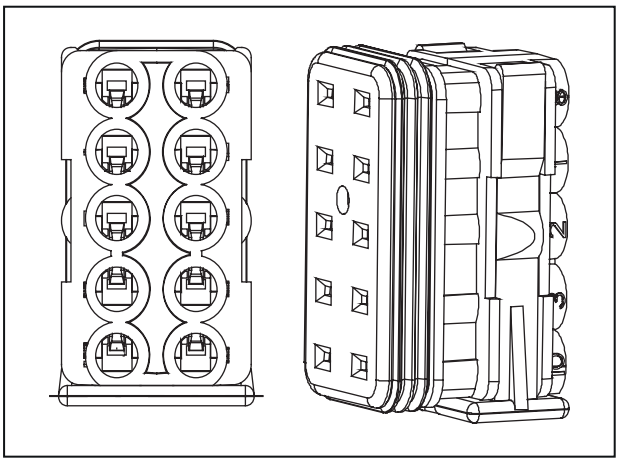
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO REAR ENGAGED	Bn	0.5	CAB-SP1	

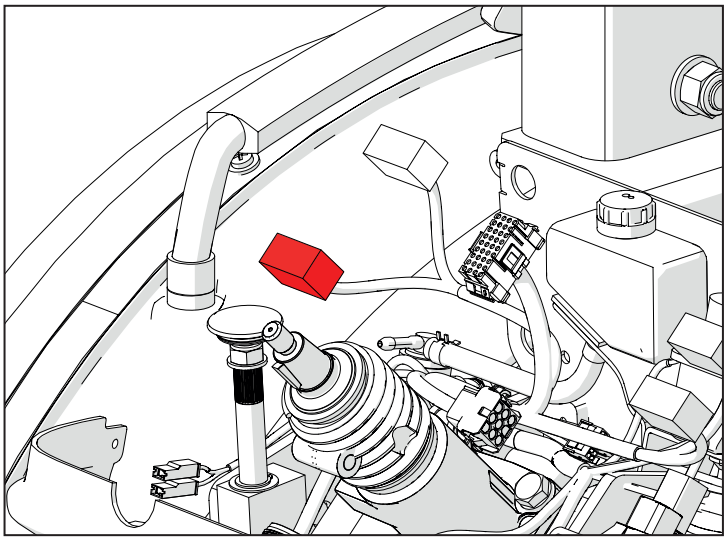




I005 (P62) Hydraulic differential lock switch

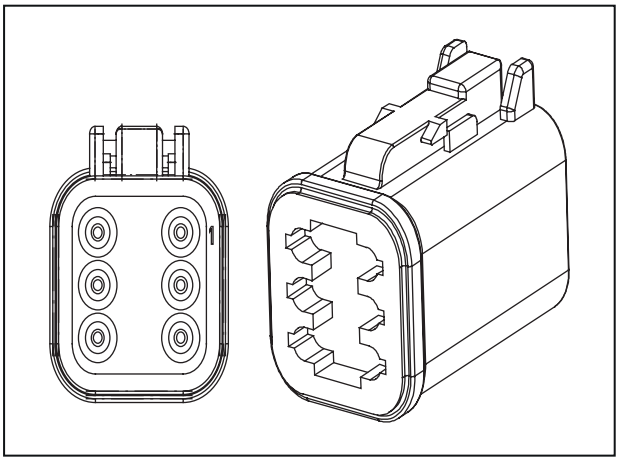
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	PB - Differential lock on/off	BK	0.5	CAB-SP2	
3	PB - Differential lock on/off	Bu	0.5	P80	K4

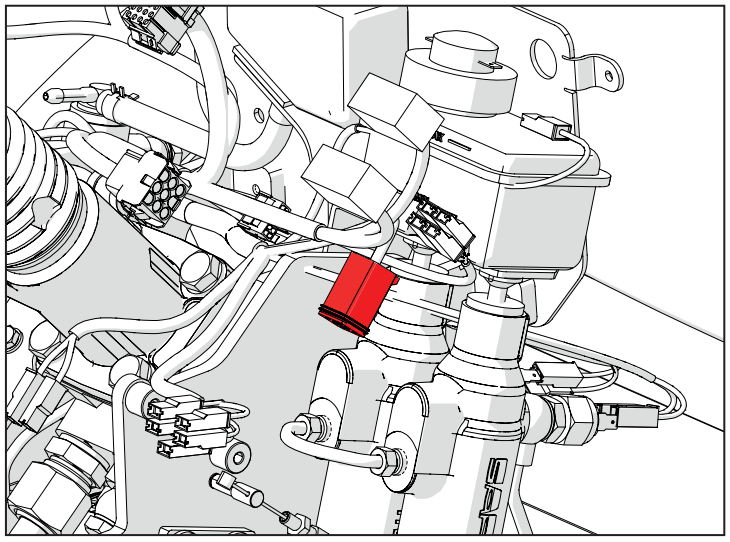




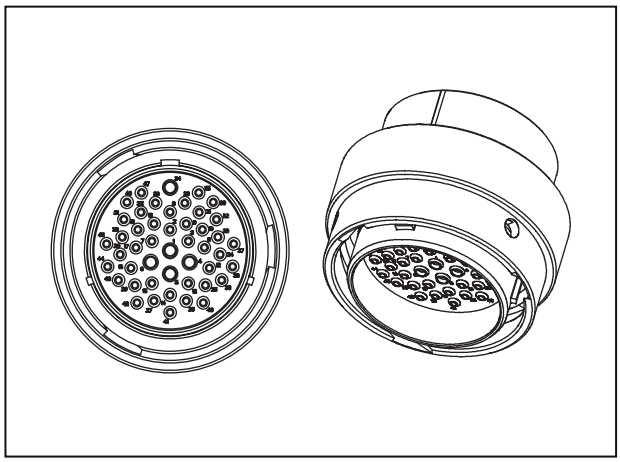
H001 (P100) Hand throttle

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ACCELERATOR GND1	BK	0,75	CAB-SP7	
2	12V	Bn	0,75	CAB-SP1	
3	THROTTLE - SIGNAL1	Gn	0.5	P80	L4
4	ACCELERATOR GND2	BK	0,75	CAB-SP7	
5	12V	Bn	0,75	CAB-SP1	
6	THROTTLE - SIGNAL2	Gn	0.5	P80	K2





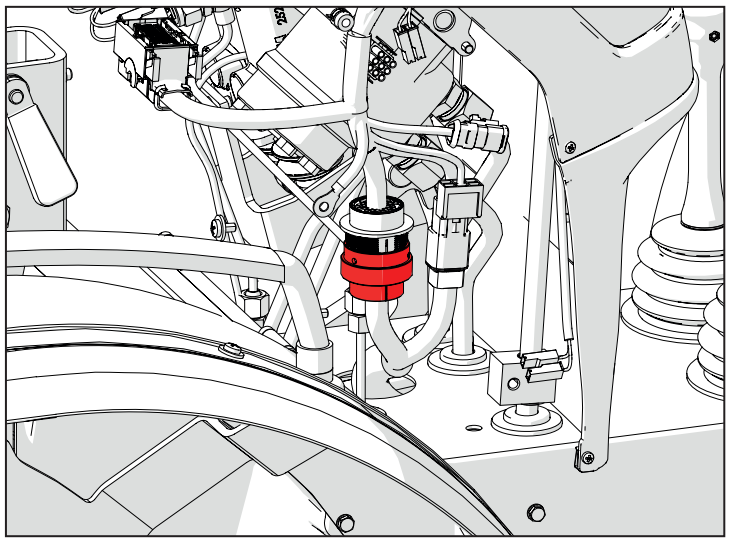
D006 (P100A) Wiring connector for dashboard wiring loom



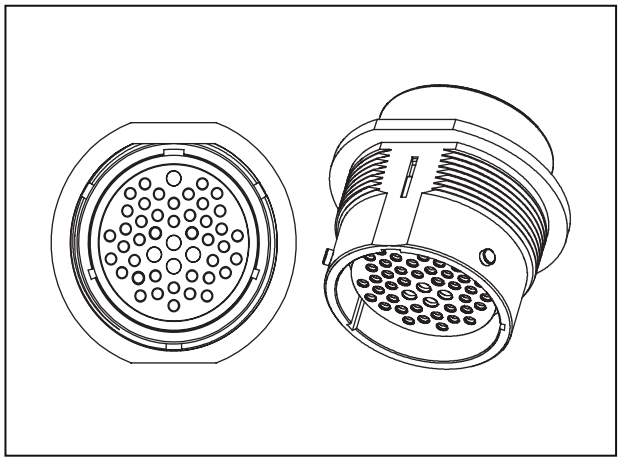
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	HAZARD LIGHTS CONTROL	Rd	0.75	P10B	31
3	BRAKE LAMP RELAY	WH	0.5	P10B	7
4	PTO RPM Sensor	Gn	0.5	P518	3
5	PTO - Speed Selection Lever	Ye	0.5	P520	1
6	GND	BK	0.5	MAIN-SP6	
7	Wheel Speed	Bu	0.75	P301	3
8	HORN/SOCKET V KEY	Pu	1.0	P10B	12
9	12V	Bn	1.5	MAIN-SP5	
10	NORMAL BEAM LIGHTS	Gy	0.5	P10B	14
11	TURN INDICATORS	Or	0.75	P10B	8
12	START ENABLE RELAY	Or	0.5	P10B	10
13	ALTERNATOR B+	Bu	0.5	P10B	17
14	DASHBOARD V BATT	Rd	0.75	P10B	18
15	VJ1939 POWER SUPPLY	Rd	1.5	P10B	19
16	START ENABLE SENSOR	Rd	0.5	P10B	20
17	VCU V KEY	Bn	0.5	P10B	21
18	RELAY FOR DASHBOARD LED	Or	0.5	P10B	22

19	LED FOR DASHBOARD	Gn	0.5	P10B	23
20	AIR FILTER	Gn	0.5	P10B	24
21	LH TURN SIGNAL	Bu	0.75	MAIN-SP3	
22	VCU V BATT	Rd	1.5	P10B	15
23	HYD OIL PRESSURE SWITCH	Ye	0.75	P471	1
24	PARKING LIGHTS	Ye	1.5	P10B	16
25	LH TURN SIGNAL	Gn	0.75	MAIN-SP8	
26	FUEL LEVEL SENSOR	Bu	0.5	P10B	2
27	HIGH BEAM	Gn	0.5	P10B	13
28	DPF REG INHIBIT SW	BK	0.5	P10B	11
29	CAN L	Gn	0.5	P10B	46
30	CAN H	Ye	0.5	P10B	47
31	BEACON LIGHT SUPPLY	Pu	1.0	P10B	33
32	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P10B	25
33	DASHBOARD 12 V	Bn	0.5	P10B	9
34	V KEY	Bn	1.5	P10B	36
35	HORN POWER SUPPLY	Pu	0.75	P10B	28
36	SEAT SWITCH SIGNAL - A	Bu	0.5	P107	2
37	SEAT SWITCH SIGNAL - B	Gn	0.5	P107	4
38	PTO - Synchronized Safety Switch	Bu	0.5	P49	2
39	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P186	2
40	DIFF LOCK ON/ OFF VALVE	Or	0.5	P187	2
41	DIVERTER VALVE	Gn	0.5	P188	2
42	PTO DIRECTION VALVE	Gy	0.5	P499	2
43	START COMMAND	Bu	0.5	P10B	3
44	DPF REGENERATION INHIBIT SW	Bu	0.5	P10B	39

45	Shuttle lever FW switch	Or	0.5	P58	1
46	Shuttle lever RW switch	Gn	0.5	P57	1
47	PB - DIVERTER	Gy	0.5	P61	3



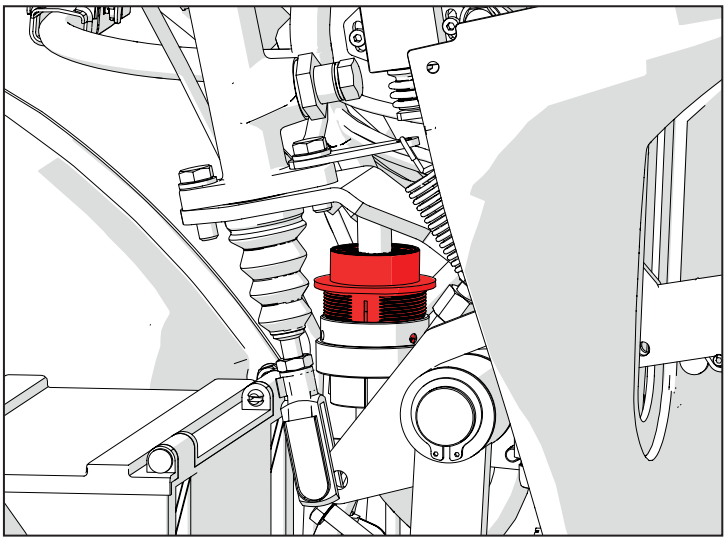
D006 (P100B) Wiring connector for engine wiring loom



Pin	Description	Colour	Sect.	Input Conn.	Pin
2	HAZARD LIGHTS CONTROL	Rd	0.75	P137	3
3	BRAKE LAMP RELAY	WH	0.5	P80	P3
4	PTO RPM Sensor	Gy	0.5	P80	C1
5	PTO - Speed Selection Lever	Ye	0.5	P80	H2
6	SIGNAL GND	BK	0.5	P80	N3
7	Wheel Speed	WH	0.5	P80	D3
8	HORN/SOCKET V KEY	Pu	1.0	CAB-SP16	PIN1
9	SENSORS V-KEY	Bn	1.5	CAB-SP1	PIN1
10	NORMAL BEAM LIGHTS	Gy	0.5	CAB-SP21	PIN1
11	TURN INDICATORS	Or	0.75	P137	1
12	START ENABLE RELAY	Or	0.5	P80	B3
13	ALTERNATOR D+	Bu	0.5	P200	33
14	DASHBOARD V-BATT	Rd	0.75	P200	3
15	VJ1939 POWER SUPPLY	Rd	1.5	J9	B
16	START ENABLE SENSOR	Rd	0.5	P80	G2

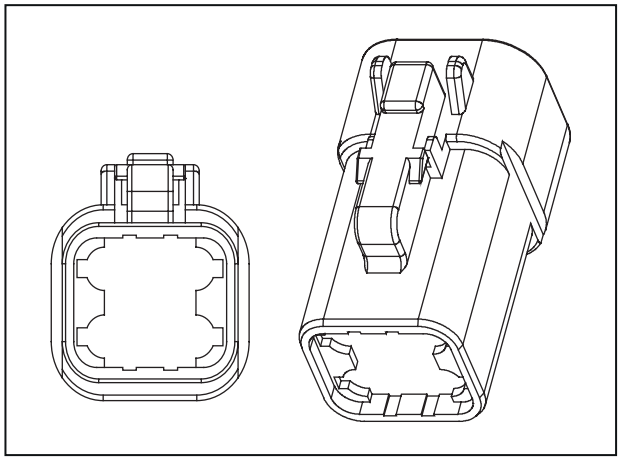
17	VCU V KEY	Bn	0.5	P80	M2
18	RELAY FOR DASHBOARD LED	Or	0.5	P80	C3
19	LED FOR DASHBOARD	Gn	0.5	CAB-SP6	PIN1
20	AIR FILTER	Gn	0.5	P80	J2
21	RIGHT INDICATOR LIGHT	Bu	0.75	CAB-SP4	PIN1
22	VCU V BAT	Rd	1.5	CAB-SP5	PIN1
23	HYD OIL PRESSURE SWITCH	Ye	0.5	P80	K3
24	PARKING LIGHTS	Ye	1.5	CAB-SP22	PIN1
25	LEFT INDICATOR LIGHT	Gn	0.75	CAB-SP3	PIN1
26	FUEL LEVEL SENSOR	Bu	0.5	P80	K1
27	HIGH BEAM	Gn	0.5	CAB-SP23	PIN1
29	CAN L	Gn	0.5	CAB-SP14	PIN1
30	CAN H	Ye	0.5	CAB-SP12	PIN1
31	BEACON LIGHT SUPPLY	Pu	1.0	P112	3
33	DASHBOARD 12 V	Bn	0.5	P200	4
34	V KEY	Bn	1.5	P456	1
35	HORN POWER SUPPLY	Pu	0.75	P144	9
36	SEAT SWITCH SIGNAL - A	Bu	0.5	P80	H1
37	SEAT SWITCH SIGNAL - B	Gn	0.5	P80	J3
38	PTO - Synchronized Safety Switch	Bu	0.5	P80	L3
39	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P80	P1
40	DIFF LOCK ON/ OFF VALVE	Or	0.5	P80	Q3
41	DIVERTER VALVE	Gn	0.5	P80	Q1
42	PTO DIRECTION VALVE	Gy	0.5	P80	P2
43	START COMMAND	Bu	0.5	CAB-SP24	PIN1
44	DPF REGENERATION INHIBIT SW	Bu	0.5	P32	2
45	Shuttle lever FW switch	Or	0.5	P80	B2

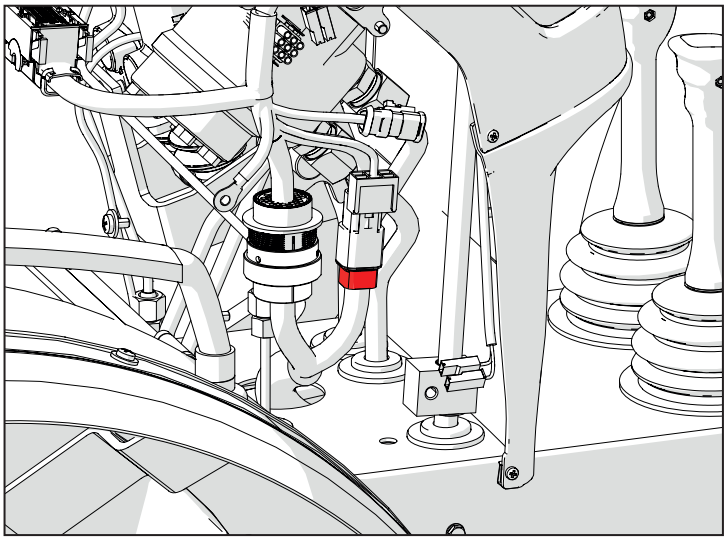
46	Shuttle lever RW switch	Gn	0.5	P80	C2
47	PB - DIVERTER	Gy	0.5	P80	H4



D007 (P102A) Wiring connector for dashboard wiring loom

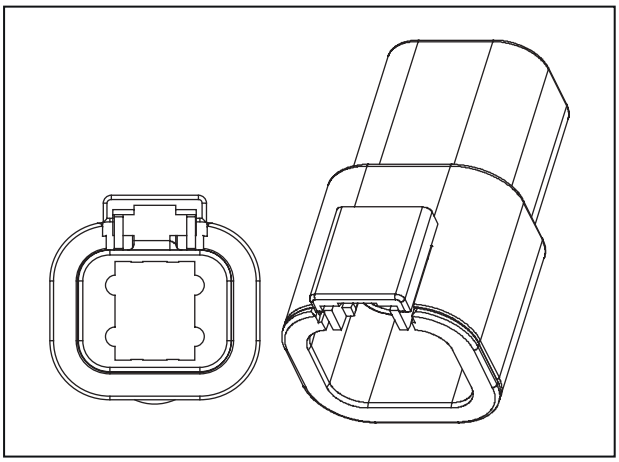
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P10B	1
2	12V BATT SUPPLY	Rd	2.5	P10B	4
3	V KEY	Bn	2.5	P10B	5
4	V KEY	Bn	2.5	P10B	6

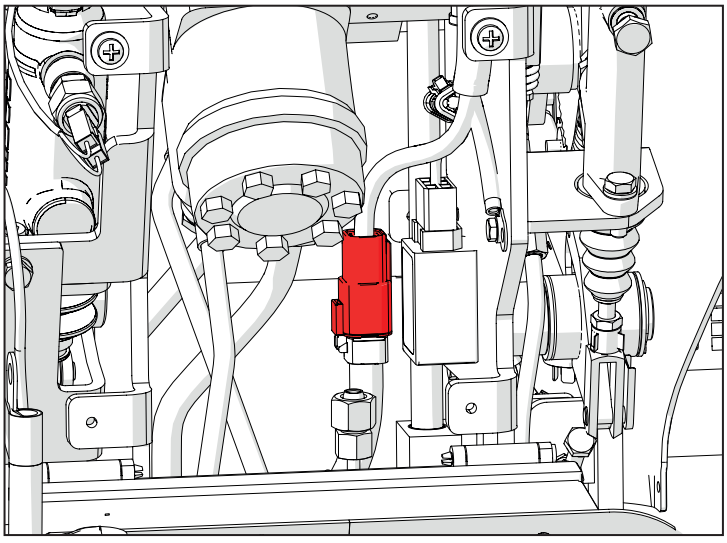




D007 (P102B) Wiring connector for engine wiring loom

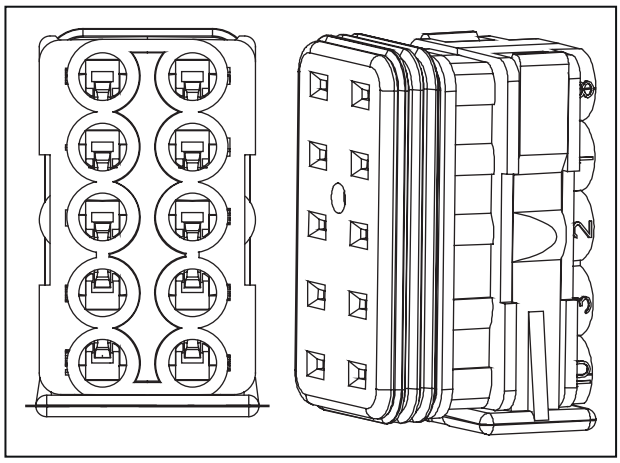
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P118	1
2	12V BATT SUPPLY	Rd	2.5	P507	1
3	V KEY	Bn	2.5	P451	1
4	V KEY	Bn	2.5	P455	1

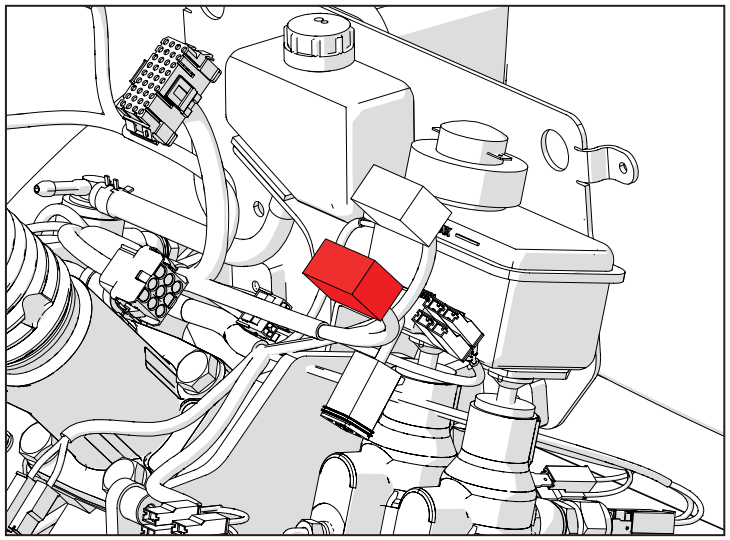




F004 (P112) Rotating beacon button

Pin	Description	Colour	Sect.	Input Conn.	Pin
2	BEACON	Pu	1	CAB-SP16	
3	BEACON LIGHT SUPPLY	Pu	1	P100B	31

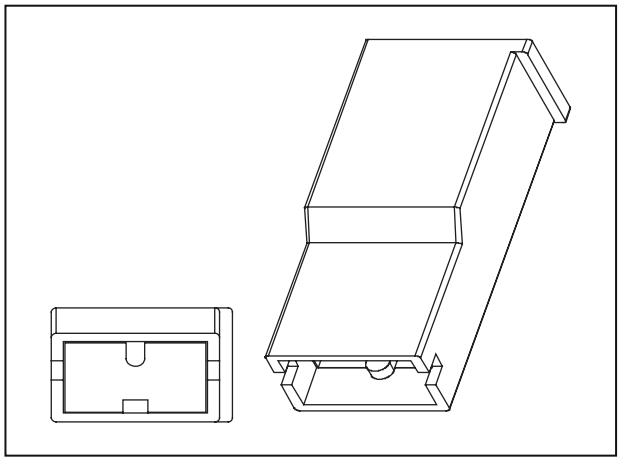


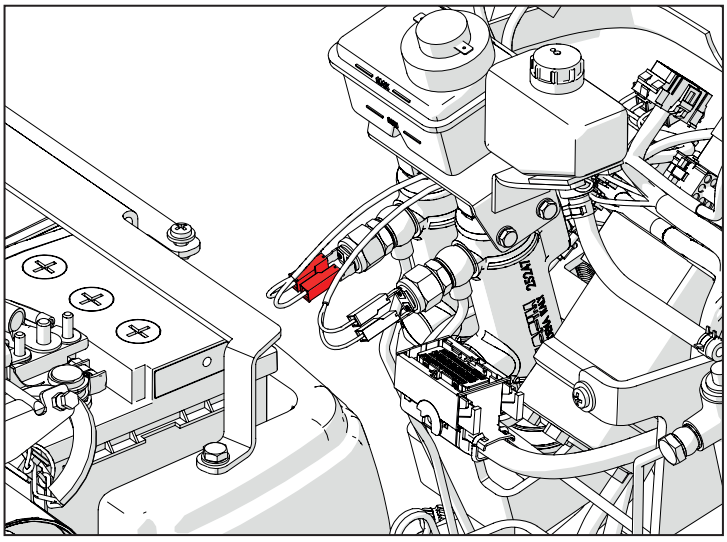


F005 (P119-P120) RH brake signal switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE RH SW	Bu	0.5	P80	E4

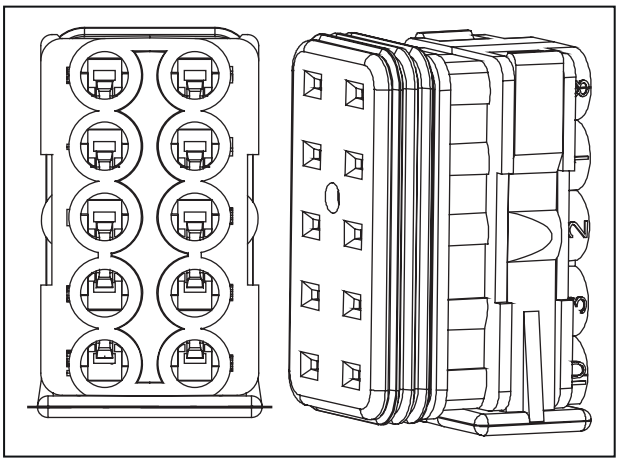
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

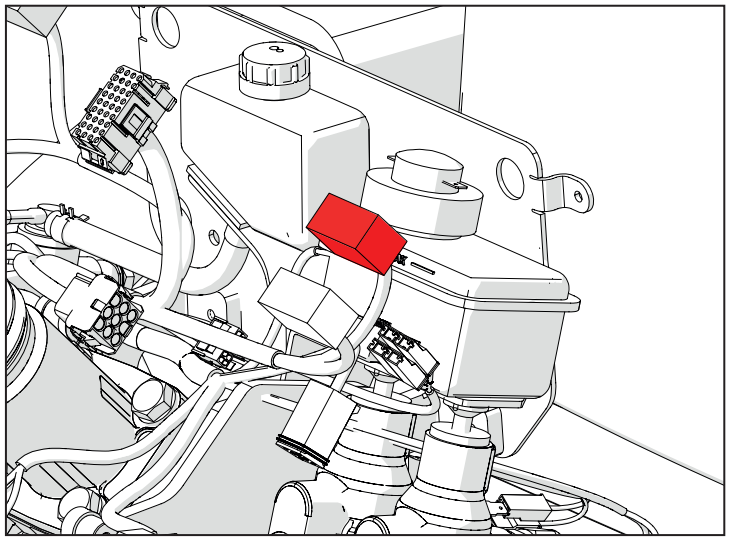




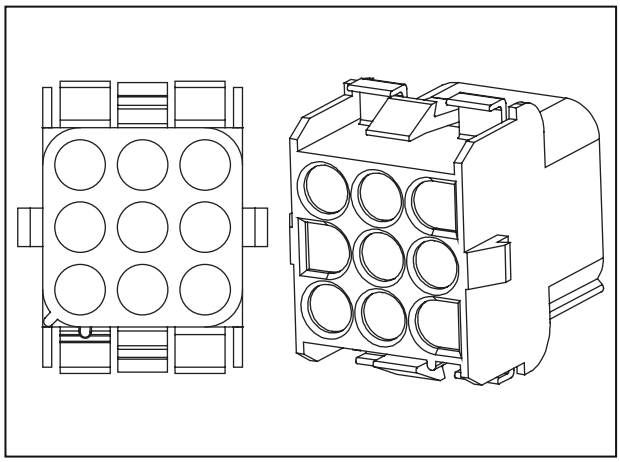
F003 (P137) Hazard warning lights button

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	TURN INDICATORS	Or	0,75	P100B	11
2		Pu	1	P274	6
3	HAZARD LIGHTS CONTROL	Rd	0,75	P100B	2
5	12V EMERGENCY	WH	1	P274	4
6	RH TURN SIGNAL LIGHT	Bu	1	CAB-SP4	
6	BRIDGE	Bu	0,75	P137	10
8	HAZARD LIGHTS CONTROL - GND	BK	0,75	CAB-SP2	
9	LH TURN SIGNAL	Gn	1	CAB-SP3	
10	BRIDGE	Bu	0,75	P137	7

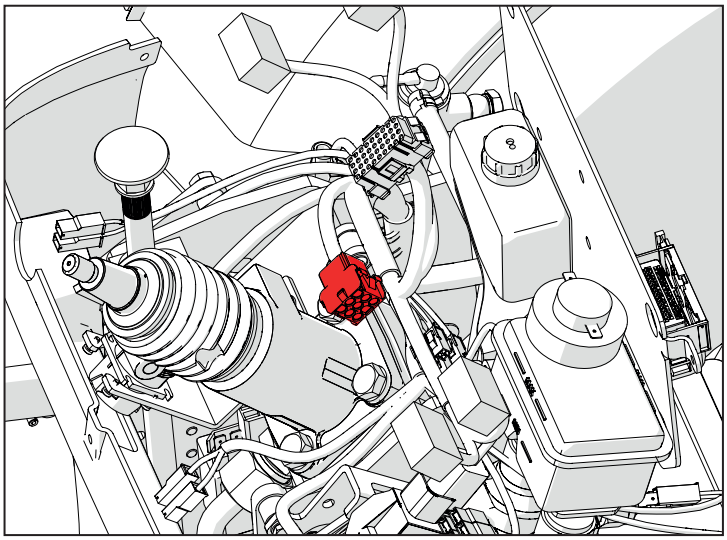




F002 (P144) RH turn indicator signal

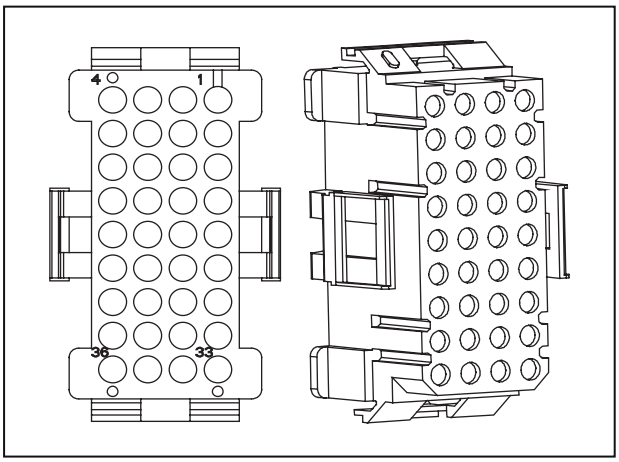


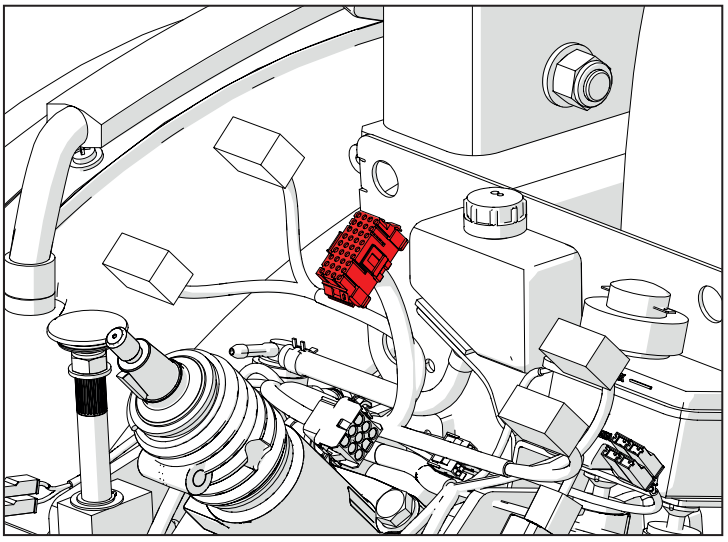
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	1.5	CAB-SP22	
2	RH TURN SIGNAL	Bu	0,75	CAB-SP4	
3	LH TURN SIGNAL	Gn	0,75	CAB-SP3	
4	HIGH BEAM	Gn	0.5	CAB-SP23	
5	12V KEY SWITCH	Bn	1.5	P455	1
6	TURN INDICATORS	WH	1	P274	4
7	NORMAL BEAM	Gy	0.5	CAB-SP21	
8	HORN V KEY	Pu	0,75	CAB-SP16	
9	HORN POWER SUPPLY	Pu	0,75	P100B	35



E002 (P200) Dashboard

Pin	Description	Colour	Sect.	Input Conn.	Pin
3	DASHBOARD V-BATT	Rd	0.75	P100B	14
4	DASHBOARD 12 V	Bn	0.5	P100B	33
8	GND DASHBOARD	BK	0.75	CAB-SP2	
20	DASHBOARD PB -	Bu	0.5	P35	4
24	DASHBOARD PB +	Bu	0.5	P34	4
25	DASHBOARD PB ENTER	Bu	0.5	P31	4
32	LED FOR DASHBOARD	Gn	0.5	CAB-SP6	
33	ALTERNATOR D+	Bu	0.5	P100B	13
35	CAN L	Gn	0.5	CAB-SP14	
36	CAN H	Ye	0.5	CAB-SP12	

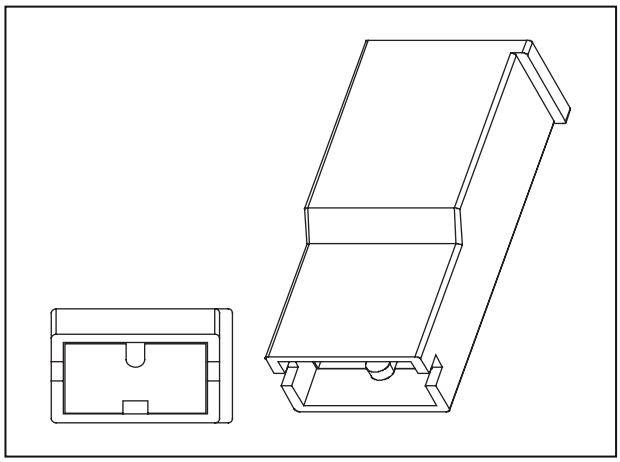


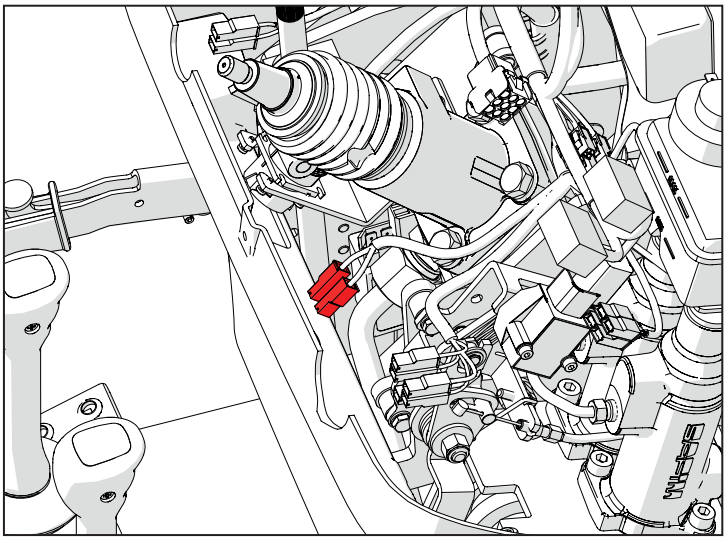


E003 (P25-P26) Buzzer

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BUZZER 12V	Gn	0.5	CAB-SP6	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BUZZER GND	BK	0.5	CAB-SP2	

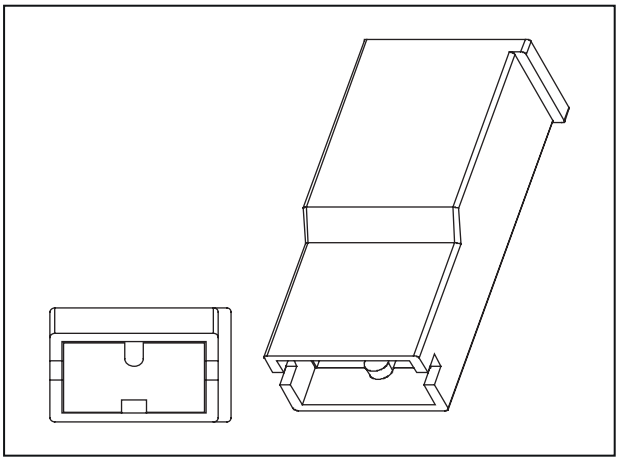


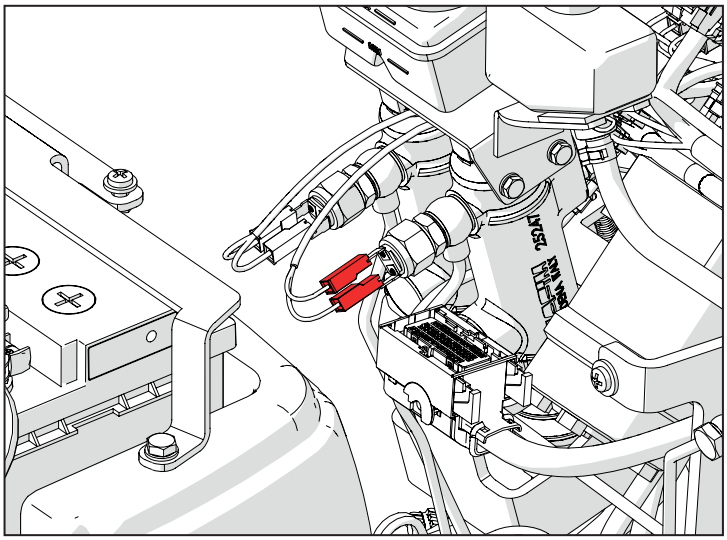


F006 (P291-P292) Left brake pedal switch

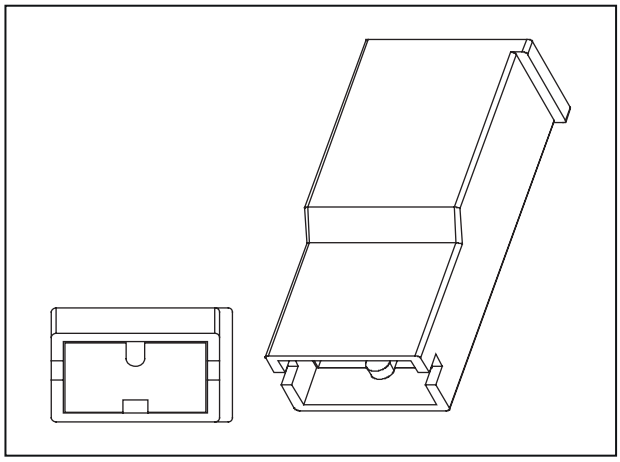
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LH SW	Or	0.5	P80	D2





I011 (P117-P118-P451-P455-P507) Ignition switch



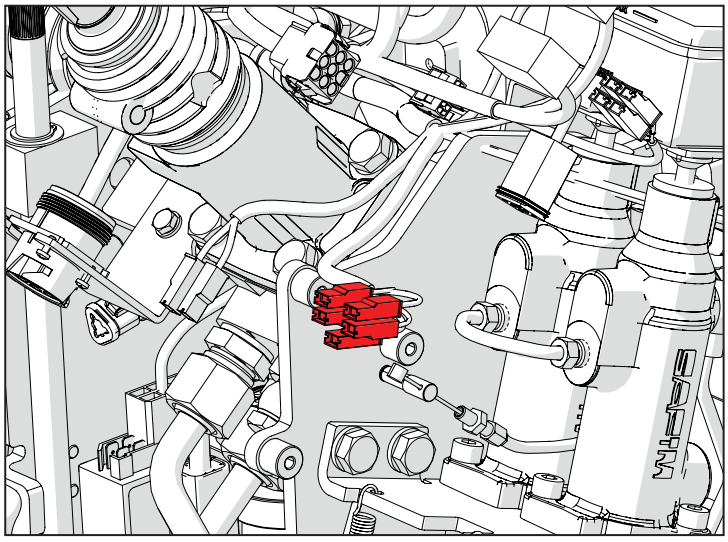
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V KEY SWITCH	Bn	1.5	P144	5
1	V KEY	Bn	2.5	P102B	4

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	V KEY	Bn	2.5	P102B	3

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P102B	2

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START COMMAND	Bu	0.5	CAB-SP24	

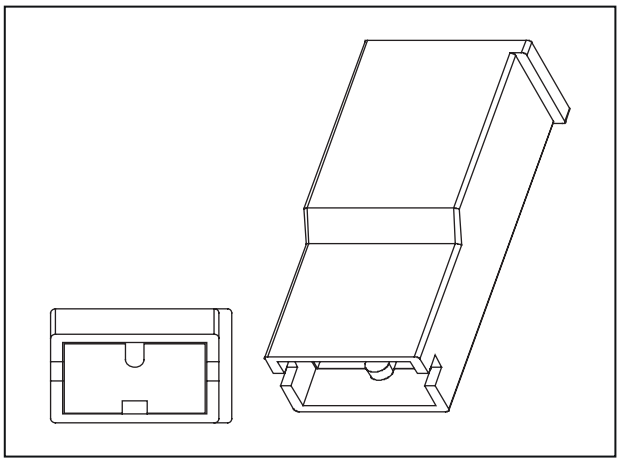
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P100B	1

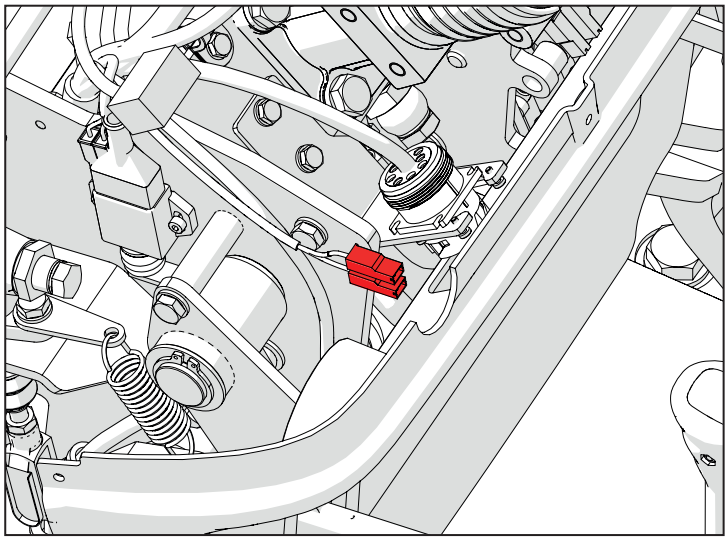


P001 (P456-P457) 1 pole socket

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	V-KEY	Bn	1.5	P100B	34

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	1.5	CAB-SP2	

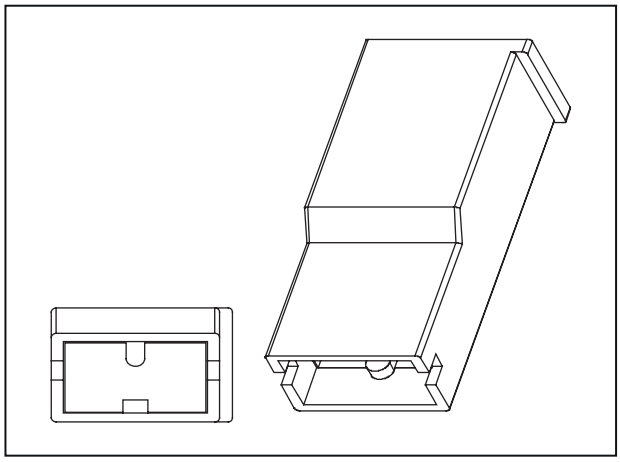


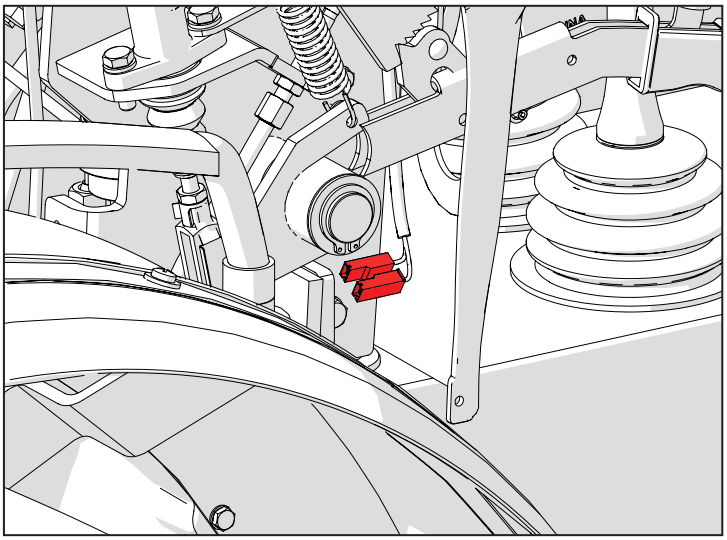


K011 (P492-P493) Clutch start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ENGINE CLUTCH SW	Gn	0.5	P80	G4

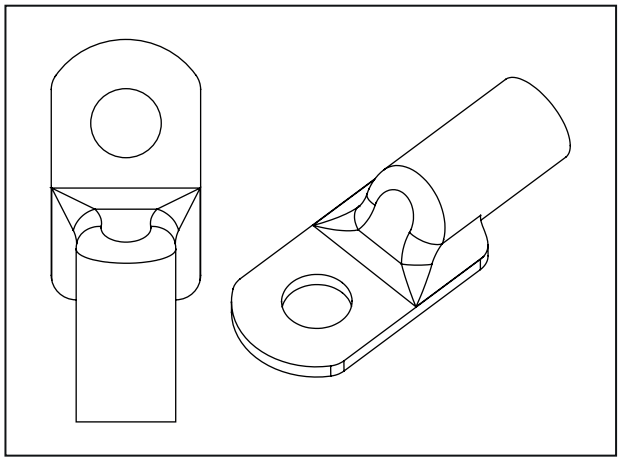
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

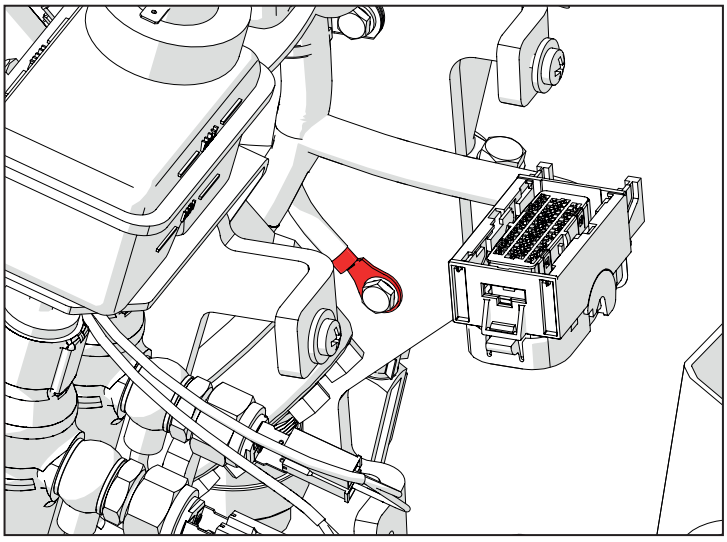




C004 (P13) Cab ground

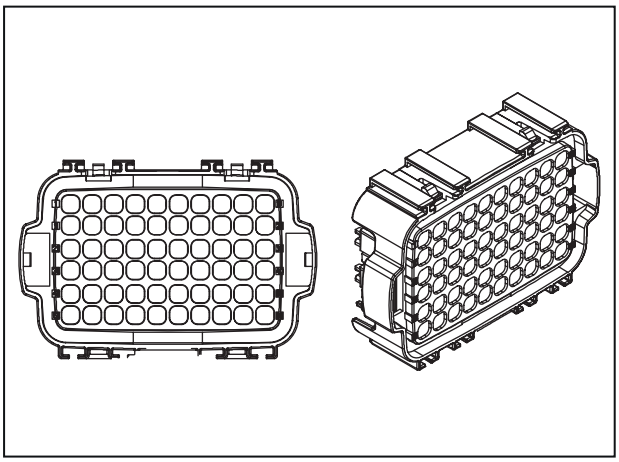
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CAB GND	BK	2.5	CAB-SP2	
1	GND	BK	1	P274	1
1	GND J1939	BK	1.5	J9	A





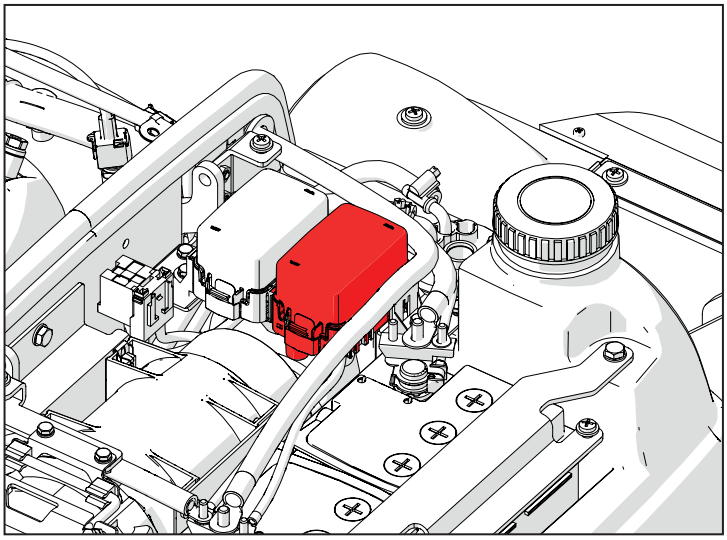
B004 (P1A) Fuse box "2"

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START COMMAND	Bu	0.5	P10A	3
2	START ENABLE SENSOR	Bu	0.5	P12	8
3	GND	BK	0.5	ENG-SP6	
4	HIGH BEAM	Pu	1.5	P1A	7
5	NORMAL BEAM RH	Pu	1.5	ENG-SP20	
6	NORMAL BEAM LH	Pu	1.5	ENG-SP20	
7	HIGH BEAM	Pu	1.5	P1A	4
8	V-KEY	Bn	0.5	ENG-SP21	
9	V KEY	Bn	0.5	ENG-SP21	
10	V KEY	Bn	1.5	ENG-SP21	
11	V KEY	Bn	0.5	ENG-SP21	
12	START ENABLE RELAY	Or	0.5	P10A	10
13	BATTERY 12V	Rd	1.5	ENG-SP17	
14	HIGH BEAM	Gn	0.5	P10A	13
15	NORMAL BEAM LIGHT RH	Pu	1.5	P20A	2
16	NORMAL BEAM LIGHT LH	Pu	1.5	P20A	3
17	HIGH BEAM LIGHTS	Pu	1.5	P20A	1

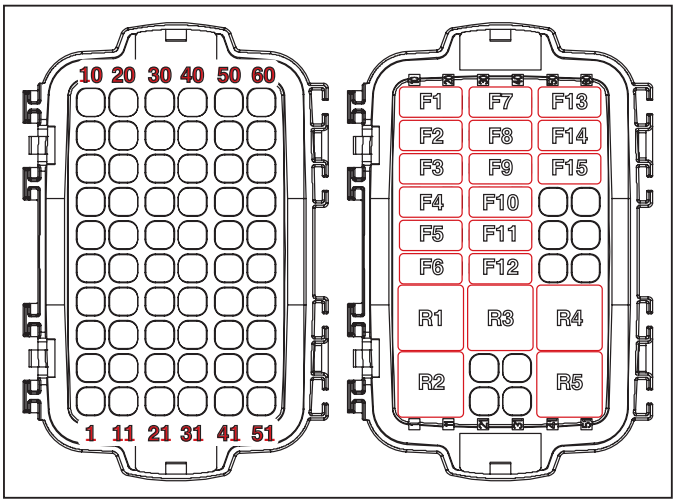


18	VCU V KEY	Bn	0.5	P10A	21
19	V-KEY DASH	Bn	0.5	P10A	9
20	V-KEY	Pu	1.0	ENG-SP25	
23	GND	BK	0.5	ENG-SP6	
24	NORMAL BEAM RH	Pu	1.5	ENG-SP20	
25	BRAKE LAMP	Bn	0.75	P1A	44
26	PARKING LIGHT	Ye	1.0	ENG-SP23	
27	PARKING LIGHT	Ye	1.0	ENG-SP23	
28	V KEY	Bn	0.75	ENG-SP22	
29	V KEY	Bn	0.75	ENG-SP22	
30	V KEY	Bn	1.5	ENG-SP22	
33	V BATT	Rd	1.5	ENG-SP17	
34	NORMAL BEAM LIGHTS	Gy	0.5	P10A	14
35	BRAKE LAMP	Rd	0.75	P10A	29
36	PARKING LIGHTS RH	Ye	1.0	ENG-SP16	
37	PARKING LIGHTS LH	Ye	1.0	ENG-SP14	
38	EDC V KEY	Bn	0.75	P12	54
39	TURN INDICATORS	Or	0.75	P10A	8
40	SENSORS V-KEY	Bn	1.5	ENG-SP7	PIN1
41	RELAY FOR DASHBOARD LED	Or	0.5	P10A	22
42	LED FOR DASH	Gn	0.5	P10A	23
43	BRAKE LAMP RELAY	WH	0.5	P10A	7
44	BRAKE LAMP	Bn	0.75	P1A	25
47	V KEY	Bn	1.5	ENG-SP21	
48	V BATT	Rd	1.5	ENG-SP17	
49	V BATT	Rd	0.75	ENG-SP17	
50	V BATT	Rd	0.75	ENG-SP17	
51	V-KEY	Bn	0.5	ENG-SP22	

52	V-KEY	Bn	0.5	ENG-SP22	
53	V KEY	Bn	0.75	ENG-SP22	
54	V KEY	Bn	0.5	ENG-SP22	
57	V KEY	Bn	1.5	P10A	36
58	VCU V BATT	Rd	1.5	P10A	15
59	DASHBOARD V-BATT	Rd	0.75	P10A	18
60	HAZARD LIGHTS CONTROL	Rd	0.75	P10A	31

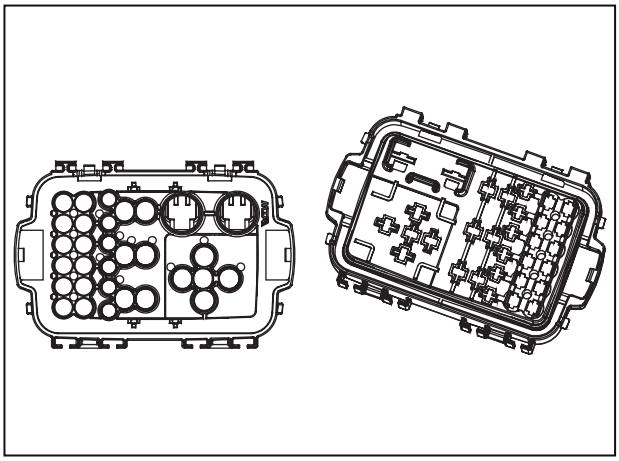


F1	Socket - Rotating beacon	10A
F2	Key-on power feed for dashboard	5A
F3	Key-on power feed for VCU	5A
F4	High beam headlights	10A
F5	LH low beams	10A
F6	RH low beams	10A
F7	Sensors/switches	10A
F8	Turn indicator lights	10A
F9	Key-on power feed for ECU	5A
F10	LH sidelights	10A
F11	RH sidelights	10A
F12	Brake lights	10A
F13	Hazard warning lights	10A
F14	12V dashboard power feed	10A
F15	12V VCU power feed	10A
F16	Socket	10A
R1	Start enable relay	
R3	Dashboard LED relay	
R4	High beam relay	
R5	Low beam relay	
R6	Brake light relay	

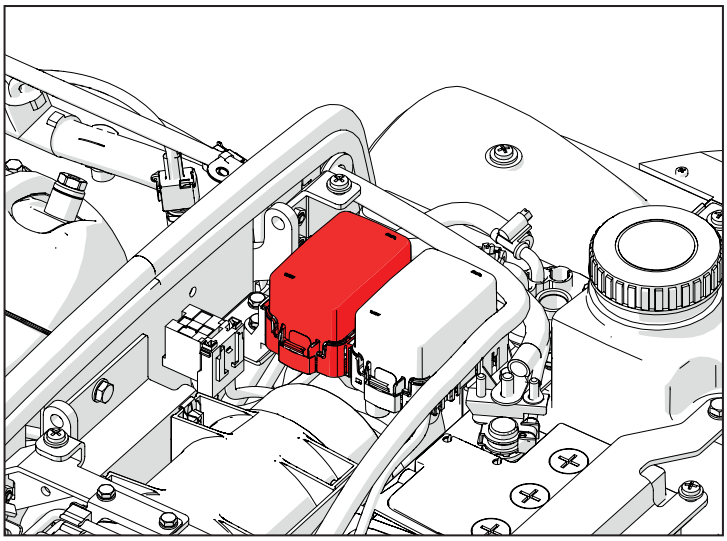


B002 (P2A) Fuse box "1"

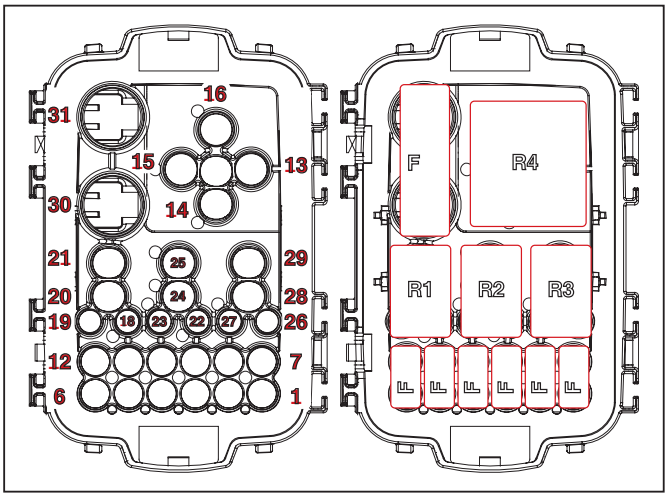
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	EDC POWER SUPPLY	Rd	1.5	ENG-SP15	
2	EDC POWER SUPPLY	Rd	1.5	P12	1
3	12V	Rd	2.5	ENG-SP5	
4	FUEL FILTER HEATER	Rd	1.5	P472	1
5	12V TRAILER SOCKET	Rd	2.5	P472	1
6	DIAGNOSTIC SOCKET	Rd	1.5	ENG-SP17	
7	12V	Rd	1.5	ENG-SP18	
8	12V	Rd	1.5	ENG-SP18	
9	12V	Rd	1.5	ENG-SP18	
10	FUEL FILTER HEATER	Rd	1.5	P2A	24



11	POWER SOCKET SUPPLY	Rd	2.5	P2A	20
12	VJ1939 POWER SUPPLY	Rd	1.5	P10A	19
13	MAIN RELAY	Rd	0.5	P472	1
14	12V	Rd	4.0	ENG-SP18	
15	MAIN RELAY	BK	0.75	P12	28
16	BATTERY 12V	Rd	4.0	P472	1
18	V KEY	Bn	0.5	ENG-SP21	
19	GND	BK	0.5	ENG-SP6	
20	POWER SOCKET SUPPLY	Rd	2.5	P2A	11
21	POWER SOCKET SUPPLY	Rd	2.5	P10A	34
22	FUEL FILTER HEATER	Gy	0.75	P12	70
23	12V MAIN RELAY	Rd	0.75	ENG-SP5	
24	FUEL FILTER HEATER	Rd	1.5	P2A	10
25	FUEL FILTER HEATER	Rd	1.5	P17	2
26	O-S-STRTH	Bu	0.75	P12	53
27	O-S-STRTL	Gy	0.75	P12	27
28	START MOTOR	Rd	1.5	ENG-SP3	
29	12V BATT SUPPLY	Rd	1.5	ENG-SP17	
30	12V BATT SUPPLY	Rd	10.0	P63	1
31	12V BATT SUPPLY	Rd	10.0	ENG-SP17	



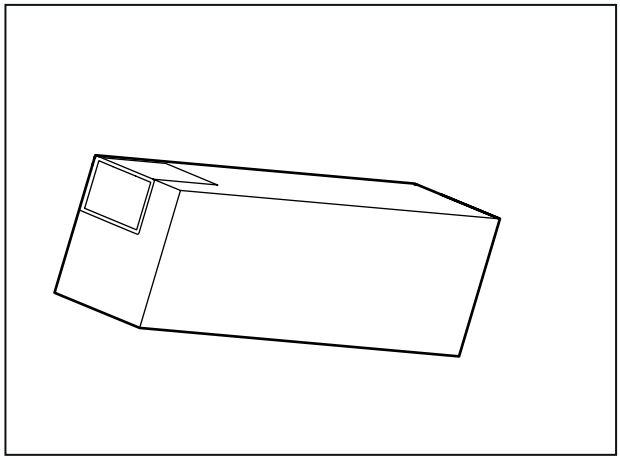
F17	Diagnostic port	10A
F18	Trailer socket	15A
F19	Fuel pre-heat	20A
F20	Accessories	15A
F21	12V ECU power feed	10A
F22	12V ECU power feed	15A
F23	Main Maxi fuse	70A
R6	Trailer socket relay	30A
R7	Fuel pre-heat relay	20A
R8	Starter relay	20A
R9	Main relay	30A

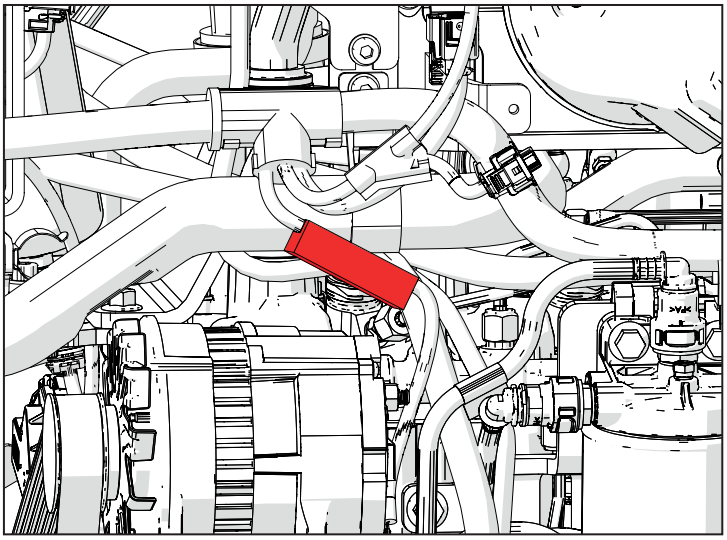


B005 (P1-P2) Diode

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P468	1

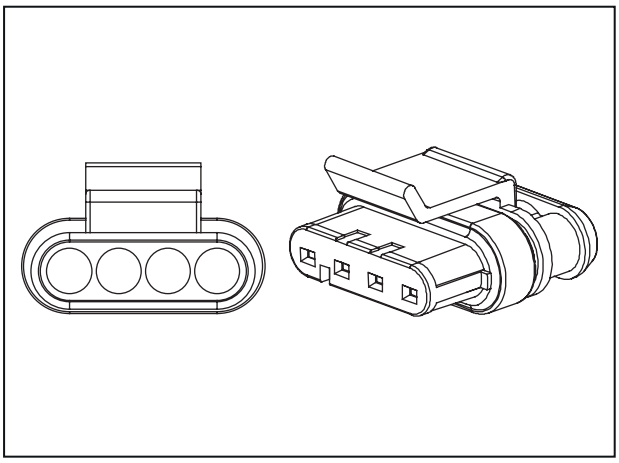
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P10A	17

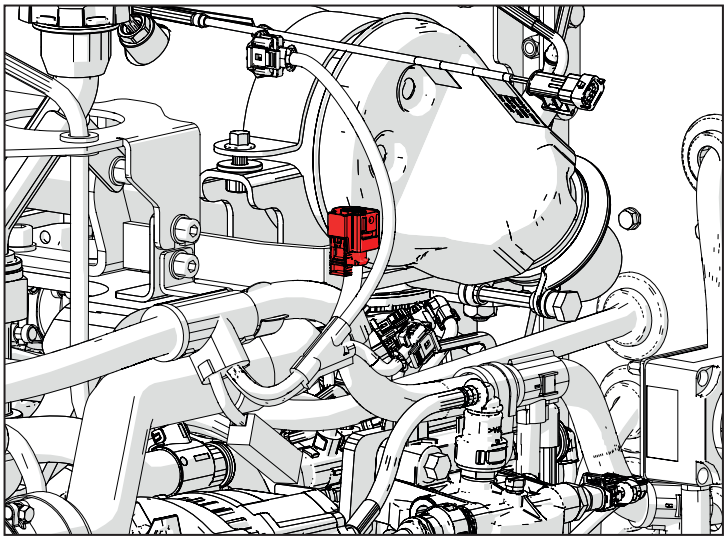




K025 (P469) Lambda sensor

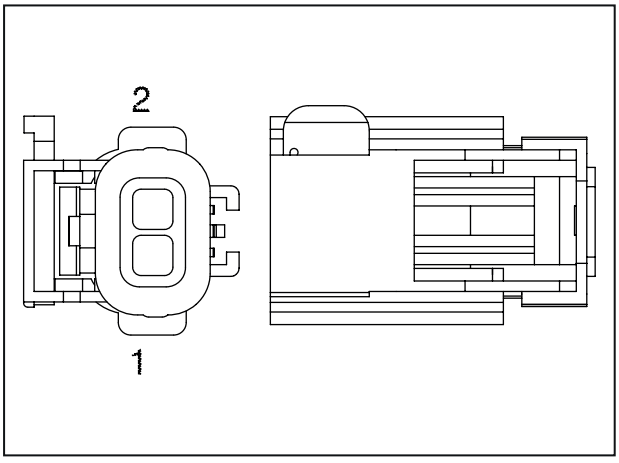
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	LAMBDA SENSOR	Gn	0.5	P12	64
2	LAMBDA SENSOR	Bu	0.5	P12	85
3	LAMBDA SENSOR HEATER	BK	1	P12	7
4	LAMBDA SENSOR 12V	Rd	1	ENG-SP5	
5	LAMBDA SENSOR	Or	0.5	P12	86
6	LAMBDA SENSOR	WH	0.5	P12	63

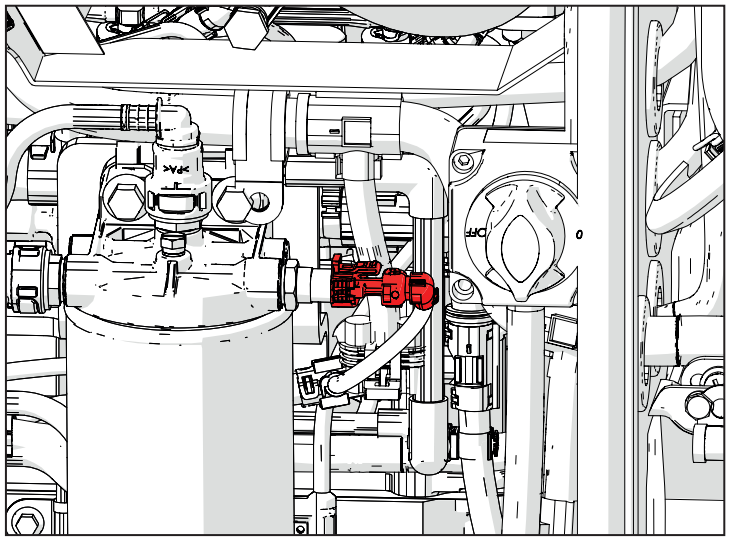




K026 (XS7) Fuel temperature sensor

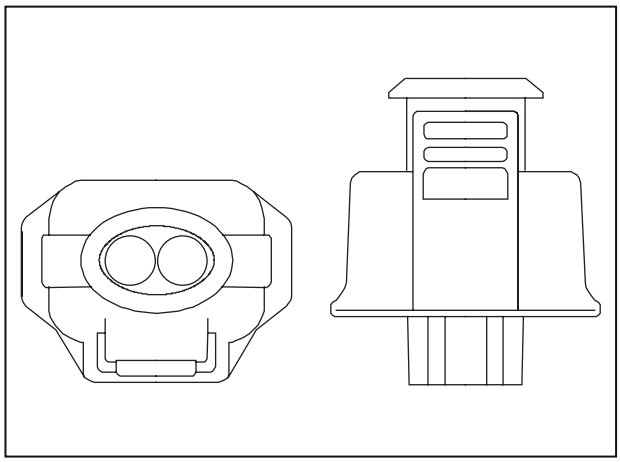
Pin	Description	Colour	Sect.	Input Conn.	Pin
1		Gn	0.5	P12	87
2		Wh	0.5	P12	65

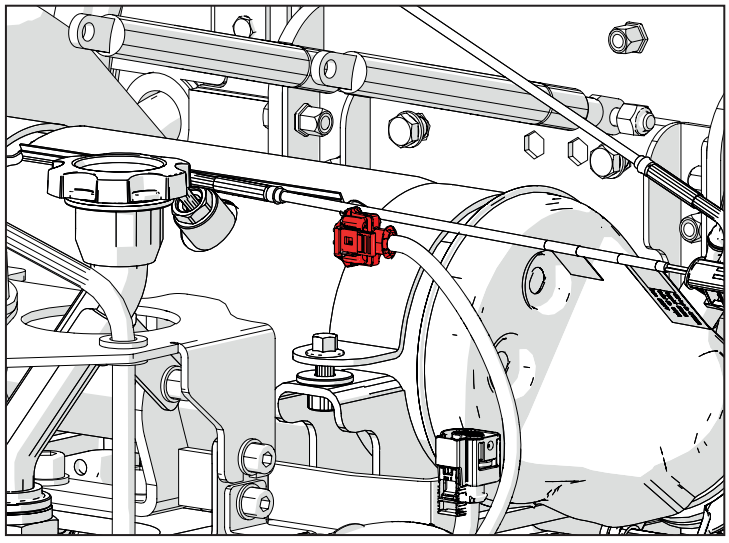




K027 (P7) POC temperature sensor

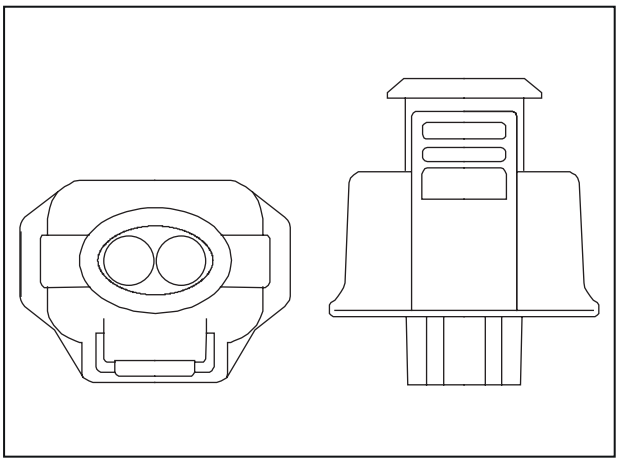
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	G_R_EXTS1	Bu	0.5	P12	83
2	I_A_EXTS1	Gy	0.5	P12	84

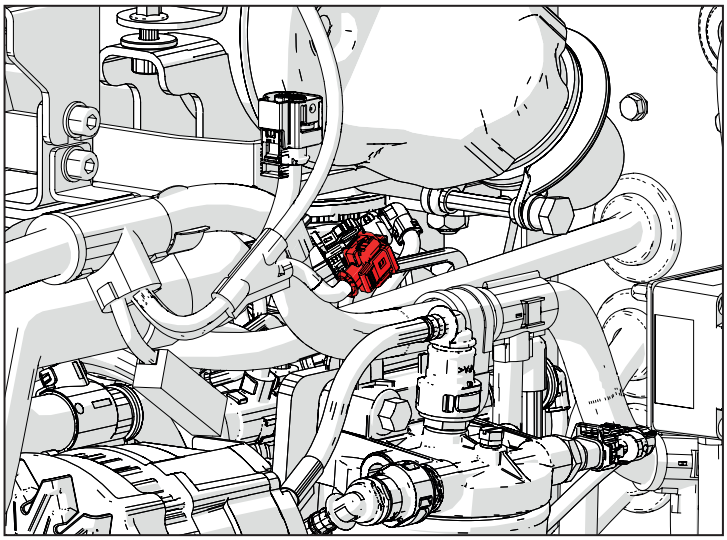




K007 (P6) DOC temperature sensor

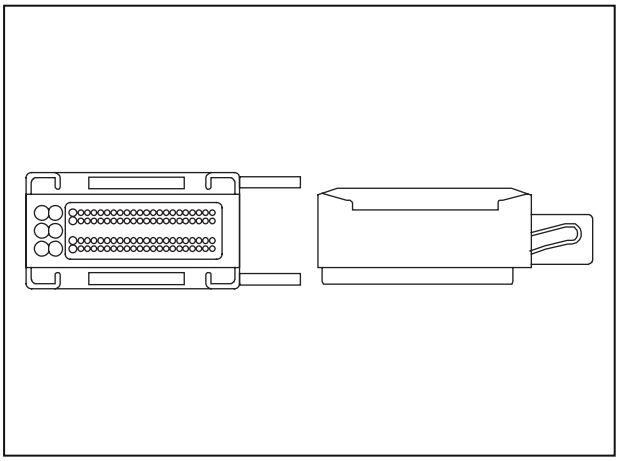
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	G_R_EXTS2	Rd	0.5	P12	79
2	I_A_EXTS2	Wh	0.5	P12	80



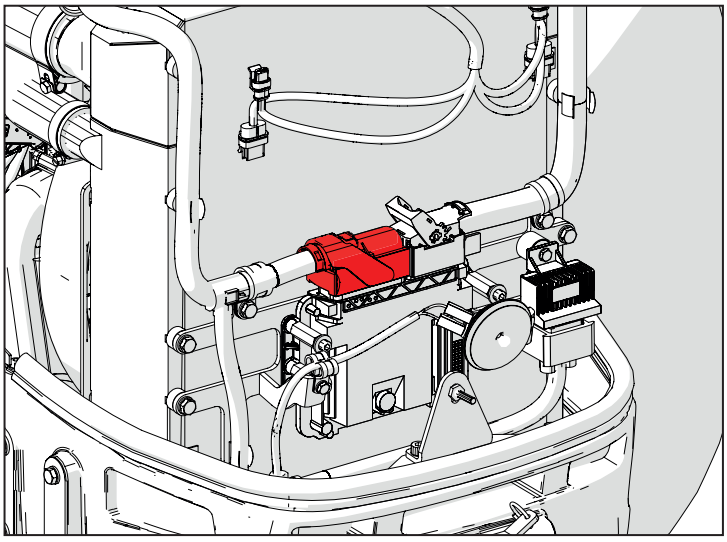


M003A (P12) Engine control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	EDC POWER SUPPLY	Rd	1.5	P2A	2
2	GND	BK	1.0	ENG-SP9	
3	EDC POWER SUPPLY	Rd	1.0	ENG-SP15	
4	GND	BK	1.0	ENG-SP9	
5	EDC POWER SUPPLY	Rd	1.0	ENG-SP15	
6	GND	BK	1.0	ENG-SP9	
7	LAMBDA SENSOR HEATER	BK	1.0	P469	3

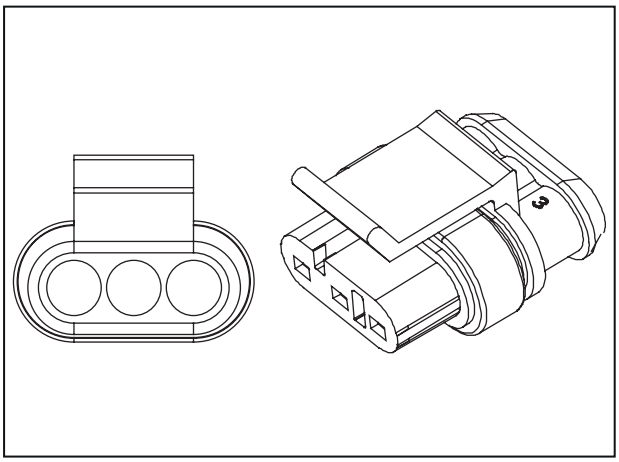


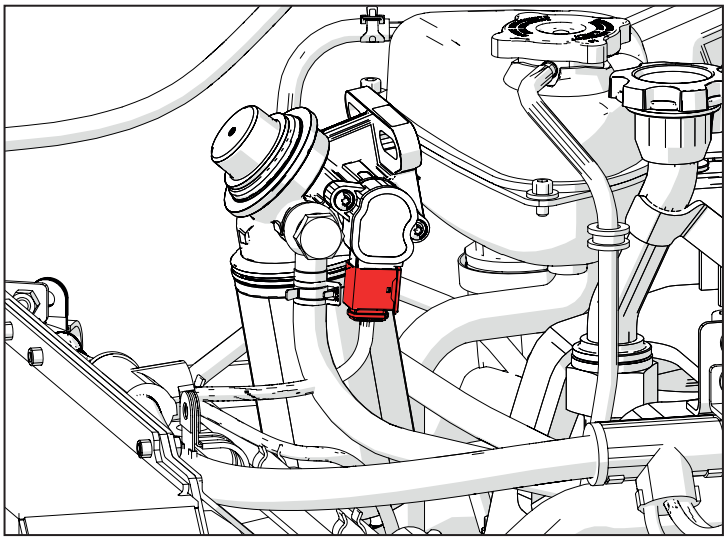
8	START ENABLE SENSOR	Bu	0.5	P1A	2
22	GLOW PLUG DI	Bu	0.5	P452	3
24	CAN H	Ye	0.5	ENG-SP11	
25	CAN L	Gn	0.5	ENG-SP12	
27	O-S-STRTL	Gy	0.75	P2A	27
28	MAIN RELAY	BK	0.75	P2A	15
41	GLOW PLUG 31	BK	0.75	ENG-SP1	
43	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P10A	25
44	DPF REGENERATION INHIBIT SW	BK	0.5	P10A	11
46	CAN H	Ye	0.5	ENG-SP11	
47	CAN L	Gn	0.5	ENG-SP12	
52	GLOW PLUG ST	Gy	0.5	P452	8
53	O-S-STRTH	Bu	0.75	P2A	26
54	EDC V KEY	Bn	0.75	P1A	38
63	LAMBDA SENSOR	WH	0.5	P469	6
64	LAMBDA SENSOR	Gn	0.5	P469	1
70	FUEL FILTER HEATER	Gy	0.75	P2A	22
79	G_R_EXTS2	Rd	0.5	P6	1
80	I_A_EXTS2	Wh	0.5	P6	2
83	G_R_EXTS1	Bu	0.5	P7	1
84	I_A_EXTS1	Gy	0.5	P7	2
85	LAMBDA SENSOR	Bu	0.5	P469	2
86	LAMBDA SENSOR	Or	0.5	P469	5
88	WATER IN FUEL SENSOR	Pu	0.5	P16	1



K005 (P16) Water in fuel sensor

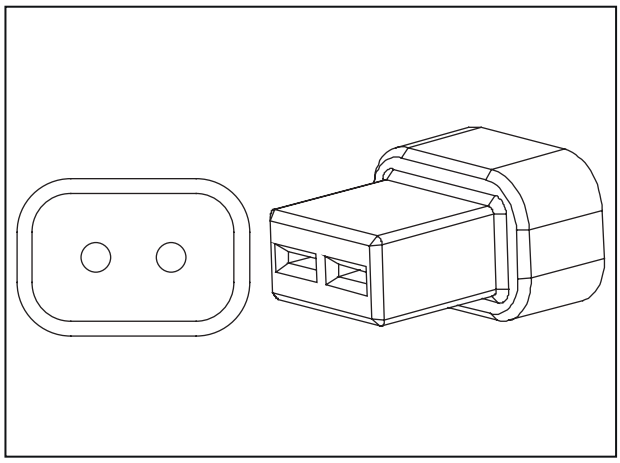
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	WATER IN FUEL SENSOR	Pu	0.5	P12	88
2	WATER IN FUEL 12V	Rd	0.5	ENG-SP5	
3	WATER IN FUEL GND	BK	0.5	ENG-SP2	

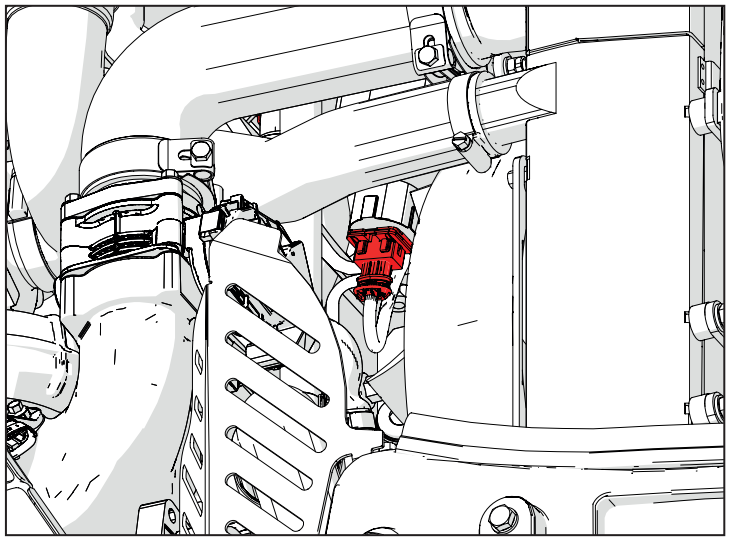




O001 (P17) Fuel filter preheat

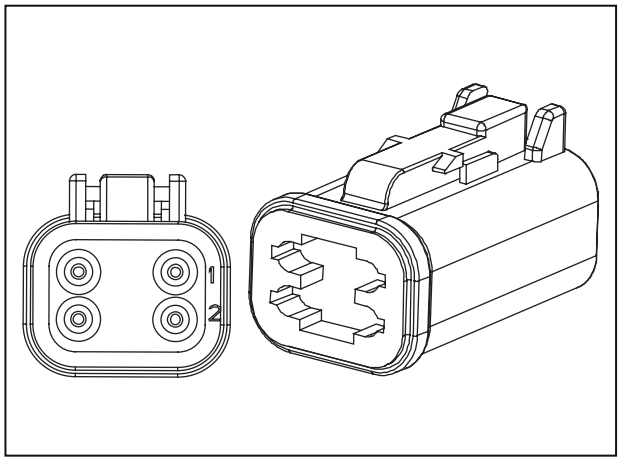
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL FILTER HEATER - GND	BK	1.5	ENG-SP6	
2	FUEL FILTER HEATER	Rd	1.5	P2A	25

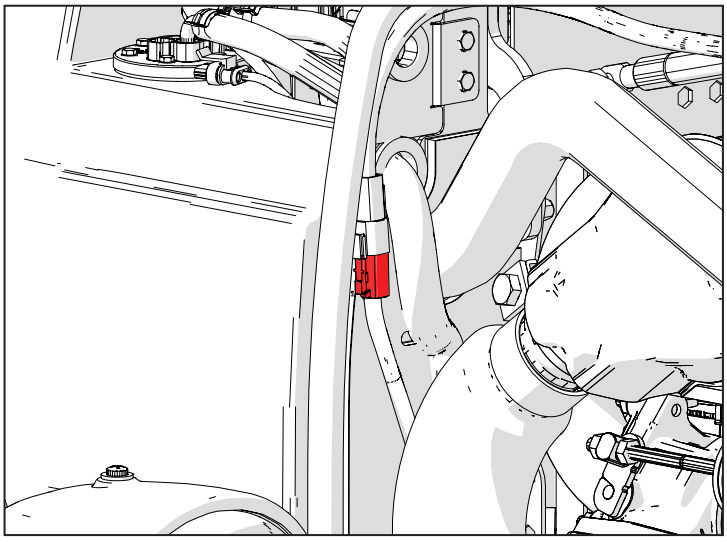




D004 (P20A) Wiring connector for cowl wiring loom

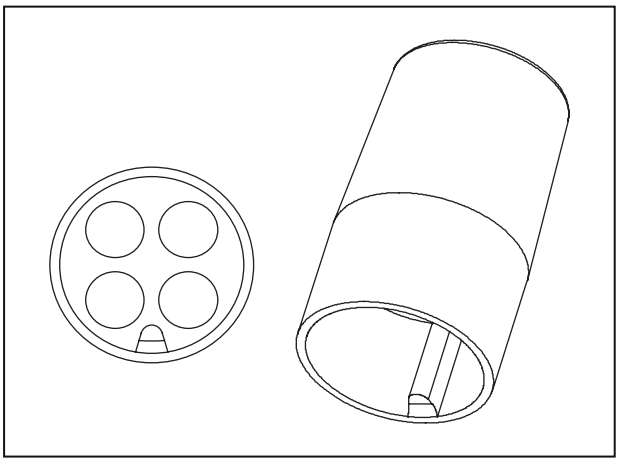
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HIGH BEAM LIGHTS	Pu	1.5	P1A	17
2	NORMAL BEAM LIGHT RH	Pu	1.5	P1A	15
3	NORMAL BEAM LIGHT LH	Pu	1.5	P1A	16
4	FRONT LIGHTS GND	BK	1.5	ENG-SP2	

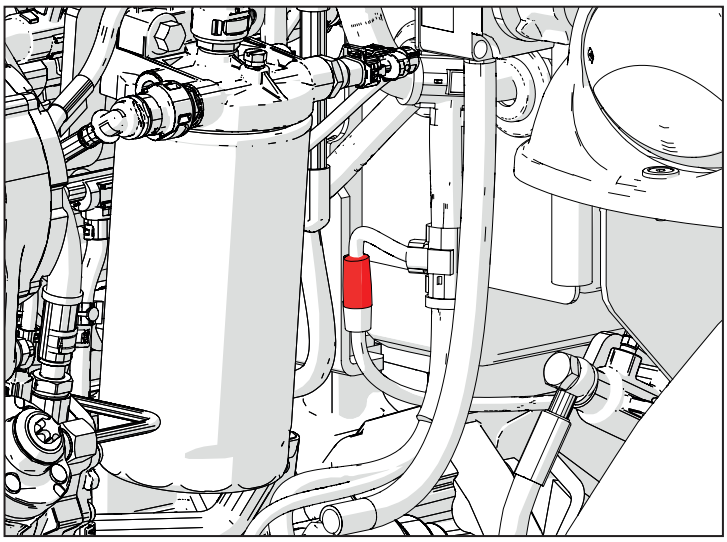




D003 (P40B) Wiring connector for front lights wiring loom

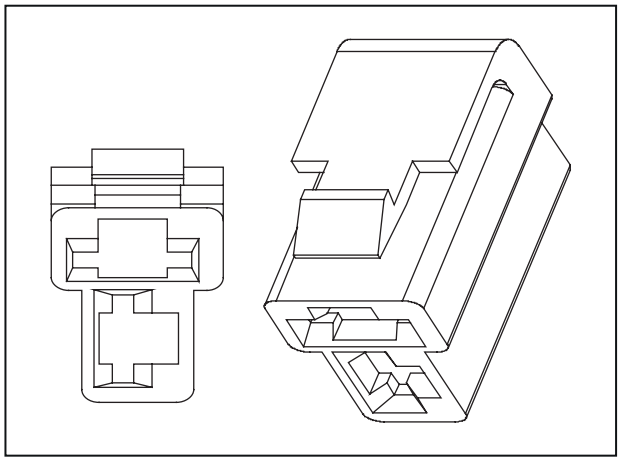
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS LH	Ye	0,75	ENG-SP14	
2	LEFT INDICATOR LIGHT	Gn	0,75	P10A	37
3	LH FENDER LIGHTS GND	BK	0,75	ENG-SP2	

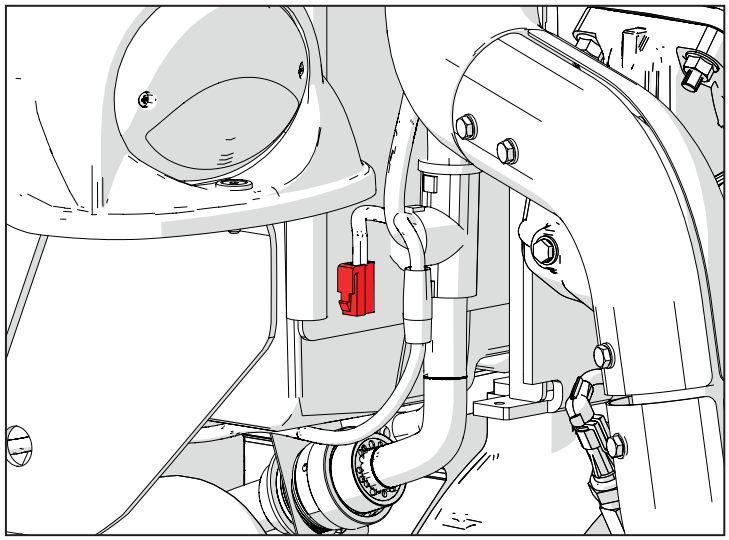




F001 (P41) Provision for rotating beacon, roll-bar version

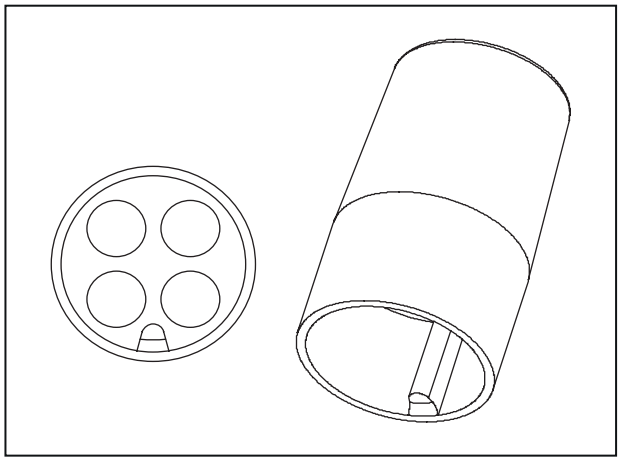
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BEACON	BK	1	ENG-SP6	
2	BEACON LIGHT SUPPLY	Pu	1	P10A	33

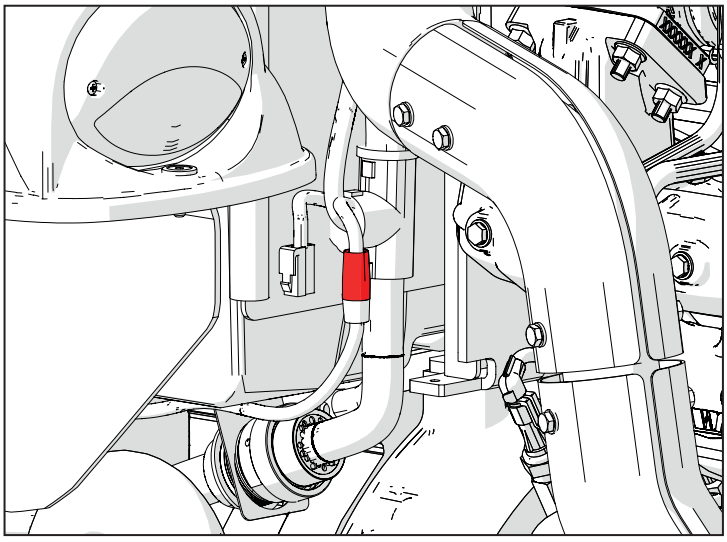




D001 (P50B) Wiring connector for RH front lights wiring loom

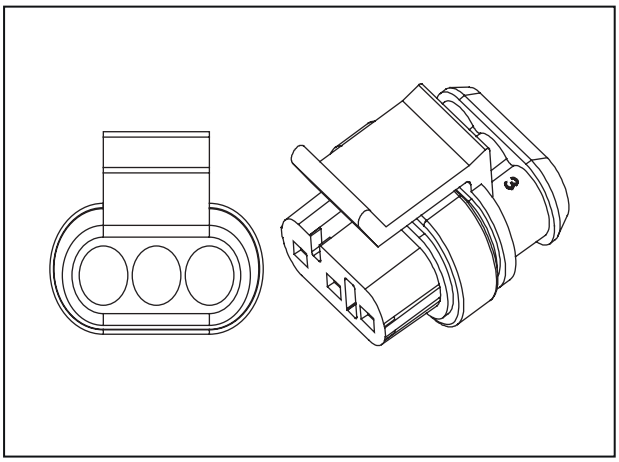
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS RH	Ye	0,75	ENG-SP16	
2	RIGHT INDICATOR LIGHT	Bu	0,75	P10A	38
3	RH FENDER LIGHTS GND	BK	0,75	ENG-SP2	

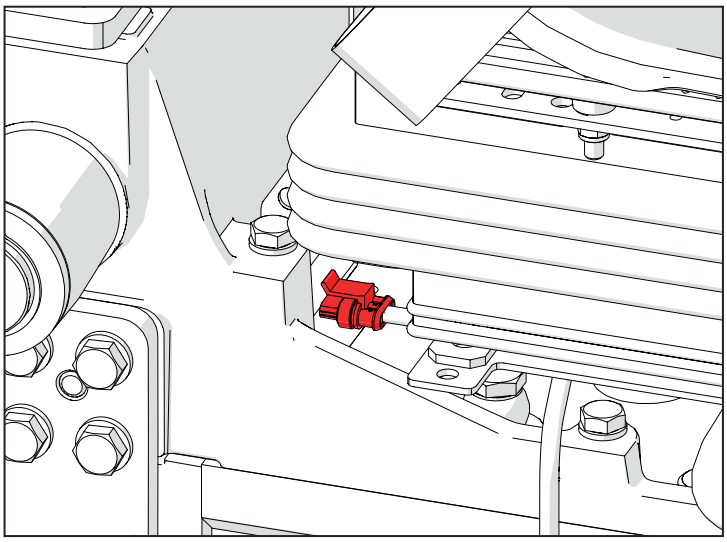




K014 (P518) PTO shaft speed sensor

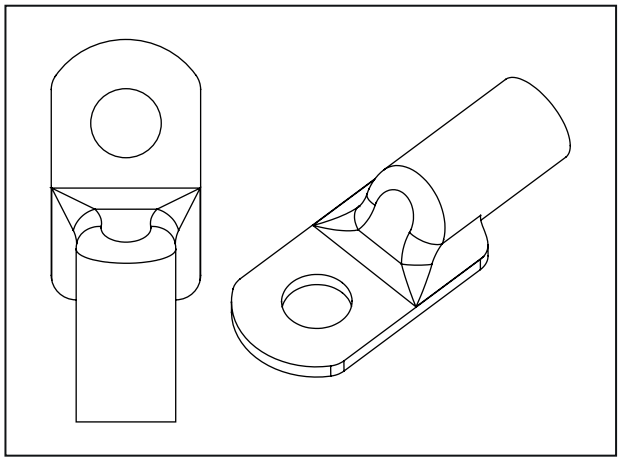
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP2	
2	GND	BK	0.5	P412	1
3	PTO rpm sensor	Gn	0.5	P100A	4

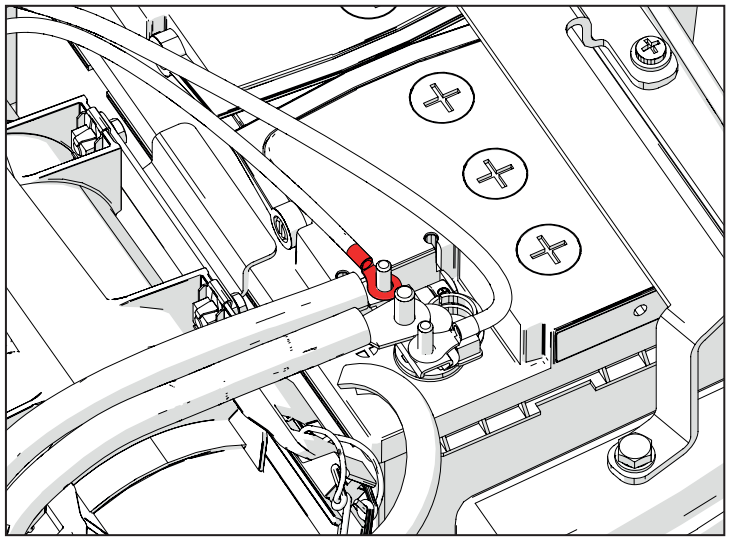




A005 (P510) Glow plug power feed

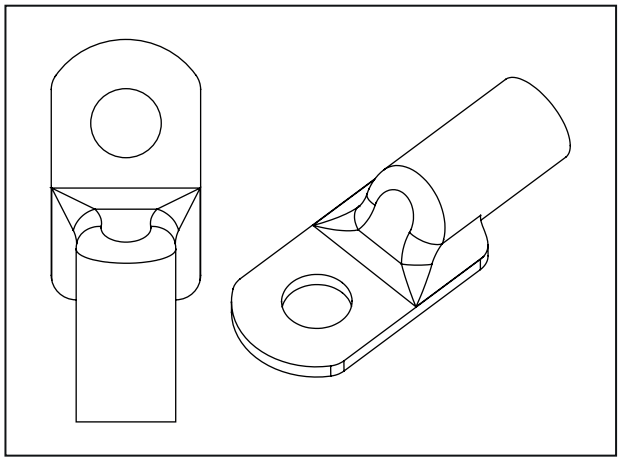
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG 12V	Rd	6	P476	1

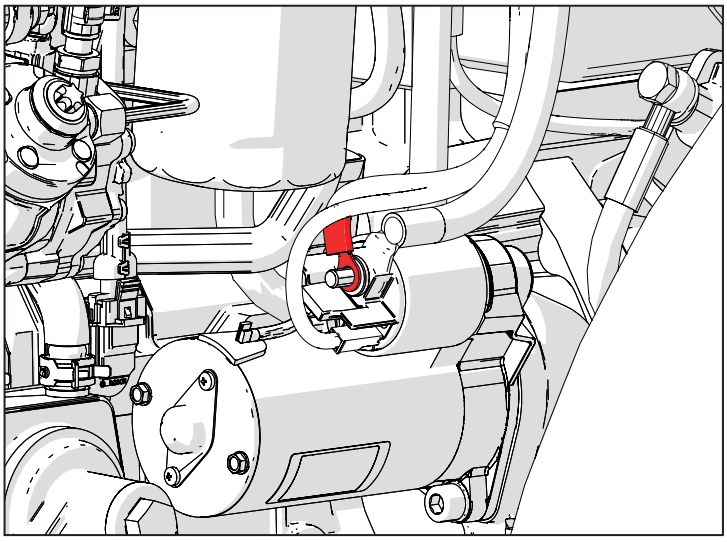




A006 (P63) Starter motor "30"

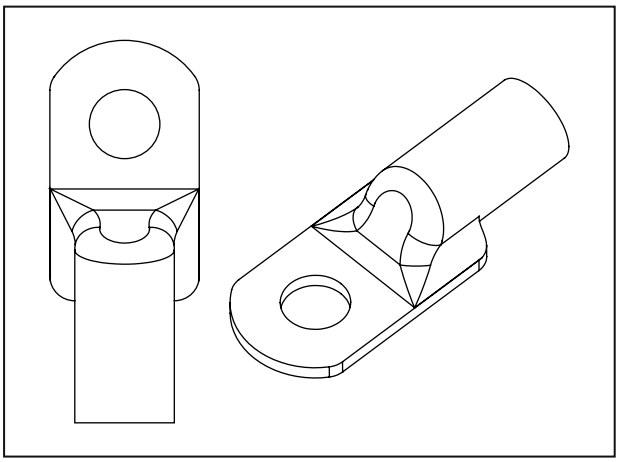
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	10	P2A	30

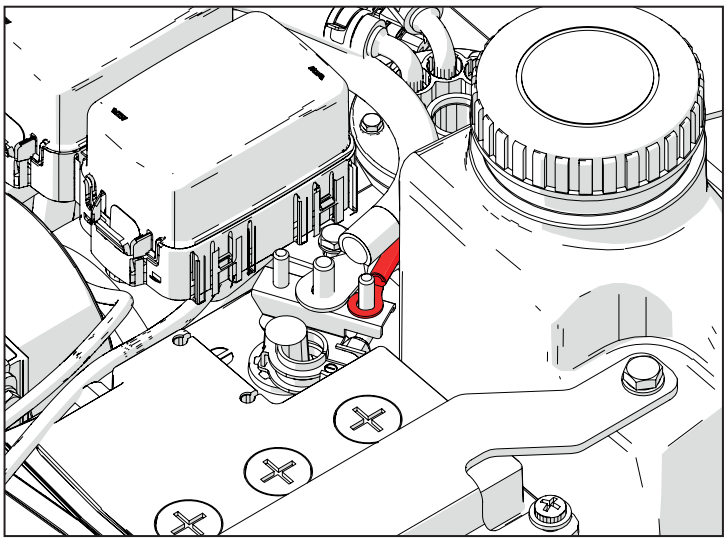




C002 (P475) Engine ground point

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FRONT GROUND	BK	6	ENG-SP6	
1	GND	BK	2.5	ENG-SP9	
1	GND	BK	2.5	ENG-SP2	

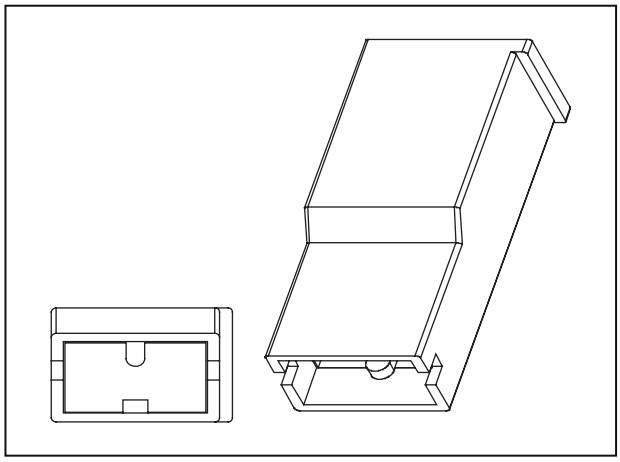


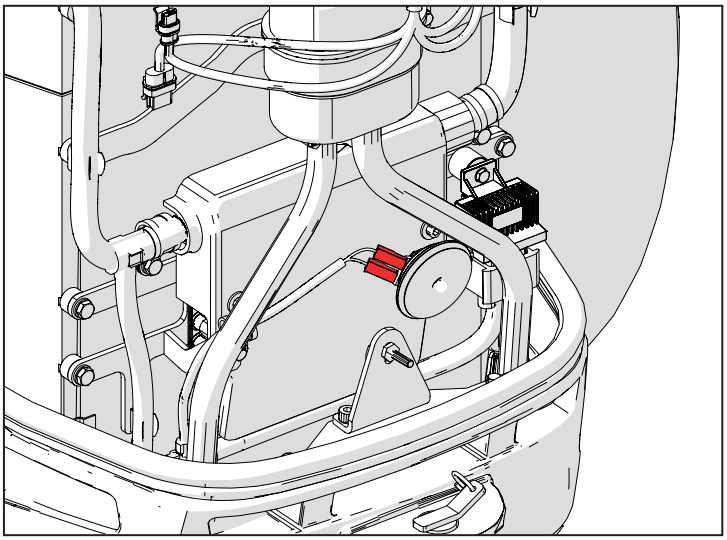


E001 (P149-P152) Horn

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HORN - GND	BK	0,75	ENG-SP6	

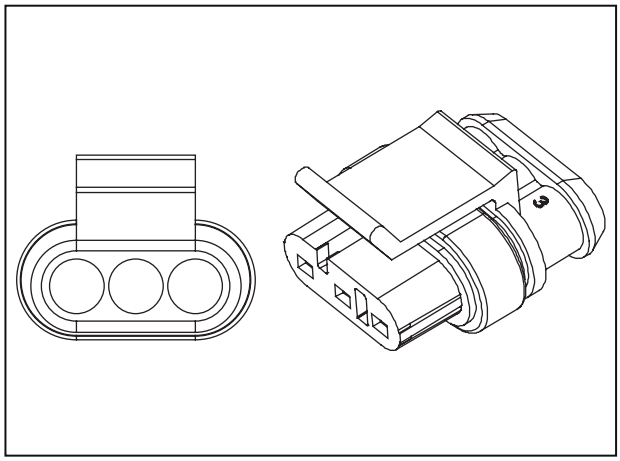
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HORN POWER SUPPLY	Pu	0,75	P10A	28

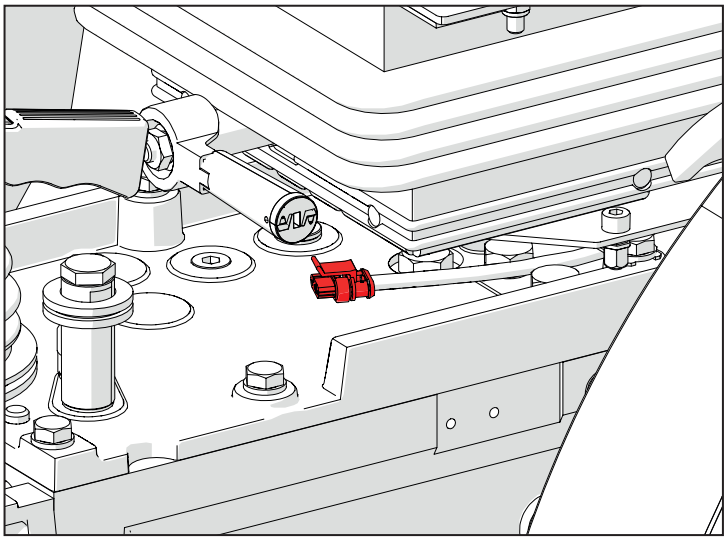




K015 (P301) Wheel speed sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VCC	Bn	0,75	MAIN-SP2	
2	WHEEL SPEED GND	BK	0,75	P412	1
3	Wheel Speed	Bu	0,75	P100A	7

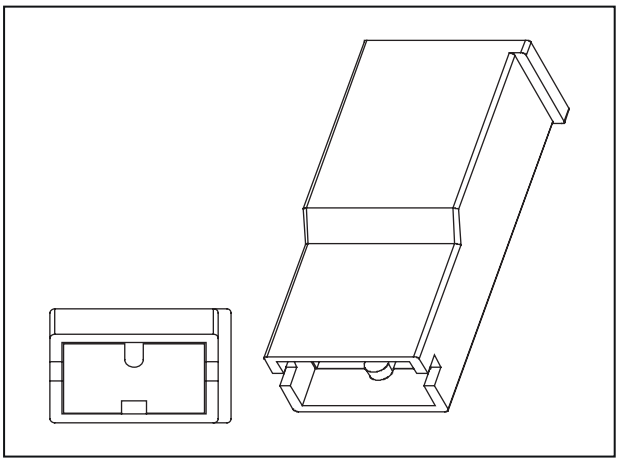


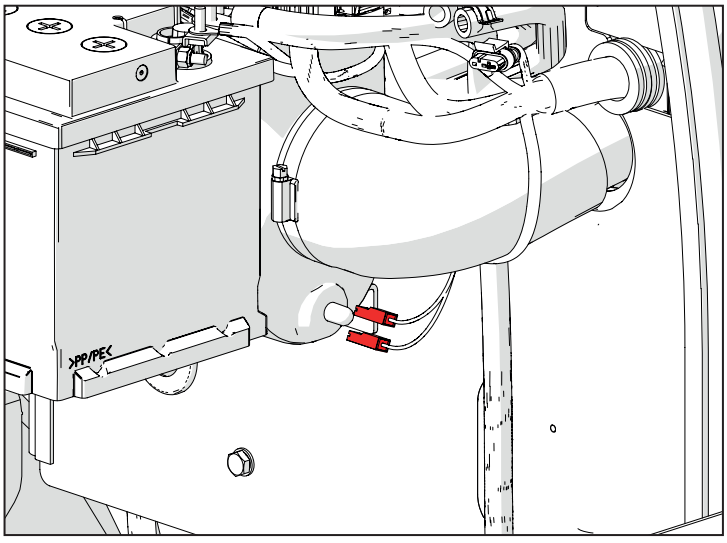


K001 (P439-P440) Air filter sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	AIR FILTER	Gn	0,75	P10A	24

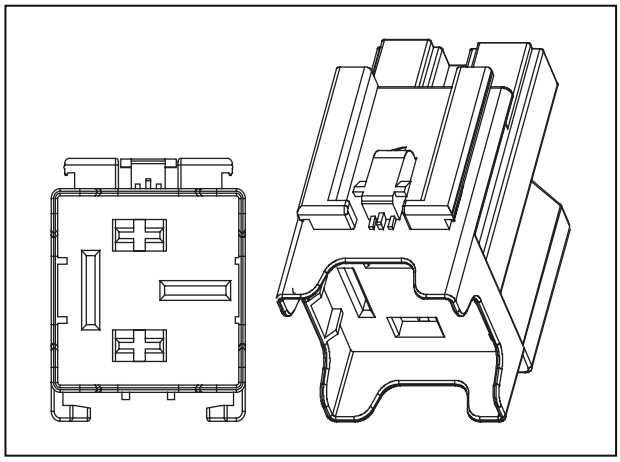
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	AIR FILTER GND	BK	0.5	ENG-SP6	

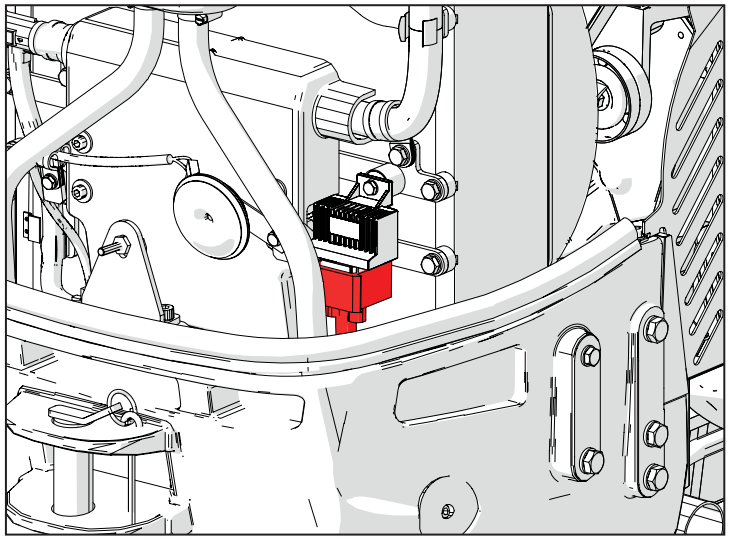




J003 (P452) Glow plug control unit

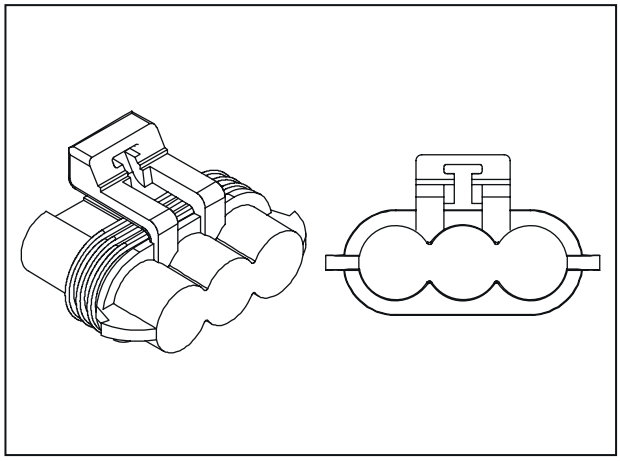
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG 3	BK	1.5	P514	3
2	GLOW PLUG 1	Rd	1.5	P514	1
3	GLOW PLUG DI	Bu	0.5	P12	22
4	GLOW PLUG 12V	Rd	6	P476	2
5	GLOW PLUG 31	BK	6	ENG-SP1	
7	GLOW PLUG 2	Bu	1.5	P514	2
8	GLOW PLUG ST	Gy	0.5	P12	52

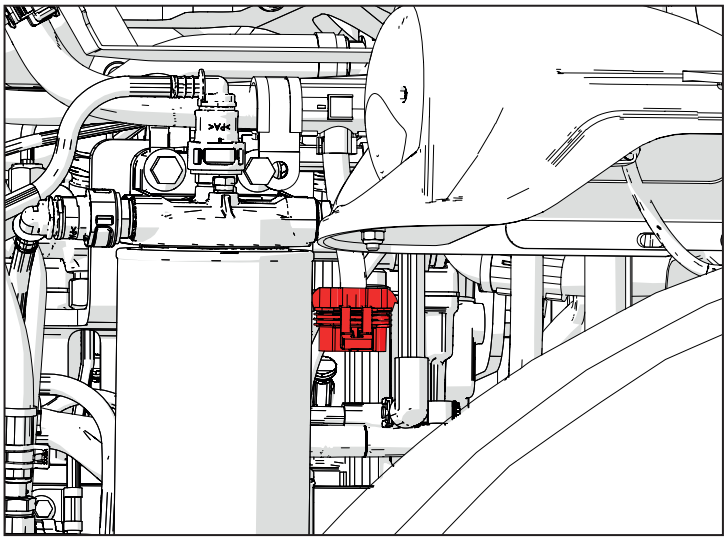




J002 (P514) Glow plugs

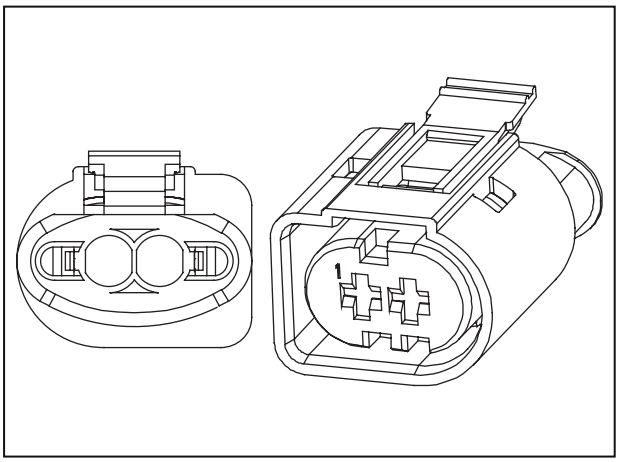
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GP1	Rd	1.5	P452	2
2	GP2	Bu	1.5	P452	7
3	GP3	BK	1.5	P452	1

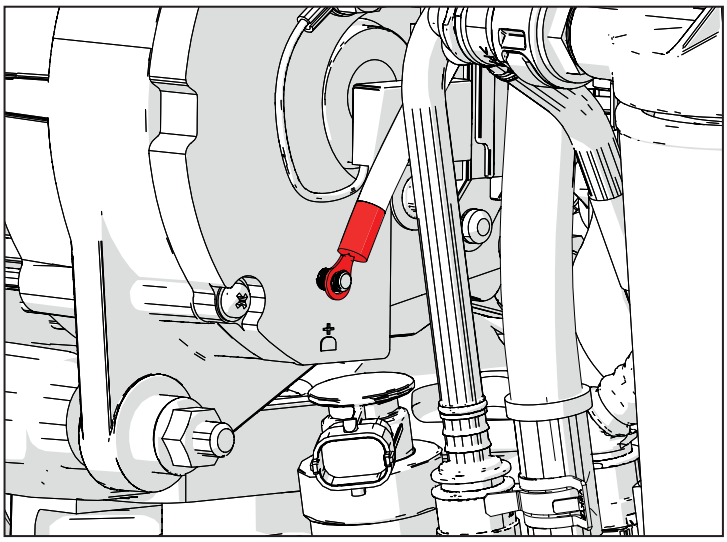




N003 (P468) Alternator

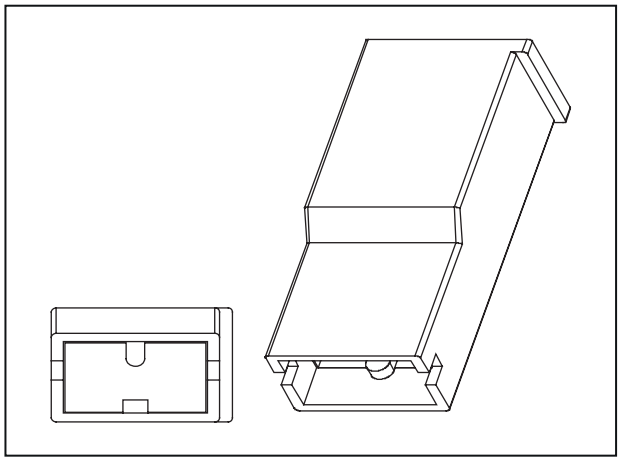
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P1	1

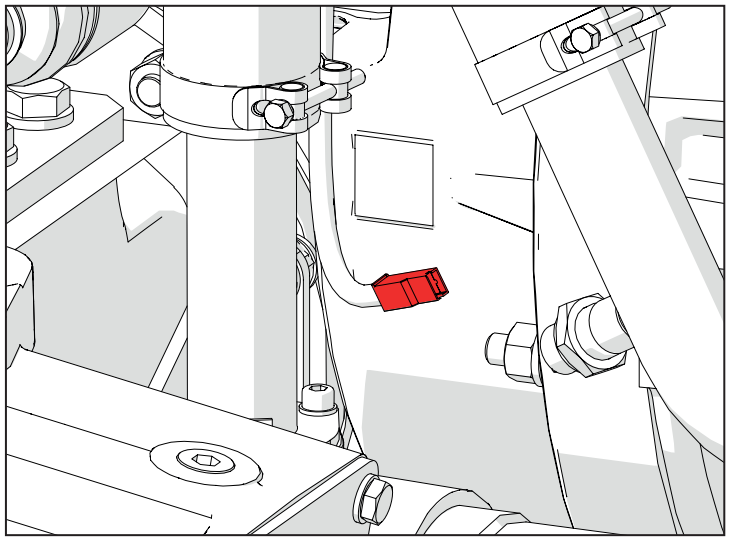




K013 (P471) Suction line hydraulic oil pressure sensor

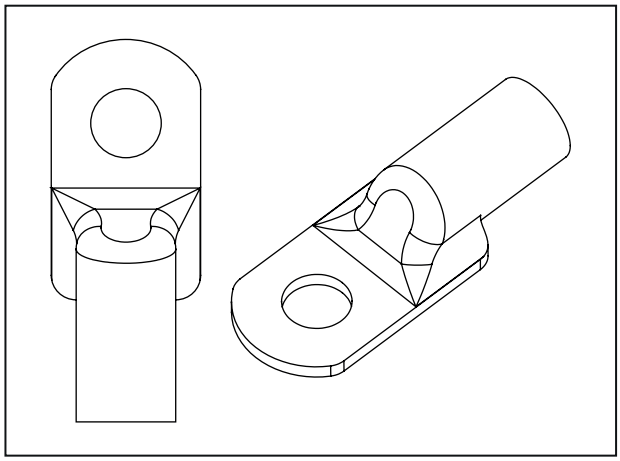
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HYD OIL PRESSURE SWITCH	Ye	0,75	P100A	23

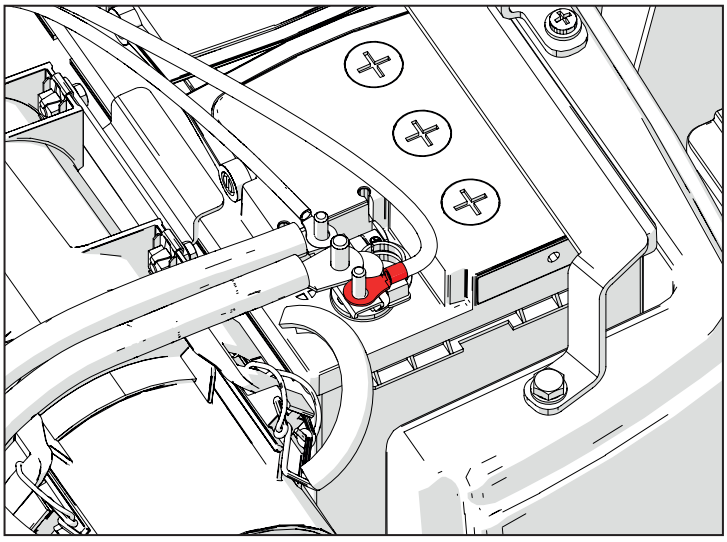




A004 (P472) Positive battery terminal

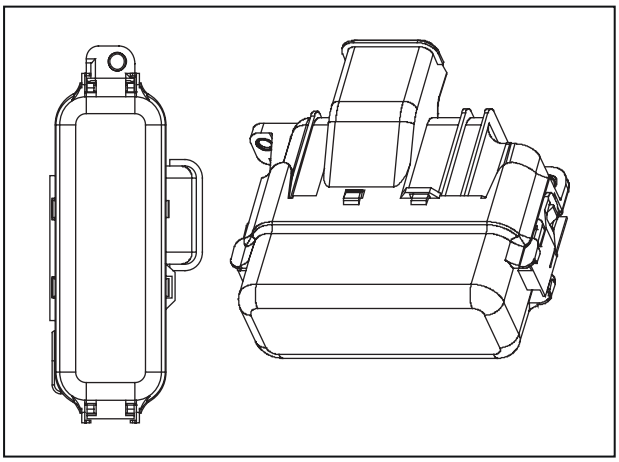
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL FILTER HEATER	Rd	1.5	P2A	4
1	MAIN RELAY	Rd	0.5	P2A	13
1	12V TRAILER SOCKET	Rd	2.5	P2A	5
1	BATTERY 12V	Rd	4	P2A	16

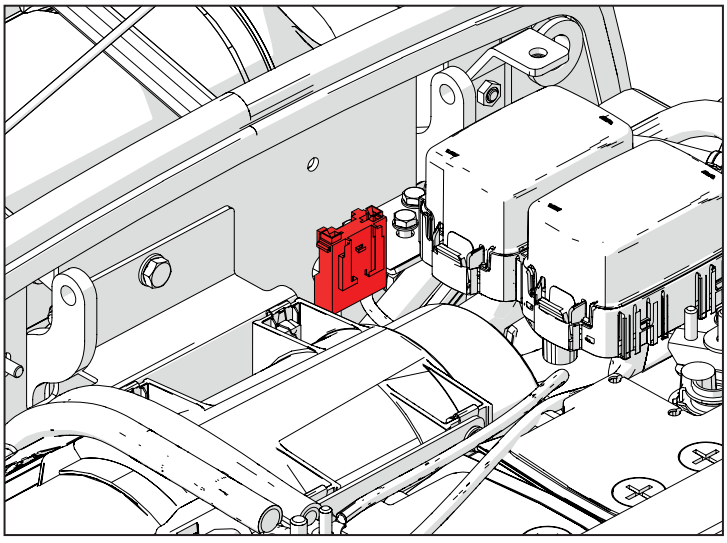




B003 (P476) Fuse holder

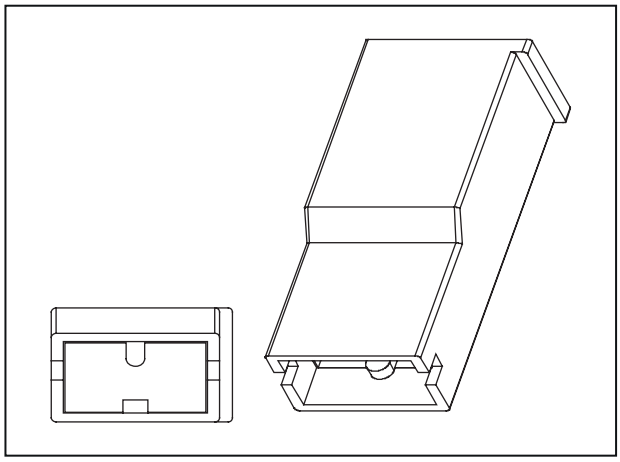
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG 12V	Rd	6	P510	1
2	GLOW PLUG 12V	Rd	6	P452	4

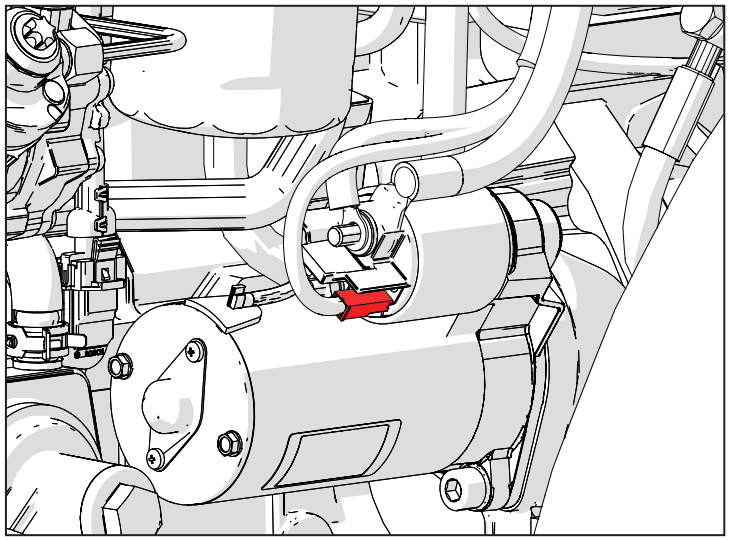




N002 (P490) Starter motor "50"

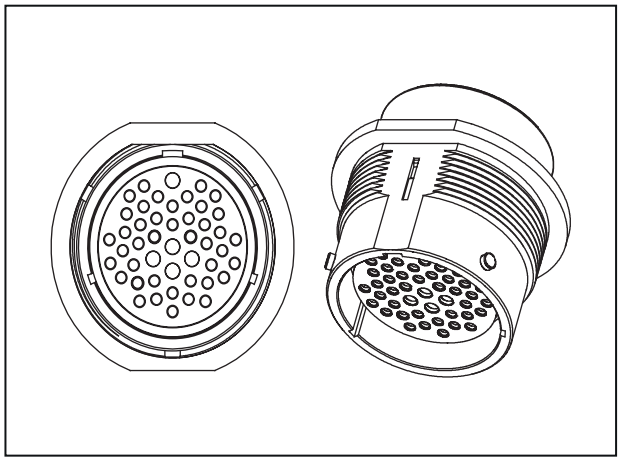
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START MOTOR	Rd	1.5	ENG-SP3	





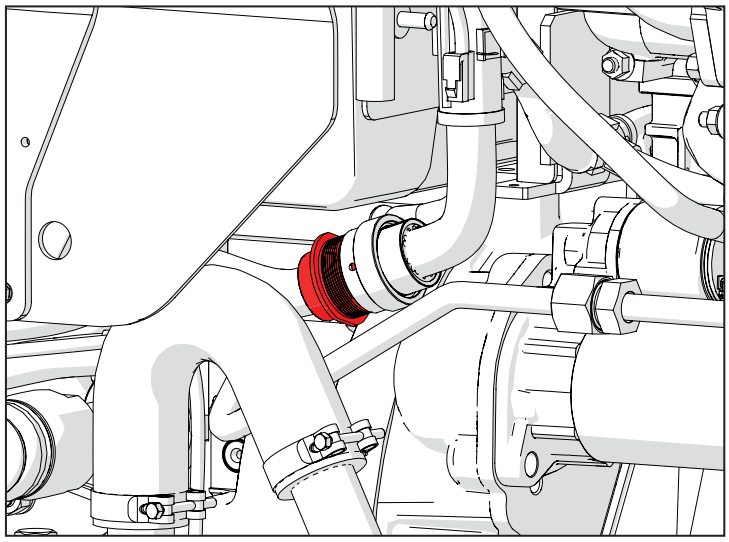
D002 (P10B) Wiring connector for engine wiring loom

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P102A	1
2	FUEL LEVEL SENSOR	Bu	0.5	P100A	26
3	START COMMAND	Bu	0.5	P100A	43
4	12V BATT SUPPLY	Rd	2.5	P102A	2
5	V KEY	Bn	2.5	P102A	3
6	V KEY	Bn	2.5	P102A	4
7	BRAKE LAMP RELAY	WH	0.5	P100A	3
8	TURN INDICATORS	Or	0.75	P100A	11
9	DASHBOARD 12 V	Bn	0.5	P100A	33



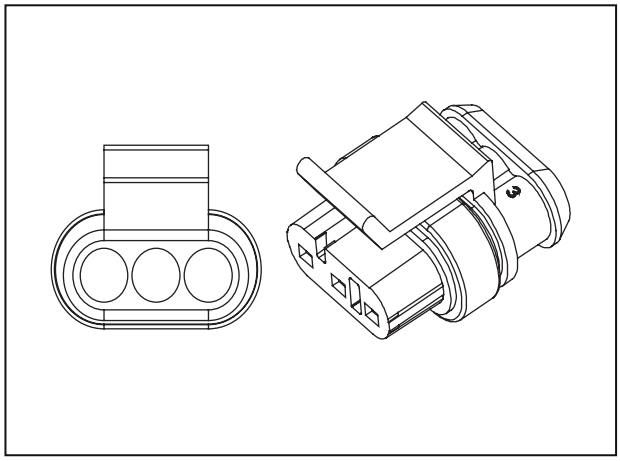
10	START ENABLE RELAY	Or	0.5	P100A	12
11	DPF REG INHIBIT SW	BK	0.5	P100A	28
12	HORN/SOCKET V KEY	Pu	1.0	P100A	8
13	HIGH BEAM	Gn	0.5	P100A	27
14	NORMAL BEAM LIGHTS	Gy	0.5	P100A	10
15	VCU V BATT	Rd	1.5	P100A	22
16	PARKING LIGHTS	Ye	1.5	P100A	24
17	ALTERNATOR B+	Bu	0.5	P100A	13
18	DASHBOARD V BATT	Rd	0.75	P100A	14
19	VJ1939 POWER SUPPLY	Rd	1.5	P100A	15
20	START ENABLE SENSOR	Rd	0.5	P100A	16
21	VCU V KEY	Bn	0.5	P100A	17
22	RELAY FOR DASHBOARD LED	Or	0.5	P100A	18
23	LED FOR DASHBOARD	Gn	0.5	P100A	19
24	AIR FILTER	Gn	0.5	P100A	20
25	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P100A	32
26	12V	Bn	1.5	MAIN-SP5	
27	VALVES V KEY	Pu	1.0	MAIN-SP14	
28	HORN POWER SUPPLY	Pu	0.75	P100A	35
29	BRAKE LAMP	Rd	0.75	MAIN-SP10	
30	PARKING LIGHT RH	Ye	1.0	MAIN-SP15	
31	HAZARD LIGHTS CONTROL	Rd	0.75	P100A	2
32	REAR PARKING LIGHT LH	Ye	1.0	MAIN-SP9	
33	BEACON LIGHT SUPPLY	Pu	1.0	P100A	31
34	12V TRAILER	Rd	2.5	MAIN-SP4	
35	GND FUEL LEVEL	BK	0.5	MAIN-SP6	
36	V KEY	Bn	1.5	P100A	34

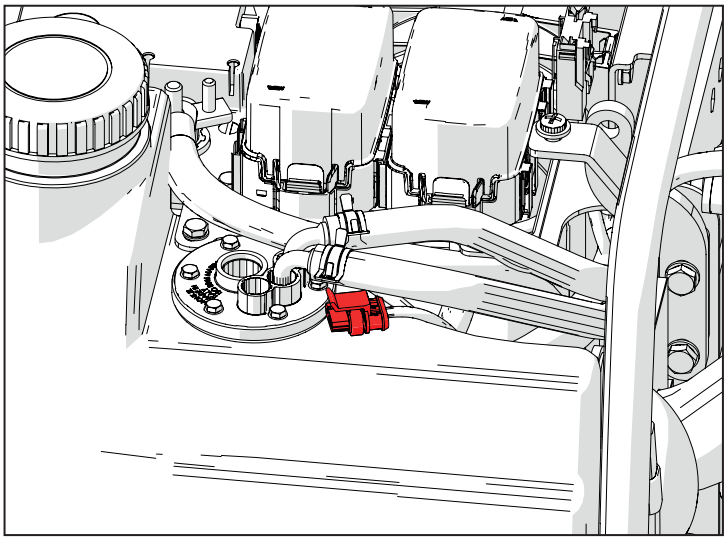
37	LH DIRECTION LIGHT	Gn	0.75	MAIN-SP8	
38	RH TURN SIGNAL LIGHT	Bu	0.75	MAIN-SP3	
39	DPF REGENERATION INHIBIT SW	Bu	0.5	P100A	44
46	CAN L	Gn	0.5	P100A	29
47	CAN H	Ye	0.5	P100A	30



K002 (P40) Fuel level sensor

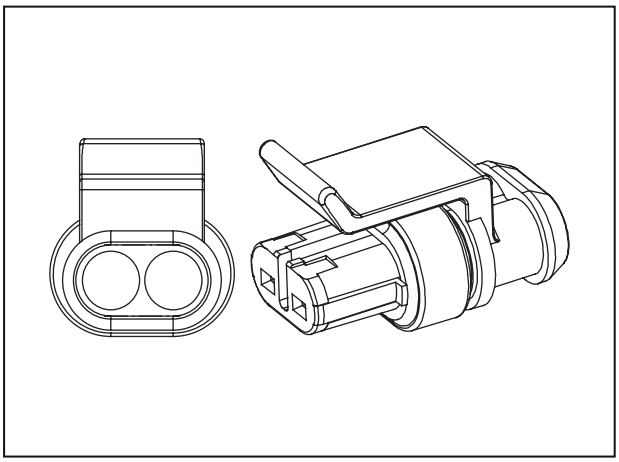
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	FUEL LEVEL SENSOR	Bu	0.5	P10A	2
3	GND FUEL LEVEL	BK	0.5	P10A	35

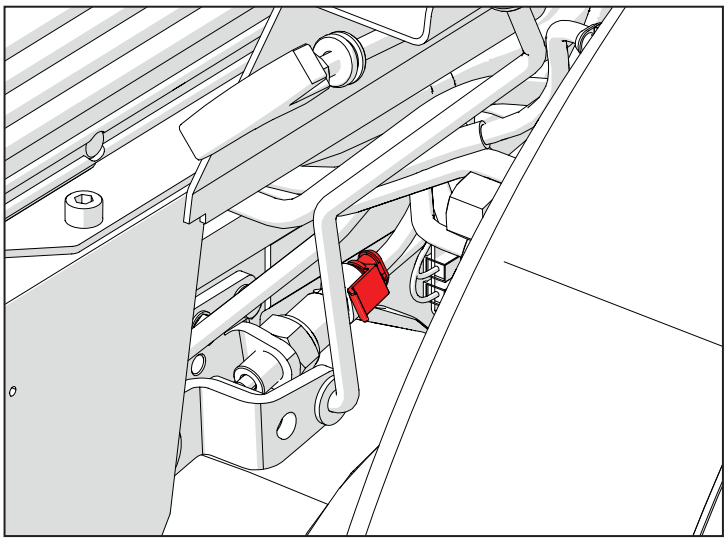




I014 (P49) PTO safety synchro switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO SYNCHRONIZED GND	BK	0.5	MAIN-SP6	
2	PTO - Synchronized Safety Switch	Bu	0.5	P100A	38

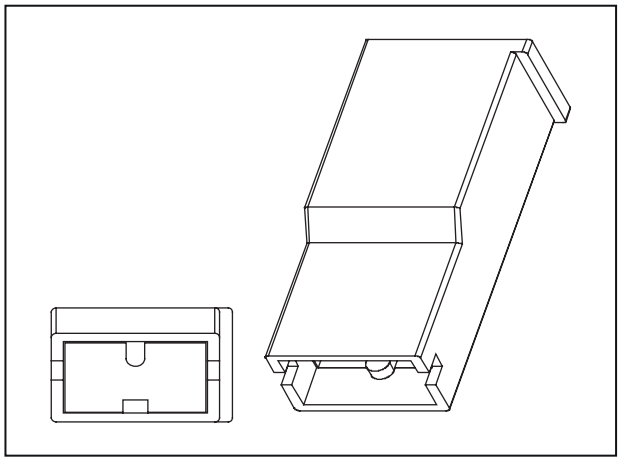


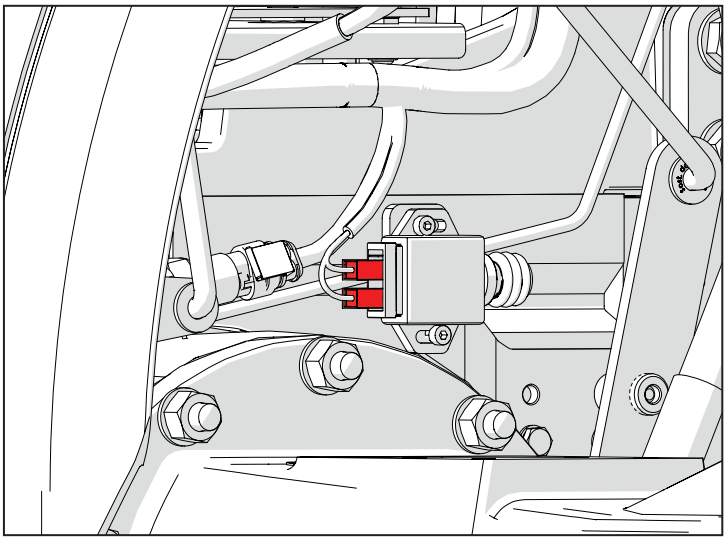


I015 (P519-P520) PTO speed mode selector

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear - Speed Selection Lever	Ye	0.5	P100A	5

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	0.5	P412	1

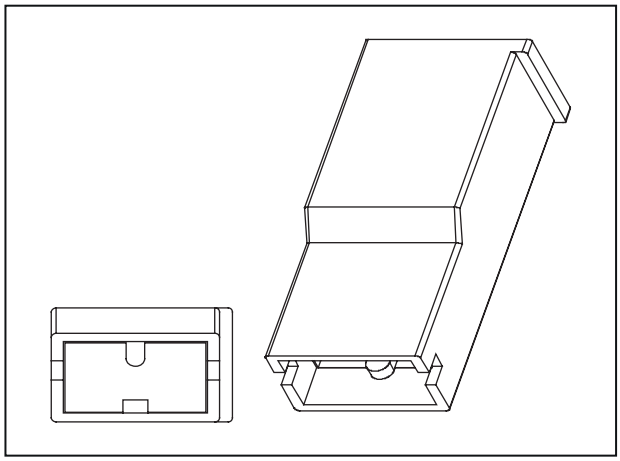


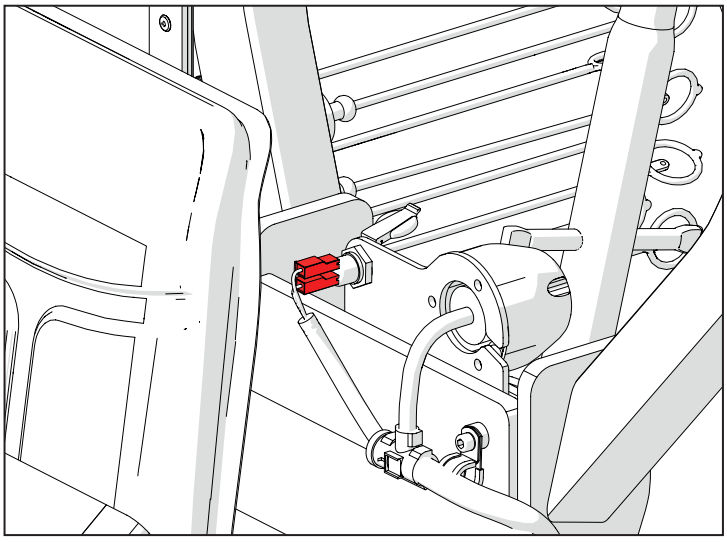


P003 (P50-P51) 1 pole socket

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	SOCKET 1 POLE SUPPLY	Rd	2.5	MAIN-SP4	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND SOCKET 1 POLE	BK	2.5	P412	1

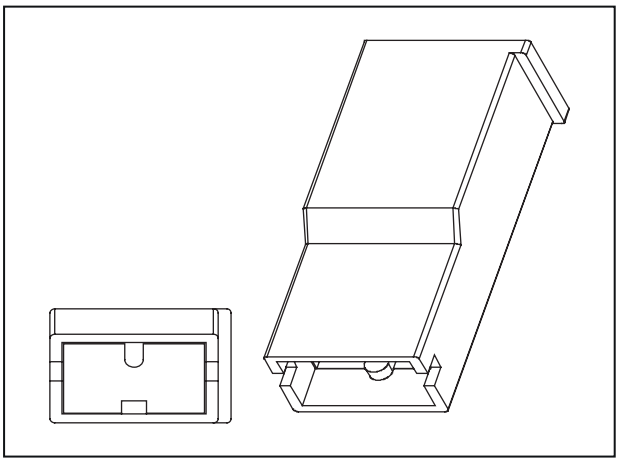


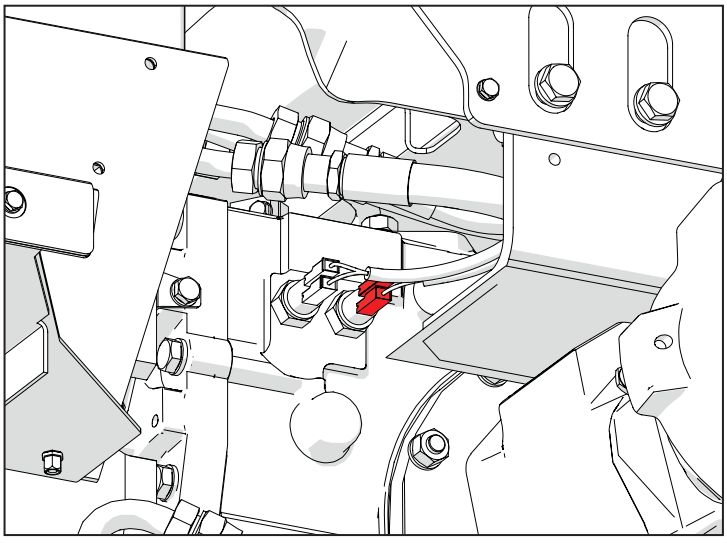


I012 (P56-P57) 'Reverse' shuttle lever button

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP5	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	Shuttle lever Rw switch	Gn	0.5	P100A	46

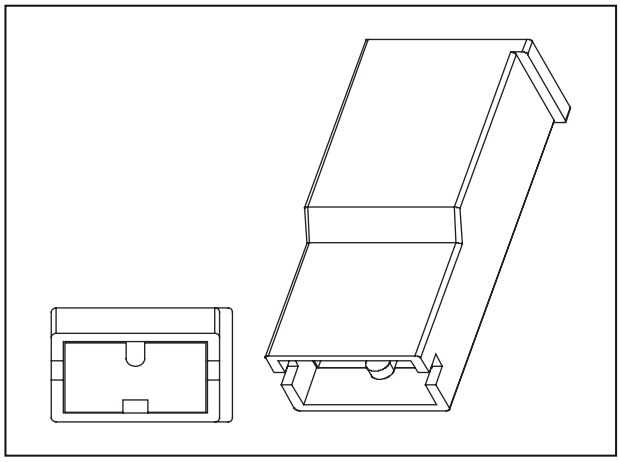


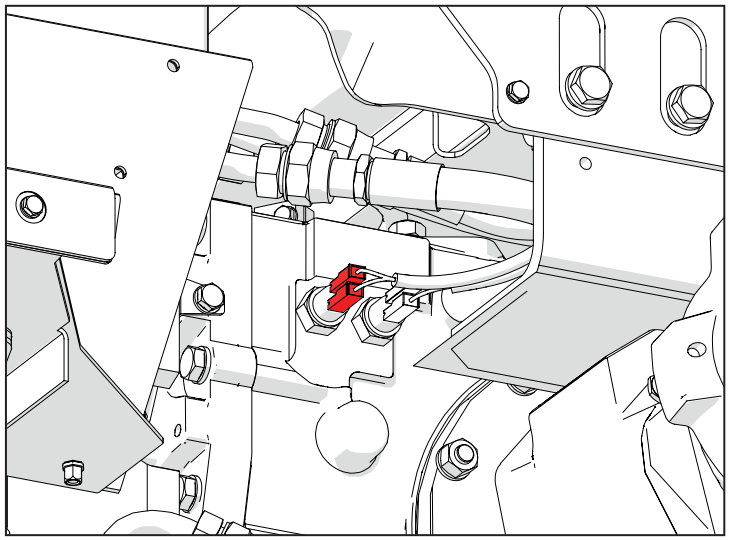


I013 (P58-P59) 'Forward' shuttle lever button

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	Shuttle lever fw switch	Or	0.5	P100A	45

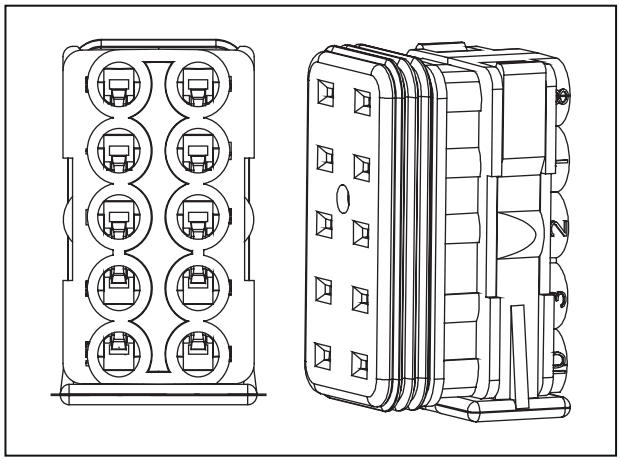
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP5	

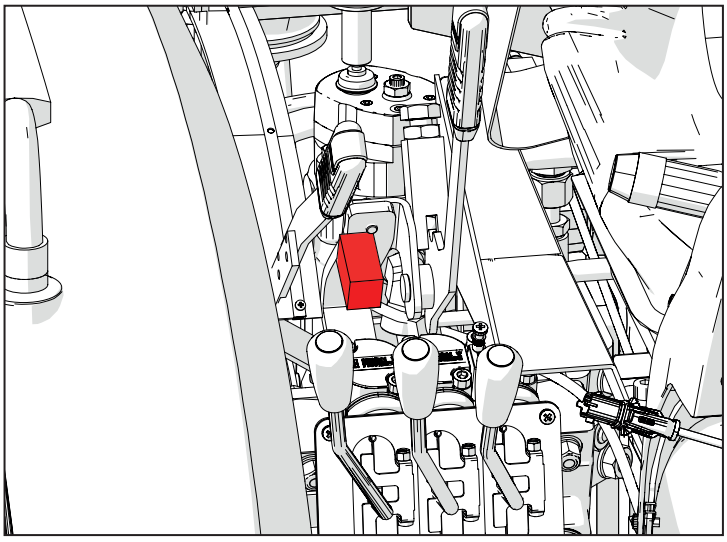




H002 (P61) "Diverter" button

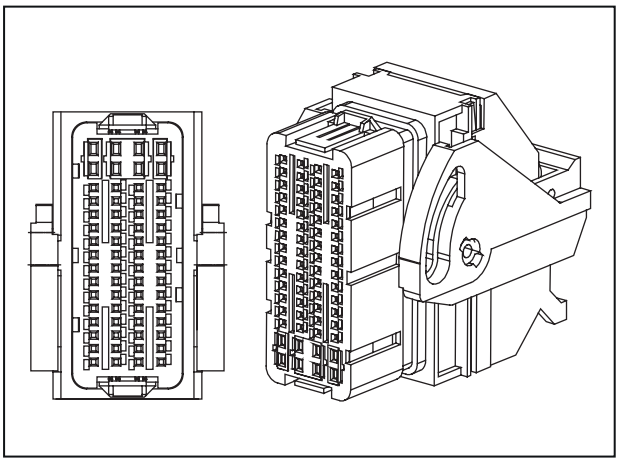
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	PB - DIVERTER 12V	Bn	0.5	MAIN-SP2	
3	PB - DIVERTER	Gy	0.5	P100A	47





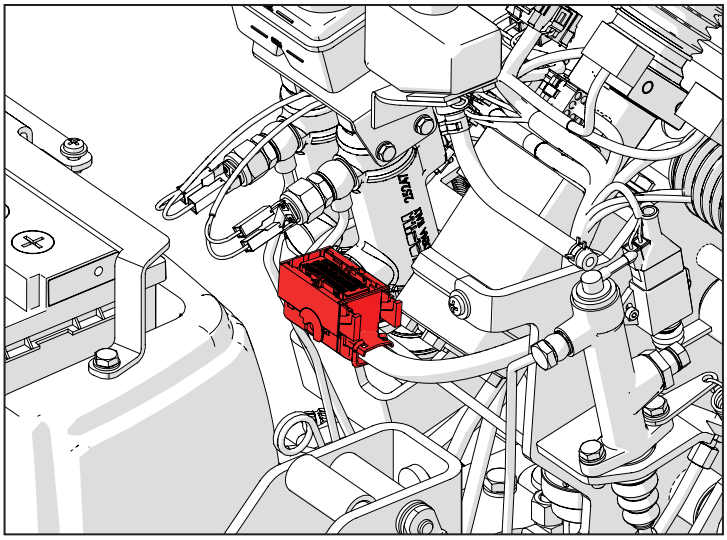
M001 (P80) Vehicle control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
A1	CAN H	Ye	0.5	CAB-SP12	
A2	CAN L	Gn	0.5	CAB-SP14	
B2	Shuttle lever FW switch	Or	0.5	P100B	45
B3	START ENABLE RELAY	Or	0.5	P100B	12
C1	PTO RPM Sensor	Gy	0.5	P100B	4
C2	Shuttle lever RW switch	Gn	0.5	P100B	46
C3	RELAY FOR DASHBOARD LED	Or	0.5	P100B	18
D1	BRAKE OIL LEVEL	Gn	0.5	P19	1
D2	BRAKE LH SW	Or	0.5	P292	1
D3	Wheel Speed	WH	0.5	P100B	7
D4	DPF REGENERATION TRIGGER SW	Gn	0.5	P32	3
E1	LEFT INDICATOR LIGHT	Gn	0.5	CAB-SP3	
E2	NORMAL BEAM LIGHTS	Gy	0.5	CAB-SP21	
E4	BRAKE RH SW	Bu	0.5	P119	1
F1	HIGH BEAM LIGHTS	Gn	0.5	CAB-SP23	
F2	PTO REAR A	Pu	0.5	P504	1



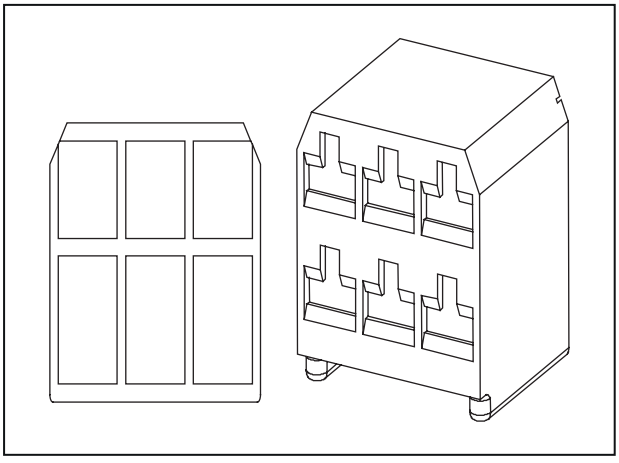
F3	RIGHT INDICATOR LIGHT	Bu	0.5	CAB-SP4	
F4	PARKING LIGHTS	Ye	0.5	CAB-SP22	
G1	PTO REAR B	Pu	0.5	P505	1
G2	START ENABLE SENSOR	Rd	0.5	P100B	16
G3	PB - PTO Rear/ Front bypass	Bu	0.5	P36	4
G4	ENGINE CLUTCH SW	Gn	0.5	P492	1
H1	SEAT SWITCH SIGNAL - A	Bu	0.5	P100B	36
H2	PTO - Speed Selection Lever	Ye	0.5	P100B	5
H3	START COMMAND	Bu	0.5	CAB-SP24	
H4	PB - DIVERTER	Gy	0.5	P100B	47
J1	PARKING BRAKE SW SIGNAL	Gn	0.5	P138	1
J2	AIR FILTER	Gn	0.5	P100B	20
J3	SEAT SWITCH SIGNAL - B	Gn	0.5	P100B	37
J4	DPF REG INHIBIT SW	Or	0.5	P32	1
K1	FUEL LEVEL SENSOR	Bu	0.5	P100B	26
K2	THROTTLE - SIGNAL2	Gn	0.5	P100	6
K3	HYD OIL PRESSURE SWITCH	Ye	0.5	P100B	23
K4	PB - Differential lock on/off	Bu	0.5	P62	3
L3	PTO - Synchronized Safety Switch	Bu	0.5	P100B	38
L4	THROTTLE - SIGNAL1	Gn	0.5	P100	3
M2	VCU V KEY	Bn	0.5	P100B	17
N2	THROTTLE GND	BK	0.5	CAB-SP7	
N3	SIGNAL GND	BK	0.5	P100B	6
O1	V BAT	Rd	0.5	CAB-SP5	
O2	12V	Rd	0.5	CAB-SP5	
O3	V BAT	Rd	0.5	CAB-SP5	
O4	V BAT	Rd	0.5	CAB-SP5	

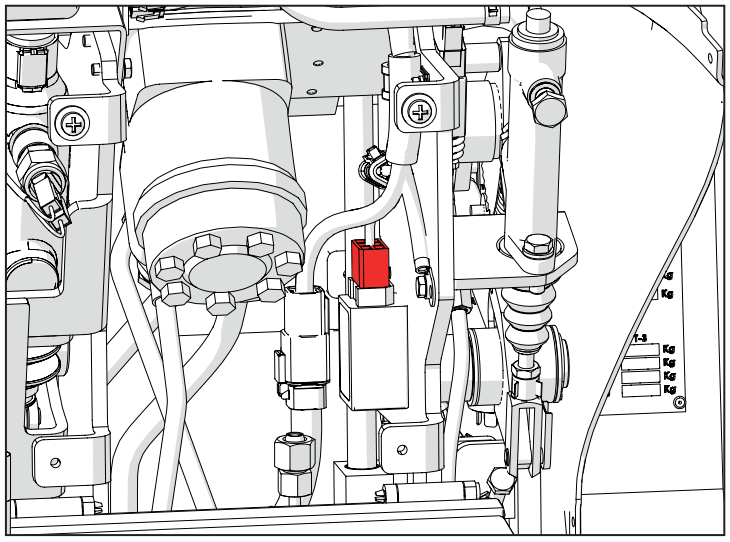
P1	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P100B	39
P2	PTO DIRECTION VALVE	Gy	0.5	P100B	42
P3	BRAKE LAMP RELAY	WH	0.5	P100B	3
P4	GND	BK	0.75	CAB-SP2	
Q1	DIVERTER VALVE	Gn	0.5	P100B	41
Q3	DIFF LOCK ON/ OFF VALVE	Or	0.5	P100B	40
Q4	GND	BK	0.75	CAB-SP2	



M002 (P274) Flasher unit

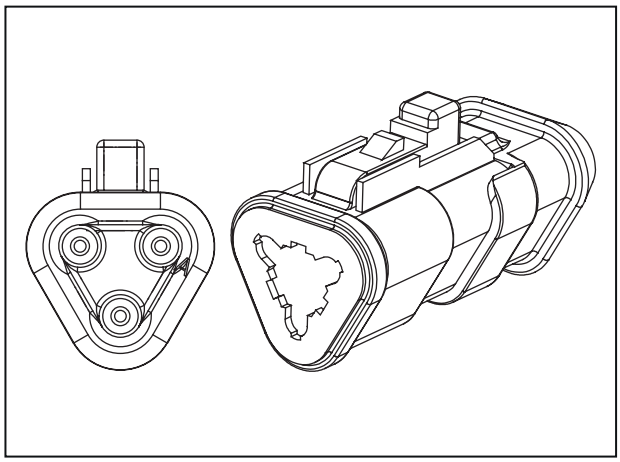
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	1	P13	1
4	12V EMERGENCY	WH	1	P137	5
4	TURN INDICATORS	WH	1	P144	6
6		Pu	1	P137	2

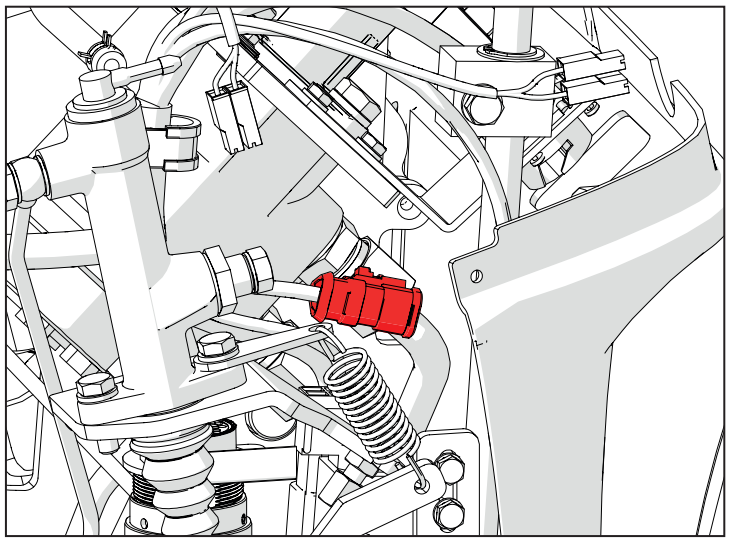




O002 (P98) CAN line termination

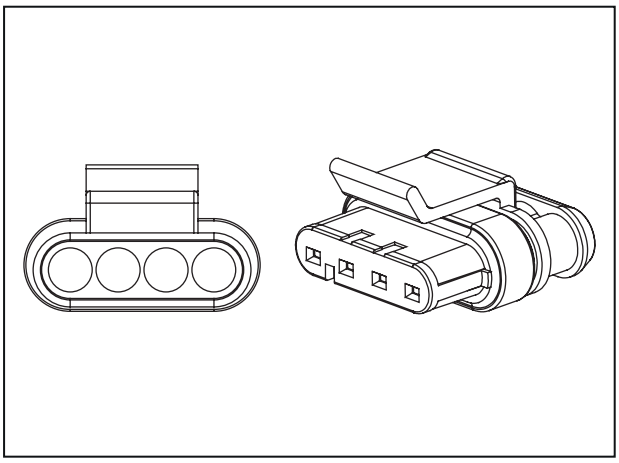
Pin	Description	Colour	Sect.	Input Conn.	Pin
A	CAN H	Ye	0.5	CAB-SP12	
B	CAN L	Gn	0.5	CAB-SP14	

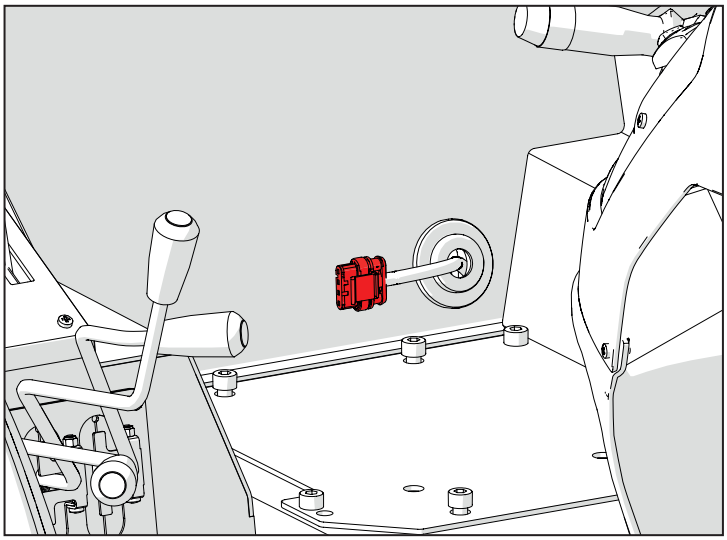




K016 (P107) Seat start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V - SEAT SAFETY	Bn	0,75	MAIN-SP2	
2	SEAT SWITCH SIGNAL - A	Bu	0.5	P100A	36
3	12V - SEAT SAFETY	Bn	0,75	MAIN-SP2	
4	SEAT SWITCH SIGNAL - B	Gn	0.5	P100A	37

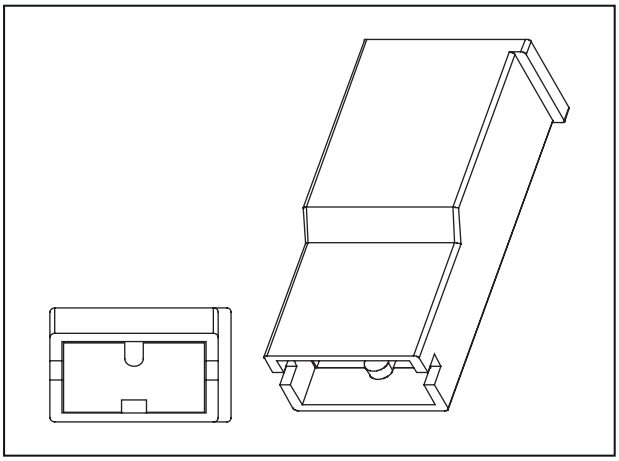


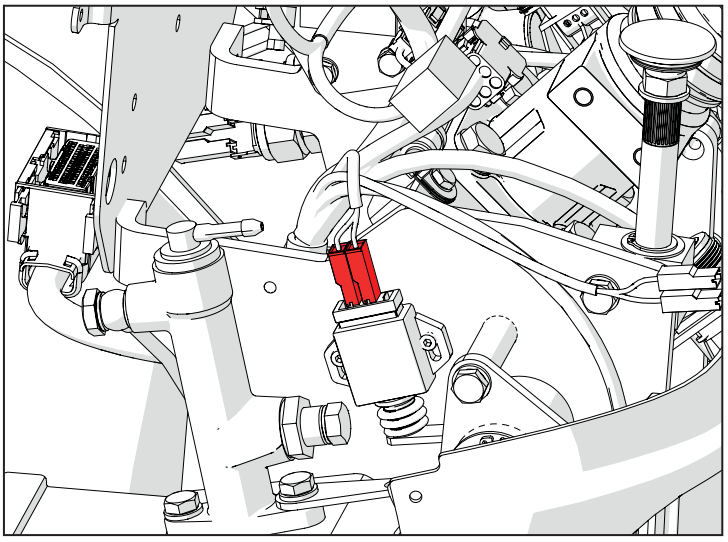


I003 (P138-P139) Park brake start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING BRAKE SW SIGNAL	Gn	0.5	P80	J1

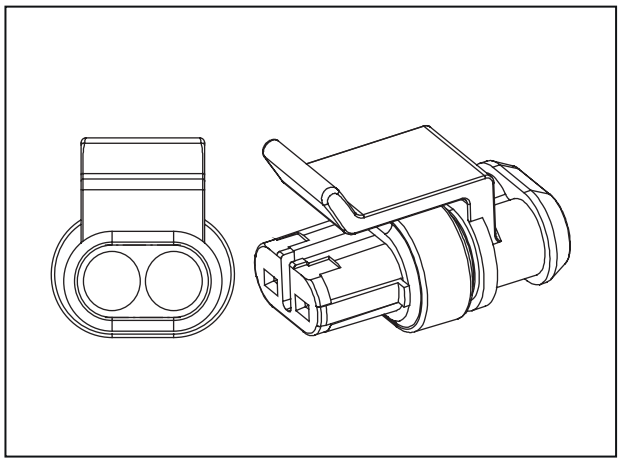
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING SW GND	BK	0.5	CAB-SP2	

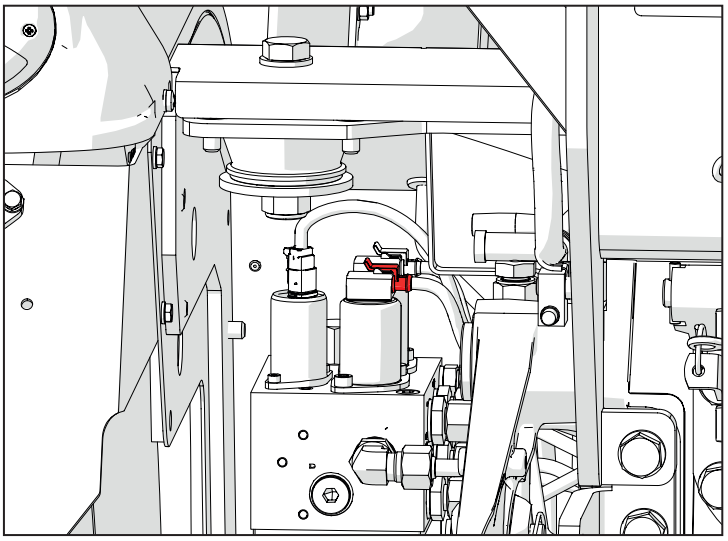




L002 (P499) PTO directional valve

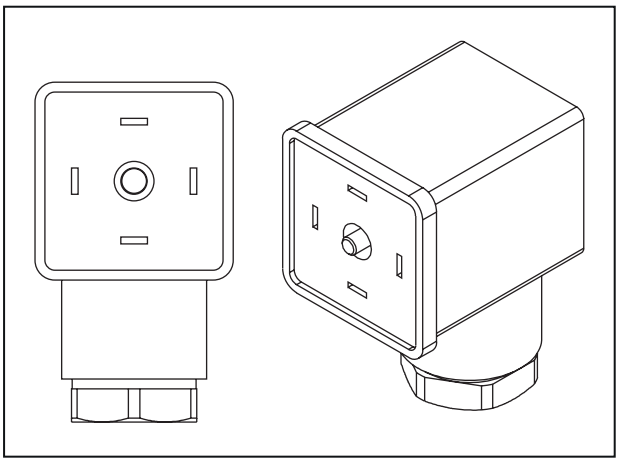
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO DIRECTION VALVE	Pu	0.5	MAIN-SP14	
2	PTO DIRECTION VALVE	Gy	0.5	P100A	42

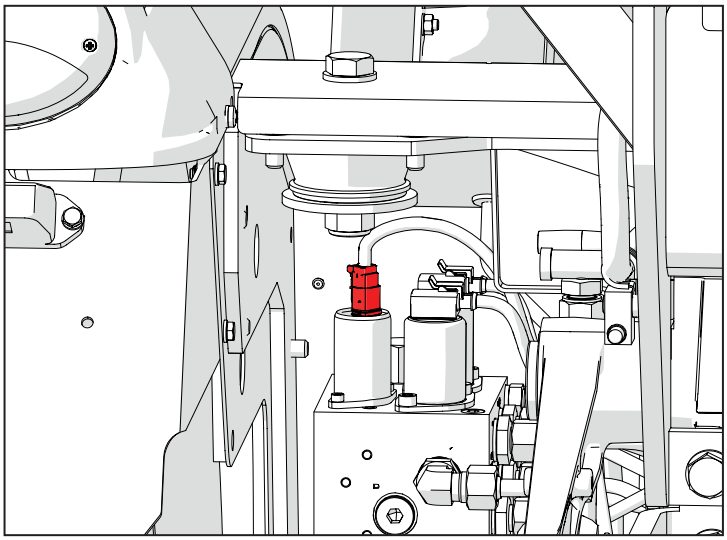




L004 (P186) PTO proportional solenoid valve

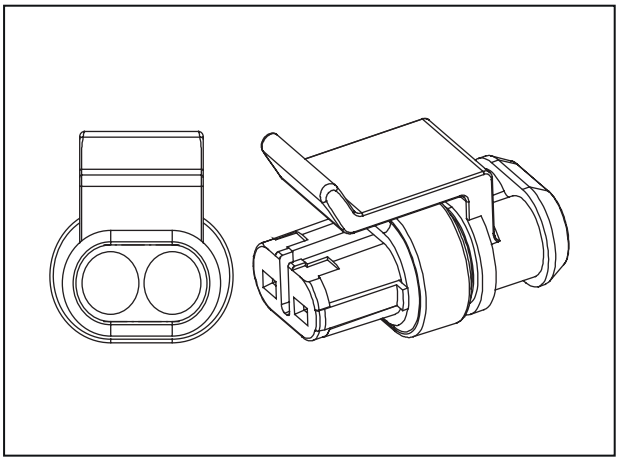
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VP VALVE T	Pu	0.5	MAIN-SP14	
2	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P100A	39

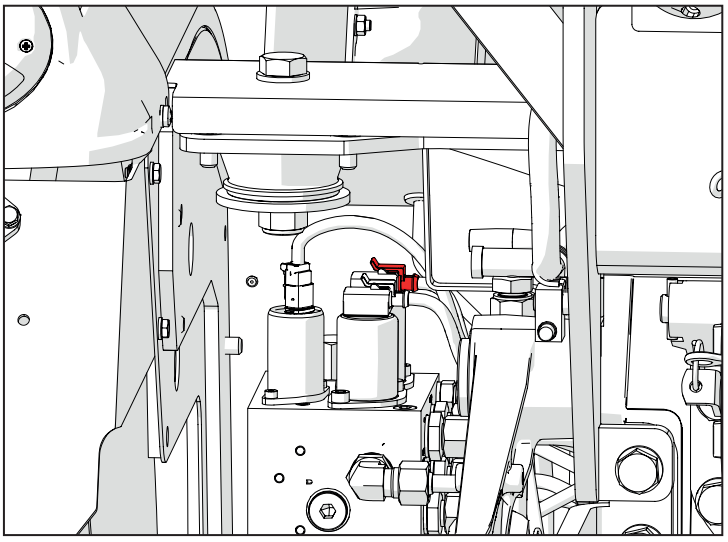




L003 (P187) Differential lock ON/OFF solenoid valve

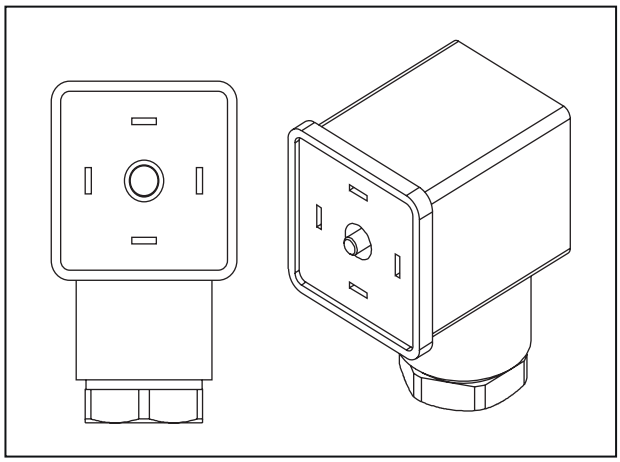
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VALVES V KEY	Pu	0.5	MAIN-SP14	
2	DIFF LOCK ON/ OFF VALVE	Or	0.5	P100A	40

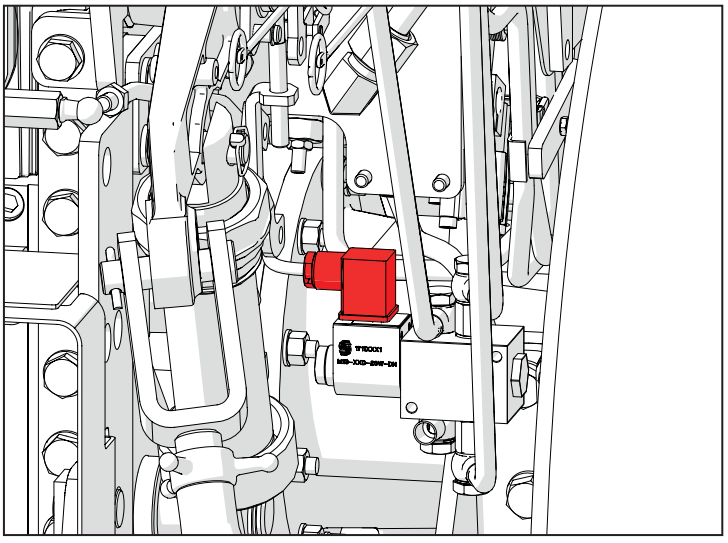




L001 (P188) "Diverter" solenoid valve

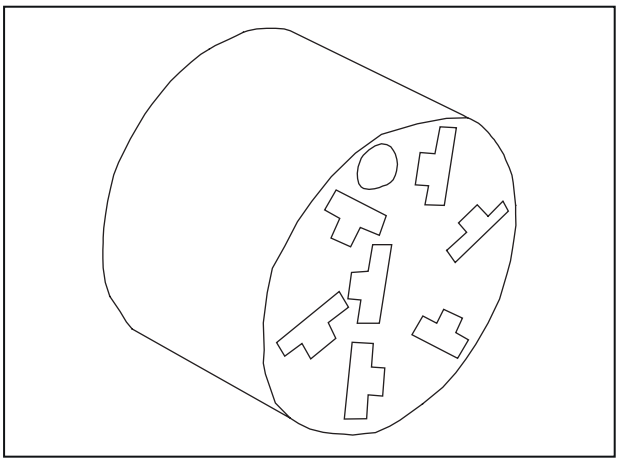
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VALVES V KEY	Pu	0.5	MAIN-SP14	
2	DIVERTER VALVE	Gn	0.5	P100A	41

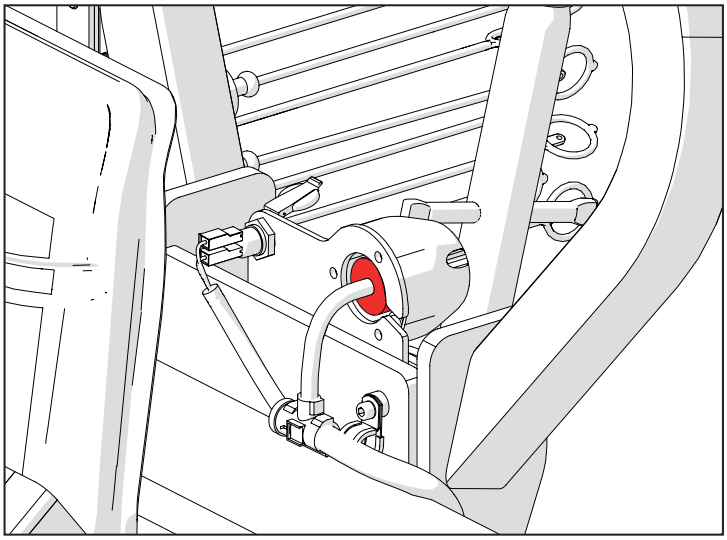




P002 (P226) Rear 7 pole socket

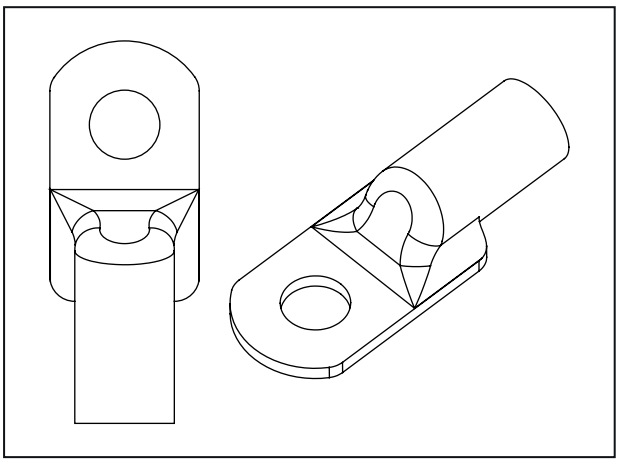
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	LH TURN SIGNAL	Gn	0,75	MAIN-SP8	
2	12V TRAILER	Rd	1.5	MAIN-SP4	
3	GND	BK	1.5	P412	1
4	RH TURN SIGNAL	Bu	0,75	MAIN-SP3	
5	PARKING LIGHT RH	Ye	0,75	MAIN-SP15	
6	BRAKE LAMP	Rd	1.5	MAIN-SP10	
7	PARKING LIGHTS LH	Ye	0,75	MAIN-SP9	

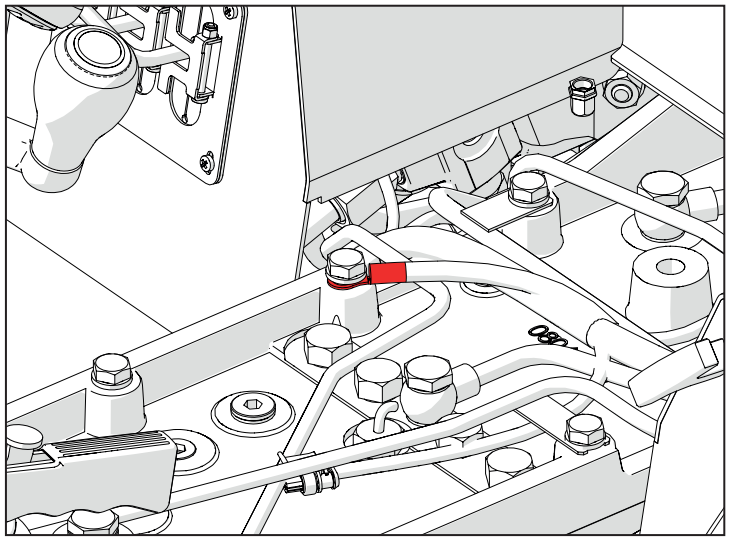




C005 (P412) Main wiring loom ground

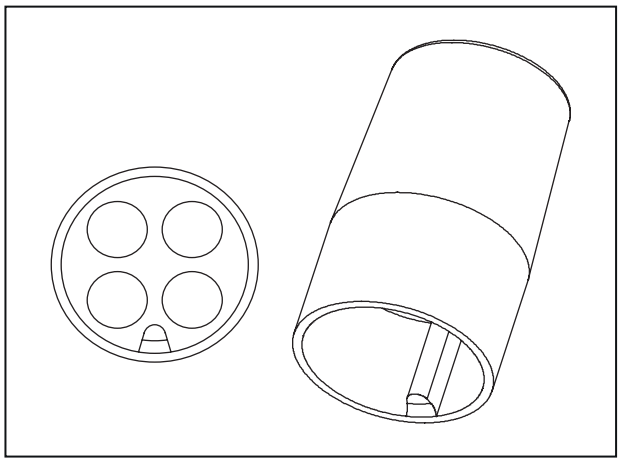
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND SOCKET 1 POLE	BK	2.5	P51	1
1	GND	BK	0.5	P519	1
1	GND REAR LIGHTS	BK	1.5	MAIN-SP1	
1	GND	BK	0.5	P518	2
1	GND	BK	1.5	P226	3
1	WHEEL SPEED GND	BK	0,75	P301	2

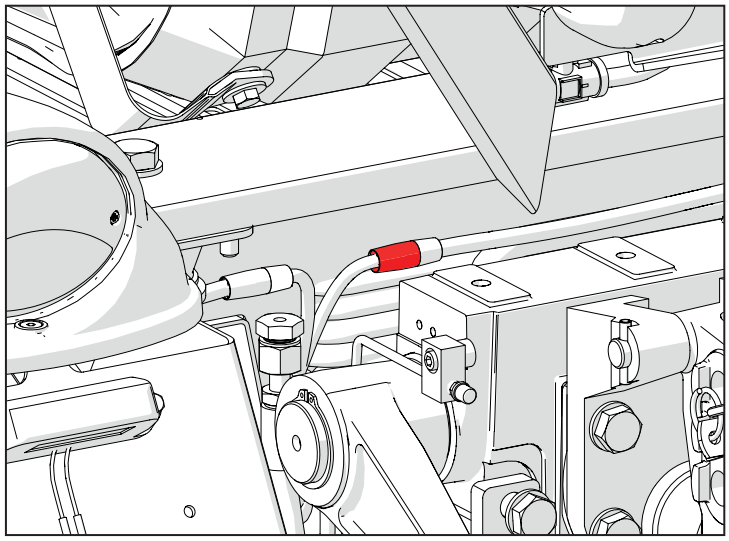




D008 (P42A) Main-right rear lights connector

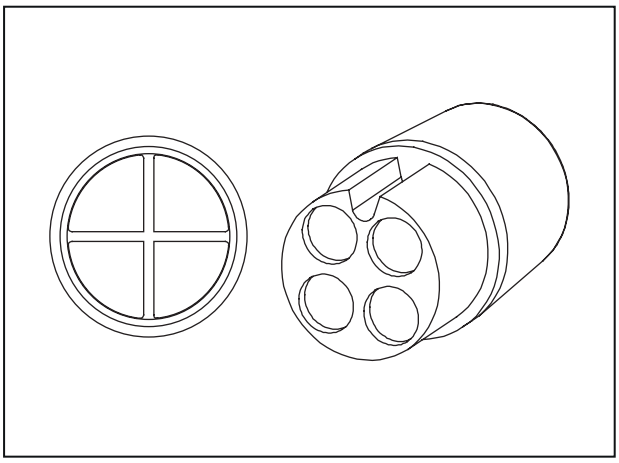
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT RH	Ye	0,75	MAIN-SP15	
2	BRAKE LAMP	Rd	0,75	MAIN-SP10	
3	GND REAR LIGHTS	BK	1	MAIN-SP1	
4	RH TURN SIGNAL	Bu	0,75	MAIN-SP3	

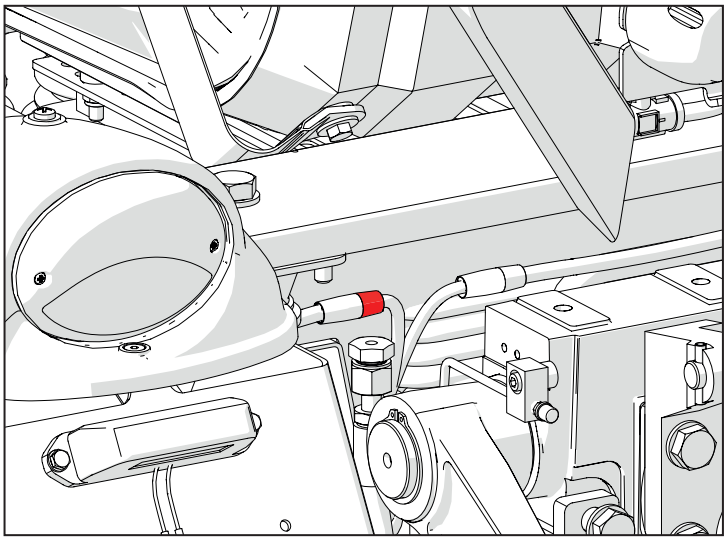




D009 (P43A) Main-left rear lights connector

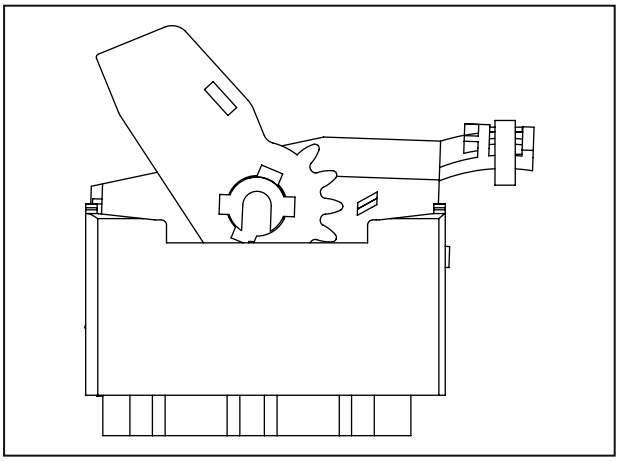
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	REAR PARKING LIGHT LH	Ye	0,75	MAIN-SP9	
2	BRAKE LAMP	Rd	0,75	MAIN-SP10	
3	GND REAR LIGHTS	BK	1	MAIN-SP1	
4	LH TURN SIGNAL	Gn	0,75	MAIN-SP8	



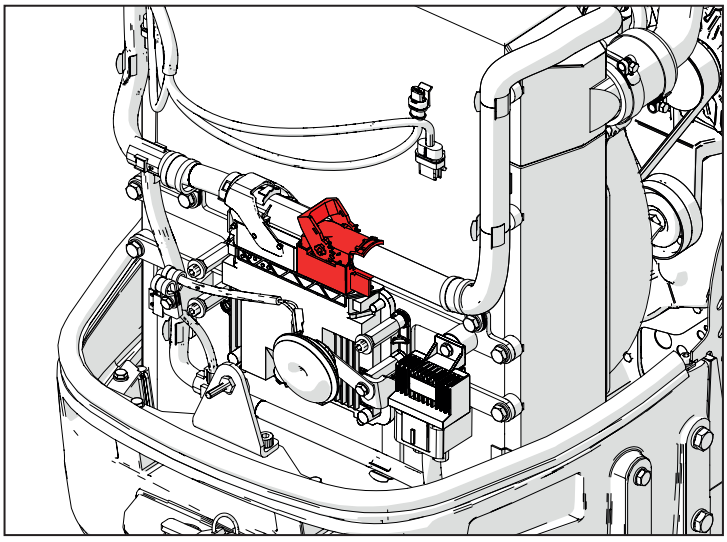


M003B (XECUA) Engine control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 3	MB	1.5	xl3	1
6	OIL PRESS. SWITCH	V	0.75	xs6	1
8	THROTTLE VALVE SENSOR SUPPLY	CR	0.75	xy2	1
10	BOOST PRESS. SENSOR SUPPLY	BG	0.75	xs4	3
11	RAIL PRESS. SENSOR SUPPLY	L	0.75	xs5	3
13	CAMSHAFT SENSOR SUPPLY	GR	0.75	xs3	3
14	CAMSHAFT SENSOR SIGNAL	HN	0.75	xs3	2

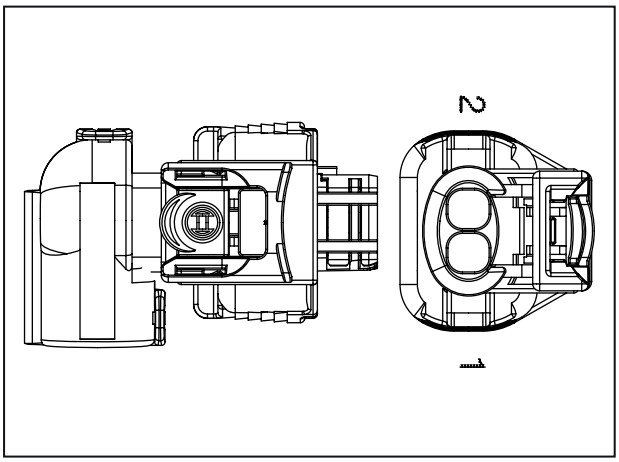


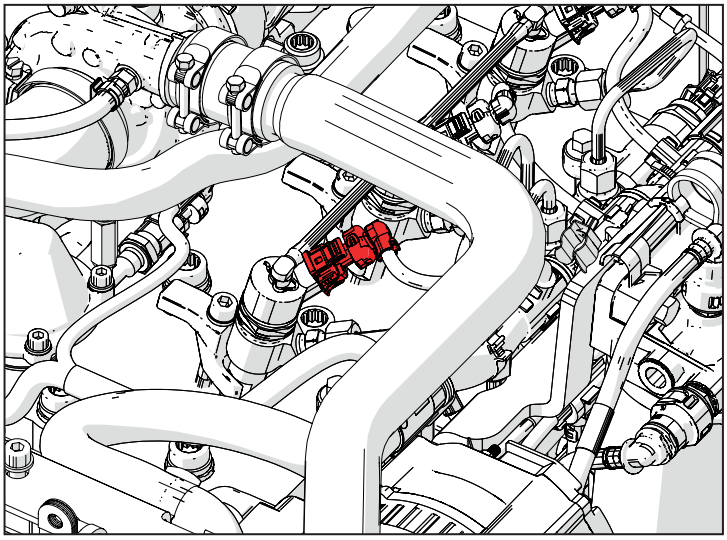
15	FUEL METERING UNIT	ZG	1.5	xy1	1
16	INJECTOR 1	RL	1.5	xl1	1
17	INJECTOR 2	R	1.5	xl2	1
23	FUEL TEMP. SENSOR GND	ZG	0.75	xs7	2
58 (SP-S1)	CRANKSHAFT SENSOR GROUND	SHIELD	None	xs2	3
25	BOOST PRESS. SENSOR GND	MR	0.75	xs4	1
26	RAIL PRESS. SENSOR GND	NZ	0.75	xs5	1
28	CAMSHAFT SENSOR GND	Z	0.75	xs3	1
31	INJECTOR 3	M	1.5	xl3	2
32	INJECTOR 1	L	1.5	xl1	2
34	THROTTLE VALVE DC MOTOR -	GV	0.75	xy2	2
37	THROTTLE VALVE GND	LV	0.75	xy2	3
38	FUEL TEMP. SENSOR SIGNAL	ZB	0.75	xs7	1
40	BOOST PRESS. SENSOR SIGNAL	BR	0.75	xs4	4
41	RAIL PRESS. SENSOR SIGNAL	G	0.75	xs5	2
44	CRANKSHAFT SENSOR SIGNAL MINUS	B	0.5	xs2	2
48	INJECTOR 2	N	1.5	xl2	2
49	THROTTLE VALVE DC MOTOR +	H	0.75	xy2	6
53	THROTTLE VALVE SENSOR SIGNAL	HR	0.75	xy2	5
55	BOOST PRESS. TEMP. SENSOR SIGNAL	BV	0.75	xs4	2
57	COOLANT TEMP. SENSOR SIGNAL	N	0.75	xs1	1
58	COOLANT TEMP. SENSOR GND	HV	0.75	xs1	2
59	CRANKSHAFT SENSOR SIGNAL PLUS	N	0.5	xs2	1
60	FUEL METERING UNIT	C	1.5	xy1	2



L008 (XI1) Fuel electro-injector 1

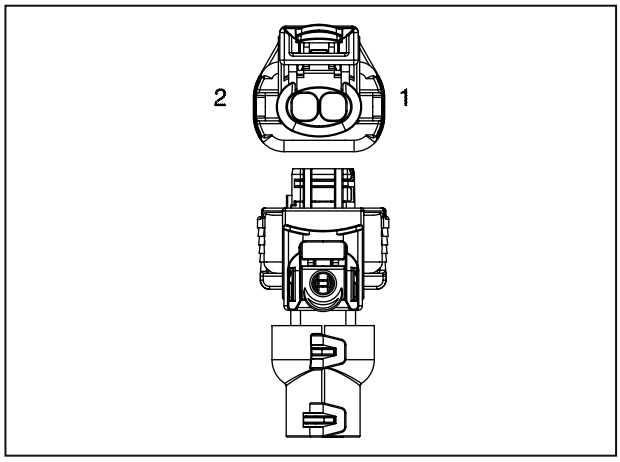
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 1	RL	1.5	xecua	16
2	INJECTOR 1	L	1.5	xecua	32

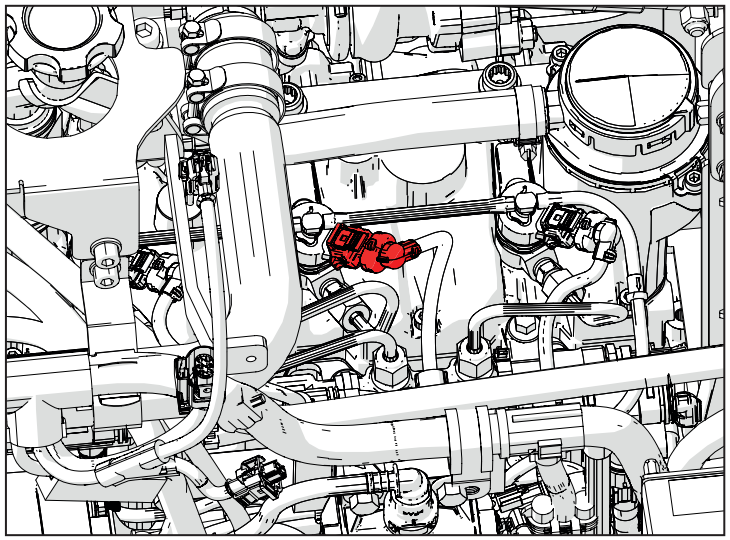




L009 (XI2) Fuel electro-injector 2

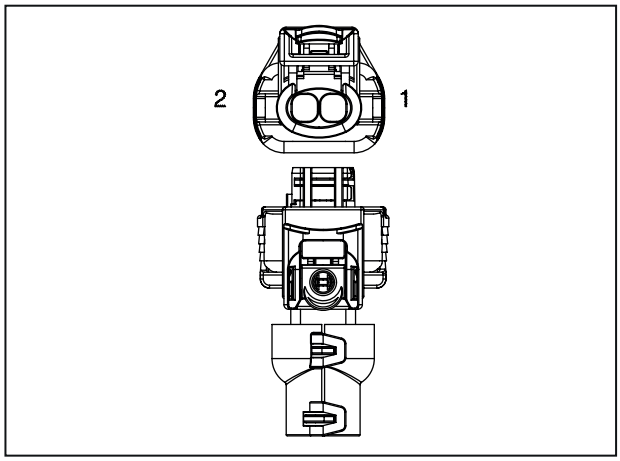
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 2	R	1.5	xecua	17
2	INJECTOR 2	N	1.5	xecua	48

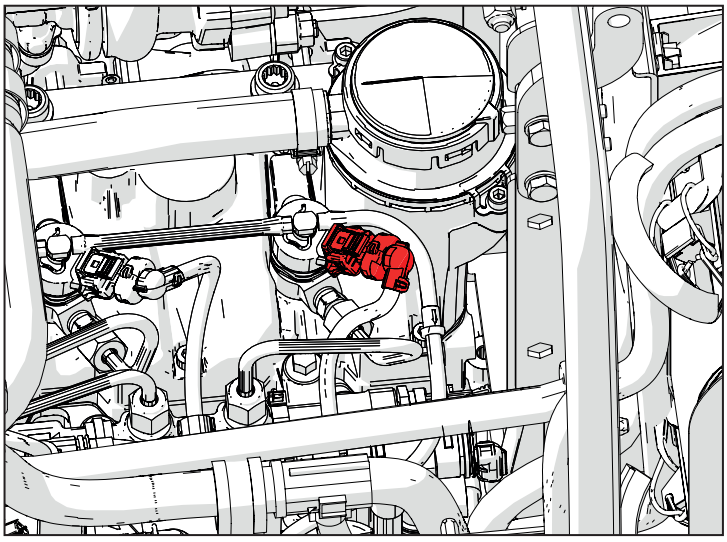




L010 (XI3) Fuel electro-injector 3

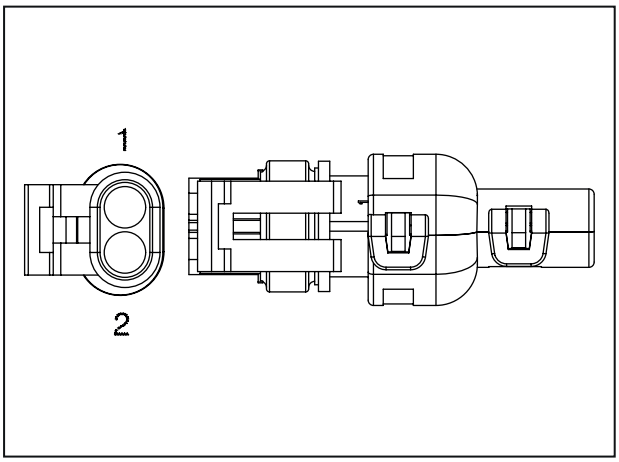
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 3	MB	1.5	xecua	1
2	INJECTOR 3	M	1.5	xecua	31

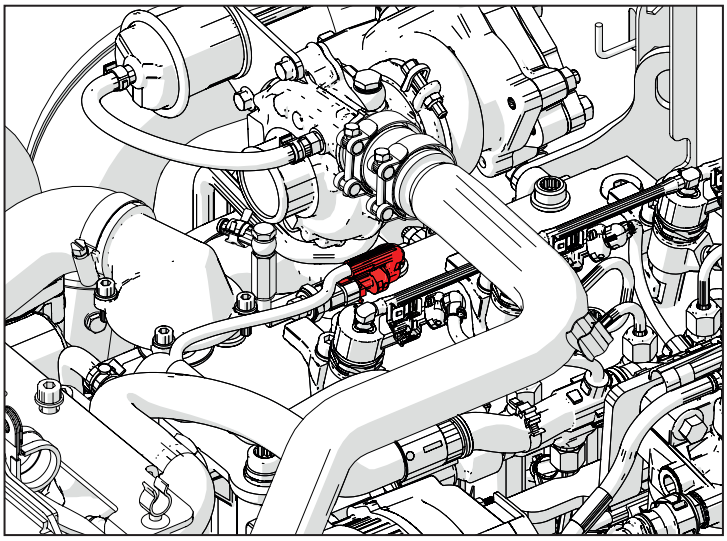




K019 (XS1) Coolant temperature sensor

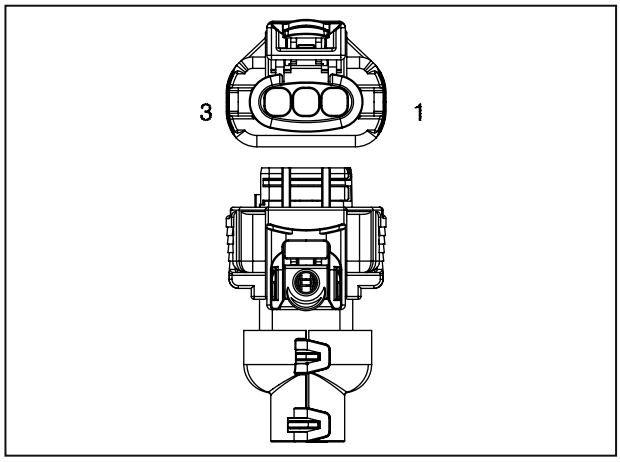
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	COOLANT TEMP. SENSOR SIGNAL	N	0,75	xecua	57
2	COOLANT TEMP. SENSOR GND	HV	0,75	xecua	58

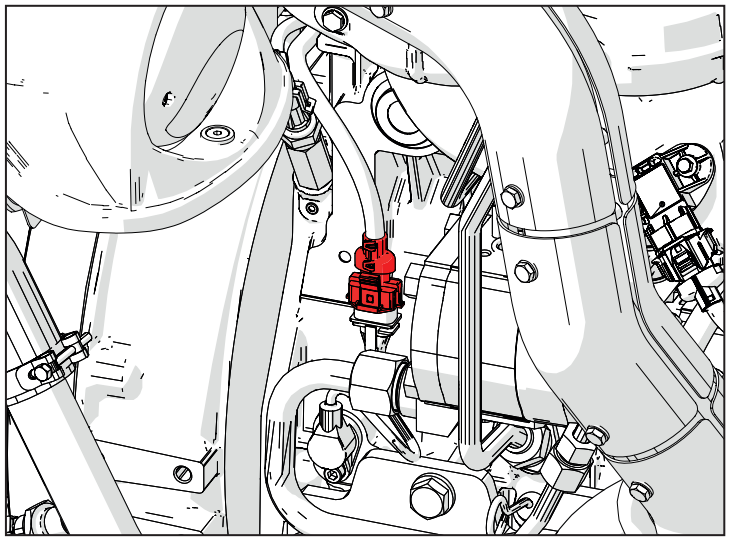




K022 (XS2) Crankshaft speed sensor

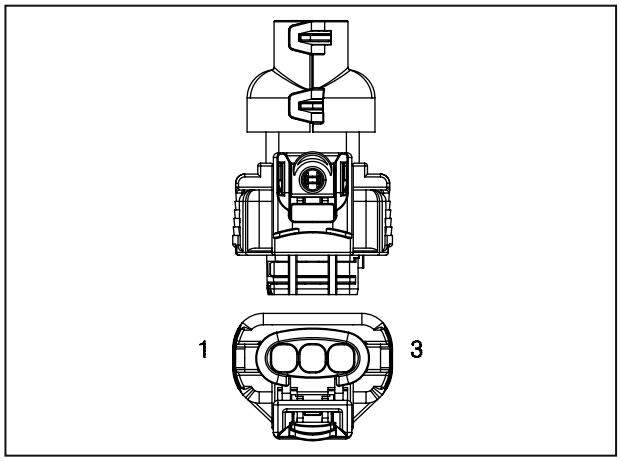
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CRANKSHAFT SENSOR SIGNAL PLUS	N	0.5	xecua	59
2	CRANKSHAFT SENSOR SIGNAL MINUS	B	0.5	xecua	44
3	CRANKSHAFT SENSOR GROUND	SHIELD		xecua	SP-S1

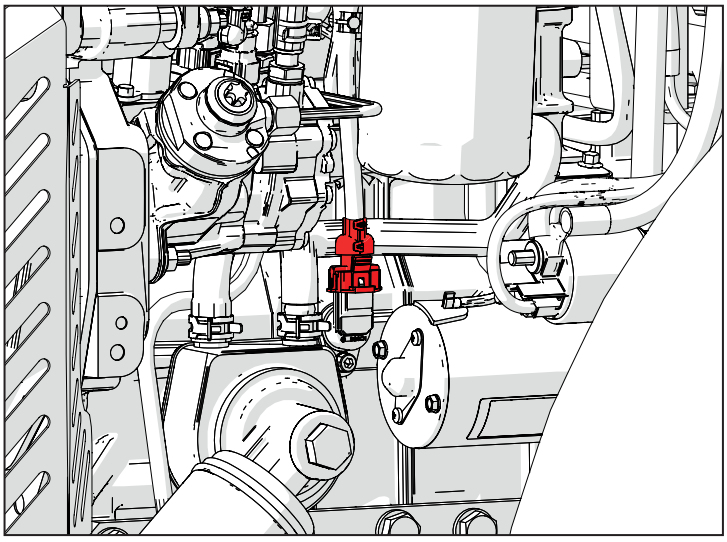




K021 (XS3) Camshaft timing sensor

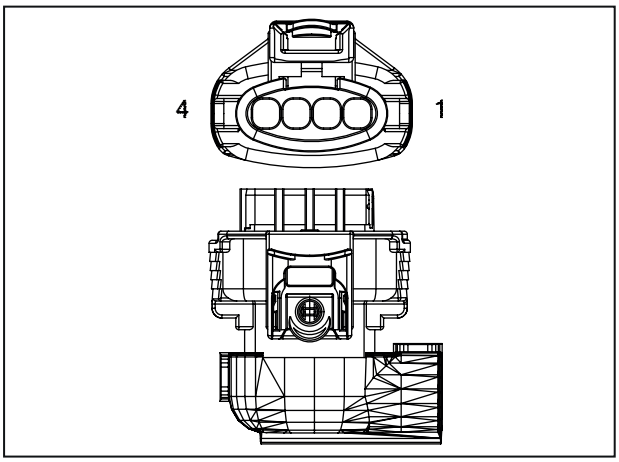
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CAMSHAFT SENSOR GND	Z	0,75	xecua	28
2	CAMSHAFT SENSOR SIGNAL	HN	0,75	xecua	14
3	CAMSHAFT SENSOR SUPPLY	GR	0,75	xecua	13

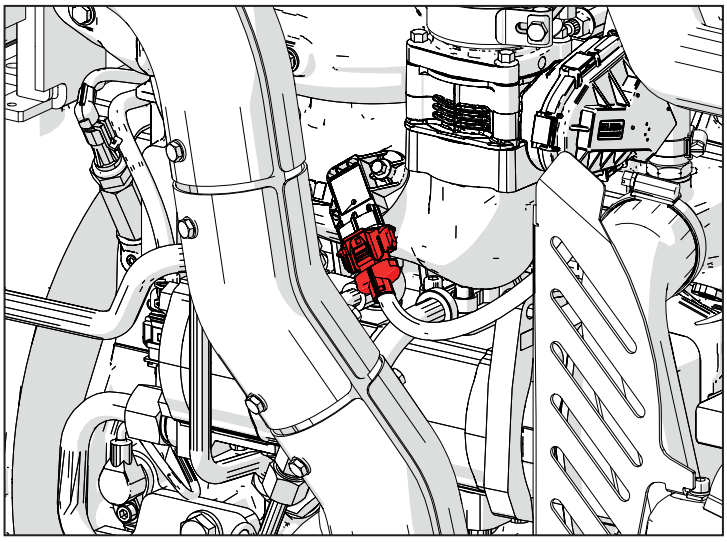




K018 (XS4) Temperature and pressure sensor (BOOST)

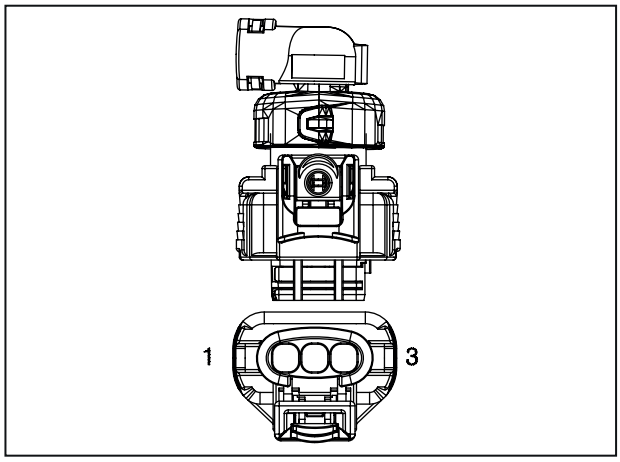
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BOOST PRESS. SENSOR GND	MR	0,75	xecua	25
2	BOOST PRESS. TEMP. SENSOR SIGNAL	BV	0,75	xecua	55
3	BOOST PRESS. SENSOR SUPPLY	BG	0,75	xecua	10
4	BOOST PRESS. SENSOR SIGNAL	BR	0,75	xecua	40

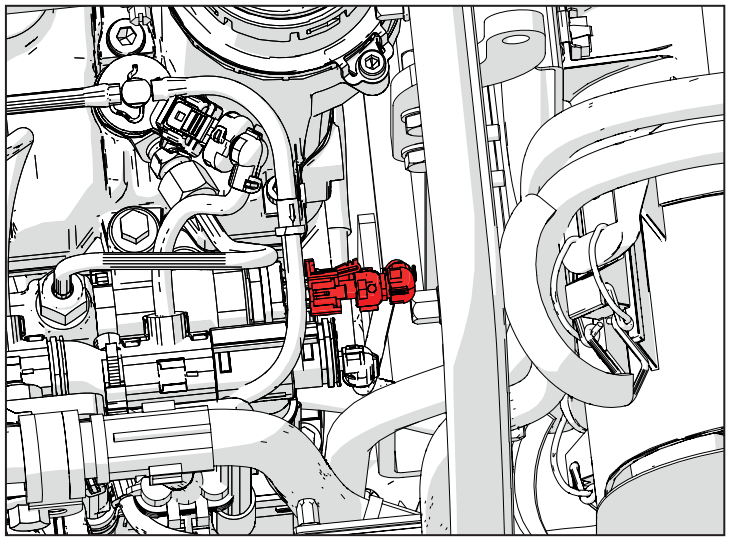




K017 (XS5) Common Rail fuel pressure sensor

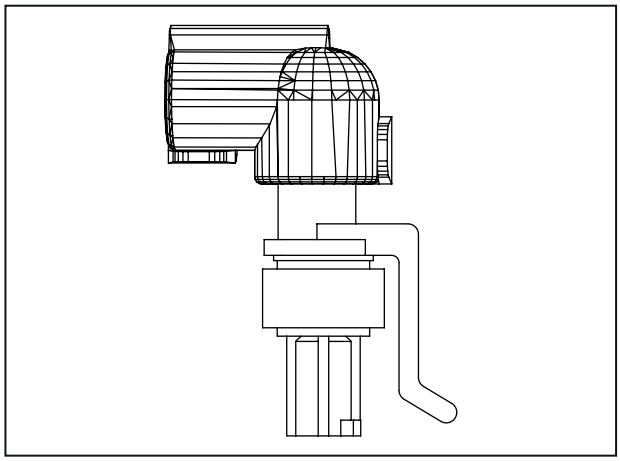
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	RAIL PRESS. SENSOR GND	NZ	0,75	xecua	26
2	RAIL PRESS. SENSOR SIGNAL	G	0,75	xecua	41
3	RAIL PRESS. SENSOR SUPPLY	L	0,75	xecua	11

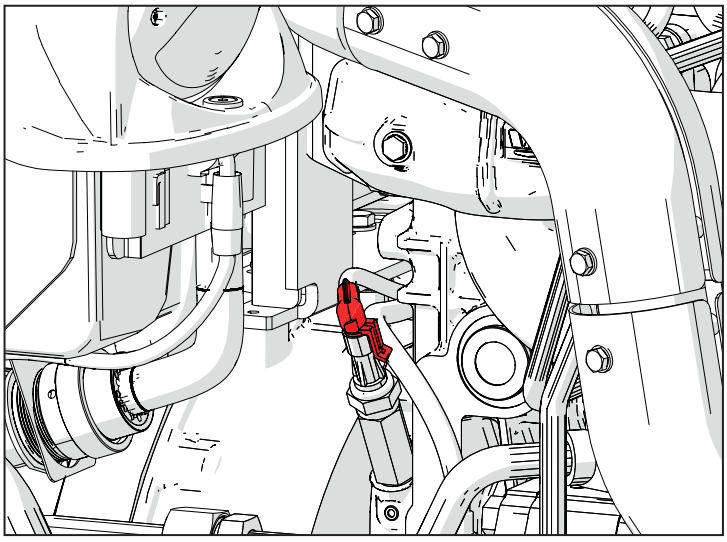




K023 (XS6) Oil pressure switch

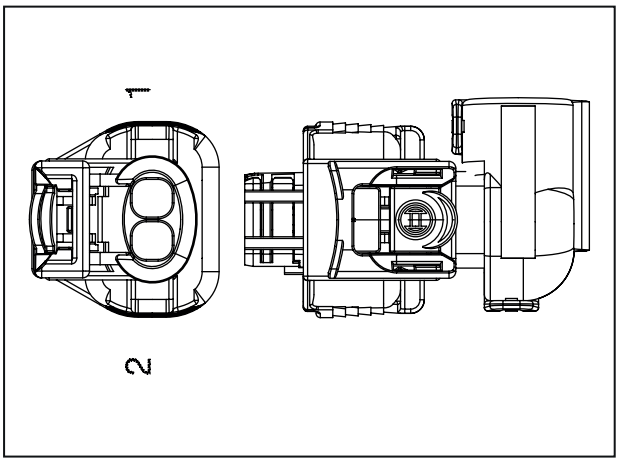
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	OIL PRESS. SWITCH	V	0,75	xecua	6

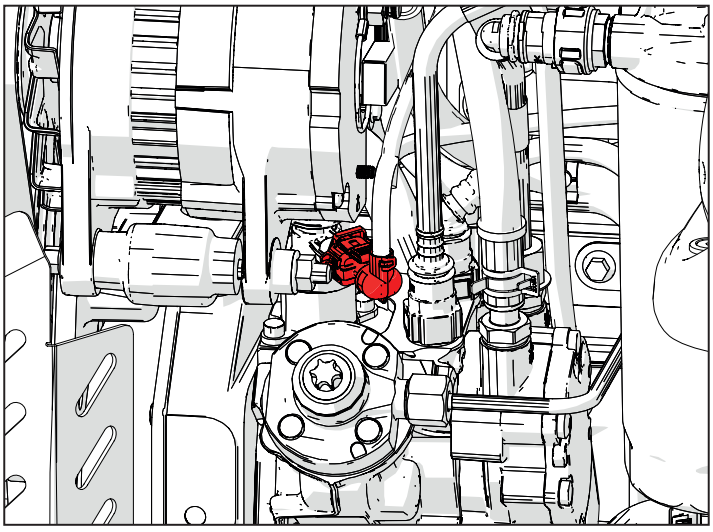




L005 (XY1) High pressure pump

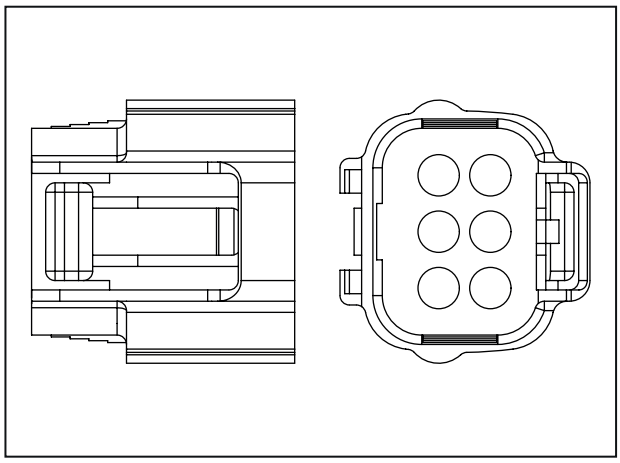
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL METERING UNIT	ZG	1.5	xecua	15
2	FUEL METERING UNIT	C	1.5	xecua	60

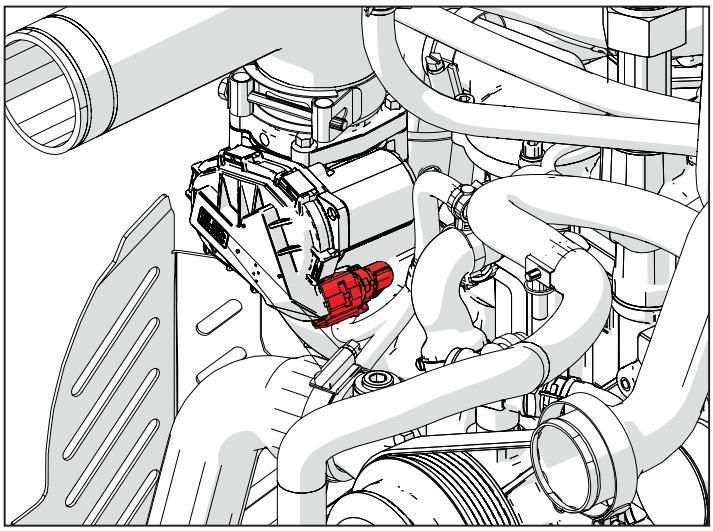




L007 (XY2) Throttle valve

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	THROTTLE VALVE SENSOR SUPPLY	CR	0,75	xecua	8
2	THROTTLE VALVE DC MOTOR -	GV	0,75	xecua	34
3	THROTTLE VALVE SENSOR GND	LV	0,75	xecua	37
5	THROTTLE VALVE SENSOR SIGNAL	HR	0,75	xecua	53
6	THROTTLE VALVE DC MOTOR +	H	0,75	xecua	49





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Engine control unit (ECU)

3001 - Incorrect message via CAN BUS between EGR and ECU

Description of fault

The control unit detects communication error on CAN Bus line between EGR and ECU engine control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect the connectors and reconnect correctly
   - If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
   - Disconnect the respective connectors
   - Check that the contact surfaces of the pins are in good condition
   - In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
   - Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
   - If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

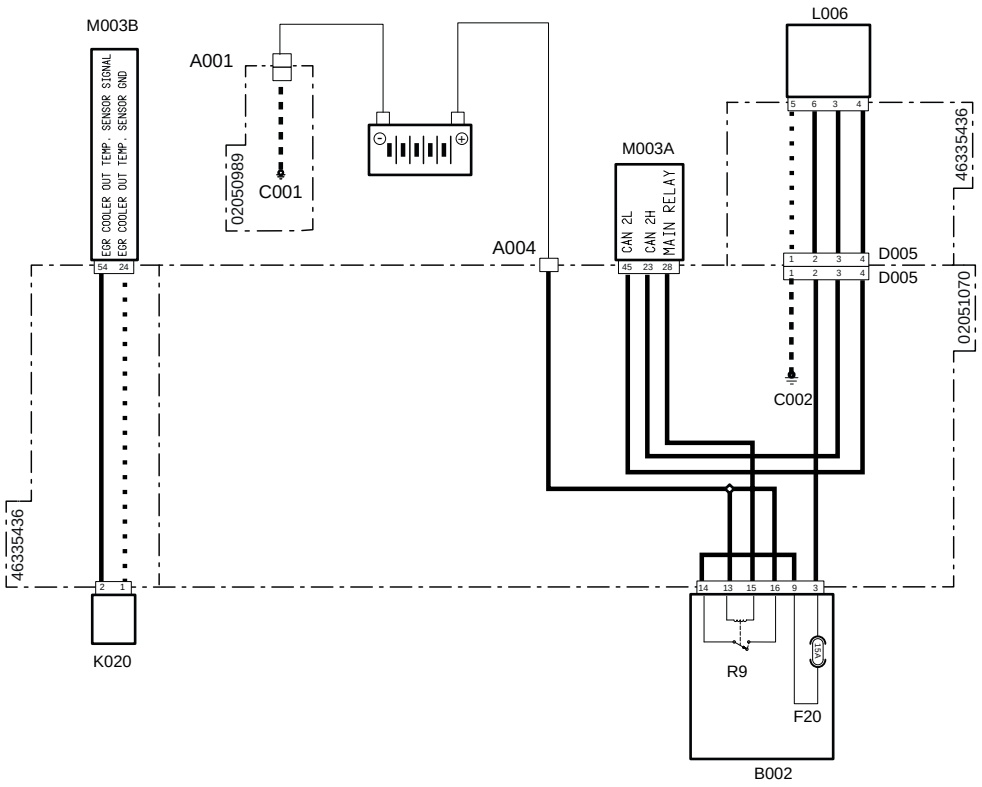
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved



System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A004(pag.R2-449)	P472	Positive battery terminal
C001(pag.R2-386)	P66	Battery ground
C002(pag.R2-442)	P475	Engine ground point
D005(pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005(pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002) (pag.R2-428)	F20	Accessories (15A)
K020(pag.R2-477)	XS7	EGR temperature sensor
L006(pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3002 - EGR position sensor malfunction

Description of fault

Engine control unit cannot identify correct aperture position of EGR valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A) and replace if necessary
- Disconnect the accessories fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the EGR is not mechanically stuck
- Remove the EGR valve and check that it is not stuck. Dirt residue may compromise the operation of the valve. Always clean the valve before refitting.
- After refitting the valve, check if it works correctly.
  Replace the EGR valve if it does not work correctly
- If the problem persists even though the valve is working correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

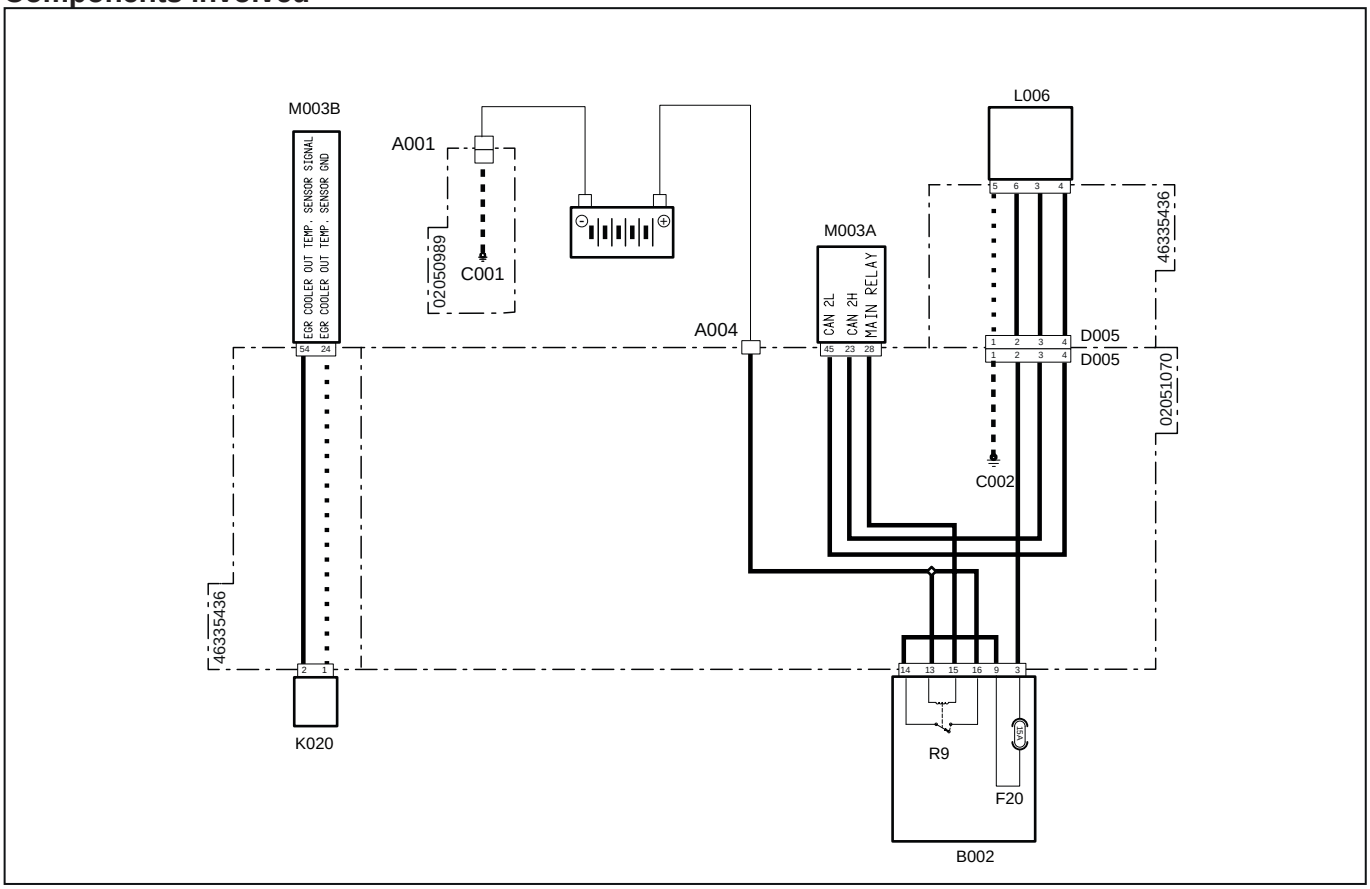
6 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

7 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

8 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

9 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3003 - No CAN Bus message between EGR valve and engine control unit

Description of fault

Control unit not receiving signal from EGR valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect the connectors and reconnect correctly
   - If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
   - Disconnect the respective connectors
   - Check that the contact surfaces of the pins are in good condition
   - In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
   - Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
   - If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service

3004 - EGR power feed voltage not within permitted range

Description of fault

The control unit detects a power feed voltage exceeding _____ V

Severity of error

Medium

Additional information

Amber lamp illuminated

The power feed voltage of the EGR valve may be measured with the diagnostic tool

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
   - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
   - If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect any badly connected connectors and reconnect correctly
   - If all the connectors are connected correctly, proceed to the next step

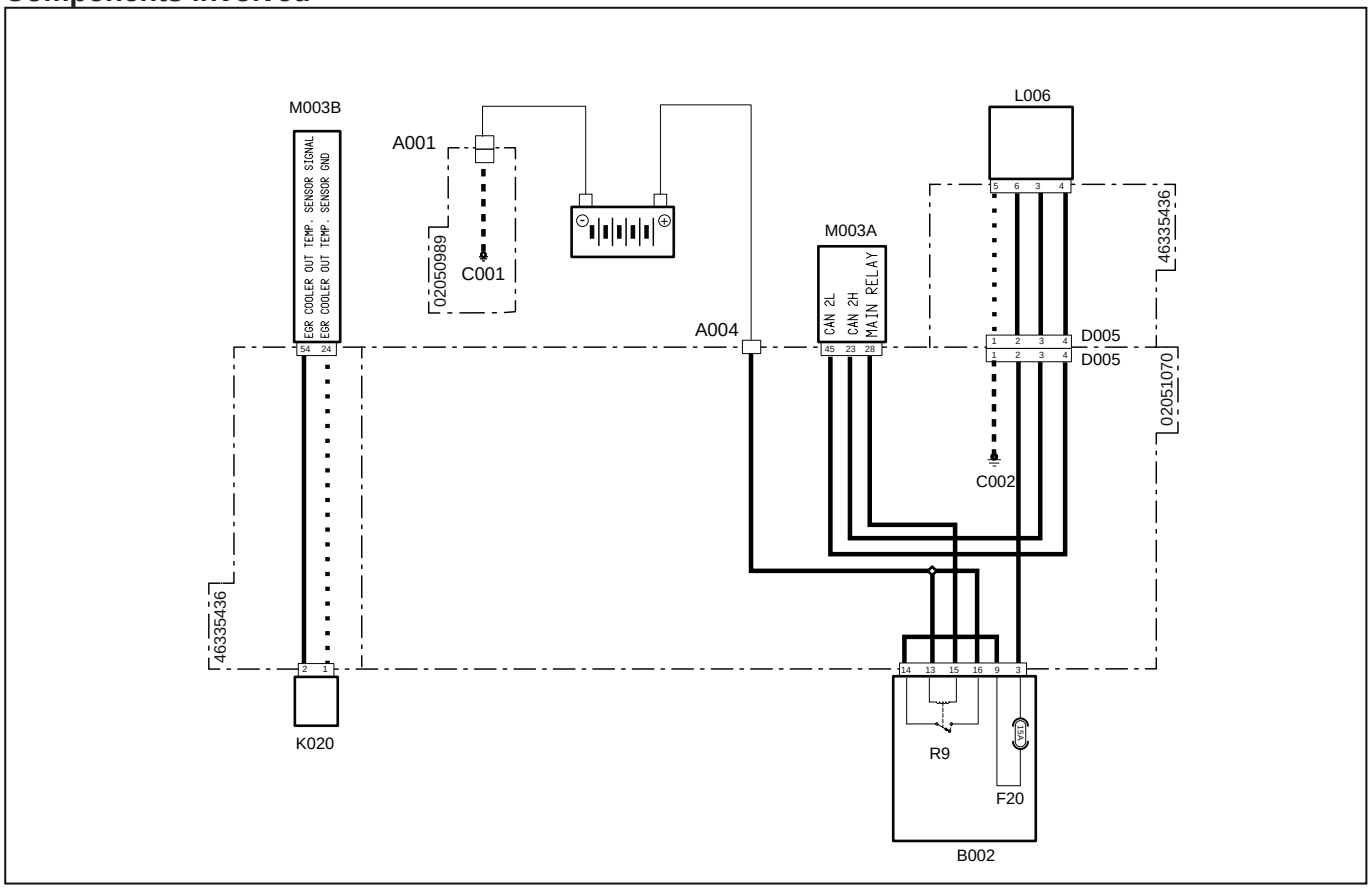
3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
   - Check that the power feed voltage of the EGR valve is within the correct range specified. Replace the EGR valve if the voltage is not within the correct range
   - If the power feed voltage is correct, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3005 - Low EGR power feed voltage

Description of fault

The electronic control unit detects low power feed voltage

Severity of error

Medium

Additional information

Amber lamp illuminated

The power feed voltage of the EGR valve may be measured with the diagnostic tool

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

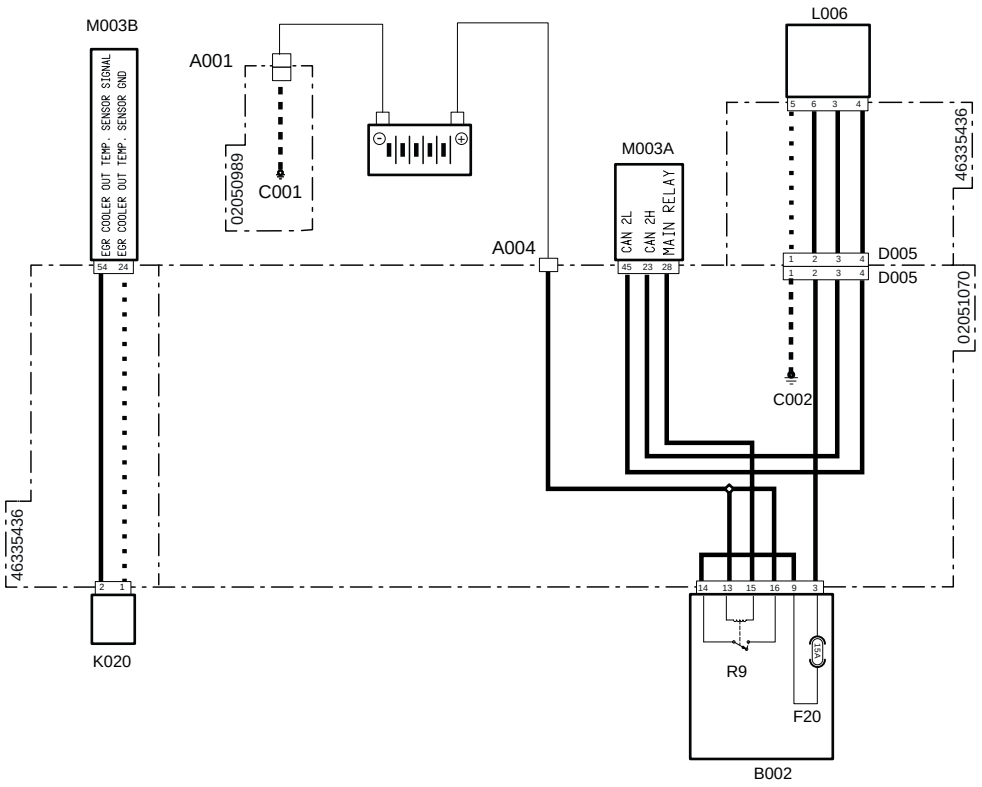
3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Check that the power feed voltage of the EGR valve is within the correct range specified. Replace the EGR valve if the voltage is not within the correct range
- If the power feed voltage is correct, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3006 - EGR valve power circuit current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state on the EGR valve.

Severity of error

Medium

Additional information

Amber lamp illuminated

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

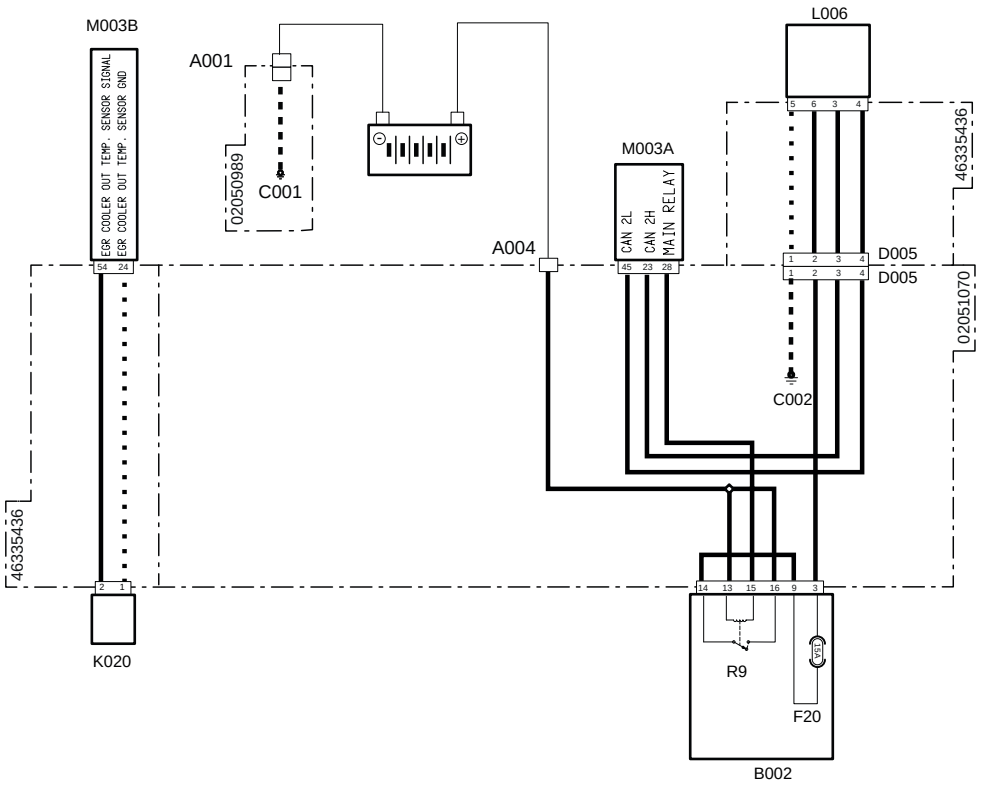
3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
  - Check that the power feed voltage of the EGR valve is within the correct range specified. Replace the EGR valve if the voltage is not within the correct range
  - If the power feed voltage is correct, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3007 - Low EGR circuit flow

Description of fault

The control unit detects excessively low EGR recirculated exhaust gas flow

Severity of error

Medium

Additional information

Amber lamp illuminated

Insufficient gas flow in the EGR circuit may not necessarily be due to a malfunction of the EGR valve. The control unit calculates values in relation to the information received, and checks that the pressure and temperature values measured in the intake manifold by the BOOST sensor match these values. This error is displayed if the values measured do not match the calculated values.

This error may be caused by a measurement error or by a malfunction of any of the following components:

- EGR Valve
- EGR temperature sensor
- Boost pressure sensor
- Exhaust pressure sensor (P3)
- Exhaust temperature sensor (T3)
- Throttle valve

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - After checking that all the components associated with this error are working correctly, proceed to the next step
  - Check for fouling and/or obstruction in the EGR exhaust gas circuit
  - Check for fouling and/or obstruction in the intake air system

3008 - No EGR temperature message on CAN Bus line

Description of fault

Control unit receives no temperature signal from EGR gas temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

4 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

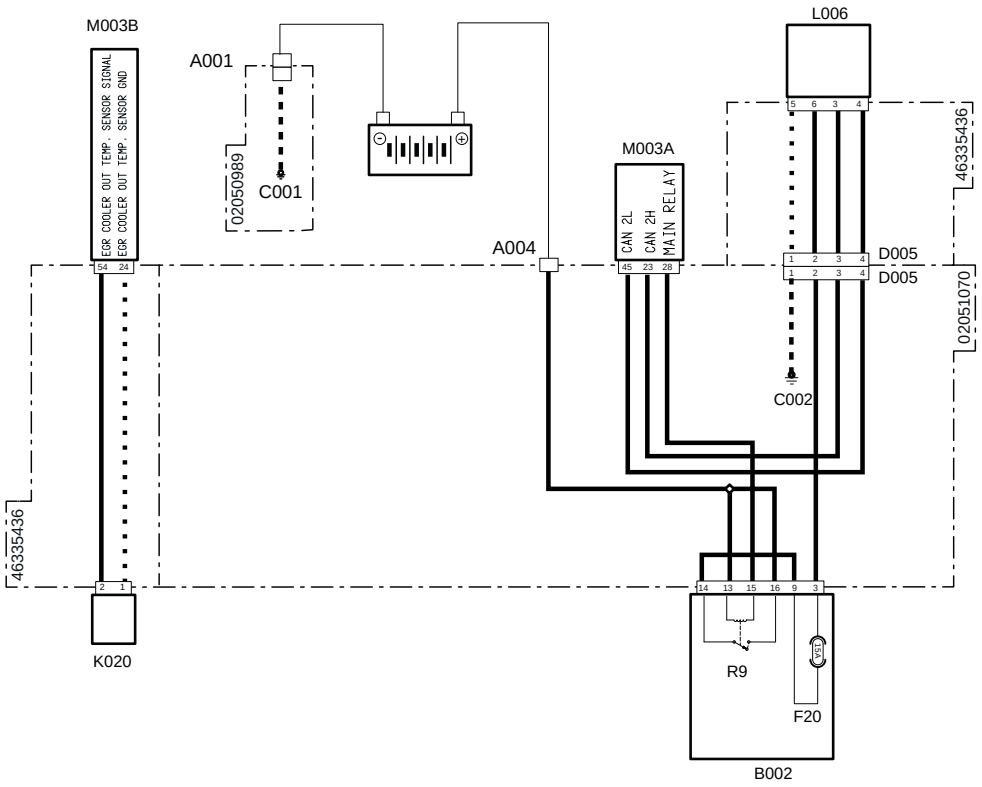
5 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service

Components involved



System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A004(pag.R2-449)	P472	Positive battery terminal
C001(pag.R2-386)	P66	Battery ground
C002(pag.R2-442)	P475	Engine ground point
D005(pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005(pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002) (pag.R2-428)	F20	Accessories (15A)
K020(pag.R2-477)	XS7	EGR temperature sensor
L006(pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3009 - EGR valve stuck closed

Description of fault

The control unit detects that the EGR valve is permanently closed

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool. The EGR valve may also be tested with the engine off.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A) and replace if necessary
- Disconnect the accessories fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

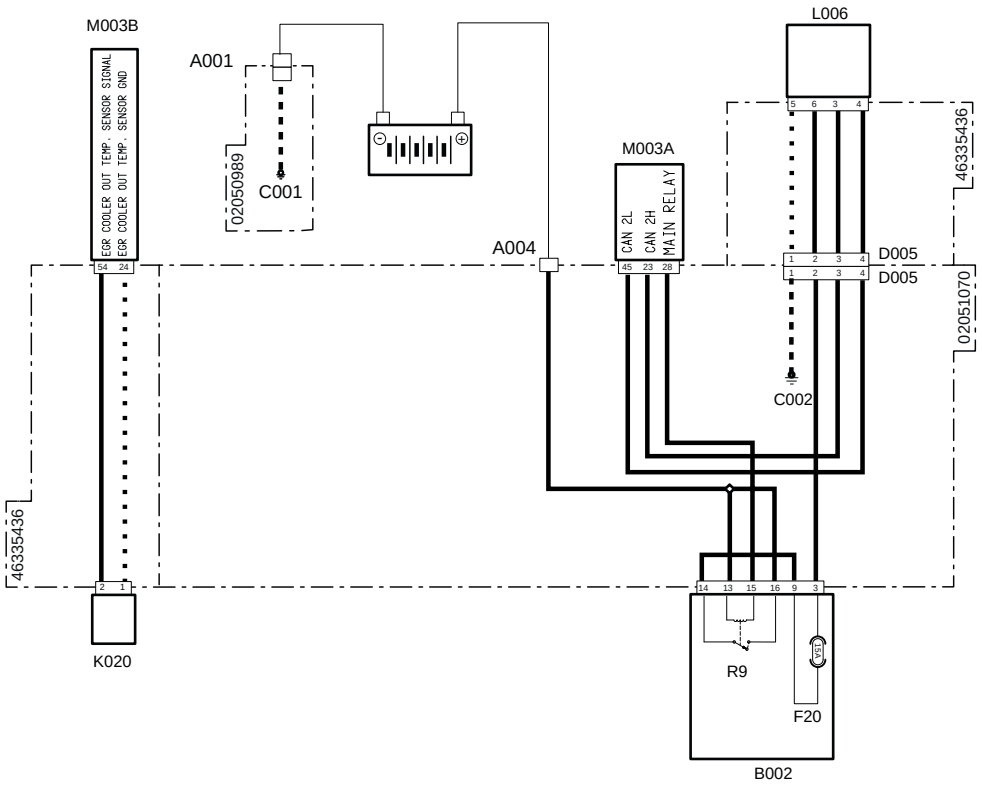
4 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the EGR is not mechanically stuck
- Remove the EGR valve and check that it is not stuck. Dirt residue may compromise the operation of the valve. Always clean the valve before refitting.
- After refitting the valve, check if it works correctly.
  Replace the EGR valve if it does not work correctly
- If the problem persists even though the valve is working correctly, proceed to the next step

6 - After checking that all the components associated with this error are working correctly, proceed to the next step
- Check for fouling and/or obstruction in the EGR exhaust gas circuit
- Check for fouling and/or obstruction in the intake air system

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3010 - EGR valve position sensor power feed voltage not within permitted range

Description of fault

The control unit detects an EGR valve position sensor power feed voltage exceeding _____ V

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool. The EGR valve may also be tested with the engine off.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
   - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
   - If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect any badly connected connectors and reconnect correctly
   - If all the connectors are connected correctly, proceed to the next step

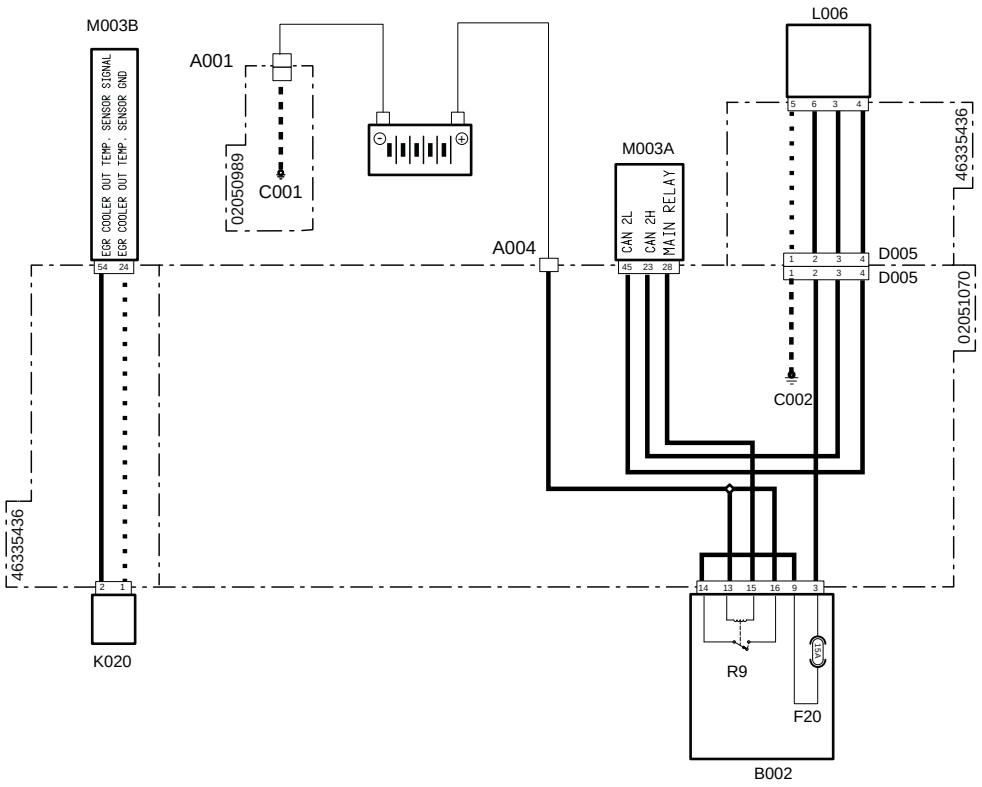
3 - Use the diagnostic tool to check that the EGR valve position sensor is working correctly (see documentation of diagnostic tool)
   - Check that the power feed voltage of the EGR valve position sensor is within the correct range specified. Replace the EGR valve if the voltage is not within the correct range
   - If the power feed voltage is correct, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service

Components involved



System code	Source code	Description
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C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3011 - EGR valve position error during self-test at key-on

Description of fault

Each time the tractor is switched on, the control unit runs an EGR valve test cycle. This error is generated if the values read by the control unit during this test are non-conformant.

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool. The EGR valve may also be tested with the engine off.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A) and replace if necessary
- Disconnect the accessories fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the EGR is not mechanically stuck
- Remove the EGR valve and check that it is not stuck. Dirt residue may compromise the operation of the valve. Always clean the valve before refitting.
- After refitting the valve, check if it works correctly.
  Replace the EGR valve if it does not work correctly
- If the problem persists even though the valve is working correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

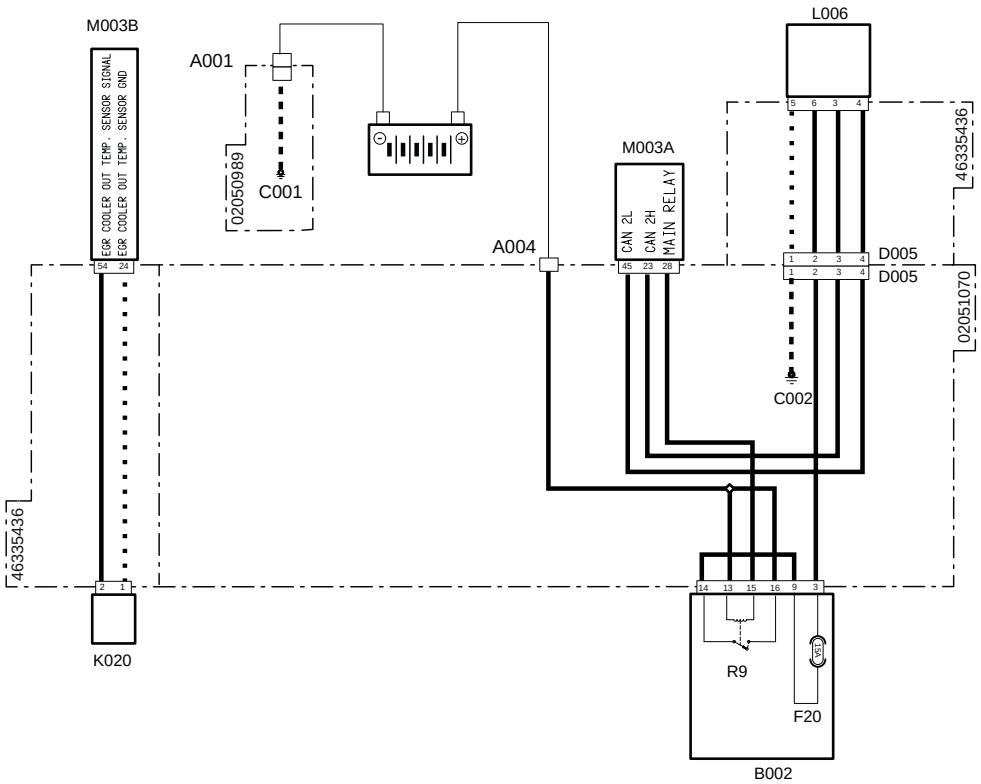
6 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

7 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

8 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

9 - Contact the technical support service

Components involved



System code	Source code	Description
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A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3012 - EGR valve stuck open

Description of fault

The control unit detects that the EGR valve is permanently open

Severity of error

Medium

Additional information

Amber lamp illuminated

Insufficient gas flow in the EGR circuit may not necessarily be due to a malfunction of the EGR valve. The control unit calculates values in relation to the information received, and checks that the pressure and temperature values measured in the intake manifold by the BOOST sensor match these values. This error is displayed if the values measured do not match the calculated values.

This error may be caused by a measurement error or by a malfunction of any of the following components:

- EGR Valve
- EGR temperature sensor
- Boost pressure sensor
- Exhaust pressure sensor (P3)
- Exhaust temperature sensor (T3)
- Throttle valve

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque and regeneration is disabled

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - After checking that all the components associated with this error are working correctly, proceed to the next step
  - Check for fouling and/or obstruction in the EGR exhaust gas circuit
  - Check for fouling and/or obstruction in the intake air system

3013 - CAN Bus line communication error between EGR and ECU control unit

Description of fault

The control unit detects communication error on CAN Bus line between EGR and ECU engine control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect the connectors and reconnect correctly
   - If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
   - Disconnect the respective connectors
   - Check that the contact surfaces of the pins are in good condition
   - In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
   - Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
   - If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

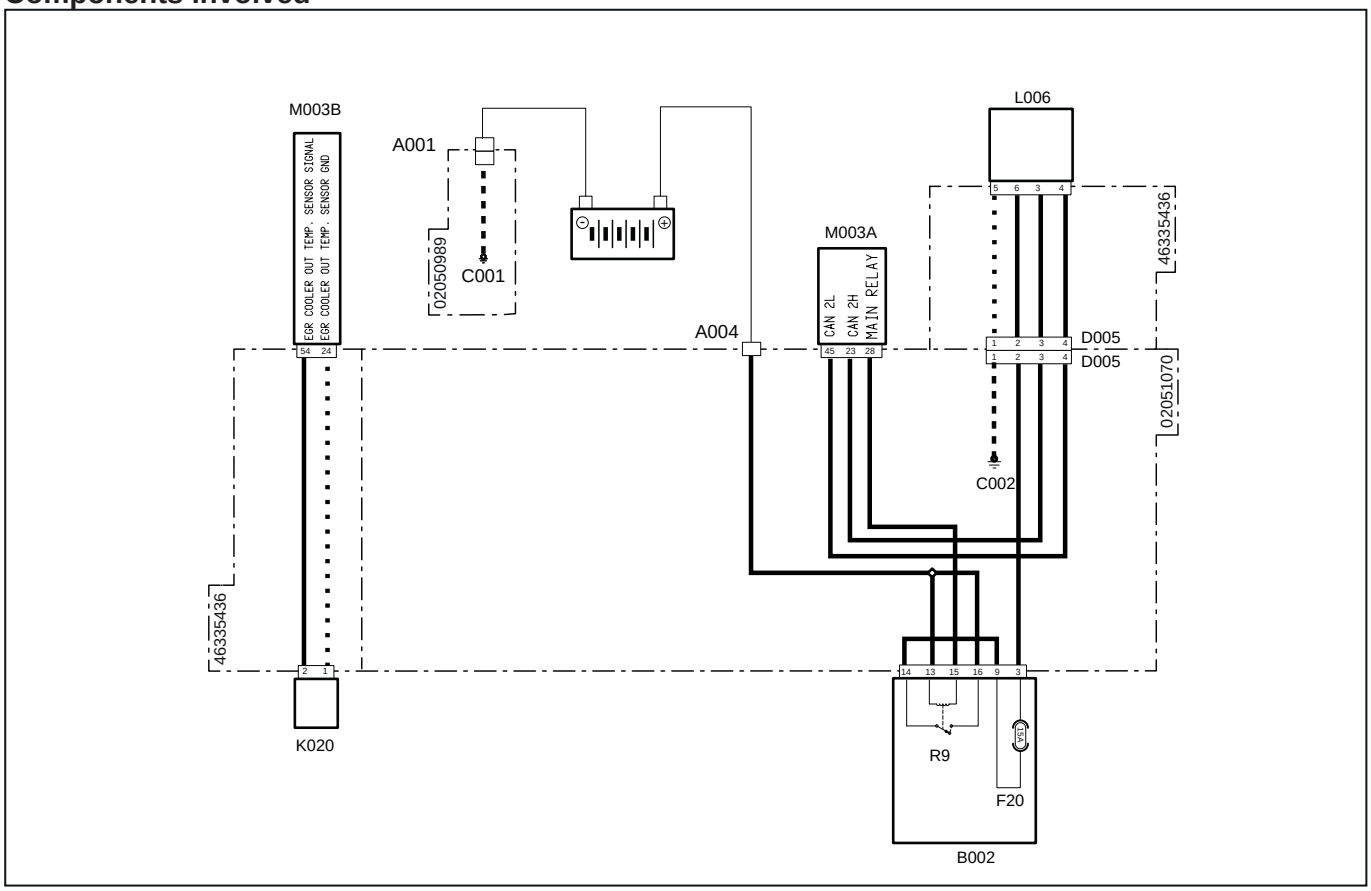
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3014 - Excessive soot levels in DPF filter

Description of fault

The control unit detects excessive levels of soot trapped in the diesel particulate filter.

Severity of error

High

Additional information

Red indicator lamp flashing

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque and regeneration is disabled

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

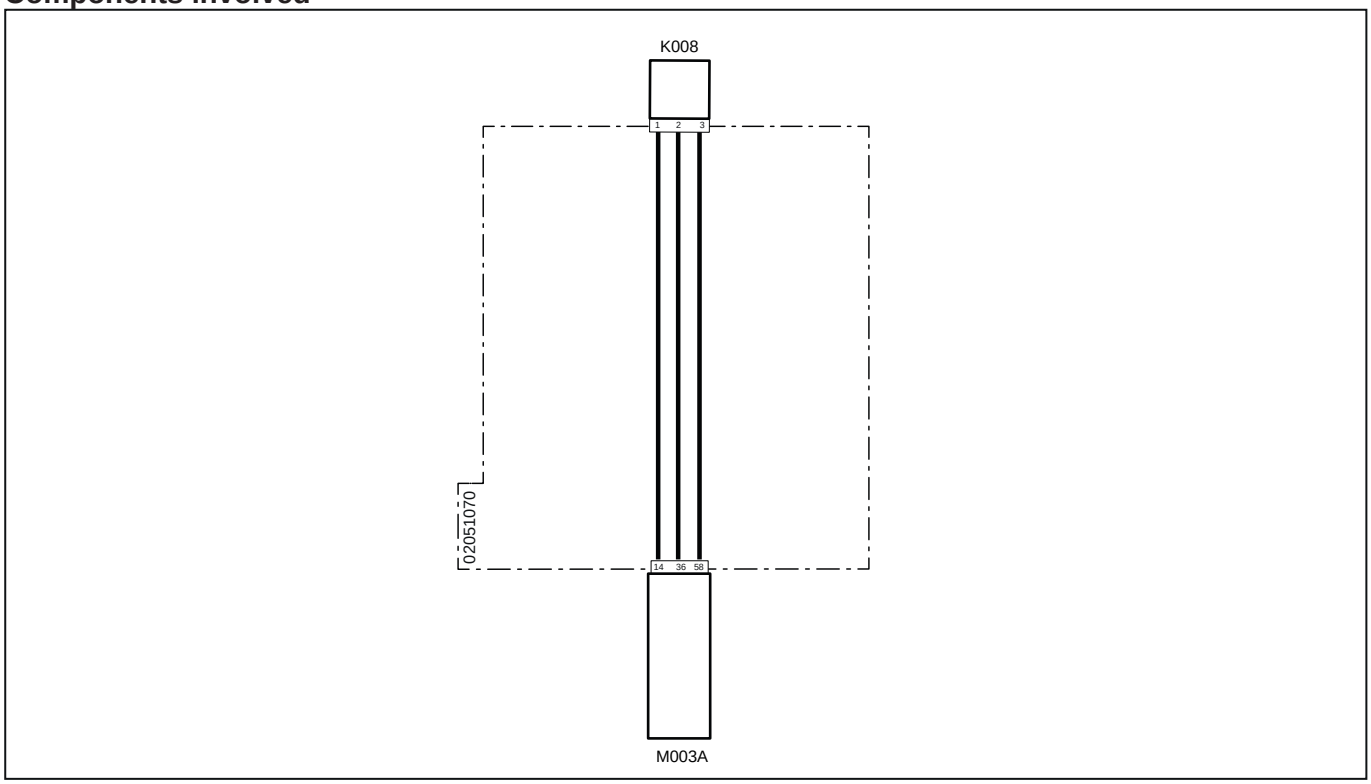
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008 (pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3015 - DPF differential pressure too low (lines obstructed or swapped)

Description of fault

Pressure difference detected by control unit between inlet and outlet sides of diesel particulate filter is too low or negative

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

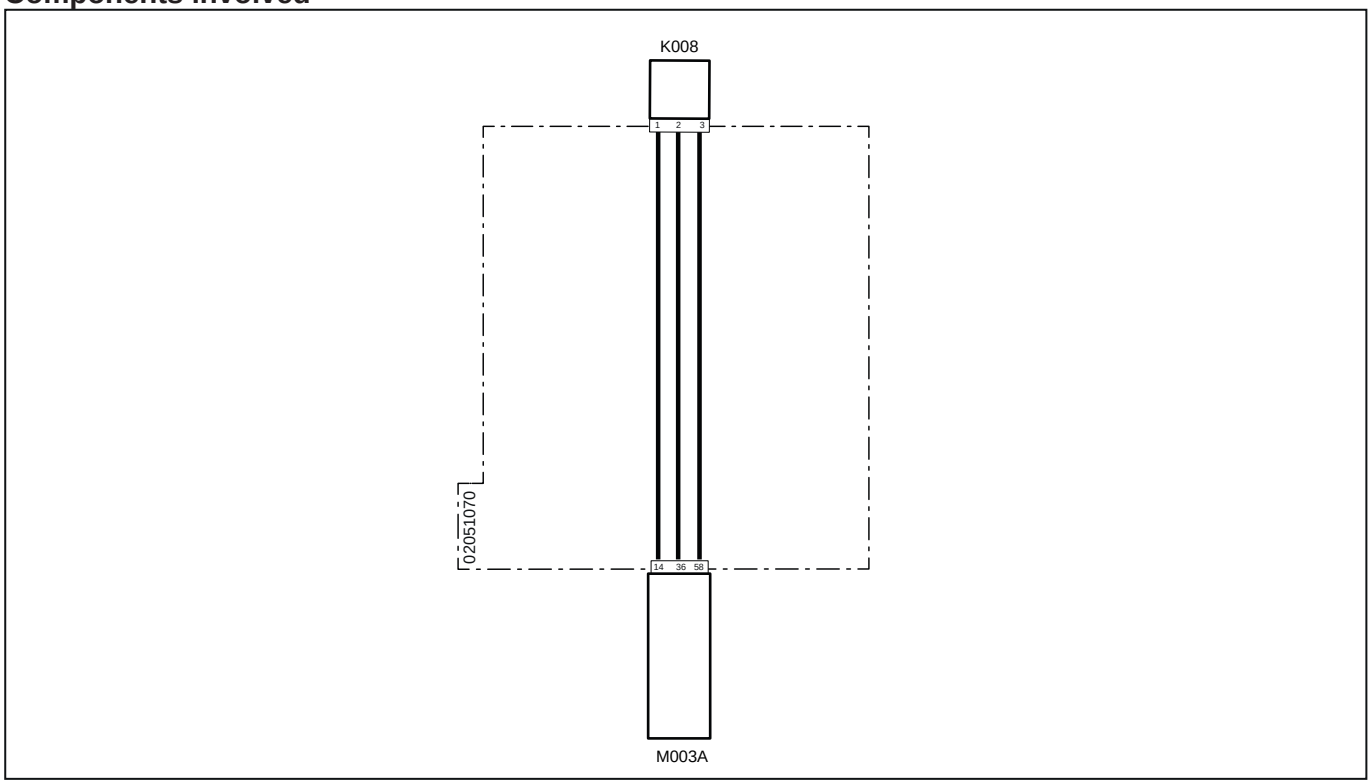
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008 (pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3016 - Frequent regeneration cycle error

Description of fault

The ECU engine control unit detects that an excessively high number of a large number of regeneration cycles has been performed

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
   - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
   - If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
   - If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
   - Proceed to the next step if the sensor is installed correctly

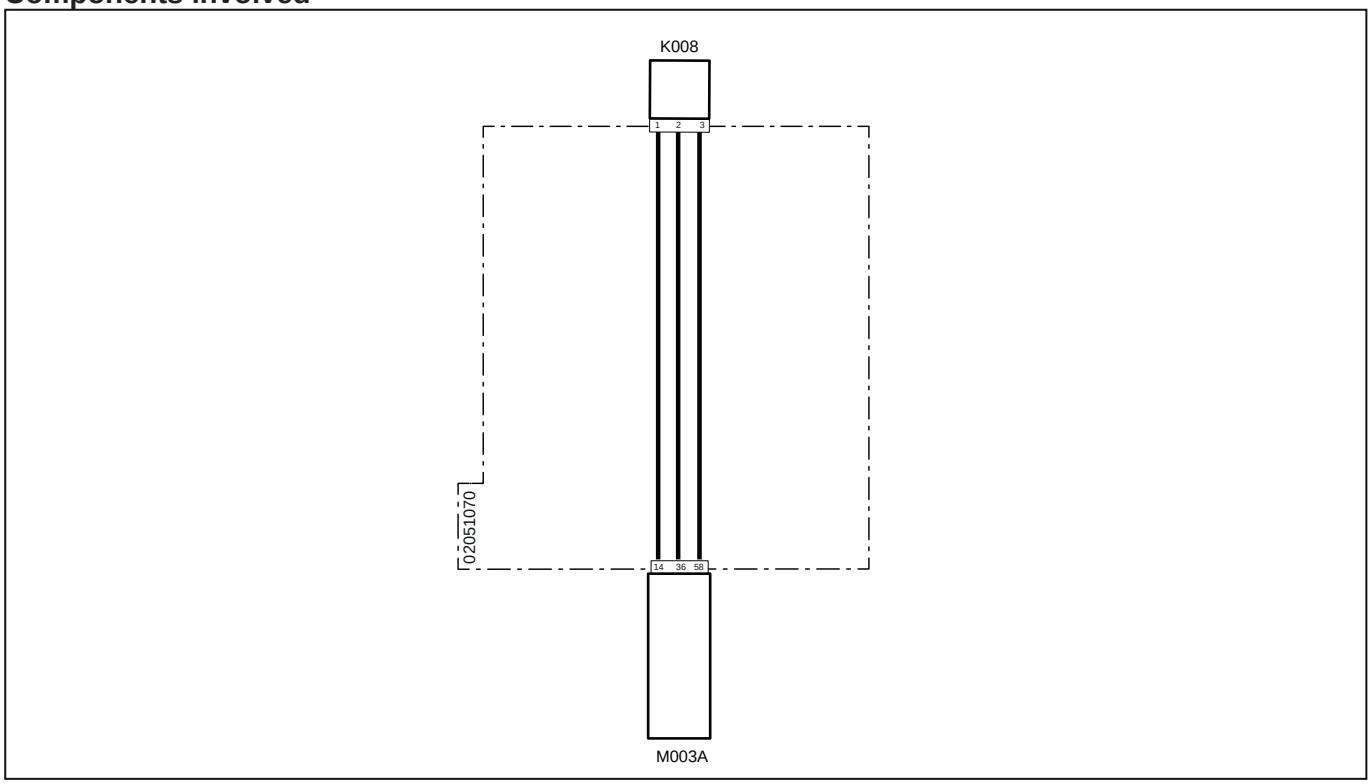
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
   - Read the safety information given in the use and maintenance manual of the vehicle with particular care.
   - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
   - Check if the differential pressure sensor is working correctly and replace if necessary
   - If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008 (pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3017 - DPF differential pressure: value not plausible

Description of fault

The ECU engine control unit detects a differential pressure sensor reading error. The difference between the pressure values read at the inlet and outlet of the filter is not plausible

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

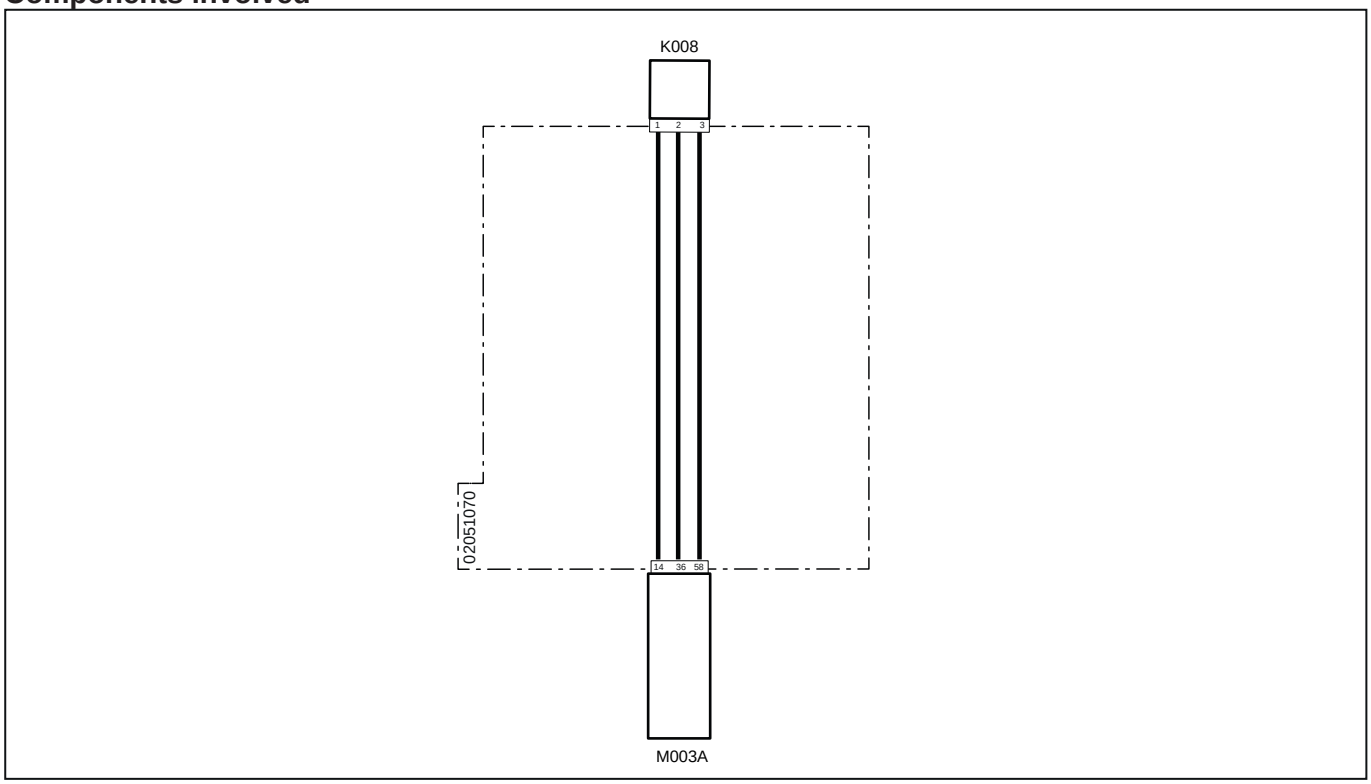
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008 (pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3018- Differential pressure sensor lines frozen

Description of fault

The ECU engine control unit detects that the connector pipes of the differential pressure sensor are frozen

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

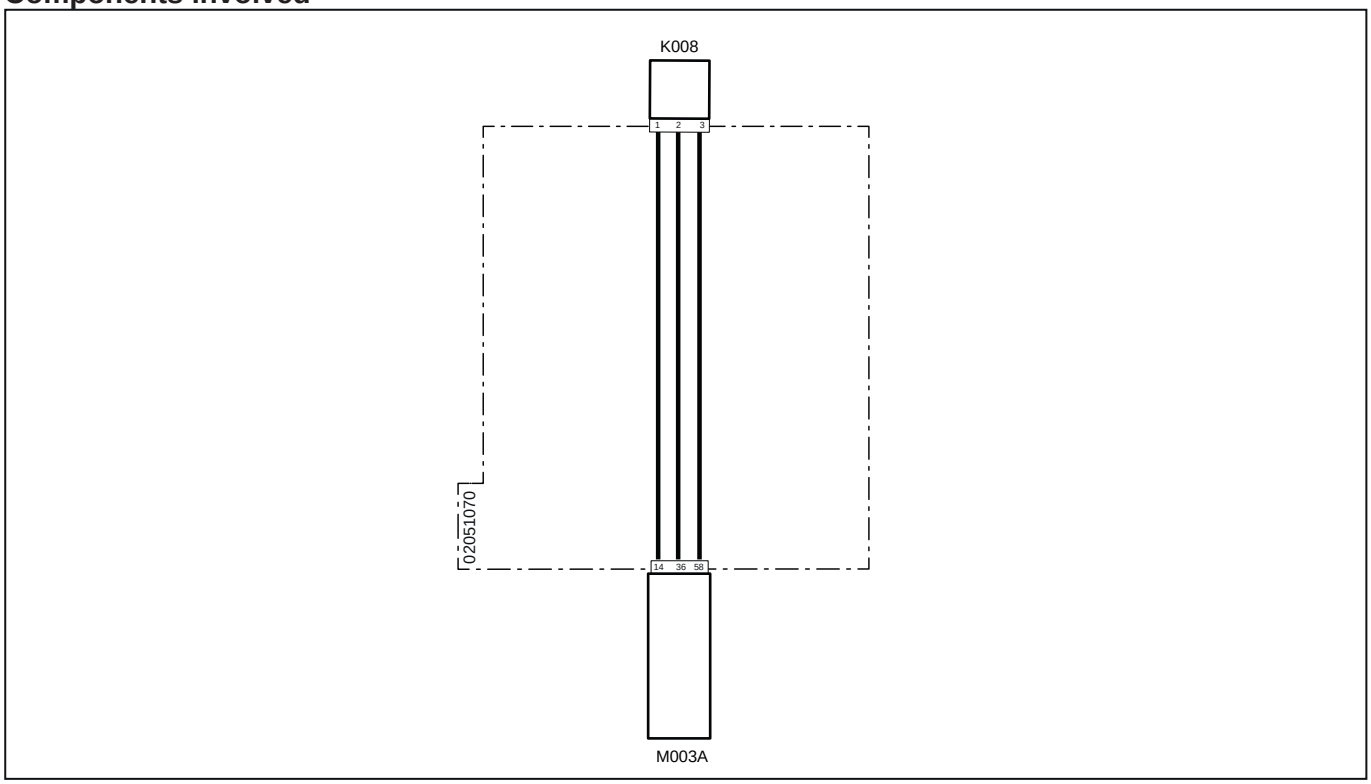
3 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

4 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

5 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008 (pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3019 - Water in fuel or water in fuel sensor open circuit

Description of fault

The ECU engine control unit detects water in the fuel. This error may also be generated by an open circuit on the water in fuel sensor line

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

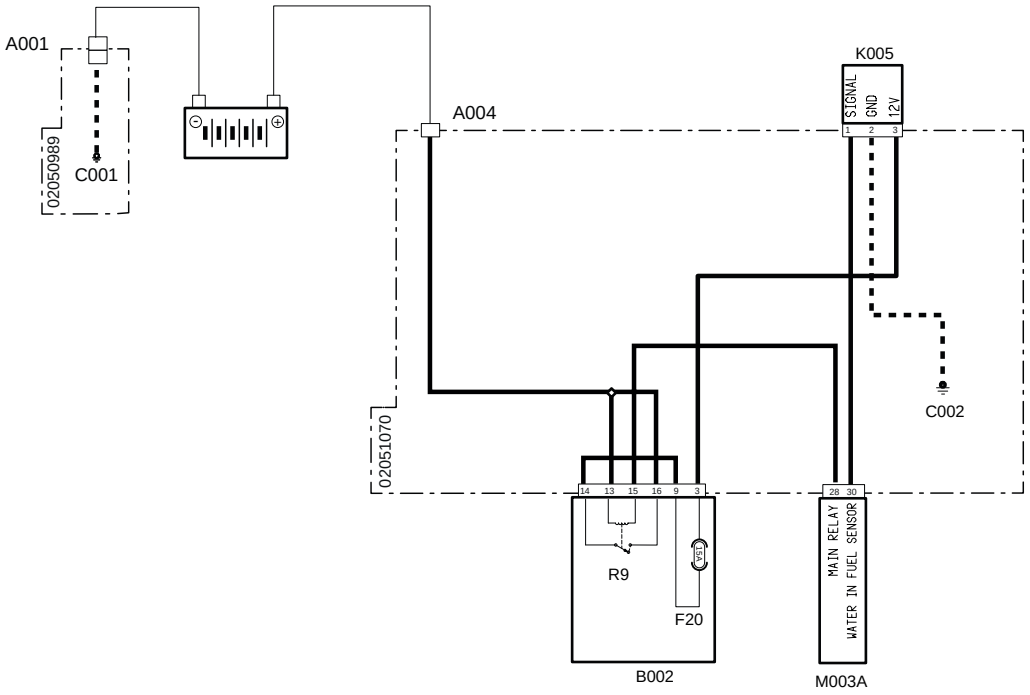
2 - Drain the water from the fuel filter
  - See the use and maintenance of the vehicle for the procedure to drain water from the filter.
  - If the problem persists after draining the water from the filter, proceed to the next step

3 - Check that the connectors of the water in fuel sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K005 (pag.R2-436)	P16	Water in fuel sensor
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3020 - Oil dilution value too high

Description of fault

The ECU engine control unit determines that the oil dilution value is too high

Severity of error

Medium

Additional information

Amber lamp illuminated

The oil dilution value is calculated by the control unit in accordance with a number of parameters such as usage of the tractor, number of regeneration cycles performed and engine oil pressure, together with other factors. There is no specific sensor for monitoring oil dilution. The control unit uses information received during usage of the tractor to determine when it is necessary to change the oil.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Change the engine oil
- See the use and maintenance of the vehicle for the procedure to change the engine oil.
- Reset the oil dilution parameter (see the documentation of the diagnostic tool)

3 - Contact the technical support service if the problem persists

3021 - Low oil pressure

Description of fault

The ECU engine control unit detects insufficient engine oil pressure

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the engine oil level is correct and top up if necessary.
- See the use and maintenance manual of the vehicle for the correct procedure for topping up the engine oil
- Reset the oil dilution parameter (see the documentation of the diagnostic tool)

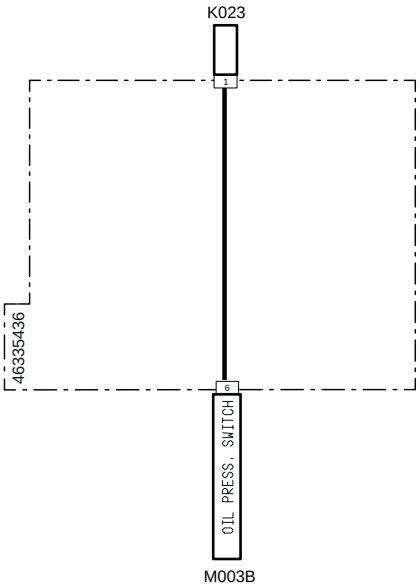
3 - Check that the connectors of the engine oil pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check the condition of the single contact oil pressure sensor switch

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R2-468)	XECUA	Engine control unit
K023(pag.R2-476)	XS6	Oil pressure switch

3022 - Engine oil pressure switch malfunction or short circuit

Description of fault

The ECU engine control unit detects a malfunction or an open circuit state of the engine oil pressure switch

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

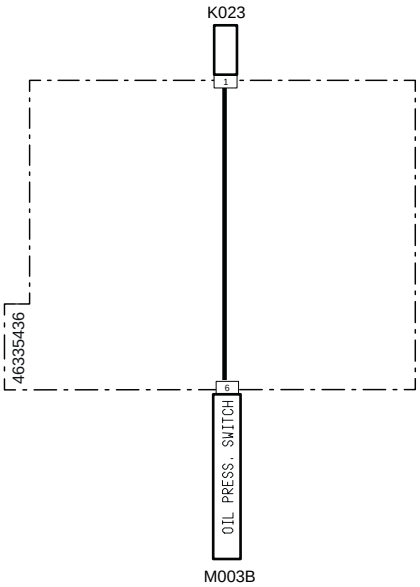
2 - Check that the connectors of the engine oil pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check the condition of the single contact oil pressure sensor switch

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R2-468)	XECUA	Engine control unit
K023(pag.R2-476)	XS6	Oil pressure switch

3023 - Maximum permitted boost pressure exceeded error

Description of fault

The control unit detects an excessively high pressure in the intake manifold

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;

  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

5 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

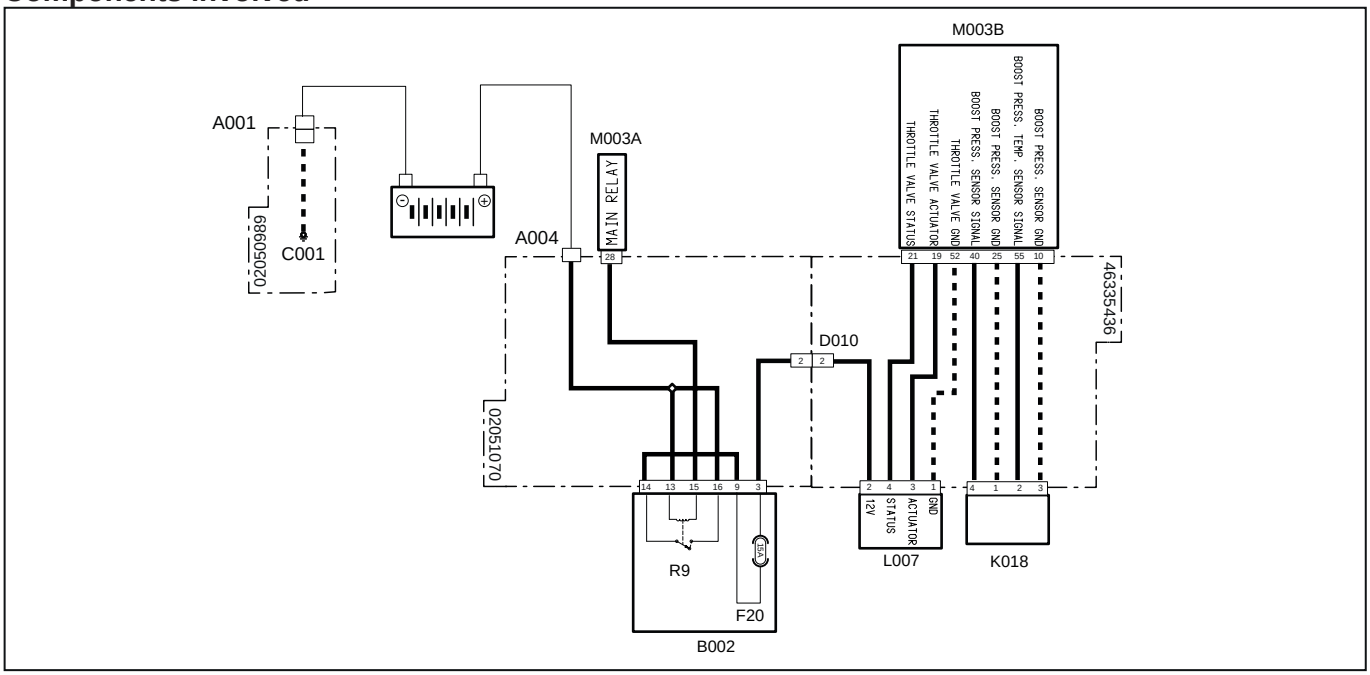
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3024 - Temperature and pressure sensor (BOOST): short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the temperature and pressure sensor (BOOST)

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

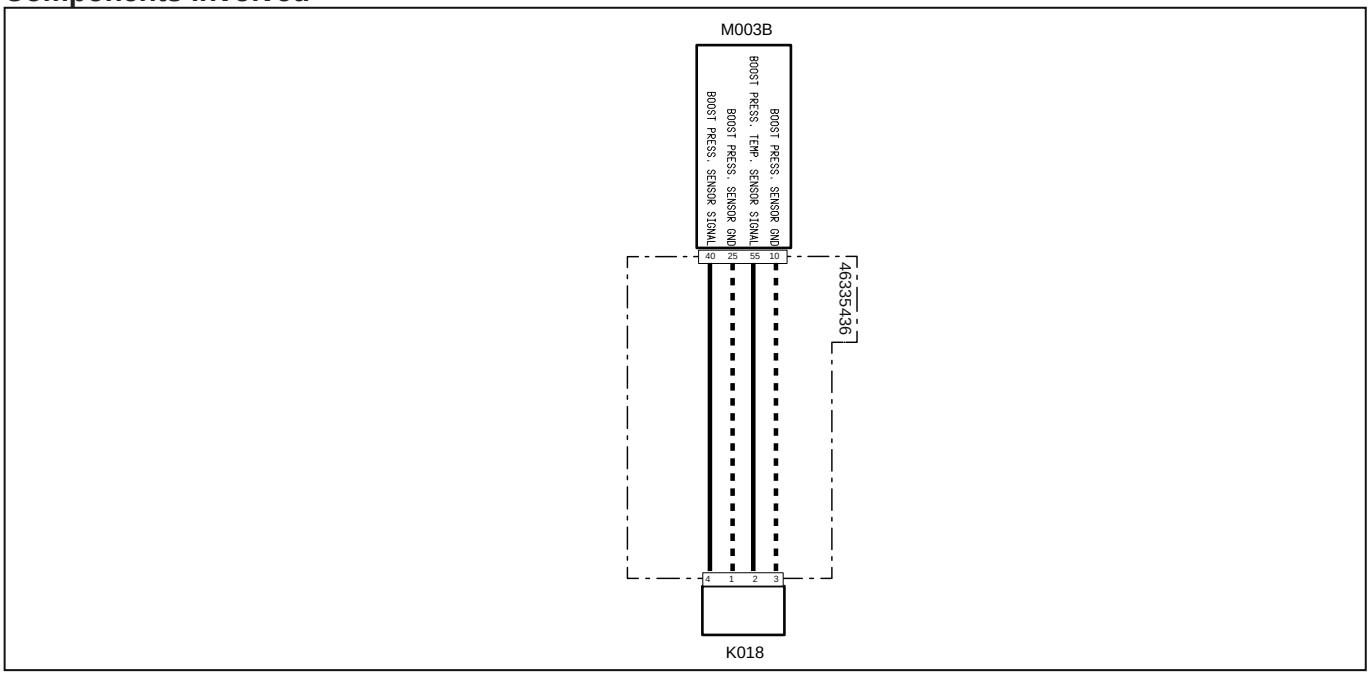
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R2-468)	XECUA	Engine control unit

3025 - Temperature and pressure sensor (BOOST): short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the temperature and pressure sensor (BOOST)

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

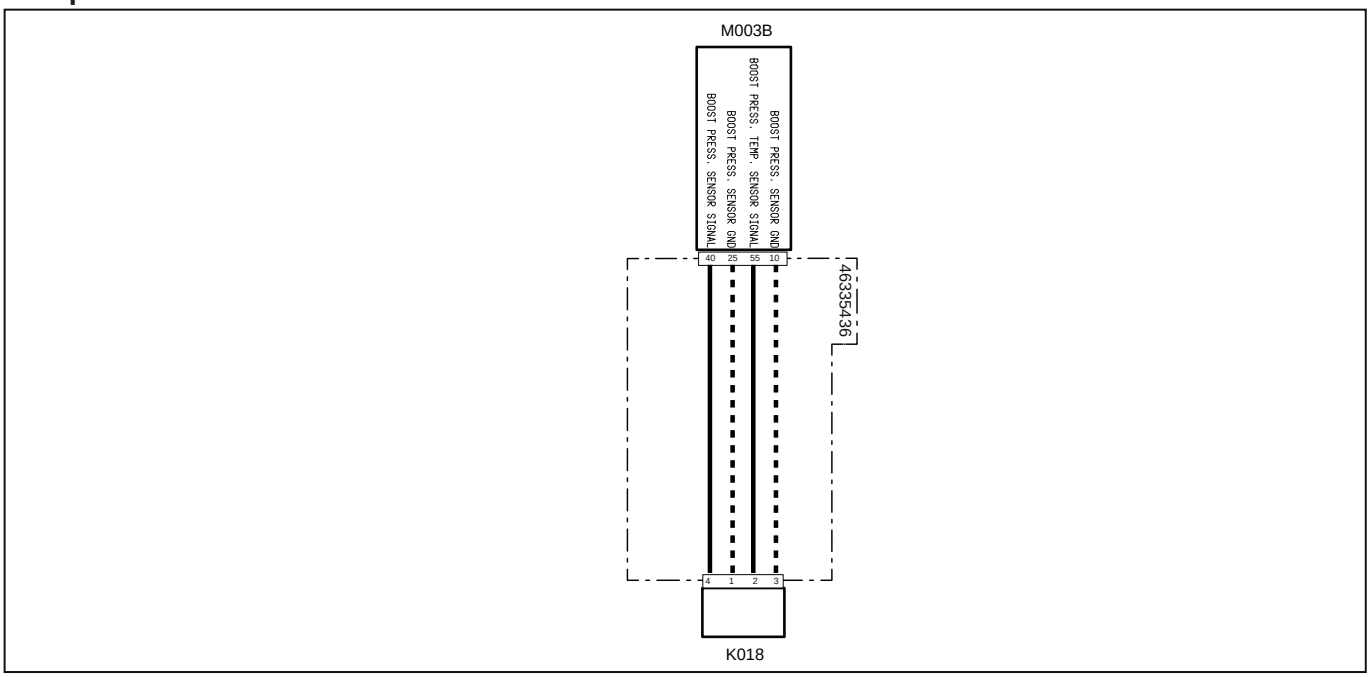
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R2-468)	XECUA	Engine control unit

3026 - Boost pressure too high relative to barometric pressure

Description of fault

The ECU engine control unit detects that the pressure measured by the temperature and pressure sensor (BOOST) is much higher than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

5 - Check that the connectors of the boost pressure sensor, of the throttle valve, of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

6 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;

  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

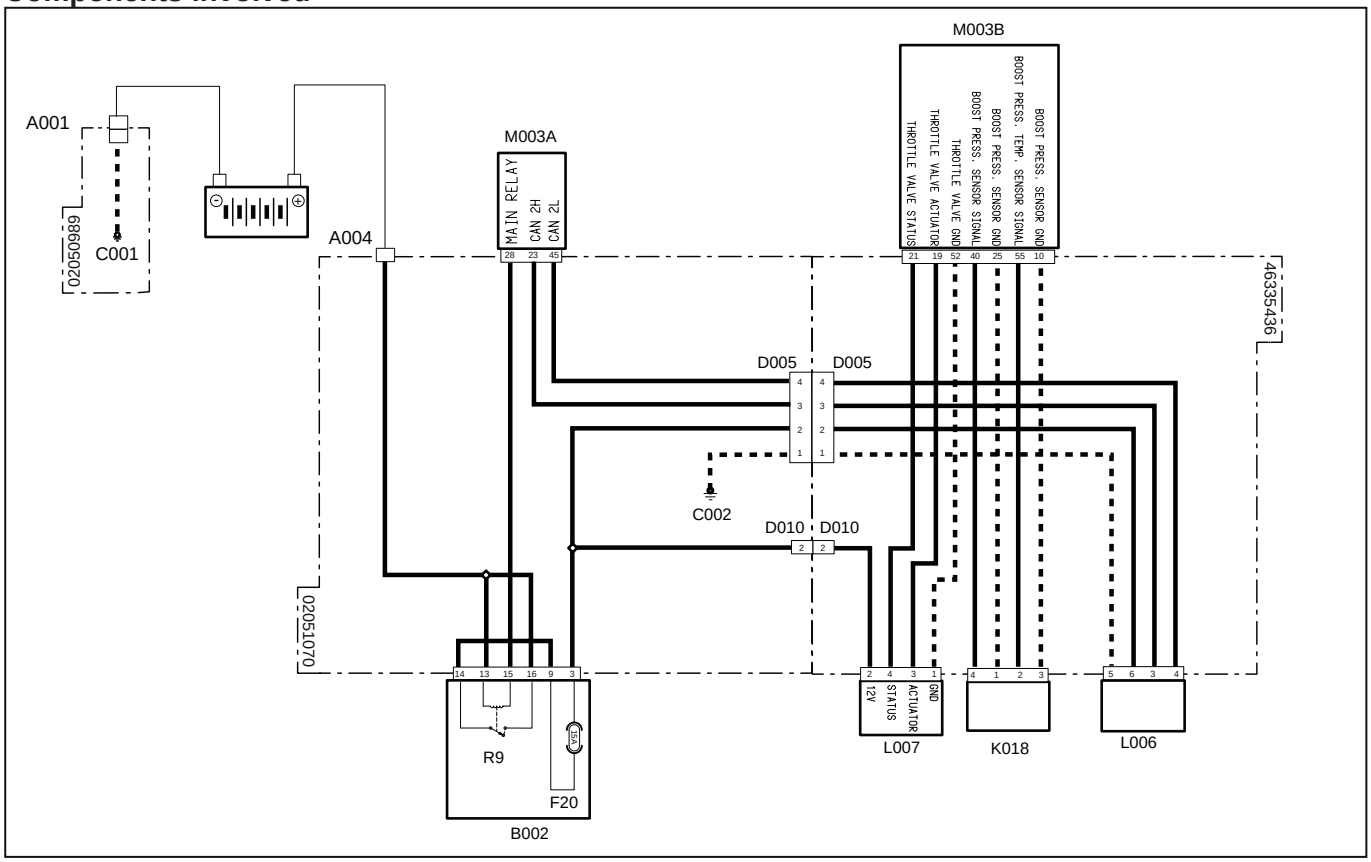
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3027 - Boost pressure too low relative to barometric pressure

Description of fault

The ECU engine control unit detects that the pressure measured by the temperature and pressure sensor (BOOST) is much lower than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

5 - Check that the connectors of the boost pressure sensor, of the throttle valve, of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

6 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;

  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

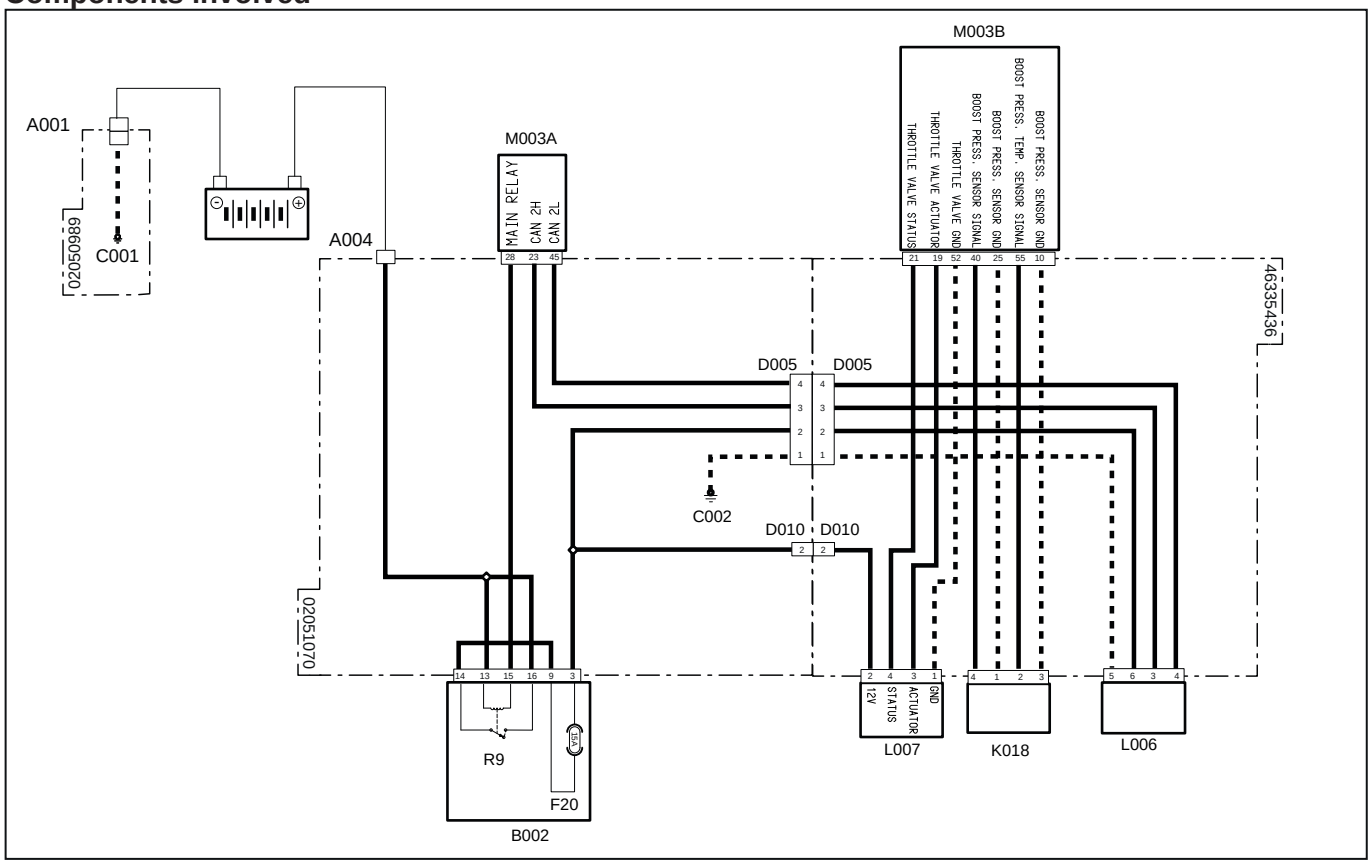
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
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C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3028 - Temperature and pressure sensor (BOOST): short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit state on the temperature and pressure sensor (BOOST)

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

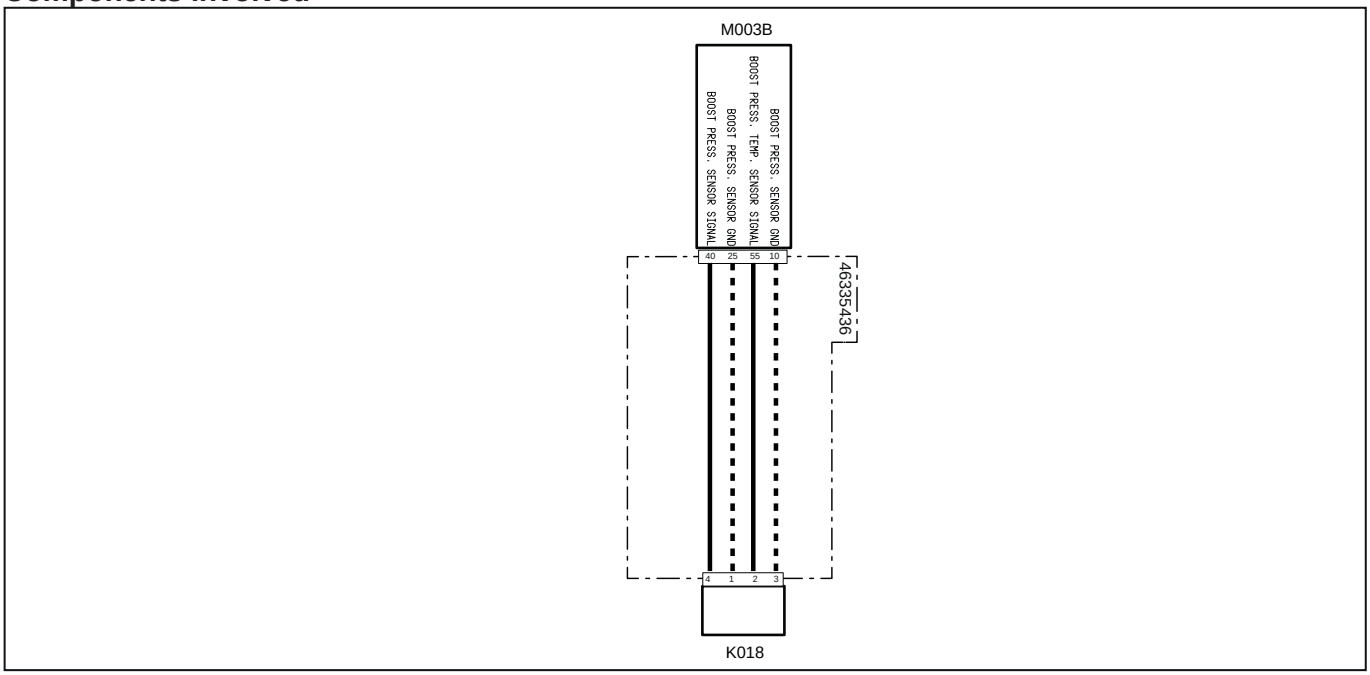
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R2-468)	XECUA	Engine control unit

3029 - Temperature and pressure sensor (BOOST): short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the temperature and pressure sensor (BOOST)

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

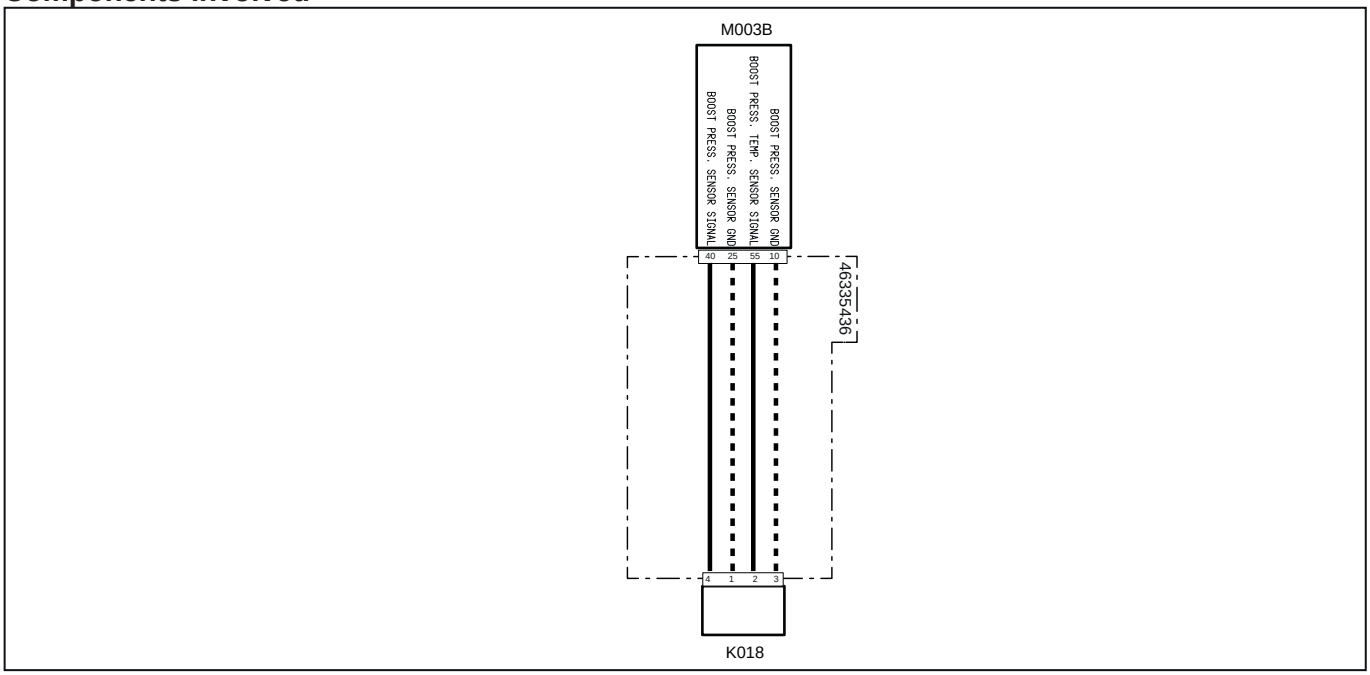
2 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the boost pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K018(pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
M003B (pag.R2-468)	XECUA	Engine control unit

3030 - Barometric pressure sensor: short circuit to battery or open circuit

Description of fault

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check that the connectors of the pressure sensor on the control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly

2 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

3 - Check that the wiring loom connectors are connected correctly and not damaged

3031 - Barometric pressure sensor: short circuit to ground

Description of fault

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check that the connectors of the pressure sensor on the control unit and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly

2 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

3 - Check that the wiring loom connectors are connected correctly and not damaged

3032 - Coolant temperature high

Description of fault

The ECU engine control unit detects an excessively high coolant temperature

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the coolant level in the radiator and top up if necessary
- See the use and maintenance manual of the vehicle for the correct procedure for topping up coolant
- If the problem persists, proceed to the next step

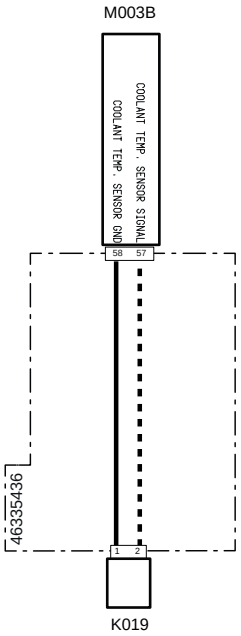
3 - Check for leaks from the coolant circuit
- Place a sheet of cardboard under the engine and start the engine. Any leaks in the circuit will wet the cardboard
  Even if no leaks are found, check the coolant level again after a couple of hours at work. If the level has dropped, this means that there is a leak somewhere in the circuit
- Check the condition of the radiator and hoses and check that the hose clamps are fastened correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R2-468)	XECUA	Engine control unit
K019(pag.R2-473)	XS1B	Coolant temperature sensor

3033 - Coolant temperature sensor: short circuit to positive or open circuit

Description of fault

The ECU engine control unit detects a short circuit to positive or open circuit fault on the coolant temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

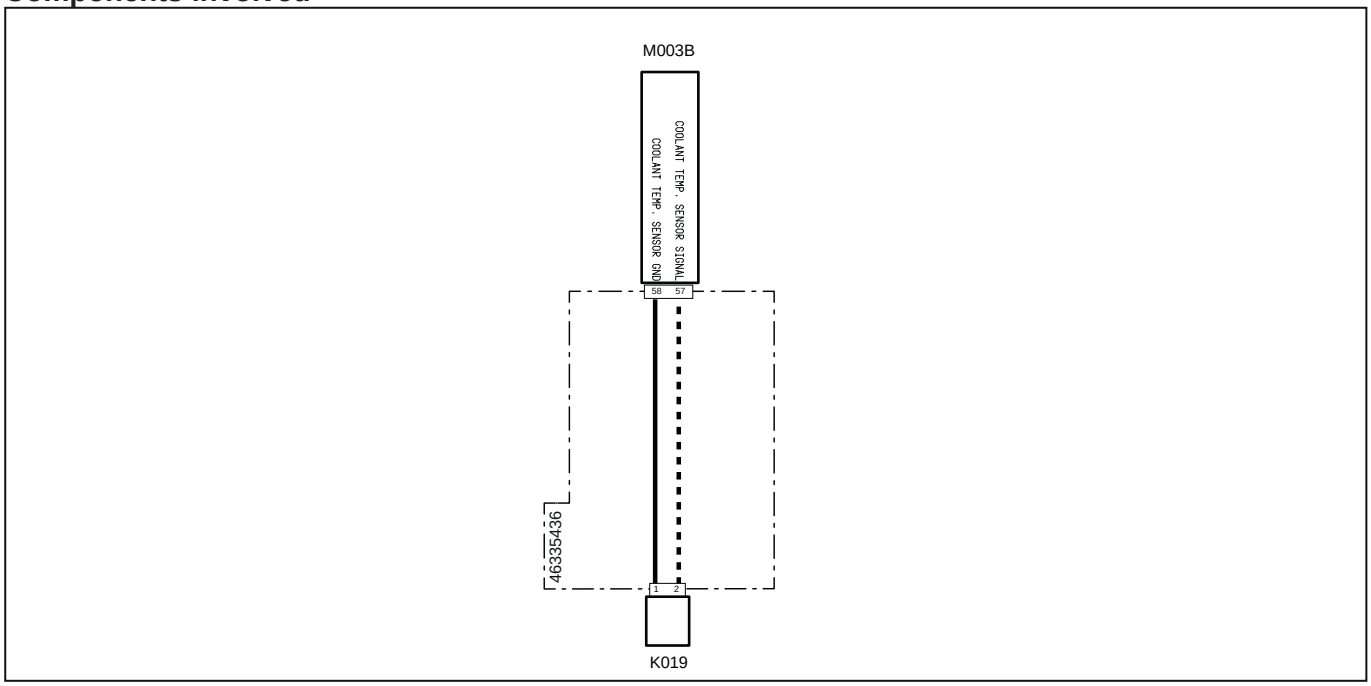
1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R2-468)	XECUA	Engine control unit
K019(pag.R2-473)	XS1B	Coolant temperature sensor

3034 - Coolant temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the coolant temperature sensor

Severity of error

Medium

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

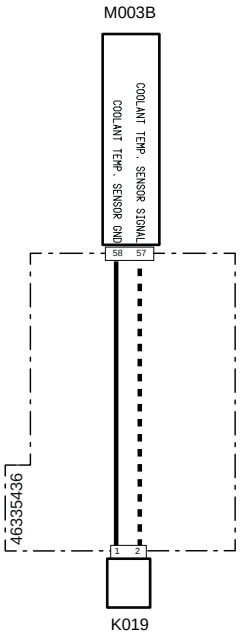
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
M003B (pag.R2-468)	XECUA	Engine control unit
K019(pag.R2-473)	XS1B	Coolant temperature sensor

3035 - DPF differential pressure too high

Description of fault

Pressure difference detected by control unit between inlet and outlet sides of diesel particulate filter is too high

Severity of error

Medium

Additional information

Red indicator lamp flashing

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

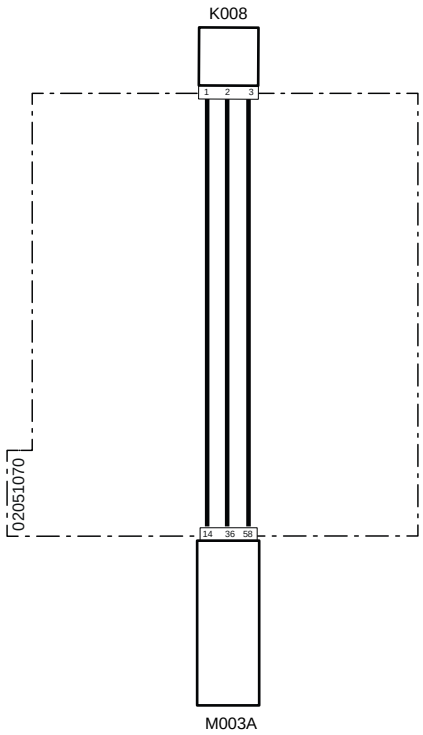
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008(pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3036 - DPF differential pressure too low

Description of fault

Pressure difference detected by control unit between inlet and outlet sides of diesel particulate filter is too low

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

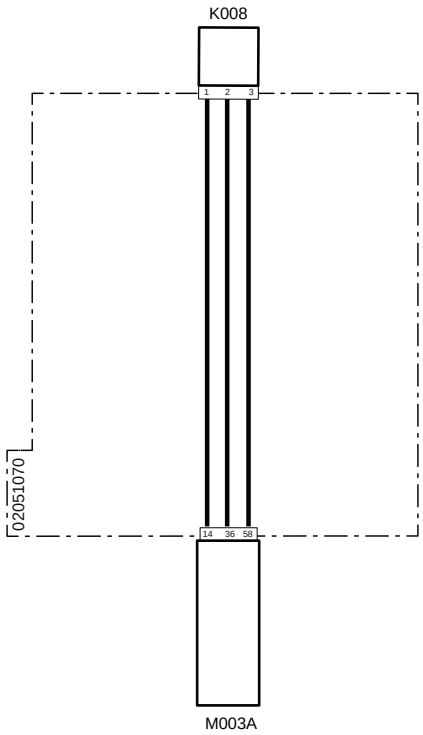
3 - Perform the service regeneration procedure for the DPF filter (see the documentation of the diagnostic tool)
- Read the safety information given in the use and maintenance manual of the vehicle with particular care.
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

5 - Check that the rubber tubes connected to the differential pressure sensor are not obstructed. An obstruction in these tubes may cause the sensor to read incorrect measurements

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008(pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3037 - Differential pressure sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the differential pressure sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

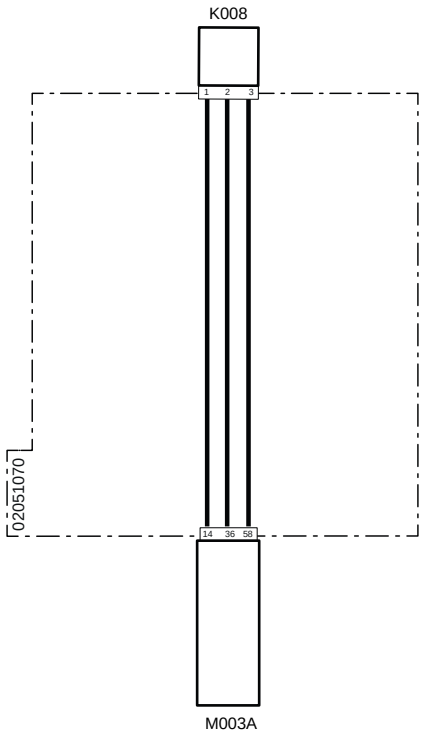
2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

3 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008(pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3038 - Differential pressure sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the differential pressure sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The degree of clogging of the DPF filter is monitored by the ECU unit via the signals received from the differential pressure sensor, which measures the pressure ahead of and after the filter. If the pressure read by the sensor on the inlet side is higher than the pressure read on the outlet side, this means that the filter is clogged.

The differential pressure sensor reading may be viewed with the diagnostic tool

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

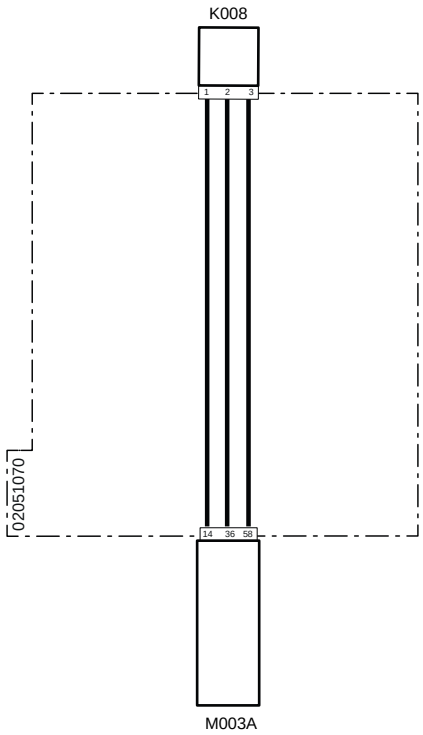
2 - Check that the differential pressure sensor is installed correctly
- If the differential pressure sensor is installed the wrong way around or if the tubes are swapped, the reading produced by the sensor will be incorrect
- Proceed to the next step if the sensor is installed correctly

3 - Use the diagnostic tool to view the differential pressure sensor reading (see the documentation of the diagnostic tool)
- Check if the differential pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K008(pag.R2-430)	P8	Differential pressure sensor
M003A (pag.R2-434)	P12	Engine control unit

3039 - Low rail pressure

Description of fault

The ECU engine control unit detects insufficient pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

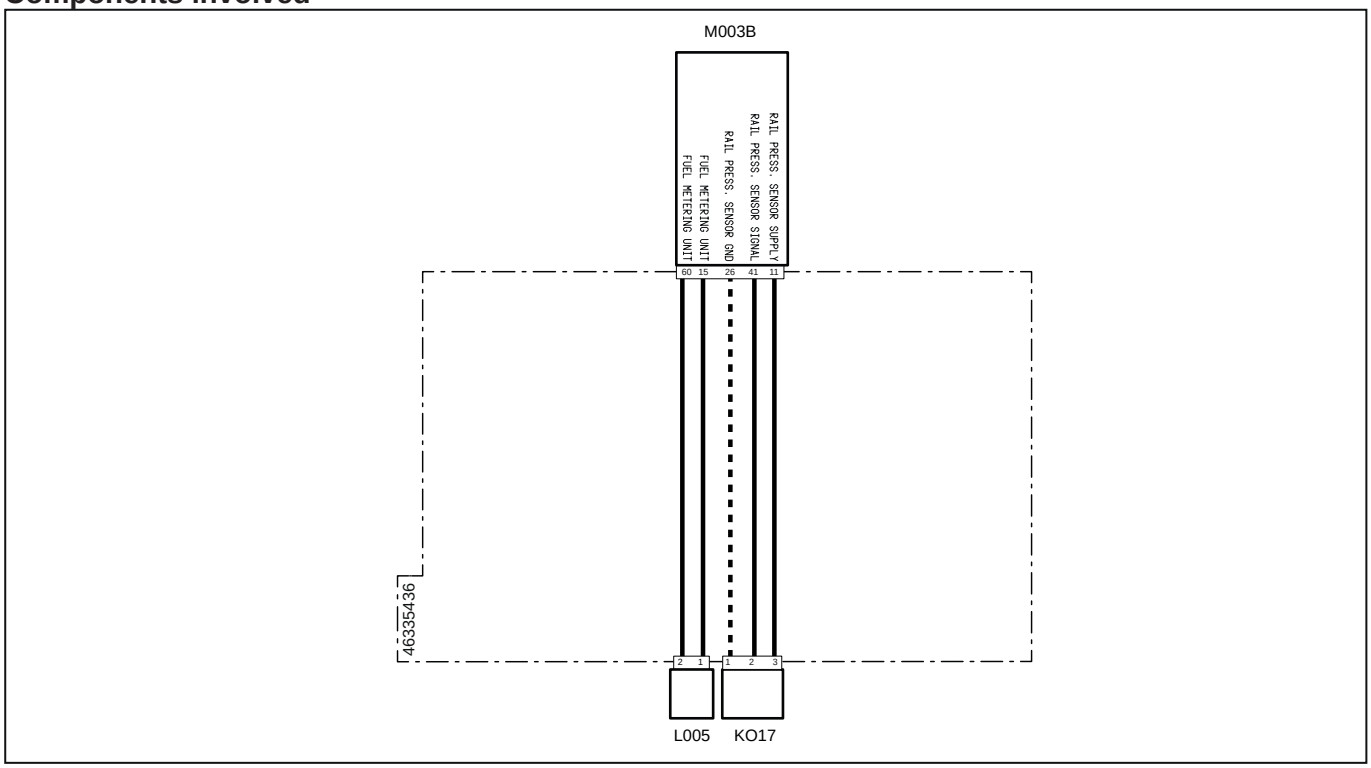
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3040 - High rail pressure

Description of fault

The ECU engine control unit detects excessively high pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

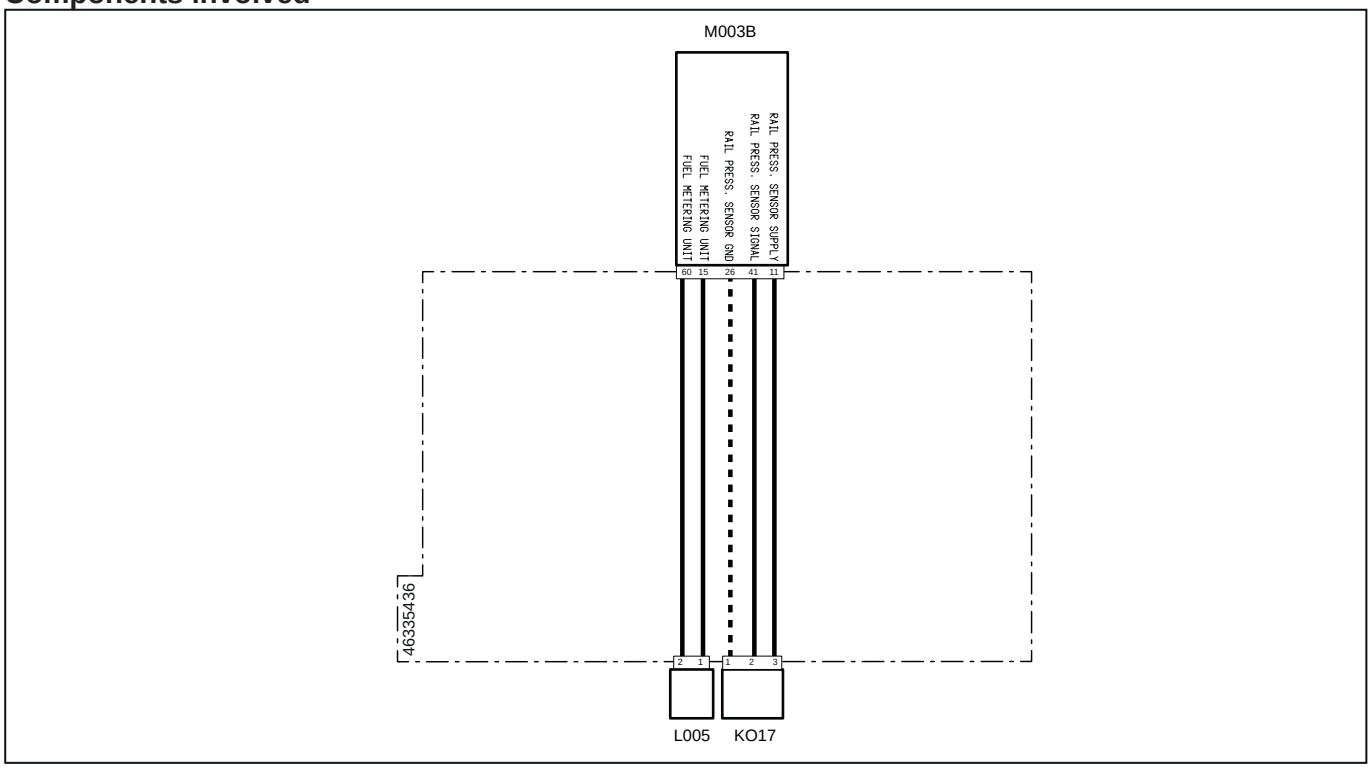
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

  The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3041 - High rail pressure

Description of fault

The ECU engine control unit detects excessively high pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

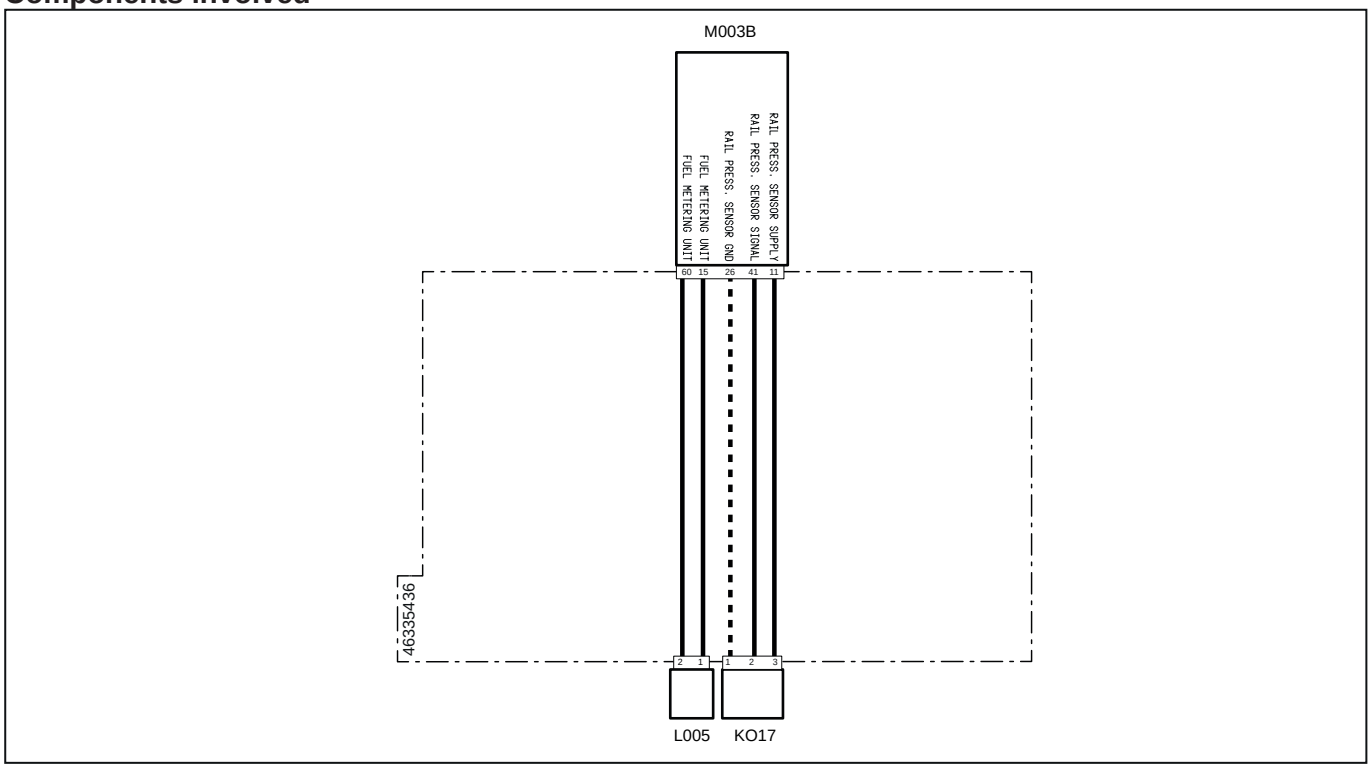
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3042 - Low rail pressure

Description of fault

The ECU engine control unit detects insufficient pressure in the rail circuit

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

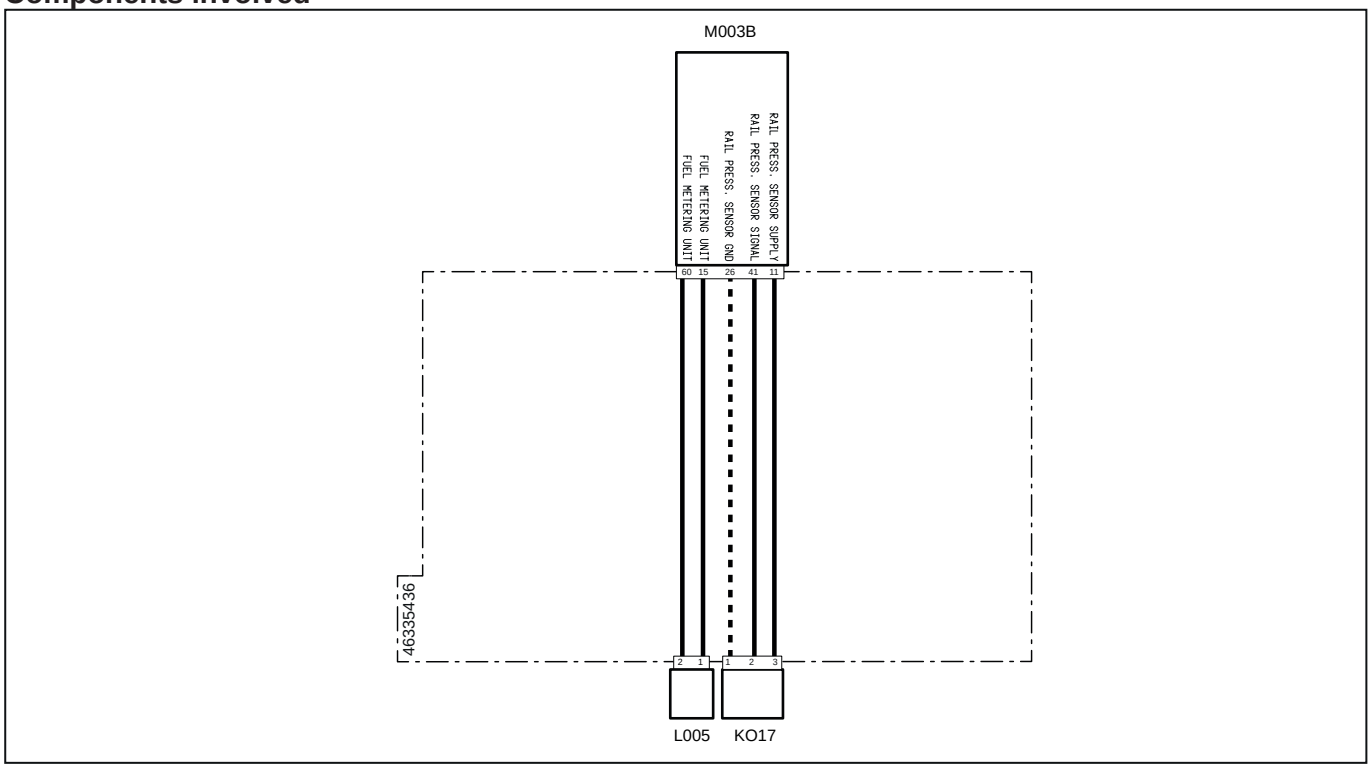
5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3043 - Rail pressure sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the rail pressure sensor

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

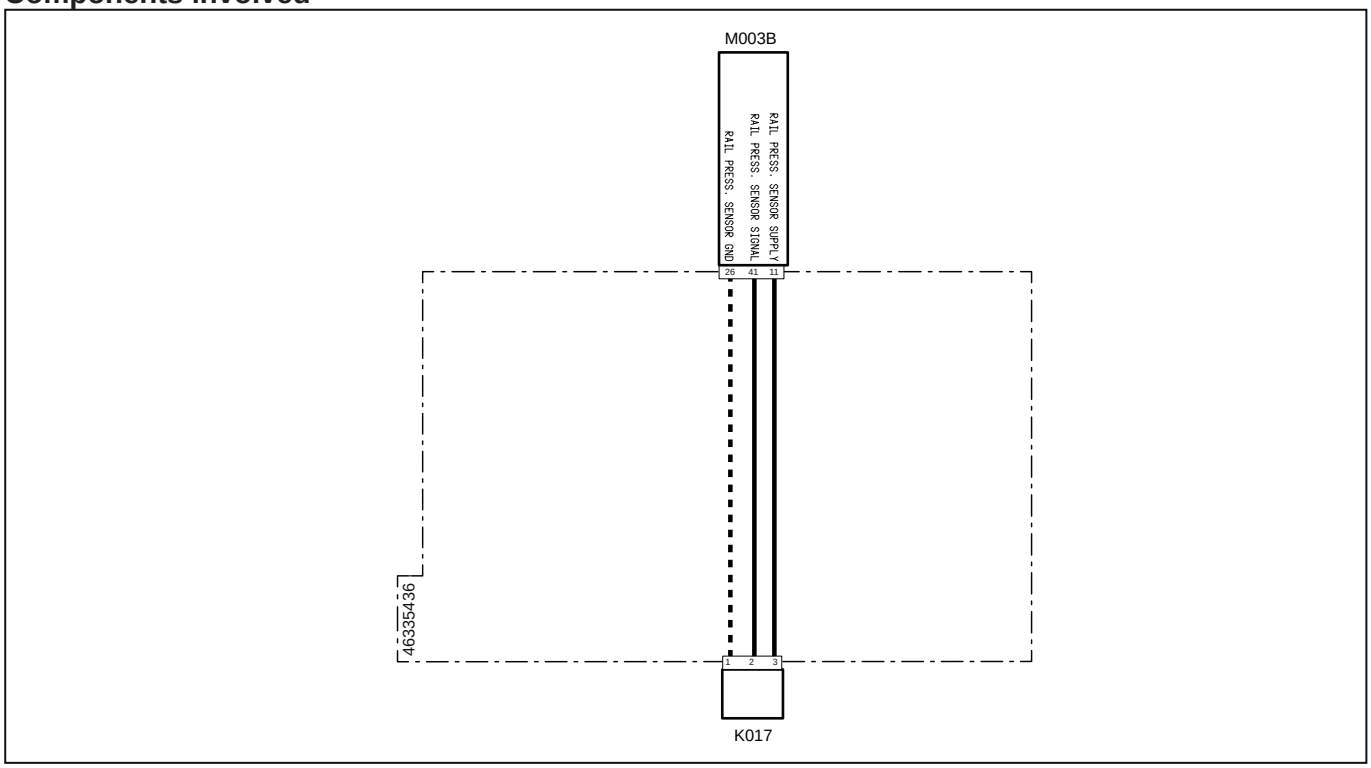
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
M003B (pag.R2-468)	XECUA	Engine control unit

3044 - Rail pressure sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the rail pressure sensor

Severity of error

High

Additional information

Red indicator lamp flashing

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

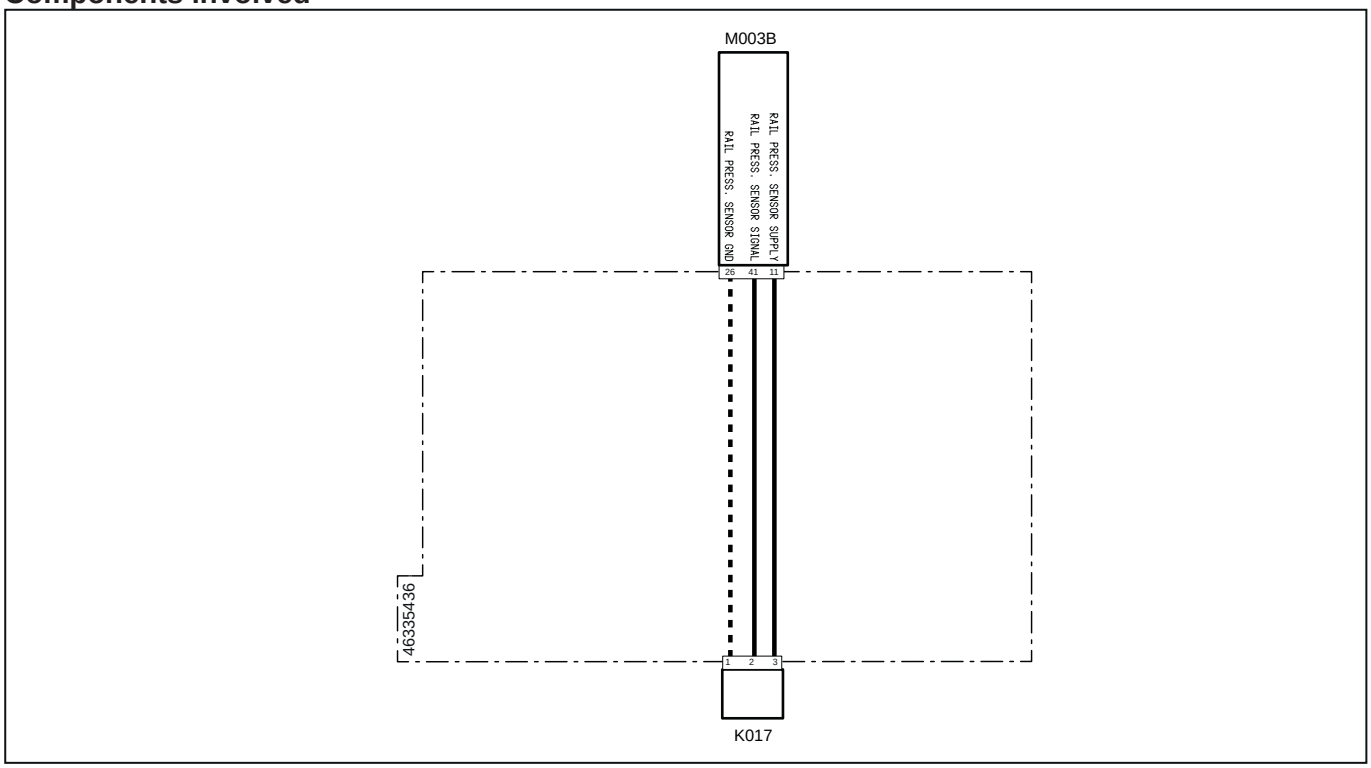
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
M003B (pag.R2-468)	XECUA	Engine control unit

3045 - Rail pressure sensor: spurious contact

Description of fault

The ECU engine control unit determines that the rail pressure sensor is producing an incorrect signal due to a spurious contact on the sensor itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

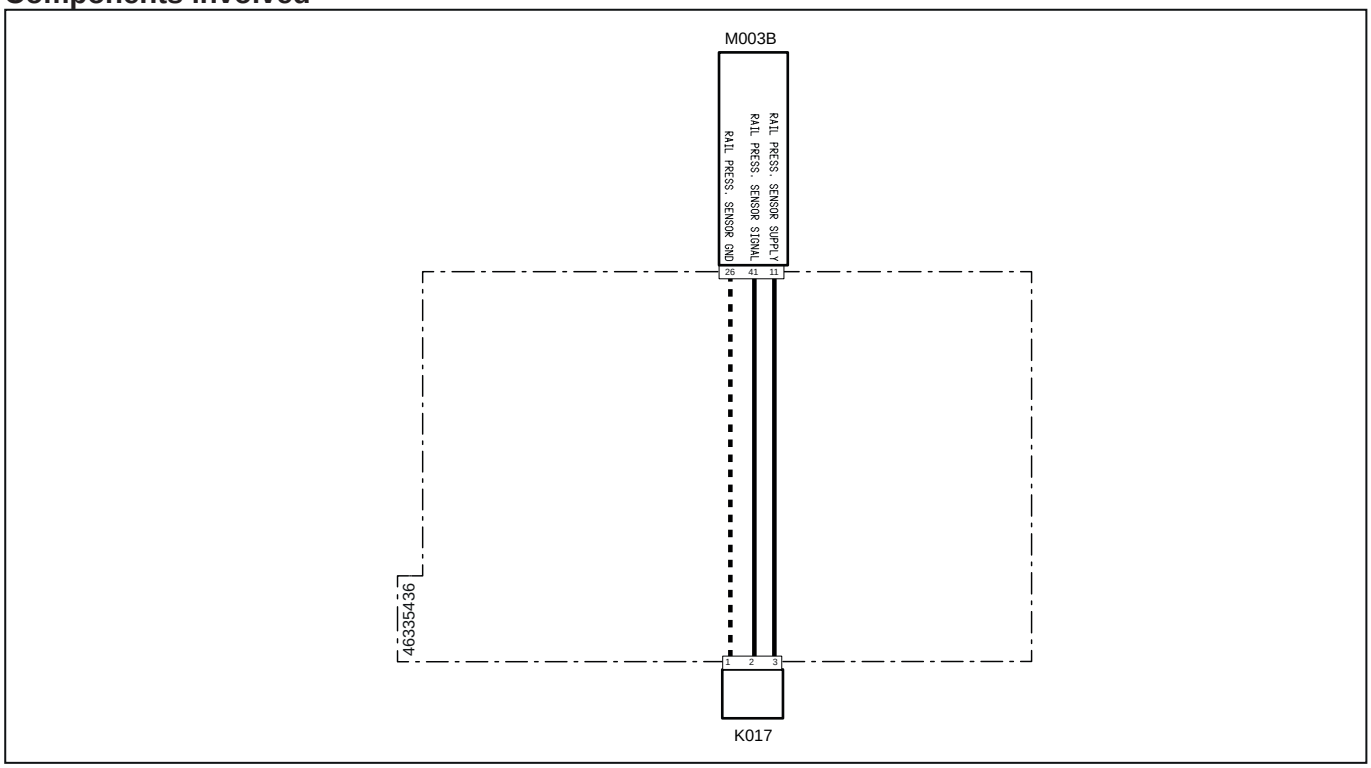
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
M003B (pag.R2-468)	XECUA	Engine control unit

3046 - Rail pressure sensor deviation

Description of fault

Signal received by the ECU engine control unit from the rail pressure sensor is not congruent with the signal received from the barometric pressure sensor at key-on

Severity of error

Medium

Additional information

Amber lamp illuminated

The rail pressure sensor monitors the pressure in the rail continuously. The sensor may start to produce inaccurate readings after extended operation. The control unit detects this malfunction by comparing the pressure value received from the rail sensor with the atmospheric pressure value received from the barometric pressure sensor within the unit itself

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

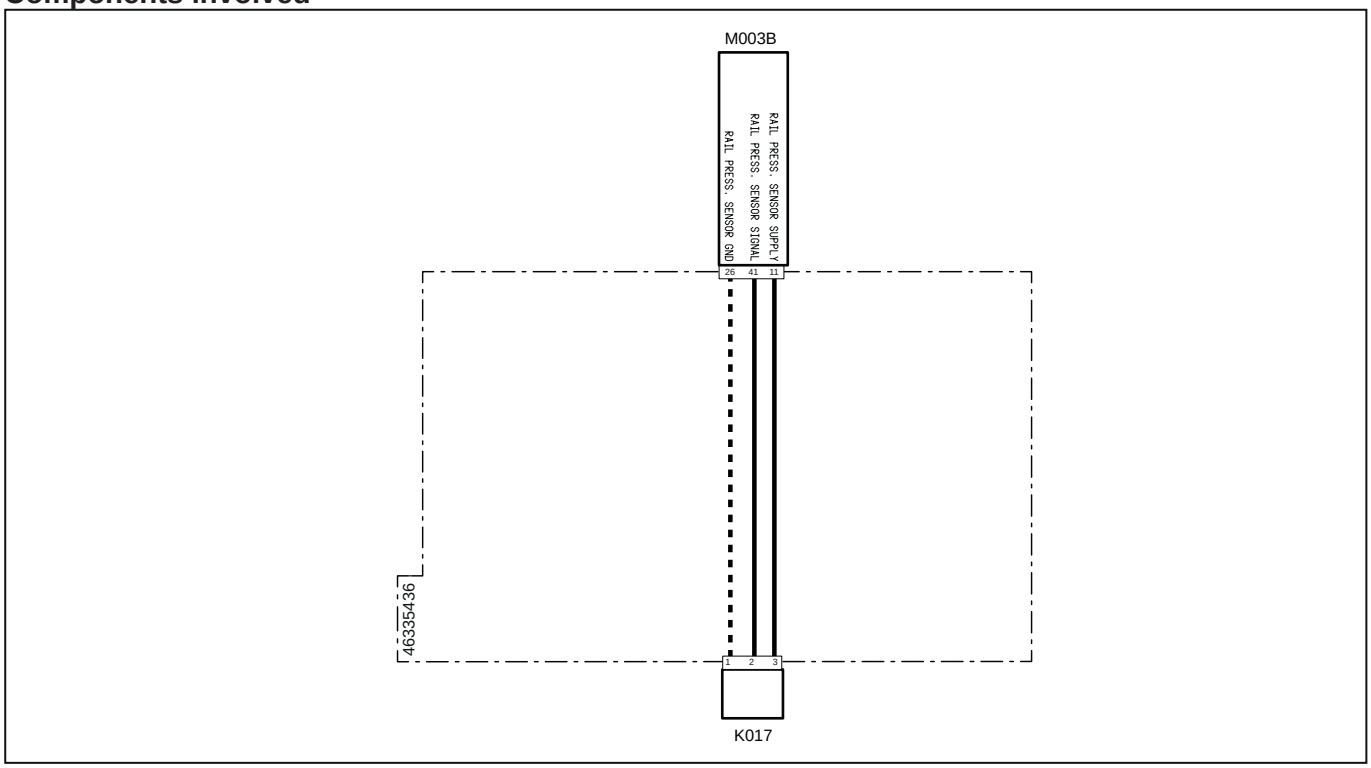
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
M003B (pag.R2-468)	XECUA	Engine control unit

3047 - Rail pressure sensor deviation

Description of fault

Signal received by the ECU engine control unit from the rail pressure sensor is not congruent with the signal received from the barometric pressure sensor at key-on

Severity of error

Medium

Additional information

Amber lamp illuminated

The rail pressure sensor monitors the pressure in the rail continuously. The sensor may start to produce inaccurate readings after extended operation. The control unit detects this malfunction by comparing the pressure value received from the rail sensor with the atmospheric pressure value received from the barometric pressure sensor within the unit itself

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

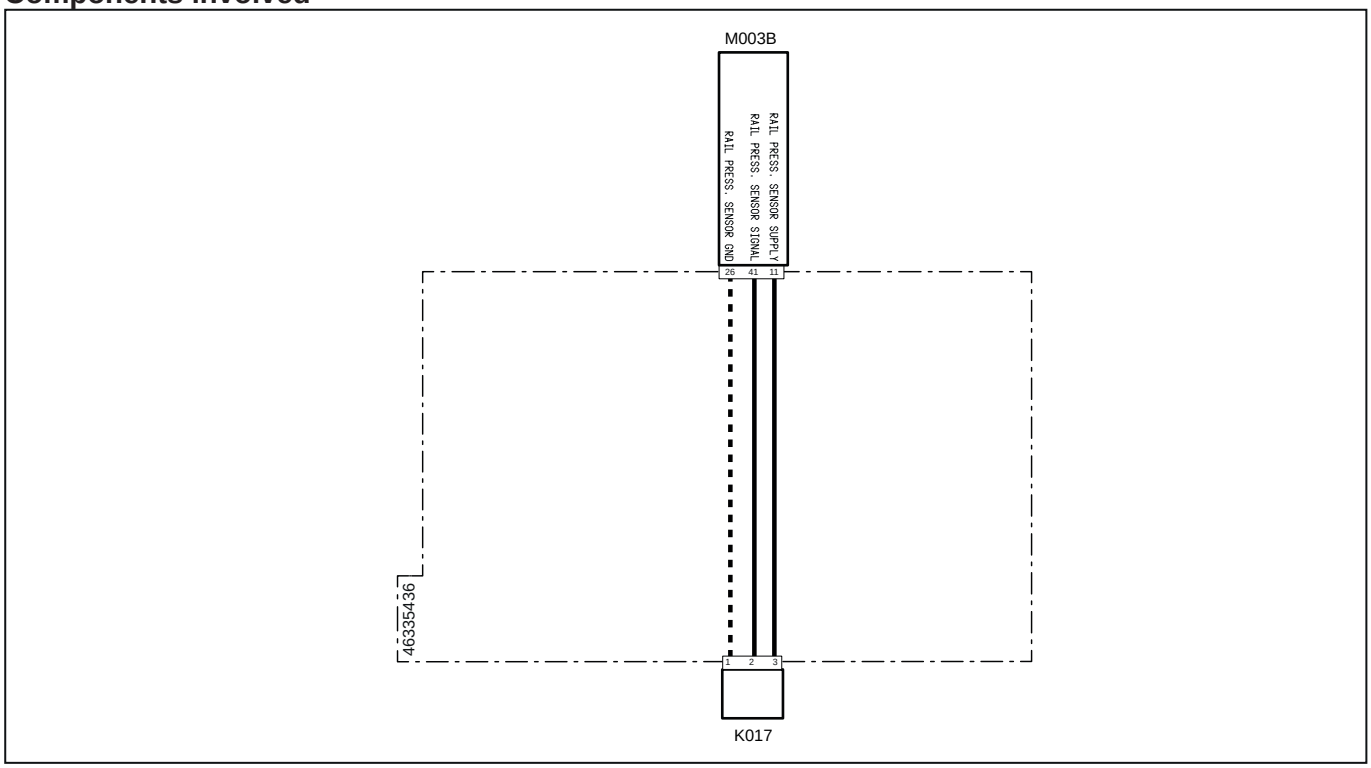
2 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

3 - Check that the connectors of the rail pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
M003B (pag.R2-468)	XECUA	Engine control unit

3048 - Battery voltage high

Description of fault

The electronic control unit detects a power feed voltage received from the battery exceeding 16 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

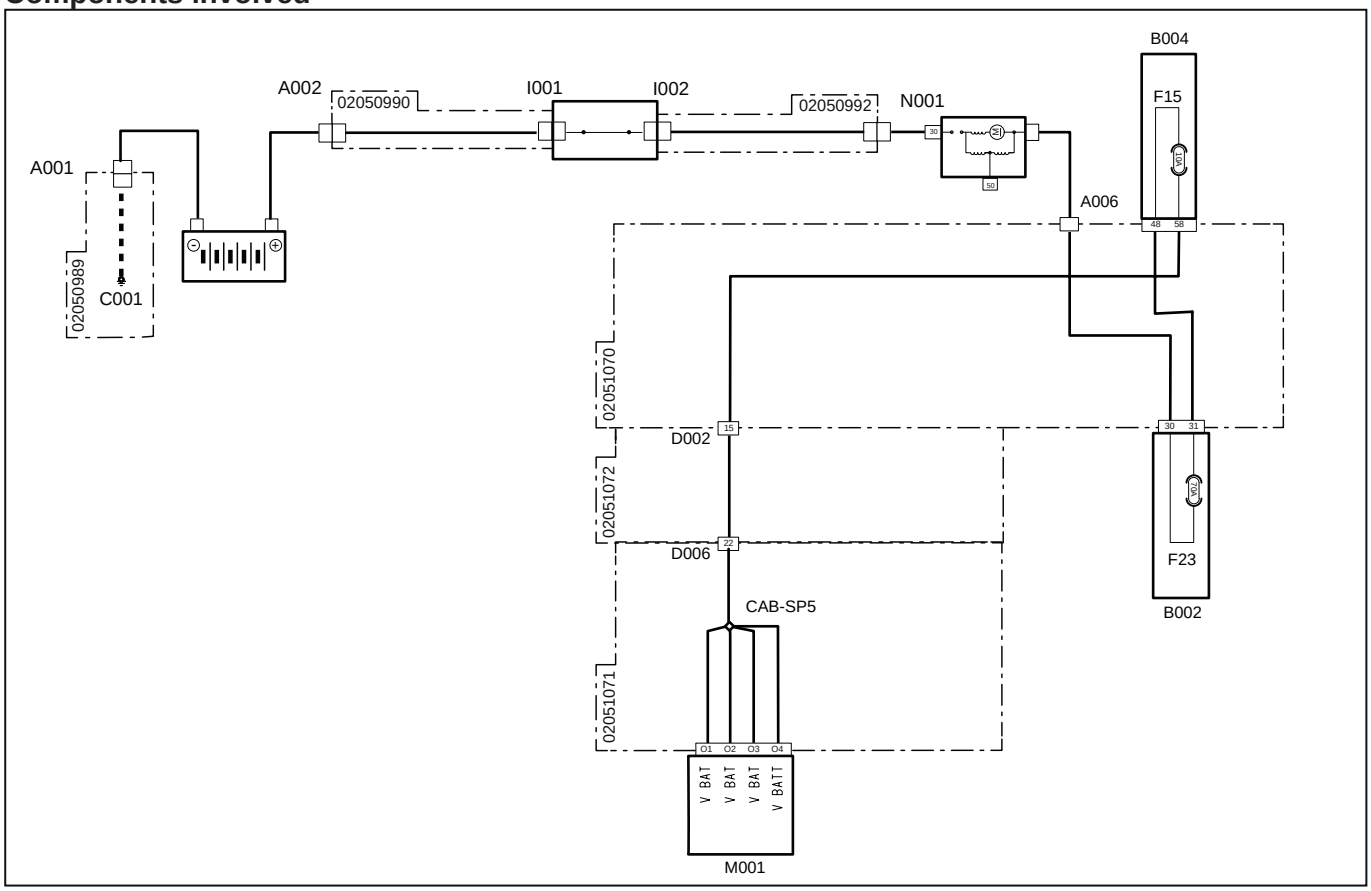
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
B004 (pag.R2-425)	P1A	Fuse box "2"
B002 (pag.R2-428)	P2A	Fuse box "1"
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F15(B004)(pag.R2-425)	F15	12V VCU power feed (10A)
F23(B002)(pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M001 (pag.R2-458)	P80	Vehicle ECU
N001 (pag.R2-388)	P10	Starter motor "30"
A006 (pag.R2-441)	P63	Starter motor

3049 - Battery voltage too low

Description of fault

The electronic control unit detects a power feed voltage received from the battery below 7 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

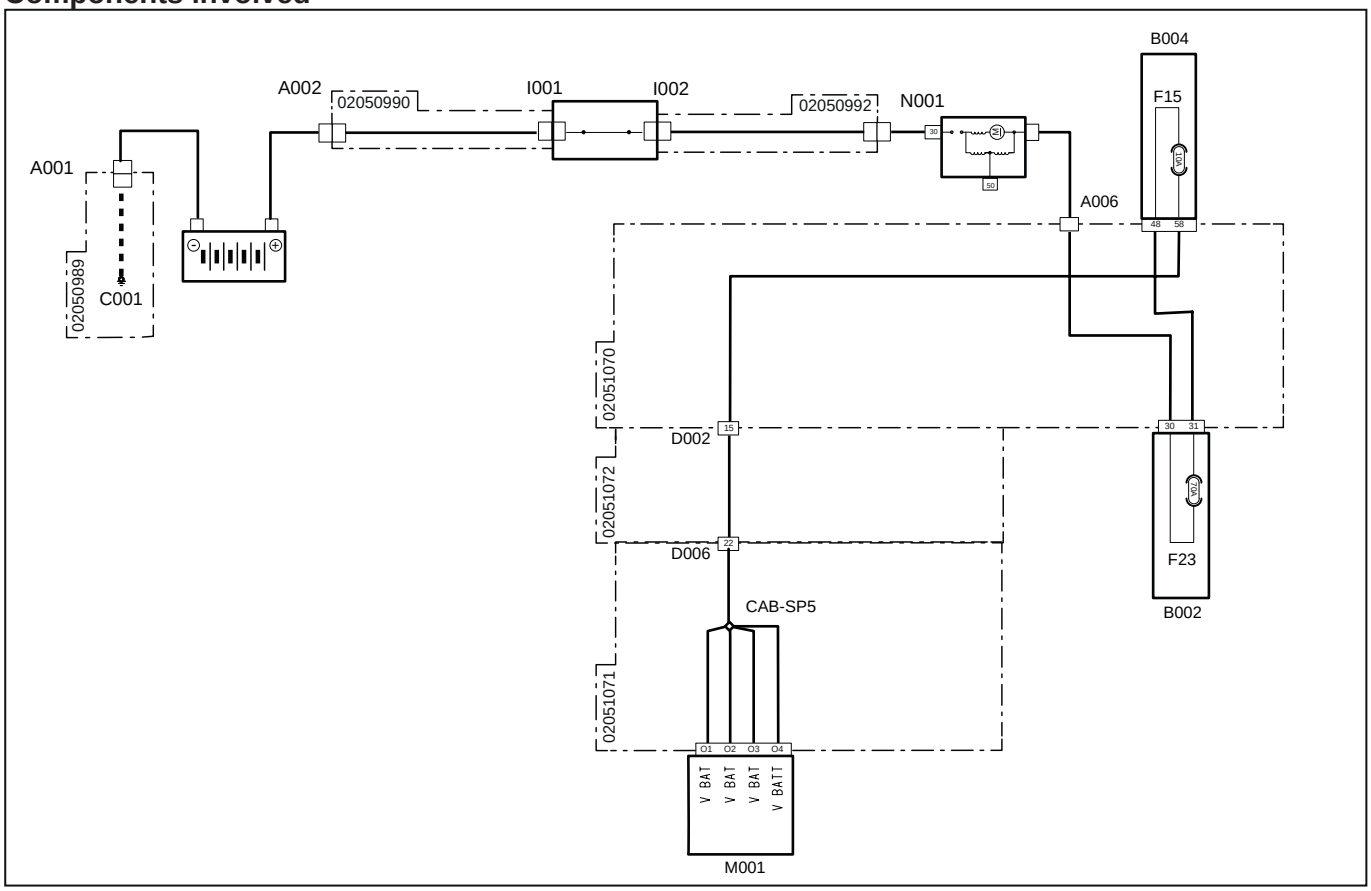
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
B004 (pag.R2-425)	P1A	Fuse box "2"
B002 (pag.R2-428)	P2A	Fuse box "1"
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F15(B004) (pag.R2-425)	F15	12V VCU power feed (10A)
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M001 (pag.R2-458)	P80	Vehicle ECU
N001 (pag.R2-388)	P10	Starter motor "30"
A006 (pag.R2-441)	P63	Starter motor

3050 - Ambient air temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the ambient air temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

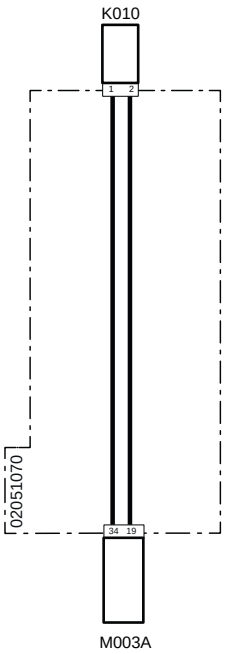
2 - Check that the connectors of the ambient air temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the ambient air temperature sensor is working correctly (see documentation of diagnostic tool)
  - Check if the ambient air temperature sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K010(pag.R2-432)	P467	Ambient air temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3051 - Ambient air temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the ambient air temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

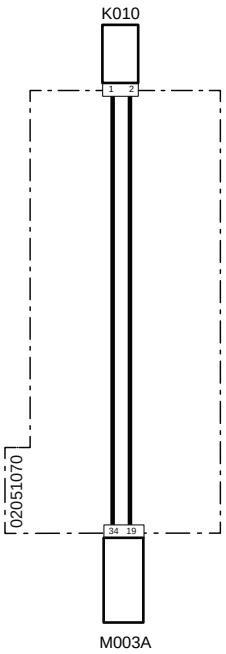
2 - Check that the connectors of the ambient air temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the ambient air temperature sensor is working correctly (see documentation of diagnostic tool)
  - Check if the ambient air temperature sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K010(pag.R2-432)	P467	Ambient air temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3052 - Fuel temperature sensor: short circuit or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the fuel temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

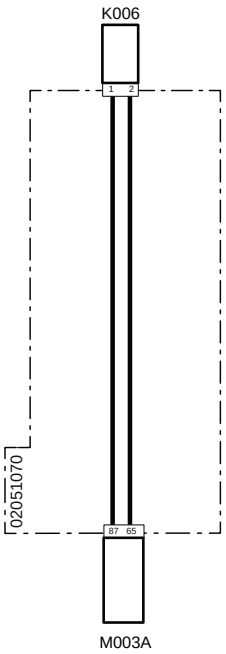
2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
  - Check if the ambient air temperature sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K006(pag.R2-431)	P4	Fuel temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3053 - Short circuit: fuel temperature sensor

Description of fault

The ECU engine control unit detects a short circuit on the fuel temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

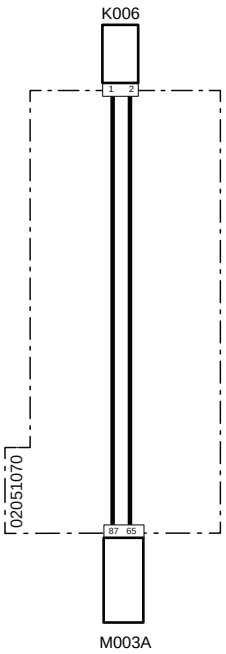
2 - Check that the connectors of the fuel temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the fuel temperature sensor is working correctly (see documentation of diagnostic tool)
  - Check if the fuel temperature sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K006(pag.R2-431)	P4	Fuel temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3054 - Crankshaft speed sensor: disturbed signal or spurious contact

Description of fault

The ECU engine control unit detects a disturbed signal from, or a spurious contact fault on, the crankshaft speed sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The crankshaft speed sensor reads the speed of the crankshaft from a tone wheel mounted on the crankshaft itself. If the tone wheel is damaged, the sensor will read the speed incorrectly and transmit an erroneous signal to the ECU engine control unit

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the crankshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

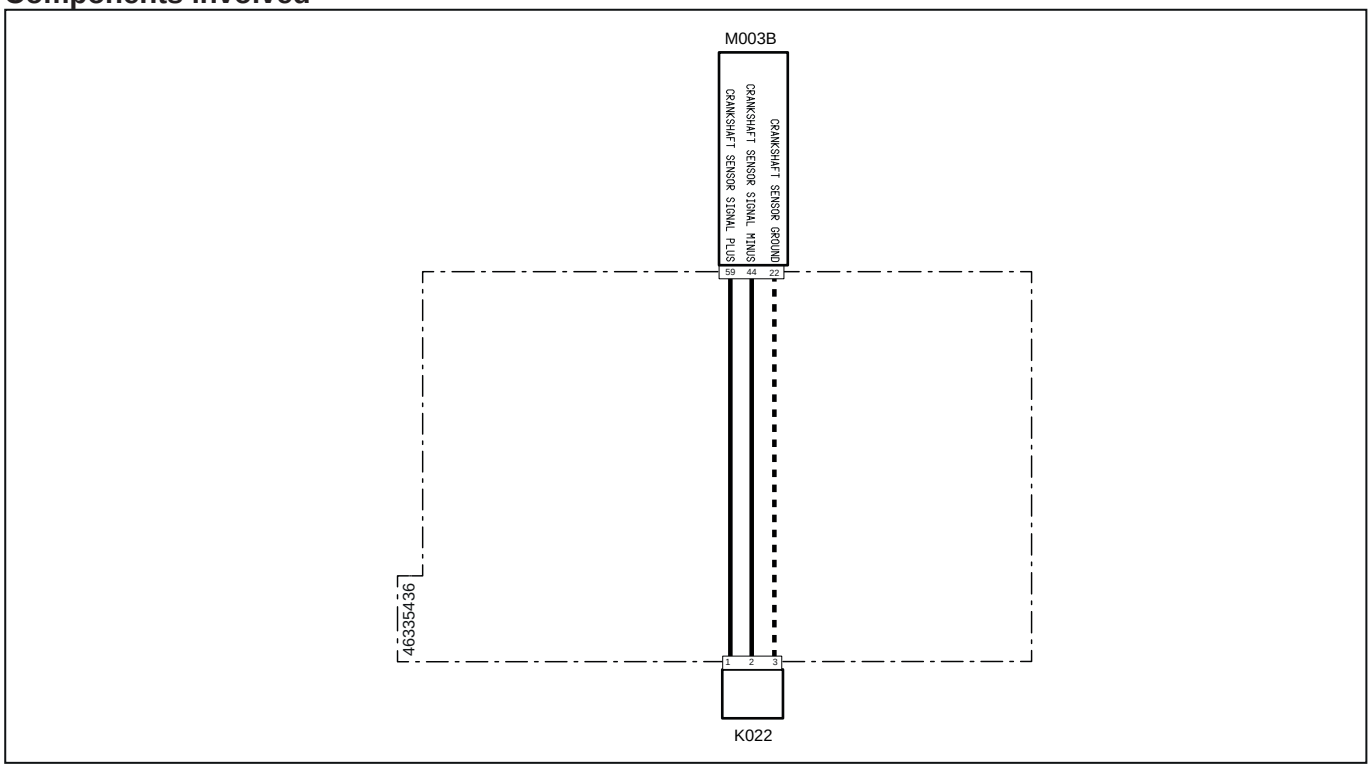
3 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check the condition of the tone wheel on the crankshaft
- Remove the crankshaft speed sensor
- Turn the crankshaft and, using a light, visually inspect the tone wheel to check if it is damaged
- An oscilloscope may also be used to check the tone wheel for damage which may not be noted with a visual inspection
- If the tone wheel is damaged, remove the engine and replace the tone wheel
- Proceed to the next step if the tone wheel is not damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K022(pag.R2-473)	XS2	Crankshaft speed sensor
M003A (pag.R2-434)	P12	Engine control unit

3055 - Open circuit: crankshaft speed sensor

Description of fault

The ECU engine control unit detects an open circuit fault on the crankshaft speed sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

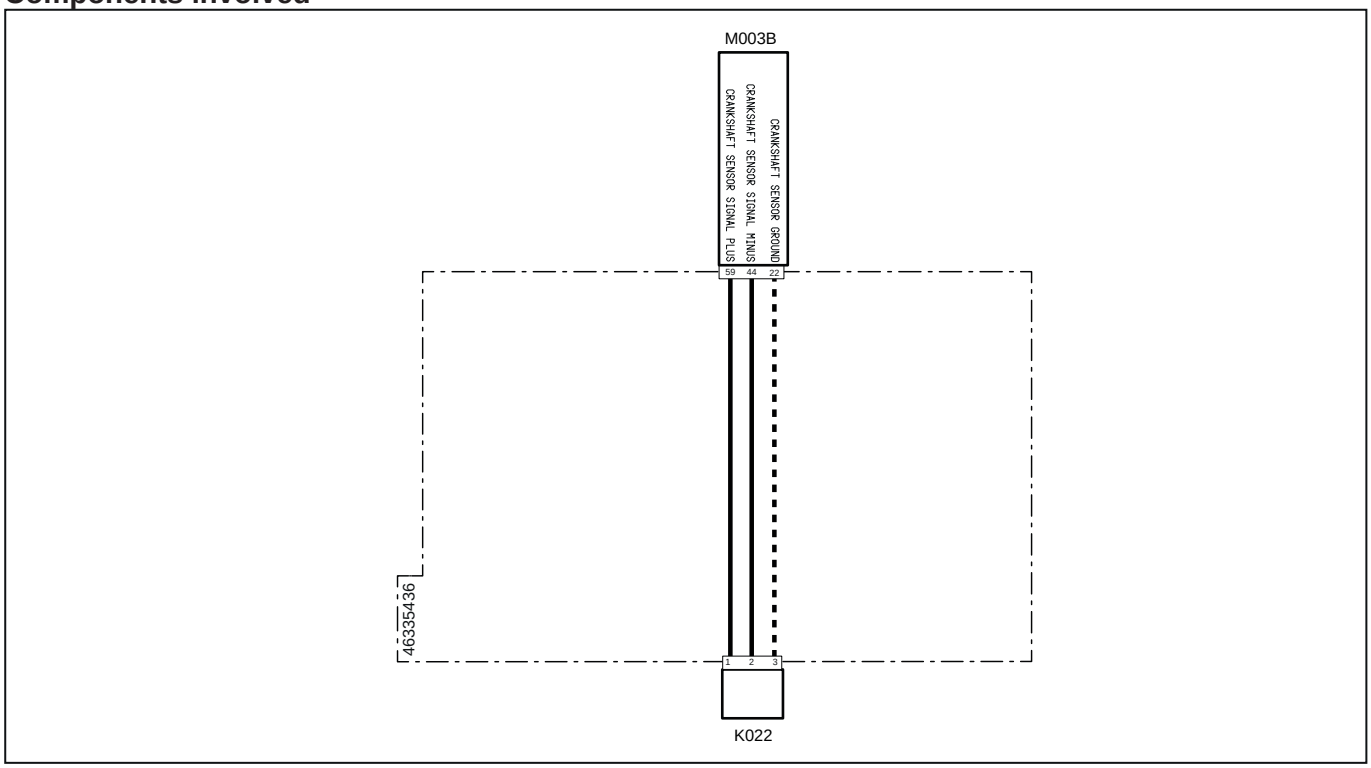
2 - Check that the connectors of the crankshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K022(pag.R2-473)	XS2	Crankshaft speed sensor
M003A (pag.R2-434)	P12	Engine control unit

3056 - Camshaft speed sensor synchronisation error

Description of fault

The ECU engine control unit detects that the camshaft speed signal is not synchronised with the crankshaft speed signal

Severity of error

Additional information

To ensure accurate injection management, the ECU engine control unit monitors the crankshaft and camshaft speed sensor signals together with a number of other parameters. These parameters allow the control unit to identify the positions of the pistons and the aperture of the valves precisely. If these two parameters are not congruent, a synchronisation error is generated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the camshaft speed sensor, the crankshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the camshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the ambient air temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the ambient air temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

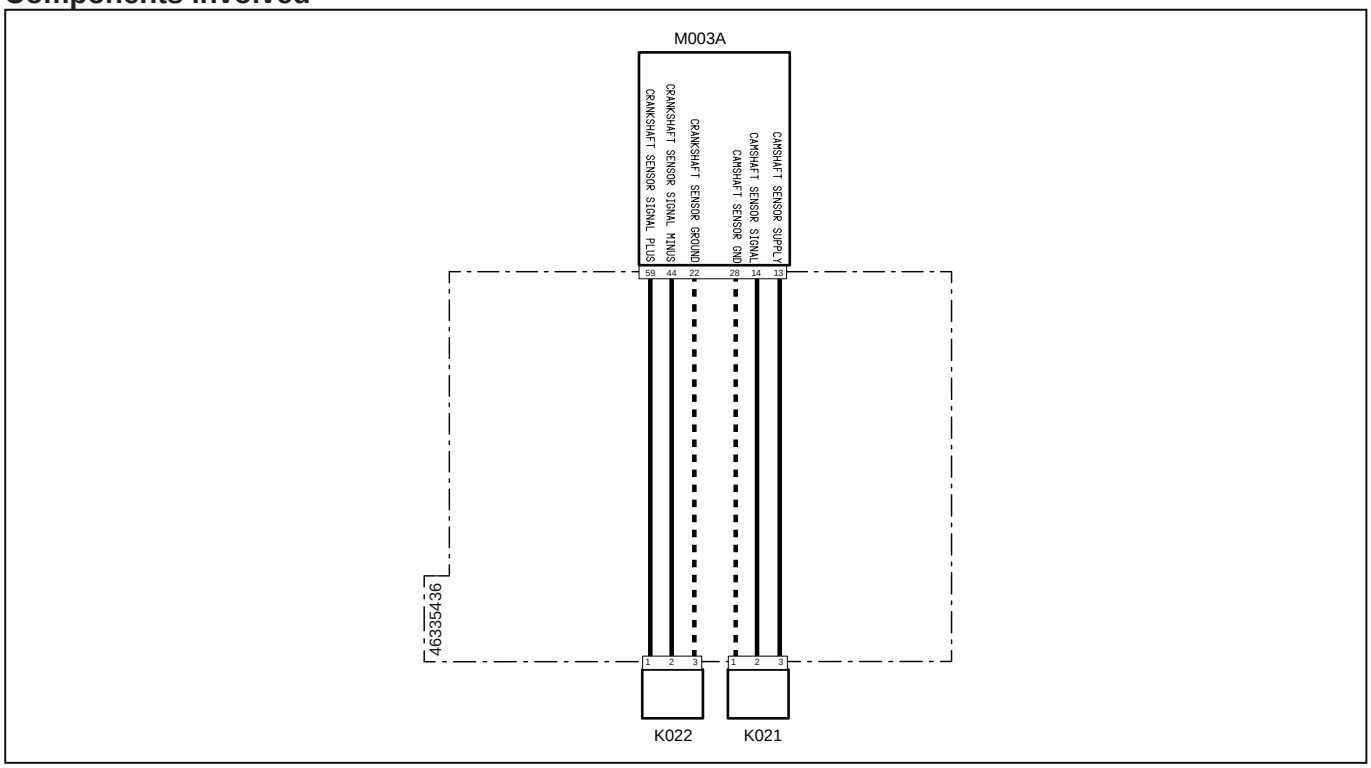
5 - Check the condition of the camshaft
- Remove the camshaft speed sensor
- Turn the camshaft and, using a light, visually check if the tooth on the camshaft is damaged
- An oscilloscope may also be used to check the camshaft for damage which may not be noted with a visual inspection
- If the camshaft is damaged, remove the engine and replace the camshaft
- Proceed to the next step if the camshaft is not damaged

6 - Check the condition of the tone wheel on the crankshaft
- Remove the crankshaft speed sensor
- Turn the crankshaft and, using a light, visually inspect the tone wheel to check if it is damaged
- An oscilloscope may also be used to check the tone wheel for damage which may not be noted with a visual inspection
- If the tone wheel is damaged, remove the engine and replace the tone wheel
- Proceed to the next step if the tone wheel is not damaged

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K021(pag.R2-474)	XS3	Camshaft timing sensor
K022(pag.R2-473)	XS2	Crankshaft speed sensor
M003A (pag.R2-434)	P12	Engine control unit

3057 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3058 - EGR temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault on the EGR temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

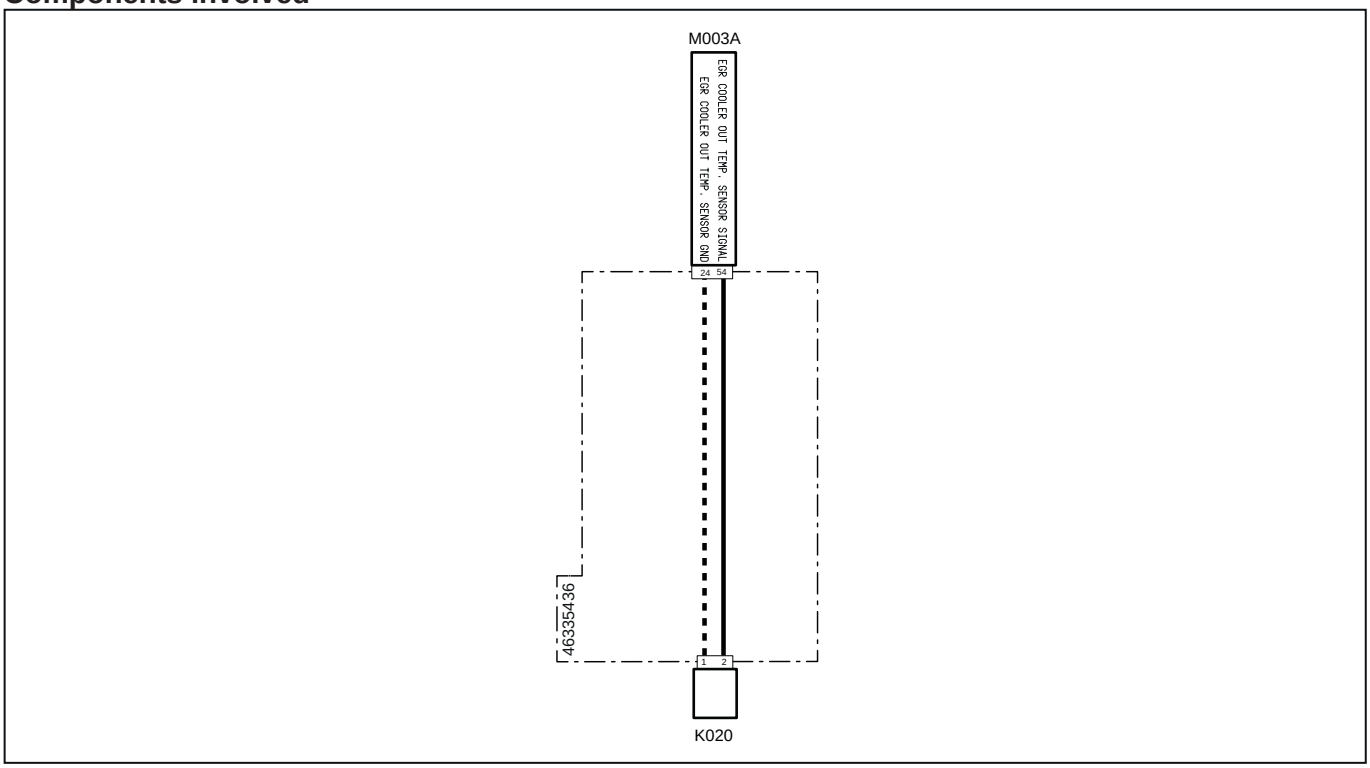
2 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the EGR temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the EGR temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K020(pag.R2-477)	XS7	EGR temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3059 - EGR temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
    - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
    - If there are no other error codes, proceed to the next step

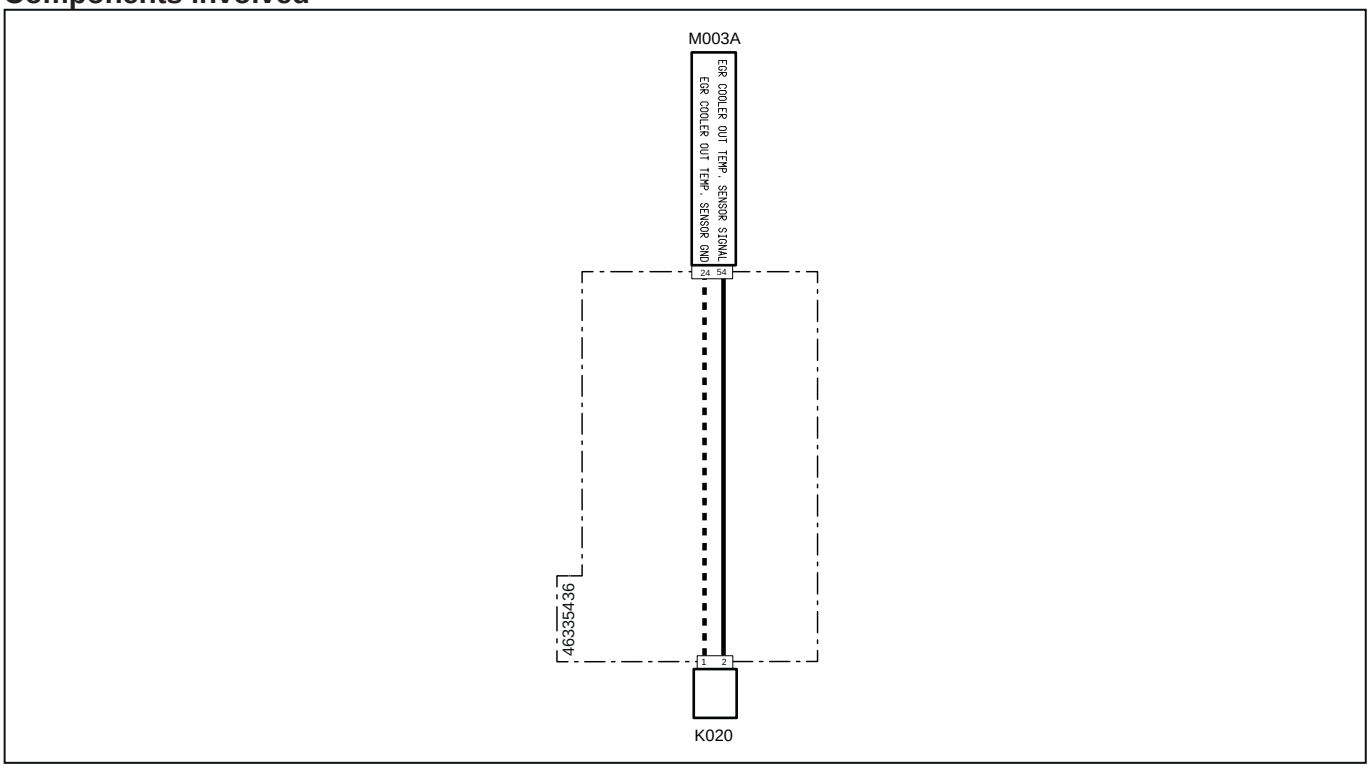
2 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
    - Disconnect any badly connected connectors and reconnect correctly
    - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the EGR temperature sensor is working correctly (see documentation of diagnostic tool)
    - Check if the EGR temperature sensor is working correctly and replace if necessary
    - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K020(pag.R2-477)	XS7	EGR temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3060 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3061 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3062 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3063 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3064 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3065 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3066 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3067 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3068 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3069 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3070 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3071 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3072 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3073 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3074 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3075 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3076 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3077 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3078 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3079 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3080 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3081 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3082 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3083 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3084 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3085 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3086 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3087 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3088 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3089 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3090 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3091 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3092 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3093 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3094 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3095 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3096 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3097 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3098 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3099 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3100 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3101 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3102 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3103 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3104 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3105 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3106 - Internal control unit error

Description of fault

Internal control unit error

Severity of error

Medium

Additional information

Amber lamp illuminated

The error may be due to an incorrect power feed voltage or to short circuits in the wiring loom or between connector pins.

This type of error may also be generated when attempting to start the tractor with very low battery charge or if the battery is disconnected (either by physically disconnecting the terminal clamps or with the battery master switch) without allowing the control unit to complete the After Run procedure

Do not replace the control unit without first identifying and resolving the problem which caused the error. If the control unit is replaced without resolving the problem, the new control unit may be damaged again within a few working hours

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the fuses and relays in the fuse box and replace any damaged fuses or relays

3 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

4 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

5 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

3107- Throttle valve stuck

Description of fault

The ECU engine control unit detects that the throttle valve is stuck permanently in the same position

Severity of error

High

Additional information

Red indicator lamp flashing

The aperture of the throttle valve affects the pressure in the intake manifold. As a result, it is also necessary to check that the temperature and pressure sensor (BOOST) and EGR valve are working correctly

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the throttle valve is working correctly
- Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- If any abnormal values are noted, visually check if the throttle valve is effectively stuck. Now clean the valve to remove all dirt and encrusted residue
  Replace the throttle valve if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself
  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

5 - Check that the connectors of the boost pressure sensor, of the throttle valve, of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

6 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

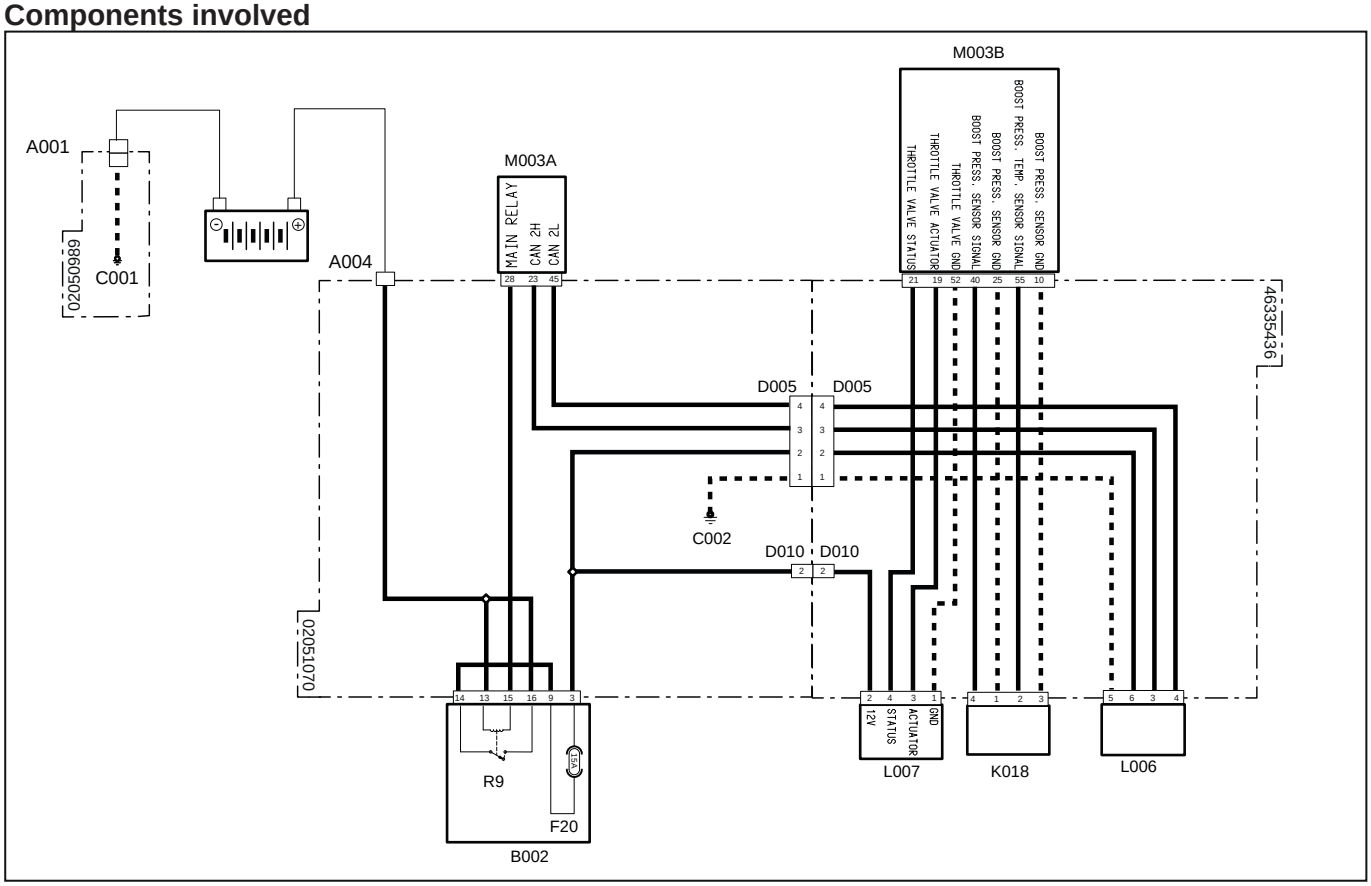
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002) (pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3108 - Throttle valve circuit: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
  - Check that the throttle valve is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

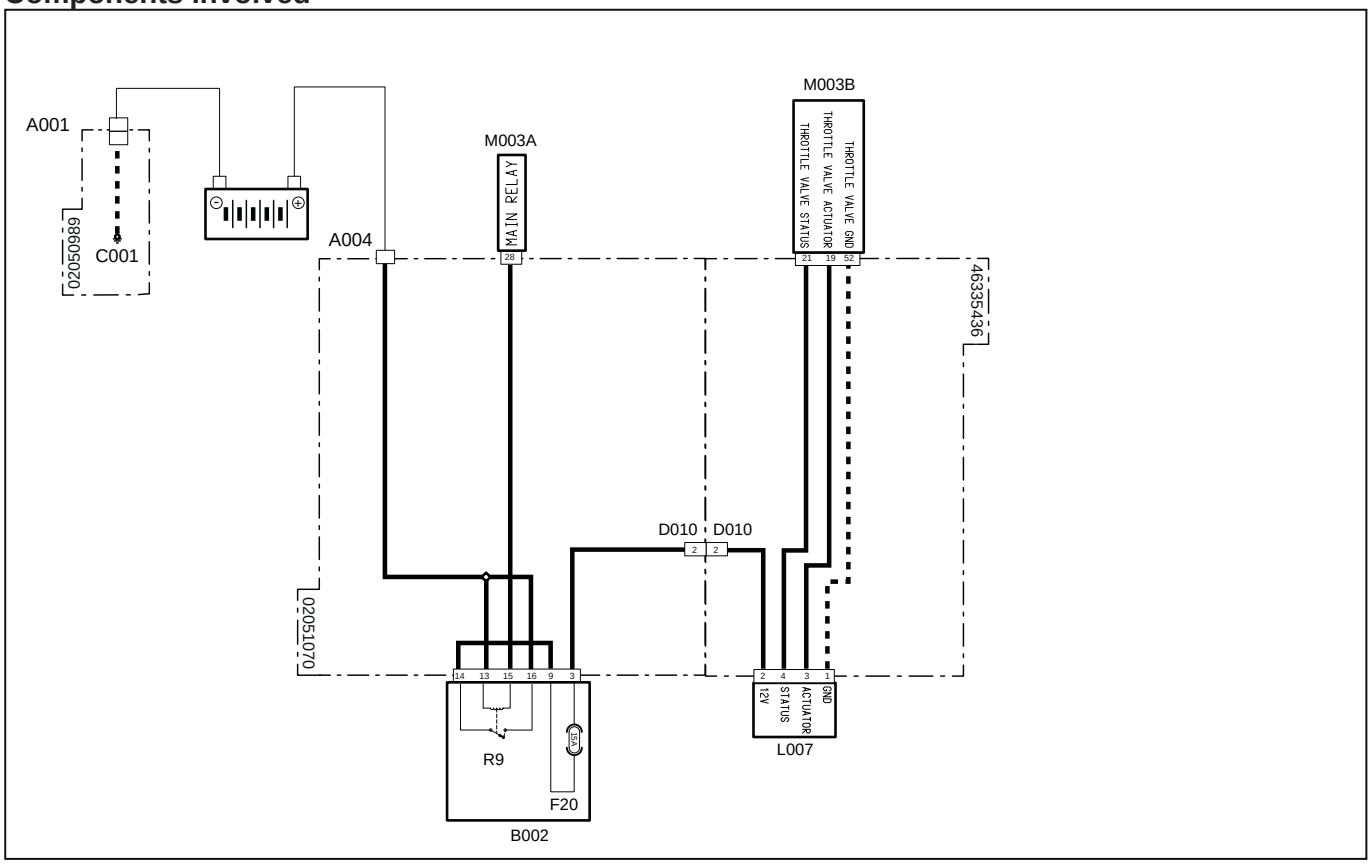
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3109 - Throttle valve, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
  - Check that the throttle valve is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

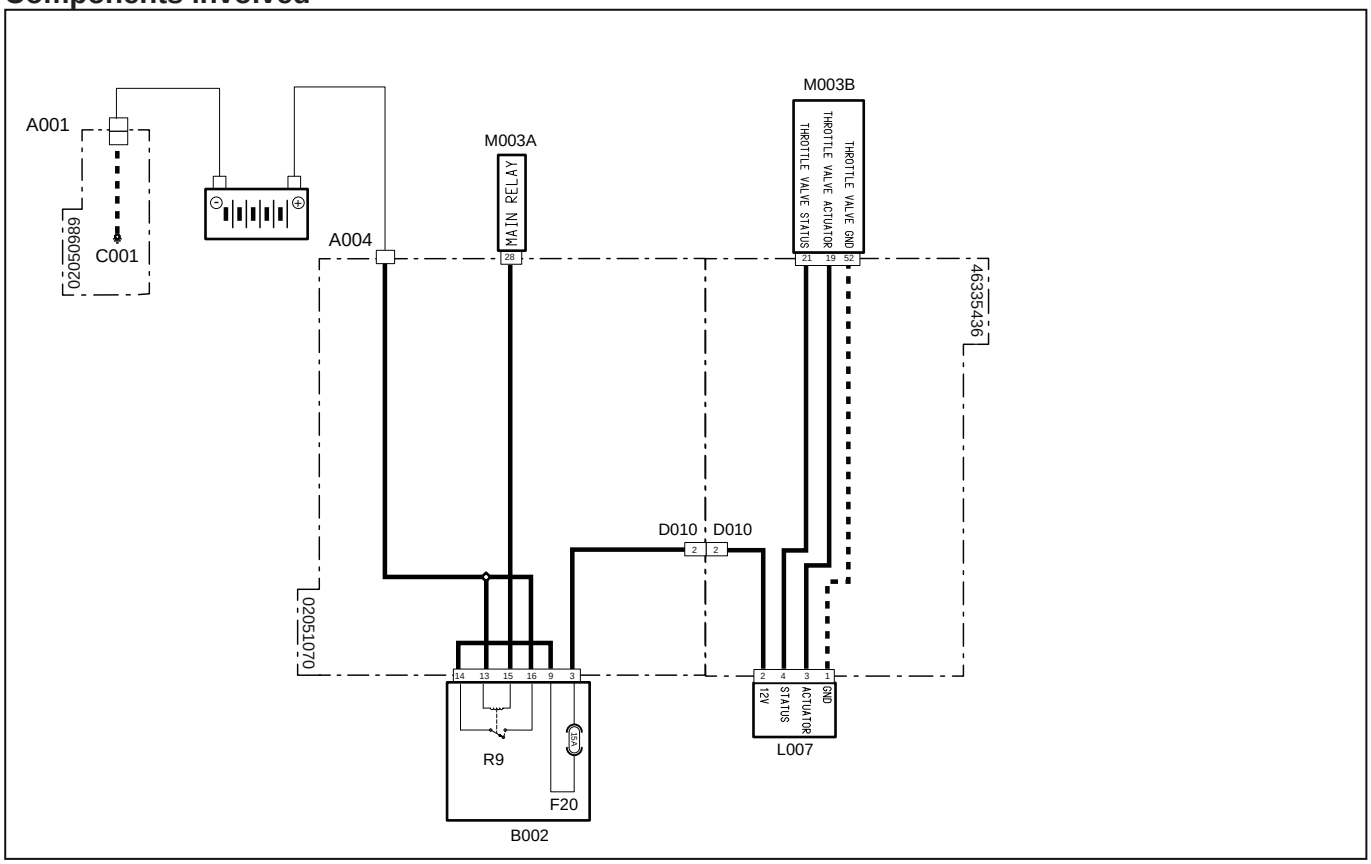
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3110 - Throttle valve, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
  - Check that the throttle valve is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

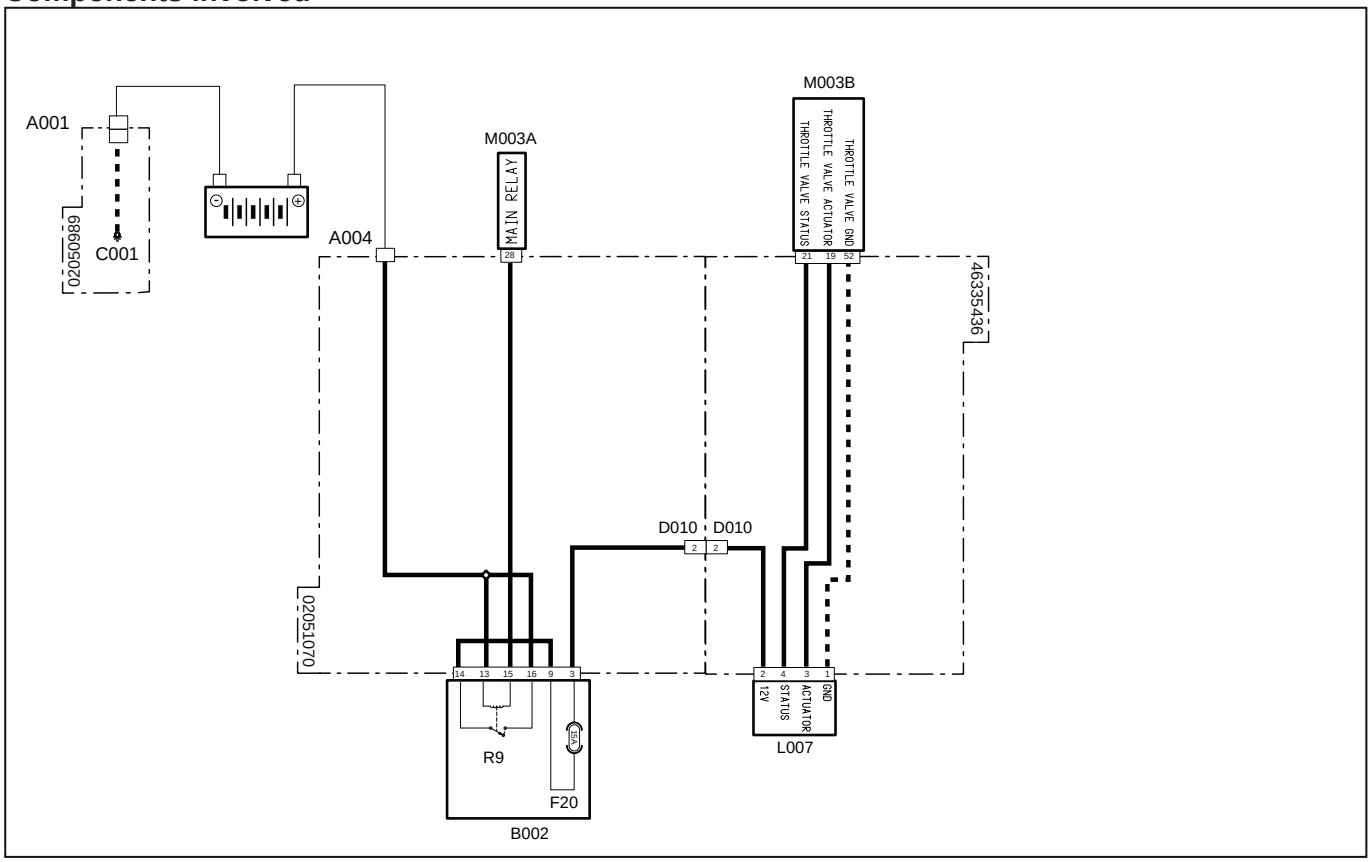
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3111 - Throttle valve, short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
  - Check that the throttle valve is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

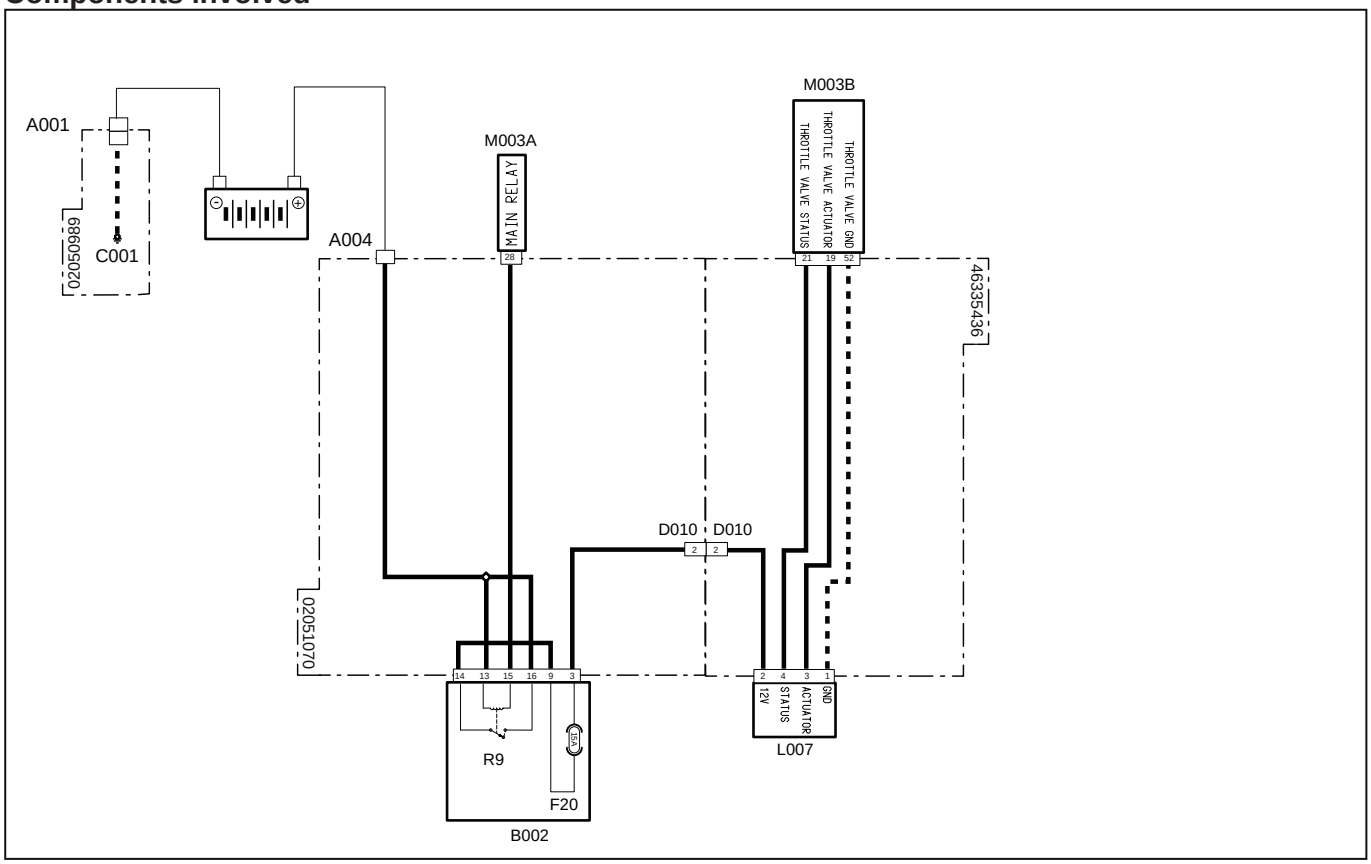
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3112 - Throttle valve: open circuit

Description of fault

The ECU engine control unit detects a short circuit in the circuit of the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
  - Check that the throttle valve is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

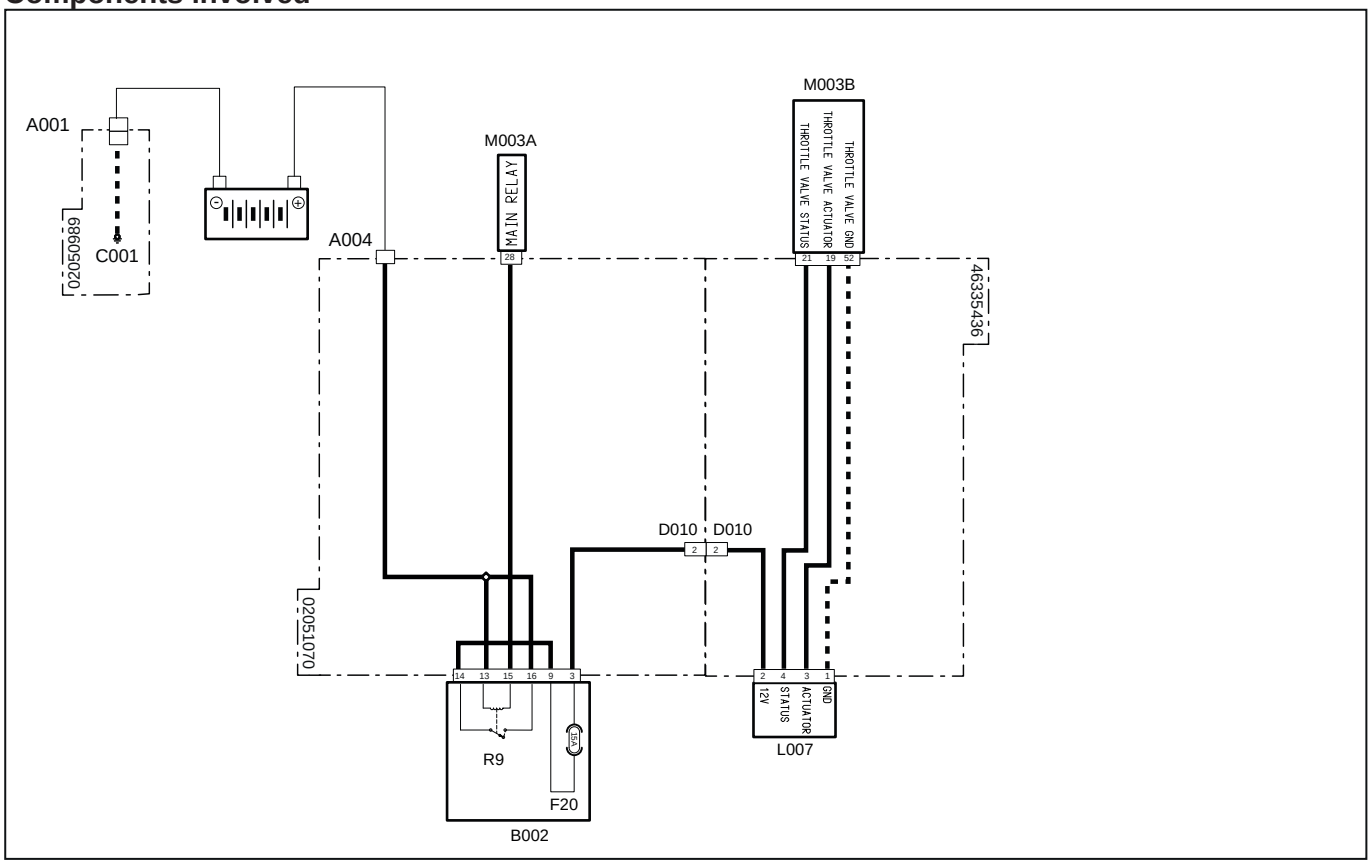
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3113 - Throttle valve current too high

Description of fault

The ECU engine control unit detects an excessively high current across the throttle valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

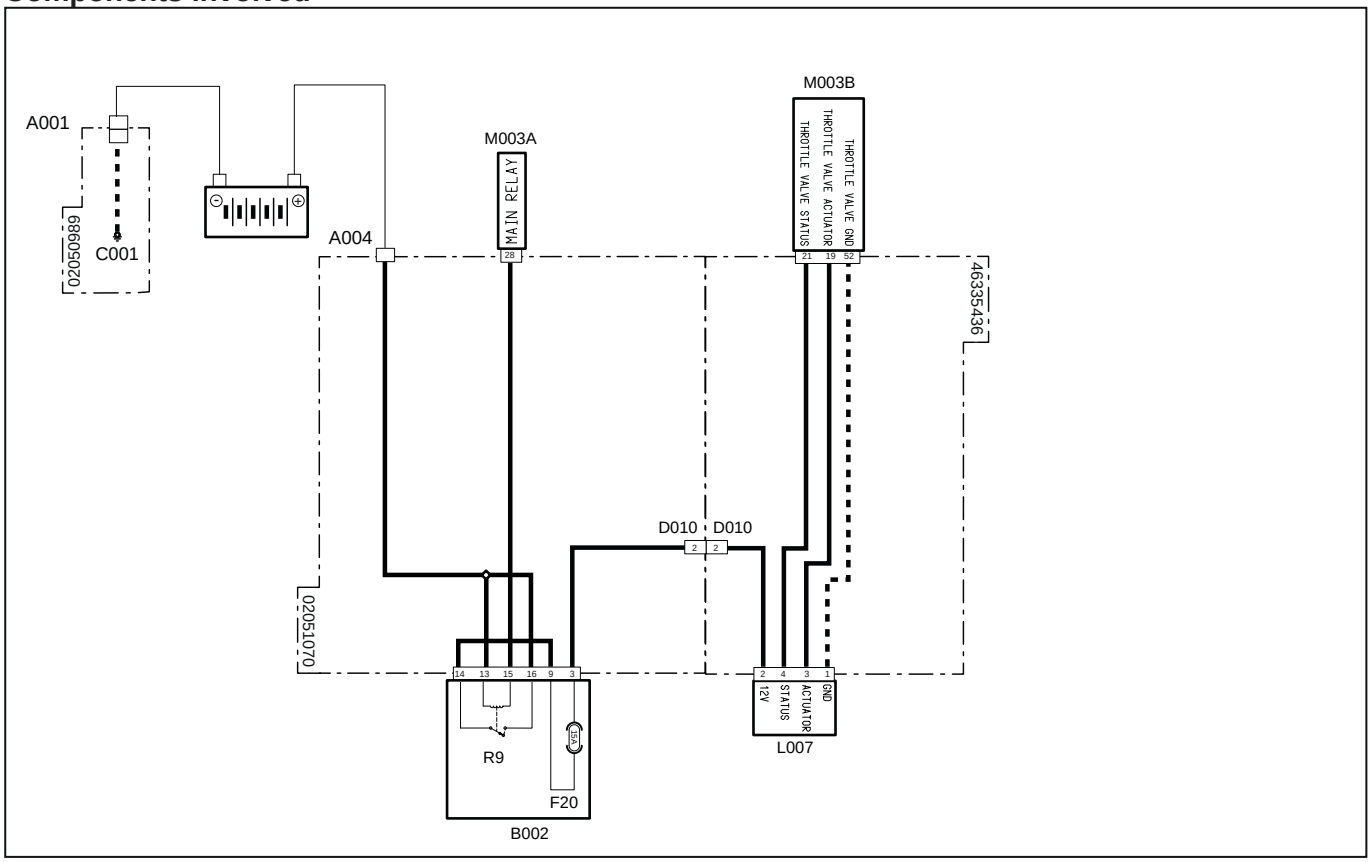
3 - Check that the connectors of the throttle valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3114 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the engine control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M003B (pag.R2-468)	XECUA	Engine control unit

3115 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the engine control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the engine control unit

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M003B (pag.R2-468)	XECUA	Engine control unit

3116 - Low boost pressure

Description of fault

The pressure value received by the ECU engine control unit from the temperature and pressure sensor (BOOST) is too low

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque, regeneration is disabled and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

5 - Check that the connectors of the boost pressure sensor, of the throttle valve, of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

6 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;

  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

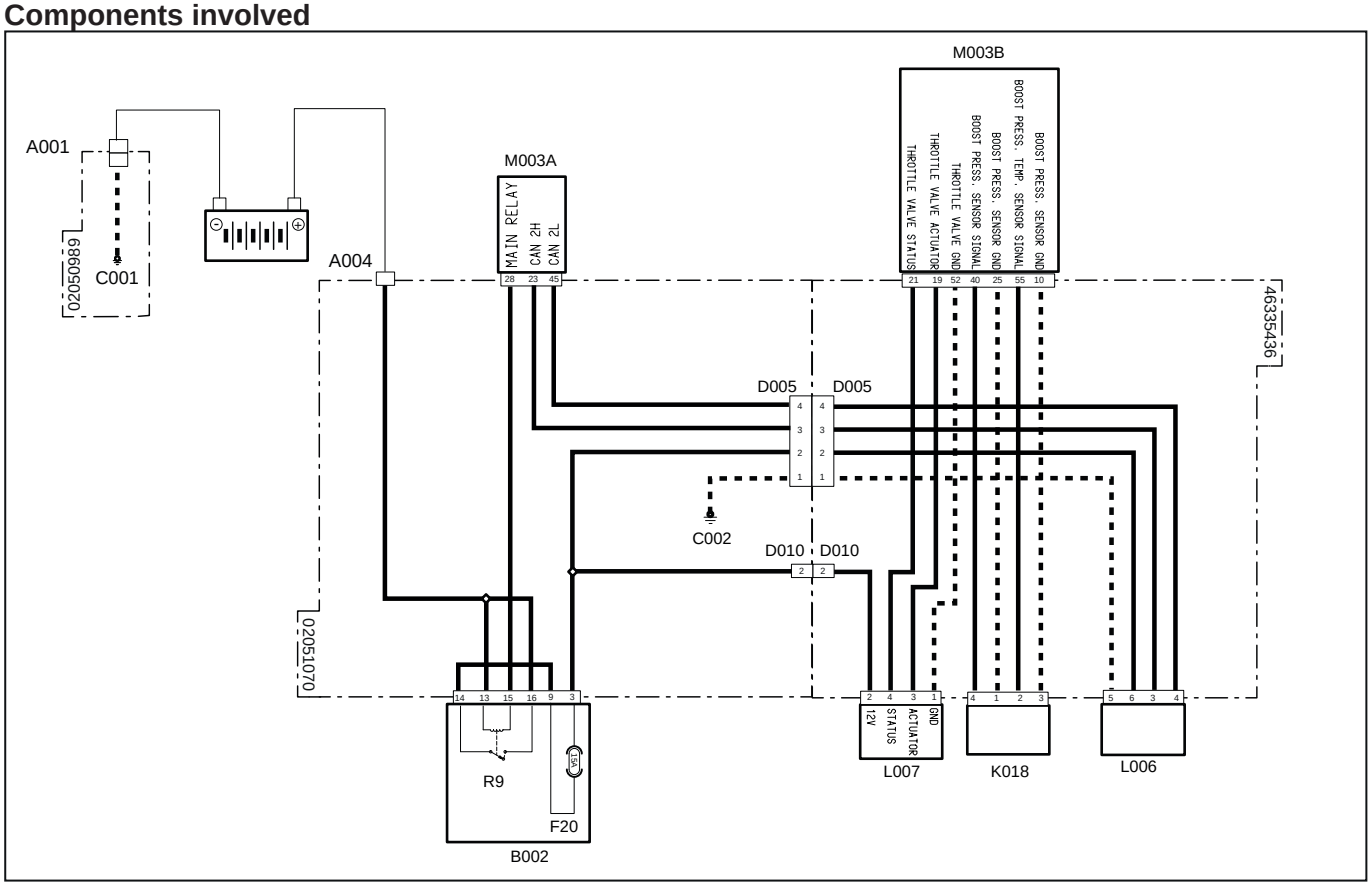
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3117 - High boost pressure

Description of fault

The pressure value received by the ECU engine control unit from the temperature and pressure sensor (BOOST) is very high

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed. The engine operates with limited torque, regeneration is disabled and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor the throttle valve (see documentation of diagnostic tool)
- Check that the throttle valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to monitor the boost pressure sensor (see the documentation of the diagnostic tool)
- Monitor the pressure in the intake manifold to check that the boost pressure sensor is working correctly
- If the problem persists, proceed to the next step

4 - Check that the connectors of the boost pressure sensor, of the throttle valve, of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Manually check that the wastegate situated on the turbocharger is working correctly
- The wastegate valve opens to release boost pressure produced by the turbocharger and reduce the pressure in the intake manifold. The pressure increases significantly if the valve remains closed
- There are two methods for checking that the valve is working correctly:
  1- applying leverage on the valve actuator link rod with a suitable tool, taking care not to damage the rod;
  2- increasing engine speed, with the engine running and with the tractor stationary, until the valve opens;
  Follow the safety instructions and rules given in the use and maintenance manual and in the workshop manual precisely
- If the problem persists, proceed to the next step

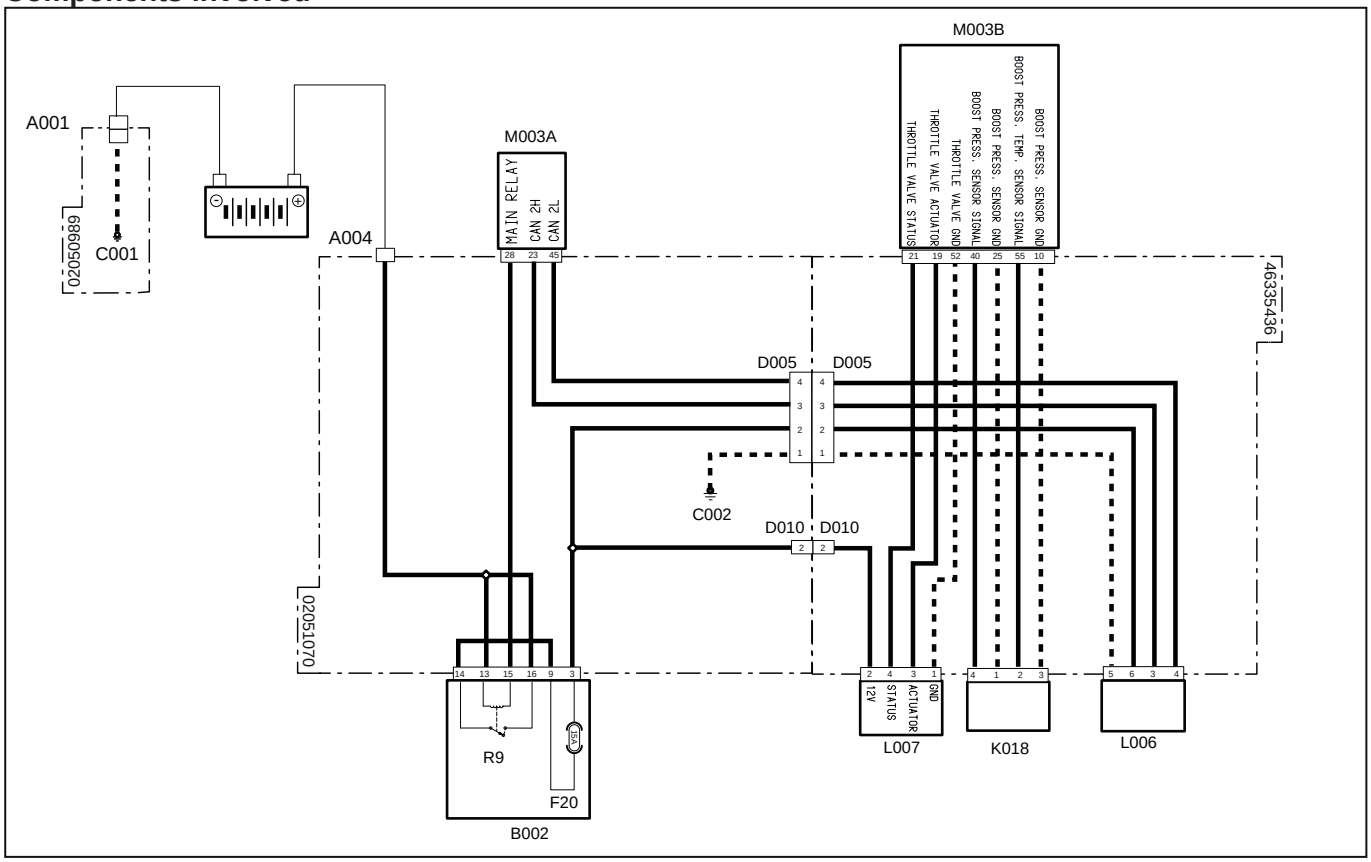
6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Check that the intake ducts are not fouled or obstructed
- Remove the intake ducts from the engine and check that they are not obstructed. Obstructions in the ducts will cause a significant increase in intake pressure.
- If the problem persists, proceed to the next step

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K018 (pag.R2-475)	XS4	Temperature and pressure sensor (BOOST)
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3118 - Injector 1 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

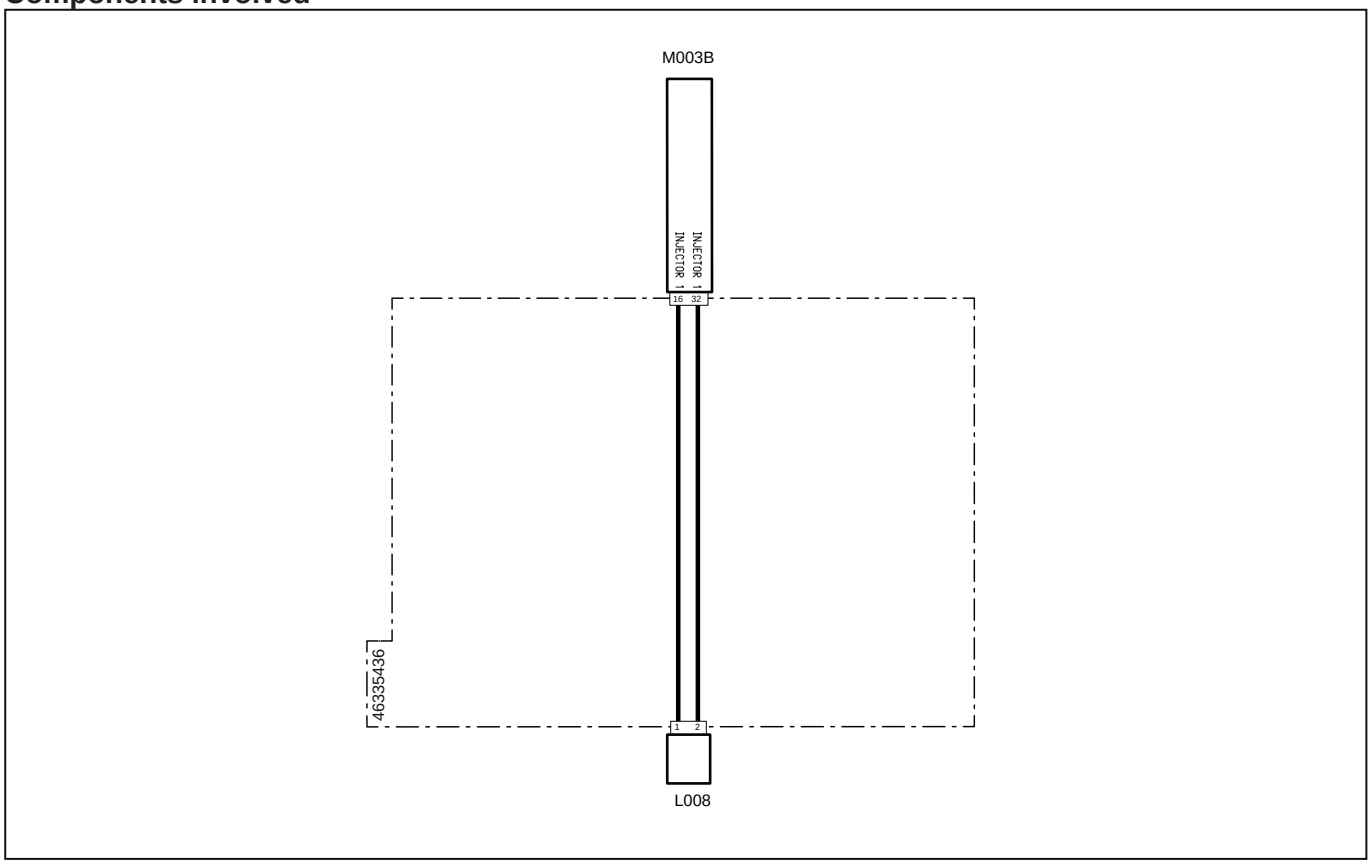
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R2-470)	XI1	Fuel electro-injector 1
M003B (pag.R2-468)	XECUA	Engine control unit

3119 - Injector 1 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

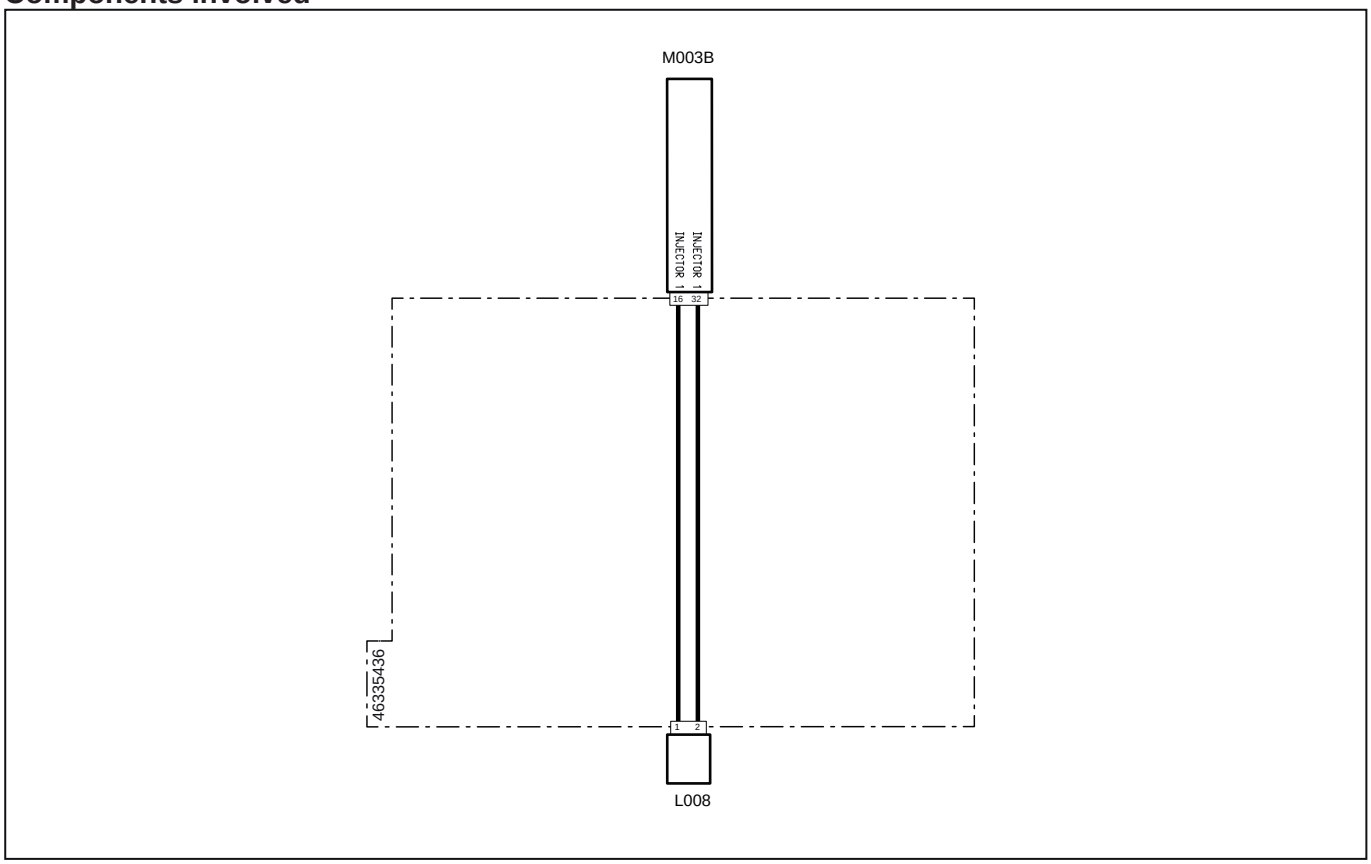
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R2-470)	XI1	Fuel electro-injector 1
M003B (pag.R2-468)	XECUA	Engine control unit

3120 - Injector 1 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the first injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

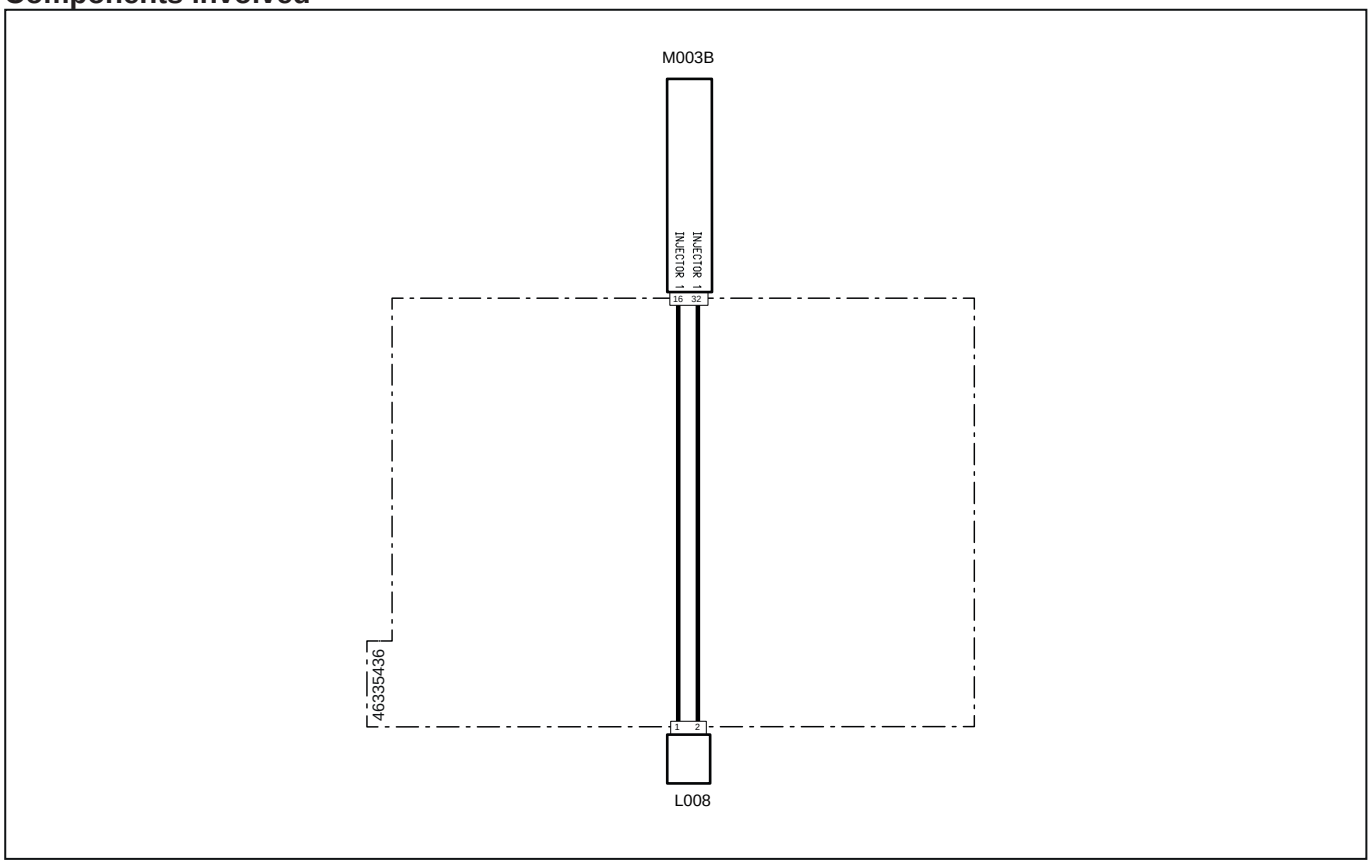
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R2-470)	XI1	Fuel electro-injector 1
M003B (pag.R2-468)	XECUA	Engine control unit

3121 - Injector 1 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 1 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

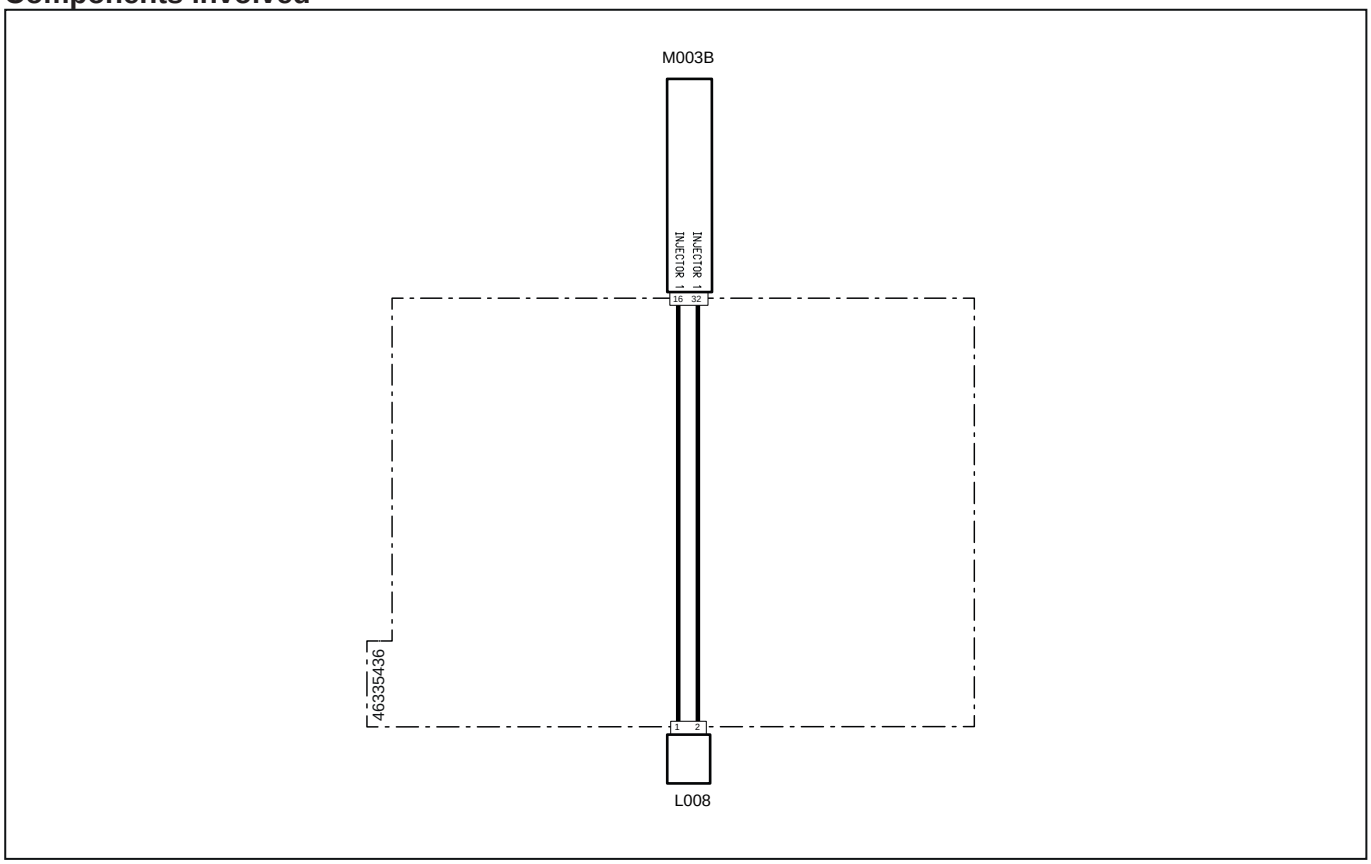
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R2-470)	XI1	Fuel electro-injector 1
M003B (pag.R2-468)	XECUA	Engine control unit

3122 - Injector 2 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

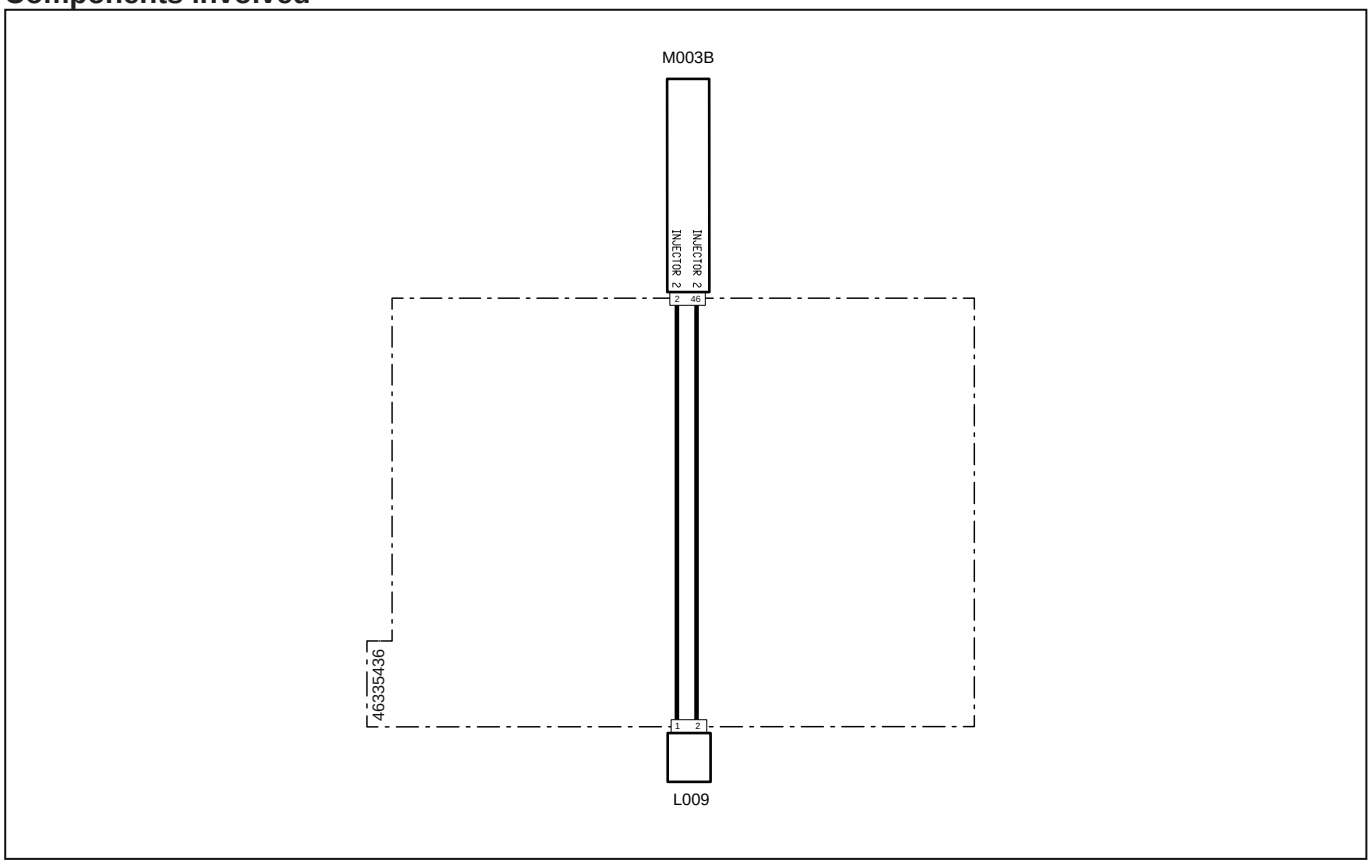
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R2-471)	XI2	Fuel electro-injector 2
M003B (pag.R2-468)	XECUA	Engine control unit

3123 - Injector 2 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

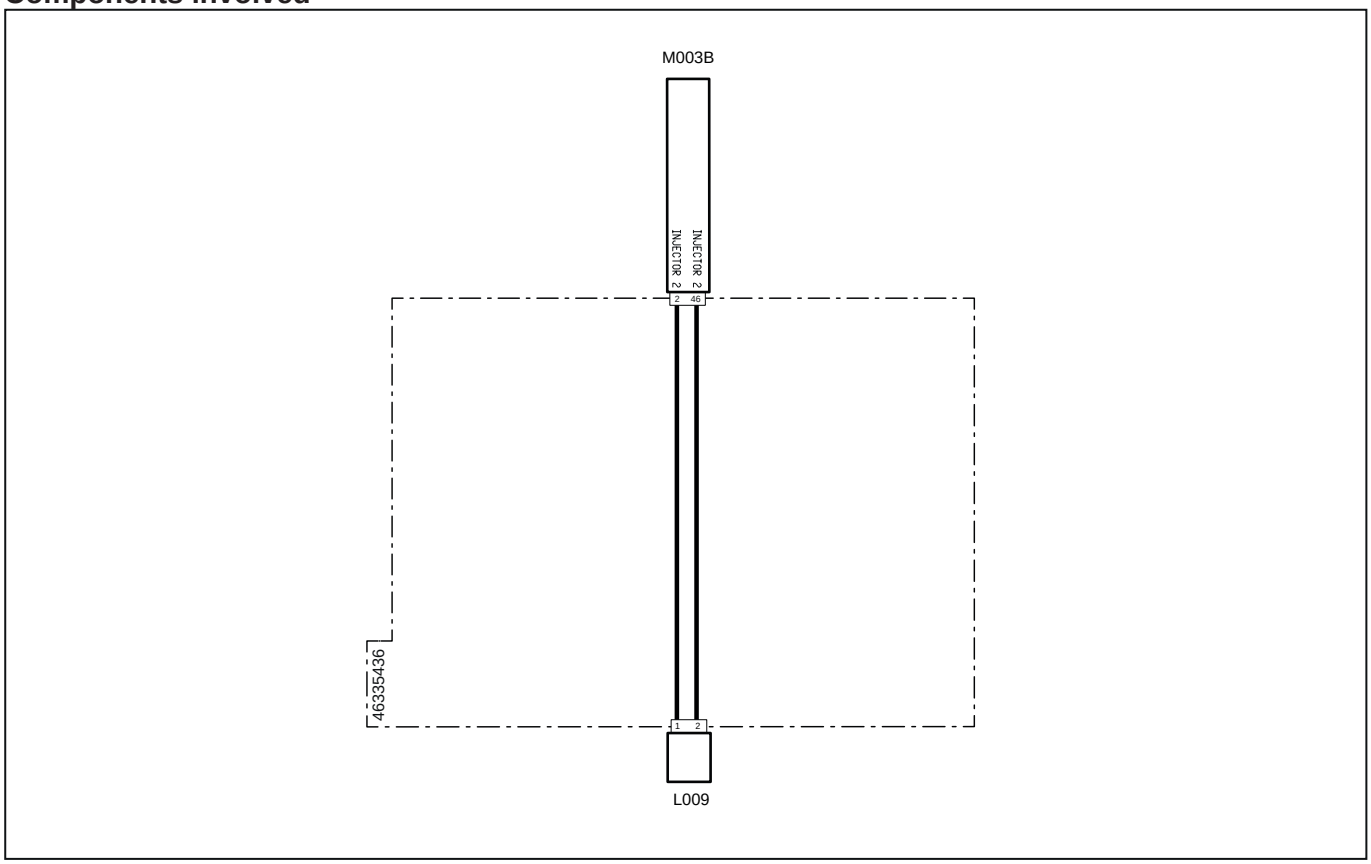
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R2-471)	XI2	Fuel electro-injector 2
M003B (pag.R2-468)	XECUA	Engine control unit

3124 - Injector 2 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the second injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

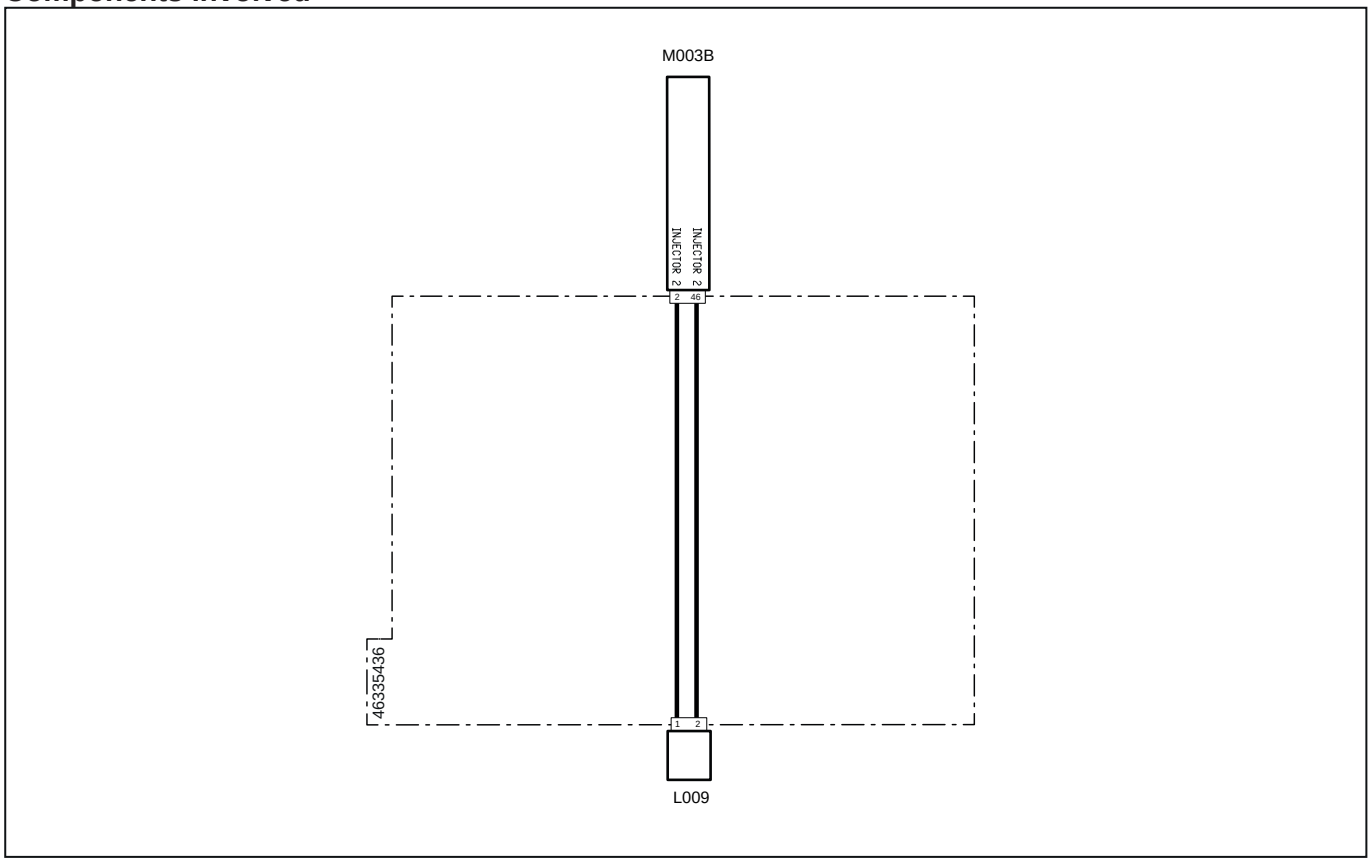
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R2-471)	XI2	Fuel electro-injector 2
M003B (pag.R2-468)	XECUA	Engine control unit

3125 - Injector 2 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 2 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

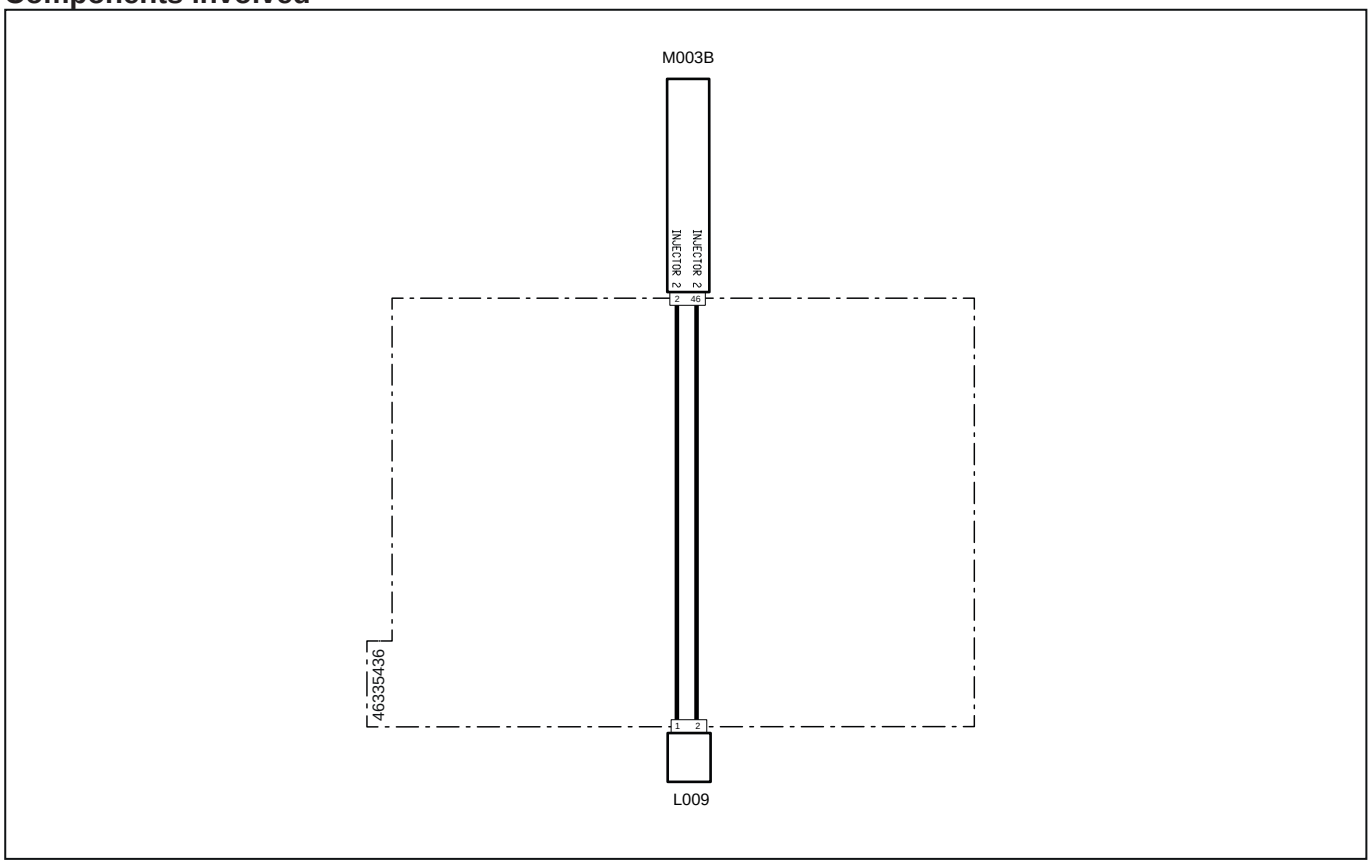
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R2-471)	XI2	Fuel electro-injector 2
M003B (pag.R2-468)	XECUA	Engine control unit

3126 - Injector 3 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

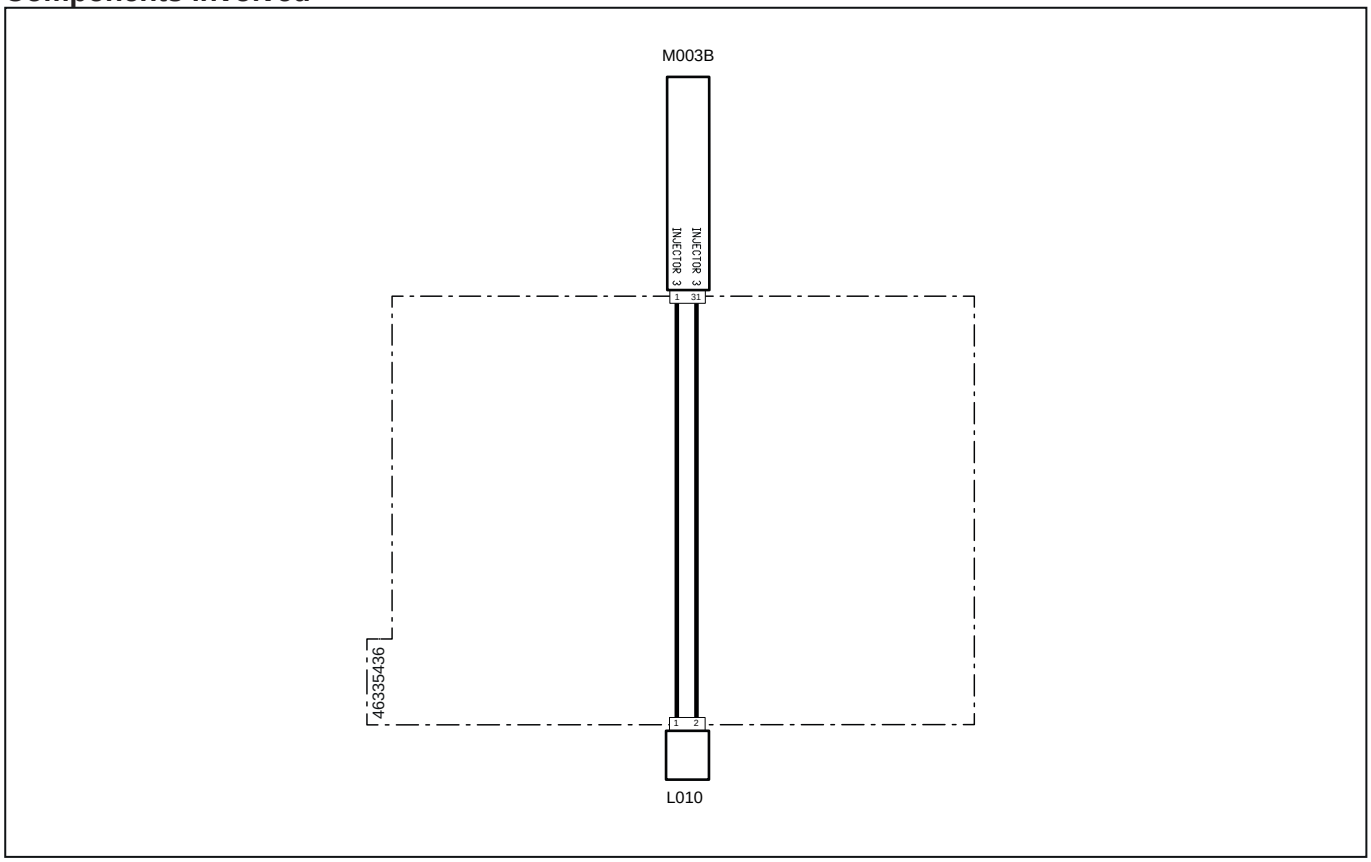
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R2-471)	XI3	Fuel electro-injector 3
M003B (pag.R2-468)	XECUA	Engine control unit

3127 - Injector 3 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

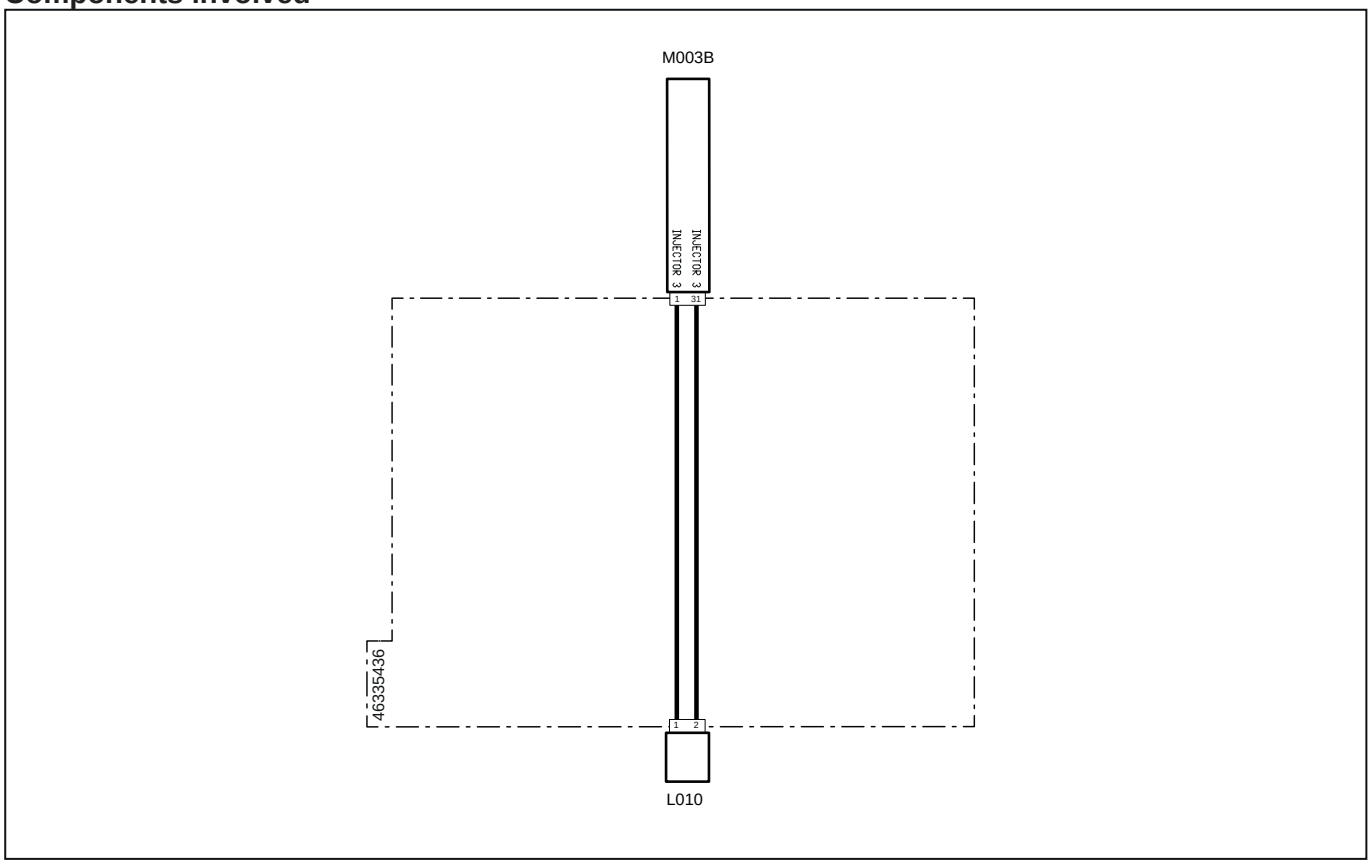
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R2-471)	XI3	Fuel electro-injector 3
M003B (pag.R2-468)	XECUA	Engine control unit

3128 - Injector 3 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the third injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

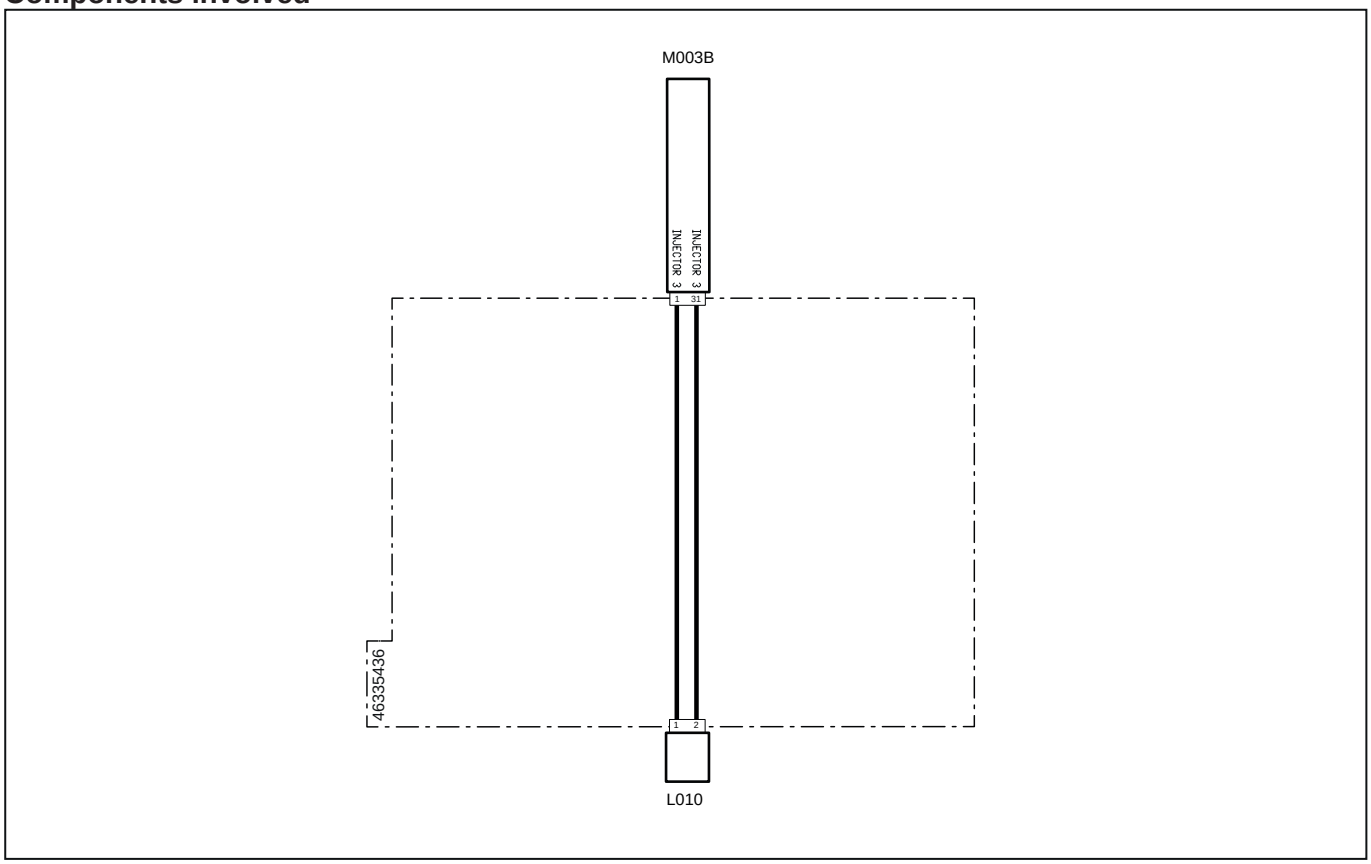
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R2-471)	XI3	Fuel electro-injector 3
M003B (pag.R2-468)	XECUA	Engine control unit

3129 - Injector 3 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 3 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

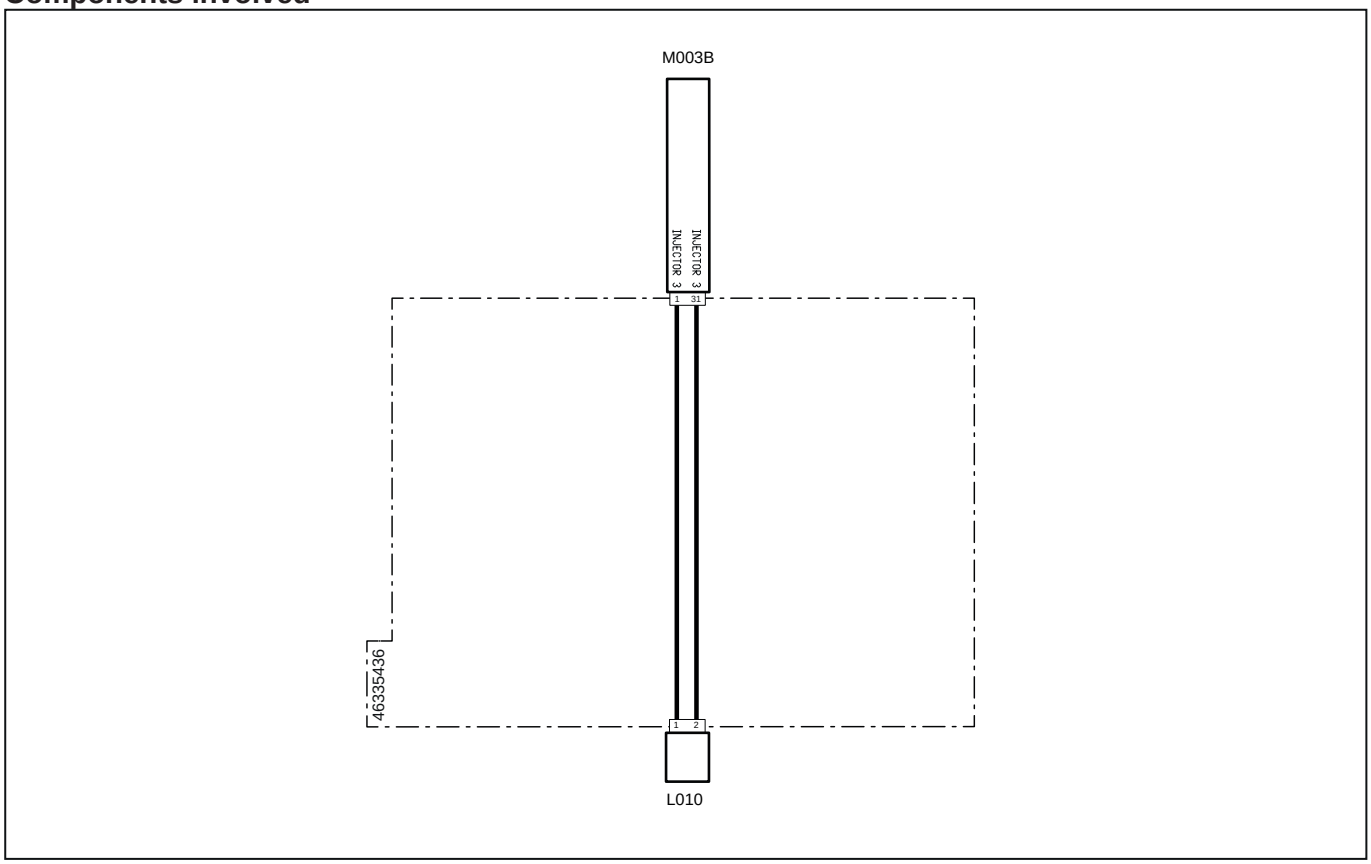
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L010(pag.R2-471)	XI3	Fuel electro-injector 3
M003B (pag.R2-468)	XECUA	Engine control unit

3130 - Injector 4 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the fourth injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

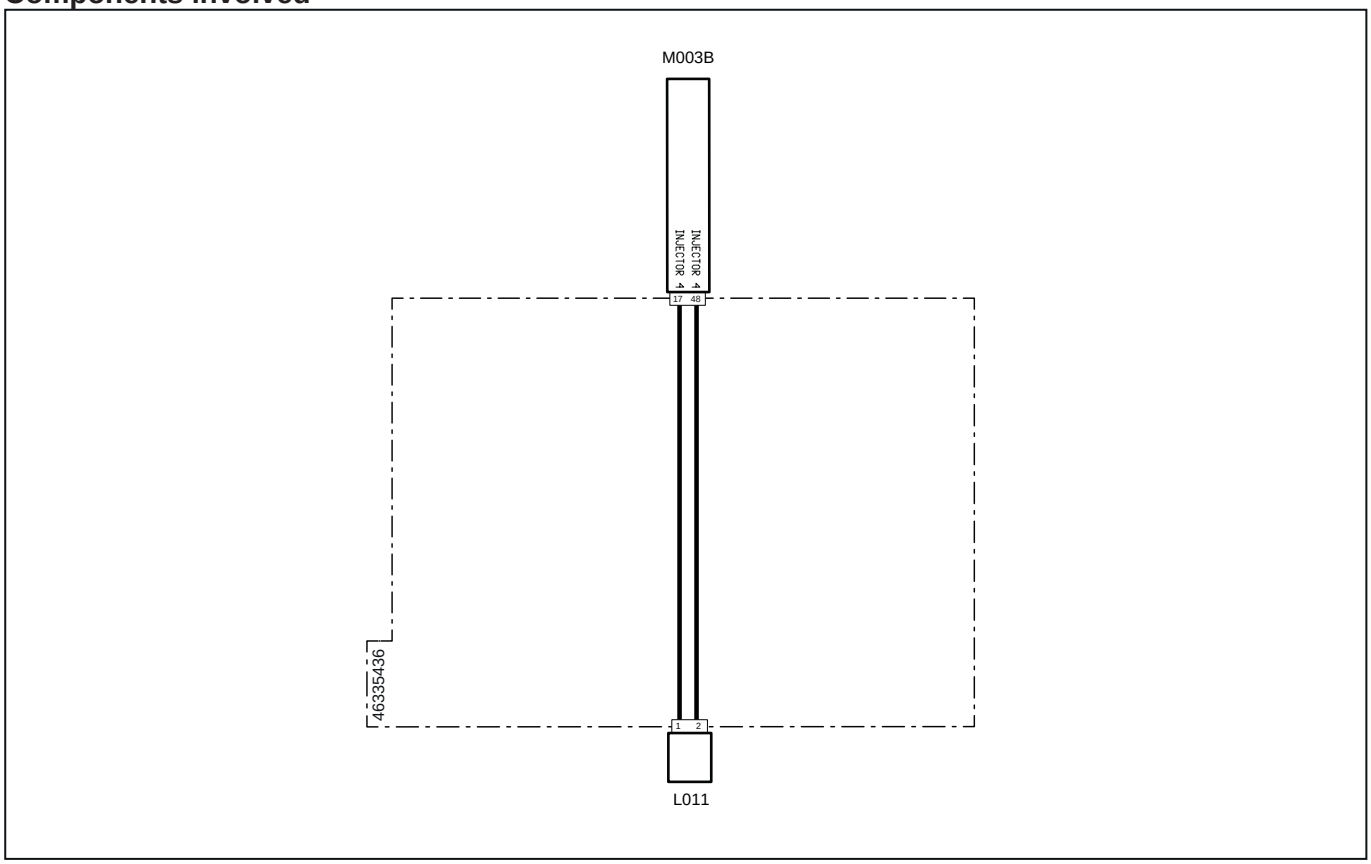
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L011(pag.R2-472)	XI4	Fuel electro-injector 4
M003B (pag.R2-468)	XECUA	Engine control unit

3131 - Injector 4 (from timing side): short circuit

Description of fault

The ECU engine control unit detects a short circuit on the fourth injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

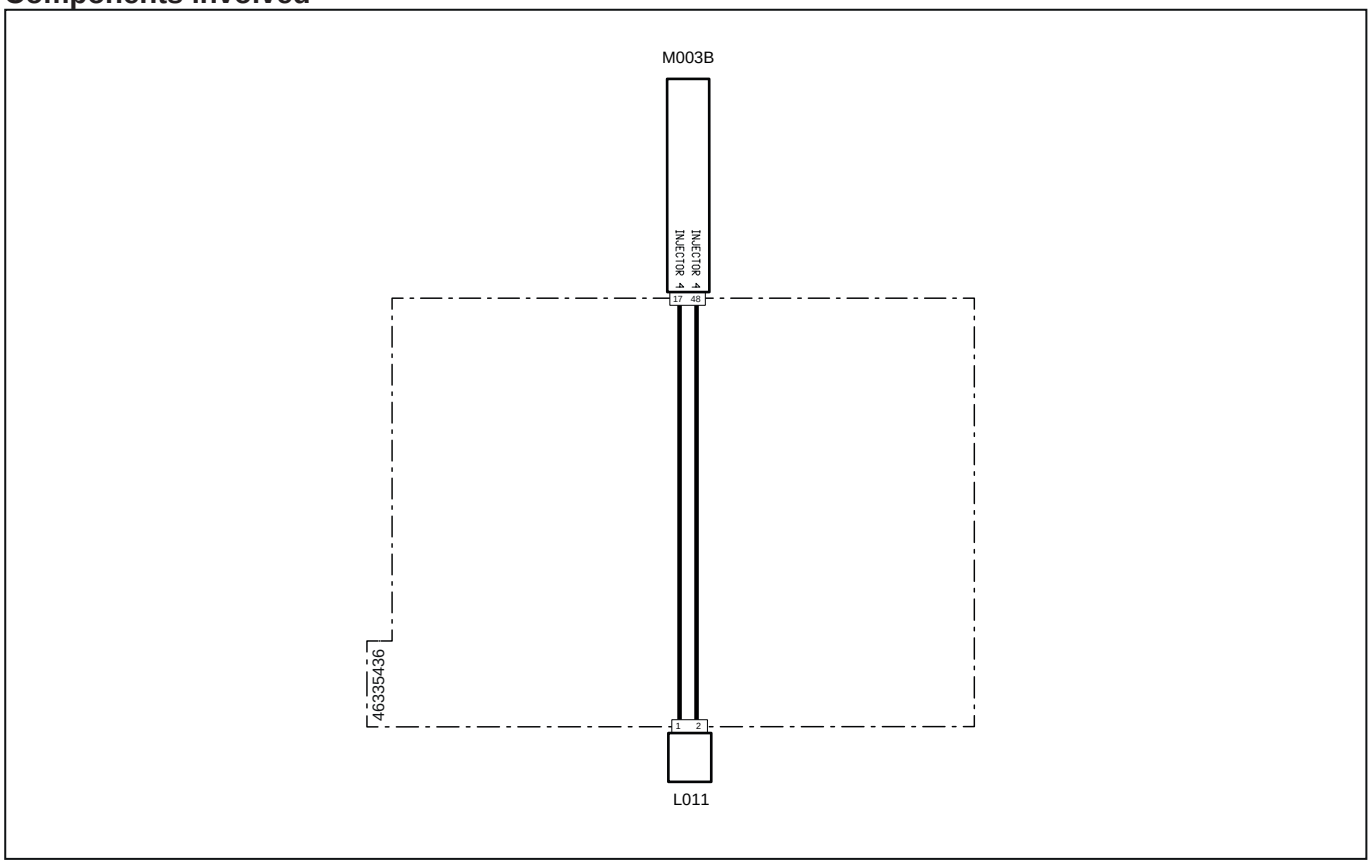
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L011(pag.R2-472)	XI4	Fuel electro-injector 4
M003B (pag.R2-468)	XECUA	Engine control unit

3132 - Injector 4 (from timing side): open circuit

Description of fault

The ECU engine control unit detects an open circuit fault on the fourth injector (from timing side)

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

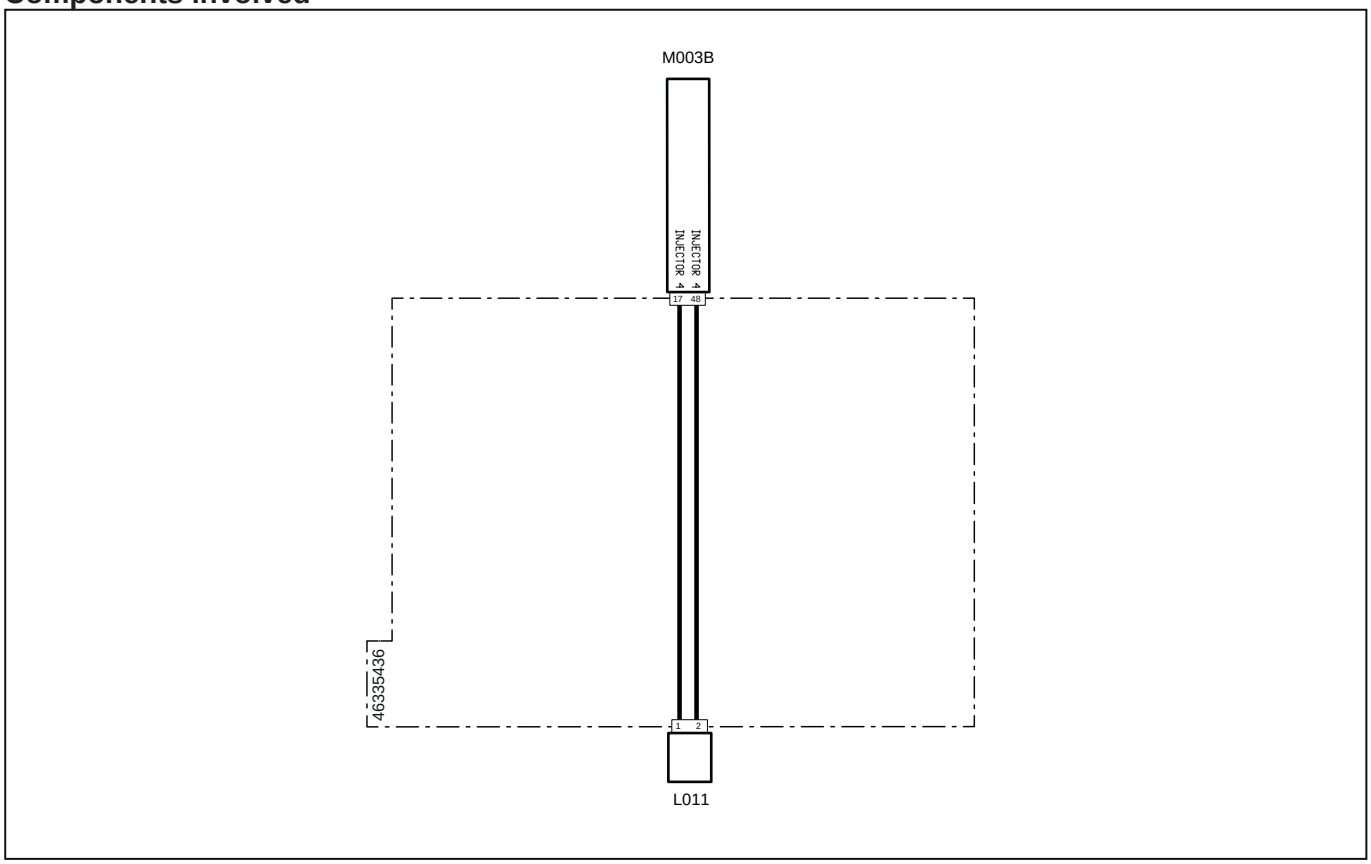
2 - Check that the connectors of the injector and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L011(pag.R2-472)	XI4	Fuel electro-injector 4
M003B (pag.R2-468)	XECUA	Engine control unit

3129 - Injector 4 (from timing side): IMA code not written

Description of fault

The ECU engine control unit detects that the IMA for injector 4 (from timing side) has not been written in the memory

Severity of error

Medium

Additional information

Amber lamp illuminated

The unique IMA code of each injector identifies the manufacturing tolerance values of the injector itself. The control unit uses this code together with other parameters to ensure accurate injection management. The IMA code is indicated on the head of the injector

This information must be saved manually in the control unit memory, entering the new IMA code with the diagnostic tool (see the documentation of the diagnostic tool) each time an injector is replaced

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool)

Behaviour of system

The engine may be started as normal

Checks necessary

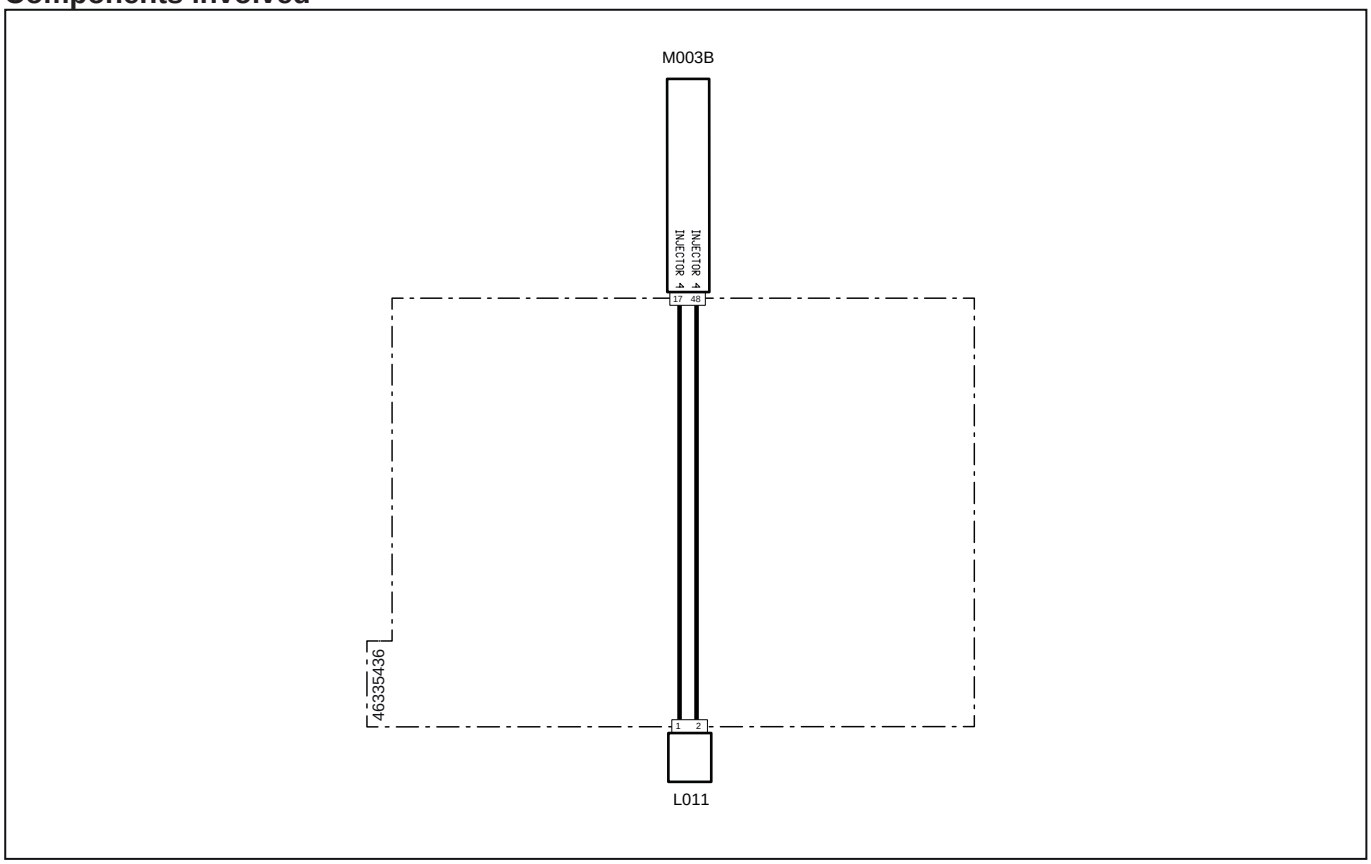
1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check if the IMA code has not been saved in the control unit memory

3 - Write the IMA code of the injector in the control unit memory
- Note the IMA code indicated on the head of the injector on a sheet of paper
- Use the diagnostic tool to write the IMA code in the control unit memory (see the documentation of the diagnostic tool)

4 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L011(pag.R2-472)	XI4	Fuel electro-injector 4
M003B (pag.R2-468)	XECUA	Engine control unit

3134 - Injector 1 and 4 solenoids: short circuit

Description of fault

The control unit detects a short circuit fault simultaneously on the solenoids of injector 1 and injector 4

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool) The new IMA must always be written in the engine control unit memory whenever an injector is replaced

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

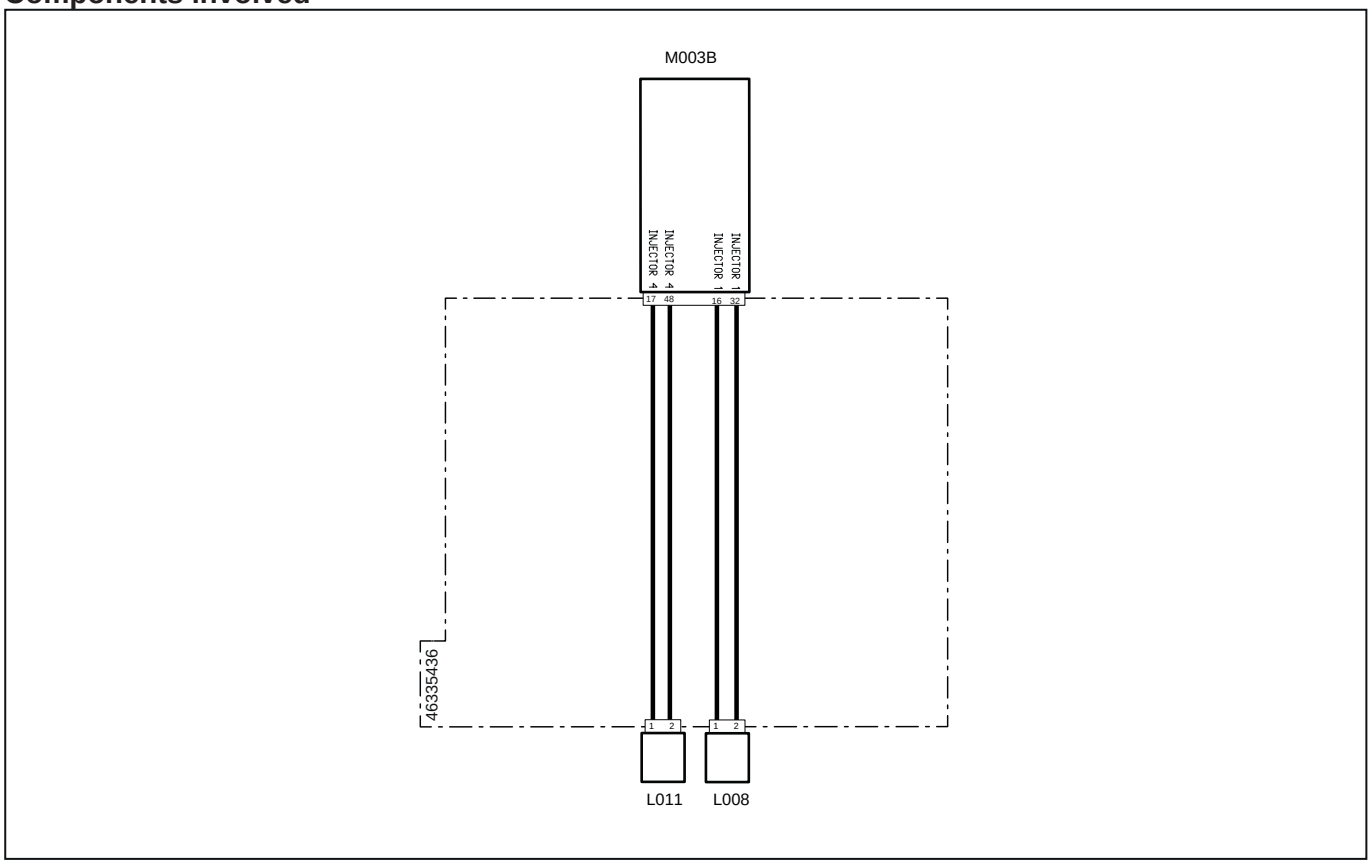
2 - Check that the connectors of injector 1, injector 4 and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L008(pag.R2-470)	XI1	Fuel electro-injector 1
L011(pag.R2-472)	XI4	Fuel electro-injector 4
M003B (pag.R2-468)	XECUA	Engine control unit

3135 - Injector 2 and 3 solenoids: short circuit

Description of fault

The control unit detects a short circuit fault simultaneously on the solenoids of injector 2 and injector 3

Severity of error

Medium

Additional information

Amber lamp illuminated

Do not swap injectors to test them. Mark the position of the injector with a marker pen before removing

Individual injectors may be disabled from the diagnostic tool to test them (see the documentation of the diagnostic tool) The new IMA must always be written in the engine control unit memory whenever an injector is replaced

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

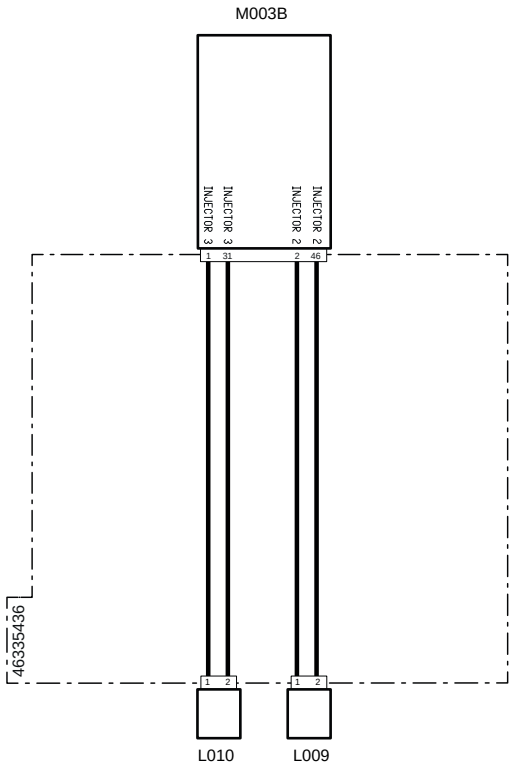
2 - Check that the connectors of injector 2, injector 3 and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L009(pag.R2-471)	XI2	Fuel electro-injector 2
L010(pag.R2-471)	XI3	Fuel electro-injector 3
M003B (pag.R2-468)	XECUA	Engine control unit

3136 - Starter motor powered for more than 25 seconds

Description of fault

The ECU engine control unit detects that the start relay has been powering the starter motor for more than 25 seconds

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- Check that the pressure measured by the rail pressure sensor is congruent with the percent aperture of the valve
- If the problem persists, proceed to the next step

4 - Check that the connectors of the rail pressure sensor, of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check the fuel delivery circuit for leaks and/or obstructions
- Check that there are no obstructions in the fuel suction pipe (low pressure side) leading from the fuel tank
- Check that the fuel filter is not clogged and replace if necessary
- Check that there are no leaks from the high pressure side pipes connected to the rail and injectors

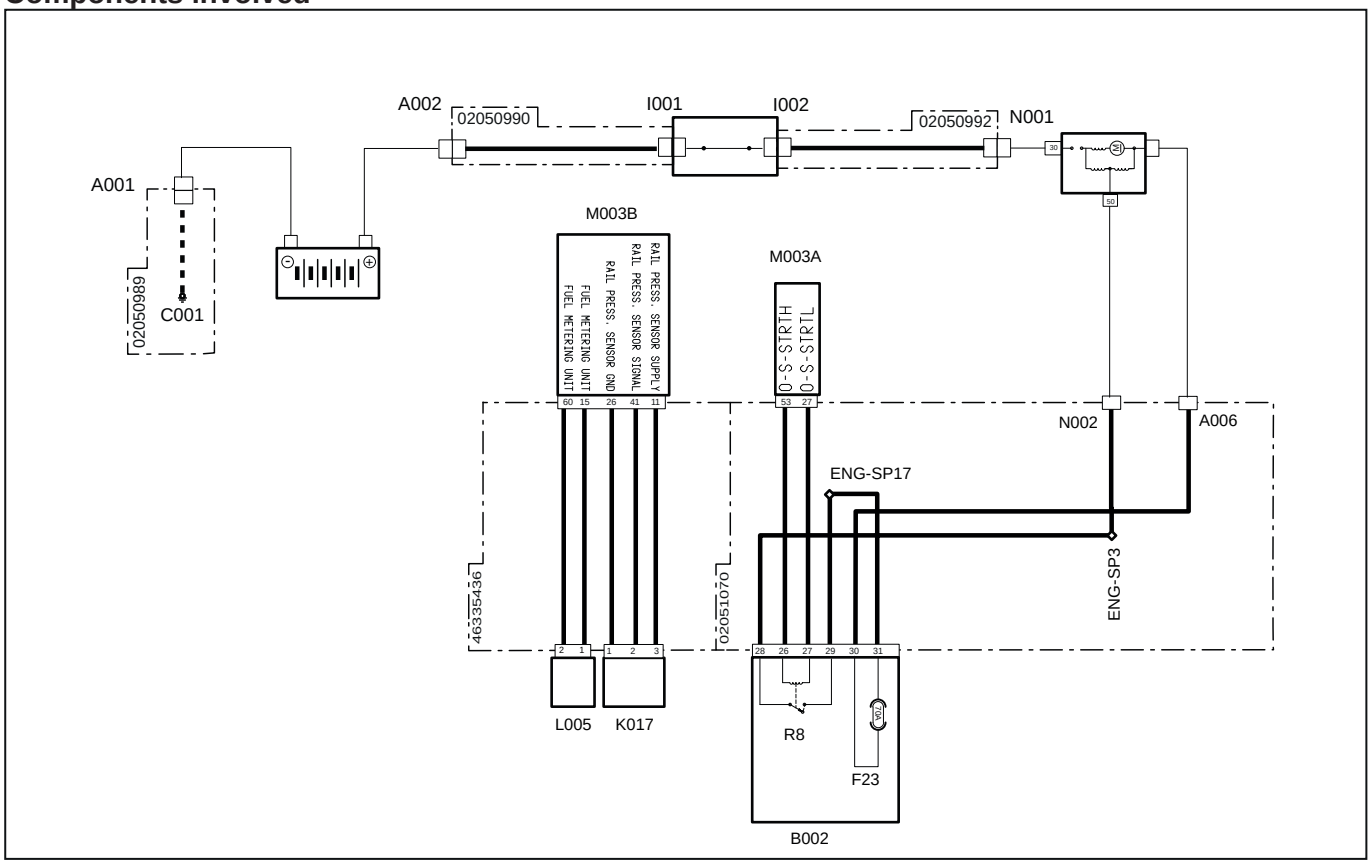
The high pressure circuit can cause severe injury. Work with extreme caution and observe all the safety rules and instructions given in the workshop manual of the vehicle

6 - Check the state of starter motor circuit "50"
- Check the condition of lug terminal N002 connected to the starter motor
- Check that the starter motor works correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005 (pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3137 - Start relay overcurrent

Description of fault

The ECU engine control unit detects a overcurrent fault in the start relay circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

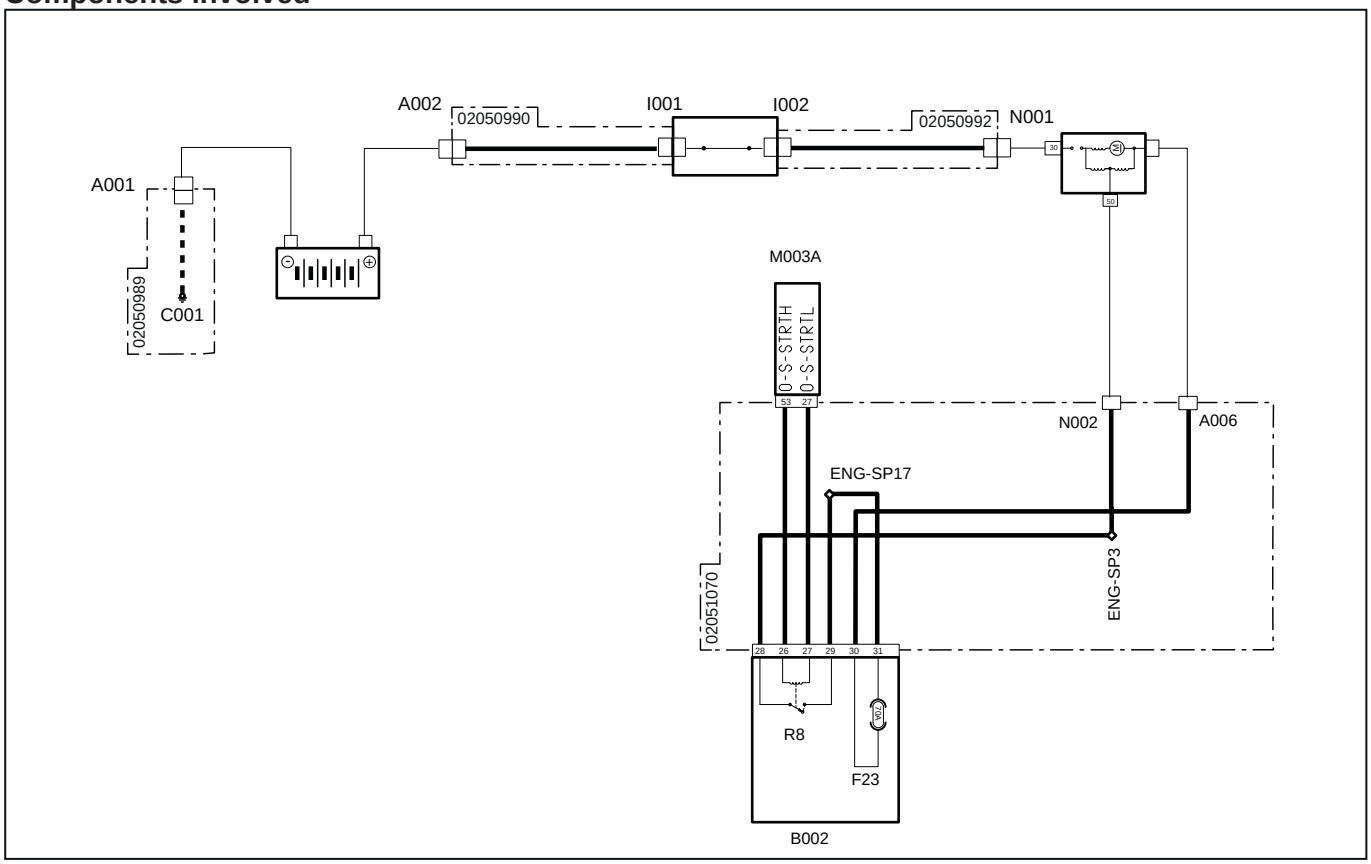
2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3138 - Start relay: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

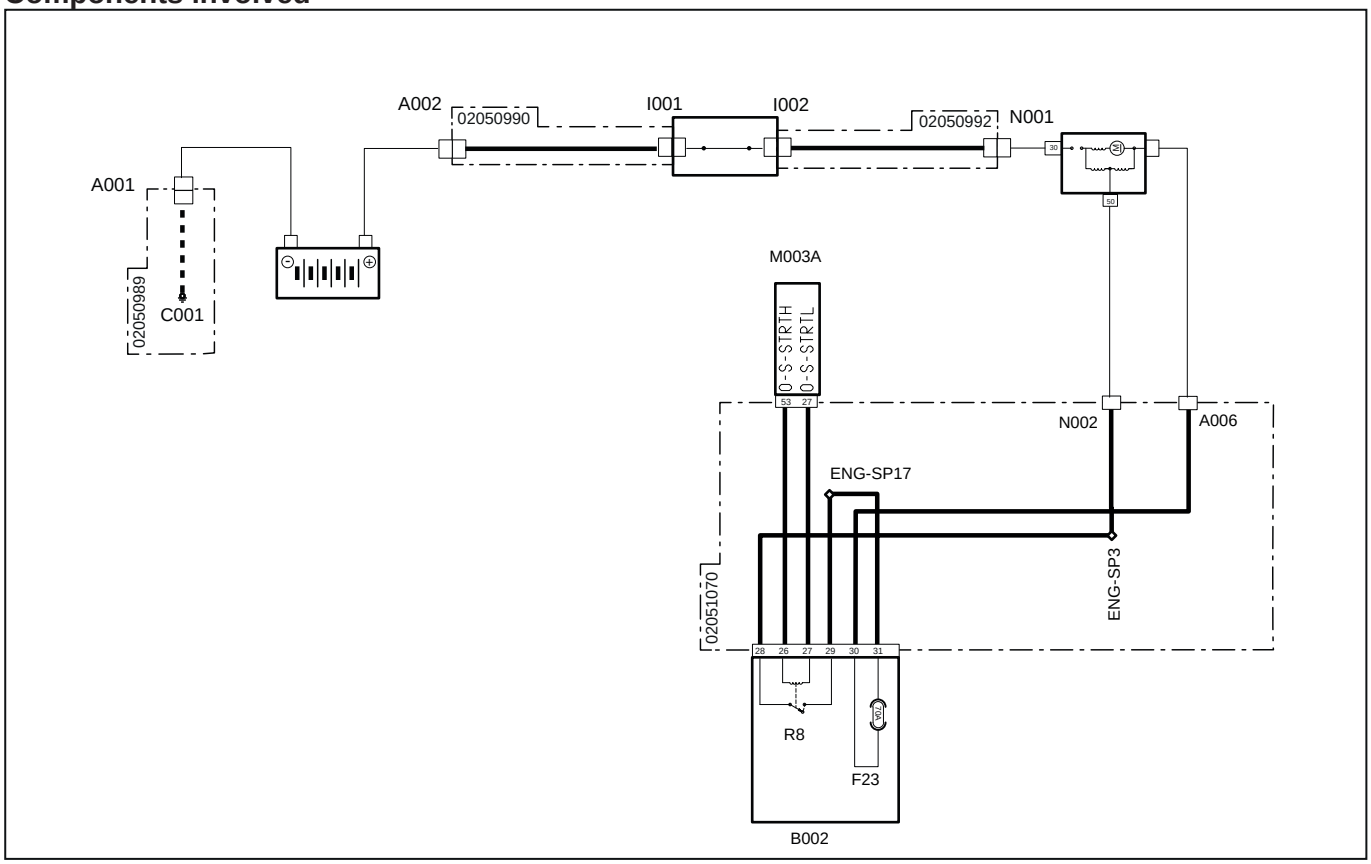
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3139 - Start relay: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

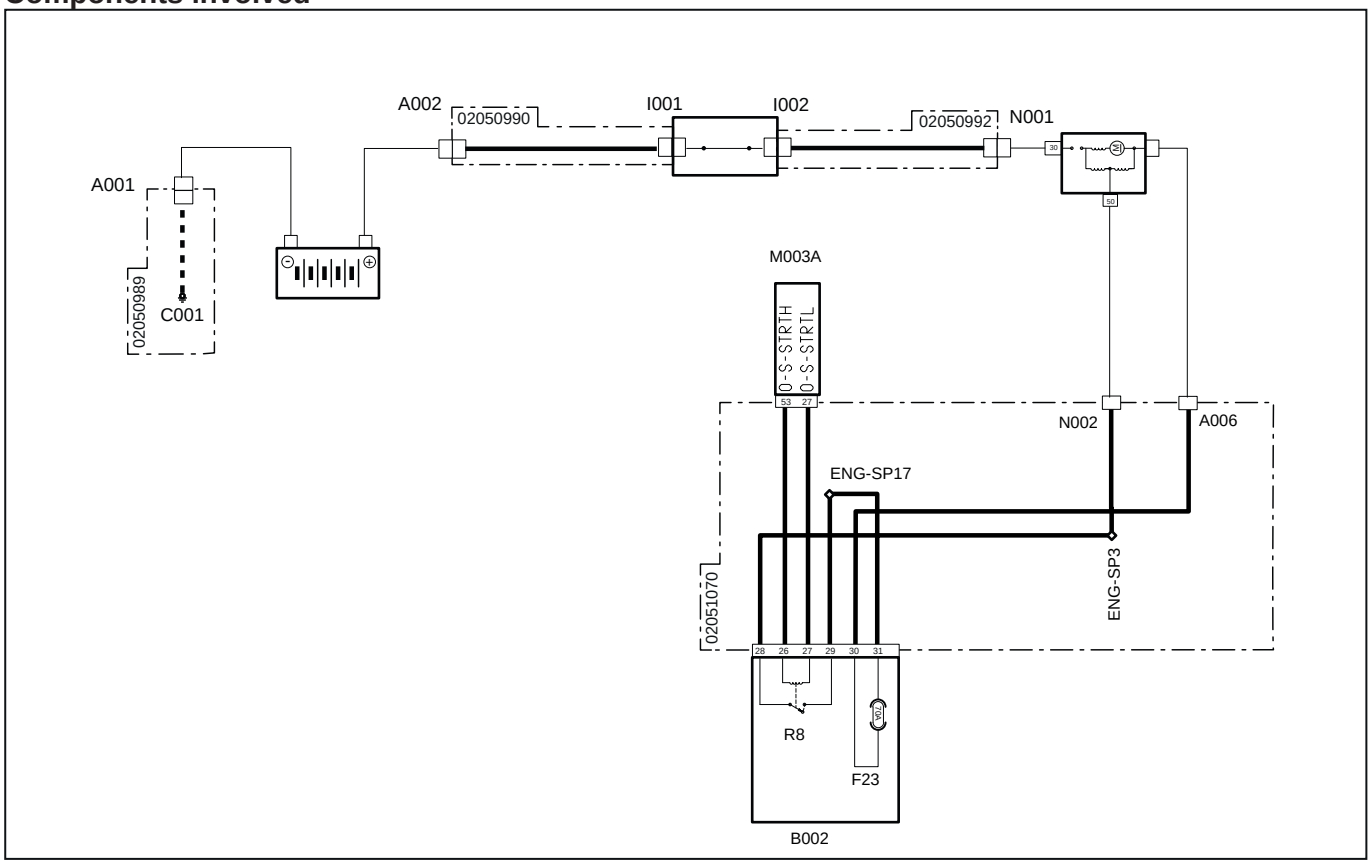
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3140 - Start relay: open circuit

Description of fault

The ECU engine control unit detects a open circuit fault in the start relay circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

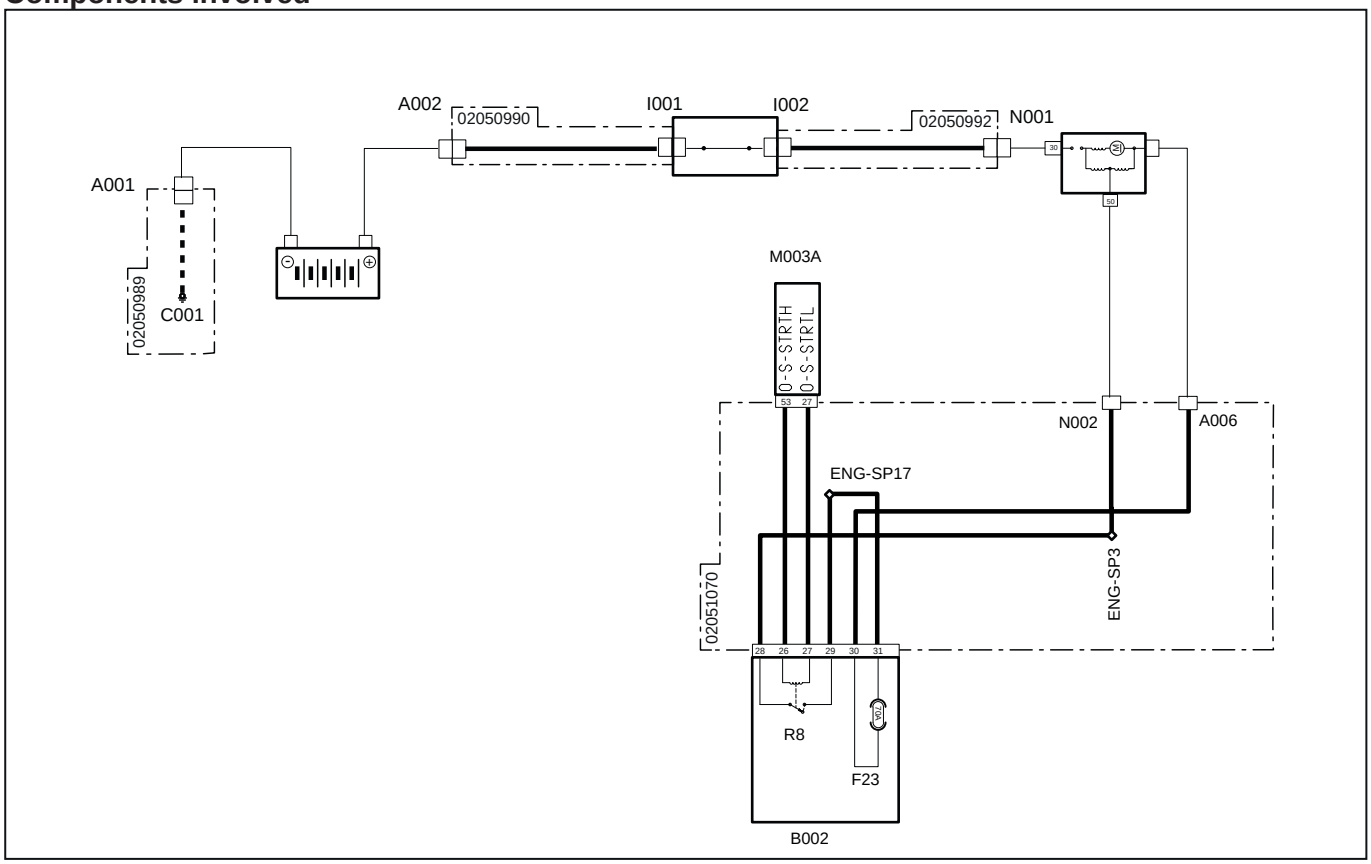
2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002)(pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3141 - Start relay: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

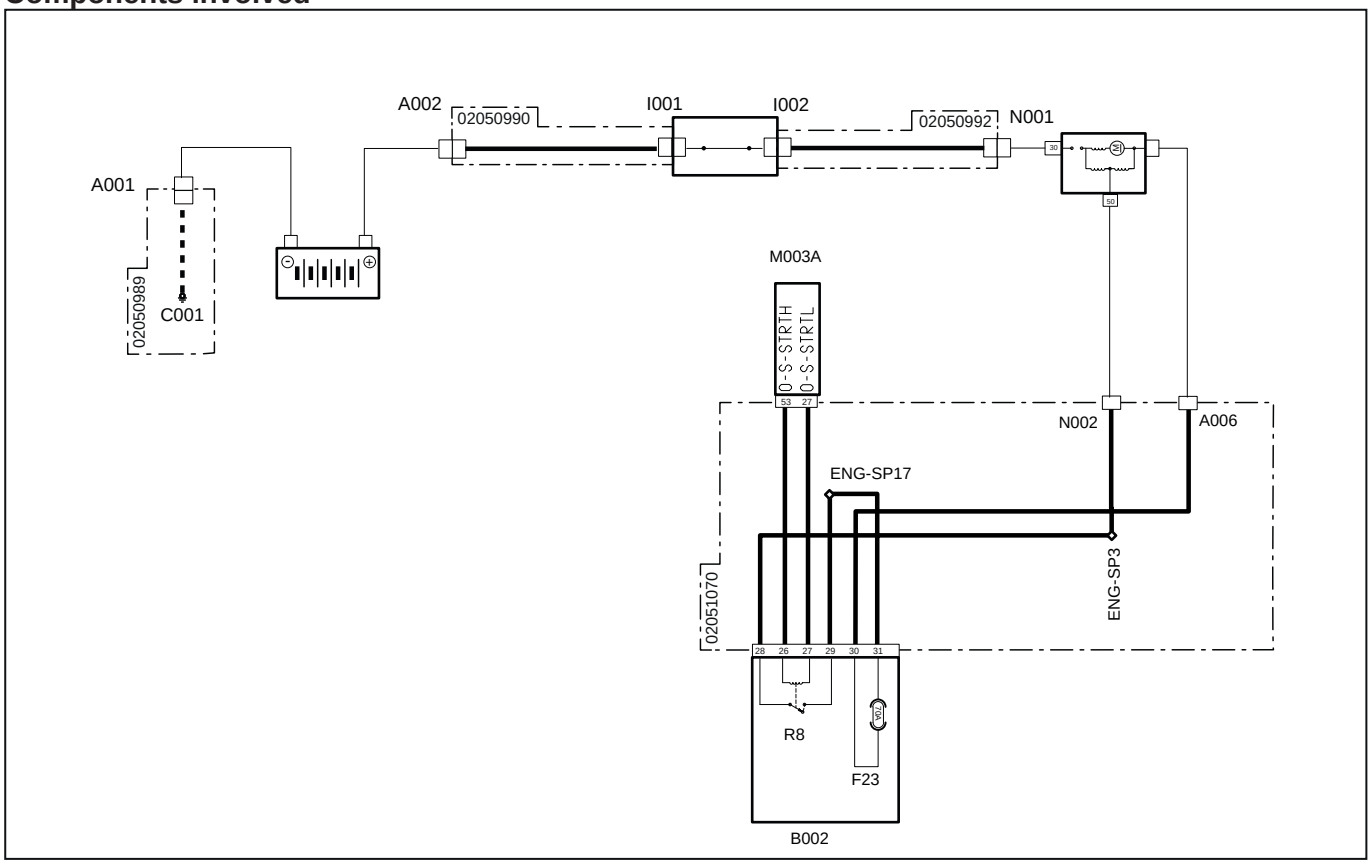
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002)(pag.R2-428)	R8	Start relay (20A)

3142 - Start relay: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground on the start relay

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the start relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

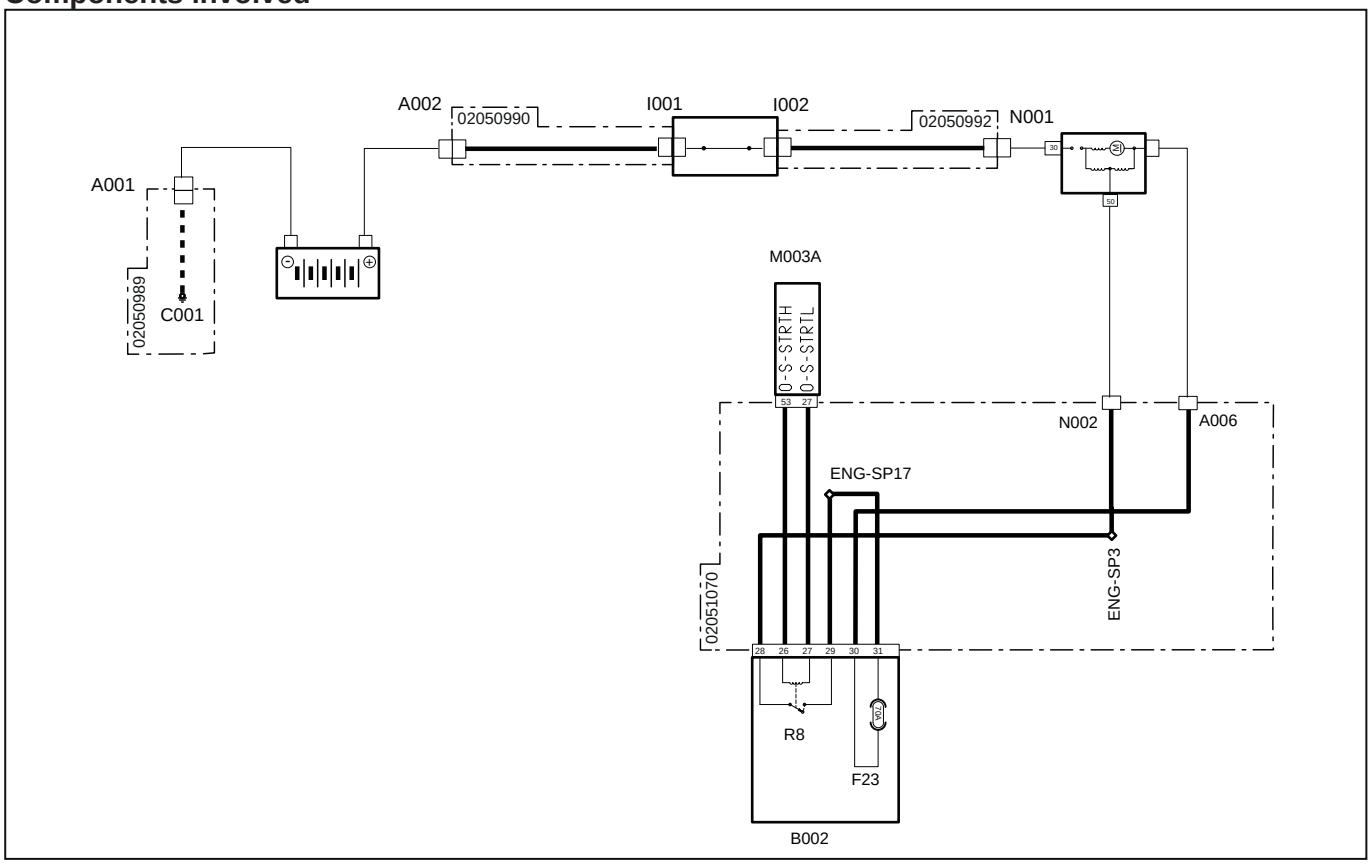
3 - Visually inspect the start relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check the connection between the fuse box pins and the control unit pins
- Check the connection between pin 27 of the engine control unit and pin 27 of the fuse box
- Check the connection between pin 53 of the engine control unit and pin 26 of the fuse box

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
F23(B002)(pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M003A (pag.R2-434)	P12	Engine control unit
N001 (pag.R2-388)	P10	Starter motor "30"
N002 (pag.R2-451)	P490	Starter motor 50
A006 (pag.R2-441)	P63	Starter motor
R8(B002) (pag.R2-428)	R8	Start relay (20A)

3143 - Camshaft sensor: disturbed signal/spurious contact

Description of fault

The ECU engine control unit detects a disturbed signal from, or a spurious contact fault on, the camshaft speed sensor

Severity of error

Additional information

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the camshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

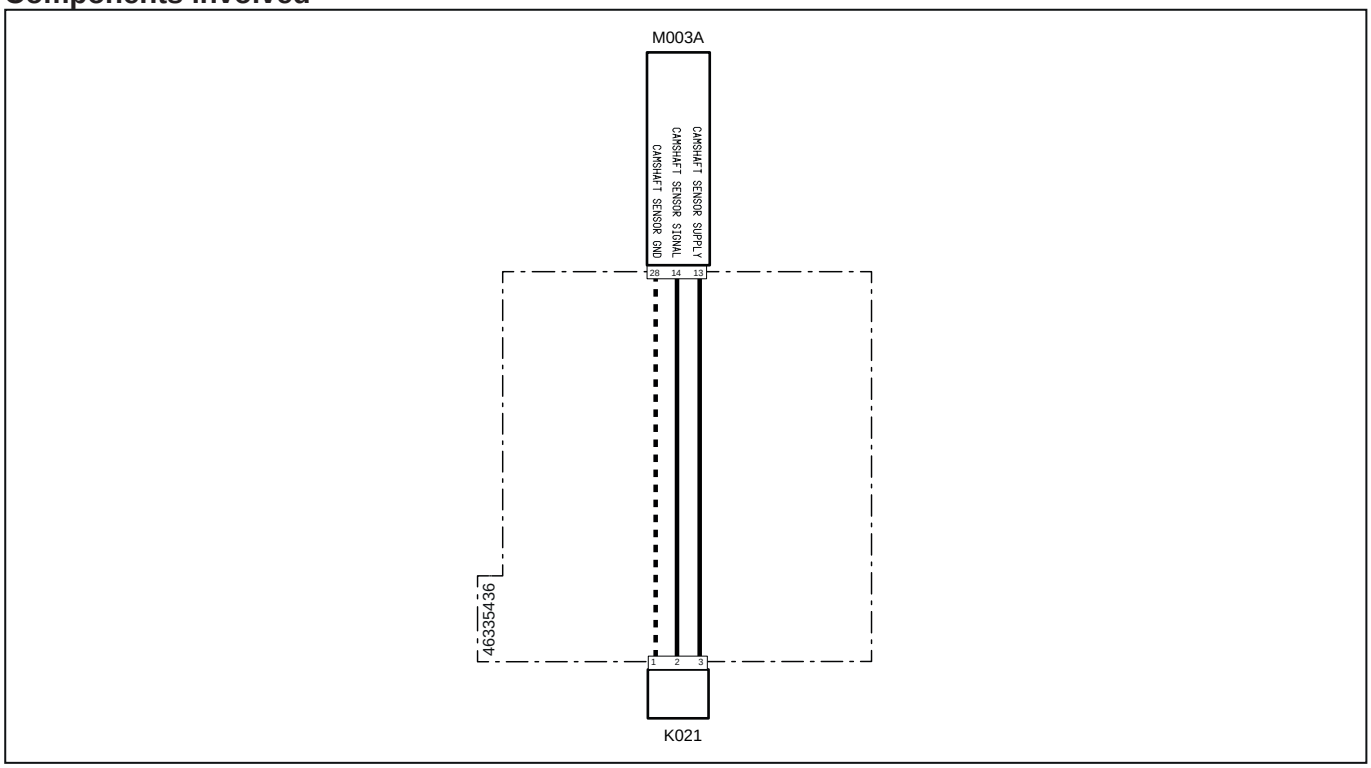
3 - Use the diagnostic tool to check that the camshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the ambient air temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Check the condition of the camshaft
- Remove the camshaft speed sensor
- Turn the camshaft and, using a light, visually check if the tooth on the camshaft is damaged
- An oscilloscope may also be used to check the camshaft for damage which may not be noted with a visual inspection
- If the camshaft is damaged, remove the engine and replace the camshaft
- Proceed to the next step if the camshaft is not damaged

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K021(pag.R2-474)	XS3	Camshaft timing sensor
M003A (pag.R2-434)	P12	Engine control unit

3144 - Camshaft sensor: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the camshaft speed sensor

Severity of error

Additional information

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
    - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
    - If there are no other error codes, proceed to the next step

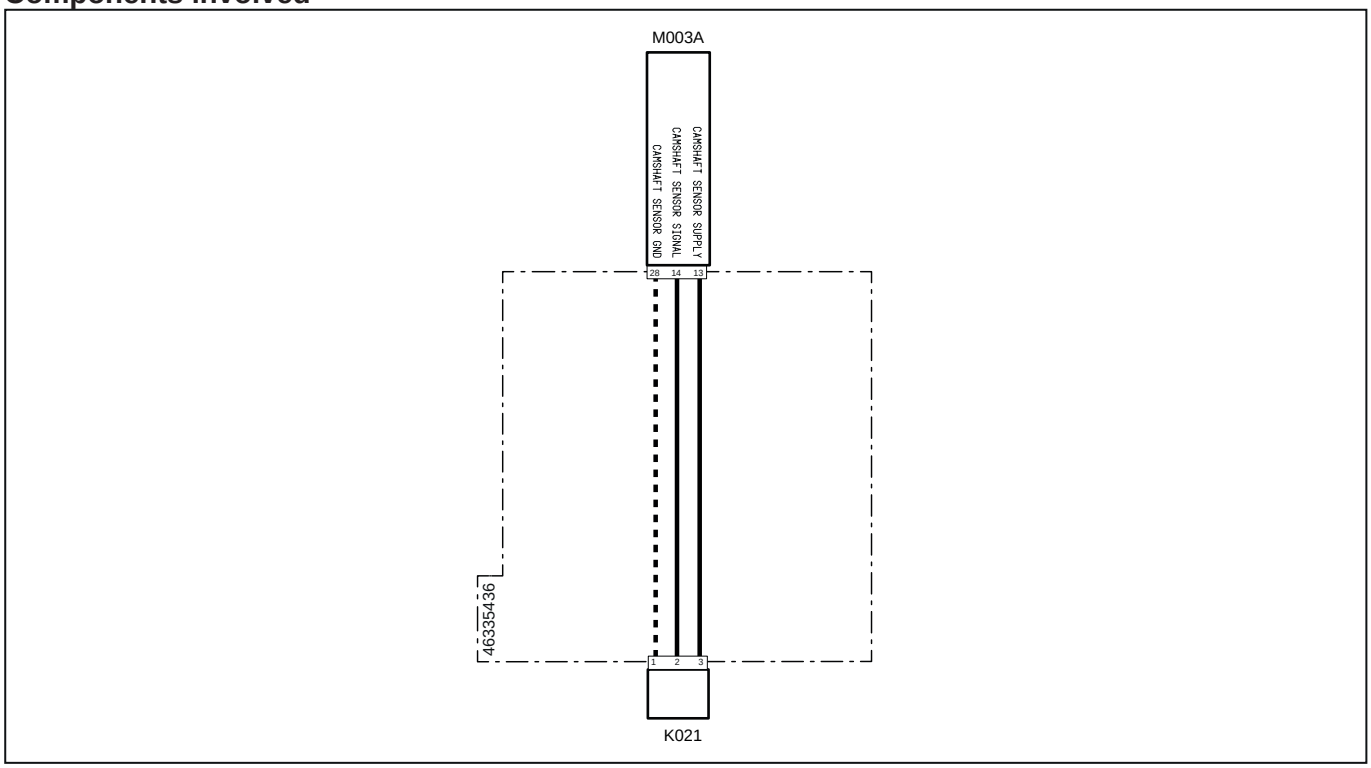
2 - Check that the connectors of the camshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
    - Disconnect any badly connected connectors and reconnect correctly
    - If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to check that the camshaft speed sensor is working correctly (see documentation of diagnostic tool)
    - Check if the ambient air temperature sensor is working correctly and replace if necessary
    - If the problem persists, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K021(pag.R2-474)	XS3	Camshaft timing sensor
M003A (pag.R2-434)	P12	Engine control unit

3145 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

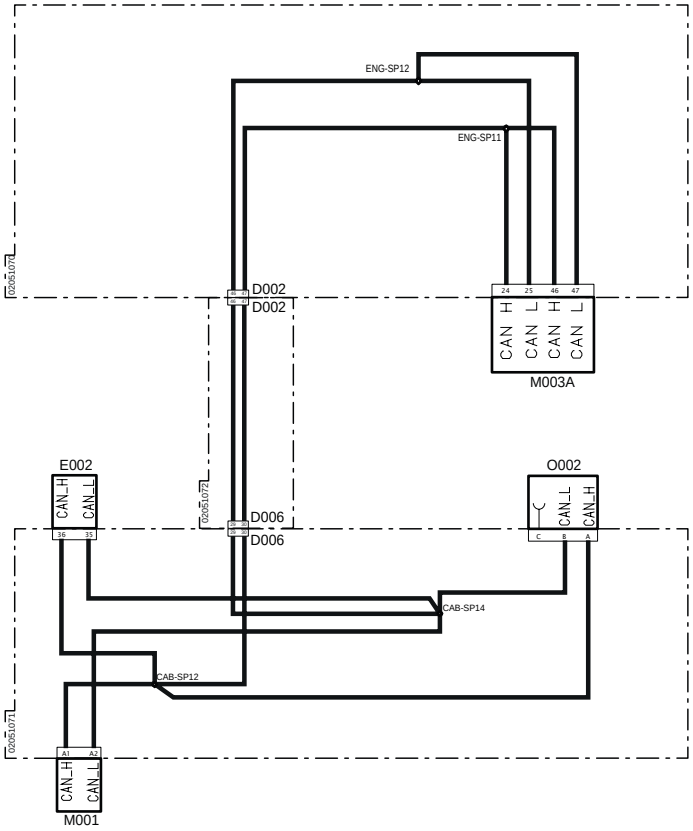
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002(pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
E002(pag.R2-419)	P200	Dashboard
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
O002(pag.R2-461)	P98	CAN line termination

3146 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

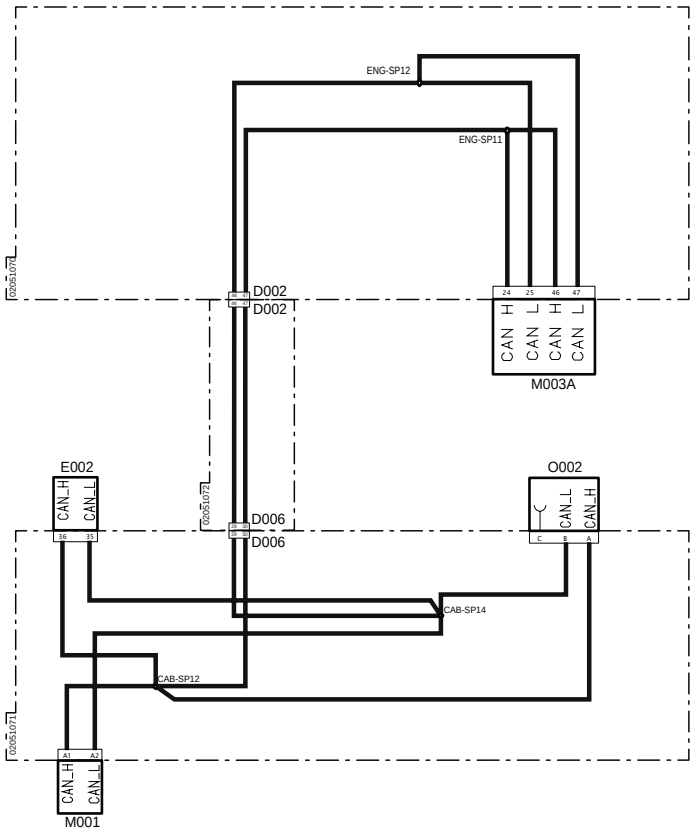
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002(pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
E002(pag.R2-419)	P200	Dashboard
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
O002(pag.R2-461)	P98	CAN line termination

3147 - No communication between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control not receiving signal from VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

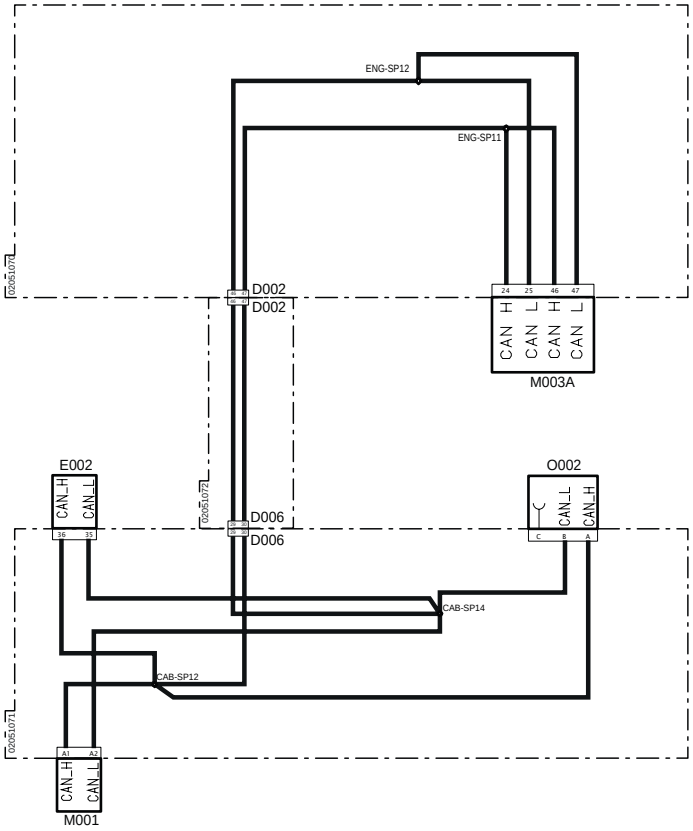
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002(pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
E002(pag.R2-419)	P200	Dashboard
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
O002(pag.R2-461)	P98	CAN line termination

3148 - Invalid message transmitted between ECU engine control unit and VCU vehicle control unit

Description of fault

ECU engine control receives an invalid message from the VCU control unit via the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the control units are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

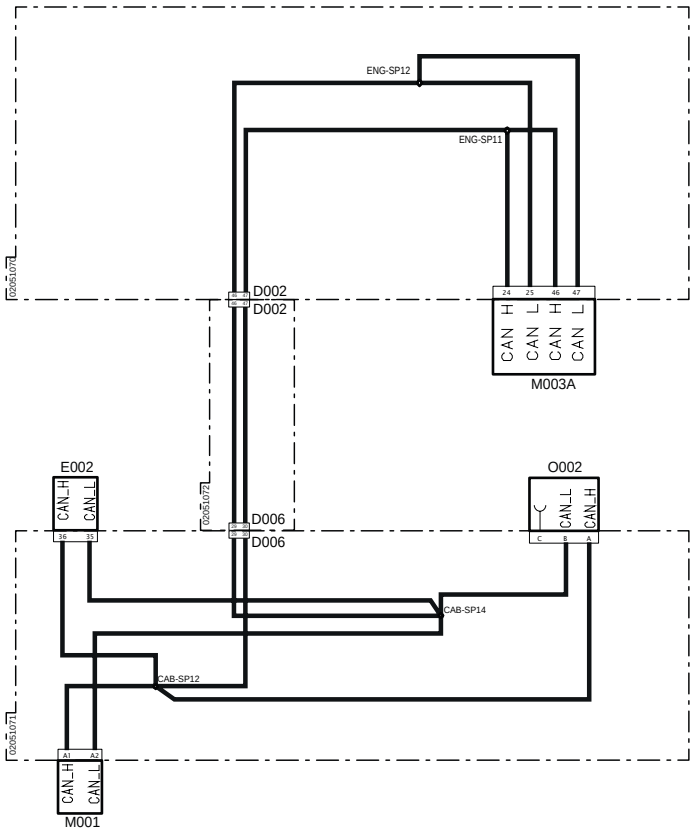
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002(pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
E002(pag.R2-419)	P200	Dashboard
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
O002(pag.R2-461)	P98	CAN line termination

3149 - Group 1 active sensor or actuator power feed error

Description of fault

The ECU engine control unit detects that all the sensors or actuators of group 1 are not receiving power

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A)
- Open the fuse box cover and disconnect the accessories fuse
- Visually inspect the fuse and replace if necessary
- If the fuse does not need to be replaced, reconnect it to the fuse box and proceed to the next step

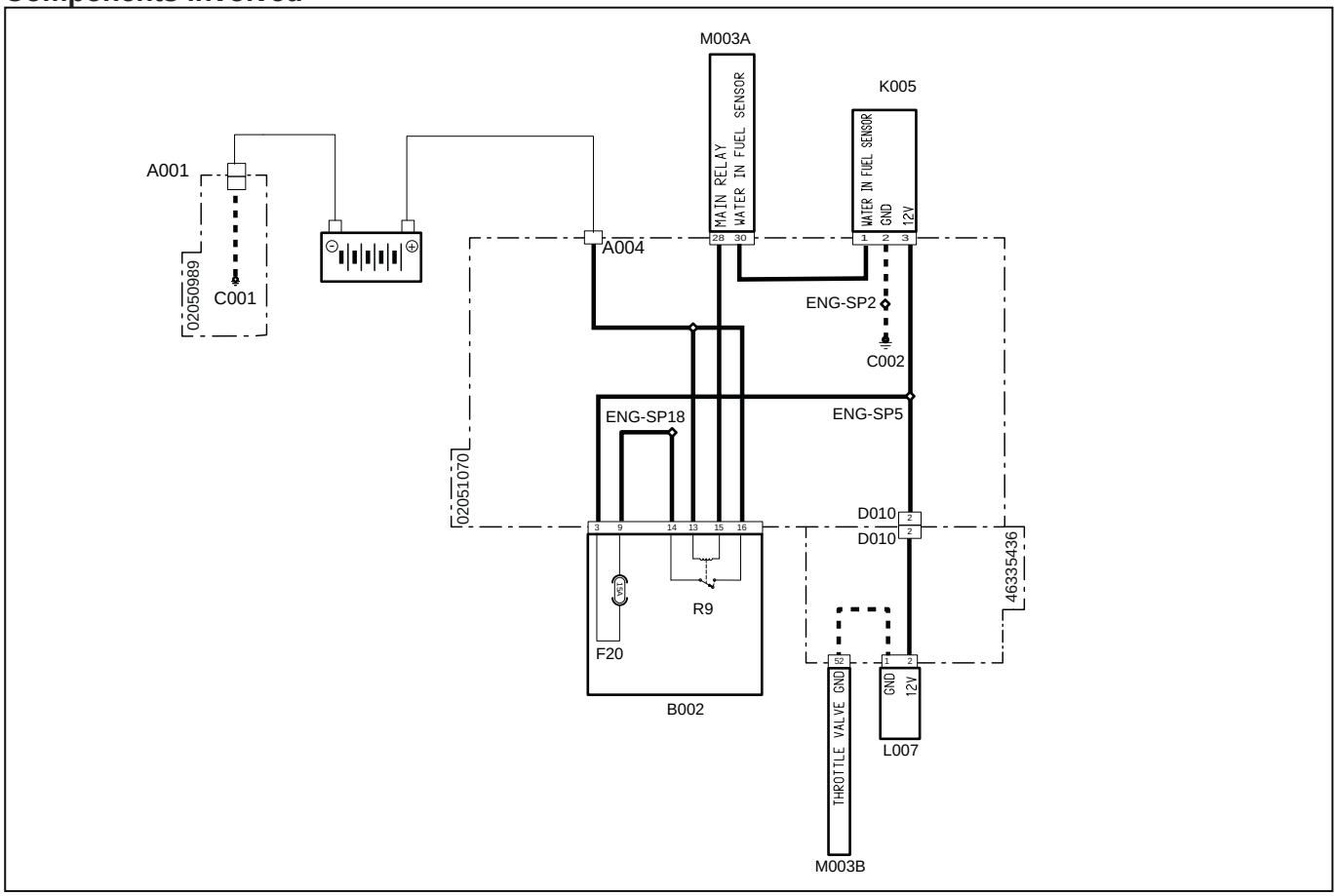
3 - Check that the connectors of the camshaft speed sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F20(B002) (pag.R2-428)	F20	Accessories (15A)
K005 (pag.R2-436)	P16	Water in fuel sensor
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3150 - Group 2 active sensor or actuator power feed error

Description of fault

The ECU engine control unit detects that all the sensors or actuators of group 2 are not receiving power

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the potentiometer and of the engine control unit are fitted and connected correctly

2 - Check the general condition of the wiring loom between the engine control unit and the potentiometer.

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Check that the timing sensor is working correctly using the diagnostic tool

3151 - Group 3 active sensor or actuator power feed error

Description of fault

The ECU engine control unit detects that all the sensors or actuators of group 3 are not receiving power

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the rail pressure sensor is working correctly using the diagnostic tool

2 - Check that the P3 exhaust pressure sensor is working correctly using the diagnostic tool

3152 - Exhaust temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault in the exhaust gas temperature sensor circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

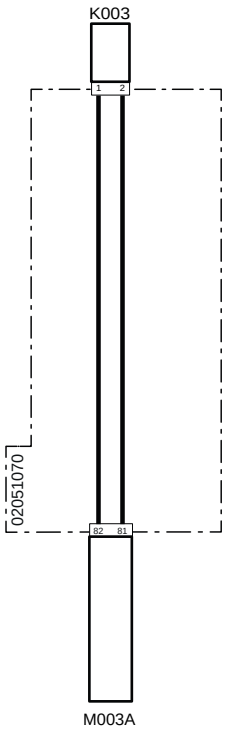
2 - Use the diagnostic tool to monitor the exhaust temperature sensor (see the documentation of the diagnostic tool)
  - Check if the exhaust temperature sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

3 - Check that the connectors of the exhaust temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K003(pag.R2-446)	P465	Exhaust gas temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3153 - Exhaust gas temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the exhaust gas temperature sensor circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

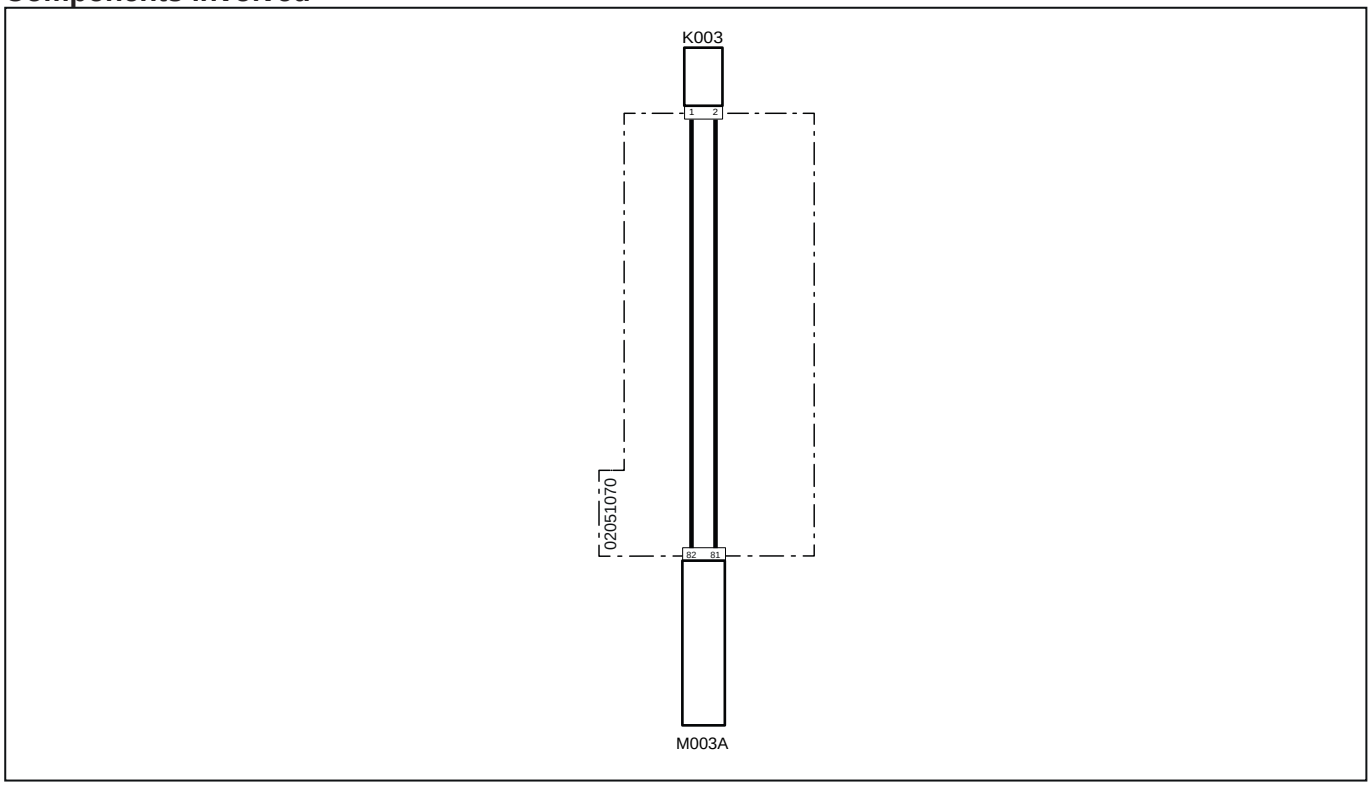
2 - Use the diagnostic tool to monitor the exhaust temperature sensor (see the documentation of the diagnostic tool)
- Check if the exhaust temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Check that the connectors of the exhaust temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K003(pag.R2-446)	P465	Exhaust gas temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3154 - Exhaust pressure too high relative to barometric pressure

Description of fault

At key-on, the ECU engine control unit detects that the pressure measured by the exhaust pressure sensor is much higher than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor sensor P3 (exhaust pressure) (see the documentation of the diagnostic tool)
- Check if sensor P3 (exhaust pressure) is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Check that the connectors of sensor P3 (exhaust pressure) and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

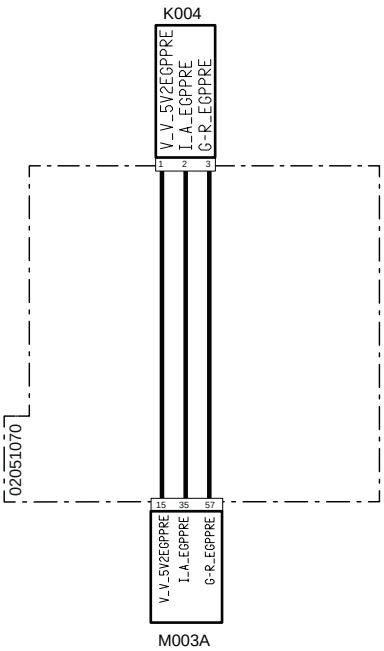
4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Check that there are no obstructions in the exhaust line
- The exhaust manifold must be removed from the engine to carry out this check. Refer to the workshop manual of the tractor

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K004(pag.R2-434)	P3	P3 sensor (exhaust pressure)
M003A (pag.R2-434)	P12	Engine control unit

3155 - Exhaust pressure too low relative to barometric pressure

Description of fault

At key-on, the ECU engine control unit detects that the pressure measured by the exhaust pressure sensor is lower than the barometric pressure read by the control unit itself

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit has an internal barometric sensor which measures atmospheric pressure. The atmospheric pressure value is crucial for determining the strategies implemented by the engine control unit

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to monitor sensor P3 (exhaust pressure) (see the documentation of the diagnostic tool)
- Check if sensor P3 (exhaust pressure) is working correctly and replace if necessary
- If the problem persists, proceed to the next step

3 - Check that the connectors of sensor P3 (exhaust pressure) and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

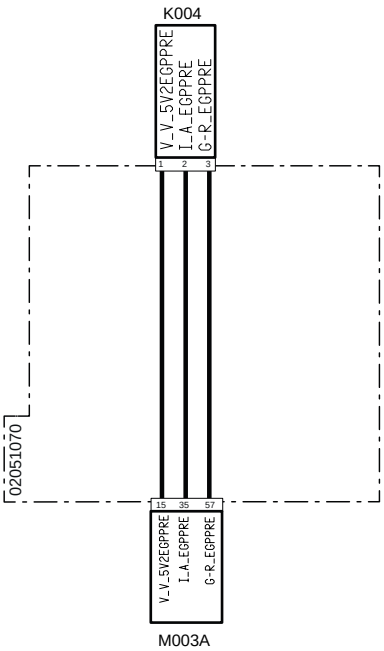
4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Check that there are no obstructions in the exhaust line
- The exhaust manifold must be removed from the engine to carry out this check. Refer to the workshop manual of the tractor

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K004(pag.R2-434)	P3	P3 sensor (exhaust pressure)
M003A (pag.R2-434)	P12	Engine control unit

3156 - Exhaust pressure sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to ground in the exhaust gas pressure sensor circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

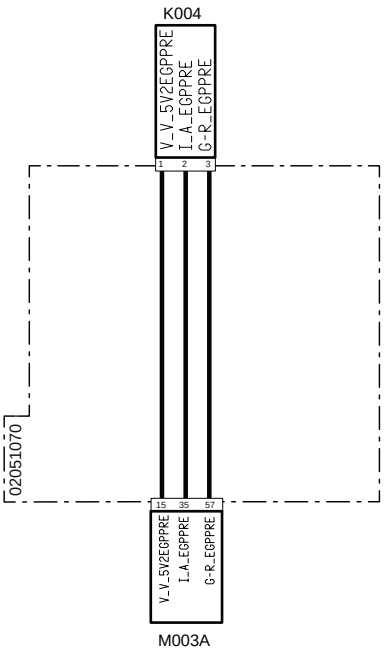
2 - Use the diagnostic tool to monitor the exhaust pressure sensor (see the documentation of the diagnostic tool)
  - Check if the exhaust pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

3 - Check that the connectors of the exhaust pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K004(pag.R2-434)	P3	P3 sensor (exhaust pressure)
M003A (pag.R2-434)	P12	Engine control unit

3157 - Exhaust gas pressure sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the exhaust gas pressure sensor circuit

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

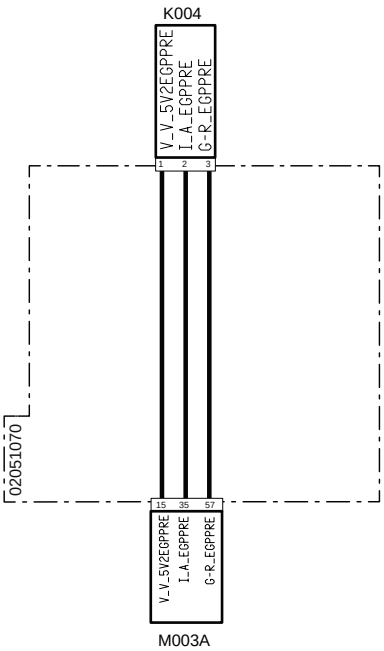
2 - Use the diagnostic tool to monitor the exhaust pressure sensor (see the documentation of the diagnostic tool)
  - Check if the exhaust pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

3 - Check that the connectors of the exhaust pressure sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K004(pag.R2-434)	P3	P3 sensor (exhaust pressure)
M003A (pag.R2-434)	P12	Engine control unit

3158 - Transmission error between EGR valve and ECU engine control unit

Description of fault

The ECU engine control unit detects an EGR valve transmission error

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect the connectors and reconnect correctly
   - If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
   - Disconnect the respective connectors
   - Check that the contact surfaces of the pins are in good condition
   - In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
   - Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
   - If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

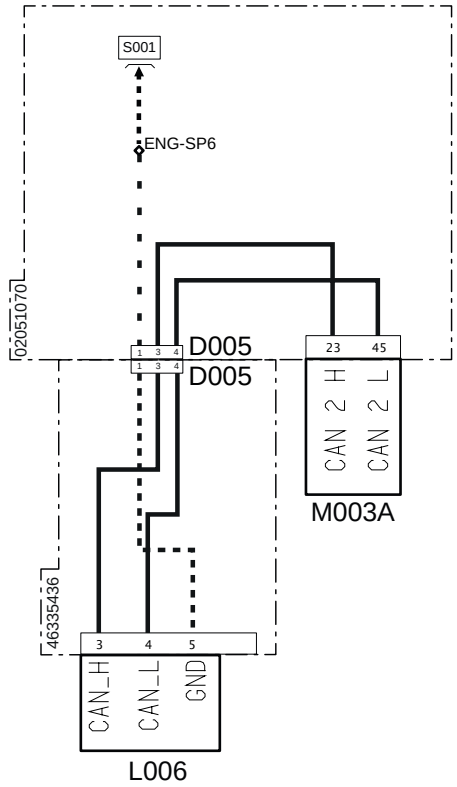
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service

Components involved



System code	Source code	Description
D005(pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005(pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
L006(pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003A (pag.R2-434)	P12	Engine control unit

3159 - Reception error between EGR valve and ECU engine control unit

Description of fault

The ECU engine control unit detects an EGR valve transmission error

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect the connectors and reconnect correctly
   - If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the engine control unit
   - Disconnect the respective connectors
   - Check that the contact surfaces of the pins are in good condition
   - In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
   - Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
   - If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

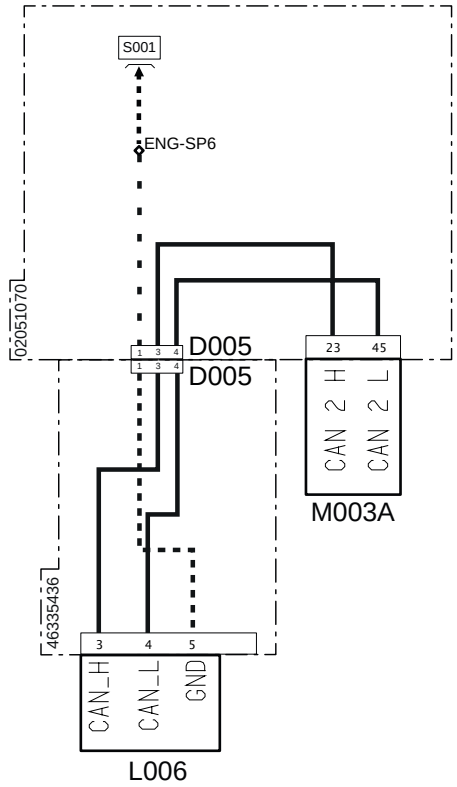
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service

Components involved



System code	Source code	Description
D005(pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005(pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
L006(pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003A (pag.R2-434)	P12	Engine control unit

3160 - High pressure pump valve: disturbed signal or spurious contact

Description of fault

The ECU engine control unit detects a disturbed signal from, or a spurious contact fault on, the high pressure pump valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The rail pressure is monitored by the rail pressure sensor. Rail pressure is managed by the ECU engine control unit, which determines the percentage aperture of the MProp metering valve situated on the high pressure fuel pump in relation to a number of different parameters

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

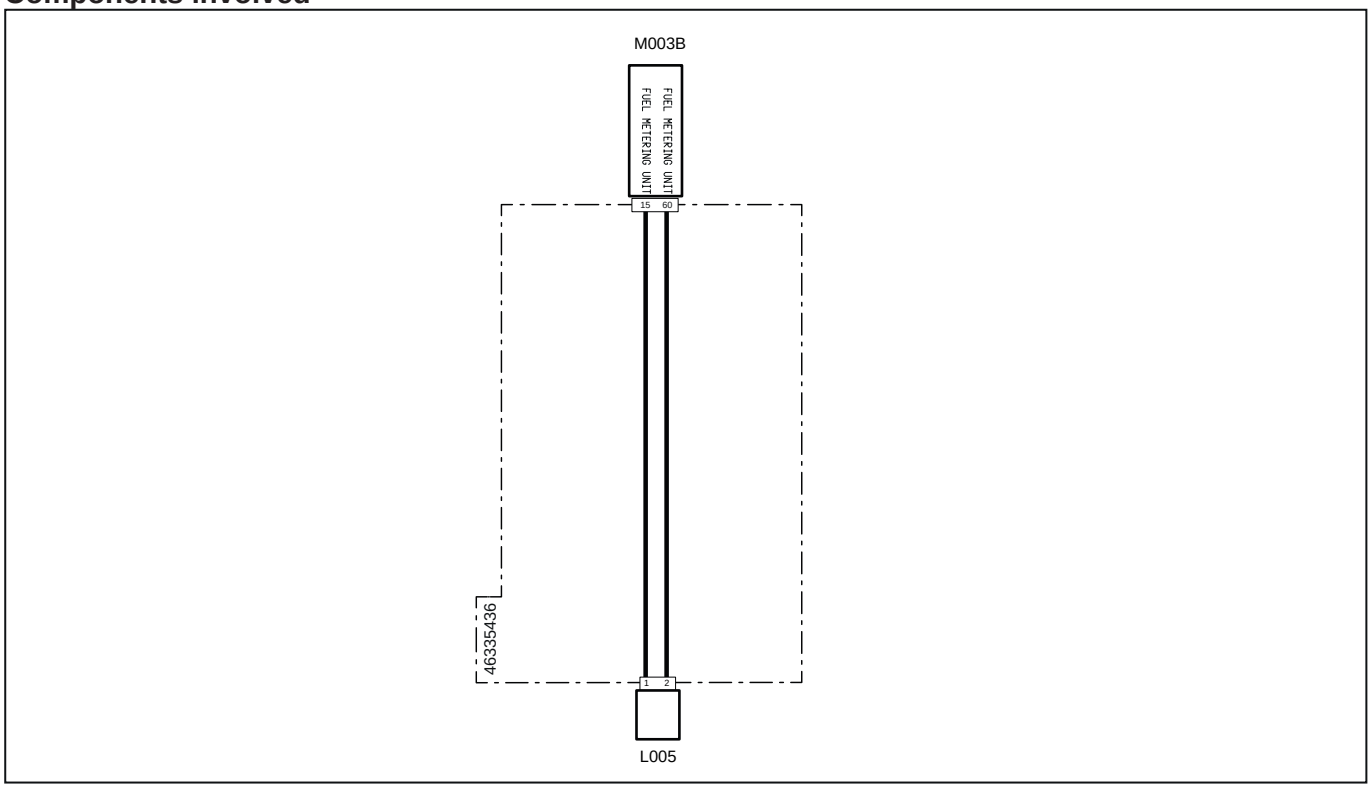
3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3161 - High pressure pump metering valve: short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

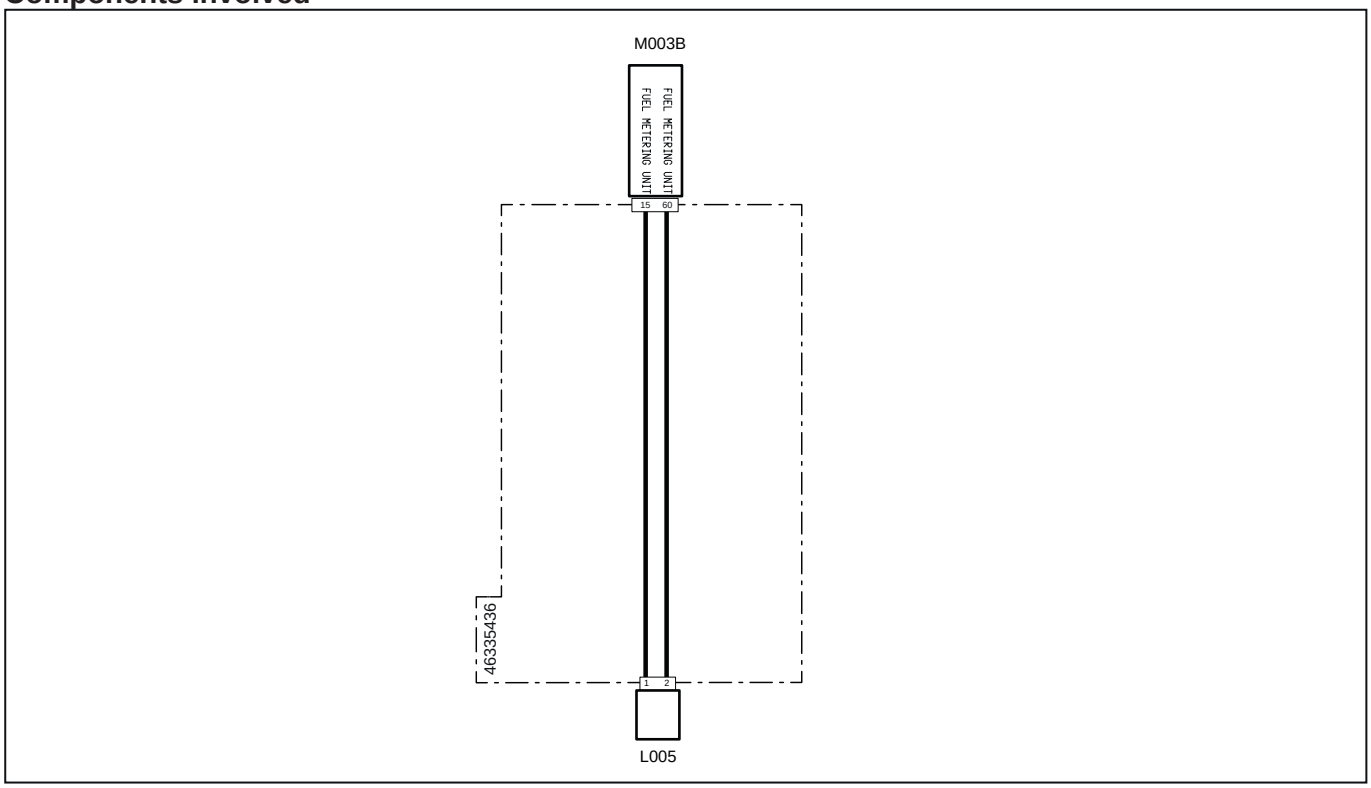
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3162 - High pressure pump metering valve: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

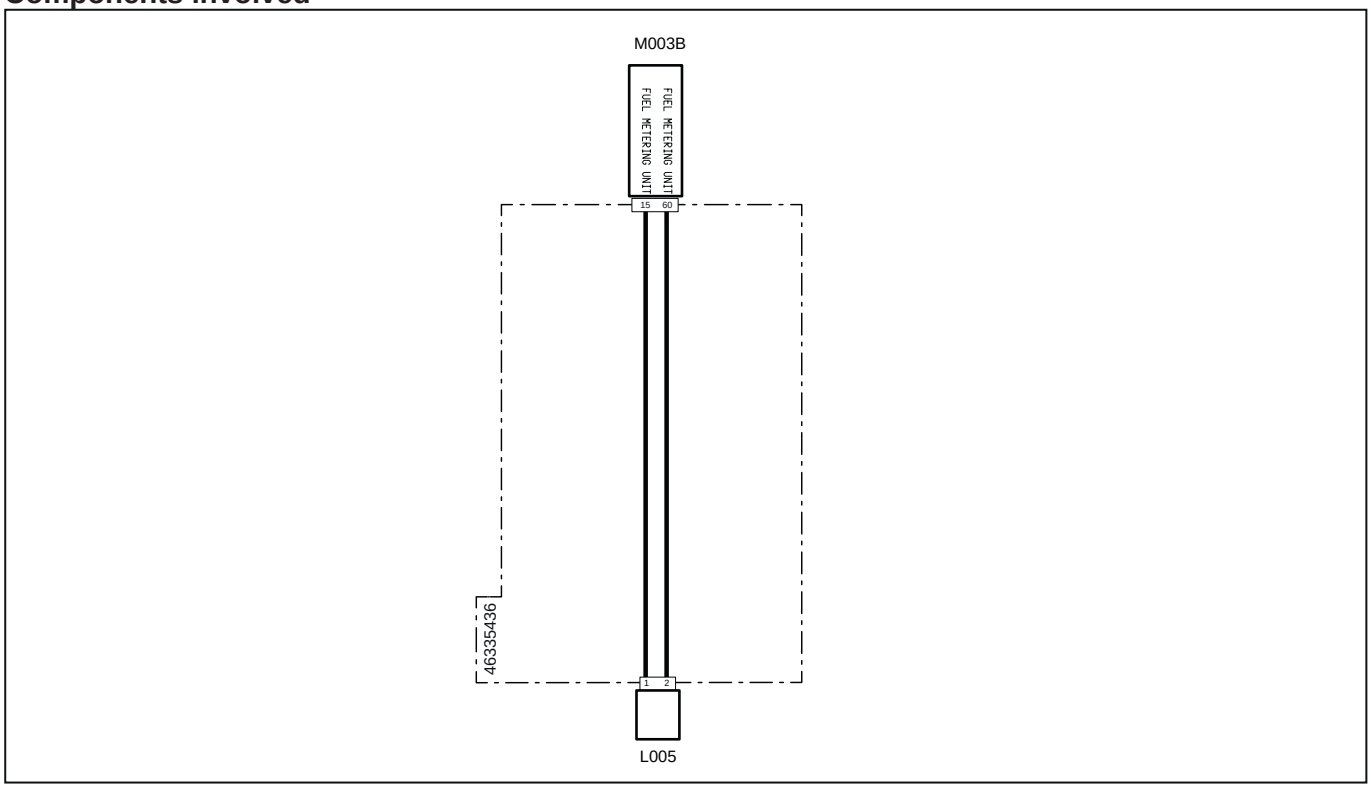
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3163 - High pressure pump metering valve: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

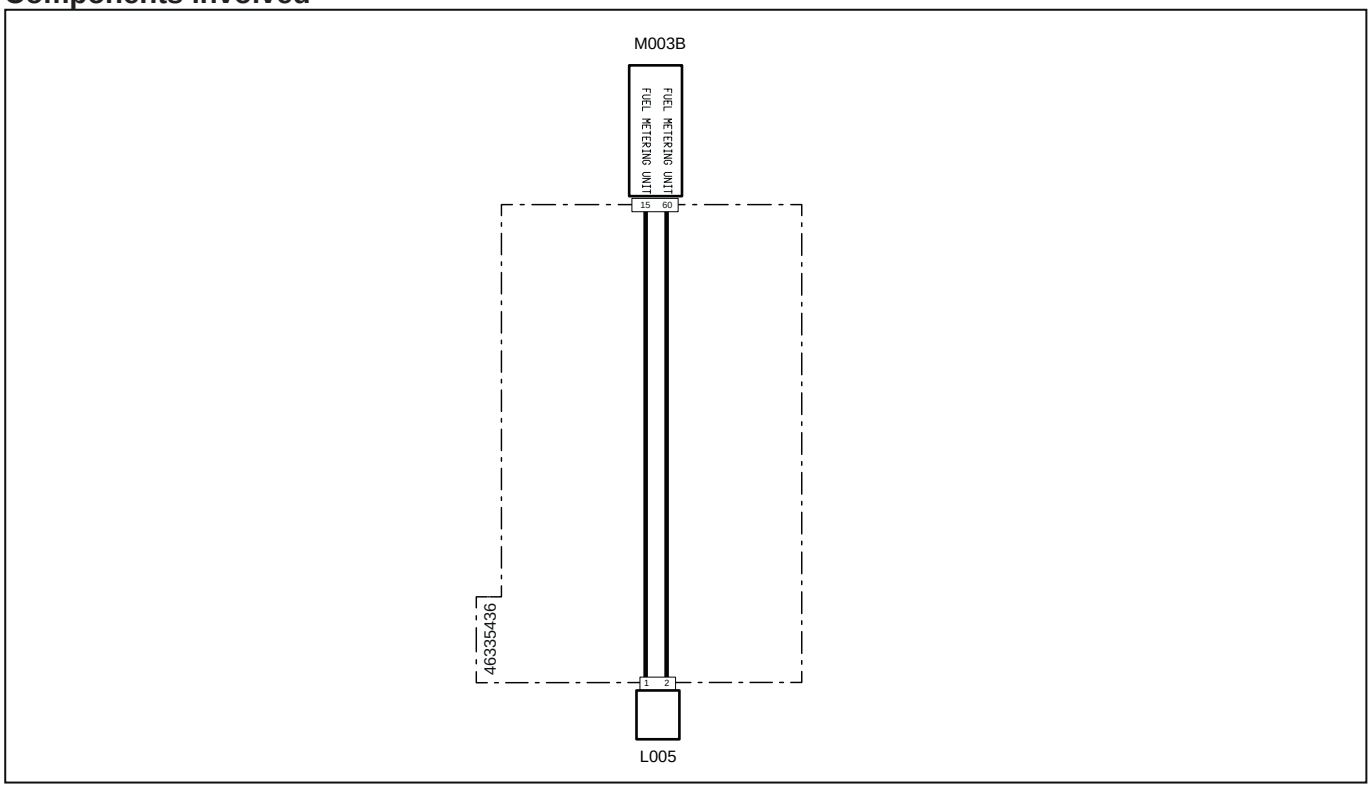
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3164 - High pressure pump metering valve: overcurrent

Description of fault

The ECU engine control unit detects an excessively high current in the circuit of the Mprop valve of the high pressure fuel pump

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

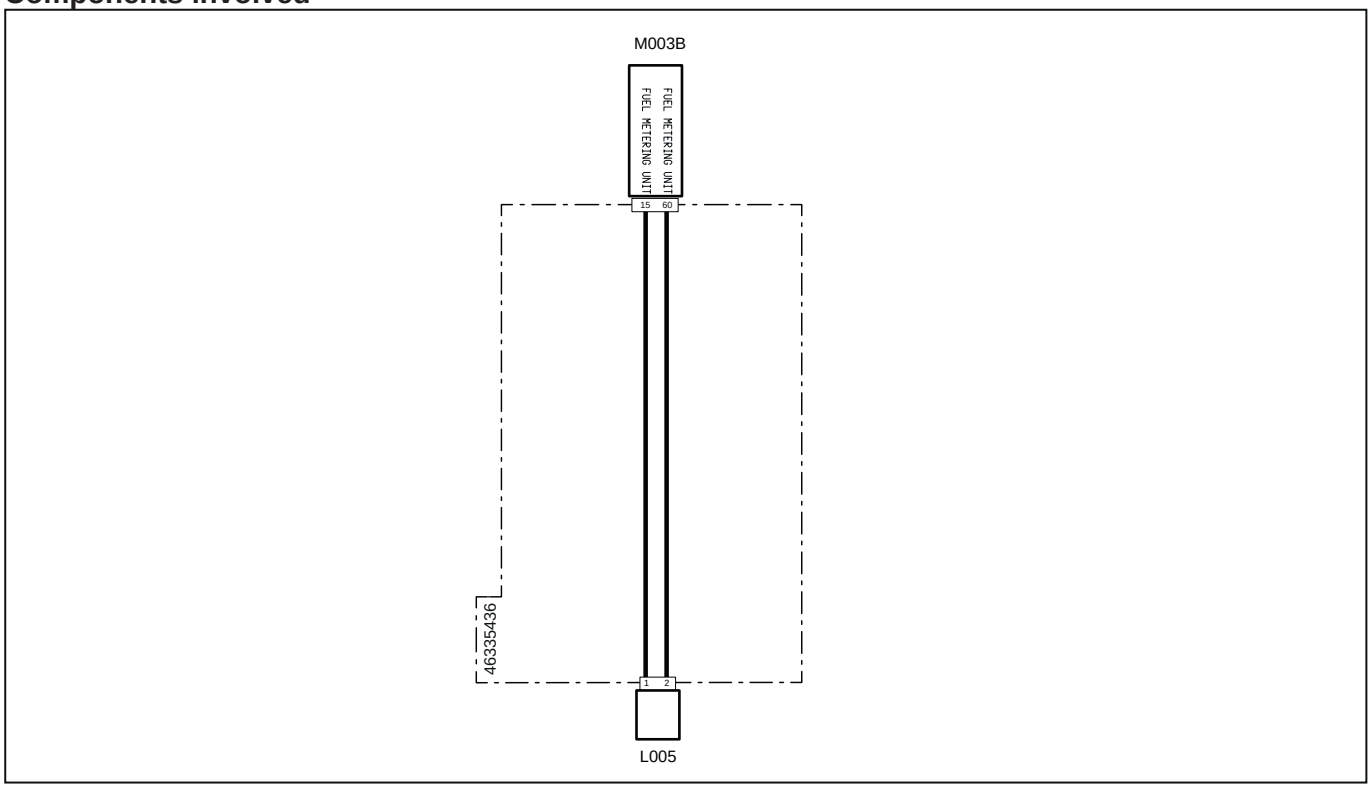
2 - Check that the connectors of the MProp metering valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

3 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

4 - Check that the wiring loom connectors are connected correctly and not damaged

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3165 - Main relay contact permanently closed and ECU control unit permanently powered

Description of fault

The contact of the main relay remains permanently closed and, as a result, the ECU engine control unit remains powered at all times

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the main relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

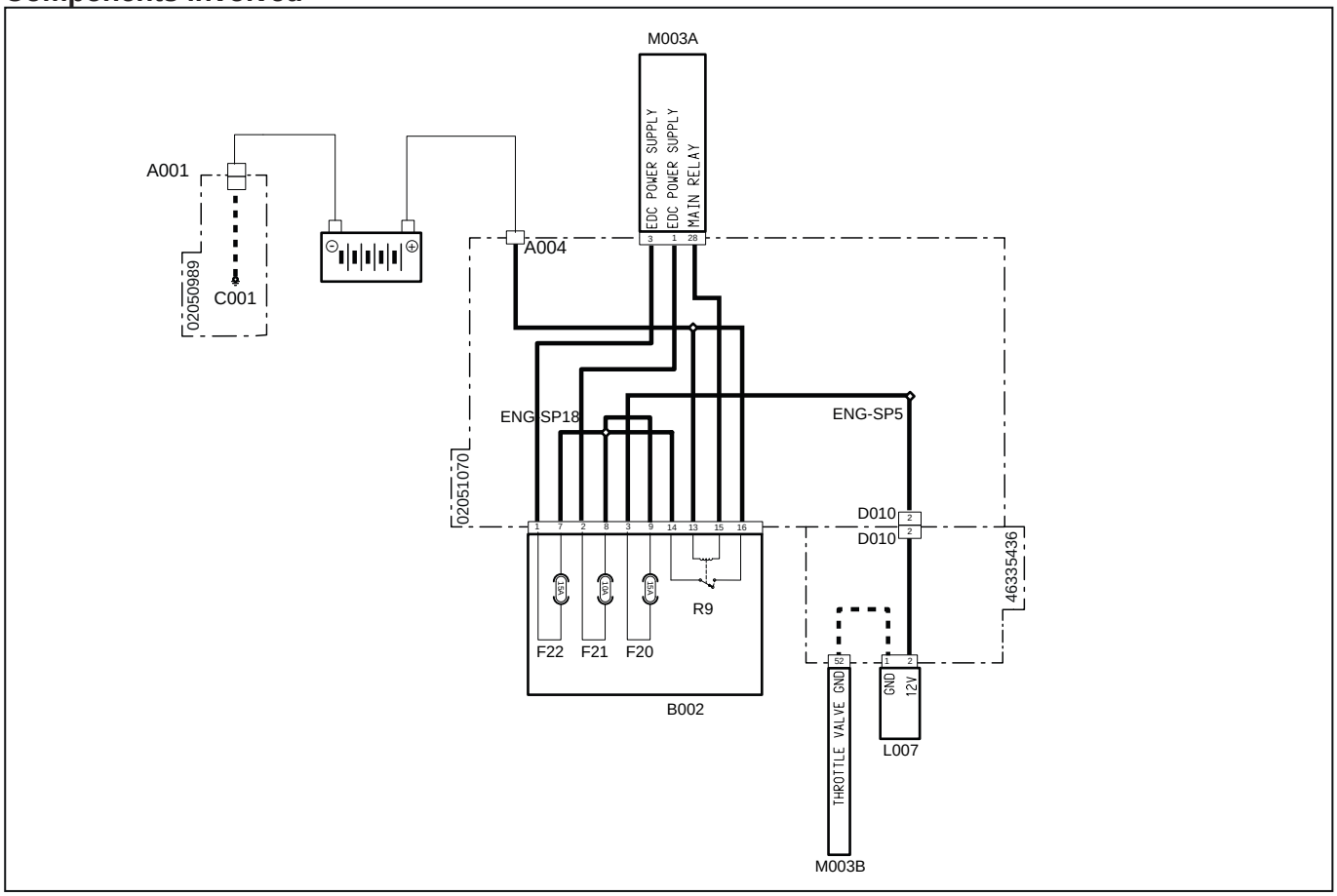
3 - Visually inspect the main relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F21(B002) (pag.R2-428)	F21	12V ECU power feed (10A)
F22(B002) (pag.R2-428)	F22	12V ECU power feed (15A)
F20(B002) (pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3166 - Premature main relay aperture fault at end of After Run

Description of fault

The contact of the main relay opens earlier than it should relative to the After Run time of the ECU engine control unit

Severity of error

Medium

Additional information

Amber lamp illuminated

Each time the instrument panel is switched off by turning the ignition switch to off, the control unit continues to receive power for the period of time necessary to save all the parameters acquired during operation of the tractor

Always wait a few minutes after turning the tractor off before physically disconnecting the battery or using the battery master switch

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the main relay and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

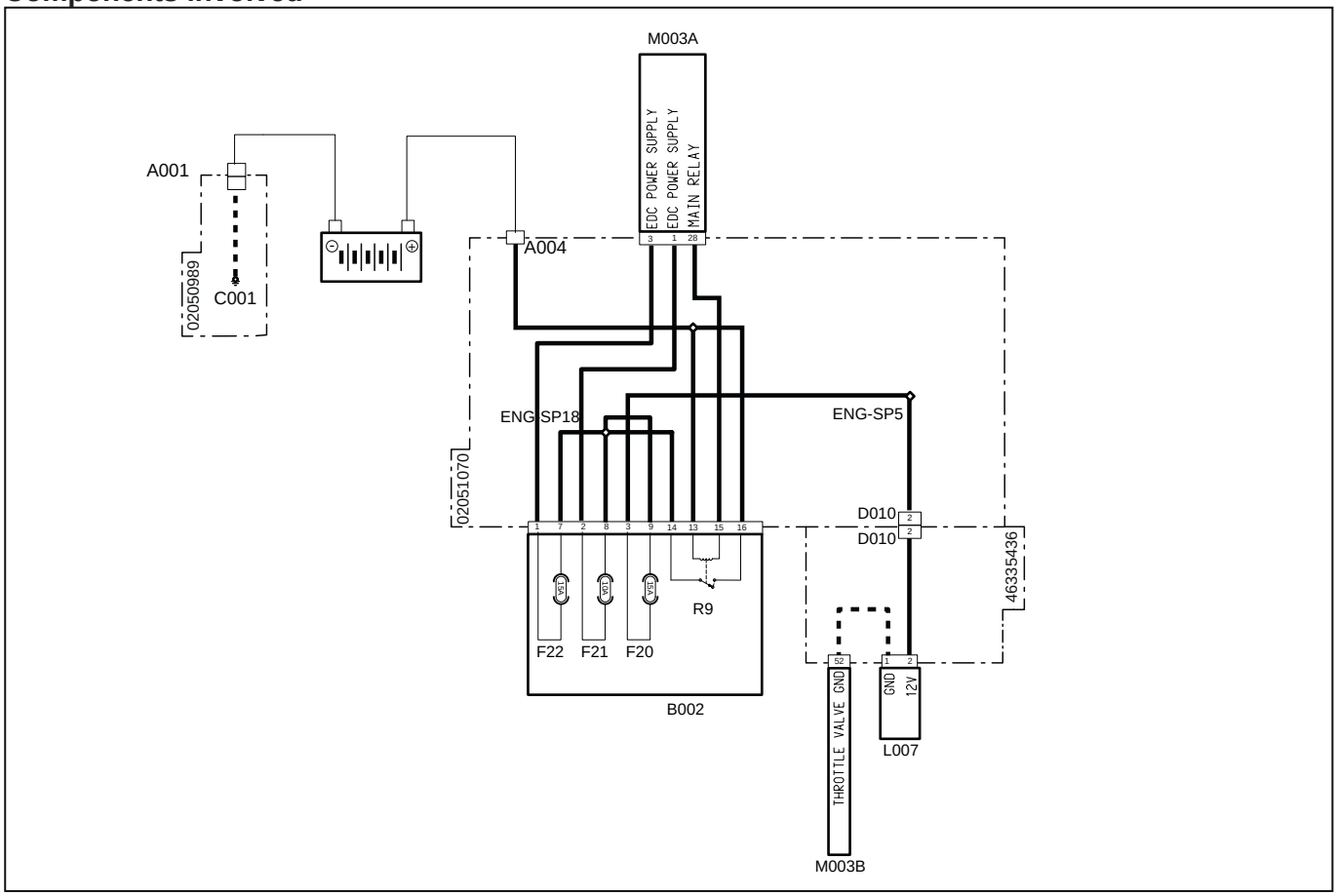
3 - Visually inspect the main relay and replace if necessary
- Open the fuse box cover and disconnect the start relay
- Visually inspect the relay and replace if necessary
- If the relay does not need to be replaced, reconnect it to the fuse box and proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
D010 (pag.R2-448)	P470	Wiring connector for prewired engine wiring loom
D010 (pag.R2-477)	XTH	Throttle valve power feed
F21(B002)(pag.R2-428)	F21	12V ECU power feed (10A)
F22(B002)(pag.R2-428)	F22	12V ECU power feed (15A)
F20(B002)(pag.R2-428)	F20	Accessories (15A)
L007 (pag.R2-479)	XY3	Throttle valve
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3167 - EGR valve: open circuit

Description of fault

The ECU engine control unit detects an open circuit fault in the circuit of the EGR valve

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

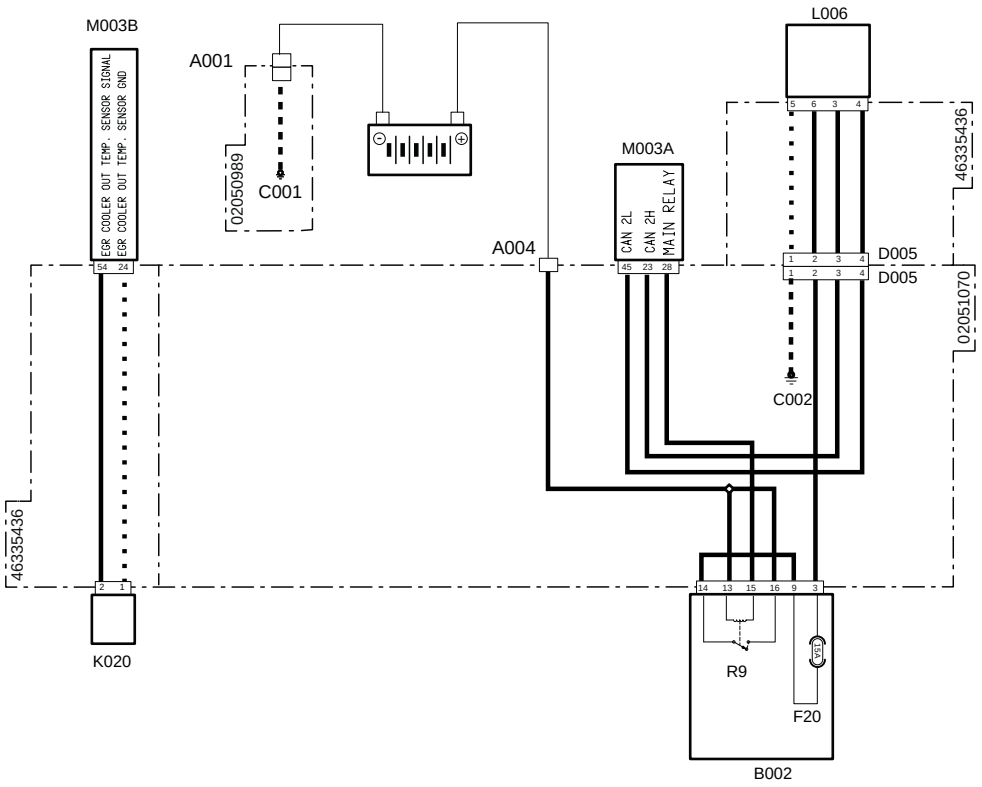
3 - Use the diagnostic tool to check that the EGR valve position sensor is working correctly (see documentation of diagnostic tool)
- Check that the power feed voltage of the EGR valve position sensor is within the correct range specified. Replace the EGR valve if the voltage is not within the correct range
- If the power feed voltage is correct, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002) (pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3168 - DOC temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault in the circuit of the DOC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and DPF (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the DPF sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

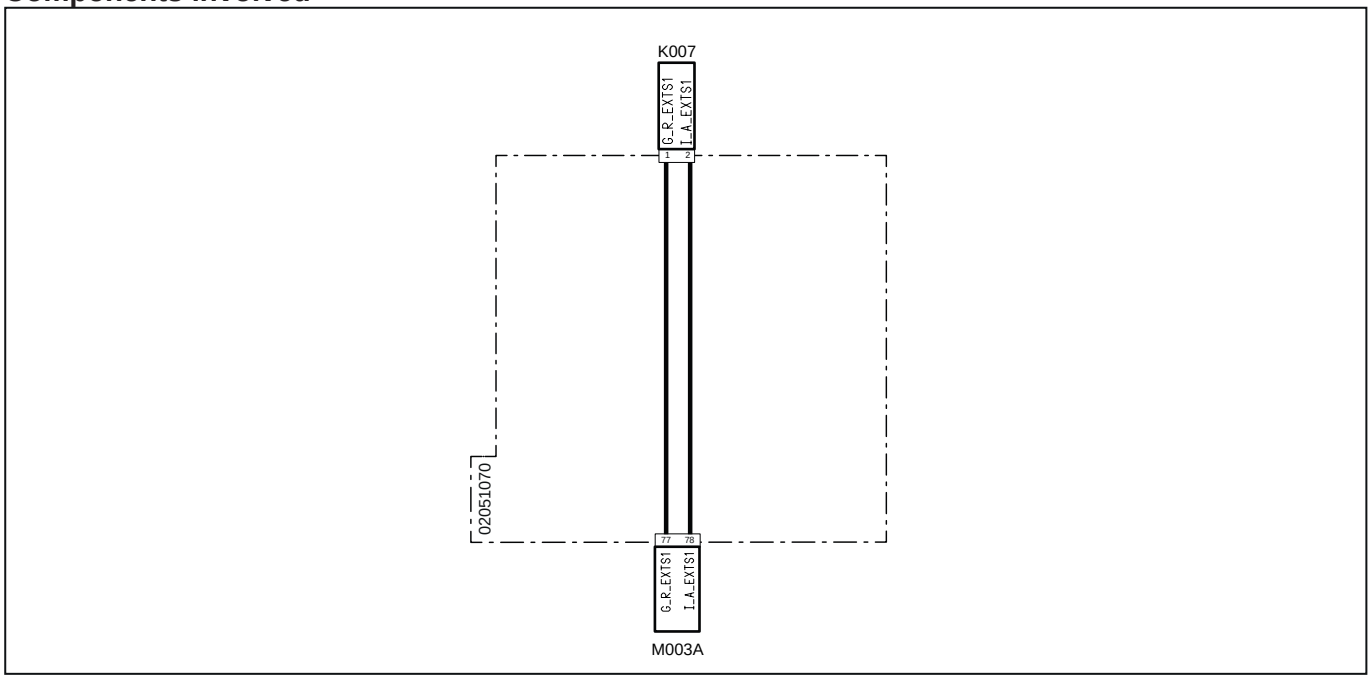
2 - Use the diagnostic tool to monitor the DOC temperature sensor (see the documentation of the diagnostic tool)
  - Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
  - If the problem persists, proceed to the next step

3 - Check that the connectors of the DOC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
  - Disconnect any badly connected connectors and reconnect correctly
  - If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K007(pag.R2-433)	P7	DOC temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3169 - DOC temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the DOC temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and DPF (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the DPF sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

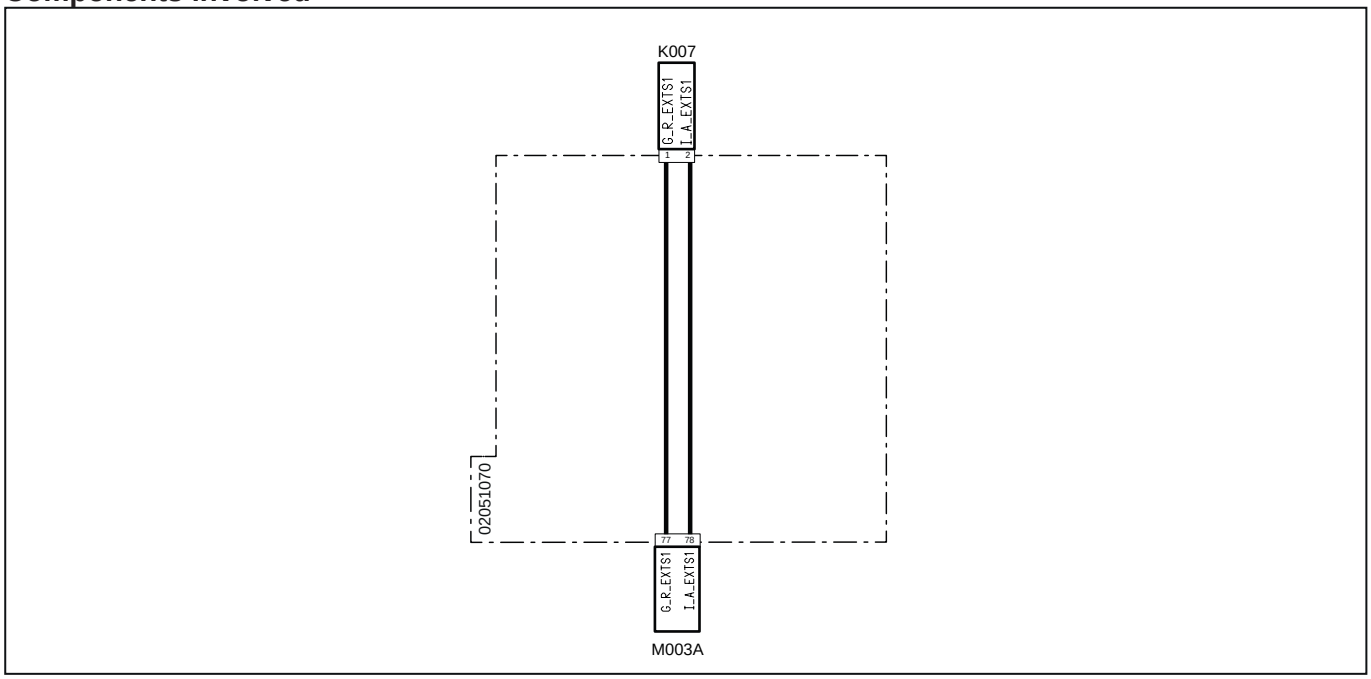
2 - Use the diagnostic tool to monitor the DOC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the DOC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K007(pag.R2-433)	P7	DOC temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3170 - DPF temperature sensor: short circuit to battery or open circuit

Description of fault

The ECU engine control unit detects a short circuit to battery or open circuit fault in the circuit of the DPF temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and DPF (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the DPF sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

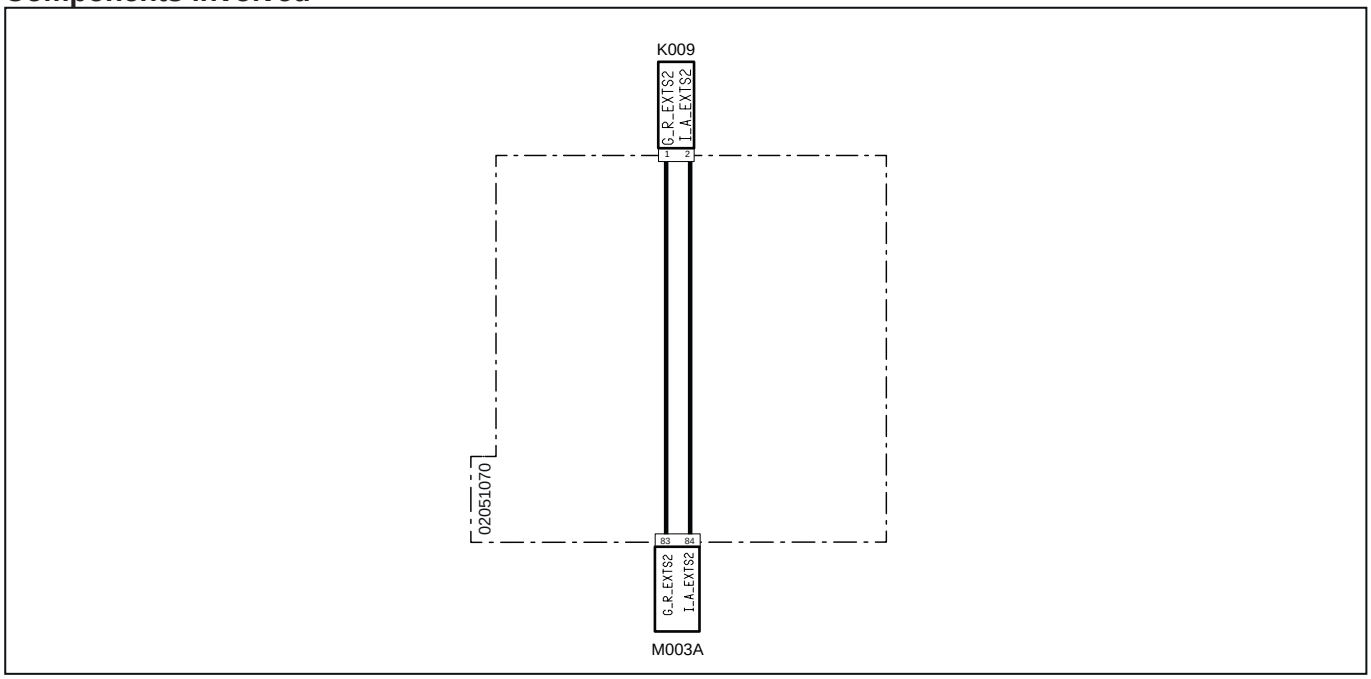
2 - Use the diagnostic tool to monitor the DPF temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the DPF temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K009(pag.R2-432)	P6	DPF temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3171 - DPF temperature sensor: short circuit to ground

Description of fault

The ECU engine control unit detects a short circuit to ground in the circuit of the DPF temperature sensor

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and DPF (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the DPF sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

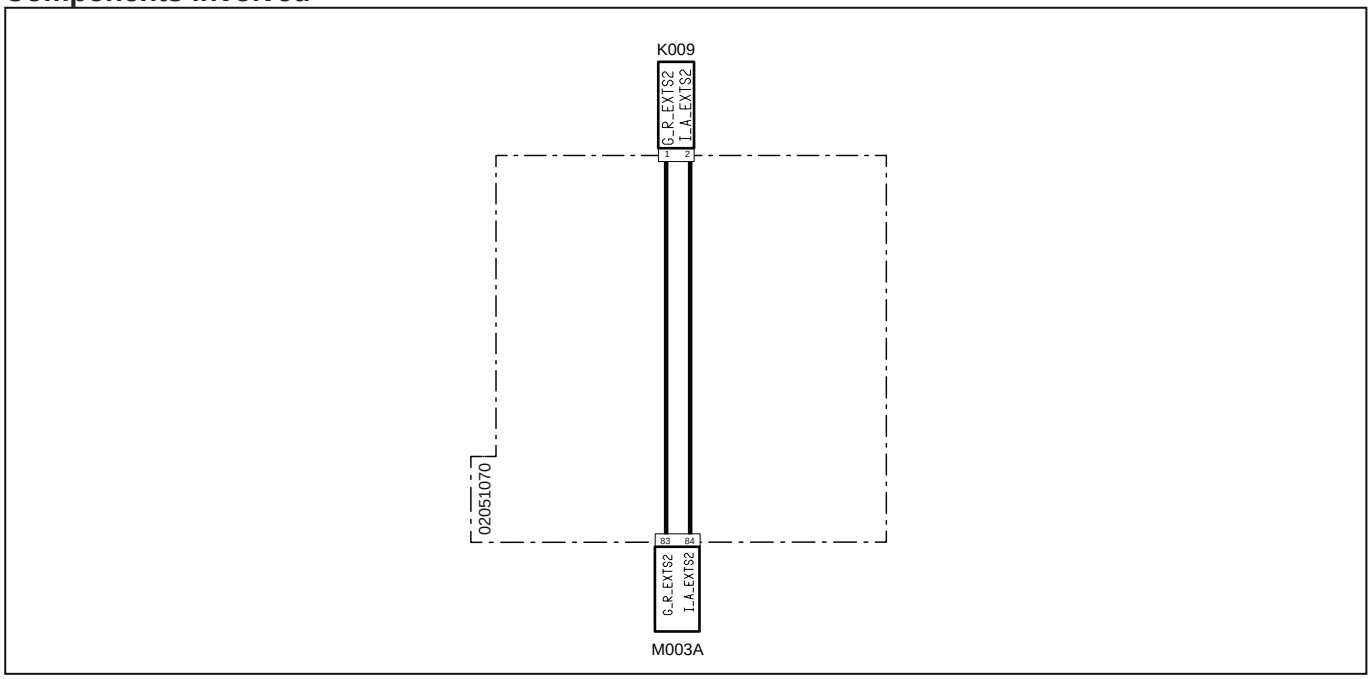
2 - Use the diagnostic tool to monitor the DPF temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

3 - Check that the connectors of the DPF temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K009(pag.R2-432)	P6	DPF temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3172 - Reduced cooling capacity of EGR cooler

Description of fault

None

Severity of error

Medium

Additional information

Amber lamp illuminated

The EGR cooler system cools the exhaust gas recovered from the exhaust manifold before it is recirculated into the intake manifold. The quantity of gas recovered is determined by the aperture of the EGR valve, while the temperature of the gas is monitored by the EGR temperature sensor. If the temperature read by the EGR temperature sensor is the same as or higher than the value read by the exhaust gas temperature sensor, this means that the EGR cooler is not working correctly

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the coolant level in the radiator and top up if necessary
- See the use and maintenance manual of the vehicle for the correct procedure for topping up coolant
- If the problem persists, proceed to the next step

3 - Check for leaks from the coolant and EGR cooler circuits
- Place a sheet of cardboard under the engine and start the engine. Any leaks in the circuit will wet the cardboard
  Even if no leaks are found, check the coolant level again after a couple of hours at work. If the level has dropped, this means that there is a leak somewhere in the circuit
- Check the condition of the radiator and hoses and check that the hose clamps are fastened correctly
  Check the condition of the EGR cooler
- If the problem persists, proceed to the next step

4 - Check the engine coolant level
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

5 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

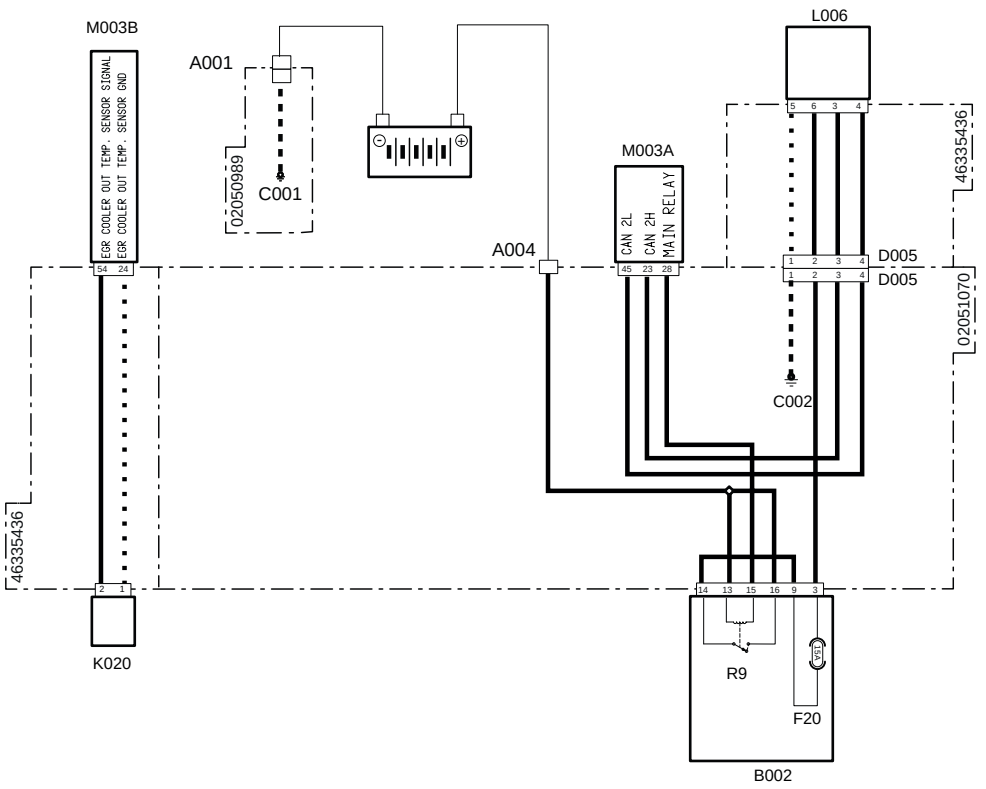
6 - Use the diagnostic tool to check that the EGR temperature sensor is working correctly (see documentation of diagnostic tool)
- Check if the EGR temperature sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

7 - Check that the connectors of the coolant temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

8 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

9 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3173 - DOC catalytic converter not working correctly

Description of fault

The control unit detects that the DOC catalytic converter is not working correctly

Severity of error

Medium

Additional information

Amber lamp illuminated

The ECU engine control unit monitors the readings of the DOC (upstream) and DPF (downstream) temperature sensors to determine if the DOC is working correctly. The DOC sensor should produce a temperature reading lower than or the same as the reading produced by the DPF sensor. If it does not, this means that the DOC is not working correctly

Behaviour of system

The engine may be started but regeneration is disabled

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the DOC and DPF temperature sensors have not been accidentally swapped
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Use the diagnostic tool to monitor the DOC temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

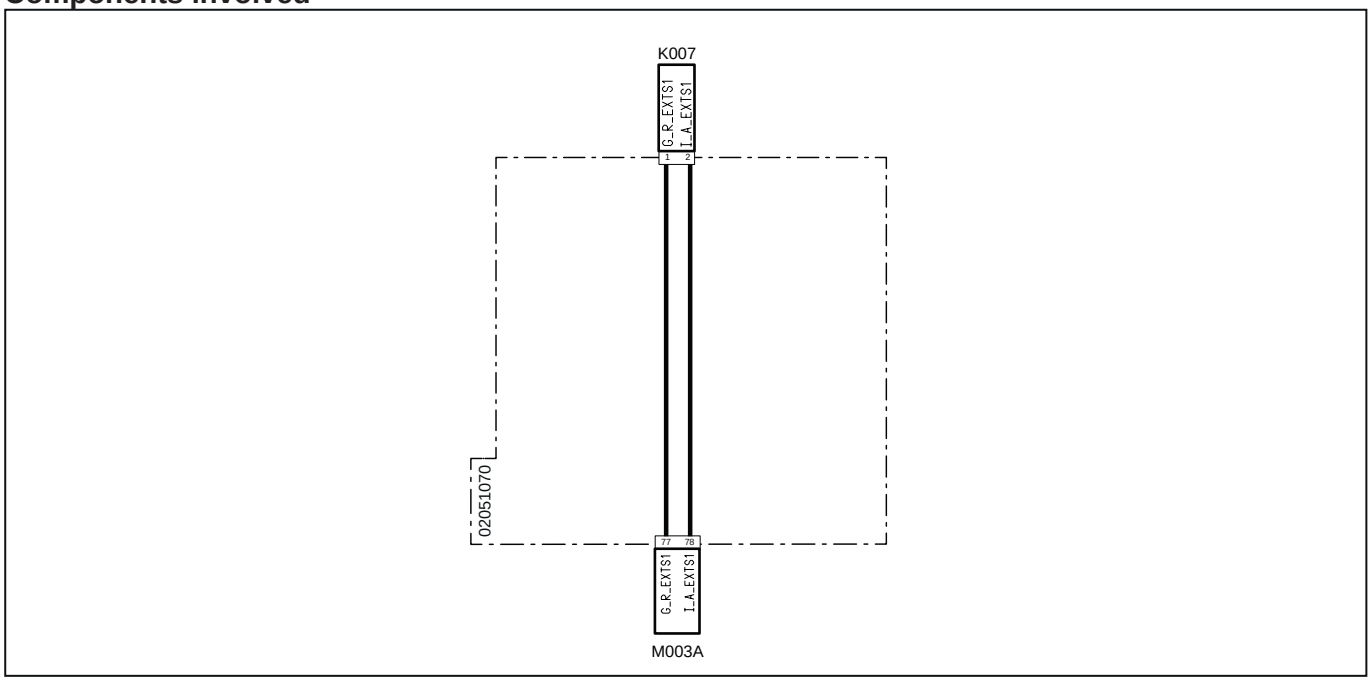
4 - Use the diagnostic tool to monitor the DPF temperature sensor (see the documentation of the diagnostic tool)
- Monitor the temperature in the intake manifold to check that the DOC temperature sensor is working correctly
- If the problem persists, proceed to the next step

5 - Check that the connectors of the DPF temperature sensor, the DOC temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K007(pag.R2-433)	P7	DOC temperature sensor
M003A (pag.R2-434)	P12	Engine control unit

3174 - Maximum permitted number of rail pressure relief valve apertures reached

Description of fault

The ECU engine control unit detects that the maximum permitted number of rail pressure relief valve apertures has been reached

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

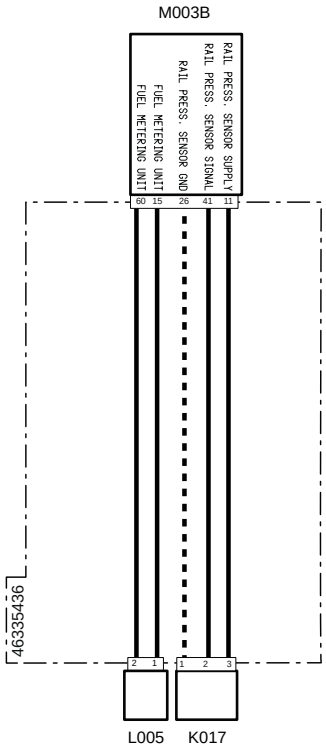
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3175 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

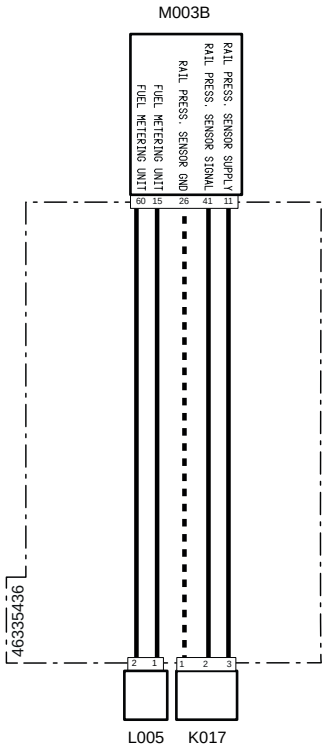
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3176 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

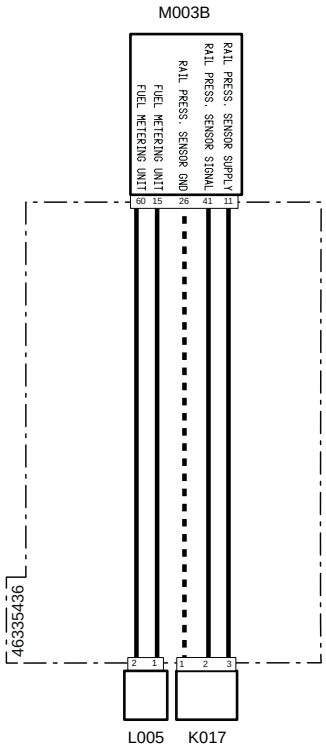
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3177 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

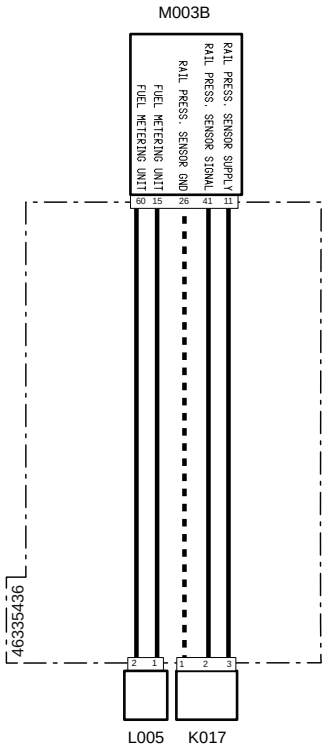
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3178 - Rail overpressure during torque limiting

Description of fault

The ECU engine control unit detects that the mechanical pressure relief valve opens while torque limiting is in effect

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

In certain conditions, the ECU engine control unit limits the torque produced by the engine for safety

Behaviour of system

Engine start not possible The EGR valve remains closed The engine operates with limited torque and the throttle valve does not work

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

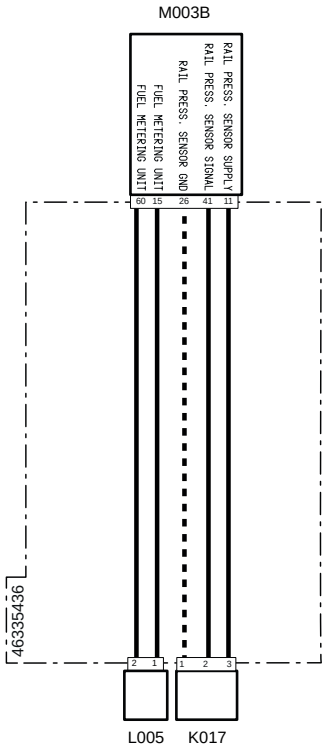
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
- Check that the MProp valve is working correctly and replace if necessary
- Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
- If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
- Check if the rail pressure sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
- Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
- If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3179 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

The engine may be started, but the engine operates with limited torque

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

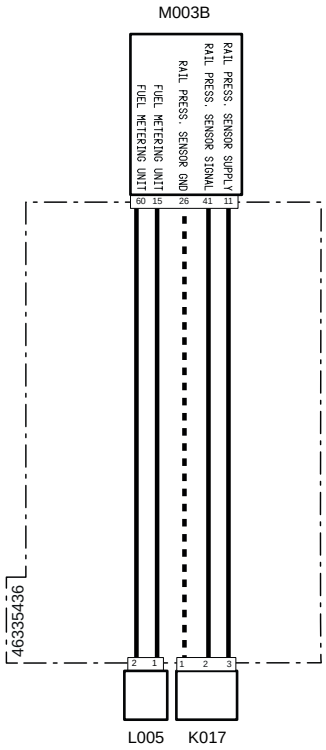
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3180 - Pressure relief valve opened before 1200 bar

Description of fault

The ECU engine control unit detects a drastic reduction in rail pressure before the 1200 bar limit is reached, due to the aperture of the pressure relief valve

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

No engine limiting strategy implemented by the control unit

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

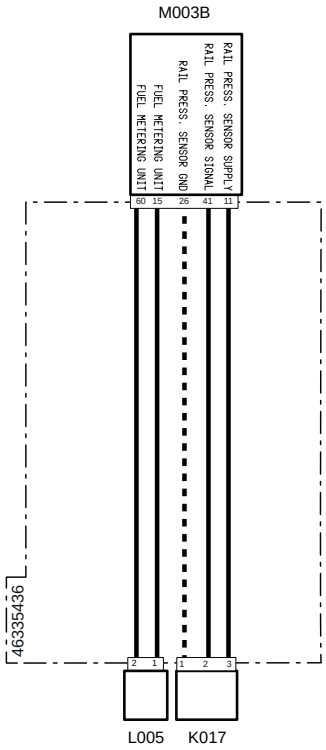
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3181 - Maximum permitted rail pressure exceeded

Description of fault

The ECU engine control unit detects that the calibrated aperture pressure of the mechanical pressure relief valve (1900 bar) has been exceeded

Severity of error

Medium

Additional information

Amber lamp illuminated

The pressure relief valve on the rail is a safety valve which redirects fuel to the return line if the pressure in the rail is too high. This valve is calibrated to 1900 bar, and may no longer function correctly if it opens too many times (more than 5). As a result, an error is generated once the valve has opened more than 5 times, requiring the valve to be replaced together with the rail and the fuel delivery pipes leading to the injectors

The pressure relief valve is completely mechanical. The ECU engine control unit detects a rapid drop in pressure in the rail via the rail pressure sensor, and interprets this an a pressure relief value aperture event

Behaviour of system

Engine start not possible

Checks necessary

1 - Check if there are any other error codes
  - If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
  - If there are no other error codes, proceed to the next step

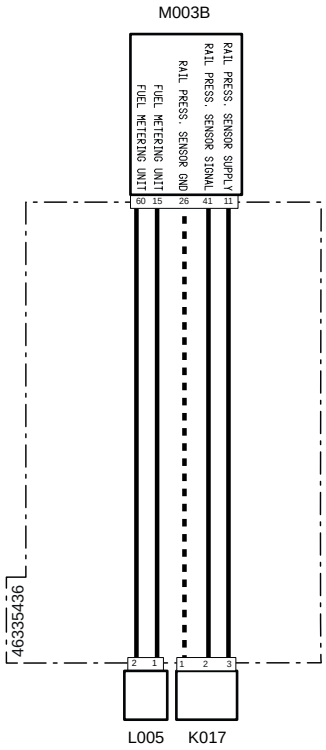
2 - Use the diagnostic tool to check that the MProp metering valve is working correctly (see documentation of diagnostic tool)
  - Check that the MProp valve is working correctly and replace if necessary
  - Check that the percent aperture of the valve is congruent with the pressure measured by the rail pressure sensor
  - If the problem persists, proceed to the next step

3 - Use the diagnostic tool to check that the rail pressure sensor is working correctly (see documentation of diagnostic tool)
  - Check if the rail pressure sensor is working correctly and replace if necessary
  - If the problem persists, proceed to the next step

4 - Use the diagnostic tool to check that the pressure relief valve is working correctly (see documentation of diagnostic tool)
  - Throttle up to maximum engine speed, and simultaneously monitor the pressure reading of the rail pressure sensor
  - If the pressure drops drastically during this check, this may be indicative of a calibration problem of the mechanical pressure relief valve

5 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
K017(pag.R2-475)	XS5	Common Rail fuel pressure sensor
L005(pag.R2-478)	XY1	High pressure pump
M003B (pag.R2-468)	XECUA	Engine control unit

3182 - EGR valve temperature too high

Description of fault

The EGR valve notifies the ECU engine control unit that the internal temperature in the EGR valve itself is too high

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

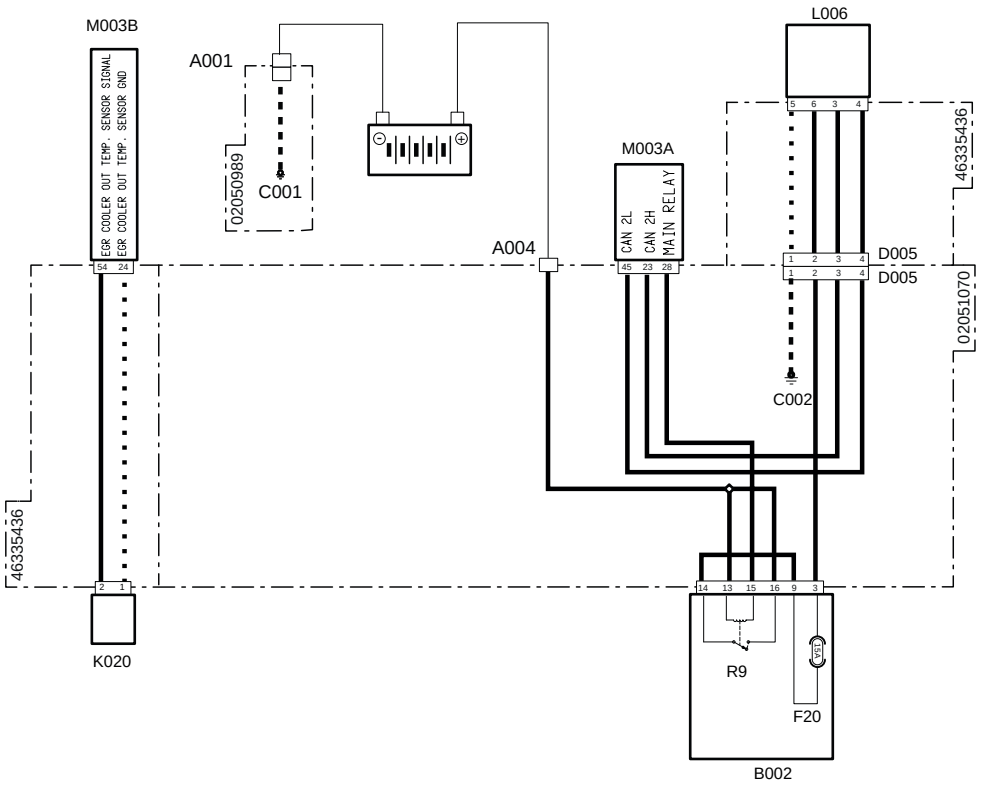
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002) (pag.R2-428)	R9	Main relay (30A)

3183 - EGR valve temperature too low

Description of fault

The EGR valve notifies the ECU engine control unit that the internal temperature in the EGR valve itself is too high

Severity of error

Medium

Additional information

Amber lamp illuminated

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check that the connectors of the EGR temperature sensor and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

3 - Check the condition of the CAN Bus communication pins of the engine control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

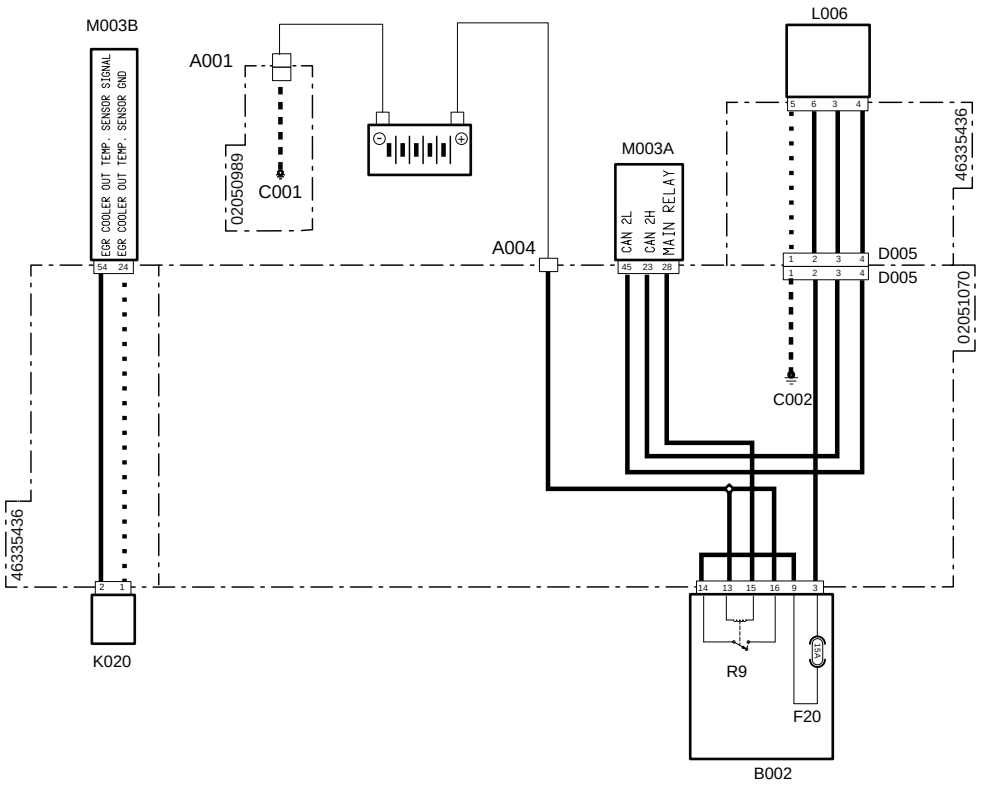
4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Contact the technical support service

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Main relay (30A)

3184 - EGR valve position error

Description of fault

The ECU engine control unit detects that the percentage error between the effective position of the EGR valve and the requested position is not within the permissible range

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool. The EGR valve may also be tested with the engine off.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A) and replace if necessary
- Disconnect the accessories fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

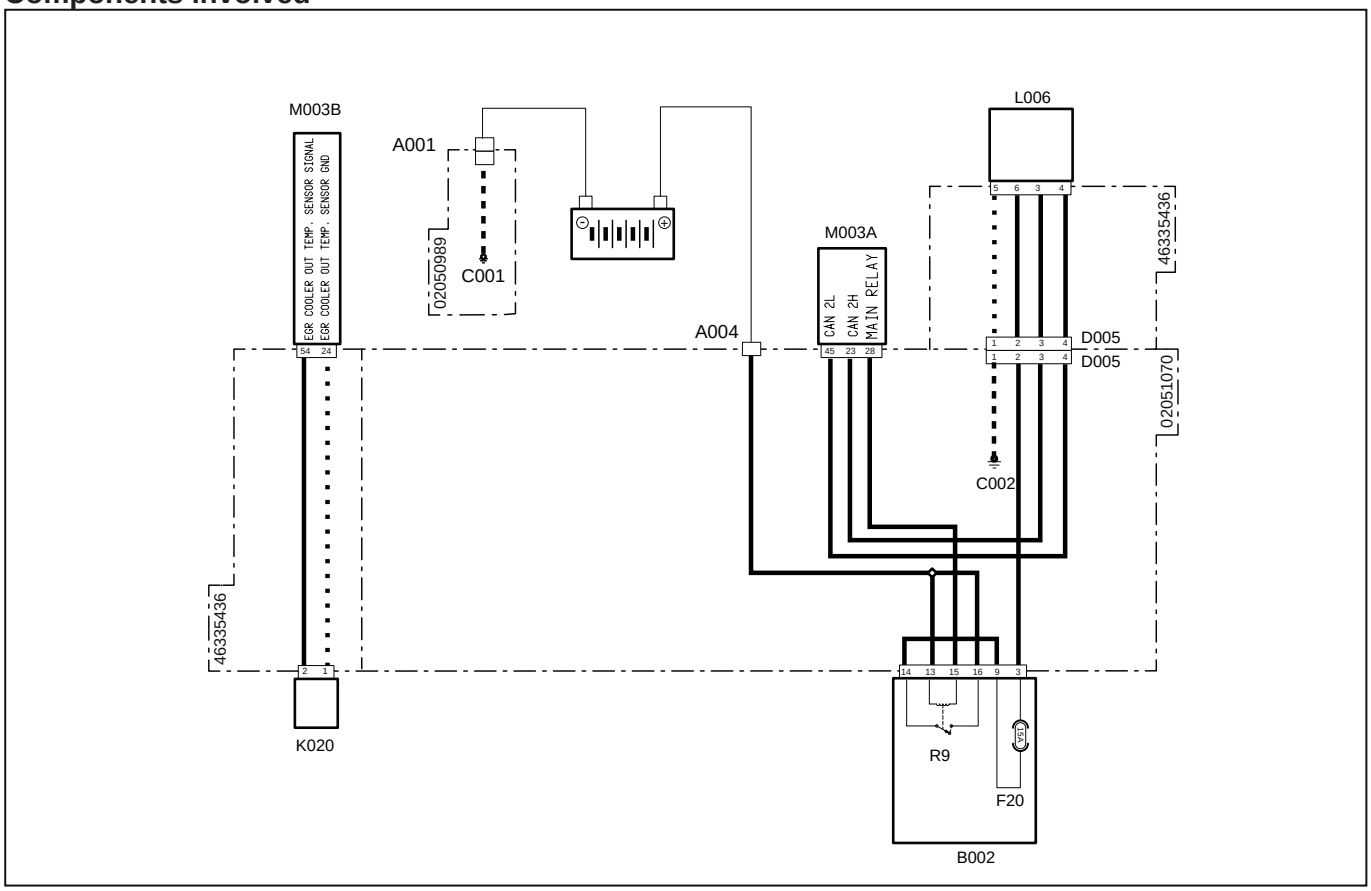
4 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the EGR is not mechanically stuck
- Remove the EGR valve and check that it is not stuck. Dirt residue may compromise the operation of the valve. Always clean the valve before refitting.
- After refitting the valve, check if it works correctly.
  Replace the EGR valve if it does not work correctly
- If the problem persists even though the valve is working correctly, proceed to the next step

6 - After checking that all the components associated with this error are working correctly, proceed to the next step
- Check for fouling and/or obstruction in the EGR exhaust gas circuit
- Check for fouling and/or obstruction in the intake air system

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Fuel pre-heat relay (30A)

3185 - EGR valve position error

Description of fault

The ECU engine control unit detects that the percentage error between the effective position of the EGR valve and the requested position is not within the permissible range

Severity of error

Medium

Additional information

Amber lamp illuminated

The percentage aperture of the valve and the relative electrical value may be determined with the diagnostic tool. The EGR valve may also be tested with the engine off.

The solenoid valve is completely open when it is not powered. The solenoid valve is completely closed when it is powered.

Behaviour of system

The engine may be started but the EGR valve remains closed

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the accessories fuse (15A) and replace if necessary
- Disconnect the accessories fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Use the diagnostic tool to check that the EGR valve is working correctly (see documentation of diagnostic tool)
- Carry out the EGR valve aperture test while simultaneously checking the effective percentage aperture of the valve itself

  The EGR valve test may also be performed with the engine off
- If the test is passed successfully and no abnormal values are measured, the problem may be due to a different component.
  If the test is failed, proceed to the next step

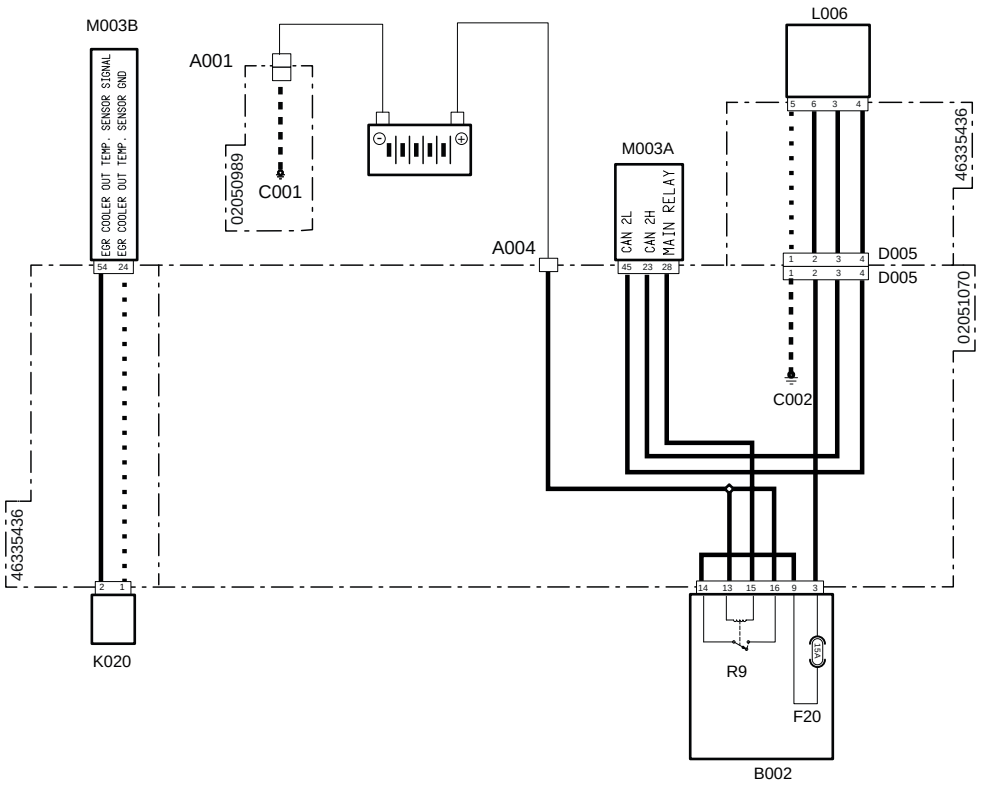
4 - Check that the connectors of the EGR valve and of the engine control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the EGR is not mechanically stuck
- Remove the EGR valve and check that it is not stuck. Dirt residue may compromise the operation of the valve. Always clean the valve before refitting.
- After refitting the valve, check if it works correctly.
  Replace the EGR valve if it does not work correctly
- If the problem persists even though the valve is working correctly, proceed to the next step

6 - After checking that all the components associated with this error are working correctly, proceed to the next step
- Check for fouling and/or obstruction in the EGR exhaust gas circuit
- Check for fouling and/or obstruction in the intake air system

7 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A004 (pag.R2-449)	P472	Positive battery terminal
C001 (pag.R2-386)	P66	Battery ground
C002 (pag.R2-442)	P475	Engine ground point
D005 (pag.R2-447)	P469	Wiring connector for prewired engine wiring loom
D005 (pag.R2-469)	XEG	Exhaust gas recirculation solenoid valve power feed
F20(B002)(pag.R2-428)	F20	Accessories (15A)
K020 (pag.R2-477)	XS7	EGR temperature sensor
L006 (pag.R2-479)	XY2	Exhaust gas recirculation solenoid valve (EGR)
M003B (pag.R2-468)	XECUA	Engine control unit
M003A (pag.R2-434)	P12	Engine control unit
R9(B002)(pag.R2-428)	R9	Fuel pre-heat relay (30A)

Vehicle control unit (VCU)

1003 - Battery voltage high

Description of fault

The electronic control unit detects a power feed voltage received from the battery exceeding 16 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

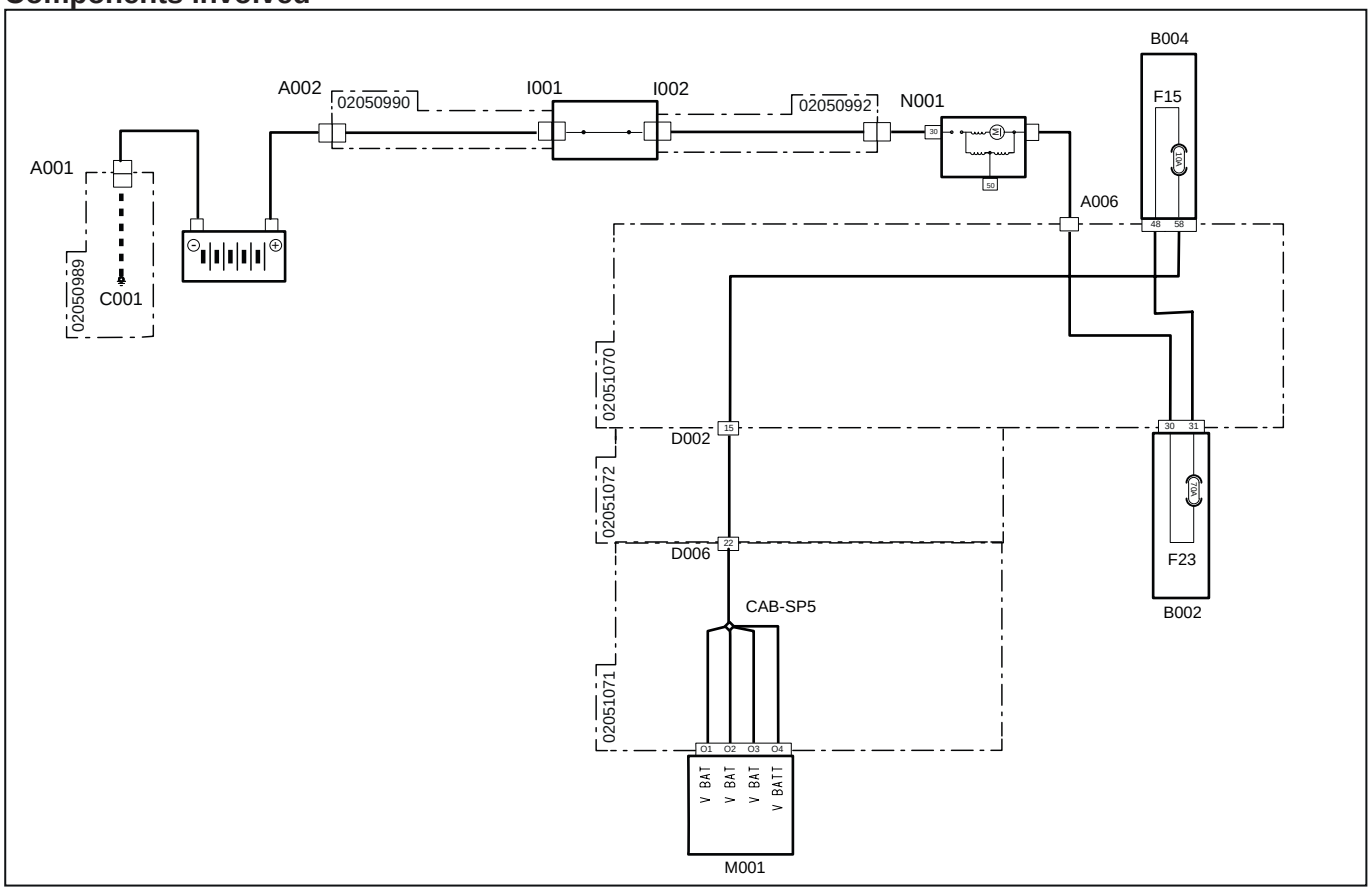
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
B004 (pag.R2-425)	P1A	Fuse box "2"
B002 (pag.R2-428)	P2A	Fuse box "1"
D002 (pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F15(B004) (pag.R2-425)	F15	12V VCU power feed (10A)
F23(B002) (pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M001 (pag.R2-458)	P80	Vehicle ECU
N001 (pag.R2-388)	P10	Starter motor "30"
A006 (pag.R2-441)	P63	Starter motor

1004 - Battery voltage too low

Description of fault

The electronic control unit detects a power feed voltage received from the battery below 7 V

Severity of error

High

Additional information

The battery voltage may be checked from the display of the multifunction instrument

Red indicator lamp flashing

Behaviour of system

The tractor cannot be switched on

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the main fuse (70A) and replace if necessary
- Disconnect the main fuse (70A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the VCU fuse (10A) and replace if necessary
- Disconnect the VCU fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

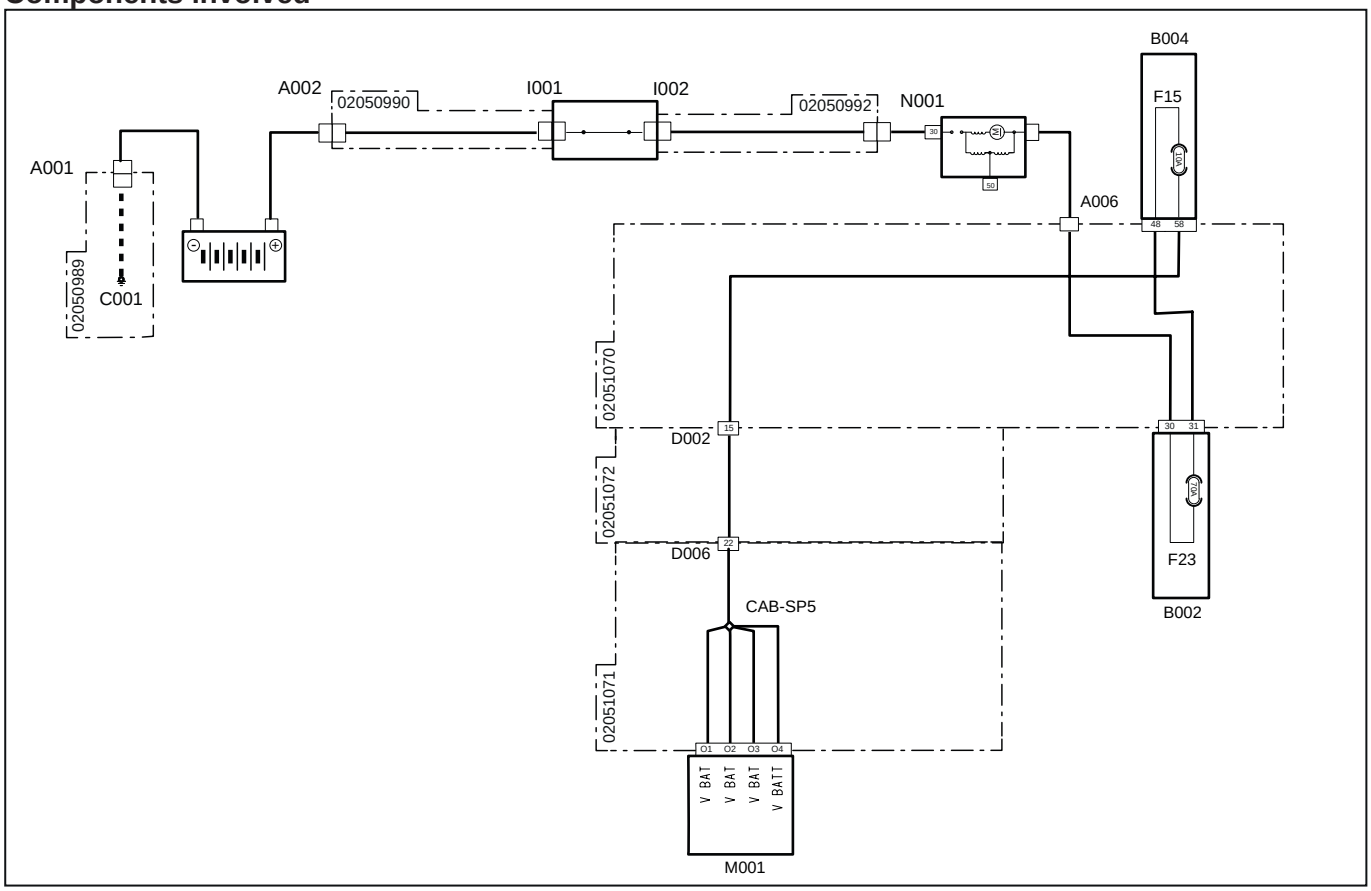
5 - Check that the battery state of charge measured is the same as the value shown on the multifunction instrument display
- Open the "Information" screen on the digital display to view the state of charge of the battery read by the control unit
- If the battery state of charge shown on the display is not the same as the value measured with the tester, replace the VCU vehicle control unit.
- If the values match, proceed to the next step

6 - Check that the alternator is working correctly
- the alternator may be tested with a tester or checked with the diagnostic tool.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

Components involved



System code	Source code	Description
A001 (pag.R2-386)	P11	Negative battery terminal
A002 (pag.R2-388)	P55	Positive battery terminal
B004 (pag.R2-425)	P1A	Fuse box "2"
B002 (pag.R2-428)	P2A	Fuse box "1"
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F15(B004)(pag.R2-425)	F15	12V VCU power feed (10A)
F23(B002)(pag.R2-428)	F23	Main maxi fuse (70A)
I001 (pag.R2-387)	P39	Battery master relay switch (input terminal)
I002 (pag.R2-389)	P23	Battery master relay switch (output terminal)
M001 (pag.R2-458)	P80	Vehicle ECU
N001 (pag.R2-388)	P10	Starter motor "30"
A006 (pag.R2-441)	P63	Starter motor

1005 - Sensor power feed voltage too high

Description of fault

The electronic control unit detects a sensor power feed voltage exceeding the maximum limit of 5.6 V

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel may be switched on (ignition on) and the engine starts.

Checks necessary

1 - Check for other error codes. If no other error codes exist, proceed to the next step.

2 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

3 - Check the ECU output powering the sensors with +5V voltage
- Check pin: N4
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

4 - Check the condition of the sensor fuse (10A) and replace if necessary
- Disconnect the sensor fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - If not faulty, problem is caused by an ECU hardware fault. Replace vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1006 - Sensor power feed voltage too low

Description of fault

The electronic control unit detects a sensor power feed voltage below the minimum limit of 4.4 V

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel may be switched on (ignition on) and the engine starts.

Checks necessary

1 - Check for other error codes. If no other error codes exist, proceed to the next step.

2 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

3 - Check the ECU output powering the sensors with +5V voltage
- Check pin: N4
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

4 - Check the condition of the sensor fuse (10A) and replace if necessary
- Disconnect the sensor fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

5 - Check the battery state of charge:
- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - If not faulty, replace the vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1009 - CAN Bus line communication error

Description of fault

The control unit detects a communication error on the CAN Bus line

Severity of error

High

Additional information

Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Check the condition of the CAN Bus communication pins of the vehicle control unit
- Disconnect the respective connectors
- Check that the contact surfaces of the pins are in good condition
- In no damage or corrosion are found, proceed to the next step

3 - Check that the resistance measured on the CAN Bus line is 60 Ohm
- Disconnect the connectors and measure the resistance of the wiring loom with a tester applied to the pins of the CAN Bus line. If the value measured is not 60 Ohm, the line is not working correctly.
- If the value measured is 60 Ohm, the line is working correctly: proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly.
- Check the relative connectors on each cable
- If all the cables are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Replace the vehicle control unit

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1010 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1011 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1012 - Vehicle control unit hardware fault

Description of fault

The control unit detects a hardware fault

Severity of error

High

Additional information

This error is not shown in the error list. Generic CAN Bus line fault icon displayed on multifunction instrument screen, accompanied by buzzer.

Red indicator lamp flashing

Behaviour of system

Engine start not possible The instrument panel may be switched on (ignition on).

Checks necessary

1 - Check that the connectors of the vehicle control unit are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

2 - Disconnect and reconnect the battery to reset the system
- Make sure that the battery is reconnected correctly

3 - Check that all the fuses and relays are in working order and are connected correctly
- Disconnect the fuses
- Replace any blown fuses with new fuses of the same current rating
- Check that the relays are connected correctly
- the relay connections may be tested with a tester.
- If all the fuses and relays are in working order, proceed to the next step

4 - Check the general condition of the CAN Bus line - check that there are no disconnected cables and that all the resistors are fitted correctly
- Check the relative connectors on each cable
- If everything is connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

6 - Check that the wiring loom connectors are connected correctly and not damaged

7 - Use the diagnostic tool to initialise the vehicle control unit (see the documentation of the diagnostic tool)

8 - Replace the vehicle control unit if the problem persists

Components involved

System code	Source code	Description
A001(pag.R2-386)	P11	Negative battery terminal
A002(pag.R2-388)	P55	Positive battery terminal
M001(pag.R2-458)	P80	Vehicle ECU

1013 - Fuel level sensor voltage not within permitted range

Description of fault

The control unit detects an excessively high voltage or a short circuit to positive on the fuel level sensor

Severity of error

Medium

Additional information

The fuel level sensor produces a voltage signal exceeding 4600 mV. This voltage signal may be checked with the diagnostic tool

Amber indicator lamp flashing

Behaviour of system

The engine may be started but the fuel gauge needle remains at 0.

Checks necessary

1 - Check that the connectors of the fuel level sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect any badly connected connectors and reconnect correctly
   - If all the connectors are connected correctly, proceed to the next step

2 - Use the diagnostic tool to check that the fuel level sensor is working correctly (see documentation of diagnostic tool)
   - Replace the sensor if it is faulty
   - Proceed to the next step if the sensor is working correctly

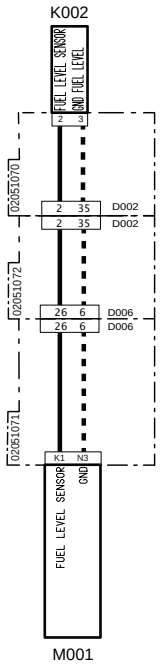
3 - Check the general condition of the wiring loom
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If no problems are found, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Replace the fuel level sensor if the problem persists

Components involved



System code	Source code	Description
K002(pag.R2-453)	P40	Fuel level sensor
M001(pag.R2-458)	P80	Vehicle ECU

1014 - Fuel level sensor voltage not within permitted range

Description of fault

The control unit detects an excessively low voltage or a short circuit to ground on the fuel level sensor

Severity of error

Medium

Additional information

The fuel level sensor produces a voltage signal below 1 mV. This voltage signal may be checked with the diagnostic tool

Amber indicator lamp flashing

Behaviour of system

The engine may be started but the fuel gauge needle remains at 0.

Checks necessary

1 - Check that the connectors of the fuel level sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
   - Disconnect any badly connected connectors and reconnect correctly
   - If all the connectors are connected correctly, proceed to the next step

2 - Use the diagnostic tool to check that the fuel level sensor is working correctly (see documentation of diagnostic tool)
   - Replace the sensor if it is faulty
   - Proceed to the next step if the sensor is working correctly

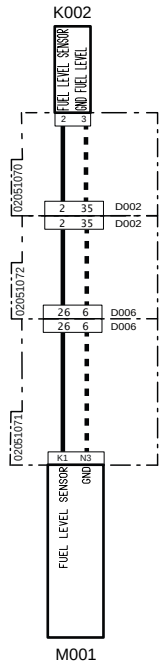
3 - Check the general condition of the wiring loom
   - Inspect the entire length of all the cables of the wiring loom to check the condition of the cables and connectors
   - If no problems are found, proceed to the next step

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Replace the fuel level sensor if the problem persists

Components involved



System code	Source code	Description
K002(pag.R2-453)	P40	Fuel level sensor
M001(pag.R2-458)	P80	Vehicle ECU

1017 - Differential lock solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state in the circuit of the differential lock solenoid valve. The signal current is above 2400 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the differential lock cannot be engaged

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

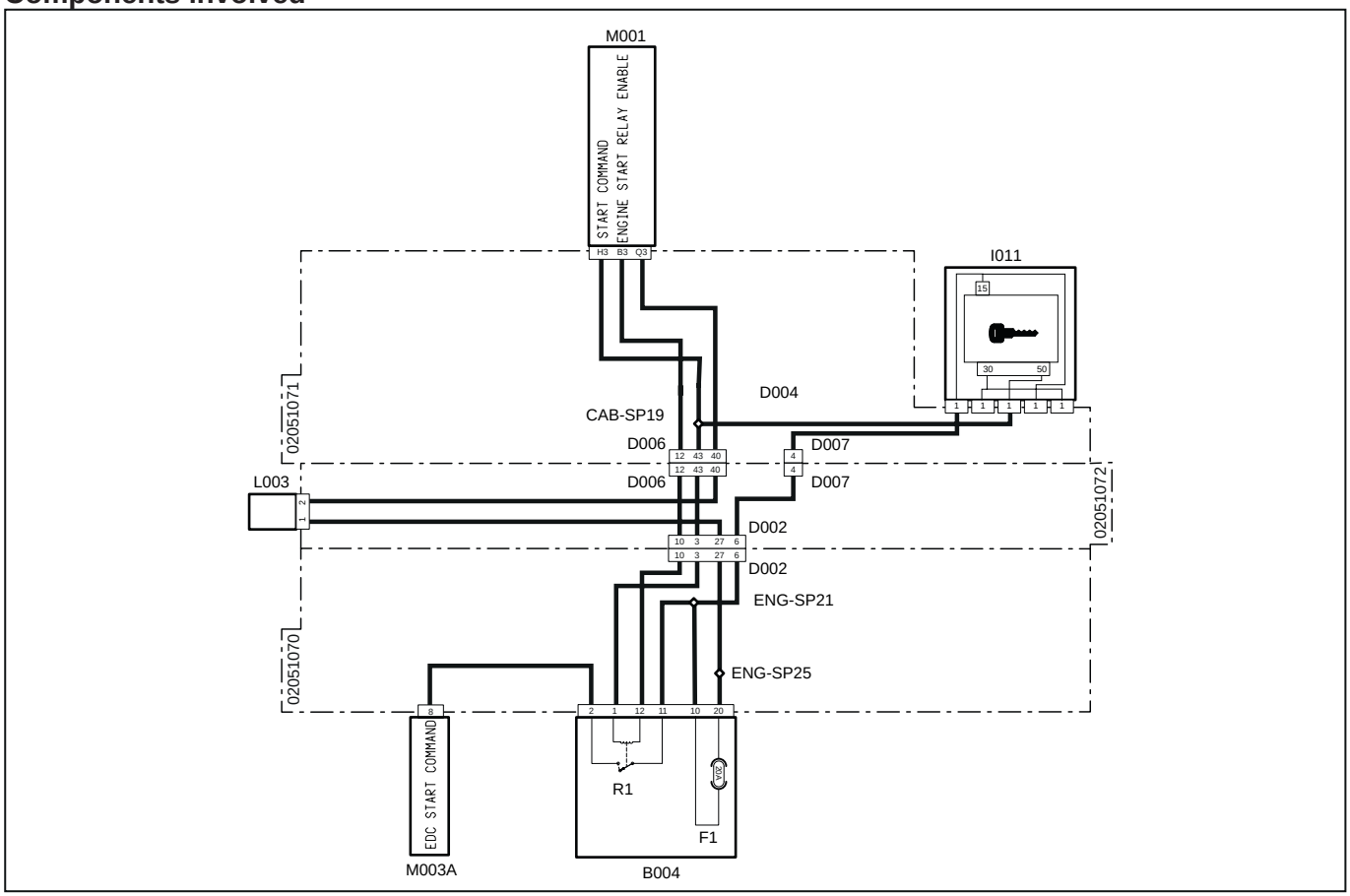
2 - Check if the DL solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve
- Proceed to the next step if the component is working correctly

3 - Check that the connectors of the DL solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the DL solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F1(B004)(pag.R2-425)	F1	Socket - Rotating beacon (10A)
I011 (pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
D007 (pag.R2-414)	P102A	Main-dashboard connector
D007 (pag.R2-415)	P102B	Dashboard-main connector
L003 (pag.R2-464)	P187	Differential lock "ON/OFF" solenoid valve
M001 (pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
R1(B004)(pag.R2-425)	R1	Start enable relay

1018 - Differential lock solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state in the circuit of the differential lock solenoid valve. The signal current is below 75 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the differential lock cannot be engaged

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

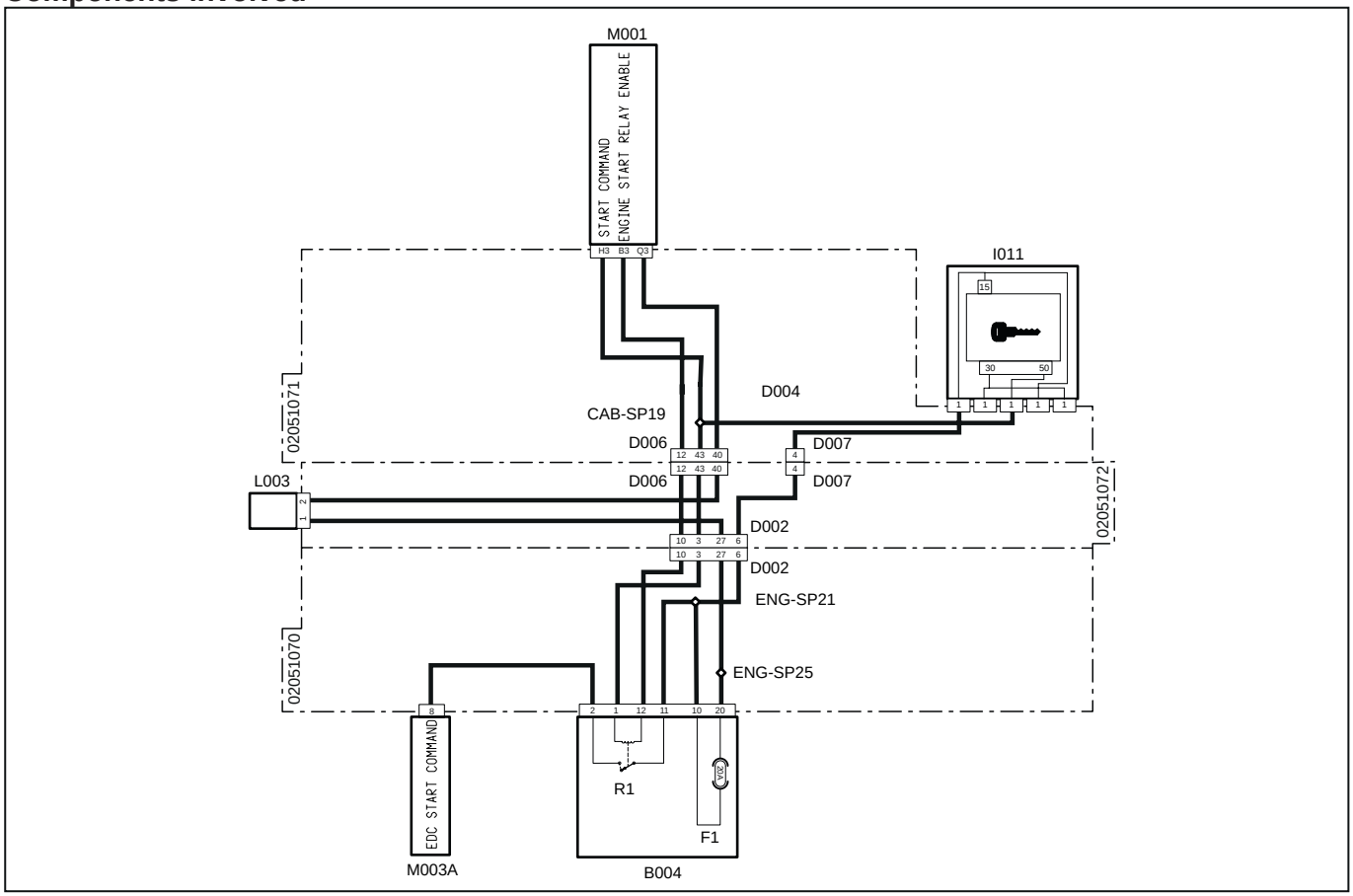
2 - Check if the DL solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve
- Proceed to the next step if the component is working correctly

3 - Check that the connectors of the DL solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the DL solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002 (pag.R2-402)	P10A	Wiring connector for main wiring loom
D002 (pag.R2-451)	P10B	Wiring connector for dashboard wiring loom
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F1(B004) (pag.R2-425)	F1	Socket - Rotating beacon (10A)
I011 (pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
D007 (pag.R2-414)	P102A	Main-dashboard connector
D007 (pag.R2-415)	P102B	Dashboard-main connector
L003 (pag.R2-464)	P187	Differential lock "ON/OFF" solenoid valve
M001 (pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
R1(B004) (pag.R2-425)	R1	Start enable relay

1019 - Tractor speed sensor reading error

Description of fault

The ECU engine control unit detects a tractor speed sensor reading error.

Severity of error

High

Additional information

The speed sensor reads the speed from a gear mounted onto the splined hub at the top of the transmission, and produces a signal with a frequency value in Hertz

Red indicator lamp flashing

Behaviour of system

The tractor may be started but the tractor speed will not be displayed on the digital display

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

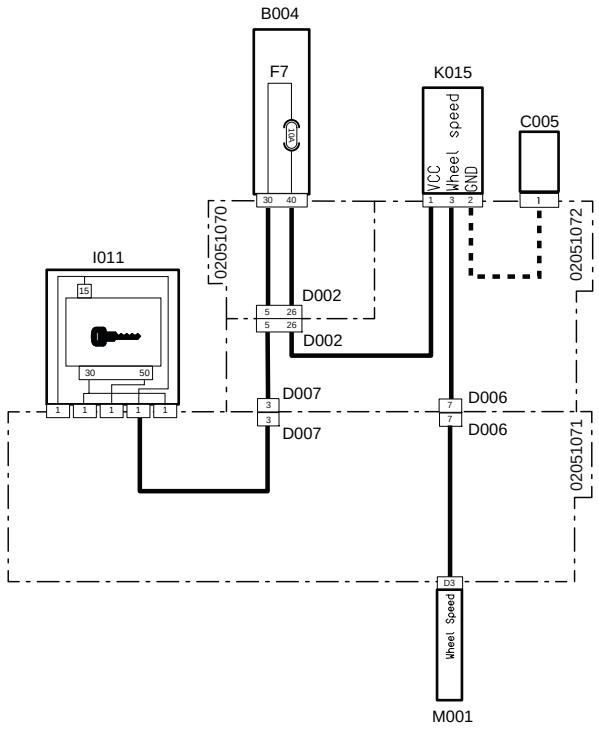
2 - Check if the sensor is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the sensor
- Proceed to the next step if the component is working correctly

3 - Check that the sensor is installed in the correct position relative to the gear

4 - Check that the connectors of the tractor speed sensor and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.
- Check that the wiring loom connectors are connected correctly and not damaged
- Replace the wheel speed sensor if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R2-466)	P412	Main ground
D007 (pag.R2-414)	P102A	Main-dashboard connector
D007 (pag.R2-415)	P102B	Dashboard-main connector
D002(pag.434)	P10B	Main-Engine connector
D002 (pag.385)	P10A	Engine-Main connector
D006 (pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006 (pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
I011 (pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
K015 (pag.R2-443)	P301	Wheel speed sensor
M001 (pag.R2-458)	P80	Vehicle ECU

1020 - Throttle potentiometer: short circuit in power feed line

Description of fault

The control units detects a short circuit in the throttle potentiometer power feed line. The power feed voltage exceeds 4.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

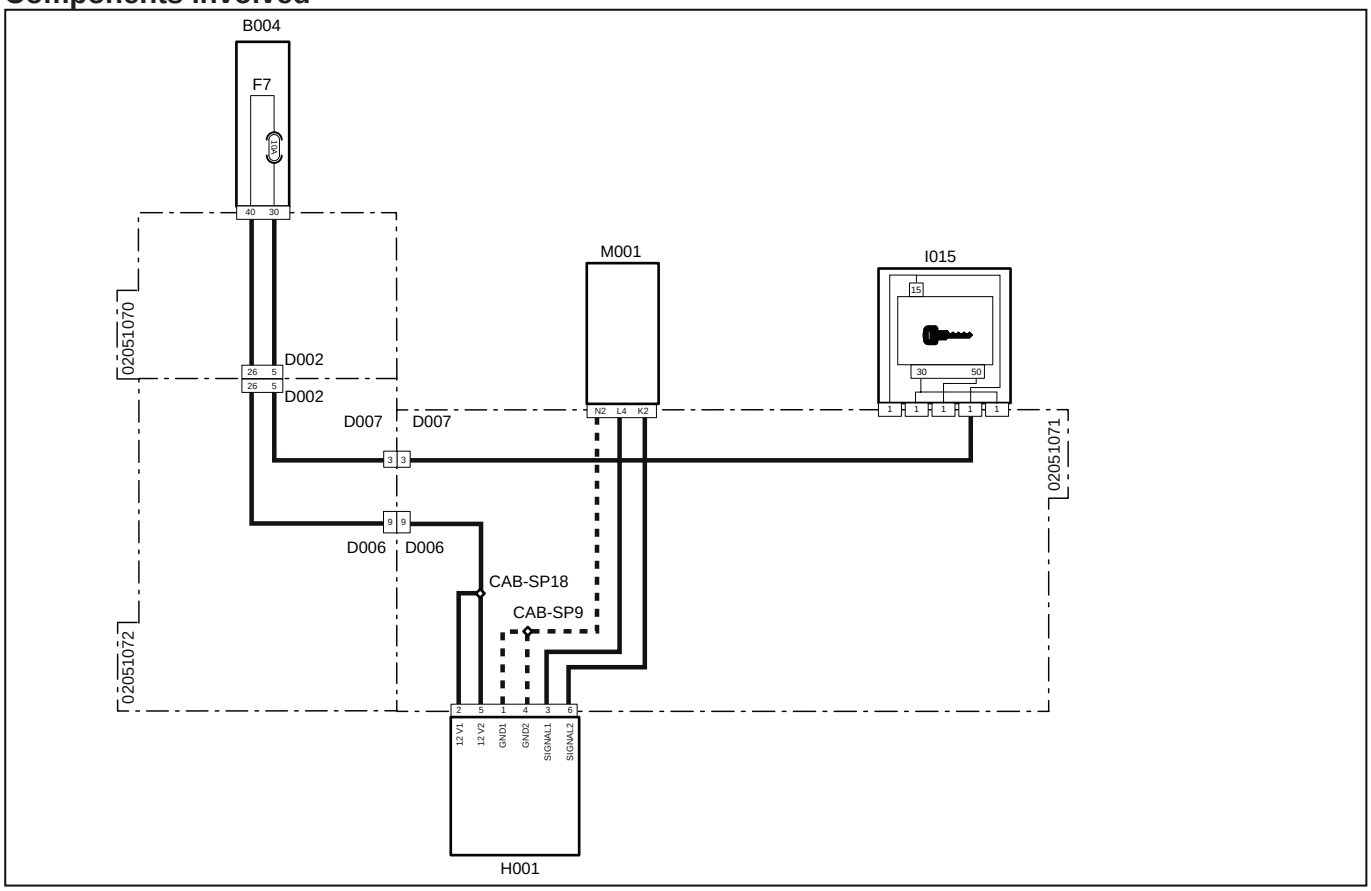
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R2-402)	P10A	Engine-main wiring connector
D002 (pag.R2-451)	P10B	Main-engine wiring connector
D007 (pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007 (pag.R2-414)	P102A	Main-dashboard wiring connector
D006 (pag.R2-410)	P100A	Main-dashboard wiring connector
D006 (pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004)(pag.R2-425)	F7	Turn indicators (10A)
H001 (pag.R2-409)	P100	Throttle
I011 (pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R2-458)	P80	Vehicle ECU

1021 - Throttle potentiometer: short circuit to ground

Description of fault

The control unit detects a short circuit to ground on the throttle potentiometer. Power feed voltage is less than 0.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

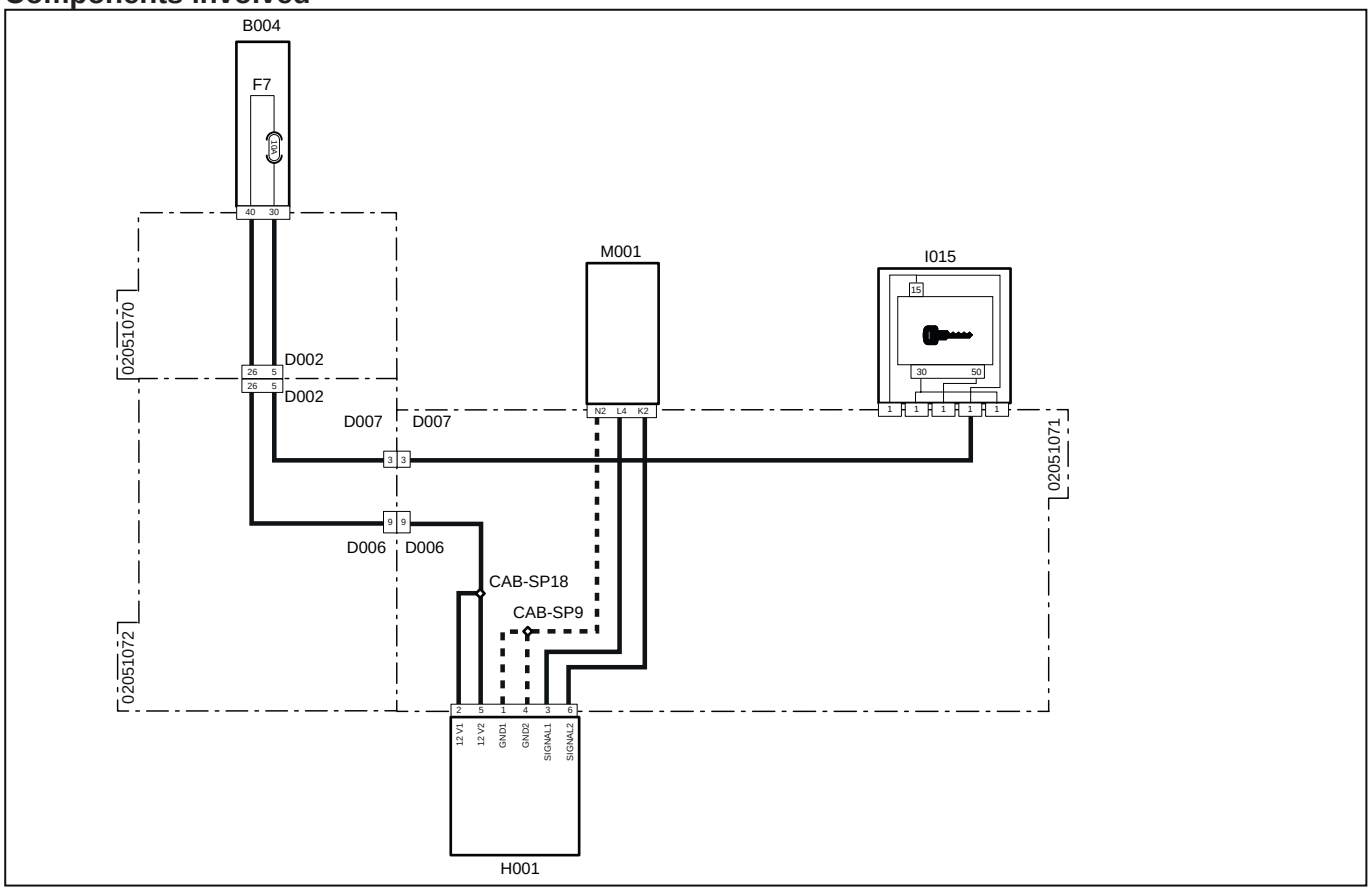
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002 (pag.R2-402)	P10A	Engine-main wiring connector
D002 (pag.R2-451)	P10B	Main-engine wiring connector
D007 (pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007 (pag.R2-414)	P102A	Main-dashboard wiring connector
D006 (pag.R2-410)	P100A	Main-dashboard wiring connector
D006 (pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
H001 (pag.R2-409)	P100	Throttle
I011 (pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001 (pag.R2-458)	P80	Vehicle ECU

1022 - Throttle potentiometer: short circuit in power feed line

Description of fault

The control units detects a short circuit in the throttle potentiometer power feed line. The power feed voltage exceeds 4.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

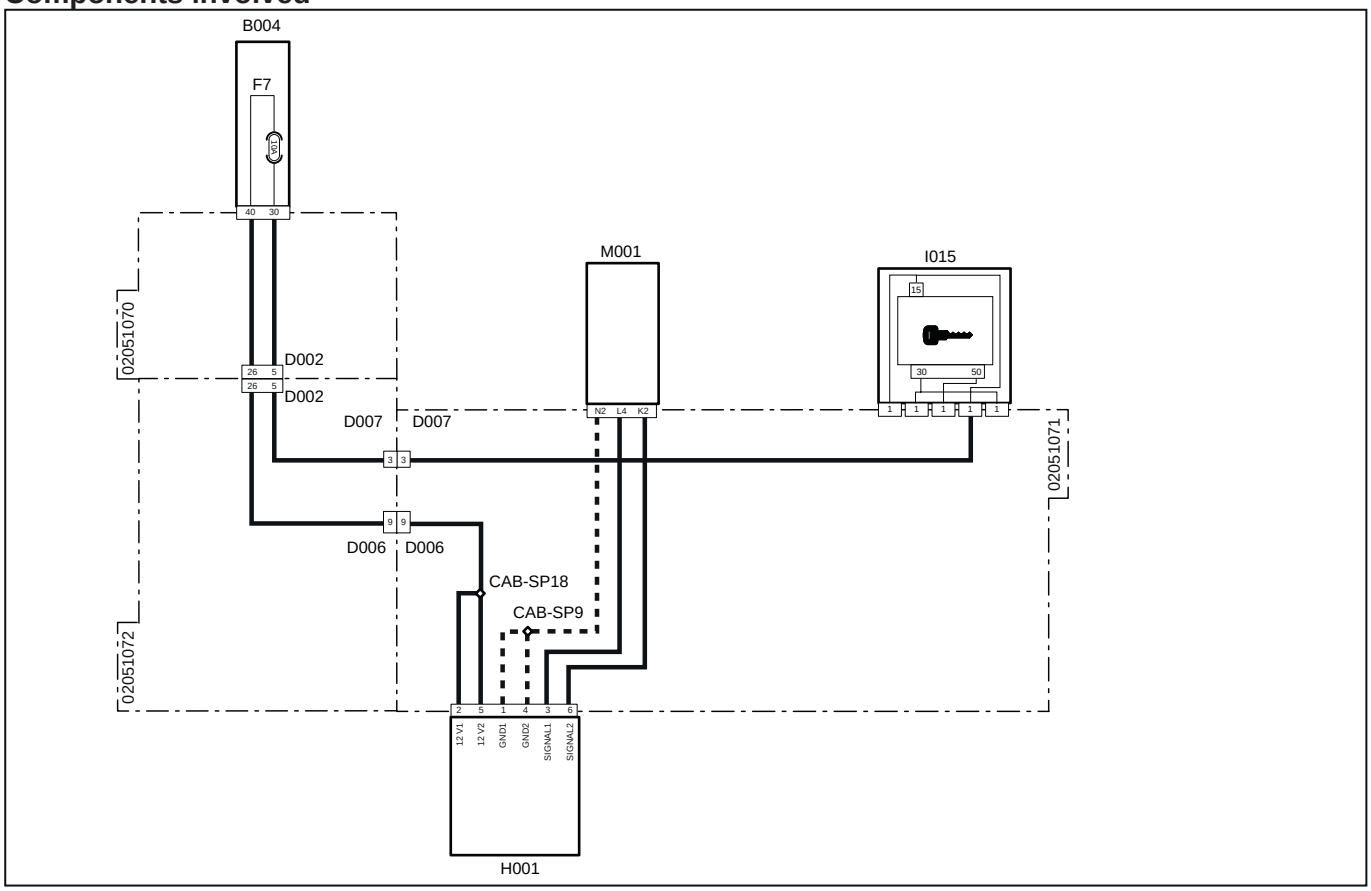
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D006(pag.R2-410)	P100A	Main-dashboard wiring connector
D006(pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
H001(pag.R2-409)	P100	Throttle
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001(pag.R2-458)	P80	Vehicle ECU

1023 - Throttle potentiometer: short circuit to ground

Description of fault

The control unit detects a short circuit to ground on the throttle potentiometer. Power feed voltage is less than 0.5 V

Severity of error

High

Additional information

Error codes 1024 or 1025 may also be displayed

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

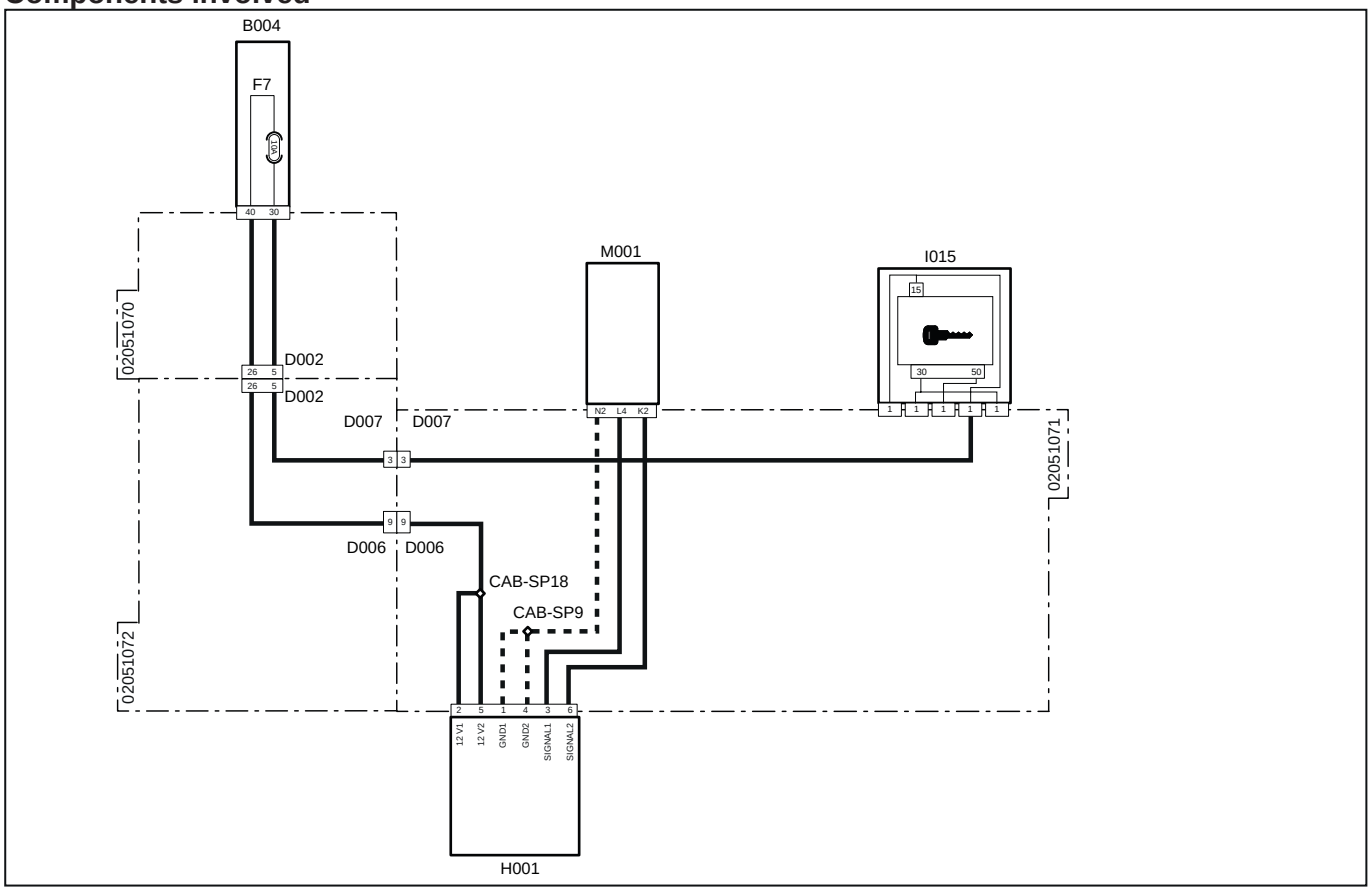
2 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

3 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D006(pag.R2-410)	P100A	Main-dashboard wiring connector
D006(pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
H001(pag.R2-409)	P100	Throttle
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001(pag.R2-458)	P80	Vehicle ECU

1024 - Signal 1 value not correct

Description of fault

The control unit detects that the value of signal 1 of the throttle potentiometer is not correct

Severity of error

High

Additional information

During calibration of the throttle potentiometer, a travel of at least 10% between the minimum and maximum positions must be detected. If not, the error code is generated. This may also occur if the potentiometer has not been calibrated

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the potentiometer receives a power feed voltage of 12V
- This may be done with a tester.
- Proceed to the next step if the component is powered correctly

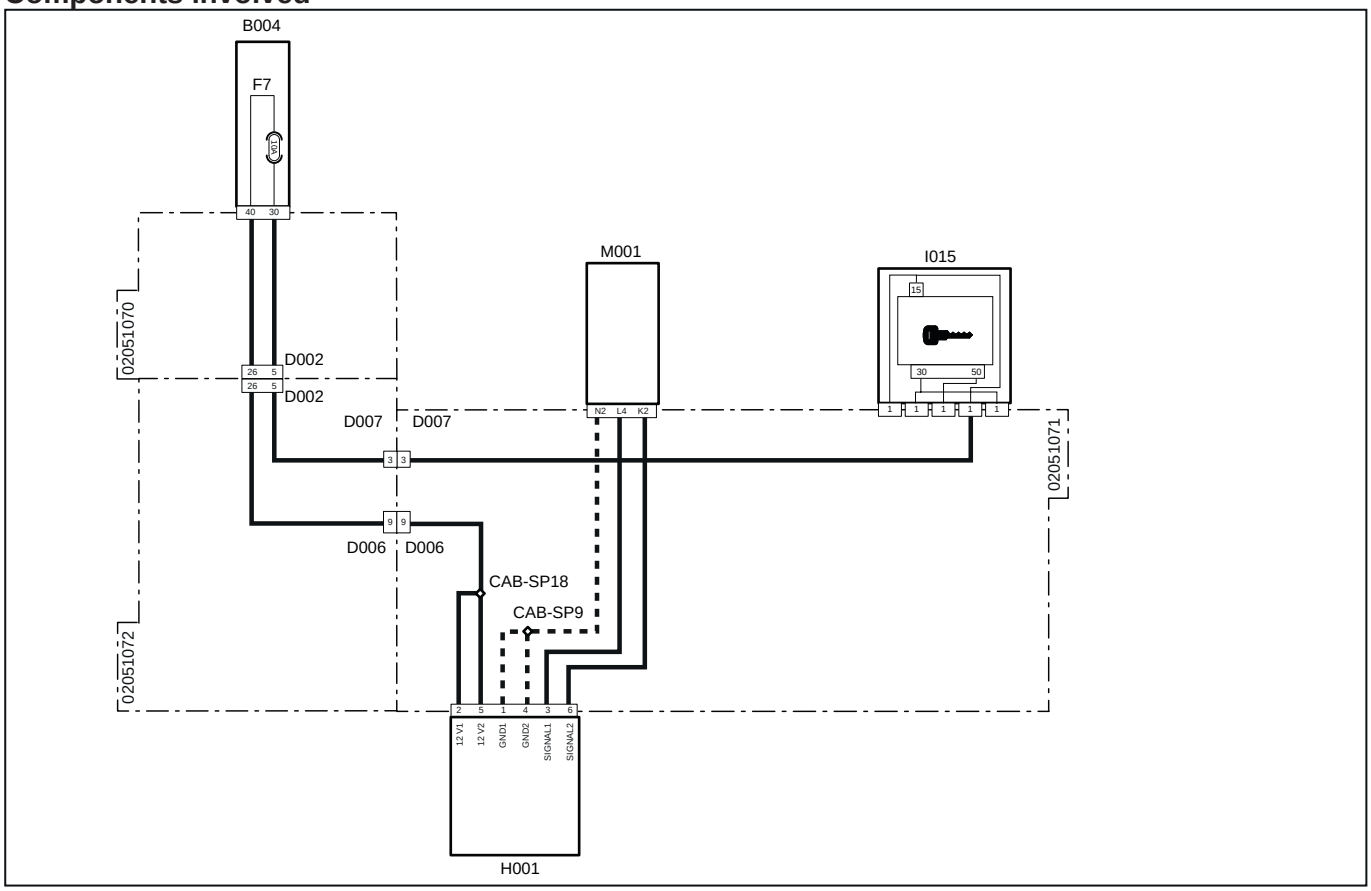
3 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

4 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

5 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

6 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D006(pag.R2-410)	P100A	Main-dashboard wiring connector
D006(pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
H001(pag.R2-409)	P100	Throttle
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001(pag.R2-458)	P80	Vehicle ECU

1025 - Signal 2 value not correct

Description of fault

The control unit detects that the value of signal 2 of the throttle potentiometer is not correct

Severity of error

High

Additional information

During calibration of the throttle potentiometer, a travel of at least 10% between the minimum and maximum positions must be detected. If not, the error code is generated. This may also occur if the potentiometer has not been calibrated

Red indicator lamp flashing

Behaviour of system

The engine may be started but no throttle control is possible

Checks necessary

1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the potentiometer receives a power feed voltage of 12V
- This may be done with a tester.

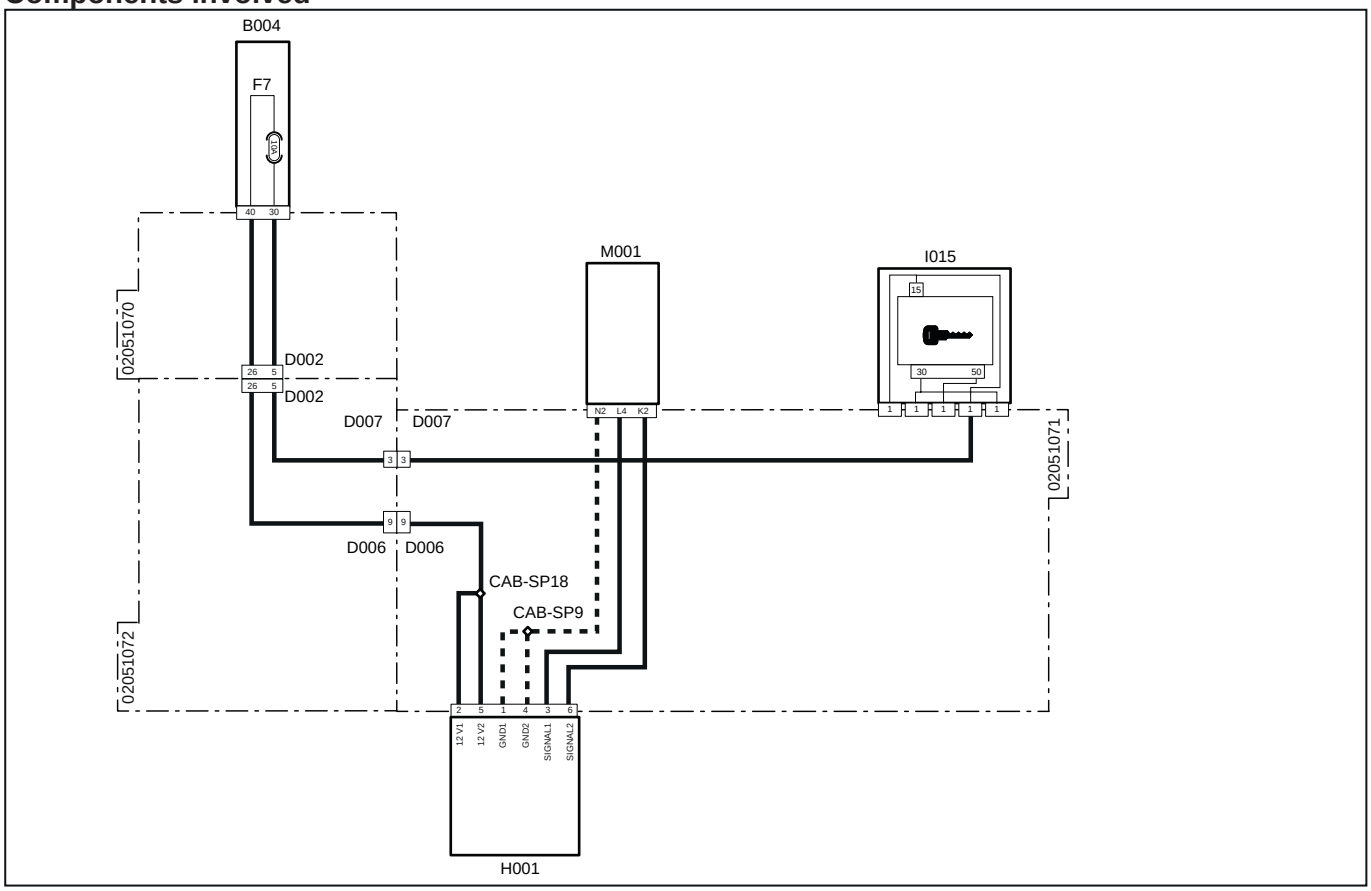
3 - Check if the potentiometer is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the potentiometer
- Proceed to the next step if the component is working correctly

4 - Calibrate the foot throttle potentiometer (see the documentation of the diagnostic tool)
- Proceed to the next step if the component is calibrated correctly

5 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

6 - Use the diagnostic tool to check that the potentiometer is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring loom connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D006(pag.R2-410)	P100A	Main-dashboard wiring connector
D006(pag.R2-412)	P100B	Dashboard-main wiring connector
F7(B004) (pag.R2-425)	F7	Turn indicators (10A)
H001(pag.R2-409)	P100	Throttle
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001(pag.R2-458)	P80	Vehicle ECU

1026 - Invalid operated seated sensor state

Description of fault

The control unit detects that the operator seated sensor is disconnected or malfunctioning

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

Once the tractor is switched off, it will no longer be possible to switch it on again

Checks necessary

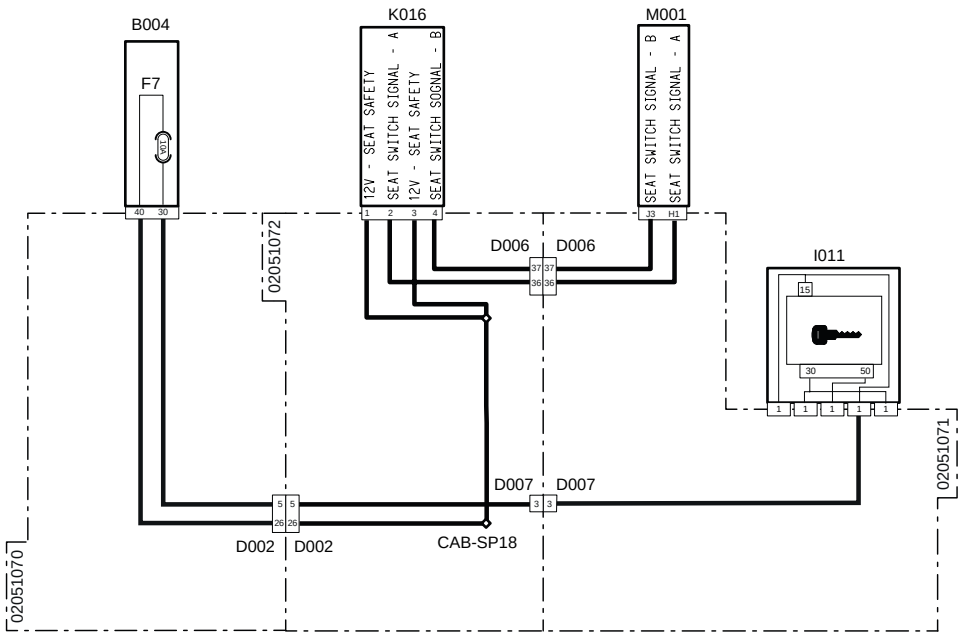
1 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

2 - Check that the sensor receives a power feed voltage of 12V
- This may be done with a tester.
- Proceed to the next step if the sensor is powered correctly

3 - Check if the sensor is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the sensor
- Proceed to the next step if the sensor is working correctly

4 - Check that the connectors of the potentiometer and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly

Components involved



System code	Source code	Description
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
D002(pag.R2-402)	P10A	Engine-Main connector
D002(pag.R2-451)	P10B	Main-Engine connector
D007(pag.R2-414)	P102A	Main-dashboard connector
D007(pag.R2-415)	P102B	Dashboard-main connector
D006(pag.R2-412)	P100B	Dashboard-main connector
D006(pag.R2-410)	P100A	Main-dashboard connector
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
K016(pag.R2-462)	P107	Seat start enable signal
M001(pag.R2-458)	P80	Vehicle ECU

1027 - Failed engine start

Description of fault

The control unit detects a condition lasting more than 2 seconds in which the start relay contact is closed but the engine does not start

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

Tractor does not start

Checks necessary

1 - Check that the start relay is connected correctly
- the relay may be tested with a tester.
- Proceed to the next step if the component is connected correctly

2 - Check that the starter motor is connected correctly
- Proceed to the next step if the component is connected correctly

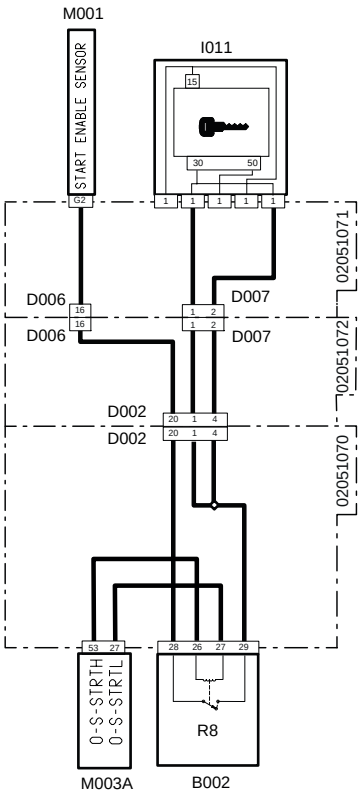
3 - Check if the components are working correctly and replace if necessary
- See the section "Components" for information on the functional states of the start system components
- Proceed to the next step if the components are working correctly

4 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

5 - Check that the wiring loom connectors are connected correctly and not damaged

6 - Check the peak battery voltage during starting
- the voltage may be measured with a tester.

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring connector
D006(pag.R2-412)	P100B	Dashboard-engine wiring loom wiring connector
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
R8(B002) (pag.R2-428)	R8	Start relay (20A)

1028 - Diverter solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state on the diverter solenoid valve. The signal current is above 2400 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the diverter cannot be used

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

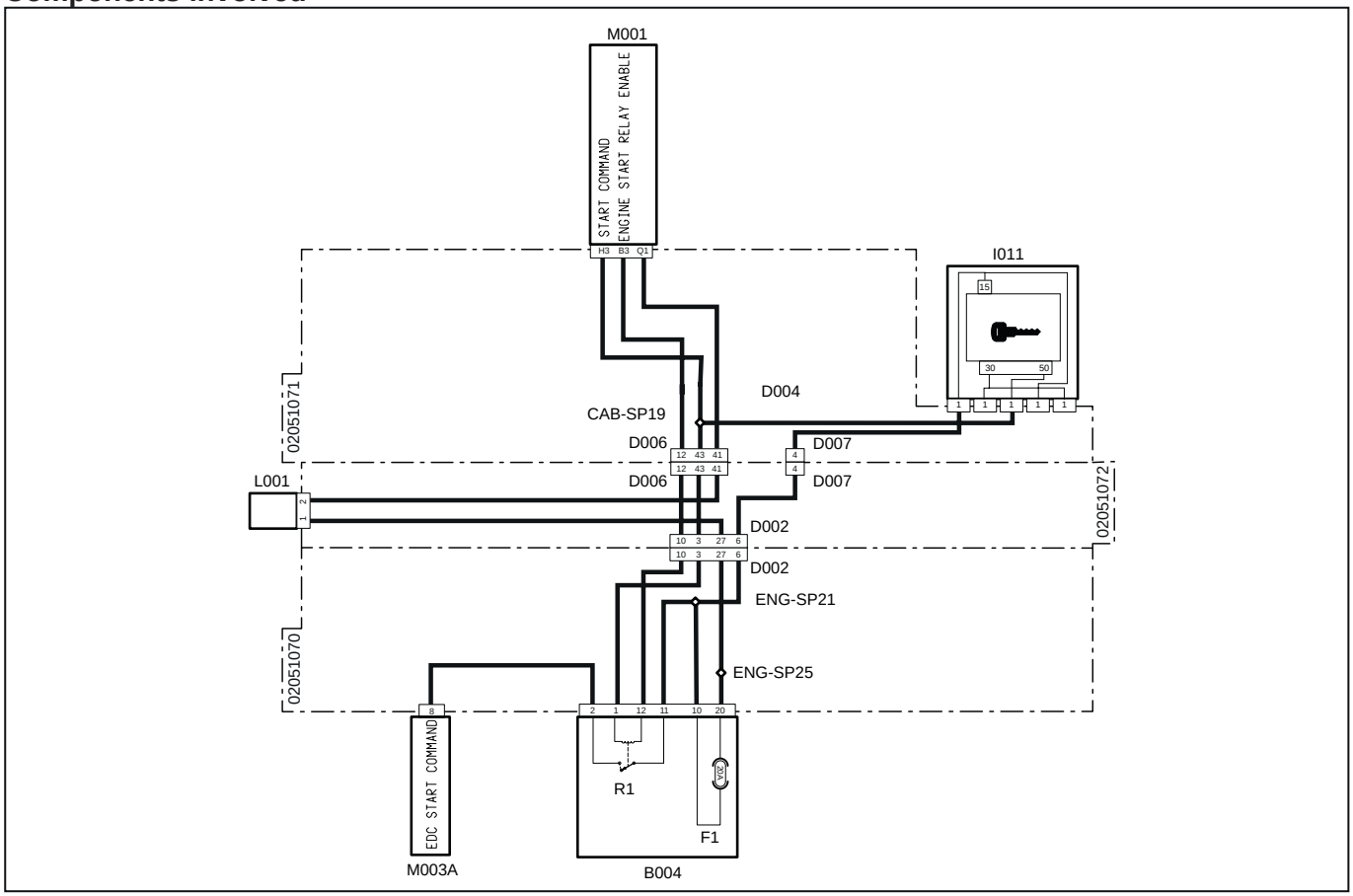
2 - Check if the diverter solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve

3 - Check that the connectors of the diverter solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the diverter solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring connector
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F1(B004) (pag.R2-425)	F1	Socket - Rotating beacon (10A)
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
L001(pag.R2-464)	P188	"Diverter" solenoid valve
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
R1(B004) (pag.R2-425)	R1	Start enable relay

1029 - Diverter solenoid valve current not within permitted range

Description of fault

The control unit detects a short circuit to ground or an open circuit state on the diverter solenoid valve. The signal current is below 75 mA

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the diverter cannot be used

Checks necessary

1 - Check the condition of the horn - socket - rotating beacon fuse (10A) and replace if necessary
- Disconnect the horn - socket - rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

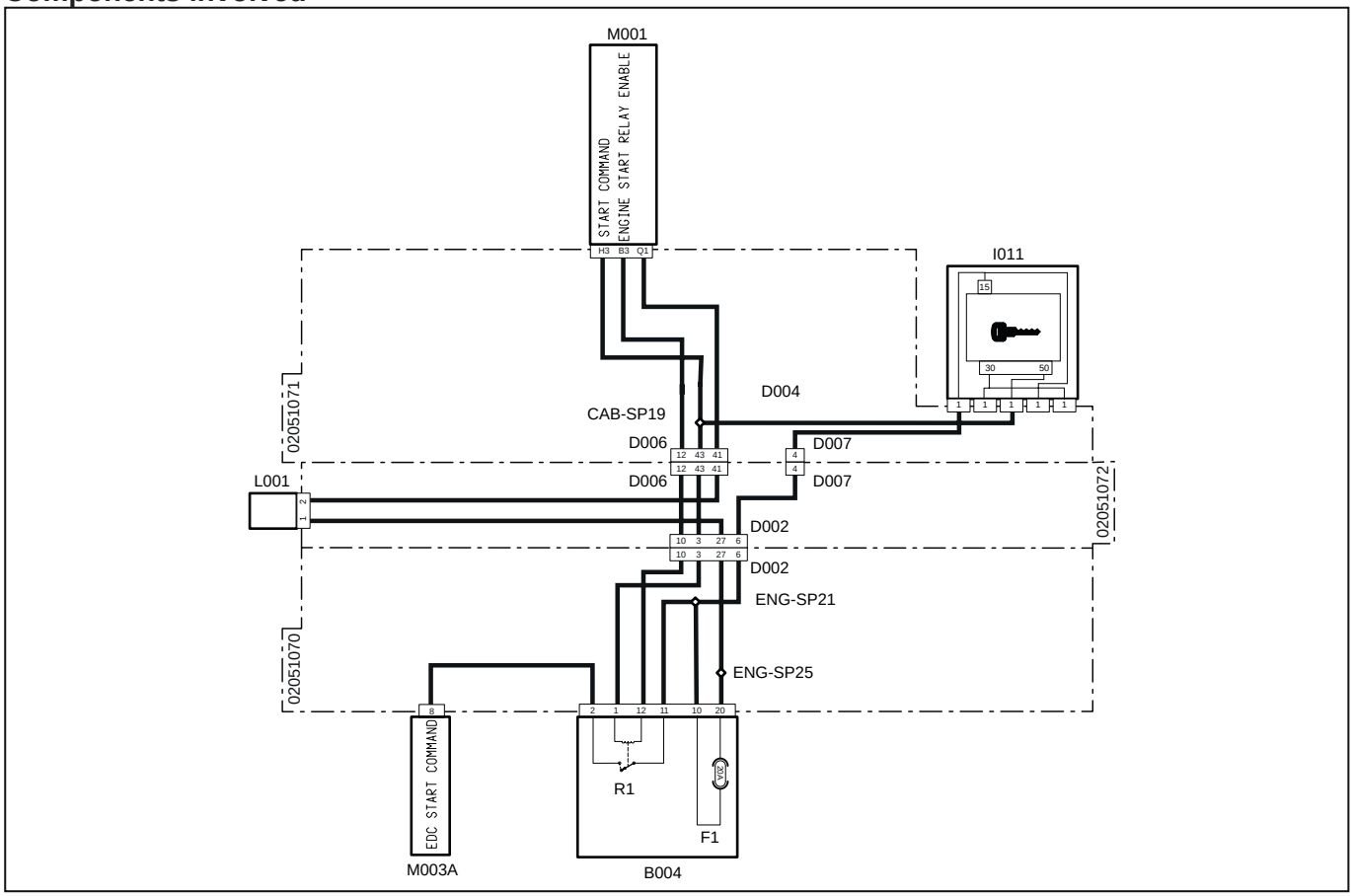
2 - Check if the diverter solenoid valve is working correctly and replace if necessary
- See the section "Components" for information on the functional states of the solenoid valve

3 - Check that the connectors of the diverter solenoid valve and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect the badly connected connectors and reconnect correctly
- If all the connectors are fitted and connected correctly, proceed to the next step

4 - Use the diagnostic tool to check that the diverter solenoid valve is working correctly and that the signal is read correctly by the control unit (see documentation of diagnostic tool)

5 - Replace the vehicle control unit if the problem persists

Components involved



System code	Source code	Description
D002(pag.R2-402)	P10A	Engine-main wiring connector
D002(pag.R2-451)	P10B	Main-engine wiring connector
D007(pag.R2-414)	P102A	Main-dashboard wiring connector
D007(pag.R2-415)	P102B	Dashboard-main wiring connector
D006(pag.R2-412)	P100B	Wiring connector for engine wiring loom
D006(pag.R2-410)	P100A	Wiring connector for dashboard wiring loom
F1(B004) (pag.R2-425)	F1	Socket - Rotating beacon (10A)
I011(pag.R2-422)	P117,P118, P451,P455,P501	Ignition switch
L001(pag.R2-464)	P188	"Diverter" solenoid valve
M001(pag.R2-458)	P80	Vehicle ECU
M003A (pag.R2-434)	P12	Engine control unit
R1(B004) (pag.R2-425)	R1	Start enable relay

1032 - Alternator not charging

Description of fault

The vehicle control unit (VCU) detects an excessively low alternator voltage (below 2 V) or a short circuit to ground

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

An alternator malfunction may cause a loss of tractor power and subsequent engine cut-out due to a drained battery

Checks necessary

1 - Check battery charge

- the state of charge of the battery may be checked with a tester or with the diagnostic tool.
- Recharge the battery if drained, or replace if necessary
- Proceed to the next step if the battery is charged correctly

2 - Check the condition of the alternator and that it is working correctly

- the alternator may be tested with a tester.
- Replace the alternator if is not working correctly
- Proceed to the next step if the alternator is working correctly

3 - Replace the components if necessary.

Components involved

Alternator
Battery

1034 - Vehicle control unit not calibrated

Description of fault

The vehicle control unit has not been calibrated correctly

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The instrument panel switches on but the engine cannot be started

Checks necessary

1 - Use the diagnostic tool to calibrate the vehicle control unit (see the documentation of the diagnostic tool)

Power Take Off

5001 - PTO on/off button malfunction

Description of fault

The electronic control unit detects a malfunction of the PTO on/off button

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO on/off button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

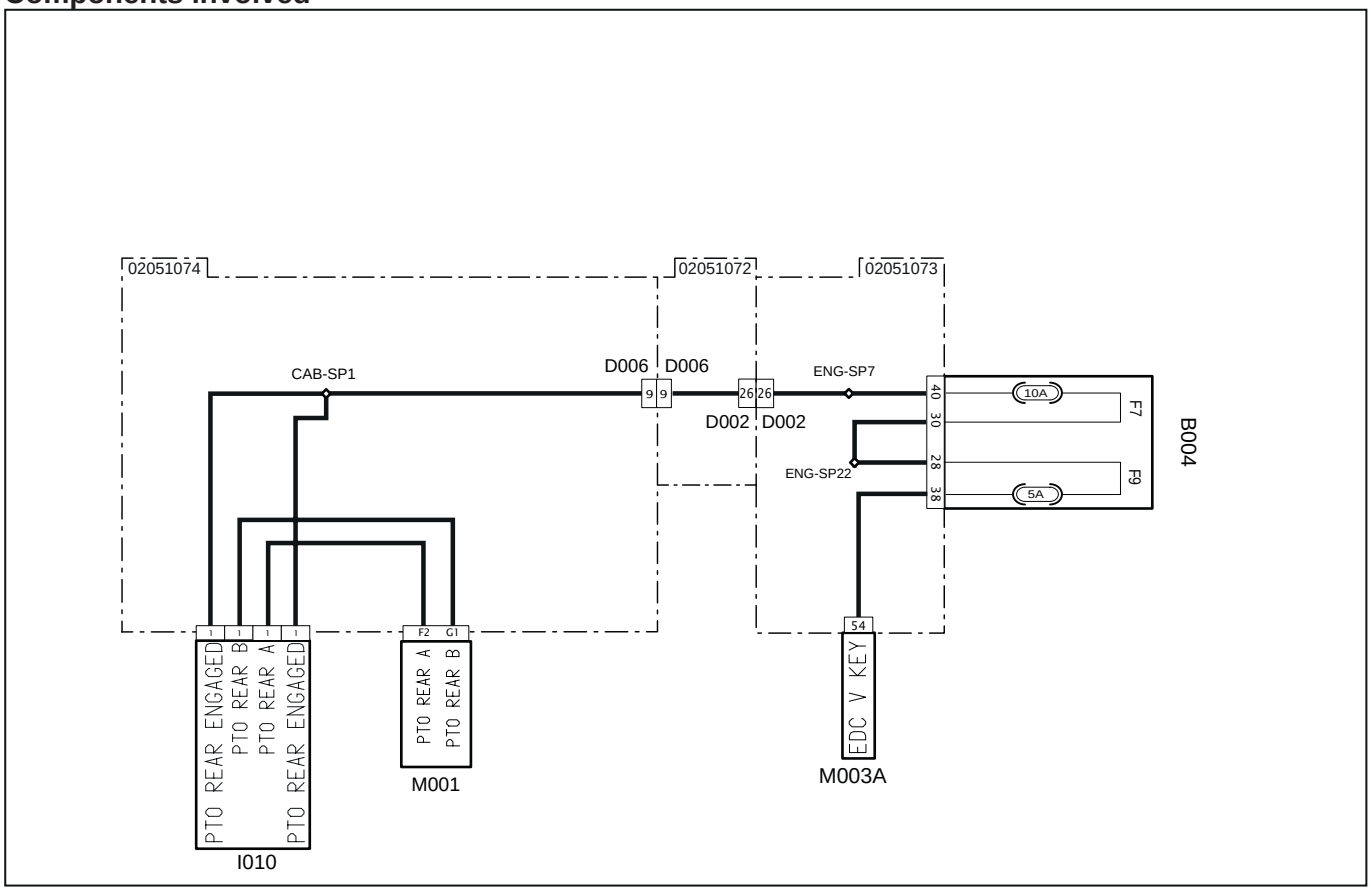
5 - Use the diagnostic tool to check function of the PTO on/off button (see the documentation of the diagnostic tool)
- Check if the PTO on/off button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
I010 (pag.R2-408)	P504/P505/P506/P508	PTO on/off button
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
F9(B004) (pag.R2-425)	F9	Key-on power feed for ECU (5A)
M003A (pag.R2-434)	P12	Engine control unit

5002 - PTO proportional valve circuit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the PTO proportional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO proportional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

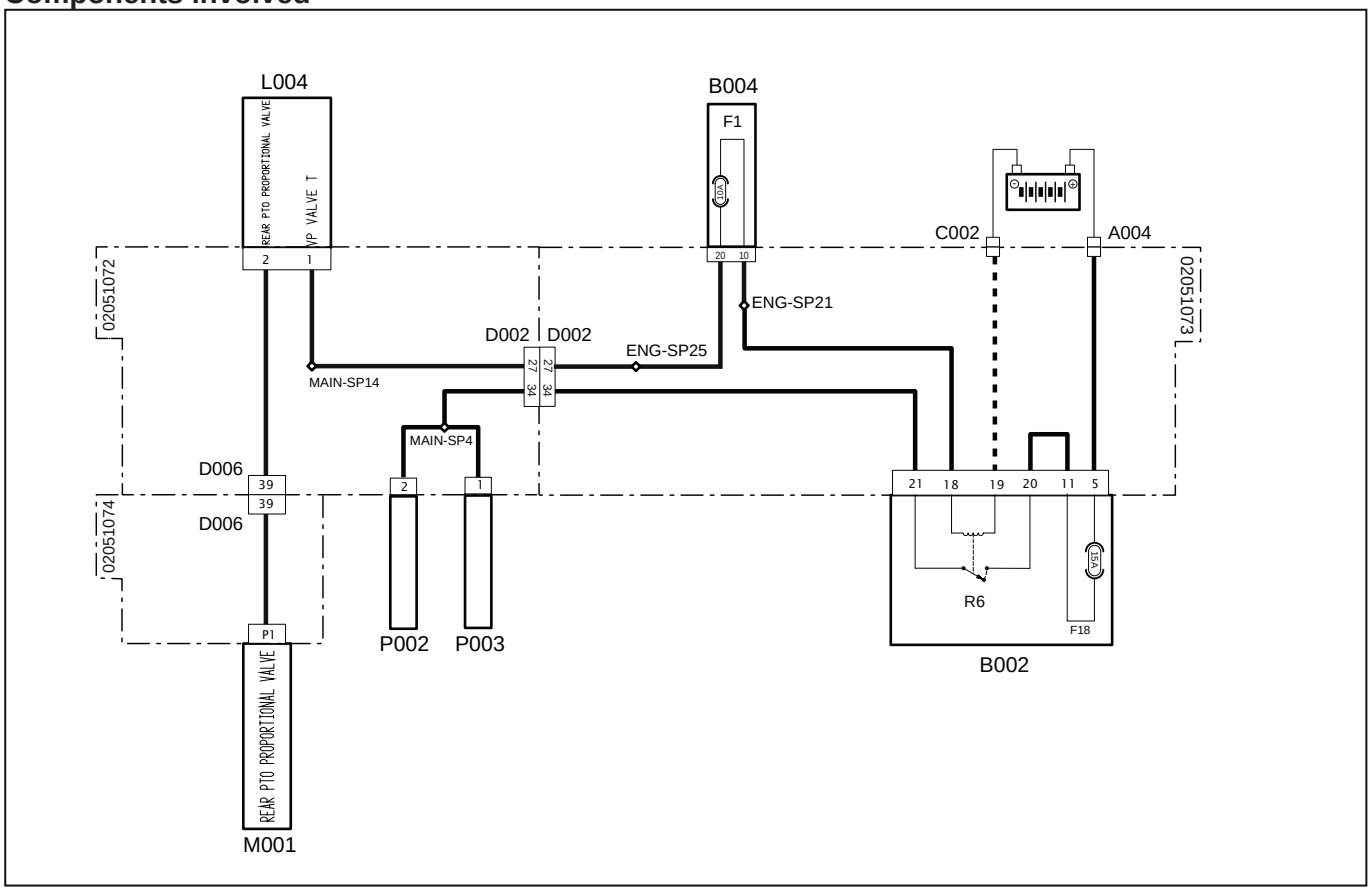
5 - Use the diagnostic tool to monitor the PTO proportional valve (see documentation of diagnostic tool)
- Check that the PTO proportional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R2-449)	P472	Battery positive
C002 (pag.R2-442)	P475	Battery ground
L004 (pag.R2-428)	P186	PTO proportional valve
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F1(B004) (pag.R2-425)	F1	Rotating beacon (10A)
F18(B002) (pag.R2-428)	F18	Trailer socket (5A)
R6(B002) (pag.R2-428)	R6	Trailer socket relay (30A)
P002 (pag.R2-465)	P226	7 pole power socket
P003 (pag.R2-455)	P50/P51	1 pole power socket

5003 - PTO proportional valve circuit, short circuit to ground or open circuit

Description of fault

The ECU engine control unit detects a short circuit to ground or open circuit fault in the circuit of the PTO proportional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO proportional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

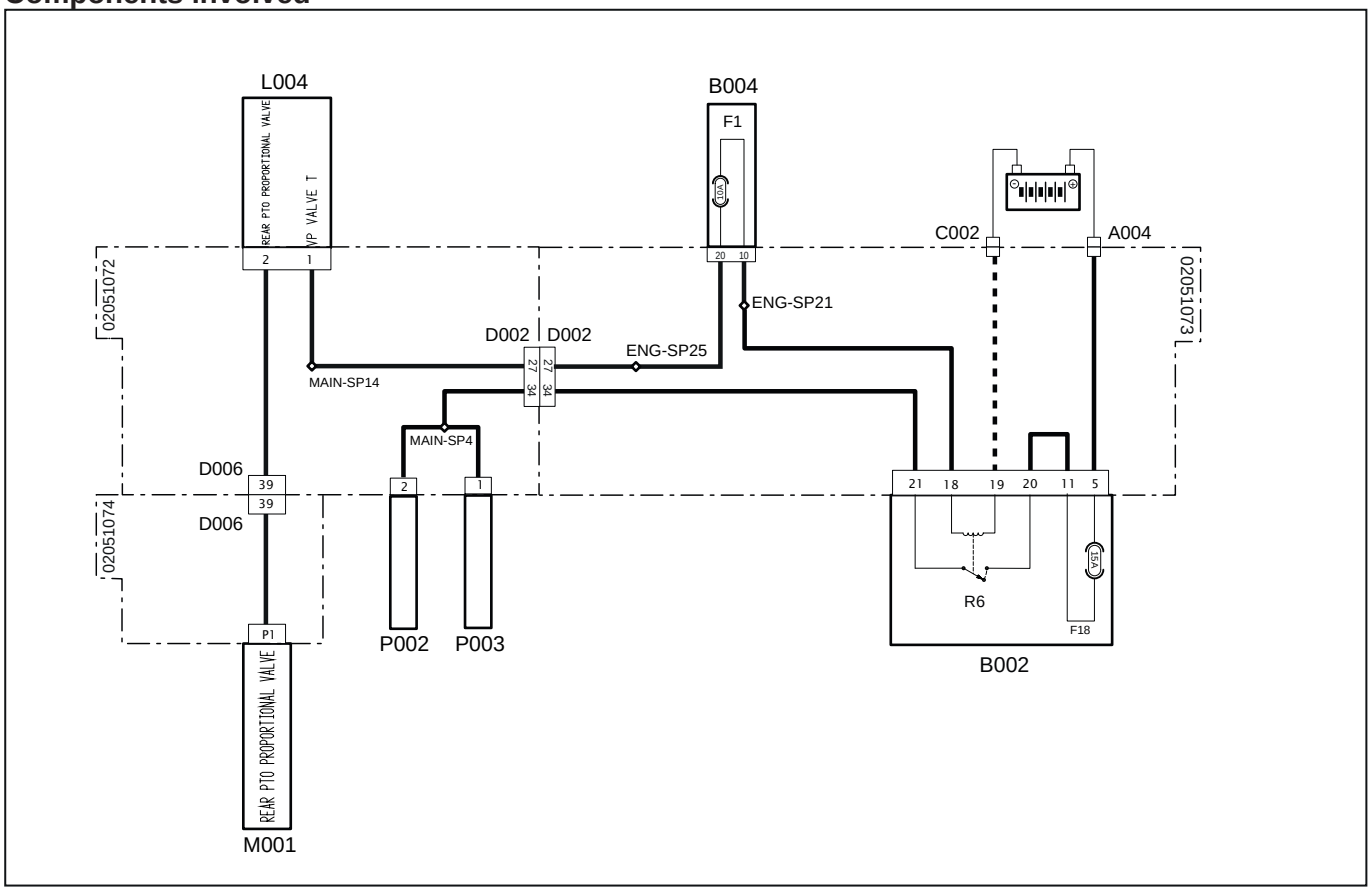
5 - Use the diagnostic tool to monitor the PTO proportional valve (see documentation of diagnostic tool)
- Check that the PTO proportional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R2-449)	P472	Battery positive
C002 (pag.R2-442)	P475	Battery ground
L004 (pag.R2-428)	P186	PTO proportional valve
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F1(B004) (pag.R2-425)	F1	Rotating beacon (10A)
F18(B002) (pag.R2-428)	F18	Trailer socket (5A)
R6(B002) (pag.R2-428)	R6	Trailer socket relay (30A)
P002 (pag.R2-465)	P226	7 pole power socket
P003 (pag.R2-455)	P50/P51	1 pole power socket

5004 - PTO directional valve circuit, short circuit to battery

Description of fault

The ECU engine control unit detects a short circuit to battery in the circuit of the PTO directional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO directional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

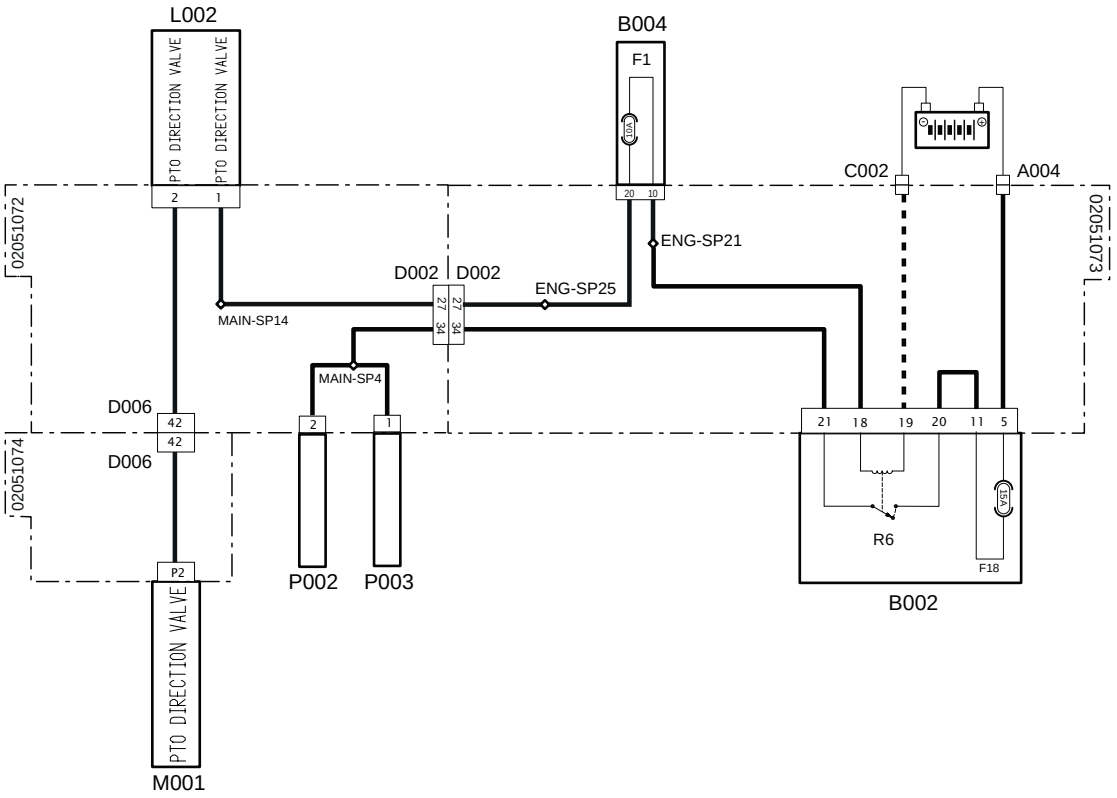
5 - Use the diagnostic tool to monitor the PTO directional valve (see documentation of diagnostic tool)
- Check that the PTO directional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R2-449)	P472	Battery positive
C002 (pag.R2-442)	P475	Battery ground
L002 (pag.R2-463)	P499	PTO directional valve
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F1(B004) (pag.R2-425)	F1	Rotating beacon (10A)
F18(B002) (pag.R2-428)	F18	Trailer socket (5A)
R6(B002) (pag.R2-428)	R6	Trailer socket relay (30A)
P002 (pag.R2-465)	P226	7 pole power socket
P003 (pag.R2-455)	P50/P51	1 pole power socket

5005 - PTO directional valve circuit, short circuit to ground or open circuit

Description of fault

The ECU engine control unit detects a short circuit to ground or open circuit fault in the circuit of the PTO directional valve

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the trailer socket fuse (15A) and replace if necessary
- Disconnect the trailer socket fuse (15A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the rotating beacon fuse (10A) and replace if necessary
- Disconnect the rotating beacon fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO directional valve and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

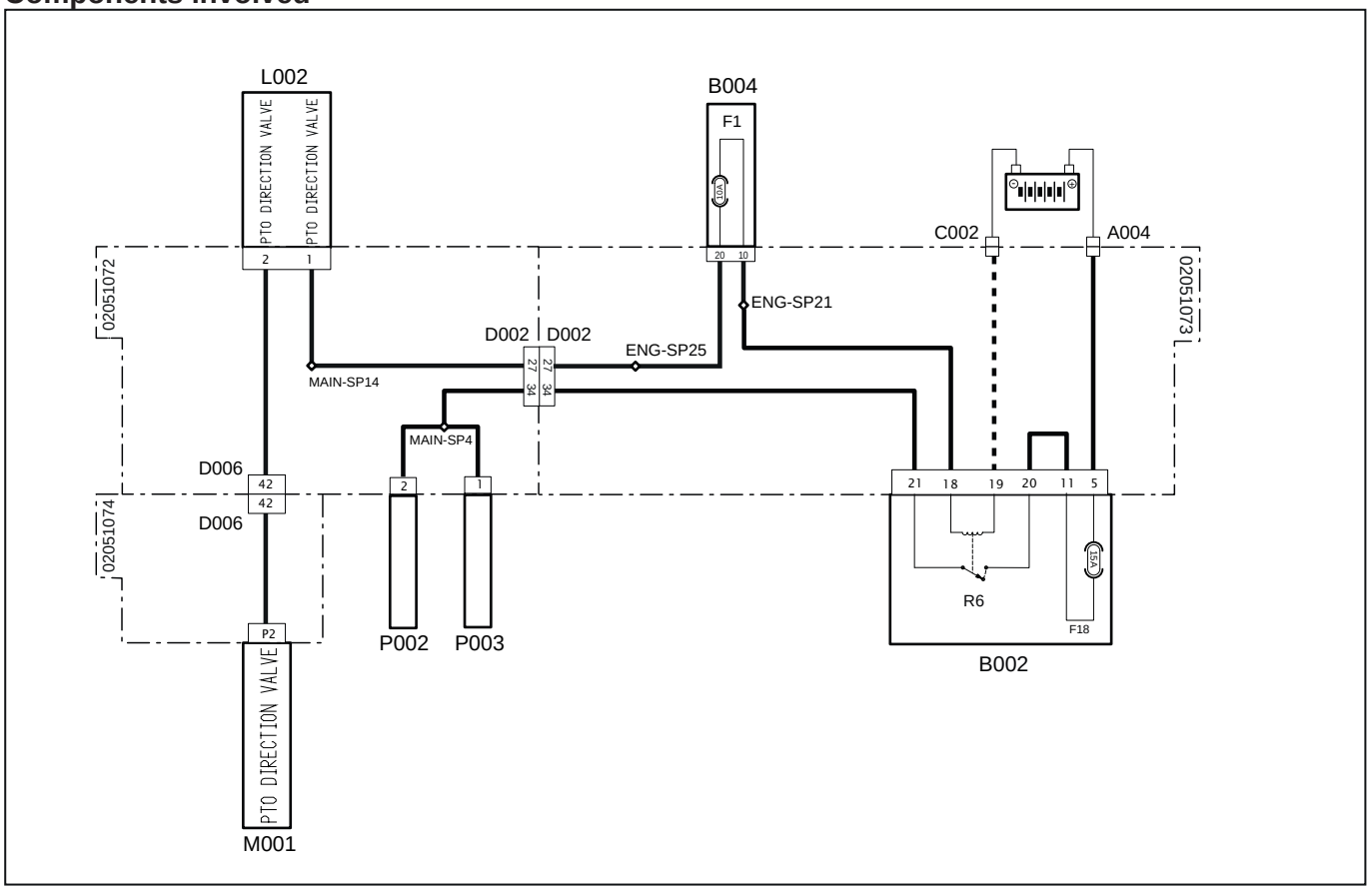
5 - Use the diagnostic tool to monitor the PTO directional valve (see documentation of diagnostic tool)
- Check that the PTO directional valve is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
A004 (pag.R2-449)	P472	Battery positive
C002 (pag.R2-442)	P475	Battery ground
L002 (pag.R2-463)	P499	PTO directional valve
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F1(B004)(pag.R2-425)	F1	Rotating beacon (10A)
F18(B002) (pag.R2-428)	F18	Trailer socket (5A)
R6(B002)(pag.R2-428)	R6	Trailer socket relay (30A)
P002 (pag.R2-465)	P226	7 pole power socket
P003 (pag.R2-455)	P50/P51	1 pole power socket

5006 - PTO clutch slipping when engaged

Description of fault

The electronic control unit detects that the PTO clutch slips when it is engaged

Severity of error

Medium

Additional information

Amber indicator lamp flashing

The electronic control unit detects a difference in the speed readings received from the PTO and crankshaft speed sensors, which should return the same speed value. This may be due to a read error of the sensors, or to slippage between the discs of the PTO clutch.

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the crankshaft speed sensor, of the engine control unit, of the vehicle control unit and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

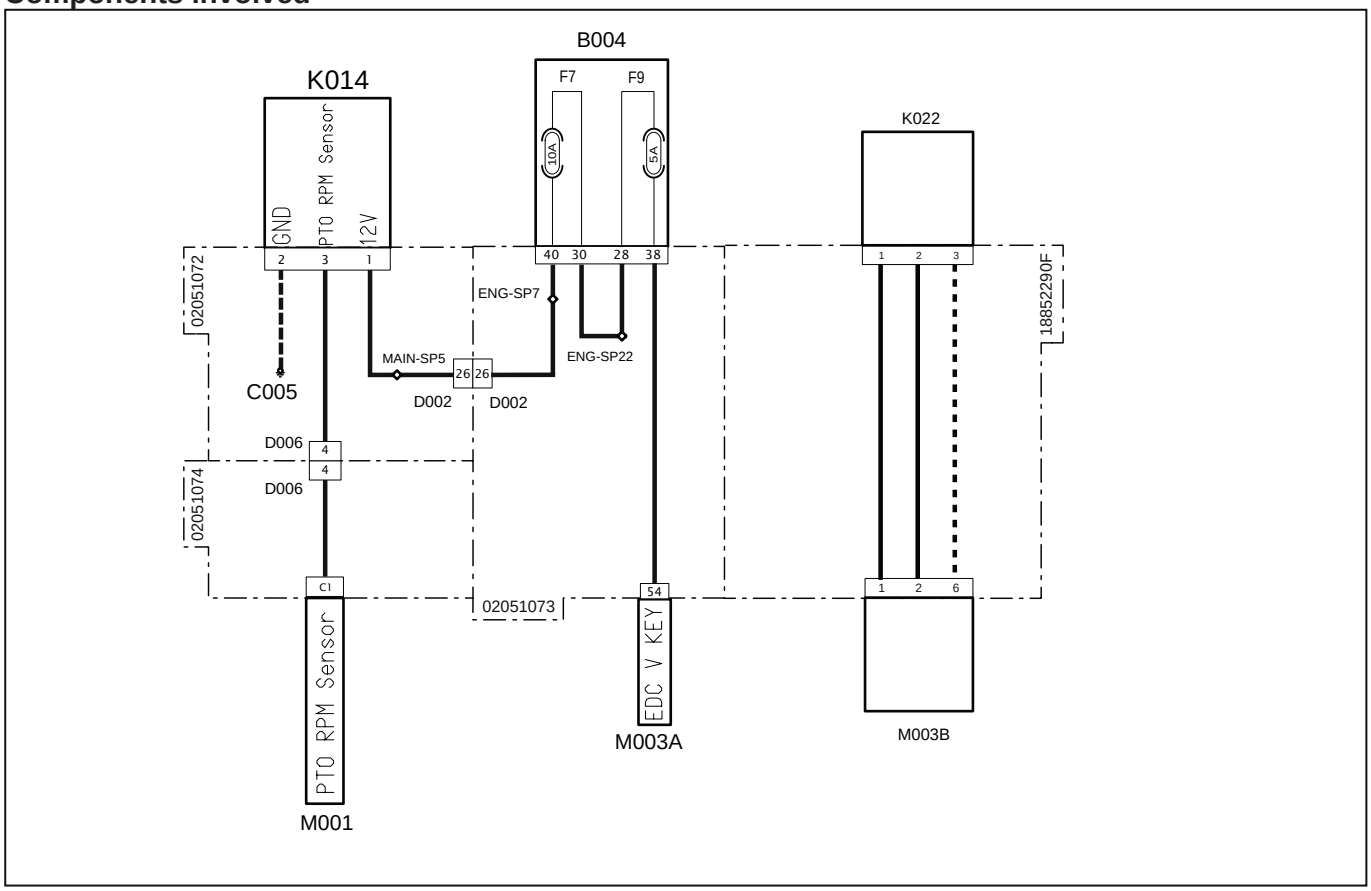
7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - Check the condition of the PTO clutch
- Check for clutch disc wear and replace the discs if necessary
- Check the condition of the spring washer and replace if necessary
- Check the hydraulic clutch actuator system and check that the oil pressure in the system is around 20 bar

10 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R2-466)	P412	Main ground
K014 (pag.R2-440)	P518	PTO speed sensor
K022 (pag.R2-473)	XS2	Crankshaft speed sensor
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
F9(B004) (pag.R2-425)	F9	Key-on power feed for ECU (5A)
M003A (pag.R2-434)	P12	Engine control unit
M003B (pag.R2-468)	XECUA	Engine control unit

5007 - Clutch PTO slips when PTO brake is engaged

Description of fault

The electronic control unit detects that the hydraulic brake of the PTO is not working correctly and the PTO clutch is slipping

Severity of error

High

Additional information

Red indicator lamp flashing

The electronic control unit detects a difference in the speed readings received from the PTO and crankshaft speed sensors, which should return the same speed value. This may be due to a read error of the sensors, or to slippage between the discs of the PTO clutch.

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the crankshaft speed sensor, of the engine control unit, of the vehicle control unit and of the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

5 - Use the diagnostic tool to check that the crankshaft speed sensor is working correctly (see documentation of diagnostic tool)
- Check if the crankshaft speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

7 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

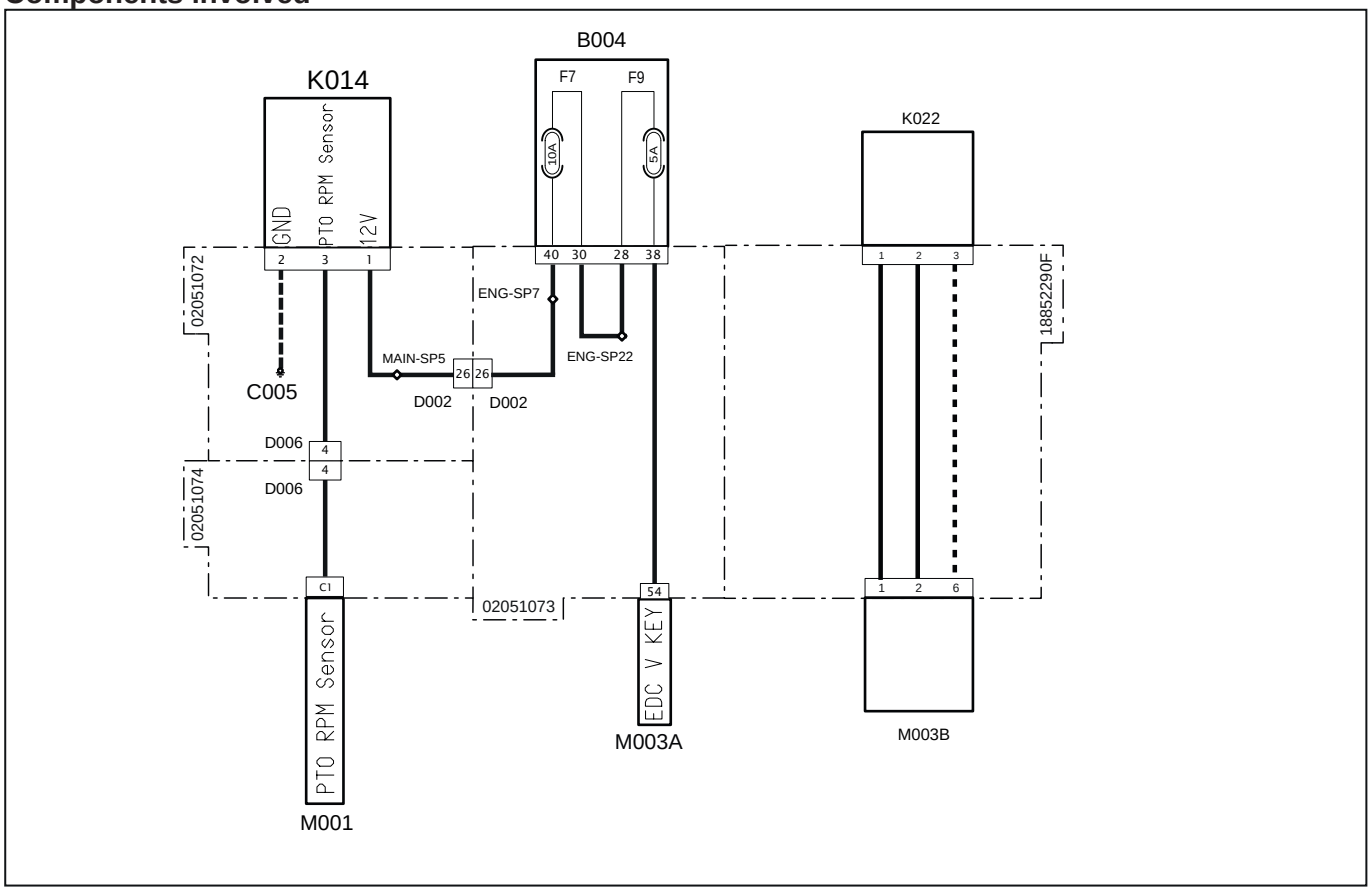
8 - Check that the wiring loom connectors are connected correctly and not damaged

9 - If the problem persists, proceed to the next step

10 - Check the condition of the PTO brake
- Check the brake piston for wear and replace if necessary

11 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R2-466)	P412	Main ground
K014 (pag.R2-440)	P518	PTO speed sensor
K022 (pag.R2-473)	XS2	Crankshaft speed sensor
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
F9(B004) (pag.R2-425)	F9	Key-on power feed for ECU (5A)
M003A (pag.R2-434)	P12	Engine control unit
M003B (pag.R2-468)	XECUA	Engine control unit

5009 - Abnormal PTO speed sensor signal frequency

Description of fault

The electronic control unit detects an abnormal PTO speed sensor signal frequency or pulsing in the signal

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started as normal

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO speed sensor, the vehicle control unit and the fuse boxes, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

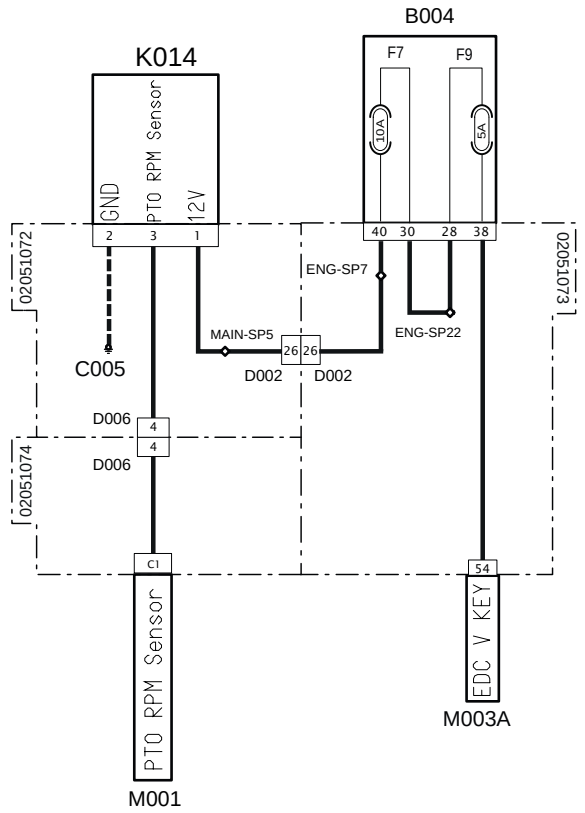
5 - Use the diagnostic tool to monitor the PTO speed sensor (see the documentation of the diagnostic tool)
- Check if the PTO speed sensor is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
C005 (pag.R2-466)	P412	Main ground
K014 (pag.R2-440)	P518	PTO speed sensor
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
M003A (pag.R2-434)	P12	Engine control unit
F7(B004)(pag.R2-425)	F7	Sensors/switches (10A)
F9(B004)(pag.R2-425)	F9	Key-on power feed for ECU (5A)

5011 - PTO bypass circuit, short circuit to ground

Description of fault

The electronic control unit detects a short circuit to ground in the PTO bypass circuit

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO bypass button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

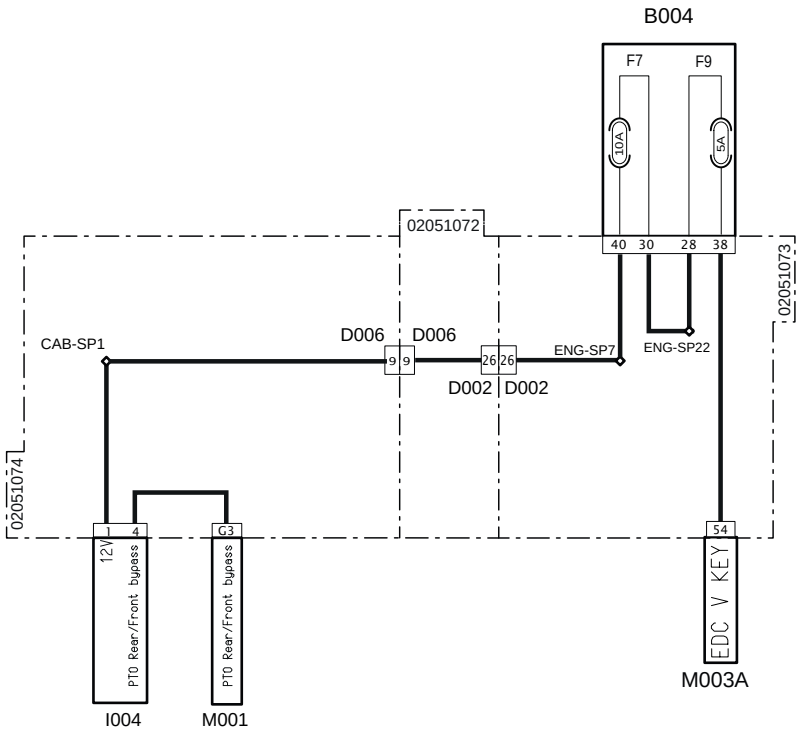
5 - Use the diagnostic tool to check function of the PTO bypass button (see the documentation of the diagnostic tool)
- Check if the PTO bypass button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved



System code	Source code	Description
I004 (pag.R2-407)	P36	Front/Rear PTO bypass
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
F9(B004) (pag.R2-425)	F9	Key-on power feed for ECU (5A)
M003A (pag.R2-434)	P12	Engine control unit

5012 - PTO bypass circuit, short circuit to battery

Description of fault

The electronic control unit detects a short circuit to battery in the PTO bypass circuit

Severity of error

High

Additional information

Red indicator lamp flashing

Behaviour of system

The engine may be started but the PTO cannot be used

Checks necessary

1 - Check if there are any other error codes
- If there are any other error codes, also refer to these codes to facilitate correct diagnosis of the problem
- If there are no other error codes, proceed to the next step

2 - Check the condition of the ECU key-on power feed fuse (5A) and replace if necessary
- Disconnect the ECU key-on power feed fuse (5A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

3 - Check the condition of the sensors/switches fuse (10A) and replace if necessary
- Disconnect the sensors/switches fuse (10A)
- Replace the fuse if it is blown
- Proceed to the next step if the fuse is in working order

4 - Check that the connectors of the PTO bypass button and of the vehicle control unit, and any intermediate interface connectors, are fitted and connected correctly
- Disconnect any badly connected connectors and reconnect correctly
- If all the connectors are connected correctly, proceed to the next step

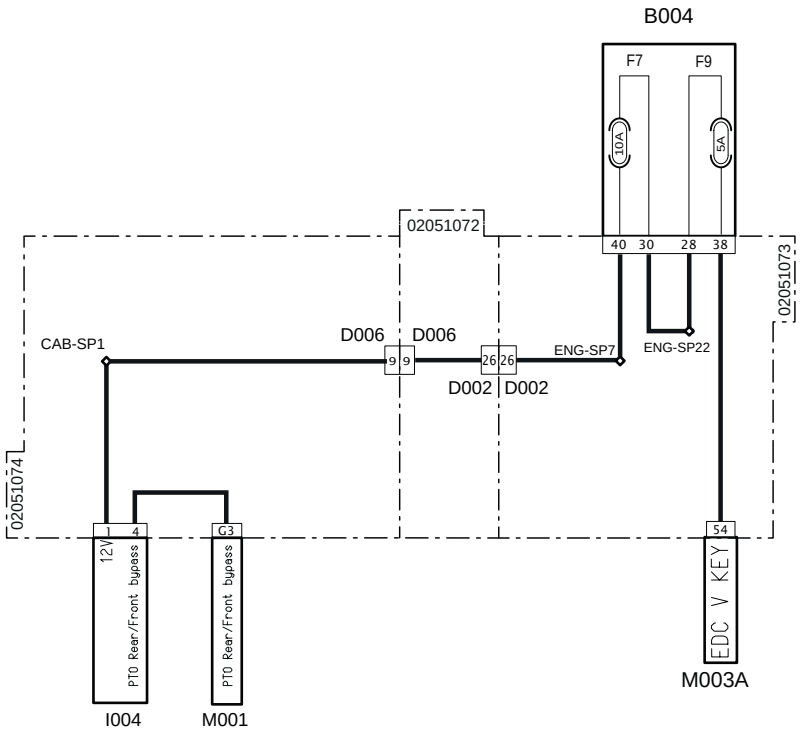
5 - Use the diagnostic tool to check function of the PTO bypass button (see the documentation of the diagnostic tool)
- Check if the PTO bypass button is working correctly and replace if necessary
- If the problem persists, proceed to the next step

6 - Check that the terminals are not contaminated with dirt or water. Dirt or water in the terminals may be the result of cleaning the engine with a pressure washer, loose connections or poor connector seal integrity.

7 - Check that the wiring loom connectors are connected correctly and not damaged

8 - Contact the technical support service if the problem persists

Components involved

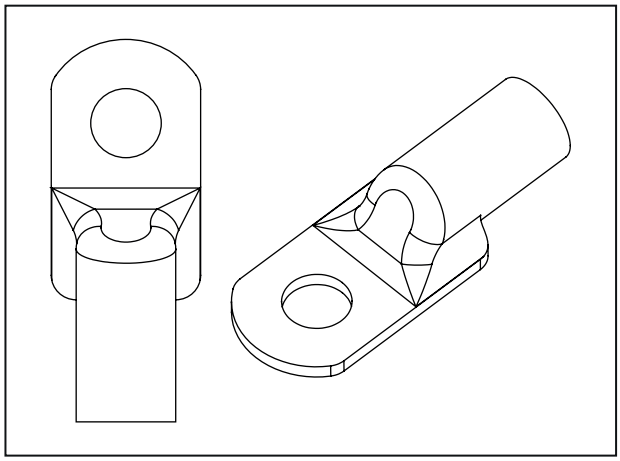


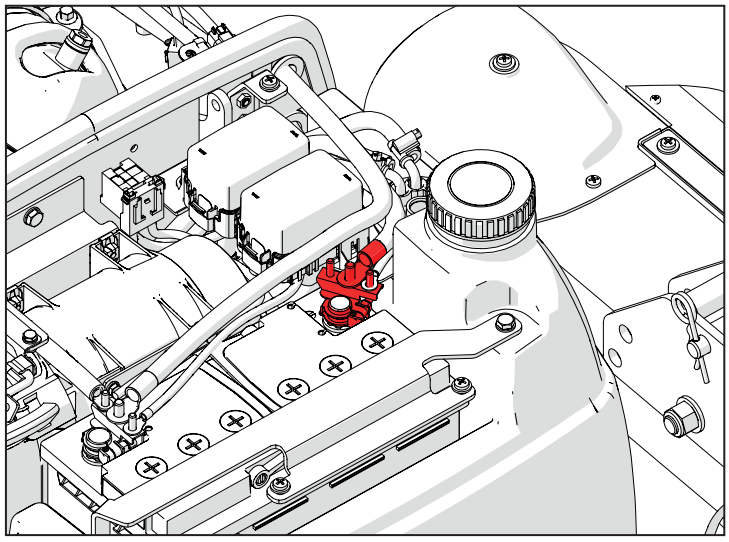
System code	Source code	Description
I004 (pag.R2-407)	P36	Front/Rear PTO bypass
M001 (pag.R2-458)	P80	Vehicle control unit
D006 (pag.R2-412)	P100B	Dashboard-main connector
D006 (pag.R2-410)	P100A	Main-dashboard connector
D002 (pag.R2-451)	P10B	Main-Engine connector
D002 (pag.R2-402)	P10A	Engine-Main connector
F7(B004) (pag.R2-425)	F7	Sensors/switches (10A)
F9(B004) (pag.R2-425)	F9	Key-on power feed for ECU (5A)
M003A (pag.R2-434)	P12	Engine control unit

Connector List

A001 (P11) Negative battery terminal

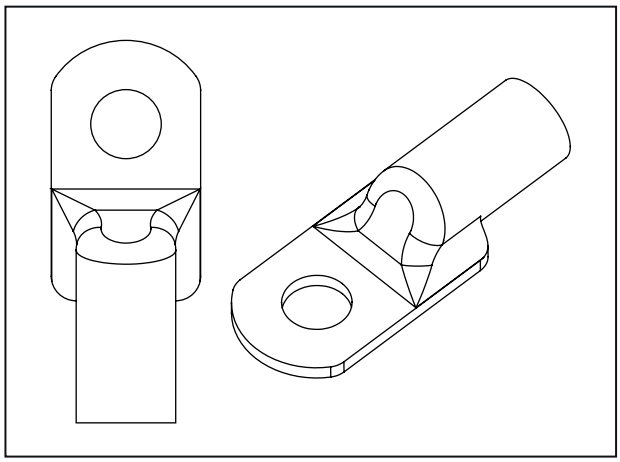
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	B-GND	BK	50	P66	1

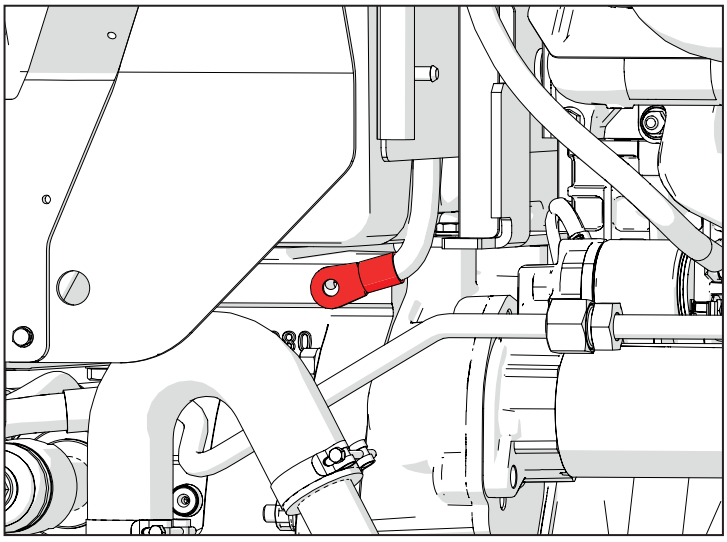




C001 (P66) Battery ground

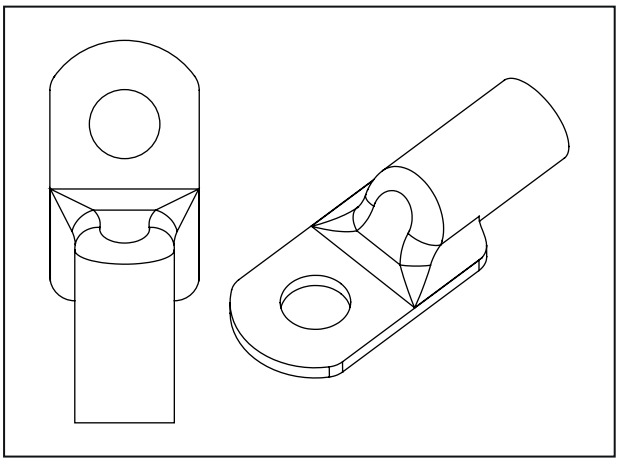
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	B-GND	BK	50	P66	1

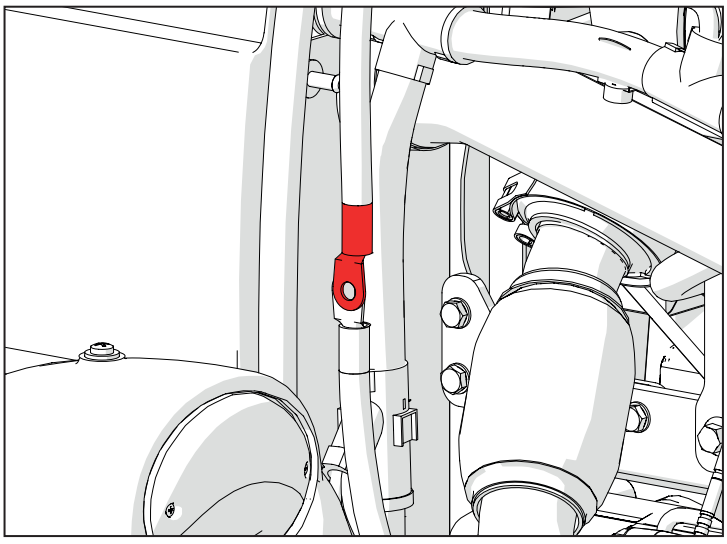




I001 (P39) Battery master switch (input terminal)

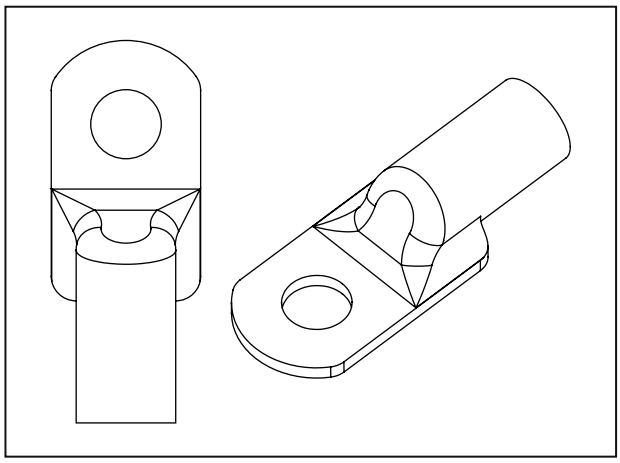
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BATTERY POSITIVE	Rd	50	P55	1

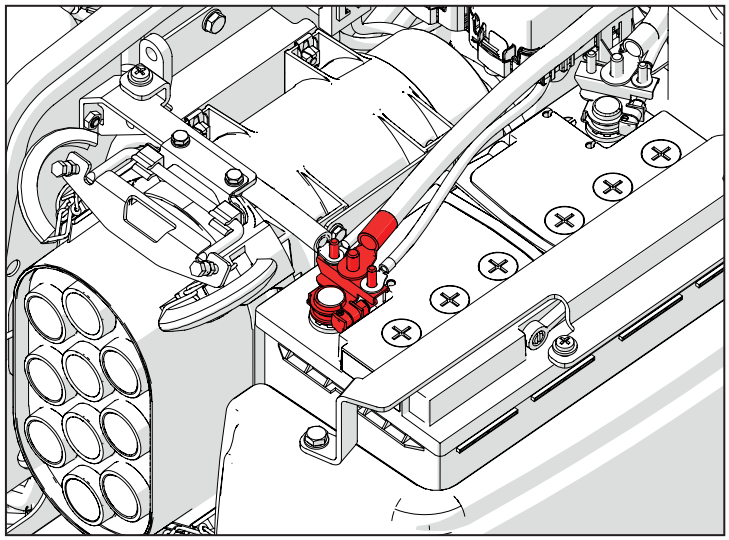




A002 (P55) Positive battery terminal

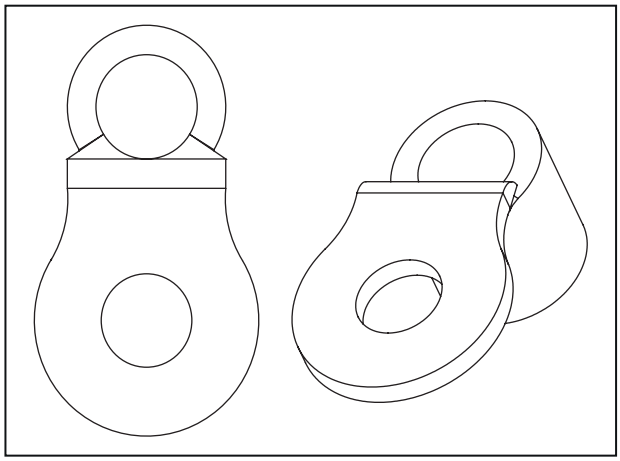
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BATTERY POSITIVE	Rd	50	P39	1

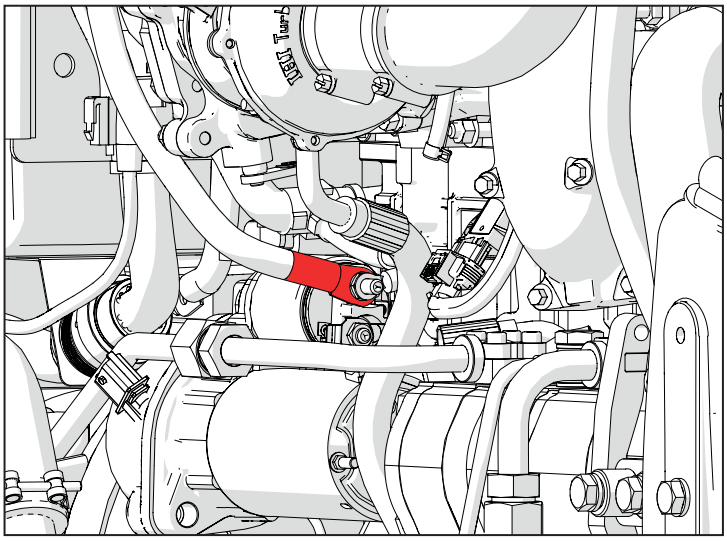




N001 (P10) Starter motor "30"

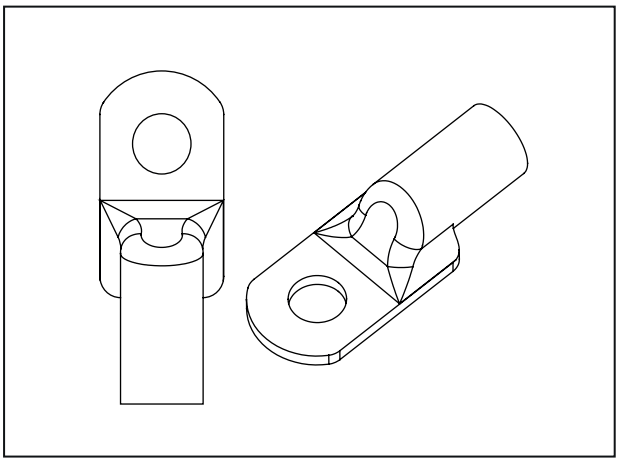
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	STARTER MOTOR INPUT	Rd	50	P23	1

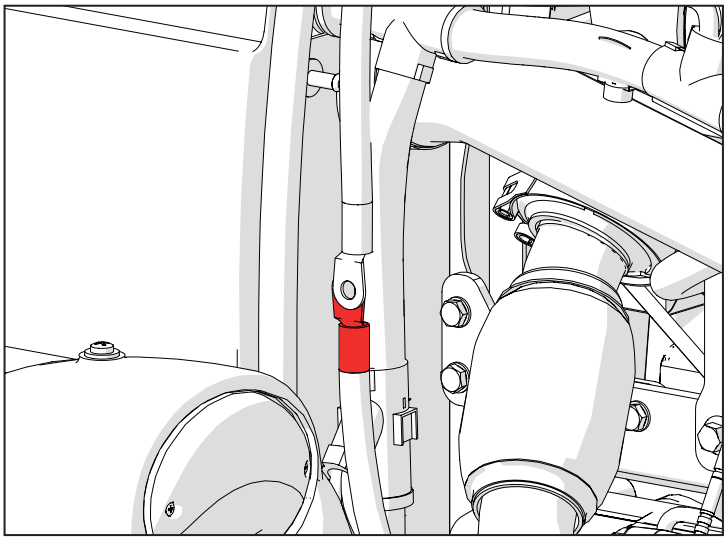




I002 (P23) Battery master switch (output terminal)

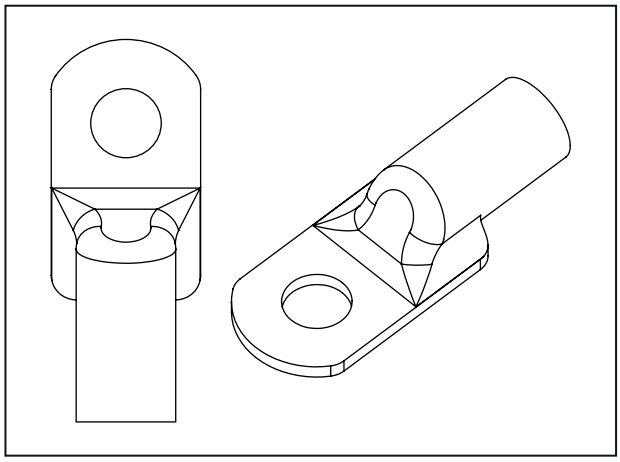
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	STARTER MOTOR INPUT	Rd	50	P10	1

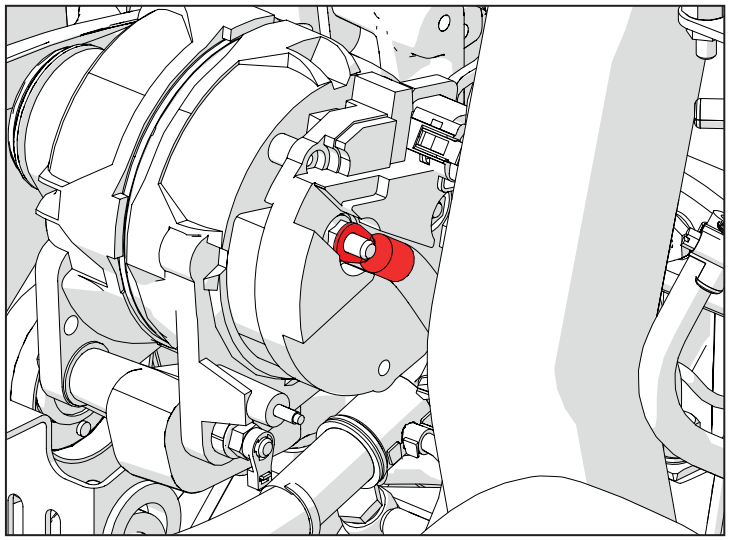




A003 (P65) Alternator power feed

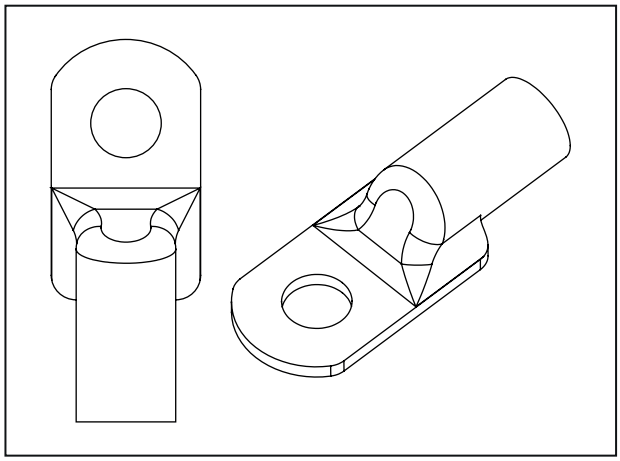
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR POWER FEED	Rd	25	P64	1

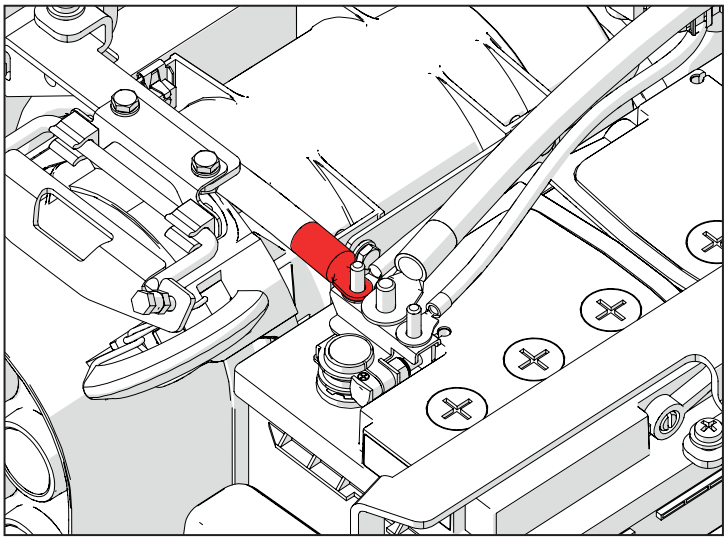




B001 (P64) Negative battery terminal

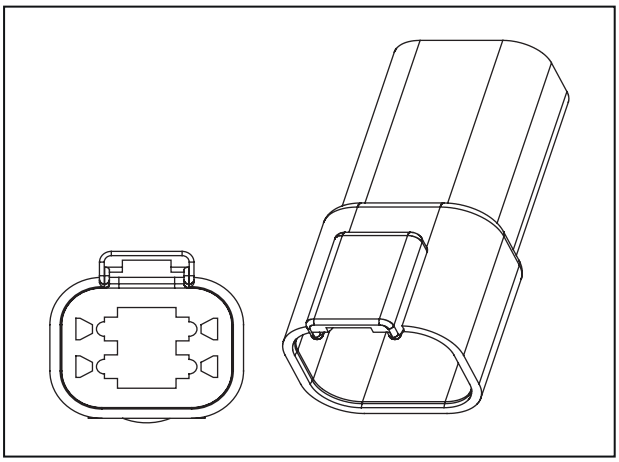
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR POWER FEED	Rd	25	P65	1

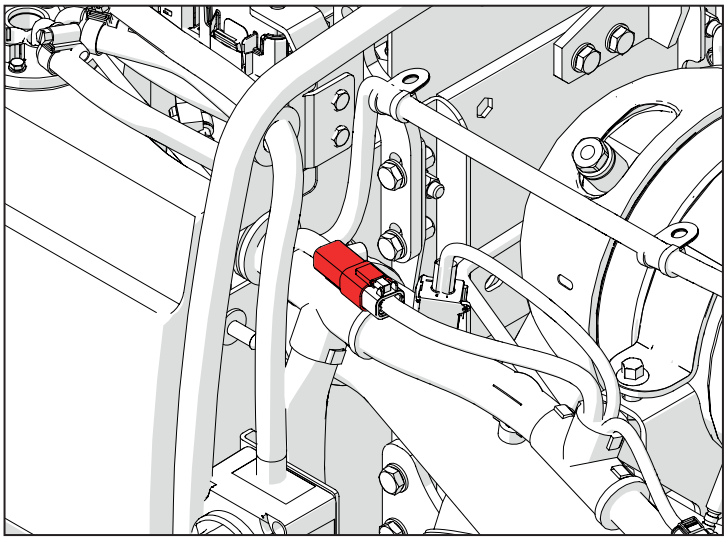




D004 (P20B) Wiring connector for engine wiring loom

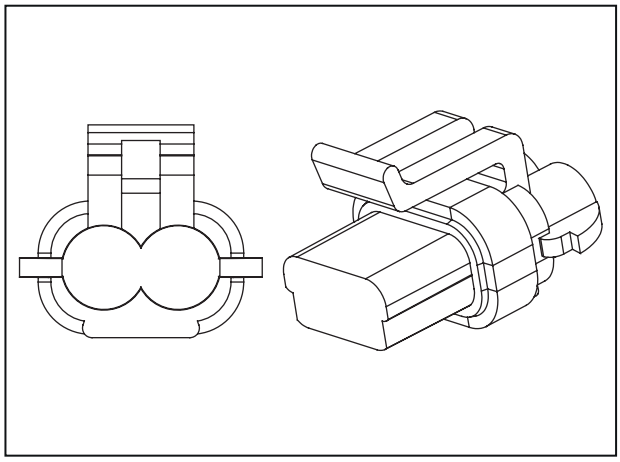
Pin	Description	Colour	Sect.	Input Conn.	Pin
4	FRONT LIGHTS GND	BK	1.5	HOOD-SP1	PIN1
2	NORMAL BEAM LIGHT RH	Pu	1	P204	1
3	NORMAL BEAM LIGHT LH	Pu	1	P206	1
1	HIGH BEAM LIGHTS	Pu	1.5	HOOD-SP2	PIN1

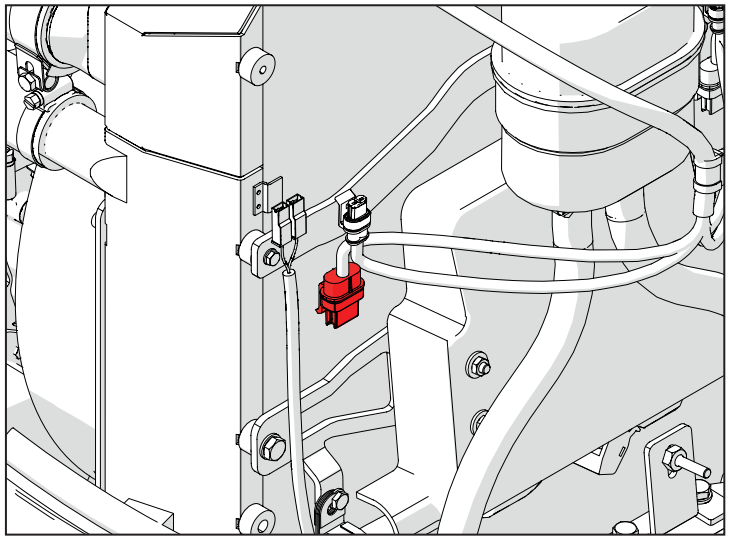




F009 (P203) RH high beam

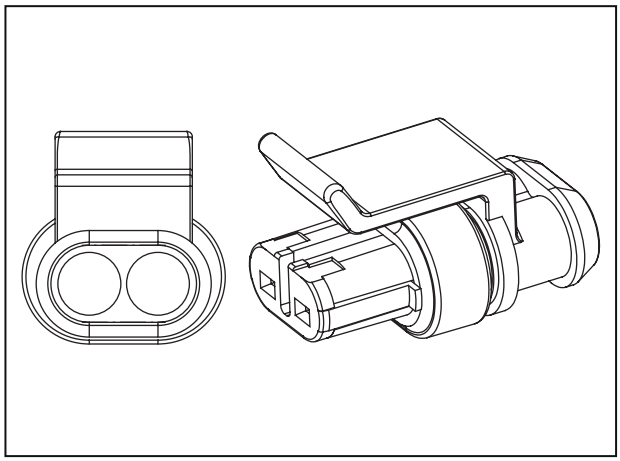
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	GND	BK	1	HOOD-SP1	
1	RH HIGH BEAM LIGHT	Pu	1	HOOD-SP2	

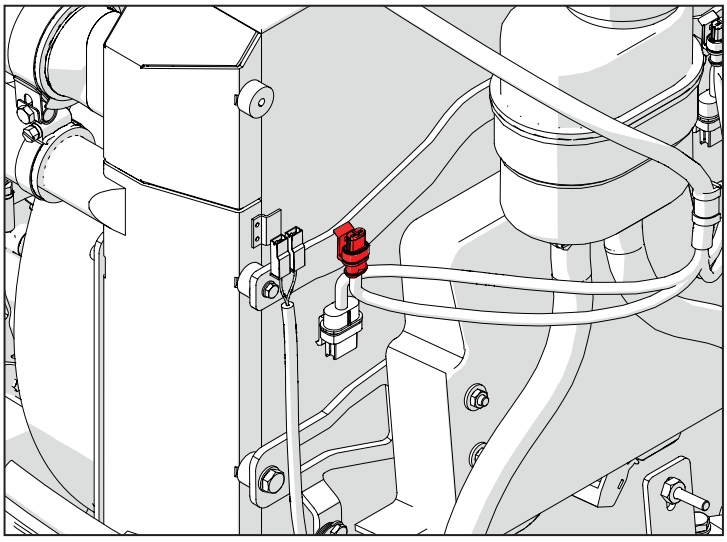




F010 (P204) RH low beam

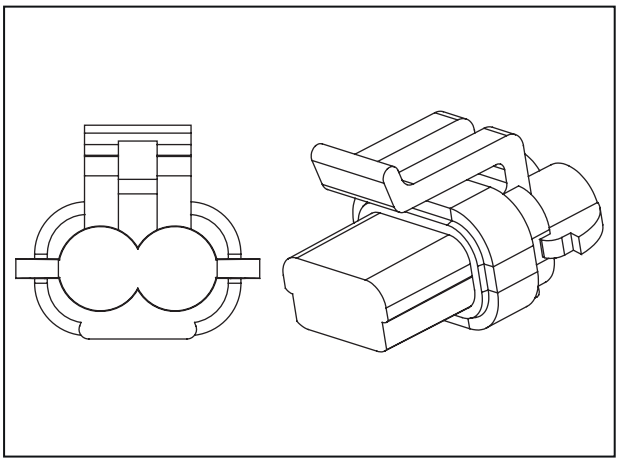
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	NORMAL BEAM LIGHT RH	Pu	1	P20B	2
2	GND	BK	1	HOOD-SP1	PIN1

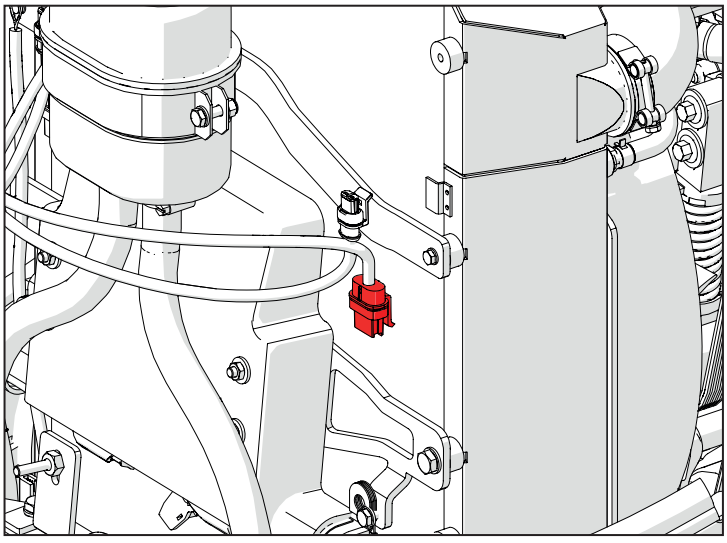




F008 (P205) LH high beam

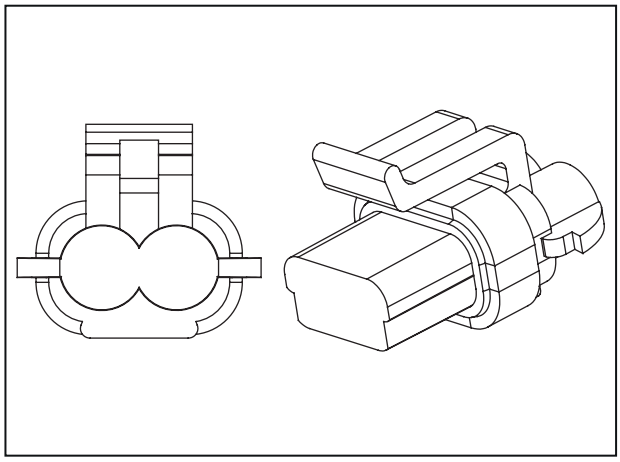
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	LH HIGH BEAM LIGHT	Pu	1	HOOD-SP2	PIN1
2	GND	BK	1	HOOD-SP1	PIN1

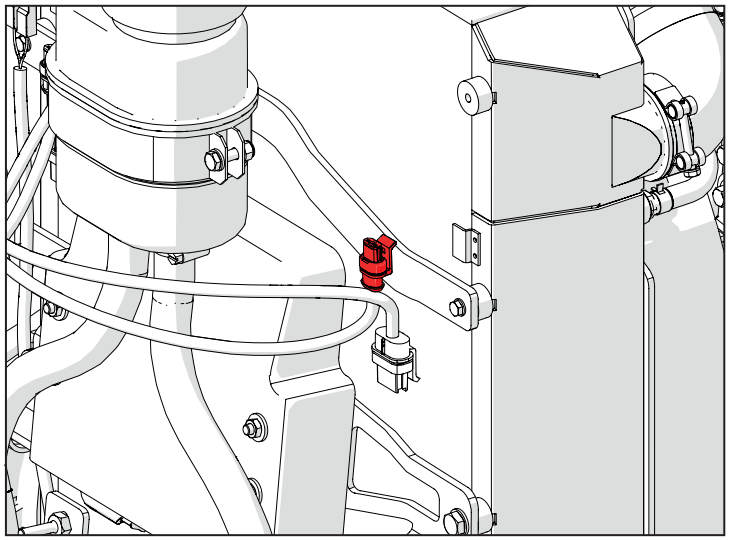




F007 (P206) LH low beam

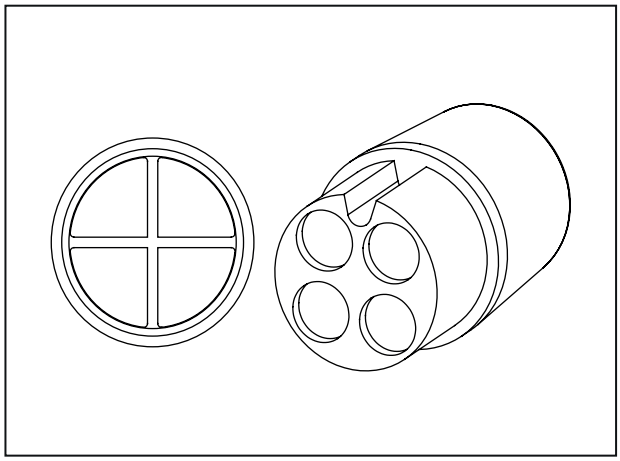
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	NORMAL BEAM LIGHT LH	Pu	1	P20B	3
2	GND	BK	1	HOOD-SP1	PIN1

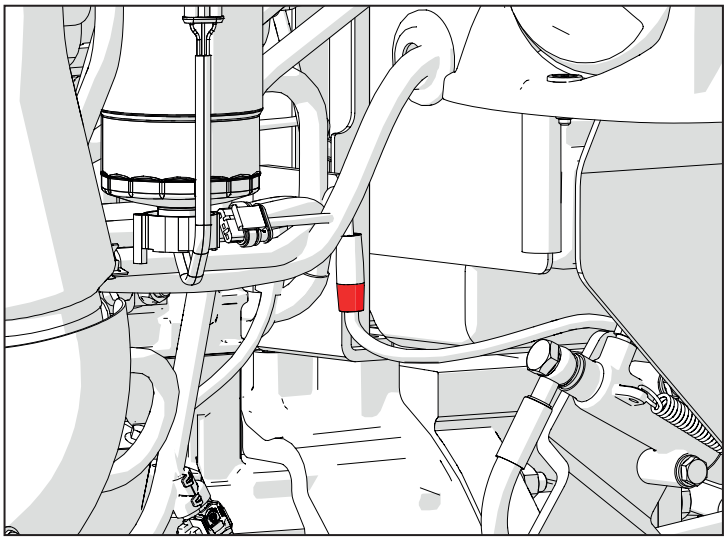




D003 (P40A) Wiring connector for engine wiring loom

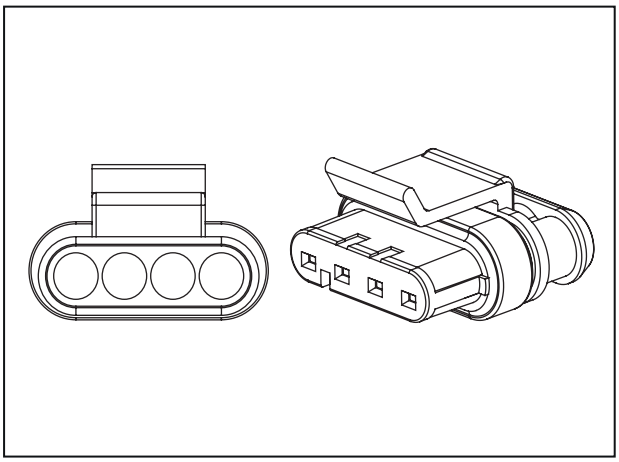
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	LEFT INDICATOR LIGHTS	Gn	0,75	P15	4
3	LH FENDER LIGHTS GND	BK	0,75	P15	3
1	PARKING LIGHTS LH	Ye	0,75	P15	1

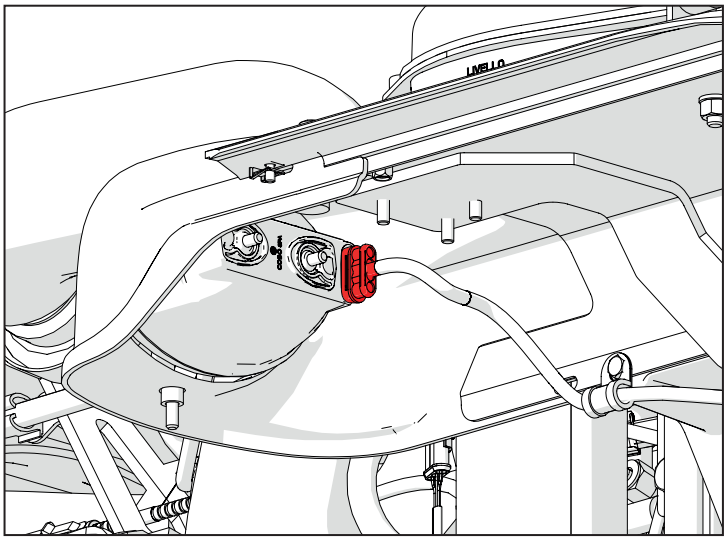




F011 (P15) LH turn indicator

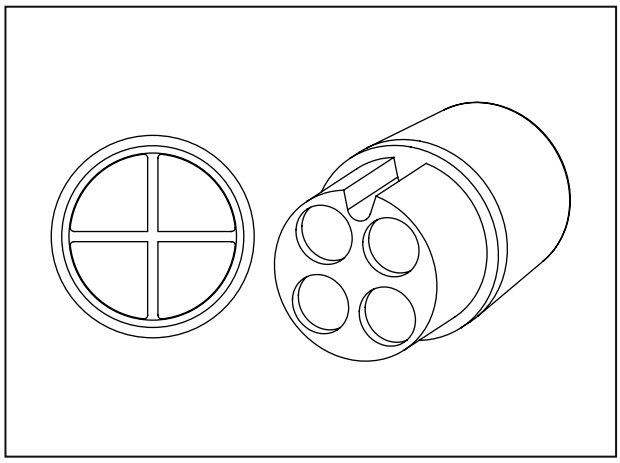
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	LH FENDER LIGHTS GND	BK	0,75	P40A	3
3	LEFT INDICATOR LIGHTS	Gn	0,75	P40A	2
1	PARKING LIGHTS LH	Ye	0,75	P40A	1

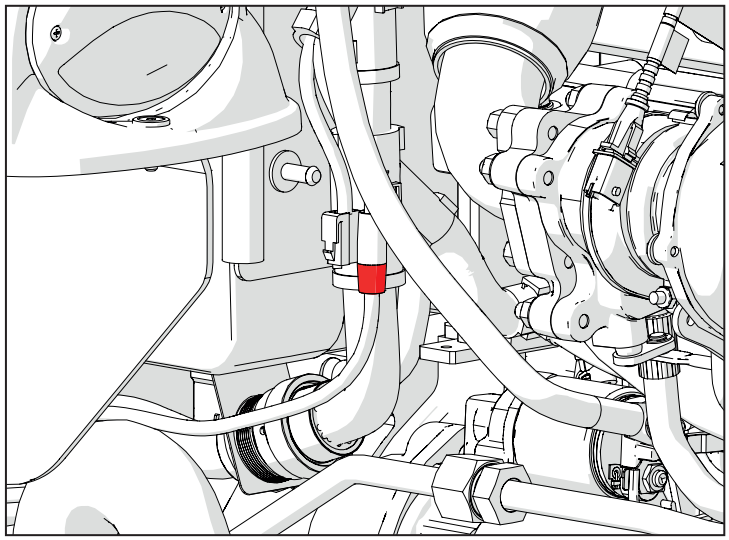




D001 (P50A) Wiring connector for engine wiring loom

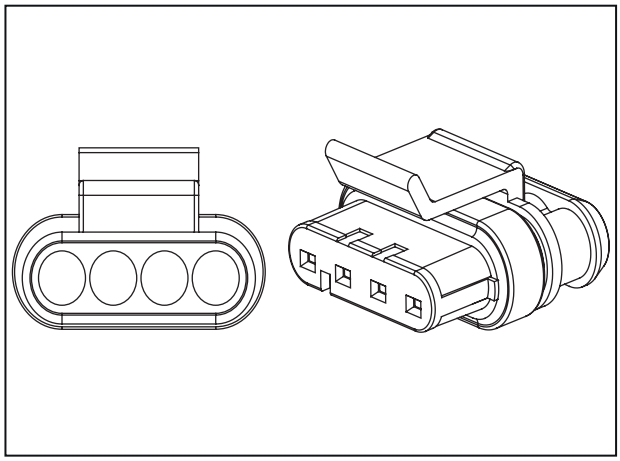
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	0,75	P14	1
2	RIGHT INDICATOR LIGHTS	Bu	0,75	P14	4
3	RH FENDER LIGHTS GND	BK	0,75	P14	3

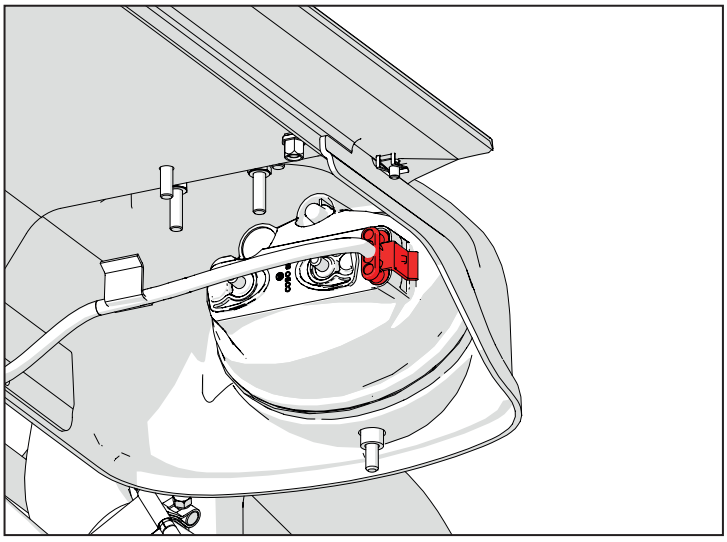




F012 (P14) RH turn indicator

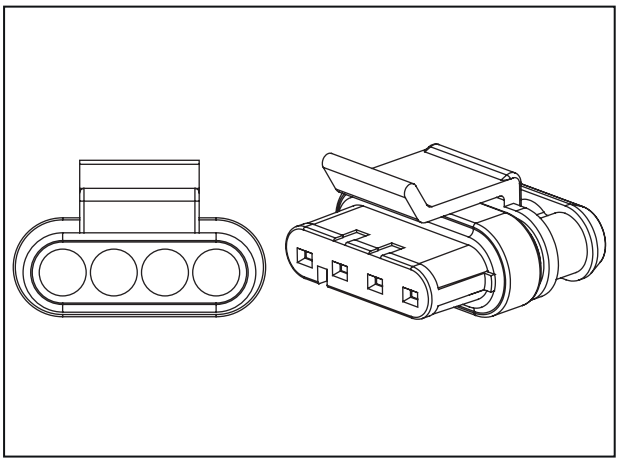
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	0,75	P50A	1
2	RH FENDER LIGHTS GND	BK	0,75	P50A	3
3	RIGHT INDICATOR LIGHTS	Bu	0,75	P50A	2

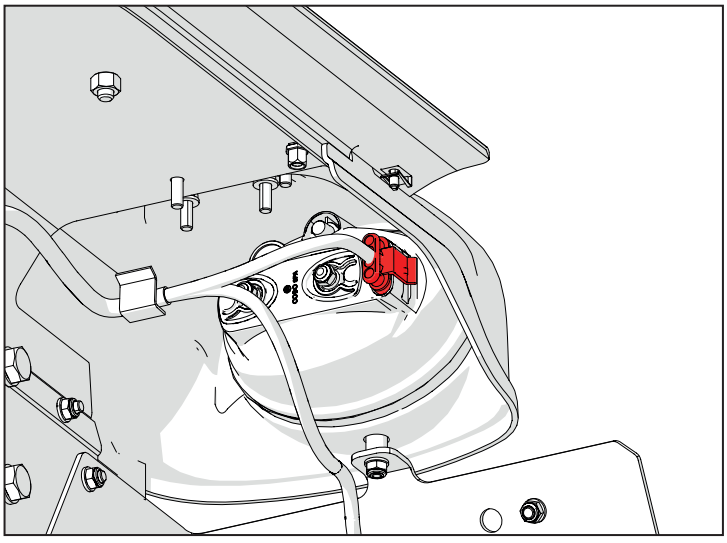




F013 (P225) LH rear mudguard lights

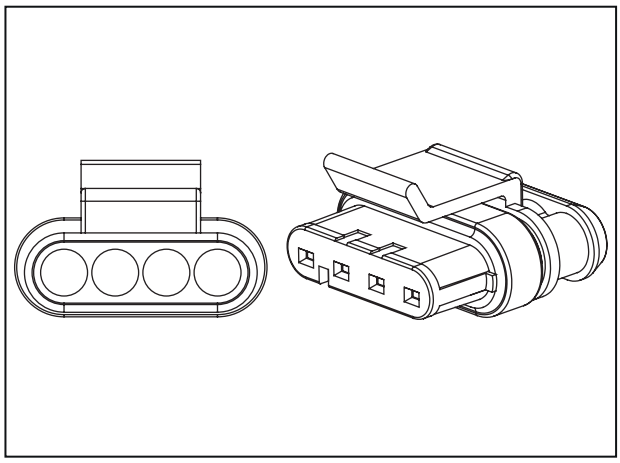
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LAMP	Rd	0,75	P43B	2
2	PARKING LIGHT	Ye	0,75	REARLH-SP2	
3	GND	BK	0,75	REARLH-SP1	
4	LH TURN SIGNAL	Gn	0,75	P43B	4

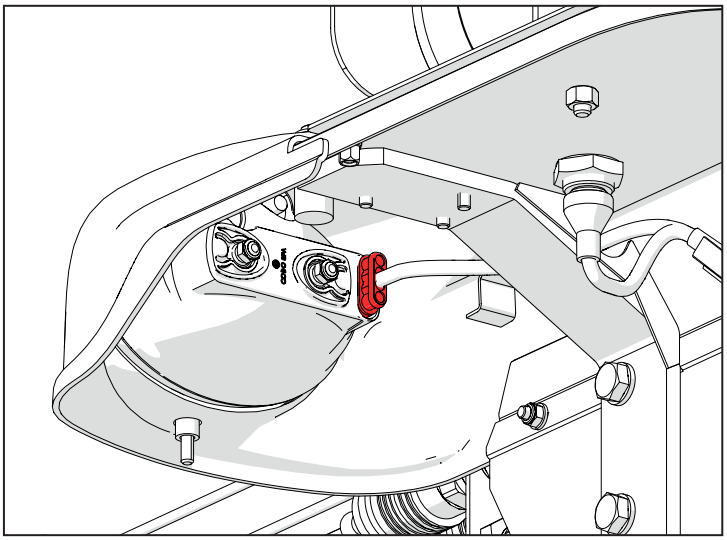




F016 (P464) RH rear mudguard lights

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LAMP	Rd	0,75	P42B	2
2	PARKING LIGHTS	Ye	0,75	REARRH-SP2	
3	GND REAR LIGHTS	BK	0,75	REARRH-SP1	
4	RH TURN SIGNAL	Bu	0,75	P42B	4

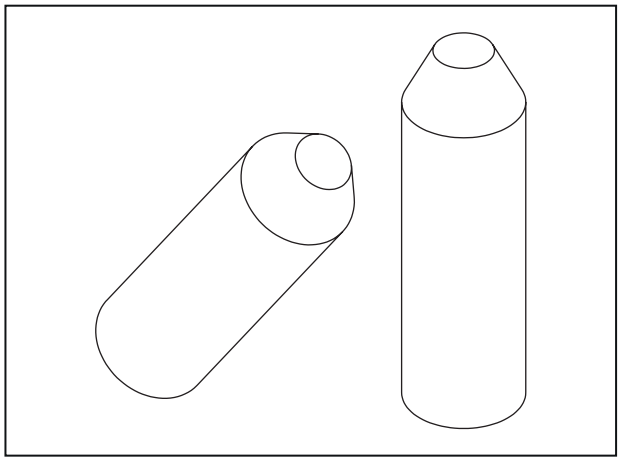


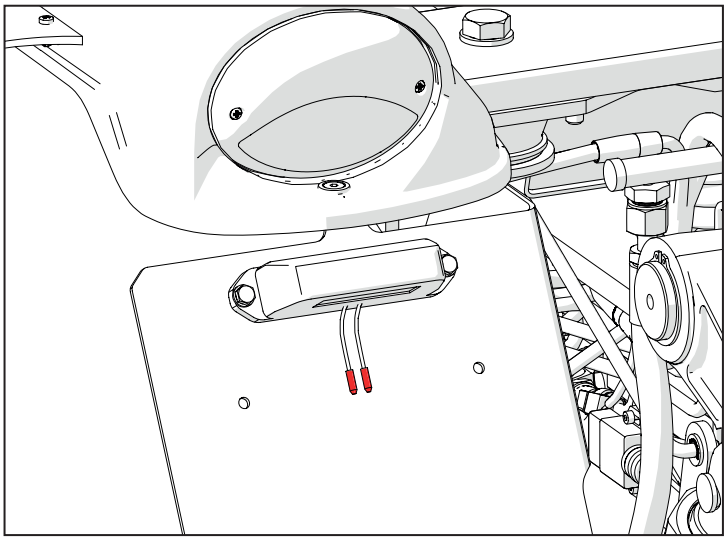


F014 (P478-P479) License plate light

Pin	Description	Colour	Sect.	Input Conn.	Pin.
1	GND	BK	0,75	REARLH-SP1	

Pin	Description	Colour	Sect.	Input Conn.	Pin.
1	PLATE LIGHT	Ye	0,75	REARLH-SP2	

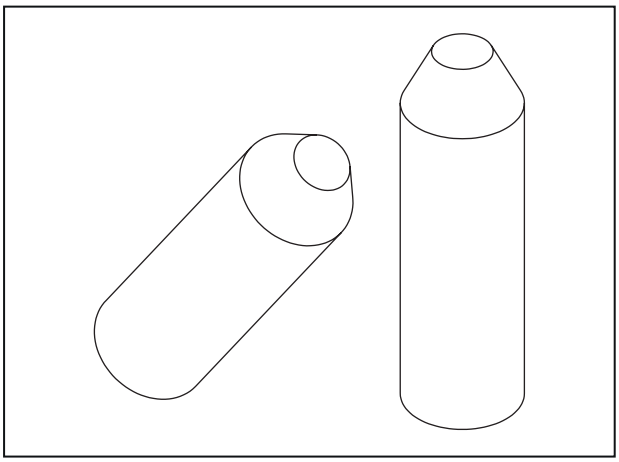


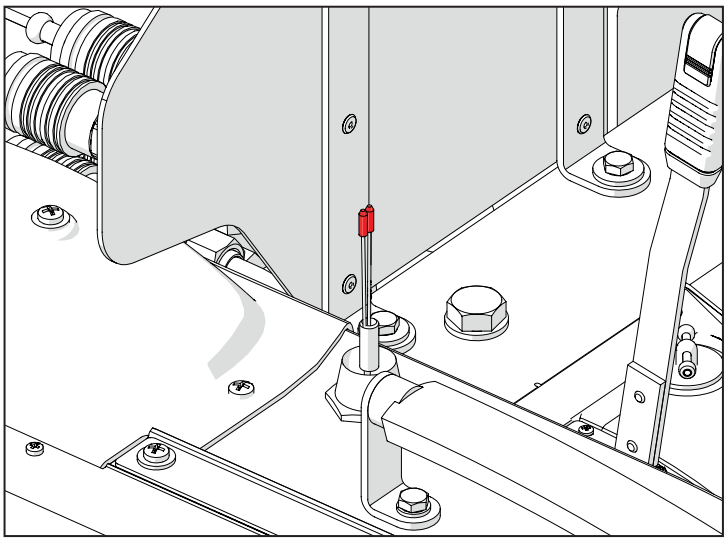


F015 (P486-P487) RH work lights

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	0.75	REARRH-SP1	

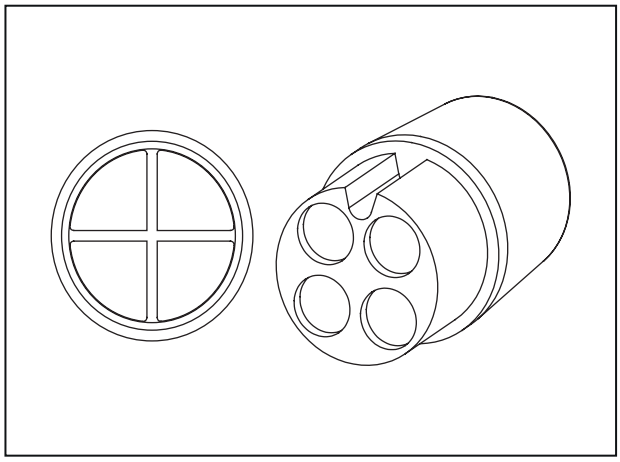
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	WORKING LIGHT	Ye	0,75	REARRH-SP2 .	

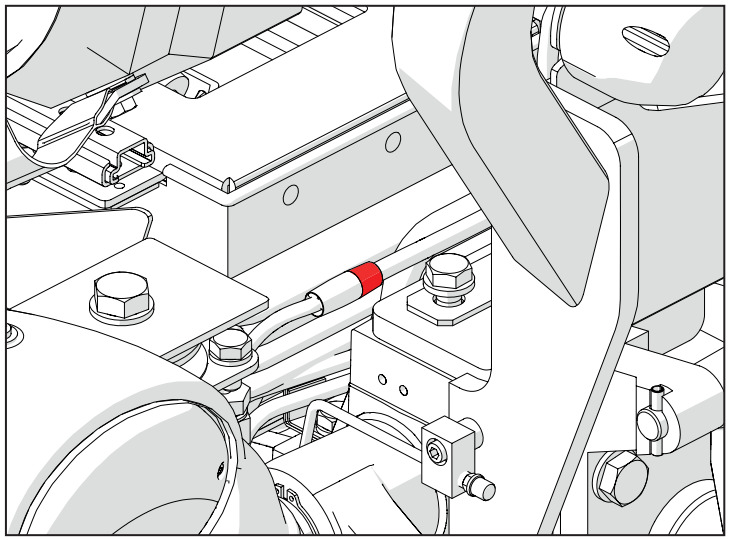




D008 (P42B) Right rear lights-main connector

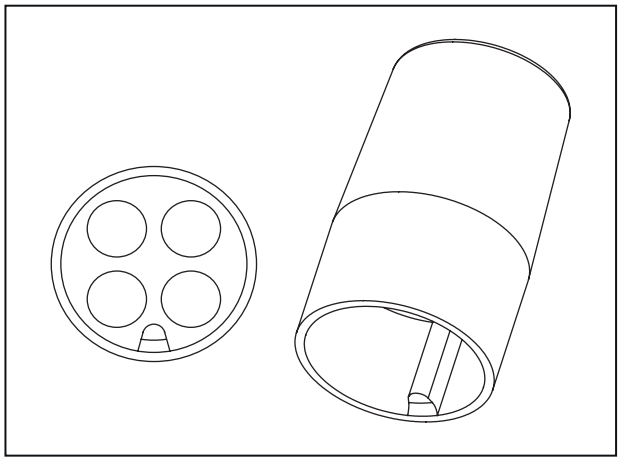
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT RH	Ye	0,75	REARRH-SP2	
2	BRAKE LAMP	Rd	0,75	P464	1
3	GND	BK	1	REARRH-SP1	
4	RH TURN SIGNAL	Bu	0,75	P464	4

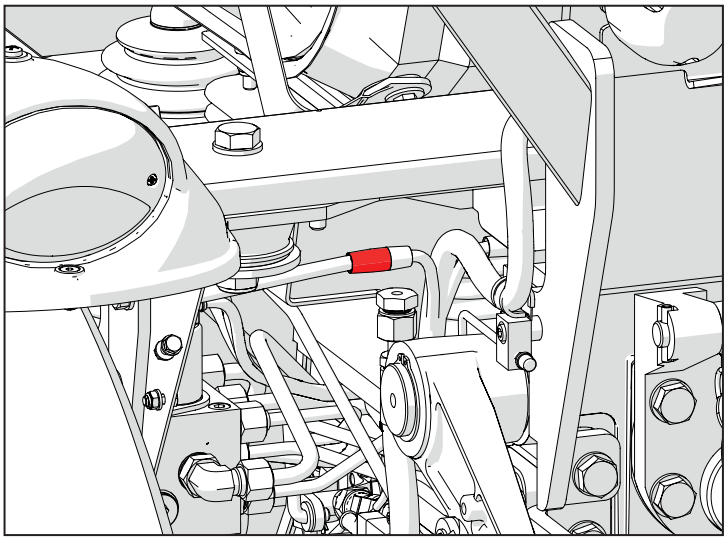




D009 (P43B) Left rear lights-main connector

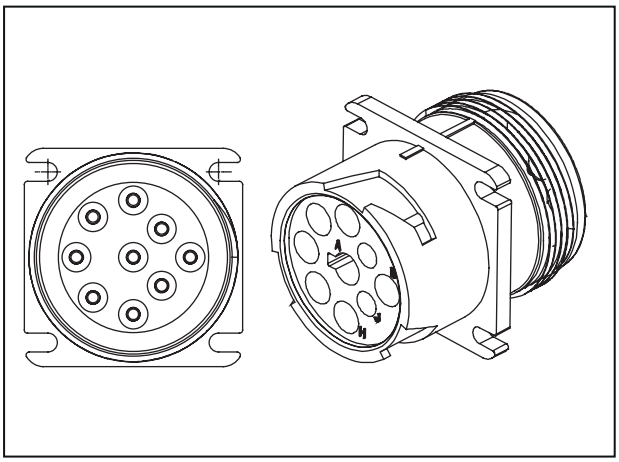
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT LH	Ye	0,75	REARLH-SP2	
2	BRAKE LAMP	Rd	0,75	P225	1
3	GND	BK	1	REARLH-SP1	
4	LH TURN SIGNAL	Gn	0,75	P225	4

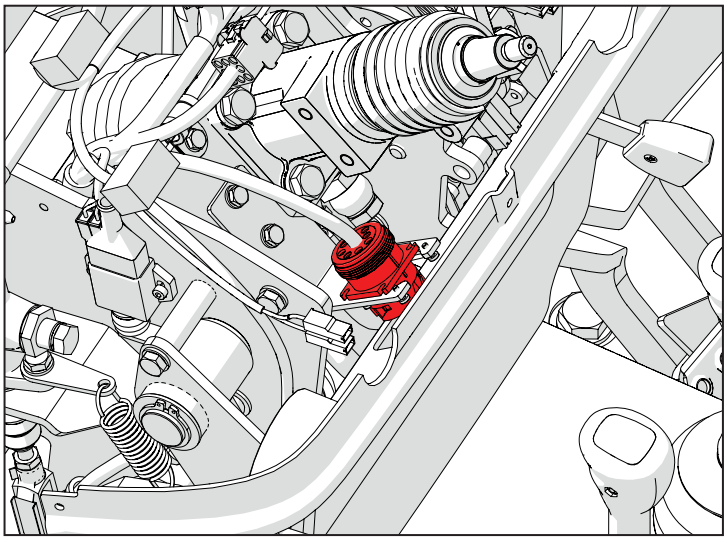




R001 (j9) Diagnostic port

Pin	Description	Colour	Sect.	Input Conn.	Pin
A	GND J1939	BK	1.5	P13	1
B	VJ1939 POWER SUPPLY	Rd	1.5	P100B	15
C	CAN H	Ye	0.5	CAB-SP12	
D	CAN L	Gn	0.5	CAB-SP14	

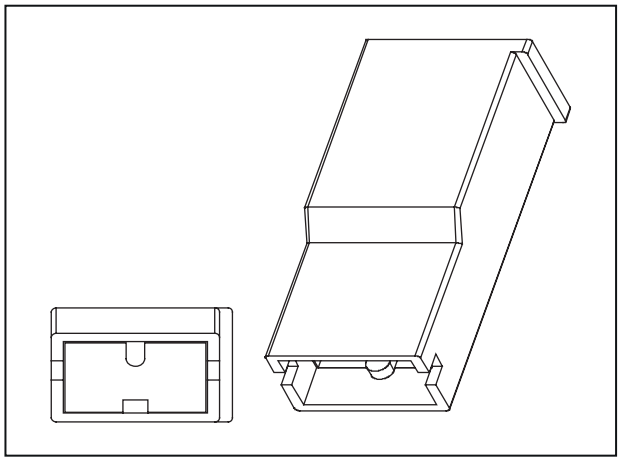


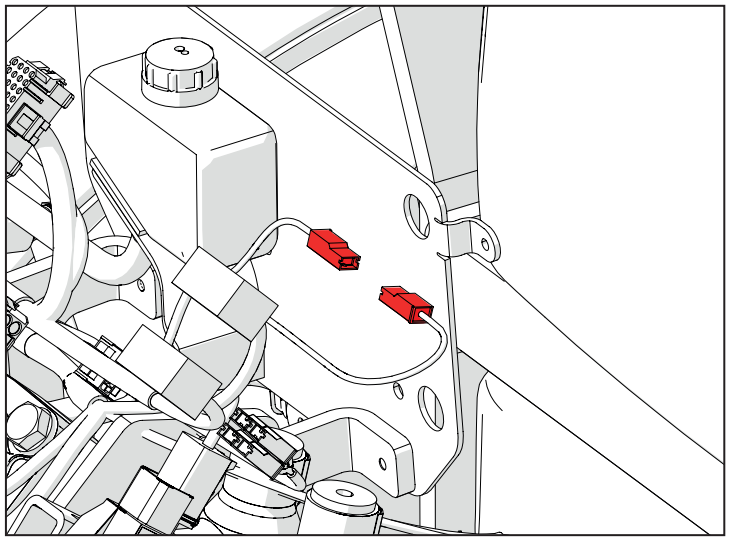


K012 (P19-P20) Brake oil level sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE OIL LEVEL	Gn	0.5	P80	D1

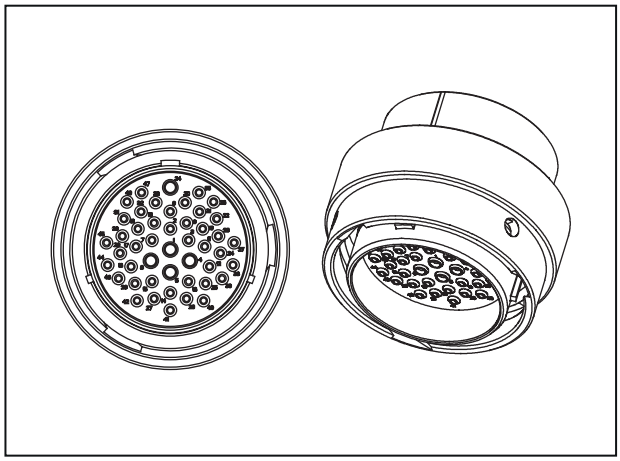
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	





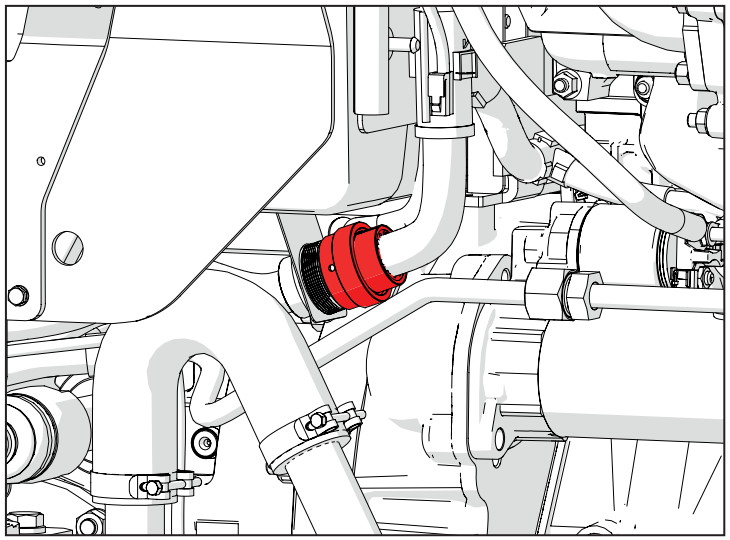
D002 (P10A) Wiring connector for main wiring loom

Pin	Description	Colour	Sect.	.Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	ENG-SP17	
2	FUEL LEVEL SENSOR	Bu	0.5	P40	2
3	START COMMAND	Bu	0.5	P1A	1
4	12V BATT SUPPLY	Rd	2.5	ENG-SP17	
5	V KEY	Bn	2.5	ENG-SP22	
6	V KEY	Bn	2.5	ENG-SP21	
7	BRAKE LAMP RELAY	WH	0.5	P1A	43
8	TURN INDICATORS	Or	0.75	P1A	39
9	V-KEY DASH	Bn	0.5	P1A	19



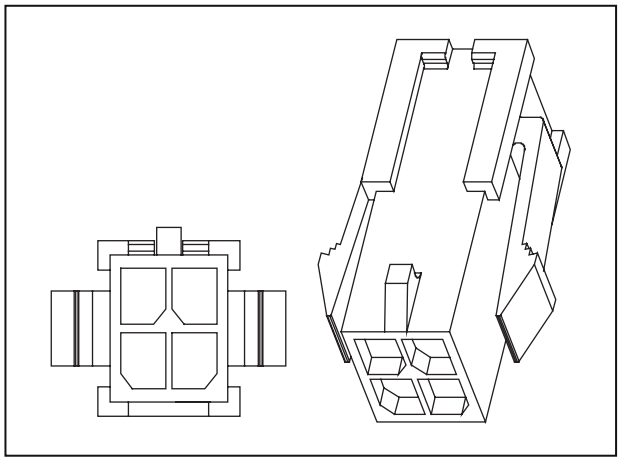
10	START ENABLE RELAY	Or	0.5	P1A	12
11	DPF REGENERATION INHIBIT SW	BK	0.5	P12	32
12	HORN/SOCKET V KEY	Pu	1.0	ENG-SP25	
13	HIGH BEAM	Gn	0.5	P1A	14
14	NORMAL BEAM LIGHTS	Gy	0.5	P1A	34
15	VCU V BATT	Rd	1.5	P1A	58
16	PARKING LIGHTS	Ye	1.5	ENG-SP23	
17	ALTERNATOR D+	Bu	0.75	P2	1
18	DASHBOARD V-BATT	Rd	0.75	P1A	59
19	VJ1939 POWER SUPPLY	Rd	1.5	P2A	12
20	START ENABLE SENSOR	Rd	0.5	ENG-SP3	
21	VCU V KEY	Bn	0.5	P1A	18
22	RELAY FOR DASHBOARD LED	Or	0.5	P1A	41
23	LED FOR DASH	Gn	0.5	P1A	42
24	AIR FILTER	Gn	0.5	P439	1
25	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P12	42
26	SENSORS V-KEY	Bn	1.5	P1A	40
27	VALVES V KEY	Pu	1.0	ENG-SP25	
28	HORN POWER SUPPLY	Pu	0.75	P152	1
29	BRAKE LAMP	Rd	0.75	P1A	35
30	PARKING LIGHTS RH	Ye	1.0	ENG-SP16	
31	HAZARD LIGHTS CONTROL	Rd	0.75	P1A	60
32	REAR PARKING LIGHT LH	Ye	1.0	ENG-SP14	
33	BEACON LIGHT SUPPLY	Pu	1.0	P41	2
34	POWER SOCKET SUPPLY	Rd	2.5	P2A	21
35	GND FUEL LEVEL	BK	0.5	P40	3
36	V KEY	Bn	1.5	P1A	57
37	LEFT INDICATOR LIGHT	Gn	0.75	P40B	2
38	RIGHT INDICATOR LIGHT	Bu	0.75	P50B	2

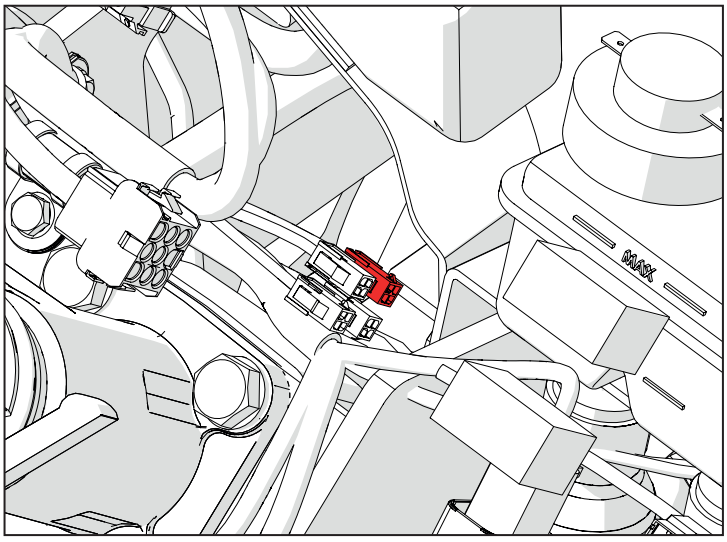
39	DPF REGENERATION INHIBIT SW	BK	0.5	ENG-SP6	
46	CAN L	Gn	0.5	ENG-SP12	
47	CAN H	Ye	0.5	ENG-SP11	



I007 (P31) Instrument panel ENTER button

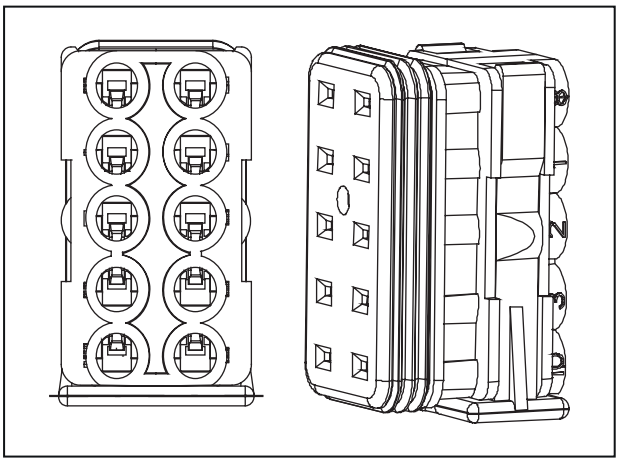
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	DASHBOARD PB ENTER	Bu	0.5	P200	25

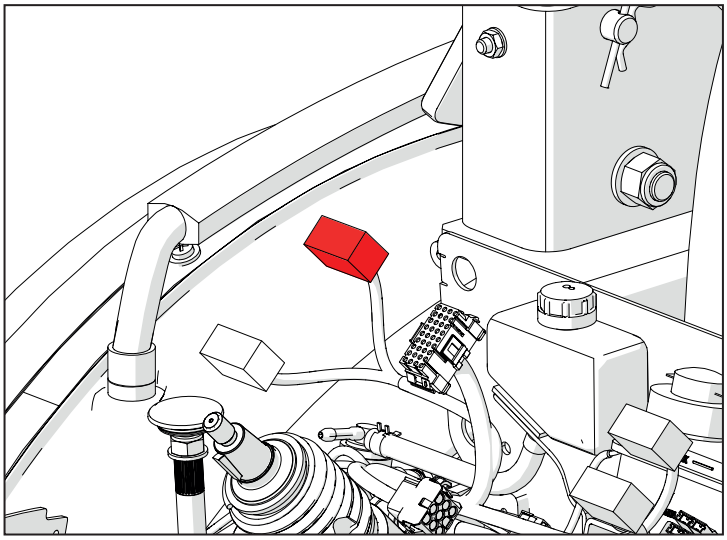




I006 (P32) Regeneration cycle disable switch

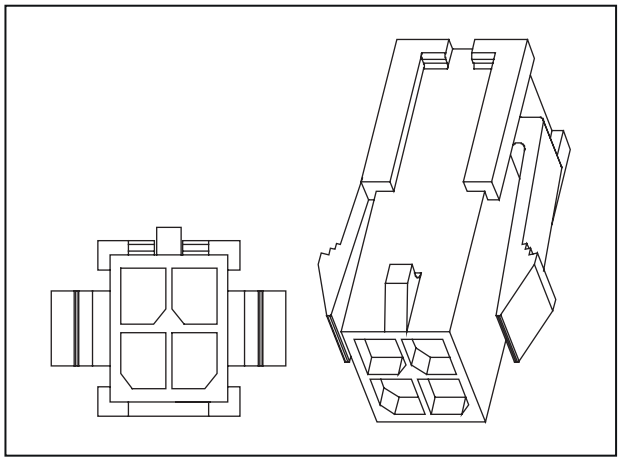
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	DPF REGENERATION INHIBIT SW	Or	0.5	P100B	28
2	DPF REGENERATION INHIBIT SW	Bu	0.5	P100B	44
3	DPF REGENERATION TRIGGER SWITCH	Gn	0.5	P100B	32

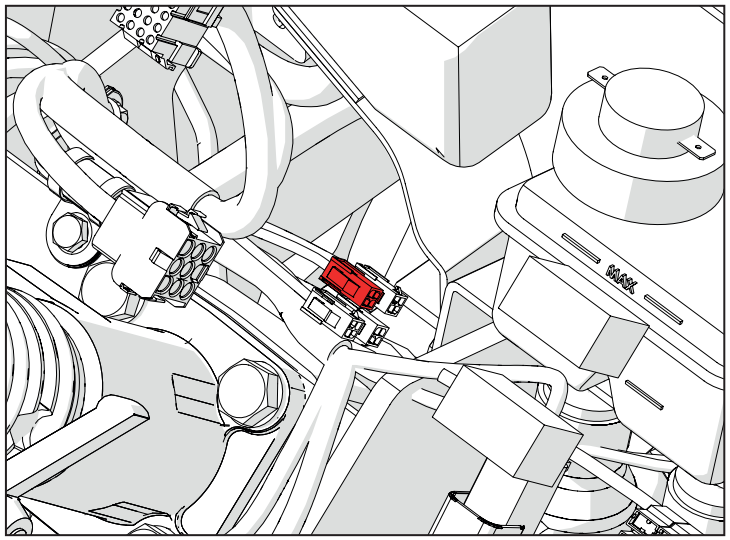




I008 (P34) Instrument panel + button

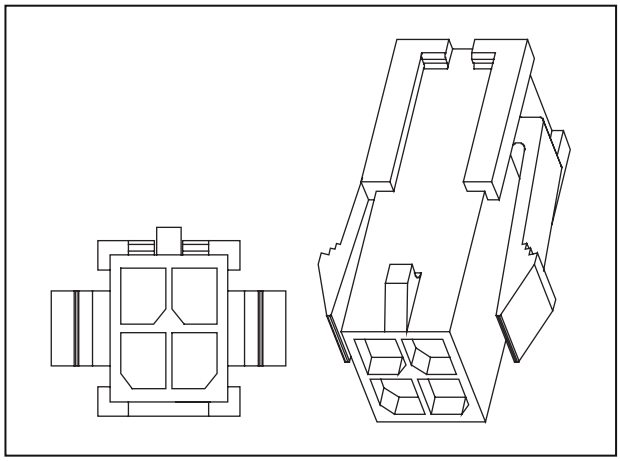
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
2	DASHBOARD PB +	Bu	0.5	P200	24

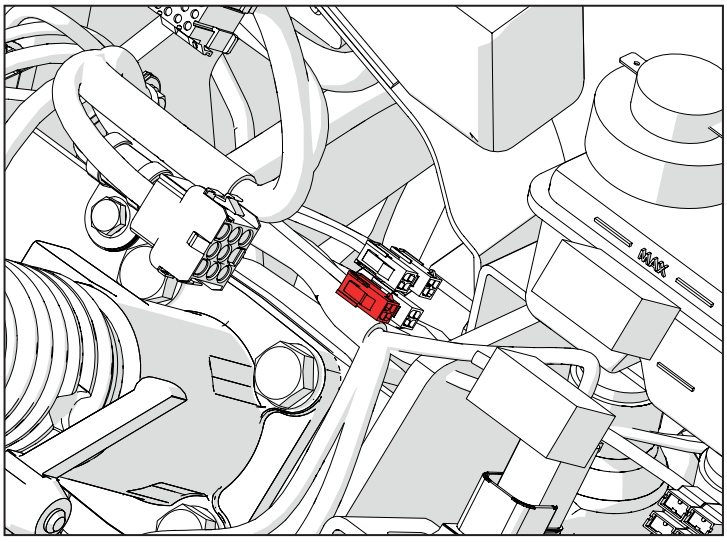




I009 (P35) Instrument panel - button

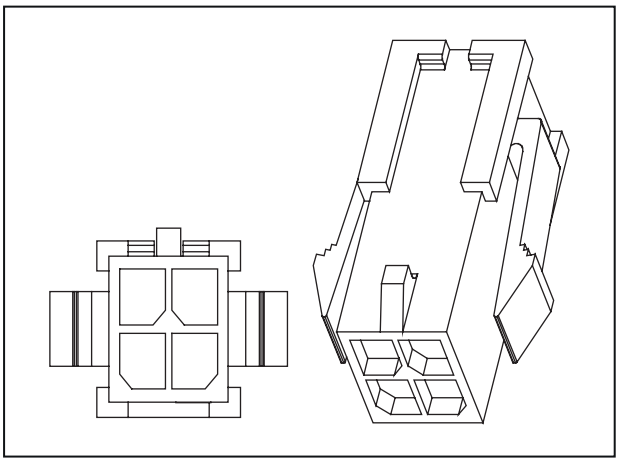
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
2	DASHBOARD PB -	Bu	0.5	P200	20

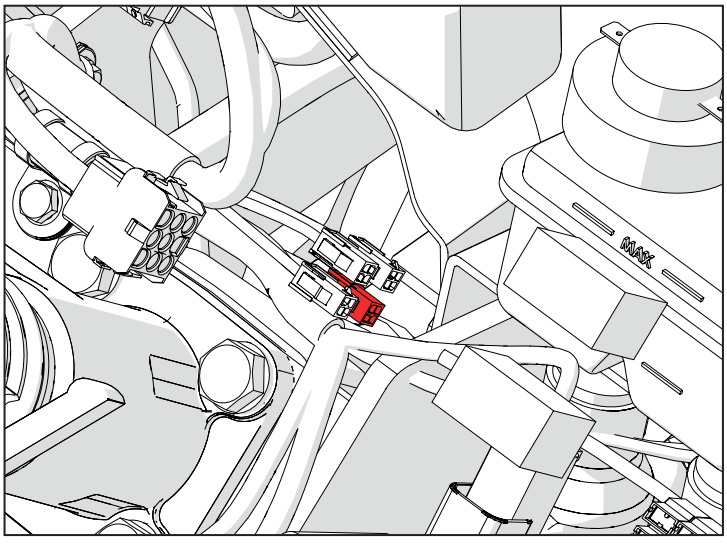




I004 (P36) Auto PTO switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	
4	PB - PTO Rear/ Front bypass	Bu	0.5	P80	G3





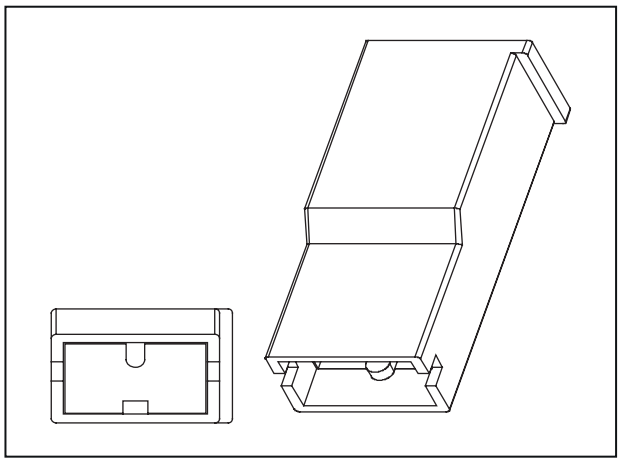
I010 (P504-P505-P506-P508) PTO start enable signal / dashboard indicator signal

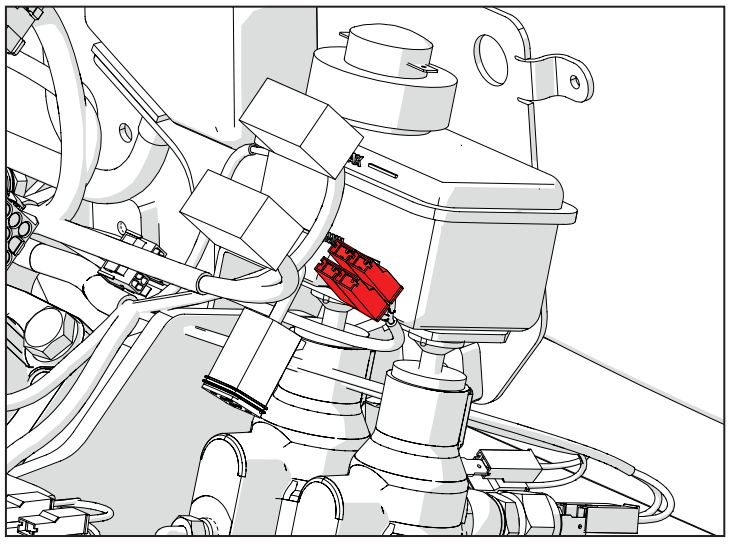
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear A	Pu	0.5	P80	F2

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear B	Pu	0.5	P80	G1

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear ENGAGED	Bn	0.5	CAB-SP1	

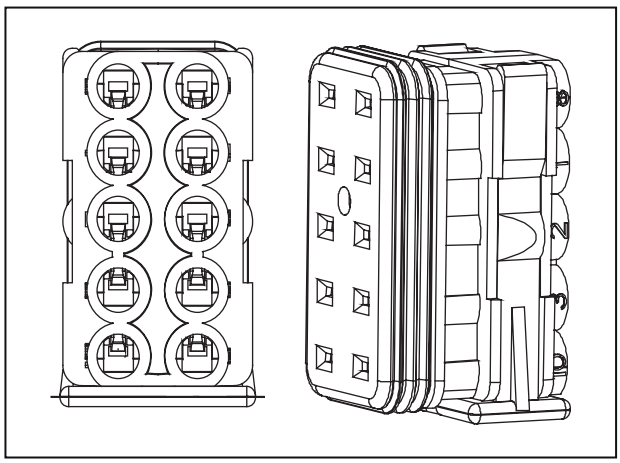
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P102B	2

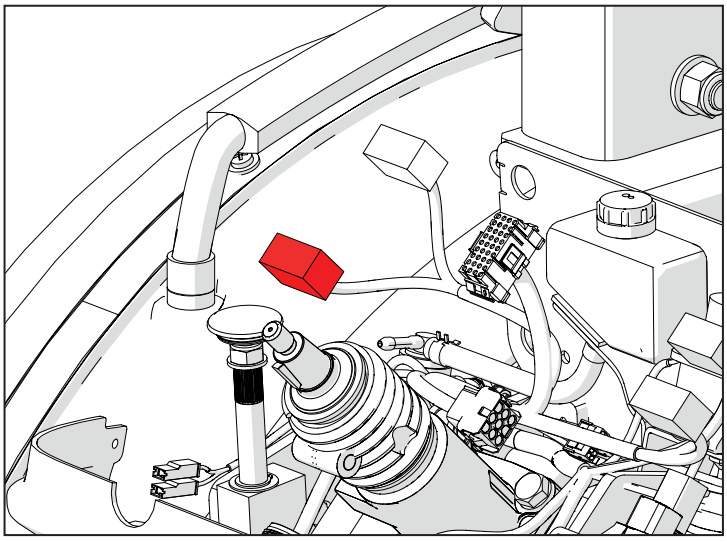




I005 (P62) Hydraulic differential lock switch

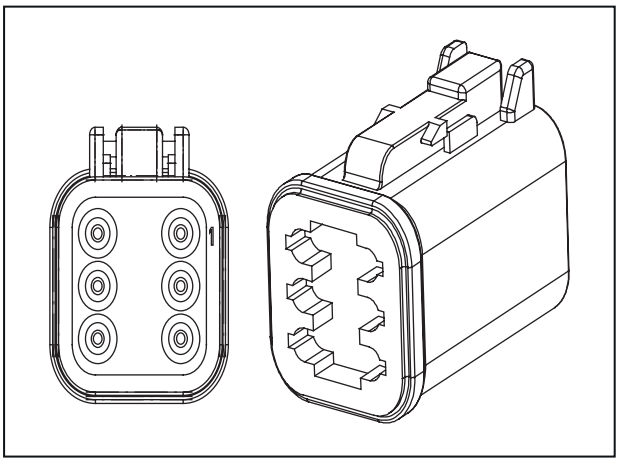
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	PB - Differential lock on/off	BK	0.5	CAB-SP2	
3	PB - Differential lock on/off	Bu	0.5	P80	K4

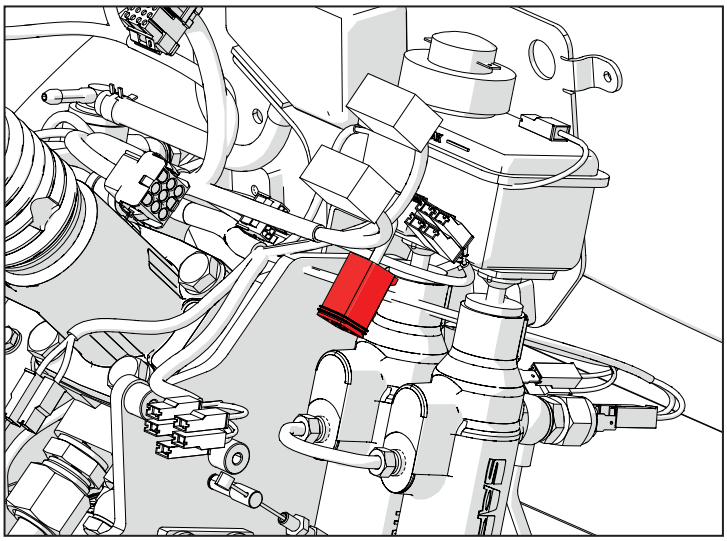




H001 (P100) Hand throttle

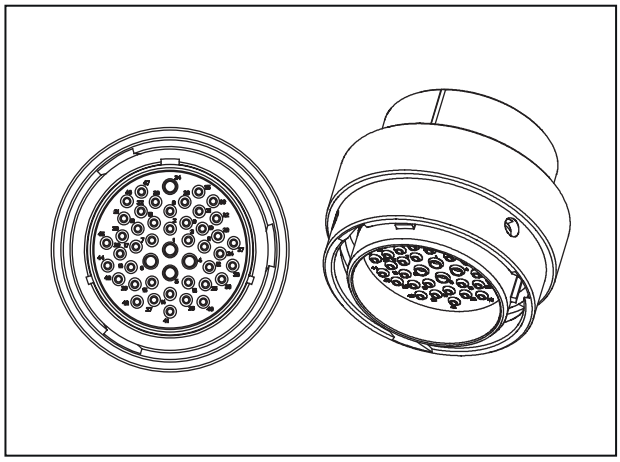
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ACCELERATOR GND1	BK	0,75	CAB-SP7	
2	12V	Bn	0,75	CAB-SP1	
3	THROTTLE - SIGNAL1	Gn	0.5	P80	L4
4	ACCELERATOR GND2	BK	0,75	CAB-SP7	
5	12V	Bn	0,75	CAB-SP1	
6	THROTTLE - SIGNAL2	Gn	0.5	P80	K2



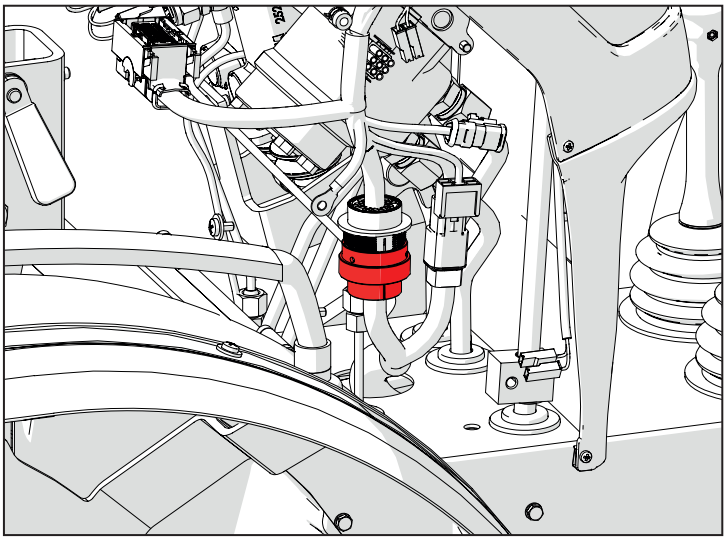


D006 (P100A) Wiring connector for dashboard wiring loom

Pin	Description	Colour	Sect.	Input Conn.	Pin
2	HAZARD LIGHTS CONTROL	Rd	0.75	P10B	31
3	BRAKE LAMP RELAY	WH	0.5	P10B	7
4	PTO RPM Sensor	Gn	0.5	P518	3
5	PTO - Speed Selection Lever	Ye	0.5	P520	1
6	GND	BK	0.5	MAIN-SP6	
7	Wheel Speed	Bu	0.75	P301	3
8	HORN/SOCKET V KEY	Pu	1.0	P10B	12
9	12V	Bn	1.5	MAIN-SP5	
10	NORMAL BEAM LIGHTS	Gy	0.5	P10B	14
11	TURN INDICATORS	Or	0.75	P10B	8
12	START ENABLE RELAY	Or	0.5	P10B	10
13	ALTERNATOR B+	Bu	0.5	P10B	17
14	DASHBOARD V BATT	Rd	0.75	P10B	18
15	VJ1939 POWER SUPPLY	Rd	1.5	P10B	19
16	START ENABLE SENSOR	Rd	0.5	P10B	20
17	VCU V KEY	Bn	0.5	P10B	21
18	RELAY FOR DASHBOARD LED	Or	0.5	P10B	22
19	LED FOR DASHBOARD	Gn	0.5	P10B	23
20	AIR FILTER	Gn	0.5	P10B	24
21	LH TURN SIGNAL	Bu	0.75	MAIN-SP3	
22	VCU V BATT	Rd	1.5	P10B	15
23	HYD OIL PRESSURE SWITCH	Ye	0.75	P471	1
24	PARKING LIGHTS	Ye	1.5	P10B	16
25	LH TURN SIGNAL	Gn	0.75	MAIN-SP8	
26	FUEL LEVEL SENSOR	Bu	0.5	P10B	2
27	HIGH BEAM	Gn	0.5	P10B	13

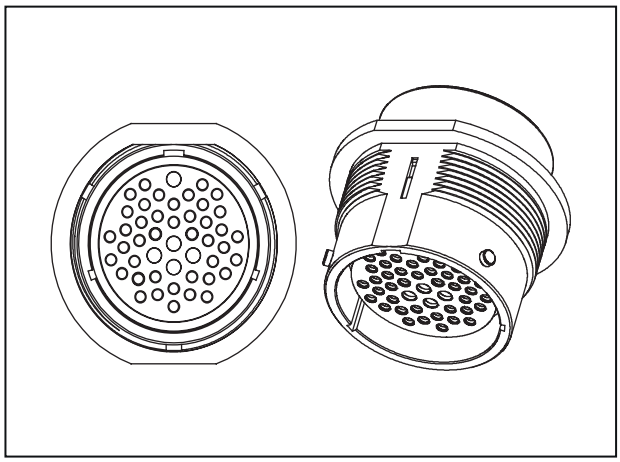


28	DPF REG INHIBIT SW	BK	0.5	P10B	11
29	CAN L	Gn	0.5	P10B	46
30	CAN H	Ye	0.5	P10B	47
31	BEACON LIGHT SUPPLY	Pu	1.0	P10B	33
32	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P10B	25
33	DASHBOARD 12 V	Bn	0.5	P10B	9
34	V KEY	Bn	1.5	P10B	36
35	HORN POWER SUPPLY	Pu	0.75	P10B	28
36	SEAT SWITCH SIGNAL - A	Bu	0.5	P107	2
37	SEAT SWITCH SIGNAL - B	Gn	0.5	P107	4
38	PTO - Synchronized Safety Switch	Bu	0.5	P49	2
39	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P186	2
40	DIFF LOCK ON/ OFF VALVE	Or	0.5	P187	2
41	DIVERTER VALVE	Gn	0.5	P188	2
42	PTO DIRECTION VALVE	Gy	0.5	P499	2
43	START COMMAND	Bu	0.5	P10B	3
44	DPF REGENERATION INHIBIT SW	Bu	0.5	P10B	39
45	Shuttle lever FW switch	Or	0.5	P58	1
46	Shuttle lever RW switch	Gn	0.5	P57	1
47	PB - DIVERTER	Gy	0.5	P61	3



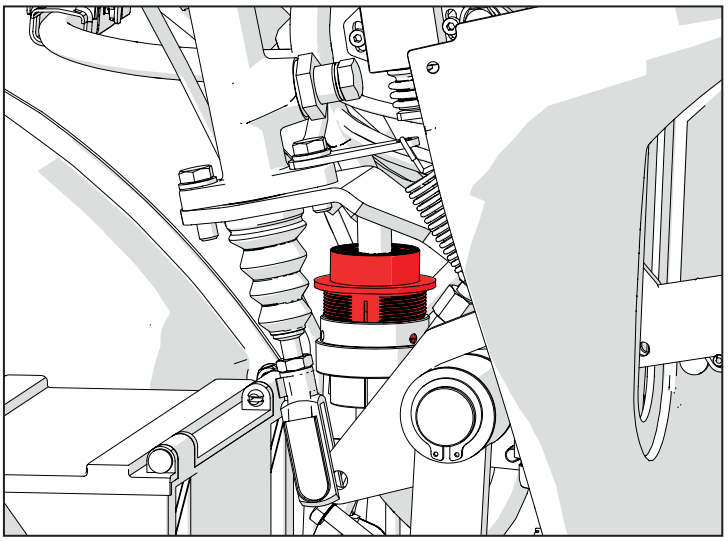
D006 (P100B) Wiring connector for engine wiring loom

Pin	Description	Colour	Sect.	Input Conn.	Pin
2	HAZARD LIGHTS CONTROL	Rd	0.75	P137	3
3	BRAKE LAMP RELAY	WH	0.5	P80	P3
4	PTO RPM Sensor	Gy	0.5	P80	C1
5	PTO - Speed Selection Lever	Ye	0.5	P80	H2
6	SIGNAL GND	BK	0.5	P80	N3
7	Wheel Speed	WH	0.5	P80	D3
8	HORN/SOCKET V KEY	Pu	1.0	CAB-SP16	
9	SENSORS V-KEY	Bn	1.5	CAB-SP1	
10	NORMAL BEAM LIGHTS	Gy	0.5	CAB-SP21	
11	TURN INDICATORS	Or	0.75	P137	1
12	START ENABLE RELAY	Or	0.5	P80	B3
13	ALTERNATOR D+	Bu	0.5	P200	33
14	DASHBOARD V-BATT	Rd	0.75	P200	3
15	VJ1939 POWER SUPPLY	Rd	1.5	J9	B
16	START ENABLE SENSOR	Rd	0.5	P80	G2
17	VCU V KEY	Bn	0.5	P80	M2
18	RELAY FOR DASHBOARD LED	Or	0.5	P80	C3



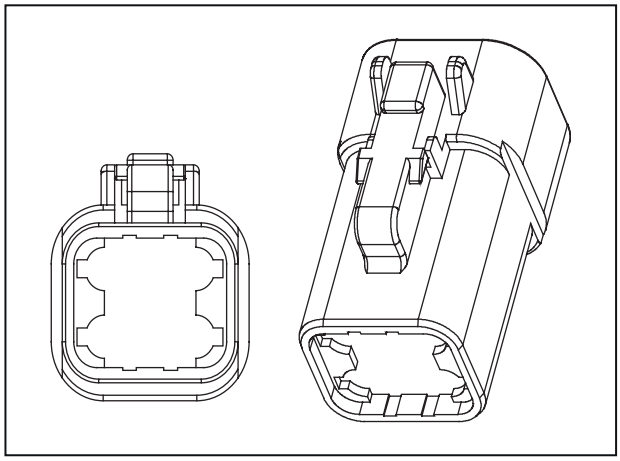
19	LED FOR DASHBOARD	Gn	0.5	CAB-SP6	
20	AIR FILTER	Gn	0.5	P80	J2
21	RIGHT INDICATOR LIGHT	Bu	0.75	CAB-SP4	
22	VCU V BAT	Rd	1.5	CAB-SP5	
23	HYD OIL PRESSURE SWITCH	Ye	0.5	P80	K3
24	PARKING LIGHTS	Ye	1.5	CAB-SP22	
25	LEFT INDICATOR LIGHT	Gn	0.75	CAB-SP3	
26	FUEL LEVEL SENSOR	Bu	0.5	P80	K1
27	HIGH BEAM	Gn	0.5	CAB-SP23	
28	DPF REG INHIBIT SW	Or	0.5	P32	1
29	CAN L	Gn	0.5	CAB-SP14	
30	CAN H	Ye	0.5	CAB-SP12	
31	BEACON LIGHT SUPPLY	Pu	1.0	P112	3
32	DPF REGENERATION TRIGGER SW	Gn	0.5	P32	3
33	DASHBOARD 12 V	Bn	0.5	P200	4
34	POWER SOCKET SUPPLY	Bn	1.5	P456	1
35	HORN POWER SUPPLY	Pu	0.75	P144	9
36	SEAT SWITCH SIGNAL - A	Bu	0.5	P80	H1
37	SEAT SWITCH SIGNAL - B	Gn	0.5	P80	J3
38	PTO - Synchronized Safety Switch	Bu	0.5	P80	L3
39	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P80	P1
40	DIFF LOCK ON/ OFF VALVE	Or	0.5	P80	Q3
41	DIVERTER VALVE	Gn	0.5	P80	Q1
42	PTO DIRECTION VALVE	Gy	0.5	P80	P2

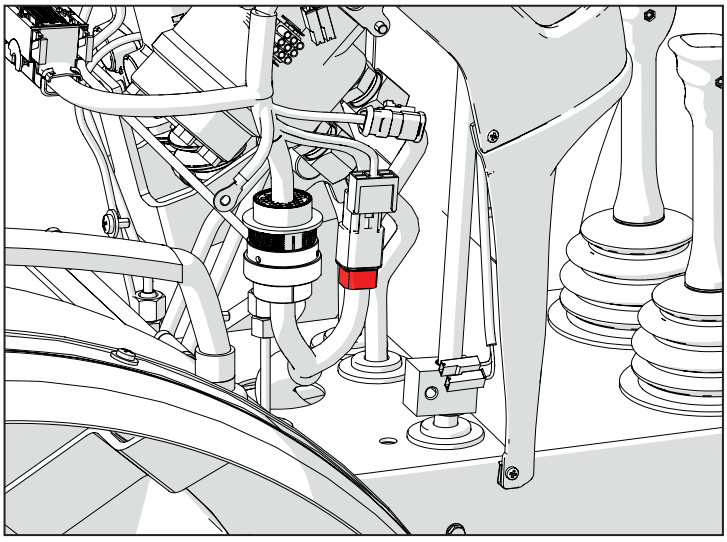
43	START COMMAND	Bu	0.5	CAB-SP24	
44	DPF REGENERATION INHIBIT SW	Bu	0.5	P32	2
45	Shuttle lever FW switch	Or	0.5	P80	B2
46	Shuttle lever RW switch	Gn	0.5	P80	C2
47	PB - DIVERTER	Gy	0.5	P80	H4



D007 (P102A) Wiring connector for dashboard wiring loom

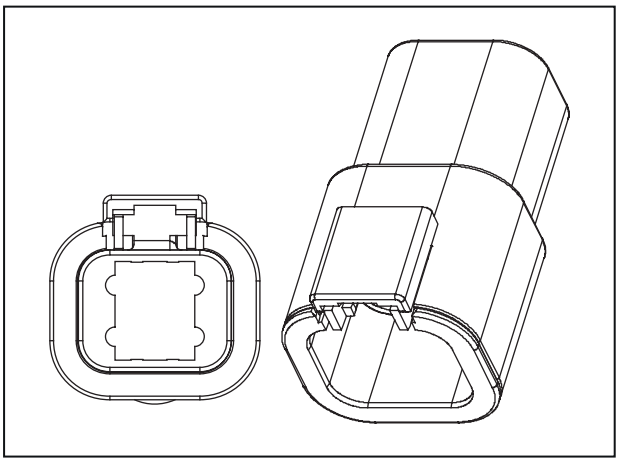
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P10B	1
2	12V BATT SUPPLY	Rd	2.5	P10B	4
3	V KEY	Bn	2.5	P10B	5
4	V KEY	Bn	2.5	P10B	6

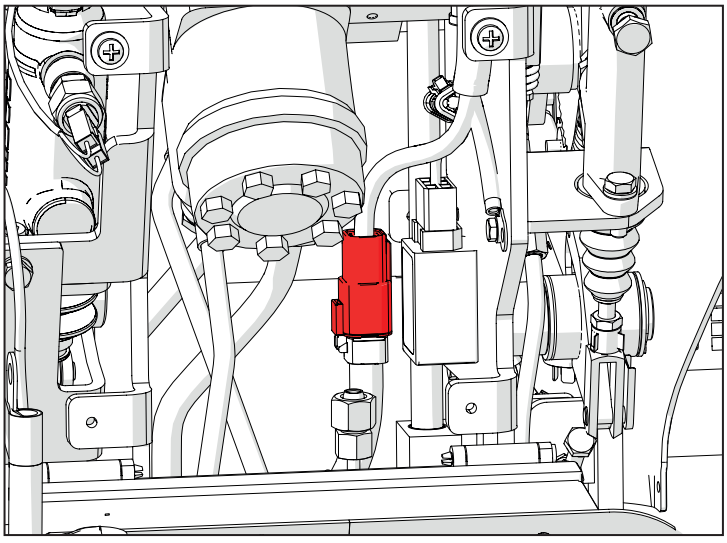




D007 (P102B) Wiring connector for engine wiring loom

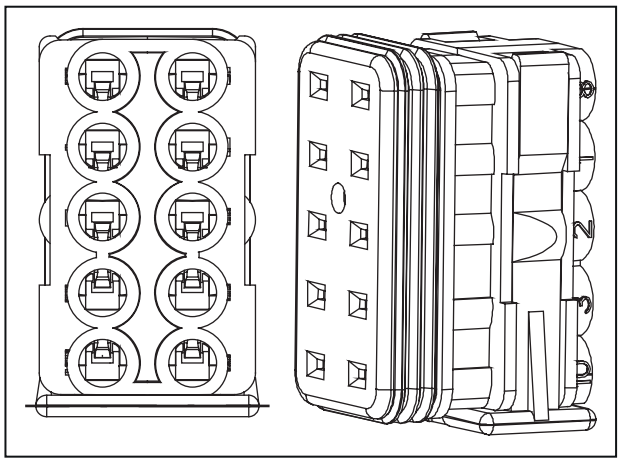
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P118	1
2	12V BATT SUPPLY	Rd	2.5	P507	1
3	V KEY	Bn	2.5	P451	1
4	V KEY	Bn	2.5	P455	1

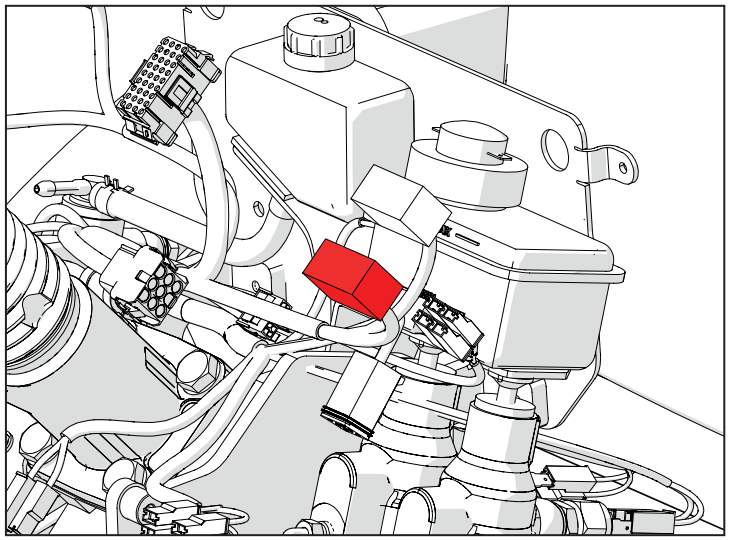




F004 (P112) Rotating beacon button

Pin	Description	Colour	Sect.	Input Conn.	Pin
2	BEACON	Pu	1	CAB-SP16	
3	BEACON LIGHT SUPPLY	Pu	1	P100B	31

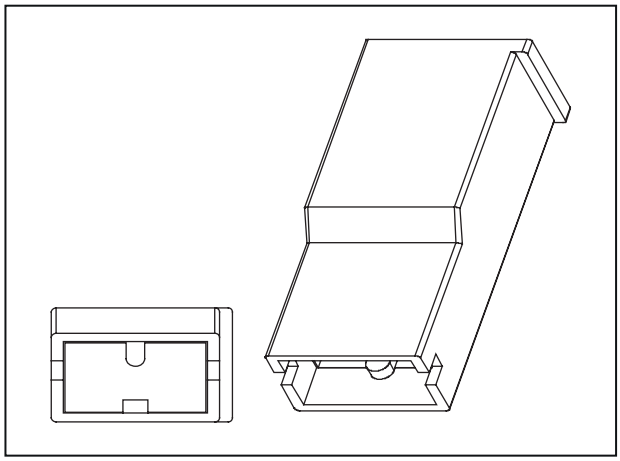


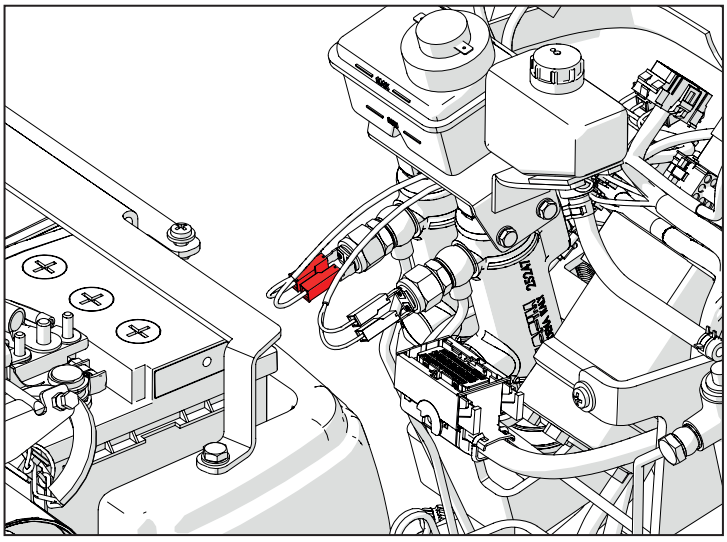


F005 (P119-P120) RH brake signal switch

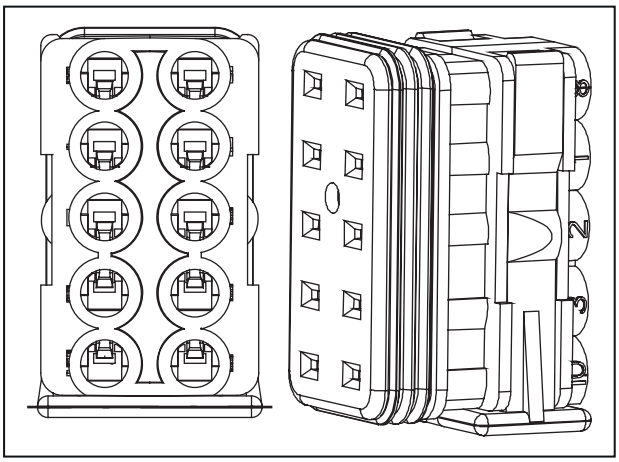
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE RH SW	Bu	0.5	P80	E4

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

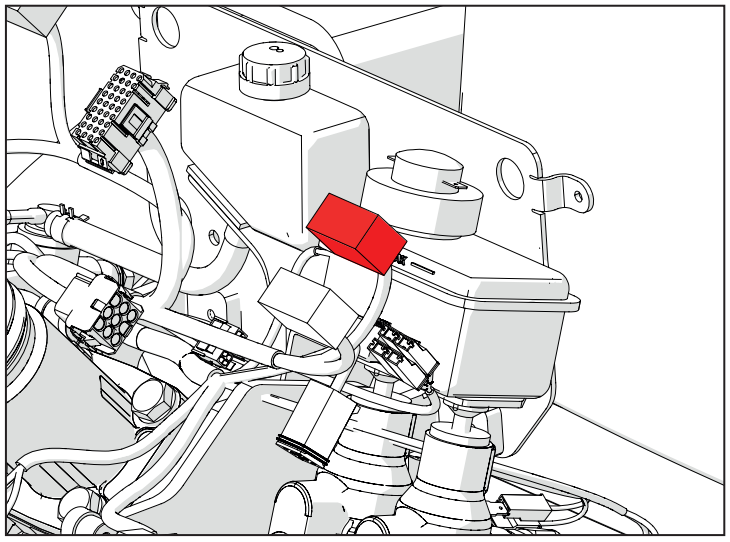




F003 (P137) Hazard warning lights button

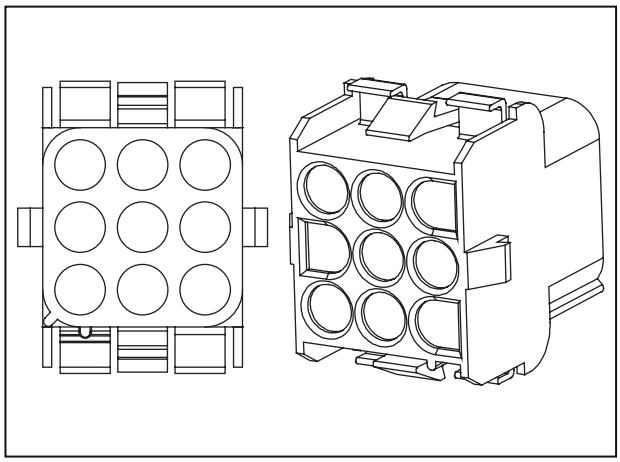


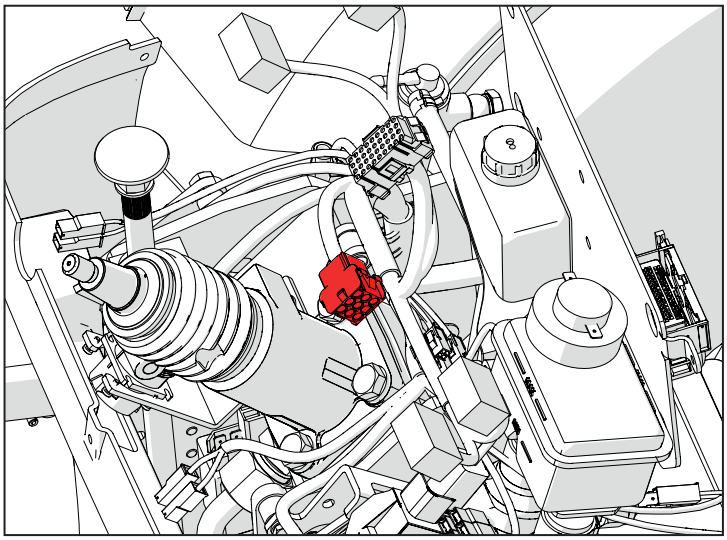
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	TURN INDICATORS	Or	0,75	P100B	11
2		Pu	1	P274	6
3	HAZARD LIGHTS CONTROL	Rd	0,75	P100B	2
5	12V EMERGENCY	WH	1	P274	4
6	RH TURN SIGNAL LIGHT	Bu	1	CAB-SP4	
6	BRIDGE	Bu	0,75	P137	10
8	HAZARD LIGHTS CONTROL - GND	BK	0,75	CAB-SP2	
9	LH TURN SIGNAL	Gn	1	CAB-SP3	
10	BRIDGE	Bu	0,75	P137	7



F002 (P144) RH turn indicator signal

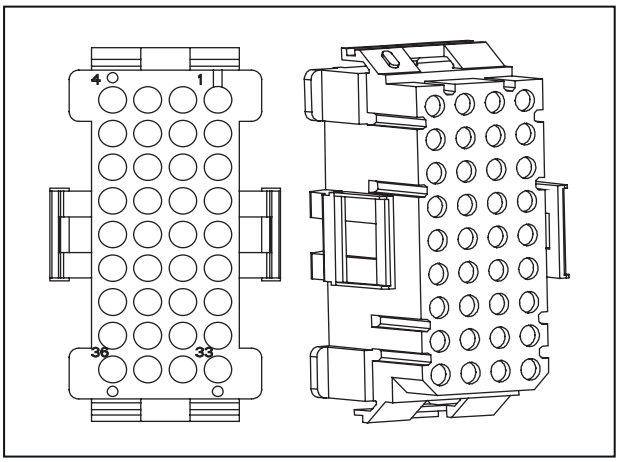
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS	Ye	1.5	CAB-SP22	
2	RH TURN SIGNAL	Bu	0,75	CAB-SP4	
3	LH TURN SIGNAL	Gn	0,75	CAB-SP3	
4	HIGH BEAM	Gn	0.5	CAB-SP23	
5	12V KEY SWITCH	Bn	1.5	P455	1
6	TURN INDICATORS	WH	1	P274	4
7	NORMAL BEAM	Gy	0.5	CAB-SP21	
8	HORN V KEY	Pu	0,75	CAB-SP16	
9	HORN POWER SUPPLY	Pu	0,75	P100B	35

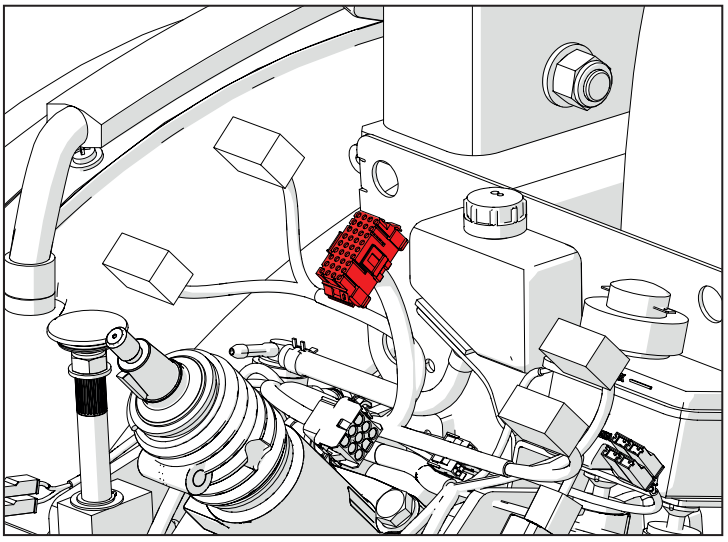




E002 (P200) Dashboard

Pin	Description	Colour	Sect.	Input Conn.	Pin
3	DASHBOARD V-BATT	Rd	0.75	P100B	14
4	DASHBOARD 12 V	Bn	0.5	P100B	33
8	GND DASHBOARD	BK	0.75	CAB-SP2	
20	DASHBOARD PB -	Bu	0.5	P35	4
24	DASHBOARD PB +	Bu	0.5	P34	4
25	DASHBOARD PB ENTER	Bu	0.5	P31	4
32	LED FOR DASHBOARD	Gn	0.5	CAB-SP6	
33	ALTERNATOR D+	Bu	0.5	P100B	13
35	CAN L	Gn	0.5	CAB-SP14	
36	CAN H	Ye	0.5	CAB-SP12	

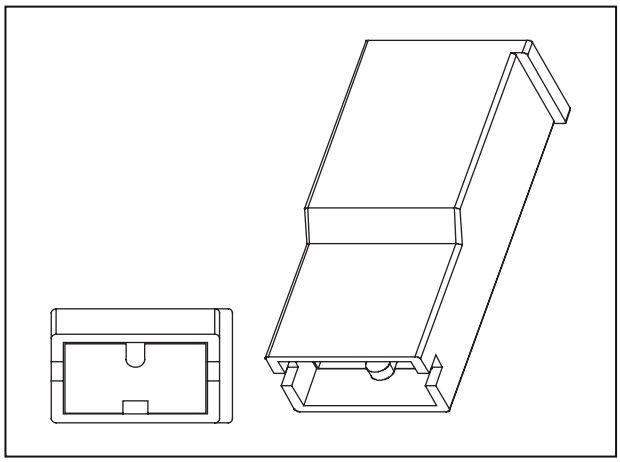


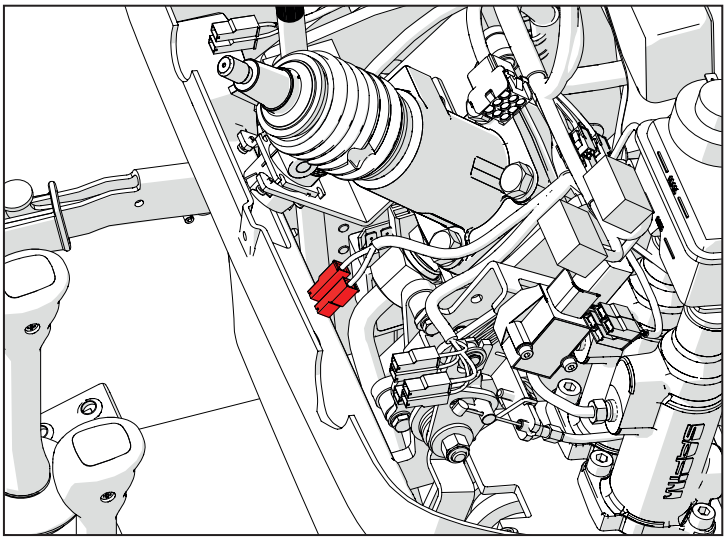


E003 (P25-P26) Buzzer

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BUZZER 12V	Gn	0.5	CAB-SP6	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BUZZER GND	BK	0.5	CAB-SP2	

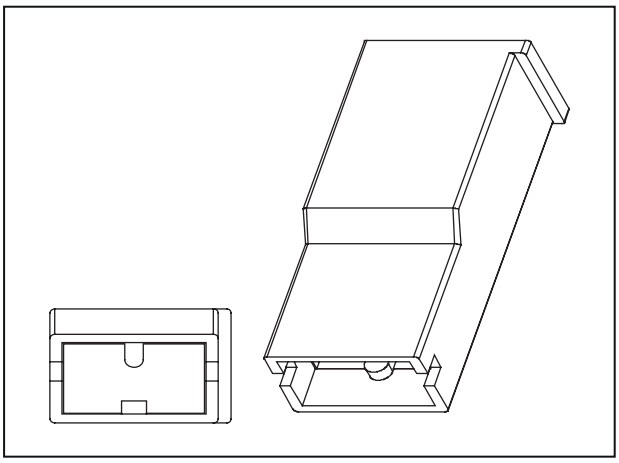


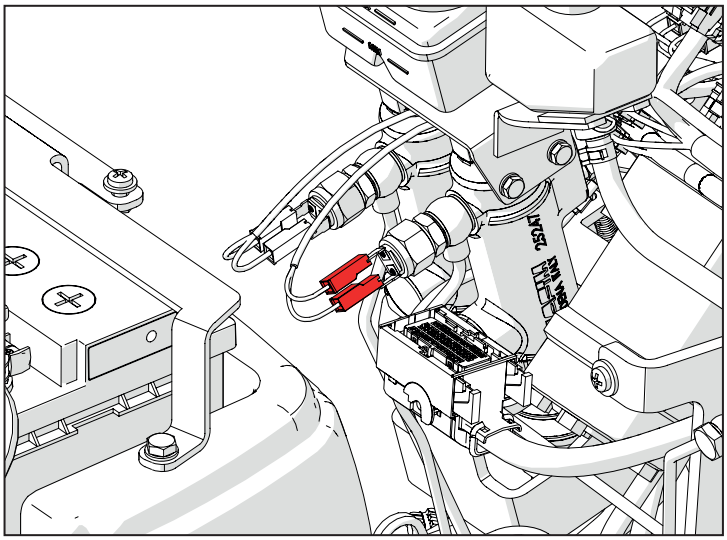


F006 (P291-P292) Left brake pedal switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BRAKE LH SW	Or	0.5	P80	D2





I011 (P117-P118-P451-P455-P507) Ignition switch

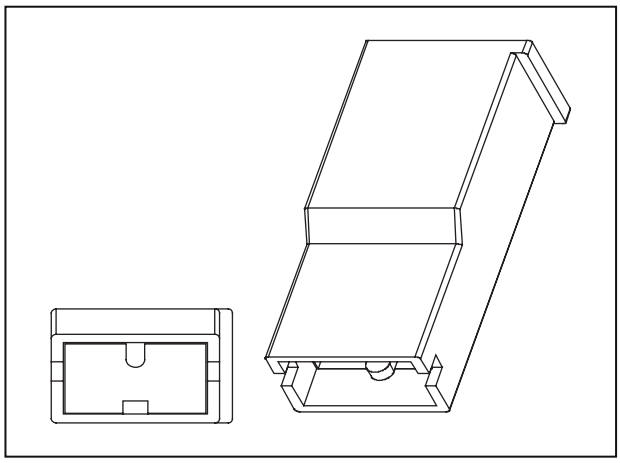
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V KEY SWITCH	Bn	1.5	P144	5
1	V KEY	Bn	2.5	P102B	4

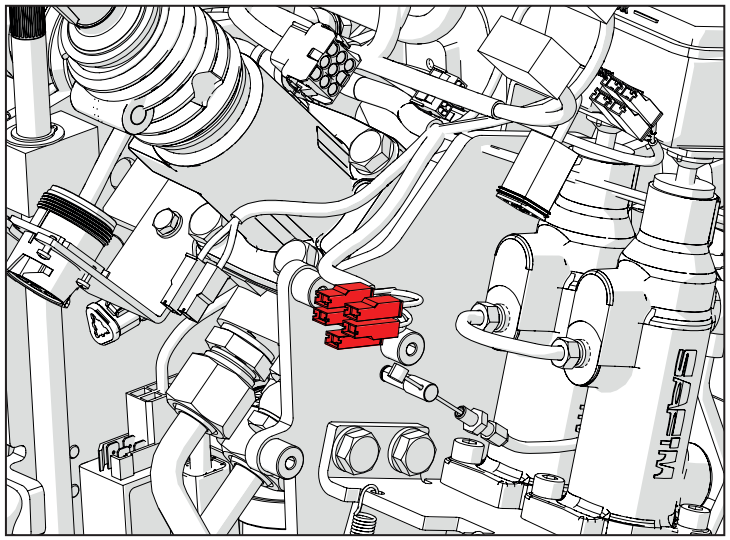
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	V KEY	Bn	2.5	P102B	3

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P102B	2

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START COMMAND	Bu	0.5	CAB-SP24	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P100B	1

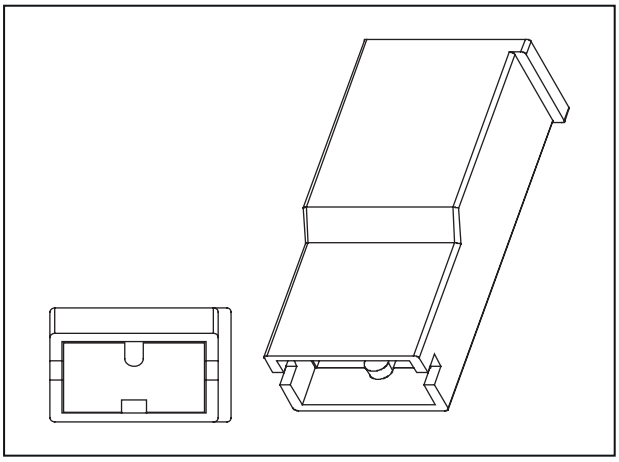


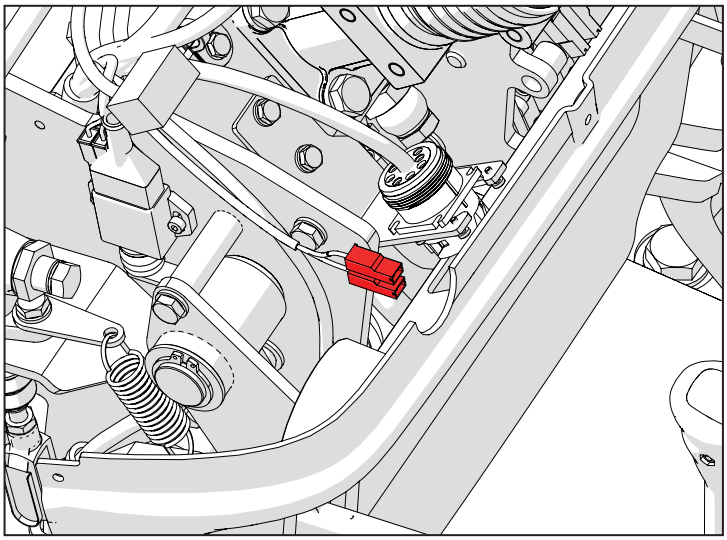


P001 (P456-P457) 1 pole socket

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	POWER SOCKET SUPPLY	Bn	1.5	P100B	34

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	1.5	CAB-SP2	

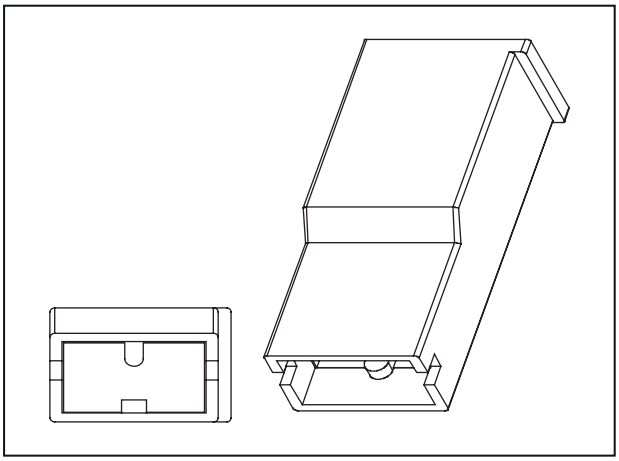


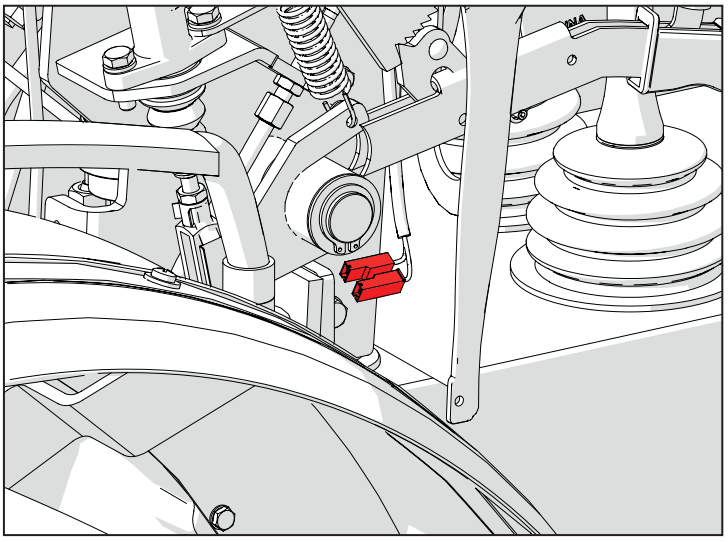


K011 (P492-P493) Clutch start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ENGINE CLUTCH SW	Gn	0.5	P80	G4

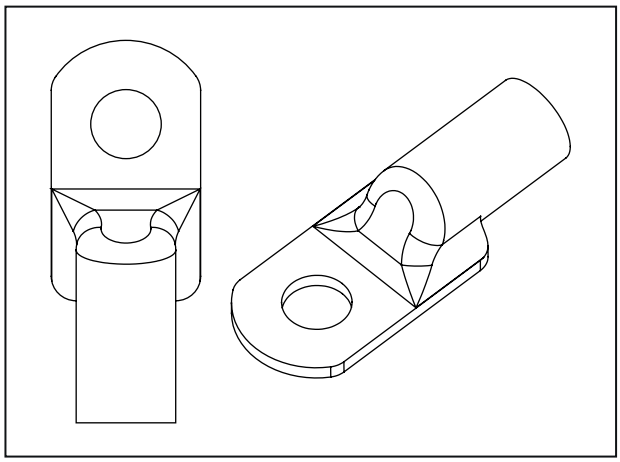
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	CAB-SP1	

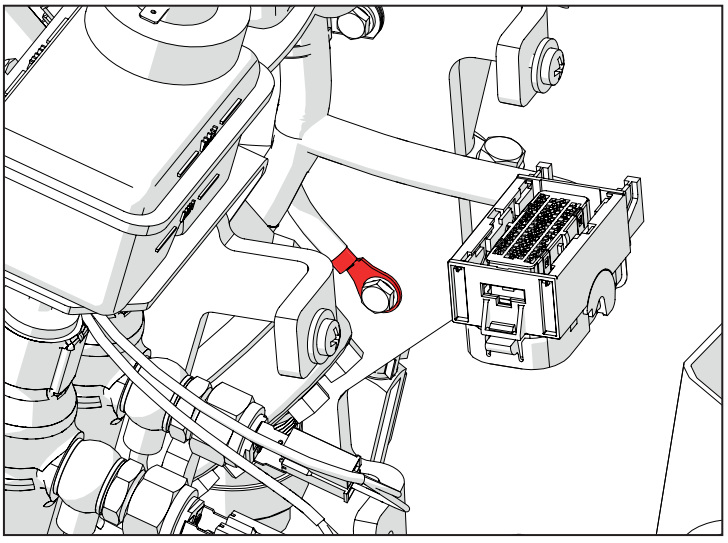




C004 (P13) Cab ground

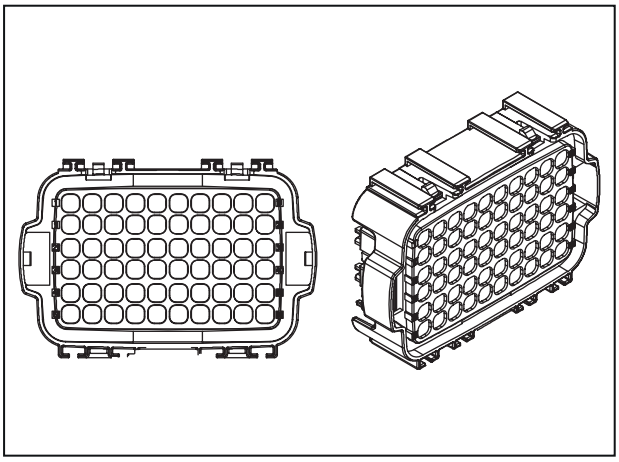
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CAB GND	BK	2.5	CAB-SP2	
1	GND	BK	1	P274	1
1	GND J1939	BK	1.5	J9	A



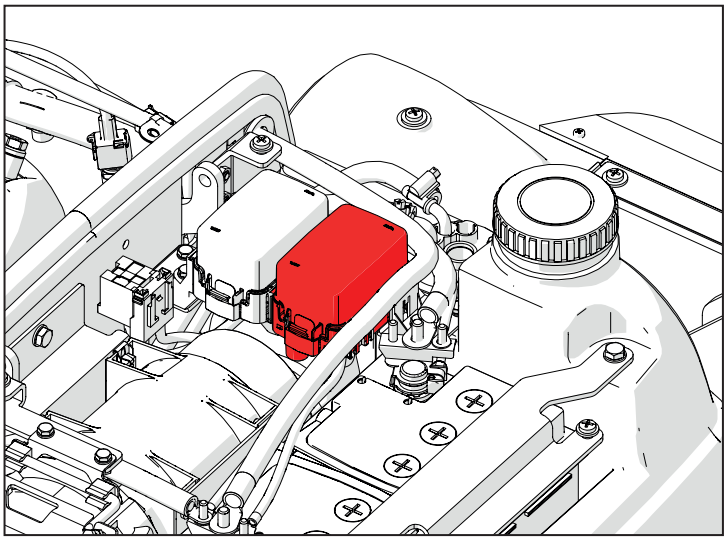


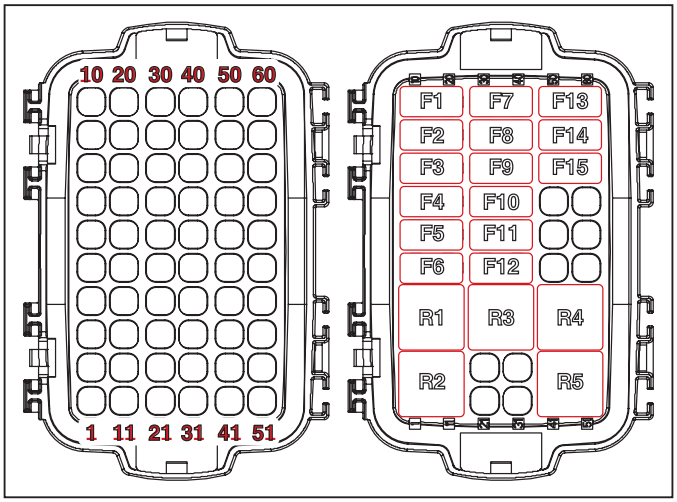
B004 (P1A) Fuse box "2"

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START COMMAND	Bu	0.5	P10A	3
2	START ENABLE SENSOR	Bu	0.5	P12	8
3	GND	BK	0.5	ENG-SP6	
4	HIGH BEAM	Pu	1.5	P1A	7
5	NORMAL BEAM RH	Pu	1.5	ENG-SP20	
6	NORMAL BEAM LH	Pu	1.5	ENG-SP20	
7	HIGH BEAM	Pu	1.5	P1A	4
8	V-KEY	Bn	0.5	ENG-SP21	
9	V KEY	Bn	0.5	ENG-SP21	
10	V KEY	Bn	1.5	ENG-SP21	
11	V KEY	Bn	0.5	ENG-SP21	
12	START ENABLE RELAY	Or	0.5	P10A	10
13	BATTERY 12V	Rd	1.5	ENG-SP17	
14	HIGH BEAM	Gn	0.5	P10A	13
15	NORMAL BEAM LIGHT RH	Pu	1.5	P20A	2
16	NORMAL BEAM LIGHT LH	Pu	1.5	P20A	3
17	HIGH BEAM LIGHTS	Pu	1.5	P20A	1
18	VCU V KEY	Bn	0.5	P10A	21
19	V-KEY DASH	Bn	0.5	P10A	9
20	V-KEY	Pu	1.0	ENG-SP25	
23	GND	BK	0.5	ENG-SP6	
24	NORMAL BEAM RH	Pu	1.5	ENG-SP20	
25	BRAKE LAMP	Bn	0.75	P1A	44
26	PARKING LIGHT	Ye	1.0	ENG-SP23	
27	PARKING LIGHT	Ye	1.0	ENG-SP23	
28	V KEY	Bn	0.75	ENG-SP22	



29	V KEY	Bn	0.75	ENG-SP22	
30	V KEY	Bn	1.5	ENG-SP22	
33	V BATT	Rd	1.5	ENG-SP17	
34	NORMAL BEAM LIGHTS	Gy	0.5	P10A	14
35	BRAKE LAMP	Rd	0.75	P10A	29
36	PARKING LIGHTS RH	Ye	1.0	ENG-SP16	
37	PARKING LIGHTS LH	Ye	1.0	ENG-SP14	
38	EDC V KEY	Bn	0.75	P12	54
39	TURN INDICATORS	Or	0.75	P10A	8
40	SENSORS V-KEY	Bn	1.5	P10A	26
41	RELAY FOR DASHBOARD LED	Or	0.5	P10A	22
42	LED FOR DASH	Gn	0.5	P10A	23
43	BRAKE LAMP RELAY	WH	0.5	P10A	7
44	BRAKE LAMP	Bn	0.75	P1A	25
47	V KEY	Bn	1.5	ENG-SP21	
48	V BATT	Rd	1.5	ENG-SP17	
49	V BATT	Rd	0.75	ENG-SP17	
50	V BATT	Rd	0.75	ENG-SP17	
51	V-KEY	Bn	0.5	ENG-SP22	
52	V-KEY	Bn	0.5	ENG-SP22	
53	V KEY	Bn	0.75	ENG-SP22	
54	V KEY	Bn	0.5	ENG-SP22	
57	V KEY	Bn	1.5	P10A	36
58	VCU V BATT	Rd	1.5	P10A	15
59	DASHBOARD V-BATT	Rd	0.75	P10A	18
60	HAZARD LIGHTS CONTROL	Rd	0.75	P10A	31

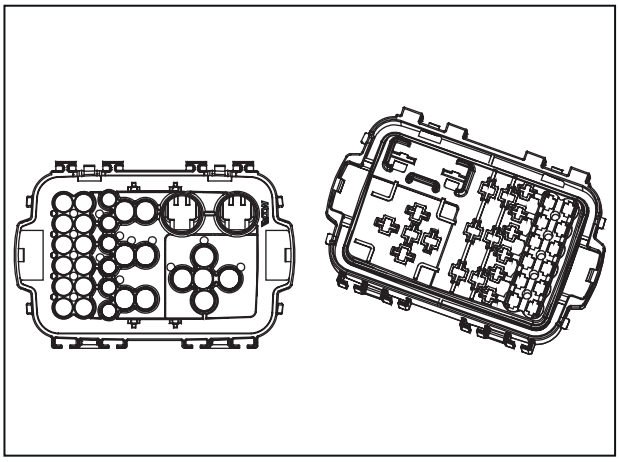




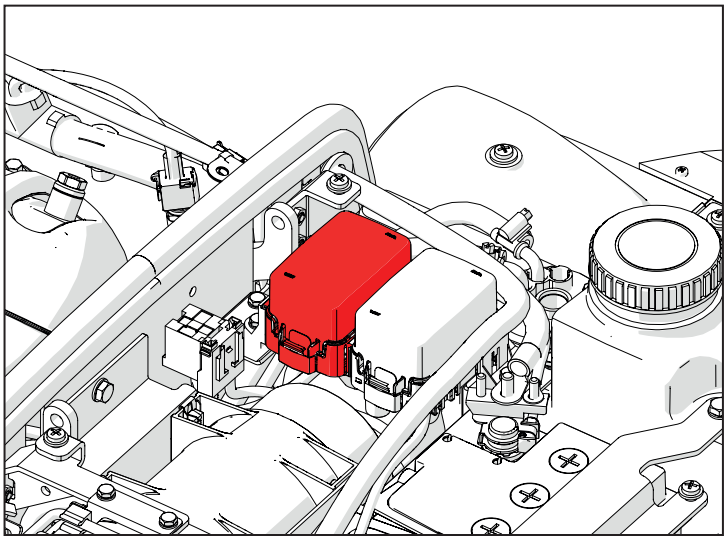
F1	Socket - Rotating beacon	10A
F2	Key-on power feed for dashboard	5A
F3	Key-on power feed for VCU	5A
F4	High beam headlights	10A
F5	LH low beams	10A
F6	RH low beams	10A
F7	Sensors/switches	10A
F8	Turn indicator lights	10A
F9	Key-on power feed for ECU	5A
F10	LH sidelights	10A
F11	RH sidelights	10A
F12	Brake lights	10A
F13	Hazard warning lights	10A
F14	12V dashboard power feed	10A
F15	12V VCU power feed	10A
F16	Socket	10A
R1	Start enable relay	
R3	Dashboard LED relay	
R4	High beam relay	
R5	Low beam relay	
R6	Brake light relay	

B002 (P2A) Fuse box "1"

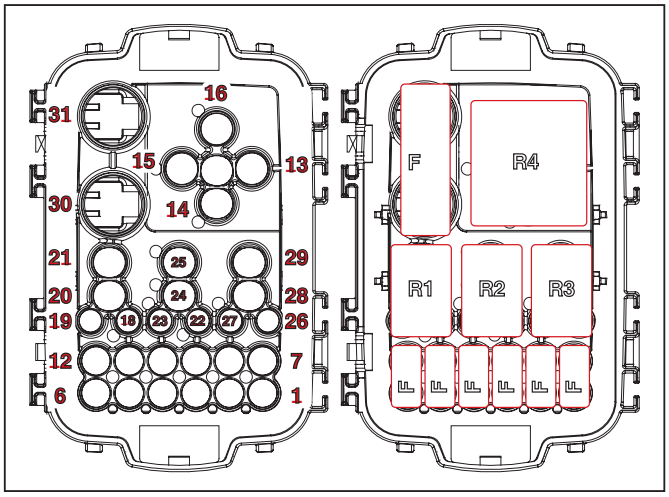
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	EDC POWER SUPPLY	Rd	1.5	ENG-SP15	
2	EDC POWER SUPPLY	Rd	1.5	P12	1
3	12V	Rd	2.5	ENG-SP5	
4	FUEL FILTER HEATER	Rd	1.5	P472	1
5	12V TRAILER SOCKET	Rd	2.5	P472	1
6	DIAGNOSTIC SOCKET	Rd	1.5	ENG-SP17	
7	12V	Rd	1.5	ENG-SP18	
8	12V	Rd	1.5	ENG-SP18	
9	12V	Rd	1.5	ENG-SP18	
10	FUEL FILTER HEATER	Rd	1.5	P2A	24
11	POWER SOCKET SUPPLY	Rd	2.5	P2A	20
12	VJ1939 POWER SUPPLY	Rd	1.5	P10A	19
13	MAIN RELAY	Rd	0.5	P472	1
14	12V	Rd	4.0	ENG-SP18	
15	MAIN RELAY	BK	0.75	P12	28
16	BATTERY 12V	Rd	4.0	P472	1
18	V KEY	Bn	0.5	ENG-SP21	
19	GND	BK	0.5	ENG-SP6	
20	POWER SOCKET SUPPLY	Rd	2.5	P2A	11
21	POWER SOCKET SUPPLY	Rd	2.5	P10A	34
22	FUEL FILTER HEATER	Gy	0.75	P12	70
23	12V MAIN RELAY	Rd	0.75	ENG-SP5	
24	FUEL FILTER HEATER	Rd	1.5	P2A	10
25	FUEL FILTER HEATER	Rd	1.5	P17	2
26	O-S-STRTH	Bu	0.75	P12	53
27	O-S-STRTL	Gy	0.75	P12	27



28	START MOTOR	Rd	1.5	ENG-SP3	
29	12V BATT SUPPLY	Rd	1.5	ENG-SP17	
30	12V BATT SUPPLY	Rd	10.0	P63	1
31	12V BATT SUPPLY	Rd	10.0	ENG-SP17	



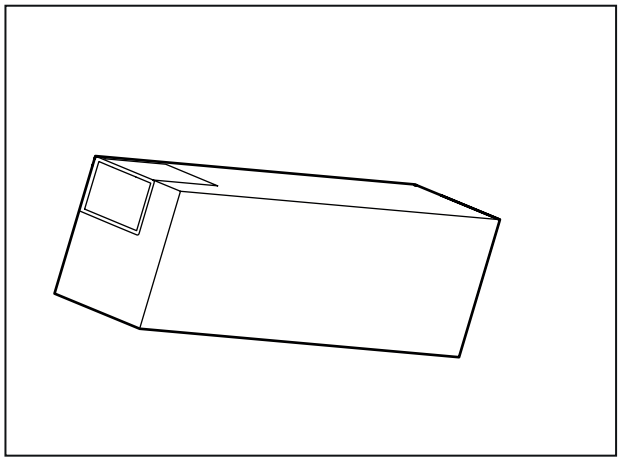
F17	Diagnostic port	10A
F18	Trailer socket	15A
F19	Fuel pre-heat	20A
F20	Accessories	15A
F21	12V ECU power feed	10A
F22	12V ECU power feed	15A
F23	Main Maxi fuse	70A
R6	Trailer socket relay	30A
R7	Fuel pre-heat relay	20A
R8	Starter relay	20A
R9	Main relay	30A

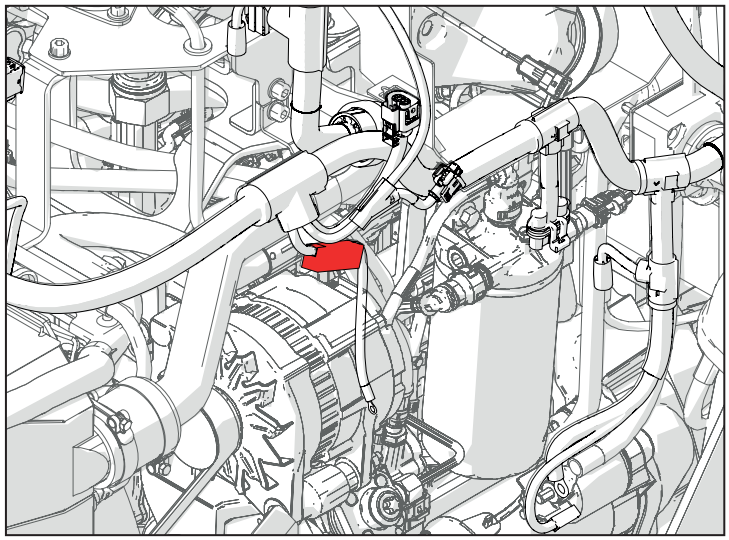


B005 (P1-P2) Diode

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P468	1

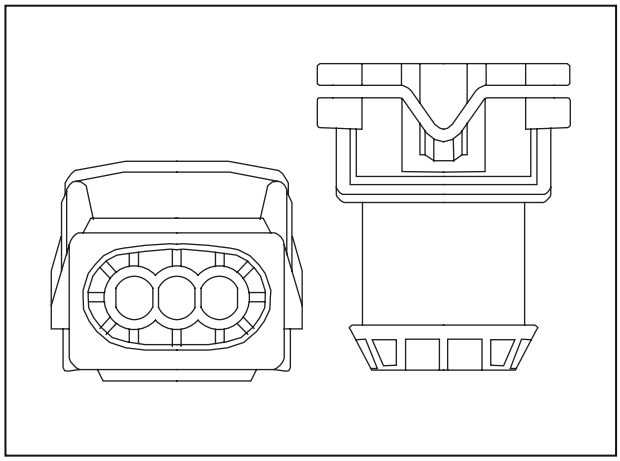
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P10A	17

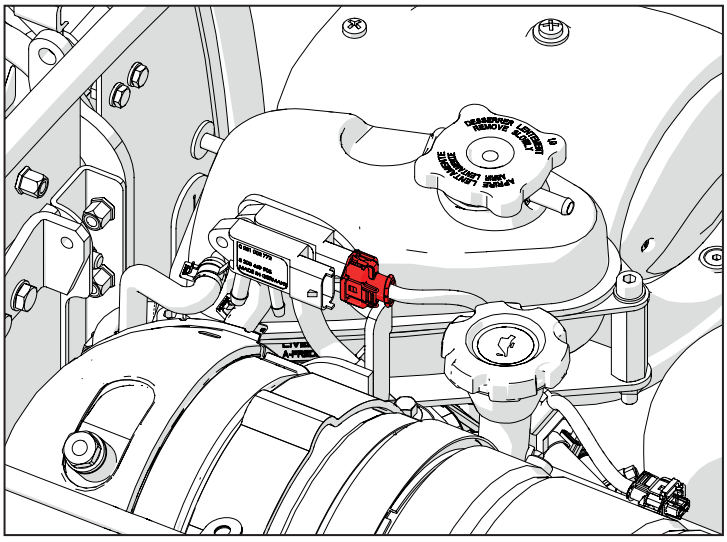




K008 (P8) Differential pressure sensor

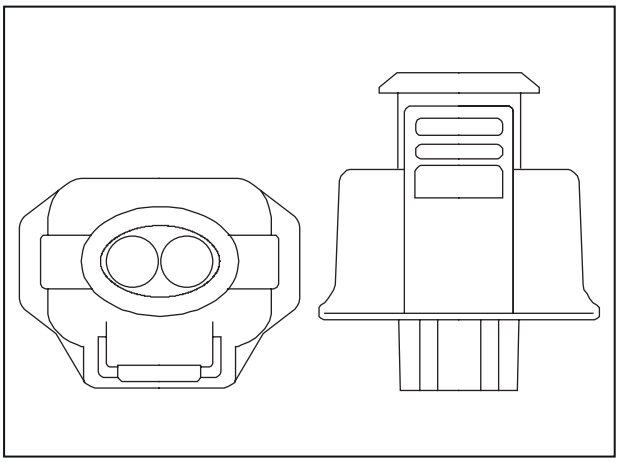
Pin	Description	Colour	Sect.	Input Conn.	Pin
1		Bu	0.5	P12	14
2		Bn	0.5	P12	36
3		Gn	0.5	P12	58

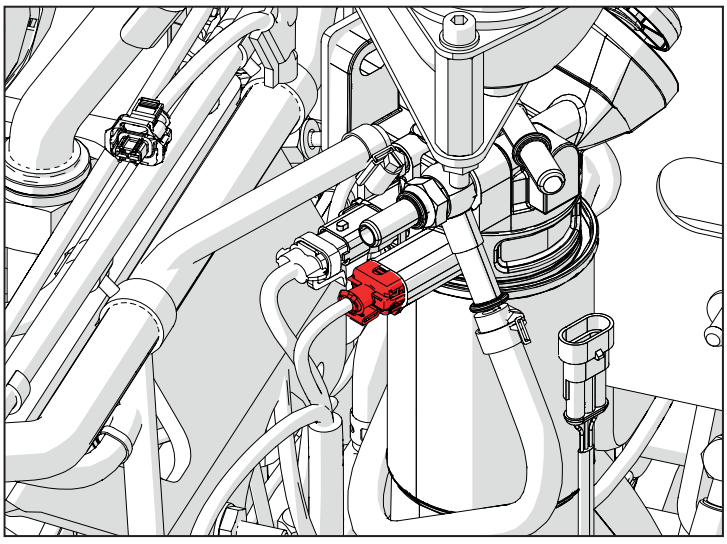




K006 (P4) Fuel temperature sensor

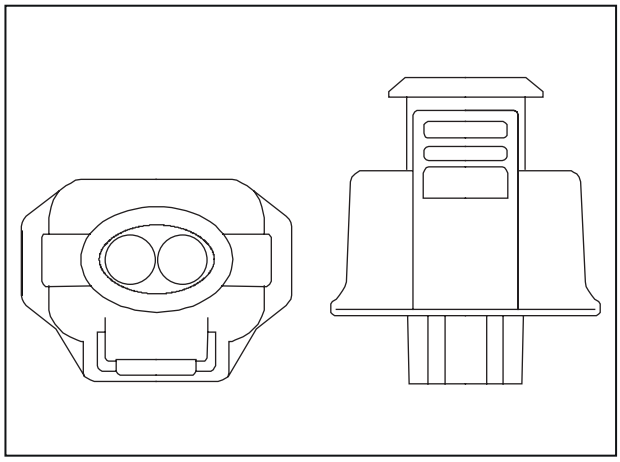
Pin	Description	Colour	Sect.	Input Conn.	Pin
1		Gn	0.5	P12	87
2		Wh	0.5	P12	65

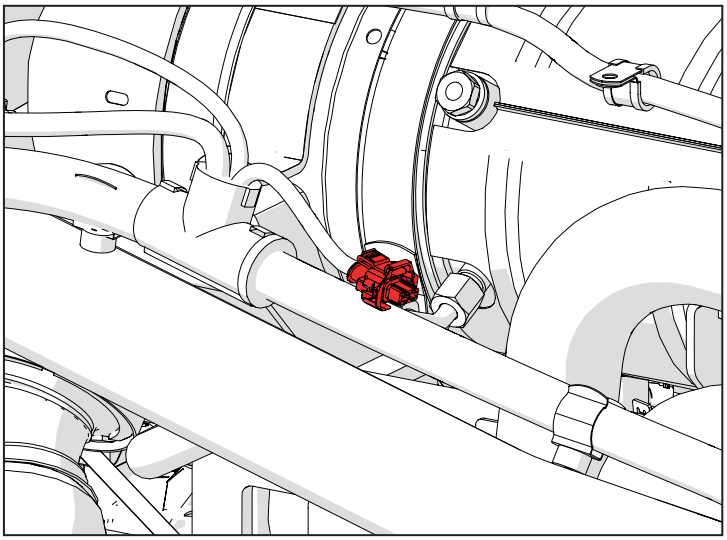




K009 (P6) DPF temperature sensor

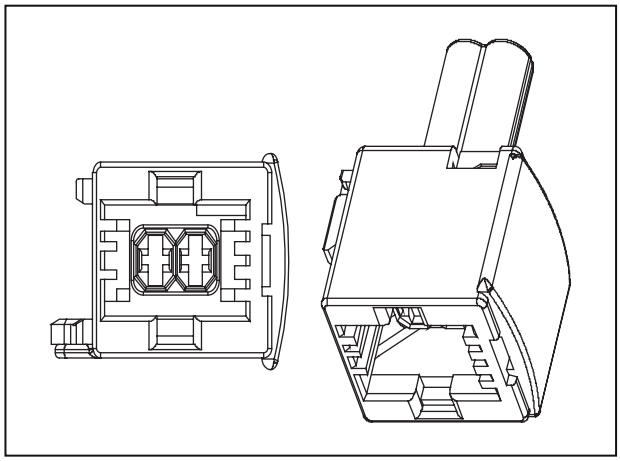
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	G_R_EXTS2	Rd	0.5	P12	83
2	I_A_EXTS2	Wh	0.5	P12	84

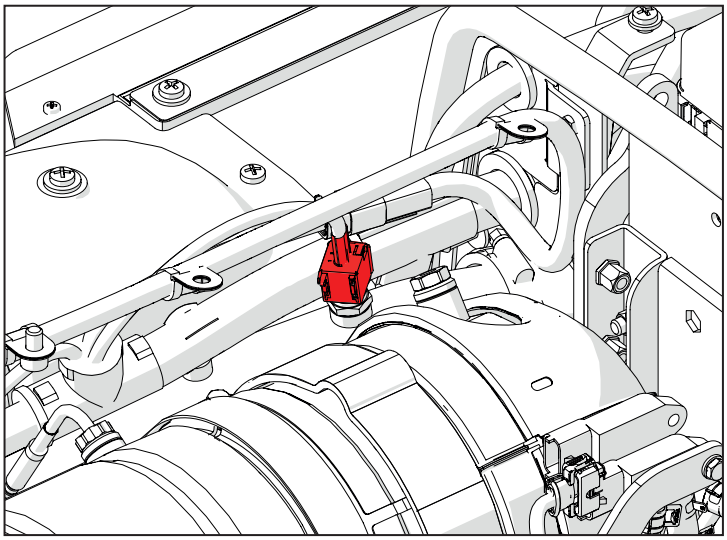




K010 (P467) Intake air temperature sensor

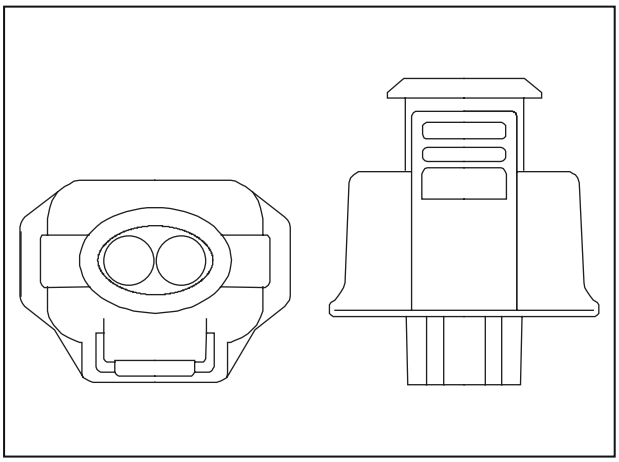
Pin	Description	Colour	Sect.	Input Conn.	Pin
1		Or	0.5	P12	19
2		BK	0.5	P12	34

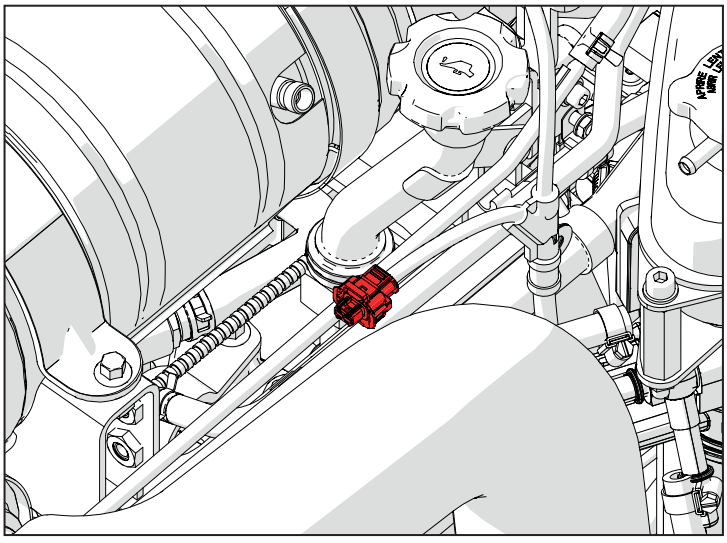




K007 (P7) DOC temperature sensor

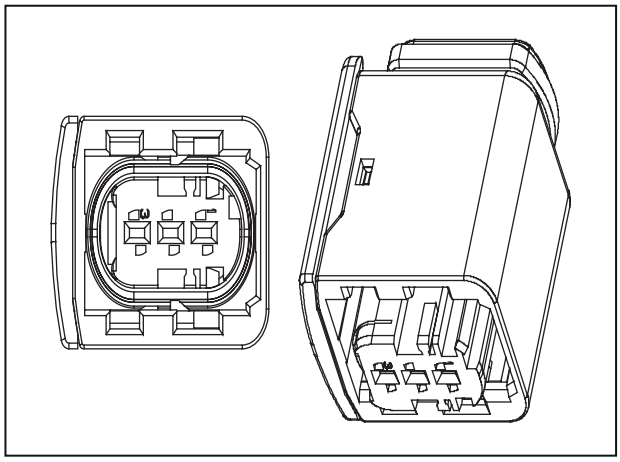
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	G_R_EXTS1	Bu	0.5	P12	77
2	I_A_EXTS1	Gy	0.5	P12	78

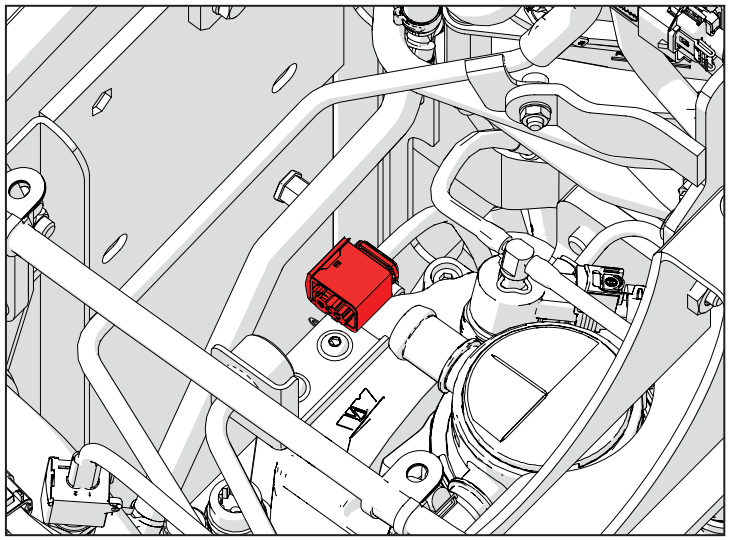




K004 (P3) P3 sensor (exhaust pressure)

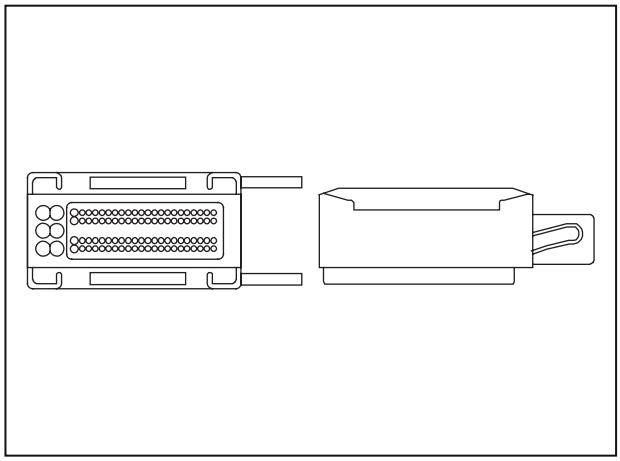
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	V_V_5V2 EGPPRE	Rd	0.5	P12	15
2	I_A_EGPPRE	Gn	0.5	P12	35
3	G_R_EGPPRE	Ye	0.5	P12	57



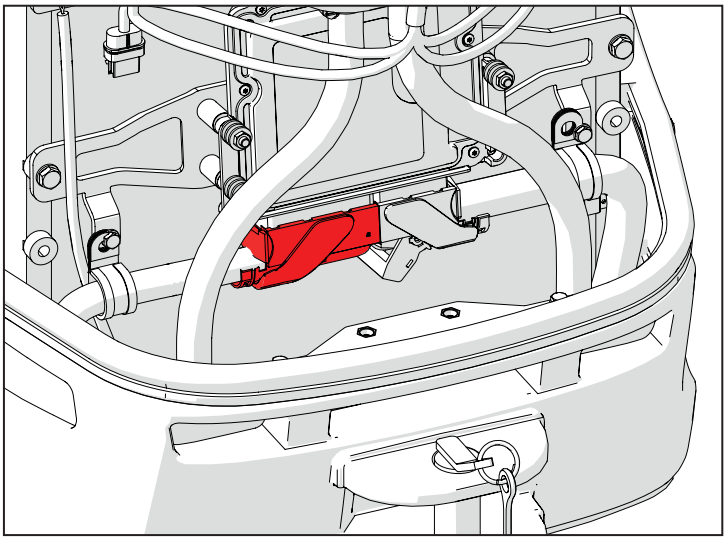


M003A (P12) Engine control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	EDC POWER SUPPLY	Rd	1.5	P2A	2
2	GND	BK	1.0	ENG-SP9	
3	EDC POWER SUPPLY	Rd	1.0	ENG-SP15	
4	GND	BK	1.0	ENG-SP9	
5	EDC POWER SUPPLY	Rd	1.0	ENG-SP15	
6	GND	BK	1.0	ENG-SP9	
8	START ENABLE SENSOR	Bu	0.5	P1A	2
14	None	Bu	0.5	P8	1
15	V_V_5V2EGPPRE	Rd	0.5	P3	1

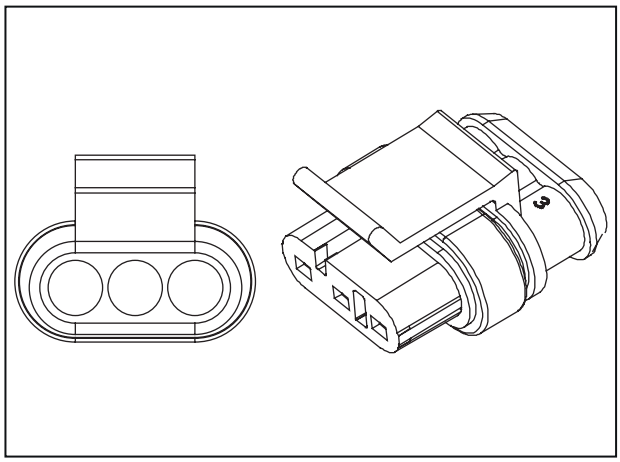


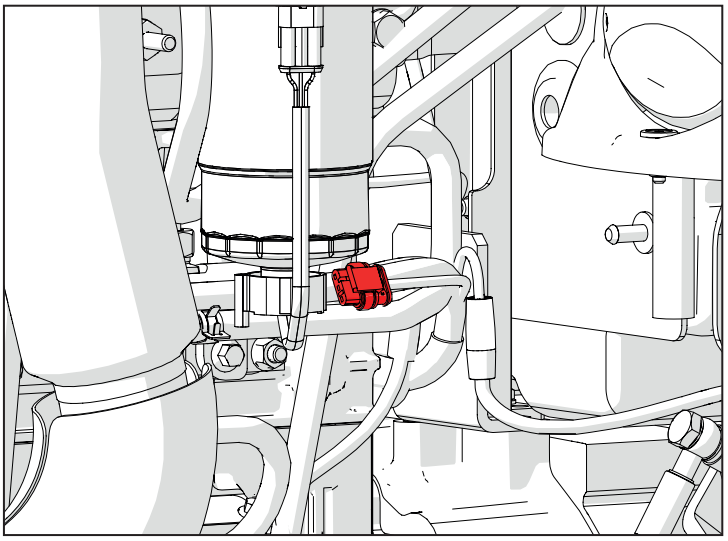
19	None	Or	0.5	P467	1
23	CAN 2 H	Ye	0.5	P469	3
24	CAN H	Ye	0.5	ENG-SP11	
25	CAN L	Gn	0.5	ENG-SP12	
27	O-S-STRTL	Gy	0.75	P2A	27
28	MAIN RELAY	BK	0.75	P2A	15
30	WATER IN FUEL SENSOR	Pu	0.5	P16	1
32	DPF REGENERATION INHIBIT SW	BK	0.5	P10A	11
33	CLOSING CIRCUIT RESISTOR	Or	0.5	330 ohm - 1W - 1%	1
34	None	BK	0.5	P467	2
35	I_A_EGPPRE	Gn	0.5	P3	2
36	None	Bn	0.5	P8	2
42	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P10A	25
45	CAN 2 L	Gn	0.5	P469	4
46	CAN H	Ye	0.5	ENG-SP11	
47	CAN L	Gn	0.5	ENG-SP12	
53	O-S-STRTH	Bu	0.75	P2A	26
54	EDC V KEY	Bn	0.75	P1A	38
55	CLOSING CIRCUIT RESISTOR	Or	0.5	330 ohm - 1W - 1%	2
57	G_R_EGPPRE	Ye	0.5	P3	3
58	None	Gn	0.5	P8	3
65	None	Wh	0.5	P4	2
70	FUEL FILTER HEATER	Gy	0.75	P2A	22
77	G_R_EXTS1	Bu	0.5	P7	1
78	I_A_EXTS1	Gy	0.5	P7	2
81	None	Gn	0.5	P465	1
82	None	Bu	0.5	P465	2
83	G_R_EXTS2	Rd	0.5	P6	1
84	I_A_EXTS2	Wh	0.5	P6	2
87	None	Gn	0.5	P4	1
92	GLOW PLUGS RELAY	Bu	1.0	P452	86



K005 (P16) Water in fuel sensor

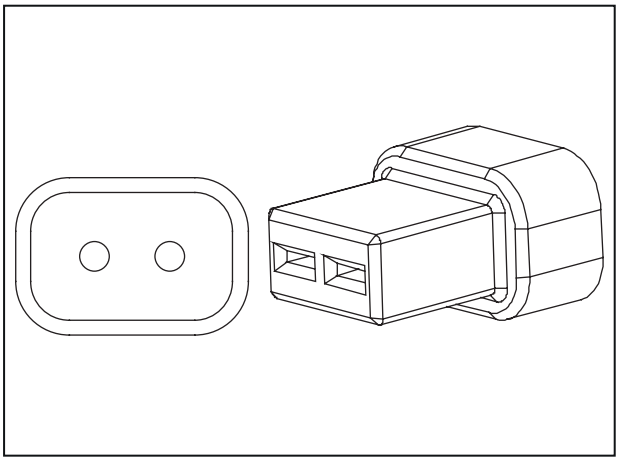
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	WATER IN FUEL SENSOR	Pu	0.5	P12	30
2	WATER IN FUEL GND	BK	0.5	ENG-SP2	
3	WATER IN FUEL 12V	Rd	0.5	ENG-SP5	

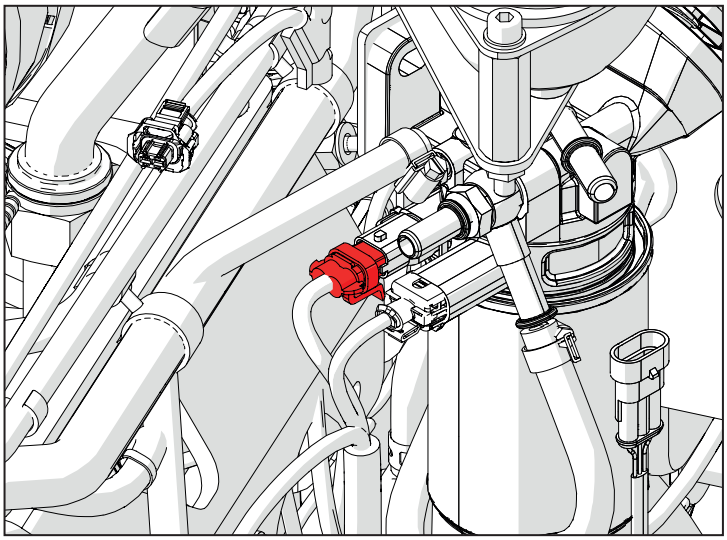




O001 (P17) Fuel filter preheat

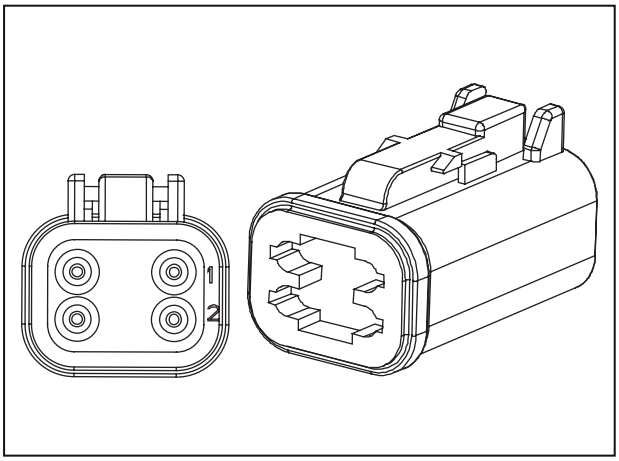
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL FILTER HEATER - GND	BK	1.5	ENG-SP6	
2	FUEL FILTER HEATER	Rd	1.5	P2A	25

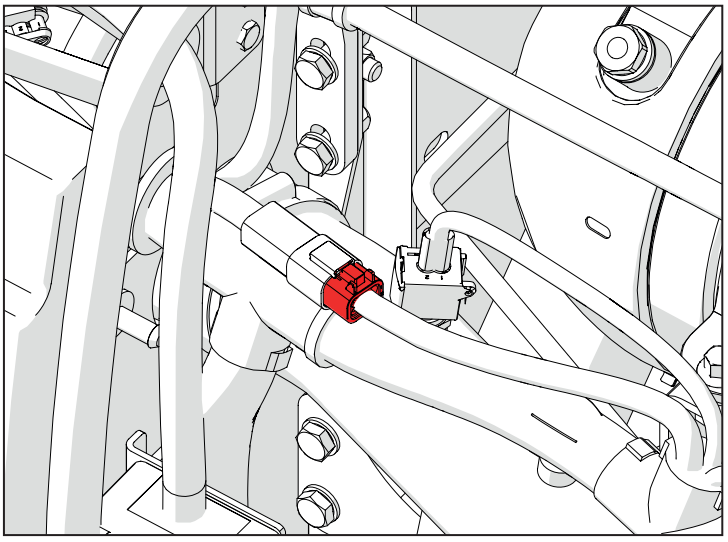




D004 (P20A) Wiring connector for cowl wiring loom

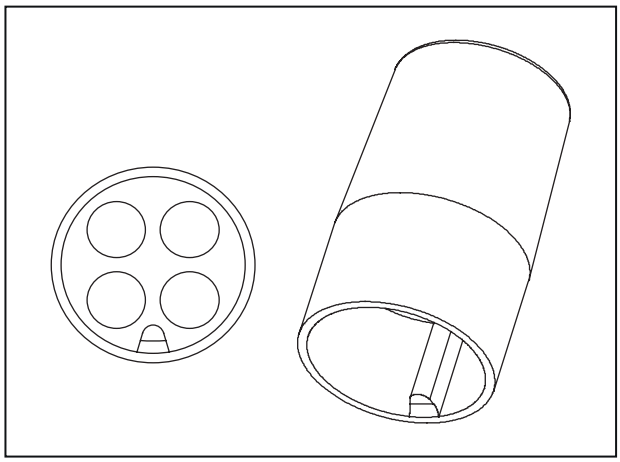
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HIGH BEAM LIGHTS	Pu	1.5	P1A	17
2	NORMAL BEAM LIGHT RH	Pu	1.5	P1A	15
3	NORMAL BEAM LIGHT LH	Pu	1.5	P1A	16
4	FRONT LIGHTS GND	BK	1.5	ENG-SP2	

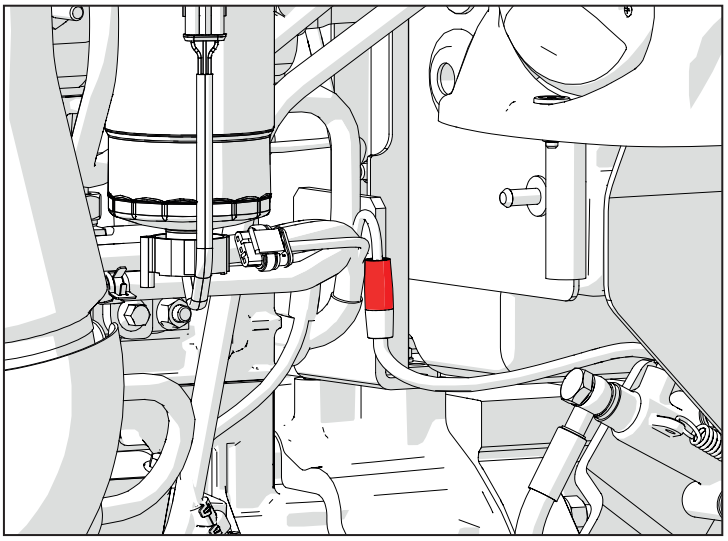




D003 (P40B) Wiring connector for LH front lights wiring loom

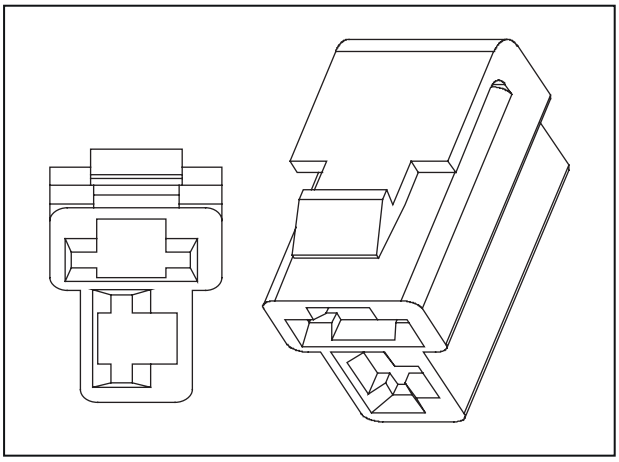
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS LH	Ye	0,75	ENG-SP14	
2	LEFT INDICATOR LIGHT	Gn	0,75	P10A	37
3	LH FENDER LIGHTS GND	BK	0,75	ENG-SP2	

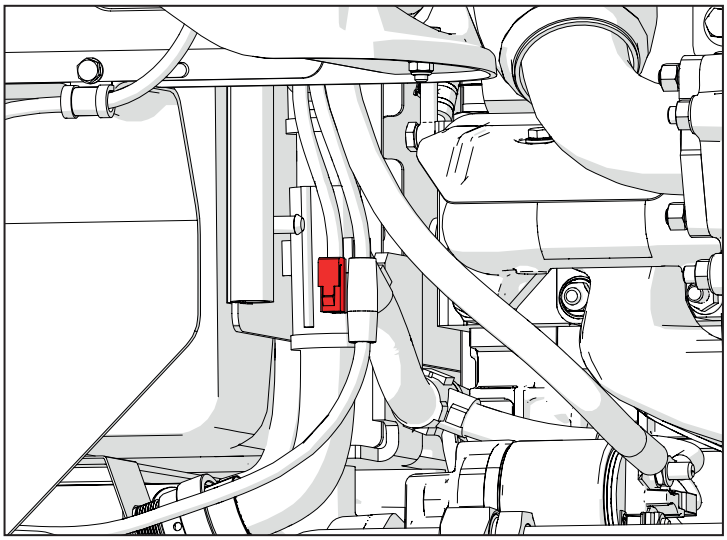




F001 (P41) Provision for rotating beacon, roll-bar version

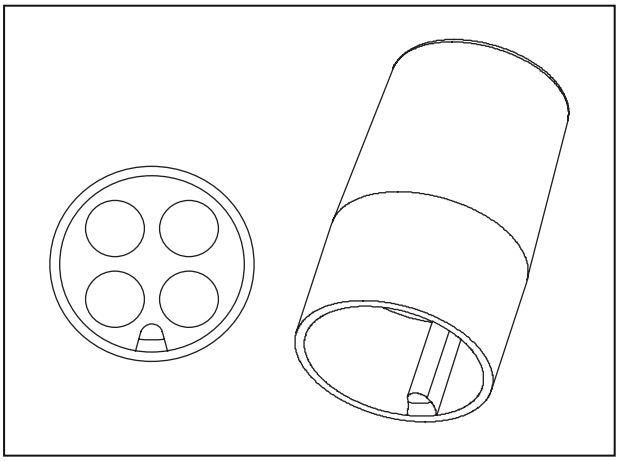
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BEACON	BK	1	ENG-SP6	
2	BEACON LIGHT SUPPLY	Pu	1	P10A	33

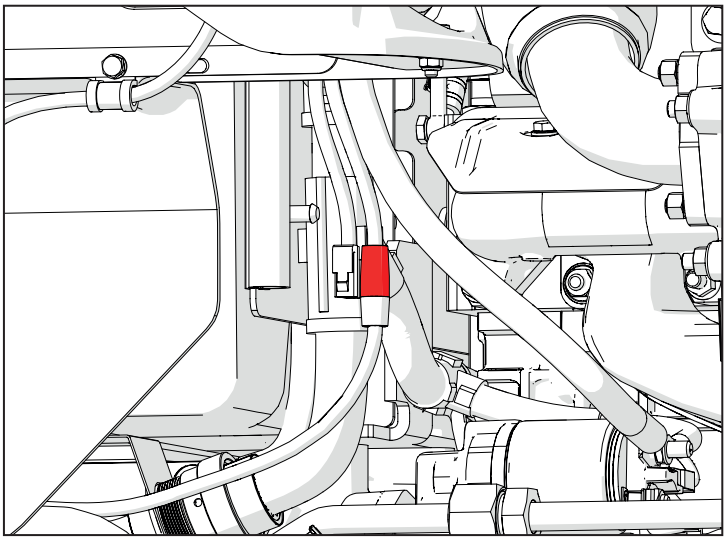




D001 (P50B) Wiring connector for RH front lights wiring loom

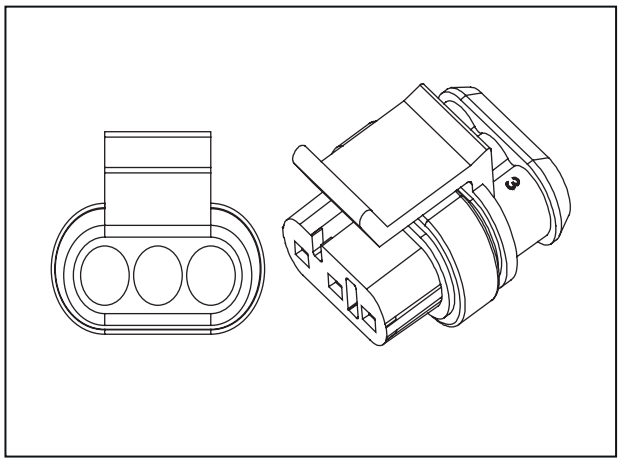
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHTS RH	Ye	0,75	ENG-SP16	
2	RIGHT INDICATOR LIGHT	Bu	0,75	P10A	38
3	RH FENDER LIGHTS GND	BK	0,75	ENG-SP2	

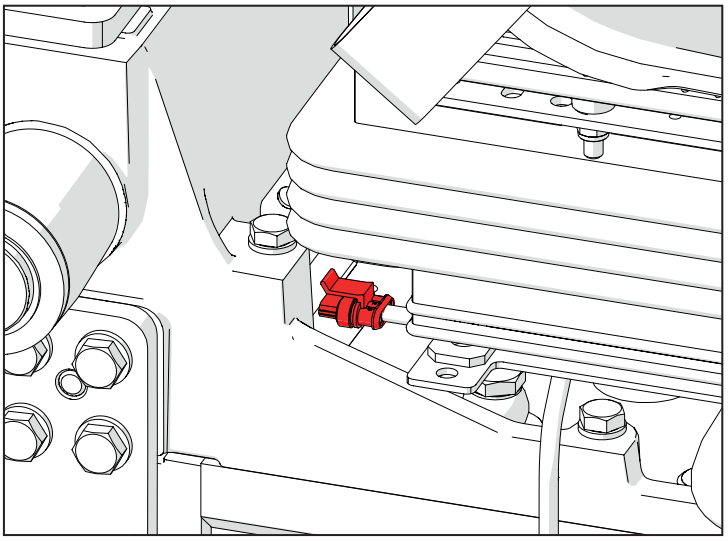




K014 (P518) PTO shaft speed sensor

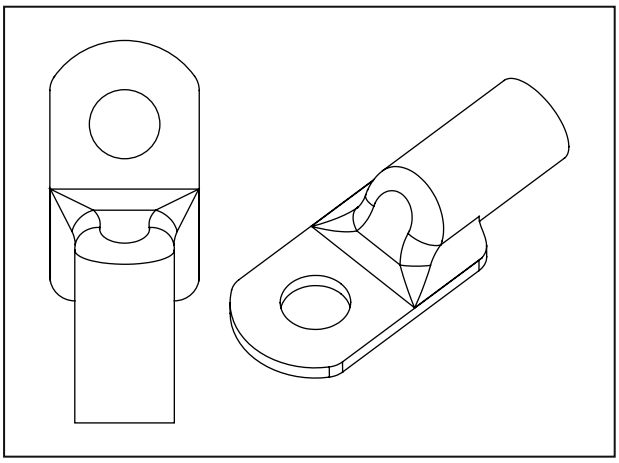
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP2	
2	GND	BK	0.5	P412	1
3	PTO rpm sensor	Gn	0.5	P100A	4

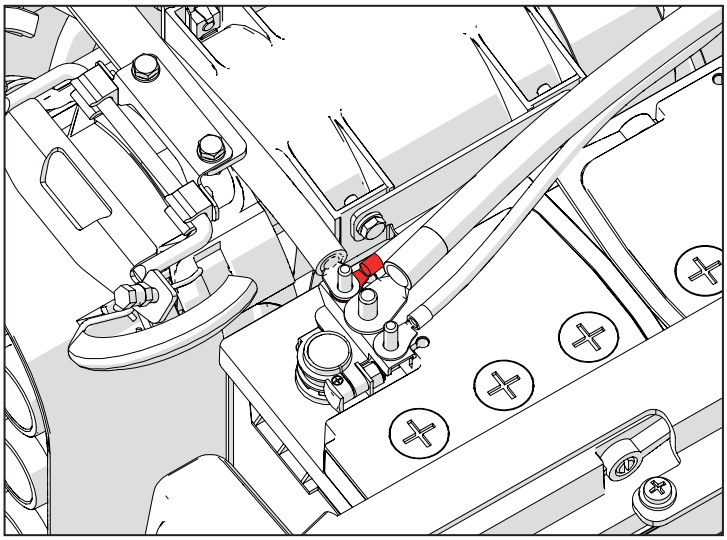




A005 (P510) Glow plug power feed

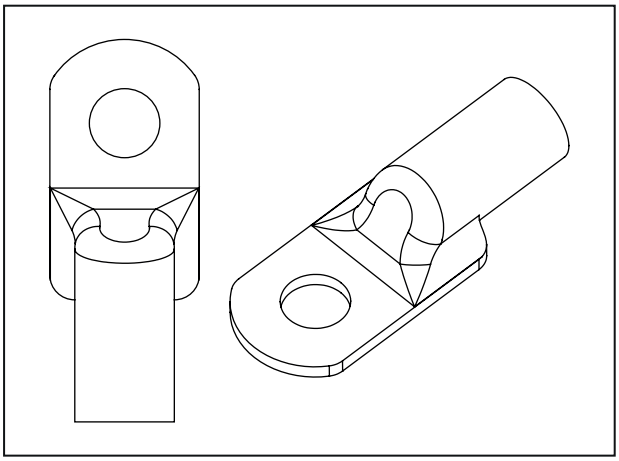
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG 12V	Rd	4	P476	1

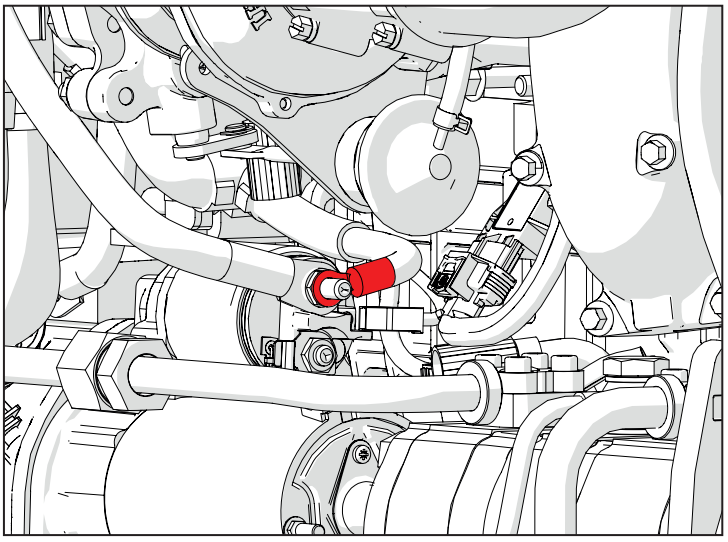




A006 (P63) Starter motor "30"

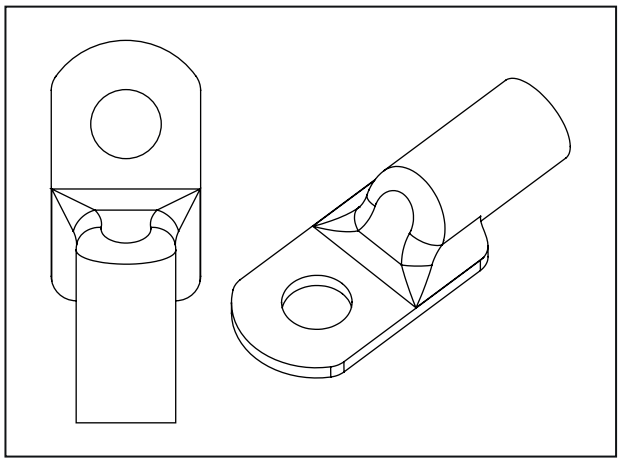
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	10	P2A	30

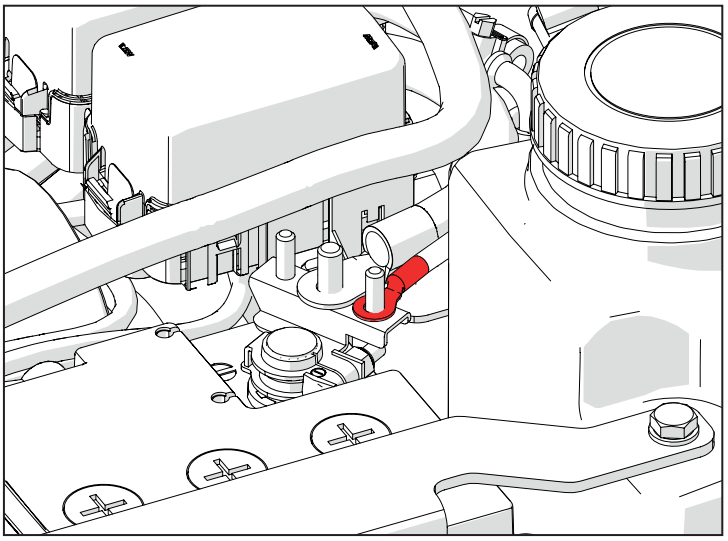




C002 (P475) Engine ground point

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FRONT GROUND	BK	6	ENG-SP6	
1	GND	BK	2.5	ENG-SP9	
1	GND	BK	2.5	ENG-SP2	

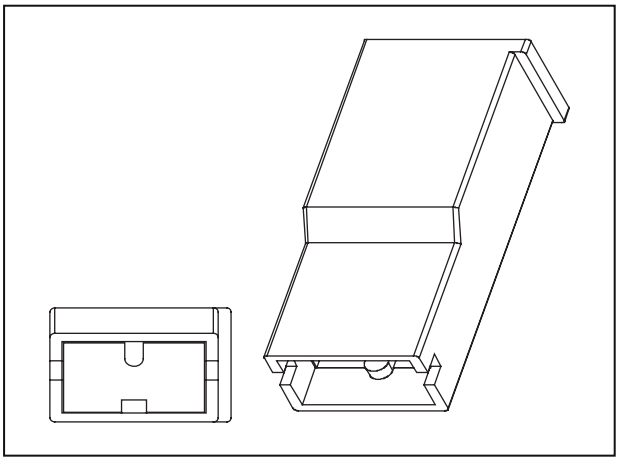


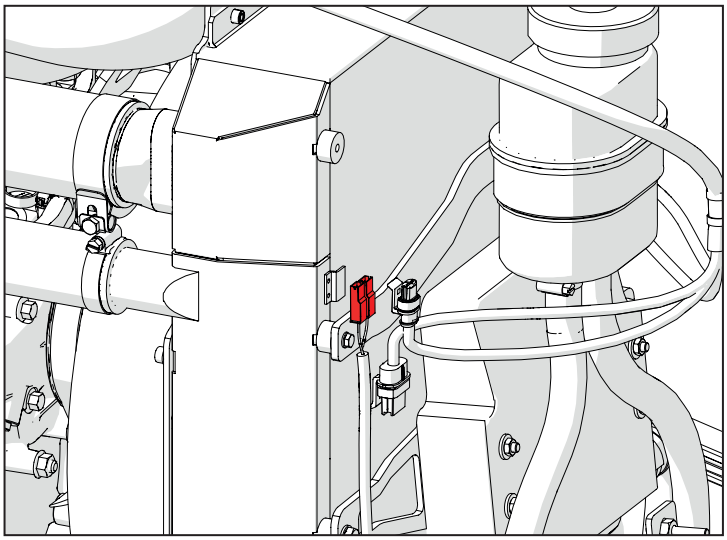


E001 (P149-P152) Horn

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HORN - GND	BK	0,75	ENG-SP6	

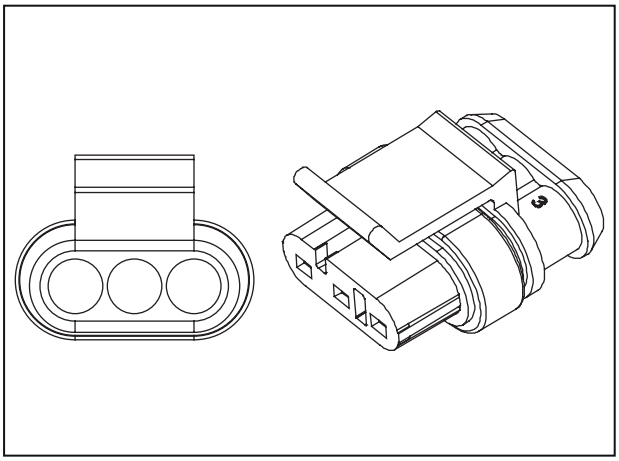
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HORN POWER SUPPLY	Pu	0,75	P10A	28

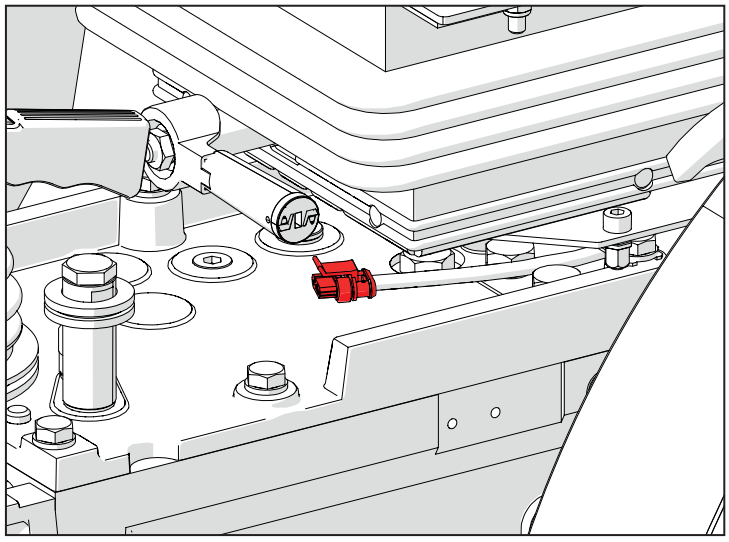




K015 (P301) Wheel speed sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VCC	Bn	0,75	MAIN-SP2	
2	WHEEL SPEED GND	BK	0,75	P412	1
3	Wheel Speed	Bu	0,75	P100A	7

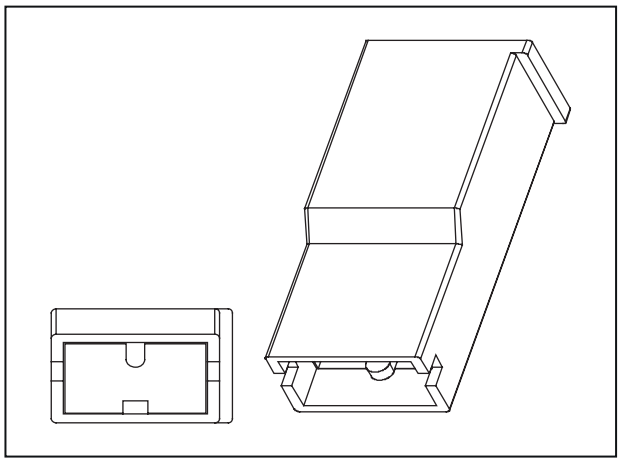


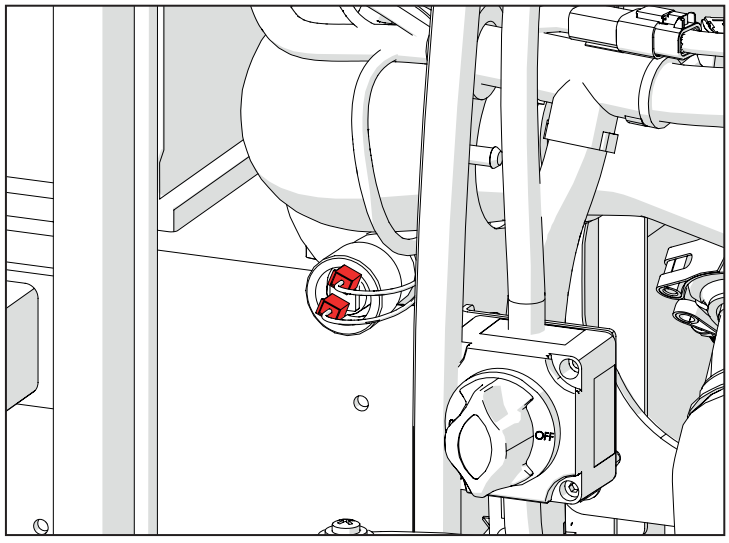


K001 (P439-P440) Air filter sensor

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	AIR FILTER	Gn	0,75	P10A	24

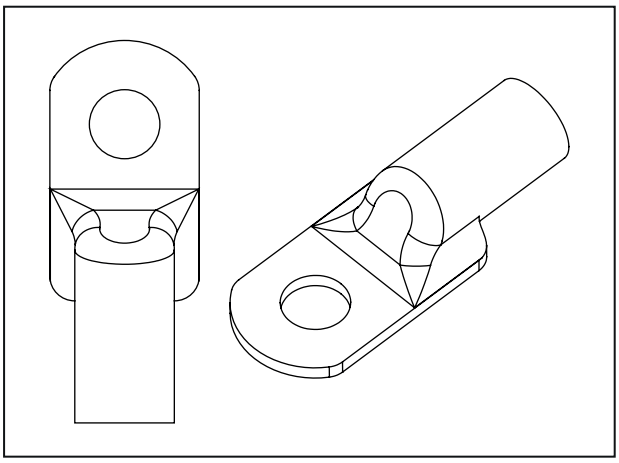
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	AIR FILTER GND	BK	0.5	ENG-SP6	

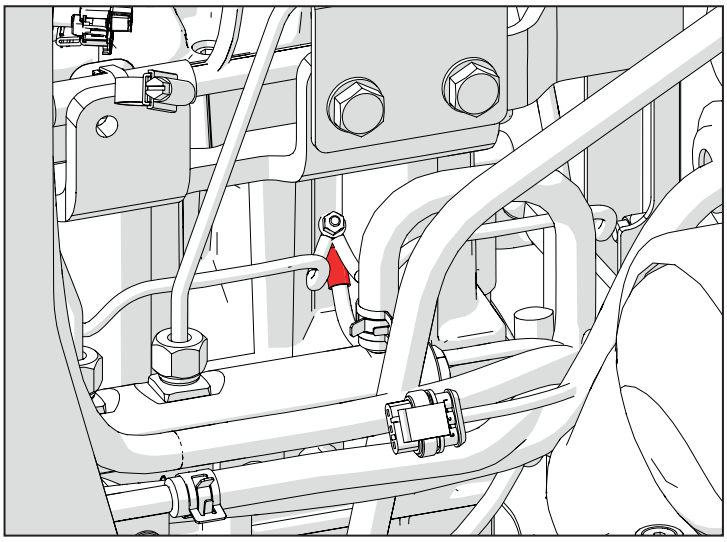




C003 (P442) Glow plug ground

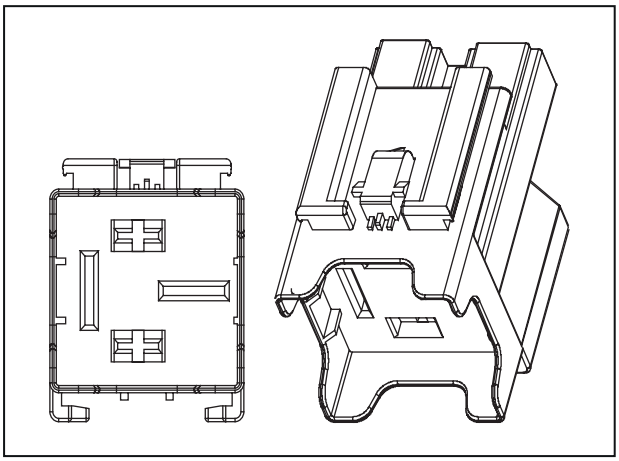
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG V BATT	Rd	4	P452	87

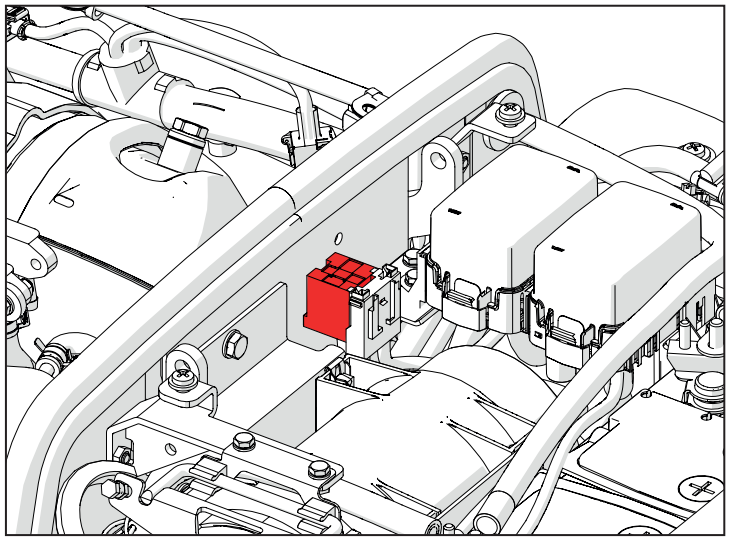




J001 (P452) Glow plug relay

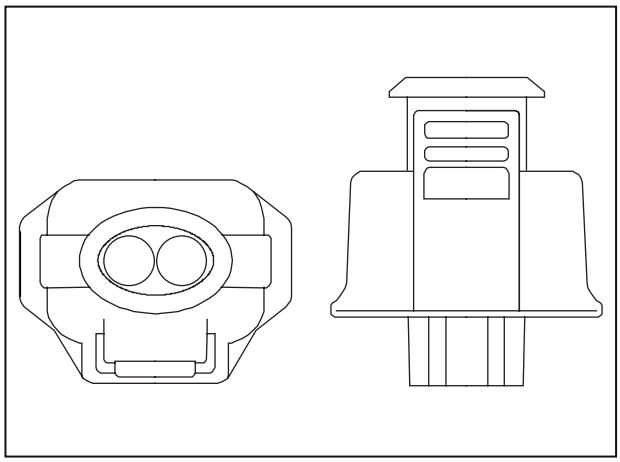
Pin	Description	Colour	Sect.	Input Conn.	Pin
30	GLOW PLUG 12V	Rd	4	P476	2
85	GLOW PLUG RELAY	Rd	1	ENG-SP5	
86	GLOW PLUGS RELAY	Bu	1	P12	92
87	GLOW PLUG V BATT	Rd	4	P442	1

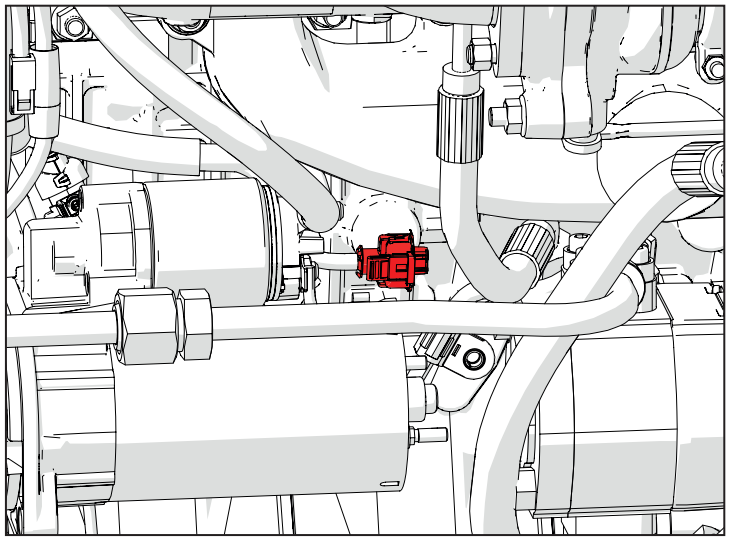




K003 (P465) Exhaust gas temperature sensor

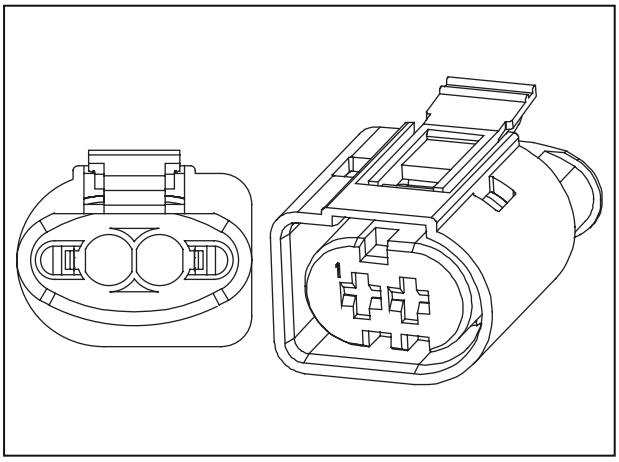
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG V BATT	Gn	0.5	P12	81
2	GLOW PLUG RELAY	Bu	0.5	P12	82

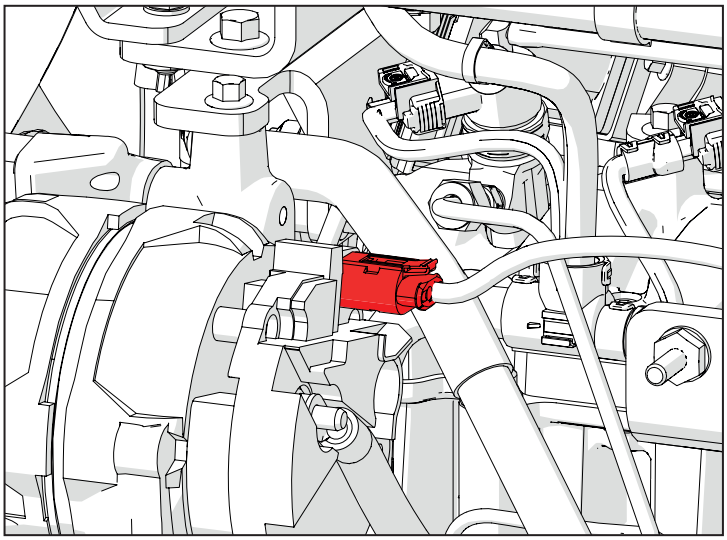




N003 (P468) Alternator

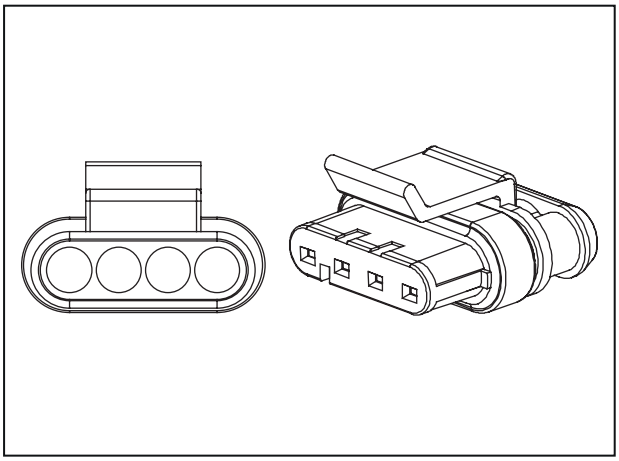
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	ALTERNATOR D+	Bu	0,75	P1	1

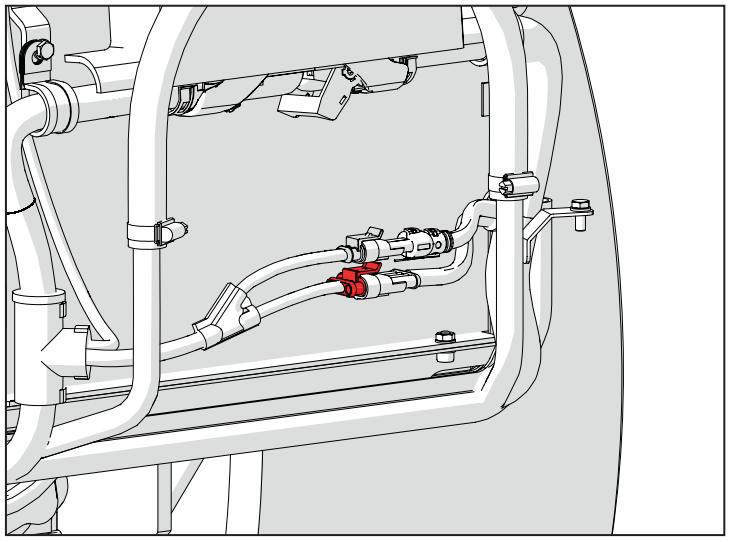




D005 (P469) EGR connector

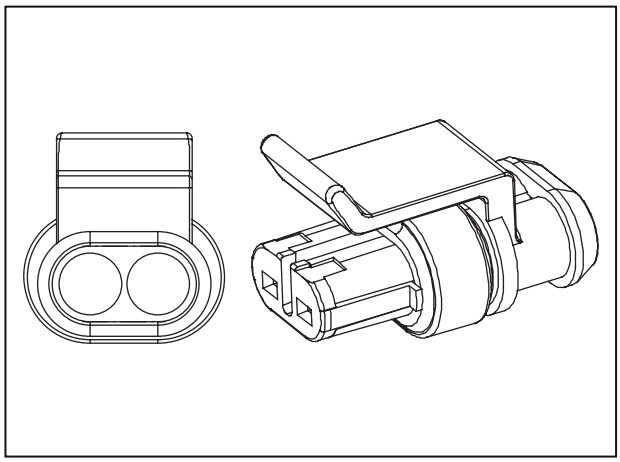
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	0,75	ENG-SP6	
2	EGR VALVE 12V	Rd	0,75	ENG-SP5	
3	CAN 2 H	Ye	0.5	P12	23
4	CAN 2 L	Gn	0.5	P12	45

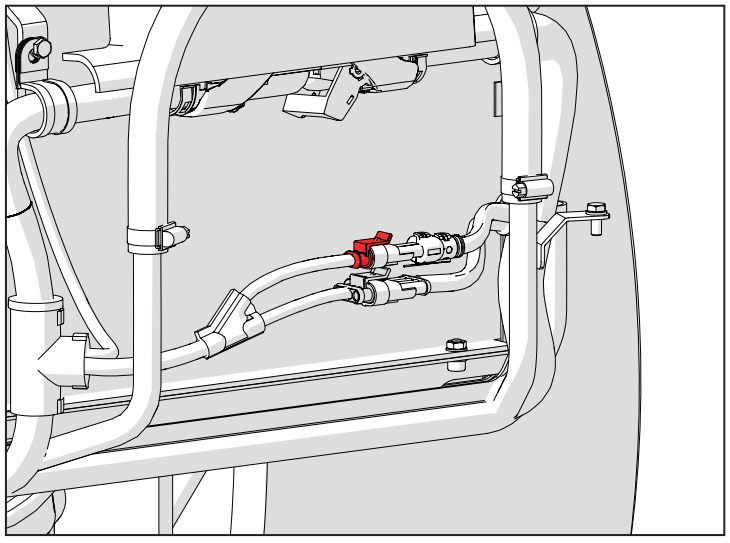




D010 (P470) Throttle valve power feed

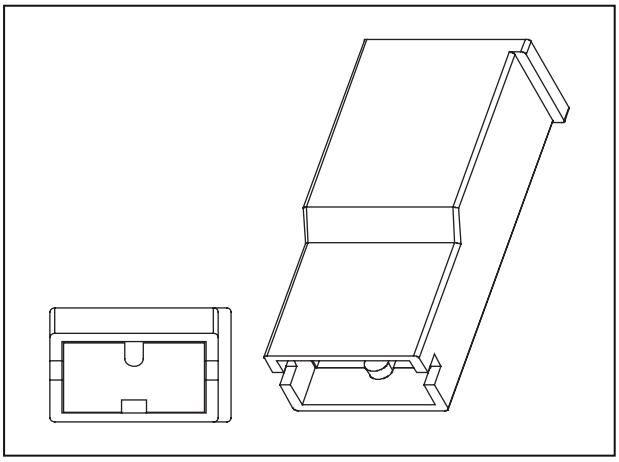
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	THROTTLE VALVE 12V	Rd	0,75	ENG-SP5	

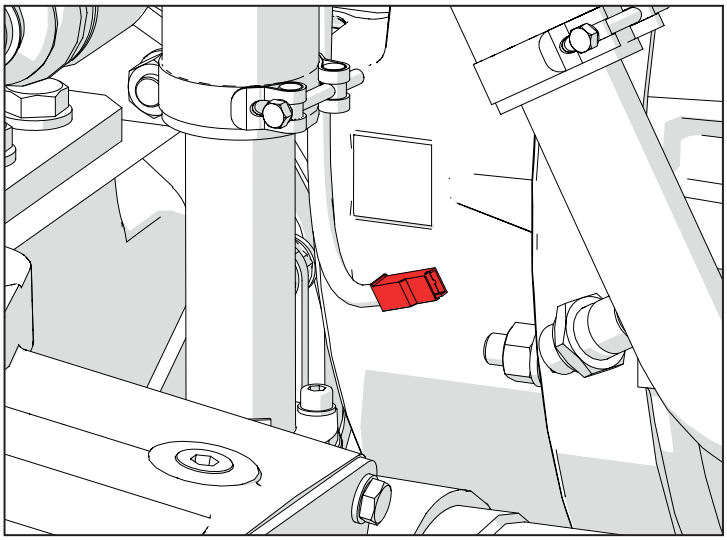




K013 (P471) Suction line hydraulic oil pressure sensor

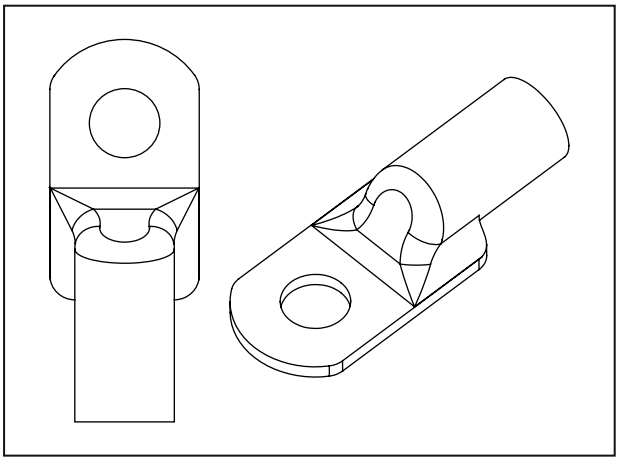
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	HYD OIL PRESSURE SWITCH	Ye	0,75	P100A	23

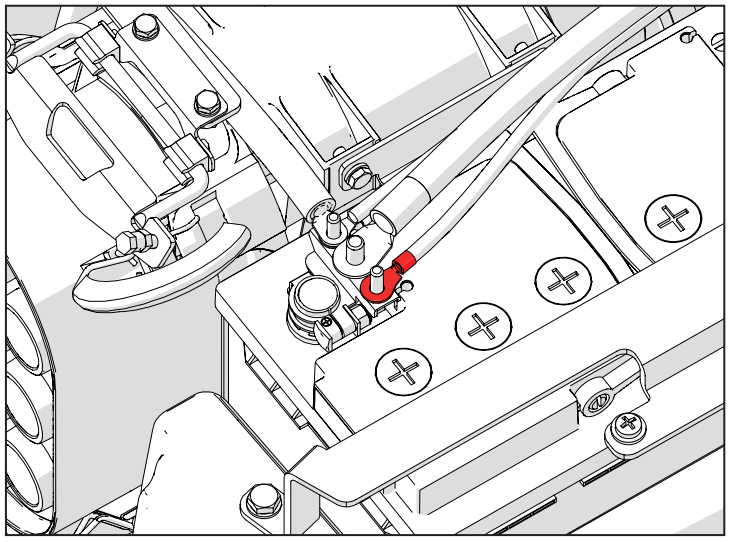




A004 (P472) Positive battery terminal

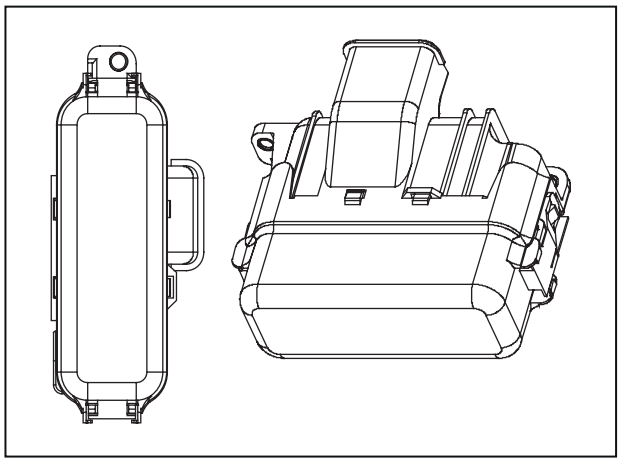
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL FILTER HEATER	Rd	1.5	P2A	4
1	MAIN RELAY	Rd	0.5	P2A	13
1	12V TRAILER SOCKET	Rd	2.5	P2A	5
1	BATTERY 12V	Rd	4	P2A	16

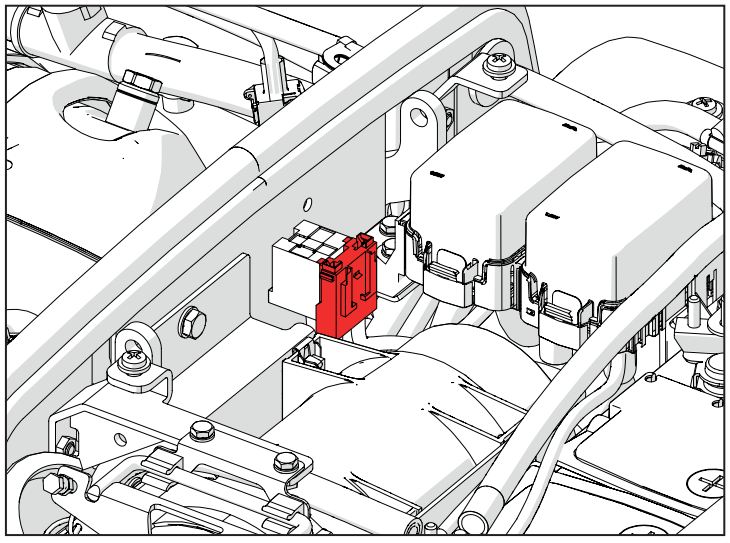




B003 (P476) Fuse holder

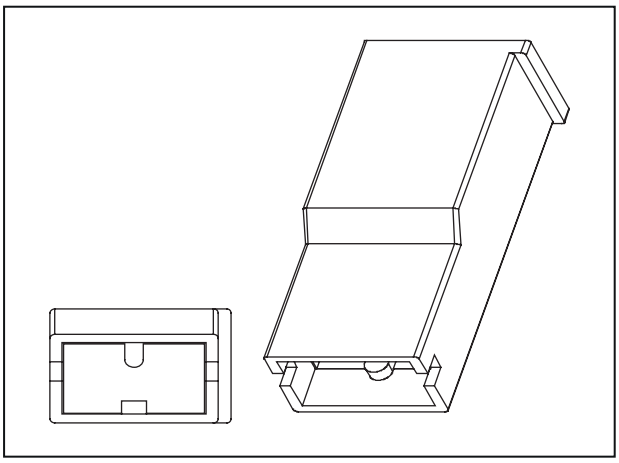
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GLOW PLUG 12V	Rd	4	P510	1
2	GLOW PLUG 12V	Rd	4	P452	30

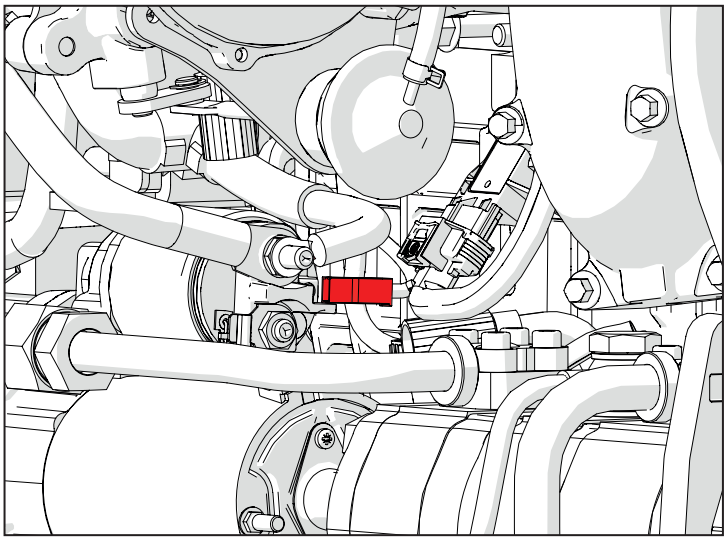




N002 (P490) Starter motor "50"

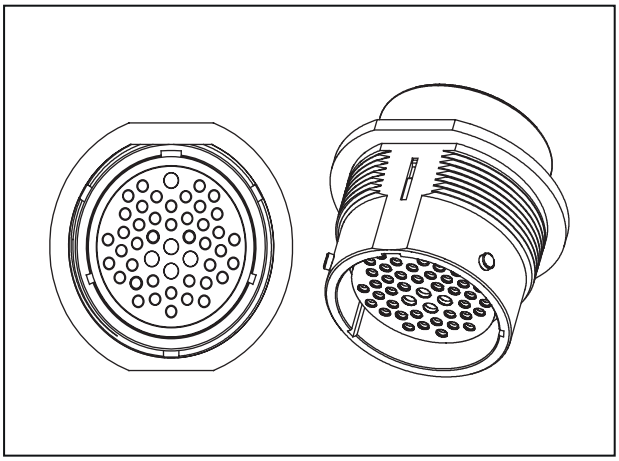
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	START MOTOR	Rd	1.5	ENG-SP3	





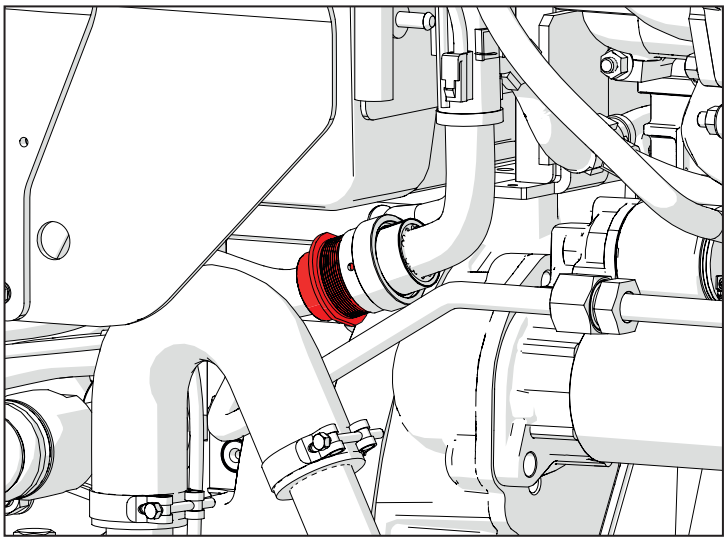
D002 (P10B) Wiring connector for engine wiring loom

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V BATT SUPPLY	Rd	2.5	P102A	1
2	FUEL LEVEL SENSOR	Bu	0.5	P100A	26
3	START COMMAND	Bu	0.5	P100A	43
4	12V BATT SUPPLY	Rd	2.5	P102A	2
5	V KEY	Bn	2.5	P102A	3
6	V KEY	Bn	2.5	P102A	4
7	BRAKE LAMP RELAY	WH	0.5	P100A	3
8	TURN INDICATORS	Or	0.75	P100A	11
9	DASHBOARD 12 V	Bn	0.5	P100A	33



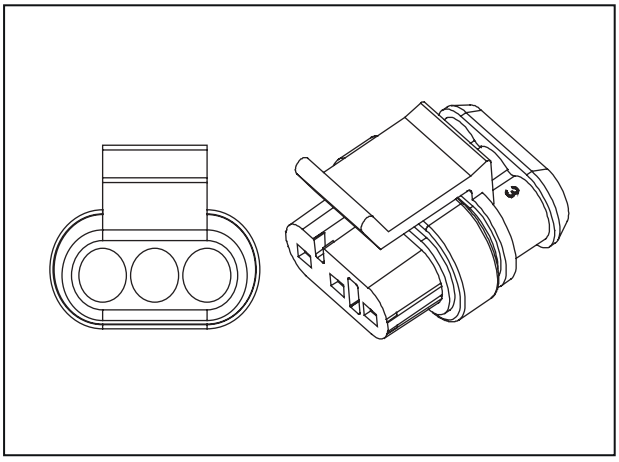
10	START ENABLE RELAY	Or	0.5	P100A	12
11	DPF REG INHIBIT SW	BK	0.5	P100A	28
12	HORN/SOCKET V KEY	Pu	1.0	P100A	8
13	HIGH BEAM	Gn	0.5	P100A	27
14	NORMAL BEAM LIGHTS	Gy	0.5	P100A	10
15	VCU V BATT	Rd	1.5	P100A	22
16	PARKING LIGHTS	Ye	1.5	P100A	24
17	ALTERNATOR B+	Bu	0.5	P100A	13
18	DASHBOARD V BATT	Rd	0.75	P100A	14
19	VJ1939 POWER SUPPLY	Rd	1.5	P100A	15
20	START ENABLE SENSOR	Rd	0.5	P100A	16
21	VCU V KEY	Bn	0.5	P100A	17
22	RELAY FOR DASHBOARD LED	Or	0.5	P100A	18
23	LED FOR DASHBOARD	Gn	0.5	P100A	19
24	AIR FILTER	Gn	0.5	P100A	20
25	DPF REGENERATION TRIGGER SWITCH	Bu	0.5	P100A	32
26	12V	Bn	1.5	MAIN-SP5	
27	VALVES V KEY	Pu	1.0	MAIN-SP14	
28	HORN POWER SUPPLY	Pu	0.75	P100A	35
29	BRAKE LAMP	Rd	0.75	MAIN-SP10	
30	PARKING LIGHT RH	Ye	1.0	MAIN-SP15	
31	HAZARD LIGHTS CONTROL	Rd	0.75	P100A	2
32	REAR PARKING LIGHT LH	Ye	1.0	MAIN-SP9	
33	BEACON LIGHT SUPPLY	Pu	1.0	P100A	31
34	12V TRAILER	Rd	2.5	MAIN-SP4	
35	GND FUEL LEVEL	BK	0.5	MAIN-SP6	
36	V KEY	Bn	1.5	P100A	34

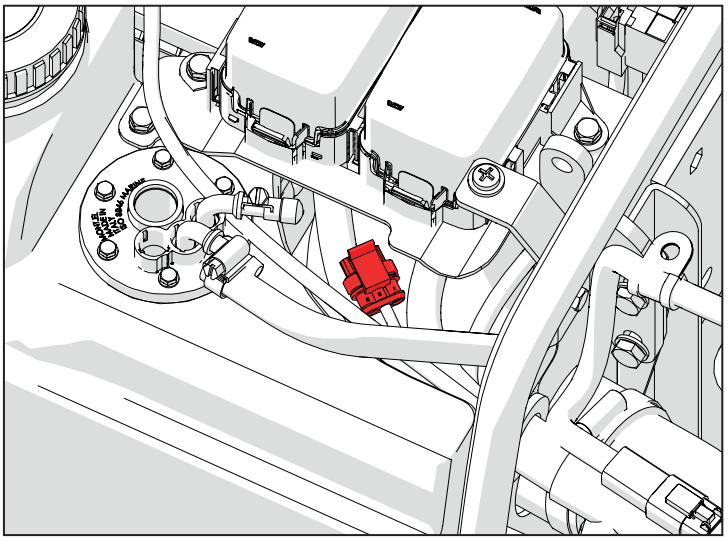
37	LH DIRECTION LIGHT	Gn	0.75	MAIN-SP8	
38	RH TURN SIGNAL LIGHT	Bu	0.75	MAIN-SP3	
39	DPF REGENERATION INHIBIT SW	Bu	0.5	P100A	44
46	CAN L	Gn	0.5	P100A	29
47	CAN H	Ye	0.5	P100A	30



K002 (P40) Fuel level sensor

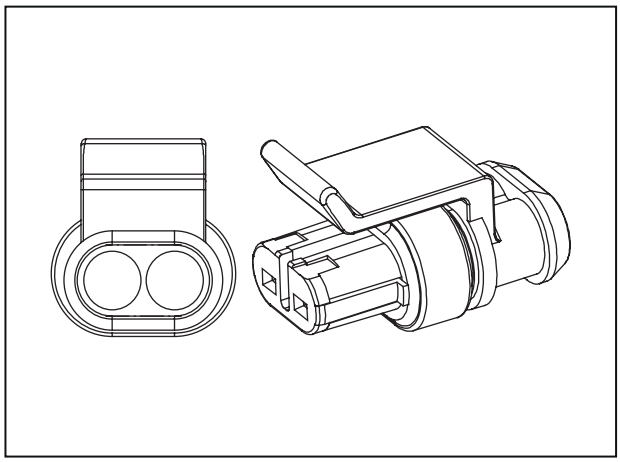
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	FUEL LEVEL SENSOR	Bu	0.5	P10A	2
3	GND FUEL LEVEL	BK	0.5	P10A	35

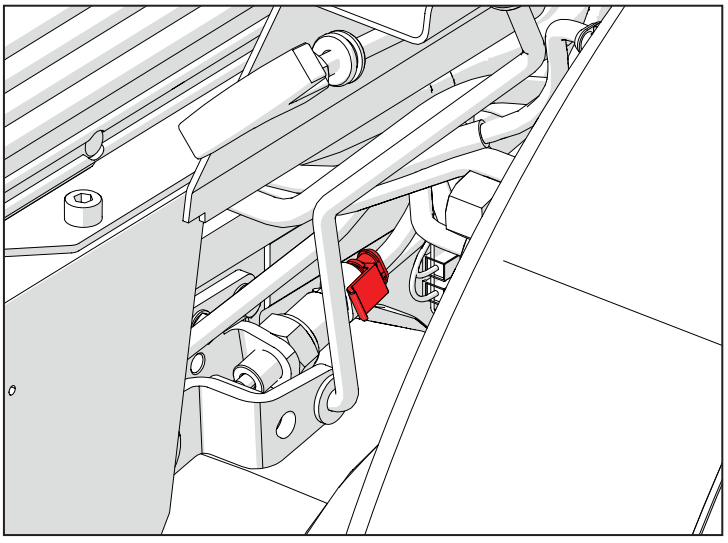




I014 (P49) PTO safety synchro switch

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO SYNCHRONIZED GND	BK	0.5	MAIN-SP6	
2	PTO - Synchronized Safety Switch	Bu	0.5	P100A	38

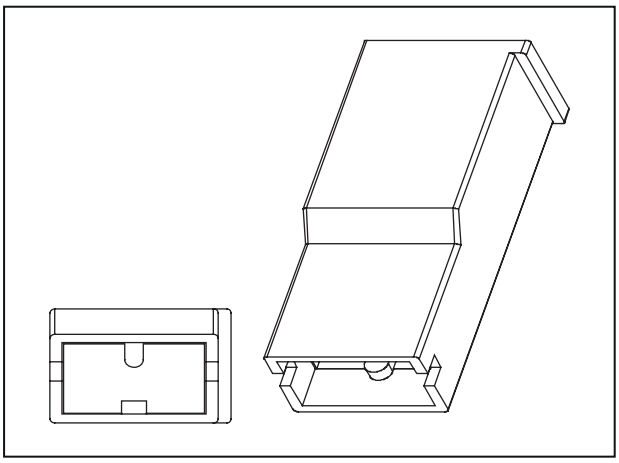


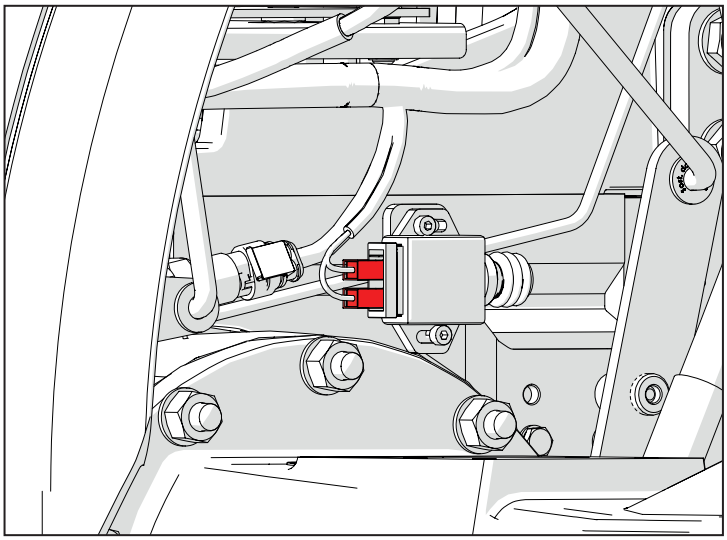


I015 (P519-P520) PTO speed mode selector

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO Rear - Speed Selection Lever	Ye	0.5	P100A	5

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	0.5	P412	1

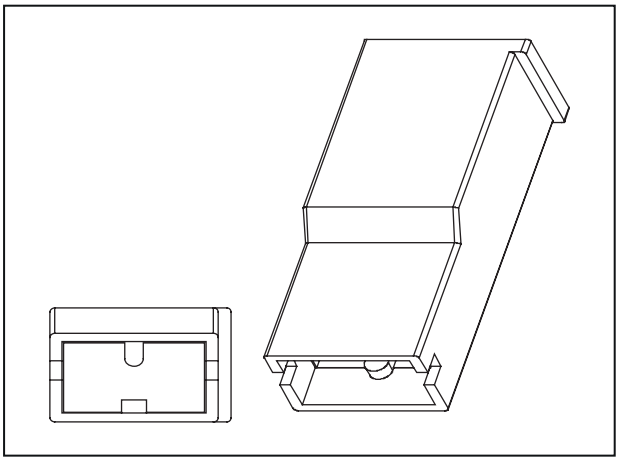


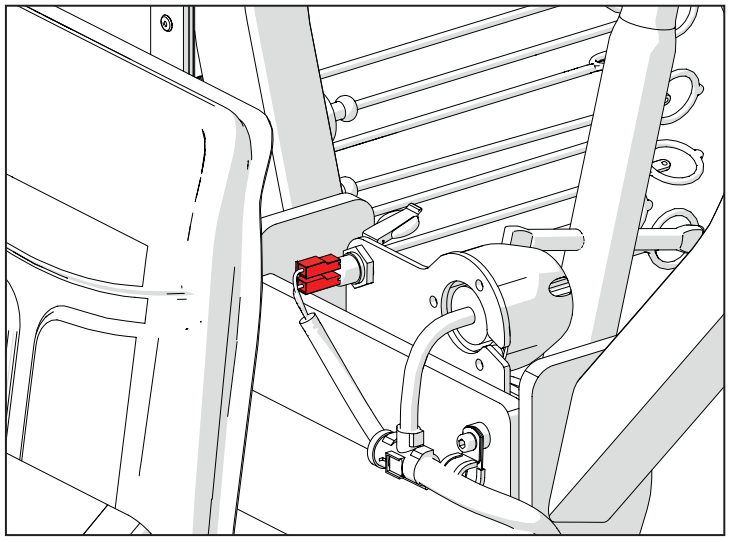


P003 (P50-P51) 1 pole socket

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	SOCKET 1 POLE SUPPLY	Rd	2.5	MAIN-SP4	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND SOCKET 1 POLE	BK	2.5	P412	1

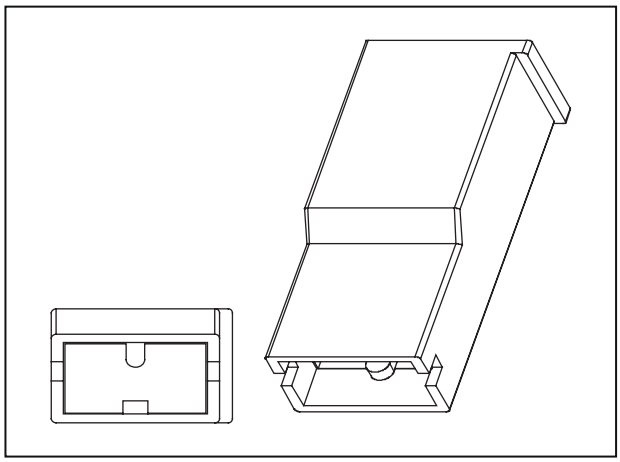


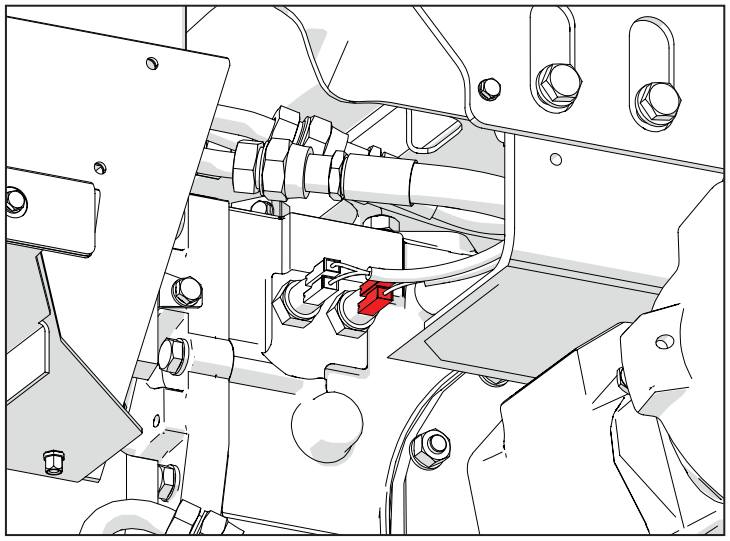


I012 (P56-P57) 'Reverse' shuttle lever button

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP5	

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	Shuttle lever Rw switch	Gn	0.5	P100A	46

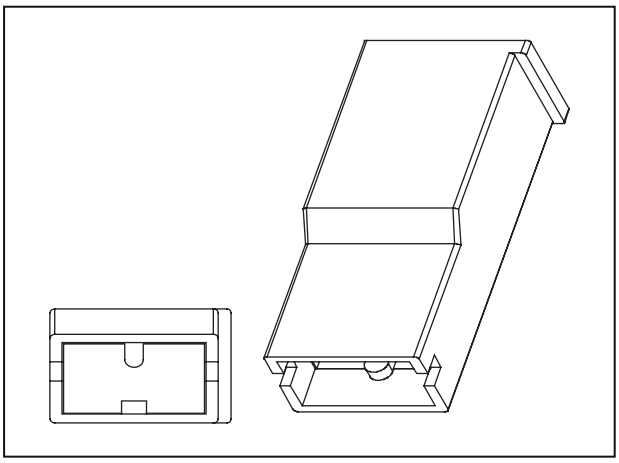


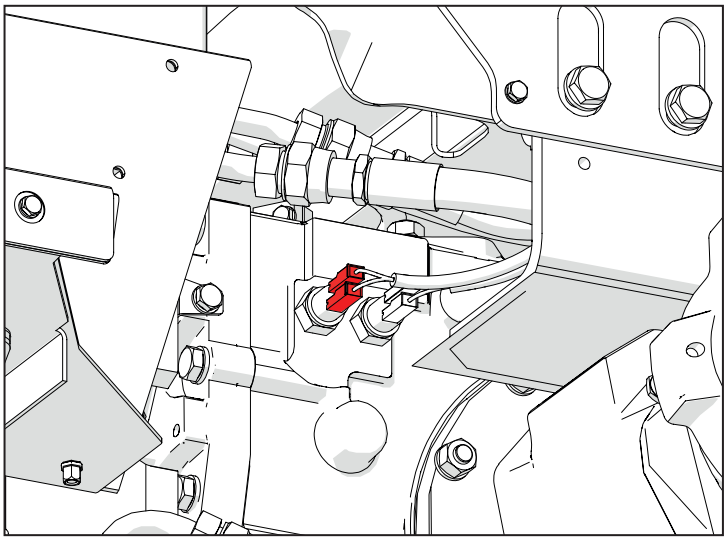


I013 (P58-P59) 'Forward' shuttle lever button

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	Shuttle lever fw switch	Or	0.5	P100A	45

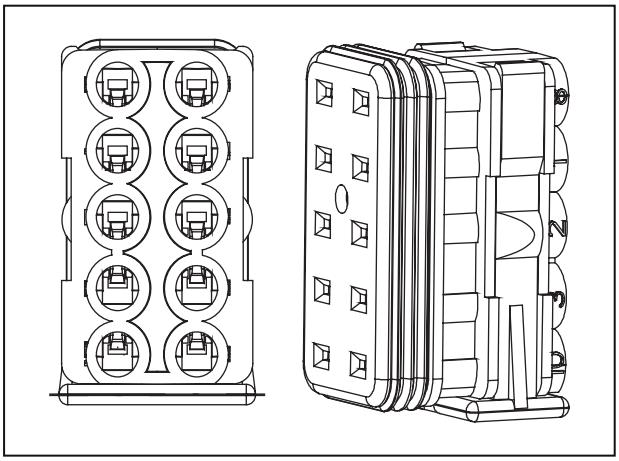
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V	Bn	0.5	MAIN-SP5	

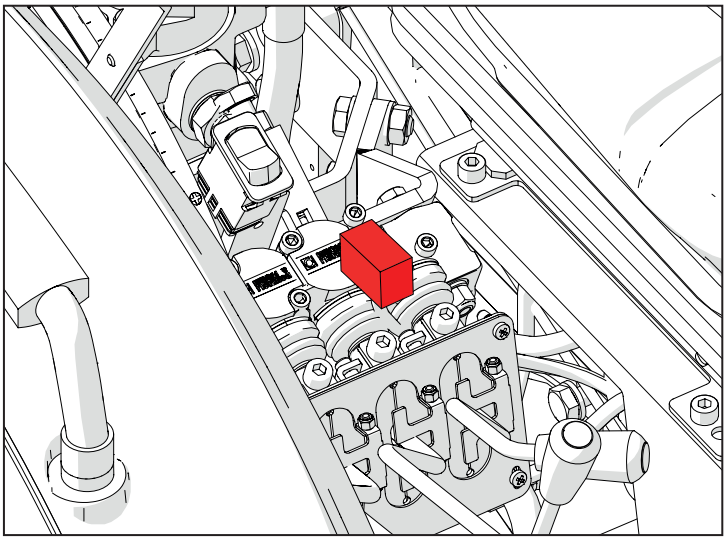




H002 (P61) "Diverter" button

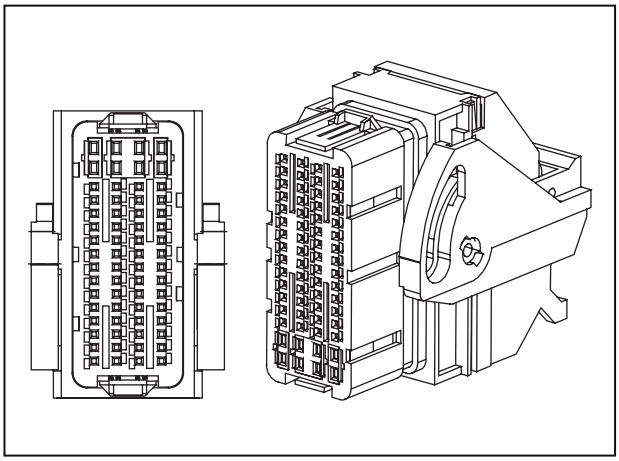
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	PB - DIVERTER 12V	Bn	0.5	MAIN-SP2	
3	PB - DIVERTER	Gy	0.5	P100A	47





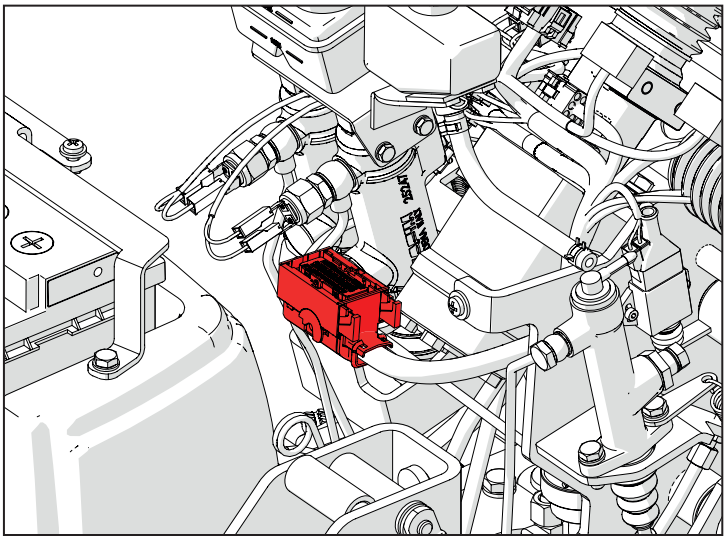
M001 (P80) Vehicle control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
A1	CAN H	Ye	0.5	CAB-SP12	
A2	CAN L	Gn	0.5	CAB-SP14	
B2	Shuttle lever FW switch	Or	0.5	P100B	45
B3	START ENABLE RELAY	Or	0.5	P100B	12
C1	PTO RPM Sensor	Gy	0.5	P100B	4
C2	Shuttle lever RW switch	Gn	0.5	P100B	46
C3	RELAY FOR DASHBOARD LED	Or	0.5	P100B	18
D1	BRAKE OIL LEVEL	Gn	0.5	P19	1
D2	BRAKE LH SW	Or	0.5	P292	1
D3	Wheel Speed	WH	0.5	P100B	7
E1	LEFT INDICATOR LIGHT	Gn	0.5	CAB-SP3	
E2	NORMAL BEAM LIGHTS	Gy	0.5	CAB-SP21	
E4	BRAKE RH SW	Bu	0.5	P119	1
F1	HIGH BEAM LIGHTS	Gn	0.5	CAB-SP23	
F2	PTO REAR A	Pu	0.5	P504	1
F3	RIGHT INDICATOR LIGHT	Bu	0.5	CAB-SP4	
F4	PARKING LIGHTS	Ye	0.5	CAB-SP22	



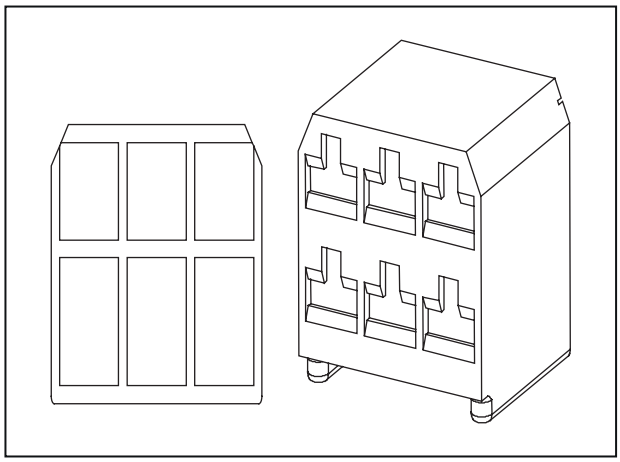
G1	PTO REAR B	Pu	0.5	P505	1
G2	START ENABLE SENSOR	Rd	0.5	P100B	16
G3	PB - PTO Rear/ Front bypass	Bu	0.5	P36	4
G4	ENGINE CLUTCH SW	Gn	0.5	P492	1
H1	SEAT SWITCH SIGNAL - A	Bu	0.5	P100B	36
H2	PTO - Speed Selection Lever	Ye	0.5	P100B	5
H3	START COMMAND	Bu	0.5	CAB-SP24	
H4	PB - DIVERTER	Gy	0.5	P100B	47
J1	PARKING BRAKE SW SIGNAL	Gn	0.5	P138	1
J2	AIR FILTER	Gn	0.5	P100B	20
J3	SEAT SWITCH SIGNAL - B	Gn	0.5	P100B	37
K1	FUEL LEVEL SENSOR	Bu	0.5	P100B	26
K2	THROTTLE - SIGNAL2	Gn	0.5	P100	6
K3	HYD OIL PRESSURE SWITCH	Ye	0.5	P100B	23
K4	PB - Differential lock on/off	Bu	0.5	P62	3
L3	PTO - Synchronized Safety Switch	Bu	0.5	P100B	38
L4	THROTTLE - SIGNAL1	Gn	0.5	P100	3
M2	VCU V KEY	Bn	0.5	P100B	17
N2	THROTTLE GND	BK	0.5	CAB-SP7	
N3	SIGNAL GND	BK	0.5	P100B	6
O1	V BAT	Rd	0.5	CAB-SP5	
O2	12V	Rd	0.5	CAB-SP5	
O3	V BAT	Rd	0.5	CAB-SP5	
O4	V BAT	Rd	0.5	CAB-SP5	
P1	REAR PTO PROPORTIONAL VALVE	Bu	0.5	P100B	39
P2	PTO DIRECTION VALVE	Gy	0.5	P100B	42
P3	BRAKE LAMP RELAY	WH	0.5	P100B	3

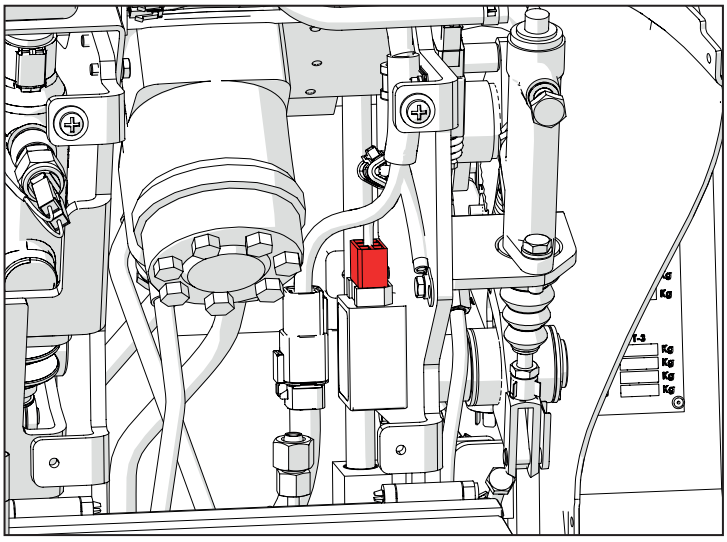
P4	GND	BK	0.75	CAB-SP2	
Q1	DIVERTER VALVE	Gn	0.5	P100B	41
Q3	DIFF LOCK ON/ OFF VALVE	Or	0.5	P100B	40
Q4	GND	BK	0.75	CAB-SP2	



M002 (P274) Flasher unit

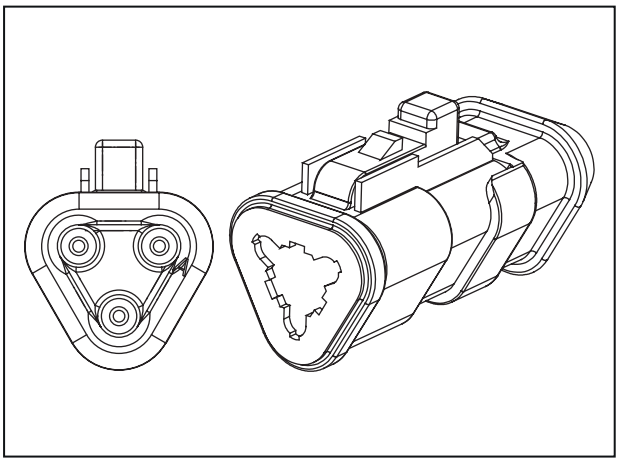
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	BK	1	P13	1
4	12V EMERGENCY	WH	1	P137	5
4	TURN INDICATORS	WH	1	P144	6
6		Pu	1	P137	2

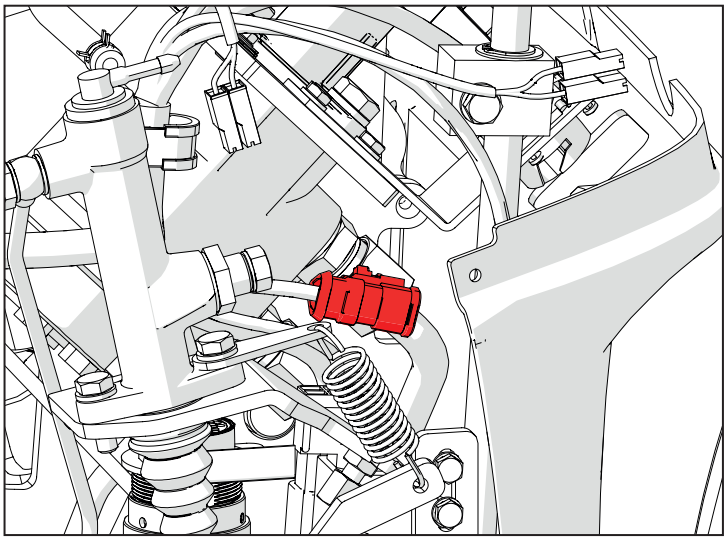




O002 (P98) CAN line termination

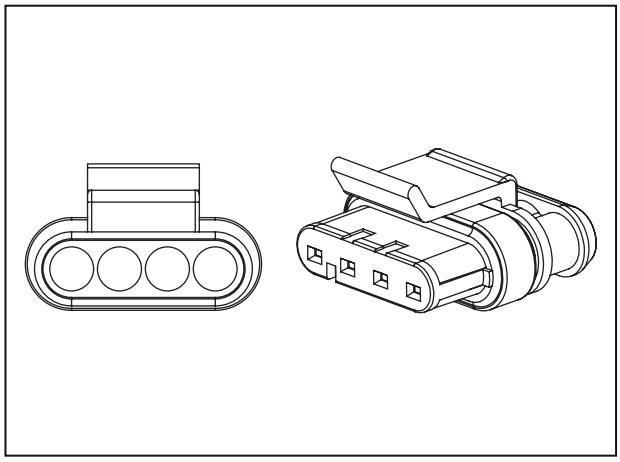
Pin	Description	Colour	Sect.	Input Conn.	Pin
A	CAN H	Ye	0.5	CAB-SP12	
B	CAN L	Gn	0.5	CAB-SP14	

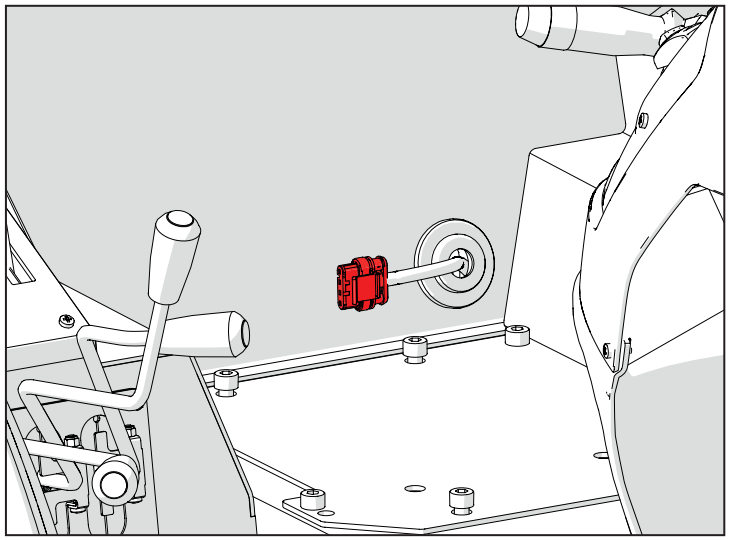




K016 (P107) Seat start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	12V - SEAT SAFETY	Bn	0,75	MAIN-SP2	
2	SEAT SWITCH SIGNAL - A	Bu	0.5	P100A	36
3	12V - SEAT SAFETY	Bn	0,75	MAIN-SP2	
4	SEAT SWITCH SIGNAL - B	Gn	0.5	P100A	37

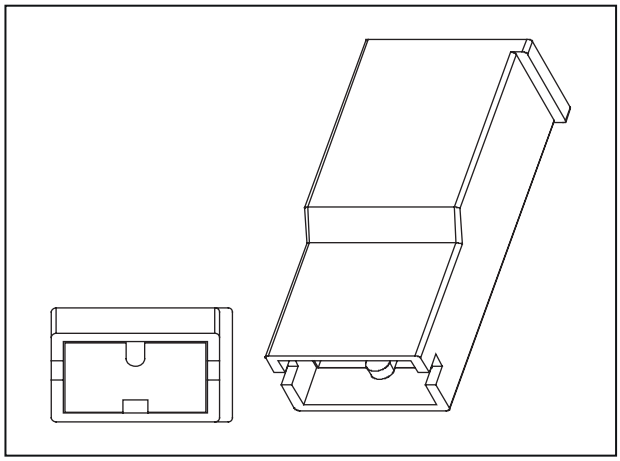


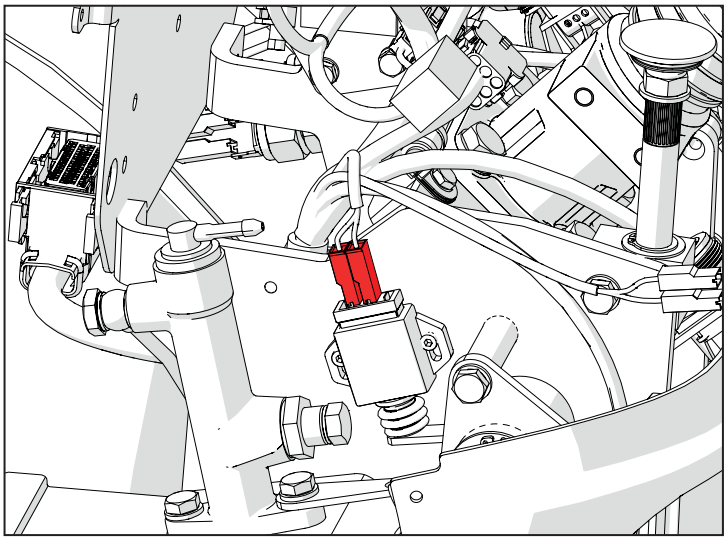


I003 (P138-P139) Park brake start enable signal

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING BRAKE SW SIGNAL	Gn	0.5	P80	J1

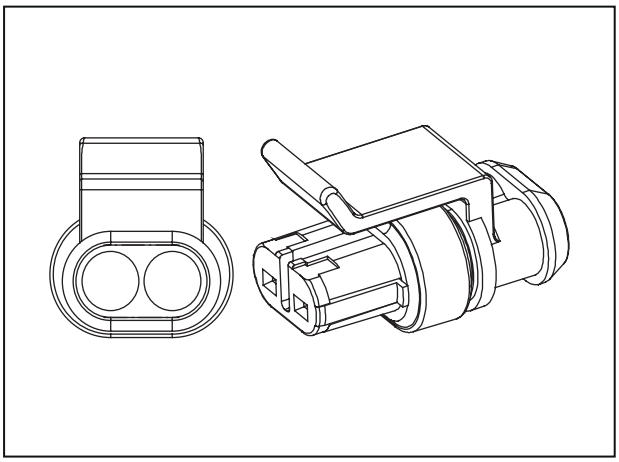
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING SW GND	BK	0.5	CAB-SP2	

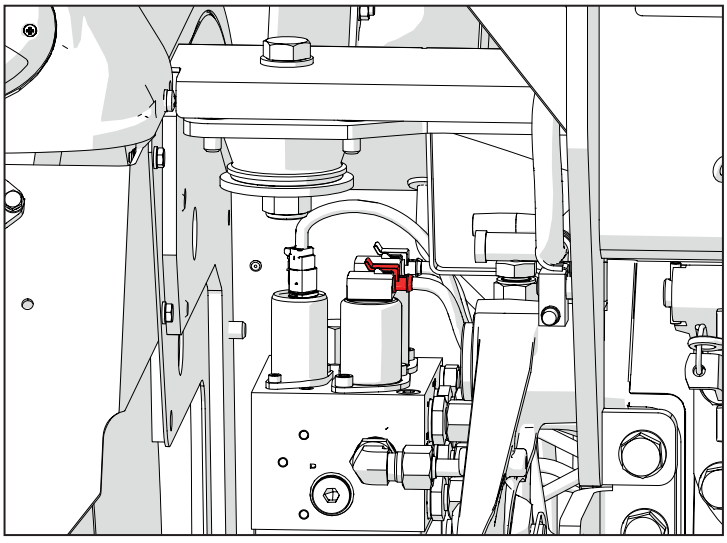




L002 (P499) PTO directional valve

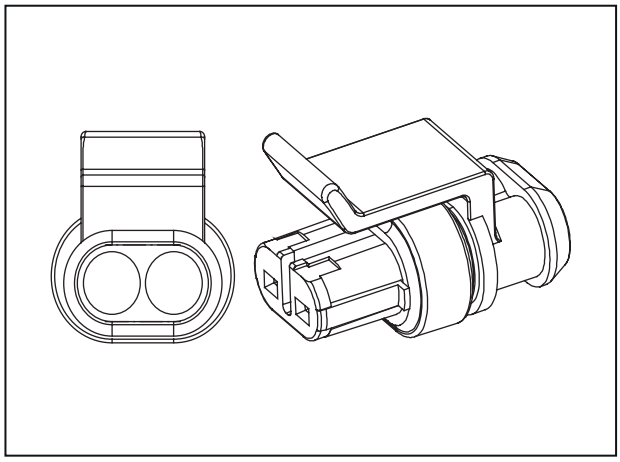
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PTO DIRECTION VALVE	Pu	0.5	MAIN-SP14	
2	PTO DIRECTION VALVE	Gy	0.5	P100A	42

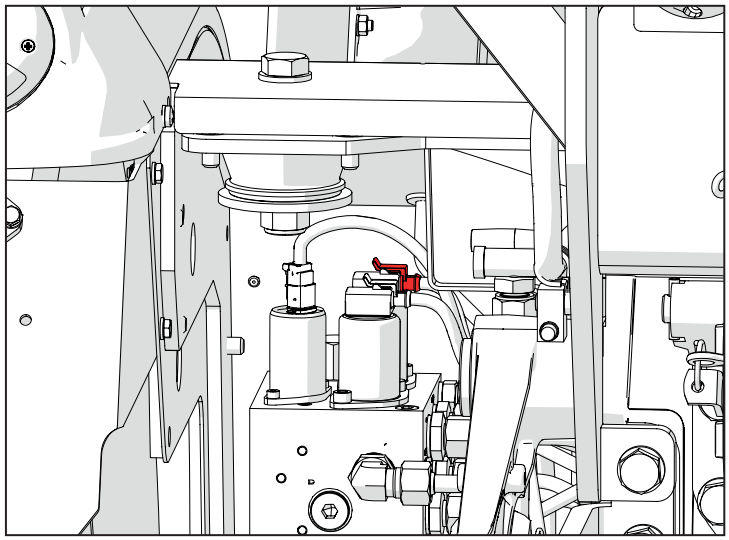




L003 (P187) Differential lock ON/OFF solenoid valve

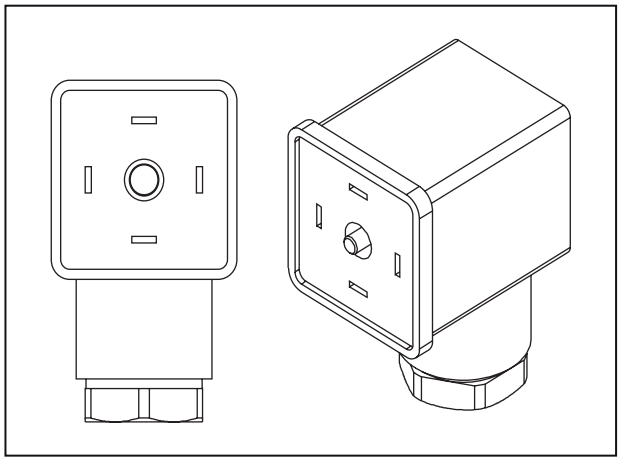
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VALVES V KEY	Pu	0.5	MAIN-SP14	
2	DIFF LOCK ON/ OFF VALVE	Or	0.5	P100A	40

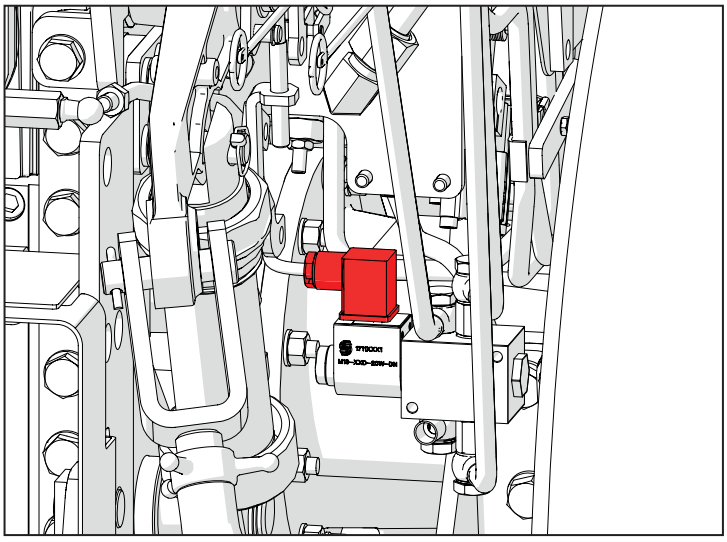




L001 (P188) "Diverter" solenoid valve

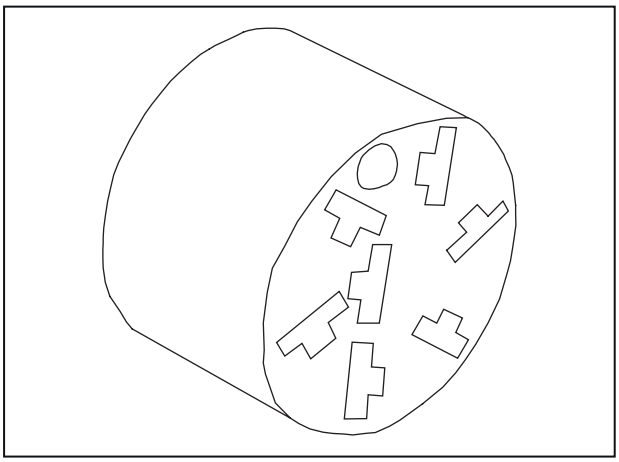
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	VALVES V KEY	Pu	0.5	MAIN-SP14	
2	DIVERTER VALVE	Gn	0.5	P100A	41

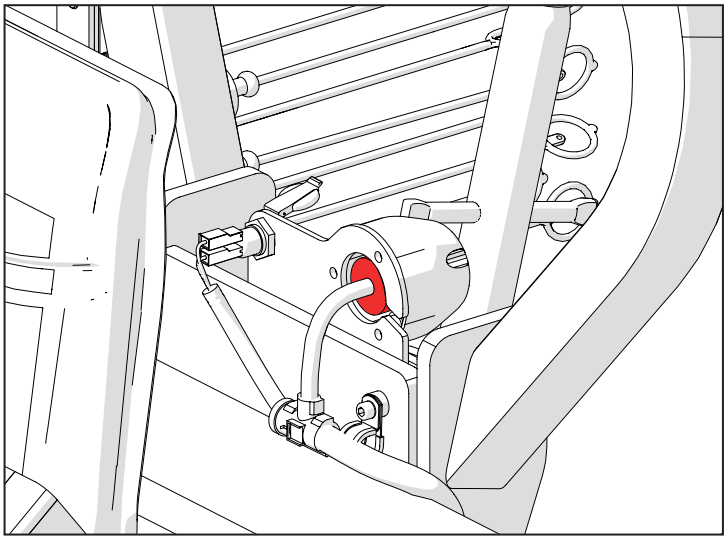




P002 (P226) Rear 7 pole socket

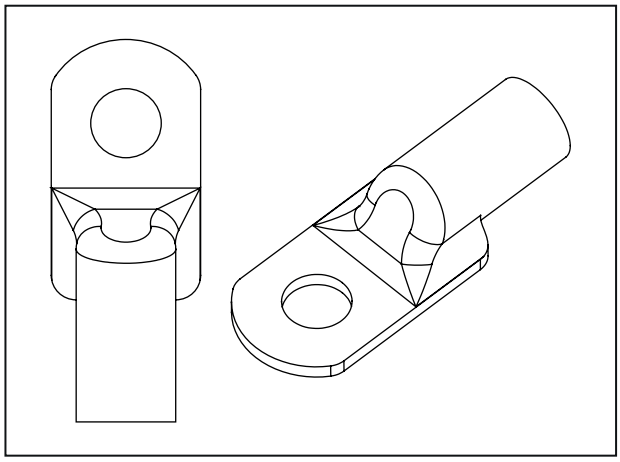
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	LH TURN SIGNAL	Gn	0,75	MAIN-SP8	
2	12V TRAILER	Rd	1.5	MAIN-SP4	
3	GND	BK	1.5	P412	1
4	RH TURN SIGNAL	Bu	0,75	MAIN-SP3	
5	PARKING LIGHT RH	Ye	0,75	MAIN-SP15	
6	BRAKE LAMP	Rd	1.5	MAIN-SP10	
7	PARKING LIGHTS LH	Ye	0,75	MAIN-SP9	

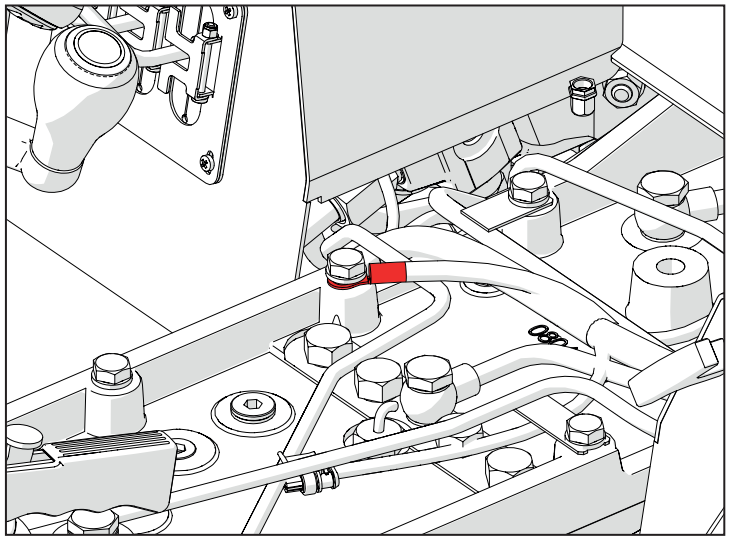




C005 (P412) Main wiring loom ground

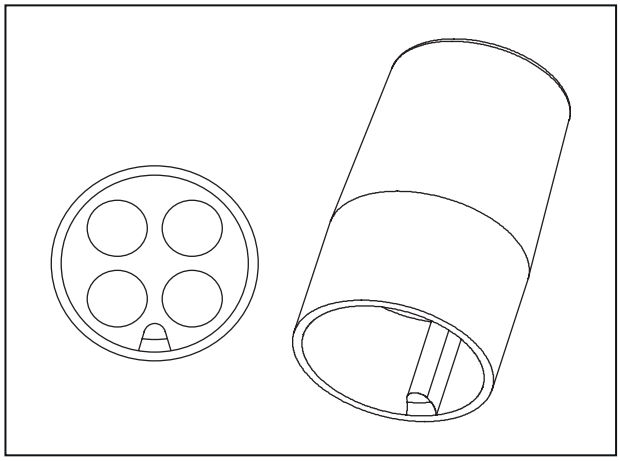
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND SOCKET 1 POLE	BK	2.5	P51	1
1	GND	BK	0.5	P519	1
1	GND REAR LIGHTS	BK	1.5	MAIN-SP1	
1	GND	BK	0.5	P518	2
1	GND	BK	1.5	P226	3
1	WHEEL SPEED GND	BK	0,75	P301	2

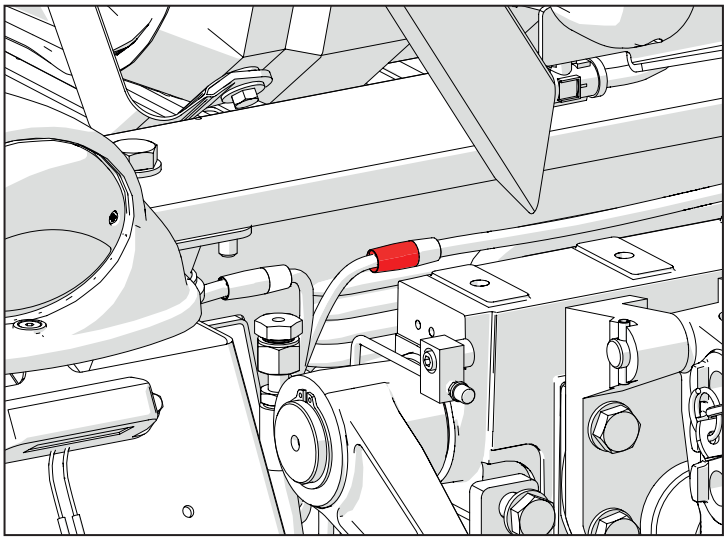




D008 (P42A) Main-right rear lights connector

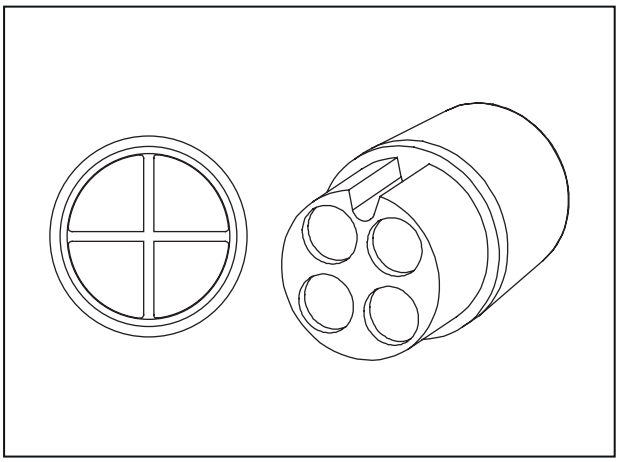
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	PARKING LIGHT RH	Ye	0,75	MAIN-SP15	
2	BRAKE LAMP	Rd	0,75	MAIN-SP10	
3	GND REAR LIGHTS	BK	1	MAIN-SP1	
4	RH TURN SIGNAL	Bu	0,75	MAIN-SP3	

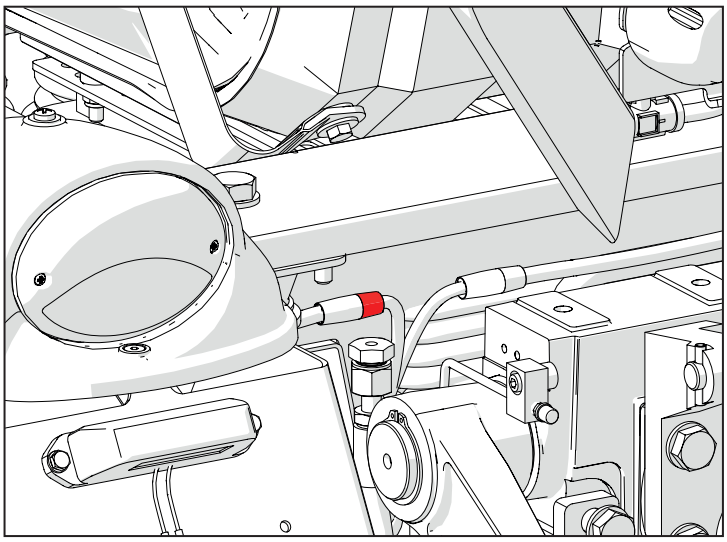




D009 (P43A) Main-left rear lights connector

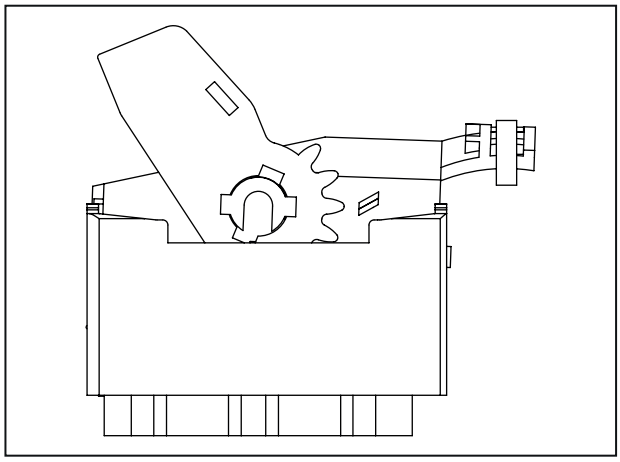
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	REAR PARKING LIGHT LH	Ye	0,75	MAIN-SP9	
2	BRAKE LAMP	Rd	0,75	MAIN-SP10	
3	GND REAR LIGHTS	BK	1	MAIN-SP1	
4	LH TURN SIGNAL	Gn	0,75	MAIN-SP8	



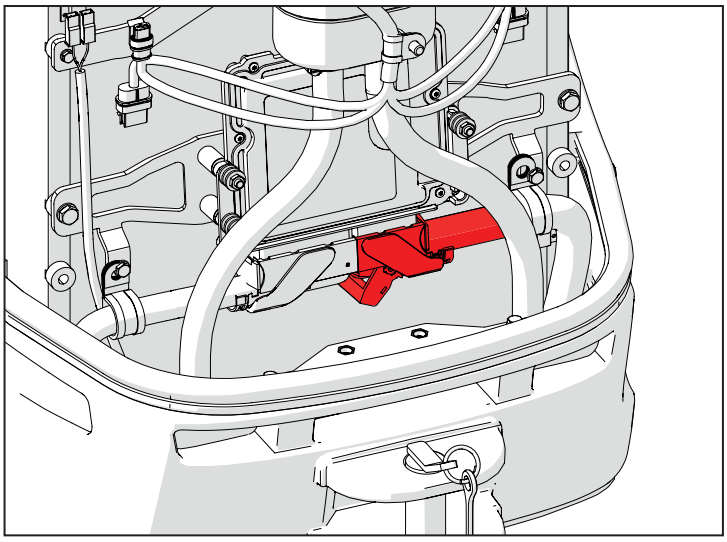


M003B (XECUA) Engine control unit

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 3	MB	1.5	xl3	1
2	INJECTOR 2	R	1.5	xl2	1
6	OIL PRESS. SWITCH	V	0.75	xs6	1
10	BOOST PRESS. SENSOR GND	CB	0.75	xs4	3
11	RAIL PRESS. SENSOR SUPPLY	L	0.75	xs5	3
13	CAMSHAFT SENSOR SUPPLY	GR	0.75	xs3	3
14	CAMSHAFT SENSOR SIGNAL	HN	0.75	xs3	2
15	FUEL METERING UNIT	ZN	1.5	xy1	1
16	INJECTOR 1	RL	1.5	xl1	1
17	INJECTOR 4	RB	1.5	xl4	1
19	THROTTLE VALVE ACTUATOR	H	0.75	xy3	3
21	THROTTLE VALVE STATUS	LG	0.75	xy3	4
22	CRANKSHAFT SENSOR GROUND	SHIELD	None	xs2	3
24	EGR COOLER OUT TEMP. SENSOR GND	NG	0.75	xs7	1
25	BOOST PRESS. SENSOR GND	MR	0.75	xs4	1
26	RAIL PRESS. SENSOR GND	NZ	0.75	xs5	1
28	CAMSHAFT SENSOR GND	Z	0.75	xs3	1
31	INJECTOR 3	M	1.5	xl3	2
32	INJECTOR 1	L	1.5	xl1	2
40	BOOST PRESS. SENSOR SIGNAL	BR	0.75	xs4	4
41	RAIL PRESS. SENSOR SIGNAL	G	0.75	xs5	2
44	CRANKSHAFT SENSOR SIGNAL MINUS	V	0.75	xs2	2
46	INJECTOR 2	N	1.5	xl2	2
48	INJECTOR 4	RN	1.5	xl4	2

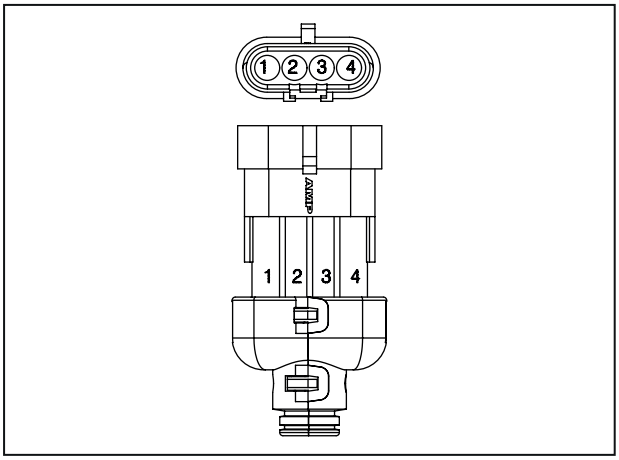


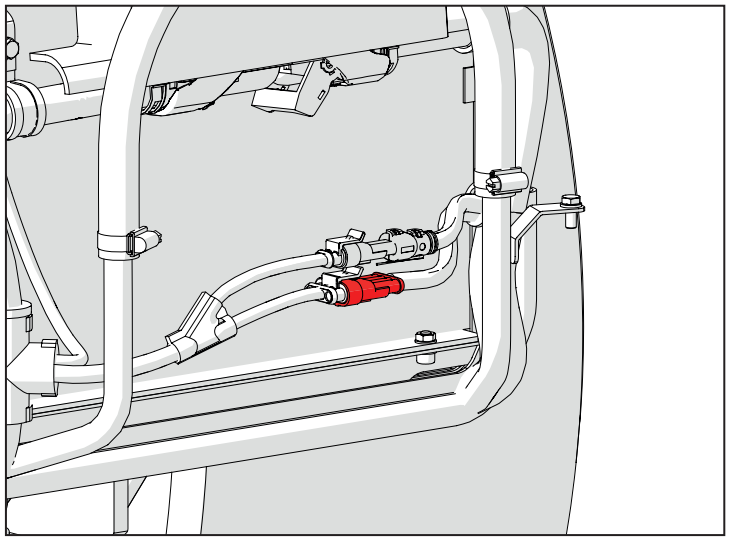
52	THROTTLE VALVE GND	HL	0.75	xy3	1
54	EGR COOLER OUT TEMP. SENSOR SIGNAL	RN	0.75	xs7	2
55	BOOST PRESS. TEMP. SENSOR SIGNAL	BV	0.75	xs4	2
57	COOLANT TEMP. SENSOR SIGNAL	S	0.75	xs1	2
58	COOLANT TEMP. SENSOR GND	VG	0.75	xs1	1
59	CRANKSHAFT SENSOR SIGNAL PLUS	ZN	0.5	xs2	1
60	FUEL METERING UNIT	C	1.5	xy1	2



D005 (XEG) Exhaust gas recirculation solenoid valve power feed

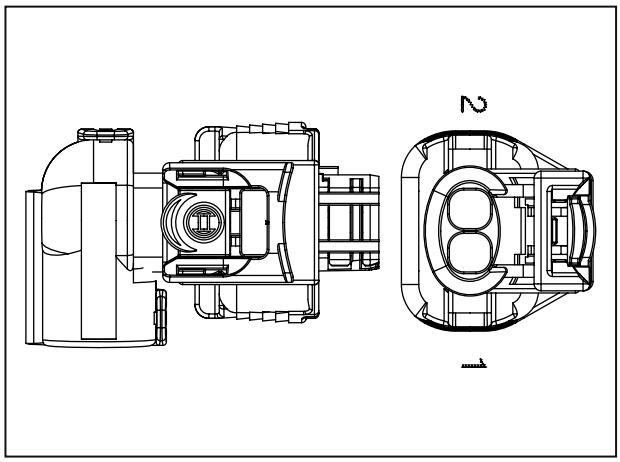
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	GND	HR	0,75	xy2	5
2	12V	CL	0,75	xy2	6
3	CAN_H	ZN	0,75	xy2	3
4	CAN_L	L	0,75	xy2	4

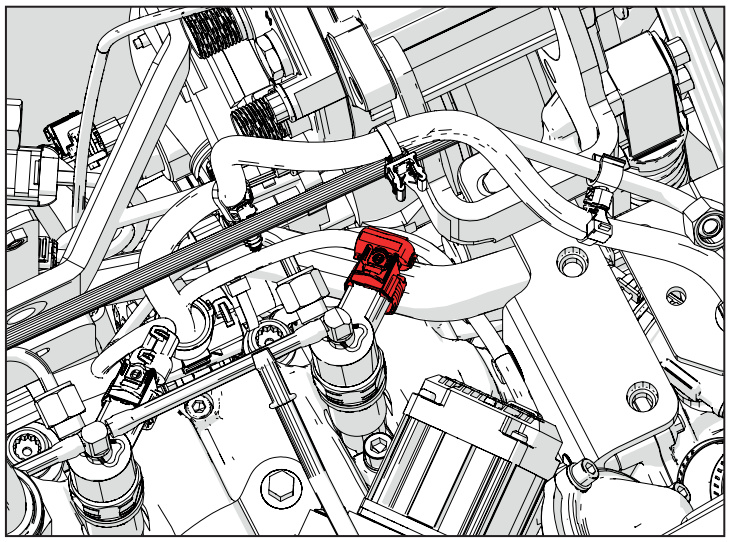




L008 (XI1) Fuel electro-injector 1

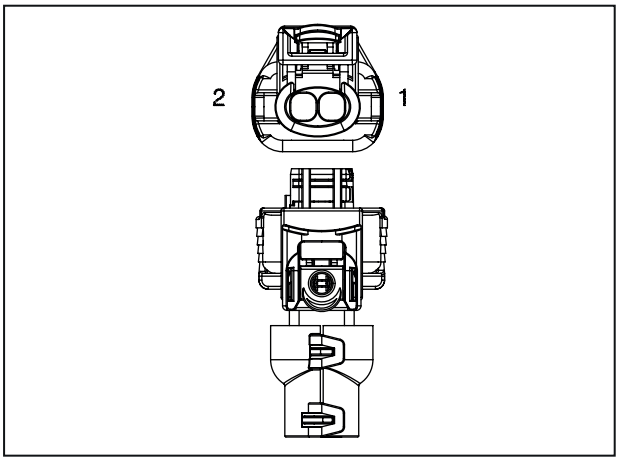
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 1	RL	1.5	xecua	16
2	INJECTOR 1	L	1.5	xecua	32

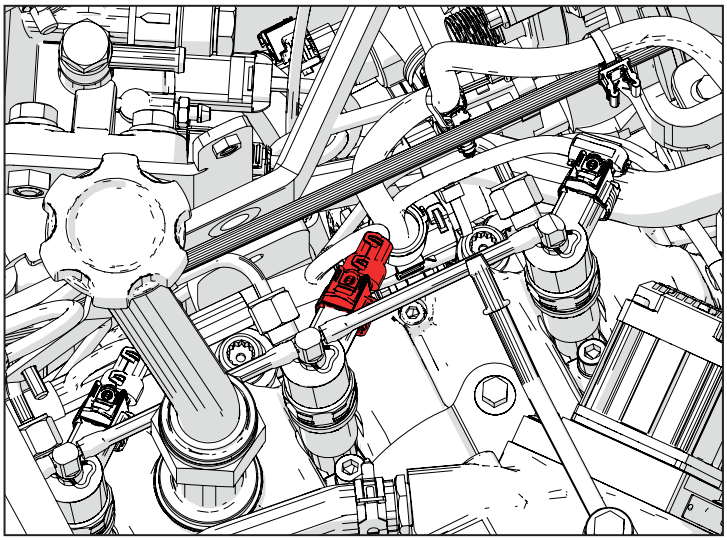




L009 (XI2) Fuel electro-injector 2

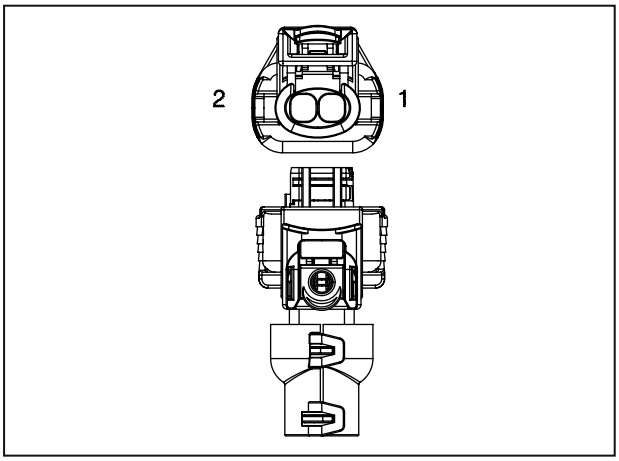
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 2	R	1.5	xecua	2
2	INJECTOR 2	N	1.5	xecua	46

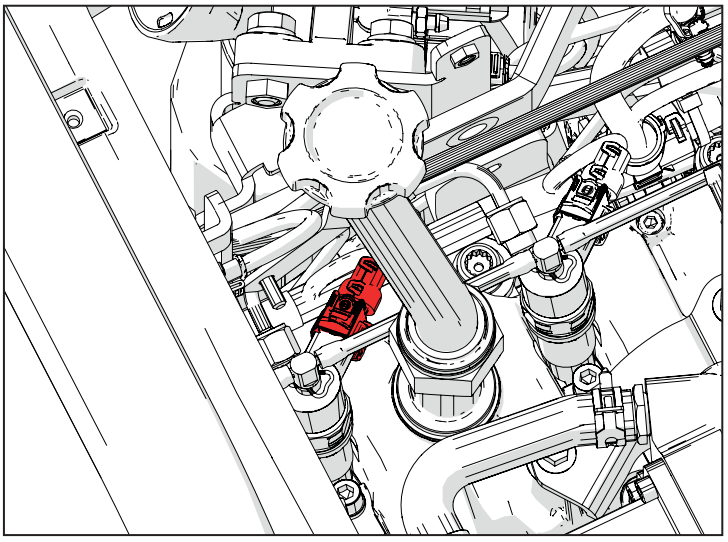




L010 (XI3) Fuel electro-injector 3

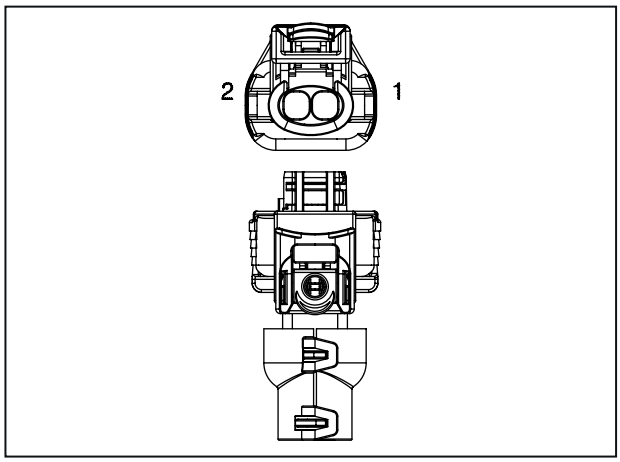
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 3	MB	1.5	xecua	1
2	INJECTOR 3	MB	1.5	xecua	31

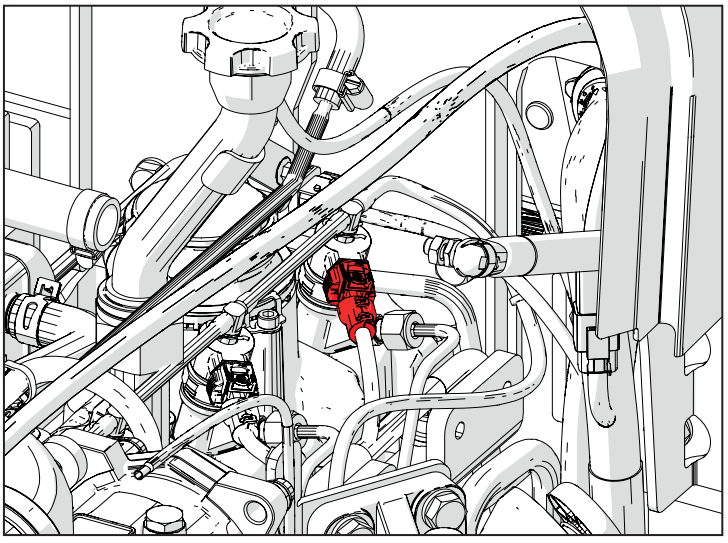




L011 (XI4) Fuel electro-injector 4

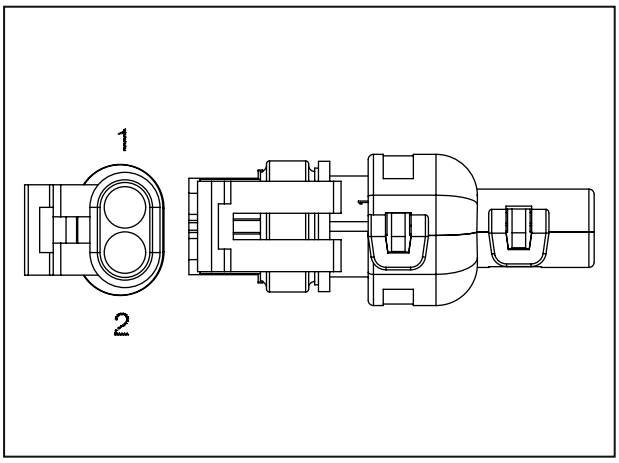
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	INJECTOR 4	RB	1.5	xecua	17
2	INJECTOR 4	RN	1.5	xecua	48

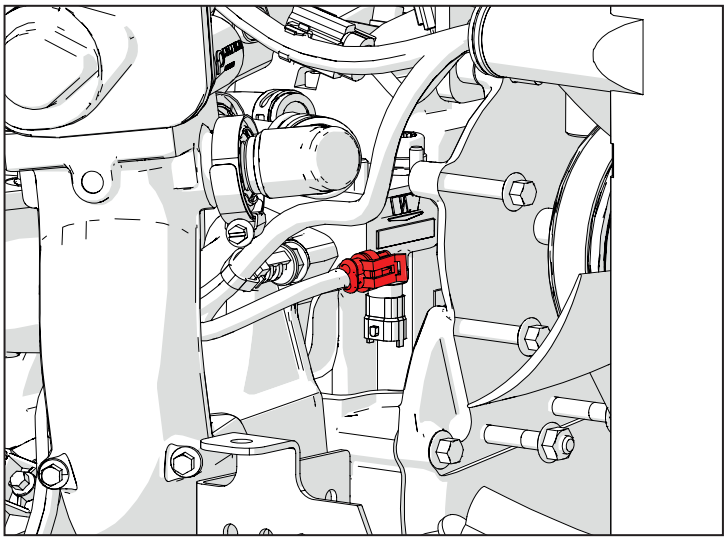




K019 (XS1B) Coolant temperature sensor

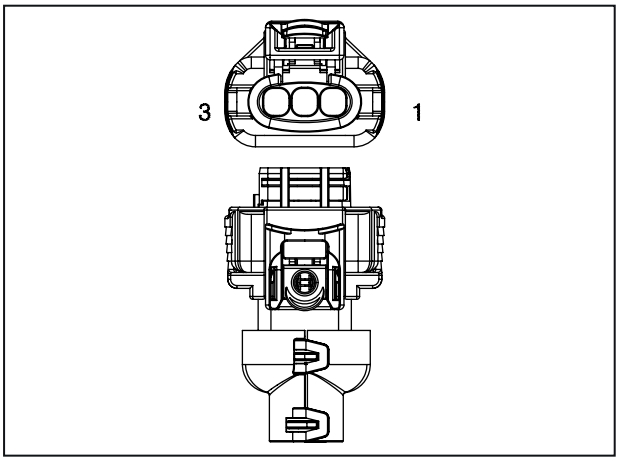
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	COOLANT TEMP. SENSOR GND	VG	0,75	xecua	58
2	COOLANT TEMP. SENSOR SIGNAL	S	0,75	xecua	57

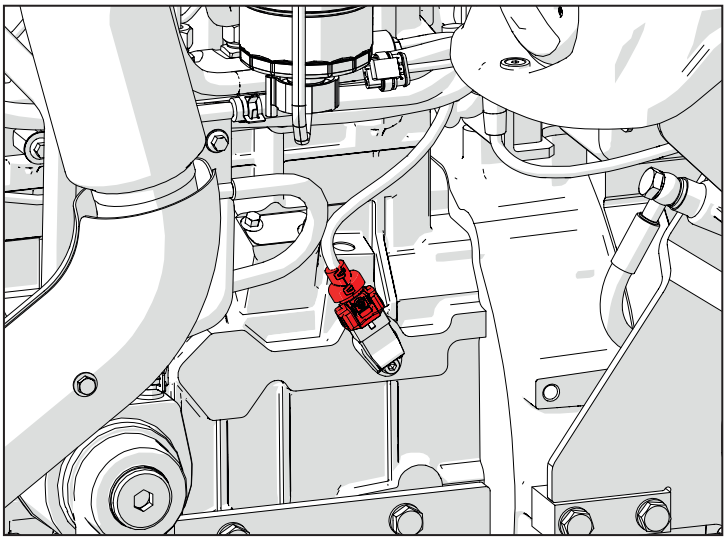




K022 (XS2) Crankshaft speed sensor

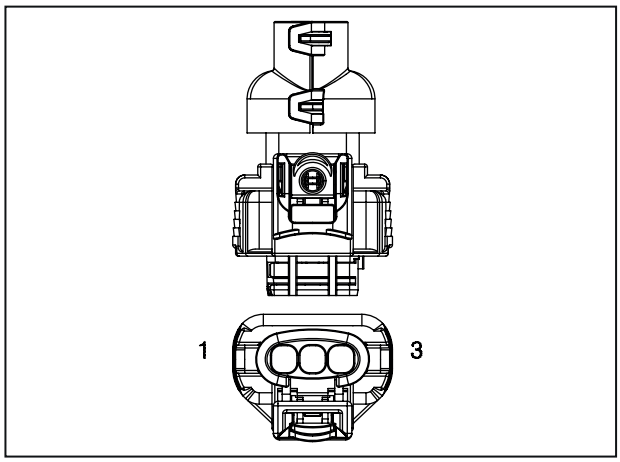
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CRANKSHAFT SENSOR SIGNAL PLUS	ZN	0.5	xecua	59
2	CRANKSHAFT SENSOR SIGNAL MINUS	V	0,75	xecua	44
3	CRANKSHAFT SENSOR GROUND	SHIELD		xecua	22

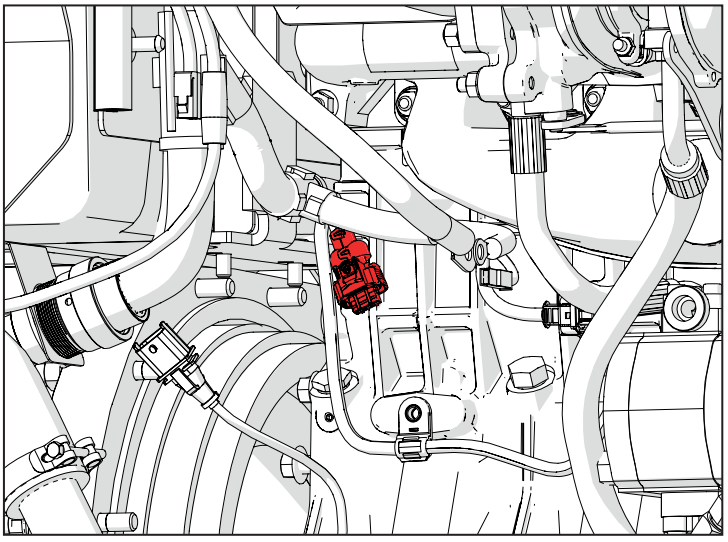




K021 (XS3) Camshaft timing sensor

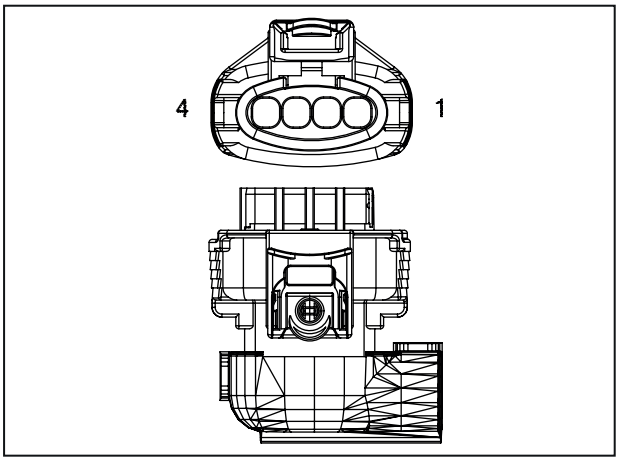
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	CAMSHAFT SENSOR GND	Z	0,75	xecua	28
2	CAMSHAFT SENSOR SIGNAL	HN	0,75	xecua	14
3	CAMSHAFT SENSOR SUPPLY	GR	0,75	xecua	13

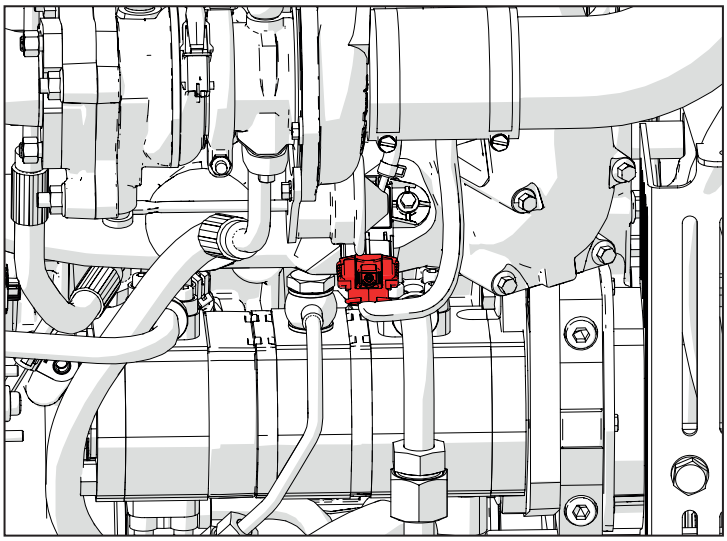




K018 (XS4) Temperature and pressure sensor (BOOST)

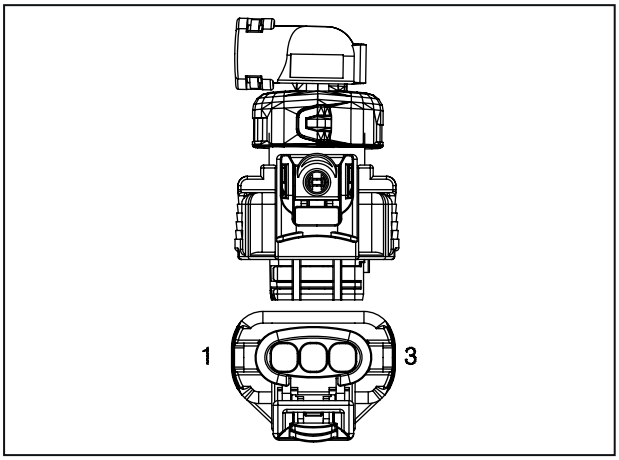
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	BOOST PRESS. SENSOR GND	MR	0,75	xecua	25
2	BOOST PRESS. TEMP. SENSOR SIGNAL	BV	0,75	xecua	55
3	BOOST PRESS. SENSOR GND	CB	0,75	xecua	10
4	BOOST PRESS. SENSOR SIGNAL	BR	0,75	xecua	40

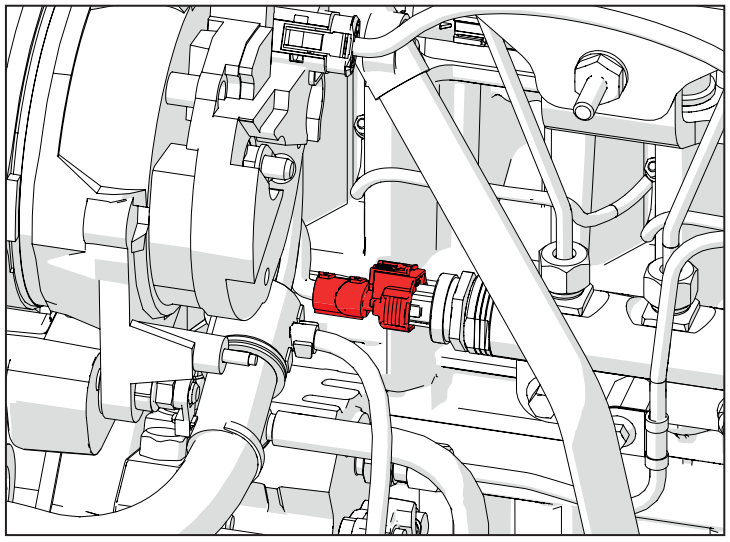




K017 (XS5) Common Rail fuel pressure sensor

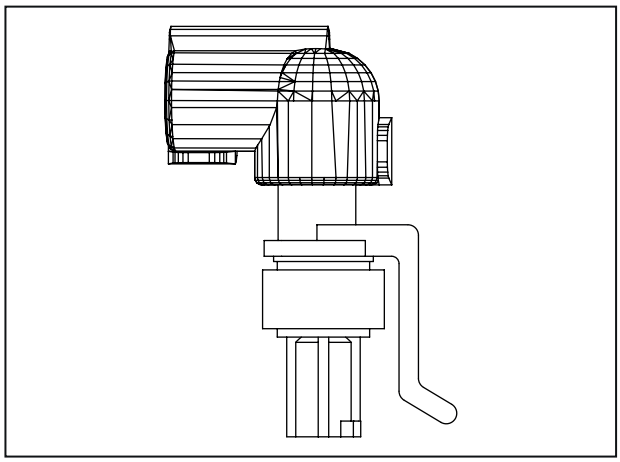
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	RAIL PRESS. SENSOR GND	NZ	0,75	xecua	26
2	RAIL PRESS. SENSOR SIGNAL	G	0,75	xecua	41
3	RAIL PRESS. SENSOR SUPPLY	L	0,75	xecua	11

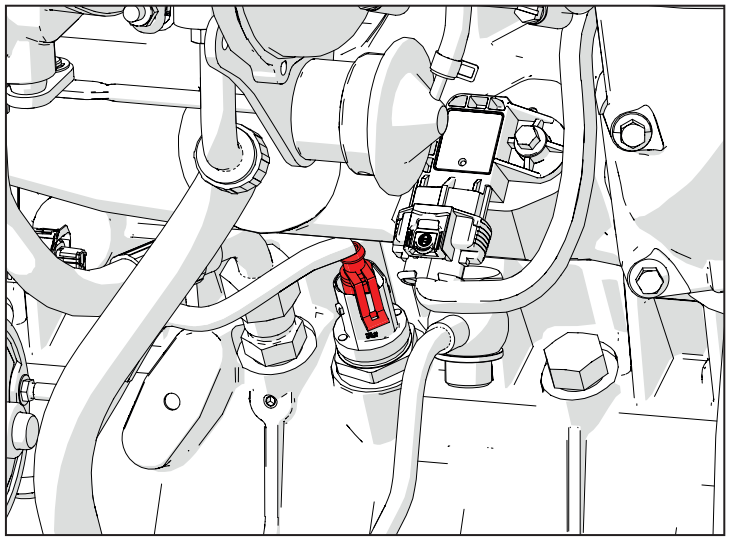




K023 (XS6) Oil pressure switch

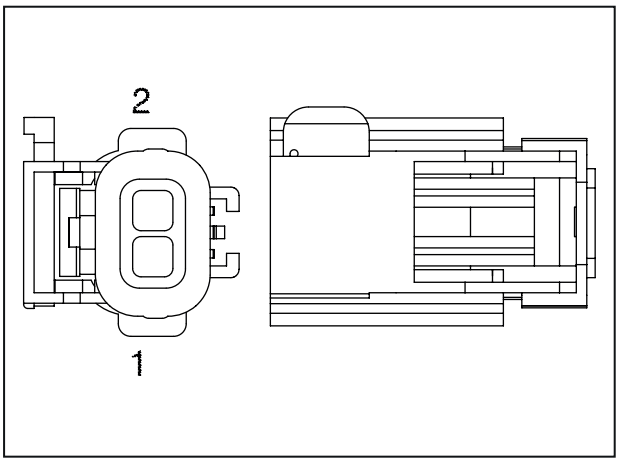
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	OIL PRESS. SWITCH	V	0,75	xecua	6

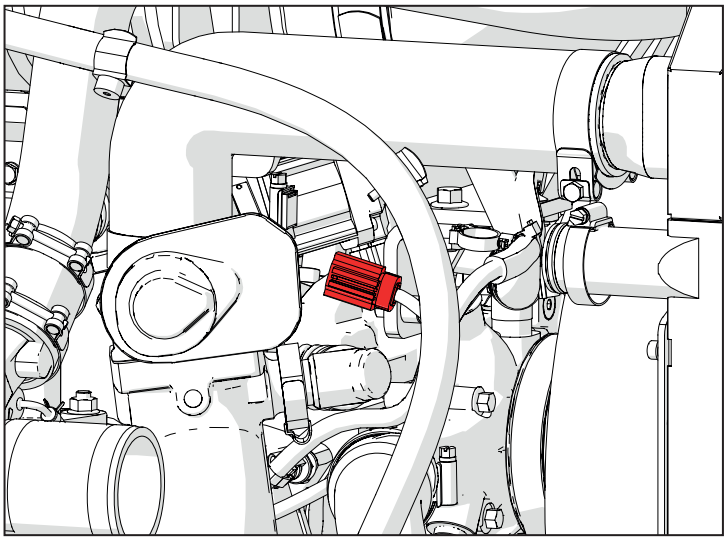




K020 (XS7) EGR temperature sensor

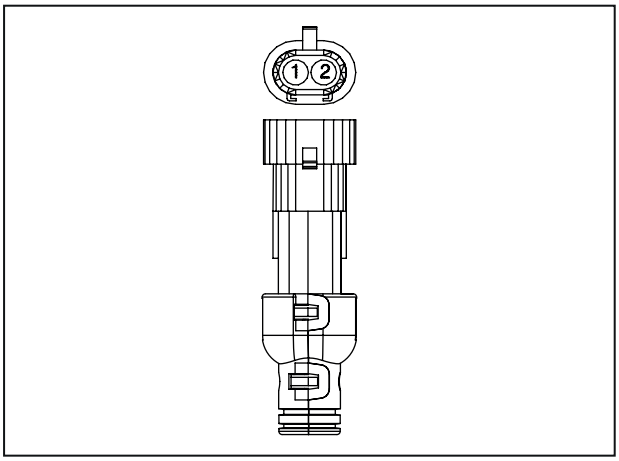
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	EGR COOLER OUT TEMP. SENSOR GND	NG	0,75	xecua	24
2	EGR COOLER OUT TEMP. SENSOR SIGNAL	RN	0,75	xecua	54

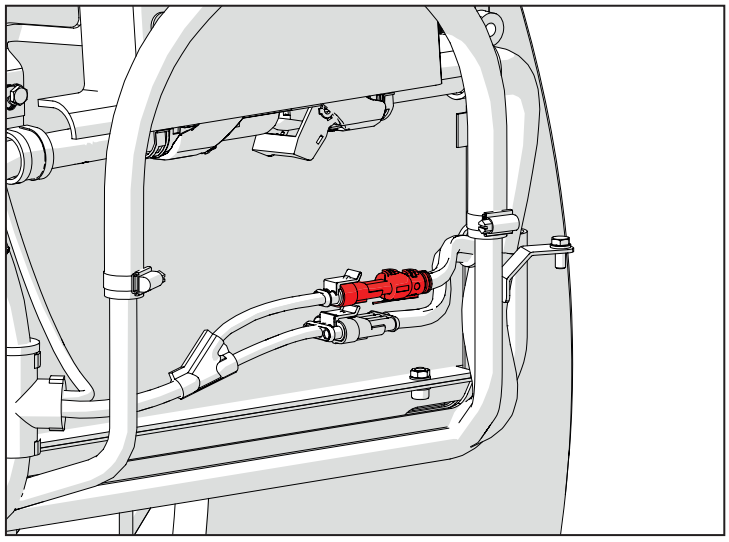




D010 (XTH) Throttle valve power feed

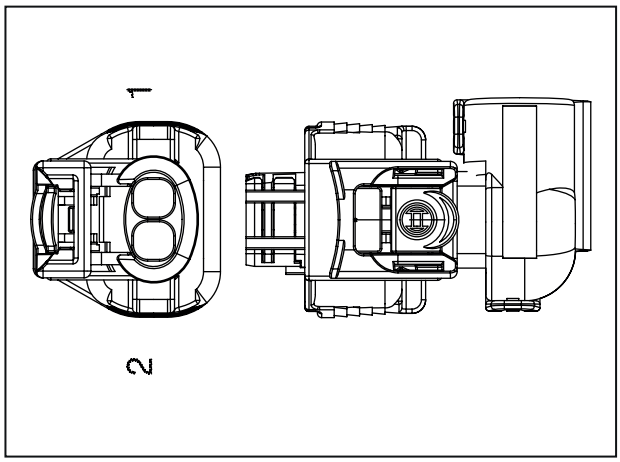
Pin	Description	Colour	Sect.	Input Conn.	Pin
2	12V	CV	0,75	xy3	2

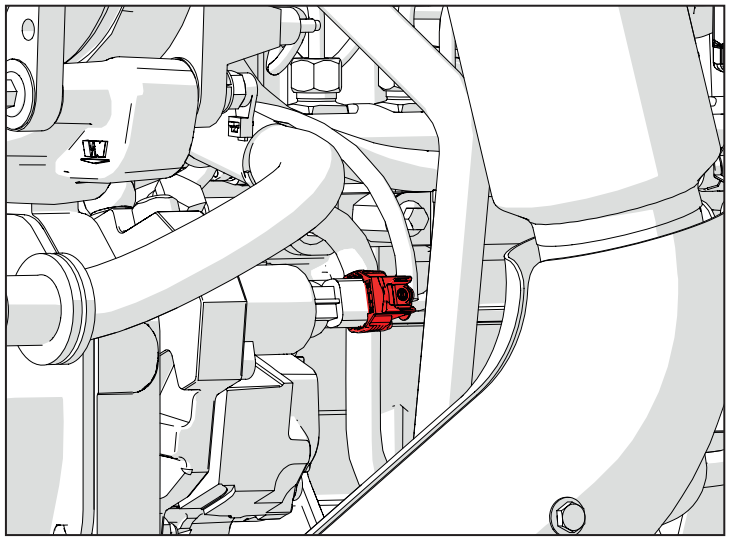




L005 (XY1) High pressure pump

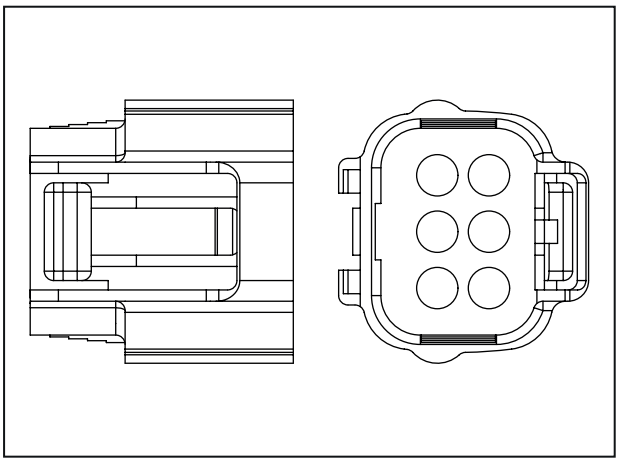
Pin	Description	Colour	Sect.	Input Conn.	Pin
1	FUEL METERING UNIT	ZN	1.5	xecua	15
2	FUEL METERING UNIT	C	1.5	xecua	60

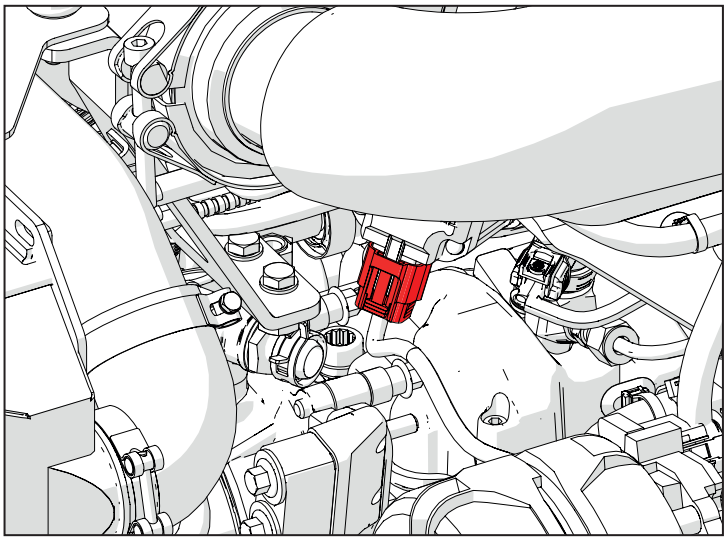




L006 (XY2) Exhaust gas recirculation solenoid valve (EGR)

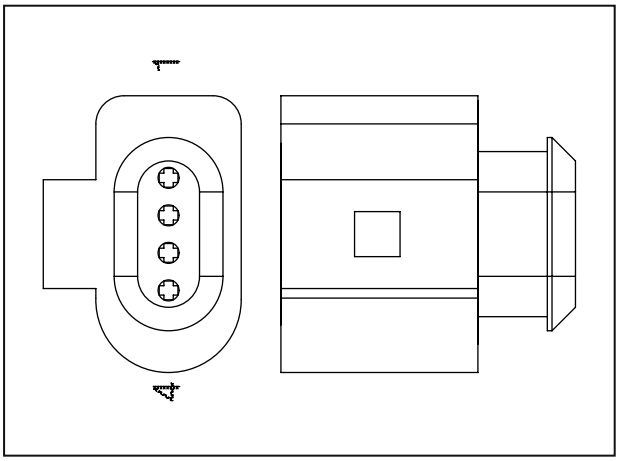
Pin	Description	Colour	Sect.	Input Conn.	Pin
3	CAN_H	ZN	0,75	xeg	3
4	CAN_L	Z	0,75	xeg	4
5	GND	HR	0,75	xeg	1
6	12V	CL	0,75	xeg	2

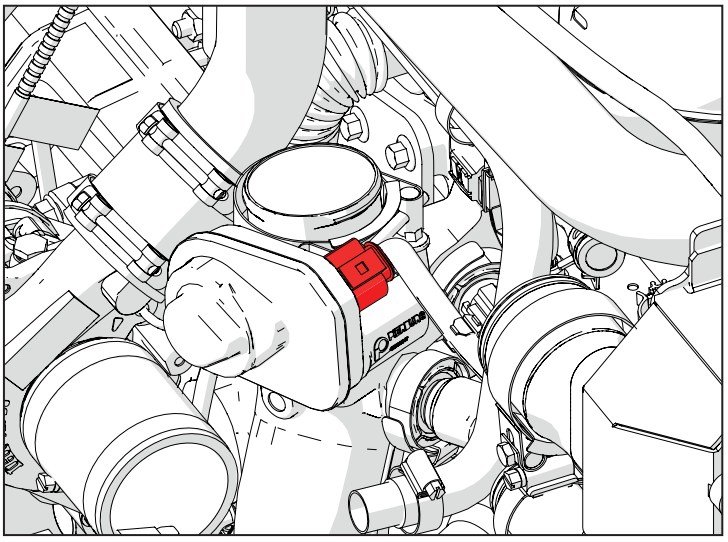




L007 (XY3) Throttle valve

Pin	Description	Colour	Sect.	Input Conn.	Pin
1	THROTTLE VALVE GND	HL	0,75	xecua	52
2	12V	CV	0,75	xth	2
3	THROTTLE VALVE ACTUATOR	H	0,75	xecua	19
4	THROTTLE VALVE STATUS	LG	0,75	xecua	21





13 : Platform

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13.1 Safety rules

These safety precautions and warnings given in this paragraph must be observed at all times to prevent the risk of operator injury. However, the safety measures indicated in the use and maintenance manual and in chapter 1 of this manual must also be applied at all times.

Danger
All other persons must keep at a safe distance from the danger area.

Danger
Lift and handle all heavy parts with lifting equipment of adequate load capacity. Hoisting straps and hooks must be positioned safely on the load. When lifting loads, all personnel must keep at a safe distance from the load itself and remain within safe areas.

Danger
Do not allow the chains or metal cables used for hoisting to twist. Always wear safety gloves when handling cables or chains.

Danger
Use appropriate tools to align the holes correctly. NEVER USE YOUR HANDS OR FINGERS.

Danger
Handle all parts with extreme caution. Never place your hands or fingers between two parts.

Danger
When removing assemblies which could fall, always leave two screws in opposite positions in place for safety until the assembly is secured. Only remove these screws after securing the assembly to a hoist or after fitting support blocks in place.

Danger
If any of the screws fastening the frame are loosened, or if the frame is removed, ensure that all parts are refitted correctly at the end of the procedure to ensure that the driver is protected.

Attention
Beware of sharp edges and corners.

Attention
Used oils must be collected and disposed of in compliance with applicable legislation.

13.2 Removing and refitting the platform

Index

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13.2.1 Preliminary operations

The main operations necessary to remove the platform are indicated as follows.

13.2.2 Removal

Disconnect the cables of the lights on the front mudguards.

Undo the screw (1) to remove the clamp.

Carry out the procedure described on both sides of the tractor.

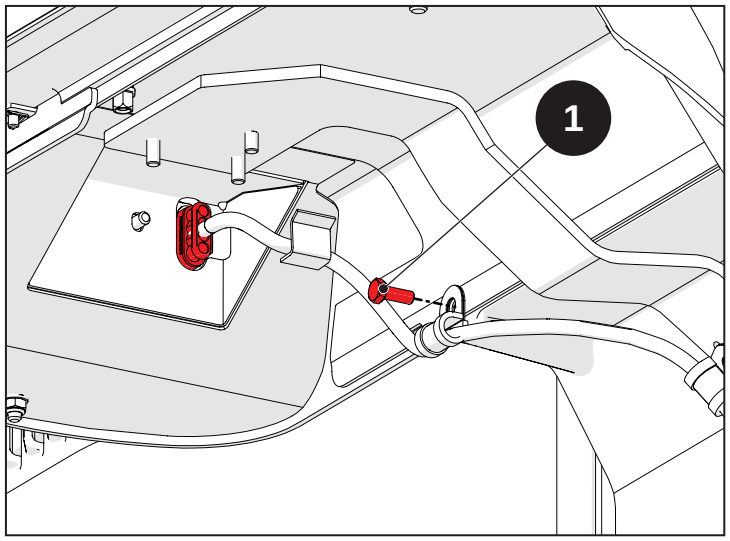


Fig. 13.1

Undo the screws (1) and remove the washers fastening the front mudguard.

Carry out the procedure described on both sides of the tractor.

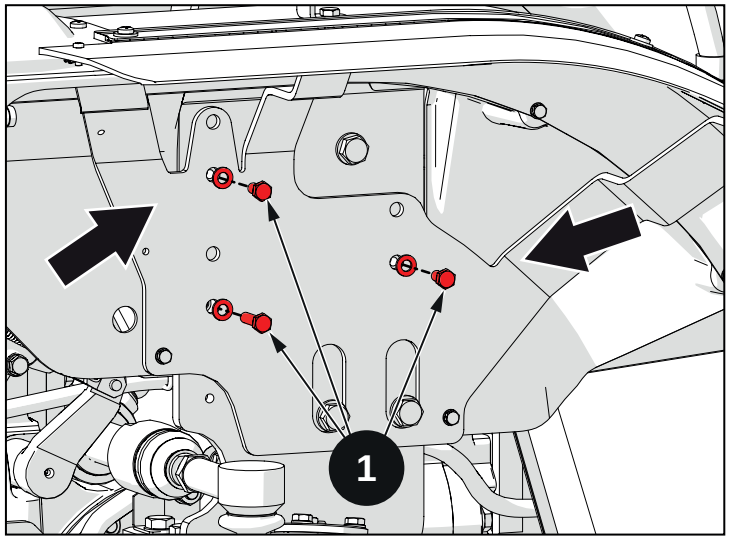


Fig. 13.2

Remove the front mudguards.

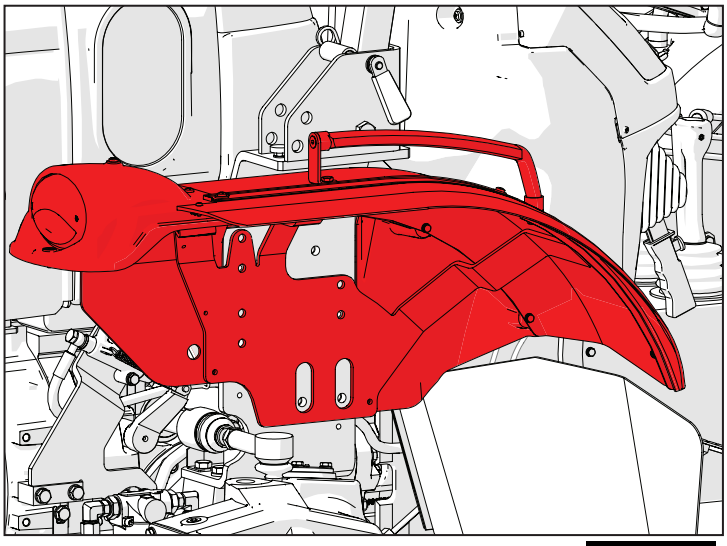


Fig. 13.3

Disconnect the operator seated sensor.

Undo the screws (2) fastening the seat suspension.

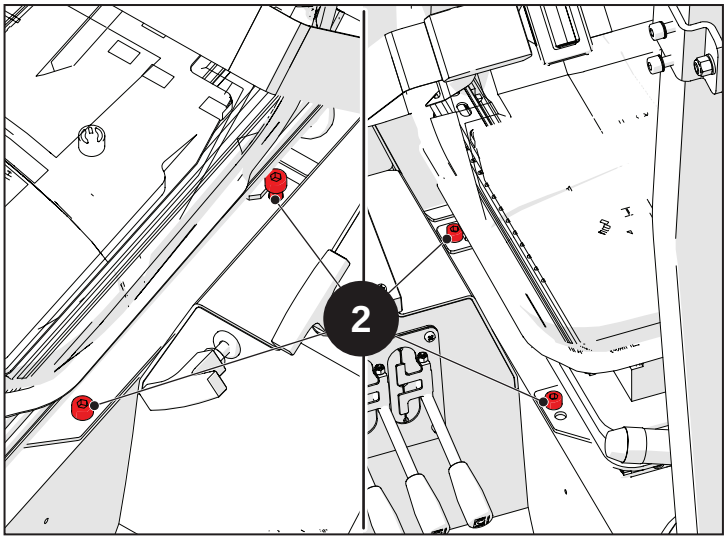


Fig. 13.4

Remove the seat.

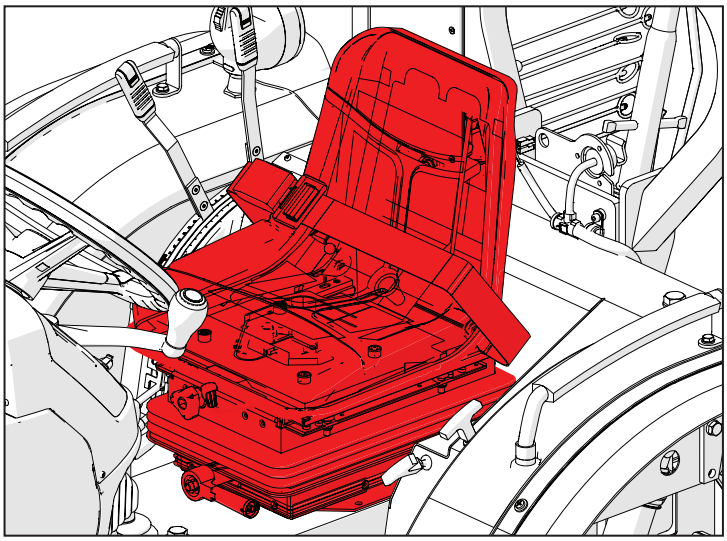


Fig. 13.5

Remove the cover from the steering wheel (5).

Undo the nut (3) and remove the washer (4).

Use the puller tool (07006212) and a hammer to detach the steering wheel (5) so that it can be removed.

Warning
Tap gently.

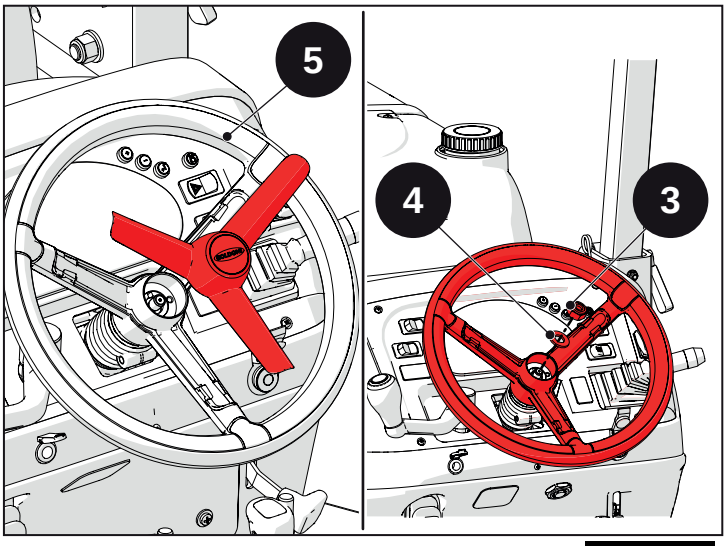


Fig. 13.6

Remove the cap on the reverse shuttle lever.

Undo the nut (6) and remove the washer (7).

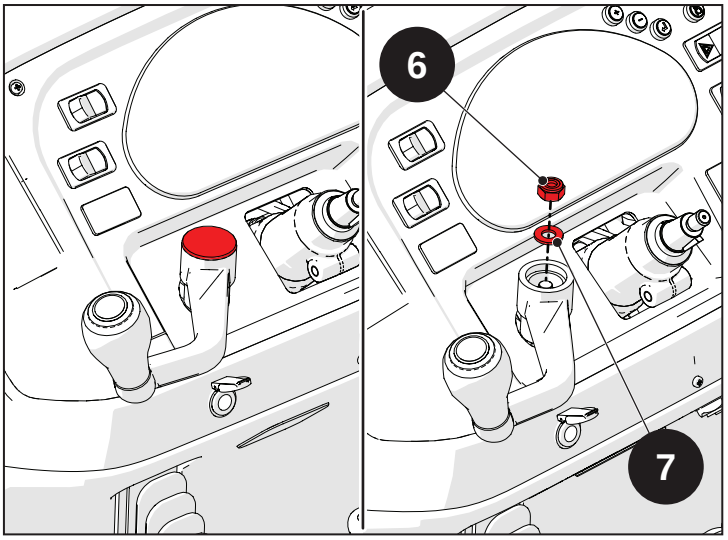


Fig. 13.7

Remove the reverse shuttle lever (8).

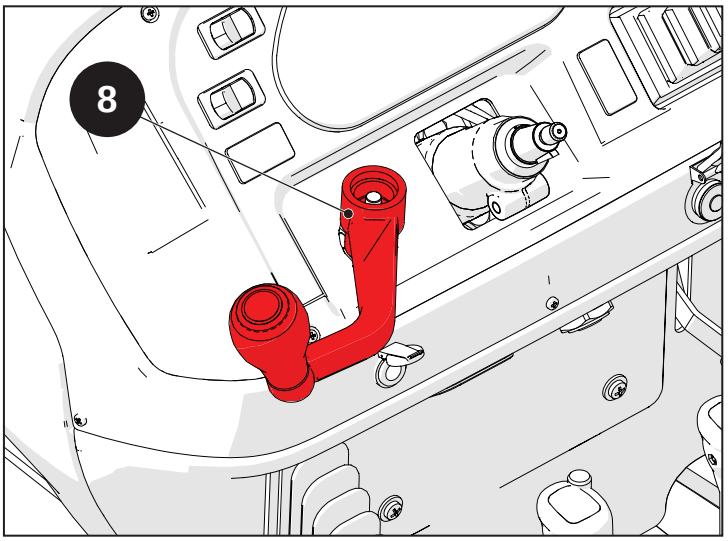


Fig. 13.8

Remove the fastener screws (9) of the dashboard.

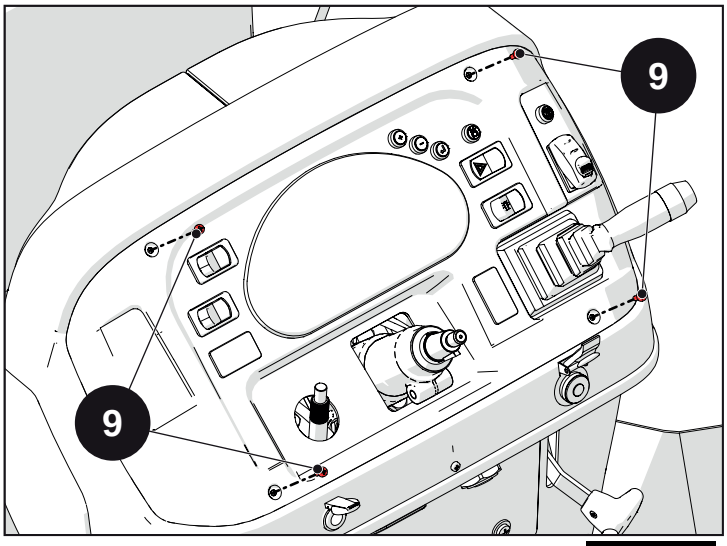


Fig. 13.9

Remove the dashboard, disconnecting the cables and noting their original positions.

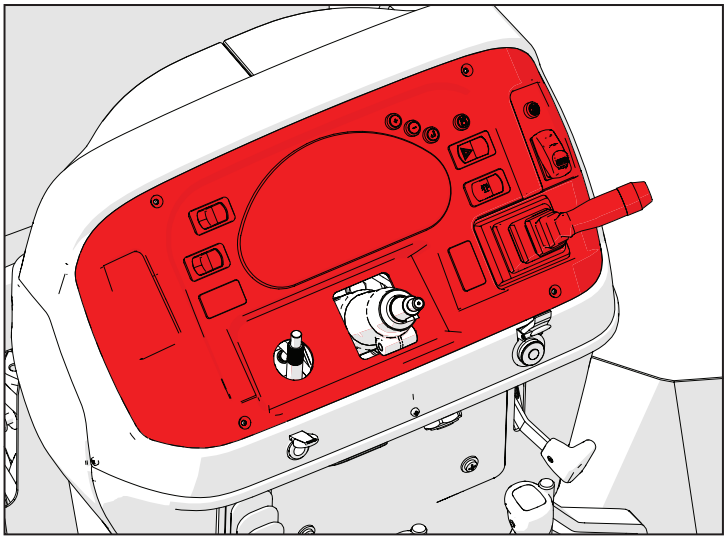


Fig. 13.10

Remove the cap to access the diagnostic socket (10).

Undo the screws (11) fastening the diagnostic socket (10).

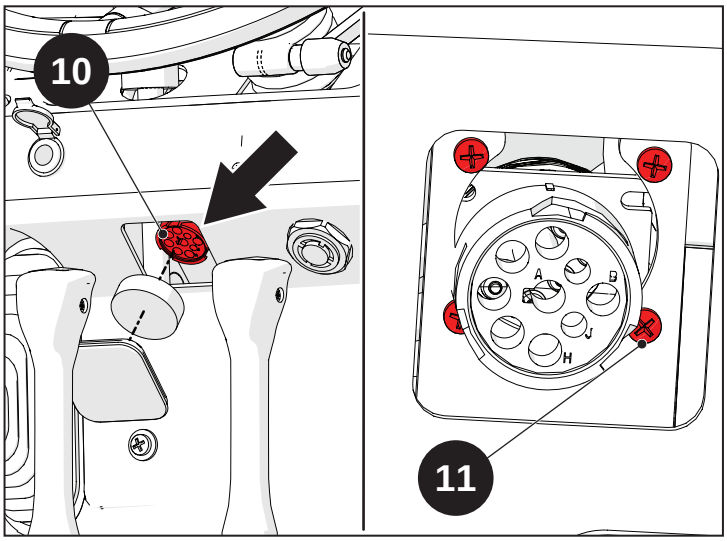


Fig. 13.11

Undo the fastener screws (12) of the upper dashboard panel.

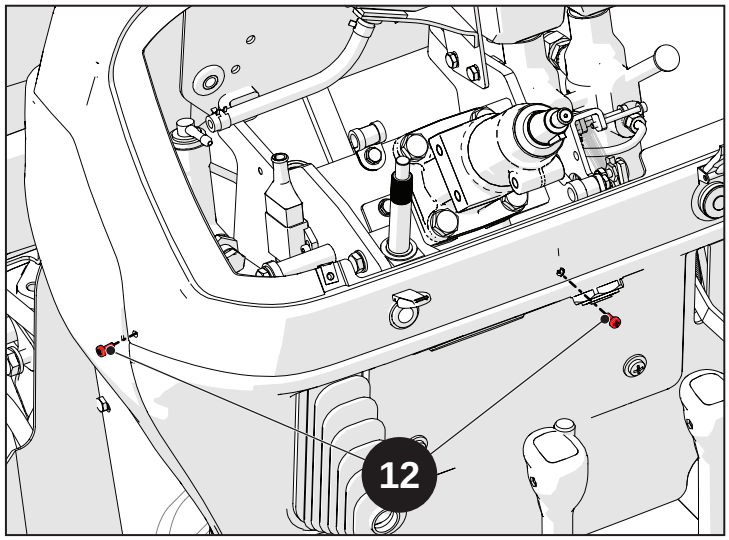


Fig. 13.12

Remove the upper dashboard panel with the ignition switch.

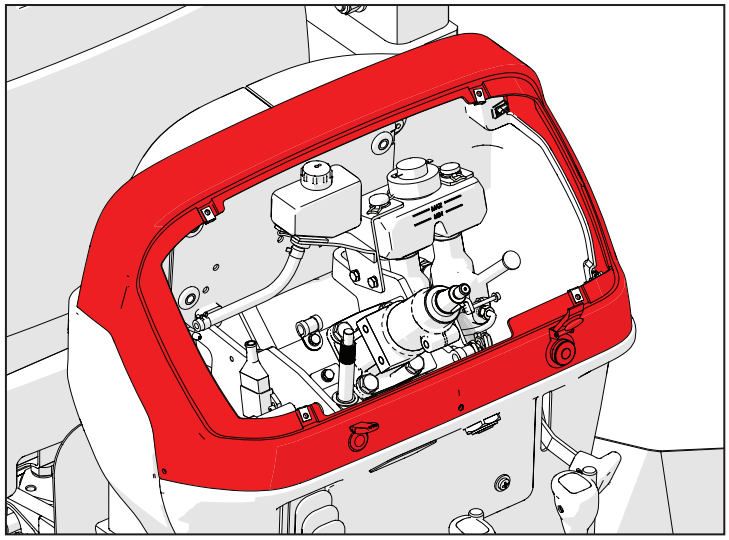


Fig. 13.13

Undo the fastener screws (13) and (14) of the centre dashboard panel.

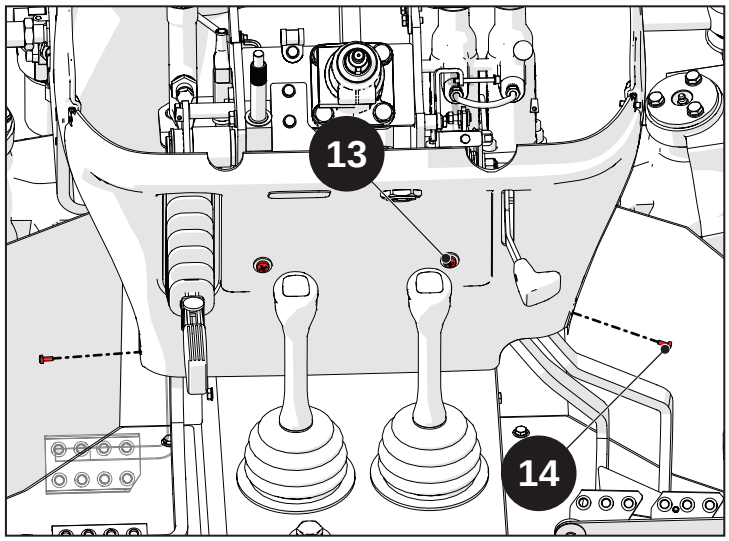


Fig. 13.14

Undo the screw (15) and remove the hand throttle lever handle (16).

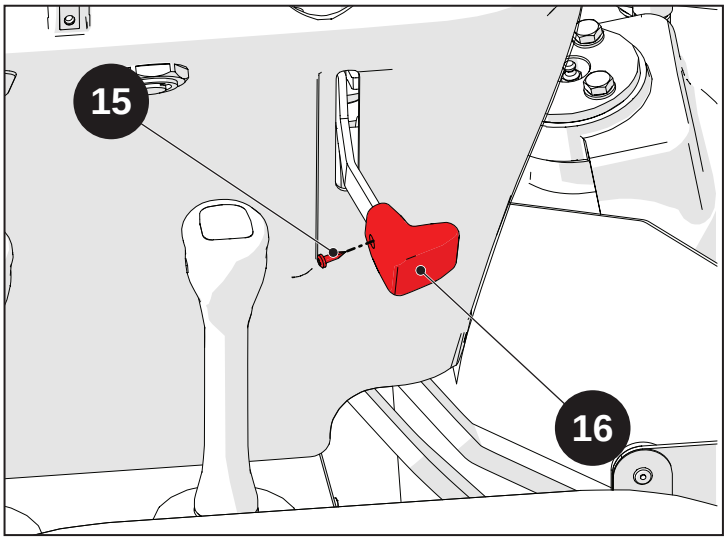


Fig. 13.15

Remove the centre dashboard panel.

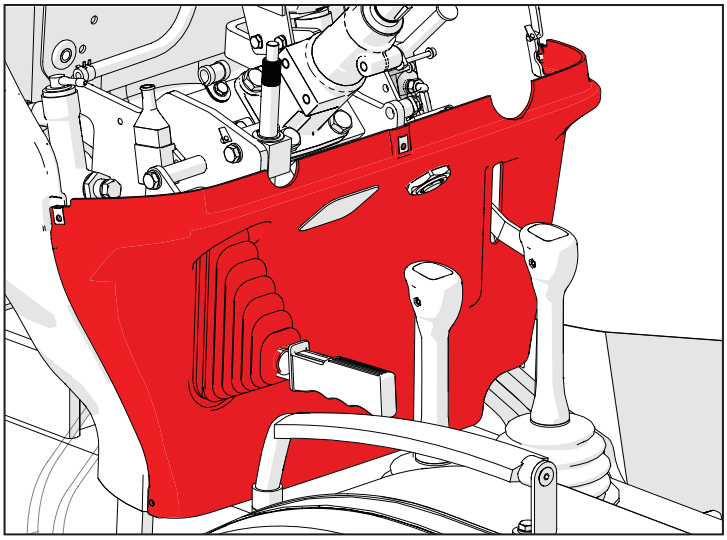


Fig. 13.16

Disconnect and remove the dashboard wiring harness.

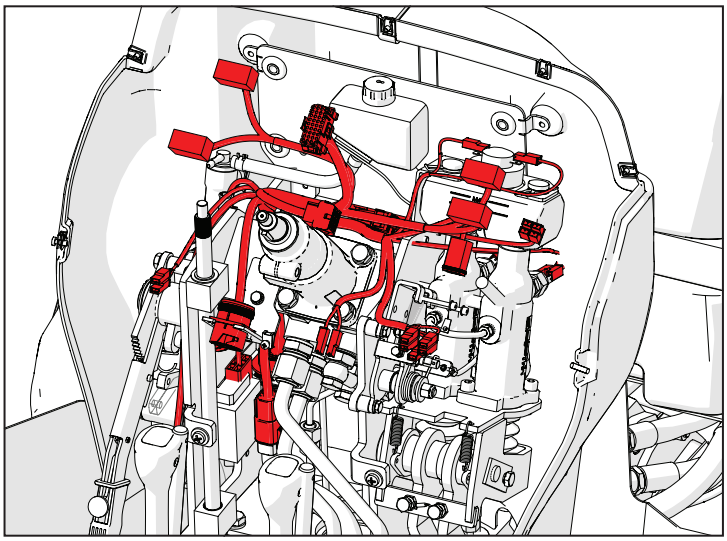


Fig. 13.17

Undo and remove the fastener screws (17) and washers (18) of the front dashboard panel.

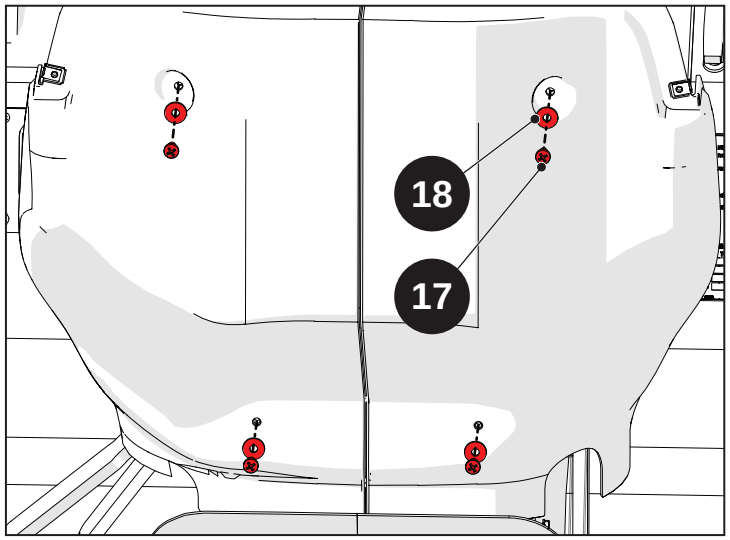


Fig. 13.18

Remove the front dashboard panel.

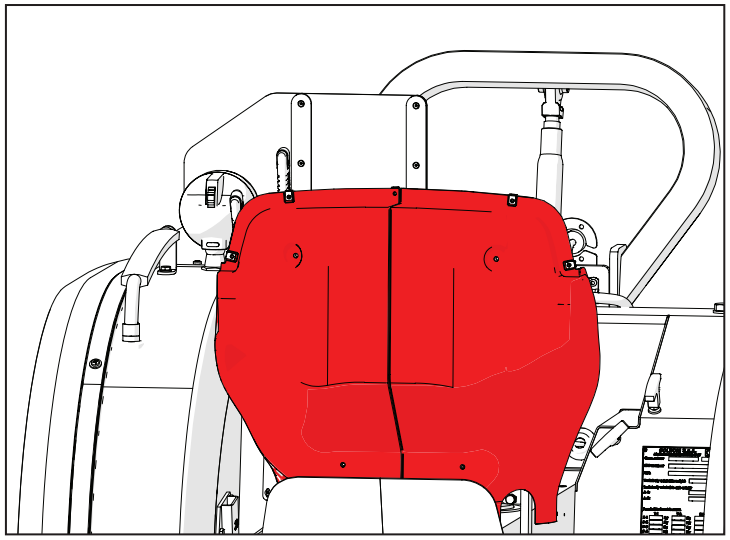


Fig. 13.19

Undo the screws (19) of the lift control levers.

Use a pin punch to remove the pin (20) from the distributor cock.

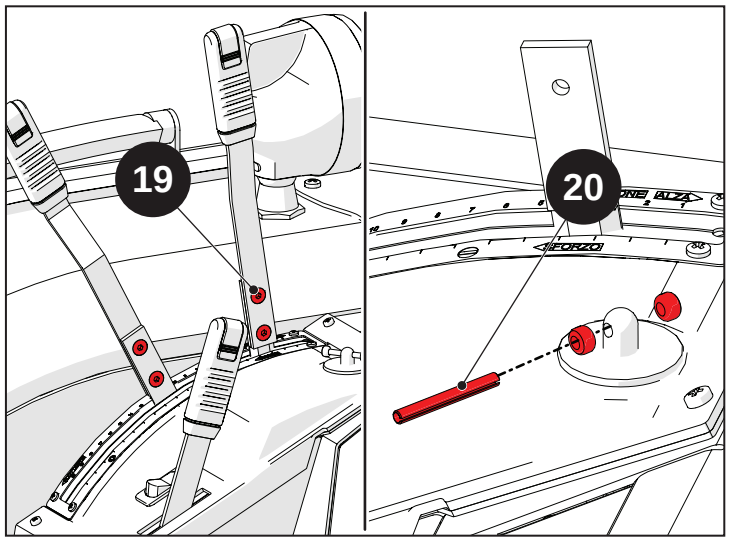


Fig. 13.20

Remove the handle of the "lift o matic" lever.

Remove the diverter button.

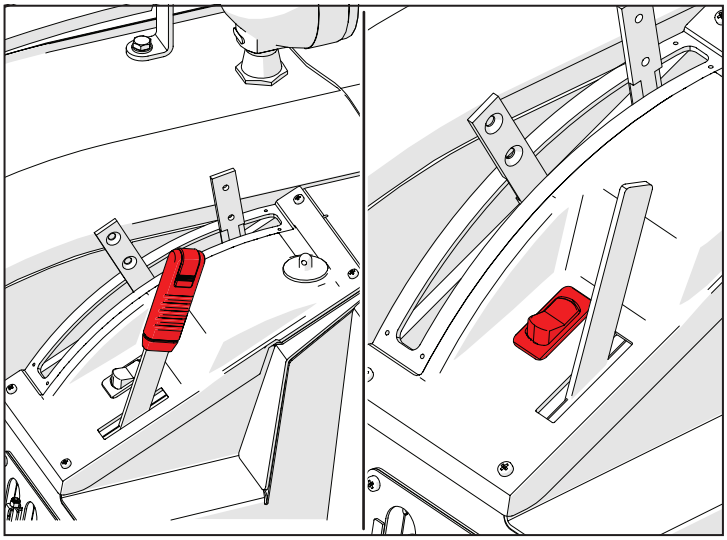


Fig. 13.21

Undo the screws (24) and remove the cover (25).

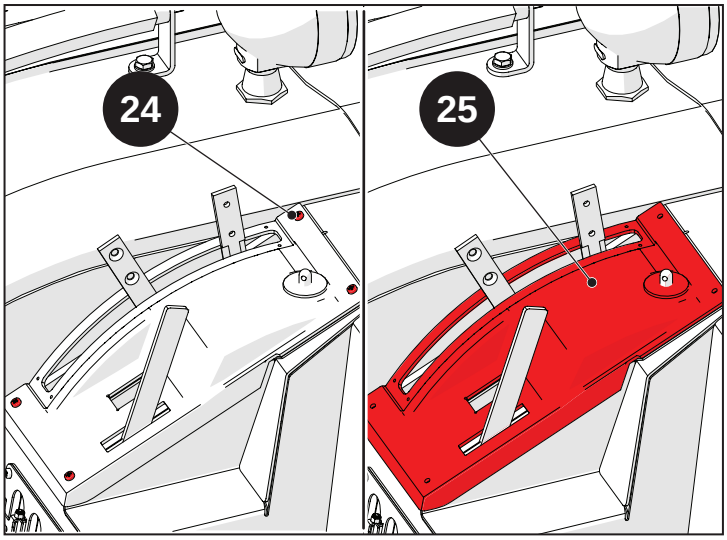


Fig. 13.22

Remove the seal (26).

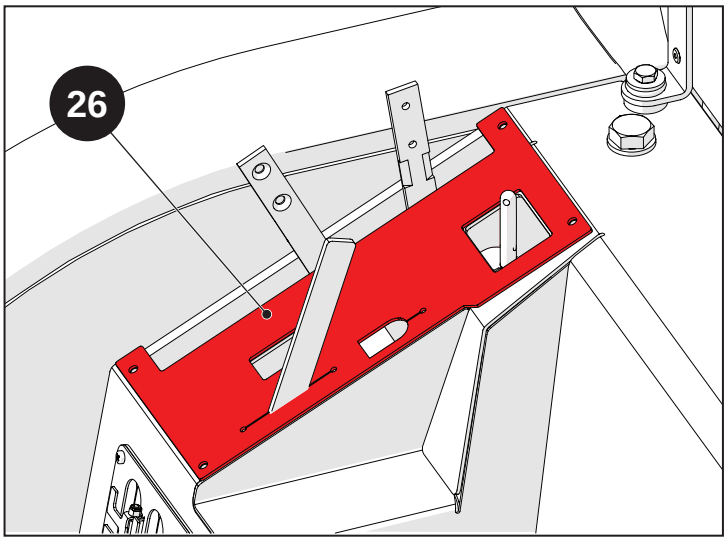


Fig. 13.23

Undo the screws (27).

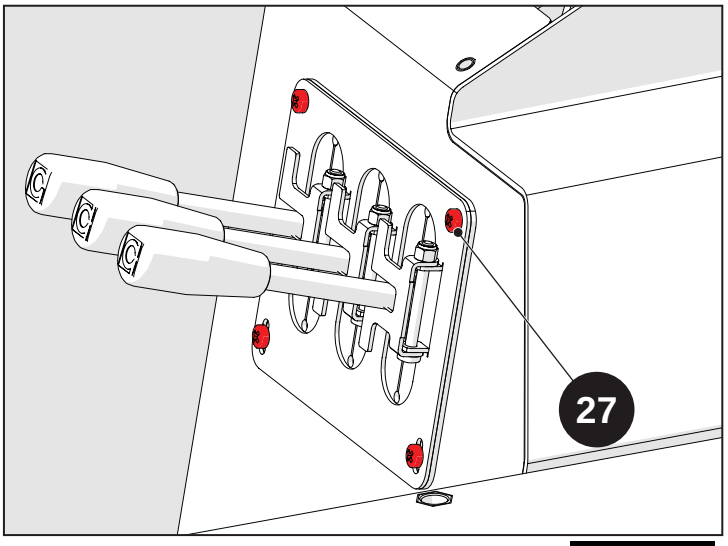


Fig. 13.24

Remove the plate (28) and the seal (29).

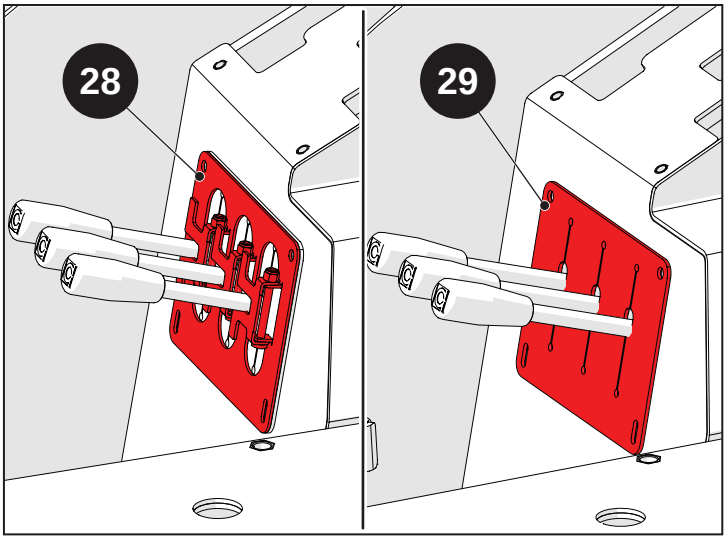


Fig. 13.25

Remove the rear auxiliary distributor levers.

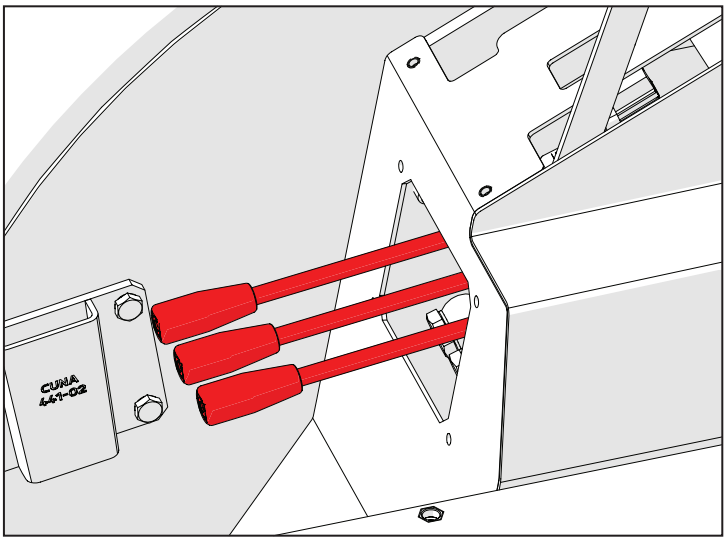


Fig. 13.26

Remove the handle (30) of the PTO mode selector lever and undo the nut (31).

Remove the handle (32) of the PTO speed selector lever and undo the nut (33).

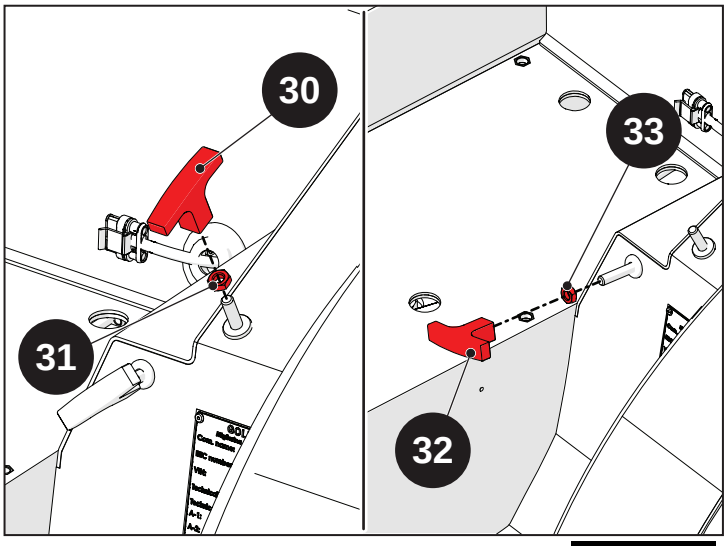


Fig. 13.27

Remove the work light from the right hand rear mudguard.

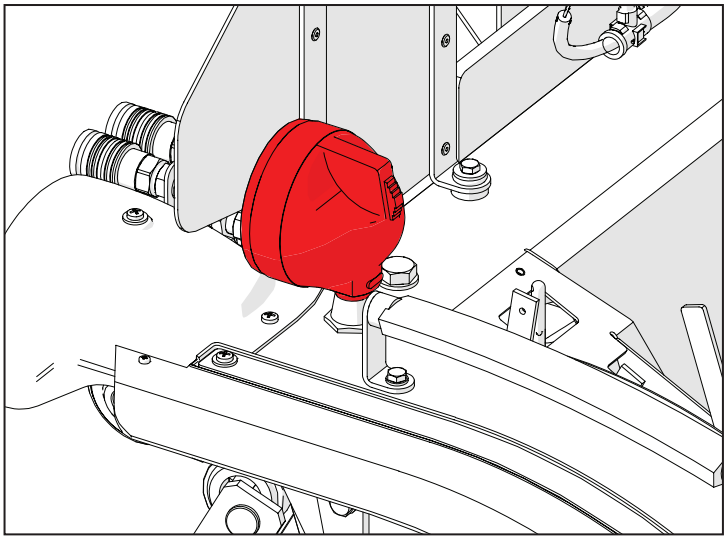


Fig. 13.28

Remove the work light guard, removing the screws ().

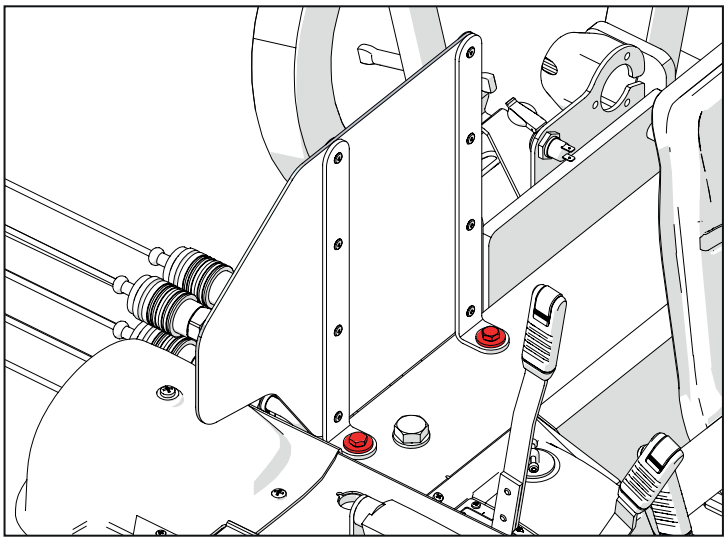


Fig. 13.29

Disconnect the ground brain from the left hand rear mudguard.

Fig. 13.30

Undo the screws (34) and remove the gear and range levers.

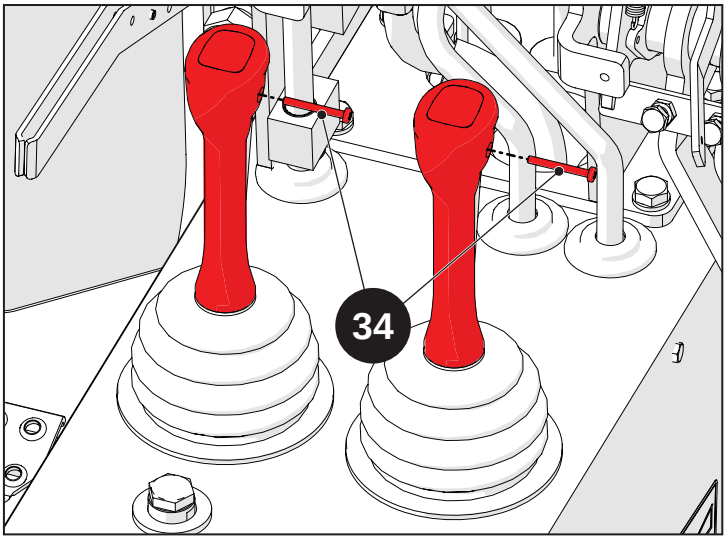


Fig. 13.31

Disconnect the wiring loom from the rear mudguard.

Carry out the procedure described on both sides of the tractor.

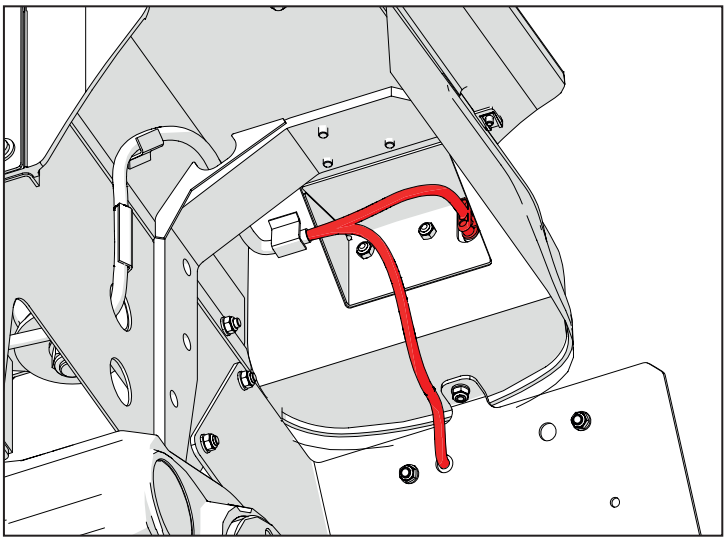


Fig. 13.32

Undo and remove the screws (35) and washers (36) fastening the rear mudguard.

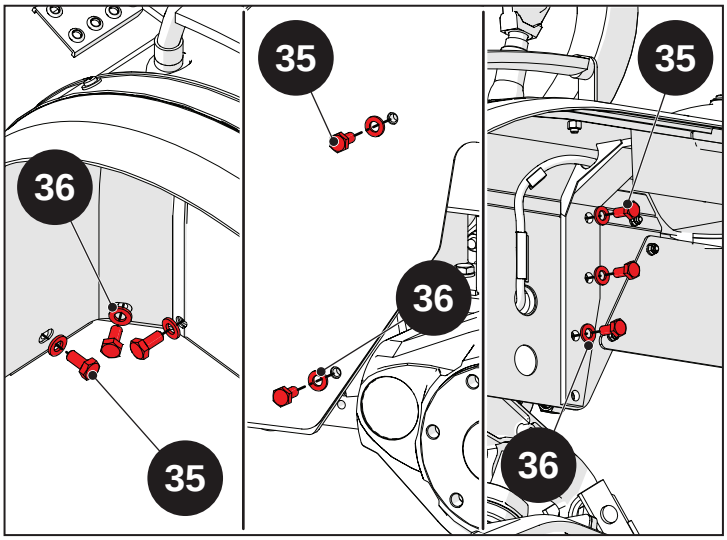


Fig. 13.33

Remove the rear mudguards.

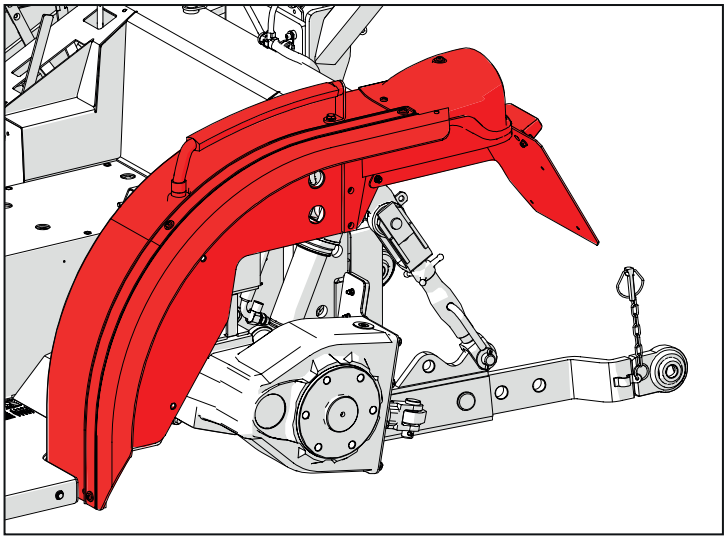


Fig. 13.34

Disconnect the clutch pedal return spring (37).

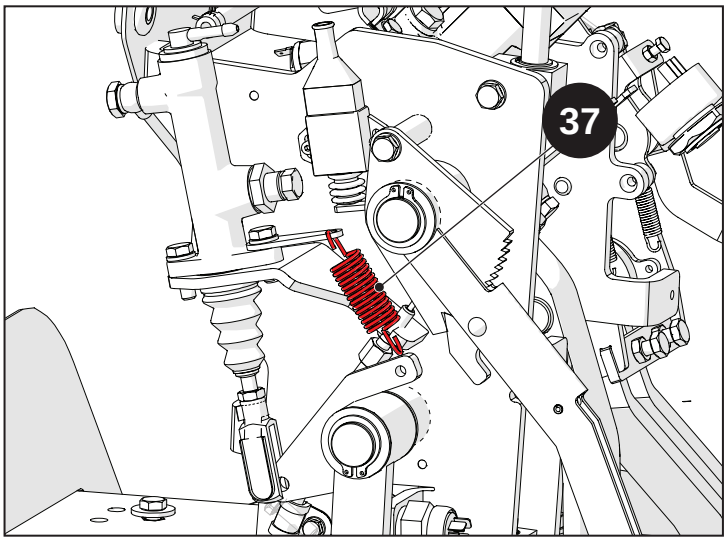


Fig. 13.35

Remove the circlip (38) and the washer (39).

Remove the parking brake cable (40).

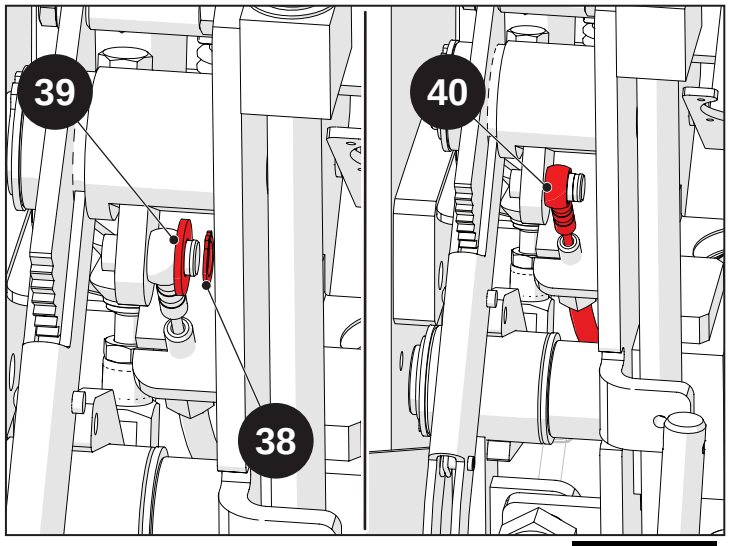


Fig. 13.36

Disconnect the foot throttle pedal cable (41).

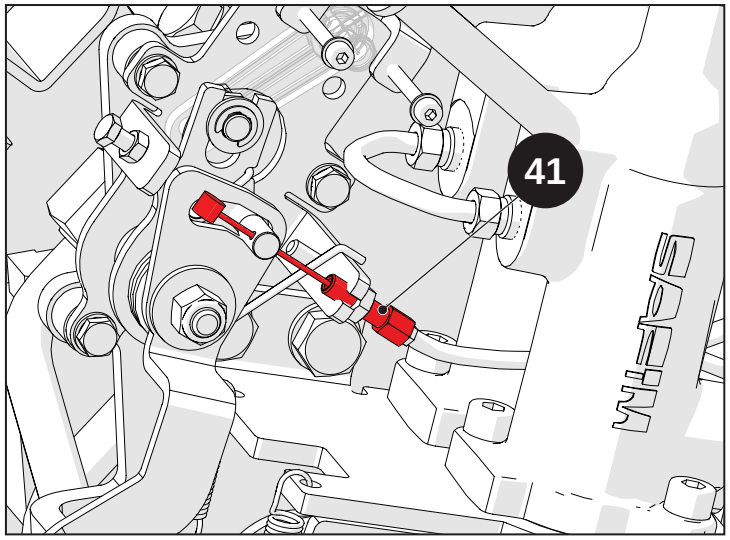


Fig. 13.37

Undo the screws (42) and remove the washers (43).

Remove the entire throttle assembly.

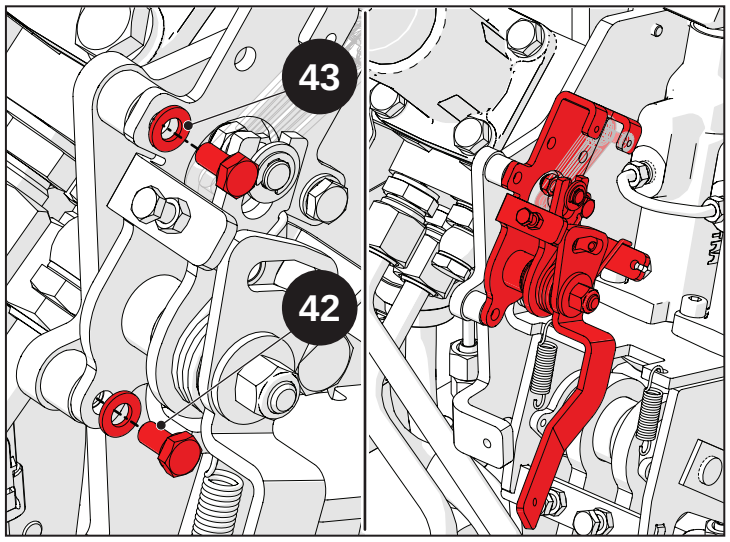


Fig. 13.38

Disconnect the dashboard wiring harness connector.

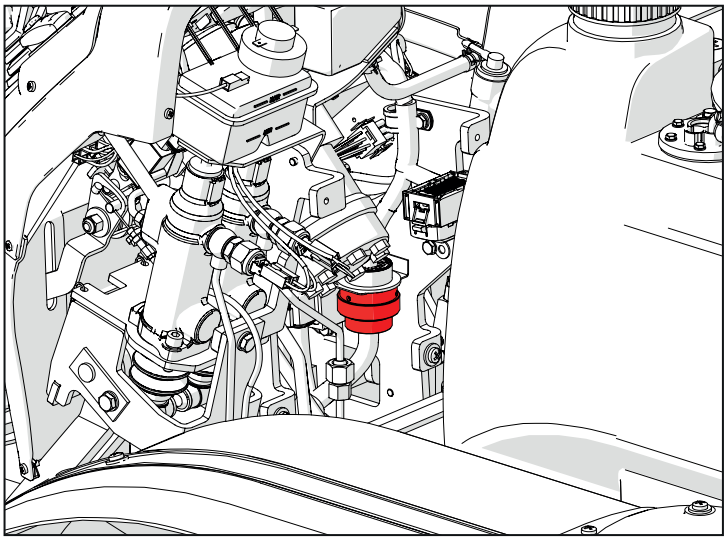


Fig. 13.39

Disconnect the hydraulic brake pipe connectors.

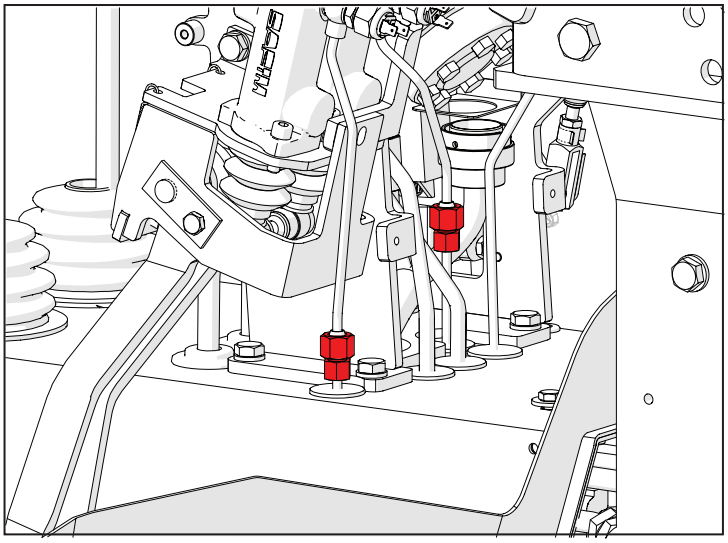


Fig. 13.40

Disconnect the hydraulic transmission clutch control pipe.

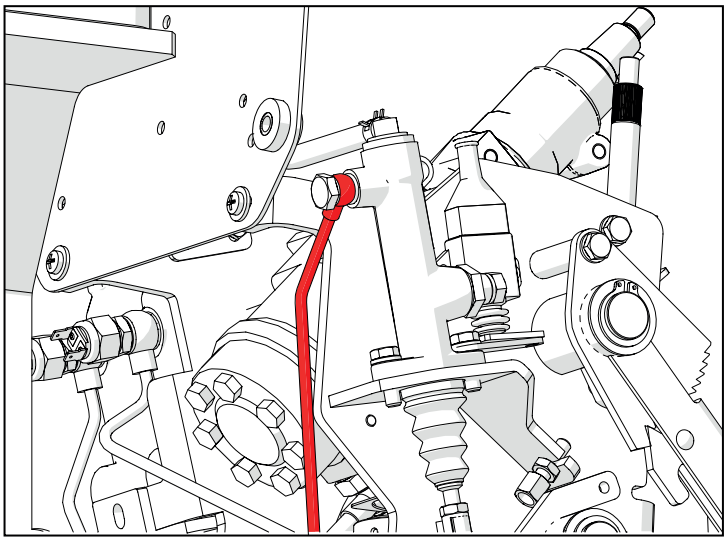


Fig. 13.41

Disconnect the hydraulic connectors of the hydraulic steering pipes.

Fig. 13.42

Disconnect the hydraulic connectors of the hydraulic steering pipes from the steering column.

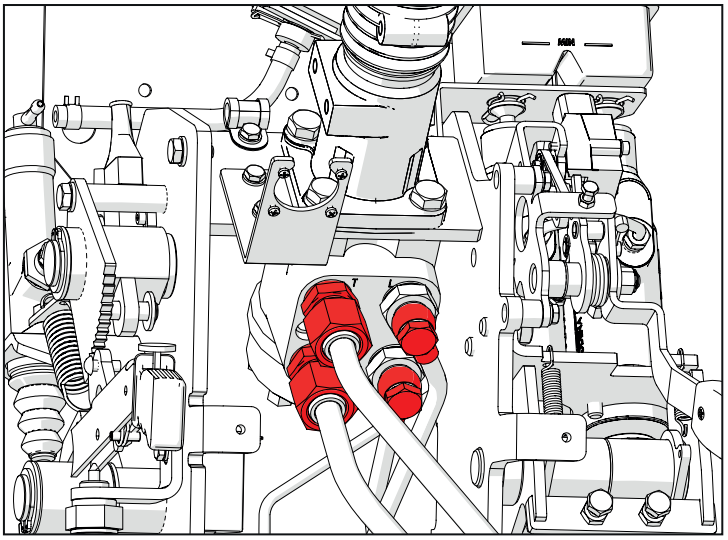


Fig. 13.43

Remove the circlip (44) and the washer (45).

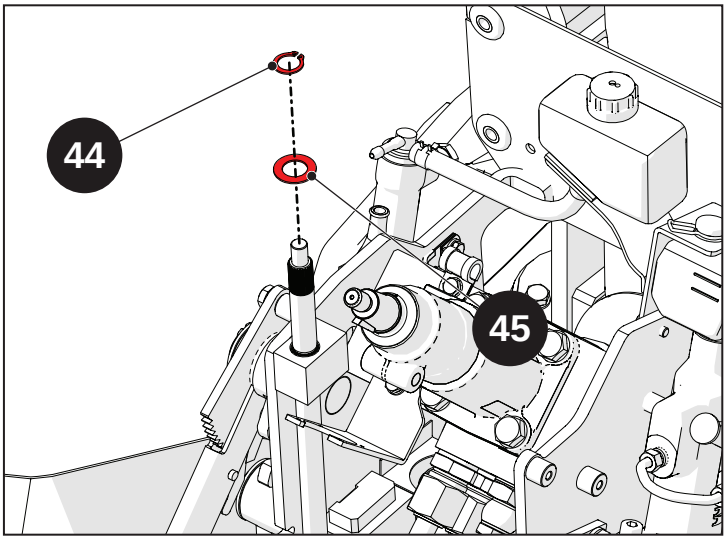


Fig. 13.44

Undo the fastener screws (46) and remove the washers (47).

Remove the locator blocks (48) from the reverse shuttle link rod.

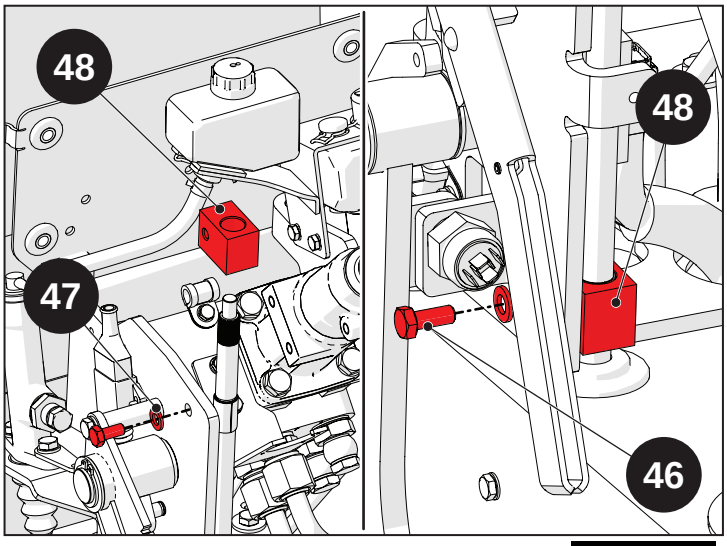


Fig. 13.45

Remove the screws (49) fastening the steering column onto the platform.

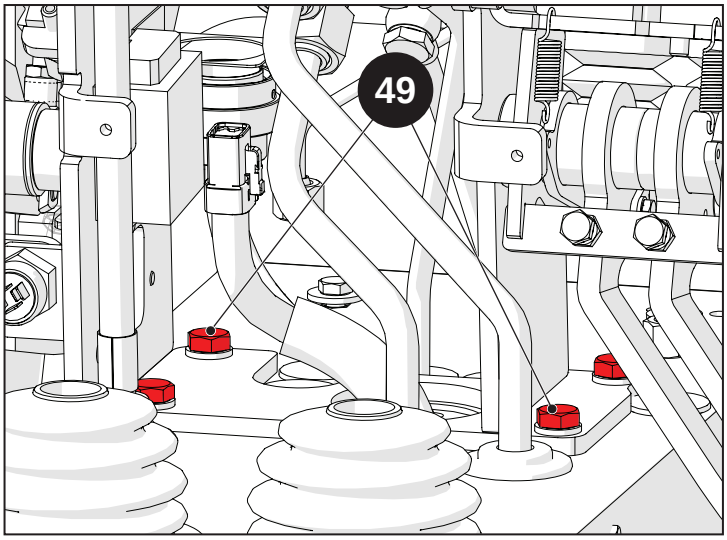


Fig. 13.46

Remove the complete steering column.

It is not strictly necessary to remove the steering col

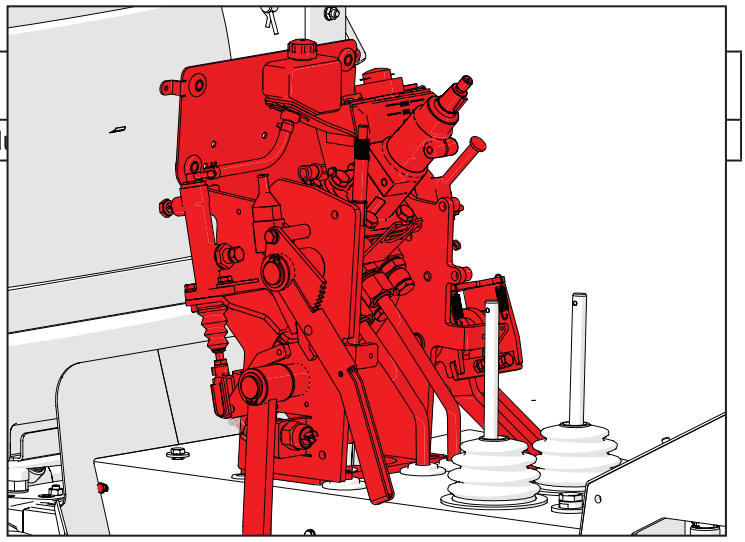


Fig. 13.47

Undo the screws (79) and (80) and remove the rear 7-pole socket and the 12V socket (81).

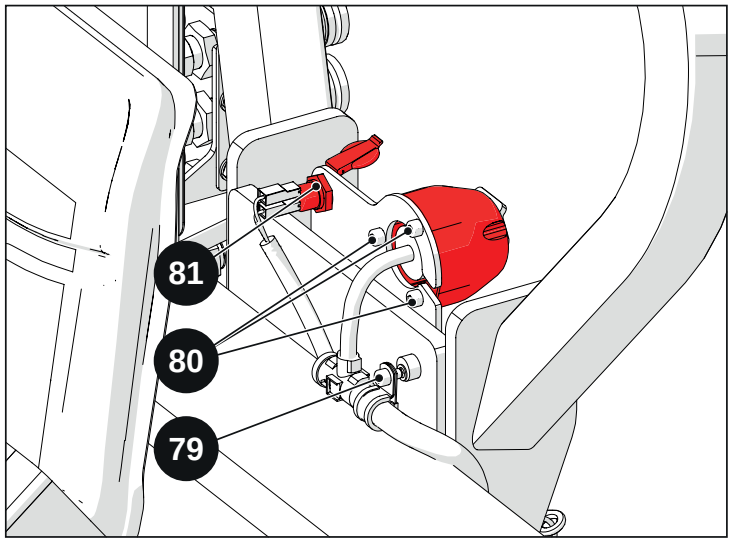


Fig. 13.48

Use tool (07007181) to lift the platform.

Warning
Use a hoist of suitable lift capacity.

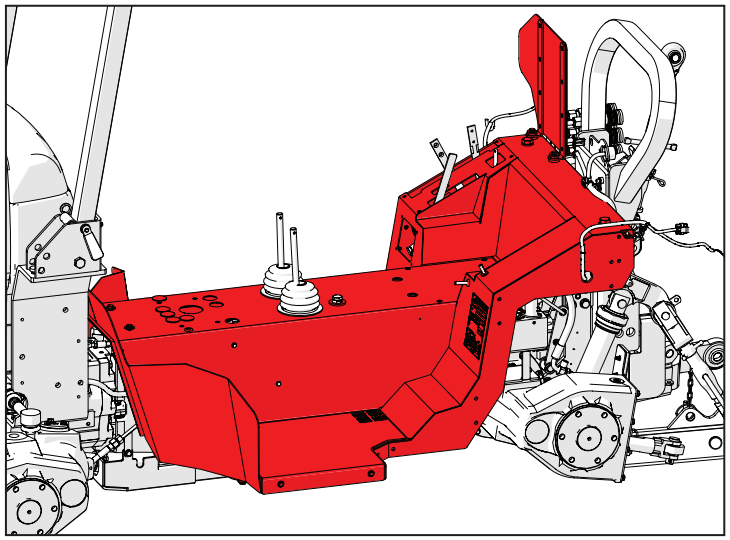


Fig. 13.49

13.2.3 Refitting

Danger
All other persons must keep at a safe distance from the danger area.

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before reassembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

Refit the platform by following the procedure for removal in reverse order.

13.3 Disassembling-Assembling the steering column

Indice

13.3.1 Disassembling the steering column.....13-22

13.3.2 Assembling the steering column 13-28

13.3.1 Disassembling the steering column

Disconnect the ground point on the steering column.

Fig. 13.50

Disconnect the vehicle control unit.

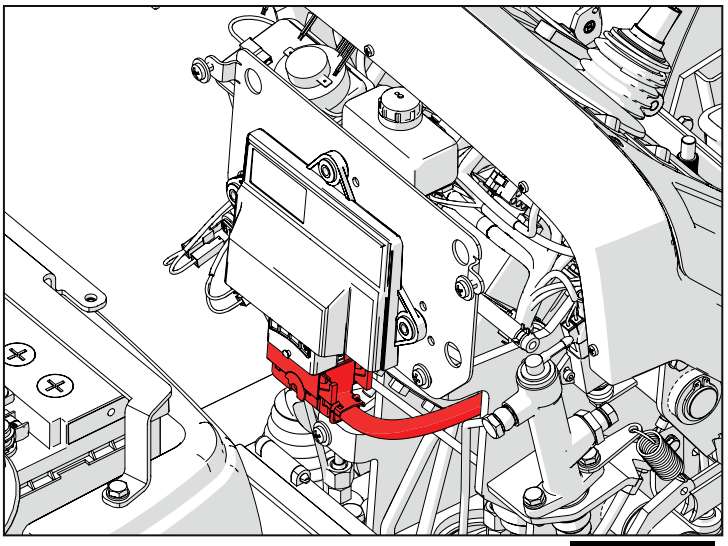


Fig. 13.51

Undo the screw (50) and remove the plate (51).

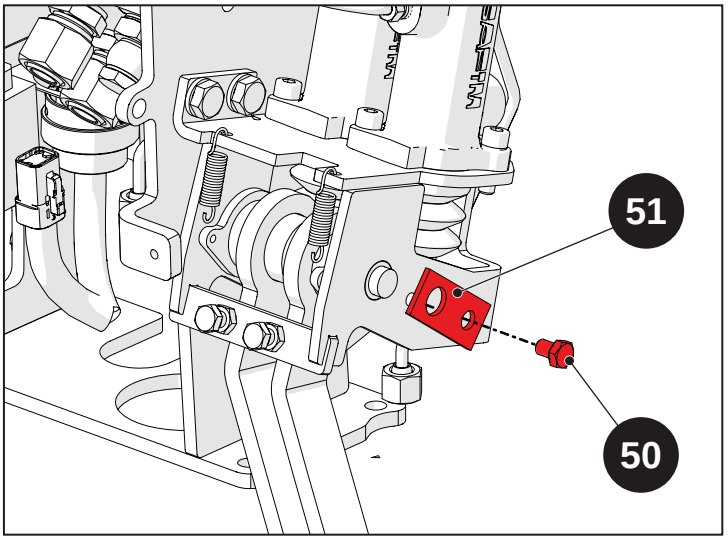


Fig. 13.52

Remove the pin (52) and then remove the brake pedals.

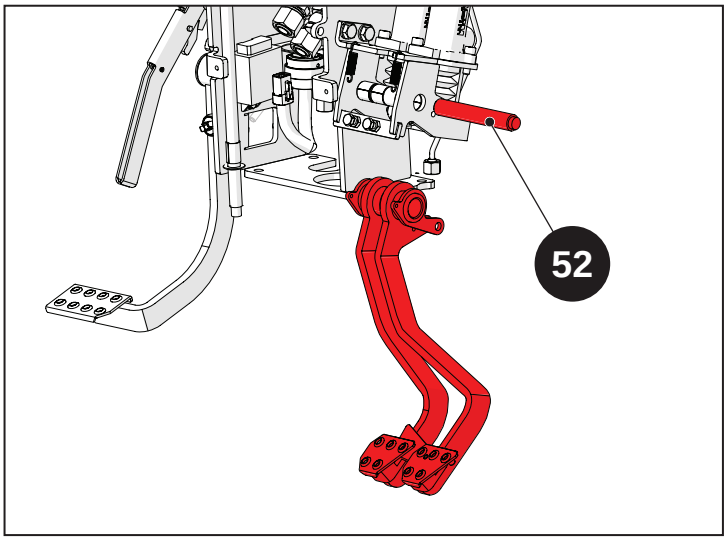


Fig. 13.53

Undo the screws (53).

Undo the screws (54) and remove the washers (55).

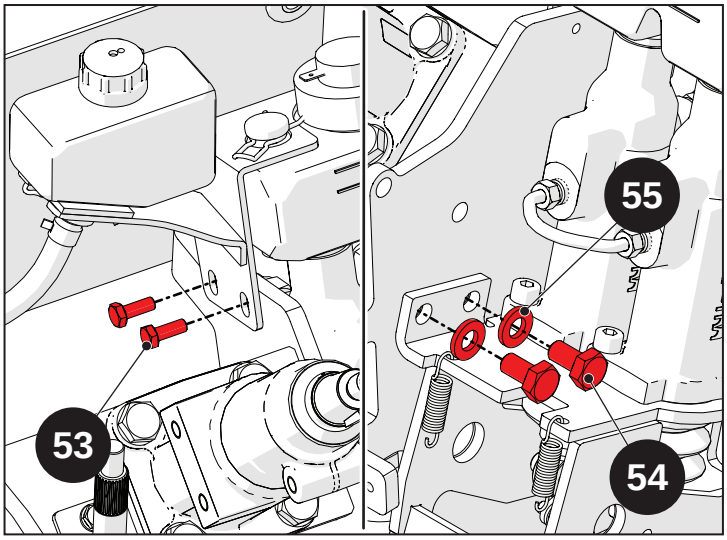


Fig. 13.54

Remove the brake pump unit.

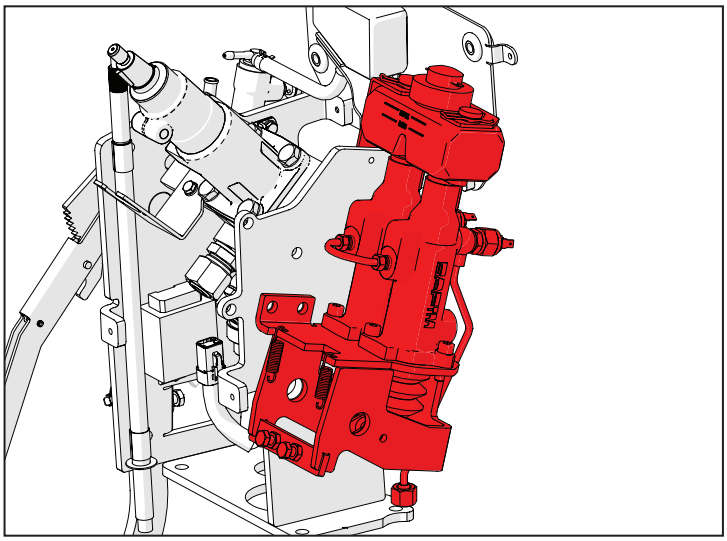


Fig. 13.55

Separate the clutch oil reservoir from the clutch actuator and then remove the reservoir.

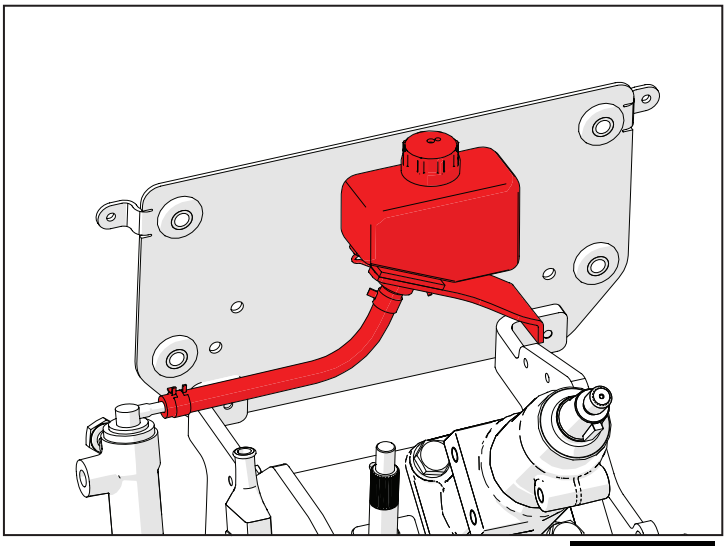


Fig. 13.56

Remove the circlip (56) and the spacer (57), and then remove the clutch pedal.

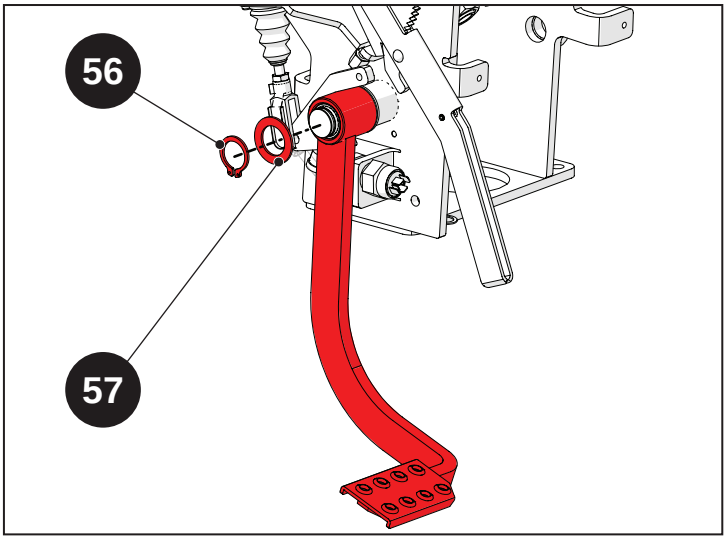


Fig. 13.57

Undo the screw (58) and remove the washer (59) and the spacer (60).

Remove the circlip (61) and the spacer (62).

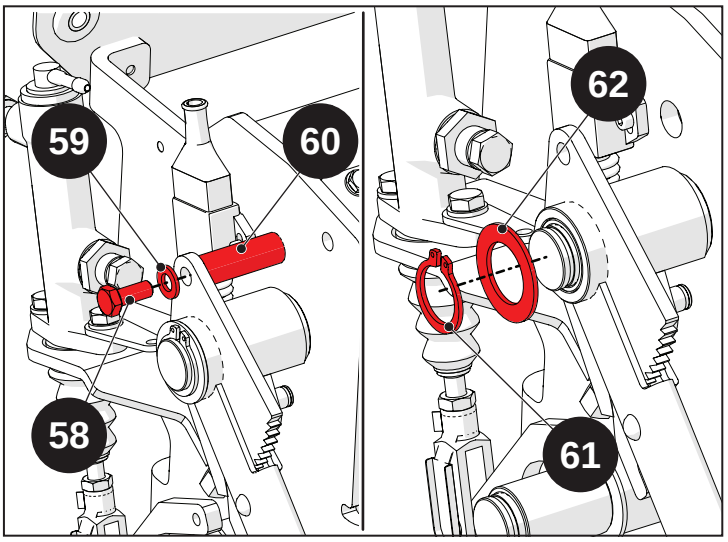


Fig. 13.58

Remove the parking brake lever.

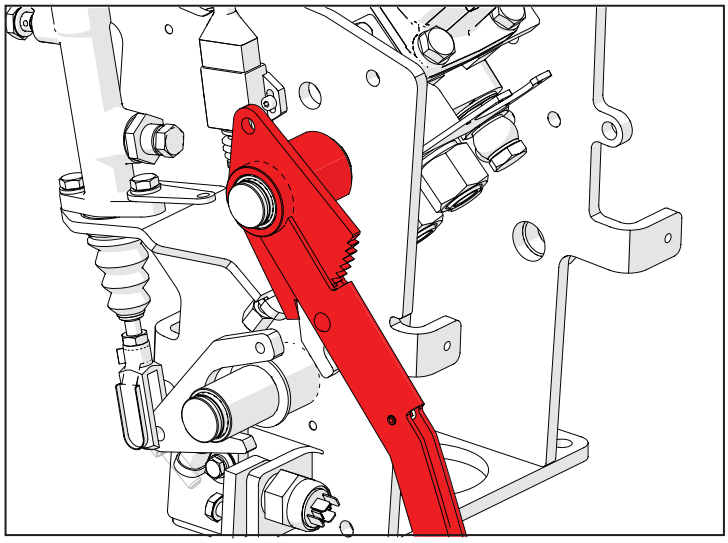


Fig. 13.59

Undo the screws (63) and remove the parking brake engaged sensor (64).

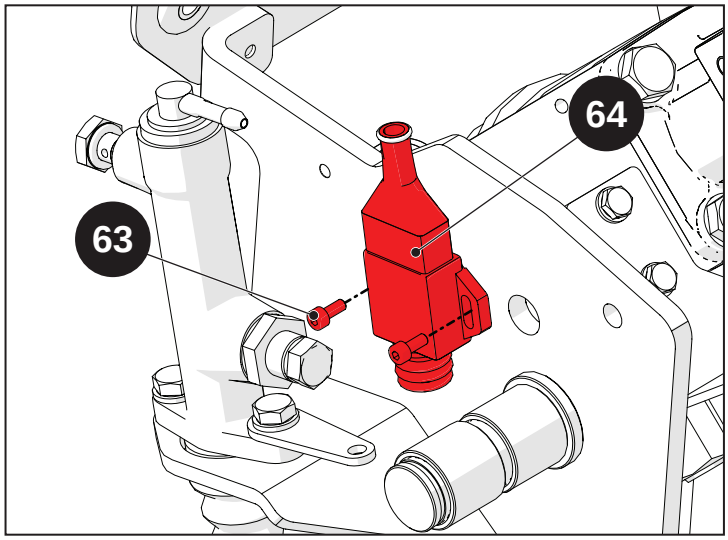


Fig. 13.60

Undo the check nut (65) to free the fork (66), and then remove the fork.

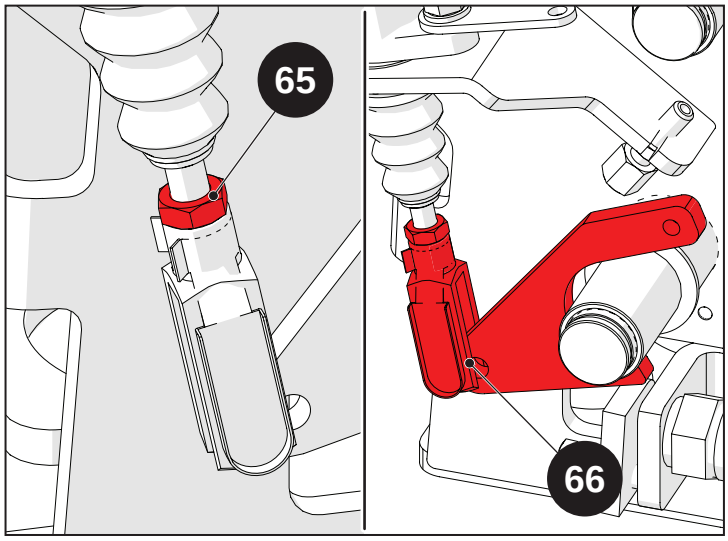


Fig. 13.61

Undo the screws (67) and then remove the hydraulic clutch actuator.

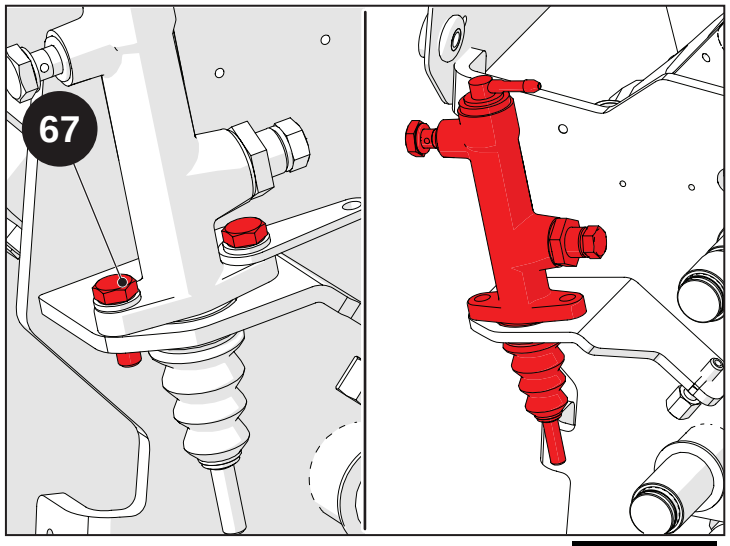


Fig. 13.62

Undo and remove the screws (68) and the washers (69), and then remove the vehicle control unit mounting plate (70).

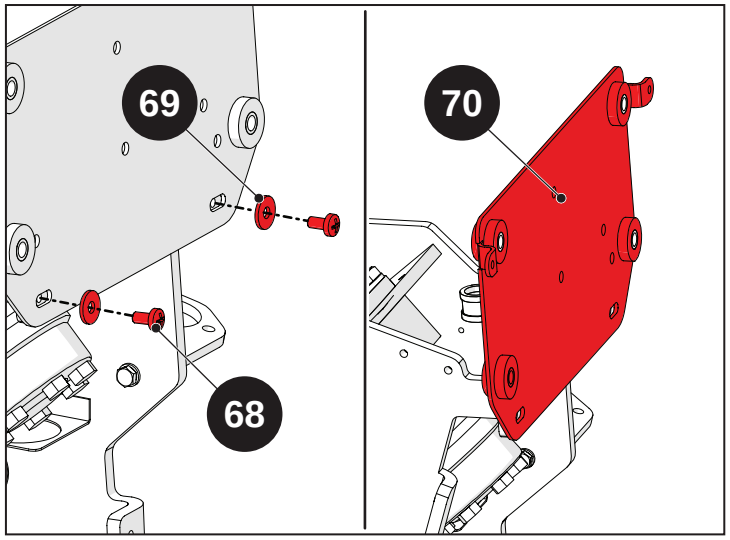


Fig. 13.63

Undo and remove the screws (71) and the washers (72), and then remove the plate (73).

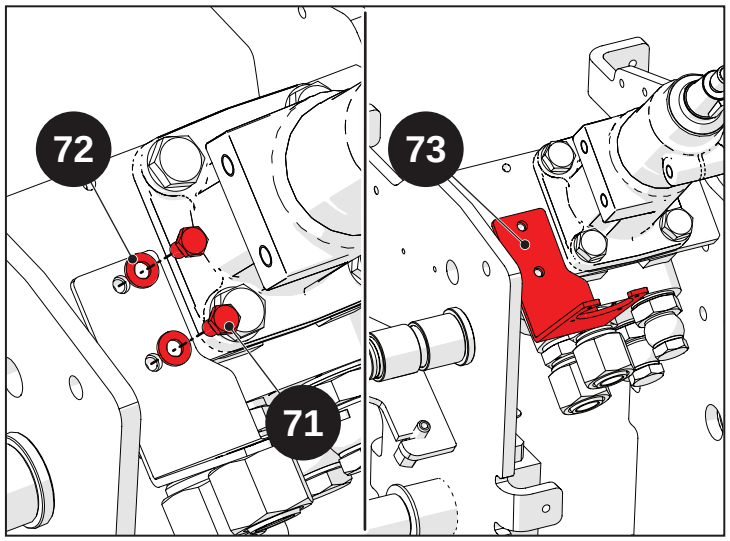


Fig. 13.64

Undo and remove the screws (74) and the washers (75), and then remove the steering column (76).

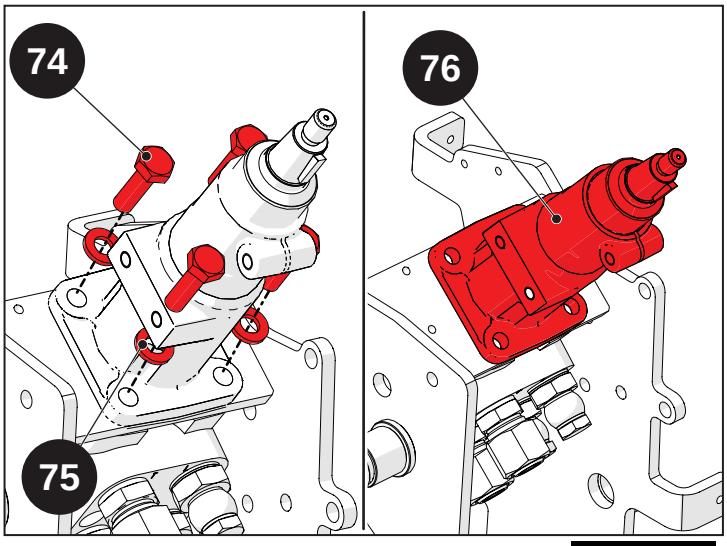


Fig. 13.65

Remove the hydraulic steering unit.

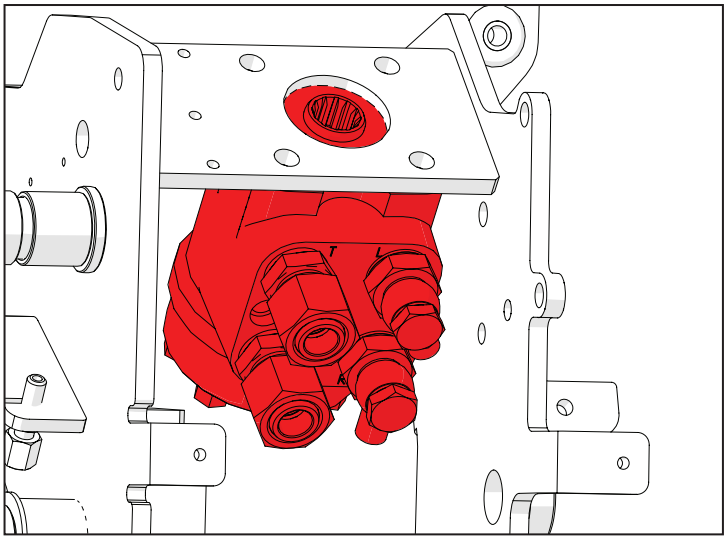


Fig. 13.66

Undo the screw (77), remove the washer (78) and then remove the flasher relay.

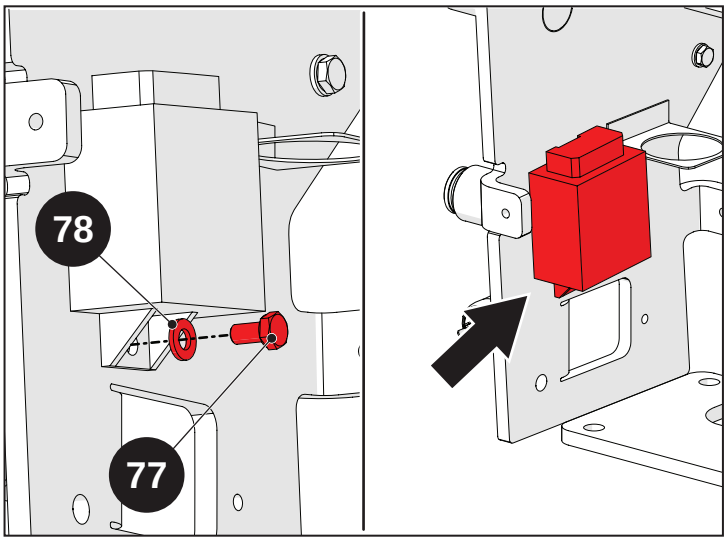


Fig. 13.67

13.3.2 Assembling the steering column

Danger
All other persons must keep at a safe distance from the danger area.

Warning
Read the instructions in chapter "1-Introduction" and, in particular, the sections concerning the installation of O-rings, oil seals and bearings, with particular care before assembling, and follow these instructions precisely when working. Apply the correct tightening torques when tighten the fasteners of components. Where tightening torques are not specified, refer to the table in chapter "1-Introduction". Use the specified sealant products during reassembly. Where the sealant required is not specified, refer to the table in chapter "1-Introduction".

To reassemble the steering column, follow the procedure for disassembly in reverse order.

13.4 Tools necessary

Indice

13.4.1 Tools necessary 13-30

13.4.1 Tools necessary

p/n	Description	Quantity
07006212	Flywheel puller tool	1
07007181	Platform/cab hoisting tool	1

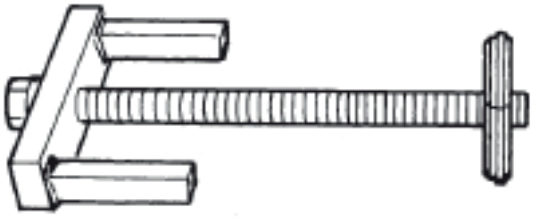
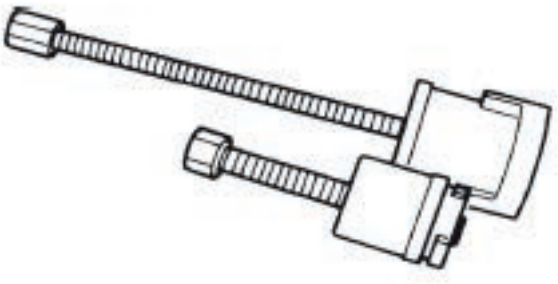
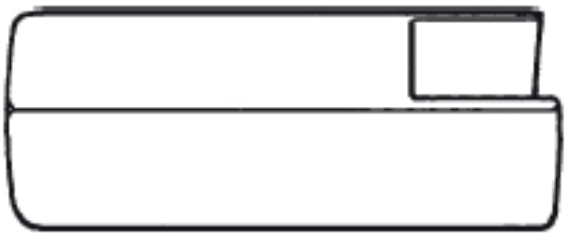
14 : Special tools

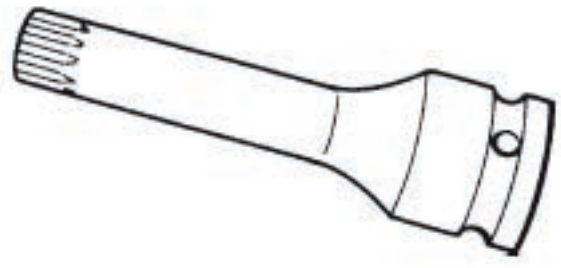
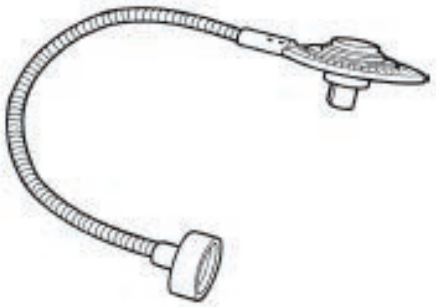
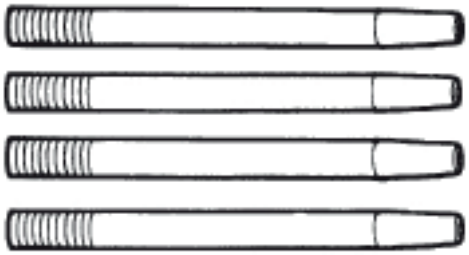
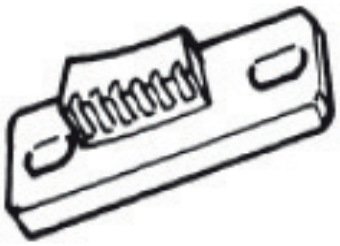
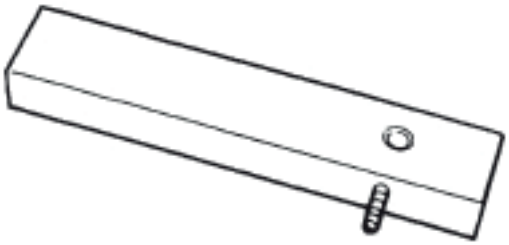
Index

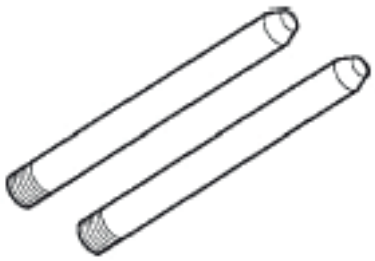
14.1 Engine tools list 14-2

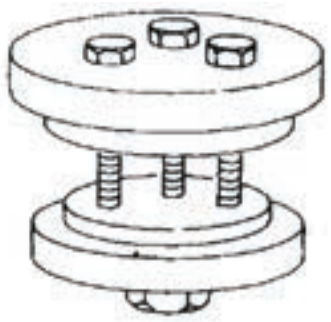
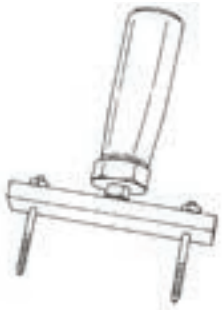
14.2 Vehicle tools list 14-8

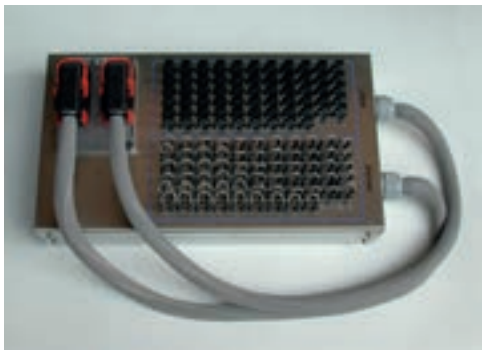
14.1 Engine tools list

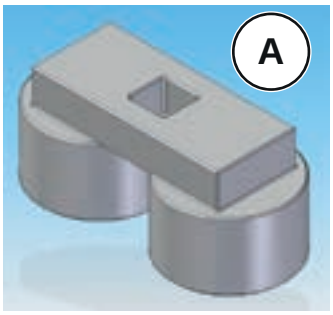
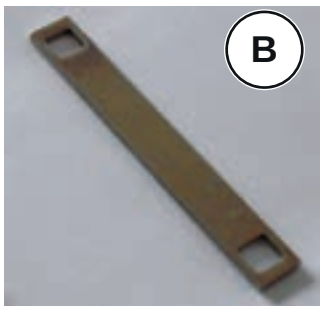
p/n	Description	Photo
68400012A	Cylinder sleeve puller tool	
68400015A	Tool for installing/removing camshaft and crankshaft bushes	
68410006A	Crankshaft installation tool	
68410012F	Tool for removing/installing hydraulic tappets	

68420016F 68420015F	XZN wrench for lateral head screws (12 mm) XZN wrench for centre head screws (14 mm)	
68420019F	Tool for angular wrench	
68460003A	Head alignment pins	
68480003A	Crankshaft immobiliser tool (installed in place of starter motor)	
68490007A	Cylinder sleeve height measurement tool	

68460005F	Flywheel alignment pins	
68400038F	Crankshaft gear extractor tool (for crankshafts with conical front shank)	
68410013G	Tool for installing front crankshaft oil seal	
68400040F 68400046F 68400044F 68400045F 68400045G	Injector puller tool (complete) Housing Pin Fork R750 EURO 4 / IE3 Fork R750 EURO 5	

68410010F	Tool for installing rear crankshaft oil seal	
68480013F	Tool for synchronising counter-rotating counterweights (only for engine versions with counter-rotating counterweights)	
6844009F 68440010F	Plate for testing hydraulic seal tightness of heads Plate for testing hydraulic seal tightness of heads complete with O-rings	
68420022F	Tool for removing alternator idler pulley	
68490038F	**FOR EURO 4 ENGINES ONLY** Furnace for cleaning diesel particulate filter 3kW - 220V	

68490035F 68490036F 68490037F 68490040F	Engine test wiring harness R750EU4-EU5 / TE3 / IE3 / TE4/ ISE4/IE4 (without throttle potentiometer and engine control unit) (with throttle potentiometer and without engine control unit) (with throttle potentiometer and with engine control unit) Engine test wiring harness R750EU6	
68490034F	Adapter for engine compression testing	
68500017F 68500016F	**Break out box** (without jumpers) (complete with jumpers)	
	Oscilloscope (recommended type “PicoScope”) Tool usable for viewing waveform of timing and crankshaft position sensor signals	

68490007F	Belt installation tool (to be applied onto belt) (R750IE4-TE4-ISE4- R754EU6) A: setting belt tension B: restraining tensioner spring	 
68490039F	Belt installation tool (to be applied onto tensioner) (R750IE4-TE4-ISE4- R754EU6)	

14.2 Vehicle tools list

p/n	06381270
Description:	Diagnostic tool kit
Chapter:	Chap.17 Electrical system

Fig. 14.1

p/n	07000245
Description:	Tractor separation support frame
Chapter:	Chap. 3 Clutch housing

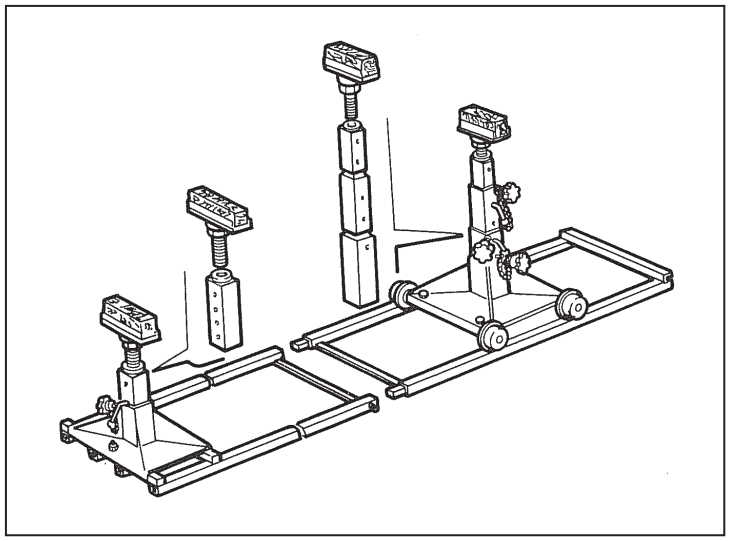


Fig. 14.2

p/n	07000303
Description:	Pressure gauge
Chapter:	Chap. 12 Hydraulic system

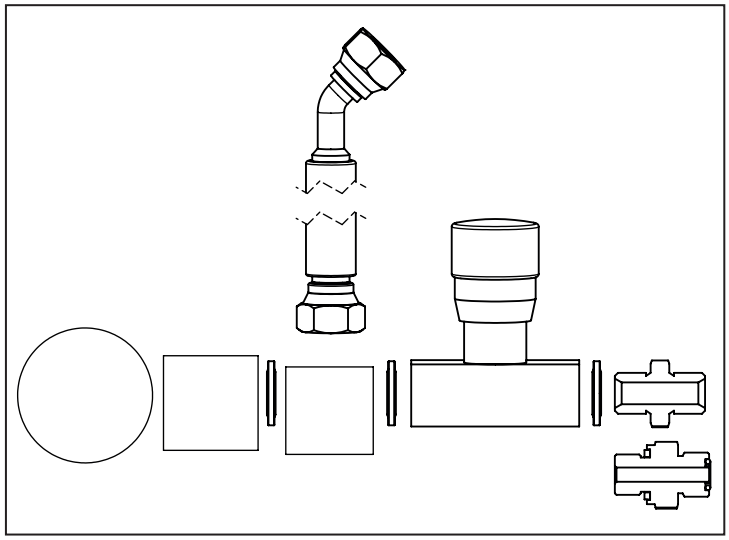


Fig. 14.3

p/n	07007171
Description:	STAR clutch plate alignment pin
Chapter:	Chap. 3 Clutch housing

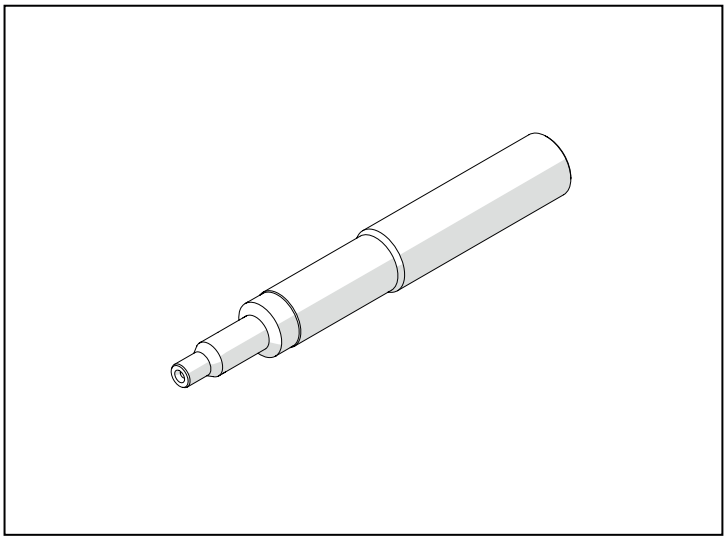


Fig. 14.4

p/n	07008470
Description:	Wrench for differential ring nut
Chapter:	Chap. 5 Transmission and Rear PTO

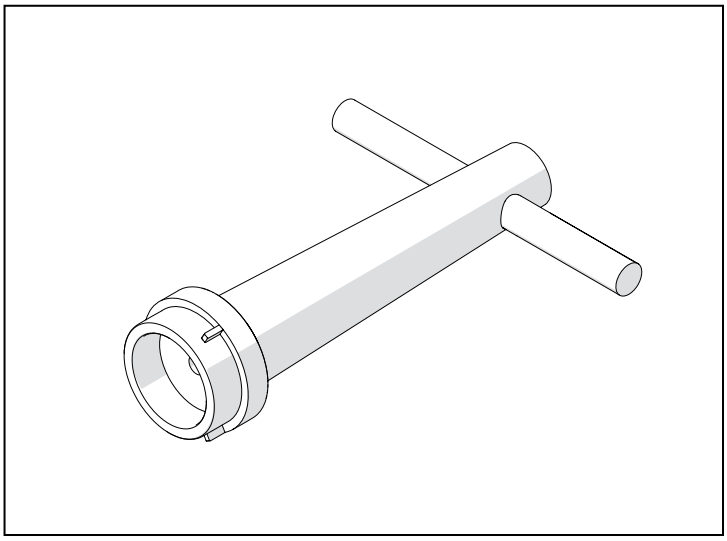


Fig. 14.5

p/n	07008467
Description:	Pinion lock sleeve
Chapter:	Chap. 5 Transmission and Rear PTO

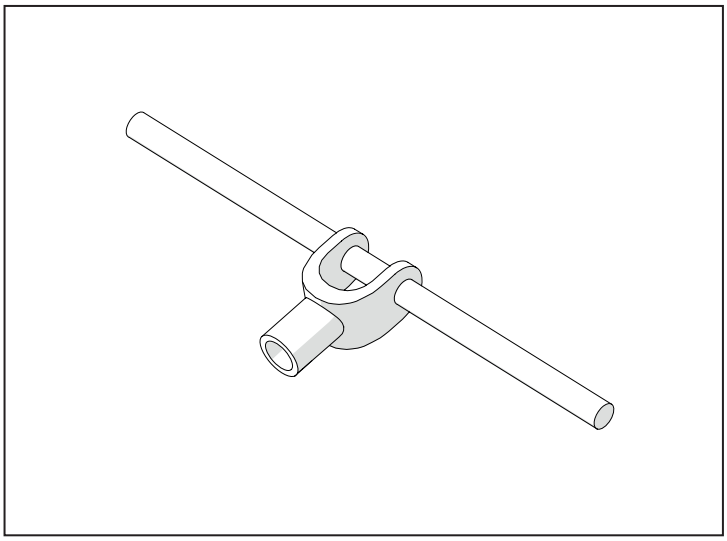


Fig. 14.6

p/n	07008471
Description:	Pinion support rod
Chapter:	Chap. 5 Transmission and Rear PTO

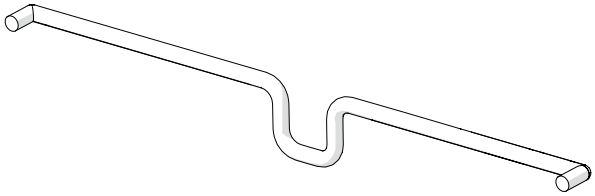


Fig. 14.7

p/n	07008472
Description:	Threaded retainer bar for pinion
Chapter:	Chap. 5 Transmission and Rear PTO

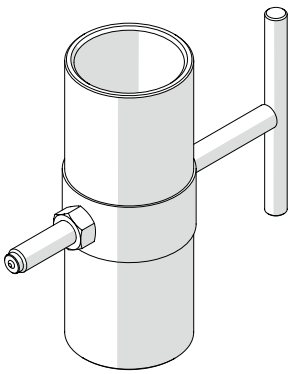


Fig. 14.8

p/n	07008473
Description:	Bearing punch
Chapter:	Chap. 5 Transmission and Rear PTO

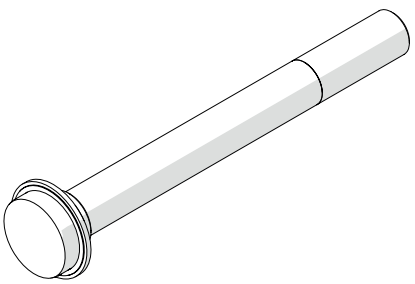


Fig. 14.9

p/n	07008474
Description:	Gear punch
Chapter:	Chap. 5 Transmission and Rear PTO

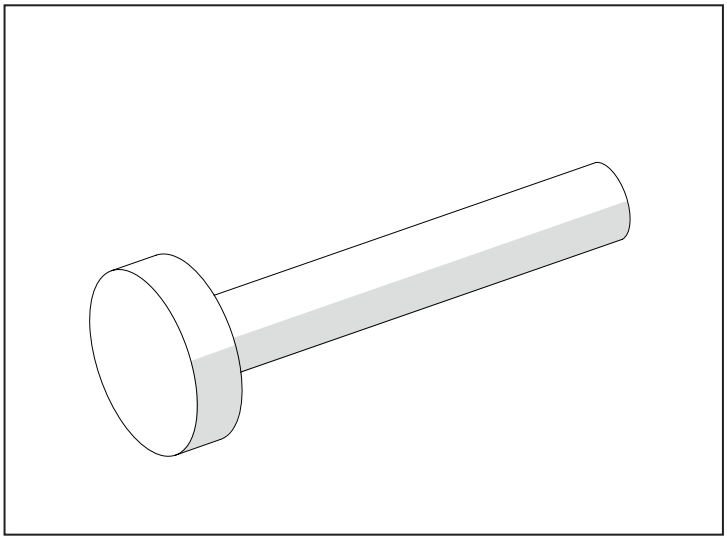


Fig. 14.10

p/n	07008475
Description:	Wrench for ring nut
Chapter:	Chap.6 Centre housing

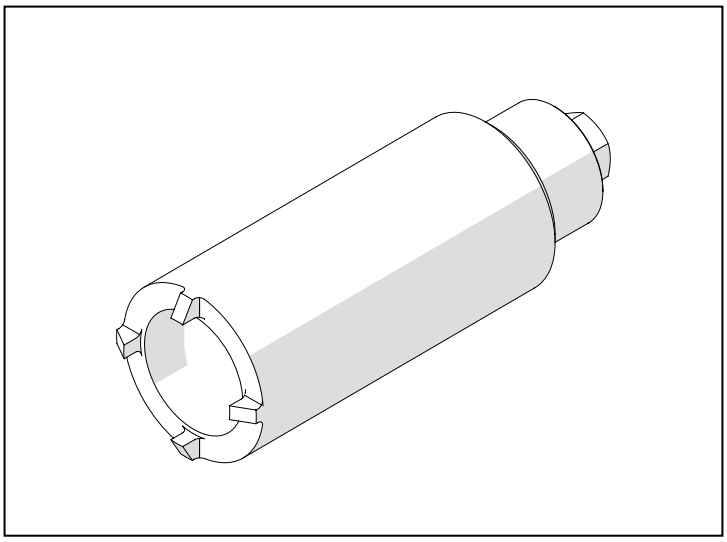


Fig. 14.11

p/n	07008476
Description:	Tool for installing PTO clutch spring
Chapter:	Chap. 5 Transmission and Rear PTO

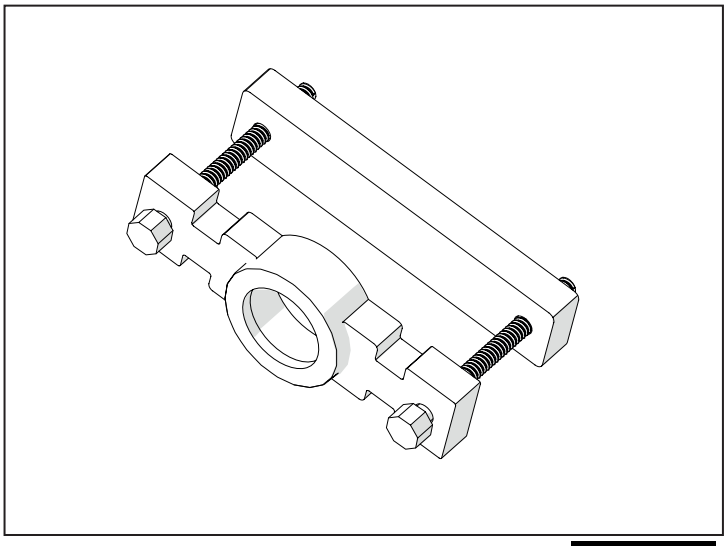


Fig. 14.12

p/n	07008477
Description:	Punch for inner oil seal
Chapter:	Chap. 5 Transmission and Rear PTO

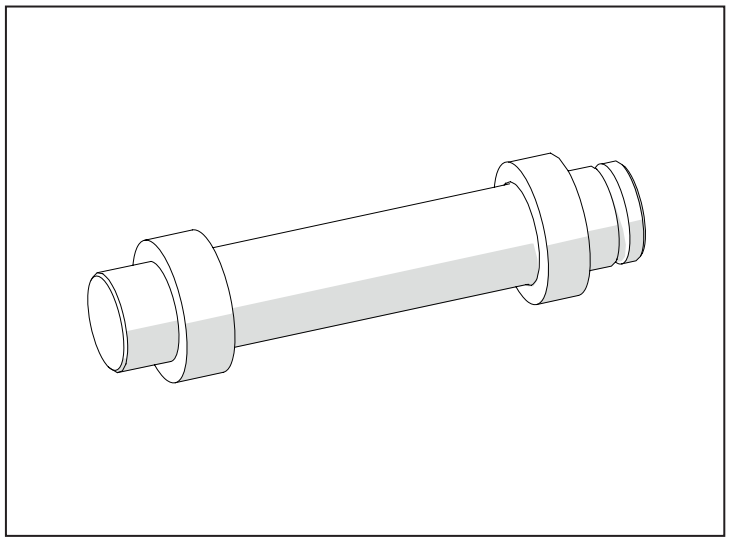


Fig. 14.13

p/n	07003519
Description:	Punch for oil seal
Chapter:	Chap.6 Centre housing

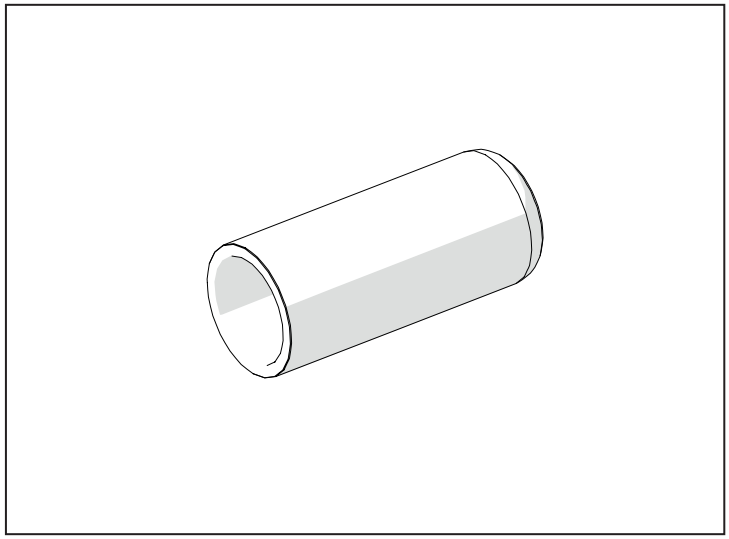


Fig. 14.14

p/n	07008478
Description:	Bearing punch
Chapter:	Chap. 3 Clutch housing
	Chap. 5 Transmission and Rear PTO

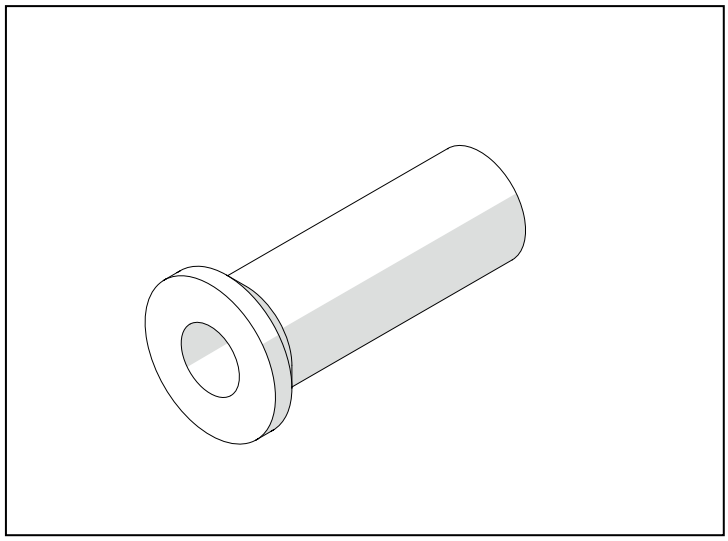


Fig. 14.15

p/n	07008479
Description:	Punch for oil seal
Chapter:	Chap.6 Centre housing

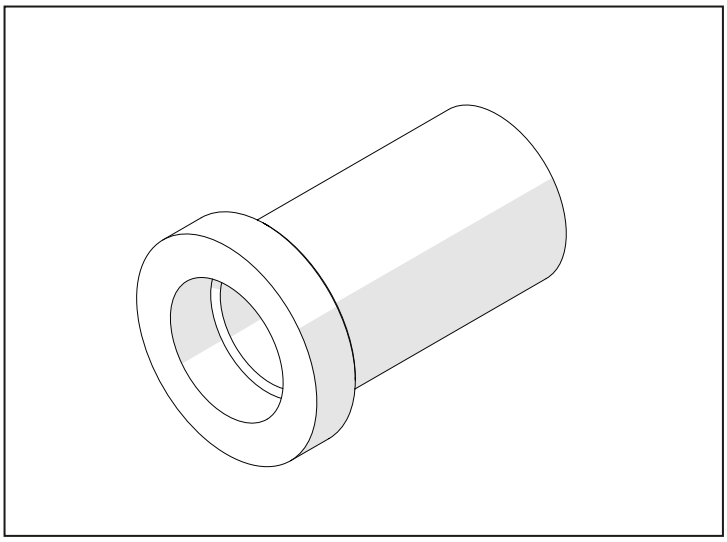


Fig. 14.16

p/n	07008480
Description:	Punch for outer bearing race
Chapter:	Chap. 5 Transmission and Rear PTO

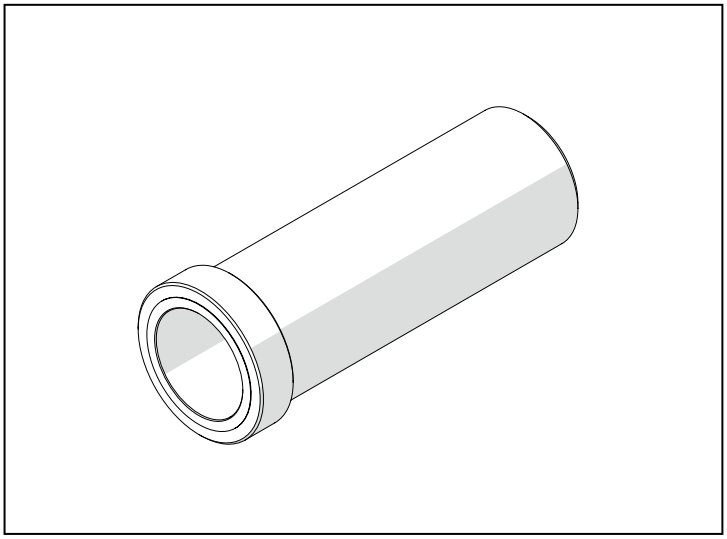


Fig. 14.17

p/n	07008481
Description:	Punch for PTO cover
Chapter:	Chap. 5 Transmission and Rear PTO

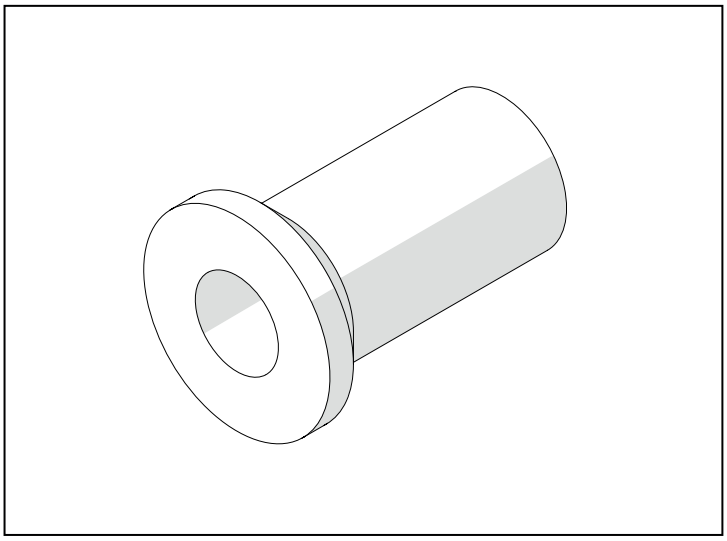


Fig. 14.18

p/n	07008482
Description:	Punch for PTO clutch piston
Chapter:	Chap. 5 Transmission and Rear PTO

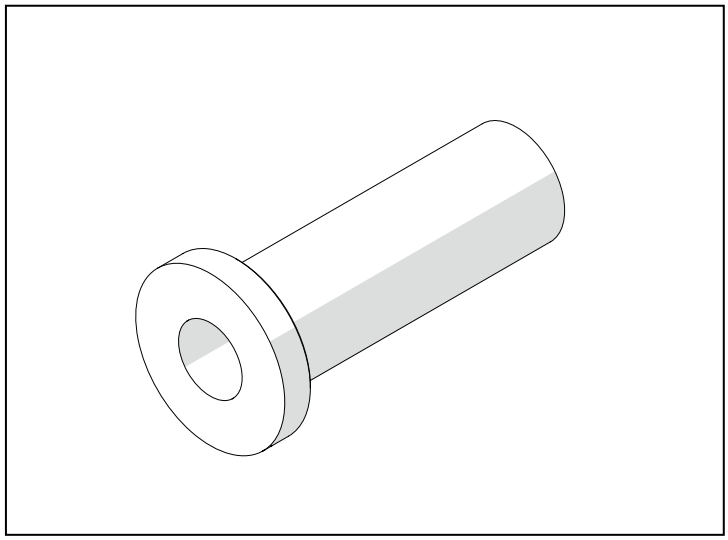


Fig. 14.19

Printed document number 06381337 Edition 2 01/2019

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