WORKSHOP MANUAL

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GOLDONI

Tractors for **Life**

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Section 1 : Reading this manual

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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 S.p.A. reserves the right to modify its products without notification. If any discrepancies are noted or for any other queries, contact your area dealer or importer.

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"

1.3 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 - Production series
3 - Machine type
4 - Variant/Version
5 - Identification number (serial number)

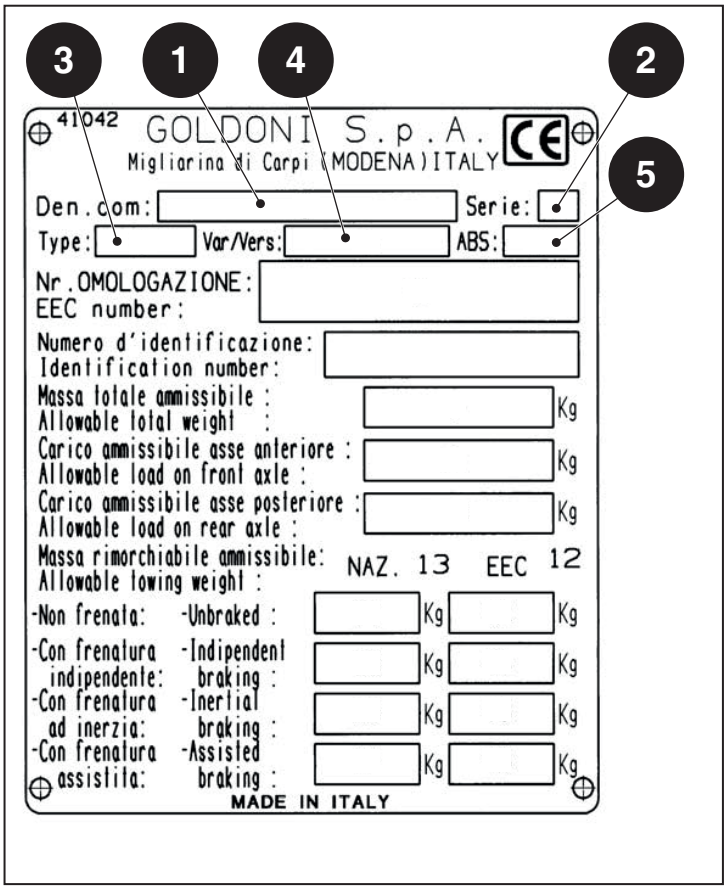


Fig. 1.1

REV Cluster

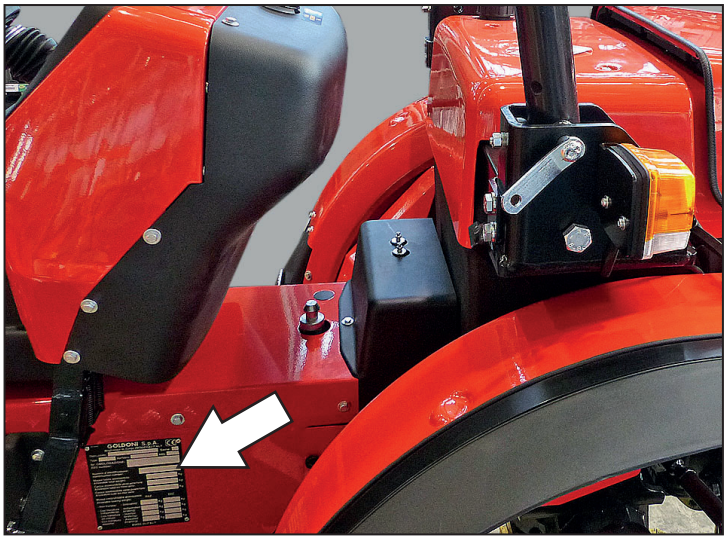


Fig. 1.2

RS Cluster

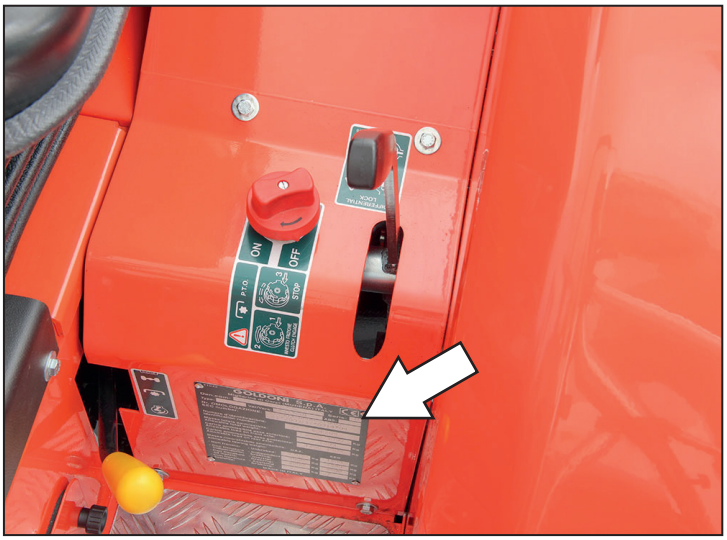


Fig. 1.3

SN/SN+ Cluster

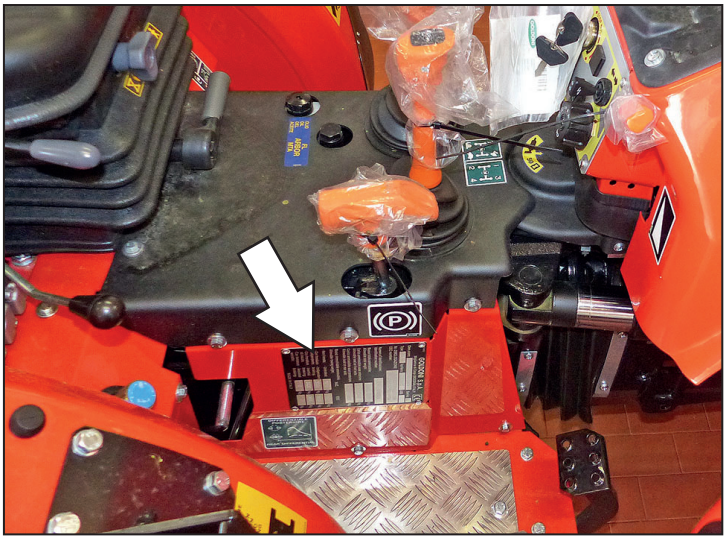


Fig. 1.4

The chassis number is also stamped on the chassis itself.

1 - Code and brand of the manufacturer
2 - Production series
3 - Machine type
4 - Chassis number (serial number)

Note

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

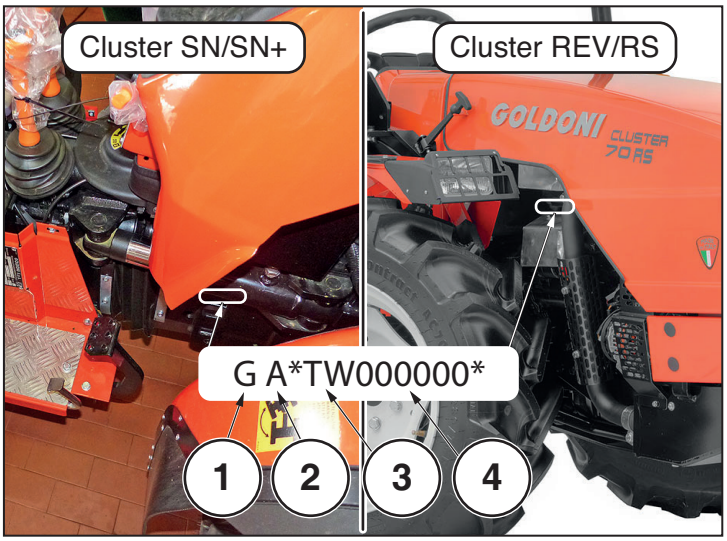


Fig. 1.5

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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: **CAUTION!** 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.

2.1.1 General rules

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).

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.).



Fig. 1.6

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.

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;

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.

2.1.1.6 Electrics

- 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.

2.1.1.7 Fire

In areas and in operations subject to the risk of fire due to the 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.

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 label.

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.

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.

2.1.1.11 Guidelines for choosing the correct fire extinguishing measures

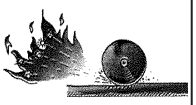
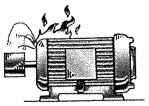
Agente estinguente					
Classe di fuoco	Acqua	Polvere	CO^2	Schiuma	Polveri speciali
 combustibili solidi ordinari	✓	✓	✓ Solo per incendi di piccole dimensioni	✓	✗
 liquidi infiammabili	✗ Tranne che utilizzando attrezzature adatte	✓	✓	✓	✗
 gas infiammabili	✗	✓	✓	✗	✗
 metalli combustibili	✗ Possono reagire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

Fig. 1.7

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 or welded wrenches;
- 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.

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.

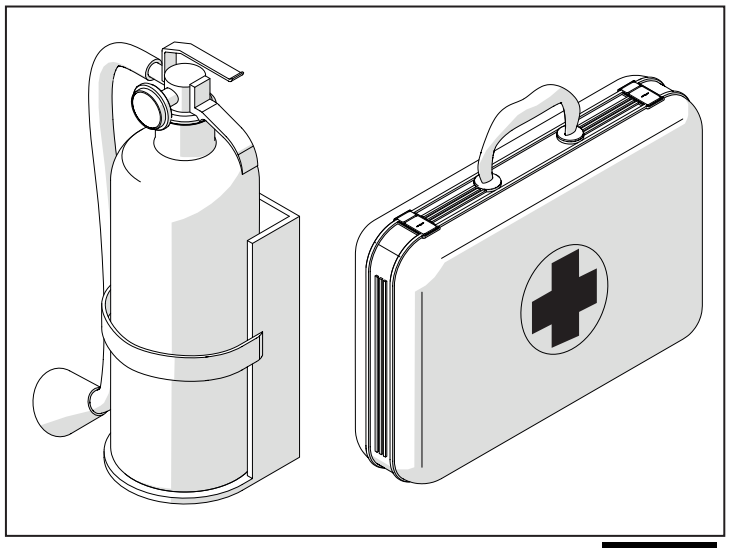


Fig. 1.8

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.

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.

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.

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 staring 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.

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.

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.

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.

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.

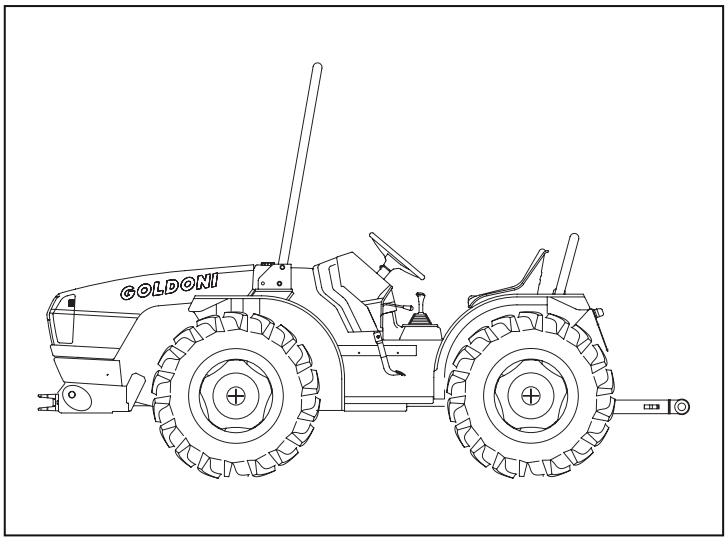


Fig. 1.9

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.

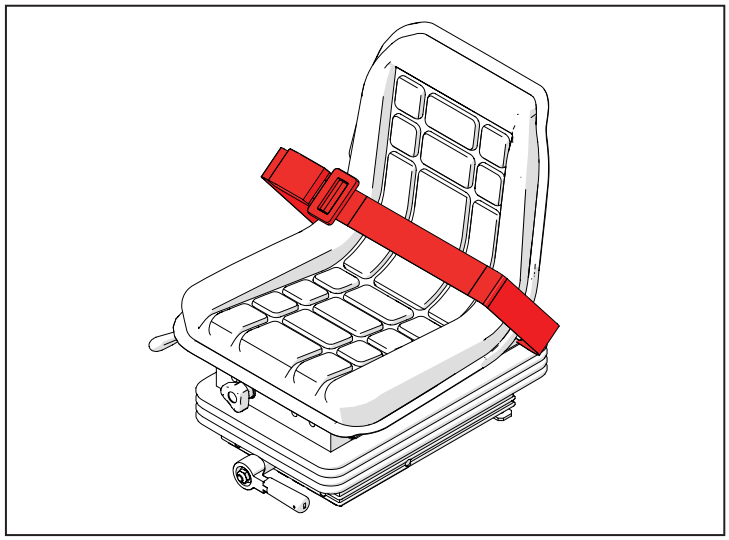


Fig. 1.10

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. 1.11):

- 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.

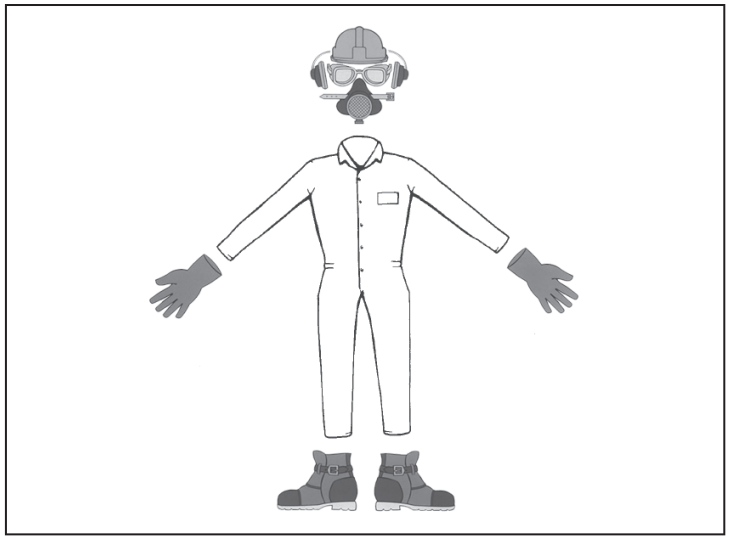


Fig. 1.11

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.

Section 3 : General

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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).

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.

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.

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.

3.5 O-ring seals

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

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.

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.

Section 4 : Technical characteristics

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4.1 Engine

Cluster	REV/RS	SN/SN+
Engine Type	VM D703 IE3 STEP 3A	VM D703 IE3 STEP 3A
Power at rated speed	48.6 kW / 66 HP - 2600 rpm	48.6 kW / 66 HP - 2600 rpm
Cylinders	3 Turbocharged, intercooled	3 Turbocharged, intercooled
Cooling	Liquid	Liquid
Displacement	2082 cm3	2082 cm3
Torque rise	35%	35%
Fuel tank	50 litres	50 litres

4.2 Transmission

Cluster	REV/RS	SN/SN+
Number of speeds	16+16 synchronised	12+4 synchronised (SN cluster) 16+16 synchronised (SN+ cluster)
Clutch	Single plate dry clutch, diameter 280 mm	Single plate dry clutch, diameter 280 mm
Reverse shuttle	Mechanical, synchronised	Mechanical, synchronised
Rear differential lock	Electrohydraulic (REV Cluster) Mechanical (RS Cluster)	Mechanical
Speed	1.16 - 36 Km/h	0.460 - 37 Km/h

4.3 Brakes and steering

Cluster	REV/RS	SN/SN+
Brake type	Hydraulically actuated multi-disc wet brakes (REV Cluster) Mechanically actuated multi-disc wet brakes (RS Cluster)	Mechanically actuated multi-disc wet brakes
Steering type	Hydraulic, of hydrostatic type on front wheels	Hydraulic, of hydrostatic type with cylinder acting on the knuckle
Steering angle	45°	-
Articulation angle	-	45°

4.4 Rear Power Take Off

Cluster	REV/RS	SN/SN+
Type	540/750 rpm Clockwise Independent Synchronised	540/750 rpm Clockwise Independent Synchronised
Clutch	Multi-disc wet brakes	Multi-disc wet brakes
Operation	Electrohydraulic	Mechanical Electrohydraulic (SN Cluster) Electrohydraulic (SN+ Cluster)

4.5 Rear lift

Type	up / down
Lifting capacity	1800 kg
3-point linkage	Cat. 1 and 1N

4.6 Hydraulic circuit

Cluster	REV/RS	SN/SN+
Pump delivery	25 + 40 l/min. (REV Cluster) 40 l/min. (RS Cluster)	40 l/min.
Number of rear hydraulic distributors	Up to 3, double acting	2, double acting

4.7 Driver zone

Cluster	REV/RS	SN/SN+
Platform	Semi-platform	Integral with the frame
Platform carrier	Silent-block	Structural work
ROPS	Foldable roll bar	Foldable roll bar
Instrument	Digital / analogue	Digital / analogue
Driver seat	Horizontally and vertically adjustable, mounted on approved elastic suspension	Horizontally and vertically adjustable, mounted on approved elastic suspension
Towing hitch	Type C/EEC	Type C/EEC

4.8 Weights and dimensions

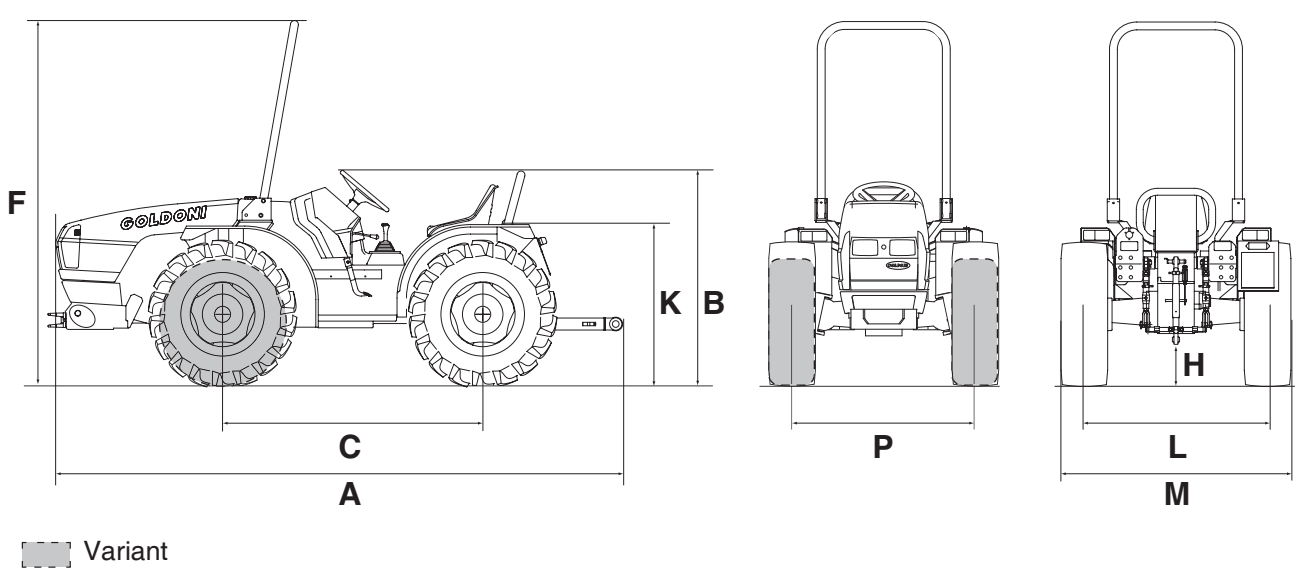


Fig. 1.12

Values given are for tractor with 280/70/18 front and rear tyres (isodiametric version) and with 300/70/20 rear and 280/70/16 front tyres (Variant version).

RS and RS VARIANT Cluster

Reference	Description	RS	RS VARIANT
A	Length, max.	2930 mm	2940 mm
M	Width (min.-max.)	1340 - 1800 mm (*)	1390 -1800 mm
F	Height at frame	2110 mm	2090 mm
B	Height at steering wheel, max	1220 mm	1250 mm
H	Ground clearance	295 mm	335 mm
C	Wheelbase	1372 mm	1375 mm
P	Front track (min.-max.)	1060 mm	-
L	Rear track (min.-max.)	1060 mm	1080 mm
-	Minimum turning radius without brakes	3.6 m (**)	3.2 m (***)
-	Weight with ROPS	1790 kg	1770 kg

(*) - 1200 mm with 8.25x16” tyres
(**) - 3.1 m with 8.25x16” tyres
(***) - 2.9 m with 9.5R20 rear tyres and 7.50x16” front tyres

REV and REV VARIANT Cluster

Reference	Description	REV	REV VARIANT
A	Length, max.	3110 mm	3130 mm
M	Width (min.-max.)	1340 - 1800 mm (*)	1390 -1800 mm
F	Height at frame	2110 mm	2090 mm
B	Height at steering wheel, max	1220 mm	1250 mm
H	Ground clearance	295 mm	335 mm
C	Wheelbase	1552 mm	1552 mm
P	Front track (min.-max.)	1060 mm	-
L	Rear track (min.-max.)	1060 mm	1080 mm
-	Minimum turning radius without brakes	3.8 m (**)	3.4 m (***)
-	Weight with ROPS	1850 kg	1850 kg

(*) - 1200 mm with 8.25x16” tyres
(**) - 3.4 m with 8.25x16” tyres
(***) - 3.1 m with 9.5R20 rear tyres and 7.50x16” front tyres

SN/SN+ Cluster

Reference	Description	SN/SN+
A	Length, max.	2930 mm
M	Width (min.-max.)	1160 - 1560 mm (*)
F	Height at frame	2110 mm
B	Height at steering wheel, max	1185 mm
H	Ground clearance	280 mm
C	Wheelbase	1372 mm
P	Front track (min.-max.)	880 mm
L	Rear track (min.-max.)	880 mm
-	Minimum turning radius without brakes	2.38 m
-	Weight with ROPS	1770 kg

(*) - 995 mm with 8.25x16” tyres

4.8.1 Available tyres

RS and REV Cluster

Tyres	Position
8.25-16"	Front and Rear
280/70-18"	Front and Rear
300/65-18"	Front and Rear
31/15.50 x 15" Xtra-Track	Front and Rear
31/15.50 x 15" Soft Track	Front and Rear

RS VARIANT and REV VARIANT Cluster

Tyres	Position
9.5-20"	Rear
7.50-16"	Front
320/70-20"	Rear
250/80-16"	Front
300/70-20"	Rear
280/70-16"	Front

SN/SN+ Cluster

Tyres	Position
280/70-18"	Front and Rear
300/70-20"	Front and Rear
31/15.50 x 15" Xtra-Track	Front and Rear
31/15.50 x 15" Soft Track	Front and Rear

4.8.2 Maximum axle load

For information on maximum permissible axle loads, see the **certificates of conformity** accompanying the machine.

Attention

Values may be subject to modification. Always refer only to the maximum permissible load values specified on type approval plate and in registration documents.

		Load capacity	Maximum axle load (Kg)		Total mass
Model	**Tyres**	**Kg**	**Rear**	**Front**	**Kg**
REV Cluster	8.25-16"	950	1850	1200	2500
	280/70-R18"	1180	1850	1200	2500
	300/65-R18"	1250	1850	1200	2500
	31/15.50 x 15" Xtra-Track	775	1200	1200	2500
	31/15.50 x 15" Soft Track	775	1200	1200	2500
REV VARIANT Cluster	9.5-20" 7.50-16"	975 - 1100	1850	1200	2500
	320/70-R20" 250/80- 16"	1150 - 858	1850	1200	2500
	300/70-R20" 280/70-R16"	1060 - 1120	1850	1200	2500
RS Cluster	8.25-16"	950	1900	1200	3000
	280/70-R18"	1180	1900	1200	3000
	300/65-R18"	1250	1900	1200	3000
	31/15.50 x 15" Xtra-Track	775	1200	1200	3000
	31/15.50 x 15" Soft Track	775	1200	1200	3000
RS VARIANT Cluster	9.5-20" 7.50-16"	975 - 1100	1900	1200	3000
	320/70-R20" 250/80- 16"	1150 - 858	1900	1200	3000
	300/70-R20" 280/70-R16"	1060 - 1120	1900	1200	3000
SN/SN+ Cluster	280/70-R18"	1180	1900	1200	3000
	300/70-R20"	1060	1900	1200	3000
	31/15.50 x 15" Xtra-Track	775	1200	1200	3000
	31/15.50 x 15" Soft Track	775	1200	1200	3000

4.9 Lubricants

Original lubricants

Arbor Alfatech Synt 10W-40 oil	
Viscosity at 100°C	14 mm2/s
Viscosity grade	158
Flash point V.A.	200°C
Pour point	-33°C
Volumetric Mass at 15° C	0.875 kg/l

Arbor Universal 15W-40 oil	
Viscosity at 40°C	110 mm2/s
Viscosity at 100°C	14 mm2/s
Viscosity at -15°C	3450 mPa.s
Viscosity grade	135
Flash point V.A.	220°C
Pour point	-36°C
Volumetric Mass at 15° C	0.886 kg/l

Arbor TRW 90 oil	
Viscosity at 40°C	135 mm2/s
Viscosity at 100°C	14.3 mm2/s
Viscosity at -26°C	108000 mPa.s
Viscosity grade	104
Flash point V.A.	220°C
Pour point	-27°C
Volumetric Mass at 15° C	0.895 kg/l

Arbor MTA oil	
Viscosity at -40°C	28000 mPa.s
Viscosity at 40°C	35.5 mm2/s
Viscosity at 100°C	7.5 mm2/s
Viscosity grade	160
Flash point V.A.	200°C
Pour point	-40°C
Volumetric Mass at 15° C	0.870 kg/l
Colour	Red

Arbor MP Extra grease	
NLGI consistency number	2
Worked penetration (60)	285 dmm
Dropping point	190°C
4-ball weld load	300 kg
Viscosity of oil at 40° C	200 mm2/s

Original protective fluids

PARAFLU 11 antifreeze fluid	
Density at 15° C	1,135 g /cm3
pH	7.7, diluted to 50%
Reserve alkalinity	16 ml HCl 0.1 N
Boiling point	-38° C diluted to 50%
Foam at 88°C	50 cc

4.10 Speed

Speed values are for an engine speed of 2600 rpm and with tractor fitted with 280/70 R18" tyres (values are indicative only).

	Forward		Reverse, Reverse Shuttle	
Gear	**SN Cluster**	**REV/RS/SN+ Cluster**	**SN Cluster**	**REV/RS/SN+ Cluster**
1st speed, slow	1.10 Km/h	0.49 Km/h	1.90 Km/h	0.35 Km/h
2nd speed, slow	1.95 Km/h	0.88 Km/h	-	0.63 Km/h
3rd speed, slow	2.72 Km/h	1.43 Km/h	-	1.02 Km/h
4th speed, slow	-	2.00 Km/h	-	1.43 Km/h
1st speed, slow range	3.77 Km/h	1.93 Km/h	6.55 Km/h	1.38 Km/h
2nd speed, slow range	6.69 Km/h	3.42 Km/h	-	2.45 Km/h
3rd speed, slow range	9.35 Km/h	5.58 Km/h	-	4.00 Km/h
4th speed, slow range	-	7.81 Km/h	-	5.60 Km/h
1st speed, normal range	4.41 Km/h	2.37 Km/h	7.66 Km/h	1.70 Km/h
2nd speed, normal range	7.83 Km/h	4.20 Km/h	-	3.01 Km/h
3rd speed, normal range	10.93 Km/h	6.85 Km/h	-	4.91 Km/h
4th speed, normal range	-	9.59 Km/h	-	6.88 Km/h
1st speed, fast range	11.40 Km/h	7.65 Km/h	19.79 Km/h	5.49 Km/h
2nd speed, fast range	20.22 Km/h	13.58 Km/h	-	9.74 Km/h
3rd speed, fast range	28.24 Km/h	22.14 Km/h	-	15.88 Km/h
4th speed, fast range	-	30.99 Km/h	-	22.23 Km/h

4.11 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

Section 5 : Tightening torques and sealants

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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

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

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

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

5.5 Tightening torques for tapered plugs

Type	Nm	kgm
1/2"	30	3

5.6 Loctite sealant types

Thread lock

Description	Type	Usage
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

Description	Type	Usage
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

Description	Type	Usage
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

Description	Type	Usage
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

Description	Type	Usage
Cleaner/degreaser	Loctite 7063	Prepares components for application of an adhesive sealant.
Gasket remover	Loctite 7200	Removes all residue of sealants and gaskets.

Section 6 : General assembly instructions

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6.1 Oil seals

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.

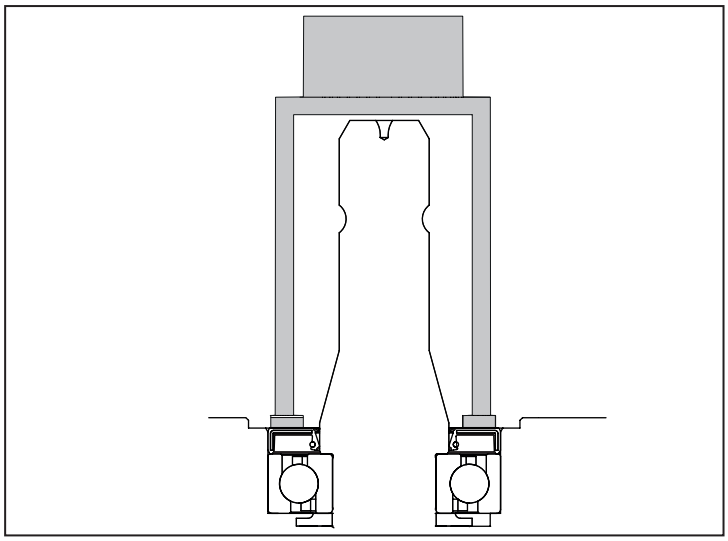


Fig. 1.13

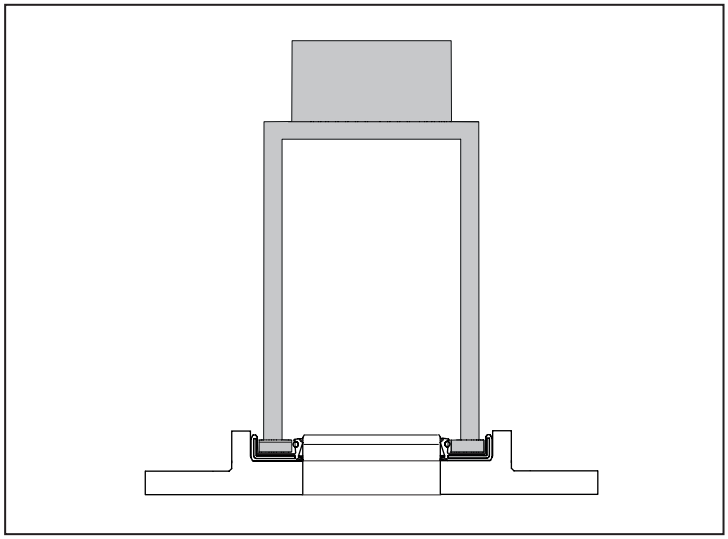


Fig. 1.14

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.

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.

6.2 O-Rings

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.

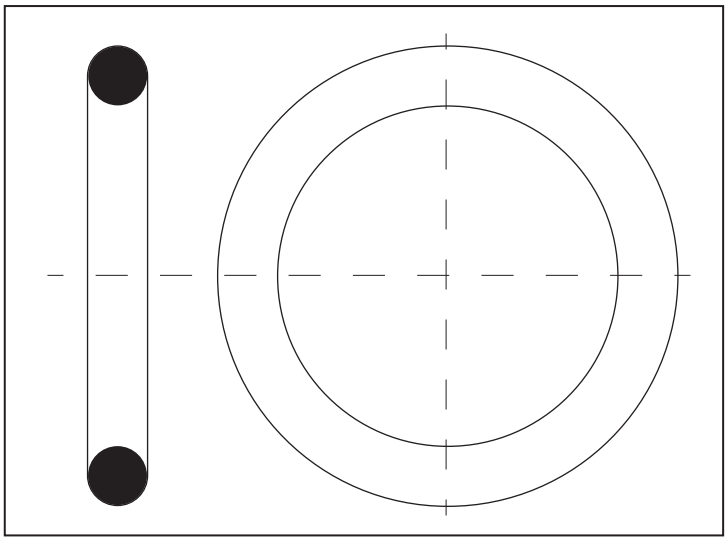


Fig. 1.15

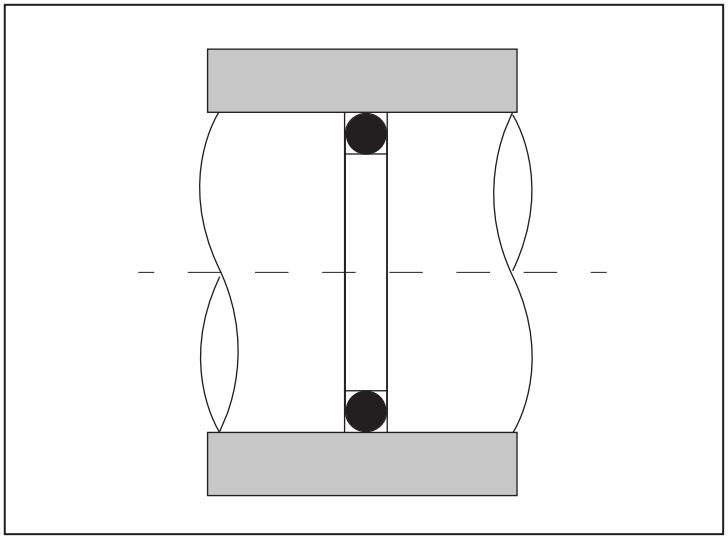


Fig. 1.16

6.3 Bearings

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.

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.

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. 1.17 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 an 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.

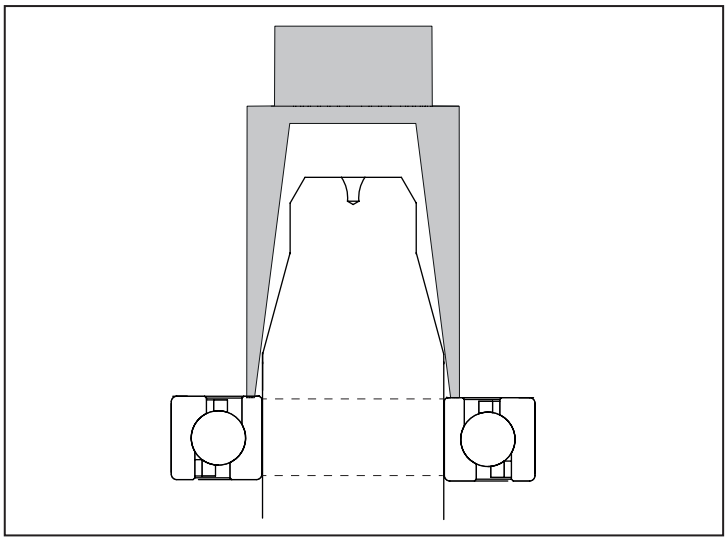


Fig. 1.17

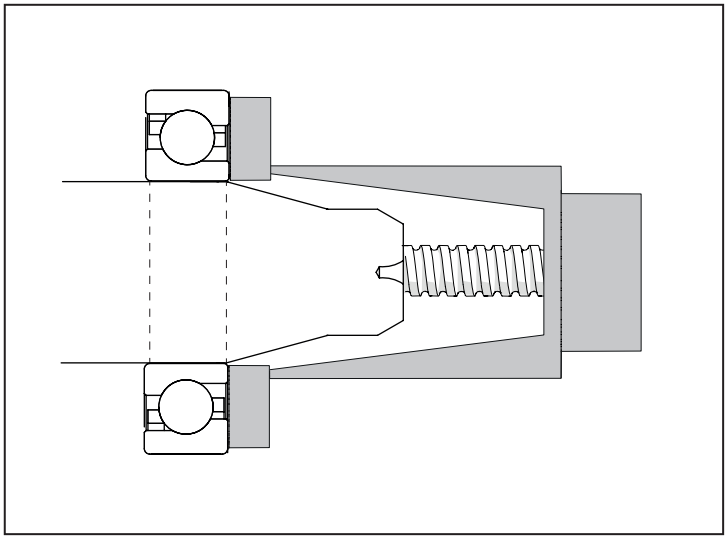


Fig. 1.18

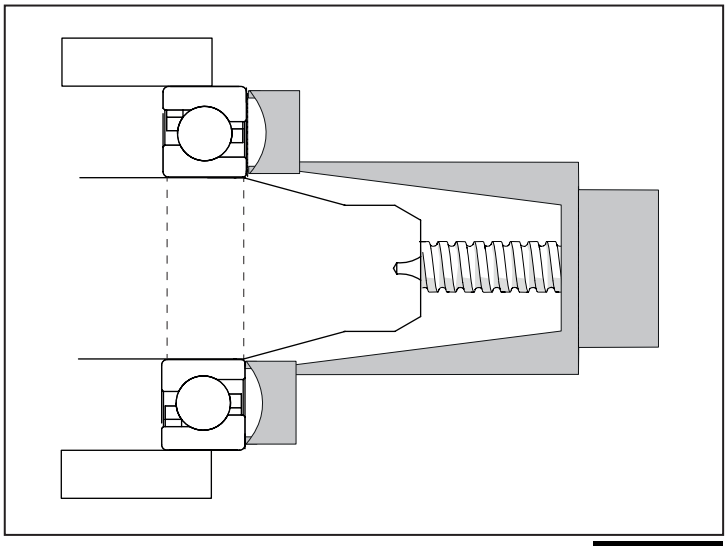


Fig. 1.19

- 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.

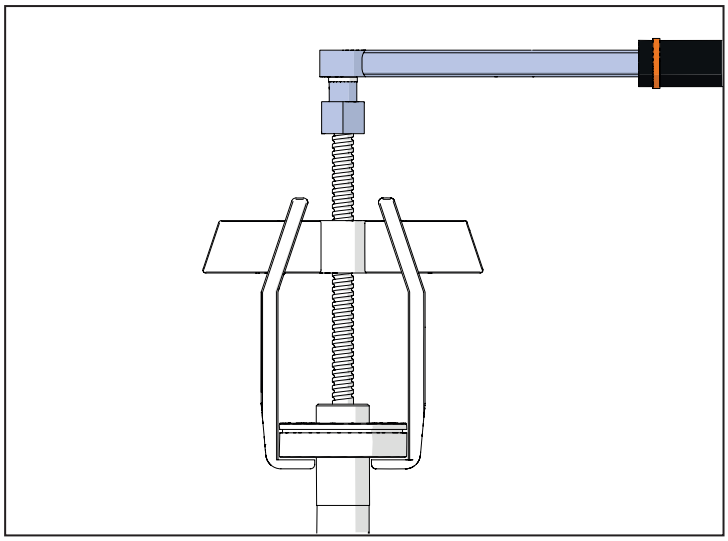


Fig. 1.20

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.

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.

Chapter 2 : Engine

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4.1 Tightening specifications 2-36

Section 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.

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 shaft 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 environment.
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.

Danger
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.
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.

Section 2 : Technical characteristics

Index

2.1 Technical characteristics 2-6

2.1 Technical characteristics

Brand	VM
Model	D703 IE3
Fuel system	Direct diesel injection
Rated power (ECE R120)	48.6 kW / 66 HP
Emissions compliance	STEP 3A
Number of cylinders	3
Intake	Turbocharged, intercooled
Rated speed	2600 rpm
Cooling	Liquid
Displacement	2082 cm3
Specific fuel consumption (at max. torque engine speed)	-
Maximum torque	260Nm@1200rpm
Torque rise	45.60%
Tank capacity	50 litres
Engine hood	Pressed steel

Section 3 : Removing and refitting the engine

Index

3.1 RS, SN and SN+ Cluster 2-8
3.1.1 Removal 2-8
3.1.2 Refitting 2-20
3.2 REV Cluster 2-22
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3.2.2 Refitting 2-33

3.1 RS, SN and SN+ Cluster

3.1.1 Removal

The main operations necessary to access the assembly 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.

Remove the screws, nuts, and then remove the engine bracket.

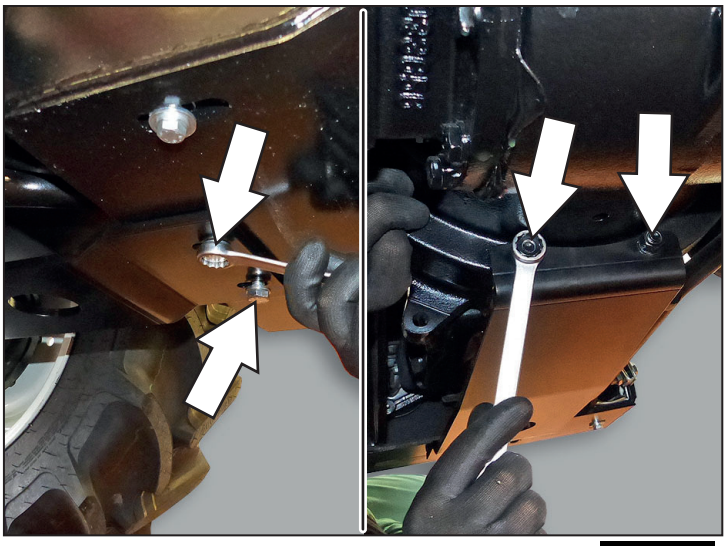


Fig. 2.1

Remove the front wheels.

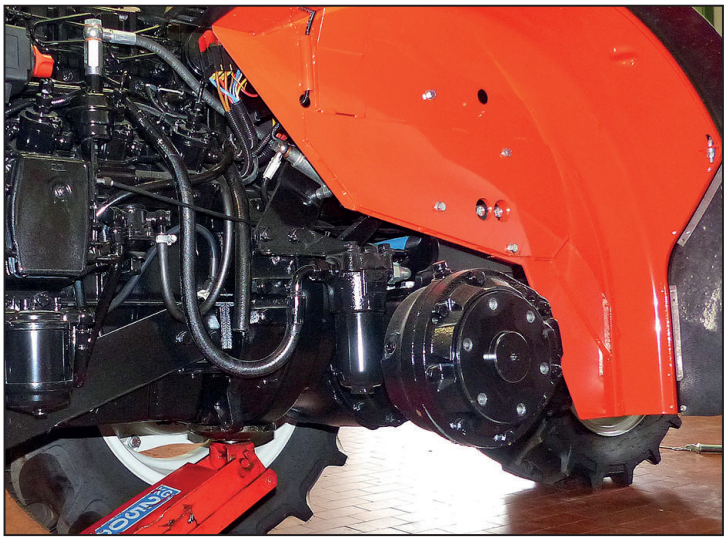


Fig. 2.2

Danger

Place stands under the front wheel hubs to secure the tractor safely.

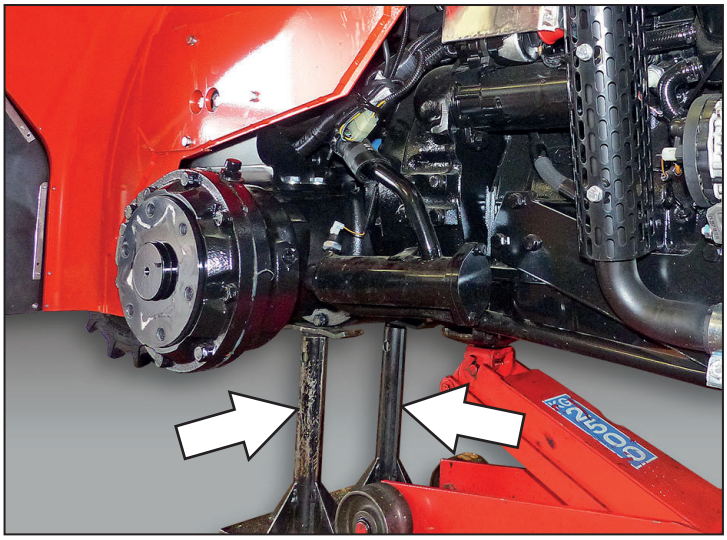


Fig. 2.3

Loosen the clamps and disconnect the air filter clogged sensor connector. Then unscrew the retainers and remove the air filter.

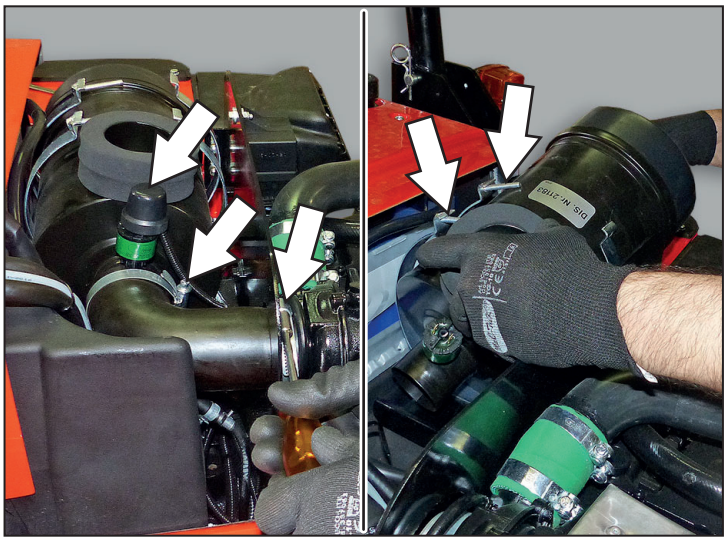


Fig. 2.4

Remove the screws fastening the air filter mount the air deflector plate.

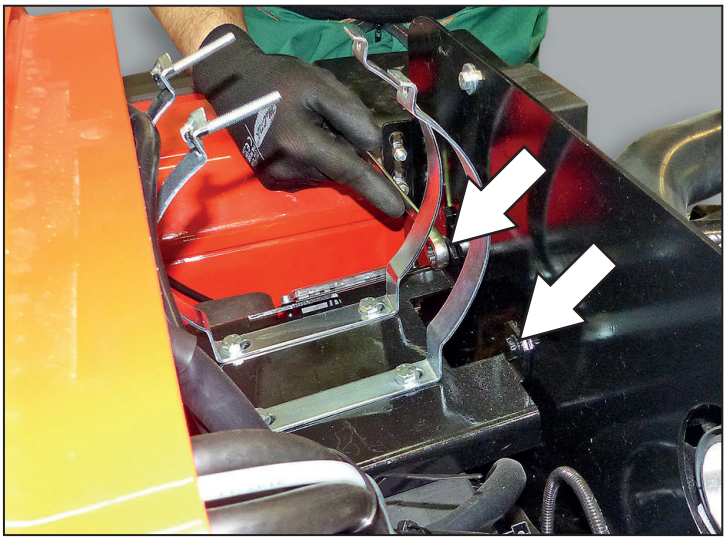


Fig. 2.5

Undo the screws and remove the fixed bonnet.

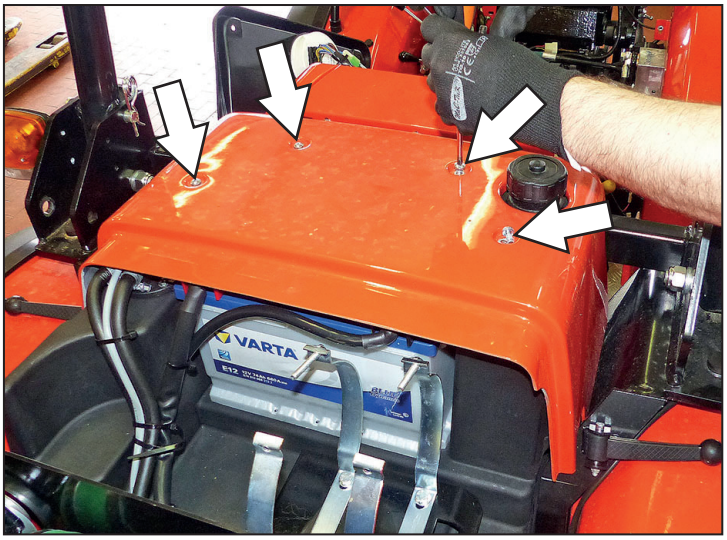


Fig. 2.6

Disconnect the battery.

> **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.

Remove the battery retaining bracket and then the battery.

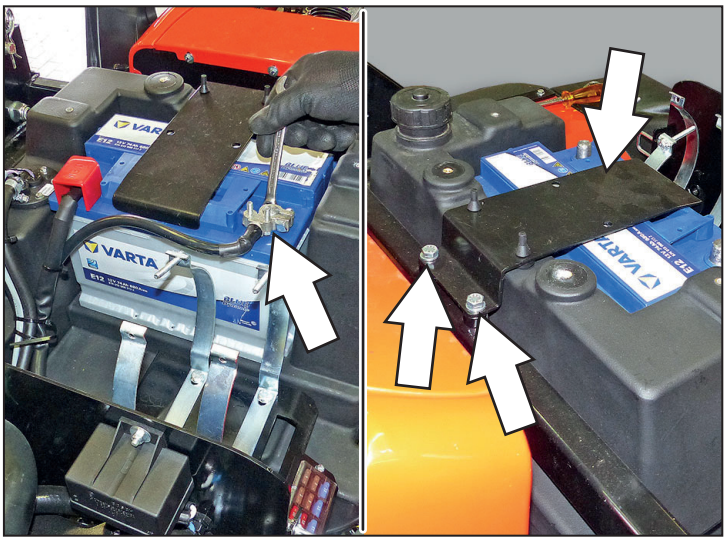


Fig. 2.7

Undo the hex socket screws of the fuse box. Remove the ties and apply leverage with a screwdriver to pull out the fuse box from the plate (1).

Warning

A number of springs are found under the plate (1). Remove the plate (1) carefully to avoid losing them.

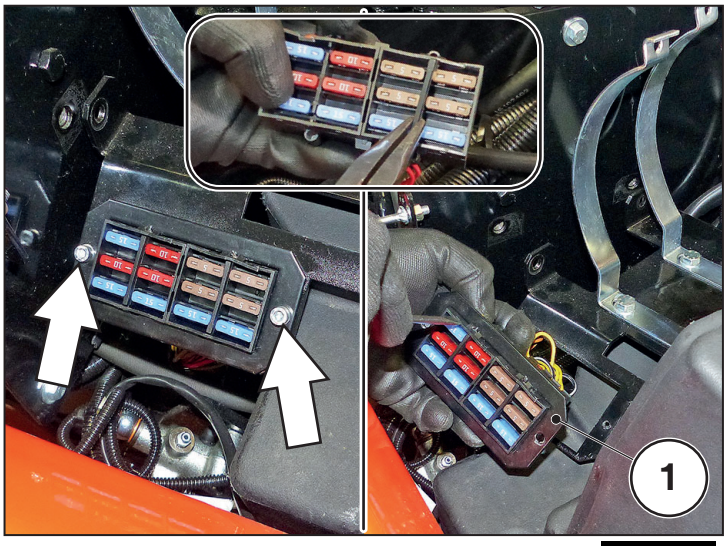


Fig. 2.8

Remove the fuse box wiring loom from the air filter mount and then the air filter mount.

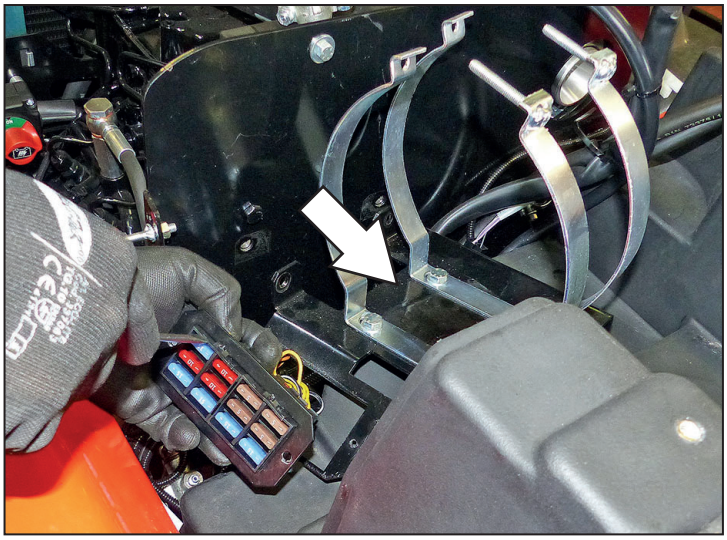


Fig. 2.9

Remove the tank cross member.

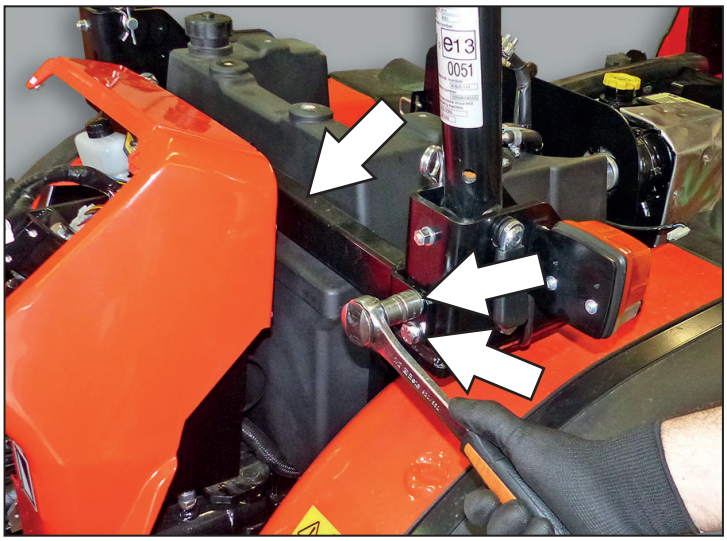


Fig. 2.10

Disconnect the tank wiring loom and the fuel piping.

Undo the screws fastening the tank and remove it.

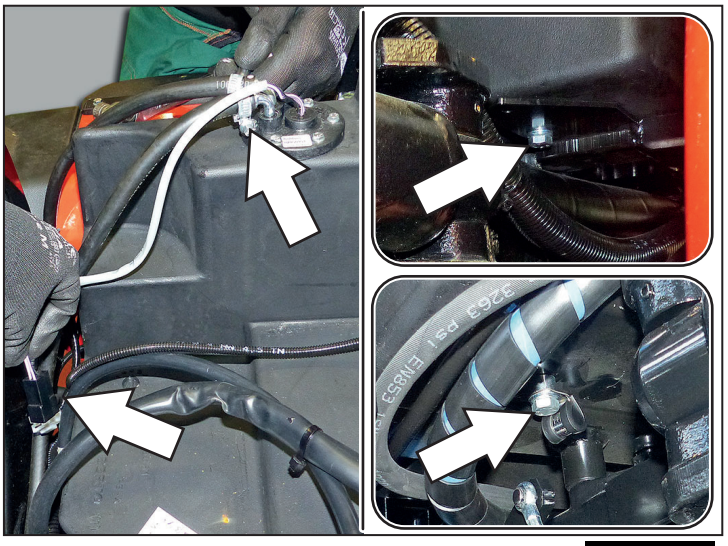


Fig. 2.11

Undo the screws fastening the tank mount and remove it.

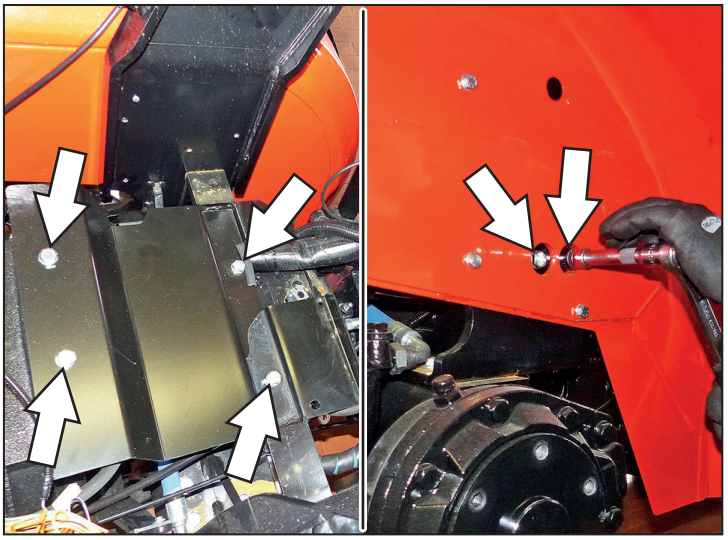


Fig. 2.12

Disconnect the connectors of the mudguard headlamps.

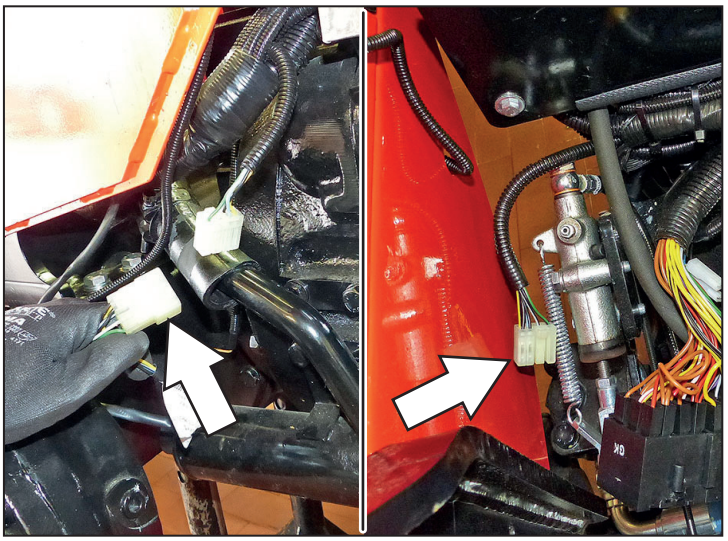


Fig. 2.13

Remove the steering wheel with the relevant extractor tool. Then unscrew the steering column handle screw and remove the handle

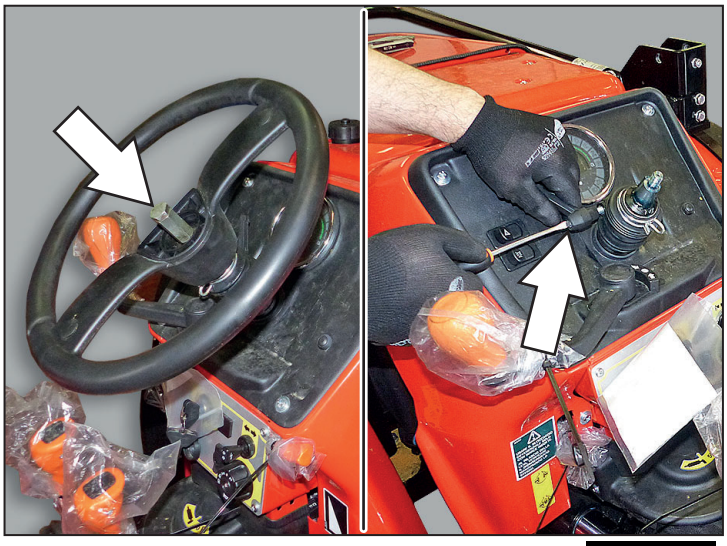


Fig. 2.14

Remove the shuttle knob.

Undo the screws and remove the instrument cluster.

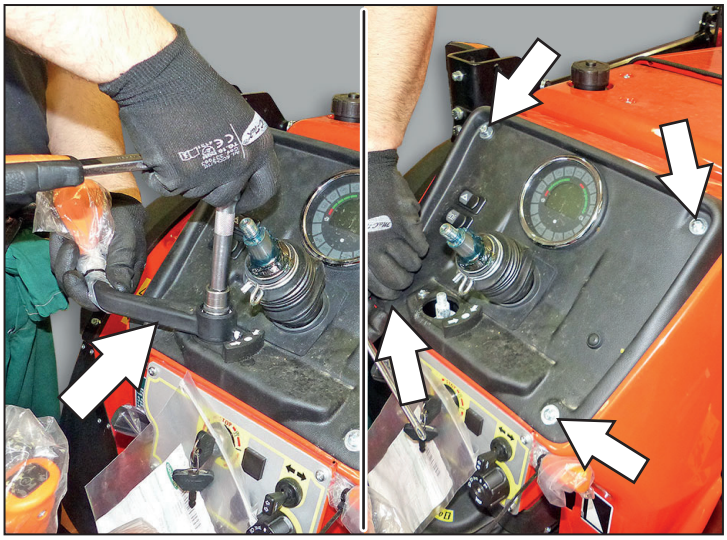


Fig. 2.15

Disconnect the engine wiring loom and pull it out from air deflector plate.

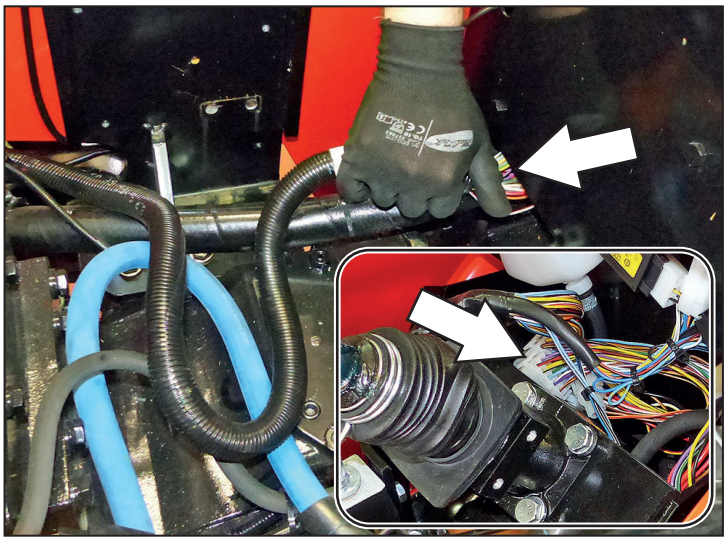


Fig. 2.16

Unscrew the connection fitting and disconnect the lubrication pipe.

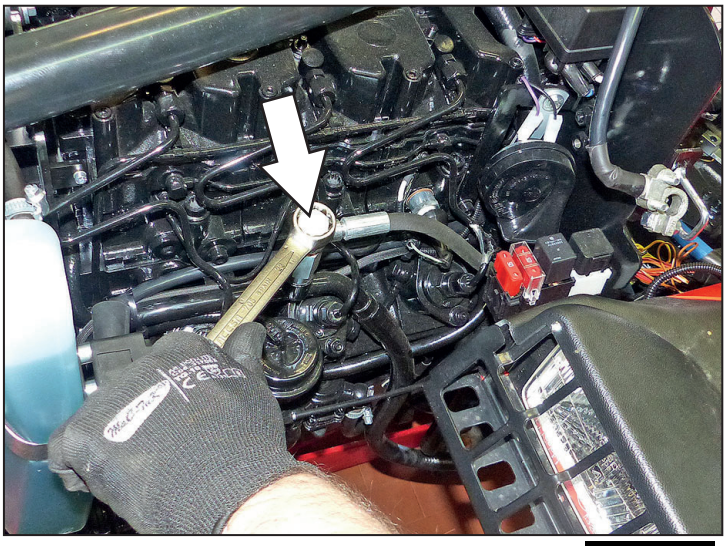


Fig. 2.17

Disconnect the hydraulic steering unit delivery pipe.

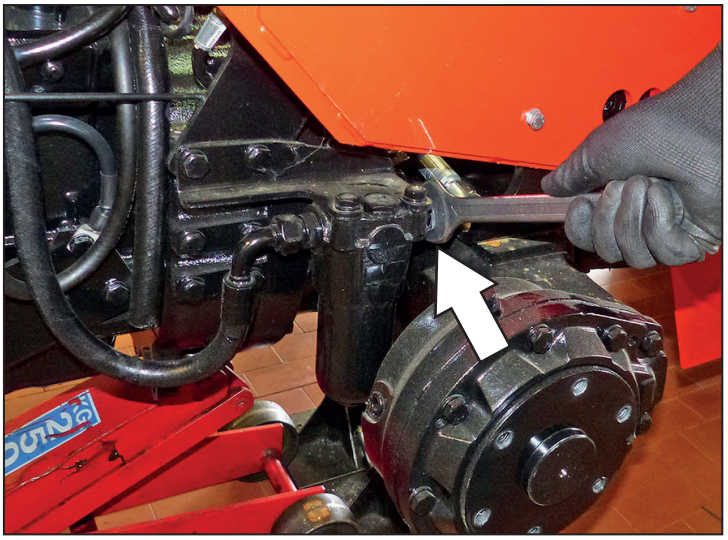


Fig. 2.18

Loosen the clamp to allow the pick-up filter to come off.

Disconnect the intake air filter clogged sensor connector.

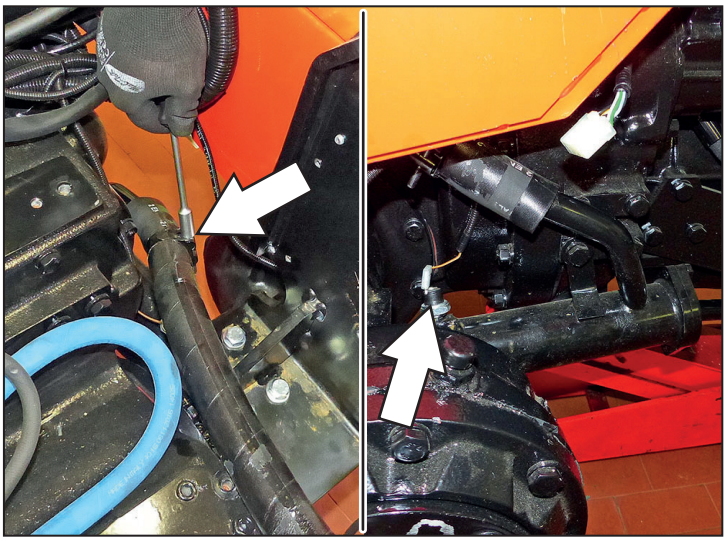


Fig. 2.19

Remove the split pin and the clutch actuator link rod.

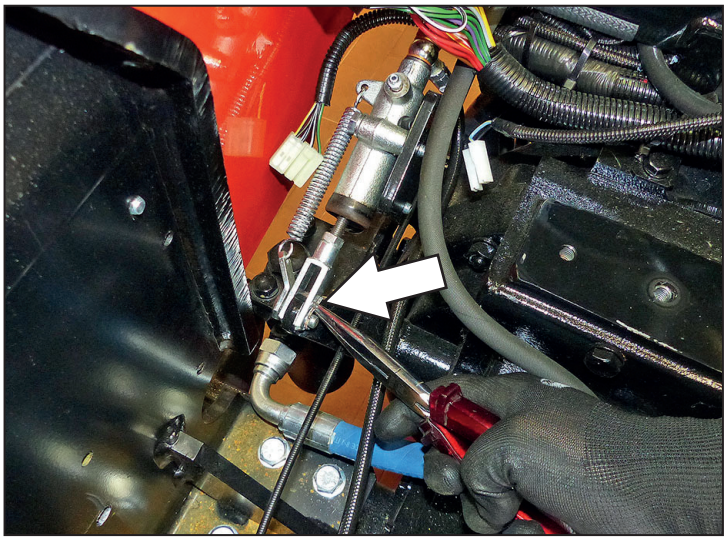


Fig. 2.20

Remove the caps of the bumper bracket and undo the underlying hex socket screws. Remove the bonnet together with the bumper bracket.

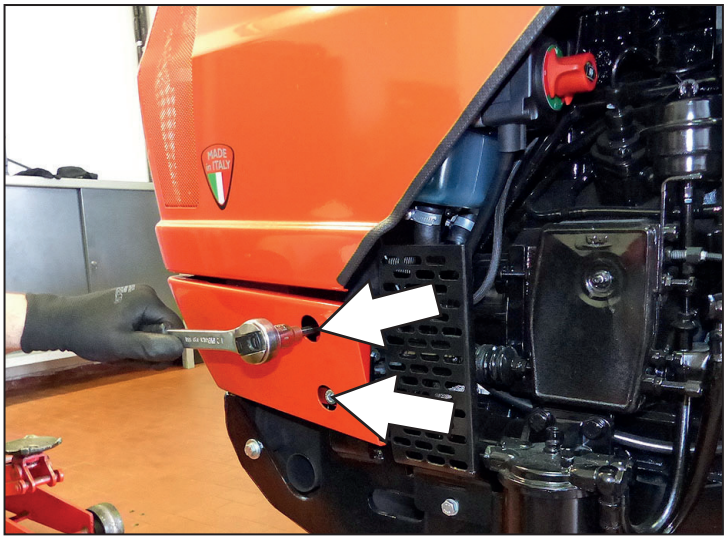


Fig. 2.21

Drain the radiator.

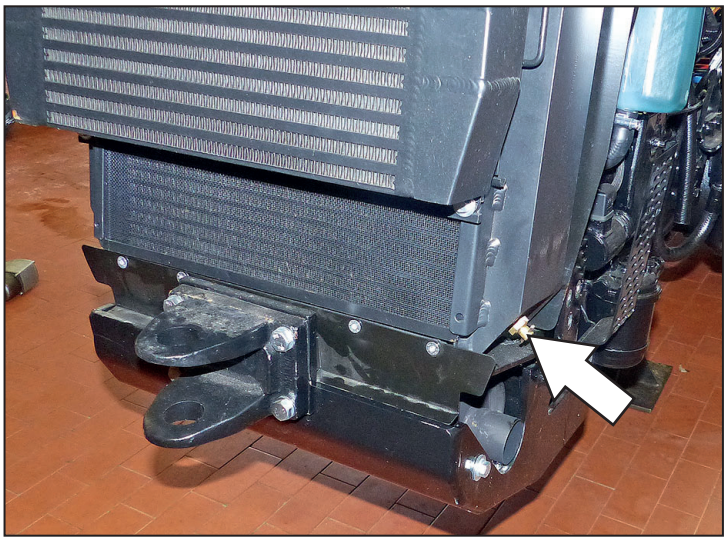


Fig. 2.22

Loosen the clamps and remove the intercooler system hose.

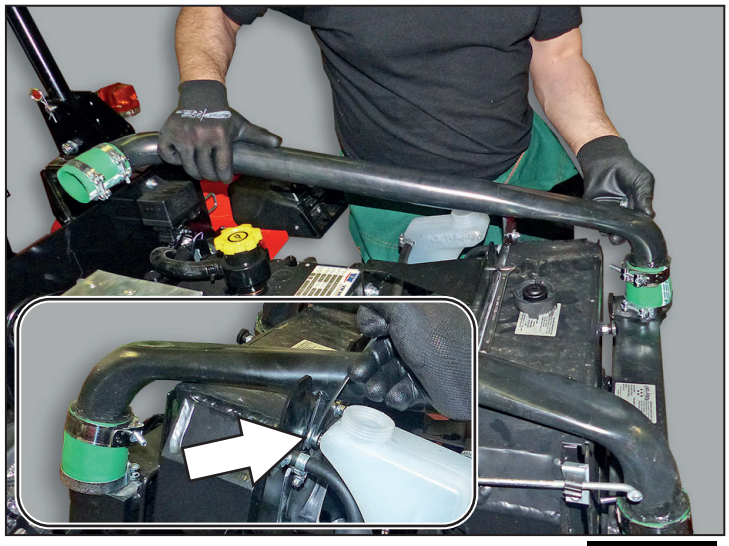


Fig. 2.23

Loosen the clamps and remove the intercooler system hose.



Fig. 2.24

Remove the radiator grille.



Fig. 2.25

Remove the intercooler radiator.

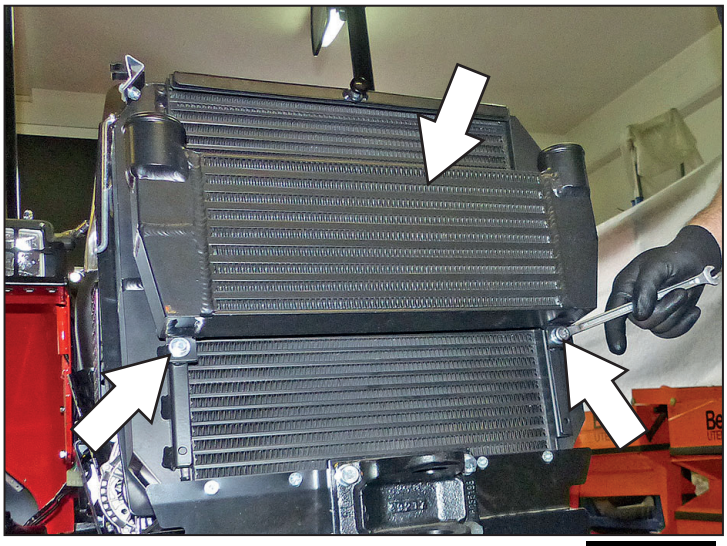


Fig. 2.26

Remove the guard.

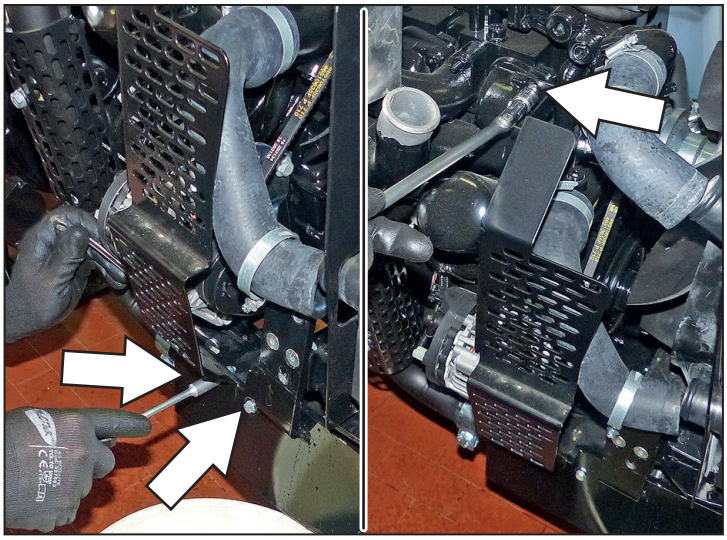


Fig. 2.27

Disconnect the radiator pipes.

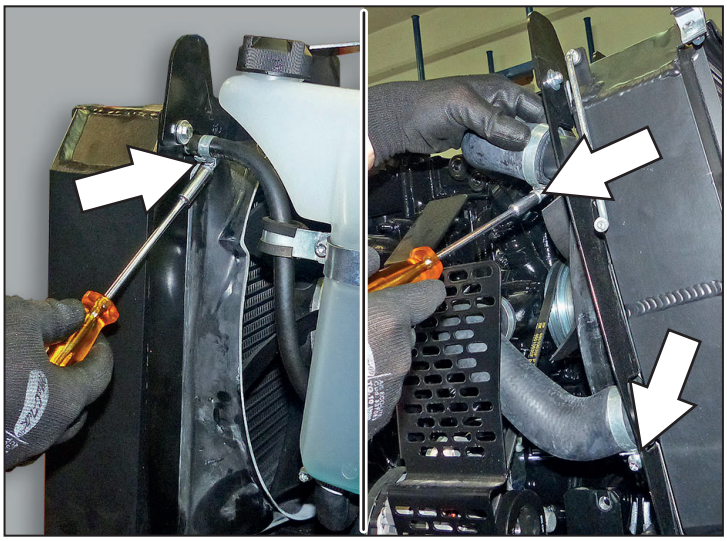


Fig. 2.28

Undo the screws fastening the radiator to the conveyor and to the towing hitch bracket.

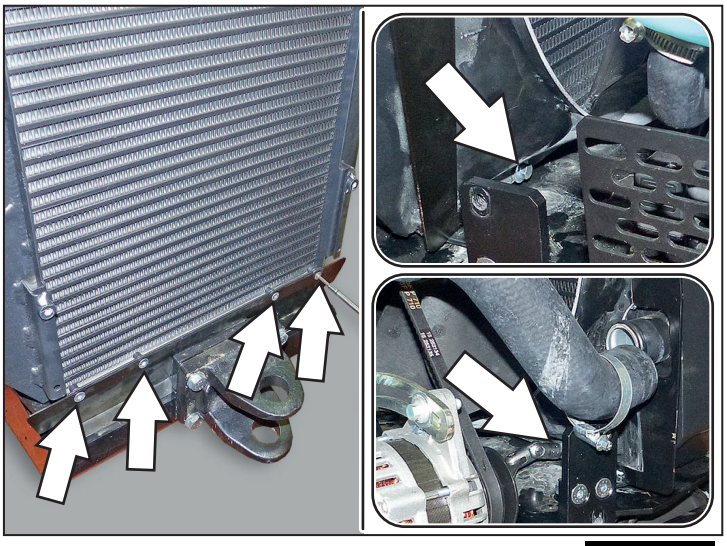


Fig. 2.29

Undo the fastener screws and remove the fan. Pull out the transmission belts from the pulley located behind the fan.

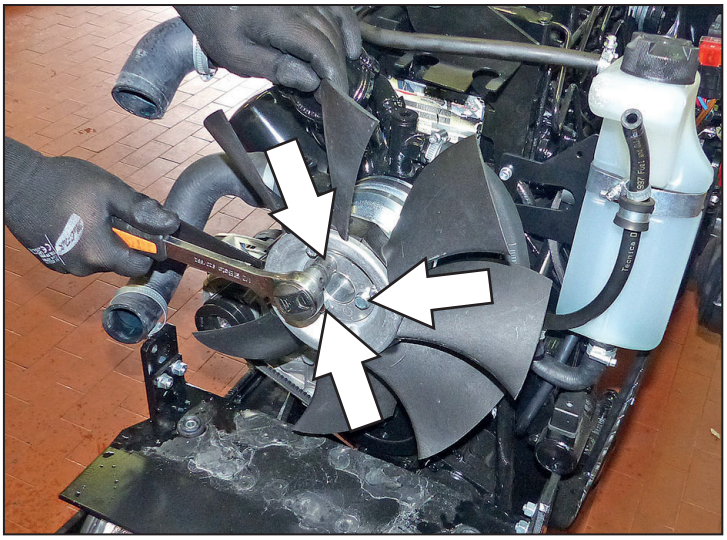


Fig. 2.30

Secure the engine safely with a hoist of adequate lifting capacity.

Danger

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

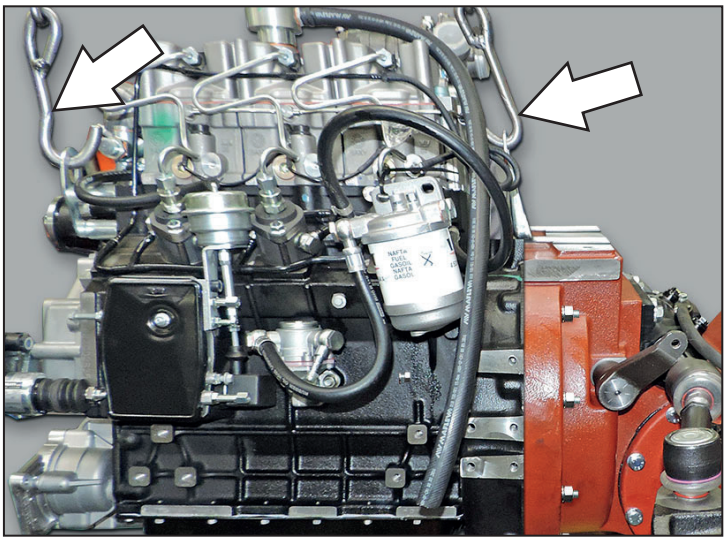


Fig. 2.31

Undo the nuts and screws fastening the engine to the clutch housing.

Warning

Make sure to have disconnected all the wiring looms and hydraulic pipes that may hinder removal.

Remove the engine assembly.

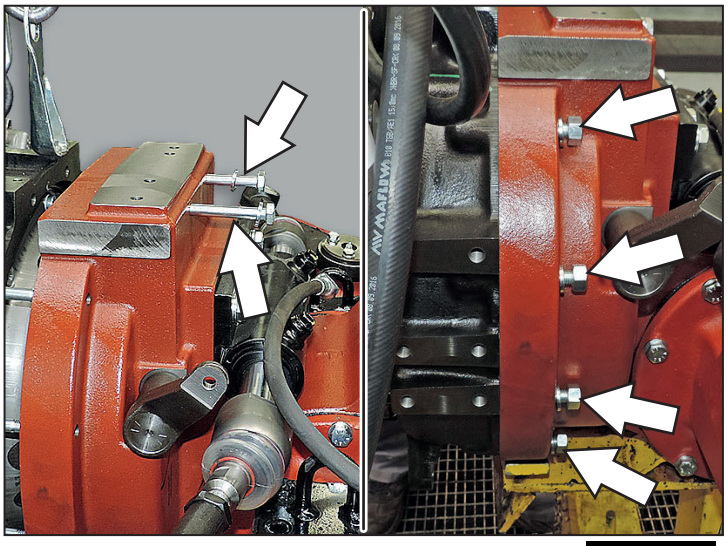


Fig. 2.32

3.1.2 Refitting

Danger

All other persons must stay at a safe distance from the danger area. Avoid vibration when loosening screws.

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".

Reassemble by following the procedure for removal in reverse order, noting the following additional instructions.

Tighten the nuts and screws fastening the engine to the clutch housing to a torque of 50 Nm (5 kgm).

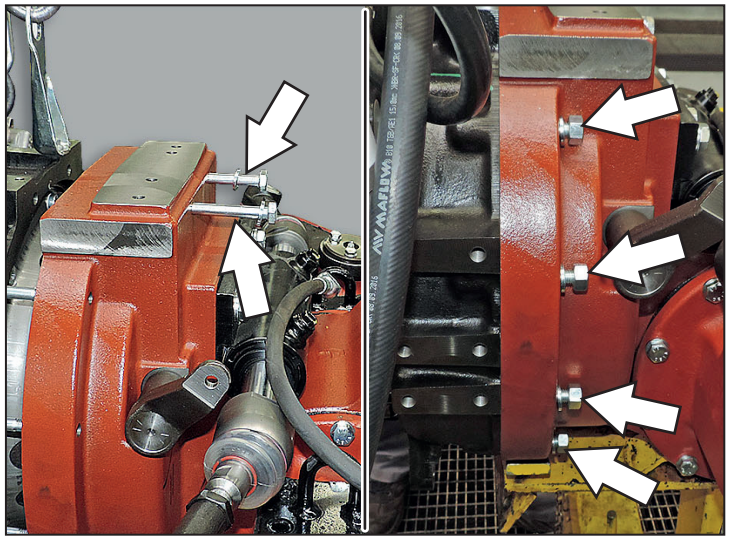


Fig. 2.33

Warning

After fitting the conveyor and radiator, turn the pulley of the alternator and check that the fan turns freely.

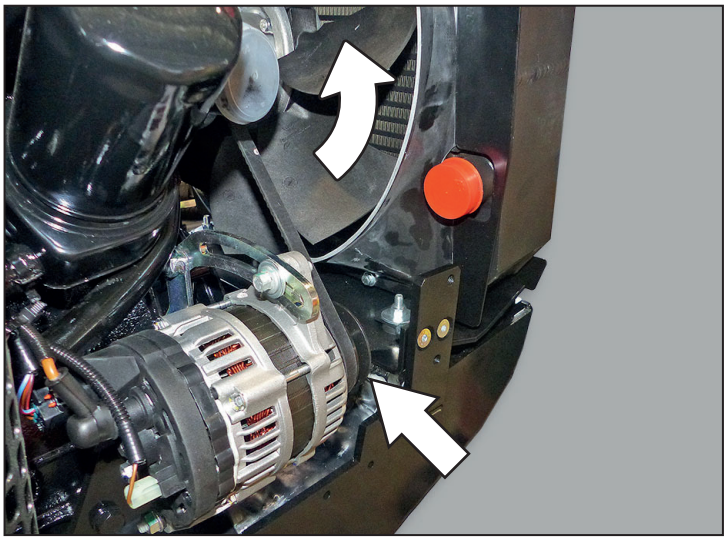


Fig. 2.34

3.2 REV Cluster

3.2.1 Removal

The main operations necessary to access the assembly 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.

Remove the screws, nuts, and then remove the engine bracket.

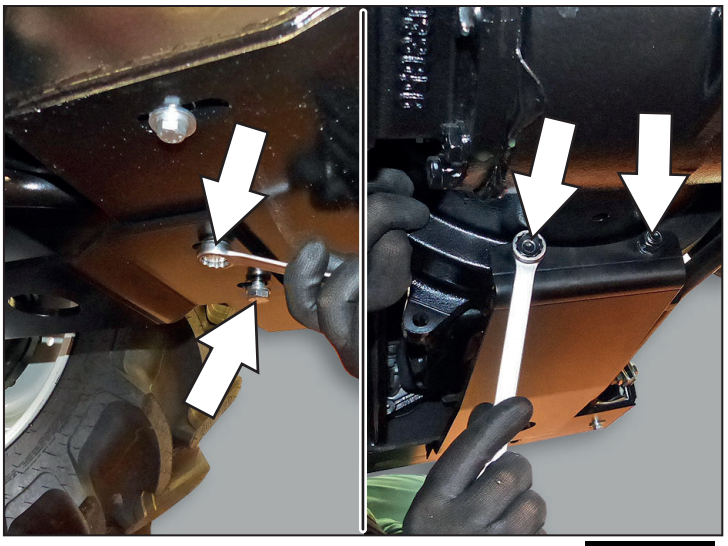


Fig. 2.35

Remove the front wheels.

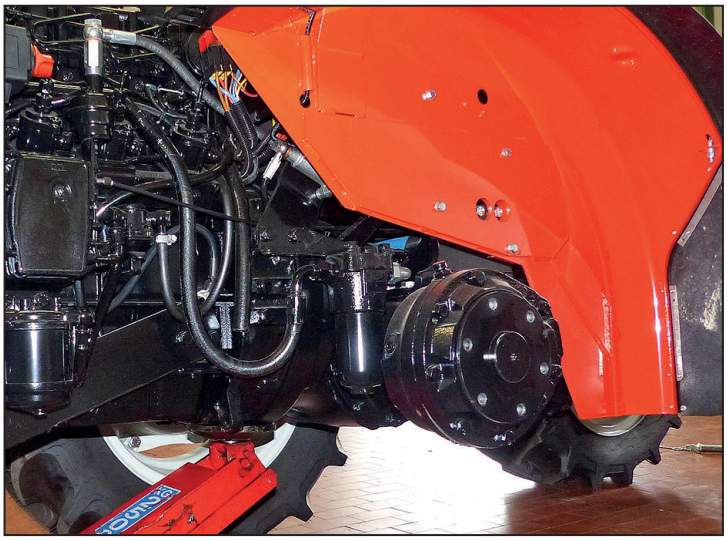


Fig. 2.36

> **Danger**
>
> Place stands under the front wheel hubs to secure the tractor safely.

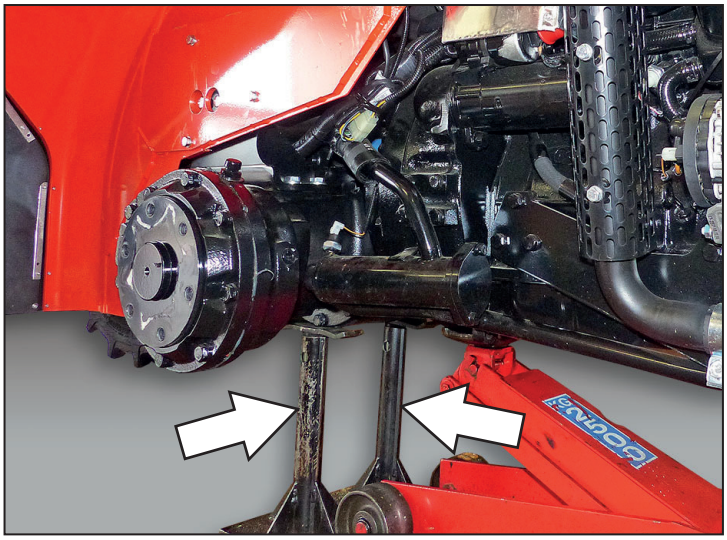


Fig. 2.37

Loosen the clamps and disconnect the air filter clogged sensor connector. Then unscrew the retainers and remove the air filter.

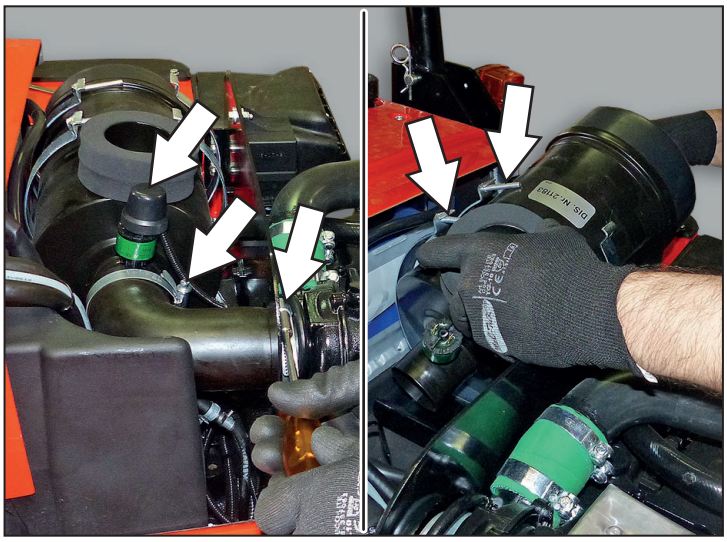


Fig. 2.38

Remove the screws fastening the air filter mount the air deflector plate.

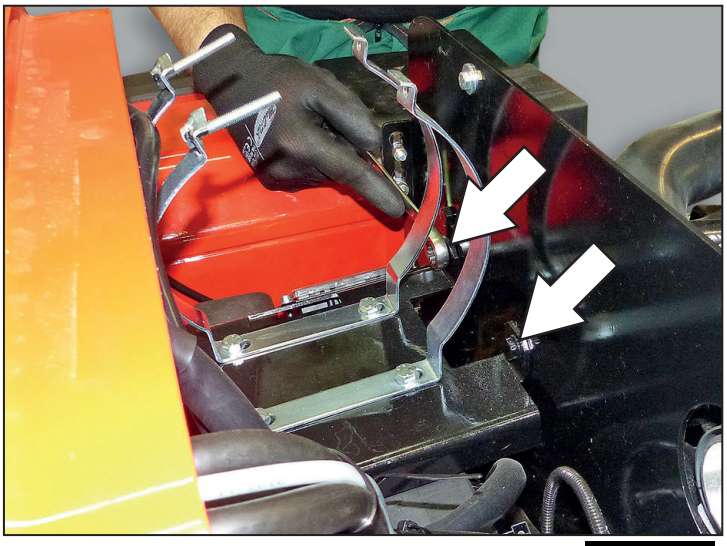


Fig. 2.39

Undo the screws and remove the fixed bonnet.

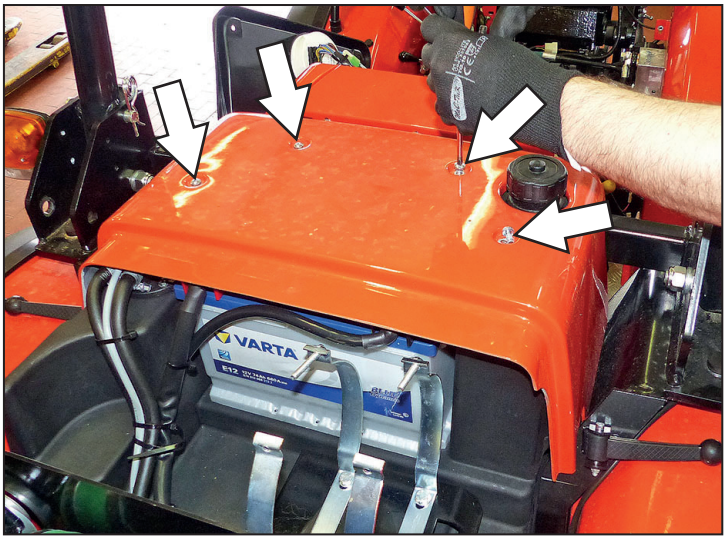


Fig. 2.40

Disconnect the battery.

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.

Remove the battery retaining bracket and then the battery.

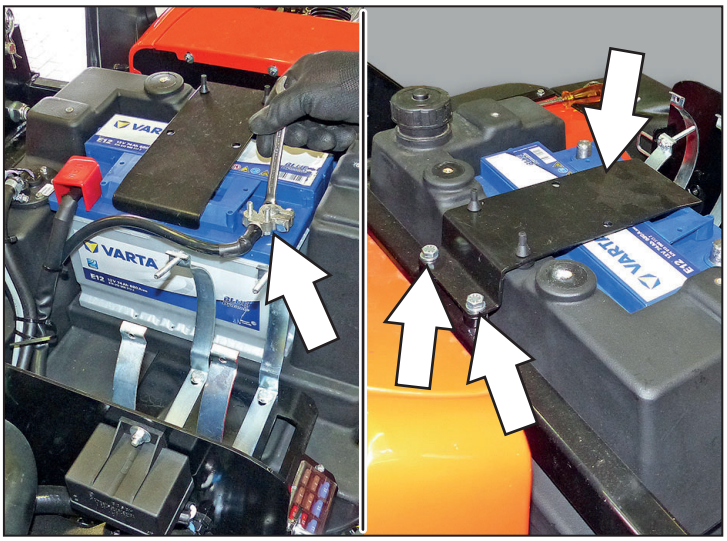


Fig. 2.41

Undo the hex socket screws of the fuse box. Remove the ties and apply leverage with a screwdriver to pull out the fuse box from the plate (1).

Warning

A number of springs are found under the plate (1). Remove the plate (1) carefully to avoid losing them.

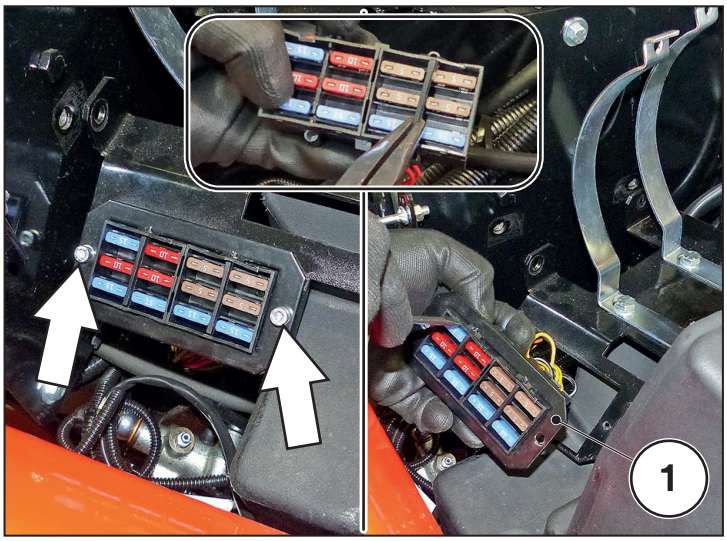


Fig. 2.42

Remove the fuse box wiring loom from the air filter mount and then the air filter mount.

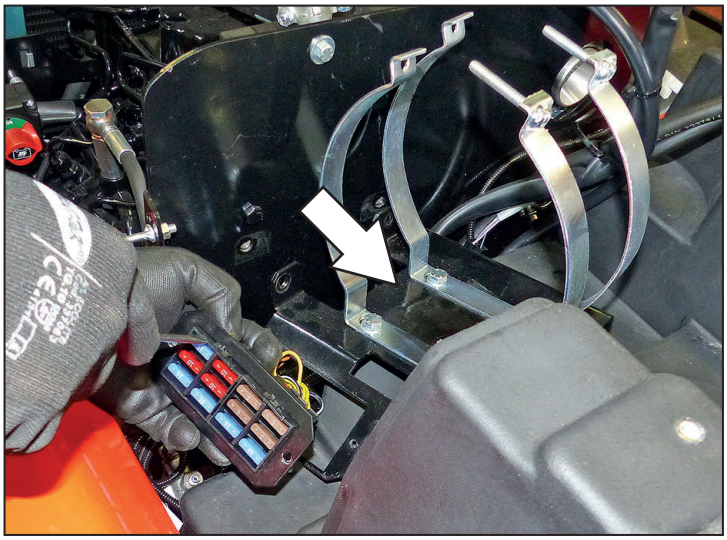


Fig. 2.43

Remove the tank cross member.

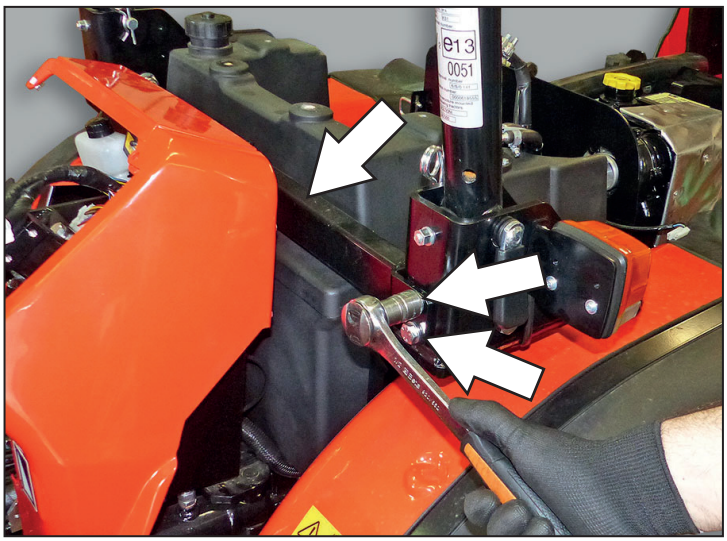


Fig. 2.44

Disconnect the tank wiring loom and the fuel piping.

Undo the screws fastening the tank and remove it.

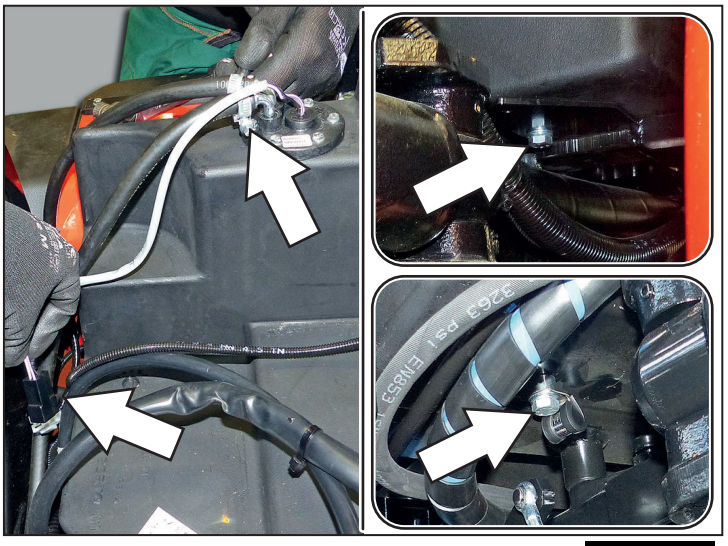


Fig. 2.45

Undo the screws fastening the tank mount and remove it.

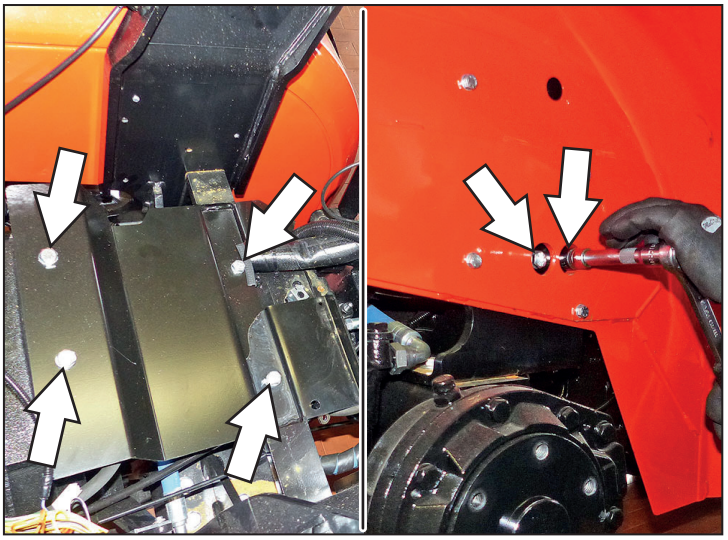


Fig. 2.46

Disconnect the connectors of the mudguard headlamps.

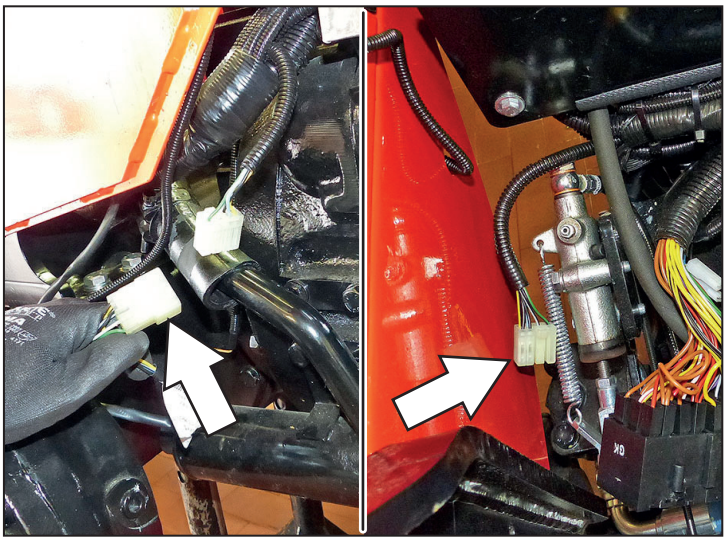


Fig. 2.47

Disconnect the engine wiring loom.

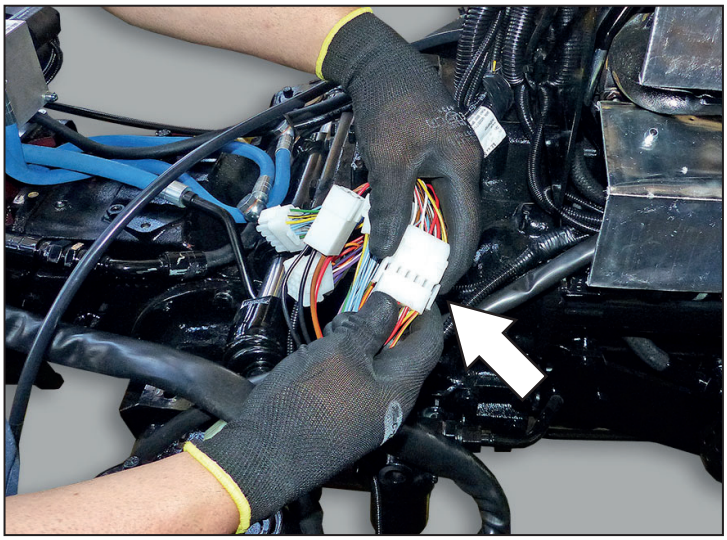


Fig. 2.48

Unscrew the connection fitting and disconnect the lubrication pipe.

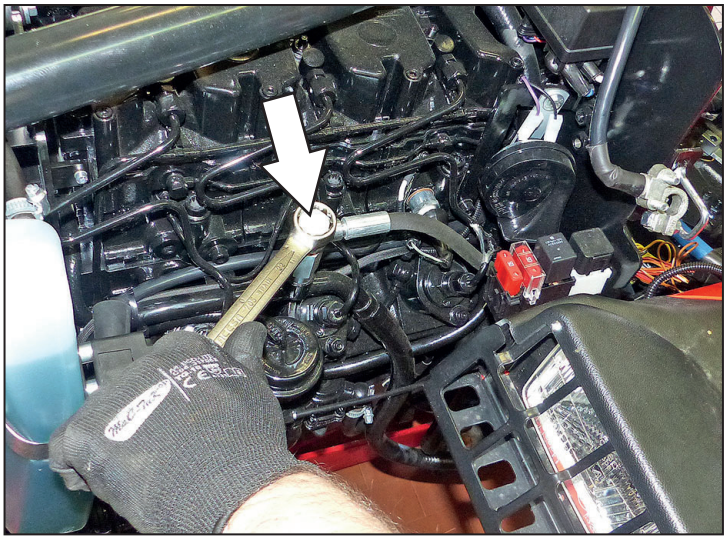


Fig. 2.49

Disconnect the hydraulic steering unit delivery pipe.

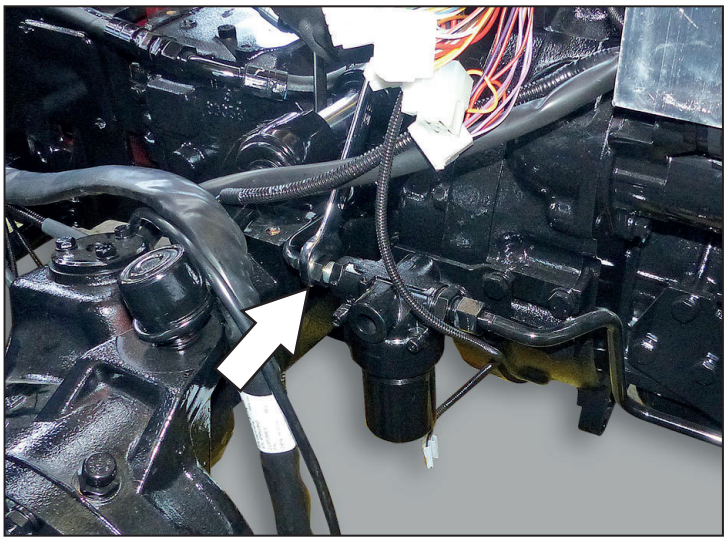


Fig. 2.50

Remove the split pin and the clutch actuator link rod.

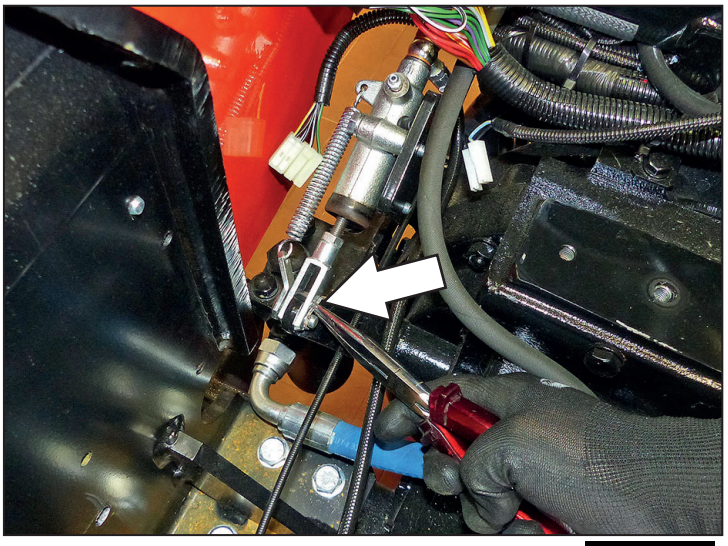


Fig. 2.51

Remove the caps of the bumper bracket and undo the underlying hex socket screws. Remove the bonnet together with the bumper bracket.

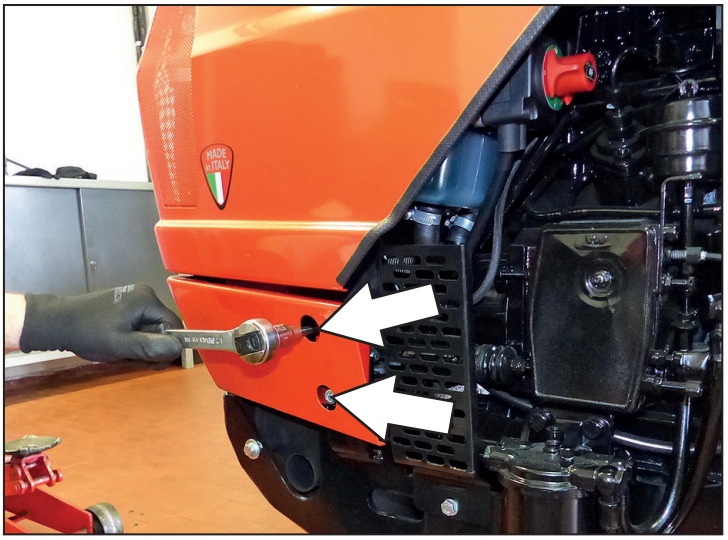


Fig. 2.52

Drain the radiator.

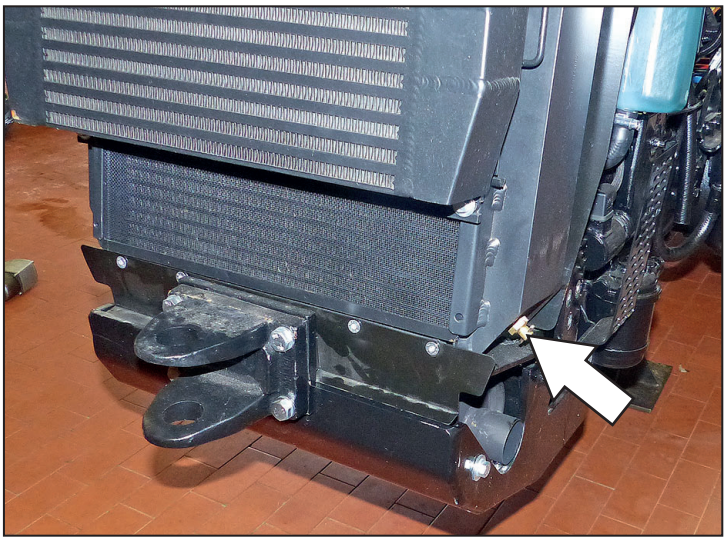


Fig. 2.53

Loosen the clamps and remove the intercooler system hose.

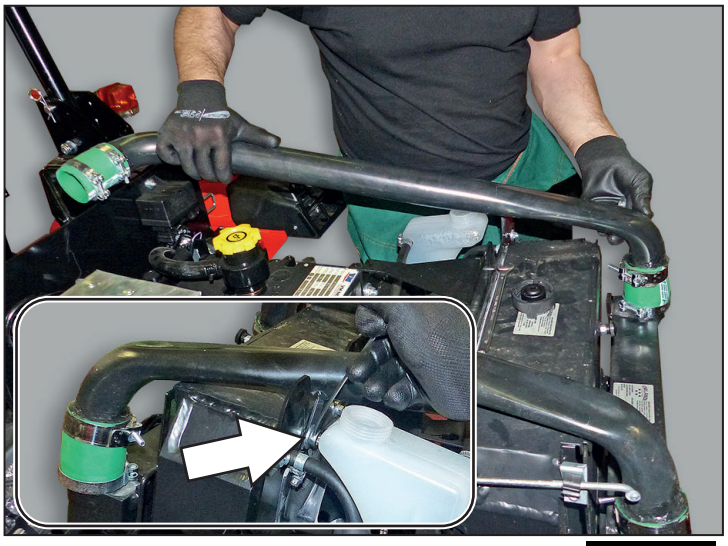


Fig. 2.54

Loosen the clamps and remove the intercooler system hose.

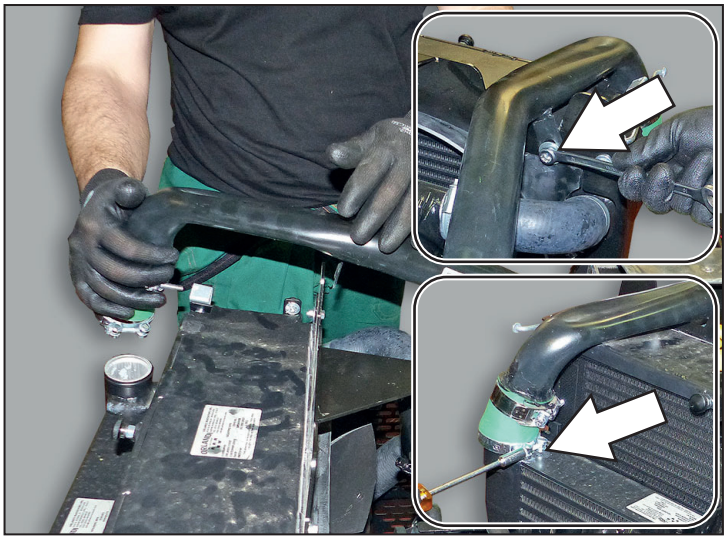


Fig. 2.55

Remove the radiator grille.



Fig. 2.56

Remove the intercooler radiator.

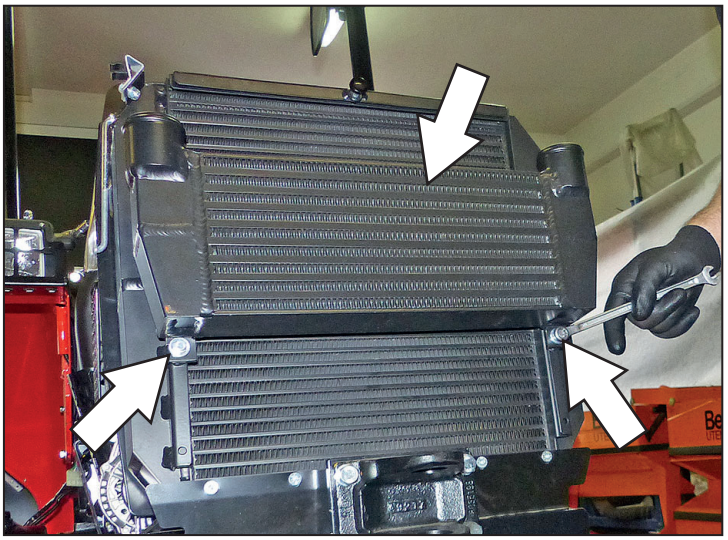


Fig. 2.57

Remove the guard.

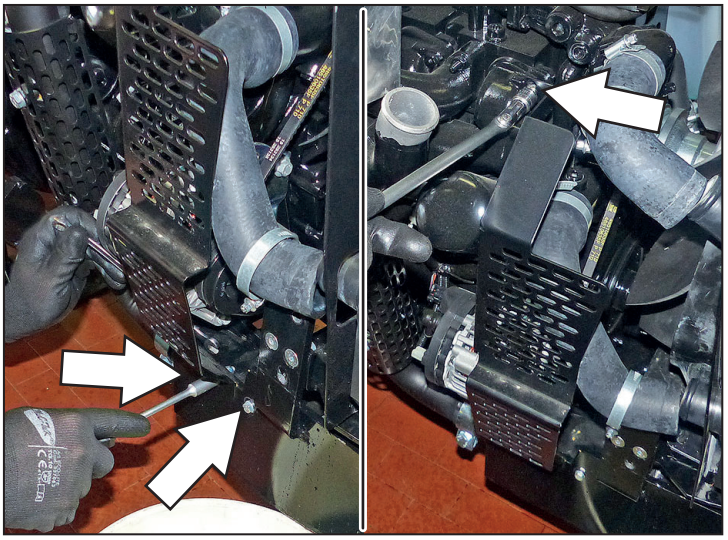


Fig. 2.58

Disconnect the radiator pipes.

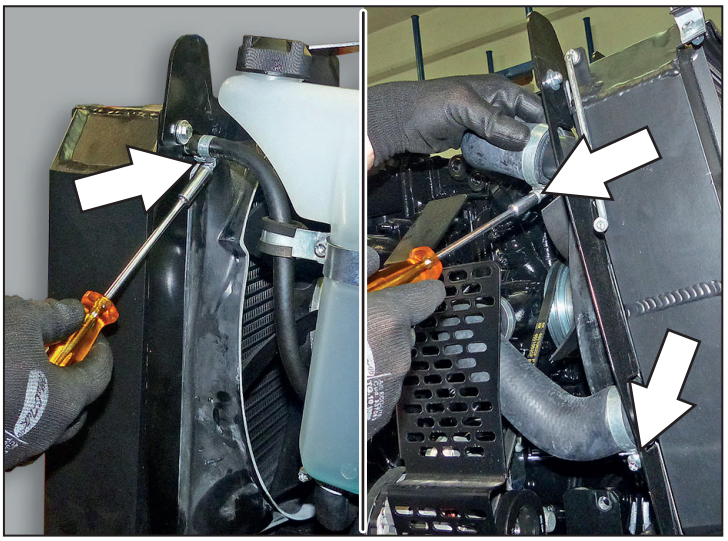


Fig. 2.59

Undo the screws fastening the radiator to the conveyor and to the towing hitch bracket.

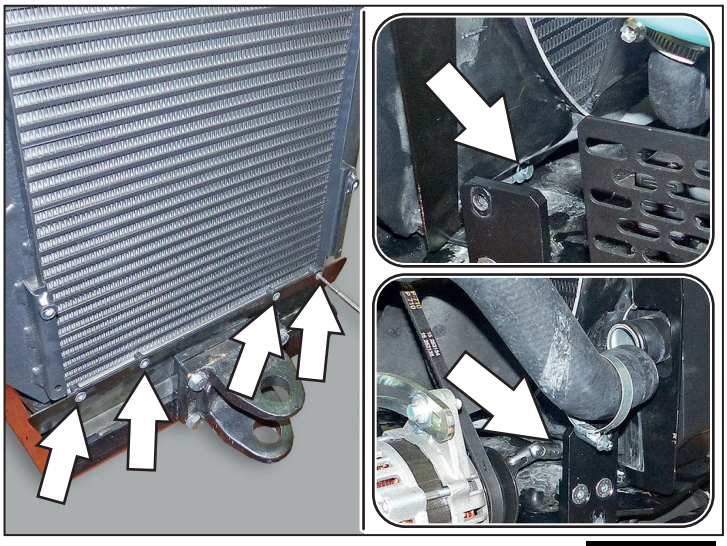


Fig. 2.60

Undo the fastener screws and remove the fan. Pull out the transmission belts from the pulley located behind the fan.

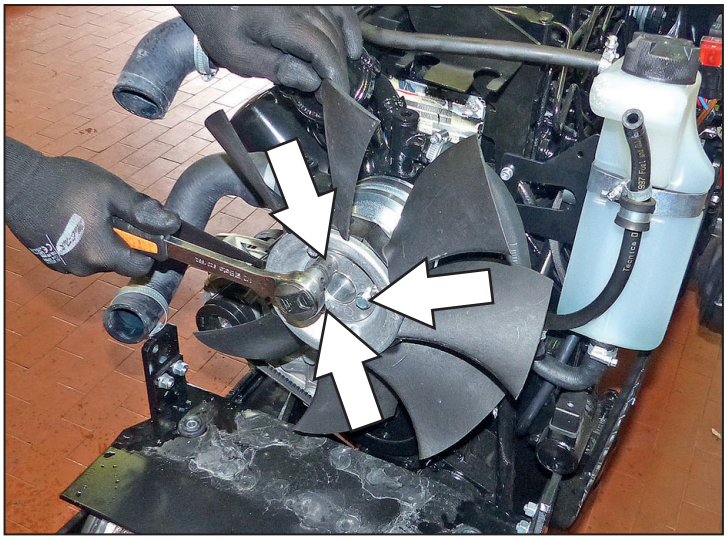


Fig. 2.61

Loosen the clamp and disconnect the suction line. Undo the fastener screw of the tub on the hub.

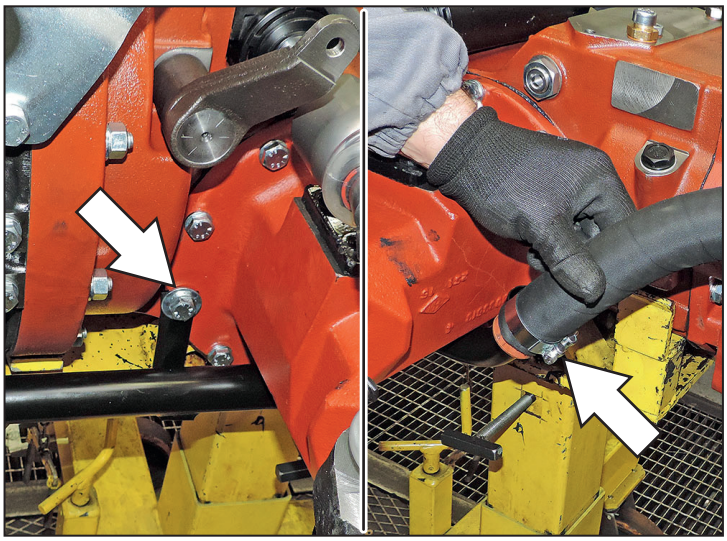


Fig. 2.62

Disconnect the delivery pipe to the distributors near the indicated connection fitting.

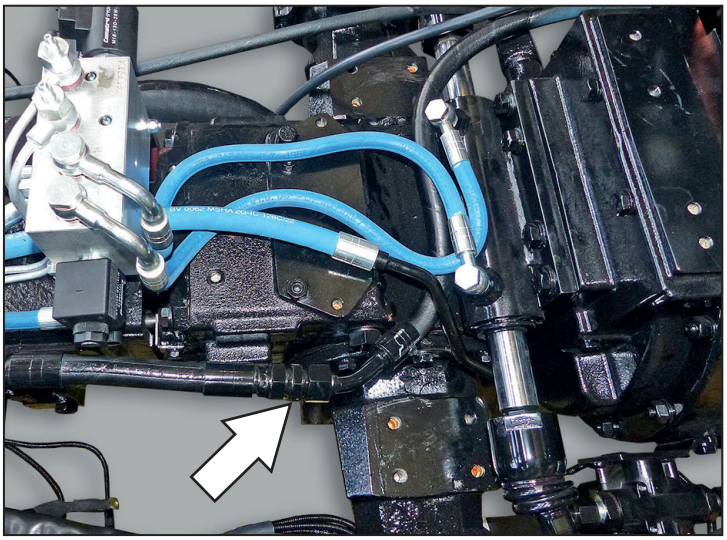


Fig. 2.63

Secure the engine safely with a hoist of adequate lifting capacity.

Danger

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

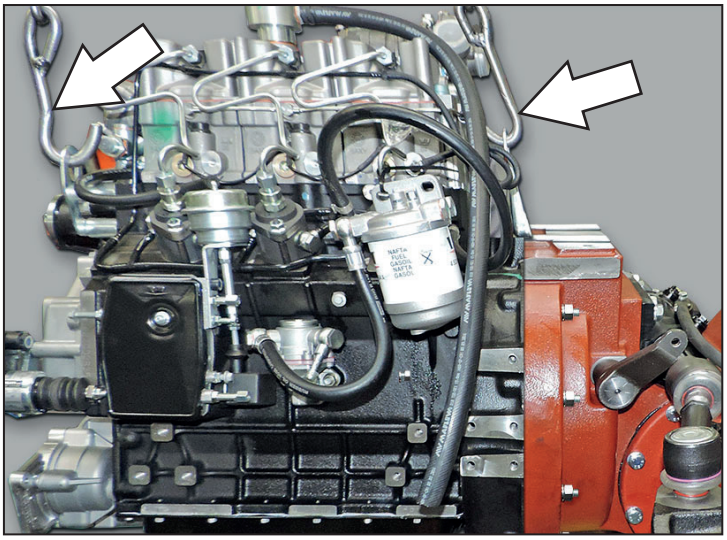


Fig. 2.64

Undo the nuts and screws fastening the engine to the clutch housing.

Warning

Make sure to have disconnected all the wiring looms and hydraulic pipes that may hinder removal.

Remove the engine assembly.

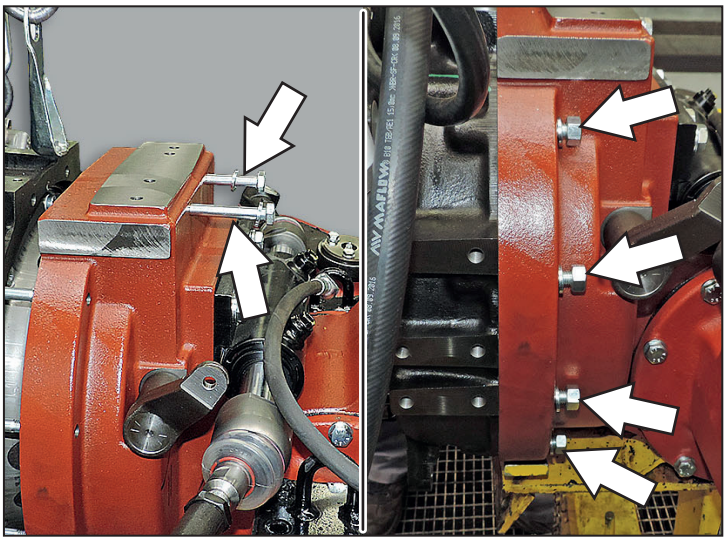


Fig. 2.65

3.2.2 Refitting

Danger

All other persons must stay at a safe distance from the danger area. Avoid vibration when loosening screws.

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".

Reassemble by following the procedure for removal in reverse order, noting the following additional instructions.

Tighten the nuts and screws fastening the engine to the clutch housing to a torque of 50 Nm (5 kgm).

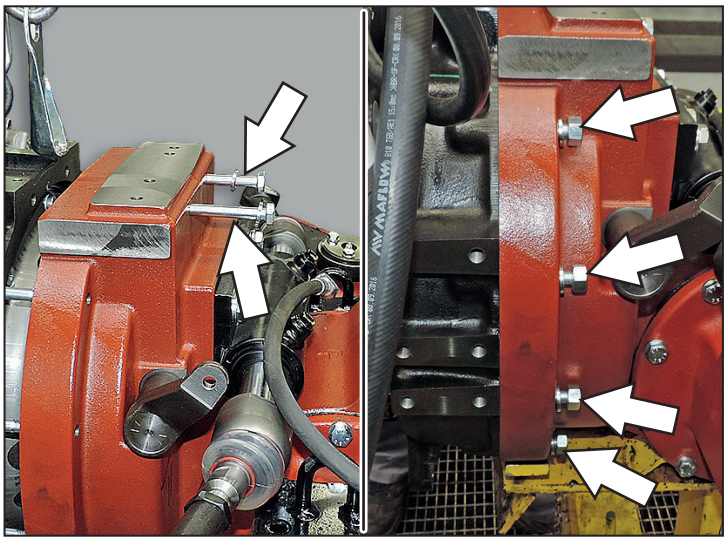


Fig. 2.66

Warning

After fitting the conveyor and radiator, turn the pulley of the alternator and check that the fan turns freely.

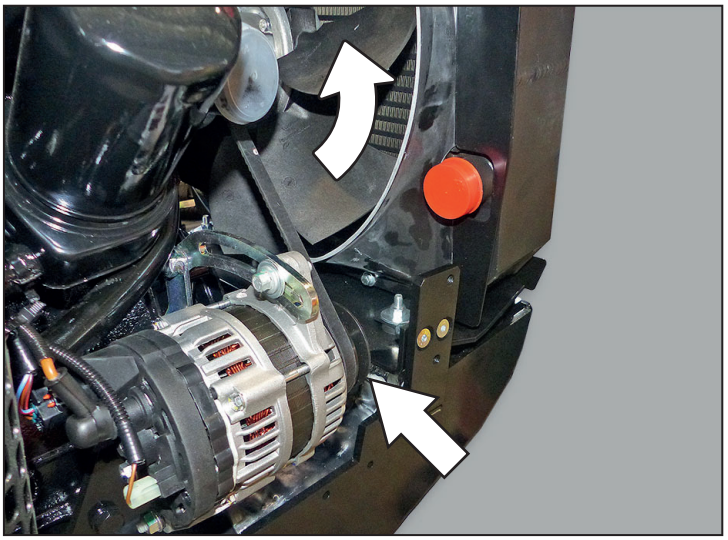


Fig. 2.67

Section 4 : Tightening specifications

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4.1 Tightening specifications 2-36

4.1 Tightening specifications

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1-Introduction".

Tightening torque	Nm	Kgm
Engine - clutch housing fastener nut	50	5

Chapter 3 : Clutch housing

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7.1 Tools necessary 3-24

Section 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.

Section 2 : General introduction

Index

2.1 Assembly drawing.....3-4

2.1 Assembly drawing

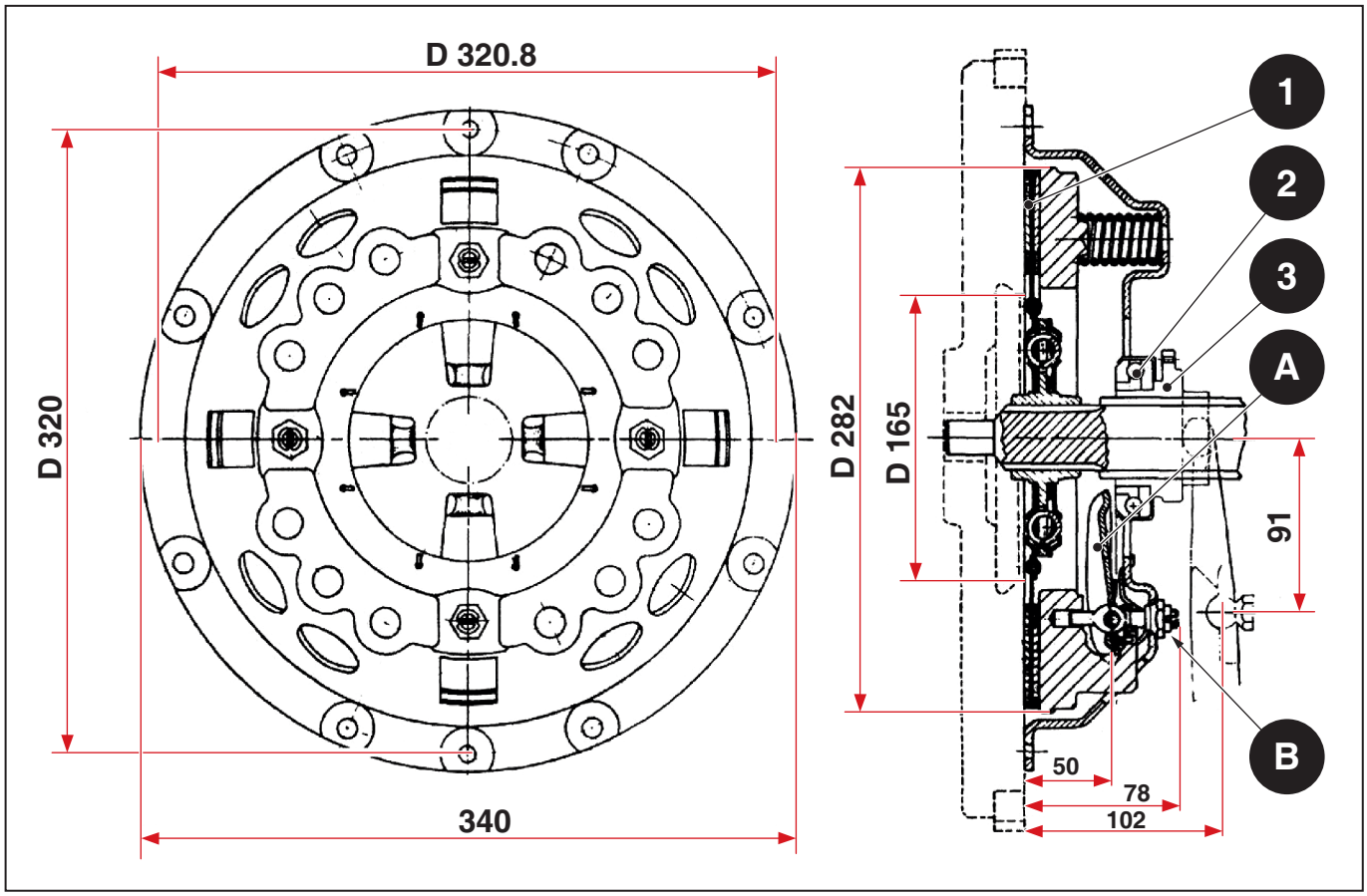


Fig. 3.1

1 - Transmission clutch plate
2 - Thrust bearing
3 - Thrust plate support
A - Transmission clutch lever
B - Lever adjuster screw

Section 3 : Technical characteristics

Index

3.1 Technical characteristics 3-6

3.1 Technical characteristics

Type	Single plate dry clutch, diameter 280 mm
Operation	mechanical-hydraulic

Section 4 : Disassembly

Index

4.1 Preliminary operations 3-8

4.2 Removing the Clutch 3-8

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.

- Remove the engine from the clutch housing.

  See the section “Engine" for the description of the steps needed to separate the two assemblies.

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.

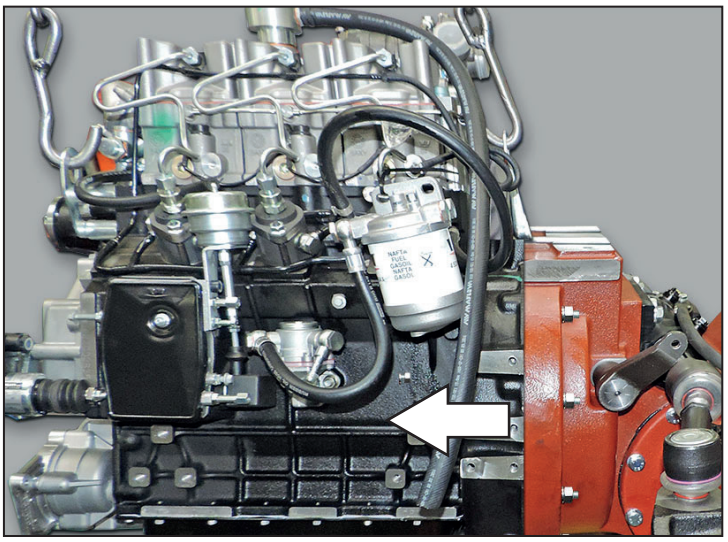


Fig. 3.2

4.2 Removing the Clutch

Fit the tool (07006228) and secure the clutch assembly safely with a hoist.

Undo the screws fastening the clutch.

Remove the complete clutch assembly.

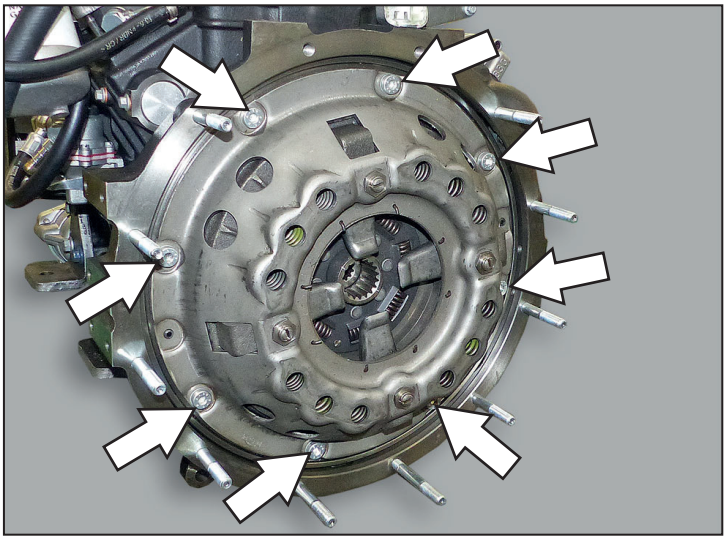


Fig. 3.3

Release the thrust plate support (3) from the fork (5).

Use a pin punch to drive out the pins (7) and then remove the fork (5) and lever (6).

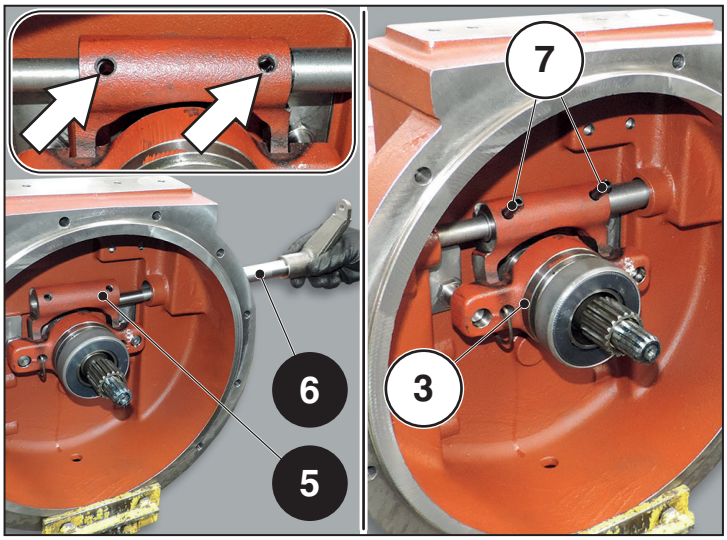


Fig. 3.4

Separate the thrust bearing (2) from the thrust plate support (3).

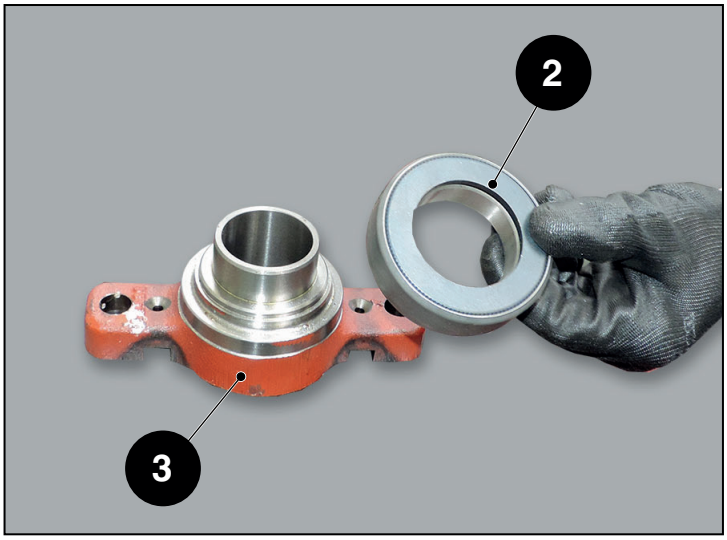


Fig. 3.5

Remove oil seal (8).

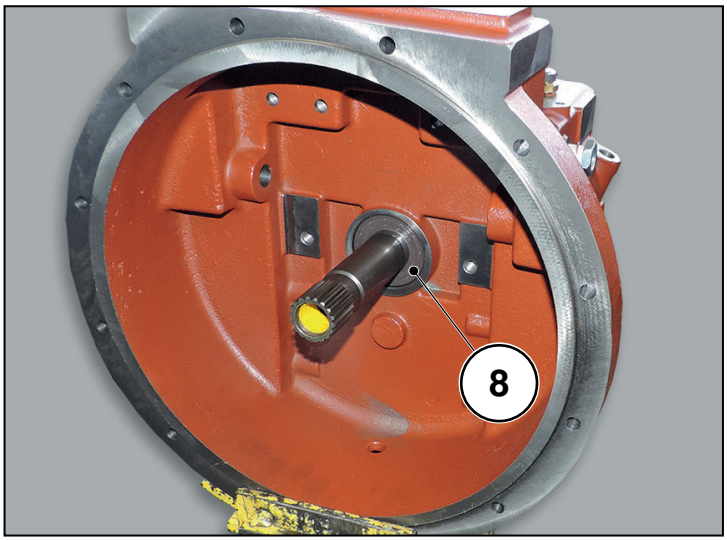


Fig. 3.6

Section 5 : Main inspection, reassembly and adjustment procedures

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5.1.2 Adjusting the clutch levers 3-13

5.2 Reassembly and adjustment 3-14
5.2.1 Refitting the clutch 3-14
5.2.2 Checking oil level 3-17
5.2.3 Clutch pedal adjustment 3-18

5.1 Inspection

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 3.7) is: X= 10.3 to 6.3 mm

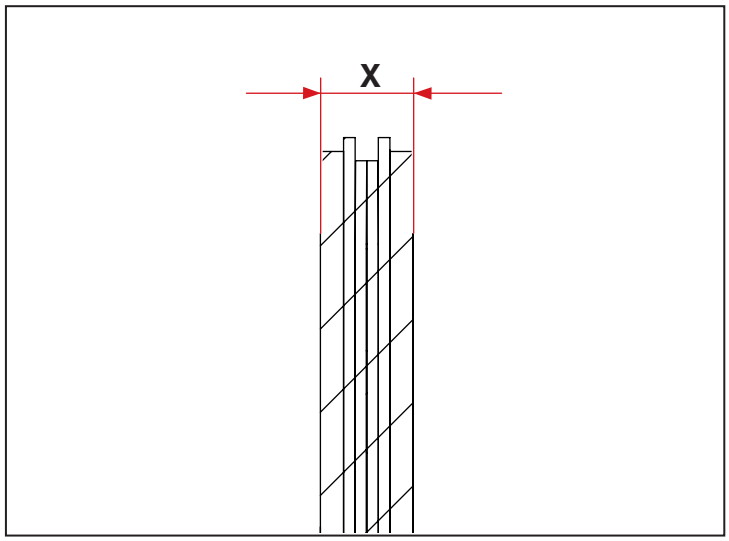


Fig. 3.7

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, replace the springs, as they will not exert the correct thrust against the clutch plate.

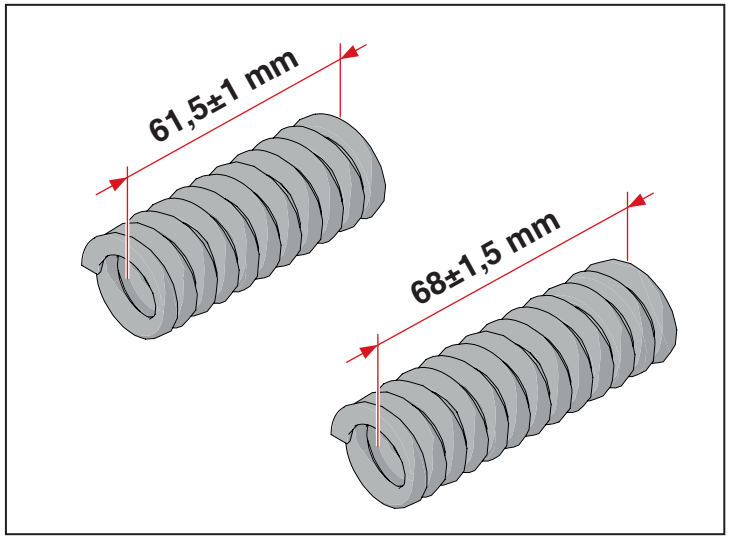


Fig. 3.8

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.

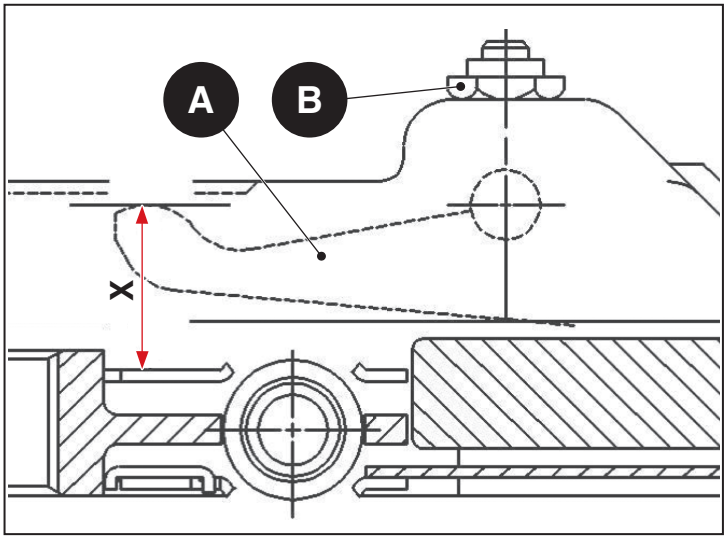


Fig. 3.9

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".

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.

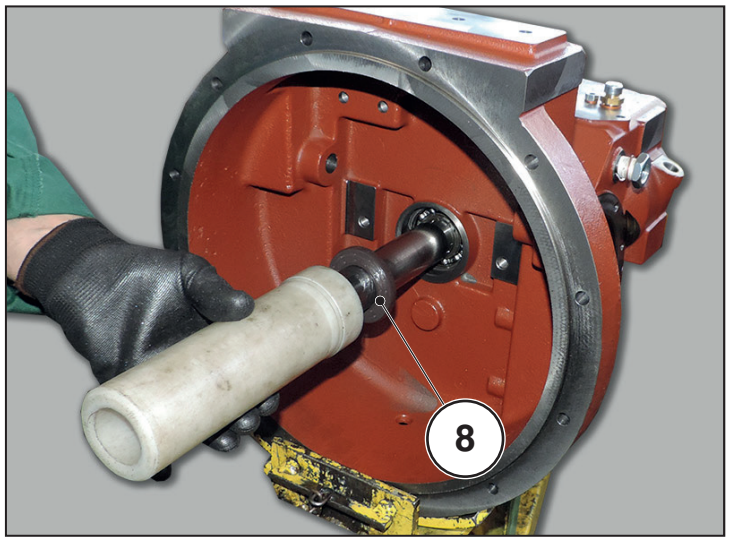


Fig. 3.10

Preassemble the thrust plate support (3) by fitting the thrust bearing (2). 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).

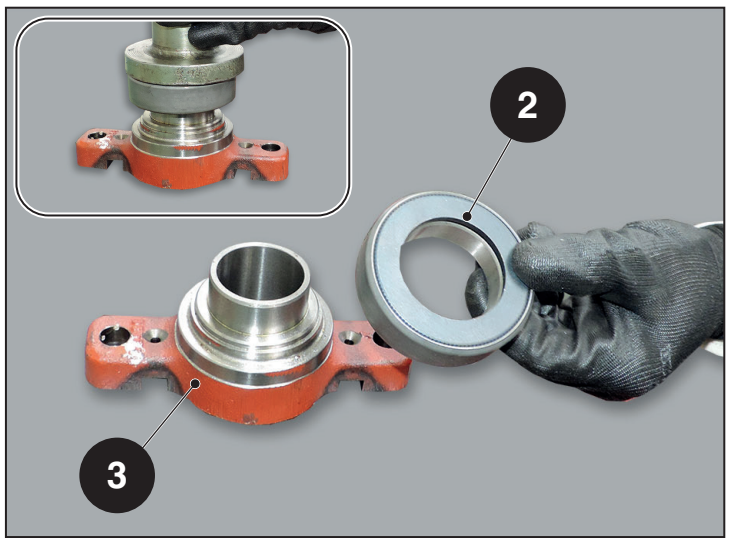


Fig. 3.11

Fasten one end of the return springs (4) to the thrust plate support (3) and then the other end to the holes in the clutch fork (5).

Turn the clutch fork (5) in the indicated direction to fasten the return springs (4) completely.

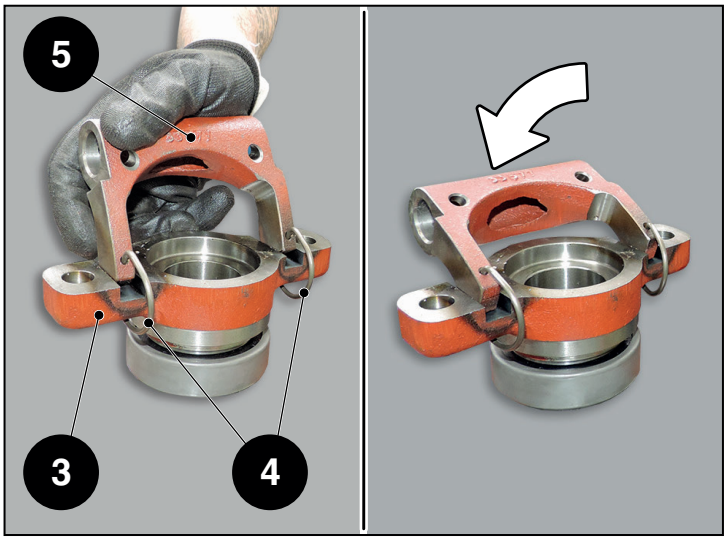


Fig. 3.12

Fit the complete thrust plate assembly (3) on the shaft and pins with the clutch fork (5) facing up.

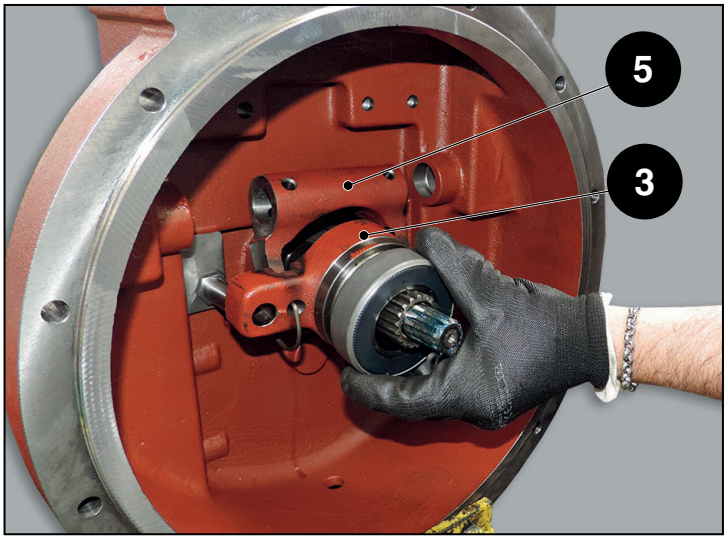


Fig. 3.13

Fit the clutch control lever (6) by inserting it in the clutch fork (5).

Match the holes on the control lever (6) with those on the fork (5) and then fit the pins (7) to secure the components.

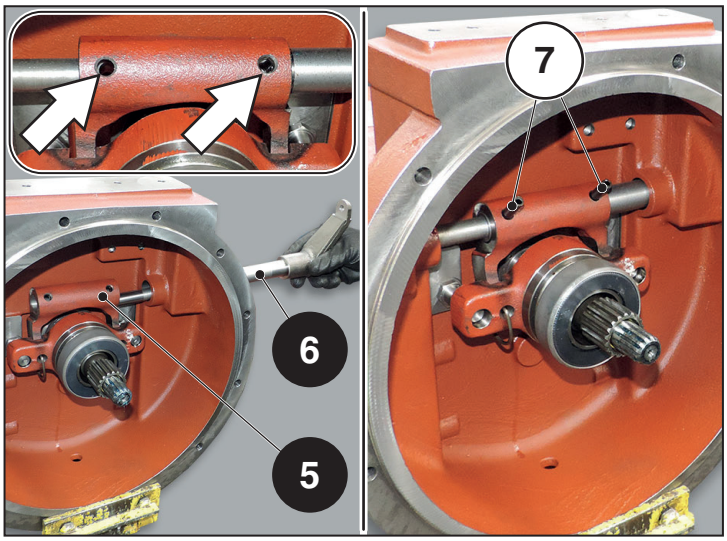


Fig. 3.14

Fit the tool (07006228) 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.

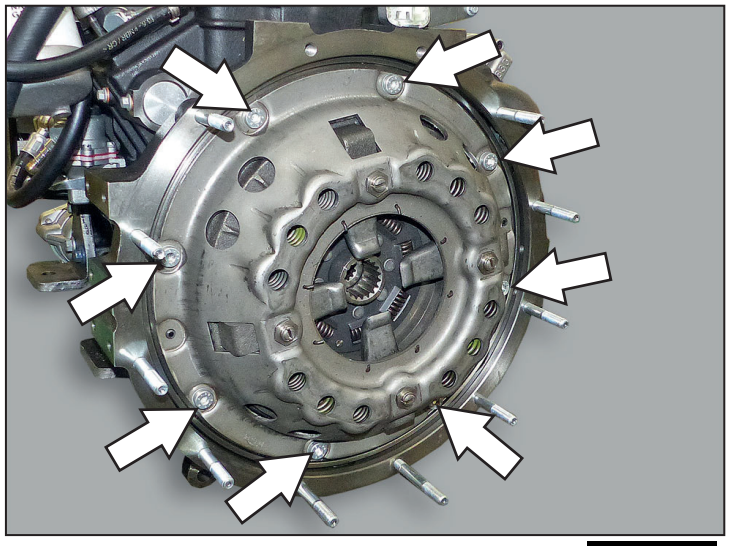


Fig. 3.15

Mate the engine assembly with the clutch housing.

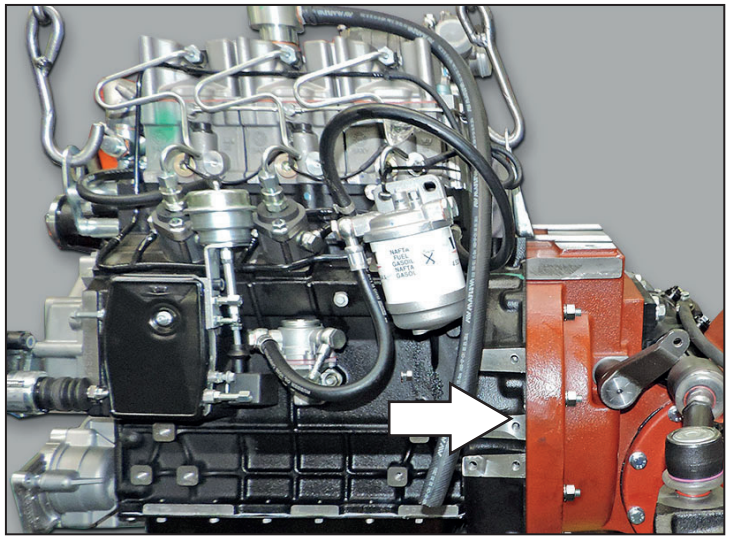


Fig. 3.16

Tighten the nuts and screws fastening the engine to the clutch housing to a torque of 50 Nm (5 kgm).

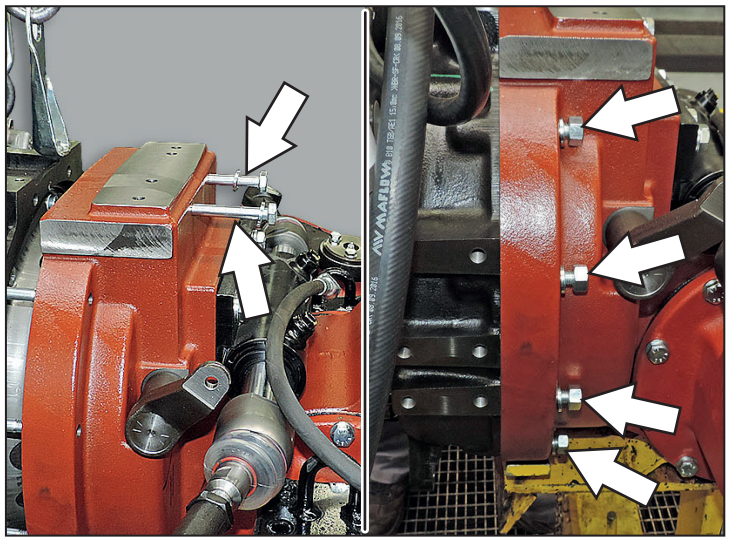


Fig. 3.17

Continue reassembly by following the procedure described for engine refitting in the section "Engine."

5.2.2 Checking oil level

Periodically check the oil level inside the expansion tank by unscrewing the upper cap, which can be accessed from outside the tractor.

Note

In the hydraulic circuit for the clutch actuation and adjustment system, use an amount of about 400 grams of mineral oil.

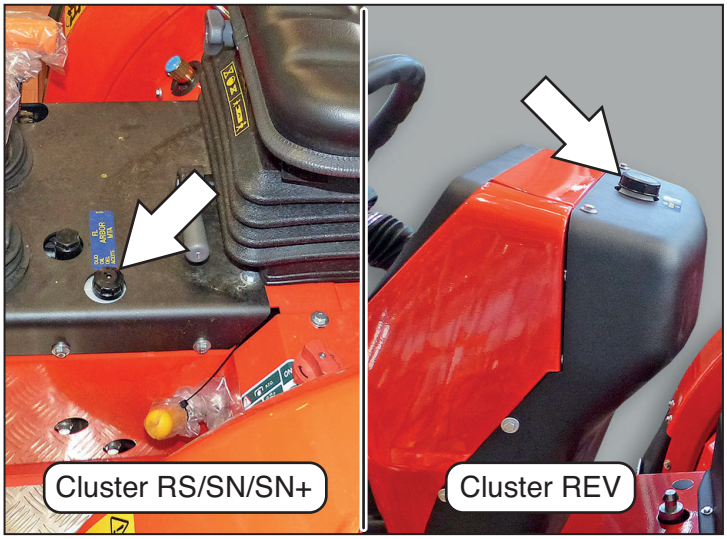


Fig. 3.18

5.2.3 Clutch pedal adjustment

The clutch pedal travel must be set correctly for the transmission clutch to engage and disengage correctly.

> **Warning**
>
> The clutch assembly must be reassembled completely onto the gearbox and engine before adjusting the clutch pedal.

The pump (9) actuated by the clutch pedal is equipped with the supply tank (10) through which the circuit is filled .

> **Warning**
>
> **REV Cluster**
>
> In the REVERSIBLE Cluster, the clutch circuit and the braking circuit are supplied by the same supply tank.

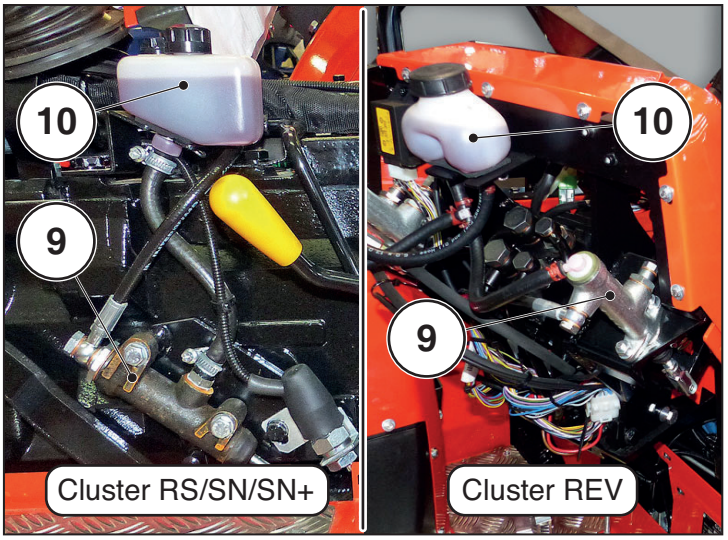


Fig. 3.19

The actuation cylinder (11) is equipped with a breather (12) to eliminate air from inside the system considering that this is the topmost point.

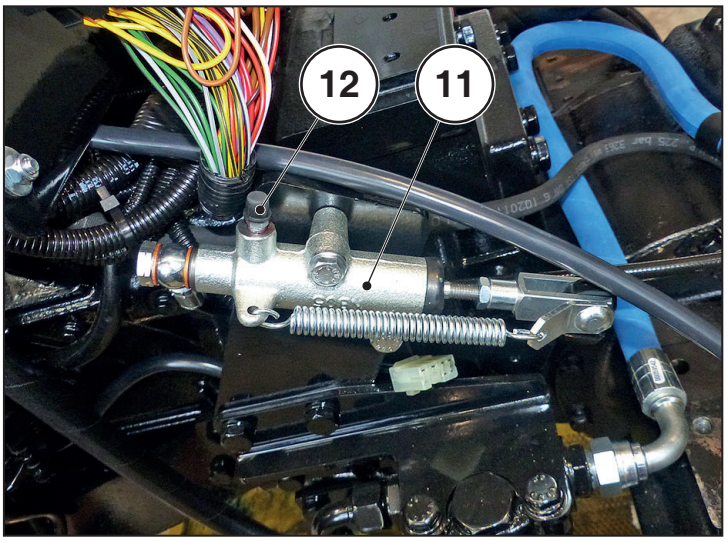


Fig. 3.20

REV Cluster only

Screw or unscrew the engage point (13) of the clutch pedal until it reaches a height of 18 mm between the head of the point and the pedal support. Screw in the check nut (14) once the adjustment is completed.

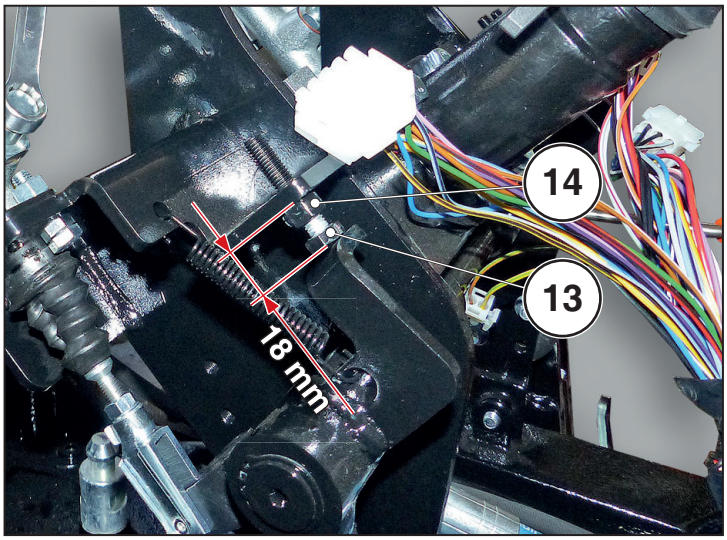


Fig. 3.21

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.

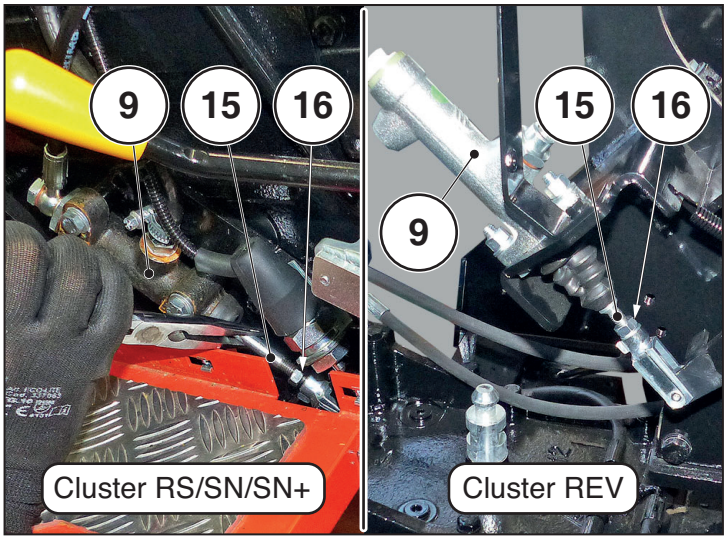


Fig. 3.22

The fork (17) allows adjusting the clutch lever push rod and eliminates excessive free play.

Once the adjustment has been made so that the lever that controls the thrust plate does not get stuck and that there is no excessive free play on the fork (17), tighten the check nut (18) on the fork (17) and block as adjusted.

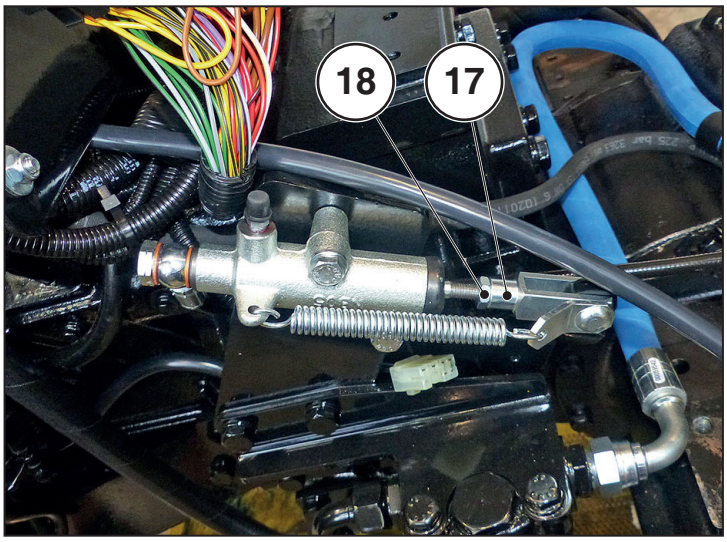


Fig. 3.23

RS, SN and SN+ Cluster only

Once the adjustments are completed on the transmission clutch assembly, the clutch pedal that has a set topmost starting point moves along its travel as illustrated in the figure.

Total pedal travel (A)	150 mm
Dead zone (B)	40 mm
Working travel (C)	110 mm

Attention

After fastening the base assembly and before refitting the platform, check that the clutch works correctly by pressing the clutch with four gear selected and checking that the tractor moves when pushed.

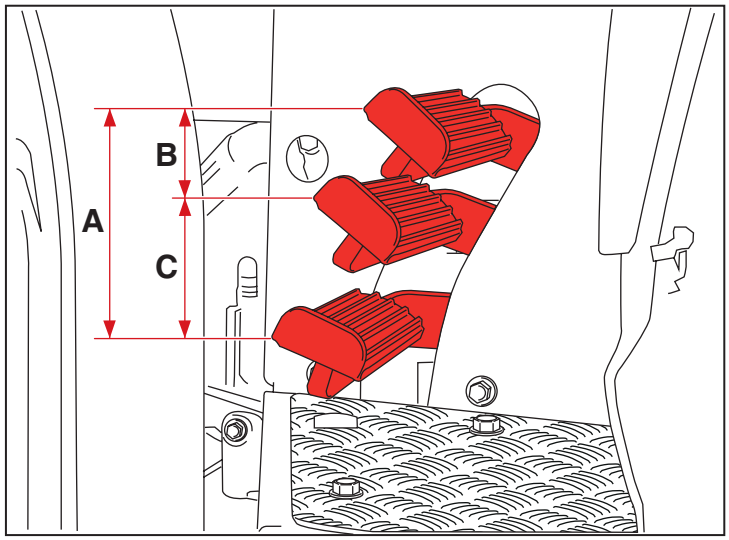


Fig. 3.24

Section 6 : Tightening specifications

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6.1 Tightening specifications 3-22

6.1 Tightening specifications

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	50	5
Cored screw 1/4" clutch hydraulic pump	20	2
Clutch hydraulic pump fastener screw	50	5

Section 7 : Tools necessary

Index

7.1 Tools necessary 3-24

7.1 Tools necessary

p/n	Description	Quantity
07006228	Clutch alignment pin 02020046	1

Chapter 4 : Front differential

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Section 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.

Section 2 : General introduction

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2.1 Assembly drawing

2.1.1 RS, REV and SN+ Cluster

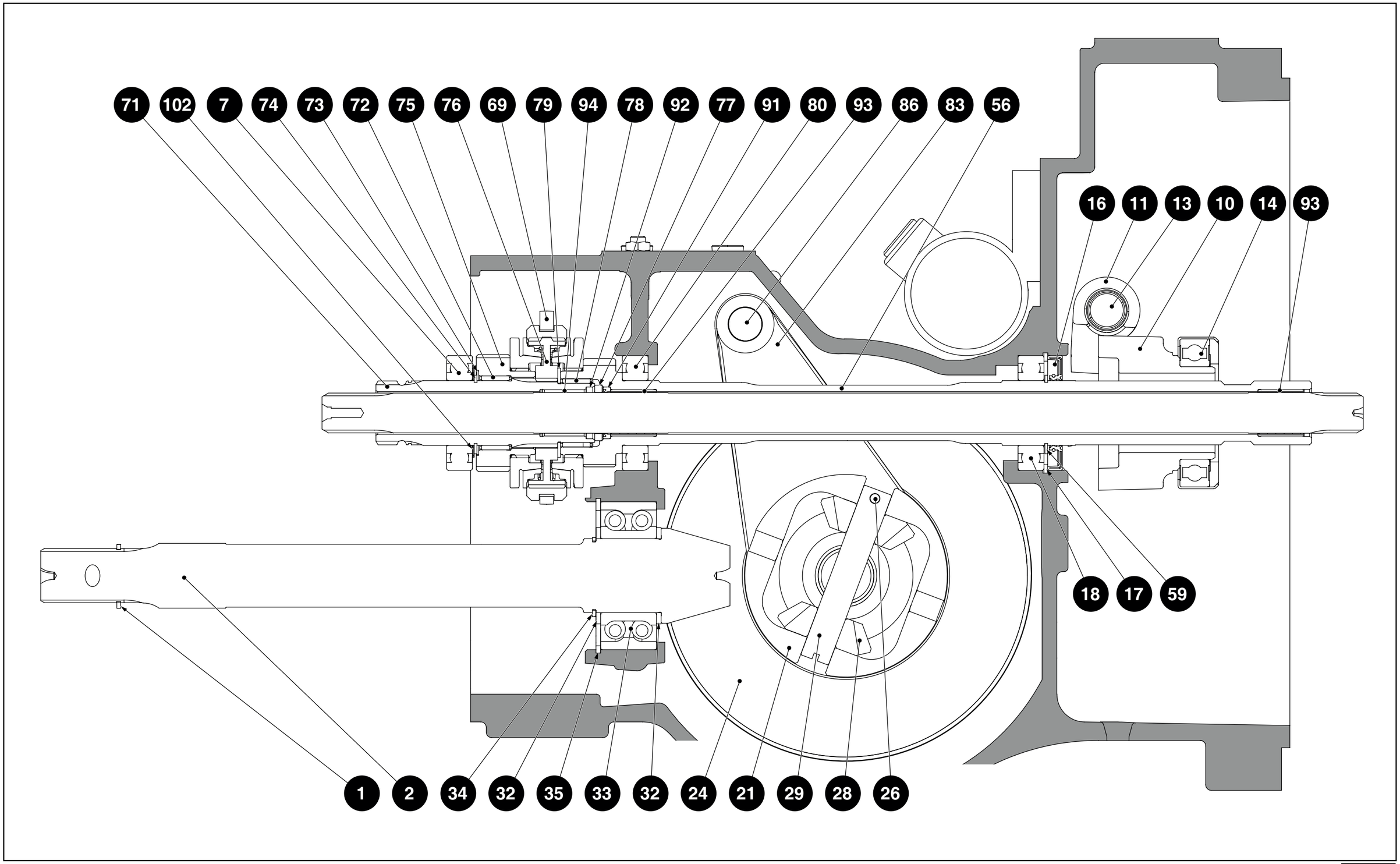


Fig. 4.1

1 - Circlip
2 - Bevel pinion
7 - Bearing
10 - Thrust plate support
11 - Clutch fork
13 - Clutch control lever
14 - Thrust bearing
16 - Oil seal
17 - circlip
18 - Bearing
21 - Differential case
24 - Conical crown wheel
26 - Pin
28 - Sun gear
29 - Planet gear spindle
32 - Spacer
33 - Bearing
34 - Circlip
35 - Circlip
56 - Primary shaft
59 - Circlip
69 - Reverse shuttle fork
71 - Spindle
72 - Roller bearing cage
73 - Spacer
74 - Circlip
75 - Synchroniser gear
76 - Synchroniser ring
77 - Spacer
78 - Roller bearing cage
79 - Flat spacer
80 - Bearing
83 - Fork
86 - Control spindle
91 - Oil seal
92 - Oil seal
93 - Bush
94 - Bush
102 - Spacer

2.1.2 Differential

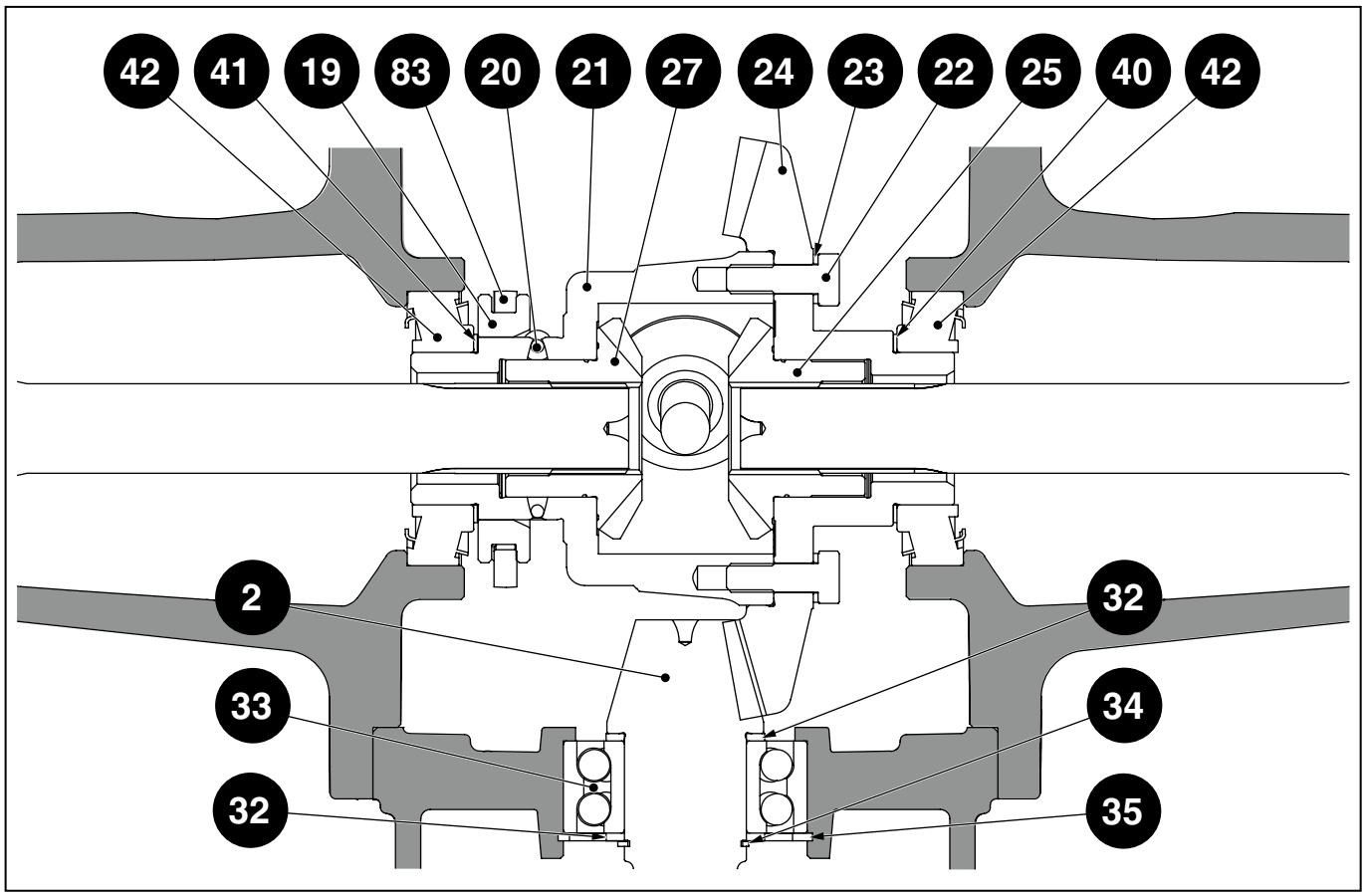


Fig. 4.2

2 - Bevel pinion
19 - Differential lock ring
20 - Ball
21 - Differential case
22 - Screw
23 - Plate
24 - Conical crown wheel
25 - Sun gear
27 - Sun gear
32 - Spacer
33 - Bearing
34 - Circlip
35 - Circlip
40 - Spacer
41 - Spacer
42 - Bearing
83 - Fork

Section 3 : Technical characteristics

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3.1 Technical characteristics

RS Cluster

Differential lock	Mechanical
Differential lock control	Mechanical
Reverse shuttle type	Mechanical, synchronised
Reverse shuttle control	Lever
4WD engagement control	-

REV Cluster

Differential lock	Mechanical
Differential lock control	Hydraulic
Reverse shuttle type	Mechanical, synchronised
Reverse shuttle control	Lever
4WD engagement control	-

SN Cluster

Differential lock	Mechanical
Differential lock control	Mechanical
Reverse shuttle type	-
Reverse shuttle control	-
4WD engagement control	-

SN+ Cluster

Differential lock	Mechanical
Differential lock control	Mechanical
Reverse shuttle type	Mechanical, synchronised
Reverse shuttle control	Lever
4WD engagement control	-

Section 4 : Disassembly

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4.2.1.2 Disassembly of differential lock hydraulic lever (REV Cluster) 4-23
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4.2.3 Disassembly of SN+ Cluster 4-31
4.2.4 Disassembling/Assembling the differential crown wheel 4-33

4.1 Preliminary operations

The main operations necessary to access the assembly 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.

Remove the engine from the clutch housing.

Note

See Chapter “Engine" for the main steps needed to remove the assembly.

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.

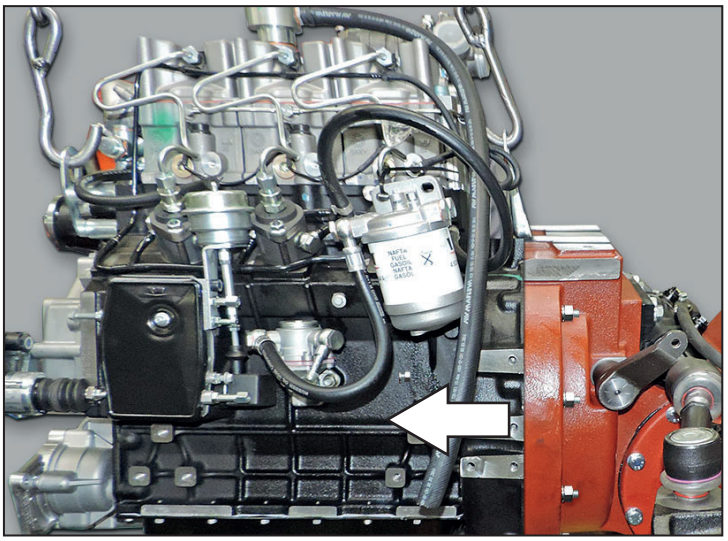


Fig. 4.3

Remove the front final drive units.

Note

See the Chapter “Front final drive units”.

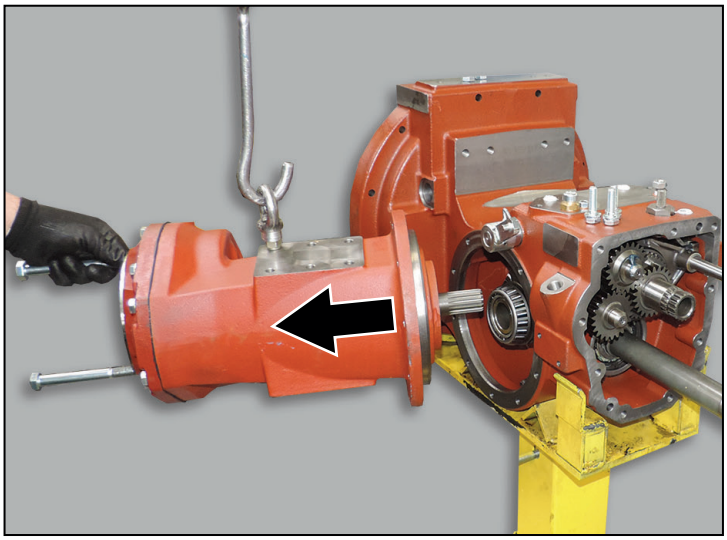


Fig. 4.4

Remove the gearbox assembly.

Note

See the Chapter “Transmission and Rear Power Take Off”.

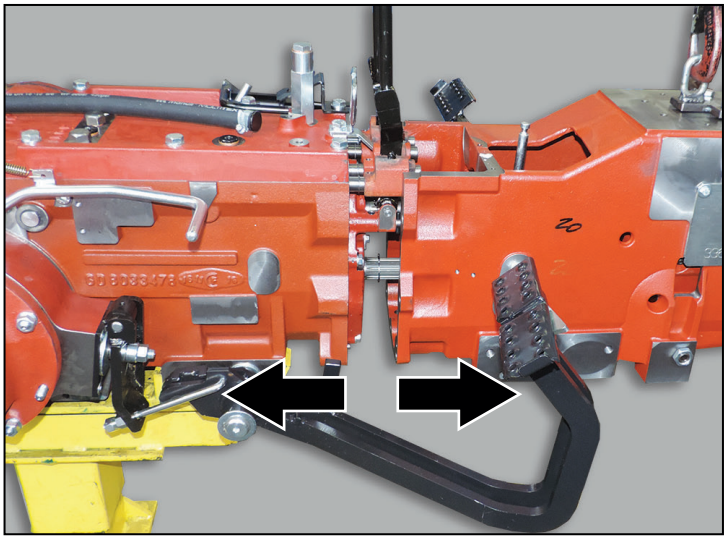


Fig. 4.5

Separate the central tunnel from the front differential assembly.

Note

See the Chapter “Central body”.

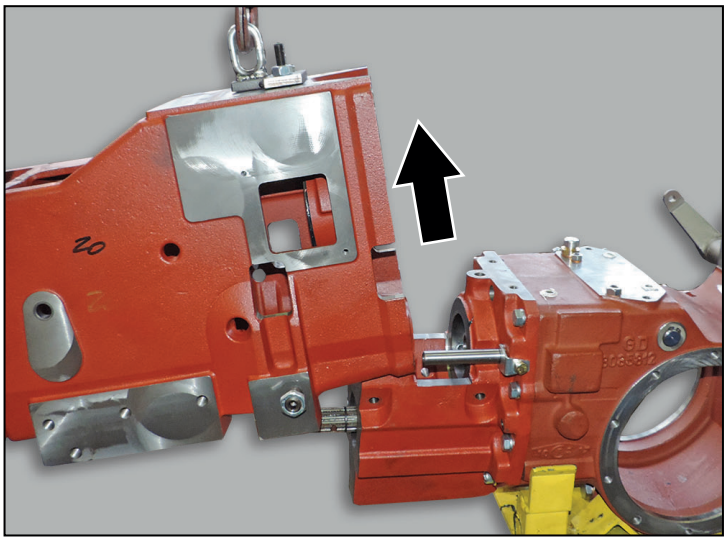


Fig. 4.6

4.1.1 Removing the differential case cover

REV, RS and SN+ Cluster only

Undo the screw (50) and then remove the washer (51) and plate (52).

Remove the spacer (53) and the O-ring (54) from the reverse shuttle rod (55).

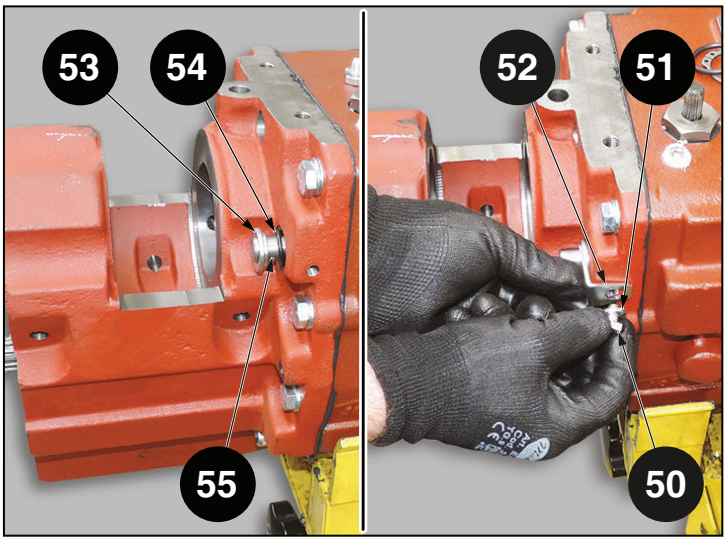


Fig. 4.7

Remove the circlip (1) from the bevel pinion (2).

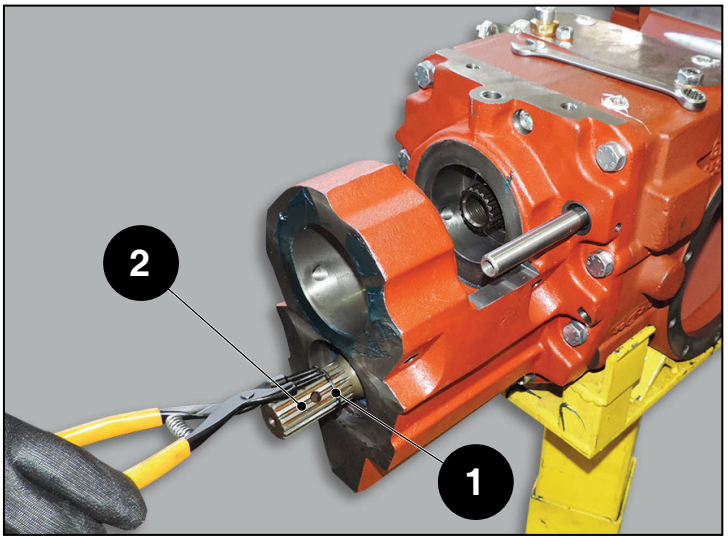


Fig. 4.8

REV, RS and SN+ Cluster only

Remove the circlip (57B) from the primary shaft (56).

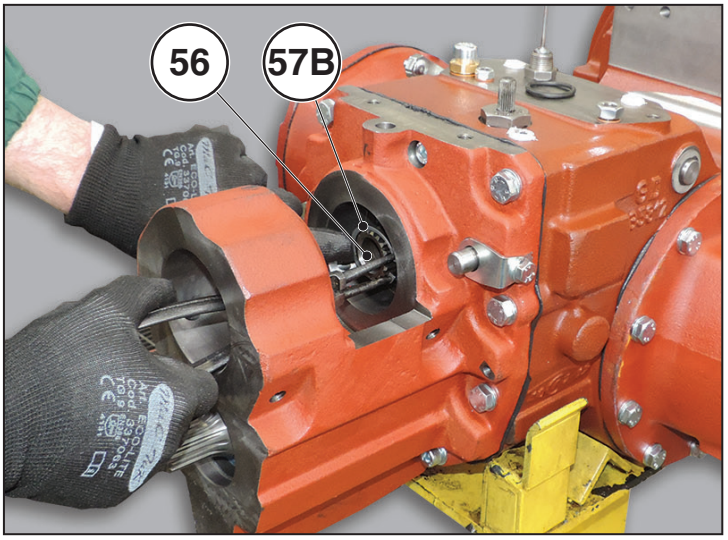


Fig. 4.9

REV, RS and SN+ Cluster only

Remove the O-ring (58) and circlip (57A) from the primary shaft (56).

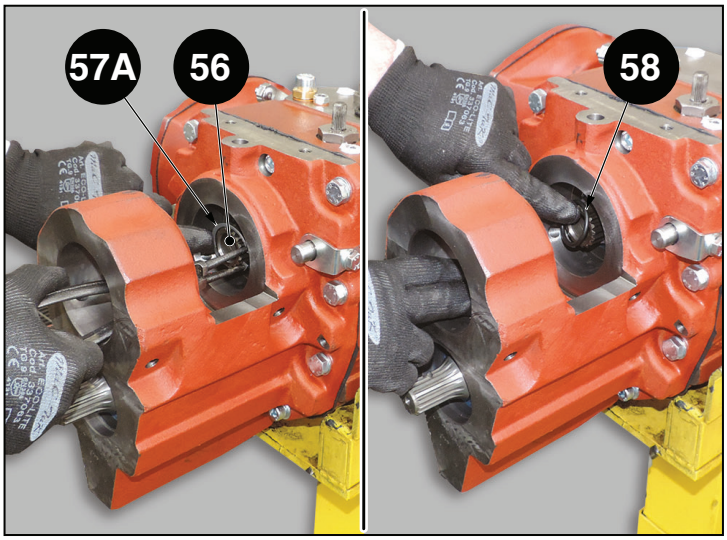


Fig. 4.10

Remove the oil seal (3) and the circlip (4) from the bevel pinion (2).

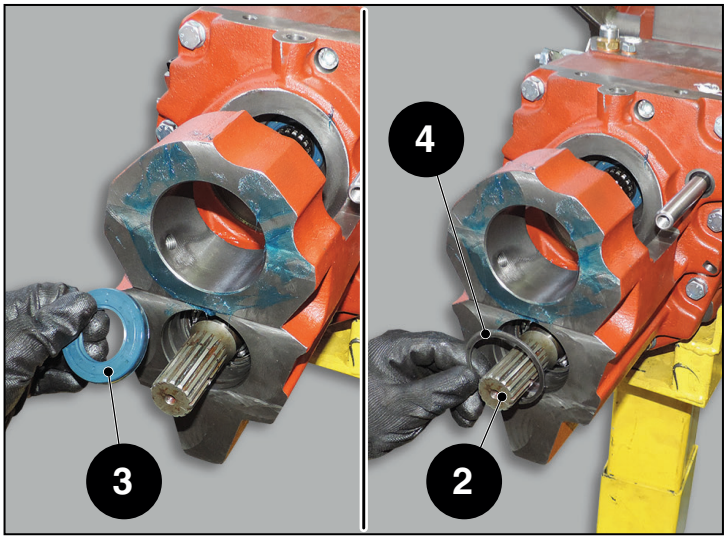


Fig. 4.11

Secure the cover to a hoist using the tool (D-p/n _____).

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Undo the screws (5) and hex socket screws (6) fastening the cover.

Separate the cover from the differential case. Facilitate separation by screwing an extraction screw.

> **Warning**
>
> While separating the assemblies, tap the primary shaft (56) with a pin to prevent it coming out together with the cover.

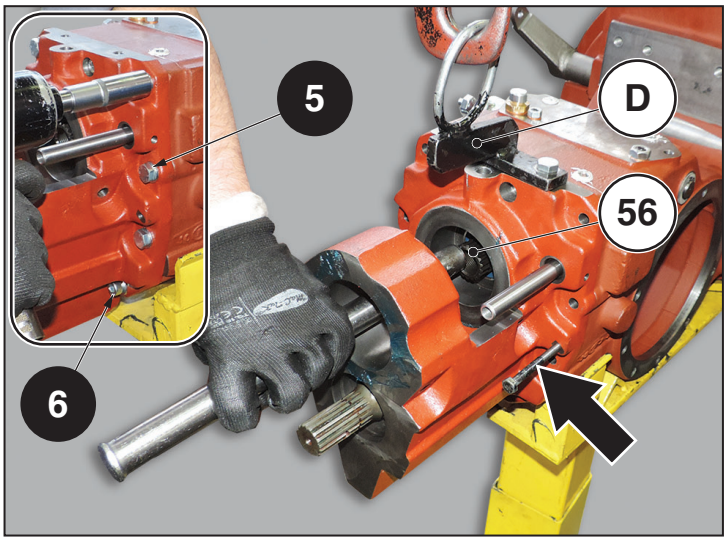


Fig. 4.12

Remove the bearings (7) and (36).

> **Warning**
>
> **For SN Cluster**
>
> The bearing (36) is not present in this model.

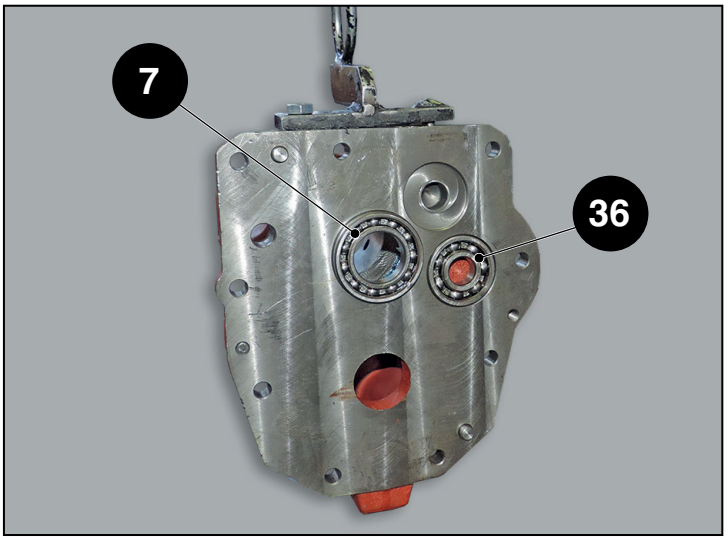


Fig. 4.13

Remove oil seal (8).

Tap the bearing (9) and remove it.

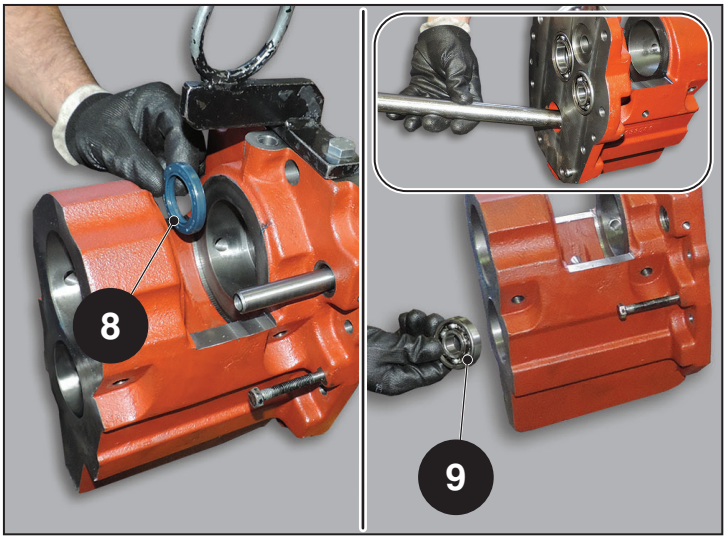


Fig. 4.14

4.2 Disassembly

4.2.1 Disassembly of REV and RS Cluster

Warning
The following operations are valid for RS Cluster and REV Cluster, unless otherwise specified.

Release the thrust plate support (10) from the fork (11).

Use a pin punch to drive out the pins (12) and then remove the fork (11) and lever (13).

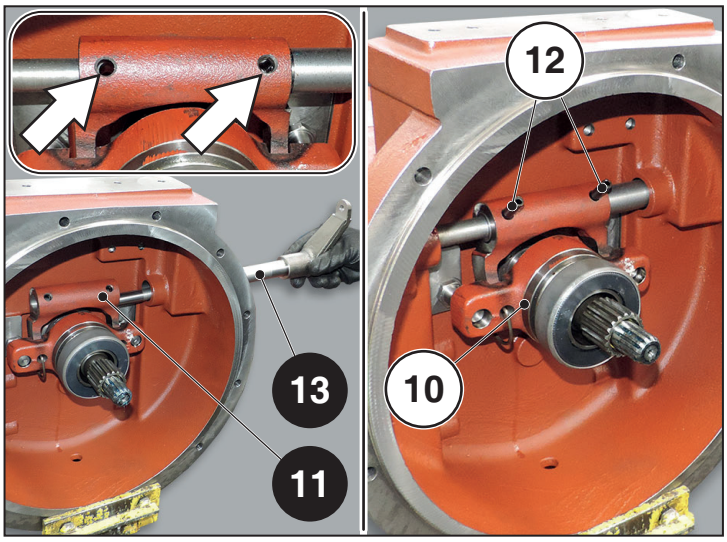


Fig. 4.15

Separate the thrust bearing (14) from the thrust plate support (10).

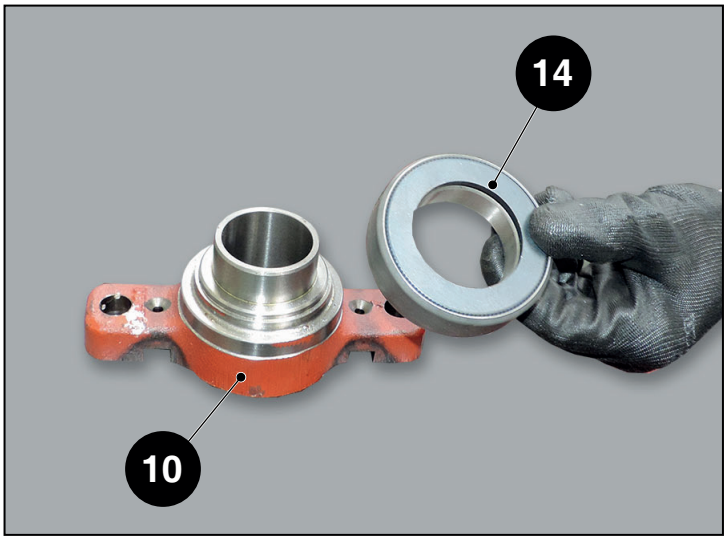


Fig. 4.16

Remove the pins (15).

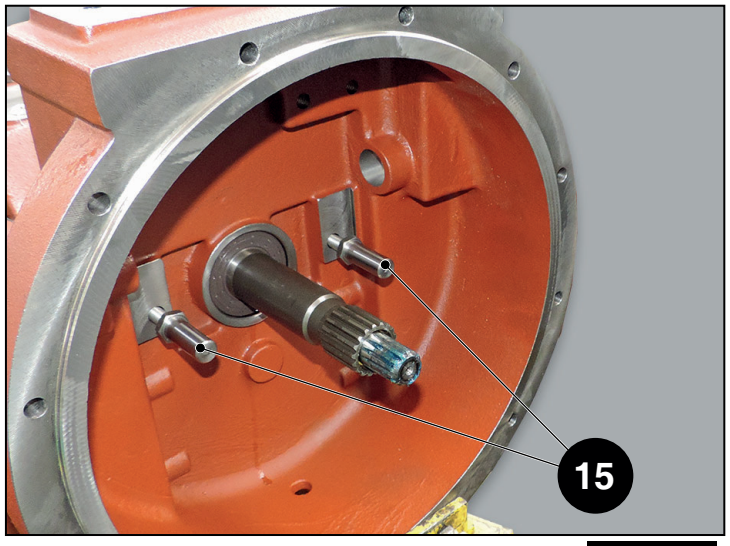


Fig. 4.17

Remove the bushes (37) and (38).

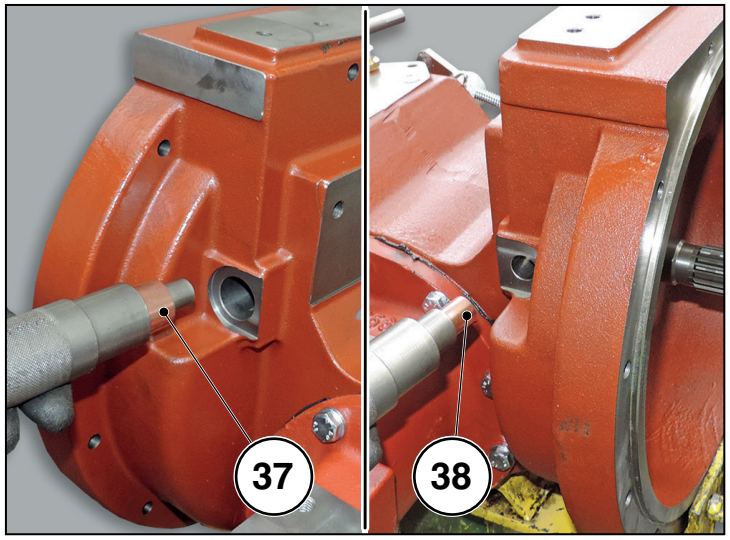


Fig. 4.18

Remove oil seal (16).

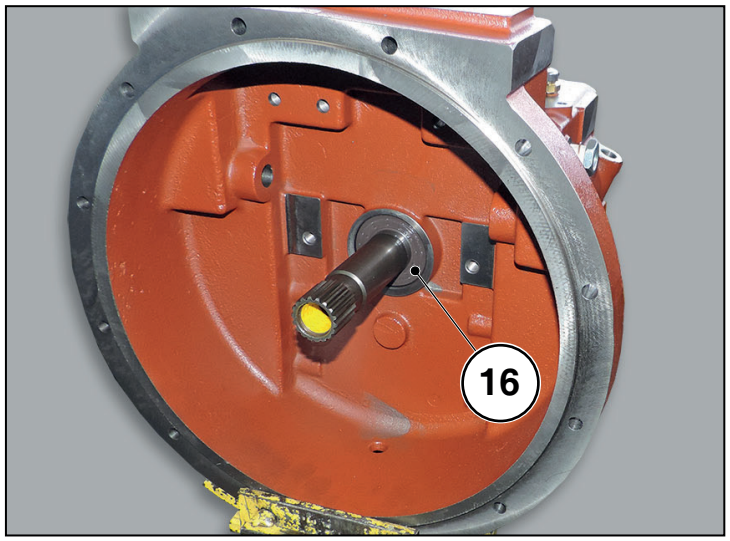


Fig. 4.19

Remove the circlip (59).

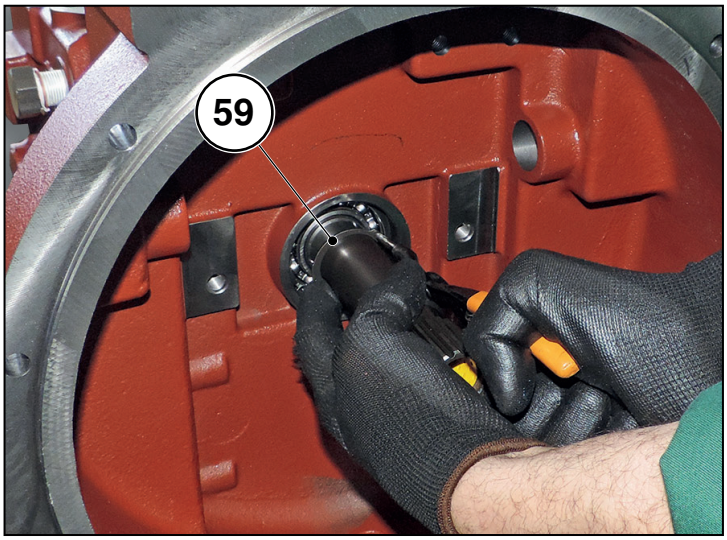


Fig. 4.20

Remove the spacer (61) and the gear (60) from the reverse shuttle pin (62).

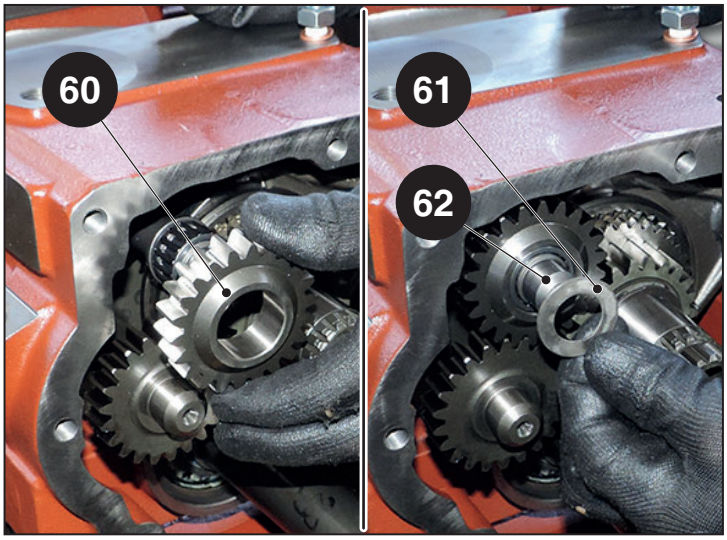


Fig. 4.21

Remove the roller bearing cage (63) from the reverse shuttle pin (62).

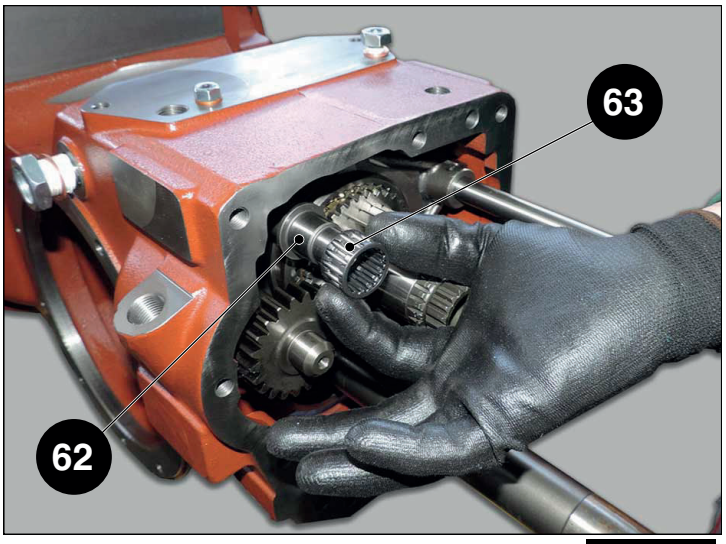


Fig. 4.22

Undo the adjuster screw (64) of the reverse shuttle rod and then recover the spring (65) and ball (66).

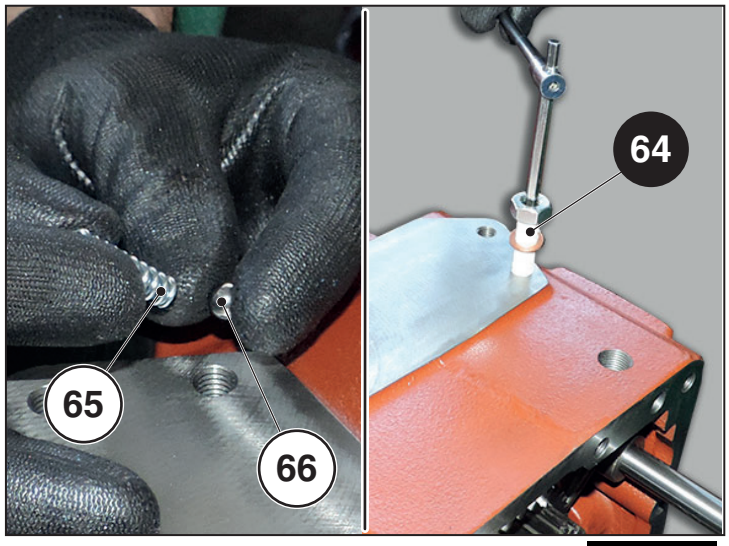


Fig. 4.23

Unscrew the retainer (67) and remove the reverse shuttle pin (62).

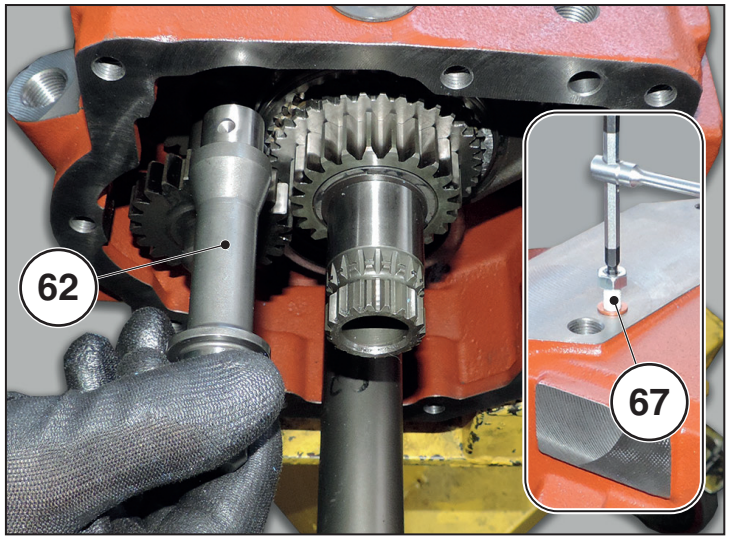


Fig. 4.24

Tap the primary shaft (56) from the front side of the clutch housing casing and then pull it out from the rear together with the reverse shuttle fork (69) and the transfer case gear (68).

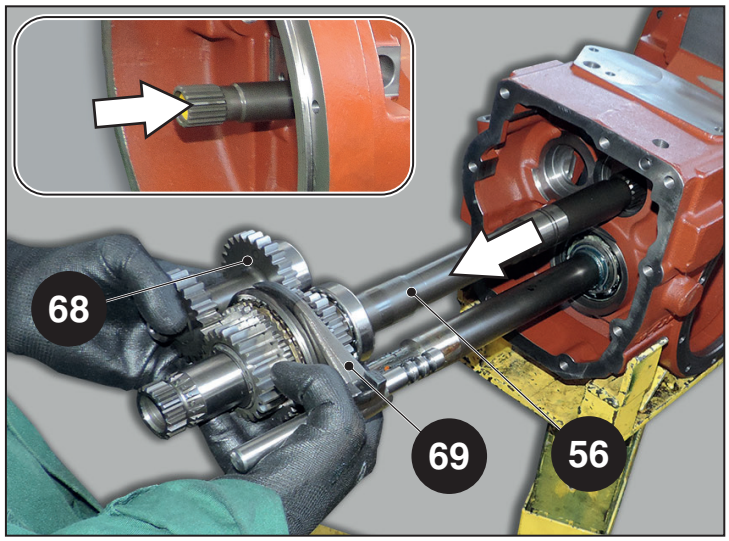


Fig. 4.25

Disassemble the reverse shuttle fork (69) from the rod (55) by removing the pin (70)



Fig. 4.26

Remove the circlip (17).

Pull out the bearing (18).

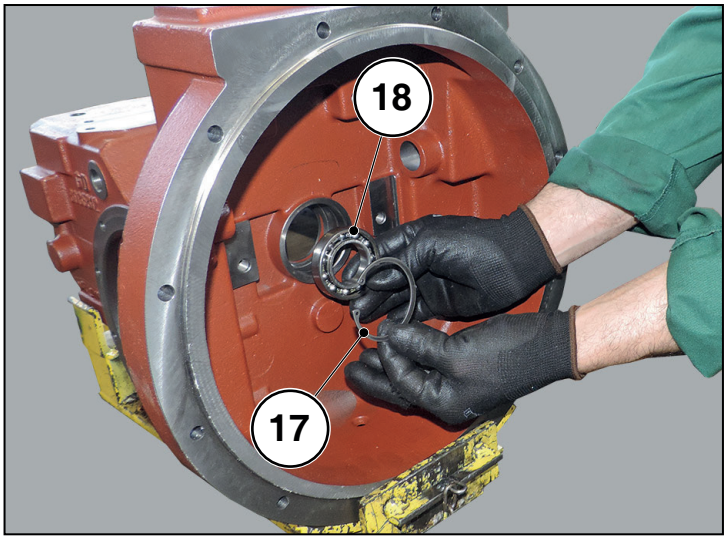


Fig. 4.27

Remove the circlip (35).

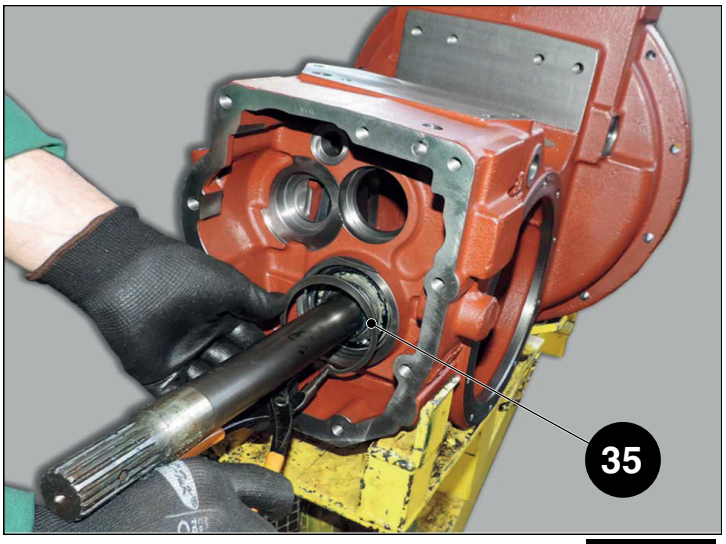


Fig. 4.28

Remove the complete bevel pinion (2) of the bearing (33).

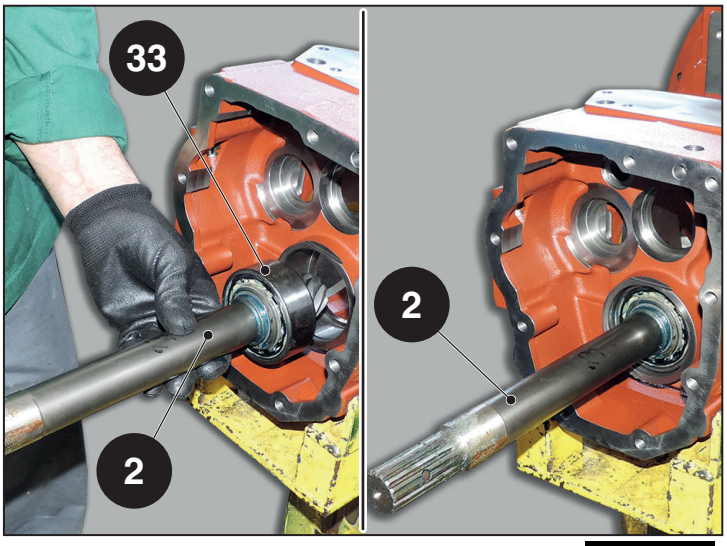


Fig. 4.29

Disassemble the bevel pinion (2) removing: circlip (34), spacers (32) and bearing (33).

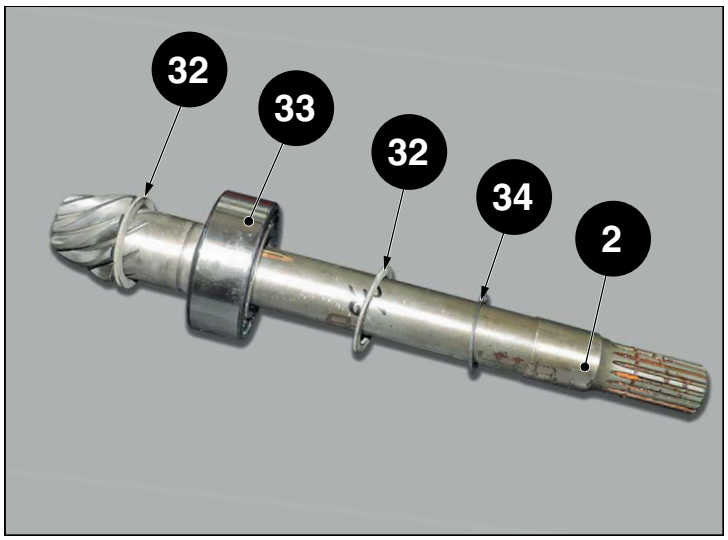


Fig. 4.30

4.2.1.1 Disassembly of the primary shaft

Pull out the complete spindle (71) from the primary shaft (56).

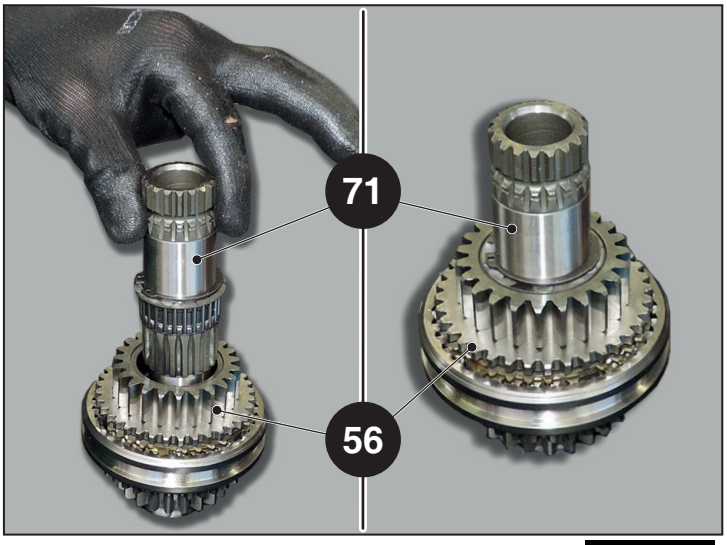


Fig. 4.31

Remove the circlip (74) from the spindle (71).

Remove the spacer (73) and roller bearing cage (72).

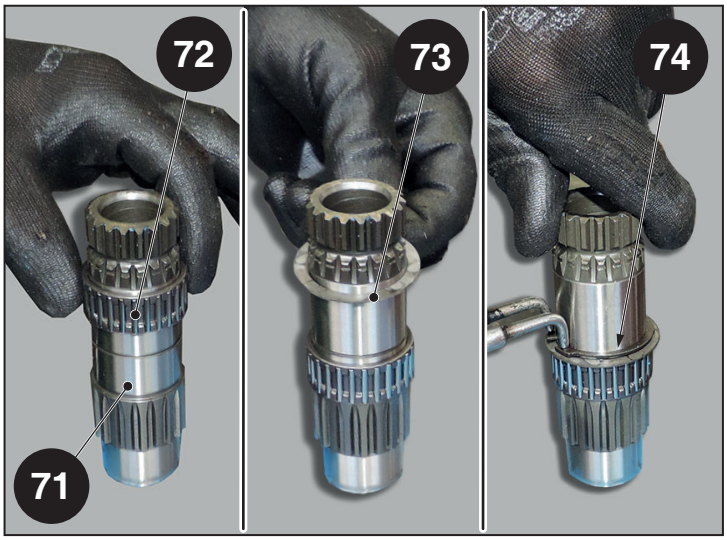


Fig. 4.32

Remove the synchroniser gear (75) and synchroniser ring (76) from the primary shaft (56).

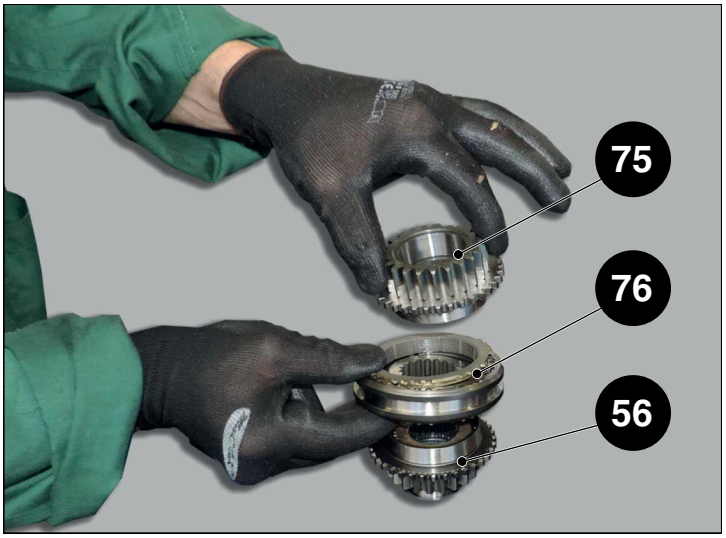


Fig. 4.33

Remove from the primary shaft (56): remove the flat spacer (79), roller bearing cage (78) and spacer (77).

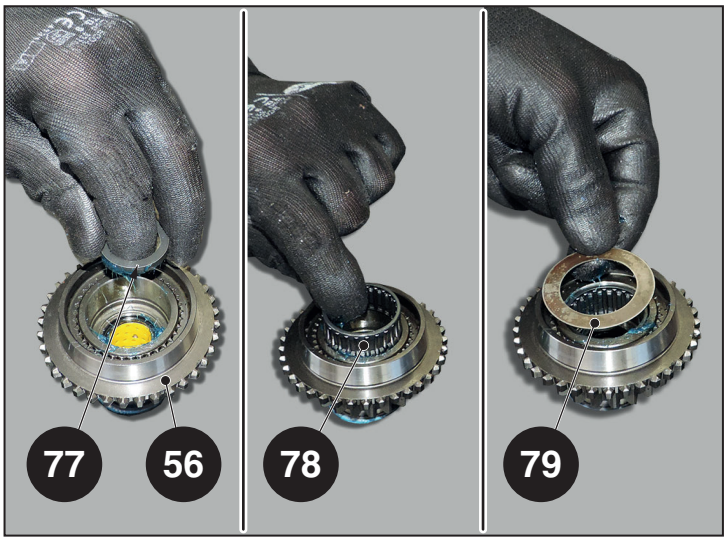


Fig. 4.34

Remove the bearing (80) from the primary shaft (56).

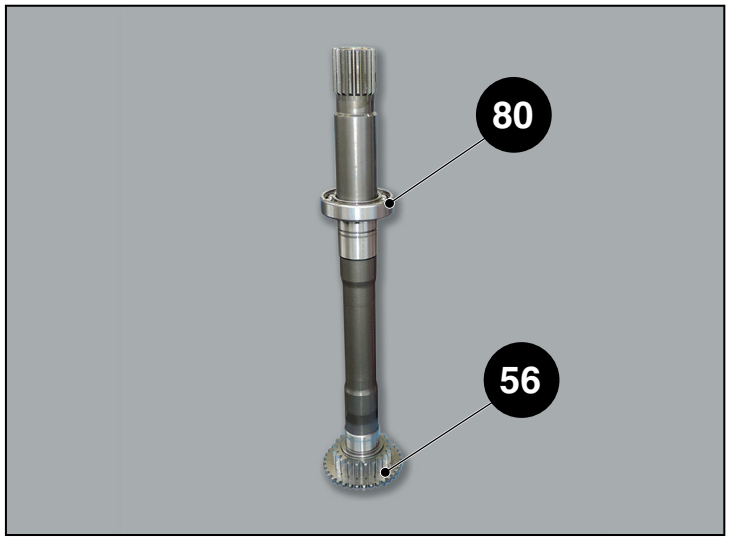


Fig. 4.35

Remove the oil seal (91) from the primary shaft (56).

Remove the oil seal (92) from the spindle (71).

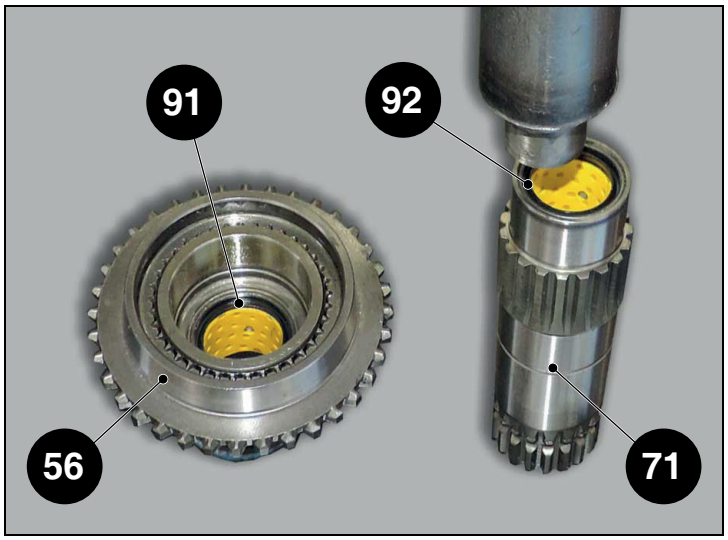


Fig. 4.36

Remove the bushes (93) from the primary shaft (56).

Remove the bush (94) from the spindle (71).

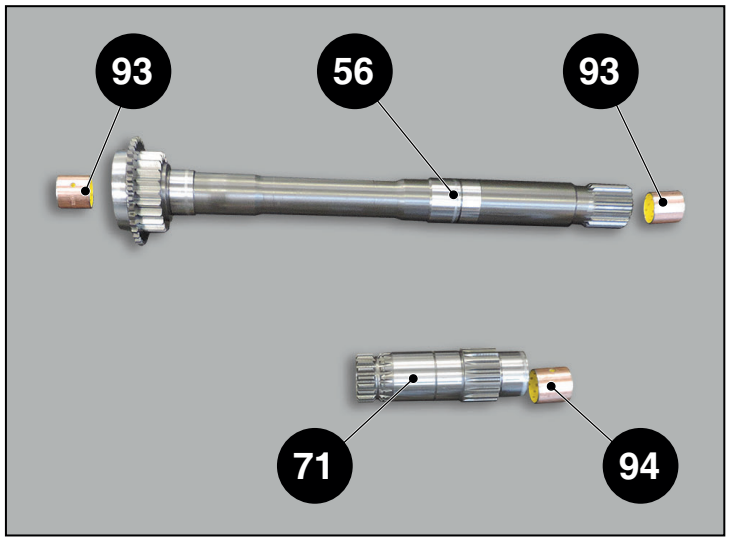


Fig. 4.37

4.2.1.2 Disassembly of differential lock hydraulic lever (REV Cluster)

Unscrew the nut (81) and remove the copper washer (82).

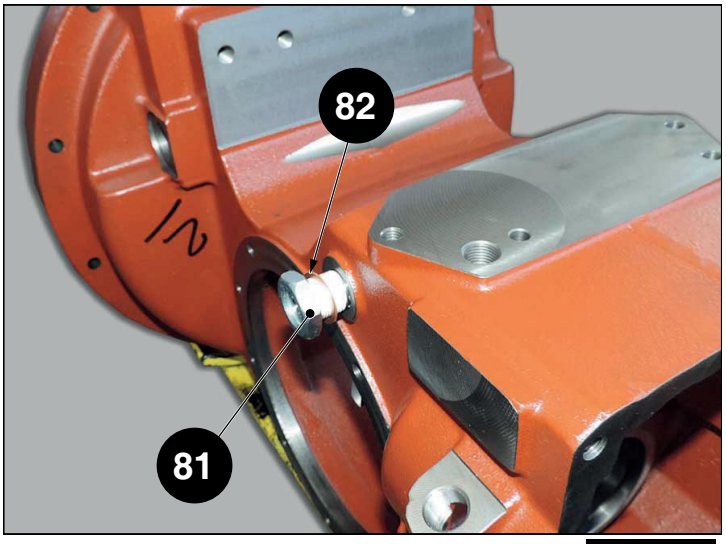


Fig. 4.38

Unscrew the complete fork (83).

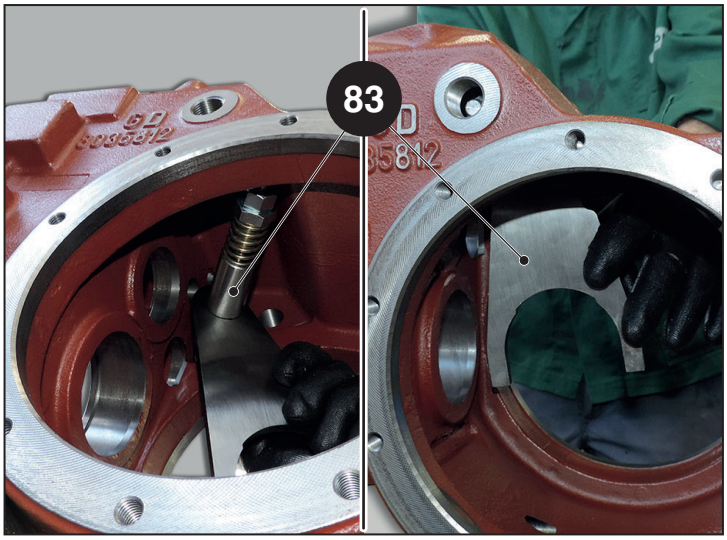


Fig. 4.39

Undo the nut (84) and remove the pin (85).

> **Note**
>
> Unscrew the pin (85) using a pin punch.

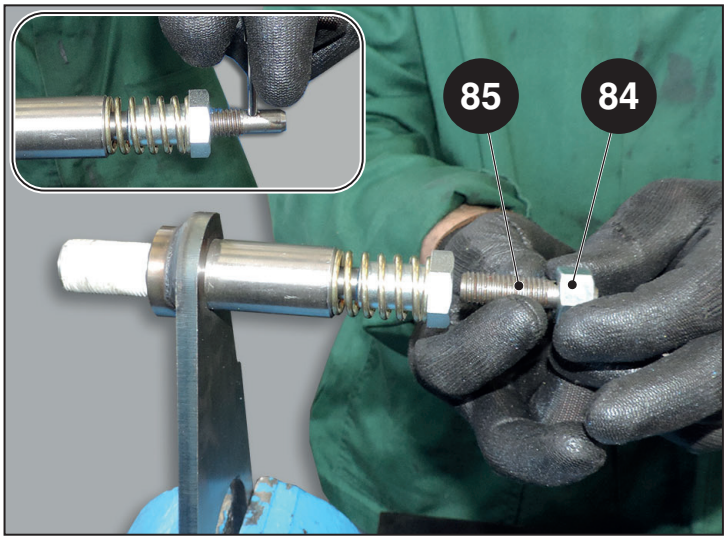


Fig. 4.40

Fit the special tool (A-p/n _____) on the control spindle (86).

Undo the bush (90) and remove the spring (89).

Remove the special tool (A-p/n_____).

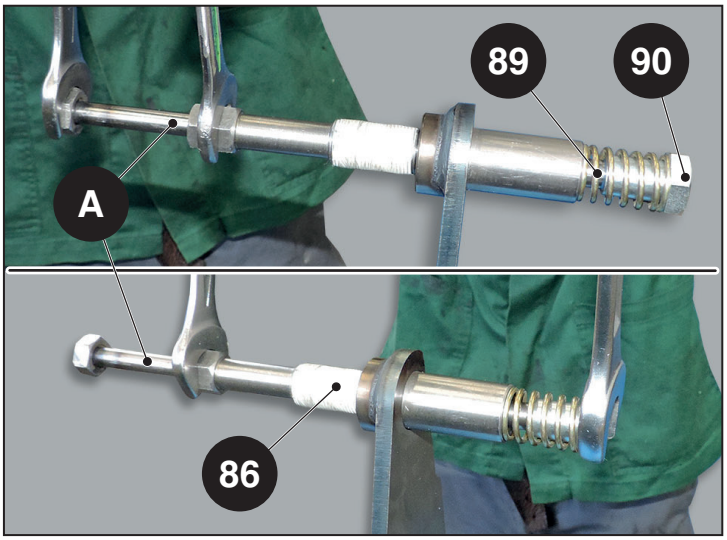


Fig. 4.41

Pull out the control spindle (86) on the fork (83).

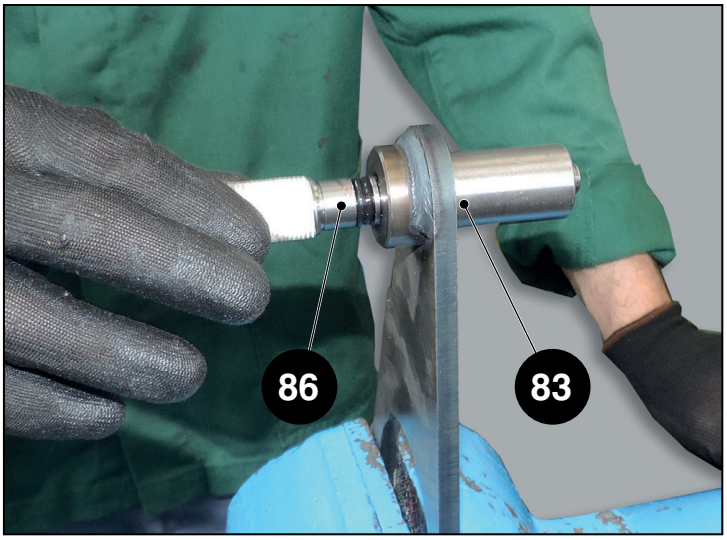


Fig. 4.42

Remove the O-rings (87) and (88) from the fork (83) and control spindle (86) respectively.

Warning
Replace the O-rings when reassembling.

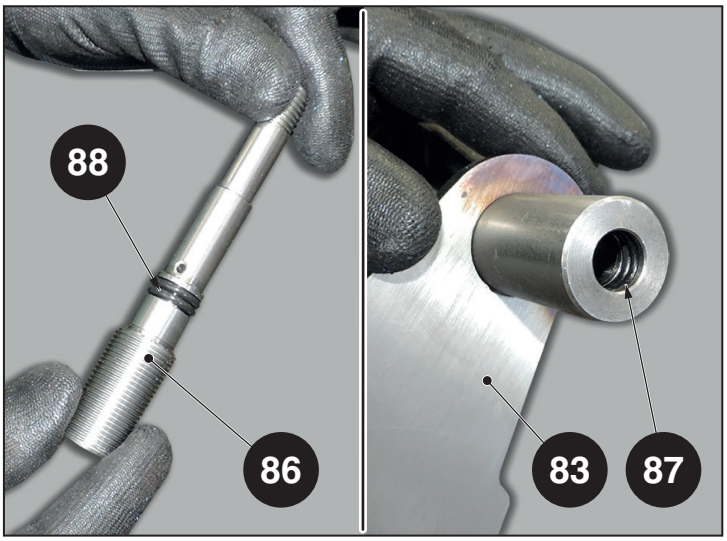


Fig. 4.43

4.2.1.3 Disassembly of differential lock mechanical lever (RS Cluster)

Remove the pin (114) with a pin punch to detach the rod (107) and fork (111).

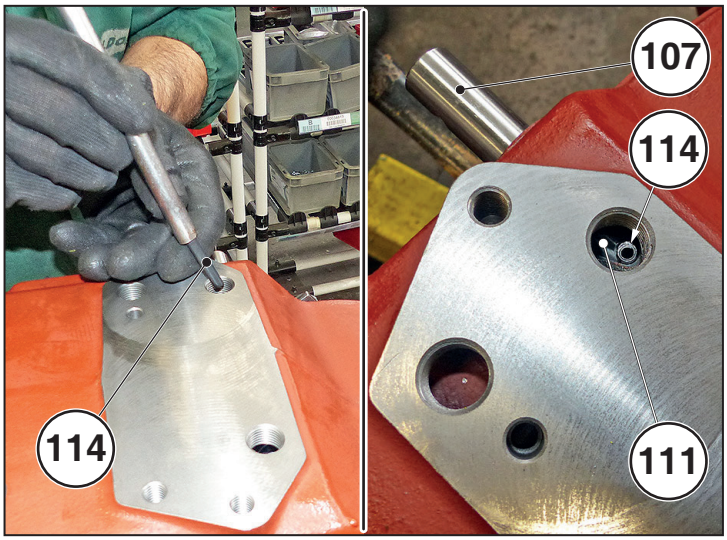


Fig. 4.44

Remove the pin (112) with a pin punch and then remove the following components from the rod (107):

- lever (47);
- spacer (115);
- O-ring (108).

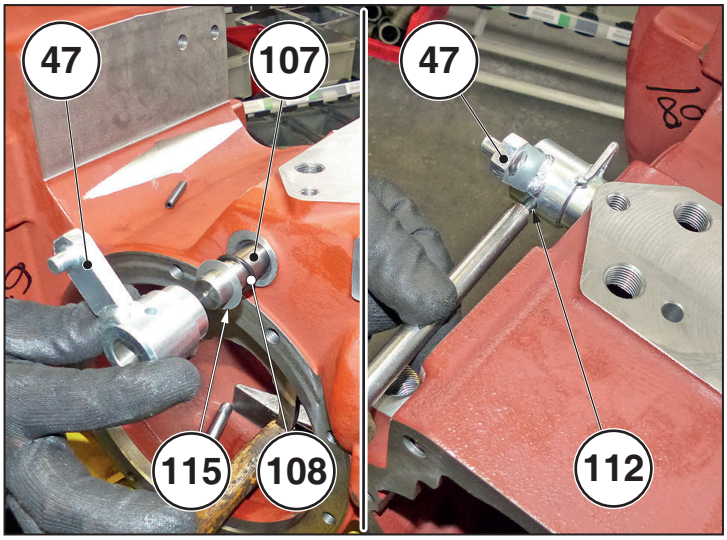


Fig. 4.45

Pull out the rod (107) and then retrieve the fork (111) and spring (113) from inside the differential case.

Remove the circlip (110), O-ring (108) and flat washer (109) from the rod (107).

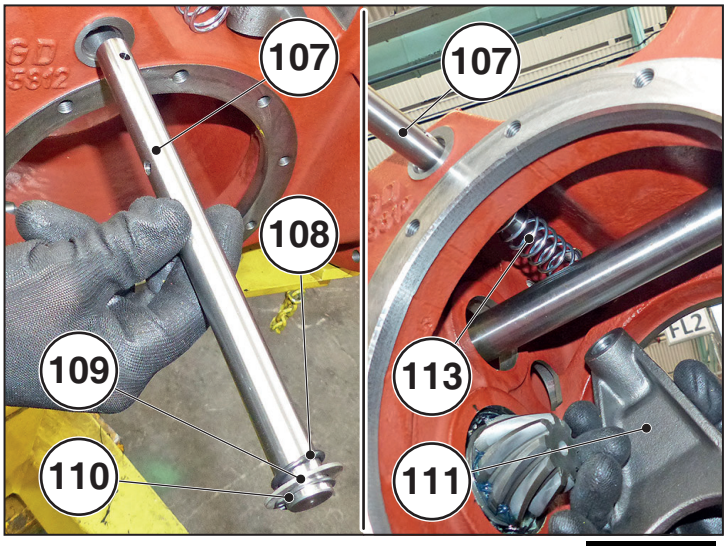


Fig. 4.46

4.2.2 Disassembly of SN Cluster

Release the thrust plate support (10) from the fork (11).

Use a pin punch to drive out the pins (12) and then remove the fork (11) and lever (13).

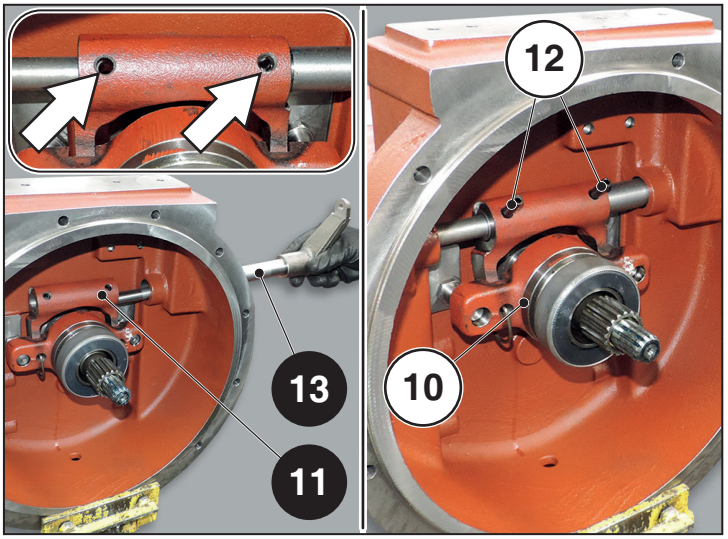


Fig. 4.47

Separate the thrust bearing (14) from the thrust plate support (10).

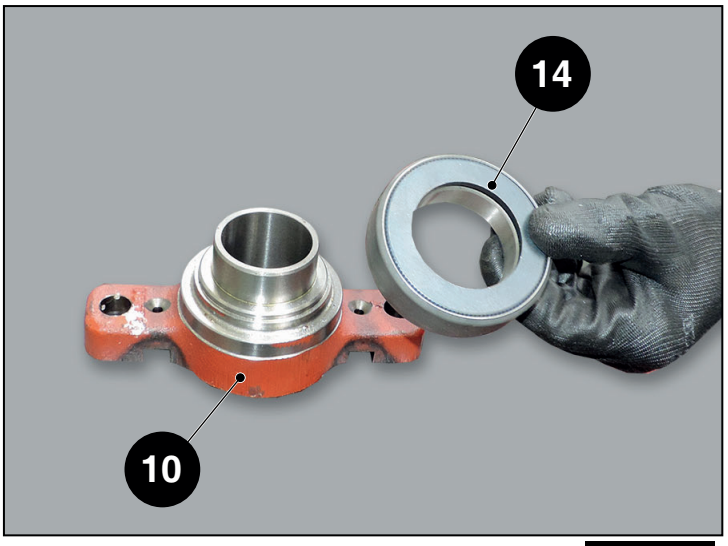


Fig. 4.48

Remove the pins (15).

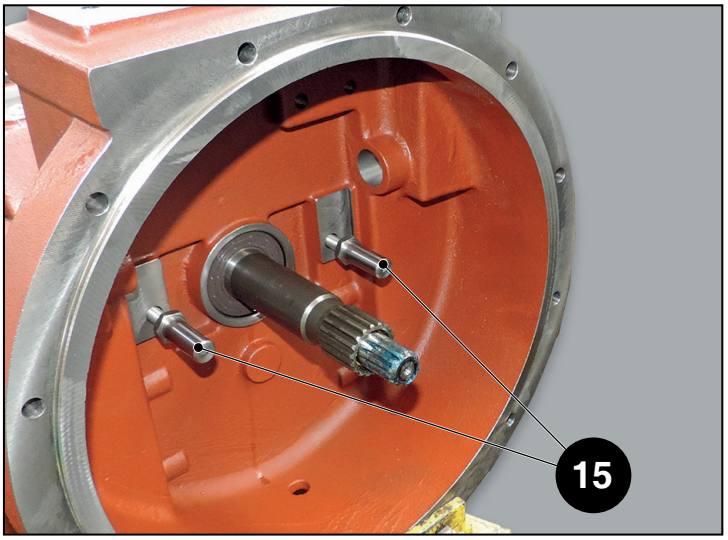


Fig. 4.49

Remove the bushes (37) and (38).

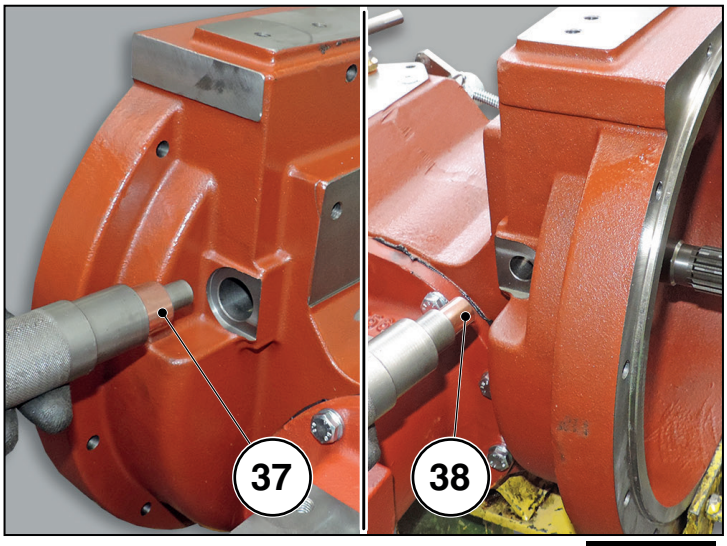


Fig. 4.50

Remove oil seal (16).

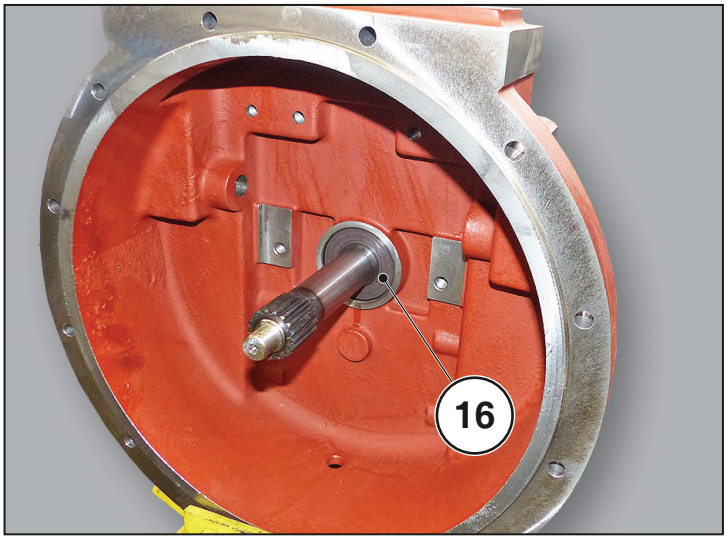


Fig. 4.51

Remove the primary shaft (56)

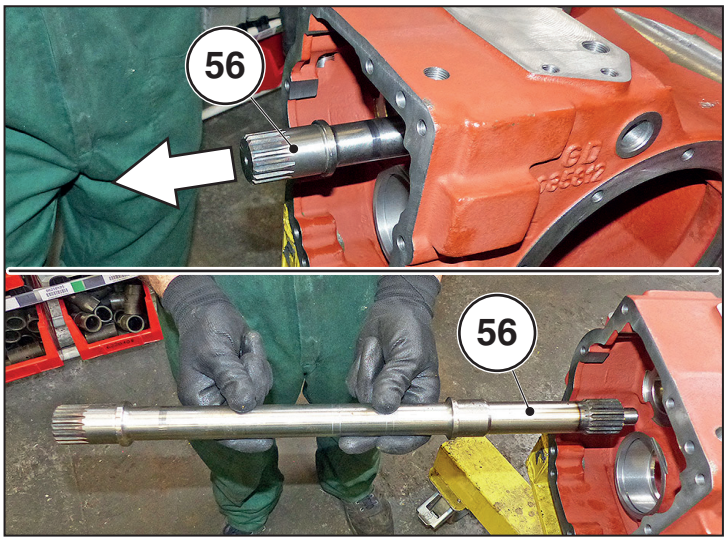


Fig. 4.52

Remove the circlip (17).

Pull out the bearing (18).

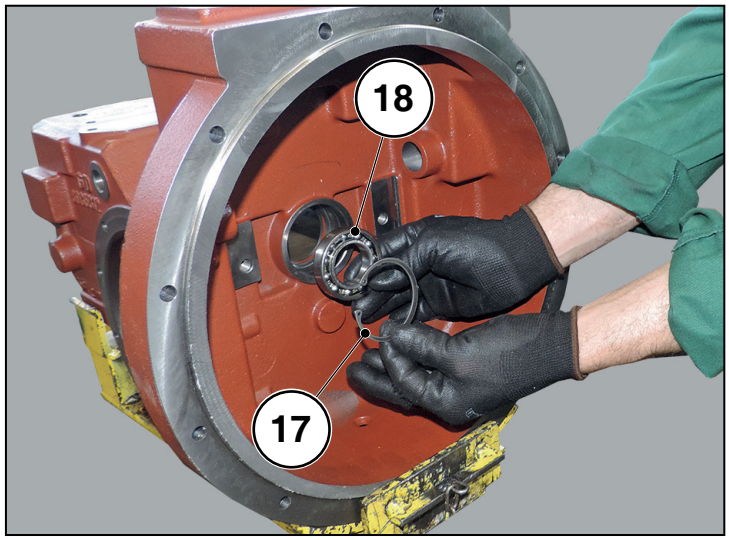


Fig. 4.53

Remove the circlip (35).

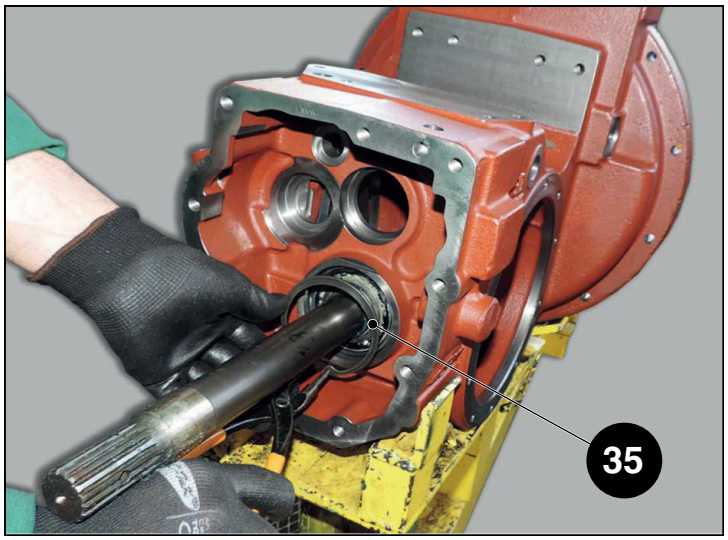


Fig. 4.54

Remove the complete bevel pinion (2) of the bearing (33).

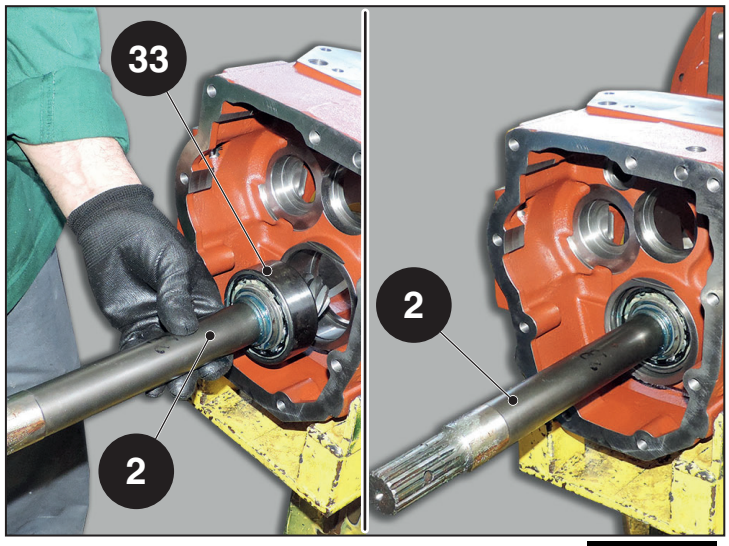


Fig. 4.55

Disassemble the bevel pinion (2) removing: circlip (34), spacers (32) and bearing (33).

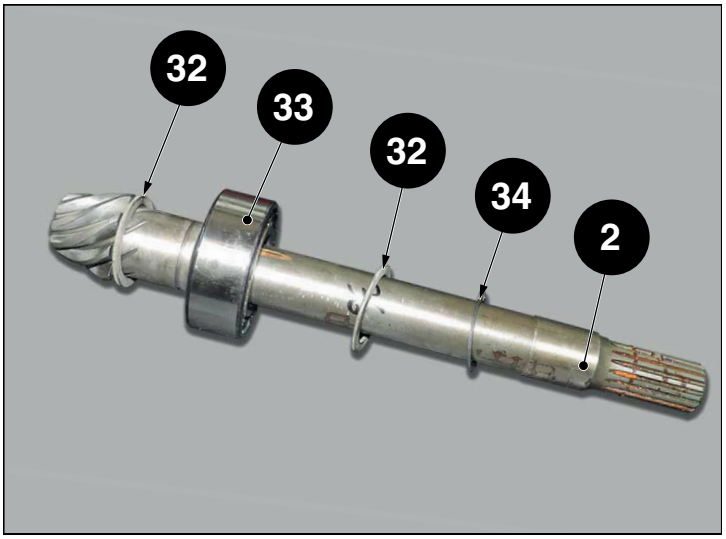


Fig. 4.56

4.2.2.1 Disassembly of differential lock mechanical lever

Remove the pin (114) with a pin punch to detach the rod (107) and fork (111).

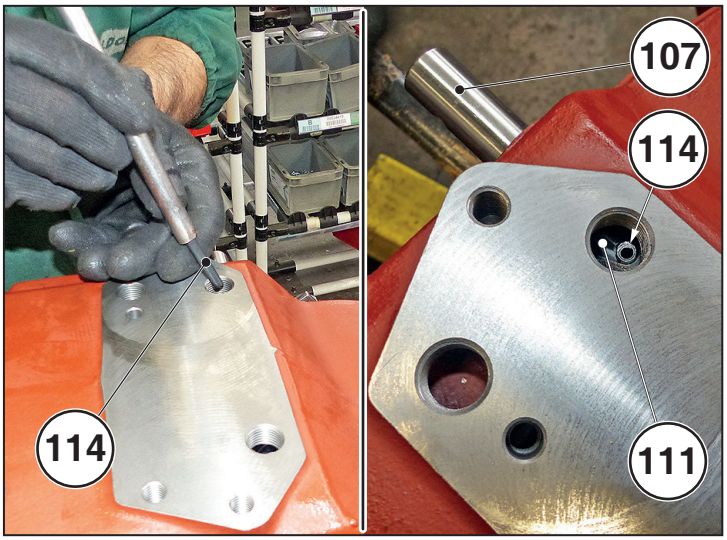


Fig. 4.57

Remove the pin (112) with a pin punch and then remove the following components from the rod (107):

- lever (47);
- spacer (115);
- O-ring (108).

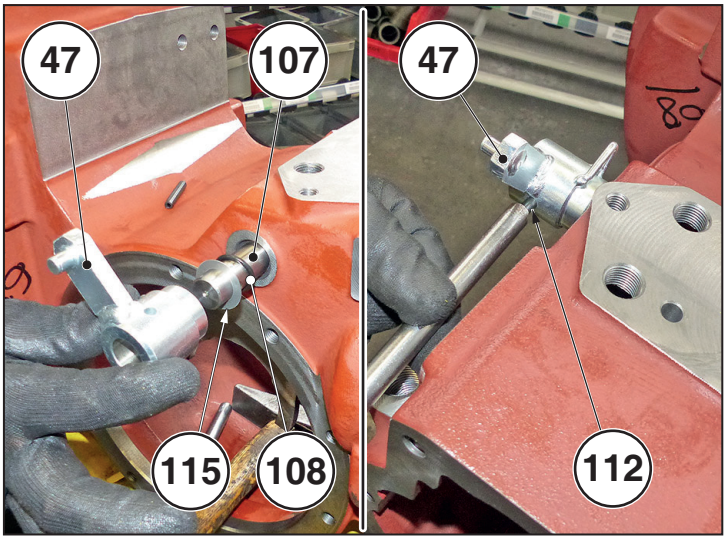


Fig. 4.58

Pull out the rod (107) and then retrieve the fork (111) and spring (113) from inside the differential case.

Remove the circlip (110), O-ring (108) and flat washer (109) from the rod (107).

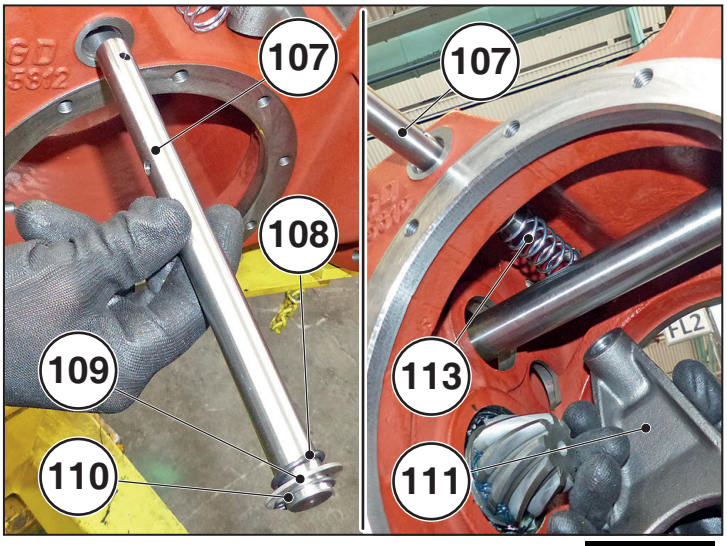


Fig. 4.59

4.2.3 Disassembly of SN+ Cluster

> **Warning**
>
> Follow the procedure described for the RS model except for the steps specified in this section.

Remove the following components from the case:

- complete primary shaft (56);
- motion transfer gear (68);
- complete reverse shuttle fork (69).

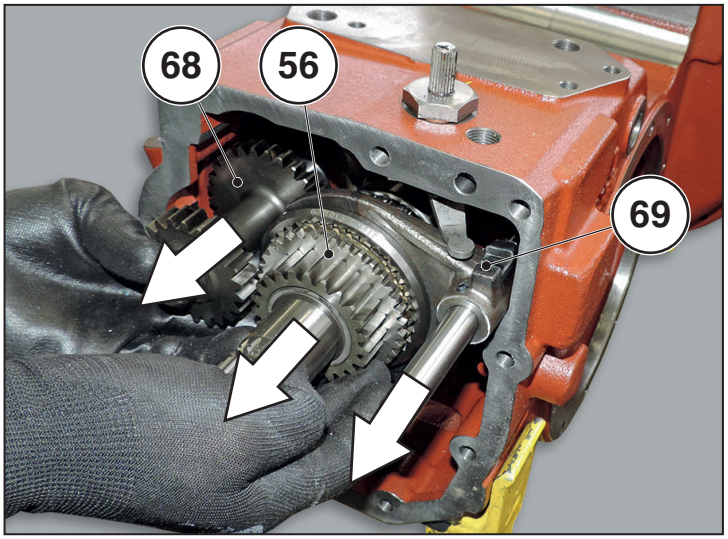


Fig. 4.60

Pull out the selector lever (106) from the guide bushing (103).

Use a pin punch to remove the pin (70) and detach the reverse shuttle fork (69) from the reverse shuttle rod (55).

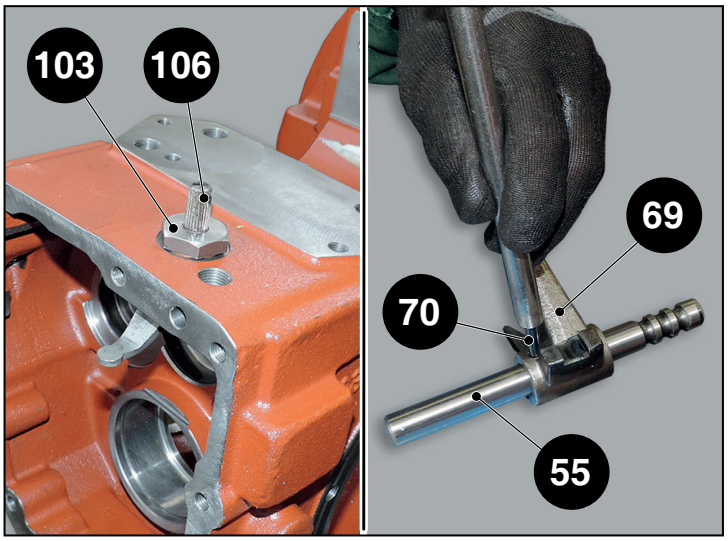


Fig. 4.61

Remove the O-ring (105) from the groove in the hole of the guide bushing (103).

Warning
Replace the O-ring (105) with a new component when reassembling.

Unscrew the guide bushing (103) together with the copper washer (104).

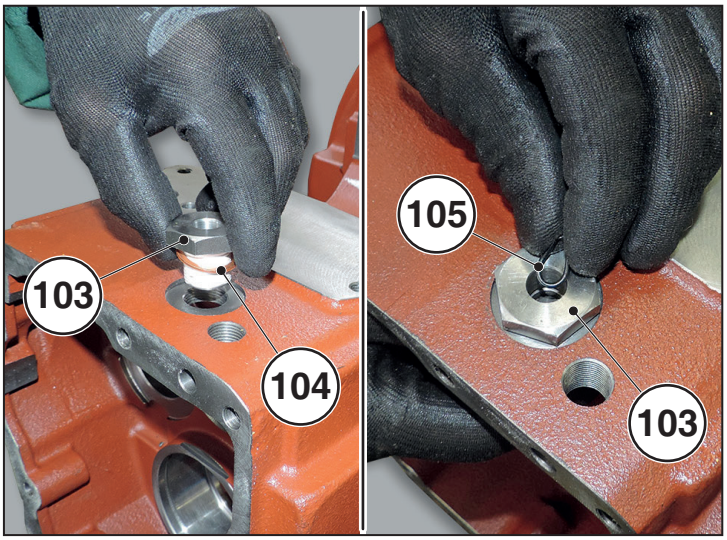


Fig. 4.62

4.2.4 Disassembling/Assembling the differential crown wheel

Disassembly

Remove differential lock ring (19).

Remove the balls (20) from the differential case (21).

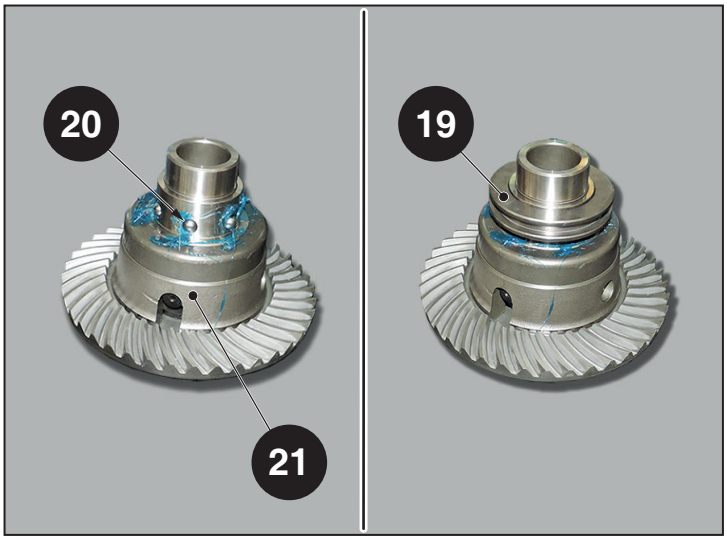


Fig. 4.63

Use a scalpel to bend back the plates (23) and free the screws (22).

Undo the screws (22) and remove the plates (23).

Remove la conical crown wheel (24).

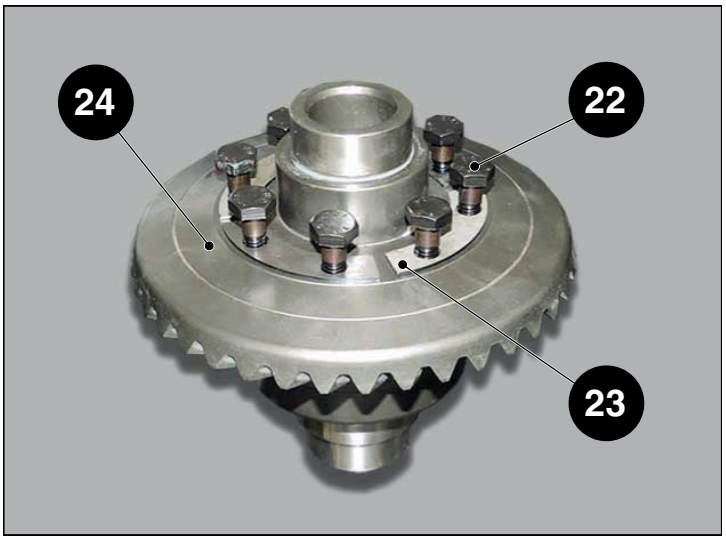


Fig. 4.64

Remove the sun gear (25) from the differential case (21).

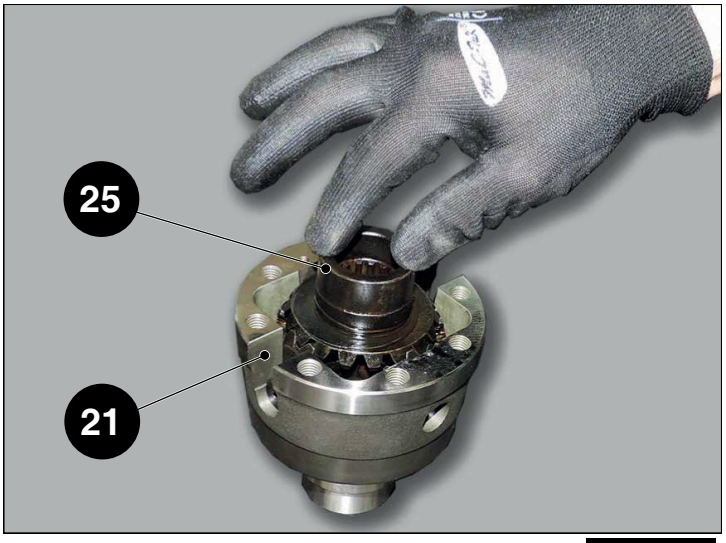


Fig. 4.65

Remove the pin (26).

Remove the planet gears (28) and their pin (29).

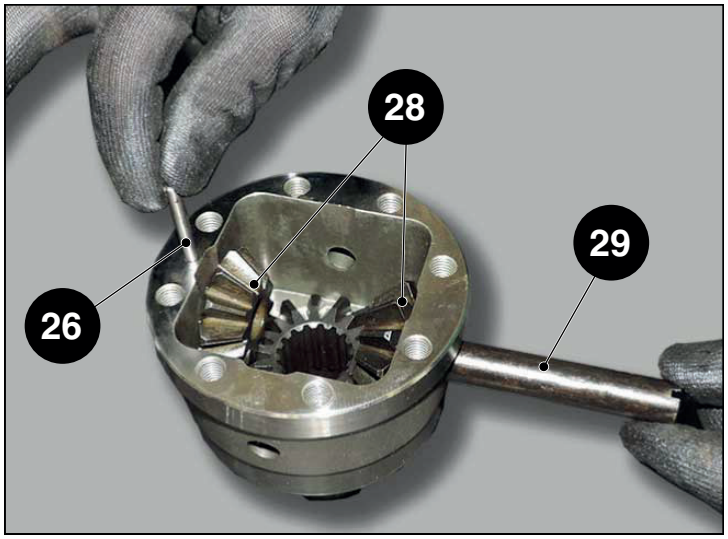


Fig. 4.66

Remove the sun gear (27) from the differential case (21).

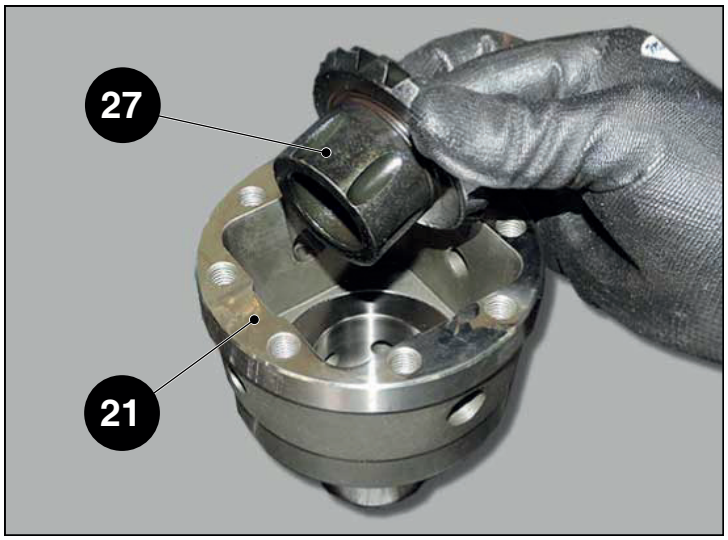


Fig. 4.67

Assembly

Fit the sun gear (27) from the differential case (21).

Warning
Make sure that the sun gear has splines for balls.

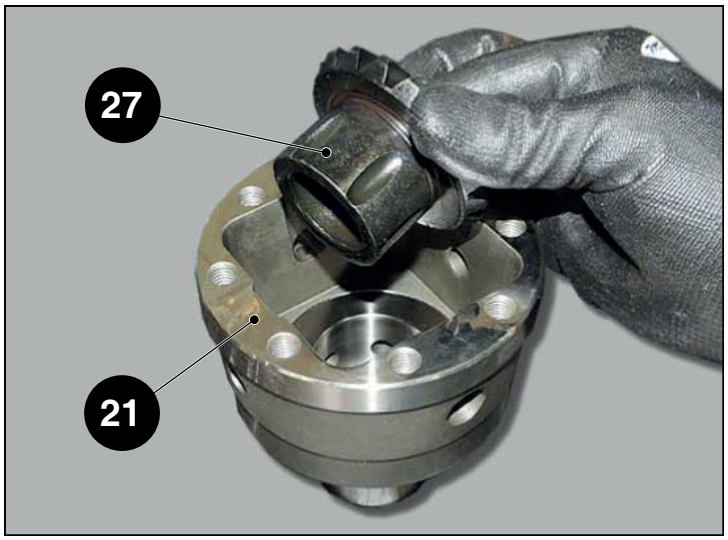


Fig. 4.68

Fit the planet gears (28) and their pin (29).

Block the pin of the planet gears (29) on the differential case by inserting the pin (26).

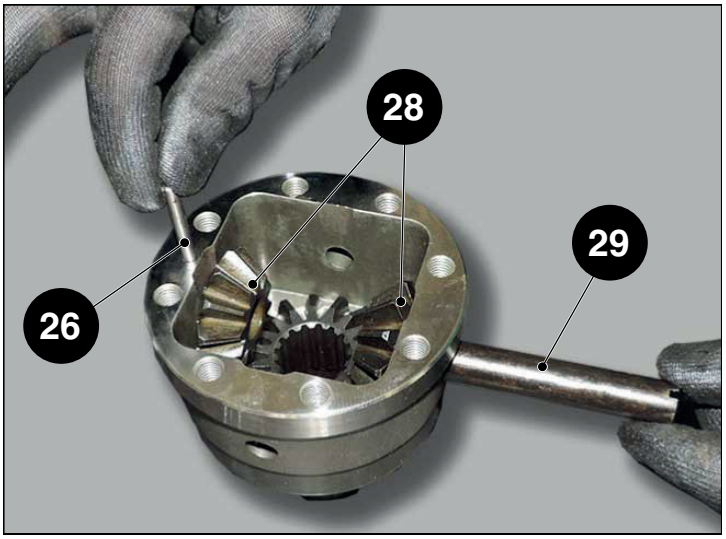


Fig. 4.69

Fit the sun gear (25) on the differential case (21).

Secure the gear set by tapping on the sun gear with a rubber mallet and check that everything turns smoothly.

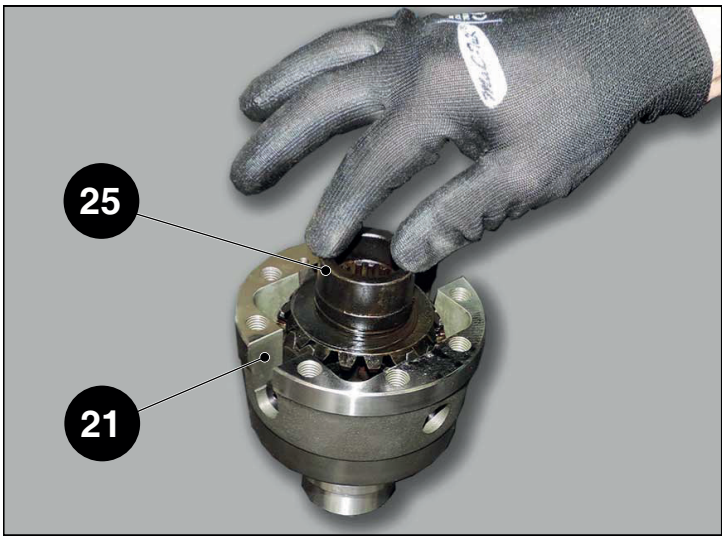


Fig. 4.70

Tighten the screws (22) together with the plates (23) to fasten the conical crown wheel (24) to the differential case. Apply a tightening torque of 90 Nm (9 kgm).

Bend the plates (23) to secure them permanently with the screws (22).

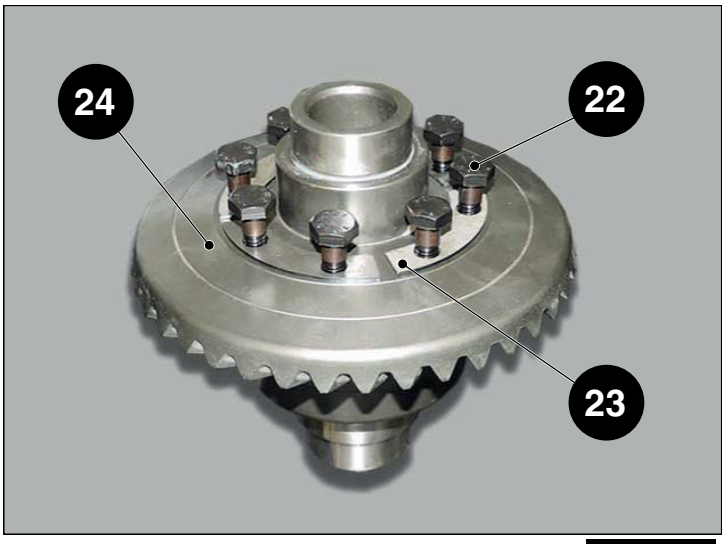


Fig. 4.71

Grease the housing of the balls on the differential case (21) and then insert the balls (20).

Fit the differential lock ring (19) by placing the bevelled side facing the crown wheel.

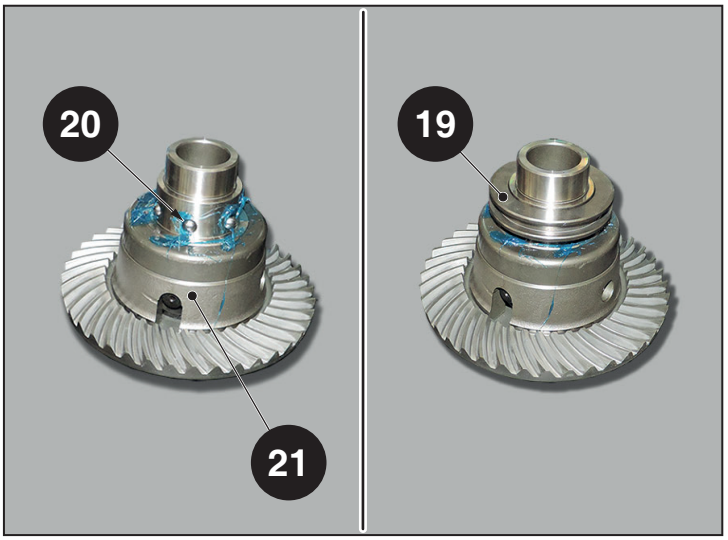


Fig. 4.72

Section 5 : Main inspection, reassembly and adjustment procedures

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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".

5.1.1 Refitting the REV and RS Cluster

Warning

The following operations are valid for RS Cluster and REV Cluster, unless otherwise specified.

Apply a coating of Teflon to the thread of the plug (30). Then screw it into the lower side of the front casing together with a copper washer (31).

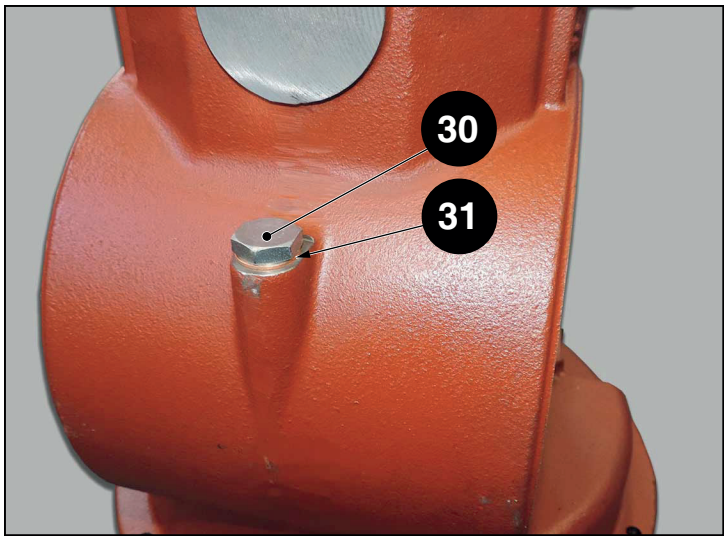


Fig. 4.73

5.1.1.1 Refitting the differential lock hydraulic lever (REV Cluster)

Fit two O-rings (88) on the control spindle (86) of the differential lock lever. Lubricate the O-rings once fit into place.

Apply a coating of Teflon to the thread of the spindle (86).

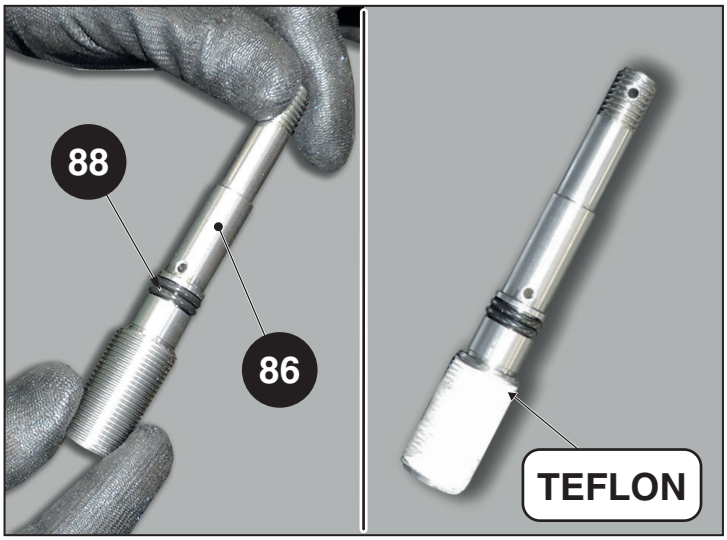


Fig. 4.74

Insert the O-rings (87) inside the differential lock fork groove (83). Lubricate the O-rings once fit into place.

Warning
Make sure that the O-rings OR (87) are fit correctly in the groove.

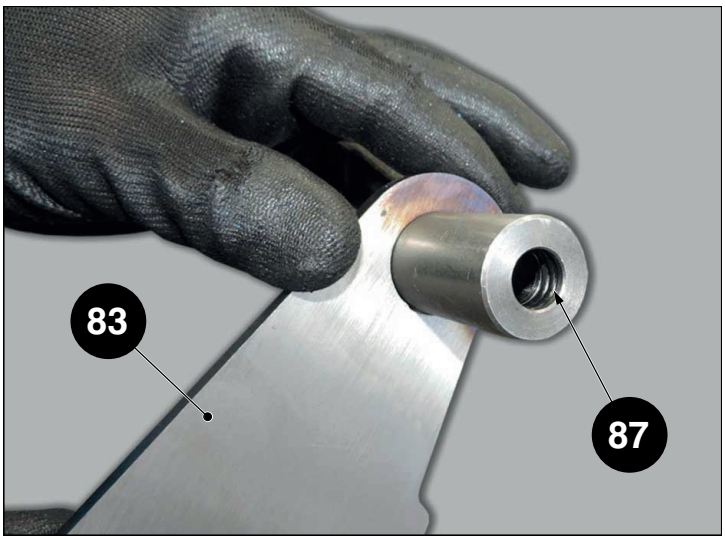


Fig. 4.75

Fit the control spindle (86) on the fork (83).

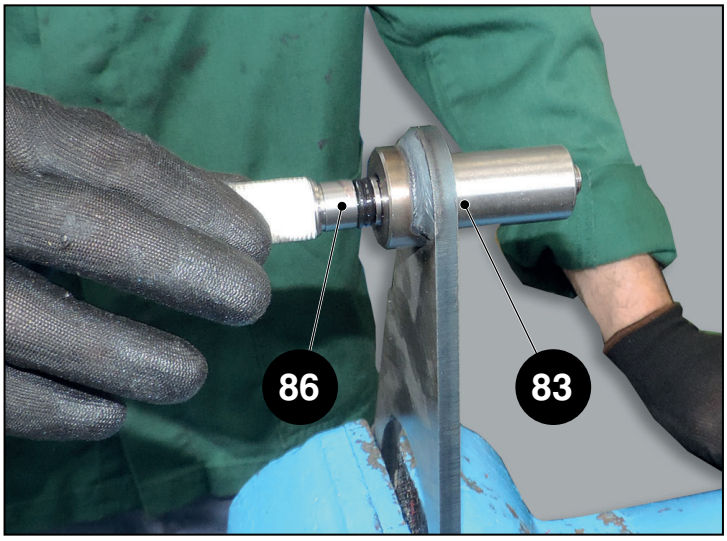


Fig. 4.76

Apply a coating of LOCTITE 243 to the thread of the spindle (86).

> **Warning**
>
> Clean the thread before applying the LOCTITE.

Fit the spring (89) and tighten the bushing completely (90).

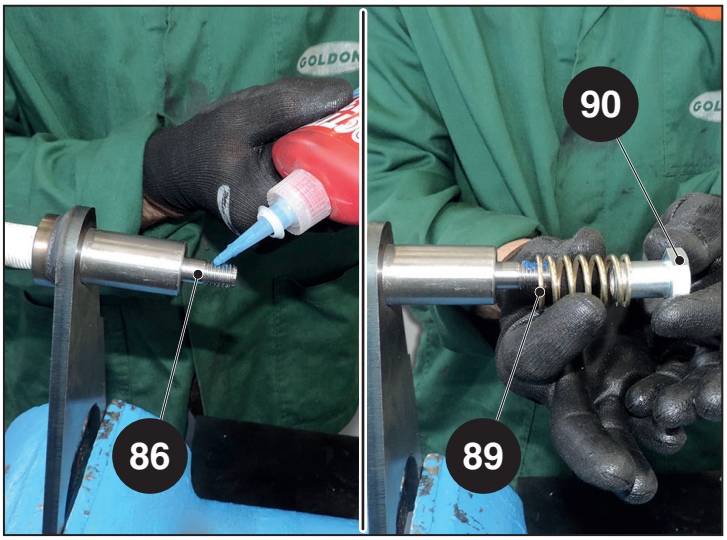


Fig. 4.77

Screw the special tool (A-p/n _____) on the control spindle (86).

Secure the special tool (A-p/n _____) on the spindle (86) by tightening the check nut.

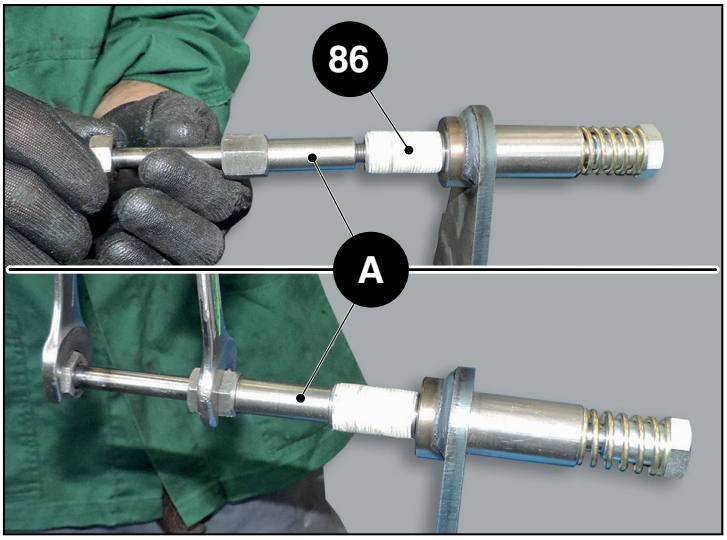


Fig. 4.78

Apply a coating of LOCTITE 243 to the thread of the pin (85) and then screw it on the bushing (90).

> **Note**
>
> To screw the pin (85), apply leverage on the hole using a pin punch.

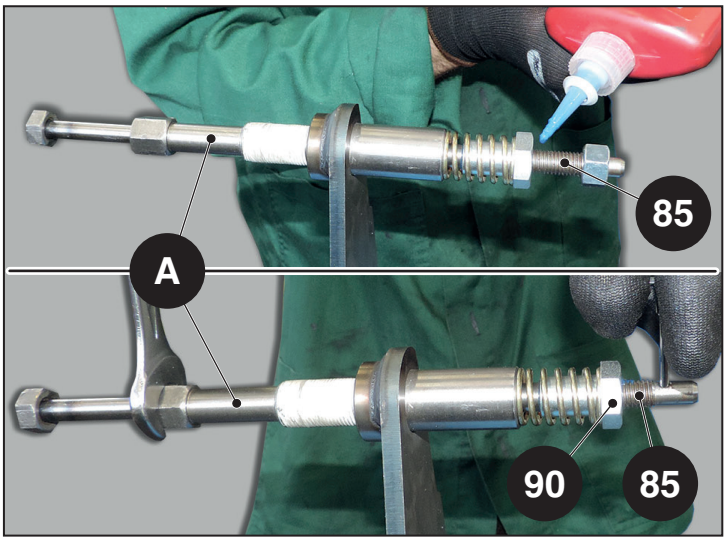


Fig. 4.79

Screw in the check nut (84) on the pin (85).

Remove the special tool (A-p/n_____).

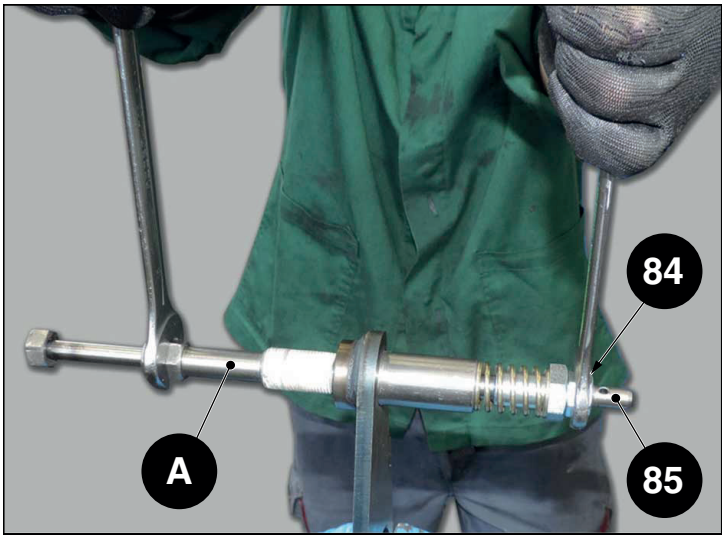


Fig. 4.80

Fit the preassembled fork (83) in the casing.

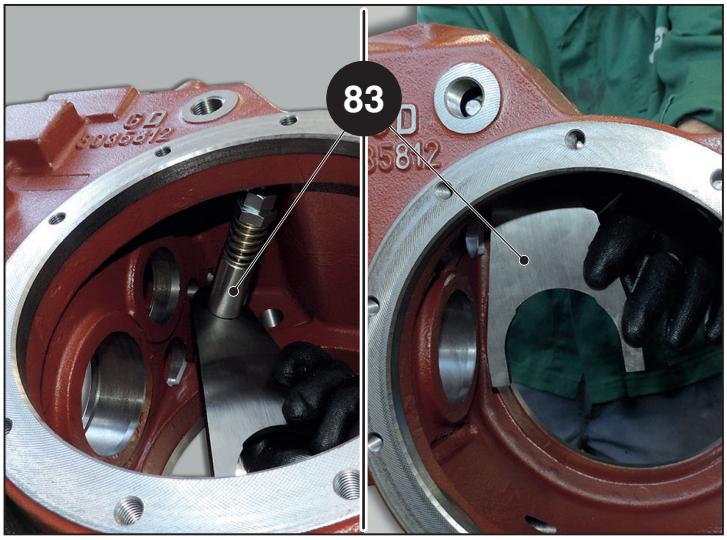


Fig. 4.81

Screw the special tool (A-p/n _____) on the spindle (86) and then screw the check nut to join the two components.

Turn the special tool (A-p/n_____) counter-clockwise so that the spindle (86) of the fork is screwed into the casing. Screw the spindle (86) all the way to the end.

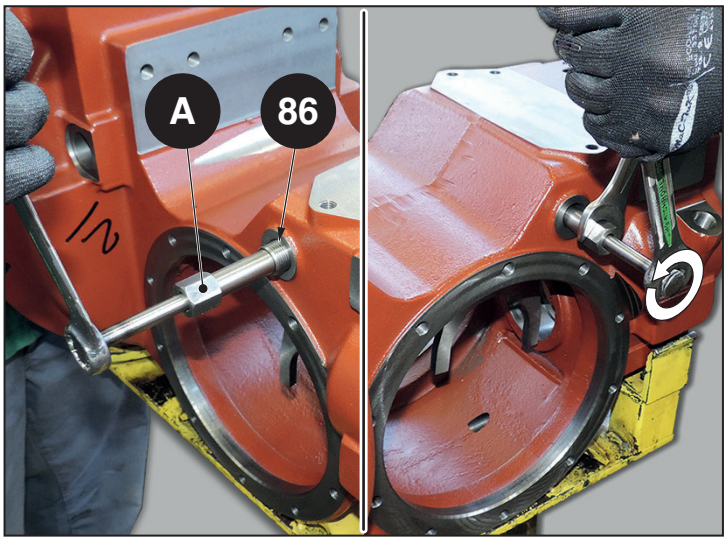


Fig. 4.82

Apply a coating of Teflon to the thread of the spindle (86).

Fit the copper washer (82) and the check nut (81).

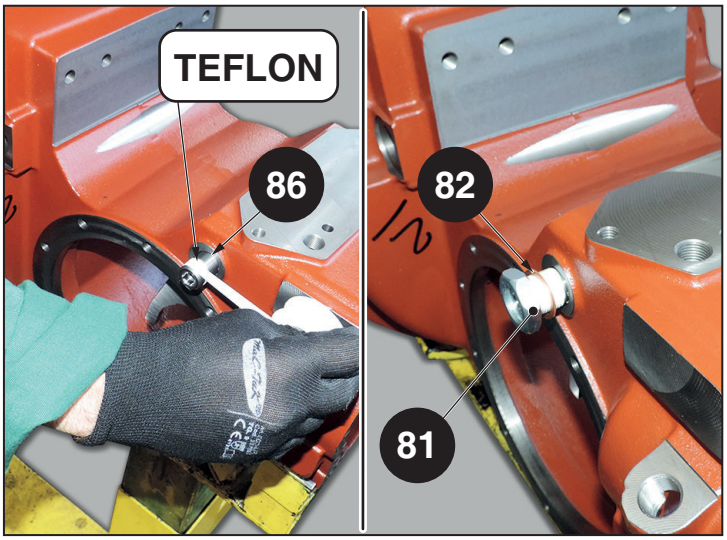


Fig. 4.83

5.1.1.2 Refitting the differential lock mechanical lever (RS Cluster)

Insert the O-ring (108) and flat washer (109) on the end of the rod (107) and secure with a circlip (110).

Warning
The right end has no holes.

Fit the rod (107) inside the differential case and at the same time insert it inside the fork (111) and in the spring (113).

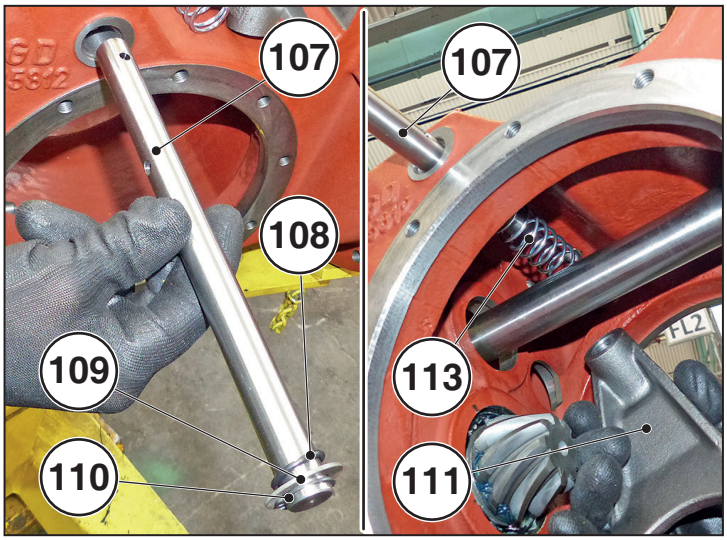


Fig. 4.84

Align the rod (107) and fork (111) holes so that they are visible from the hole on the cast and then insert the pin (114) to join the components.

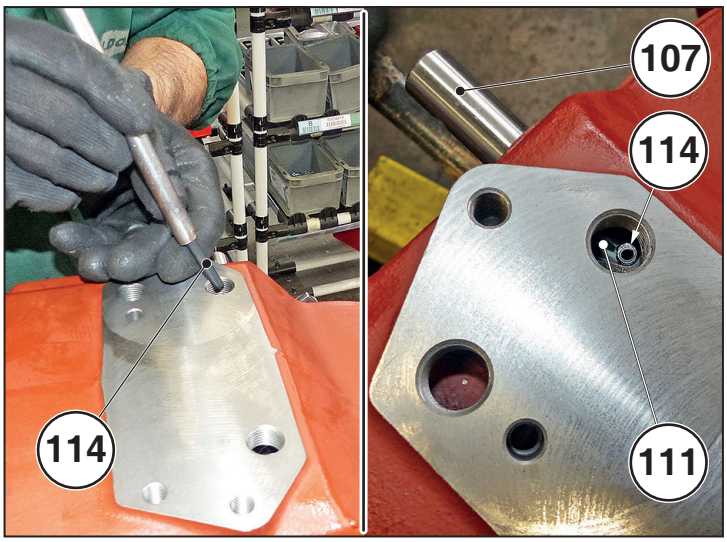


Fig. 4.85

Insert the O-ring (108), spacer () and lever (47) onto the left end of the rod (107). Secure the lever on the rod with the pin (112).

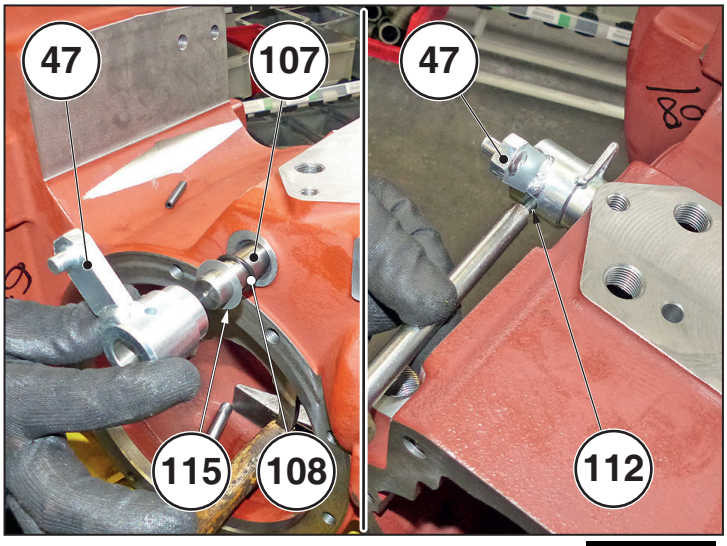


Fig. 4.86

5.1.1.3 Refitting the bevel pinion

Preassemble the bevel pinion (2) inserting the components below in the following order:

- spacer (32);
- bearing (33), driving it completely into its seat.
- spacer (32);
- circlip (34).

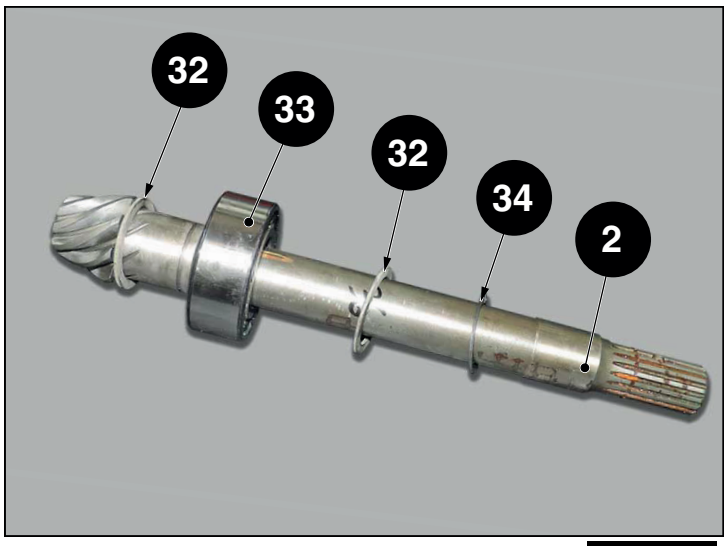


Fig. 4.87

Fit the complete bevel pinion (2) in the case and drive the bearing (33) completely into its seat.

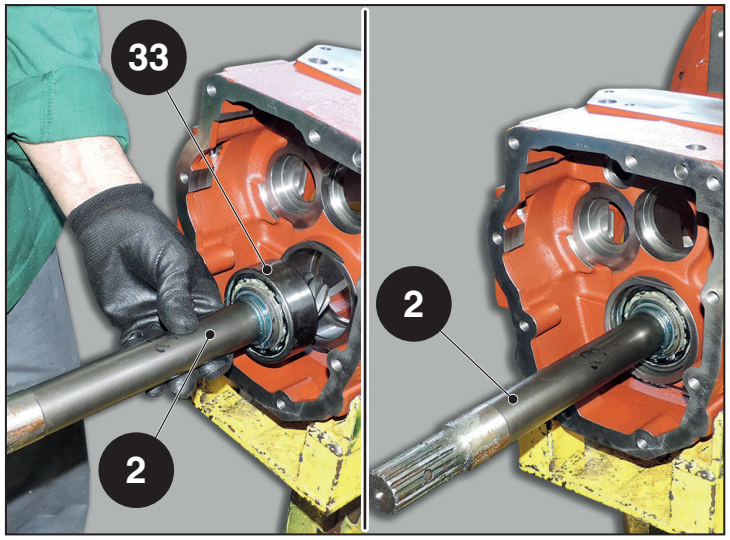


Fig. 4.88

Lock the pinion with the circlip (35).

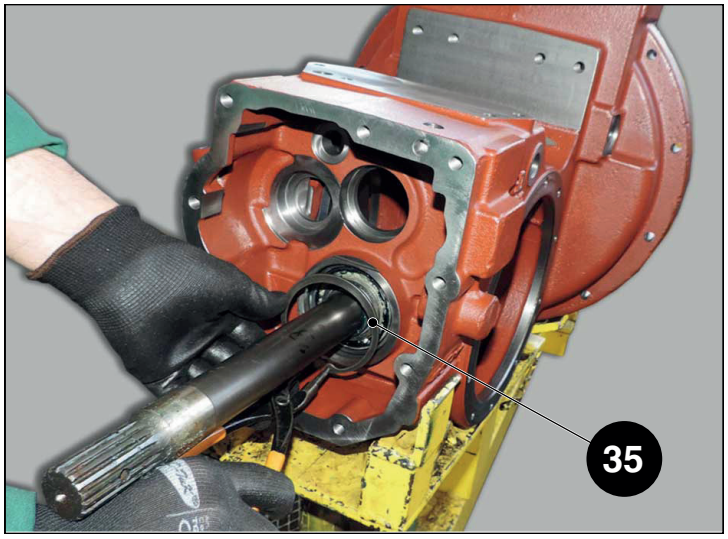


Fig. 4.89

5.1.1.4 Refitting the primary shaft and reverse shuttle

Drive the bearing (18) on the housing with a punch tool of suitable diameter.

Secure the bearing (18) with a circlip (17).

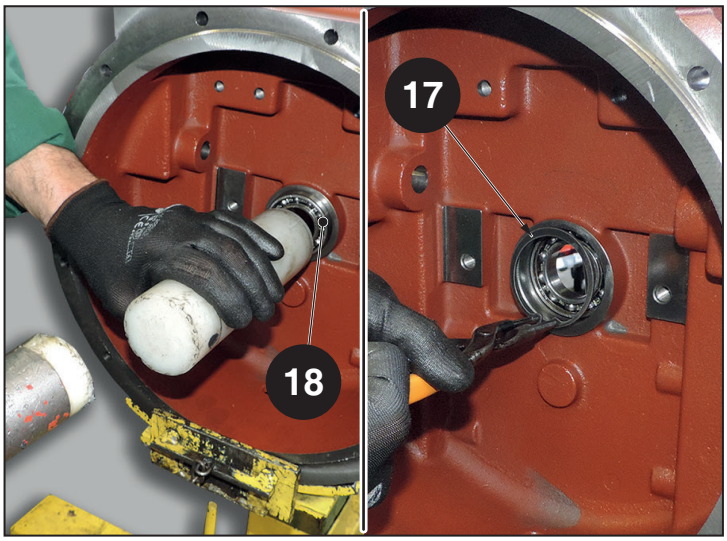


Fig. 4.90

Fit the bush (94) in the spindle (71).

Insert the bushes (93) on the ends of the primary shaft (56).

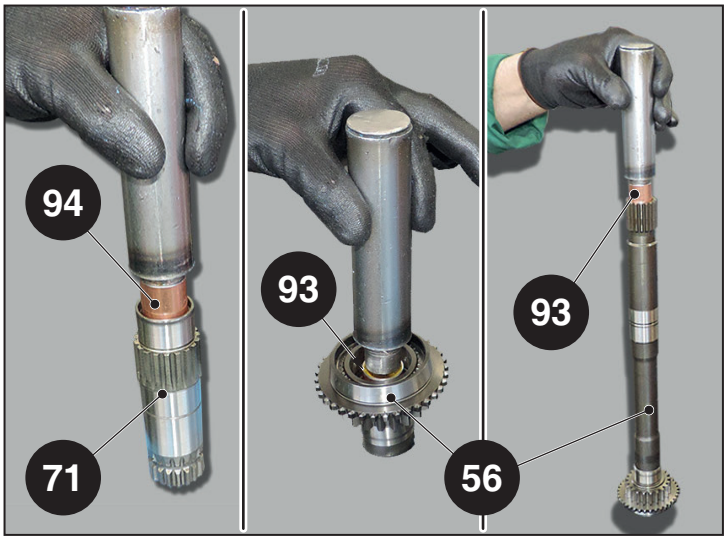


Fig. 4.91

Insert the oil seal (92) in the spindle (71).

Insert the oil seal (91) on the primary shaft (56) from the synchroniser side.

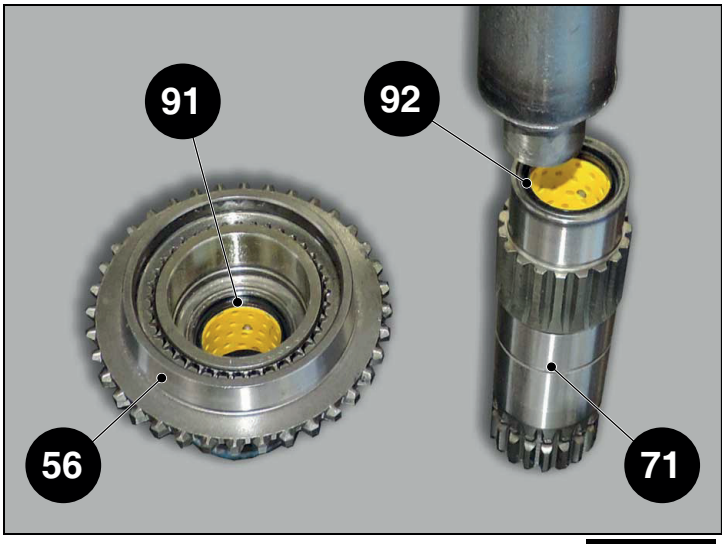


Fig. 4.92

Fit the bearing (80) on the primary shaft (56) and drive it into its seat with an adequate punch tool.

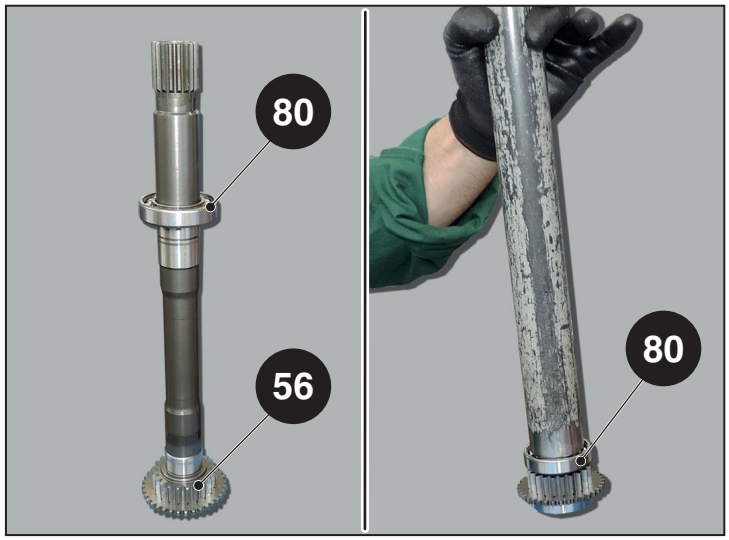


Fig. 4.93

Grease the housing on the primary shaft (56) and then insert the spacer (77), roller bearing cage (78) and flat spacer (79).

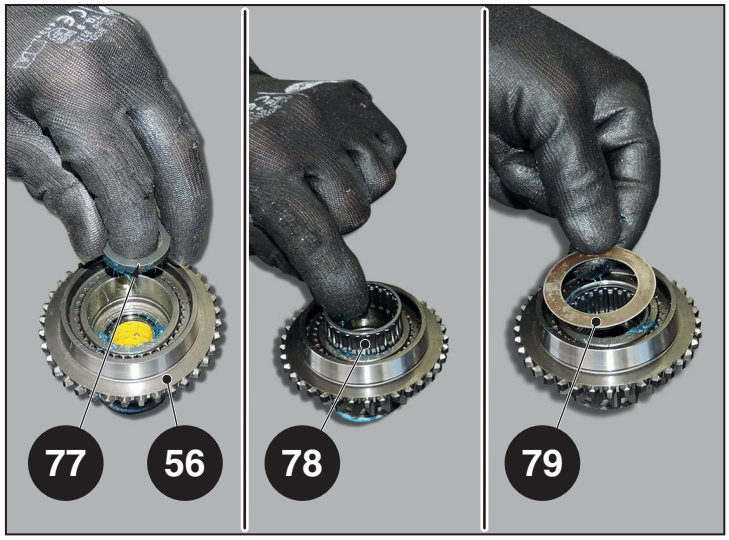


Fig. 4.94

Fit the synchroniser ring (76) and the synchroniser gear (75) on the primary shaft (56).

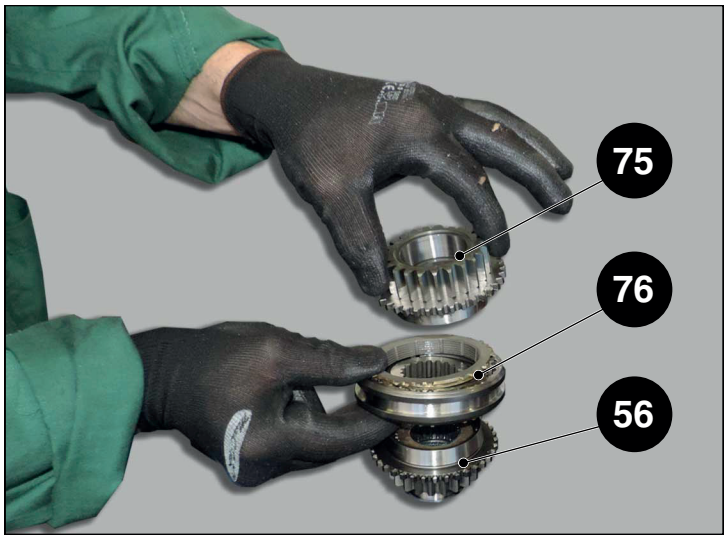


Fig. 4.95

Fit the roller bearing cage (72) on the spindle (71).

Fit the spacer (73) and secure it in place with the circlip (74).

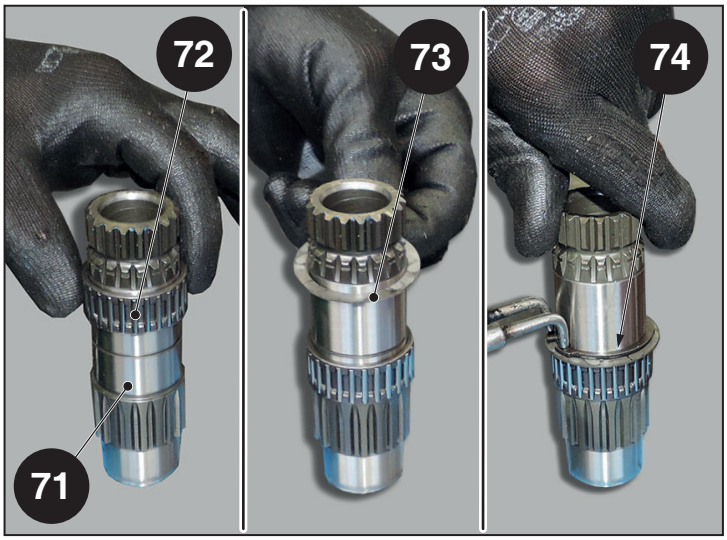


Fig. 4.96

Fit the complete spindle (71) on the primary shaft (56).

Check that the synchroniser turns smoothly.

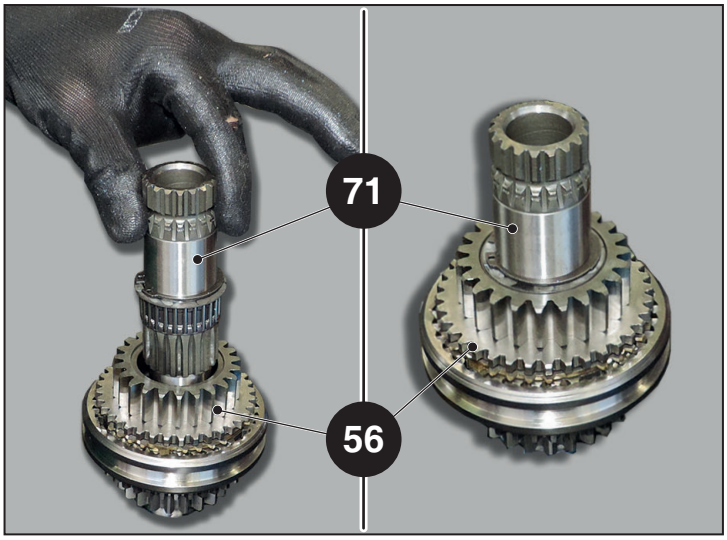


Fig. 4.97

Preassemble the reverse shuttle fork (69) securing it on the rod (55) with the pin (70).



Fig. 4.98

Fit the following components in the casing:

- complete primary shaft (56);
- motion transfer gear (68);
- reverse shuttle fork (69).

Note

Insert the listed components at the same time to avoid freeing the synchroniser.

Drive the shaft (56) and transfer case gear (68) into their seat.

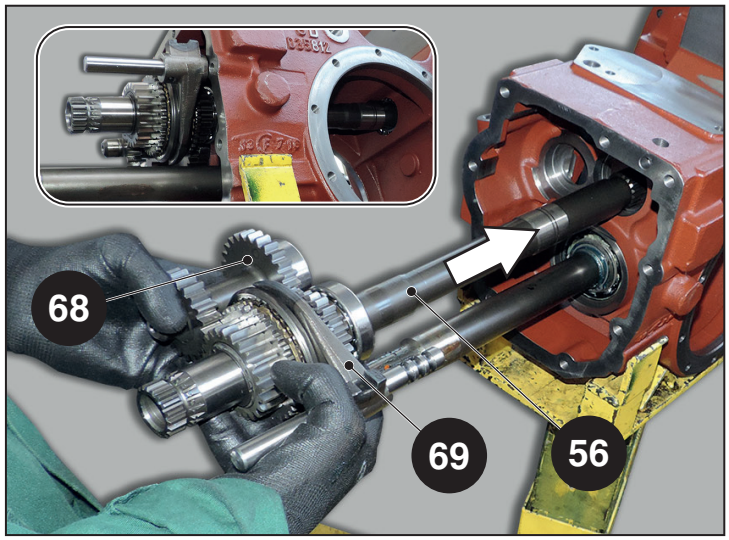


Fig. 4.99

Fit the reverse shuttle pin (62) on the case making sure that the hole is facing up.

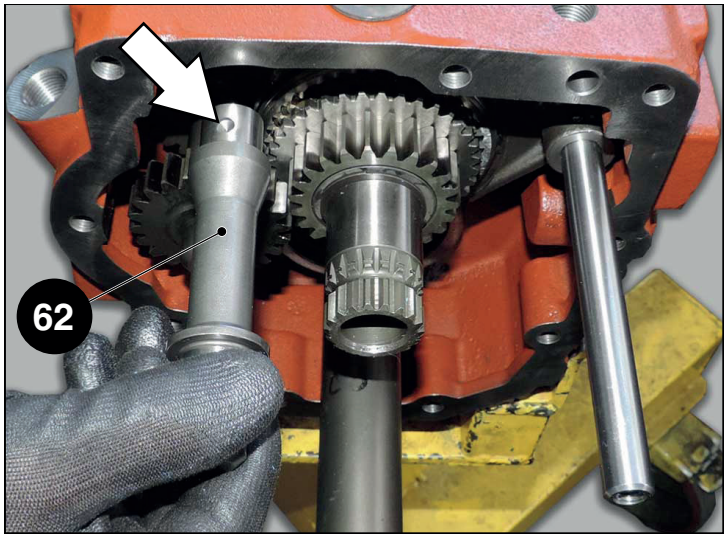


Fig. 4.100

Preassemble the grub screw (67) securing the reverse shuttle pin by applying a coat of TEFLON and fitting the washer (95) and nut (96).

Bolster the reverse shuttle pin (62) and tighten the grub screw (67) securing the reverse shuttle pin to the end.

Warning

Make sure that the grub screw (67) is aligned with the hole in the pin (62). The latter should be firmly locked after the grub screw has been inserted.

Secure the grub screw (67) permanently with the nut (96).

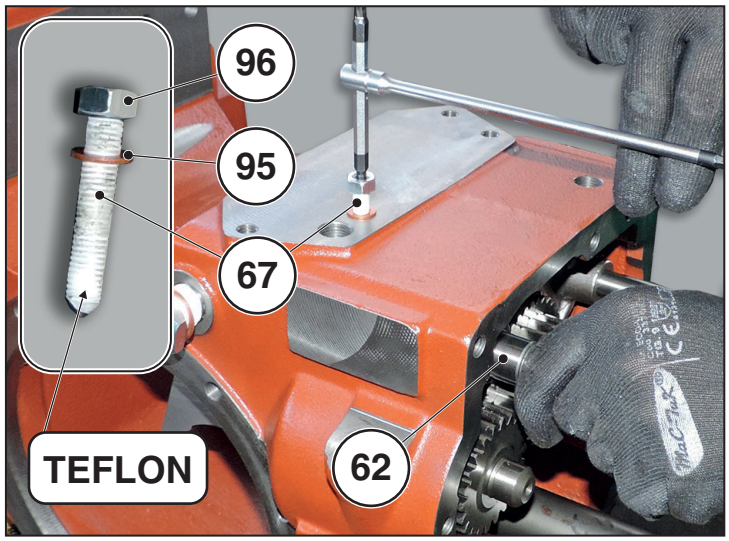


Fig. 4.101

Screw the special tool ((B-p/n_____) onto the shuttle lever rod.

Fit and remove the reverse shuttle lever and make sure that the reverse shuttle synchroniser is fully integral with the gears in both positions. Check that the synchroniser rotates smoothly in neutral position.

Remove the special tool (B-p/n_____).

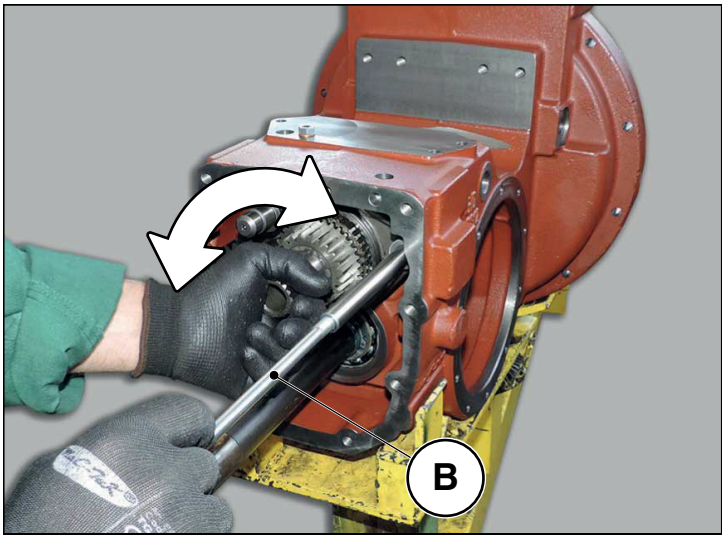


Fig. 4.102

Fit the ball (66) and the spring (67).

Preassemble the reverse shuttle adjuster screw (64) by applying a coat of TEFLON and fitting the washer (97) and nut (98).

Tighten the reverse shuttle adjuster screw (64). Do not completely tighten the screw but leave a minimum of clearance on the reverse shuttle rod.

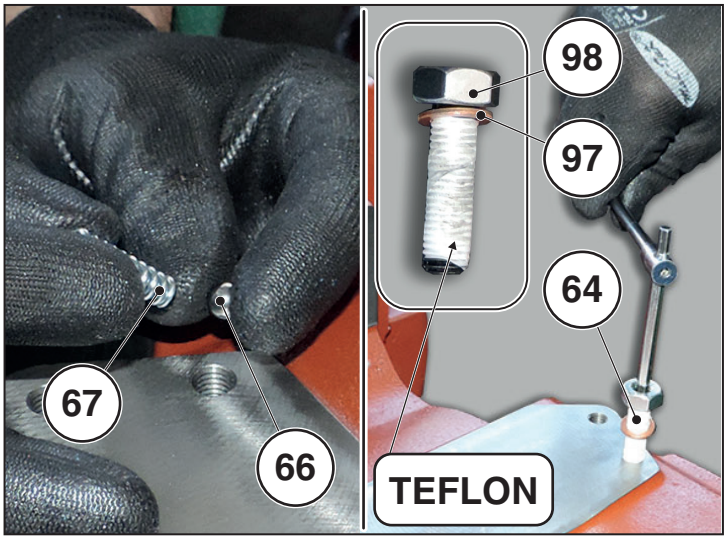


Fig. 4.103

Fit the roller bearing cage (63) on the reverse shuttle pin (62).

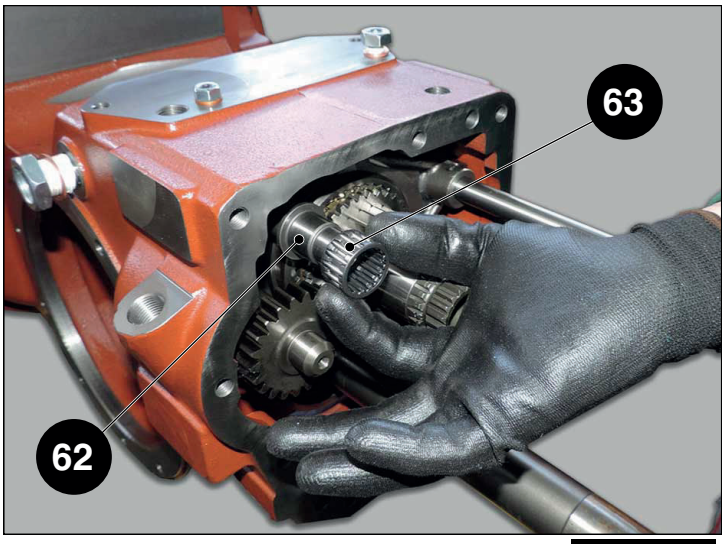


Fig. 4.104

Fit the gear (60) on the reverse shuttle pin (62) with the protruding part facing the rear.

Fit the spacer (61) on the reverse shuttle pin (62).

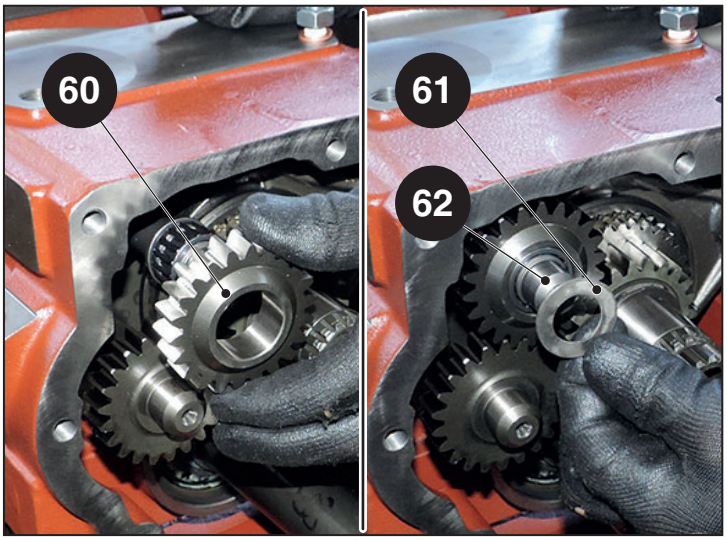


Fig. 4.105

5.1.1.5 Refitting the clutch control

Fit the circlip (59) on the primary shaft (56).

Use a press and a guide tool to install the oil seal (16).

Warning
Lubricate the oil seal (16) before fitting it.

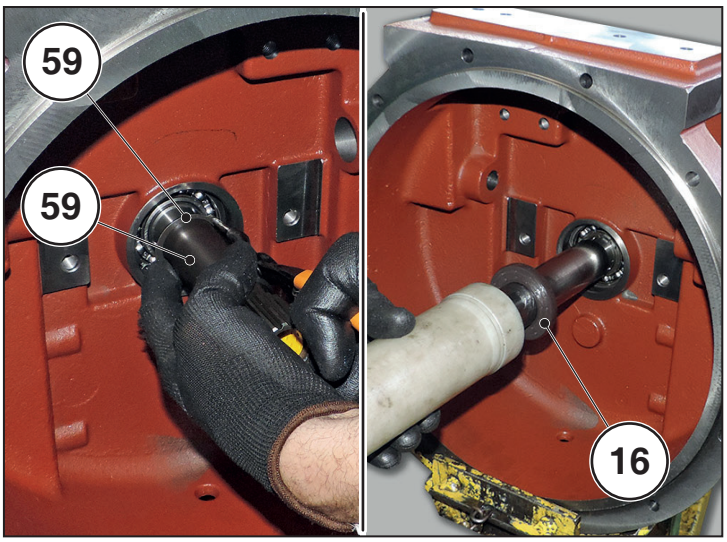


Fig. 4.106

Apply a coating of LOCTITE 270 to the thread of the pins (15) and then screw them on the housing. Apply a tightening torque of 55 Nm (5.5 kgm).

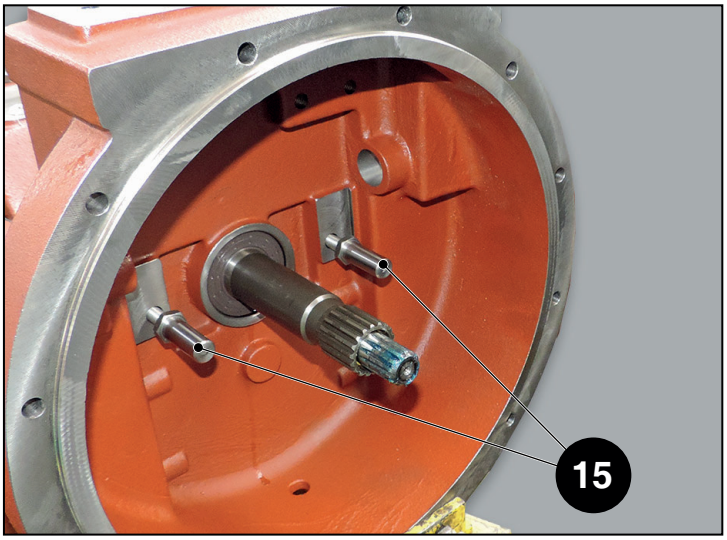


Fig. 4.107

Insert the bush (37) on the left and the bush (38) on the right. Use a punch tool of suitable diameter.

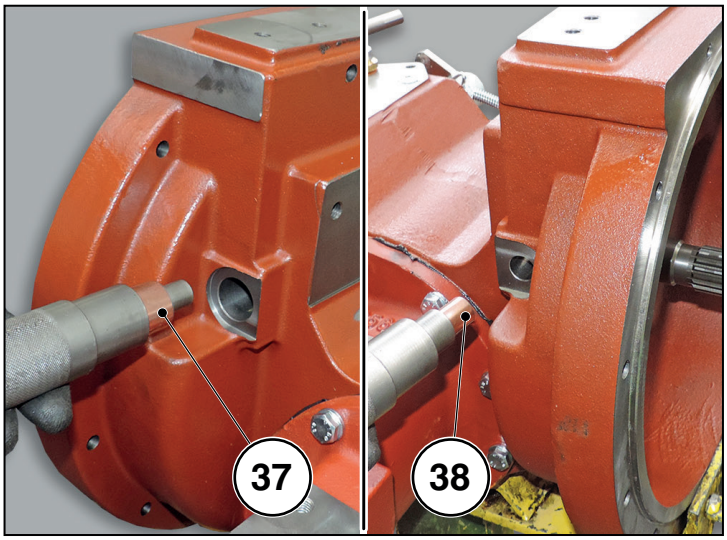


Fig. 4.108

Preassemble the thrust plate support (10) by fitting the thrust bearing (14). Drive the bearing with a punch tool of suitable diameter.

Warning

Fit the bearing (14) with the protected part facing the opposite side of the thrust plate support (10).

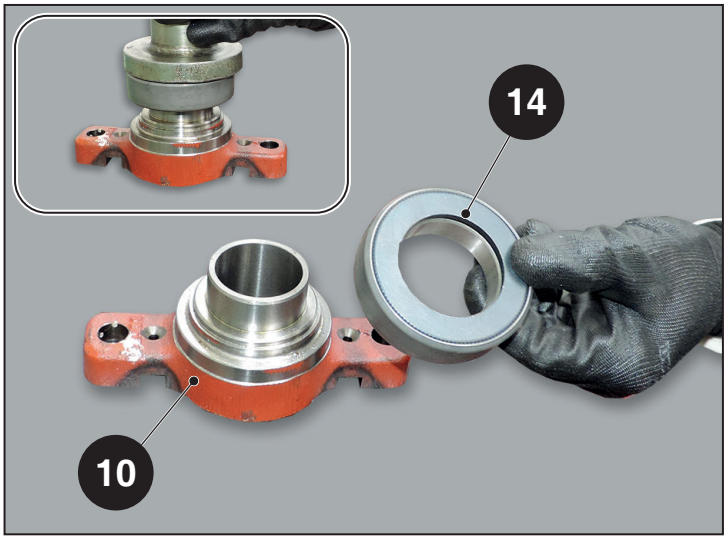


Fig. 4.109

Fasten one end of the return springs (39) to the thrust plate support (10) and then the other end to the holes in the clutch fork (11).

Turn the clutch fork (11) in the indicated direction to fasten the return springs (39) completely.

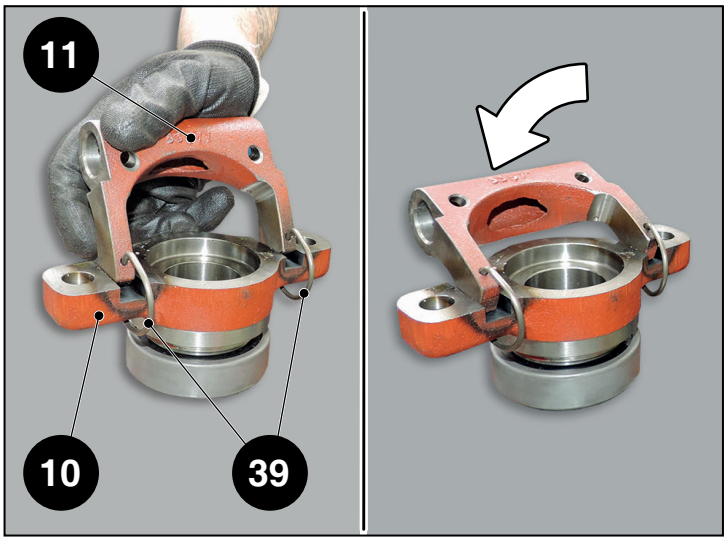


Fig. 4.110

Fit the complete thrust plate assembly (10) on the shaft and pins with the clutch fork (11) facing up.

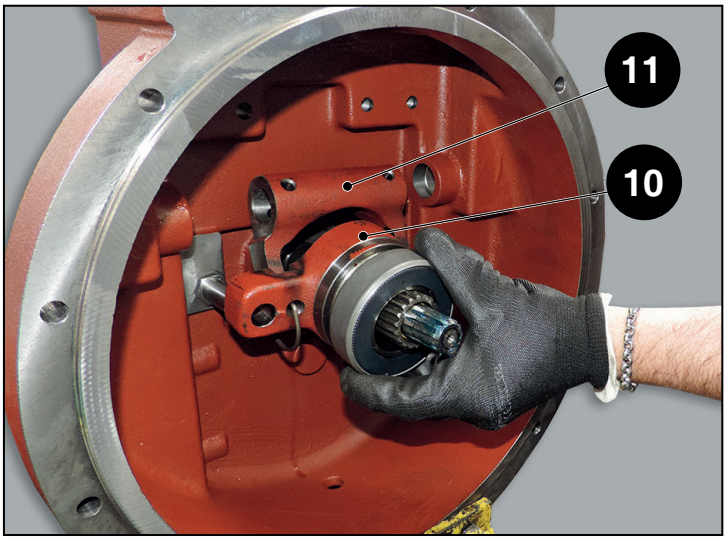


Fig. 4.111

Fit the clutch control lever (13) by inserting it in the clutch fork (11).

Match the holes on the control lever (13) with those on the fork (11) and then fit the pins (12) to secure the components.

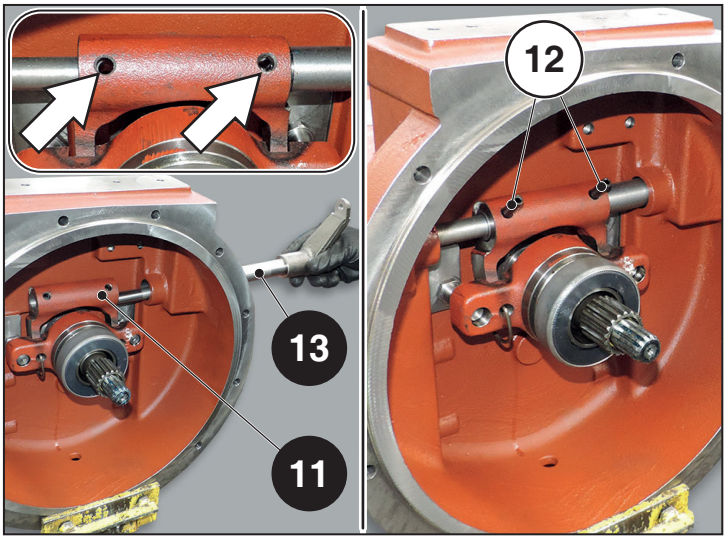


Fig. 4.112

Apply a coat of Teflon to the plug (99) and tighten it.

Tighten the vent plug (100) complete with washer (101).

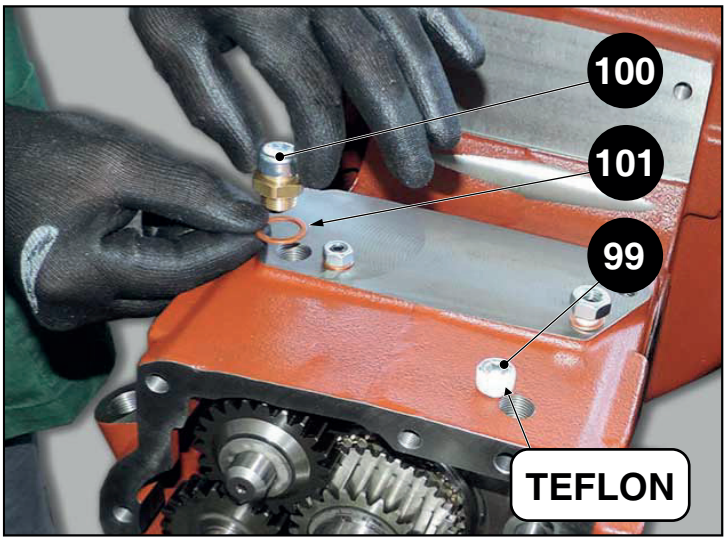


Fig. 4.113

5.1.1.6 Adjusting the differential and refitting the final drive units

Insert spacers to obtain an initial thickness on the crown wheel assembly:

- spacer (40) on crown wheel side: 1.3 mm
- spacer (41) opposite the crown wheel: 1.6 mm

Note

The crown wheel side spacer determines the backlash between the pinion and crown wheel.

The spacer opposite the crown wheel determines the load on the bearings supporting the differential assembly.

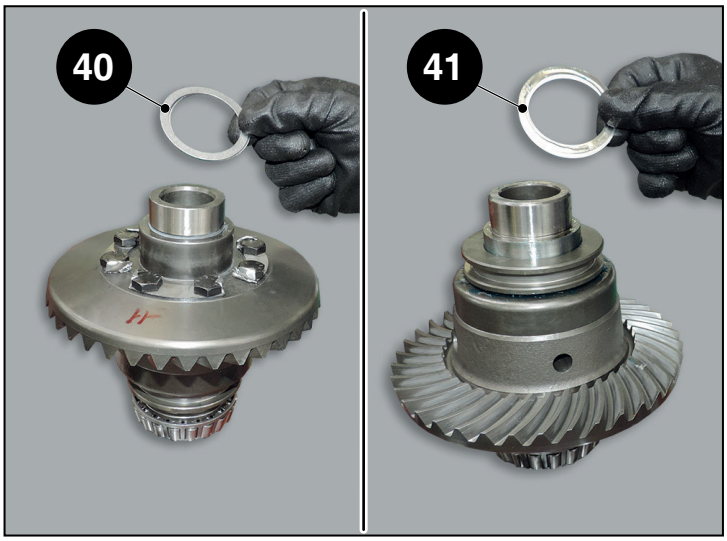


Fig. 4.114

Fit the complete crown wheel assembly (24) in the differential case. Use a screw or pin to bear the crown wheel assembly.

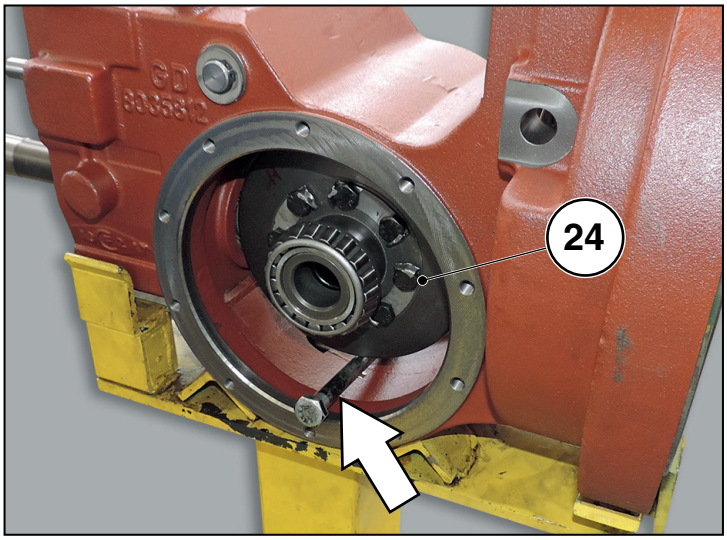


Fig. 4.115

Fit the outer bearing races (42) on the final drive units.

Fit the inner bearing races (42) on the crown wheel assembly (24).

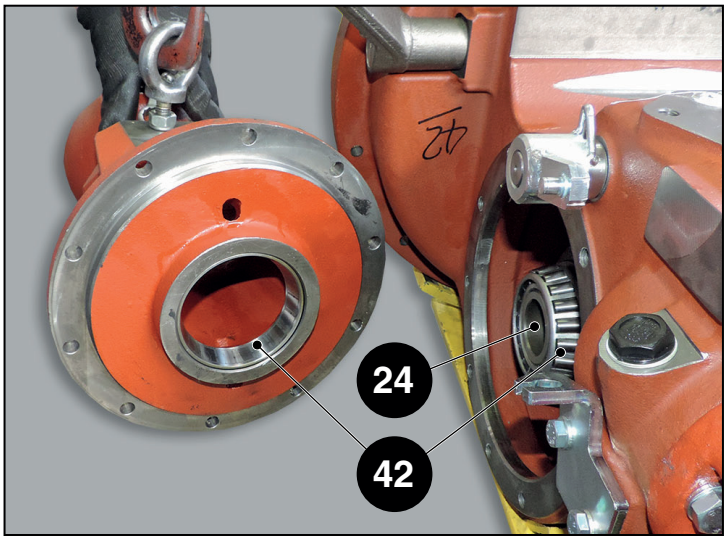


Fig. 4.116

Assemble both front hubs securing them with 3 screws only on each side.

Warning

The hubs are fastened temporarily: do not apply SILICONE on the mating surface.

Attention

Use lifting equipment of sufficient capacity to secure the hubs.

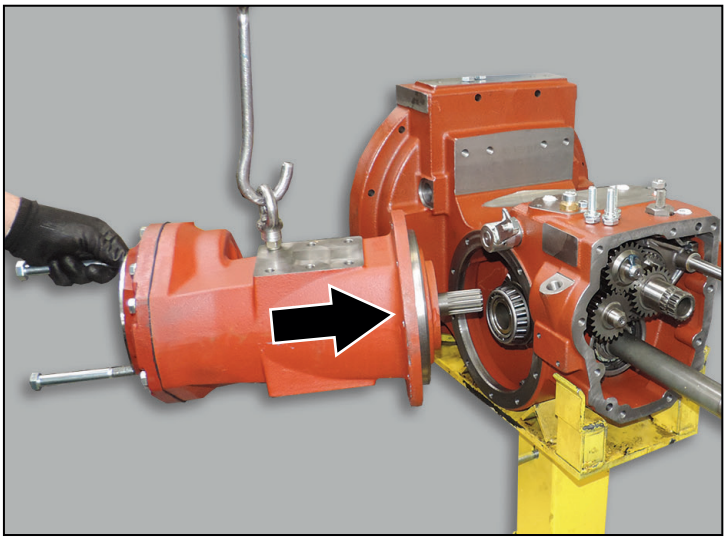


Fig. 4.117

Turn the bevel pinion (2) vigorously to secure the differential in place.

Check the backlash between the pinion and crown wheel; it must be comprised between 0.1 and 0.3 mm. In addition, the pinion and crown wheel must turn freely (smoothly without jamming).

Warning

Turn the bevel pinion and check the backlash in several points.

If there is too much backlash or if the bevel gear set is too tight, increase or reduce the thickness of the spacers (40) and (41) respectively.

To reduce the pinion—crown wheel reduce, increase the thickness of the spacer (40) on the crown wheel side and reduce the thickness of the opposite spacer by the same amount (41).

To increase the pinion—crown wheel reduce, reduce the thickness of the spacer (40) on the crown wheel side and increase the thickness of the opposite spacer by the same amount (41).

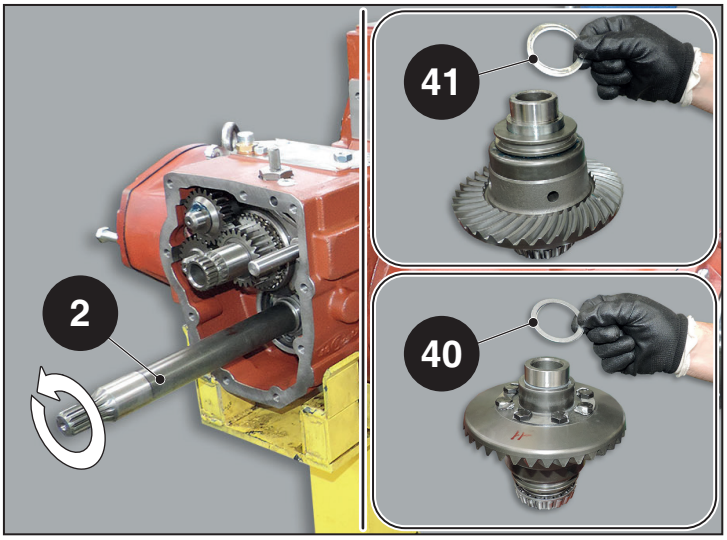


Fig. 4.118

Apply a coating of silicone sealant to the mating surfaces of the final drive units.

Secure the final drive units to a lifting equipment of adequate load capacity and mount them on the differential case.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Warning

See the Chapter “Front final drive units” for the detailed steps on how to mount the drive units.

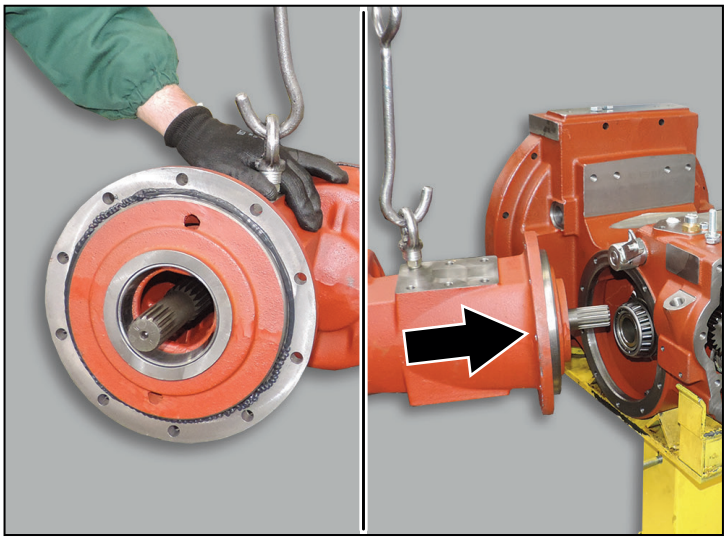


Fig. 4.119

Tighten the screws (43) and the washers (44) fastening the final drive units. Apply a tightening torque of 70 Nm (7 kgm).

Warning

For RS and SN+ Cluster

Before tightening the topmost screw of the left final drive unit, fit the plate (45). Fasten the spring (46) to the differential lock lever (47).

Tighten the hooks of the spring (46) and rotate the plate (45) in order to pretension the spring.

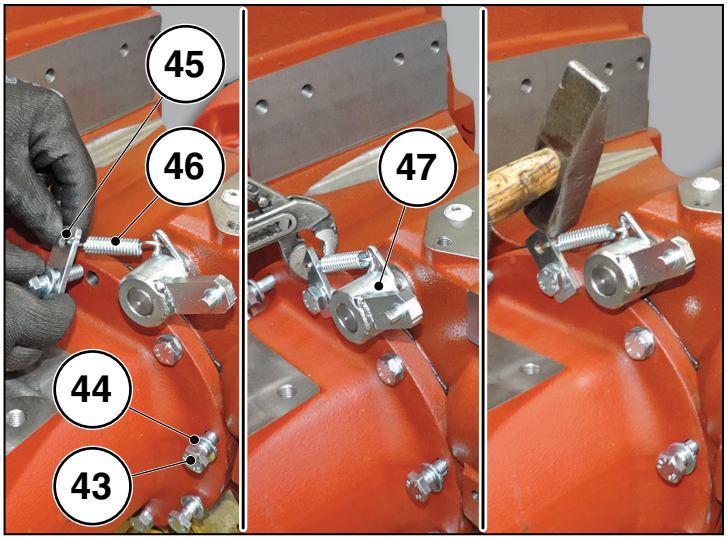


Fig. 4.120

5.1.1.7 Adjusting the reverse shuttle and refitting the cover

Insert a 0.8-mm spacer (102) to achieve an initial thickness on the primary shaft (56).

Mount the special tool (D-p/n ____).

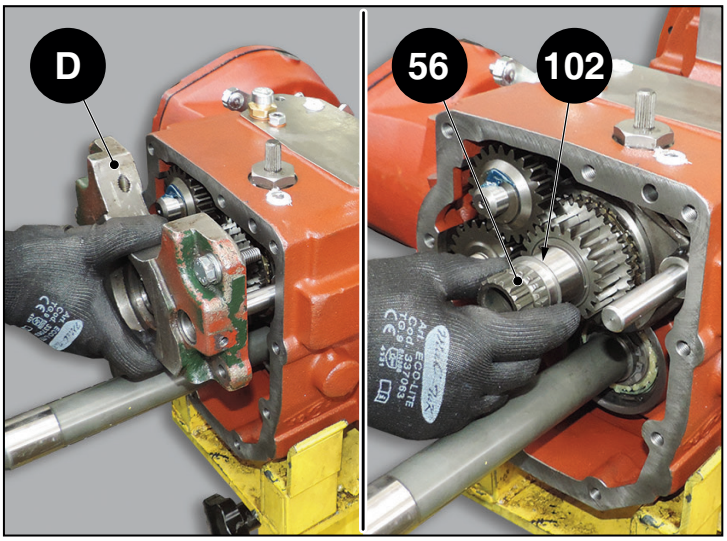


Fig. 4.121

Mount the special tool (B-p/n_____) on the reverse shuttle rod (55).

Use the special tool to move the lever back and forth and open the gear pack.

> **Note**
>
> **For SN+ Cluster**
>
> Mount the tool (C-p/n_____) on the reverse shuttle lever (106).

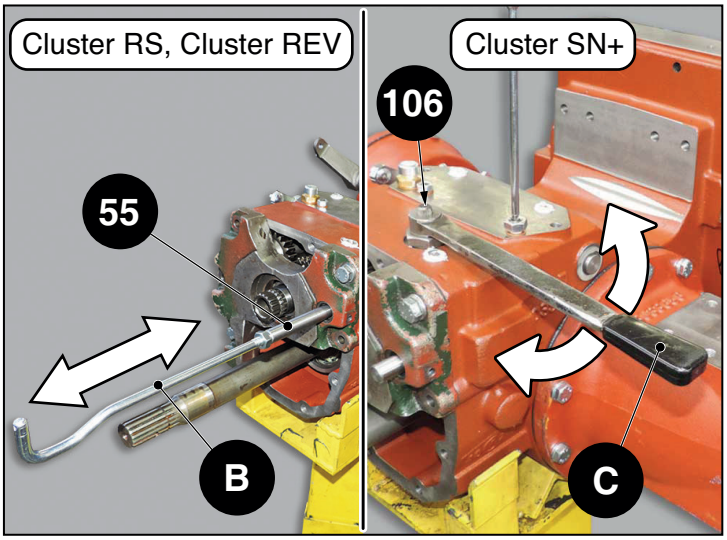


Fig. 4.122

Tighten the grub screw (64) to achieve the right degree of pretensioning on the reverse shuttle rod (55). Tighten the check nut (98) to fasten the position of the grub screw (64) permanently.

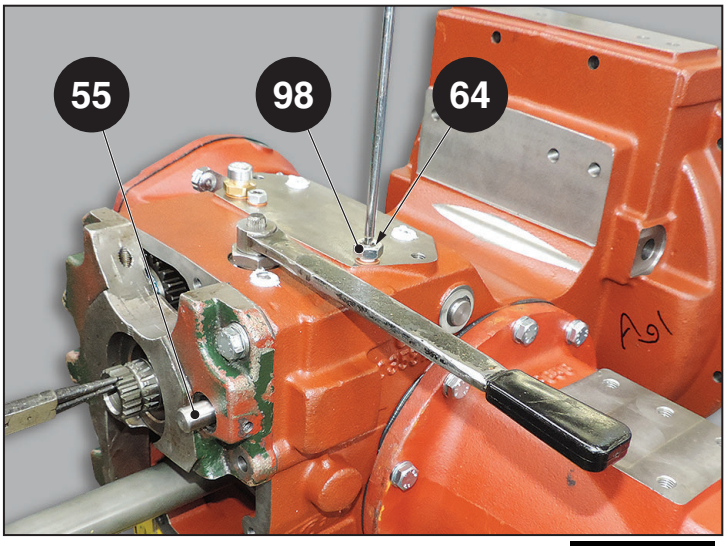


Fig. 4.123

Grasp the primary shaft (56) with pliers and check the backlash by moving the shaft back and forth. The backlash measured must be between _____ and _____ mm.

Use the spacer (102) to vary the backlash:

- to reduce the backlash, increase the spacer thickness;
- to increase the backlash, increase the spacer thickness.

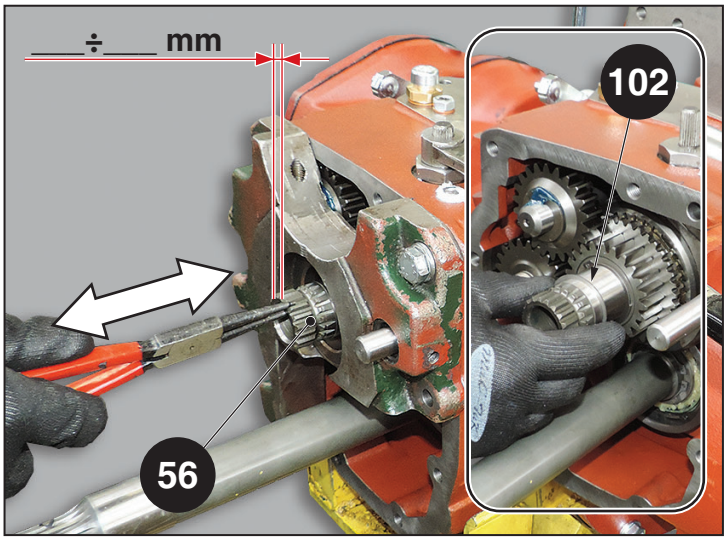


Fig. 4.124

Remove all special tools mounted.

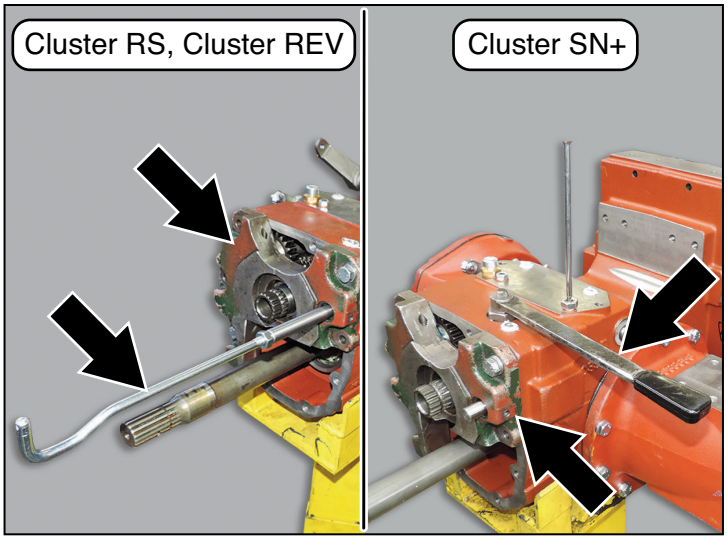


Fig. 4.125

Pre-assemble the cover by fitting the bearing (7) and the bearing (36).

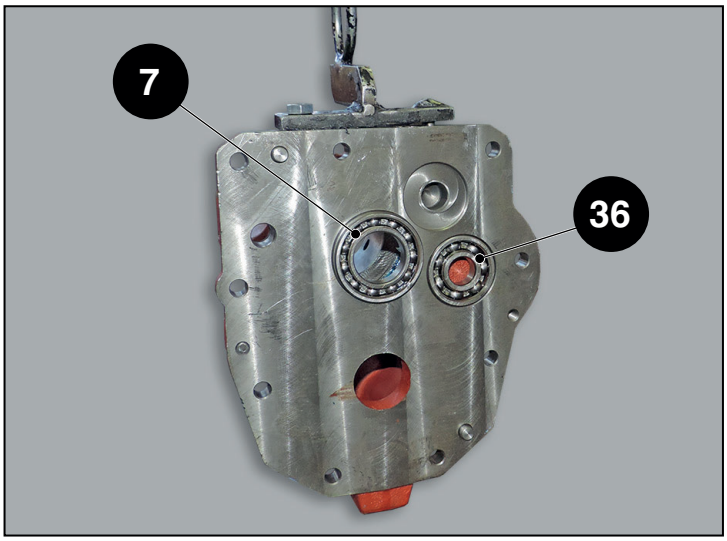


Fig. 4.126

Apply a layer of SILICONE sealant on the mating surface of the differential case.

Tighten the special tool (E-p/n_____) on the (48) and lift it; then assemble it on the differential case.

Attention
Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

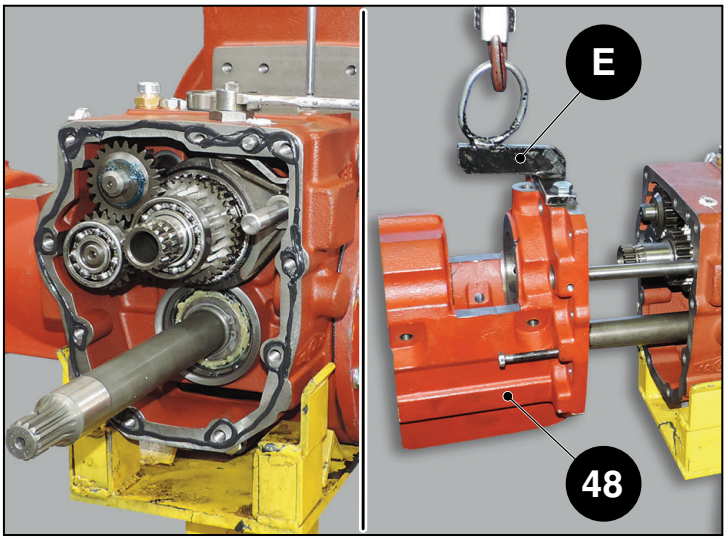


Fig. 4.127

Fasten the cover (48) by tightening the screws (5) and hex socket screws (6) with the washers (49). Apply a tightening torque of 55 Nm(5.5 kgm).

Check that the reverse shuttle is engaged correctly.

Make sure that the reverse shuttle works properly in the 3 lever positions: forward, central (neutral position) and back.

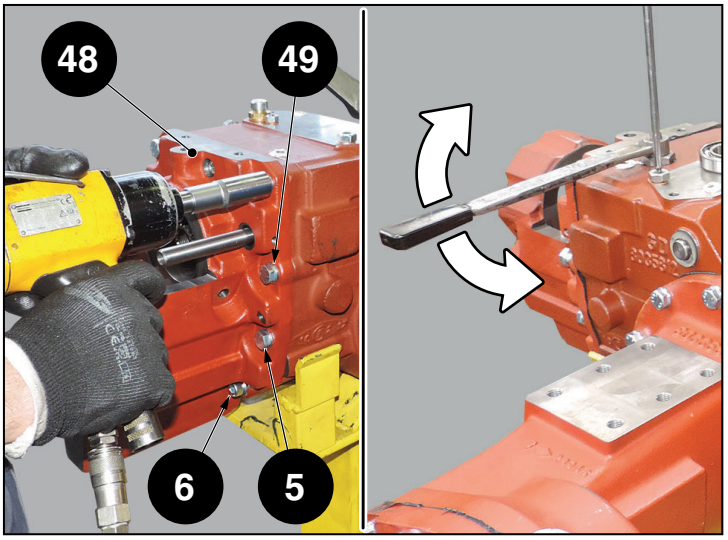


Fig. 4.128

5.1.1.8 Refitting the differential case cover

Remove the O-ring (54) and washer (53) on the reverse shuttle rod (53).

Warning
The protruding part of the washer (53) must face the O-ring (54).

Tighten the plate (52) with the screw (50) and washer (51) to secure the components fit on the rod (55) in place.

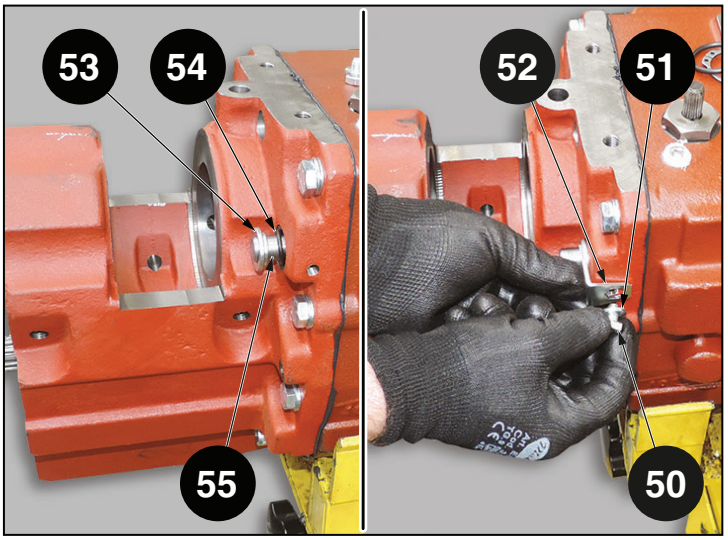


Fig. 4.129

Fit the circlip (57A) and O-ring (58) on the primary shaft (56).

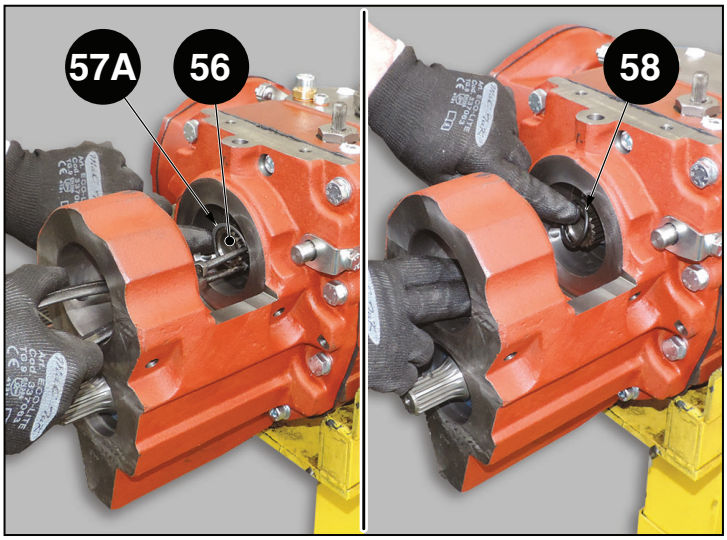


Fig. 4.130

Fit the circlip (57B) on the primary shaft (56).

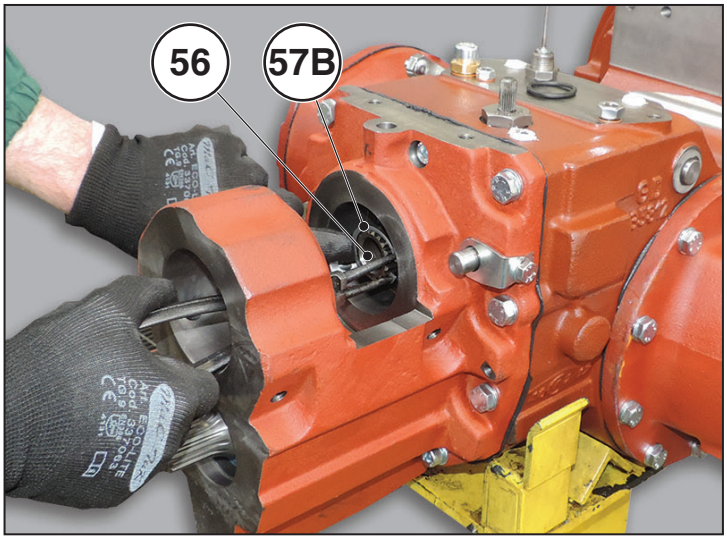


Fig. 4.131

Lubricate the oil seal (8). Use a guide tool and a punch of suitable diameter to drive the oil seal (8) into its seat on the primary shaft (56).

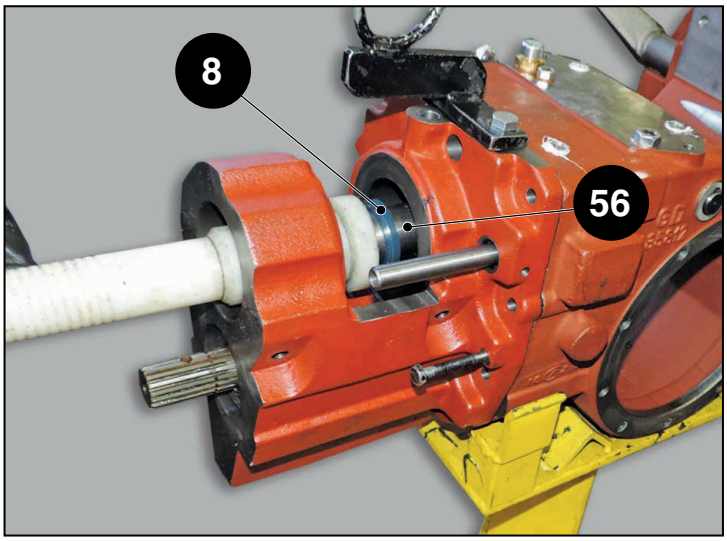


Fig. 4.132

Fit the bearing (9) on the pinion (2) and drive it fully into its seat with a punch tool of suitable diameter.

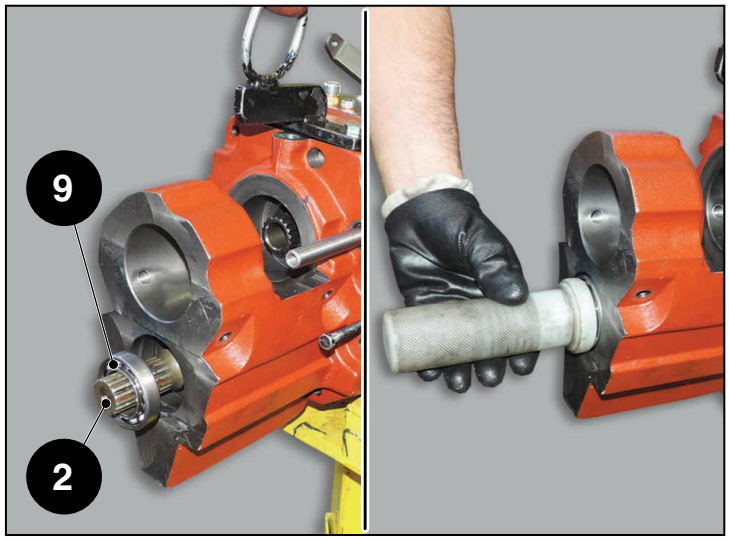


Fig. 4.133

Fit the circlip (4) and the oil seal (3) on the pinion (2). Lubricate the oil seal (3) before fitting it.

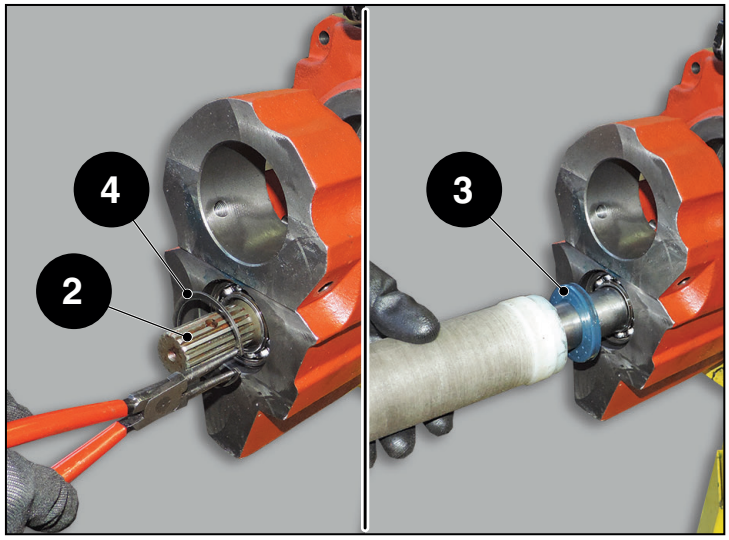


Fig. 4.134

Fit the circlip (1) on the pinion (2).

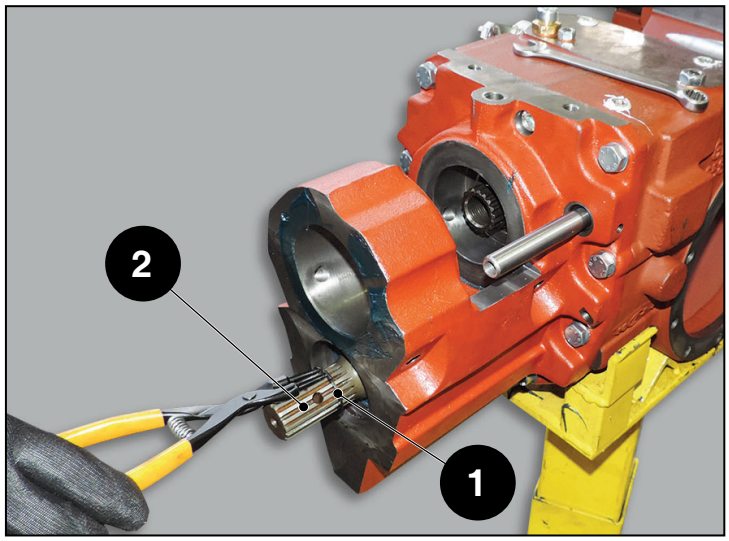


Fig. 4.135

5.1.2 Reassembling the SN Cluster

Apply a coating of Teflon to the thread of the plug (30). Then screw it into the lower side of the front casing together with a copper washer (31).

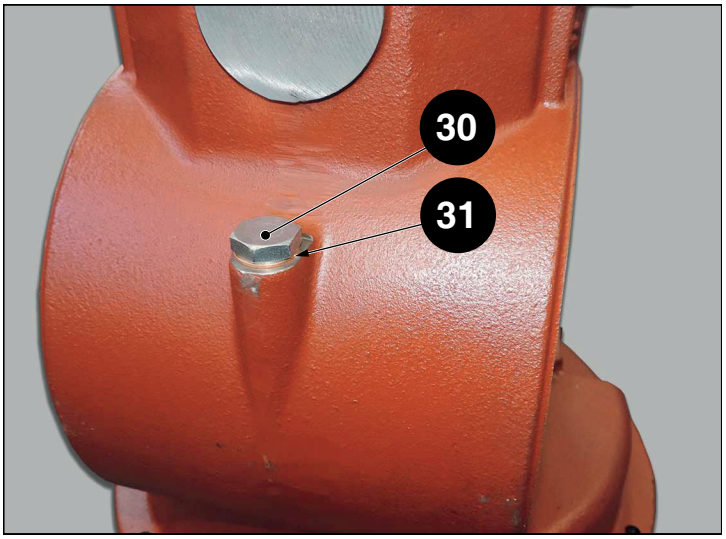


Fig. 4.136

5.1.2.1 Refitting the primary shaft and bevel pinion

Drive the bearing (18) on the housing with a punch tool of suitable diameter.

Secure the bearing (18) with a circlip (17).

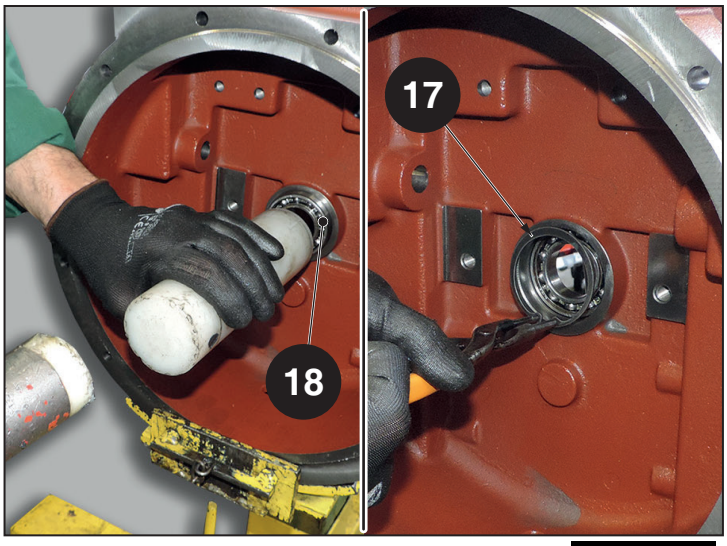


Fig. 4.137

Fit the primary shaft (56) against the cast orienting it as shown in the figure.

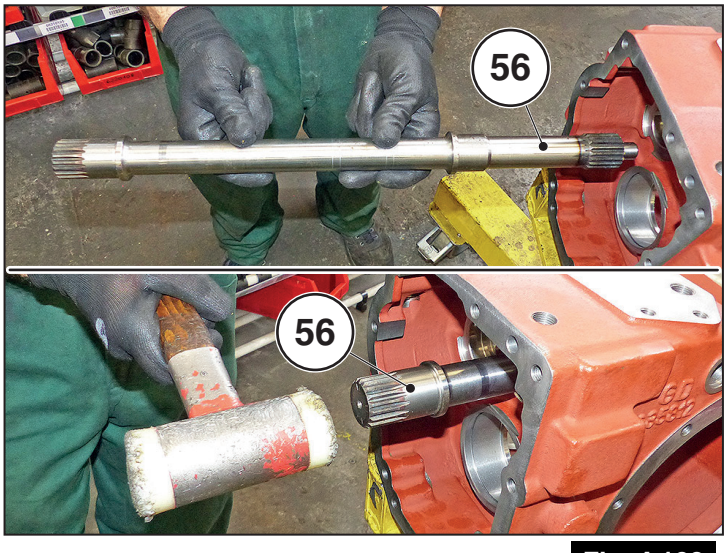


Fig. 4.138

Preassemble the bevel pinion (2) inserting the components below in the following order:

- spacer (32);
- bearing (33), driving it completely into its seat.
- spacer (32);
- circlip (34).

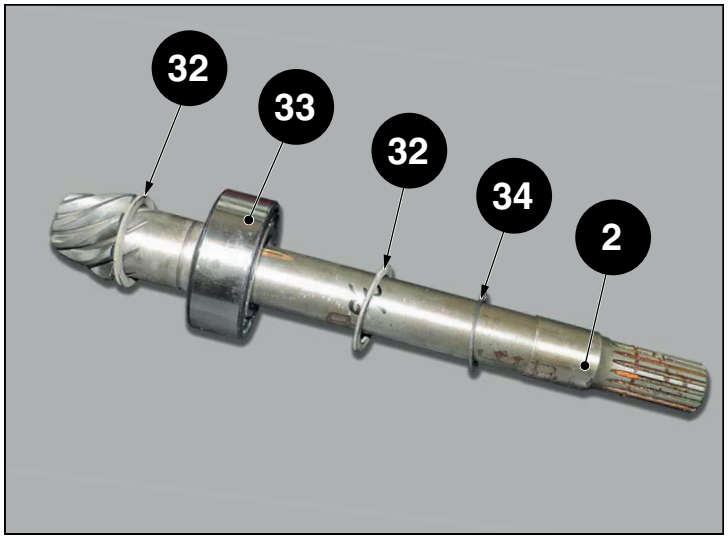


Fig. 4.139

Fit the complete bevel pinion (2) in the case and drive the bearing (33) completely into its seat.

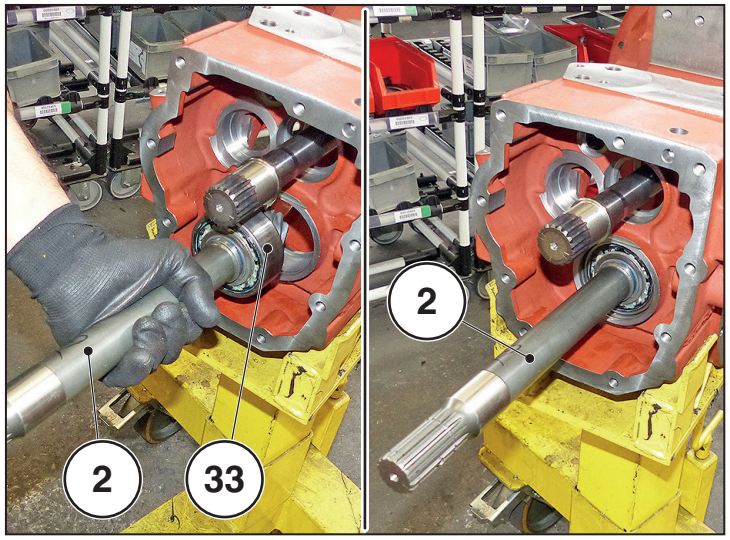


Fig. 4.140

Lock the pinion with the circlip (35).

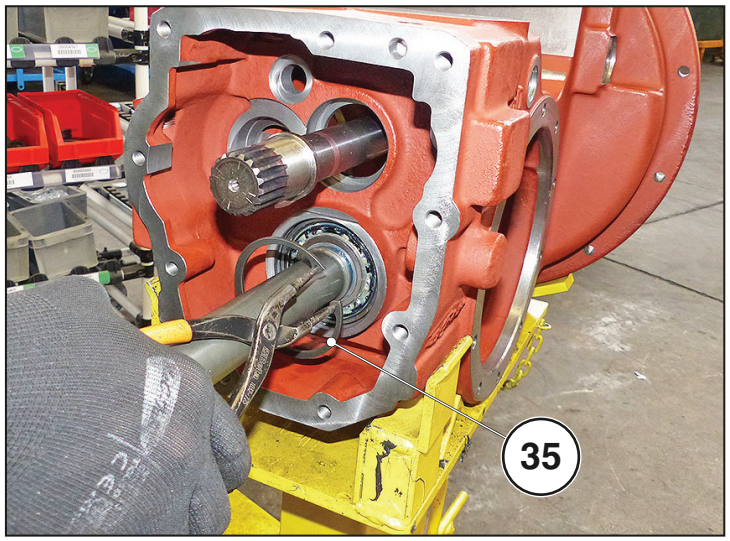


Fig. 4.141

5.1.2.2 Refitting the differential lock mechanical lever

Insert the O-ring (108) and flat washer (109) on the end of the rod (107) and secure with a circlip (110).

Warning
The right end has no holes.

Fit the rod (107) inside the differential case and at the same time insert it inside the fork (111) and in the spring (113).

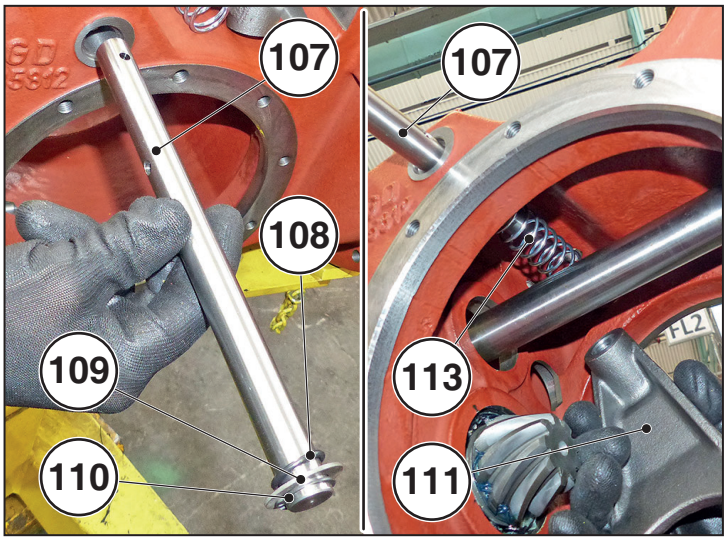


Fig. 4.142

Align the rod (107) and fork (111) holes so that they are visible from the hole on the cast and then insert the pin (114) to join the components.

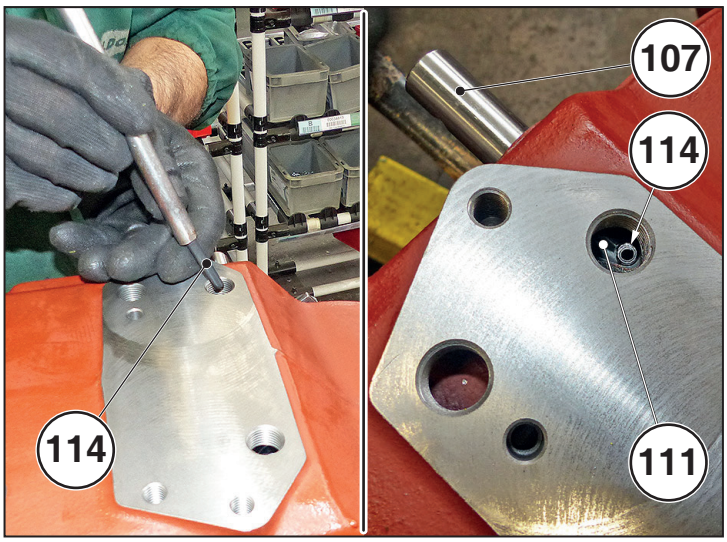


Fig. 4.143

Insert the O-ring (108), spacer (115) and lever (47) onto the left end of the rod (107). Secure the lever on the rod with the pin (112).

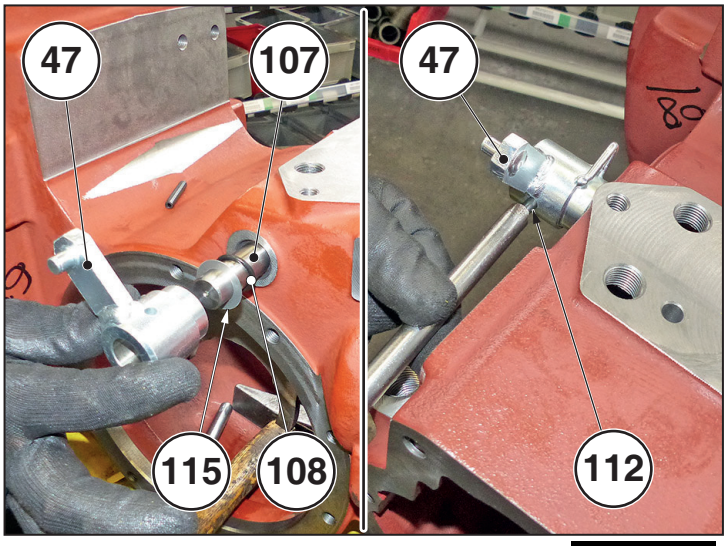


Fig. 4.144

5.1.2.3 Refitting the clutch control

Use a press and a guide tool to install the oil seal (16).

Warning
Lubricate the oil seal (16) before fitting it.

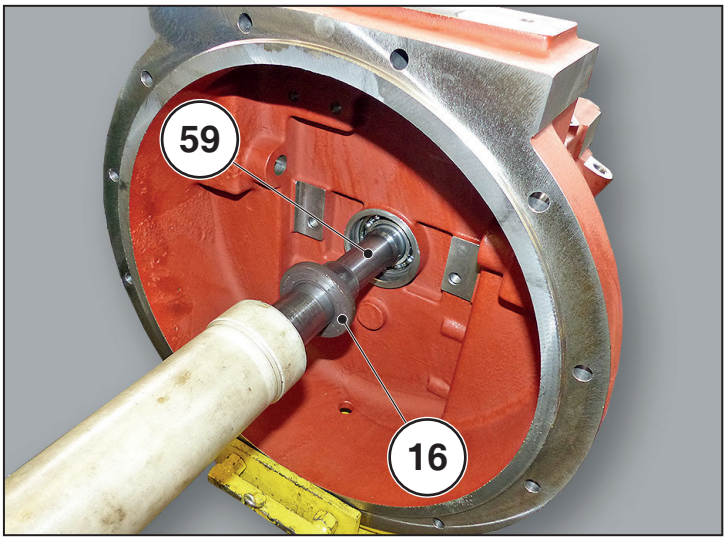


Fig. 4.145

Apply a coating of LOCTITE 270 to the thread of the pins (15) and then screw them on the housing. Apply a tightening torque of 55 Nm (5.5 kgm).

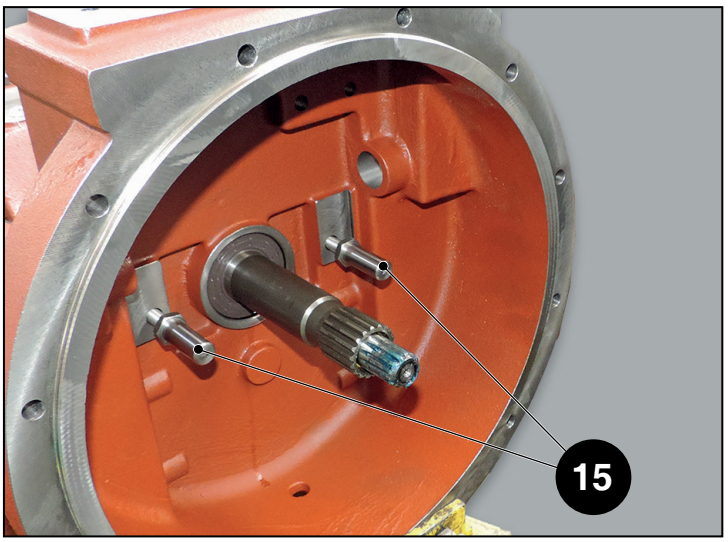


Fig. 4.146

Insert the bush (37) on the left and the bush (38) on the right. Use a punch tool of suitable diameter.

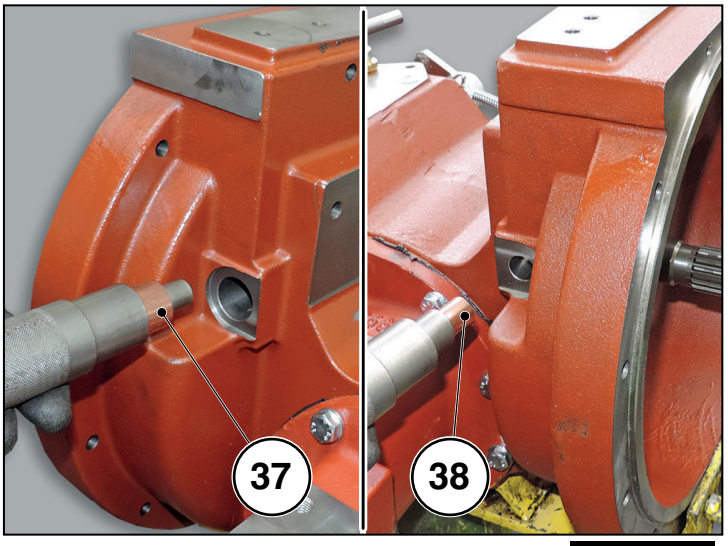


Fig. 4.147

Preassemble the thrust plate support (10) by fitting the thrust bearing (14). Drive the bearing with a punch tool of suitable diameter.

Warning

Fit the bearing (14) with the protected part facing the opposite side of the thrust plate support (10).

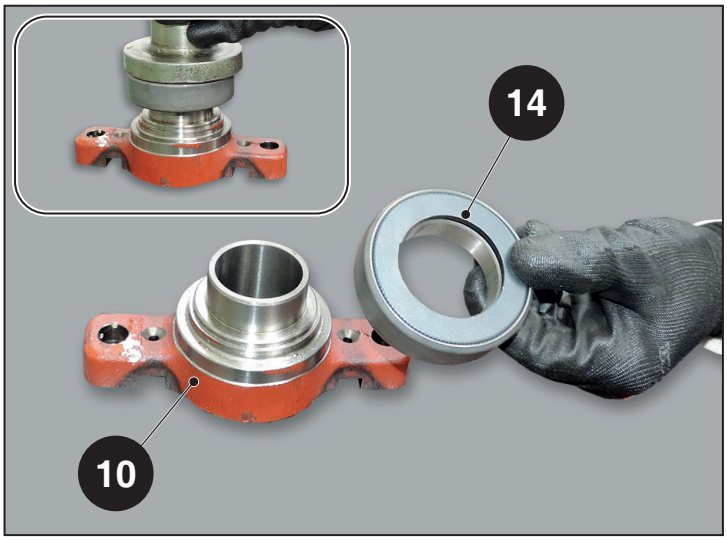


Fig. 4.148

Fasten one end of the return springs (39) to the thrust plate support (10) and then the other end to the holes in the clutch fork (11).

Turn the clutch fork (11) in the indicated direction to fasten the return springs (39) completely.

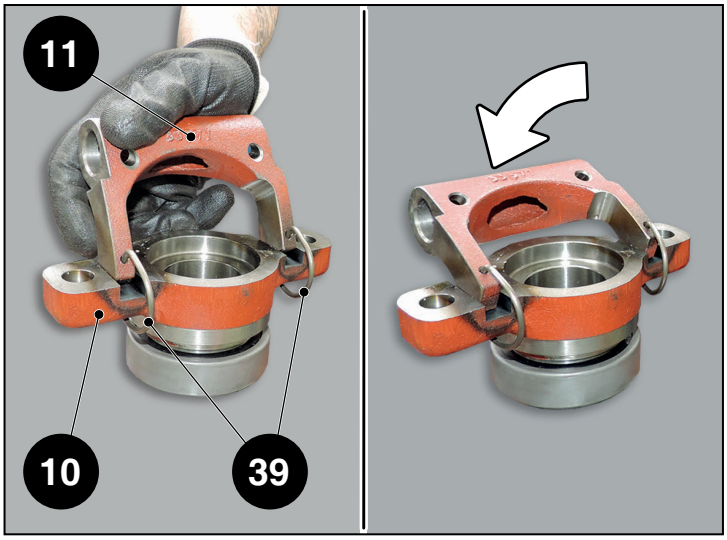


Fig. 4.149

Fit the complete thrust plate assembly (10) on the shaft and pins with the clutch fork (11) facing up.

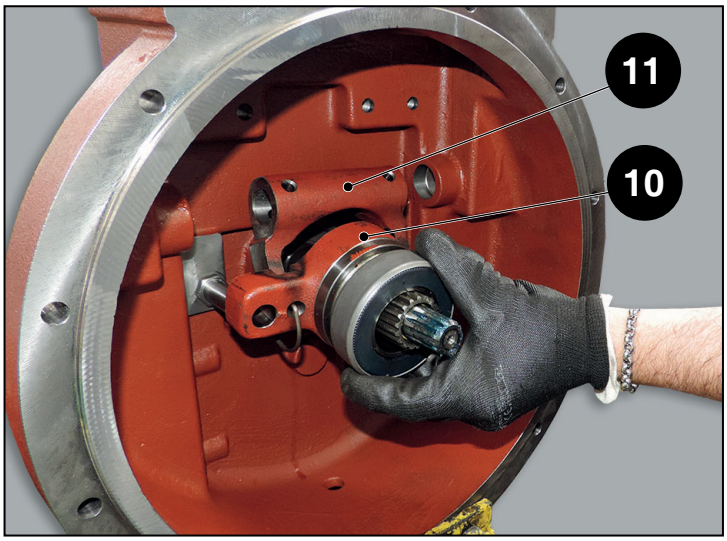


Fig. 4.150

Fit the clutch control lever (13) by inserting it in the clutch fork (11).

Match the holes on the control lever (13) with those on the fork (11) and then fit the pins (12) to secure the components.

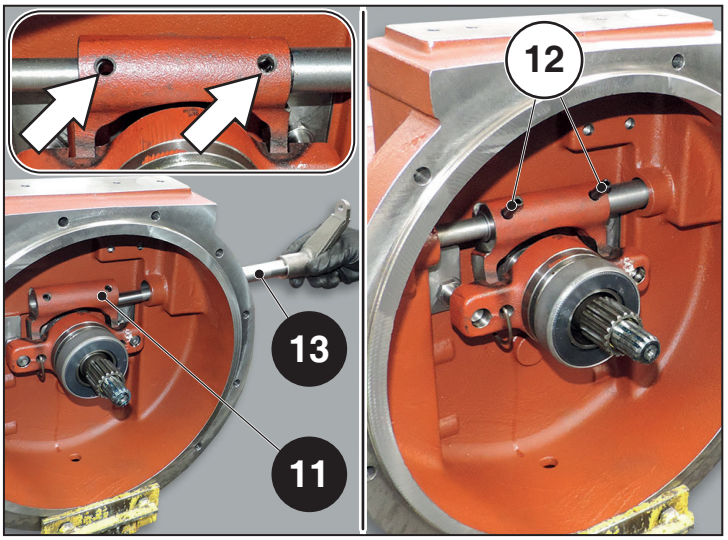


Fig. 4.151

Apply a coat of TEFLON on the screws (116) and screw them on the cast together with the washers (117).

Tighten the vent plug (100) complete with washer (101).

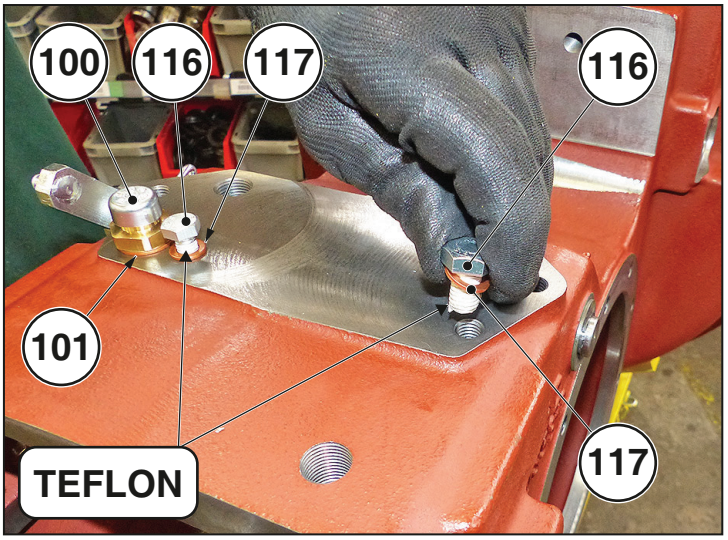


Fig. 4.152

Apply a coat of Teflon on the plugs (99) and tighten them on the cast.

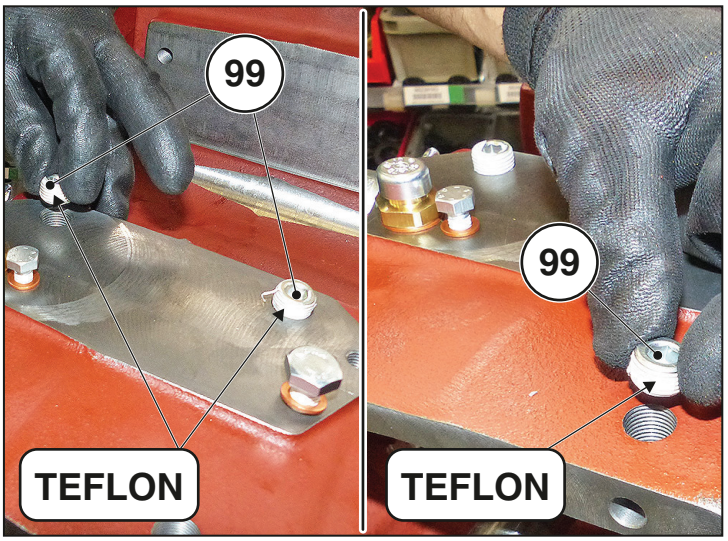


Fig. 4.153

5.1.2.4 Adjusting the differential and refitting the final drive units

Insert spacers to obtain an initial thickness on the crown wheel assembly:

- spacer (40) on crown wheel side: 1.3 mm
- spacer (41) opposite the crown wheel: 1.6 mm

Note

The crown wheel side spacer determines the backlash between the pinion and crown wheel.

The spacer opposite the crown wheel determines the load on the bearings supporting the differential assembly.

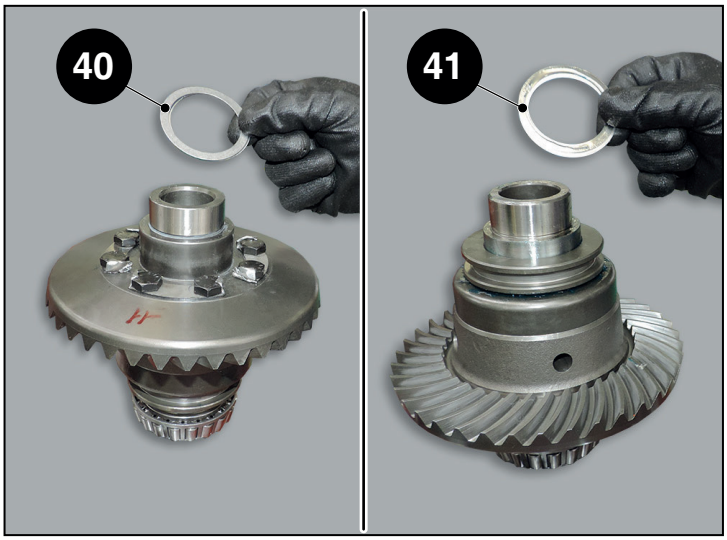


Fig. 4.154

Fit the complete crown wheel assembly (24) in the differential case. Use a screw or pin to bear the crown wheel assembly.

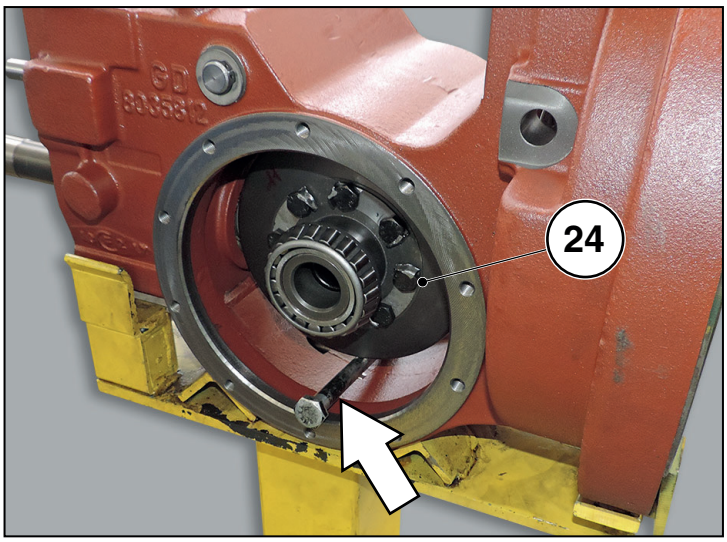


Fig. 4.155

Fit the outer bearing races (42) on the final drive units.

Fit the inner bearing races (42) on the crown wheel assembly (24).

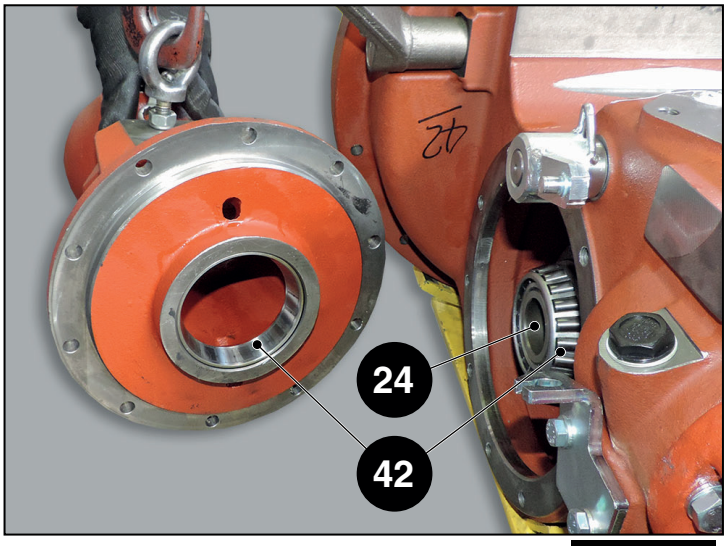


Fig. 4.156

Assemble both front hubs securing them with 3 screws only on each side.

Warning

The hubs are fastened temporarily: do not apply SILICONE on the mating surface.

Attention

Use lifting equipment of sufficient capacity to secure the hubs.

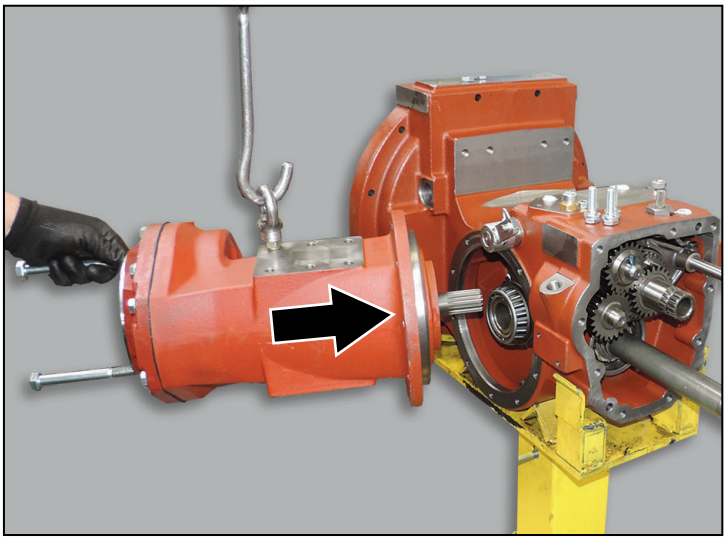


Fig. 4.157

Turn the bevel pinion (2) vigorously to secure the differential in place.

Check the backlash between the pinion and crown wheel; it must be comprised between 0.1 and 0.3 mm. In addition, the pinion and crown wheel must turn freely (smoothly without jamming).

Warning

Turn the bevel pinion and check the backlash in several points.

If there is too much backlash or if the bevel gear set is too tight, increase or reduce the thickness of the spacers (40) and (41) respectively.

To reduce the pinion—crown wheel reduce, increase the thickness of the spacer (40) on the crown wheel side and reduce the thickness of the opposite spacer by the same amount (41).

To increase the pinion—crown wheel reduce, reduce the thickness of the spacer (40) on the crown wheel side and increase the thickness of the opposite spacer by the same amount (41).

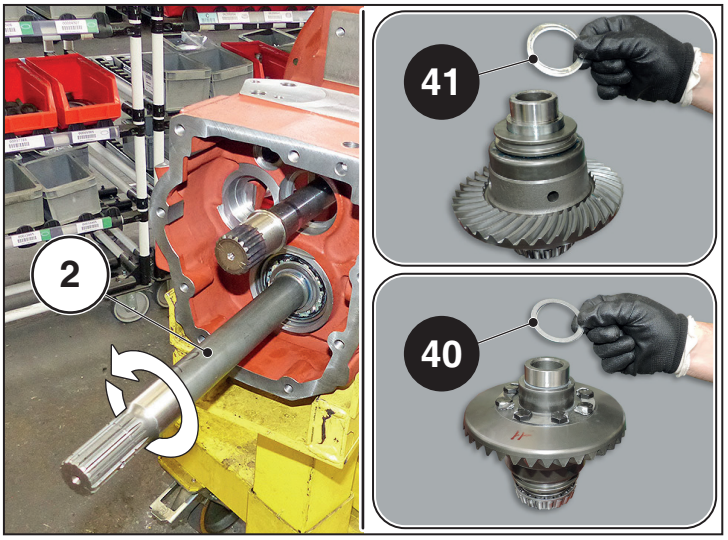


Fig. 4.158

Apply a coating of silicone sealant to the mating surfaces of the final drive units.

Secure the final drive units to a lifting equipment of adequate load capacity and mount them on the differential case.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Warning

See the Chapter “Front final drive units” for the detailed steps on how to mount the drive units.

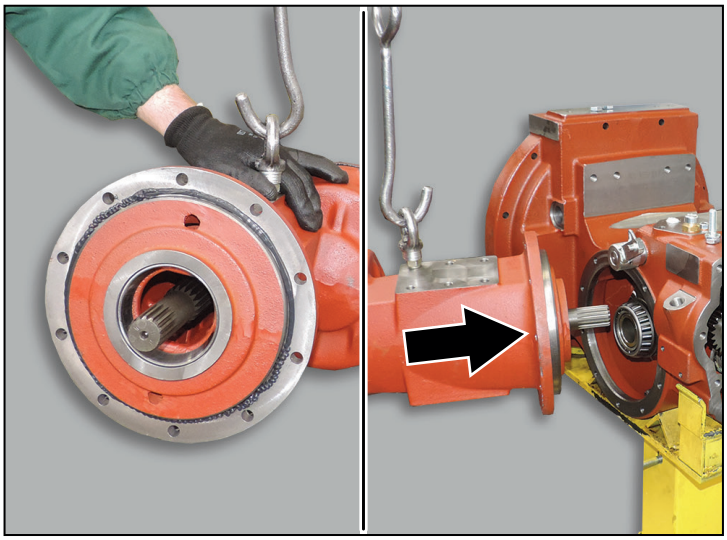


Fig. 4.159

Tighten the screws (43) and the washers (44) fastening the final drive units. Apply a tightening torque of 70 Nm (7 kgm).

Before tightening the topmost screw of the left final drive unit, fit the plate (45). Fasten the spring (46) to the differential lock lever (47). Tighten the hooks of the spring (46) and rotate the plate (45) in order to pretension the spring.

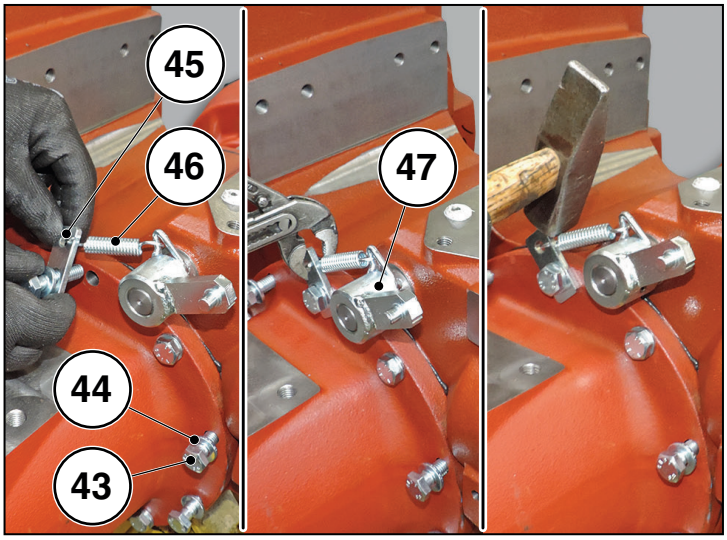


Fig. 4.160

5.1.2.5 Refitting the cover

Pre-assemble the cover by fitting the bearing (7).

> **Warning**
> The bearing (36) is not present in model SN.

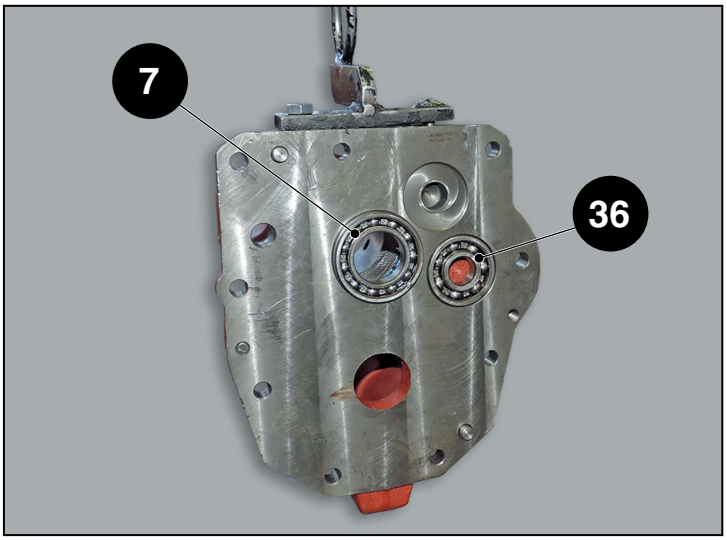


Fig. 4.161

Apply a layer of SILICONE sealant on the mating surface of the differential case.

Tighten the special tool (E-p/n_____) on the (48) and lift it; then assemble it on the differential case.

> **Attention**
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

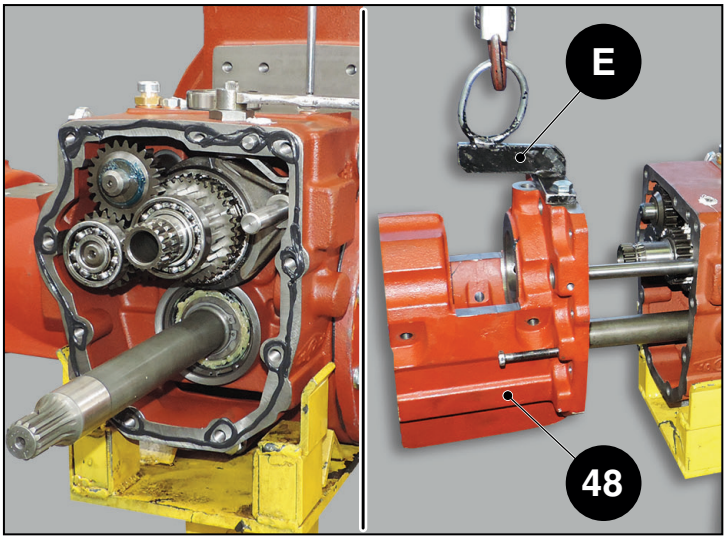


Fig. 4.162

Fasten the cover (48) by tightening the screws (5) and hex socket screws (6) with the washers (49). Apply a tightening torque of 55 Nm(5.5 kgm).

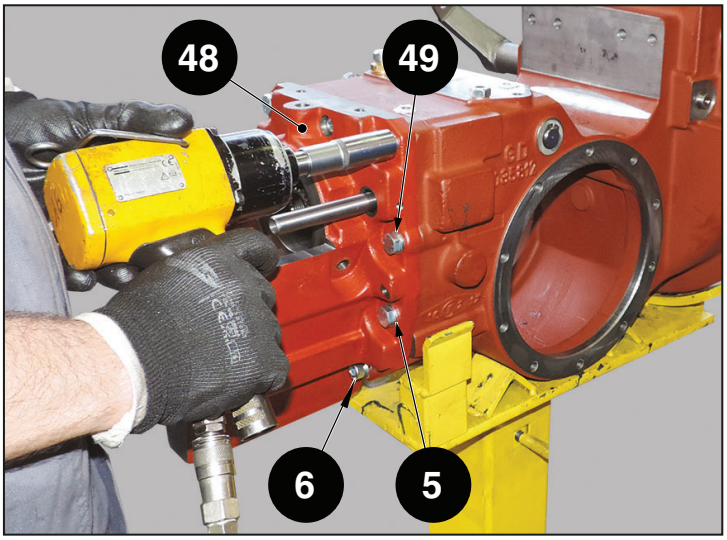


Fig. 4.163

5.1.2.6 Refitting the differential case cover

Lubricate the oil seal (8). Use a guide tool and a punch of suitable diameter to drive the oil seal (8) into its seat on the primary shaft (56).

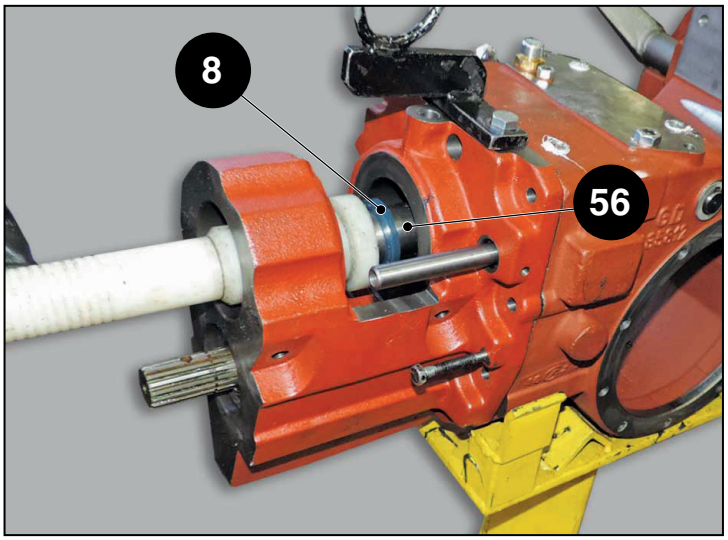


Fig. 4.164

Fit the bearing (9) on the pinion (2) and drive it fully into its seat with a punch tool of suitable diameter.

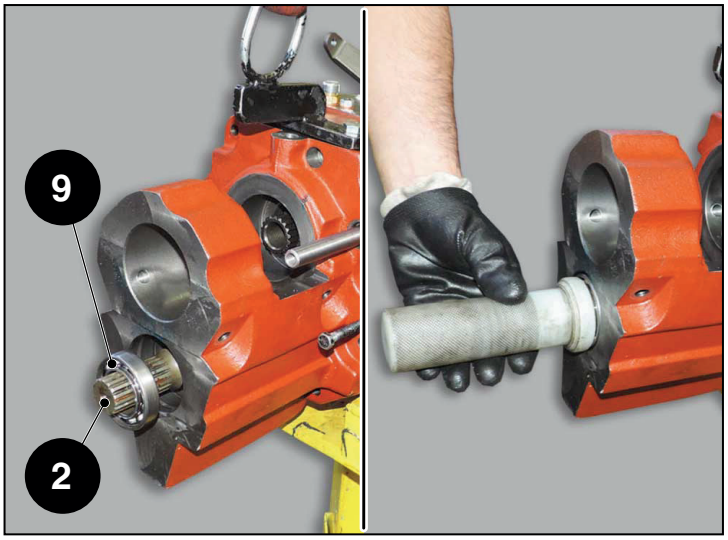


Fig. 4.165

Fit the circlip (4) and the oil seal (3) on the pinion (2). Lubricate the oil seal (3) before fitting it.

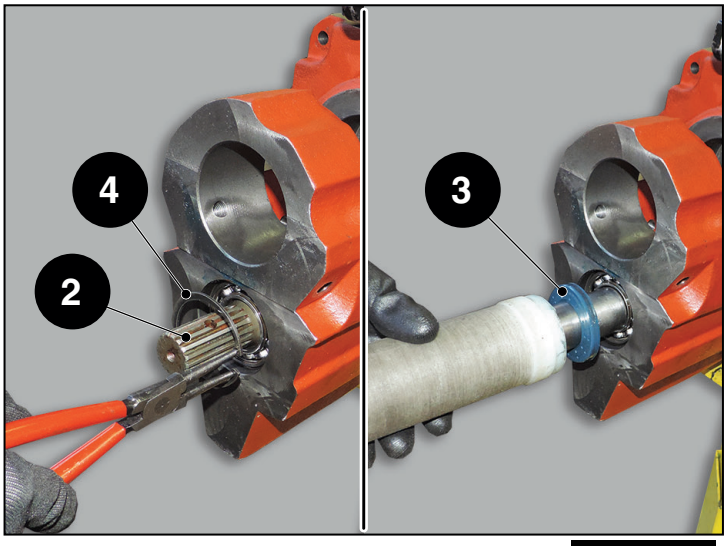


Fig. 4.166

Fit the circlip (1) on the pinion (2).

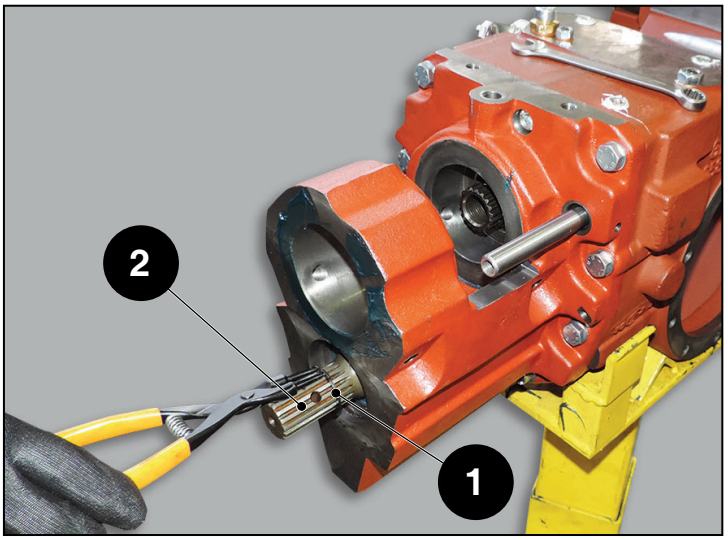


Fig. 4.167

5.1.3 Reassembling the SN+ Cluster

Warning
Follow the procedure described for the RS model except for the steps specified in this section.

Apply a coat of TEFLON to the thread of the guide bushing (103).

Screw the guide bushing (103) on the case together with the copper washer (104).

Fit the O-ring (105) in the groove in the hole of the guide bushing (103).

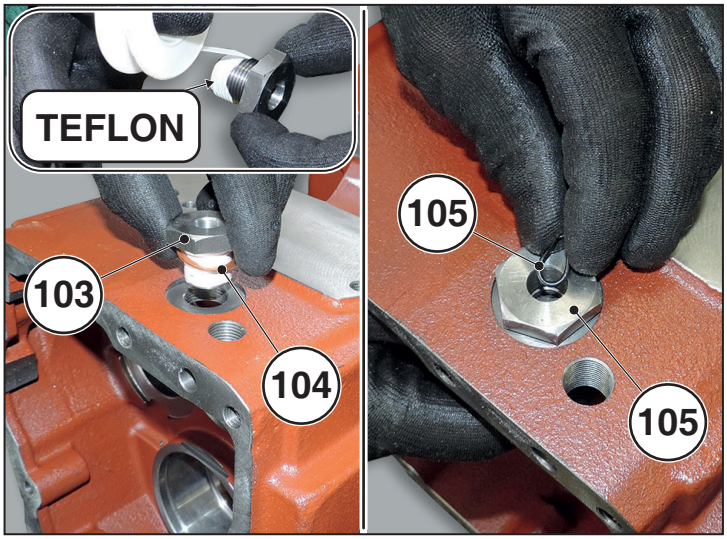


Fig. 4.168

Lubricate the pivot pin of the reverse shuttle lever (106) and fit it on the guide bushing (103) orienting it as shown

Preassemble the reverse shuttle fork (69) securing it on the rod (55) with the pin (70).

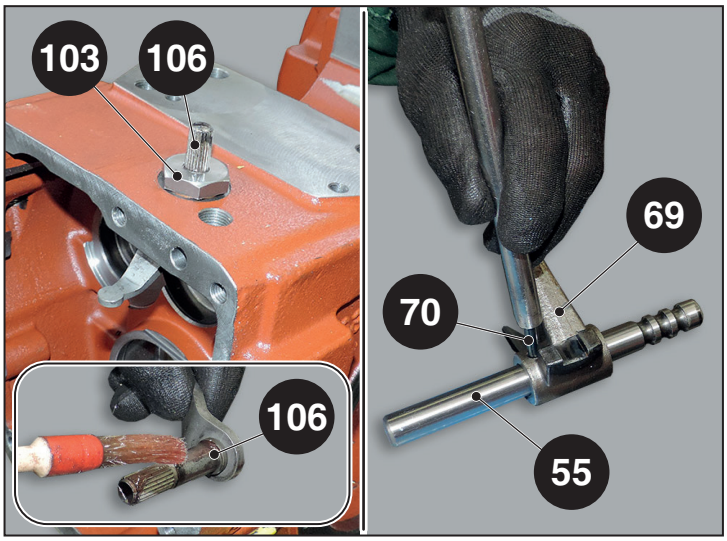


Fig. 4.169

Fit the following components in the casing:

- complete primary shaft (56);
- motion transfer gear (68);
- complete reverse shuttle fork (69).

Note

Insert the listed components at the same time to avoid freeing the synchroniser.

Warning

Guide the lever (106) in the groove on the reverse shuttle fork (69).

Drive the shaft (68) and transfer case gear (56) into their seat.

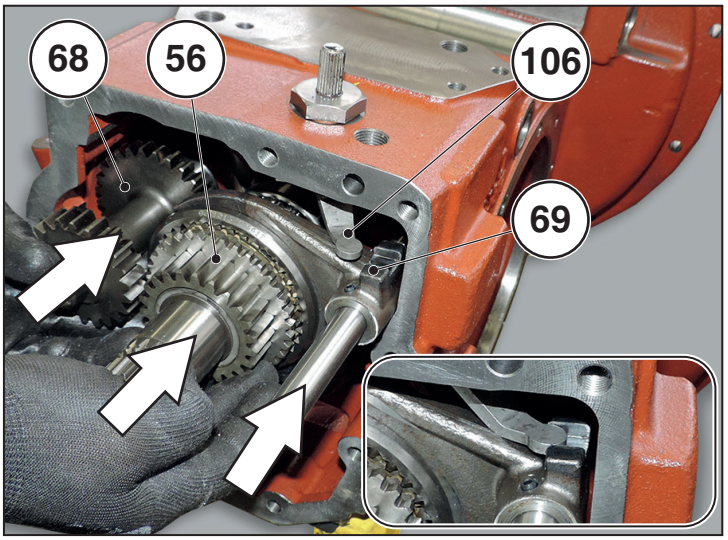


Fig. 4.170

Section 6 : Tightening specifications

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6.1 Tightening specifications 4-76

6.1 Tightening specifications

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	55	5.5
Hub-differential case fastener screw	70	7

Section 7 : Tools necessary

Index

7.1 Tools necessary 4-78

7.1 Tools necessary

p/n	Description	Quantity
A-p/n_____	Front differential lever spindle screwing tool.	1
B-p/n_____	Rod for actuating differential engagement.	1
C-p/n_____	Lever for actuating differential engagement	1
D-cod._____	Template for adjusting the reverse shuttle lever	1
E-p/n_____	Special tool for lifting the differential case cover	1

Chapter 5 : Transmission and Rear Power Take Off

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Section 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.

Section 2 : General introduction

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2.2 Assembly drawing of rear PTO 5-6

2.1 Assembly drawing of gearbox

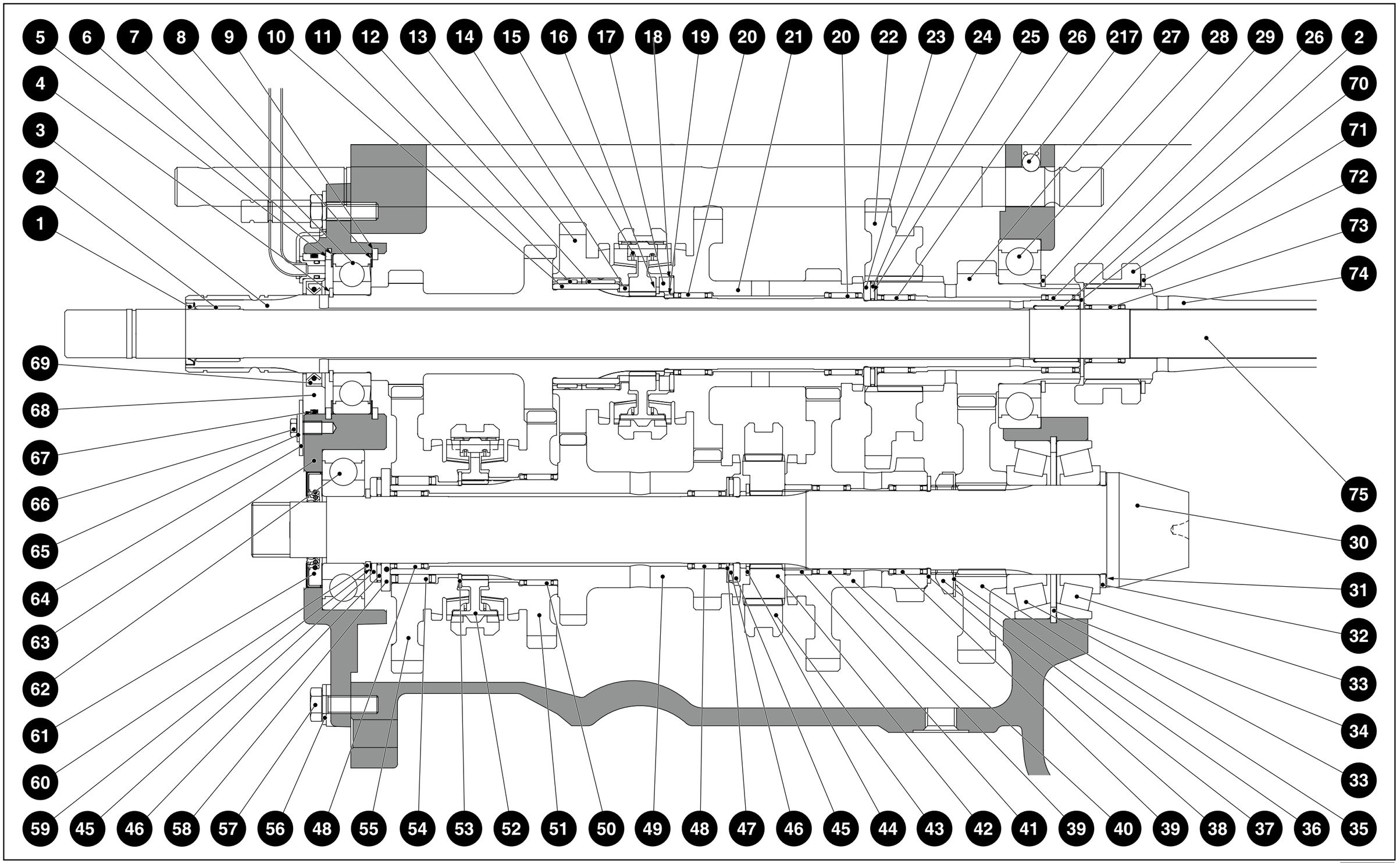


Fig. 5.1

1 - Oil seal
2 - Bush
3 - Upper primary shaft
4 - Circlip
5 - Circlip
6 - Spacer
7 - Bearing
8 - Spacer
9 - Circlip
10 - Internal ring
11 - Roller bearing cage
12 - Roller bearing cage
13 - Synchroniser gear
14 - Spacer
15 - Synchroniser ring
16 - Thrust washer
17 - Spacer
18 - Roller spacer
19 - Internal ring
20 - Roller bearing cage
21 - Gear
22 - Medium slow-slow range gear
23 - Spacer
24 - Roller spacer
25 - Bearing race
26 - Roller bearing cage
27 - Splined hub
29 - Circlip
30 - Bevel pinion
31 - Spacer
32 - Spacer
33 - Bearing
34 - Circlip
35 - Medium-fast range gear
36 - Ring nut retainer washer
37 - Ring nut
39 - Roller bearing cage
40 - Medium slow-slow range gear
41 - Spacer
42 - Fixed hub
43 - Splined ring
44 - Circlip
45 - Spacer
45 - Spacer
45 - Spacer
46 - Roller spacer
46 - Roller spacer
47 - Spacer
48 - Roller bearing cage
49 - 2nd-3rd speed gear
50 - Roller bearing cage
51 - Synchroniser gear
52 - Synchroniser ring
53 - Spacer
54 - Roller bearing cage
55 - 1st-speed gear
56 - Washer
57 - Screw
58 - Spacer
59 - Spacer
60 - Circlip
61 - Oil seal
62 - Bearing
63 - Cover
64 - Plate
65 - Washer
66 - Screw
67 - O-ring
68 - Lubrication cap
69 - Oil seal
70 - Spacer
71 - Sleeve
72 - Circlip
73 - Roller bearing cage
74 - PTO shaft
75 - Independent PTO shaft
217 - Ball

2.2 Assembly drawing of rear PTO

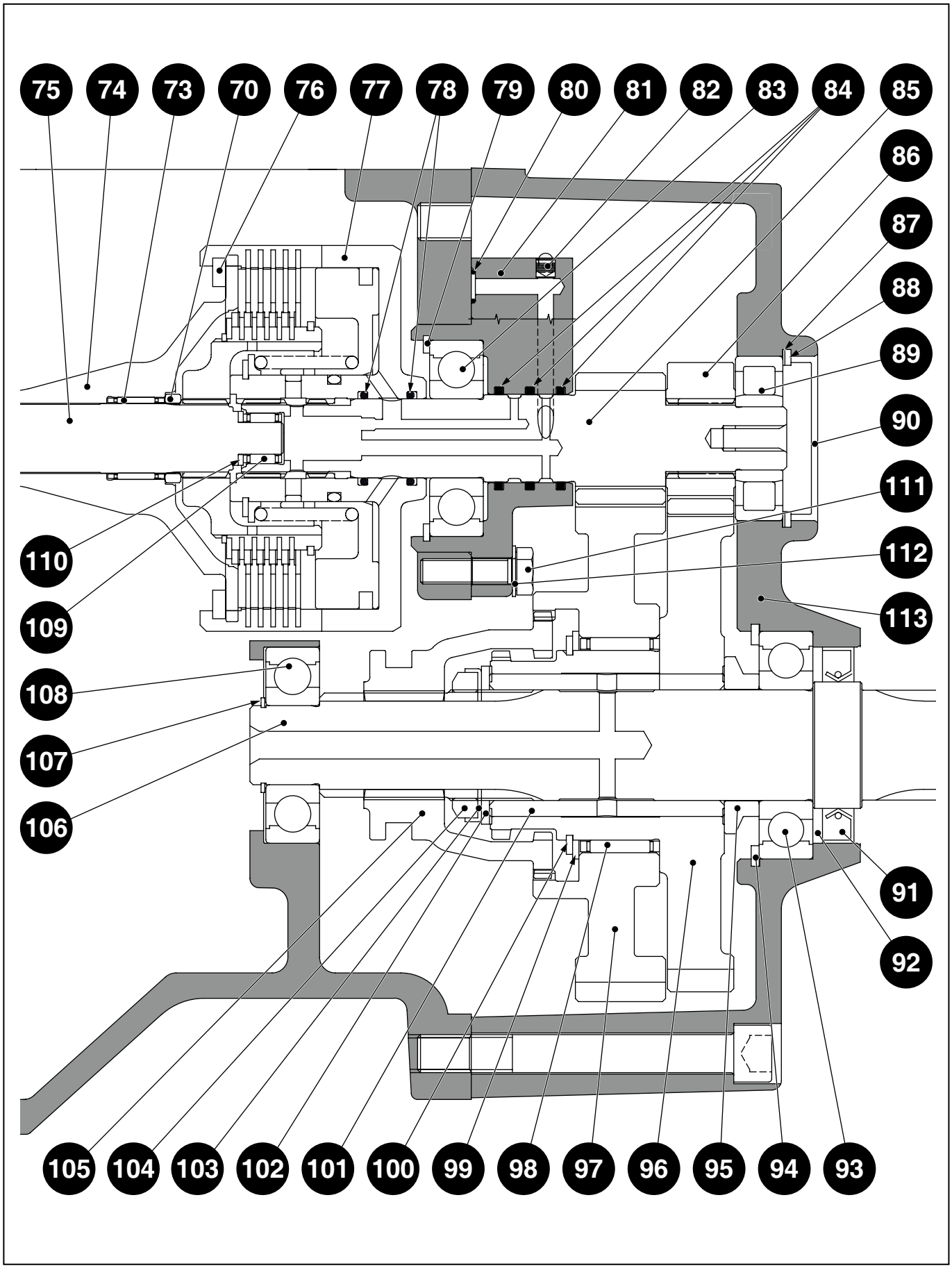


Fig. 5.2

70 - Spacer
73 - Roller bearing cage
74 - Shaft
75 - Independent PTO shaft
76 - Circlip
77 - PTO clutch
78 - O-ring
79 - Circlip
80 - O-ring
81 - Shaft mount
81 - Shaft mount
82 - Koenig expander plug
83 - Bearing
84 - Quad ring
85 - Splined shaft
86 - Gear
87 - Spacer
88 - Circlip
89 - Bearing
90 - Plug
91 - Oil seal
92 - Spacer
93 - Bearing
94 - Circlip
95 - Spacer
96 - PTO gear
97 - Gear
98 - Roller bearing cage
99 - Spacer
100 - Circlip
101 - Bush
102 - Spacer
103 - Ring nut retainer washer
104 - Ring nut
105 - PTO sleeve
106 - PTO shaft
107 - Circlip
108 - Bearing
109 - Roller bearing cage
110 - Spacer
111 - Screw
112 - Washer
113 - PTO rear cover

Section 3 : Technical characteristics

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3.2 Power Take Off 5-10

3.1 Transmission

Model	REV	RS, SN+	SN
Transmission type	Mechanical transmission, four wheel drive		
Gearbox type	16+16 synchronised	16+16 synchronised	12+4 synchronised
Shift control system	Mechanical with central levers		
Safety	PUSH & START device on clutch pedal		
Reverse shuttle type	Mechanical, synchronised	Mechanical, synchronised	–
Reverse shuttle control	Lever	Lever	–
Rear differential lock	Electrohydraulic	Mechanical	Mechanical
Minimum speed	0.47 Km/h		
Maximum speed (homologated)	36 Km/h		
Quantity of oil	20 litres		
Oil type	SAE 15-40W		

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 (REV, RS, and SN+ Cluster) Mechanical Electrohydraulic (SN Cluster)
Safety	PUSH & START device on PTO selector

Section 4 : Disassembly

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4.3 SN Disassembly 5-55

4.3.1 Disassembly 5-55

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4.3.1.5 Removing the gearbox 5-70

4.3.2 Disassembling/Assembling the differential crown wheel 5-76

4.3.3 Disassembling/assembling the SN primary shaft 5-76

4.1 Preliminary operations

The main operations necessary to access the assembly 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.

Remove the rear final drive units.

Note

See Chapter “Front Final Drive Units" for the main steps needed to remove the assembly.

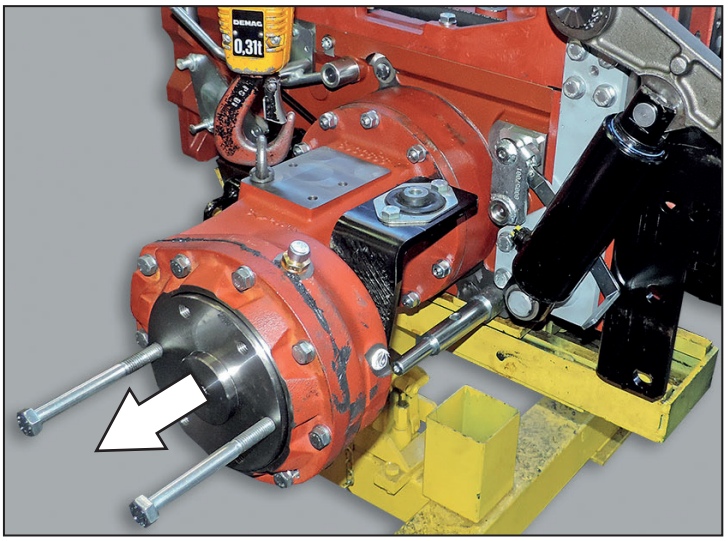


Fig. 5.3

Remove the gearbox assembly from the central body.

Warning

Make sure to have disconnected all the tubes and wiring looms that may hinder removal of the gearbox assembly from the central body.

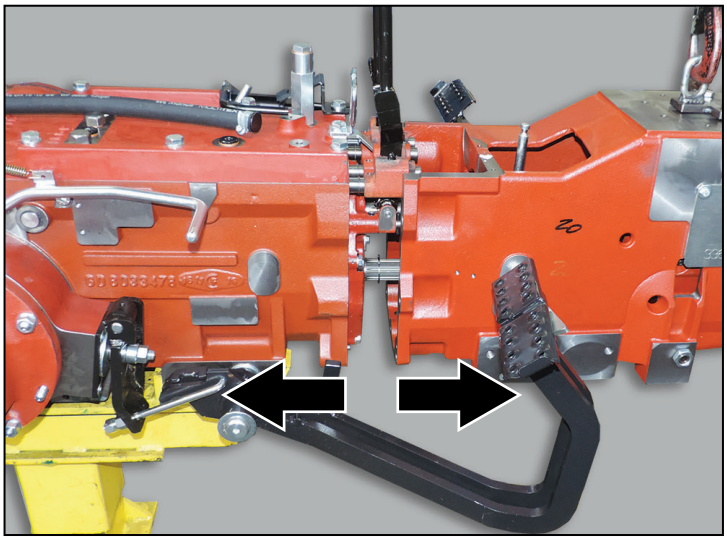


Fig. 5.4

4.2 Disassembly of REV, RS and SN+

4.2.1 Disassembly

4.2.1.1 Disassembly of clutch cover, rods and levers

Loosen the plugs (234) and remove the springs (233).

Attention
While removing the plugs (234), the springs (233) may quickly escape posing a hazard.

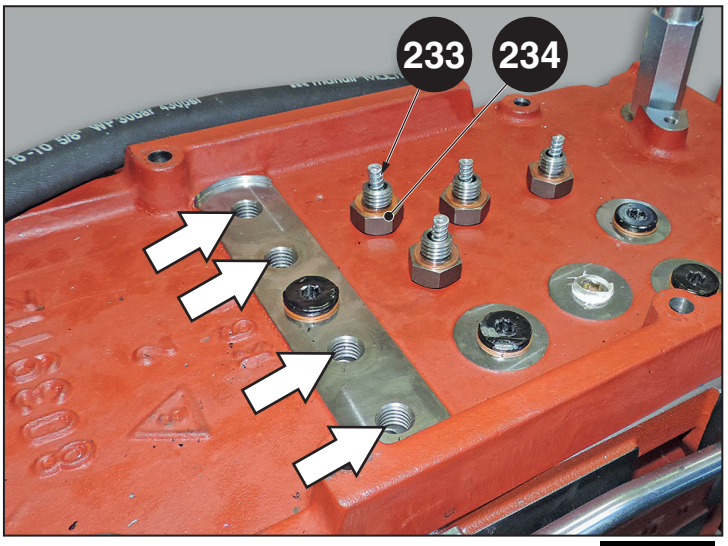


Fig. 5.5

Unscrew the oil level plug (235) and oil filling spacer (236) and remove the copper washer (237).

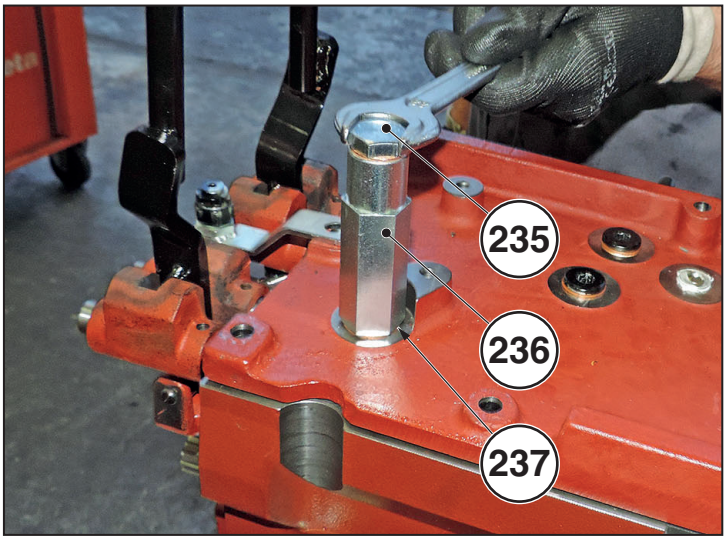


Fig. 5.6

RS, SN and SN+ Cluster only

Loosen the screw (231) and remove the plate (238) and spring (239) of the differential lock lever.

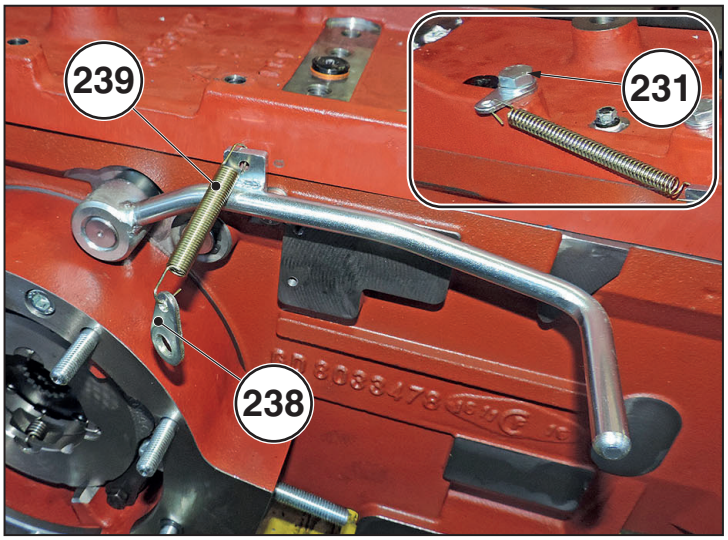


Fig. 5.7

Undo the screws (231) and remove the washers (232). Then remove the cover (230) from the gearbox casing.

RS, SN and SN+ Cluster only

Remove the piping guard (240).

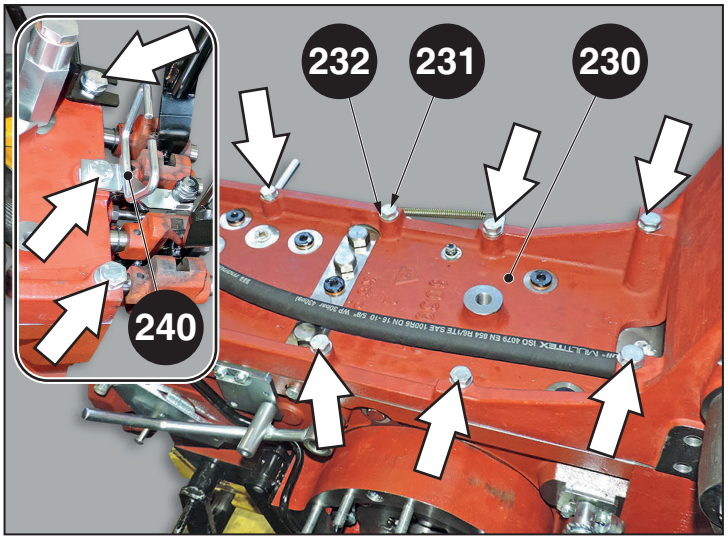


Fig. 5.8

Undo the prevention stop locking screw (228) and remove the washer (229). Carry out this step on both sides of the gearbox casing.

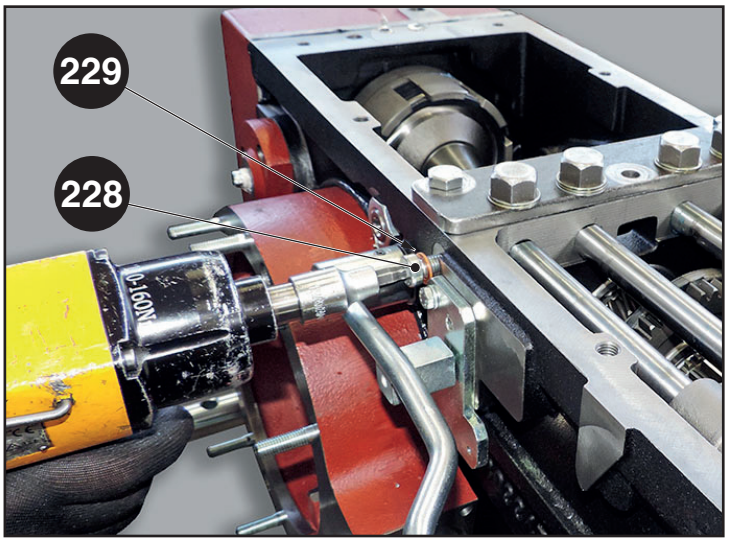


Fig. 5.9

Release the springs (226) from the pin (141).

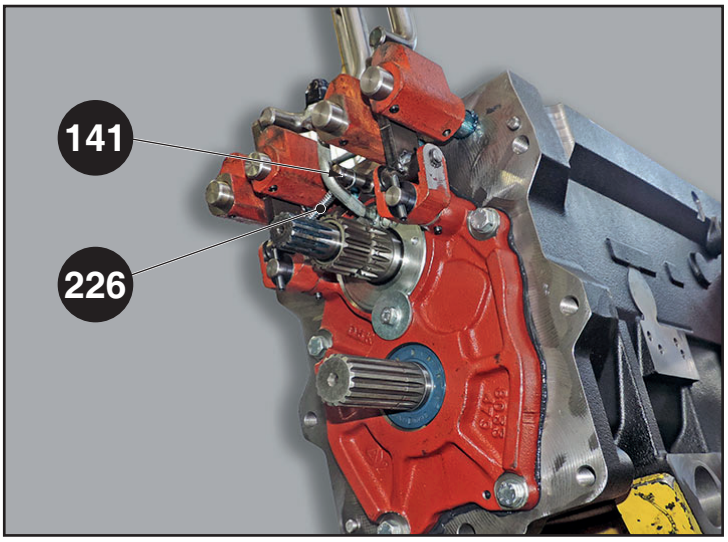


Fig. 5.10

Remove the pins (145) and spacers (227) placed on the pins (144) to free the forks (221).

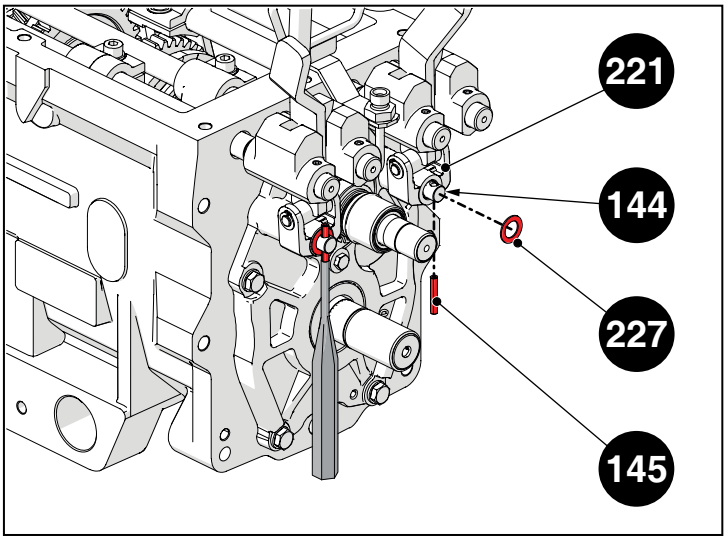


Fig. 5.11

Remove the gear lever (225) and range lever (224) from the respective pins (144).

Release the springs (226).

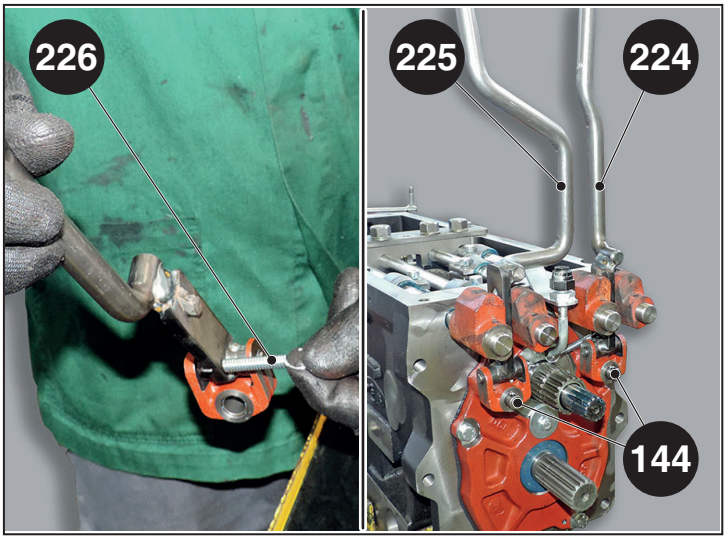


Fig. 5.12

Disassemble the levers (224) and (225) by removing the circlips (222), pins (223) and forks (221). Remove the bushes (220) from the forks (221).

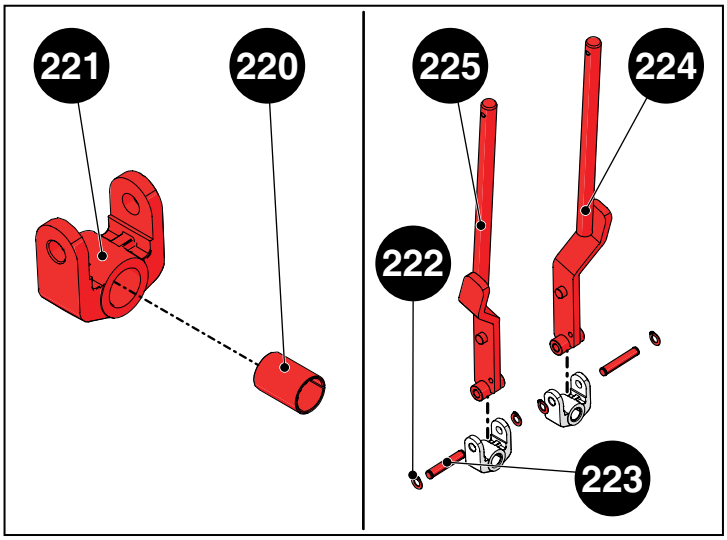


Fig. 5.13

Remove the pins (219) and remove the guide bushes (218).

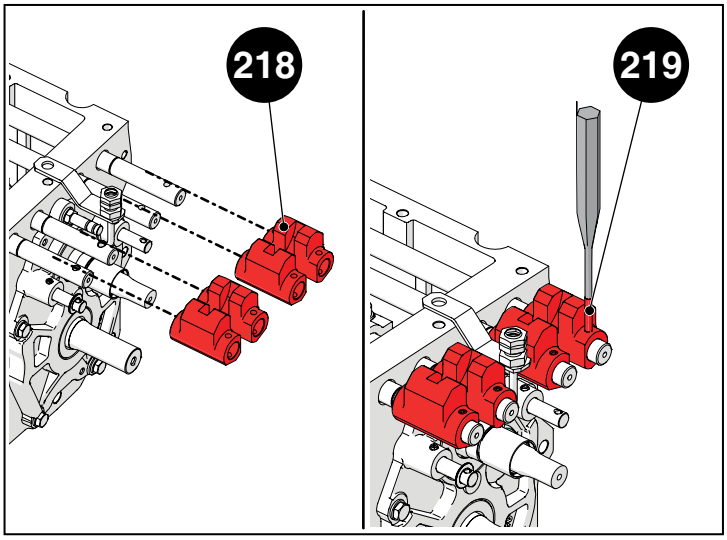


Fig. 5.14

Remove the balls (217).

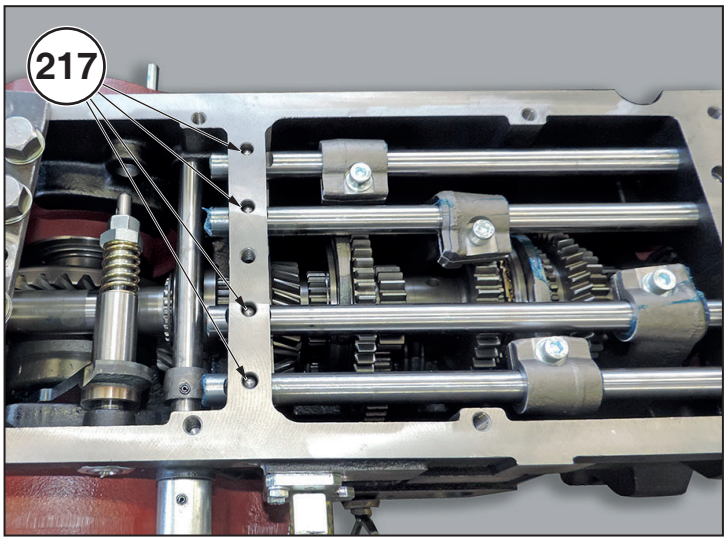


Fig. 5.15

Undo the screws (215) and remove the washers (216).

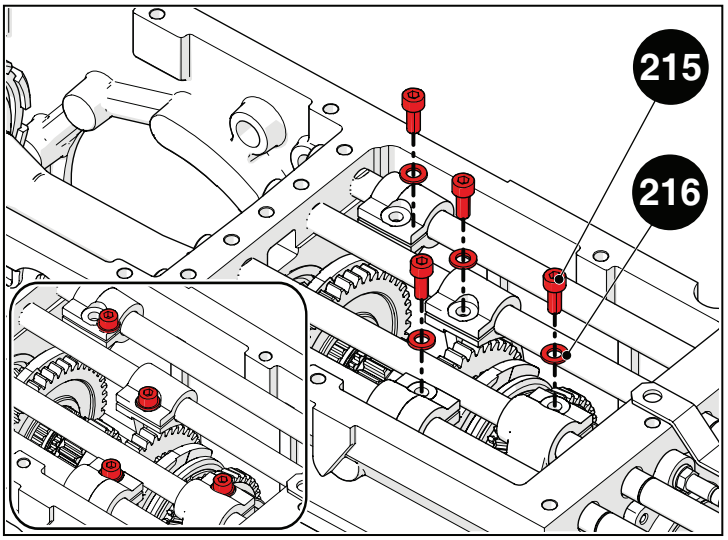


Fig. 5.16

Remove the circlips (214) and O-rings (213). Pull out the rods.

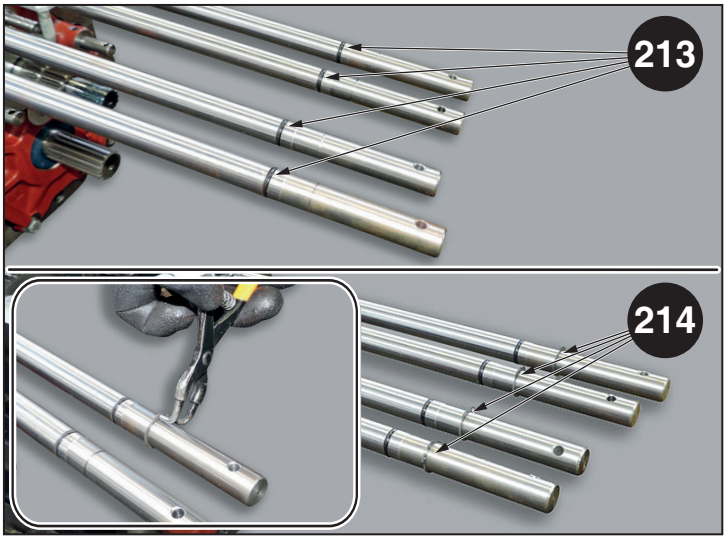


Fig. 5.17

Remove the prevention stops (208).

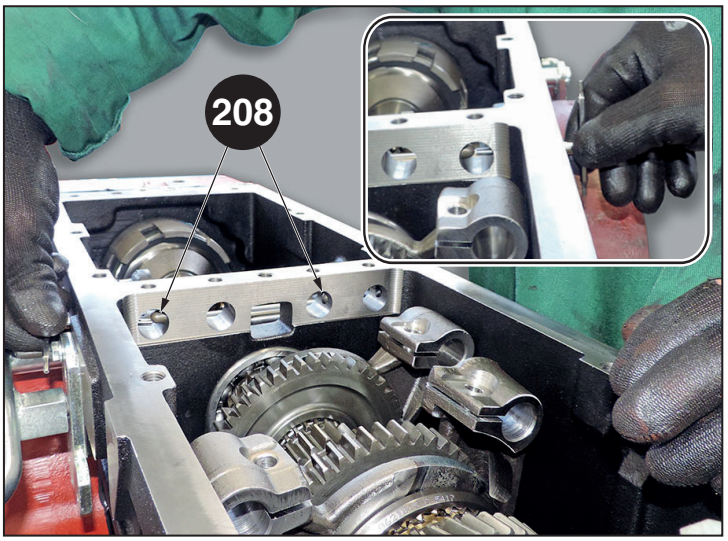


Fig. 5.18

4.2.1.2 Removing the differential lock hydraulic lever (REV Cluster)

Undo the guide bush (199) and remove the copper washer (200).

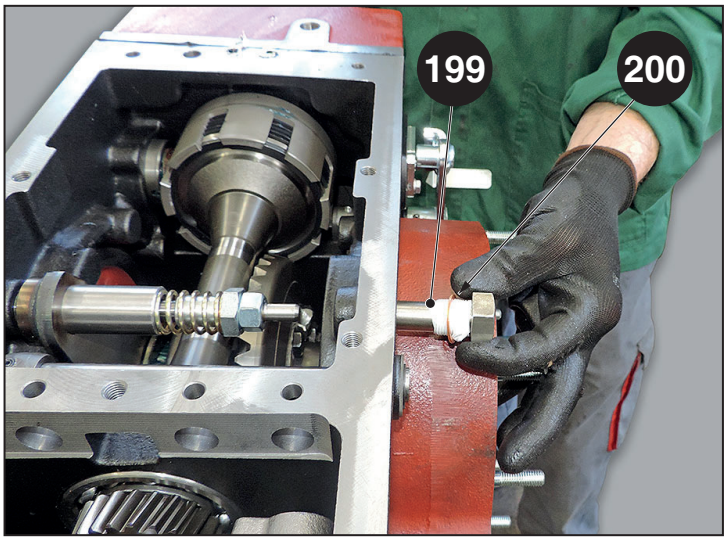


Fig. 5.19

Unscrew the check nut (198) and then the pin (197) using a pin punch.

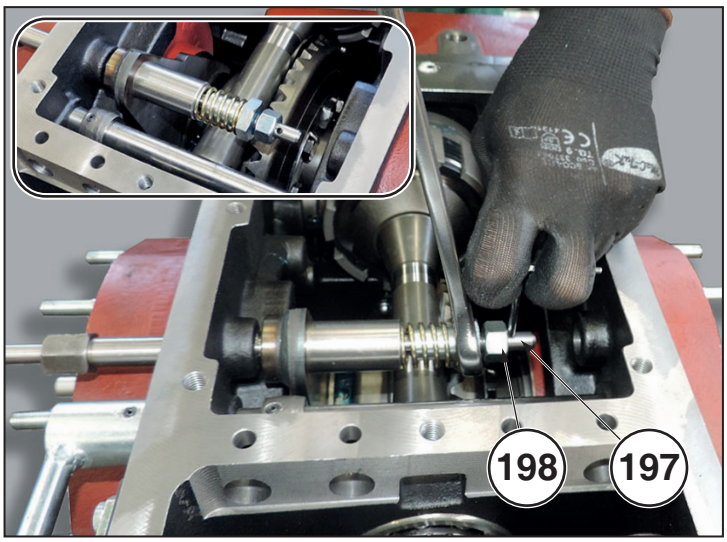


Fig. 5.20

Undo the bush (196) and remove the spring (195).

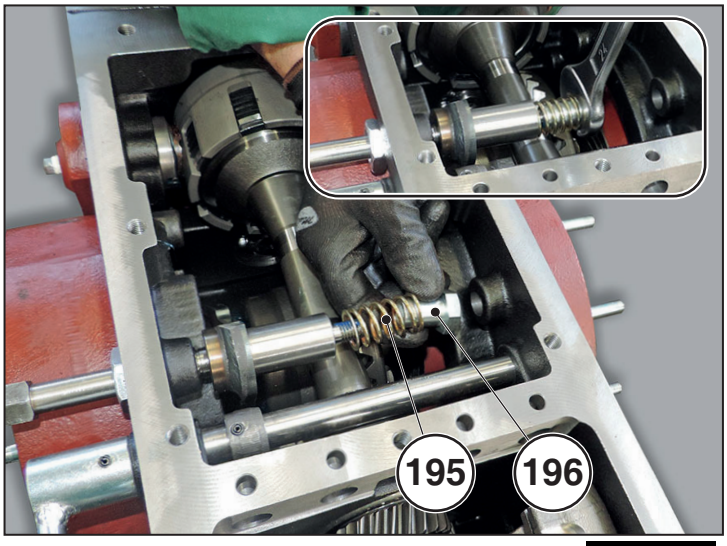


Fig. 5.21

Tighten the special tool (D-p/n _____) on the spindle (189).

Loosen the nut (191) and then use the special tool (D) to unscrew the spindle (189) from the gearbox casing. Remove the special tool (D).

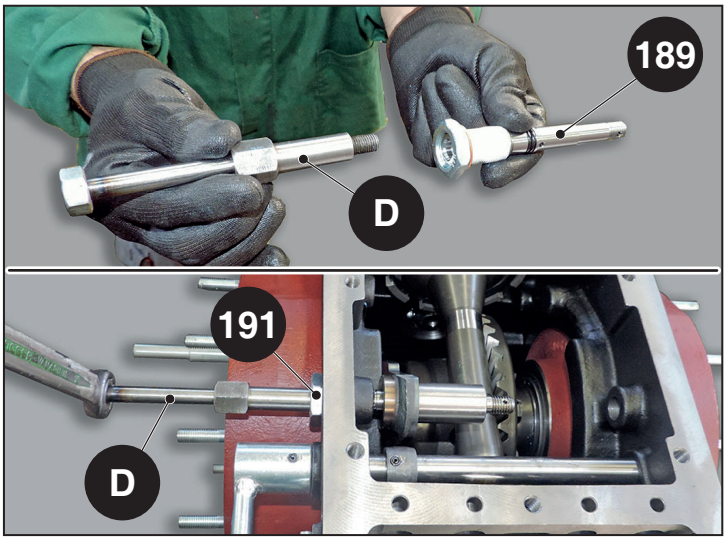


Fig. 5.22

Unscrew the nut (191) and remove the copper washer (190) and the O-rings (192).

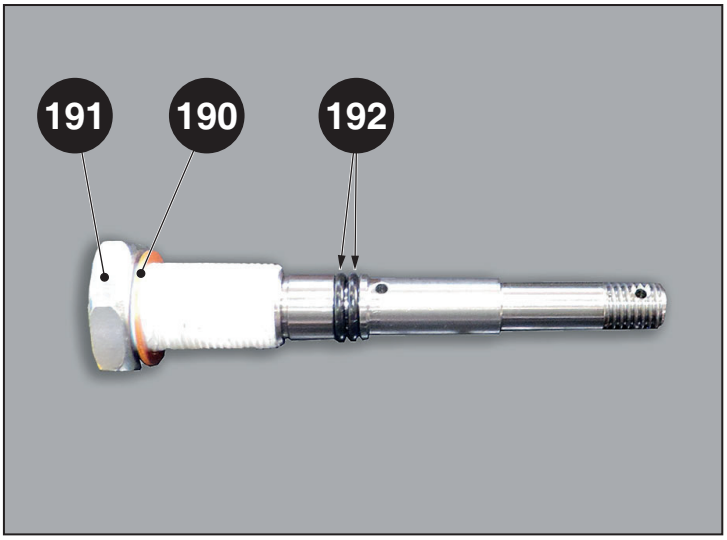


Fig. 5.23

Remove la fork (194) from the differential lock ring (114).

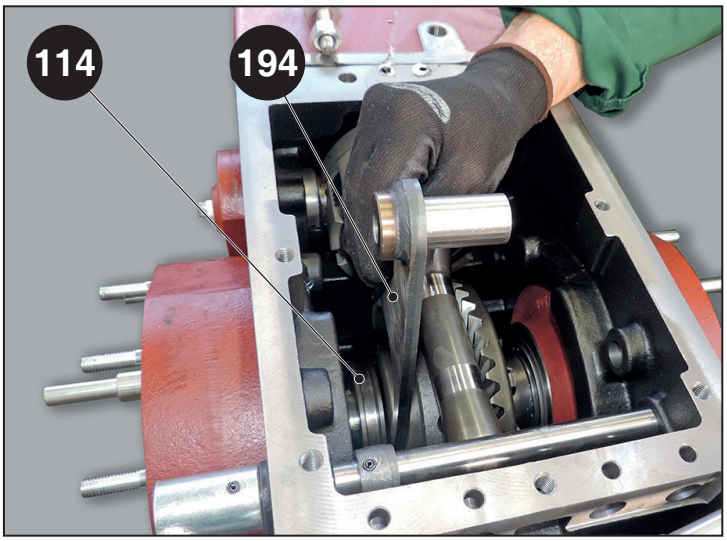


Fig. 5.24

Remove the two O-rings (193) inside the differential lock fork groove (194).

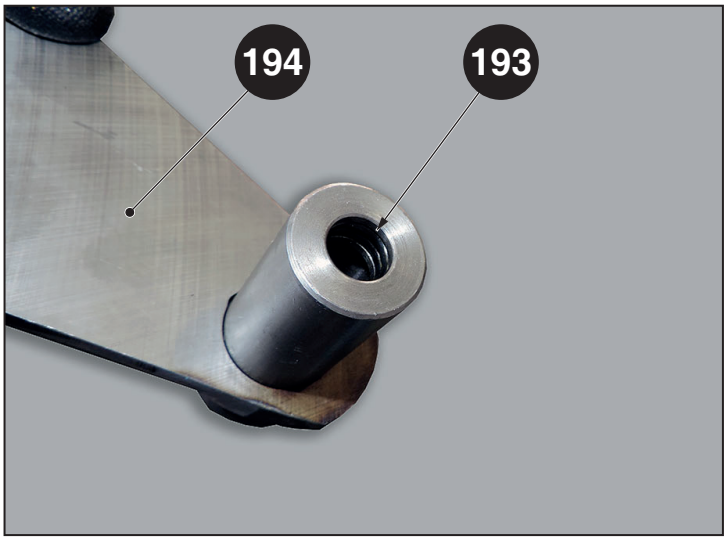


Fig. 5.25

4.2.1.3 Removing the differential

Unscrew and remove the ring nut retainer (188) and then unscrew the ring nut (187). Carry out this step on both sides of the gearbox casing.

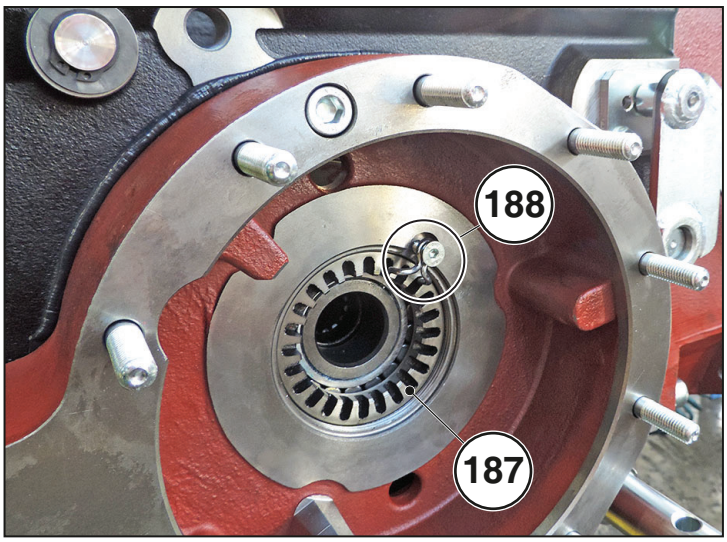


Fig. 5.26

Undo the screws (186) and remove the washers (185). Then remove the brake casing (184). Carry out this step on both sides of the gearbox casing.

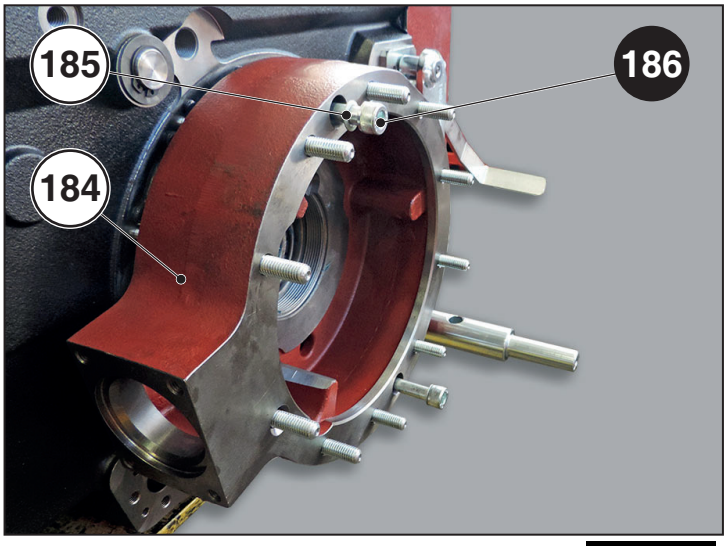


Fig. 5.27

Remove the outer bearing races (183) from the brake casings (184).

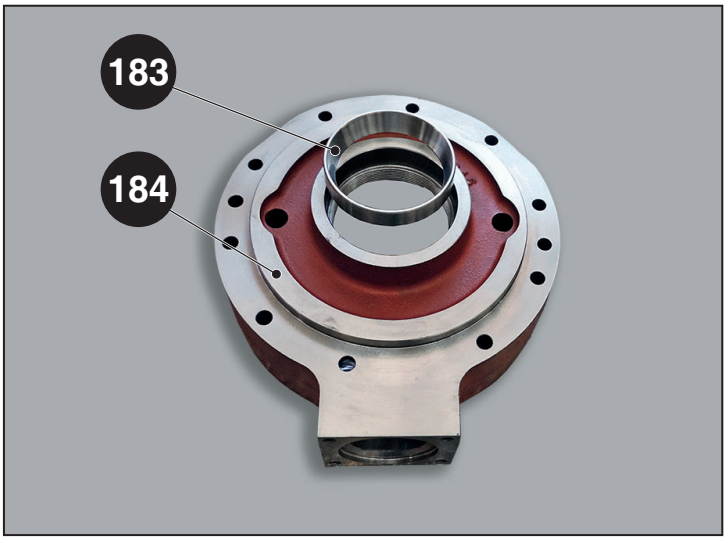


Fig. 5.28

Remove the complete crown wheel assembly (119) from the gearbox casing.

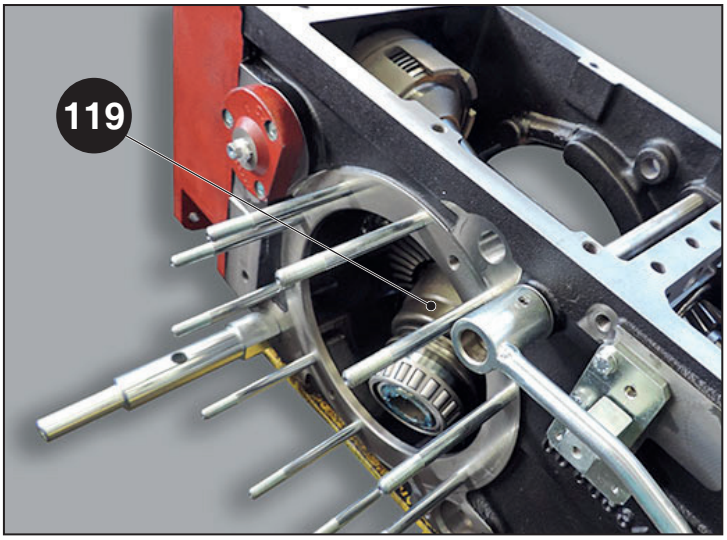


Fig. 5.29

Remove the inner bearing races (183) on the crown wheel assembly (119).

Warning

To remove the complete crown wheel assembly (119), see the Chapter “Disassembling/ Assembling the differential crown wheel".

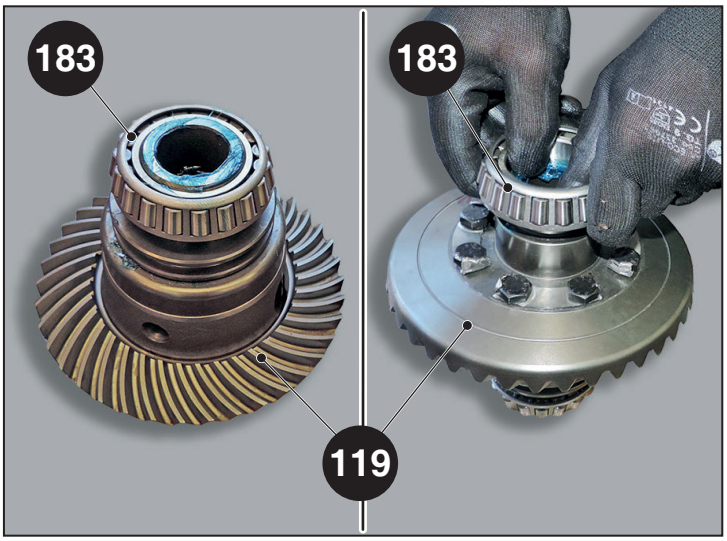


Fig. 5.30

Undo the stud bolts (182).

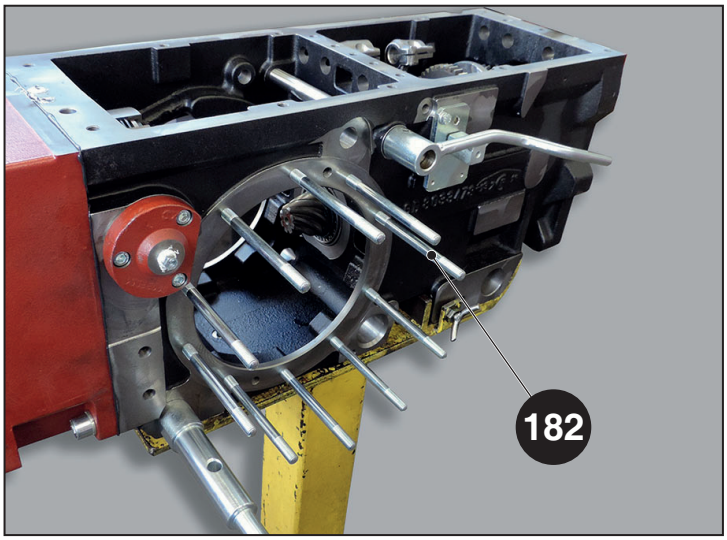


Fig. 5.31

RS and SN+ Cluster only

Remove the pin (207) first and then the lever (206), spacer (251) and O-ring (203) from the rod (201).

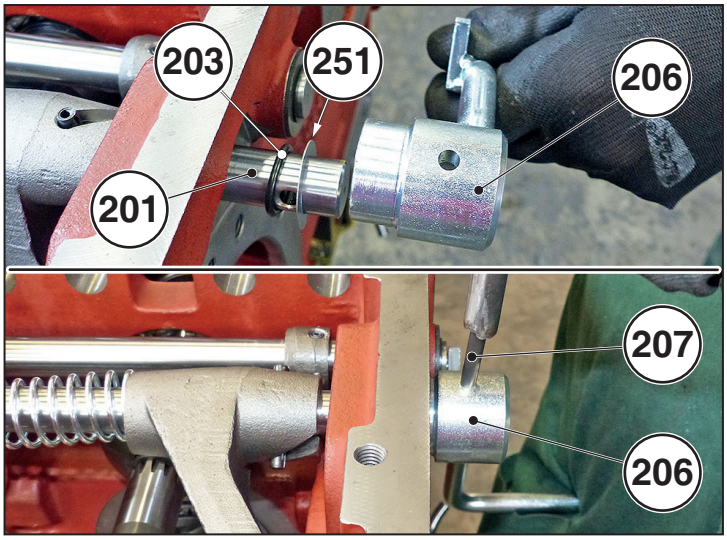


Fig. 5.32

RS and SN+ Cluster only

Remove la pin (207) to free the fork (194).

Remove the circlip (205), spacer (204) and O-ring (203) from the left end of the rod (201).

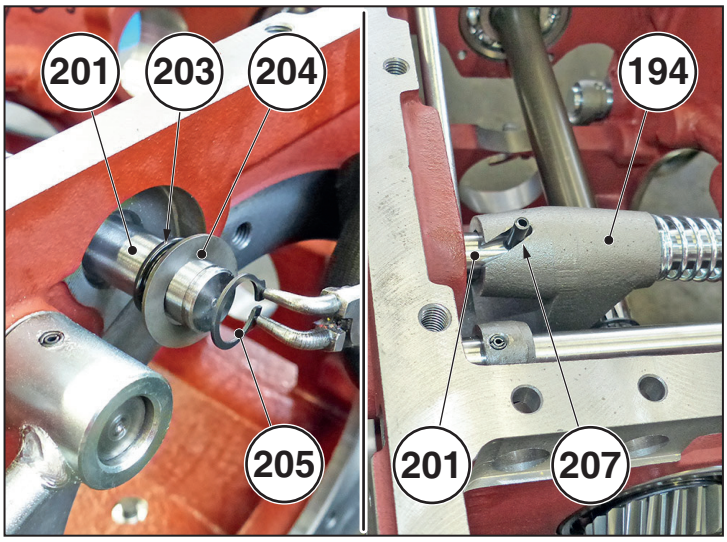


Fig. 5.33

RS and SN+ Cluster only

Pull out the rod (201) and then retrieve the spring (202) and fork (194).

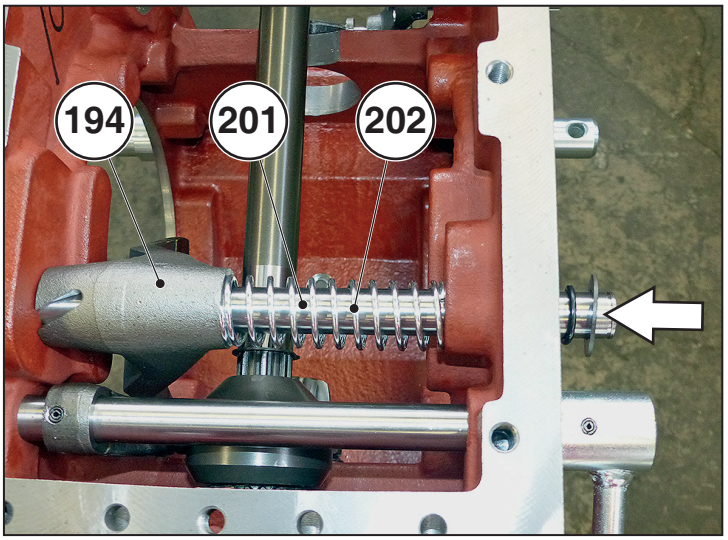


Fig. 5.34

4.2.1.4 Disassembling the Power Take Off

Remove la pin (159) to free the lever (178).

Remove the lever (178) and the: engagement pin (179), spring (180), spacer (177) and O-ring (176).

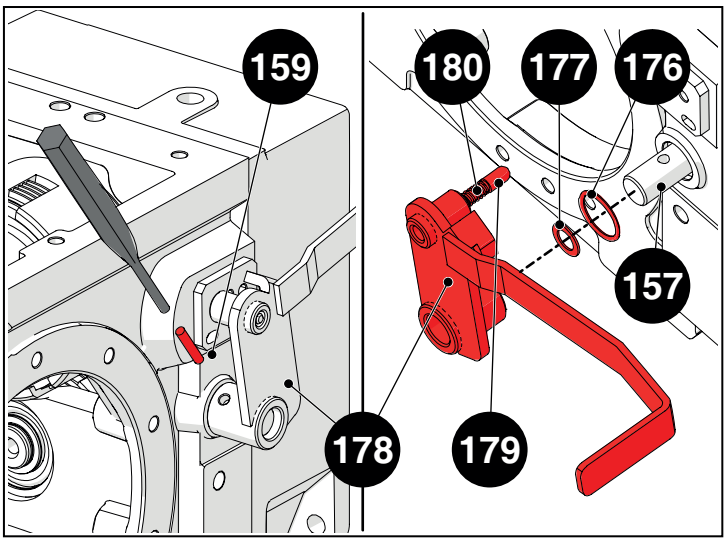


Fig. 5.35

Remove the plug (90) and the oil seal (91).

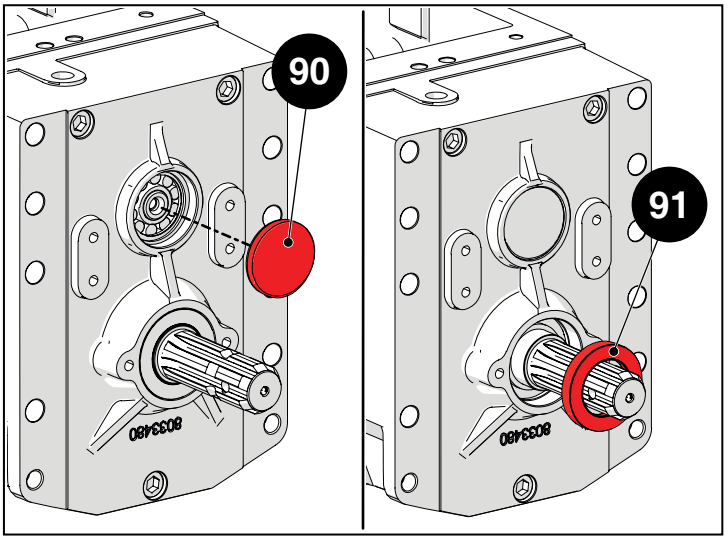


Fig. 5.36

Remove the circlip (88) and spacer (87) to free the bearing (89).

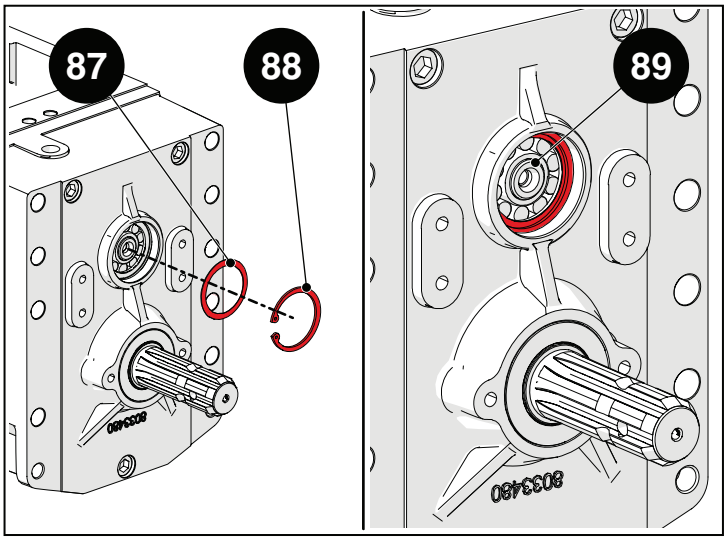


Fig. 5.37

Undo the screws (161) and (163) and remove the washers (162) and (164).

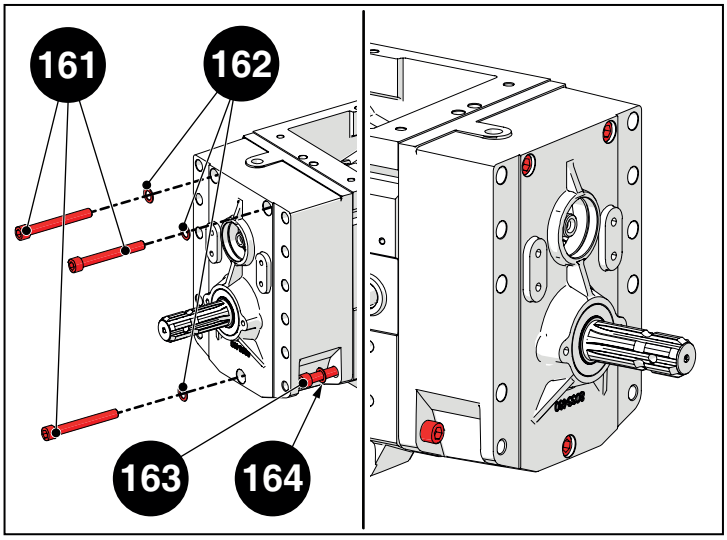


Fig. 5.38

Separate the complete rear cover (113) from the gearbox casing, making sure to disengage the fork (160) from the PTO sleeve (105) before separating the assemblies completely.

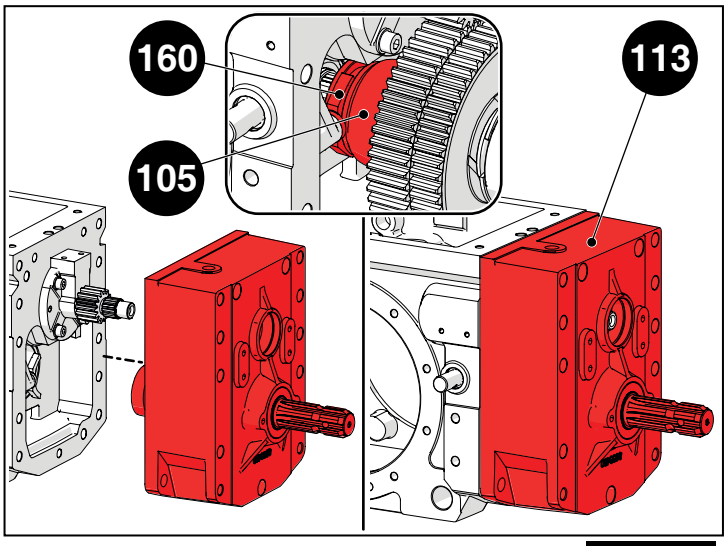


Fig. 5.39

Remove the bearing (89) from the rear cover (113).

Remove the gear (86) from the splined shaft (85).

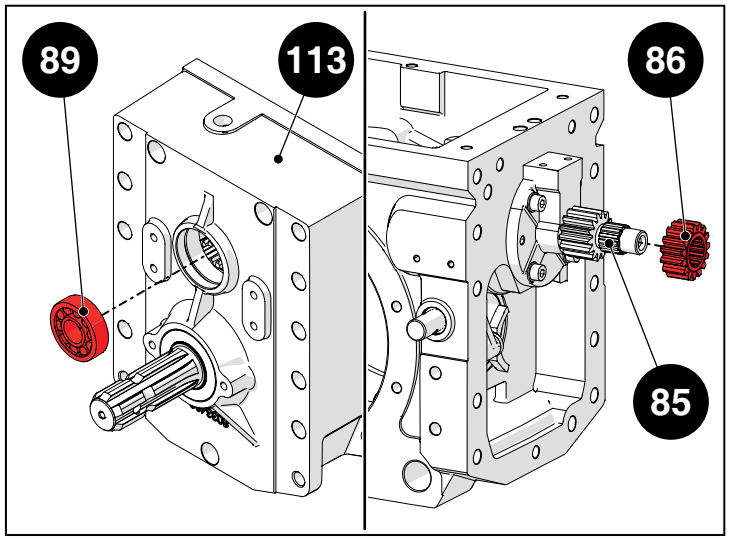


Fig. 5.40

Remove the circlip (107) and then bearing (108) and PTO sleeve (105).

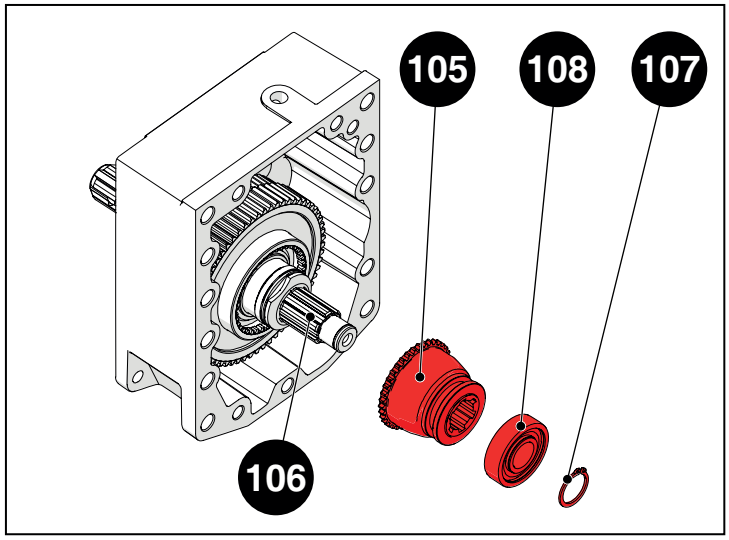


Fig. 5.41

Free the ring nut (104) and unscrew and remove the ring nut retainer (103) and the spacer (102).

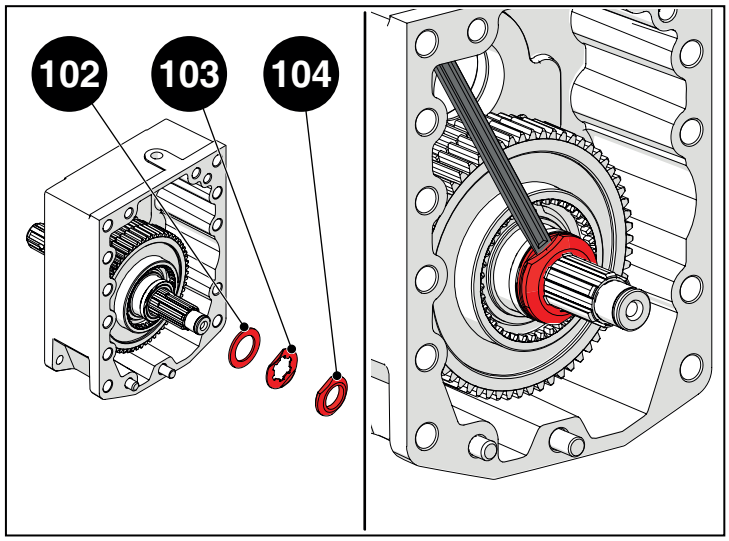


Fig. 5.42

Remove the following components:

- circlip (100);
- spacer (99);
- gear (97);
- roller bearing cage (98);
- PTO gear (96).

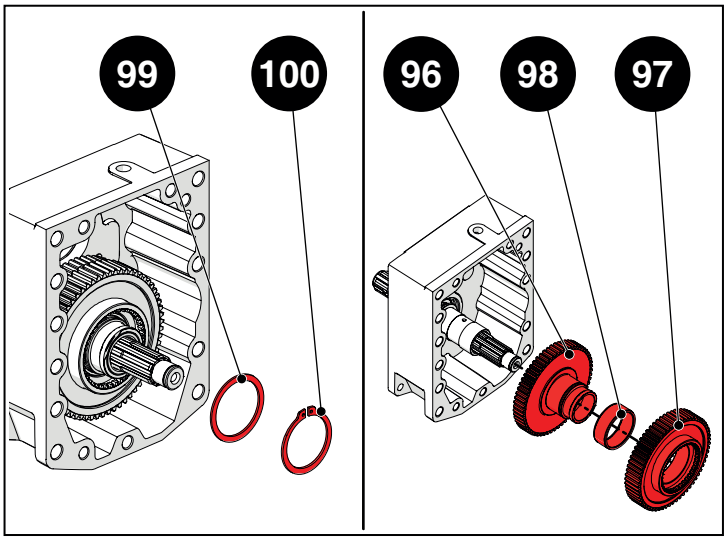


Fig. 5.43

Remove the bush (101) and the spacer (95).

Pull out the PTO shaft (106).

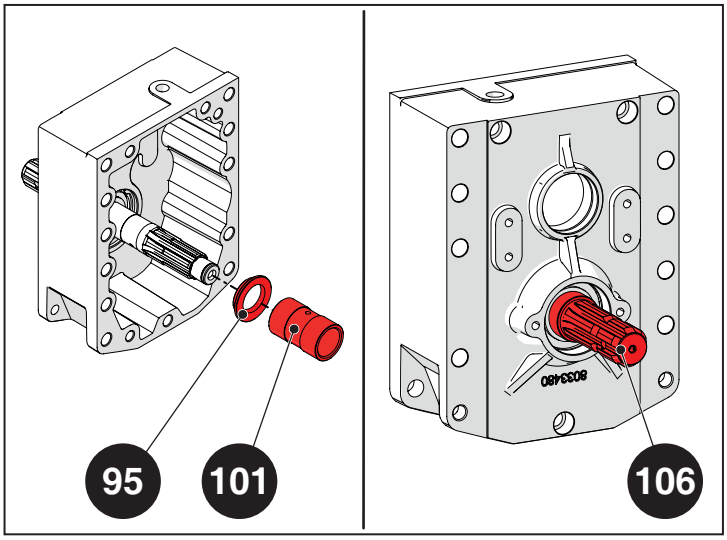


Fig. 5.44

Remove the circlip (94), the bearing (93) and the spacer (92) from the rear cover (113).

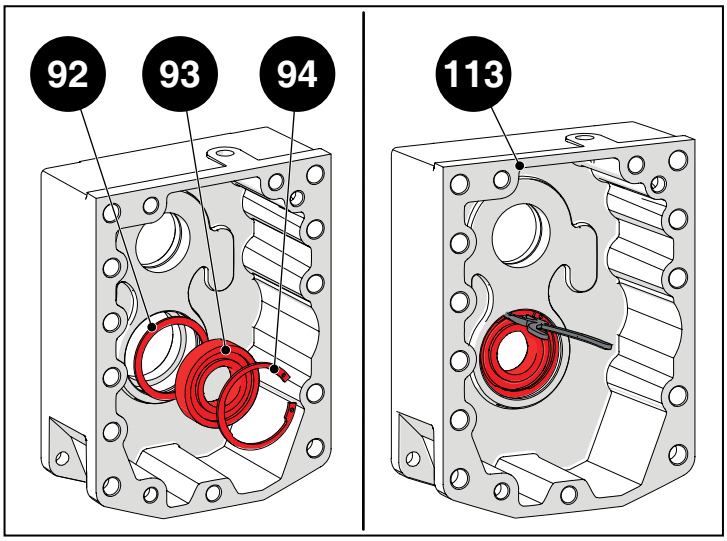


Fig. 5.45

Undo the screws (154) and remove the clutch cylinder (150).

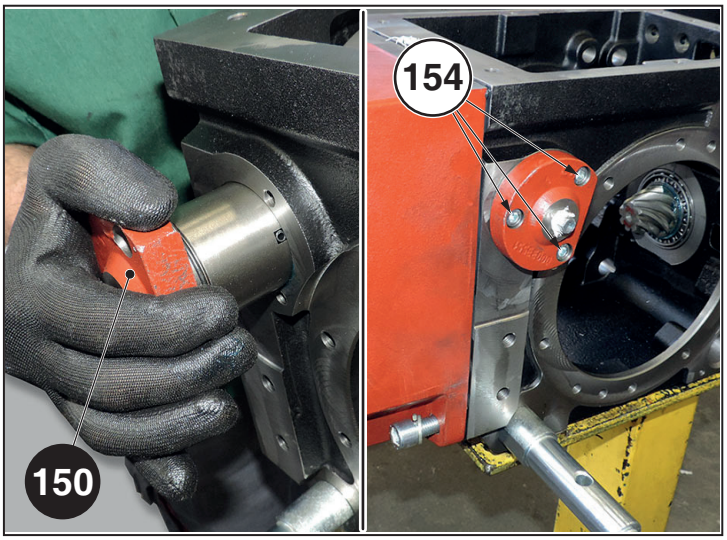


Fig. 5.46

Disassemble the PTO clutch cylinder:

- pull out the complete piston (152) from the cylinder (150);
- pull out the pin (153) from the piston (152);
- remove the O-ring (151) from the piston (152);
- remove the O-ring (149) from the cylinder (150);



Fig. 5.47

Remove the pin (159) first and then the lever (158) and fork (160). Pull out the rod (157) from the box.

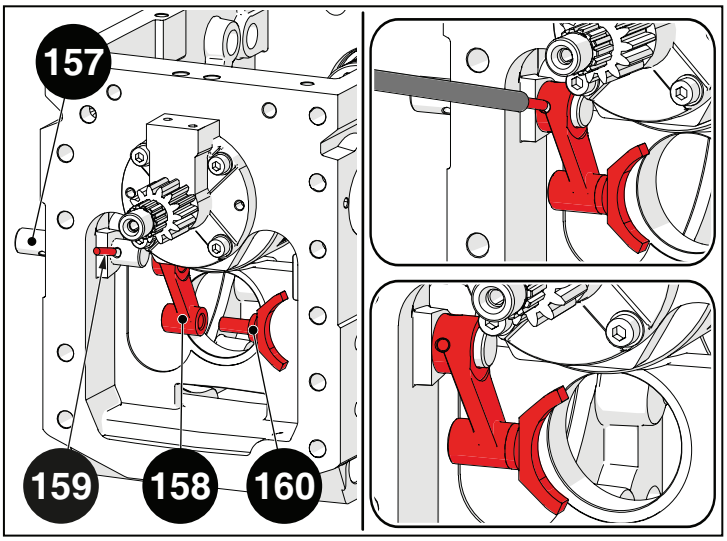


Fig. 5.48

Undo the screws (133) and remove the washers (134) and the PTO speed plate (132).

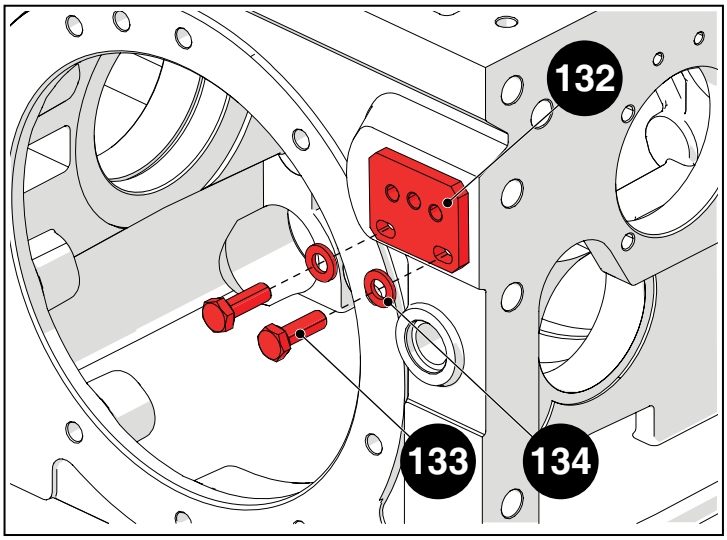


Fig. 5.49

REV Cluster only

Remove the pins (175) and (174) to free the lever (170) and lever (171).

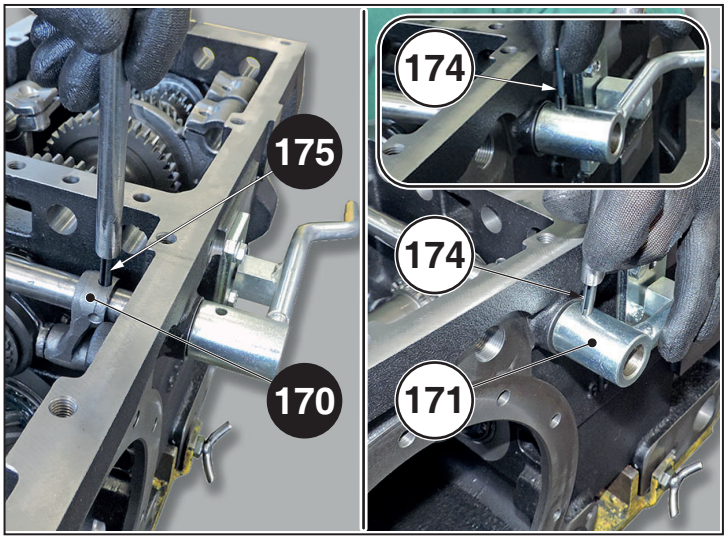


Fig. 5.50

REV Cluster only

Remove the lever (171) first and then the engagement pin (173) and the spring (172).

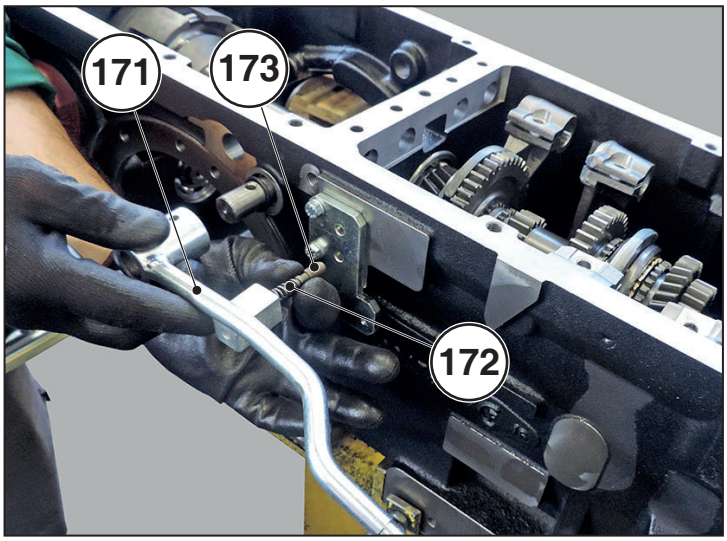


Fig. 5.51

REV Cluster only

Remove the O-ring (166) first and pull out the rod (165) and the lever (170).

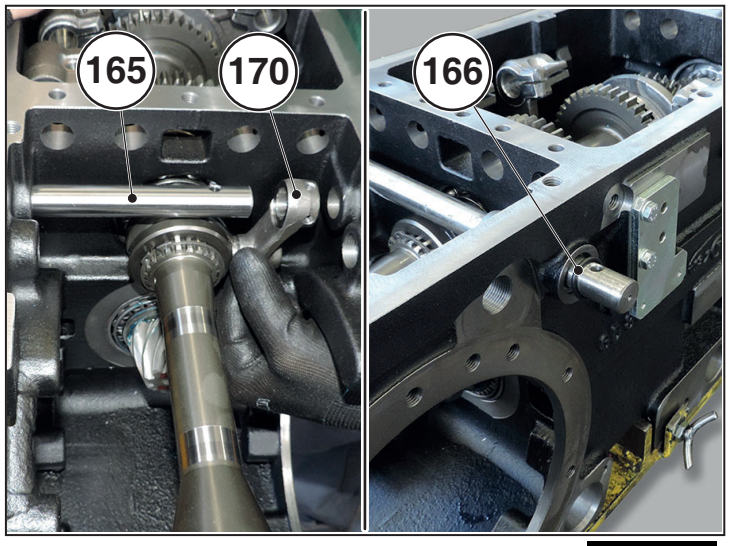


Fig. 5.52

REV Cluster only

Remove the circlip (168), spacer (167) and O-ring (166) from the PTO selector rod (165).

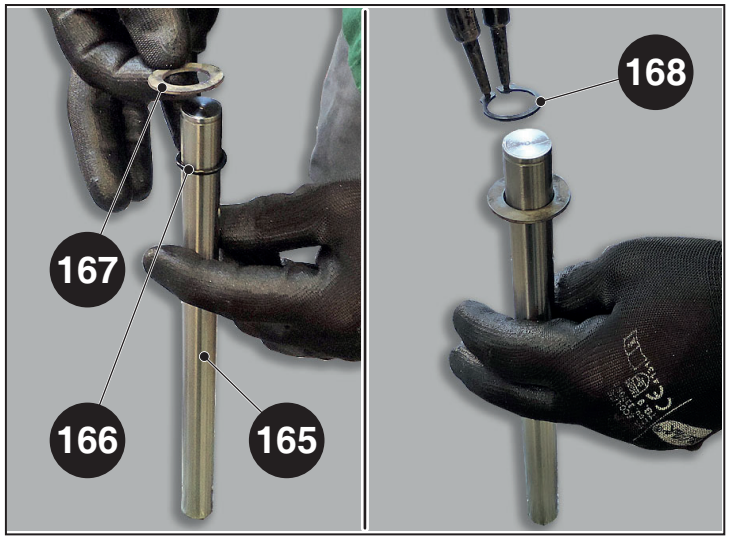


Fig. 5.53

REV Cluster only

Undo the screws (136) and remove the washers (137) and the PTO selector plate (135).

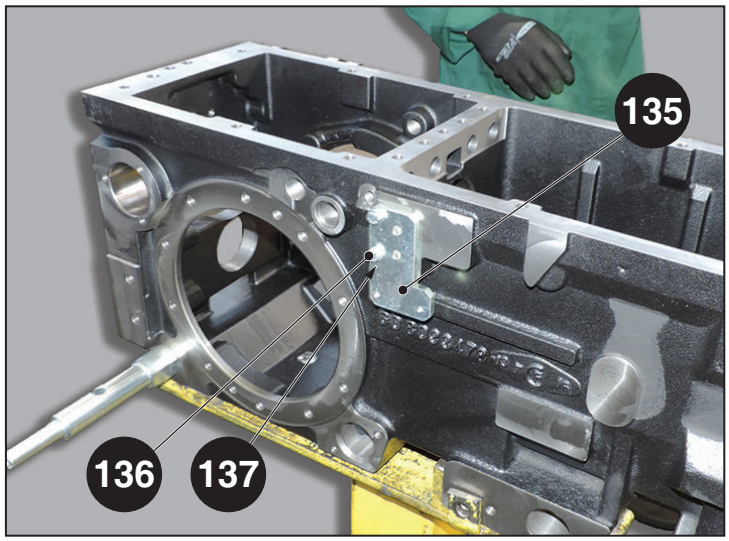


Fig. 5.54

RS and SN+ Cluster only

Remove la dual pin (174) to free the PTO selector lever (171).

Remove la dual pin (175) to free the lever (170).

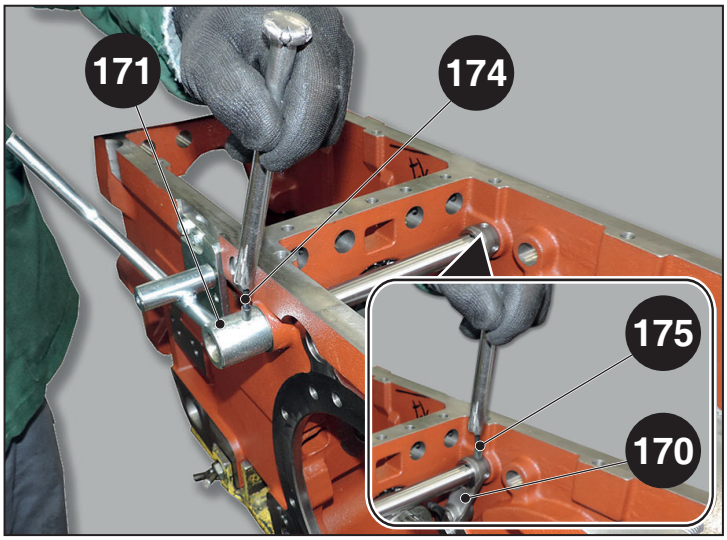


Fig. 5.55

RS and SN+ Cluster only

Remove the PTO selector lever (171), the spring (172) and selector pin (173).

Remove the spacer (167) and O-ring (166).

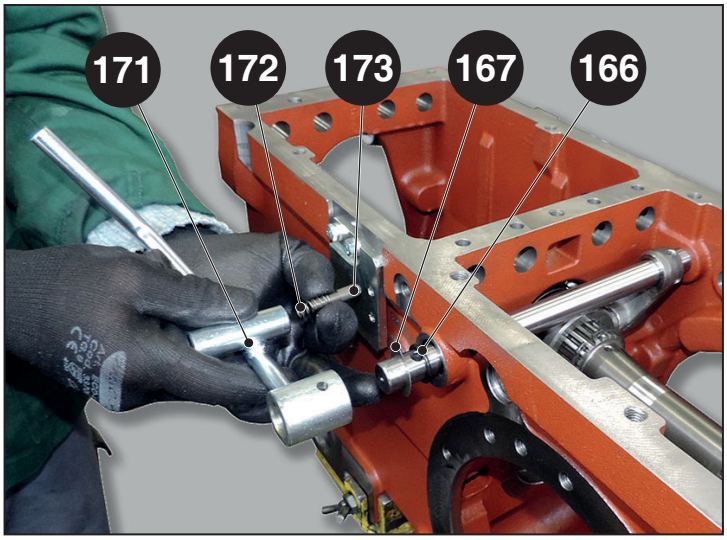


Fig. 5.56

RS and SN+ Cluster only

Pull out the rod (165) and remove the complete lever (170) from the PTO selector sleeve (71). Disassemble the lever (170) and fork (169).

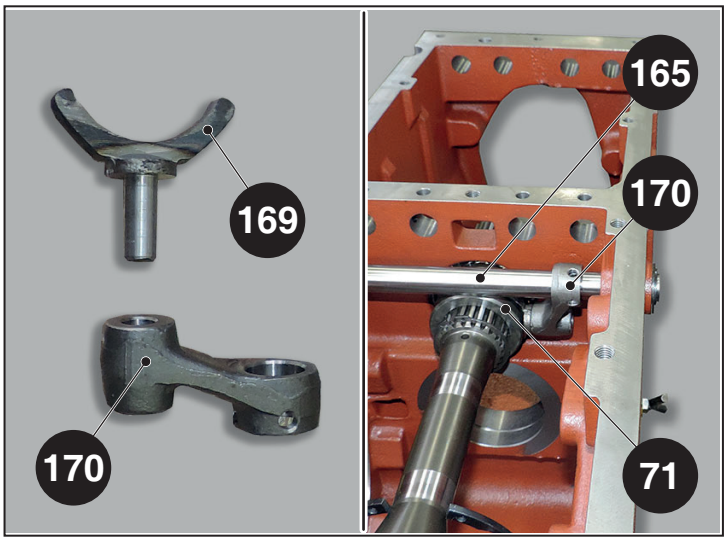


Fig. 5.57

RS and SN+ Cluster only

Remove the circlip (168), spacer (167) and O-ring (166) from the rod (165).

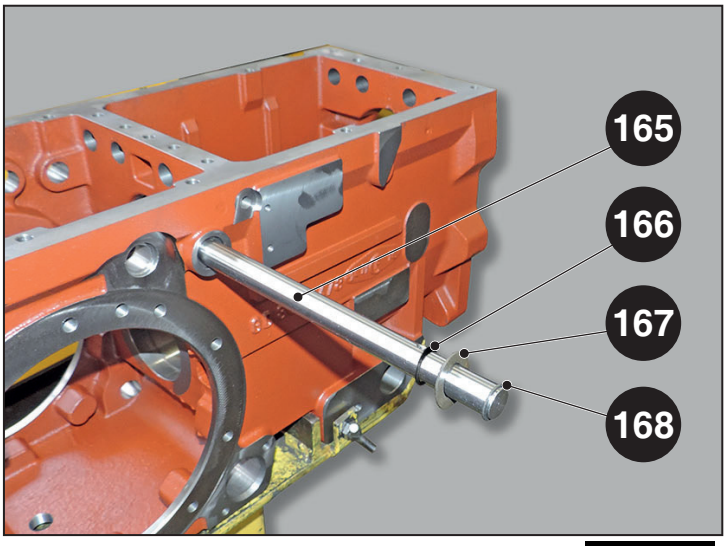


Fig. 5.58

RS and SN+ Cluster only

Undo the screws (136) and remove the washers (137) and the PTO selector plate (135).

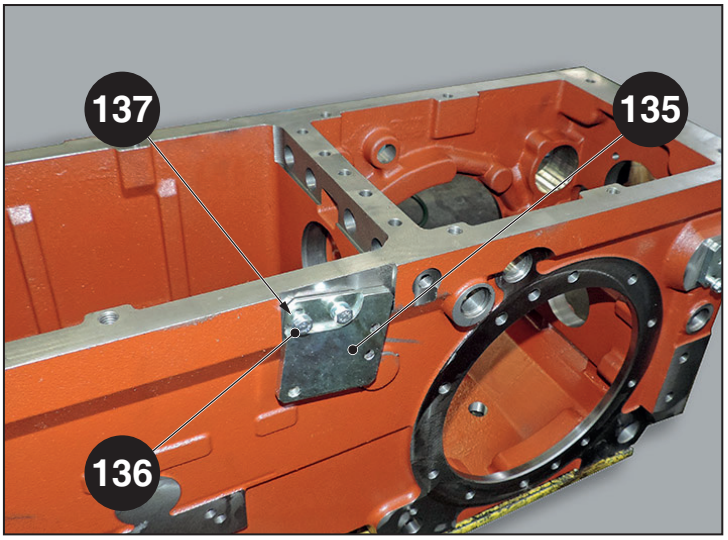


Fig. 5.59

Free the circlips (76) and (72).

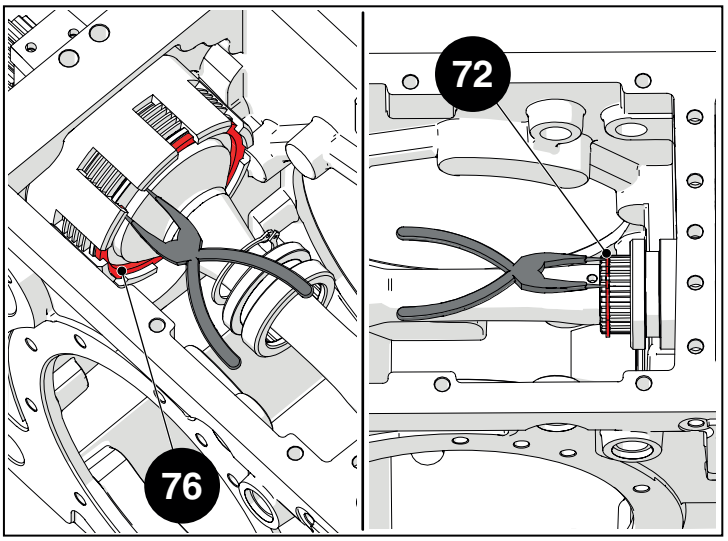


Fig. 5.60

Undo the screws (111) fastening the shaft mount (81) to the gearbox casing and remove the washers (112).

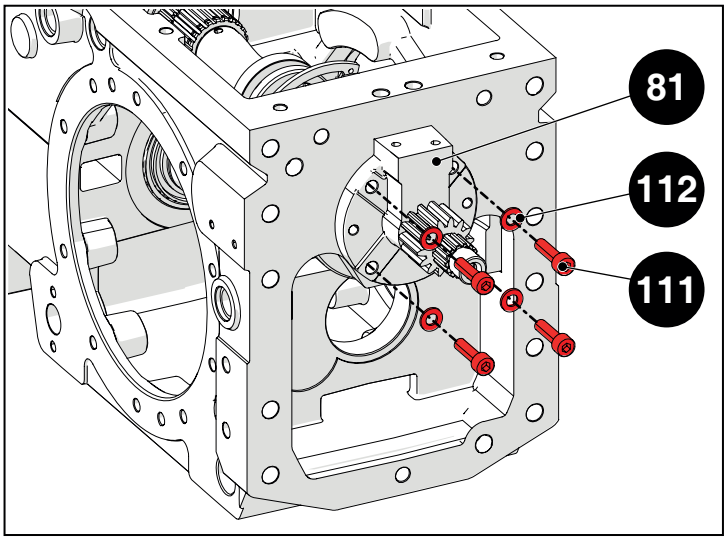


Fig. 5.61

Disassemble the complete support (81) from gearbox casing (148).

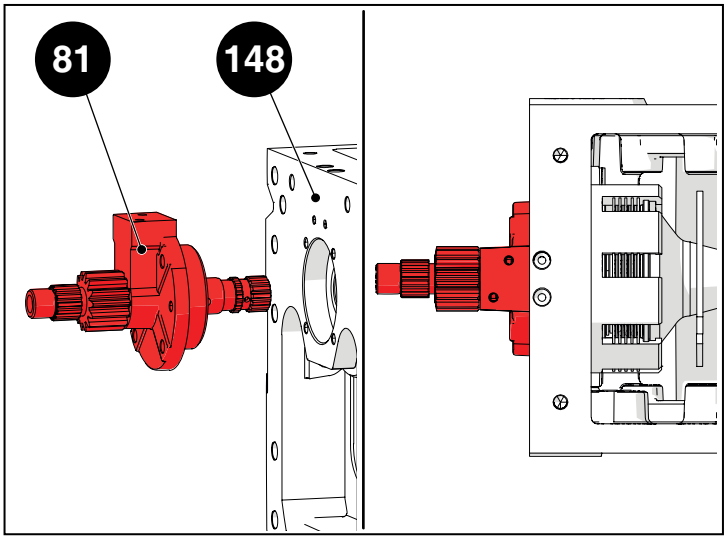


Fig. 5.62

Remove the spacer (110) and roller bearing cage (109) from inside the splined shaft (85).

Remove the O-rings (80).

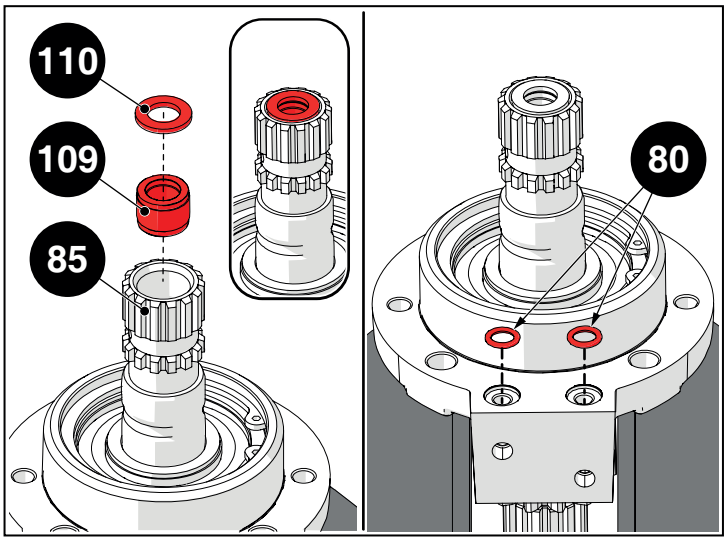


Fig. 5.63

Remove the Koening expander plugs (82) from the shaft mount (81) holes.

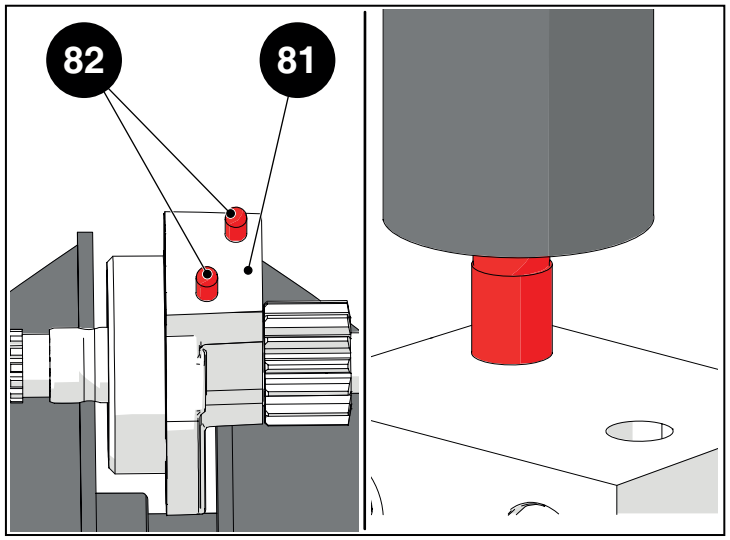


Fig. 5.64

Remove the splined shaft (85) from the shaft mount (81).

Remove the Koenig expander plug (147) from inside the splined shaft (85).

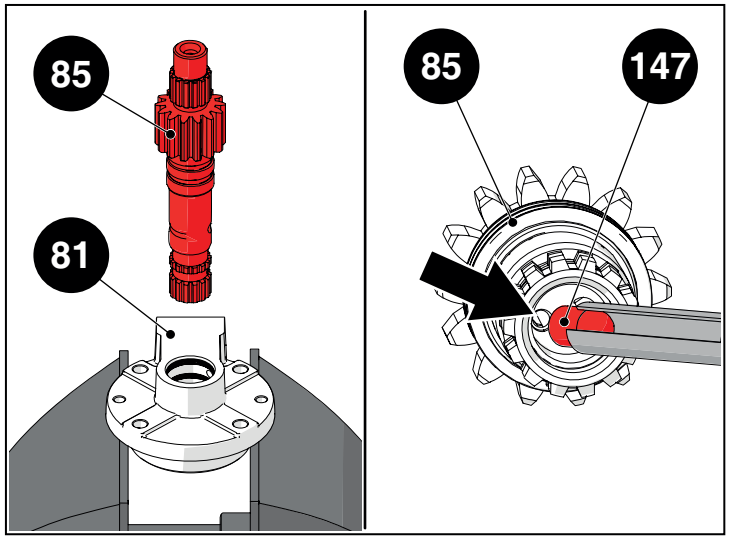


Fig. 5.65

Remove the circlip (79) and bearing (83) from the shaft support (81).

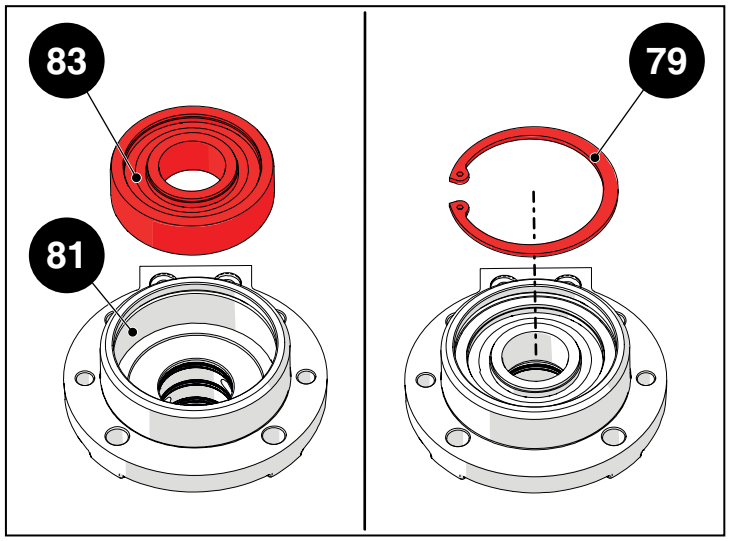


Fig. 5.66

Remove the Quad Rings (84) from the shaft mount (81).

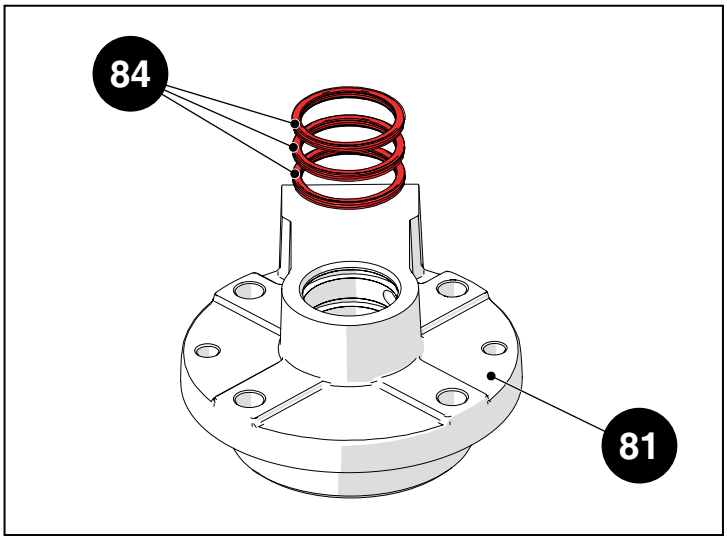


Fig. 5.67

Remove the shaft (75).

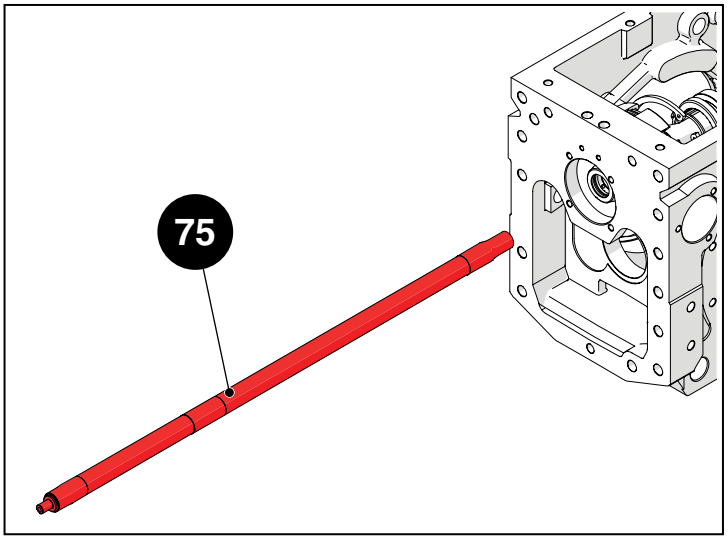


Fig. 5.68

Disassemble the shaft (74) complete with PTO clutch (77) and then remove the circlip (76).

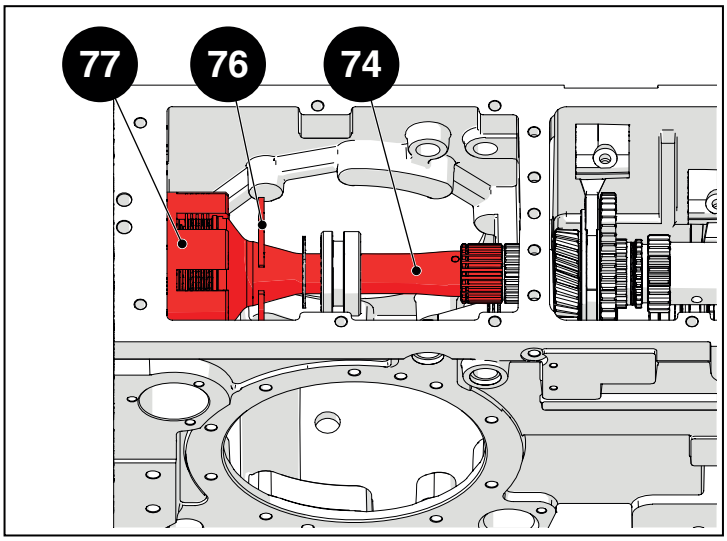


Fig. 5.69

Separate the shaft (74) from the PTO clutch (77). Remove the spacer (146) and roller bearing cage (73).

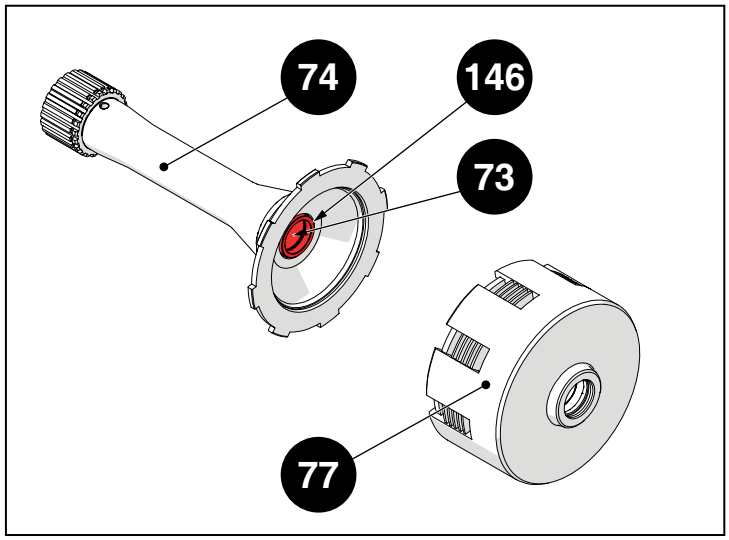


Fig. 5.70

Remove the O-rings (78) from the PTO clutch (77).

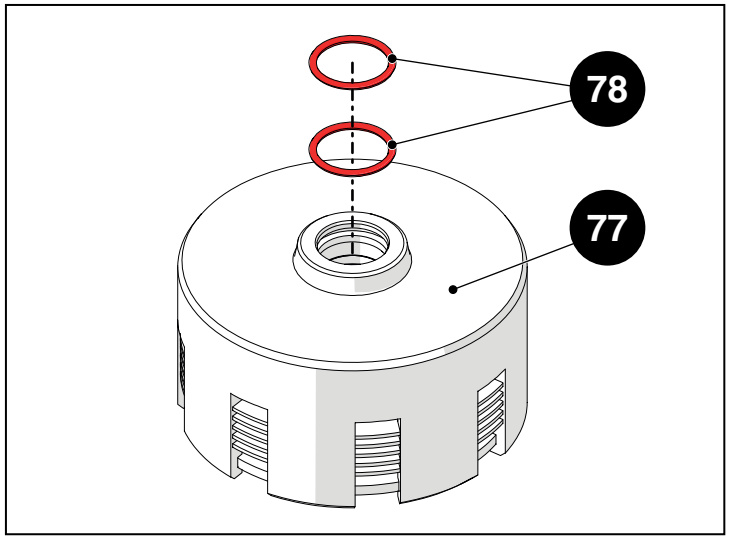


Fig. 5.71

Pull out the sleeve (71) and circlip (72) from the shaft (74).

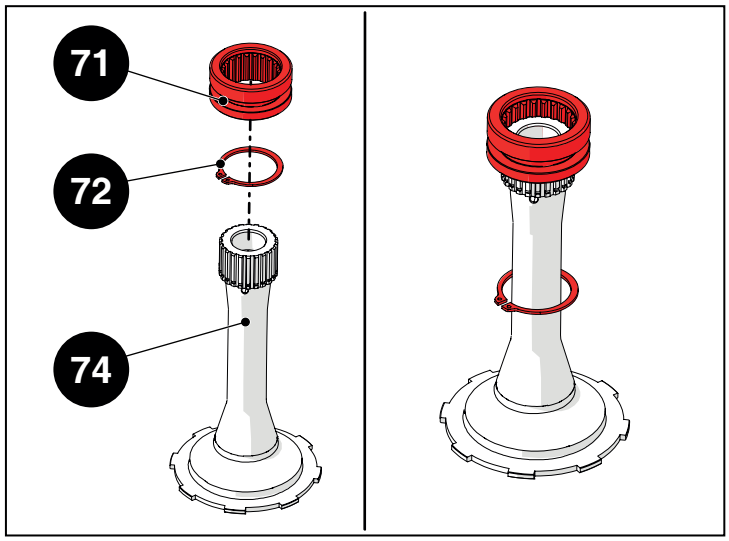


Fig. 5.72

Remove the spacer (70) and roller bearing cage (73) from the shaft (74).

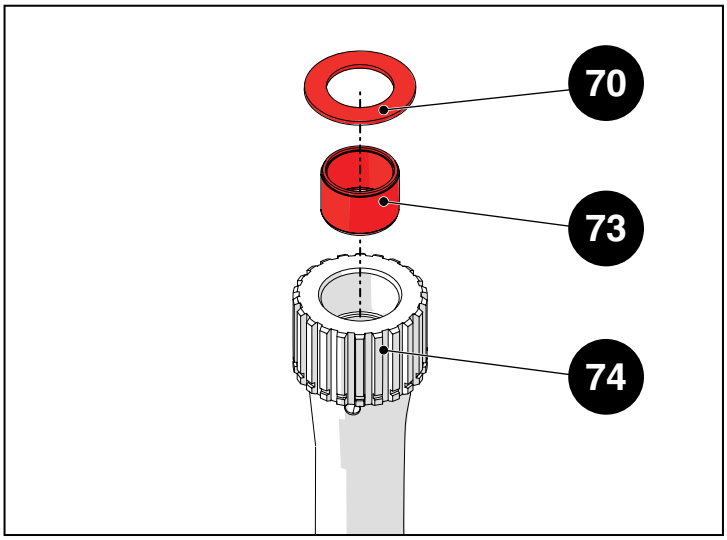


Fig. 5.73

4.2.1.5 Disassembling the gearbox front cover

Remove the pins (144) and pull out the studs (145).

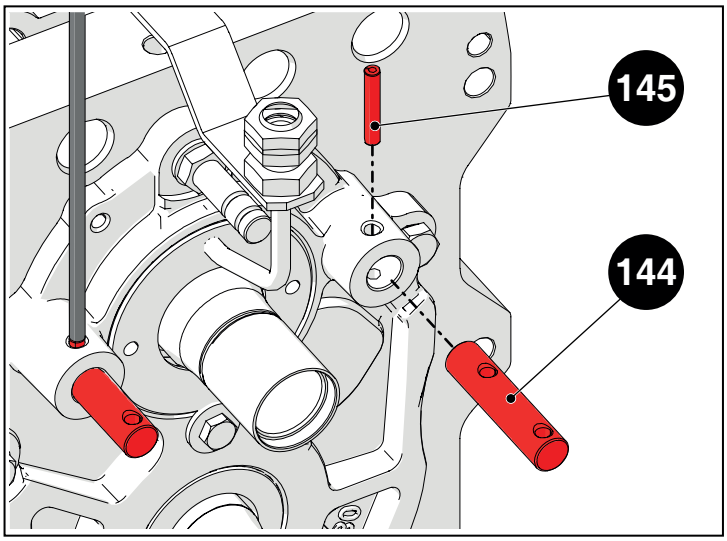


Fig. 5.74

Undo the stop screw (66) of the lubrication cover (68) and remove the washer (65) and plate (64).

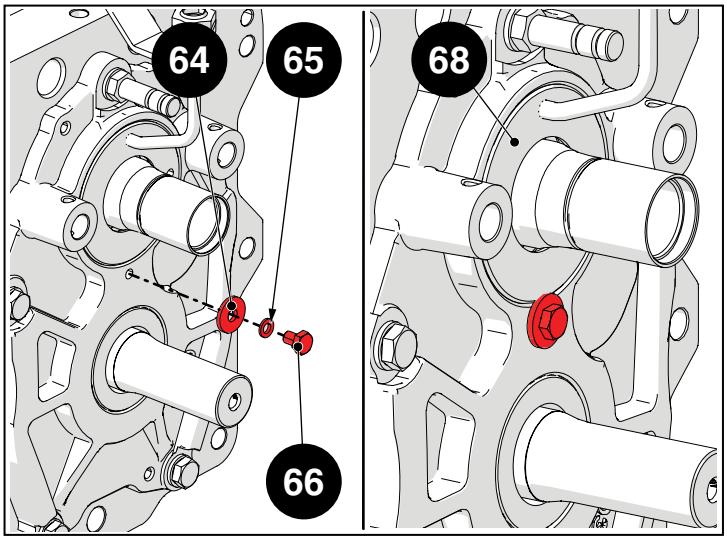


Fig. 5.75

Remove the oil seal (61) from the bevel pinion (30).

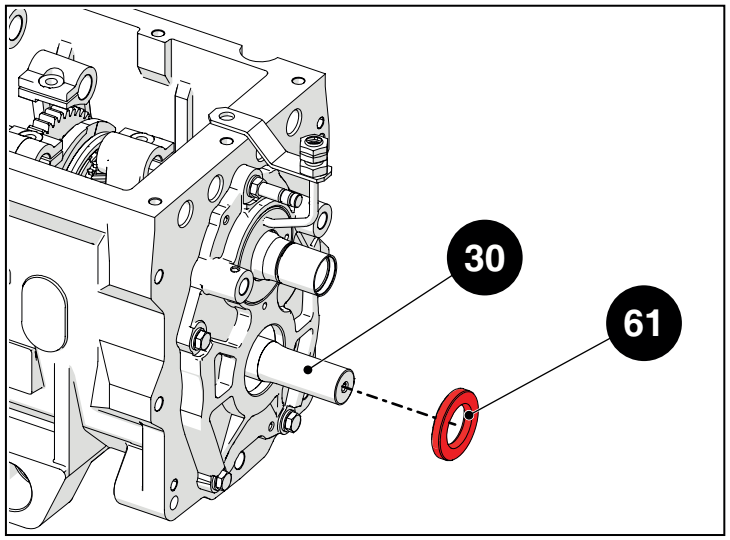


Fig. 5.76

Remove the lubrication cover (68).

Disassemble the lubrication cover (68) removing the plug (143), oil seal (69) and O-ring (67).

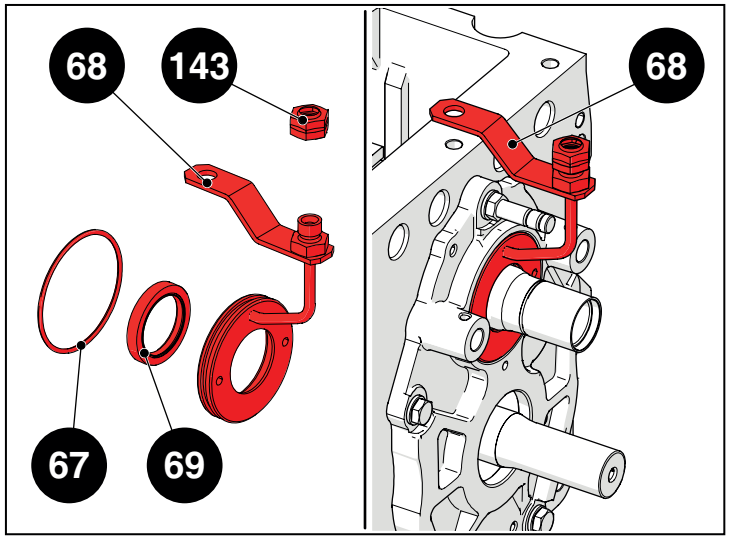


Fig. 5.77

Remove the circlip (4) from the primary shaft (3).

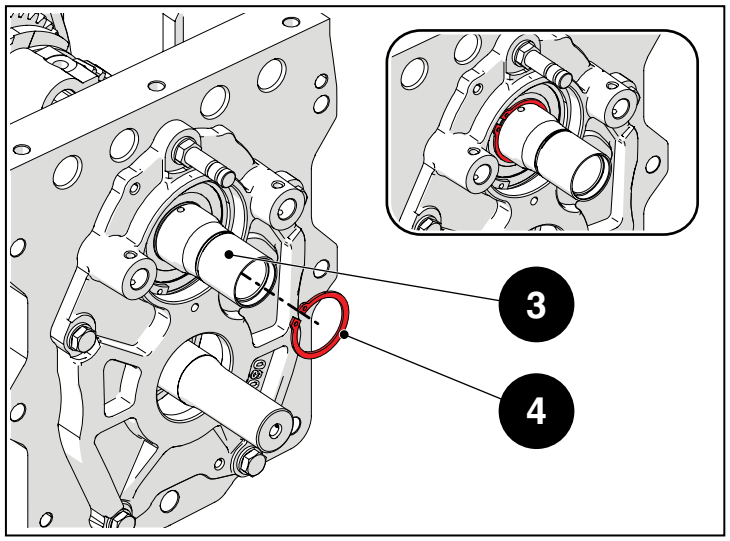


Fig. 5.78

Undo the screws (57) and pin (141) and remove washers (56) and (142). Then remove the gearbox cover (63).

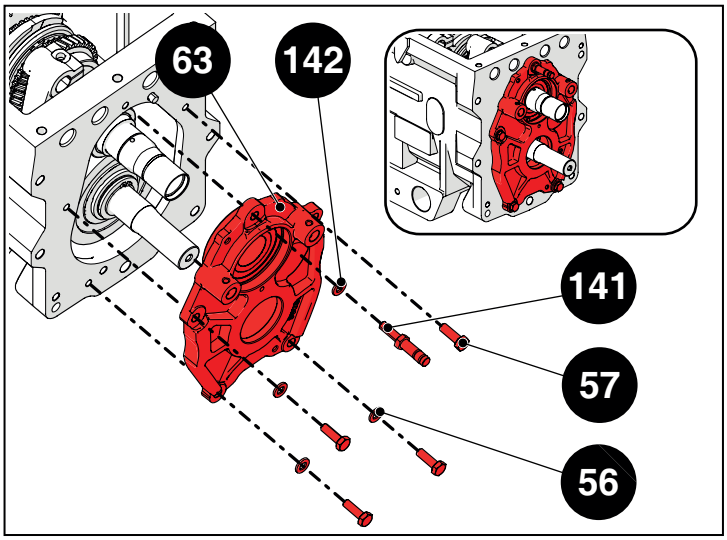


Fig. 5.79

Remove the circlips (5) and (9) as well as the spacers (6) and (8) from the gearbox cover (63).

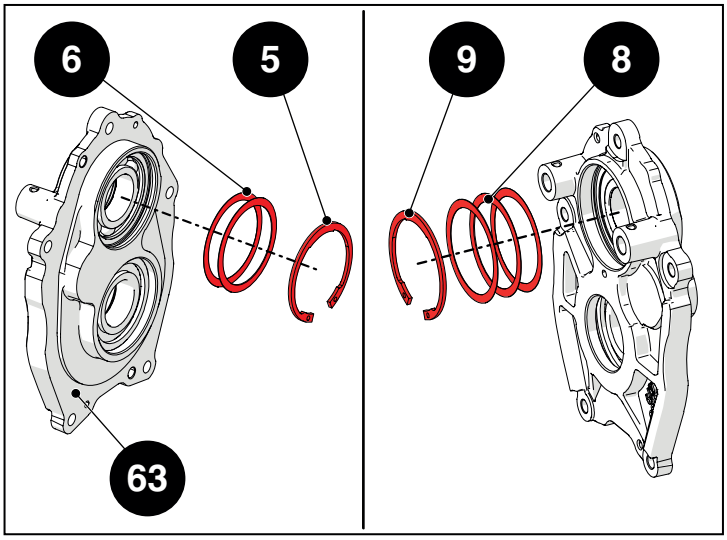


Fig. 5.80

Remove the bearings (62) and (7) from the gearbox cover (63).

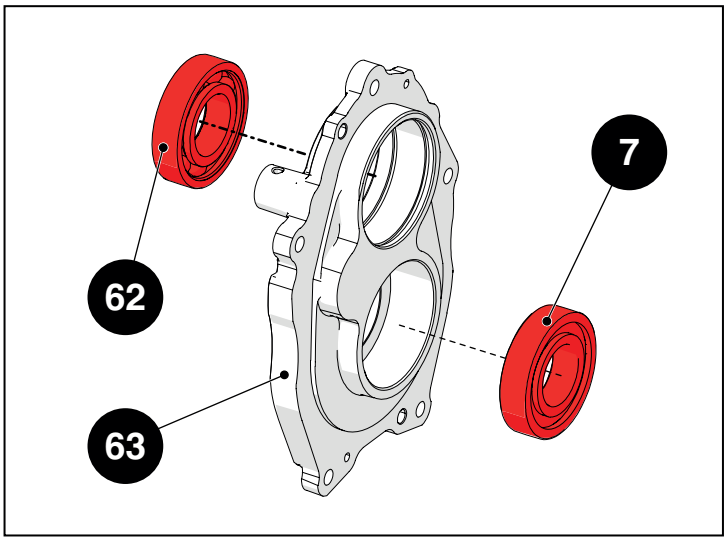


Fig. 5.81

4.2.1.6 Removing the gearbox

Remove the following components from the bevel pinion (30):

- circlip (60);
- spacers (59);
- spacer (45);
- roller spacer (46);
- spacer (58).

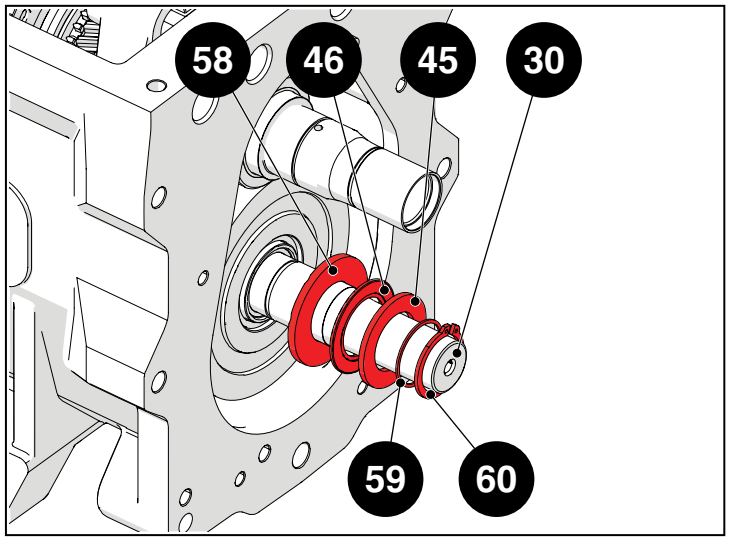


Fig. 5.82

Disassemble the 1st speed gear (55) from the bevel pinion (30) and remove it from the roller bearing cage (54).

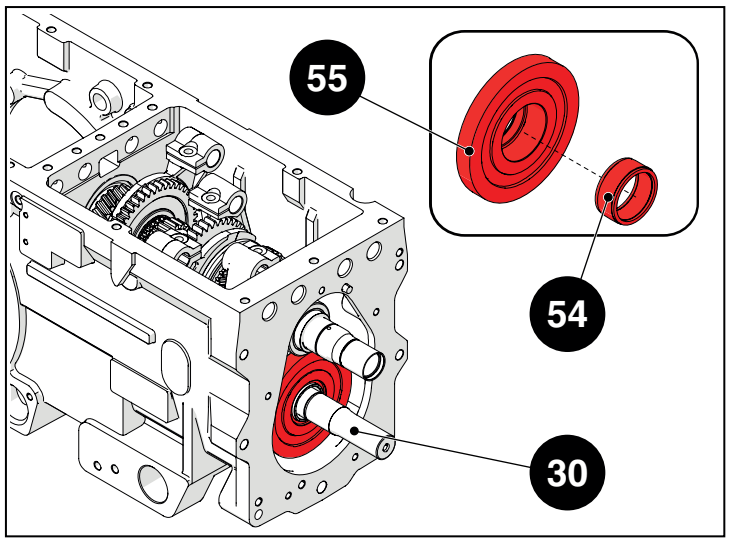


Fig. 5.83

Remove la fork (140) and then pull out the complete 2nd-3rd speed gear (49) from the bevel pinion (30).

Remove la fork (139) engaged on the synchroniser (15).

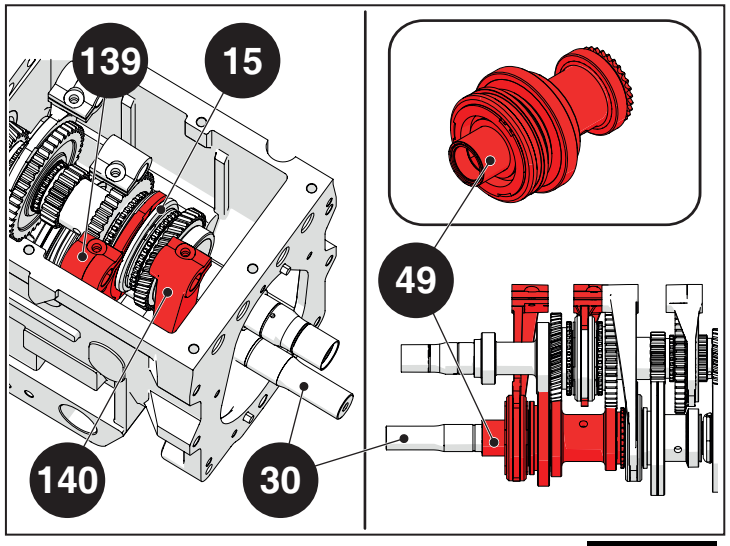


Fig. 5.84

Disassemble the 2nd-3rd speed gear (49):

- spacer (53);
- synchroniser ring (52);
- synchroniser gear (51);
- roller bearing cage (50);
- roller bearing cage (48).

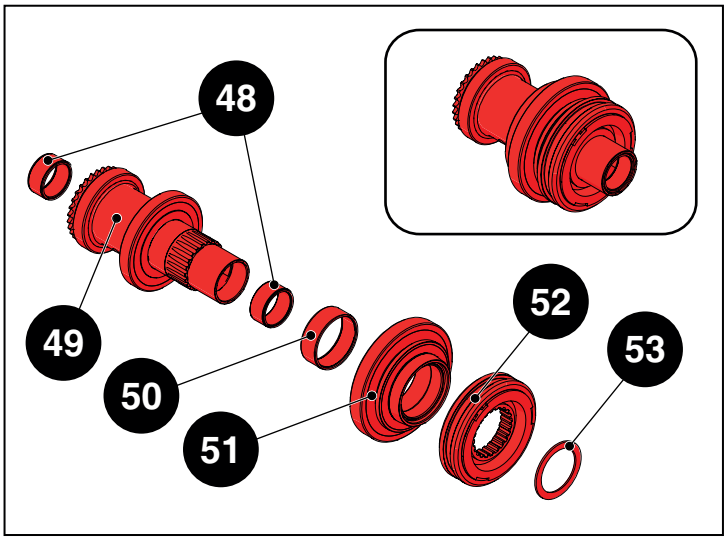


Fig. 5.85

Remove the complete primary shaft (3) by pulling it out from the gear (22).

Note

To remove the primary shaft (3), see the Chapter “Disassembling/Assembling the primary shaft".

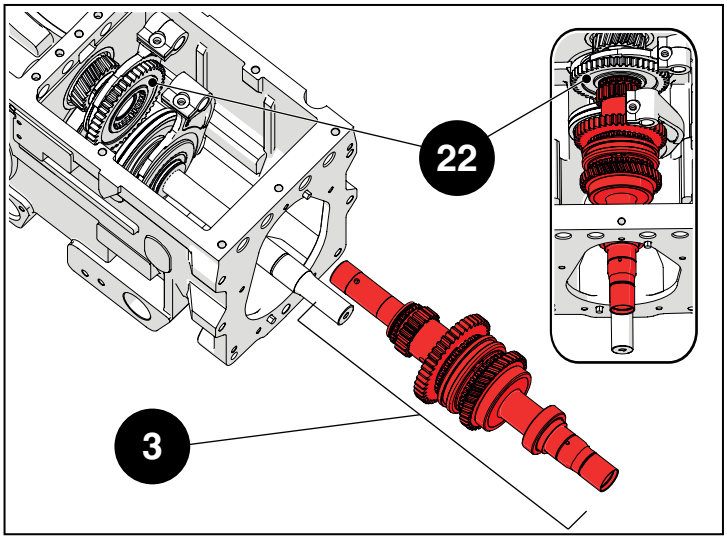


Fig. 5.86

Remove the fork (140) from the splined ring (43), and the fork (139) from the medium slow-slow range gear (22).

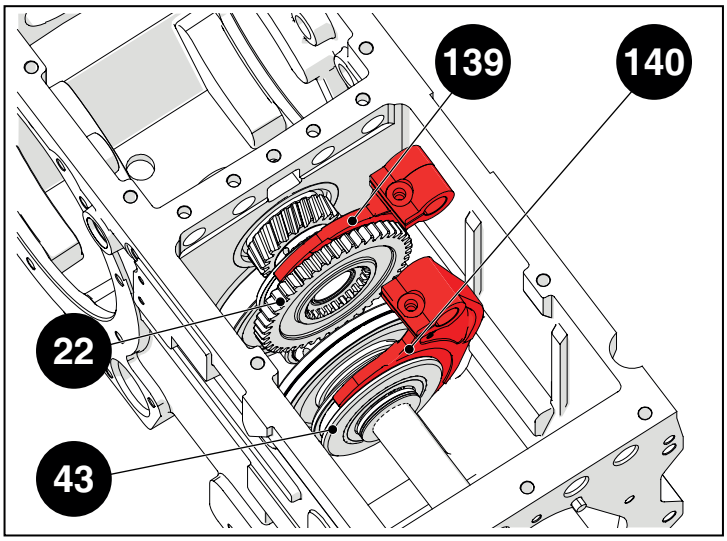


Fig. 5.87

Remove the following components from the bevel pinion (30):

- spacer (47);
- roller spacer (46);
- spacer (45);
- circlip (44);
- splined ring (43);
- fixed hub (42).

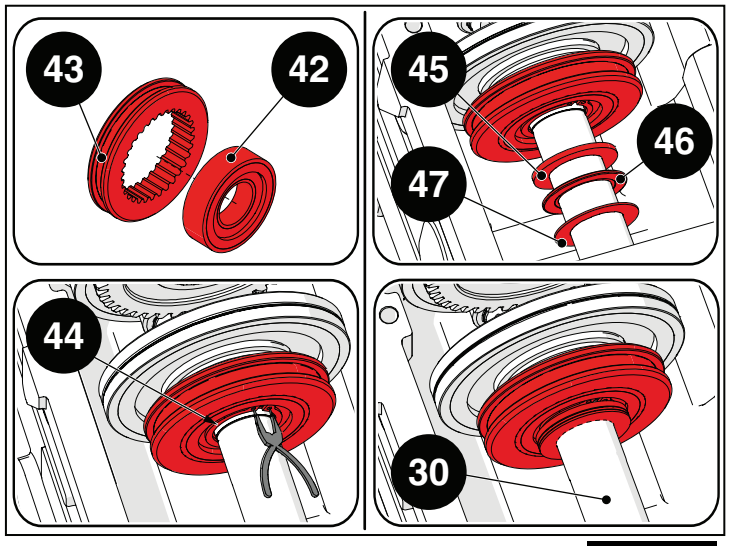


Fig. 5.88

Remove the complete medium slow-slow range gear (40) from the bevel pinion (30).

Disassemble the medium slow-slow range gear (40) by removing the roller bearing cages (39) and spacer (41).

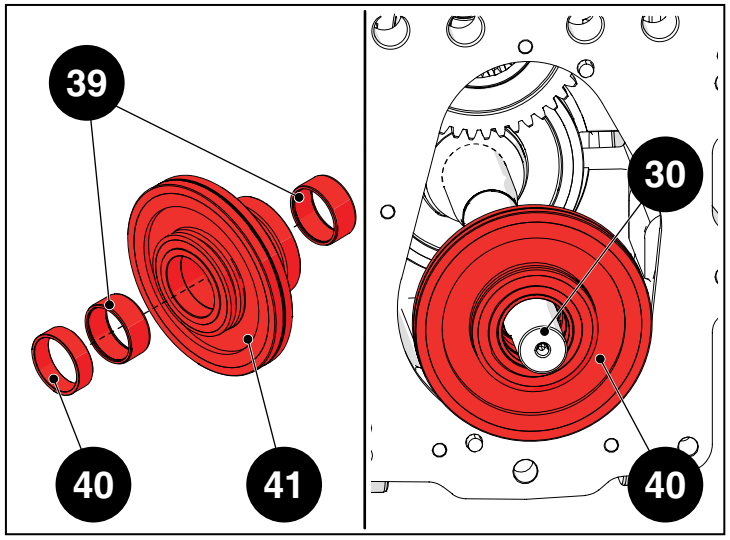


Fig. 5.89

Remove the roller bearing cages (26) on both ends of the splined hub (27).

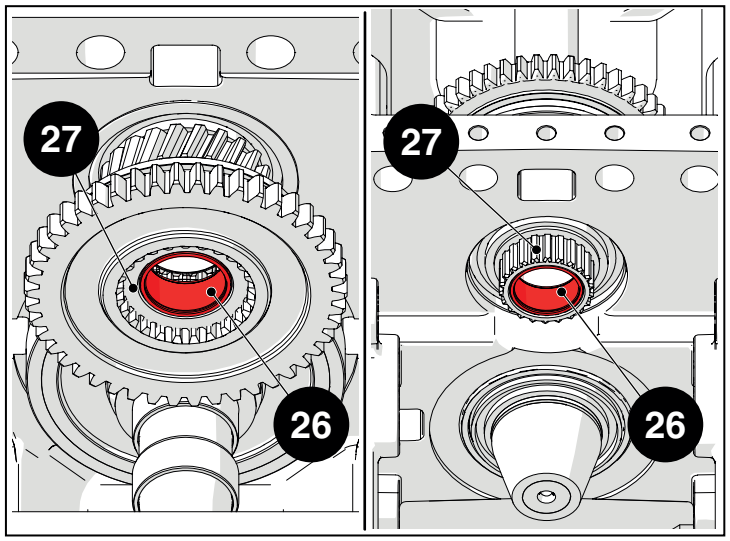


Fig. 5.90

Remove the circlip (29) to free the splined hub (27).

Remove the complete splined hub (27) and separate it from the medium slow-slow range gear (22).

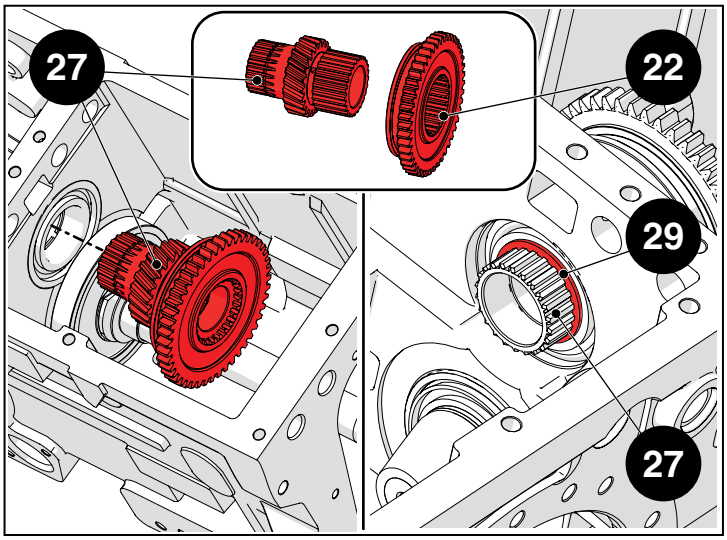


Fig. 5.91

Remove the following components from the bevel pinion (30):

- spacer (38);
- ring nut (37);
- ring nut retainer washer (36);
- medium-fast range gear (35).

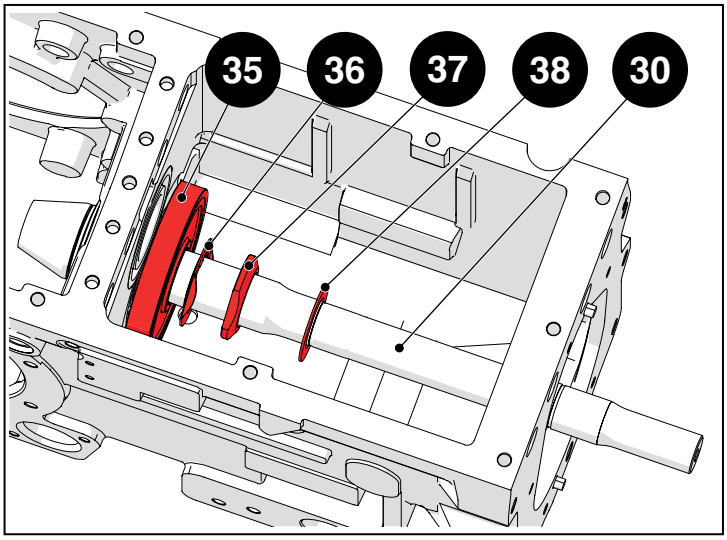


Fig. 5.92

Tap the bevel pinion (30) and pull it out from the opposite side along with the inner race of the bearing (33), spacer (32) and spacer (31).

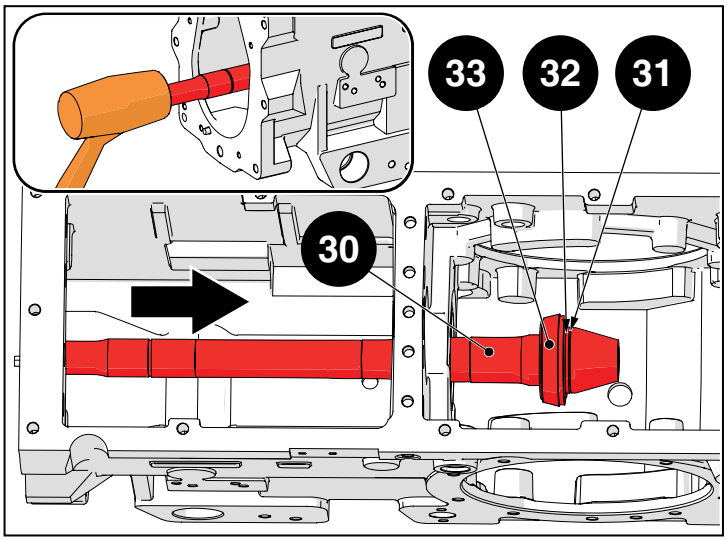


Fig. 5.93

Remove the outer race of the bearing (33), the circlip (34) and the bearing (33).

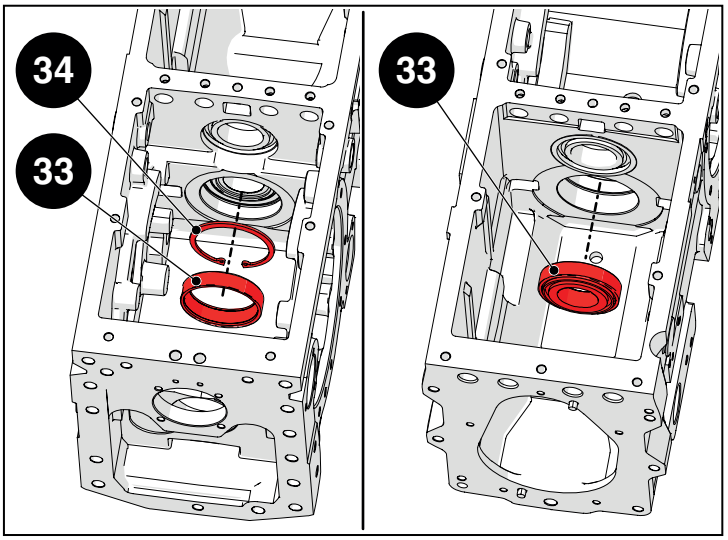


Fig. 5.94

Remove the bearing (28).

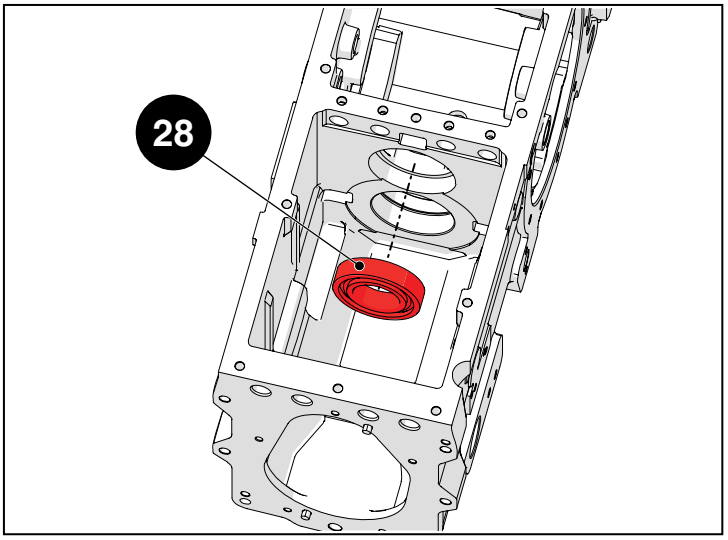


Fig. 5.95

Remove the cover centring pins (138).

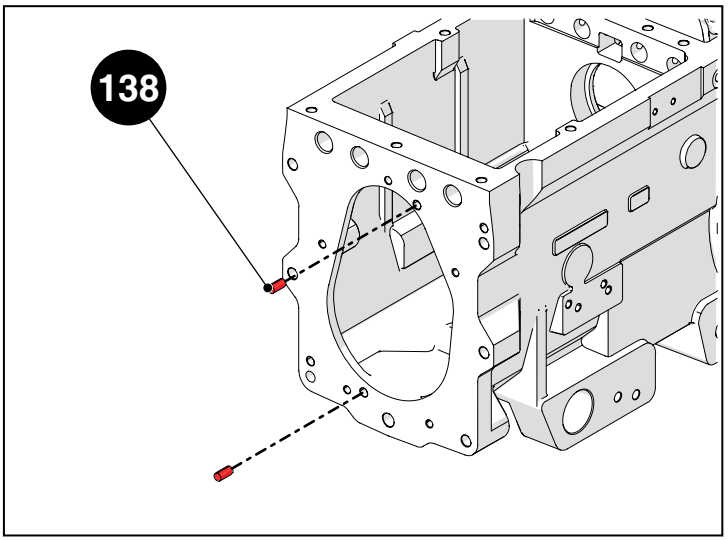


Fig. 5.96

Loosen the plug (129) and the plug (130), together with the washer (131).

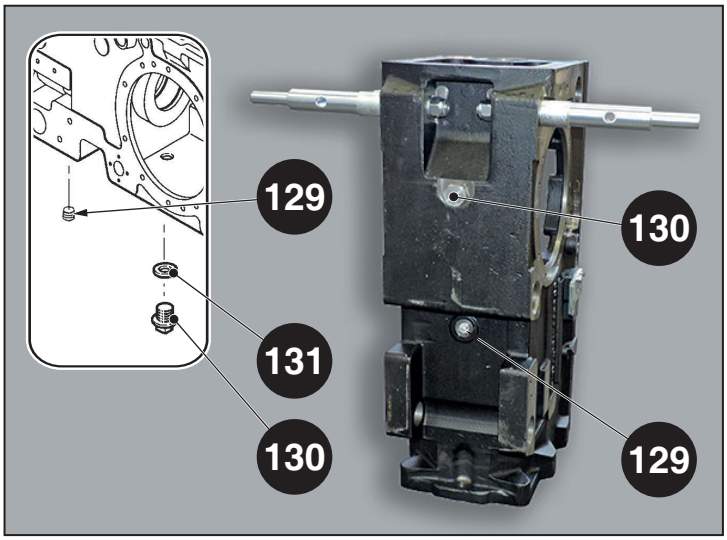


Fig. 5.97

Undo the nuts (127) and remove the washers (128) and the arms pivot pins (126).

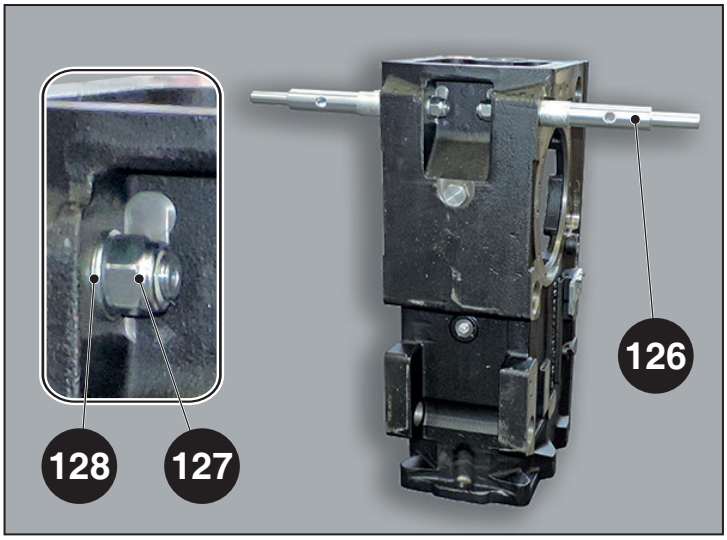


Fig. 5.98

4.2.2 Disassembling/Assembling the differential crown wheel

Disassembly

Remove differential lock ring (114).

Remove the balls (115) from the differential case (116).

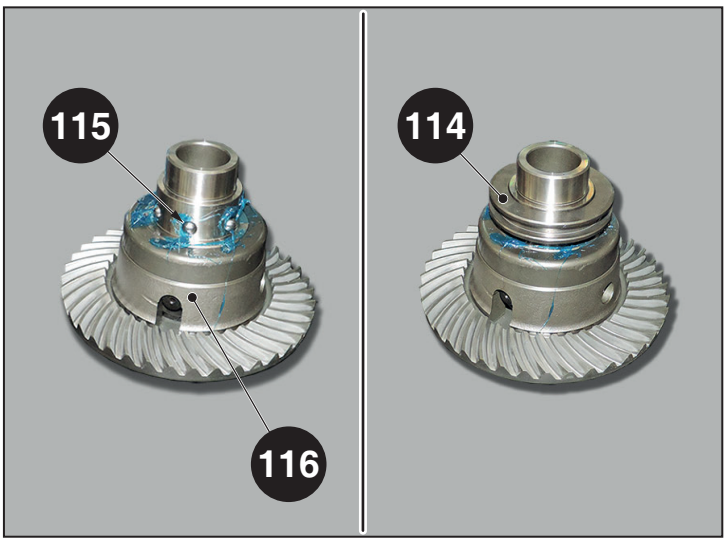


Fig. 5.99

Use a scalpel to bend back the plates (118) and free the screws (117).

Undo the screws (117) and remove the plates (118).

Remove la conical crown wheel (119).

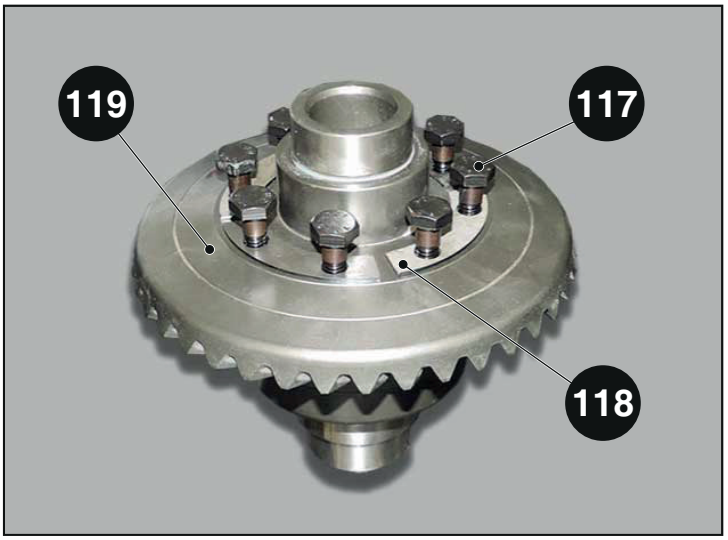


Fig. 5.100

Remove the sun gear (120) from the differential case (116).

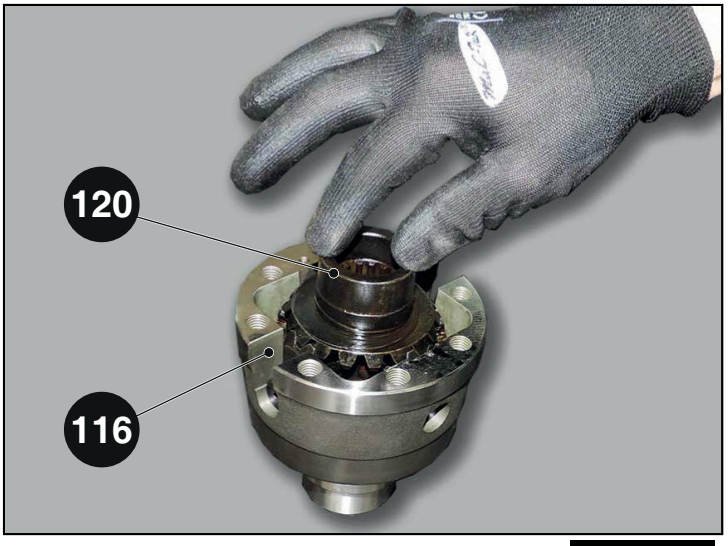


Fig. 5.101

Remove the pin (121).

Remove the planet gears (123) and the pins of the planet gears (125) and (124).

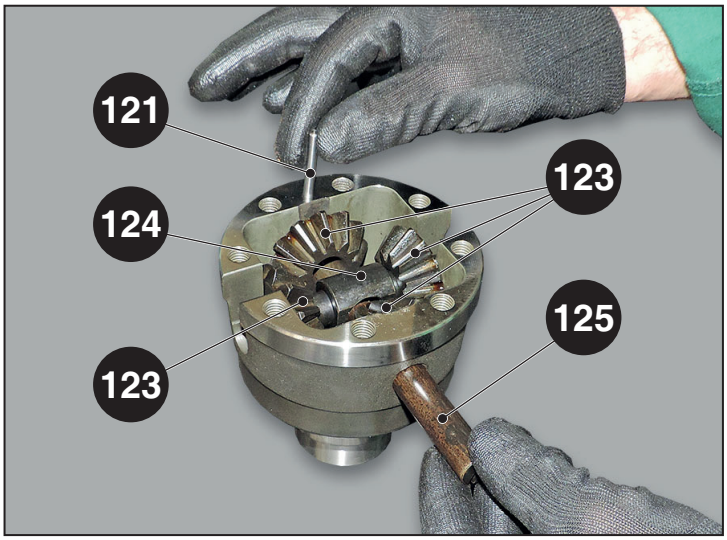


Fig. 5.102

Remove the sun gear (122) from the differential case (116).



Fig. 5.103

Assembly

Fit the sun gear (122) from the differential case (116).

> **Warning**
>
> Make sure that the sun gear has splines for balls.



Fig. 5.104

Fit the planet gears (123) on the pin of the planet gears (124).

Fit the complete pin (124) in the spline of the differential case (116). Point the hole on the pin in the same direction as the holes on the differential case (116).

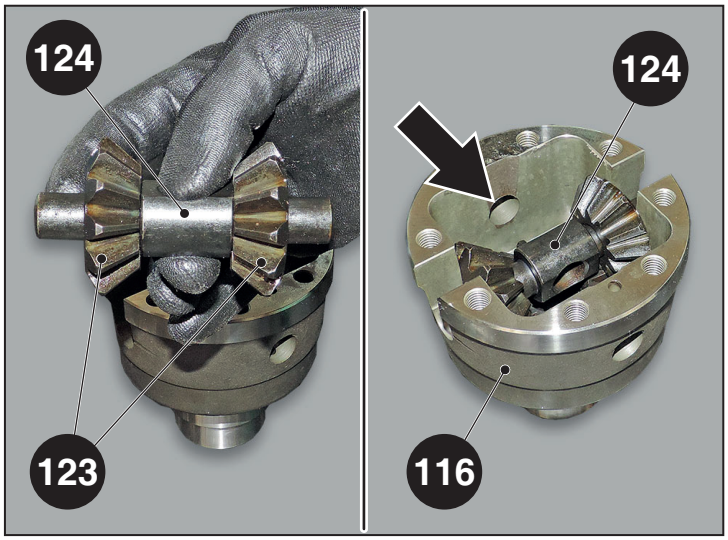


Fig. 5.105

Fit the planet gears (123) in the differential case (116) and then insert the planet gear pin (125) and secure it with the pin (121).

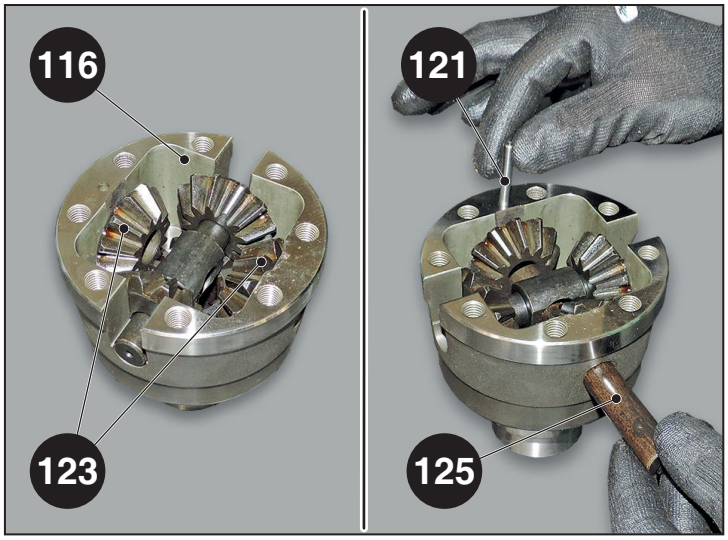


Fig. 5.106

Fit the sun gear (120) on the differential case (116).

Secure the gear set by tapping on the sun gear with a rubber mallet and check that everything turns smoothly.

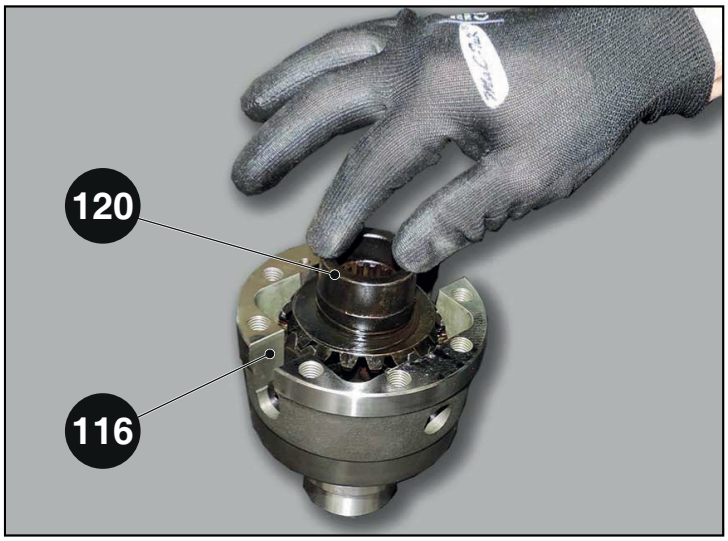


Fig. 5.107

Tighten the screws (117) together with the plates (118) to fasten the conical crown wheel (119) to the differential case. Apply a tightening torque of 90 Nm (9 kgm).

Bend the plates (118) to secure the screws (117) permanently.

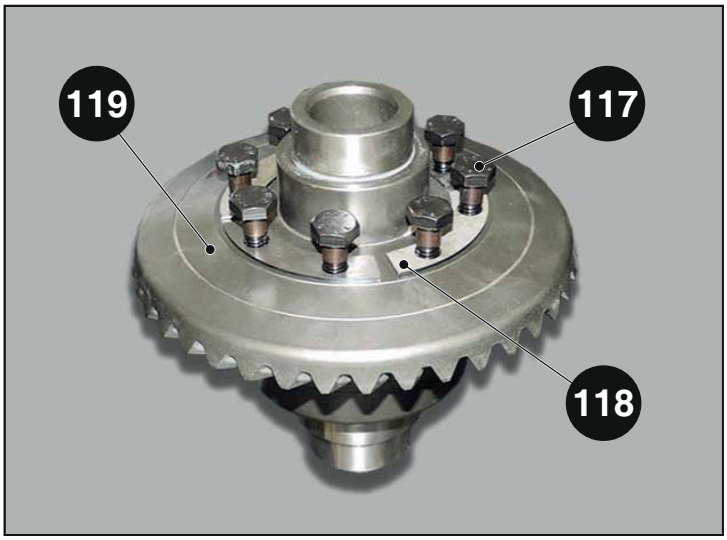


Fig. 5.108

Grease the housing of the balls on the differential case (116) and then insert the balls (115).

Fit the differential lock ring (114) by placing the bevelled side facing the crown wheel.

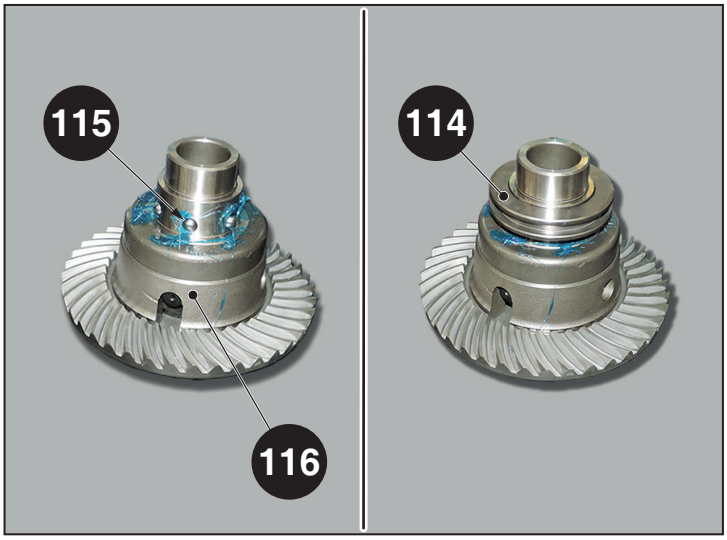


Fig. 5.109

4.2.3 Disassembling/assembling the primary shaft (REV, RS and SN+ Cluster)

> **Note**
>
> The following steps apply only to REV, RS and SN+ models.

Disassembly

Remove the following components from the rear end of the primary shaft (3):

- bearing race (25);
- roller spacer (24);
- spacer (23);
- roller bearing cage (20);
- gear (21);
- roller bearing cage (20);

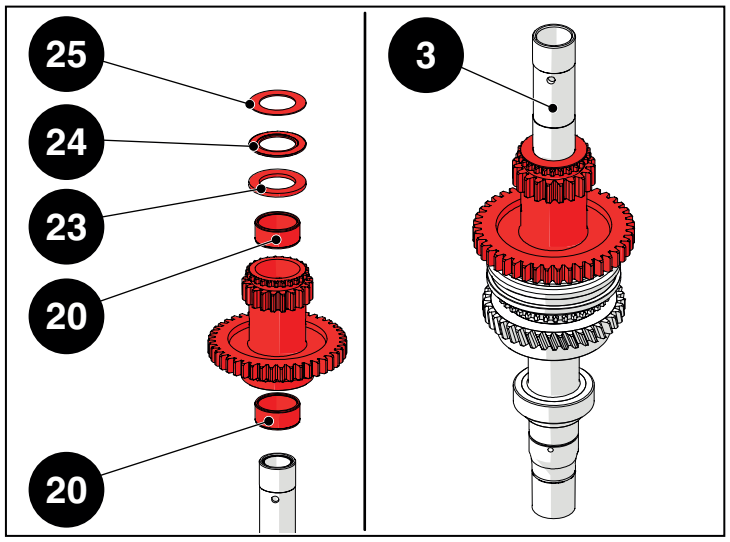


Fig. 5.110

- roller spacer (18);
- spacer (17);
- internal ring (19);
- thrust washer (16);

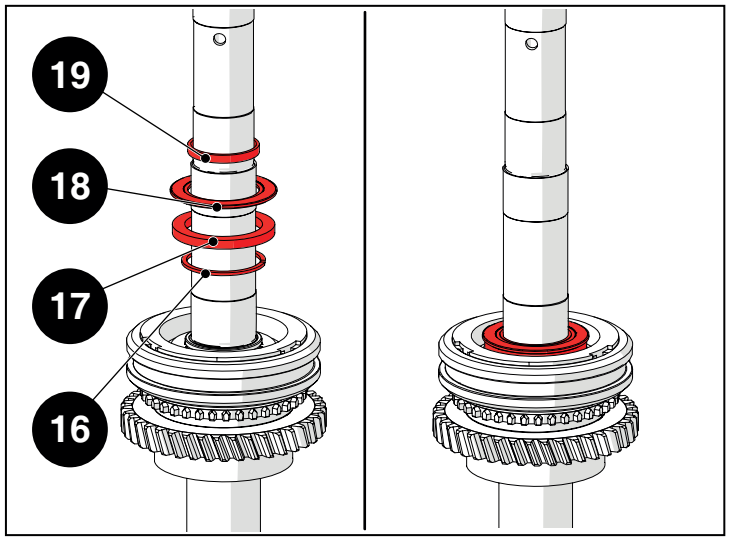


Fig. 5.111

- synchroniser ring (15);
- spacer (14);

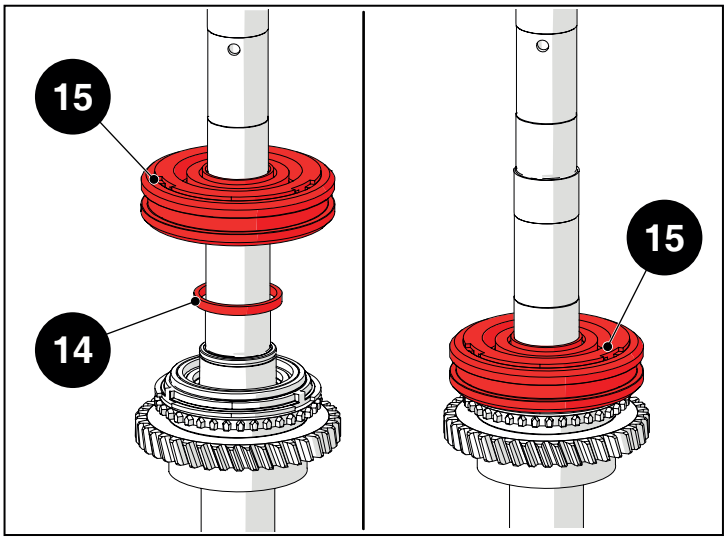


Fig. 5.112

- synchroniser gear (13).
- roller bearing cage (12);
- roller bearing cage (11);

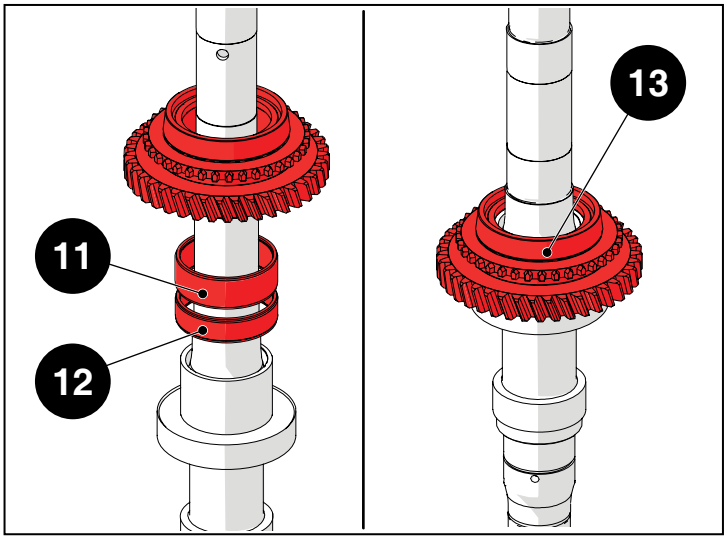


Fig. 5.113

- internal ring (10);
- bush (2).

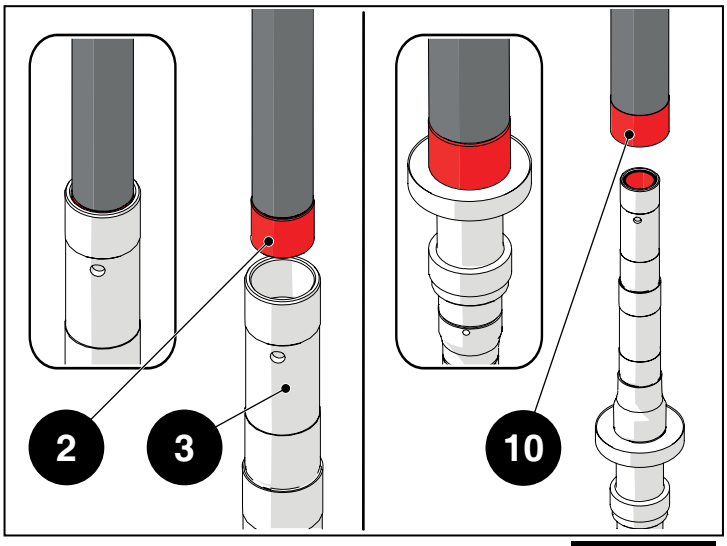


Fig. 5.114

Remove the following components from the rear end of the primary shaft (3):

- bush (2);
- oil seal (1).

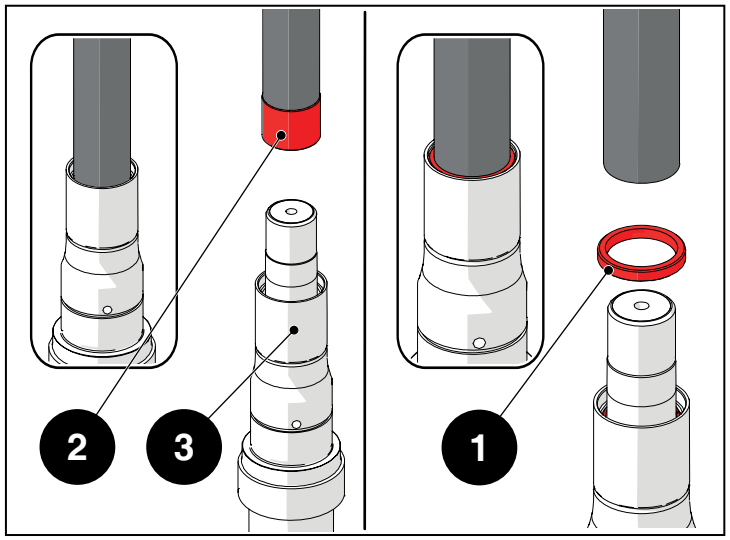


Fig. 5.115

Assembly

Fit the components on the front end of the primary shaft (3) in the following order:

- bush (2);
- oil seal (1) driving it into its seat with a punch tool of suitable diameter.

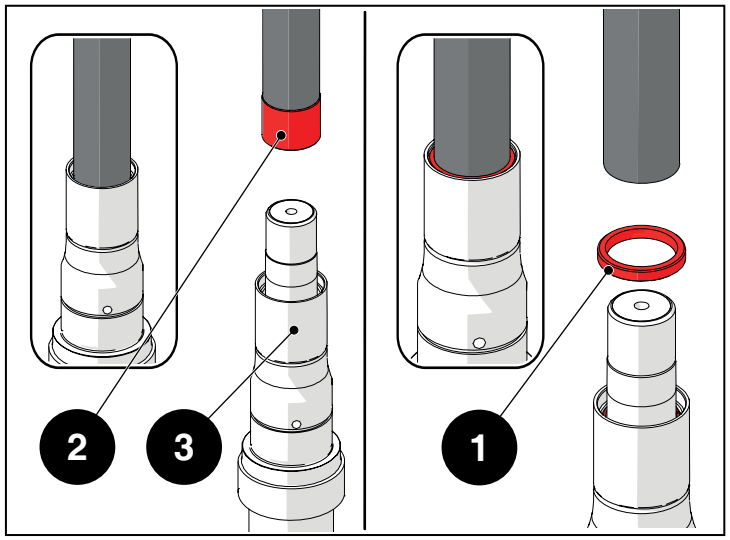


Fig. 5.116

Fit the components on the rear end of the primary shaft (3) in the following order:

- bush (2);
- internal ring (10), driving it into its seat with a suitable punch tool;

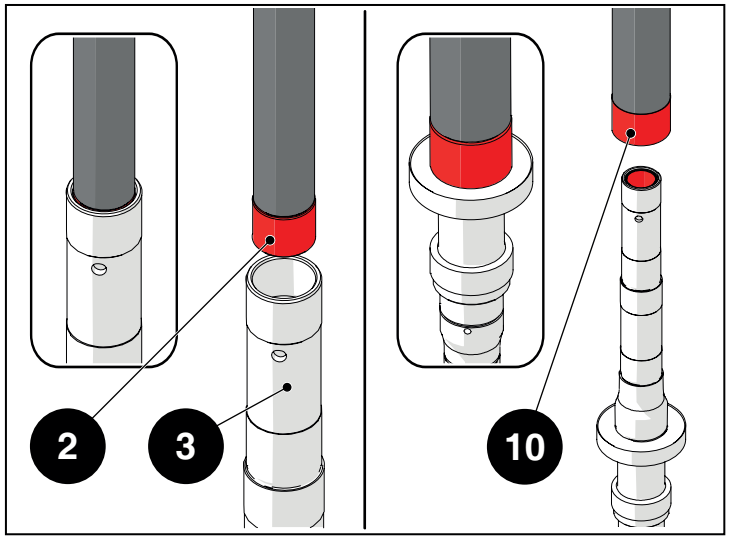


Fig. 5.117

- roller bearing cage (11);
- roller bearing cage (12);
- synchroniser gear (13);

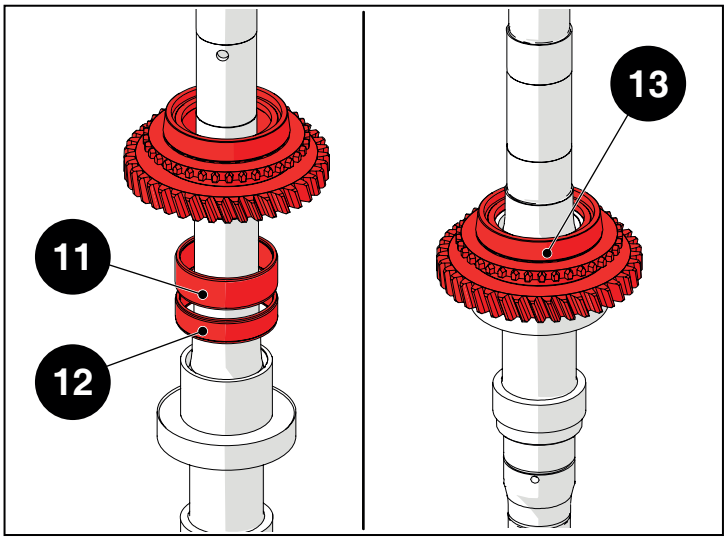


Fig. 5.118

- spacer (14);
- synchroniser ring (15);

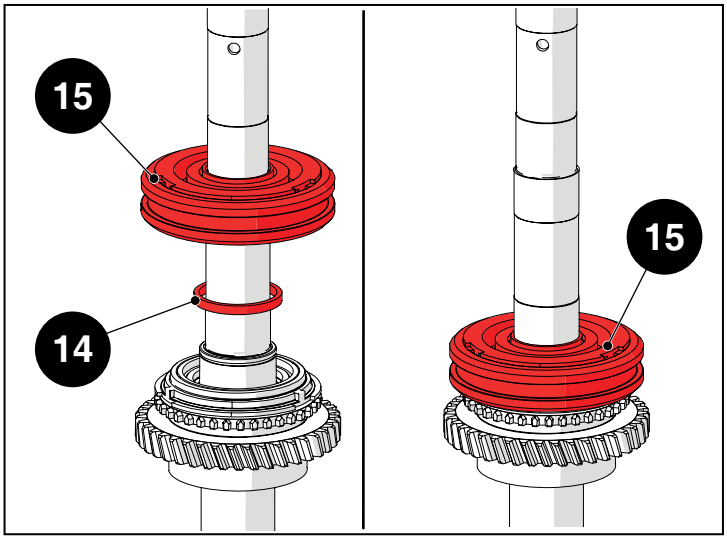


Fig. 5.119

- thrust washer (16);
- spacer (17);
- roller spacer (18);
- internal ring (19);

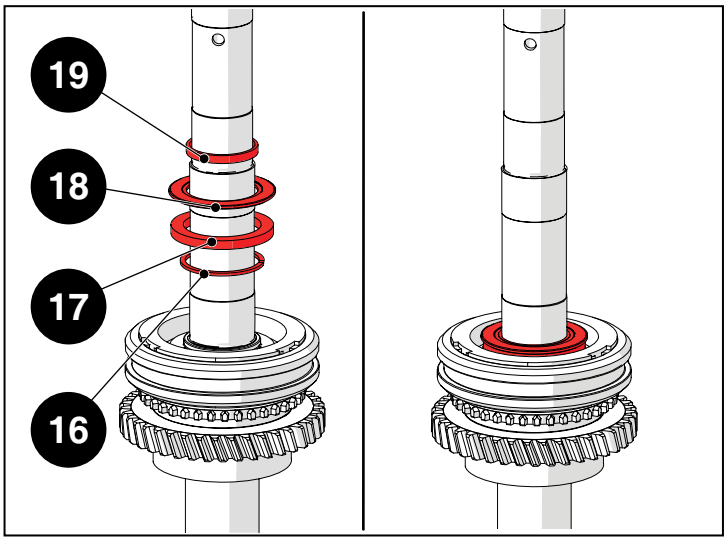


Fig. 5.120

- roller bearing cage (20);
- gear (21);
- roller bearing cage (20);
- spacer (23) by placing the bevelled side facing the gear (21);
- roller spacer (24);
- bearing race (25).

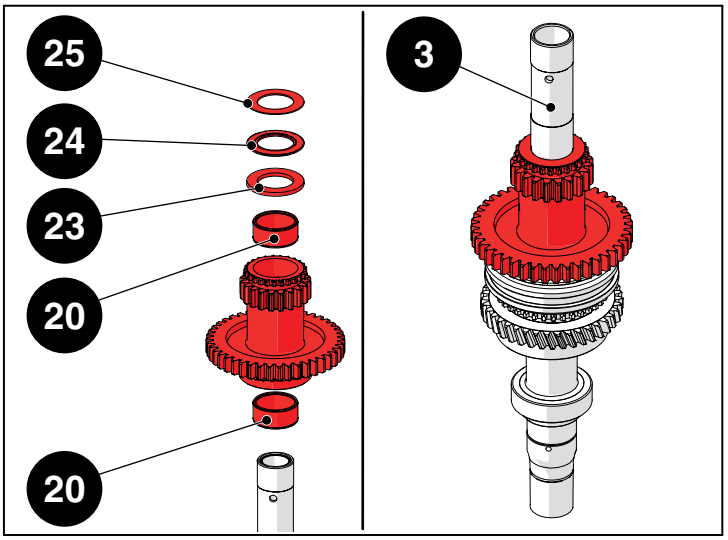


Fig. 5.121

4.3 SN Disassembly

4.3.1 Disassembly

4.3.1.1 Disassembly of clutch cover, rods and levers

> **Note**
>
> When disassembling the gearbox cover, rods and levers, follow the instructions for the REV, RS and SN+ Cluster in the relevant Chapter.

4.3.1.2 Removing the differential

Unscrew and remove the ring nut retainer (188) and then unscrew the ring nut (187). Carry out this step on both sides of the gearbox casing.

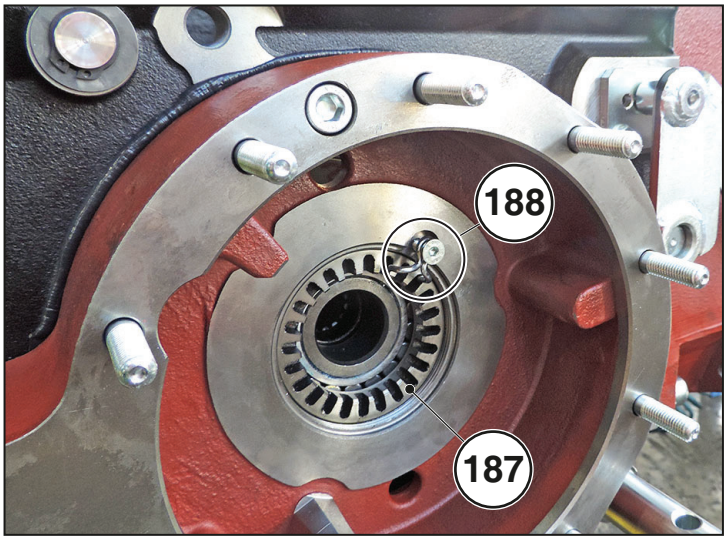


Fig. 5.122

Undo the screws (186) and remove the washers (185). Then remove the brake casing (184). Carry out this step on both sides of the gearbox casing.

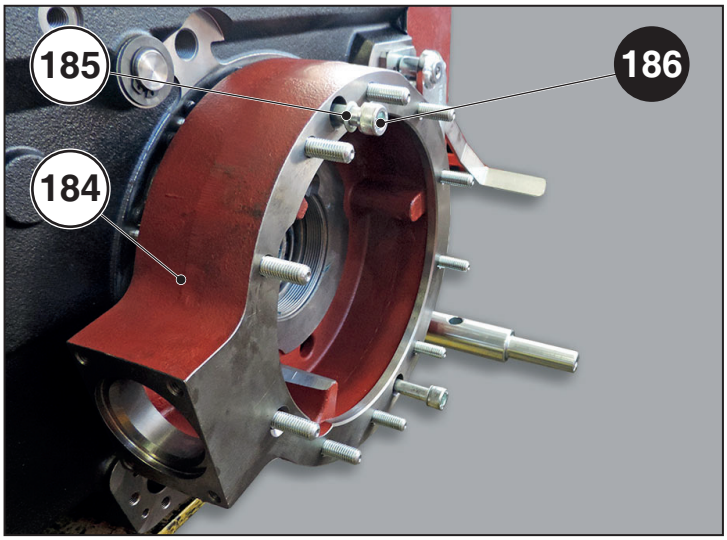


Fig. 5.123

Remove the outer bearing races (183) from the brake casings (184).

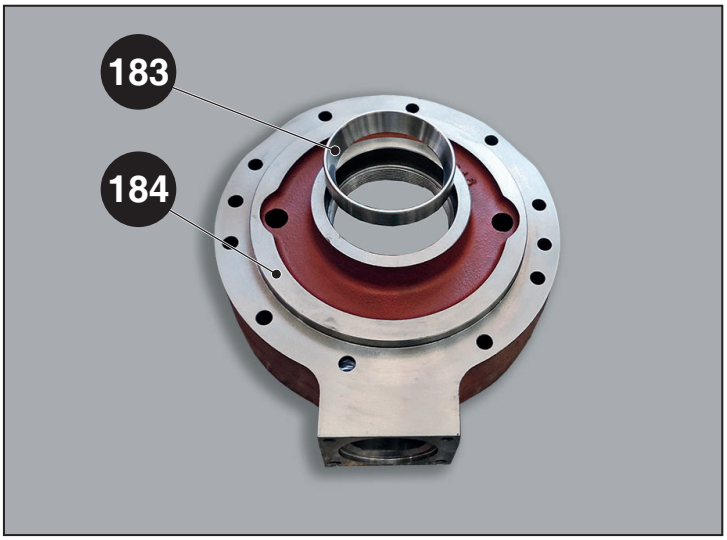


Fig. 5.124

Remove the complete crown wheel assembly (119) from the gearbox casing.

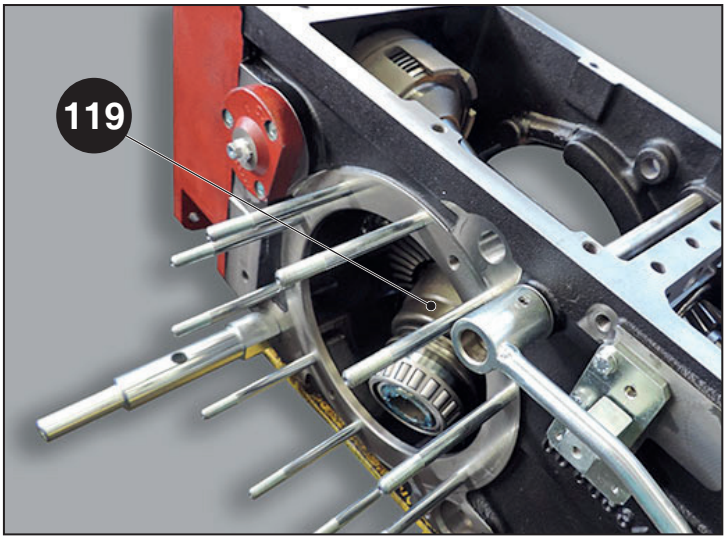


Fig. 5.125

Remove the inner bearing races (183) on the crown wheel assembly (119).

Warning

To remove the complete crown wheel assembly (119), see the Chapter “Disassembling/ Assembling the differential crown wheel".

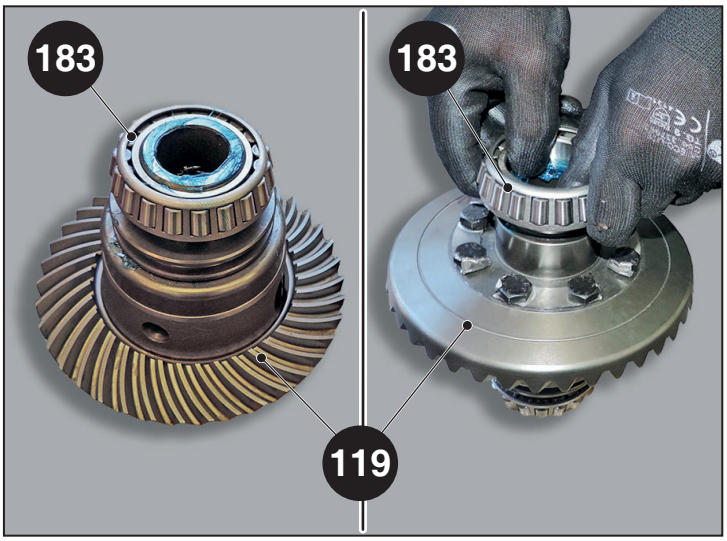


Fig. 5.126

Undo the stud bolts (182).

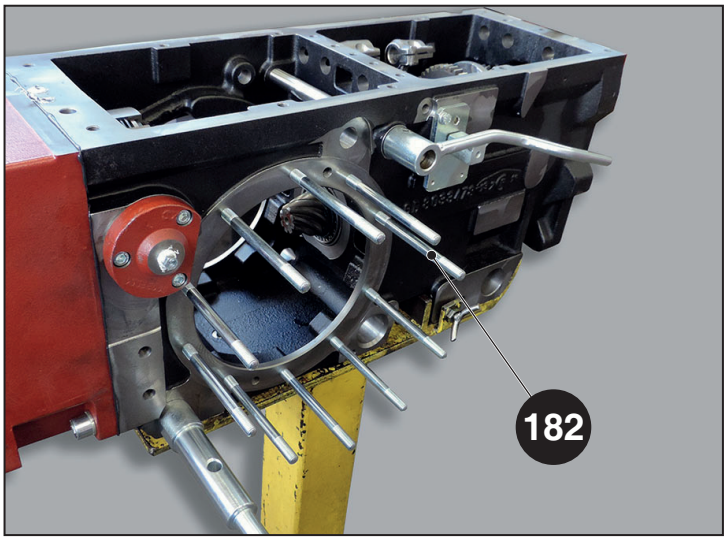


Fig. 5.127

Remove the pin (207) first and then the lever (206), spacer (251) and O-ring (203) from the rod (201).

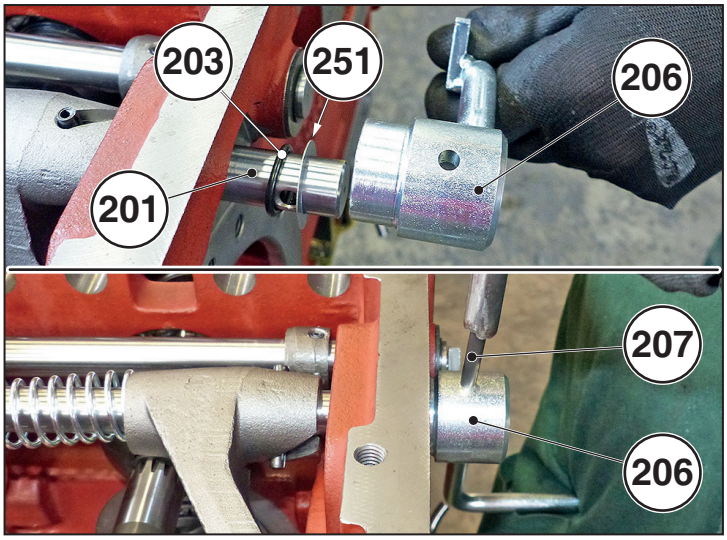


Fig. 5.128

Remove la pin (207) to free the fork (194).

Remove the circlip (205), spacer (204) and O-ring (203) from the left end of the rod (201).

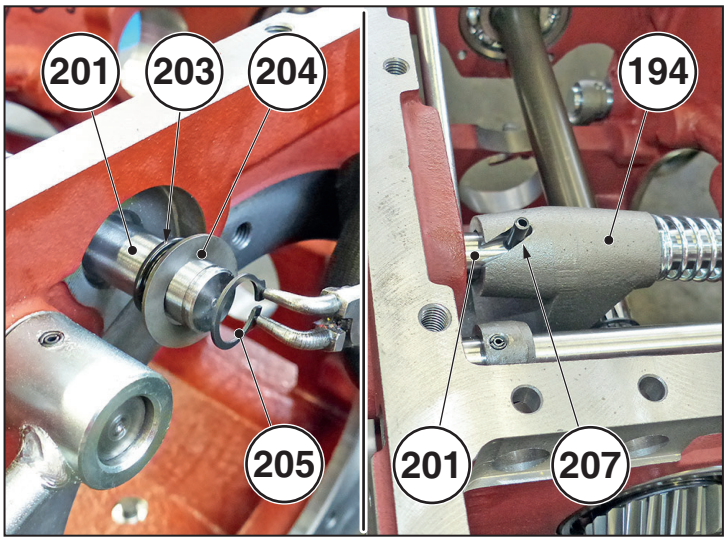


Fig. 5.129

Pull out the rod (201) and then retrieve the spring (202) and fork (194).

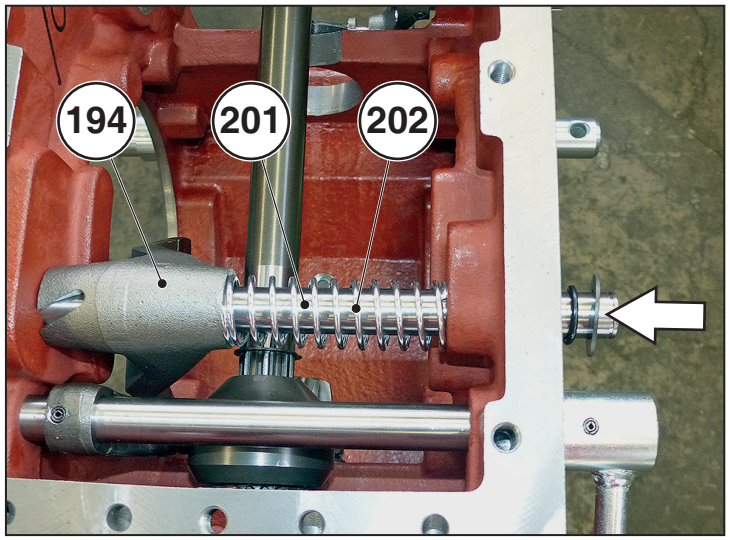


Fig. 5.130

4.3.1.3 Disassembling the Power Take Off

Remove la pin (159) to free the lever (178).

Remove the lever (178) and the: engagement pin (179), spring (180), spacer (177) and O-ring (176).

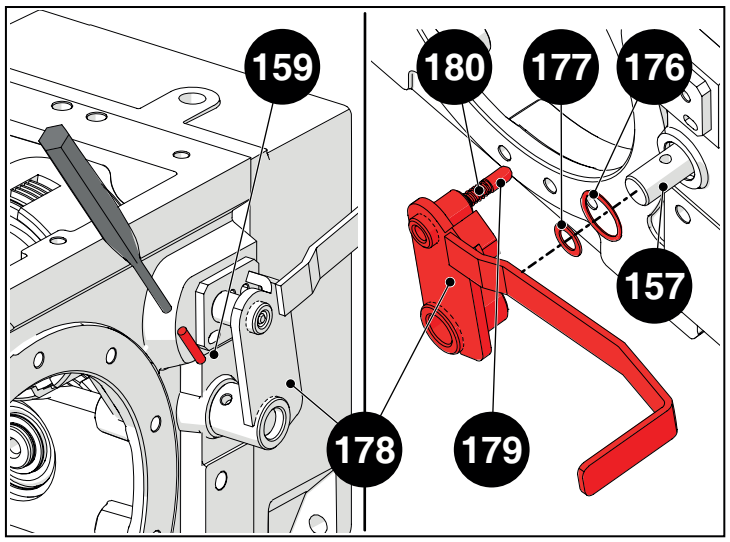


Fig. 5.131

Remove the plug (90) and the oil seal (91).

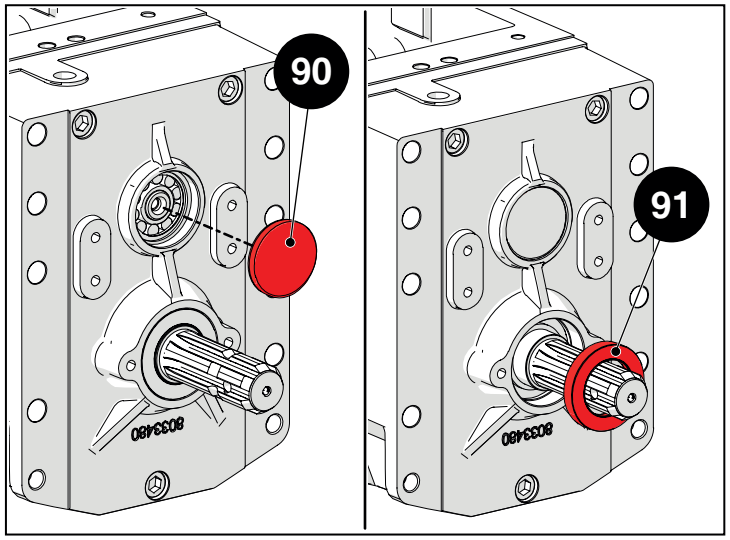


Fig. 5.132

Remove the circlip (88) and spacer (87) to free the bearing (89).

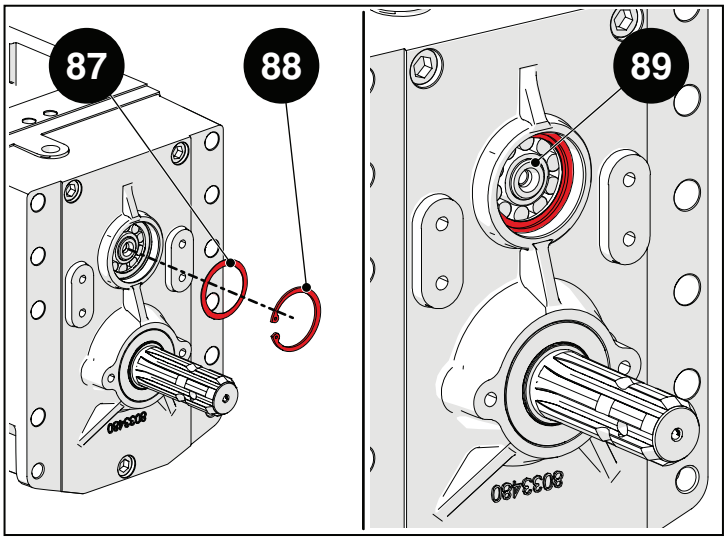


Fig. 5.133

Undo the screws (161) and (163) and remove the washers (162) and (164).

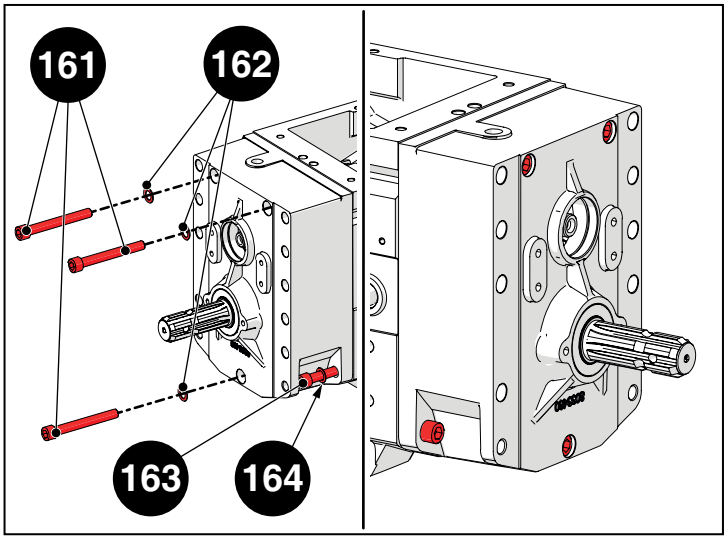


Fig. 5.134

Separate the complete rear cover (113) from the gearbox casing, making sure to disengage the fork (160) from the PTO sleeve (105) before separating the assemblies completely.

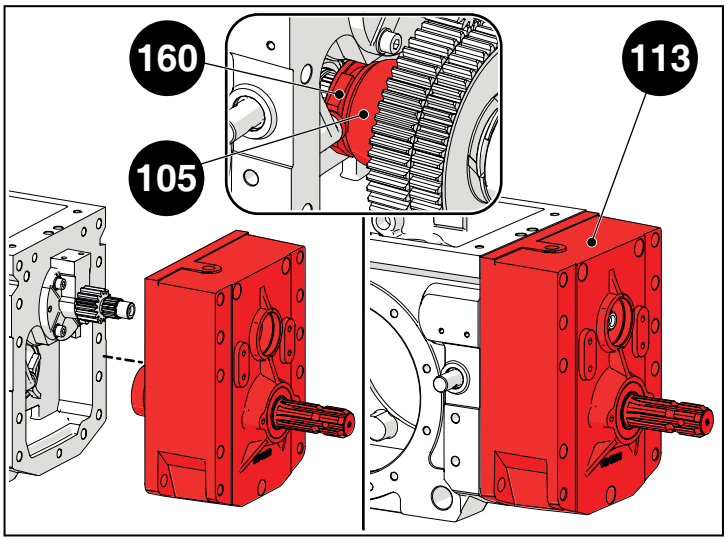


Fig. 5.135

Remove the bearing (89) from the rear cover (113).

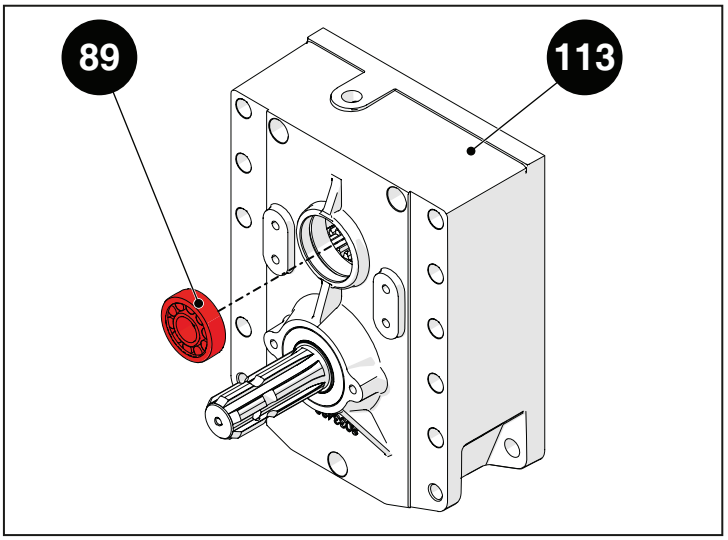


Fig. 5.136

Remove the circlip (107) and then bearing (108) and PTO sleeve (105).

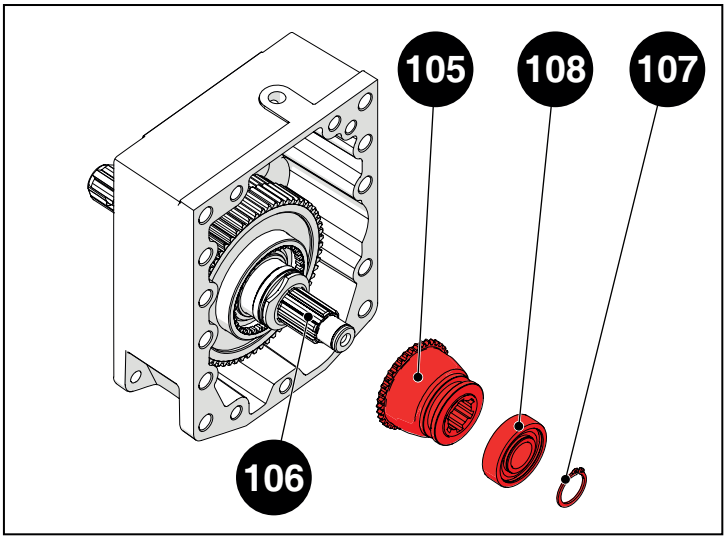


Fig. 5.137

Free the ring nut (104) and unscrew and remove the ring nut retainer (103) and the spacer (102).

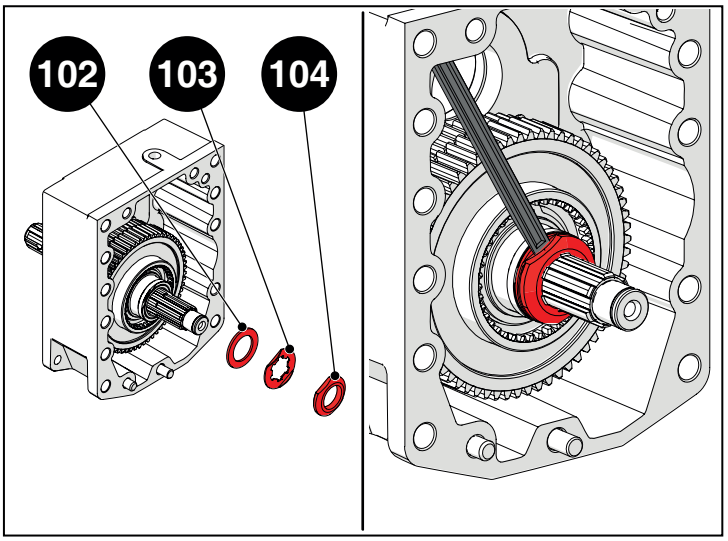


Fig. 5.138

Remove the following components:

- circlip (100);
- spacer (99);
- gear (97);
- roller bearing cage (98);
- PTO gear (96).

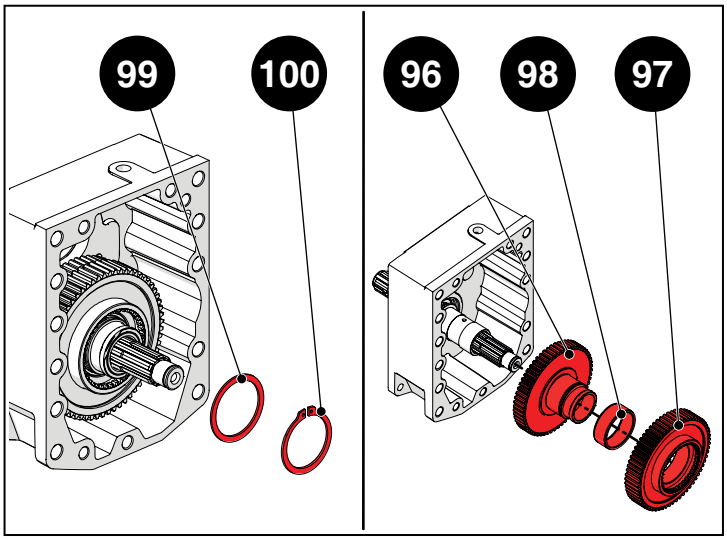


Fig. 5.139

Remove the bush (101) and the spacer (95).

Pull out the PTO shaft (106).

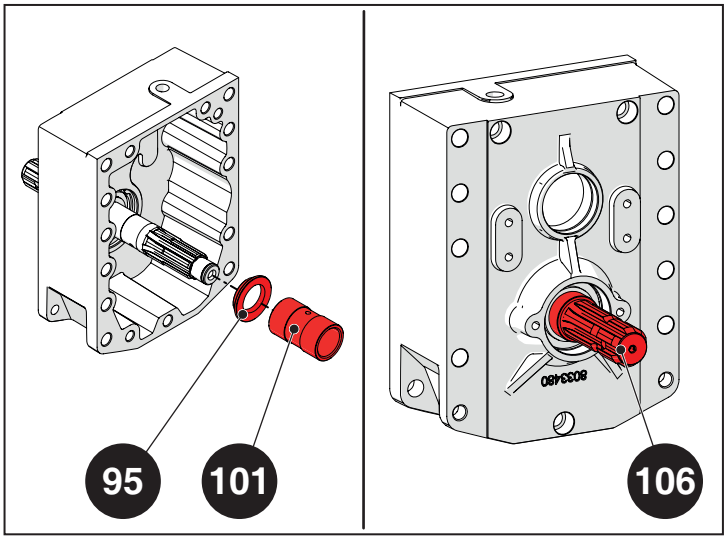


Fig. 5.140

Remove the circlip (94), the bearing (93) and the spacer (92) from the rear cover (113).

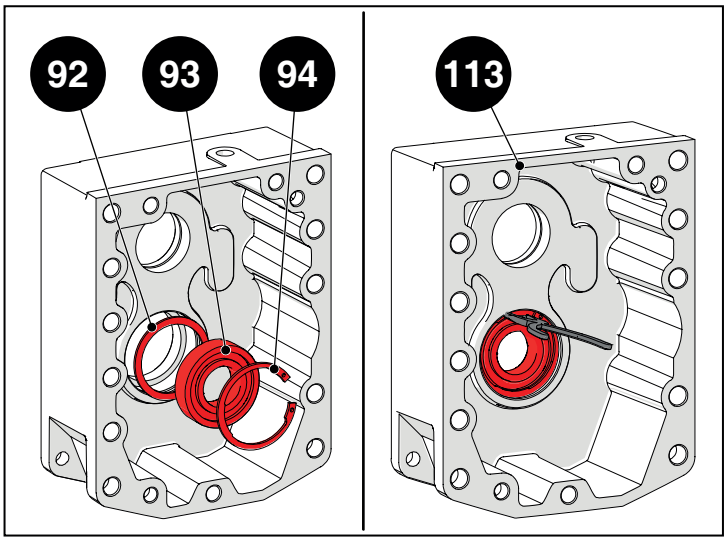


Fig. 5.141

Remove the plug (255).

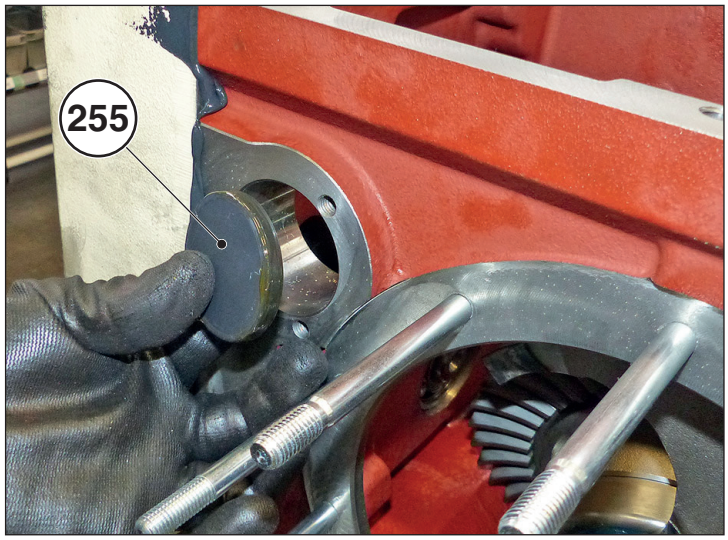


Fig. 5.142

Remove the pin (159) first and then the lever (158) and fork (160). Pull out the rod (157) from the box.

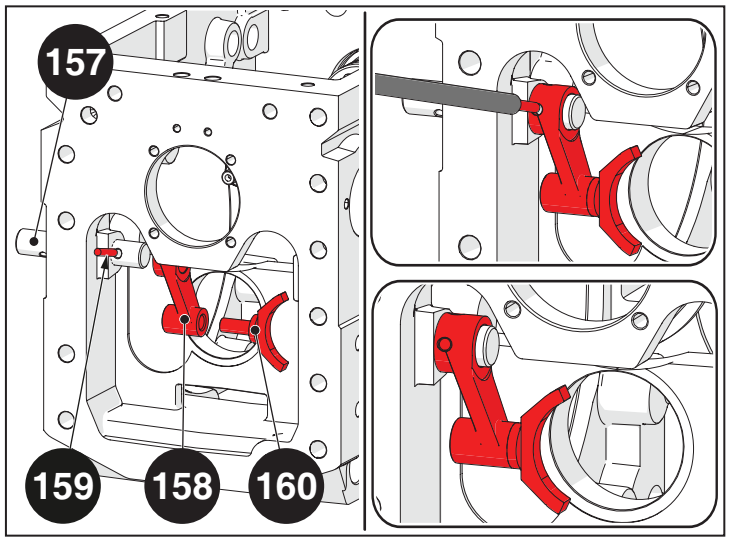


Fig. 5.143

Undo the screws (133) and remove the washers (134) and the PTO speed plate (132).

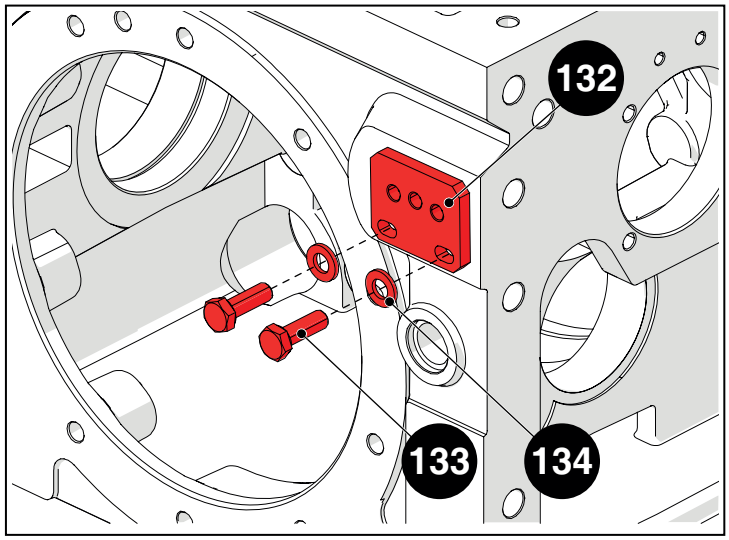


Fig. 5.144

Remove la dual pin (174) to free the PTO selector lever (171).

Remove la dual pin (175) to free the lever (170).

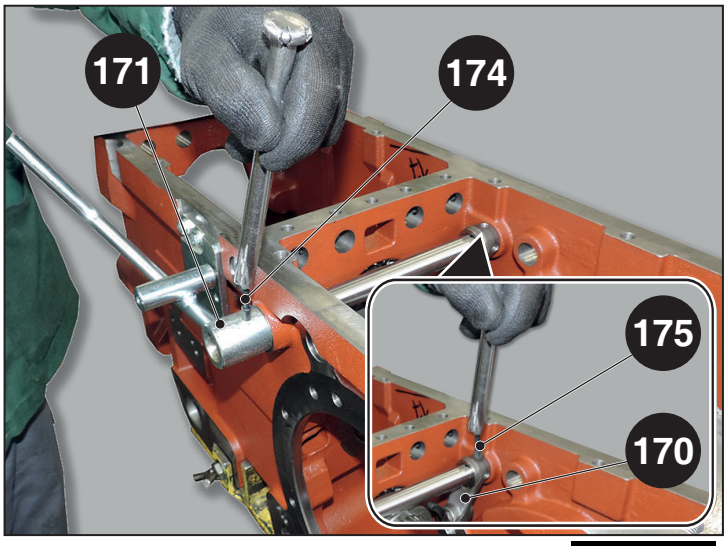


Fig. 5.145

Remove the PTO selector lever (171), the spring (172) and selector pin (173).

Remove the spacer (167) and O-ring (166).

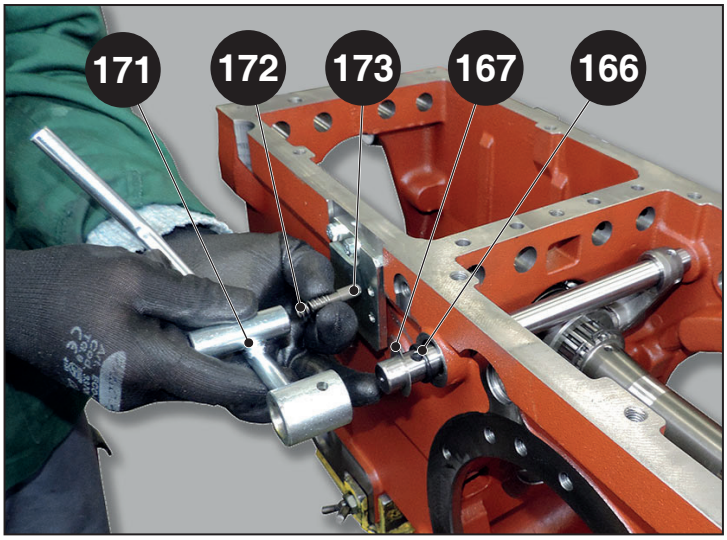


Fig. 5.146

Remove the pin (175).

Remove the following from the right end of the rod (165):

- circlip (168);
- washer (167);
- O-ring (166).

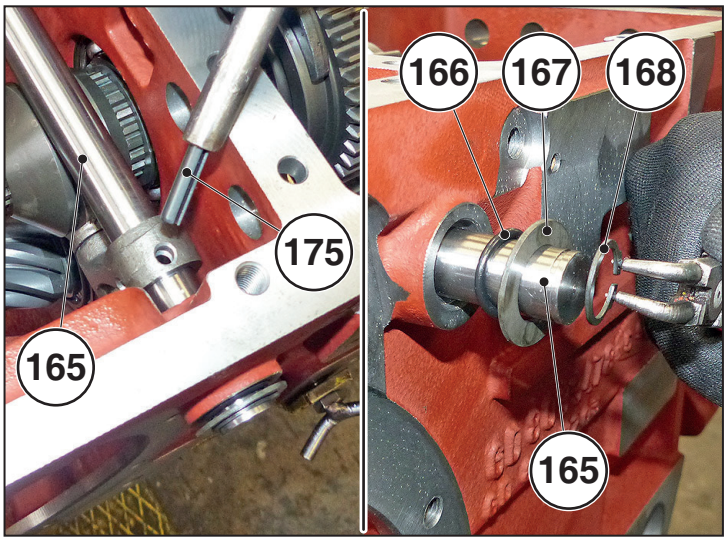


Fig. 5.147

Pull out the rod (165); recover the lever (170) and fork (169).

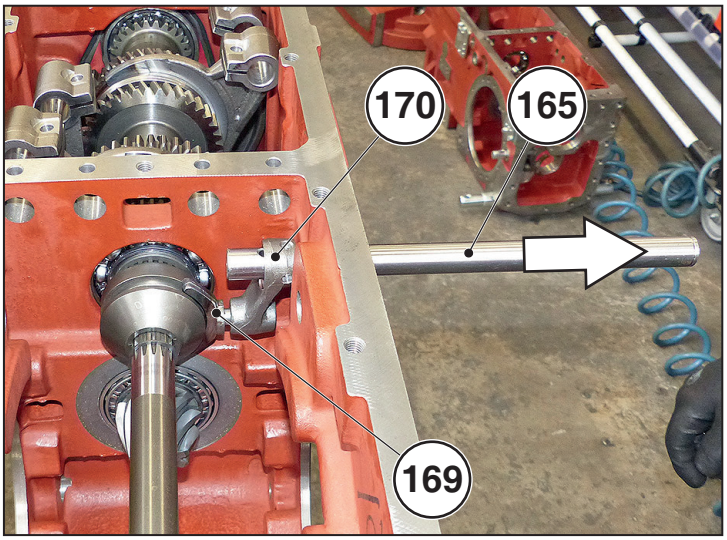


Fig. 5.148

Undo the screws (136) and remove the washers (137) and the PTO selector plate (135).

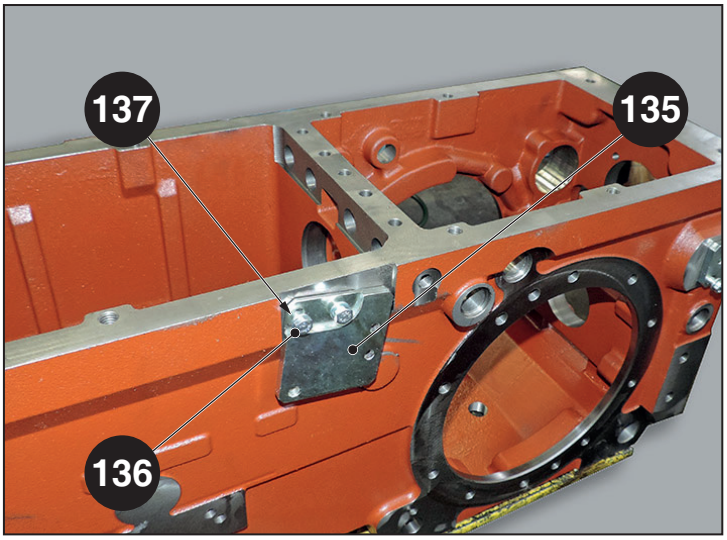


Fig. 5.149

Pull out the complete PTO shaft (75) from the gearbox casing.

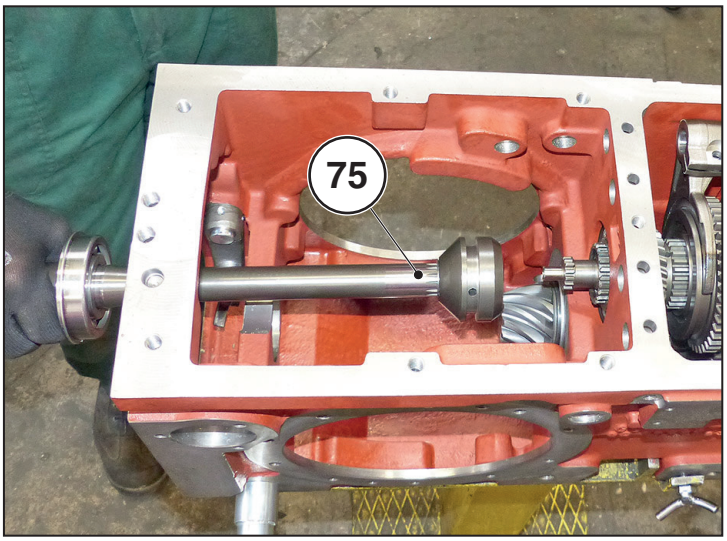


Fig. 5.150

Disengage the sliding sleeve (71) from the PTO shaft (75).

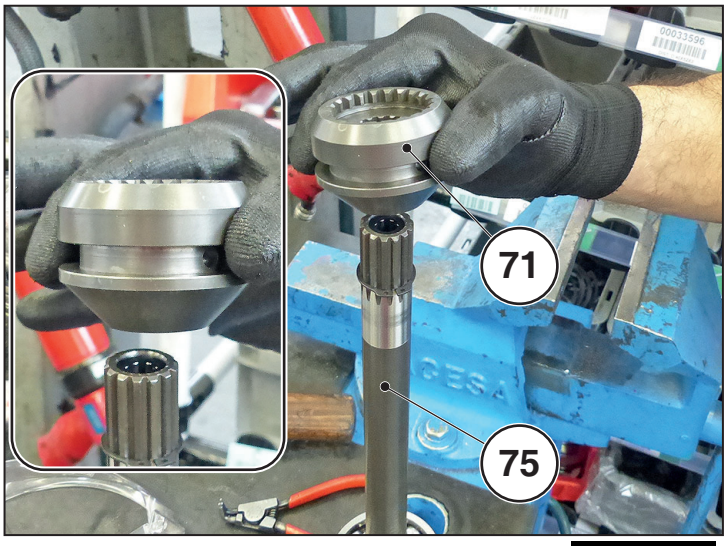


Fig. 5.151

Remove the roller bearing cage (73) and circlip (72).

Remove the bearing (241) from the PTO shaft (75).

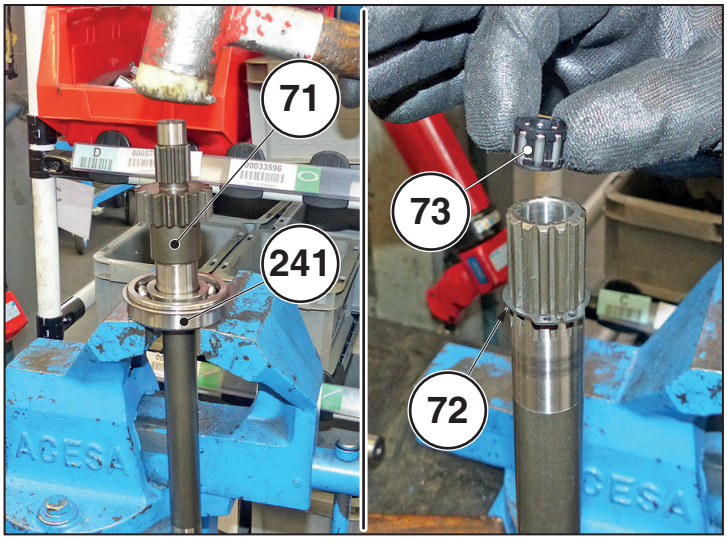


Fig. 5.152

4.3.1.4 Disassembling the gearbox front cover

Remove the pins (144) and pull out the studs (145).

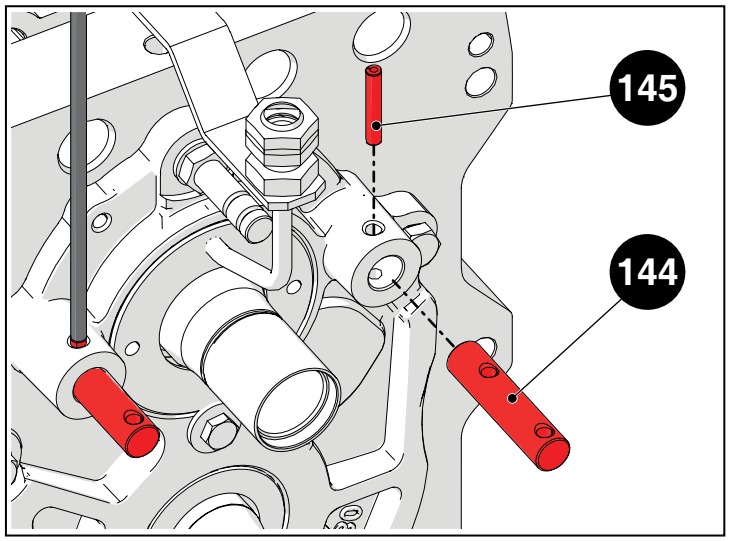


Fig. 5.153

Remove the oil seal (69) from the primary shaft (3).

Remove the oil seal (61) from the bevel pinion (30).

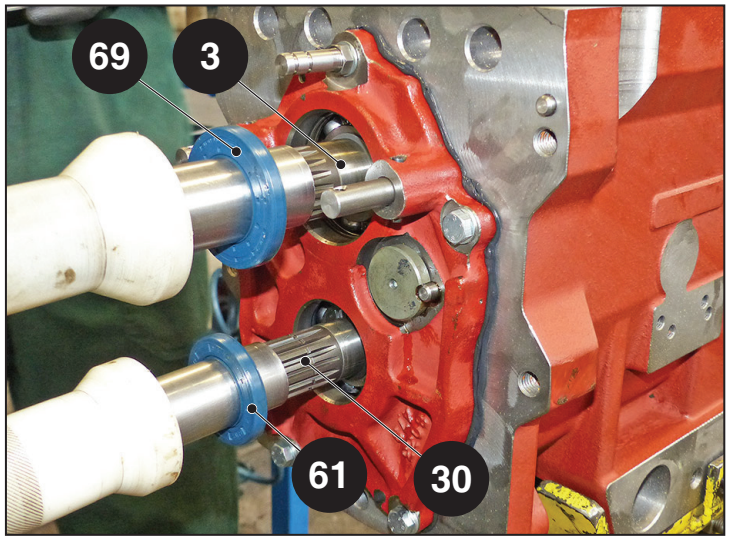


Fig. 5.154

Remove the circlip (4) from the primary shaft (3).

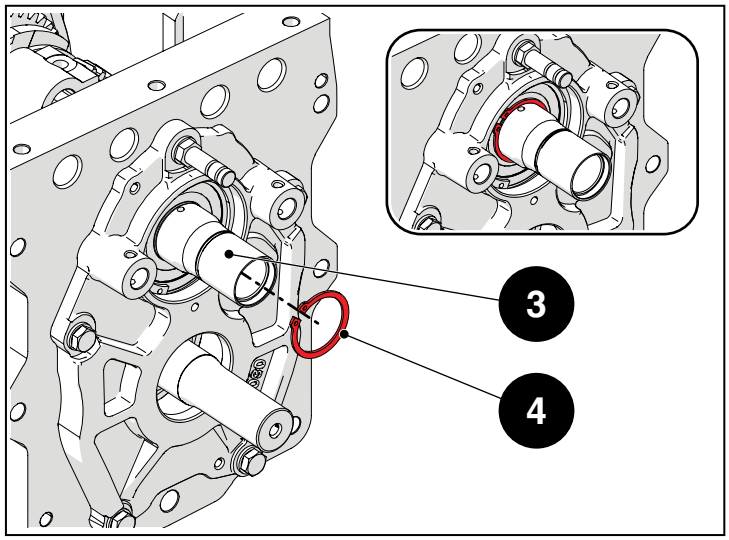


Fig. 5.155

Undo the screws (57) and pin (141) and remove washers (56) and (142). Then remove the gearbox cover (63).

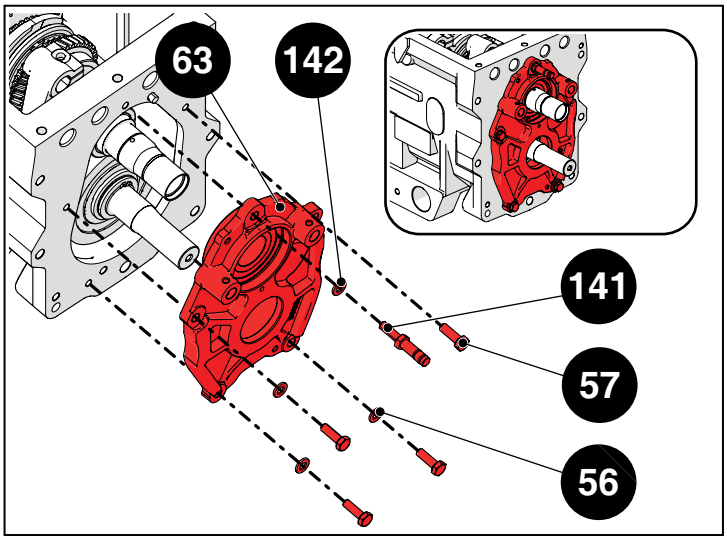


Fig. 5.156

Remove the circlip (242) from the pin (243).

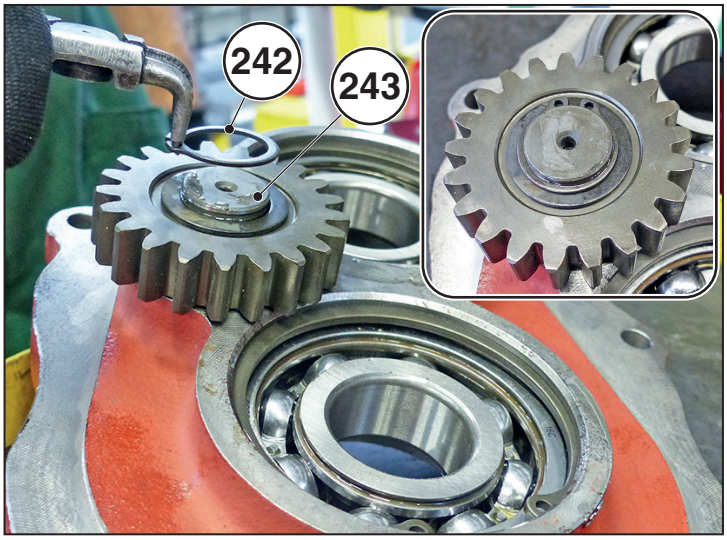


Fig. 5.157

Remove the spacer (246) and reverse gear (245).

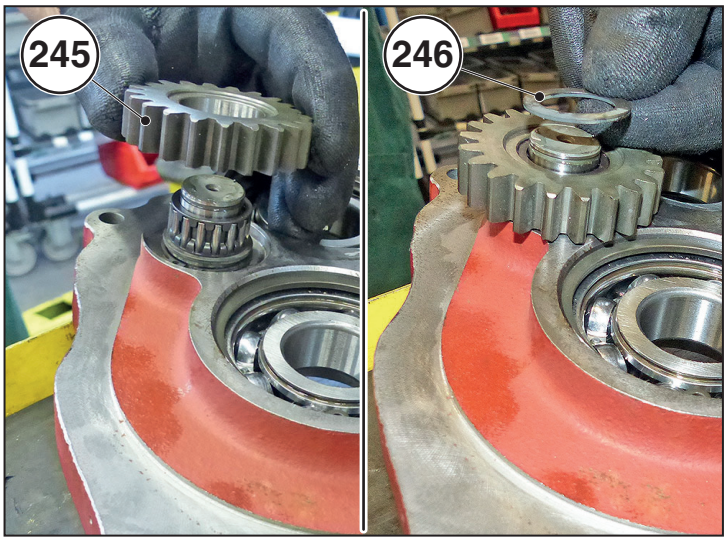


Fig. 5.158

Remove the pin (243):

- roller bearing cage (244);
- spacer (246);
- circlip (247).

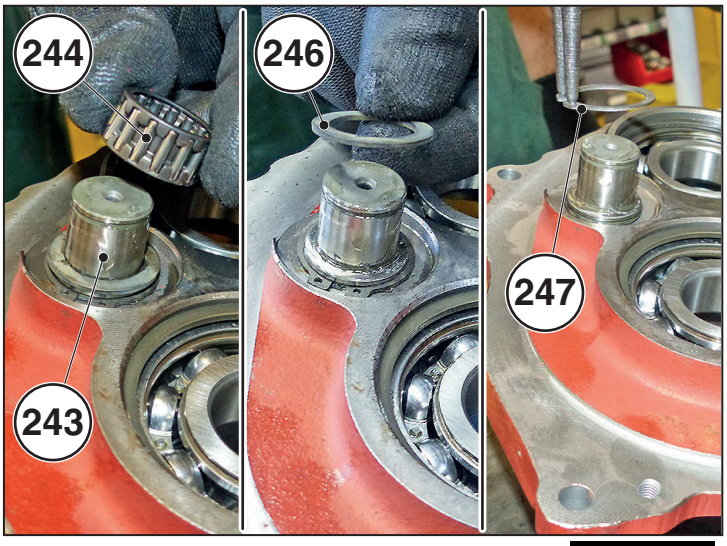


Fig. 5.159

Remove the pin (138) to release the pin (243).

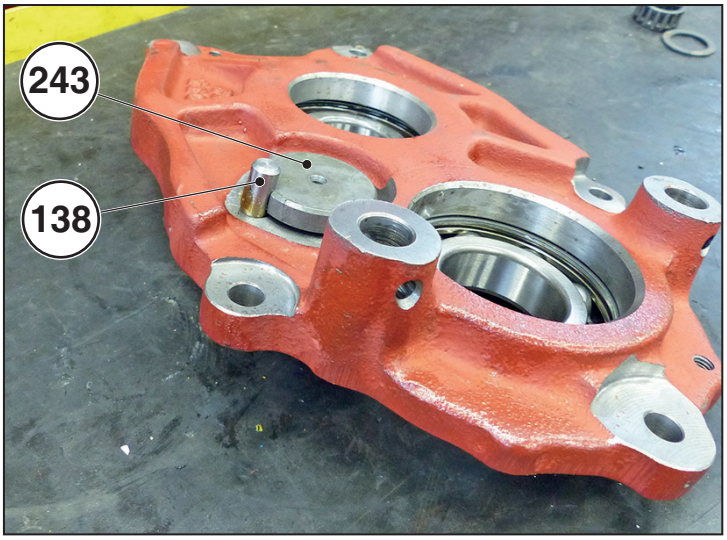


Fig. 5.160

Pull out the pin (243) from the cover (63) and then remove the O-ring (248).

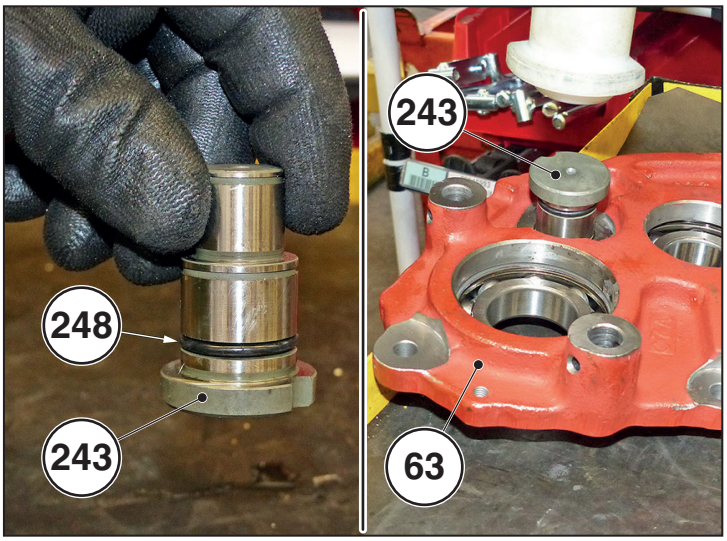


Fig. 5.161

Remove the circlip (252) from the lower hole and remove the circlip (5) e the spacer (6) from upper hole.

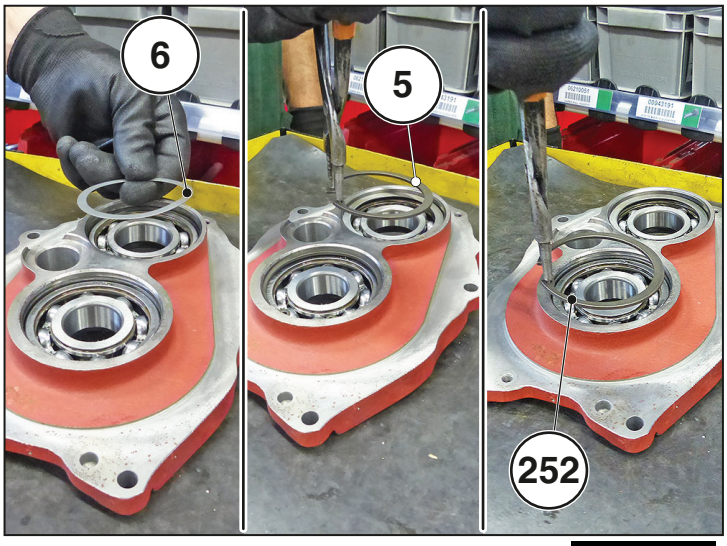


Fig. 5.162

Remove the bearings (7) and (62) from the cover (63) and then remove the spacers (8).

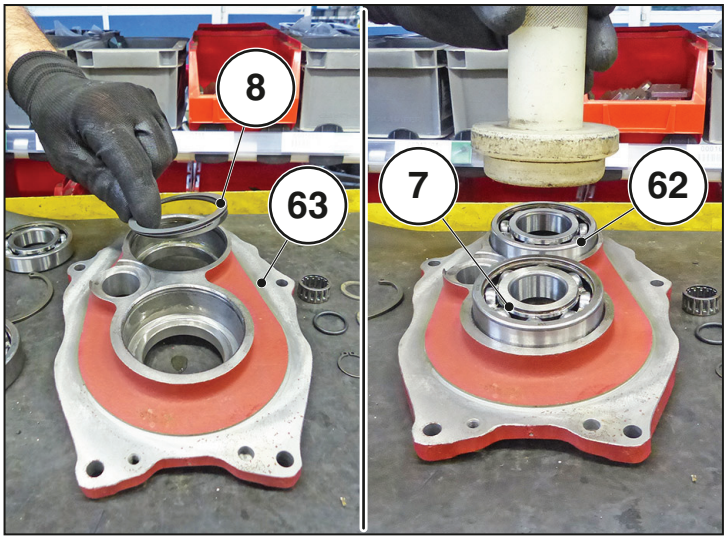


Fig. 5.163

4.3.1.5 Removing the gearbox

Remove the following components from the bevel pinion (30):

- circlip (60);
- spacers (59);
- spacer (45);
- roller spacer (46);
- spacer (58).

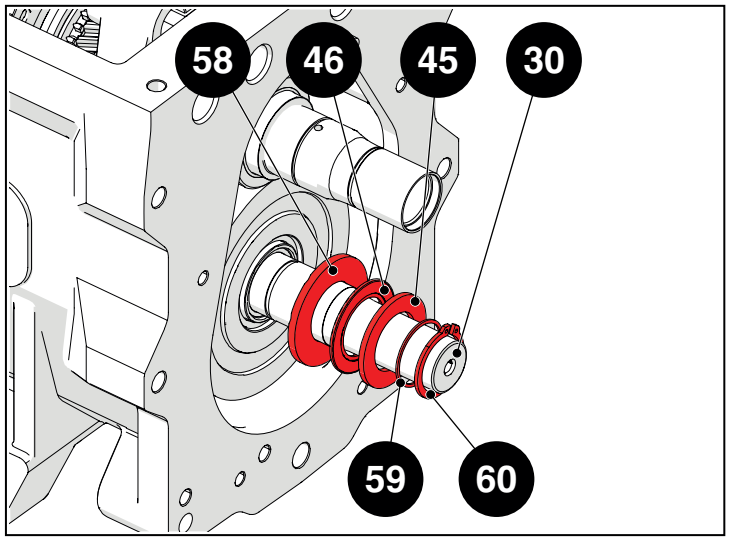


Fig. 5.164

Disassemble the 1st speed gear (55) from the bevel pinion (30) and remove it from the roller bearing cage (54).

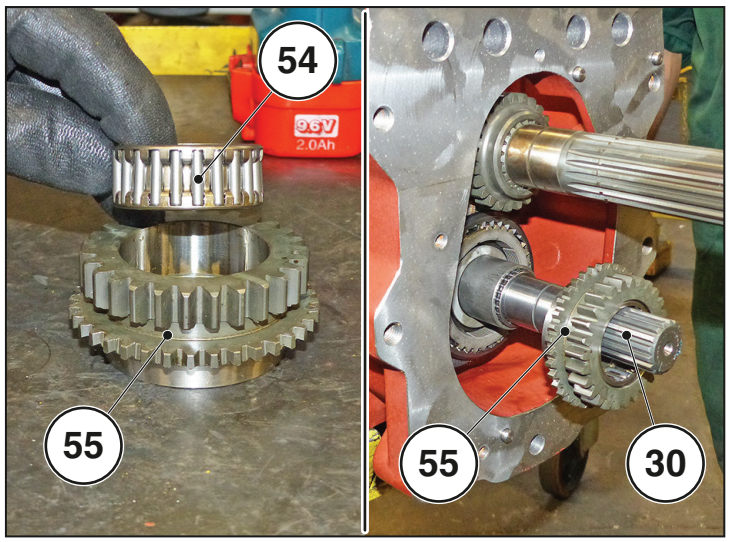


Fig. 5.165

Remove la fork (140) and then pull out the complete 2nd-3rd speed gear (49) from the bevel pinion (30).

Remove la fork (139) engaged on the synchroniser (15).

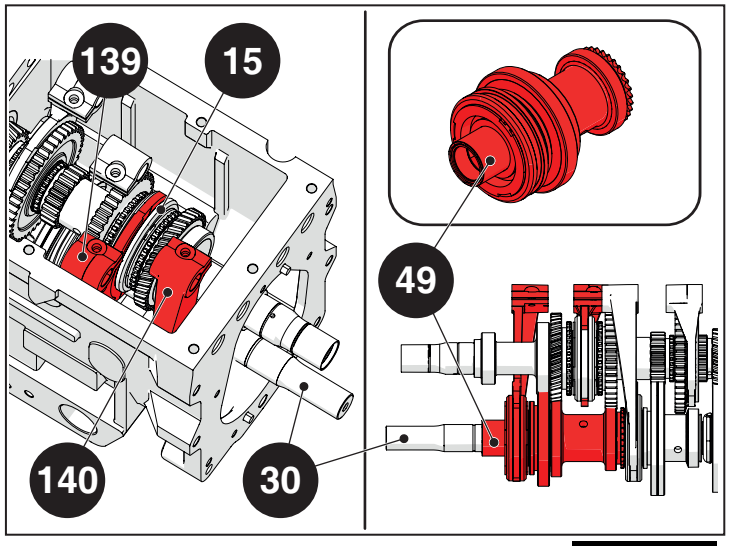


Fig. 5.166

Disassemble the 2nd-3rd speed gear (49):

- spacer (53);
- synchroniser ring (52);
- synchroniser gear (51);
- roller bearing cage (50);
- roller bearing cage (48).

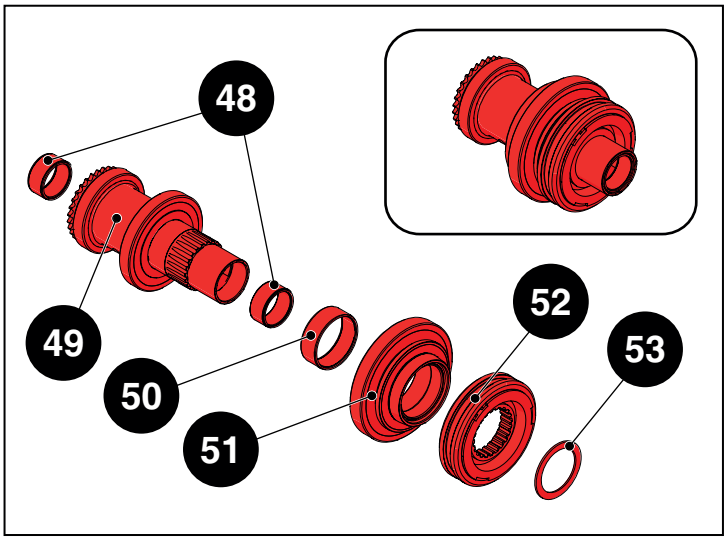


Fig. 5.167

Remove the complete primary shaft (3) by pulling it out from the gear (22).

Note

To remove the primary shaft (3), see the Chapter “Disassembling/Assembling the primary shaft".

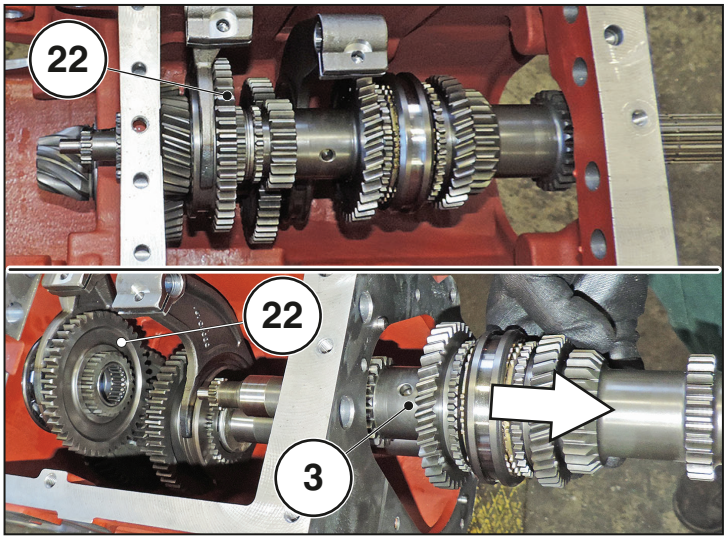


Fig. 5.168

Remove the fork (140) from the splined ring (43), and the fork (139) from the medium slow-slow range gear (22).

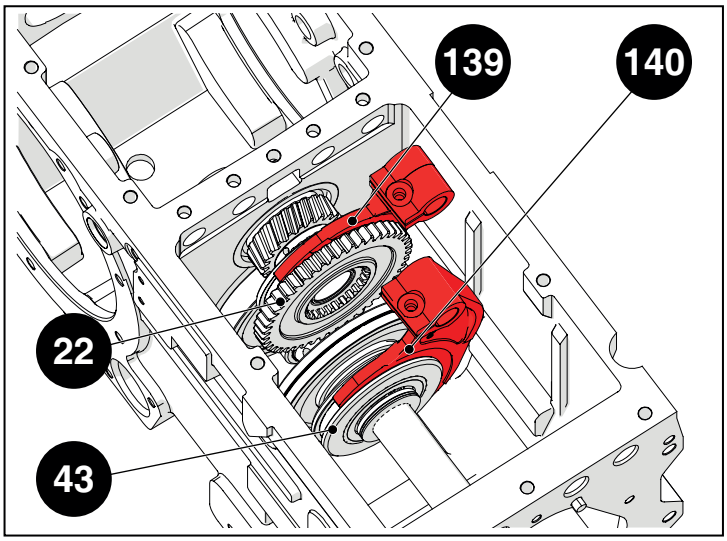


Fig. 5.169

Remove the following components from the bevel pinion (30):

- spacer (253);
- spacer (47);
- roller spacer (46);
- spacer (45);
- circlip (44);
- splined ring (43);
- fixed hub (42).

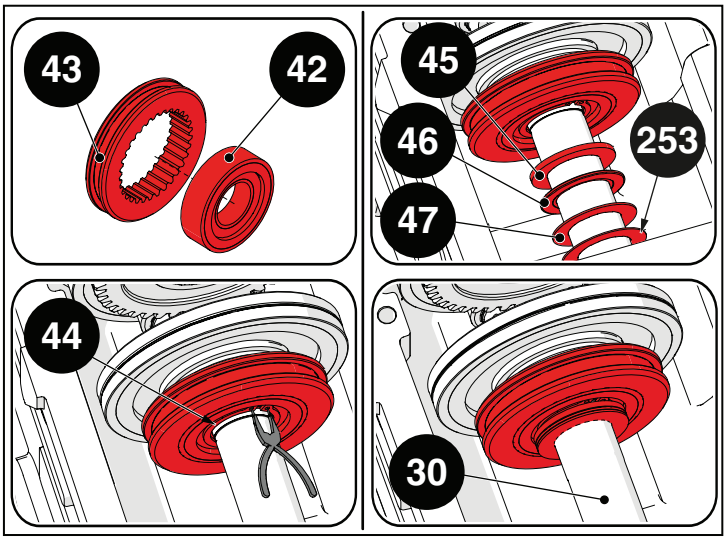


Fig. 5.170

Remove the complete medium slow-slow range gear (40) from the bevel pinion (30).

Disassemble the medium slow-slow range gear (40) by removing the roller bearing cages (39) and spacer (41).

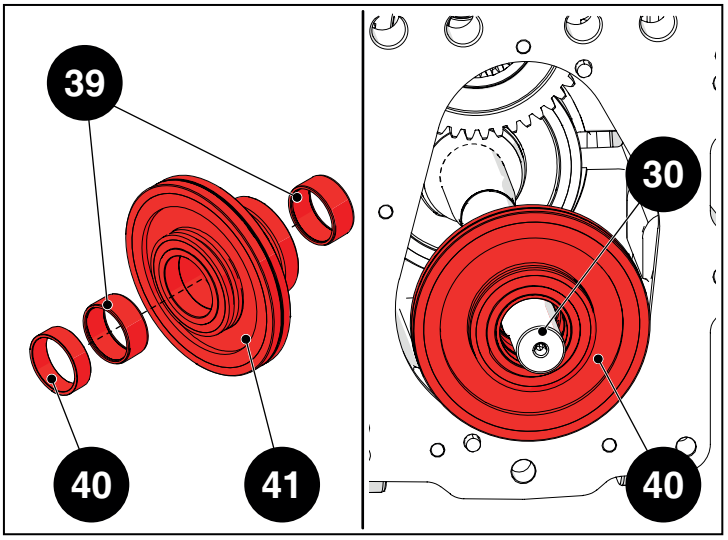


Fig. 5.171

Remove the roller bearing cages (26) on both ends of the splined hub (27).

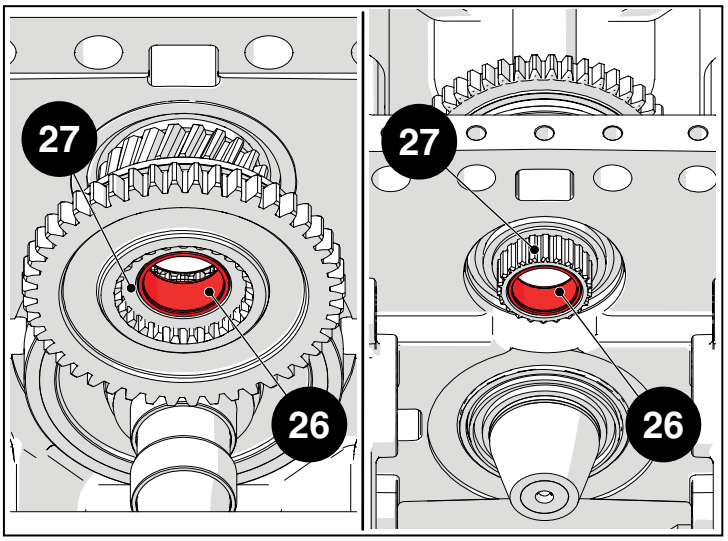


Fig. 5.172

Remove the circlip (29) to free the splined hub (27).

Remove the complete splined hub (27) and separate it from the medium slow-slow range gear (22).

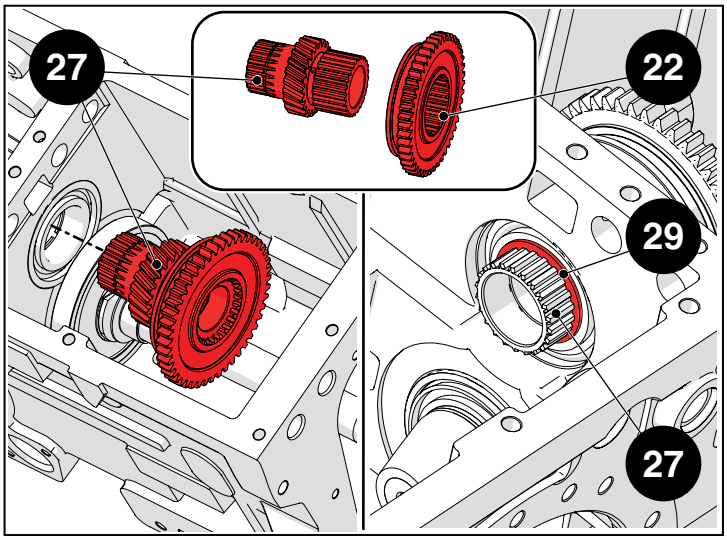


Fig. 5.173

Remove the roller bearing cage (26) from the splined hub (27).

Remove the circlip (181), spacer (249) and roller bearing cage (26).

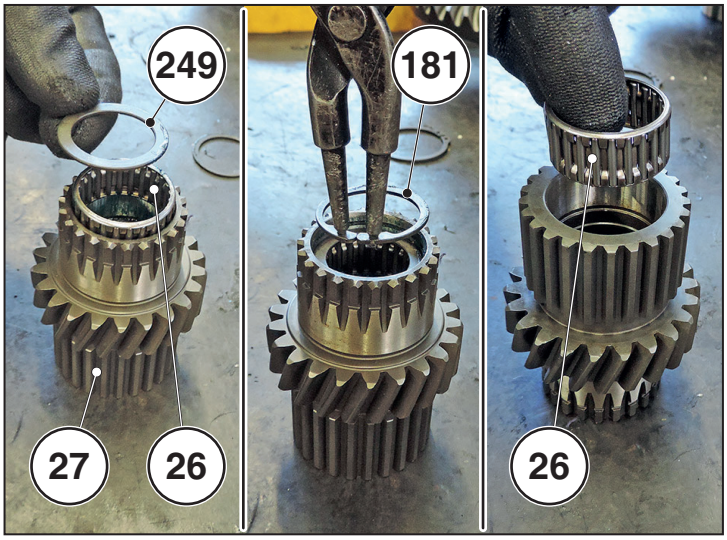


Fig. 5.174

Remove the following components from the bevel pinion (30):

- spacer (38);
- ring nut (37);
- ring nut retainer washer (36);
- medium-fast range gear (35).

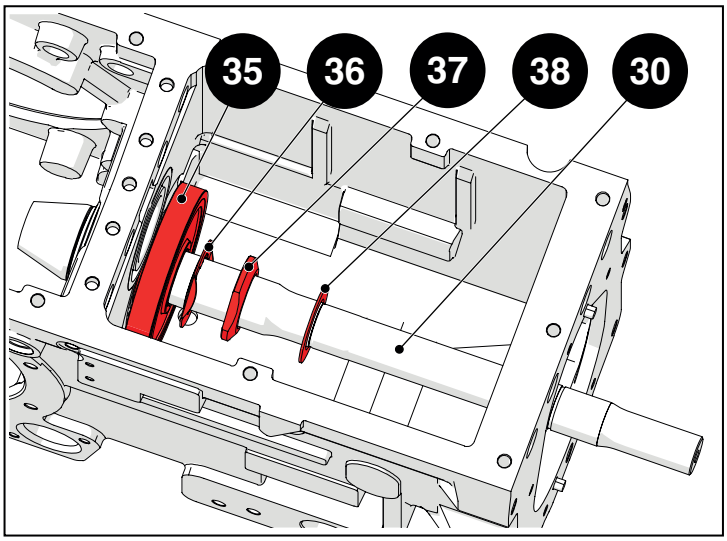


Fig. 5.175

Tap the bevel pinion (30) and pull it out from the opposite side along with the inner race of the bearing (33) and spacer (32).

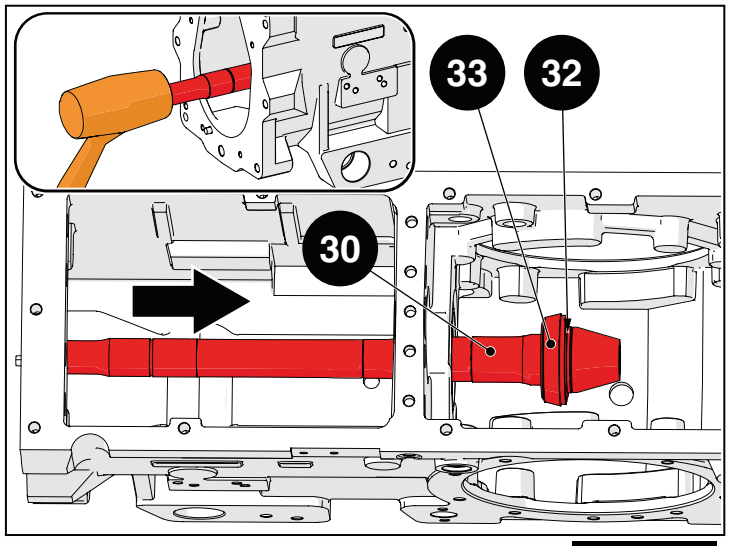


Fig. 5.176

Remove the outer race of the bearing (33), the circlip (34) and the bearing (33).

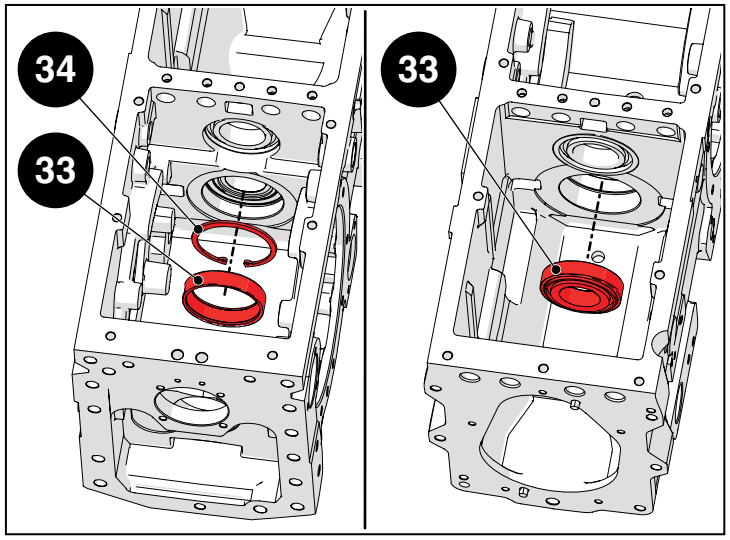


Fig. 5.177

Remove the bearing (28).

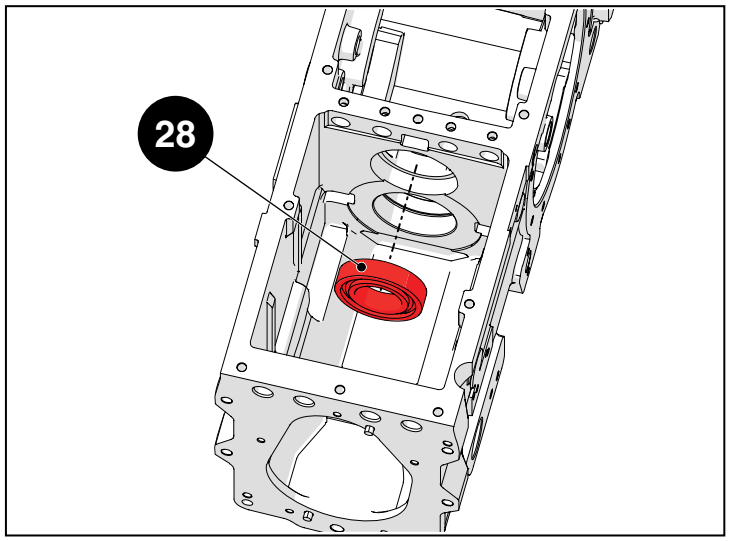


Fig. 5.178

Remove the cover centring pins (138).

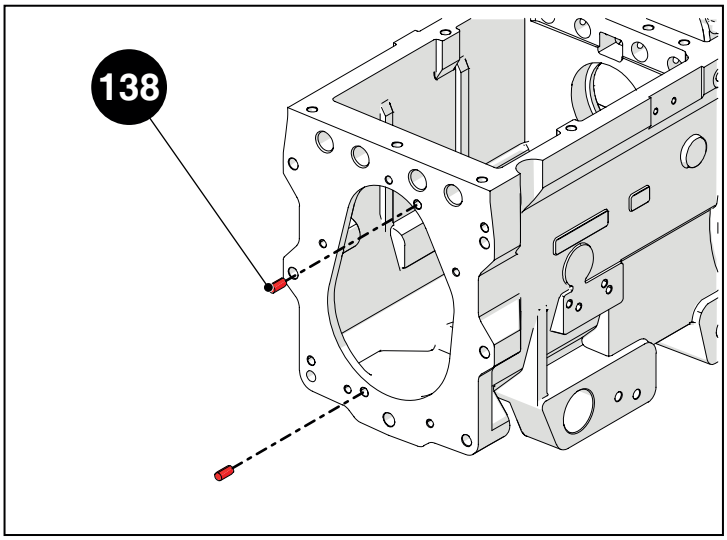


Fig. 5.179

Loosen the plug (129) and the plug (130), together with the washer (131).

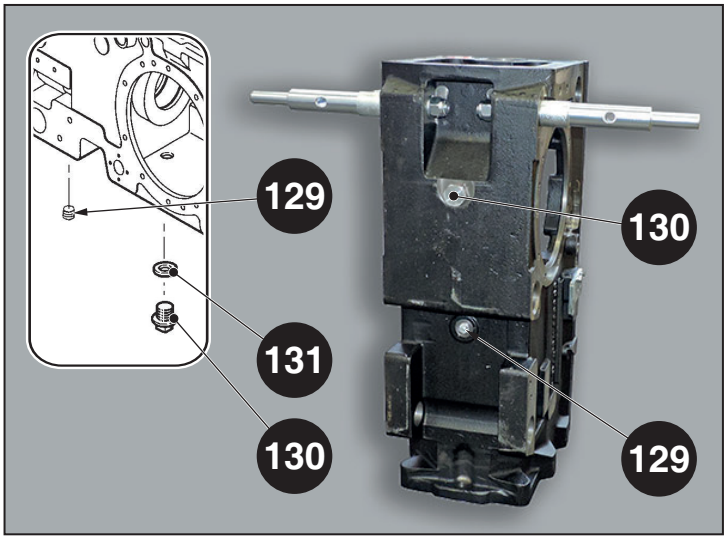


Fig. 5.180

Undo the nuts (127) and remove the washers (128) and the arms pivot pins (126).

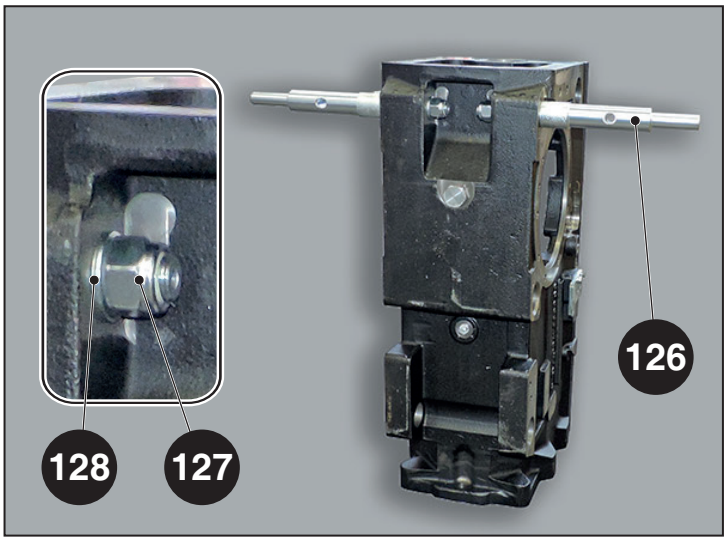


Fig. 5.181

4.3.2 Disassembling/Assembling the differential crown wheel

Note
Follow the instructions for REV, RS and SN+ Cluster.

4.3.3 Disassembling/assembling the SN primary shaft

Note
The following steps apply only to the SN model.

Disassembly

Remove the following components from the rear end of the primary shaft (3):

- bearing race (25);
- roller spacer (24);
- spacer (23);
- roller bearing cage (20);
- gear (21);
- roller bearing cage (20);

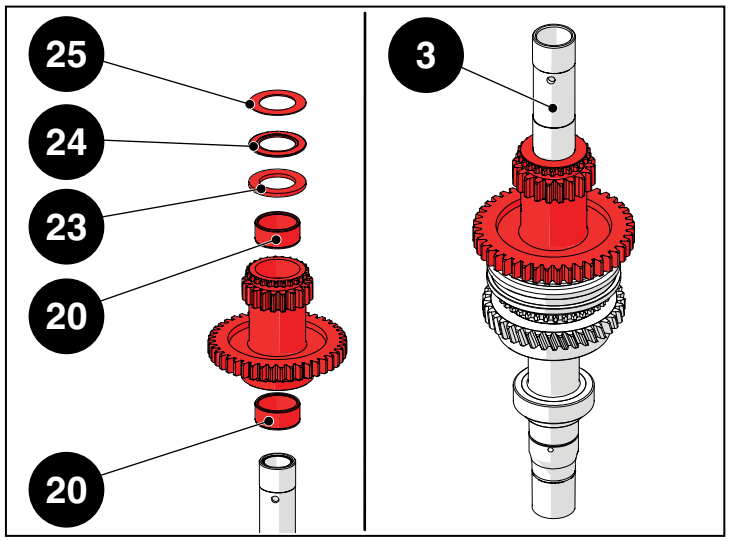


Fig. 5.182

- roller spacer (18);
- spacer (17);
- internal ring (19);
- thrust washer (16);

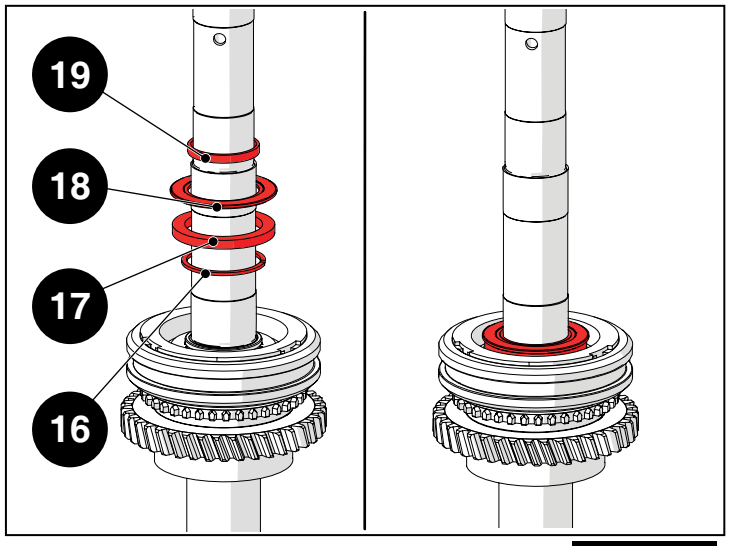


Fig. 5.183

- synchroniser ring (15);
- spacer (14);

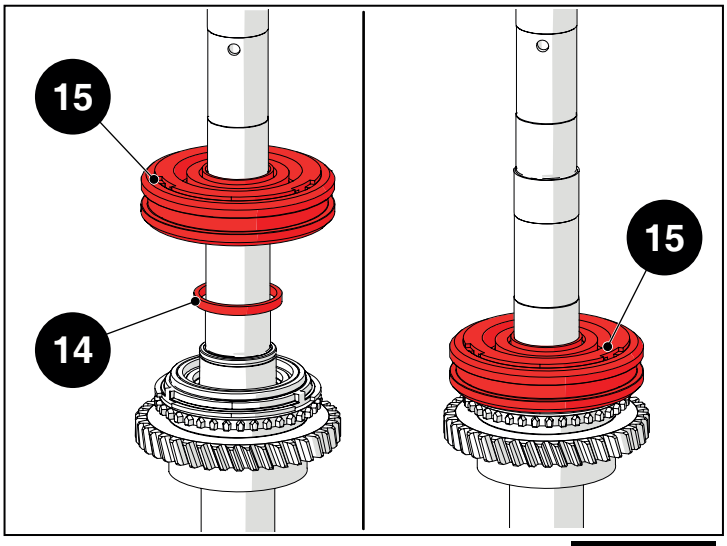


Fig. 5.184

- synchroniser gear (13).
- roller bearing cage (12);
- roller bearing cage (11);

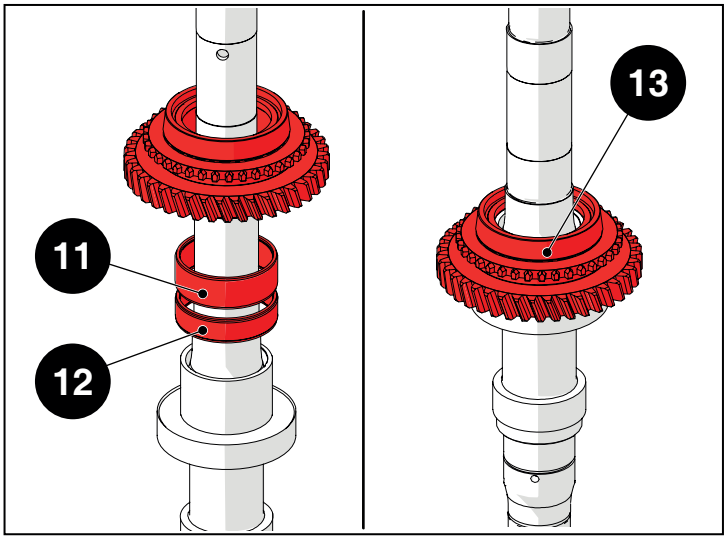


Fig. 5.185

- internal ring (10);
- gear (250).

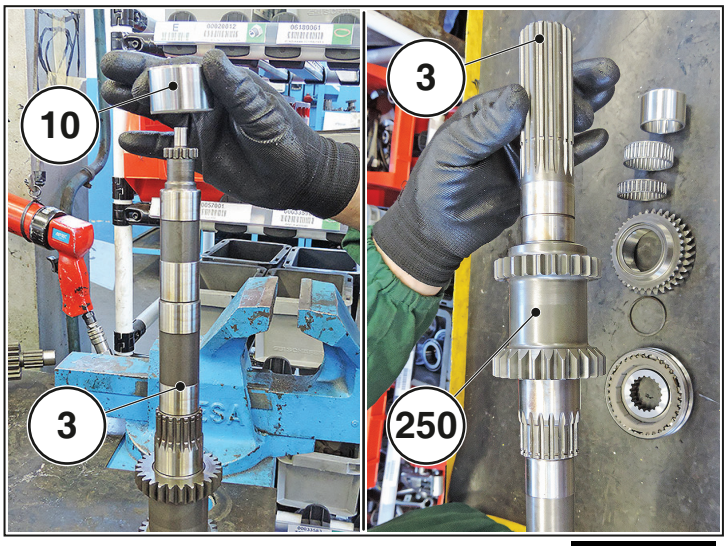


Fig. 5.186

Assembly

Fit the gear (250) on the primary shaft (3). Position the gear as shown in the figure.

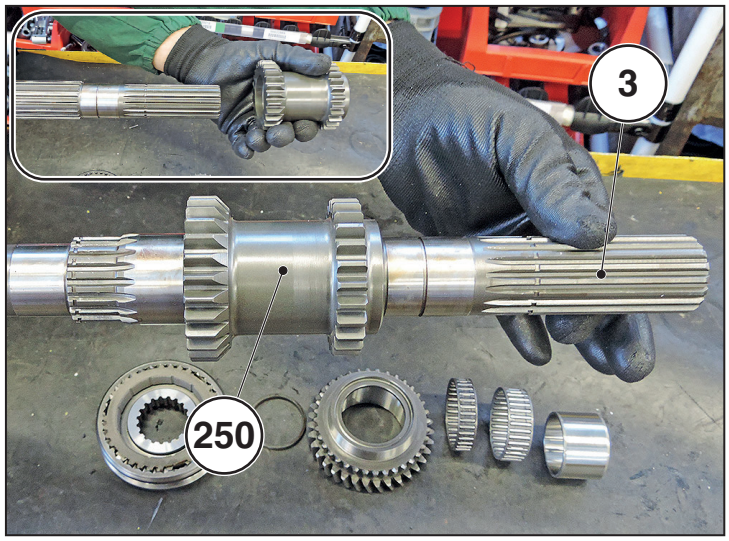


Fig. 5.187

Fit the internal ring (10) on the rear end of the primary shaft (3), driving it into its seat with a suitable punch tool.

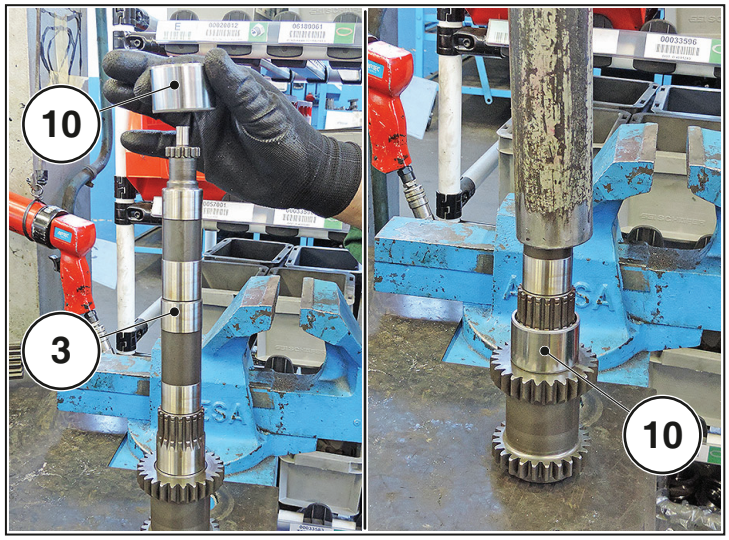


Fig. 5.188

- roller bearing cage (11);
- roller bearing cage (12);
- synchroniser gear (13);

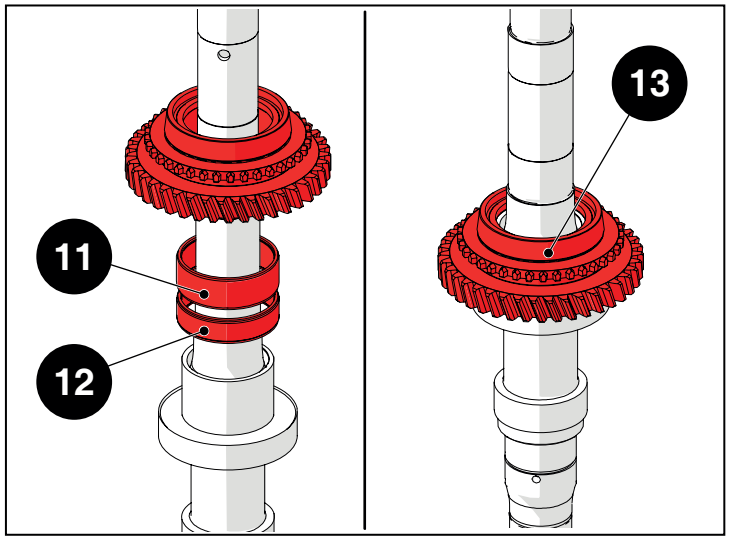


Fig. 5.189

- spacer (14);
- synchroniser ring (15);

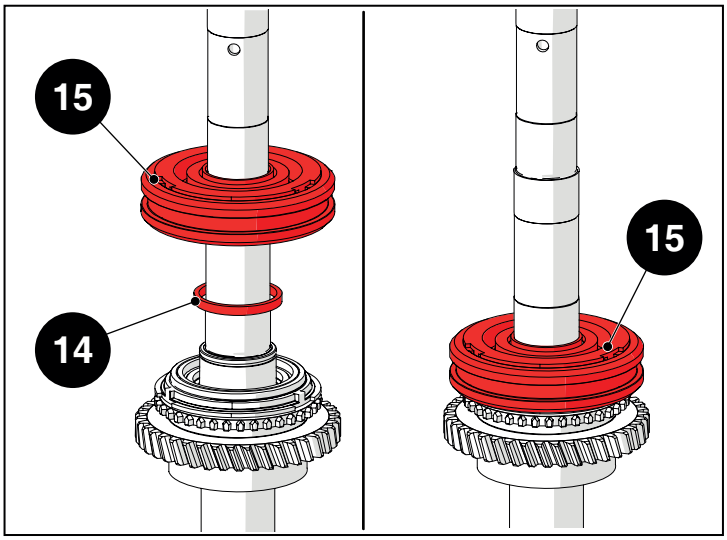


Fig. 5.190

- thrust washer (16);
- spacer (17);
- roller spacer (18);
- internal ring (19);

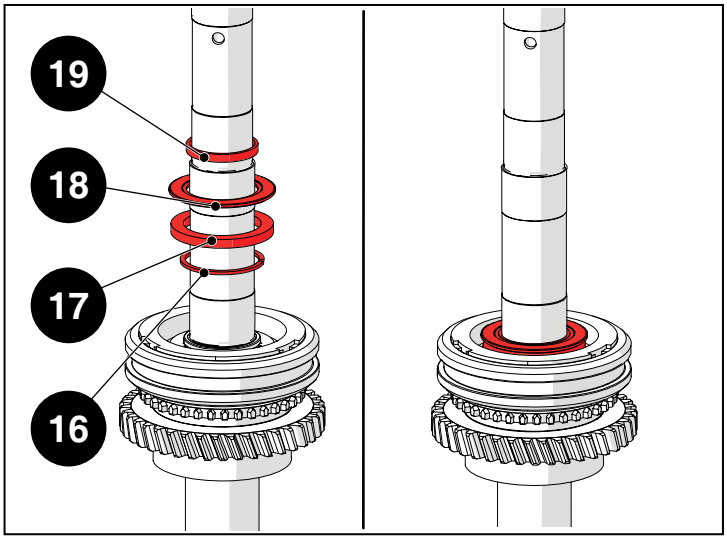


Fig. 5.191

- roller bearing cage (20);
- gear (21);
- roller bearing cage (20);
- spacer (23) by placing the bevelled side facing the gear (21);
- roller spacer (24);
- bearing race (25).

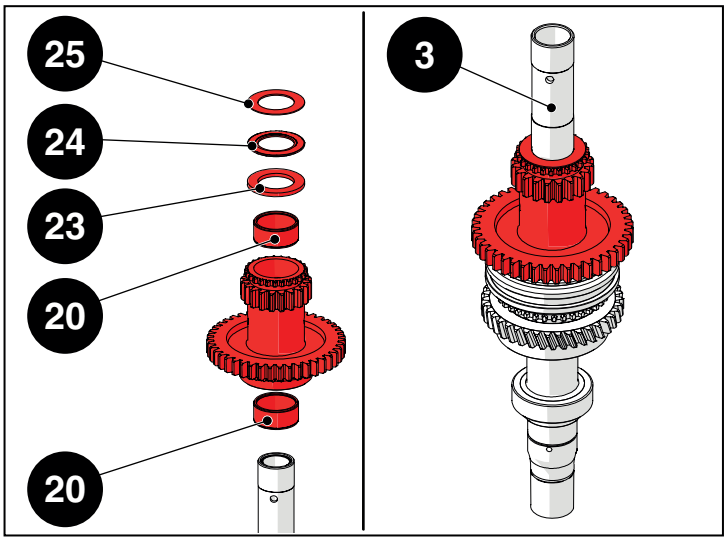


Fig. 5.192

Section 5 : Main inspection, reassembly and adjustment procedures

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5.1 Reassembling and adjusting REV, RS and SN+

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".

5.1.1 Reassembly

5.1.1.1 Refitting the gearbox

Fit the arms pivot pins (126) and secure them by tightening the nuts (127) with the washers (128).

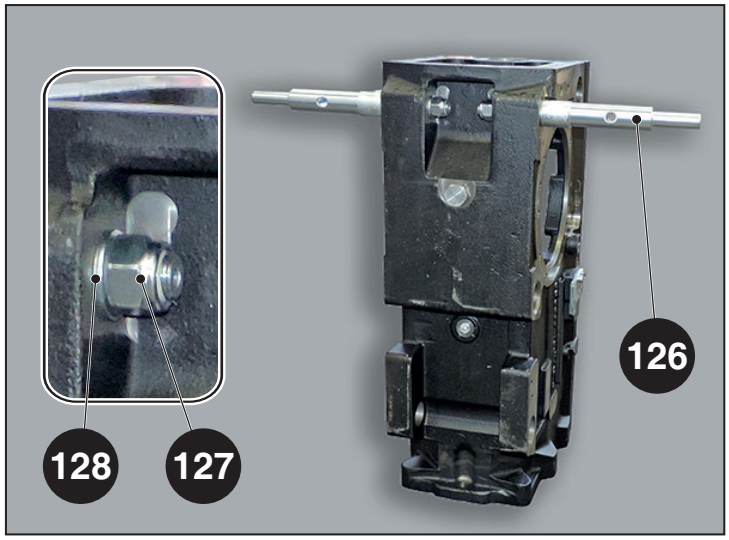


Fig. 5.193

Apply a coat of Teflon to the thread of the plug (129) and screw it under the gearbox casing.

Tighten the plug (130) with the copper washer(131) under the gearbox casing.

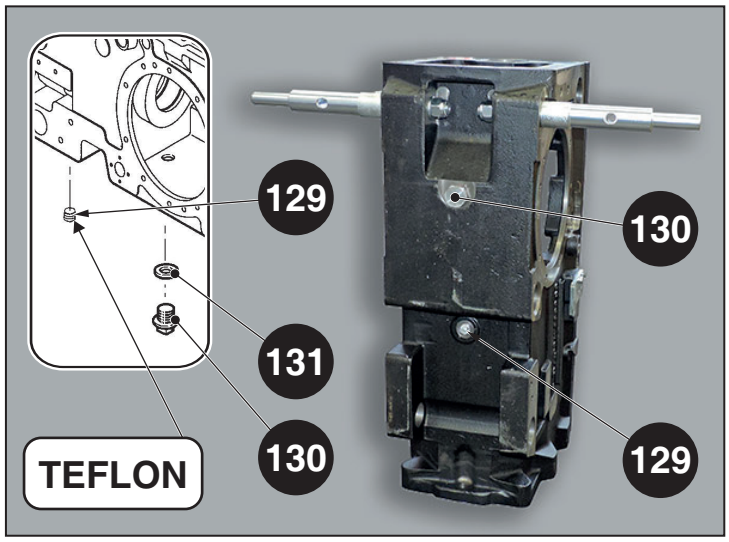


Fig. 5.194

Insert the cover centring pins (138).

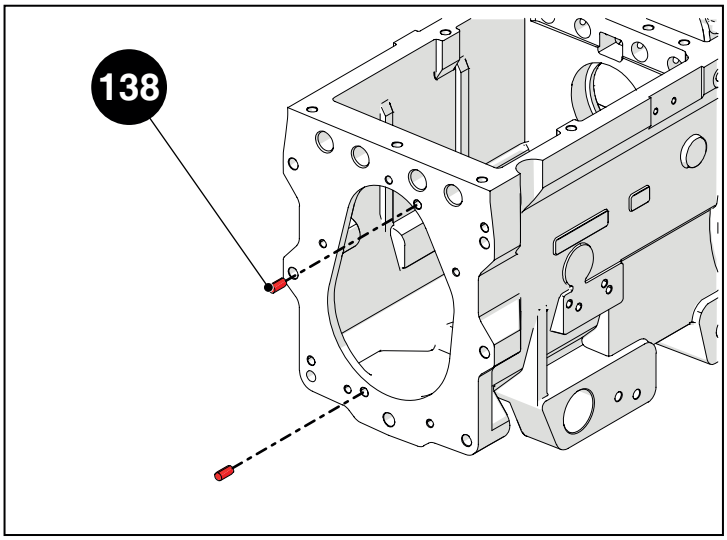


Fig. 5.195

Fit the bearing (28) (from the front side) of the casing and drive it into its seat with a punch tool of suitable diameter.

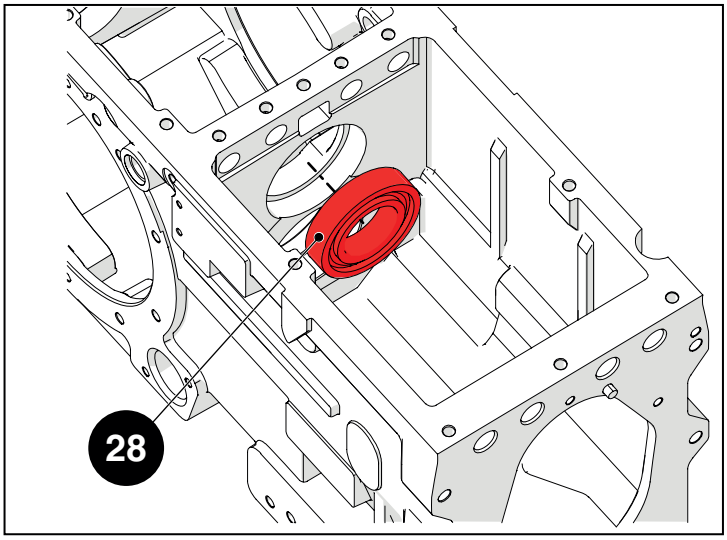


Fig. 5.196

Fit the circlip (34).

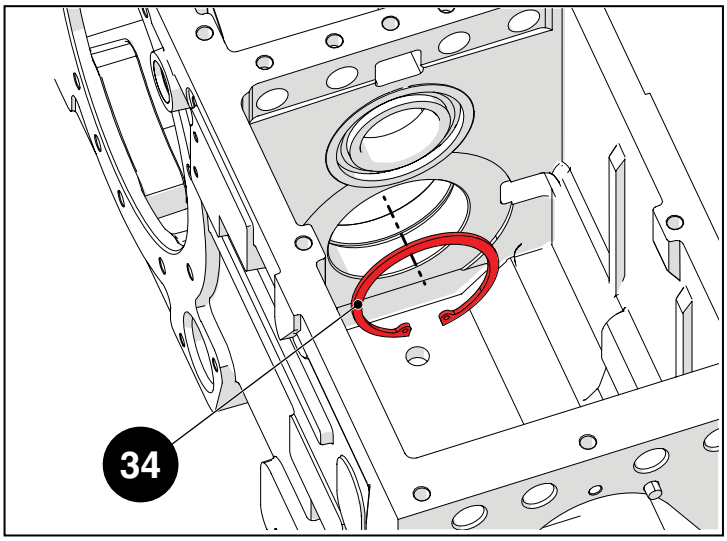


Fig. 5.197

Fit the outer bearing races (33) and drive them on the circlip (34) using a suitable pin punch.

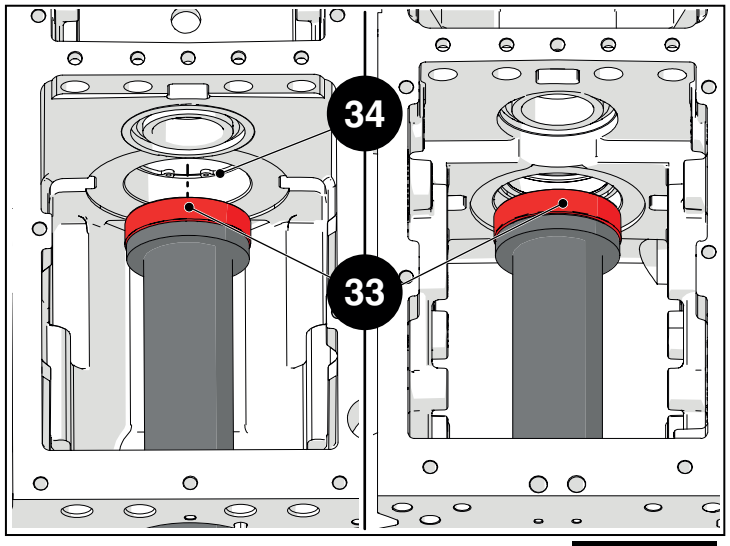


Fig. 5.198

Preassemble the bevel pinion (30) by fitting the spacer (32) , the spacer (31) and the bearing (33).

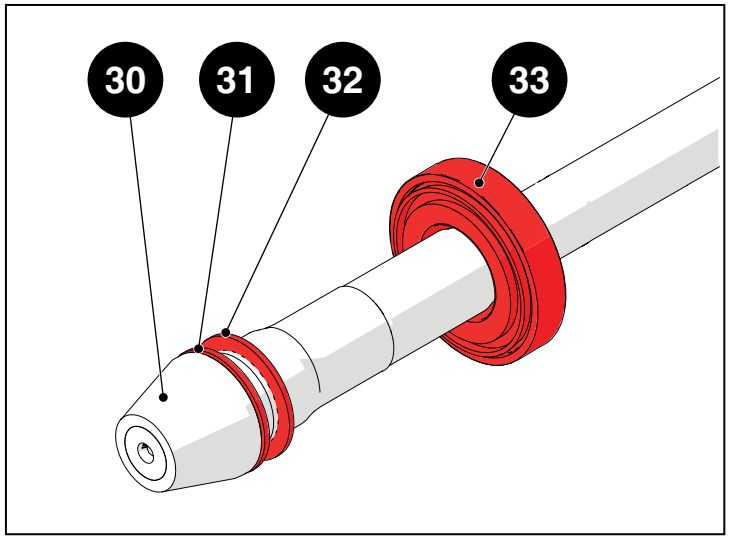


Fig. 5.199

Mount the pinion guide tool (A-p/n_____).

Fit the bevel pinion (30) in the gearbox casing and drive it into its seat with a punch tool of suitable diameter.

Remove the special tool (A-p/n_____).

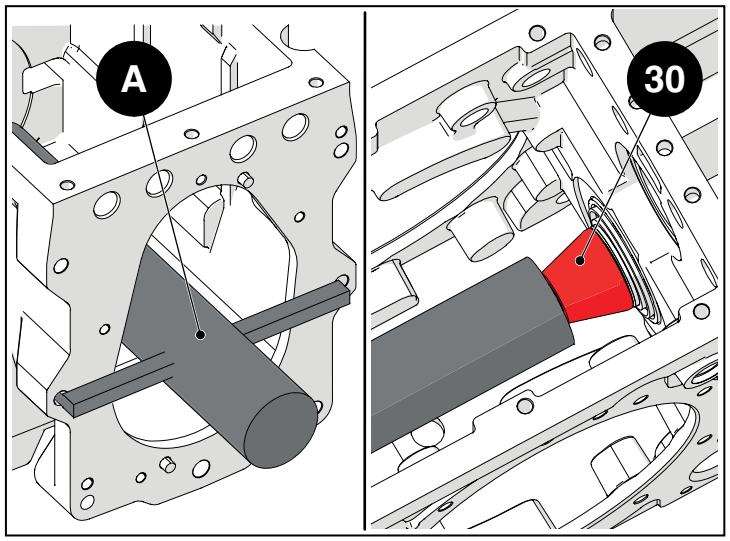


Fig. 5.200

Lock the bevel pinion (30) into position by fitting the tool (B-p/n_____).

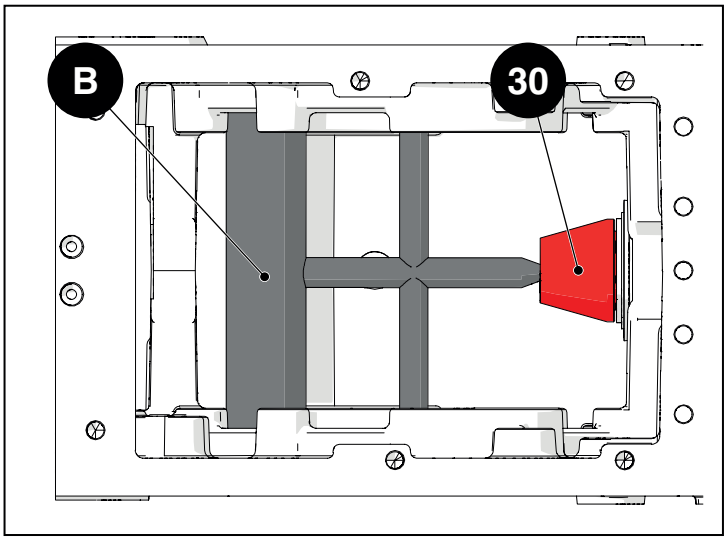


Fig. 5.201

Fit the bearing (33) on the bevel pinion (30) using a punch tool of suitable diameter and driving it into its seat on the gearbox casing.

Remove the special tool (B-p/n_____).

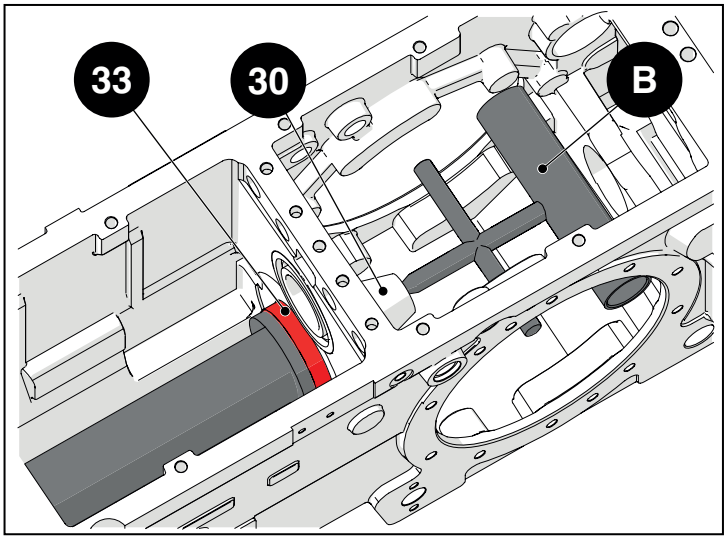


Fig. 5.202

Fit the components on the bevel pinion in the following order (30):

- medium-fast range gear (35) making sure that the protruding face is directed toward the inside of the gearbox casing;
- ring nut retainer washer (36);
- ring nut (37); making sure that the bevelled side is facing the front of the tractor;
- the spacer (38).

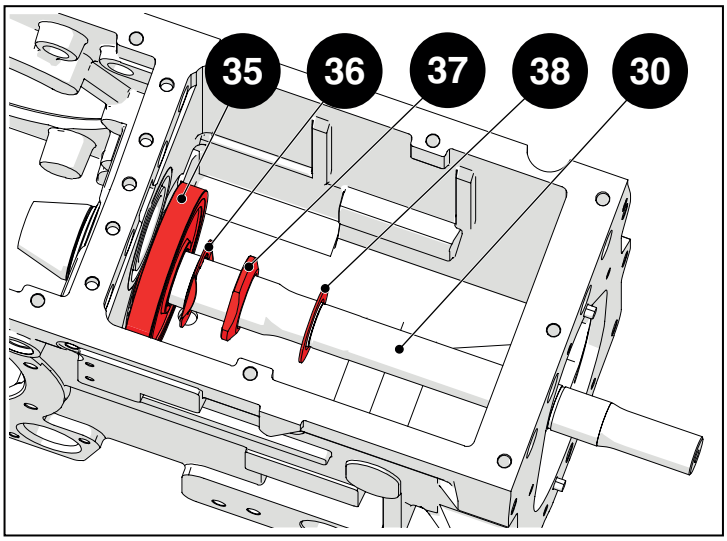


Fig. 5.203

Tighten the ring nut (37) and secure the bevel pinion 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 (36).

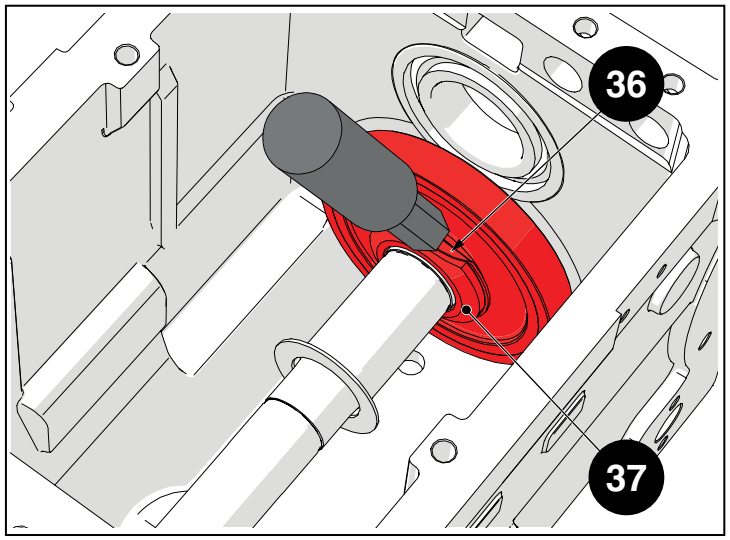


Fig. 5.204

Preassemble the splined hub (27) inserting the Medium slow-slow range gear (22) with the spline for fitting the fork facing the front of the tractor.

Fit the splined hub (27) on the gearbox casing and drive it onto the bearing (28) with a suitable bearing punch. Then fit the circlip (29) to lock the splined hub (27) in place.

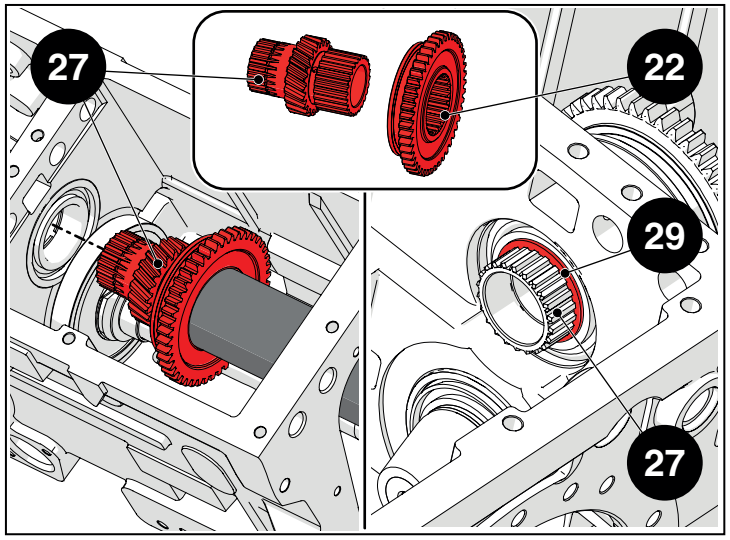


Fig. 5.205

Grease the seats on both sides of the spline hub (27) and then insert the roller bearing cages (26).

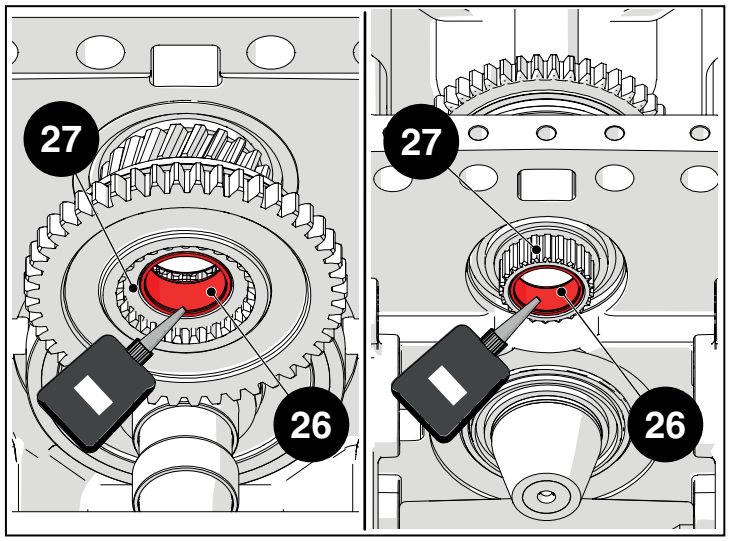


Fig. 5.206

Preassemble the medium slow-slow range gear (40) by inserting the roller bearing cages (39) and spacer (41).

Fit the medium slow-slow range gear (40) on the bevel gear (30) with the cogged end facing the rear end of the tractor and key it on the medium slow-slow range gear (22).

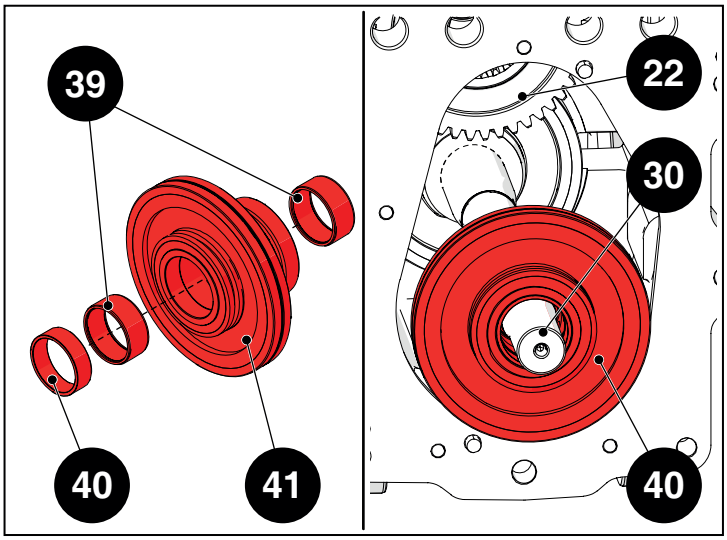


Fig. 5.207

Fit the components on the bevel pinion (30) in the following order:

- fixed hub (42) preassembled with the splined ring (43);

Warning

The flat side of the fixed hub (42) must face the rear.

- circlip (44) to lock the fixed hub (42);
- spacer (45) by placing the bevelled side facing the front of the tractor;
- roller spacer (46);
- the spacer (47).

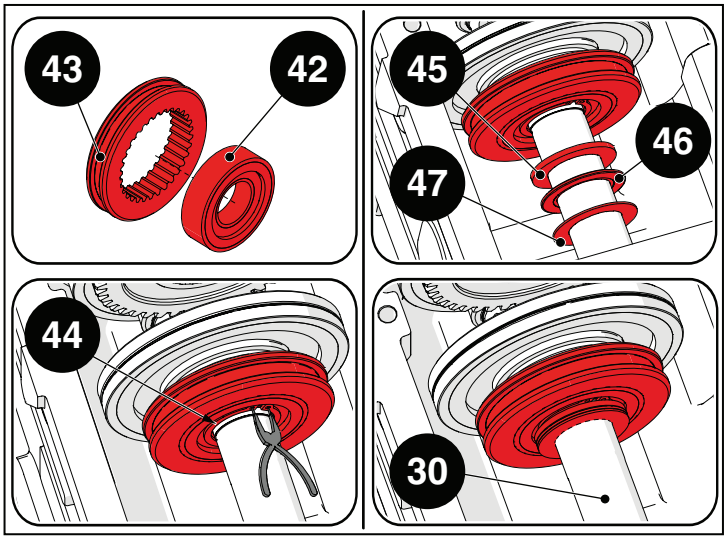


Fig. 5.208

Fit the fork (139) on the medium slow-slow range gear (22), and the fork (140) from the splined ring (43).

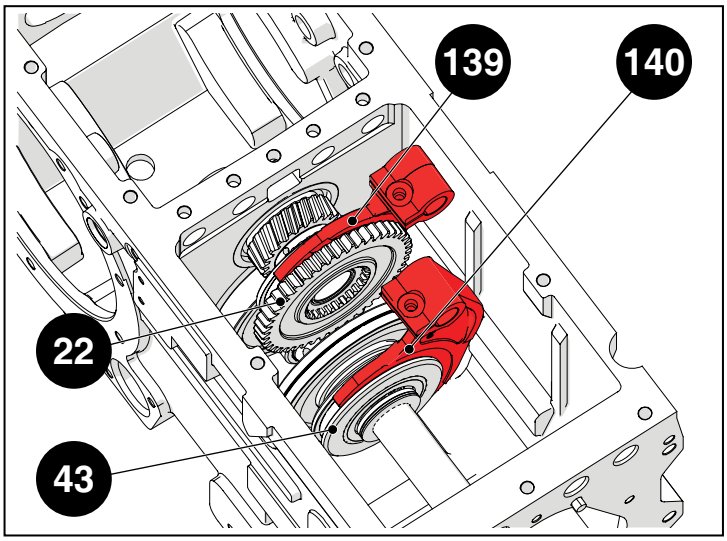


Fig. 5.209

Fit the complete primary shaft (3) in the gearbox casing by inserting it in the gear (22).

> **Warning**
>
> To preassemble the primary shaft (3), see the Chapter “Disassembling/Assembling the primary shaft".

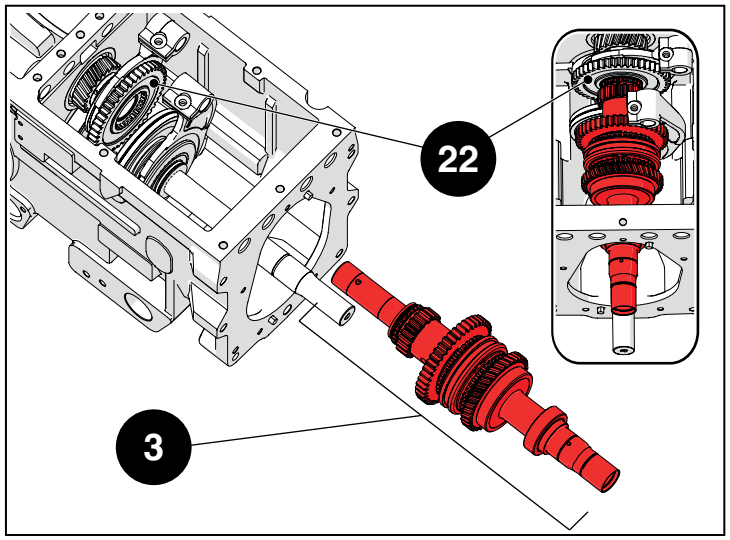


Fig. 5.210

Preassemble the 2nd-3rd speed gear (49) by inserting the roller bearing cages (48).

Fit the following components on the front end of the gear (49):

- roller bearing cage (50);
- synchroniser gear (51);
- synchroniser ring (52);
- the spacer (53).

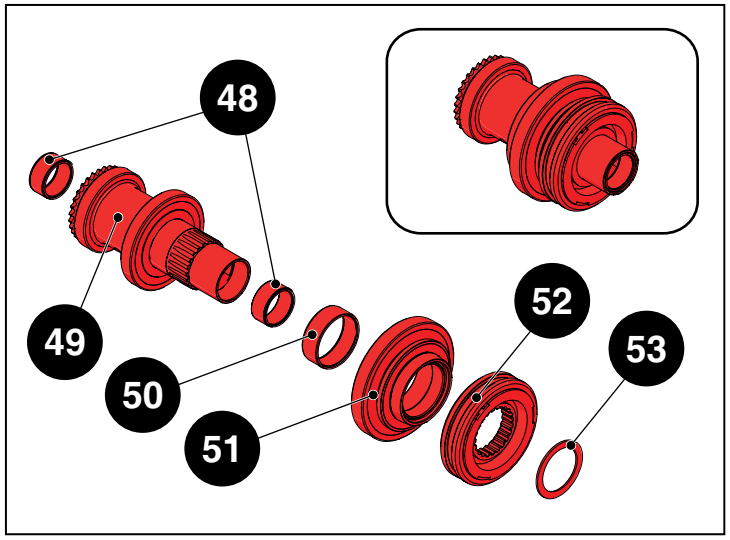


Fig. 5.211

Fit la fork (139) on the synchroniser (15).

Fit the fork (140) in the gearbox casing, then insert the complete 2nd-3rd speed gear (49) on the bevel pinion (30) and mount the fork on it.

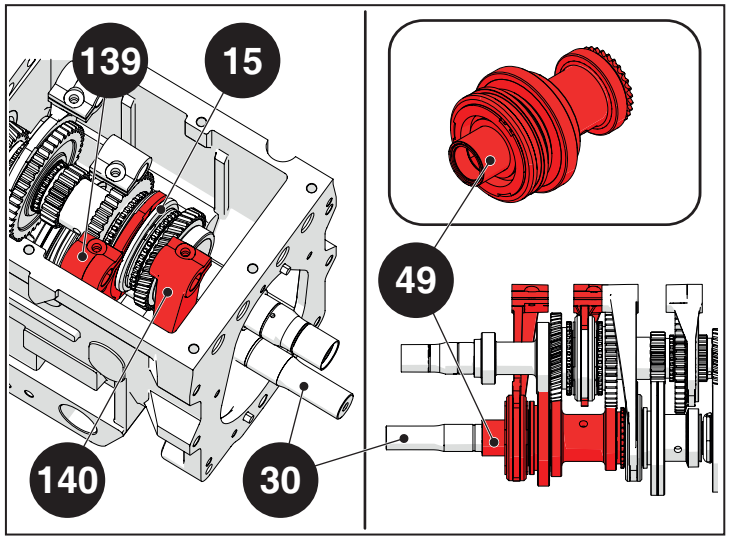


Fig. 5.212

Preassemble the 1st gear (55) by fitting the roller bearing cage (54).

Fit the complete 1st gear (55) on the bevel pinion (30).

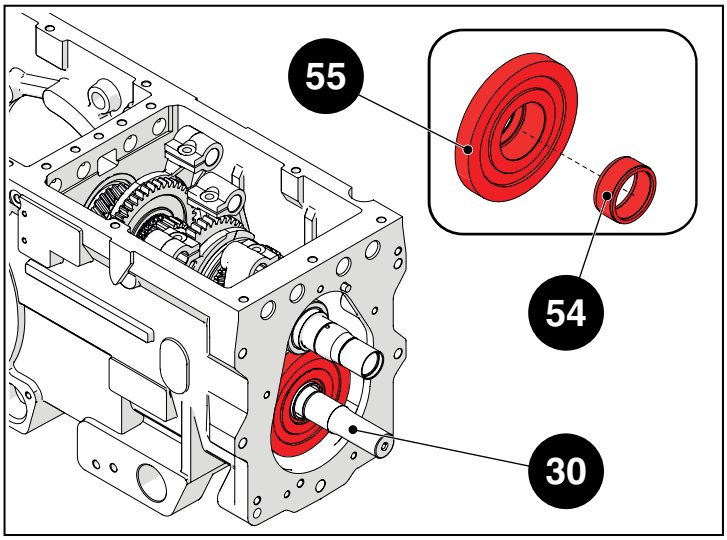


Fig. 5.213

Fit the components on the bevel pinion (30) in the following order:

- spacer (58) by placing the lubrication channels facing the gear (55);
- roller spacer (46);
- spacer (45) by placing the bevelled side facing the gear (55);
- spacers (59);
- circlip (60).

Check the backlash of the gear (55) and the rolling of the spacer (58). Increase or reduce the thickness of the spacers (59) to reduce or increase the backlash.

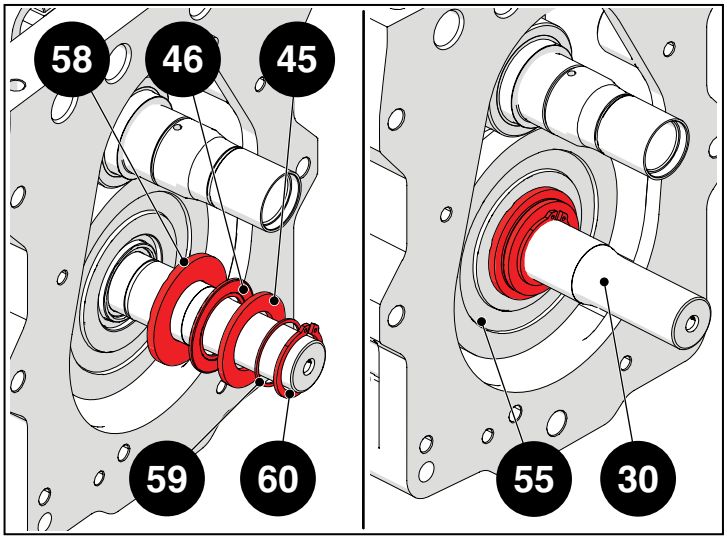


Fig. 5.214

5.1.1.2 Reassembling the gearbox front cover

On the inner side of the gearbox cover (63):

- fit the circlip (9) in the upper groove;
- fit the bearings (62) and (7) and drive them into their seats;

> **Warning**
>
> The shielded side of the bearing (7) must face the inside of the gearbox casing.

> **Warning**
>
> **For SN+ Cluster**
>
> The bearing (62) has a shielded side that must face the outer side the gearbox casing.

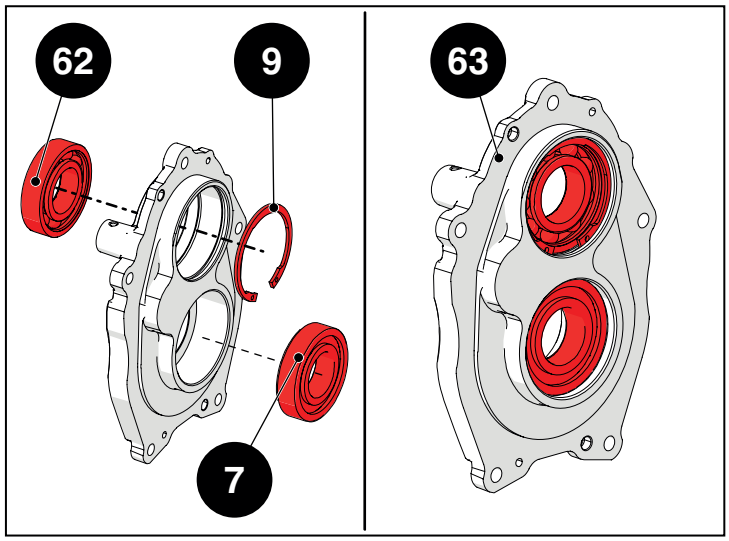


Fig. 5.215

Fit the spacer (6) up to a thickness of 0.3 mm and then insert the circlip (5).

> **Note**
>
> The spacer (6) determines the initial theoretical backlash on the primary shaft.

Turn over the gearbox cover (63) on the other side (outer side) and then remove the circlip (9).

Fit the spacers (8) of adequate thickness to eliminate the space between the bearing (7) and the groove for the circlip just removed to eliminate by free play on the bearing.

Fit the circlip (9) back on.

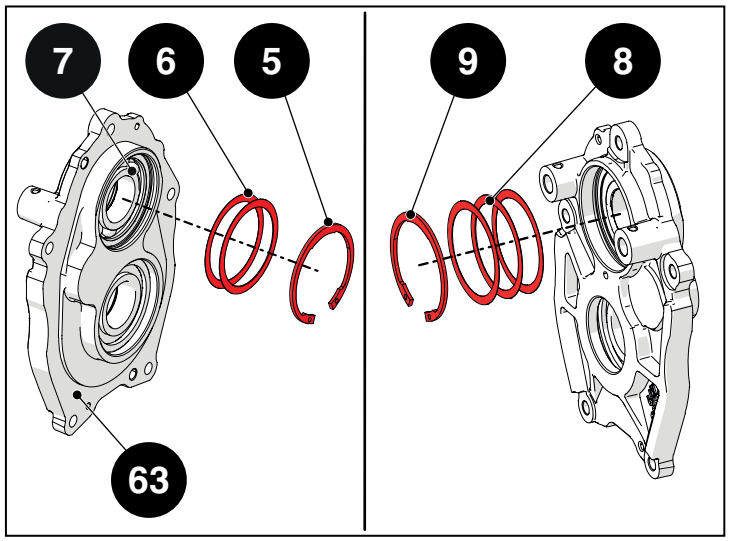


Fig. 5.216

Apply a coat of silicone sealant in the holes of the gearbox cover (63) 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.

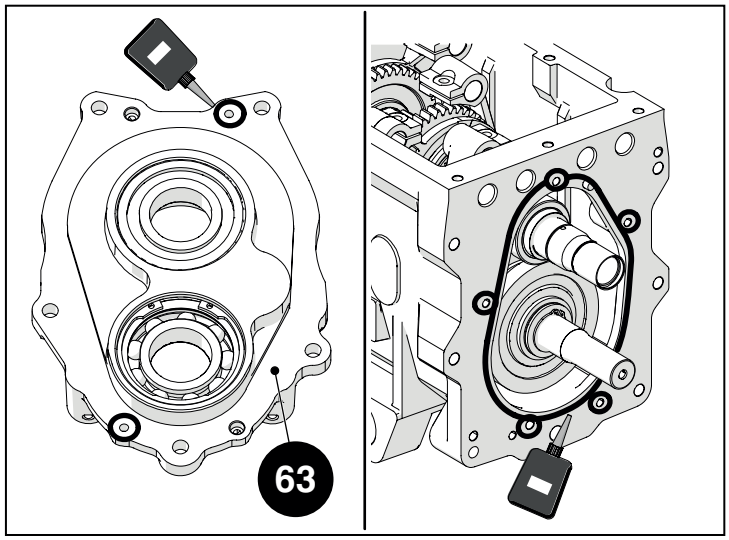


Fig. 5.217

Fit the gearbox cover(63) on the gearbox casing. Use a rubber mallet to make it adhere completely.

Fasten the cover by tightening the screws (57) with the washers (56), and tighten the pin (141) with the washer (142).

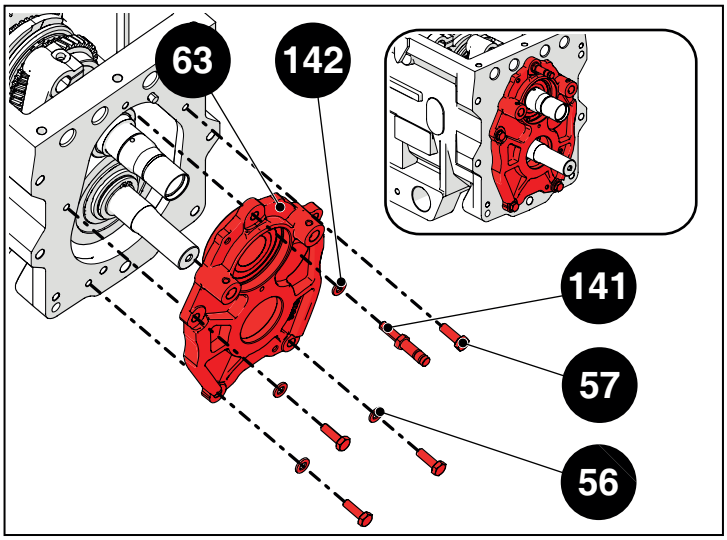


Fig. 5.218

Fit the circlip (4) on the primary shaft (3).

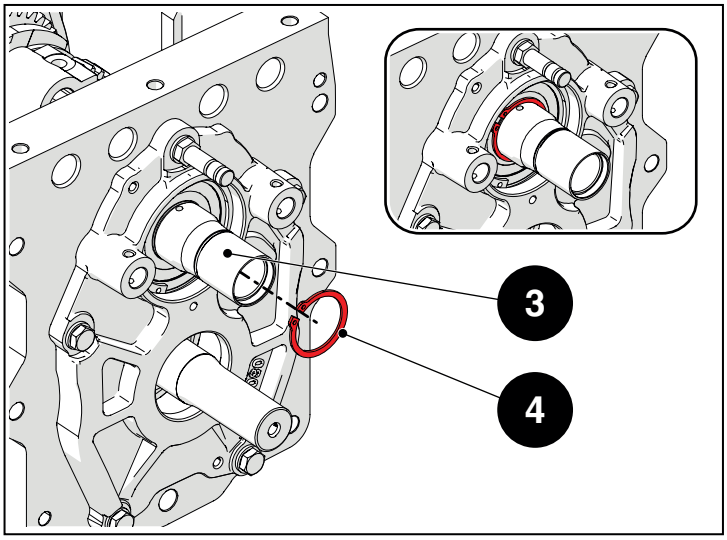


Fig. 5.219

Secure the primary shaft in place with a rubber mallet.

Use a feeler gauge to check the free play on the 4th gear; it must be comprised between 0.25 - 0.4 mm.

If the free play is not correct, rearrange the spacers (6) and (8) to change the position of the bearing (62): increase the thickness (6) and reduce by an equivalent amount the thickness (8) to reduce the free play; vice versa to increase the free play; do not change the total thickness values.

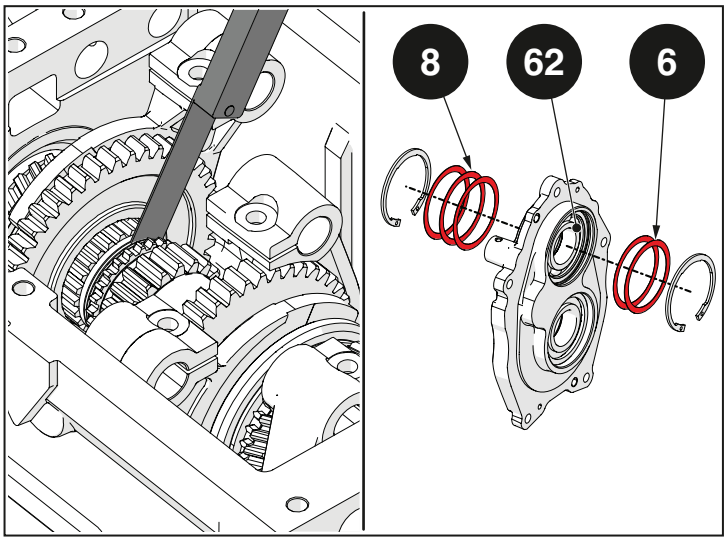


Fig. 5.220

Preassemble the lubrication cover (68) by inserting the oil seal (69), the O-ring (67) and the plug (143).

Fit the complete lubrication cover (68) on the gearbox cover using a suitable guide tool.

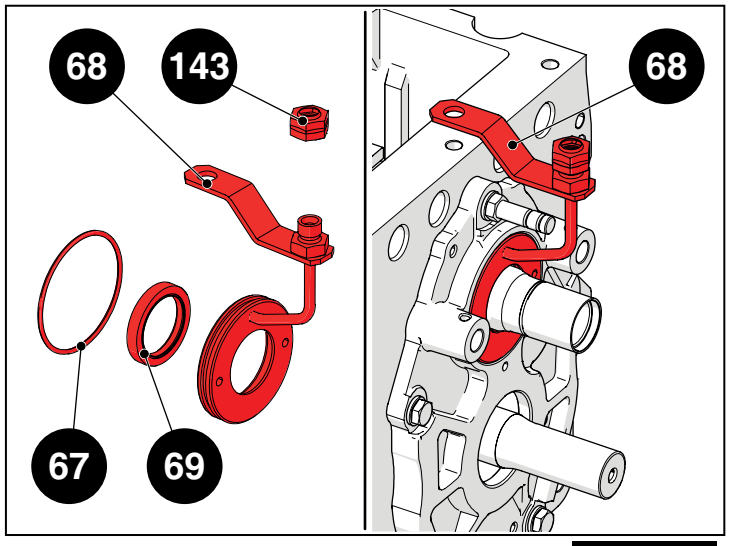


Fig. 5.221

Fit the oil seal (61) on the bevel pinion (30) using a suitable guide tool.

Warning

For SN+ Cluster

The oil seal (61) is thinner and fits deeper into the hole. Drive the oil seal against the bearing inside the cover.

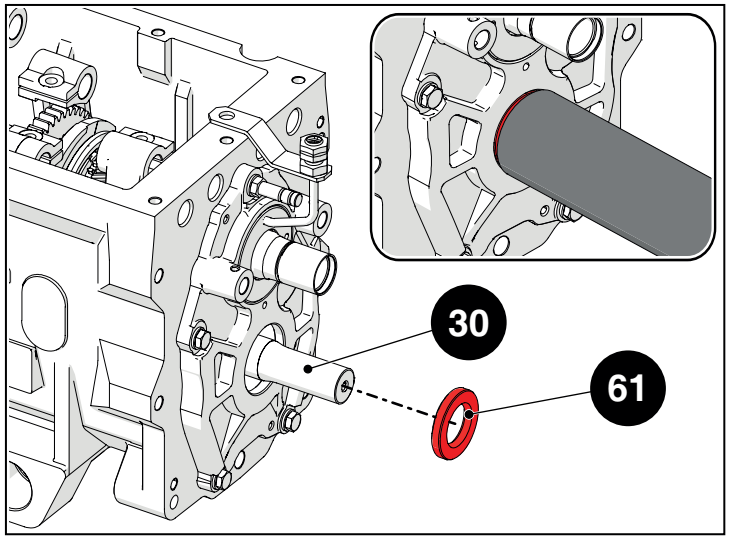


Fig. 5.222

Tighten the screw (66) of the washer (65) and stop plate (64) to fasten the lubrication cover (68).

Warning

Bend up the plate (64) to press it against the cover.

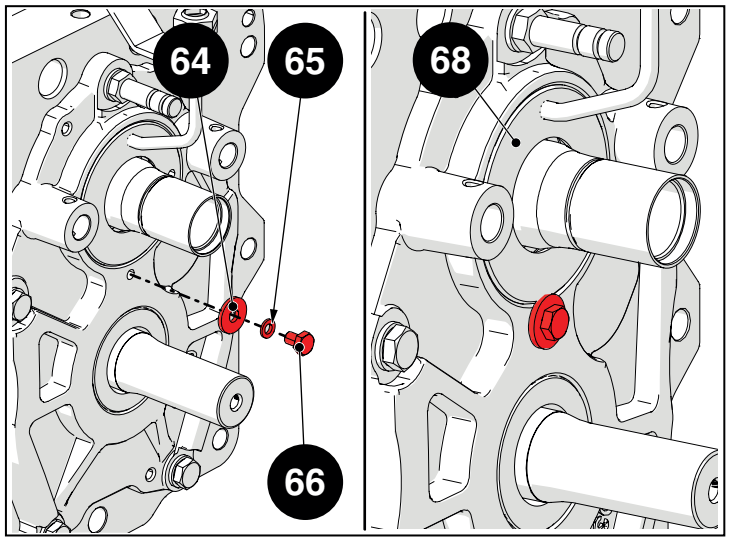


Fig. 5.223

Insert the pins (144).

> **Warning**
>
> The end of the pins with the nearest holes must be faced toward the front of the tractor.

Insert the pins (145) to secure the pins in position.

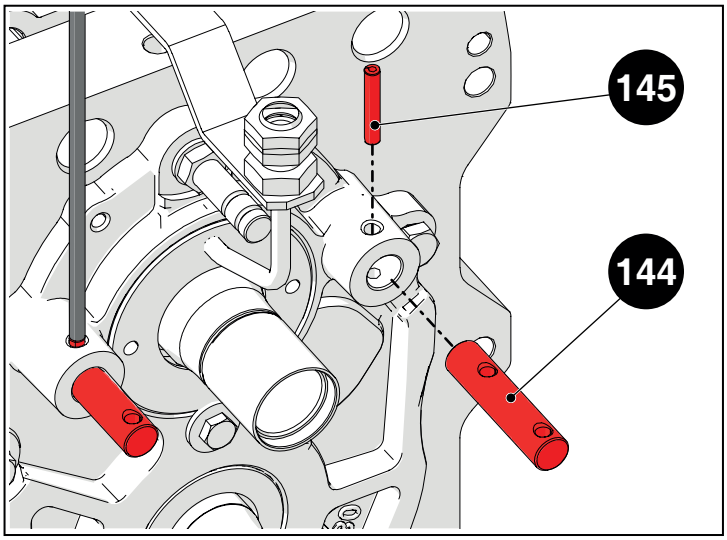


Fig. 5.224

5.1.1.3 Reassembling the Power Take Off

Fit the roller bearing cage (73) on the shaft (74).

Apply a layer of grease and then fit the spacer (70).

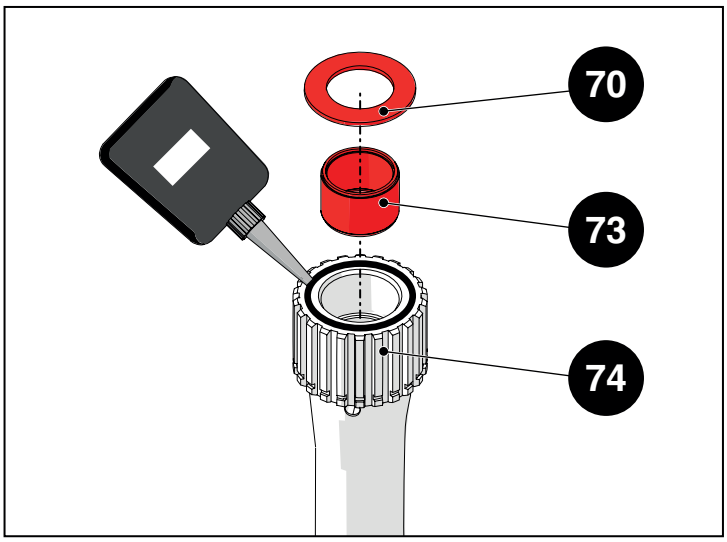


Fig. 5.225

Fit the free circlip (72) on the shaft (74) and then the sleeve (71).

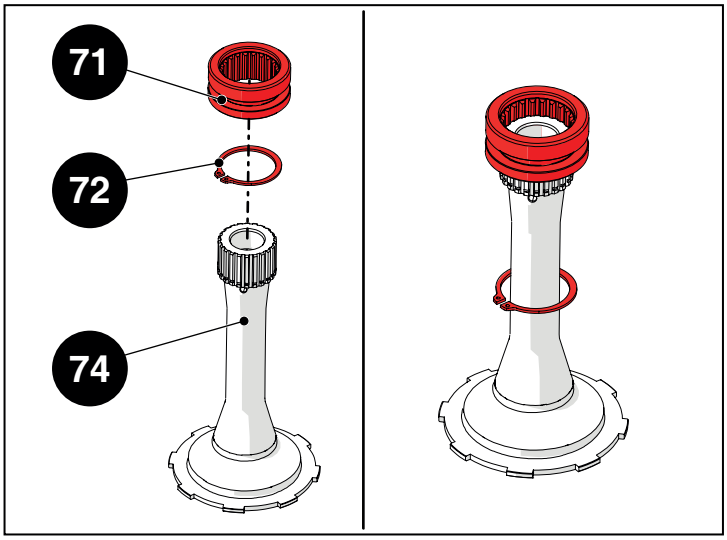


Fig. 5.226

Fit the roller bearing cage (73) on the shaft (74).

Apply a layer of grease and then fit the spacer (70).

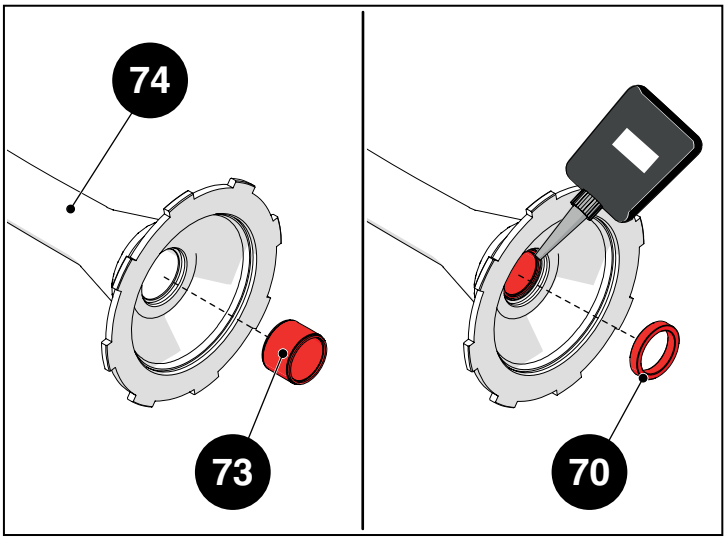


Fig. 5.227

Insert the O-rings (78) in the grooves inside the clutch (77).

Warning

First, fit the O-ring in the outermost groove.

Make sure that the O-rings are completely fit into the respective grooves.

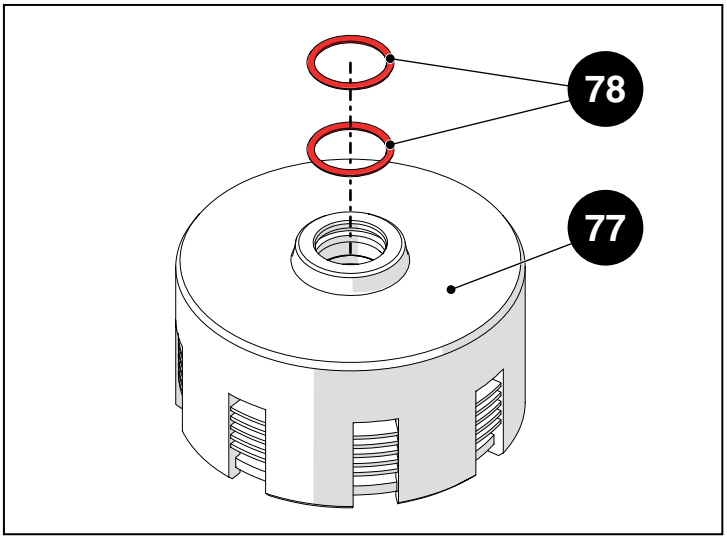


Fig. 5.228

Fit the shaft (74) on the complete clutch (77) making sure that the spacer (146) and the roller bearing cage (73) do not come out during operation.

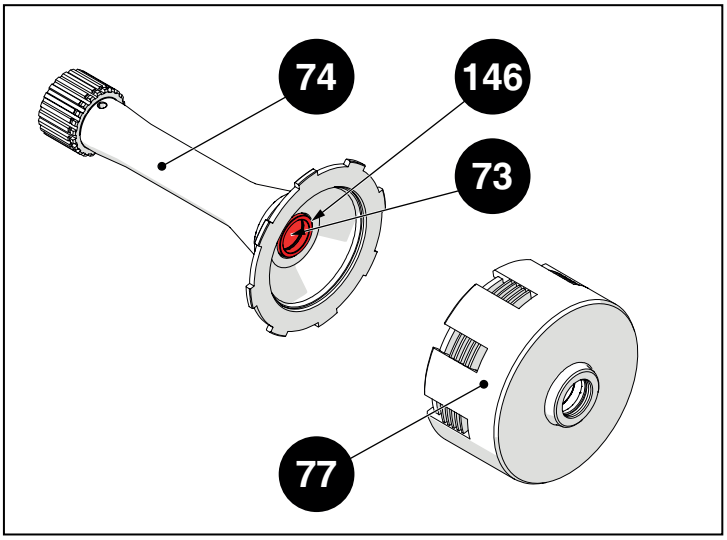


Fig. 5.229

Fit the free circlip (76) on the shaft.

Insert the shaft (74), complete with the clutch (77), in the differential case.

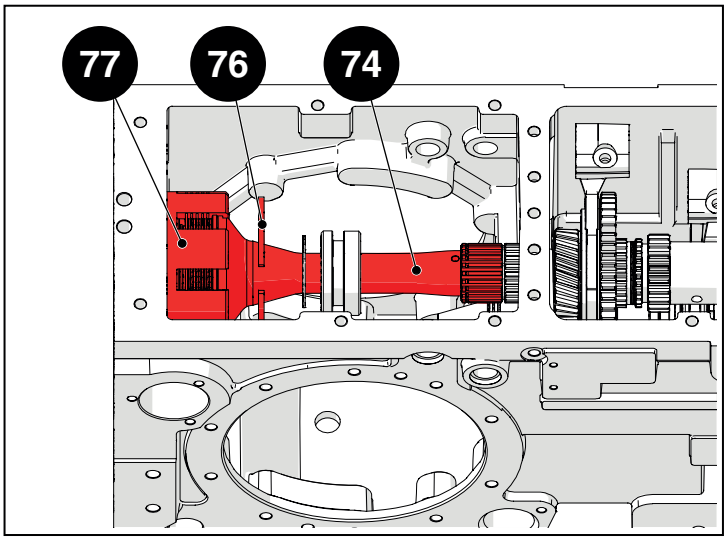


Fig. 5.230

Grease the splined end of the shaft (75) and its seat on the clutch.

Fit the shaft (75) completely keying it with the primary shaft.

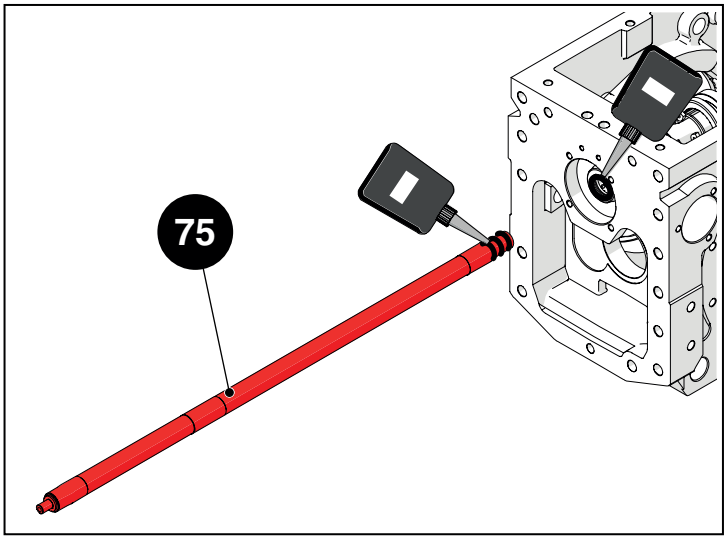


Fig. 5.231

Fit the Quad rings (84) in the 3 grooves of the shaft mount (81).

Warning

Fit the Quad rings (84) starting from the outermost groove.

Make sure that the Quad rings are completely fit into the respective grooves.

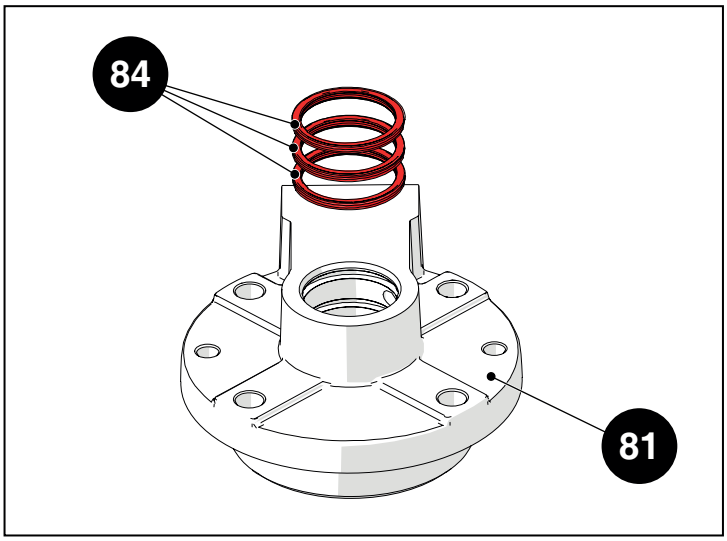


Fig. 5.232

Grease the bearing seat and then fit the bearing (83). Drive the bearing with a suitable punch tool.

Secure the bearing by fitting the circlip (79).

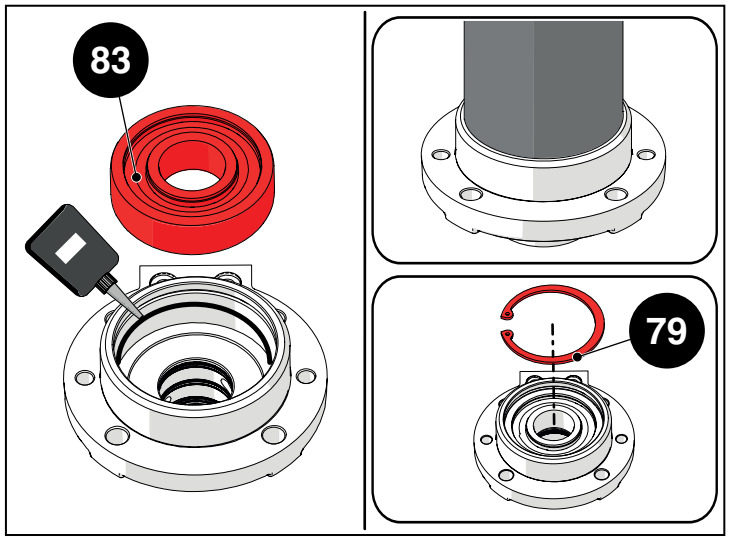


Fig. 5.233

Fit the Koenig expander plug (147) inside the splined shaft (85). Use a pin punch to drive it into its seat.

Warning
The Koening plug is to be fit on the narrowest hole.

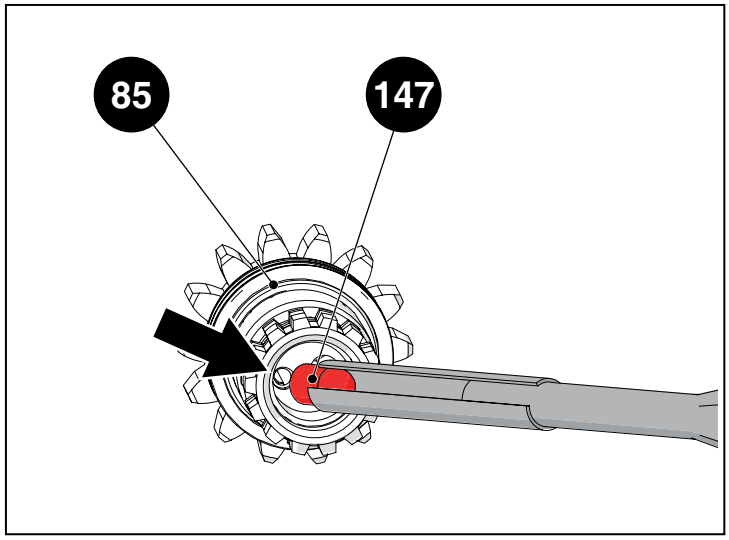


Fig. 5.234

Grease the seat on the shaft mount (81) and then fit the splined shaft (85). Drive the splined shaft in place with a rubber mallet.

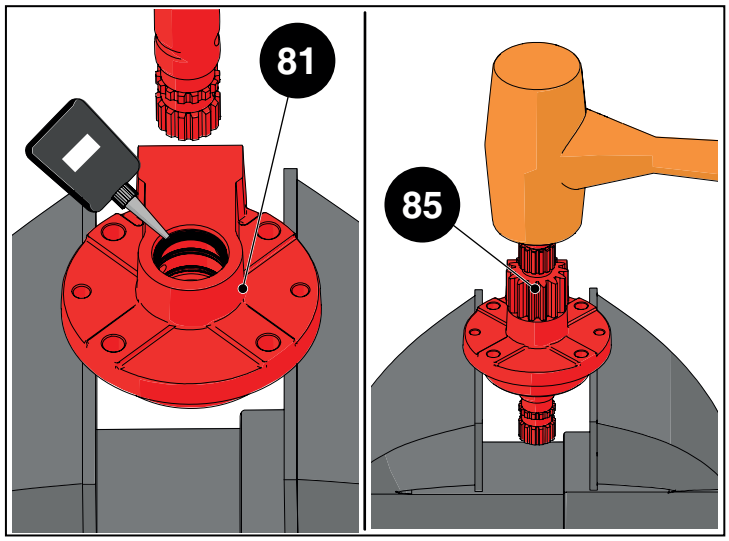


Fig. 5.235

Fit the Koening expander plugs (82) on the shaft mount (81) holes. Bend up the plugs using a pin.

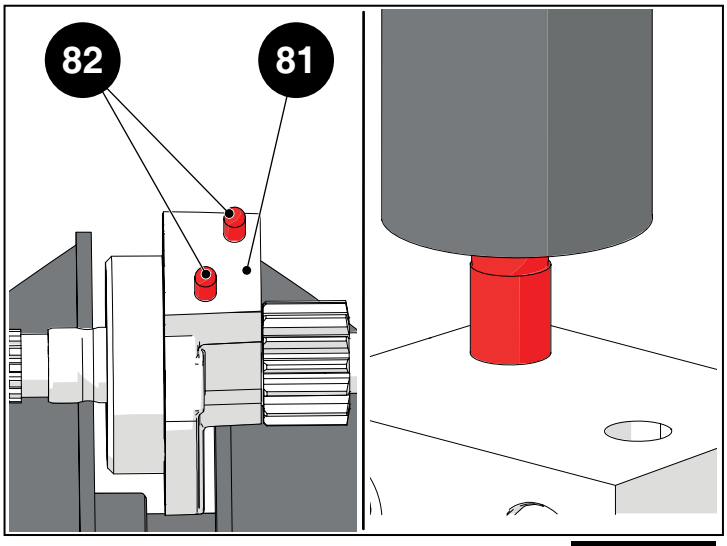


Fig. 5.236

Fit the roller bearing cage (109) and the spacer (110) inside the splined shaft (85). Apply a coating of grease to the components.

Position the O-rings (80). Apply a coating of grease to the O-rings to make them adhere.

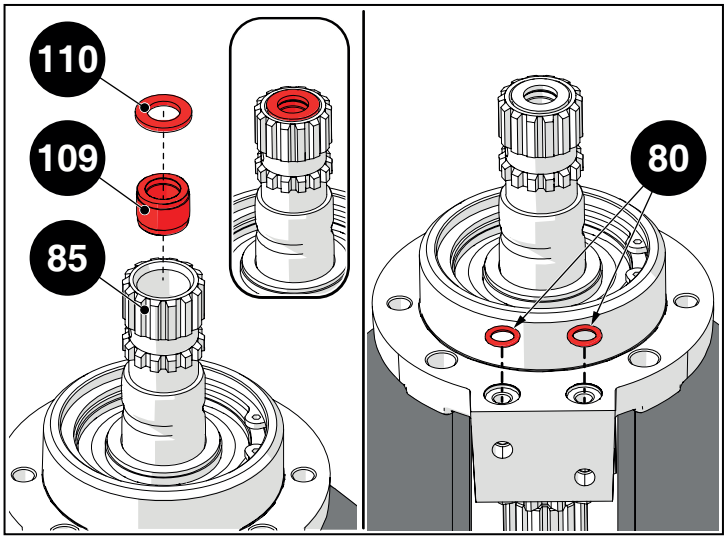


Fig. 5.237

Fit the complete support (81) on the gearbox casing (148), keying the shaft (85) with the shaft and the PTO clutch shaft (74).

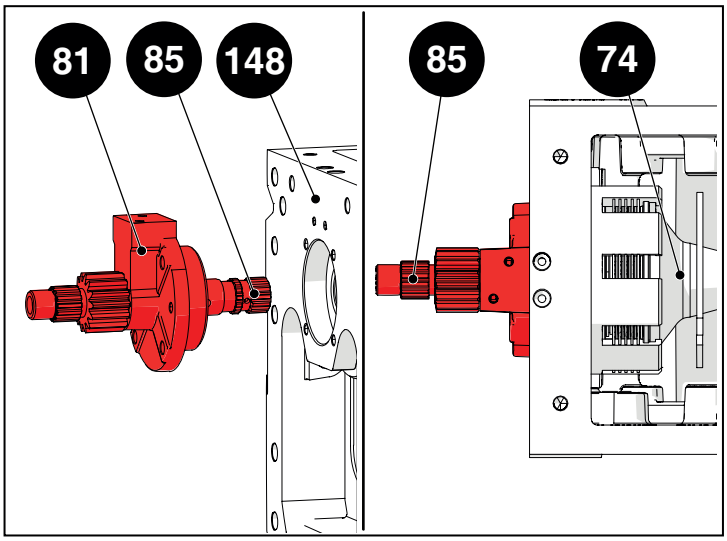


Fig. 5.238

Fasten the shaft mount (81) on the gearbox casing with the screws (111) and washers (112) tightening to a torque of 25 Nm (2.5 Kgm).

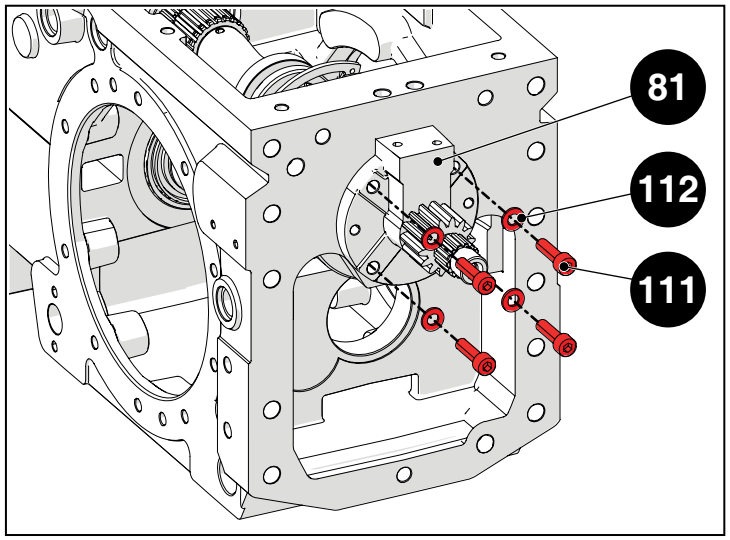


Fig. 5.239

Fasten the PTO clutch assembly (77) by fitting the circlip (76) left previously free on the shaft.

Key the sleeve (71) with the primary shaft and fasten the circlip (72).

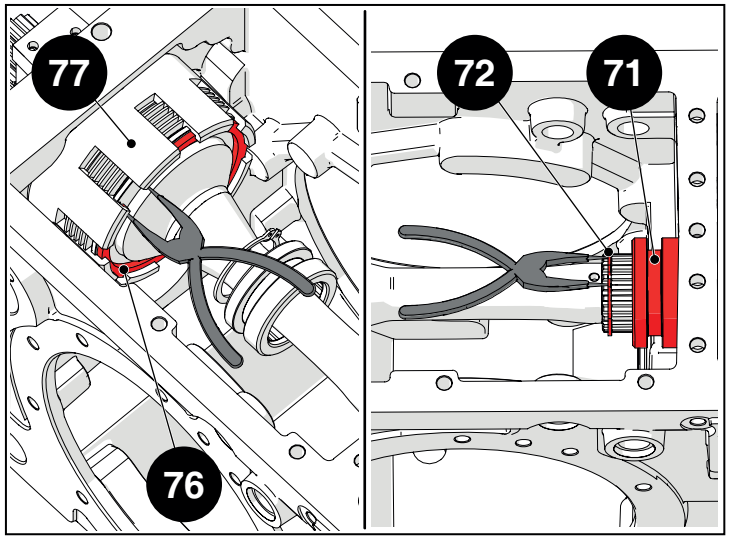


Fig. 5.240

Fasten the PTO selector plate (132) to the gearbox casing with the screws (133) and washers (134).

⚠ Warning
Do not tighten the screws completely.

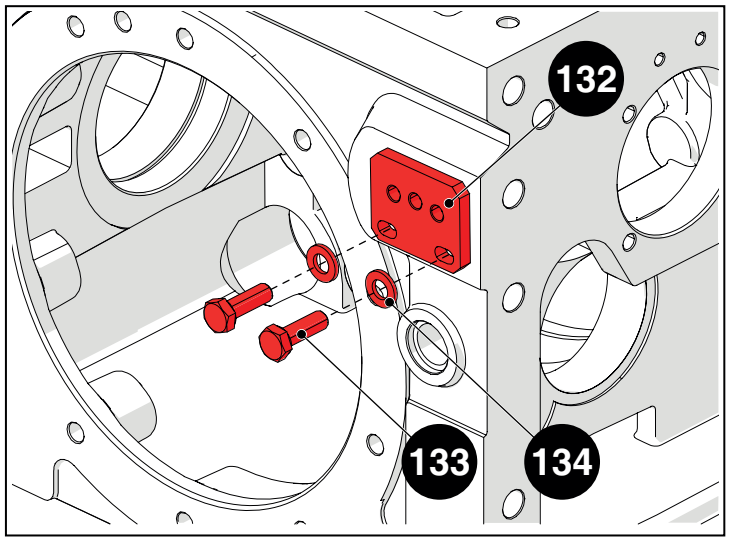


Fig. 5.241

Insert the PTO speed selector rod (157) with the end with the nearest hole facing the inside of the gearbox casing.

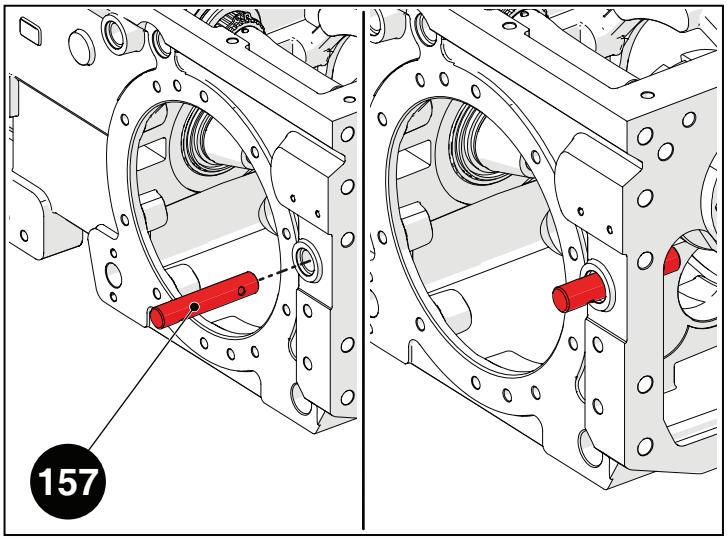


Fig. 5.242

Fit the bracket (158) on the rod (157) mating the holes. Secure the bracket (158) by inserting the pin (159).

Fit the fork (160).

Warning

Make sure that the end of the pin (159) does not touch the gearbox casing.

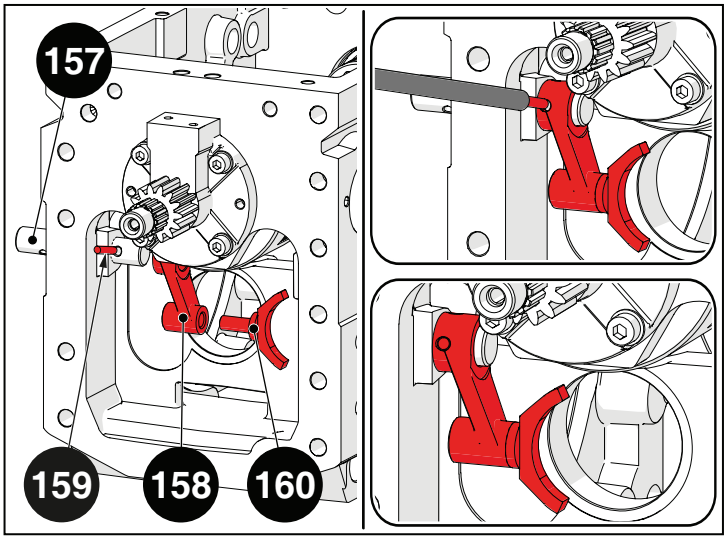


Fig. 5.243

RS and SN+ Cluster only

Fasten the PTO selector plate (135) on the gearbox casing with the screws (136) and washers (137).

Warning

Do not tighten the screws completely.

Note

The holes of the SN model plate are arranged differently compared to RS and SN+.

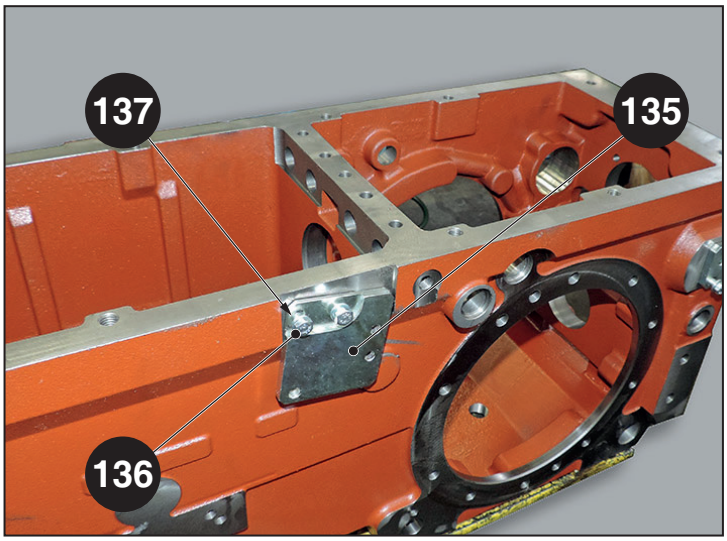


Fig. 5.244

RS and SN+ Cluster only

Preassemble the PTO selector rod (165) fitting the components below in the following order:

- O-ring (166);
- spacer (167);
- circlip (168).

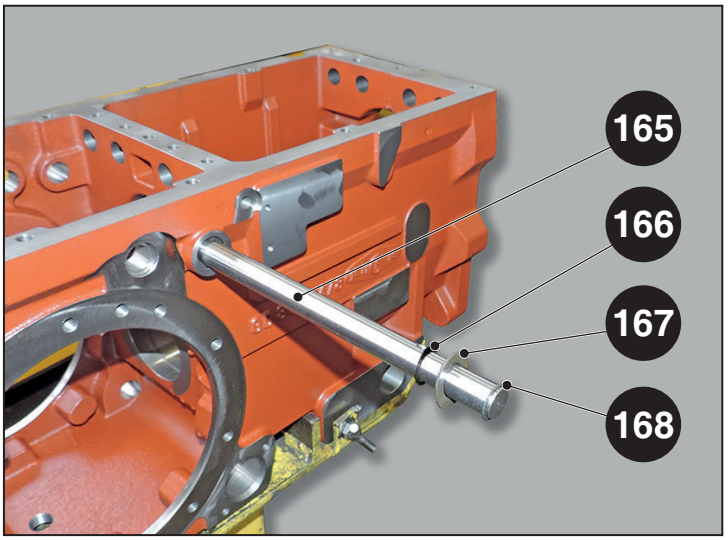


Fig. 5.245

RS and SN+ Cluster only

Fit the fork (169) on the lever (170) and then fit the complete lever (170) on the PTO selector sleeve (71).

Fit the rod (165) on the gearbox casing and on the lever (170).

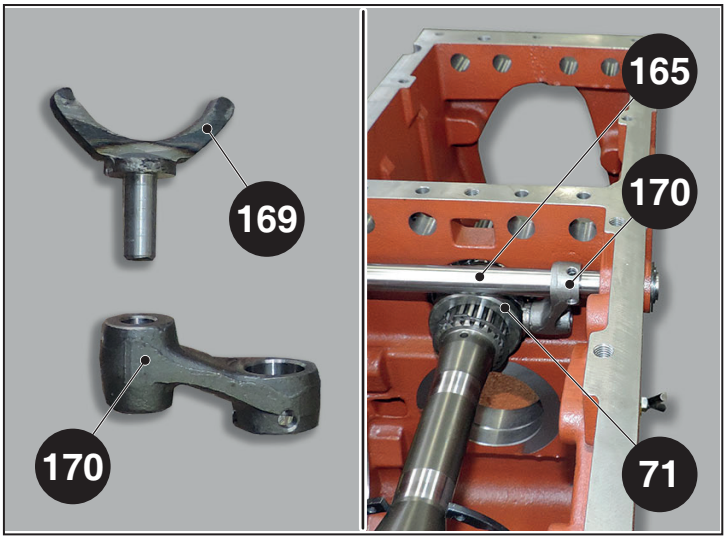


Fig. 5.246

RS and SN+ Cluster only

Fit the parts below on the rod in the following order:

- O-ring (166);
- spacer (167);

Fit the PTO selector lever (171), together with the spring (172) and selector pin (173).

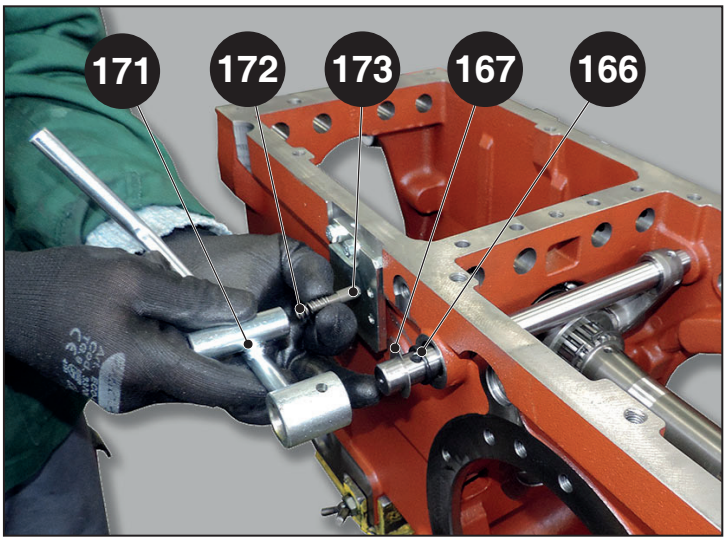


Fig. 5.247

RS and SN+ Cluster only

Lock the PTO selector lever (171) on the rod with the dual pin (174).

Lock the lever of the fork (170) on the rod with the dual pin (175).

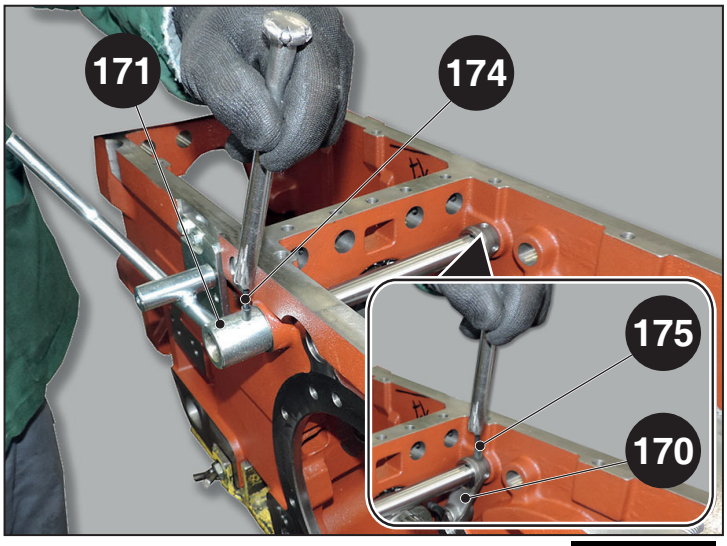


Fig. 5.248

REV Cluster only

Fasten the PTO selector plate (135) on the gearbox casing with the screws (136) and washers (137).

Warning
Do not tighten the screws completely.

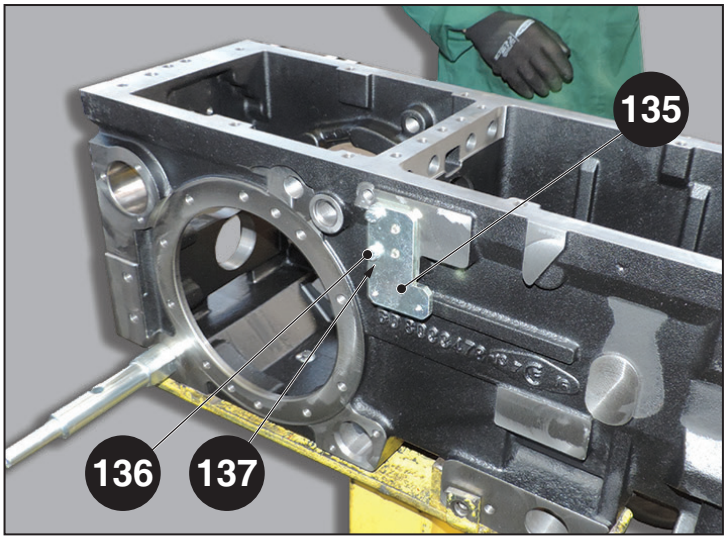


Fig. 5.249

REV Cluster only

Preassemble the PTO selector rod (165) fitting the components below in the following order:

- O-ring (166);
- spacer (167);
- circlip (168).

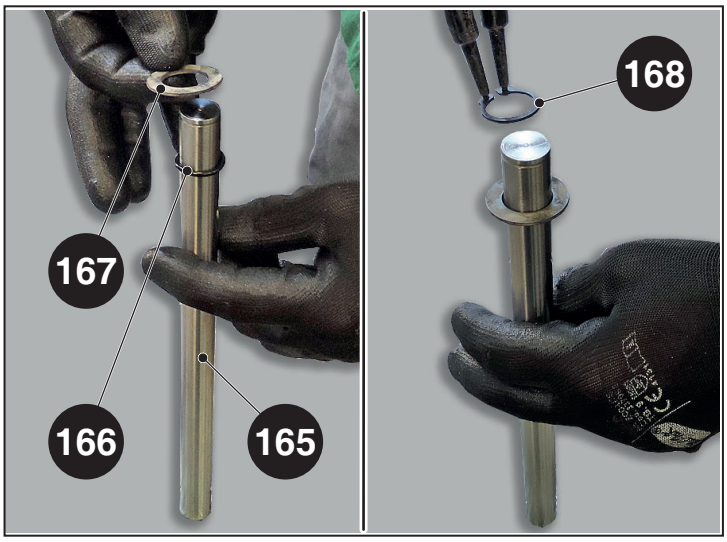


Fig. 5.250

REV Cluster only

Fit the rod (165) in the gearbox casing making sure to insert it in the lever (170).

Fit the O-ring (166) on the rod.

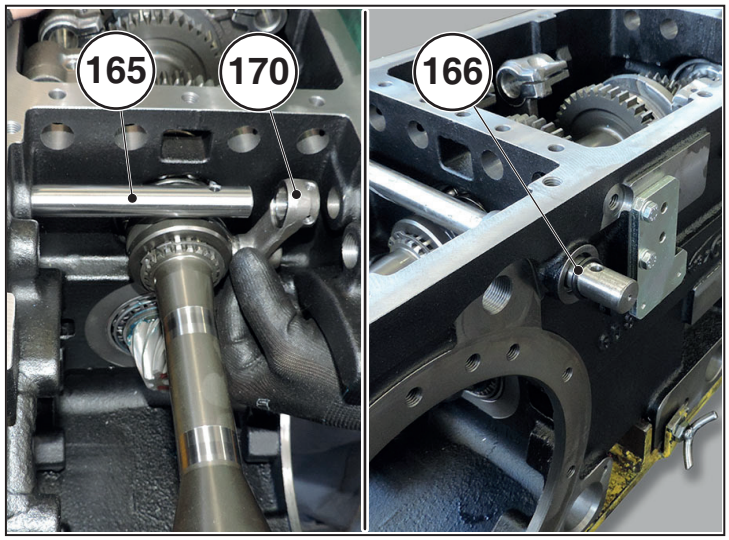


Fig. 5.251

REV Cluster only

Fit the lever (171) and insert the engagement pin (173) with the spring (172).

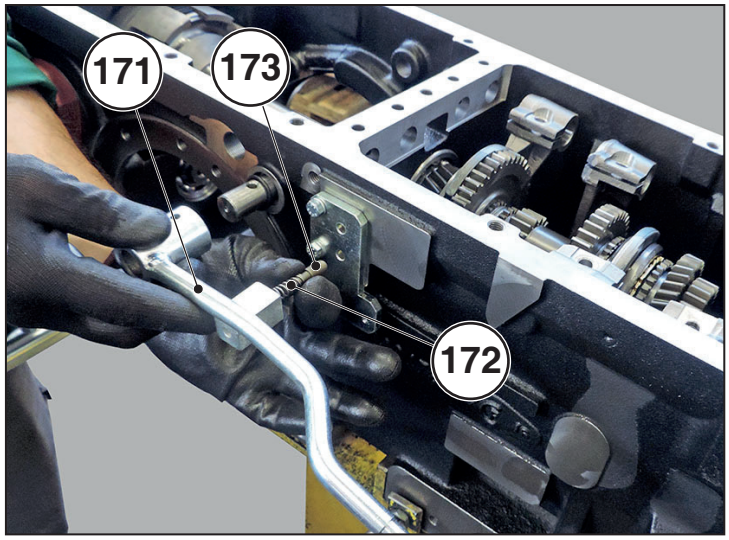


Fig. 5.252

REV Cluster only

Insert the dual pin (175) to secure the lever (170) on the rod.

Insert the dual pin (174) to secure the lever (171) on the rod.

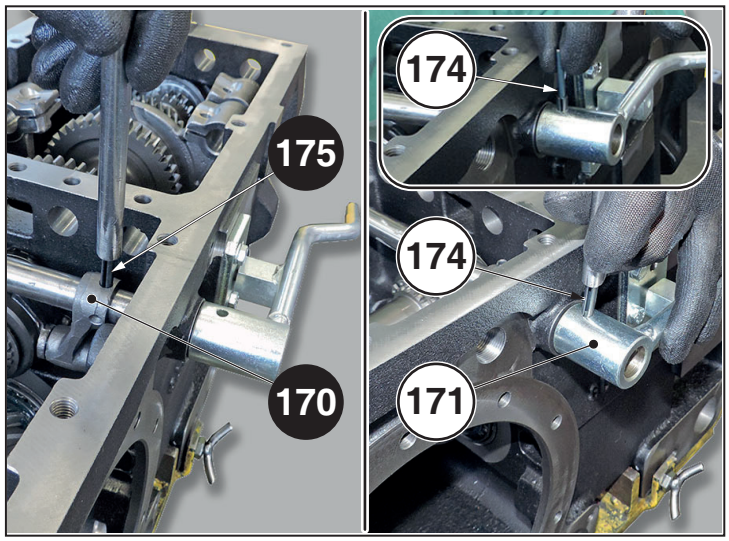


Fig. 5.253

REV Cluster only

Use a feeler gauge to check that the free play between the lever (171) and the gearbox casing is between 0.2 - 0.3 mm. If the free play is greater, a spacer needs to be added in that position.

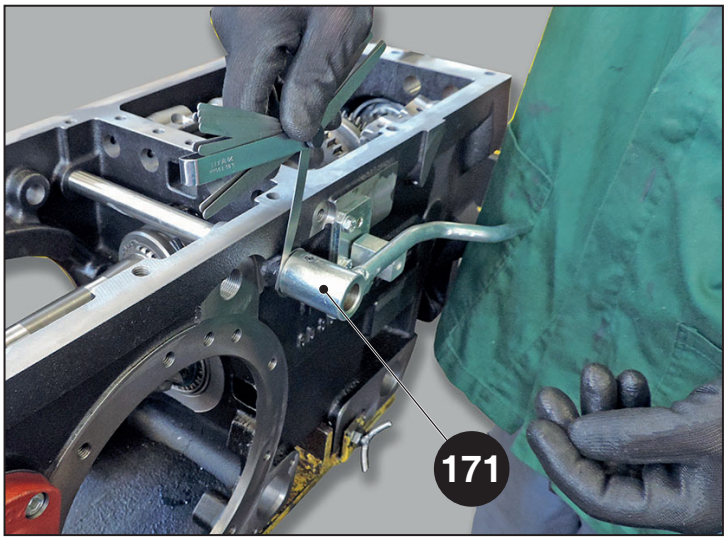


Fig. 5.254

Preassemble the PTO clutch cylinder:

- fit the O-ring (149) on the cylinder (150);
- fit the O-ring (151) on the piston (152) and apply a coat of grease;
- fit the pin (153) on the piston (152);
- insert the complete piston (152) into the cylinder (150) by aligning the pin (153) with the spline of the cylinder.



Fig. 5.255

Insert the complete clutch cylinder (150) onto the gearbox casing, taking care to align the holes of the fastener screws.

Warning

If the pin (153) is protruding, the cylinder cannot be inserted.

Drive in the pin with a hammer to eliminate the protrusion.

Fasten the cylinder (150) with the screws (154) and washers tightening to a torque of 25 Nm (2.5 Kgm).

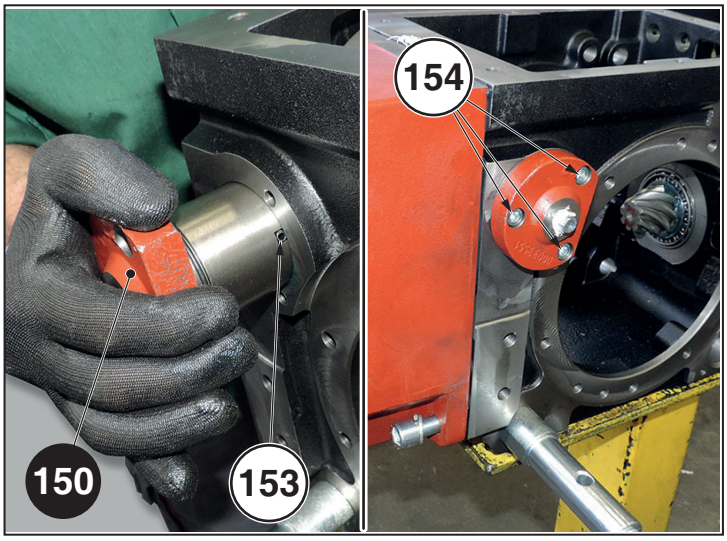


Fig. 5.256

Check the operation of the clutch cylinder (150) and the PTO clutch assembly (77): blow air into the holes shown in the figure, the components must engage correctly at the air inlet.

Warning

If air leaks occur, check all O-rings and Koening expander plugs of the PTO clutch assembly (77) and clutch cylinder (150).

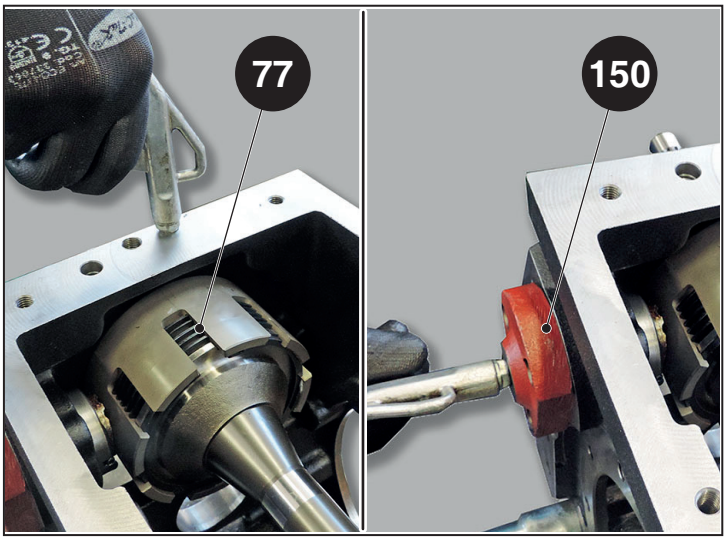


Fig. 5.257

Insert the following items in the lower (wider) hole of the rear cover (113):

- spacer (92);
- bearing (93), driving it into its seat with a punch tool of suitable diameter;
- circlip (94).

Warning

The circlip (94) must be integral with the bearing (93). Increase the spacer thickness (92) to make the two components integral; or decrease (or eliminate) it if the circlip (94) has no room to fit in.

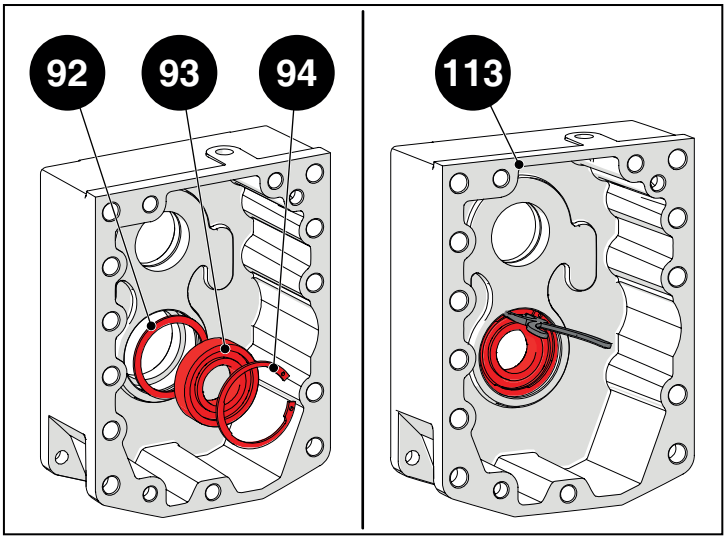


Fig. 5.258

Fit the PTO shaft (106) and drive it fully into the bearing (93).

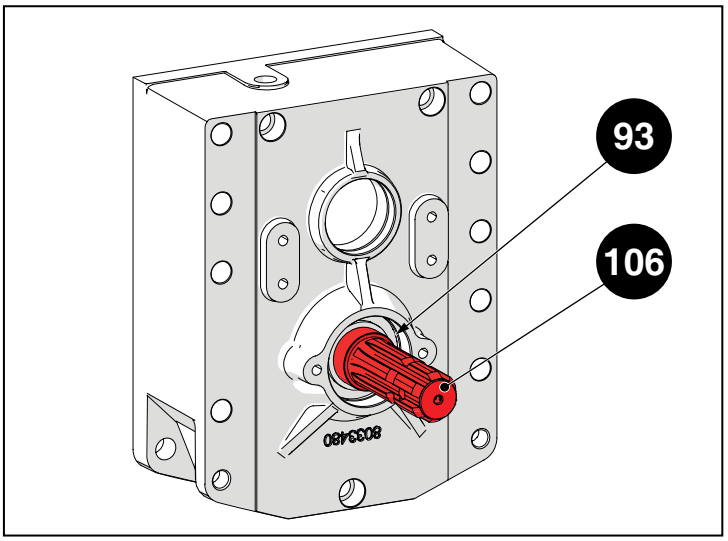


Fig. 5.259

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (95) by placing the narrow side facing the rear of the tractor;
- bush (101);

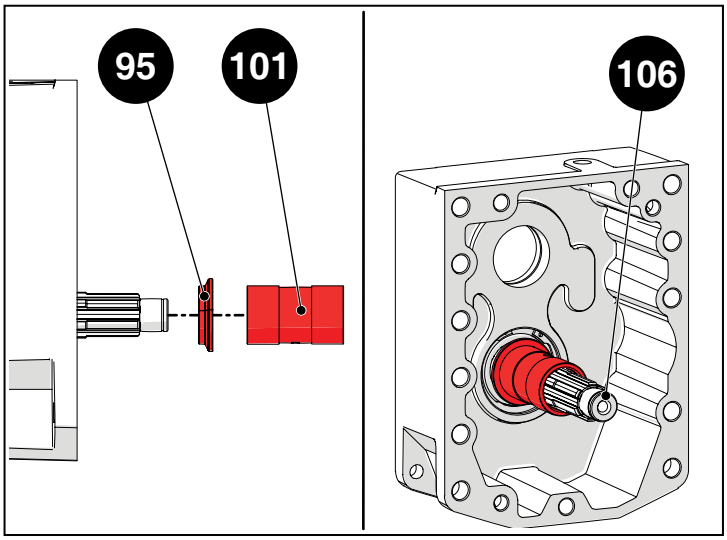


Fig. 5.260

Fit the following items on the front end of the PTO shaft (106) in the following order:

- PTO gear (96) directing it shown in the figure ;
- roller bearing cage (98);
- gear (97);

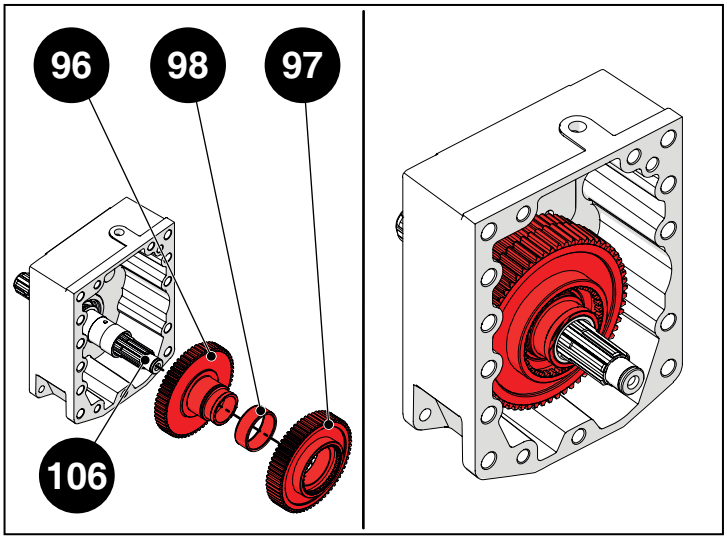


Fig. 5.261

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (99);
- circlip (100) fastening it on the PTO shaft (106);

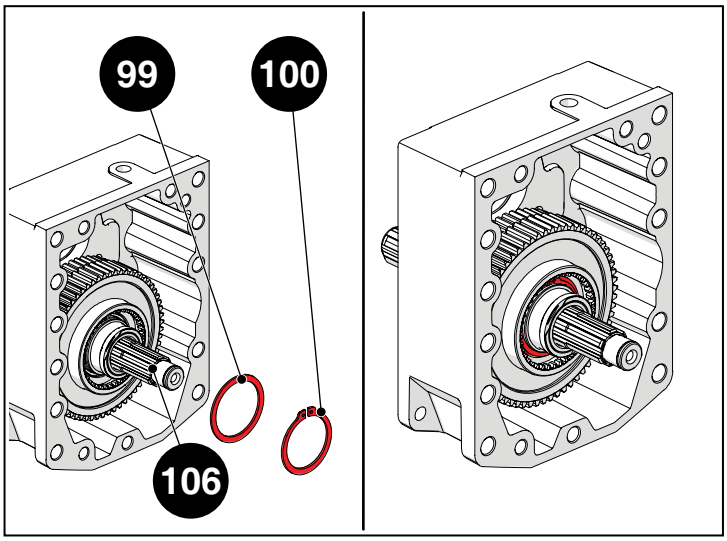


Fig. 5.262

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (102);
- ring nut retainer washer (103);
- ring nut (104).

Bend up the ring nut retainer washer (103) to secure the ring nut (104) permanently.

Warning

Bend up the ring nut retainer washer (103) on one side only.

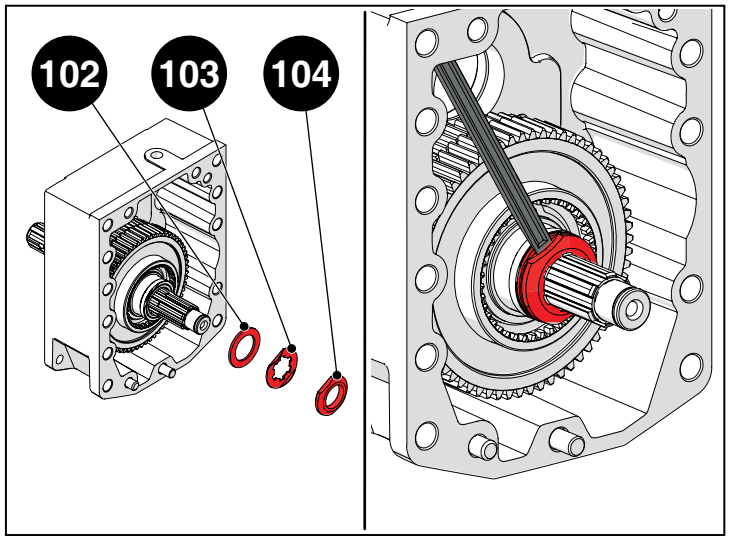


Fig. 5.263

Continue by fitting the following items on the PTO shaft (106) in the following order:

- PTO sleeve (105), keying it with the gear (97);

Warning

Make sure that the coupling of the sleeve (105) is smooth by rotating and keying it with the gear (97) in several points.

- bearing (108), driving it into its seat with a suitable punch tool;
- circlip (107) fastening it on the PTO shaft (106).

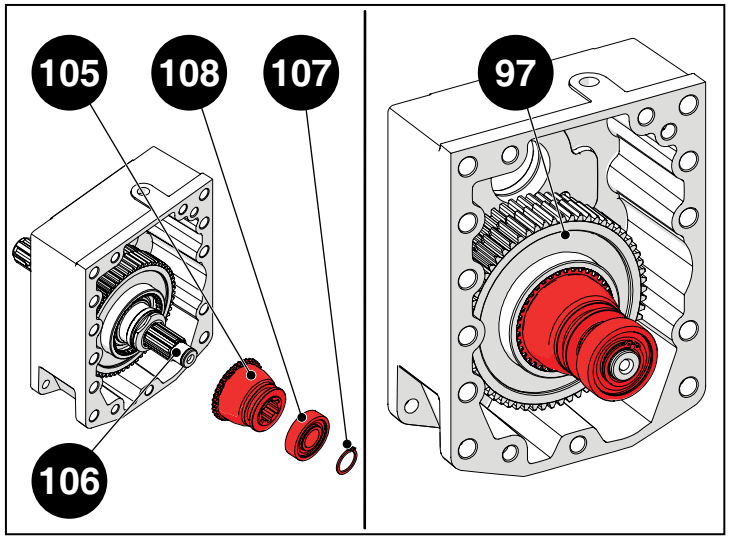


Fig. 5.264

Insert the centring pins (156) on the rear cover (113).

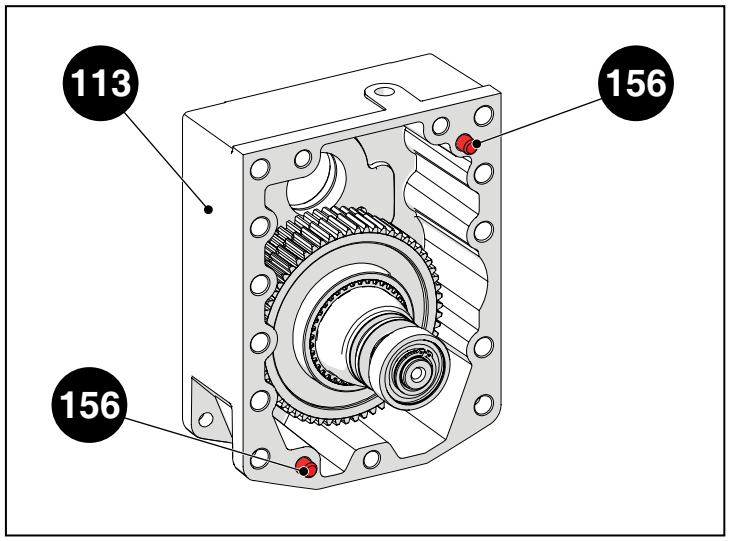


Fig. 5.265

Apply a coat of silicone sealant on the mating surface of the rear cover.

Apply a thread of silicone sealant on the mating surface of the gearbox casing near the splines.

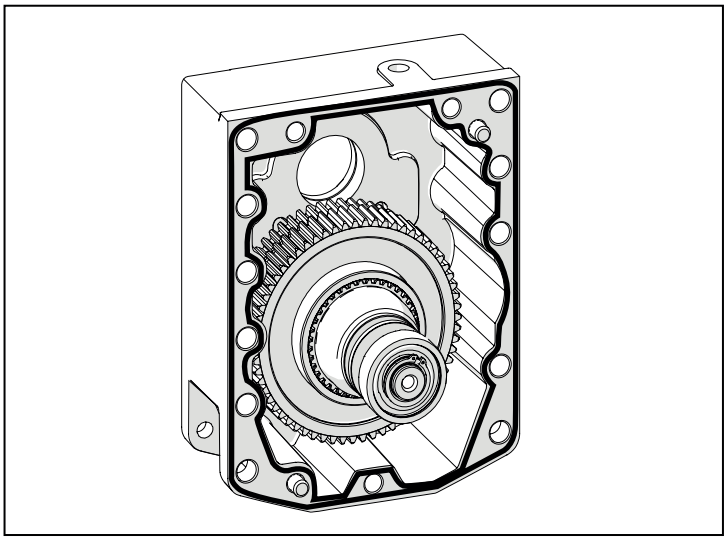


Fig. 5.266

Join the complete rear cover (113) on the gearbox casing.

> **Warning**
>
> Fit the fork (160) on the PTO sleeve (105) before mating the two assemblies.

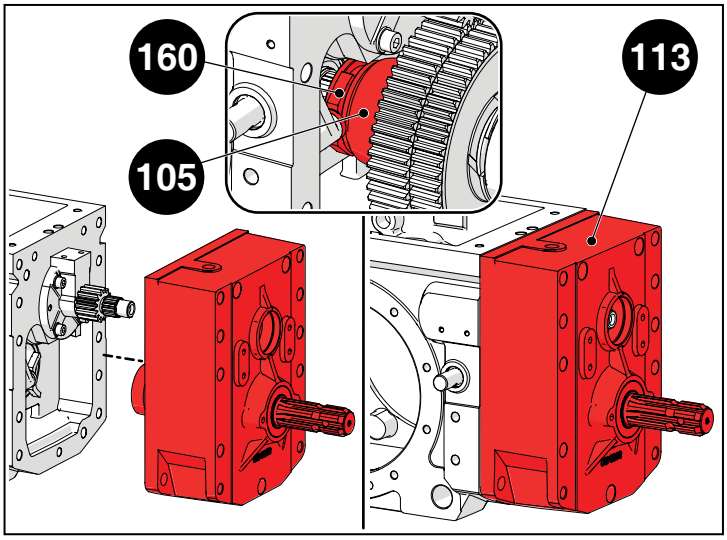


Fig. 5.267

Fasten the cover by tightening the screws (161) with the knurled washers (162), and the screws (163) with the conical washers (164).

Tighten the screws with a tightening torque of 85 Nm (8.5 kgm).

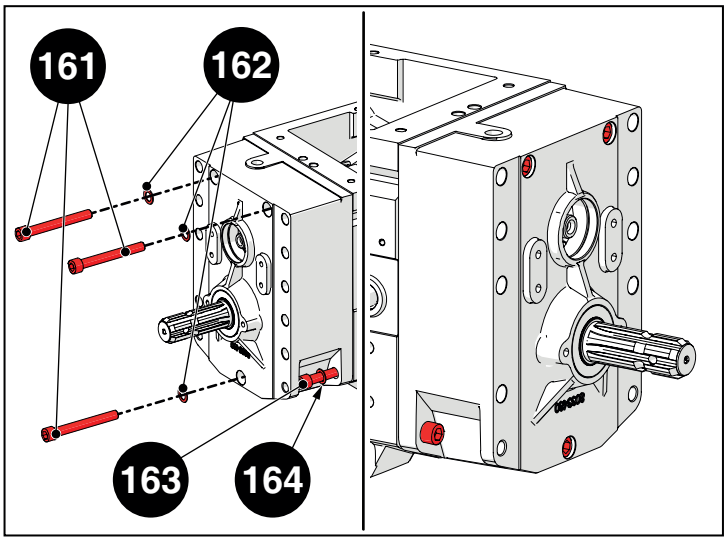


Fig. 5.268

Check the engagement of the PTO speed selector lever (157): insert a pin punch into the hole and apply leverage to the right and left to engage/disengage the lever; lever operation must be fluid.

Check that the PTO shaft (106) rotates correctly.

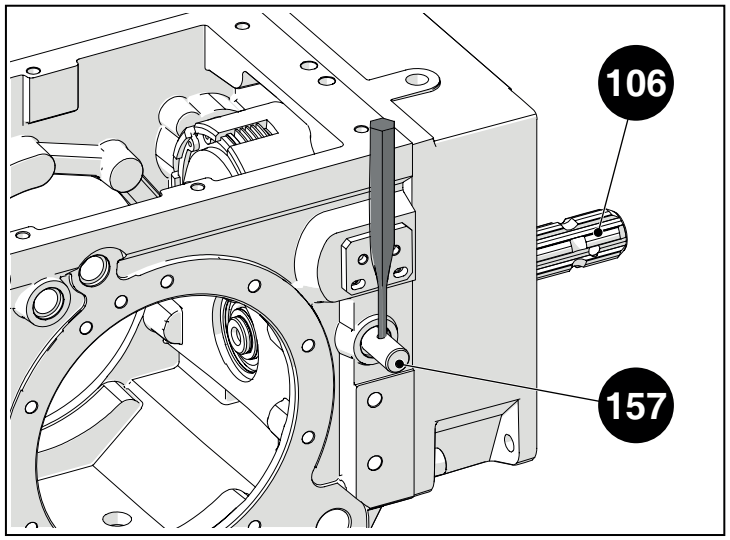


Fig. 5.269

Fit the gear (86) on the shaft (106), keying it with the gear (96).

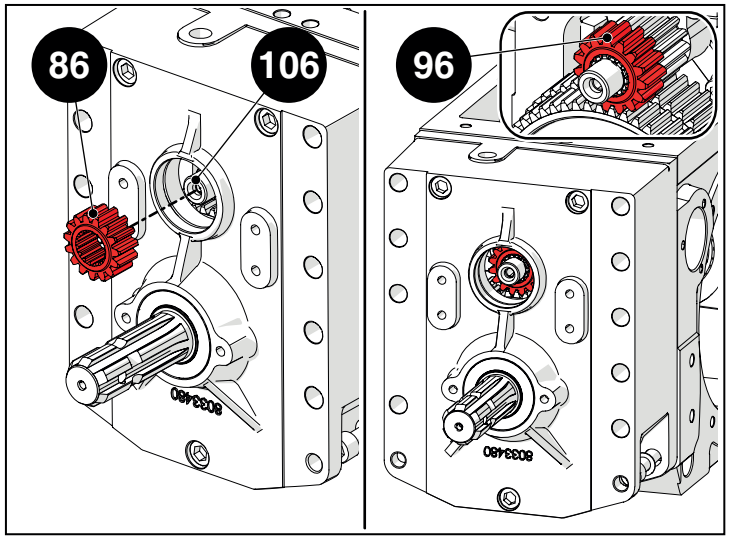


Fig. 5.270

Insert the inner bearing race (89) on the shaft (85). Then fit the bearing (89) and drive it fully into its seat with a punch tool of suitable diameter.

Warning
Before driving the bearing (89) in, make sure that it is not inserted distorted.

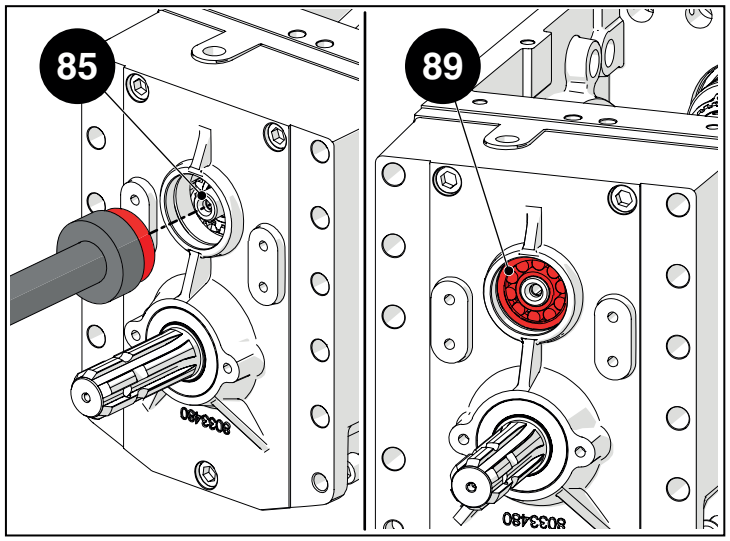


Fig. 5.271

Fit the spacer (87) and the circlip (88).

Make sure that free play between bearing (89) and the circlip (88) is between _____ - _____ mm. Otherwise vary the thickness of the spacer (87) until the indicated free play is obtained.

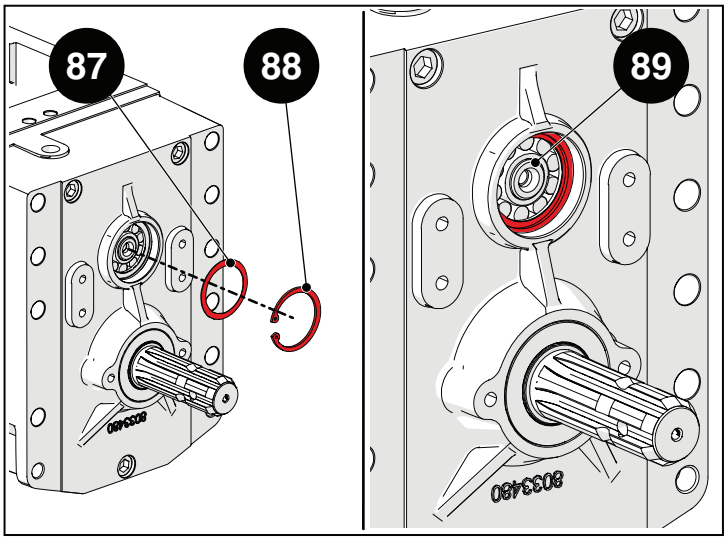


Fig. 5.272

Apply a coat of mastic sealant on the plug (90) and drive it into its seat with a suitable punch.

Lubricate the oil seal (91) and insert it on the PTO shaft (106) using a guide tool of suitable diameter and a punch tool.

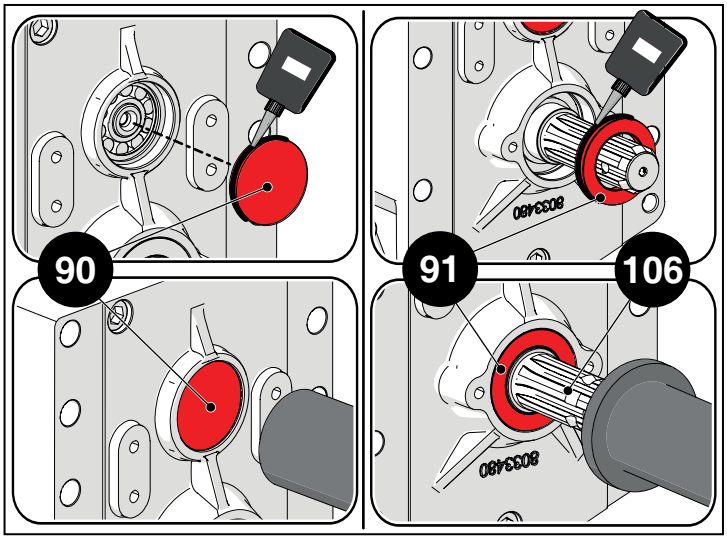


Fig. 5.273

Fit the O-ring (176) and the spacer (177) on the PTO speed rod (157).

Fit the PTO speed lever (178), together with the engagement pin (179) with the spring (180). Make sure to match the hole on the lever with the one on the rod.

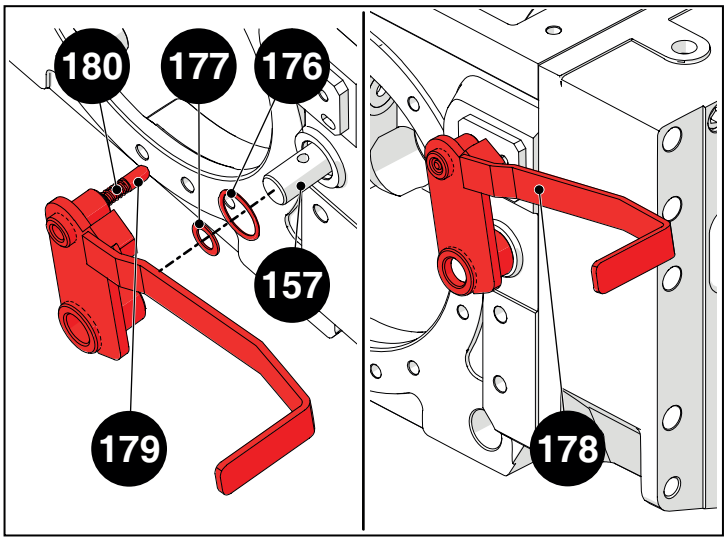


Fig. 5.274

Secure the lever on the rod by inserting the pin (159).

Use a feeler gauge to check that the free play between the lever (178) and the gearbox casing is between 0.2 - 0.3 mm. Otherwise vary the thickness of the spacer (177) until the indicated free play is obtained.

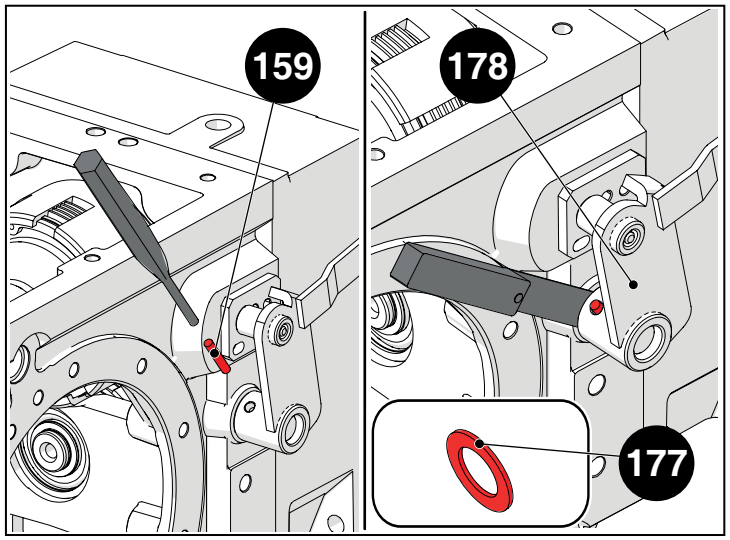


Fig. 5.275

Adjust the PTO speed lever (178) by moving the plate (132), gently tapping it with a pin and a mallet until the desired result is achieved:

- the lever (178) must have the same free play in the forward position (A) and back position (C);
- the engagement of the forward and backward gears must be equidistant from the central position (B).

In addition, make sure that the lever (178) is operated smoothly.

Warning

Make sure that the plate fastener screws (133) are not completely tightened.

Once the adjustment is completed, tighten the fastener screws of the plate (133) completely.

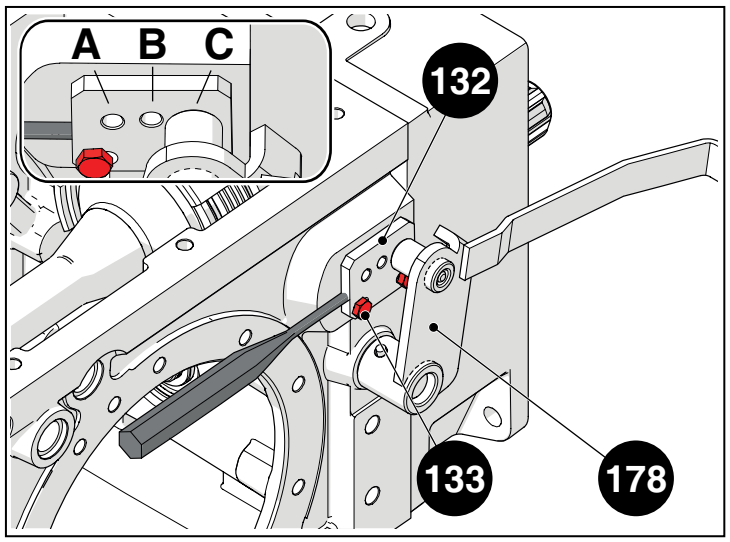


Fig. 5.276

Adjust the PTO selector lever (171) by moving the plate (135), gently tapping it with a pin and a mallet.

Warning

Make sure that the plate fastener screws (135) are not completely tightened.

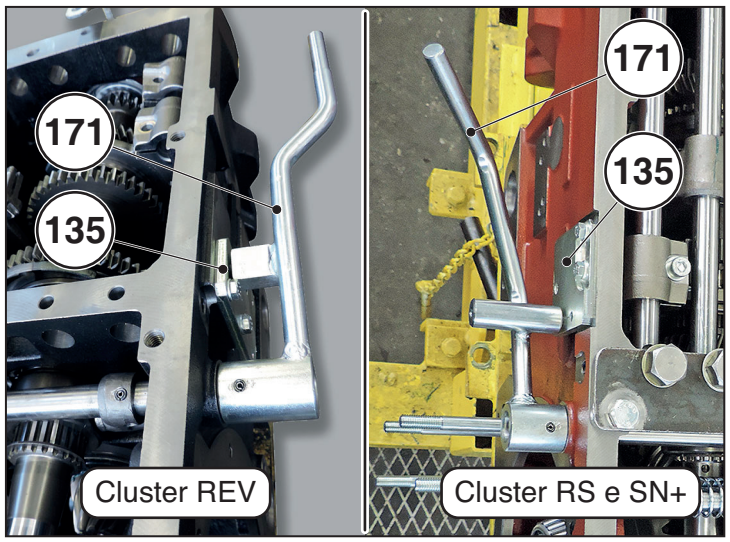


Fig. 5.277

The lever (171), shown in the figure (5.277) must have the same free play in the up and down position.

The distance X between the sleeve (71) in back position and the circlip (56) must be equal to the distance Y between the sleeve in forward position and the circlip (29); in any case , avoid that the distance Y is less than the distance X.

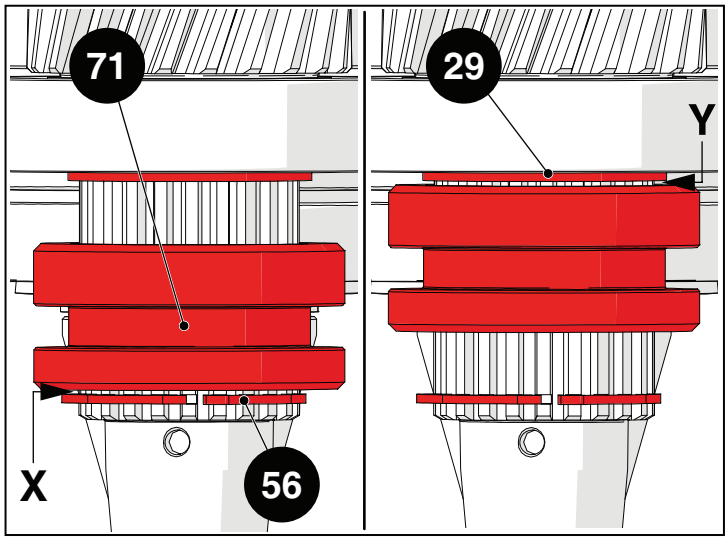


Fig. 5.278

Once the adjustment is completed, tighten the fastener screws (136) of the plate completely.

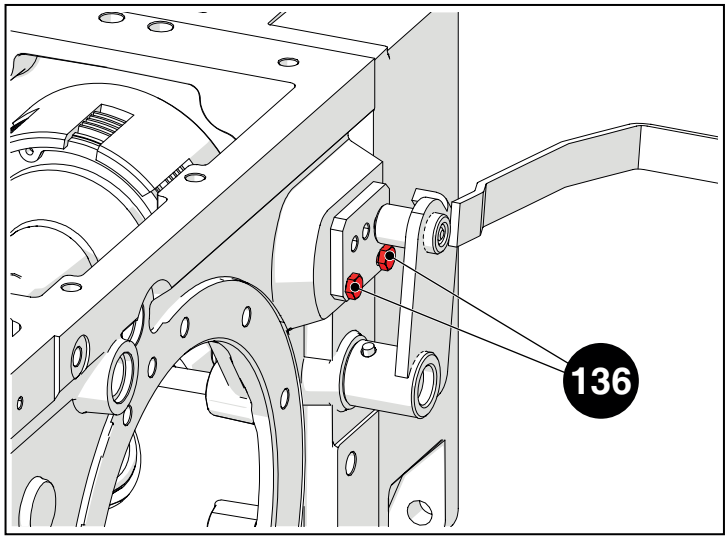


Fig. 5.279

5.1.1.4 Reassembling the differential

Tighten the stud bolts (182) on the gearbox casing.

> **Warning**
>
> Screw the end with the shorter threaded shank.

> **Warning**
>
> **For SN+ model**
>
> The stud bolt (182) in the three topmost holes are shorter than the others.

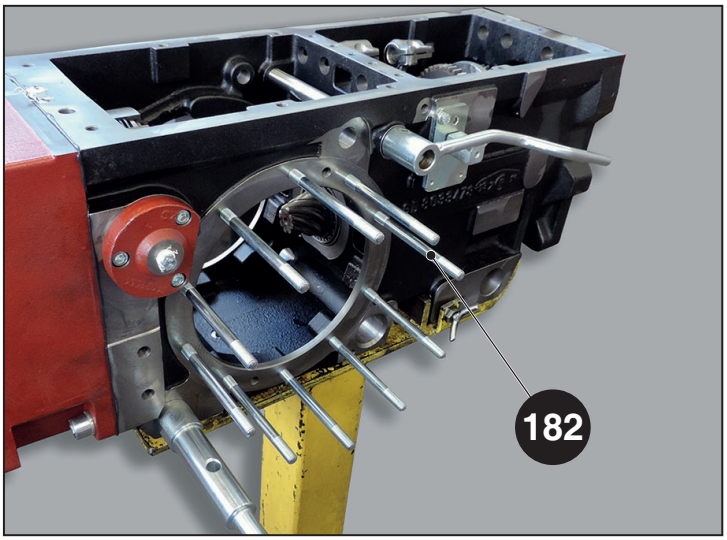


Fig. 5.280

Grease the sun gear of the complete crown wheel assembly (119) and fit the inner bearing races (183) using a punch of suitable diameter.

> **Warning**
>
> To preassemble the complete crown wheel assembly (119), see the Chapter “Disassembling/ Assembling the differential crown wheel".

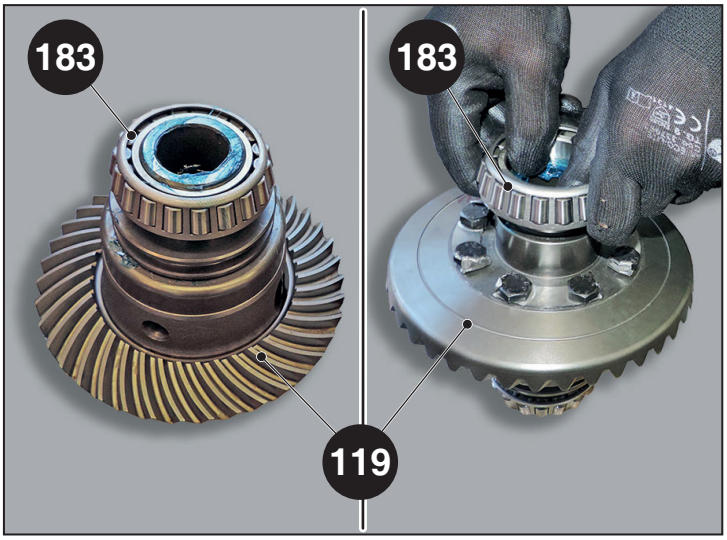


Fig. 5.281

Position the complete crown wheel assembly (119) inside the gearbox casing.

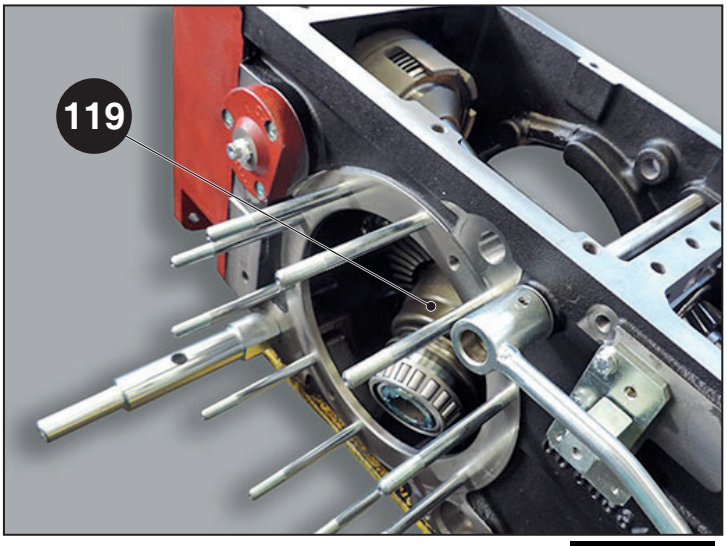


Fig. 5.282

Insert the outer bearing races (183) on the brake casings (184), driving them in with a punch tool of suitable diameter.

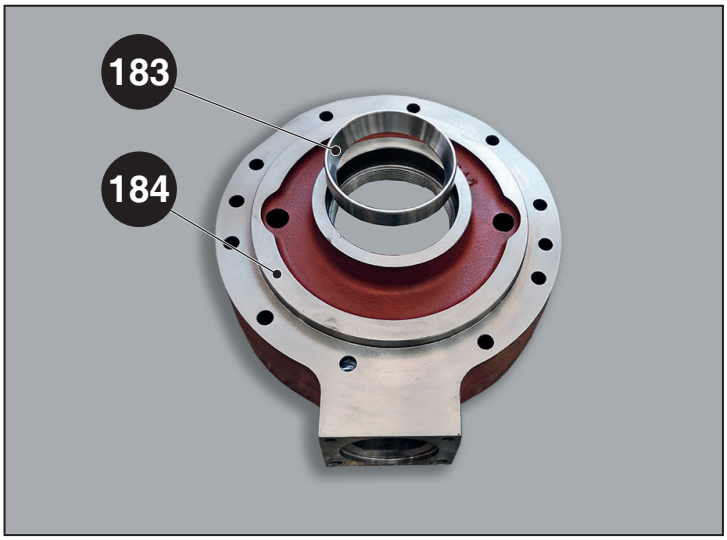


Fig. 5.283

Apply a layer of silicone sealant on the mating surfaces of the gearbox casing and brake casings.

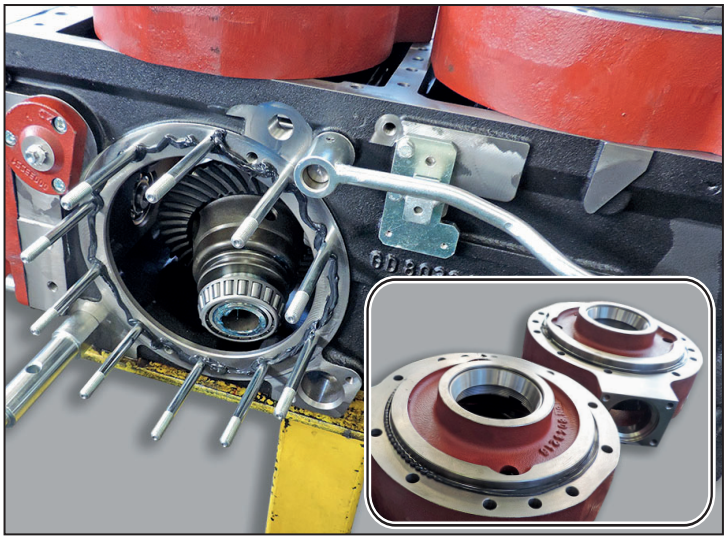


Fig. 5.284

Straighten the complete crown wheel assembly (119), then fit the brake casings (184) **without driving them completely in**.

Match the inner bearing races (183) mounted on the complete crown wheel assembly (119), with the outer races mounted on the brake casings.

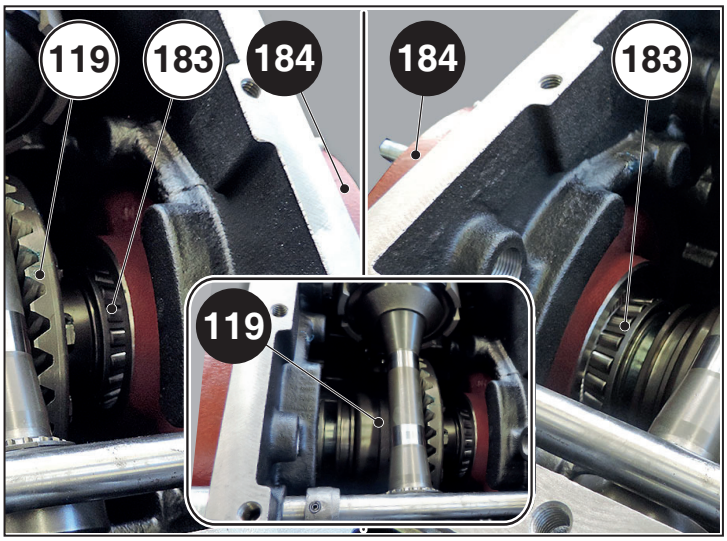


Fig. 5.285

Fit the washers (185) and the fastener screws (186) in the holes on the brake casings (184).

Make sure that the brake casings (184) match with the gearbox casing and then tighten the screws (186) completely. Tighten the screws to a torque of 55 Nm (5.5 kgm).

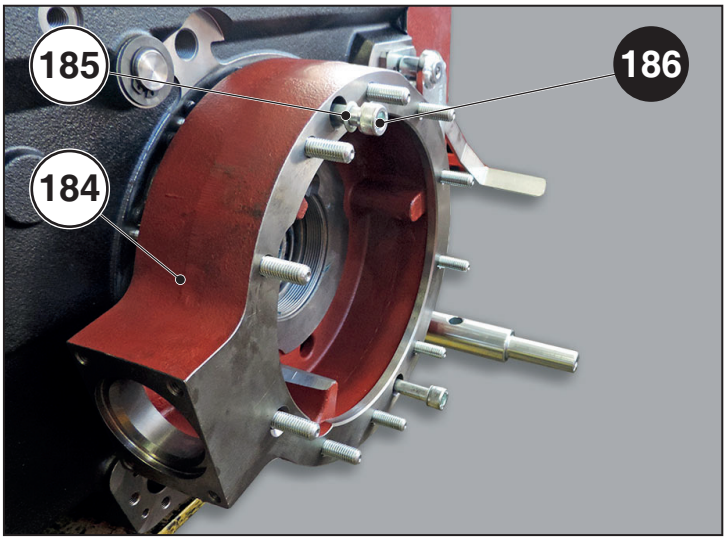


Fig. 5.286

Using the special tool (C-p/n_____), tighten the ring nut (187) on the crown wheel pack side and unscrew it by 3 splines, taking the ring nut retainer hole as reference.

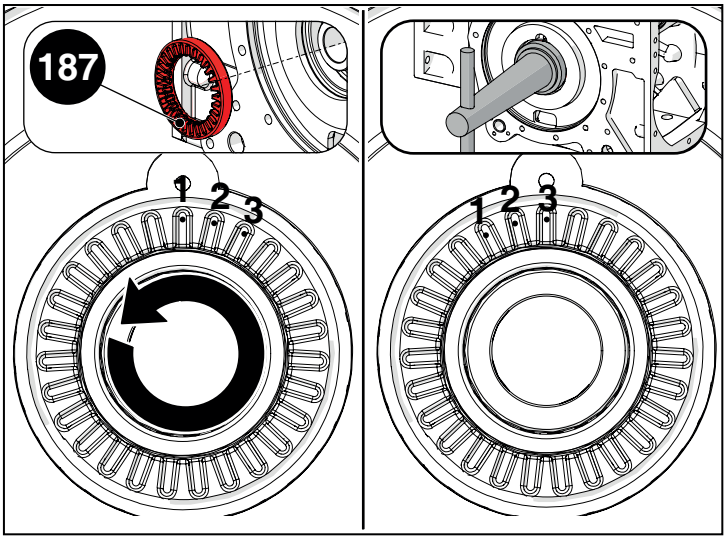


Fig. 5.287

Using the special tool (C-p/n_____), tighten the ring nut (187) on the side opposite the crown wheel pack and pretension by screwing it by another 1-2 splines.

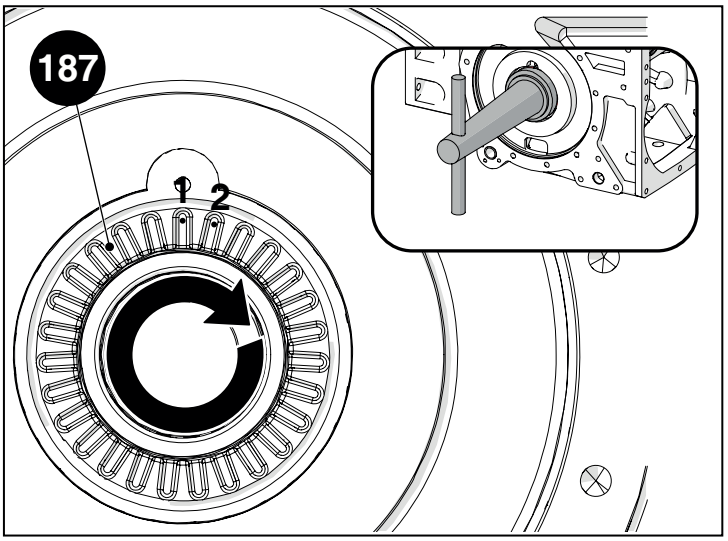


Fig. 5.288

Secure the bevel gear set using a punch tapping first on the crown wheel side and then on the opposite side.

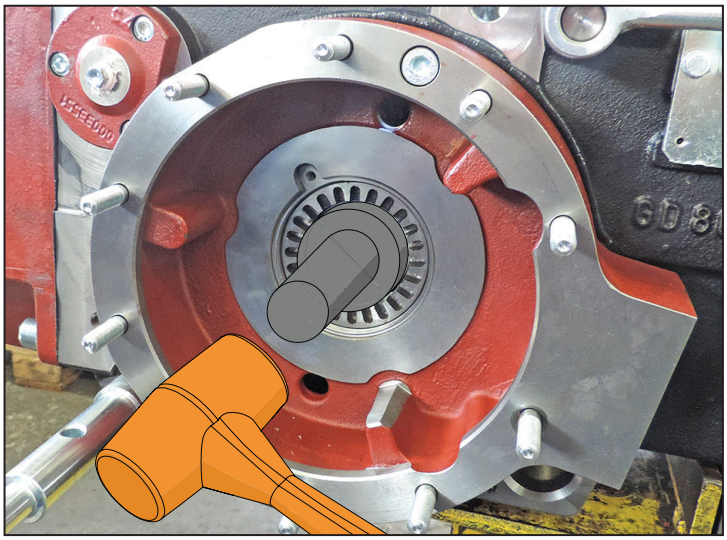


Fig. 5.289

Lock the crown wheel side ring nut retainer (187) by tightening the ring nut retainer (188).

Using the special tool (C-p/n_____), loosen the ring nut (187) on the side opposite the crown wheel and tighten it again against the set. Tighten it by another spline.

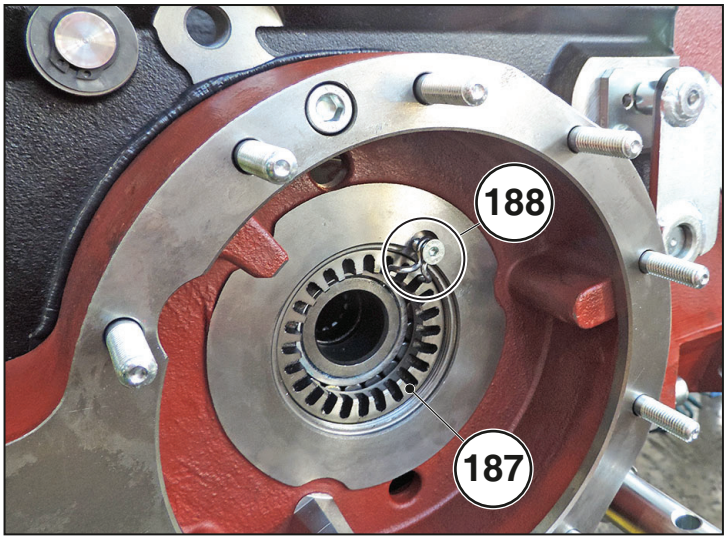


Fig. 5.290

Apply the probe of a dial gauge with a magnetic base against one of the teeth of the crown wheel (119) and reset the dial gauge.

Move the crown wheel (119) 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: unscrew the ring nut (187) on the crown side and tighten the ring nut by an equivalent number of splines.

If the backlash is greater than the correct value: screw the ring nut (187) on the crown side and loosen the ring nut by an equivalent number of splines.

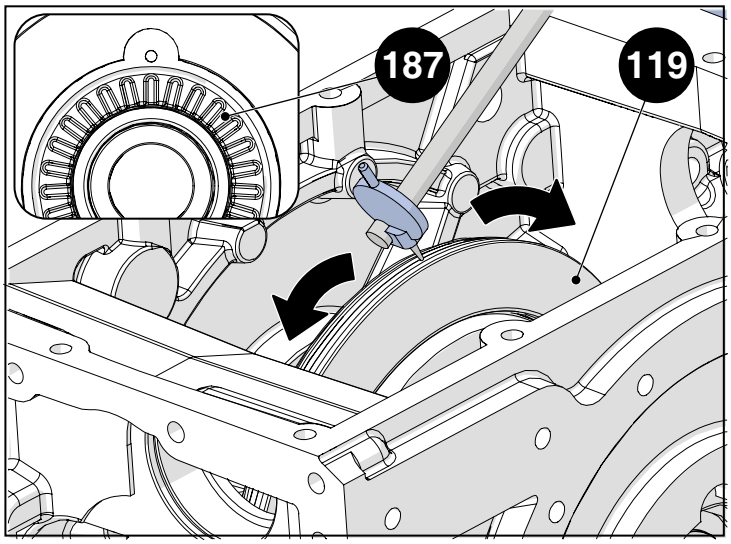


Fig. 5.291

Tighten the ring nut retainers (188) on both sides.

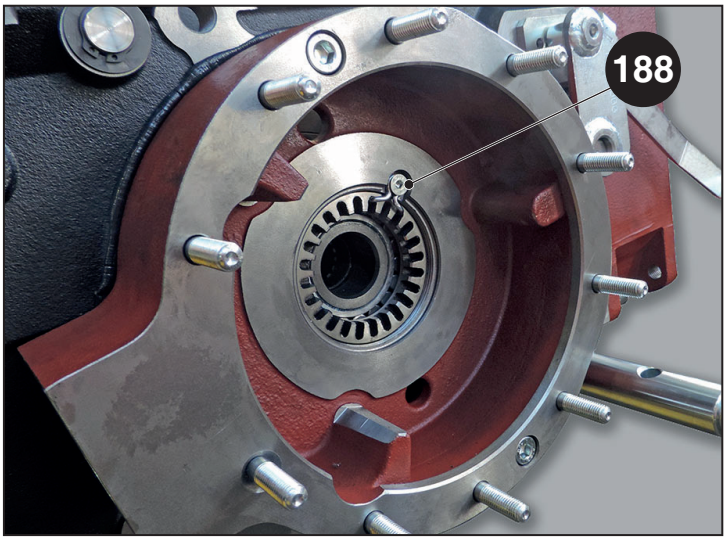


Fig. 5.292

RS and SN+ Cluster only

Insert the rod (201) from the grooveless end on the gearbox casing from the left side. Insert it also in the spring (202) and in the fork (194).

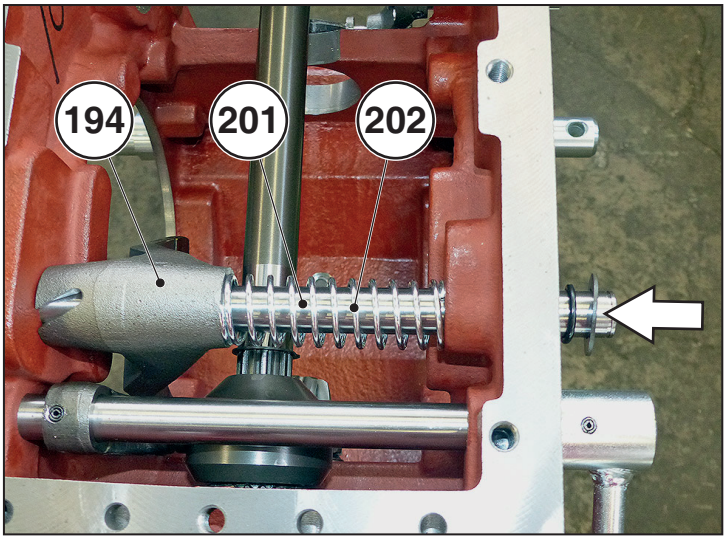


Fig. 5.293

RS and SN+ Cluster only

Fit the circlip (201), O-ring (203) and washer (204) and the circlip (205).

Secure the fork (194) on the rod (201) with the pin (207).

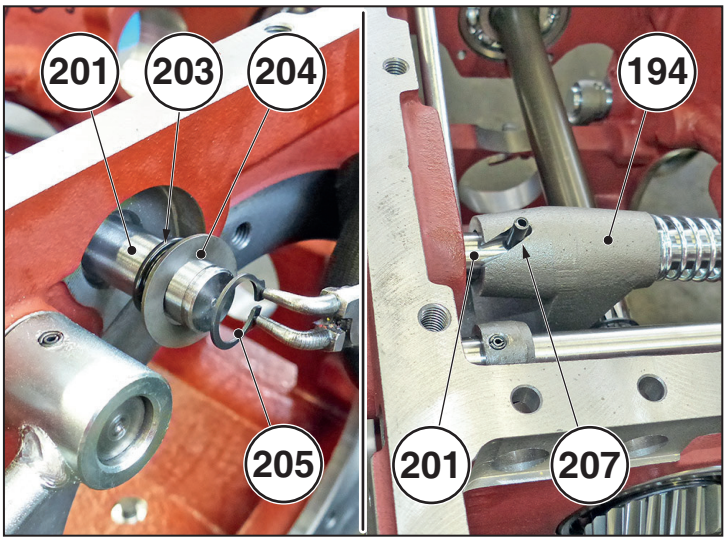


Fig. 5.294

RS and SN+ Cluster only

Insert the following from the right end of the rod (201) in the following order:

- O-ring (203);
- spacer (251);
- lever (206).

Insert the pin (207) to secure the lever (206) on the rod.

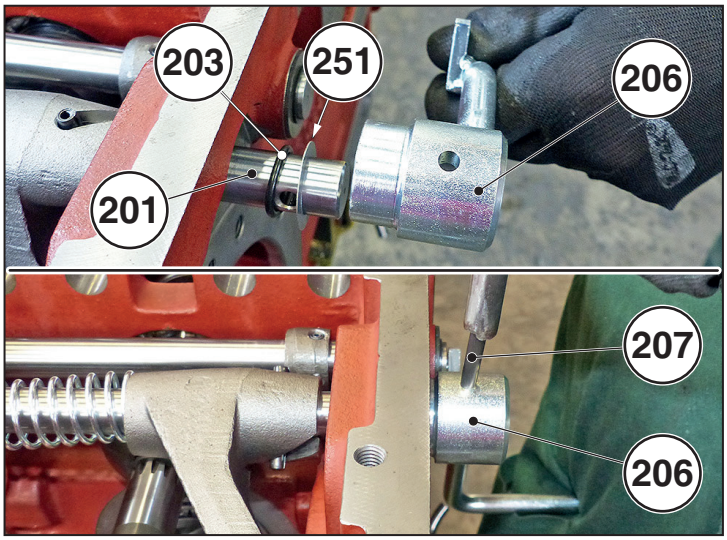


Fig. 5.295

5.1.1.5 Refitting the differential lock hydraulic lever (REV Cluster)

Apply a coating of Teflon to the thread of the spindle (189).

Insert the copper washer (190) and fit the check nut (191).

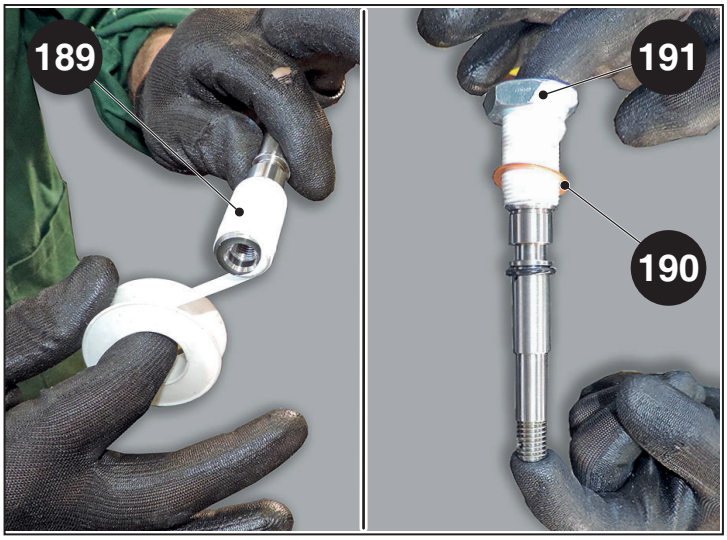


Fig. 5.296

Insert the two O-rings (193) inside the differential lock fork groove (194). Lubricate the O-rings.

⚠ Warning
Make sure that the O-rings are fit correctly in the groove.

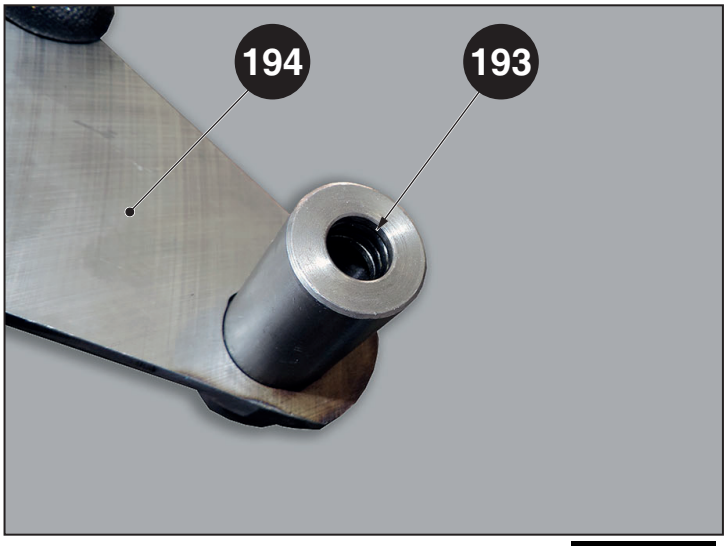


Fig. 5.297

Fit the fork (194) on the differential lock ring (114).

Move the fork completely to the right (differential disengaged).

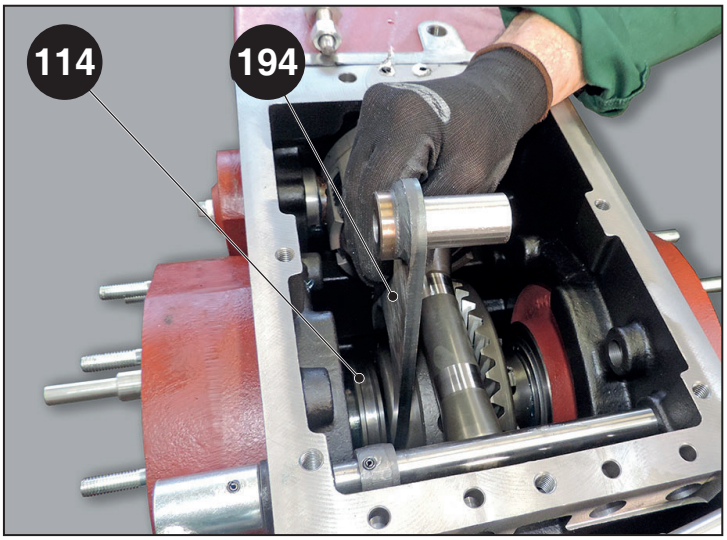


Fig. 5.298

Insert the two O-rings (192) on the spindle (189) groove. Lubricate the O-rings once fit into place.

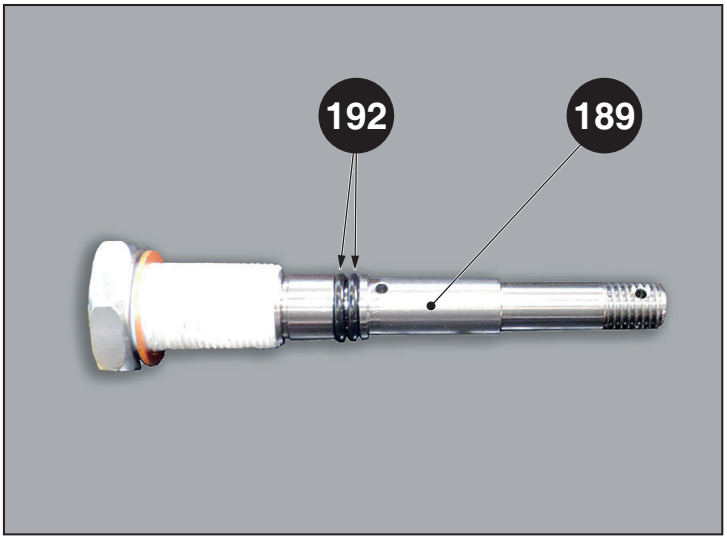


Fig. 5.299

Tighten the special tool (D-p/n _____) on the spindle (189).

Tighten the spindle (189) complete with the special tool (D) on the gearbox casing. Continue to tighten until the thread becomes visible between the fork (194) and the casing.

Warning
Make sure that the O-rings on the spindle remain in their place.

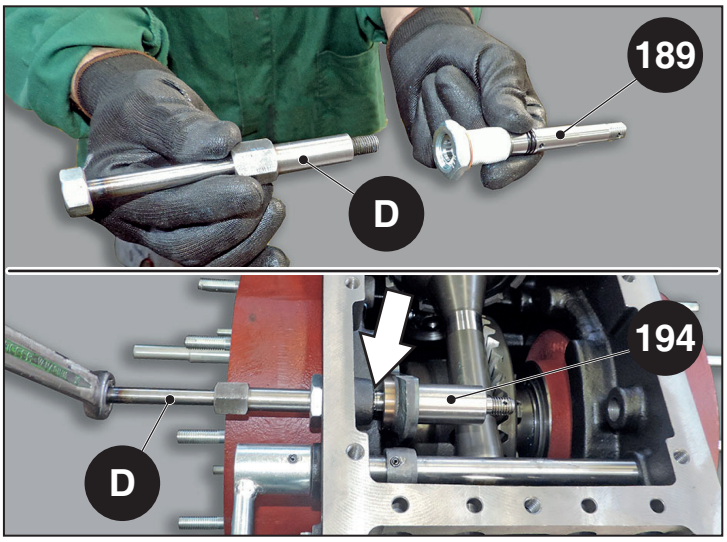


Fig. 5.300

Apply LOCTITE 243 to the thread of the spindle (189).

Fit the spring (195) and screw the bush (196) pack-tight.

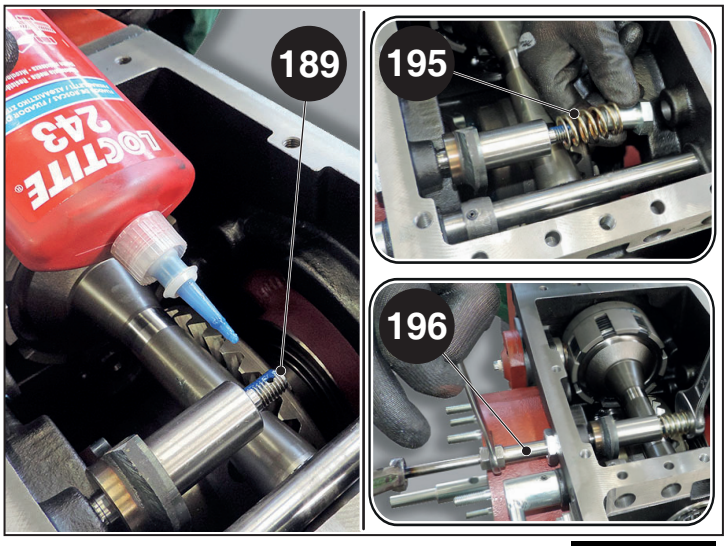


Fig. 5.301

Apply LOCTITE 243 to the thread of the pin (197). Tighten the pin (197) completely on the bush (196) and then secure it with the check nut (198).

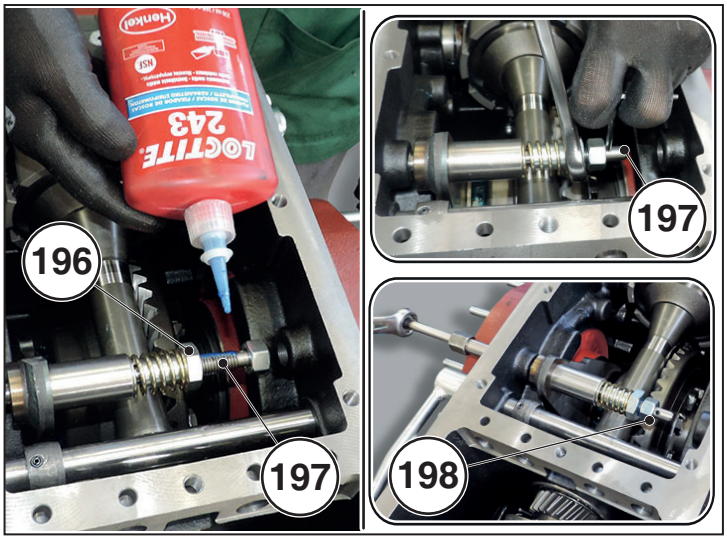


Fig. 5.302

Tighten or loosen the spindle (189) to determine the two free plays:

1 - free play at rest with differential not engaged (fork to the right) to prevent pre-engagement at rest;

2 - free play with differential engaged (fork to the left), between the fork (194) and the differential lock ring (114), to prevent the fork (194) from straining the ring (114) against the differential case (116).

Once the second free play is adjusted, move the fork (194) back to the right (differential not engaged) and make sure that the free play at rest has not been changed. In this case, readjust the first free play.

Warning
Check the insertion of the differential several times.

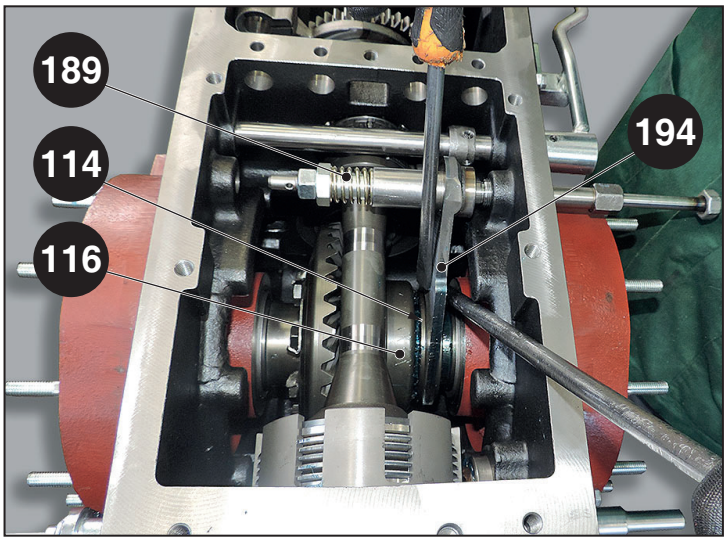


Fig. 5.303

Before removing the special tool ((D-p/n _____), check the distance between the fork (194) at rest and the gearbox casing.

Loosen the special tool (D-p/n _____).

Check the distance measured to make sure that it has not been altered when removing the tool.

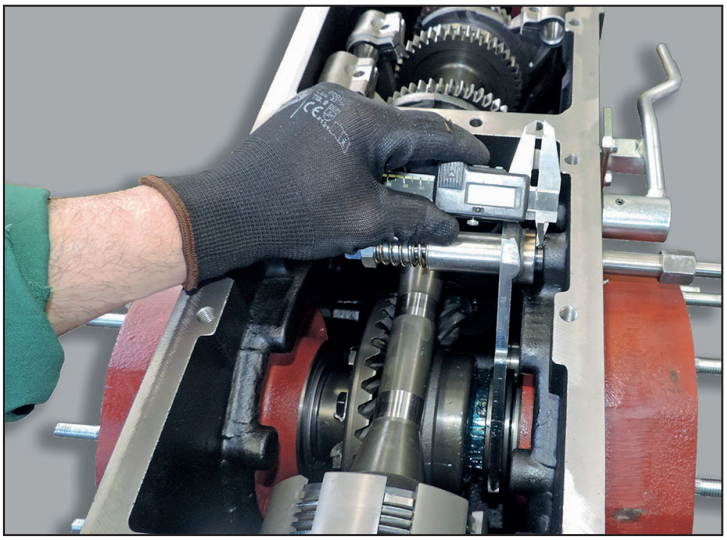


Fig. 5.304

Tighten the nut (191) and then secure the spindle (189) permanently and the fork (194).

Warning
Check again the engagement of the differential lock and the free play.

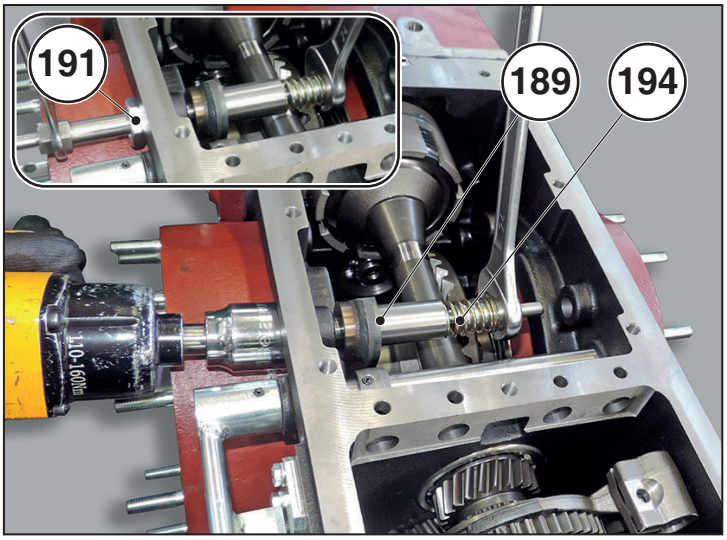


Fig. 5.305

Apply a coat of TEFLON to the thread of the guide bushing (199) and tighten it on the gearbox casing with the copper washer (200).

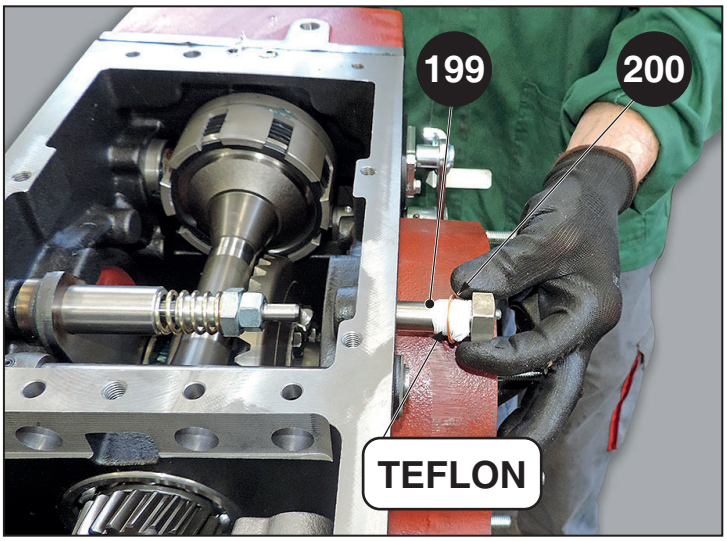


Fig. 5.306

5.1.1.6 Reassembling the rods, levers and gearbox cover

Insert the prevention stops (208) and drive them in using a pin punch.

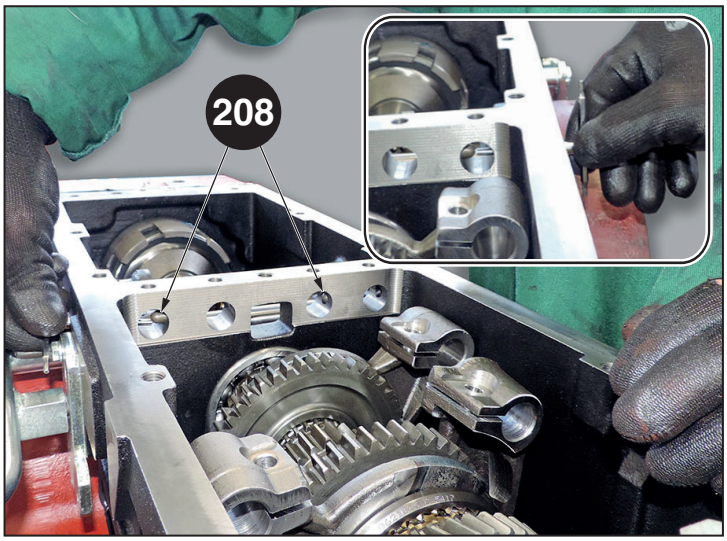


Fig. 5.307

Fit the gear control and range control rods on the gearbox casing , but do not fit them in the forks.

> **Warning**
>
> The rods differ from one another: gear rod (209), gear rod (210), medium-slow range rod (211), medium-fast range rods (212).
>
> Make sure that the rods are inserted in the correct position.

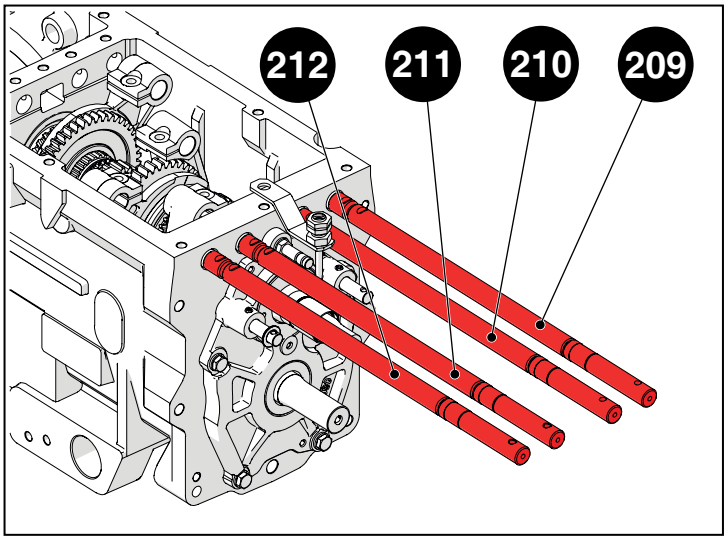


Fig. 5.308

Using a guide tool, fit the O-rings (213) on the rods .

Insert the circlips (214) on the rods.



Fig. 5.309

Apply a coating of grease to the rod seats on the forks and the O-rings on the rods.

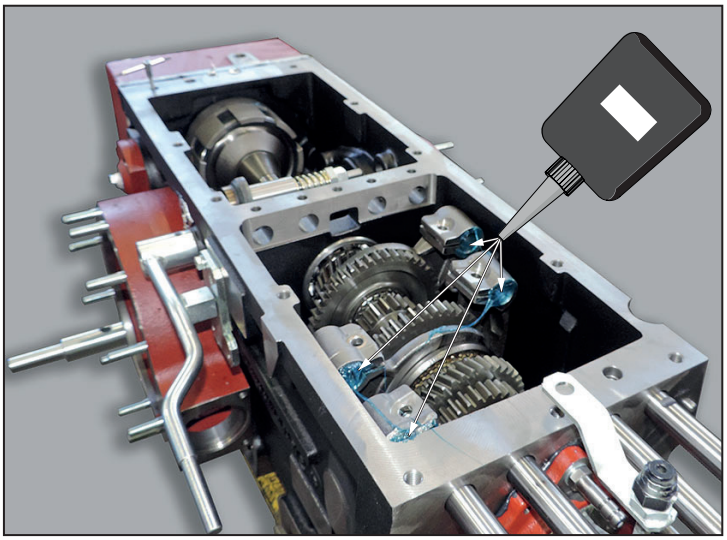


Fig. 5.310

Fit the rods in the forks.

Secure the rods on the forks by fitting the screws (215) together with the conical washers (216).

> **Warning**
>
> The indicated screw is shorter than the others and features a knurled and not a conical washer.

> **Warning**
>
> Do not tighten the screws completely (215).

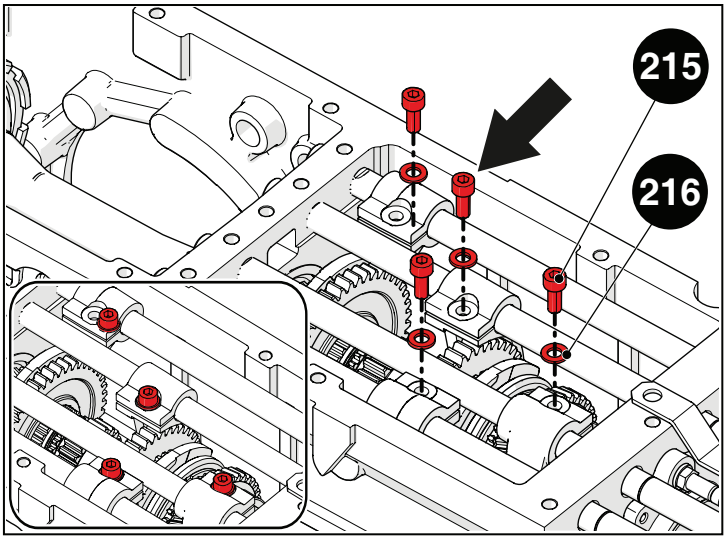


Fig. 5.311

Insert the balls (217) in the holes.

Mount the special tool (E-p/n_____) to pretension the balls.

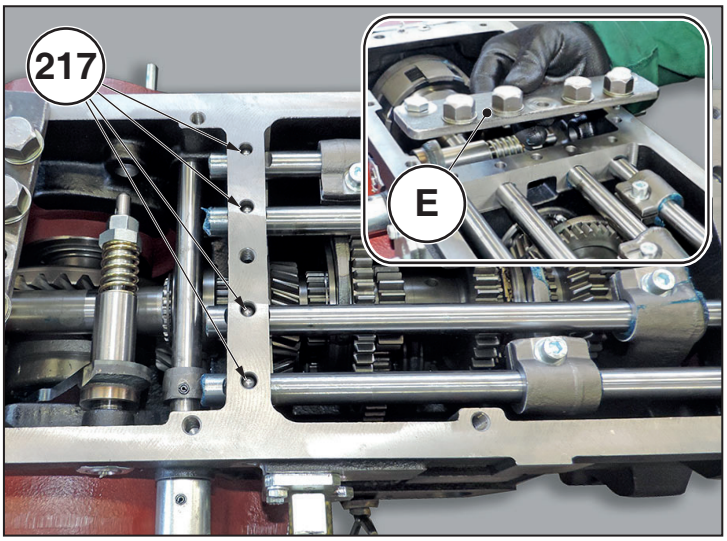


Fig. 5.312

Fit the guide bushes (218) on the rods and secure them with the pins (219).

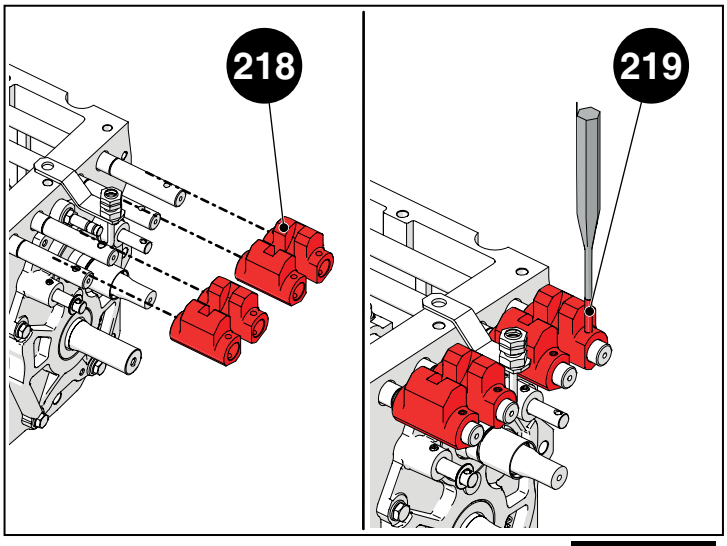


Fig. 5.313

Fit the bush (220) in the fork (221).

Fit the circlip (222) on the fork pin (223).

Join the forks (221) and the levers (224) and (225) by inserting pins (223). Lock the pins in place by inserting another circlip (222).

Note

The steps for preassembling the gear levers apply to both levers.

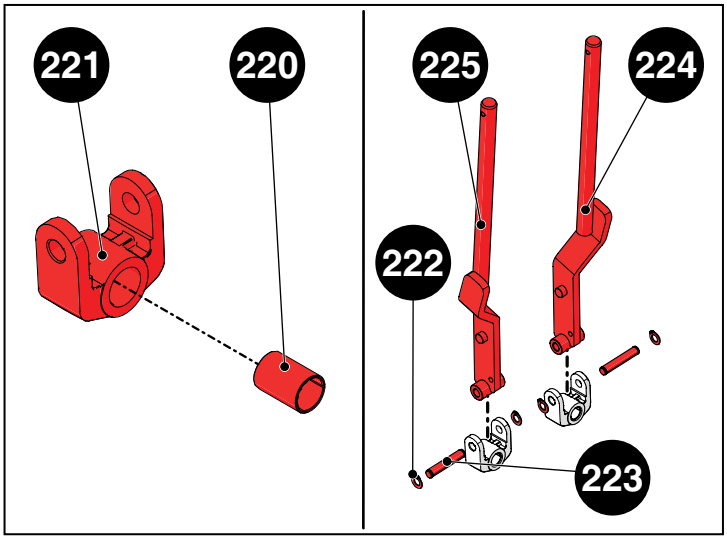


Fig. 5.314

Fasten the springs (226) on the levers.

Insert the gear lever (225) and range lever (224) on the respective pins (144). Drive the levers in against the gearbox cover.

Warning

Fit the lever in the correct position.

The range lever (224) is located on the left hand of the operator; the gear lever is located on the right (225).

The spring holes are facing inside the gearbox casing.

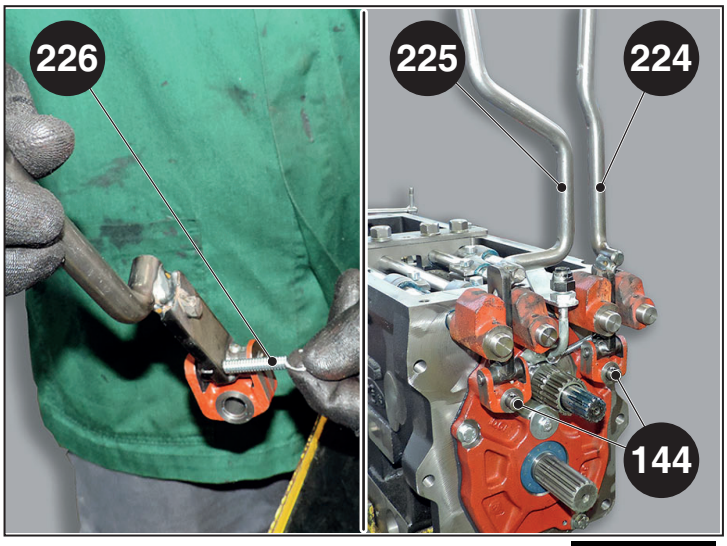


Fig. 5.315

Eliminate the free play on the gear levers by inserting the spacers (227) until the space between the forks (221) and the edge of the holes on the pins (144) is filled.

Insert the pins (145) in the holes to secure the levers in position.

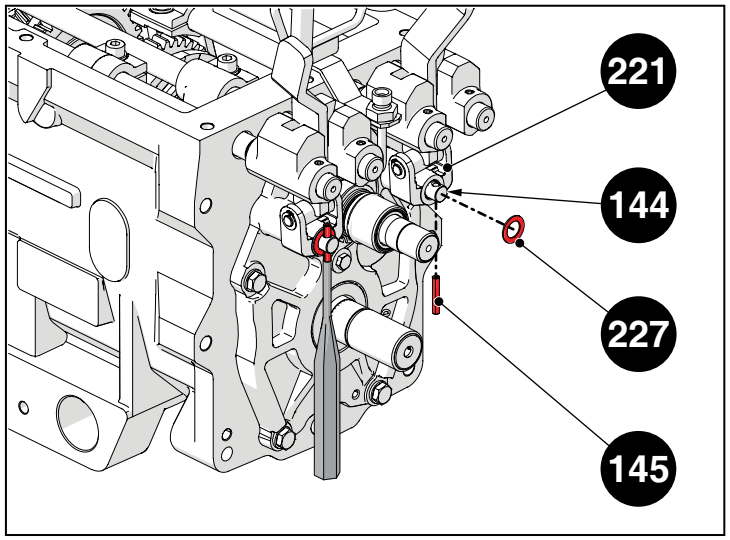


Fig. 5.316

Adjust the position of the forks on the rods.

There needs to a free play of _____ - _____ mm 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 (215) to lock it in position.

Note

The adjustment procedure needs to be done for each fork.

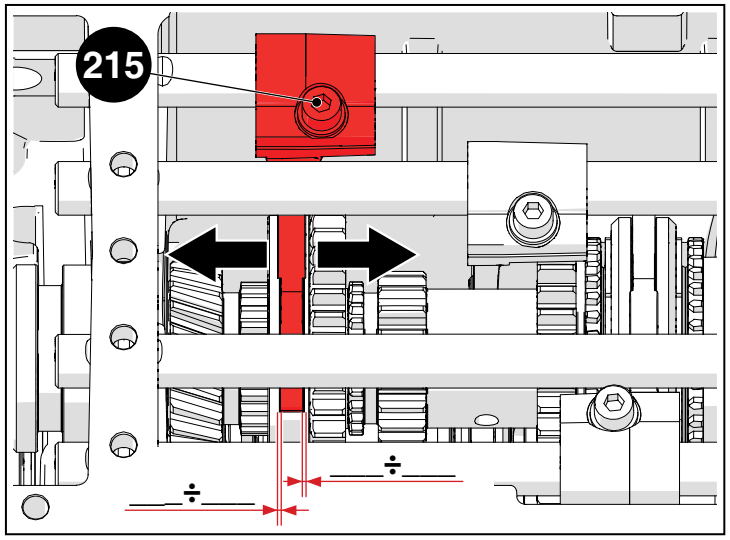


Fig. 5.317

Fasten the springs (226) on the pin (141).

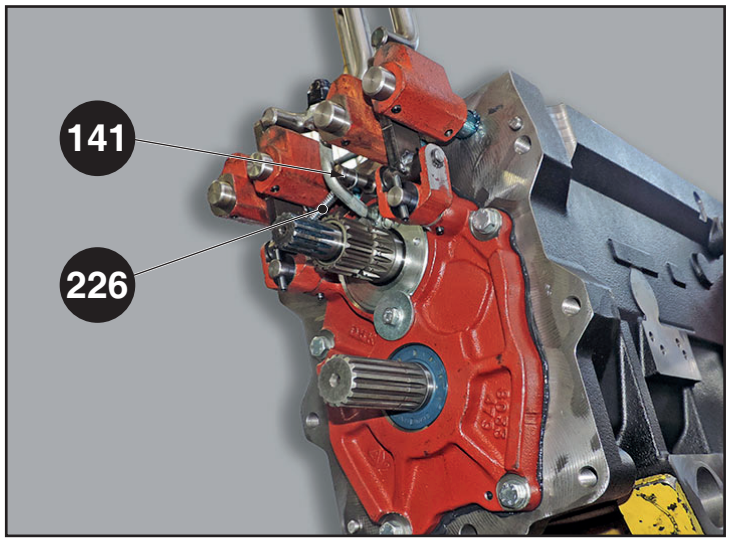


Fig. 5.318

Tighten the prevention stop locking screw (228) with the washer (229). Carry out this step on both sides of the gearbox casing.

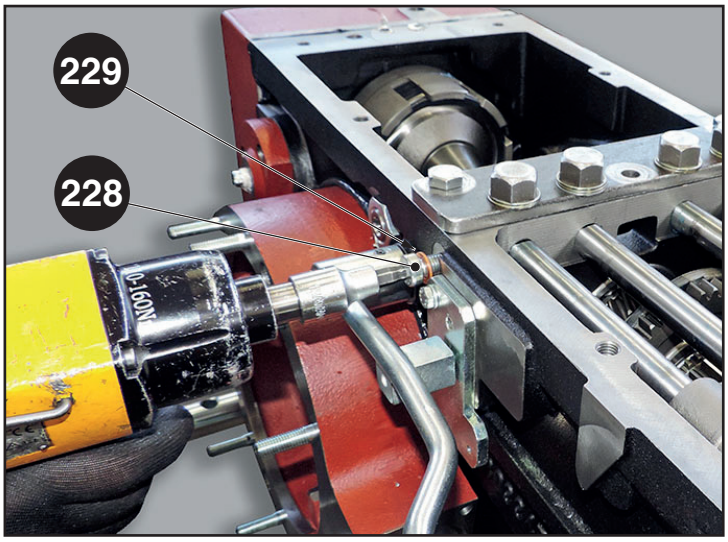


Fig. 5.319

Apply a layer of silicone sealant on the resting surface of the cover making sure to fill the indicated holes.

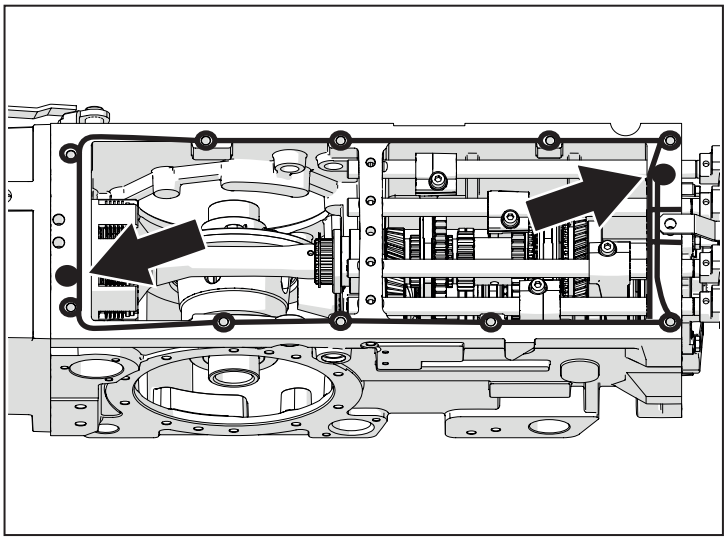


Fig. 5.320

Fit the cover (230) on the gearbox casing. Insert the washers (232) and tighten the fastener screws (231) to a torque of 55 Nm (5.5 kgm).

RS and SN+ Cluster only

Fit the piping guard (240).

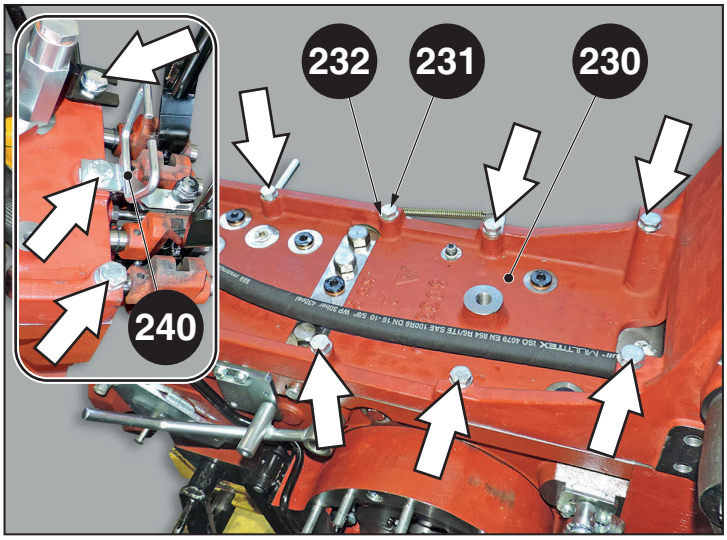


Fig. 5.321

RS, SN and SN+ Cluster only

Tighten the screw (231), then fit the plate (238) and spring (239) of the differential lock lever. Tighten the screw (231) again to fasten the plate.

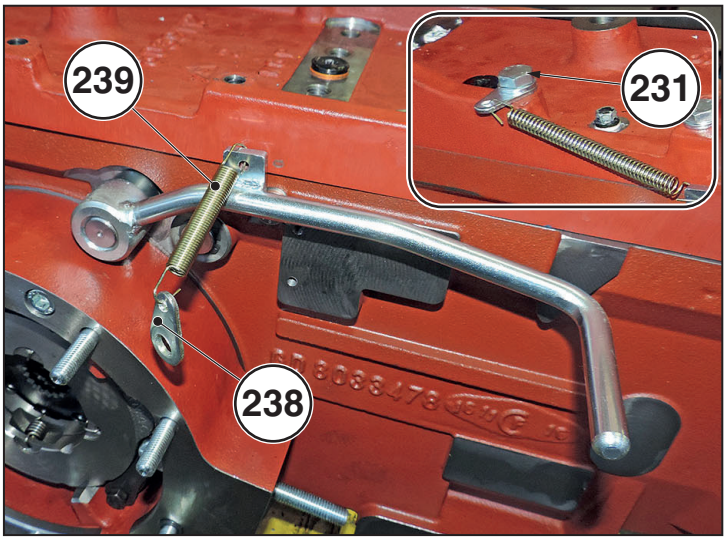


Fig. 5.322

Tighten the oil filling spacer (236) by inserting the copper washer (237) and then tighten the oil level plug (235).

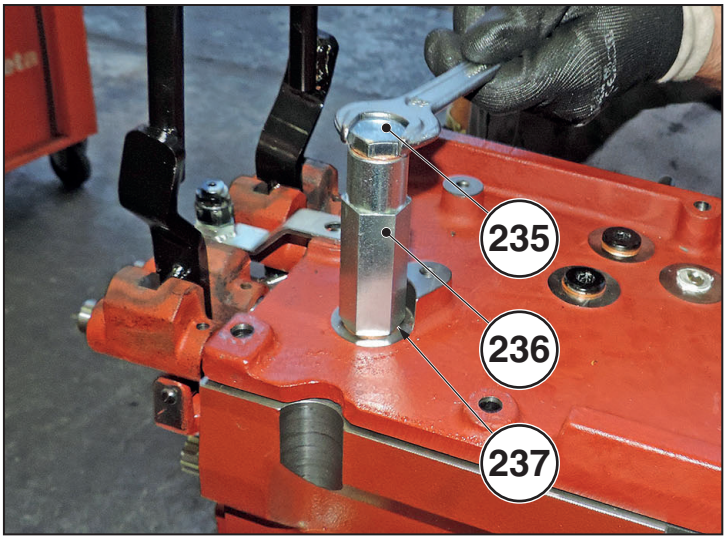


Fig. 5.323

Insert the springs (233) and tighten the plugs (234).

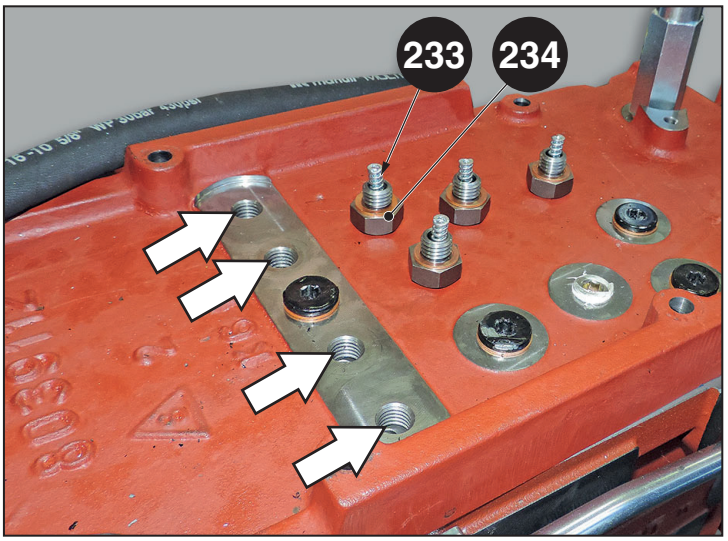


Fig. 5.324

5.2 SN 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".

5.2.1 Reassembly

5.2.1.1 Refitting the gearbox

Fit the arms pivot pins (126) and secure them by tightening the nuts (127) with the washers (128).

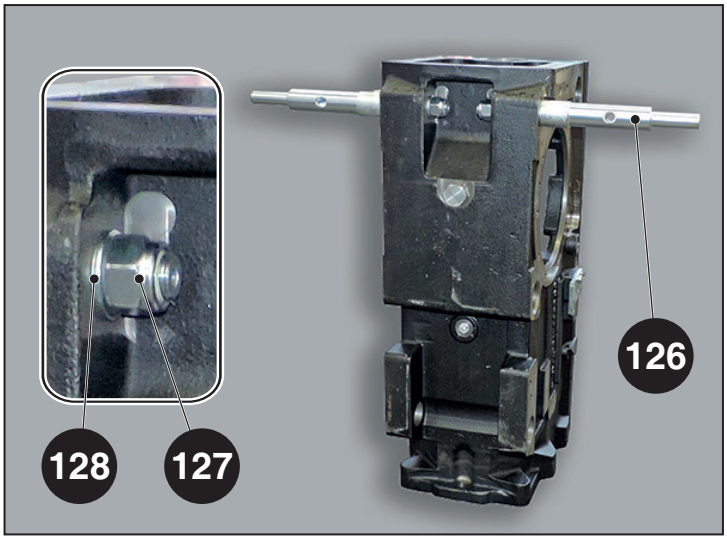


Fig. 5.325

Apply a coat of Teflon to the thread of the plug (129) and screw it under the gearbox casing.

Tighten the plug (130) with the copper washer(131) under the gearbox casing.

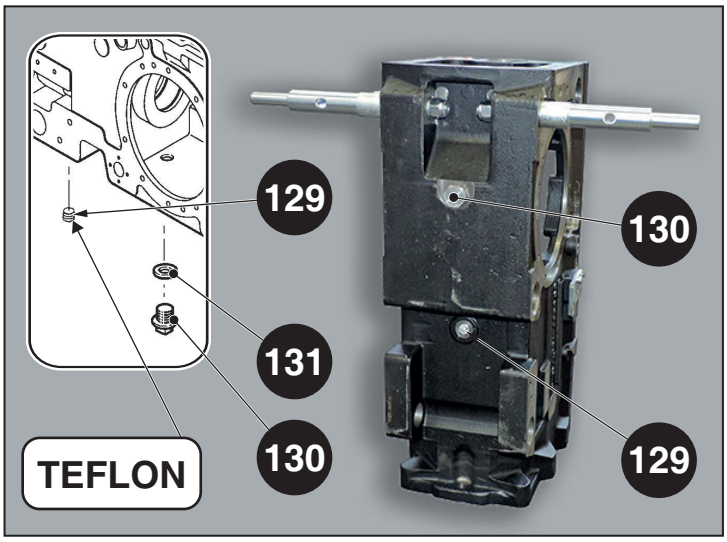


Fig. 5.326

Insert the cover centring pins (138).

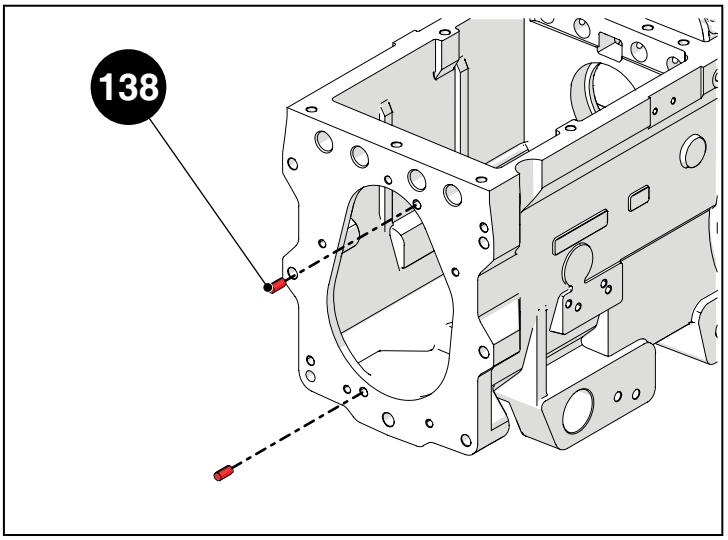


Fig. 5.327

Fit the bearing (28) (from the front side) of the casing and drive it into its seat with a punch tool of suitable diameter.

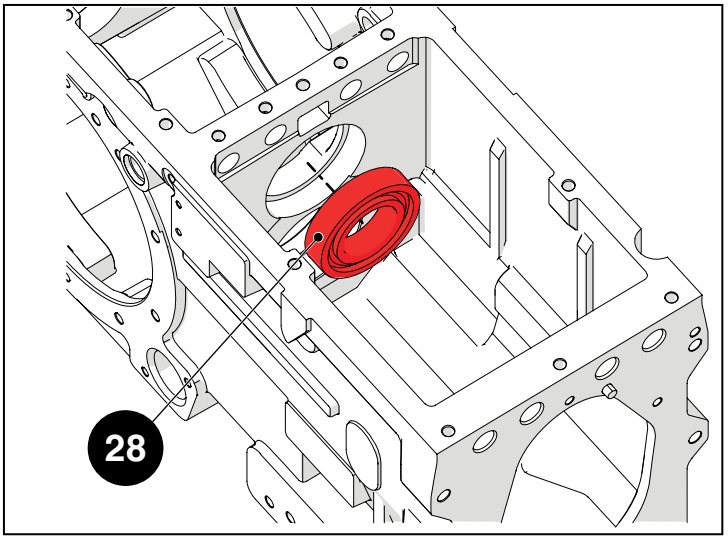


Fig. 5.328

Fit the circlip (34).

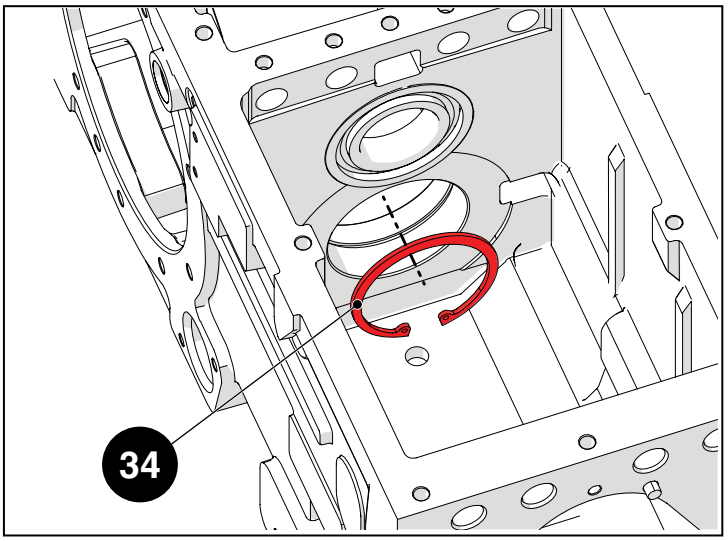


Fig. 5.329

Fit the outer bearing races (33) and drive them on the circlip (34) using a suitable pin punch.

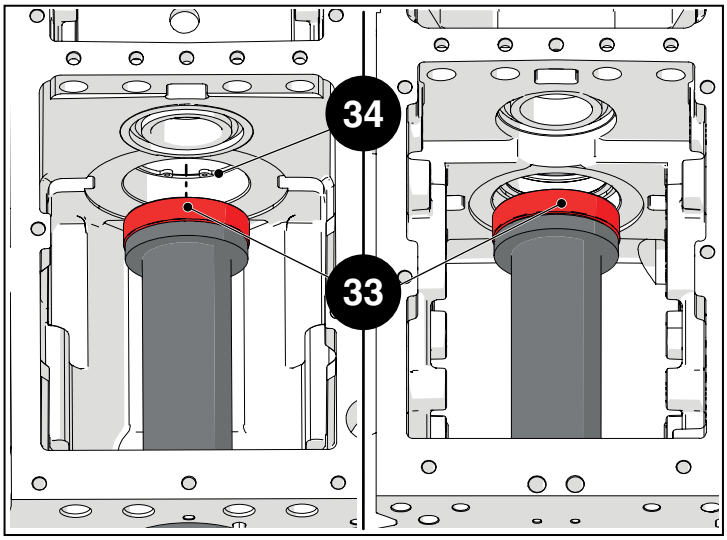


Fig. 5.330

Preassemble the bevel pinion (30) by fitting the spacer (32) and the inner bearing race (33).

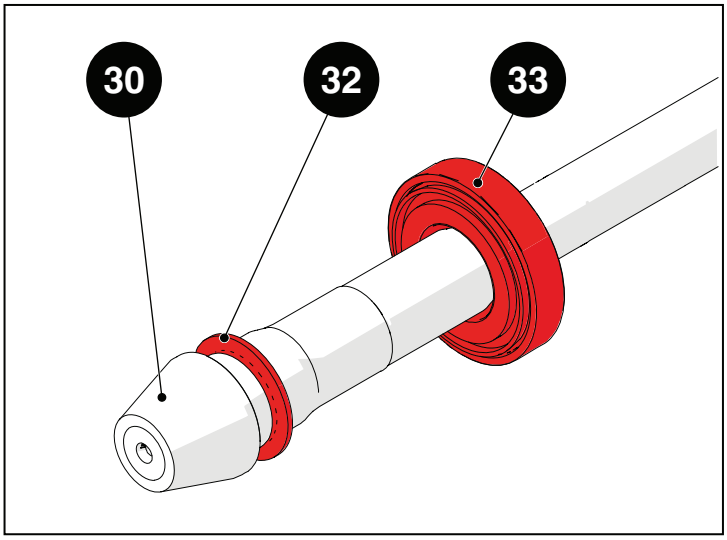


Fig. 5.331

Mount the pinion guide tool (A-p/n_____).

Fit the bevel pinion (30) in the gearbox casing and drive it into its seat with a punch tool of suitable diameter.

Remove the special tool (A-p/n_____).

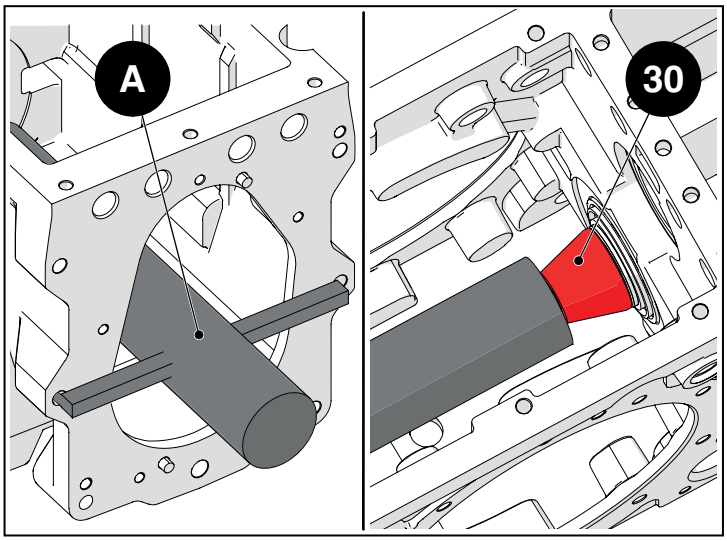


Fig. 5.332

Lock the bevel pinion (30) into position by fitting the tool (B-p/n_____).

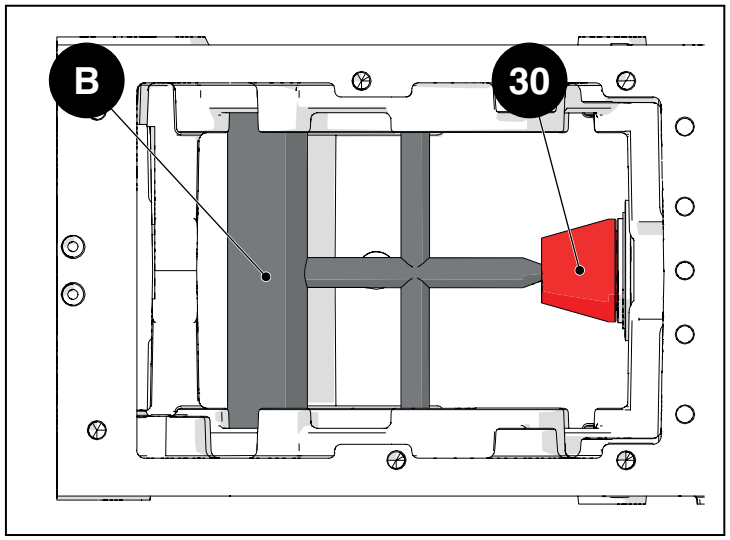


Fig. 5.333

Fit the inner bearing race (33) on the bevel pinion (30) using a punch tool of suitable diameter and driving it into its seat on the gearbox casing.

Remove the special tool (B-p/n_____).

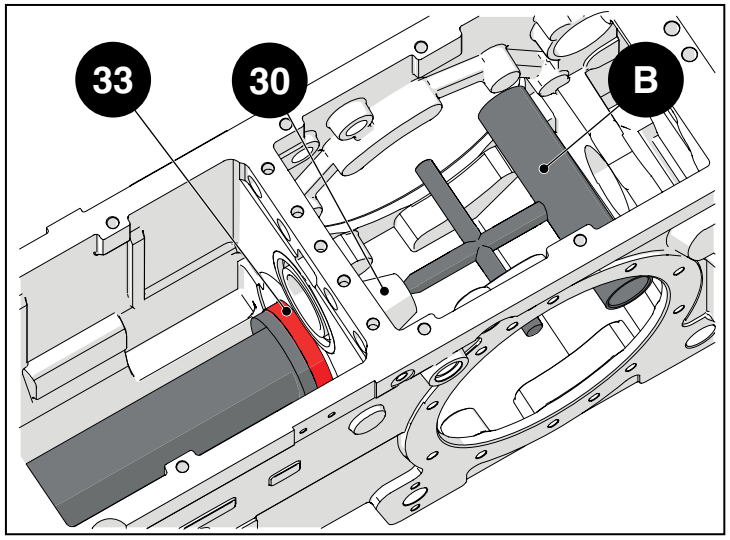


Fig. 5.334

Fit the components on the bevel pinion (30) in the following order:

- medium-fast range gear (35) making sure that the protruding face is directed toward the inside of the gearbox casing;
- ring nut retainer washer (36);
- ring nut (37); making sure that the bevelled side is facing the front of the tractor;
- the spacer (38).

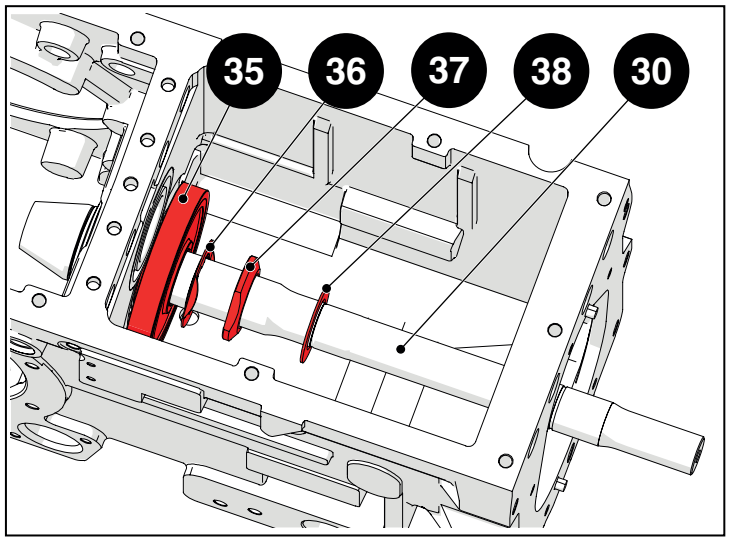


Fig. 5.335

Tighten the ring nut (37) and secure the bevel pinion 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 (36).

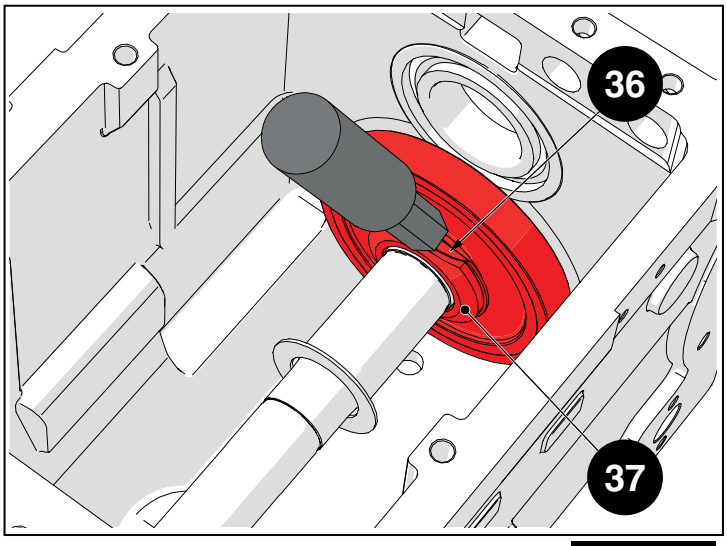


Fig. 5.336

Preassemble the splined hub (27):

- grease the seats on both ends of the hub;
- fit roller bearing cage (26), the spacer (249) and the circlip (181) on the front end;
- fit the roller bearing cage (26) on the rear end.

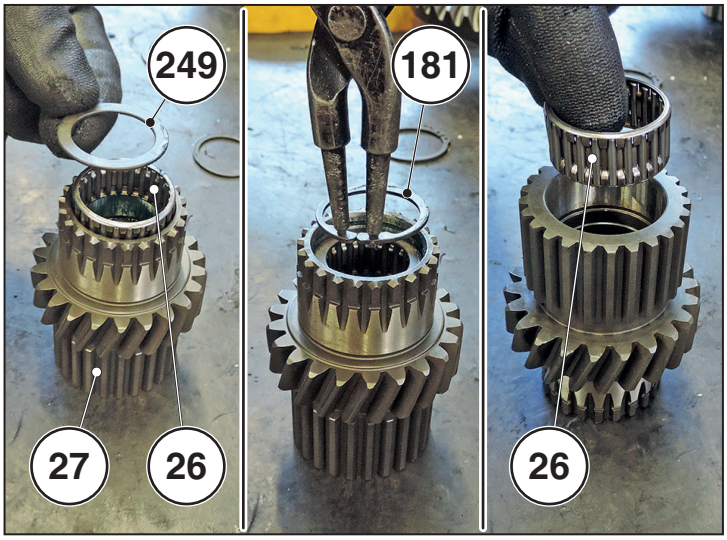


Fig. 5.337

Preassemble the splined hub (27) inserting the Medium slow-slow range gear (22) with the spline for fitting the fork facing the front of the tractor.

Fit the splined hub (27) on the gearbox casing and drive it onto the bearing (28) with a suitable bearing punch. Then fit the circlip (29) to lock the splined hub (27) in place.

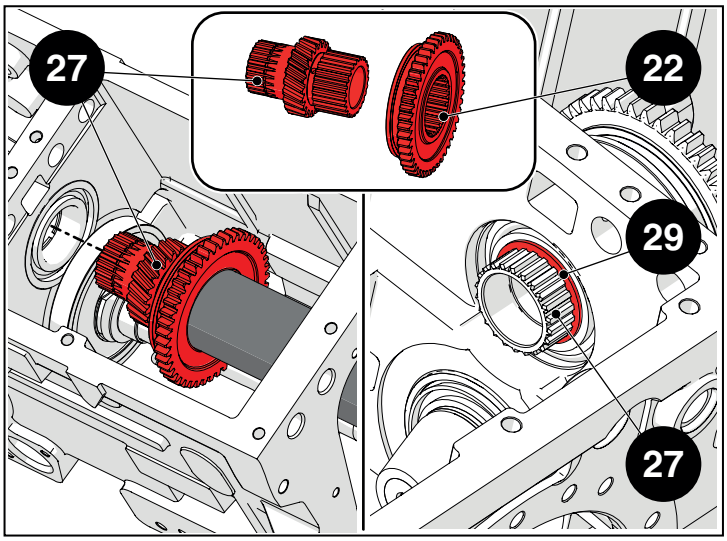


Fig. 5.338

Grease the roller bearing cages (26) on both sides of the splined hub (27).

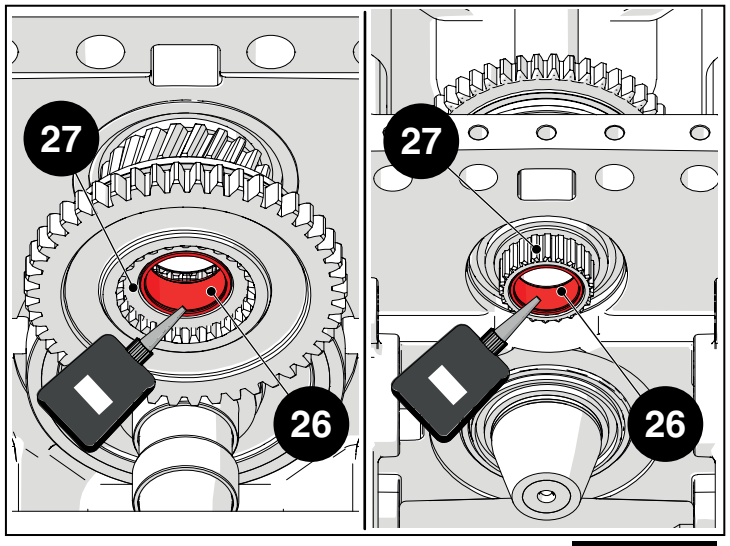


Fig. 5.339

Preassemble the medium slow-slow range gear (40) by inserting the roller bearing cages (39) and spacer (41).

Fit the medium slow-slow range gear (40) on the bevel gear (30) with the cogged end facing the rear end of the tractor and key it on the medium slow-slow range gear (22).

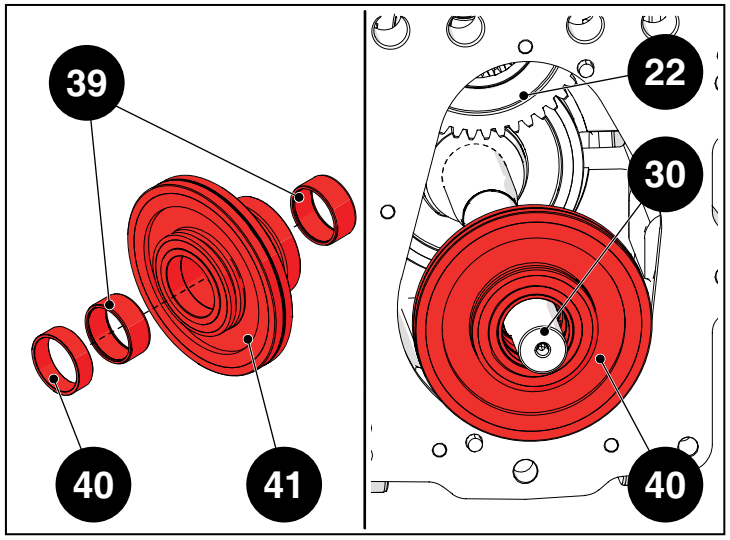


Fig. 5.340

Fit the components on the bevel pinion (30) in the following order:

- fixed hub (42) preassembled with the splined ring (43);

Warning

The flat side of the fixed hub (42) must face the rear.

- circlip (44) to lock the fixed hub (42);
- spacer (45) by placing the bevelled side facing the front of the tractor;
- roller spacer (46);
- the spacer (47).
- the spacer (253).

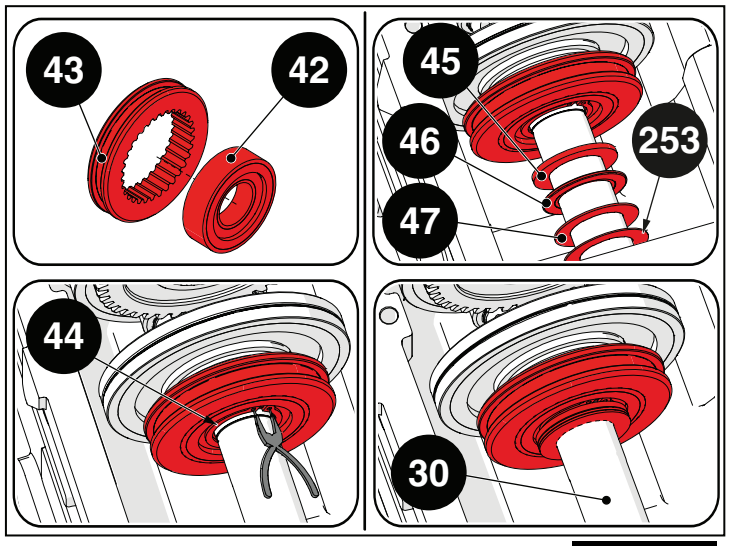


Fig. 5.341

Fit the fork (139) on the medium slow-slow range gear (22), and the fork (140) from the splined ring (43).

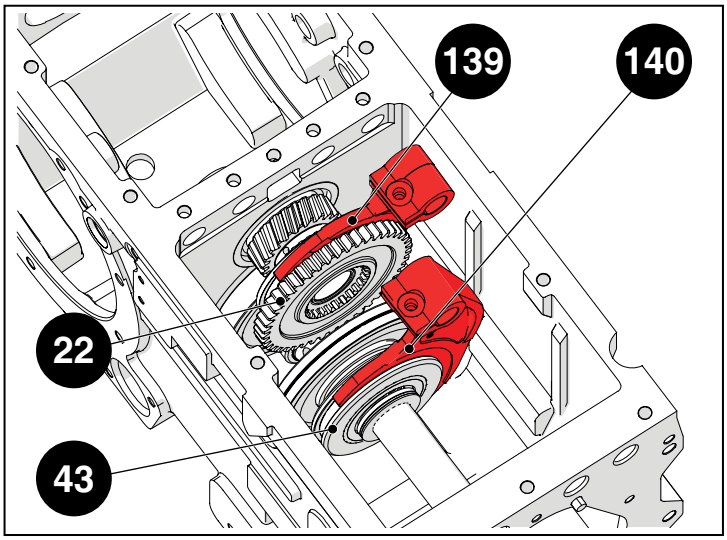


Fig. 5.342

Fit the complete primary shaft (3) in the gearbox casing by inserting it in the gear (22).

Warning

To preassemble the primary shaft (3), see the Chapter “Disassembling/Assembling the primary shaft".

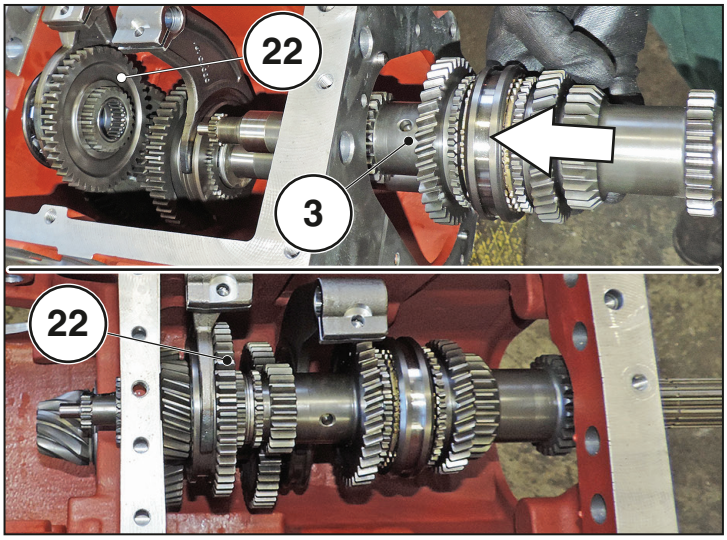


Fig. 5.343

Preassemble the 2nd-3rd speed gear (49) by inserting the roller bearing cages (48).

Fit the following components on the front end of the gear (49):

- roller bearing cage (50);
- synchroniser gear (51);
- synchroniser ring (52);
- the spacer (53).

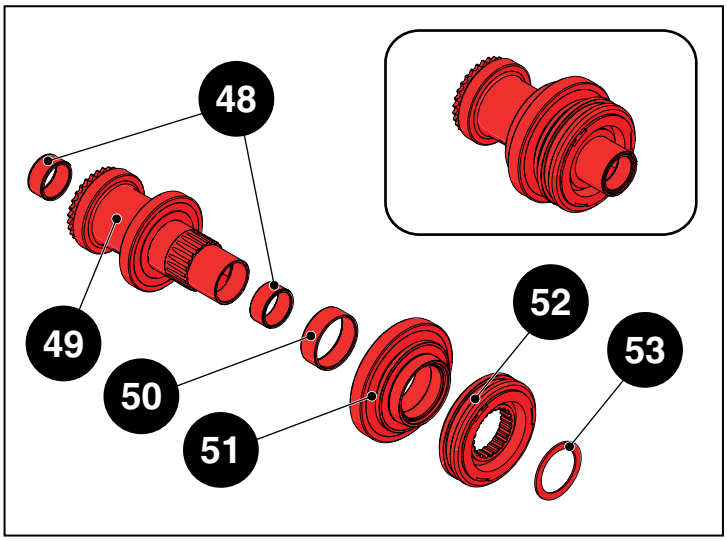


Fig. 5.344

Fit the complete gear (49) on the bevel pinion.

Fit the fork (140) in the gearbox casing and insert it in the gear synchroniser (49).

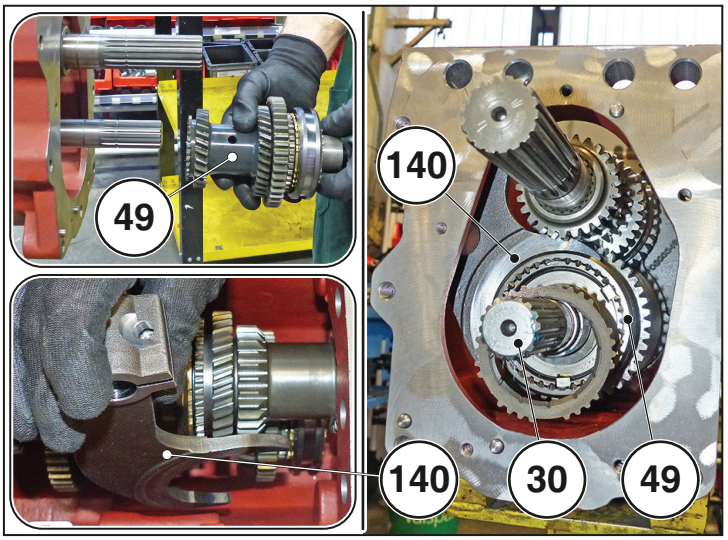


Fig. 5.345

Preassemble the gear (55) by fitting the roller bearing cage (54).

Fit the complete gear (55) on the bevel pinion (30).

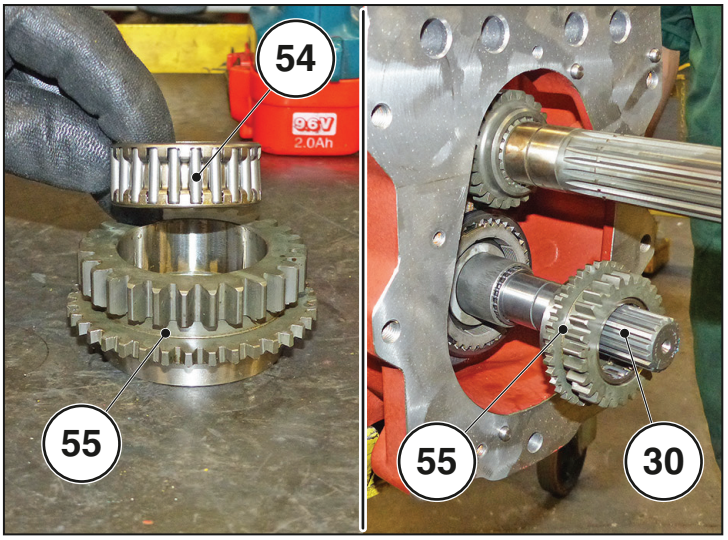


Fig. 5.346

Fit the components on the bevel pinion (30) in the following order:

- spacer (58) by placing the lubrication channels facing the gear (55);
- roller spacer (46);
- spacer (45) by placing the bevelled side facing the gear (55);
- spacers (59);
- circlip (60).

Check the backlash of the gear (55) and the rolling of the spacer (58). Increase or reduce the thickness of the spacers (59) to reduce or increase the backlash.

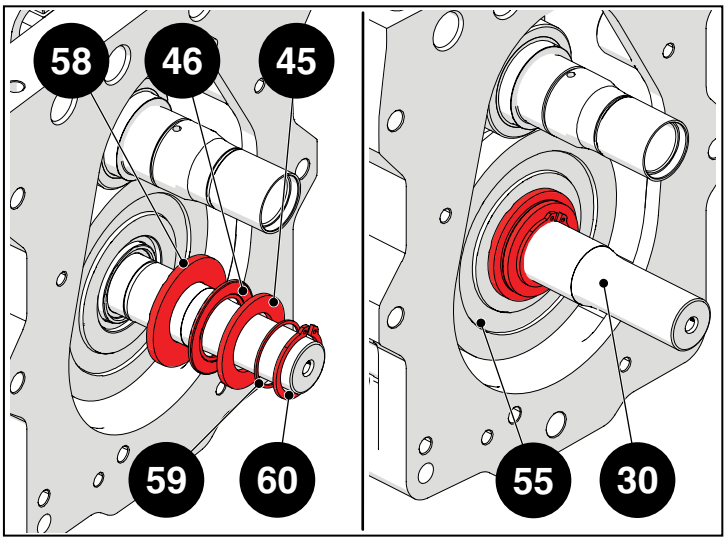


Fig. 5.347

5.2.1.2 Reassembling the gearbox front cover and mating the reverse gear

On the inner side of the gearbox cover (63):

- lubricate the holes;
- fit the spacers (8) on the upper hole up to a total thickness of 1 mm;
- fit the bearing (62) completely in on the upper hole;
- fit the bearing (7) completely in on the lower hole;

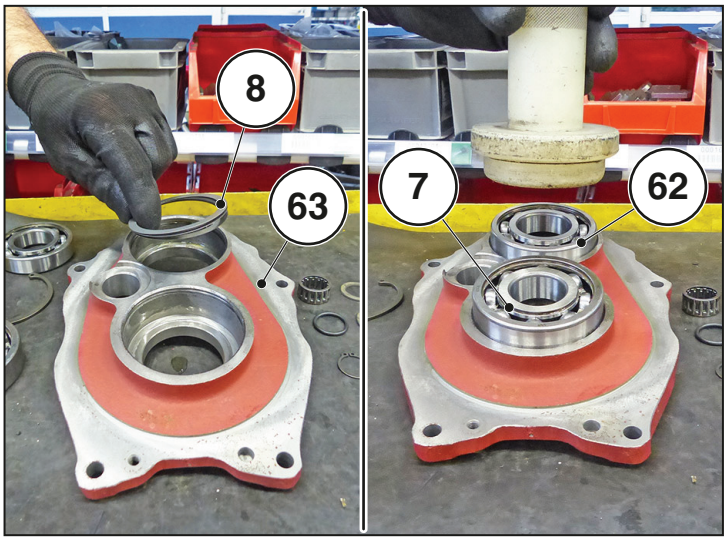


Fig. 5.348

Fit the spacer (6) of adequate thickness on the upper hole to eliminate the space between the bearing (62) and the groove for the circlip to eliminate by free play on the bearing; fit the circlip (5).

Note

The spacer (6) determines the initial theoretical backlash on the primary shaft.

Fit the circlip (252) on the lower hole.

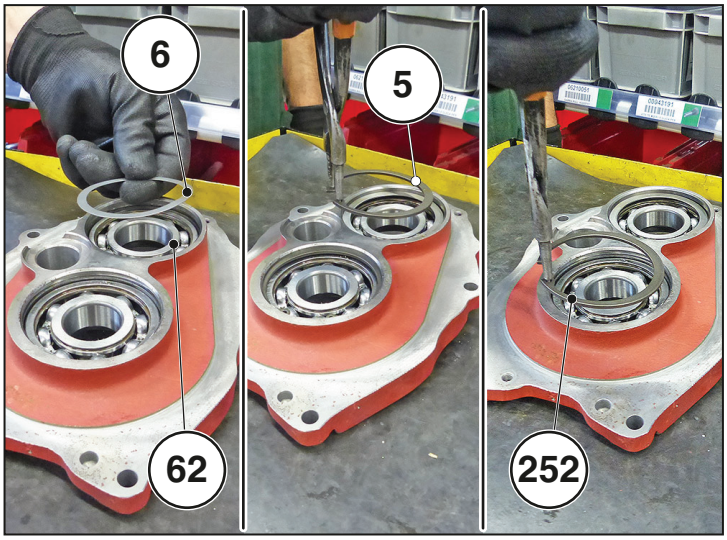


Fig. 5.349

Fit the O-ring (248) on the pin (243).

Lubricate the hole on the cover (63) and then insert the pin (243) driving it in.

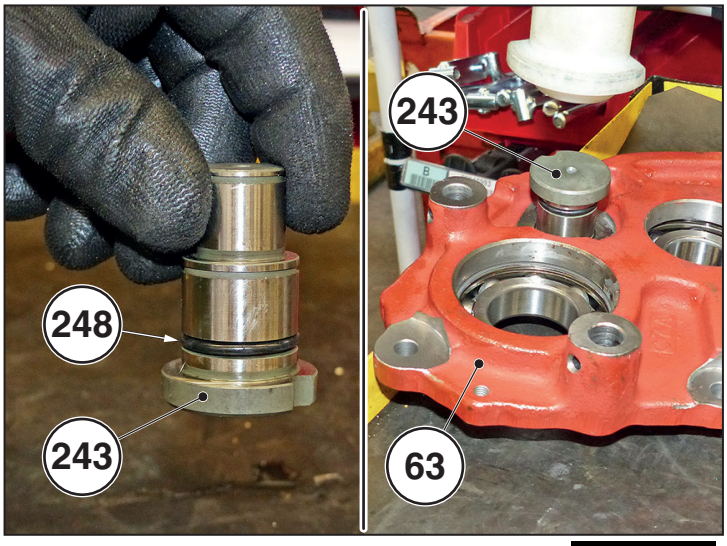


Fig. 5.350

Apply mastic sealant on the pin (138) and then insert it to the end on the cover (63) to secure the pin (243).

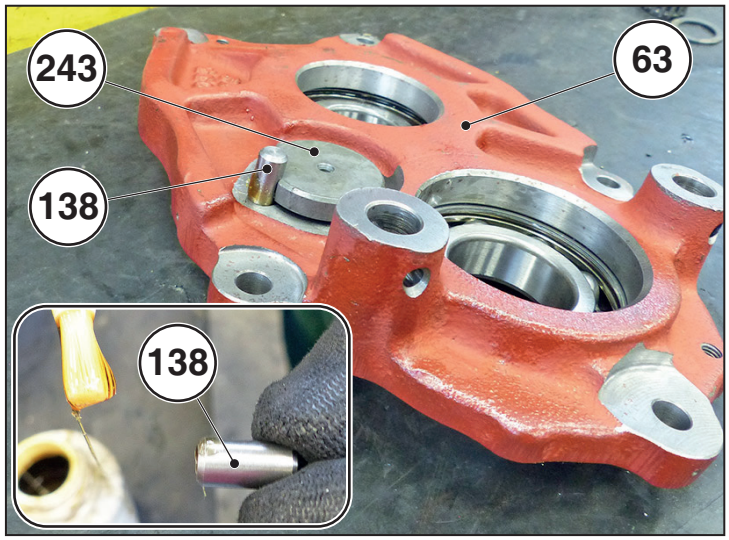


Fig. 5.351

Fit the circlip (247) on the pin groove (243).

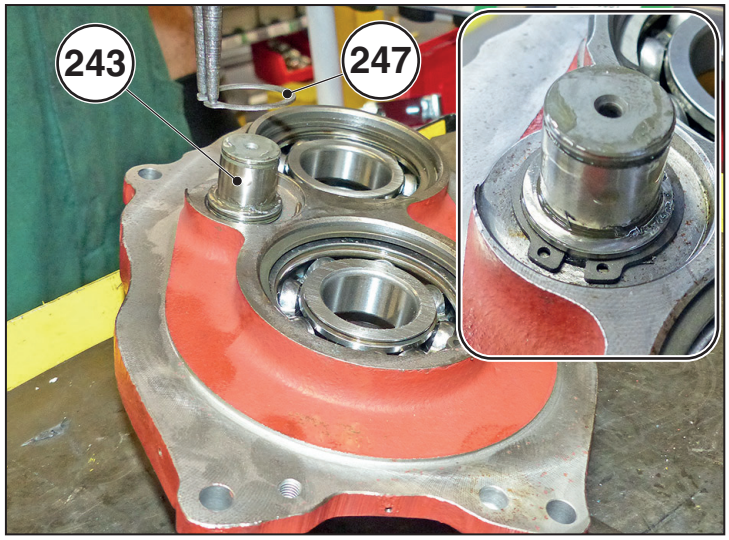


Fig. 5.352

Fit the spacer (246) and roller bearing cage (244) on the pin (243).

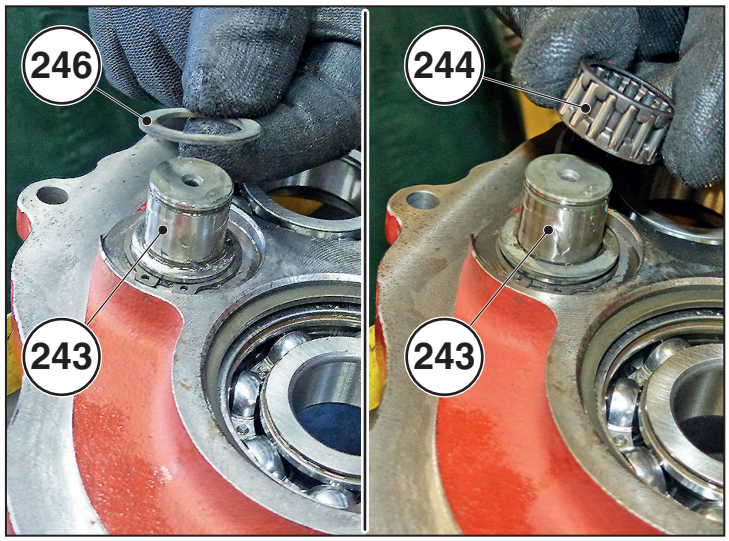


Fig. 5.353

Fit the reverse gear (245) and the spacer (246) on the pin (243).

Warning
Position the flat part of the reverse gear (245) facing the cover (63).

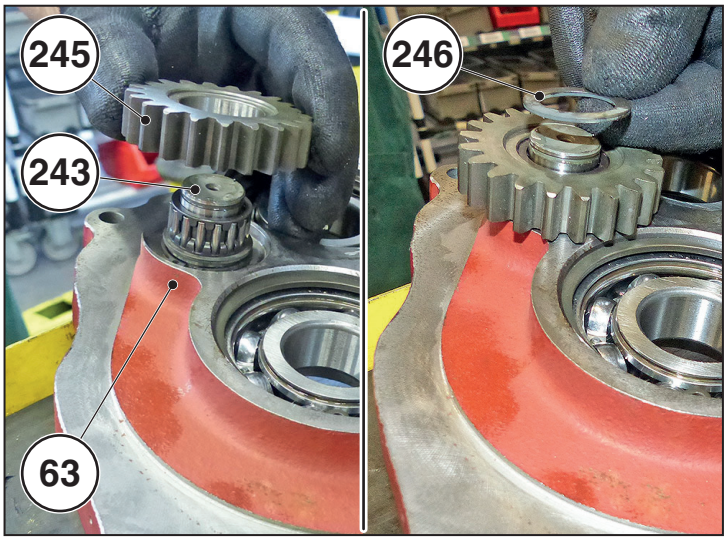


Fig. 5.354

Fit the circlip (242) on the pin (243) to secure the set of assembled components.

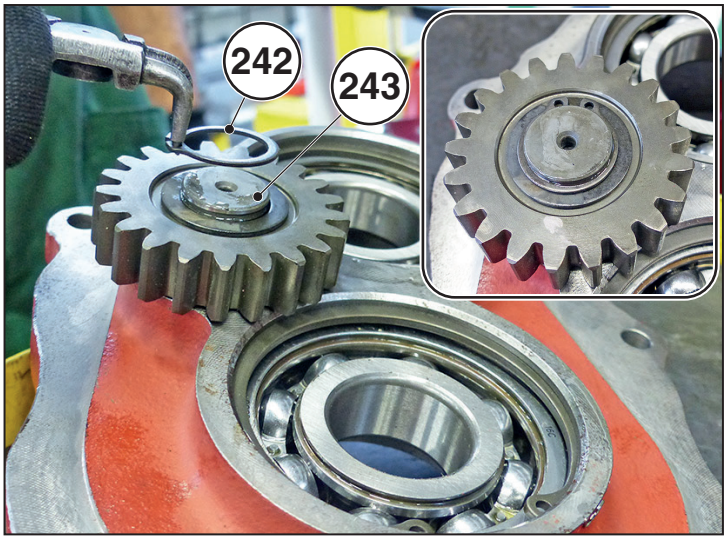


Fig. 5.355

Apply a coat of silicone sealant in the holes of the gearbox cover (63) 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.

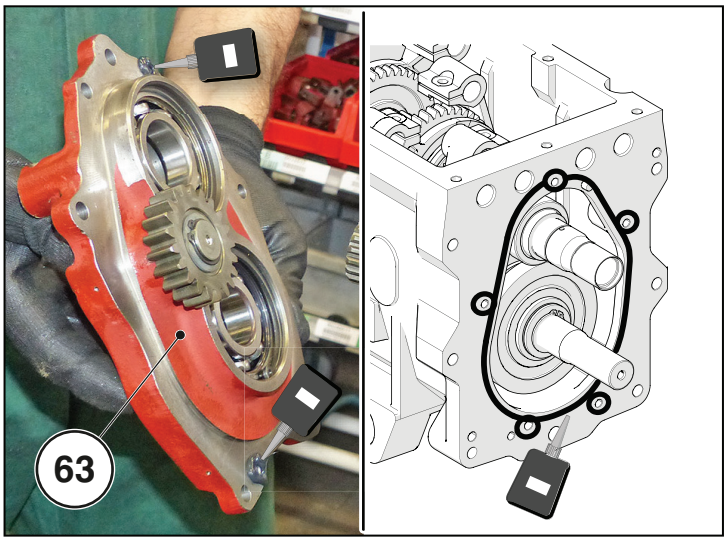


Fig. 5.356

Fit the gearbox cover (63) on the gearbox casing making sure to key the reverse gear (245) on the gears (250) and (55).

> **Warning**
>
> Fit the cover (63) evenly. Use a rubber mallet to make it adhere completely on the gearbox casing.

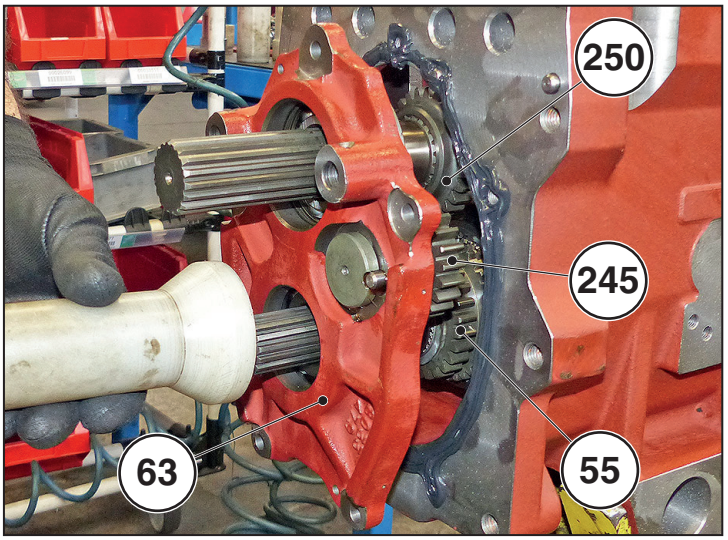


Fig. 5.357

Fasten the cover by tightening the screws (57) with the washers (56), and tighten the pin (141) with the washer (142).

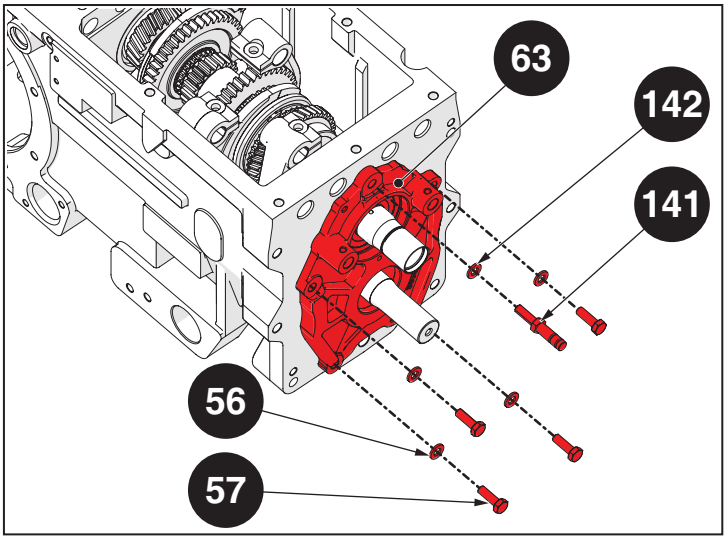


Fig. 5.358

Fit the circlip (4) on the primary shaft (3).

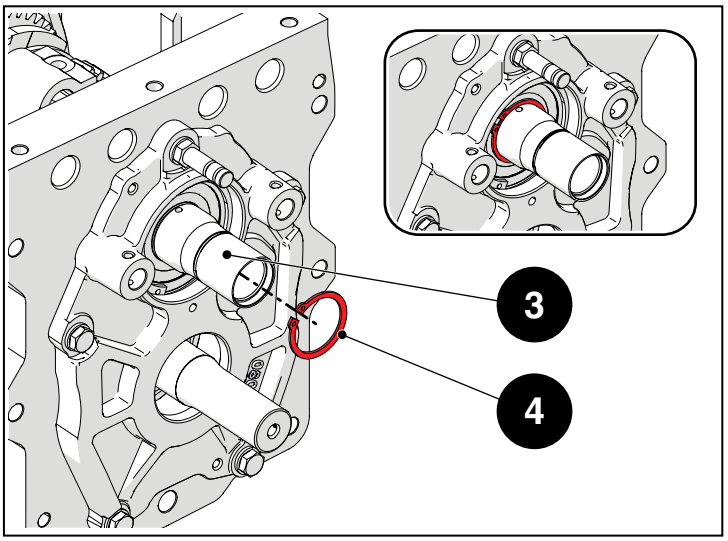


Fig. 5.359

Secure the primary shaft in place with a rubber mallet.

Use a feeler gauge to check the free play on the 3rd gear; it must be comprised between 0.25 - 0.4 mm.

If the free play is not correct, rearrange the spacers (6) and (8) to change the position of the bearing (62): increase the thickness (6) and reduce by an equivalent amount the thickness (8) to reduce the free play; vice versa to increase the free play. Do not change the total thickness values.

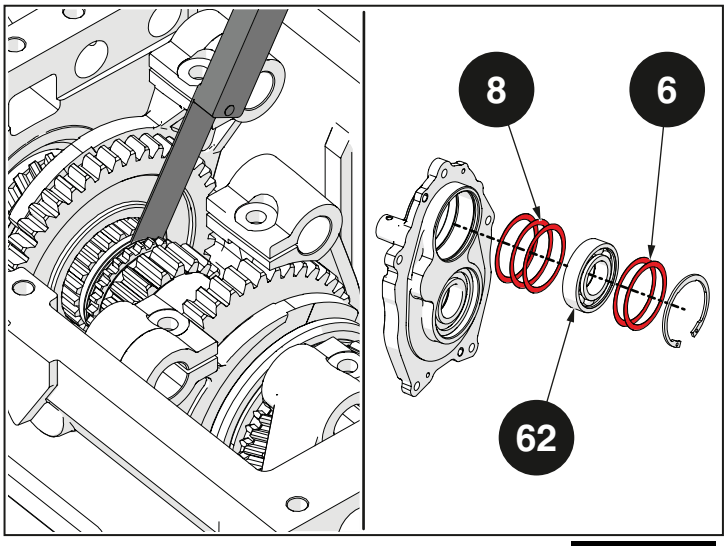


Fig. 5.360

Make sure that the synchroniser ring (52) is free and that there is no dragging between gears.

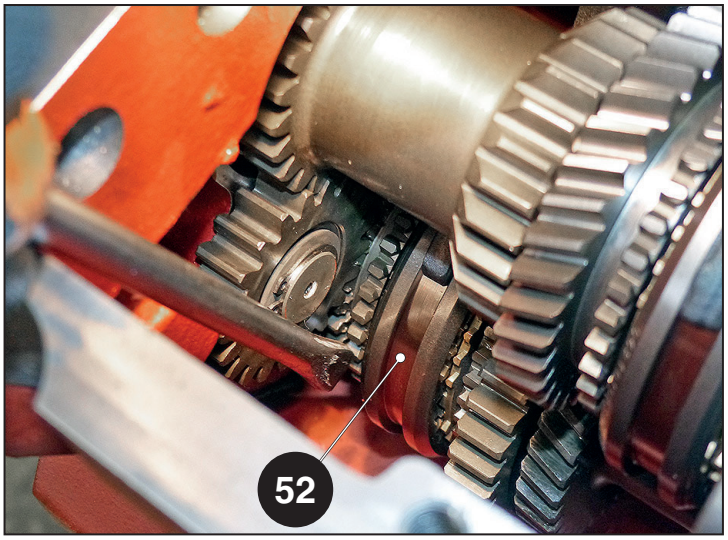


Fig. 5.361

Fit the oil seal (69) on the primary shaft (3) and the oil seal (61) on the bevel pinion (30). Drive them in using suitable guide tools and punches.

Note

Lubricate the outer edges of the oil seals with oil and use suitable guide tools to fit them on the respective shafts.

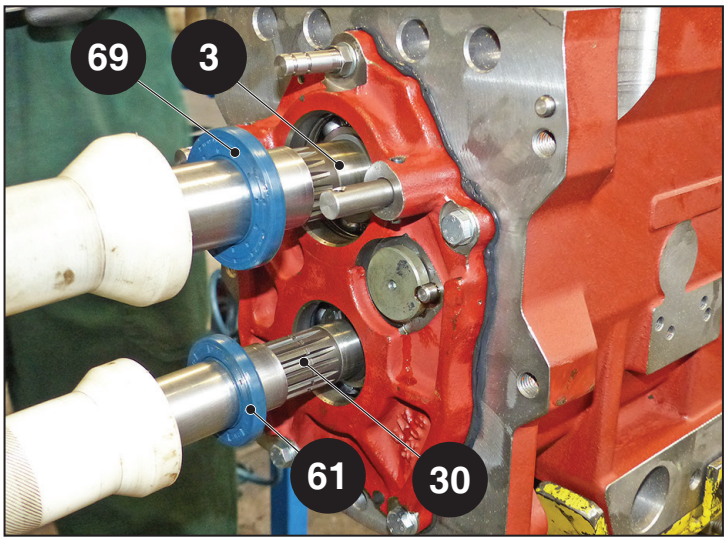


Fig. 5.362

Insert the pins (144).

> **Warning**
>
> The end of the pins with the nearest holes must be faced toward the front of the tractor.

Insert the pins (145) to secure the pins in position.

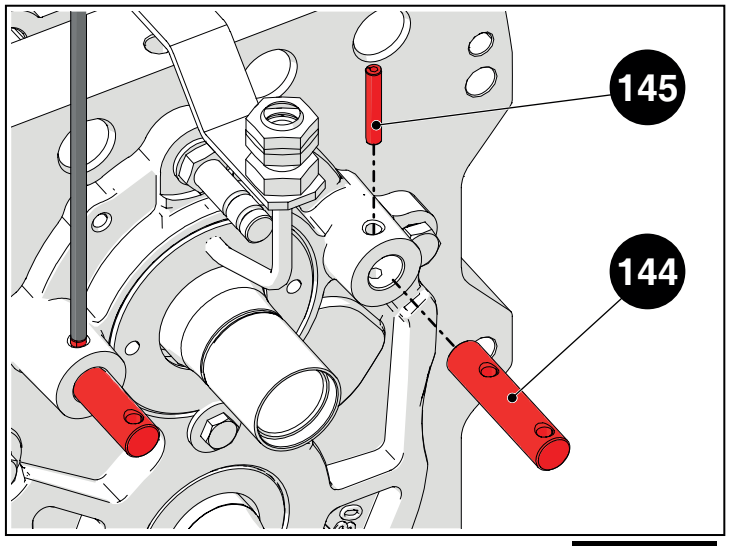


Fig. 5.363

5.2.1.3 Reassembling the Power Take Off

Fit the bearing (241) driving it to the end on the PTO shaft (75). Face the shoulder of the bearing toward the rear end of the shaft as shown in the figure.

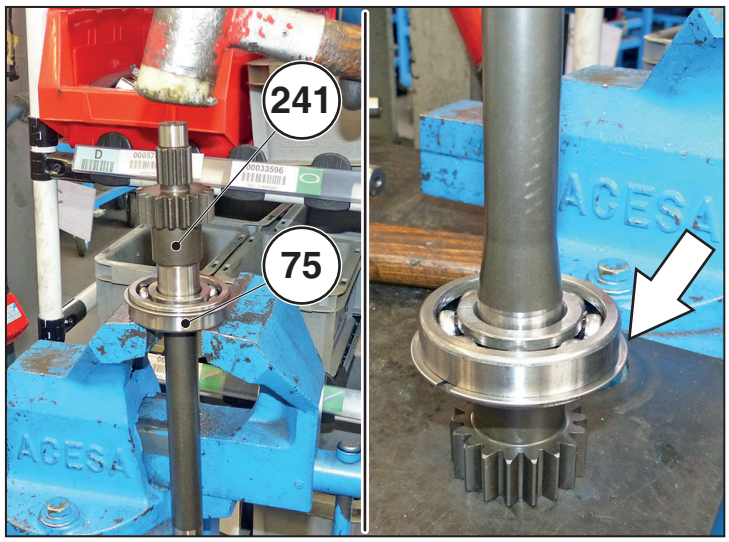


Fig. 5.364

Fit the circlip (72) and insert the roller bearing cage (73) on the front end of the PTO shaft (75).

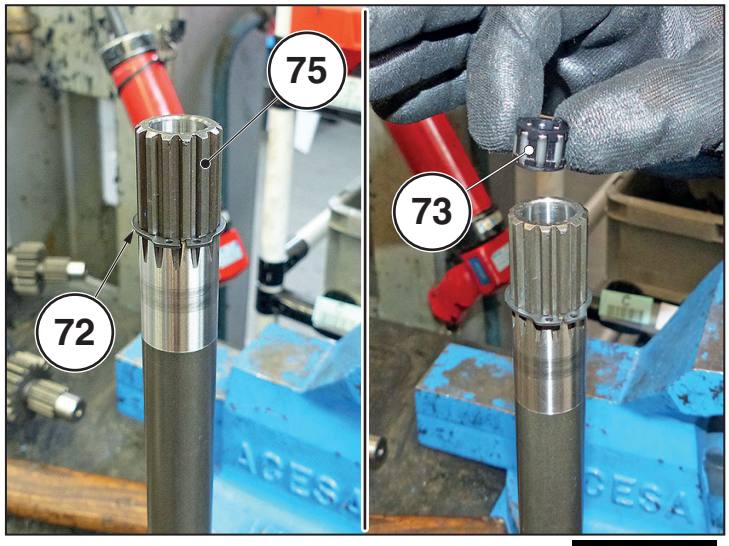


Fig. 5.365

Insert the sliding sleeve (71) from the PTO shaft (75) driving it in against the circlip (72). Position the sliding sleeve (71) as shown in the figure.

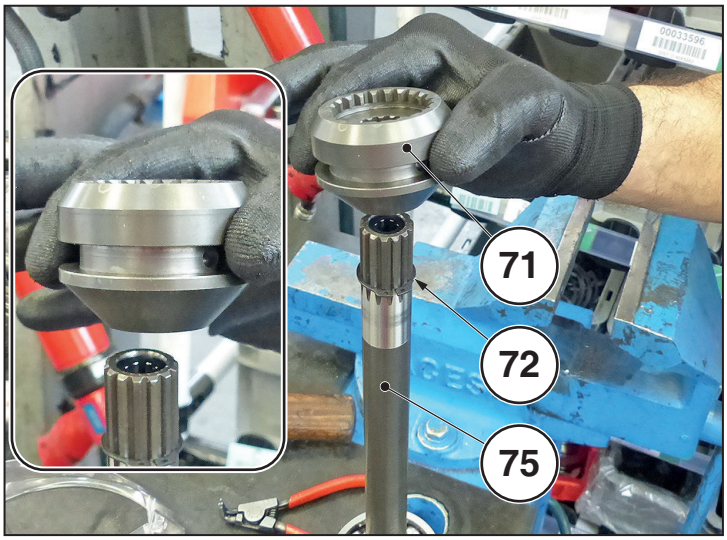


Fig. 5.366

Insert the complete PTO shaft (75) in the gearbox casing until the shoulder of the bearing (241) is driven in against the gearbox casing. Make sure that, during insertion, the PTO shaft (75) fits on the primary shaft (3).

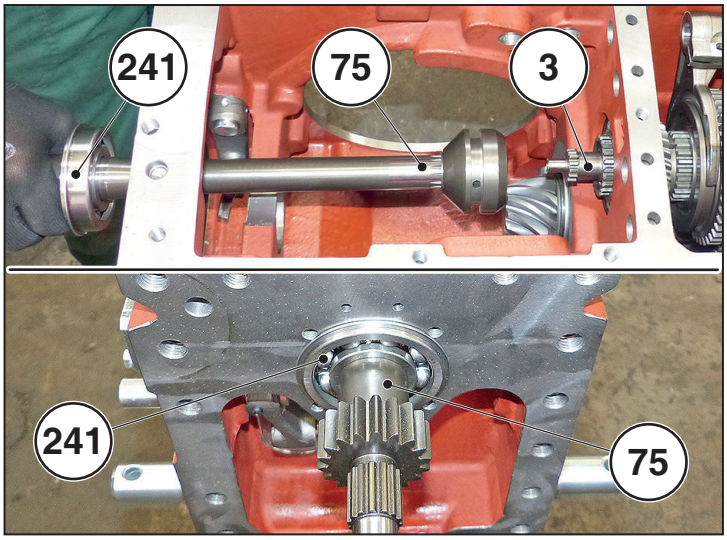


Fig. 5.367

Fasten the PTO selector plate (135) on the gearbox casing with the screws (136) and washers (137).

Warning

Do not tighten the screws completely.

Note

The holes of the SN model plate are arranged differently compared to RS and SN+.

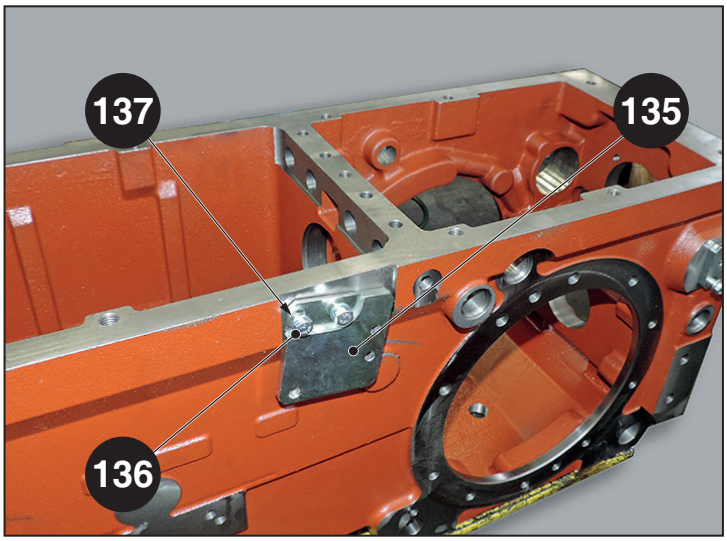


Fig. 5.368

Fit the rod (165) from the side with the hole closer to the end on the gearbox casing on the right side. Fit the lever (170) and fork (169), engaging the fork (169) on the groove of the sliding sleeve (71).

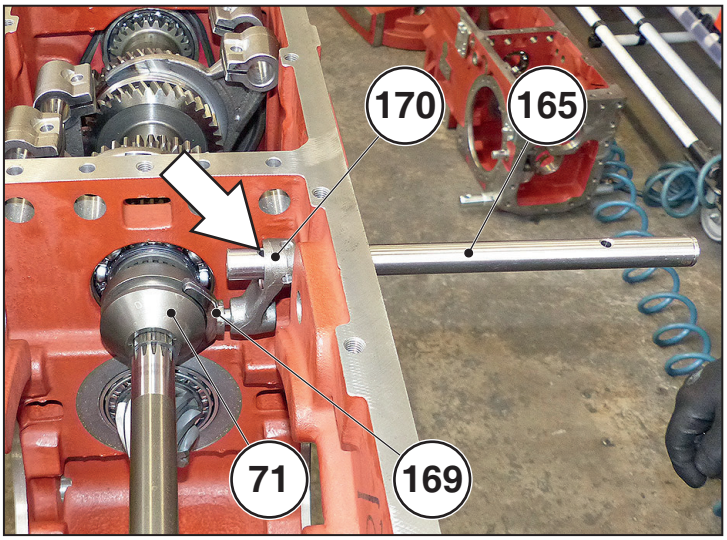


Fig. 5.369

Insert the following on the rod (165) in the following order:

- O-ring (166);
- washer (167);
- circlip (168).

Fit the rod (165) completely in the gearbox casing and then secure the lever (170) to the rod (165) with the pin (175).

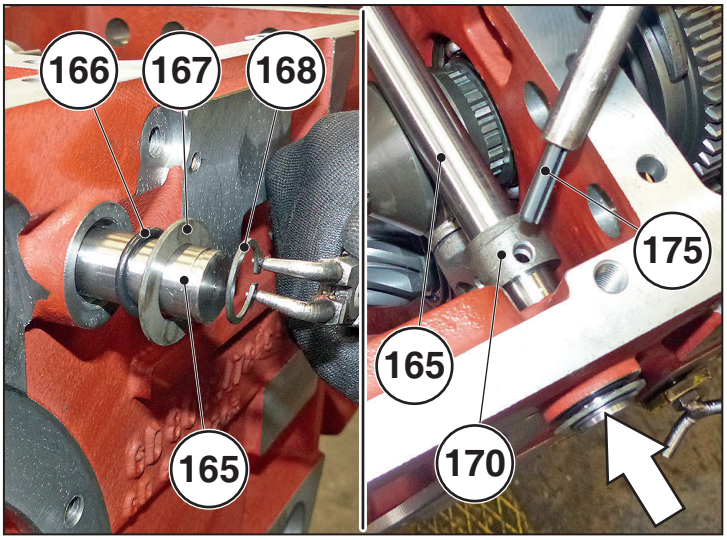


Fig. 5.370

Fit the parts below on the rod in the following order:

- O-ring (166);
- spacer (167);

Fit the PTO selector lever (171), together with the spring (172) and selector pin (173).

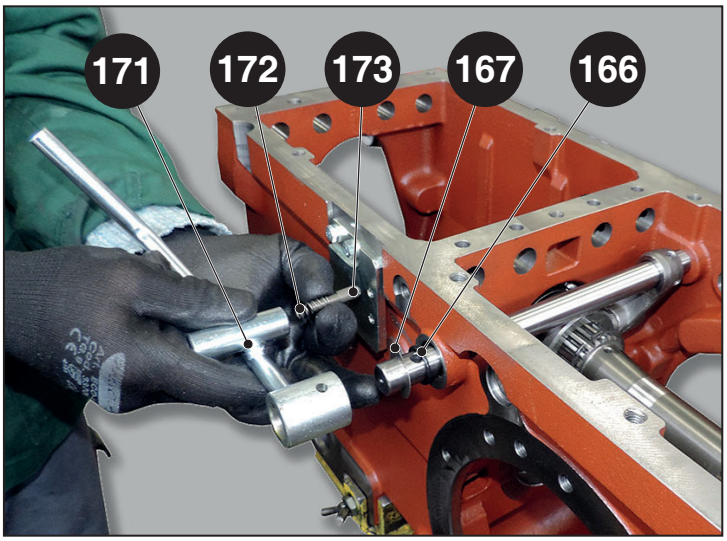


Fig. 5.371

Lock the PTO selector lever (171) on the rod with the dual pin (174).

Lock the lever of the fork (170) on the rod with the dual pin (175).

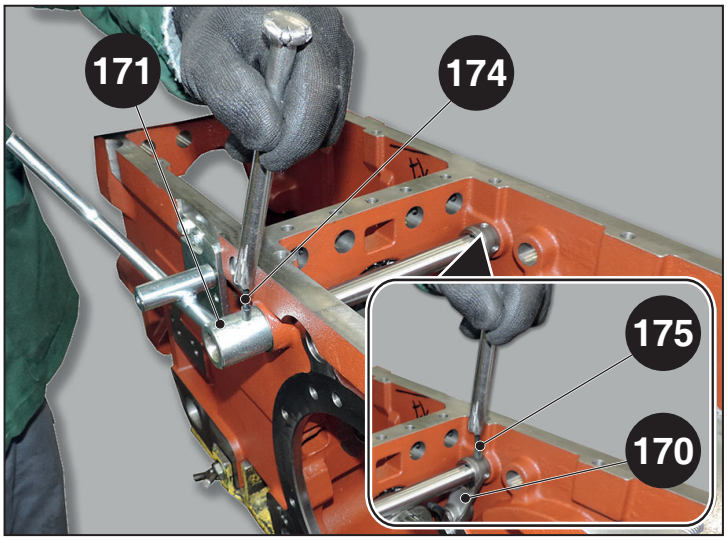


Fig. 5.372

Fasten the PTO selector plate (132) to the gearbox casing with the screws (133) and washers (134).

Warning
Do not tighten the screws completely.

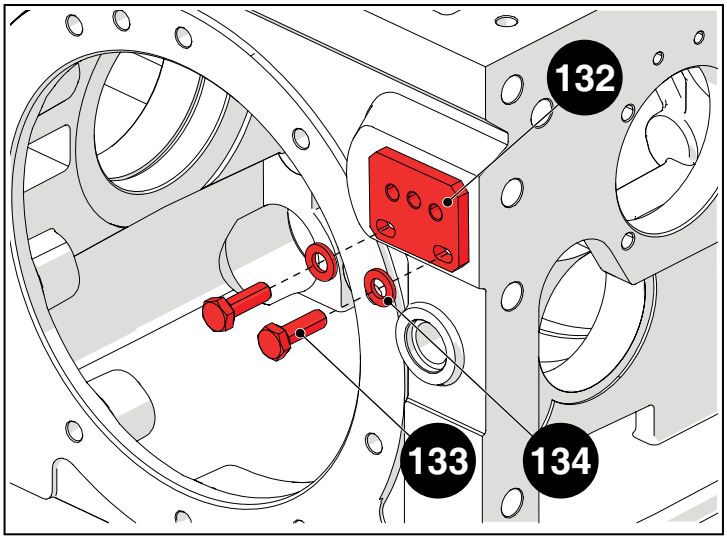


Fig. 5.373

Insert the PTO speed selector rod (157) with the end with the nearest hole facing the inside of the gearbox casing.

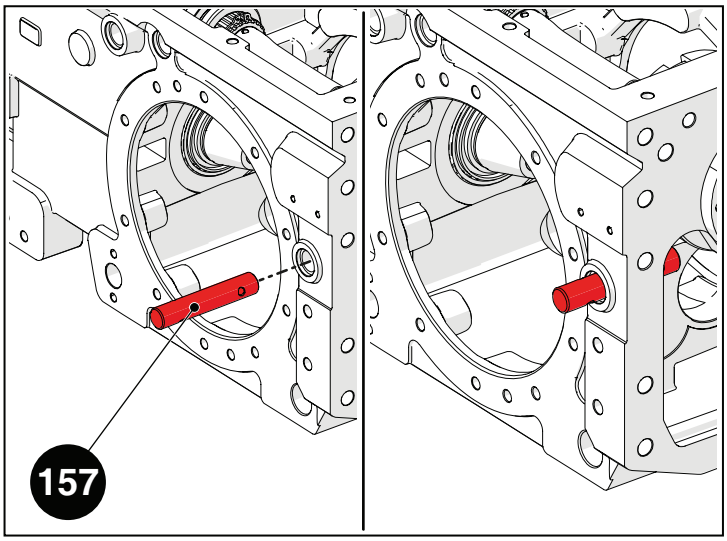


Fig. 5.374

Fit the bracket (158) on the rod (157) mating the holes. Secure the bracket (158) by inserting the pin (159).

Fit the fork (160).

> **Warning**
>
> Make sure that the end of the pin (159) does not touch the gearbox casing.

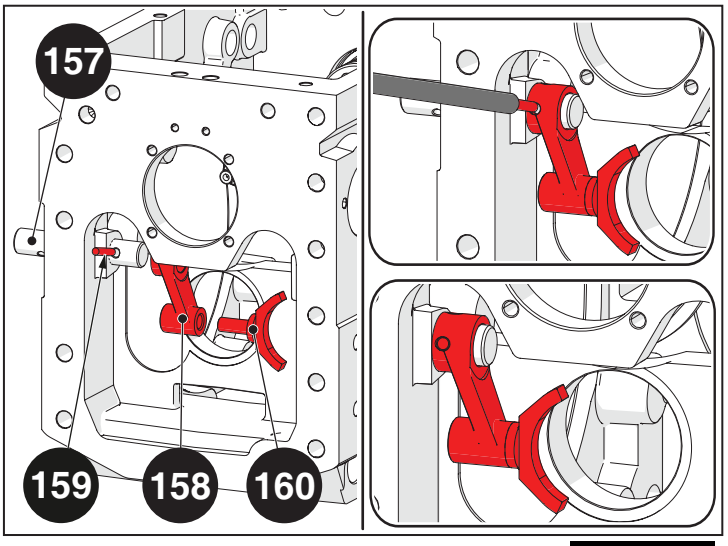


Fig. 5.375

Apply a coating of mastic sealant on the edge of the plug (255) before fitting it into gearbox casing using a suitable punch. Apply it evenly.

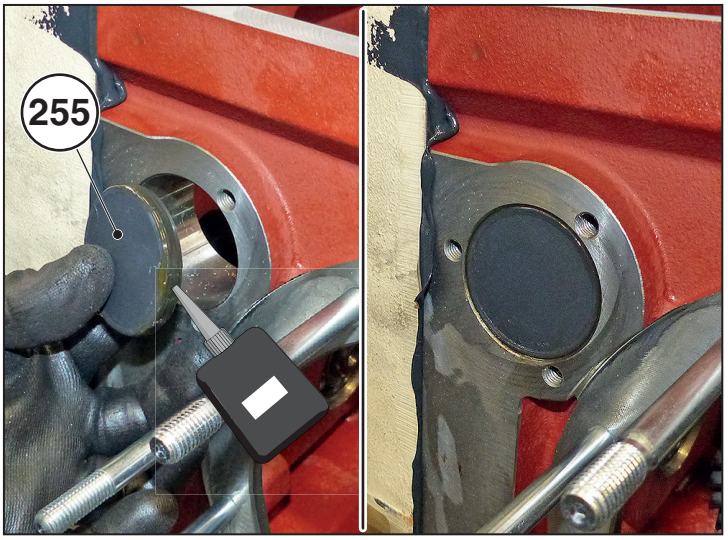


Fig. 5.376

Insert the following items in the lower (wider) hole of the rear cover (113):

- spacer (92);
- bearing (93), driving it into its seat with a punch tool of suitable diameter;
- circlip (94).

> **Warning**
>
> The circlip (94) must be integral with the bearing (93). Increase the spacer thickness (92) to make the two components integral; or decrease (or eliminate) it if the circlip (94) has no room to fit in.

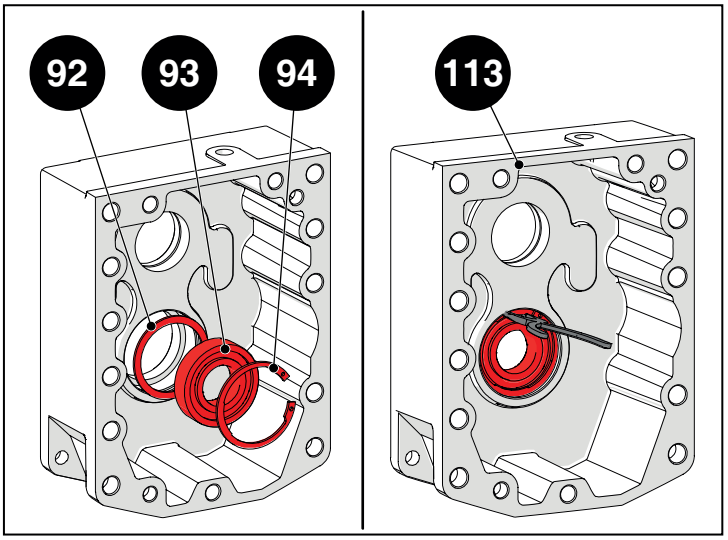


Fig. 5.377

Fit the PTO shaft (106) and drive it fully into the bearing (93).

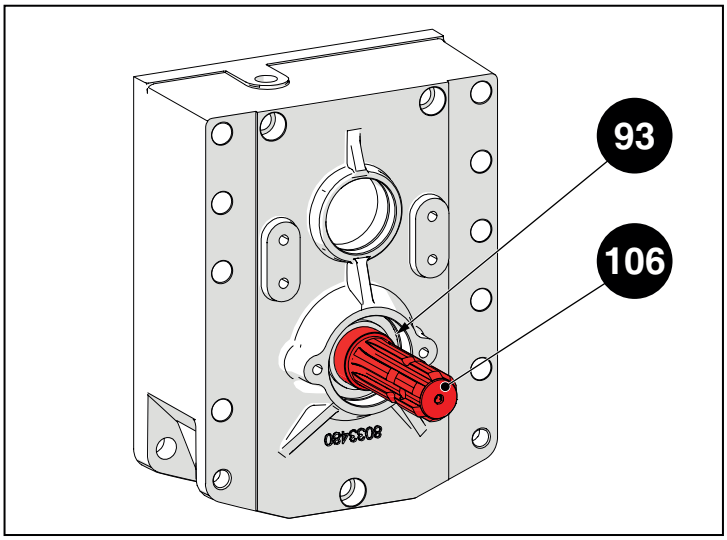


Fig. 5.378

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (95) by placing the narrow side facing the rear of the tractor;
- bush (101);

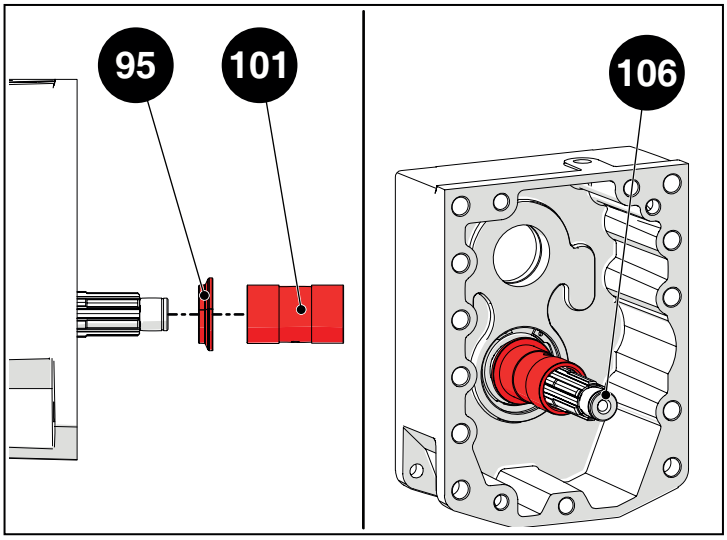


Fig. 5.379

Fit the following items on the front end of the PTO shaft (106) in the following order:

- PTO gear (96) directing it shown in the figure ;
- roller bearing cage (98);
- gear (97);

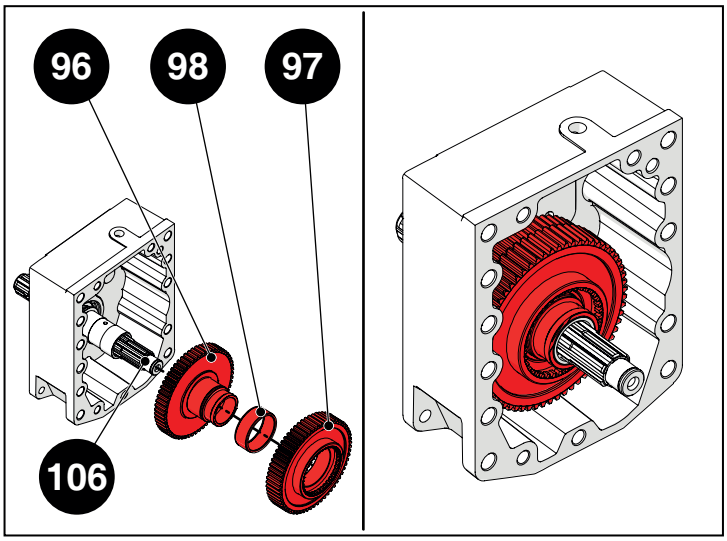


Fig. 5.380

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (99);
- circlip (100) fastening it on the PTO shaft (106);

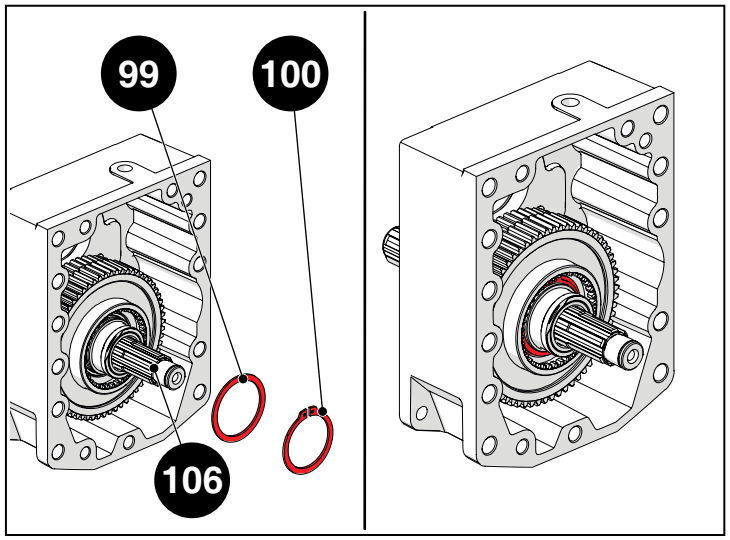


Fig. 5.381

Fit the following items on the front end of the PTO shaft (106) in the following order:

- spacer (102);
- ring nut retainer washer (103);
- ring nut (104).

Bend up the ring nut retainer washer (103) to secure the ring nut (104) permanently.

Warning

Bend up the ring nut retainer washer (103) on one side only.

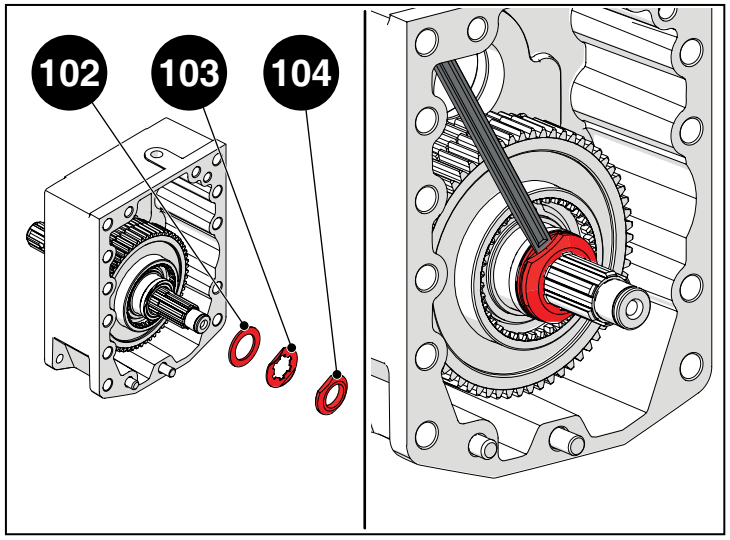


Fig. 5.382

Continue by fitting the following items on the PTO shaft (106) in the following order:

- PTO sleeve (105), keying it with the gear (97);

Warning

Make sure that the coupling of the sleeve (105) is smooth by rotating and keying it with the gear (97) in several points.

- bearing (108), driving it into its seat with a suitable punch tool;
- circlip (107) fastening it on the PTO shaft (106).

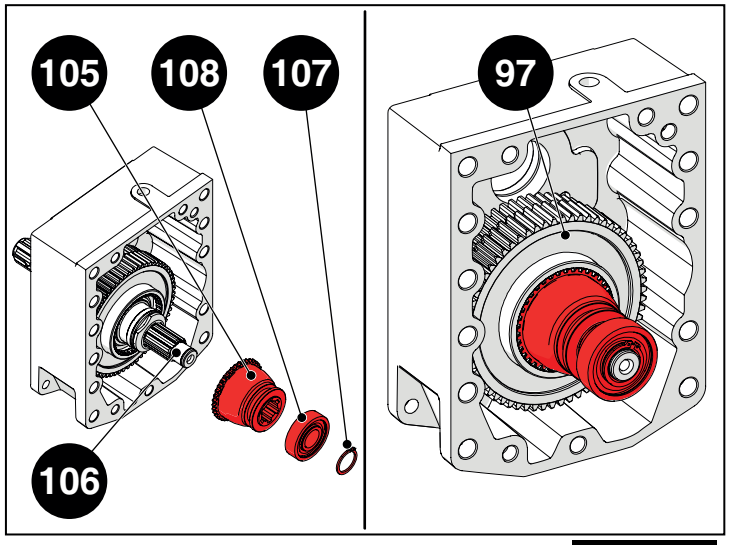


Fig. 5.383

Insert the centring pins (156) on the rear cover (113).

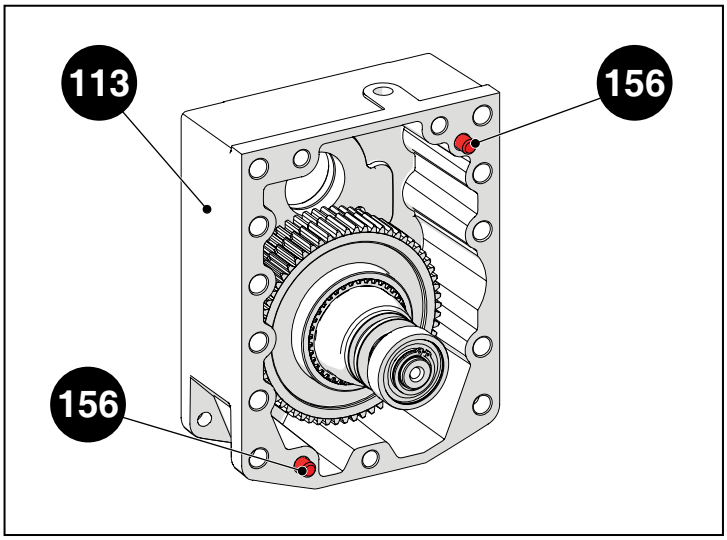


Fig. 5.384

Apply a coat of silicone sealant on the mating surface of the rear cover.

Apply a thread of silicone sealant on the mating surface of the gearbox casing near the splines.

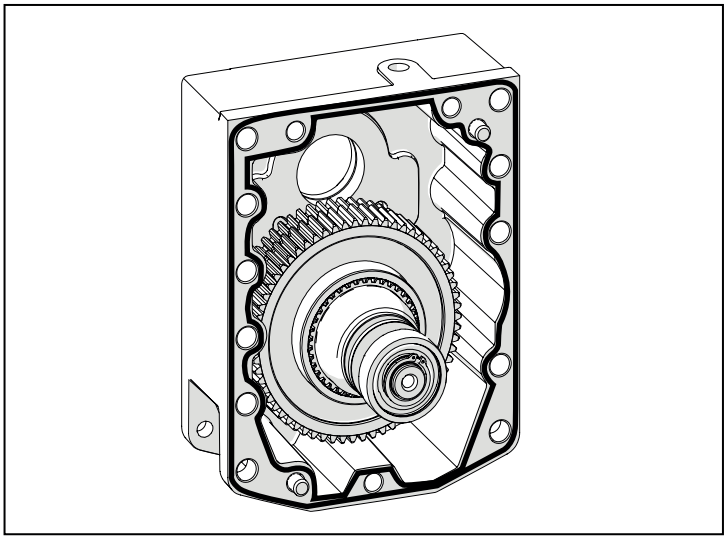


Fig. 5.385

Join the complete rear cover (113) on the gearbox casing.

Warning

Fit the fork (160) on the PTO sleeve (105) before mating the two assemblies.

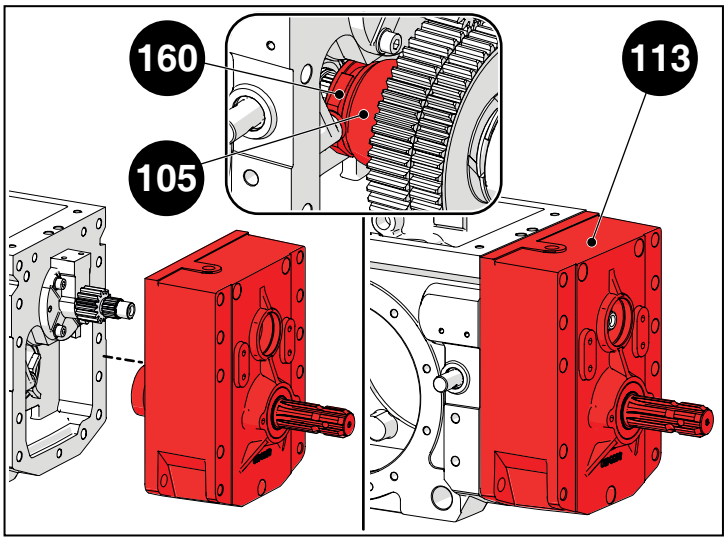


Fig. 5.386

Fasten the cover by tightening the screws (161) with the knurled washers (162), and the screws (163) with the conical washers (164).

Tighten the screws with a tightening torque of 85 Nm (8.5 kgm).

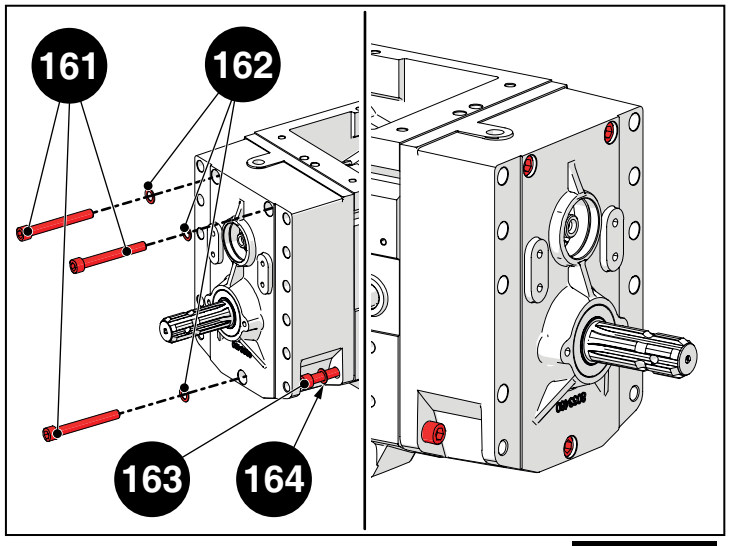


Fig. 5.387

Check the engagement of the PTO speed selector lever (157): insert a pin punch into the hole and apply leverage to the right and left to engage/disengage the lever; lever operation must be fluid.

Check that the PTO shaft (106) rotates correctly.

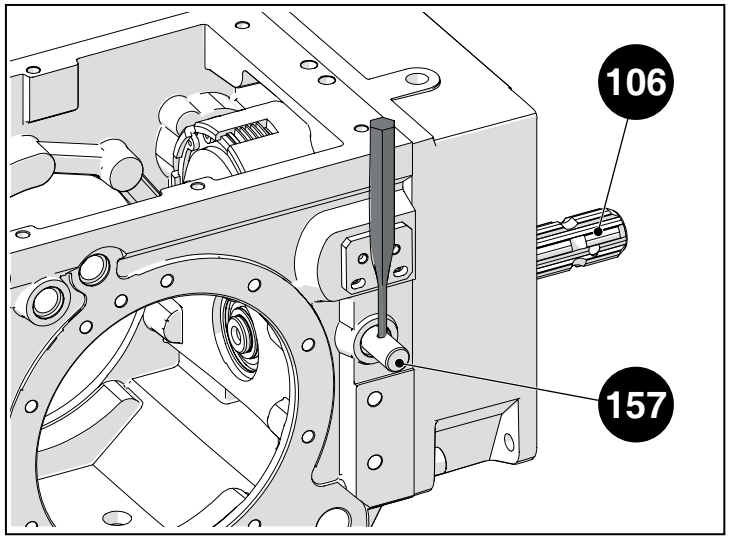


Fig. 5.388

Fit the gear (86) on the shaft (106), keying it with the gear (96).

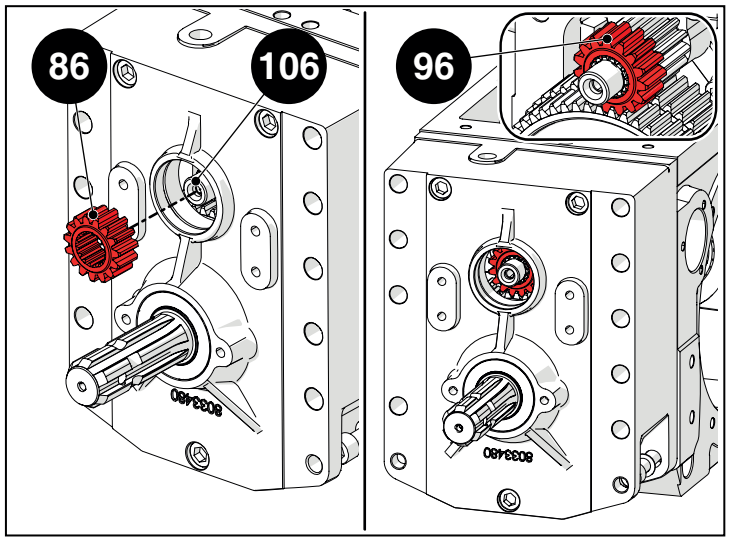


Fig. 5.389

Insert the inner bearing race (89) on the shaft (85). Then fit the bearing (89) and drive it fully into its seat with a punch tool of suitable diameter.

> **Warning**
>
> Before driving the bearing (89) in, make sure that it is not inserted distorted.

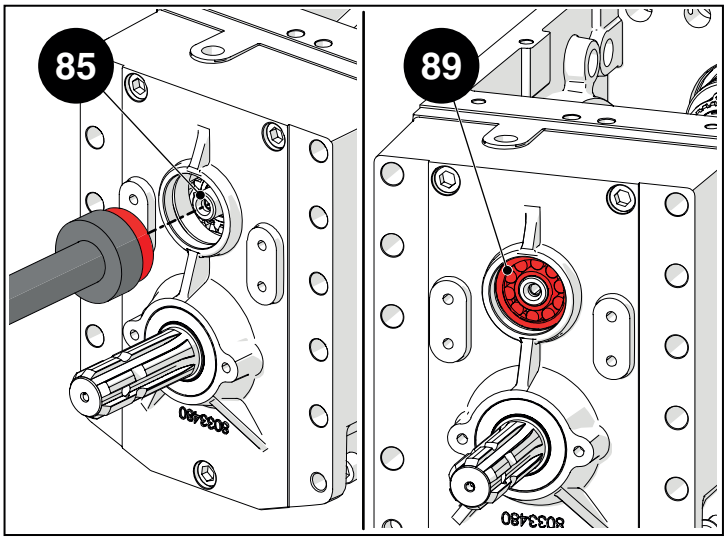


Fig. 5.390

Fit the spacer (87) and the circlip (88).

Make sure that free play between bearing (89) and the circlip (88) is between _____ - _____ mm. Otherwise vary the thickness of the spacer (87) until the indicated free play is obtained.

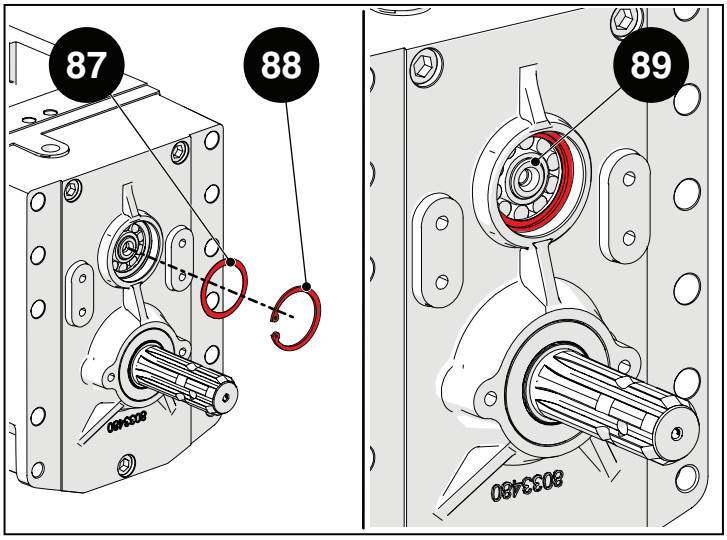


Fig. 5.391

Apply a coat of mastic sealant on the plug (90) and drive it into its seat with a suitable punch.

Lubricate the oil seal (91) and insert it on the PTO shaft (106) using a guide tool of suitable diameter and a punch tool.

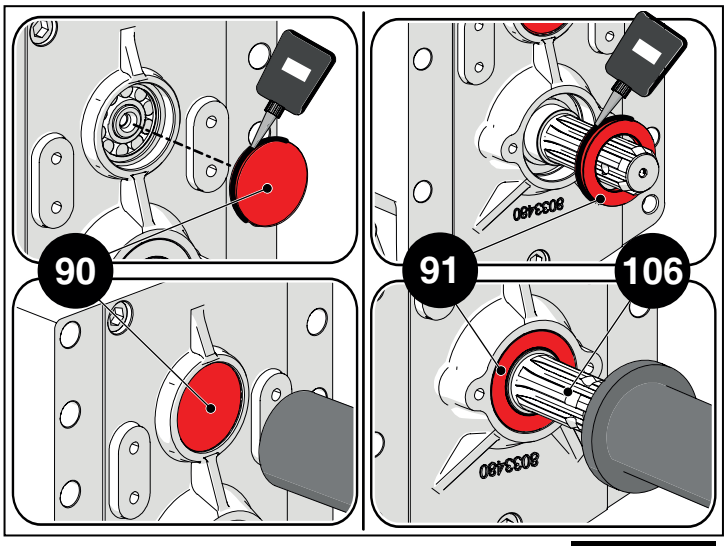


Fig. 5.392

Fit the O-ring (176) and the spacer (177) on the PTO speed rod (157).

Fit the PTO speed lever (178), together with the engagement pin (179) with the spring (180). Make sure to match the hole on the lever with the one on the rod.

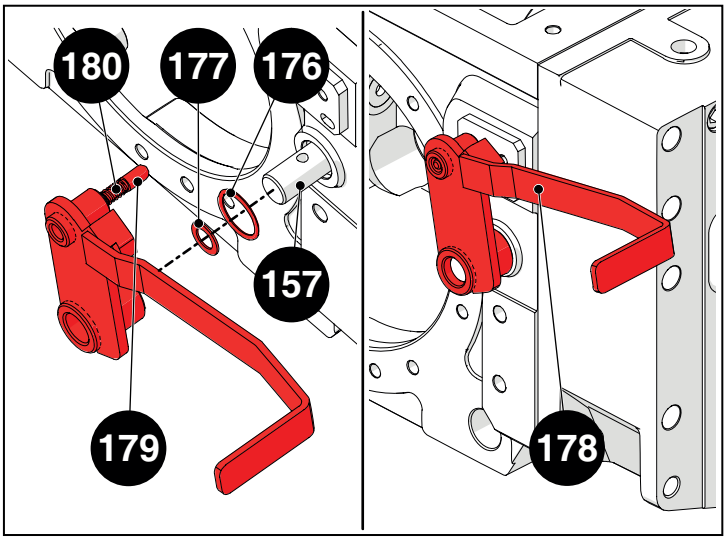


Fig. 5.393

Secure the lever on the rod by inserting the pin (159).

Use a feeler gauge to check that the free play between the lever (178) and the gearbox casing is between 0.2 - 0.3 mm. Otherwise vary the thickness of the spacer (177) until the indicated free play is obtained.

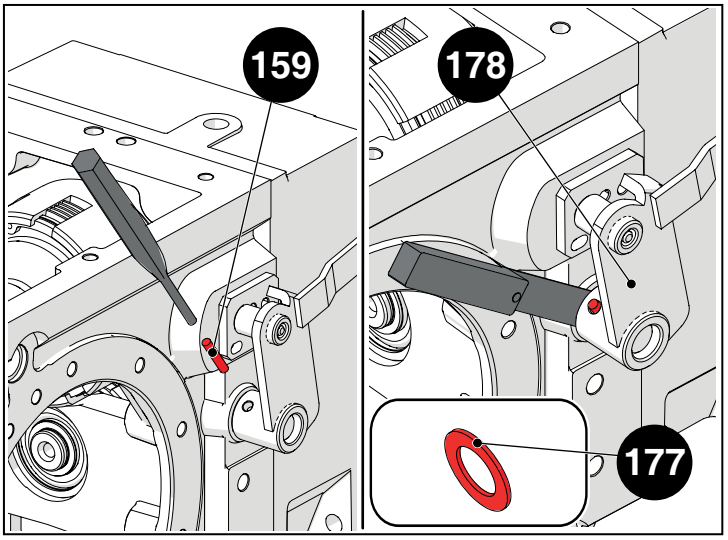


Fig. 5.394

Adjust the PTO speed lever (178) by moving the plate (132), gently tapping it with a pin and a mallet until the desired result is achieved:

- the lever (178) must have the same free play in the forward position (A) and back position (C);
- the engagement of the forward and backward gears must be equidistant from the central position (B).

In addition, make sure that the lever (178) is operated smoothly.

⚠ Warning
Make sure that the plate fastener screws (133) are not completely tightened.

Once the adjustment is completed, tighten the fastener screws of the plate (133) completely.

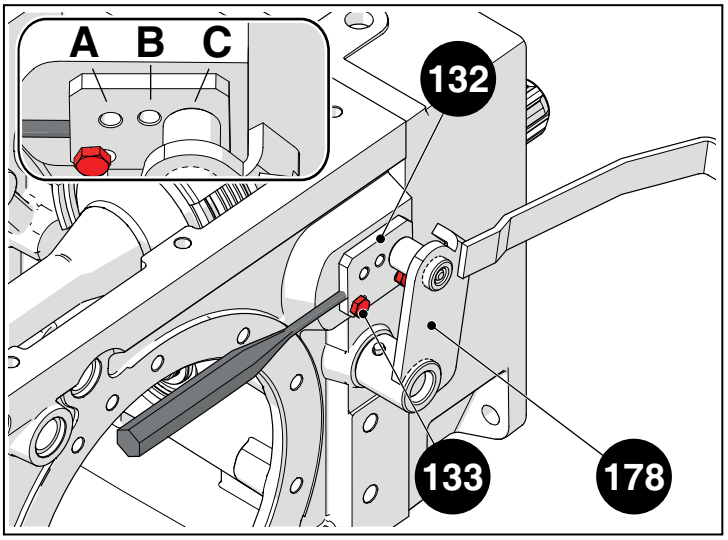


Fig. 5.395

Adjust the PTO selector lever (171) by moving the plate (135), gently tapping it with a pin and a mallet.

> **Warning**
>
> Make sure that the plate fastener screws (135) are not completely tightened.

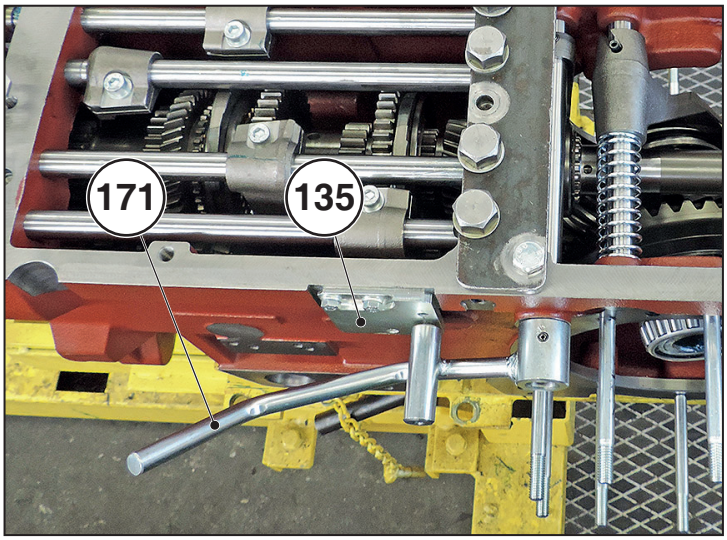


Fig. 5.396

The lever (171), shown in the figure (5.396) must have the same free play in the up and down position.

The distance X between the sleeve (71) in back position and the circlip (72) must be equal to the distance Y between the sleeve in forward position and the circlip (29); in any case , avoid that the distance Y is less than the distance X.

> **Warning**
>
> Make sure that there is no rubbing or dragging between the gears in neutral position.

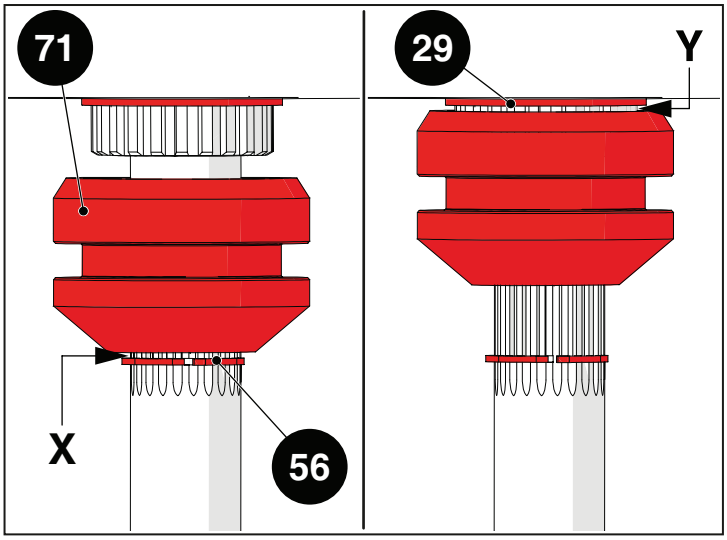


Fig. 5.397

Once the adjustment is completed, tighten the fastener screws (136) of the plate completely.

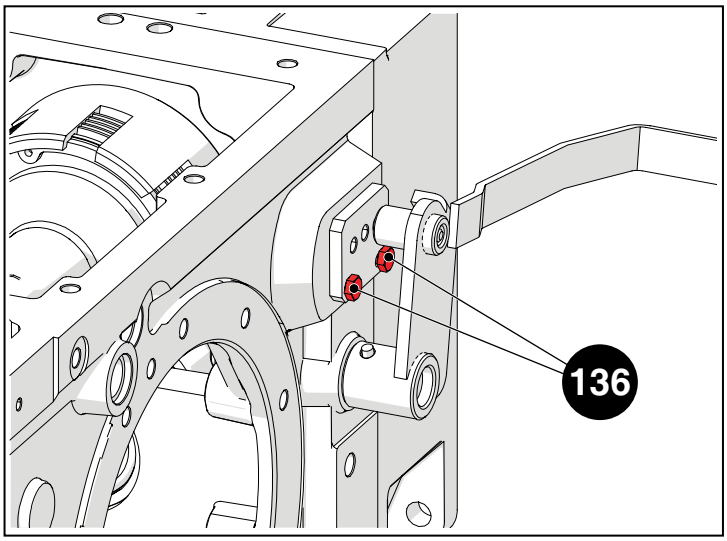


Fig. 5.398

5.2.1.4 Reassembling the differential

Insert the rod (201) from the grooveless end on the gearbox casing from the left side. Insert it also in the spring (202) and in the fork (194).

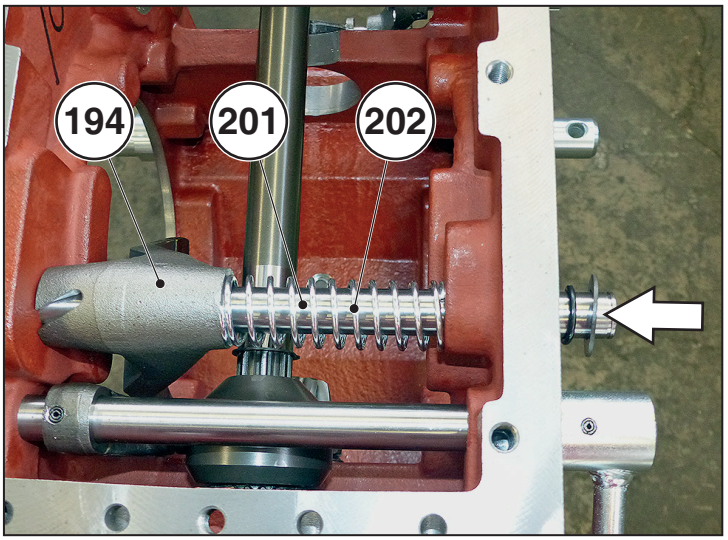


Fig. 5.399

Fit the circlip (201), O-ring (203) and washer (204) and the circlip (205).

Secure the fork (194) on the rod (201) with the pin (207).

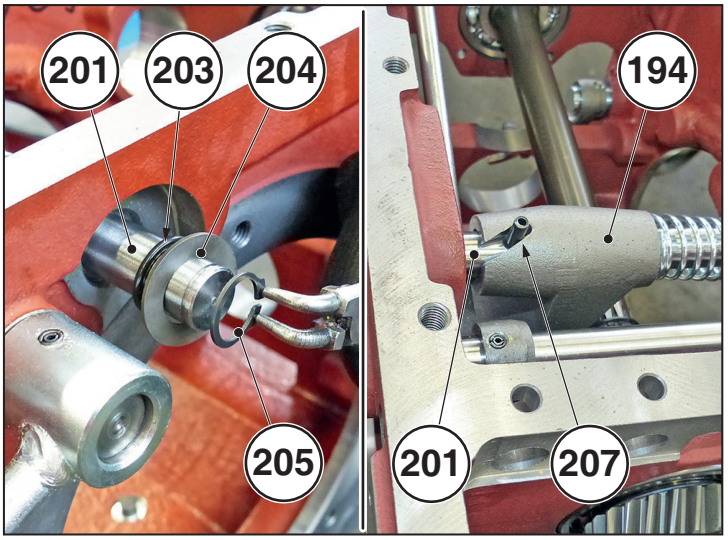


Fig. 5.400

Insert the following from the right end of the rod (201) in the following order:

- O-ring (203);
- spacer (251);
- lever (206).

Insert the pin (207) to secure the lever (206) on the rod.

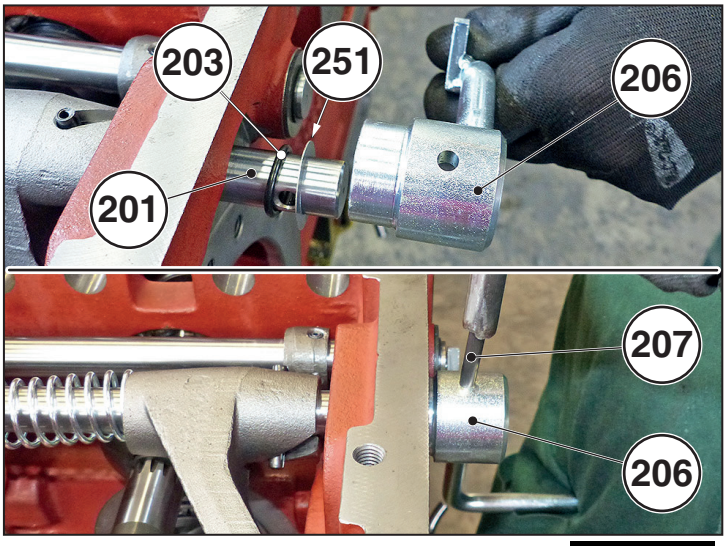


Fig. 5.401

Tighten the stud bolts (182) on the gearbox casing.

Warning

Screw the end with the shorter threaded shank.

Warning

The stud bolt (182) in the three topmost holes are shorter than the others.

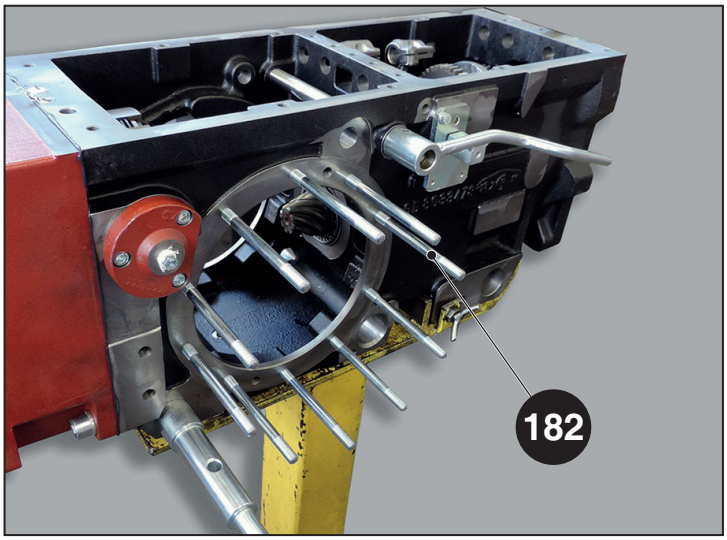


Fig. 5.402

Grease the sun gear of the complete crown wheel assembly (119) and fit the inner bearing races (183) using a punch of suitable diameter.

Warning

To preassemble the complete crown wheel assembly (119), see the Chapter “Disassembling/ Assembling the differential crown wheel".

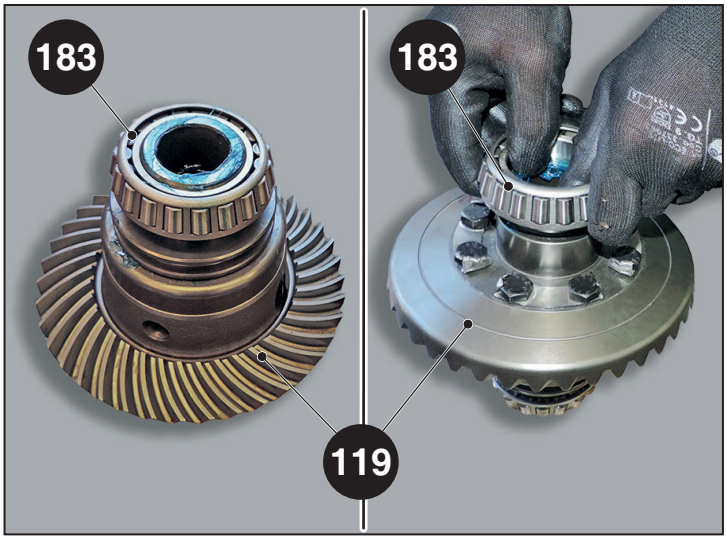


Fig. 5.403

Position the complete crown wheel assembly (119) inside the gearbox casing.

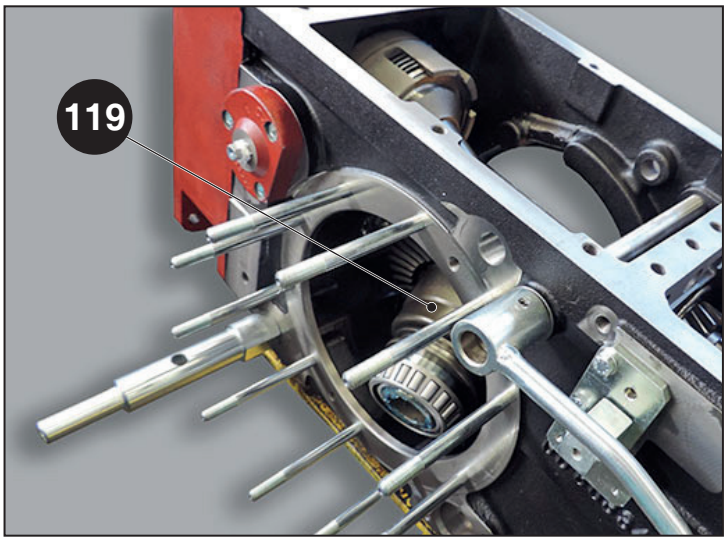


Fig. 5.404

Insert the outer bearing races (183) on the brake casings (184), driving them in with a punch tool of suitable diameter.

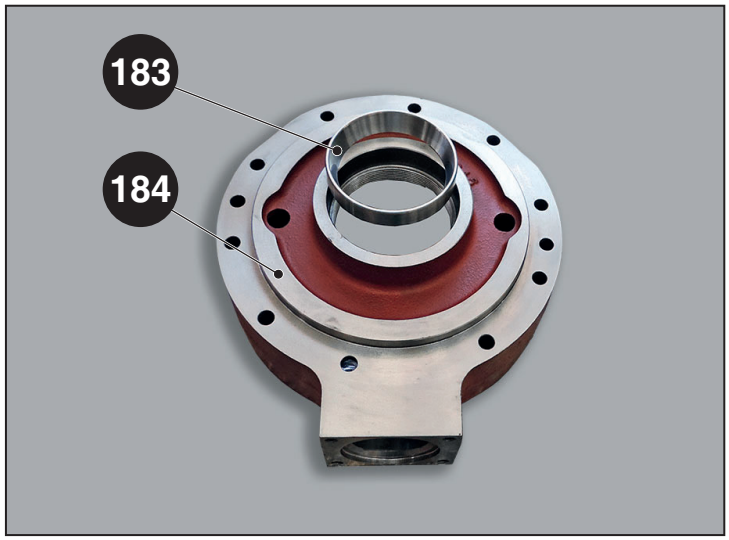


Fig. 5.405

Apply a layer of silicone sealant on the mating surfaces of the gearbox casing and brake casings.

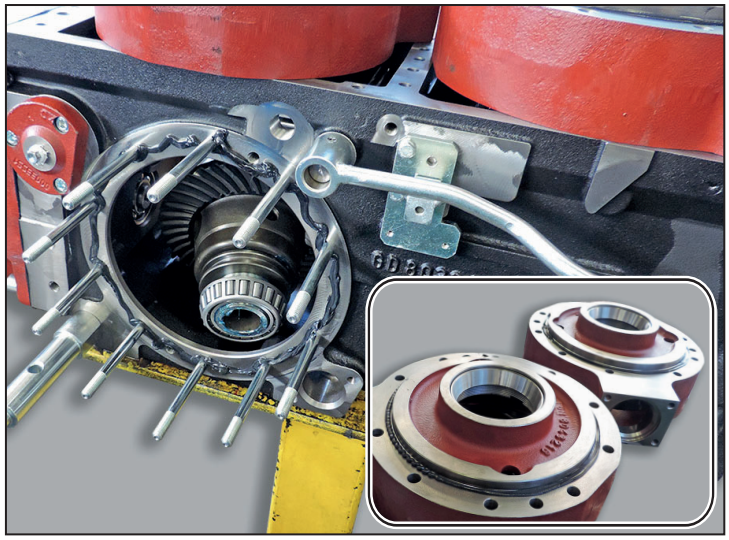


Fig. 5.406

Straighten the complete crown wheel assembly (119), then fit the brake casings (184) **without driving them completely in**.

Match the inner bearing races (183) mounted on the complete crown wheel assembly (119), with the outer races mounted on the brake casings.

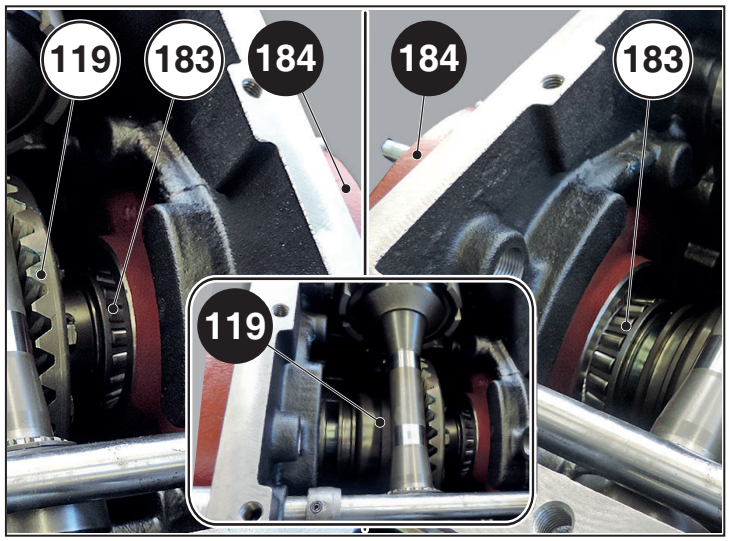


Fig. 5.407

Fit the washers (185) and the fastener screws (186) in the holes on the brake casings (184).

Make sure that the brake casings (184) match with the gearbox casing and then tighten the screws (186) completely. Tighten the screws to a torque of 55 Nm (5.5 kgm).

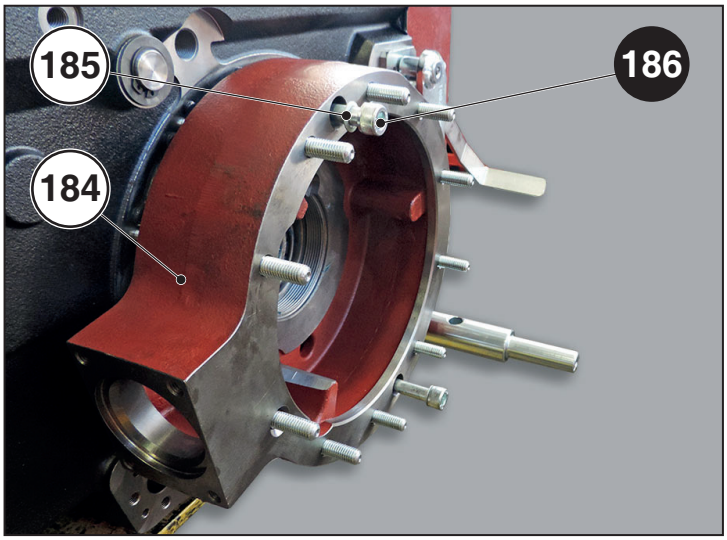


Fig. 5.408

Using the special tool (C-p/n_____), tighten the ring nut (187) on the crown wheel pack side and unscrew it by 3 splines, taking the ring nut retainer hole as reference.

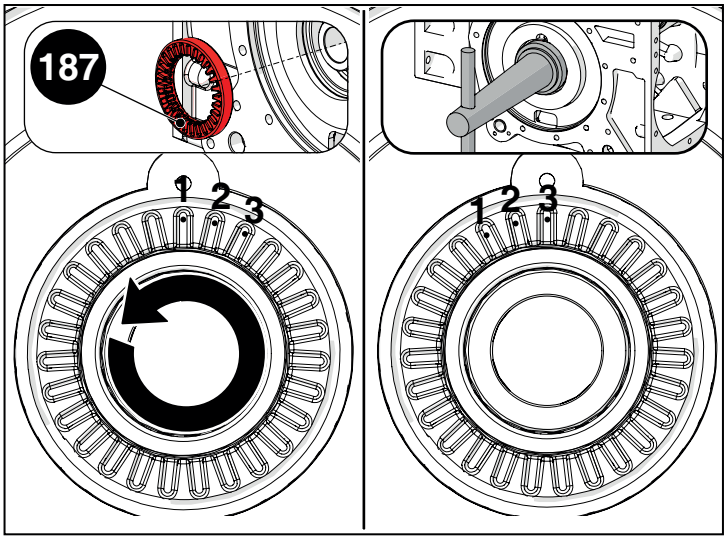


Fig. 5.409

Using the special tool (C-p/n_____), tighten the ring nut (187) on the side opposite the crown wheel pack and pretension by screwing it by another 1-2 splines.

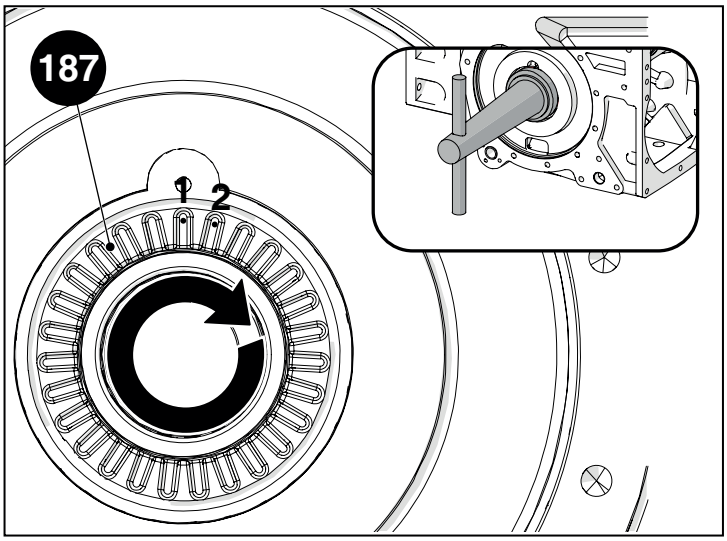


Fig. 5.410

Secure the bevel gear set using a punch tapping first on the crown wheel side and then on the opposite side.

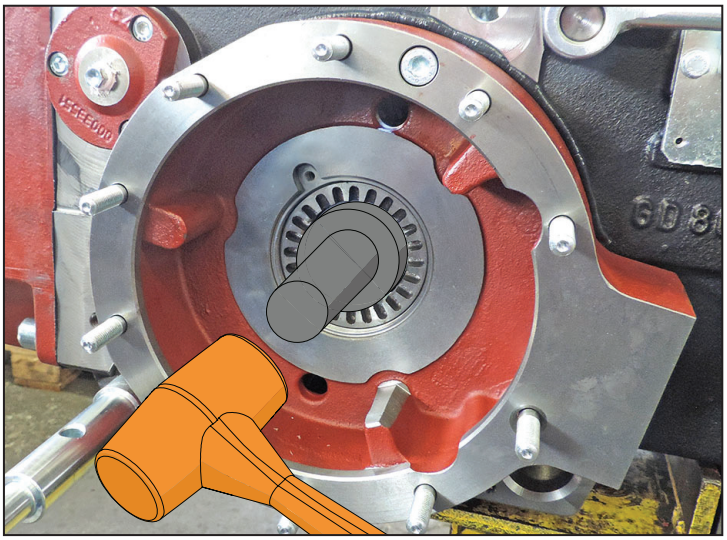


Fig. 5.411

Lock the crown wheel side ring nut retainer (187) by tightening the ring nut retainer (188).

Using the special tool (C-p/n_____), loosen the ring nut (187) on the side opposite the crown wheel and tighten it again against the set. Tighten it by another spline.

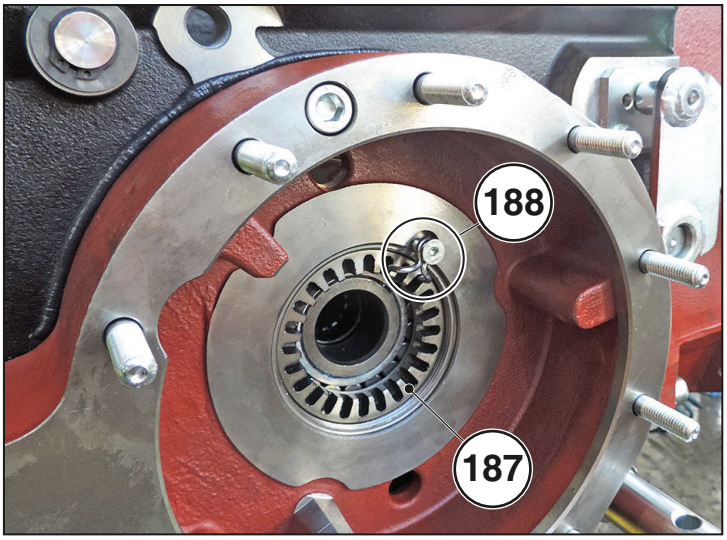


Fig. 5.412

Apply the probe of a dial gauge with a magnetic base against one of the teeth of the crown wheel (119) and reset the dial gauge.

Move the crown wheel (119) 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: unscrew the ring nut (187) on the crown side and tighten the ring nut by an equivalent number of splines.

If the backlash is greater than the correct value: screw the ring nut (187) on the crown side and loosen the ring nut by an equivalent number of splines.

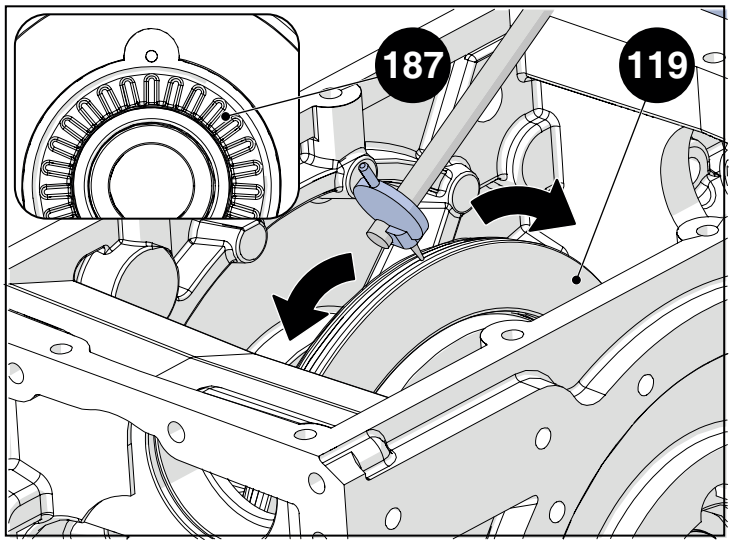


Fig. 5.413

Tighten the ring nut retainers (188) on both sides.

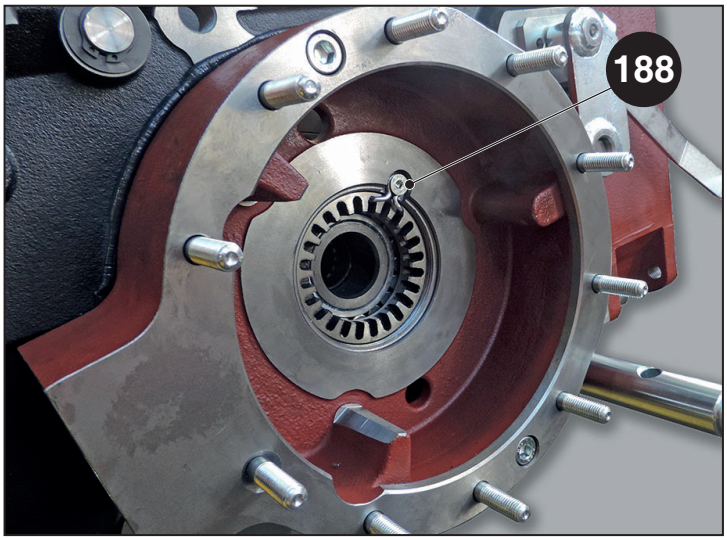


Fig. 5.414

5.2.1.5 Reassembling the rods, levers and gearbox cover

Note

When reassembling the gearbox cover, rods and levers, follow the instructions for the REV, RS and SN+ Cluster in the relevant Chapter.

Section 6 : Tightening specifications

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6.1 Tightening specifications

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

Section 7 : Tools necessary

Index

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7.1 Tools necessary

p/n	Description	Quantity
A-p/n_____	Bevel pinion installation guide	1
B-p/n_____	Bevel pinion retainer	1
C-p/n_____	Crown wheel assembly ring nut key	1
D-cod._____	Tool for installing the rear differential control shaft	1
E-p/n_____	Gearbox shaft ball pretensioning tool	1

Chapter 6 : Central body

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Section 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.

Section 2 : Technical characteristics

Index

2.1 REV and RS Cluster.....6-4

2.2 SN and SN+ Cluster 6-4

2.1 REV and RS Cluster

Front swing angle	15° right + 15° left

2.2 SN and SN+ Cluster

Front swing angle	15° right + 15° left
Articulation angle	45°

Section 3 : Central body of REV and RS Cluster

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3.1 Disassembly

3.1.1 Preliminary operations

Before starting disassembly work, follow the "Preliminary operations" in the Chapter “Rear final drive units”. In addition, remove the following assemblies:

- front wheels;
- front mudguards;
- instrument cluster (RS Cluster)
- rotary mount (REV Cluster, see the Chapter “Rotary mount" for the disassembly/reassembly instructions).

3.1.2 Disassembly

3.1.2.1 Disassembling the reverse shuttle selector lever (REV Cluster)

Remove the split pin (1), the flat washer (2) and the pin (3) to separate the support (4) from the lever (5).

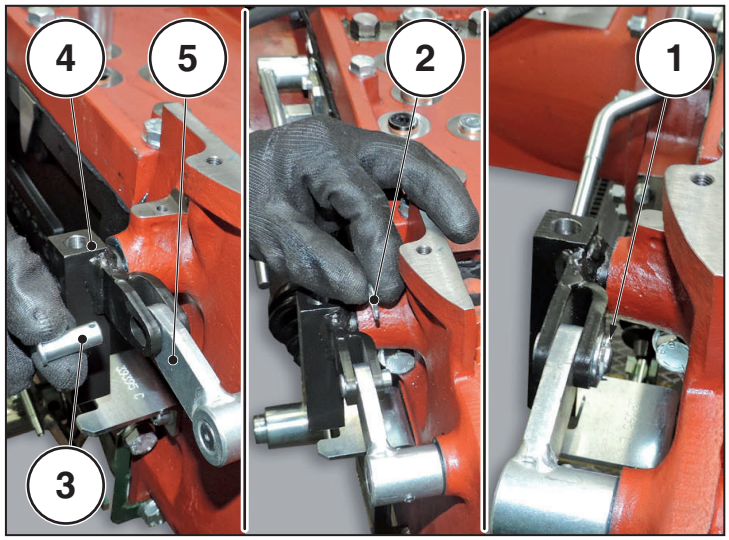


Fig. 6.1

Unscrew the joint (6) from the reverse shuttle selector rod (7).

Pull out the pin (8), then remove the lever (9) from the pin (10) and pull it out of the housing.

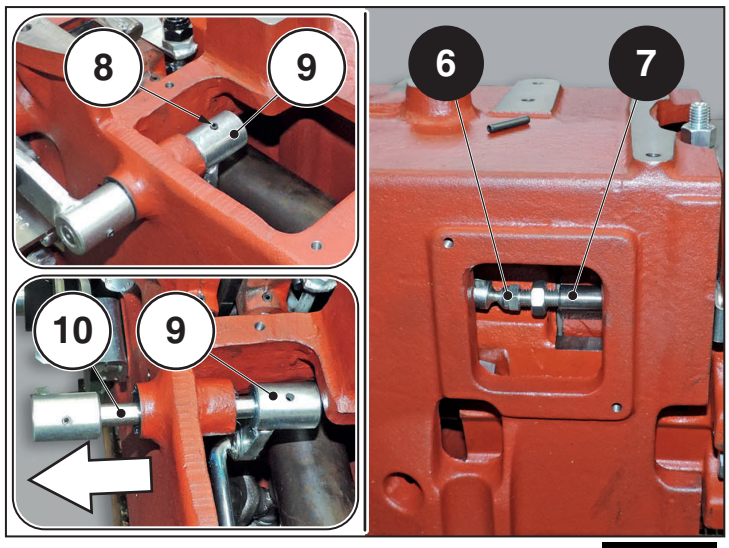


Fig. 6.2

Undo the nut (11), the joint (6) and nut (12) from the tie-rod (13).

Remove the split pin (14) and flat washer (15) to disassemble the tie-rod (13) from the lever (9).

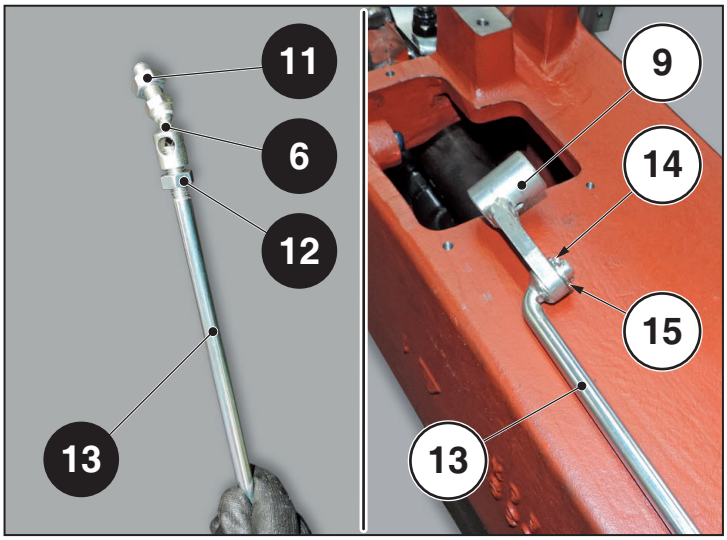


Fig. 6.3

Remove the lever (5). Remove the pin (8) to remove the pin (10) from the lever (5).

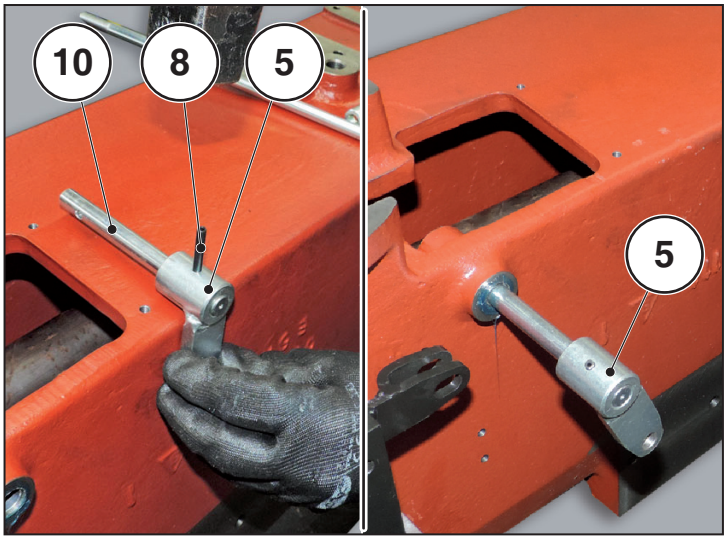


Fig. 6.4

Undo the screws (16) and remove the washers (17) fastening the brackets (18) and remove the mount (4).

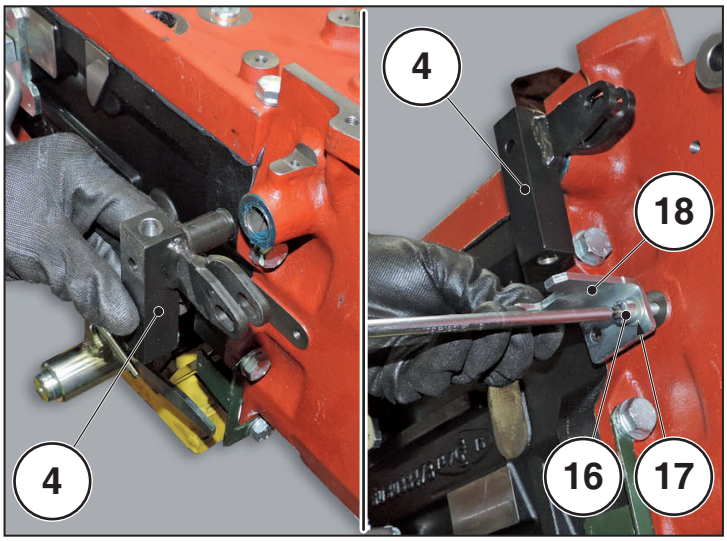


Fig. 6.5

Remove the bushes (19), (20A) and (20B).

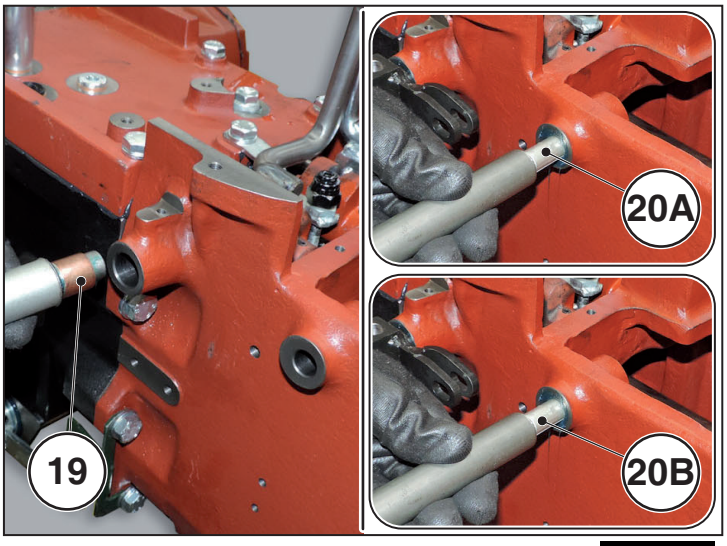


Fig. 6.6

3.1.2.2 Removing the drive shafts

Undo the screws (57), remove the conical washers (58) and then separate the gearbox assembly from the central body.

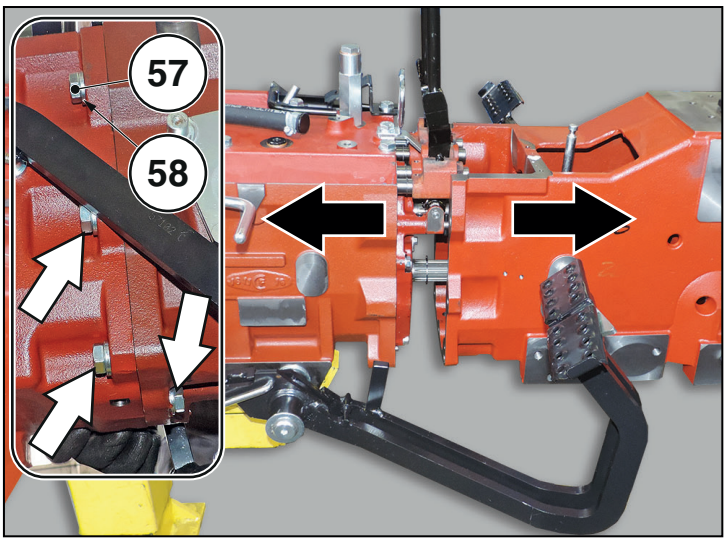


Fig. 6.7

Remove the drive shaft (21) and independent PTO shaft (22).

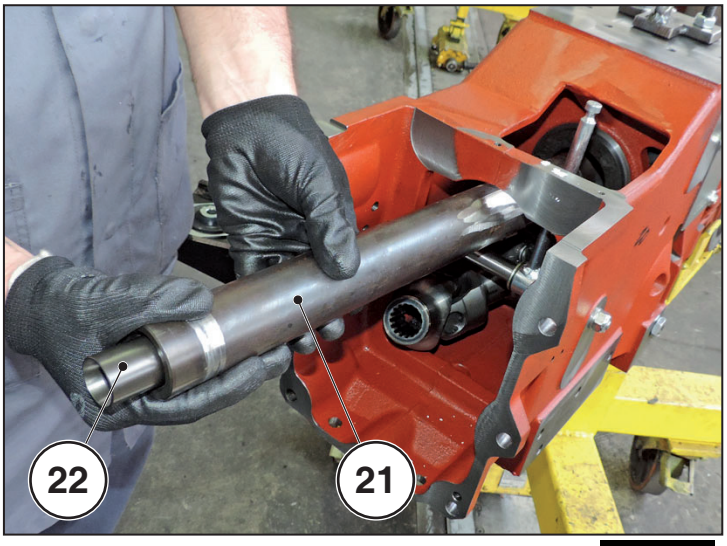


Fig. 6.8

Remove the sleeves (23) and (24) from the independent PTO shaft (22). Remove the circlips (25) and (26) from inside the sleeves.

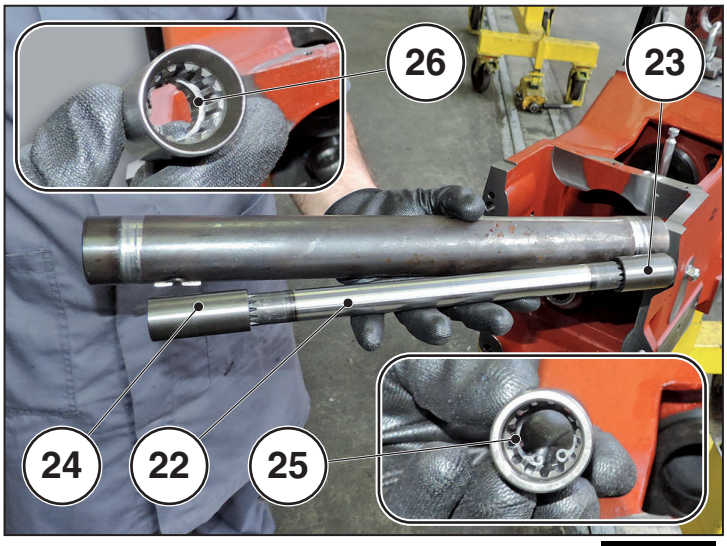


Fig. 6.9

Remove the pin (27) of the joint (28) with a pin punch.

Remove the joint (28).

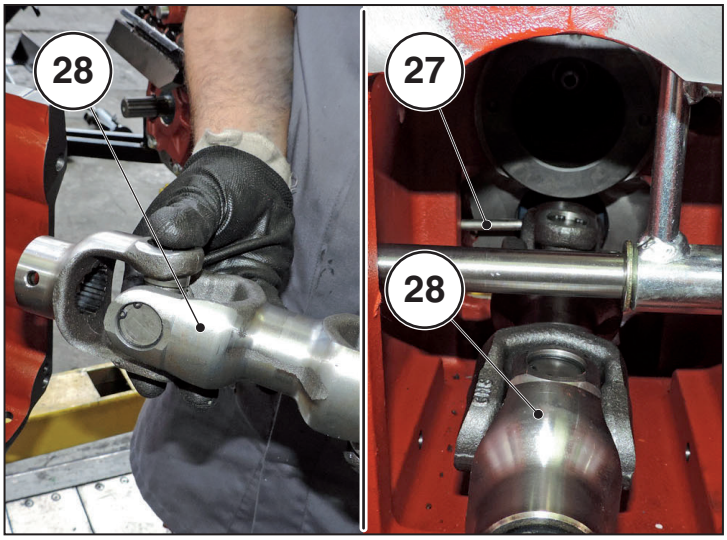


Fig. 6.10

3.1.2.3 Disassembling the RS shuttle selector lever (RS Cluster)

Undo the screws (29) and remove the plate (30).

Loosen the nut (31).

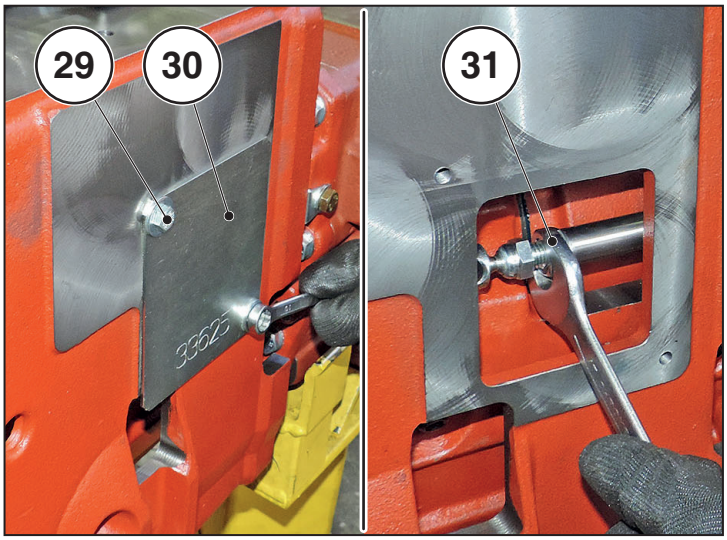


Fig. 6.11

Undo the pin (32) by removing the fastener nut (33).

Remove the pin (32) and recover the washers (34) and spring (35).

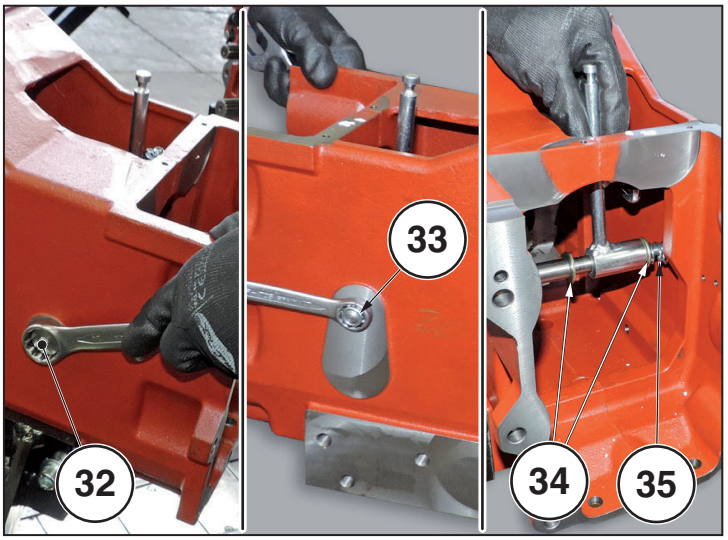


Fig. 6.12

Unscrew the joint (6). Remove the complete lever (36).

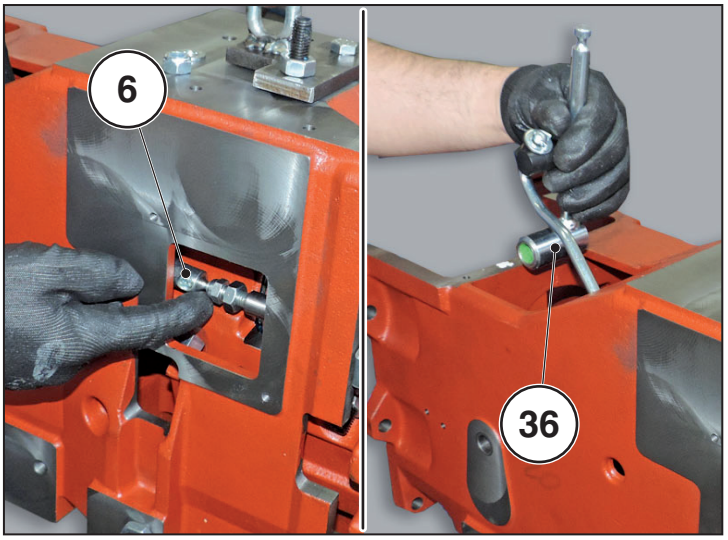


Fig. 6.13

Remove the bushes (37), one on each side, from the lever (36).

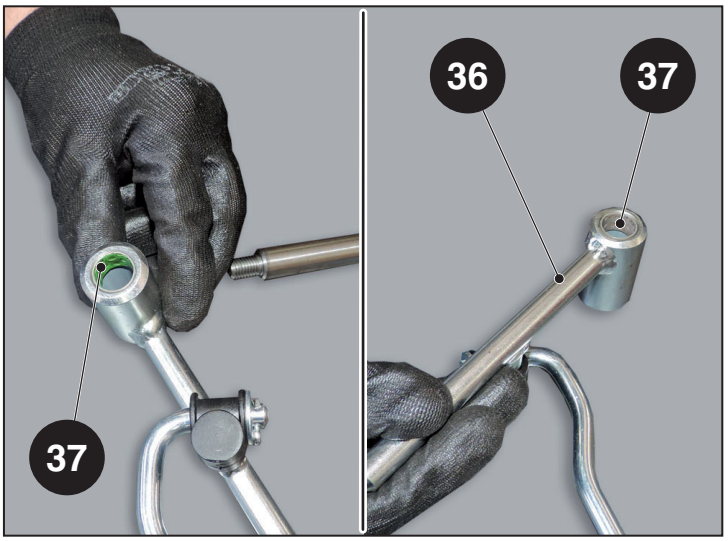


Fig. 6.14

Remove the tie-rod (38) from the lever (36) by removing the split pin (39).

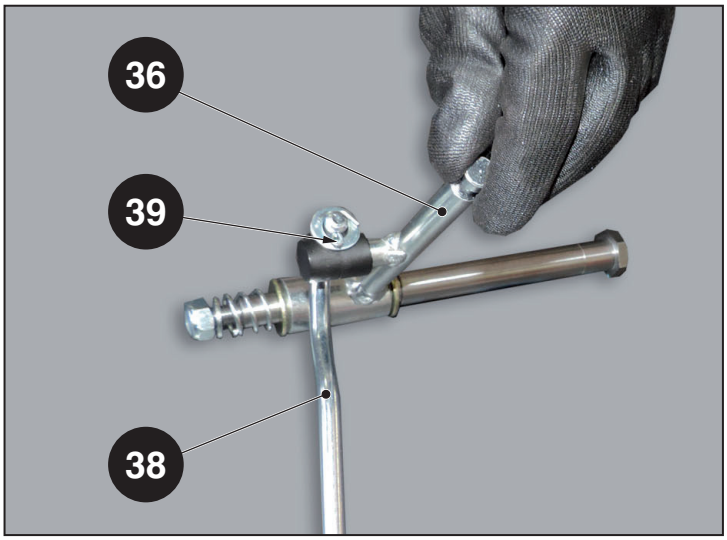


Fig. 6.15

3.1.2.4 Removing the central cast

Loosen the nut (40) and the swing end stop grub screw (41). Just unscrew the grub screw (41) completely outwards without removing it. Carry out this step on both sides of the tractor.

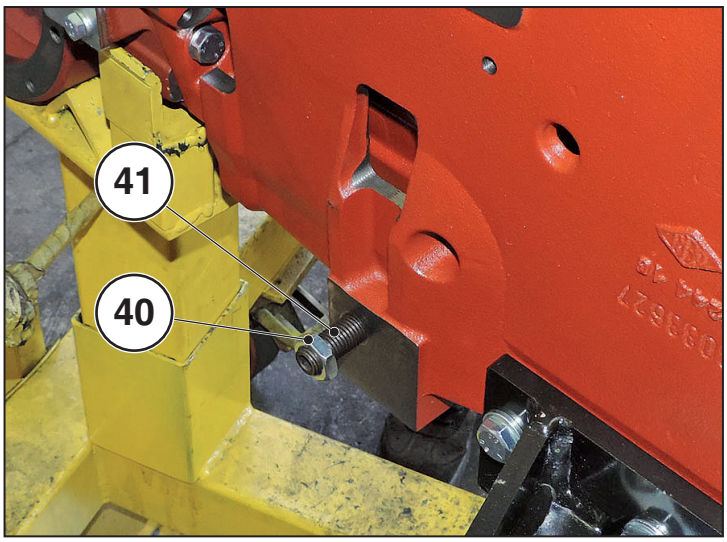


Fig. 6.16

Loosen the nut (42) and the grub screw (43).

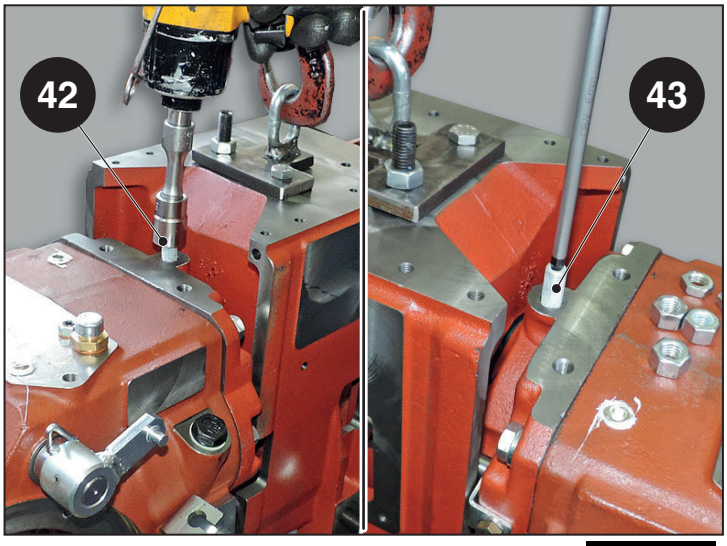


Fig. 6.17

Undo the nuts (44) and (45) and the grub screws (46) and (47). Carry out this step on both sides of the tractor.

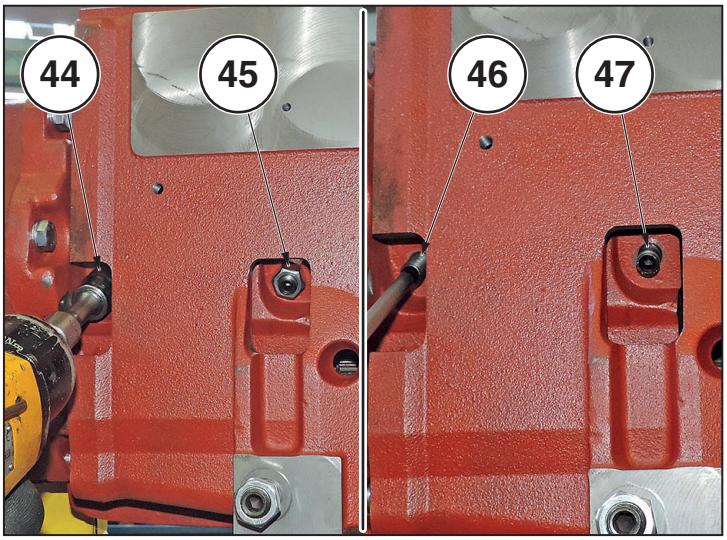


Fig. 6.18

Use a punch to remove the coupling cylinder (48).

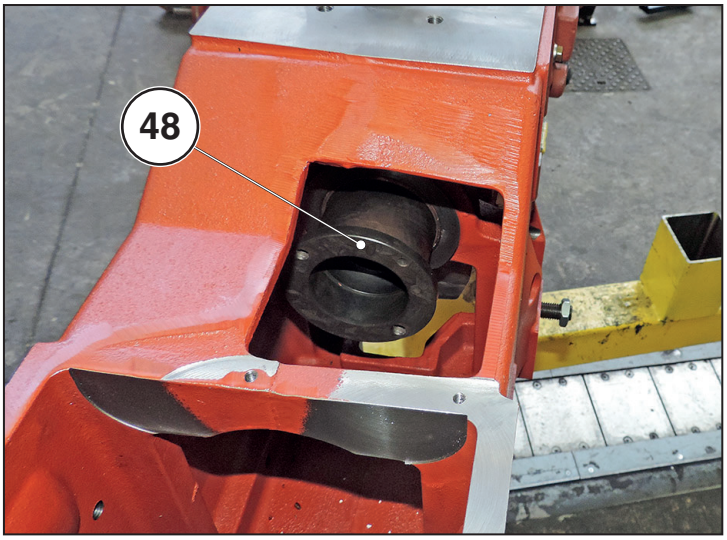


Fig. 6.19

Pull out the independent PTO shaft (49).

Note

If the engine has not been disassembled, it is possible to remove the shaft (49) from the rear, either by gripping it with pliers or by screwing a screw in the threaded hole at the end.

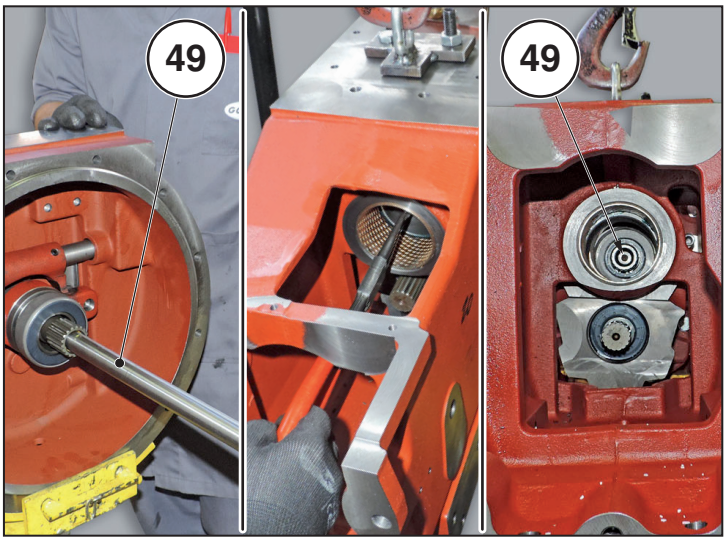


Fig. 6.20

Secure the cast to a suitable hoist, then lift it up 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.

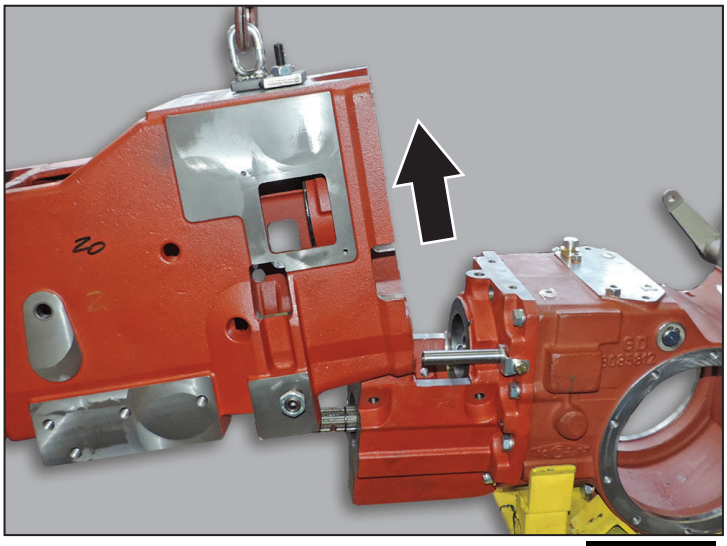


Fig. 6.21

Remove the spacers (50) on the front bush (51).

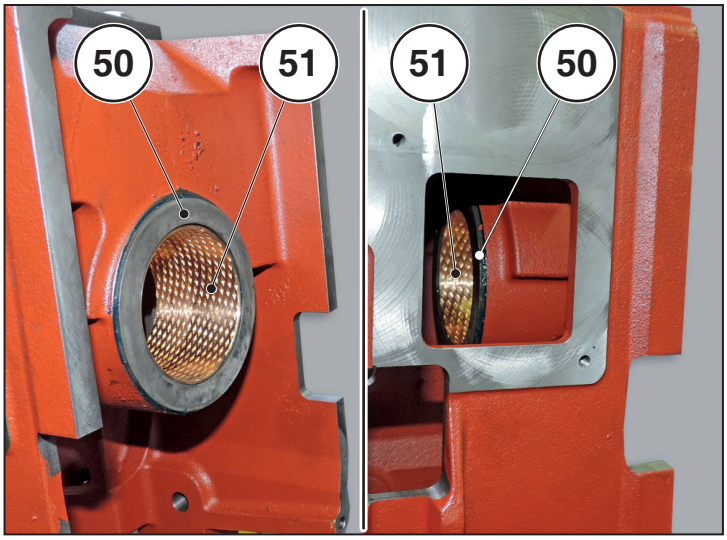


Fig. 6.22

Remove the bushes (51).

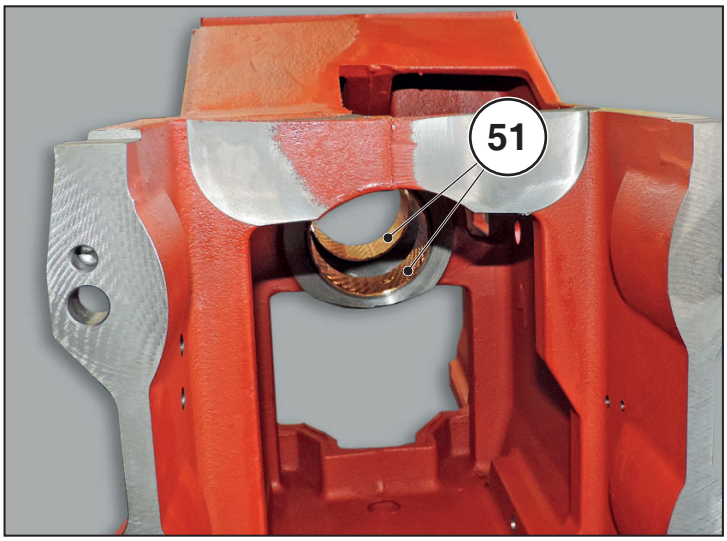


Fig. 6.23

3.2 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".

3.2.1 Reassembly

3.2.1.1 Reassembling the central cast

Use the tool (A-p/n_____) to drive the bushings (51) to the end on the casing.

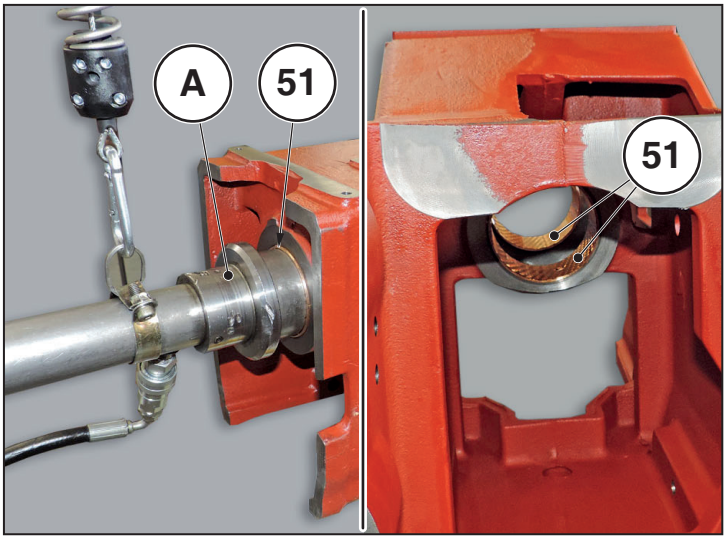


Fig. 6.24

Grease the bushes (51).

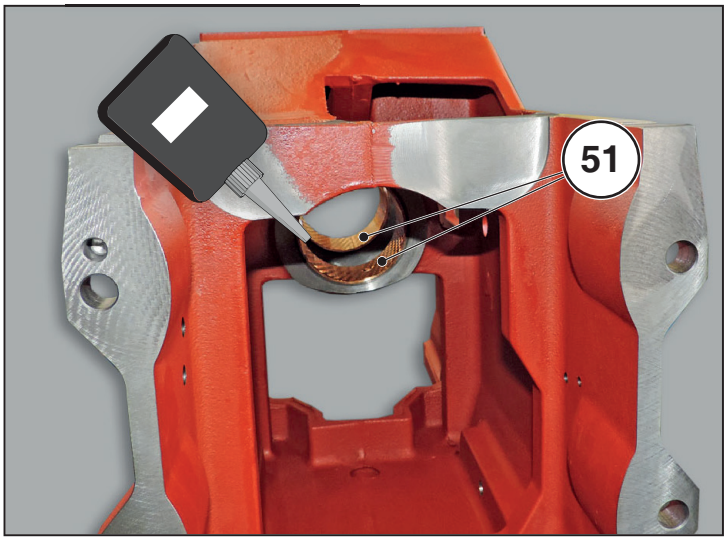


Fig. 6.25

Fit the spacers (50) on the front bush (51).

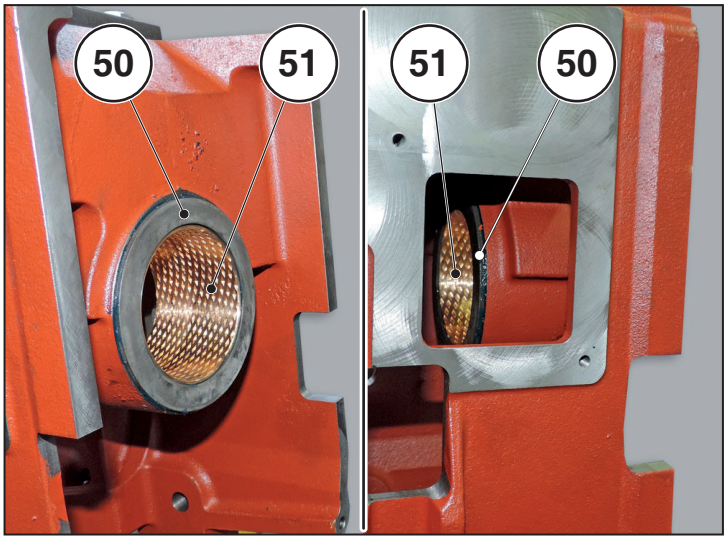


Fig. 6.26

Secure the cast to a suitable hoist and then fit it on the front differential.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

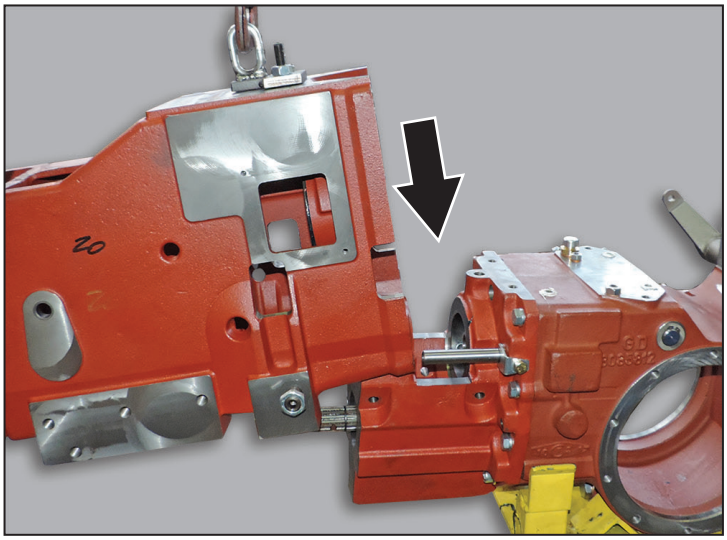


Fig. 6.27

Fit the independent PTO shaft (49), making sure that the longer mating is facing the rear.

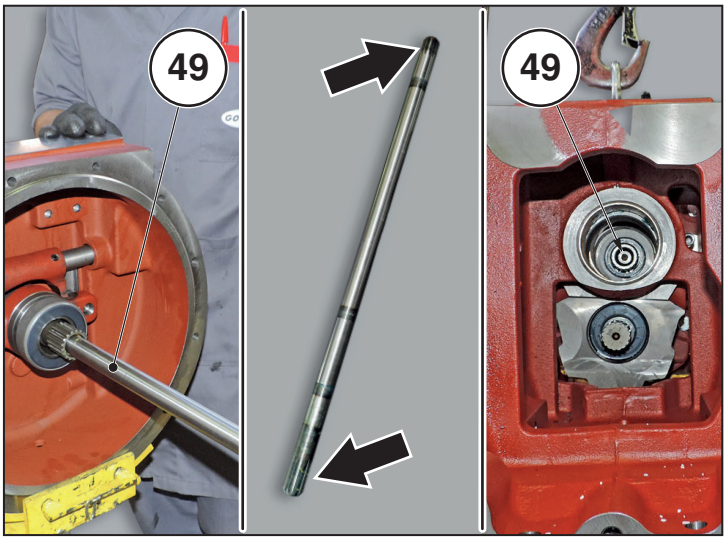


Fig. 6.28

Grease the outer surface of the knuckle cylinder (48) and fit it to the end on the casing.

Note

The notch on the cylinder collar (48) must be oriented vertically, thus allowing the correct alignment with the retainer grub screws.

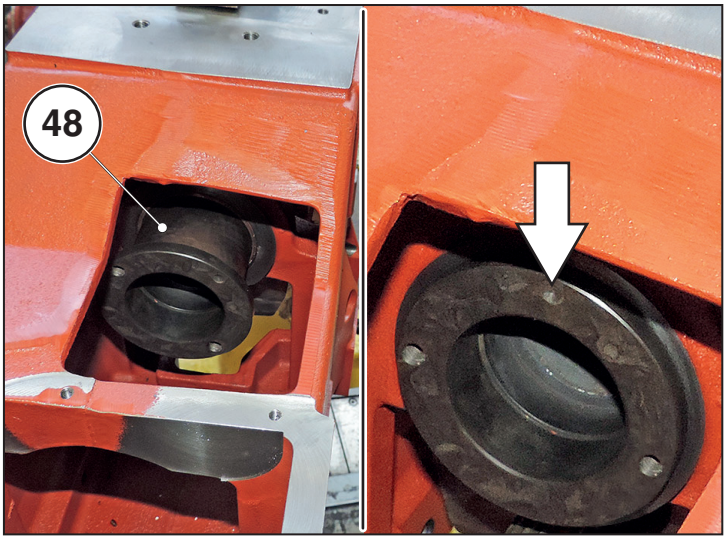


Fig. 6.29

Note

Bear in mind the difference between the grub screws.

The nuts (44) of the front side grub screws are shorter than the nuts (45) for the rear side grub screws.

The rear side grub screws (47) have a flat head.



Fig. 6.30

Tighten the front side grub screw (46) to the end and then the check nut (44).

Tighten the rear side grub screw (47) to the end and then the check nut (45).

Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Carry out these steps on both sides of the tractor.

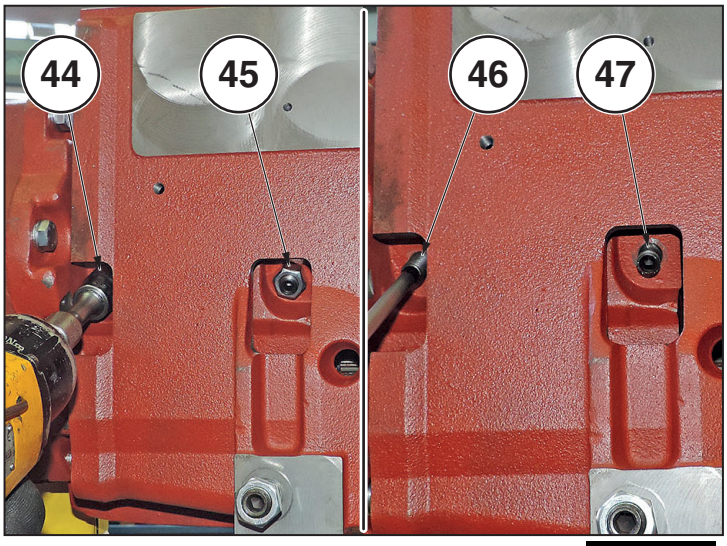


Fig. 6.31

Tighten the grub screw (43) to the end and then the check nut (42). Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Warning

Make sure that the grub screw (43) is completely fit on the knuckle cylinder (48, see figure 6.29).

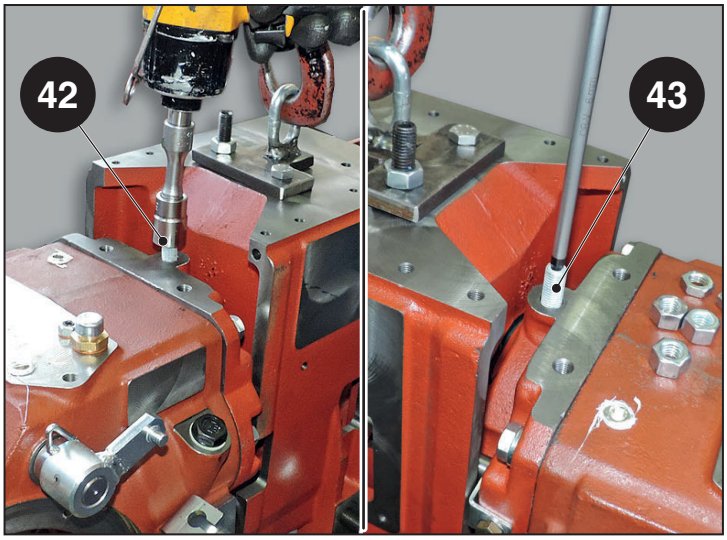


Fig. 6.32

Tighten the swing end stop grub screw (41) until it is flush with the nut (40) and tighten the nut (40). Apply a tightening torque of 100 Nm (10 kgm) to secure the check nut. Carry out this step on both sides of the tractor.

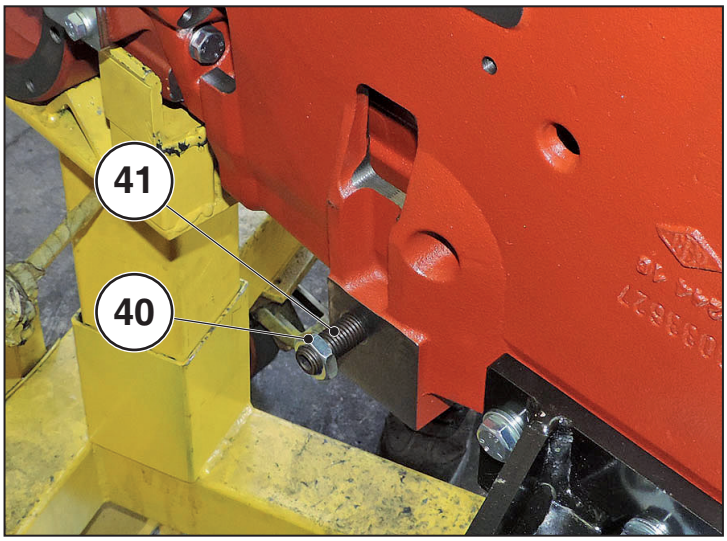


Fig. 6.33

3.2.1.2 Reassembling the reverse shuttle lever (RS Cluster)

Fit the pin (32) on the casing and insert the following in the order below: flat washer (34), lever (36), flat washer (34) and spring (35). Drive the pin (32) to the end.

Warning
Fit the lever (36) with the rod facing left.

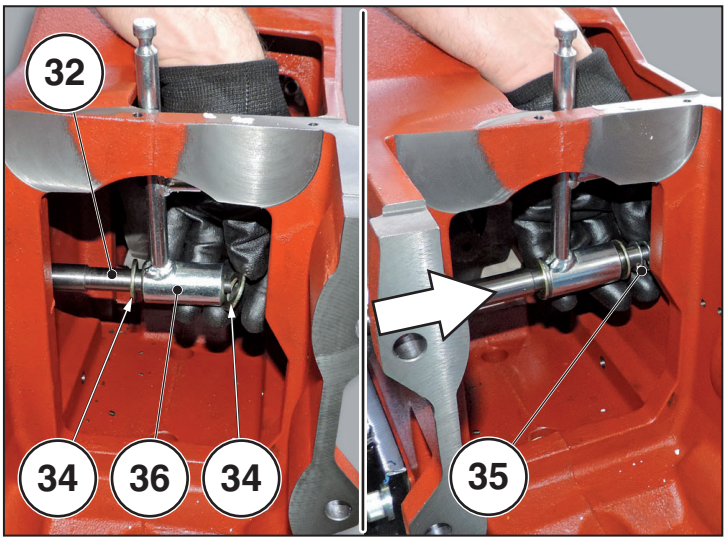


Fig. 6.34

Fit the flat washer (53) and tighten the nut (33).

Fit the guide (54).

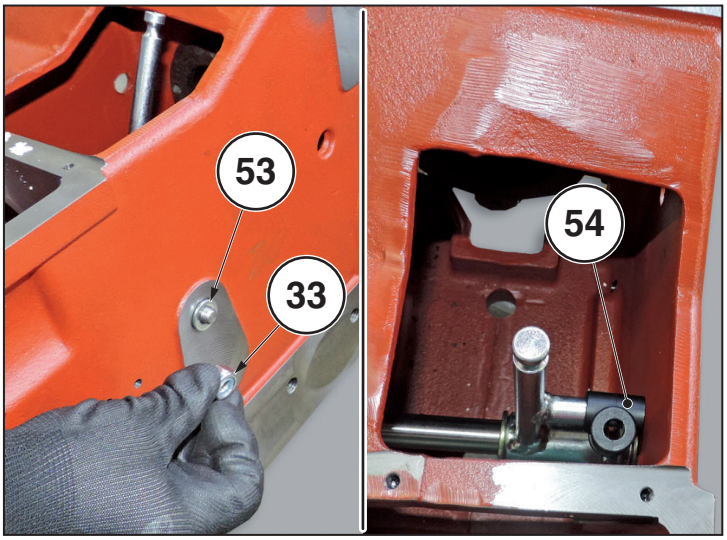


Fig. 6.35

Tighten the nut (12), the joint (6) and nut (11) on the tie-rod (38).

Fit the tie-rod (38) in the casing with the threaded end facing the front. Screw the joint (6) on the reverse shuttle selector rod (7).

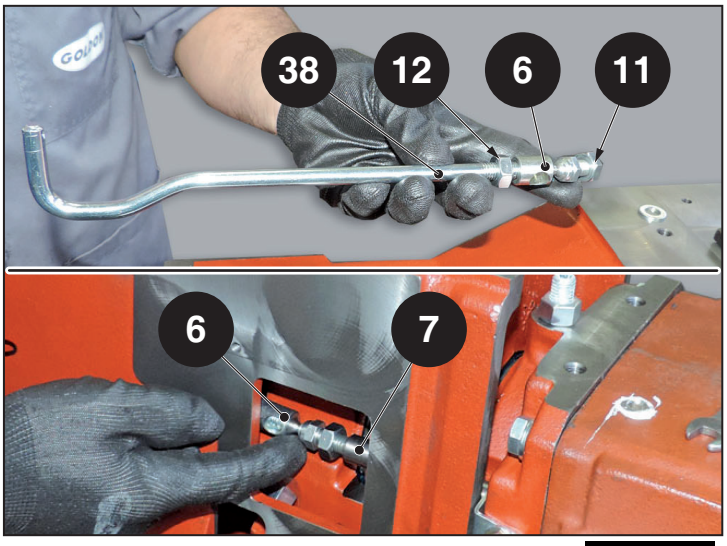


Fig. 6.36

Fit the tie-rod (38) on the guide (54) and then fit the flat washer (55) and the split pin (39).

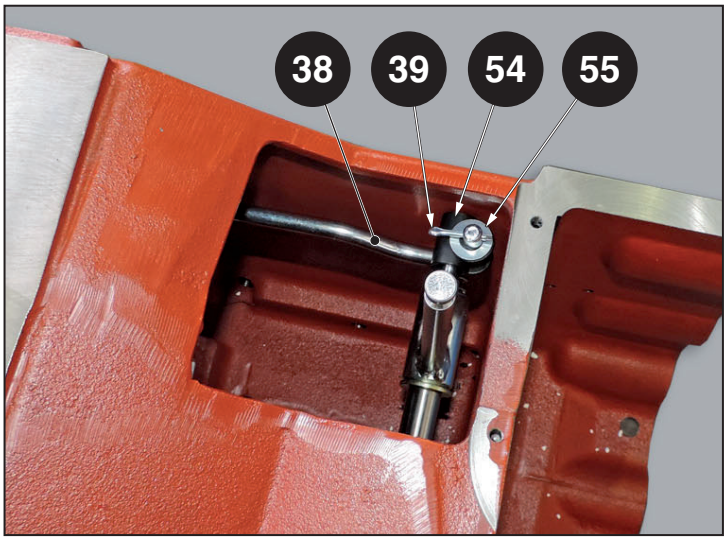


Fig. 6.37

3.2.1.3 Reassembling the drive shafts

Key the cored end of the joint (28) on the bevel pinion by aligning the holes. Fit the pin (27) to secure the joint (28).

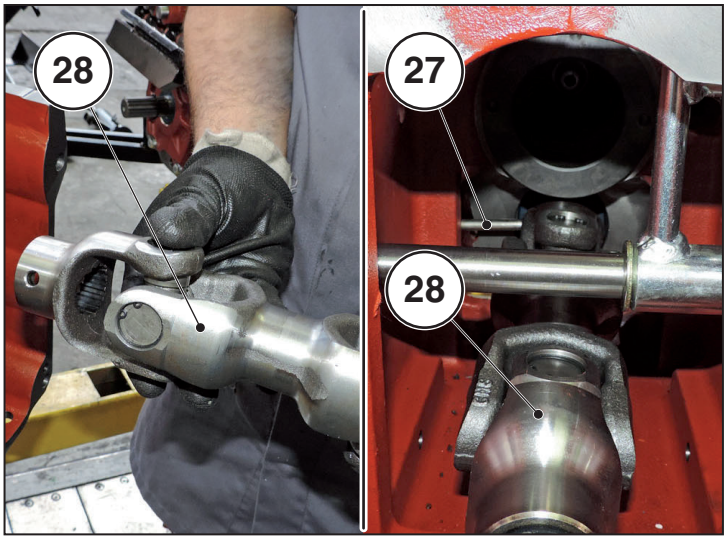


Fig. 6.38

Fit the circlip (25) on the sleeve (23) and the circlip (26) on the sleeve (24).

Note

The sleeve (23) is shorter than the sleeve (24).

Key the sleeves to the end on the PTO shaft (22) following the instructions below:

- sleeve (23) on the front end of the PTO shaft (22) with the outer bevel facing the front;
- sleeve (24) on the rear end of the PTO shaft (22) with the inner bevel facing the rear.

Warning

Apply a coat of LOCTITE 5922 to the keying part of the sleeves to be inserted on the PTO shaft (22).

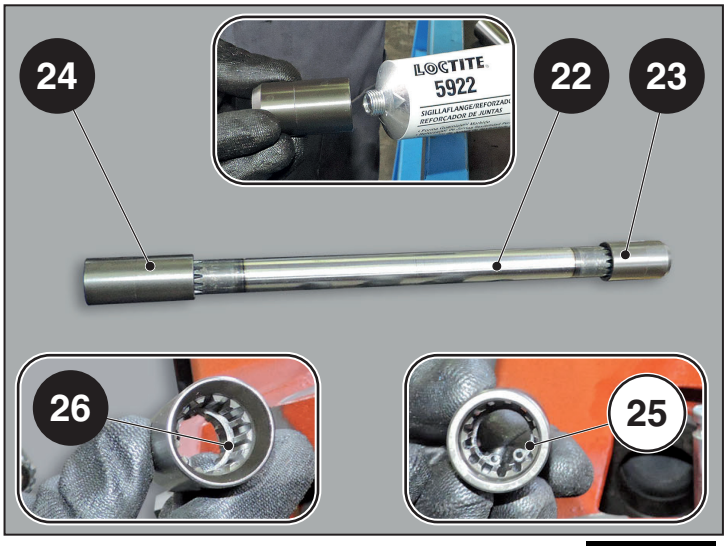


Fig. 6.39

Fit the complete independent PTO shaft (22) keying it with the PTO shaft (49).

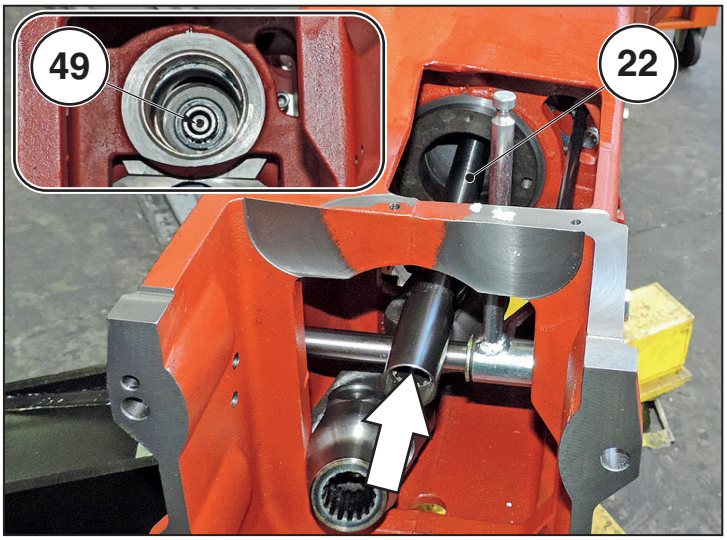


Fig. 6.40

Fit the drive shaft (21) on the primary shaft (56).

> **Warning**
>
> If the welded plate is found on the shaft (21), it must be facing the rear.

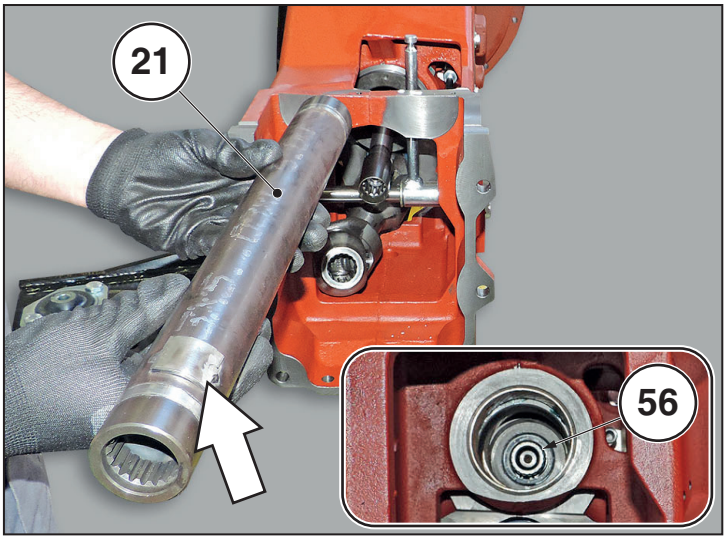


Fig. 6.41

Join the gearbox assembly to the central body. Tighten the screws (57) fastening the conical washers (58) together. Apply a tightening torque of 90 Nm (9 kgm).

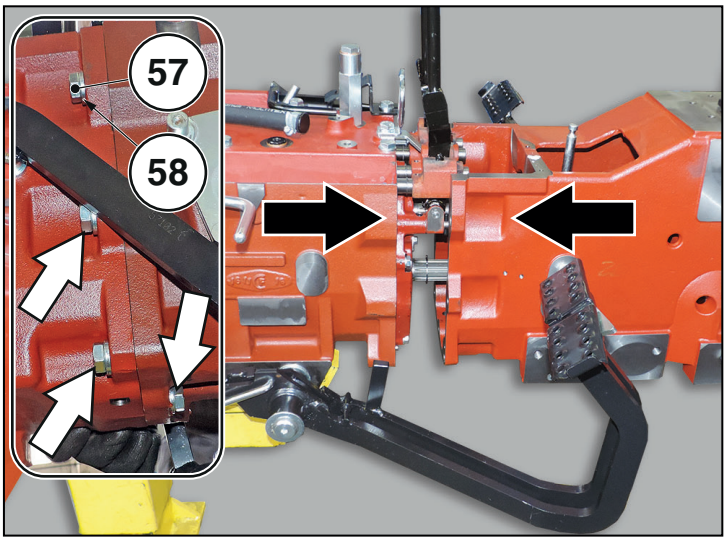


Fig. 6.42

3.2.1.4 Reassembling the reverse shuttle lever (REV Cluster)

Grease the two holes in the casing. Fit the bush (19) in the rear hole driving it in with a punch. Fit the two bushes (20A) and (20B) in the front hole driving them in with a punch.

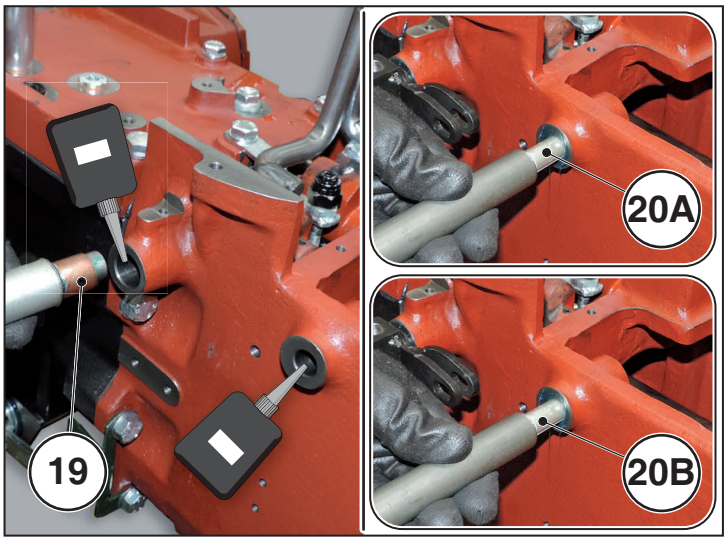


Fig. 6.43

Fit the mount (4).

Fasten the bracket (18) tightening the hex nut screws (16) together with the washers (17).

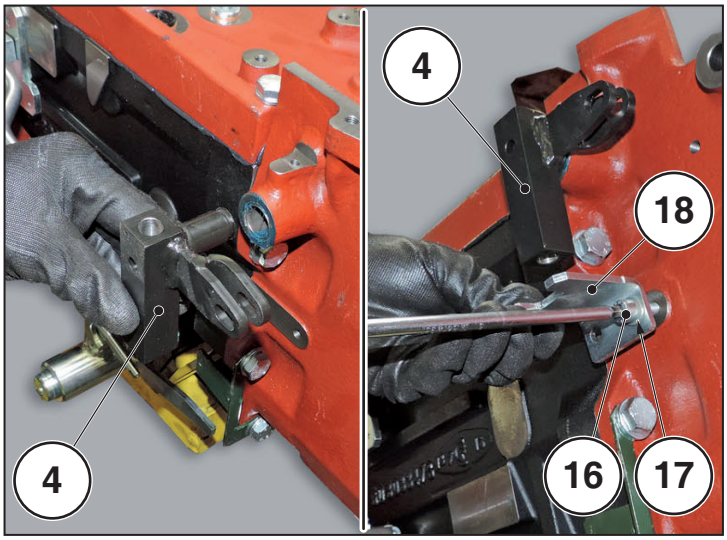


Fig. 6.44

Fasten the pin (10) to the lever (5) with the pin (8).

Insert the lever (5) on the casing.

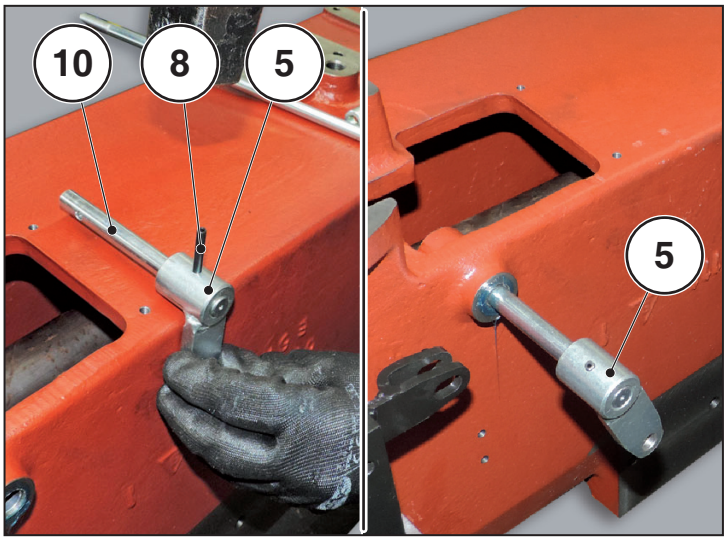


Fig. 6.45

Tighten the nut (12) on the tie-rod (13) and then tighten the joint (6) complete with nut (11).

Assemble the tie-rod (13) with the lever (9). Fit the flat washer (15) and then the split pin (14).

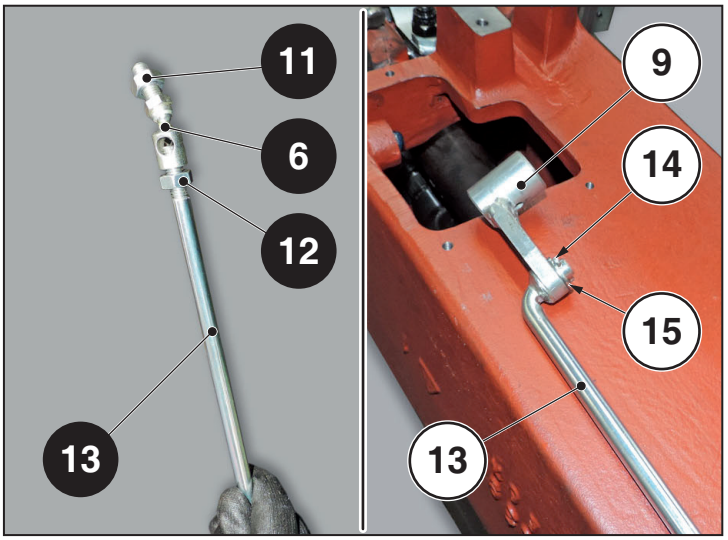


Fig. 6.46

Insert the complete lever (9) in the casing. Screw the joint (6) on the reverse shuttle selector rod (7).

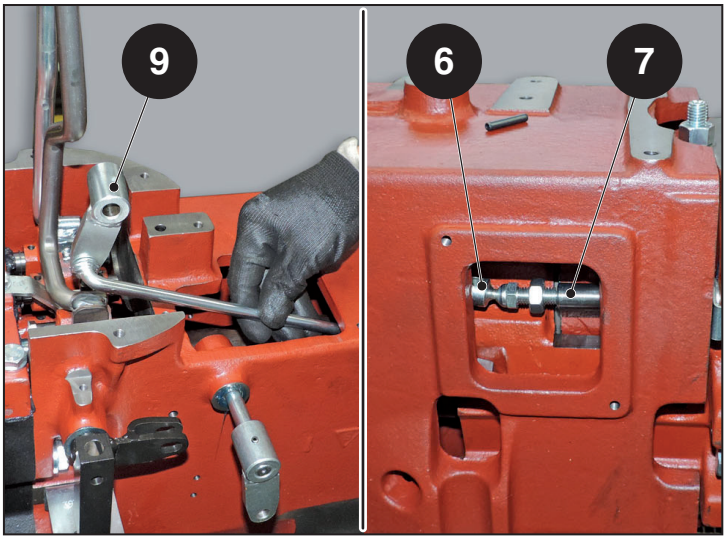


Fig. 6.47

Insert the complete lever (9) on the pin (10). Align the lever (5) with the mount (4) aligning the holes; then insert the pin (8) to join the components.

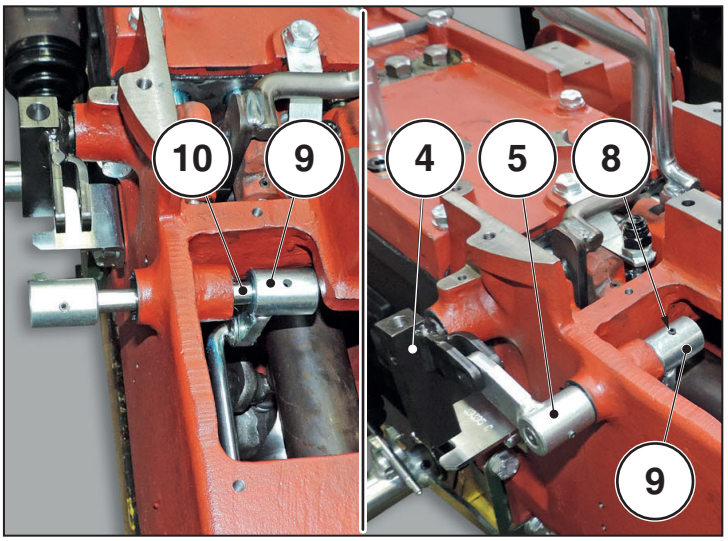


Fig. 6.48

Insert the pin (3) to join the support (4) and lever (5). Fit the flat washer (2) and then the split pin (1).

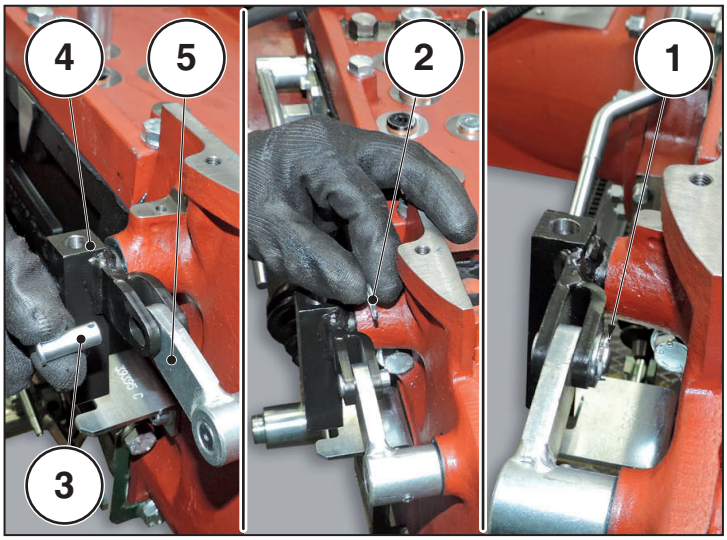


Fig. 6.49

Fit a lever (L) on the mount (4) and adjust the engagement of the reverse shuttle:

- move the lever (L) forward and check that there is free play with the reverse shuttle inserted;
- move the lever (L) back and check that there is free play with the reverse shuttle inserted and that the lever (9) does not come into contact with the casing;
- tighten or loosen the joint (6) to adjust both the free play and the position of the lever (9);

Engage and disengage the lever (L) repeatedly to check that the reverse shuttle engages correctly. Once adjusted as needed, tighten the check nuts (12) and (11).

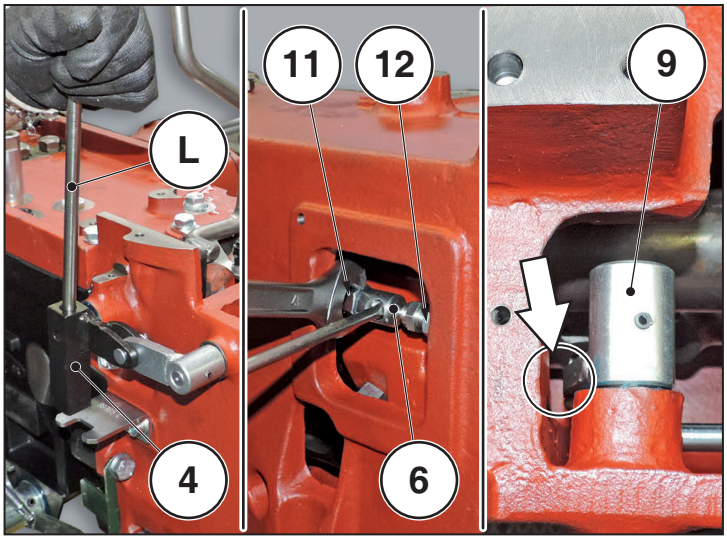


Fig. 6.50

Note

Move the lever (L) back to gain easy access to the rear check nut (11).

Tighten or loosen the grub screw (59) to adjust the pretension on the reverse shuttle selector rod (7) and then tighten the check nut (60).

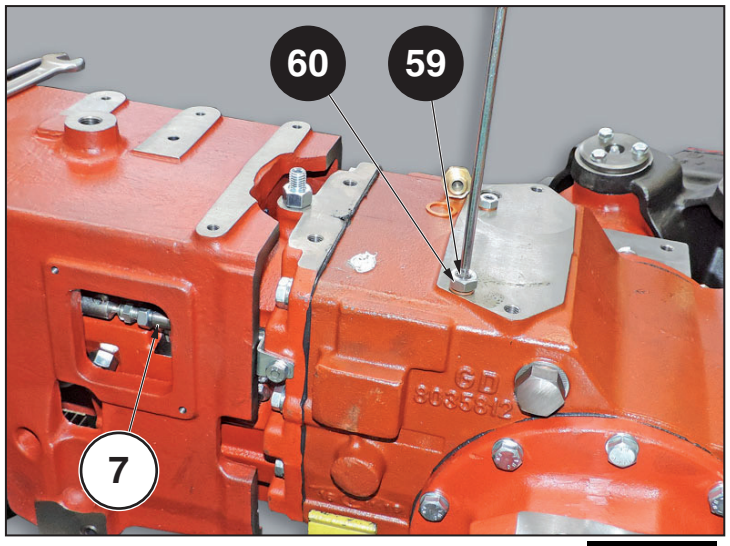


Fig. 6.51

Continue the reassembly operations by following the preliminary operations in reverse order.

Section 4 : SN+ Cluster central body

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4.1 Disassembly

4.1.1 Preliminary operations

Before starting disassembly work, follow the "Preliminary operations" in the Chapter “Rear final drive units”. In addition, remove the following assemblies:

- front wheels;
- front mudguards;
- footboards;
- instrument cluster.

4.1.2 Disassembly

Remove the footboard mounts (99) and (100) by undoing the screws (101) and (103) along with the washers (102).

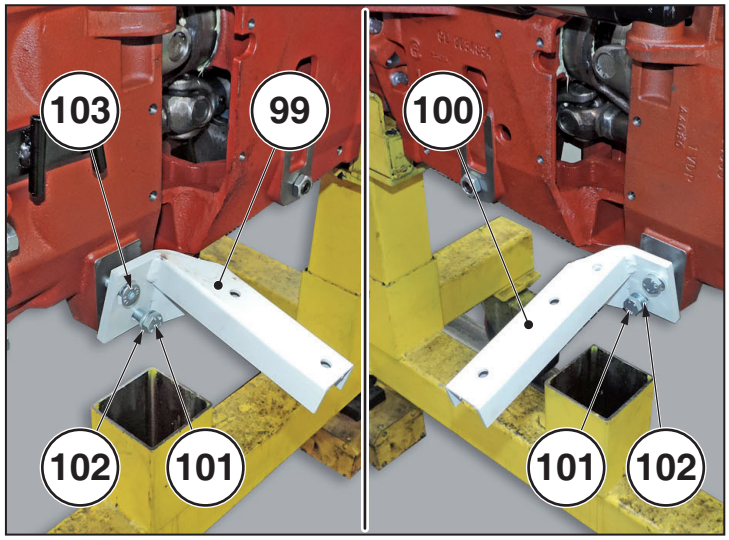


Fig. 6.52

Remove the pin (61) and pull out the front pin (62). Carry out this step on both sides of the tractor.

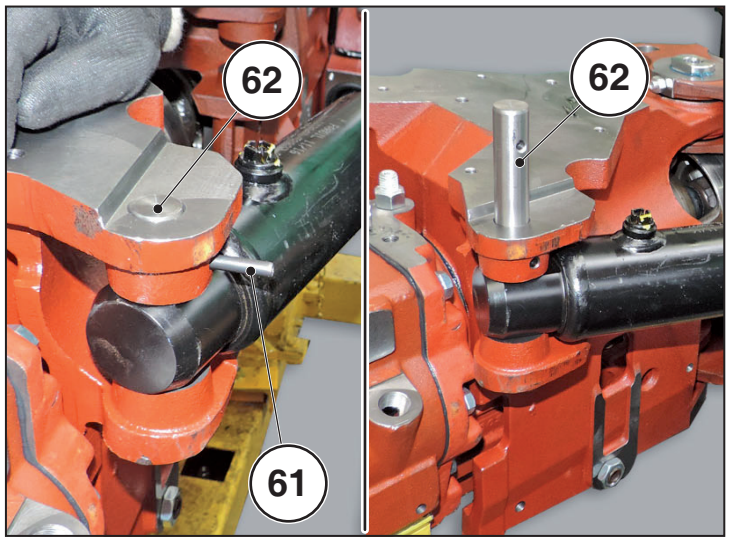


Fig. 6.53

Remove the pin (61) and pull out the rear pin (63). Carry out this step on both sides of the tractor.

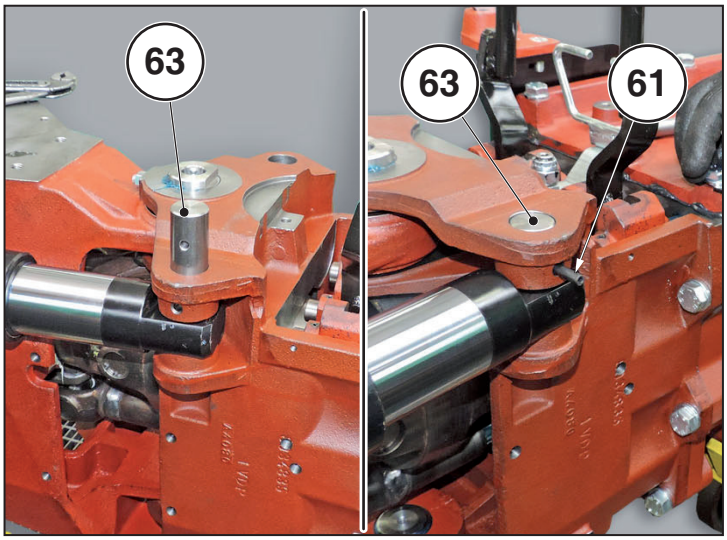


Fig. 6.54

Loosen the grub screw (64).

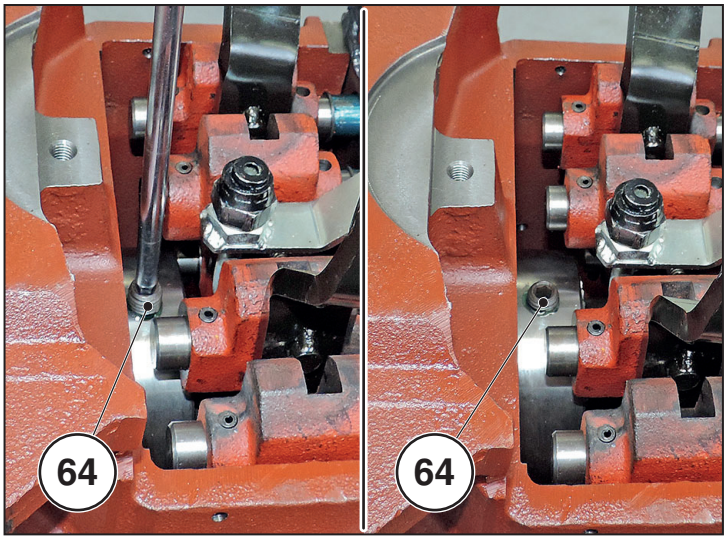


Fig. 6.55

Undo the screws (57) and remove the washers (58).

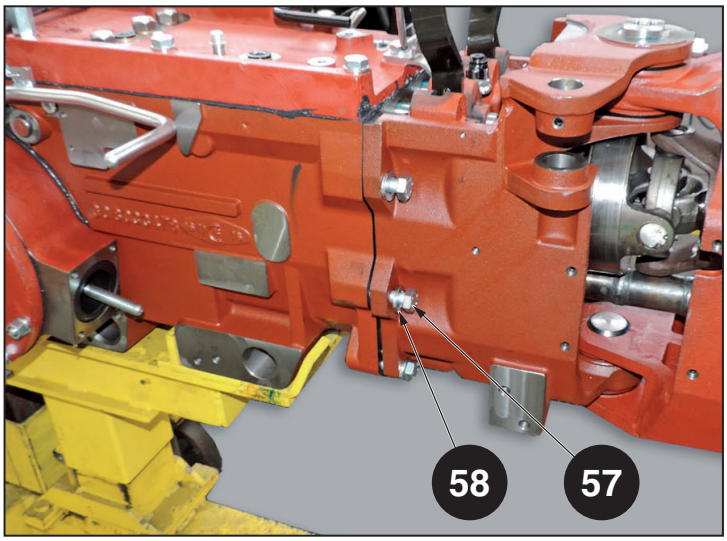


Fig. 6.56

Separate the central body from the gearbox assembly.

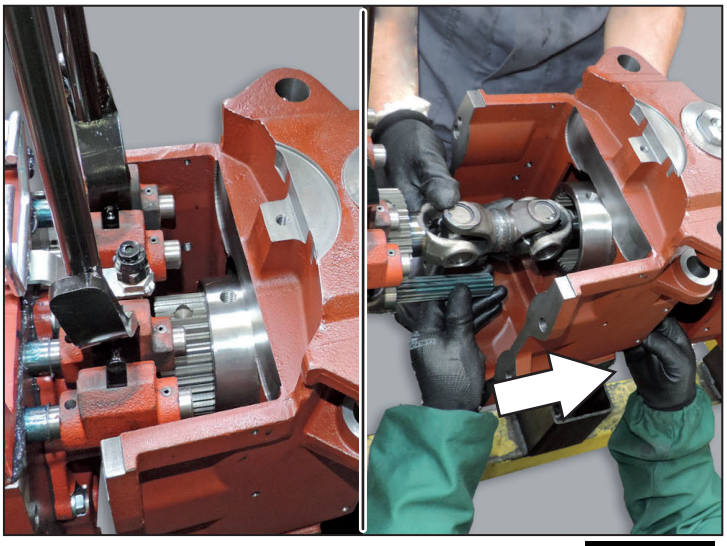


Fig. 6.57

Secure the rear flange (68) to a suitable hoist.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Loosen the grub screw (65) together with the check nut (66) and then pull out the pin (67).

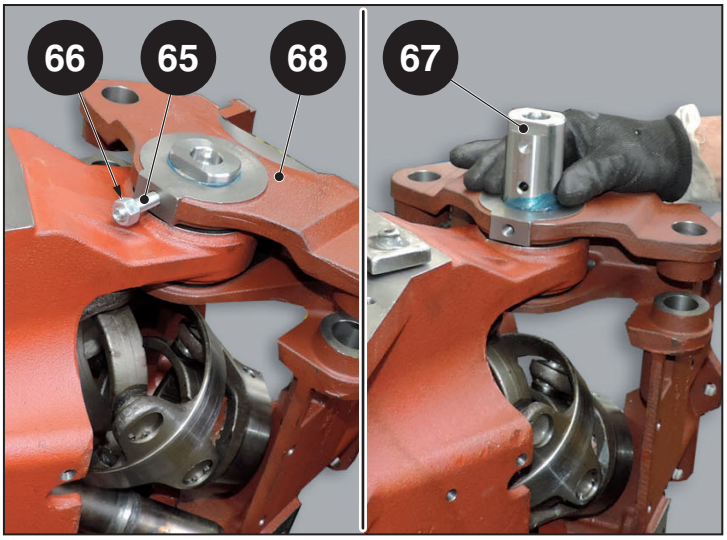


Fig. 6.58

Loosen the grub screw (65) together with the check nut (66) and then pull out the pin (71).

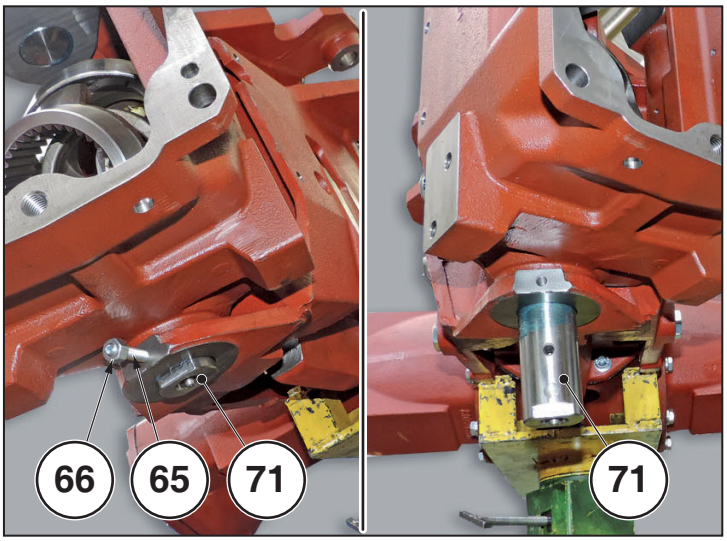


Fig. 6.59

Separate the rear flange (68) from the front flange (69).

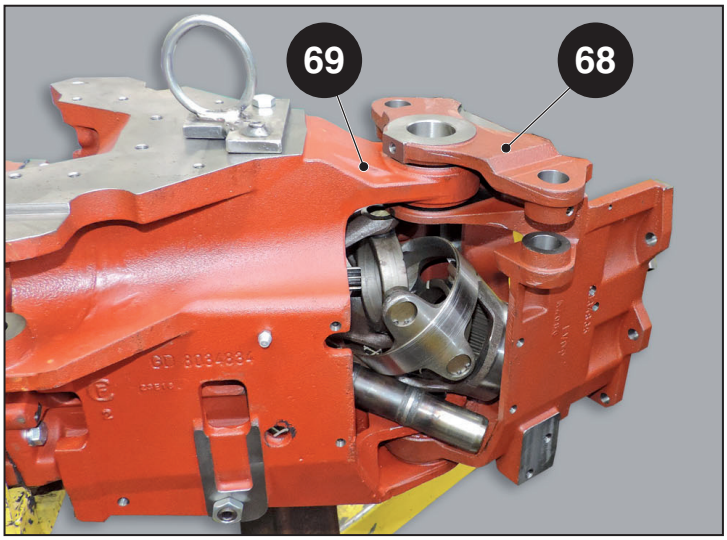


Fig. 6.60

Remove the bush (70) from the rear flange (68).

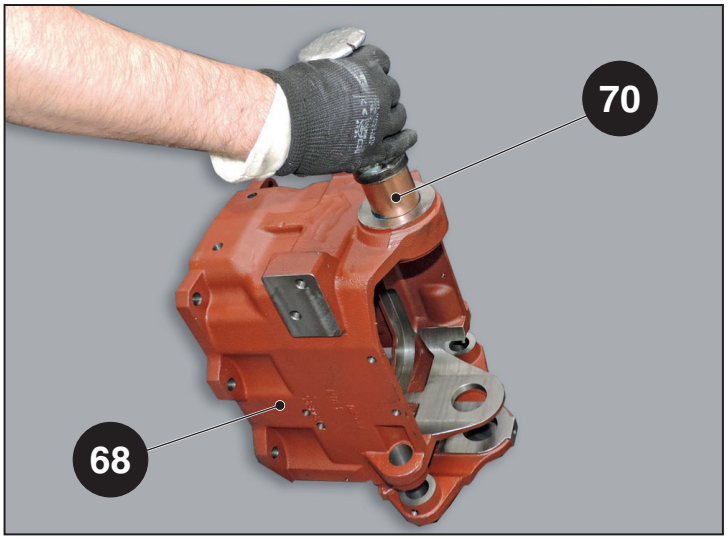


Fig. 6.61

Remove the coupling (72).

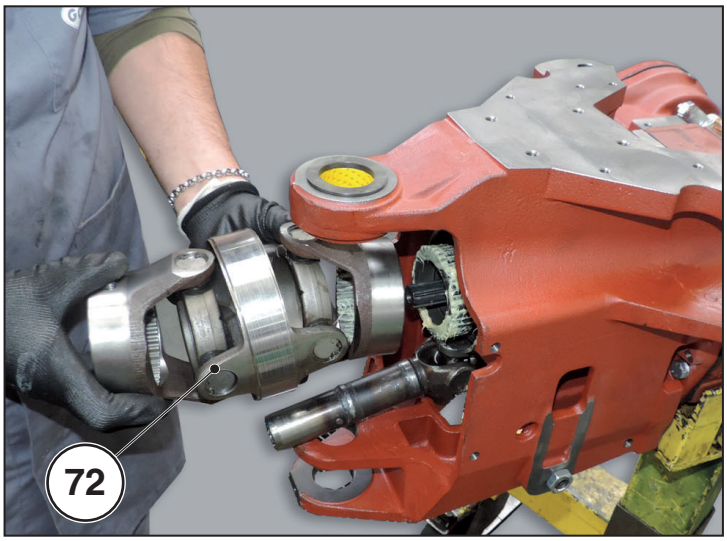


Fig. 6.62

Remove the pin (73) and then the lower front joint (74).

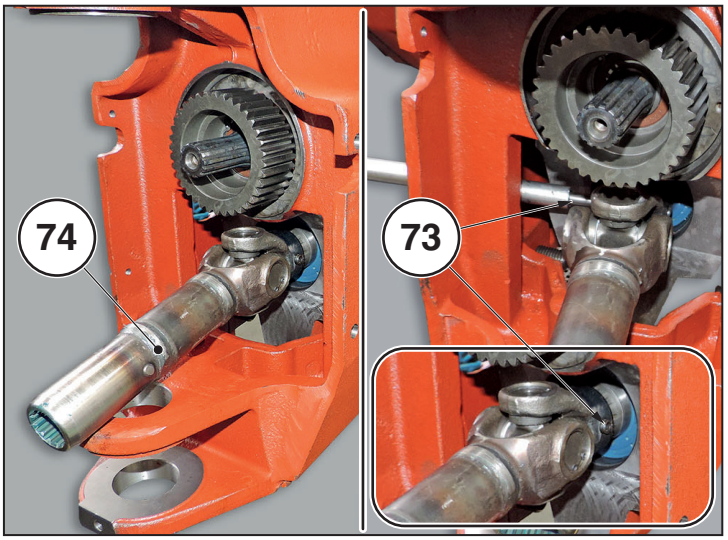


Fig. 6.63

Loosen the grub screw (75) and remove the upper joint (76).

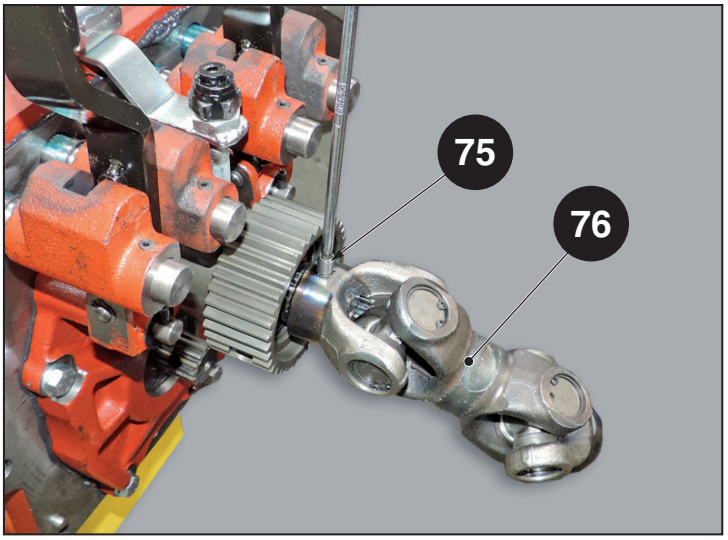


Fig. 6.64

Remove the spacer (77) and circlip (78) from the independent PTO shaft (79).

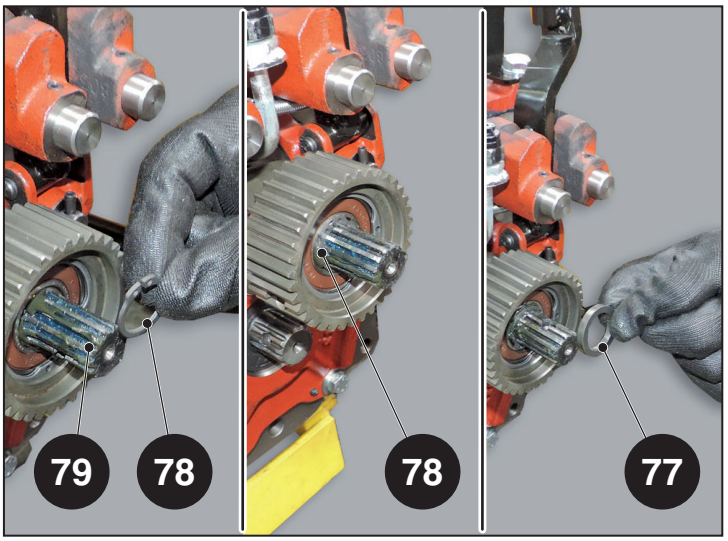


Fig. 6.65

Remove the knuckle sleeve (80).

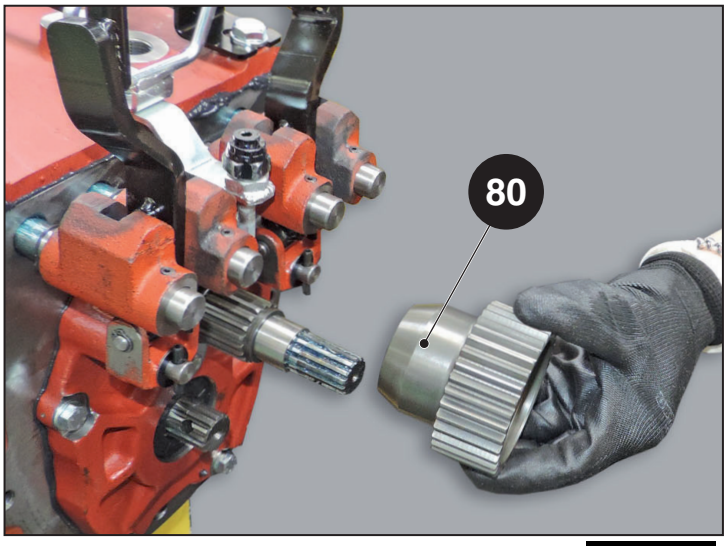


Fig. 6.66

Disassemble the knuckle sleeve (80) by removing the circlip (81) and bearing (82).

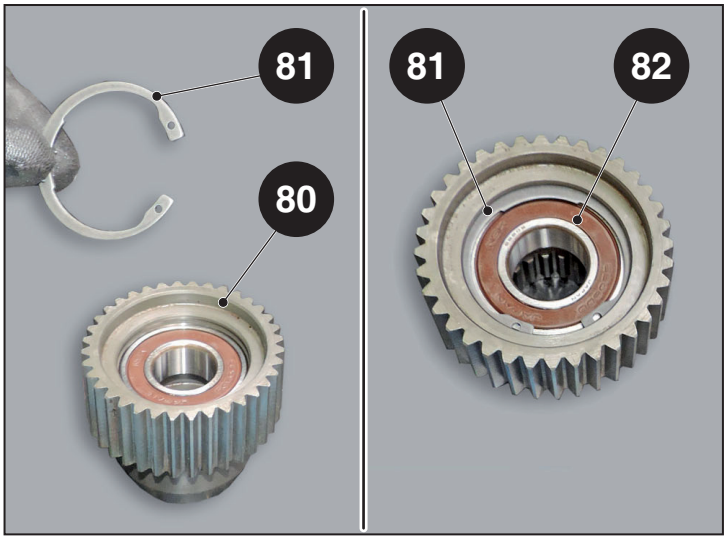


Fig. 6.67

Remove the bush (83) and spacer (84) from the independent PTO shaft (79).

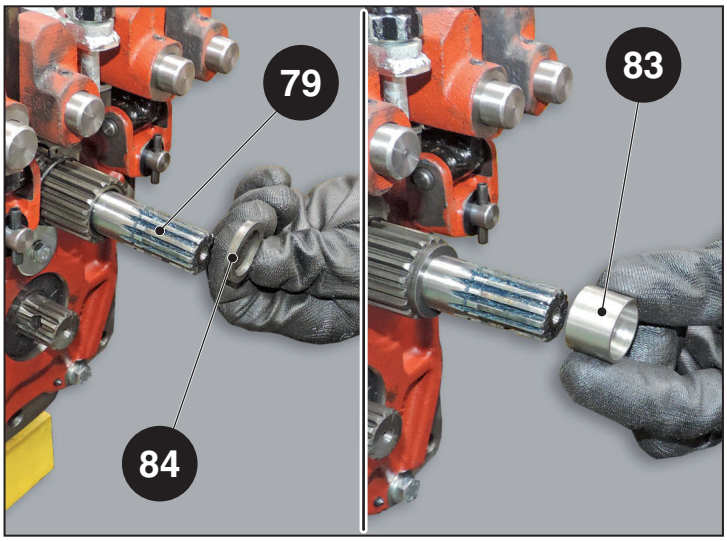


Fig. 6.68

Undo the swing end stop nuts (40) and grub screws (41).

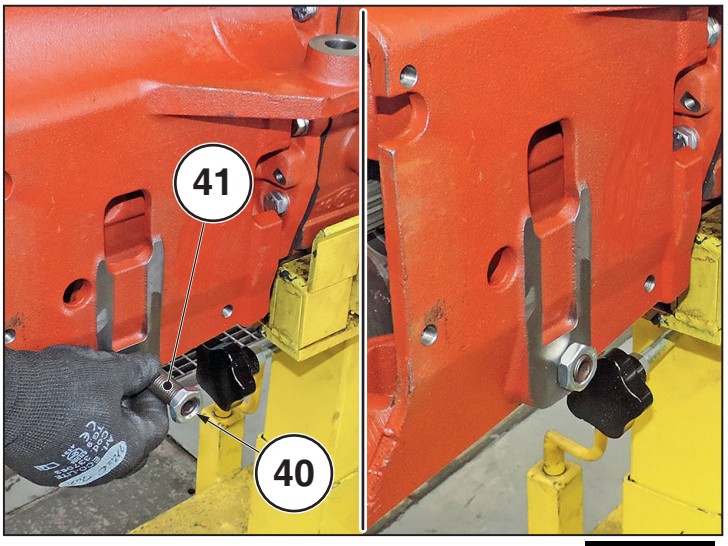


Fig. 6.69

Secure the front flange (69) to a suitable hoist.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Undo the nuts (44) and (45) and the lateral grub screws (46) and (47).

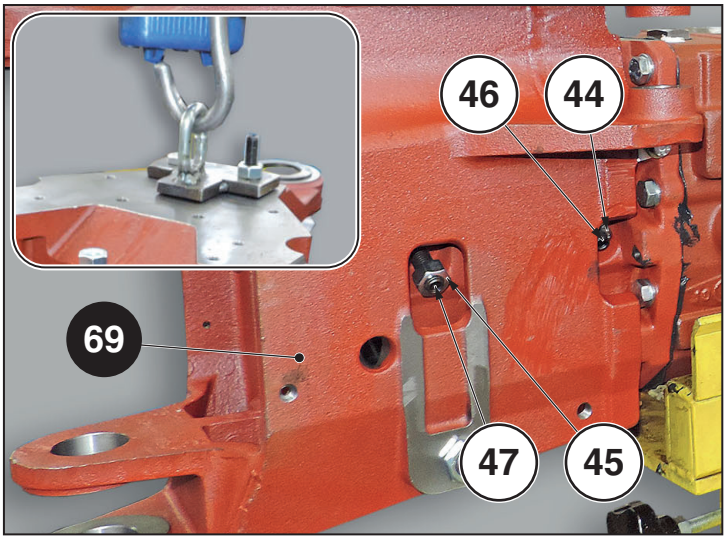


Fig. 6.70

Undo the nut (42) and the upper grub screw (43).

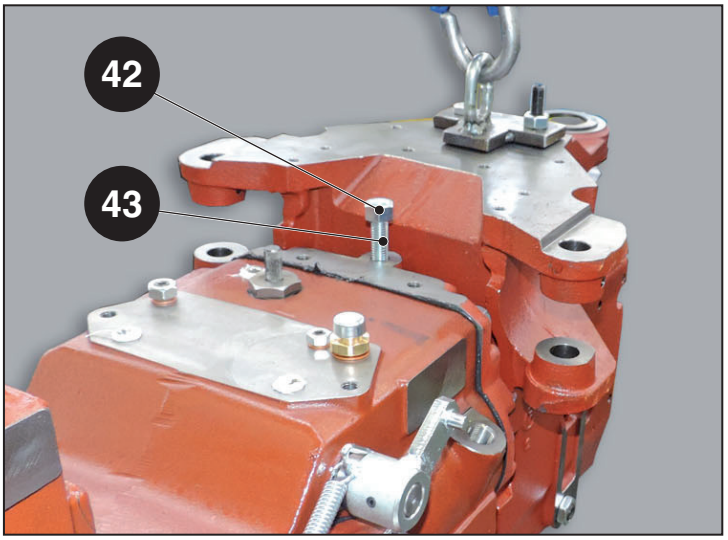


Fig. 6.71

Pull out the complete knuckle cylinder (48).

> **Warning**
>
> To remove the complete knuckle cylinder (48), see the Chapter “Disassembling/Assembling the knuckle cylinder".

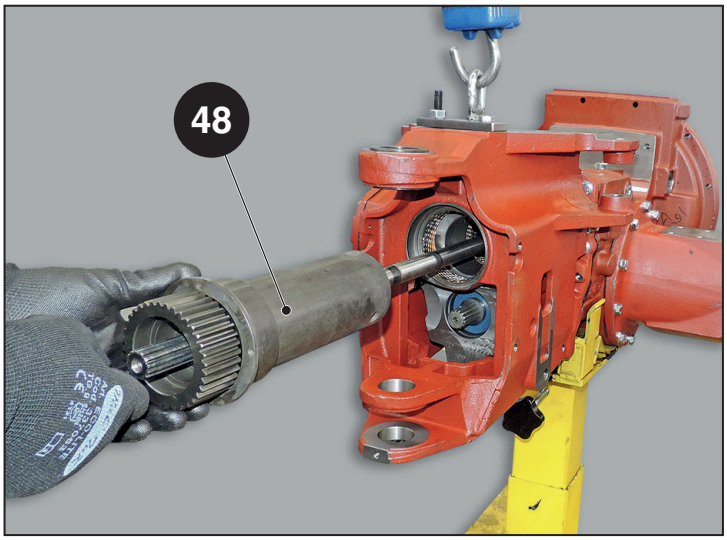


Fig. 6.72

Remove the front flange (69) from the differential case.

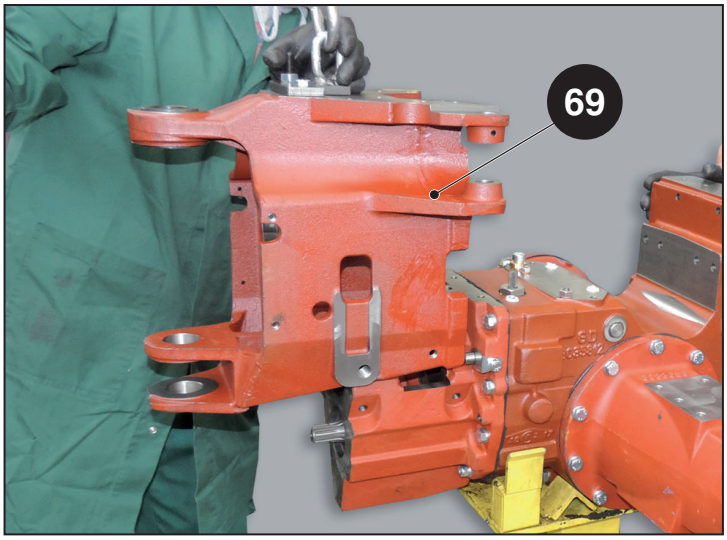


Fig. 6.73

Remove the spacers (50) on the side of the bush (51).

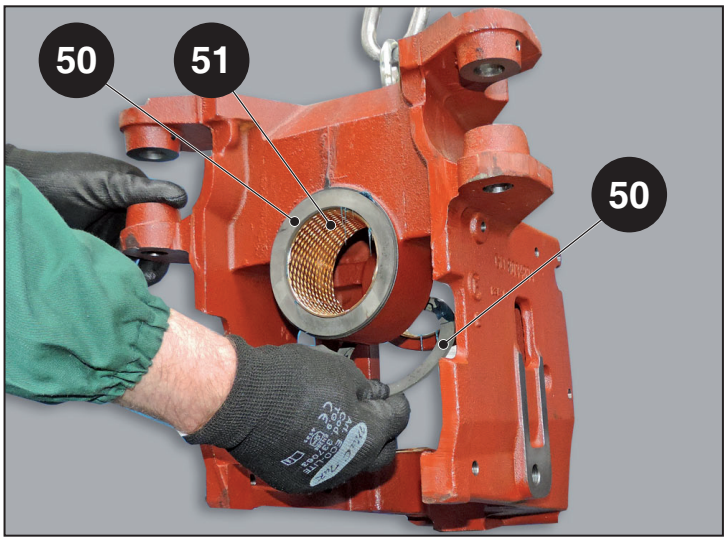


Fig. 6.74

Remove the spacers (85).



Fig. 6.75

Remove the bush (86).

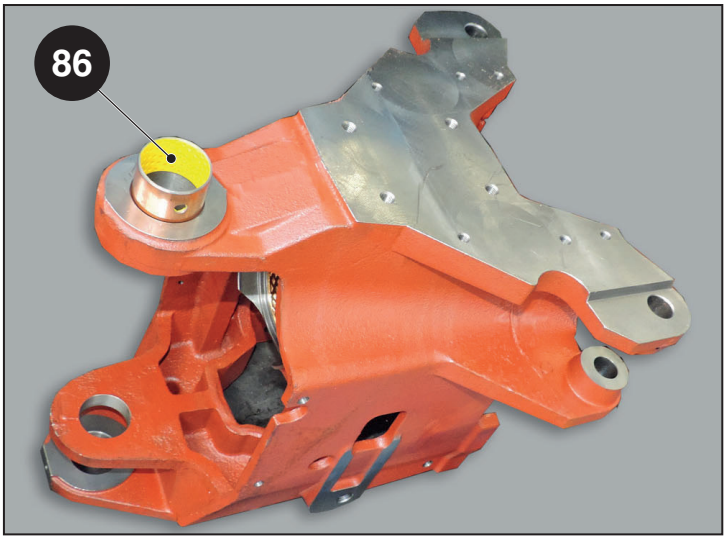


Fig. 6.76

Remove the bushes (51) and (52).

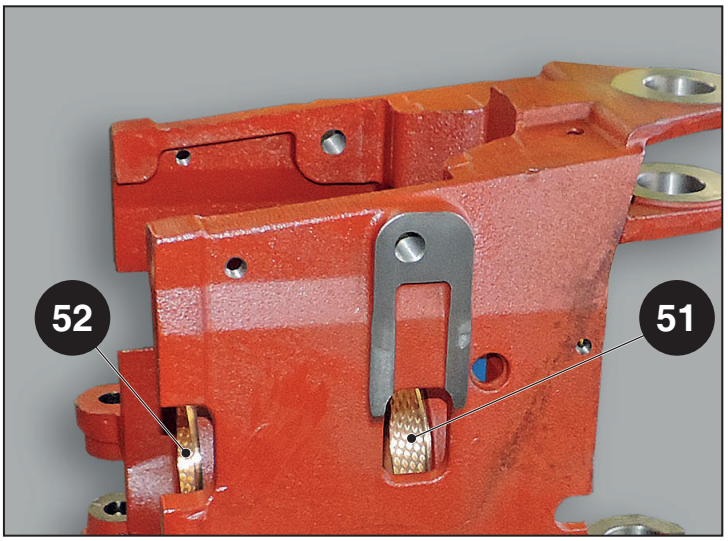


Fig. 6.77

4.1.3 Disassembling/assembling the knuckle cylinder

Disassembly

Remove the circlip (87) and pull out the independent PTO shaft (22).

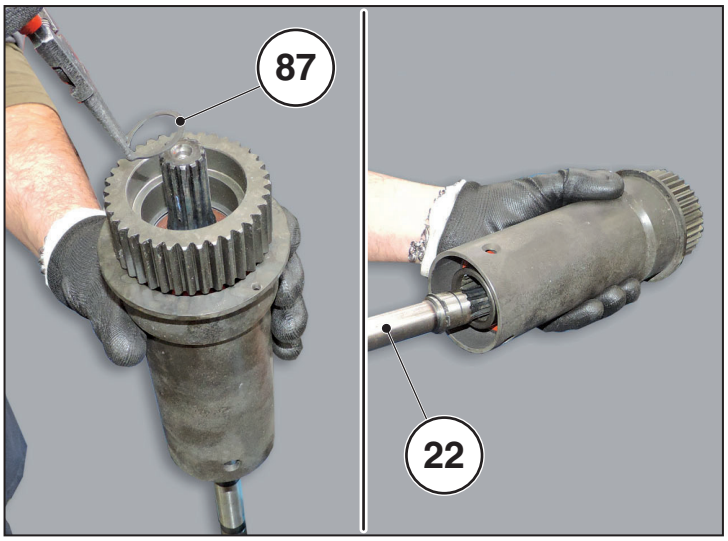


Fig. 6.78

Remove the circlip (88) and bearing (89).

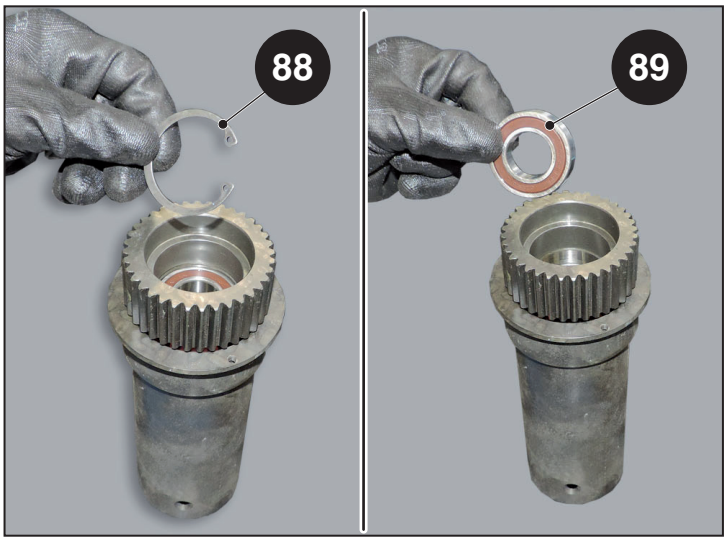


Fig. 6.79

Remove the circlip (90) and bearing (91).

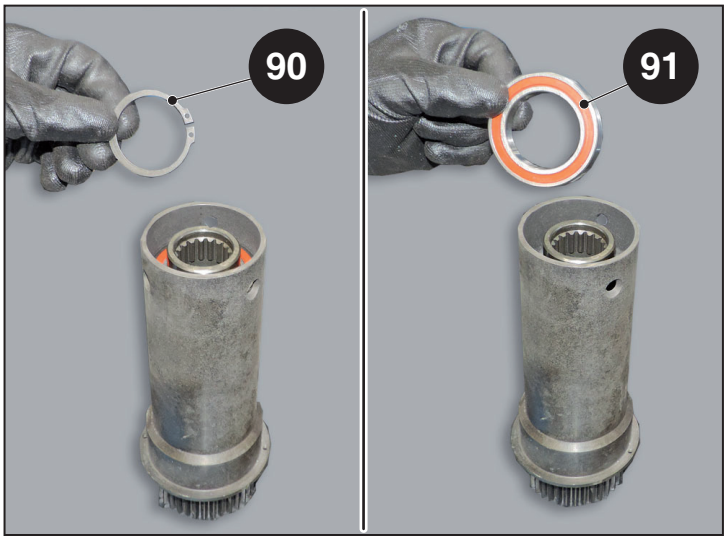


Fig. 6.80

Pull out the drive shaft (92) from the knuckle cylinder (48), and then remove the bearing (93).

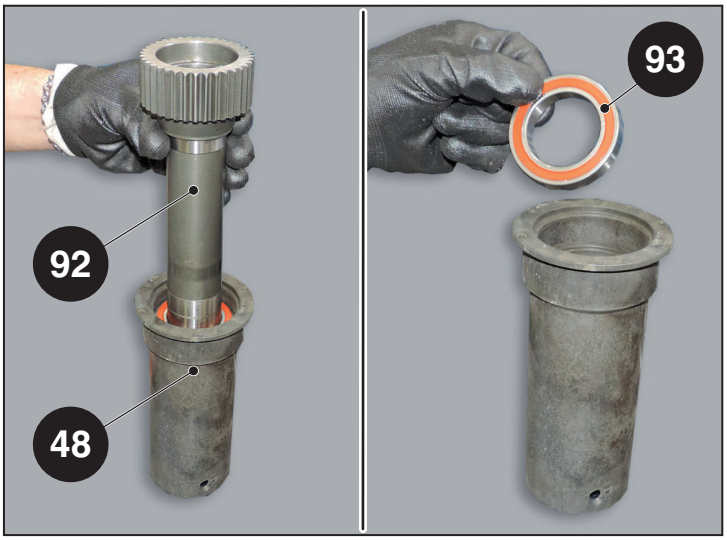


Fig. 6.81

Assembly

On the rear side of the knuckle cylinder (48), fit the bearing (93) and drive it fully into its seat with a punch tool of suitable diameter.

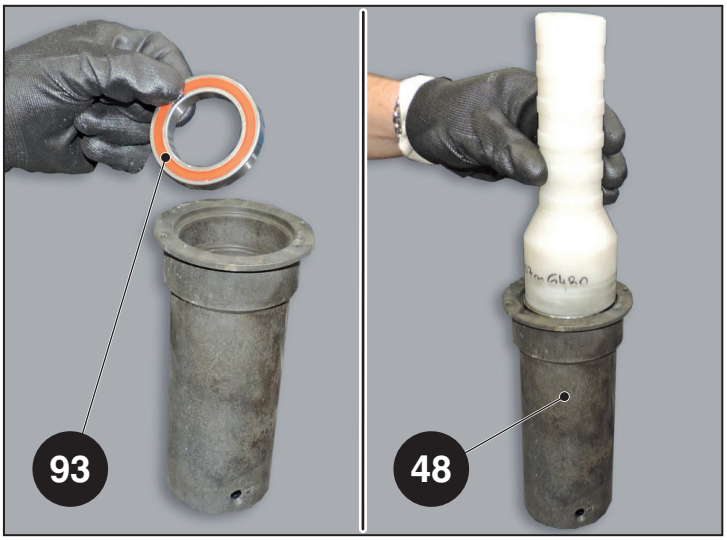


Fig. 6.82

Insert the drive shaft (92) in the knuckle cylinder (48).

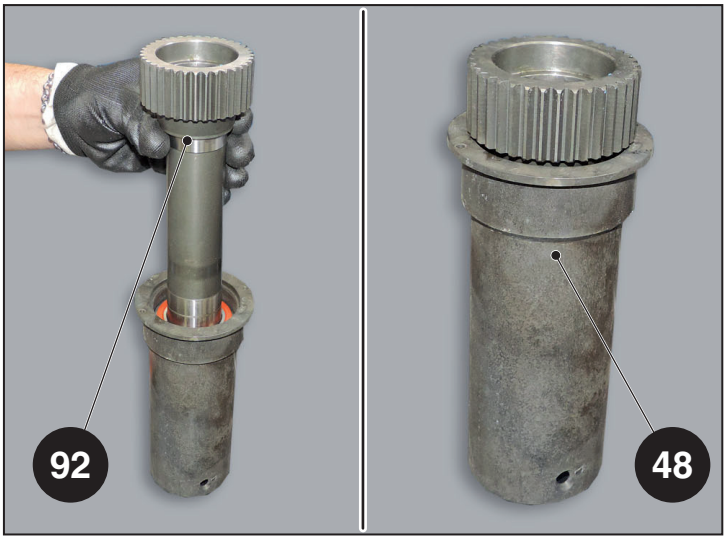


Fig. 6.83

On the front side of the knuckle cylinder (48), fit the bearing (91) and drive it fully into its seat with a punch tool of suitable diameter.

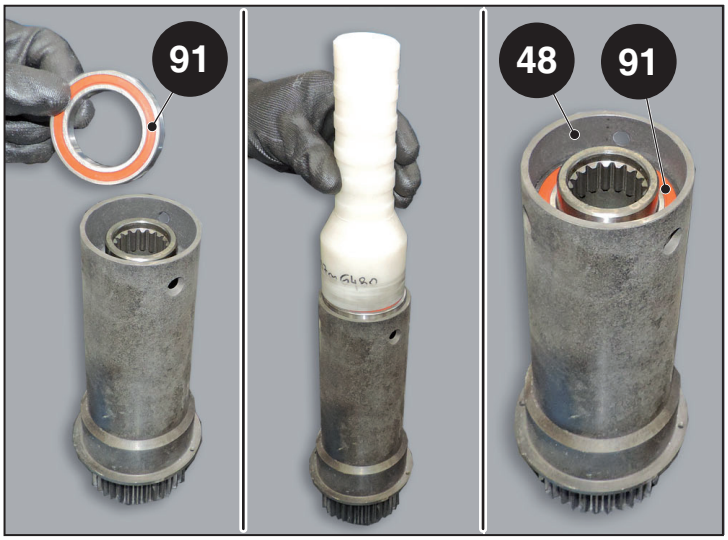


Fig. 6.84

Fit the circlip (90) to secure the bearing (91).

> **Warning**
>
> Drive down the circlip (90) using a punch to insert it completely.

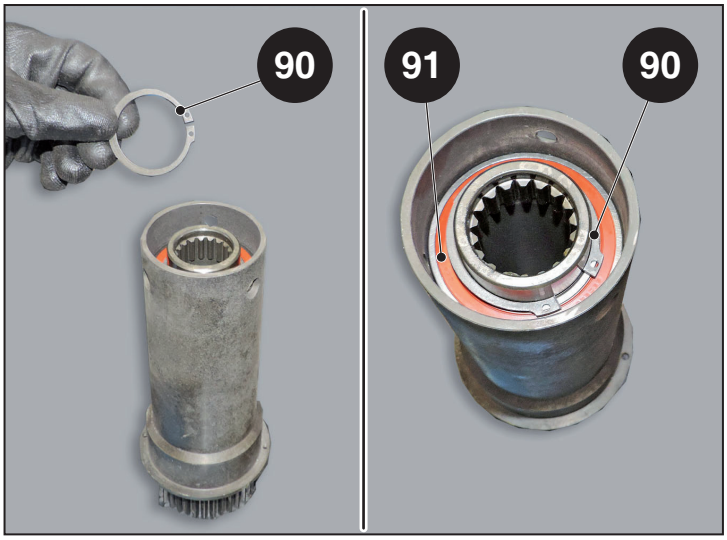


Fig. 6.85

On the rear side of the knuckle cylinder (48), fit the bearing (89) on the drive shaft (92) and drive it fully into its seat with a punch tool of suitable diameter.

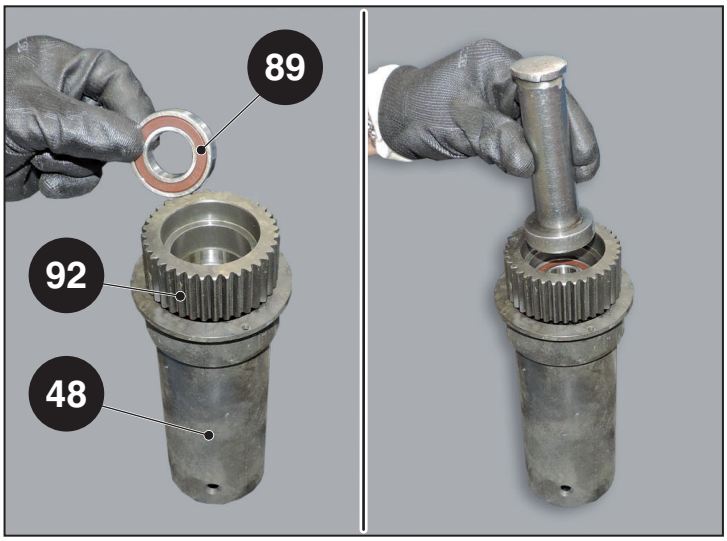


Fig. 6.86

Fit the circlip (88) to secure the bearing (89).

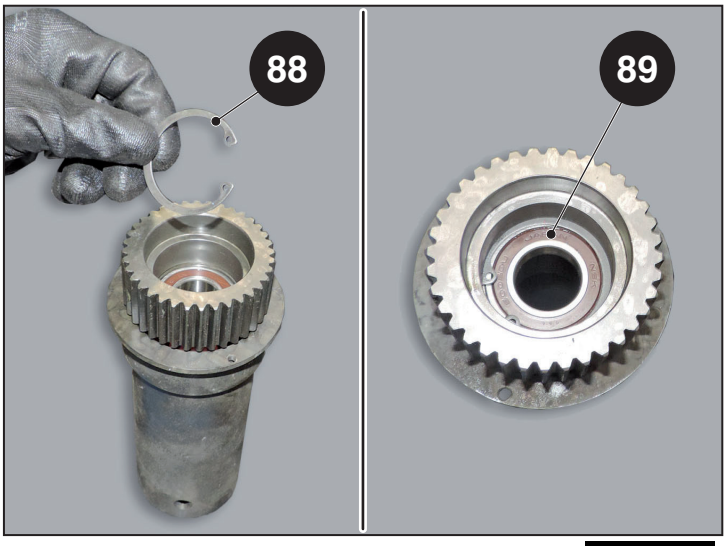


Fig. 6.87

Fit the circlip (94) on the rear end of the independent PTO shaft (22).

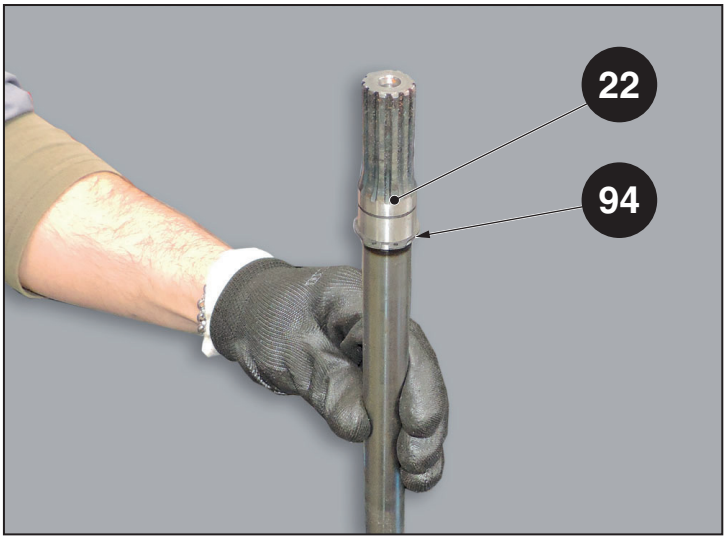


Fig. 6.88

Fit the independent PTO shaft (22) in the coupling cylinder (48) and drive it into its seat with a rubber mallet.

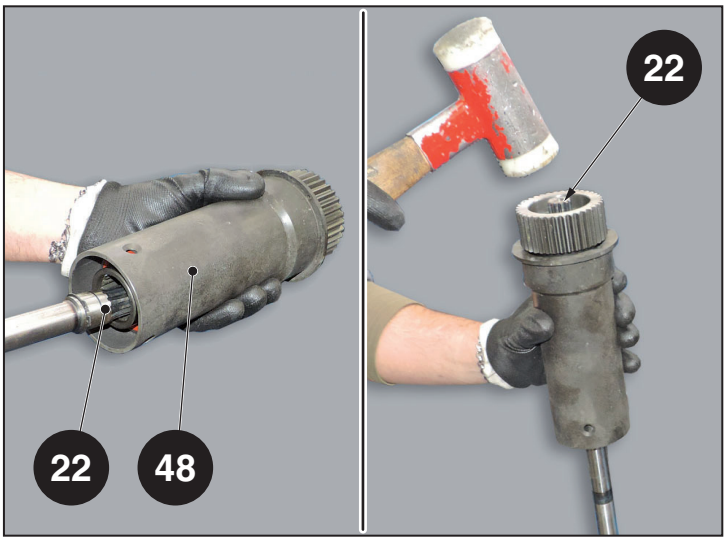


Fig. 6.89

Fit the circlip (87) to secure the position of the independent PTO shaft (22).

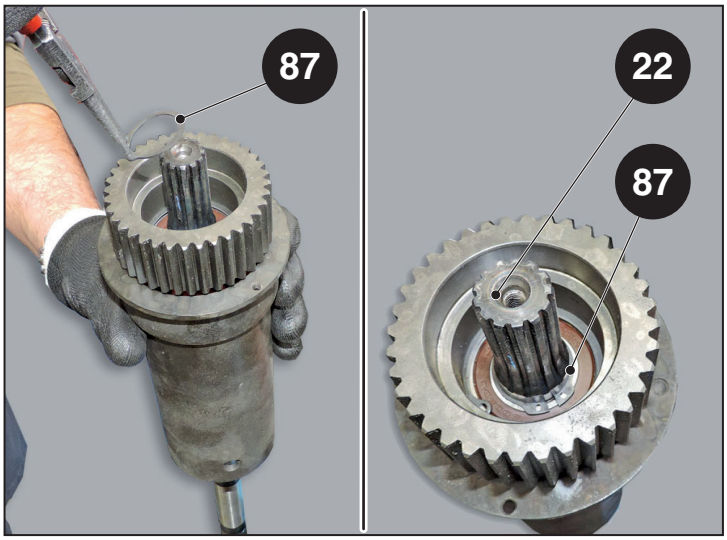


Fig. 6.90

4.2 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".

4.2.1 Reassembly

Use the special tool (A-p/n_____) to drive the bushings (51 and (52) to the end on the front coupling flange.

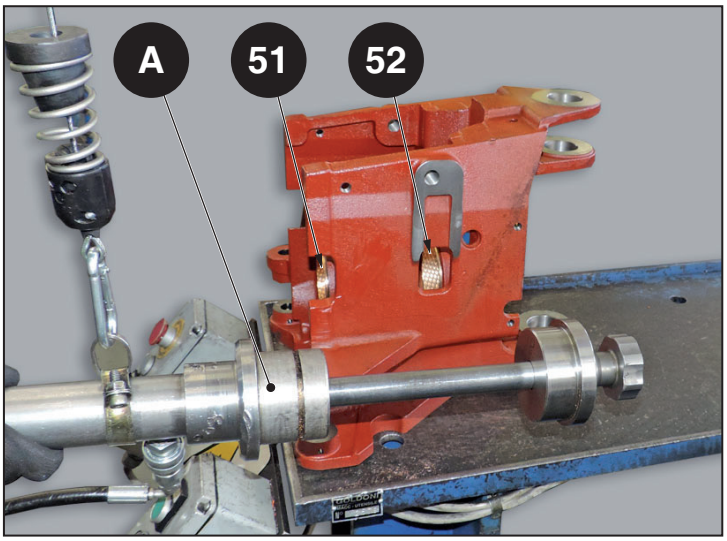


Fig. 6.91

Insert the bush (86) on the hole in the front flange.

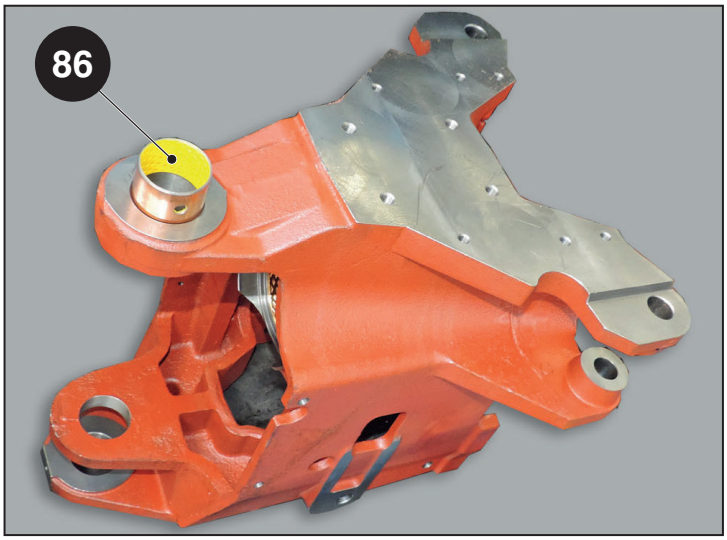


Fig. 6.92

Fit the spacers (85) making sure that the protruding face is directed toward the inside of the hole.



Fig. 6.93

Mount the spacers (50) on the sides of the front bush (51).

Note

Apply a coating of grease to the spacers (50) to make them adhere in place.

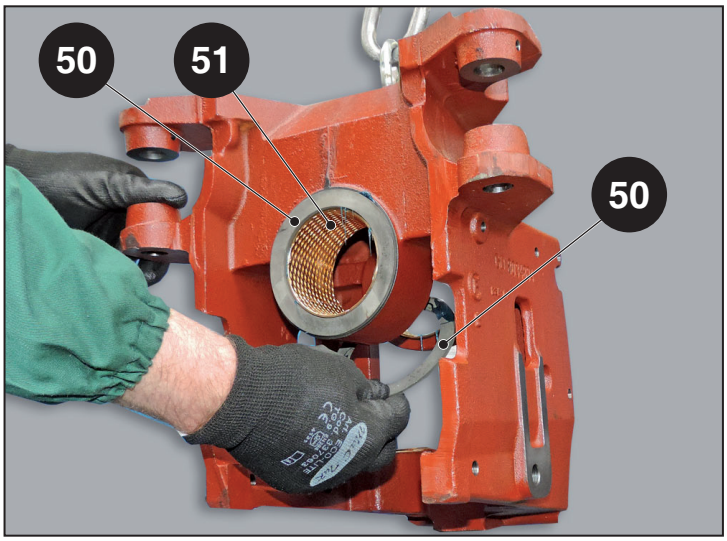


Fig. 6.94

Grease the bush (52).

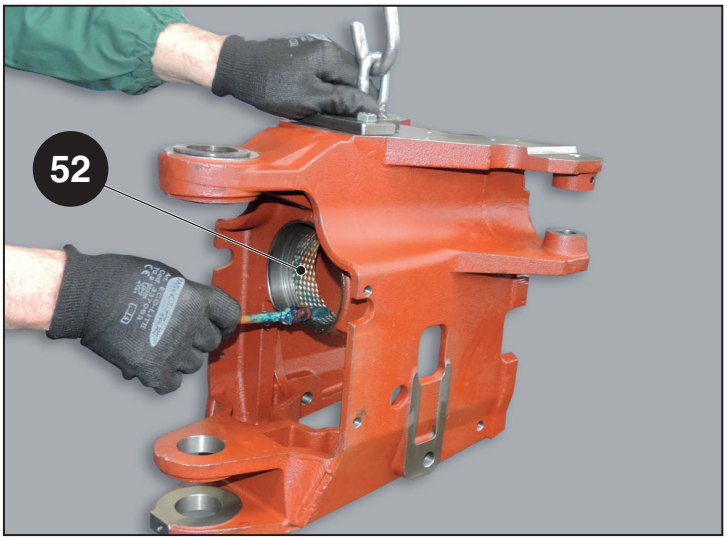


Fig. 6.95

Secure the front flange (69) to a suitable hoist and then mount it on the differential case.

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

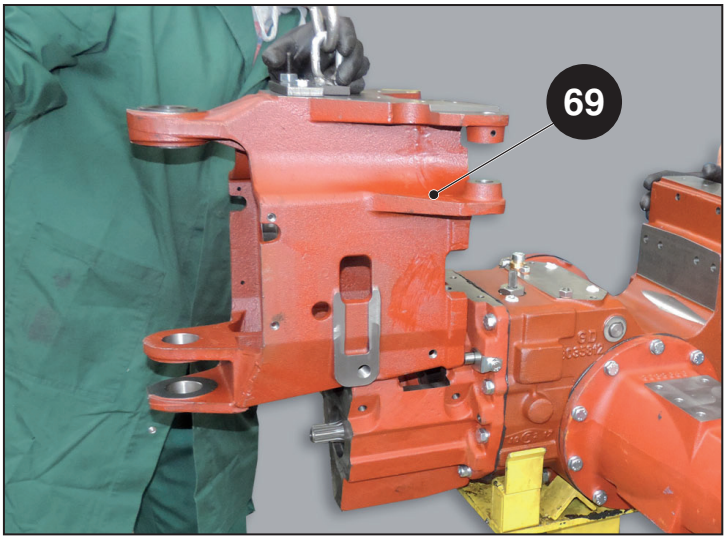


Fig. 6.96

Fit the complete knuckle cylinder (48) all the way to the end on the front knuckle flange.

Note

The notch on the cylinder collar (48) must be oriented vertically with the notch on the forecarriage coupling flange, thus allowing the correct alignment with the retainer grub screws.

Warning

To reassemble the complete knuckle cylinder (48), see the Chapter “Disassembling/Assembling the knuckle cylinder".

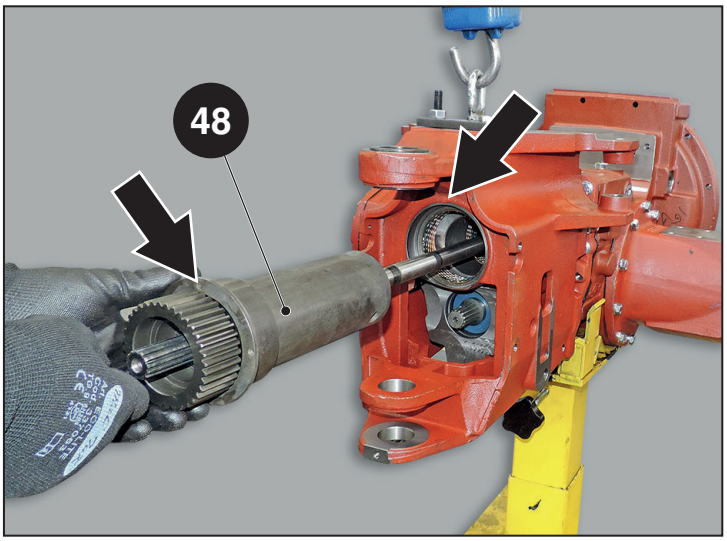


Fig. 6.97

Tighten the swing end stop grub screw (41) until it is flush with the nut (40) and tighten the nut (40). Apply a tightening torque of 100 Nm (10 kgm) to secure the check nut. Carry out this step on both sides of the tractor.

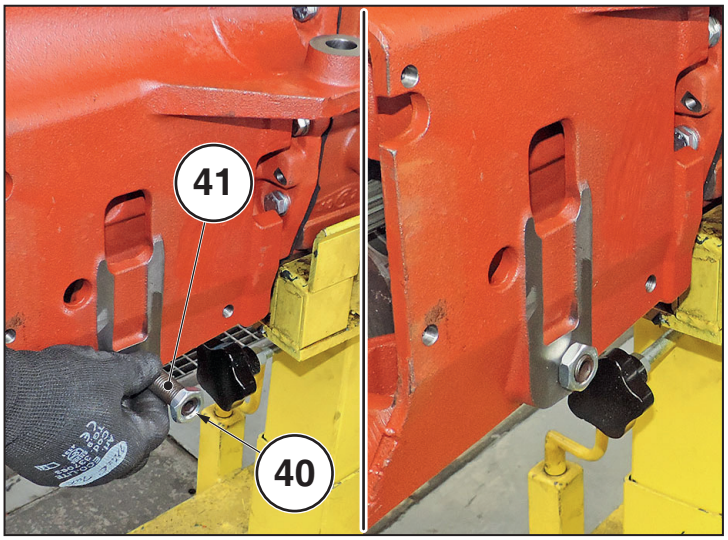


Fig. 6.98

Note

Bear in mind the difference between the grub screws.

The nuts (44) of the front side grub screws are shorter than the nuts (45) for the rear side grub screws.

The rear side grub screws (47) have a flat head.



Fig. 6.99

Tighten the front side grub screw (46) to the end and then the check nut (44).

Tighten the rear side grub screw (47) to the end and then the check nut (45).

Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Carry out these steps on both sides of the tractor.

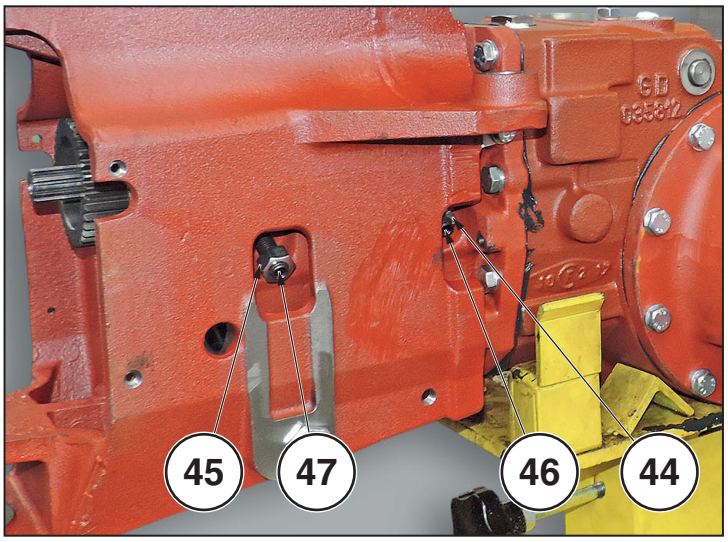


Fig. 6.100

Tighten the grub screw (43) to the end and then the check nut (42). Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

> **Warning**
>
> Make sure that the grub screw (43) is completely fit on the knuckle cylinder (48, see figure 6.72).

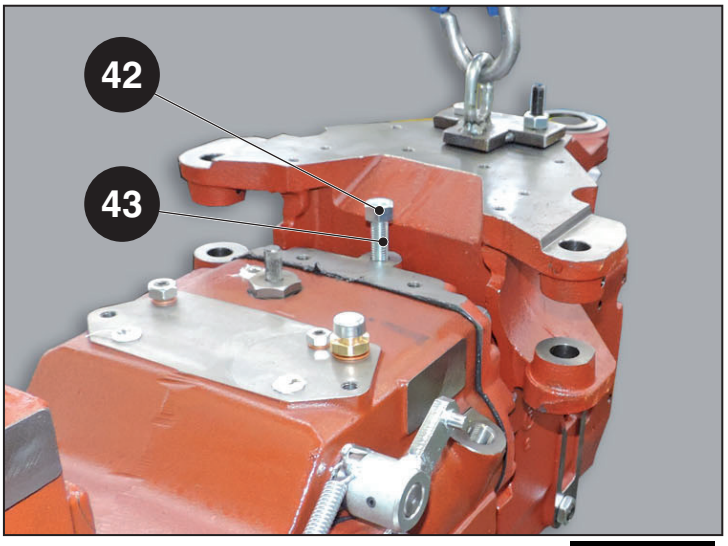


Fig. 6.101

Fit the bearing (82) on the knuckle sleeve (80) and drive it fully in with a punch tool of suitable diameter.

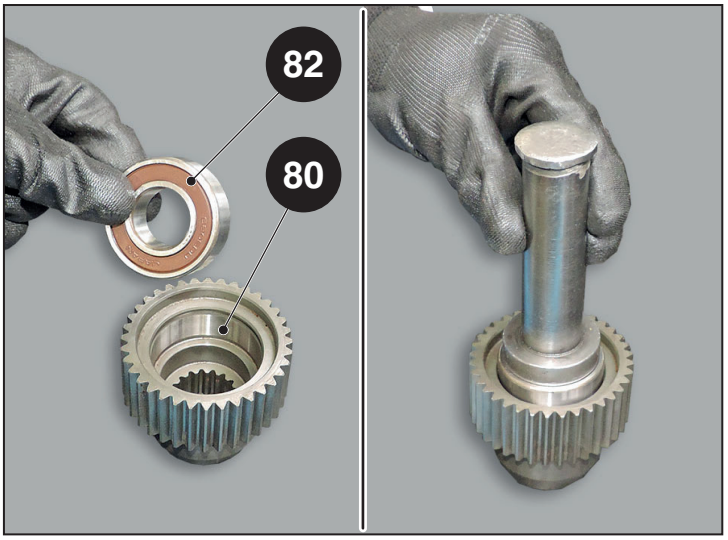


Fig. 6.102

Fit the circlip (81) on the knuckle sleeve (80) to secure the bearing (82) in place.

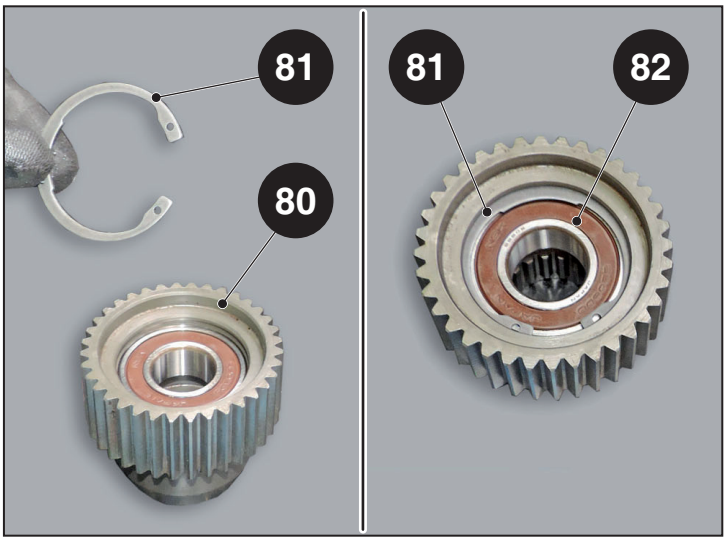


Fig. 6.103

Fit the spacer (84) and bush (83) on the independent PTO shaft (79).

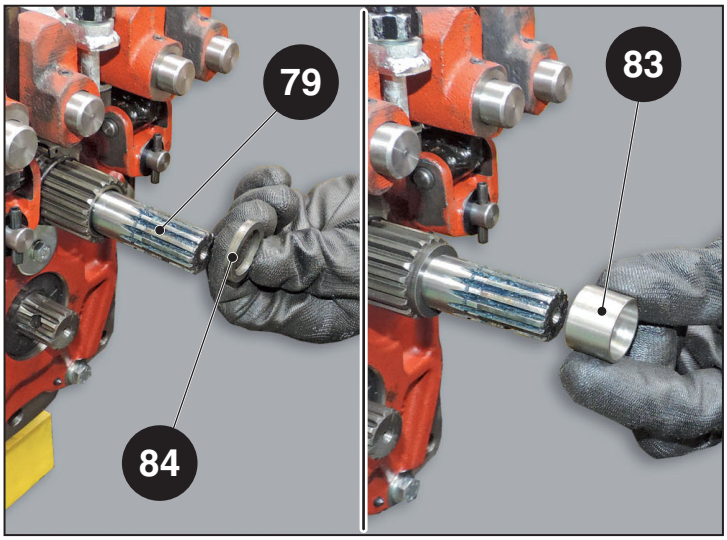


Fig. 6.104

Apply a coat of LOCTITE 5922 on the inner keying part of the knuckle sleeve (80).

Fit the knuckle sleeve (80) making it key on the primary shaft (95) and drive it in with a rubber mallet.

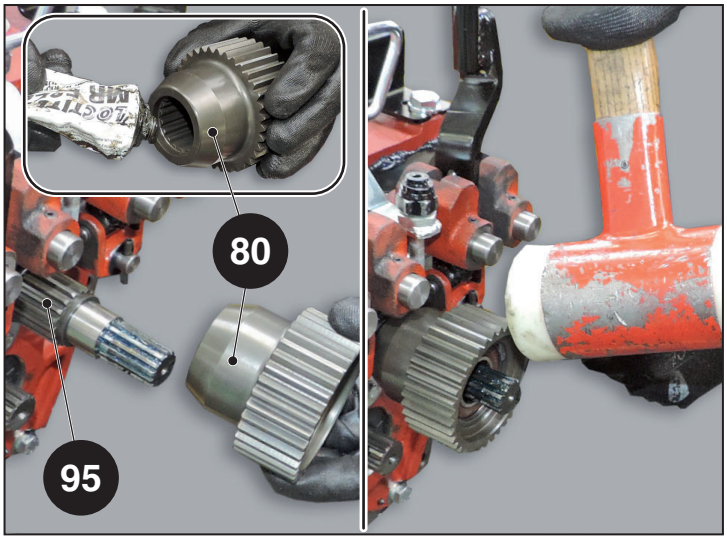


Fig. 6.105

Turn the knuckle sleeve (80) so that the flare is facing right.

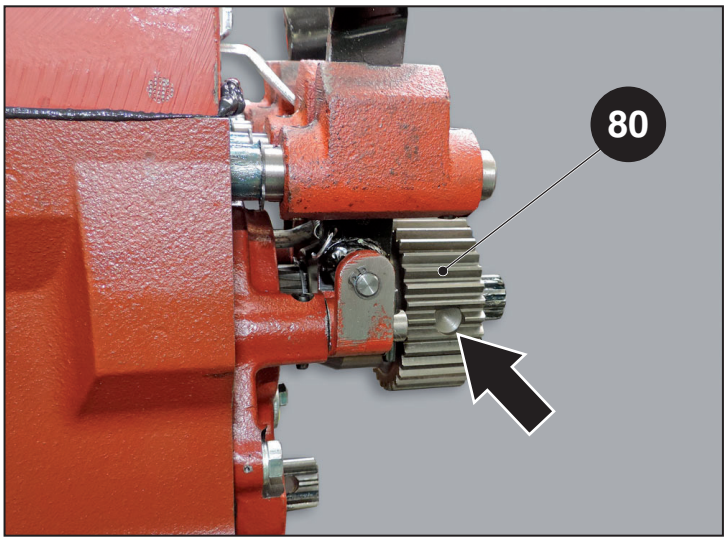


Fig. 6.106

Fit the circlip (78) on the independent PTO shaft (79) and then insert the spacer (77).

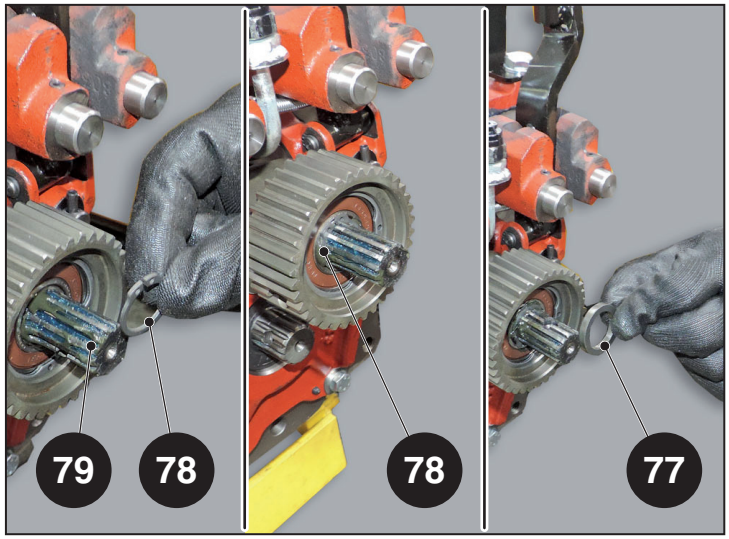


Fig. 6.107

Turn the independent PTO shaft (79) so that the flare is facing up.

Key the upper joint (76) on the independent PTO shaft (79). Position the joint so that the threaded hole is aligned with the flare on the independent PTO shaft (79).

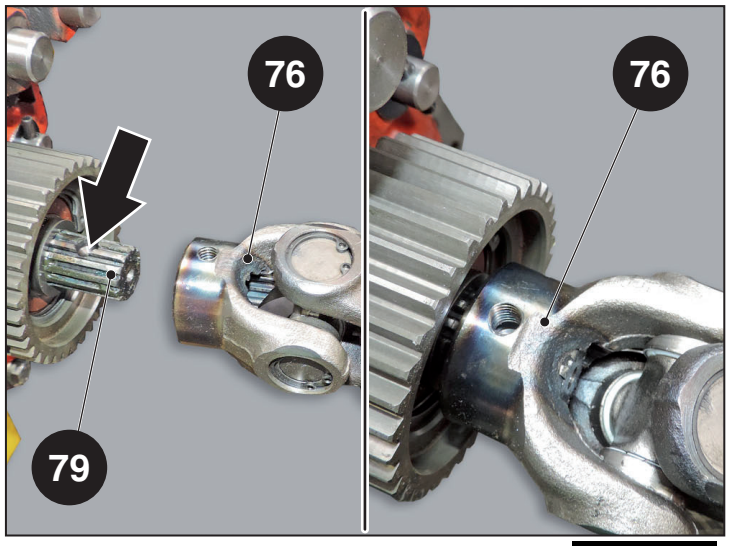


Fig. 6.108

Apply LOCTITE 270 to the tip of the grub screw (75).

Tighten the grub screw (75) on the hole to secure the joint (76) to the independent PTO shaft.

Warning

Make sure that the grub screw (75) is inserted completely: it must be almost equal to the surface area of the joint (76).

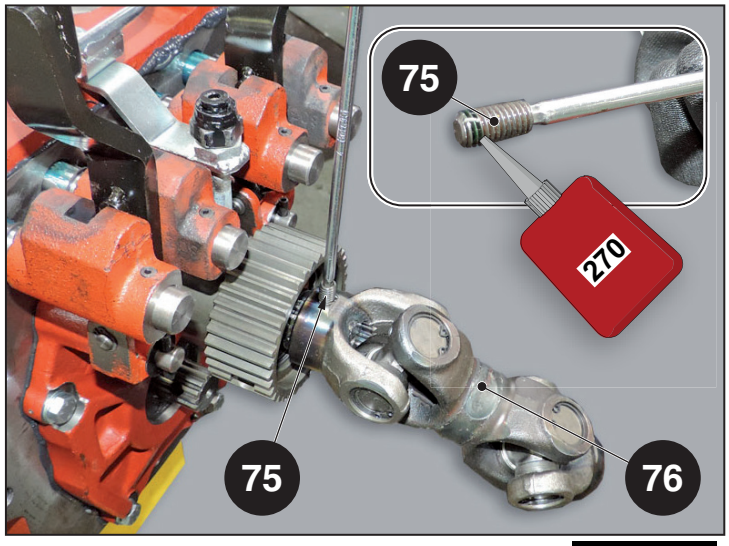


Fig. 6.109

Apply abundant grease on the keying part of the rear lower joint parts (96).

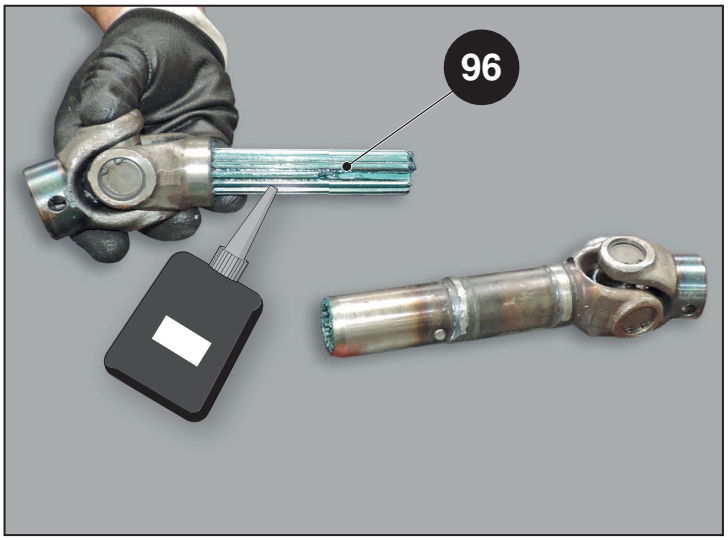


Fig. 6.110

Key the rear lower joint (96) on the rear bevel pinion positioning with the holes aligned. Fit the pin (97) to secure the joint (96).

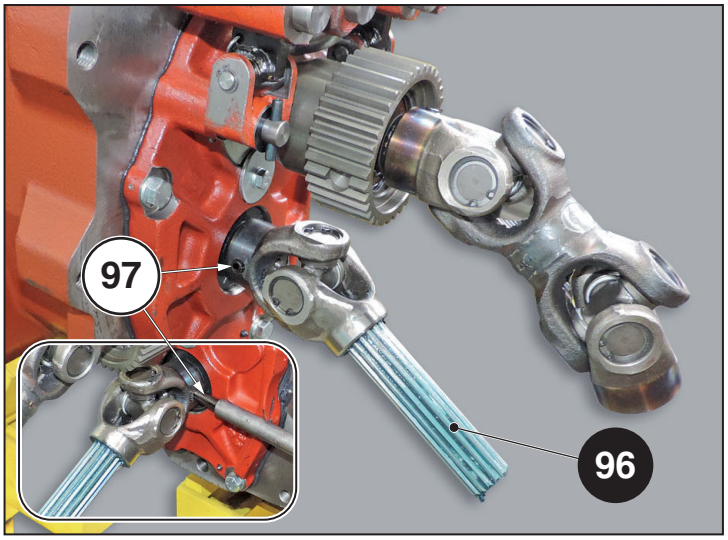


Fig. 6.111

Key the front lower joint (74) on the front bevel pinion positioning it with the holes aligned. Fit the pin (73) to secure the joint (74).

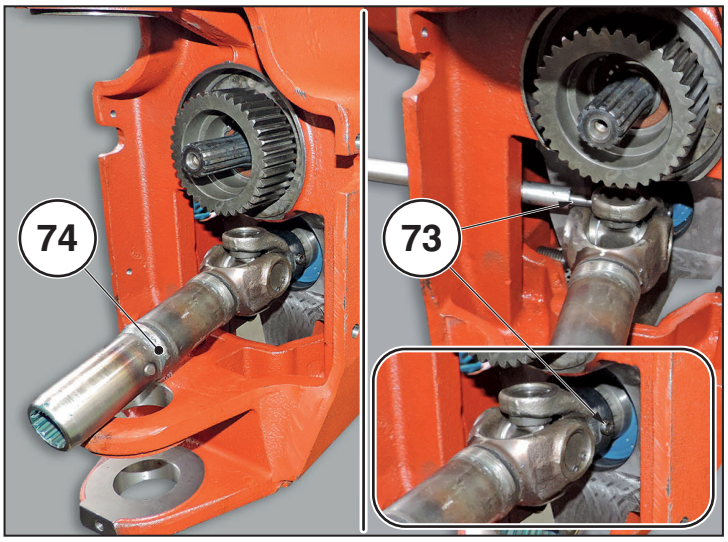


Fig. 6.112

Apply abundant grease on the outer keyed part of the coupling cylinder (48).

Warning
Use Teflon-based multi-purpose grease.

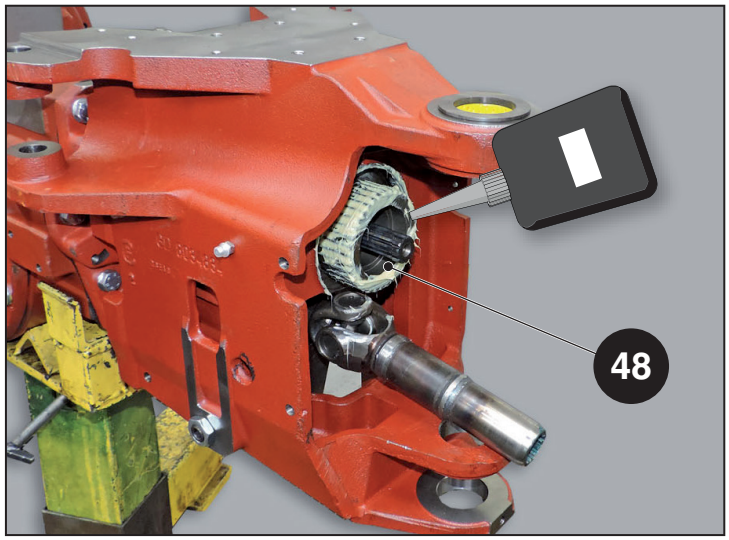


Fig. 6.113

Grease the front keyed part of the joint (72). The front end of the joint (72) has no threaded holes.

Warning
Use Teflon-based multi-purpose grease.

Key the joint (72) on the knuckle cylinder (48).

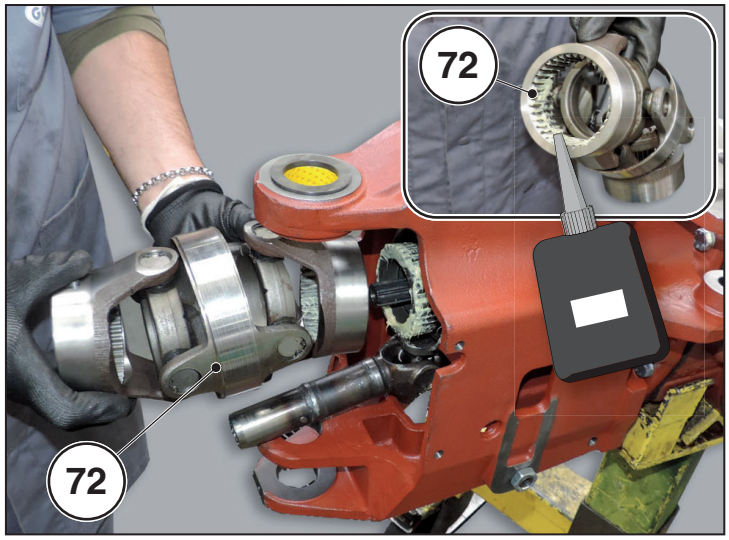


Fig. 6.114

Align the flare on the knuckle sleeve (80) and the threaded hole on the joint (72) upwards. The hole and flare must match when the two components will be keyed together in a following step.

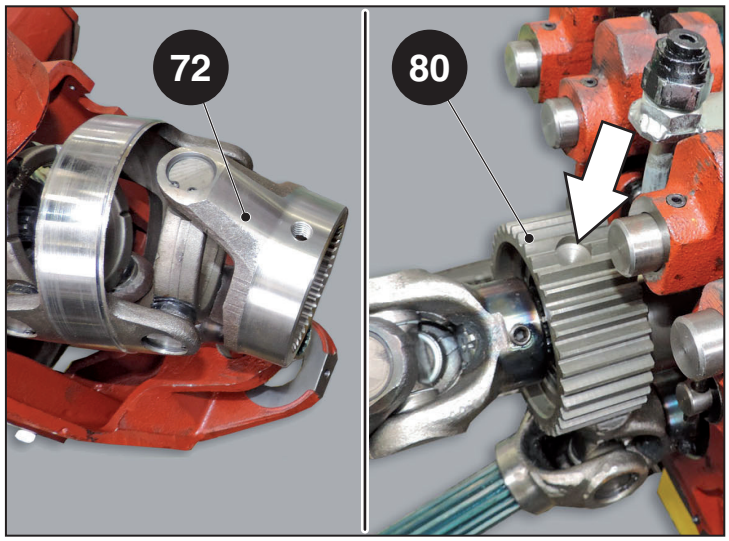


Fig. 6.115

Insert the bush (70) on the lower hole of the rear flange (68), driving it into its seat with a punch tool of suitable diameter.

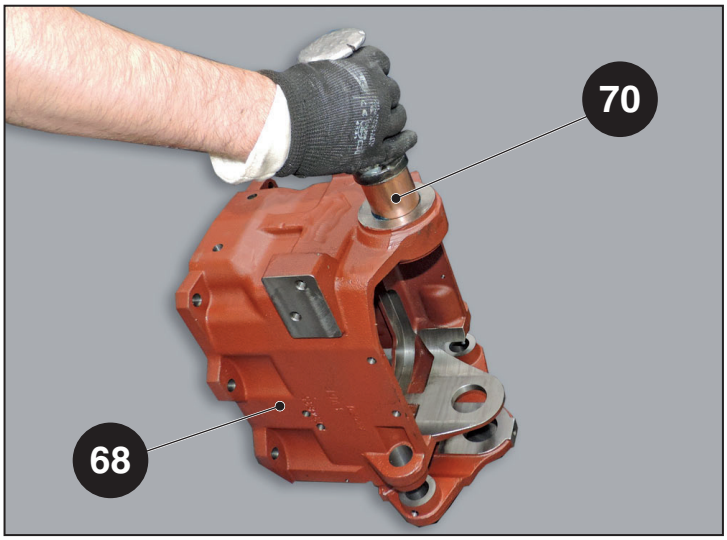


Fig. 6.116

Secure the front flange (68) to a suitable hoist and then mount it on the front flange (69).

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

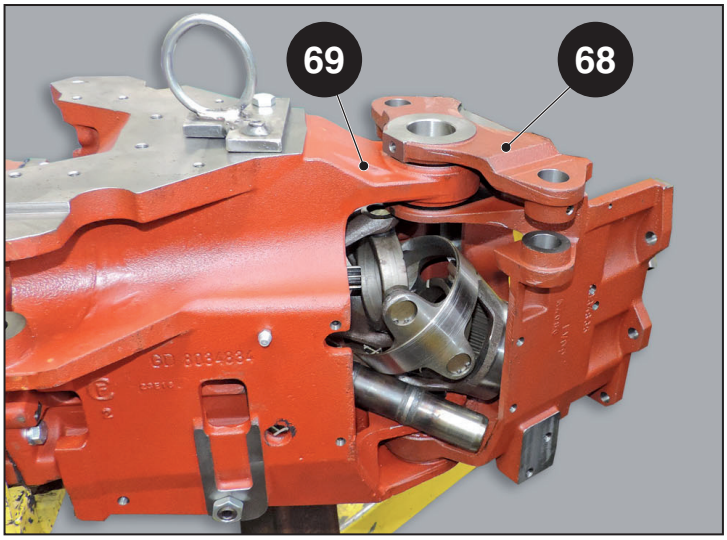


Fig. 6.117

Screw the lubricators on the pins (71) and (67).

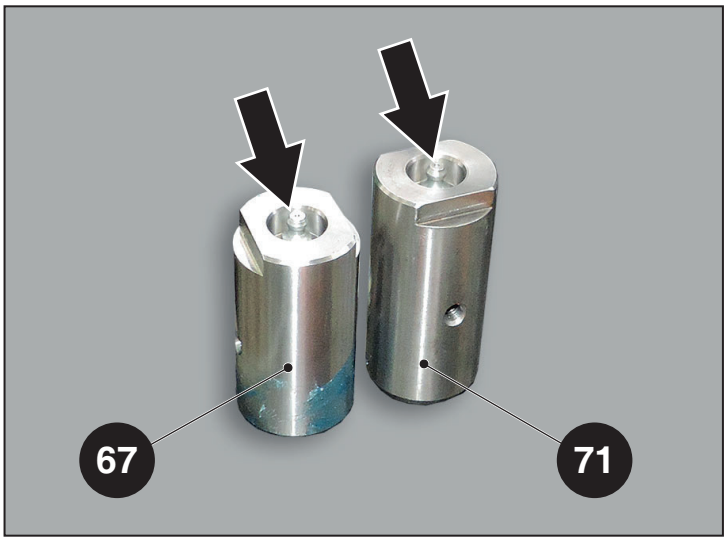


Fig. 6.118

Grease the upper knuckle pin (67) and then insert it on the knuckle flanges. Align the hole on the knuckle pin (67) with the hole on the rear flange (68).

> **Warning**
>
> The upper knuckle pin (67) is shorter than the lower one.

Tighten the retainer grub screw (65) to the end and then the check nut (66).

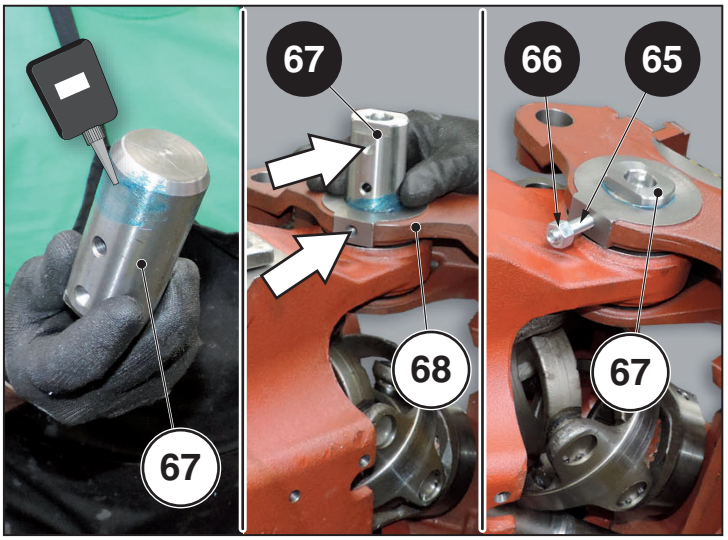


Fig. 6.119

Grease the lower knuckle pin (71) and then insert it on the knuckle flanges. Align the hole on the knuckle pin (71) with the hole on the front flange (69).

Tighten the retainer grub screw (65) to the end and then the check nut (66).

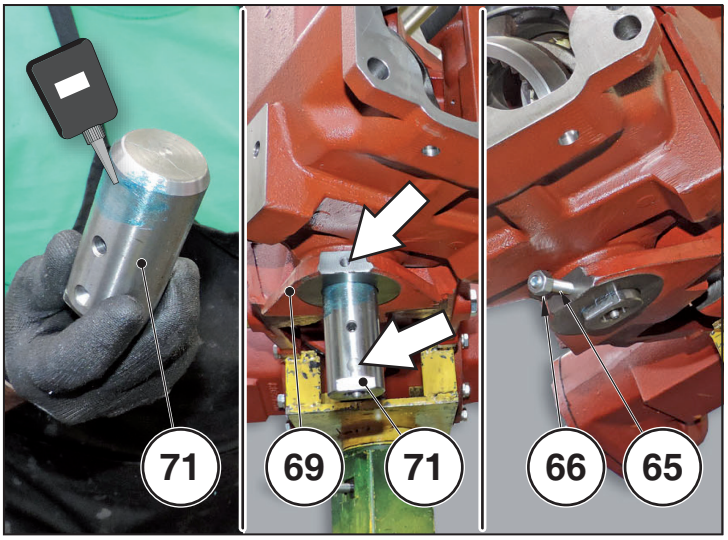


Fig. 6.120

Align the spline on the keyed part on the lower rear joint (96) with the mark on the front lower joint (74).

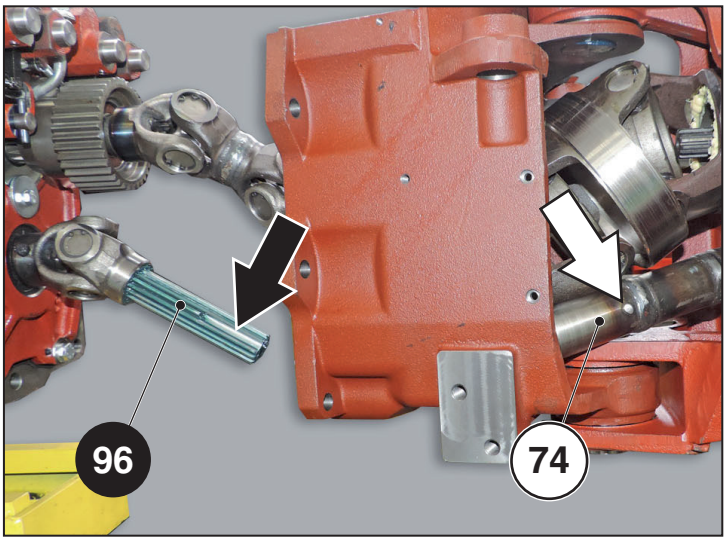


Fig. 6.121

Join the gearbox assembly with the central body. During the process, carry out the following operations:

- insert the upper joint (76) inside the joint (72);
- key the front lower joint (74) and the rear lower joint (96);

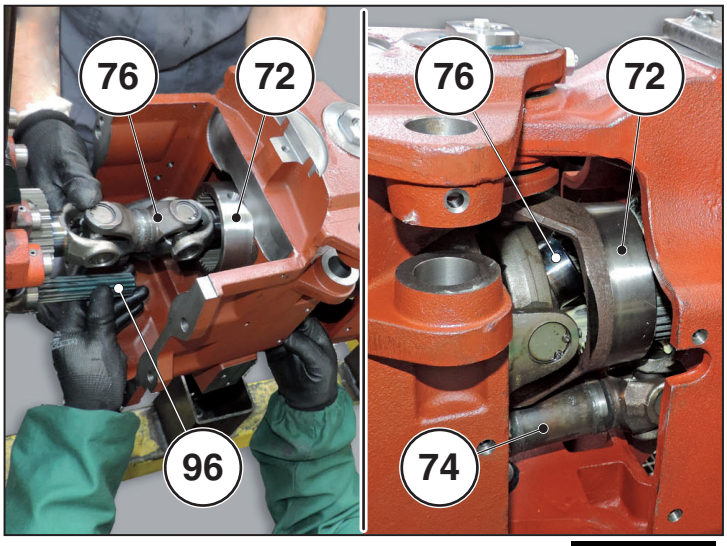


Fig. 6.122

- key the joint (72) with the knuckle sleeve (80);

> **Warning**
>
> Make sure that the flare on the knuckle sleeve (80) and the hole on the joint (72) are aligned.

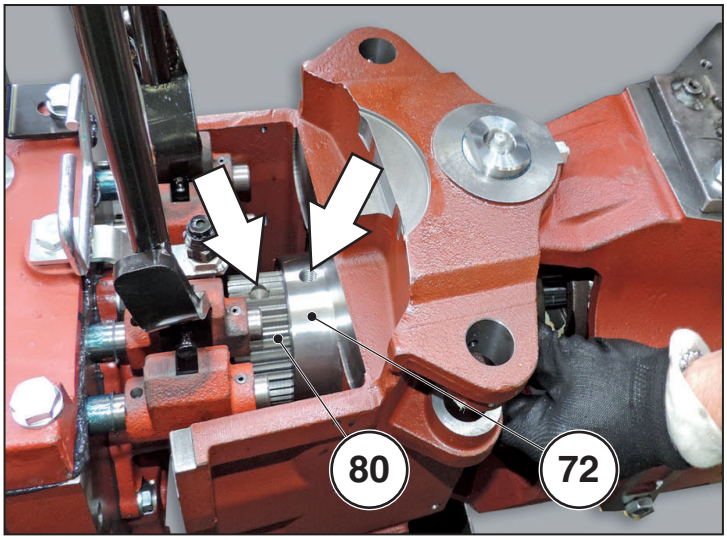


Fig. 6.123

- Key the upper joint (76) on the independent PTO shaft (22).

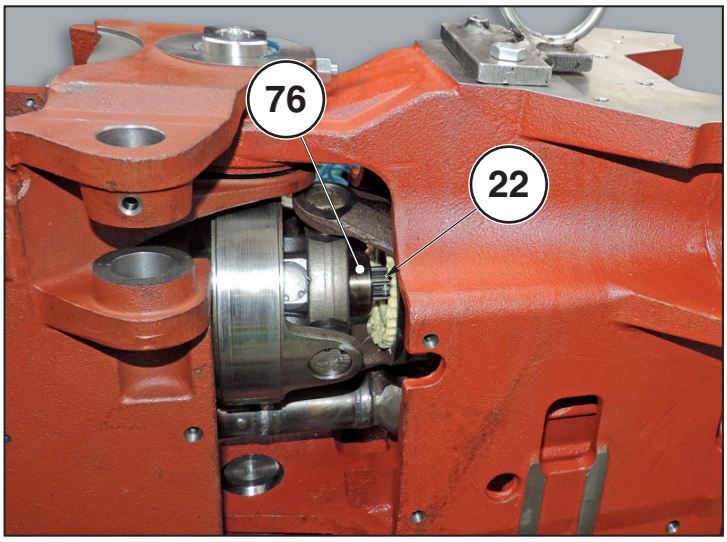


Fig. 6.124

Apply LOCTITE 270 on the grub screw (64) and then tighten the grub screw to the end (64) on the joint (72) hole.

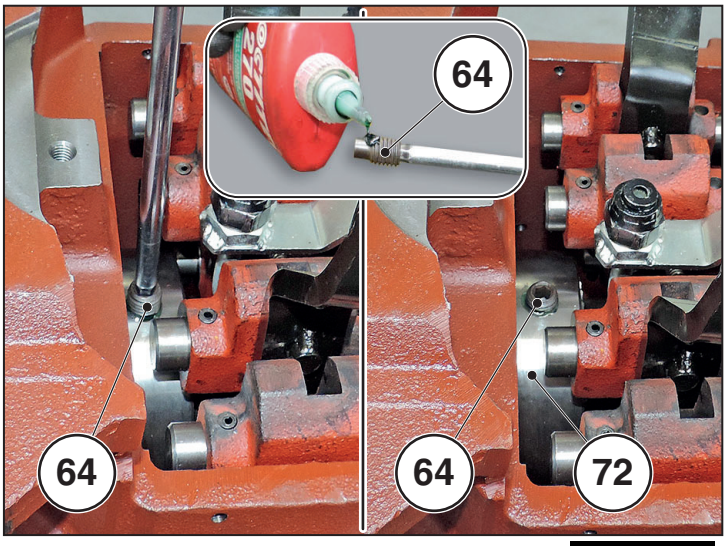


Fig. 6.125

Tighten the screws (57) together with the washers (58) to secure the gearbox assembly on the joint. Apply a tightening torque of 90 Nm (9 kgm).

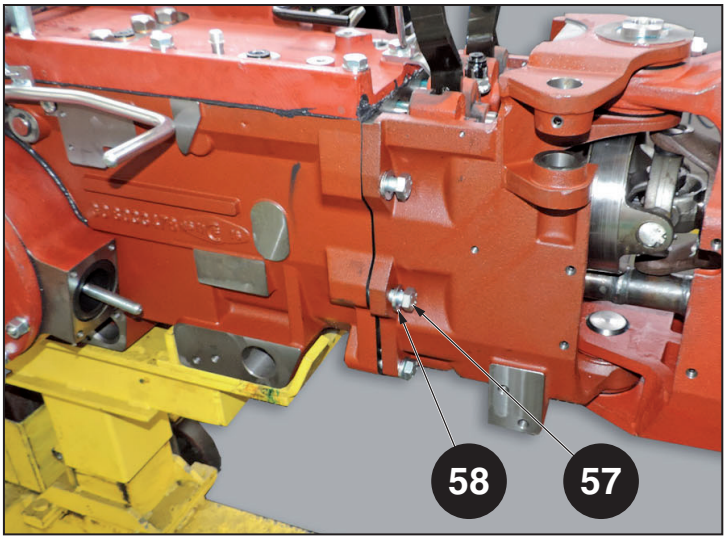


Fig. 6.126

Fit the hydraulic cylinder (98) on the front flange (69). Fit the pin (62) and align the holes. Fasten the pin (62) with the pin (61).

Repeat the operation on the opposite side of the tractor for the remaining hydraulic cylinder.

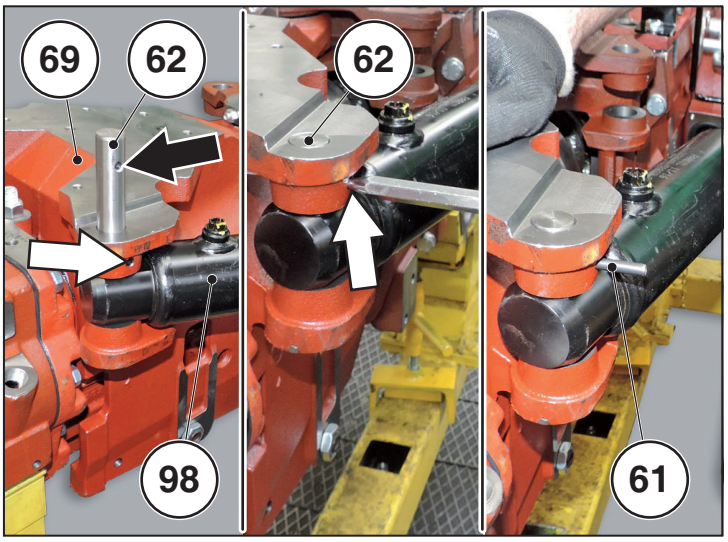


Fig. 6.127

Fit the pin (63) by aligning the holes to secure the hydraulic cylinder (98) on the rear flange (68). Fasten the pin (63) with the pin (61).

Repeat the operation on the opposite side of the tractor for the remaining hydraulic cylinder.

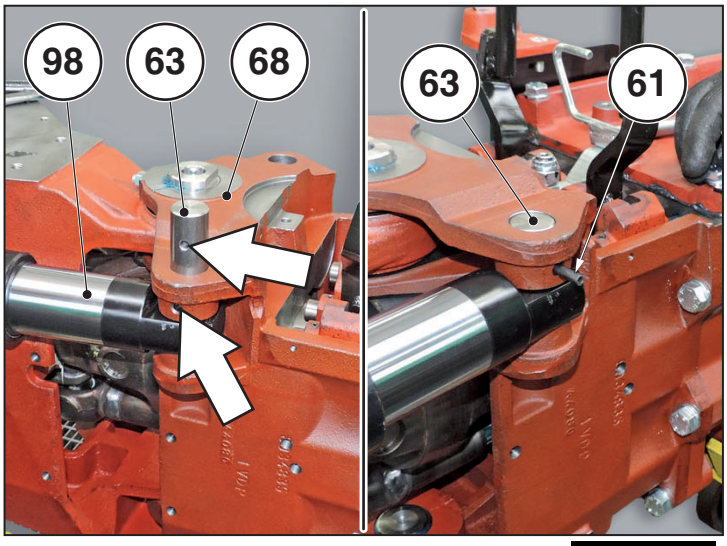


Fig. 6.128

Secure the footboard mounts (99) and (100) on both sides of the rear flange with the screws (101) and washers (102).

⚠ Warning
Tighten the screw (103) in the upper hole of the right mount (99).

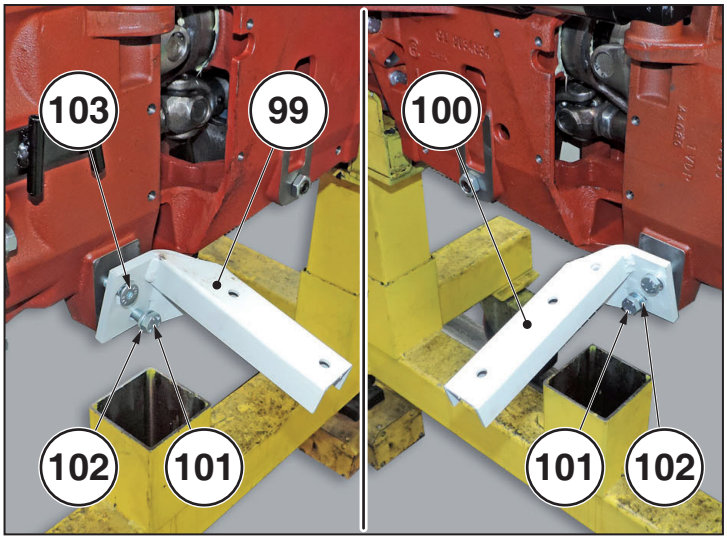


Fig. 6.129

Continue the reassembly operations by following the preliminary operations in reverse order.

Section 5 : SN Cluster central body

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5.1.1 Preliminary operations 6-56
5.1.2 Disassembly 6-56
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5.1 Disassembly

5.1.1 Preliminary operations

Before starting disassembly work, follow the "Preliminary operations" in the Chapter “Rear final drive units”. In addition, remove the following assemblies:

- front wheels;
- front mudguards;
- footboards;
- instrument cluster.

5.1.2 Disassembly

Remove the footboard mounts (99) and (100) by undoing the screws (101) and (103) along with the washers (102).

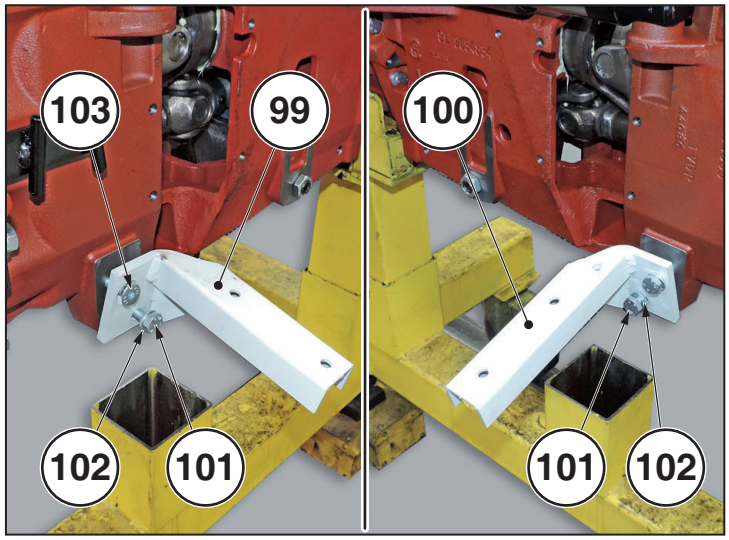


Fig. 6.130

Remove the pin (61) and pull out the front pin (62). Carry out this step on both sides of the tractor.

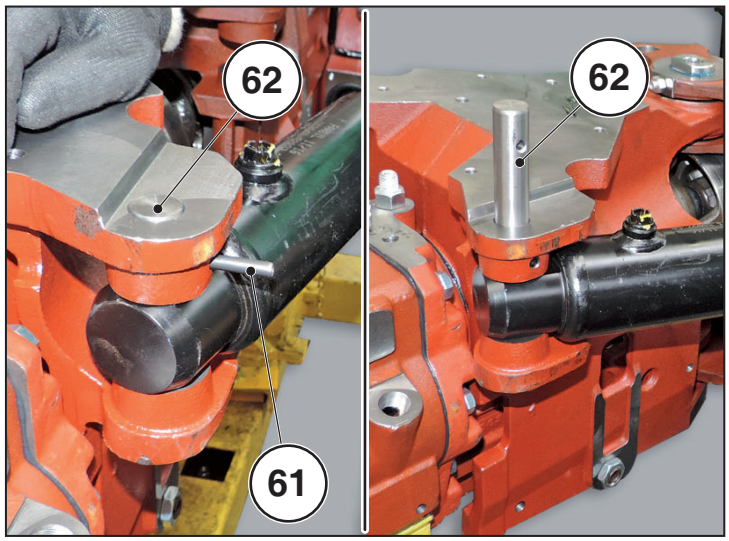


Fig. 6.131

Remove the pin (61) and pull out the rear pin (63). Carry out this step on both sides of the tractor.

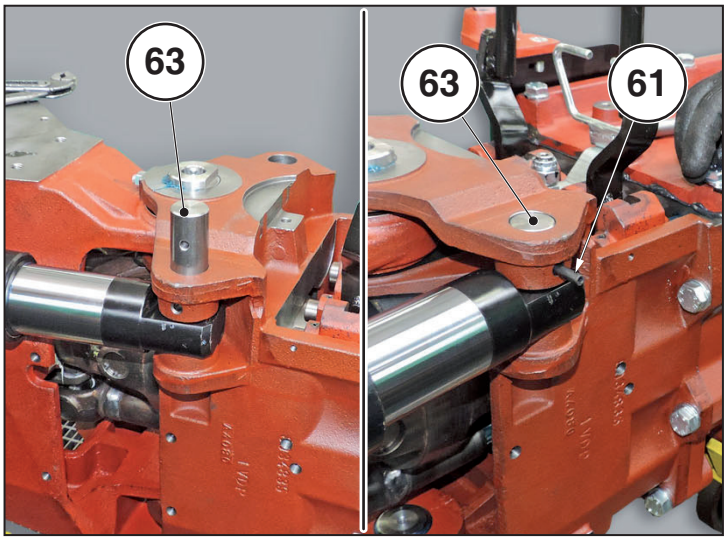


Fig. 6.132

Undo the screws (57) and remove the washers (58).

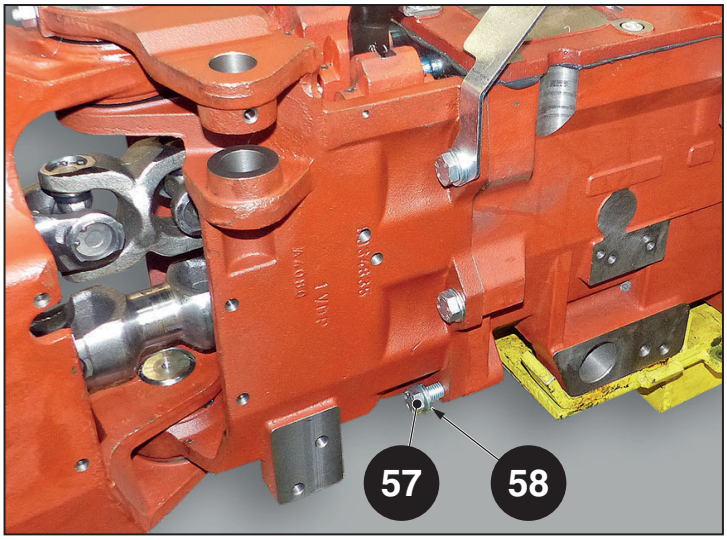


Fig. 6.133

Separate the central body from the gearbox assembly.

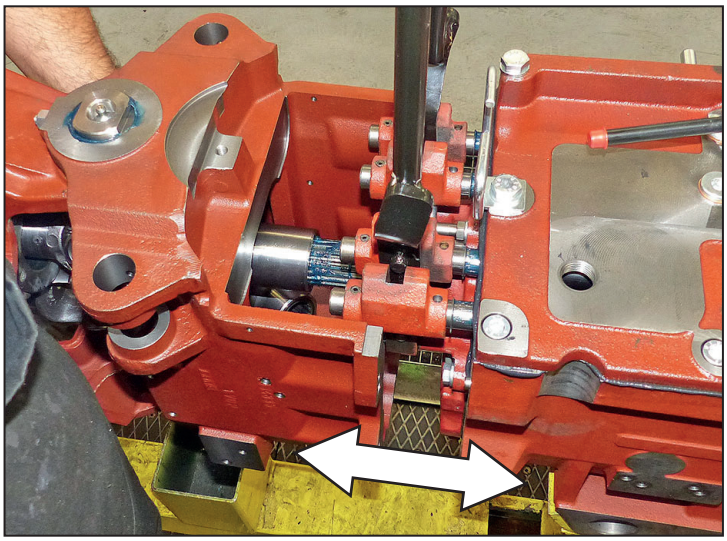


Fig. 6.134

Remove the pin (111) and remove the upper joint (110) from the shaft (105).

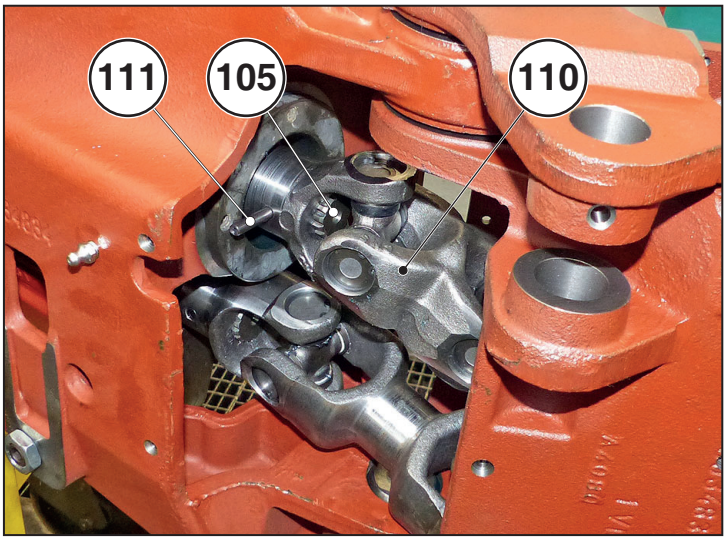


Fig. 6.135

Remove the pin (27) and then the lower front joint (28) from the front bevel pinion.

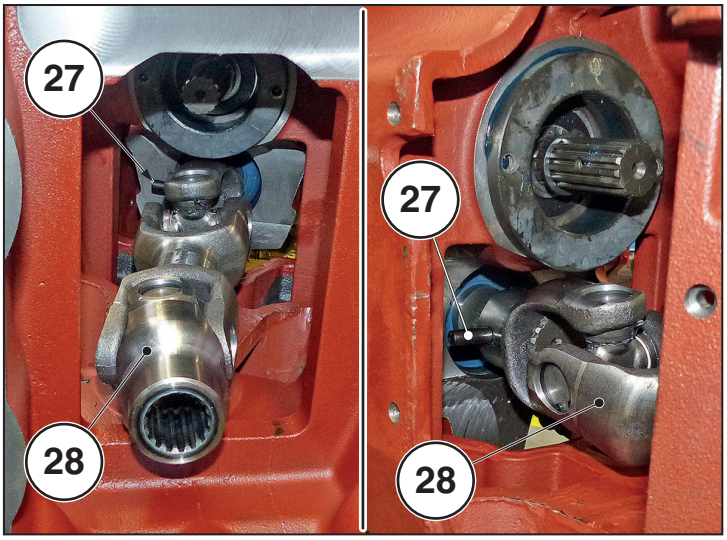


Fig. 6.136

Secure the rear flange (68) to a suitable hoist.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Loosen the grub screw (65) together with the check nut (66) and then pull out the pin (71).

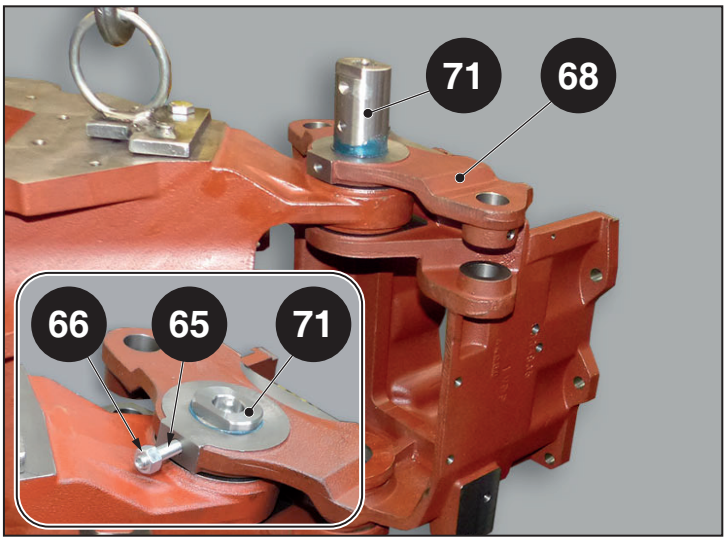


Fig. 6.137

Loosen the grub screw (65) together with the check nut (66) and then pull out the pin (71).

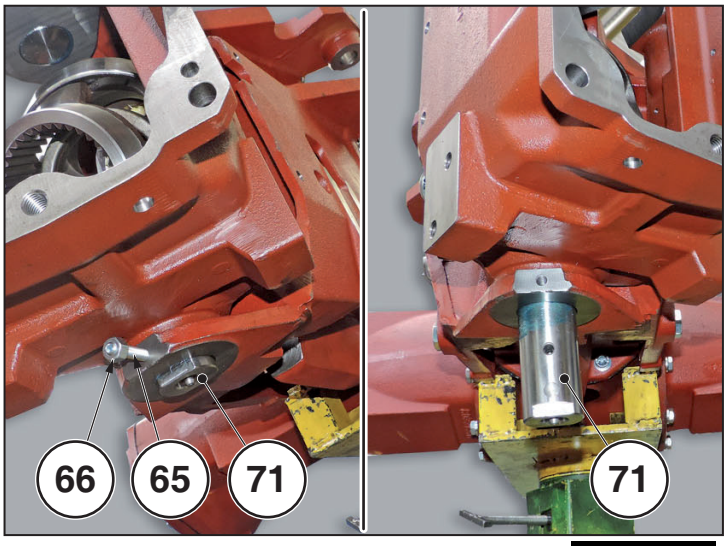


Fig. 6.138

Separate the rear flange (68) from the front flange (69).

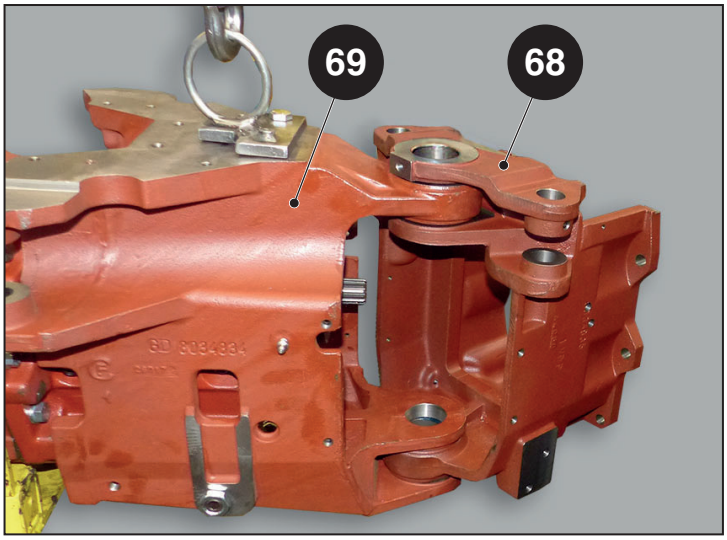


Fig. 6.139

Remove the bush (70) from the rear flange (68).

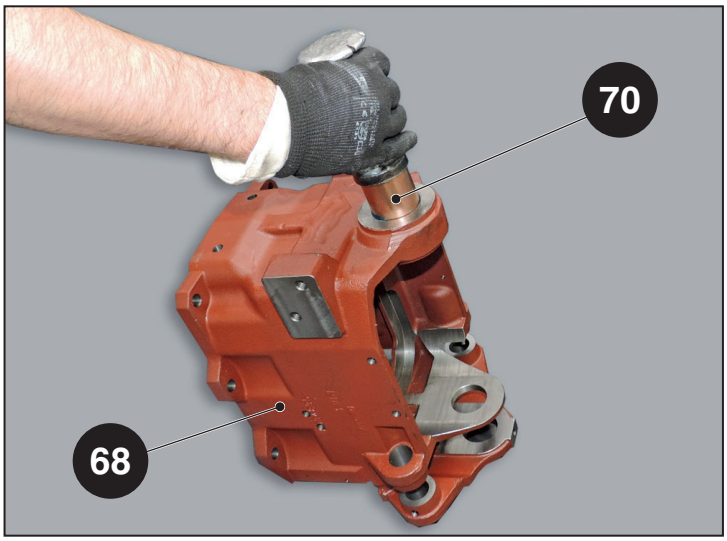


Fig. 6.140

Undo the swing end stop nuts (40) and grub screws (41).

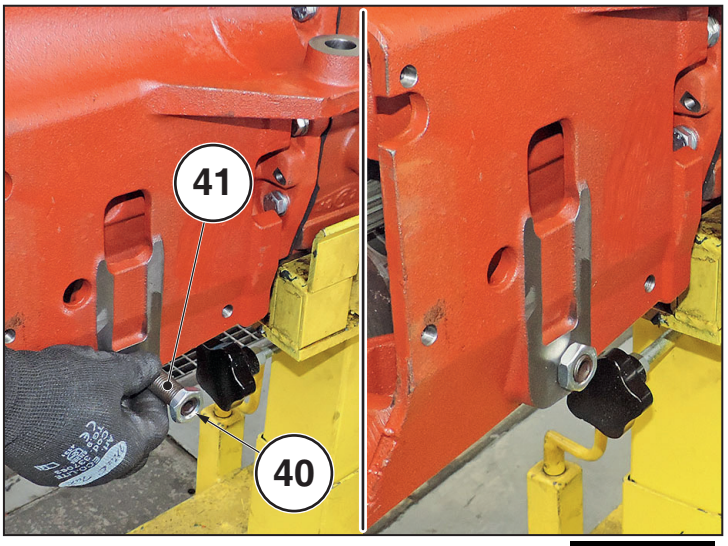


Fig. 6.141

Secure the front flange (69) to a suitable hoist.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Undo the nuts (44) and (45) and the lateral grub screws (46) and (47).

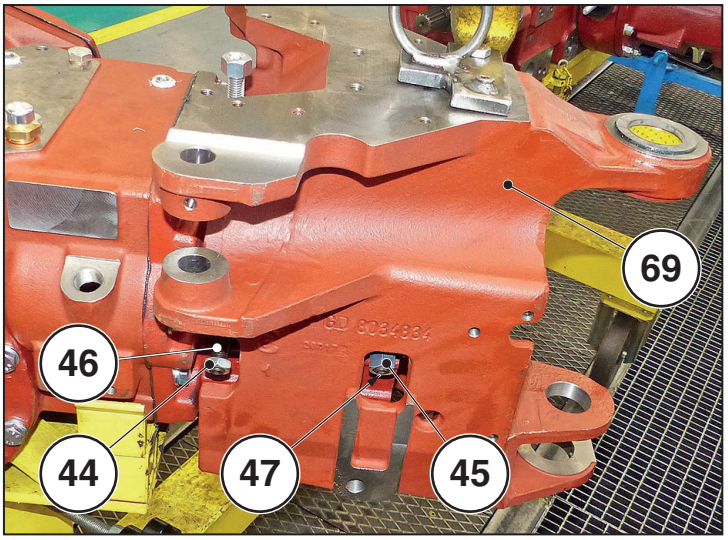


Fig. 6.142

Undo the nut (42) and the upper grub screw (43).

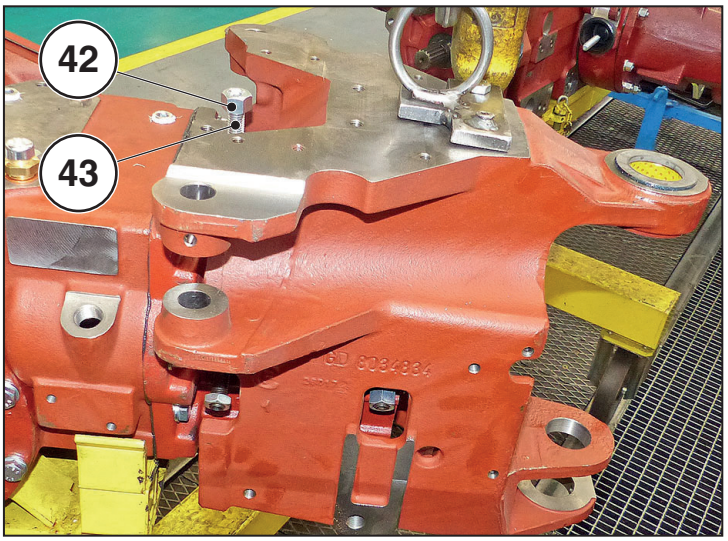


Fig. 6.143

Pull out the complete knuckle cylinder (48) from the flange (69).

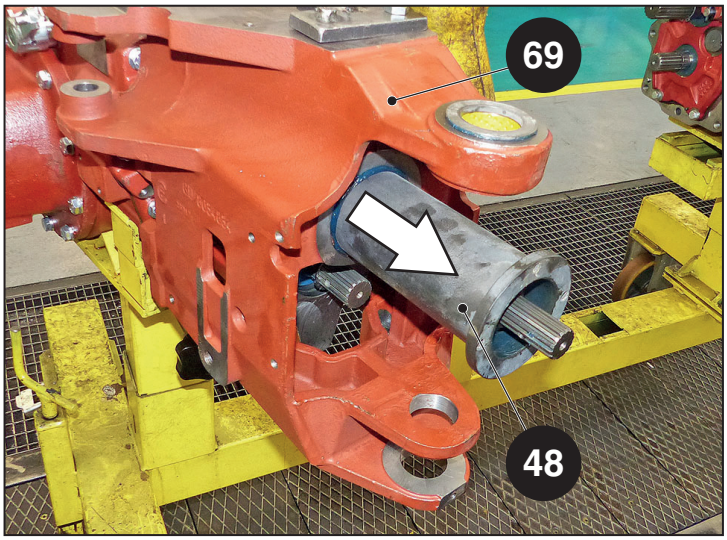


Fig. 6.144

Remove the circlip (108) inside the knuckle cylinder (48).

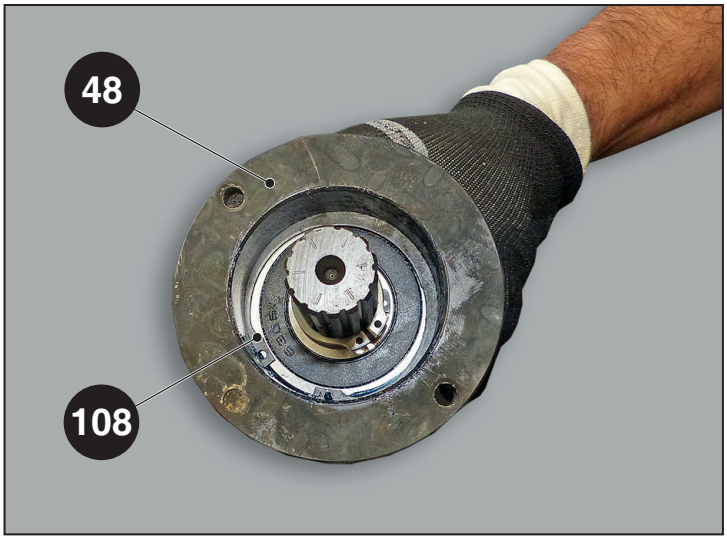


Fig. 6.145

Pull out the shaft (105) from the knuckle cylinder (48).

Remove the reinforced circlip (107).

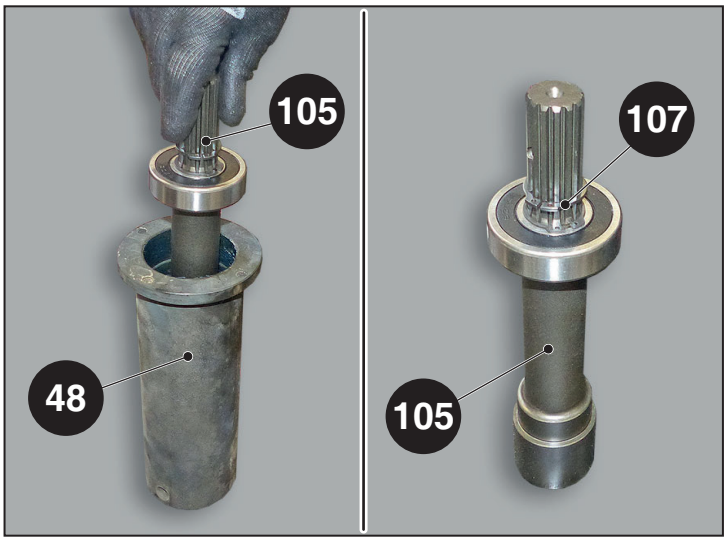


Fig. 6.146

Remove the circlip (106) and then bearing (104) from the shaft (105).

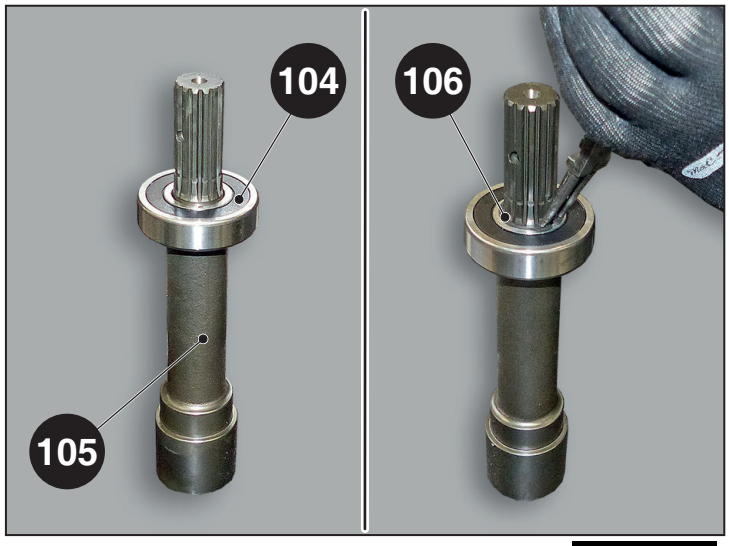


Fig. 6.147

Remove the front flange (69) from the differential case.

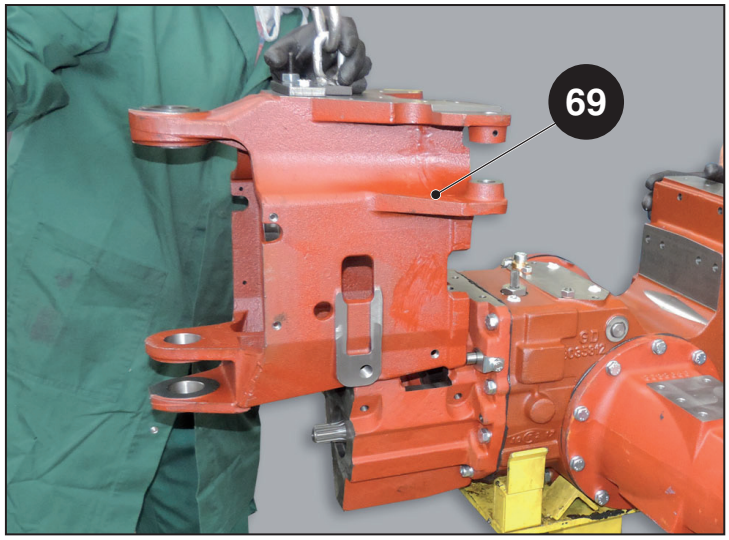


Fig. 6.148

Remove the spacers (50) on the side of the bush (51).

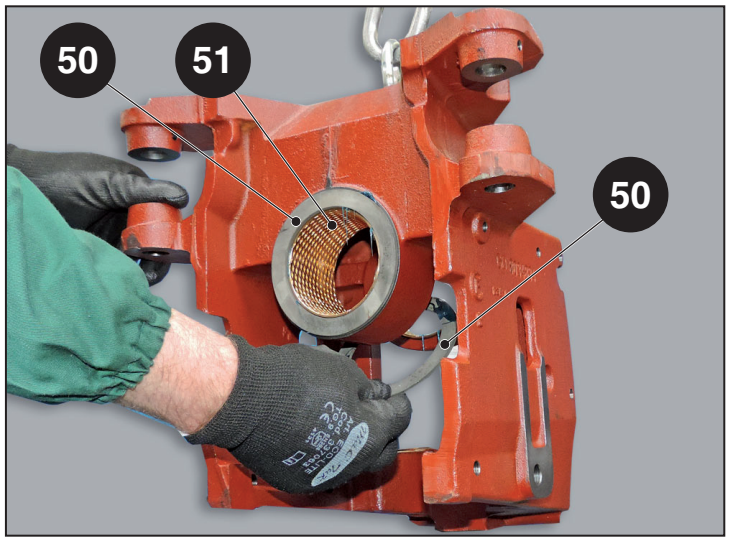


Fig. 6.149

Remove the spacers (85).



Fig. 6.150

Remove the bush (86).

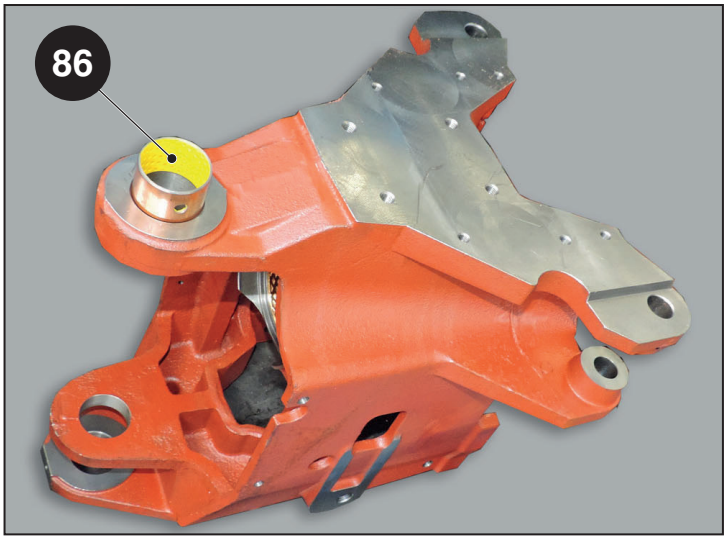


Fig. 6.151

Remove the bushes (51) and (52).

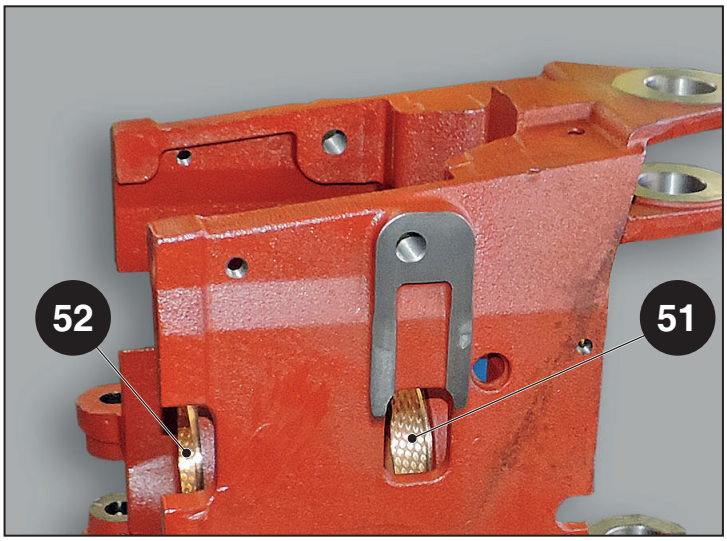


Fig. 6.152

5.2 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".

5.2.1 Reassembly

Use the special tool (A-p/n_____) to drive the bushings (51 and (52) to the end on the front coupling flange.

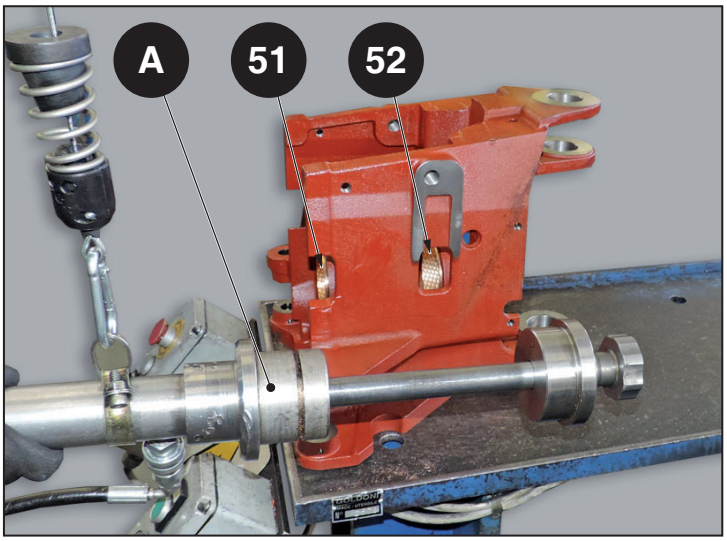


Fig. 6.153

Insert the bush (86) on the hole in the front flange.

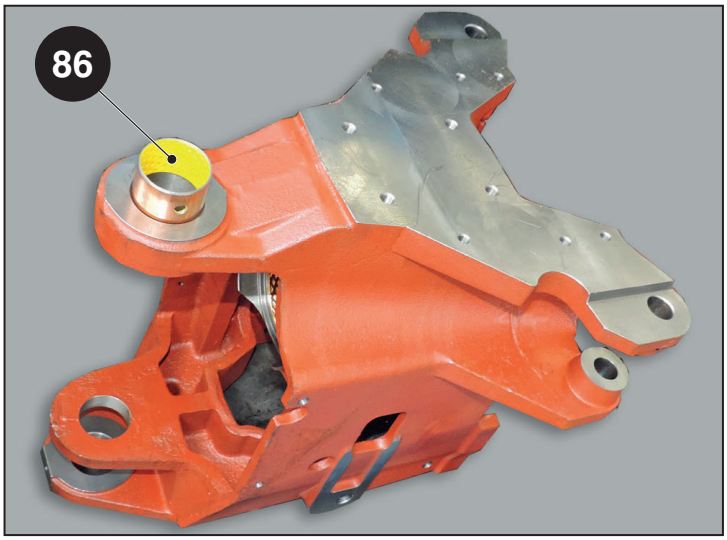


Fig. 6.154

Fit the spacers (85) making sure that the protruding face is directed toward the inside of the hole.



Fig. 6.155

Mount the spacers (50) on the sides of the front bush (51).

Note

Apply a coating of grease to the spacers (50) to make them adhere in place.

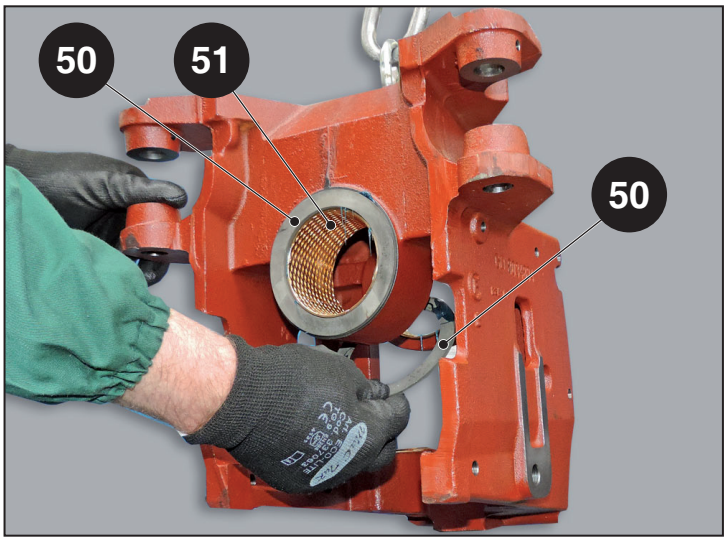


Fig. 6.156

Grease the bush (52).

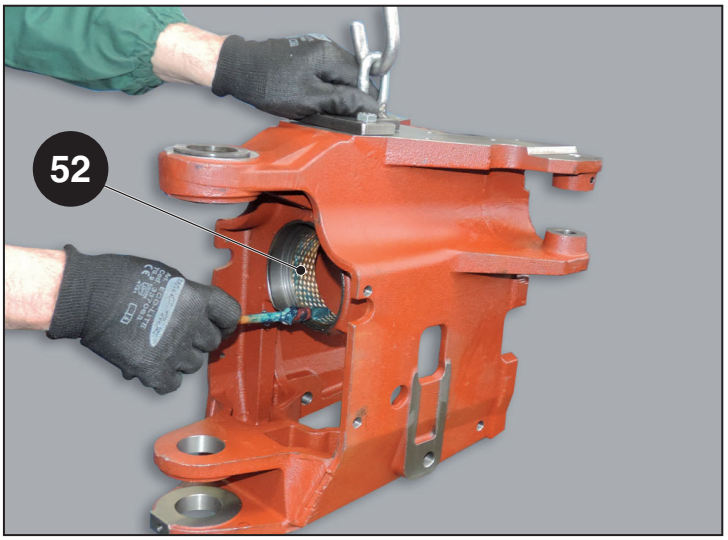


Fig. 6.157

Secure the front flange (69) to a suitable hoist and then mount it on the differential case.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

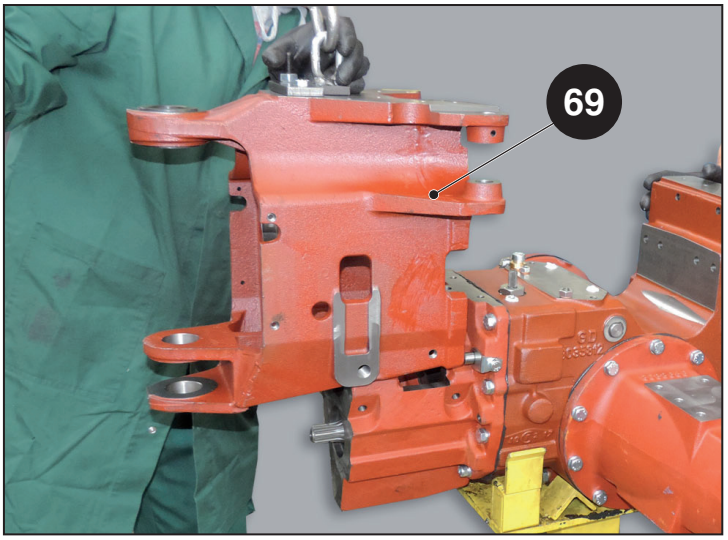


Fig. 6.158

Fit the bearing (104) on the shaft (105) and drive it fully in with a punch tool of suitable diameter. Fit the circlip (106) to retain the bearing.

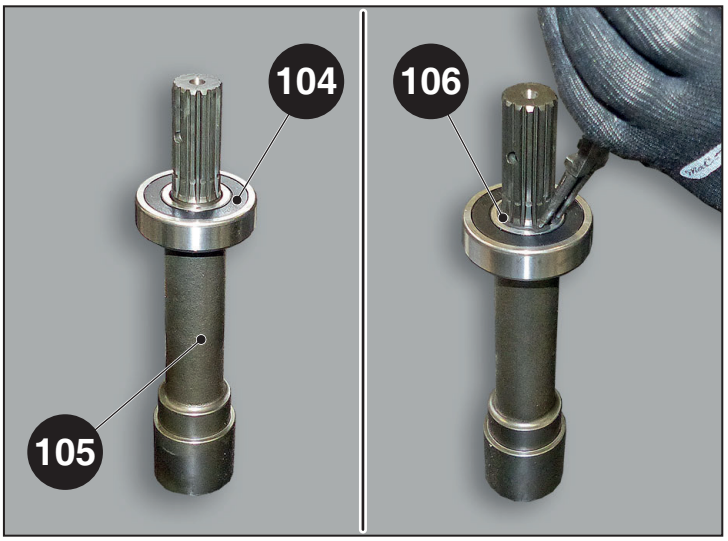


Fig. 6.159

Fit the reinforced circlip (107) on the shaft (105).

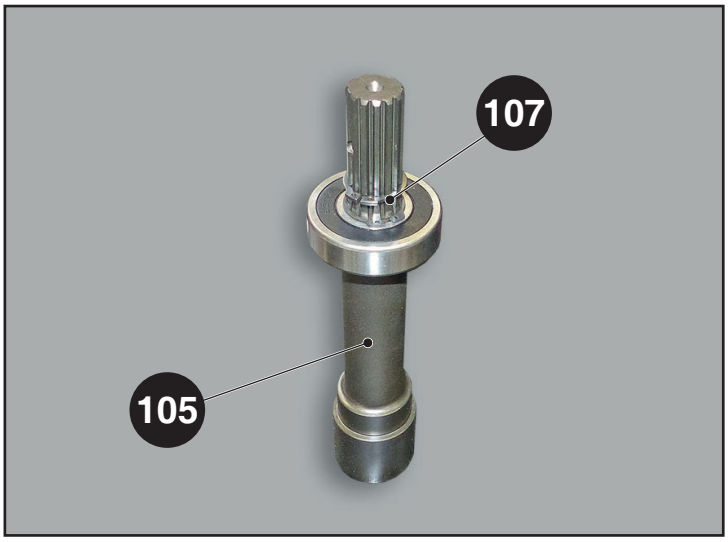


Fig. 6.160

Apply a coat of grease inside the knuckle cylinder (48).



Fig. 6.161

Fit the shaft (105) in the knuckle cylinder (48) and drive it into its seat by tapping it with a rubber mallet.

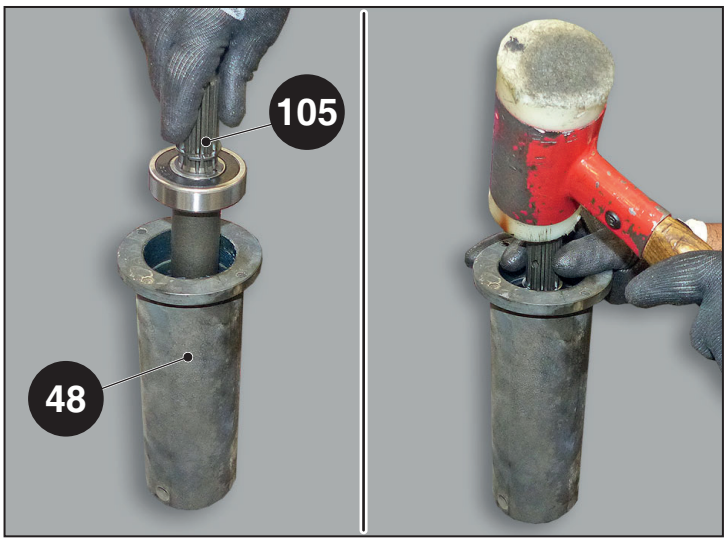


Fig. 6.162

Fit the circlip (108) inside the knuckle cylinder (48).

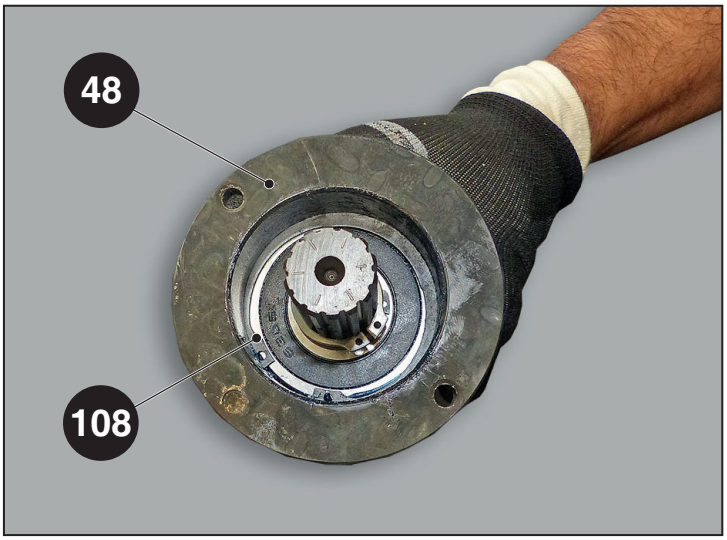


Fig. 6.163

Insert the complete knuckle cylinder (48) on the flange (69). To insert the knuckle cylinder (48) completely, turn the shaft (105) and key it on the front primary shaft.

Note

The notch on the cylinder collar (48) must be aligned vertically with the notch on the forecarriage coupling flange (69), thus allowing the correct alignment with the retainer grub screws.

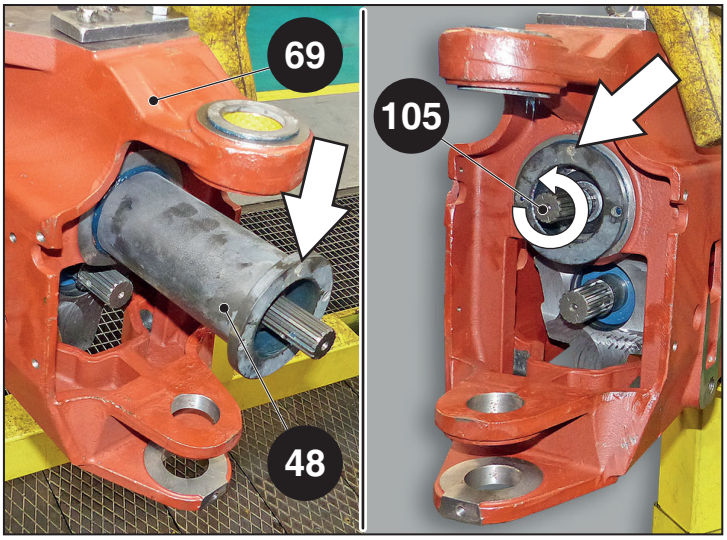


Fig. 6.164

Tighten the swing end stop grub screw (41) until it is flush with the nut (40) and tighten the nut (40). Apply a tightening torque of 100 Nm (10 kgm) to secure the check nut. Carry out this step on both sides of the tractor.

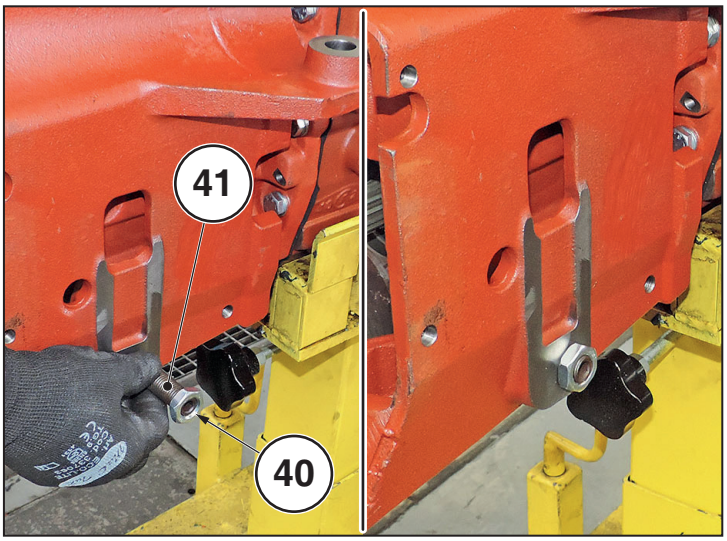


Fig. 6.165

Note

Bear in mind the difference between the grub screws.

The nuts (44) of the front side grub screws are shorter than the nuts (45) for the rear side grub screws.

The rear side grub screws (47) have a flat head.



Fig. 6.166

Tighten the front side grub screw (46) to the end and then the check nut (44).

Tighten the rear side grub screw (47) to the end and then the check nut (45).

Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Carry out these steps on both sides of the tractor.

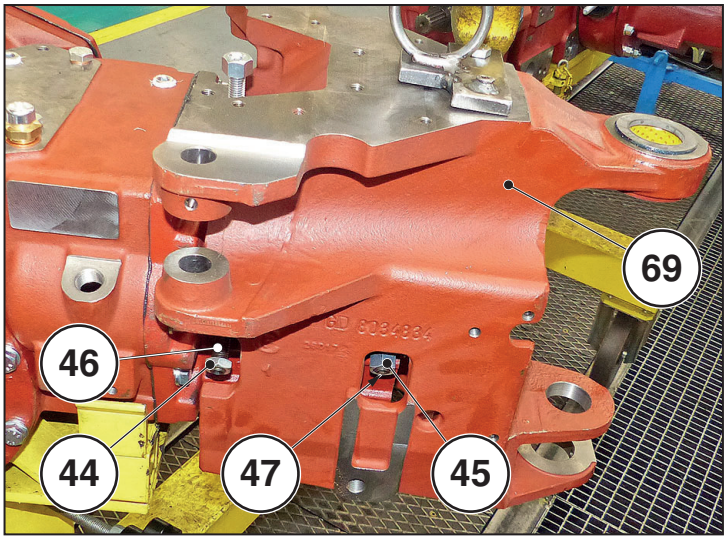


Fig. 6.167

Tighten the grub screw (43) to the end and then the check nut (42). Apply a tightening torque of 85 Nm (8.5 kgm) to secure the check nuts.

Warning

Make sure that the grub screw (43) is completely fit on the knuckle cylinder (48, see figure 6.164).

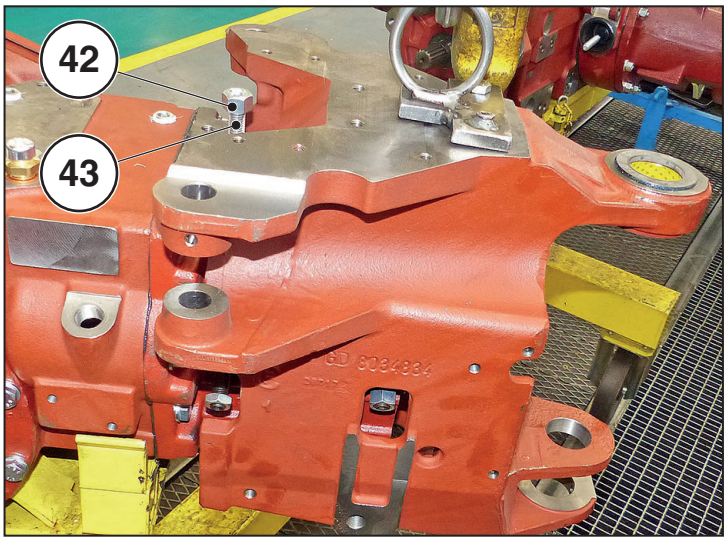


Fig. 6.168

Insert the bush (70) on the lower hole of the rear flange (68), driving it into its seat with a punch tool of suitable diameter.

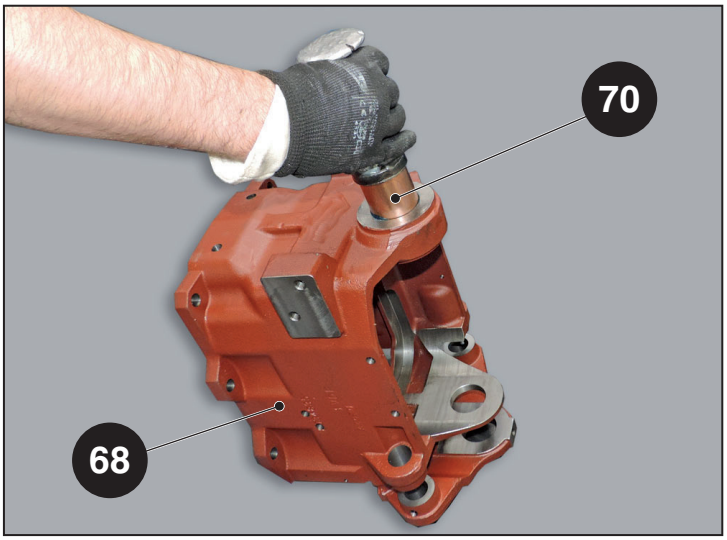


Fig. 6.169

Secure the front flange (68) to a suitable hoist and then mount it on the front flange (69).

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

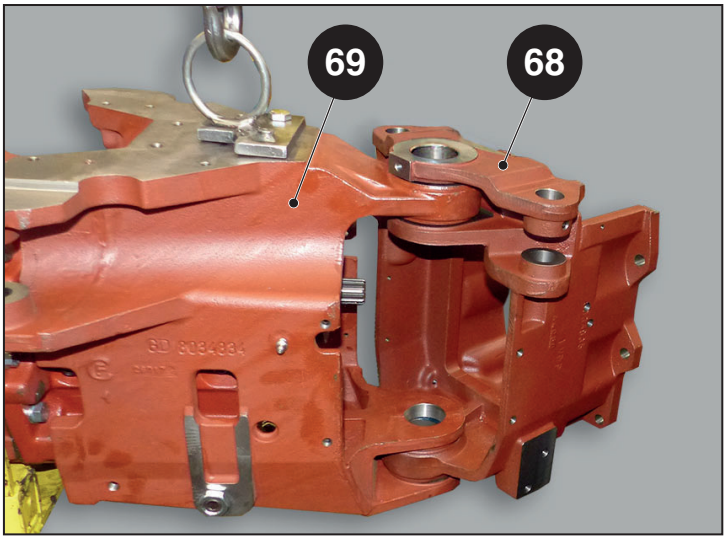


Fig. 6.170

Screw the lubricators on the pins (71).

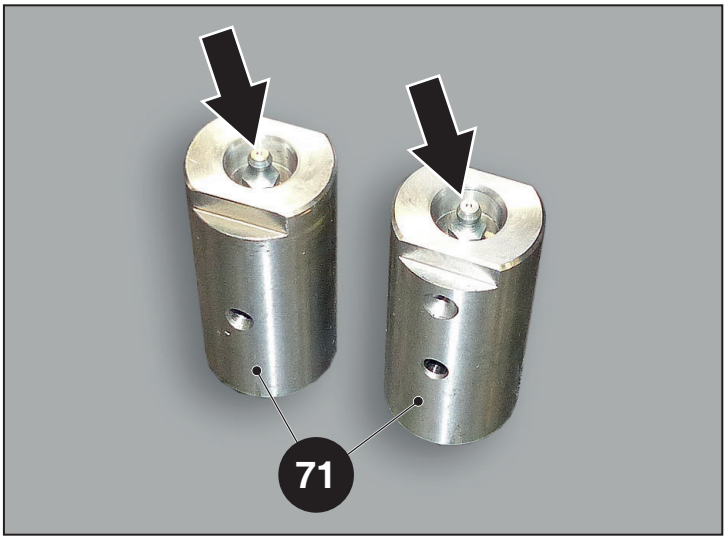


Fig. 6.171

Grease the knuckle pin (71) and then insert it on the knuckle flanges. Align the hole on the knuckle pin (71) with the hole on the rear flange (68).

Tighten the retainer grub screw (65) to the end and then the check nut (66).

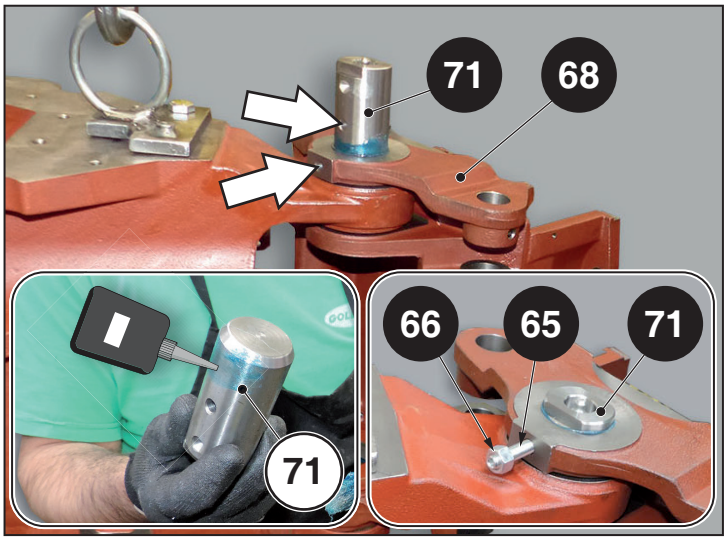


Fig. 6.172

Grease the knuckle pin (71) and then insert it on the knuckle flanges. Align the hole on the knuckle pin (71) with the hole on the front flange (69).

Tighten the retainer grub screw (65) to the end and then the check nut (66).

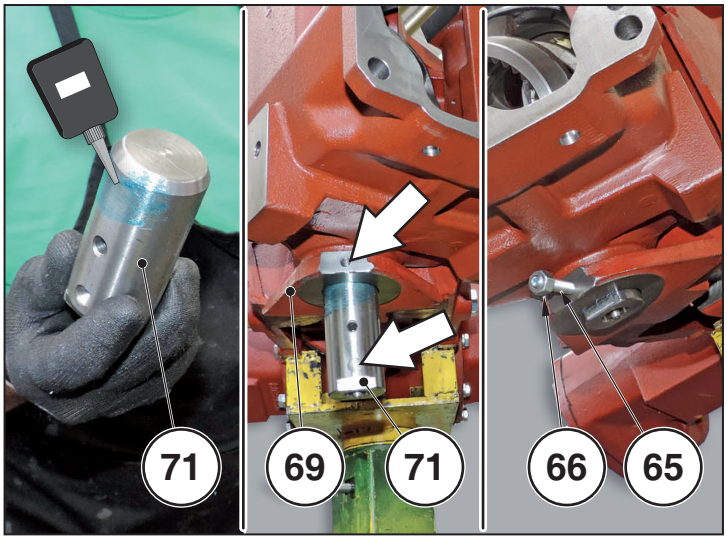


Fig. 6.173

Turn the shaft (105) and the bevel pinion (109) so that the holes for the pins are horizontal so as to facilitate subsequent reassembly.

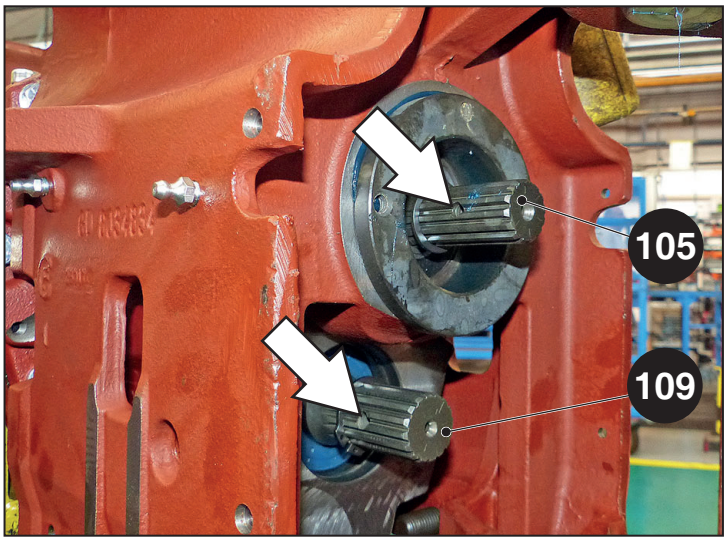


Fig. 6.174

Key the lower joint (28) on the front bevel pinion positioning it with the holes aligned. Fit the pin (27) to secure the joint (28).

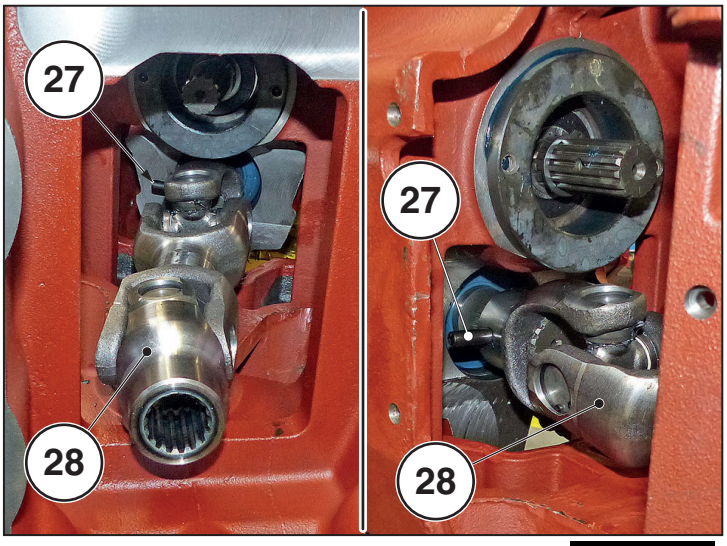


Fig. 6.175

Key the upper joint (110) on the shaft (105) positioning it with the holes aligned. Fit the pin (111) to secure the joint (110).

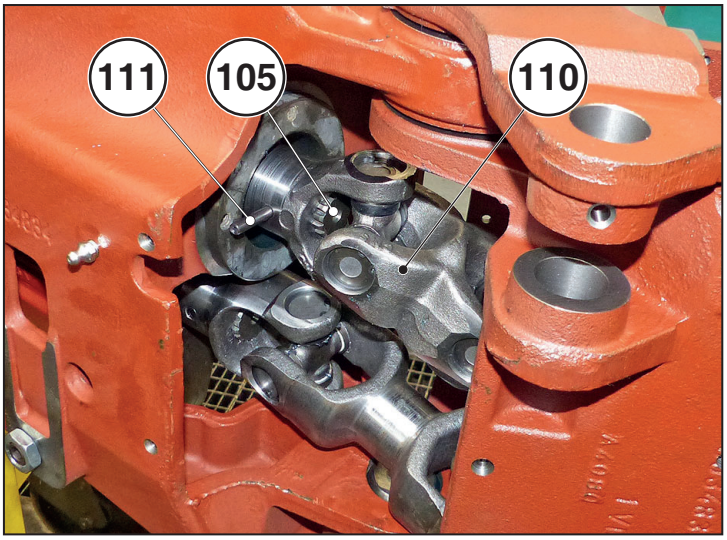


Fig. 6.176

Apply a coat of grease to the primary shaft and to the rear bevel pinion.

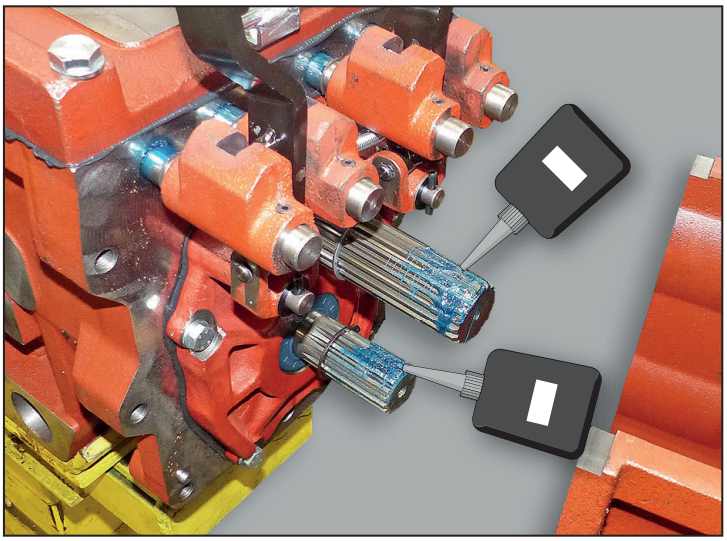


Fig. 6.177

Join the gearbox assembly with the central body. During the process, key the parts in the following order:

- upper joint (110) on the rear primary shaft (95);
- lower joint (28) on the rear bevel pinion.

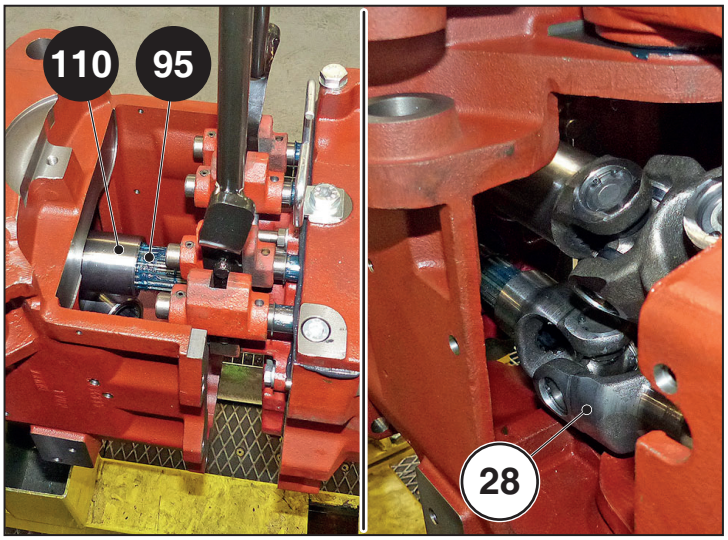


Fig. 6.178

Tighten the screws (57) together with the washers (58) to secure the gearbox assembly on the joint. Apply a tightening torque of 90 Nm (9 kgm).

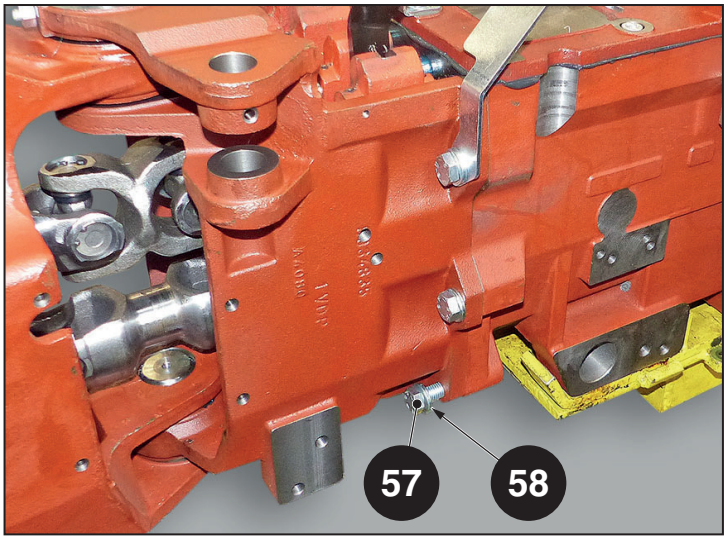


Fig. 6.179

Fit the hydraulic cylinder (98) on the front flange (69). Fit the pin (62) and align the holes. Fasten the pin (62) with the pin (61).

Repeat the operation on the opposite side of the tractor for the remaining hydraulic cylinder.

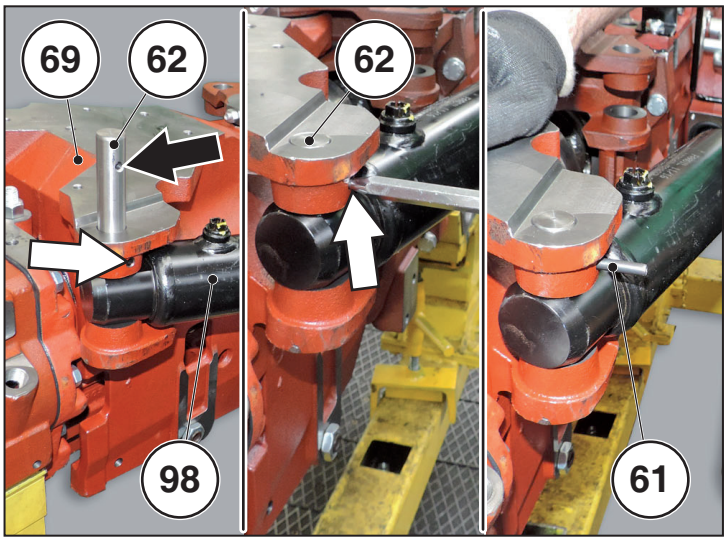


Fig. 6.180

Fit the pin (63) by aligning the holes to secure the hydraulic cylinder (98) on the rear flange (68). Fasten the pin (63) with the pin (61).

Repeat the operation on the opposite side of the tractor for the remaining hydraulic cylinder.

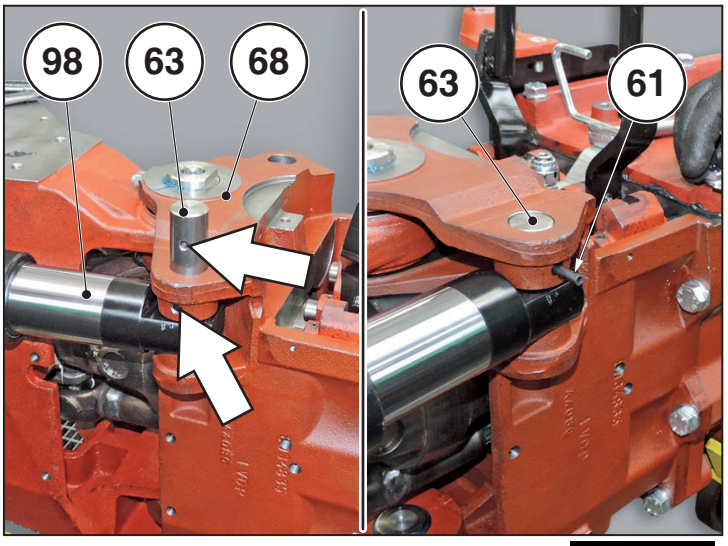


Fig. 6.181

Secure the footboard mounts (99) and (100) on both sides of the rear flange with the screws (101) and washers (102).

Warning
Tighten the screw (103) in the upper hole of the right mount (99).

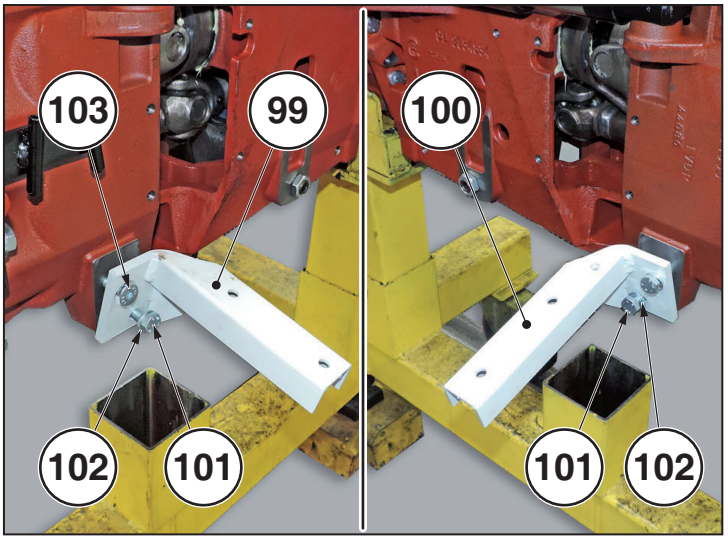


Fig. 6.182

Continue the reassembly operations by following the preliminary operations in reverse order.

Section 6 : Tightening specifications

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6.1 Tightening specifications

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	100	10
Central body - gearbox casing fastener screw	90	9

Section 7 : Tools necessary

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7.1 Tools necessary

p/n	Description	Quantity
A.p/n _____	Special press for bush fitting	1

Chapter 7 : Rear final drive units

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6.1 Tools necessary 7-30

Section 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.

Section 2 : General introduction

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2.1 Assembly drawing for reduction gear cover

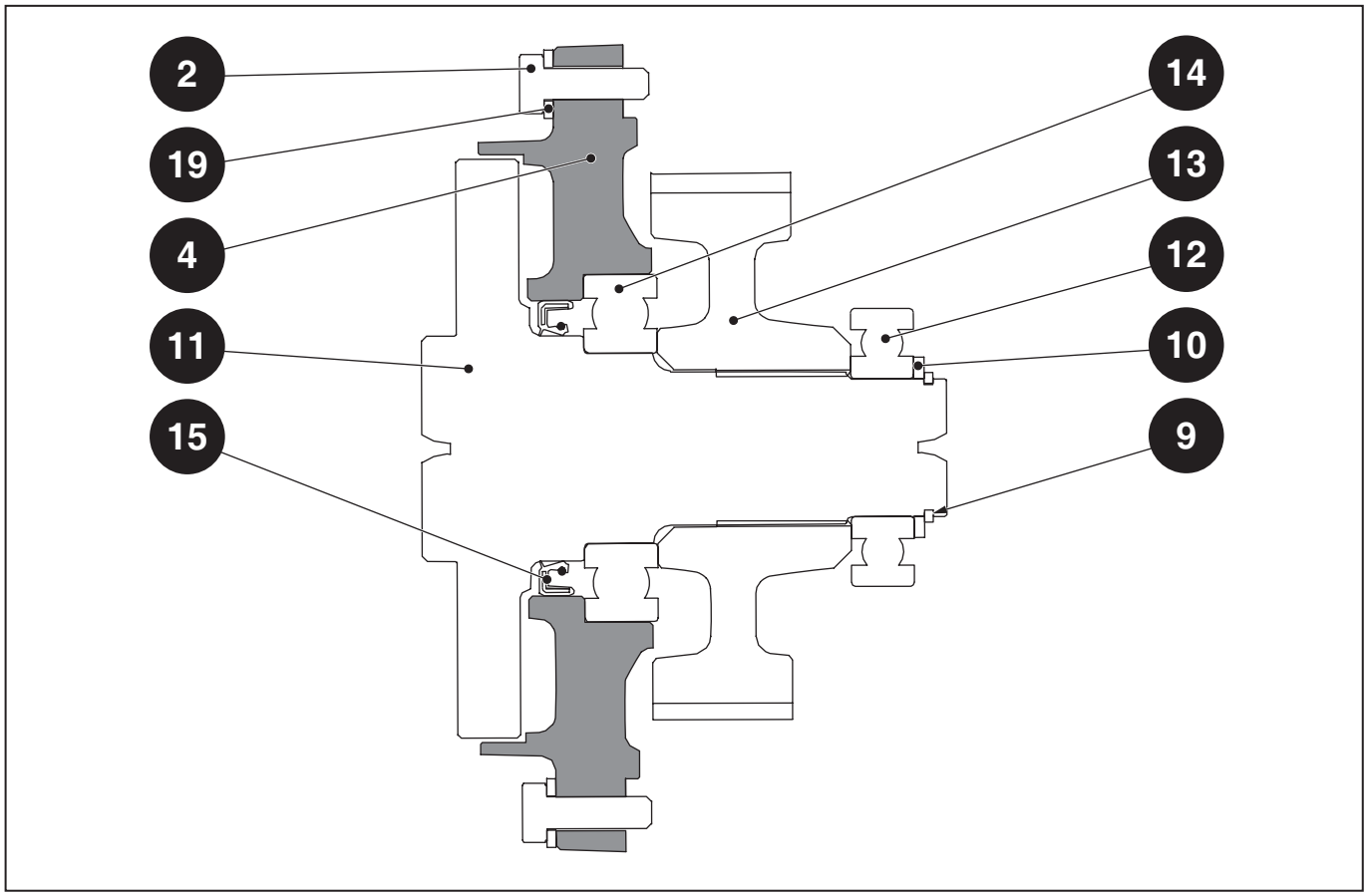


Fig. 7.1

2 - Screw
4 - Reduction gear cover
9 - Circlip
10 - Spacer
11 - Half-axle
12 - Bearing
13 - Reduction gear
14 - Bearing
15 - Oil seal
19 - Conical washer

Section 3 : Disassembly

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3.1 Preliminary operations

The main operations necessary to access the reduction gears are indicated as follows.

3.1.1 RS Cluster and REV Cluster

Remove the rear lift cock knob.

Remove the protective plate of the rear distributors.

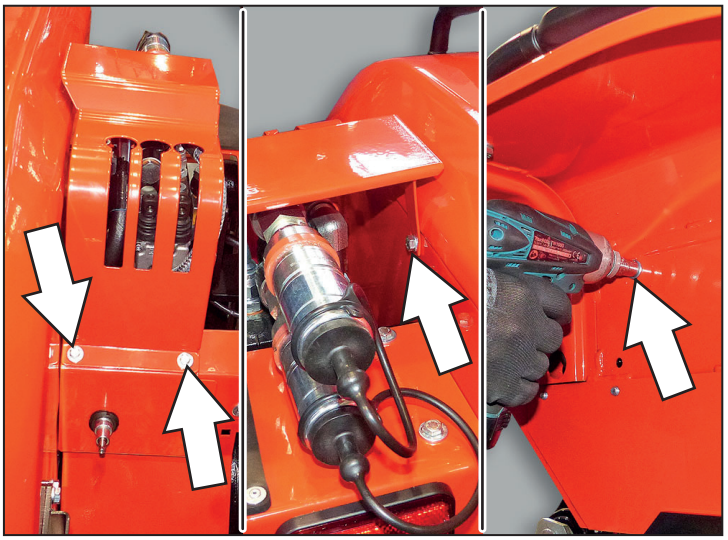


Fig. 7.2

Remove the rear wheels.

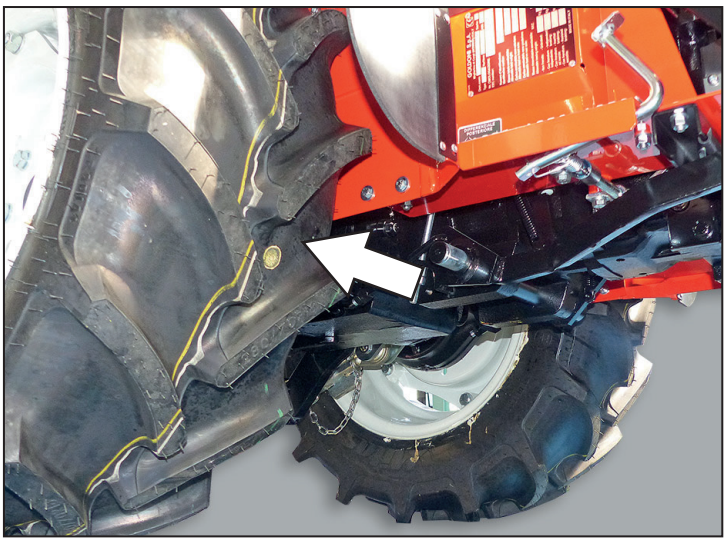


Fig. 7.3

Disconnect the rear light wiring loom.

Unscrew the license plate light and disconnect the wiring loom. Pull out the mudguard wiring loom.

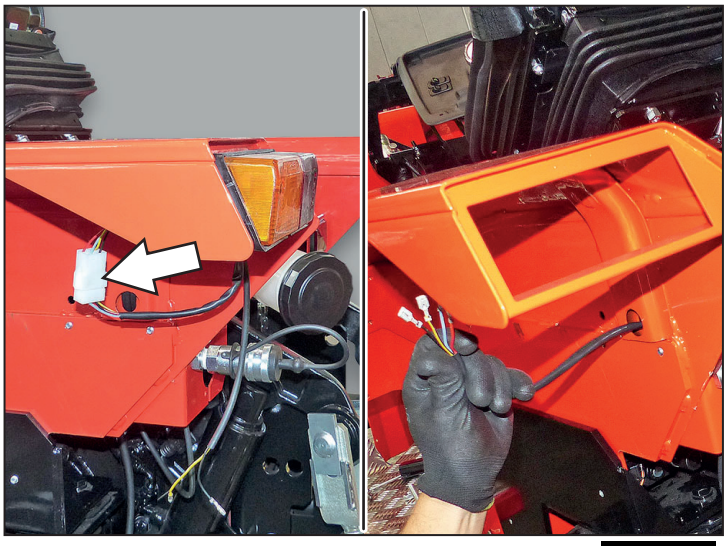


Fig. 7.4

Remove the rear mudguards.

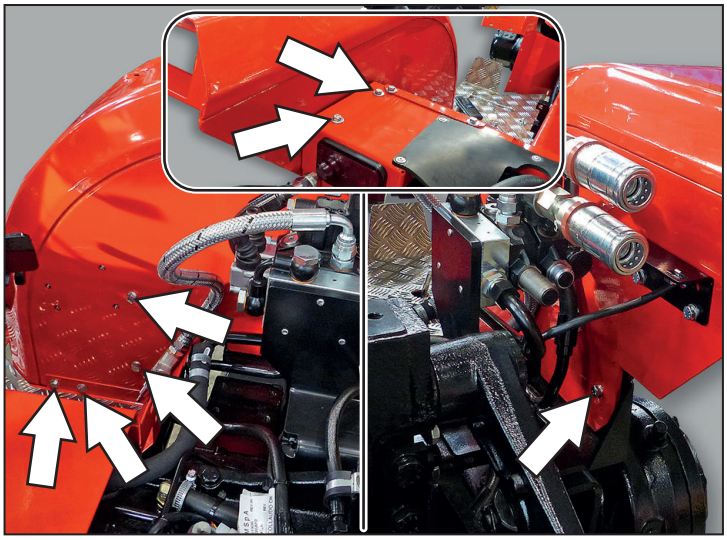


Fig. 7.5

Remove the rear guard.

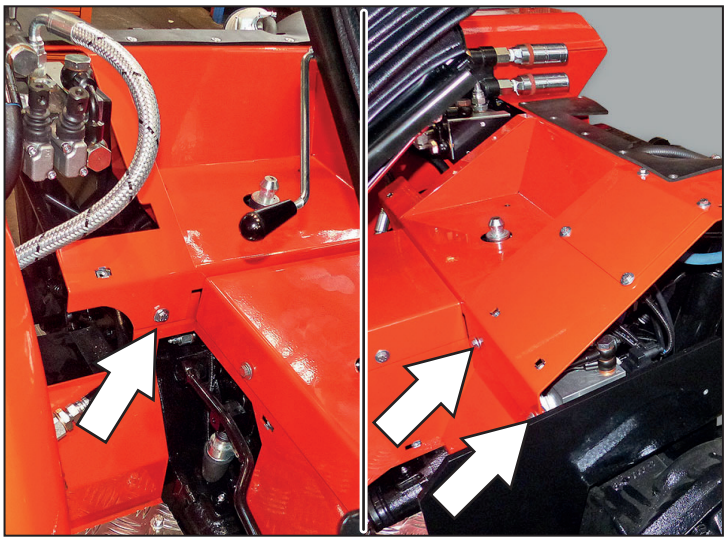


Fig. 7.6

Remove the footboards.

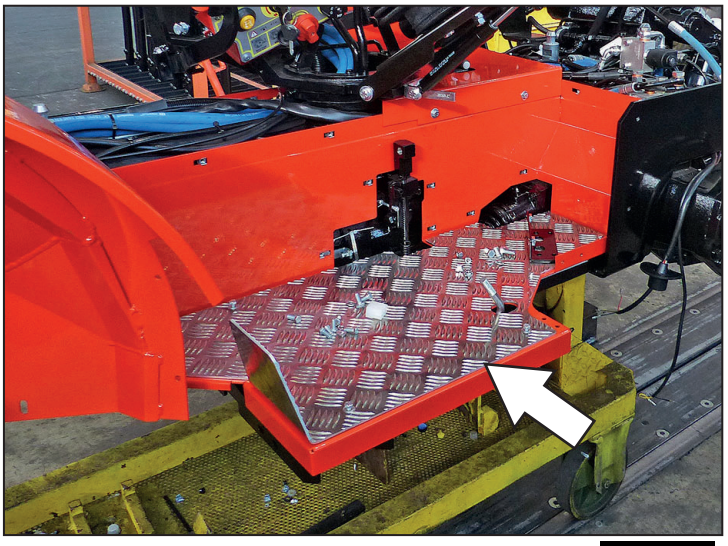


Fig. 7.7

Undo the pipe fittings on the PTO clutch control unit.

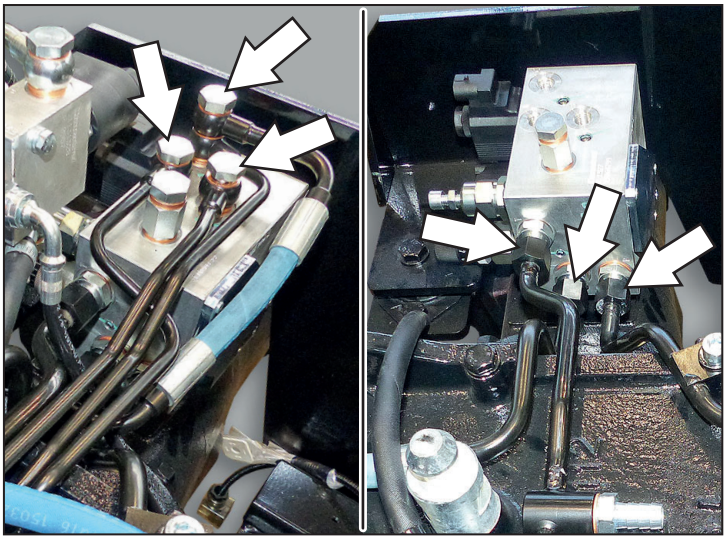


Fig. 7.8

Unscrew the front and fear silent blocks

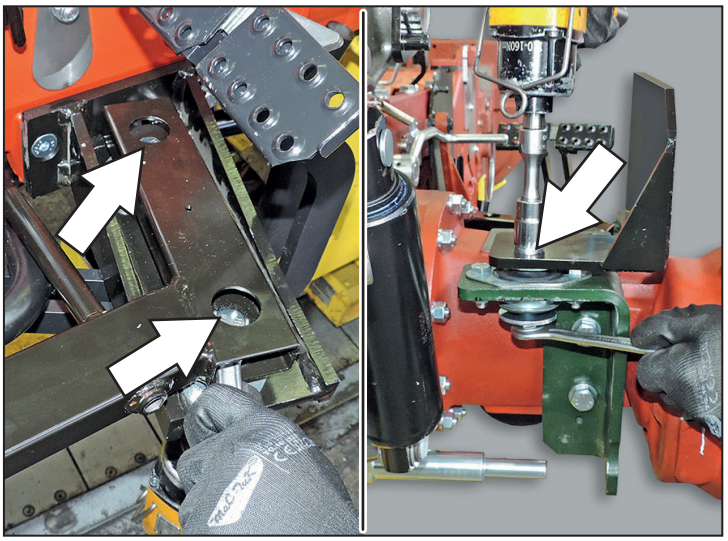


Fig. 7.9

Remove the footboard supports.

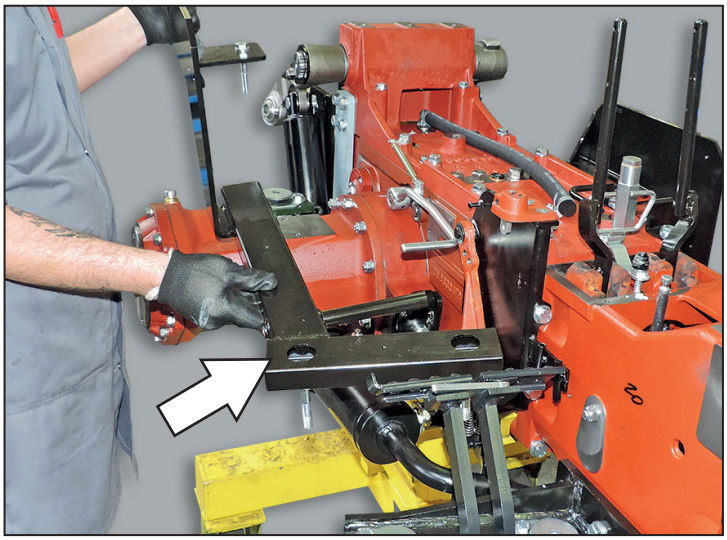


Fig. 7.10

RS Cluster only

Remove the PTO lever sensor bracket (24).

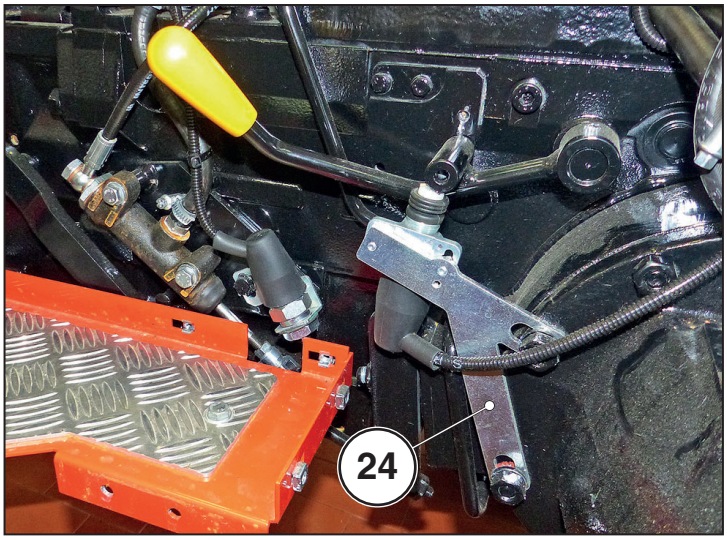


Fig. 7.11

Secure the hub to a suitable hoist.

Attention
Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

Undo the fastener nuts (1) of the hub and pull out the complete hub.

Warning
Some brake discs may come out with the hub.

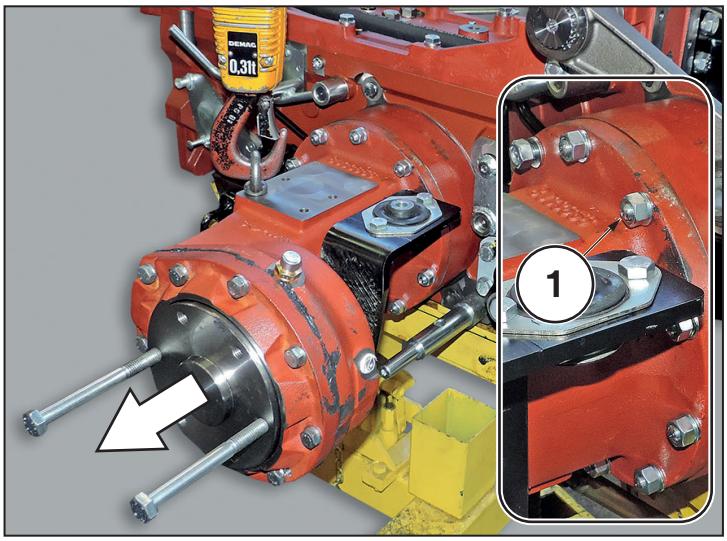


Fig. 7.12

3.1.2 SN Cluster and SN+ Cluster

Remove the guard of the rear distributors.

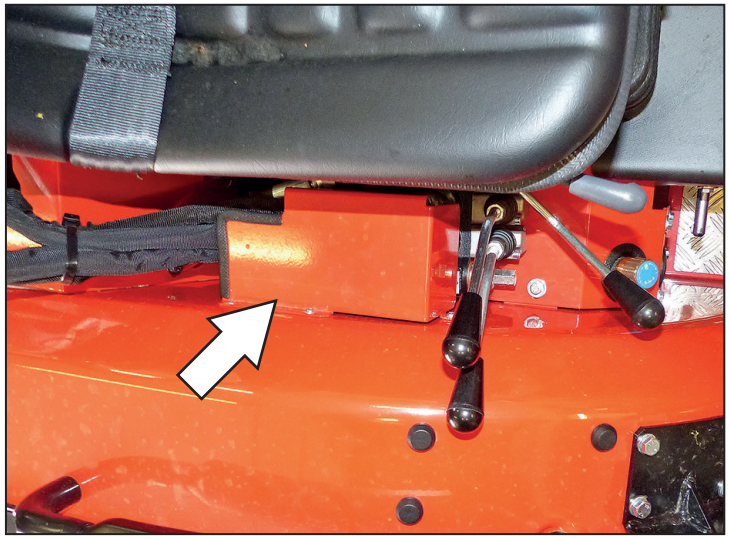


Fig. 7.13

Remove the right lower lateral guard.

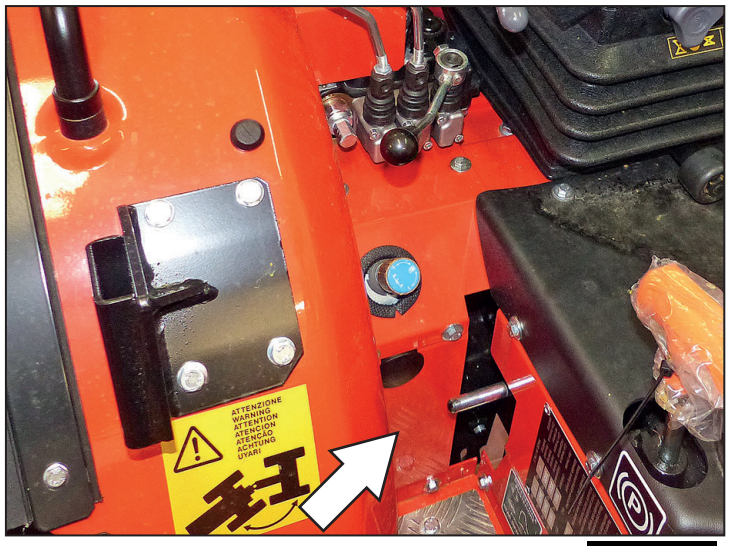


Fig. 7.14

Remove the PTO clutch solenoid valve guard.

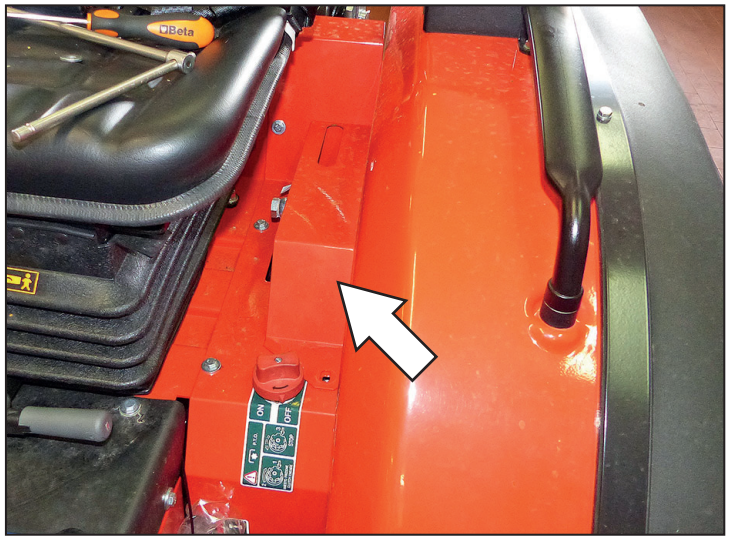


Fig. 7.15

Remove the left lower lateral guard. Disconnect the wiring looms before removing the guard completely.

Warning

Note the position of the connectors to reconnect them correctly during reassembly.

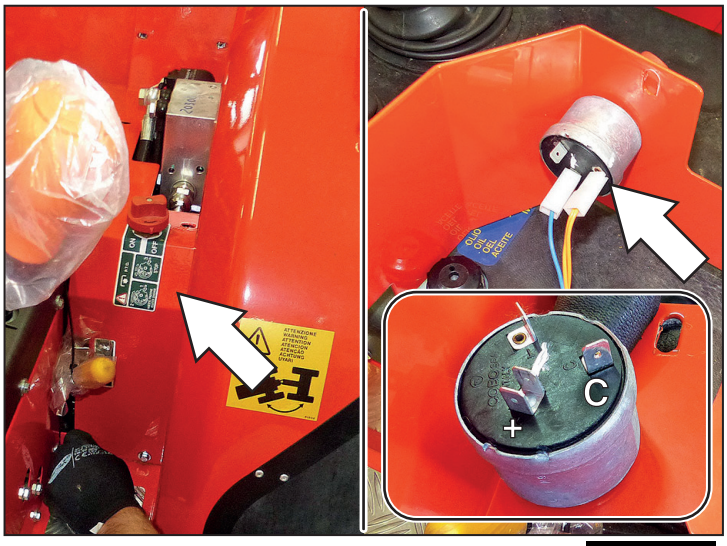


Fig. 7.16

Remove the rear wheels.

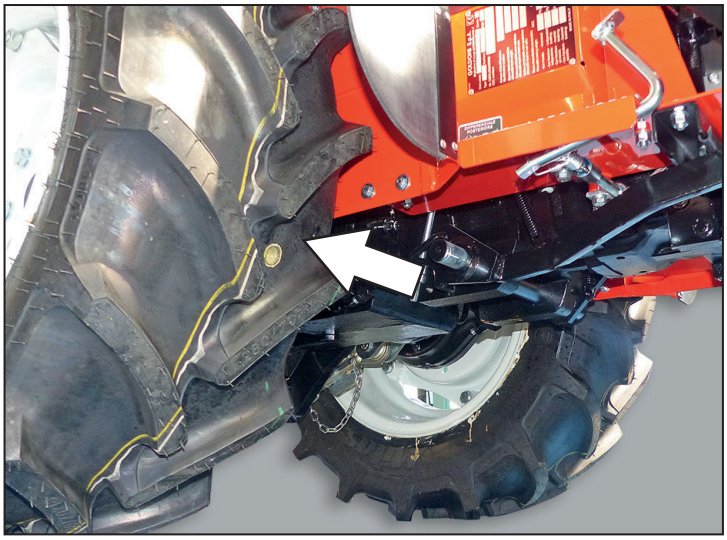


Fig. 7.17

Undo the fastener screws of the PTO clutch solenoid valve.

Undo the fastener screws of the nitrogen accumulator mount.

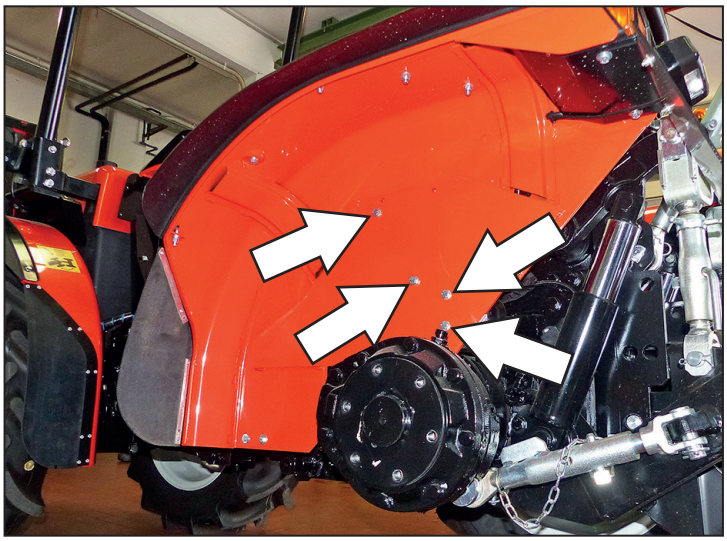


Fig. 7.18

Undo the fastener screws of the mudguard.

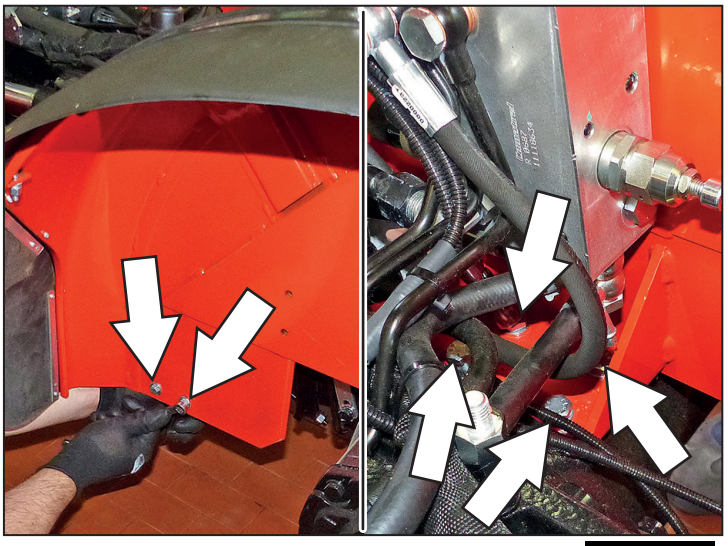


Fig. 7.19

Disconnect the rear light wiring loom.

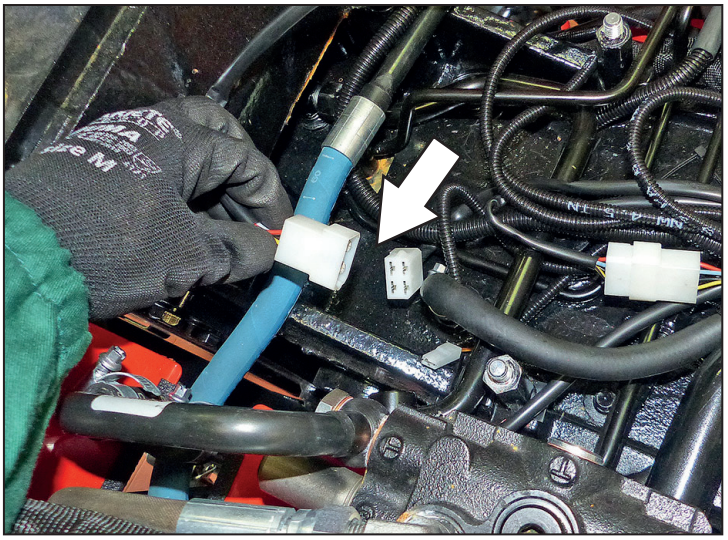


Fig. 7.20

Unscrew the license plate light and disconnect the wiring loom. Pull out the mudguard wiring loom.

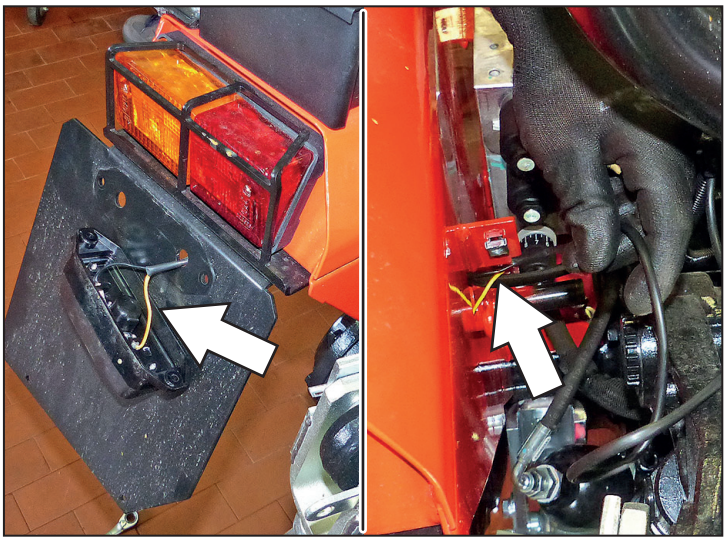


Fig. 7.21

Remove the PTO lever sensor bracket (24).

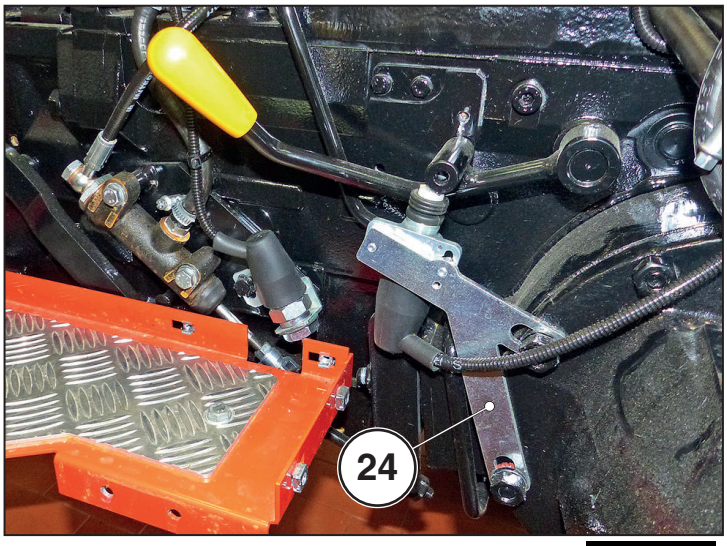


Fig. 7.22

Secure the hub to a suitable hoist.

Attention

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

Undo the fastener nuts (1) of the hub and pull out the complete hub.

Warning

Some brake discs may come out with the hub.

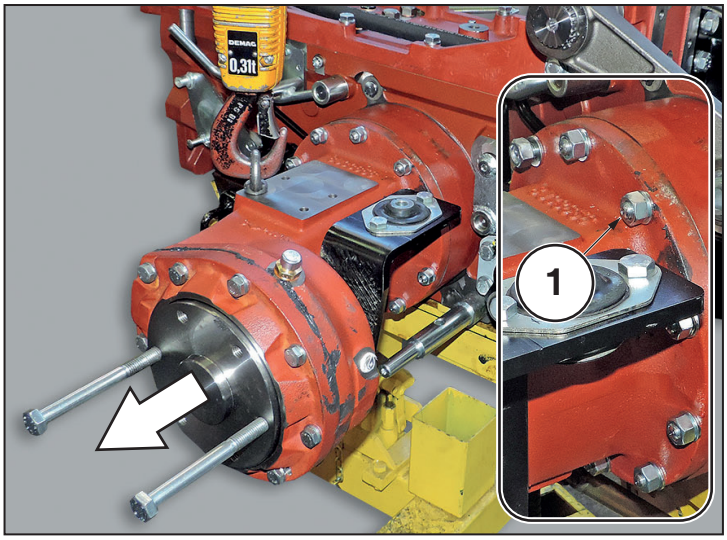


Fig. 7.23

3.2 Disassembly

Attention

The following instructions are applicable for both final drive units.

Undo the fastener screws (2) and (3) of the reduction gear cover (4).

Tighten two jacking screws on the indicated screws and then separate the reduction gear cover (4) from the rest of the assembly.

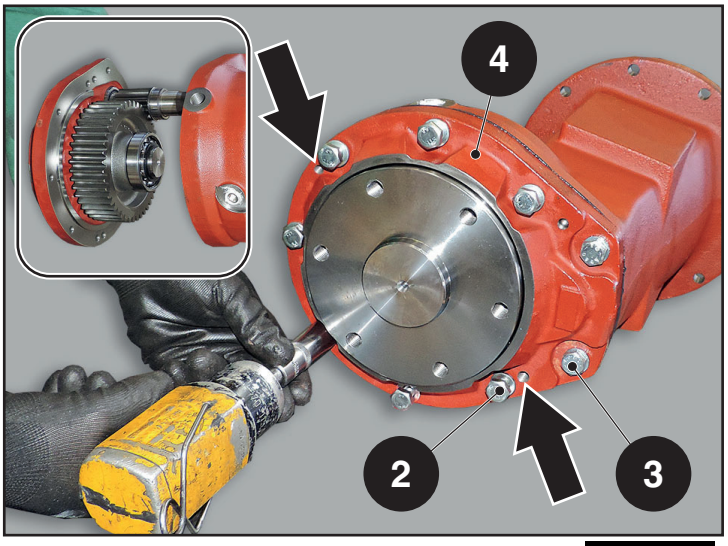


Fig. 7.24

Remove the half-axle pinion (5) from the reduction gear cover.

Disassemble the half-axle (5) by removing the inner bearing races (6) and (7).

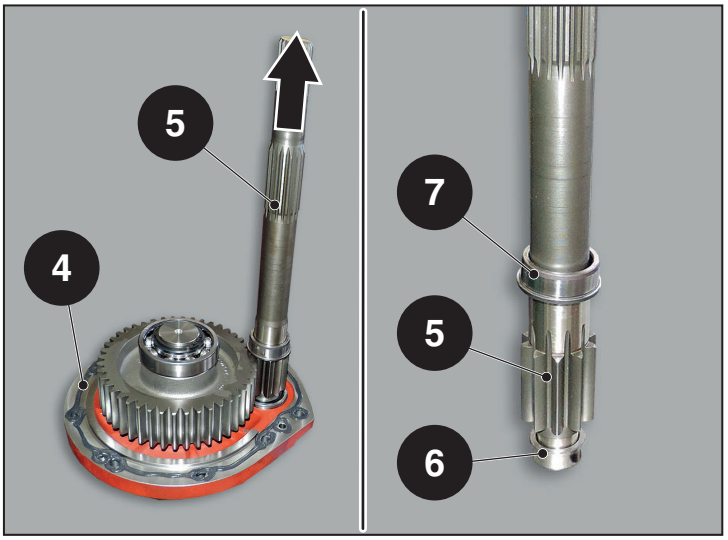


Fig. 7.25

Remove the bearing (7).

Remove oil seal (8).

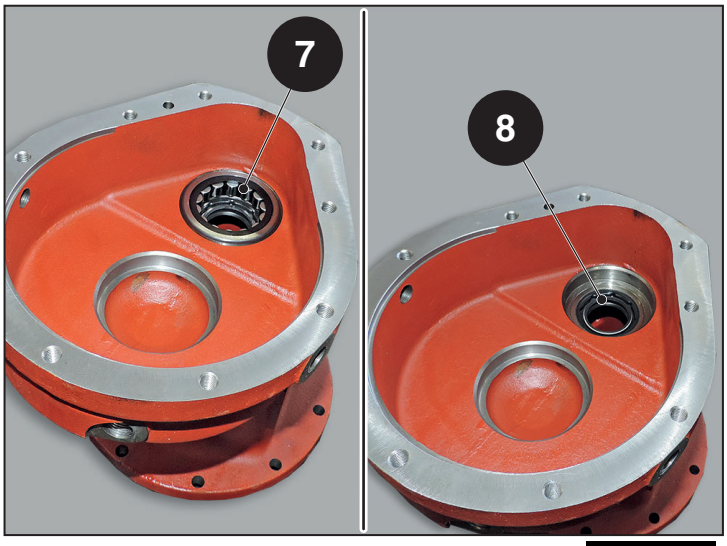


Fig. 7.26

Remove the circlip (9) and the spacer (10) from the half-axle (11).

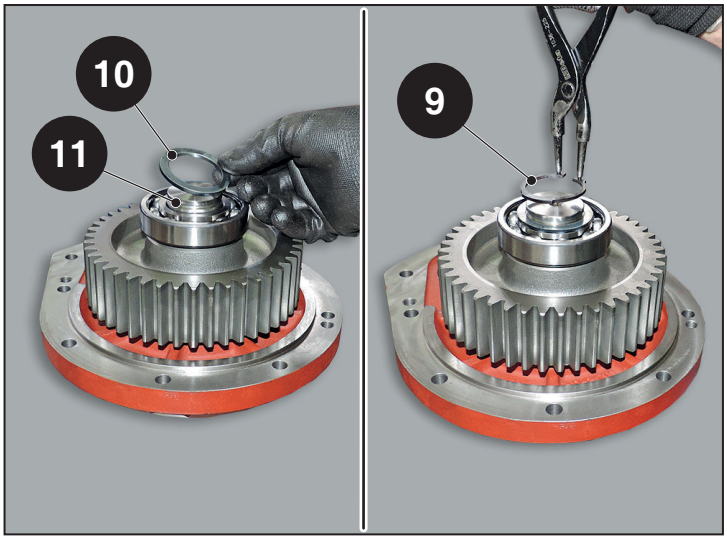


Fig. 7.27

Remove the bearing (12) and the reduction gear (13) from half-axle (11).

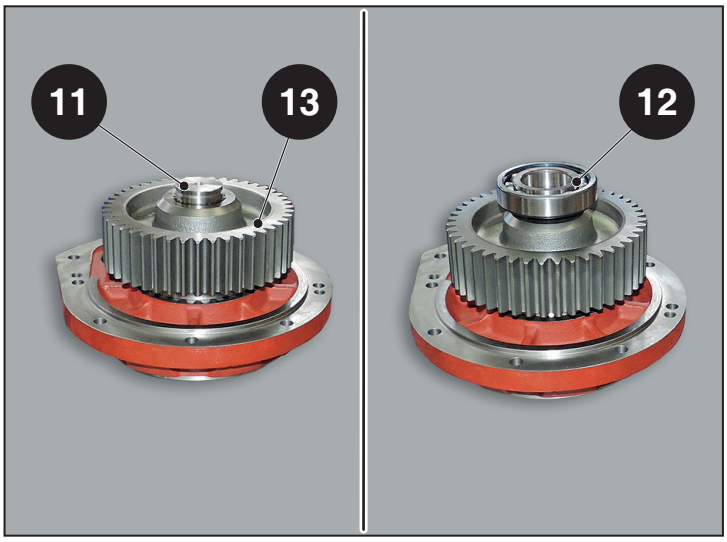


Fig. 7.28

Remove the half-axle (11) from the reduction gear cover (4) and remove the bearing (14).

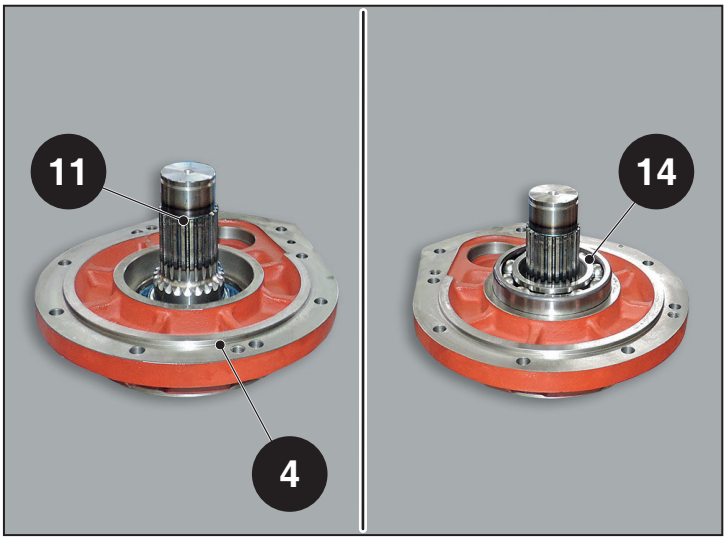


Fig. 7.29

Remove the bearing (6) form the reduction gear cover (4).

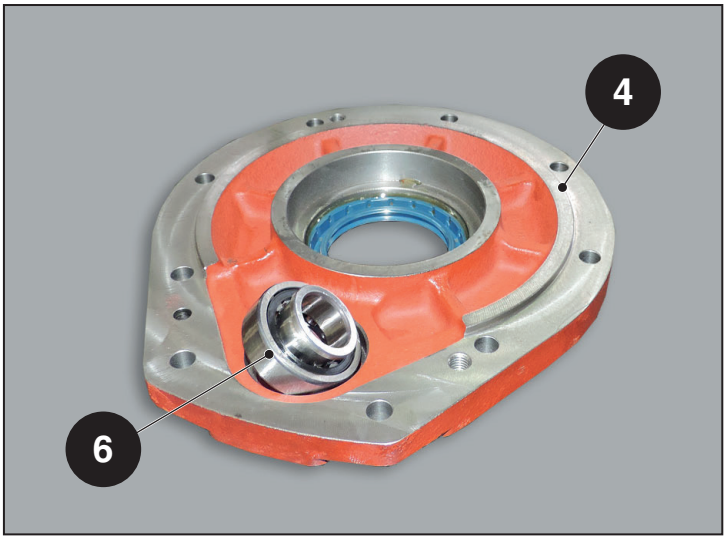


Fig. 7.30

Remove oil seal (15) from the reduction gear cover (4).

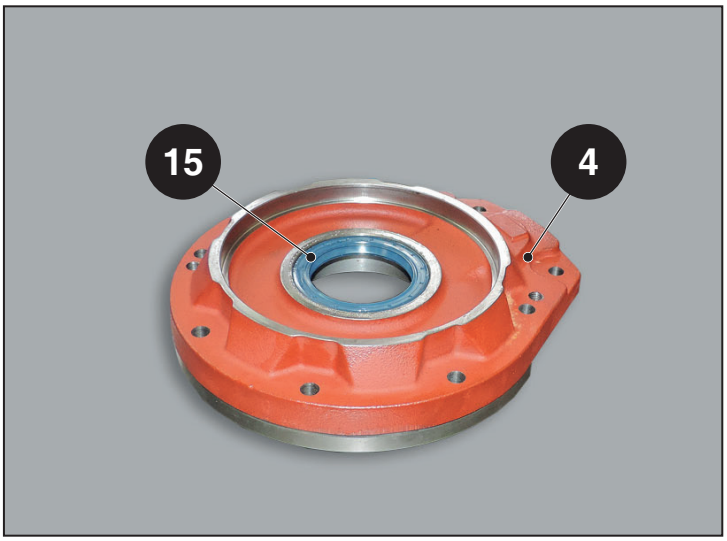


Fig. 7.31

Section 4 : Main inspection, reassembly and adjustment procedures

Index

4.1 Main inspection, reassembly and adjustment procedures 7-18
4.1.1 Refitting 7-24

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".

Lubricate the seat on the reduction gear cover (4), then fit the oil seal (15) and drive it in seat with a press.

Apply a coating of grease on the oil seal (15).

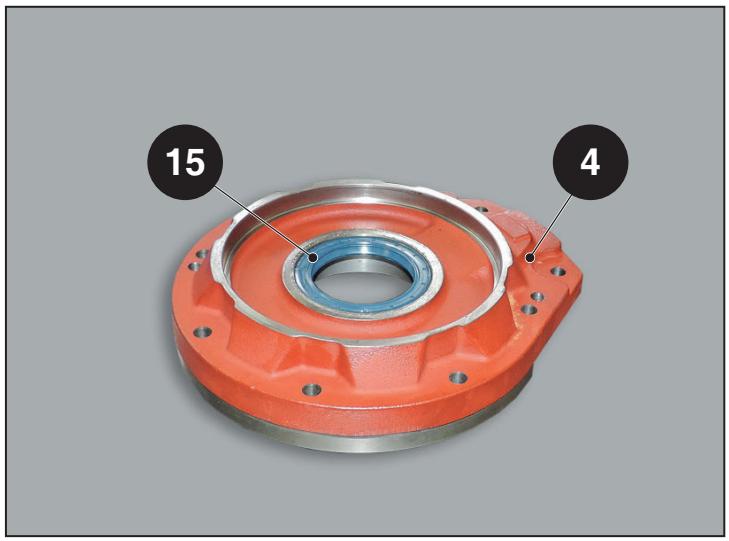


Fig. 7.32

Fit the bearing (6) on the reduction gear cover (4) and drive it in with a suitable punch.

Warning

Position the bearing (6) so that the inner race can be pulled out as shown in the figure.

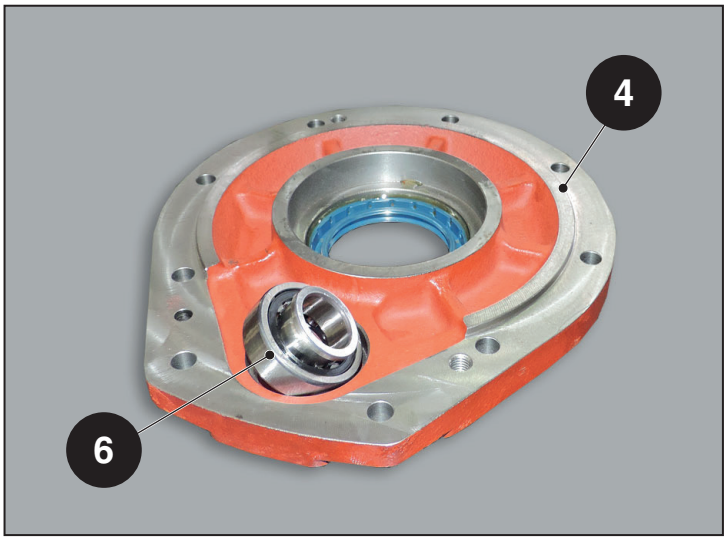


Fig. 7.33

Fit the half-axle (11) in the reduction gear cover (4).

Fit the bearing (14) on the half-axle (11) and drive it in with a press.

Warning

Clean the half-axle (11) before inserting it on the reduction gear cover (4).

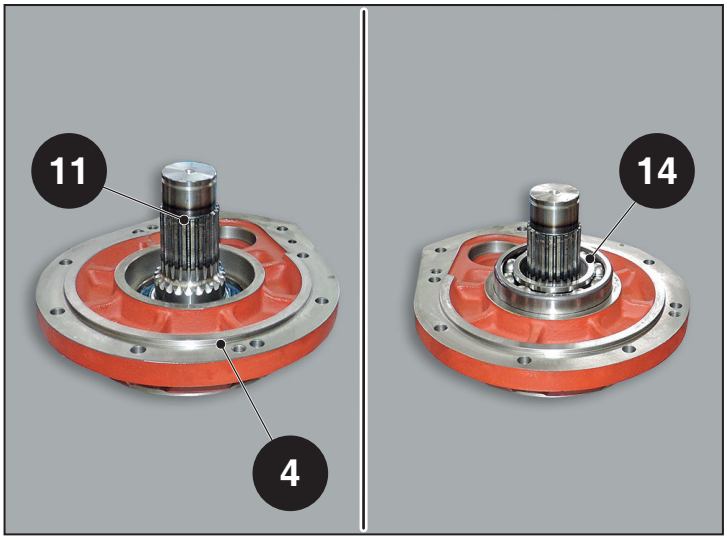


Fig. 7.34

Key the reduction gear (13) on the half-axle (11), making sure to position the protruding part facing up (toward the gearbox casing).

Fit the bearing (12) on the half-axle (11).

Drive assembled parts in using a press.

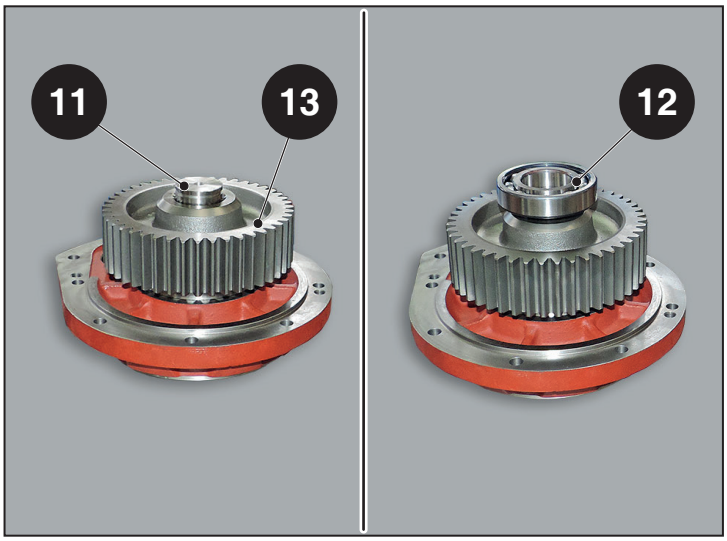


Fig. 7.35

Fit the spacer (10).

Fit the circlip (9) on the groove of the half-axle (11) to secure all the components in place.

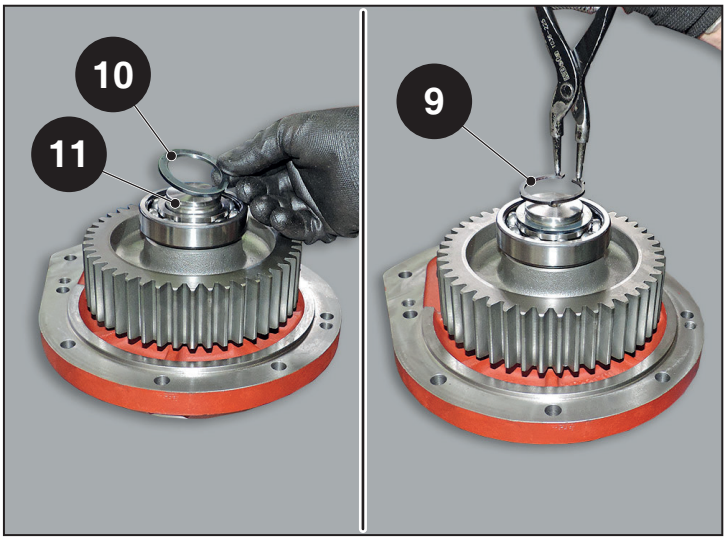


Fig. 7.36

Lubricate the seat and then insert the oil seal (8).

Warning

Position the oil seal (8) with the notches facing up (toward the reduction gear cover).

Make sure that the springs of the oil seal (8) do not fall off during assembly.

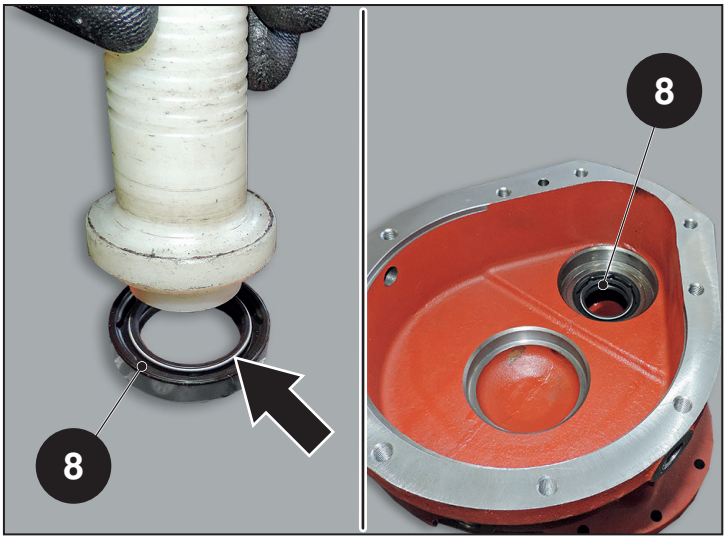


Fig. 7.37

Insert the bearing (7).

Warning

Position the bearing (7) so that the inner race can be pulled out.

Pull out the inner race (7A).

Punch a dot in the guard around the bearing (7) to prevent the bearing from coming out by accident.

Warning

Turn the hub upside down and shake it and make sure that the bearing (7) stays firmly in place.

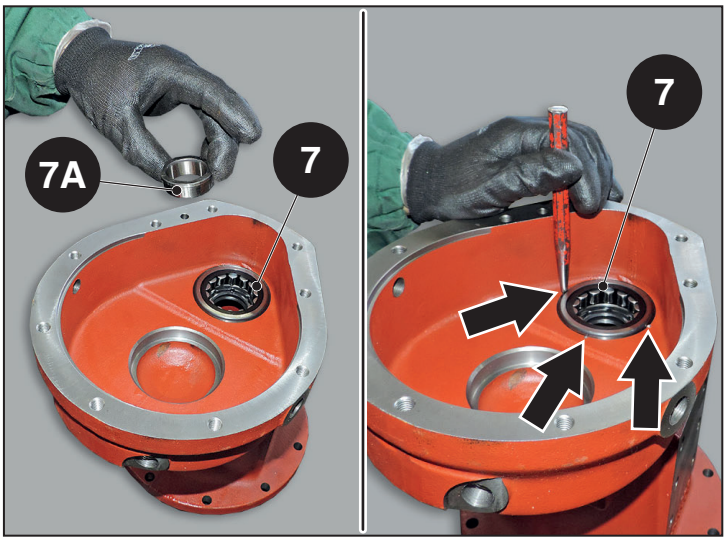


Fig. 7.38

Tighten the drain plug (16) and the oil filling plug (17).

Warning
Apply a coat of TEFLON on the plugs.

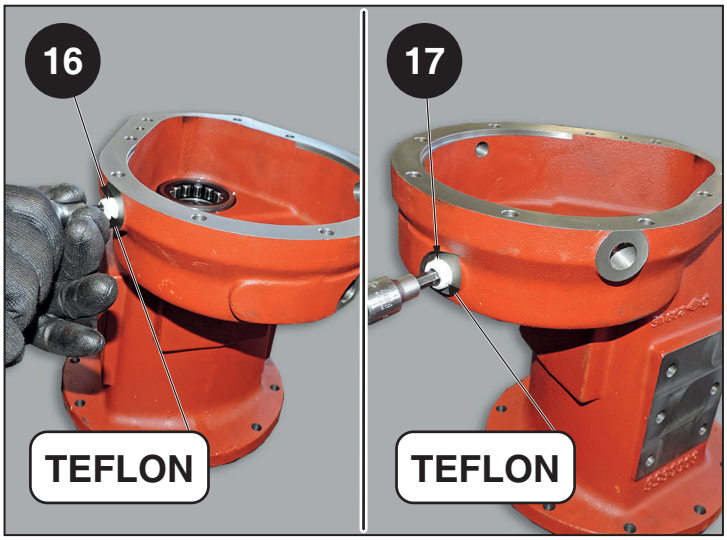


Fig. 7.39

Pull out the inner race from the bearing (6) fit on the reduction gear cover.

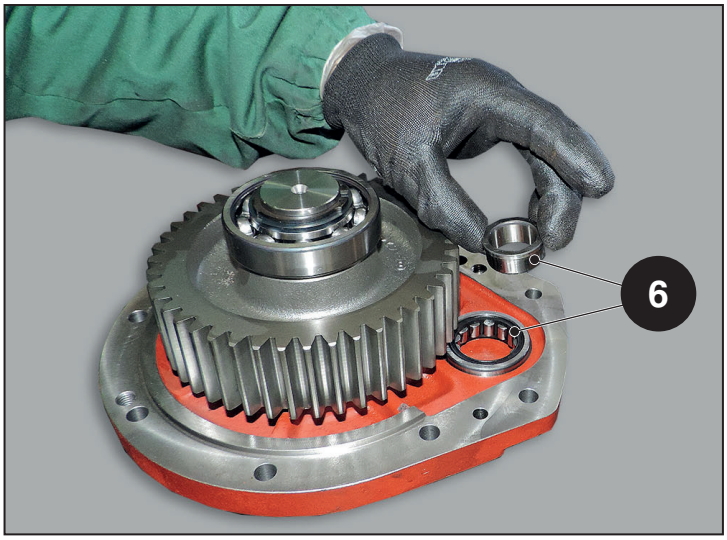


Fig. 7.40

Fit the inner races of the bearings (6) and (7) on the half-axle pinion (5). Drive them in using a suitable punch tool.

Warning
The inner races are to be fit with the beat facing the toothed part of the half-axle pinion (5).

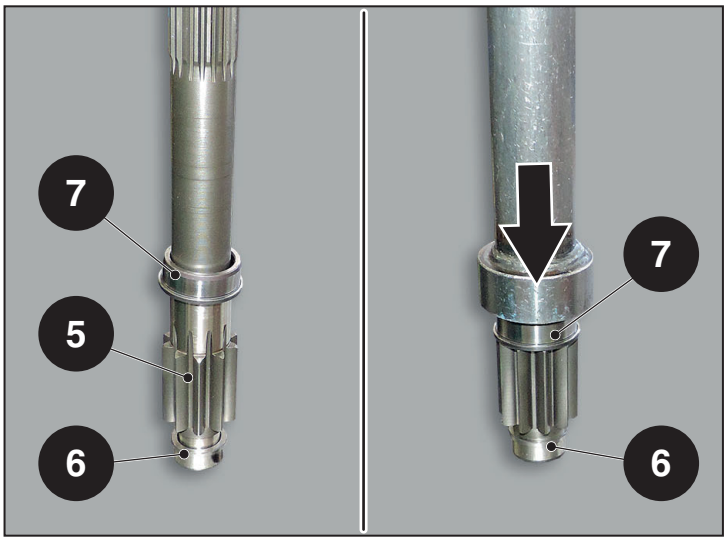


Fig. 7.41

Apply a layer of silicone sealant on the mating surface of the reduction gear cover (4).

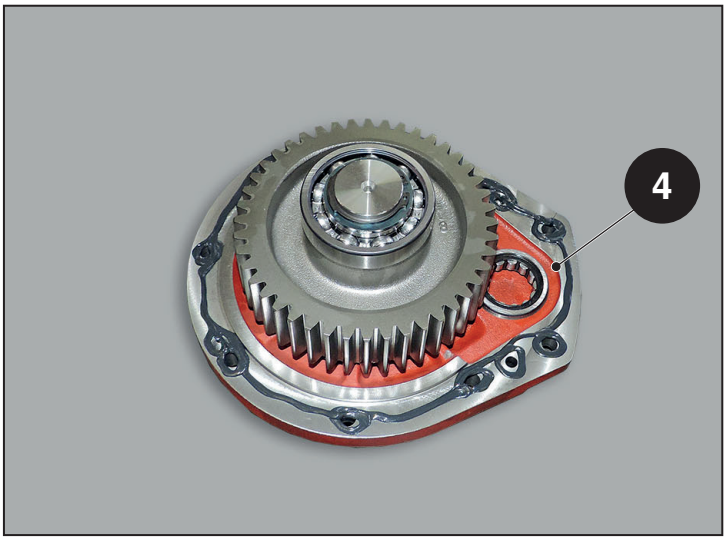


Fig. 7.42

Fit the half-axle pinion (5) on the casing cover by inserting it in the bearing (6) and driving it in to the end.

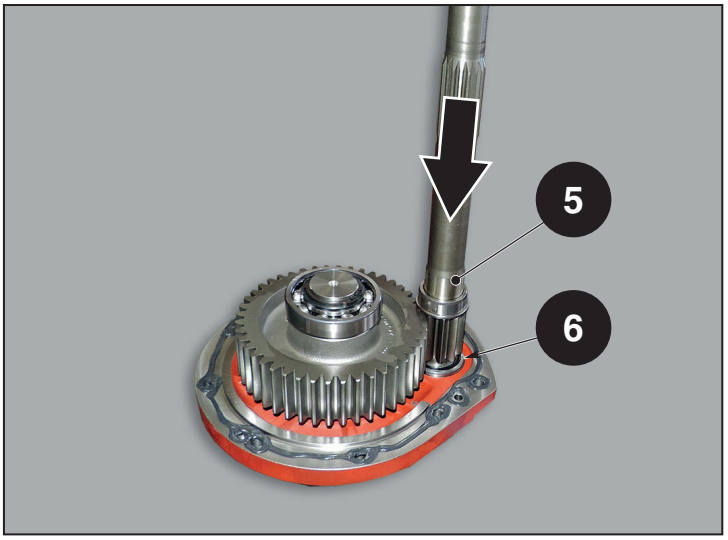


Fig. 7.43

Position a guide tool of suitable diameter on the half-axle pinion (5).

Secure the hub to a suitable hoist using the special tool (A-p/n _____).

Attention

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

Sink the hub on the reduction gear cover (4) and then join the assemblies.

Warning

Make sure that the bearing (7, shown in figure 7.38) stays fixed in place during the operation.

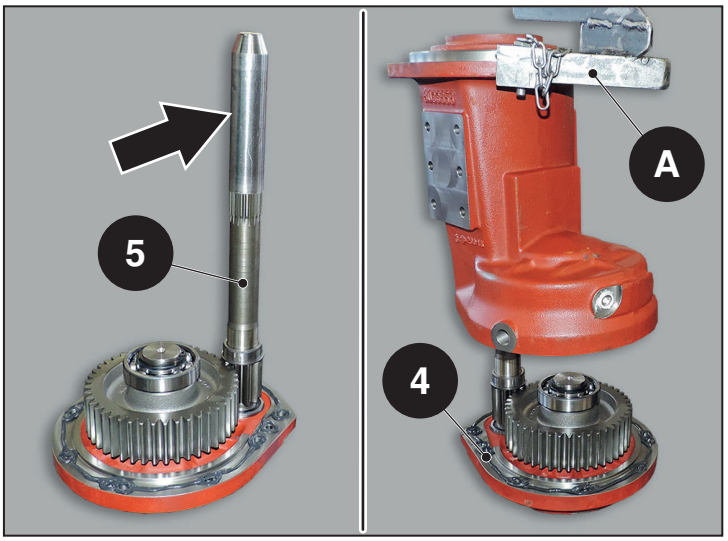


Fig. 7.44

Tap with a rubber mallet to set the assemblies together.

Rotate the half-axle pinion (5) to centre the reduction gear cover (4).

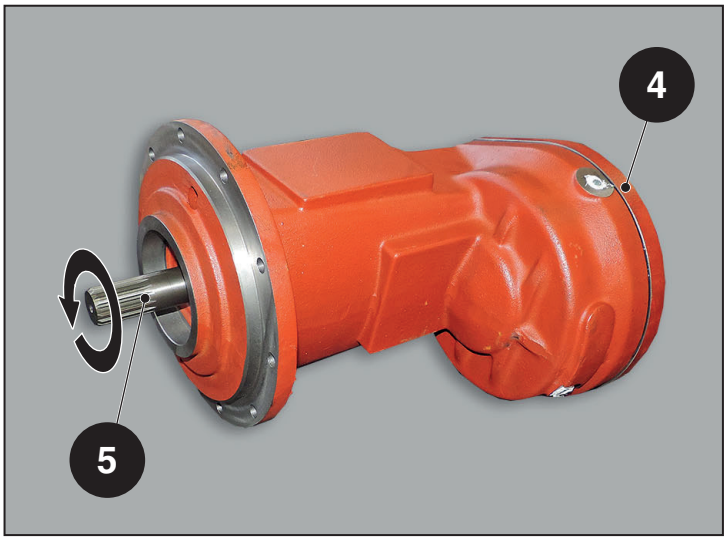


Fig. 7.45

Insert the alignment stud (18) fully.

Tighten the screws (3) with the conical washers (19). Apply a tightening torque of 60 Nm (6 kgm).

Tighten the screws (2) with the conical washers (19) to complete fastening the cover. Tighten the screws (2) crosswise. Apply a tightening torque of 60 Nm (6 kgm).

Note

The screws (3) are shorter than the reduction gear fastener screws (2).

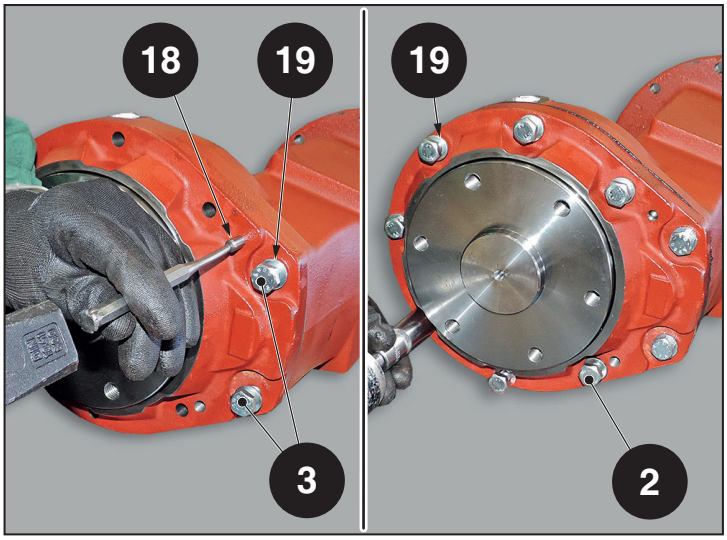


Fig. 7.46

Check the rolling of the half-axle pinion (5) and half-axle (11).

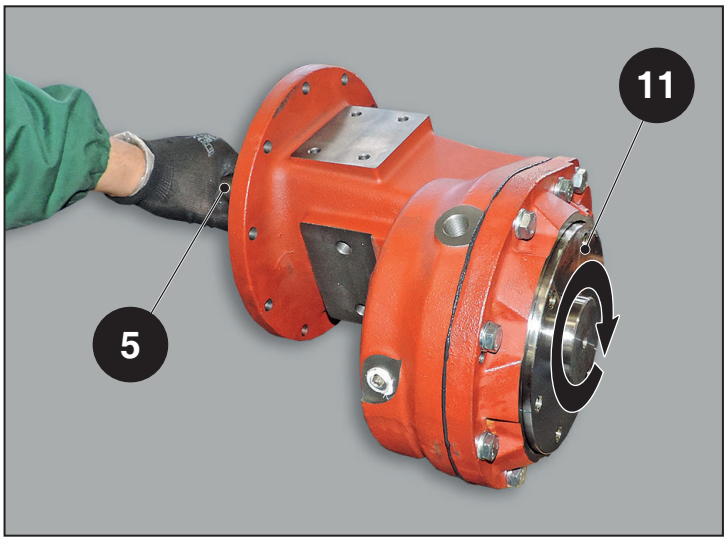


Fig. 7.47

4.1.1 Refitting

> **Warning**
>
> Fit the O-ring (20) on the stud bolt.

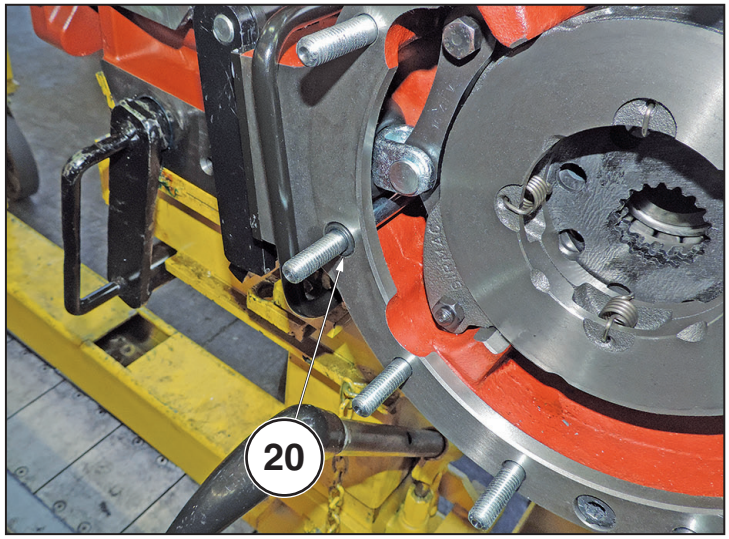


Fig. 7.48

Apply silicone sealant on the mating surface of the final drive unit.

Transfer the outermost friction disc (21) to the pinion (5).

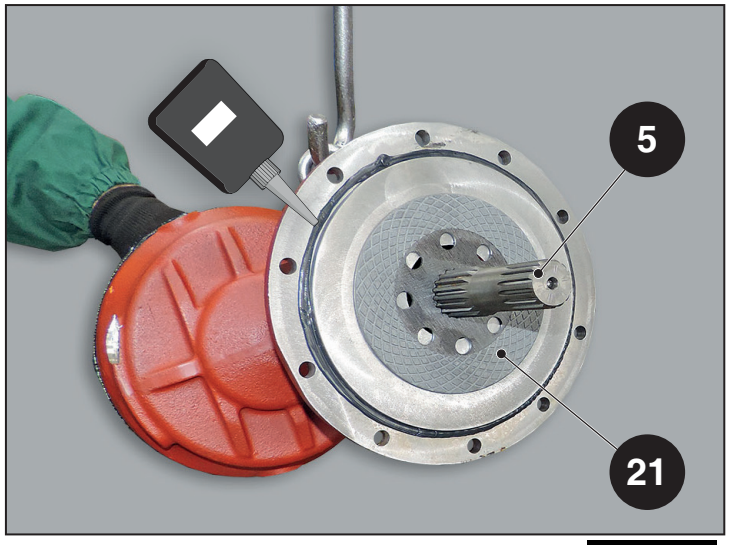


Fig. 7.49

Mate the assemblies. Swing the half-axle (11) to key it on the brake discs and rear differential.

> **Note**
>
> Tighten two screws on the half-axle (11) to facilitate the operation.

> **Warning**
>
> Check the correct positioning of the O-ring (20) on the stud bolt.
>
> Make sure that the brake discs do not fall off during the operation.

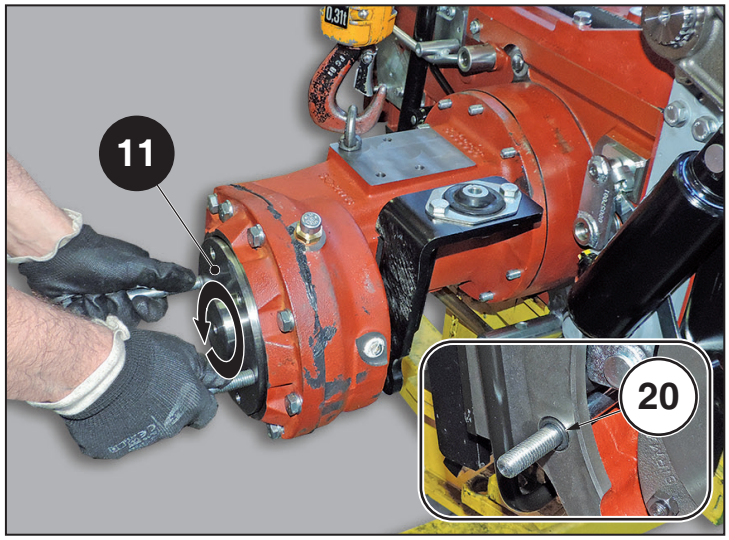


Fig. 7.50

Secure the complete reduction gear by tightening the nuts (1) with the washers (22).

Check that the half-axle (11) rotates correctly.

Tighten the nuts (1) with a torque wrench using a tightening torque of 60 Nm (6 kgm).

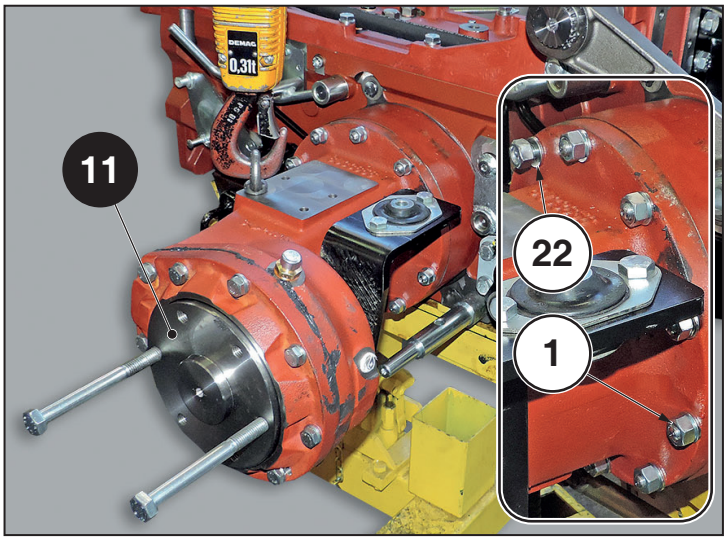


Fig. 7.51

If present, reassemble the PTO lever sensor bracket (24).

Adjust the position of the PTO selector lever sensor (23). The sensor button must be pressed well with the lever in low (independent) position.

Danger
Keep the tractor at a distance during the check on sensor operation.

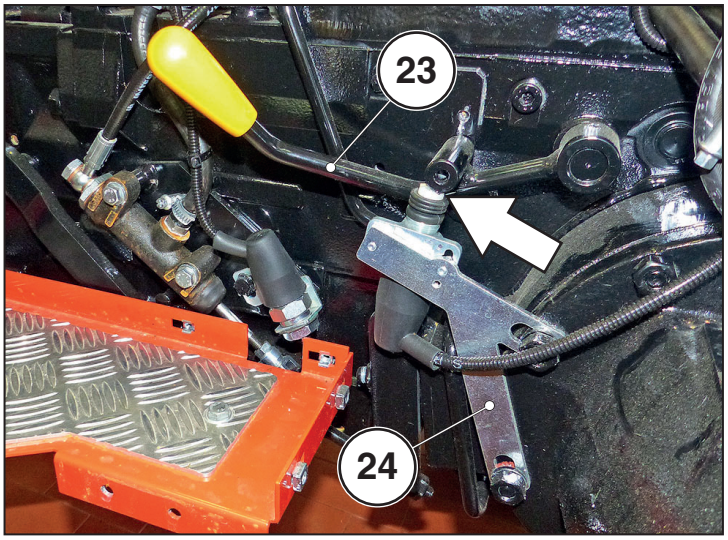


Fig. 7.52

Continue the reassembly operations by following the Preliminary Operations indicated in the Chapter "Disassembly" in reverse order.

Section 5 : Tightening specifications

Index

5.1 Tightening specifications 7-28

5.1 Tightening specifications

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
Hub - reduction gear cover fastener screws	60	6

Section 6 : Tools necessary

Index

6.1 Tools necessary 7-30

6.1 Tools necessary

p/n	Description	Quantity
A-p/n _____	Hub lifting tool	1

Chapter 8 : Front final drive units

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Section 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.

Section 2 : Removal

Index

2.1 WD final drive units (RS and REV Cluster).....8-4

2.2 Fixed final drive units (SN and SN+ Cluster).....8-7

2.1 WD final drive units (RS and REV Cluster)

Remove the front wheel.

Undo the front mudguard screws and remove the mudguard.

Warning
Disconnect the front light wiring loom.

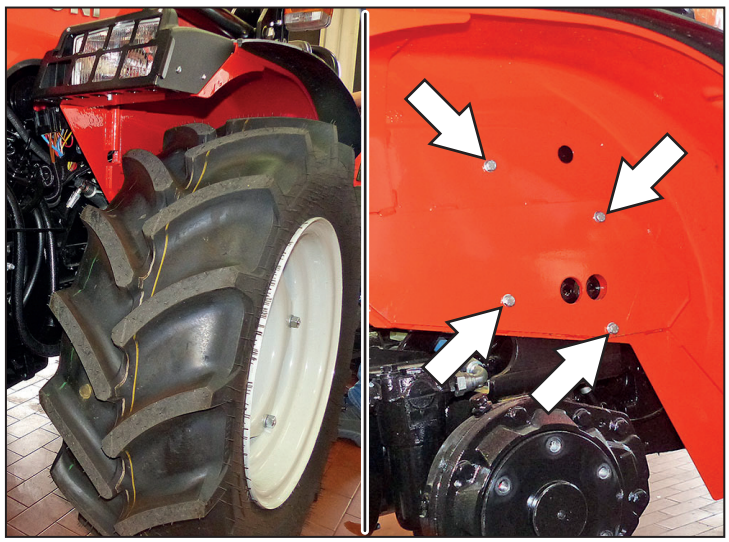


Fig. 8.1

Remove the roll-bar hoop.

Undo the mudguard mount screws and remove the mudguard mount.

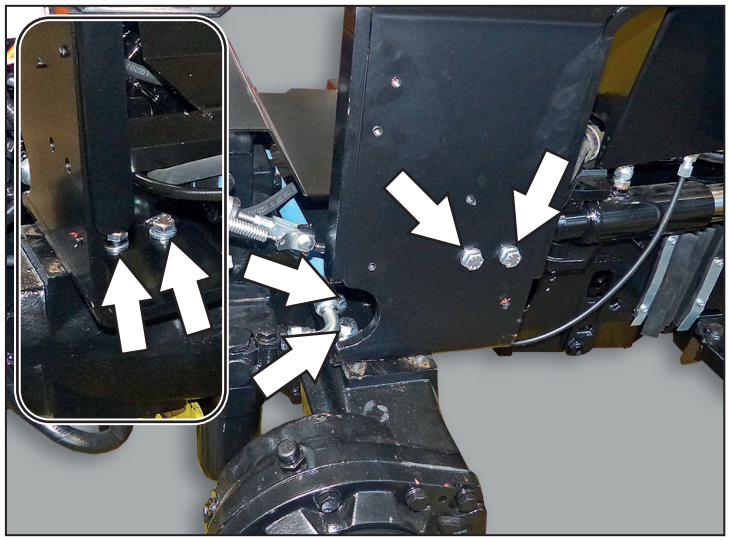


Fig. 8.2

Undo the nut (1) and pull out the steering cylinder pin (2) from the knuckle flange (3).

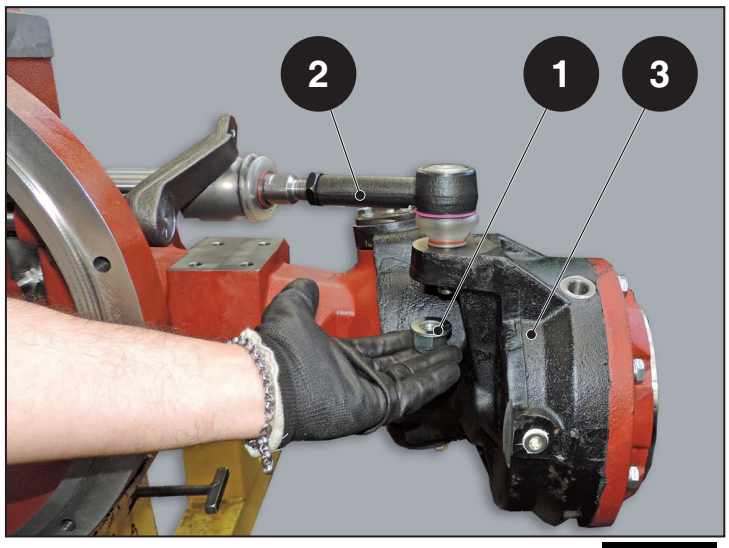


Fig. 8.3

Undo the fastener screws (4) and (5) of the reduction gear cover (7).

Tighten two screws on the extraction holes to separate the reduction gear cover (7) from the knuckle flange (3).

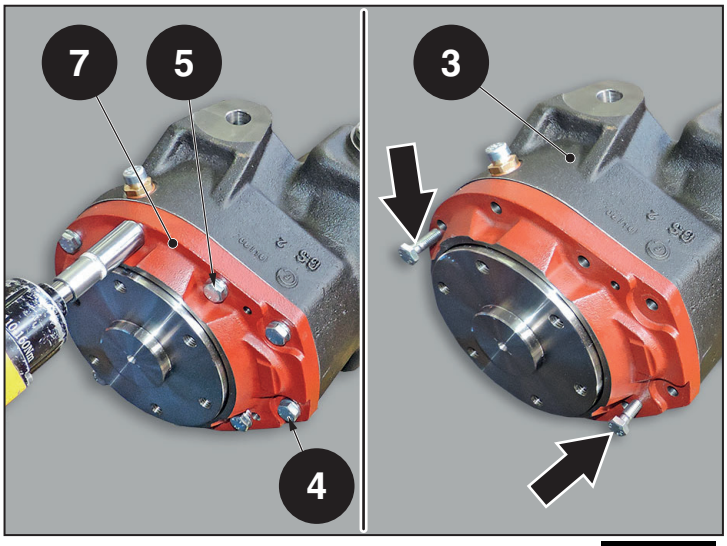


Fig. 8.4

Tighten the screws (8) with the washers (9) fastening the knuckle pins (10). Then remove the knuckle pins (10)

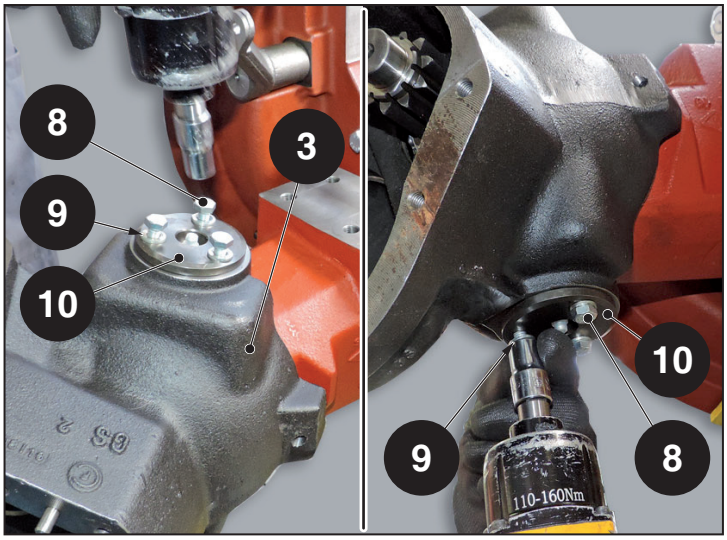


Fig. 8.5

Secure the complete knuckle flange (3) to a suitable hoist using the tool (A-p/n_____).

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Separate the knuckle flange (3) from the hub.

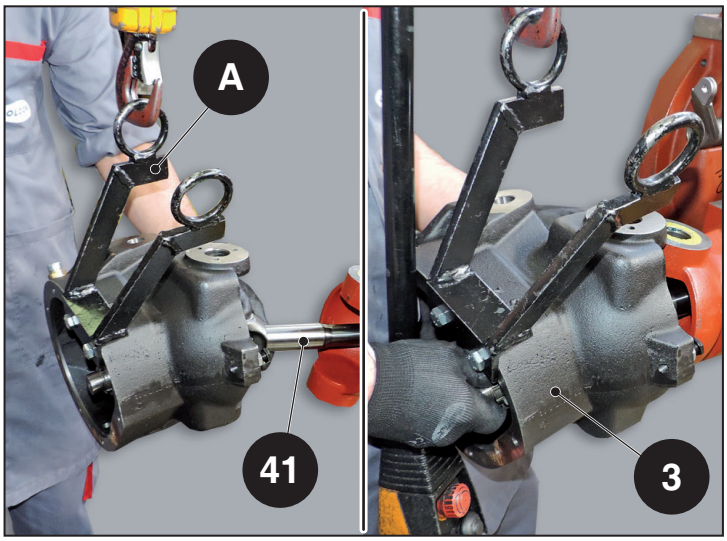


Fig. 8.6

Secure the hub (11) to a suitable hoist using an eye-bolt.

Attention
Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Undo the screws (4) and pull the hub from the front differential.

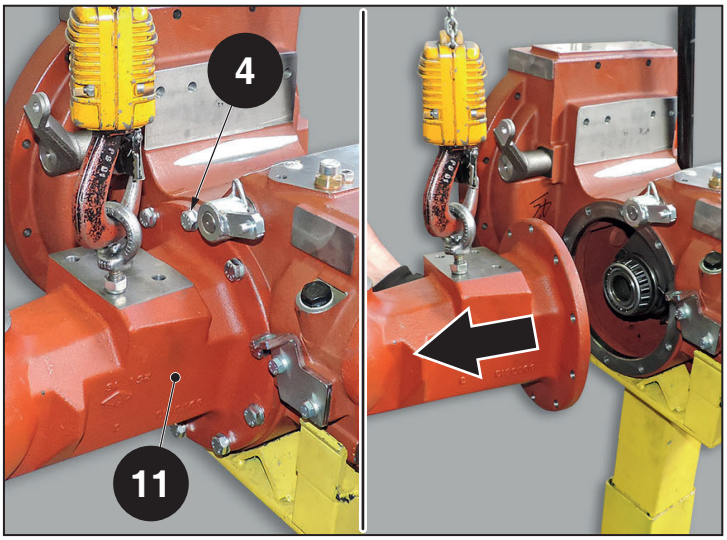


Fig. 8.7

2.2 Fixed final drive units (SN and SN+ Cluster)

Remove the front wheel.

Undo the front mudguard screws and remove the mudguard.

> **Warning**
>
> Disconnect the front light wiring loom.

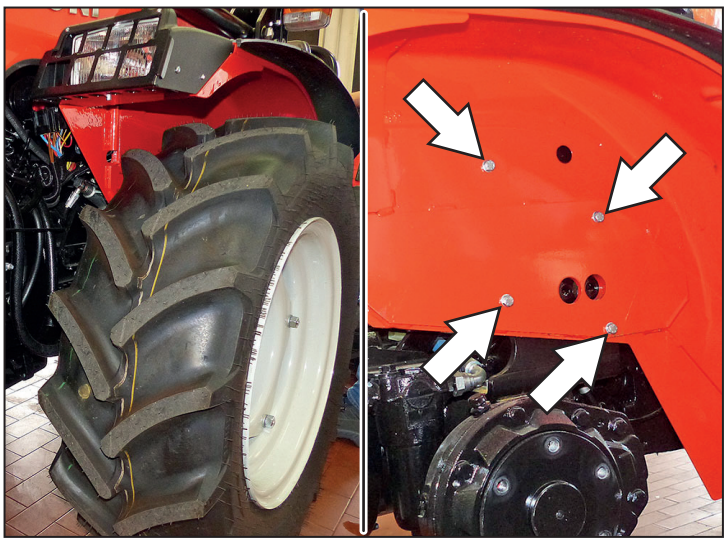


Fig. 8.8

Remove the roll-bar hoop.

Undo the mudguard mount screws and remove the mudguard mount.

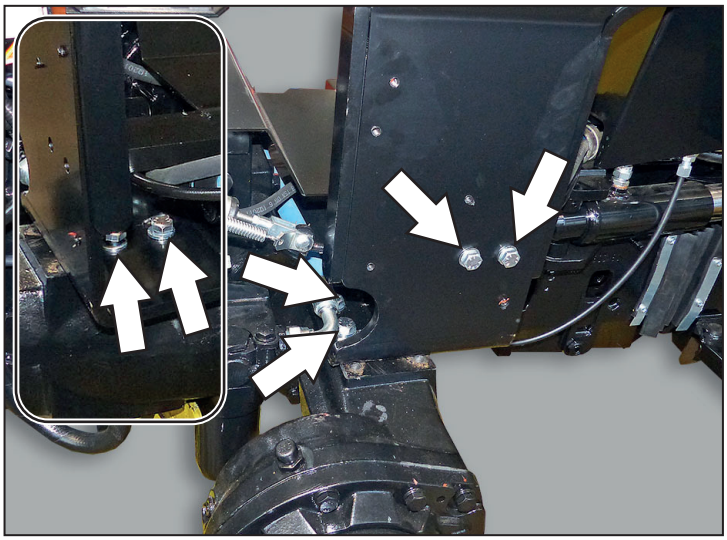


Fig. 8.9

Secure the complete reduction gear (11) to a suitable hoist using an eye-bolt.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Undo the screws (4) and pull out the complete reduction gear from the front differential.

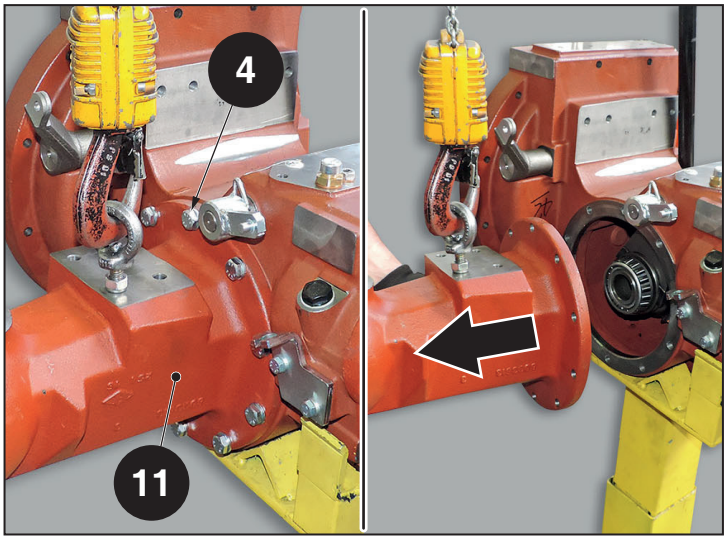


Fig. 8.10

Section 3 : Main components

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3.1 Reduction gear cover

3.1.1 Assembly drawing

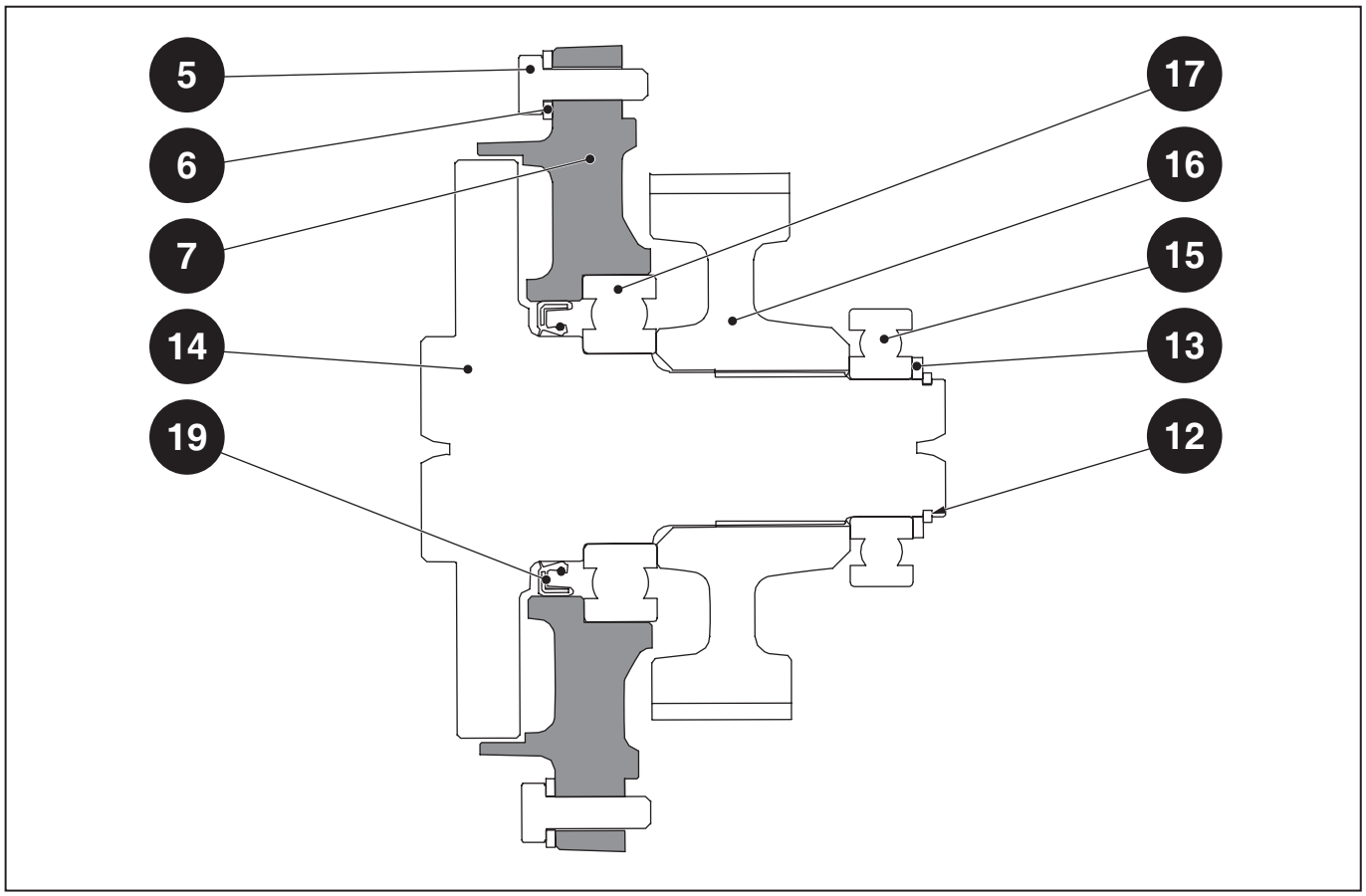


Fig. 8.11

5 - Screw
6 - Conical washer
7 - Reduction gear cover
12 - Circlip
13 - Spacer
14 - Half-axle
15 - Bearing
16 - Reduction gear
17 - Bearing
19 - Oil seal

3.1.2 Disassembly

Remove the circlip (12) and the spacer (13) from the half- axle (14).

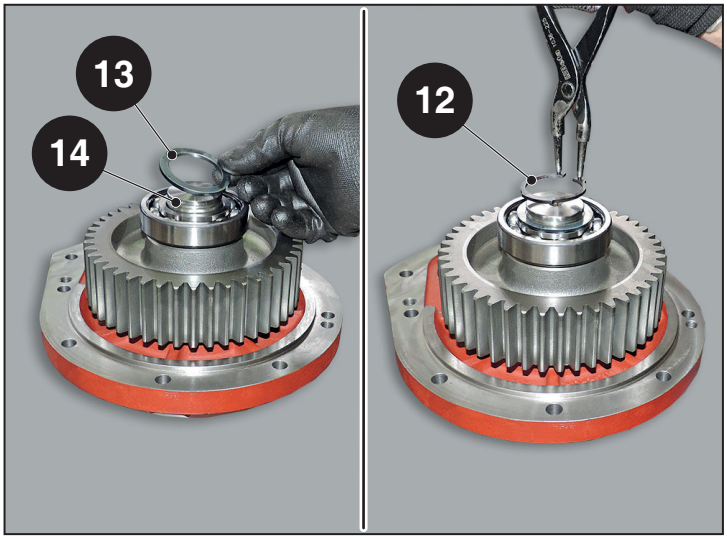


Fig. 8.12

Remove the bearing (15) and the reduction gear (16) from half-axle (14).

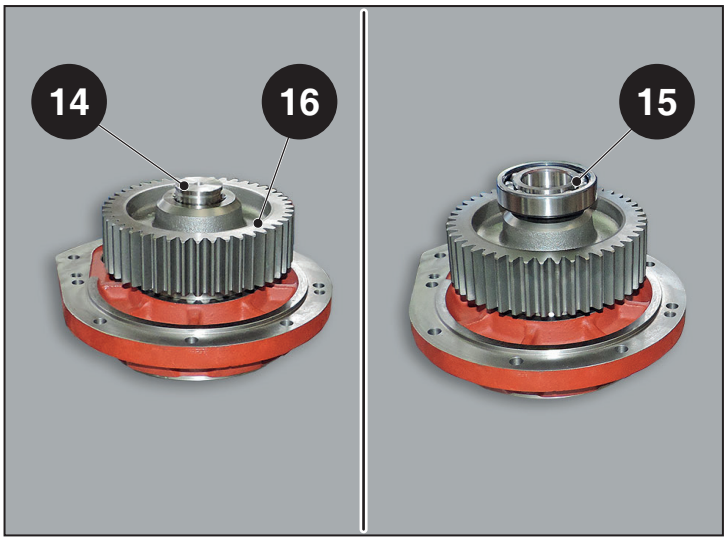


Fig. 8.13

Remove the half-axle (14) from the reduction gear cover (7) and remove the bearing (17).

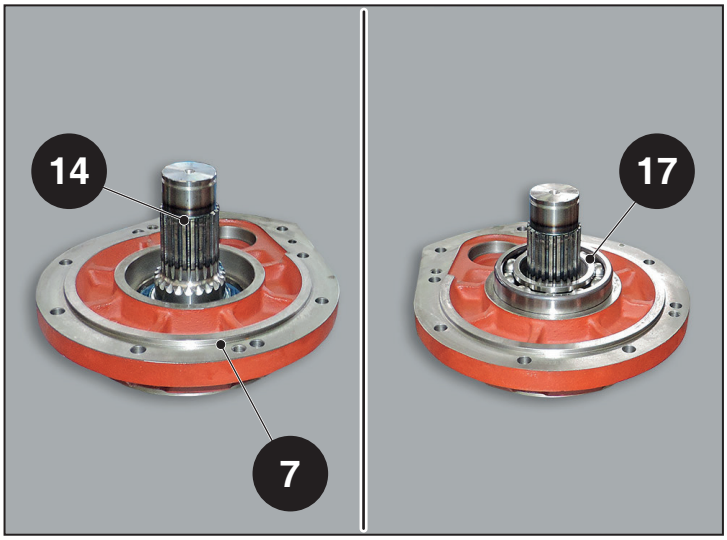


Fig. 8.14

Remove shielded bearing (18) from the reduction gear cover (7).

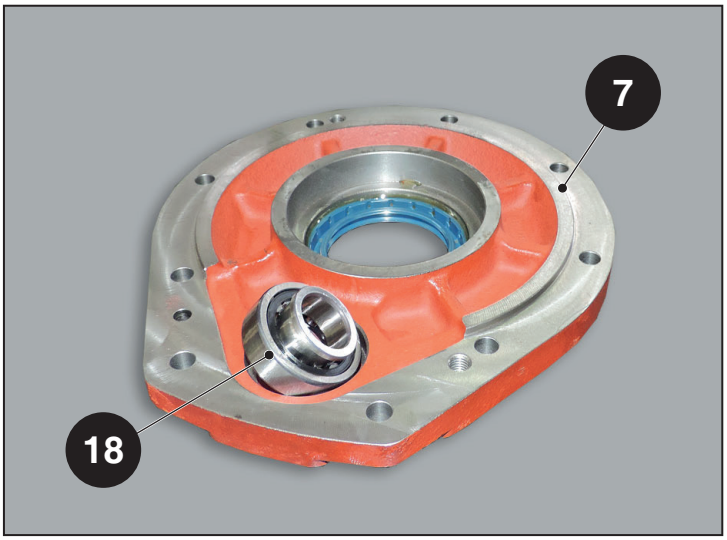


Fig. 8.15

Remove oil seal (19) from the reduction gear cover (7).

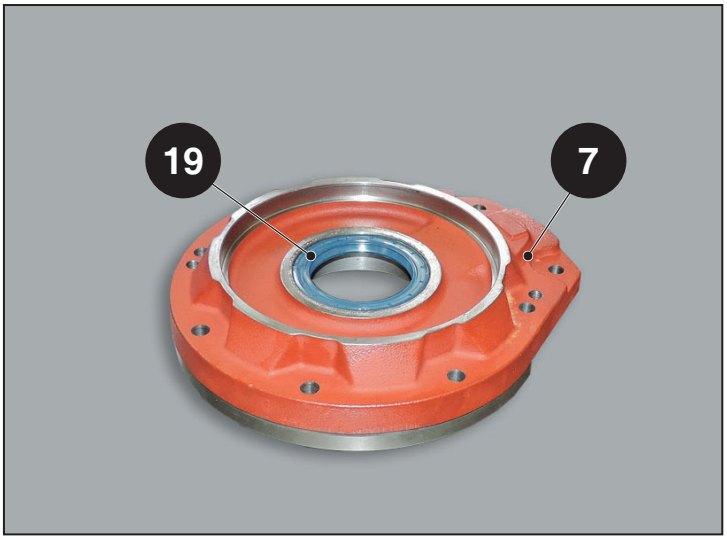


Fig. 8.16

3.1.3 Main inspection, reassembly and adjustment procedures

Warning

The following instructions are applicable for both covers.

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 sealants required are not specified, refer to the table in Chapter "1-Introduction".

Lubricate the seat on the reduction gear cover (7), then fit the oil seal (19) and drive it in seat with a press.

Apply a coating of grease on the oil seal (19).

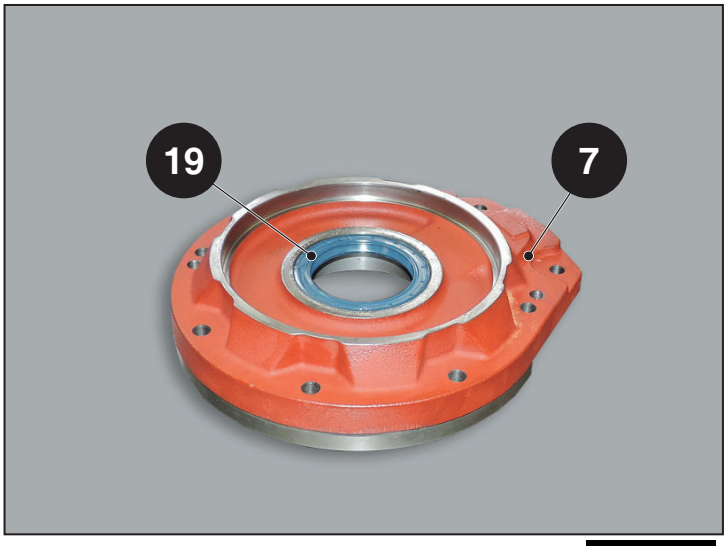


Fig. 8.17

Fit the shielded bearing (18) on the reduction gear cover (7) and drive it in with a suitable punch.

Warning
Position the bearing (18) so that the inner race can be pulled out as shown in the figure.

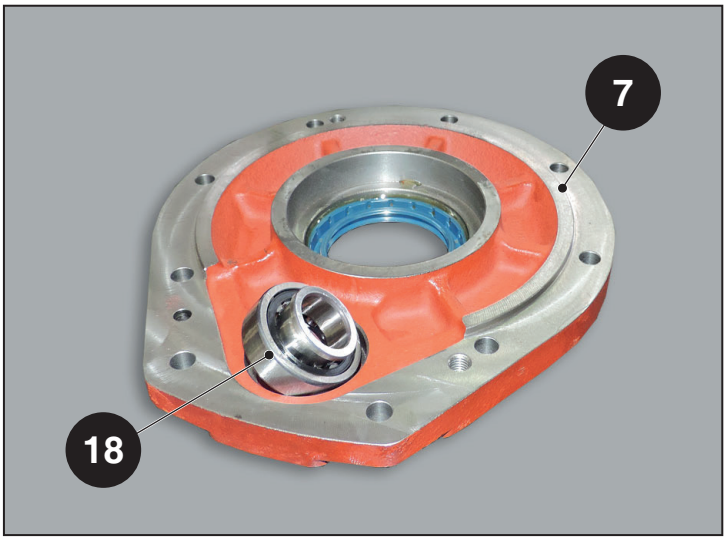


Fig. 8.18

Fit the half-axle (14) in the reduction gear cover (7).

Fit the bearing (17) on the half-axle (14) and drive it in with a press.

Warning
Clean the half-axle (14) before inserting it on the reduction gear cover (7).

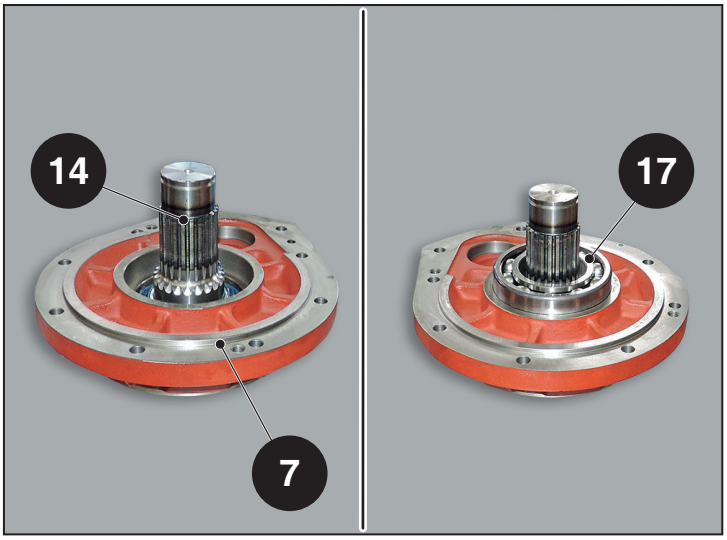


Fig. 8.19

Key the reduction gear (16) on the half-axle (14), making sure to position the protruding part facing up (toward the gearbox casing).

Warning
RS and REV Cluster The reduction gear (16) features a spline on the teeth.

Fit the bearing (15) on the half-axle (14).

Drive the assembled parts in using a press.

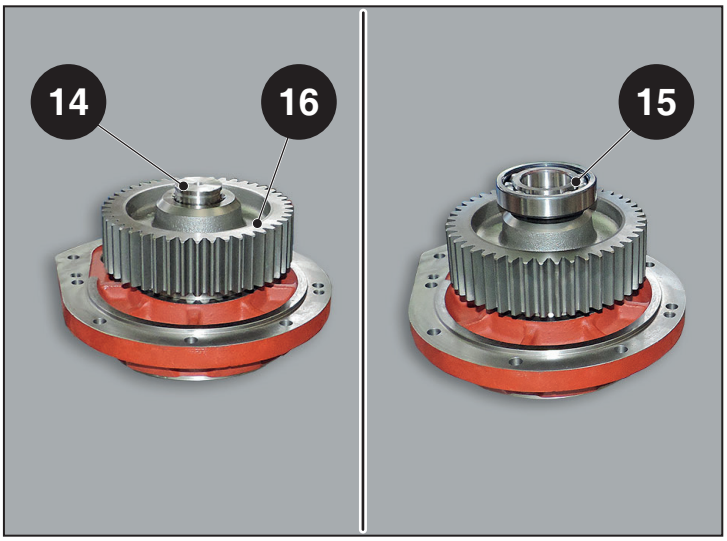


Fig. 8.20

Fit the spacer (13).

Fit the circlip (12) on the groove of the half-axle (14) to secure all the components in place.

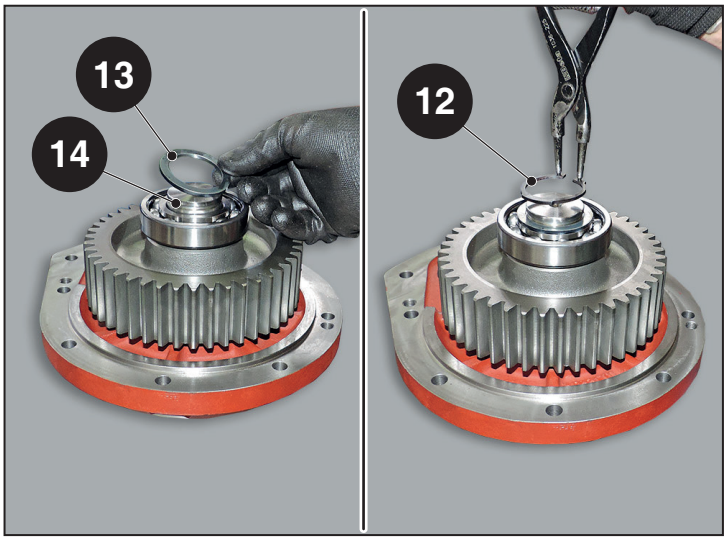


Fig. 8.21

3.2 WD final drive units (RS and REV Cluster)

3.2.1 Assembly drawing

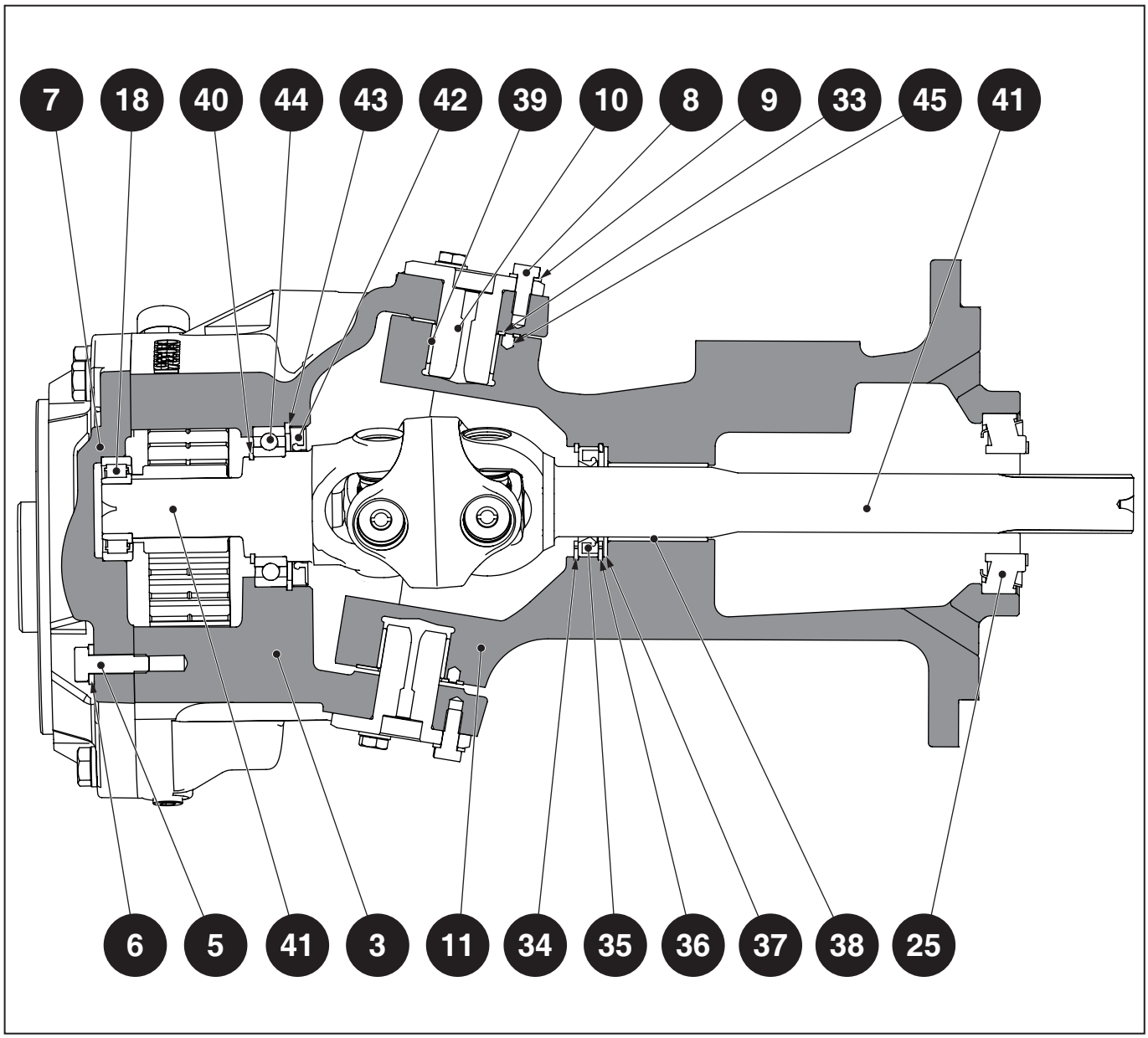


Fig. 8.22

3 - Knuckle flange
5 - Screw
6 - Conical washer
7 - Reduction gear cover
8 - Screw
9 - Conical washer
10 - Knuckle pin
11 - Hub casing
18 - Shielded bearing
25 - Conical bearing
33 - Shim washer
34 - Circlip
35 - Oil seal
36 - Circlip
37 - Spacer
38 - Bush
39 - Bush
40 - Circlip
41 - Half-axle pinion
42 - Oil seal
43 - Circlip
44 - Bearing
45 - Alignment stud

3.2.2 Disassembly

> **Warning**
>
> The following instructions are applicable for both final drive units.

Remove the shim washers (33).

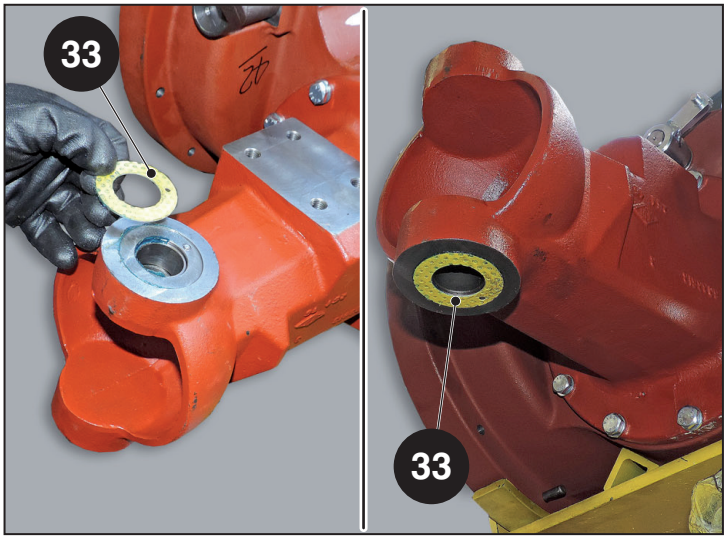


Fig. 8.23

Remove the circlip (34) and oil seal (35).

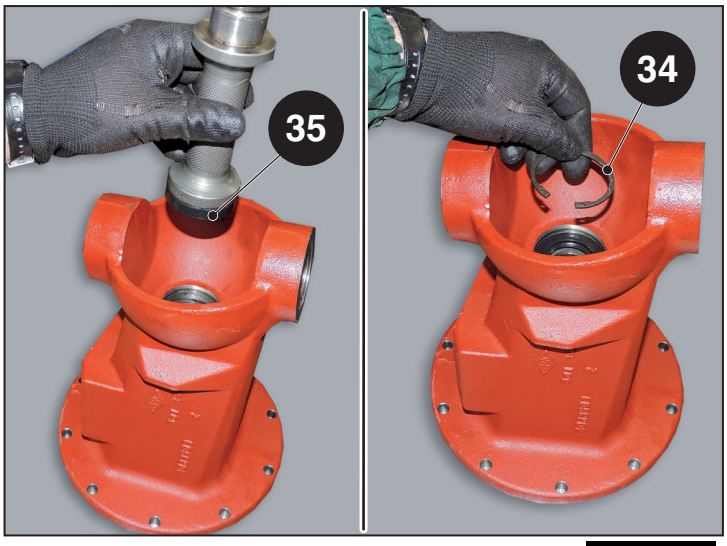


Fig. 8.24

Remove the circlip (36) and spacer (37).

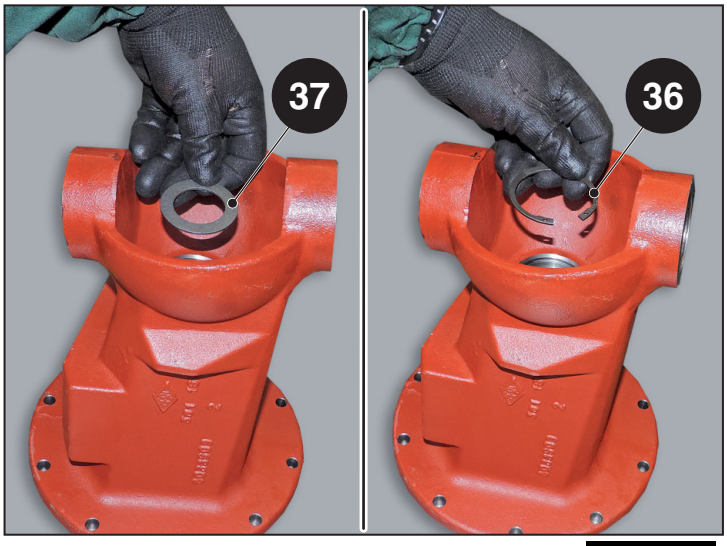


Fig. 8.25

Remove the bush (38). Remove the bushes (39).

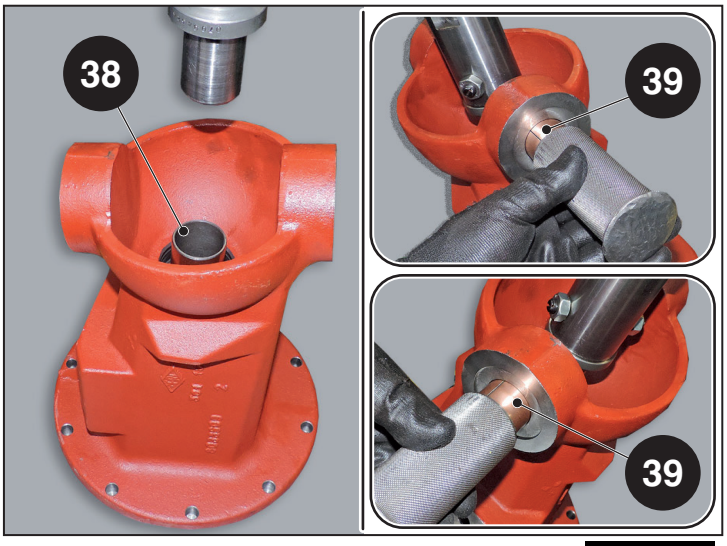


Fig. 8.26

Remove the circlip (40). Remove the half-axle pinion (41) from the knuckle flange (3).

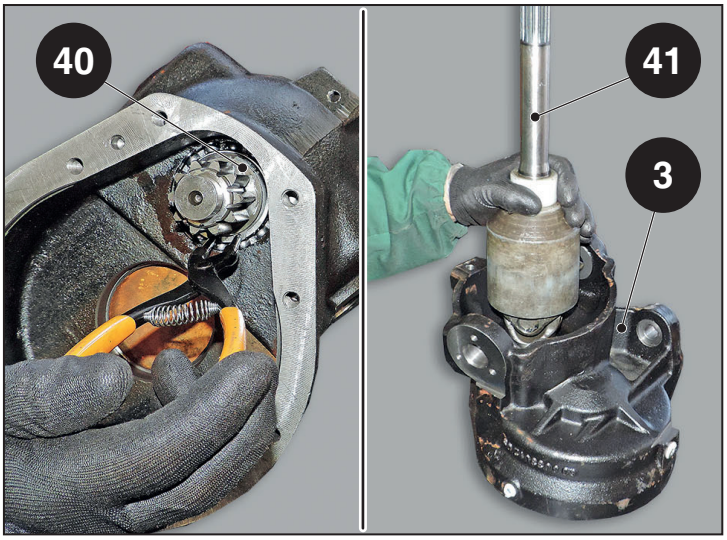


Fig. 8.27

Remove the oil seal (42), the circlip (43) and the bearing (44).

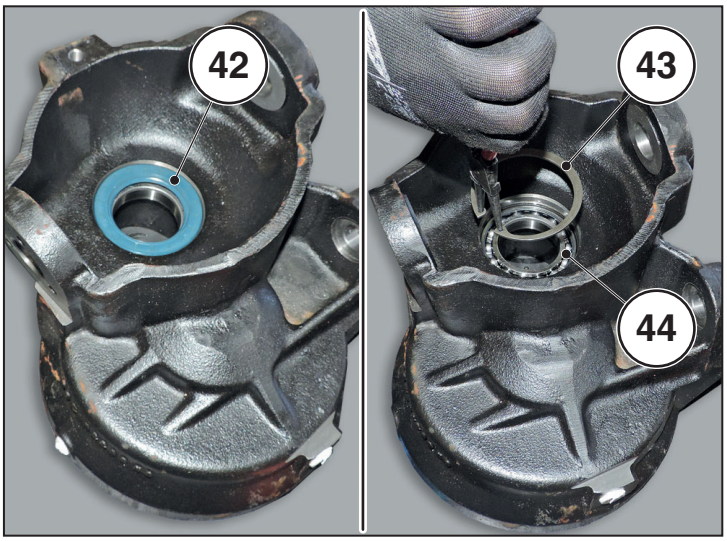


Fig. 8.28

3.2.3 Main inspection, reassembly and adjustment procedures

Warning

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 sealants required are not specified, refer to the table in Chapter "1-Introduction".

3.2.3.1 Refitting the hub

Fit the bushes (39), one on each side. Drive them in using a punch tool and hammer.

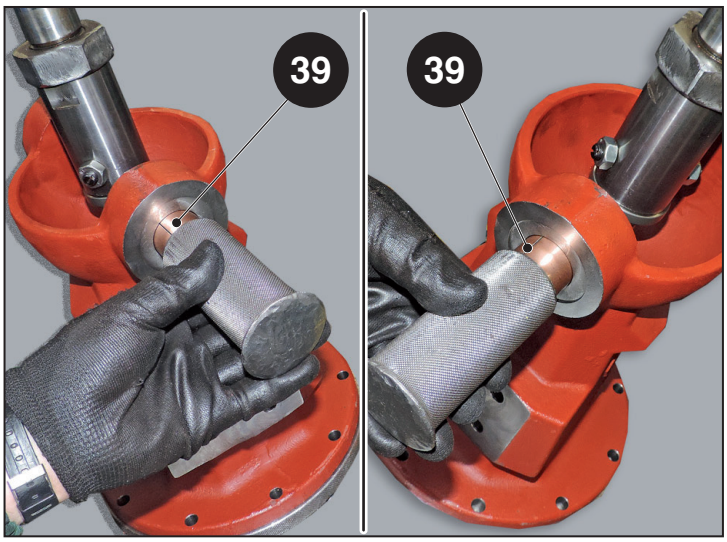


Fig. 8.29

Fit the bush (38); drive them in using a press together with a suitable punch tool.

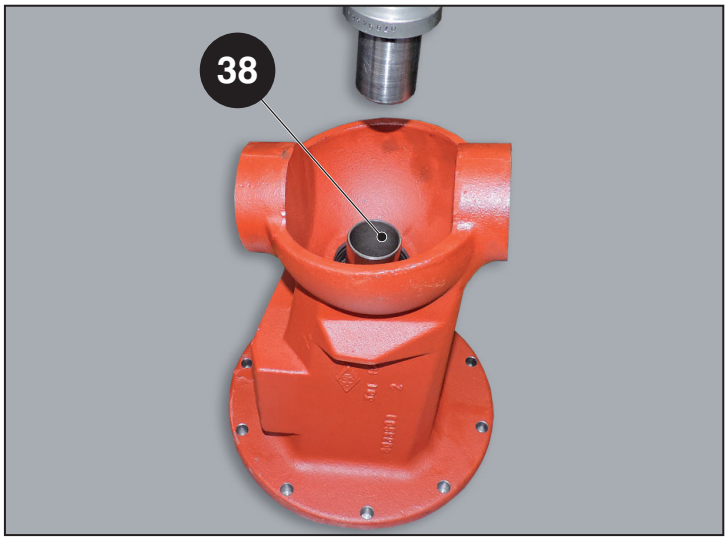


Fig. 8.30

Fit the spacer (37).

Fit the circlip (36).

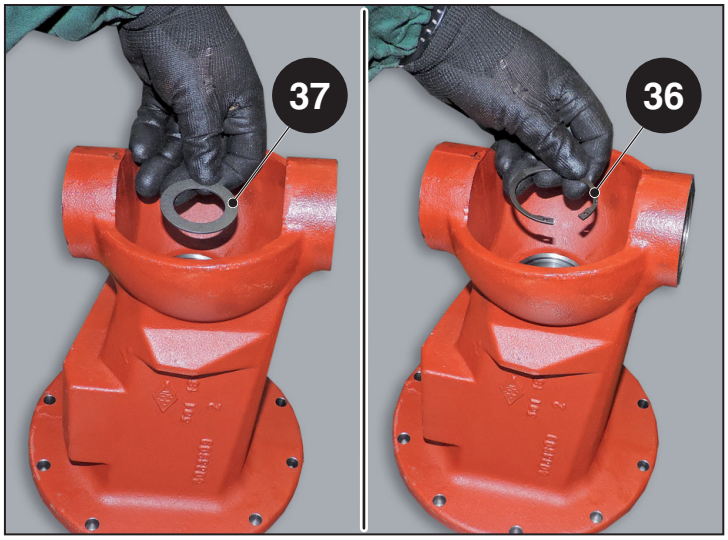


Fig. 8.31

Lubricate the seat and then insert the oil seal (35). Drive the oil seal in (35) with a press and a punch tool.

Fit the circlip (34) to secure the oil seal (35) in place.

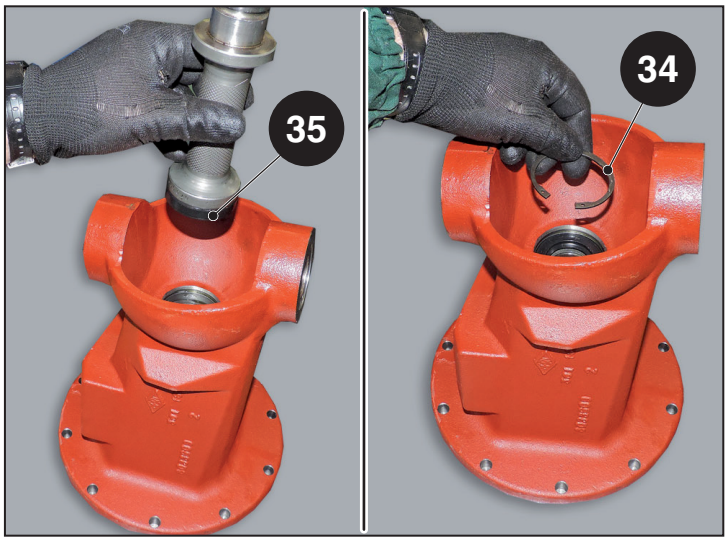


Fig. 8.32

3.2.3.2 Reassembling the knuckle flange

Lubricate the seat on the knuckle flange and then fit the bearing (44) driving it in. Use a punch tool of suitable diameter to drive the bearing (44) into place.

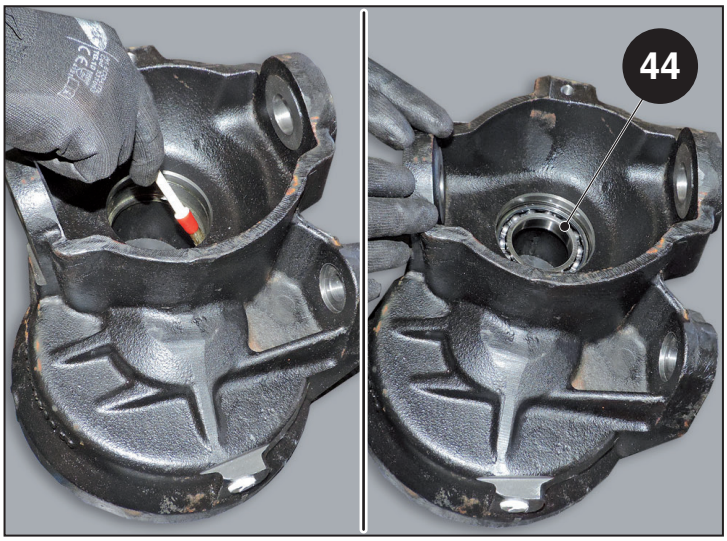


Fig. 8.33

Fit the circlip (43).

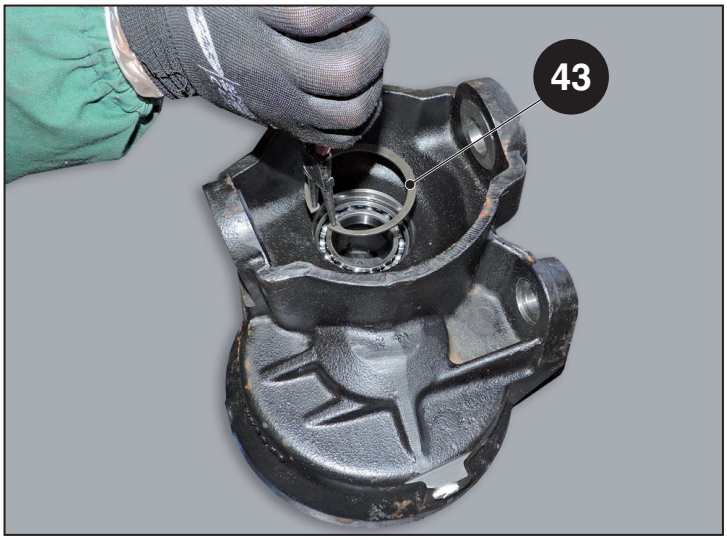


Fig. 8.34

Lubricate the seat on the knuckle flange and then fit the oil seal (42) driving it in.

Lubricate the inner ring of the oil seal (42).

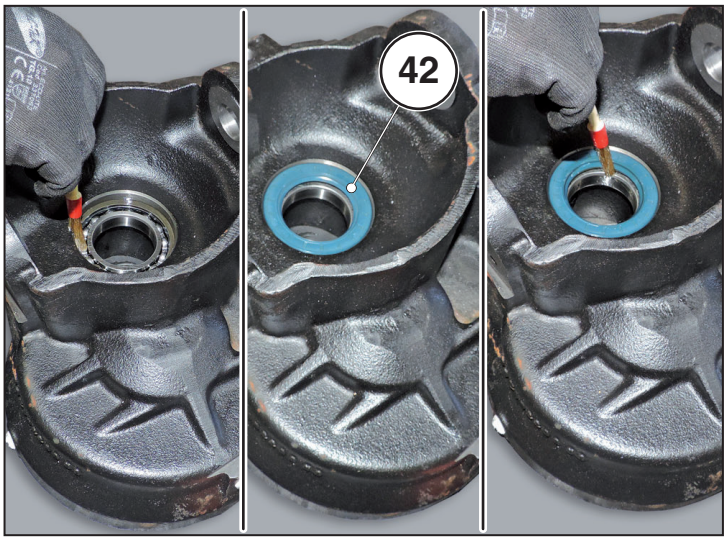


Fig. 8.35

Lock the swing of the half-axle knuckle (41) with the tool (B-p/n_____).

Fit the half-axle pinion (41) on the knuckle flange (3) driving it in.

Warning

To correctly insert the half-axle pinion (41) , it is necessary to position the knuckle flange (3) in order to have some space underneath, as the pinion (41) protrudes compared to the edge of the flange.

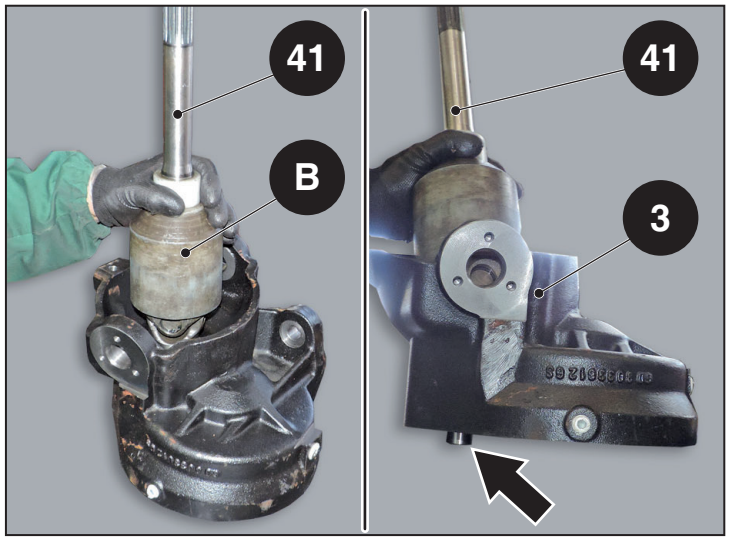


Fig. 8.36

Fit the circlip (40) to lock the half-axle pinion (41) in place.

Warning

If the circlip (40) has no room to fit in, it means that the half-axle pinion (41) is not fully engaged.

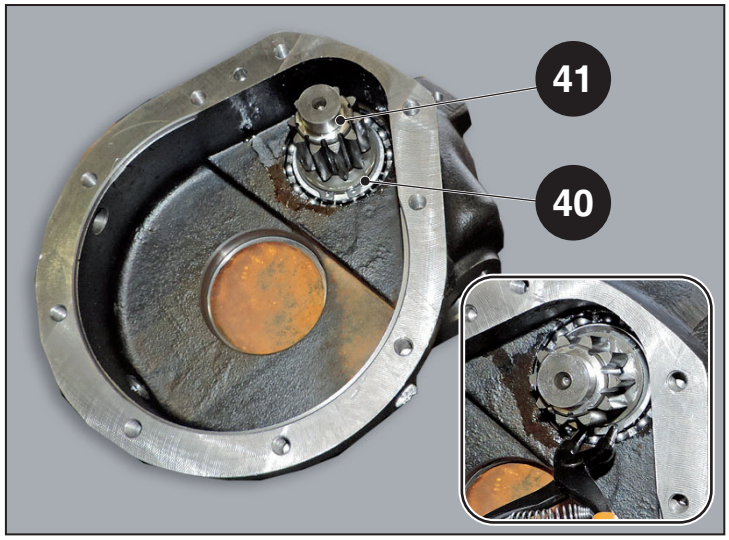


Fig. 8.37

3.3 Fixed final drive units (SN and SN+ Cluster)

3.3.1 Disassembly

> **Warning**
>
> The following instructions are applicable for both final drive units.

Undo the fastener screws (5) and (4) of the reduction gear cover (7).

Tighten two jacking screws on the indicated screws and then separate the reduction gear cover (7) from the rest of the assembly.

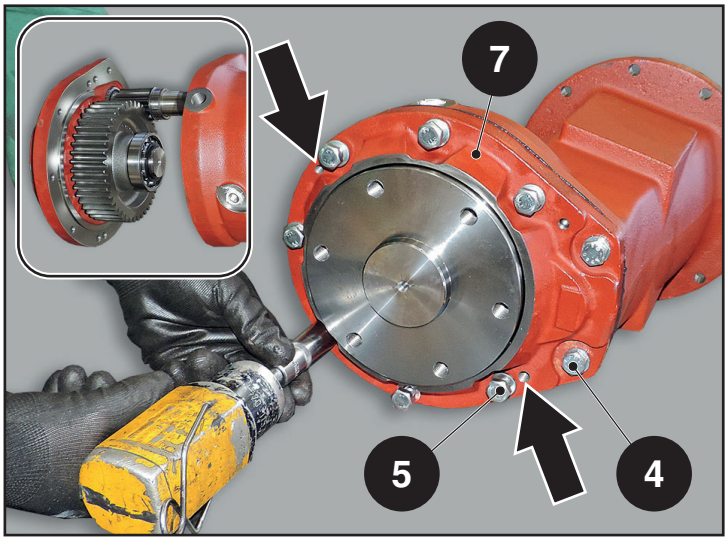


Fig. 8.38

Remove the half-axle pinion (24) from the reduction gear cover (7).

Disassemble the half-axle pinion (24) by removing the inner races of bearings (18) and (21).

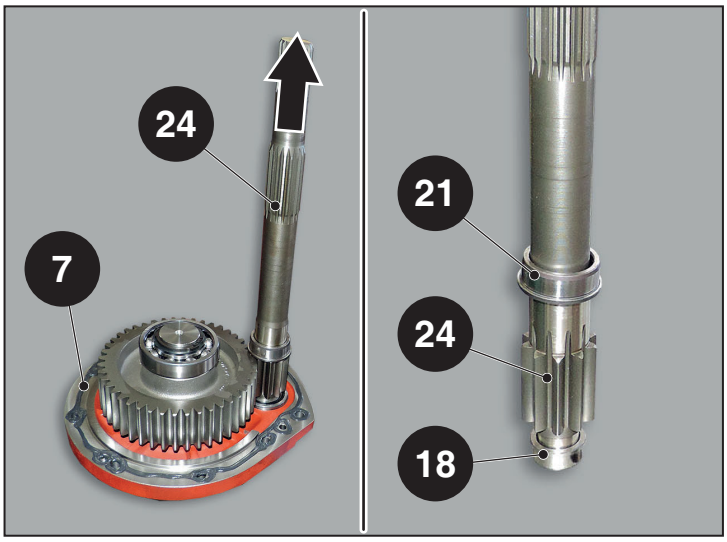


Fig. 8.39

Remove shielded bearing (21).

Remove oil seal (20).

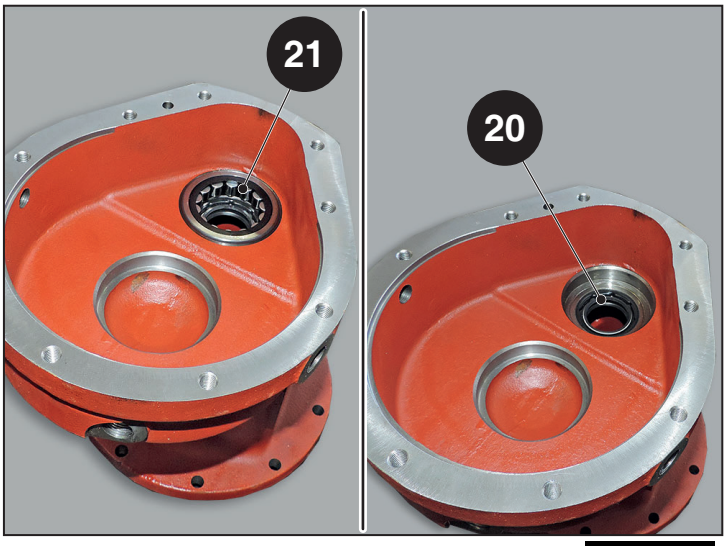


Fig. 8.40

3.3.2 Main inspection, reassembly and adjustment procedures

Warning

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 sealants required are not specified, refer to the table in Chapter "1-Introduction".

Lubricate the seat and then insert the oil seal (20).

Warning

Position the oil seal (20) with the notches facing up (toward the reduction gear cover).

Make sure that the springs of the oil seal (20) do not fall off during assembly.

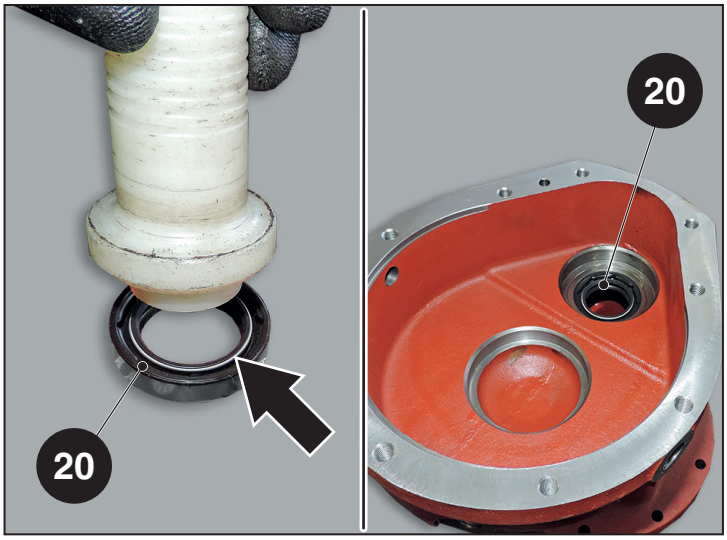


Fig. 8.41

Fit the shielded bearing (21).

Warning

Position the shielded bearing (21) so that the inner race can be pulled out.

Pull out the inner race (21A).

Punch a dot in the guard around the shielded bearing (21) to prevent the bearing from coming out by accident.

Warning

Turn the hub upside down and shake it and make sure that the shielded bearing (21) stays firmly in place.

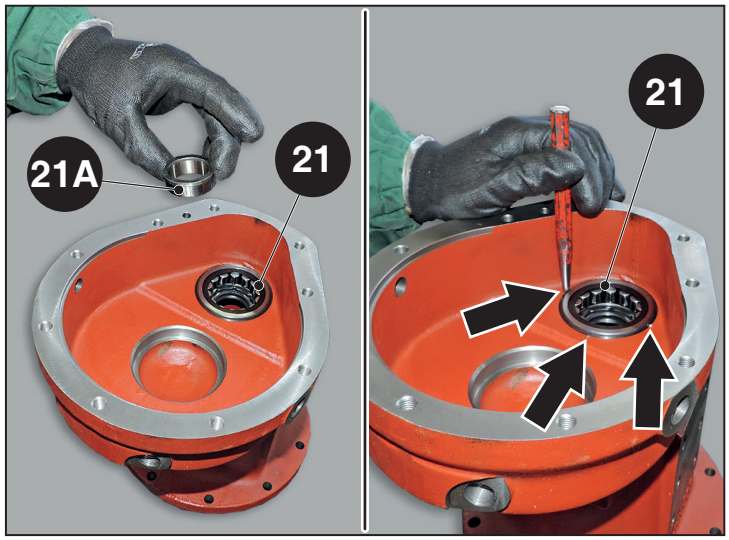


Fig. 8.42

Tighten the drain plug (22) and the oil filling plug (23).

Warning

Apply a coating of TEFLON to the threads of the plugs.

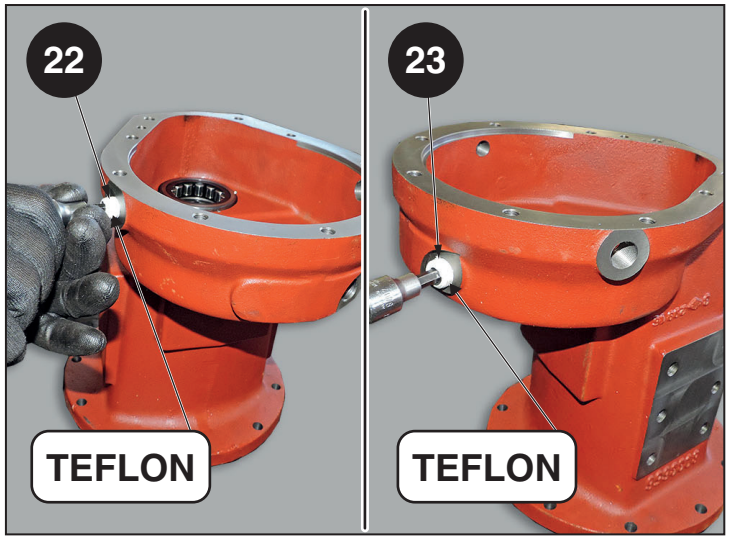


Fig. 8.43

Pull out the inner race from the shielded bearing (18) fit on the reduction gear cover.

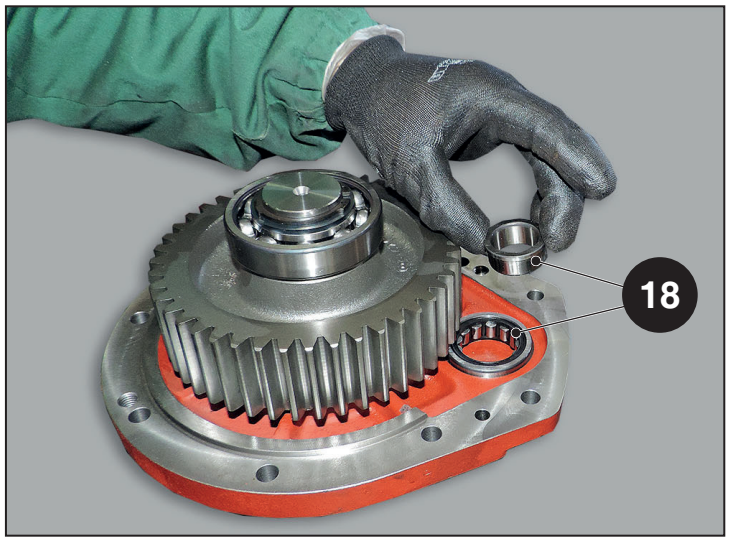


Fig. 8.44

Fit the inner races of the bearings (18) and(21) on the half-axle pinion (24). Drive them in using a suitable punch tool.

> **Warning**
>
> The inner races are to be fit with the beat facing the toothed part of the half-axle pinion (24).

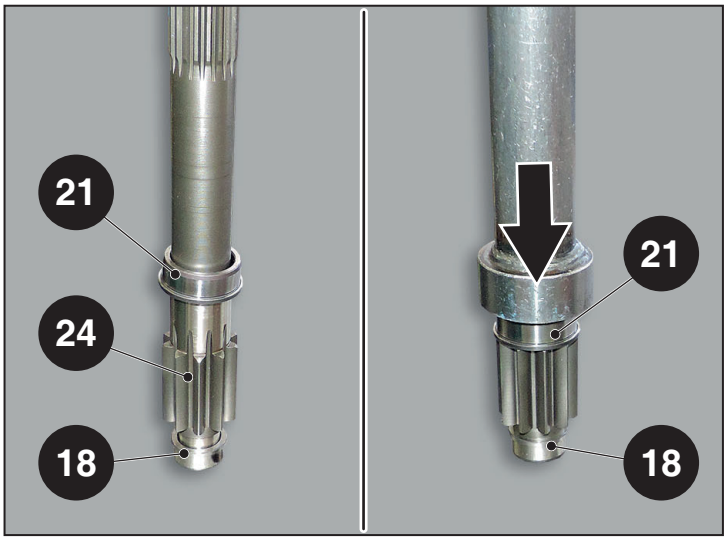


Fig. 8.45

Apply a layer of silicone sealant on the mating surface of the reduction gear cover (7).

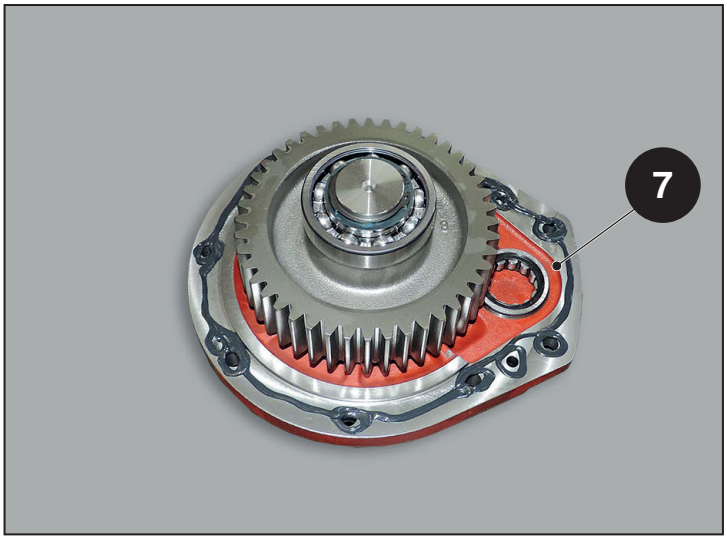


Fig. 8.46

Fit the half-axle pinion (24) on the casing cover by inserting it in the bearing (18) and driving it in to the end.

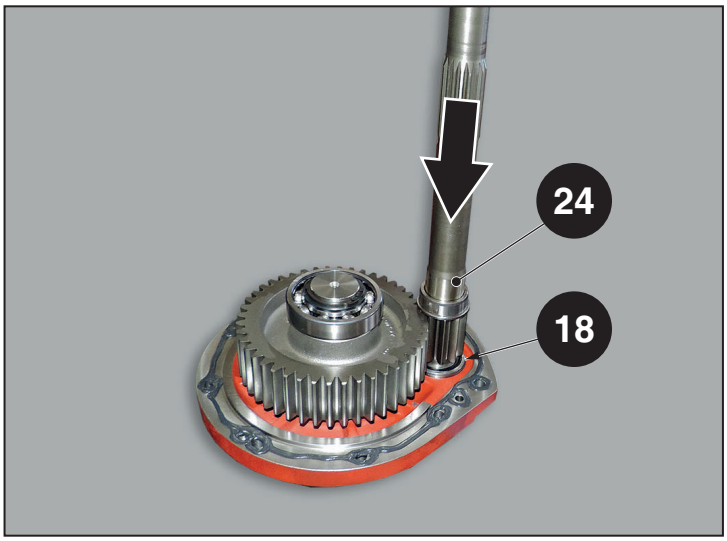


Fig. 8.47

Position a guide tool of suitable diameter on the half-axle pinion (24).

Secure the hub to a suitable hoist using the special tool (C-p/n _____).

Attention

Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

Sink the hub on the reduction gear cover (7) and then join the assemblies.

Warning

Make sure that the bearing (21, shown in the figure) 8.42stays fixed in place during the operation.

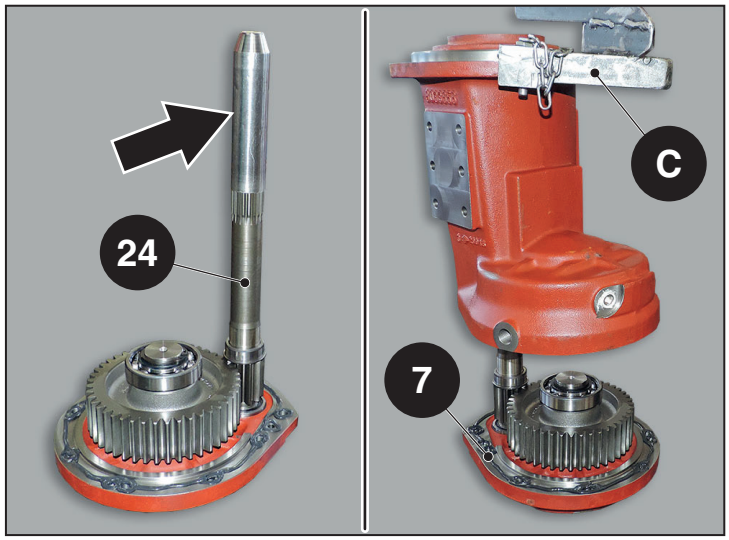


Fig. 8.48

Tap with a rubber mallet to set the assemblies together.

Rotate the half-axle pinion (24) to centre the reduction gear cover (7).

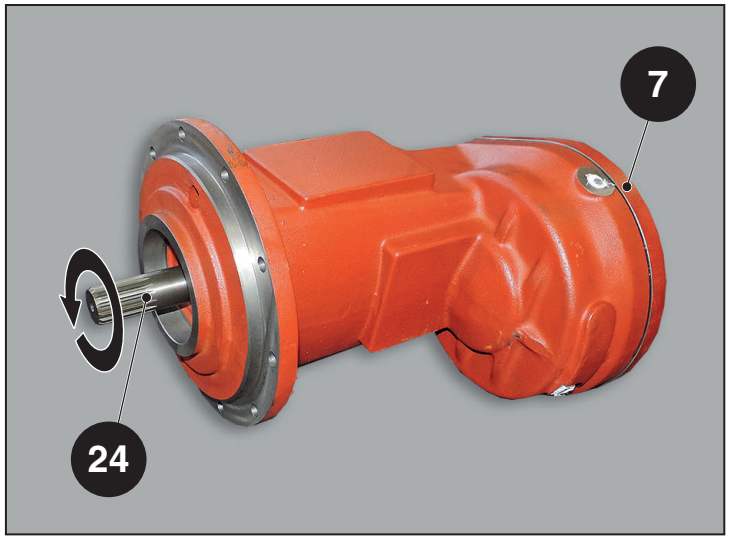


Fig. 8.49

Insert the alignment stud (32) fully.

Tighten the screws (4) with the conical washers (6). Apply a tightening torque of 60 Nm (6 kgm).

Tighten the screws (5) with the conical washers (6) to complete fastening the cover (7) to the knuckle flange. Tighten the screws (5) crosswise. Apply a tightening torque of 60 Nm (6 kgm).

Note

The screws (4) are shorter than the reduction gear fastener screws (5).

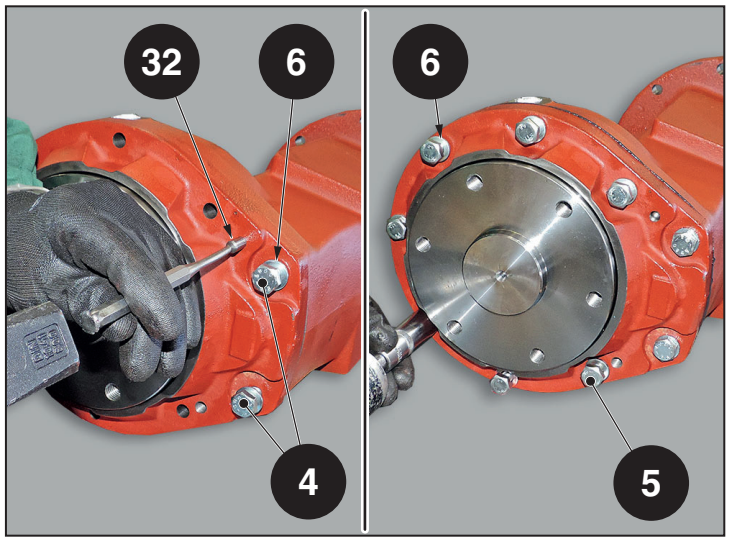


Fig. 8.50

Check the rolling of the half-axle pinion (24) and half-axle (14).

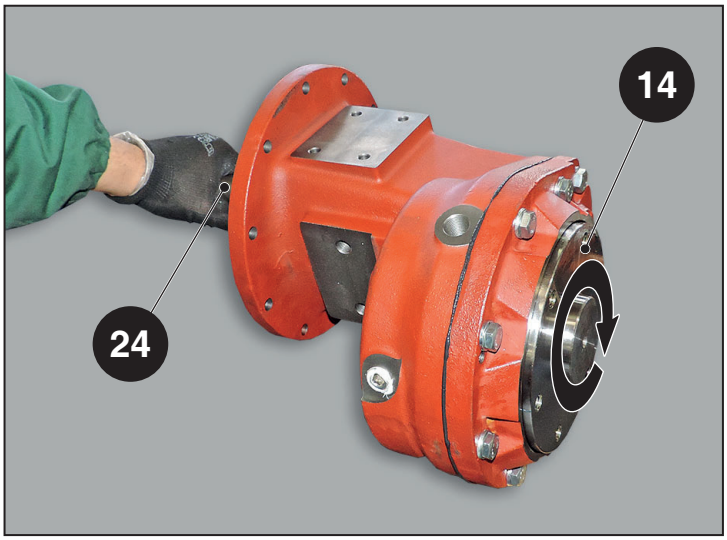


Fig. 8.51

Section 4 : Refitting

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4.1 WD final drive units (RS and REV Cluster).....8-32
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4.1 WD final drive units (RS and REV Cluster)

Fit the outer races of the bearings (25) on the final drive units.

Fit the inner bearing races (25) on the crown wheel assembly (26).

> **Warning**
>
> For detailed instructions on reassembling the front differential, refer to the Chapter “Front differential”.

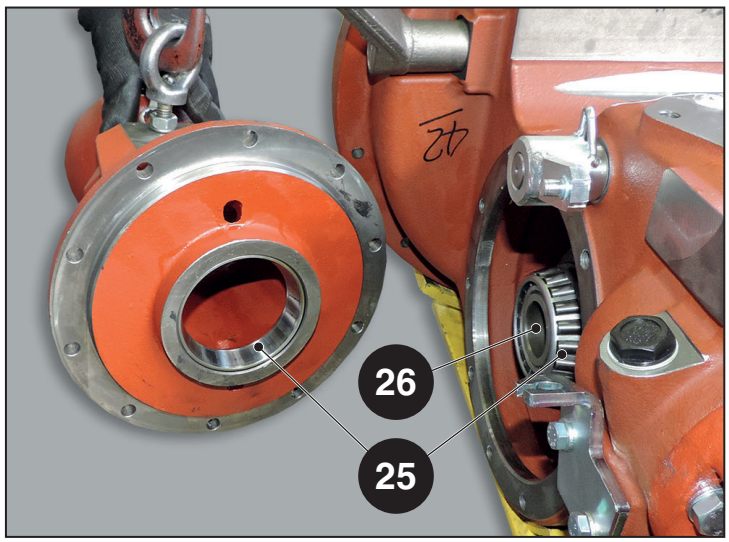


Fig. 8.52

Apply a coating of silicone sealant to the mating surfaces of the final drive units.

Secure the final drive units to a lifting equipment of adequate load capacity and mount them on the differential case.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

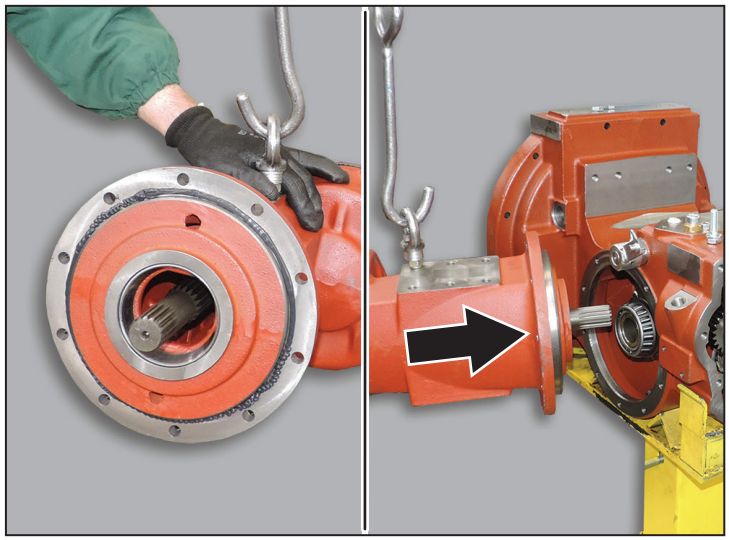


Fig. 8.53

Tighten the screws (27) and the washers (28) fastening the final drive units. Apply a tightening torque of 70 Nm (7 kgm).

> **Warning**
>
> **For versions with mechanical differential lock**
>
> Before tightening the topmost screw of the left drive unit, fit the plate (29). Fasten the spring (30) to the differential lock lever (31).
>
> Tighten the hooks of the spring (30) and rotate the plate (29) in order to pretension the spring.

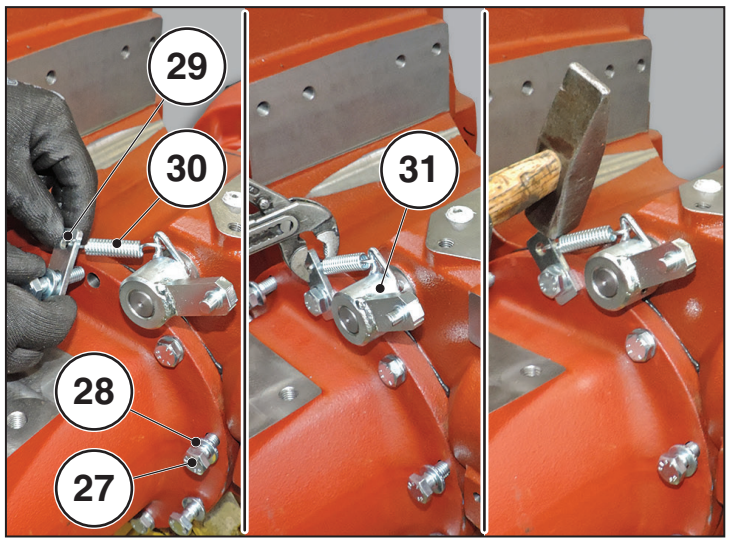


Fig. 8.54

Insert the alignment stud (45) and then position the shim washer (33) matching the hole with the pin (45)

Repeat the same operation on the lower side of the hub.

Note

Apply grease before fitting the shim washers (33) to make them adhere to the hub and prevent them from falling off.

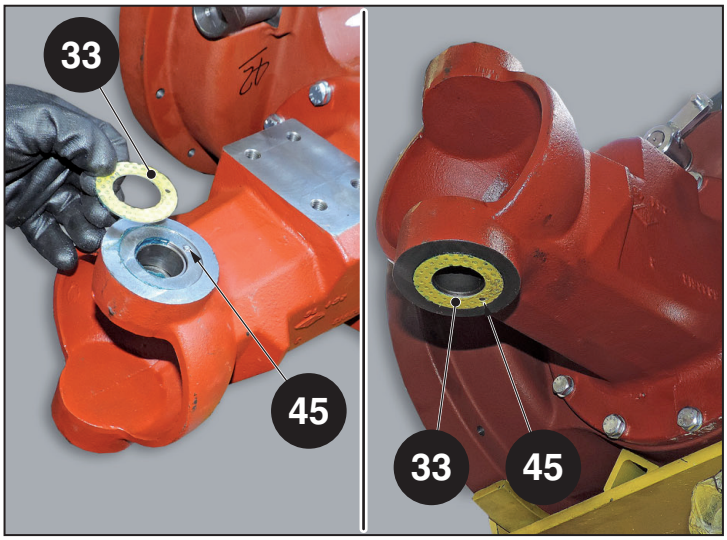


Fig. 8.55

Secure the complete knuckle flange (3) to a suitable hoist using the tool (B-p/n_____).

Attention

Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

Fit the complete knuckle flange (3) on the hub. Manipulate the pinion (41) to find the mating with the differential group and then insert the knuckle flange (3) completely.

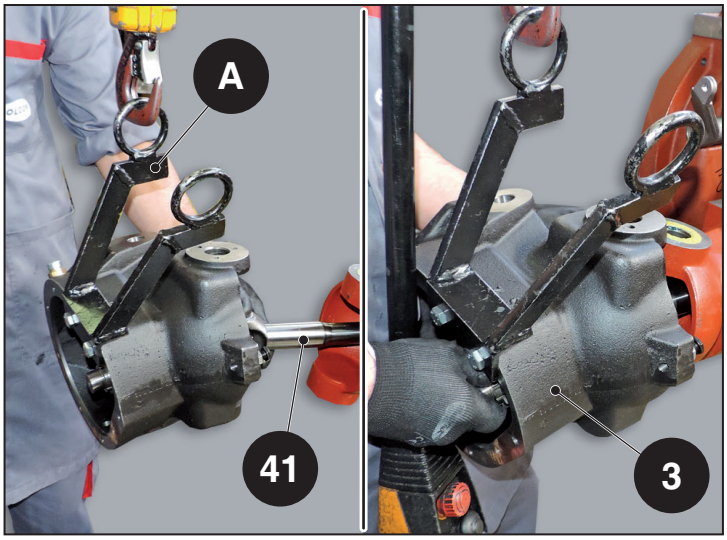


Fig. 8.56

Insert the knuckle pins (10) on the upper and lower sides of the knuckle flange (3).

Secure the knuckle pins (10) tightening the screws (8) and washers (9). Apply a tightening torque of 25 Nm (2.5 kgm).

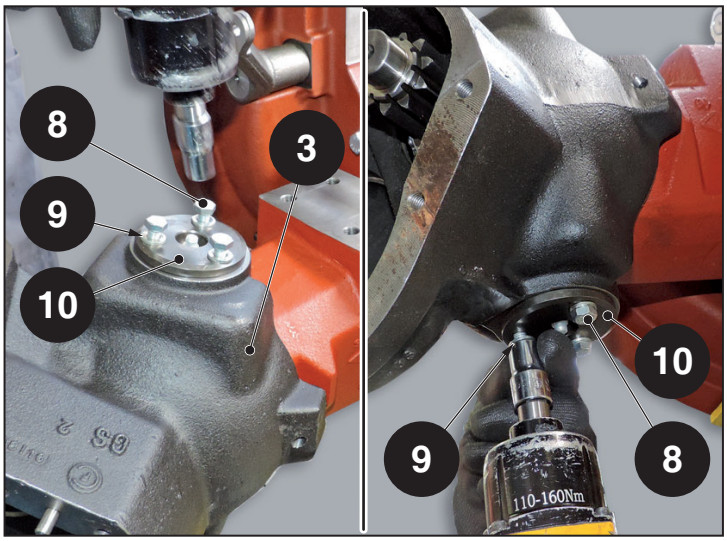


Fig. 8.57

Insert the inner race of the bearing (18), mounted on the reduction gear cover (7), on the pinion (41), turning the side with the wider end towards the differential case.

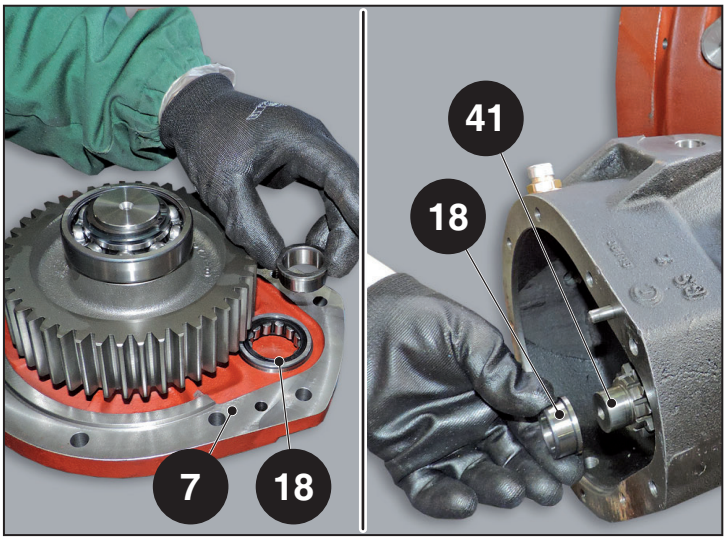


Fig. 8.58

Apply a layer of silicone sealant on the mating surface of the knuckle flange (3) with the reduction gear cover.

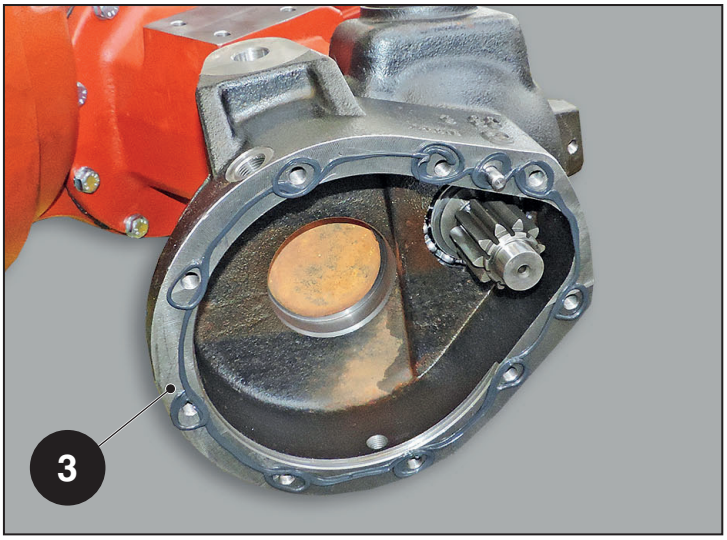


Fig. 8.59

Fit the complete reduction gear cover (7) on the knuckle flange.

Tighten the screws (4) with the conical washers (6). Apply a tightening torque of 60 Nm (60 kgm).

Tighten the screws (5) with the conical washers (6) to complete fastening the cover (7) to the knuckle flange. Tighten the screws (5) crosswise. Apply a tightening torque of 60 Nm (60 kgm).

Note
The screws (4) are shorter than the reduction gear fastener screws (5).

Fill the reduction gear with 80W90 oil.

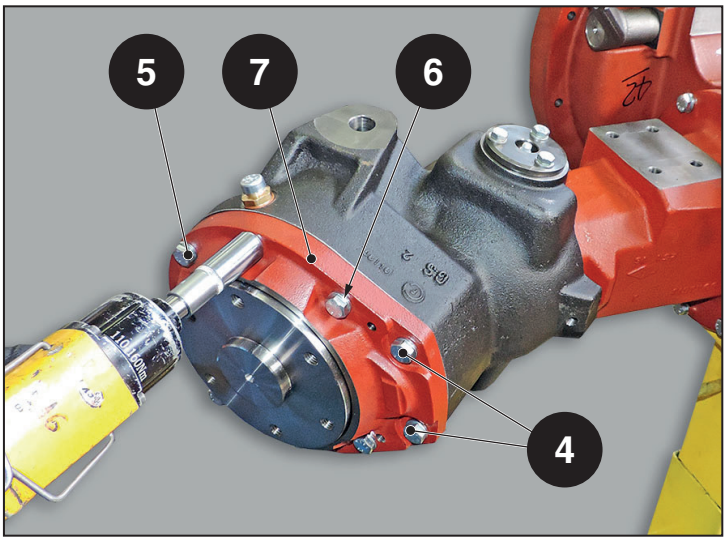


Fig. 8.60

4.1.1 Reassembling the steering cylinder

Loosen the steering cylinder screws (2) and centre the rod.

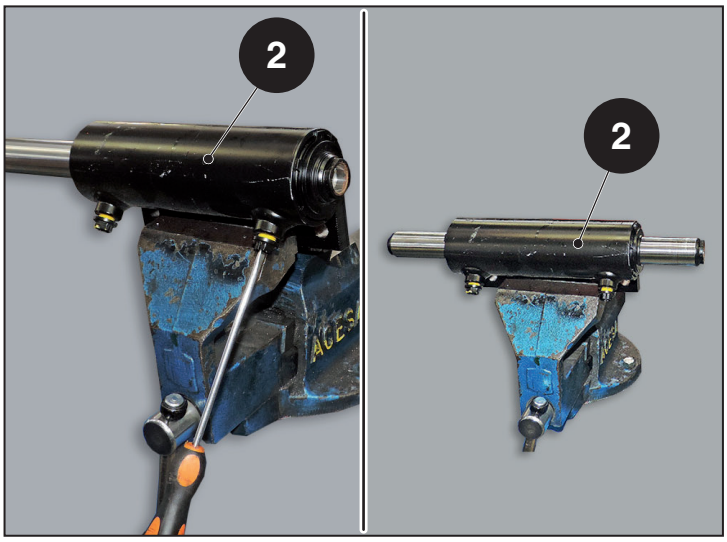


Fig. 8.61

Apply a coating of LOCTITE 270 to the thread of the ball joints (46) and then screw the ball joints (46) on the steering cylinder (2).

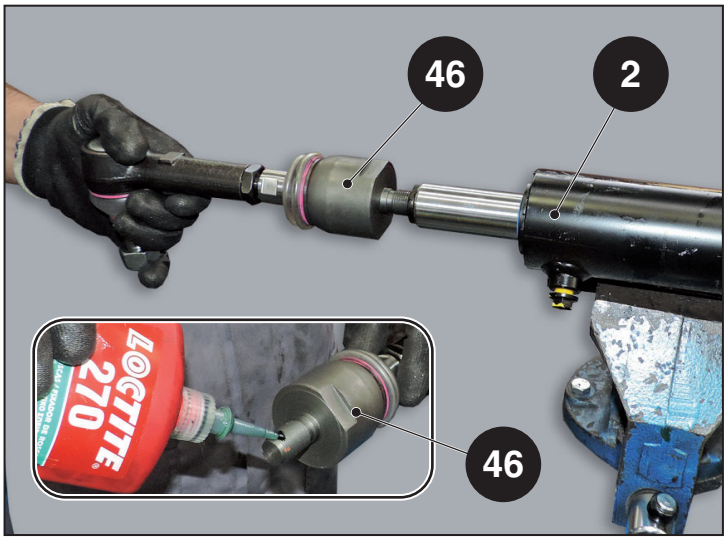


Fig. 8.62

Tighten the ball joints (46) completely to the steering cylinder (2).

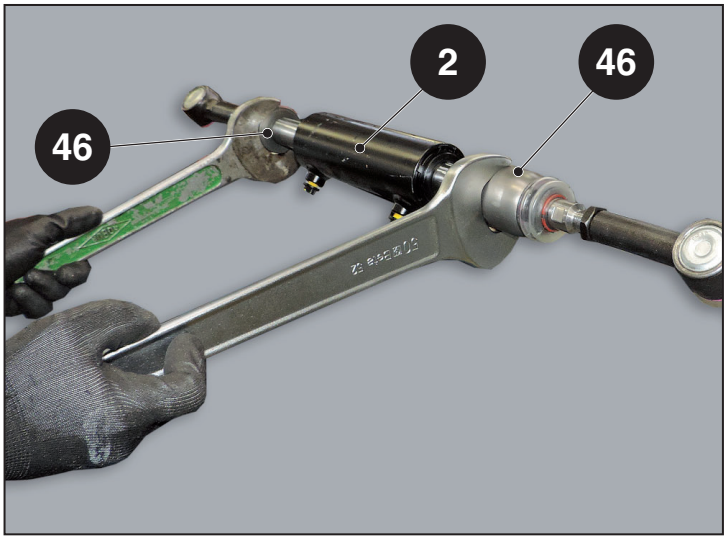


Fig. 8.63

Fasten the complete steering cylinder (2) on the differential case using the screws (47) and washers (48). Apply a tightening torque of 85 Nm (8.5 kgm).

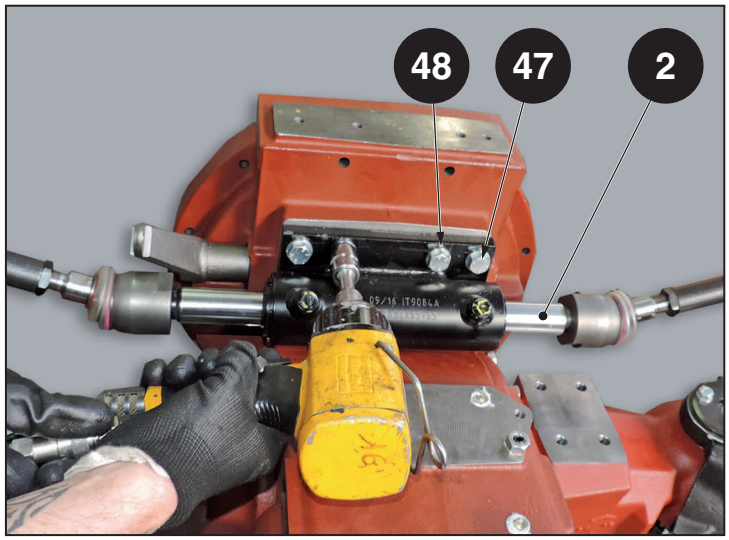


Fig. 8.64

Make a preliminary adjustment to the steering cylinder pins loosening them from the check nut by 6 or 7 threads.

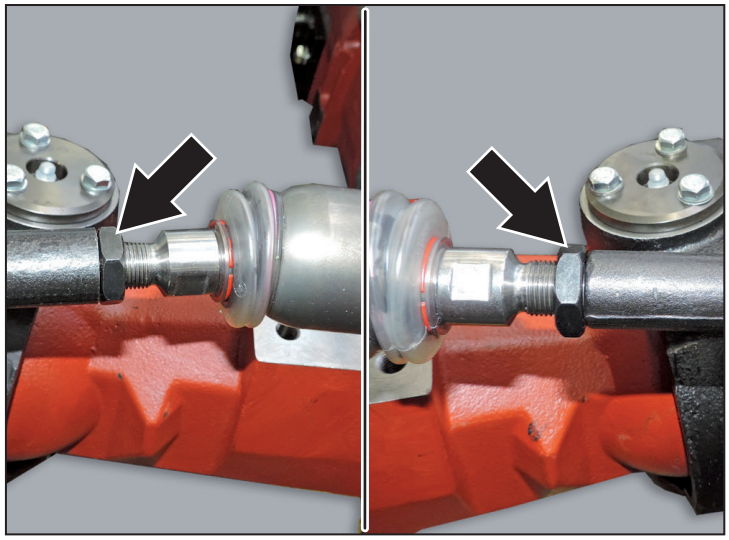


Fig. 8.65

Insert the steering cylinder pins into their seat on the knuckle flanges (3).

Tighten the nuts (1) to lock the steering cylinder pins in place. Apply a tightening torque of 120 Nm (12 kgm).

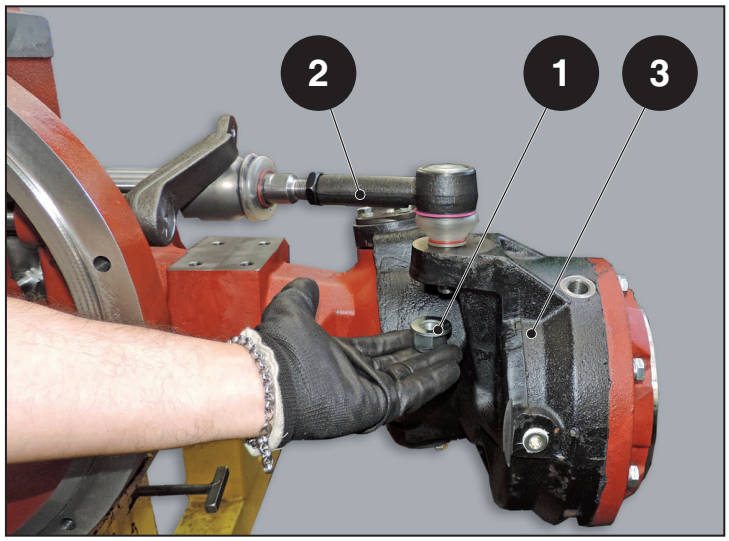


Fig. 8.66

4.1.2 Adjusting the steering cylinder

Tighten the special tools (C-p/n_____) for adjusting the toe angle.

Position the special tools (C-p/n_____) at right angles relative to the hubs.

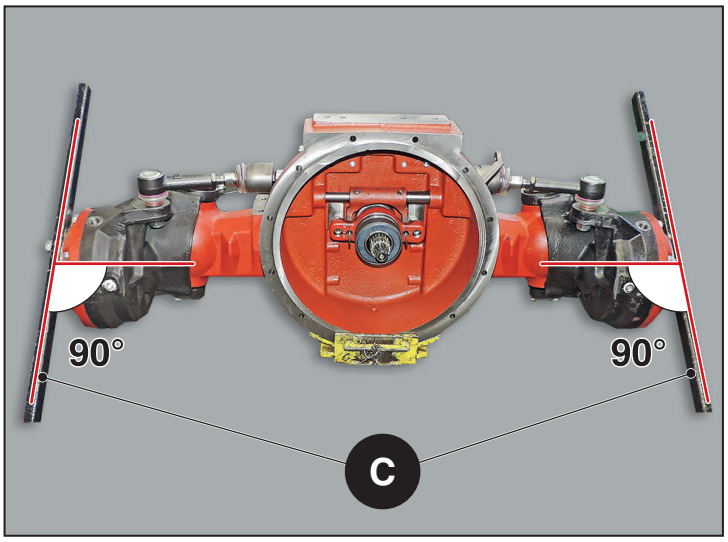


Fig. 8.67

Measure the distance between the ends of the tools (C) at the front (X) and rear (Y).

The values measured must satisfy the following formula:

Y = X + 2 to 5 mm

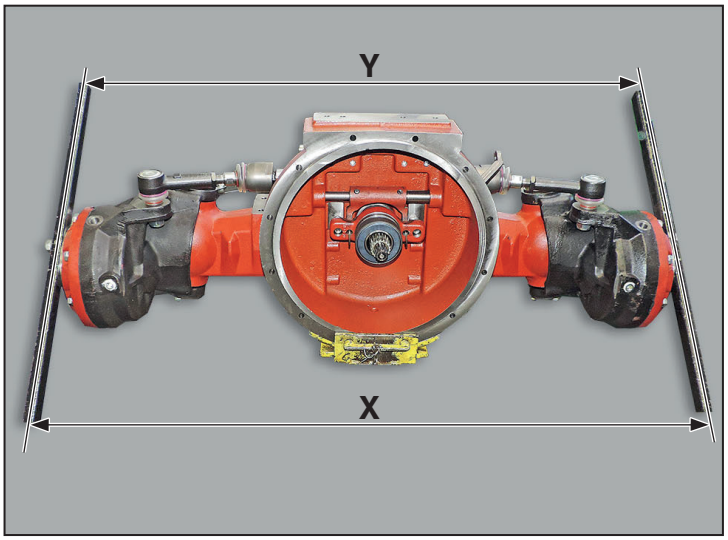


Fig. 8.68

Screw in or out the straight joints (D) to change the value of the dimensions (X) and (Y), see figure Fig. 8.68.

> **Warning**
>
> To have the same steering radius on the right and left, screw in or out the joints (D) equally on both sides.

Once the right toe angle is reached, tighten the nuts (E) of the steering cylinder pins by applying a tightening torque of 200 Nm (20 kgm).

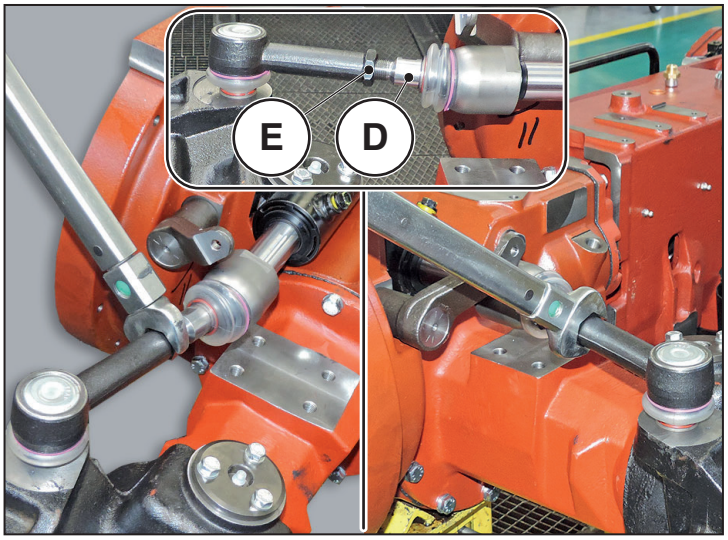


Fig. 8.69

4.1.3 Adjusting steering wheel end stop screw

Tighten the steering wheel end stop screw (49), complete with the check nut (50), on the knuckle flange. Leave a distance of about 20 mm between the head of the screw (49) and the knuckle flange wall , and then tighten the check nut (50) to secure the position of the screw (49). Do this for both drive final drive units.

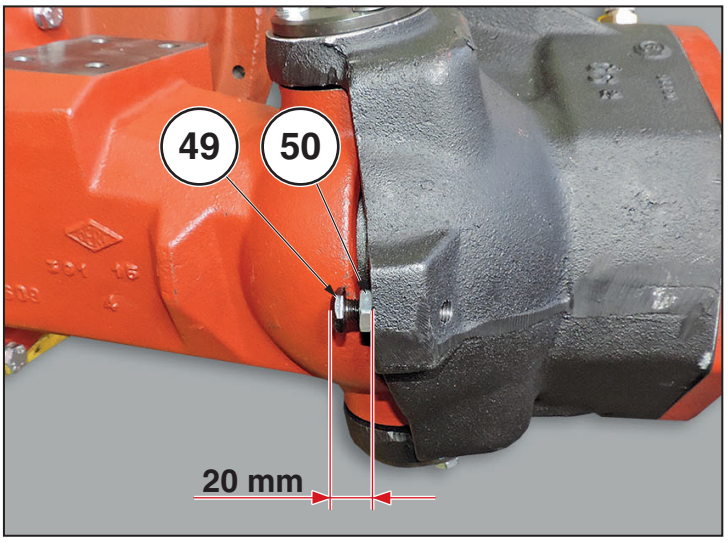


Fig. 8.70

Reassemble by following the procedure for disassembly in reverse order.

4.2 Fixed final drive units (SN and SN+ Cluster)

Fit the outer races of the bearings (25) on the final drive units.

Fit the inner bearing races (25) on the crown wheel assembly (26).

> **Warning**
>
> For detailed instructions on reassembling the front differential, refer to the Chapter “Front differential”.

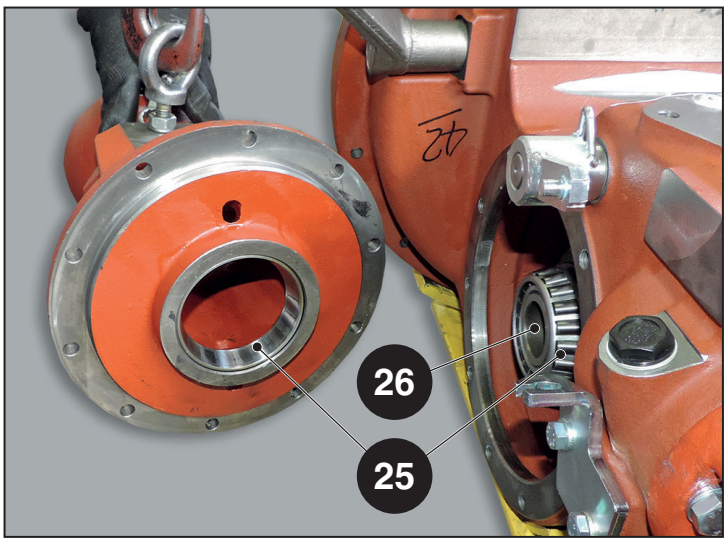


Fig. 8.71

Apply a coating of silicone sealant to the mating surfaces of the final drive units.

Secure the final drive units to a lifting equipment of adequate load capacity and mount them on the differential case.

> **Attention**
>
> Make sure that the hoist used is in perfect working order and is of adequate lifting capacity.

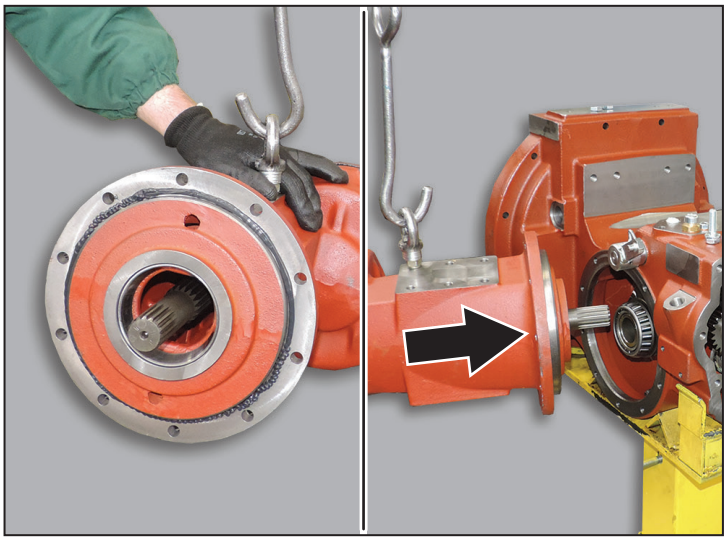


Fig. 8.72

Tighten the screws (27) and the washers (28) fastening the final drive units. Apply a tightening torque of 70 Nm (7 kgm).

> **Warning**
>
> **For versions with mechanical differential lock**
>
> Before tightening the topmost screw of the left drive unit, fit the plate (29). Fasten the spring (30) to the differential lock lever (31).
>
> Tighten the hooks of the spring (30) and rotate the plate (29) in order to pretension the spring.

Reassemble by following the procedure for disassembly in reverse order.

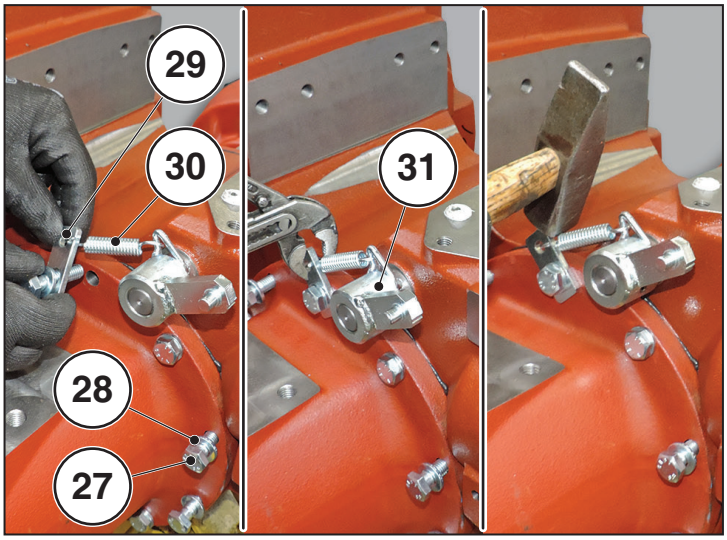


Fig. 8.73

Section 5 : Tightening specifications

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5.1 Tightening specifications 8-42

5.1 Tightening specifications

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	120	12
Steering cylinder — differential case fastener screws	85	8.5
Hub-differential case fastener screws	70	7
Reduction gear cover fastener screws	60	6
Knuckle pin fastener screws	25	2.5
Steering cylinder ball joints	200	20

Section 6 : Tools necessary

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6.1 Tools necessary 8-44

6.1 Tools necessary

p/n	Description	Quantity
A-p/n _____	Knuckle flange lifting tool	1
B-p/n _____	Half-axle pinion knuckle lock	1
C-p/n _____	Hub lifting tool	1
D-p/n _____	Wheel toe angle bar	2

Chapter 9 : Rotary mount

Index

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4.1 Tightening specifications 9-34

Section 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.

Section 2 : Disassembly

Index

2.1 Disassembly 9-4

2.1 Disassembly

Undo the screws (48) and remove the grips (47).

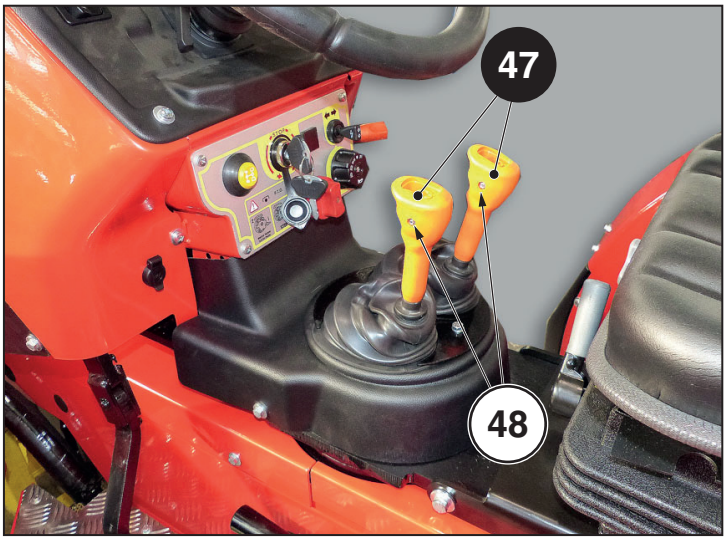


Fig. 9.1

Undo the screws (46) and gear lever cover (43) together with the casing retainer plates (45).

Remove the casings (44) from the gear lever cover (43).

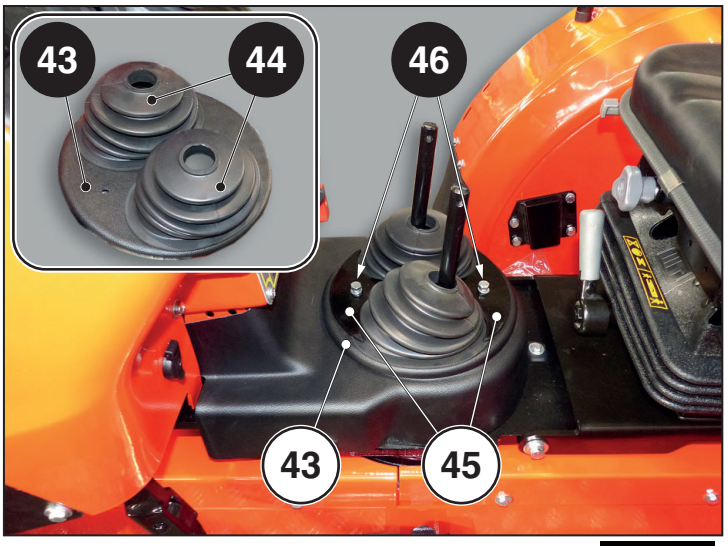


Fig. 9.2

Undo the screws (42) and remove the gear lever guard (41).

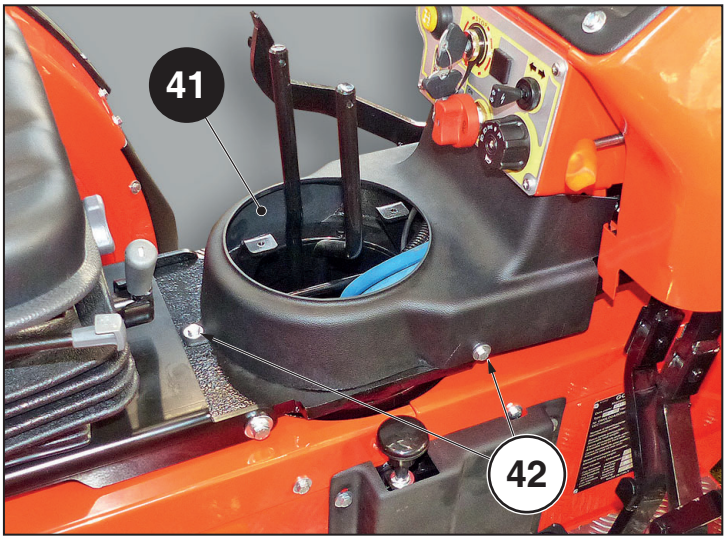


Fig. 9.3

Remove the steering wheel with the relevant extractor tool.

Note
Extractor tool: P/N 07006212.



Fig. 9.4

Undo the screws (20) and remove the central tunnel plate and cover (40).

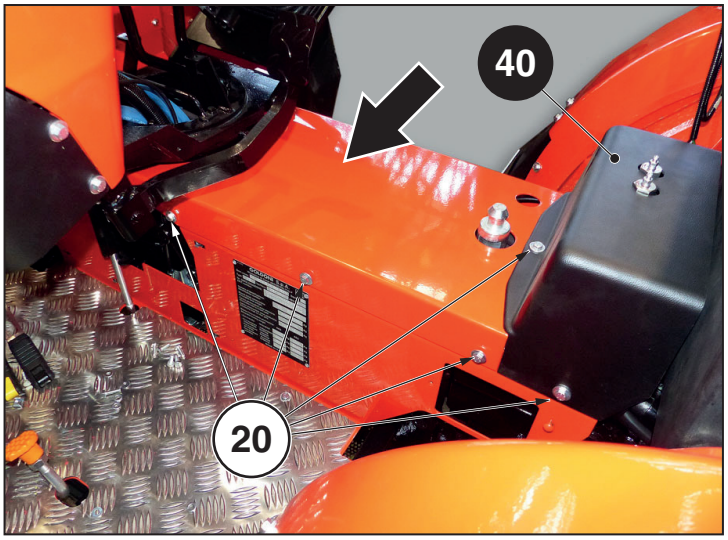


Fig. 9.5

Undo the screws (39) and remove the guide module cover (38).

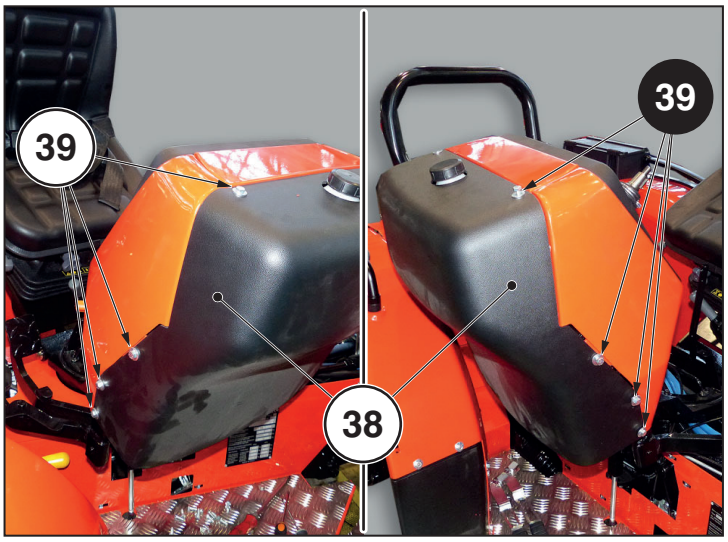


Fig. 9.6

Undo the screws (36) to separate the front lateral panels (34) from the pedal support (37).

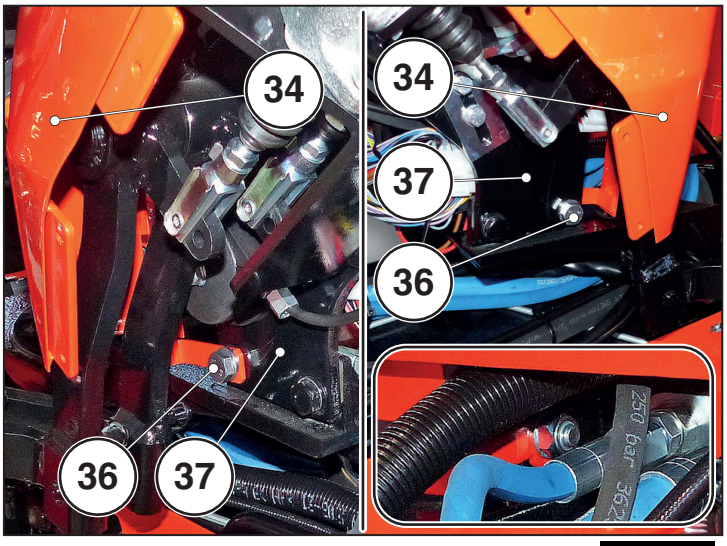


Fig. 9.7

Undo the instrument cluster screws (35). Separate the upper instrument cluster and the lower instrument cluster from the front lateral panels.

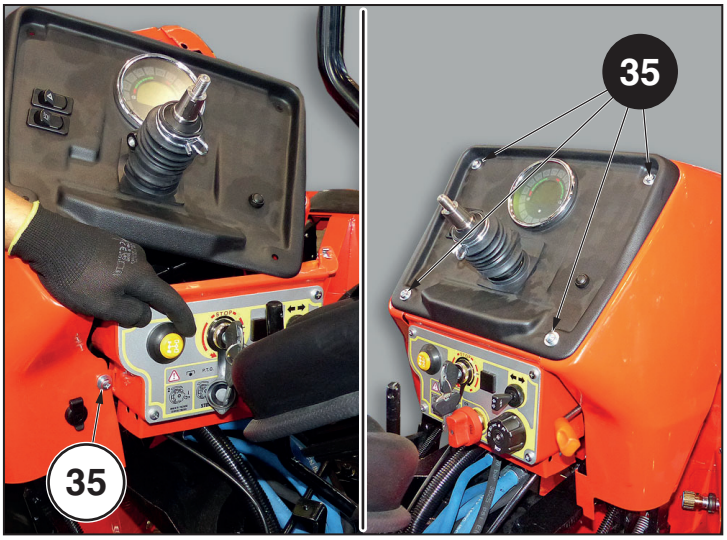


Fig. 9.8

Undo the screws and disconnect the connector; then remove the front lateral panels (34).

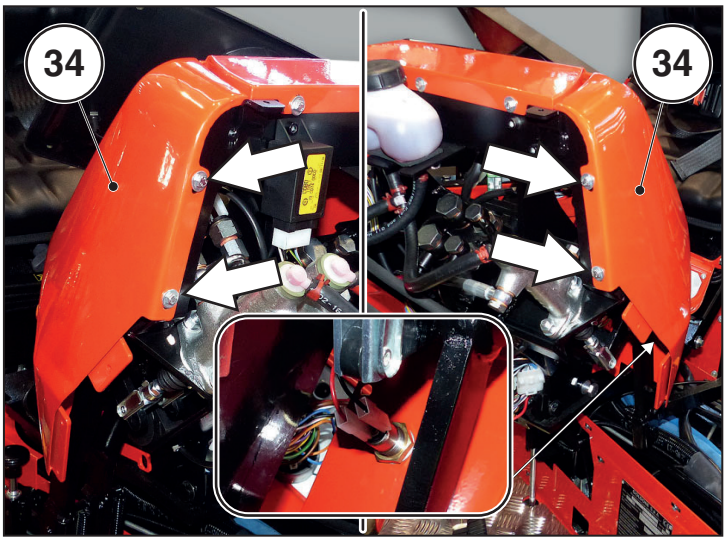


Fig. 9.9

Remove the upper front lateral panels (33).

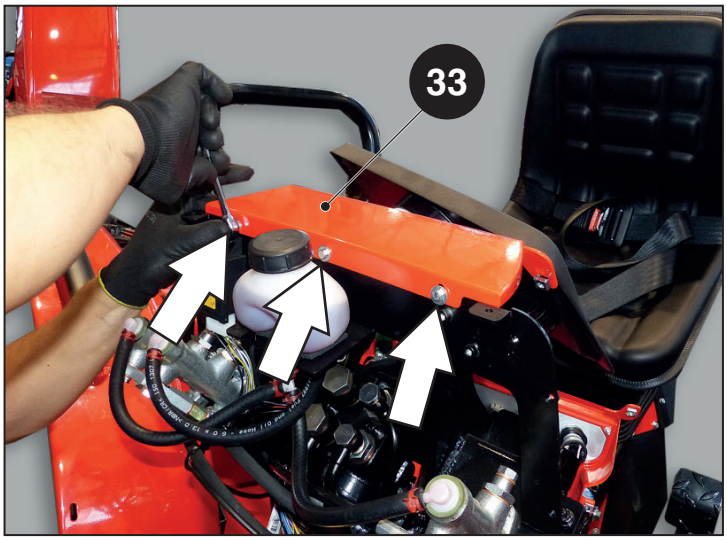


Fig. 9.10

Remove the plates from the central body.

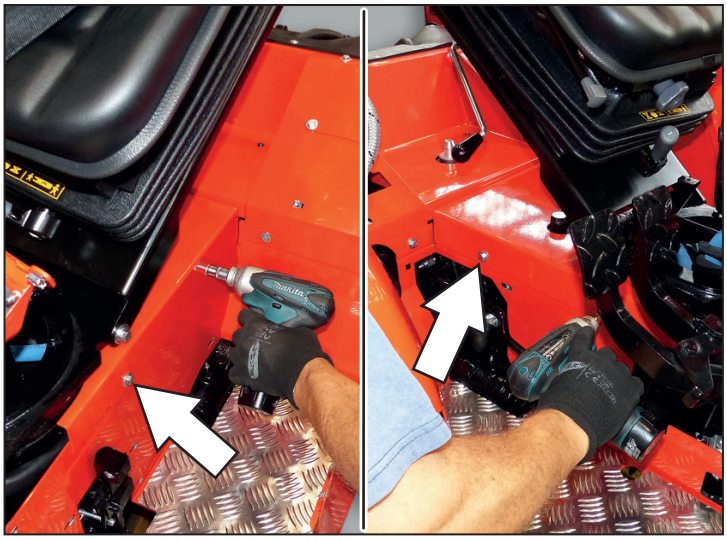


Fig. 9.11

Remove the complete seat mount.

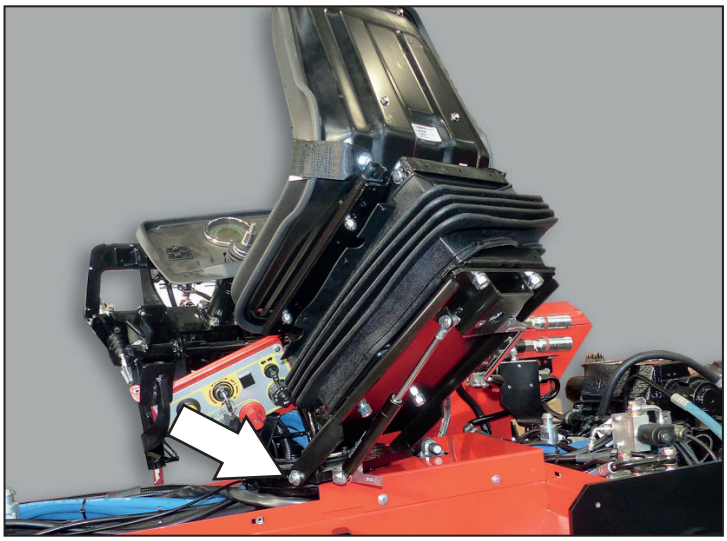


Fig. 9.12

Loosen the ferrule (31) and terminal (32); then pull out the hand throttle cable in the linkage (30).

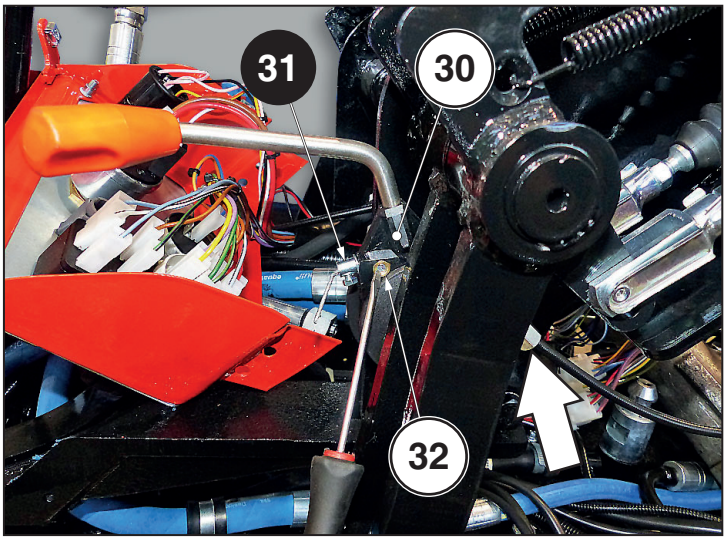


Fig. 9.13

Disconnect the connectors of the clutch enable switch (29).

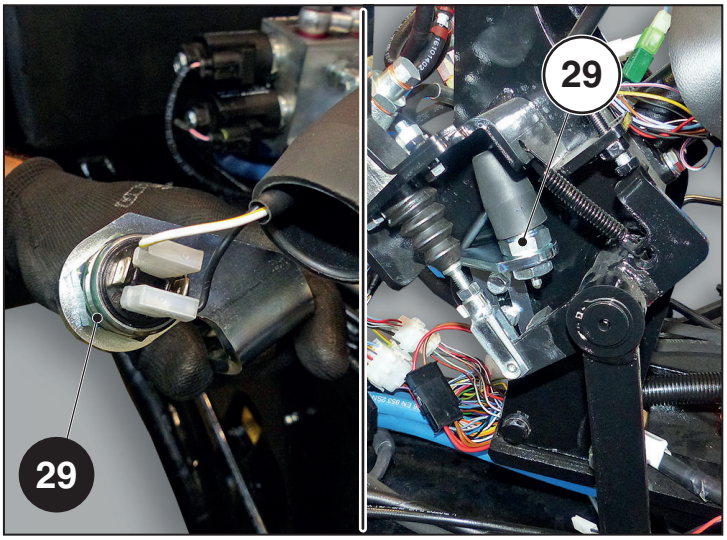


Fig. 9.14

Disconnect the connectors from the brake bulb (28).

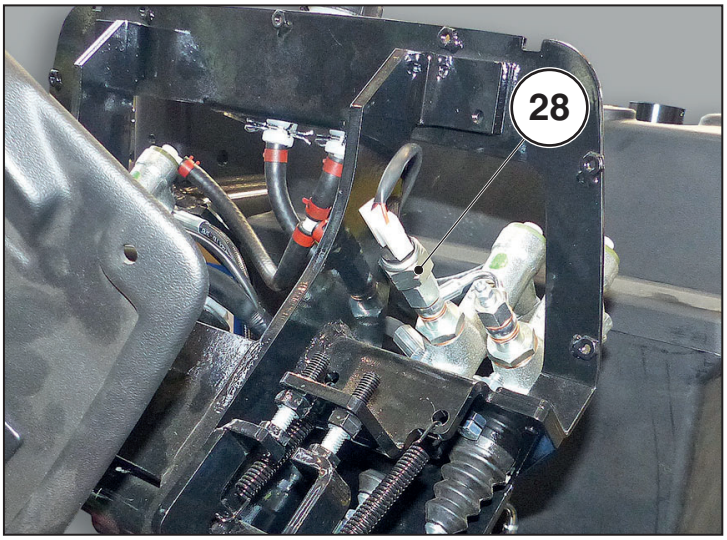


Fig. 9.15

Disconnect the multifunction and lower instrument cluster connectors.

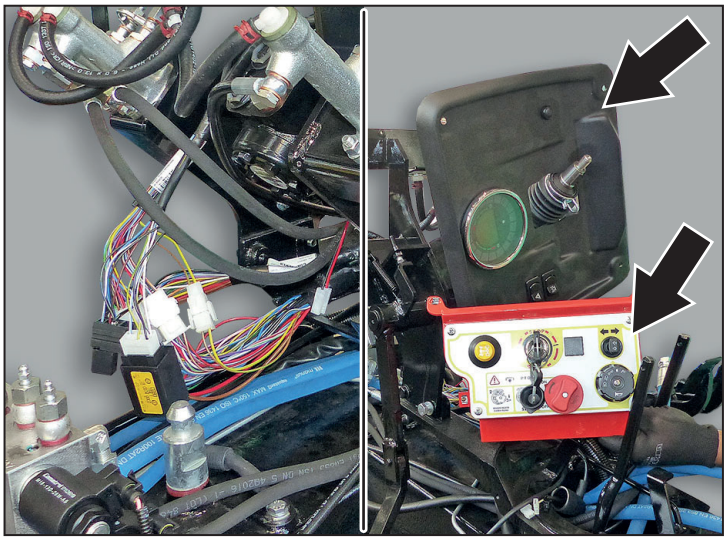


Fig. 9.16

Disconnect the connectors of the flow reverse switch (27).

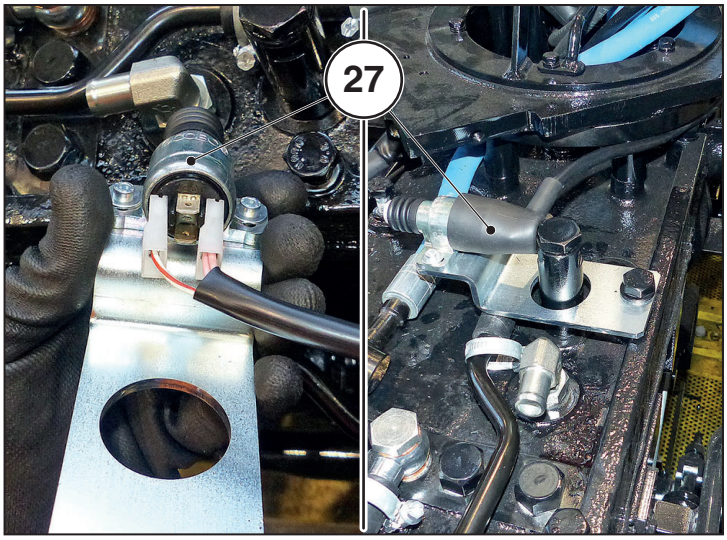


Fig. 9.17

Disconnect the hoses from the connectors mount (23):

- filter-hydraulic steering delivery (24);
- hydraulic steering-valve drain (25);
- right steering wheel delivery, hydraulic steering-valve (17A);
- left steering wheel delivery, hydraulic steering-valve (17B).

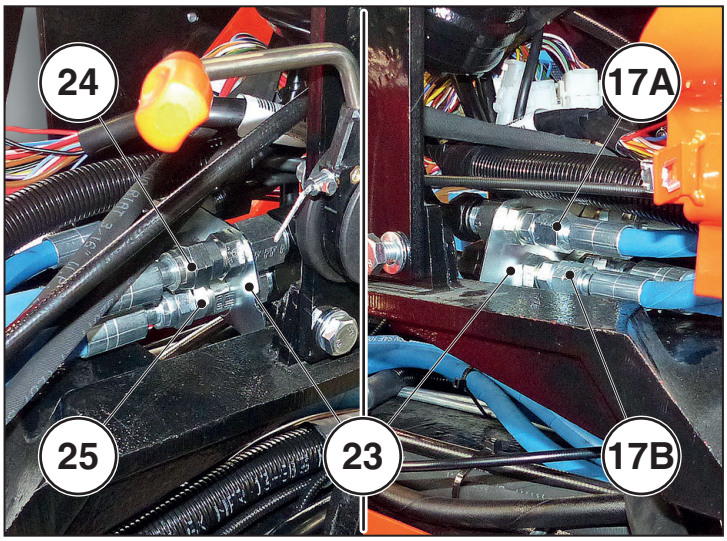


Fig. 9.18

Disconnect the connector of the right brake tube (22) from the brake pump.

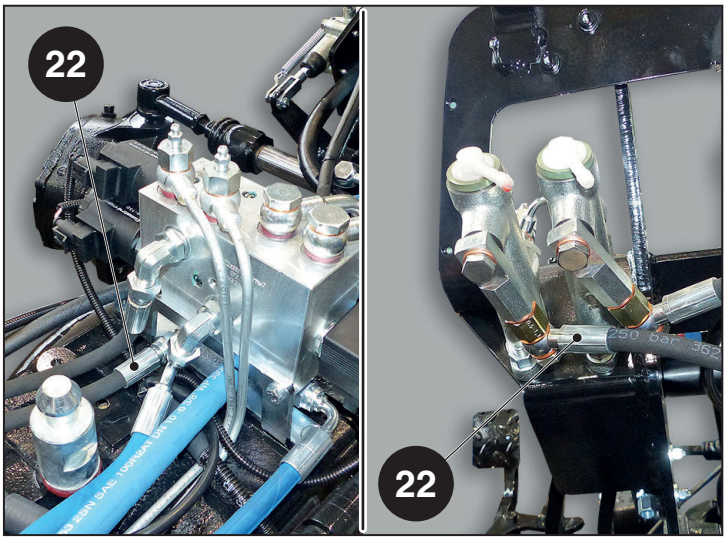


Fig. 9.19

Disconnect the connector of the left brake tube (21) from the brake pump.

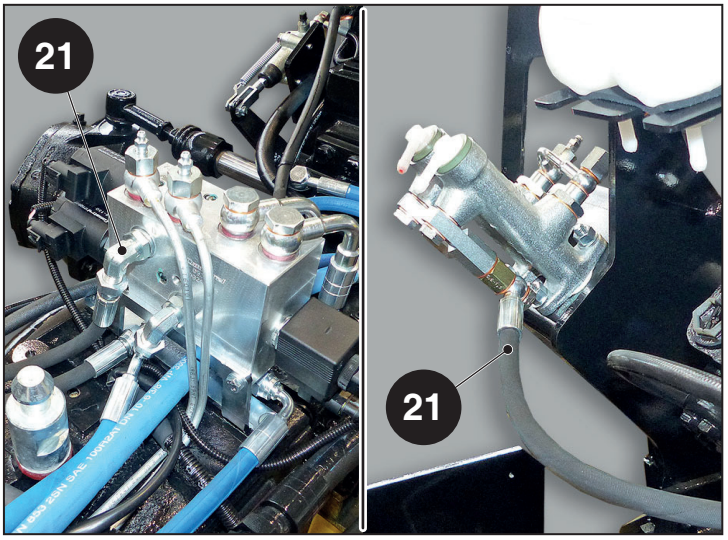


Fig. 9.20

Pull out the tubes (22) and (21) from the rotary mount (8).

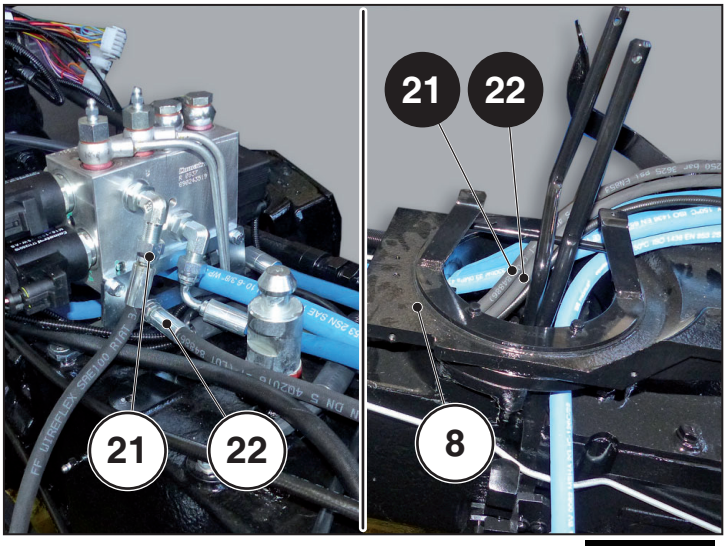


Fig. 9.21

Disconnect the connector of the tube (19) from the clutch control actuator from the clutch pump (26).

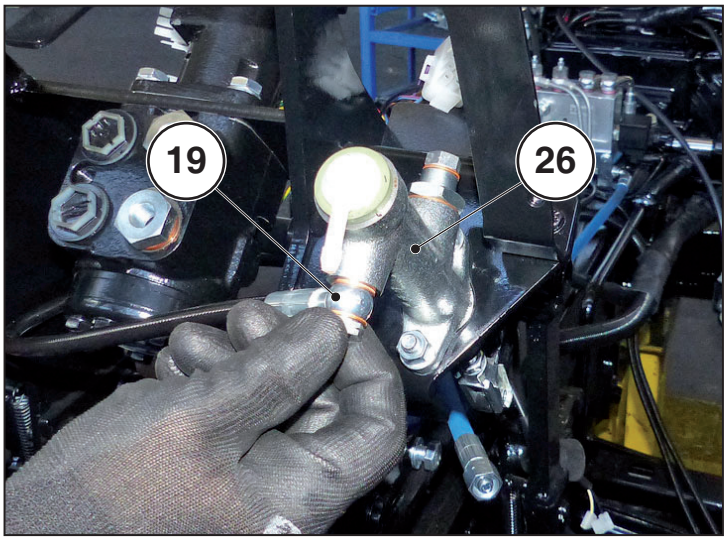


Fig. 9.22

Pull out the tube (19) from the rotary mount (8).

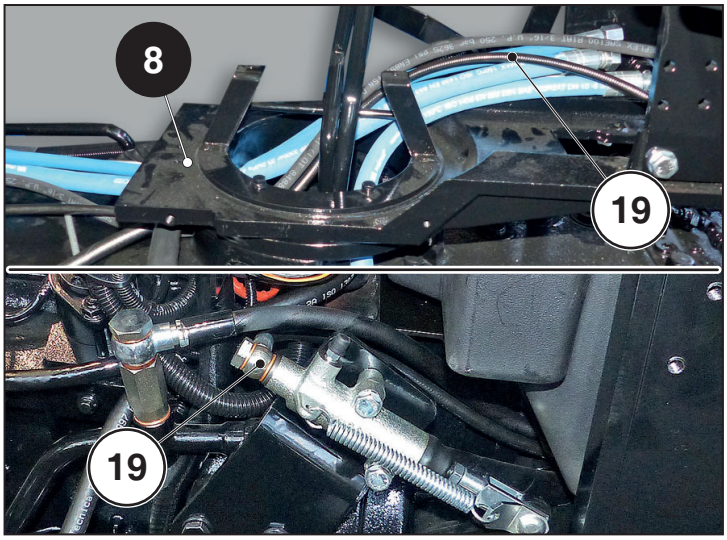


Fig. 9.23

Pull out the hydraulic steering-flow reverse control unit tubes (17) from the rotary mount (8).

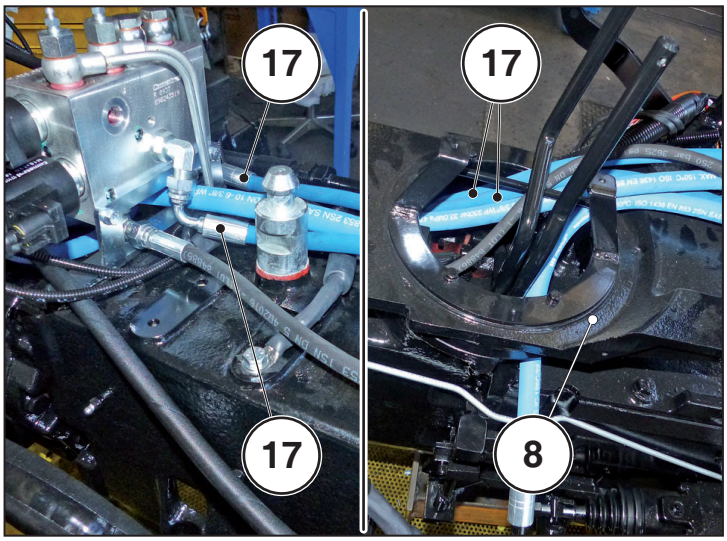


Fig. 9.24

Pull out the hydraulic steering-valve drain tube (25) from the rotary mount (8). If necessary, unscrew the clamp to make it easier to pull out the tube.

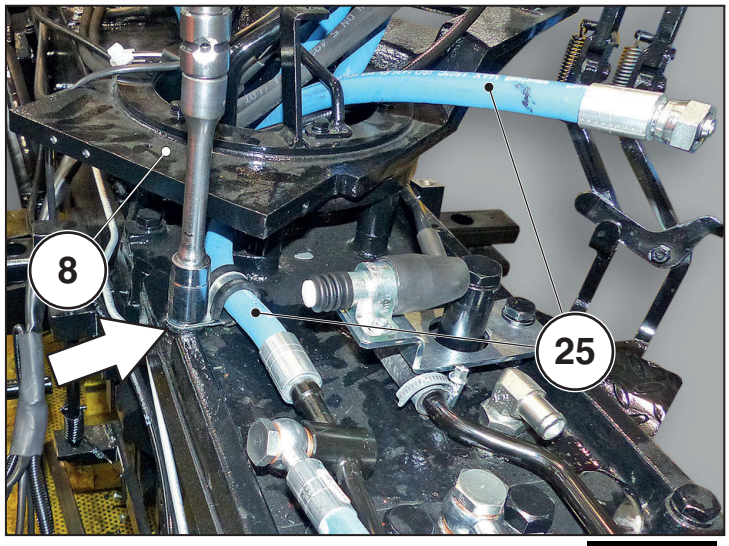


Fig. 9.25

Pull out the filter-hydraulic steering delivery tube (24) from the rotary mount (8).

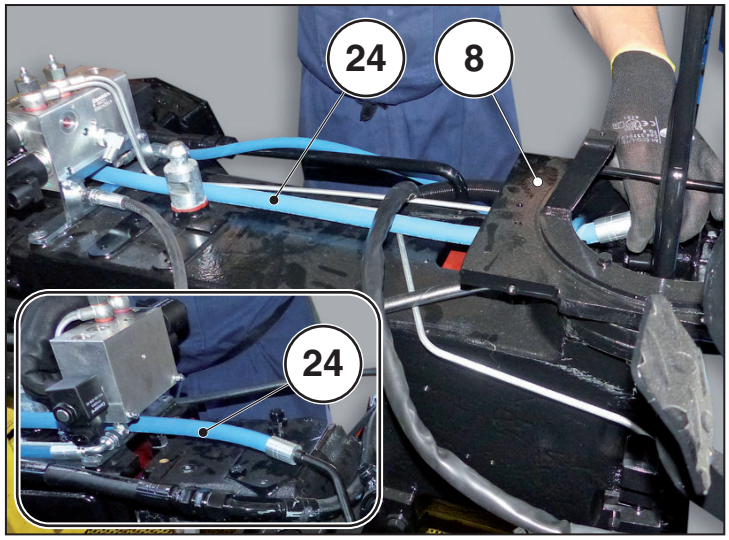


Fig. 9.26

Warning

Make sure to have pulled out all seven tubes from the rotary mount.

17A - Hydraulic steering-reverse control unit right delivery
17B - Hydraulic steering-reverse control unit left delivery
19 - Clutch-actuator pump
21 - Left brake-reverse control unit pump
22 - Right brake-reverse control unit pump
24 - Filter-hydraulic steering delivery
25 - Hydraulic steering-PTO clutch valve drain

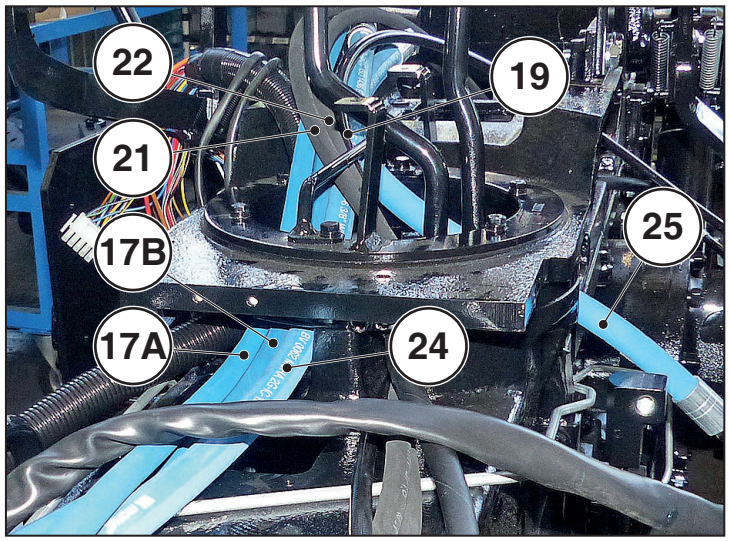


Fig. 9.27

Pull out the instrument cluster wiring loom (15) from the rotary mount (8).

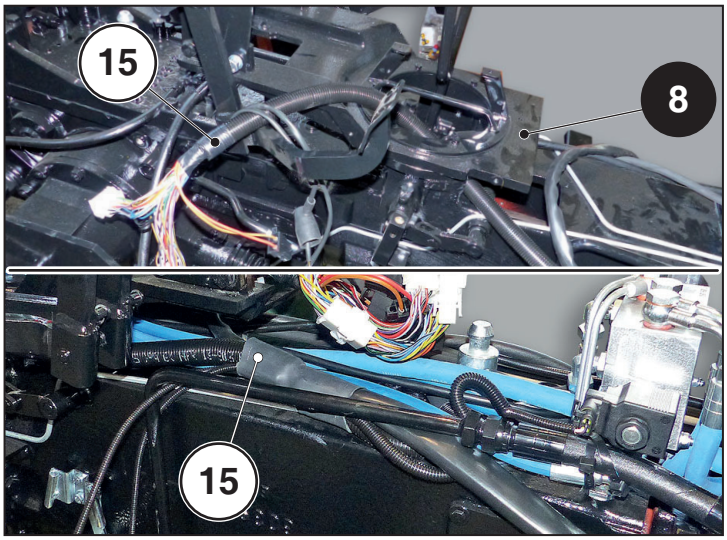


Fig. 9.28

Secure the entire rotary mount with a hoist of suitable load capacity.

> **Danger**
>
> Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

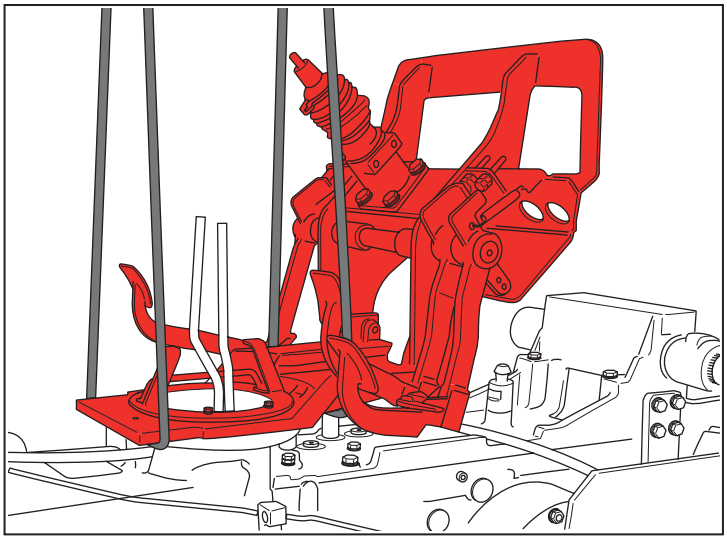


Fig. 9.29

Undo the screws (10) and (13), remove the washers (11) and then remove the retainer ring (12) and bracket (14).

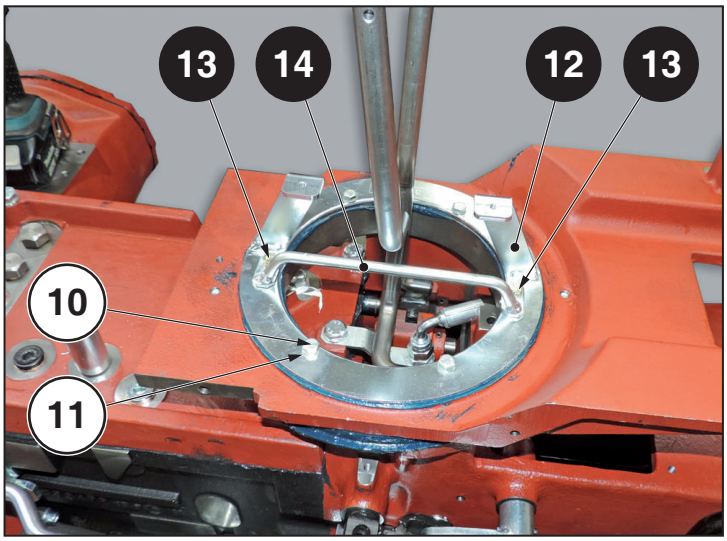


Fig. 9.30

Remove the rotary mount (8) from the central bush (4).

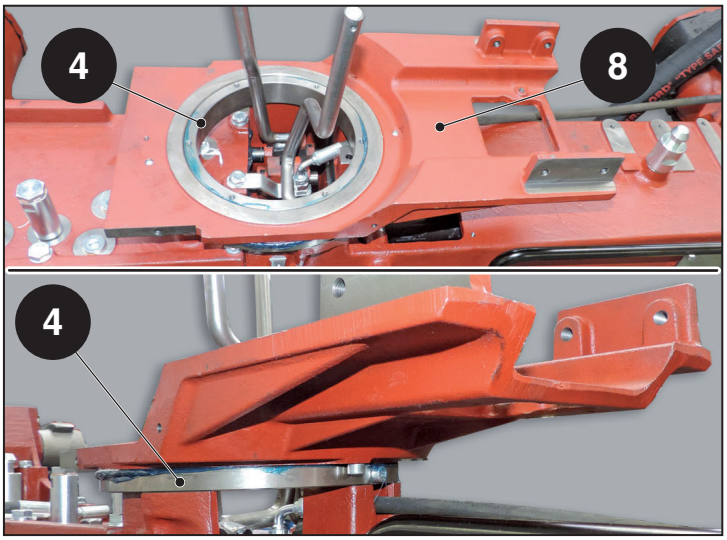


Fig. 9.31

Undo the hex socket screws (5) and (6) and remove the knurled washers (7) fastening the central bush (4).

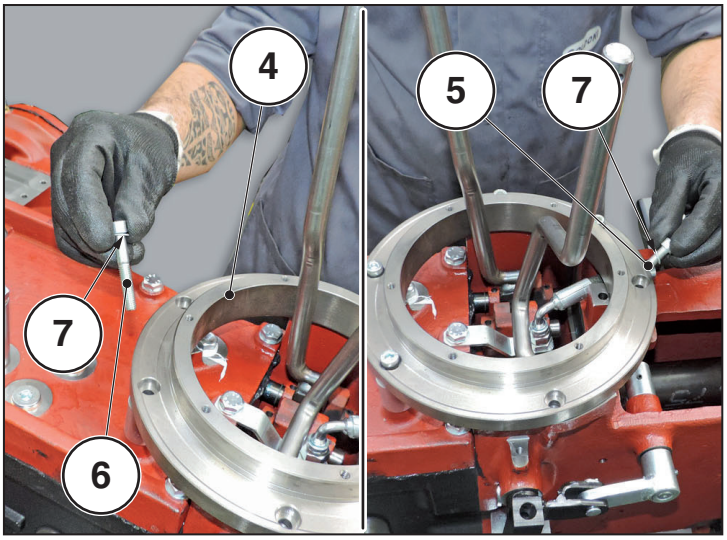


Fig. 9.32

Remove the central bush (4) from the casing and undo the hex socket screws (3).

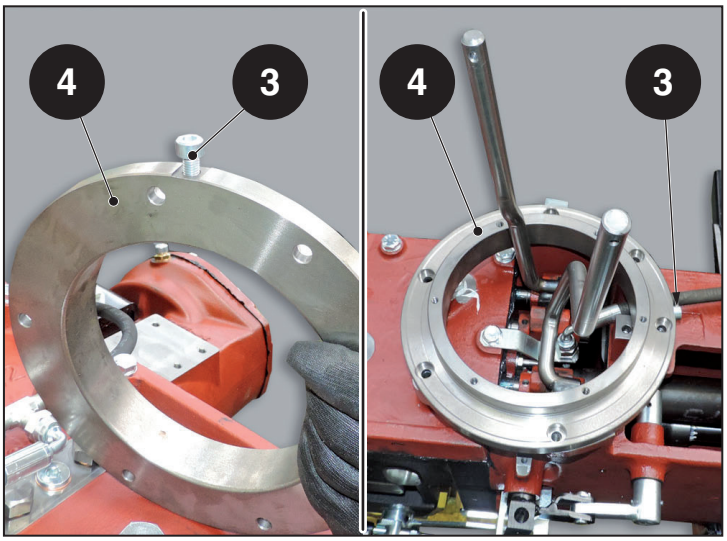


Fig. 9.33

Remove the circlips (1) and the washers (2).

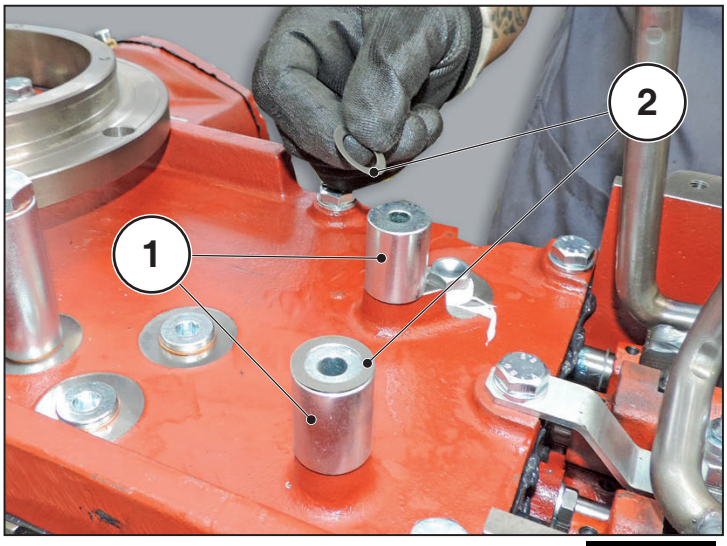


Fig. 9.34

Section 3 : Main inspection, reassembly and adjustment procedures

Index

3.1 Main inspection, reassembly and adjustment procedures 9-18

3.1 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 spacers (1) and the washers (2).

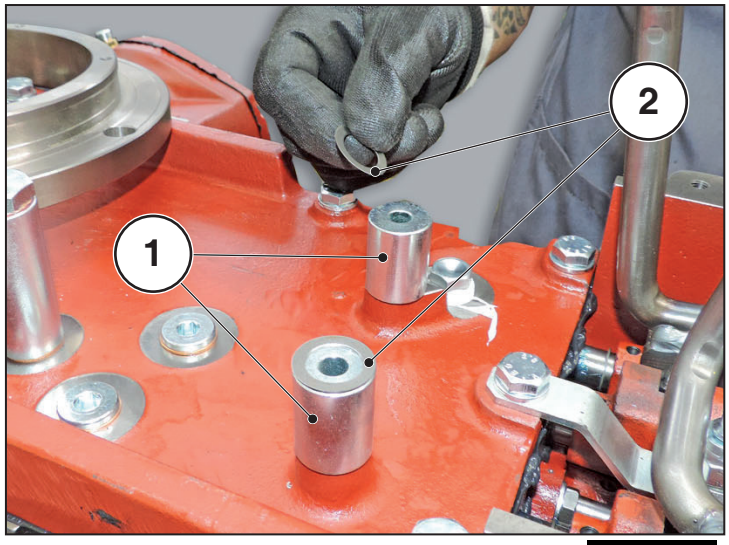


Fig. 9.35

Make sure that the forced lubrication tube is connected and positioned correctly.

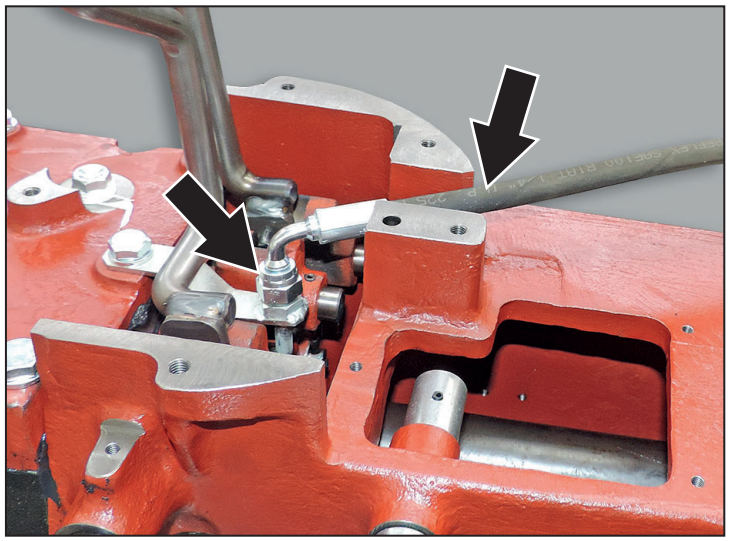


Fig. 9.36

Tighten the hex socket screw (3) on the central bush (4).

Position the central bush (4) on the casing, with the screw (3) facing forward and aligning the holes with the matching underlying ones.

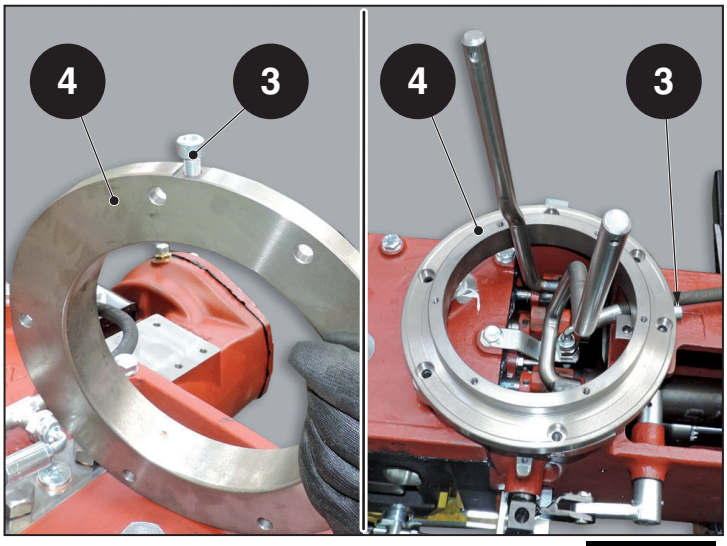


Fig. 9.37

Tighten the hex socket screws (5) and (6) with the knurled washers (7) to fasten the central bush (4). Apply a tightening torque of 60 Nm (6 kgm).

Warning

The screws (6) are long and must be tightened into the two holes on the spacers (1, see figure 9.34).

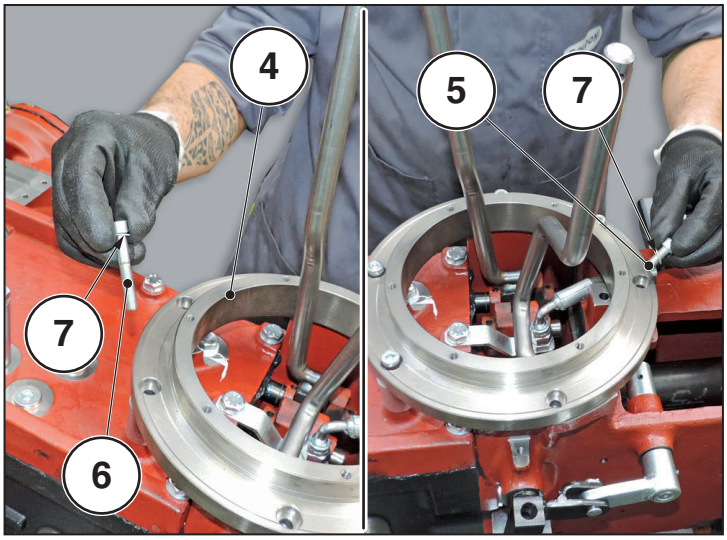


Fig. 9.38

Apply an abundant amount of grease to the central bush (4).

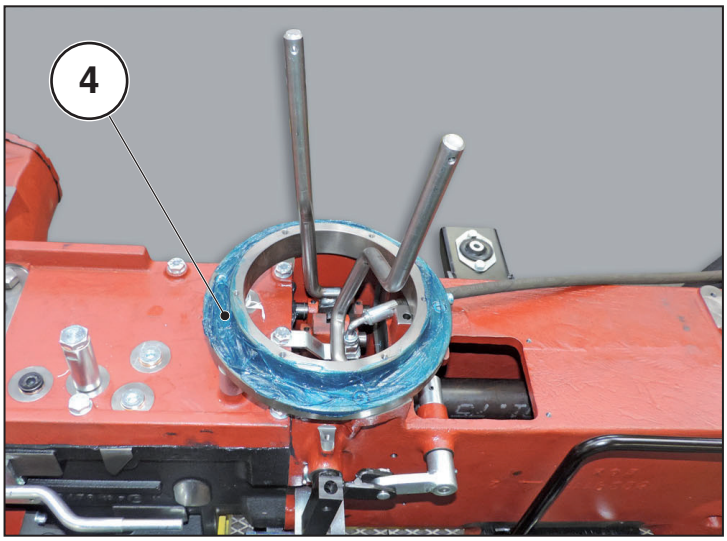


Fig. 9.39

Mount the rotary support (8) on the central bush (4), making sure to position the screw (9) to the right of the retainer screw (3).

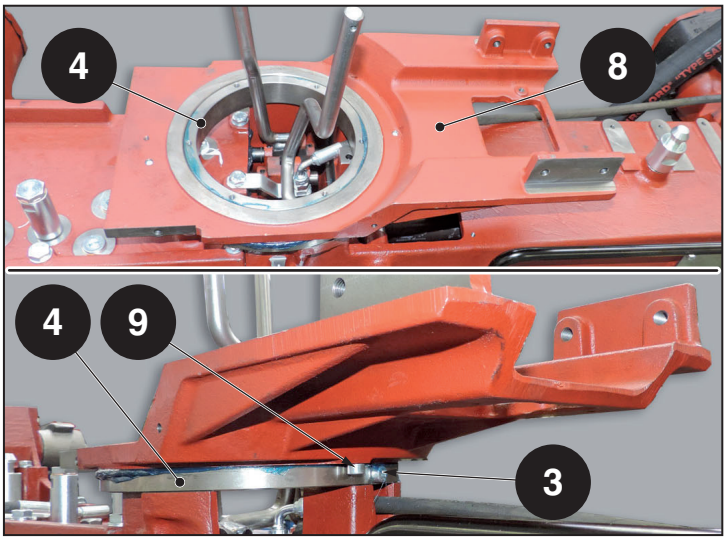


Fig. 9.40

Apply a coat of grease to the central bush (4) and to the rotary support (8).

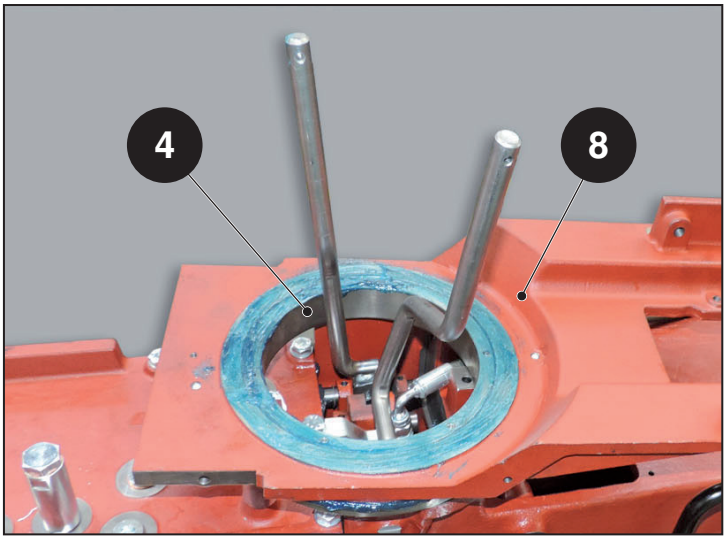


Fig. 9.41

Tighten the screws (10), with the washers (11), to fasten the retainer ring (12). Tighten the screws (13), with the washers (11), to fasten the bracket (14). Apply a tightening torque of 30 Nm (3 kgm) to tighten all the screws.

Warning

The bracket (14) must be mounted with the fastening plates facing to the left.

Note

The fastening screws (13) of the bracket (14) are longer than the screws (10).

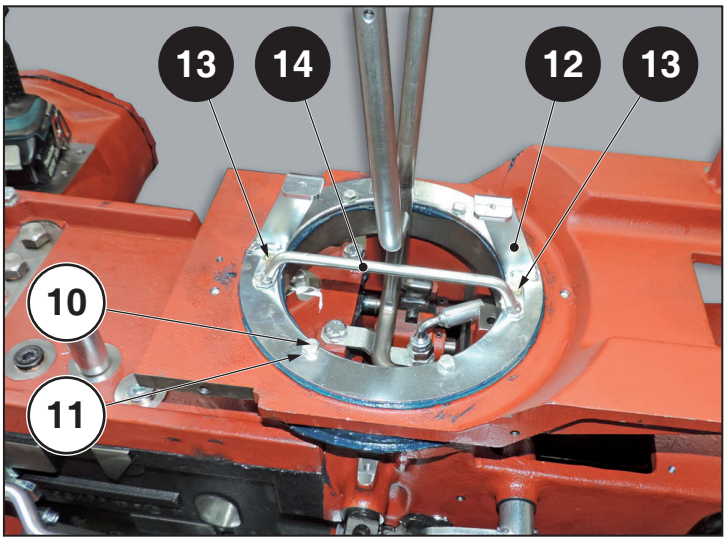


Fig. 9.42

Make sure that the mount (8) turns freely.

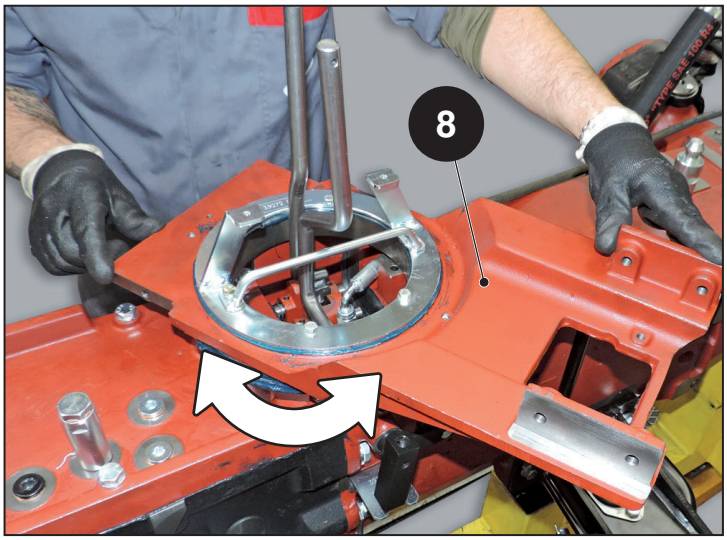


Fig. 9.43

Insert the instrument cluster wiring loom (15) in the rotary mount (8), making sure to position it to the left of the bracket (14).

Warning

The instrument cluster wiring loom 15) must slide under the stiff delivery tube (16) to the rear distributors.

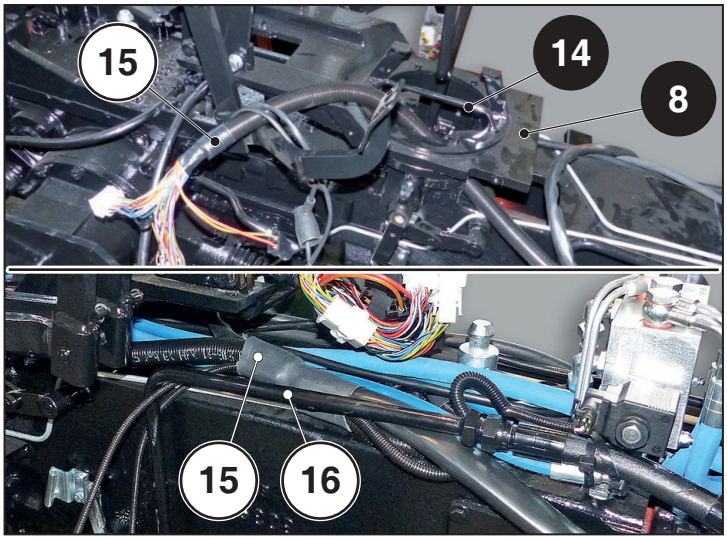


Fig. 9.44

Tighten the connector (17) of the hydraulic steering-control unit left delivery tube 18) and insert it inside the rotary mount (8).

Warning

The tube (17) must be positioned to the left of the bracket (14).

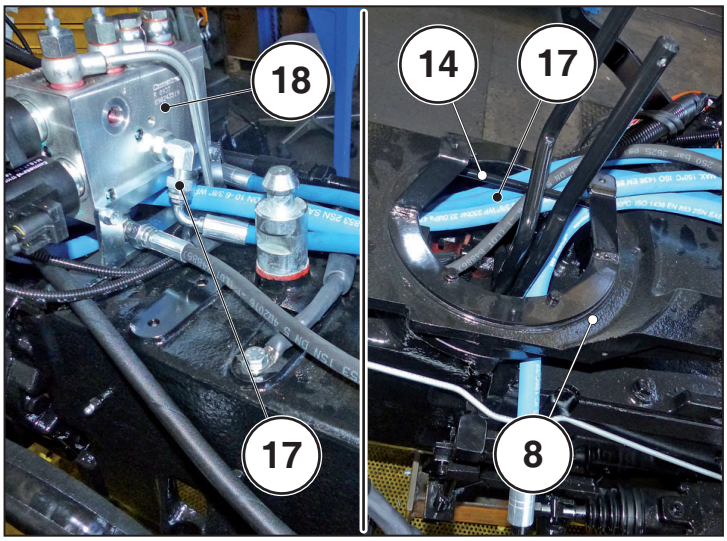


Fig. 9.45

Insert the pump-clutch actuator connection tube (19) on the rotary mount (8); the end of the tube with the wider connector must face forward.

> **Warning**
>
> The tube (19) must be positioned to the left of the bracket (14).

Fit the connector of the tube (19) on the clutch control actuator (20).

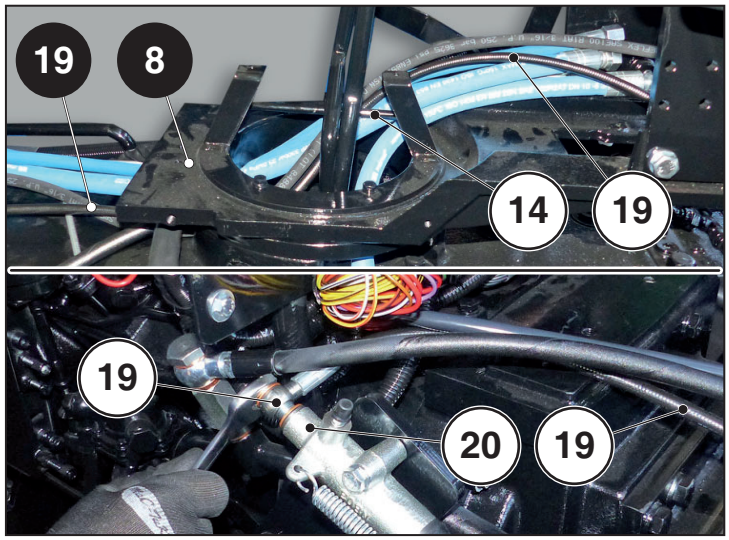


Fig. 9.46

Fit the tube (21) on the flow reverse control unit (18).

Insert the tubes (22) and (21) on the rotary mount (8), making sure to position them to the left of the bracket (14).

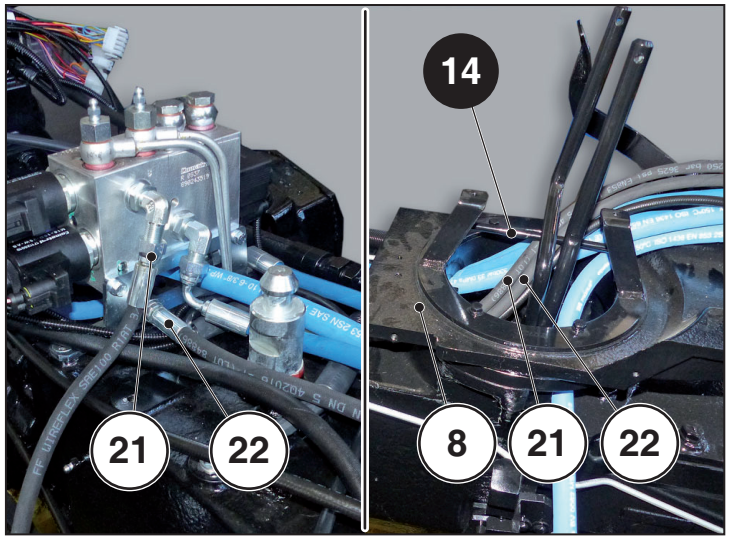


Fig. 9.47

Fit the hydraulic steering-valve drain tube (25) on the rotary mount (8). Fasten the clamp to the gearbox casing.

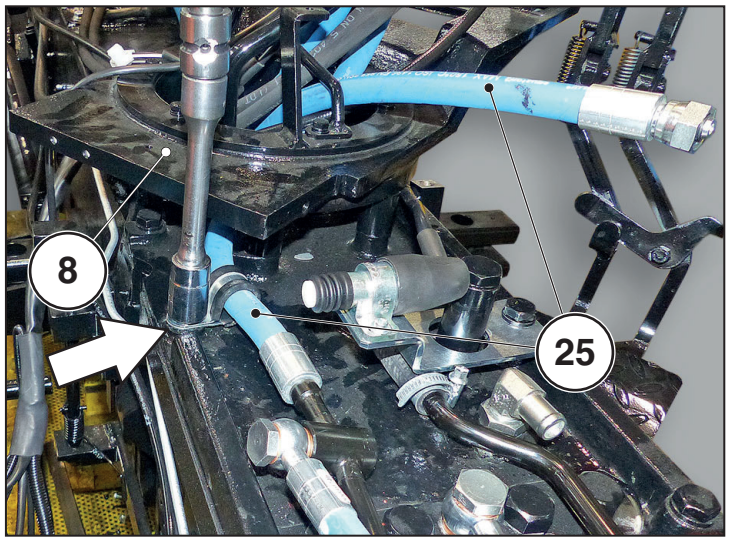


Fig. 9.48

Make sure that the tube (25) does not rub against the plug; otherwise, lift the tube fastening clamp.

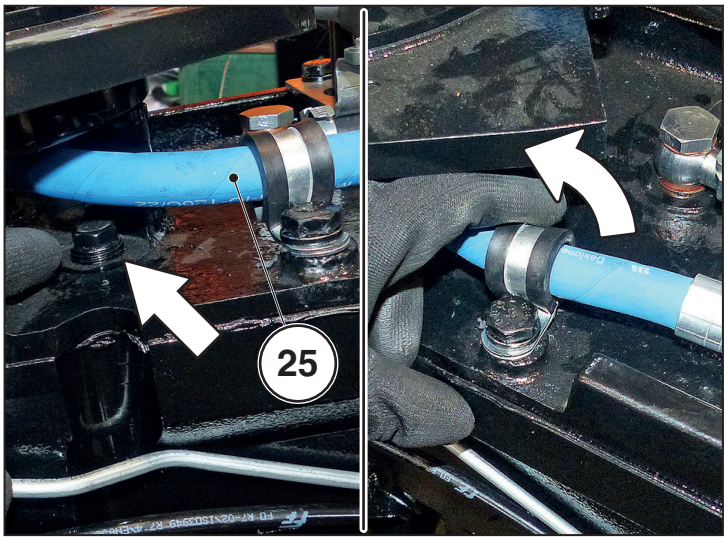


Fig. 9.49

Make sure that the hydraulic tubes and the wiring loom are fit on the rotary mount (8) in an orderly manner.

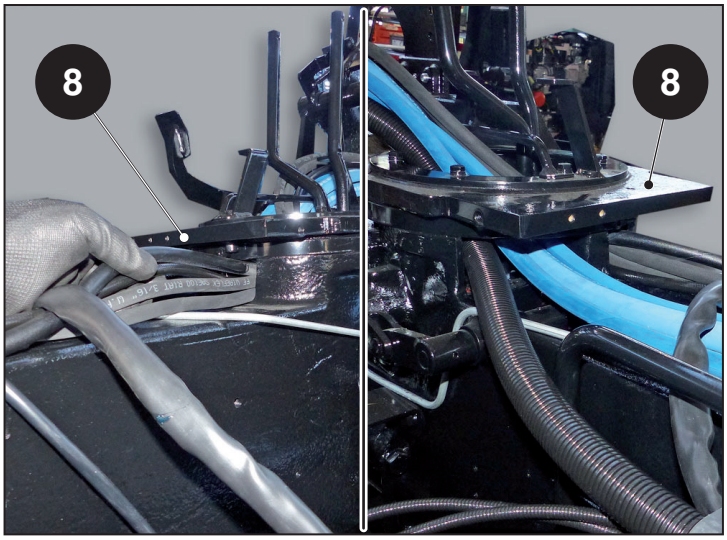


Fig. 9.50

Connect the hoses to the connectors mount (23):

- filter-hydraulic steering delivery (24);
- hydraulic steering-valve drain (25);
- right steering wheel delivery, hydraulic steering-valve (17A);
- left steering wheel delivery, hydraulic steering-valve (17B).

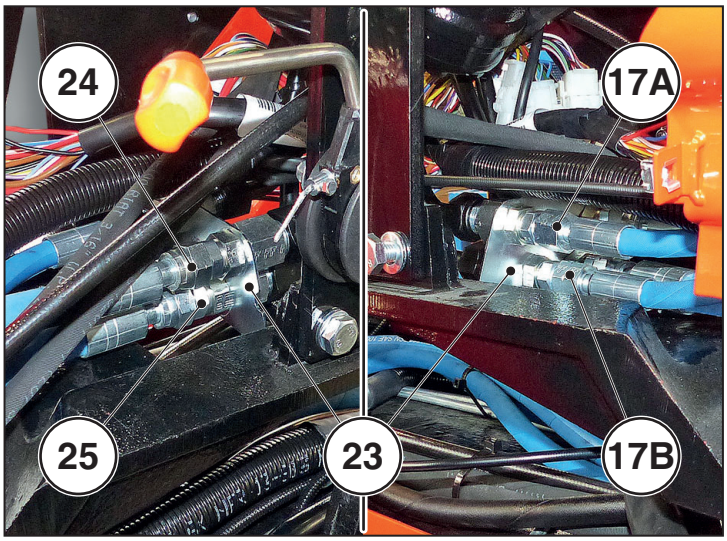


Fig. 9.51

Fit the connector of the actuator tube (19) to the clutch pump (26).

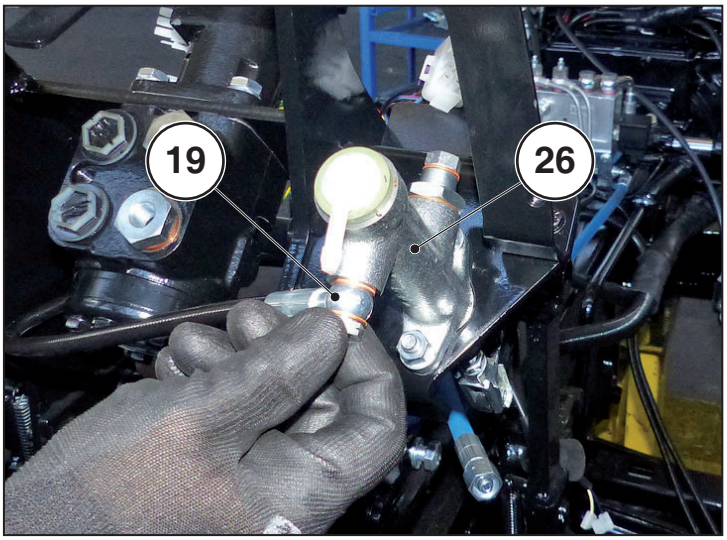


Fig. 9.52

Connect the connector of the left brake tube (21) to the brake pump.

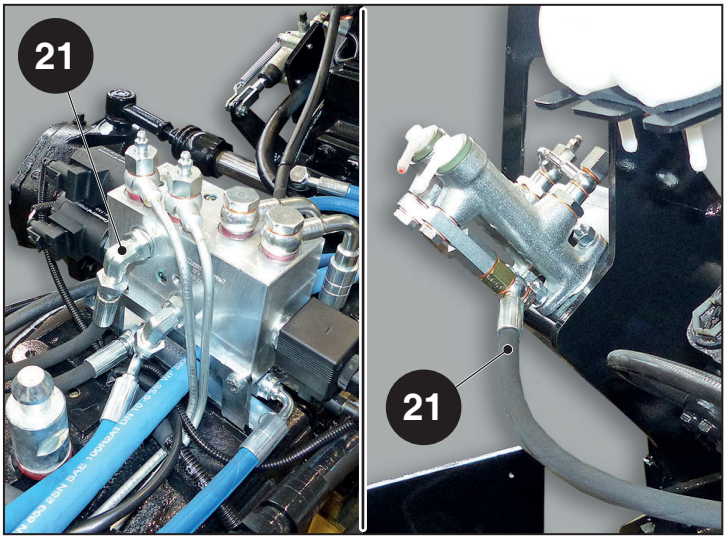


Fig. 9.53

Connect the connector of the right brake tube (22) on the brake pump.

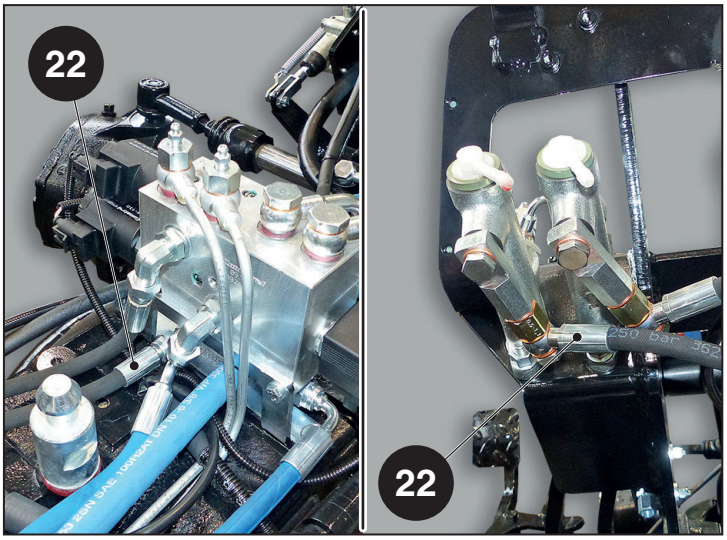


Fig. 9.54

Connect the connectors to the flow reverse switch (27).

Colour	Function
Pink	Flow reverse solenoid valve
White-Red	Drain switch

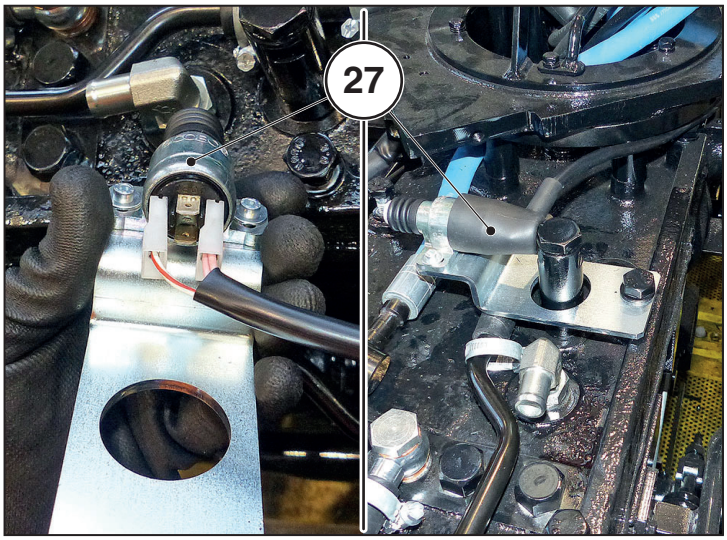


Fig. 9.55

Connect the multifunction instrument cluster and lower instrument cluster connectors to the main wiring loom.

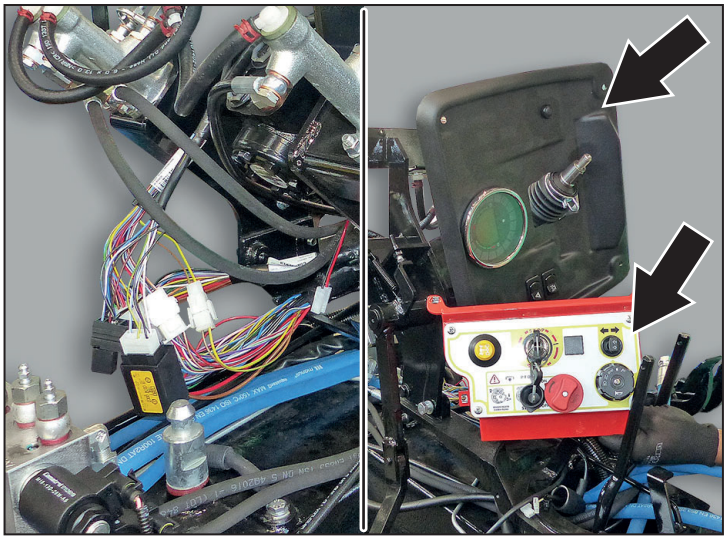


Fig. 9.56

Connect the connectors to the brake bulb (28).

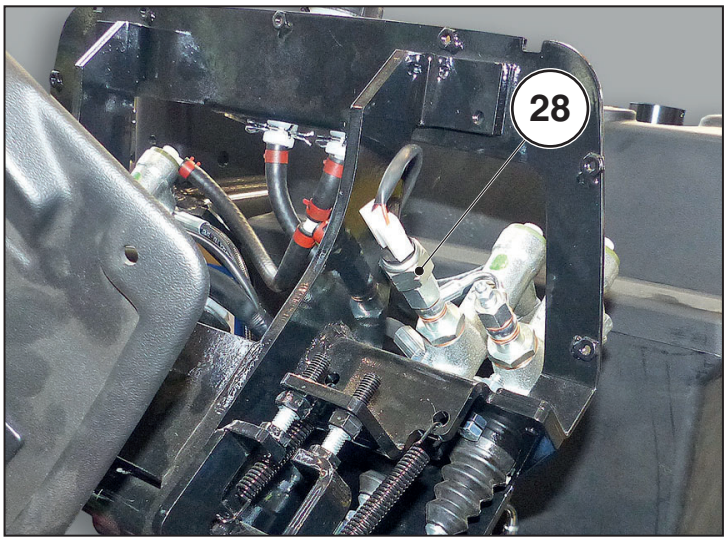


Fig. 9.57

Secure the tubes with clamps to keep them adjacent to the central casing.

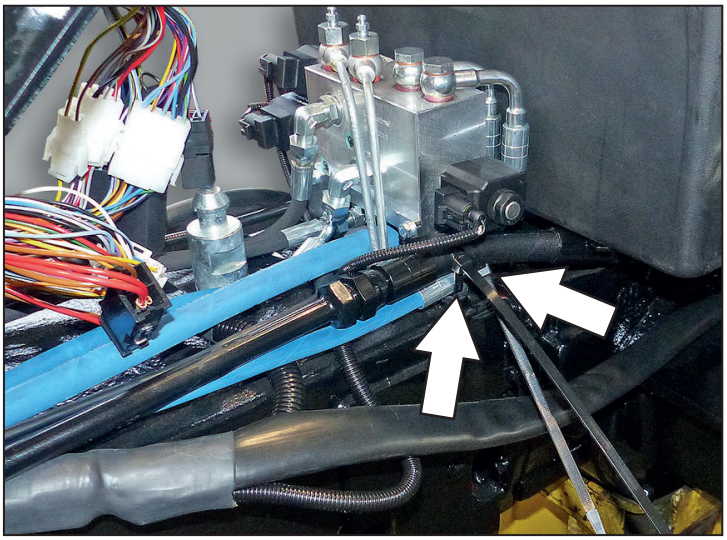


Fig. 9.58

Connect the connectors to the clutch enable switch (29).

Colour	Function
White-Yellow	Starter enable
Black	Earth

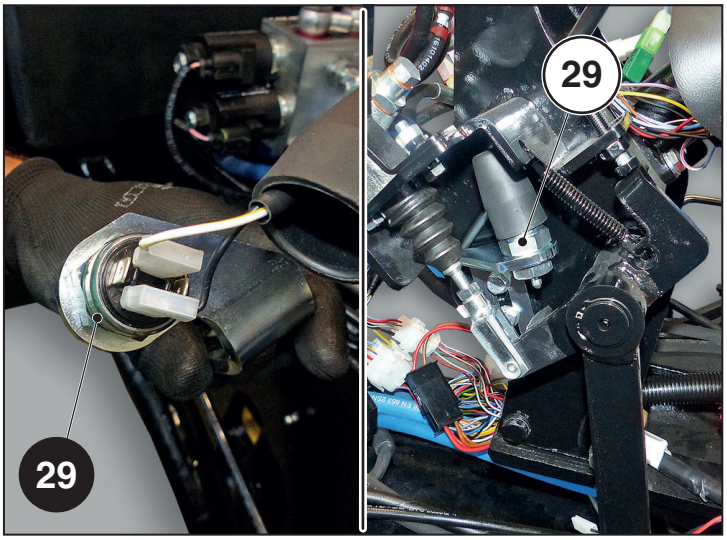


Fig. 9.59

Fit the hand throttle cable in the linkage (30). Tighten the ferrule (31) and the terminal (32) to fasten the cable.

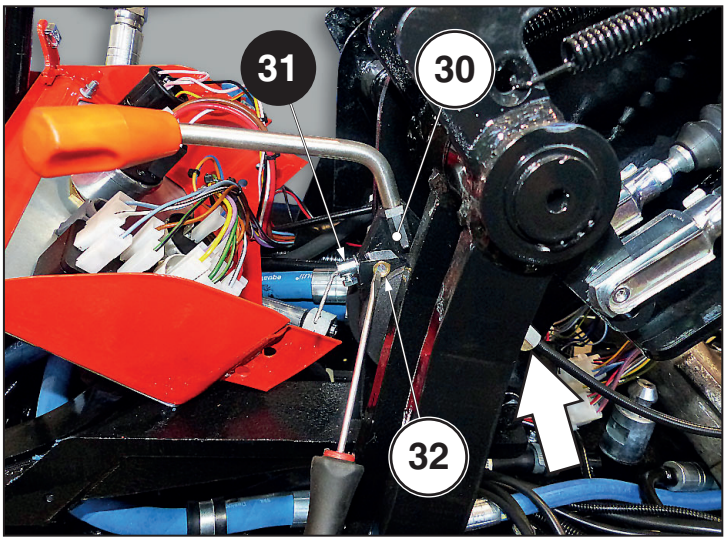


Fig. 9.60

Fit the complete seat mount. Make sure that the bracket presses on the flow reverse switch (27) with the seat in normal position.

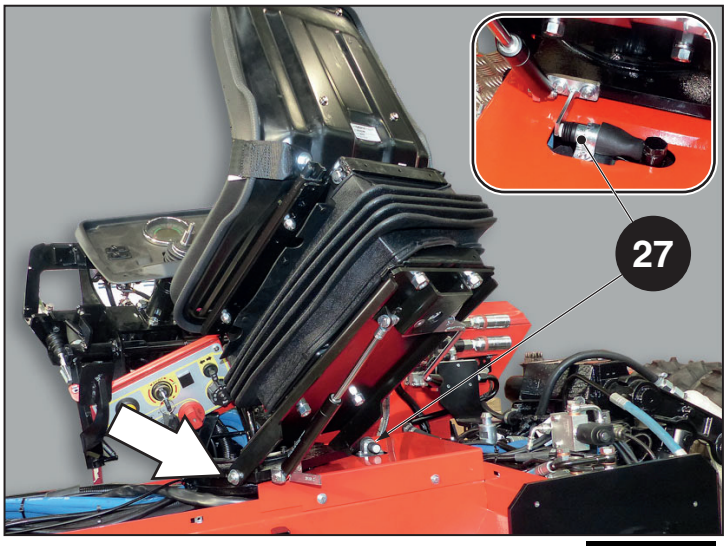


Fig. 9.61

Fasten the plates to the central body.

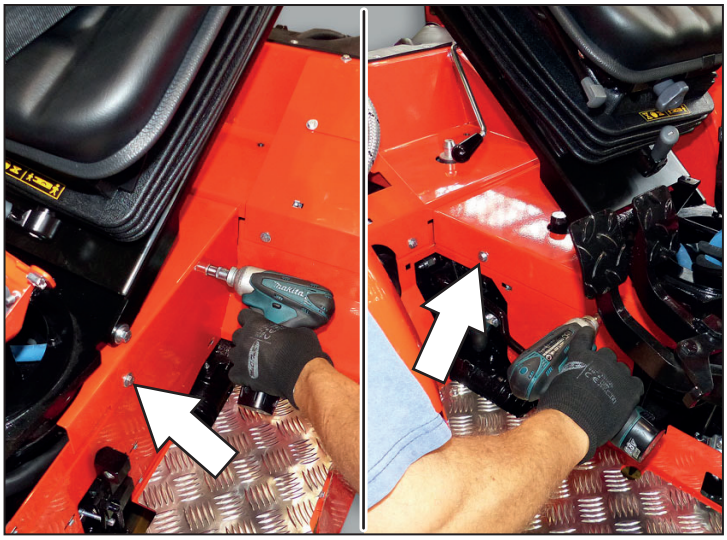


Fig. 9.62

Fasten the upper front lateral panels (33).

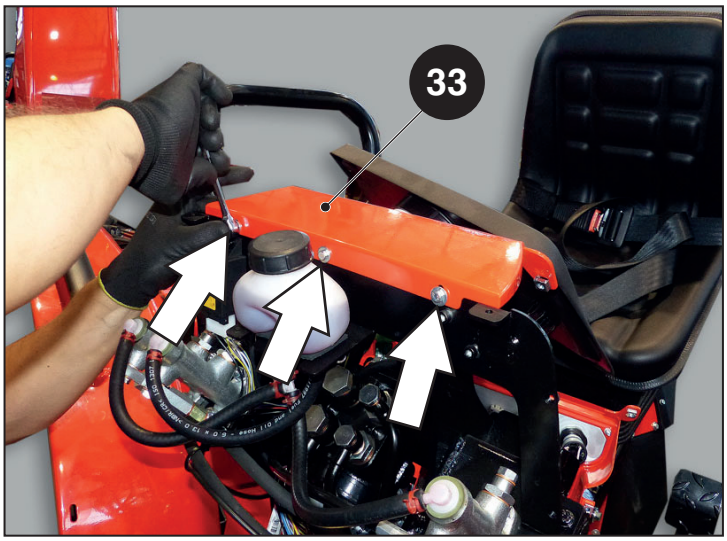


Fig. 9.63

Fasten the front lateral panels (34).

Warning
Tighten the screws of the front lateral panels in part.

Connect the 1-pole socket connectors.

Colour	Function
Red	+30 1-pole socket
Black	Earth

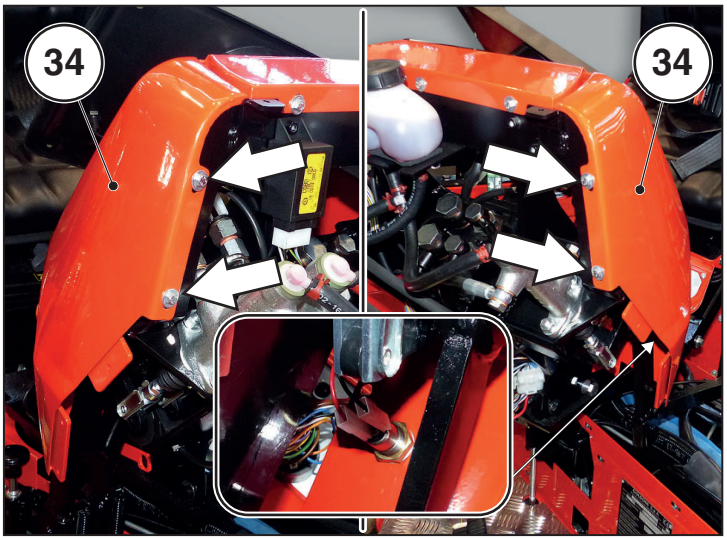


Fig. 9.64

Fit the lower instrument cluster between the front lateral panels and then position the upper instrument cluster in place and secure it with the screws (35). Tighten the screws in part.

Tighten the screws of the front lateral panels (34, shown in the previous figure) completely and tighten the screws (35) of the instrument cluster.

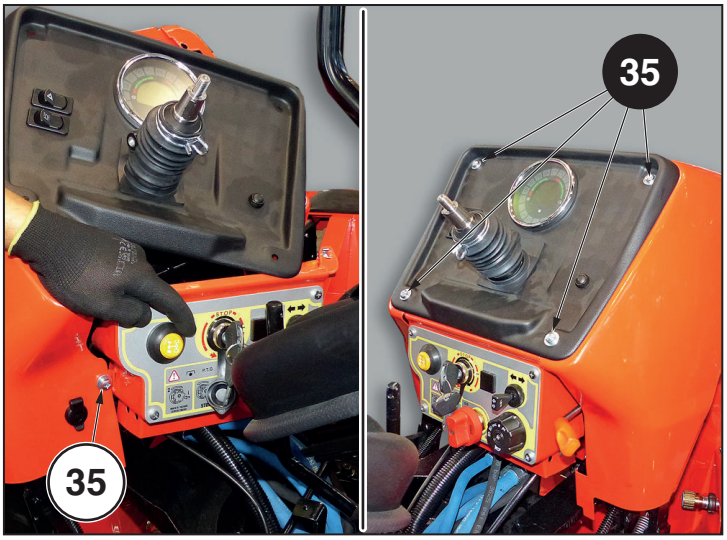


Fig. 9.65

Fasten the front lateral panels (34) to the screws (36) of the pedal support (37): the right front lateral panel is fastened on the outside of the support while the left lateral panel is fastened on the inside.

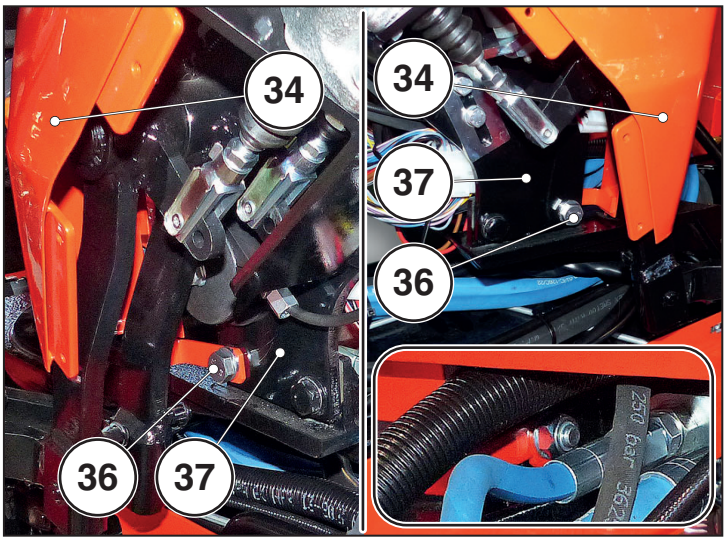


Fig. 9.66

Tie the tubes and wiring looms with clamps to prevent them from hanging loosely.

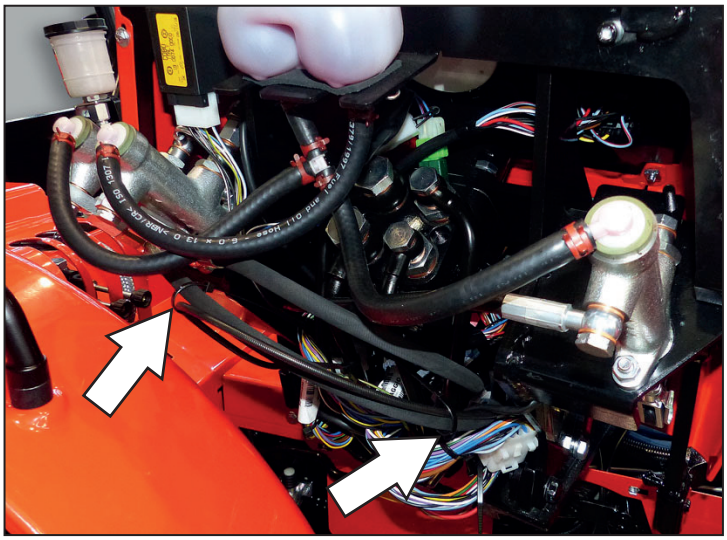


Fig. 9.67

Tighten the guide module cover (38) with the screws (39).

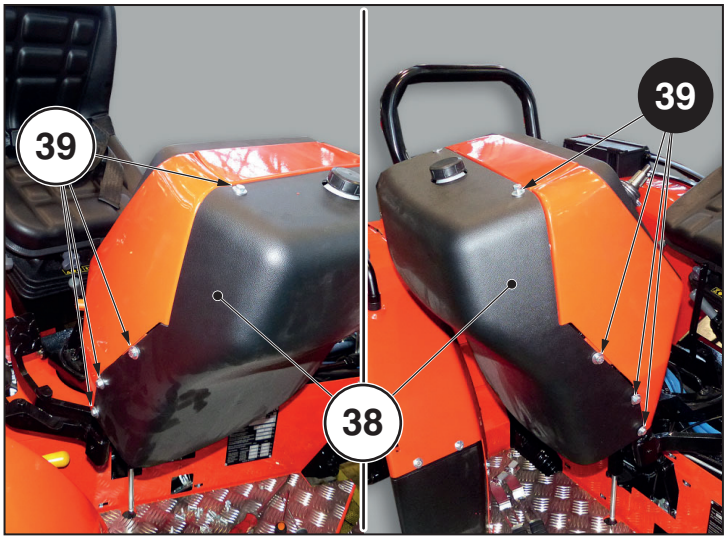


Fig. 9.68

Fit the plate and the flow reverse control unit cover (40). Tighten the screws (20) to fasten the components.

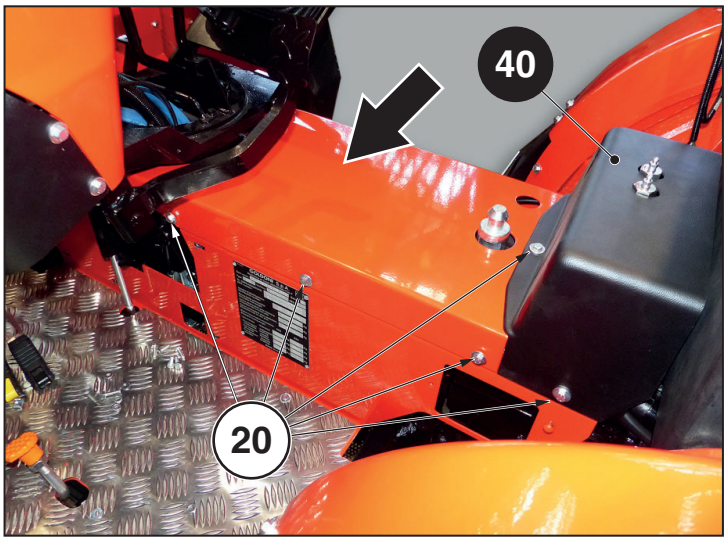


Fig. 9.69

Fit the steering wheel.



Fig. 9.70

Fit the gear lever guard (41) by tightening the screws (42).

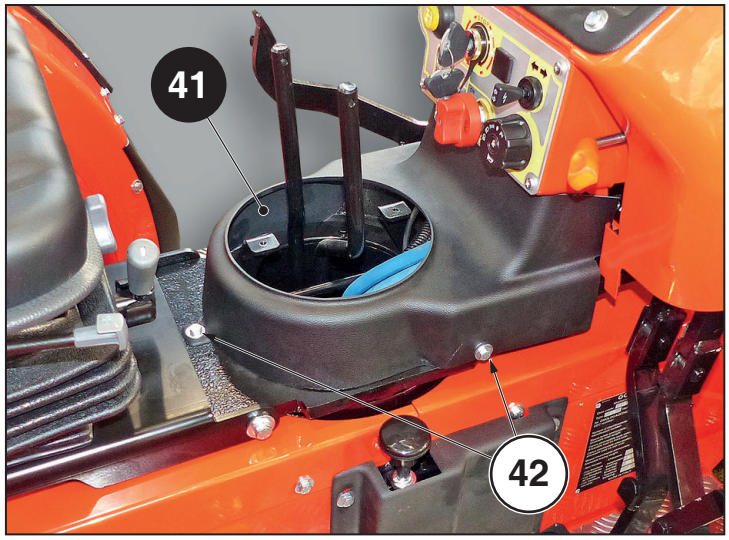


Fig. 9.71

Preassemble the gear lever cover (43) by inserting the casings (44).

Fit the gear lever cover (43) and the casing retainer plates (45). Tighten the cover (43) with the screws (46).

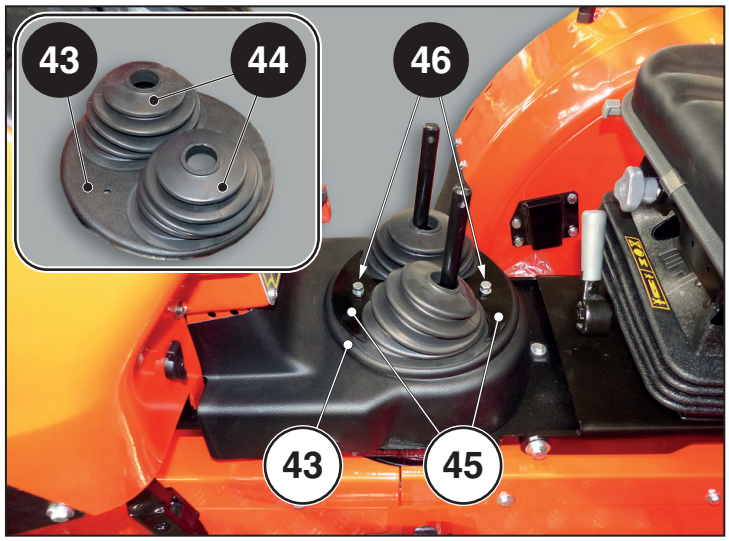


Fig. 9.72

Fit the grips (47) and fasten them with the screws (48).

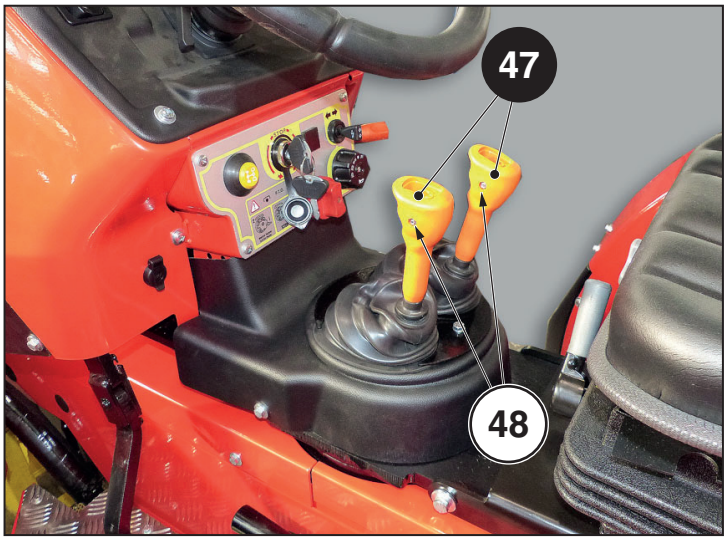


Fig. 9.73

Section 4 : Tightening specifications

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4.1 Tightening specifications 9-34

4.1 Tightening specifications

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1-Introduction".

Tightening torque	Nm	Kgm
Central mount bush hex socket screws	60	6
Retainer ring fastener screws	30	3
Pedal support - rotary support fastener screws	60	6

Chapter 10 : Brakes

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Section 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.

Section 2 : Technical characteristics

Index

2.1 Technical characteristics 10-4

2.1 Technical characteristics

RS, SN and SN+ Cluster

Rear brake type	Multi-disc wet brakes
Operation	Mechanical control
Front brake type	-
Emergency and parking brake	Independently and mechanically controlled. Braking action on rear wheels.
Trailer hydraulic braking	-
Trailer brake mechanical lever mount	Type CUNA

REV Cluster

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	-
Trailer brake mechanical lever mount	Type CUNA

Section 3 : Disassembly

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3.2 Disassembly 10-8
3.2.1 Disassembling the mechanically operated brakes (RS, SN and SN+ Cluster) 10-8
3.2.2 Disassembling hydraulically operated brakes (REV Cluster) 10-13

3.1 Preliminary operations

The main operations necessary to access the brakes indicated as follows.

Secure the hub to a suitable hoist.

> **Attention**
>
> Check that the hoist used is in perfect working order and is of adequate lifting capacity for the load.

Undo the fastener nuts (60) of the hub and pull out the complete hub.

> **Warning**
>
> Some brake discs may come out with the hub.
>
> See the Chapter “Rear final drive units” for the detailed steps on how to disassemble and reassemble the drive units.

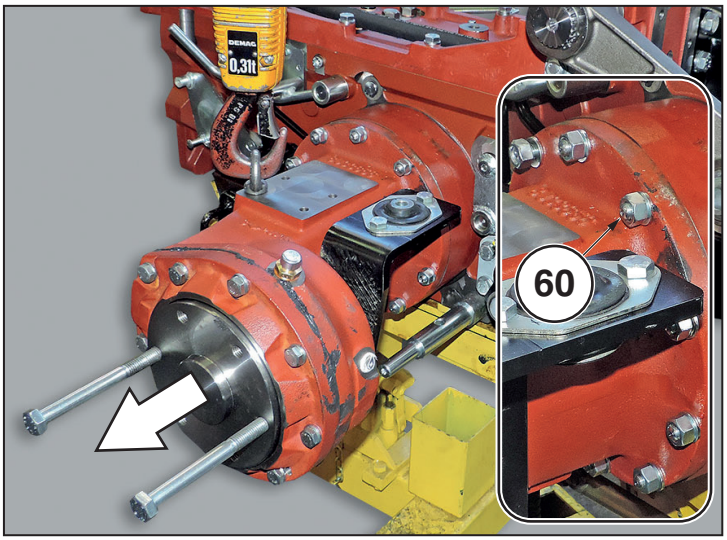


Fig. 10.1

3.1.1 Preparations for disassembling the pedal support (RS Cluster)

> **Warning**
>
> Perform the following operations only if the pedal support needs to be disassembled.
>
> The following steps apply to the RS model. See the Chapter “Rotary mount” for the detailed steps on how to disassemble and reassemble the pedal support for the REVERSIBLE model.

Undo the pick-up filter mounting screws.

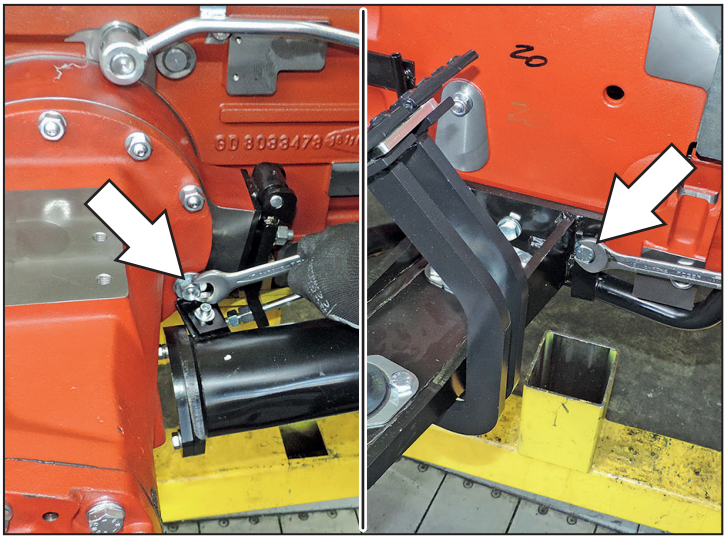


Fig. 10.2

Undo the suction line screws and remove the pick-up filter.

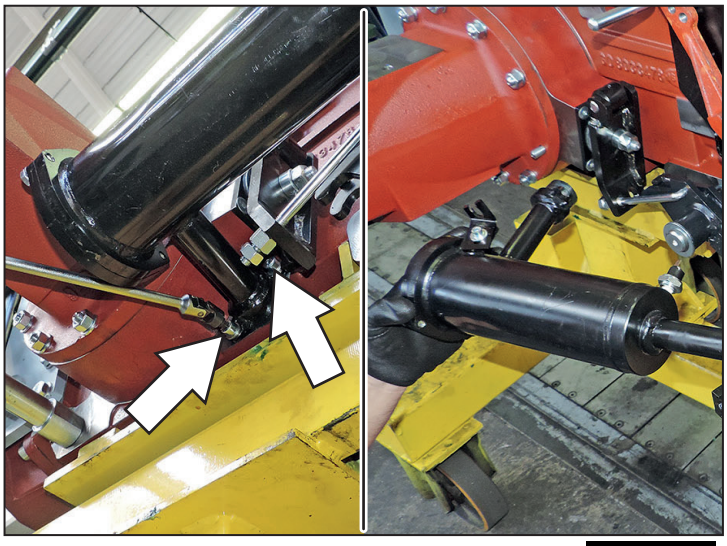


Fig. 10.3

Undo the screws and remove the right mount.

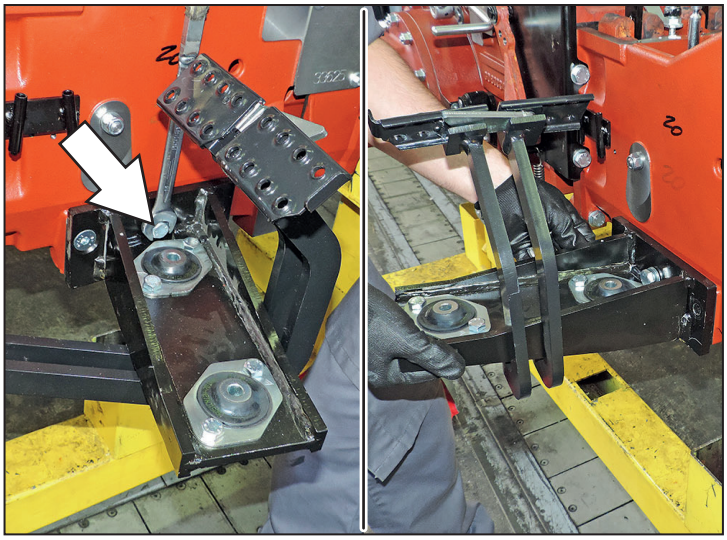


Fig. 10.4

3.2 Disassembly

3.2.1 Disassembling the mechanically operated brakes (RS, SN and SN+ Cluster)

Remove the pin (1).

Undo the nut (8) and pull out the spherical collar nut (9).

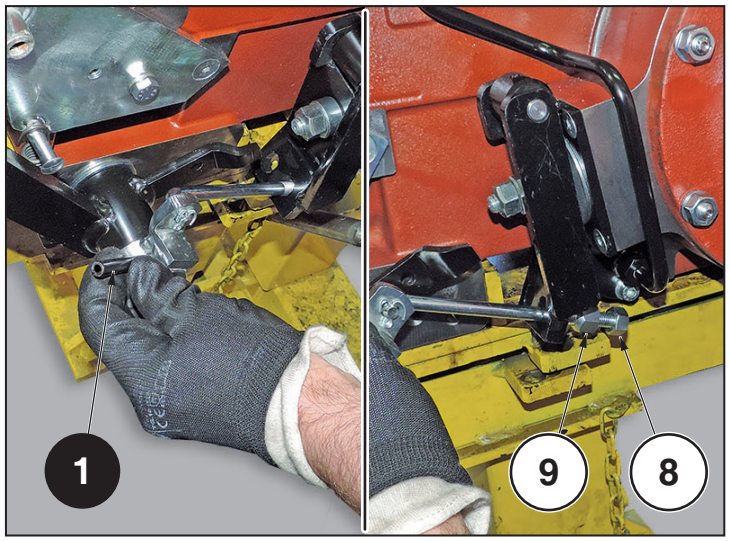


Fig. 10.5

Remove the complete lever (4).

Remove the split pin (6) and separate the tie-rod (5) from the lever (4).

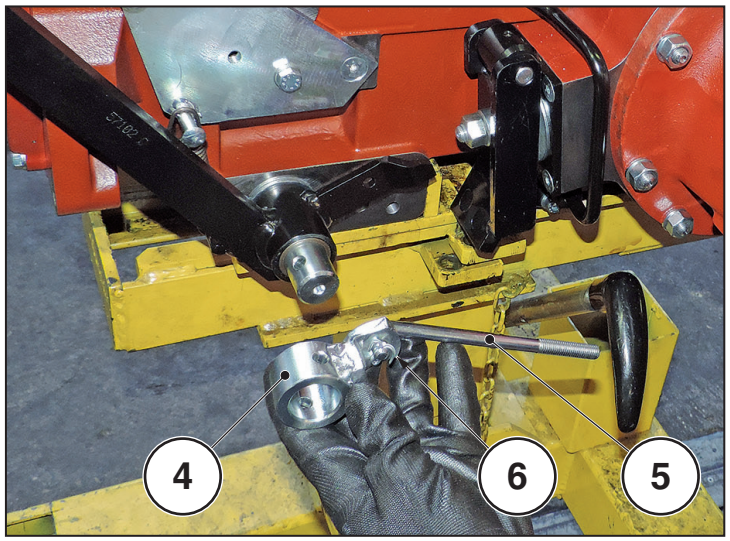


Fig. 10.6

Release the spring (7).

Pull out the clutch pedal (29) and remove the spacer (31).

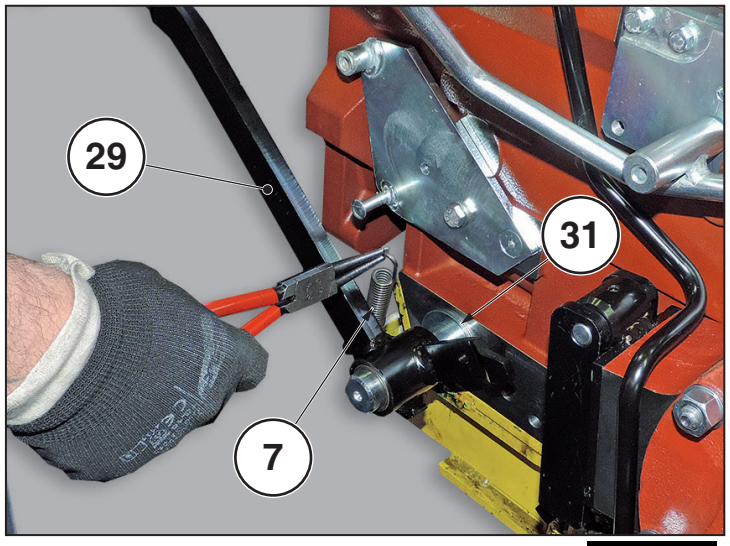


Fig. 10.7

Undo the nuts (66) and (67).

Release the springs (7) and unscrew the two screws that secure the parking brake plate (68) to the gearbox casing and remove it.

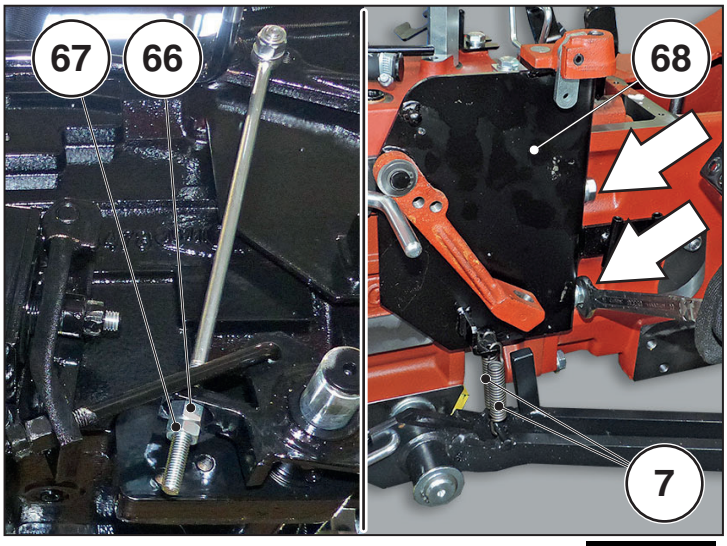


Fig. 10.8

Undo the check nut (8) and the spherical collar nut (9).

Remove the tie-rod (5) from the mobile flange (10) by bending the pedal support downwards.

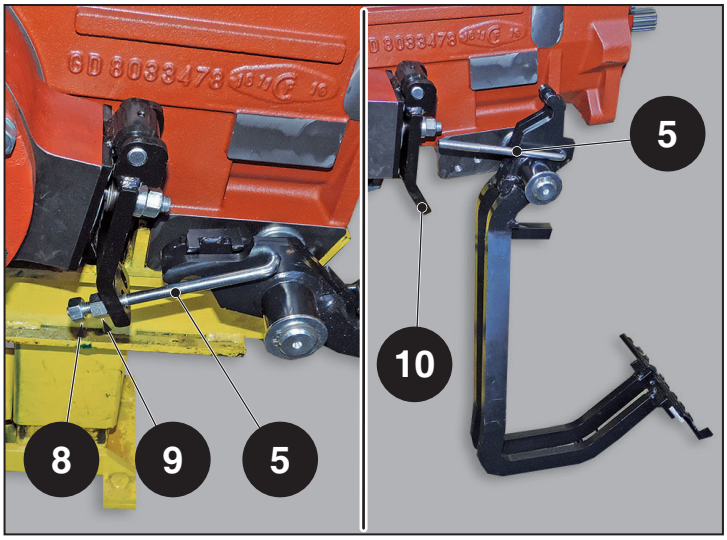


Fig. 10.9

Slide off the complete right pedal support (11) together with the pivot pin (12).

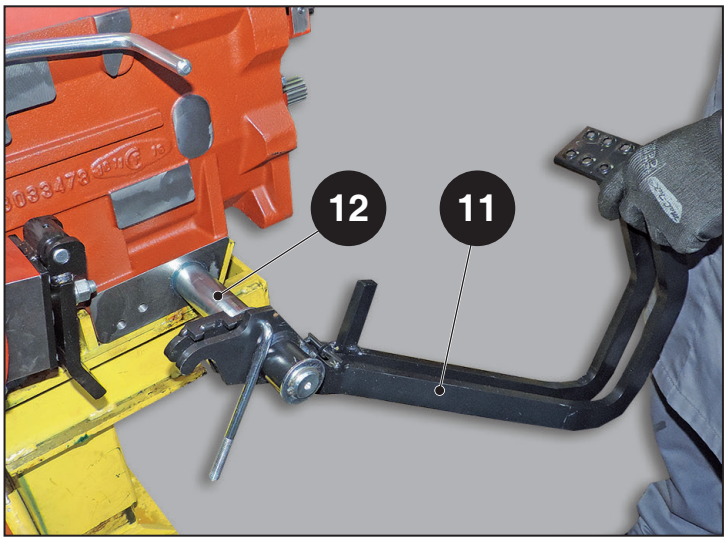


Fig. 10.10

Disassemble the right pedal support removing the circlip (32) and the pin (1).

Remove the spacers (31) and the brake pedals (11) from the pivot pin (12).

Remove the split pin (6) to separate the tie-rod (5) from the pedal.

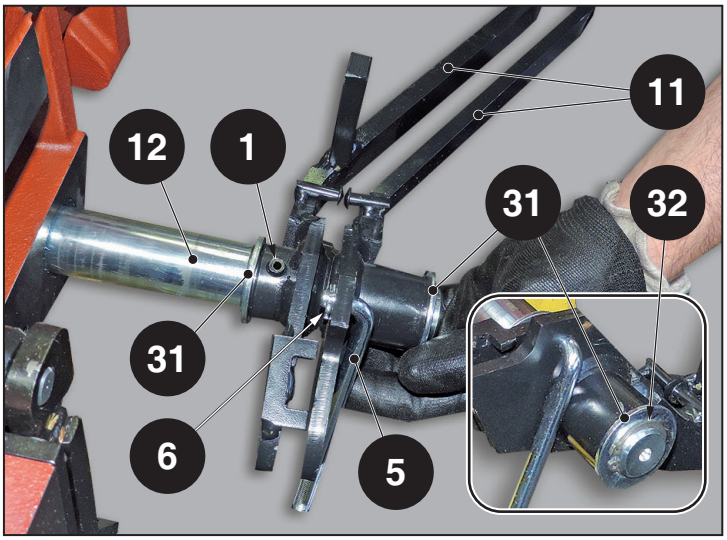


Fig. 10.11

Attention

The following instructions are applicable for both brakes.

Undo the nut (2) and pull out the spherical collar nut (3).

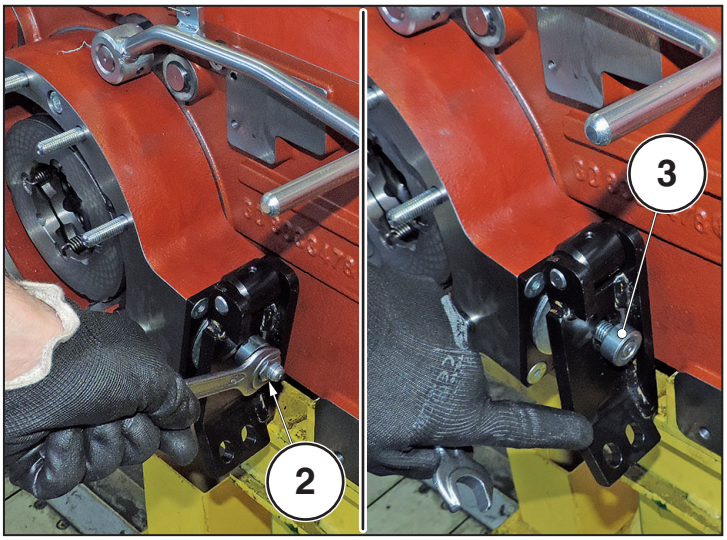


Fig. 10.12

Undo the retainer grub screw (13) to free the pin (14). Then remove the pin (14) and remove the mobile flange (10).

Remove the spring (15) and the washer (16).

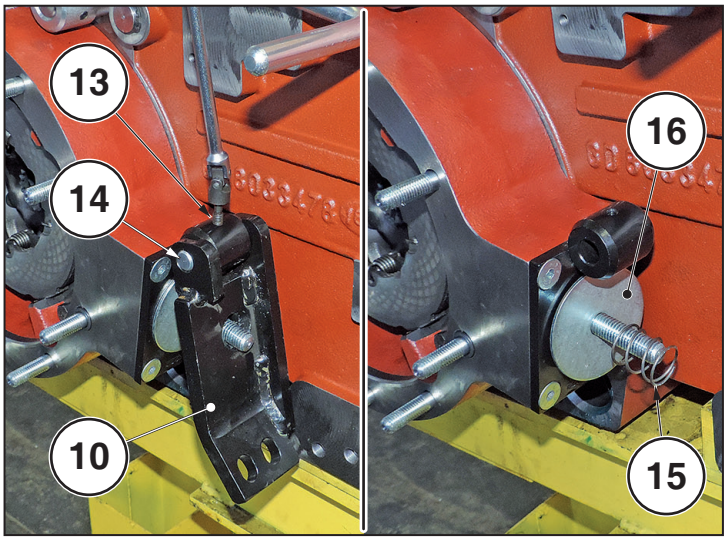


Fig. 10.13

Undo the screws (17) and remove the flange (18).

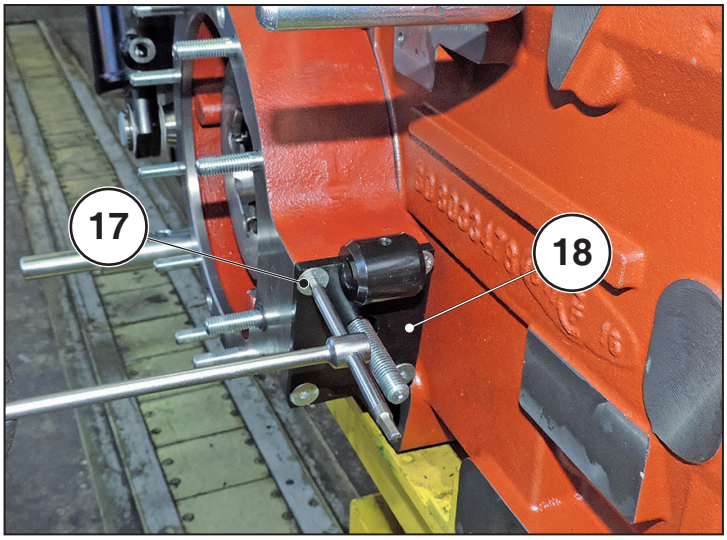


Fig. 10.14

Remove the casing (19) and the O-ring (20).

Warning

Replace the O-ring (20) with a new component when reassembling.

Replace the casing (19) if worn or damaged .

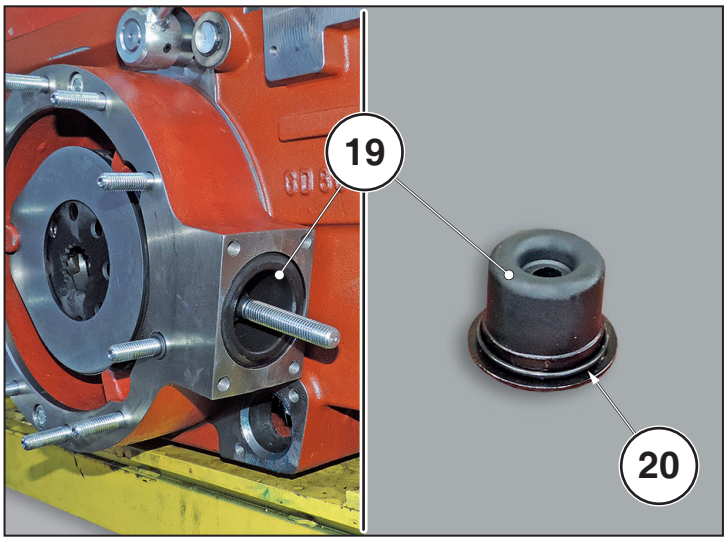


Fig. 10.15

Remove the brake discs (21) and (22) and braking plate (23).

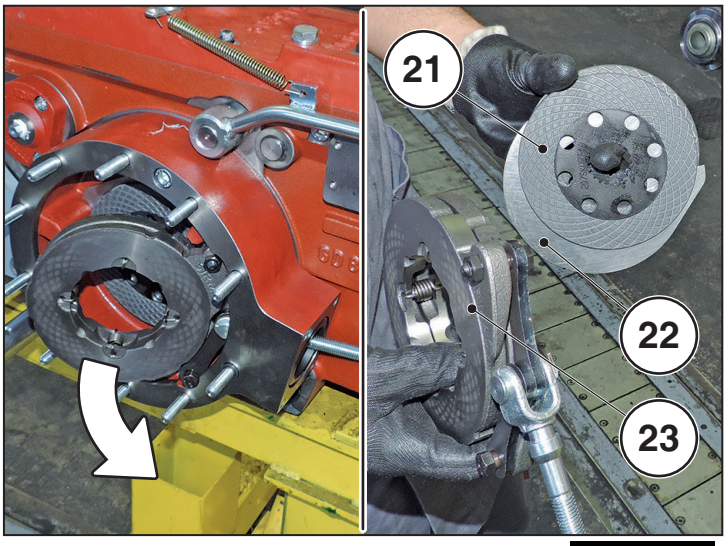


Fig. 10.16

Disassemble the braking plate by removing the split pin (24) and the pin (25) and then the brake tie-rod (26).

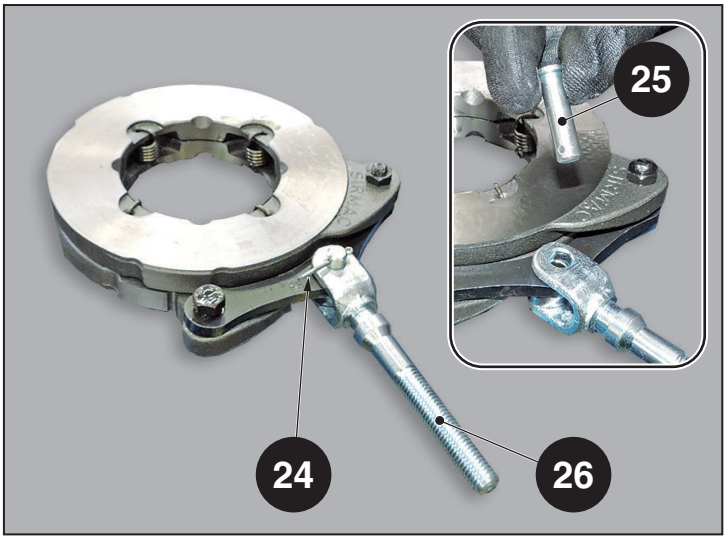


Fig. 10.17

3.2.2 Disassembling hydraulically operated brakes (REV Cluster)

Undo the connectors (98) of the brake pipes from the respective cylinders.

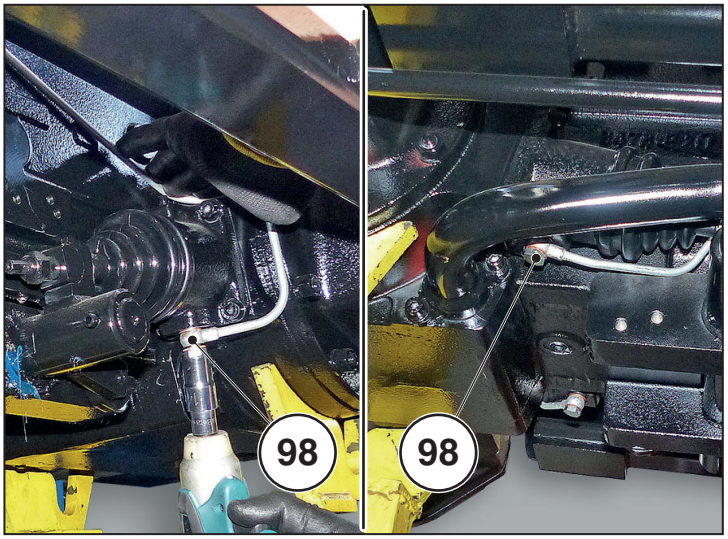


Fig. 10.18

Undo the nut (64) from the tie-rod (33).

Remove the spacer (63) and the ferrule (62).

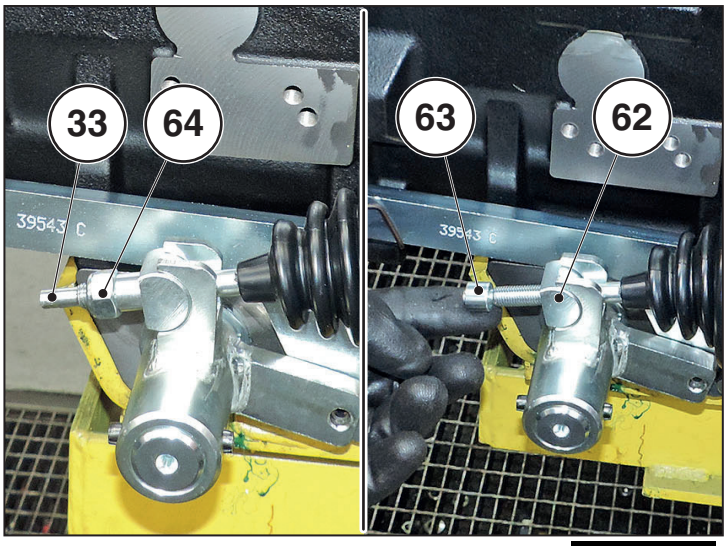


Fig. 10.19

Remove the circlip (57) from the pin (45) and then remove the complete linkage (54).

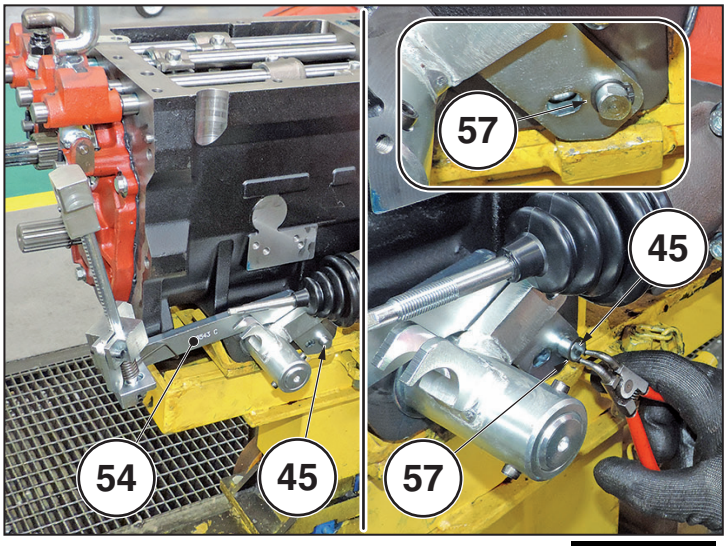


Fig. 10.20

Pull out the pedal support pivot pin (12).

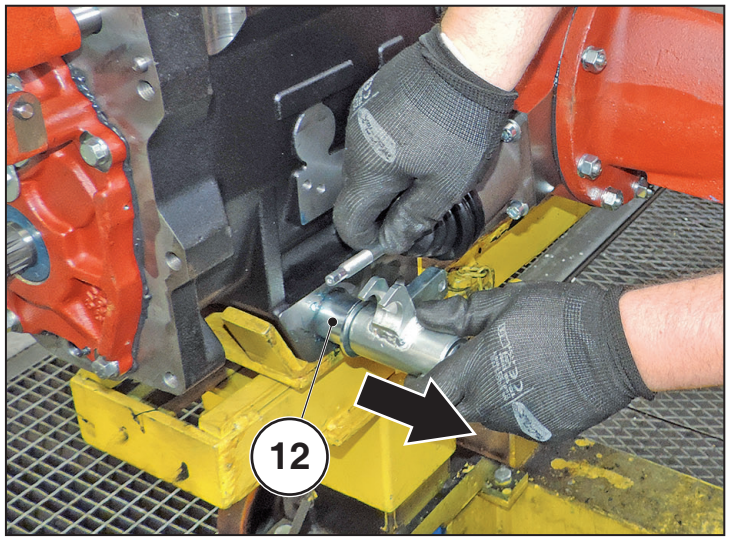


Fig. 10.21

Remove the pin (1), lever (59) and spacer (31).

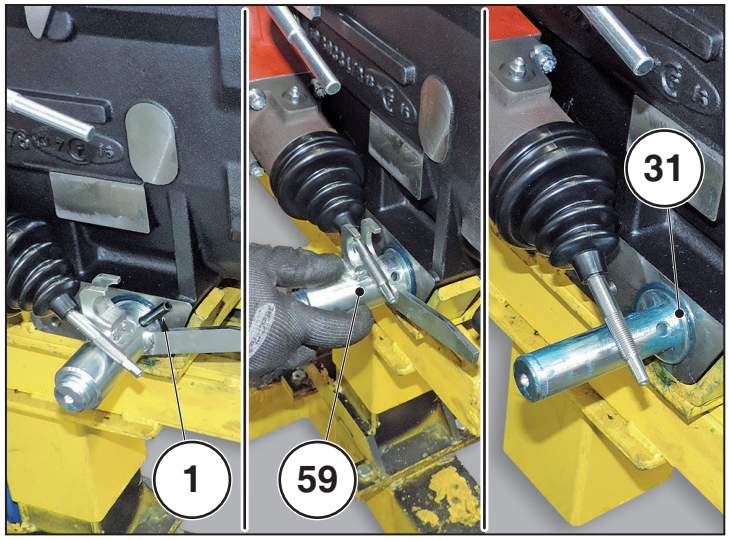


Fig. 10.22

Pull out the casing (43).

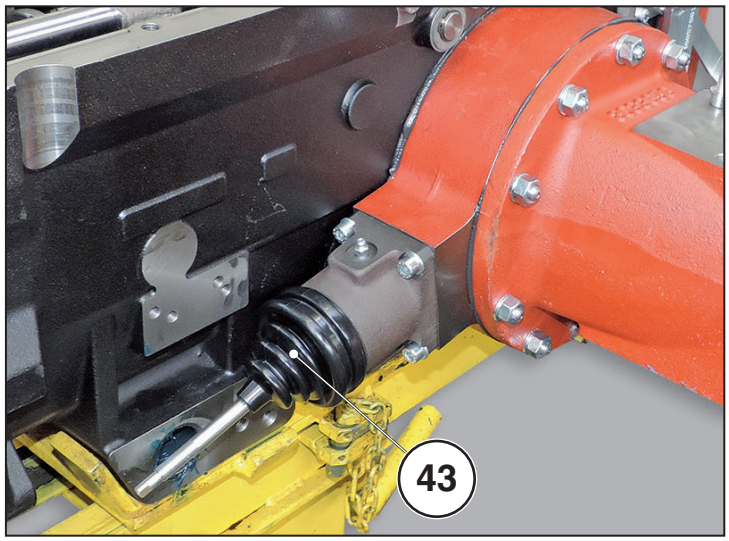


Fig. 10.23

Undo the hex socket screws (39) and the washers (40) fastening the cylinder (34).

Unscrew the cylinder (34) from the braking plate pin.

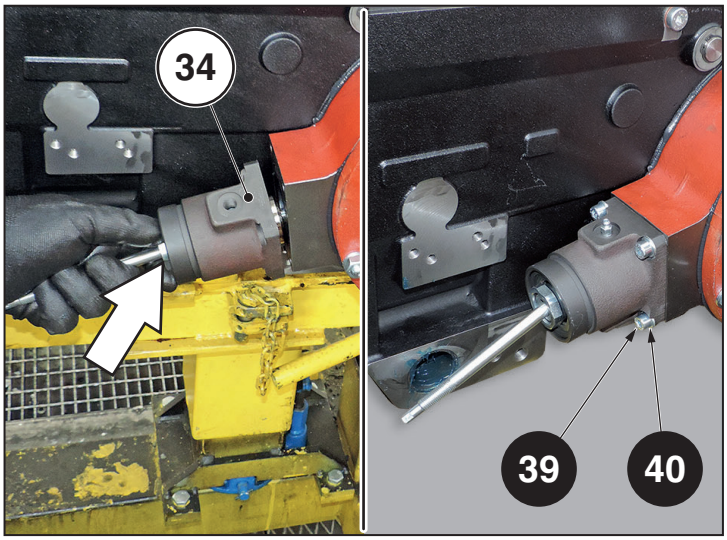


Fig. 10.24

Remove the brake discs (21) and (22) and braking plate (23).

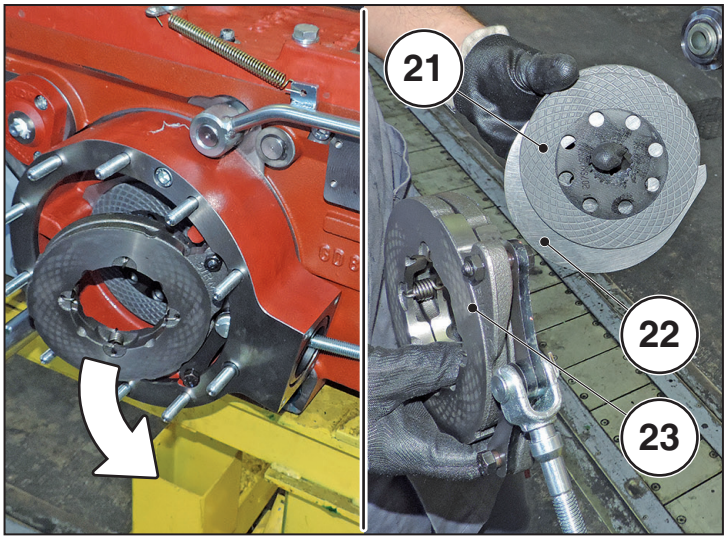


Fig. 10.25

Disassemble the braking plate by removing the split pin (24) and the pin (25) and then the tie-rod (26).

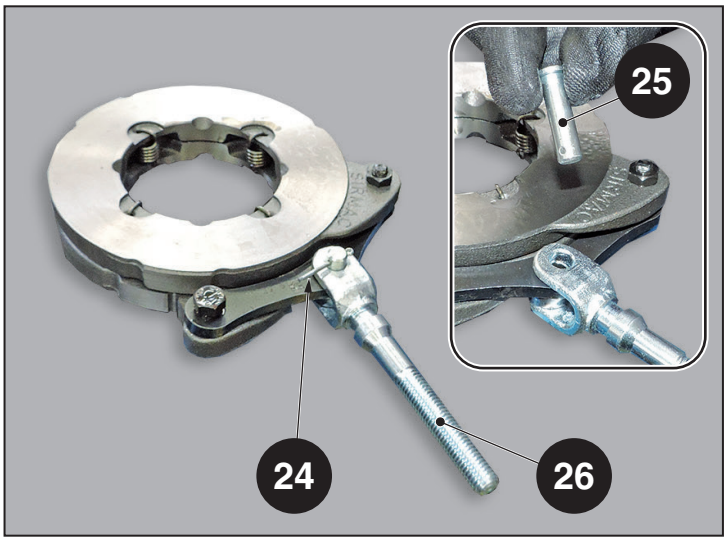


Fig. 10.26

Section 4 : Main inspection, reassembly and adjustment procedures

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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".

4.1.1 Reassembling the brake assembly

Fasten the tie-rod (26) to the braking plate with the pin (25) and then secure with the circlip (24).

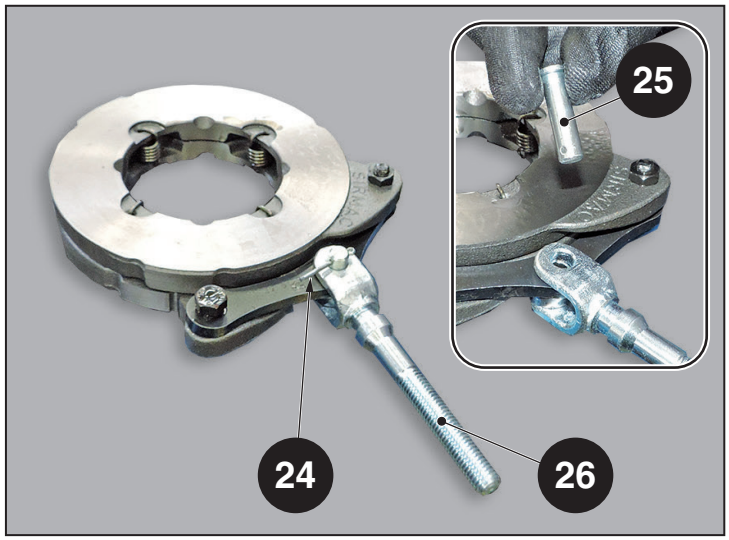


Fig. 10.27

Mount the brake discs and braking plate. The fitting sequence is the following:

- friction disc (21);
- fixed disc (22);
- friction disc (21);
- braking plate (23);
- friction disc (21);
- fixed disc (22);
- friction disc (21).

Warning

The fixed disks (22) must be anchored by turning the guide to the rear.

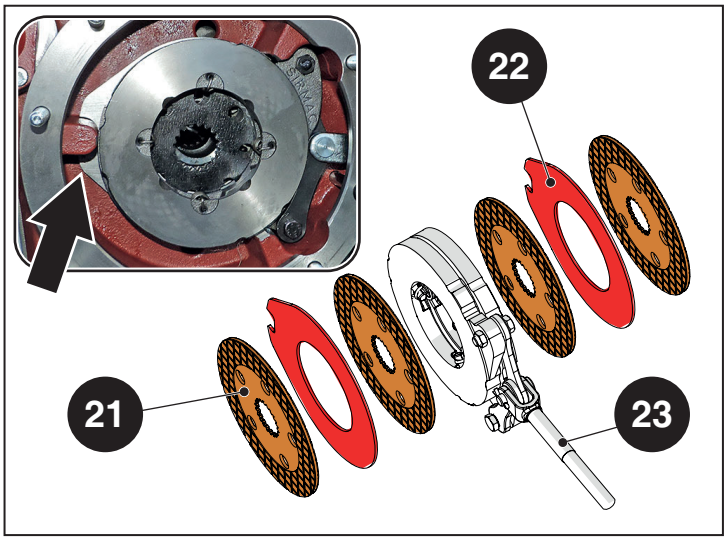


Fig. 10.28

Warning

Fit the O-ring (28) on the stud bolt.

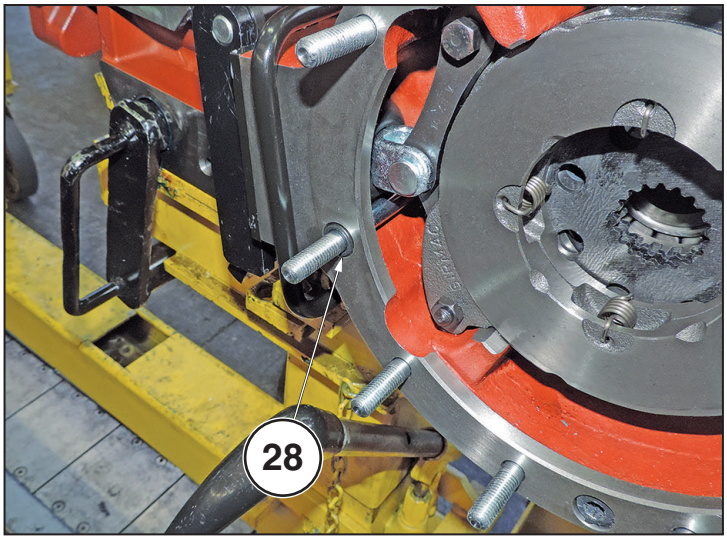


Fig. 10.29

Apply silicone sealant on the mating surface of the final drive unit.

Transfer the outermost friction disc (21) to the pinion (27) to favour the insertion the final drive unit on the gearbox casing.

Warning

See the Chapter “Rear final drive units” for the detailed steps on how to disassemble and reassemble the final drive units.

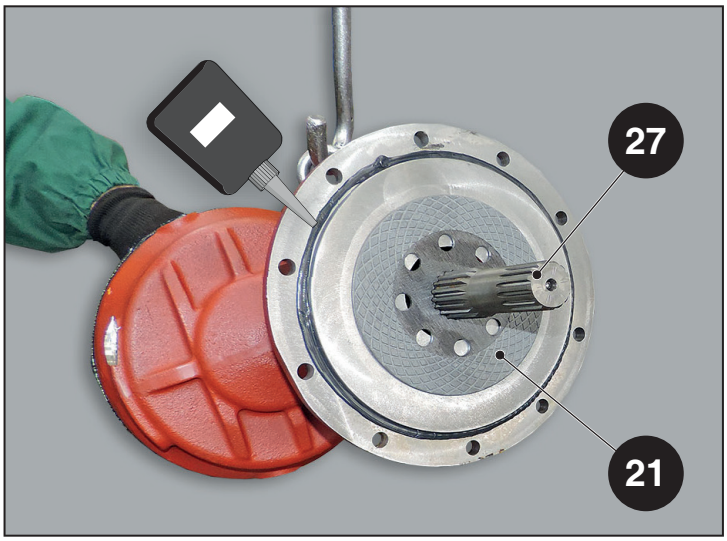


Fig. 10.30

Mate the assemblies. Swing the half-axle (42) to key it on the brake discs and rear differential.

Note

Tighten two screws on the half-axle (42) to facilitate the operation.

Warning

Check the correct positioning of the O-ring (28) on the stud bolt.

Make sure that the brake discs do not fall off during the operation.

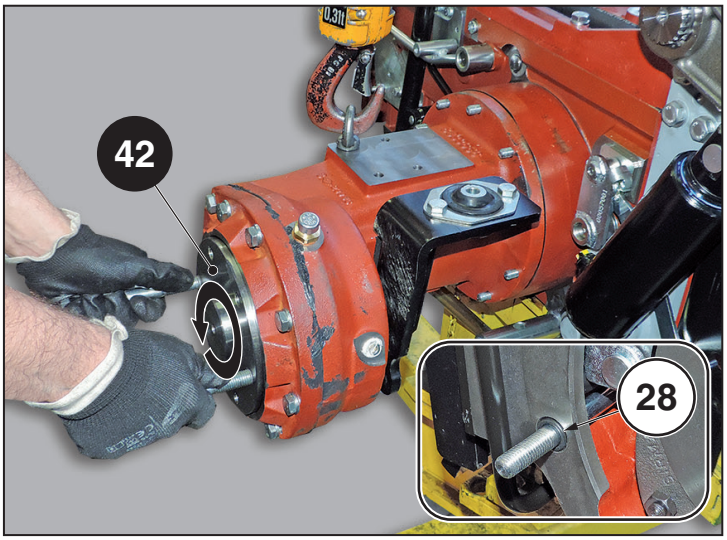


Fig. 10.31

Tighten the nuts (60) with the washers (61) to secure the final drive unit. Do not tighten the nuts (60) completely.

Check that the half-axle (42) rotates correctly.

Tighten the nuts (60) completely with a torque wrench using a tightening torque of 85 Nm (8.5 kgm).

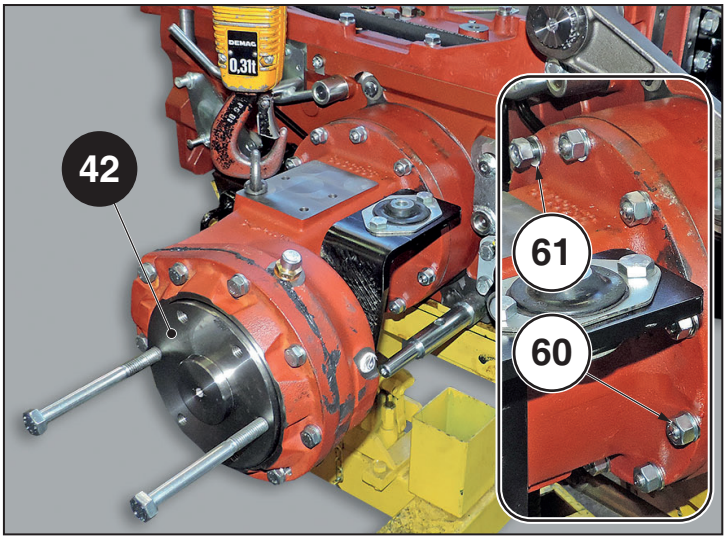


Fig. 10.32

Continue the reassembly by referring to the specific chapter for the brake version installed on the tractor.

4.1.2 Reassembling the mechanically operated brakes (RS, SN and SN+ Cluster)

Fit the O-ring (20) on the casing (19). Apply a coating of silicon sealant to the O-ring after fitting.

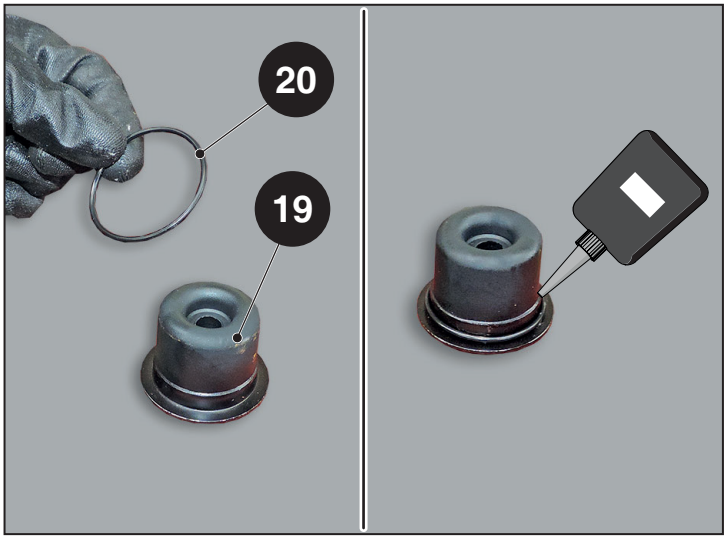


Fig. 10.33

Using a guide tool and punch, drive the casing (19) in on the brake housing.

> **Warning**
>
> The inner ring of the casing (19) is to be driven on the wide part of the braking plate tie-rod (23).

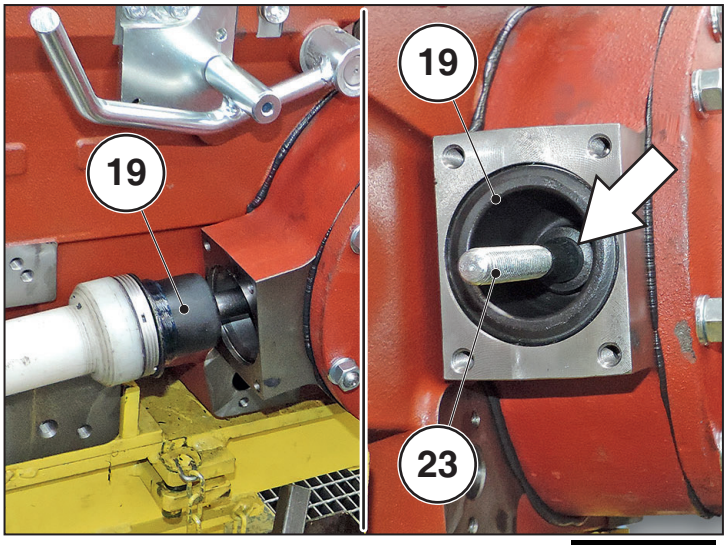


Fig. 10.34

Fasten the flange (17) with the screws (18).

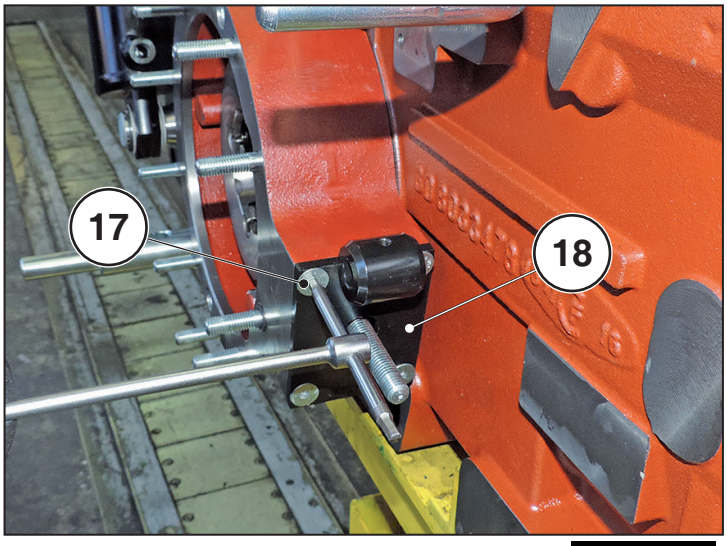


Fig. 10.35

Fit the washer (16) and the spring (15).

Fit the mobile flange (10) and secure it with the pin (14). Fasten the pin (14) with the retainer grub screw (13).

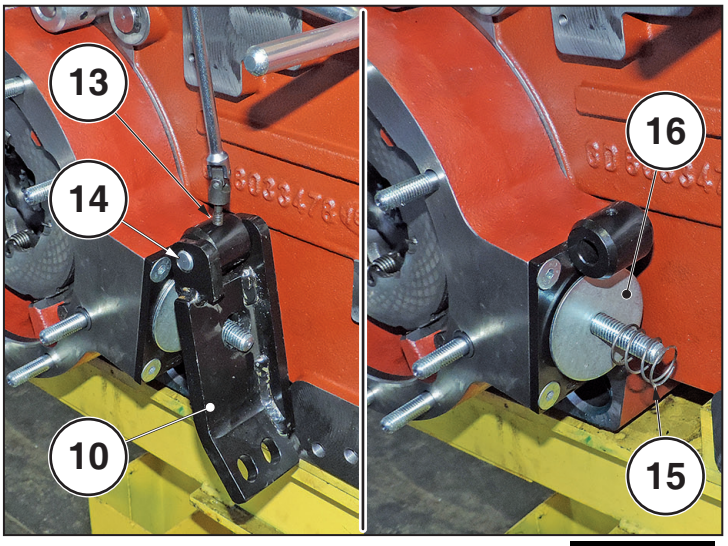


Fig. 10.36

Insert the spherical collar nut (3) and tighten the nut (2).

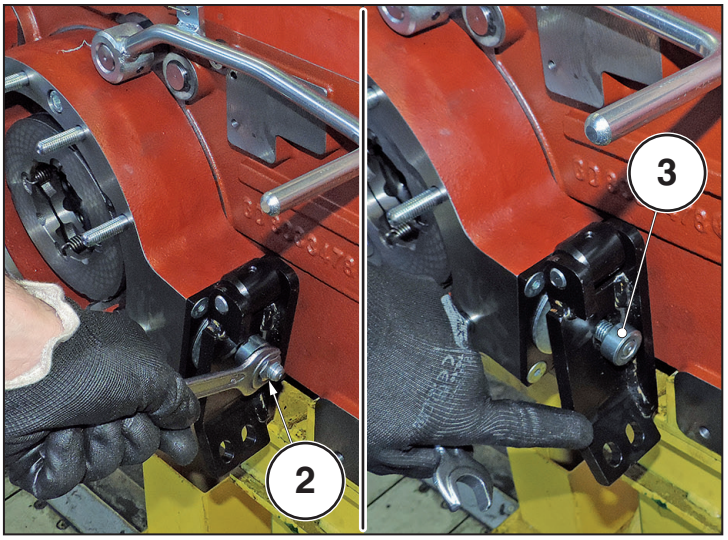


Fig. 10.37

4.1.2.1 Refitting the pedal support

Fasten the tie-rod (5) to the brake pedal (11) with the split pin (6).

Fit the following components on the right end of the pivot pin (12):

- spacer (31);
- brake pedals (11);
- spacer (31);
- circlip (32);
- pin (1) to secure the brake pedal to the pivot pin (12).

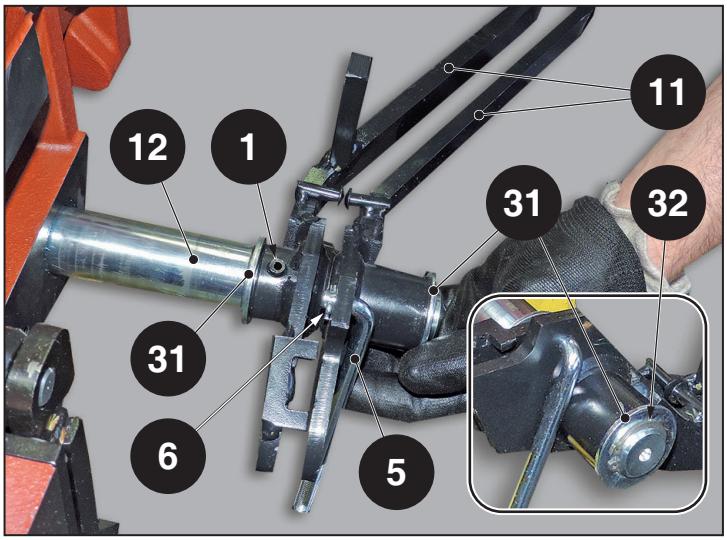


Fig. 10.38

Fit the complete pedal support (11) on the pivot pin (12).

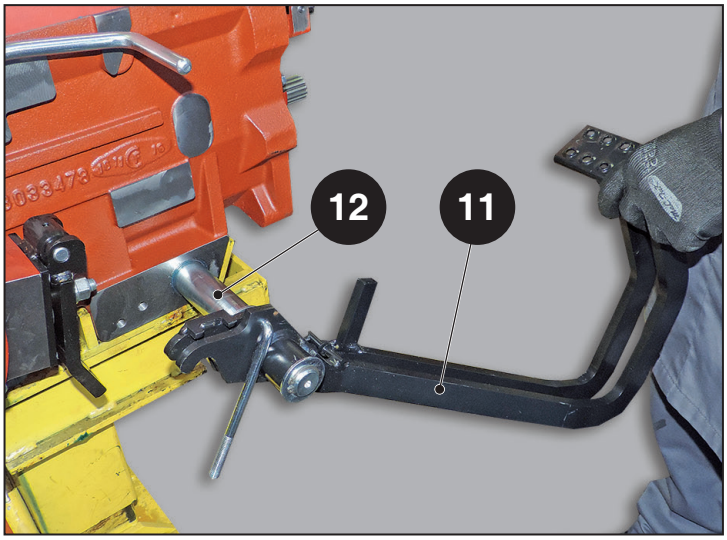


Fig. 10.39

Insert the tie-rod (5) on the mobile flange (10) and then screw in the spherical collar nut (9) and then the check nut (8).

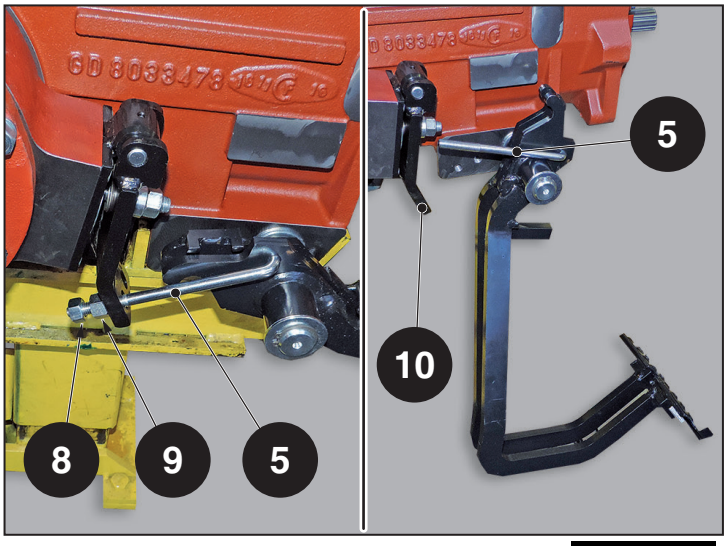


Fig. 10.40

Fit the spacer (31) and the clutch pedal (29). Attach the spring (7).

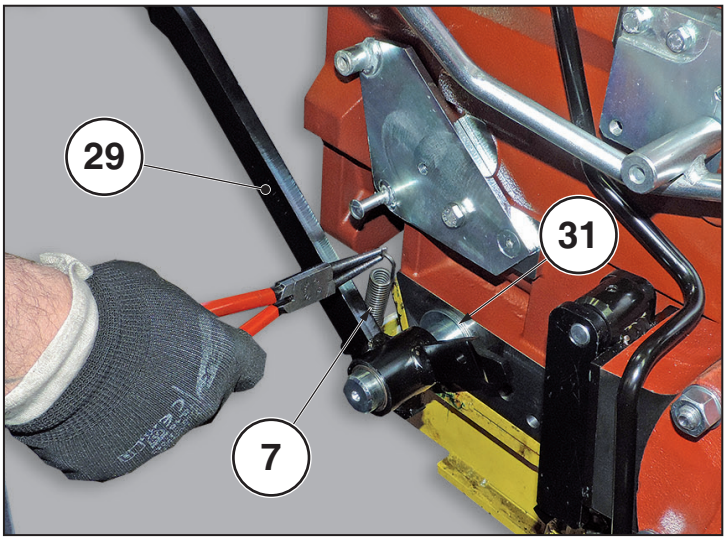


Fig. 10.41

Fasten the tie-rod (5) to the lever (4) with the circlip (6). Insert the complete lever (4) on the pivot pin.

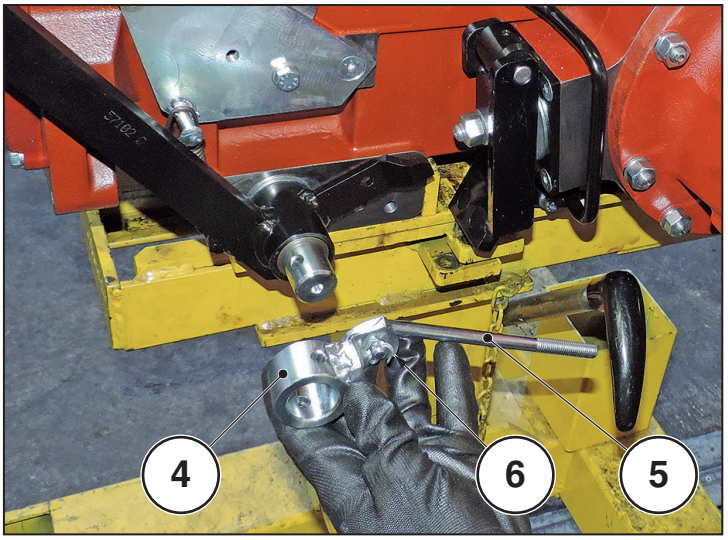


Fig. 10.42

Insert the pin (1).

Tighten the spherical collar nut (9) and the check nut (8).

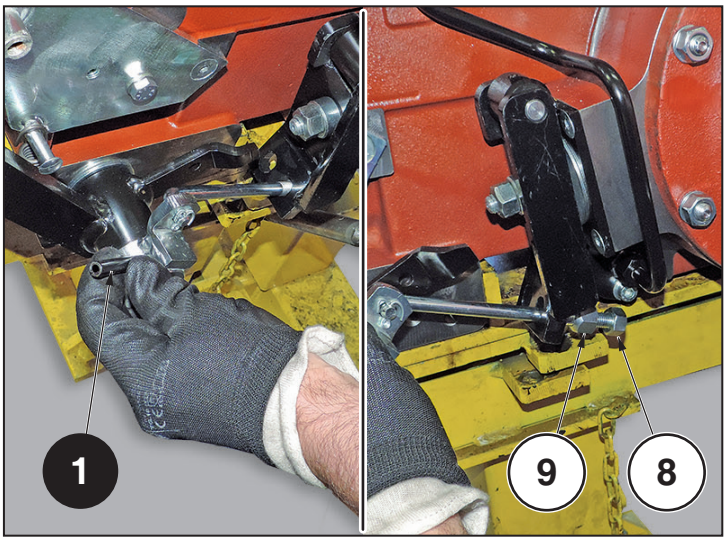


Fig. 10.43

4.1.2.2 Reassembling the parking brake lever

Fit the bush (69) on the lever (70).

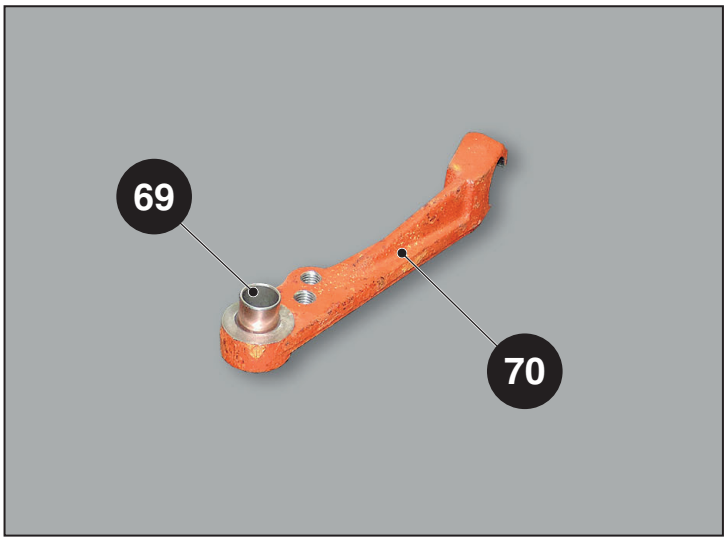


Fig. 10.44

Apply a coating of grease to the pin of the plate (68) and then mount the components in the following order:

- bush (81);
- Belleville washer (71) making the conical side face outward;
- lever (70);
- spacer (72);
- circlip (73).

Note

Spacers (72) can be mounted instead of the Belleville washer (71); it is important to eliminate free play on the lever (70).

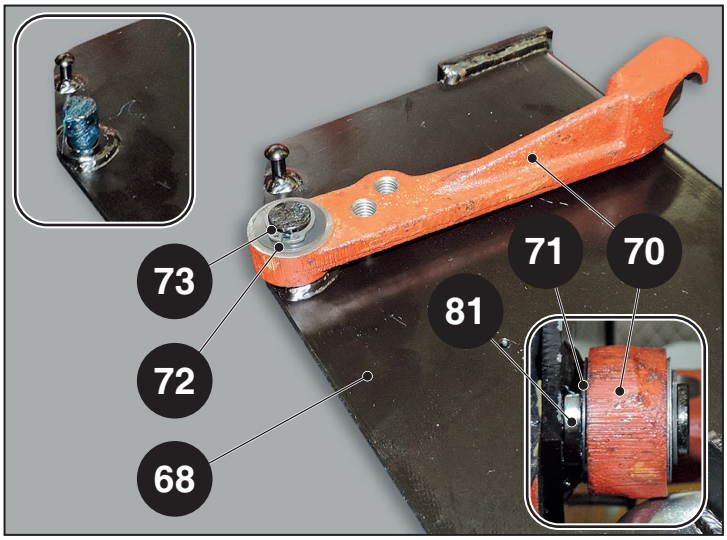


Fig. 10.45

Assemble the lever mount (74) with the hook (75) by inserting the pin (76).

Tighten the screws (77) to fasten the complete mount (74) on the plate (68).

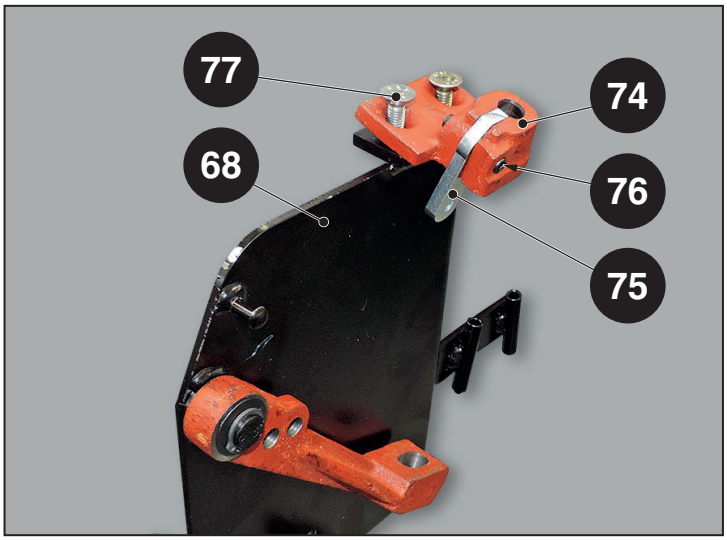


Fig. 10.46

Assemble the plate (68) on the casing by tightening the screws (79) with the washers (80). Apply a tightening torque of 85 Nm (8.5 kgm).

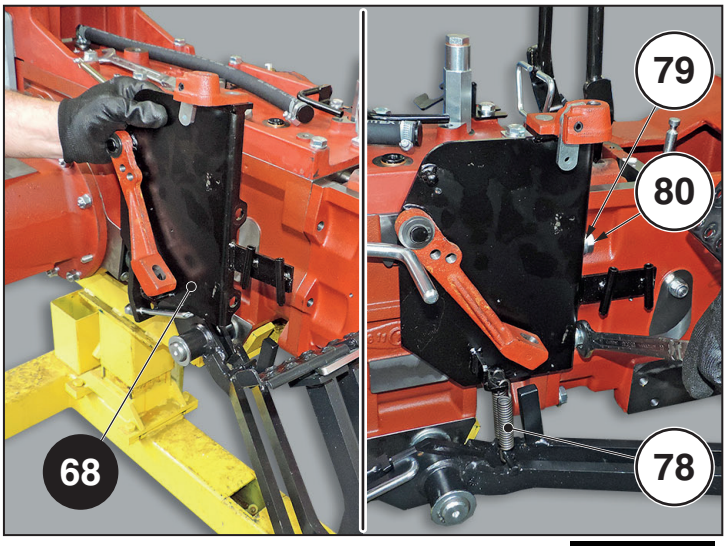


Fig. 10.47

Fasten the spherical bushing (82) to the rod (65) with the pin (83).

Insert the complete rod (65) together with the spring (84), on the lever (70) and the mount (74). Insert the spring (85) and then fasten the spring (84) to the pin (85) and lever (70). Attach the spring (86) to the hook (75) and to the plate (68).

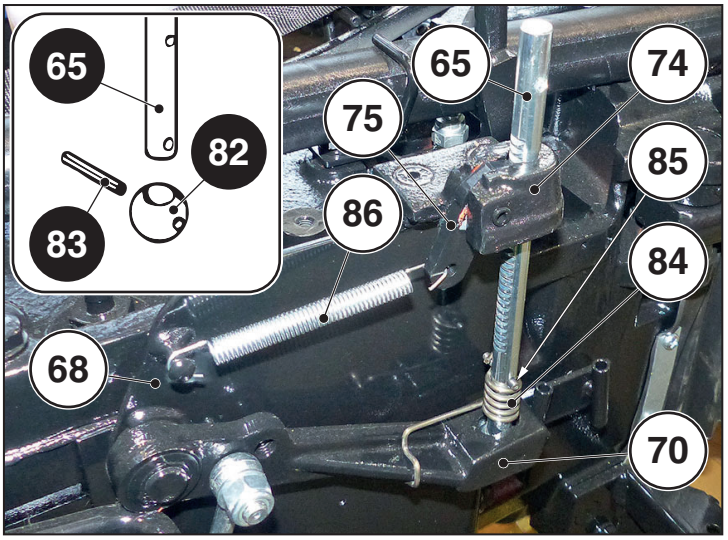


Fig. 10.48

Tighten the stud bolt (89) on the lever (70). Insert the tie-rod (90) to the stud bolt (89) and brake pedal (11). Fit the washer (88) and tighten the nut (87) to secure the tie-rod (90).

Screw the nut (66) and check nut (67) on the tie-rod (90).

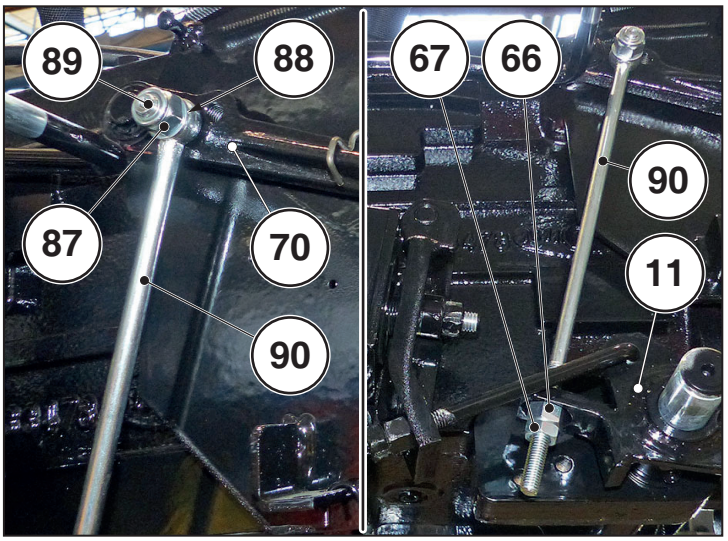


Fig. 10.49

4.1.3 Reassembling hydraulically operated brakes (REV Cluster)

Fit the tie-rod (33) in the cylinder (34).

Fit the spacers (35) and (36).

> **Warning**
>
> Turn the rounded side of both spacers to the outside of the cylinder.
>
> Make sure that you have completely inserted the spacers.

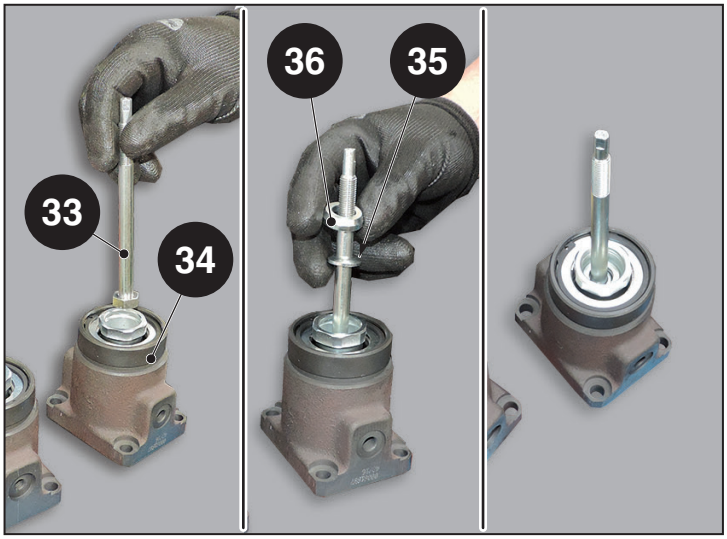


Fig. 10.50

Insert the thrust washer (37).

Screw the vent (38) into the hole on the cylinder (34).

> **Warning**
>
> The cylinder has two holes on opposite sides: the vent (38) must be screwed onto the smallest hole.

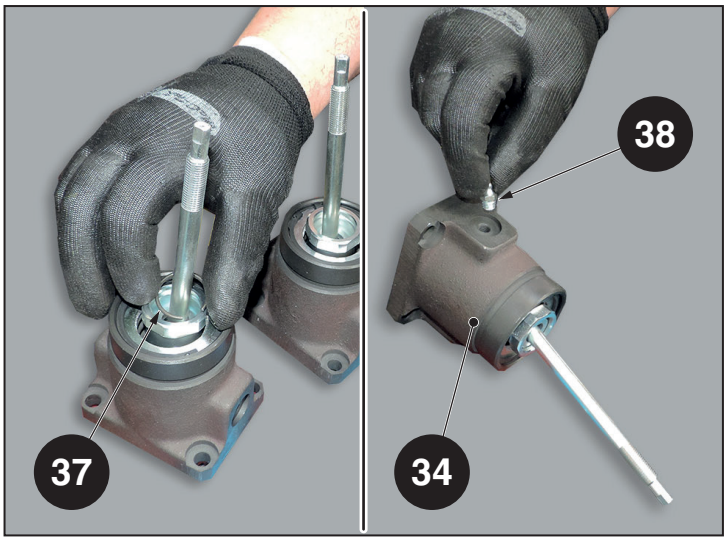


Fig. 10.51

Screw the cylinder (34) onto the braking plate pin up to against the brake casing (41). To screw in the cylinder, the adjuster nut (A) must be rotated, keeping the outer chassis still.

> **Warning**
>
> Turn the vent (38) upwards.

Fasten the cover (34) by tightening the hex socket screws (39) with the washers (40). Apply a tightening torque of 50 Nm (5 kgm).

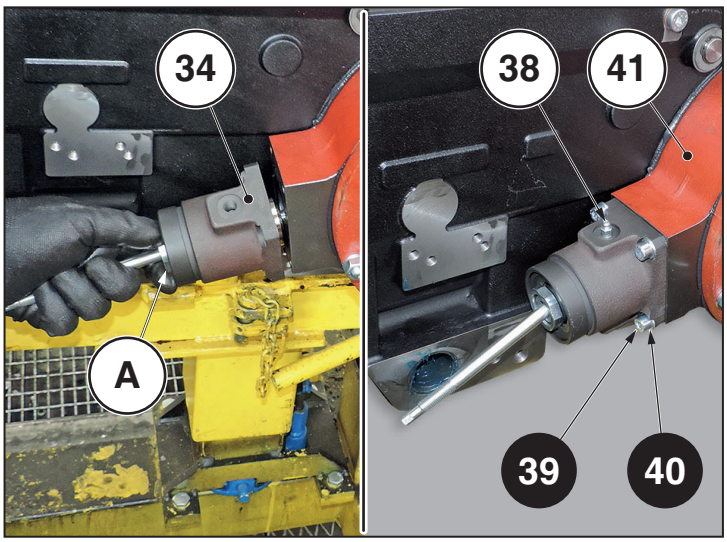


Fig. 10.52

Tighten two screws on the half-axle (42) to make it turn easily.

Tighten the adjuster nut (A) to the end until the rotation of the half-axle (42) is blocked.

Unscrew the brake adjustment nut (A) until the rotation of the half-axle (42) is partially free again, unscrew further the nut (A) by one turn (six faces) to avoid the blocking of the hot brake. Then check correct braking during movement.

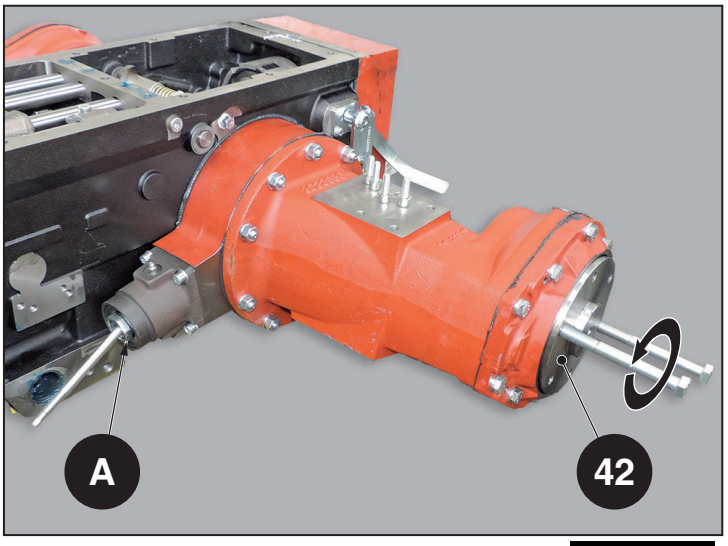


Fig. 10.53

Apply a coat of grease inside the casing (43) and then insert it on the tie-rod of the cylinder (33).

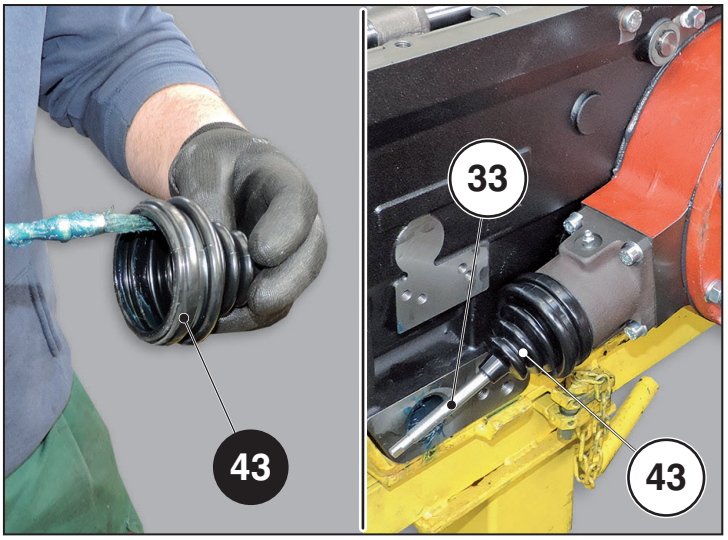


Fig. 10.54

Preassemble the pivot pin (12) of the pedal support, fitting the spacer (31) and lever (44) on the left end. Lock the lever position with the pin (1).

Note

The left side of the pivot pin (12) has the hole closest to the end.

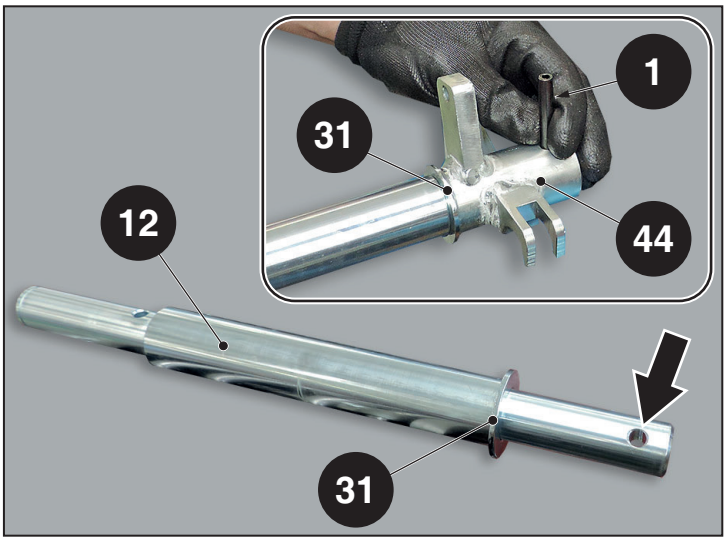


Fig. 10.55

Insert the pedal support pivot pin (12) into its seat on the gearbox to the end.

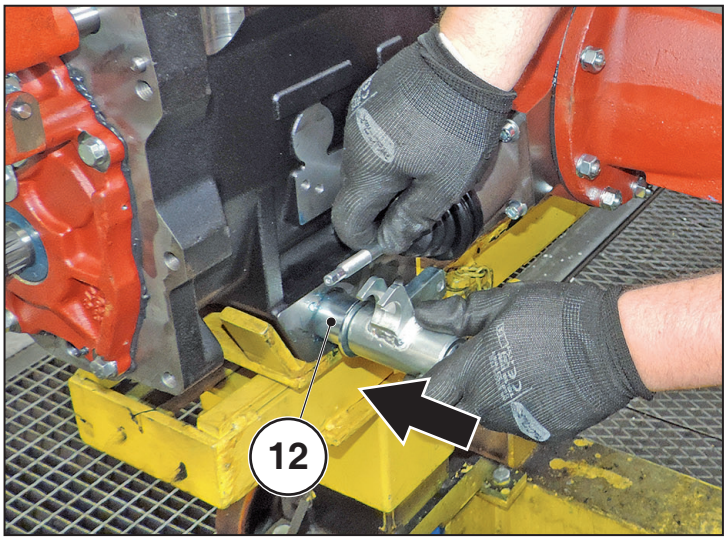


Fig. 10.56

Fit the pin (45).

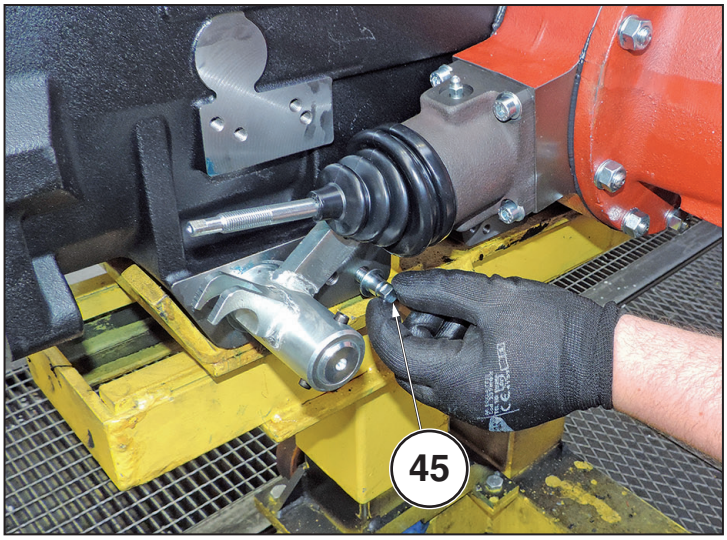


Fig. 10.57

Fasten the rod (46) to the mount (47) using the pin (48).

Fasten the hook (49) to the mount (50) using the pin (51). Fit the complete mount (50) on the rod (46).

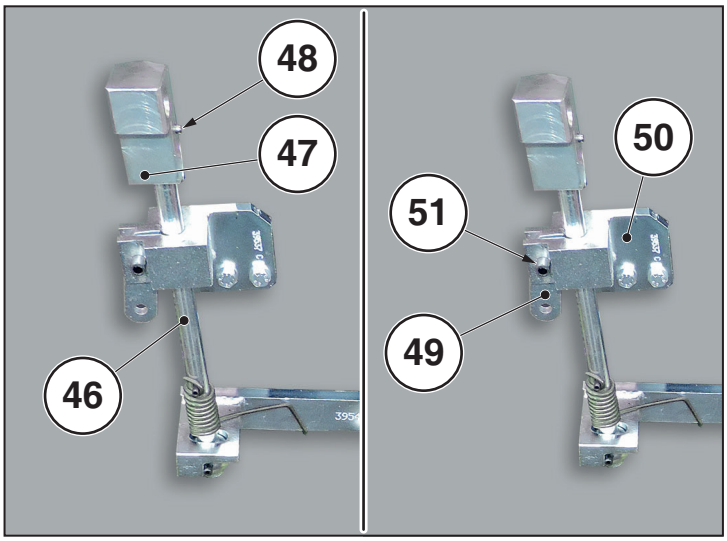


Fig. 10.58

Fit the retainer pin (52) on the rod (46). Insert the spring (53) and hook it to the retainer pin (52).

Insert the complete rod (46) on the lever (54). Fasten the spring (53) to the lever (54).

Fasten the spherical collar nut (55) to the rod (46) and fasten it with the pin (56).

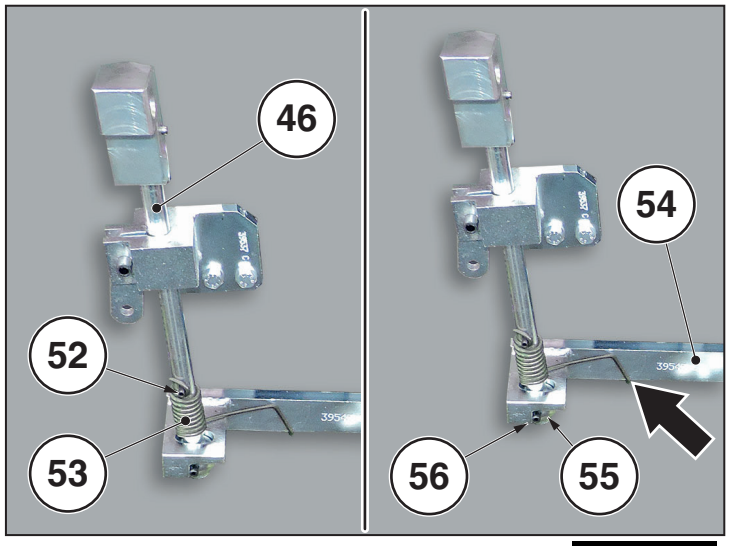


Fig. 10.59

Fit the complete linkage (54) by fitting it on the pin (45). Fasten the complete linkage (54) with the circlip (57).

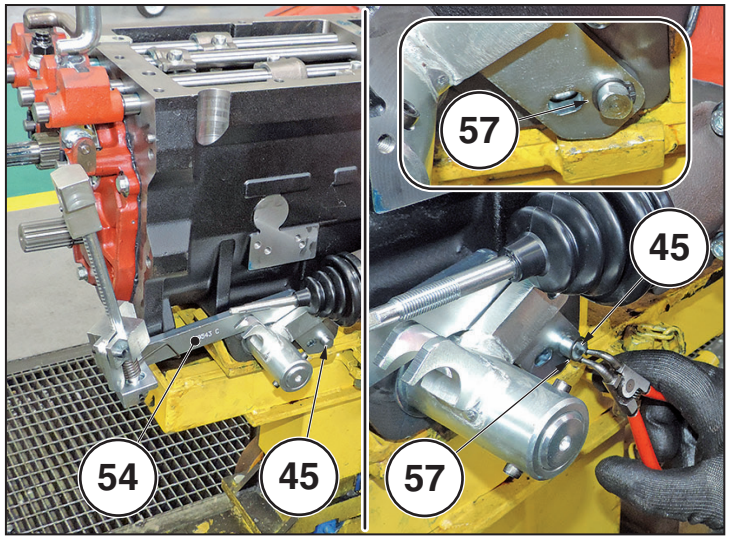


Fig. 10.60

Drive the pin (58) completely into place using a pin punch to secure the lever (43) to the linkage (54).

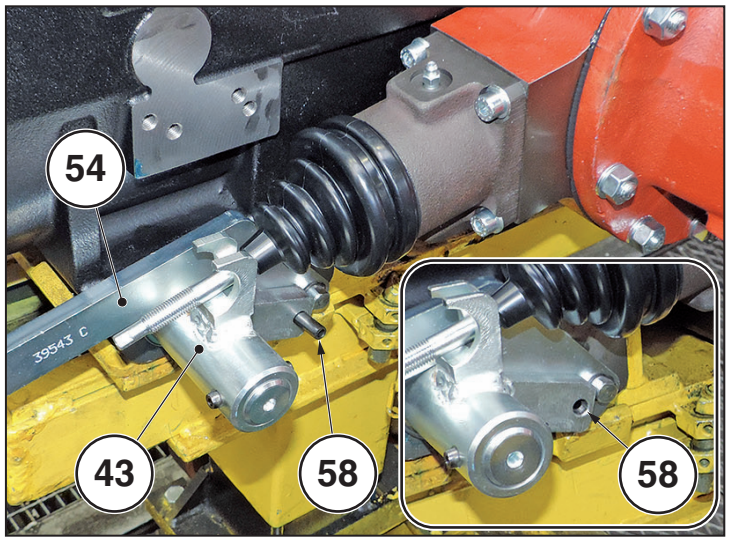


Fig. 10.61

Screw the hex socket screw (91) onto the hook (49) and fasten it with the nuts (92). Fasten the spring (93) to the screw (91) and to the bracket.

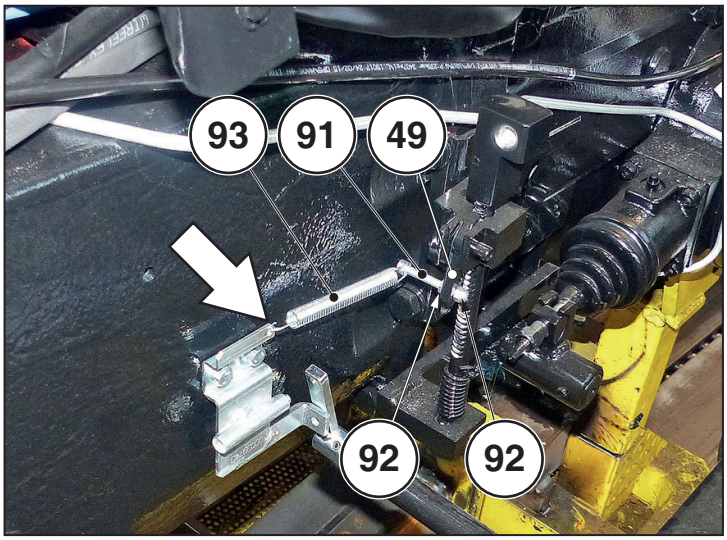


Fig. 10.62

Grease the pedal support pivot pin (12) and insert the spacer (31).

Fit the lever (59) on the pedal support pivot pin (12). Secure the lever with the pin (1).

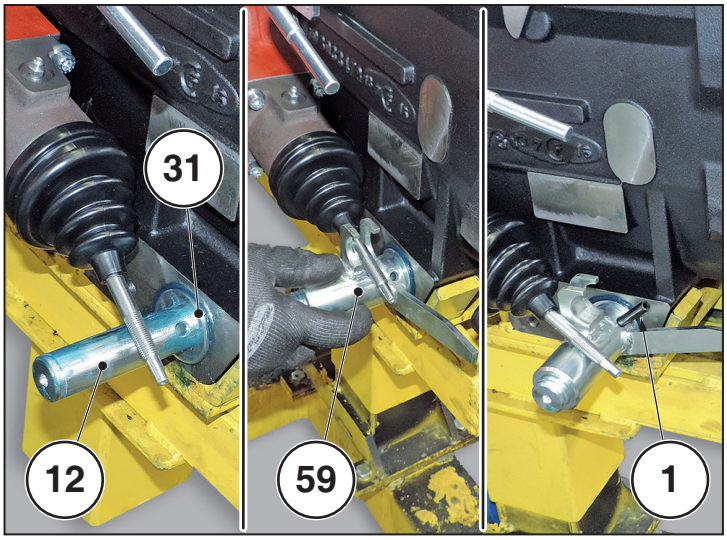


Fig. 10.63

Insert the ferrule (62) and the spacer (63) onto the tie-rod (33).

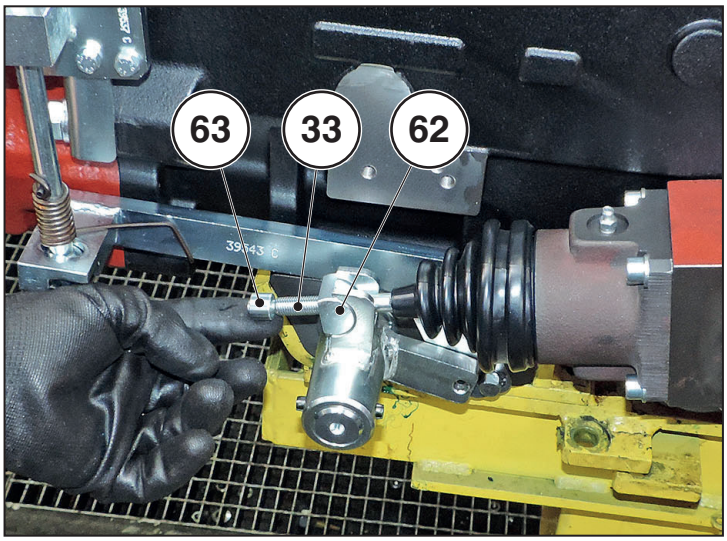


Fig. 10.64

Screw the nut (64) on the tie-rod (33). Use pliers to lock the tie-rod (33).

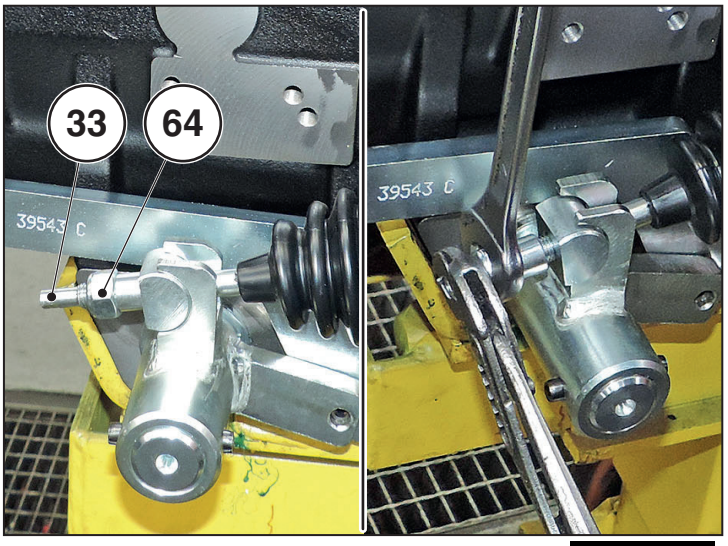


Fig. 10.65

Fasten the brake pipe fittings (98) on the respective cylinders.

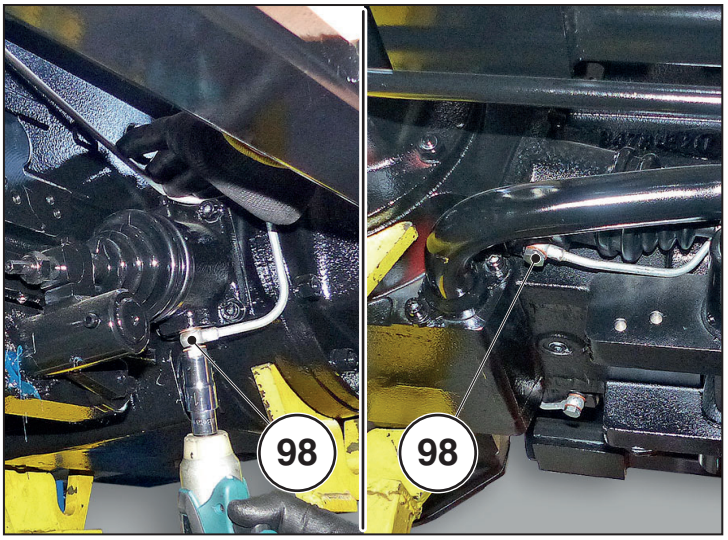


Fig. 10.66

4.1.3.1 Refitting the pedal support

Note

See the Chapter “Rotary mount” for the reassembly of the pedal support.

4.2 Adjustment

4.2.1 Mechanically operated brakes

4.2.1.1 Adjusting the service brakes

Unscrew the nuts (8) and (9) to the end of the tie-rod (5).

Screw the nut (2) in and slide the mobile flange (10) against the nut (9). Then unscrew the nut (2) until you find the right free play on the brake pedal.

The adjustment must be made in such a way that the mobile flange (10) takes a vertical position when the machine is braked, thus allowing simultaneous blocking of the rear wheels.

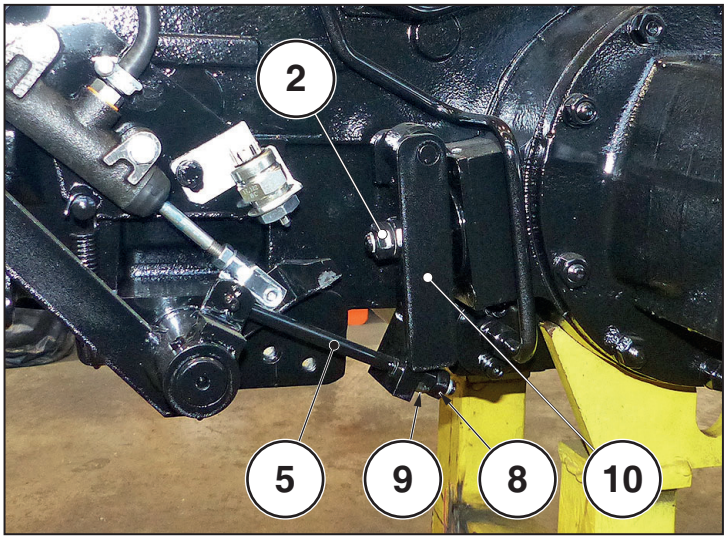


Fig. 10.67

Warning

When the wheels are mounted, check that the braking action occurs at the same time on the two wheels. If so, do not loosen the nut (2) of the wheel that blocks early.

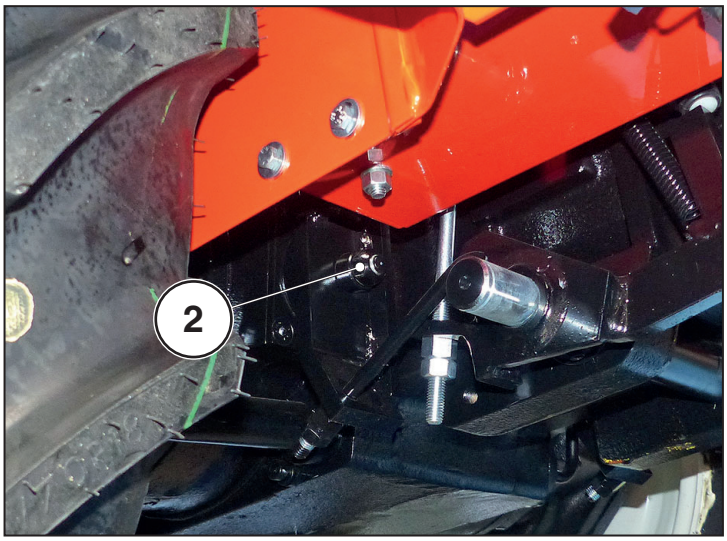


Fig. 10.68

4.2.1.2 Adjusting the emergency and parking brake

Position the rod (65) on the 4th notch.

Tighten the nut (66) until it touches the pedal (11) and then tighten the check nut (67).

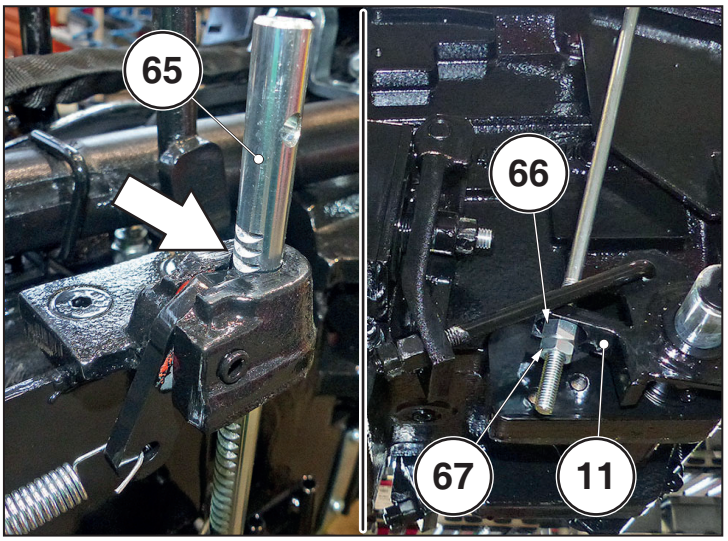


Fig. 10.69

4.2.2 Hydraulically operated brakes

4.2.2.1 Bleeding the braking circuit

When replacing seals or in the case of breakage of some components, bleed the braking circuit.

The bleeding points where the air present in the circuit comes out are located on the following components:

- actuator cylinders mounted on the hubs (34);
- flow reverse control unit (100);
- brake pumps (97).

To correctly load the circuit, it is necessary to bleed all these components, making sure that all the air in the circuit is eliminated.

Warning

The brake bleeding must be done with the electrical system in operation to operate the flow reverse solenoid valve. Make sure that air bleeding was done correctly with the solenoid valve selected in both options.

Once the system has been properly bled, proceed with the adjustments.

Note

Bleeding takes a few minutes and can be speeded up by pressurising the recovery tank of the brake system with compressed air and using a cap with a bicycle inner tube valve to supply the pressurised air.

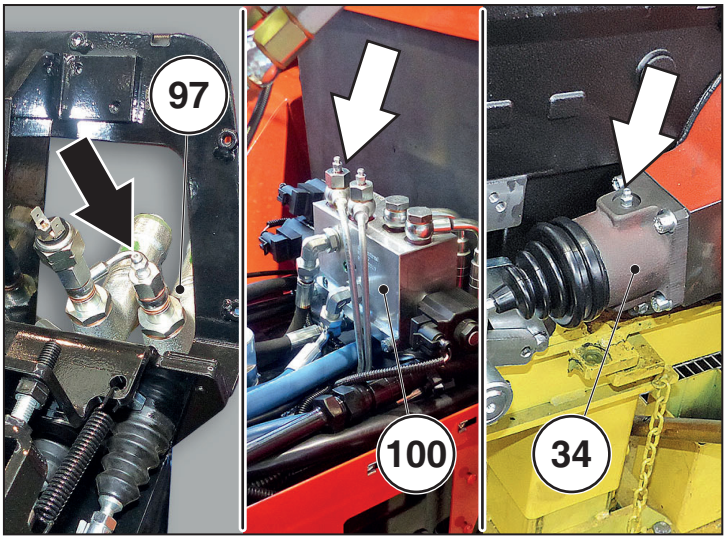


Fig. 10.70

4.2.2.2 Adjusting the service brakes

Screw or unscrew the engage point (94A) of the left brake pedal until it reaches a height of 22 mm between the head of the point and the pedal support. Then align the right brake pedal until it fits easily with the left pedal, and adjust the engage point (94B) accordingly. Screw the check nuts (95) of the engage points once the adjustment is completed.

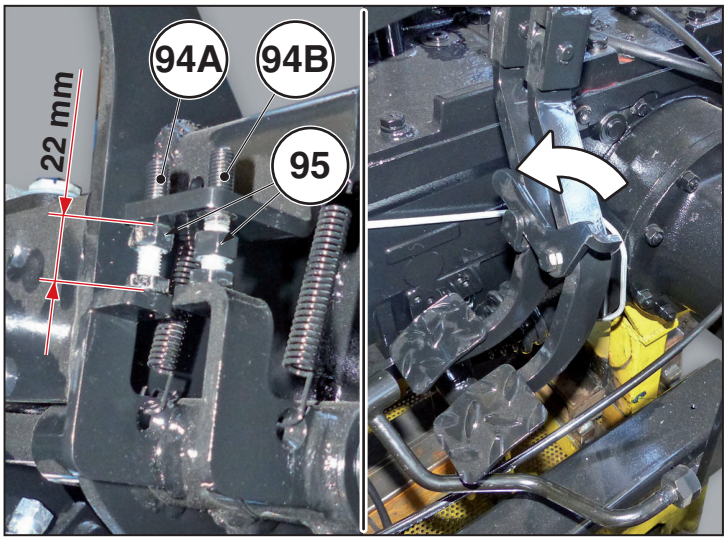


Fig. 10.71

Screw the pin (96) in or out to leave minimal free play on the brake pedal so that the brake pump (97) does not remain packed. Screw in the check nut (99) once the adjustment is completed.

Do this for both brake pumps.

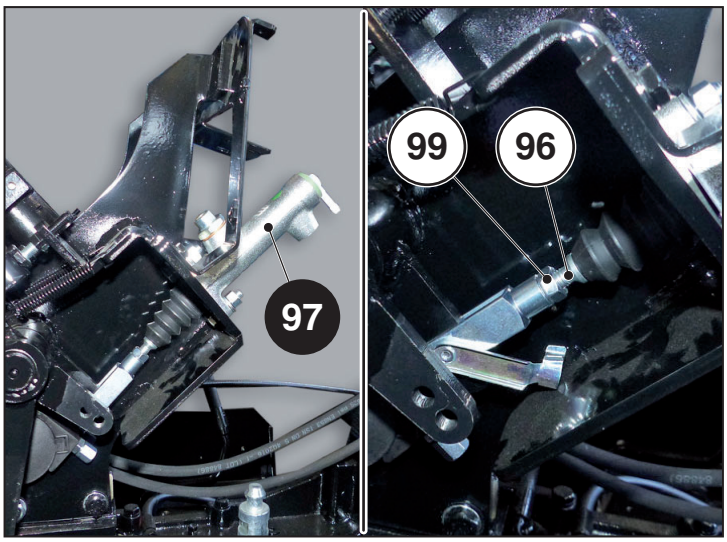


Fig. 10.72

Turn the wheel and tighten the adjuster nut (A) until wheel rotation is blocked. Then unscrew the nut (A) by 6/7 faces (unscrew at least 1 full turn).

Do this for both actuators (34).

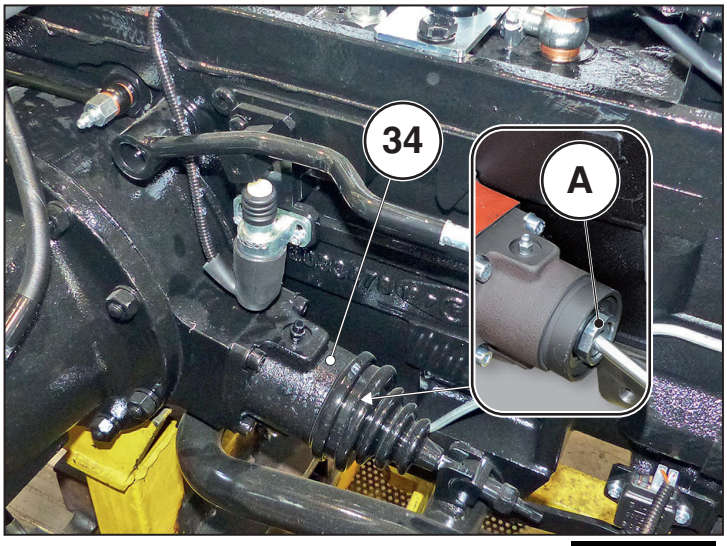


Fig. 10.73

Dimensions A and B indicate the approximate height that the adjusted pedals must have from the footboard once the bleeding is completed.

Note
The values of the dimensions are indicative and do not need to be accurate to the millimetre.

Dimension	Description	Value
A	Pedal rest position (A)	100 mm
B	The point where the pedals become hard to operate, the pressure value in the brake cylinders becomes high and the braking action on the wheels becomes sensitive.	70 mm

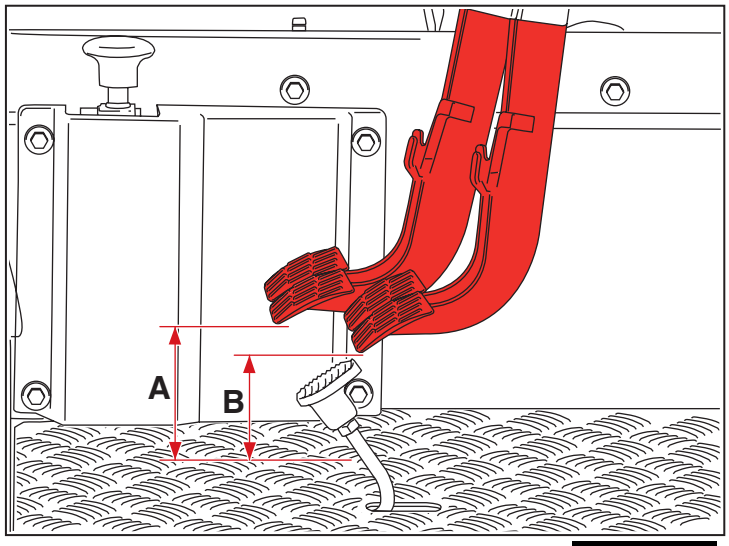


Fig. 10.74

4.2.2.3 Adjusting the emergency and parking brake

Performing the service brake adjustment operations, illustrated in the previous section, gives an optimal adjustment of the parking brake in which, by pulling the lever, the wheels block after 6-7 clicks.

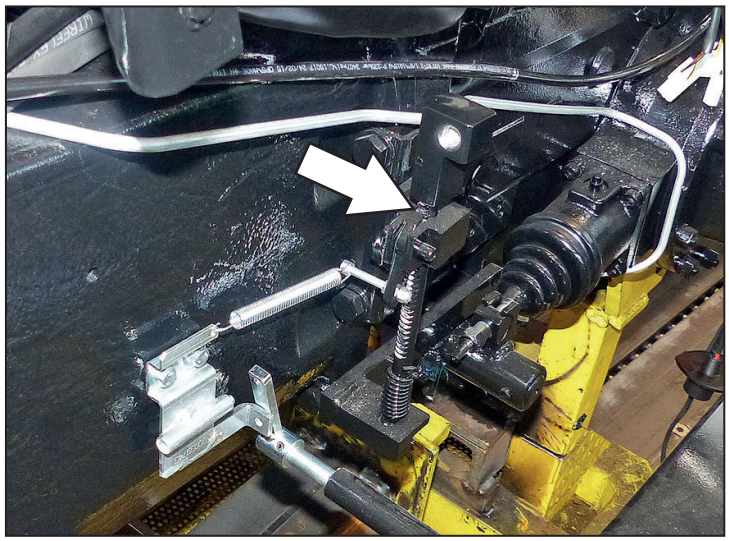


Fig. 10.75

Section 5 : Tightening specifications

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5.1 Tightening specifications

The main tightening torques are listed as follows. For all other tightening torques, see chapter "1- Introduction".

Tightening torque	Nm	Kgm
Central body — gearbox fastener screws (fastening of the parking brake plate)	85	8.5
Actuator cylinder hex socket fastener screws	50	5

Chapter 11 : Hydraulic System

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5.1 Tools necessary 11-32

Section 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.

Section 2 : Main hydraulic circuit

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2.1 RS/SN/SN+ version

2.1.1 General hydraulic circuit diagram

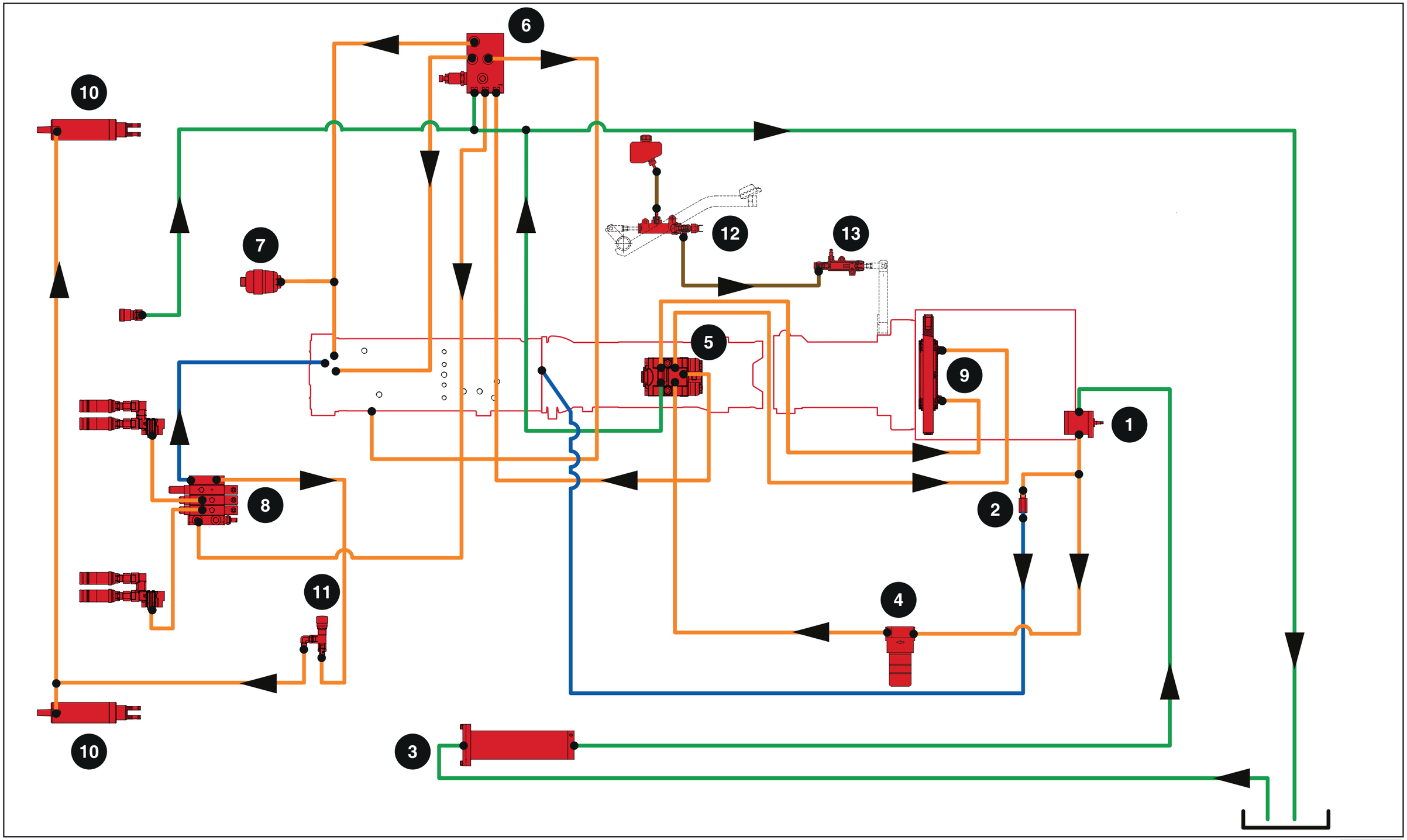


Fig. 11.1

- Main hydraulic circuit
- Suction/return circuit
- Lubrication circuit
- Transmission clutch circuit

1 - Pump
2 - Distribution valve
3 - Suction line filter
4 - Delivery line filter
5 - Hydraulic steering valve
6 - Hydraulic unit
7 - Accumulator
8 - Rear distributors
9 - Steering cylinder
10 - Lift cylinder
11 - Flow regulator
12 - Transmission clutch pump
13 - Transmission clutch cylinder

2.1.2 General description

The hydraulic system consists of a single circuit fed by a pump driven by the engine. A suction line filter cleans the oil aspirated by the pump.

A distributor valve is positioned downstream of the pump that draws a small quantity of oil for forced lubrication in the gearbox. Most of the oil is sent to the hydraulic steering through a delivery line filter.

The oil that is not used by the hydraulic steering is sent to a hydraulic control unit that allows the engagement/ disengagement of the rear PTO. A nitrogen accumulator allows gentle clutch engagement of the PTO clutch.

The oil that is not used by the hydraulic control unit is sent to the rear distributors and to the up/down distributor. A flow regulator allows adjusting the oil flow rate to the lift cylinders, thus reducing or increasing the lifting speed.

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.

2.2 REV version

2.2.1 General hydraulic circuit diagram

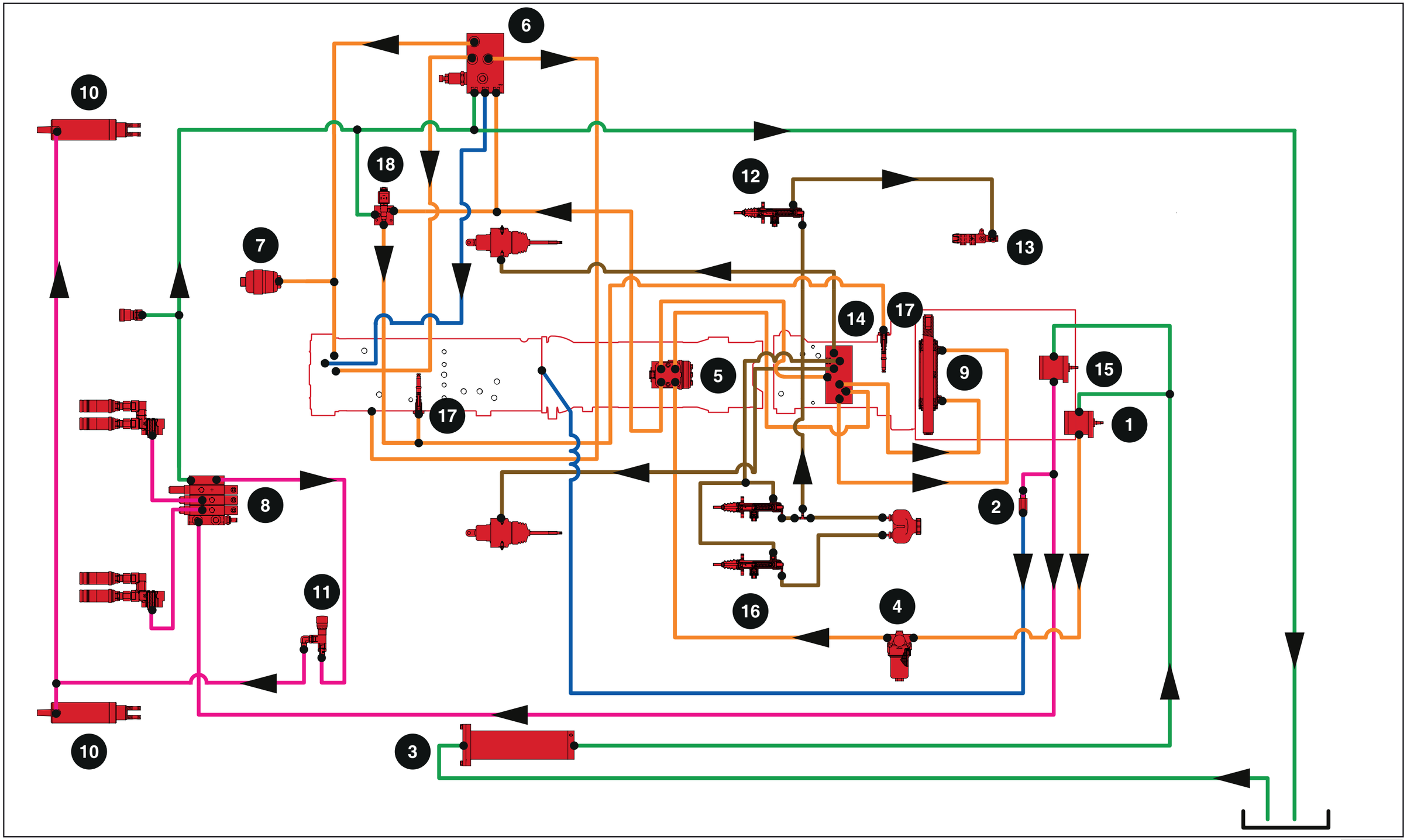


Fig. 11.2

- Main hydraulic circuit
- Hydraulic circuit distributors
- Suction/return circuit
- Lubrication circuit
- Brake/transmission clutch circuit

1 - Main pump
2 - Distribution valve
3 - Suction line filter
4 - Delivery line filter
5 - Hydraulic steering valve
6 - Hydraulic unit
7 - Accumulator
8 - Rear distributors
9 - Steering cylinder
10 - Lift cylinder
11 - Flow regulator
12 - Transmission clutch pump
13 - Transmission clutch cylinder
14 - Flow reverse
15 - Distributor pump
16 - Brake pump
17 - Differential lock
18 - Differential lock solenoid valve

2.2.2 General description

The hydraulic system is composed of two separate circuits managed by 2 pumps controlled by the engine. A pump sends oil to the rear distributors and to the lift. The main pump manages all other devices. A suction line filter cleans the oil aspirated by both pumps.

The main pump sends the oil directly to the hydraulic steering by passing through a suction line filter. The hydraulic steering is not connected directly to the steering cylinder but it sends oil to a flow reverser which allows the flow of the tubes to be reversed when the tractor is in reversible position.

The oil that is not used by the hydraulic steering is sent to a hydraulic control unit that allows the engagement/ disengagement of the rear PTO and differential lock. A nitrogen accumulator allows gentle clutch engagement of the PTO clutch. The oil that is not used by the hydraulic control unit is sent to the drain.

Transmission clutch and brake control is of the mechanically engaged hydraulic type by means of a separate circuit. Pressing the clutch pedal sends oil to a cylinder that disengages the transmission clutch. Pressing the brake pedals sends oil to the flow reverser which allows the flow of the pipes to be reversed when the tractor is in the reversible position. As a result, the oil is sent to the cylinders that actuate the brake tie-rods.

A distributor valve is positioned downstream of the distributor pump that draws a small quantity of oil for forced lubrication in the gearbox. The oil is then sent to the rear distributors and to the up/down distributor. A flow regulator allows adjusting the oil flow rate to the lift cylinders, thus reducing or increasing its lifting speed.

2.3 Technical characteristics

2.3.1 RS version

Pump

Displacement	14.53 cc
Direction of rotation	left
Minimum speed	500 rpm
Maximum speed	3500 rpm
Flow rate	40 litres/min.

Hydraulic steering valve

Hydraulic steering type	dynamic
Maximum steering wheel pressure	110/115 bar
Antishock valve	200/220 bar

Distributors

Coupler type	Rear quick couplings
Rear distributor pressure relief valve	180 bar

Rear lift

Type	Hydraulic, up / down
Lift capacity at lower link ends	1800 kg
3-point linkage category	Category 1 and 1N

Accumulator

Type	Nitrogen accumulator
Maximum pressure	210 kg

Filter

Calibration of bypass valve	6 bar
Filtration rating	16 µm

2.3.2 REV version

Distributor pump

Displacement	14.53 cc
Direction of rotation	left
Minimum speed	500 rpm
Maximum speed	3500 rpm
Flow rate	40 litres/min.

System pump

Displacement	8.51 cc
Direction of rotation	left
Minimum speed	650 rpm
Maximum speed	3500 rpm
Flow rate	25 litres/min.

Hydraulic steering valve

Hydraulic steering type	dynamic
Flow rate	9.2 litres/min.
Maximum steering wheel pressure	100 bar
Antishock valve	200 bar

Distributors

Coupler type	Rear quick couplings
Rear distributor pressure relief valve	180 bar

Rear lift

Type	Hydraulic, up / down
Lift capacity at lower link ends	1800 kg
3-point linkage category	Category 1 and 1N

Accumulator

Type	Nitrogen accumulator
Maximum pressure	210 kg

Filter

Calibration of bypass valve	/
Filtration rating	25 µm

2.3.3 SN/SN+ version

Pump

Displacement	14.53 cc
Direction of rotation	left
Minimum speed	500 rpm
Maximum speed	3500 rpm
Flow rate	40 litres/min.

Hydraulic steering valve

Hydraulic steering type	dynamic
Maximum steering wheel pressure	130/135 bar
Antishock valve	180/210 bar

Distributors

Coupler type	Rear quick couplings
Rear distributor pressure relief valve	180 bar

Rear lift

Type	Hydraulic, up / down
Lift capacity at lower link ends	1800 kg
3-point linkage category	Category 1 and 1N

Accumulator

Type	Nitrogen accumulator
Maximum pressure	210 kg

Filter

Calibration of bypass valve	6 bar
Filtration rating	16 µm

Section 3 : Main components

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3.1 Main 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 pump delivers oil via (B) to the distribution valve. A part of the oil flows into the gearbox lubrication circuit, while the most of it is sent to the hydraulic steering.

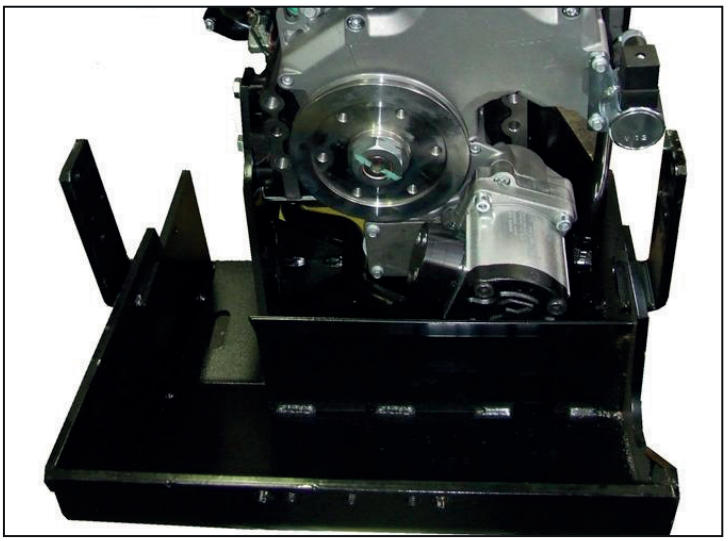


Fig. 11.3

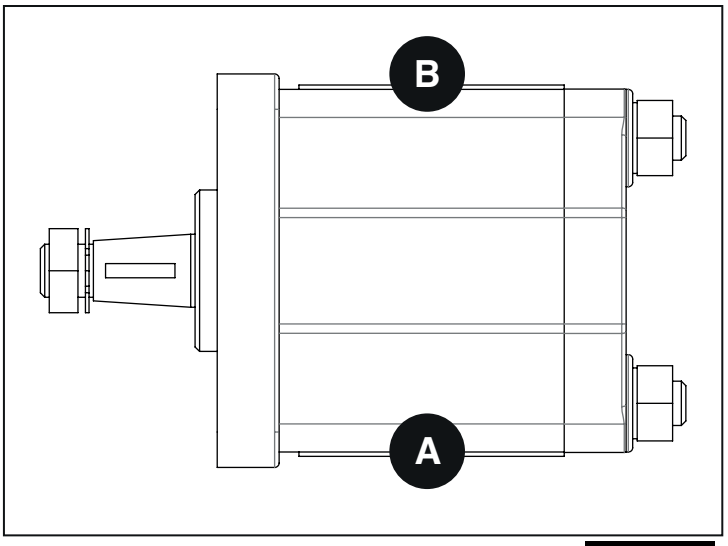


Fig. 11.4

3.2 Distributor hydraulic pump (REV version)

The distributor hydraulic pump (2) is positioned in front next to the hydraulic pump of the steering circuit (1). The pump is driven by the camshaft timing gear and delivers oil to the hydraulic system of the rear distributors and of the lift distributor. Oil from the gearbox and filtered by the suction line filter flows into the suction pipe (A). The pump sends oil via (B) to the distributor inlet block.

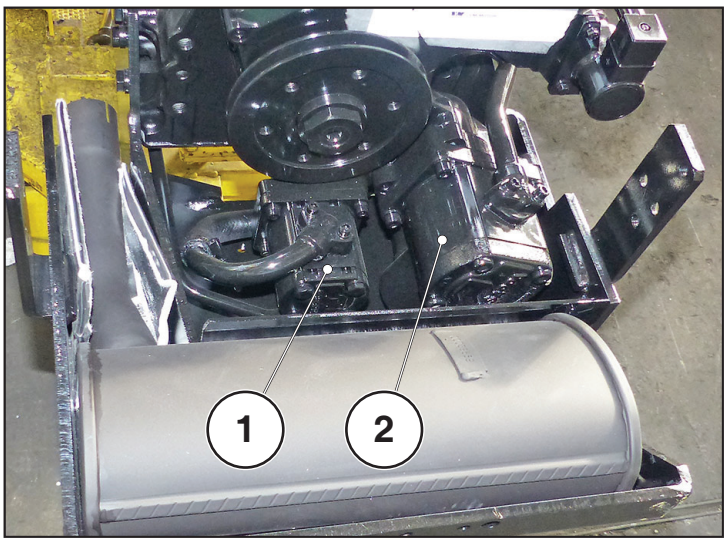


Fig. 11.5

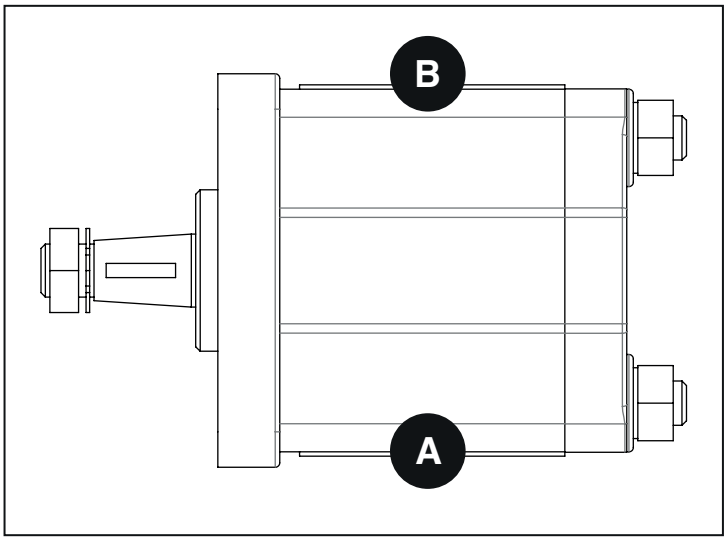


Fig. 11.6

3.3 Distribution valve

The distribution valve situated on the front left side receives oil directly from the hydraulic pump (B1). A part of oil is taken for forced lubrication in the gearbox (B2). The remaining oil is delivered to the downstream devices (B3).

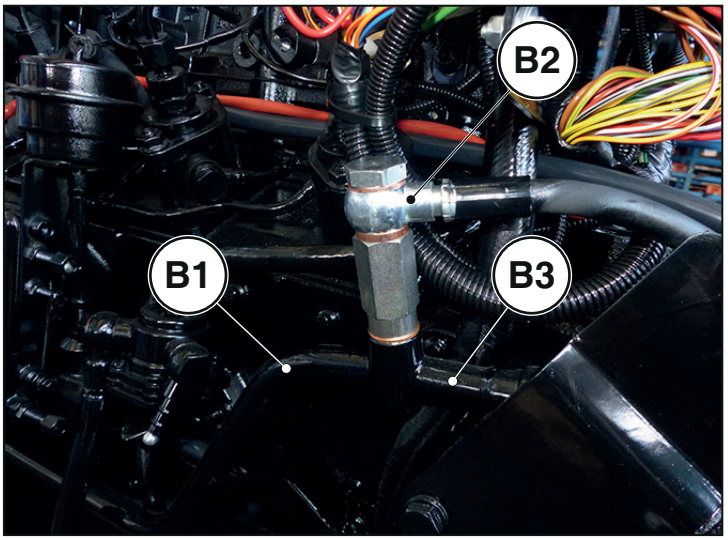


Fig. 11.7

3.4 Suction line filter

The suction line filter is situated in the rear right part of the tractor (RS/REV model) or in the front right part (SN/SN+ model) of the tractor. The filter protects the hydraulic system and its components against damage caused by contaminants contained in the oil.

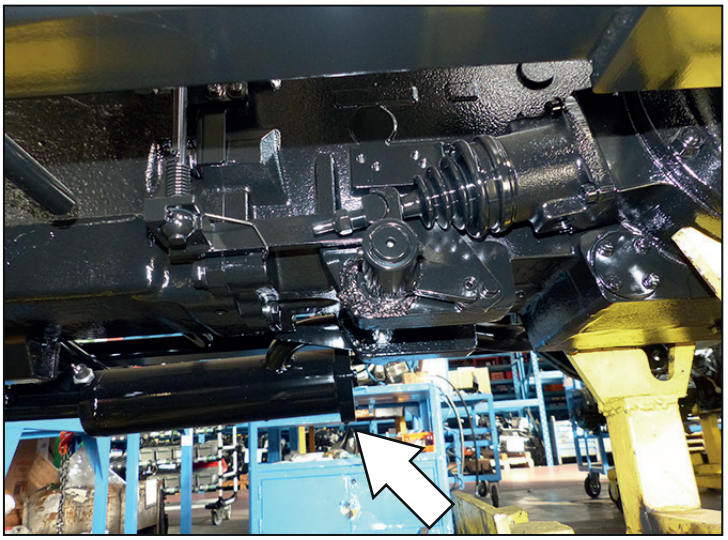


Fig. 11.8

3.5 Hydraulic steering valve

The hydraulic steering circuit receives the oil necessary to operate the double acting steering cylinders from the hydraulic circuit with priority over other utilities. The circuit includes a pressure relief valve and two overpressure safety valves protecting the cylinder and the hydraulic steering valve against accidental damage.

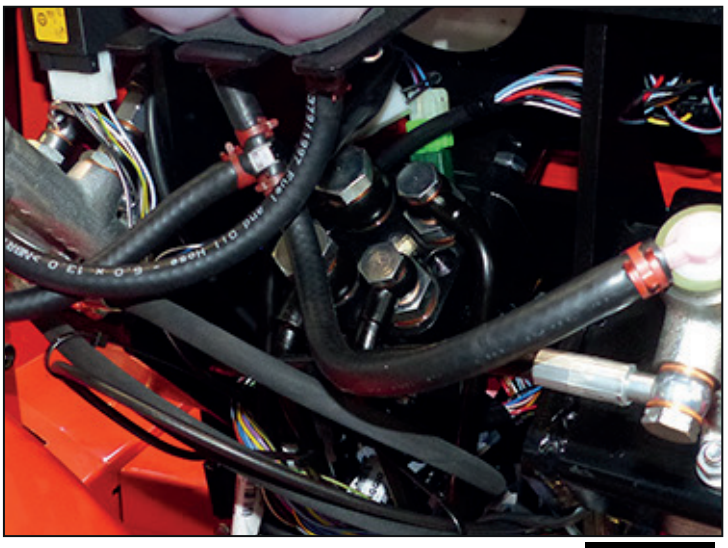


Fig. 11.9

3.6 Rear hydraulic distributors (RS/REV versions)

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 supplied by the circuit downstream of the hydraulic control unit (RS version) or managed by an additional pump (REV version).

The machine may be equipped with up to two double acting distributors

RS version

Oil received from the hydraulic control unit flows into the inlet head (C1), which is equipped with a pressure relief valve (C2) calibrated to 150 bar. In response to movements of the distributor levers, oil is sent to the delivery (C3) or return (C4) hydraulic couplers, and then to the drain line (C5).

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.

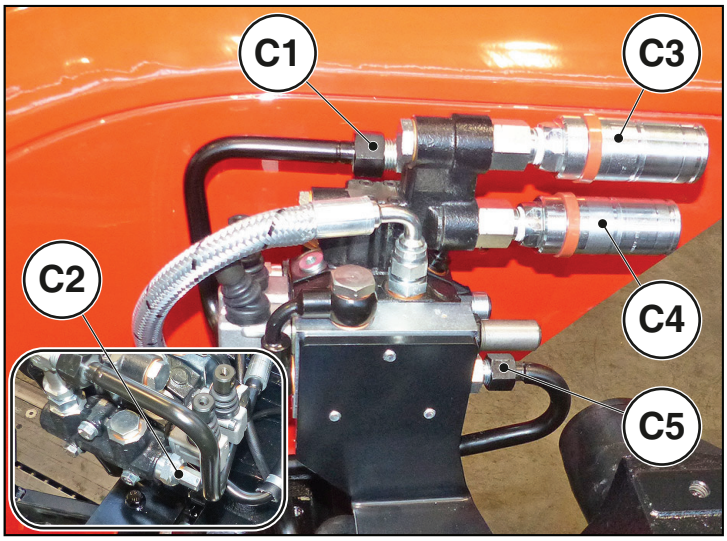


Fig. 11.10

REV version

Oil received from the hydraulic control unit flows into the inlet head (C1), which is equipped with a pressure relief valve (C2) calibrated to 150 bar. In response to movements of the distributor levers, oil is sent to the delivery (C3) or return (C4) hydraulic couplers, and then to the drain line (C5).

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.

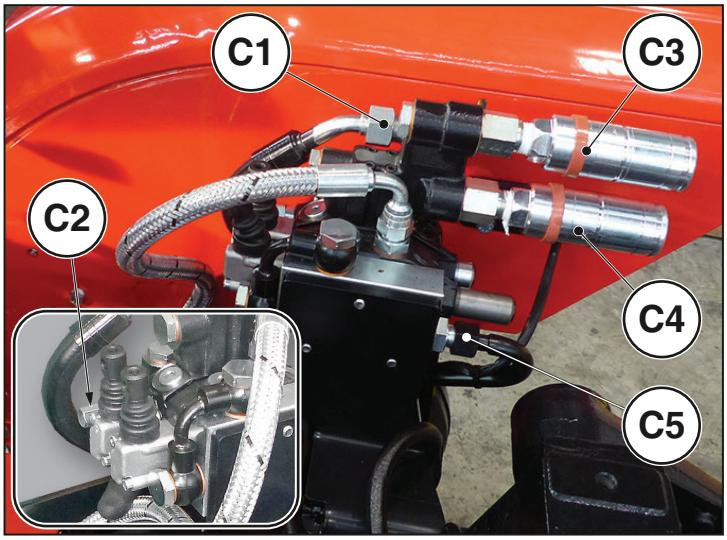


Fig. 11.11

3.7 Rear hydraulic distributors (SN/SN+ versions)

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 supplied by the circuit downstream of the hydraulic control unit.

The distributor block may be equipped with two double acting distributors.

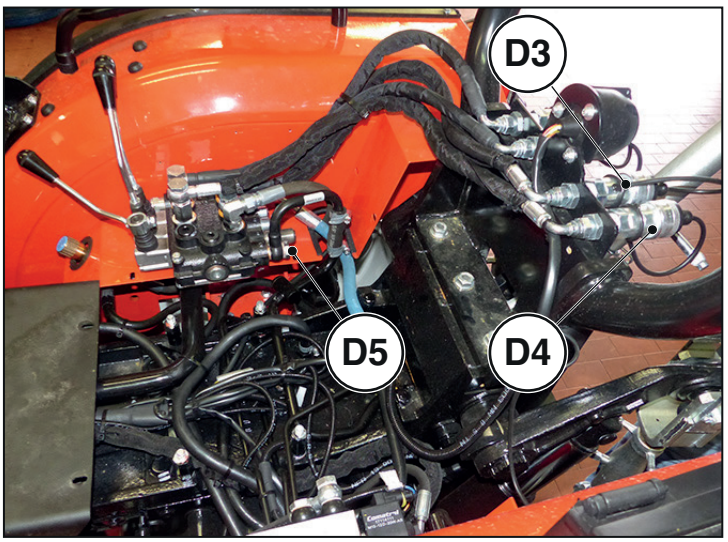


Fig. 11.12

Oil received from the PTO hydraulic control unit flows into the inlet head (D1), which is equipped with a pressure relief valve (D2) calibrated to 150 bar. In response to movements of the distributor levers, oil is sent to the delivery (D3) or return (D4) hydraulic couplers, and then to the drain line (D5).

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.

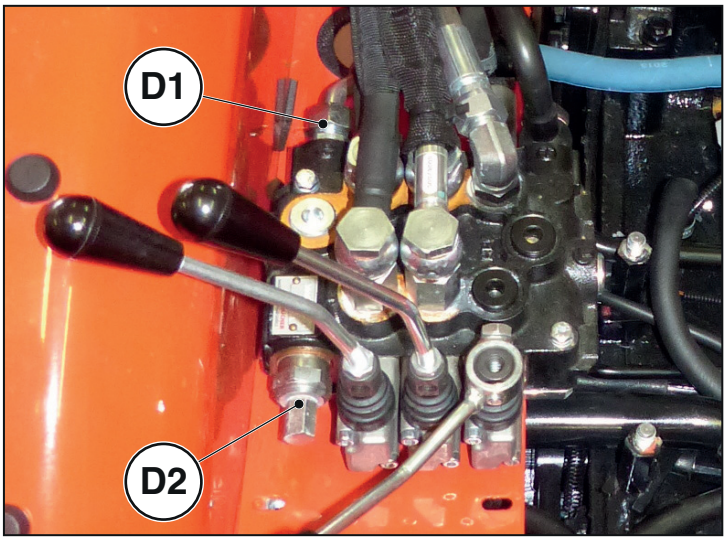


Fig. 11.13

3.8 Rear lift

These tractor models may be equipped with an up / down type rear 3-point linkage controlled from a lever which operates a distributor situated at the rear right of the tractor that determines the lift height of the lift itself. The single-acting distributor of the lift can be either single (L1 - RS/REV versions) or inserted into the distributor block (L2 - SN/SN+ versions).

The oil is sent via (L3) to two single-acting cylinders via a flow regulator (L4) which allows the oil flow rate to the lift cylinders to be adjusted and thereby decreases or increases the lift speed.

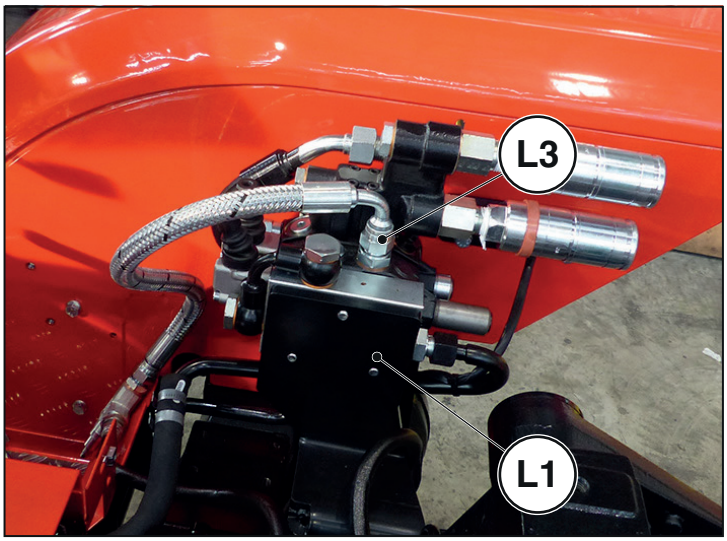


Fig. 11.14

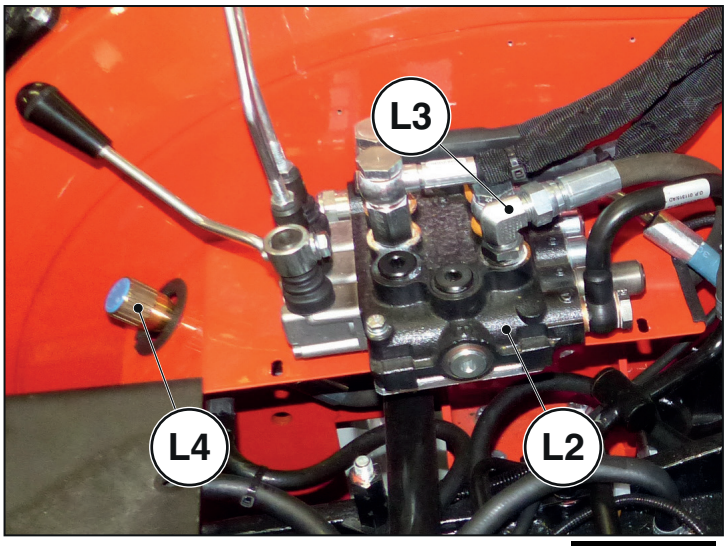


Fig. 11.15

3.9 Differential lock (REV version)

The differential lock in REV versions is of the electrohydraulic type operated by a button located on the instrument cluster. The oil is supplied via the hydraulic steering in (F1). When the solenoid valve (F2) is energised, oil is sent to the cylinders on the differentials by means of (F3) in order to block them.

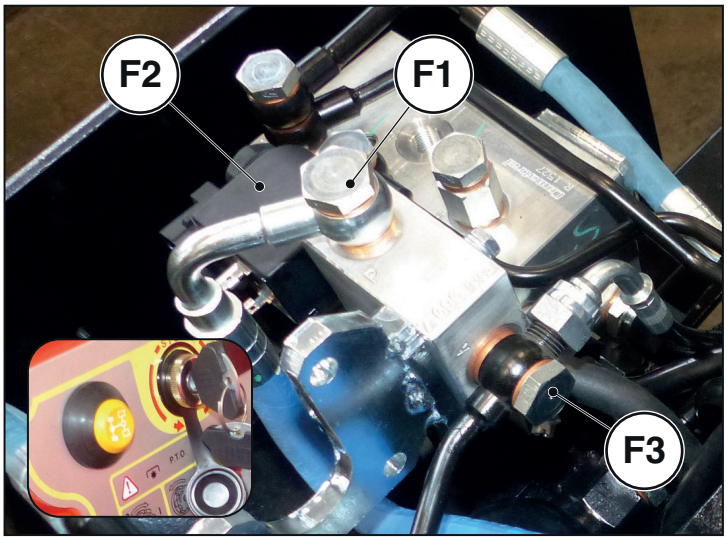


Fig. 11.16

3.10 Hydraulic control unit (REV version)

The hydraulic control unit manages the engagement and disengagement of the rear PTO. Within the assembly, there is a flow regulator (E1) which allows receiving 3.5 litres/min. of oil at minimum engine rpm. The unit is also equipped with a relief valve (E2) calibrated to 21 bar. A nitrogen accumulator (E3) mounted on the side of the control unit allows gradual engagement of the PTO.

The oil in (E4) is used for forced lubrication of the upper bearing of the PTO shaft.

Drainage in (E5), which is always supplied by the solenoid valve assembly when the clutch is not closed, avoids the dragging of the PTO due to accidental contact between the clutch discs. In addition, there is a brake (E6) that helps to avoid dragging.

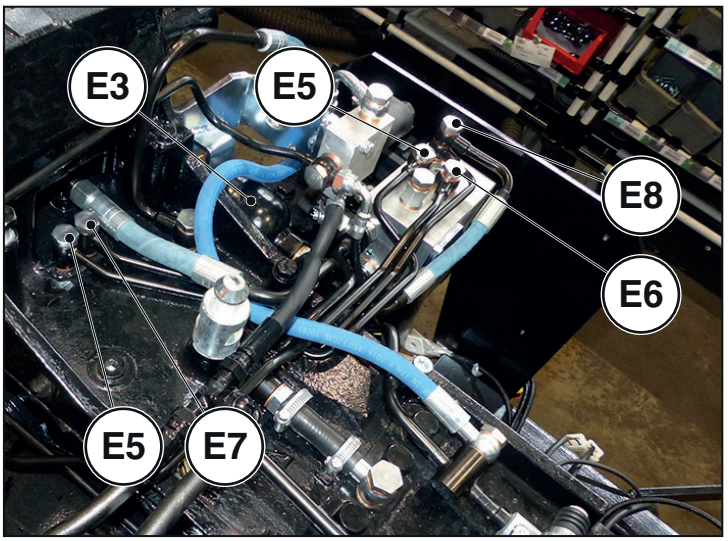


Fig. 11.17

- E1 - Flow regulator
- E2 - Pressure relief valve
- E3 - Accumulator
- E4 - Lubrication
- E5 - Clutch drain
- E6 - PTO brake
- E7 - Clutch supply line
- E8 - Oil to accumulator
- E9 - Oil from hydraulic steering
- E10 - Drain
- E11 - Solenoid valve
- E12 - Solenoid valve

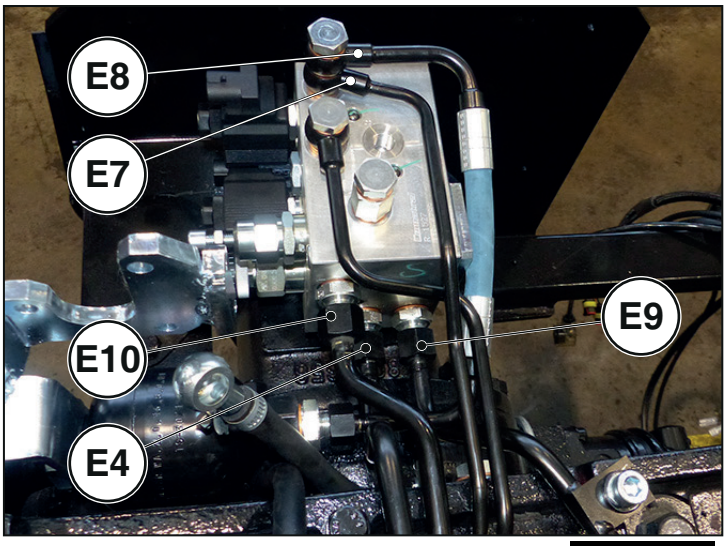


Fig. 11.18

Two solenoid valves (E11) and (E12) manage rear PTO engagement/disengagement and the selection of Independent or Ground Speed mode.

PTO engagement mode and solenoid valve energise state

- PTO not engaged:
  - (E11) - Not energised
  - (E12) - Energised
- Independent PTO:
  - (E11) - Energised
  - (E12) - Energised
- Ground speed PTO:
  - (E11) - Not energised
  - (E12) - Not energised

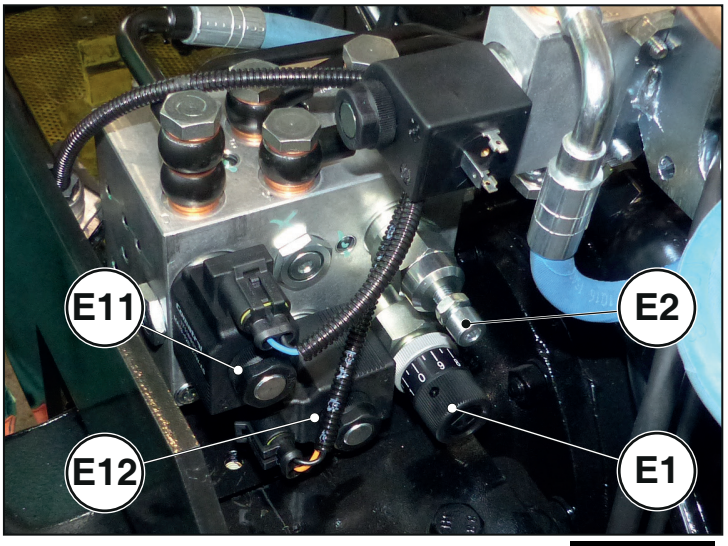


Fig. 11.19

3.11 Hydraulic control unit (SN/SN+ version)

In the SN and SN+ versions, the operating concept of the hydraulic control unit is identical to REV versions. The basic difference in these models is due to the layout of the tubes and the positioning of the components. The photos show the connections of the hydraulic control unit pipes and hydraulic and electronic components. The system further differs from the REV version in that forced lubrication on the gearbox is replaced by the oil delivery to the rear distributors (E4) and the solenoid valve of the differential lock is not present because it is of the mechanically engaged type.

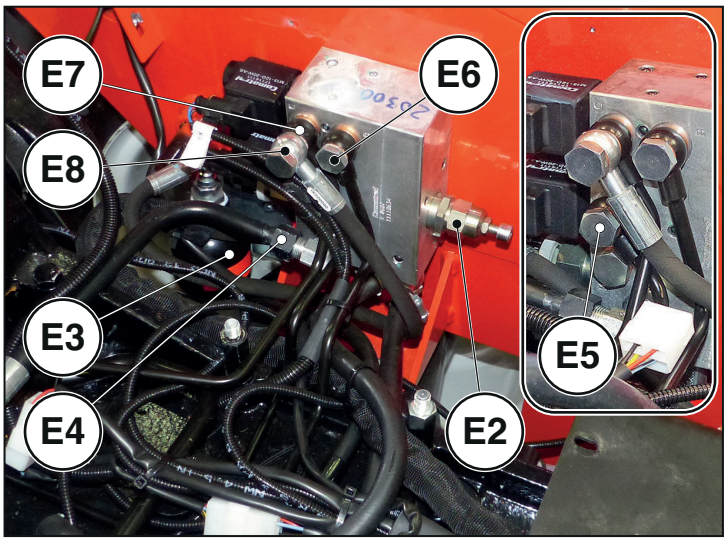


Fig. 11.20

- E1 - Flow regulator
- E2 - Pressure relief valve
- E3 - Accumulator
- E4 - Oil to rear distributors
- E5 - Clutch drain
- E6 - PTO brake
- E7 - Clutch supply line
- E8 - Oil to accumulator
- E9 - Oil from hydraulic steering
- E10 - Drain
- E11 - Solenoid valve
- E12 - Solenoid valve

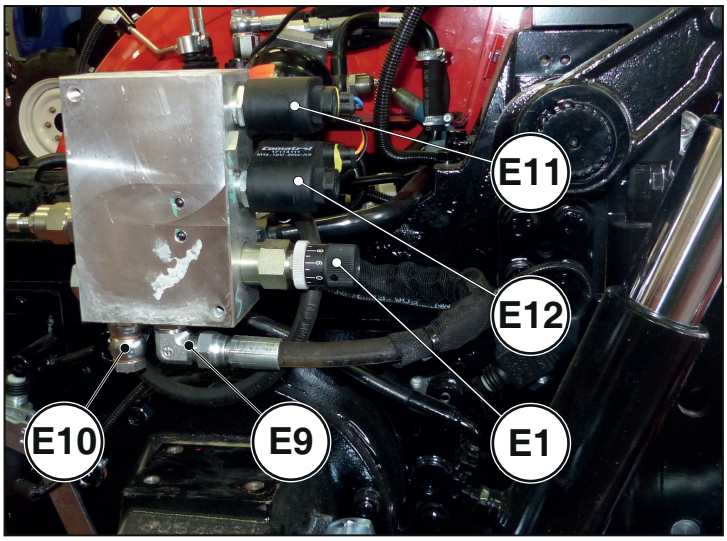


Fig. 11.21

3.12 Hydraulic control unit (RS version)

In RS versions, the operating concept of the hydraulic control unit is identical to the SN/SN+ versions. The basic difference in these models is due to the layout of the tubes and the positioning of the components. The photos show the connections of the hydraulic control unit pipes and hydraulic and electronic components.

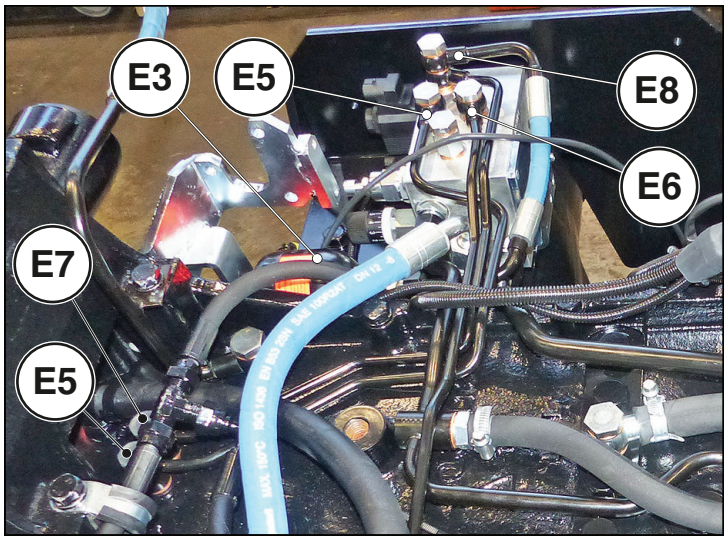


Fig. 11.22

- E1 - Flow regulator
- E2 - Pressure relief valve
- E3 - Accumulator
- E4 - Oil to rear distributors
- E5 - Clutch drain
- E6 - PTO brake
- E7 - Clutch supply line
- E8 - Oil to accumulator
- E9 - Oil from hydraulic steering
- E10 - Drain
- E11 - Solenoid valve
- E12 - Solenoid valve

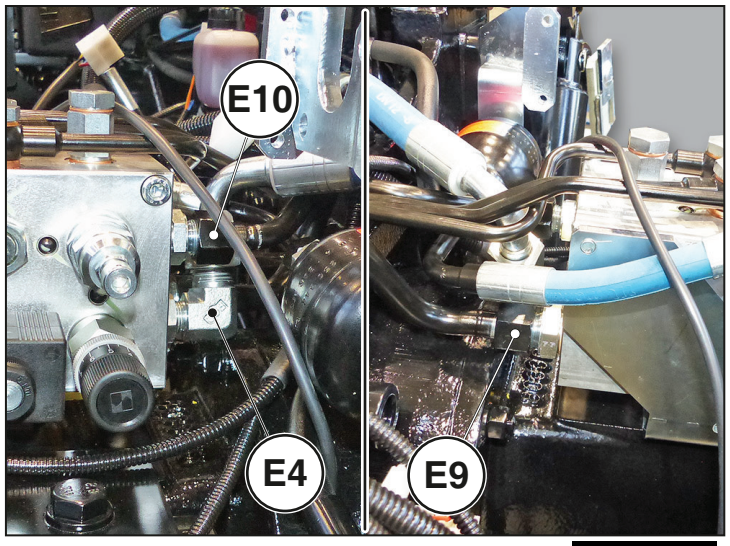


Fig. 11.23

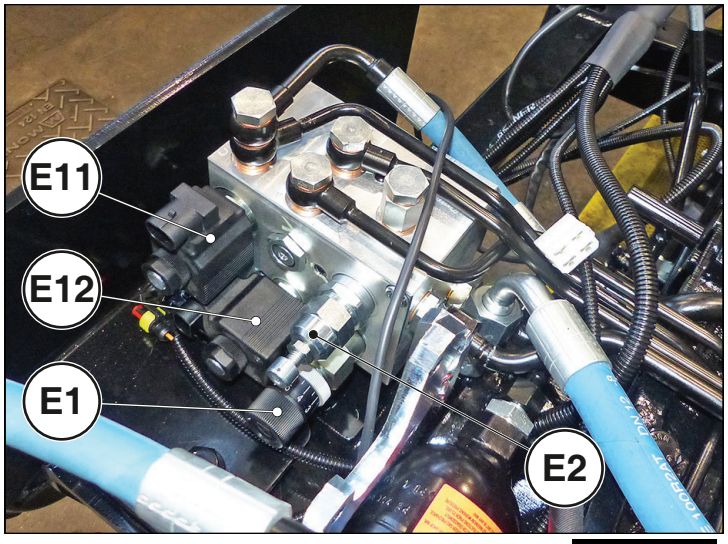


Fig. 11.24

3.13 Flow reverser (REV version)

In reversible versions, the brake and steering wheel tubes must also be reversed when reversing the driver zone. This is done thanks to a flow reverser controlled by 3 solenoid valves. The solenoid valves (G1) and (G2) divert the right and left brake flow, while the solenoid valve (G3) diverts the steering wheel flow.

The switch (G4) on the gearbox identifies the drive zone position.

- G4 pressed: Drive zone in standard position;
- G4 not pressed: Drive zone in reverse position;

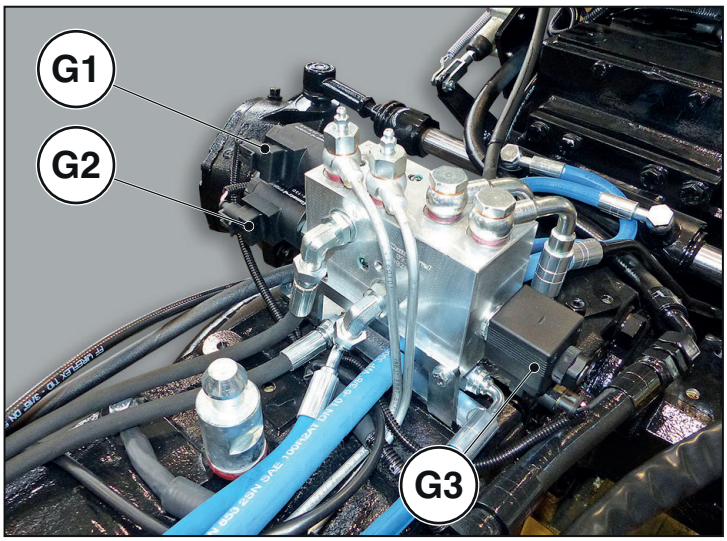


Fig. 11.25

Flow reverse engagement mode and solenoid valve energise state

- Drive zone in standard position:
  - G1 - Not energised
  - G2 - Not energised
  - G3 - Not energised
- Drive zone in reverse position:
  - G1 - Energised
  - G2 - Energised
  - G3 - Energised

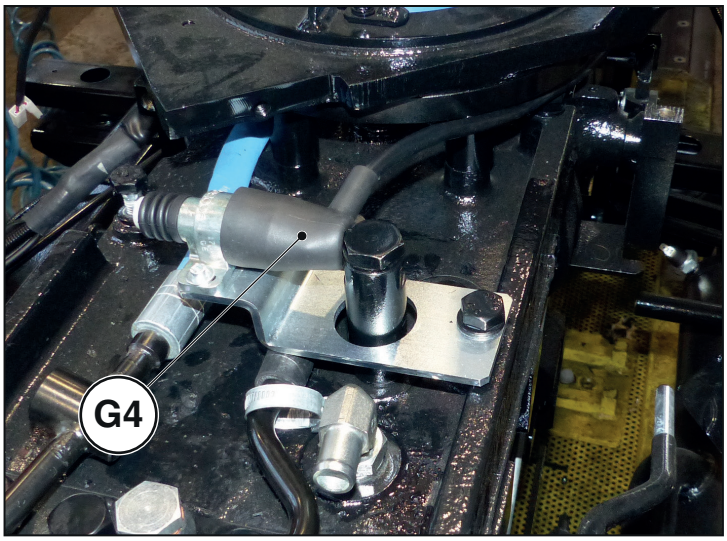


Fig. 11.26

Note

Bleed the brakes with the electrical system operating. Make sure that air bleeding was done correctly with the solenoid valve selected in both options.

3.14 Transmission clutch

Transmission clutch control is of the mechanically engaged hydraulic type. Pressing the clutch pedal draws the oil from the tank via (H1) and sends it via (H2) to an actuator (H3) which disengages the transmission clutch.

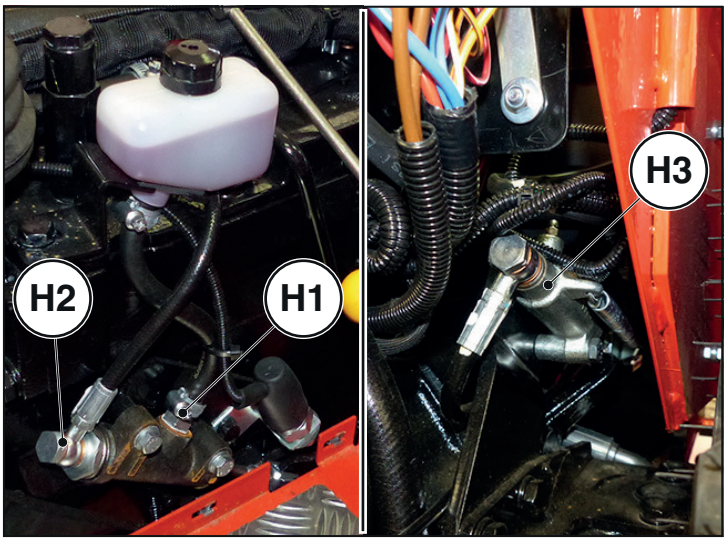


Fig. 11.27

3.15 Hydraulic brakes (REV version)

Braking in the reverse version is of the mechanically engaged hydraulic type. Pressing the brake pedals sends oil through (I1-right) and (I2-left) to the flow reverser (I3-right, I4-left) and then to an actuator (I5-right, I6-left) that activates the pressed brake.

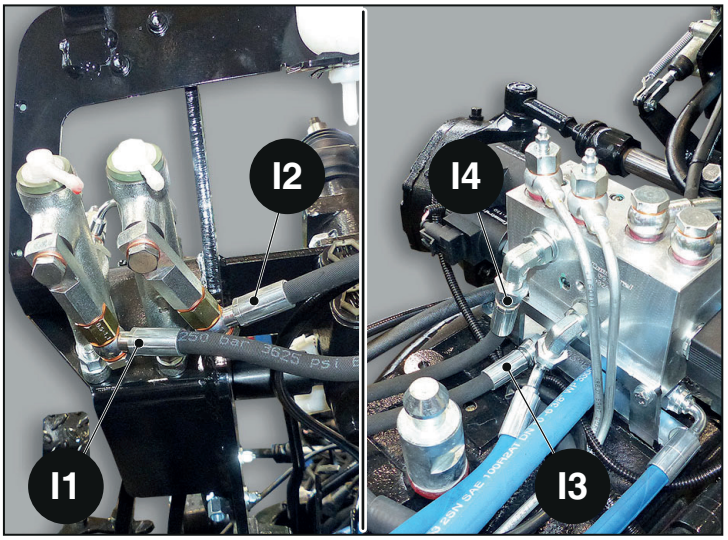


Fig. 11.28

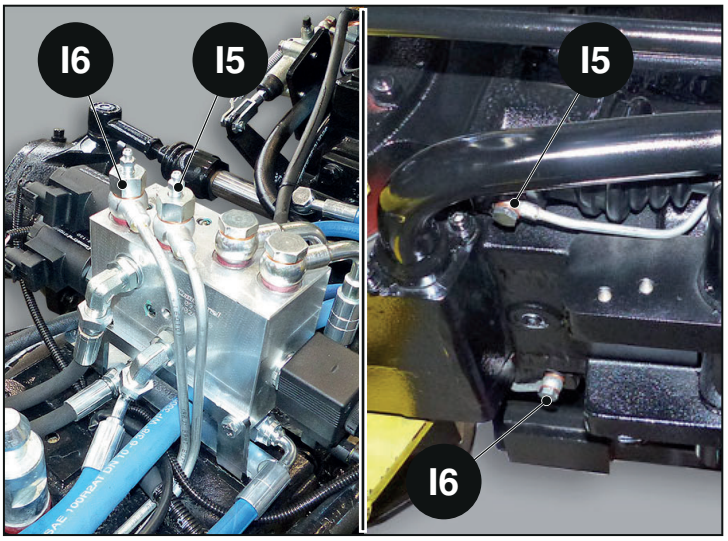


Fig. 11.29

Section 4 : Checking operating pressure values

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4.1 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 and, in the case of the lubrication pressure relief valve, may cause the transmission seal rings to fail.

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.

4.2 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 07000122) 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.

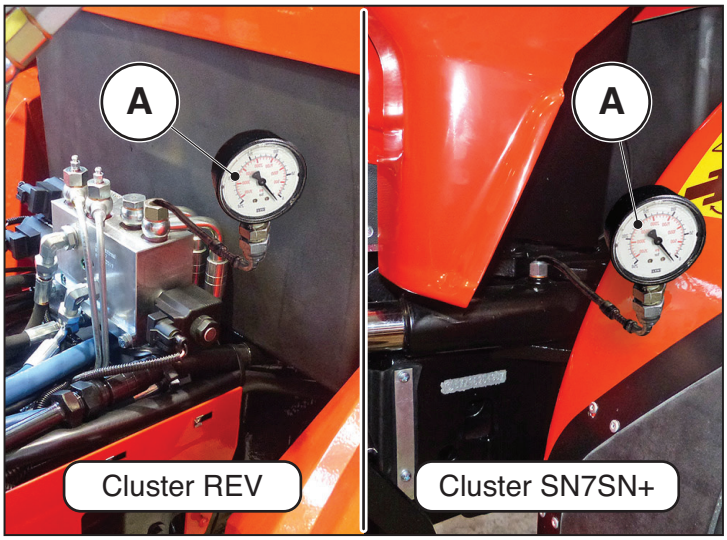


Fig. 11.30

Note

RS Cluster

The measurement is carried out on the hydraulic steering: remove the lower instrument cluster panel and the right front lateral panel, then connect the pressure gauge (A-p/n 07000122) to the connector.

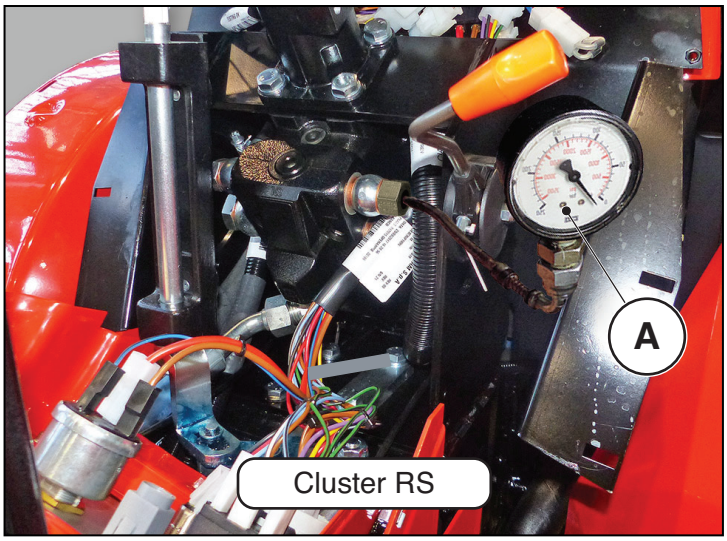


Fig. 11.31

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:

Model	Calibration
RS/SN/SN+	135 bar
REV	105 bar

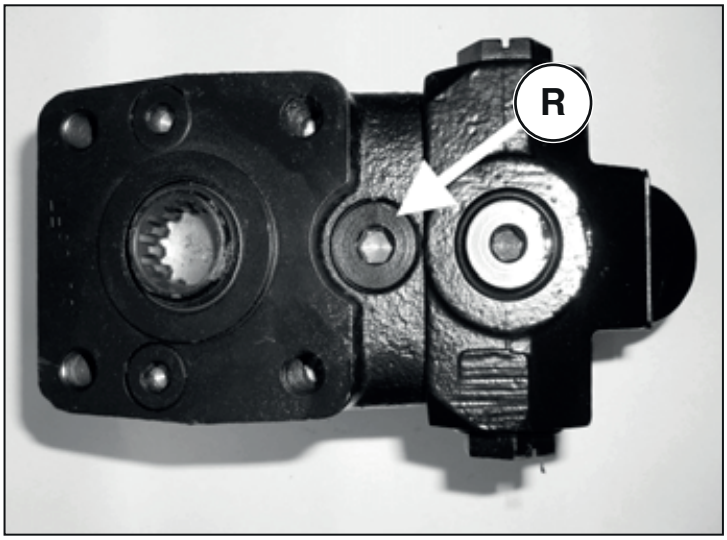


Fig. 11.32

4.2.1 Cleaning the load sensing valve (RS/SN/SN+ versions)

The hydraulic steering units installed on the RS, SN and SN+ models are complete with Load Sensing valve. Each time the steering wheel moves, a small quantity of oil passes through the orifice (B1) and activates the Load Sensing valve, which draws the amount of oil required for steering. A malfunction of the hydraulic steering may be caused by dirt present in the orifice (B1) or inside the valve spool.

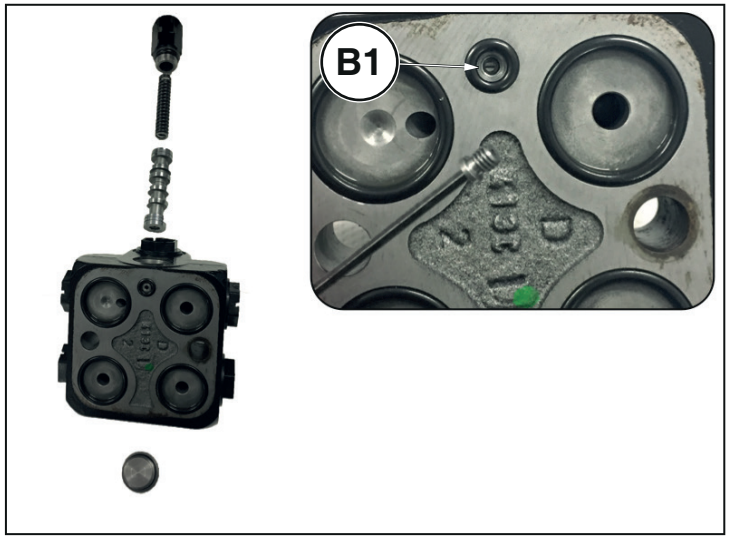


Fig. 11.33

Clean the interior of the Load Sensing valve and orifice.

Warning

Make sure that all the components are reassembled in the correct order.

Note

For more detailed instructions, see the use and maintenance manual provided by the manufacturer.

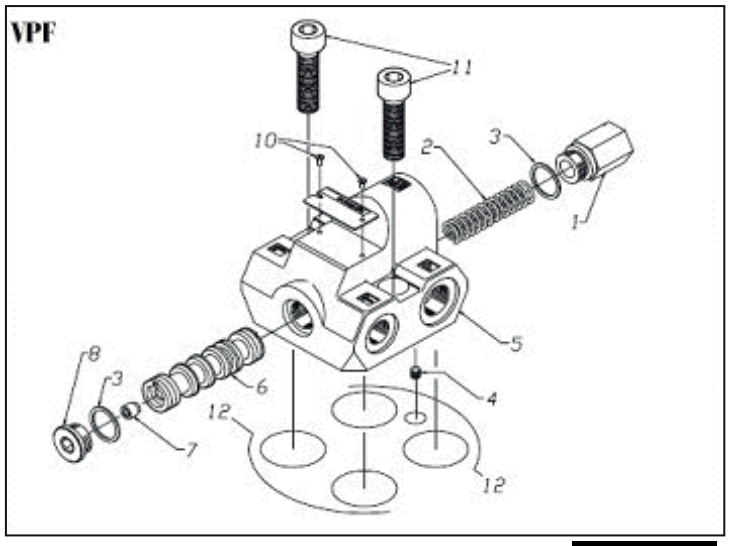


Fig. 11.34

4.3 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 180-190 bar should be read on the pressure gauge.

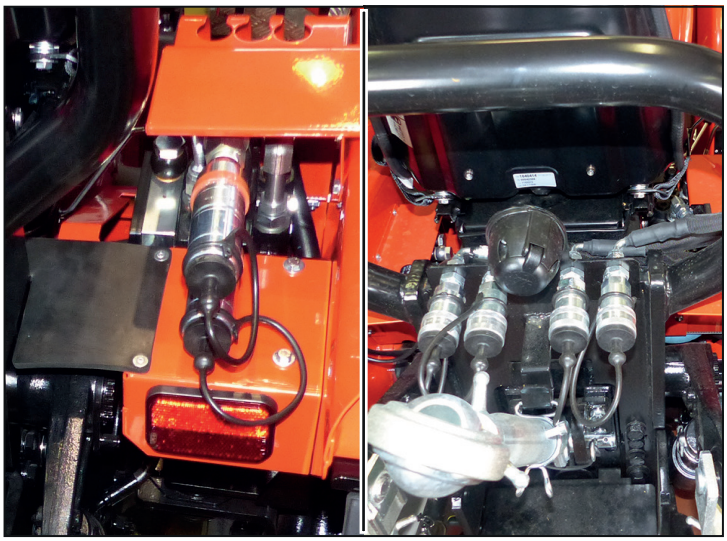


Fig. 11.35

Tighten or loosen the pressure relief valve to attain the correct pressure value.

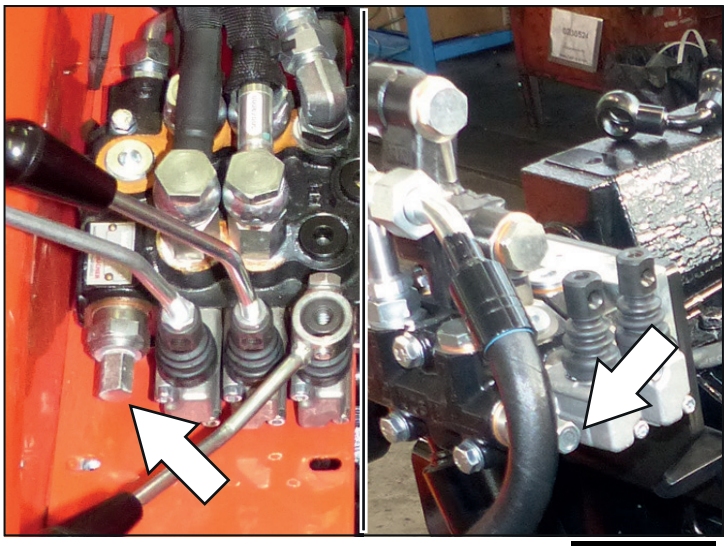


Fig. 11.36

4.4 Checking PTO pressure and engagement flow rate

The hydraulic control unit has a pressure relief valve (A) and a flow regulator (B). For correct functioning of the PTO, it is necessary to check that the pressure and flow rate values are correct.

To check the calibration of the flow regulator (B), use a stopwatch and a canister with level indicator. Collect the oil from the delivery pipe to the PTO (C) inside a canister. After 60 seconds, the oil in the canister must be 3.5 litres.

Note

3.5 litres is the quantity with an oil temperature of 20°C. At different oil temperatures, the amount of oil may be different but still correct.

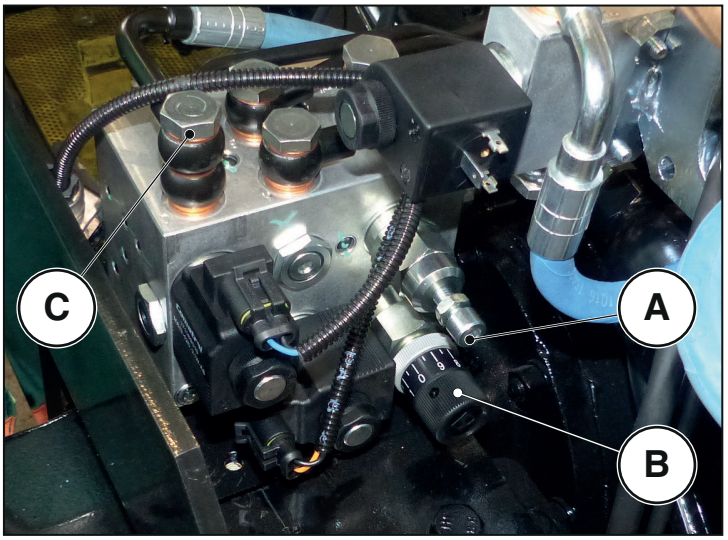


Fig. 11.37

If the PTO engagement speed is not correct, turn the knob (B). Turning it clockwise will increase the flow rate; turning it counterclockwise will decrease it.

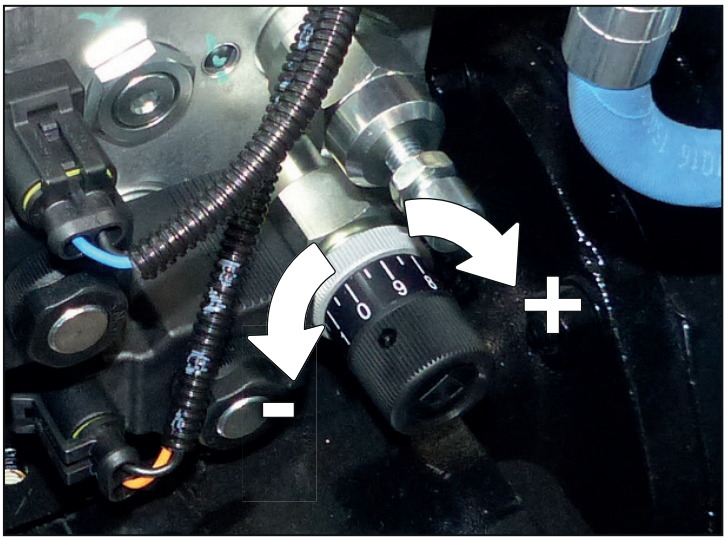


Fig. 11.38

To check the PTO engagement pressure, mount a pressure gauge on the connector (D) and check the pressure according to the values below:

Model	Pressure
RS/SN/SN+	21 bar (cold oil) 18 bar (hot oil)
REV	24 bar (cold oil) 21 bar (hot oil)

Note

The difference in pressure in the REV version is due to the hydraulic engagement of the front and rear differential lock.

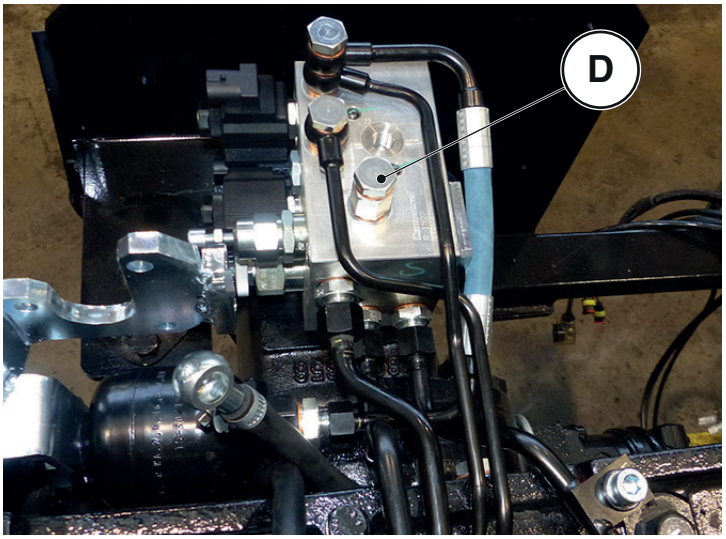


Fig. 11.39

A further check on the functioning of the PTO can be carried out by measuring the brake pressure. Install a pressure gauge on the flange (E) for the check. Insert the PTO. Disengage the PTO and check that the value measured on the pressure gauge is 18-20 bar.

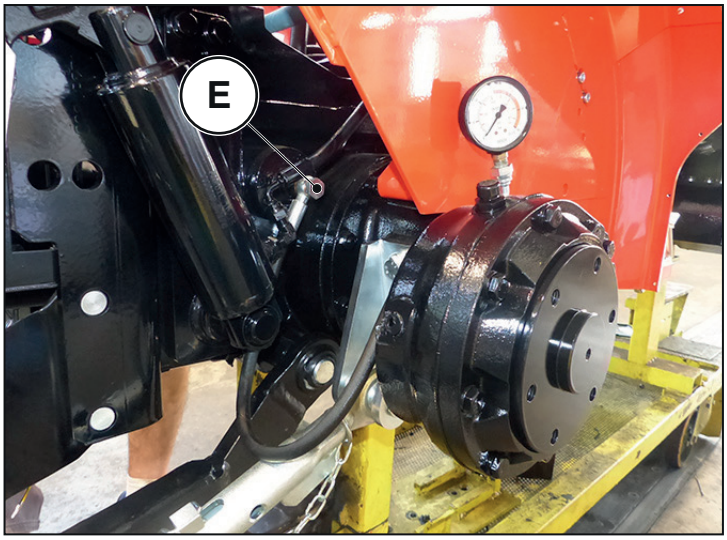


Fig. 11.40

Proceed as follows to diagnose pressure drops on the hydraulic control unit and on the PTO clutch.

1 - Remove the delivery pipe (F) to the accumulator and the delivery pipe (G) to the PTO clutch; then mount a pressure gauge on the free connector:
   - if there is no pressure, then the hydraulic control unit may be faulty;
   - if the pressure is correct, go to the next step.

2 - Reconnect the delivery pipe (G) to the PTO clutch and fit the pressure gauge above it: if there is no pressure, there may be a leak in the PTO clutch assembly

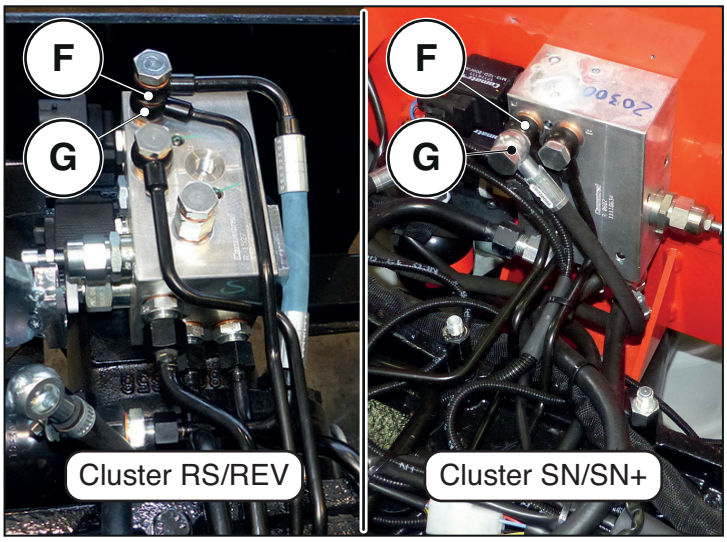


Fig. 11.41

Section 5 : Tools necessary

Index

5.1 Tools necessary 11-32

5.1 Tools necessary

p/n	Description	Quantity
07000122	Pressure gauge	1

Chapter 12 : Electrical system

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Section 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.

Section 2 : Instrument panel

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2.2 Gruppo spie 12-4

2.1 Digital instrument panel

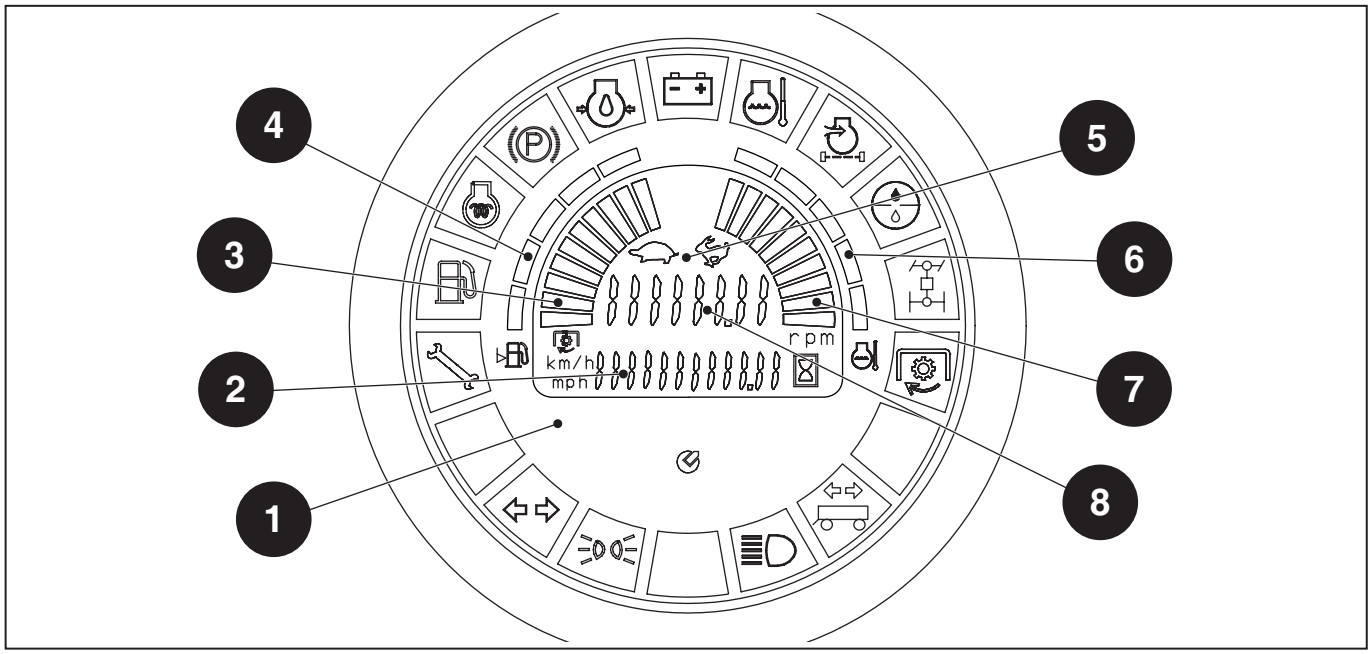


Fig. 12.1

1 - Dial
2 - Hour meter
3 - PTO speed indicator
4 - Fuel gauge
5 - Range indicator
6 - Coolant temperature
7 - Tachometer
8 - Tachometer

2.2 Indicator lamps

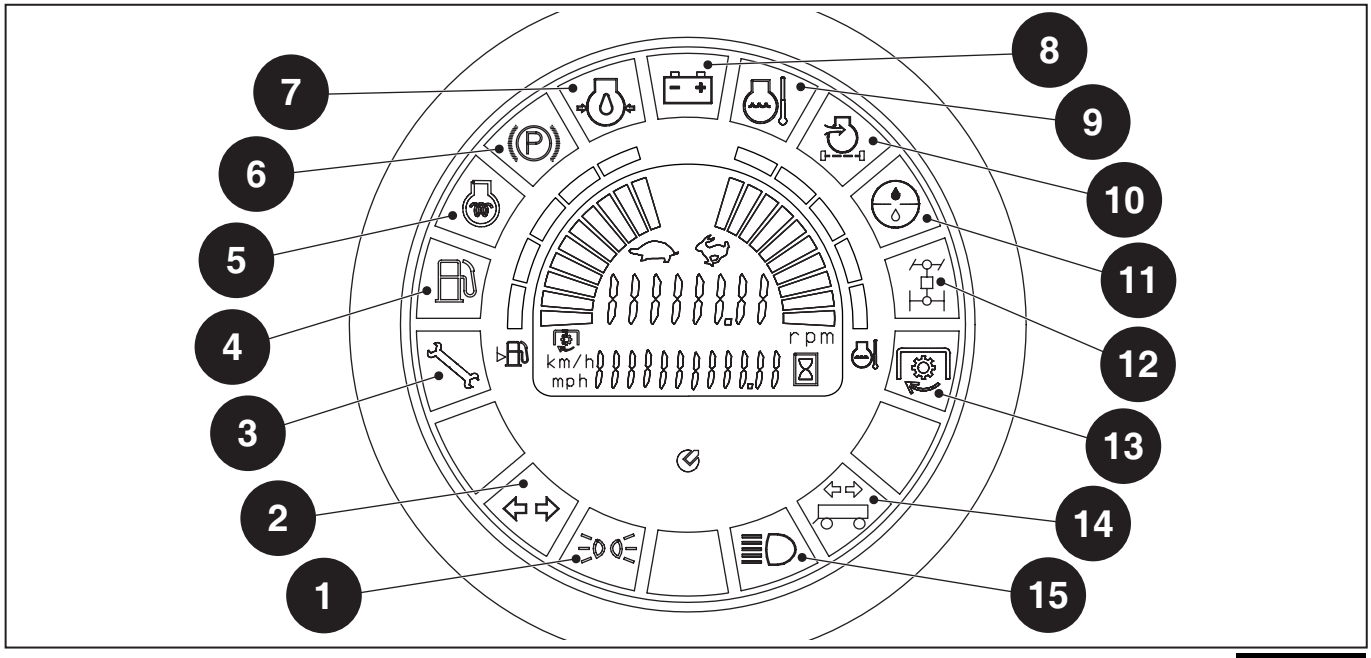


Fig. 12.2

1 - Position lights, green
2 - Position lights indicator lamp, green
3 - Service indicator lamp
4 - Reserve fuel warning lamp, yellow
5 - Preheat indicator lamp, yellow
6 - Parking brake red indicator lamp
7 - Engine oil pressure red warning lamp
8 - Generator red indicator lamp
9 - Engine coolant temperature warning lamp, red
10 - Air filter clogged warning lamp, red
11 - Oil filter clogged warning lamp, red
12 - Front wheel drive engaged indicator lamp, yellow
13 - PTO engaged indicator lamp, yellow
14 - Trailer turn signal indicator lamp, green
15 - High beam headlights indicator lamp, blue

Section 3 : Main components

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3.3 Fusibili 12-8

3.4 Relè 12-9

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3.6 Montaggio lampada rotante su Roll-bar 12-13

The electrical system is protected against short circuits or abnormal current absorption by fuses.

Identify and resolve the cause of the short circuit before replacing a fuse.

Replace failed fuses with new components with the same characteristics, as indicated on the fuse itself.

Contact a specialised technician in case of any doubt.

3.1 Battery

Attention
Any work on the battery must be carried out with particular caution: electrolyte is corrosive and the gas released by the battery is highly flammable.

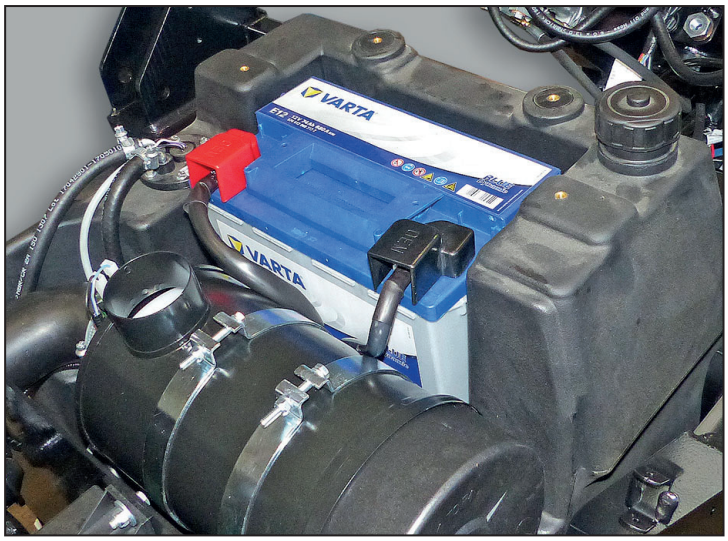


Fig. 12.3

Check

Check that the battery is fastened correctly to the machine.

Cleaning

Keep the battery clean with a damp, antistatic cloth.

Keep the battery terminals and the cable terminal clamps clean.

Lubrication

When needed, lightly grease the terminals and terminal clamps.

Use a petroleum jelly based grease, not a standard grease.

Topping up

Check the electrolyte level and keep it topped up correctly so that the battery plates are completely covered. Top up with demineralised water, with the engine off and with no naked flame in the vicinity.

Periods with the machine not in use

In case of prolonged periods with the machine not in use:

- Charge the battery as indicated by the manufacturer.
- Disconnect both cables
- Keep the battery in a cool, dry and well ventilated place.

Replacement

If the battery has to be replaced, use a battery with the same technical specifications (see the values indicated on the battery itself).

3.2 Battery disconnector

This device disconnects the electrical system correctly and safely. It must be used prior to prolonged periods with the machine not on use or when it is necessary to work safely on the electrical system.

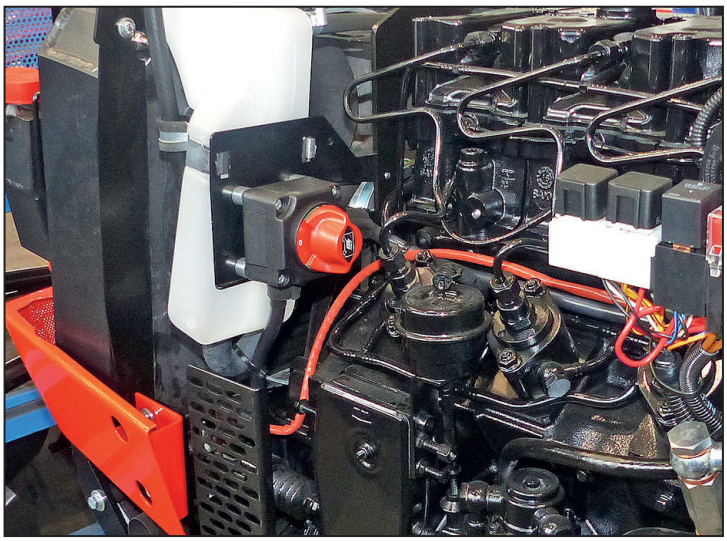


Fig. 12.4

3.3 Fuses

Functions of fuses:

A	Rotary beacon switch	15A
B	Engine stop solenoid valve power feed Energise alternator. Preheat ECU. Seven pole socket.	10A
C	LH front sidelight. Right rear light.	5A
D	RH front sidelight. Left rear light. Multifunction instrument lighting. Number plate light. Seven pole socket.	5A
E	Draft rear ELX connection. Drain selector switch.	10A
F	Parking brake switch power feed. Seven pole socket.	10A
G	LH low beam headlight.	5A
H	RH low beam headlight.	5A
I	Hazard warning lights switch power feed (+15).	15A
L	Hazard warning lights switch power feed (+30). 1-pole socket power feed.	15A
M	Horn.	15A
N	High beam headlights.	15A

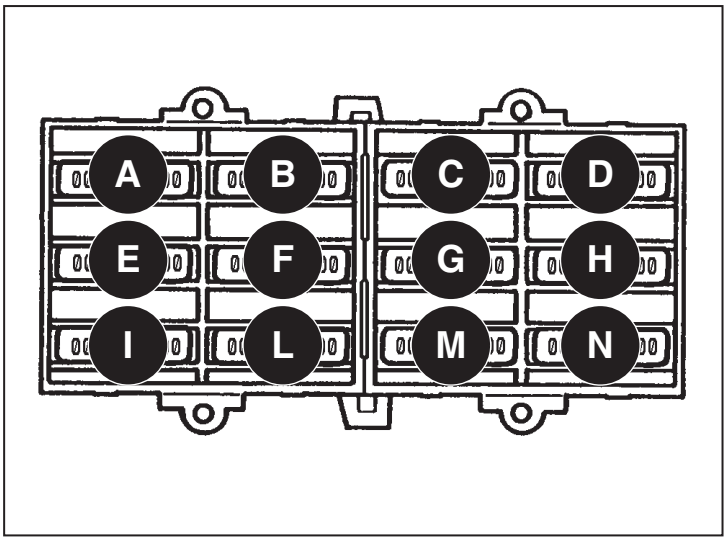


Fig. 12.5

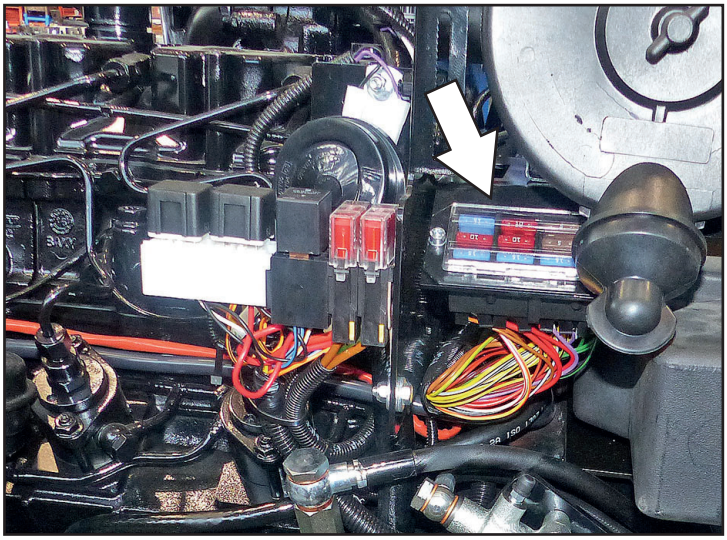


Fig. 12.6

Main fuses:

A	Maxi-fuse 50A, the main+starter system.	50A
B	Maxi-fuse 50A, glow plugs	50A

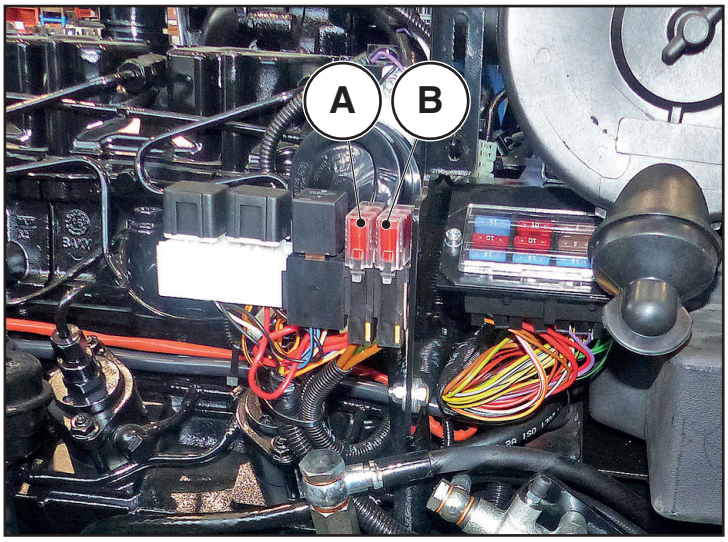


Fig. 12.7

3.4 Relay

Main relays:

A	Solenoid valve power supply maintain and restore relay	-
B	Start enable relay.	-
C	Starter relay	-

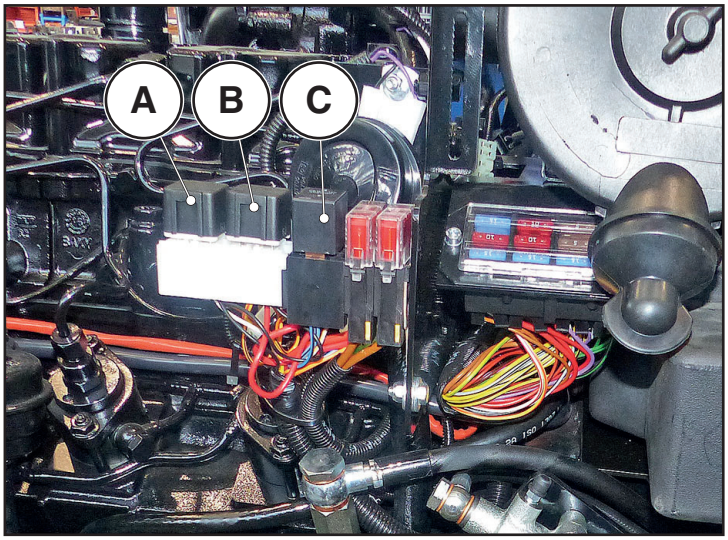


Fig. 12.8

3.5 Sensors

Brake lights

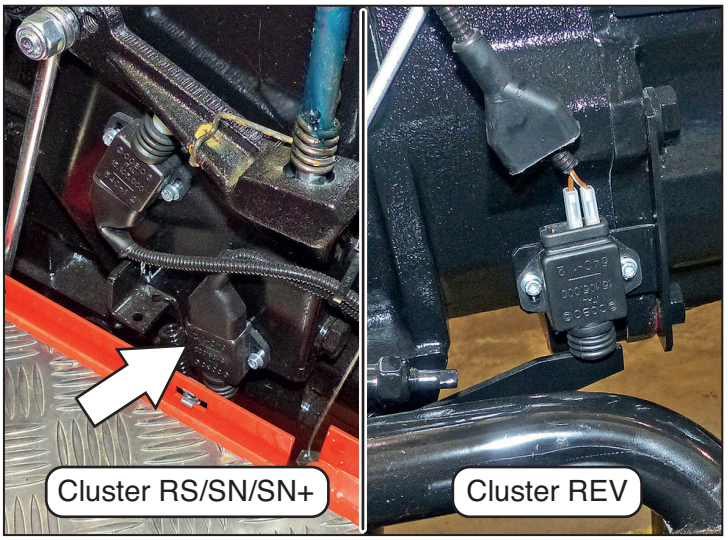


Fig. 12.9

RS/SN/SN+ Cluster

Parking brake indicator lamp switch

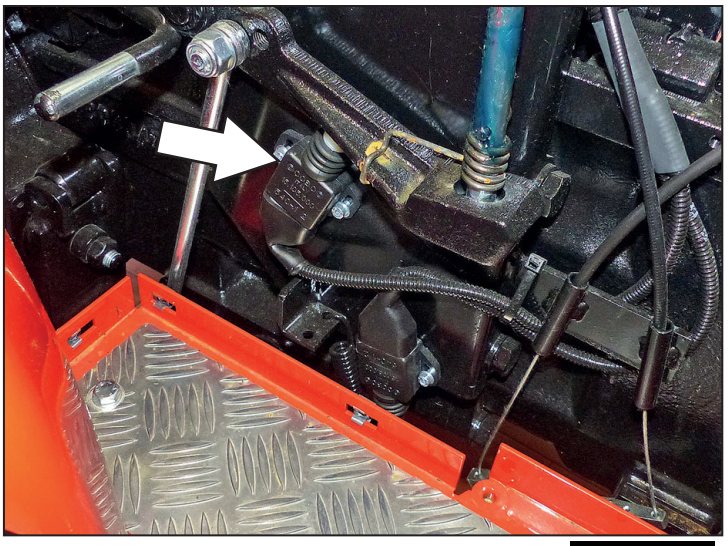


Fig. 12.10

PTO 540/750, start enable

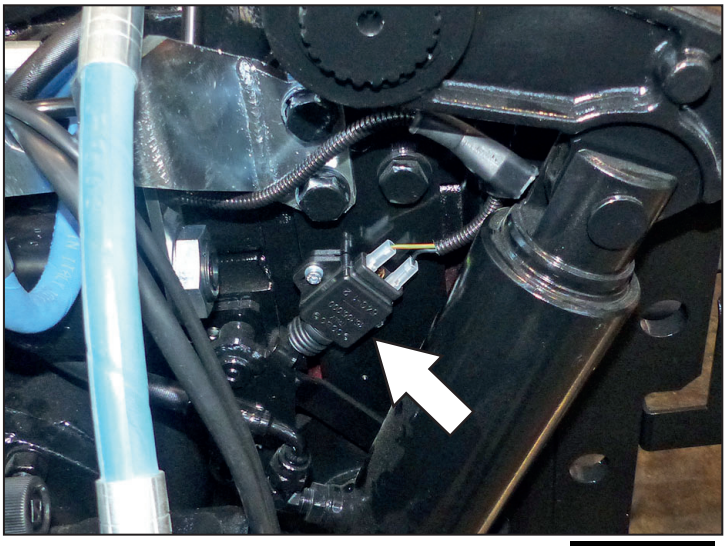


Fig. 12.11

Rear PTO clutch engagement and start enable indicator lamp

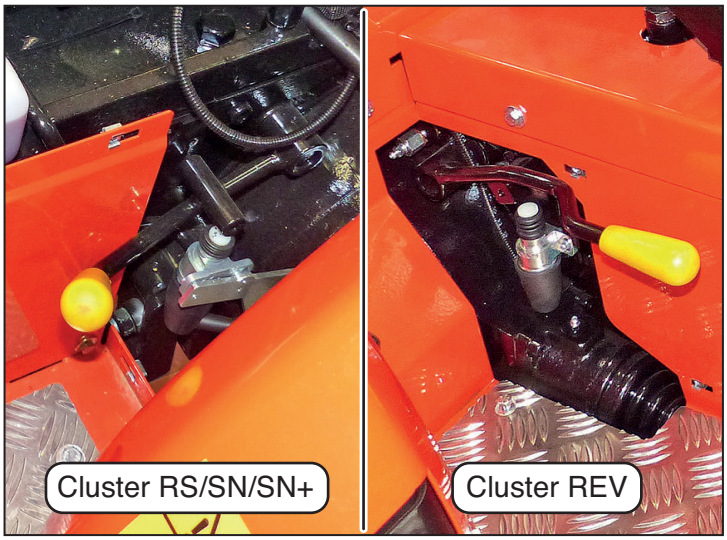


Fig. 12.12

Air filter sensor

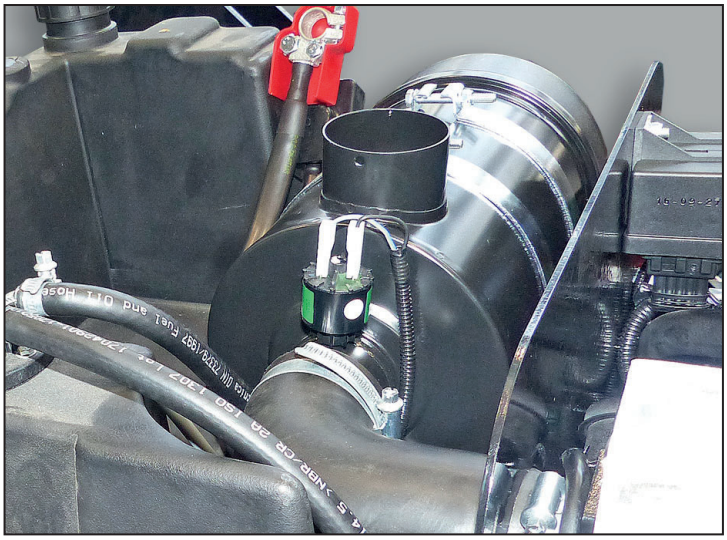


Fig. 12.13

Engine RPM

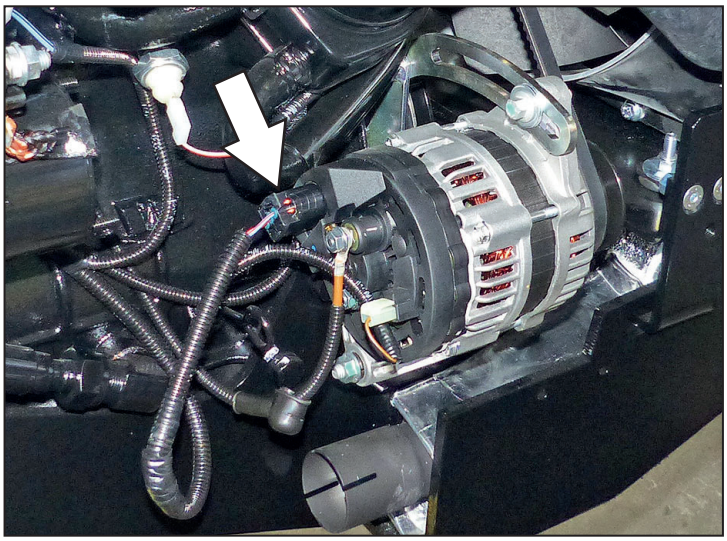


Fig. 12.14

Engine temperature sensor

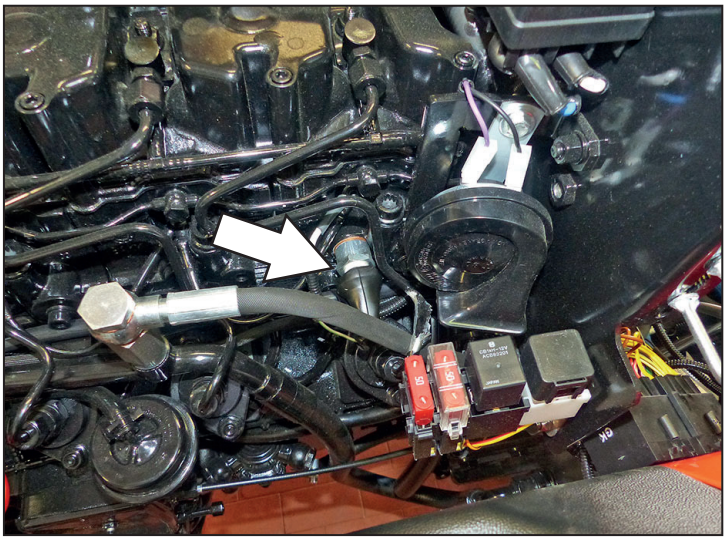


Fig. 12.15

Engine oil pressure sensor

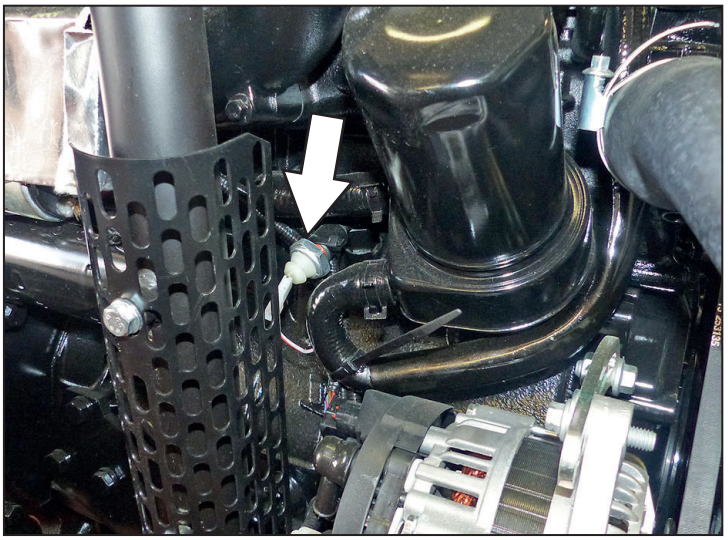


Fig. 12.16

3.6 Installing rotating beacon on roll bar

Feed the cable into the clamp (1) under the base of the right-hand pillar of the roll-bar; then insert it into the hole on the roll-bar pillar, to the hole in the top end of the hoop (2).

Pass the cable through the rotating beacon mount (3), fasten the mount to the roll bar, fit the cylinder (4) into the mount, leaving the two ends of the cable protruding at the top of the cylinder, fit the two Faston connectors (5) onto the cables, with the respective connector covers, and then connect them to the plug (6).

Tighten the cylinder (4) onto the plug (6) and fasten to the rotating beacon carrier (3) with the grub screw (7).

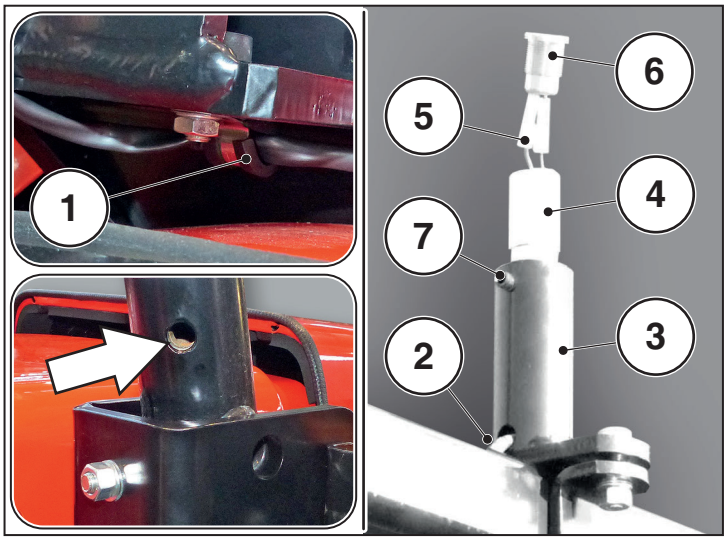


Fig. 12.17

Fasten the rotating beacon to the cylinder (4) and secure by tightening the screw (8).

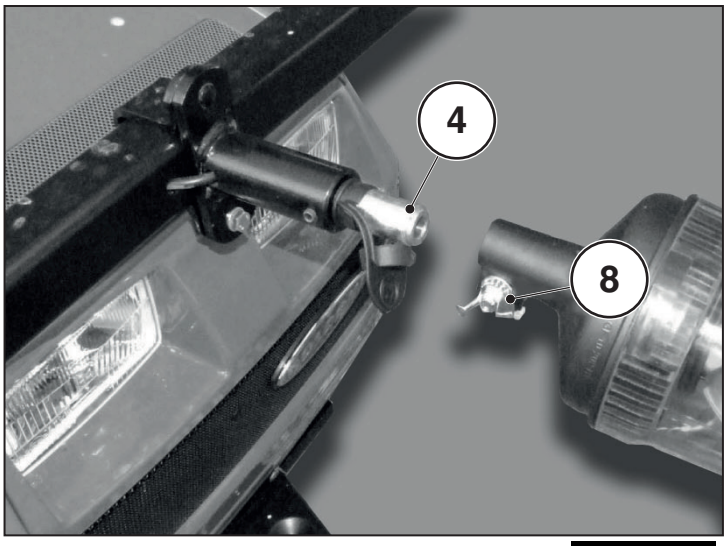


Fig. 12.18

Connect the cable terminal to the plug (9) of the rotating beacon switch (10), under the starter motor.

Connect the cable terminal to the plug (9) of the rotating beacon switch (10), on the right-hand side of the engine, behind the starter motor.

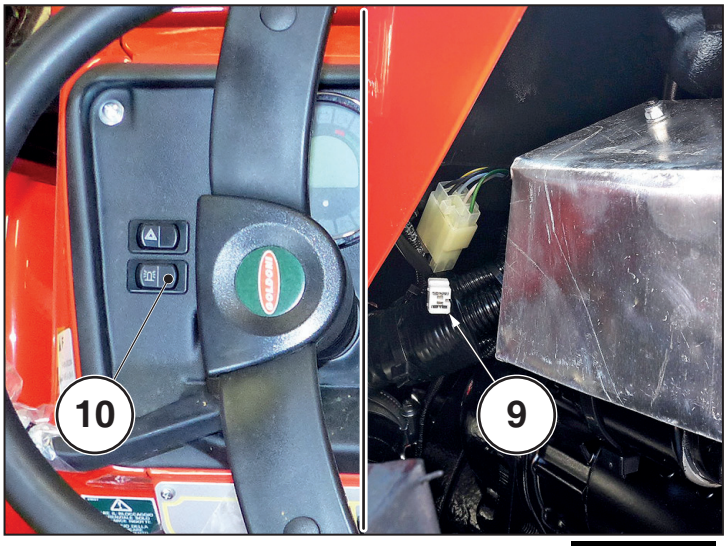


Fig. 12.19

Section 4 : RS/SN/SN+ wiring looms

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4.4 02003642 - Cruscotto ABS Cluster RS-SN 12-20

4.5 02003642 - Pulsante reset cablato 12-21

4.6 02003642 - Linea motore Cluster 70 SN 12-22

4.7 02003642 - Linea parafango 12-24

4.1 02003642 - RS Cluster rear line

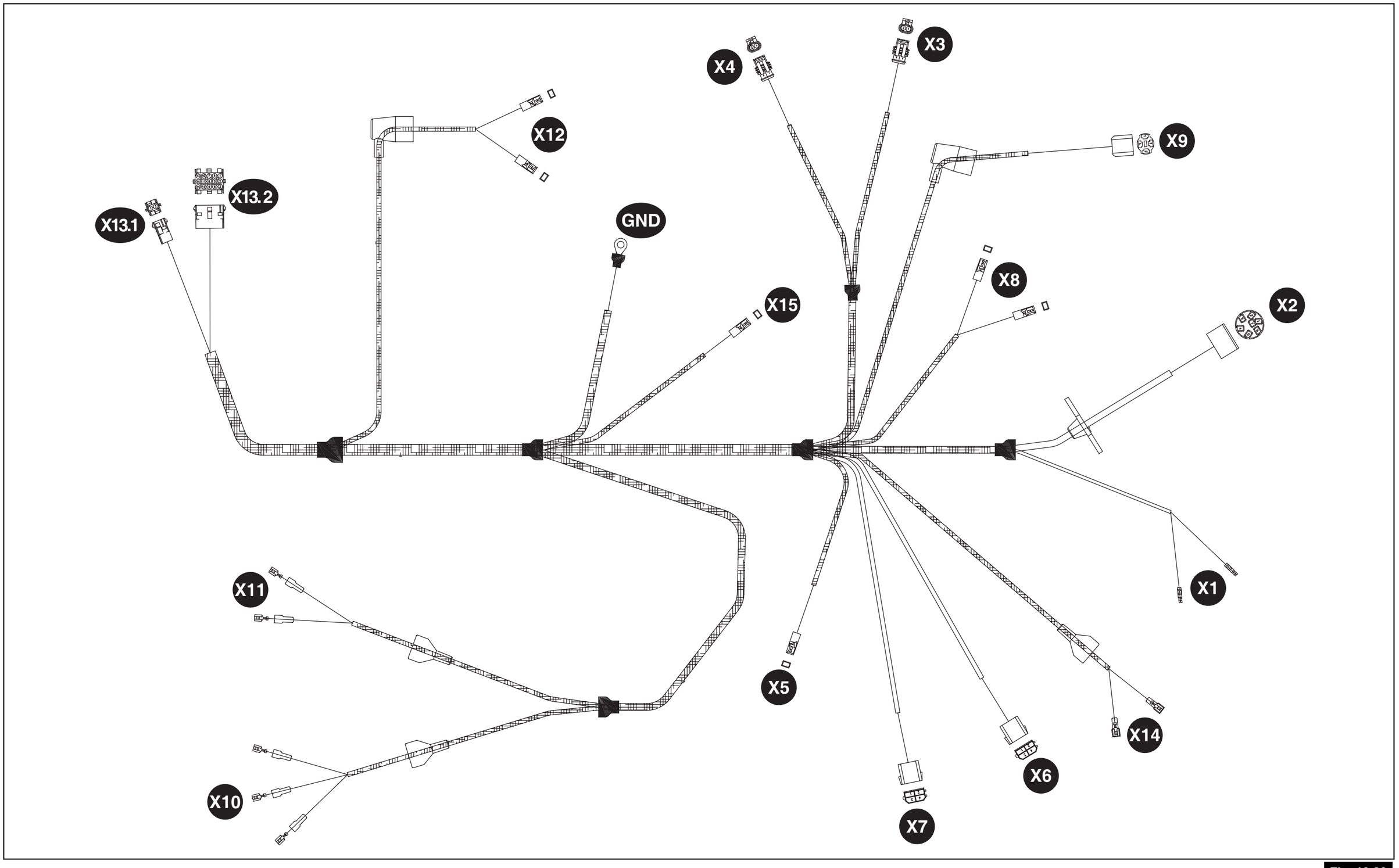


Fig. 12.20

X1 - Number plate light
X2 - Trailer socket
X3 - Drain solenoid valve
X4 - PTO solenoid valve
X5 - + Rear draft ELX
X6 - RH taillight
X7 - LH taillight
X8 - PTO switch
X9 - PTO selector switch
X10 - Parking switch
X11 - Brake switch
X12 - Start enable switch
X13.1 - Instrument cluster connector
X13.2 - Instrument cluster connector
X14 - PTO fast-slow switch
X15 - Oil filter clogged bulb
GND - Earth

4.2 02003642 - Taillight line

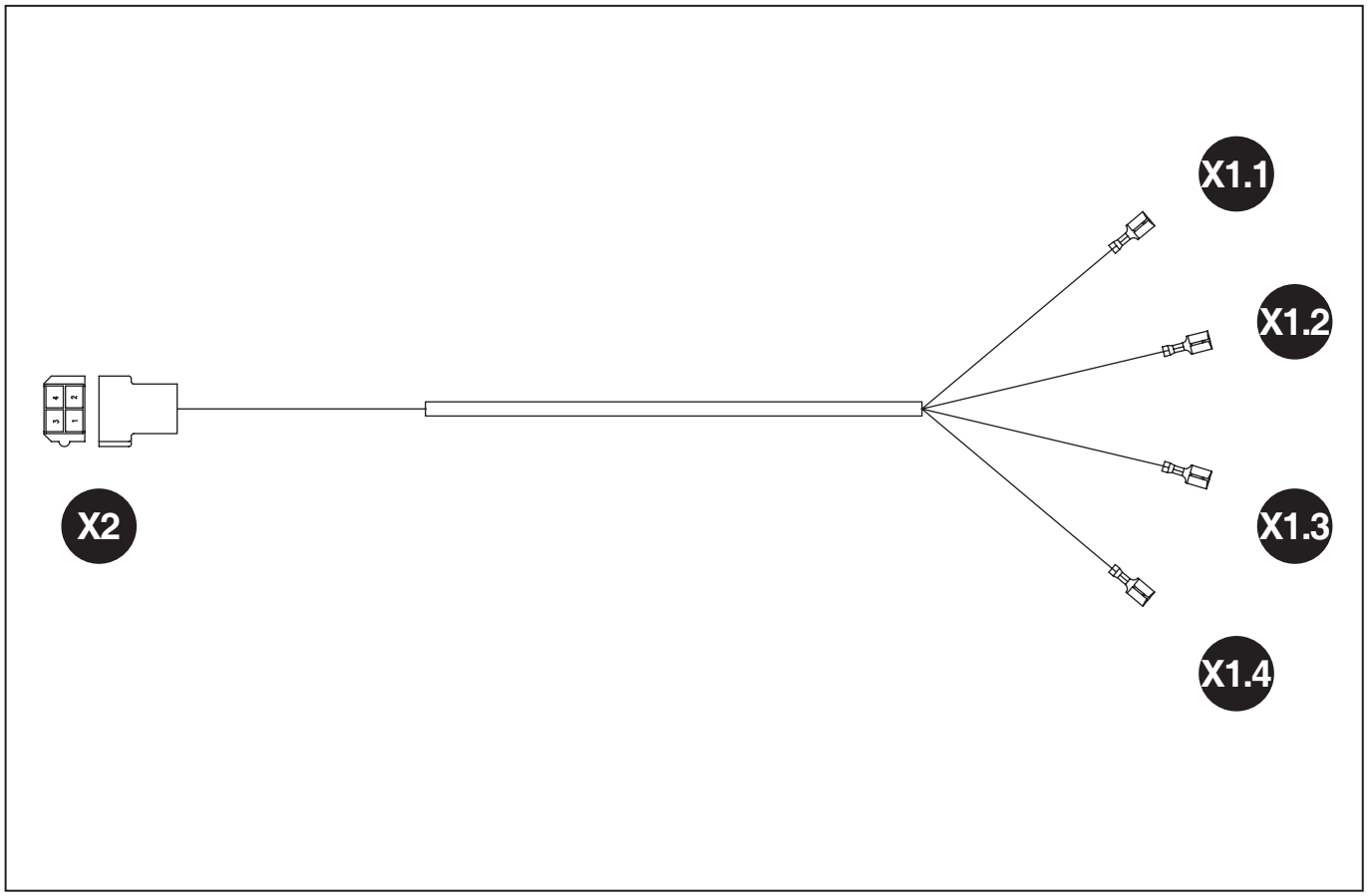


Fig. 12.21

X1.1 - Earth
X1.2 - Brake light
X1.3 - Sidelight
X1.4 - Rear turn light
X2 - Line connector

4.3 02003642 - Aluminium instrument cluster, RS-SN cluster

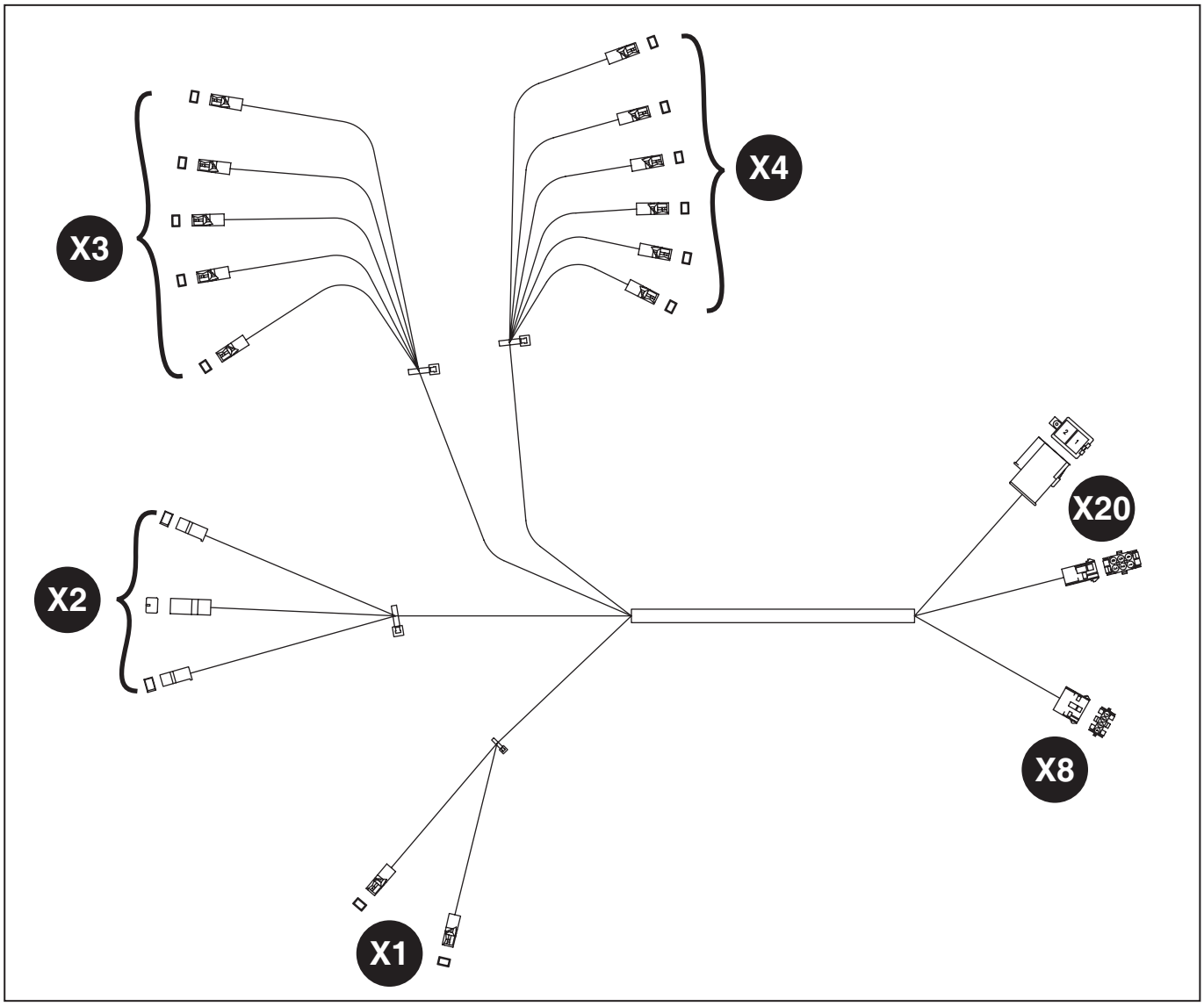


Fig. 12.22

X1 - 1-pole socket
X2 - Starter switch
X3 - Turn indicator stalk
X4 - Lights switch
X8 - ABS instrument cluster
X20 - Engine line

4.4 02003642 - ABS instrument cluster, RS-SN cluster

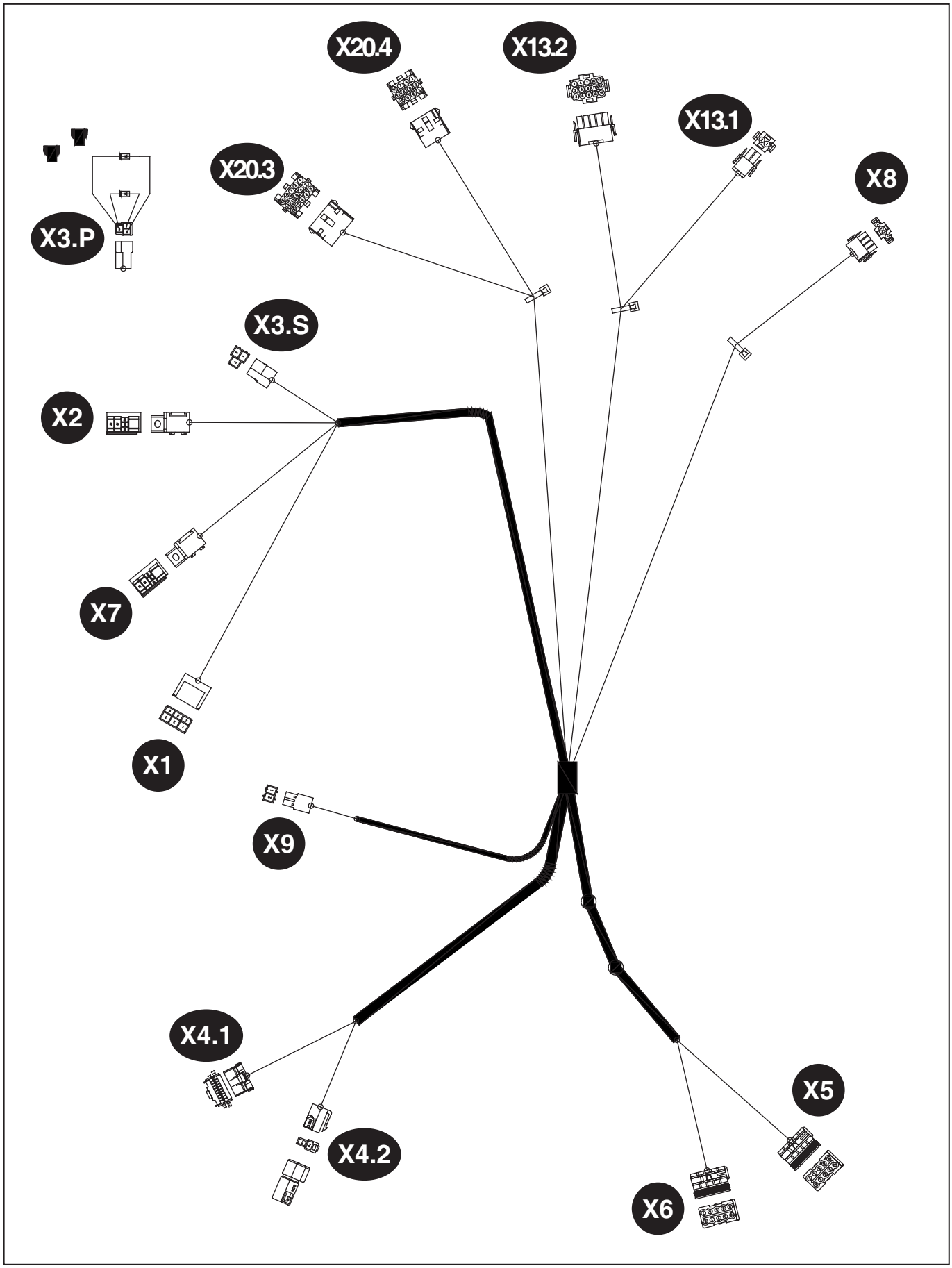


Fig. 12.23

X1 - Turn indicator blinking
X2 - Start enable relay
X3.P - Diode holder connector
X3.S - Diode connector
X4.1 - Instrument
X4.2 - Diode holder connector
X5 - 4 hazard warning light switch
X6 - Beacon light switch
X7 - PTO indicator lamp relay
X8 - Aluminium instrument cluster
X9 - External button
X13.1 - Rear line
X13.2 - Rear line
X20.3 - Engine line
X20.4 - Engine line

4.5 02003642 - Cabled reset button

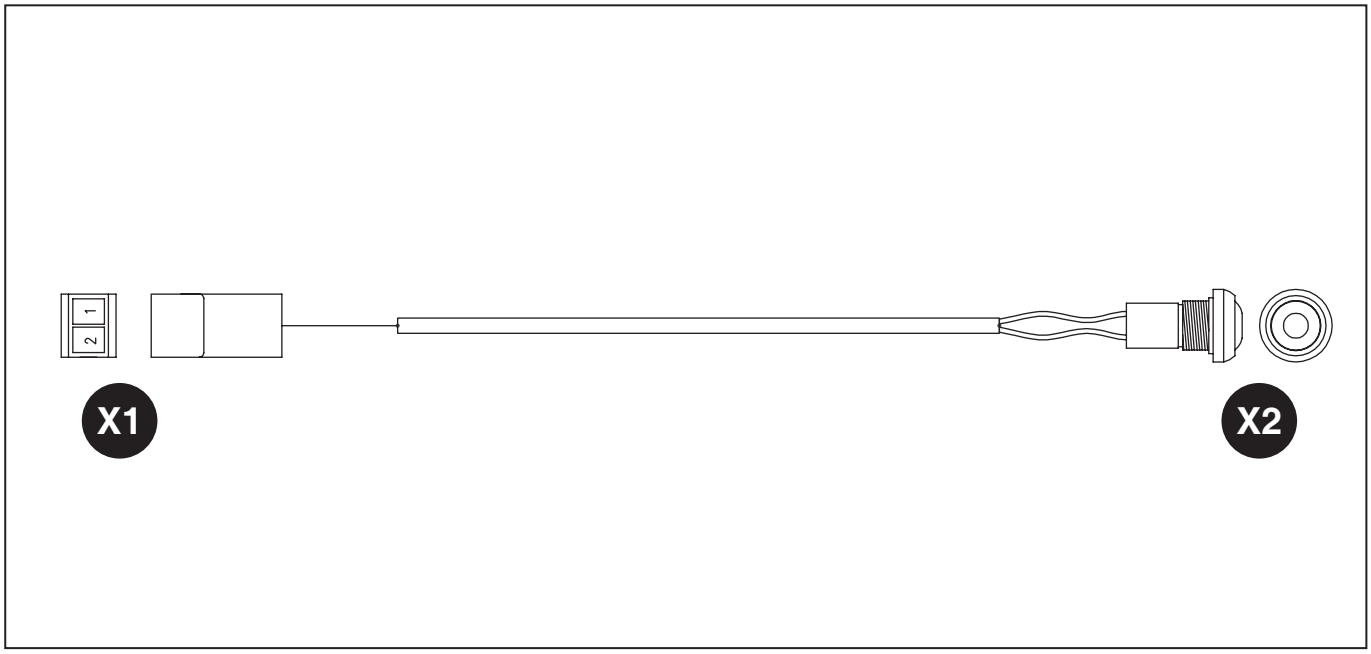


Fig. 12.24

X1 - PM 2-way Amp connector
X2 - Button

4.6 02003642 - Engine line, 70 SN Cluster

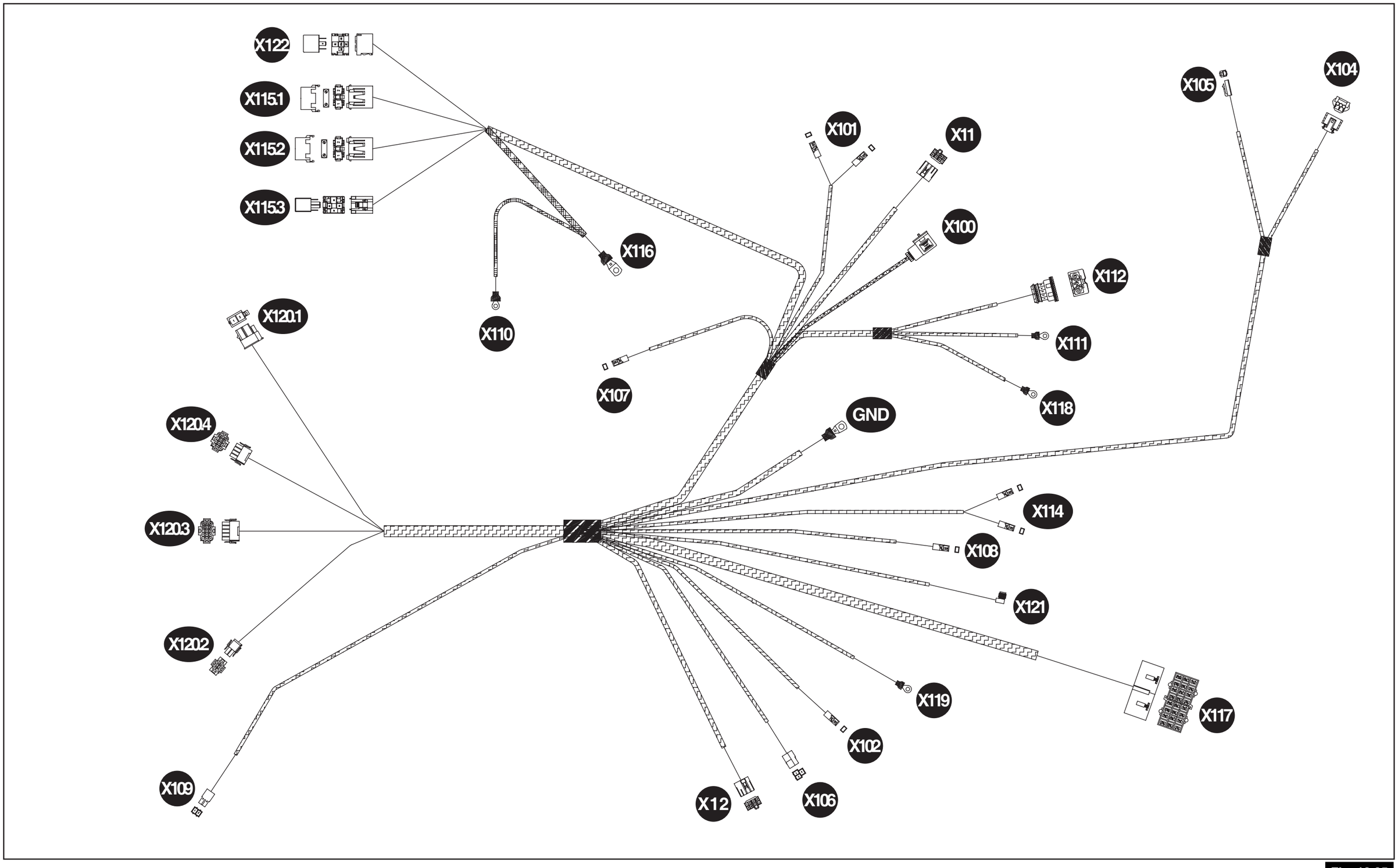


Fig. 12.25

X11 - LH front mudguard
X12 - RH front mudguard
X100 - Engine cut-out
X101 - Horn
X102 - Oil pressure switch
X104 - Alternator
X105 - W
X106 - Fuel sensor float
X107 - Water temperature sensor
X108 - +50 Starter motor
X109 - Rotating beacon
X110 - B+ Alternator
X111 - +30 preheat ECU
X112 - Glow plug ECU
X114 - Air cleaner
X115.1 - Maxi-fuse, glow plugs
X115.2 - System protection
X115.3 - Starter relay
X116 - +30 Starter motor
X117 - Fuse box
X118 - Preheat glow plugs
X119 - Glow plugs
X120.1 - Aluminium instrument cluster line
X120.2 - Aluminium instrument cluster line
X120.3 - ABS instrument cluster line
X120.4 - ABS instrument cluster line
X121 - Hydraulic oil bulb
X122 - Off relay
GND - Plates

4.7 02003642 - mudguard line

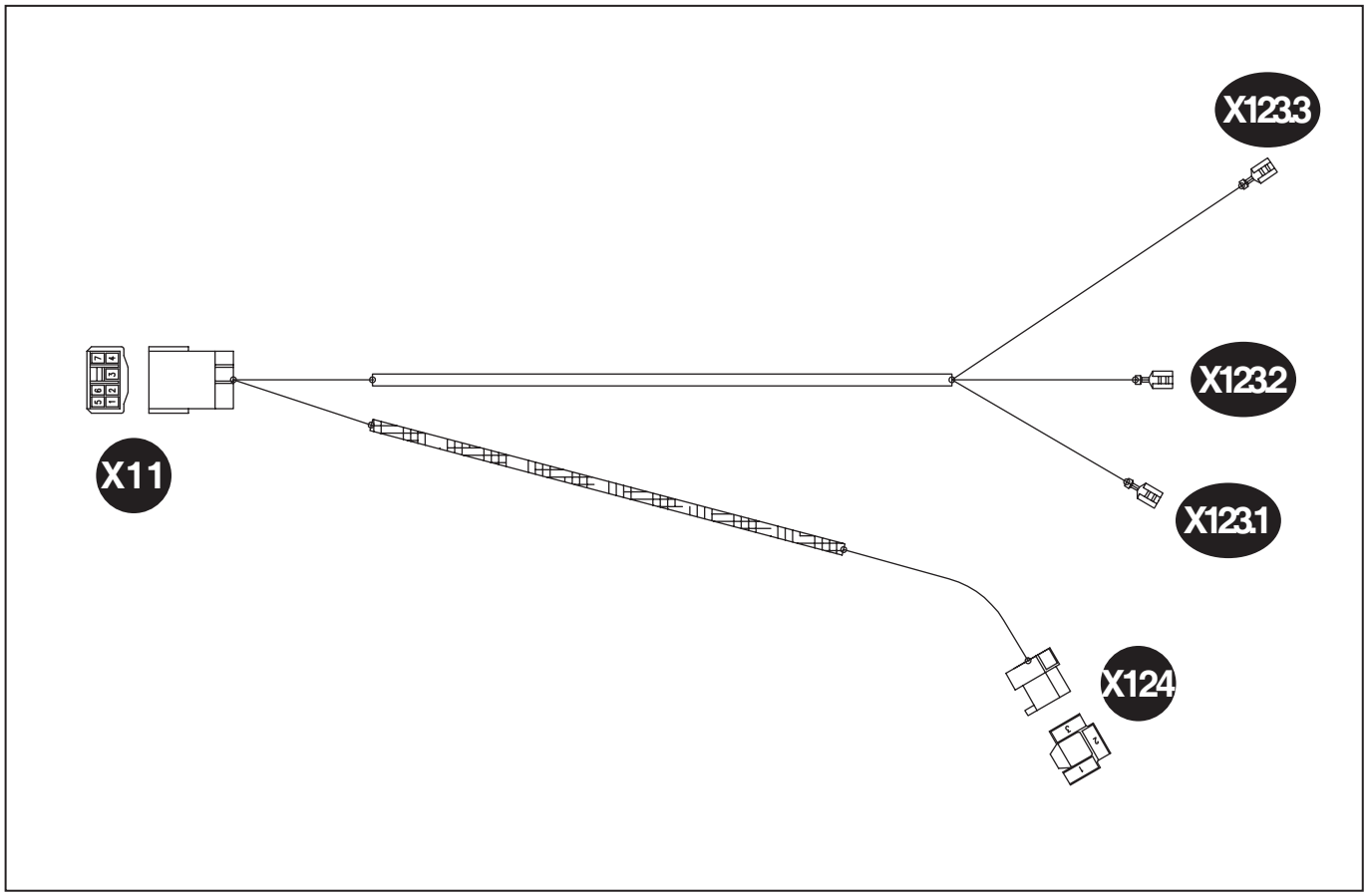


Fig. 12.26

X11 - Instrument cluster connector
X123.1 - Right/left turn light
X123.2 - Earth
X123.3 - RH/LH sidelight
X124 - Front light

Section 5 : REV wiring looms

Index

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5.5 02003643 - Pulsante reset cablato e cavo candelette.....12-31

5.6 02003643 - Linea motore Cluster 70 reversibile 12-32

5.7 02003643 - Linea parafango 12-34

5.1 02003643 - Reverse cluster rear line

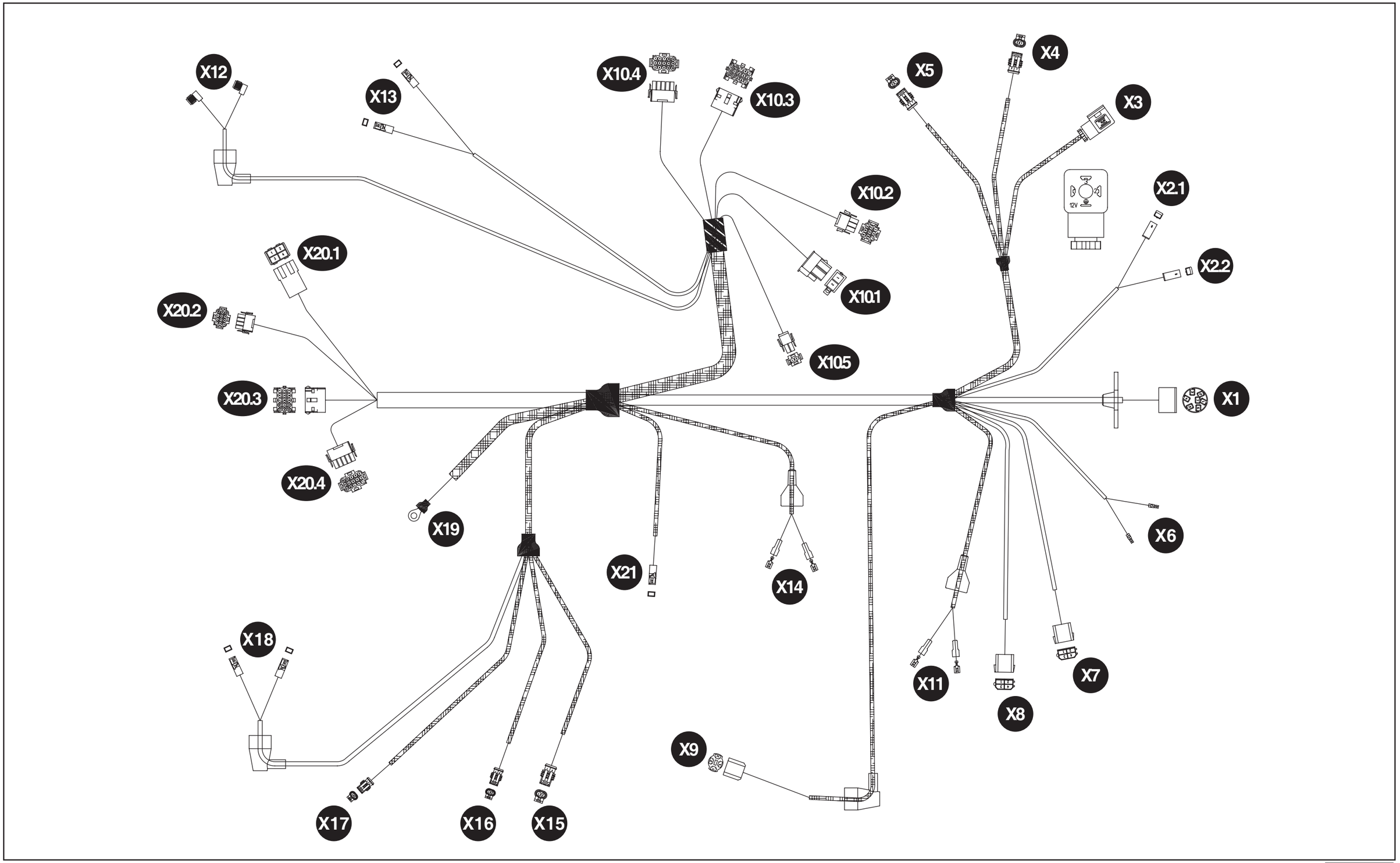


Fig. 12.27

X1 - Trailer socket
X2.1 - +15 draft pos. kit
X2.2 - Draft pos. kit earth
X3 - Differential solenoid valve
X4 - PTO solenoid valve
X5 - Drain solenoid valve
X6 - Number plate light
X7 - RH rear light
X8 - LH rear light
X9 - Drain switch
X10.1 - Aluminium instrument cluster connection
X10.2 - ABS instrument cluster connection
X10.3 - Aluminium instrument cluster connection
X10.4 - ABS instrument cluster connection
X10.5 - ABS instrument cluster connection
X11 - Fast-slow switch
X12 - Starter enable
X13 - Hydraulic stop
X14 - Parking brake microswitch
X15 - Reverse solenoid valve
X16 - Reverse solenoid valve
X17 - Reverse solenoid valve
X18 - Tower switch
X19 - Earth
X20.1 - Engine line connection
X20.2 - Engine line connection
X20.3 - Engine line connection
X20.4 - Engine line connection
X21 - Hydraulic oil bulb

5.2 02003643 - Taillight line

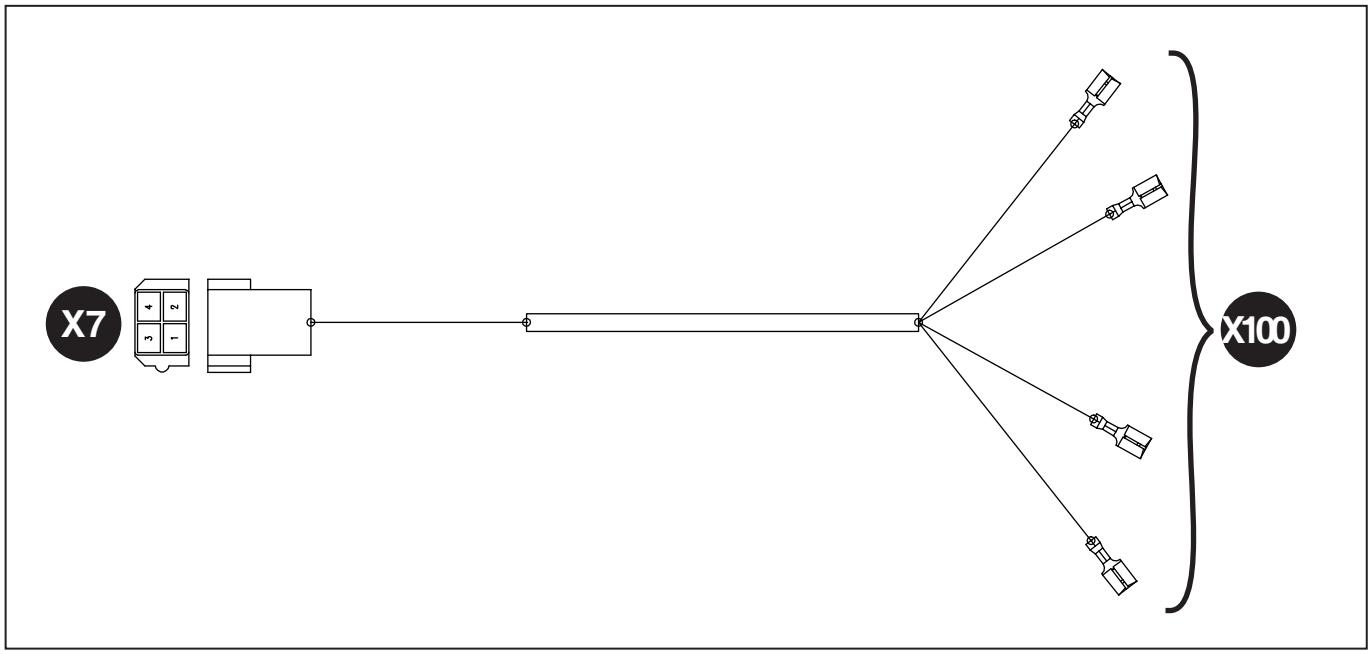


Fig. 12.28

X7 - Rear line
X100 - RH/LH rear light

5.3 02003643 - Aluminium instrument cluster, REV cluster

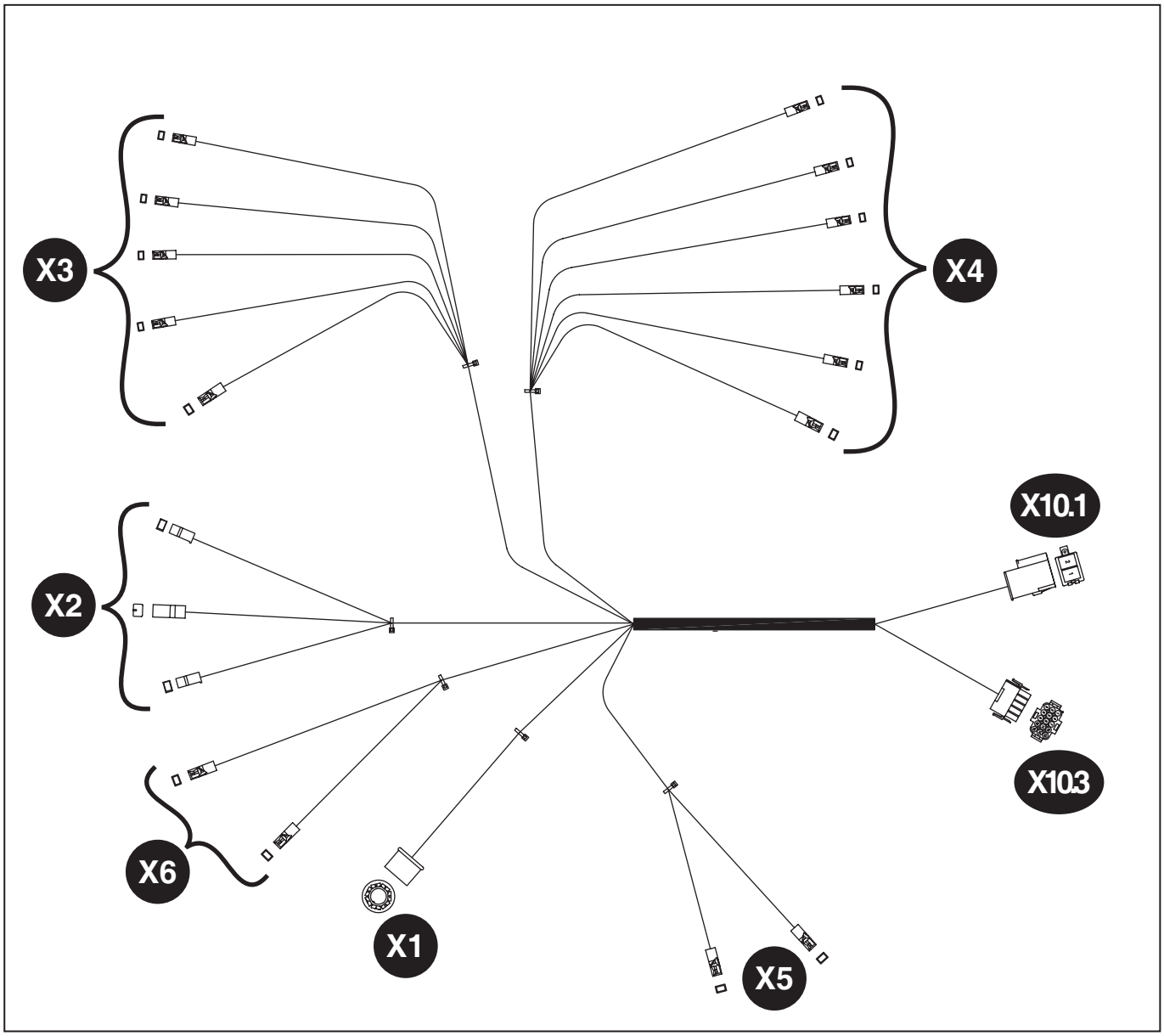


Fig. 12.29

X1 - Differential lock button
X2 - Starter switch
X3 - Turn indicator stalk
X4 - Lights switch.
X5 - Drain solenoid valve control switch
X6 - 1-pole socket
X10.1 - Rear line
X10.3 - Rear line

5.4 02003643 - ABS instrument cluster, REV cluster

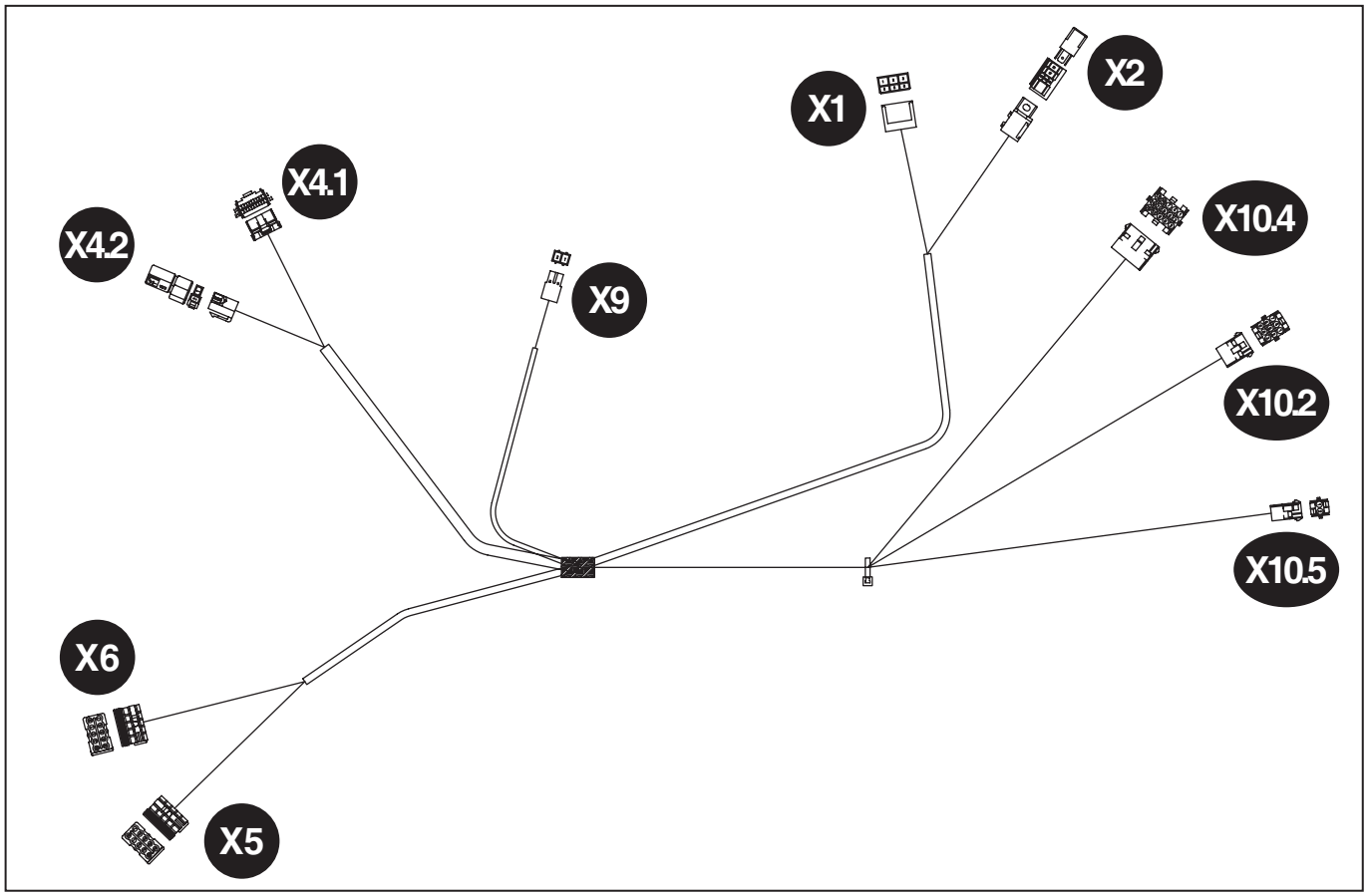


Fig. 12.30

X1 - Turn indicator blinking
X2 - PTO indicator lamp relay
X4.1 - Instrument
X4.2 - Diode connector
X5 - 4 hazard warning light switch
X6 - Beacon light switch
X9 - External button
X10.2 - Rear line
X10.4 - Rear line
X10.5 - Rear line

5.5 02003643 - Cabled reset and glow plug button

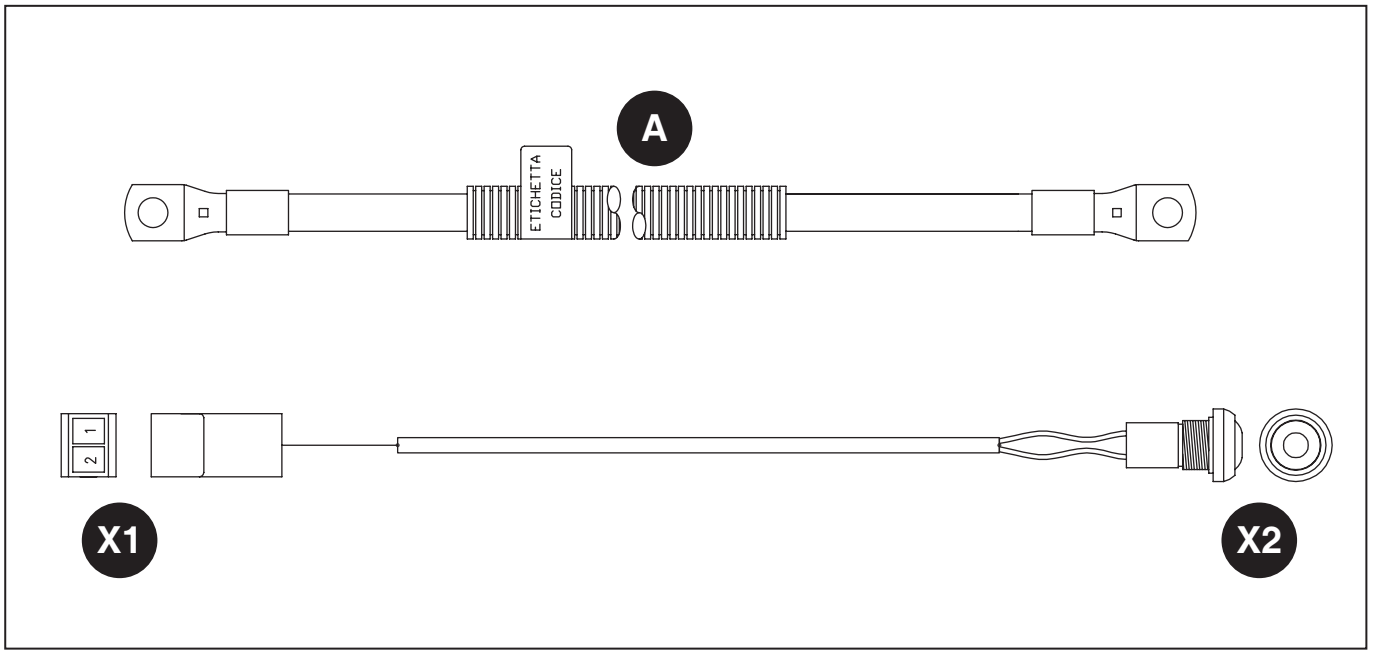


Fig. 12.31

A - Glow plugs cable
X1 - PM 2-way Amp connector
X2 - Button

5.6 02003643 - Engine line, Reversible 70 Cluster

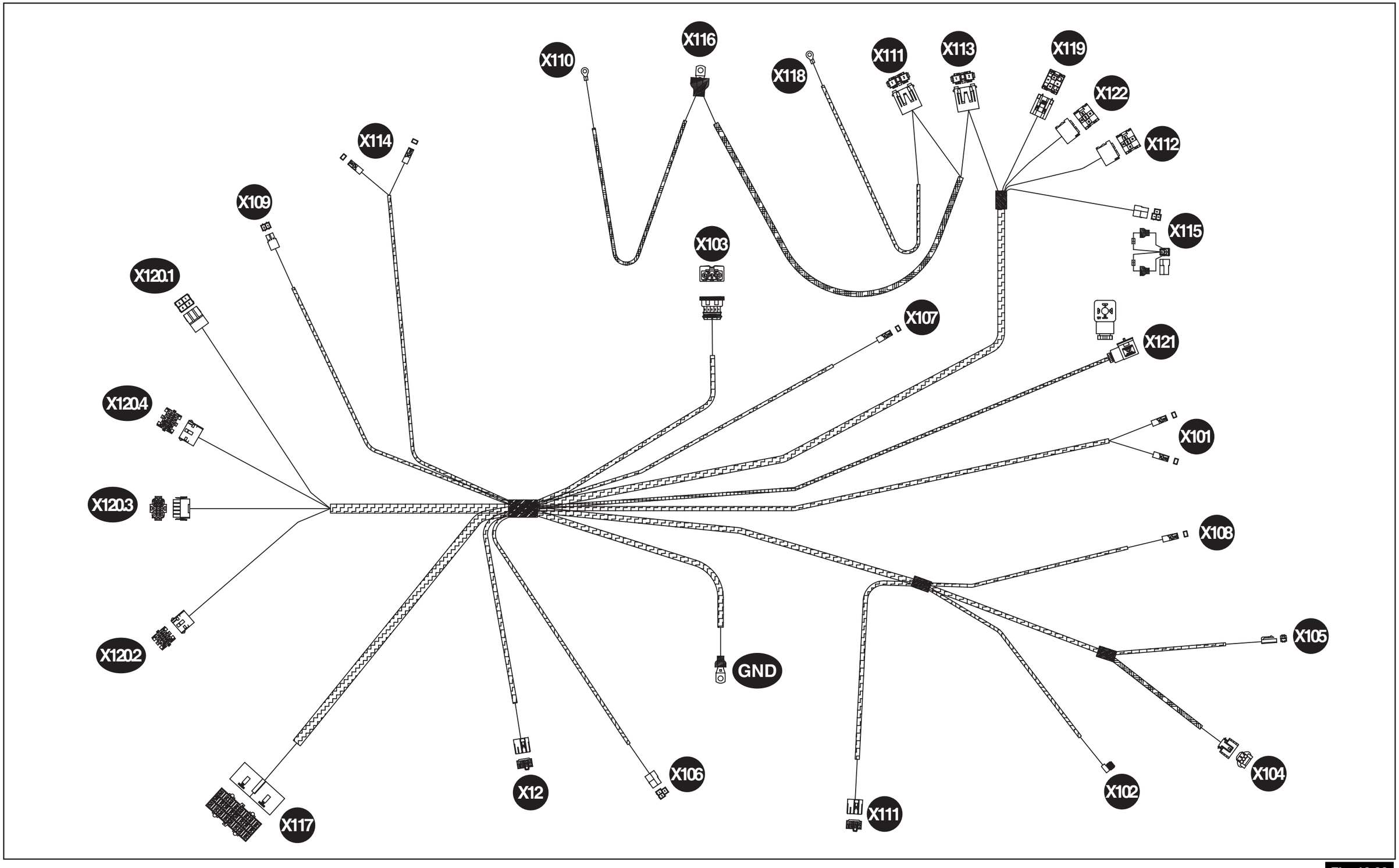


Fig. 12.32

X11 - LH front mudguard
X12 - RH front mudguard
X101 - Horn
X102 - Oil pressure switch
X104 - Alternator
X105 - W Alternator
X106 - Fuel sensor float
X108 - +50 Starter motor
X109 - Rotating beacon
X110 - B+ alternator
X111 - Glow plug guard
X112 - Starter enable
X113 - System protection
X114 - Air cleaner
X115 - Diode connector
X116 - +30 Starter motor
X117 - Fuse box
X118 - +30 preheat ECU
X119 - Starter relay
X120.1 - Rear line
X120.2 - Rear line
X120.3 - Rear line
X120.4 - Rear line
X121 - Engine cutoff solenoid valve
X122 - Engine pick-up relay
GND - Plates

5.7 02003643 - mudguard line

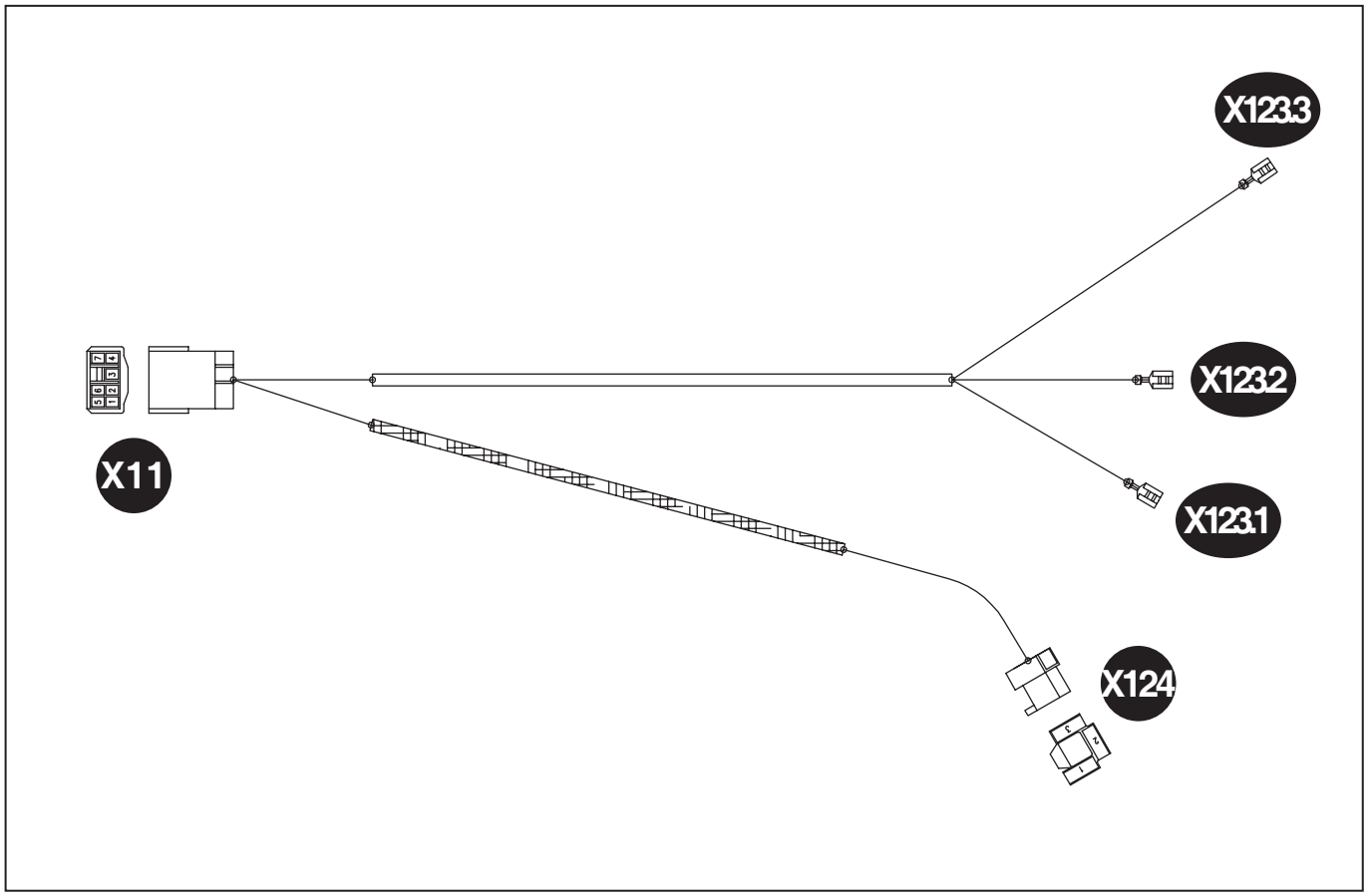


Fig. 12.33

X11 - Instrument cluster connector
X123.1 - Right/left turn light
X123.2 - Earth
X123.3 - RH/LH sidelight
X124 - Front light

Chapter 13 : Special tools

Index

Section 1 : Tools list 13-2

Section 1 : Tools list

p/n	07000122
Description:	Pressure gauge
Chapter:	Chap.11

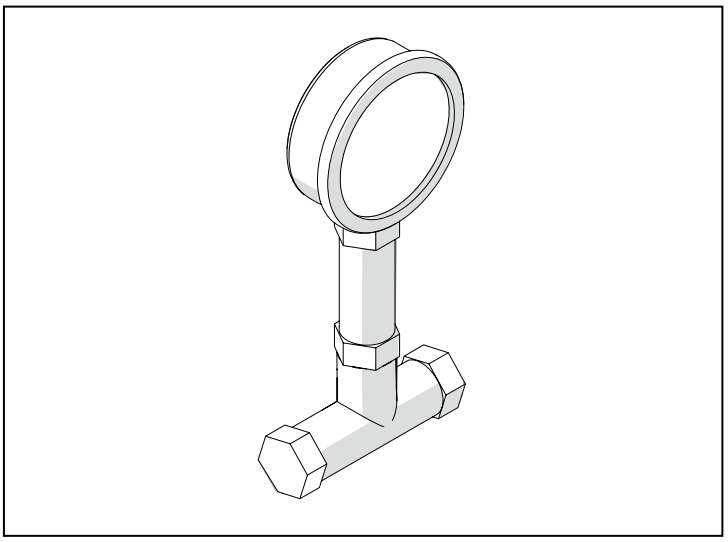


Fig. 13.1

p/n	07006228
Description:	Clutch alignment pin 02020046
Chapter:	Chap.3

Fig. 13.2

p/n	_____
Description:	Front differential lever spindle screwing tool
Chapter:	Chap.4

Fig. 13.3

p/n	_____
Description:	Rod for actuating differential engagement
Chapter:	Chap.4

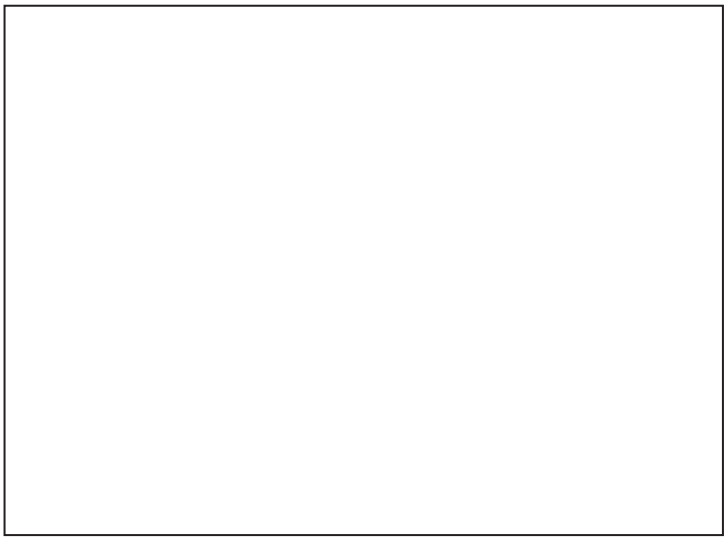


Fig. 13.4

p/n	_____
Description:	Lever for actuating differential engagement
Chapter:	Chap.4

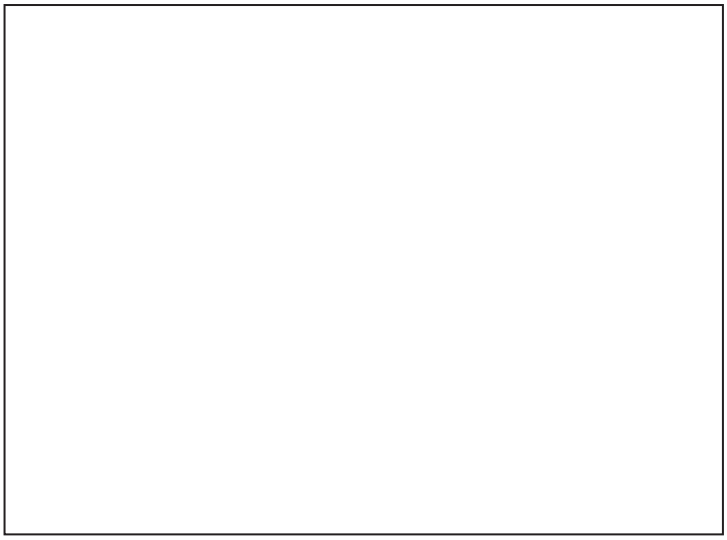


Fig. 13.5

p/n	_____
Description:	Template for adjusting the reverse shuttle lever
Chapter:	Chap.4

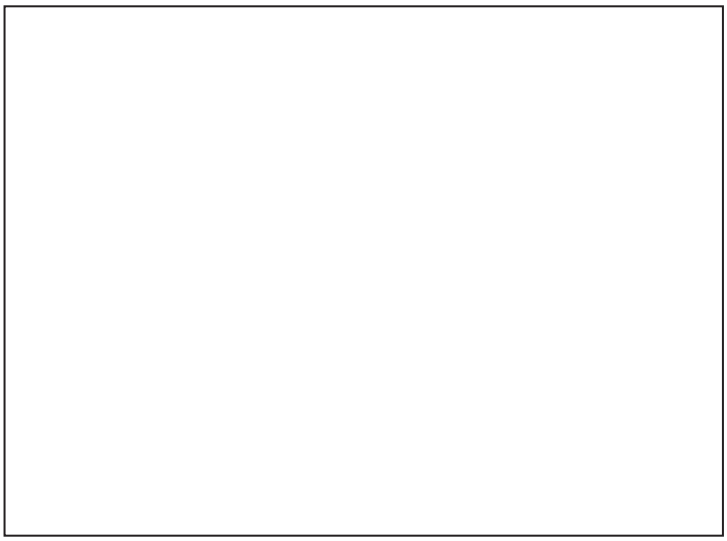


Fig. 13.6

p/n	_____
Description:	Special tool for lifting the differential case cover
Chapter:	Chap.4

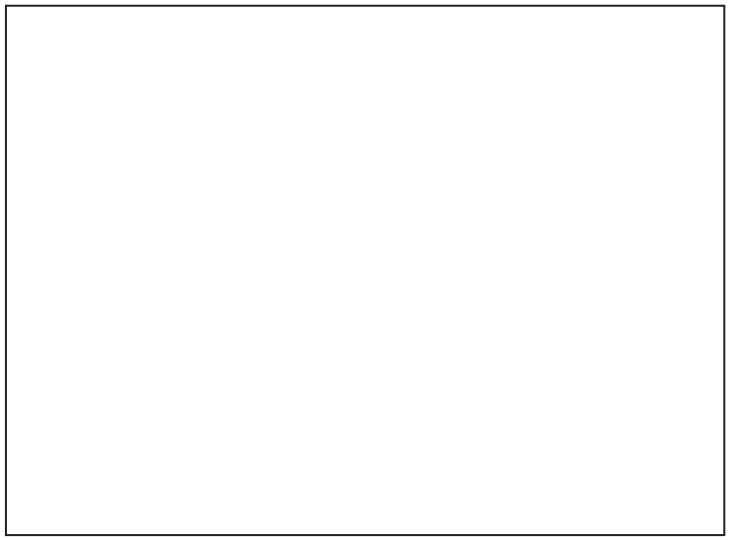


Fig. 13.7

p/n	_____
Description:	Bevel pinion installation guide
Chapter:	Chap.5

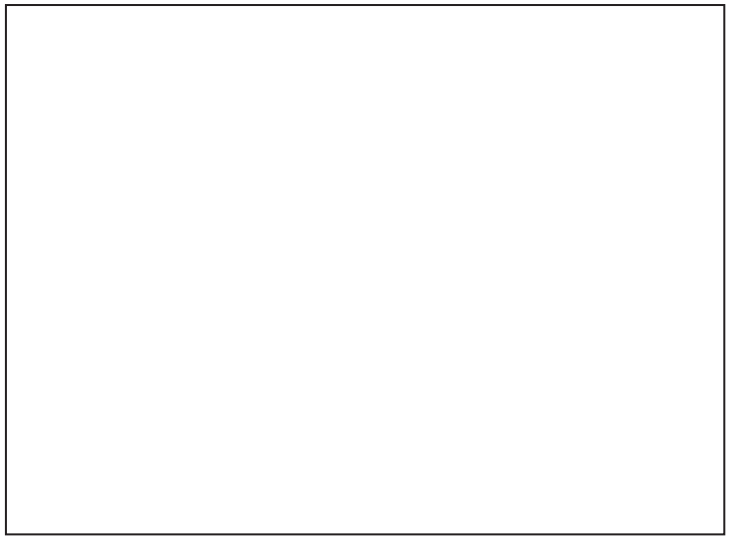


Fig. 13.8

p/n	_____
Description:	Bevel pinion retainer
Chapter:	Chap.5

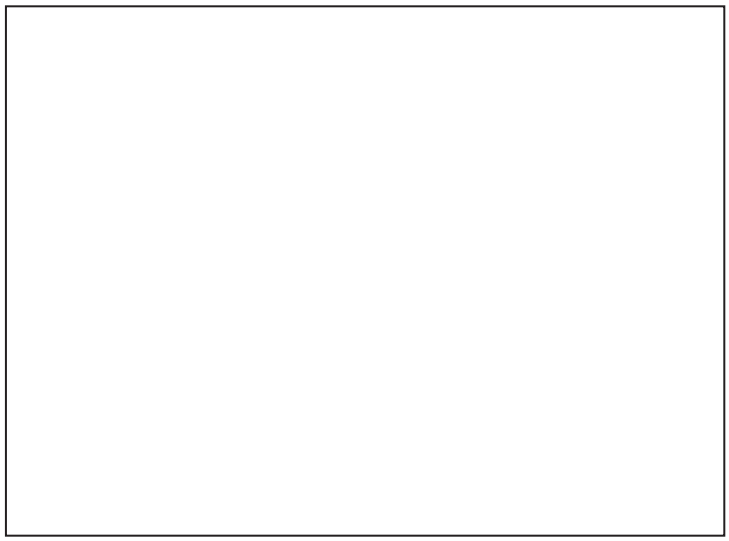


Fig. 13.9

p/n	_____
Description:	Crown wheel assembly ring nut key
Chapter:	Chap.5

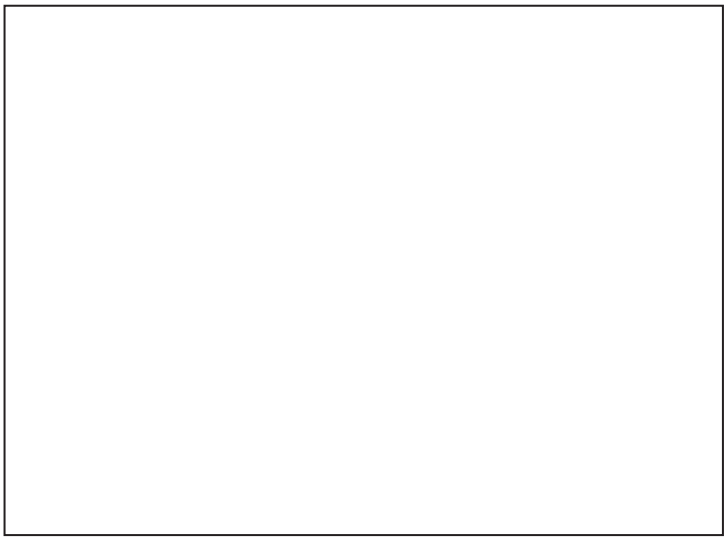


Fig. 13.10

p/n	_____
Description:	Tool for installing the rear differential control shaft
Chapter:	Chap.5

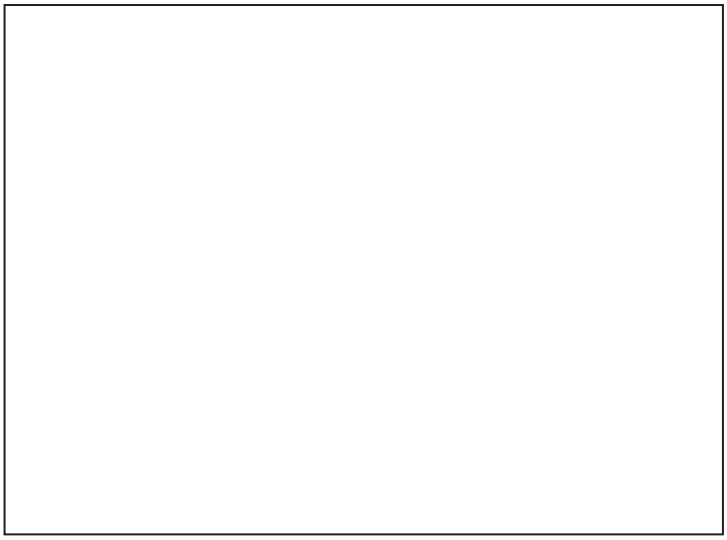


Fig. 13.11

p/n	_____
Description:	Gearbox shaft ball pretensioning tool
Chapter:	Chap.5

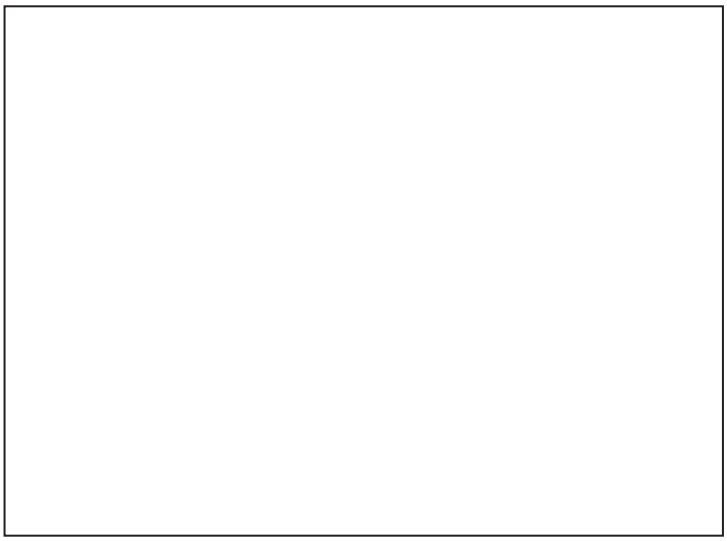


Fig. 13.12

p/n	_____
Description:	Special press for bush fitting
Chapter:	Chap.6

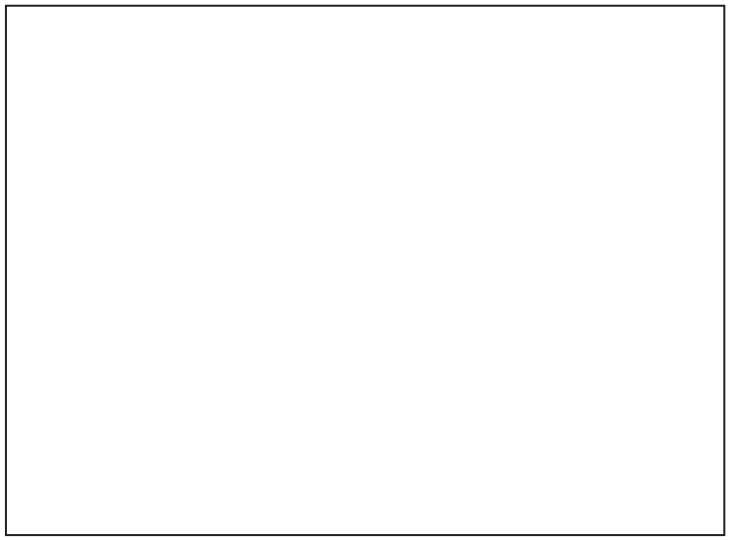


Fig. 13.13

p/n	_____
Description:	Hub lifting tool
Chapter:	Chap.7

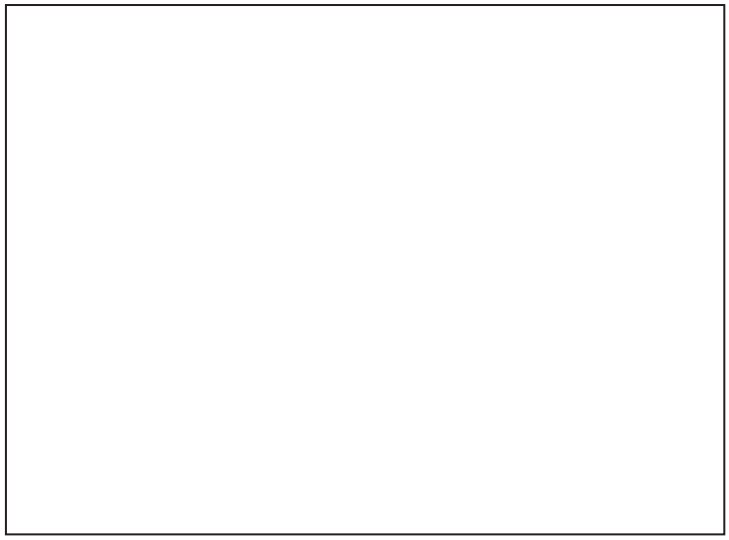


Fig. 13.14

p/n	_____
Description:	Knuckle flange lifting tool
Chapter:	Chap.8

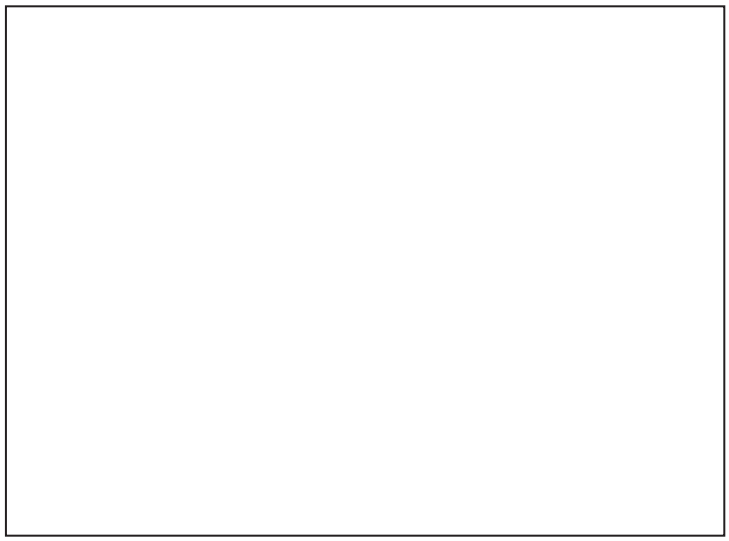


Fig. 13.15

p/n	_____
Description:	Half-axle pinion knuckle lock
Chapter:	Chap.8

Fig. 13.16

p/n	_____
Description:	Hub lifting tool
Chapter:	Chap.8

Fig. 13.17

p/n	_____
Description:	Wheel toe angle bar
Chapter:	Chap.8

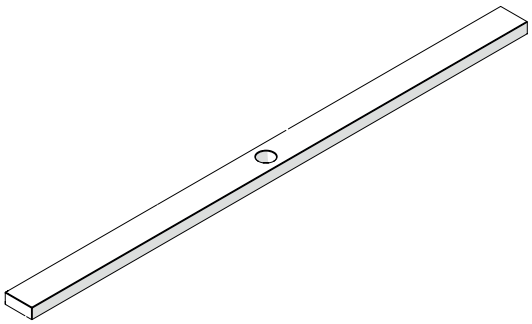


Fig. 13.18

WORKSHOP MANUAL

CLUSTER 70 SERIES

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