WORKSHOP MANUAL **Tr. Star 75Q-85 Q**

GOLDONI

GOLDONI S.p.A.
FABBRICA MACCHINE AGRICOLE

Star 75Q – 85Q

GOLDONI S.p.A.
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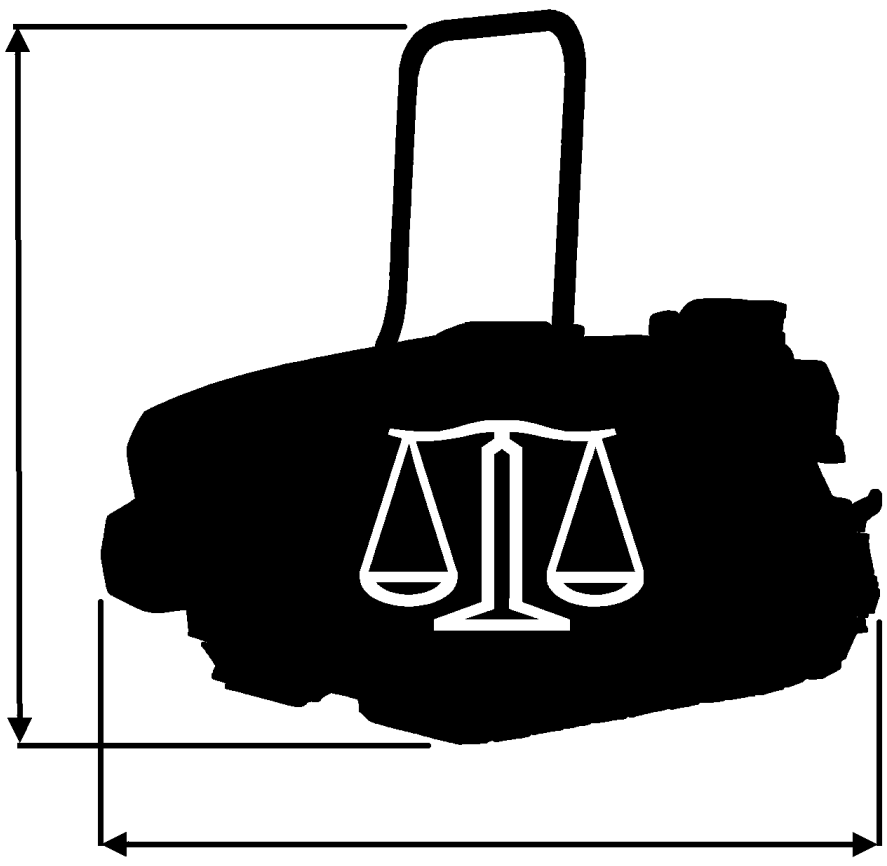
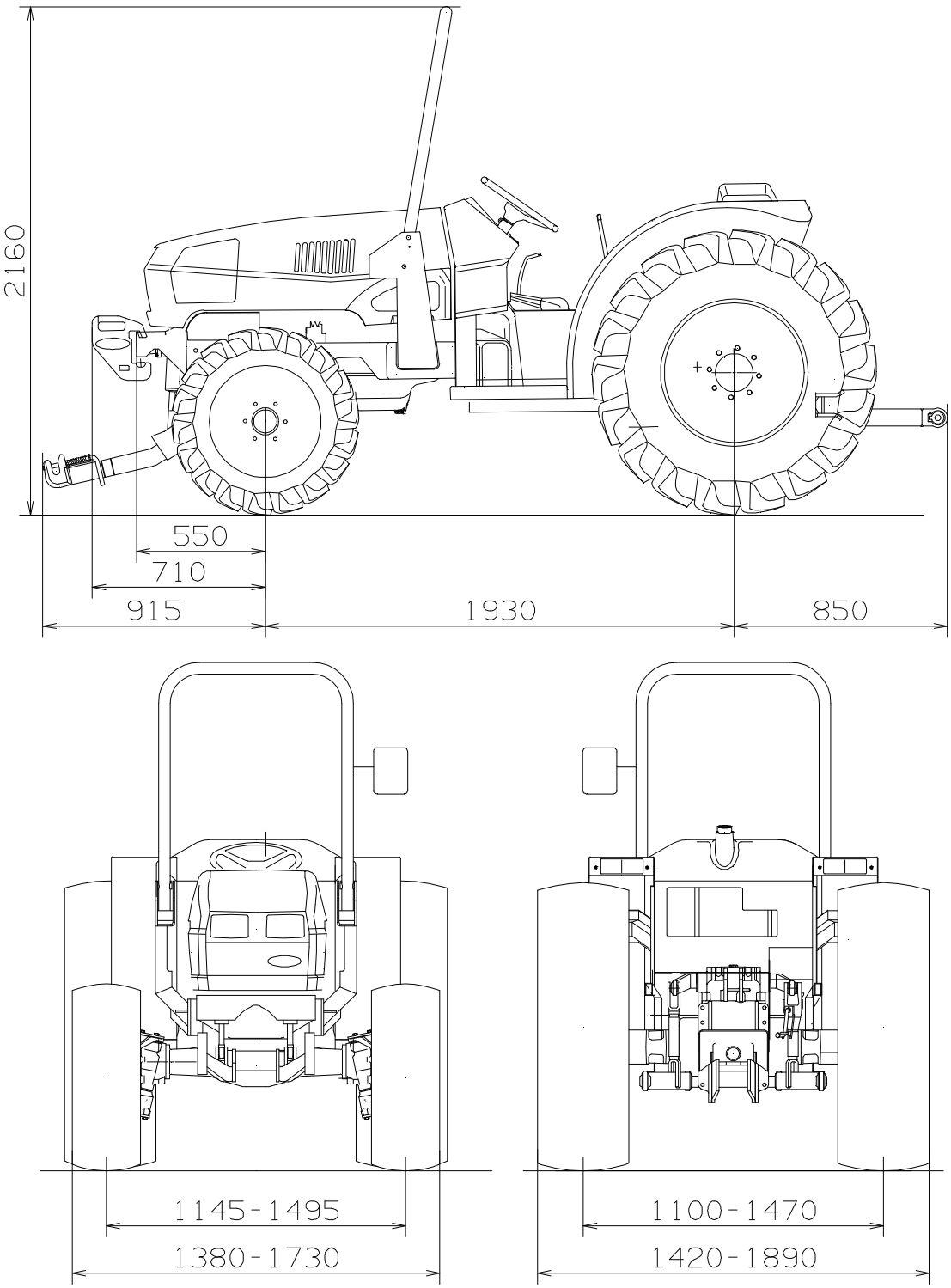
DIMENSIONS, TRACK WIDTHS SPEEDS, WEIGHTS

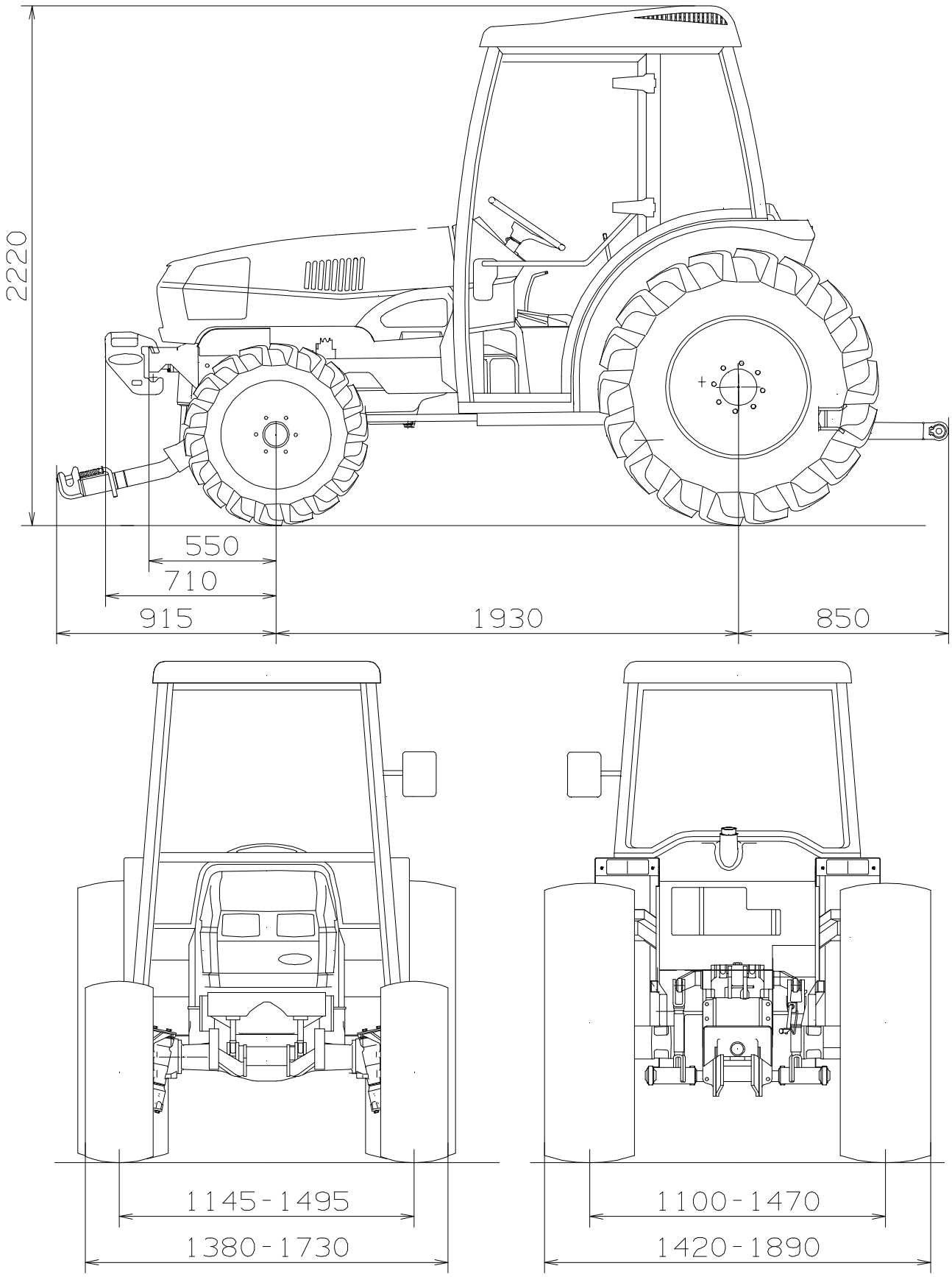


Tractor dimensions



The tractor mainly consists of the engine assembly, a chassis, a gearbox and two front and rear differential assemblies.

CAB VERSION


2220
550
710
915
1930
850
1145 - 1495
1380 - 1730
1100 - 1470
1420 - 1890

TYRES	TYPE	MAX LOAD PER AXLE (kg)	PRESSURE (Bar)	SPEED (kph)
FRONT	**280/70 R16 109 A8 (GOOD YEAR)**	2060	2.4	40
REAR	**380/70 R24 125 A8**	3300	1.6	40
ALTERNATIVE TYRES	**TYPE**	**MAX LOAD PER AXLE (kg)**	**PRESSURE (Bar)**	**SPEED (kph)**
FRONT 1) 3)	**280/70 R18 111 A8 (GOOD YEAR)**	2180	2.4	40
2) 4)	**250/80 -18 8 PR**	1800	3.2	40
5)	**260/70 R16 109 A8**	2060	2.4	40
6)	**280/60 –15.5 6 PR (TRELLEBORG)**	2010	1.5	40
REAR 1)	**360/70 R28 125 A8**	3300	1.6	40
2)	**12.4 R28 121 A8**	2900	1.6	40
3)	**420/70 R24 130 A8**	3800	1.6	40
4)	**14.9 R24 126 A8**	3400	1.6	40
5)	**360/70 R24 122 A8**	3000	1.6	40
6)	**375/75 R20 143 B (MICHELIN)**	2850	3,8	40

MECHANICAL TRANSMISSION 16+8; 8+8 DUAL POWER+REV. SHUTTLE

NO-LOAD GROUND SPEEDS WITH ENGINE AT TOP RATE

GEARS		RATIOS GEAR B	RATIOS TOTAL	2300 rpm Speeds with tyres as shown (kph) 360/70 R 28 C. R. 3707	12.4 R 28 C. R. 3707	420/70 R 24 C. R. 3707	14.9 R 24 C. R. 3707	11.2 R 28 C. R. 3550	13.6 R 24 C. R. 3518	380/70 R 24 C. R. 3518	360/70 R 24 C. R. 3393	12.4 R 24 C. R. 3393	44x18.00 R20 C. R. 3353	320/70 R 24 C. R. 3236	375/75 R 20 C. R. 3204	380/70 R 20 C. R. 3204
NORMAL SPEEDS																
FORWARD	1	3.67	316.86	1.61	1.61	1.61	1.61	1.55	1.53	1.53	1.48	1.48	1.46	1.41	1.39	1.39
	2	2.23	192.47	2.66	2.66	2.66	2.66	2.54	2.52	2.52	2.43	2.43	2.40	2.32	2.30	2.30
	3	1.29	111.51	4.59	4.59	4.59	4.59	4.39	4.35	4.35	4.20	4.20	4.15	4.00	3.96	3.96
	4	0.89	77.07	6.64	6.64	6.64	6.64	6.35	6.30	6.30	6.07	6.07	6.00	5.79	5.73	5.73
	5	3.67	55.52	9.21	9.21	9.21	9.21	8.82	8.74	8.74	8.43	8.43	8.33	8.04	7.96	7.96
	6	2.23	33.73	15.17	15.17	15.17	15.17	14.52	14.39	14.39	13.88	13.88	13.72	13.23	13.10	13.10
	7	1.29	19.54	26.18	26.18	26.18	26.18	25.06	24.84	24.84	23.95	23.95	23.69	22.84	22.62	22.62
	8	0.89	13.51	37.88	37.88	37.88	37.88	36.25	35.93	35.93	34.65	34.65	34.27	33.05	32.73	32.73
REV	1	3.67	132.64	3.86	3.86	3.86	3.86	3.69	3.66	3.66	3.53	3.53	3.49	3.36	3.33	3.33
	2	2.23	80.57	6.35	6.35	6.35	6.35	6.08	6.02	6.02	5.81	5.81	5.74	5.54	5.49	5.49
	3	1.29	46.68	10.96	10.96	10.96	10.96	10.49	10.40	10.40	10.03	10.03	9.91	9.56	9.47	9.47
	4	0.89	32.26	15.86	15.86	15.86	15.86	15.18	15.04	15.04	14.50	14.50	14.34	13.83	13.70	13.70
FINAL DRIVE 20%																
FORWARD	1	3.67	422.48	1.21	1.21	1.21	1.21	1.16	1.15	1.15	1.11	1.11	1.10	1.06	1.05	1.05
	2	2.23	256.63	1.99	1.99	1.99	1.99	1.91	1.89	1.89	1.82	1.82	1.80	1.74	1.72	1.72
	3	1.29	148.67	3.44	3.44	3.44	3.44	3.29	3.26	3.26	3.15	3.15	3.11	3.00	2.97	2.97
	4	0.89	102.77	4.98	4.98	4.98	4.98	4.76	4.72	4.72	4.55	4.55	4.50	4.34	4.30	4.30
	5	3.67	74.03	6.91	6.91	6.91	6.91	6.61	6.56	6.56	6.32	6.32	6.25	6.03	5.97	5.97
	6	2.23	44.97	11.38	11.38	11.38	11.38	10.89	10.79	10.79	10.41	10.41	10.29	9.92	9.83	9.83
	7	1.29	26.05	19.64	19.64	19.64	19.64	18.79	18.63	18.63	17.96	17.96	17.76	17.13	16.97	16.97
	8	0.89	18.01	28.41	28.41	28.41	28.41	27.19	26.95	26.95	25.99	25.99	25.70	24.78	24.54	24.54
REV	1	3.67	176.85	2.89	2.89	2.89	2.89	2.77	2.74	2.74	2.65	2.65	2.62	2.52	2.50	2.50
	2	2.23	107.43	4.76	4.76	4.76	4.76	4.56	4.52	4.52	4.36	4.36	4.31	4.15	4.11	4.11
	3	1.29	62.24	8.22	8.22	8.22	8.22	7.87	7.80	7.80	7.52	7.52	7.44	7.17	7.10	7.10
	4	0.89	43.02	11.89	11.89	11.89	11.89	11.38	11.28	11.28	10.88	10.88	10.76	10.38	10.27	10.27
REVERSE SHUTTLE																
FORWARD	1	3.67	316.86	1.61	1.61	1.61	1.61	1.55	1.53	1.53	1.48	1.48	1.46	1.41	1.39	1.39
	2	2.23	192.47	2.66	2.66	2.66	2.66	2.54	2.52	2.52	2.43	2.43	2.40	2.32	2.30	2.30
	3	1.29	111.51	4.59	4.59	4.59	4.59	4.39	4.35	4.35	4.20	4.20	4.15	4.00	3.96	3.96
	4	0.89	77.07	6.64	6.64	6.64	6.64	6.35	6.30	6.30	6.07	6.07	6.00	5.79	5.73	5.73
	5	3.67	55.52	9.21	9.21	9.21	9.21	8.82	8.74	8.74	8.43	8.43	8.33	8.04	7.96	7.96
	6	2.23	33.73	15.17	15.17	15.17	15.17	14.52	14.39	14.39	13.88	13.88	13.72	13.23	13.10	13.10
	7	1.29	19.54	26.18	26.18	26.18	26.18	25.06	24.84	24.84	23.95	23.95	23.69	22.84	22.62	22.62
	8	0.89	13.51	37.88	37.88	37.88	37.88	36.25	35.93	35.93	34.65	34.65	34.27	33.05	32.73	32.73
REVERSE	1	3.67	372.78	1.37	1.37	1.37	1.37	1.31	1.30	1.30	1.26	1.26	1.24	1.20	1.19	1.19
	2	2.23	226.44	2.26	2.26	2.26	2.26	2.16	2.14	2.14	2.07	2.07	2.04	1.97	1.95	1.95
	3	1.29	131.18	3.90	3.90	3.90	3.90	3.73	3.70	3.70	3.57	3.57	3.53	3.40	3.37	3.37
	4	0.89	90.68	5.64	5.64	5.64	5.64	5.40	5.35	5.35	5.16	5.16	5.10	4.92	4.87	4.87
	5	3.67	65.32	7.83	7.83	7.83	7.83	7.50	7.43	7.43	7.16	7.16	7.08	6.83	6.77	6.77
	6	2.23	39.68	12.89	12.89	12.89	12.89	12.34	12.23	12.23	11.79	11.79	11.66	11.25	11.14	11.14
	7	1.29	22.99	22.25	22.25	22.25	22.25	21.30	21.11	21.11	20.36	20.36	20.13	19.42	19.23	19.23
	8	0.89	15.89	32.20	32.20	32.20	32.20	30.82	30.54	30.54	29.45	29.45	29.13	28.09	27.82	27.82

MECHANICAL TRANSMISSION 16 + 8 CREEPER

NO-LOAD GROUND SPEEDS WITH ENGINE AT TOP RATE

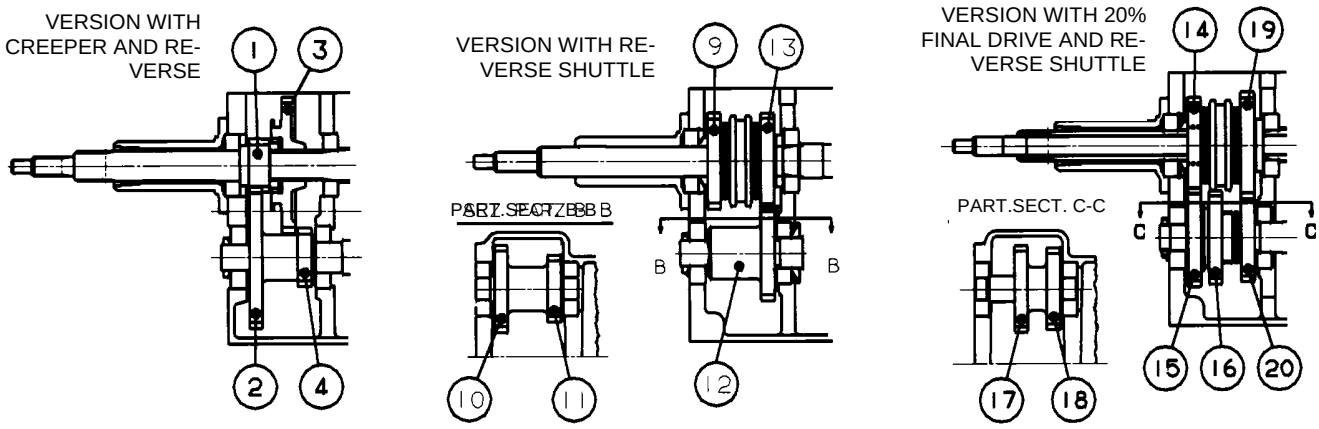
GEARS		TRANS. RATIOS		2300 rpm												
				Speeds with tyres as shown (kph)												
		GEARBOX	TOTALS	**360/70 R 28** C. R. mm **3707**	**12.4 R 28** C. R. mm **3707**	**420/70 R 24** C. R. mm **3707**	**14.9 R 24** C. R. mm **3707**	**11.2 R 28** C. R. mm **3550**	**13.6 R 24** C. R. mm **3518**	**380/70 R 24** C. R. mm **3518**	**360/70 R 24** C. R. mm **3393**	**12.4 R 24** C. R. mm **3393**	**44x18.00 R 20** C. R. mm **3353**	**320/70 R 24** C. R. mm **3236**	**375/75 R 20** C. R. mm **3204**	**380/70 R 20** C. R. mm **3204**
CREEPER																
FORWARD	1	3.67	2379.11	0.22	0.22	0.22	0.22	0.21	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19
	2	2.23	1445.16	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.32	0.32	0.32	0.31	0.31	0.31
	3	1.29	837.22	0.61	0.61	0.61	0.61	0.59	0.58	0.58	0.56	0.56	0.55	0.53	0.53	0.53
	4	0.89	578.70	0.88	0.88	0.88	0.88	0.85	0.84	0.84	0.81	0.81	0.80	0.77	0.76	0.76
	5	3.67	416.89	1.23	1.23	1.23	1.23	1.18	1.16	1.16	1.12	1.12	1.11	1.07	1.06	1.06
	6	2.23	253.24	2.02	2.02	2.02	2.02	1.93	1.92	1.92	1.85	1.85	1.83	1.76	1.75	1.75
	7	1.29	146.71	3.49	3.49	3.49	3.49	3.34	3.31	3.31	3.19	3.19	3.16	3.04	3.01	3.01
	8	0.89	101.41	5.04	5.04	5.04	5.04	4.83	4.79	4.79	4.62	4.62	4.57	4.40	4.36	4.36
REV	1	3.67	995.91	0.51	0.51	0.51	0.51	0.49	0.49	0.49	0.47	0.47	0.46	0.45	0.44	0.44
	2	2.23	604.95	0.85	0.85	0.85	0.85	0.81	0.80	0.80	0.77	0.77	0.77	0.74	0.73	0.73
	3	1.29	350.47	1.46	1.46	1.46	1.46	1.40	1.39	1.39	1.34	1.34	1.32	1.27	1.26	1.26
	4	0.89	242.25	2.11	2.11	2.11	2.11	2.02	2.00	2.00	1.93	1.93	1.91	1.84	1.83	1.83
NORMAL SPEEDS																
FORWARD	1	3.67	316.86	1.61	1.61	1.61	1.61	1.55	1.53	1.53	1.48	1.48	1.46	1.41	1.39	1.39
	2	2.23	192.47	2.66	2.66	2.66	2.66	2.54	2.52	2.52	2.43	2.43	2.40	2.32	2.30	2.30
	3	1.29	111.51	4.59	4.59	4.59	4.59	4.39	4.35	4.35	4.20	4.20	4.15	4.00	3.96	3.96
	4	0.89	77.07	6.64	6.64	6.64	6.64	6.35	6.30	6.30	6.07	6.07	6.00	5.79	5.73	5.73
	5	3.67	55.52	9.21	9.21	9.21	9.21	8.82	8.74	8.74	8.43	8.43	8.33	8.04	7.96	7.96
	6	2.23	33.73	15.17	15.17	15.17	15.17	14.52	14.39	14.39	13.88	13.88	13.72	13.23	13.10	13.10
	7	1.29	19.54	26.18	26.18	26.18	26.18	25.06	24.84	24.84	23.95	23.95	23.69	22.84	22.62	22.62
	8	0.89	13.51	37.88	37.88	37.88	37.88	36.25	35.93	35.93	34.65	34.65	34.27	33.05	32.73	32.73
REV	1	3.67	132.64	3.86	3.86	3.86	3.86	3.69	3.66	3.66	3.53	3.53	3.49	3.36	3.33	3.33
	2	2.23	80.57	6.35	6.35	6.35	6.35	6.08	6.02	6.02	5.81	5.81	5.74	5.54	5.49	5.49
	3	1.29	46.68	10.96	10.96	10.96	10.96	10.49	10.40	10.40	10.03	10.03	9.91	9.56	9.47	9.47
	4	0.89	32.26	15.86	15.86	15.86	15.86	15.18	15.04	15.04	14.50	14.50	14.34	13.83	13.70	13.70

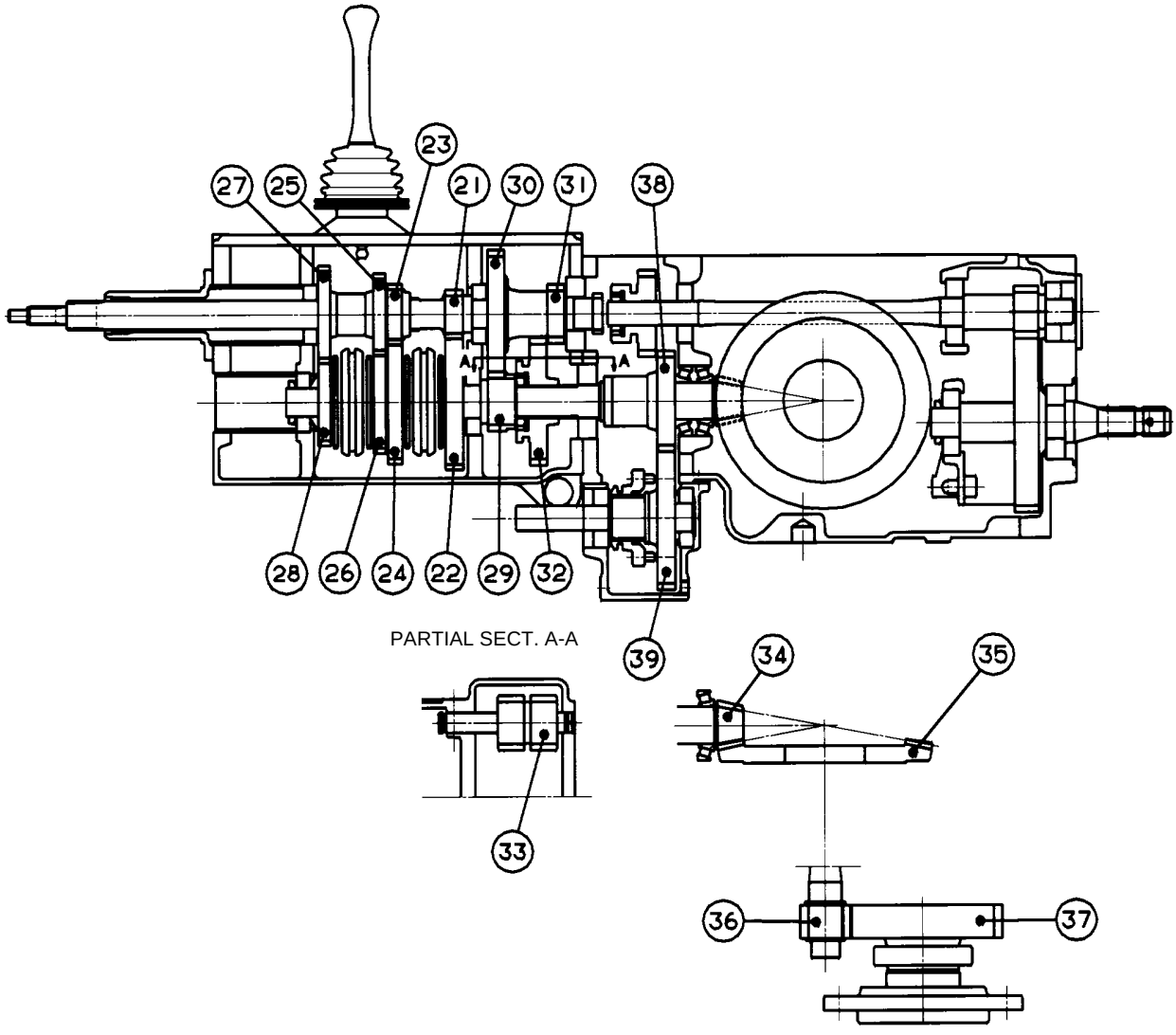
MECHANICAL TRANSMISSION 8+8 REVERSE SHUTTLE

NO-LOAD GROUND SPEEDS WITH ENGINE AT TOP RATE

GEARS		TRANSMISSION RATIOS		2300 rpm Speeds with tyres as shown (kph)												
		GEARBOX	TOTALS	**360/70 R 28** C. R. mm **3707**	**12.4 R 28** C. R. mm **3707**	**420/70 R 24** C. R. mm **3707**	**14.9 R 24** C. R. mm **3707**	**11.2 R 28** C. R. mm **3550**	**13.6 R 24** C. R. mm **3518**	**380/70 R 24** C. R. mm **3518**	**360/70 R 24** C. R. mm **3393**	**12.4 R 24** C. R. mm **3393**	**44x18.00 R 20** C. R. mm **3353**	**320/70 R 24** C. R. mm **3236**	**375/75 R 20** C. R. mm **3204**	**380/70 R 20** C. R. mm **3204**
NORMAL SPEEDS																
FORWARD	**1**	3.67	316.86	1.61	1.61	1.61	1.61	1.55	1.53	1.53	1.48	1.48	1.46	1.41	1.39	1.39
	2	2.23	192.47	2.66	2.66	2.66	2.66	2.54	2.52	2.52	2.43	2.43	2.40	2.32	2.30	2.30
	3	1.29	111.51	4.59	4.59	4.59	4.59	4.39	4.35	4.35	4.20	4.20	4.15	4.00	3.96	3.96
	4	0.89	77.07	6.64	6.64	6.64	6.64	6.35	6.30	6.30	6.07	6.07	6.00	5.79	5.73	5.73
	5	3.67	55.52	9.21	9.21	9.21	9.21	8.82	8.74	8.74	8.43	8.43	8.33	8.04	7.96	7.96
	6	2.23	33.73	15.17	15.17	15.17	15.17	14.52	14.39	14.39	13.88	13.88	13.72	13.23	13.10	13.10
	7	1.29	19.54	26.18	26.18	26.18	26.18	25.06	24.84	24.84	23.95	23.95	23.69	22.84	22.62	22.62
	8	0.89	13.51	37.88	37.88	37.88	37.88	36.25	35.93	35.93	34.65	34.65	34.27	33.05	32.73	32.73
REVERSE SHUTTLE																
	1	3.67	372.78	1.37	1.37	1.37	1.37	1.31	1.30	1.30	1.26	1.26	1.24	1.20	1.19	1.19
REVERSE	**2**	2.23	226.44	2.26	2.26	2.26	2.26	2.16	2.14	2.14	2.07	2.07	2.04	1.97	1.95	1.95
	3	1.29	131.18	3.90	3.90	3.90	3.90	3.73	3.70	3.70	3.57	3.57	3.53	3.40	3.37	3.37
	4	0.89	90.68	5.64	5.64	5.64	5.64	5.40	5.35	5.35	5.16	5.16	5.10	4.92	4.87	4.87
	5	3.67	65.32	7.83	7.83	7.83	7.83	7.50	7.43	7.43	7.16	7.16	7.08	6.83	6.77	6.77
	6	2.23	39.68	12.89	12.89	12.89	12.89	12.34	12.23	12.23	11.79	11.79	11.66	11.25	11.14	11.14
	7	1.29	22.99	22.25	22.25	22.25	22.25	21.30	21.11	21.11	20.36	20.36	20.13	19.42	19.23	19.23
	8	0.89	15.89	32.20	32.20	32.20	32.20	30.82	30.54	30.54	29.45	29.45	29.13	28.09	27.82	27.82

Transmission diagram





POS.	DESCRIPTION	N° TEETH	
	INPUT REDUCTION GEAR: TRANSMISSION 16+8 DUAL POWER+REV. SHUTTLE		
14	Driving wheel - 1st reduction	Z =	35
15	Driven wheel - 1st reduction	Z =	35
16	Reverse shuttle transmission input driving wheel	Z =	34
17	Reverse shuttle transmission input driven wheel	Z =	30
18	Reverse shuttle transmission output driving wheel	Z =	30
19	Driven wheel - 2nd reduction	Z =	40
20	Driving wheel - 2nd reduction	Z =	30
	GEARBOX		
21	Driving wheel - 1st gear	Z =	15
22	Driven wheel - 1st gear	Z =	55
23	Driving wheel - 2nd gear	Z =	22
24	Driven wheel - 2nd gear	Z =	49
25	Driving wheel - 3rd gear	Z =	31
26	Driven wheel - 3rd gear	Z =	40
27	Driving wheel - 4th gear	Z =	37
28	Driven wheel - 4th gear	Z =	33
	CENTRAL REDUCTION GEAR R - V - REV		
29	Driving wheel - 1st reduction	Z =	18
30	Driven wheel—1st reduction	Z =	43
31	Medium speed gear driving wheel	Z =	18
32	Medium speed gear driven wheel	Z =	43
33	REVERSE transmission gear	Z =	17
	REAR AXLE BEVEL GEAR PAIR FINAL DRIVE ASSEMBLY		
34	Rear axle bevel pinion	Z =	11
35	Rear axle bevel ring gear	Z =	53
	REAR FINAL DRIVE		
36	Final drive Driving wheel	Z =	21
37	Final drive Driven wheel	Z =	66

SPECIFICATIONS		
DIMENSIONS (mm)	**TIPO TZC5**	
	SAFETY FRAME VERSION	**CAB VERSION**
MAXIMUM LENGTH	3695	
MAXIMUM WIDTH	1890	
MAX. WIDTH (for road circulation)	1800	
MAXIMUM HEIGHT	2160	2220
WHEELBASE	1930	
FRONT OVERHANG	550 / 710 / 915	
REAR OVERHANG	850	
FRONT TRACK (VARIABLE §)	1145 : 1495	
REAR TRACK (VARIABLE §)	1100 : 1470	

(VARIABILITY §) OBTAINED BY FITTING WHEEL DISC DIFFERENTLY ON HUB

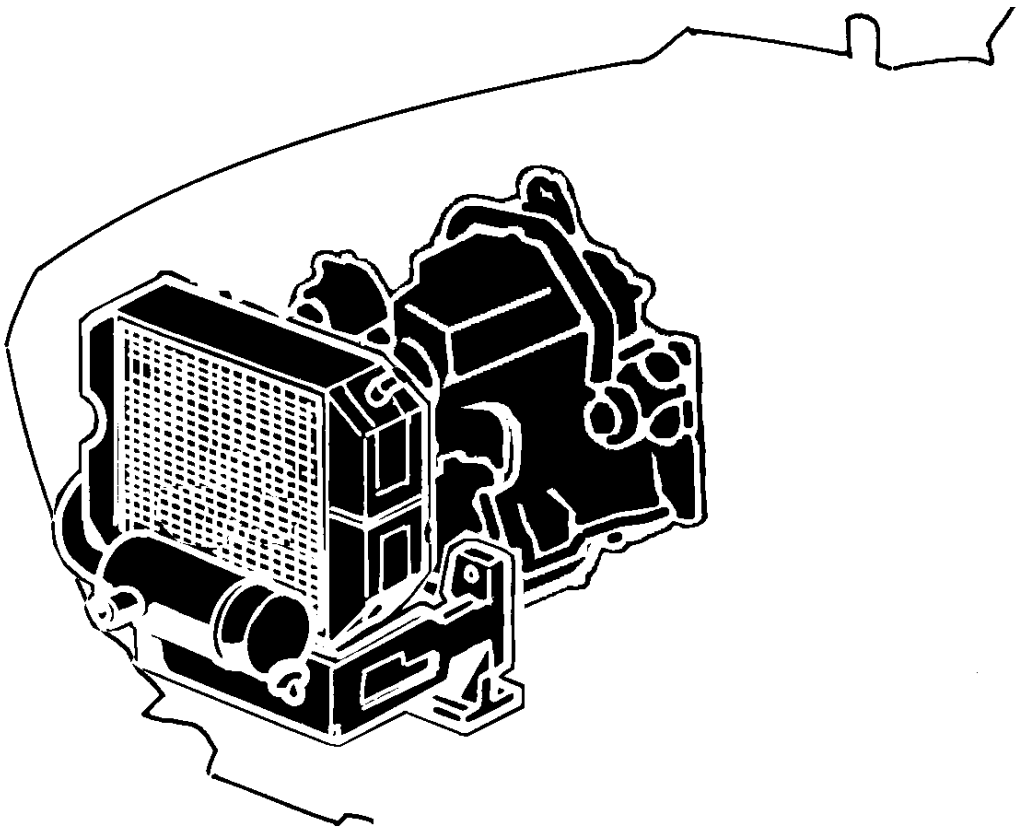
WEIGHTS (IN RUNNING ORDER INCLUDING DRIVER) in kg:								
MACHINE	**SAFETY FRAME VERSION**				**CAB VERSION**			
	(1)	**(2)**	**(3)**	**(3)**	**(1)**	**(2)**	**(3)**	**(3)**
FRONT AXLE	1010	1120	1090	1090	1000	1110	1100	1100
REAR AXLE	1360	1480	1350	1475	1500	1620	1470	1605
TOTAL	2370	2600	2440	2575	2500	2730	2570	2705

KEY:

WITHOUT BALLAST	(1)
WITH BALLAST	(2)
WITH FRONT POWER LIFT	(3)

TECHNICALLY TOLERATED MAXIMUM LOADS		
FRONT	REAR	TOTAL
1800	2800	3700

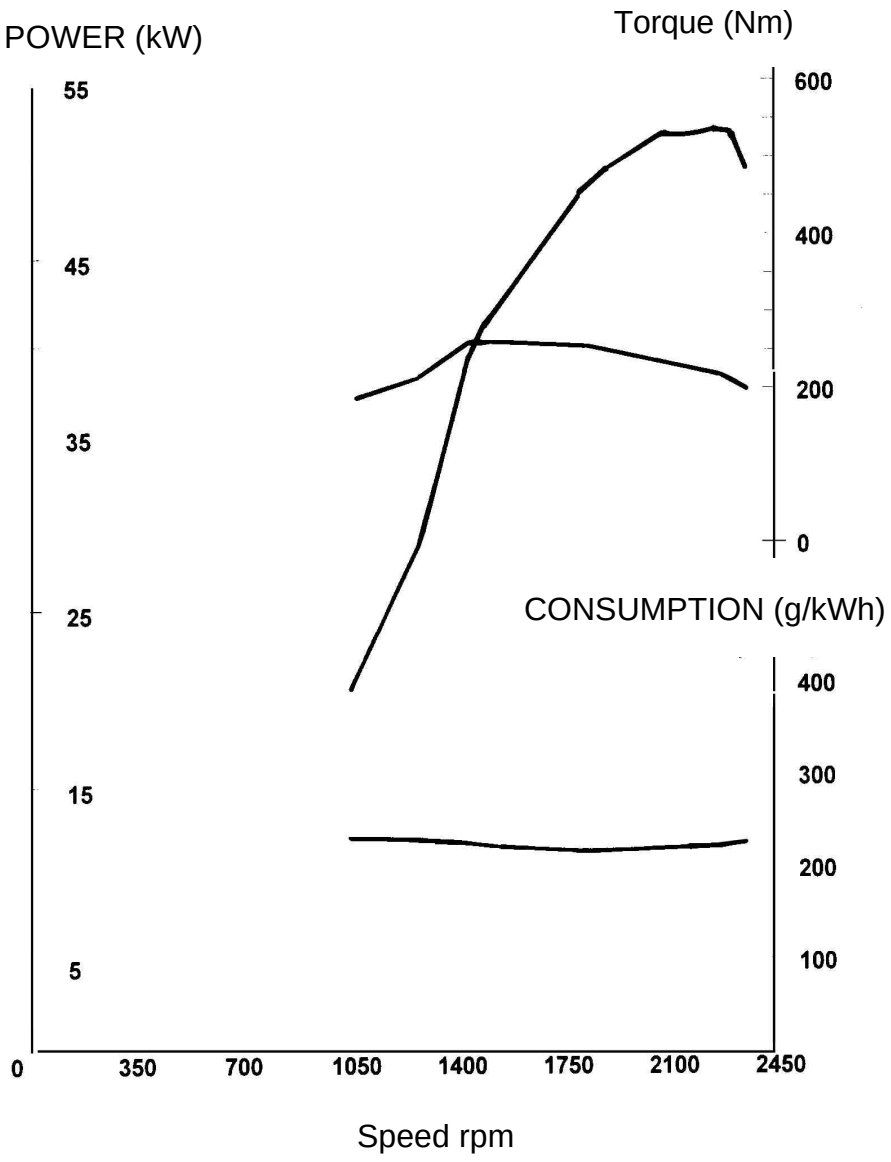
ENGINE



ENGINE SPECIFICATIONS

Engine rating	JOHN DEERE 3029TFG50
Power rating	71.4 HP - 52.5 kW
Type	Diesel
N° cylinders	3 in line (TURBO)
Swept volume	2940 cc
Cooling	Water

The engine power rating is checked in compliance with EEC 80/1269 and successive updates.



Contact one of JOHN DEERE's authorized workshops if engine repairs are required. Consult the operation and maintenance manual of the engine for filter replacement, greasing and oil changes.

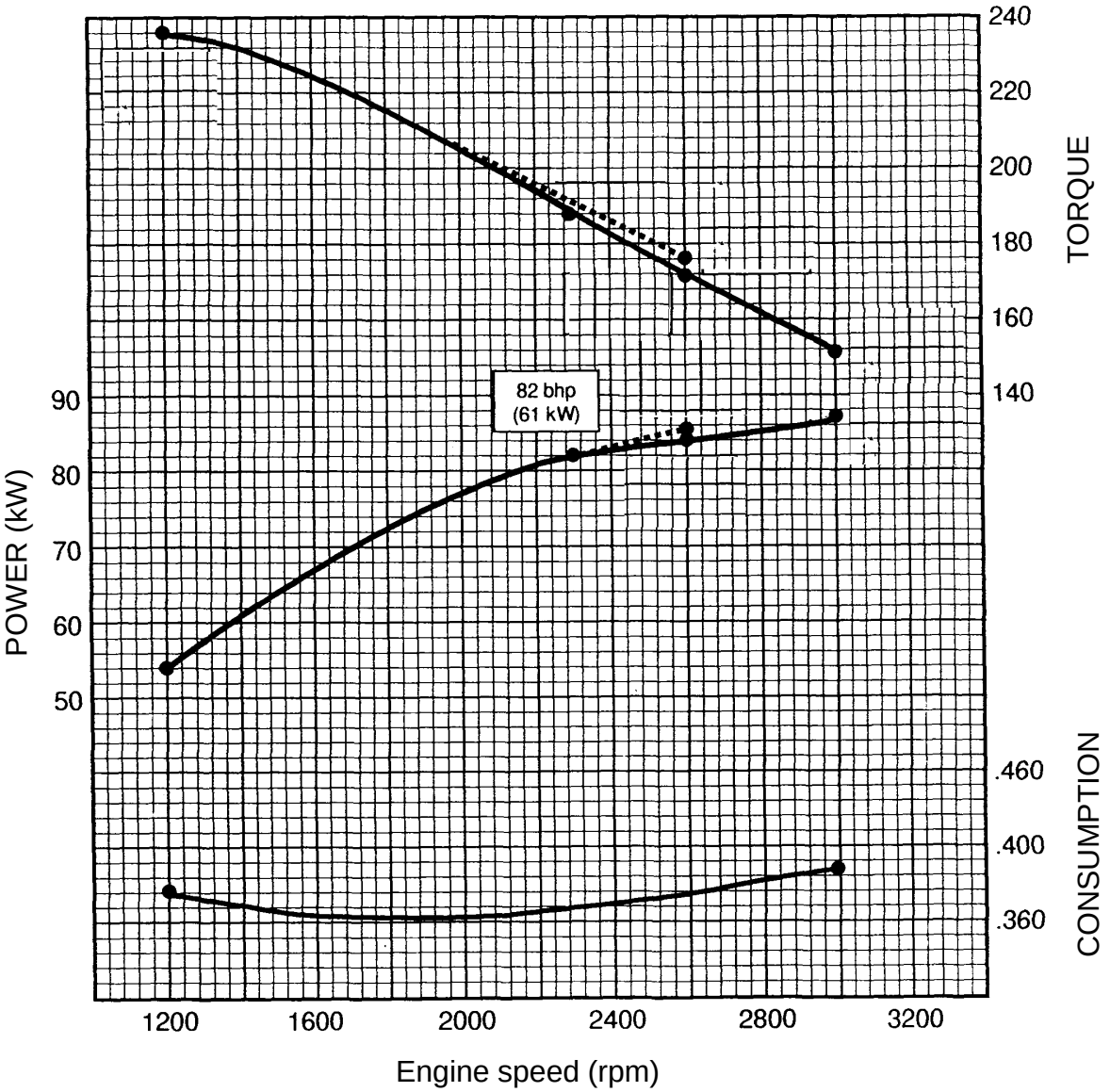
ENGINE SPECIFICATION TABLE	J.D. 3029	TFG50
Cylinders	N°	3
Swept volume	cc.	2940
Bore	mm	106.5
Stroke	mm	110
Compression ratio		17.8:1
Rpm		2300
Power rating kW/HP at 2300 rpm	kW/HP	52.5-71.5
Maximum torque 1500 rpm	Nm	240
Maximum torque	Nm (kgm)min/rpm	248 (25) 1500
No-load idling rate rpm		850¸1000
Oil sump capacity	l.	7
Weight when empty	kg	316
Recommended battery	V/ah	12/100
Consumption (g/Kwh – 100% and 80%)	g/Kwh	229-183

Contact an authorized John Deere Center if the engine's Workshop Manual is also required.

ENGINE SPECIFICATIONS

Engine	VM 77 B/4
Power rating	81.6 HP - 60 kW
Type	Diesel
N° cylinders	4 in line (TURBO)
Swept volume	2776
Cooling	Water

The engine power rating is checked in compliance with EEC 80/1269 and successive updates

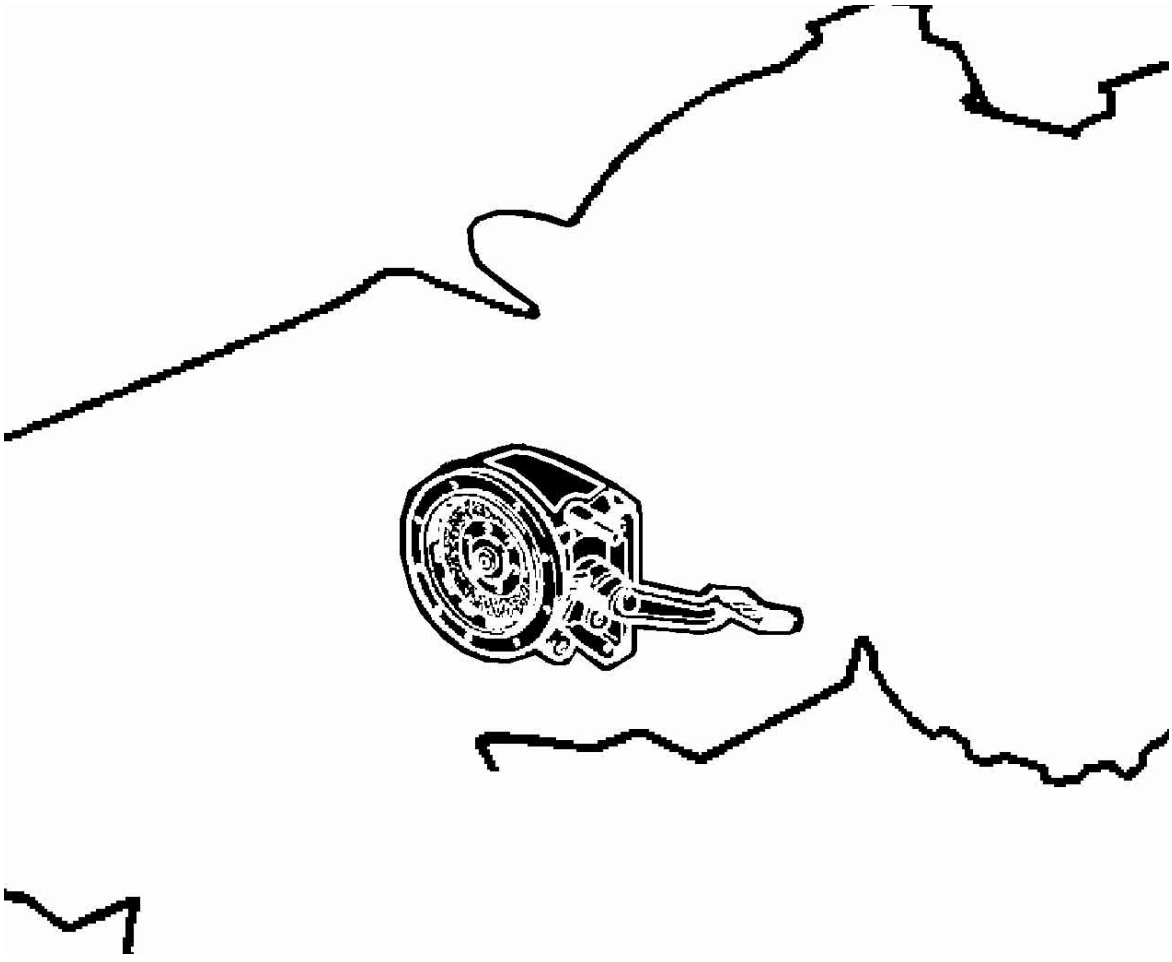


Contact one of VM Motori S.p.A.'s authorized workshops if engine repairs are required. Consult the engine's operation and maintenance manual to replace the filters, grease parts and change the oil.

ENGINE SPECIFICATION TABLE	D 704TE 2 – VM 77 B/4	
Cylinders	N°	4
Swept volume	cc.	2776
Bore	mm	94
Stroke	mm	100
Compression ratio		17:1
Rpm		2300
Power rating kW/HP at 2600 rpm	kW/HP	59-80
Maximum torque 1400 rpm	Nm	260
Maximum torque	Nm (kgm)min/rpm	260 (26.5) 1400
No-load idling rate Rpm		950¸1000
Oil sump capacity	l.	7
Weight when empty	kg	262
Recommended battery	V/ah	12/100
Consumption (g/Kwh-100% and 80%)	g/Kwh	226/220

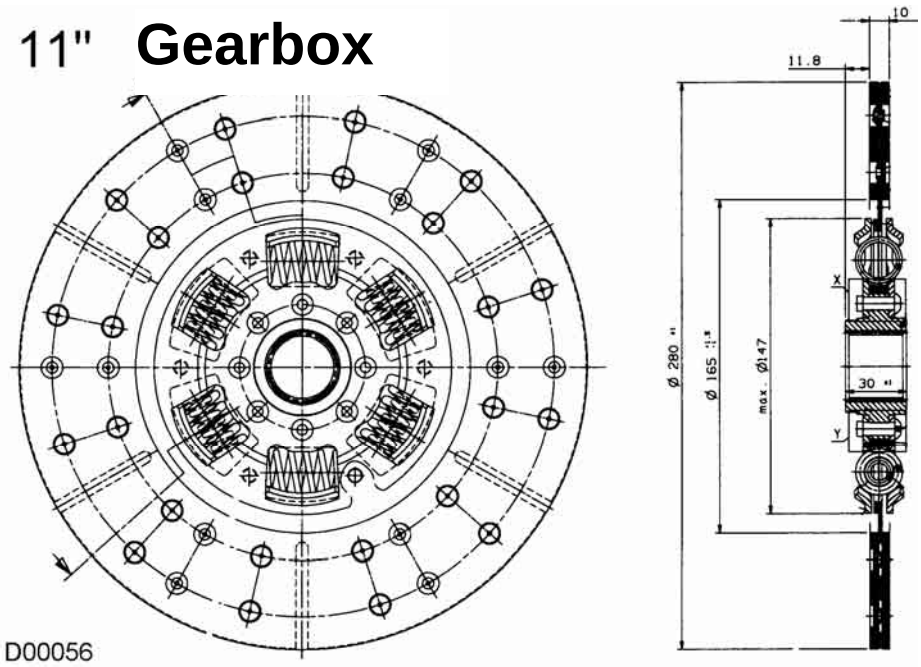
Contact an authorized VM Motori S.p.A. Center if the engine's Workshop Manual is also required.

CLUTCH



Clutch	DRY TWIN-PLATE
Type	11” Luk

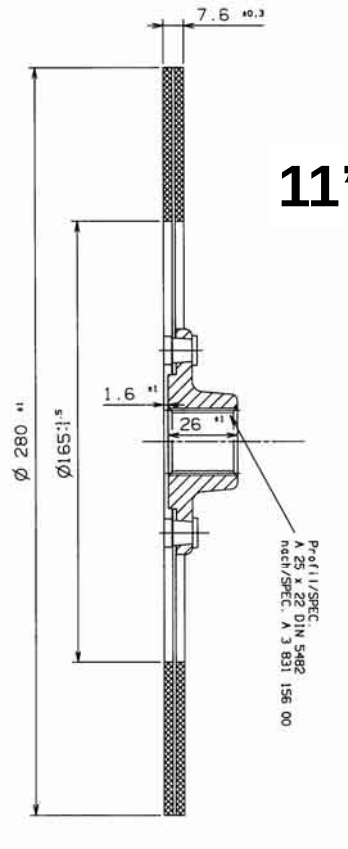
11" Gearbox



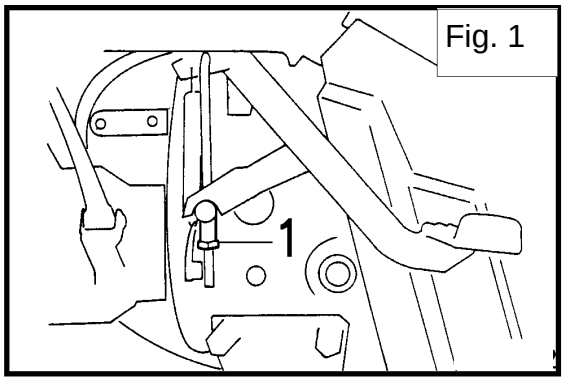
CHARACTERISTICS OF THE FRICTION MATERIAL:

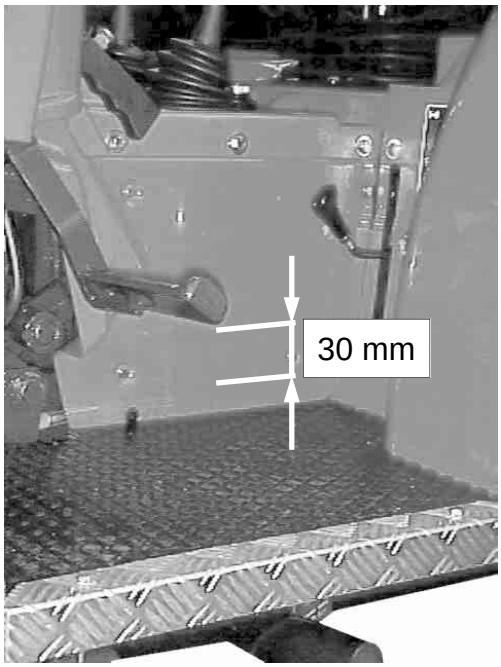
RAYBESTOS 8402

11” P. t. o.



The figure shows the dimensions and specifications of the main - clutch plate.
The clutch plate in direct contact with the flywheel is that of the PTO while the main clutch plate is the outermost one.





DRIVE CLUTCH PEDAL ADJUSTMENT (GEARBOX)

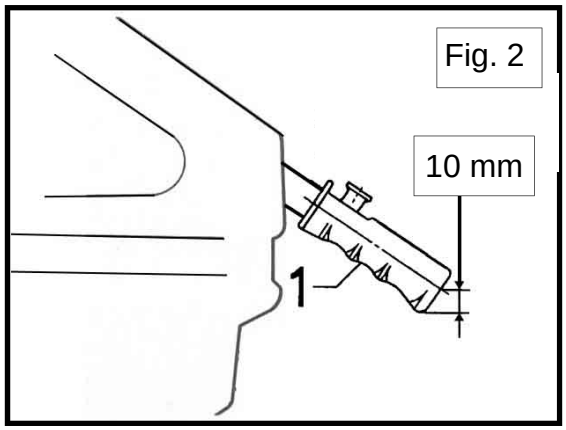
The free travel of the pedal must be 30 mm. The total pedal travel is 130 mm (fig. 1).

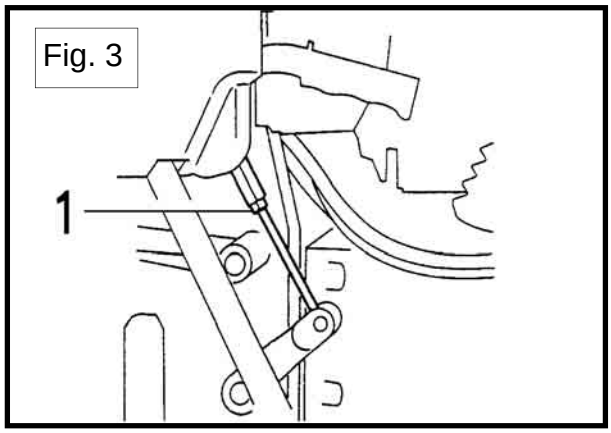
- Remove the guard;
- Unscrew the adjuster screw **1** (fig. 3) to lengthen the free travel of the pedal. Tighten the screw to shorten it. Fit the guard back in place once the adjustments have been made.

PTO CLUTCH LEVER ADJUSTMENT

The free travel of the lever must be 10 mm (fig. 2).

- Remove the guard;
- unscrew the adjuster screw **1** (fig. 1) to lengthen the free travel, tighten the screw to shorten it;
- Fit the guard back in place.





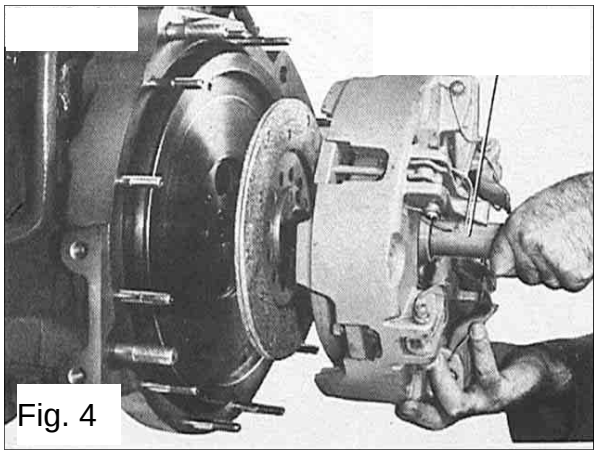


Fig. 4

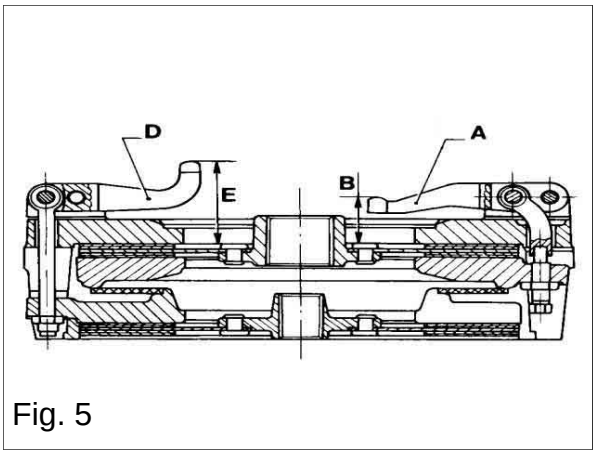


Fig. 5

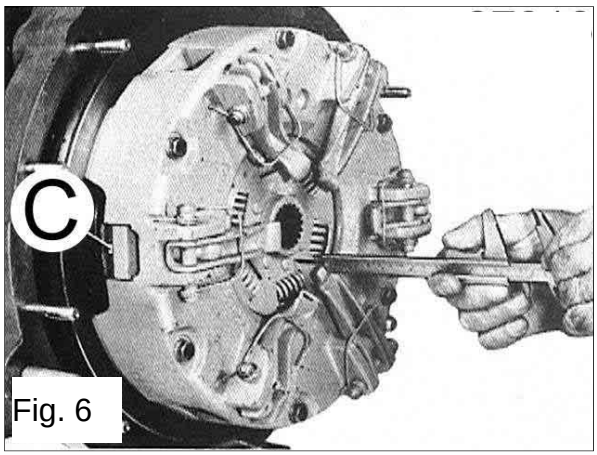


Fig. 6

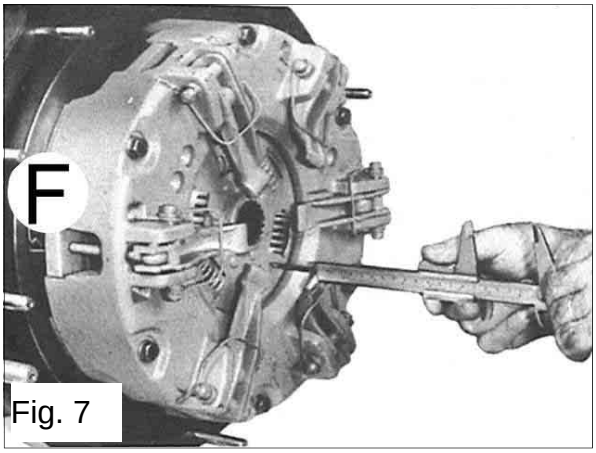


Fig. 7

INTERNAL LEVER ADJUSTMENT

To access the clutch compartment it is necessary to separate the tractor as illustrated in Fig. 4 removing the side guards, gearbox guard, hydraulic pipes and the power supply, electrical connections and the dashboard.

Gearbox

The levers **A** (Fig. 5) must be adjusted so as to obtain the distance **B** = 25 mm.
For the adjustment it is necessary to:
- loosen the lock nuts and turn the nuts C (fig. 6) to obtain the prescribed distance;
- on completing adjustment, tighten the lock nuts.

P.t.o.

The levers **D** (Fig. 5) must be adjusted so as to obtain the distance **E** = 50 mm.
For the adjustment it is necessary to:
- turn the nuts **F** (fig. 7) to obtain the prescribed distance;
- on completing adjustment, press the edge of the nut with snap pliers.

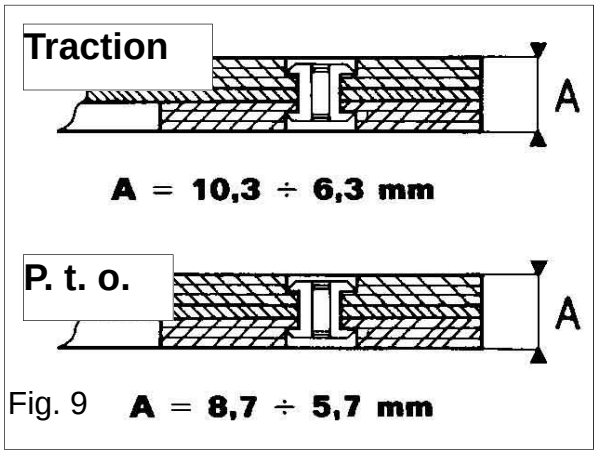


Fig. 9

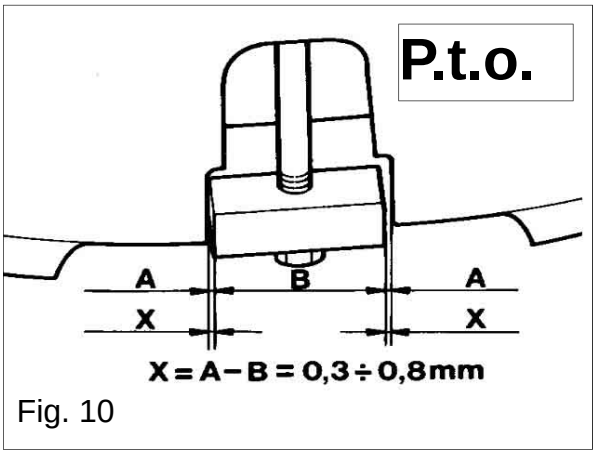


Fig. 10

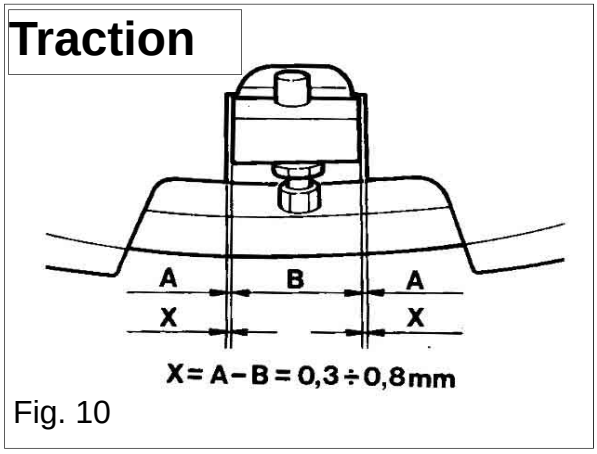


Fig. 10

Fig. 10 shows the max range of clearance that must come to bear on the tie-rods of the two clutch assemblies: the one for the power take-off and the one for traction.

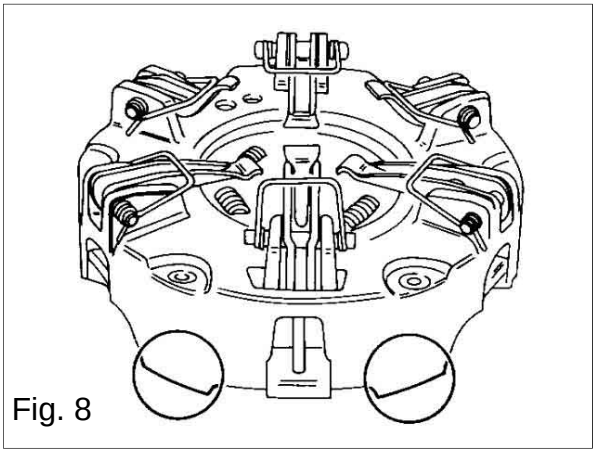


Fig. 8

ELEMENT CONTROL

If the pressure plate rings show any scoring or signs of overheating it is necessary to grind the working faces removing 0.5 mm of material from the original thickness; for further removal (max 1 mm) it is necessary to remove the same amount of material from the coupling seat of the clutch on the flywheel (fig. 8).
Fig. 9 shows the wear thicknesses of the two clutch plates: the one for the power take-off and the one for traction.

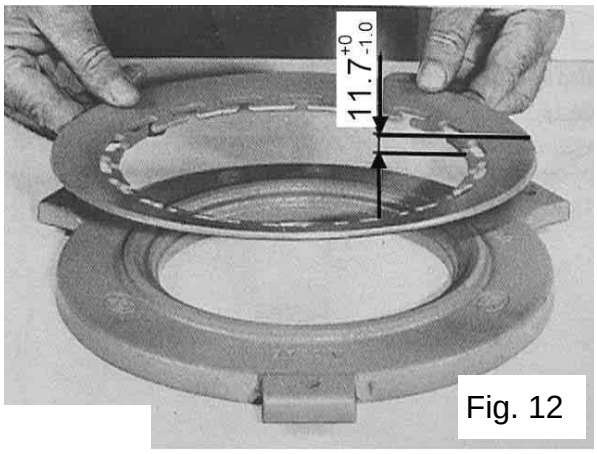


Fig. 12

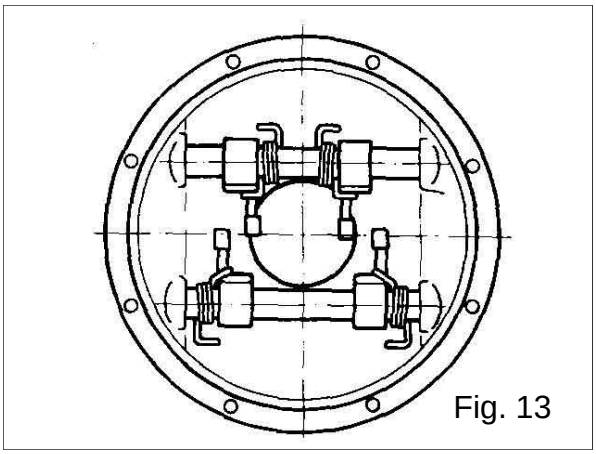


Fig. 13

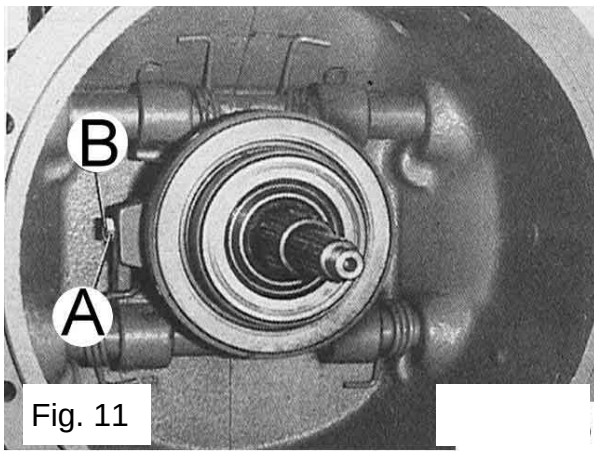


Fig. 11

HOW TO DISASSEMBLE THE CLUTCH ASSEMBLY

Note - Mark the various components before they are disassembled.

Fig. 12 shows the operating camber of the clutch spring.

When relieved, the spring must have this dimension to as to ensure it pushes on the clutch plate in the correct way.

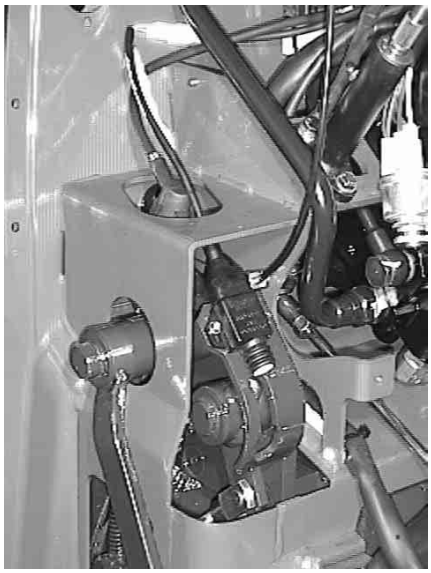
Fig. 13 shows the correct positions of the clutch linkages in the clutch bowl: the one used to operate the PTO clutch and the one used to operate the main clutch.

HOW TO ASSEMBLE THE CLUTCH ASSEMBLY

Note - Comply with the positions of the marks made on the components to ensure that the assembly is correctly balanced.

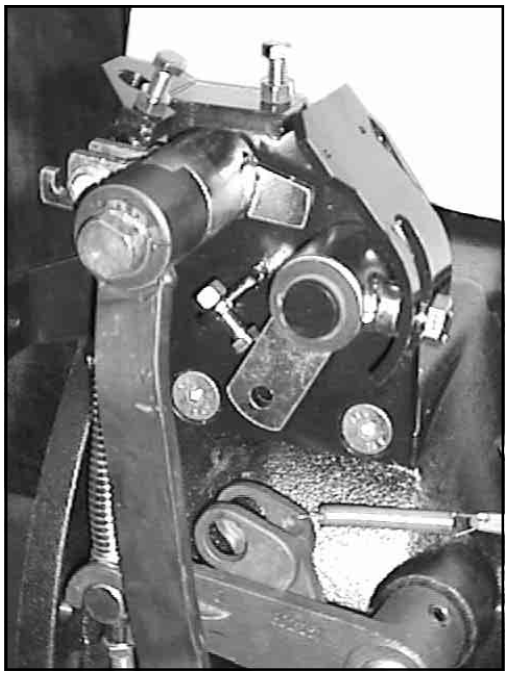
HOW TO ASSEMBLE THE CLUTCH LINKAGES

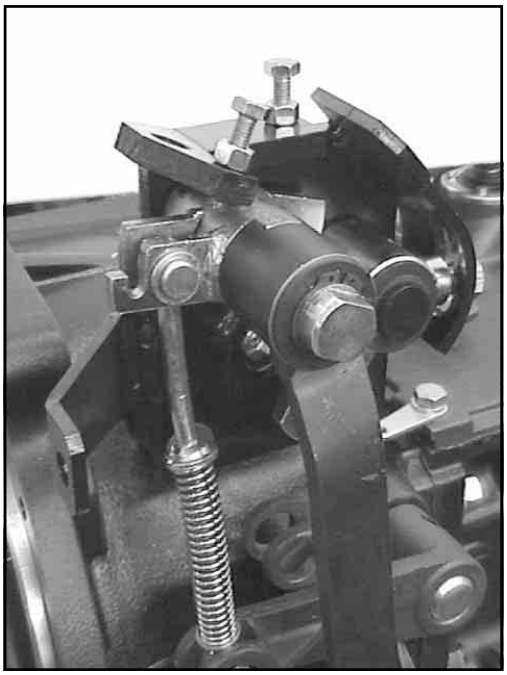
Note - To correctly assemble the thrust bearings on the levers, screws **B** (fig. 11) must lightly contact the sleeve housings. Block nuts **A** when this condition has been achieved.



As already explained, these tractors are equipped with an integral platform mounted on Silent - Blocks. The main clutch pedal and PTO clutch lever must therefore allow the platform to be disassembled. The lever is screwed to the linkage and must be removed before the platform is removed.

The clutch pedal is inserted into a pin and is held in its housing by a circlip which must be removed and taken out along with the pedal before the platform is disassembled.





The pictures above show these assemblies in detail. The adjuster rods that regulate the two clutch assemblies can also be seen.
While the rod of the lever operated clutch must be regulated so that lever travel takes up the entire slot in which the lever itself operates, the clutch pedal must be adjusted as shown in fig. 14.

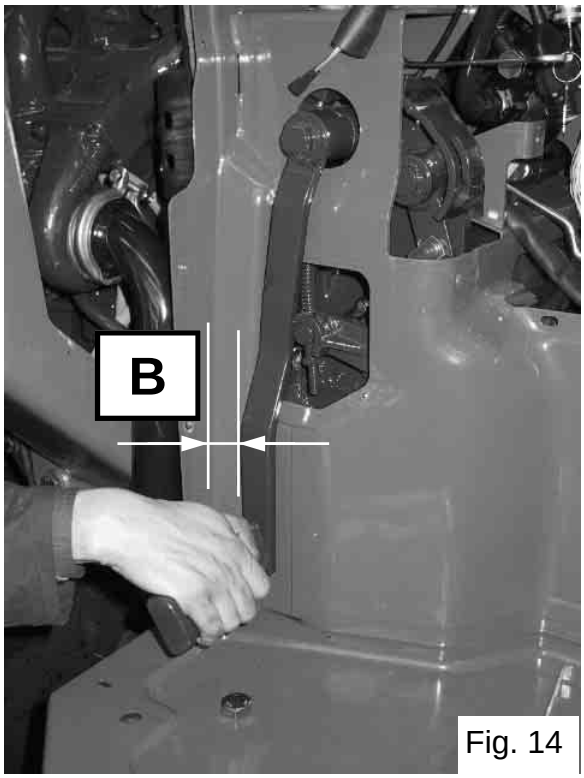


Fig. 14

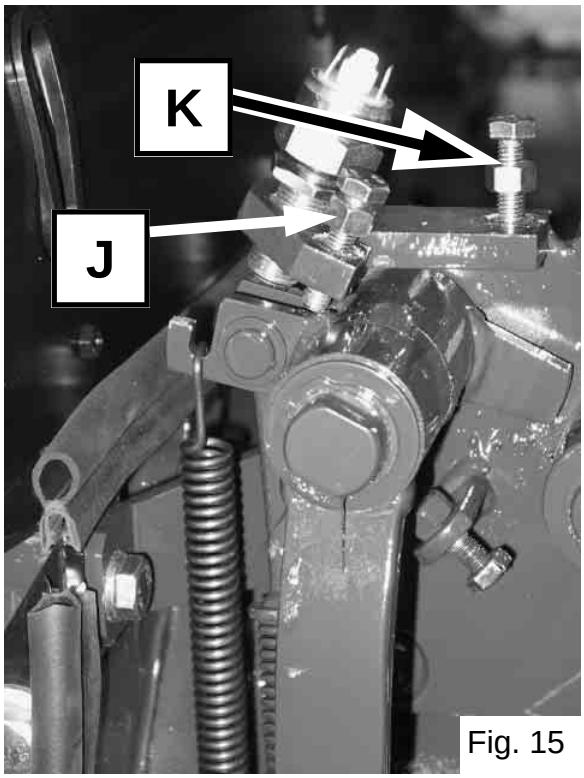


Fig. 15

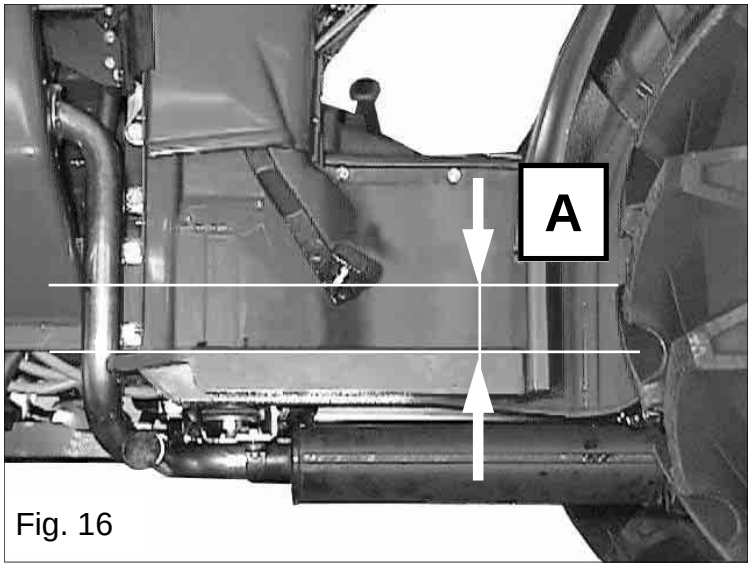


Fig. 16

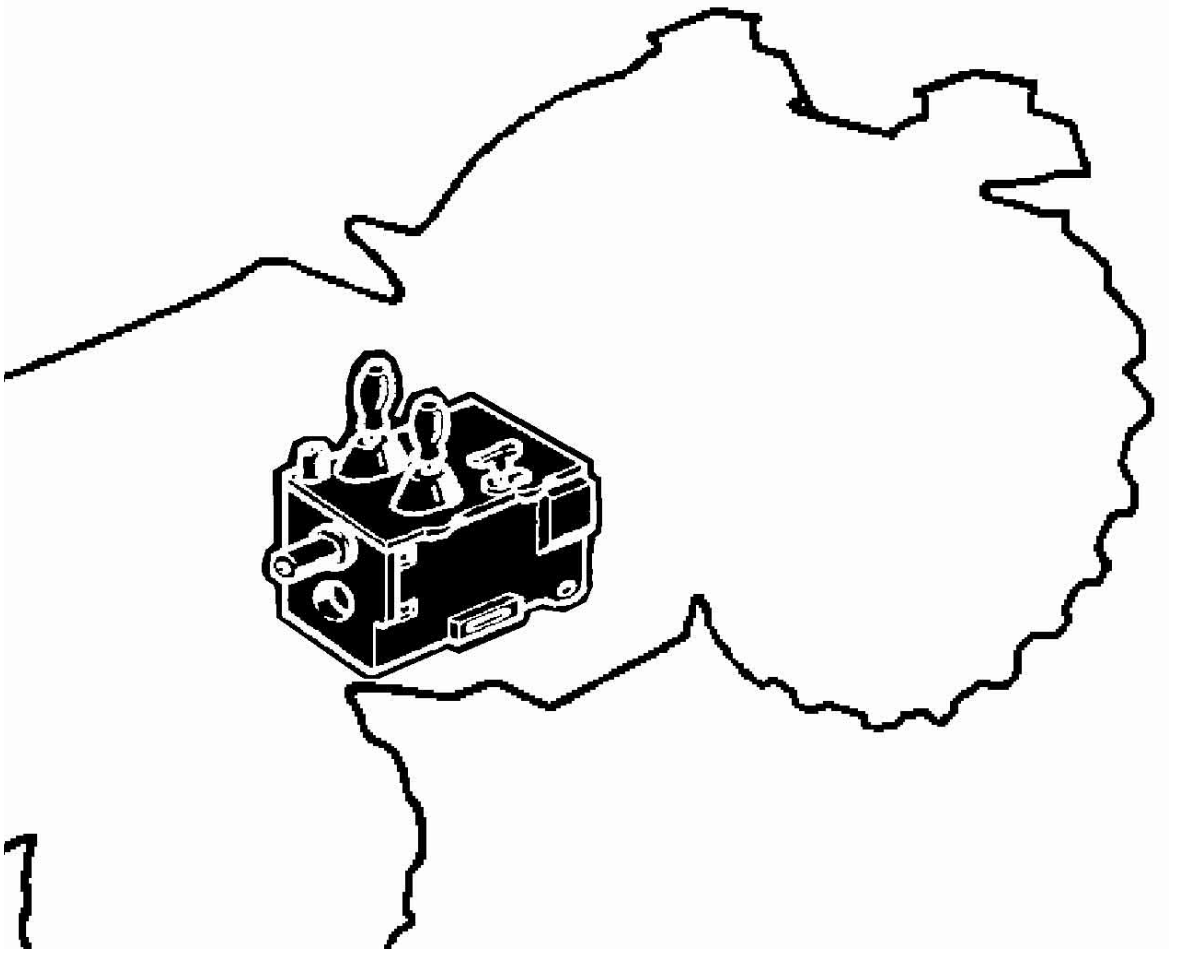
Fig. 15 indicates the two nuts used to adjust the end of travel positions of the clutch pedal by means of two letters, **K** and **J**.
Once the pedal has been adjusted as described further on, the check nuts must be tightened to lock the positions.
The two switches, whose functions are described in the chapter on the electrical system, must be installed: one on the PTO clutch linkage and the other on the clutch pedal.

The pictures at the top (fig. 14 and 16) show the main clutch pedal adjustments required, i.e.:
- as shown in the first picture, the space **B** that remains between the pedal and platform must be about 10 mm when the pedal is fully pushed to end of travel (complete disengagement of the clutch);
- when the clutch pedal is in the adjusted condition, the pedal must be about 13 cm from the footboard (pedal height **A**) (see fig. 16);
- at the start of disengagement, pedal height from the footboard must be about 11 cm.

DRIVING TORQUES	(kgm)
M8 x 90 screw that fixes the clutch to the flywheel	4
M10 x 12.5 nut that fixes the engine flange, clutch bowl	6
M8 x 20 main shaft sleeve fixing screw	3.5
M12 x 35 dashboard support fixing screw	8
M16 x 140 motor flange - clutch bowl fixing screw	8

GEARBOX

VALID UP TO MACHINE n° B524072



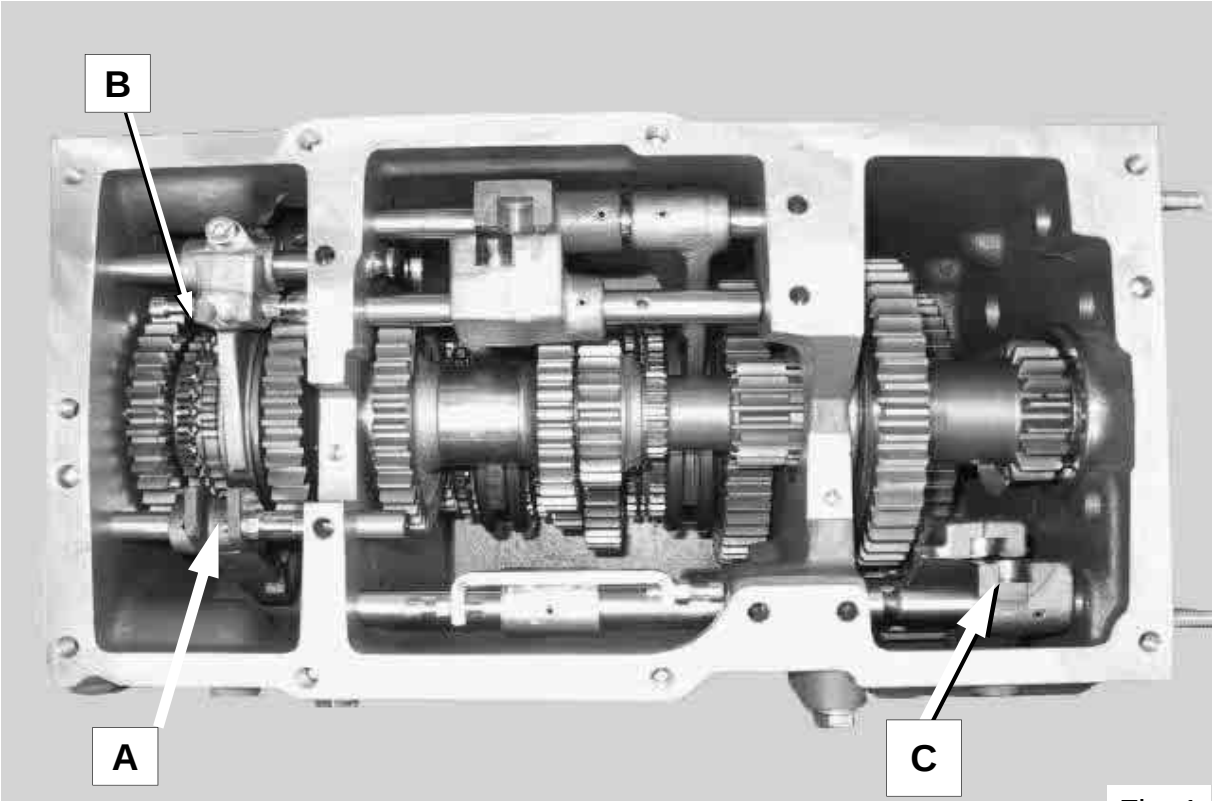


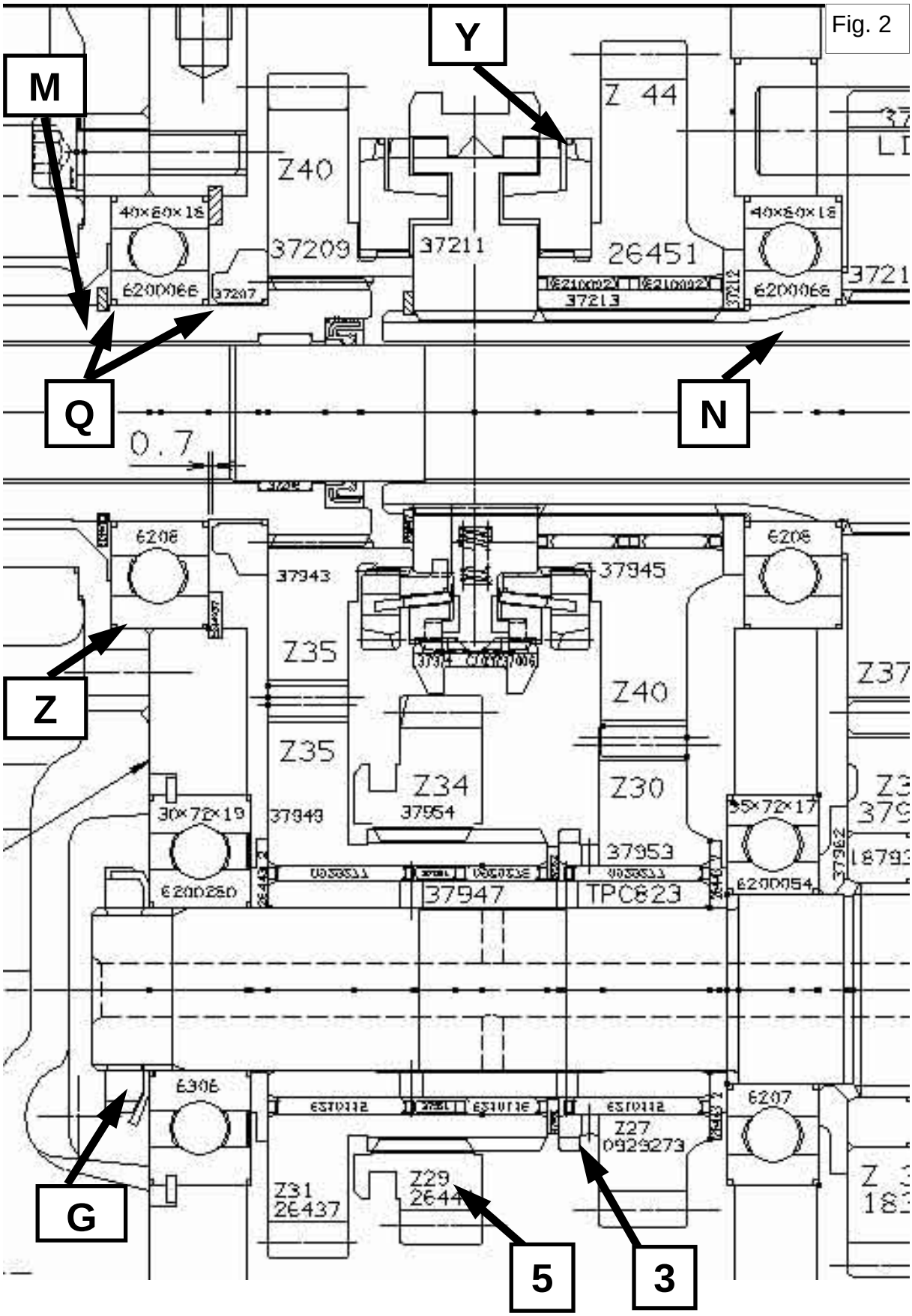
Fig. 1

With reference to (fig. 1), the selectors indicated with the letter **C** are positioned as shown in the figure for machines with side levers (reduction gear lever near to the lh mudguard and gearshift lever under the fixed bonnet).
Consult the following descriptions when adjusting the end of travel screws.
The screw adjustments must prevent the levers from being pushed beyond the selector races when operated.

All the pictures, adjustments and assembly instructions on the following pages refer to the 16+8/8+8 gearbox, which is the most complete and widely used version.

Certain specific instructions will be included in future updates for the creeper version even though many parts and specifications are the same as those of the version described in this text.

Fig. 2


M
Y
Q
N
Z
G
5
3
Z 44
Z40
37209
37211
26451
37213
40×60×18
6200066
37207
37212
0.7
6206
37943
37945
Z35
Z40
Z35
Z34
37954
Z30
30×72×19
37949
35×72×17
37953
6200260
37947
TPC823
6200054
6306
6207
Z27
0929273
Z31
26437
Z29
2644

The first portion of the gearbox is shown on the previous page, i.e. the section that houses the reverse shuttle and –20% reverse selector.
Gear Z 29 di (fig. 2) is controlled by fork **A** of (fig. 1). The reverse shuttle is selected when it is in position 5 while the –20% option is selected when it is in position 3.

Fork **B** of (fig. 1) selects the –20% option or the reverse shuttle, depending on the position of fork **A** .

Once forks **A** and **B** have been installed, lock the screws shown in (fig. 4) so that it is not possible to slip out of the selection made by the balls which position in the races of the respective rods.

For fork **B**, first center the synchro-ring in the neutral position and then tighten the screw that locks the fork on to the rod to a 3.5 kgm torque value.

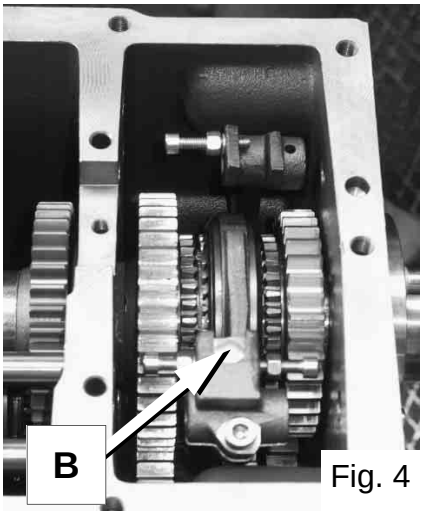


Fig. 4

It is important to correctly shim bearing **Z** which ensures the main shaft and driven shaft are correctly positioned and that the –20% reverse shuttle synchronizer has the right operating play (fig. 2). The shims must be applied to the shaft, on the left and right sides of the bearing. The shimming on the left of the bearing (as shown in fig. 2) is usually 0.6-0.8 mm, while it must be 0.8-1 mm on the right.

The ring nut that closes the pack of synchronizers, part **G** of (fig. 2-5) must be tightened to a 9.0 kgm torque value, with the retainer plate inserted, and be punched to ensure that it is well clamped: it must be replaced each time the unit is disassembled.

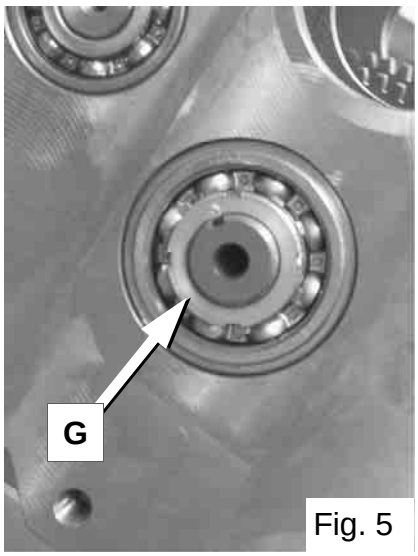


Fig. 5

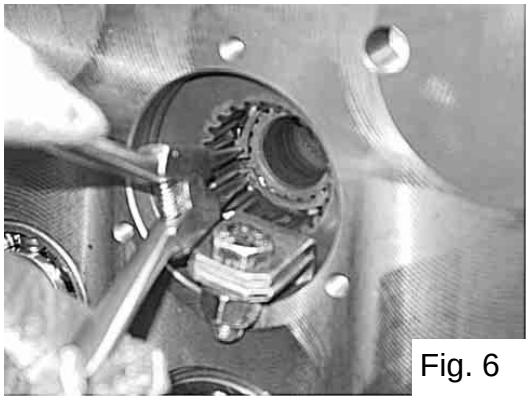


Fig. 6

Before assembling shaft **M** of (fig. 2), install the circlip as illustrated (fig. 6) using a pair of circlip pliers and the simple tool of (fig. 6), which keeps shaft **N** and gear 6 of (fig. 2) in position.

Before setting shaft **M** of (fig. 2) in position, do not forget to install the guide and oil retainer shown in (fig. 7) inside the shaft. In the Quadrifoglio series, the reverse shuttle synchronizer is a biconical element that exercises a braking action on the two tapering surfaces. It is worthwhile examining the shims to apply in points **Q** of fig.2: two 0.8 mm spacers are usually positioned in the two points **Q** to allow the reverse shuttle synchronizer to maintain a 0.2-0.4 mm float. These shims, whose total thickness is always 1.6 mm, can also be distributed differently in the two points **Q** so long as the synchronizer has the right float. There must be a gap of about 1.8 mm in the point indicated with **Y** in fig.2, when the synchronizer is new. The gap narrows as the cone of the synchronizer wears. This dimension gives an indication about the state of wear of the synchronizer.

Fig. 7

Insert spacers in position **H** (fig. 2) so as to maintain the bearing in position once the clutch bowl has been installed.
To carry out this operation and ensure that the shimming is correct, check the gap between the bearing and the outer stop point of the casing using a gauge. (fig. 3).

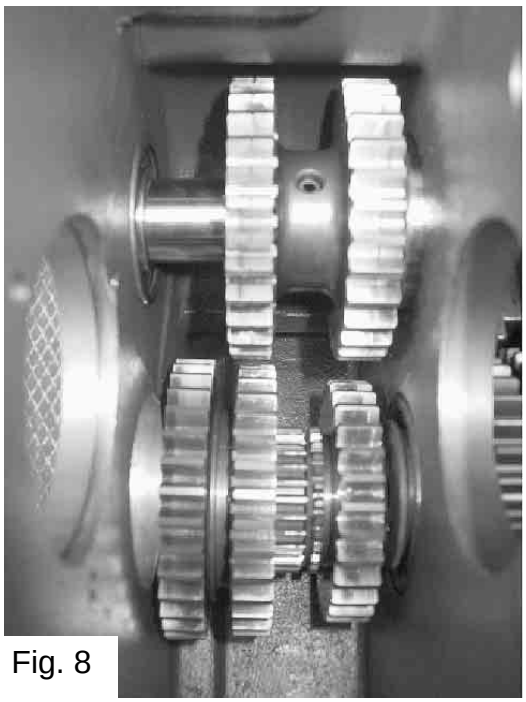


Fig. 8

Up to the [D] series, the reverse shuttle gear was in two parts while from the [E] series onwards, it was made in a single piece. This is the version to which the pictures refer.

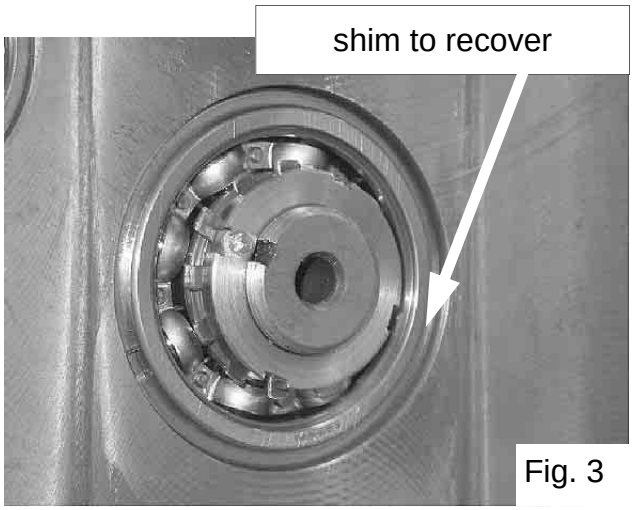


Fig. 3

Fig. 8 shows the idle transmission shaft of the reverse shuttle and its position inside the casing.
This shaft must be assembled after the parts in (fig. 8) have been installed on the lower shaft. The gear fixed by the pin must be positioned as shown in the figure, installing the transmission shaft within the relative bushes in the casting.

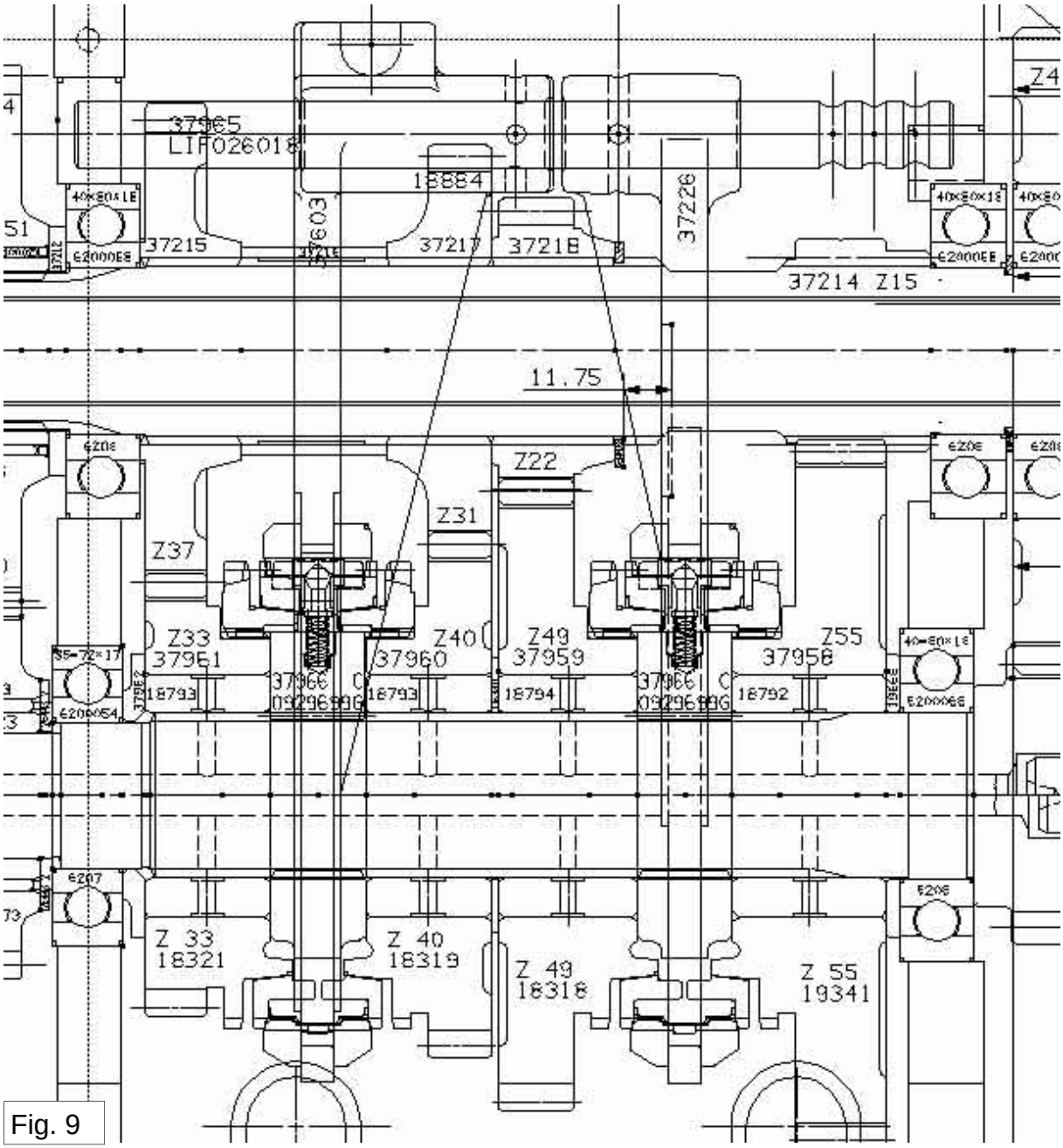


Fig. 9

Fig. 9 shows the pair of synchronizers that operate the gearbox.
Shimming is not required within this pack as all the play values are pre-defined.

Fig. 10

Using the few simple tools shown in fig. 10, the complete packs of synchronizers can be installed in a very quick and simple way as illustrated in fig. 11.

Using pointed-tip pincers, position the spacer that divides the packs of synchronizers as shown in fig. 12.
The two plugs of (fig. 10) are used to extend the lower shaft as shown in fig. 13, so as to form a reliable guide for the this latter and support the packs of synchronizers during the assembly phase.

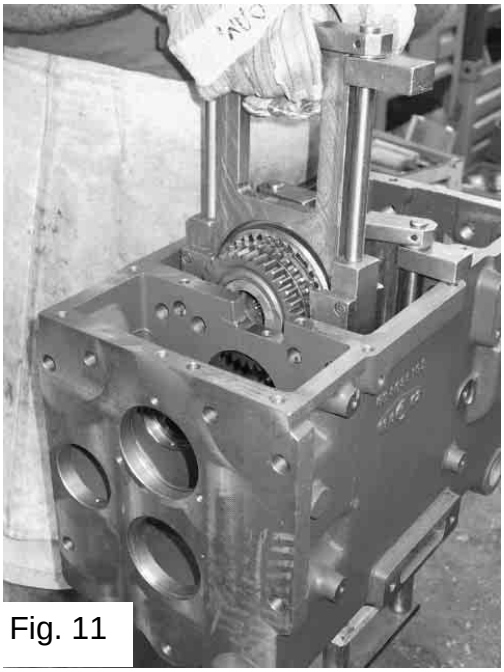


Fig. 11

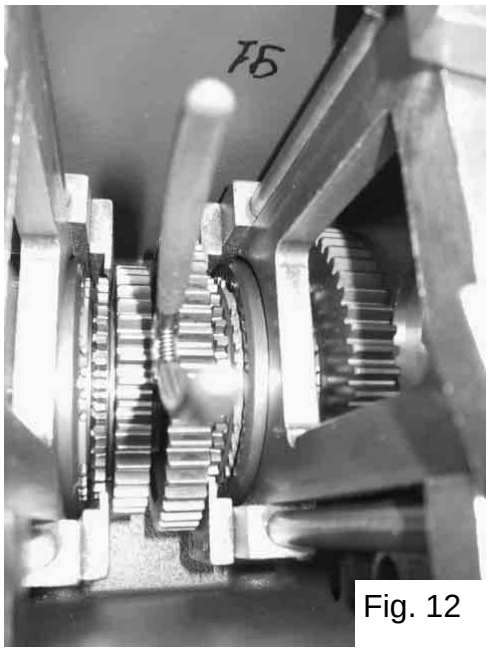


Fig. 12

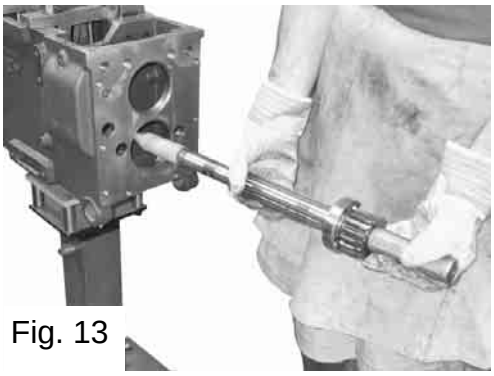


Fig. 13

A safety rod is inserted between the two gear control rods to prevent some accidental manoeuvre from the operator from engaging two gears at the same time.
Fig. 14 shows how this part is installed (it must not be forgotten) when the machine is re-assembled.

Fig. 15

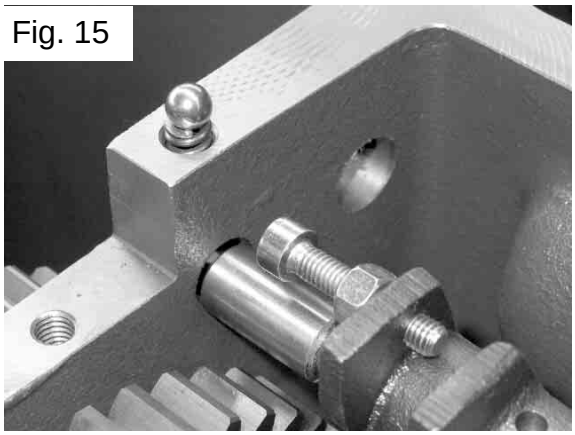


Fig. 14

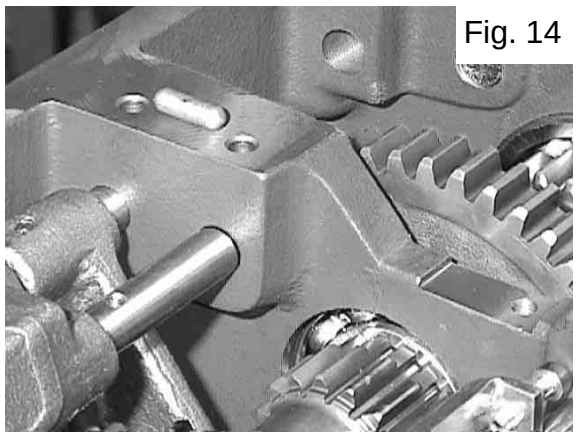
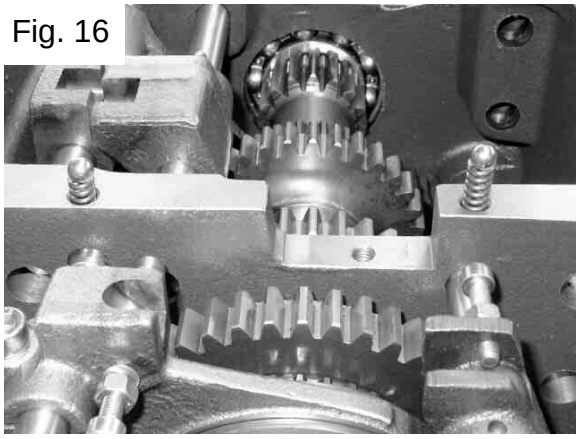


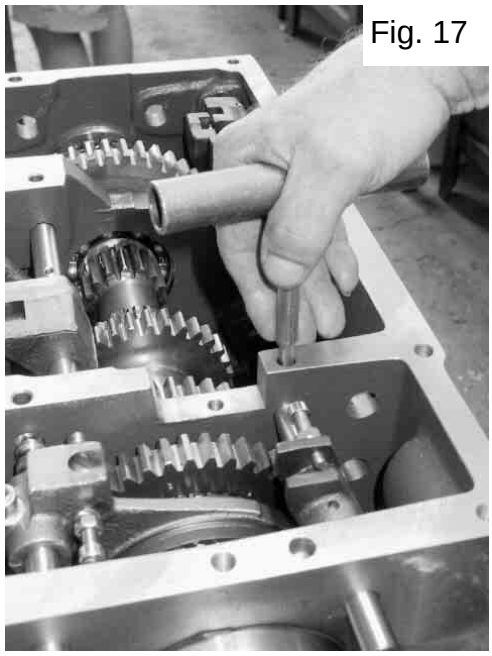
Fig. 16



Figs. 15 and 16 show the positions of the springs and relative balls used for selecting the 20% option and reverse shuttle.

Fig. 17 shows how, with the aid of a rod, the spring plus ball packs are installed by packing down the spring and allowing the rod to slide on the supports until the parts have been fully seated.

Fig. 17



Now install the pins (if applicable), aligning the hole on the rod and on the fork with the aid of a pin driver.

It is advisable to test the selection, checking the various positions assumed by the selector fork and adjusting the retainer screws as described in the previous pages.

Fig. 14 A

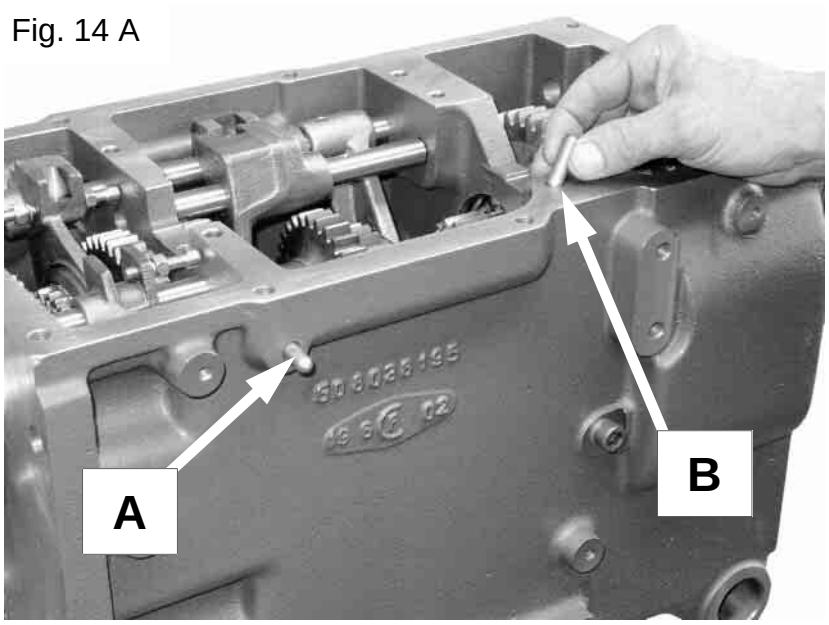


Fig. 14 A illustrates the other retainers to install in the gearbox during the assembly phase.

Retainer **A** of fig. 14 A is the one that prevents the reverse gear from being engaged once the reverse shuttle option has been selected and that, vice versa, that enables the Reverse gear to be engaged when the 20% option is selected.

Retainer **B** of fig. 14 A works between the Reverse gear and final drive and prevents two ranges from being engaged at the same time.

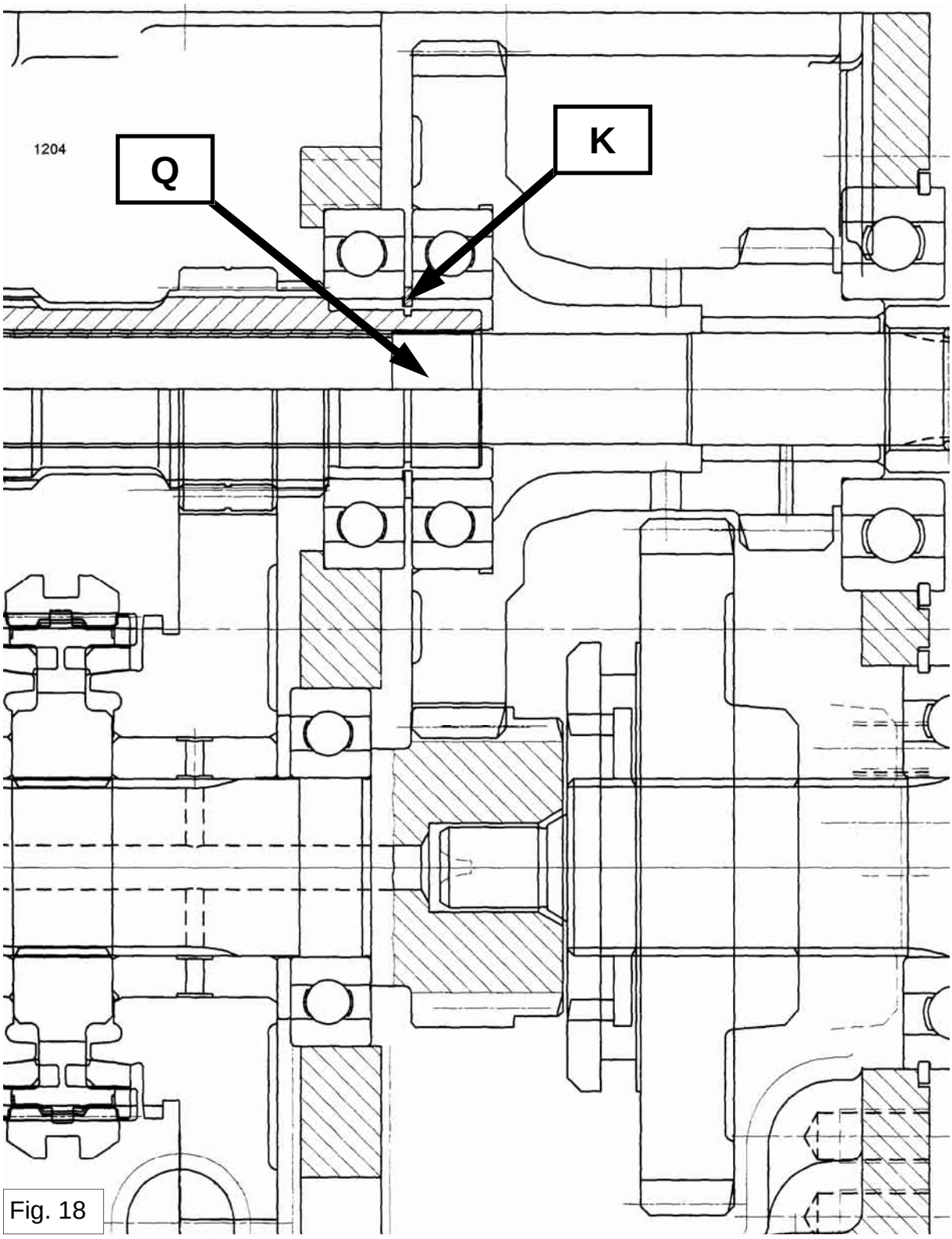


Fig. 18

Fig. 18 shows the last portion of the gearbox, i.e. the final drive and reverse gear shaft section.
Fig. 19 shows how the reverse gear shaft is assembled and where attention must be paid to the direction in which the gear is installed: the engaging chamfer on the gear must point in the advancement direction.

Fig. 20 shows how the final drive fork is assembled.
Once the Reverse gear and relative fork have been installed, the fork of the final drive must be positioned correctly as shown in fig. 20 so that it positions in the right way in the casing.

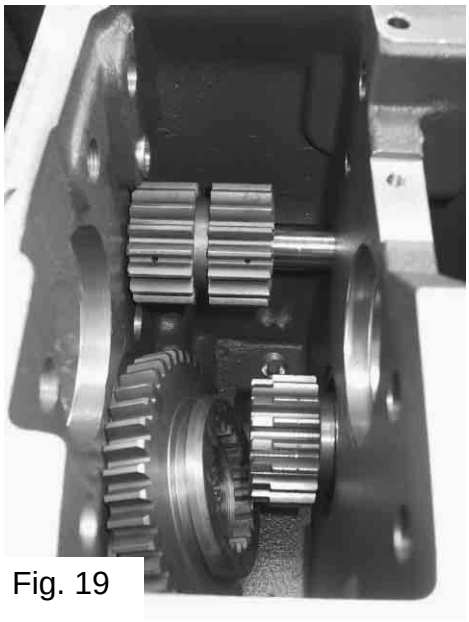
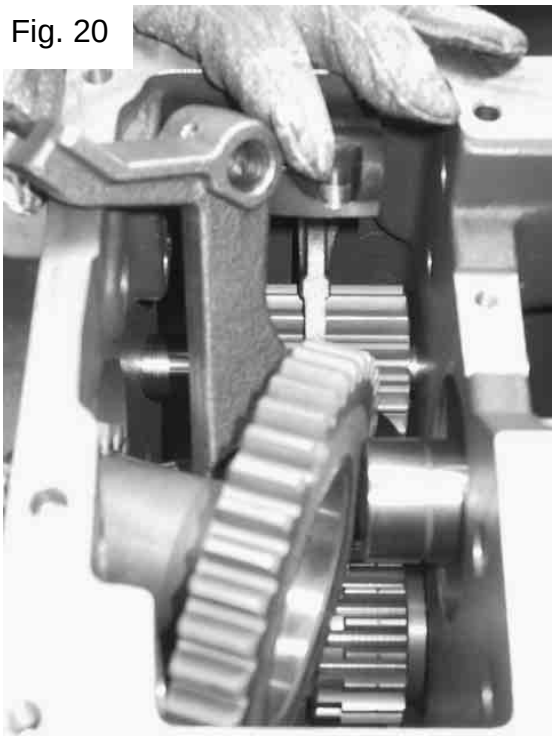


Fig. 19

Once the fork has been installed as shown in fig. 20, proceed by assembling the reduction gear illustrated in fig. 21, without forgetting to fit the intermediate circlip between the two bearings shown in fig. 18 with the letter **K**. Also consult (fig. 21).

Fig. 20



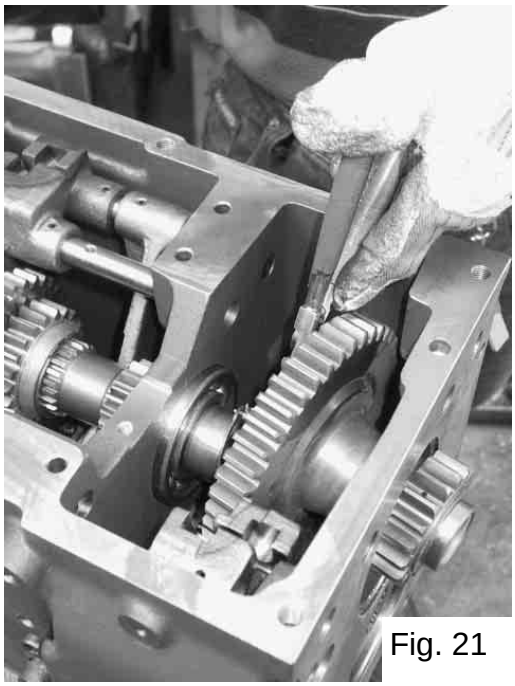


Fig. 21

Fig. 22

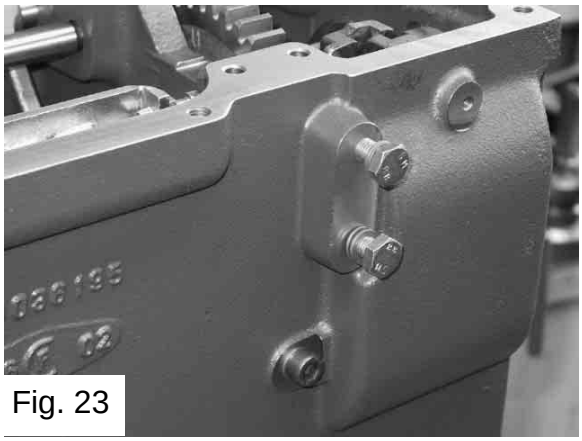


Fig. 23

Figs. 22 and 23 show how the double option - reduction gear/reverse gear - is assembled. The balls and relative springs must be housed in the casting. Install the M 10x15 with two 1.5 mm copper washers and tighten the screws to a 3.0 kgm torque.

The main shaft of the power take-off must be assembled once the gearbox has been installed and before flanging the rear differential housing.
This shaft should be inserted within the main shaft of the gearbox and reduction gear part **Q** of fig. 18.
Before fitting the shaft in the gearbox, pre-assemble as shown in figs. 24 and 25 using a piece of pipe to seat the positioning ring of the PTO gear.
After this, use a pair of circlip pincers to install the circlip that keeps the gear of fig. 25 in position.

Fig. 24

Fig. 25

Pre-assemble the clutch control components before flanging the clutch bowl to the gearbox housing.
As illustrated in fig. 26, position the lower shaft and relative control levers with the aid of a pin driver.
Using a piece of shaped metal plate, position the ends of the torsion springs as illustrated in fig. 27.

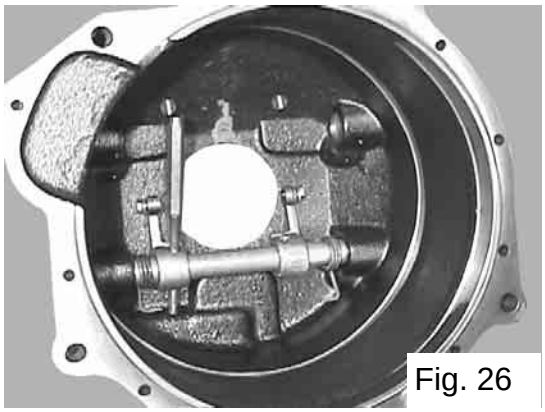


Fig. 26

Now install the shaft and upper control levers as illustrated in fig. 28
The levers should be positioned as shown in fig. 28.

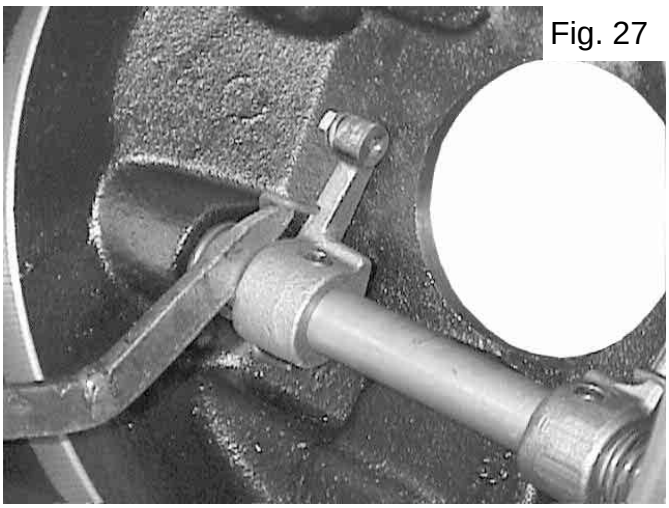


Fig. 27

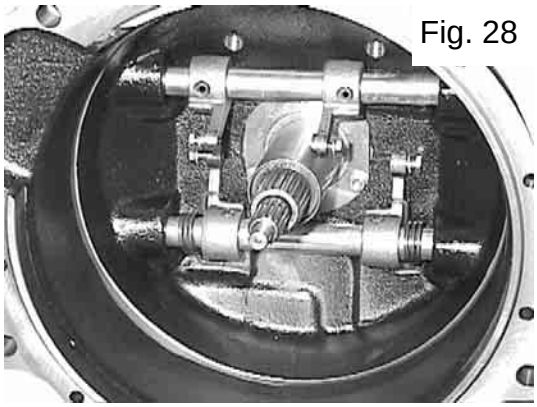


Fig. 28

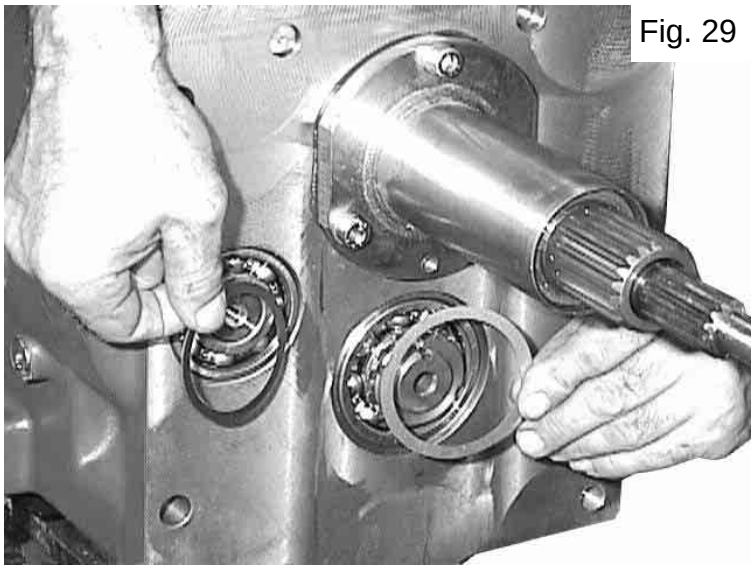


Fig. 29

After having installed the guiding sleeve of the thrust bearings as illustrated in fig. 2-9,shim the lower shaft bearing as already described in the previous pages (the shimming ranges from 0.2 to 0.4 mm) and install the clutch bowl on the gearbox housing, tightening the relative screws to a 7.0 kgm torque value.
Do not forget to shim the shaft of the reverse shuttle guide pulley as shown in fig. 29.
This shimming usually ranges from 0.2 to 0.4 mm.

DRIVING TORQUES	(kgm)
M 10 x30 gearbox cover fixing screw	6
M14 x 17 clutch bowl - gearbox fixing nut	9
M12 x 14.6 gearbox - rear axle fixing nut	7.5
M12 x1.5 gearbox - rear axle fixing screw	15
M 30x1.5 transmission shaft fixing ring nut	10
M 35x1.5 transmission shaft fixing ring nut	10
M 8x30 main shaft cover fixing screw	2.5
M 8x16 retainer plate fixing screw	2.5
M 16x140 bowl - engine flange fixing screw	20

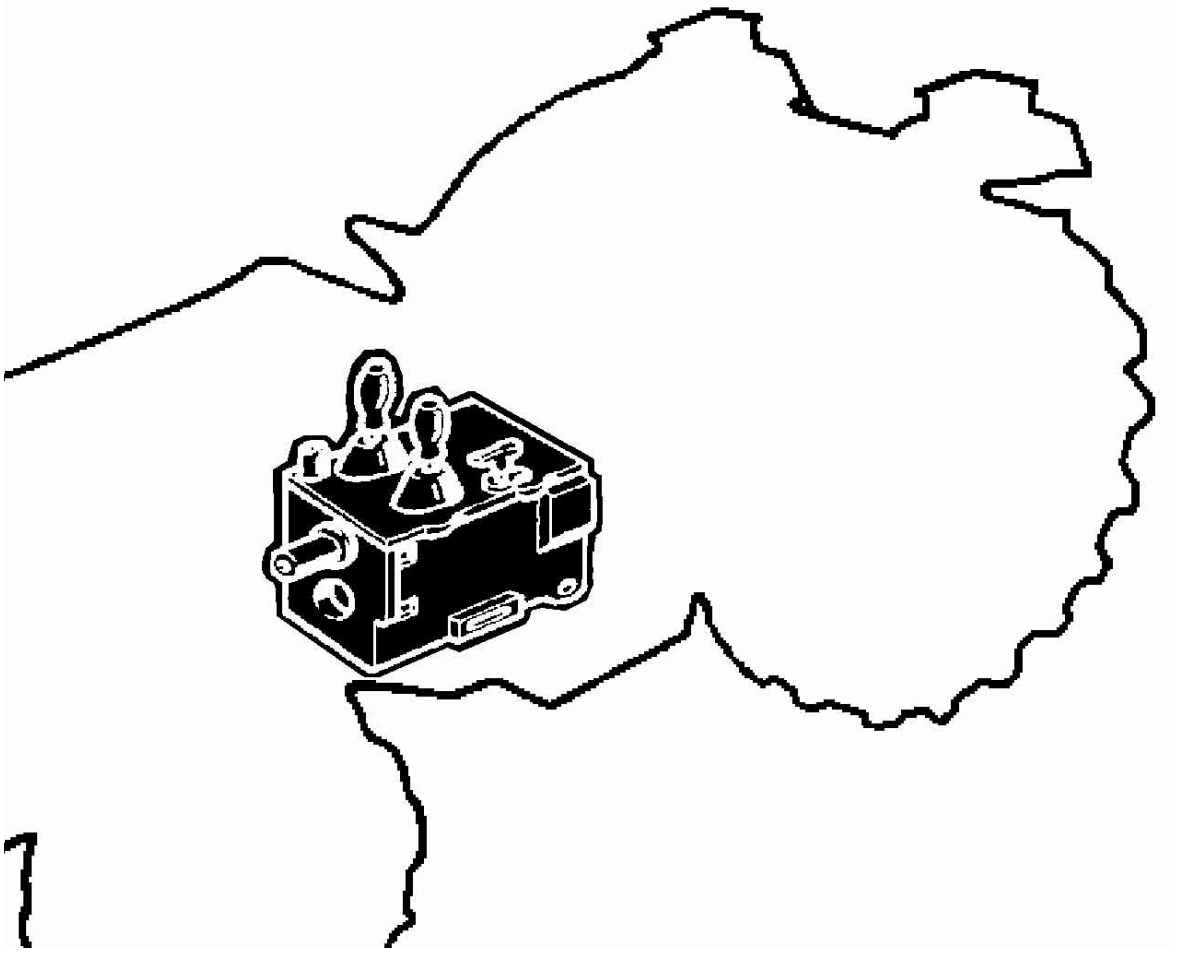
LUBRICATION

Oil	ARBOR UNIVERSAL 15W 40	32	Liters
Grease	ARBOR MT EXTRA		

We recommend lubricants and liquid by: ***FL SELENIA.***

GEARBOX

VALID FROM MACHINE n° C524073



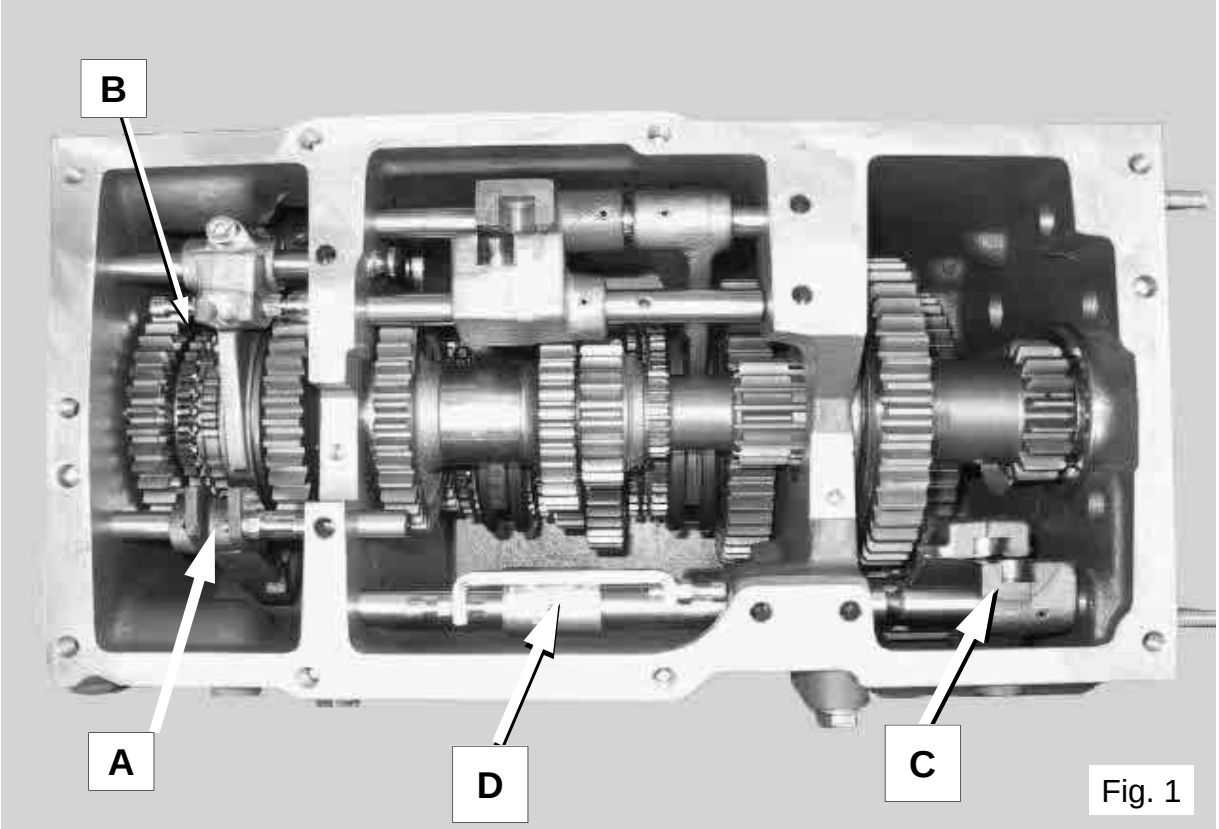


Fig. 1

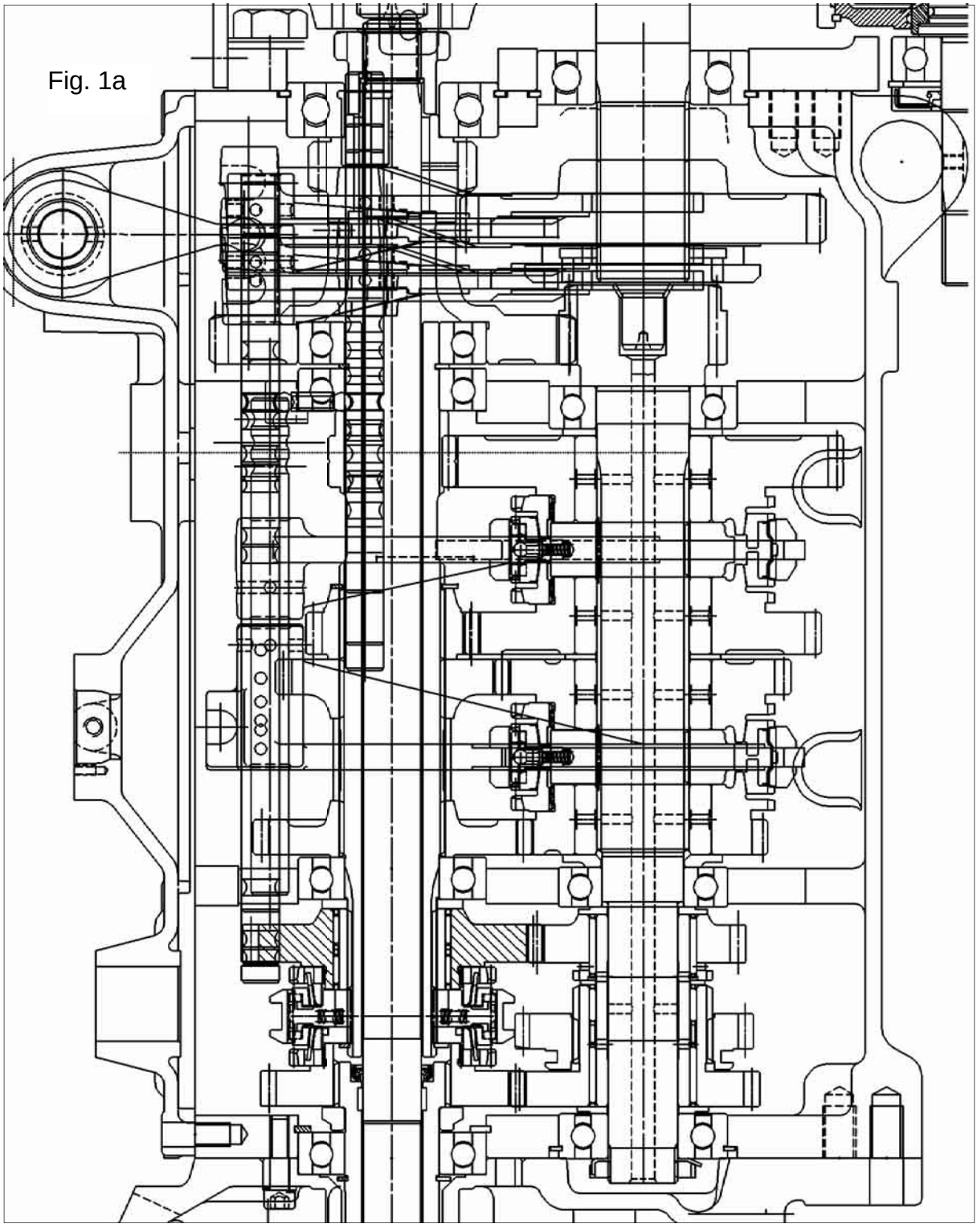
With reference to (fig. 1), the selectors indicated with the letter **C** are positioned as shown in the figure for machines with side levers.

Consult the following descriptions when adjusting the end of travel screws.
The screw adjustments must prevent the levers from being pushed beyond the selector races when operated.

All the pictures, adjustments and assembly instructions on the following pages refer to the 16+8/8+8 gearbox, which is the most complete and widely used version.

Certain specific instructions will be included in future updates for the creeper version even though many parts and specifications are the same as those of the version described in this text.

Fig. 1 shows the assembly drawing of the gearbox.
The following pages analyse the construction phases starting from the reverse shuttle assembly.
This version of the gearbox has a double-cone synchronizing device for the reverse shuttle.



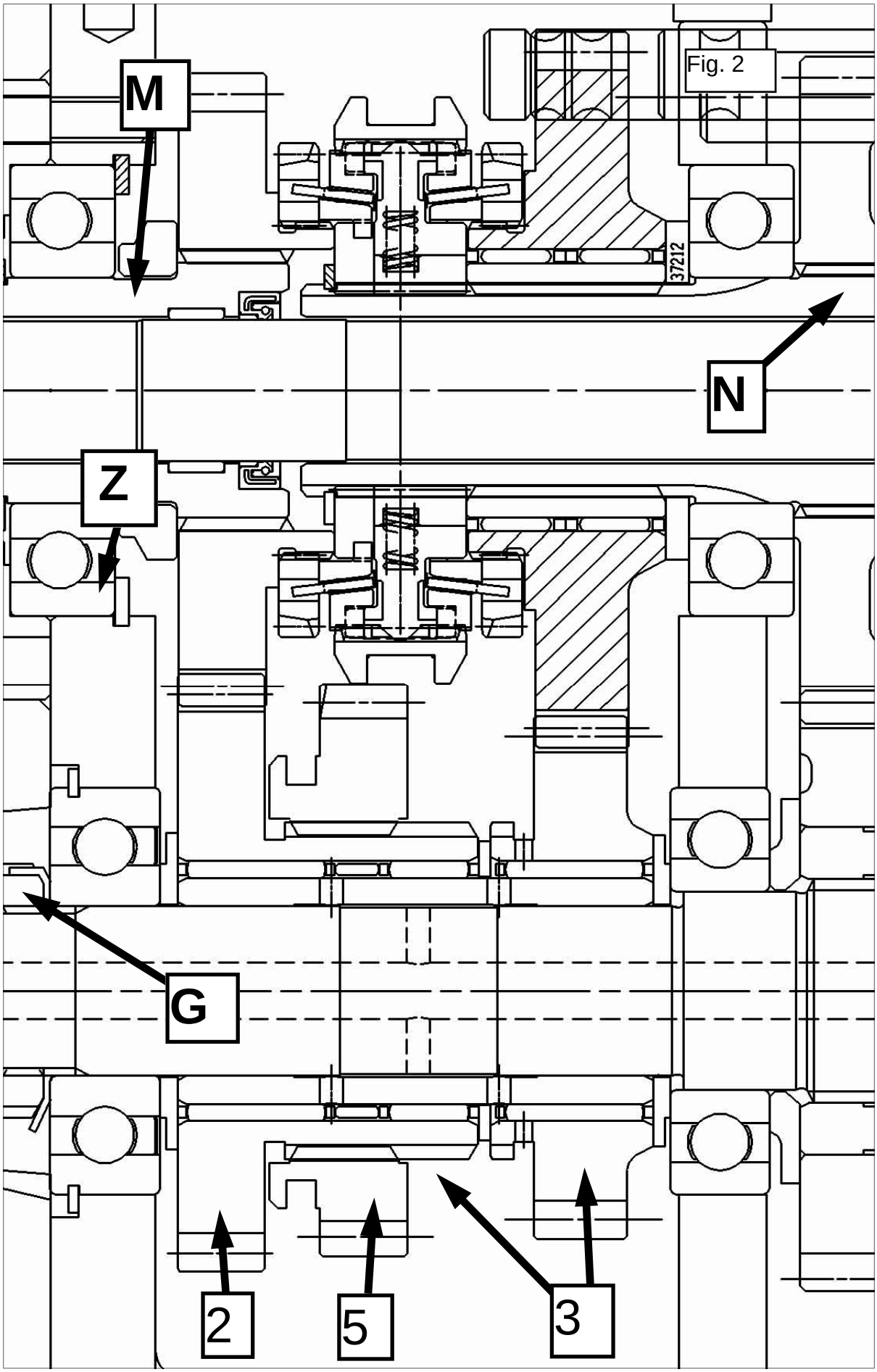


Fig. 2
M
N
Z
G
2
5
3
37212

The first portion of the gearbox is shown on the previous page, i.e. the section that houses the reverse shuttle and the -20% reversing selector.
Gear 5 of (Fig. 2) is governed by fork **A** of (Fig. 1) and when it is in position 5 the reverse shuttle is selected, whereas when it is in position 3 the -20% option is selected.
Fork **B** of (Fig. 1) selects the –20% option or the reverse shuttle according to the position of fork **A**.
Once forks **A** and **B** have been installed, lock the screws shown in (Fig. 4) so that is not possible to slip out of the selection made by the balls that position in the races of the respective rods.
For fork **B**, first centre the synchro-ring on the neutral position and then tighten the screw that locks the fork on the rod to 3.5 kgm.
Fig.5 illustrates the first phases of assembly of the reverse shuttle transmission.
In Fig. 6, with the aid of a rubber mallet, the bearings are positioned in the casing.
In Fig. 7 the gear is splined onto the shaft.
Fig. 8 shows the following phase, i.e. fitting the reverse gear transmission at the rear of the casing.

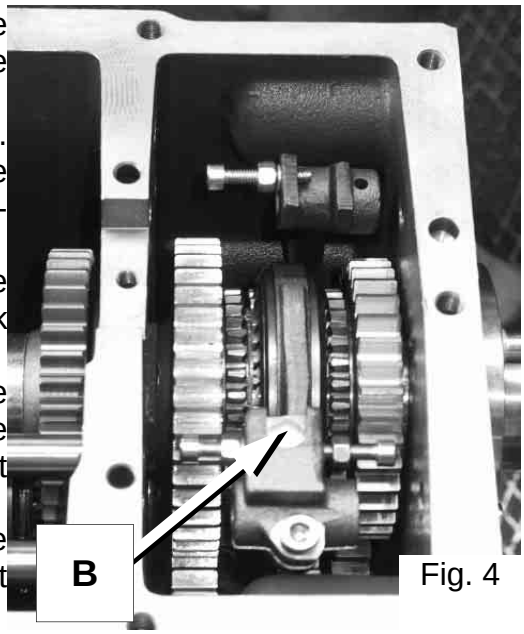


Fig. 4

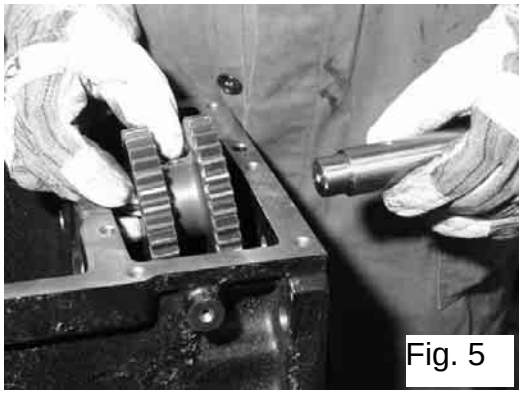


Fig. 5

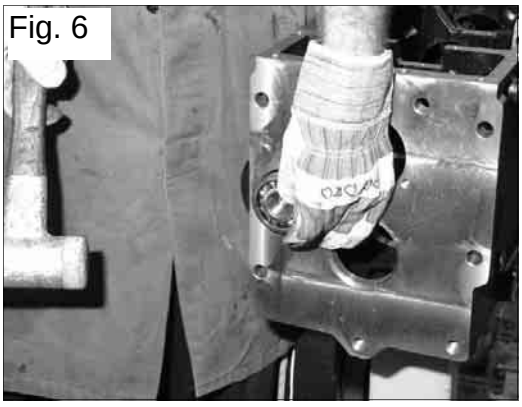


Fig. 6

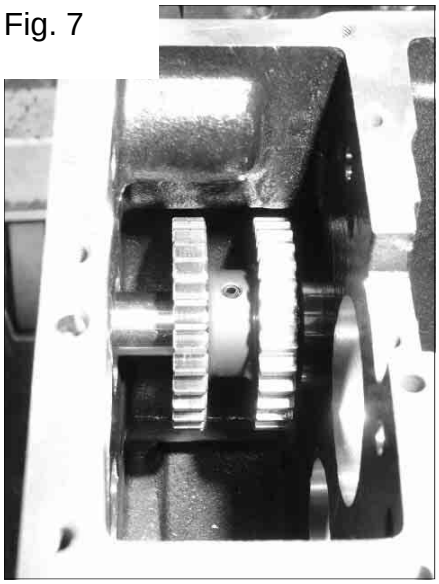


Fig. 7

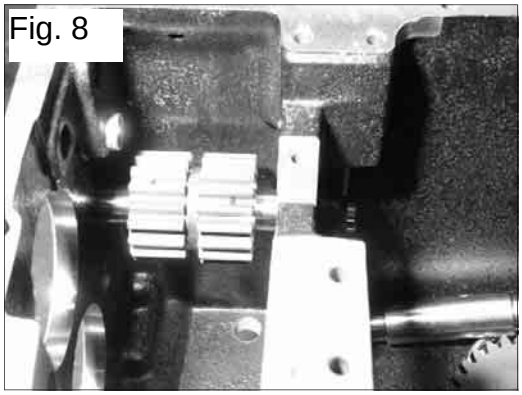


Fig. 8

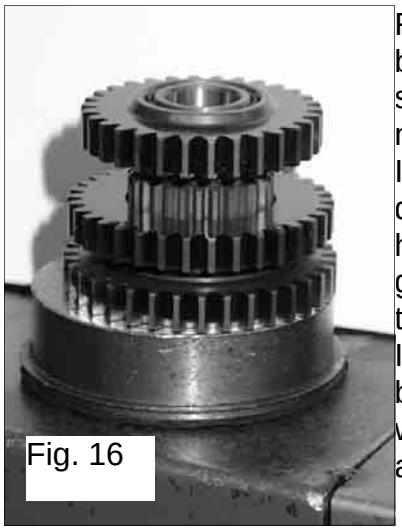


Fig. 16

Fig. 9a shows the assembly drawing of the lower shaft on which the synchronizer packs are located.
It also shows the assembly drawing of the gearbox to highlight the position of the gearbox lower shaft inside the casing.

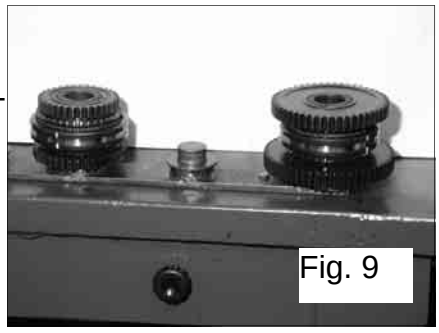


Fig. 9

In Fig. 9 the synchronizer assemblies are pre-assembled, together with their spacers, following the assembly drawing of Fig. 9a.

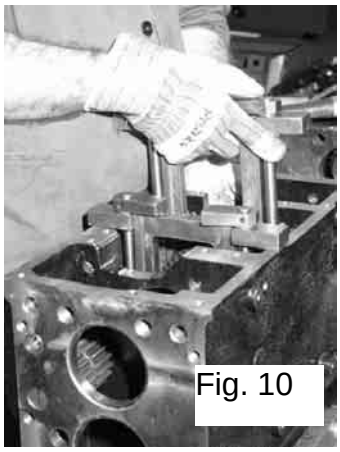


Fig. 10

In Fig. 10, with the aid of a special tool, the synchronizer blocks are lowered inside the casing. In Fig. 11 the spacer **A** of Fig. 9a is positioned with the aid of a pair of pliers.

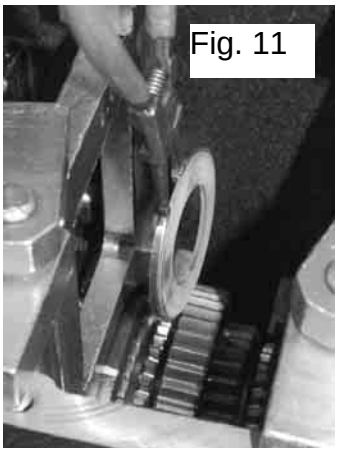


Fig. 11

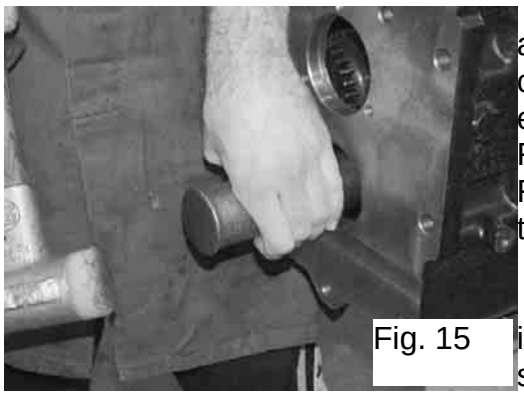


Fig. 15

In Fig. 12, before inserting the lower shaft in the synchronizer packs, the spacer B is fitted on the shaft and it is all inserted inside the gearbox (see Fig. 13).

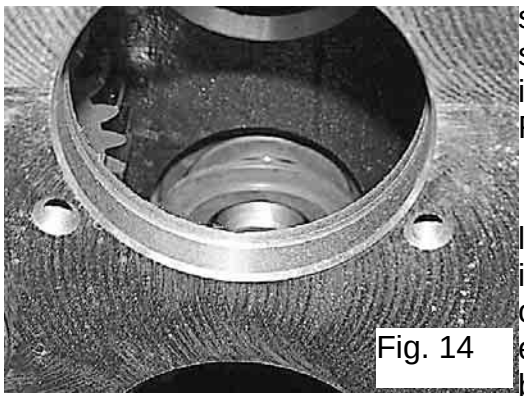


Fig. 14

Fig. 14 and Fig. 15 highlight the phases of inserting the shaft in the packs of gears and synchronizers; the final positioning is made with the aid of a block to place the bearings in their seats.

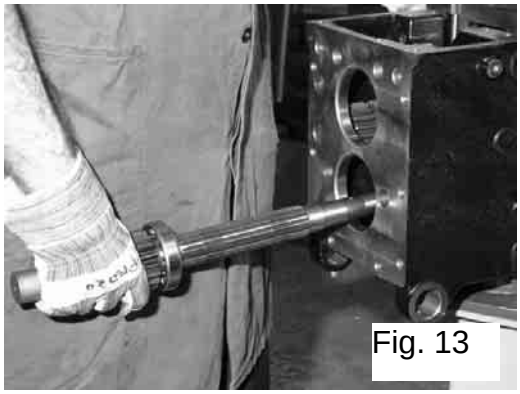


Fig. 13

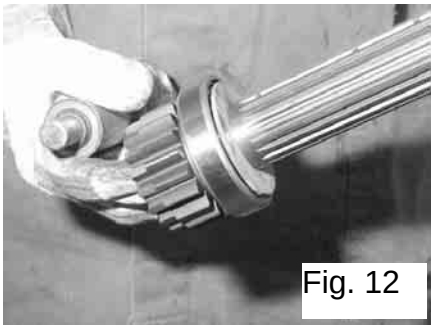
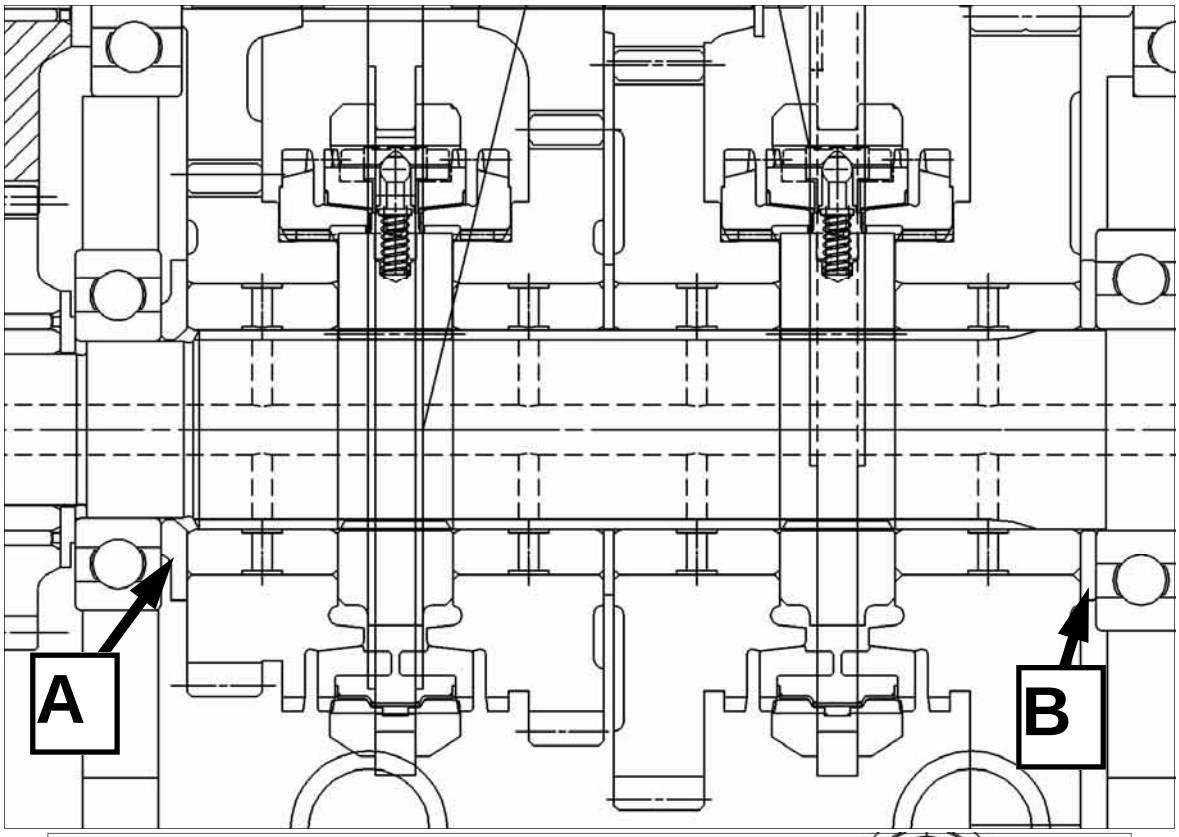


Fig. 12



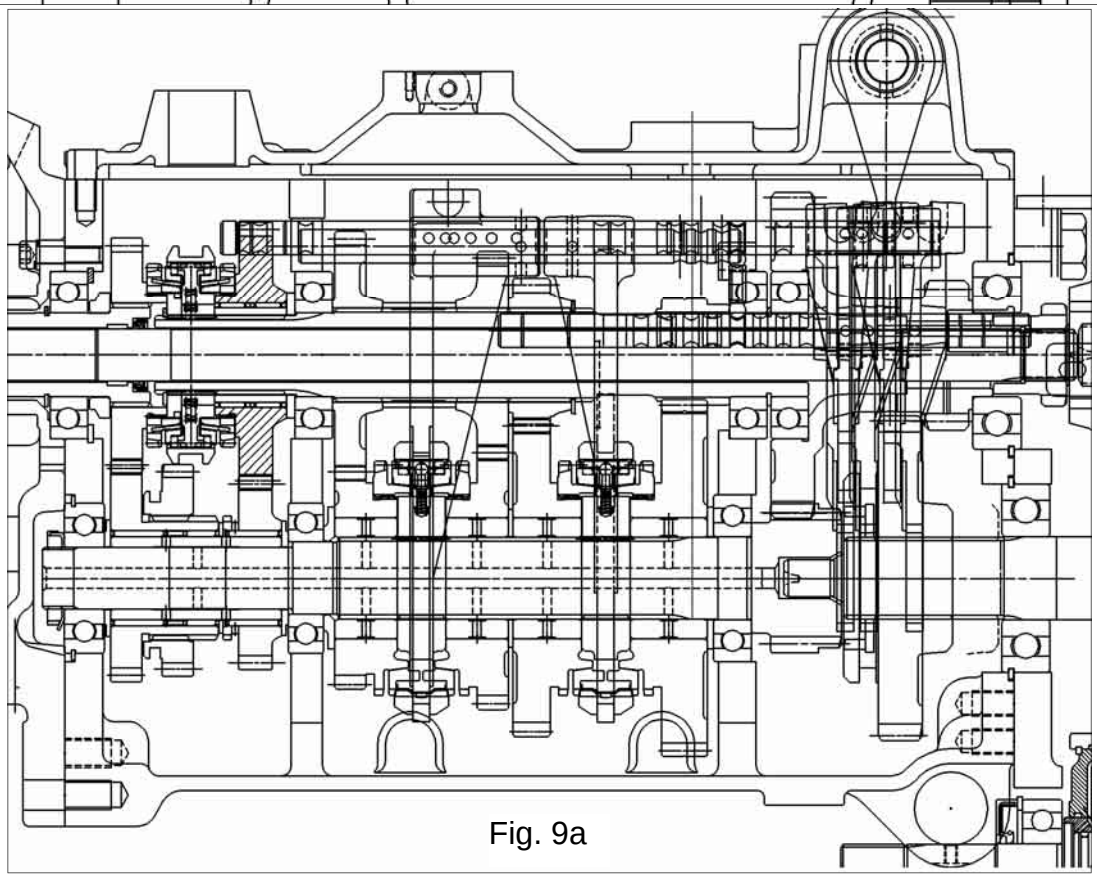


Fig. 9a

Fig. 9 shows the pair of synchronizers that operate the gearbox. These synchronizers have a greater diameter and are made in a more modern way than the previous versions.

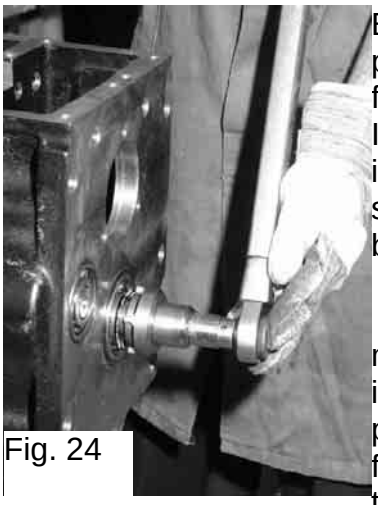


Fig. 24

Before fully inserting the shaft, position the last gears that are fitted at the front of the casing. In Fig. 17 the set of gears forming the bottom of the reverse shuttle – 20% final drive assembly is prepared on the bench.

In practice these are the gears marked with the numbers 2-5-3 in Fig. 2. While the pack prepared in this way is inserted, the fork and the spacers are positioned too, as seen in the drawing of Fig. 2, as illustrated in Fig. 17 and 18. Fig. 19 shows the packing getting positioned. In Fig. 20 the spacer is positioned and in Fig. 21 the closing bearing is fitted with the aid of a block and a rubber mallet.
After inserting the bearing in its seat, fit the stop plate and the ring nut making the pack of synchronizers.

Fig. 23

The ring nut must be tightened to 10 kgm and subsequently the plate must be beaten and the ring nut punched to avoid accidental loosening of the pack (see Fig. 23-24-25).

Fig. 22

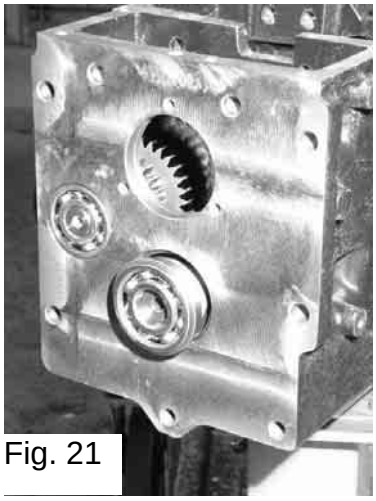


Fig. 21

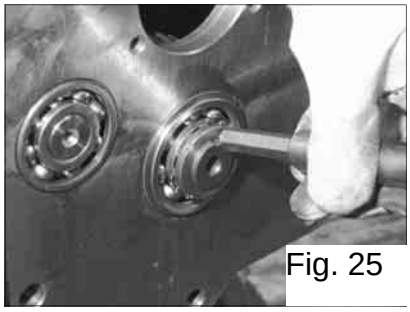


Fig. 25

Fig. 17

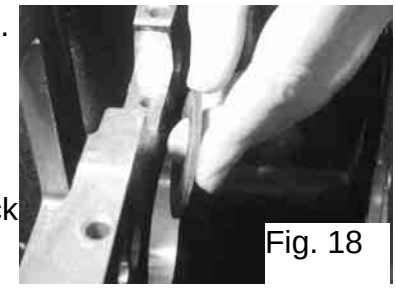


Fig. 18

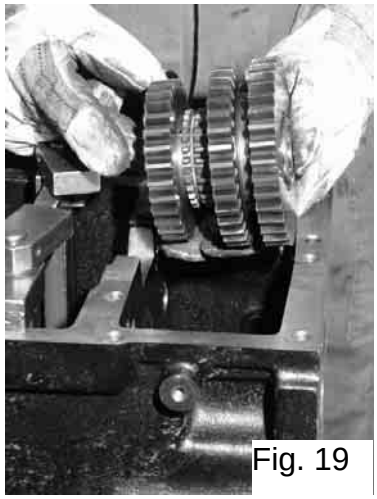


Fig. 19

Fig. 20

Before passing on to fit the top main shaft, it is necessary to position some other elements such as the forks that select the speeds and the final drive selection gear that is lowered inside the casing in Fig. 26.
Fig. 27 shows the speed selection forks inside the casing, located on the synchronizers. After positioning the forks, the rods are fitted (see Fig. 28) and the selectors (spring + ball) are positioned. The retainer shown in Fig. 28 prevents two speeds from accidentally getting selected.
In Fig. 29 the gear couplings are keyed onto the respective rods with spirol pins. Fig. 30 shows a pin punch used to fit the spirol pins.
Fig. 9a shows the positions of the gear forks on the synchronizer rings and the positions of the couplings keyed on the rods.
It is now possible to move on to fit the top main shaft.
The first operation to carry out is to fit the snap ring illustrated in Fig. 31 that can be done outside the casing. Subsequently you can insert the shaft inside the gearbox as illustrated in Fig. 32, positioning the splined couplings on the rods.
It is now possible to move on to fit the top main shaft.

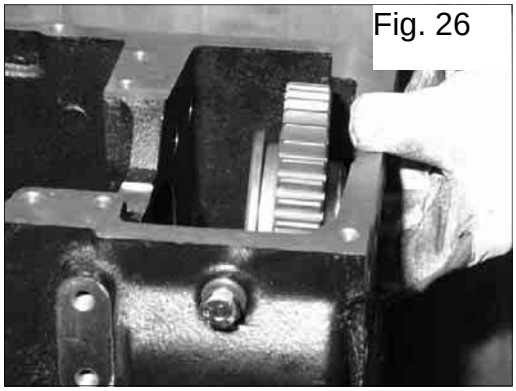


Fig. 26

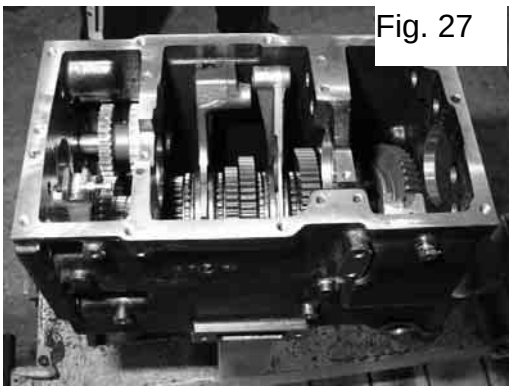


Fig. 27

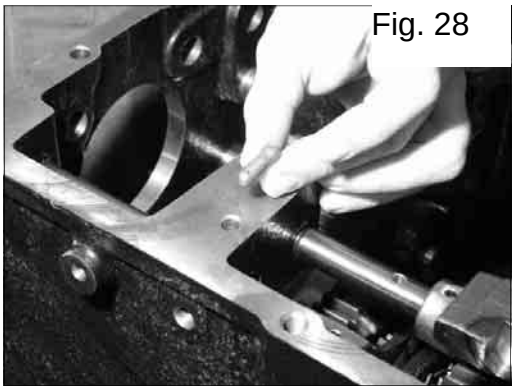


Fig. 28

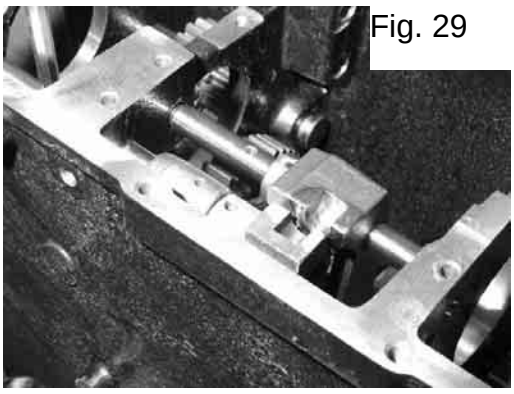


Fig. 29

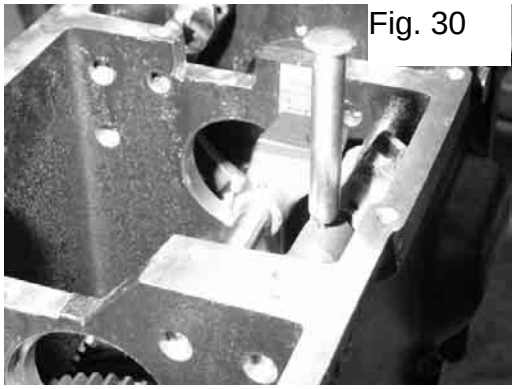


Fig. 30

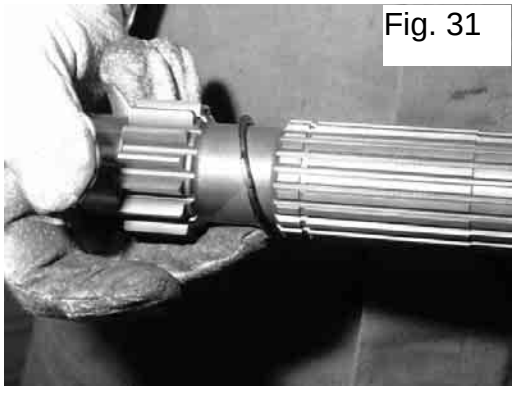


Fig. 31

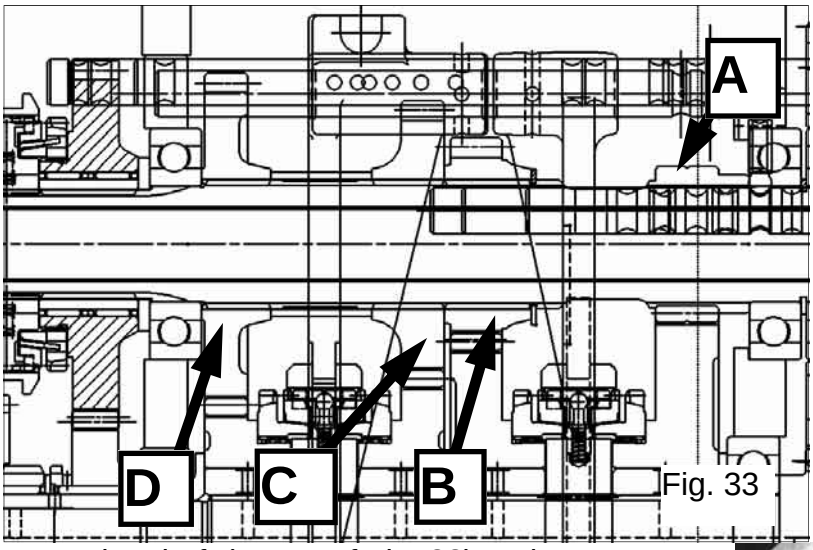


Fig. 33

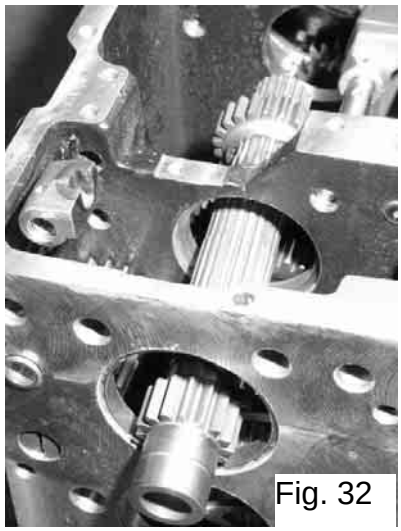


Fig. 32

Insert the shaft (part **A** of Fig. 33) and move on to fit the gears **B**-**C** and **D** of Fig. 33. The gear **B** is held in position by the snap ring shown in the assembly drawing of Fig. 33. Sometimes it is necessary to insert spacers between the gear and the snap ring to position the band of gear B correctly in relation to the lower mating one.
Fig. 34 shows the top of the main shaft fitted with the 4 gears making the 4 speeds.
Check that all 4 toothed bands correspond with the lower ones.
In Fig. 34a the first of the two bearings indicated with the letter **R** in Fig. 36 is fitted. The second one is positioned inside the reduction gear shown in Fig. 35.
In Fig. 36, marked with the letter **Q**, there is the position of the reduction gear inside the gearbox.

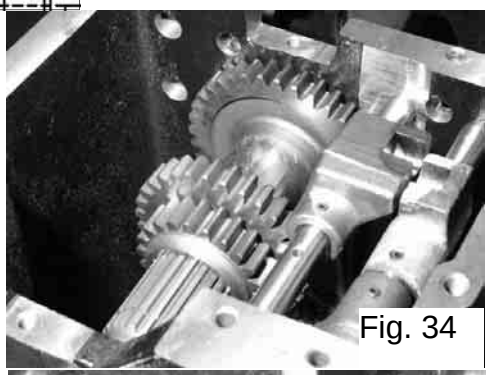


Fig. 34

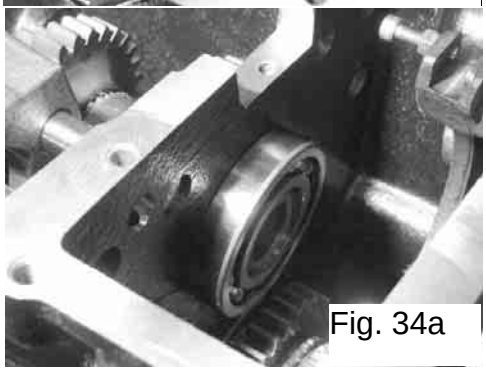


Fig. 34a

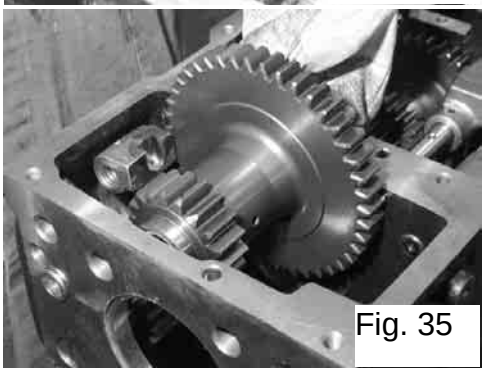


Fig. 35

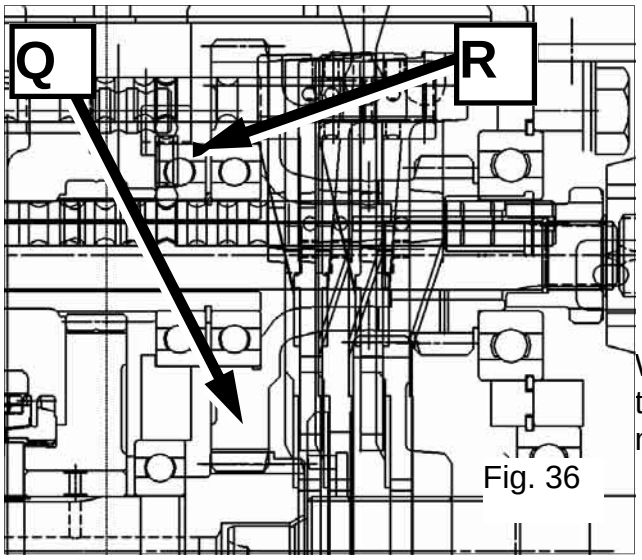


Fig. 36

What was mentioned above holds for this gear too: check its correct alignment with the lower toothed bands.

In Fig. 37 the pack is prepared comprising the double-cone synchronizer that is positioned on the front at the top of the main shaft. Fig.39 shows the assembly drawing of the entire unit.

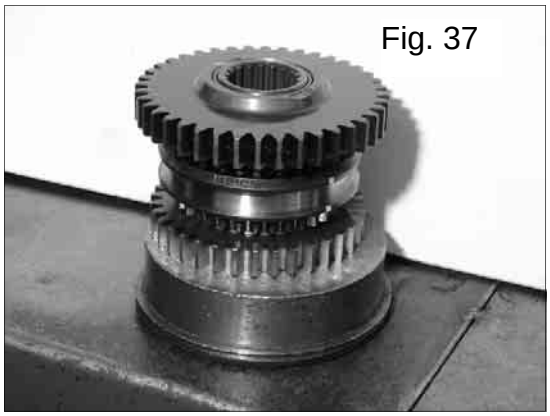


Fig. 37

The letter **F** indicates the spacer shown in Fig. 38 and that is positioned inside the casing in Fig. 40. Again in Fig. 40 you can see the fork that acts on the -20% reversing selector already inserted in the casing. In Fig. 41 the entire pre-assembled unit is lowered inside the casing and positioned, using a block, as illustrated in Fig. 42, seating the bearing positioned behind the spacer **F** of Fig. 39.

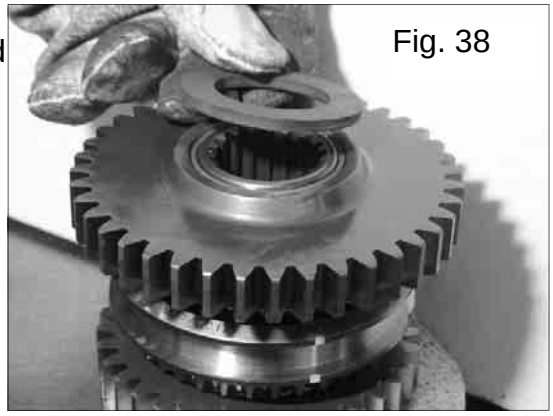


Fig. 38

Do not forget to lock the whole pack with the snap ring marked with the letter **H** in Fig. 39, as shown in Fig. 43.

Fig. 43 also shows a simple tool composed of two blades and a screw that holds the gear marked with the letter **L** in Fig. 39 in position until the initial portion of the main shaft gets inserted in its seat. Still in Fig. 43, the snap ring is assembled too, with the aid of a pair of pliers with its noses bent at 90 degrees.

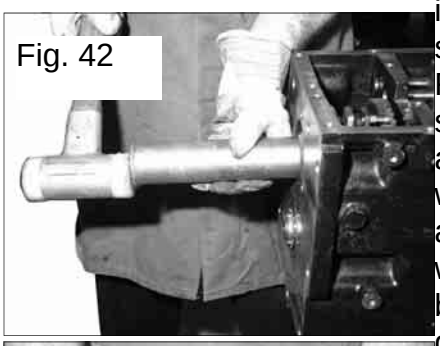


Fig. 42

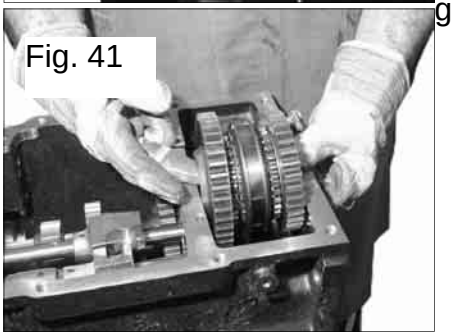


Fig. 41

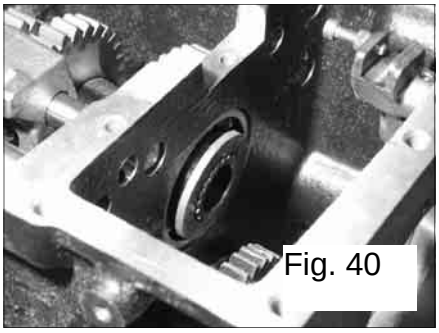


Fig. 40

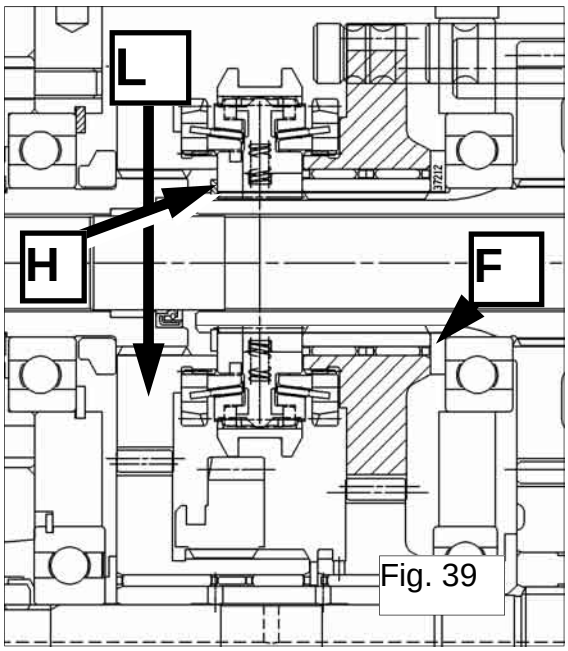


Fig. 39

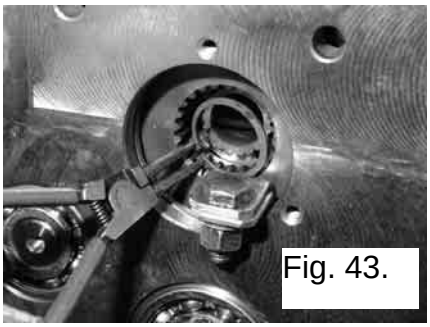


Fig. 43.

Before finishing the front of the gearbox it is better to finish the rear.
In Fig. 44 the snap ring is fitted between the two paired bearings (part **R** of Fig. 36). Afterwards, install the gear selector fork in the casing as illustrated in Fig. 45a and then fit the upper reduction gear.
In Fig. 45 a spacer is placed between the gear and bearing that may be necessary depending on the clearance between the bearing and gear.

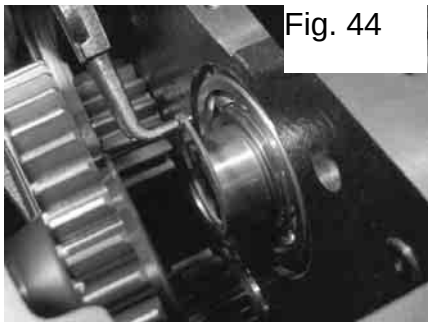


Fig. 44

To verify whether this spacer is necessary, fit the bearing as in Fig. 46 and check whether there is a gap between the bearing and gear. Using a feeler gauge, measure the gap, fit the spacer and reposition the bearing permanently. Now, after positioning the gear **S** of Fig. 48 inside the casing, you can install the lower bearing as illustrated in Fig. 47 with the aid of a block.
Returning to the front of the gearbox, proceed to fit the rods and selector forks of the reverse shuttle and of the 20% reduction gear - reversing selector.


Fig. 45

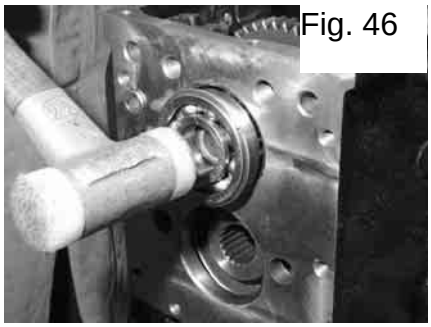


Fig. 46

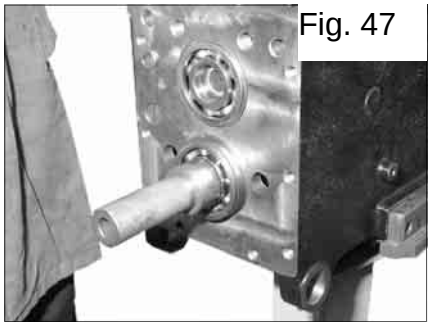


Fig. 47

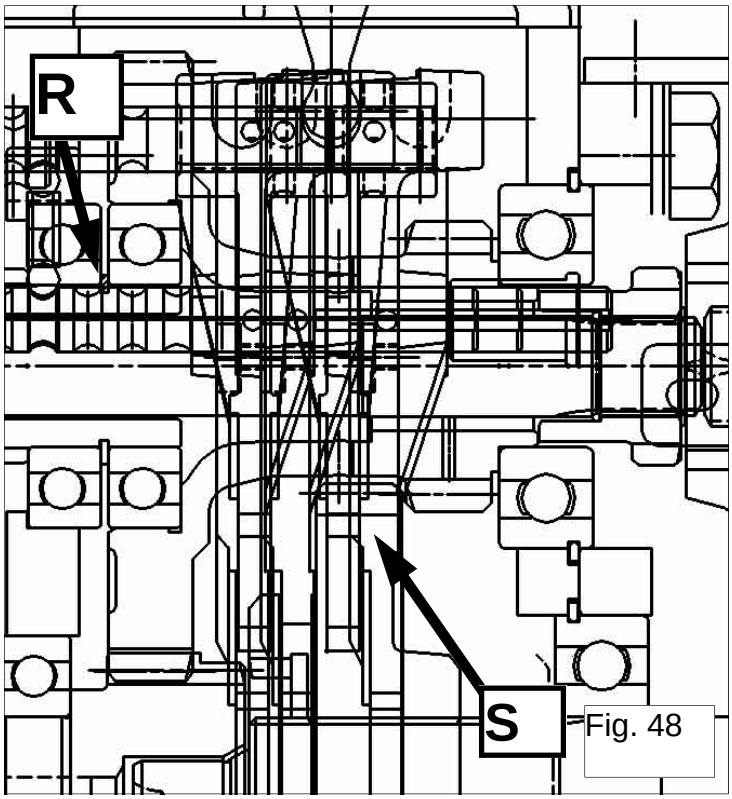
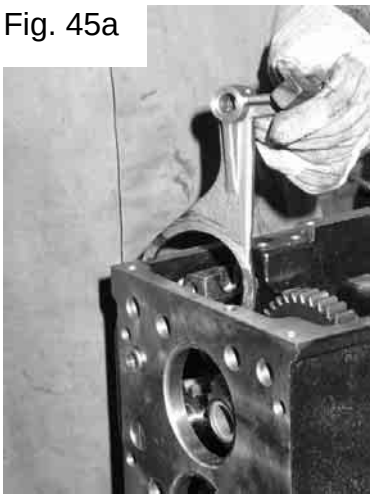


Fig. 48

Fig. 45a



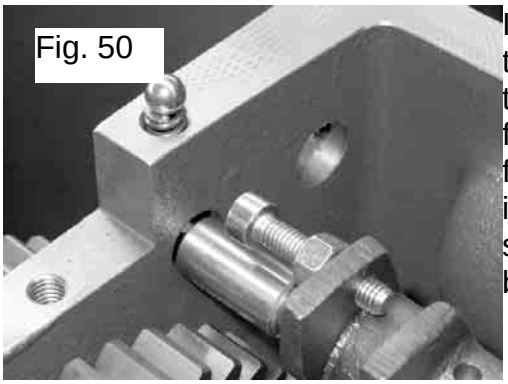


Fig. 50

In Fig. 50, after inserting the rod in the fork, and before splining it, install the spring and ball.

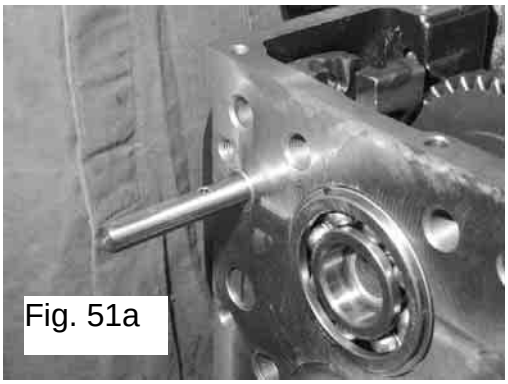


Fig. 51a

In Fig. 50a, insert the guide bushing of the guide rod of the lower reduction gear selector fork.

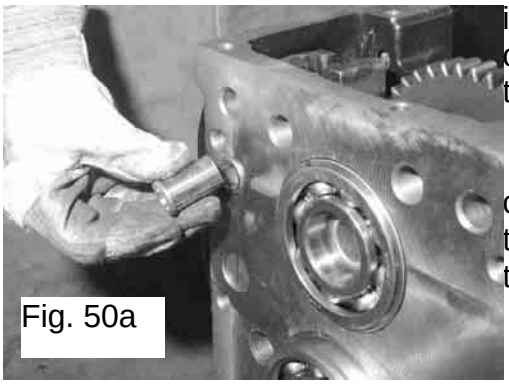


Fig. 50a

The fork has already been positioned inside the casing in the preceding phases and in Fig. 51a the lower guide rod is inserted that positions it on the coupling.

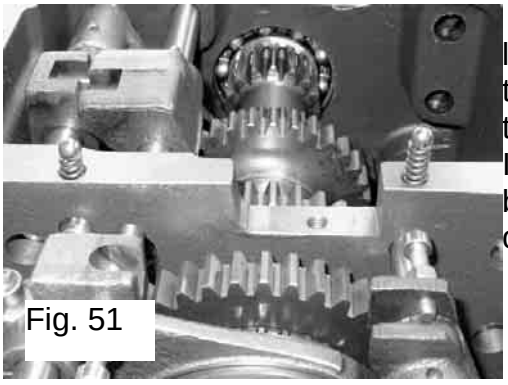


Fig. 51

At the top it will be splined on the rod with the selection races. Fig. 50 and 51 show the position of the springs and balls to select the 20% option and the reverse shuttle.
In Fig. 52 with the aid of a rod you fit the spring + ball packs, packing the spring and sliding the rod on the supports until fully inserted in its seat.

Then fit any pins, lining up the hole on the rod and on the fork with the aid of a pin punch.

It is then wise to test the selection, verifying the various positions taken by the selection fork and adjust the setscrew on the couplings splined on the rods (with spirol pins) so that at the limit stops the ball cannot come out of the race. If this happens there could be early wear on the fork and damage to the synchronizers.

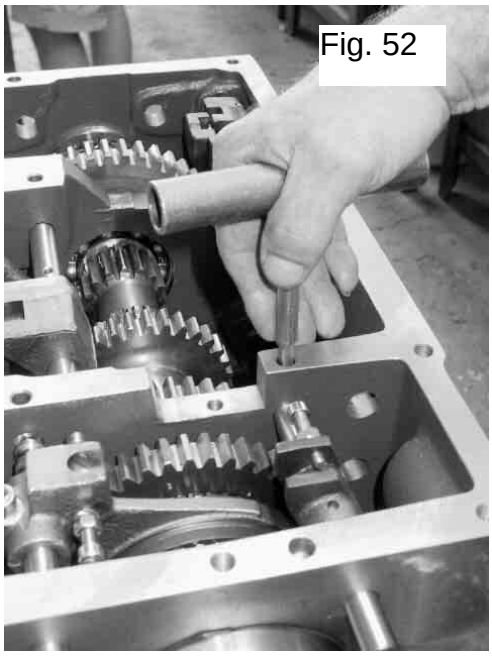


Fig. 52

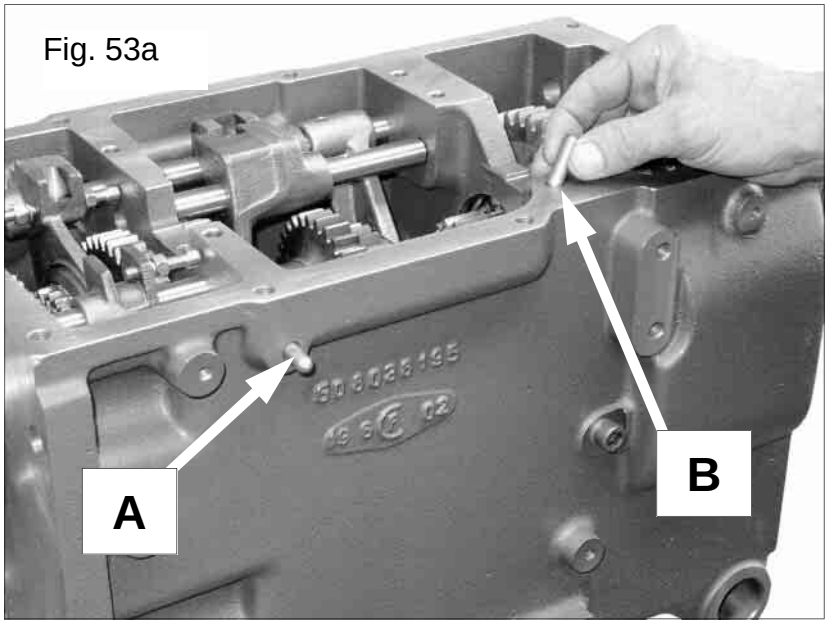


Fig. 53a illustrates the other retainers to install in the gearbox during the assembly phase.

Retainer **A** of Fig. 53a is the one that prevents engaging reverse gear after selecting the reverse shuttle option and that on the contrary enables engaging the reverse gear when the 20% option is selected.

Retainer **B** of Fig. 53a works between the reverse gear and the final drive and prevents two ranging getting engaged at the same time.

These retainers should be considered together with the one illustrated above, which works between the two rods of the gears and prevents engaging two ranges at the same time.

Before proceeding further with the illustration of the following phases, it is worthwhile dwelling on the assembly of the lower fork operating the final drive assembly.
On the following page, Fig. 54 illustrates the position of the fork inside the casing.
We have already spoken of the assembly of the reverse transmission and engaging the final drive selector gear inside the casing, before fitting the lower rear bearing on the bevel pinion shaft.
(see Fig. 53).

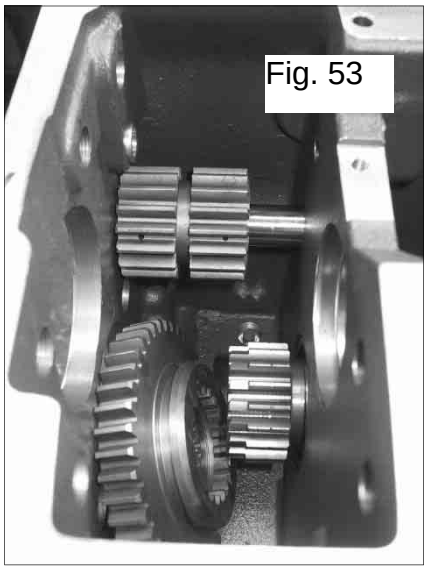


Fig. 54 illustrates assembling the final drive fork, which has been mentioned above. After fitting the reverse gear and the fork, you need to correctly direct the final drive fork as indicated in Fig. 54 to permit installing it correctly inside the casing.

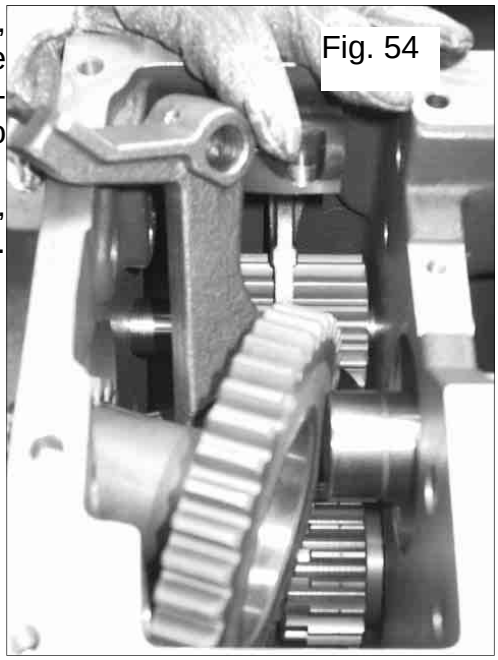


Fig. 54

After fitting the snap ring between the two bearings, as mentioned above and briefly summarized in Fig. 54a, you can proceed as shown in Fig. 55 to fit the rods and couplings that govern engaging the reverse gear and the final drive, fitting the springs and balls in the casing (Fig. 55).


Fig. 55

To perform this operation, use a strut as illustrated in the figure.

Then spline the couplings on the rods and verify the selectors are inserted in the race correctly and the positions of the gears inside the box are right.

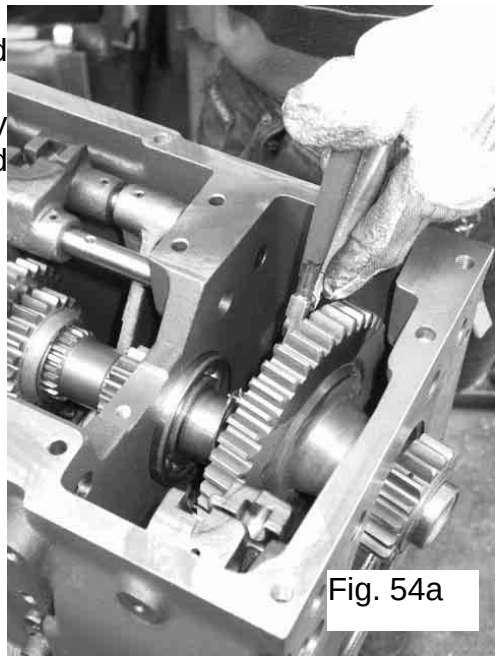


Fig. 54a

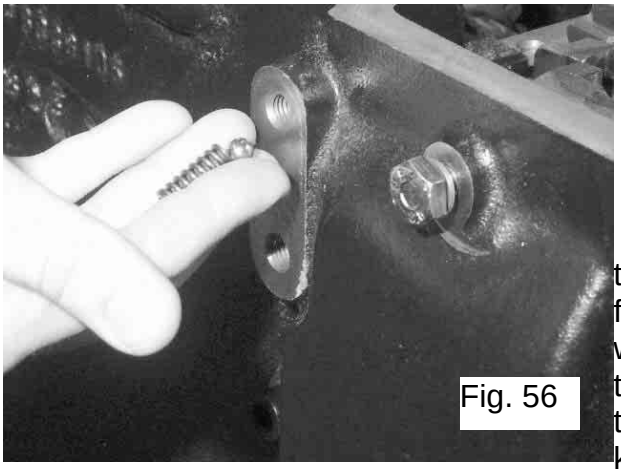


Fig. 56

In Fig. 56 the springs and balls making the double selection on the final drive are fitted: this is to have a safer selection and with a greater load on the rod. Then fit the two screws that hold the two springs and two balls in position, tightening them to 3 kgm.

After performing this operation and making the final drive selections, you can move on to fit the PTO internal shaft, the so-called whip that transmits motion from the 2nd clutch plate to the rear PTO transmission. Fig. 57 illustrates the preparation of the whip and Fig. 58 its insertion in the gearbox and the upper shaft.

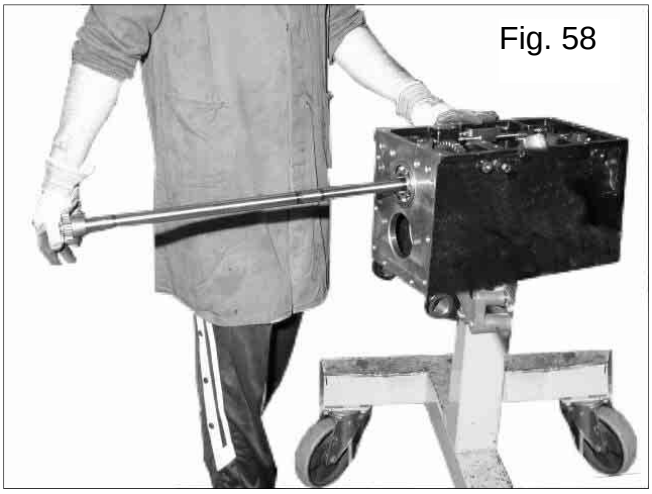


Fig. 58

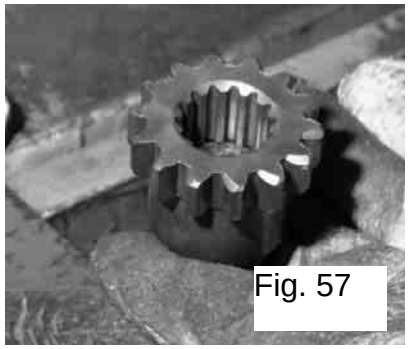


Fig. 57

After inserting the whip from the rear of the casing, you can proceed with the last phases of the assembly of the gearbox, i.e. insertion of the front of the main shaft and the cover on which the clutch thrust bearing works.

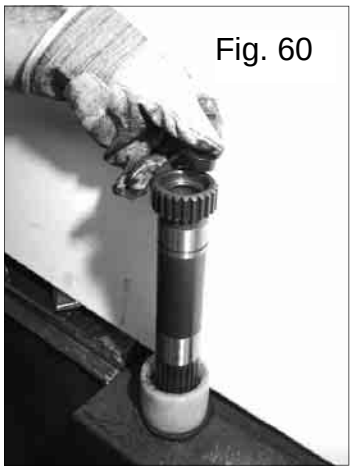


Fig. 60


Fig. 61

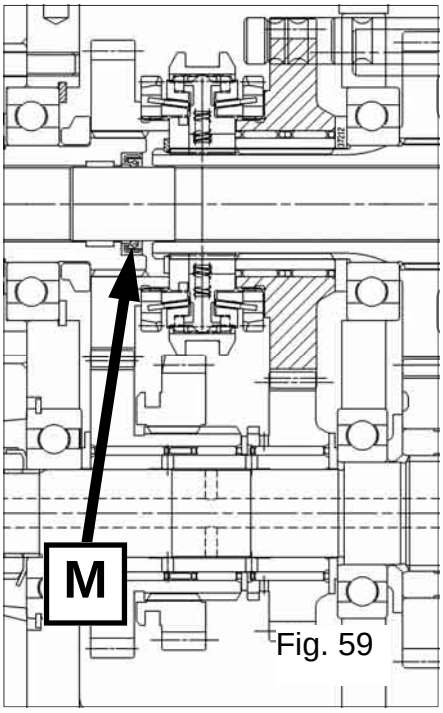


Fig. 59

Fig. 59 shows the assembly drawing of the initial part of the upper main shaft that in Fig. 60 and Fig. 61 is preassembled, placing the seal in position that will operate on the whip fitted in the previous operations. This seal is marked with the letter **M** in Fig. 59. Afterwards, on the shaft it is possible to fit the rear bearing (bearing **R** of Fig. 59a).

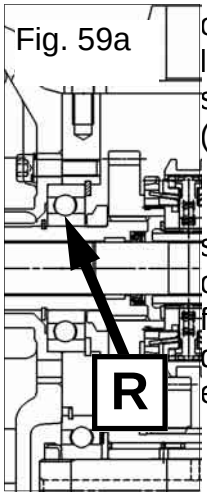


Fig. 59a

This bearing is held in position by two snap rings. The shimming to be done on this bearing to provide the right clearance for the synchronizer is the following:
depending on the tolerances on the single components the shimming is equal to 1.6 mm.

A 1 mm shim is normally placed between the bearing and the snap ring on the shaft and a 0.6 mm shim in front of the bearing. The thicker spacer always goes on the side of the snap ring while the other, on the other side of the bearing, must be such that the sum of their thicknesses always gives 1.6 mm. After these operations you can proceed to fit the shaft inside the casing.

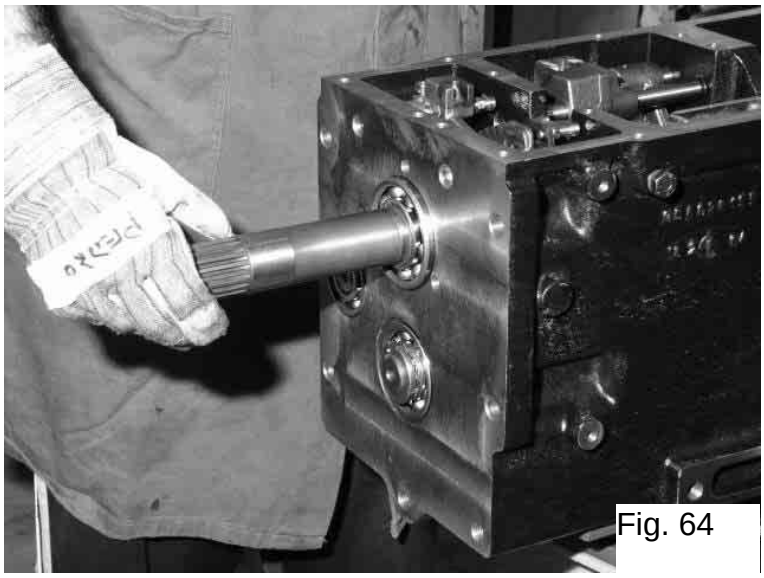


Fig. 64

Fig. 63

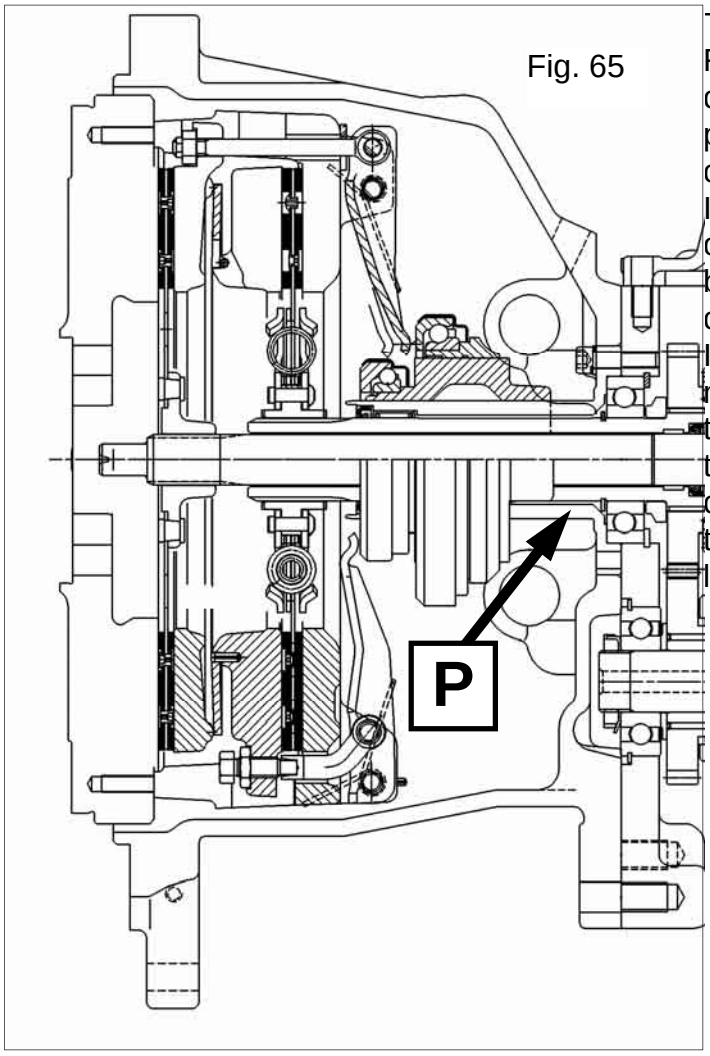


Fig. 65

This last operation is illustrated in Fig. 64, preceding installation of the coupling, part **P** of Fig. 65 that supports the thrust bearing of the clutch.
In Fig. 66 with the aid of a block the oil seal is inserted on the coupling, before assembling on the gearbox casing.
In Fig. 67 the mating surface of the coupling on the casing is carefully siliconed to prevent oil leaks.

Fig. 66

Fig. 67

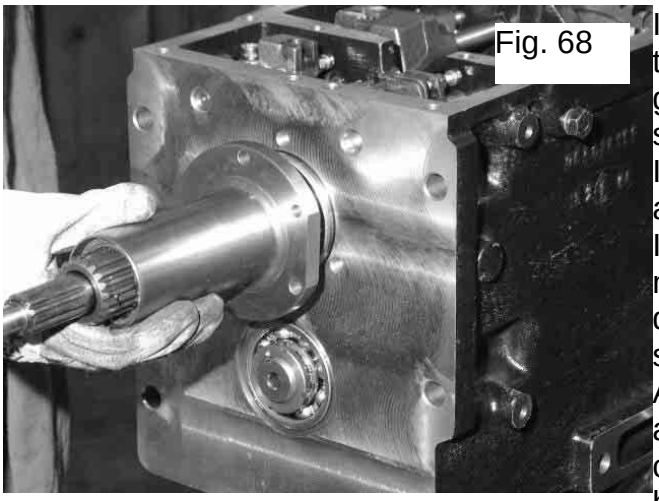


Fig. 68

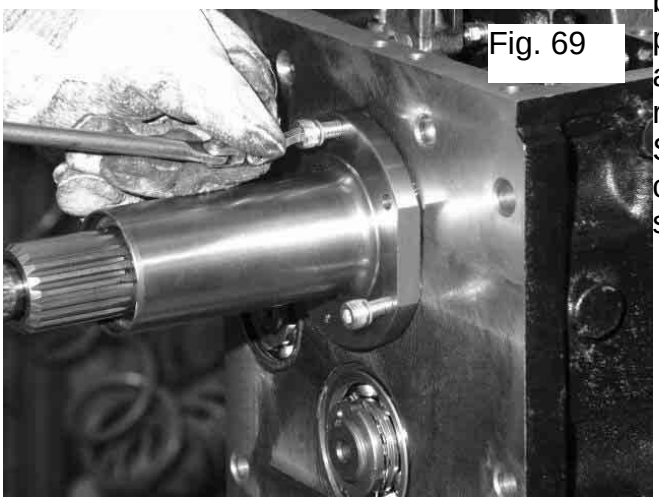


Fig. 69

In Fig. 68 the coupling is positioned on the main shaft and moved up to the gearbox to allow the silicone to form a seal.
In Fig. 69 the screws fixing the coupling are tightened to 3 kgm.
Insert the coupling on the groove of the main shaft with care so as not to cut or damage the seal fitted beforehand inside the coupling.
After performing these operations the assembly of the gearbox is almost complete, it just remains to fit the clutch bowl that as illustrated in Fig. 70 completes the assembly of the lower shaft and of the drive reversal shaft of the reverse shuttle.
Spacers will be inserted between the clutch bowl and the gearbox that are specified on the following page.

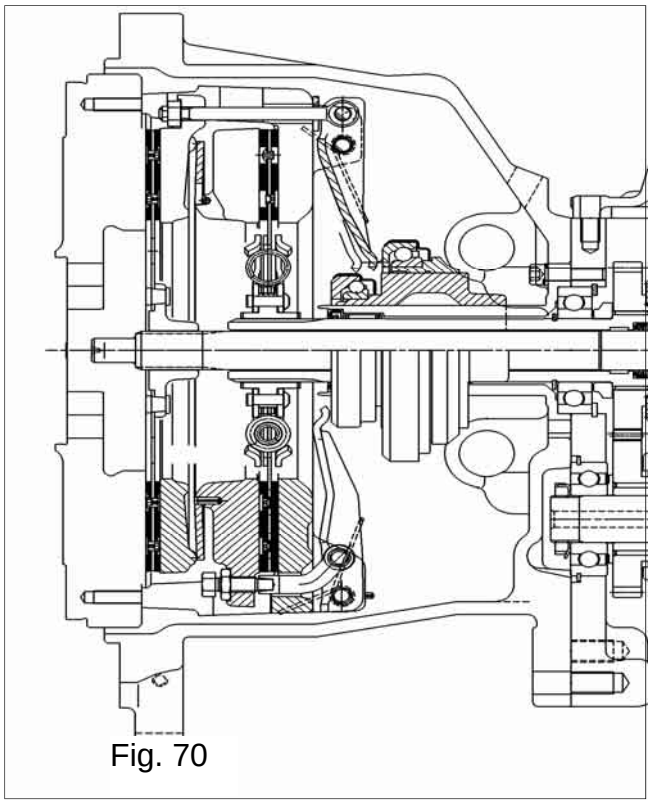


Fig. 70

Before flanging the clutch bowl on the gearbox it is necessary to preassemble the components governing the clutch.
As illustrated in Fig. 71 with the aid of a pin punch install the lower shaft and the control levers.
With the aid of a piece of shaped blade position the terminals of the torsion springs as illustrated in Fig. 72.

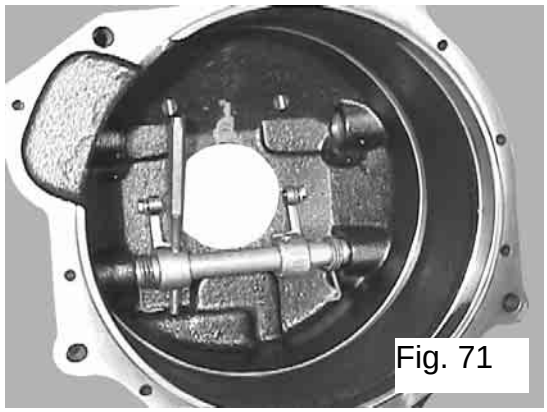


Fig. 71

Then fit the shafts and the upper control levers as illustrated in Fig. 73
The direction of the levers is as illustrated in Fig. 73.

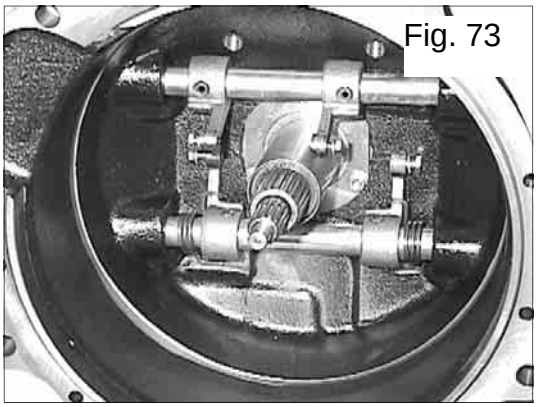


Fig. 73

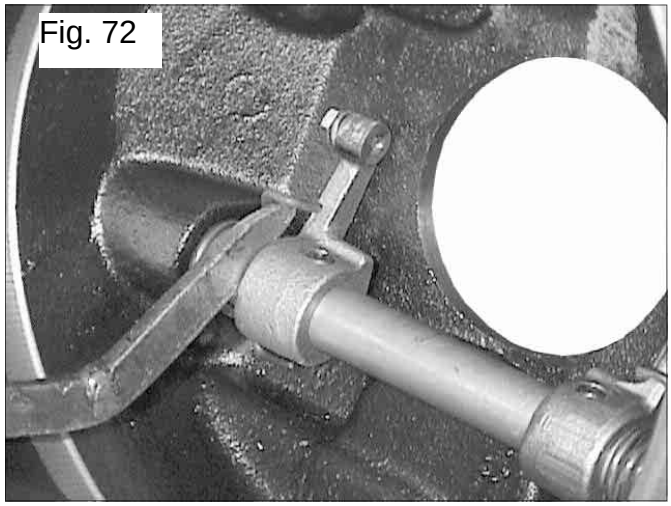


Fig. 72

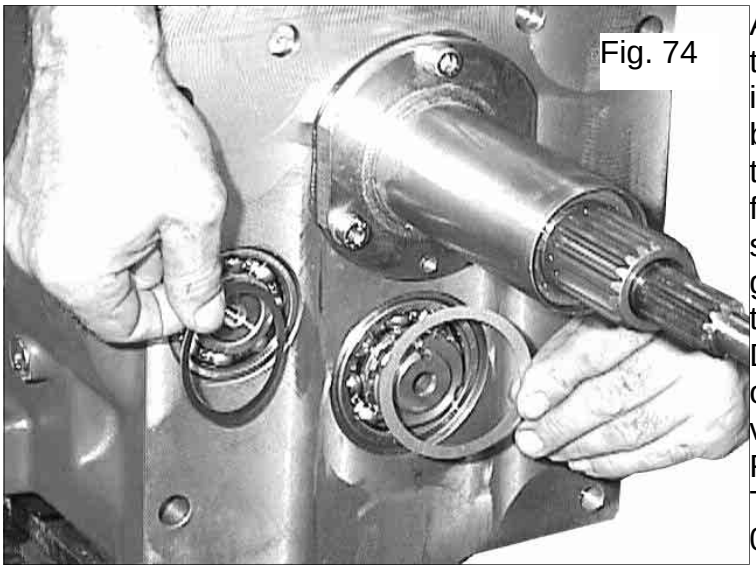


Fig. 74

After fitting the guide coupling of the thrust bearings as illustrated in Fig. 73, shim the lower shaft bearing as already described on the previous pages (shimming from 0.2 to 0.4 mm), and assemble the clutch bowl to the gearbox, tightening the screws to 7.0 kgm.
Do not forget to shim the shaft of the guide pulley of the reverse shuttle, as illustrated in Fig. 74.
The usual shimming is between 0.2 and 0.4 mm.

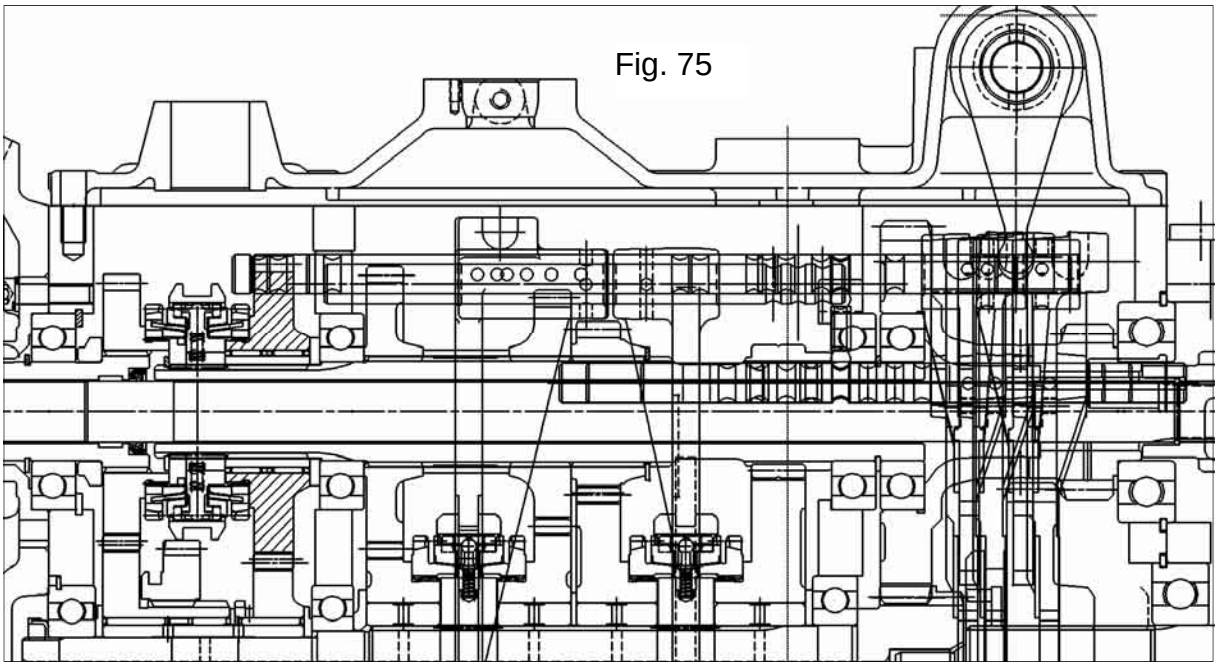


Fig. 75

Once the clutch bowl is flanged, preassemble the gearbox cover with the levers operating the final drive assembly, reverse shuttle and gears.
This operation can be done on the bench.

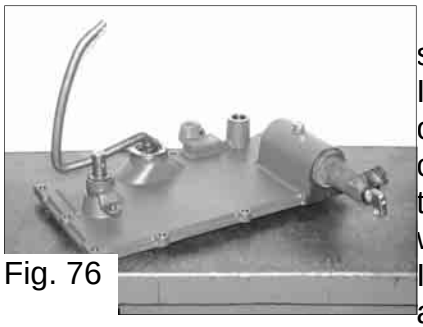


Fig. 76

Fig. 76 shows the gearbox assembly cover and Fig. 75 shows the position of the gearbox cover on the gearbox. In this assembly drawing you can also see the position of the levers on the gearbox in relation to the internal controls. Fig. 80 shows the start of the sequence to fit the gearbox cover by inserting the bushing, smeared with loctite, which supports the final drive control.

In Fig. 78 with the aid of a plug, the bushing is inserted in the casting.

Fig. 77

In Fig. 77, after inserting the bushing, a seal is fitted to prevent oil coming out of the cover.

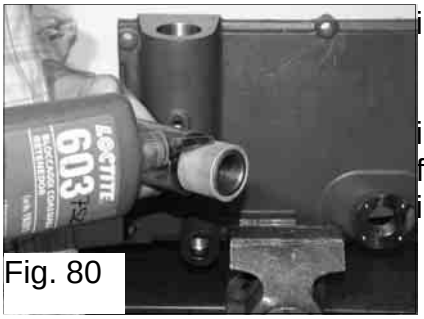


Fig. 80

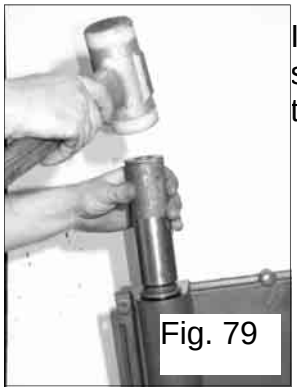


Fig. 79

In Fig. 79 with the aid of a block also the seal is positioned opposite the bushing, in the seat of the cover.

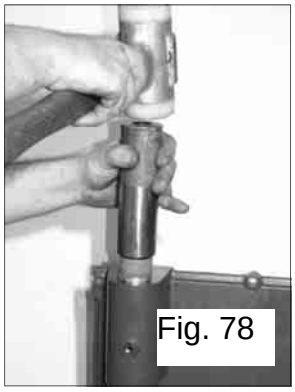


Fig. 78

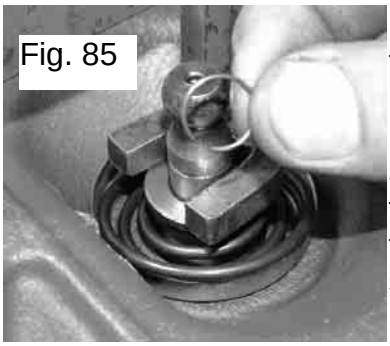


Fig. 85

In Fig. 81 the gear lever starts to be fitted on the cover.

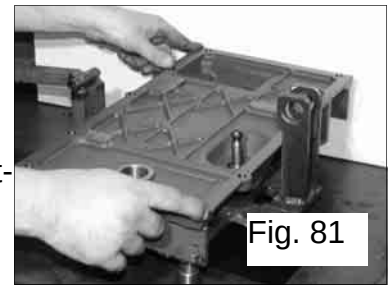


Fig. 81

The lever is inserted on the spherical seat and from the bottom of the cover there begins the assembly of the tapered spring illustrated in Fig. 82.

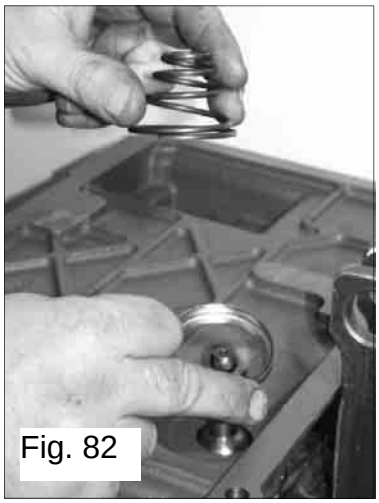


Fig. 82

The tapered spring rests on a collar placed on the casting. Fig. 83 shows the direction of assembly of the spacer that is placed over the tapered spring, as illustrated in Fig. 84.


Fig. 86

Fig. 85 illustrates the ring that is to go into the race and will keep the spring under tension and close the pack.
Fig. 86 illustrates the tool that permits
loading the spring and creating room for insertion on the race obtained in the lever of the retainer ring of the pack.


Fig. 83

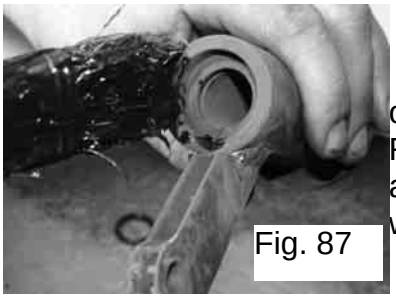


Fig. 87

After fitting the gear lever, pass on to fit the final drive lever. In Fig. 87 the seat of the O-ring and seal that are positioned inside the lever is lubricated with grease.


Fig. 88


Fig. 89


Fig. 84

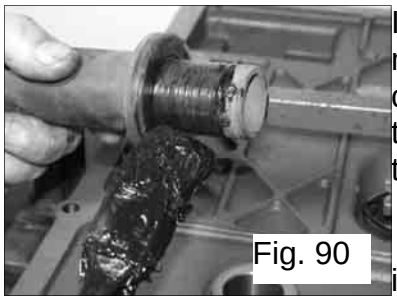


Fig. 90

In Fig. 88 and 89 these elements are fitted, which are made to ensure the oil seal even for parts that, as in this case, make axial movements. In Fig. 90 the other end of the lever support is greased, which will then be inserted in the casting as illustrated in Fig. 91.

In Fig. 92 a spacer is inserted that locks the lever support in position and acts as a support for the snap ring that is fitted in Fig. 93.

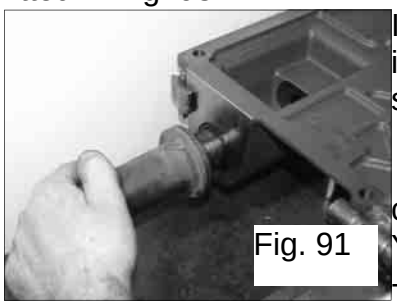


Fig. 91

In Fig. 94 the internal lever is greased, which in Fig. 97 is inserted in the support, taking care to insert also the spring and the internal lever shown in Fig. 95 and 96.

The internal lever in Fig. 98 is splined onto the lever. To conclude this assembly, it just needs the external lever. You now pass on to the control linkage of the 20% option - reverse shuttle selector and the linkage that actuates the real engagement of the reverse shuttle or 20% option, connected to the lever situated under the steering wheel (see Fig. 99).

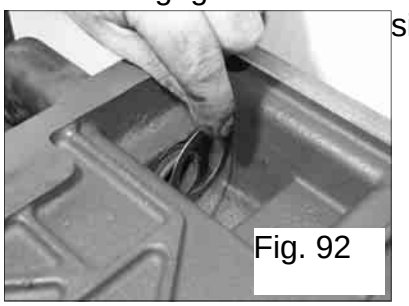


Fig. 92

Fig. 93

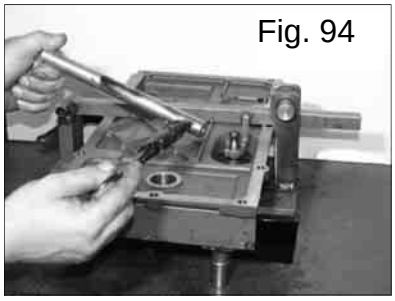


Fig. 94

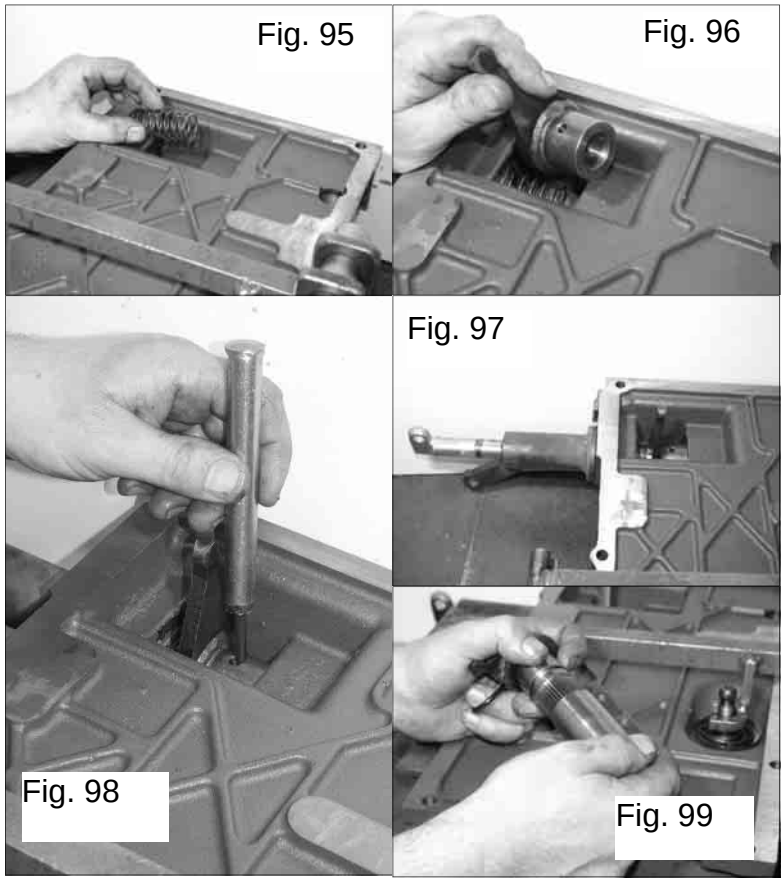


Fig. 95

Fig. 96

Fig. 97

Fig. 98

Fig. 99


Fig. 100

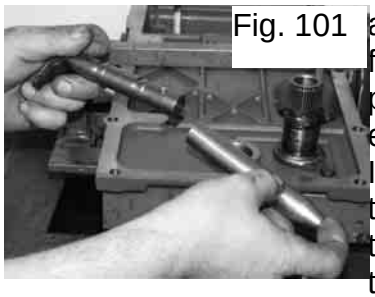


Fig. 101

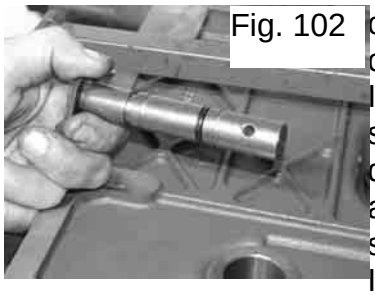


Fig. 102

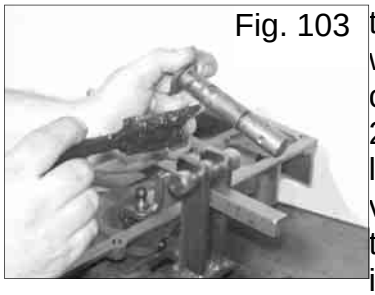


Fig. 103


Fig. 104

Fig. 100 shows a simple tool to help fit the seals on the reverse selector pin, without the machining on the pin being able to damage the sealing parts while they are being positioned in their seats. In Fig. 101 the element used for assembly is extracted and Fig. 102 shows the O-ring fitted in its seat. In Fig. 103 the pin is greased to help insert the external shaft shown in Fig. 104. In Fig. 105 the snap ring is fitted that keeps the two pins in position, after the O-ring has been fitted on the external pin to prevent oil coming out from the gearbox cover.
In Fig. 106 the two pins are inserted in the casting, after abundantly greasing the surfaces to avoid damaging and pinching the seals.
In Fig. 107 you can see the control on the inside of the cover, where you can seen the two concentric levers that operate the 20% option - reverse shuttle selector and the control of the device. In Fig. 108 the assembly of the gear lever is completed by inserting the pivot of the spherical surface. This special screw with a copper washer must be tightened to 3 kgm.
In Fig. 109 the hole in the final drive lever control is closed, again using a copper washer and screw.
After performing these operations there remain just a few more steps to complete the assemblies presented on the preceding pages, concerning the external part of the gearbox cover.

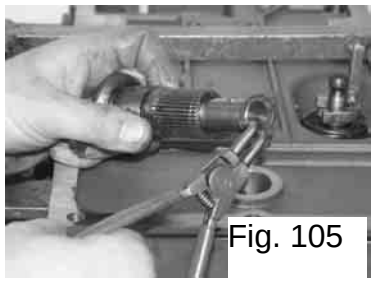


Fig. 105


Fig. 106

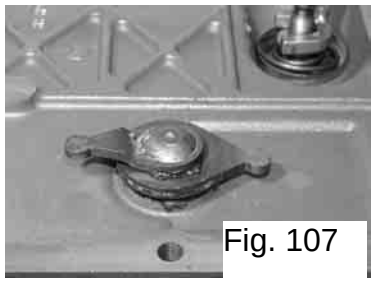


Fig. 107

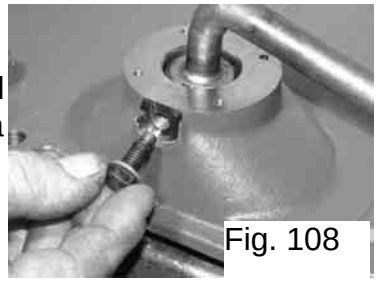


Fig. 108


Fig. 109

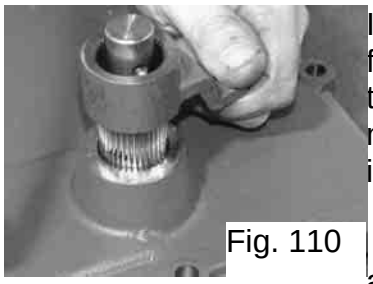


Fig. 110

In Fig. 110 the external lever is fitted, which is controlled by the transmission coupling connected to the lever of the steering wheel.

Fig. 111

It is positioned on the keying and the snap ring is inserted that keeps it in position, with the aid of a pair of snap ring pincers (see Fig. 111).

In Fig. 112 we move on to conclude assembling the gear lever, where the external surface of the gearbox cover is siliconed, the supporting plate of the casing shown in Fig. 113 is positioned.

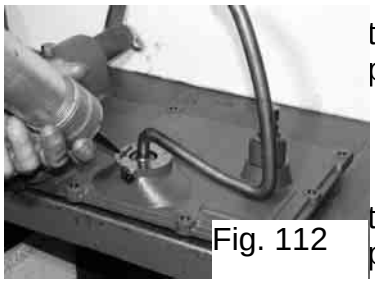


Fig. 112

In Fig. 114, we prepare the casing, smearing it with plenty of grease.

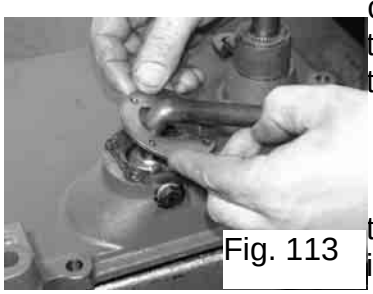


Fig. 113

In Fig. 115 it is positioned on the plate and then the other plate is inserted that locks the casing in position, tightening the 4 screws shown in Fig. 116 to 3 kgm.

Fig. 114

In Fig. 117, before installing the gearbox cover on the casing, the gear selection balls and springs are inserted, the entire mating surface of the gearbox cover is siliconed as shown in Fig. 118. Lastly, the screws fastening the cover are tightened to 5 kgm.

Fig. 115

Fig. 116

Fig. 117

Fig. 118

After fitting the platform on the tractor, you can pass on to complete the final drive assembly operating lever.
In Fig. 119 the external lever if fitted on the two ends of the levers coming out of the gearbox cover. The fixing screws, equipped with self-locking, are tightened to 3 kgm.
In Fig. 120 the lever is completed with the rubber casing and the upper handgrip that is held in position by a screw tightened to 3 kgm.
The upper press-on cover with the indication of the ranges and reverse gear completes the lever (see Fig. 121).
In Fig. 122 we complete assembling the central lever on the tunnel that governs selection of the reverse shuttle or the 20% option.
The lever is splined on the pin that comes out of the gearbox cover and is subsequently completed with the casing and the knob.
Fig. 123 shows the coupling joining the lever to the steering wheel with the reverse shuttle - 20% option control lever on the gearbox cover.
In Fig. 124 the coupling is adjusted to secure the start and finish position of the lever under the steering wheel.
The screw fastening the coupling to the cover lever should be tightened to 3 kgm.
On the lever column under the steering wheel there is a lubricator.
It is wise if every time the fixed bonnet is removed you grease the column of this lever with the lubricator.
Any sticking of this lever is due to a lack of grease inside the sleeve.

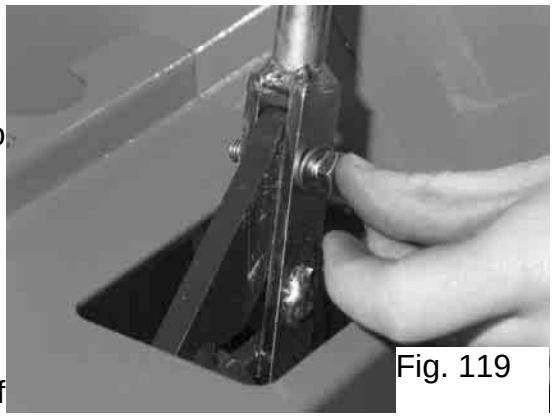


Fig. 119


Fig. 120


Fig. 121

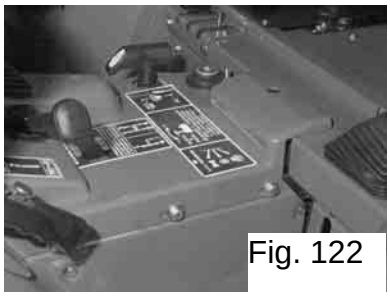


Fig. 122


Fig. 124


Fig. 123

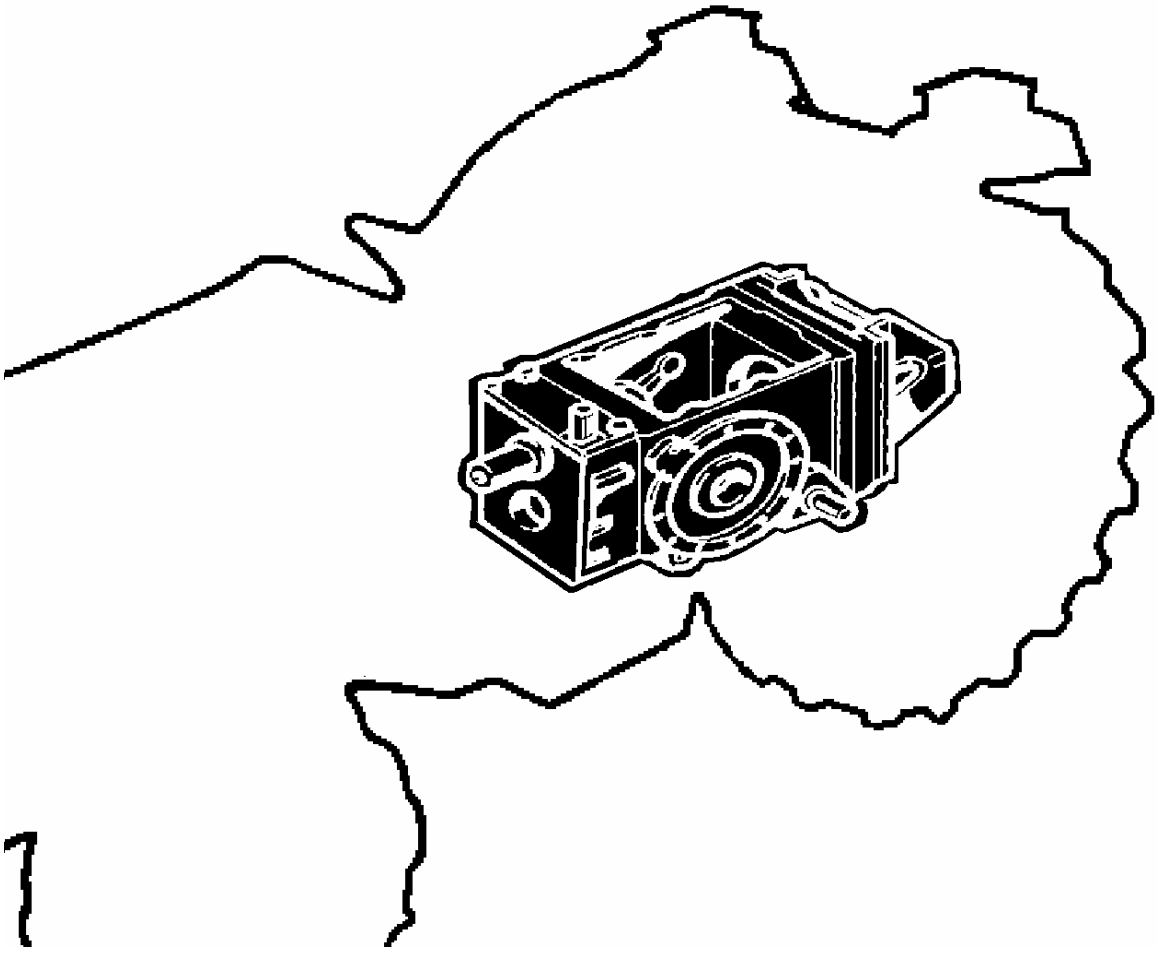
DRIVING TORQUES	kgm
M 10 x30 gearbox cover fixing screw	5.4
M14 x 7 clutch bowl - gearbox fixing nut	8
M12 x 4.6 gearbox - rear axle fixing nut	7.4
M12 x1.5 gearbox - rear axle fixing screw	7
M 30x1.5 transmission shaft fixing ring nut	10
M 35x1.5 transmission shaft fixing ring nut	10
M 8x30 main shaft cover fixing screw	2.4
M 8x16 retainer plate fixing screw	2.4
M 16x140 bowl - engine flange fixing screw	10
Screw locking the fork on the rod	3.5

LUBRICATION

Oil	ARBOR UNIVERSAL 15W 40	32	Liters
Grease	ARBOR MT EXTRA		

We recommend lubricants and liquid by: ***FL SELENIA.***

REAR DIFFERENTIAL



REAR DIFFERENTIAL ASSEMBLY

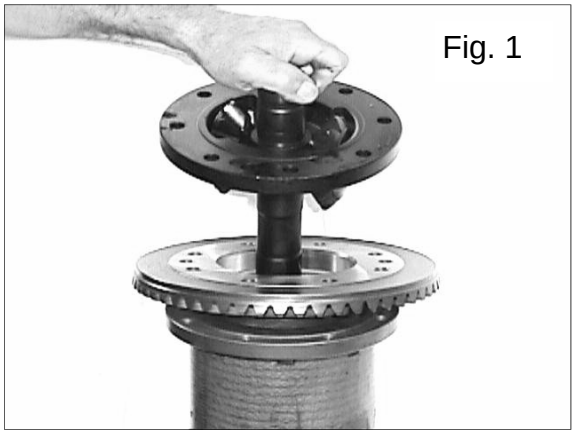


Fig. 1

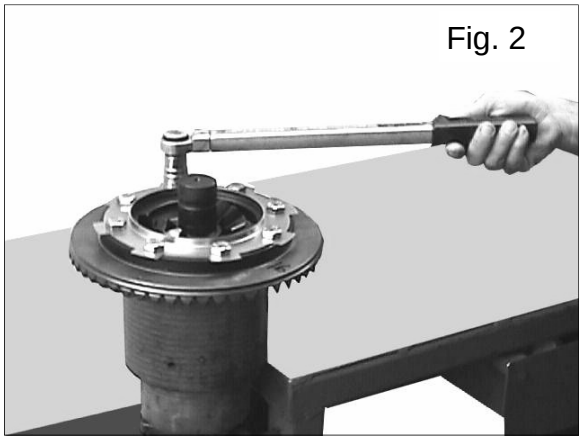


Fig. 2

The first thing to do is to pre-assemble the planetary gears and bevel ring gear as shown in figures 1 and 2.
Install the retainer plate for the screws that fix the bevel ring gear to the central shaft of the differential as shown in fig. 2, tightening the screws to an 9Kgm torque value and clinching the plate around the screws with the aid of a chisel.

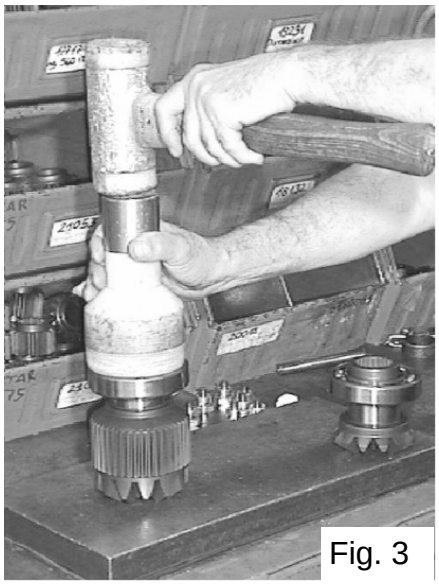
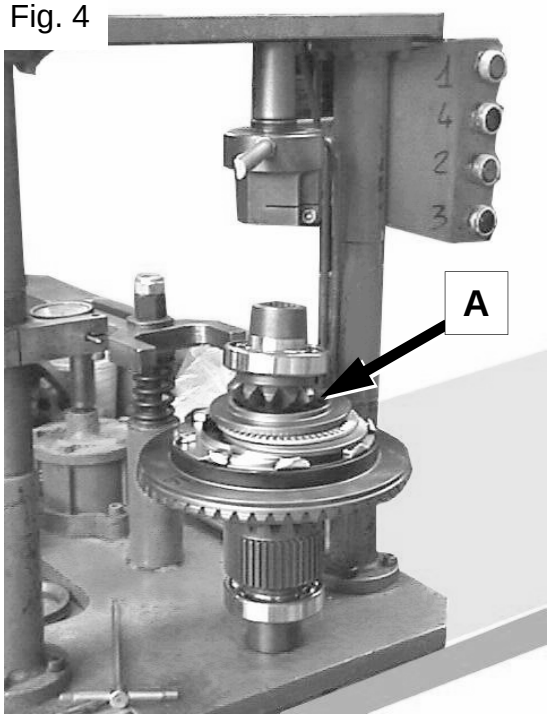


Fig. 3

Pre-assemble the bearings on the crown wheel with the aid of a plug, as shown in fig. 3.

Fig. 4



A special tool is used to establish the assembly conditions for the differential and determine shim **A** of fig. 4, in order to allow the correct play to be obtained between the crown wheel and planetary gear (i.e. between 0.07 and 0.15 mm). If this tool is unavailable, proceed by attempts in the casing, trying out various shims **A** of fig. 4 until the correct one has been obtained.

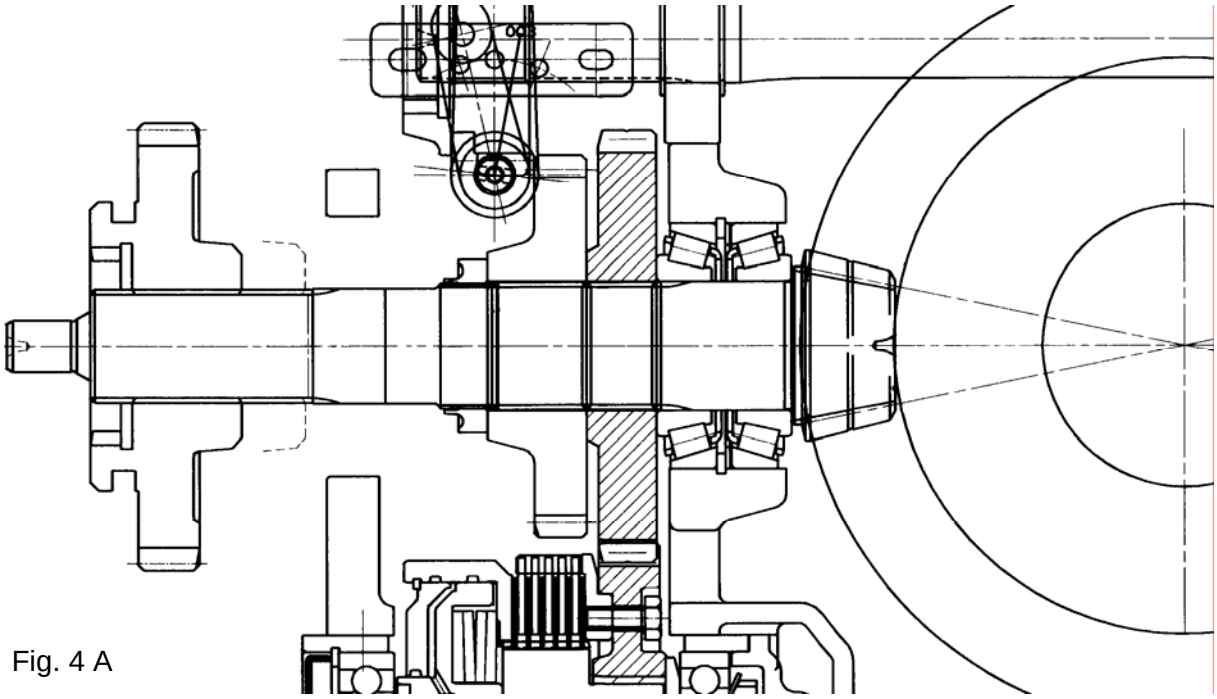


Fig. 4 A

Fig. 4A illustrates the overall assembly of the bevel pinion with the two taper bearings and ring nut that provides the preload for the taper bearings.
The play adjustments of the crown wheels and planetary gears and that of the rear bevel gear pair are summed together when the rear differential is assembled.
The following pages describe how these adjustments are made and how to make sure that the correct meshing play is maintained in all conditions throughout the entire circular meshing surface of the gear.
Thus, when the text explains that the play of a bevel gear pair must be checked, it means that the whole circular meshing surface must be checked.

Using the press shown in fig. 5, load one of the taper bearings (the one behind the pinion head) that position the bevel pinion with a load value that corresponds to that of assembly (ring nut that fixes the bevel pinion must be tightened to a 4 Kgm torque value).
In these conditions, which correspond to those of assembly, insert the shims behind the taper bearing so that this is positioned in a correct way in relation to the ring bevel gear and to obtain the right meshing play.

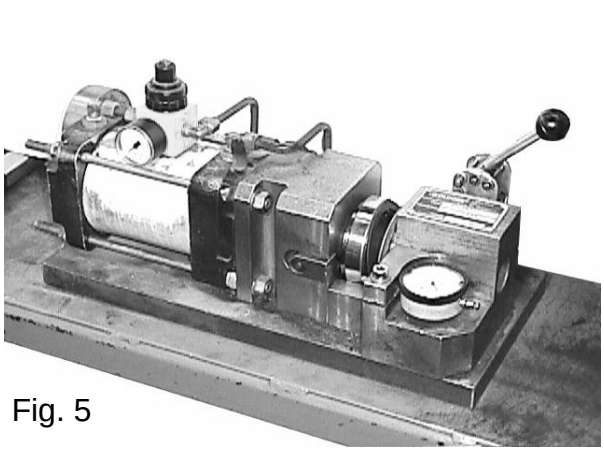


Fig. 5

NOTE - If the machine is disassembled, all the spacers will have already been determined thus these operations need not be carried out.

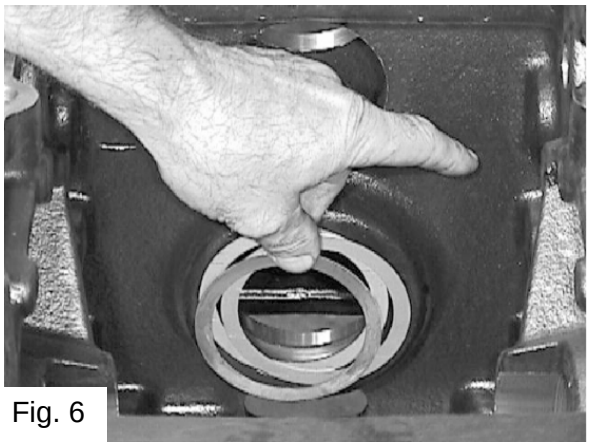


Fig. 6

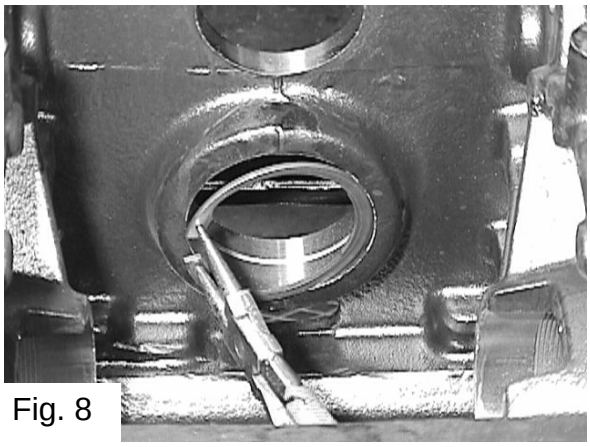


Fig. 8

Figs. 6 to 8 show the assembly sequence, beginning with the circlip and followed by shim positioning, then the seat of the taper bearing and lastly, the bevel pinion shaft with the internal part of the taper bearing pre-assembled.
Fig. 8 shows how the internal part of the bearing is installed on the shaft with the aid of a plug.
Make sure that the bearing is fully seated behind the head of the bevel pinion: this ensures that the pre-determined shimming sets the pinion in the right position.

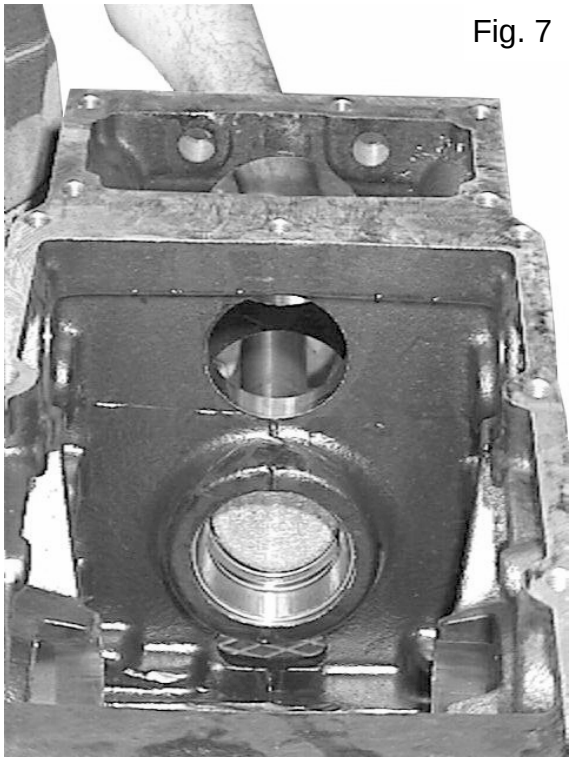


Fig. 7

Fig. 9 shows how the pinion is installed inside the differential housing.
Bed the bearings and bevel pinion shaft by tapping a few times with a plastic mallet.

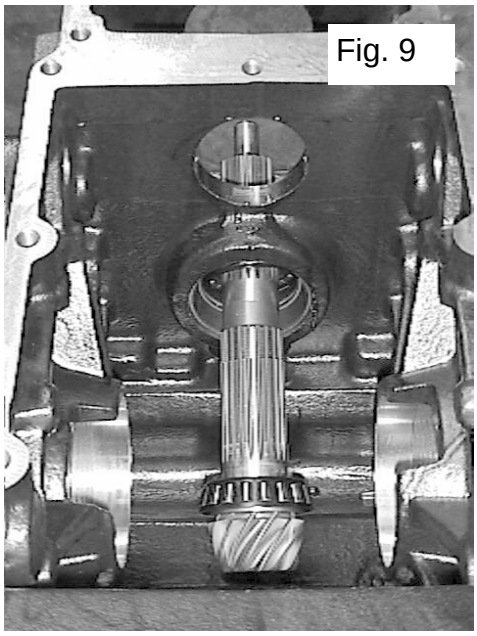


Fig. 9

Position the shaft on the gears and tighten the ring nut to a 4 Kgm Nm torque value as shown in fig. 10. Comply with the following procedure:
After having fully tightened the ring nut to pack everything together using two large wrenches as shown in fig. 10, loosen the nut one quarter of a turn and then tighten it again to 4Kgm. With a torque wrench.
Once the ring nut has been tightened, punch it with a plug as shown in fig. 11 to prevent it from working loose.


Fig. 10

Once the bevel pinion has been assembled and the ring nut torqued, make sure that the pinion is free to turn but that it is not too loose. If all the parts have bedded correctly, rotation will occur but a certain torque will be required.
Now proceed by installing the pre-determined pack of the bevel ring gear, using a plug to position the bearings that support the crown wheels inside the differential housing (fig. 12).


Fig. 11

Do not forget to position the rear differential locking ring in the pack of the bevel ring gear.

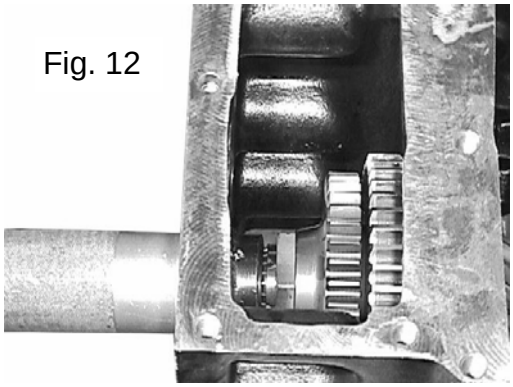


Fig. 12

Tap the bearings as illustrated in fig. 12.
Fully tighten the lh ring nut, annulling the play between the bevel pinion and bevel ring gear.
Now unscrew the lh ring nut (fig. 13) by 4 positions using the M 6 hole on the differential housing of fig. 14 (part **A**) as a reference.
Fully tighten the ring nut on the rh side also.
Measure the misalignment of the ring gear with the aid of a comparator positioned at the root of the tooth, as illustrated in fig. 15.
If the misalignment over the entire circumference is within 0,15mm, proceed with the following phases.
Unloose the right ring nut of 5-6 notches from the hole of M6 (part **A** of pict. 14); beat with a plastic hammer on bearing **B** of pict. 16 to the external. Also beat on the bedding satellite.

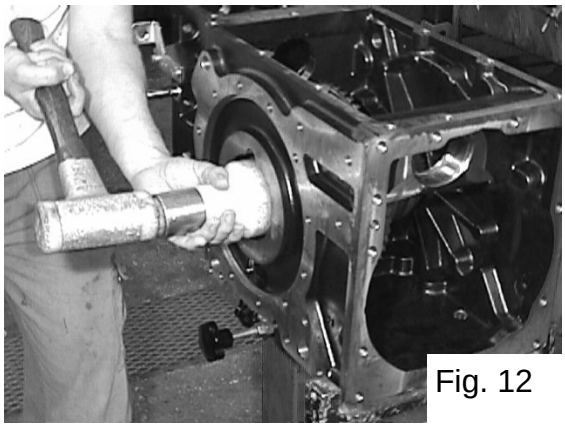


Fig. 12

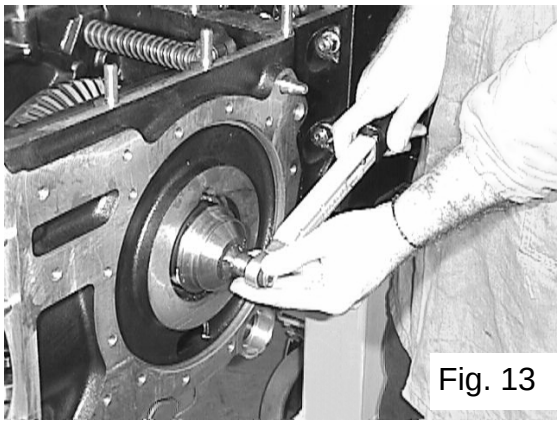


Fig. 13

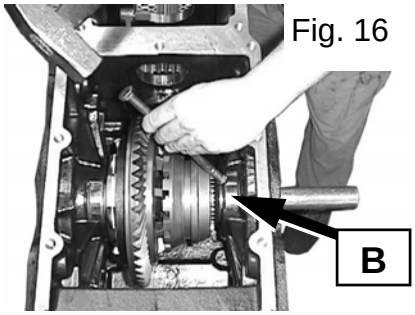


Fig. 16

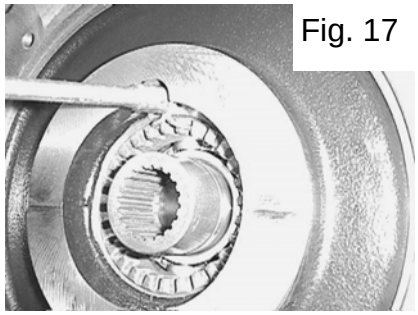


Fig. 17

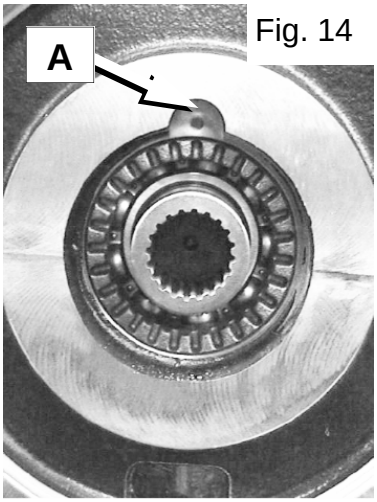


Fig. 14

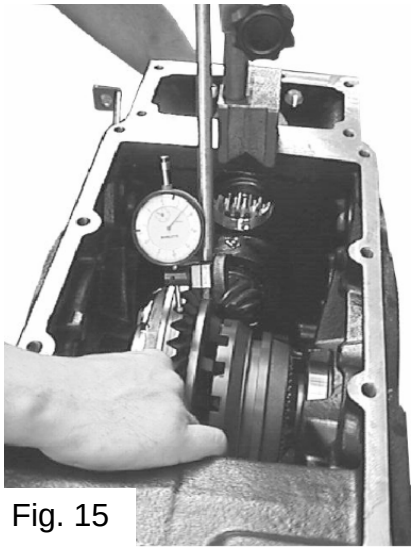


Fig. 15

The planetary leans on the ring nut, so verify that there is a clearance between 0,07 and 0,15 releasing the pression between pignon and ring bevel gear; check again that the pignon and the ring bevel gear turn with the correct mesh.

Mount the plates and the setscrews of the ring nut as shown in pict. 17.
In order to change the mesh clearance between pignon and ring bevel gear, operate on the left ring nut.

The components of the rear part of the PTO and the differential lock must be installed to complete the assembly operations for the rear differential housing.

Fig. 18 shows how the upper PTO shaft is assembled after the bearing, the relative retainer circlip and the gear that carries the PTO selector fork have been pre-assembled on it.

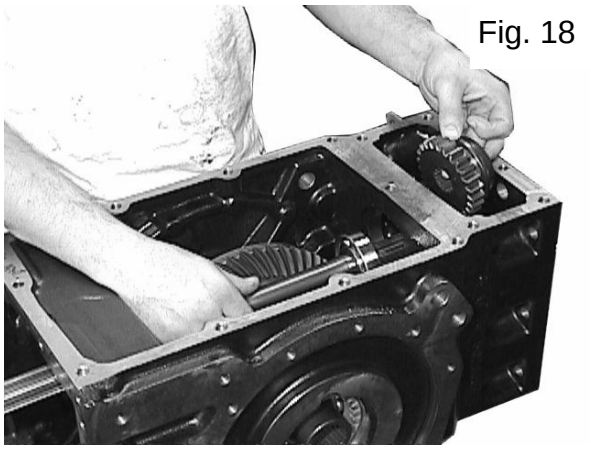


Fig. 18

As illustrated in figs. 19 and 20, finish assembling the PTO shaft with the main gear, the relative bearing complete with spacer and the closing circlip.

Now install the external lever that selects the PTO, checking the position of the fork inside the housing to make sure that the external selector plate has been regulated correctly (fig. 20 A).

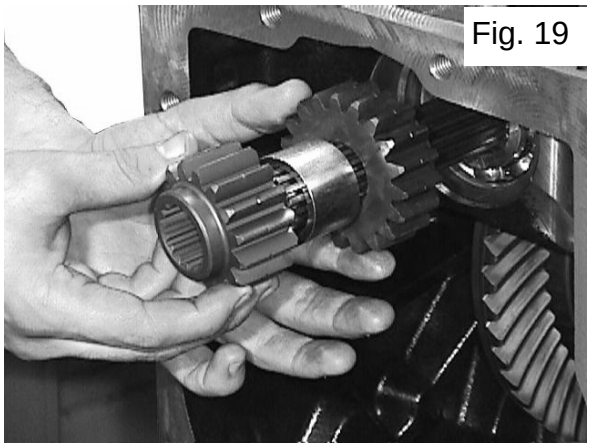


Fig. 19

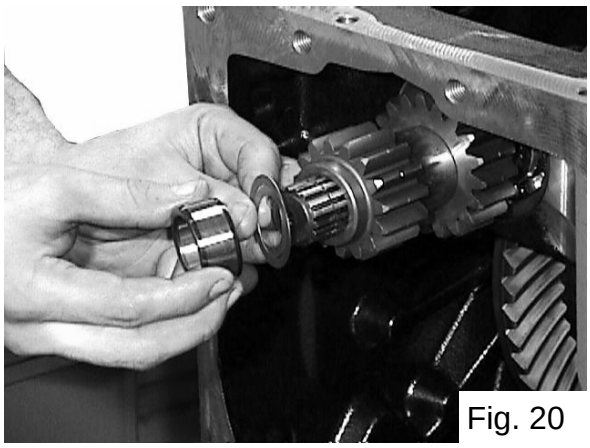
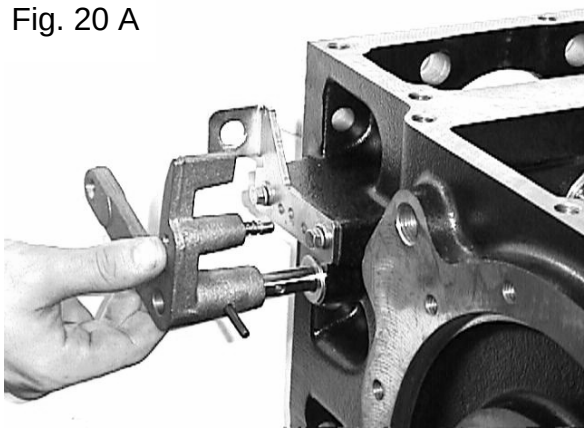


Fig. 20

Fig. 20 A



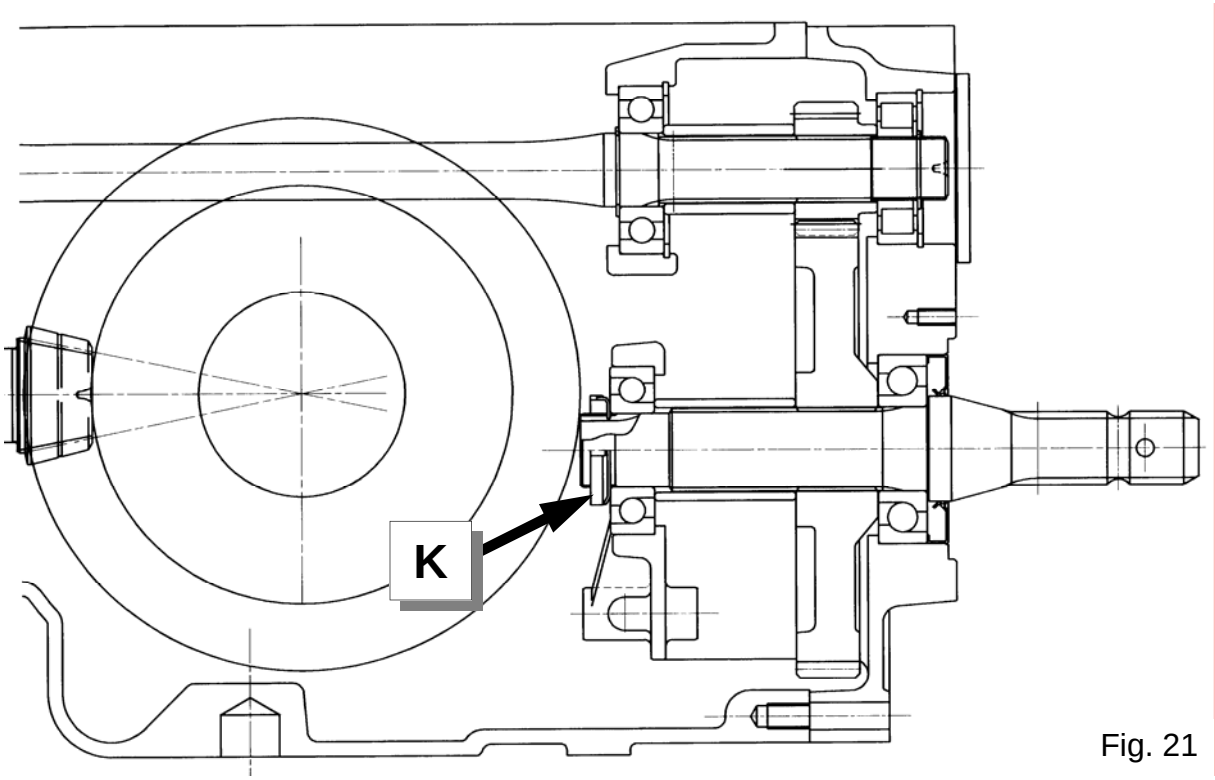


Fig. 21

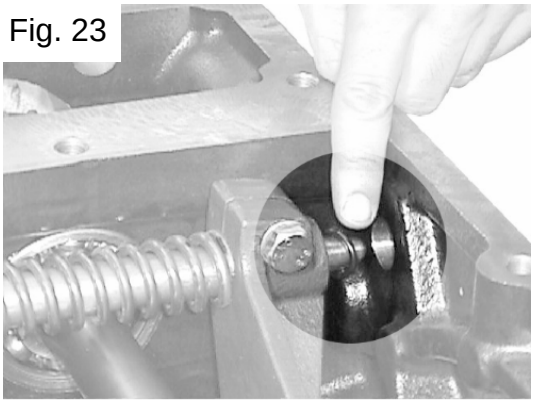
Once the bearing has been pre-assembled on the upper PTO shaft, proceed by assembling the rear casing which can house the double speed option for the PTO or the single speed as illustrated in fig. 21.
Tighten ring nut **K** of fig. 21 to a 2,5Kgm torque value and punch it to clinch before coupling the PTO casing with the differential housing.

Fig. 22

The last operation required when assembling the rear differential housing is to install the diff lock control rod as shown in figs. 22 and 23.
Oil the rod on which the O-Rings will then be inserted. Fit the rod carefully into its housing. When this is done, make sure that the O-Ring is not pinched as shown in fig. 23.

Having completed the assembly operations, make sure that a 1.5-2 mm gap remains between the diff lock ring and the teeth on the ring gear.

Fig. 23



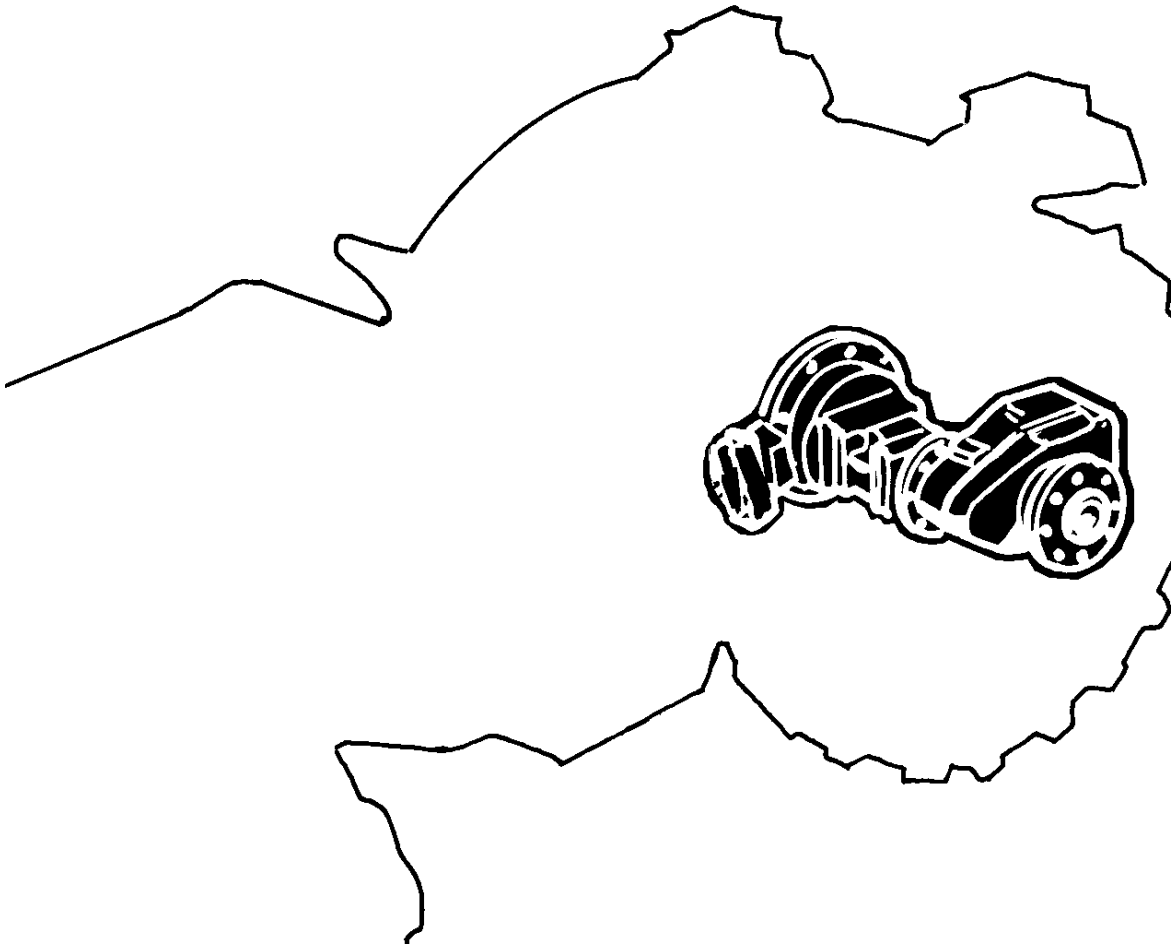
DRIVING TORQUES	(kgm)
M12 x 14.6 rear axle - gearbox fixing nut	7.5
M18 x 1.5 rear axle - gearbox fixing screw	12
M12 x 14.6 rear axle - power lift fixing nut	7.5
M12 x 30 screw that fixes the cover to the rear axle	5
M12 x 14.6 rear axle - PTO flange fixing nut	7.5
M12 x 40 screw that fixes rear axle - hubs	7.5
M12 x 35 rear axle - drive transmission support fixing screw	6
M12 x 50 bevel ring gear fixing screw	9
M10 x 35 diff lock control fork fixing screw	5
Bevel pinion fixing ring nut	4
Bevel differential fixing ring nut	2
Bevel PTO fixing ring nut	2.5

LUBRICATION

Oil	ARBOR UNIVERSAL 15W 40	32	Liters
Grease	ARBOR MT EXTRA		

We recommend lubricants and liquid by: ***FL SELENIA.***

REAR FINAL DRIVES



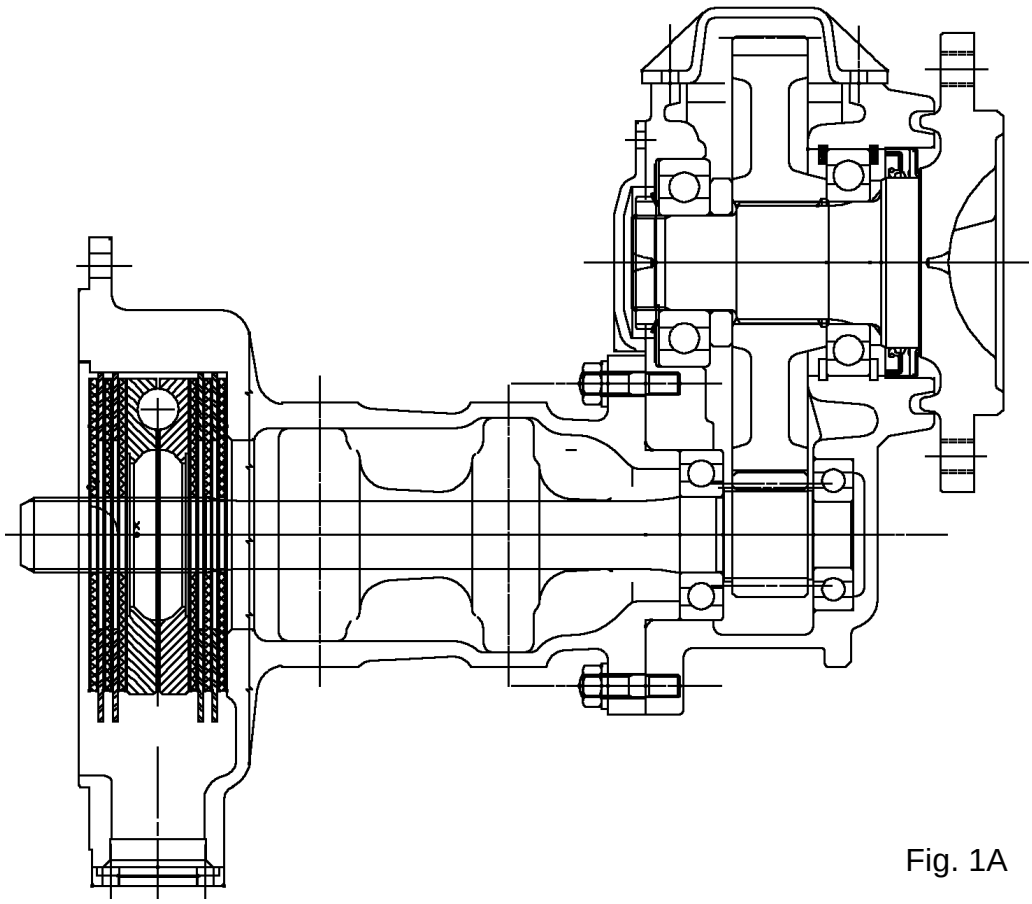


Fig. 1A

Fig. 1A illustrated the rear final drive assembly of the Quadrifoglio series.
The position of the final drive in relation to the rear hub changes, depending on whether the tractor is the high or low version.
If the rear final drive must be disassembled, take care of the broaching and the position of the final drive in relation to the hub so as to avoid making mistakes with the positioning during the re-assembly phase.

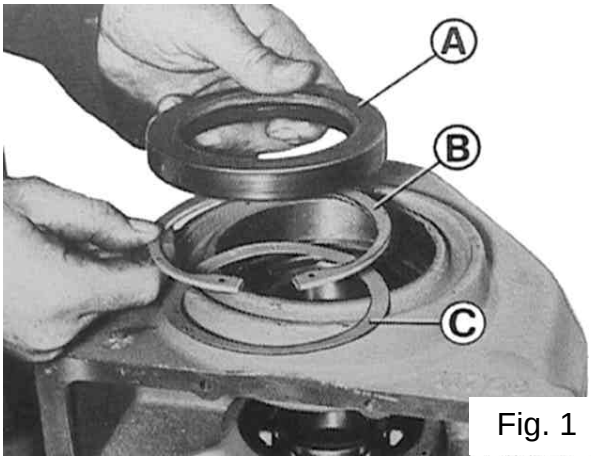


Fig. 1

AXIAL PLAY ADJUSTMENT.
Comply with the following instructions. Jack up the machine and remove the wheel;
- apply the parking brake so as to lock the braking components;
- split the complete final drive from the hub, working with screw **D** of fig. 2 on the internal axle shaft;
- unscrew the ring nut and remove the axle shaft;
- remove the oil retainer ring **A** of fig. 1;
- remove the circlip ring **B** of fig. 1;
- insert 0.2 mm spacers **C** until the float has been eliminated.

Re-assemble the complete final drive on the hub.

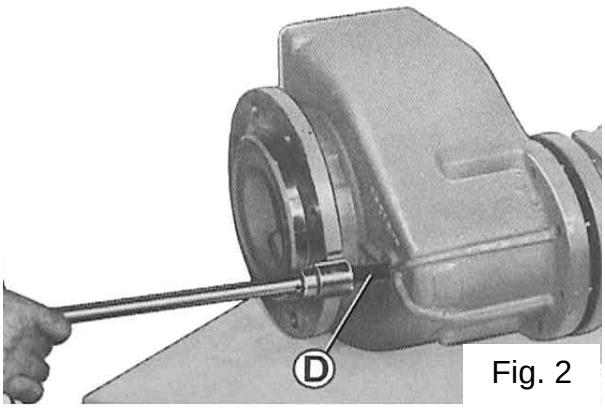


Fig. 2

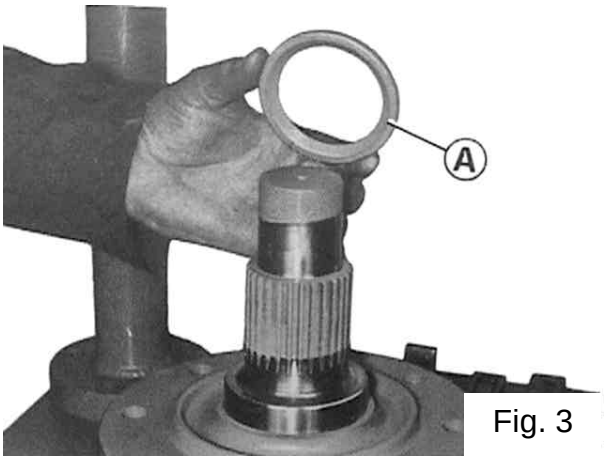


Fig. 3

If the final drive must be assembled, spacer **A** of fig. 3 must be positioned with the chamfered part pointing towards the flange of the axle shaft.

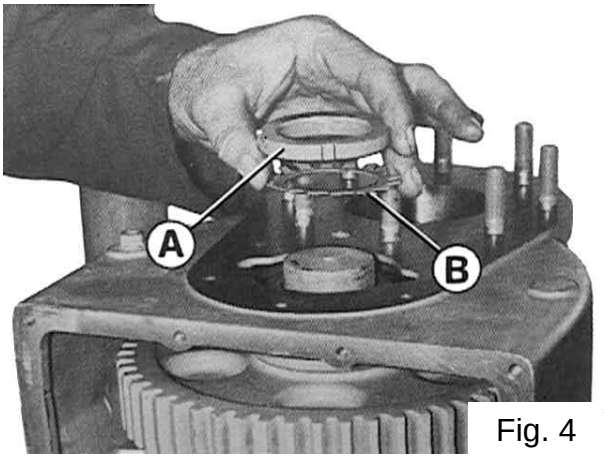
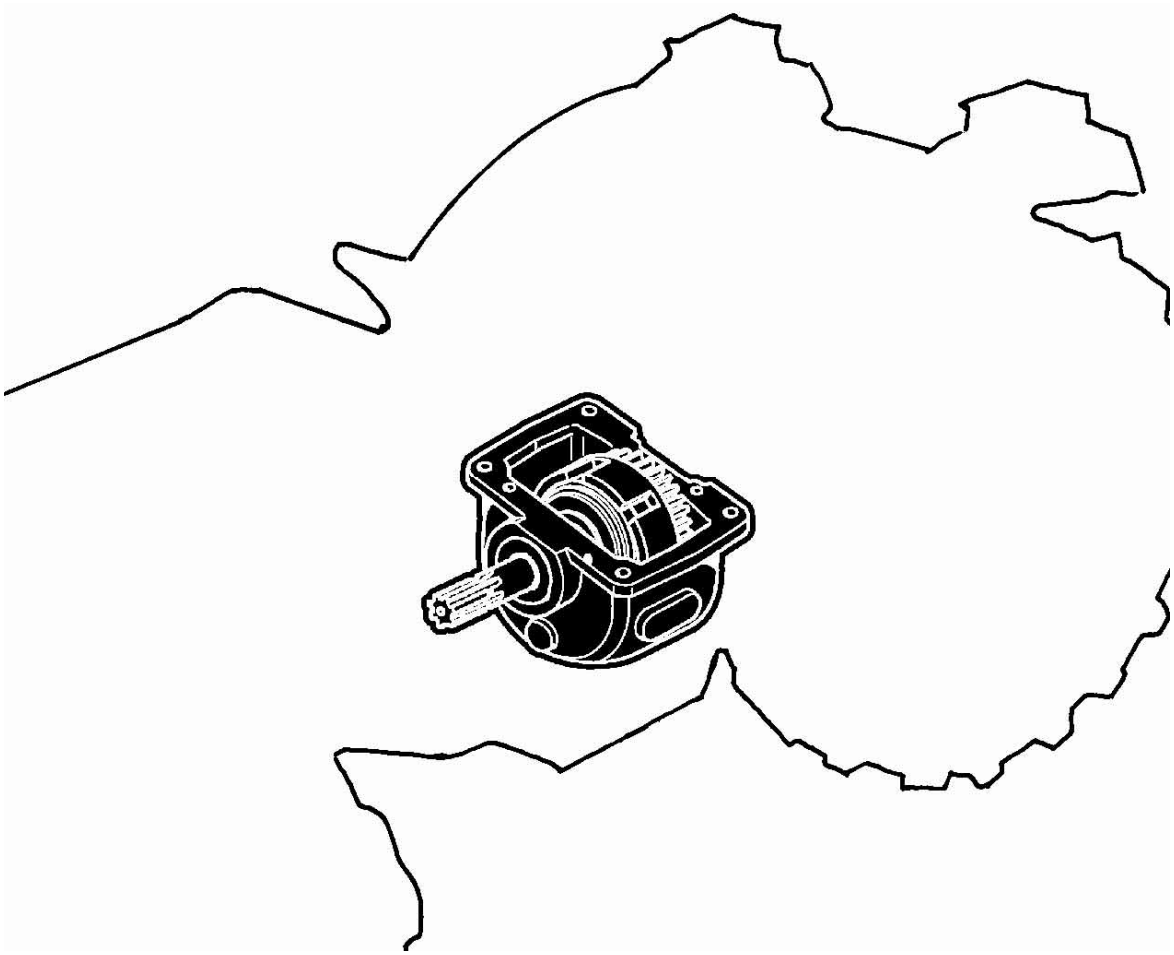


Fig. 4

Tighten ring nut **A** of fig. 4 to a 17.0 kgm torque value. Lock it in place with the retainer plate and punching.
This ring nut must be replaced whenever the axle shaft is disassembled.
Take care of the fact that the ring nut on the lh final drive has lh threading while the one on the rh final drive has rh threading.

DRIVING TORQUES	kgm
M 50 x 1.5 axle shaft fixing ring nut	17
M 18 x 1.5 screw that fixes the wheel to the axle shaft	15
M12 nut that fixes the final drive to the axle shaft support	8
M 8 x 20 axle shaft ring nut cover fixing screw	2.4
M 8 x 20 final drive gear cover fixing screw	2.4

DRIVE TRANSMISSION



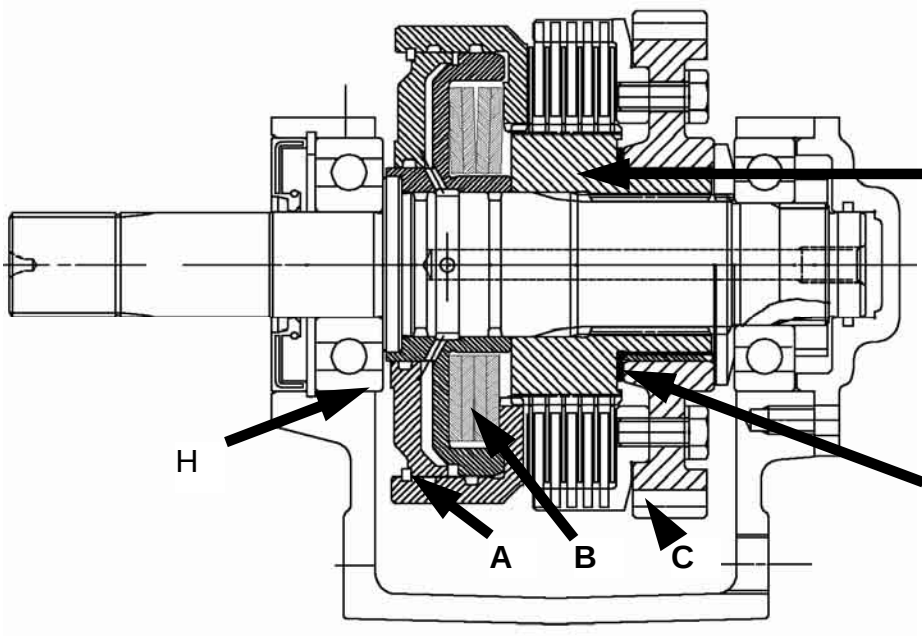
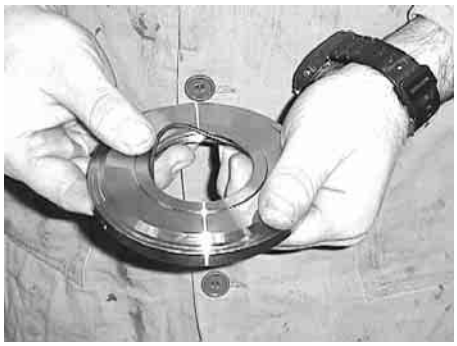


Fig. 1



To correctly assemble the drive transmission housing, the first thing to do is to position the various retention rings in their respective housings, as illustrated in the sequence alongside.

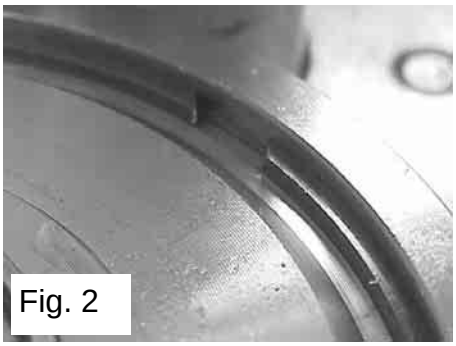


Fig. 2

When these operations are carried out, spread grease in the housings and take care to prevent the rings from being punched during the assembly phase.
As illustrated in the assembly drawing of fig. 1, the Belleville washers should be installed in opposed directions. To do this, use a small press capable of applying a thrust of at least 500 kg .
As illustrated in fig. 2, make sure that the ring fits into the housing before relieving the pressure exercised by the press (part **A** of fig. 1).


Fig. 3

Once the clutch assembly's pack of reaction springs has been pre-assembled, proceed by assembling the true clutch pack.
Install part **C** of fig. 1 on the drive transmission gear as shown in fig. 3, tightening the screws that fix the gear to the housing to a 3.5 Kgm torque value and clinching the safety plates with the aid of a chisel as shown in fig. 5.

Position the spacers **E** of fig. 1 and the plate support (part. **D** of fig. 1)
As shown in the picture alongside (fig. 6).

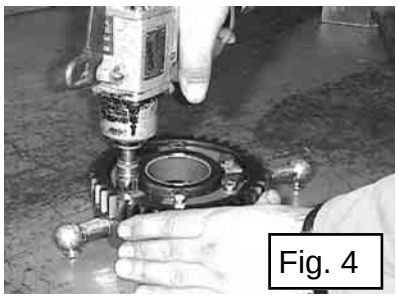


Fig. 4

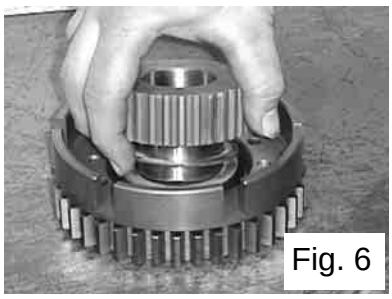


Fig. 6

Now install the clutch plates, alternating them with the steel ones. Make sure that the splines are inserted correctly. Now place this pack in the drive housing casting as shown in fig. 7.

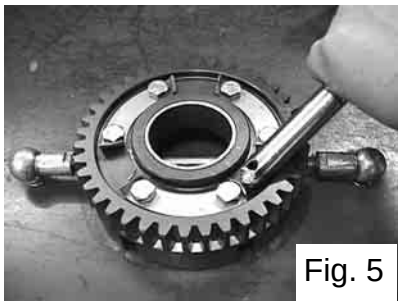


Fig. 5

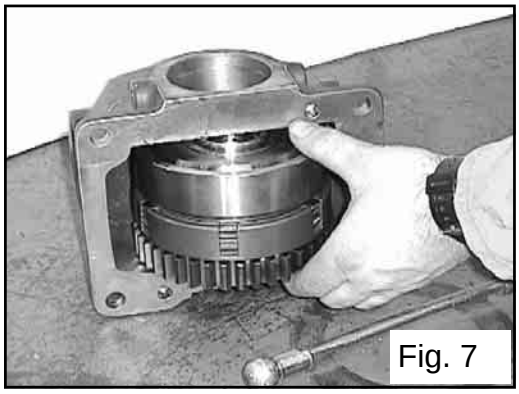


Fig. 7

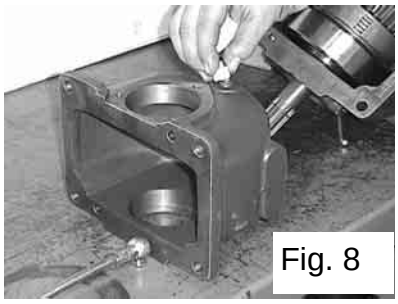


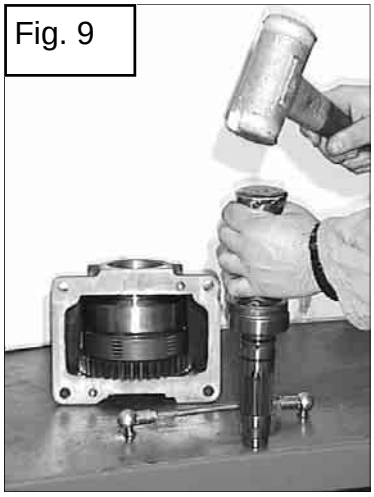
Fig. 8

Before proceeding with the assembly operations, shut off the oil drain hole in the casting with the relative plug, improving the seal by wrapping Teflon around the thread (see fig. 8).

Now proceed by assembling the central shaft. Here again, the first thing to do is to install the seals.
Take care not to pinch or damage them when they are installed.

Using a plug, position bearing **H** of fig. 1 on the shaft as illustrated in fig. 9.

Fig. 9



When the shaft is fitted into the clutch pack, lubricate the seals with oil or grease to prevent the parts from being damaged.

Install the closing circlip from the splined shaft side using a pair of circlip pincers (see fig. 10)

Fig. 10

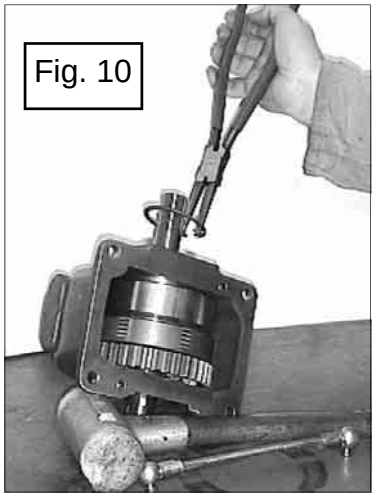
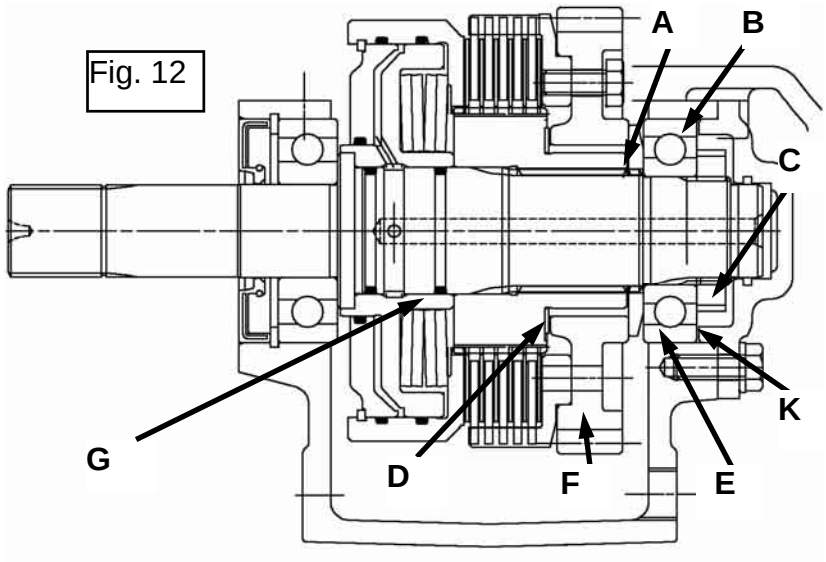


Fig. 11

Using a plastic mallet, make sure that the bearing beds correctly in the casting (see fig. 11).

The shims can now be determined for the assembly. The shimming in **D** of fig. 12 has already been explained. It's value is usually 1.2 mm.

Fig. 12



The shims applied in point A of fig. 12 usually consist of two 0.8 mm spacers and one 0.2 mm spacer.

During a first phase, bearing **B** of fig. 12 is replaced by a spacer of equal thickness in order to make sure that the device operates correctly. It also allows the shims to be changed in a rapid way.

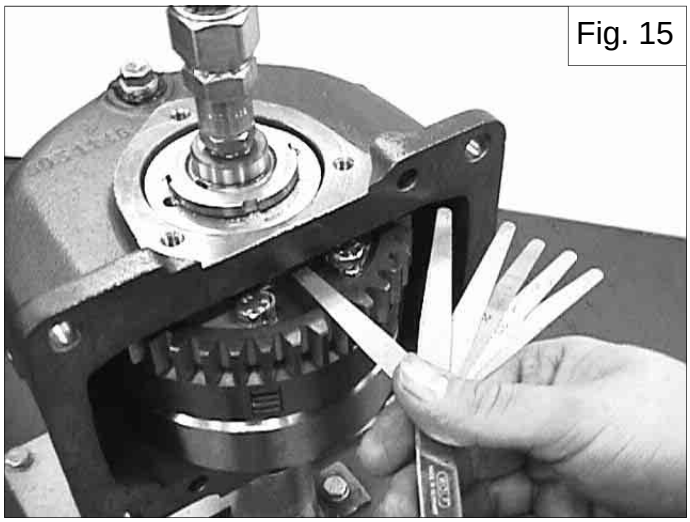
All these operations are illustrated in figures 13 and 14.

Fig. 13

Pressure (60 bar) can now be applied to the assembly and can then be applied and relieved for a few cycles in order to bed all the components.
Make the measurements illustrated in fig. 15: if the play between the gear and splined bush is between 0.2 and 0.5 mm (point A of fig. 12) and if the assembly makes gear **F** of fig. 12 set to the neutral condition as a pressure between 30 and 35 bar, proceed by assembling the definitive bearing in place of the spacer used for the tests.
If the play between the splined bush and gear is 0.6 mm or more, eliminate the 0.2 mm shim installed in point **A** of fig. 12.

Fig. 14

Fig. 15



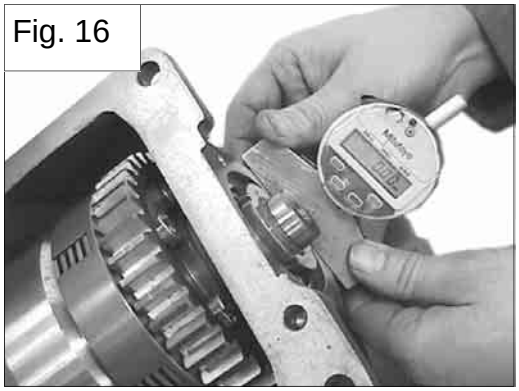
If gear **F** of fig. 12 fails to set to the fully neutral state with a pressure of 30-35 bar, either replace the Belleville washers or part **G** of fig. 12, as they are not within the tolerance margin.

Once the spacer has been removed, proceed by definitively assembling the bearing, the ring nut tightened to a 22 Kgm torque value, the relative retainer plate and then punch to hold the parts definitively in place.

Now determine the shimming required for the bearing on the gear side.

As shown in fig. 16, a comparator must be used to determine the value of the shims to insert.

Fig. 16



To facilitate the shimming operation, remember that the shim of the cover that positions the bearing is 5 mm. Thus, with reference to point **K** of fig. 12, if the distance between the bearing and the stop point of the cover on the casting is more than 5 mm, a spacer equal to the dimension measured with the comparator minus 5 mm must be positioned behind the cover in point **K** of fig. 12.

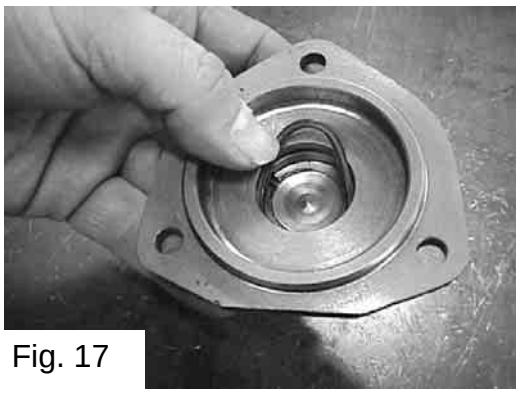


Fig. 17

Position the seal in the closing cover as shown in fig. 17. Make sure that the seal does not twist and that it remains in its housing. Carefully apply silicone to the cover and tighten the screws that fix the cover to the drive transmission housing to a 3.5 Kgm torque value.

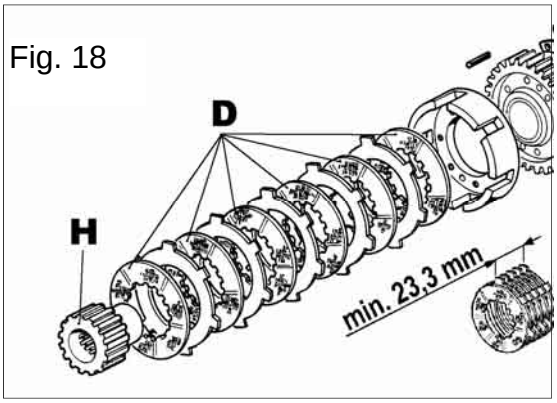
At this point, the 4-wheel drive housing can be applied to the rear differential housing by tightening the screws that fix it to an 8 Kgm torque value.

Here again, the machined surface of the drive housing must be carefully spread with silicone before it is assembled on the rear differential housing.

DRIVING TORQUES	Kgm
M 8 screw that fixes the drive housing cover	3.5
M 12 drive housing fixing screw	8.0
4 WD clutch pack fixing ring nut	22
1/4” nipple for clutch pack oil supply	3

Star 75 adjustment with hand press

Fig. 18



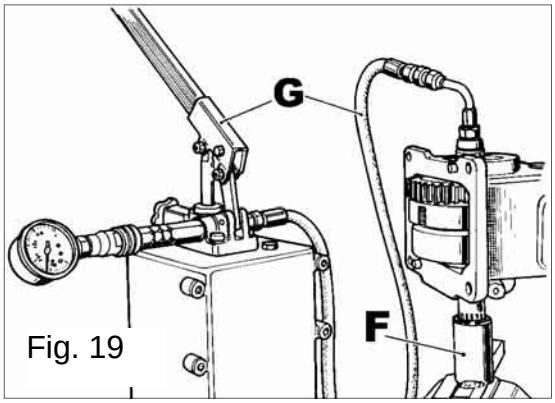


Fig. 19

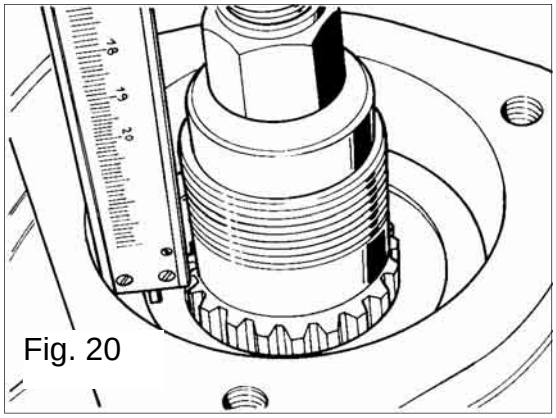


Fig. 20

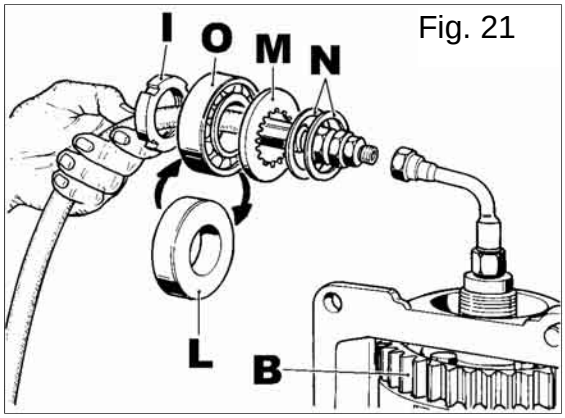


Fig. 21

Connect the test implement G fig. 19 then pressurize to 50 , 60 bar.

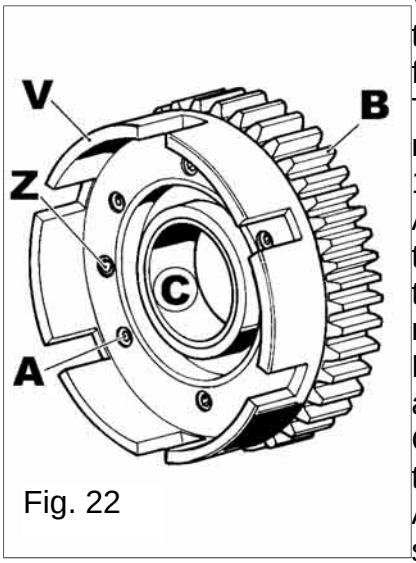
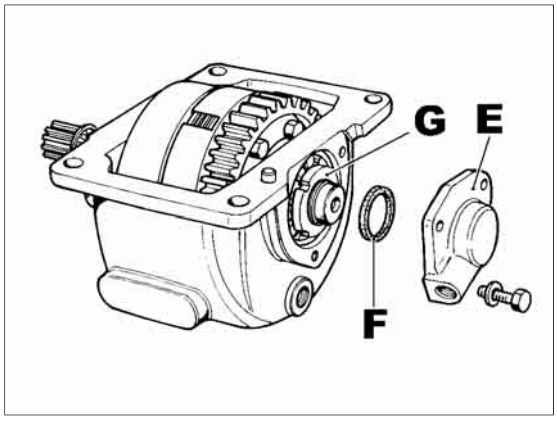


Fig. 22

With a gauge, measure the resulting distance between the face of the splined bushing H fig. 18 and the outer face of the gear B fig. 22 as shown in fig. 20.
This distance will be used to calculate the shimming to make so that the inside face of the splined bushing is 1.2 mm higher than the external face of the gear.
After determining the shimming, disconnect the tool then as shown in fig. 21, insert on the pipe the ring nut I, test spacer L, washer M and spacers N for the above-measured shimming.
Reconnect the tool, pressurized it again then install the above-mentioned parts tightening the end ring nut.
Cut off the pressure and put it back on again a few times so as to allow the assembly to bed in.
At this point, pressurize the tool progressively and at the same time try and manually apply the rotatory movement on the gear B fig. 21. Check that this movement can only be applied when the pressure gauge reaches 35 bar to then make it totally free at 40 bar. If this is not so, increase or decrease the shimming of the spacers N.

In a horizontal position, use a feeler gauge to check that the distance between the cylinder and clutch pack is between 0.8 and 1.2 mm as shown in fig. 24.
After adjusting the assembly, replace the test spacer L fig. 21 with the bearing O.
Tighten the ring nut **I** fig.16 to **22,5 k**gm. .
If when fitting the cover E fig. 23 back on you find clearance between the bearing and the cover, recover it with appropriate shimming.



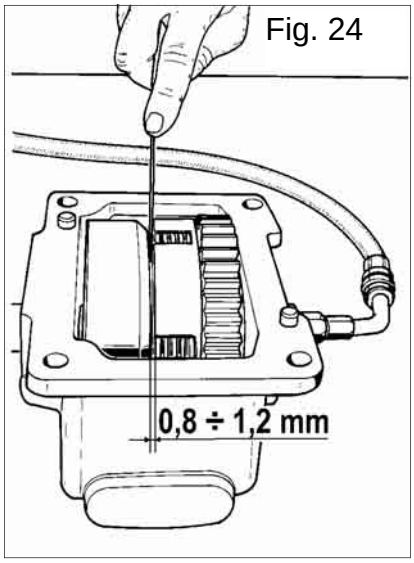


Fig. 24

REAR POWER TAKE-OFF

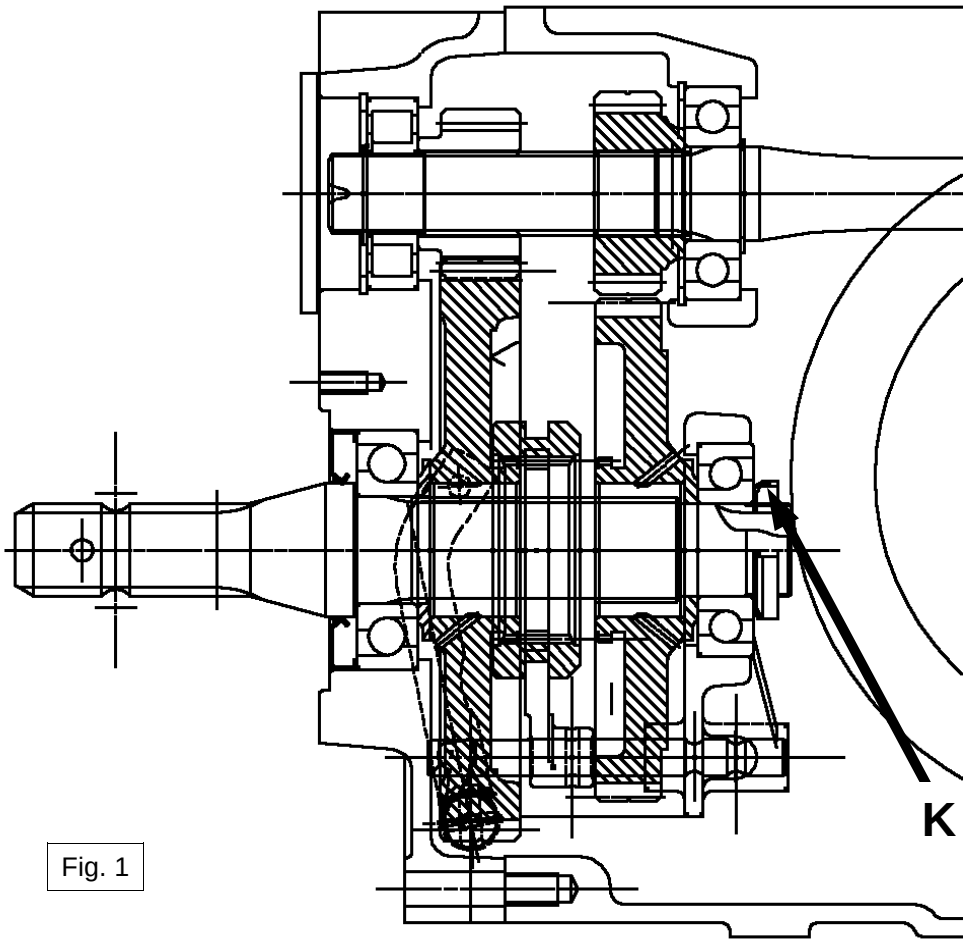


Fig. 1

Fig. 1 illustrates the rear power take-off assembly with the rear two-speed selection option.

The assembly sequence for the rear PTO will be described in the following pages, beginning with selection.

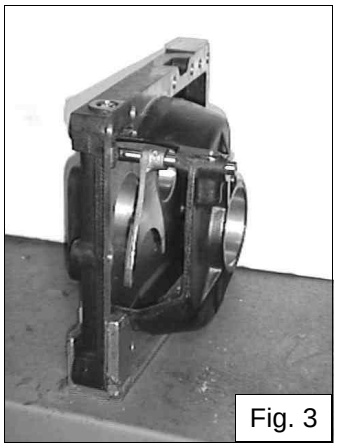
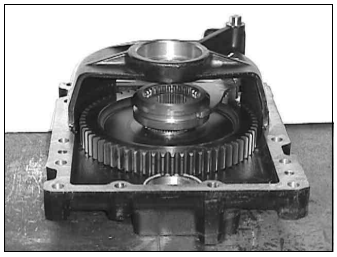
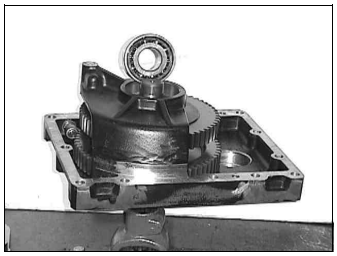
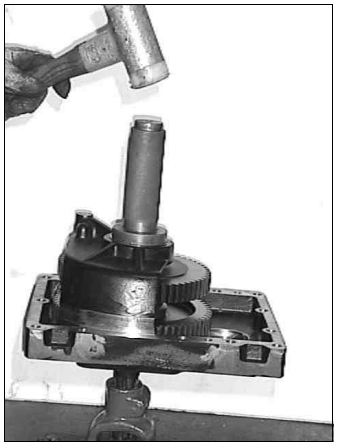


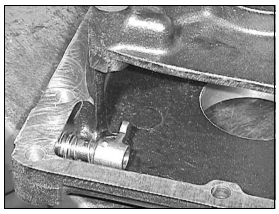
Fig. 3

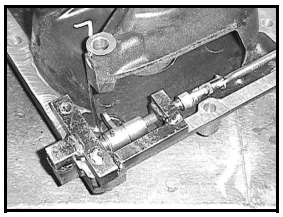


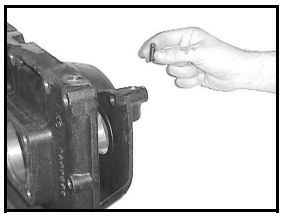


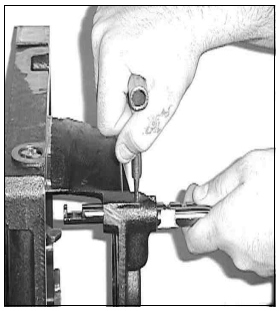


The sequence illustrated alongside shows how the power take-off casing is assembled.
Before beginning to install the gears, position the selector









These parts form the PTO gearbox and are positioned on the rear rh side of the tractor.

fork and the parts shown in fig. 3 inside the casing.
The way the ring nut that fixes the lower shaft of the PTO is tightened is particularly important. This operation can be carried out with a 2.5 kgm torque wrench part **K** of fig. 1 and the ring nut must then be punched to prevent it from accidentally working loose.

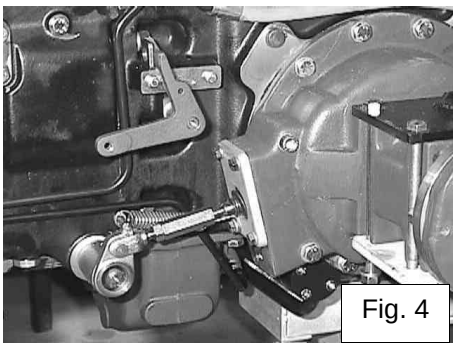
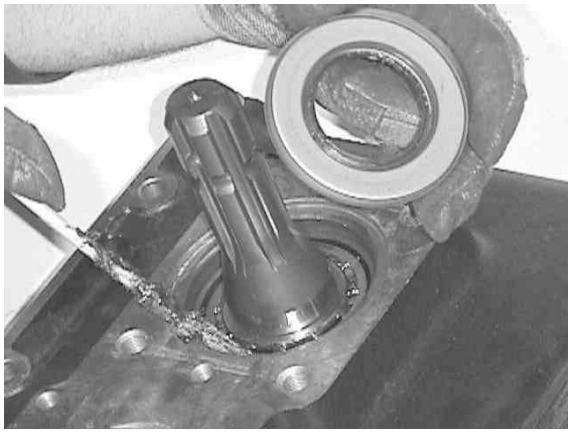
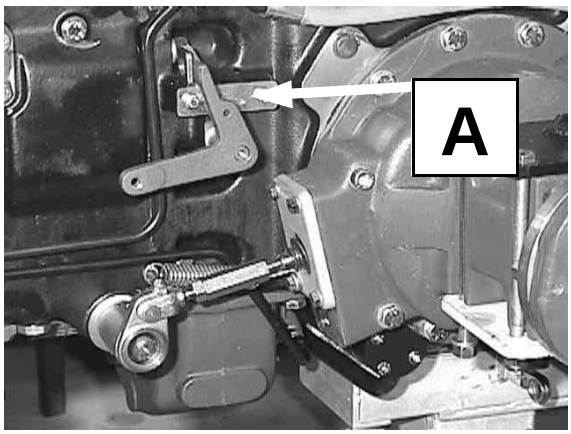
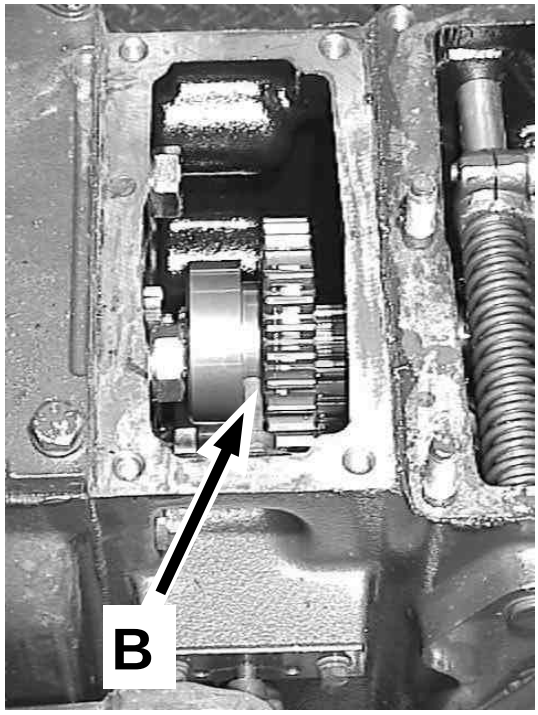


Fig. 4

Once the PTO casing has been installed on the rear differential assembly, pay particular attention when adjusting the PTO selection option (see fig. 4)
Before assembling the power lift on the rear differential housing, adjust the PTO selector plate and check its internal travel.
Position the plate so that the neutral option of the synchronized PTO or independent PTO is selected without the fork forcing on the gears and so that selection is correct.
The diagram below shows the controlling power train of the PTO selection option.
The independent PTO is engaged when the external lever is in the doanward position. The neutral position is engaged when the lever is horizontal while the synchronized PTO is selected when the lever is in the upward position.
A switch is also installed on the external lever of the PTO to prevent the engine from being started when the PTO is engaged. Remember to also adjust this switch in the correct way.







The pictures above show the parts that form the PTO selection option.
Part **A** is the PTO selector plate whose correct adjustment ensures that the entire operating range of the PTO is engaged.
Part **B** is the end element of the selection mechanism on the sliding gear, illustrated schematically on the previous page.

DRIVING TORQUES	**(kgm)**
M 35 x 1.5 ring nut that fixes the rear PTO shaft	2.5
M12 nut that fixes the rear PTO assembly	8
M12 x 30 screw that fixes the cover of the upper compartment of the PTO	4.9
M12 x 35screw that fixes the transmission unit	4.9
M 8 x 20 screw that fixes the rear Pto cover	2.4

FRONT AXLE

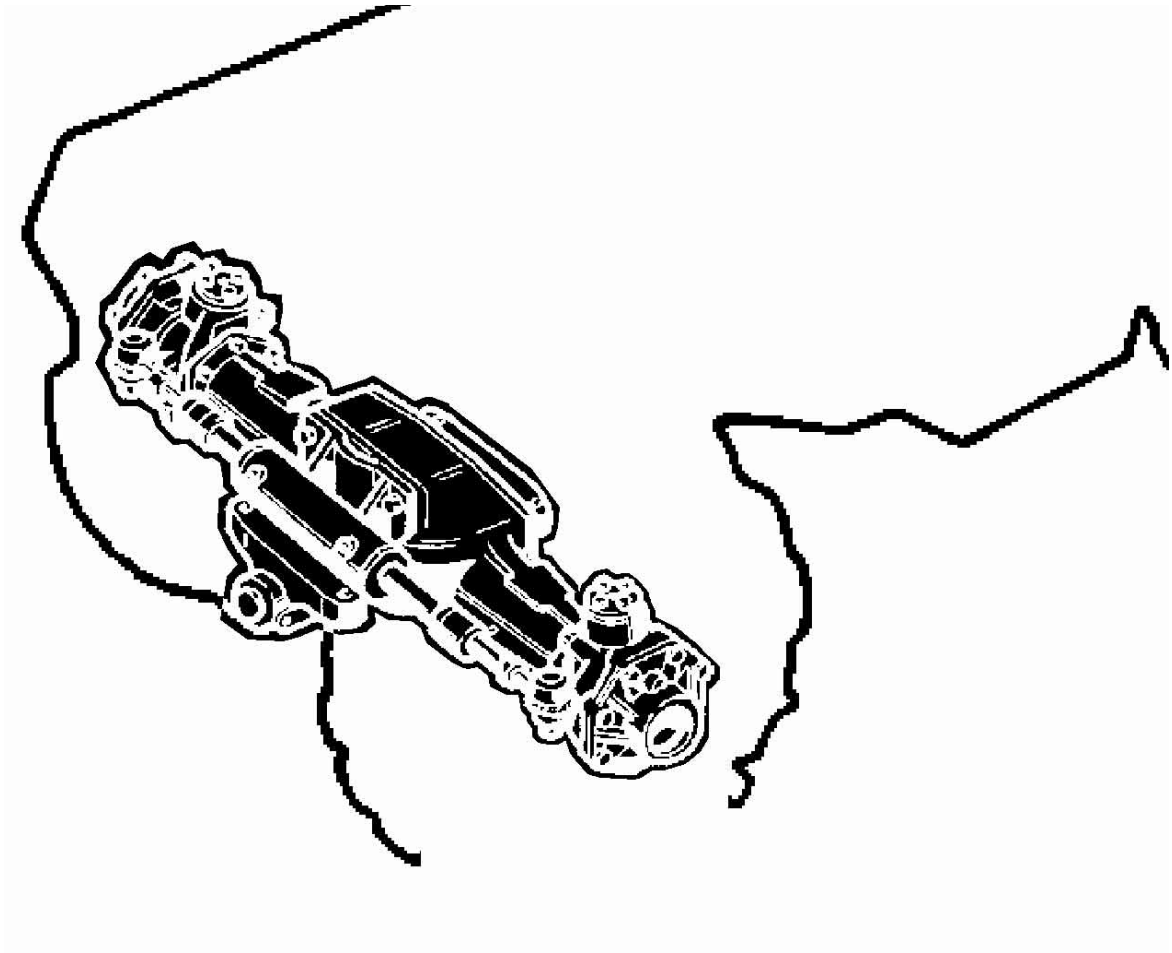


Fig. 6a

LOW–PROFILE

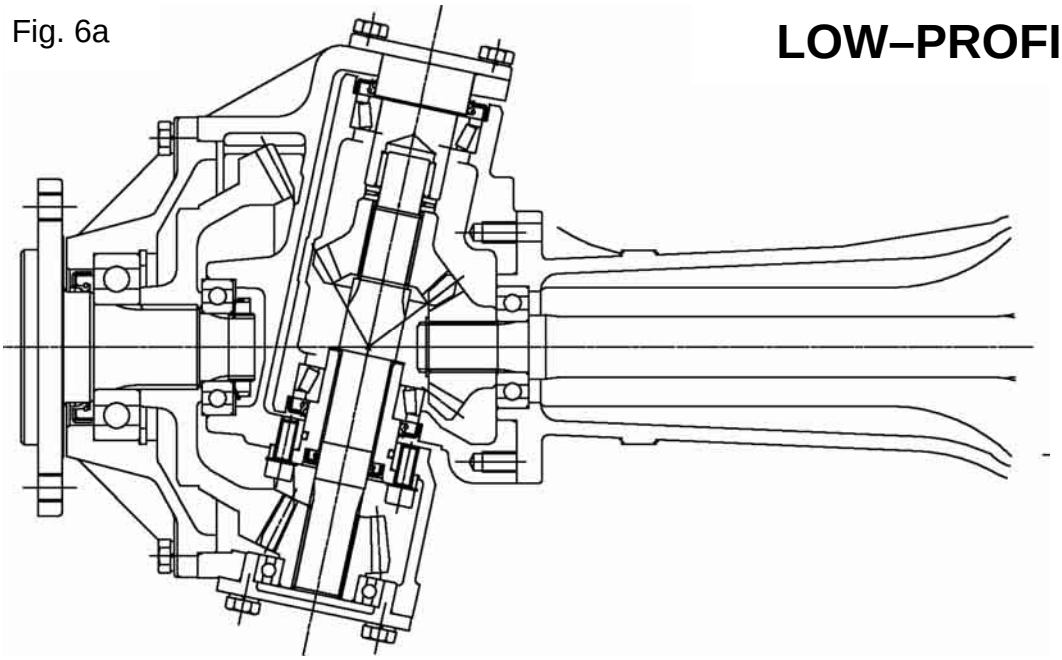
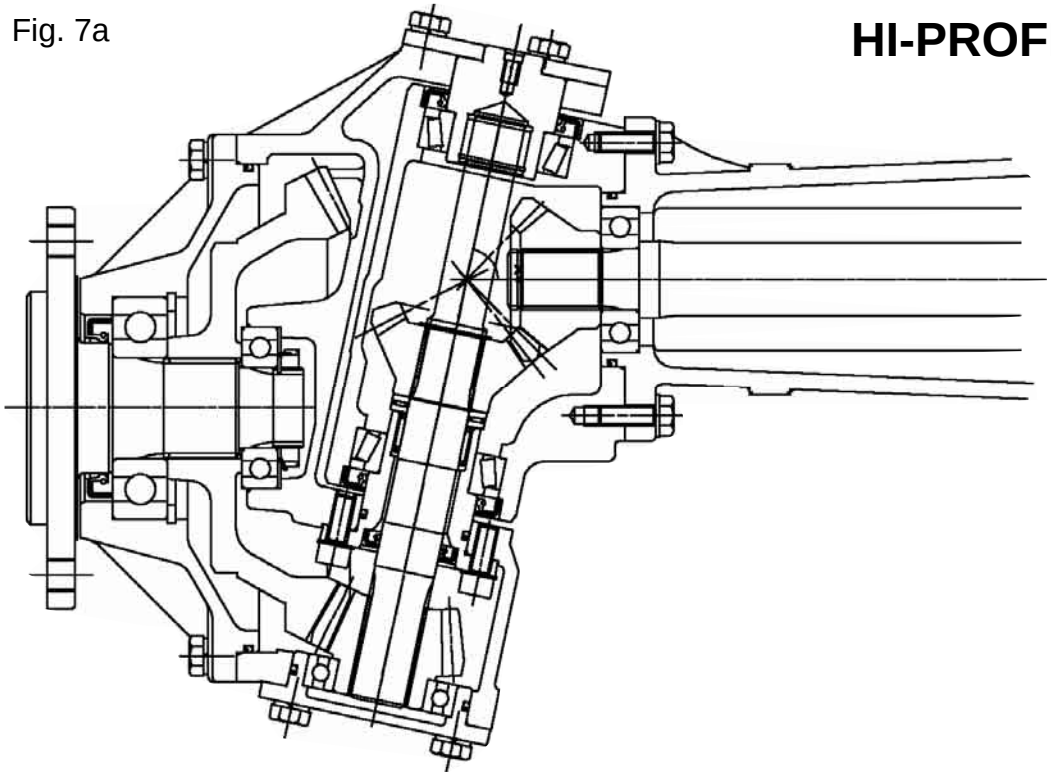


Fig. 7a

HI-PROFILE



In the Quadrifoglio series, besides the NO-SPIN front differential (application on request) there is the front axle in the HI-PROFILE version (fig. 7a) or LOW-PROFILE version (fig. 6a), depending on the type of tyres selected.
From the point of view of assembly, there are not any great differences even if the single components are different.
The differences between the two types of axle are concentrated in the different front final reduction gears represented in figs. 6a and 7a.
Whereas as regards assembly of the bevel pinion represented here alongside there are no differences.

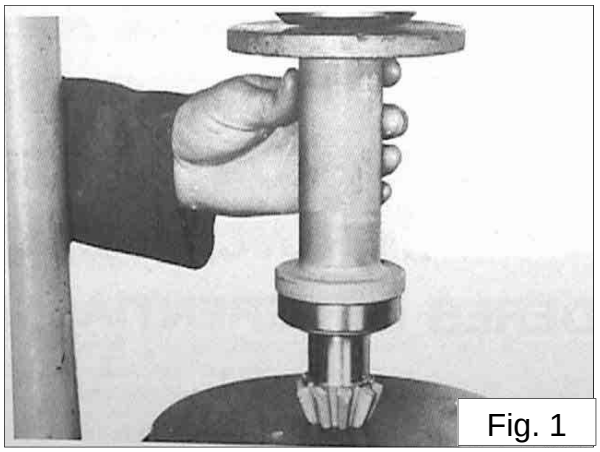


Fig. 1

The first thing to do is to pre-assemble the pinion as illustrated in fig. 1, using the plugs shown in fig. 2.

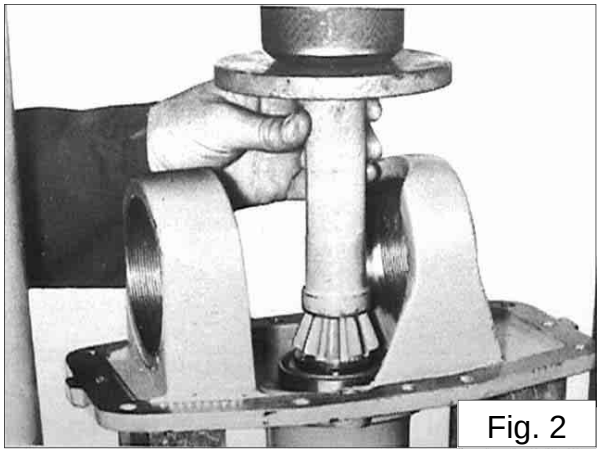


Fig. 2

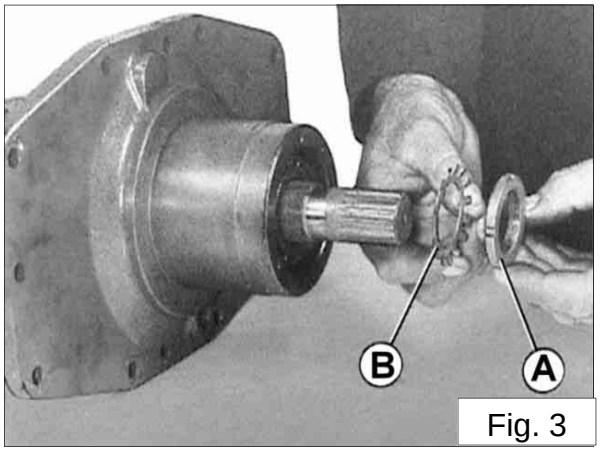
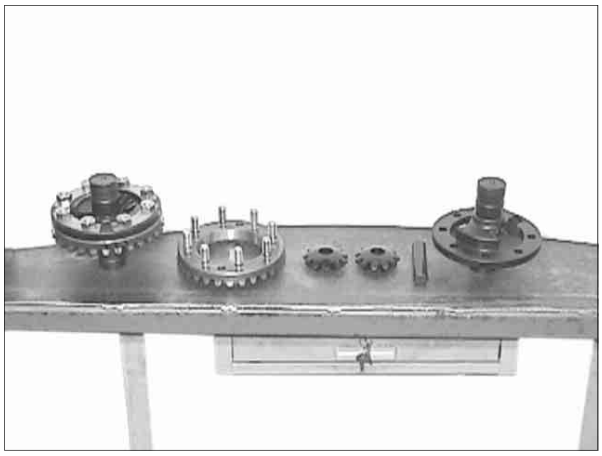


Fig. 3

After having tightened ring nut **A** and tapped on the bearings with a plastic hammer in order to bed them, unscrew the ring nut again and re-tighten ring nut **A** of fig. 3 to a 4 Kgm torque value then punch it to prevent it from working loose.
This ring nut must be replaced whenever the unit is disassembled. The pinion must turn in a regular way (not too stiffly).



The next thing to do is to pre-assemble the bevel ring gear as shown in fig. 4.

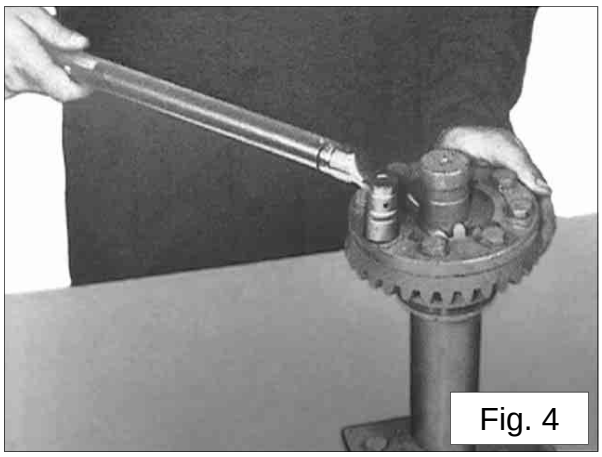
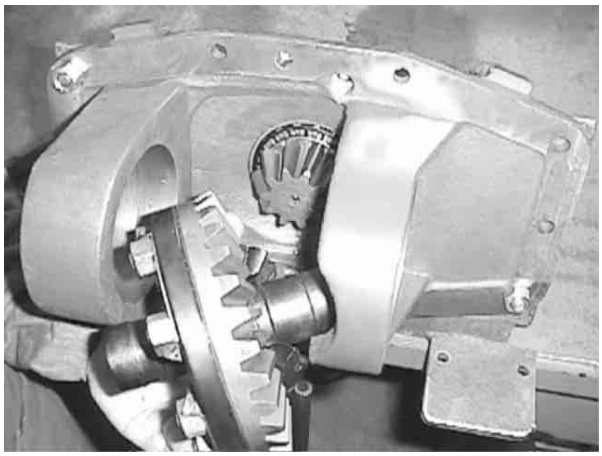


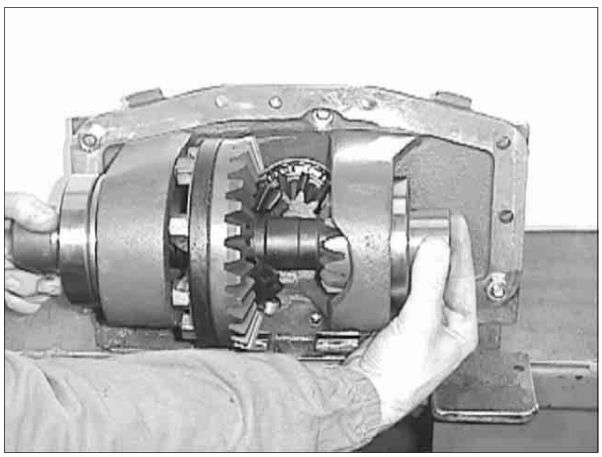
Fig. 4

Fit the safety pins in the relative housings so that the safety plates keep them in position. Tighten the M 12 screws that fix the ring gear to the shaft to an 8.5 kgm torque value as illustrated in fig. 4, then clinch the plates around the screws to prevent them from accidentally working loose.

Assemble the bevel ring gear unit and tighten the ring nuts as shown in fig. 5.



The bearings are a special type. Make sure that they are installed in the right direction.



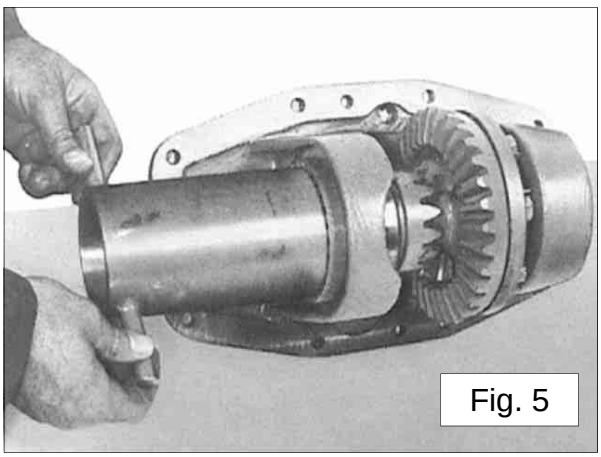


Fig. 5

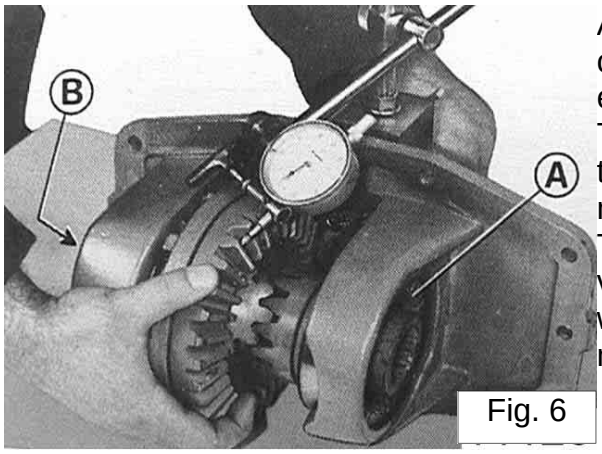


Fig. 6

A good adjustment of the pinion-crown coupling requires a pre-load on the differential of 1.9 kgm through the ring nuts A-B.
To adjust the coupling use the ring nuts, to the same extent, keeping the above-mentioned pre-load.
The clearance between the pinion and bevel crown wheel must be checked on the whole circumference and this clearance must be in the range 0.10-0.18 mm.

For a correct coupling, follow the indications on the following pages.

After adjusting the pinion and the crown, it is necessary to adjust the differential.
Unscrew the ring nut A of fig. 6 by about 3 notches, removing the pre-load and thereby obtaining a clearance between the crown wheel and planet gear of 0.16-0.17 mm.
After making this adjustment, lock the ring nuts with the safety locks C of fig. 7; make sure the differential turns freely.

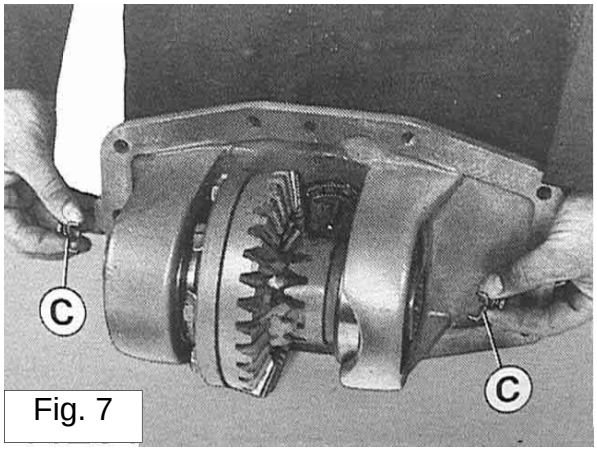
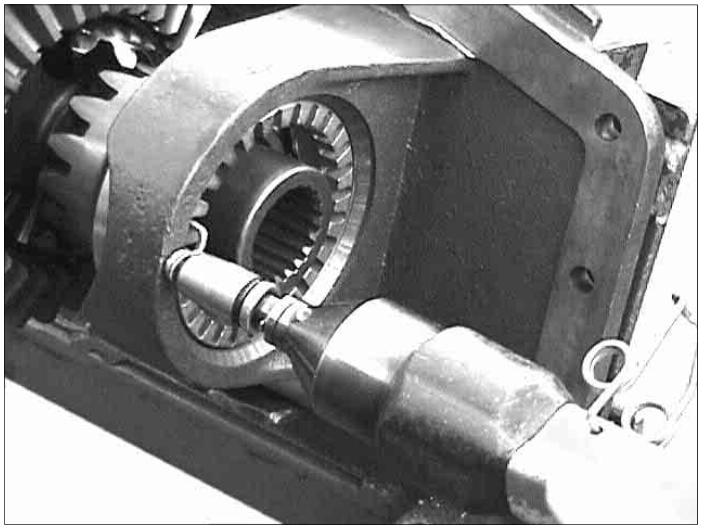


Fig. 7



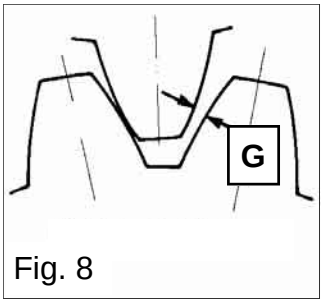


Fig. 8

Fig. 8 – To obtain a good coupling, play **G** between the pinion and ring gear must be between 0.10 and 0.18 mm.

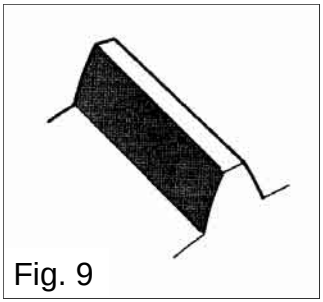


Fig. 9

Fig. 9 – Correct adjustment: contact between the teeth must be uniform throughout the entire length.

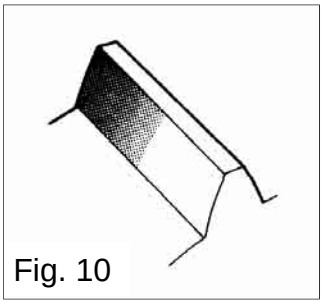


Fig. 10

Fig. 10 – The pinion is in an excessively forward position and works on the root of the tooth too much: this means that the bevel gear pair must be replaced.

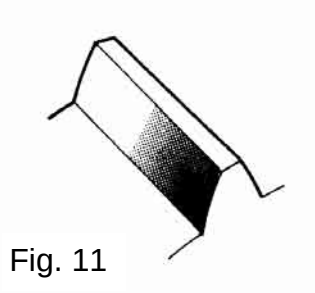


Fig. 11

Fig. 11 – The pinion is in an excessively retracted position and works on the crest of the tooth too much: add 0.2 mm shims between the bearing and casing.

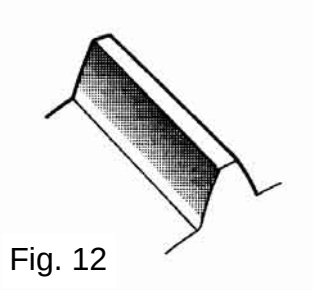


Fig. 12

Fig. 12 – The ring gear is too far from the pinion and works on the crest of the tooth. Unscrew ring nut **A** of fig. 6 and tighten ring nut **B** to an equal extent.

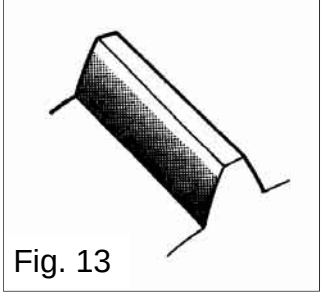


Fig. 13

Fig. 13 – The ring gear is too near the pinion and works on the root of the tooth. Unscrew ring nut **B** of fig. 6 and tighten ring nut **A** to an equal extent.

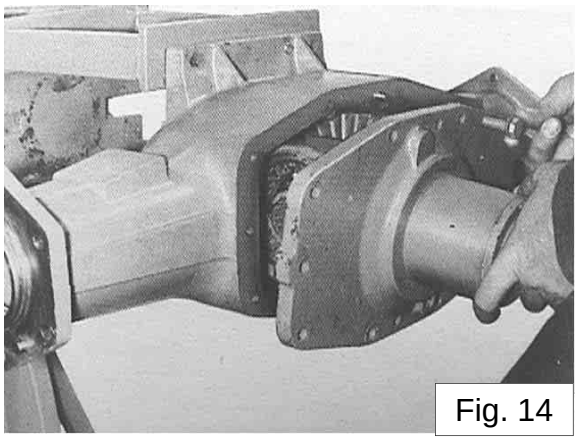


Fig. 14

First assemble the differential unit and then proceed by assembling the front axle.
Fig. 14 to fig. 17 illustrate the various assembly phases. It is worthwhile paying particular attention to the way the front side final drives are pre-assembled. The instructions are given on the next page.
Instructions about how to adjust the steering cylinder are also given so as to ensure correct wheel toe-in and tyre wear as well as a correct steering position.

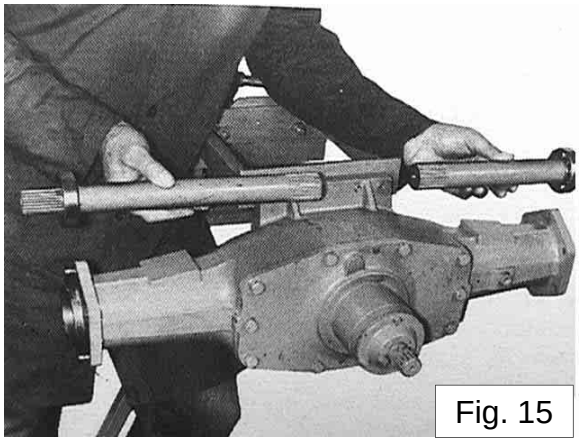


Fig. 15

Many of the seals made with O-Rings must be strengthened with silicone to prevent oil from oozing out. This will be specified when required.

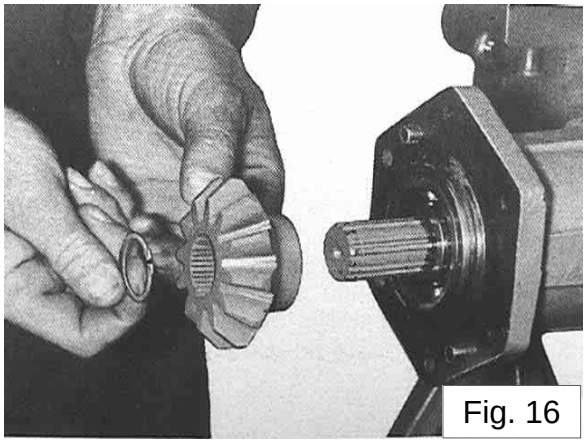


Fig. 16

In fig. 17, adjuster screw **K** is used to adjust the front axle end of travel positions.

This adjustment must be made on the tractor to suit the tyres mounted and the conditions in which the tractor is used.

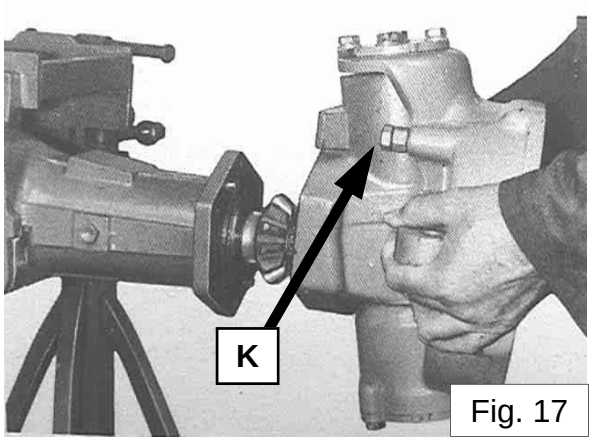


Fig. 17

The steering system of the tractor can be regulated by means of these adjuster screws and by fitting spacers under the pads that limit the longitudinal pivot of the front axle, modifying the minimum turning radius or the axle's longitudinal pivot as required (depending on the slope on which the tractor operates, the type of soil worked, the implements hitched, etc.).

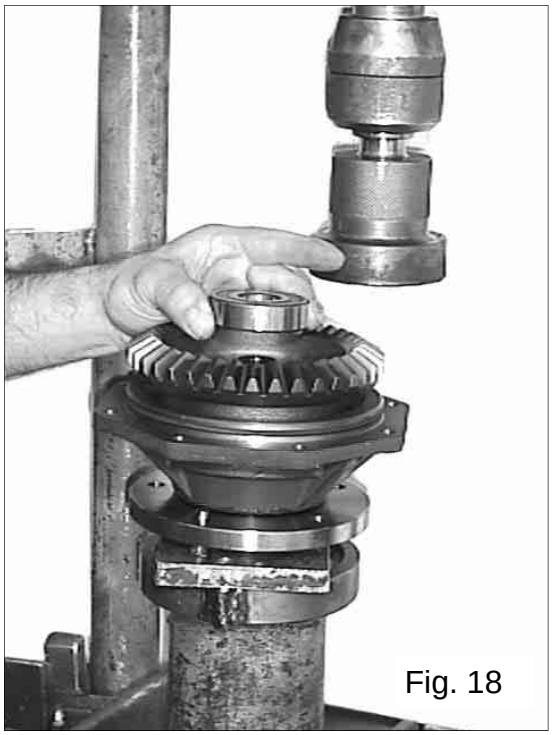


Fig. 18

The bevel ring reduction gear must be pre-assembled on the front final drives as illustrated in fig. 18, with the aid of a press able to exercise a thrust of at least 500 kg.

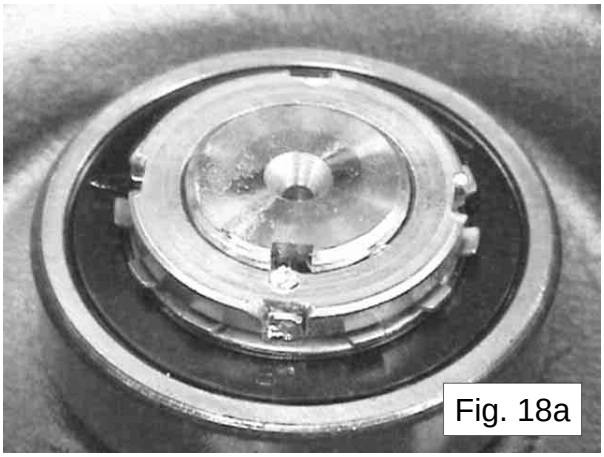


Fig. 18a

As shown above, the bevel ring gear must then be locked in place by tightening the ring nut to a 15.0 kgm torque value to prevent it from accidentally working loose.

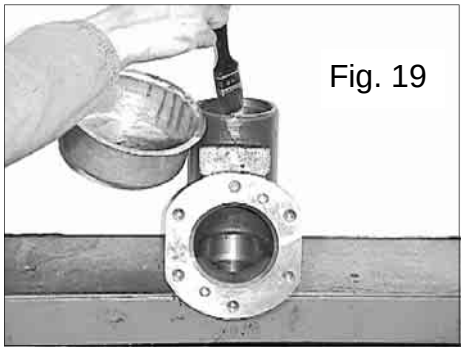
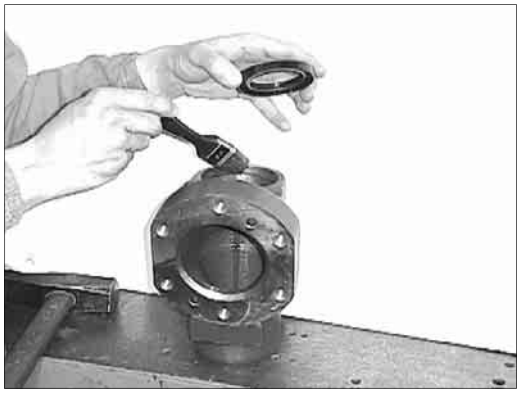
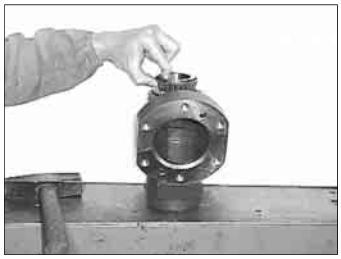


Fig. 19

Once the ring gear has been pre-assembled, proceed by assembling the central part of the front reduction gear as shown in the sequence illustrated alongside and using a plug and circlip pincers. The seals and taper bearing are shown in detail in the assembly drawing of fig. 24.





The sequence illustrated alongside and on the following pages shows how the reduction unit of the low version is assembled.
The assembly operations for the high version are not much different; neither are the adjustments nor the sequence.

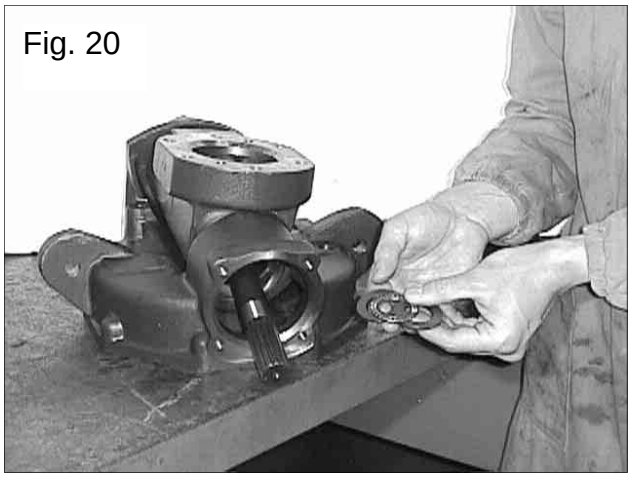


Fig. 20

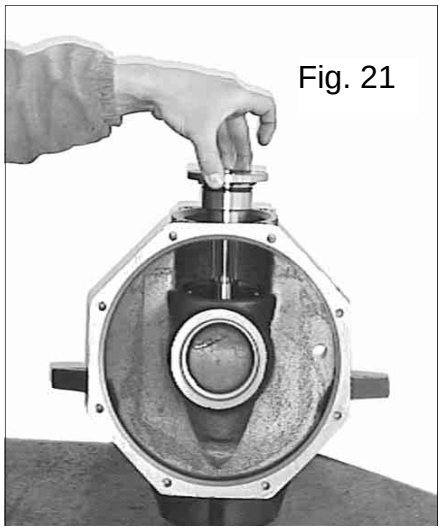


Fig. 21

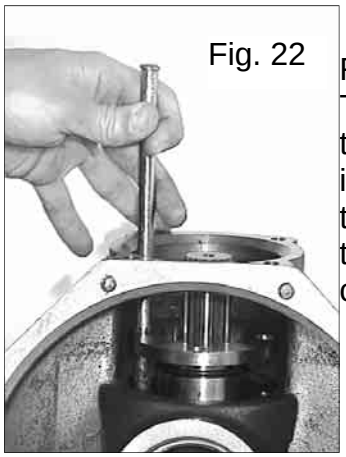


Fig. 22

Fig. 20 – 21 – 22 illustrate the following assembly phases. The only precaution that needs to be taken is to oil the seat of the pin of fig. 21 before inserting it in its seat. Part B of fig. 24 is the one positioned in fig. 21 and 22 and the screws fixing the part must be tightened to 5 kgm., taking care to silicone them to prevent oil leaking from the thread. In Fig. 22 the centring pin is positioned.

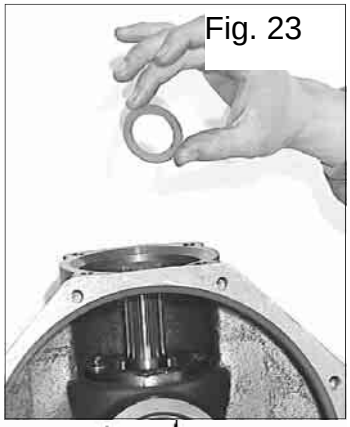


Fig. 23

In fig. 20 the roller cage is fitted (part D of fig. 24) and afterwards part A of fig. 24 that positions the roller cage and the tapered bearing.
Fig. 23 shows the spacer (part E. of fig. 24) fitted inside the reduction gear before the shaft.

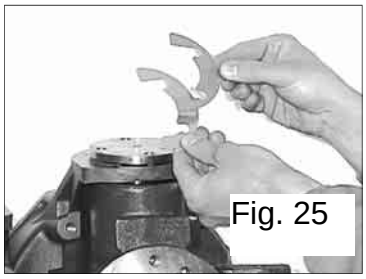


Fig. 25

Part A of fig. 24 at the time of assembly must be shimmed with the spacers of fig. 25 .
The fixing screws of part A must be tightened to 6 kgm

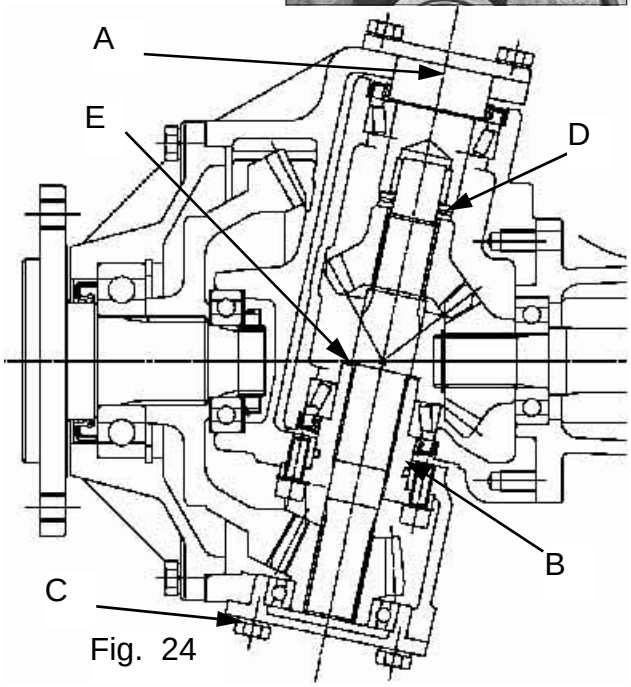


Fig. 24

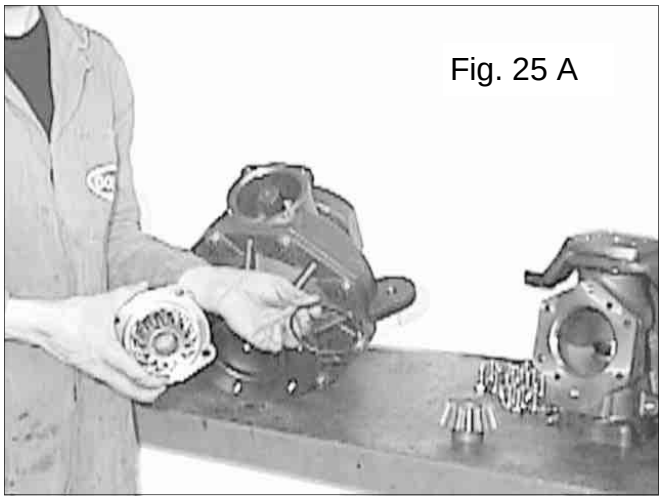


Fig. 25 A

After having tightened the screws that fix part **A**, install the bevel gear as shown in fig. 25 and tighten the screws that fix the cover that supports the gear and lower bearing to a 6 kgm torque value.
To correctly tighten the 8 screws that fix the ring gear, begin by tightening two opposite screws so as to correctly distribute the torque value around the entire perimeter of the final drive cover and prevent the O-Ring from being pinched.

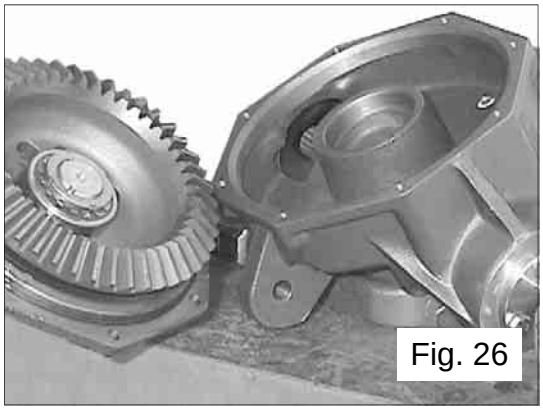


Fig. 26

The screws must be tightened to a 9 kgm torque value. Do not forget to position the centering pin on the final drive cover.

When the transmission bevel gear of fig. 2-5A is assembled, carefully apply silicone to the supporting cover to prevent oil leaks from the base of the final drive.

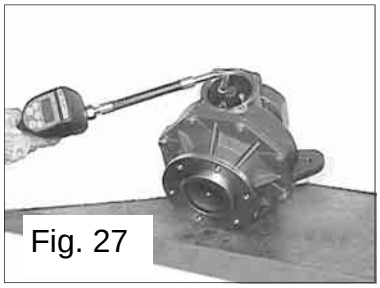


Fig. 27

Once the ring gear has been pre-assembled, pour 1.8 liters of SAE 80-90 W oil into the final drive as illustrated in fig. 27 (the oil must be of the same type used in the gearbox for the max version).
Carry out the assembly operations illustrated in fig. 28, tightening the stud bolts to a 6 kgm torque value and thus concluding the pre-assembly operations for the front final drive.
Pre-assemble the steering wheel's end of travel adjuster screws, which will be regulated after assembly on the tractor to suit the type of tyres used.
Fig. 28 shows the oil level plug on the final drive. Teflon should be wrapped around it to prevent leaks.

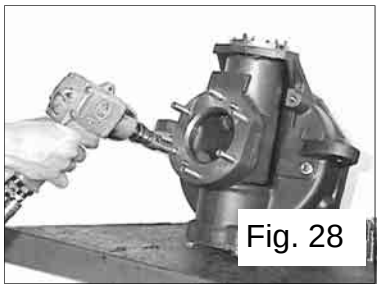


Fig. 28

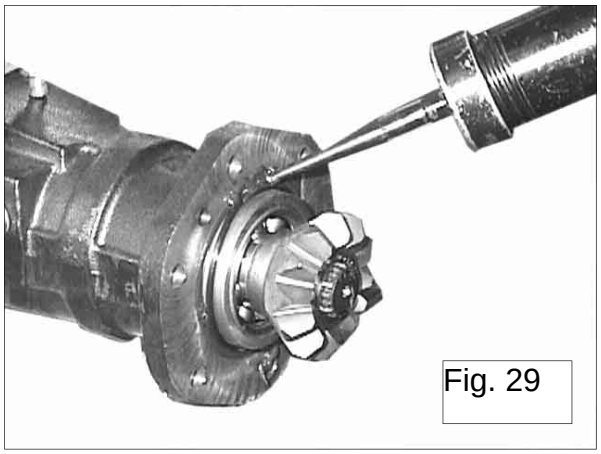


Fig. 29

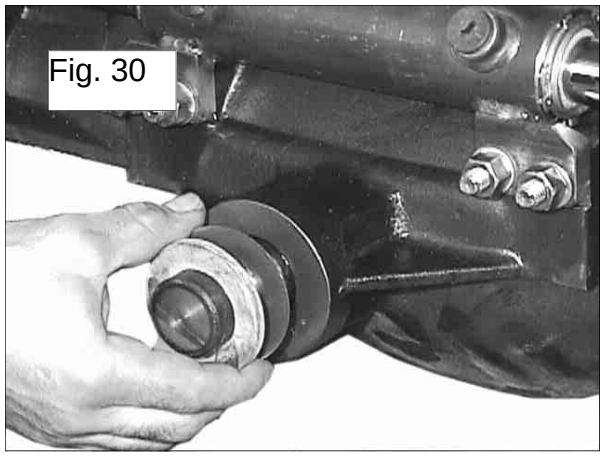


Fig. 30

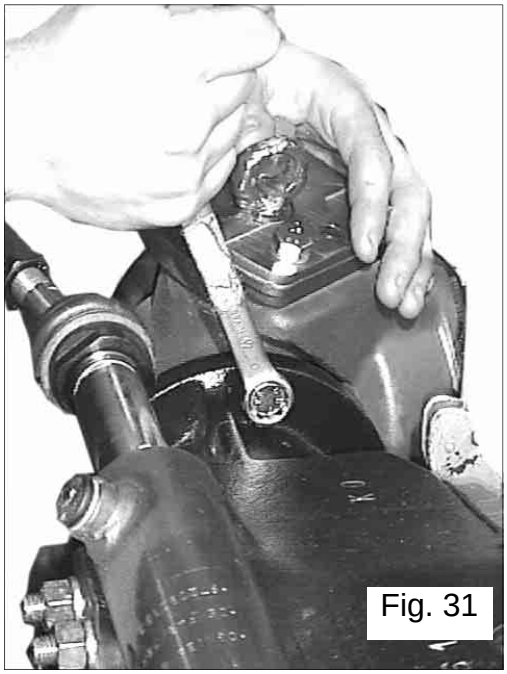


Fig. 31

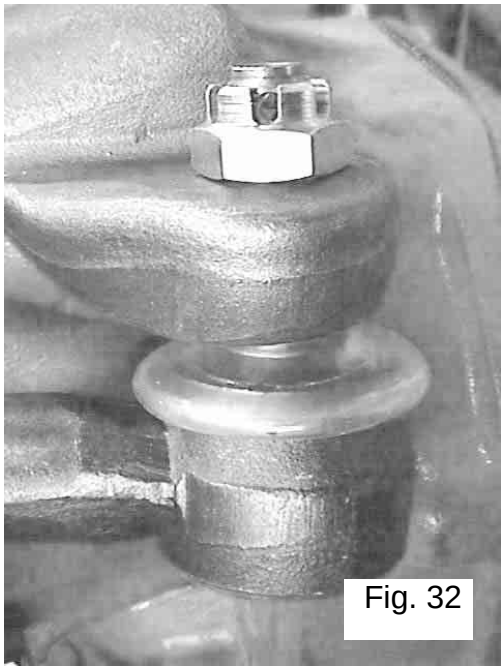


Fig. 32

As illustrated in fig. 29, silicone the axle support, not forgetting the pre-assembly of the spacer illustrated in Fig. 30.

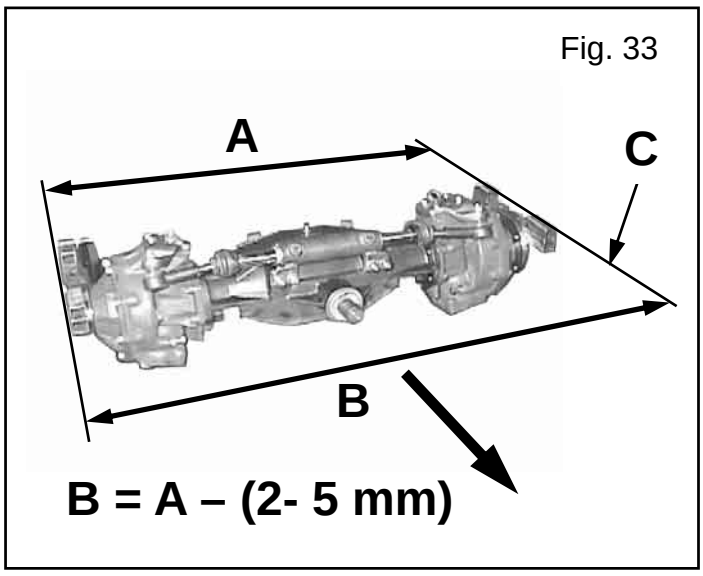
Tighten the screws that fix the front reduction gear to the axle support as illustrated in fig. 31 to 6 kgm.
Fit the slotted nuts and split pins on the steering arms illustrated in fig. 32.

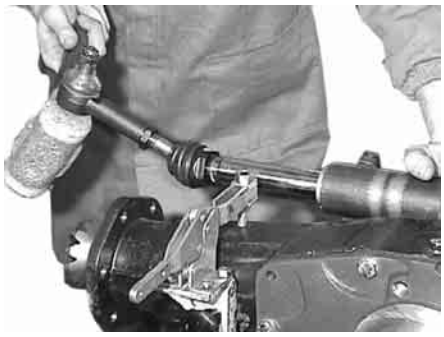
Complete the axle by filling the axle support with approximately 3 litres of SAE 80-90 W oil. (for the MAX, see above).

Adjust the toe-in as illustrated in fig. 33, taking care to respect the distances shown in the figure.
The two rods B (fig. 33) are 80 cm long.

To obtain these distances, adjust the steering arms and, after making the adjustment, lock the

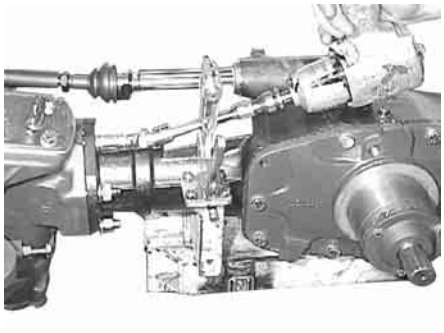
Fig. 33





The sequence illustrated alongside, shows some of the front axle assembly phases described on the previous pages.

The pictures show certain tyres of wrench that make the various axle components easier to lock in place. The last picture at the bottom shows the breather screw on the top part of the axle which is installed with a 2 kgm torque value with a copper washer in between.



When the side final drive is fitted to the axle housing, use lifting equipment and fix the opposite part of the axle so that the weight of the first final drive applied does not cause the axle itself to overturn.

In a similar way to the side final drives, use a syringe to squirt oil into the axle housing.


Fig. 38

Fig. 38 alongside shows the components of the NO – SPIN front differential lock.

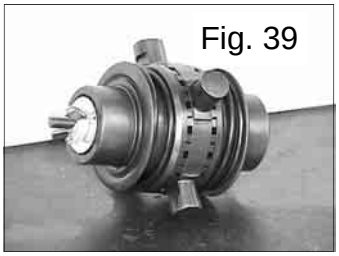


Fig. 39

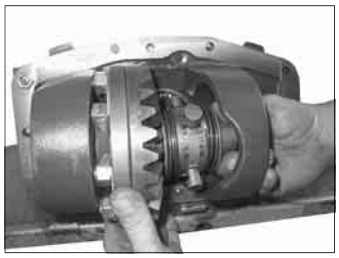


Fig. 39 shows the differential unit inside the ring gear before its housing is assembled.

Comply with the positions shown by the two marks on the two half-casings when the NO - SPIN differential unit is installed in the housing itself.


Fig. 34

Figs. 34 and 35 shows how the front bevel pinion is assembled in the NO – SPIN version.
The ring nut that fixes the bevel pinion must always be tightened to a 4 kgm torque value.
The front final drives are always assembled as illustrated on the previous pages for both the high and low versions.

Comply with the instructions given previously for the basic version when the front bevel gear pair is adjusted.
The number of teeth in the bevel ring gear varies in relation to the basic version so as to give a greater lead to the front axle and facilitate the way the device operates.


Fig. 35

Make sure that the taper bearing operates smoothly after having tightened the ring nut and once the bevel pinion has been assembled and bedded by a few strokes with a plastic mallet.

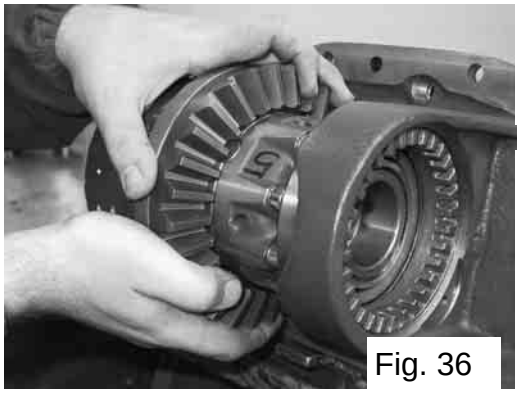


Fig. 36

The smaller size ring nut (M 102x2) should be tightened and then unscrewed 3 positions.
The opposite ring nut should also be fully tightened, then unscrewed and tightened to a 3 kgm torque value with a torque wrench.


Fig. 37

Once the assembly has been locked in place, check how the device operates with the aid of two levers as illustrated in fig. 37.

When the two axle shafts connected to the differential turn at the same speed (over a straight distance), the differential lock is engaged.


Fig. 40

When the two axle shafts turn at different speeds (turning phase), the differential lock is disengaged and one wheel turns freely in relation to the other.

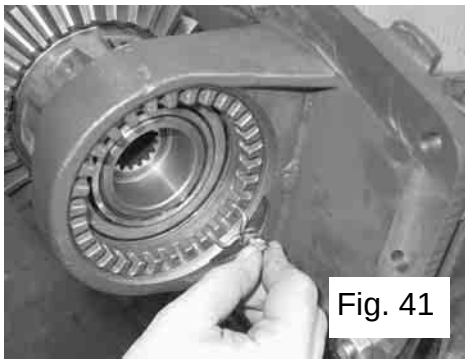


Fig. 41

Fig. 42 shows the two reference marks on the half-casings. They must be kept in position-when the differential unit is assembled.

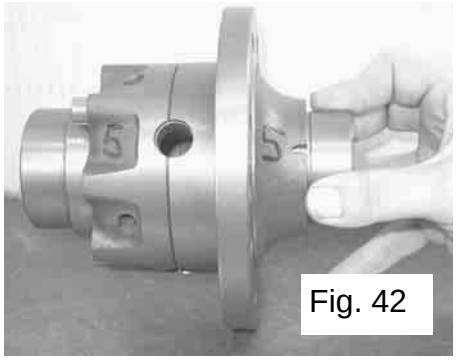


Fig. 42

Fig. 40 shows how the two half-casings that enclose the differential unit are joined together.
The two casings must be tightened against each other with a 5 kgm driving torque.

Fig. 41 illustrates a detail of how the retainer that positions the ring nuts at the sides of the differential is assembled. This retainer is also installed in the version without the NO - SPIN option.

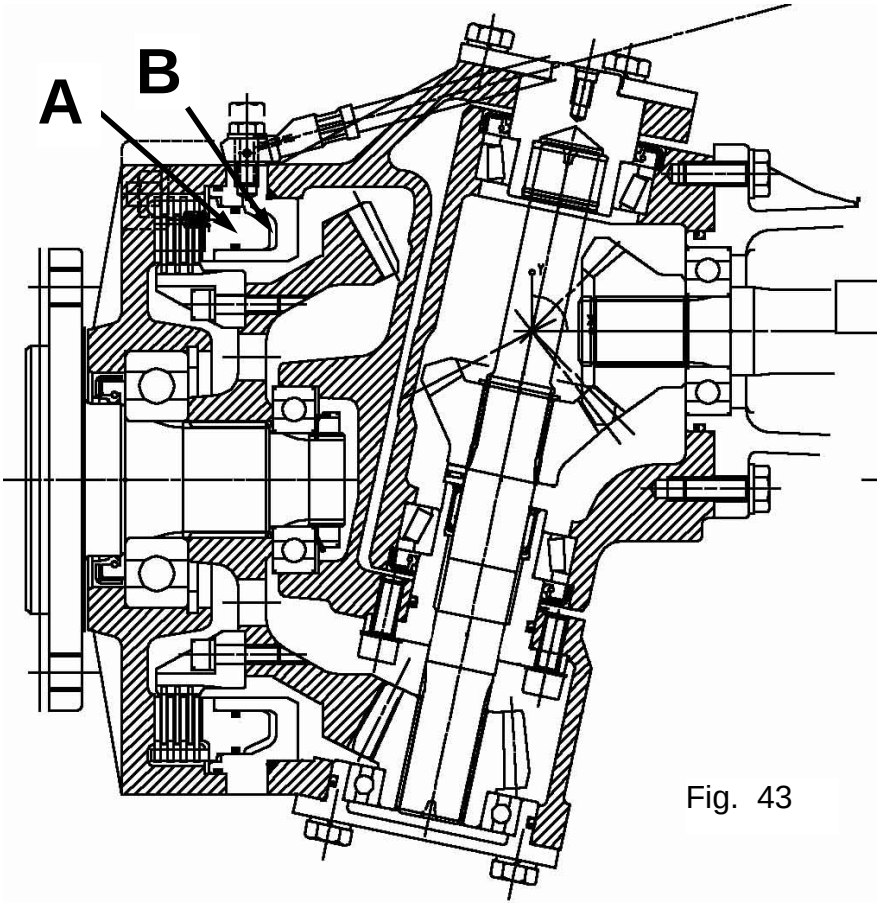


Fig. 43

In both the high and low versions, as already mentioned, the front axle with braking is available. (MAX version).
Fig. 43 shows the assembly drawing of the front reduction gear equipped with braking.

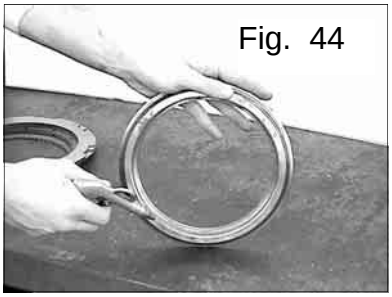


Fig. 44

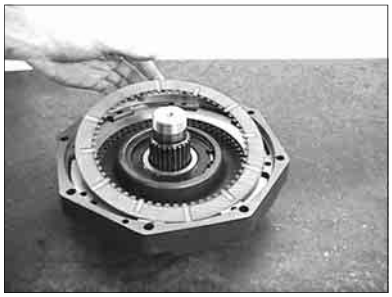


Fig. 45

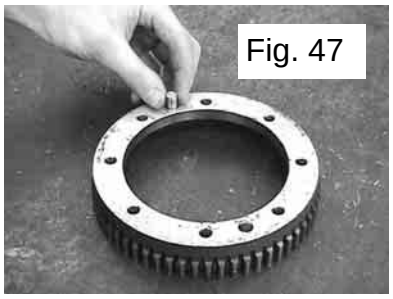
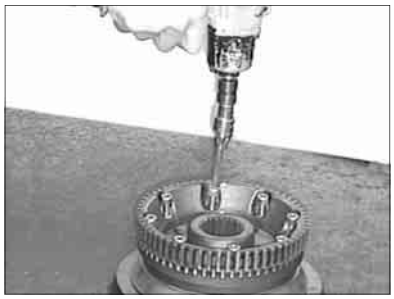


Fig. 47



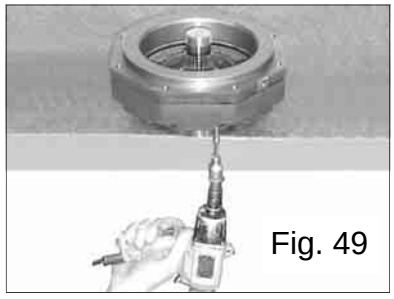


Fig. 49

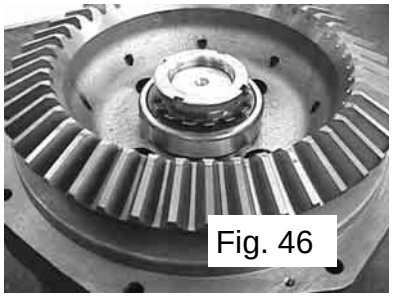
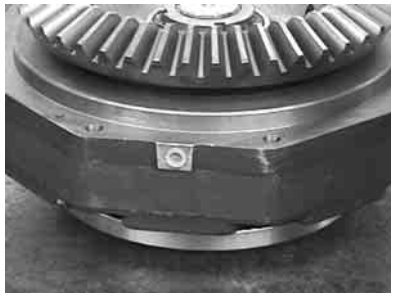


Fig. 46



The sequence illustrated on the previous page shows how the front final drive with front braking option is assembled. The sequence shows the various assembly phases, beginning with the first operations through to the way the final drive is installed on the central spider of the front differential.
When assembling part **A** of fig. 43, take care to ensure that the seals are correctly positioned in their housings (as illustrated in fig. 44)


Fig. 48

The piston (part A of fig. 43) should be carefully fitted into the cylinder without pinching the seals.

As illustrated in fig. 45, do not forget to insert the springs and guiding pins. Make sure that the discs of friction material and the steel ones fit correcting into the housing without slipping sideways.
Fig. 47 shows how the reduction ring gear that supports the brake discs is assembled. The brake disc support should be broached on to the reduction ring gear while the M8x30 fastening screws should be tightened to a 5 kgm torque value.

Fig. 49 shows how the two elements are packed together. Here again, the screws should be tightened to a 5 kgm torque value.
Assembly and tightening of the ring gear's retainer ring nut are illustrated in fig. 46.

The ring nut that fixes the ring gear must be tightened at a 15 kgm torque value and then punched to prevent it from accidentally working loose.
After the ring nut has been tightened, fit the O-Ring on the outside of the final drive and grease thoroughly before assembling the final drive itself, as shown in the last picture of the sequence on the previous page.

During the disassembly phase, always check the thickness of the wear discs of the brakes, which must not be less than 2.6 mm.
Split the cylinder from the piston by blowing into the oil delivery hole.

Make sure that the size of the eight pins with the relative springs (fig. 45) is not less than 22.5 mm. Replace the springs is necessary.

TIGHTENING TORQUES

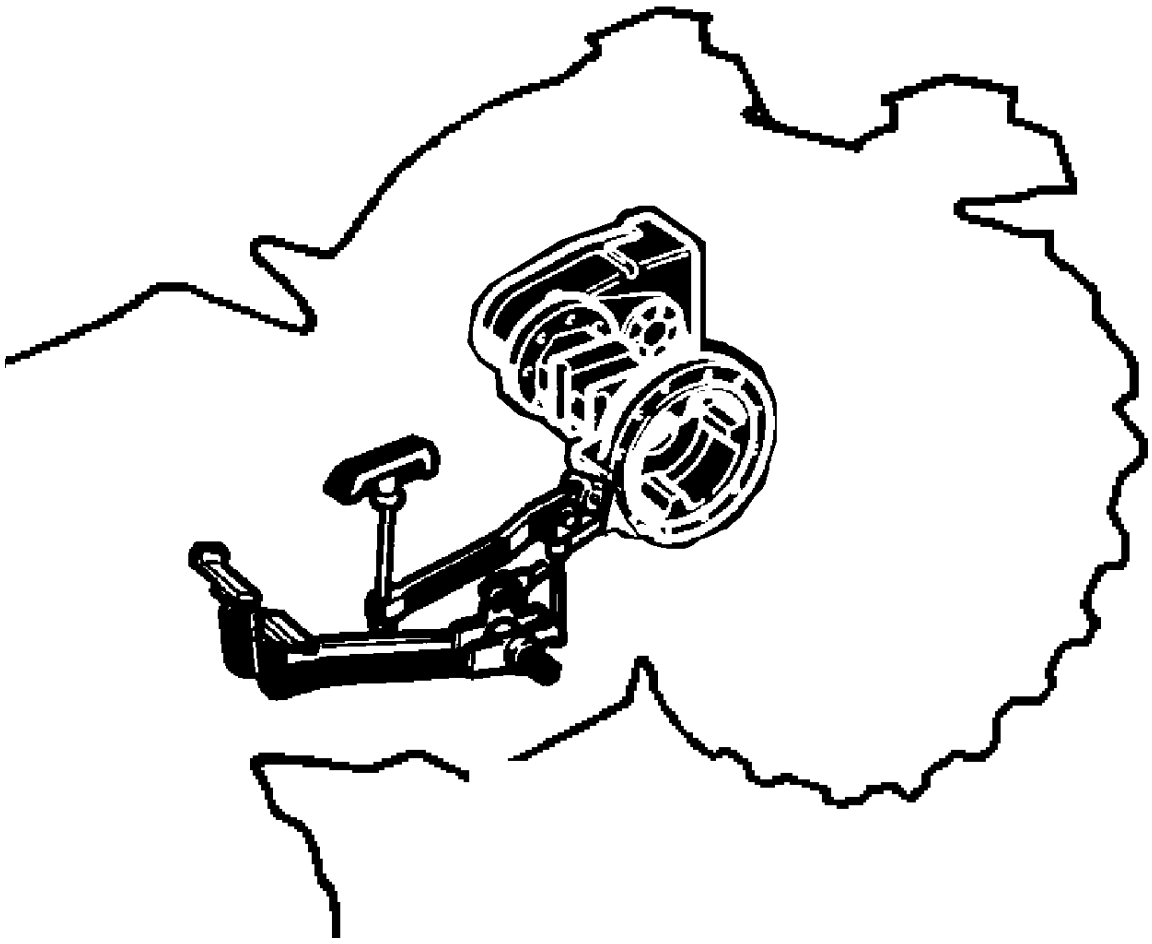
	(kgm)
Ring nut fixing bevel pinion M 35x1.5	4
Screw fixing differential support to the axle M 10x30	6
Screw and nut fixing bevel crown wheel M12	8
Screw fixing final drive axle M 10x30	6
Screw fixing bevel pinion cover M 6x16	1,5
Screw fixing two shells NO-SPIN	5
Ring nut fixing crown wheel	15
Ring nut M112x2	3

LUBRICATION

Oil	ARBOR TRW90 (SAE 80W-90, API GL-5)	3	Litros
Oil (MAX)	ARBOR UNIVERSAL 10W-40 (SAE 10W/40)	3	
Oil	ARBOR TRW90 (SAE 80W-90, API GL-5)	1,8	
Grease	ARBOR MP EXTRA (NLGI2)		

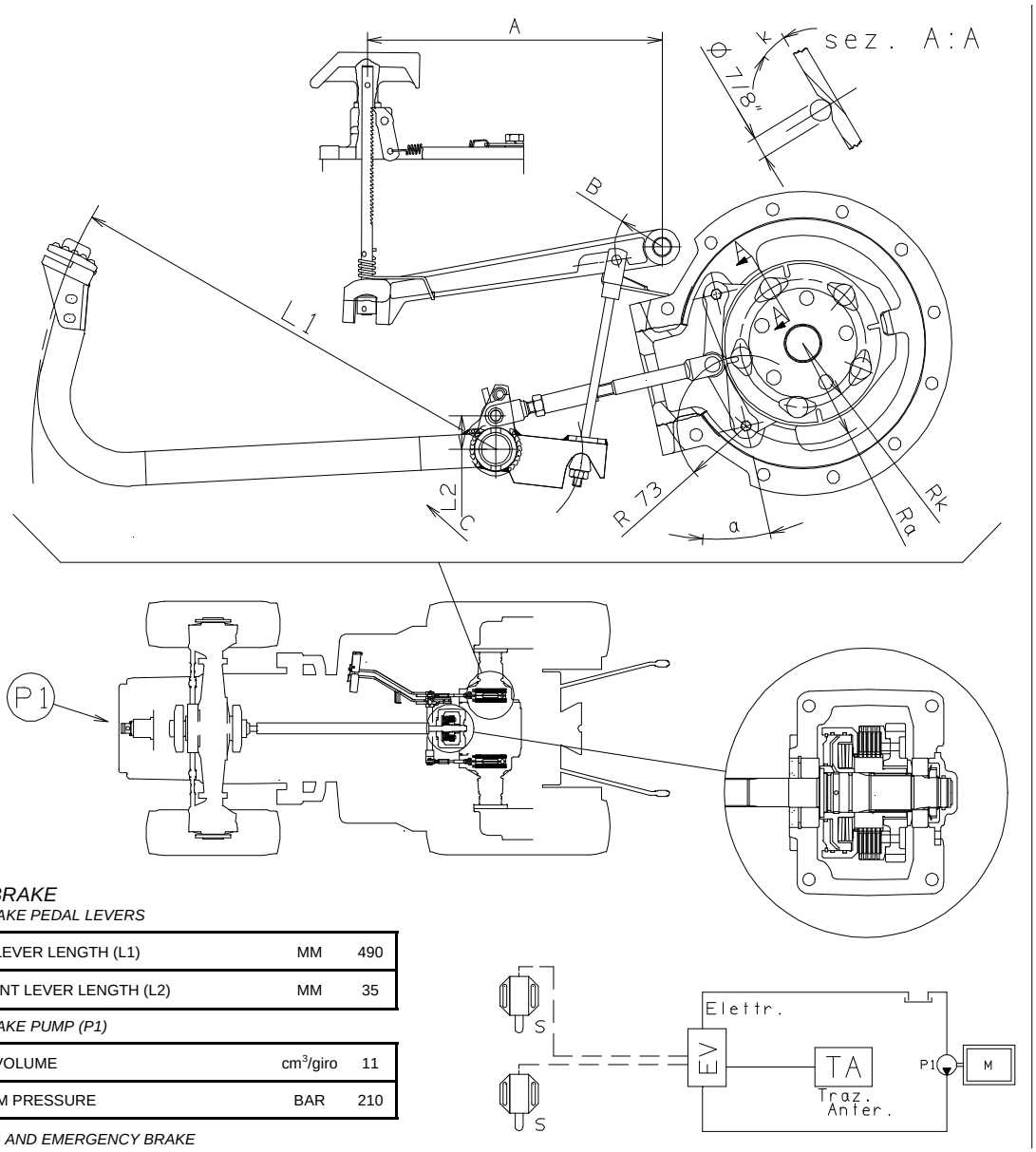
Se aconseja utilizar lubricantes y líquido: ***FL SELENIA***

BRAKES



BRAKING SYSTEMS (VERSION 1)

- MAIN BRAKES :
1) Mechanical braking of the rear axle by means of a mechanical transmission that acts on oil-cooled plates
2) Electrohydraulic engagement of the four-wheel drive by means of oil-cooled multiple plate clutch
- PARKING BRAKE : With oil-cooled plates. This is the same rear main brake with mechanical transmission. It is operated by hand and has a mechanism that prevents the command from being reversed.



MAIN BRAKE

MAIN BRAKE PEDAL LEVERS

ACTIVE LEVER LENGTH (L1)	MM	490
RESISTANT LEVER LENGTH (L2)	MM	35

MAIN BRAKE PUMP (P1)

SWEPT VOLUME	cm^3/giro	11
MAXIMUM PRESSURE	BAR	210

PARKING AND EMERGENCY BRAKE

BRAKE PEDAL ACTIVE LEVER LENGTH (A)	MM	310
BRAKING AREAS (B)	MM	50
BRAKE PEDAL ACTIVE LEVER LENGTH (C)	MM	92

REAR BRAKING ELEMENT

BRAKE PEDAL ACTIVE LEVER LENGTH (Ra)	MM	105
RESISTANT LEVER LENGTH (Rk)	MM	66,5
ACTIVE LEVER APPLIC. ANGLE (ia)		26°
RESISTANT LEVER APPLIC. ANGLE (k)		38°
OUTER DISC DIAMETER (De)	MM	165,25
INNER DISC DIAMETER (Di)	MM	114,3

BRAKING AREAS

AXLE	REAR
N° DISCS PER WHEEL	6
TOTAL AREA	2684,8 cm^2
MATERIAL USED	HDT 303

BRAKING SYSTEMS (VERSION 2 - MAX)

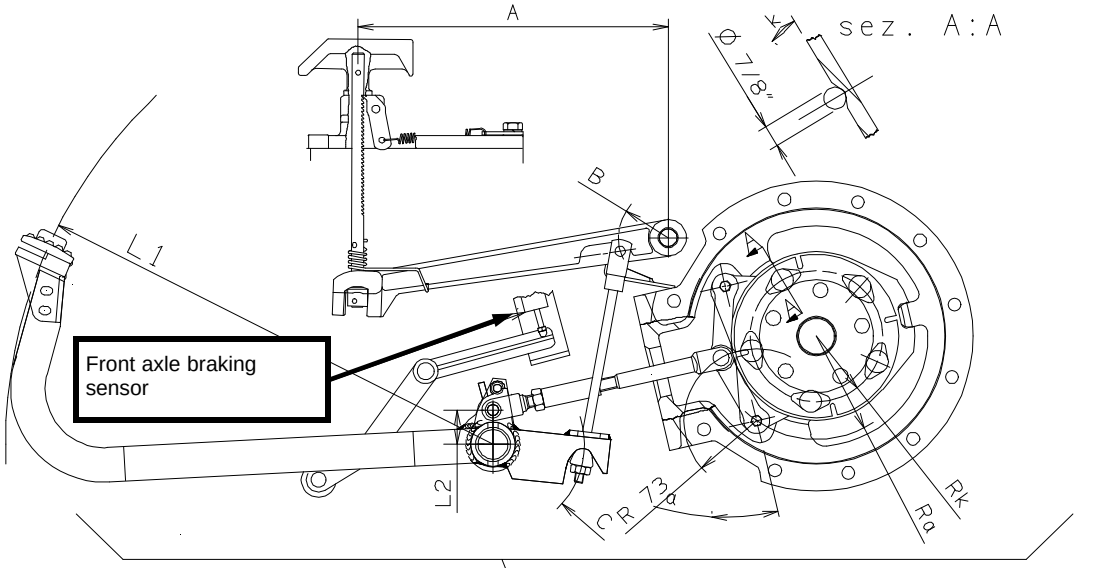
- MAIN BRAKES :

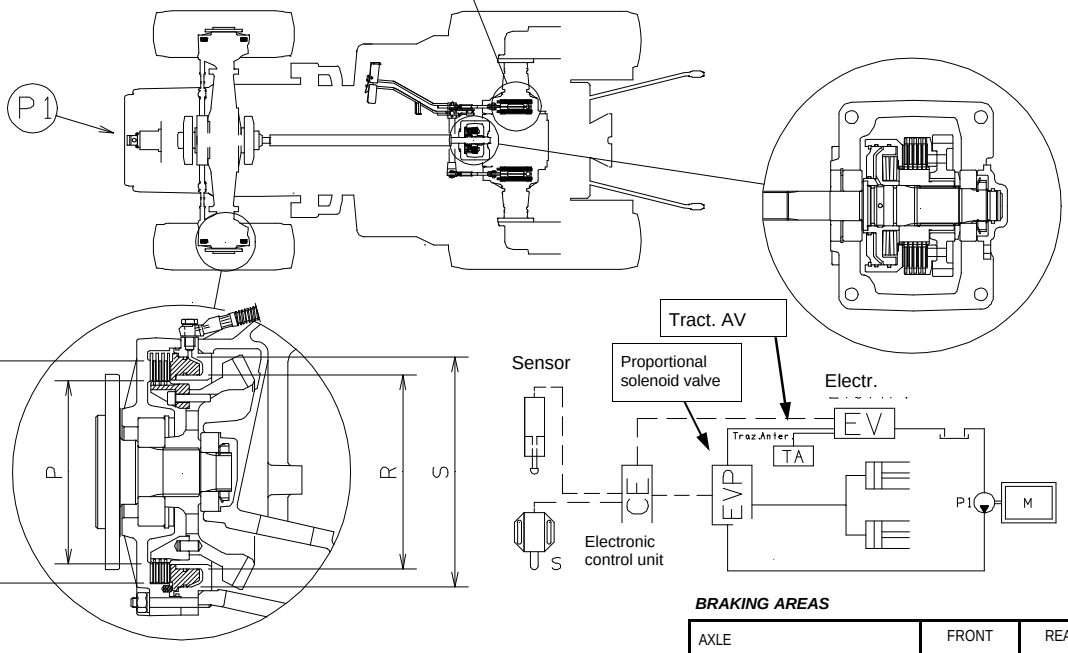
1) Mechanical braking of the rear axle by means of a mechanical transmission that acts on oil-cooled plates

2) Electrohydraulic engagement of the four-wheel drive by means of oil-cooled multiple plate clutch

3) Assisted hydraulic braking of the front axle by means of oil-cooled plates

- PARKING BRAKE : With oil-cooled plates. This is the same rear main brake with mechanical transmission. It is operated by hand and has a mechanism that prevents the command from being reversed.





MAIN BRAKE

LEVIER PÉDALE DU FREIN DE SERVICE		
ACTIVE LEVER LENGTH (L1)	MM	490
RESISTANT LEVER LENGTH (L2)	MM	35

FRONT BRAKE CYLINDER		
MAX. BORE	MM	234
MIN. BORE	MM	197

MAIN BRAKE PUMP (P1)	
SWEPT VOLUME	cm³/tour 1
MAXIMUM PRESSURE	210 BARS

PARKING AND EMERGENCY BRAKE		
ACTIVE LEVER LENGTH (A)	MM	310
RESISTANT LEVER LENGTH (B)	MM	50
BRAKE PEDAL ACTIVE LEVER LENGTH (C)	MM	92

FRONT BRAKING ELEMENT		
OUTER DISC DIAMETER (N)	MM	226
INNER DISC DIAMETER (P)	MM	186

BRAKING AREAS

AXLE	FRONT	REAR
N° DISCS PER WHEEL	3	6
TOTAL AREA cm²	1553,2	2684,8
MATERIAL USED	HDT 303	

REAR BRAKING ELEMENT

BRAKE PEDAL ACTIVE LEVER LENGTH (Ra)	MM	105
RESISTANT LEVER LENGTH (Rk)	MM	66,5
ACTIVE LEVER APPLIC. ANGLE (ia)		26°
RESISTANT LEVER APPLIC. ANGLE (k)		38°
OUTER DISC DIAMETER (De)	MM	165,25
INNER DISC DIAMETER (Di)	MM	114,3

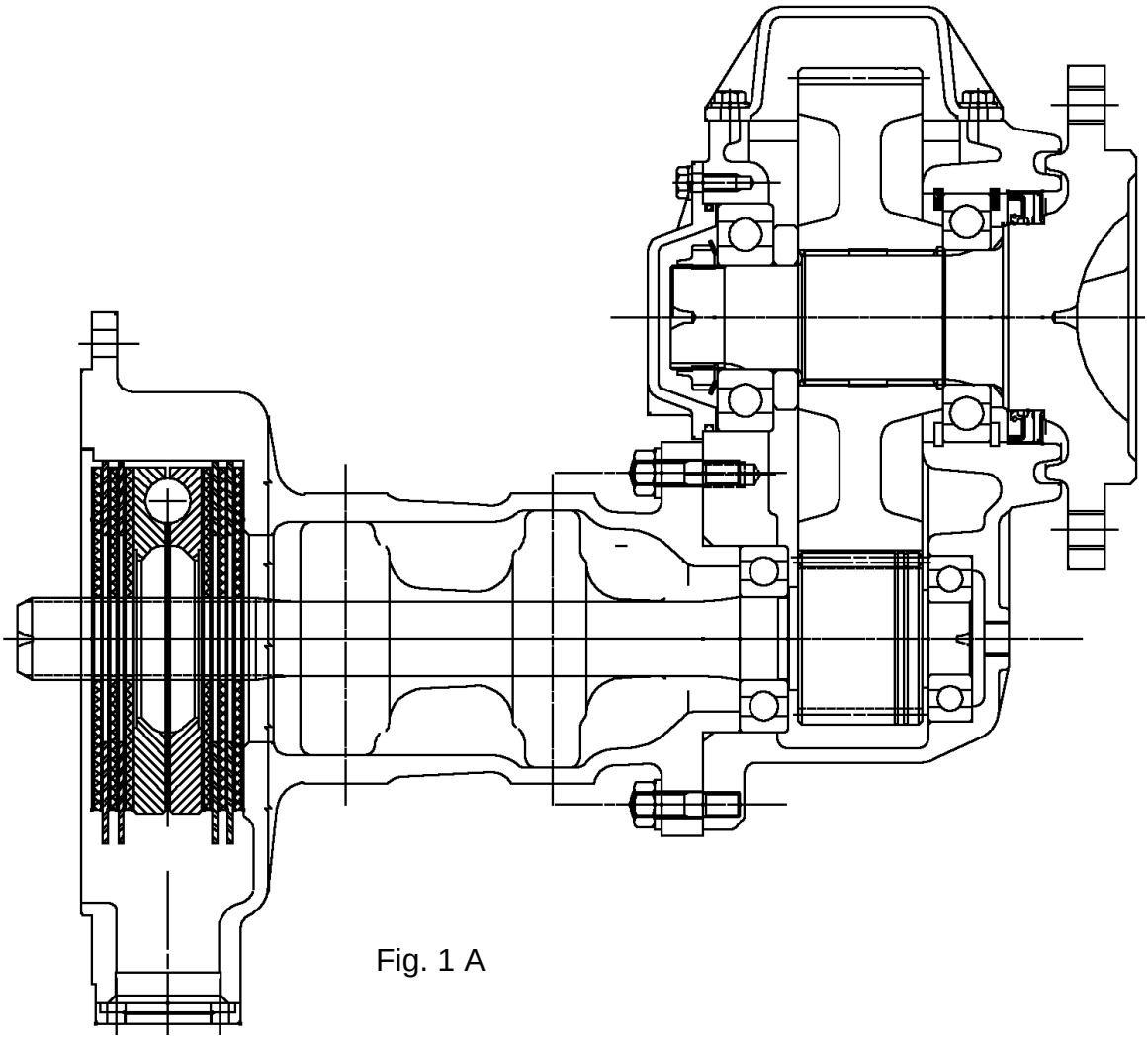
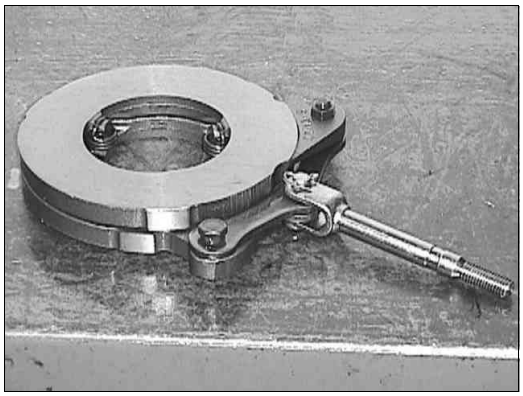


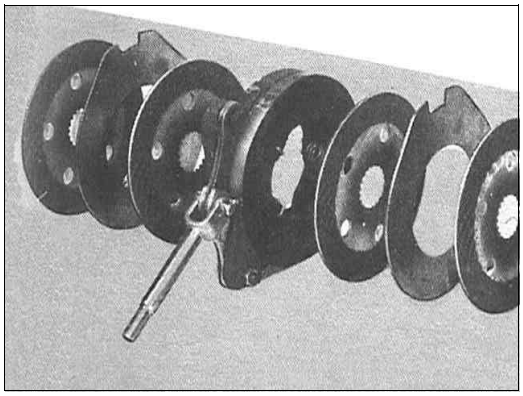
Fig. 1 A

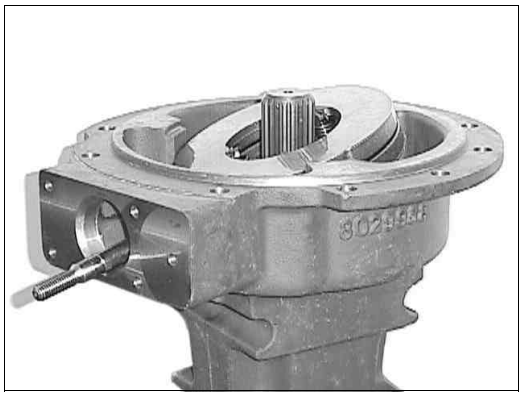
Fig. 1 A shows the constructional layout of the lh rear hub including the braking elements formed by oil-cooled plates.
There are 6 friction plates and 4 steel plates.

There are 2 braking elements on the rear axle while the front axle becomes enbloc, thus braked, with the rear one when the 4-wheel drive function is engaged during the braking phase (with the exception of the MAX. version, which also has front braking elements).

The brake is the expanding type: 2 plates slide on 2 balls that turn in a groove of variable thickness. By means of 2 rods, these turn the pulling action on the link into a rotation and, thus, a thrusting action on the friction plates.
During the braking phase, the link lengthens about 2 mm and this, by means of the brake pedal lever ratio, corresponds to a lowering action of the pedal board by about 35 mm.







HOW TO ASSEMBLE THE BRAKING ELEMENT.

To access the braking element, raise the rear part of the platform, then detach the wheels, the axle shaft supports and the complete final drives.

The friction material of the brake discs must never be thinner than 3.8 mm. If the brake discs are replaced, they must be kept in an oil bath for at least 12 hours before they are assembled.

When the final drive axle shaft supports are fitted back on the differential housing, make sure that the metal plates are correctly positioned as shown in the sequence alongside.

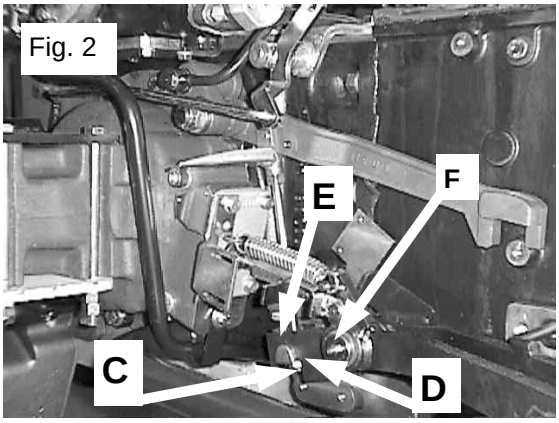
EXTERNAL BRAKE CONTROL LINKS

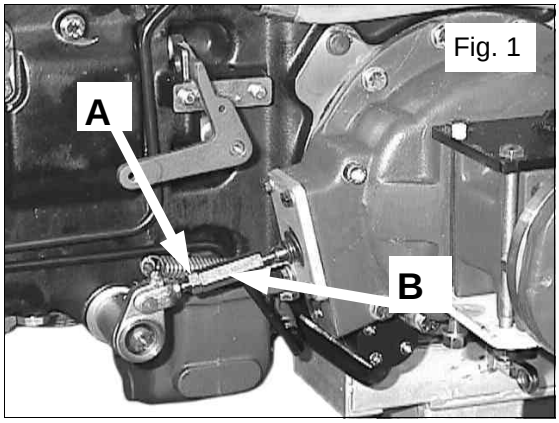
Remove the rear wheels from the machine to access the external links and seals on the controls.
Each braking element has 3 friction plates and 2 metal plates.

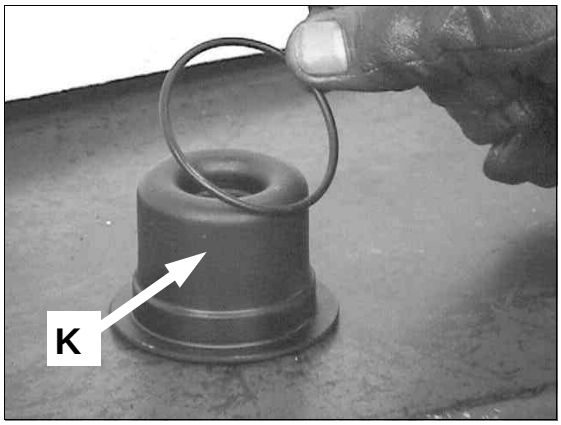
The main brake operates correctly when the braking action begins after about 25-40 mm free travel of the pedal. Proceed in the following way to adjust:
-loosen nut **A** of fig. 1 (see next page),
-adjust by means of link **B,**
-lock nut **A** after the adjustments have been made.
Make sure that the braking action is applied simultaneously on the two wheels. If necessary, make adjustments to the wheel that brakes in advance by loosening the link.

EMERGENCY AND PARKING BRAKE ADJUSTMENT

The emergency brake is correctly adjusted when the control lever travels 2-3 positions. Proceed in the following way to adjust:
-position the control lever as indicated above,
-adjust nut **C** of fig. 2. Until block **D** slightly touches lever **E**.





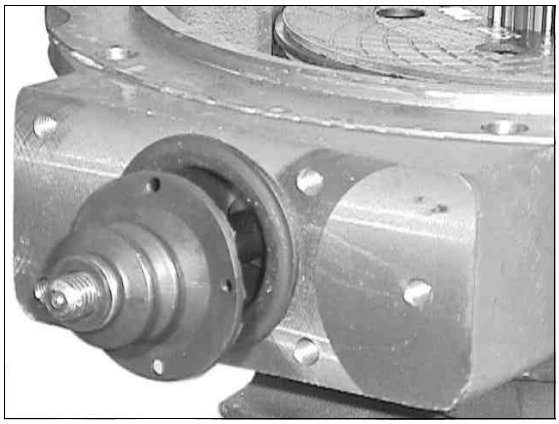


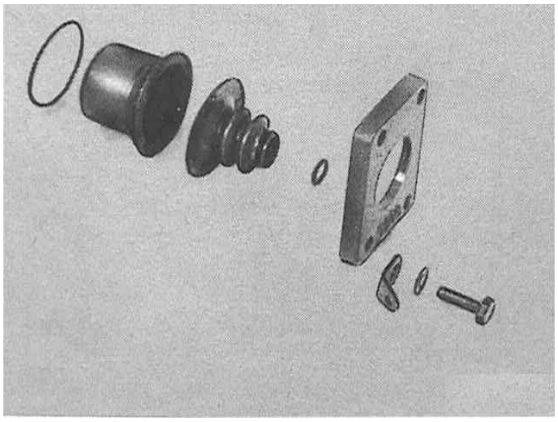
Remove the rear wheels from the machine to access the external links of the main and parking brakes and the seals on the controls.

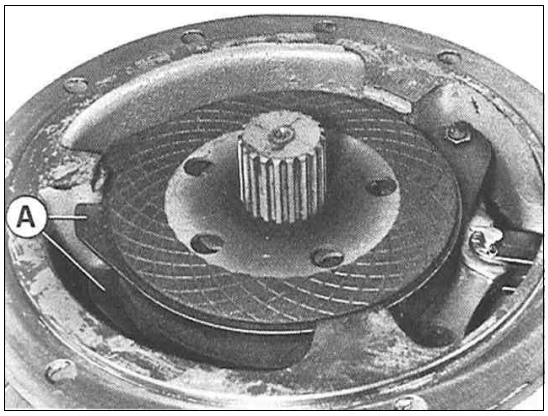
The pictures alongside show how the seals and assembled on the brake link.

Pay particular attention when assembling seal **K** shown in the picture. Apply silicone all round to prevent oil from oozing out.

The aluminium cover that closes the housing of the braking element should be fixed in place with four M 8 screws tightened to a 3 kgm torque value.

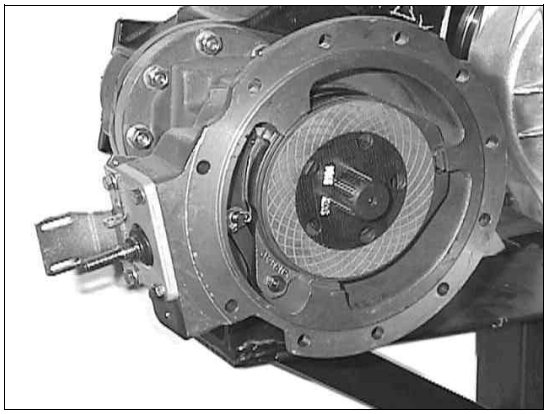






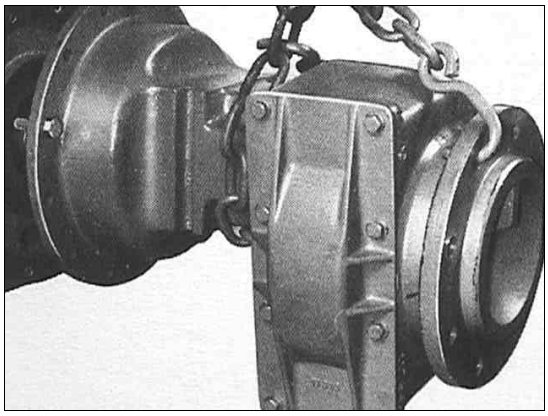
When the hub assembly is assembled on to the differential housing, make sure that metal plates A are correctly positioned inside the casting.

Do not forget to grease the internal bushes that support the brake pedals using grease nipples **F** of fig. 2 (previous page).



The picture alongside shows the assembled braking element before it is applied to the tractor's rear differential housing.

Thoroughly apply silicone to the entire bearing surface between the hub and differential housing.



Assemble the hub using lifting equipment.
Make sure that the wheel hub is installed in the initial position, in a symmetrical way to the other hub (this must also be done for the final drive).
Or mark the position of the final drive housing in relation to the axle shaft support before disassembling the final drive.

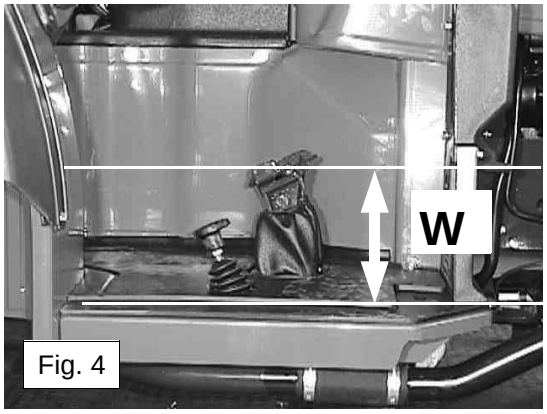


Fig. 4

Fig. 4 shows the main brake pedals when they are not being used.
They are about 15 cm away from the footboard.
When the adjustment is optimal, the pedal will lower 30 – 35 mm from this initial height as it starts to brake.

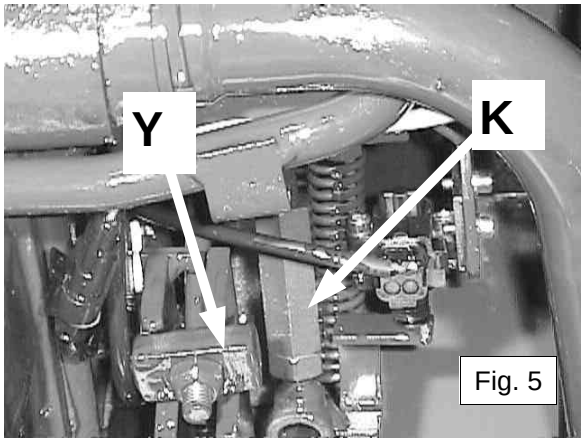


Fig. 5

The two pedals must be adjusted to that they are exactly the same height: only in these conditions will the braking action on the two rear wheels be symmetrical.
To adjust the two brake pedals, tighten or loosen the hexagonal stud bolts K of fig. 5 under the tractor footboards.

Remove the plate that protects the switches (shown in fig. 6) to make these adjustments on the rh side of the tractor.
The hand brake adjuster, shown with the letter Y in fig. 5, can also be accessed in this position.

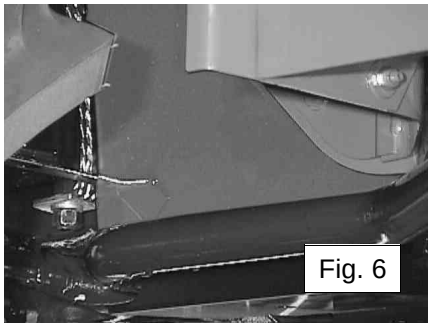


Fig. 6

If the hand brake links are adjusted correctly, the machine will begin to brake after the third position and the indicator light on the dashboard will come on.
Since the hand brake link acts on the two main brake pedals, the four-wheel drive function also engages when the hand brake is applied.

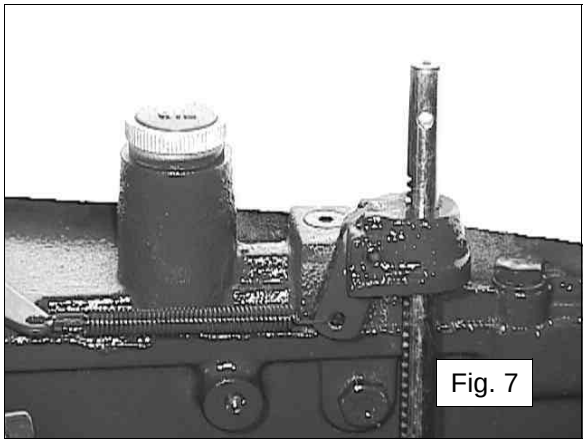


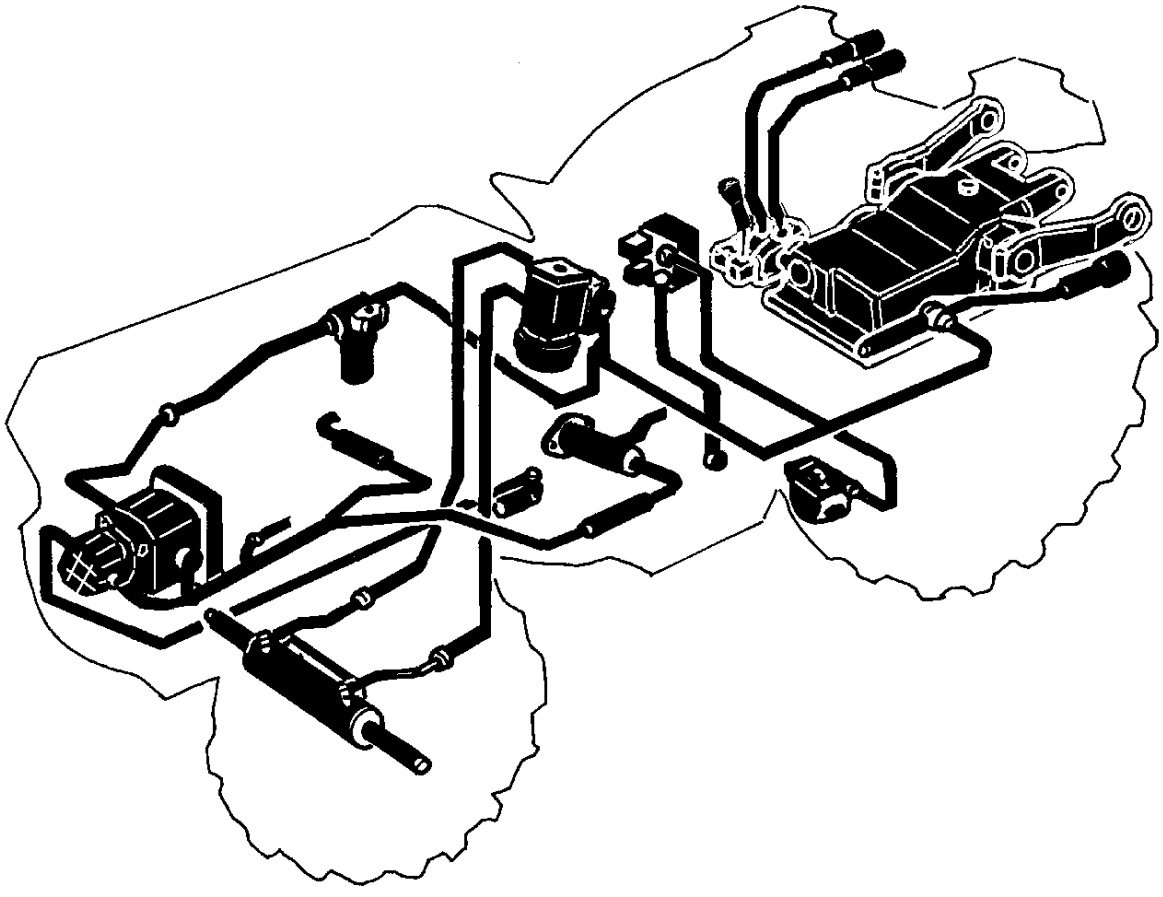
Fig. 7

The hand brake lever is shown in fig. 7.

To prevent the action of the hand brake from hardening and becoming stiff, always keep the selecting mechanism lubricated where the guillotine blade operates.

DRIVING TORQUES	kgm
Screw that fixes final drive axle shaft support to differential housing	8.0
M 8 x 25 oil retainer cover fixing screw	3.0

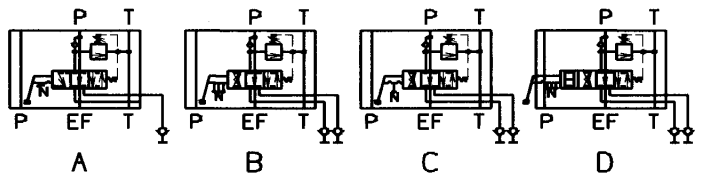
HYDRAULIC CIRCUIT



“BASIC” VERSION HYDRAULIC CIRCUIT LAYOUT FOR STAR Q SERIES TRACTORS

1 - POWER STEERING SYSTEM
2 - MAXIMUM PRESSURE VALVE FOR SERVICE FACILITIES
3 - SOLENOID VALVES TO CONTROL FRONT DRIVE ENGAGEMENT
4 - FORCED GEARBOX LUBRICATION
5 - FLANGE FOR FRONT AUIXILIARY CONTROL VALVES
5.1 - FRONT AUXILIARY CONTROL VALVES
6 - REAR AUXILIARY CONTROL VALVE FLANGE
6.1 - REAR AUXILIARY CONTROL VALVES
7 - REAR POWER LIFT
8 - DIRECT DISCHARGE OF EXTERNAL AUXILIARIES
9 - “LS” VALVE FOR POWER STEERING SYSTEM
10 - FRONT BRAKES
11 - PROPORTIONAL VALVE FOR BRAKES (ONLY ON MAX VERSION)

DIAGRAMS OF FRONT AND REAR AUXILIARY CONTROL VALVE OPTIONS



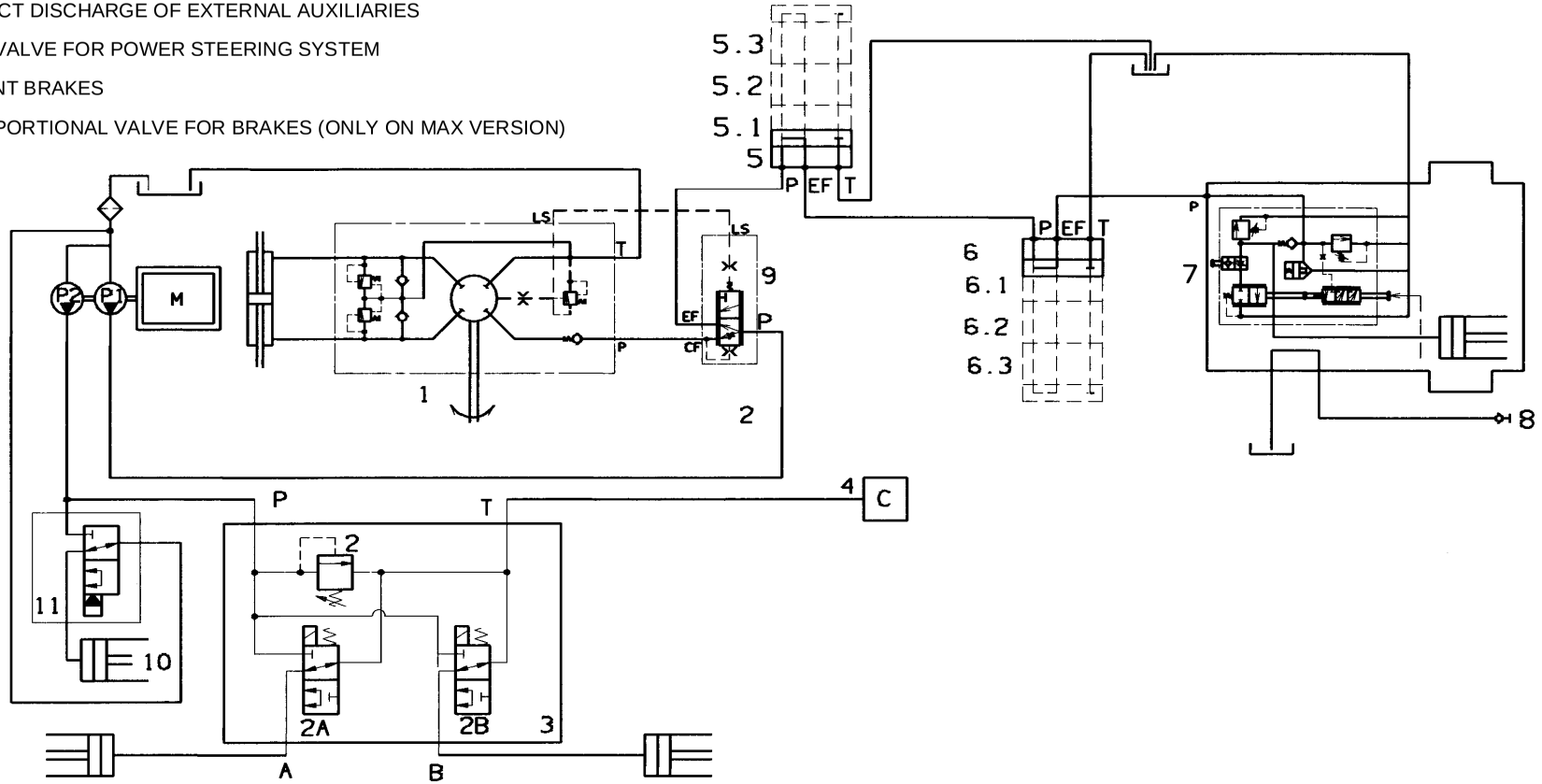


Fig. 1

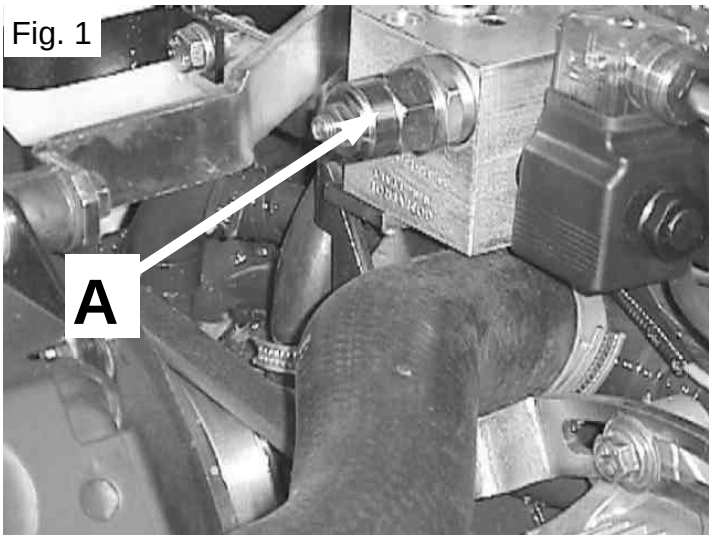
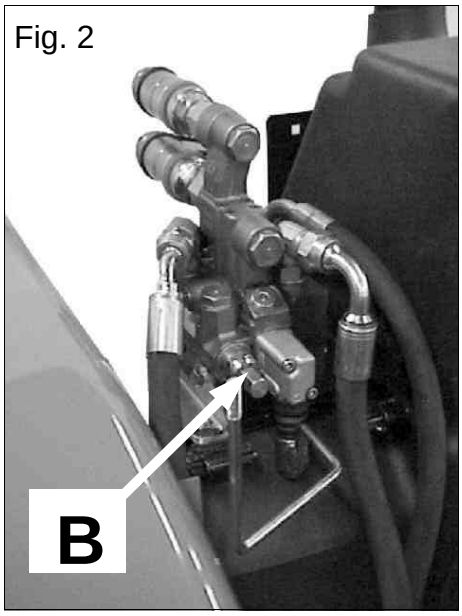


Fig. 1 illustrates the solenoid valve unit that controls the engagement of the four-wheel drive and rear differential lock (Part. 3 of the hydraulic layout on the previous page).
The unit is installed on the engine assembly in two slightly different positions, depending on the type of engine installed.
It can be accessed by opening the bonnet.

The maximum valve indicated by part **A** of fig. 1 is used to regulate the pressure required to engage the four-wheel drive and differential lock.
This pressure value is 40 -0+2 bar and can be checked by applying a pressure gauge to the delivery of the valve unit.
The oil discharged by this group of solenoid valves supplies the forced lubrication function for the tractor's gearbox.
The oil that supplies this group of solenoid valves is provided by the assembly 1 pump with 1.7 cc/rev. Swept volume installed in front of the tractor's engine in tandem with the one that operates the main hydraulic circuit.

Fig. 2

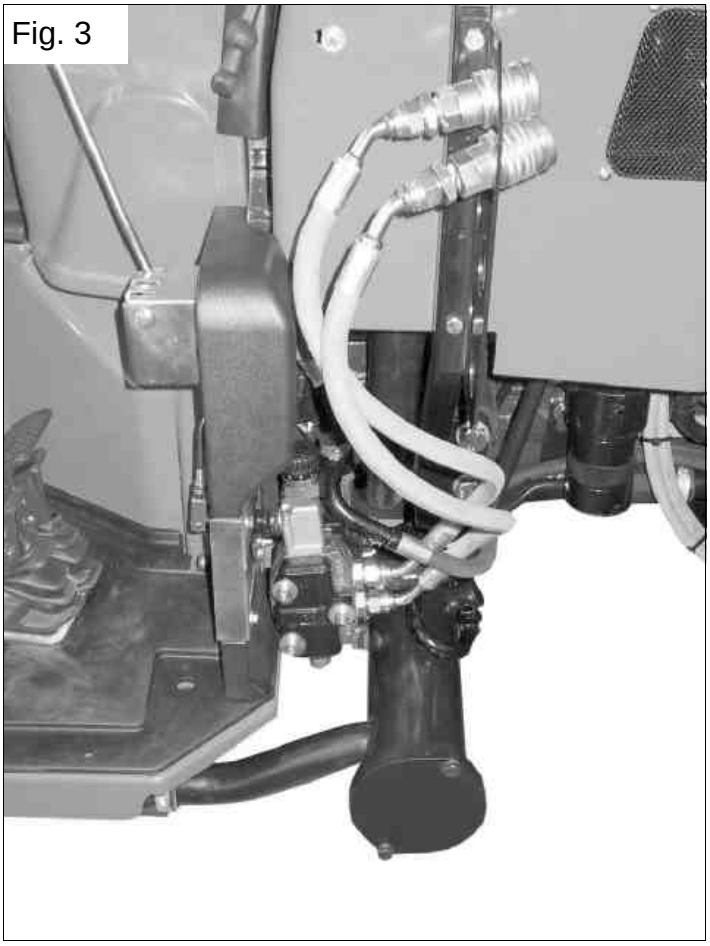


Part **B** of fig. 2 is the maximum valve of the main hydraulic circuit. It establishes the maximum operating pressure of the rear control valves (190 bar) and is installed after the power steering system on the plate that supports the rear control valves.

The front control valves may or may not be installed, since they are available on request.

The maximum valve shown in fig. 2 is installed on the plate that supports the rear control valves indicated by N° 6 in the hydraulic layout on page 2.

Fig. 3



If the tractor is equipped with front control valves, the valve gear is positioned as shown in fig. 3.
A maximum valve is also installed on the bearing flange of the front control valves and acts on the maximum pressure available for the circuit.
This valve is identical to the one already described for the rear control valves in fig. 2.

If this setting or that of the rear maximum valve is below 180-190 bar, that value is the one that determines the maximum pressure of the entire circuit.

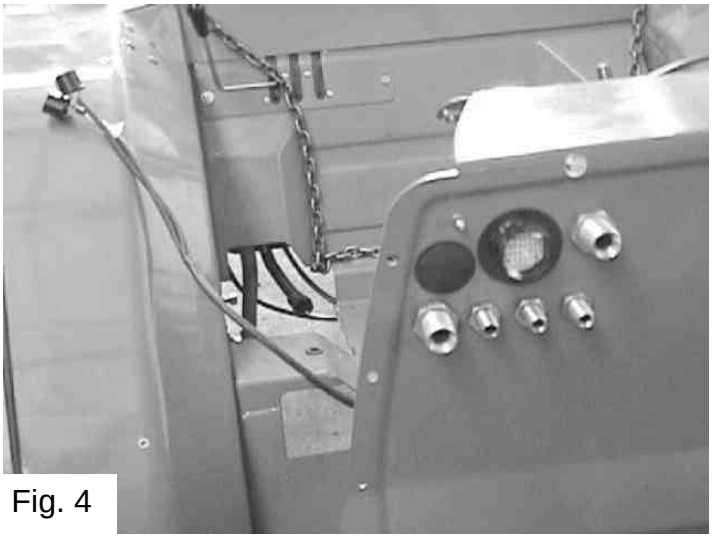


Fig. 4

As already mentioned in other chapters, this tractor is equipped with an integral monocoque platform.
Fig. 4 shows the point of conmnection between the pipes that are enbloc with the platform and those that and routed to the chassis.
It is essential to disconnect these pipes before the platform can be split from the tractor.
The front valve gear is enbloc with the chassis while tyhe rear control valves and those of the power steering system are enbloc with the platform.

The entire power steering system and the load-sensing valve are installed on the platform.

Fig. 5

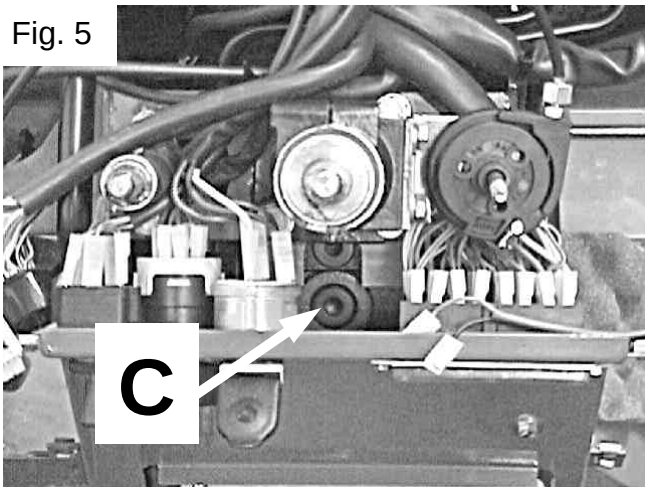


Fig. 5 shows how the power steering system is assembled on the tractor.
Part **C** is the maximum valve of the power steering system and must be set at 130 bar.
To access the pressure adjuster, remove cover **C** illustrated in fig. 5 and regulate by means of the Allen screw under the plug.
Tighten the screw to increase the pressure value delivered to the steering cylinder or unscrew the screw to reduce the value.

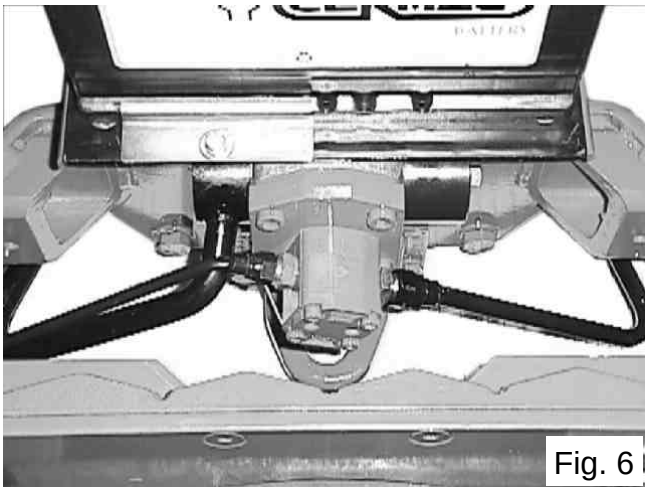


Fig. 6

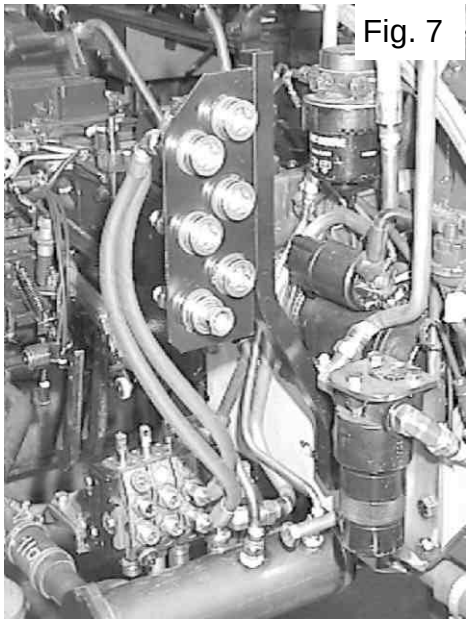


Fig. 7

To check all the pressure values in the circuit, there is a pressure tap on the delivery pipe at the side of the engine (on the right side) where a pressure gauge can be screwed on.
To check the pressure of the power steering system, move the steering cylinder to end of stroke on the rh or lh side and read the pressure value on the gauge. Naturally, no other user must be operated while this test is being conducted.
Fig. 6 shows the hydraulic pump assembly: the large pump that supplies a 34 liter flow rate at full engine rate, indicated by **P1** in the hydraulic layout on page 2, supplies the main hydraulic circuit while the small pump, indicated by **P2** in the diagram, provides a maximum flow rate of 4.0 liters at full engine rate. This supplies the differential lock, 4 WD drive engagement and forced lubrication for the gearbox, as indicated in the hydraulic layout on page 2.
Fig. 7 shows the hydraulic filter installed on the intake. It has a 90 micron filtering capacity and filter clogging bulb which indicates when the hydraulic filter is blocked by means of a warning light on the dashboard.

The delivery filter on the main pump that supplies the power steering system and auxiliary control valves is positioned (see fig. 7) alongside the filter on the intake with metal gauze cartridge. It has a replaceable internal cartridge in special paper with 20 micron filtering capacity. Another filter with the same filtering capacity is installed on the pipe of the pump that supplies the auxiliaries and on the tractor, near the front axle support on a level with the front axle limiting point on the rh side.

Fig. 8

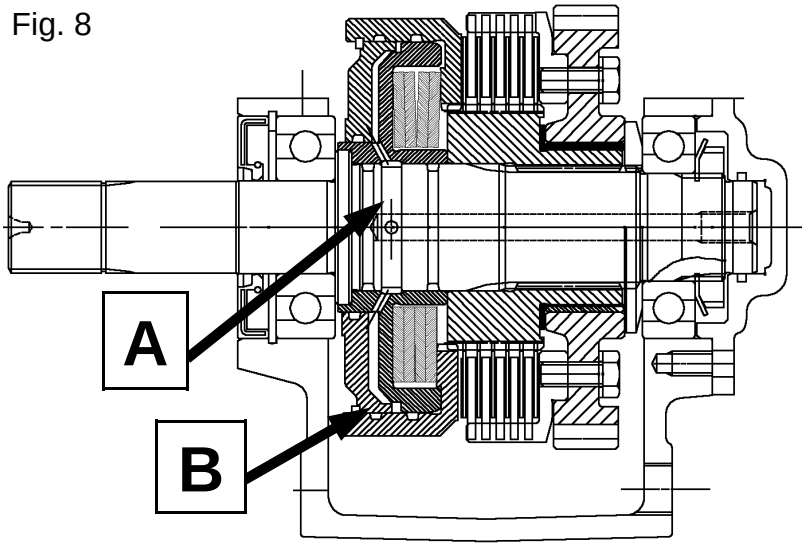


Fig. 8 illustrates the internal circuit of the clutch that engages the four-wheel drive. Oil flows at a pressure of 40 bar from the solenoid valve unit described on the previous pages, through hole **A** of fig. 8 into chamber **B**. Here, the pressure overcomes the reaction of the Belleville washers and disengages the four-wheel drive.

This is a negative command which ensures that the four-wheel drive is engaged even in the event of faults in the electrical system or hydraulic circuit.

The command that engages the differential lock is a positive one: the solenoid valve unit only delivers oil to the actuator plunger that engages the lock when the key near the power lift levers is pressed.
The lock disengages when the key is released.

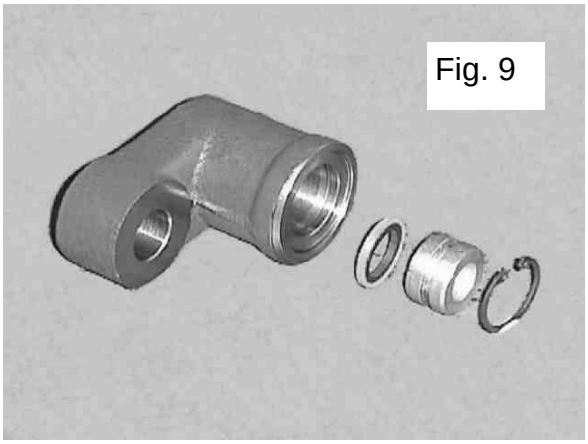
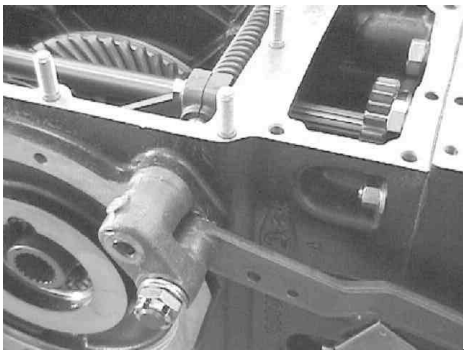


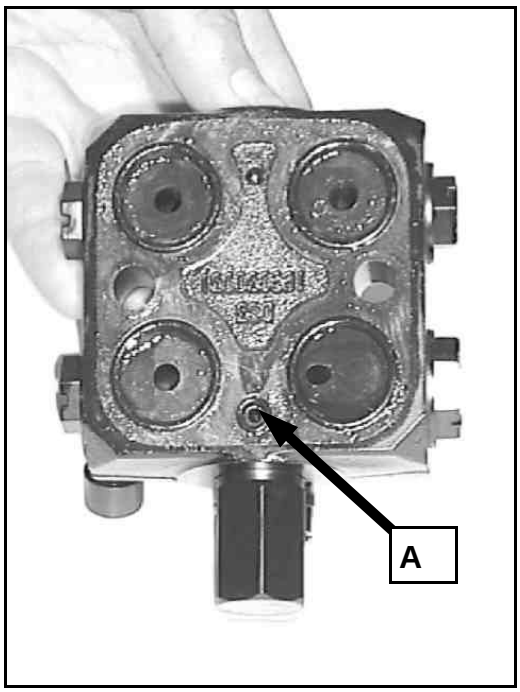
Fig. 9

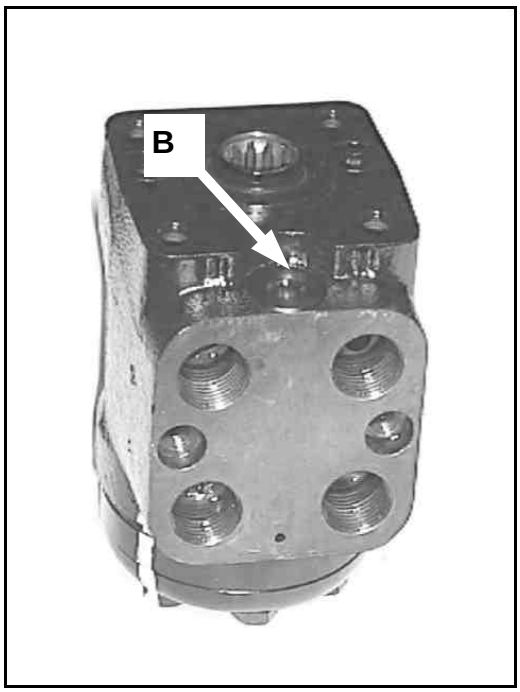
Fig. 9 shows the actuator plunger that engages the fork of the differential lock.

Take care to prevent the seal from being pinched when assembled on the bronze part.
Lubricate the seal when the piston is inserted into the plunger so that it slides more easily inside the part.



The picture alongside shows how the plunger (that operates the fork of the rear differential lock) is positioned on the tractor.
To ensure that the plunger positions correctly, assembly is carried out by means of a plug while the plunger is held in position by a notched nut and spiral pin to prevent it from working loose.





The pictures above illustrate certain parts of the power steering system that may develop faults.
Consult the specific workshop manual (supplied on request) for a more detailed analysis of the power steering system.

Plug **B** allows the adjuster of the maximum valve of the steering unit to be accessed. The setting can be checked by fitting a pressure gauge on the tractor's delivery pipe and moving the steering cylinder to end of stroke on the rh or lh side.
The valve setting must be **130** bar.
Part **A** in the picture shows the load-sensing branch of the power steering system.
Before the oil has been changed and the filter cleaned in a new machine, faults in the power steering system can be caused by clogging in orifice **A** which prevents the unit from operating correctly. Before working on the power steering system, make sure that none of the other parts is causing the fault (e.g. non-lubricated steering column or faulty steering cylinder).
Once you have made sure that the fault is due to the power steering system, check the setting of valve **B** and clean orifice **A** if necessary.

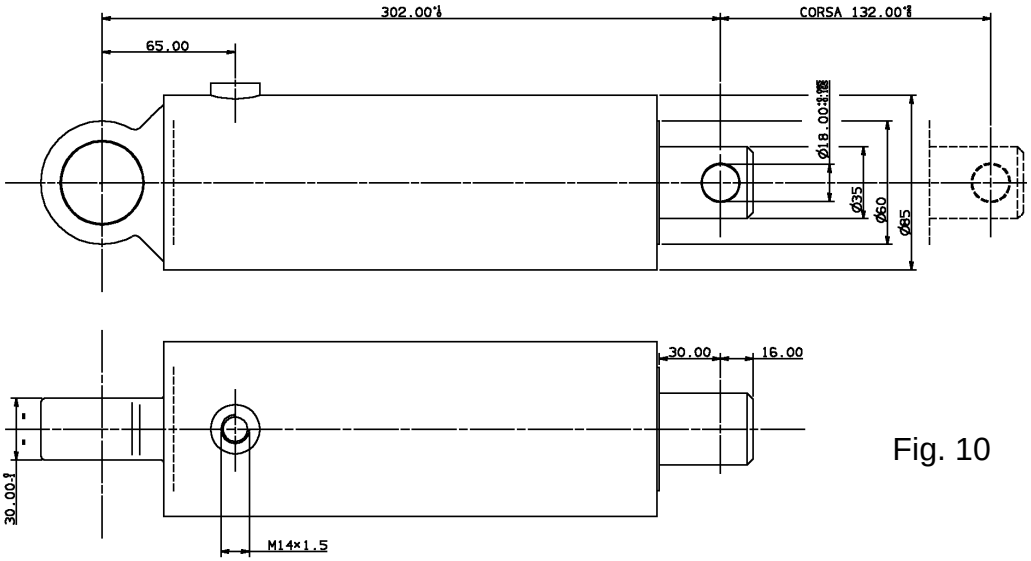


Fig. 10

The following considerations are valid for the steering and lifting cylinders:
The lifting cylinder (depicted in fig. 10) cannot be demounted. It is the disposable type.
If there are oil leaks, something that can be easily checked in view of the position in which the cylinder is installed in the machine, the cylinder itself must be replaced. It cannot be repaired.
If there are oil leaks from the steering cylinder (depicted in fig. 11), the internal seals can be replaced. The Spare Parts Service supplies a kit containing all the seals and gaskets required for overhauls.

Comply with the following operations in order to replace the steering cylinder seals:
-remove the circlip and retention ring of the end casing using a pair of pliers (see fig. 12 part **A**).
-remove the end casing and take out the internal piston. Make sure that the chromium plating on the stem is not danaged;
-replace the piston seals and re-assemble all the parts, working through the operations described above in reverse order.

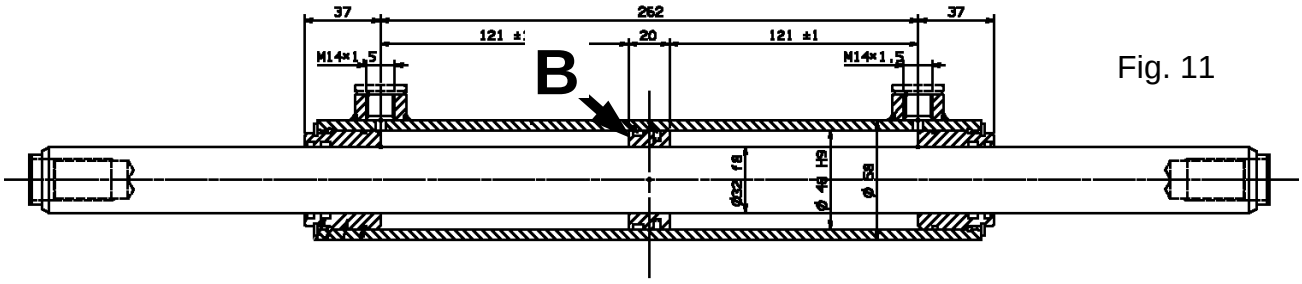


Fig. 11

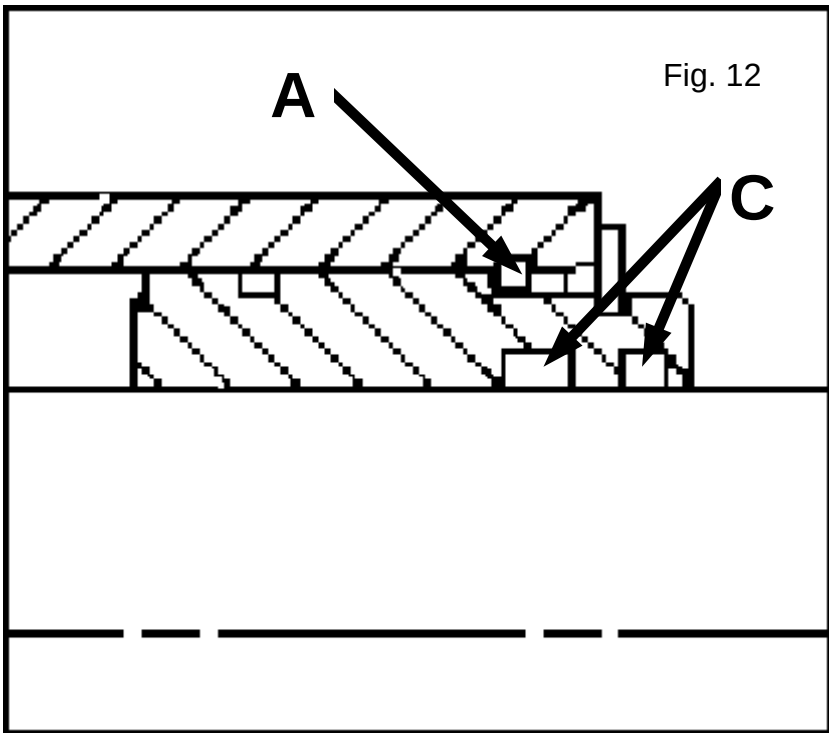


Fig. 12

If there are faults when it comes to the direction in which the cylinder operates, replace seals **B** of fig. 11, while if there are oil leaks on the outer part of the cylinder or stem, replace seals **C** of fig. 12.

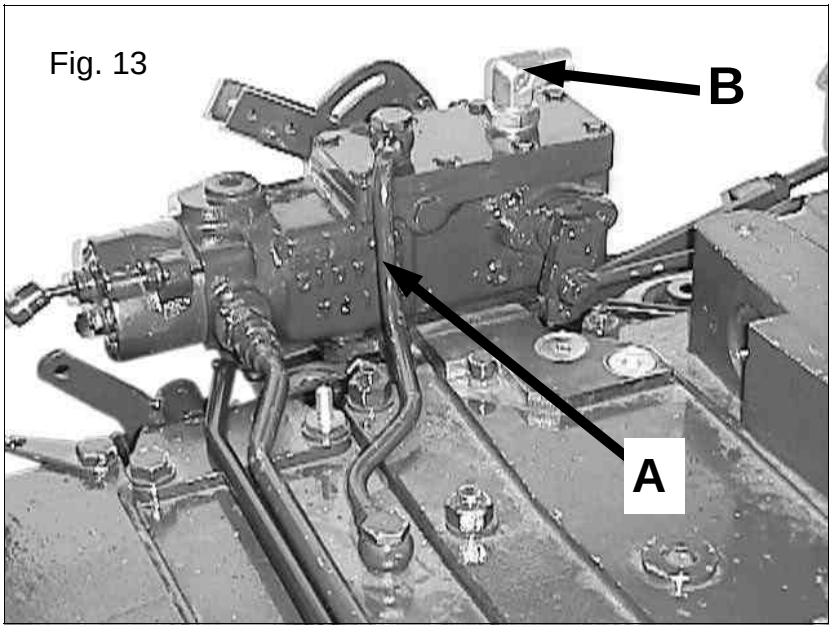


Fig. 13

The lubrication tube of the upper bearing of the power take-off is indicated with letter **A** in fig. 13. Two pipes project from the power lift's valve gear housing. The one marked with the letter **B** in fig. 13 is the main discharge pipe.
The one marked with the letter **A** is still a discharge pipe, but its contents lubricate the upper bearing of the PTO shaft so as to ensure that the part is lubricated even when the machine remains stationary for several hours.

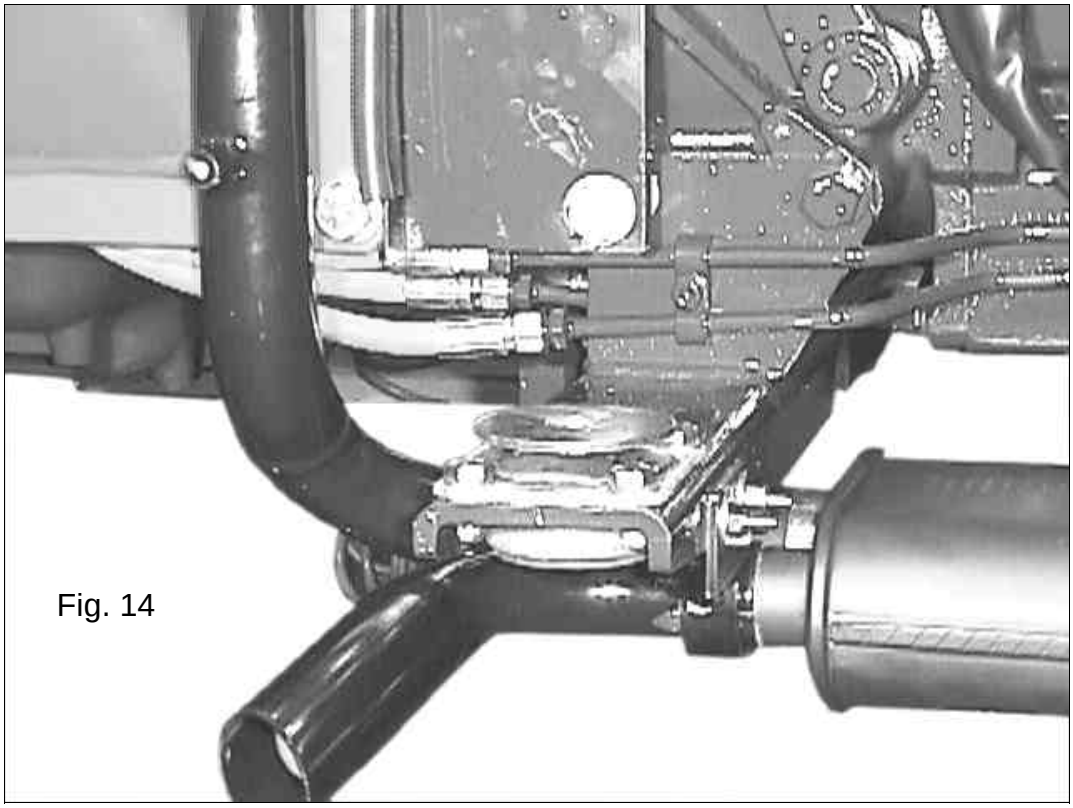


Fig. 14

Fig. 14 shows the connections of the pipes that supply the diff lock and 4 WD between the front and rear parts of the tractor.

These connections must be unscrewed when the machine is disassembled, e.g. when the clutch plate is replaced for instance.

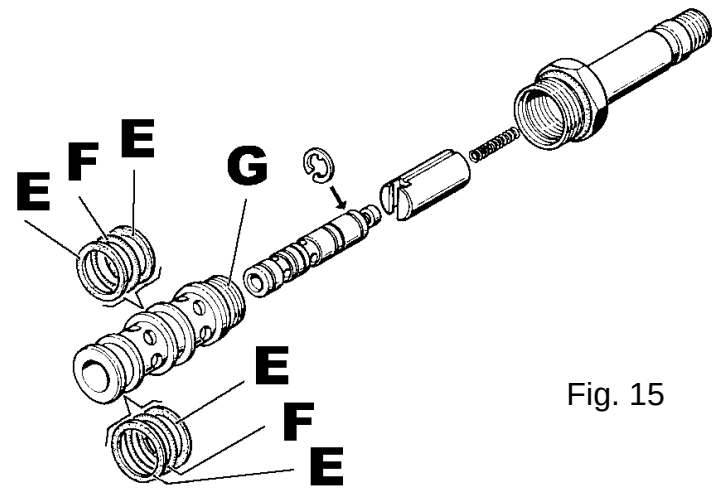


Fig. 15

Fig. 15 is an exploded drawing that shows the components of the internal spool that controls the 4WD and diff lock engaging solenoid valve.
The position of the solenoid valve unit on the tractor has already been described on the previous pages.

Proceed as described further on in order to clean the internal parts in the case of faults ascribable to the hydraulic component.

Remove the coil from the solenoid of the above mentioned solenoid valve.
Unscrew and remove the solenoid from the body of the solenoid valve.
Wash the components illustrated in fig. 15, blow them dry and lubricate them with oil of the same type.
Re-assemble the components, using Loctite on the threads when assembling the solenoid components.

Check all the seals when the parts are re-assembled, and replace them if necessary.
Fit the coil back in the solenoid. Connect the wires to the coil head and, after having powered the wiring, brake the tractor and check visually to see how the solenoid works.
If everything operates in a regular way, proceed by assembling the solenoid on the aluminium block.

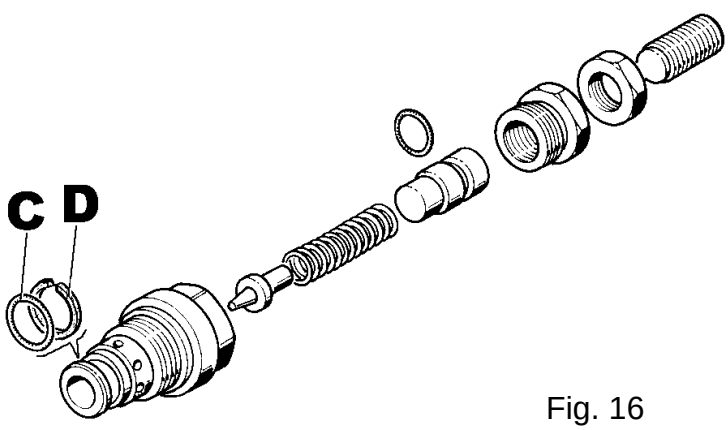


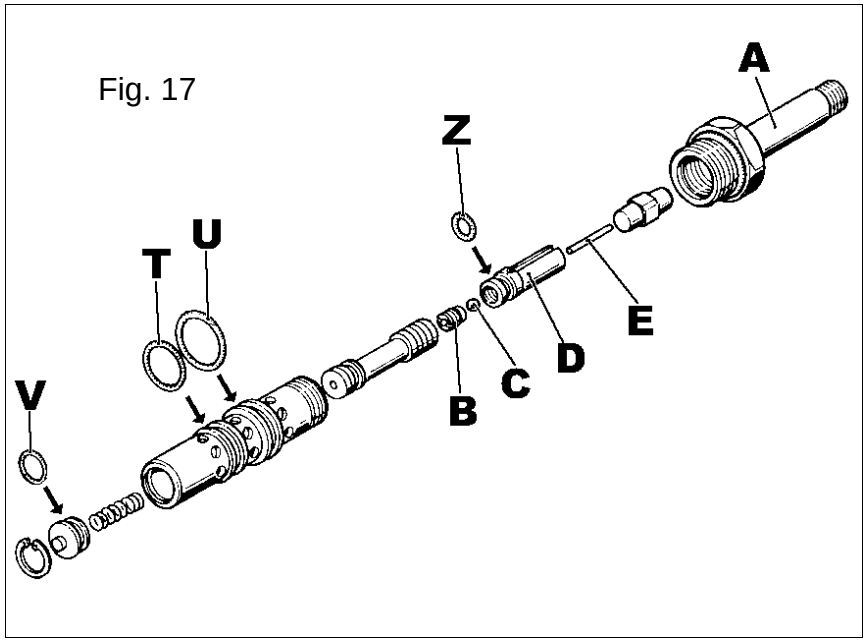
Fig. 16

The operating pressure of the diff lock and 4WD solenoid valve unit (and of the front proportional valve in the MAX version) is determined by the maximum valve. The exploded drawing of this part can be seen in fig. 16.
The valve is physically installed on the aluminium block of the diff lock and 4WD.
As already mentioned, tighten the plug on the valve to regulate the maximum pressure value of the auxiliary service system.

If there is no pressure increase when the plug is tightened, turn off the tractor engine and clean the valve.
Unscrew and remove the valve from the solenoid valve unit and disassemble it as shown in fig. 16.
Make sure that retention rings **C – D** are in a perfect condition and replace them if necessary.
Wash all the components with clean oil to eliminate all traces of dirt and blow them dry.
Re-assemble all the parts, lubricating them with the same oil used in the circuit.

With the engine running at 1000 rpm, pressurize the circuit and bring the pressure value to 40 - 42 bar.
As previously mentioned, this is also the maximum valve of the proportional valve that controls the front braking option on the MAX version.

Fig. 17



Hydraulic faults in the front braking circuit can also be caused by the proportional solenoid valve of the front brake, thus:
Excluding faults of the hydraulic type in the previously described components and faults of an electrical type in the actual solenoid valve because they would be indicated by the control unit (see chapter dedicated to the electrical system), proceed in the following way:
- fit a pressure gauge with 60 bar full scale on the pipe that delivers oil to the front brakes;
- start the engine, then depress the brake pedals while checking to make sure that the pressure reaches 40 bar.

If this fails to occur and the pressure remains at sensibly lowers values, it means that the proportional solenoid valve is clogged.

Carry out the following operations to clean the valve:
Remove the solenoid from the solenoid valve unit and disassemble it as shown in fig. 17.

Make sure that retention rings **T- U- V- Z** of fig. 17 are in a perfect condition and replace them if necessary.
Wash and blow dry all the components in order to eliminate all traces of dirt.

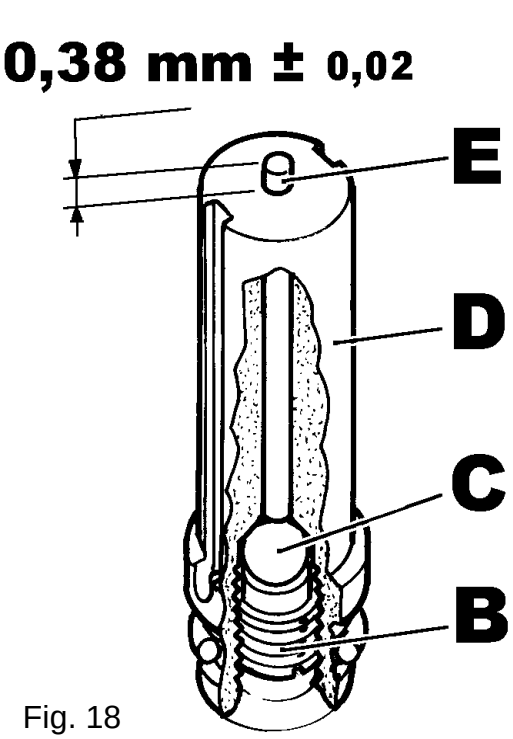


Fig. 18

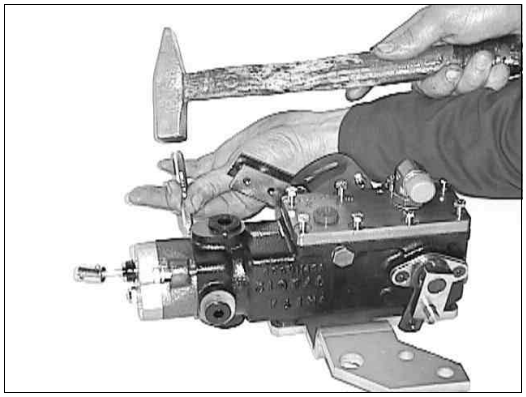
The components of assembly **D** of fig. 17 are illustrated in fig. 18.
Just wash the unit after having removed it from plug **E**, then blow through the holes in the outer casing without removing plug **B** and ball **C**.
During the re-assembly phase, check the roundness of ball **C** and replace it if it has become ovalized.
If plug **B** has been disassembled, parts **B** – **C** – **D** – **E** of fig. 18 must be re-assembled in the following way:

- plug **B** must be re-assembled after Loctite has been applied to the threads;

- measured as shown in fig. 19, plug **E** must project 0.38 mm

with a tolerance of more or less 0.02 mm, and with the concave head pointing towards the ball;
- fit all the parts back in place, lubricating them with oil of the same type as the circuit, and filling body **A** of the solenoid valve;
- reset the control unit as described in the chapter dedicated to the electrical system.

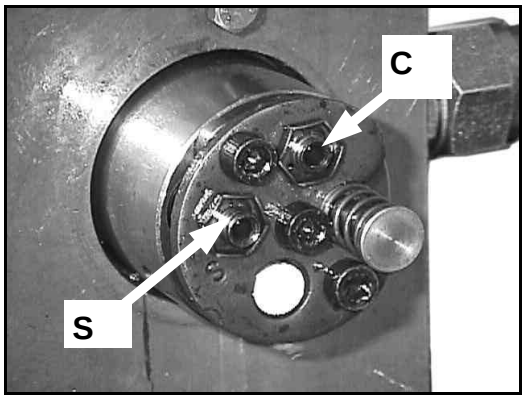
If the result of the previous pressure test is correct, i.e. around 40 bar, proceed by examining the seals to see whether they are faulty, as already explained in the description about how to assemble the front braking elements.



Disassemble the valve gear housing as illustrated alongside to check the pressure values that act inside the power lift's valve system.

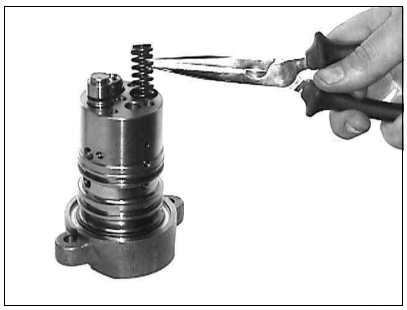
Before this operation is carried out, fit a pressure gauge in the relative housing in the delivery pipe of the tractor's hydraulic circuit described on the previous pages.
As shown in the picture alongside, there are two valves: **C** and **S**.
Valve **C** is the overpressure valve while **S** is the safety valve.

The setting of valve **C** must be higher than 30 bar while that of valve **S** must be 180 bar.
To raise the pressure value, tighten the screws in **S** and **C** and then lock the adjustments with the check nut. After fitting the valve system back on the power lift, check the pressure value again on the gauge fitted in the delivery pipe.

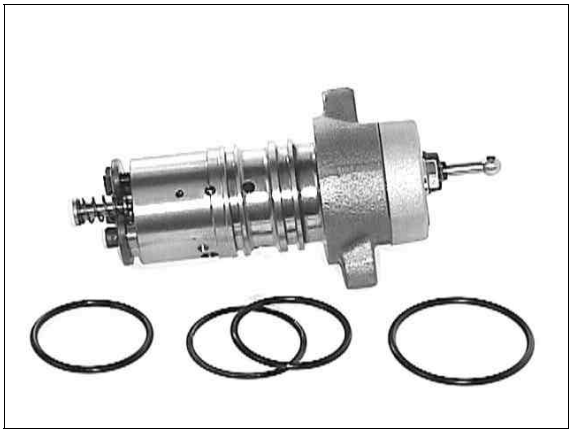


To pressurize the power lift, lock the lift links with a bar connected to the tow hook.

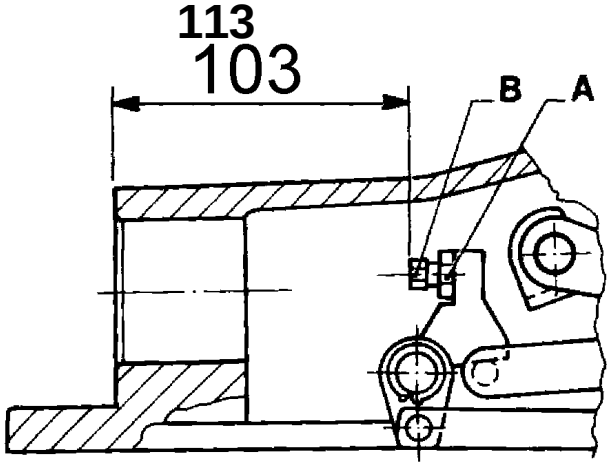
The pictures alongside show the sequence required to check the parts forming valves **C** and **S** until the entire rear part of the block has been fully disassembled.



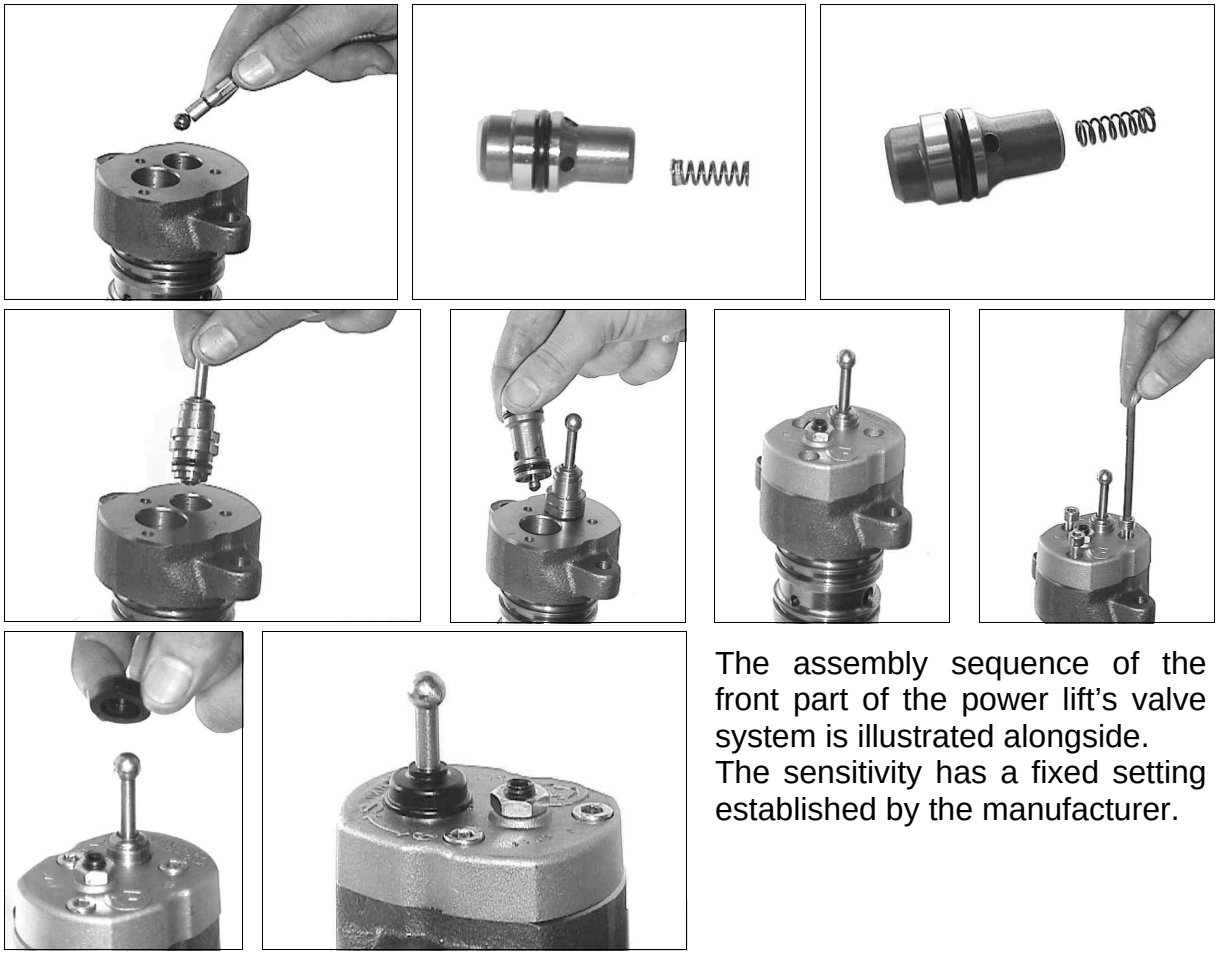
Take care to make sure that the longer spring is installed behind valve **S** when the valve gear block is re-assembled.
The spring fitted behind valve **C** is shorter than the one in **S**.
Do not invert the two springs during the re-assembly phase.



When the power lift's valve gear block is re-assembled, check to make sure that all the O-Rings in the picture alongside are in perfect conditions and not crimped.
This will prevent faults from subsequently occurring and requiring further work on the unit.

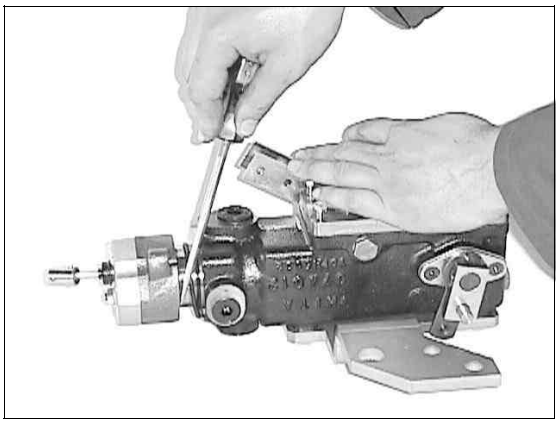


Make sure that the dimension indicated in the diagram is correct when the power lift's valve system is assembled.
This measurement must be checked with both the power lift levers in the low position and with the lift links at the end of their downward travel.

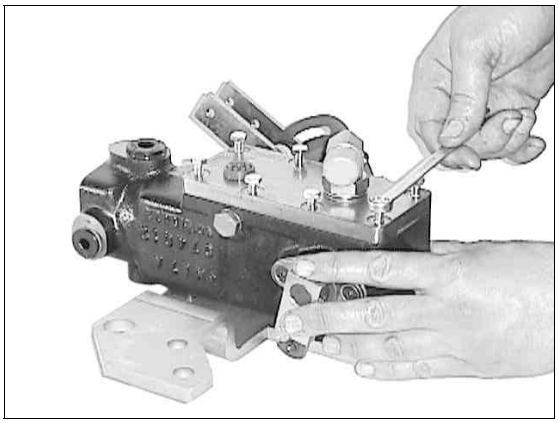


The assembly sequence of the front part of the power lift's valve system is illustrated alongside.
The sensitivity has a fixed setting established by the manufacturer.

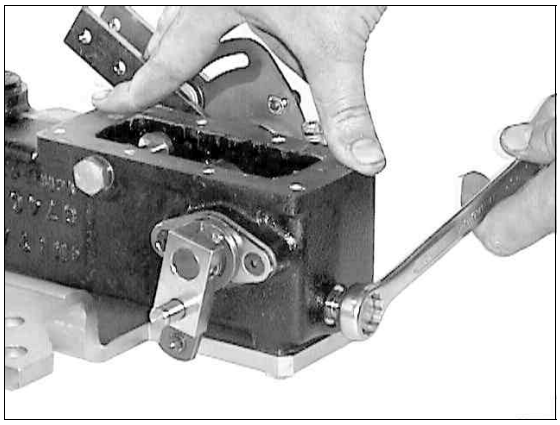
ASSEMBLY SEQUENCE FOR THE INTERNAL LINKAGES OF THE REAR POWER LIFT'S VALVE



The sequence depicted in the following pages explains how the internal and external links of the power lift are assembled.
The explanations merely give hints about the main parts forming the links of the rear power lift assembly.



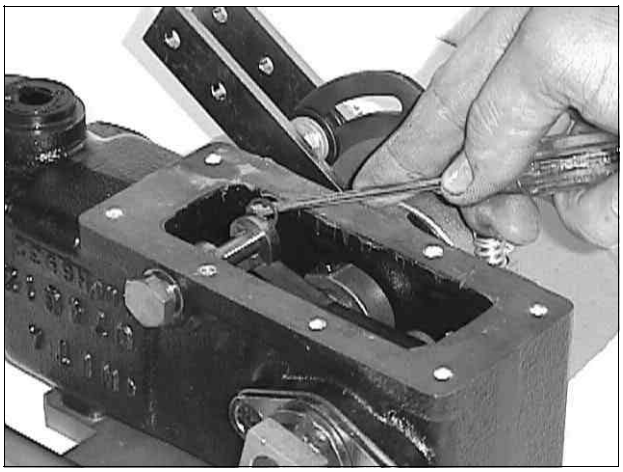
All the parts that form the power lift links are available from our Spare Parts Service. However, it is highly unlikely that these parts will develop faults and they are very easy to assemble by merely examining the pictures without going into too much detail.

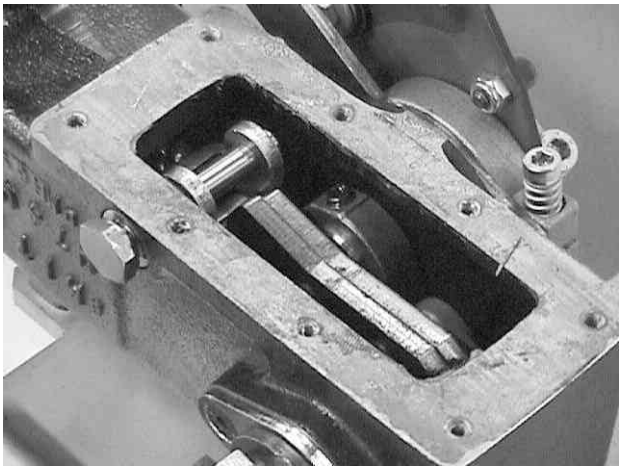


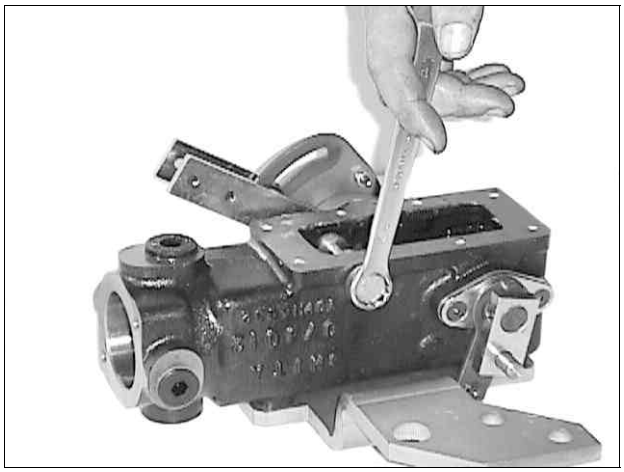
As will also be mentioned on the following pages, a specific Workshop Manual about the links and the entire rear power lift assembly is available on request. This manual is extremely detailed and can be obtained if the explanations on these pages are not sufficiently exhaustive.

This page depicts the preliminary operations required to disassemble the internal links of the position and draft control functions.

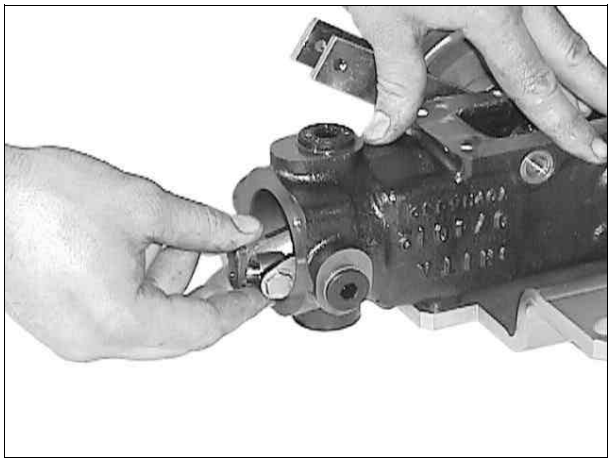
The most important thing to do is to analyse the components that form the internal mechanism and the fulcrum of the links with all the relative transmissions.

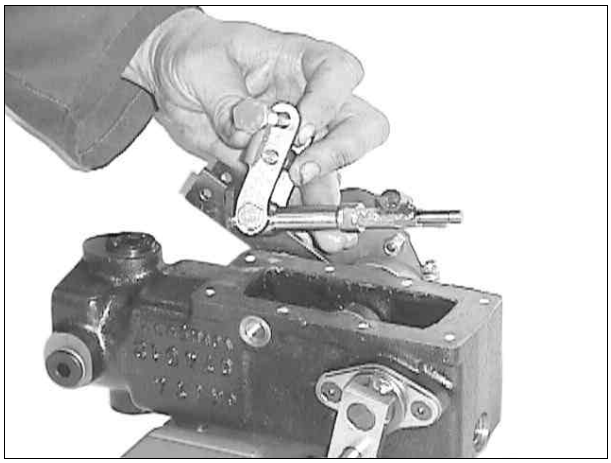


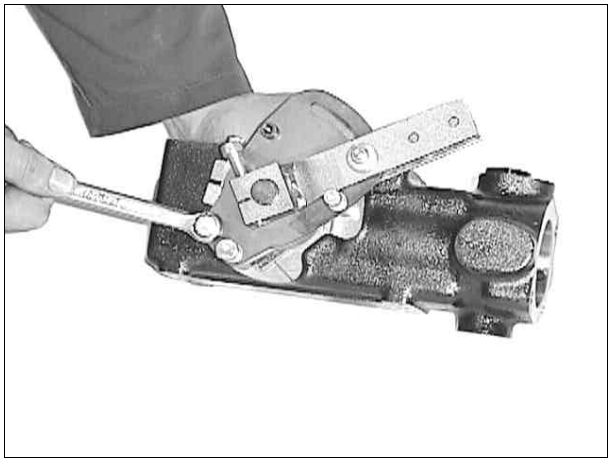




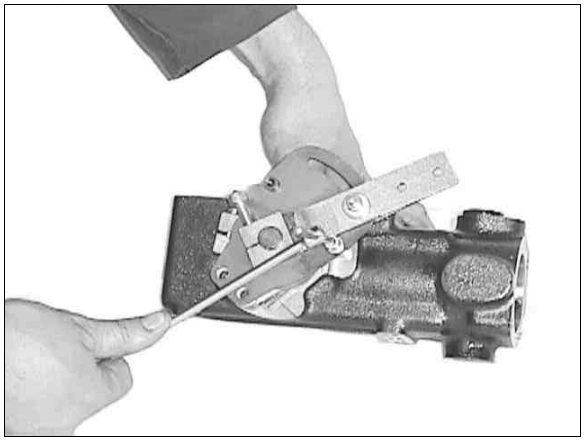
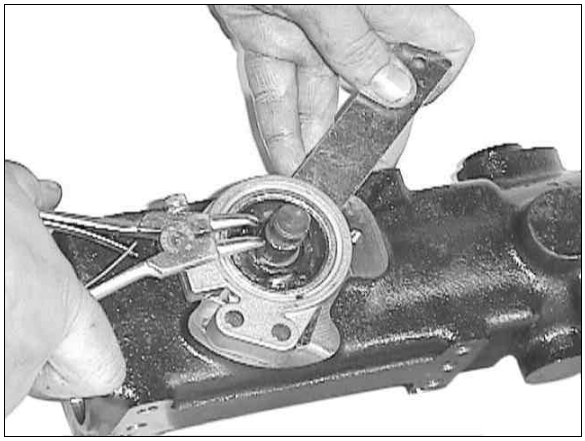
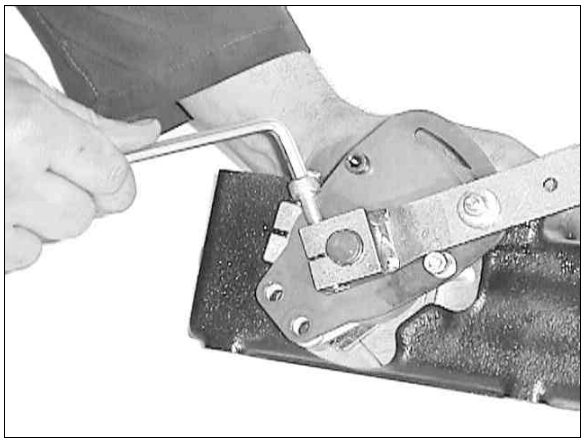
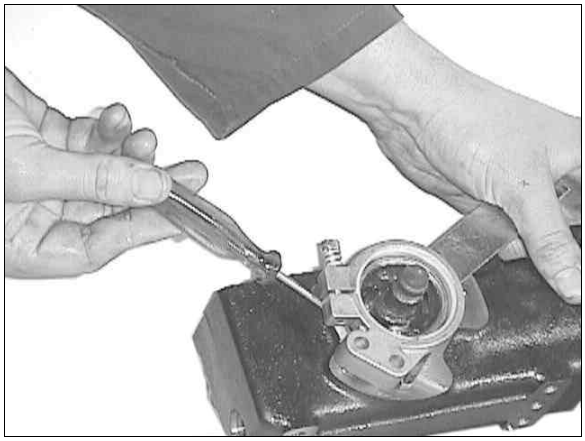
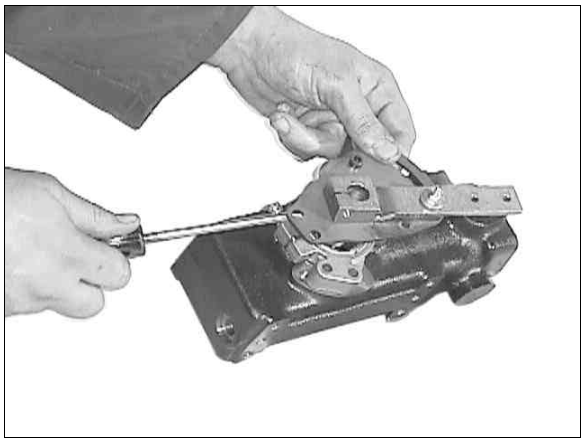
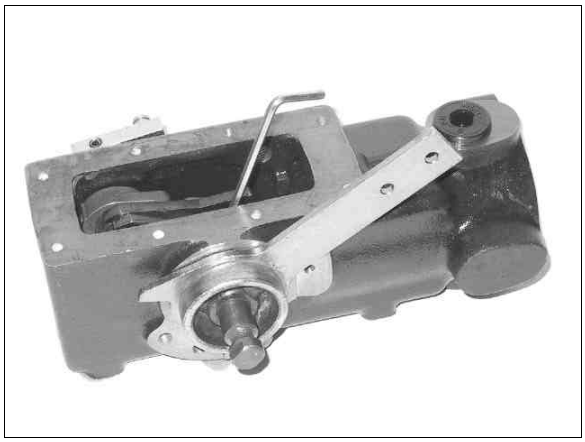
The pictures show the disassembly sequence for the two position and draft control cams.
Unlike the other valves that control power lifts, many of the adjustments are fixed with obligatory positions.





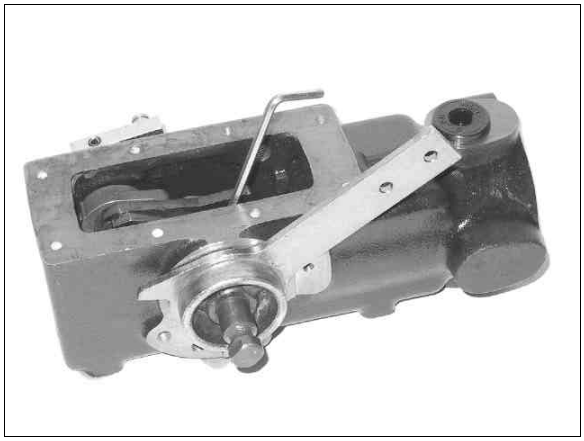


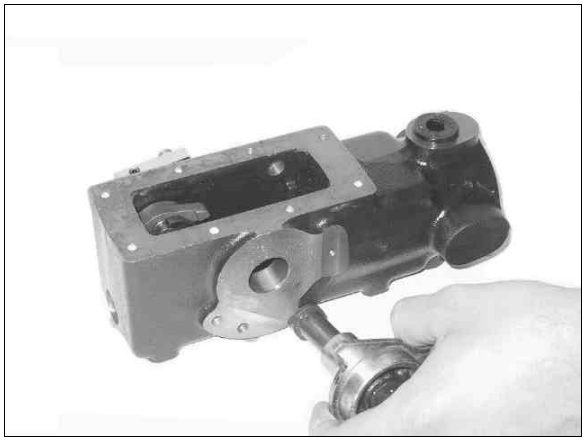
These pictures illustrate the successive disassembly phases for the external position and draft control links.

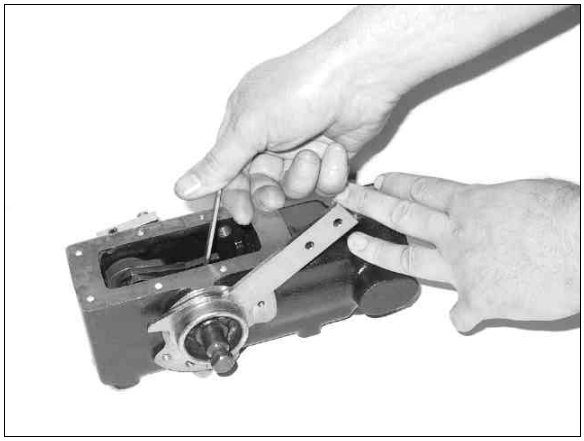







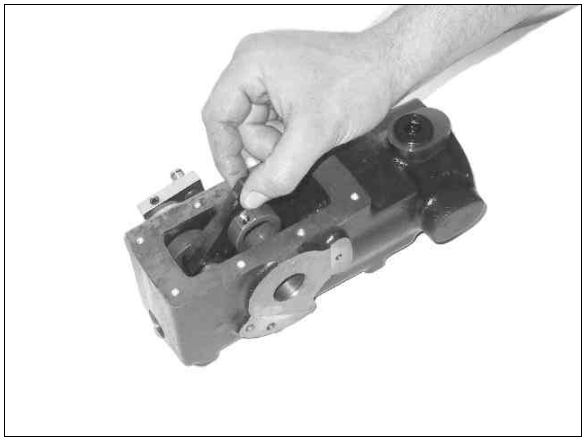
All the sequences on this page concern assembly of the fulcrum of the position and draft control levers.
They show the sequence required in order to check for possible breakages inside the unit.

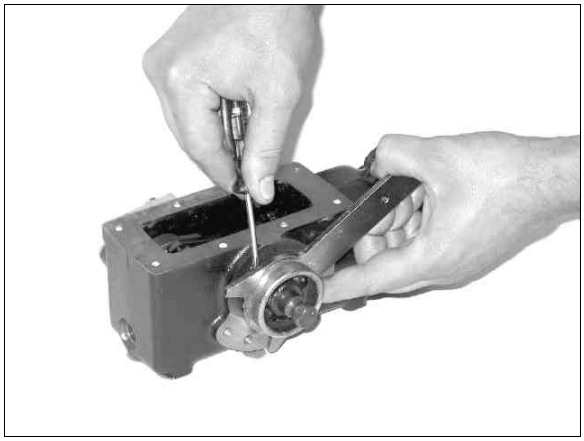
As assembly is univocal, the sequence illustrates the order of the operations since there are no particular adjustments to make.

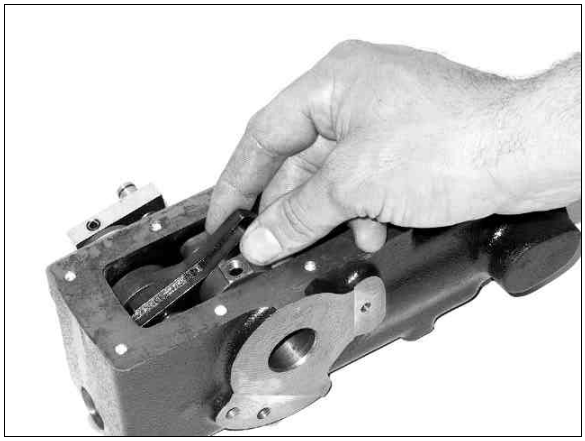




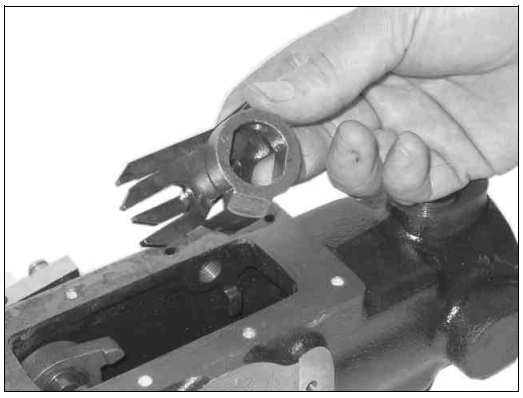


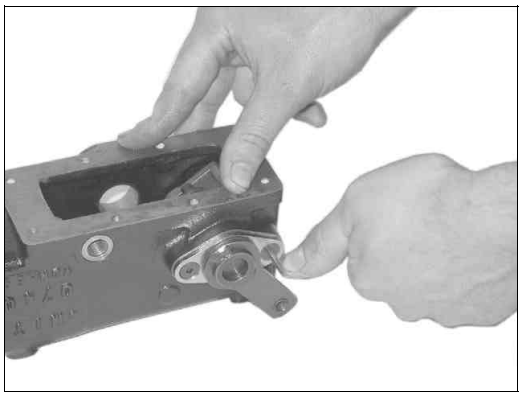


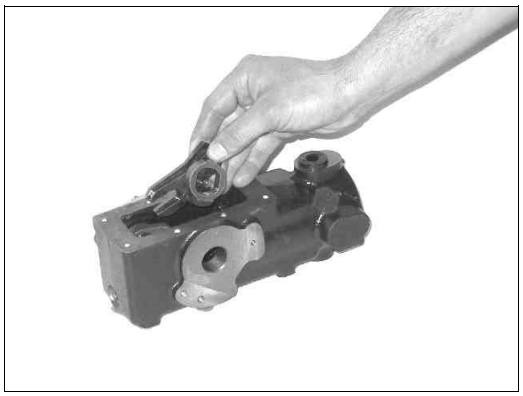


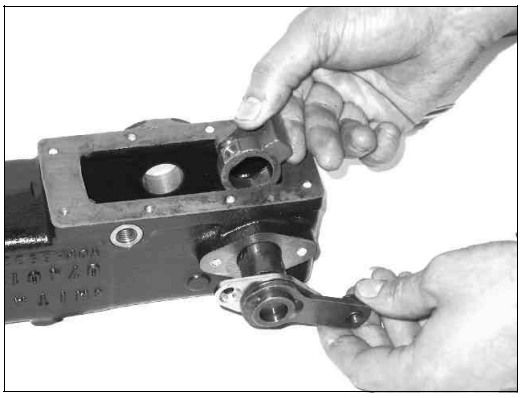


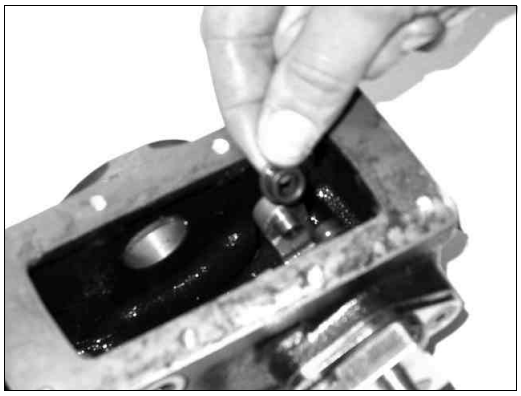
The last thing to do is to disassemble the double fork that operates the position and draft control functions of the power lift.
A specific workshop manual for the power lift is available for a detailed explanation about how these linkages are assembled.

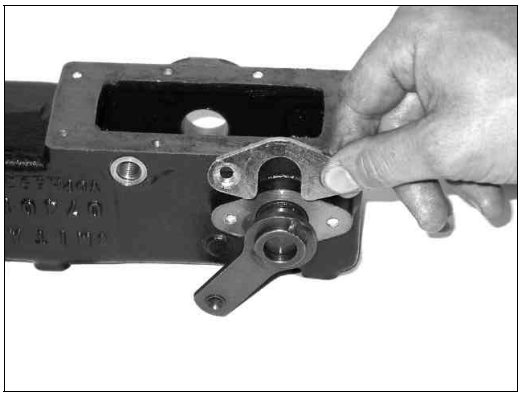


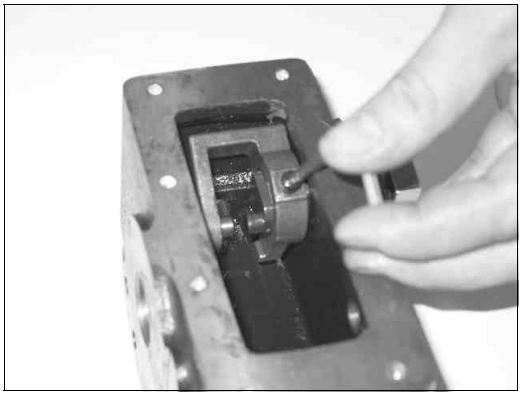










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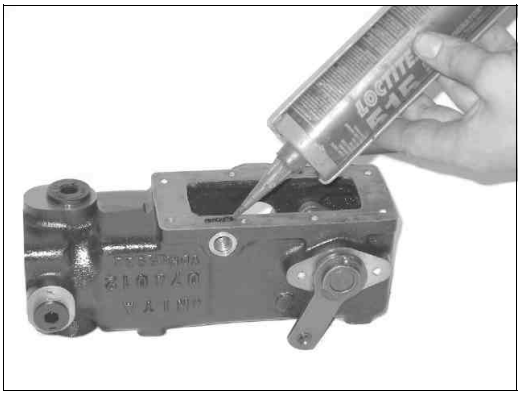
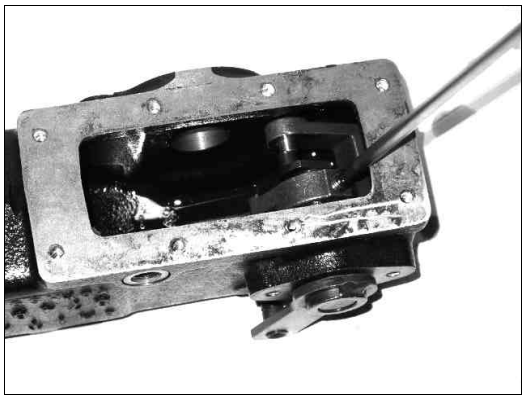
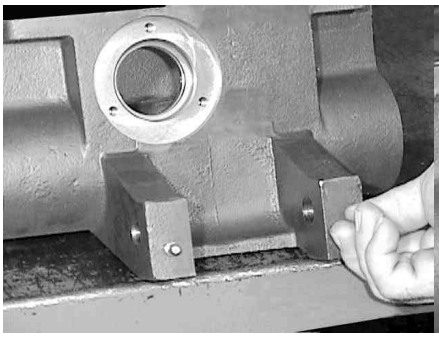
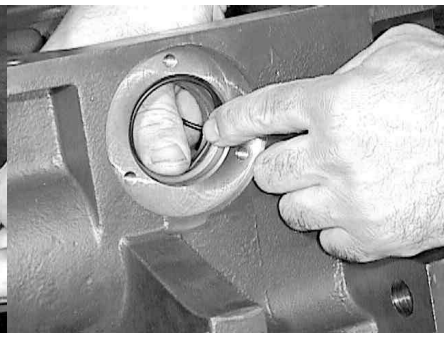
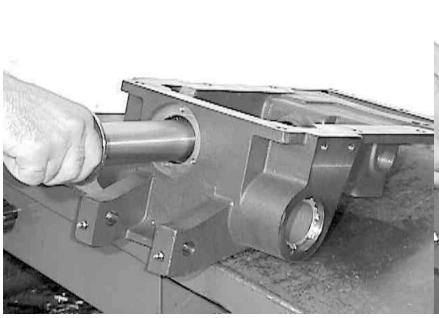
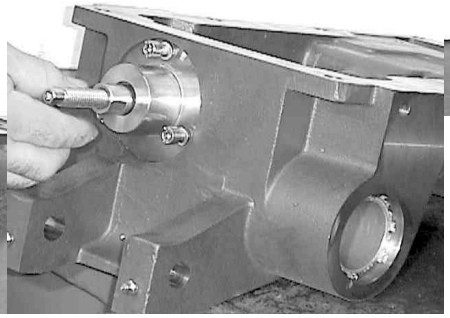




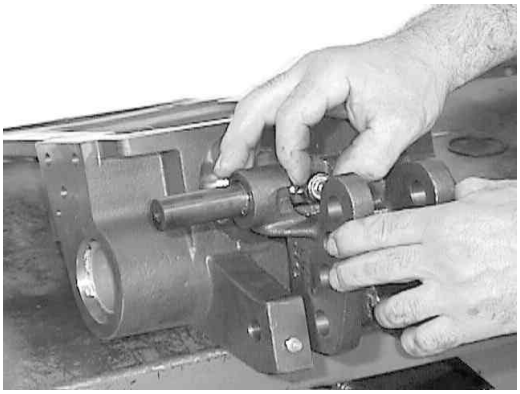
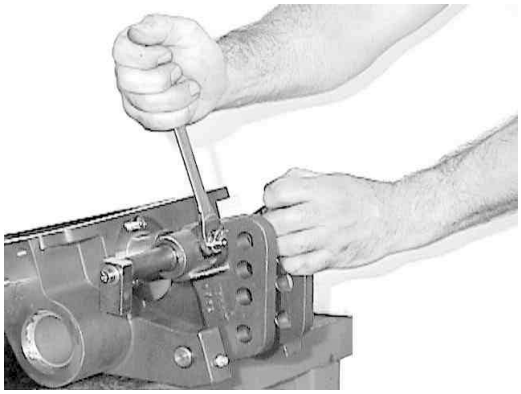
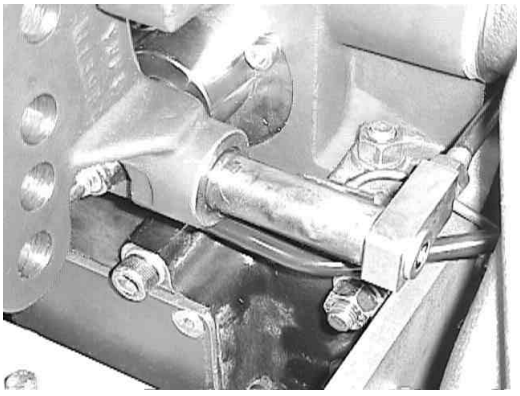
Proceed with the following tests to make sure that the position and draft control rods are correctly adjusted on the tractor:
-with no implement hitched to the power lift and with the lever pushed fully upwards, make sure that the links start to lift when the draft lever is moved towards top dead center, at about 3/4 of its travel.
If this fails to occur, adjust the draft control rod until this condition is obtained.

POWER LIFT AND ADJUSTMENT

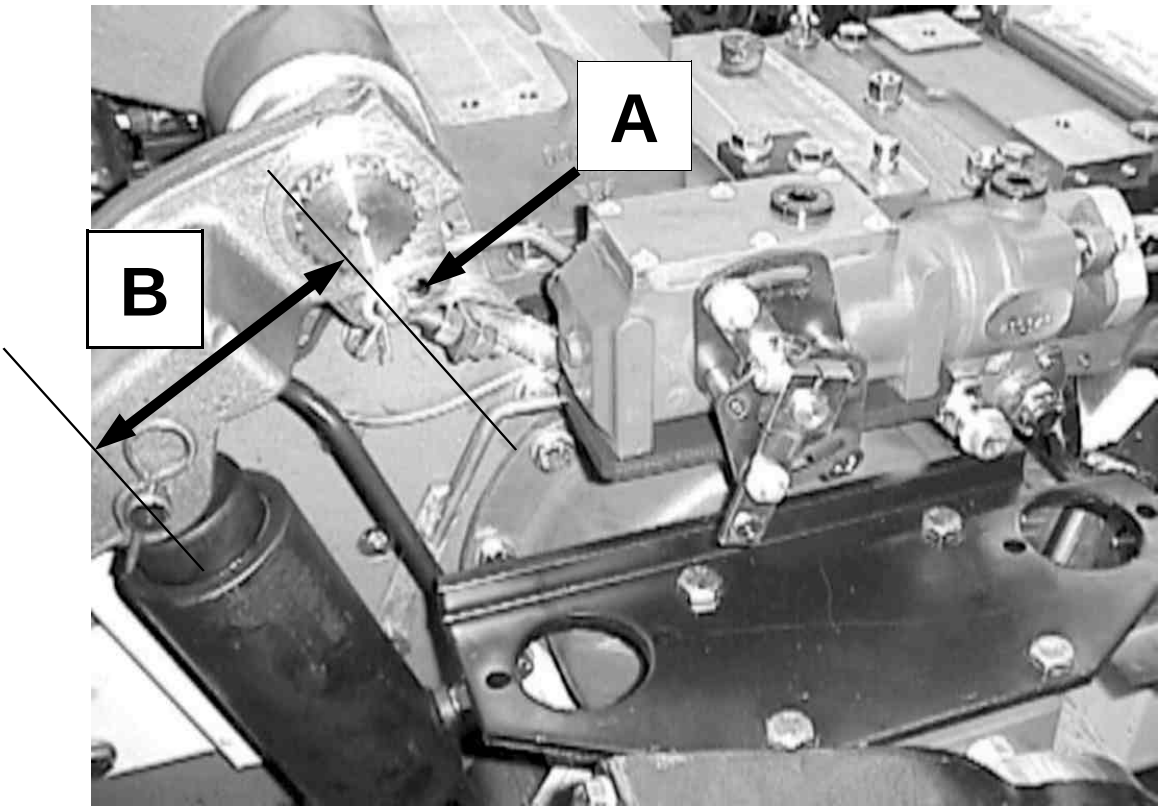




The sequence illustrated above shows how the linkages that form the rear power lift are assembled, with particular attention to the unit that forms the assembly that opposes the pulling action on the third point.
After having installed the opposing spring inside the casting, assemble the third point hitch which transmits the pulling action of the implement to the spring itself.

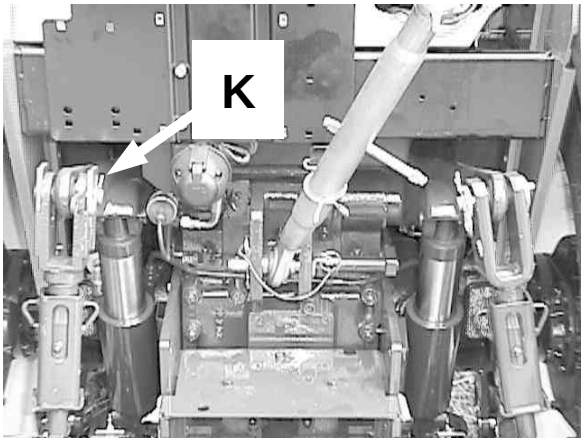




Tighten the self-locking nut to a 3 kgm torque value and complete the assembly by connecting the transmission device on the mobile part of the third point to the power lift's valve system by means of the rod depicted in the picture alongside.



Detail **A** of the picture above must be positioned during assembly (sector keyed to the shaft of the power lift) so that dimension **B** in the figure is **136 mm.**

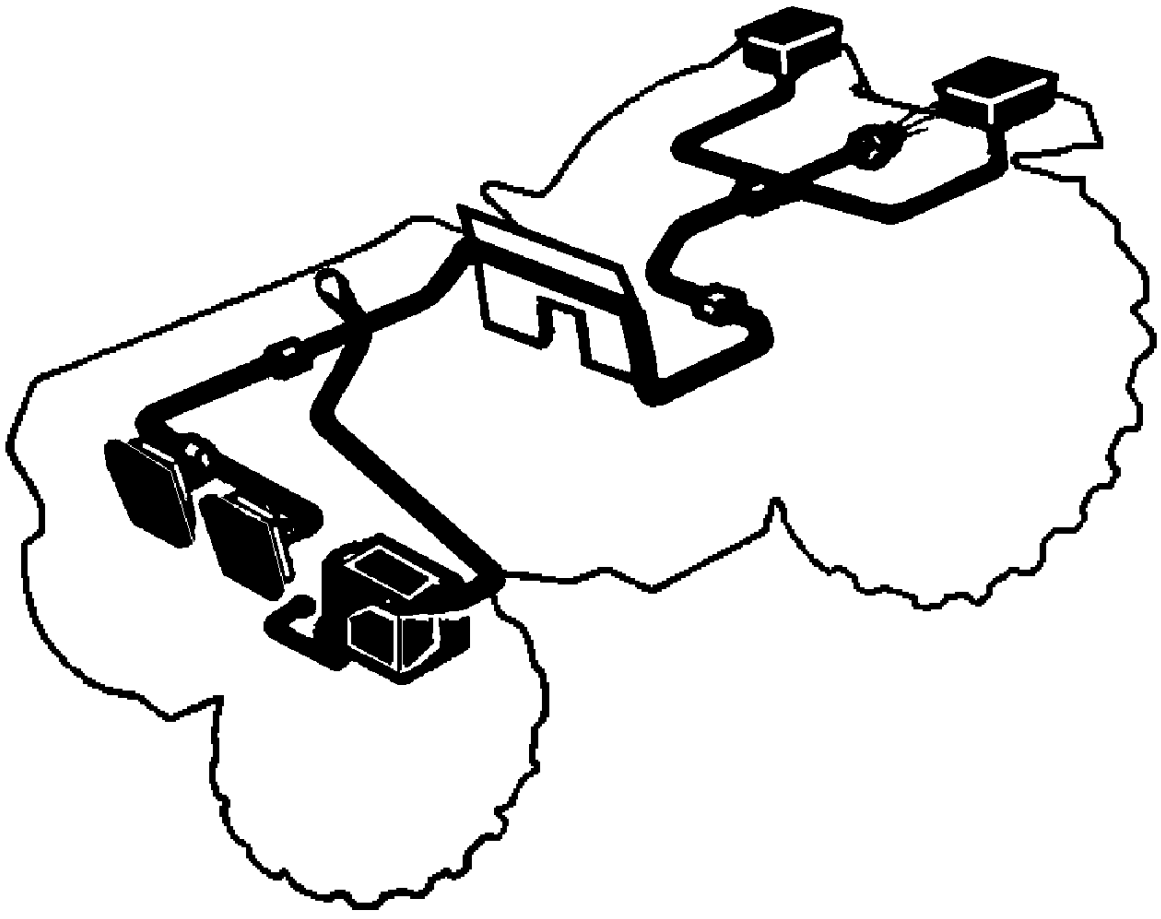
Comply with the following instructions when adjusting the power lift levers operated from the driver's seat (position and draft) and connected by two rods to the cam of the position on the power lift shaft and to the third point transmission device:
- when both the levers are in the up position, the engine must not be stressed and there must be a gap of approx. 2 cm between the power lift links and the cross member (see picture, point indicated with the letter **K**);
- when the position and draft levers are moved downwards: the links lower. When only the draft lever is operated, the links must begin to rise to about number 15 of the graduated scale (see picture alongside).



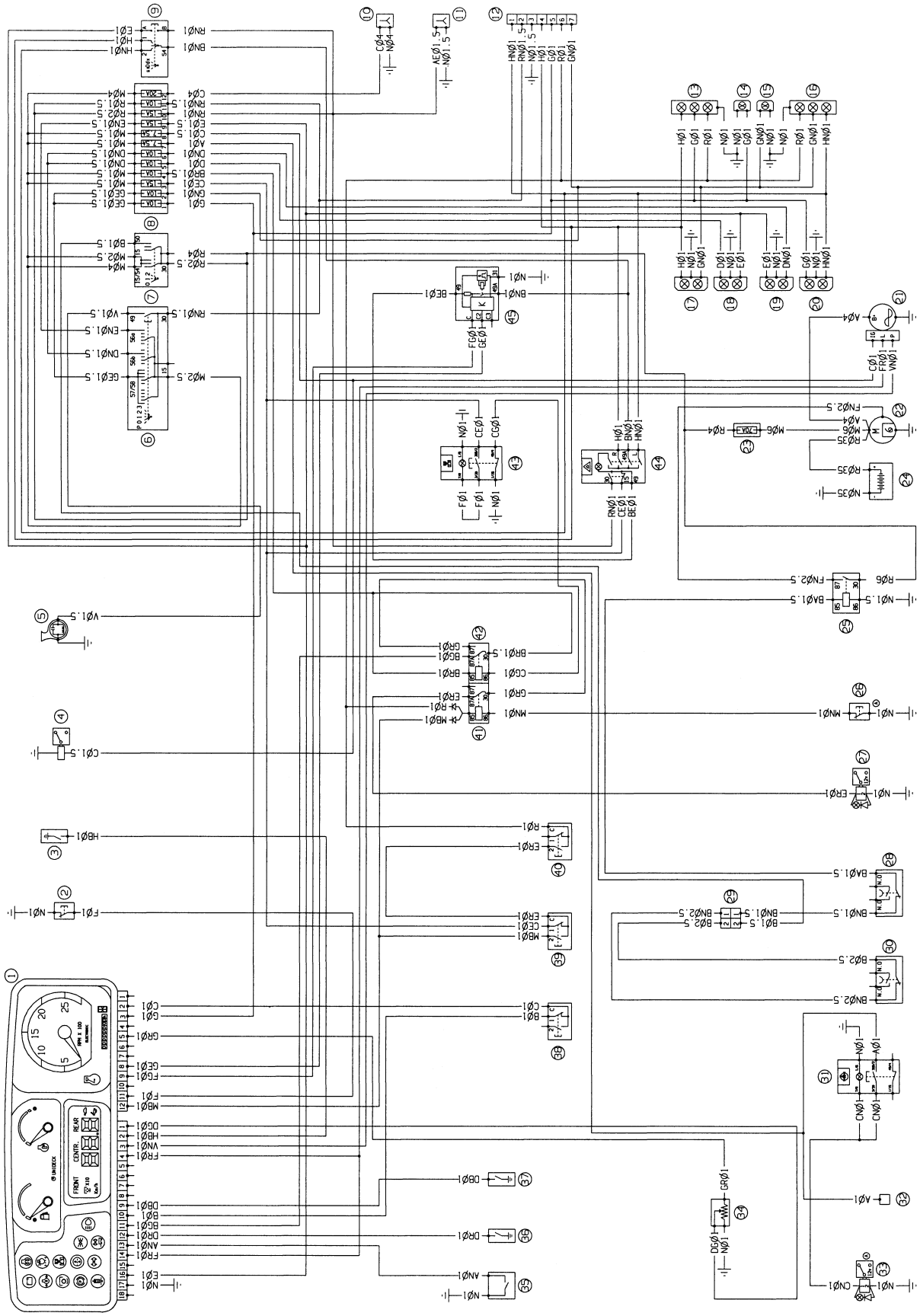
- turn off the engine and move both levers to the end of downward travel;
Switch on the engine, move the position lever up until the links reach their maximum height.

Move the draft lever to top dead center. The rear links rise a further 2-3 cm but the previously mentioned 2 cm gap between the short links of the power lift and the cross member remains (space K in the figure on the previous page).

ELECTRICAL SYSTEM



WIRING DIAGRAM - STAR 75Q – J.DEERE ENGINE

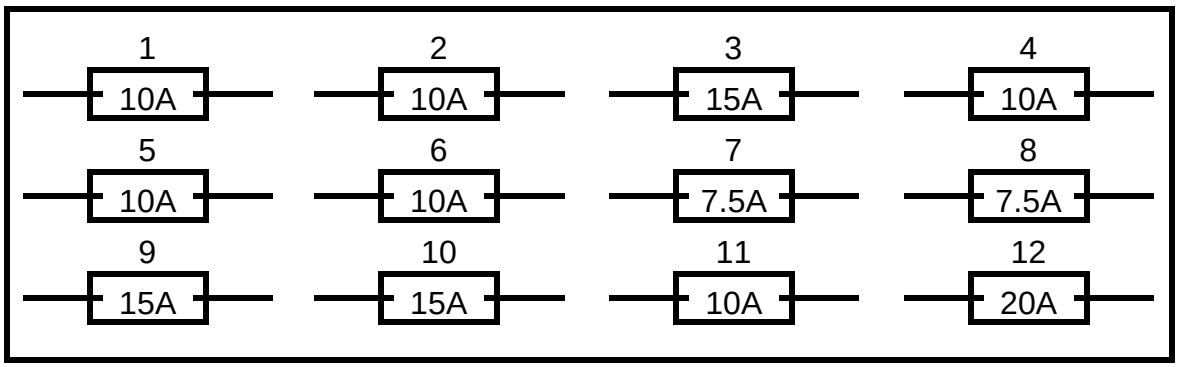


Key to wiring diagram of the electrical system of mod: Star ***75Q***

1 Control panel
2 Roll-bar light switch
3 Coolant temperature sensor
4 Motor stop solenoid
5 Horn
6 Light switch
7 Ignition key switch
8 Fuse box
9 Turn indicator switch
10 1-pin power socket
11 1-pin power socket
12 7-pin socket
13 Rh rear light
14 Rh licence plate light
15 Lh licence plate light
16 Lh rear light
17 Rh turn indicator-side light
18 Rh headlight
19 Lh headlight
20 Lh turn indicator-side light
21 Dense alternator
22 Starter motor
23 Maxifuse to protect system
24 12V battery
25 Ignition enabling relay
26 4WD S.V. switch
27 4WD S.V.
28 Ignition enabling switch
29 Ignition enabling switch connector
30 lignition enabling switch
31 Differential lock switch
32 Optional powering connector
33 Diff lock S.V.
34 Fuel level float
35 Clogged air filter sensor
36 Hydraulic oil temperature sensor
37 Engine oil pressure sensor
38 P.T.O. clutch switch
39 Parking brake switch
40 Brake light switch
41 4WD relay
42 4WD relay enabling relay
43 4WD switch
44 Turn indicator emergency switch (hazard lights)
45 Turn indicator intermittence

Cable colours			
A	Orange	G	Yellow
B	White	H	Light blue
C	Pink	M	Brown
D	Grey	N	Black
E	Green	R	Red
F	Blue	V	Purple

Description of fuse box for mod: Star 75Q



USERS

1 Rear right - front left side lights, rh licence plate light, 7-pin socket, side light, Indicator light

2 Rear left - front right side lights, lh licence plate light, 7-pin socket

3 Power supply for 4WD switch, +15 turn indicator emergency switch (hazard lights, parking brake switch

4 4WD relay enabling relay power supply

5 Rh dipped beam

6 Lh dipped beam

7 Power supply for differential lock switch, optional powering connector

8 Power supply for motor stop solenoid, ECX dense alternator

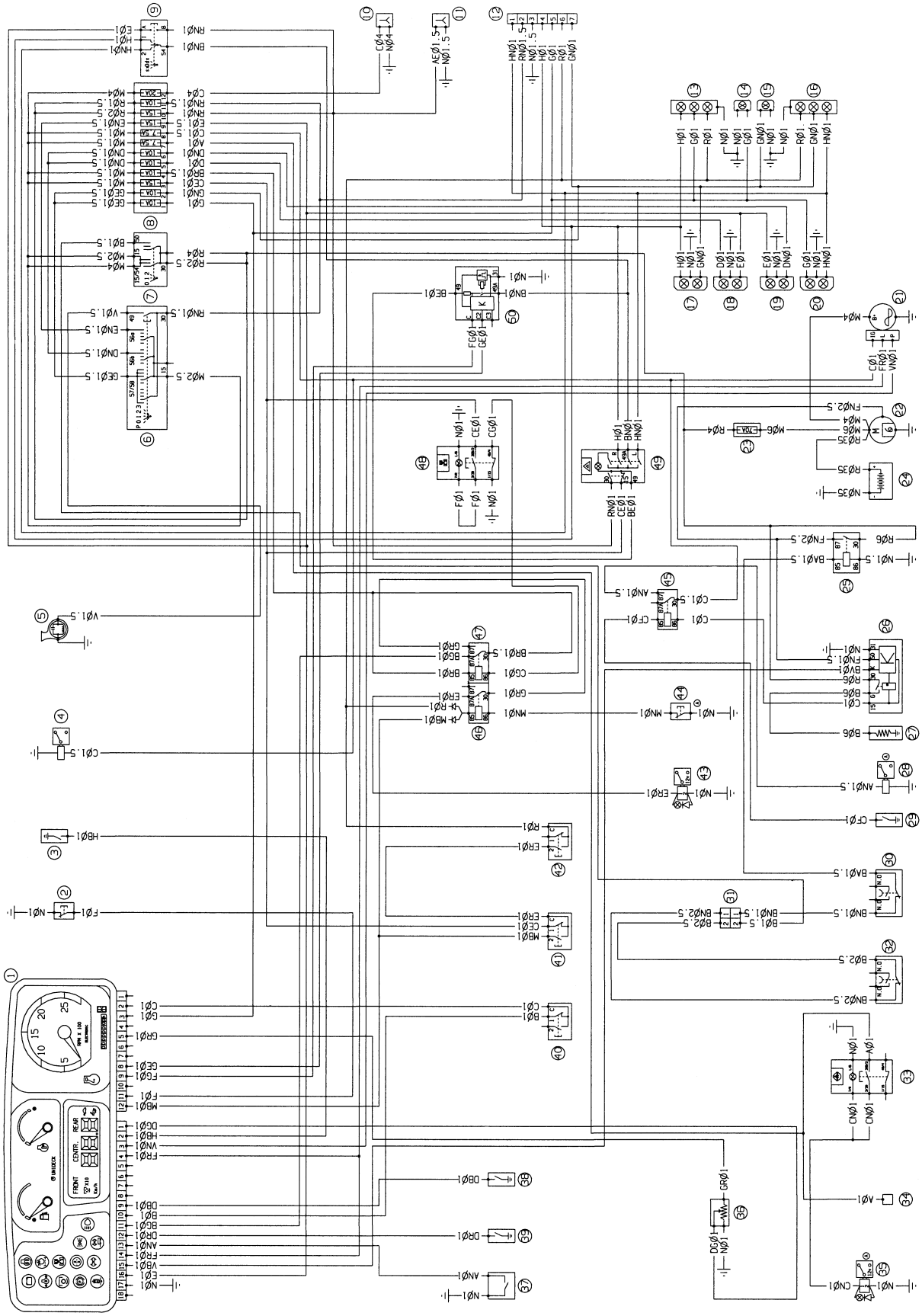
9 Rh and lh driving beams, turn indicator switch, driving beam Indicator light

10 Power supply for +30 turn indicator emergency switch (hazard lights), 1-pin Socket, driving beam blinker

11 Power supply for 7-pin socket, light switch

12 1-pin socket power supply

WIRING DIAGRAM - STAR 85Q – VM ENGINE

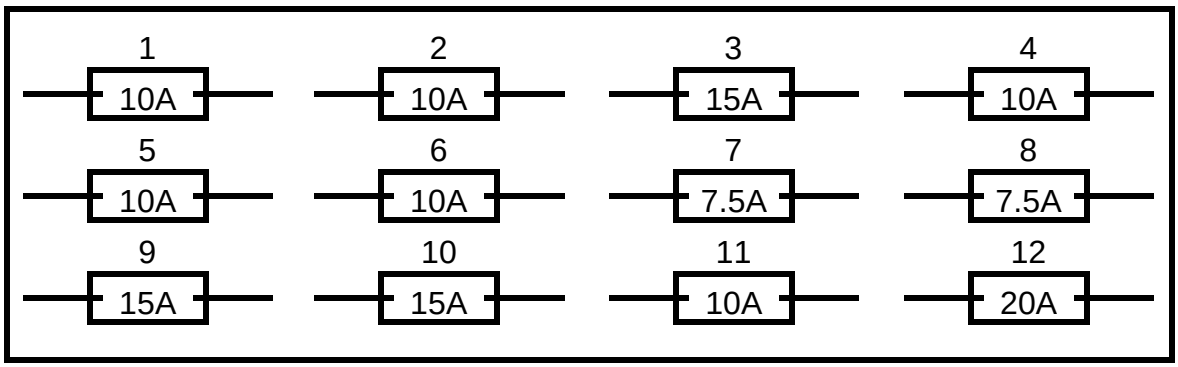


Key to wiring diagram of the electrical system of mod: Star ***85Q***

1 Control panel
2 Roll-bar light switch
3 Coolant temperature sensor
4 Motor stop solenoid
5 Horn
6 Light switch
7 Ignition key switch
8 Fuse box
9 Turn indicator switch
10 1-pin power socket
11 1-pin power socket
12 7-pin socket
13 Rh rear light
14 Rh licence plate light
15 Lh licence plate light
16 Lh rear light
17 Rh turn indicator-side light
18 Rh headlight
19 Lh headlight
20 Lh turn indicator-side light
21 Dense alternator
22 Starter motor
23 Maxifuse to protect system
24 12V battery
25 Ignition enabling relay
26 Preheater spark plug plant
27 Preheater plugs
28 Lead variator
29 Lead variator sensor
30 Ignition enabling switch
31 Ignition enabling switch connector
32 Ignition enabling switch
33 Differential lock switch
34 Optional power supply connector
35 Differential lock S.V.
36 Fuel level float
37 Clogged air filter sensor
38 Hydraulic oil temperature sensor
39 Engine oil pressure sensor
40 P.T.O. clutch switch
41 Parking brake switch
42 Brake light switch
43 4WD S.V.
44 4WD S.V. switch
45 Lead variator relay
46 4WD relay
47 4WD relay enabling relay
48 4WD switch
49 Turn indicator emergency switch (hazard lights)
50 Turn indicator intermittence

Cable colours			
A	Orange	G	Yellow
B	White	H	Light blue
C	Pink	M	Brown
D	Grey	N	Black
E	Green	R	Red
F	Blue	V	Purple

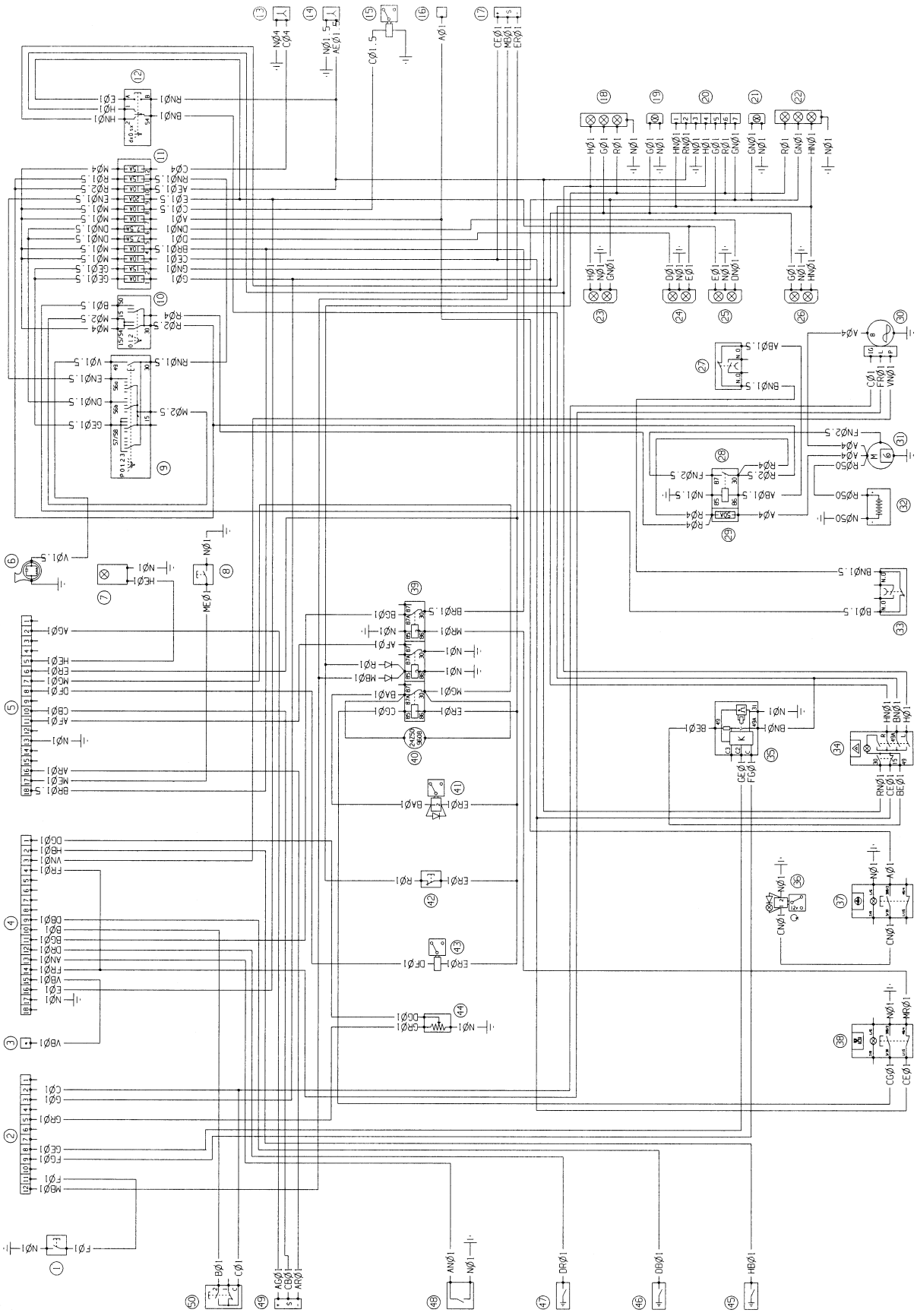
Description of fuse box for mod: Star 85Q



USERS

1 Lh front - rh rear side lights, rh licence plate light, 7-pin socket, side light Indicator light
2 Rh front - lh rear side lights, lh licence plate light, 7-pin socket
3 Power supply for 4WD switch, +15 turn indicator emergency switch (hazard lights, parking brake switch
4 4WD relay enabling relay power supply
5 Rh dipped beam
6 Lh dipped beam
7 Power supply for differential lock switch, optional power supply connector
8 Power supply for lead variator relay, motor stop solenoid, ECX dense alternator
9 Rh and lh driving beams, turn indicator switch, driving beam indicator light
10 Power supply for +30 turn indicator emergency switch (hazard lights), 1-pin Socket, driving beam blinker
11 Power supply for 7-pin socket, light switch
12 1-pin socket power supply

WIRING DIAGRAM - STAR 75Q MAX – J.DEERE ENGINE

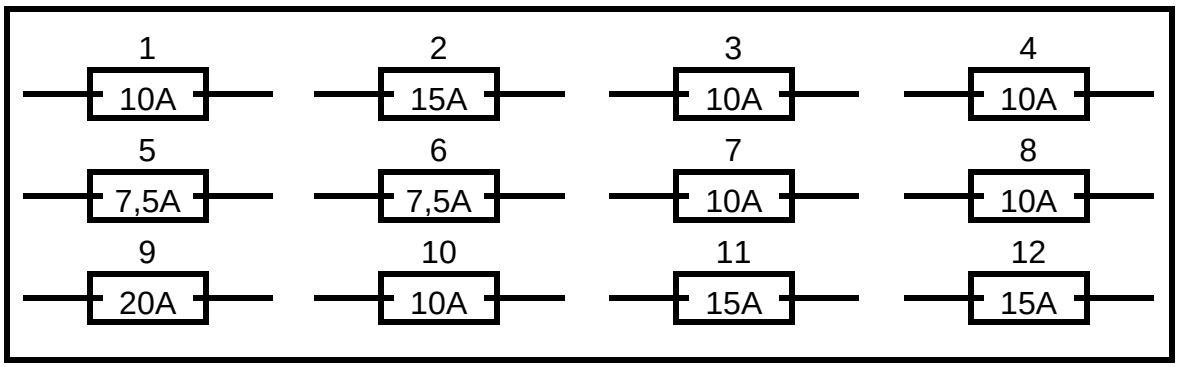


Key to wiring diagram of the electrical system of mod: ***75Q MAX***

1 Roll-bar switch
2 12-way connector to connect instrument
3 Connection for preheater indicator light (optional)
4 18-way connector to connect instrument
5 18-way connector of brake system control unit
6 Horn
7 Brake fault indicator light
8 Calibration reset button
9 Light switch—horn
10 Ignition key switch
11 Fuse box
12 Turn indicator switch
13 1-pin socket
14 1-pin socket
15 Motor stop solenoid
16 +15 cab power supply
17 Parking brake sensor
18 Rh rear light
19 Rh licence plate light
20 7-pin power socket
21 Lh licence plate light
22 Lh rear light
23 Rh turn indicator - side light
24 Rh headlight
25 Lh headlight
26 Lh turn indicator - side light
27 Braking system control unit fault indicator light
28 Ignition relay
29 Maxifuss for general protection of system
30 Alternator
31 Starter motor
32 12V battery
33 Ignition switch
34 Turn indicator emergency switch (hazard lights)
35 Turn indicator blinker
36 Differential lock S.V.
37 Differential lock switch
38 4WD switch
39 Relay unit
40 Marrys suppressor
41 4WD S.V.
42 Brake light switch
43 4WD-proportional brake S.V.
44 Fuel level float
45 Coolant temperature sensor
46 Hydraulic oil temperature sensor
47 Engine oil pressure sensor
48 Clogged air filter sensor
49 Brake end of travel sensor
50 Double clutch switch

Cable colours			
A	Orange	G	Yellow
B	White	H	Light blue
C	Pink	M	Brown
D	Grey	N	Black
E	Green	R	Red
F	Blue	V	Purple

Description of fuse box for mod: 75Q MAX



USERS

1 Rh rear - lh front side lights, rh licrnce plate light, 7-pin power socket, instrument lighting
2 Lh rear - rh front side lights, lh licence plate light, 7-pin power socket
3 Power supply for parking brake sensor, +15 turn indicator emergency switch (hazard lights), 4WD switch
4 Power supply for relay 3, brake system control unit
5 Rh dipped beam
6 Lh dipped beam
7 +15 cab power supply and for differential lock switch
8 Motor stop solenoid
9 Rh and lh driving beam, driving beam indicator light
10 Driving beam blinker, power supply for 1-pin socket, 7-pin socket +30 turn indicator emergency switch (hazard lights)
11 Power supply for light switch - +30 horn
12 1-pin power socket power supply

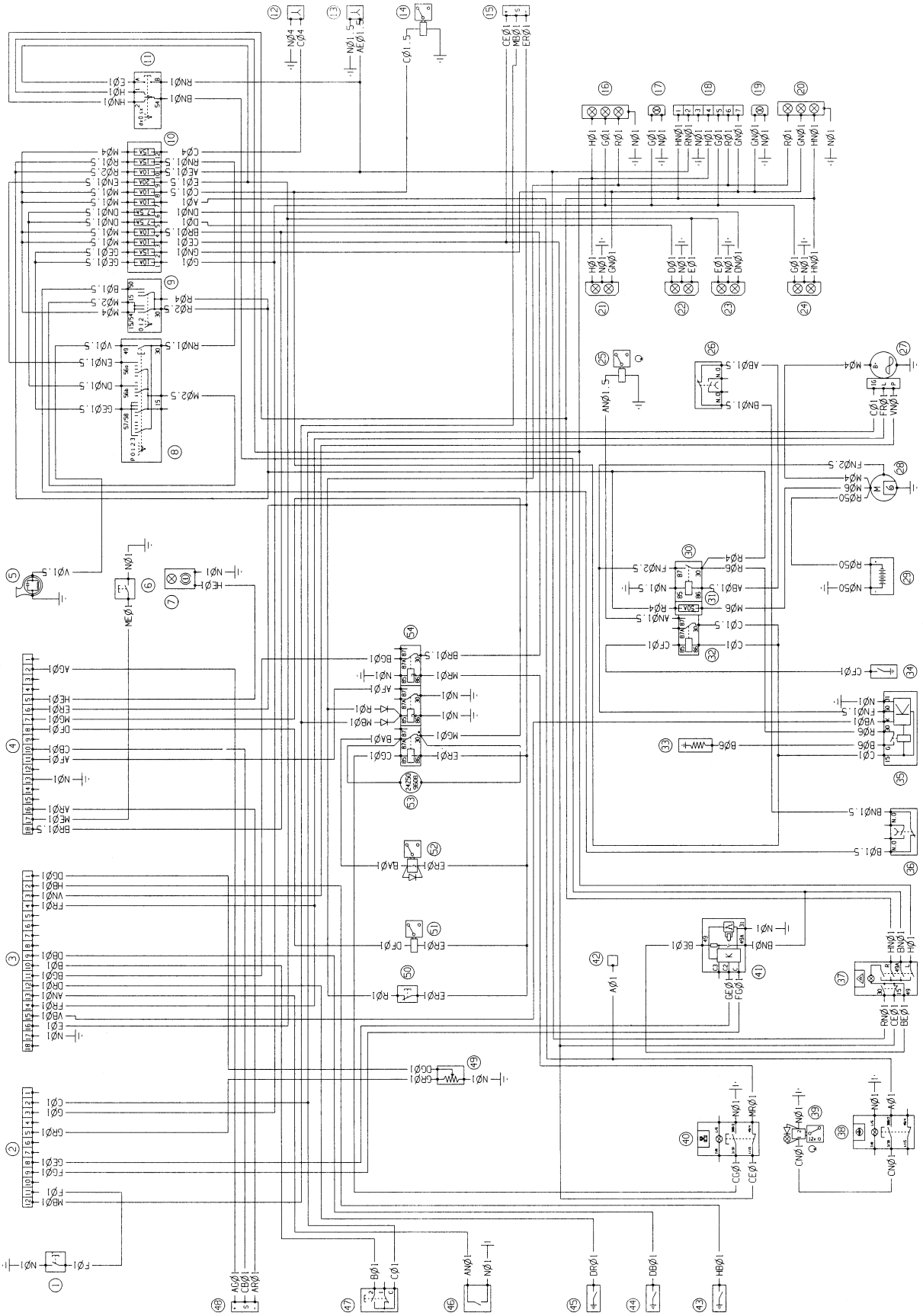
RELAY UNIT

Relay 1 – 4WD S.V.

Relay 2 – 4WD

Relay 3 – 4WD indicator light

WIRING DIAGRAM - STAR 85Q MAX – VM ENGINE

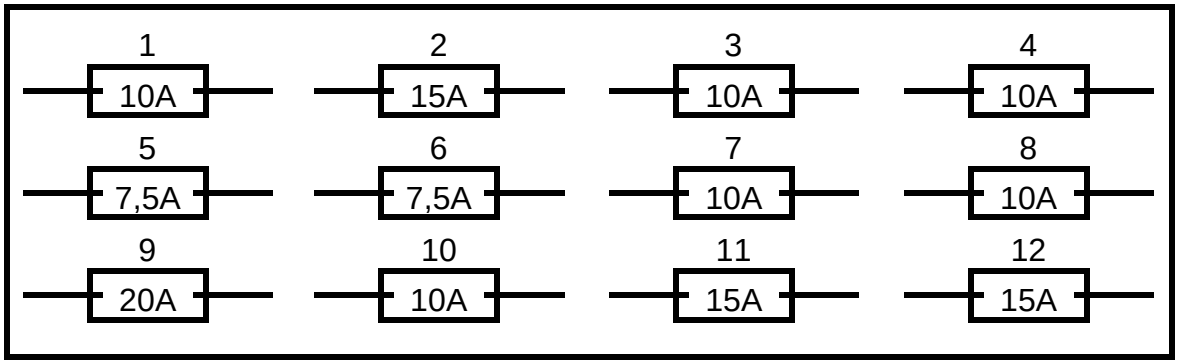


Key to wiring diagram of the electrical system of mod: ***85 MAX***

1 Roll-bar switch
2 12-way connector to connect instrument
3 18-way connector to connect instrument
4 18-way connector of brake system control unit
5 Horn
6 Calibration reset button
7 Brake fault indicator light
8 Light switch - horn
9 Ignition key switch
10 Fuse box
11 Turn indicator switch
12 1-pin socket
13 1-pin socket
14 Motor stop solenoid
15 Parking brake sensor
16 Rh rear light
17 Rh licence plate light
18 7-pin socket
19 Lh licence plate light
20 Lh rear light
21 Rh turn indicator - side light
22 Rh headlight
23 Lh headlight
24 Lh turn indicator - side light
25 Lead variator
26 Ignition switch on clutch pedal
27 Dense alternator
28 Starter motor
29 12V battery
30 Ignition relay
31 Maxifuse for general protection of system
32 Lead variator enabling relay
33 Thermostarter
34 Variator sensor
35 Preheater plant
36 Ignition switch on P.T.O. lever
37 Turn indicator emergency switch (hazard lights)
38 Differential lock switch
39 Differential lock S.V.
40 4WD switch
41 Turn indicator blinker
42 +15 cab power supply
43 Coolant temperature sensor
44 Hydraulic oil temperature sensor
45 Engine oil pressure sensor
46 Clogged air filter sensor
47 Double clutch switch
48 Brake end of travel sensor
49 Fuel level float
50 Brake light switch
51 4WD - proportional brake S.V.
52 4WD S.V.
53 Marrys suppressor
54 Relay unit

Cable colours			
A	Orange	G	Yellow
B	White	H	Light blue
C	Pink	M	Brown
D	Grey	N	Black
E	Green	R	Red
F	Blue	V	Purple

Description of fuse box for mod: 85 MAX



USERS

1 Rh rear - lh front side lights, rh licence plate light, 7-pin power socket, side light indicator light
2 Lh rear - rh front side lights, lh licence plate light, 7-pin socket
3 Power supply for 4WD switch, +15 turn indicator emergency switch (hazard lights), parking brake switch
4 Power supply for 4WD relay enabling relay
5 Rh dipped beam
6 Lh dipped beam
7 Power supply for differential lock switch, optional power supply connector
8 Power supply for lead variator relay, motor stop solenoid, ECX dense alternator
9 Rh and lh driving beams, turn indicator switch, driving beam indicator light
10 Power supply for +30 turn indicator emergency switch (hazard lights), 1-pin socket, driving beam blinker
11 Power supply for 7-pin socket, light switch
12 1-pin socket power supply

RELAY UNIT

Relay 1 – 4WD S.V.

Relay 2 – 4WD

Relay 3 – 4WD indicator light

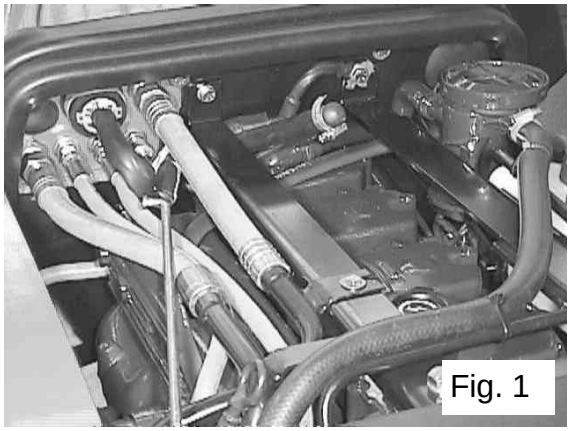


Fig. 1

Figs. 1 and 2 show the connections between the engine and platform.
Since the driver's platform in the Quadrifoglio series is entirely mounted on Silent - blocks, it was necessary to power the actual platform itself by means of a single sealed connector, which is the one shown in fig. 1.

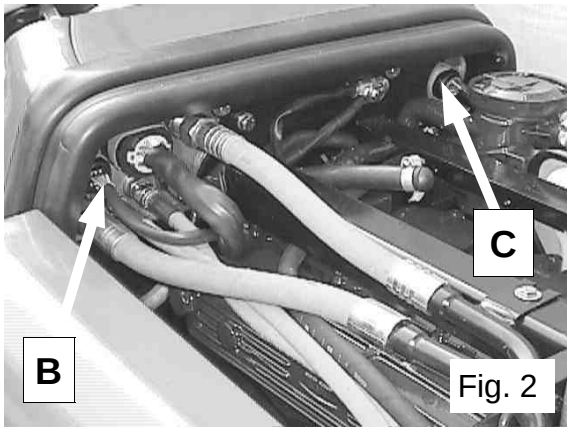


Fig. 2

In Fig. 2, the connector that connects to the control wiring of the front brake (MAX version) is shown with letter **B**, while the connector of the front PTO control is indicated with letter **C**.
These optionals are not always installed on the tractor.

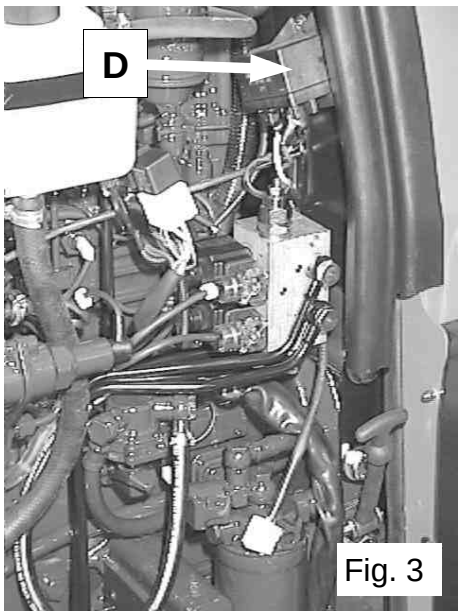
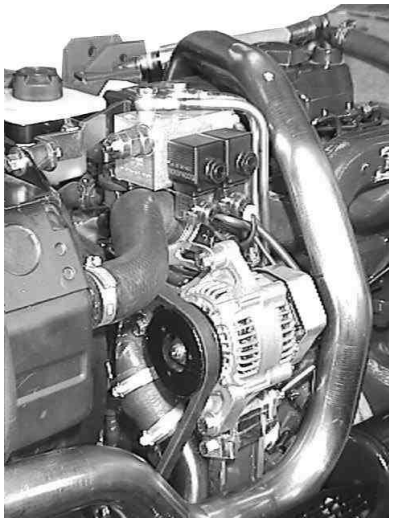


Fig. 3

Fig. 3, which depicts the VM engine of the 85Q tractor, shows the position of the solenoid valve that controls 4WD and diff lock engagement. There is a led on the heads of the solenoid valve unit which shows when the individual solenoid valves are operating in a regular way.
Remember that the 4WD solenoid valve is always energized (led on) when the 4WD is not engaged. On the other hand, the led of the differential lock (BD) is only on when the lock is actually engaged.

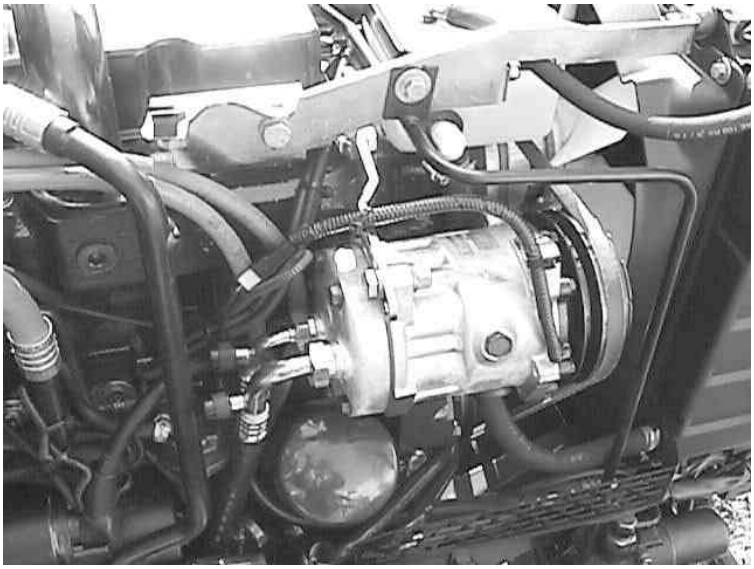
Fig. 3 shows the preheater unit (part **D**), which reduces the emissions from emission-controlled VM engines when started.
The wiring diagram of the preheater unit is supplied separately for use if the part must be replaced.
Since the engine is the direct injection type, this unit makes starting easier in very cold weather.



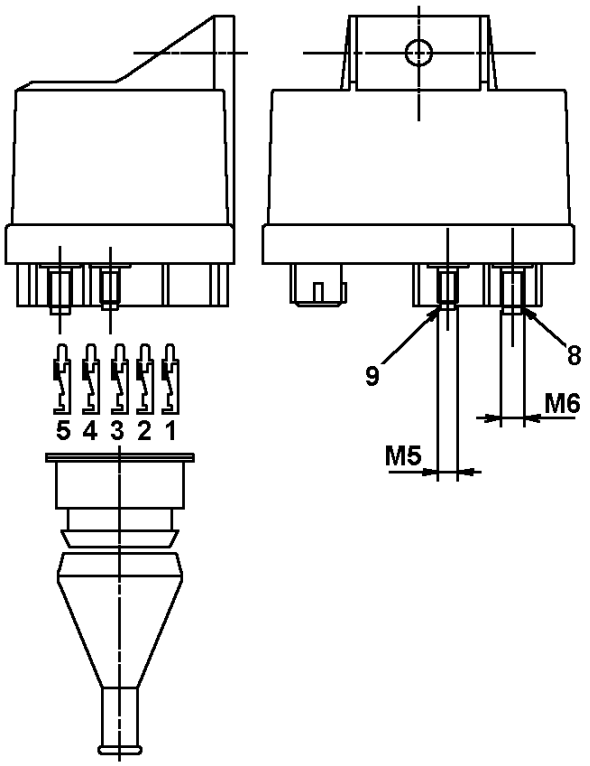
The pictures alongside show how the position of the solenoid valve unit that controls 4WD and diff lock engagement is different on tractors with J.Deere engines.
Although the functions previously described for Star Q 85 remain the same, the unit itself is positioned above the alternator.
In the Star 75Q version, the main fuse, and possibly the additional one that protects the front PTO line, are installed near the diesel fuel filter, thus on the opposite side of the engine as compared to tractors with VM engines.
In the Star 85Q version, the position of the alternator changes, depending on whether the machine is equipped with the air conditioning system or not.
In the version with compressed air system, the position of the alternator is occupied by the compressor while the alternator is installed on the rh side of the engine.

The picture alongside shows how the compressor is assembled in the version with J. Deere engine.
The alternator is always on the lh side of the engine in these tractors.

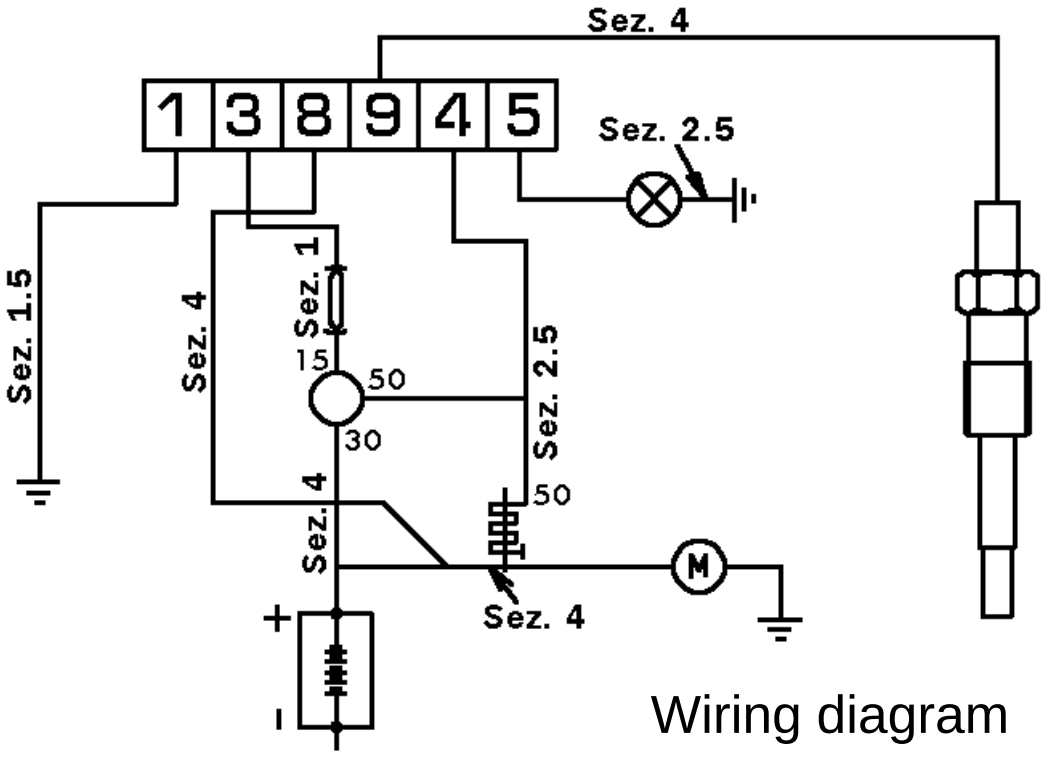
Cab GL6, with which the Quadrifiglio series is equipped, is always independent from the engine installed in the tractor.



COMPLETE DEVICE FOR PREHEATER PLUGS
ENGINE D 703 L / LT—D 704 LTE
REF. VM 13002151F

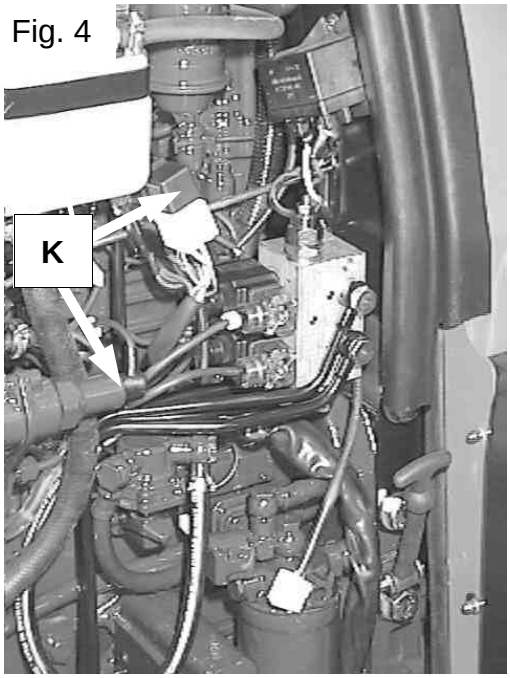


TECHNICAL SPECIFICATIONS OF THE GLOW PLUGS
VOLTAGE **12 V**
POWER DRAW ON PICK-UP **10A**



Wiring diagram

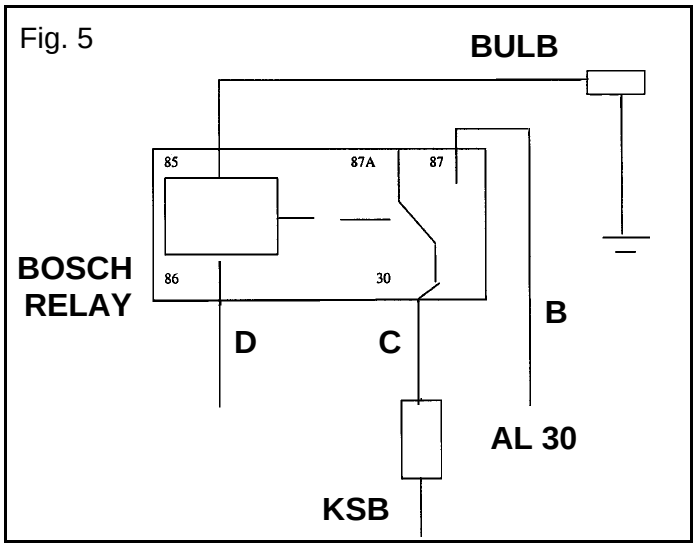
Fig. 4



The three parts depicted in the enclosed diagram, i.e. the so-called KSB or automatic lead variator, are indicated by the letter **K** in fig. 4.
Depending on the temperature of the water measured by the bulb indicated in the figure, the lead variator on the engine is operated by means of the relay shown in the enclosed diagram (fig. 5) and also in fig. 4.
This optimizes combustion and reduces the polluting elements.

The other bulb positioned on the engine, near to the one that activates the KSB, is the one that measures the temperature of the water and transmits the relative signal to the instrument on the dashboard.

Fig. 5



The main fuse of the entire electrical system is installed behind the relay of the KSB.

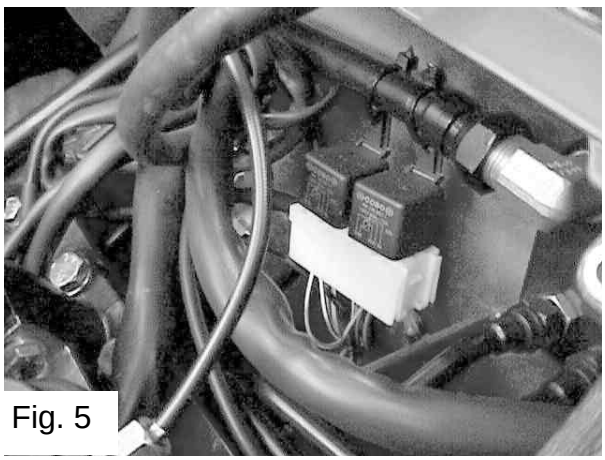


Fig. 5

The two relays that control four-wheel drive engagement are installed inside the dashboard. They are activated during both the braking phase and with the switch installed near the power lift levers. The relay can be heard to tick (denoting that it is operating correctly) when both the brake pedals are depressed at the same time with the ignition key inserted.

The other ticking sound that can be heard is the one made by the two switches on the brake pedals, which engage the drive function during the braking phase when operated at the same time.

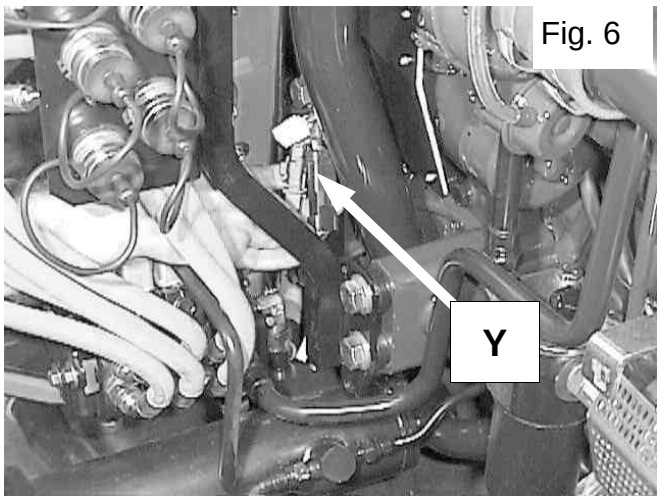


Fig. 6

Part. **Y** of fig. 6 indicates the two sealed connectors that connect the fixed part of the rear electrical system (brake switch line, ignition switch line, differential lock switch...).
These connectors should also be disconnected if the platform is split from the chassis of the tractor.
Fig. 7 shows the two switches on their respective brake pedals and the hand brake switch (emergency and parking).
Remember that it is very important to correctly adjust the switches on the two brake pedals. The switches operate by extension and are therefore compressed when the brakes are not being used. The contacts to use on the switches are indicated by numbers 1 and 2.

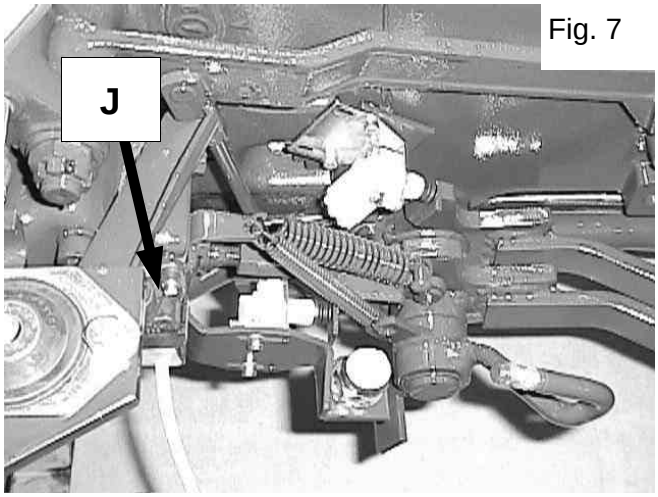


Fig. 7

When the hand brake is not being used, the hand brake switch (part J of fig. 7) must also be compressed and must not turn on the indicator light on the dashboard that indicates that the parking brake is engaged.

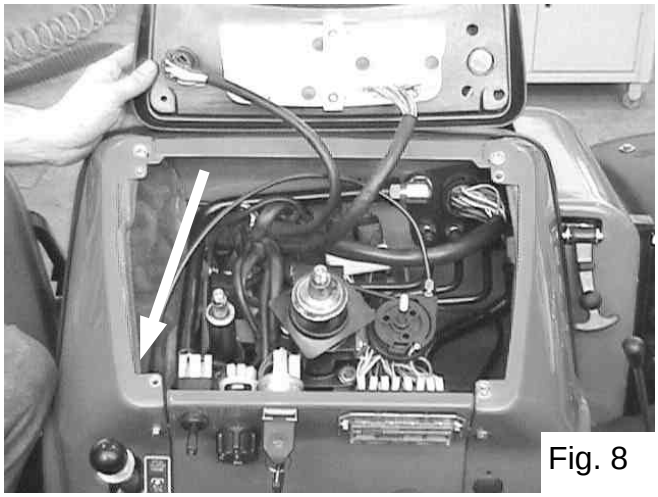


Fig. 8

The manual PTO engaging switch is installed inside the dashboard, on the left hand side, in the zone indicated by the arrow in fig. 8. The indicator light on the dashboard will come on when the PTO clutch is engaged. Here again, the connector that connects this part to the electrical system must be disconnected before the platform is split from the chassis of the tractor.

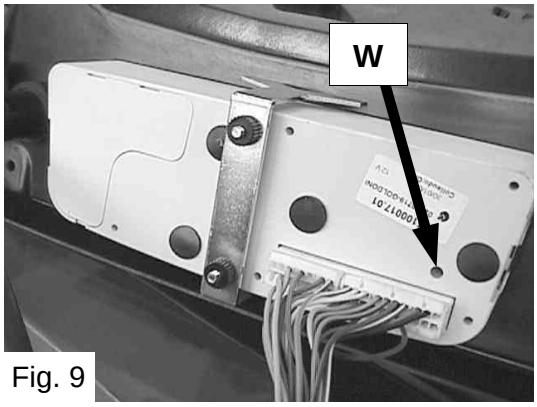


Fig. 9

The point where a small screwdriver can be used to adjust the engine's rpm rate is shown with the letter **W** on the multifunction instrument depicted in fig. 9.
After the PTO rate has been measured with a speedometer and bearing in mind that the ratio between the engine rate and that of the PTO (540 rpm independent) is 4, the indication on the rpm meter and hour counter can be made to match that of the speedometer by means of the adjuster screw of fig. 9.

This operation must be carried out if the rpm meter and hour counter, or the alternator are replaced.

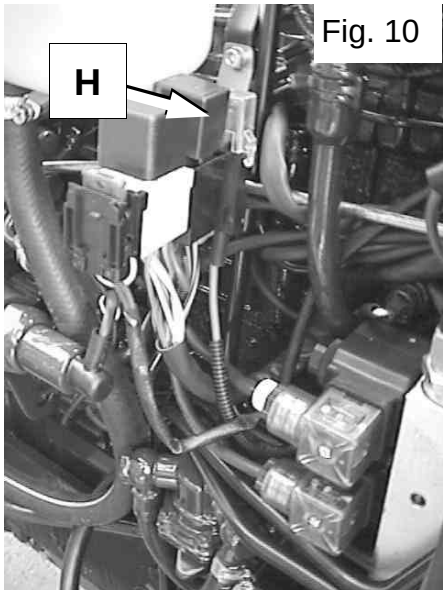


Fig. 10

The other relay, near that of the KSB, is the one that enables ignition.
After the enabling signals have been received from all the switches that ensure that the safety conditions required to start the engine have been complied with (clutch pedal pressed, PTO disengaged), the relay indicated with letter **H** in fig. 10, powers the starter motor.

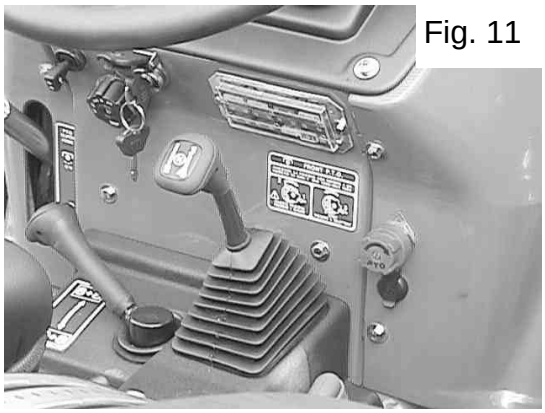


Fig. 11

Fig. 11 shows the position where the fuse box is installed on the tractor.
After the wiring diagram and relative key, the previous pages illustrate the diagram of the fuse box and fuse matches with the tractor functions.
If a fuse burns out, first find out why this happened and then replace the burnt out fuse with one of the same ampere rating.

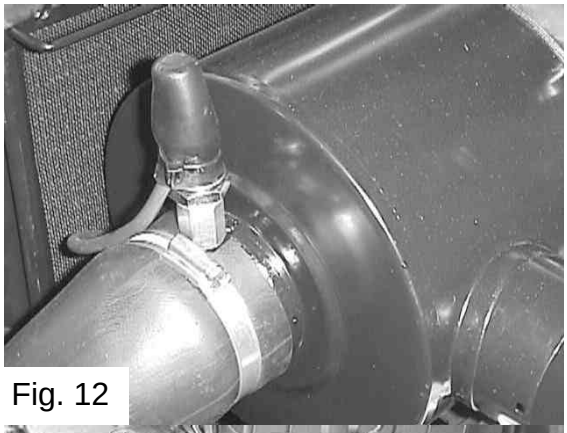


Fig. 12

Fig. 12 illustrates the bulb that indicates when the air filter is clogged. Replace the bulb shown in the photograph if the relative indicator light on the dashboard still remains on when the air filter is clean.

When the tractor is fitted with the line for the electromagnetic clutch that controls front PTO engagement, the connectors in the front part of the machine shown in fig. 13, should be connected in the following way:

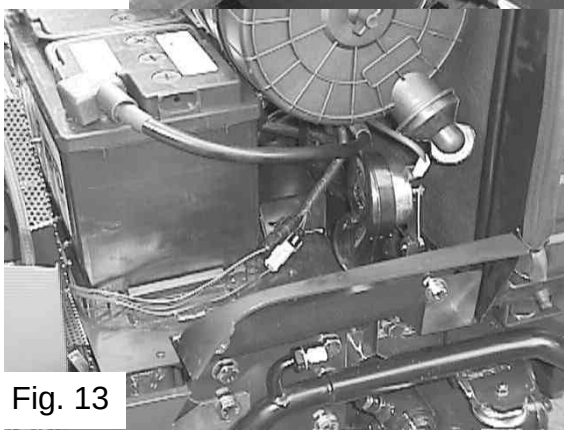


Fig. 13

CLUTCH			SYSTEM
wire	thick	BLACK	L.BLUE - BLACK
	thick	RED	RED
	thin	BLACK	BROWN - BLACK
	thin	RED	RED – BLACK

When the tractor is fitted with the line for the electromagnetic clutch that controls the front PTO, there will also be a relay installed further down under the dashboard.
The function of this relay is to draw power straight from the battery charging wire that comes from the alternator and to power the plant that controls PTO engagement, drawing this power straight from the battery (thus doing away with voltage drops caused by other users).
It is worthwhile examining the functions of the plant that controls the electromagnetic clutch in more detail:
- gradual engagement of the front PTO (smooth starts), signalled by the indicator light which first blinks and then remains on with an unbroken light;
- disengagement of the front PTO if there is a sudden overload;
- the front PTO can be engaged at an engine rate of between 1200 and 1800 rpm (thus not at the idling rate or top rate of the engine).
Since the plant that controls PTO engagement receives a signal from the alternator, the command is only activated when the engine is running. This prevents the PTO from being engaged when the engine is at a standstill, and from then starting the engine together with any implement applied to the front PTO.
If the PTO fails to engage, make sure that this connection between the **W** of the alternator and the plant is correct.
One last indication about the impedance values of the two circuits in the electromagnetic clutch.
The circuit with the tinner connection wires is the one that detects clutch slipping and its impedance must be 15.2-15.3 Ohm. The impedance of the primary circuit is 2.9-3 ohm.

Fig. 13 A

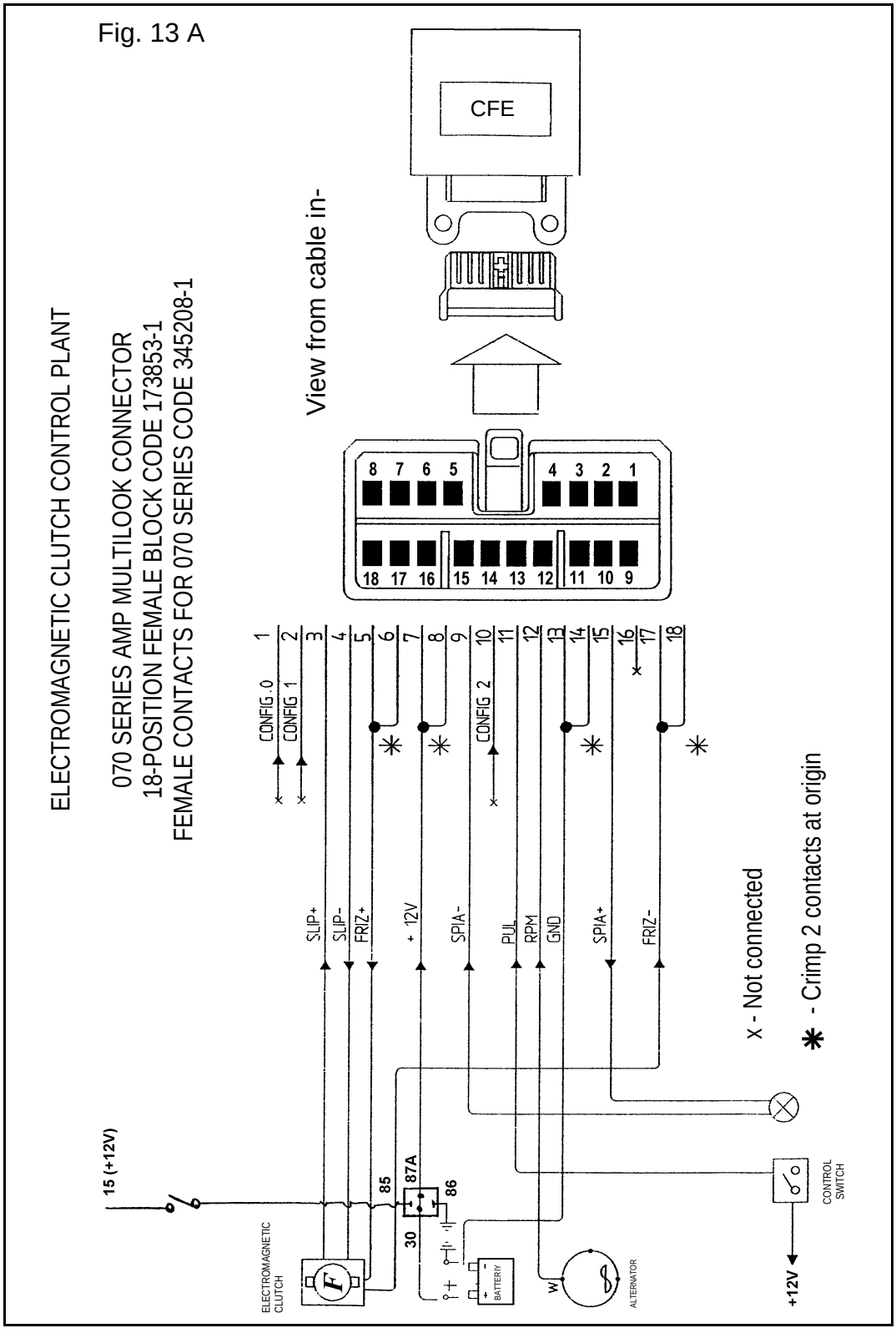


Fig. 13 A shows the wiring diagram of the plant that controls front PTO engagement and disengagement.
The + and - slips are terminals of the plant that should be connected to the thin red and thin black wires that project from the electromagnetic clutch windings and control its slip.

When the tractor is fitted with the front PTO, there will be an additional fuse on the engine line near the main fuse of the system to safeguard the electrical line that controls the front PTO.
After the diagrams of the electrical systems of the basic versions, the previous pages also include the diagrams of the systems installed in the MAX versions, i.e. machines which, besides being equipped with the function whereby the drive is engaged on braking, also have brakes on both the high or low front axles (machines with either J. Deere or VM engines).
In this case, the electrical system is a specific type for these tractor versions.
There is a proportional solenoid valve in front of the radiator in these tractors, which controls the oil-cooled disc brakes in the front axle.

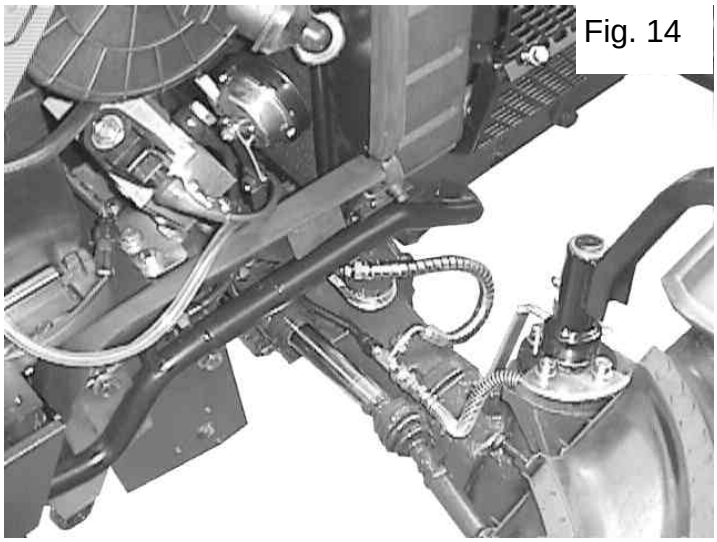


Fig. 14

Fig. 14 shows the position in the tractor of the proportional solenoid valve that controls front axle braking (oil-cooled disc brakes) and the relative delivery tube leading to the front axle brakes.
Unlike the version where the drive is engaged when the main brake is applied, in this case the tractor is fitted with an electronic plant. This receives a pulse from the sensor on one of the brake pedals (see fig. 15), which substitutes one of the two switches installed in the basic version, and engages the four-wheel drive. After this, it begins to deliver pressurized oil to the front brakes by means of the proportional solenoid valve of fig. 14.

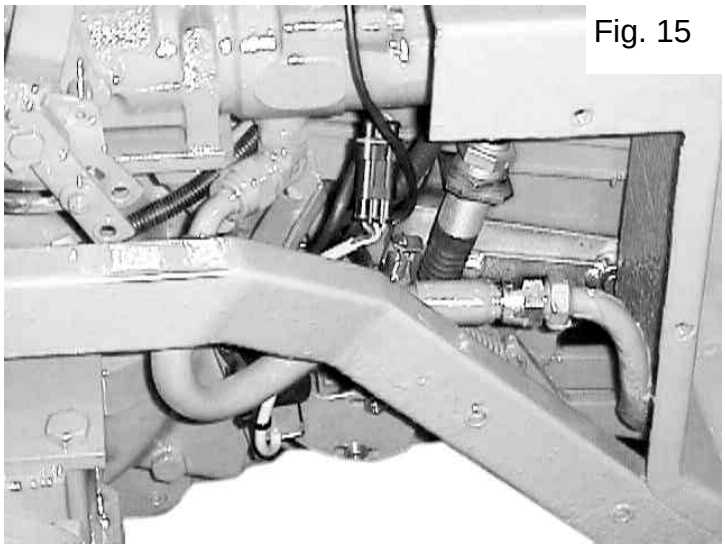


Fig. 15

The greater the action on the rear brake pedals, the higher the pressure conveyed to the front brakes becomes.
There is a transmission between the brake pedal and sensor which ensures that the sensor is only compressed to a maximum 10 mm.

When the pedals are not being used, the gap that must remain between the sensor and the element that compresses it must be about 3 mm.
The electronic plant that activates the braking action is installed inside the dashboard, in the zone indicated with the letter **L** of fig. 16.

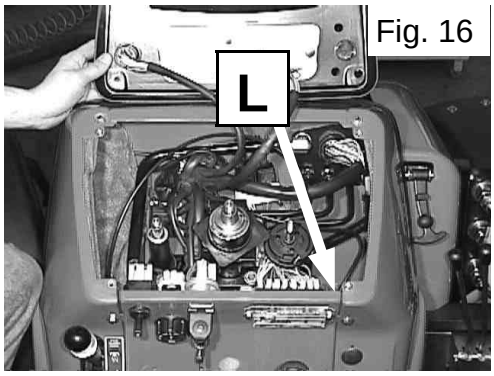
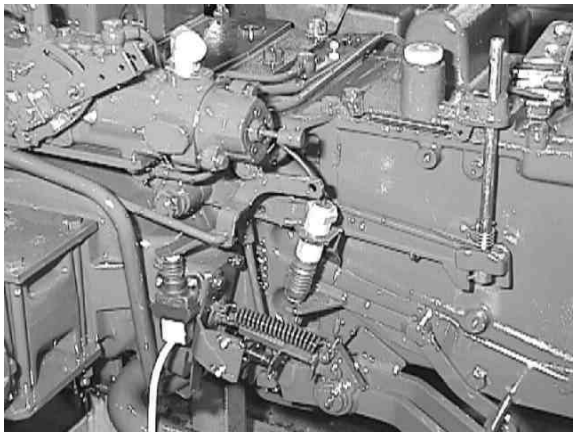


Fig. 16

The dashboard has an additional indicator light (with the brake pad symbol) that warns of any faults in the braking system.
If the braking system operates in a faulty way, the indicator light on the dashboard may come on in different ways. This device has been designed to make it easier for specialized technicians to identify faults.

Operators who are not expert technicians should remember that if an indicator light comes on or flashes, it always denotes a fault in the braking system that could impair the efficiency of the braking action itself.
The table of alarm signals is given below.
- 2 flashes + pause : brake sensor short-circuited towards ground;
- 3 flashes + pause : brake sensor disconnected or not detected;
- 4 flashes + pause : brake or 4WD solenoid valve short-circuited;
- 5 flashes + pause : brake solenoid valve disconnected or not detected
- Continuous flashing : maximum brake wear: proceed with the adjustments.
- Unbroken light : faulty plant, short-circuited.



The photo alongside shows the various switches and position sensor of the braking action in the MAX version.
The thread on the sensor shank allows adjustments to be made to advance or delay the braking action of the front axle in relation to the rear one.

With reference to the description about continuous flashing, the procedure required to adjust the brakes and RESET the plant will now be illustrated.
The plant indicates brake wear when sensor travel nears the 10 mm mark. This occurs following wear on the brake discs in the tractor and leads to increased brake pedal travel.

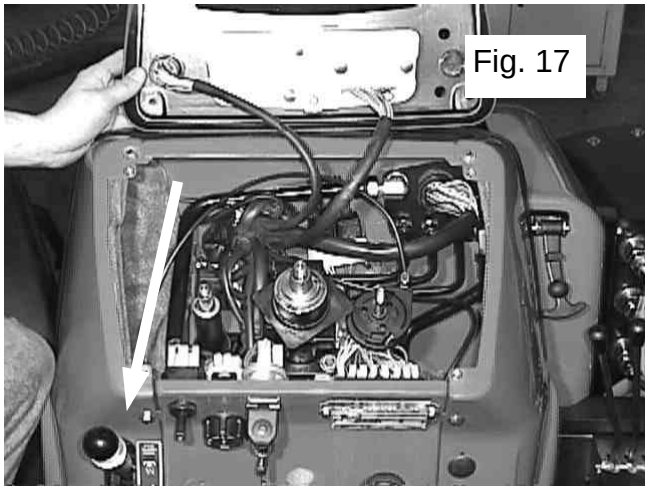


Fig. 17

It is worthwhile remembering that all the previously described operations must be carried out with the key in the igntion switch.
If the front axle braking action is too much in advance of the rear one, move the sensor a couple of mm upwards by loosening and then tightening the ring nut that keeps it in position.

Before resetting the plant, adjust the brake pedal links in order to shorten the travel of the brake pedals.
Position the sensor in the correct way, as mentioned previously, and then proceed with the resetting operation.
To do this, keep the switch in the clutch lever compartment depressed for about 30 seconds.
As soon as the switch is pressed, the brake indicator light on the dashboard will begin to flash: keep the switch depressed until the operation has terminated.
Now depress the brake pedals with an average sort of thrust in order to make 5 braking actions and allow the plant to calibrate itself. The operation has now terminated and you can proceed with a test braking action.

To check the condition of the 4WD engaging solenoid valve windings and those of the proportional solenoid valve that controls the front braking action, consider the following reference values:
-resistance of the 4WD coil: 7.6 Ohm - resistance of the proportional solenoid valve coil: 7.4 Ohm (both measured with a tester). Remember that values near to 0 indicate short-circuits while last of a measurement means that the circuit is broken.

If the dashboard and fixed bonnet have been disassembled, take care to prevent the brake indicator light from being switched with the reset one when the parts are reassembled as this would prevent the plant from functioning owing to a multiple series of resets. Mark the wires before

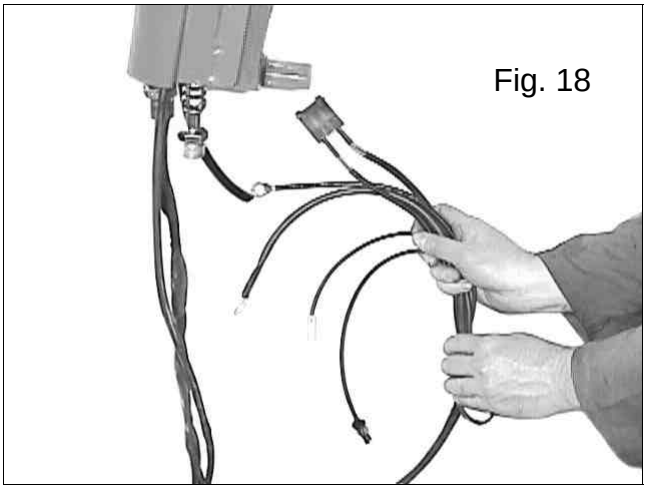
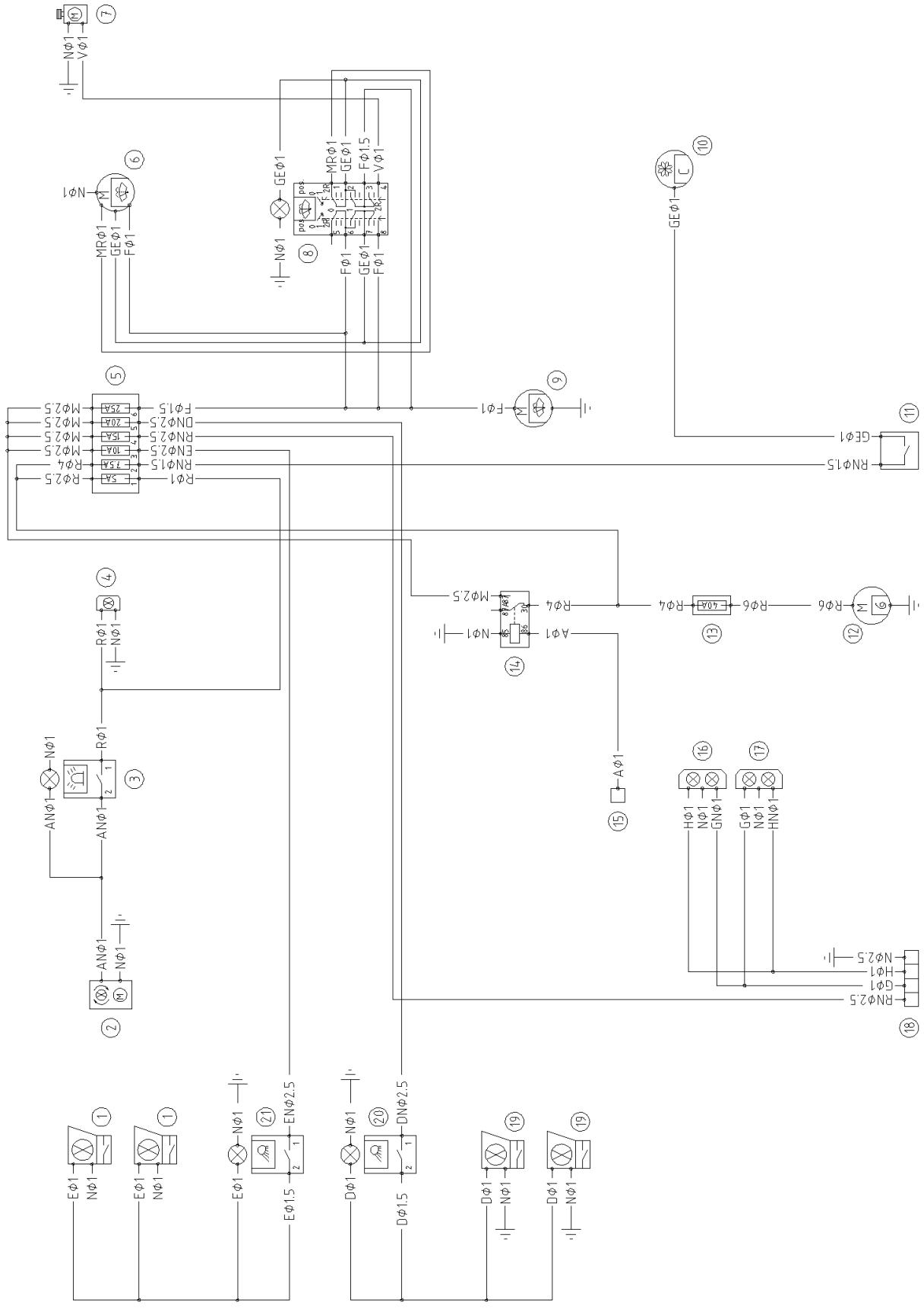


Fig. 18

Fig. 18 shows the wiring that connects cab GL6 with the tractor. The connections are the same, regardless of whether the tractor is a Star 85Q or Q 75.
The cab line has its own fuse, ground wire, a red wire with eyelet that should be connected under the starter motor terminal and an orange wire that interfaces with the other orange wire in the wiring of the tractor.

CABIN ELECTRICAL DIAGRAM

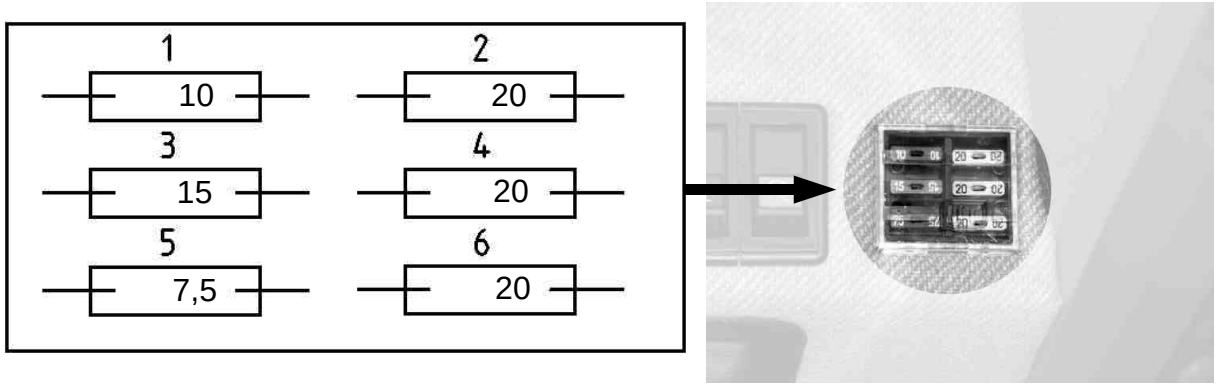


KEY

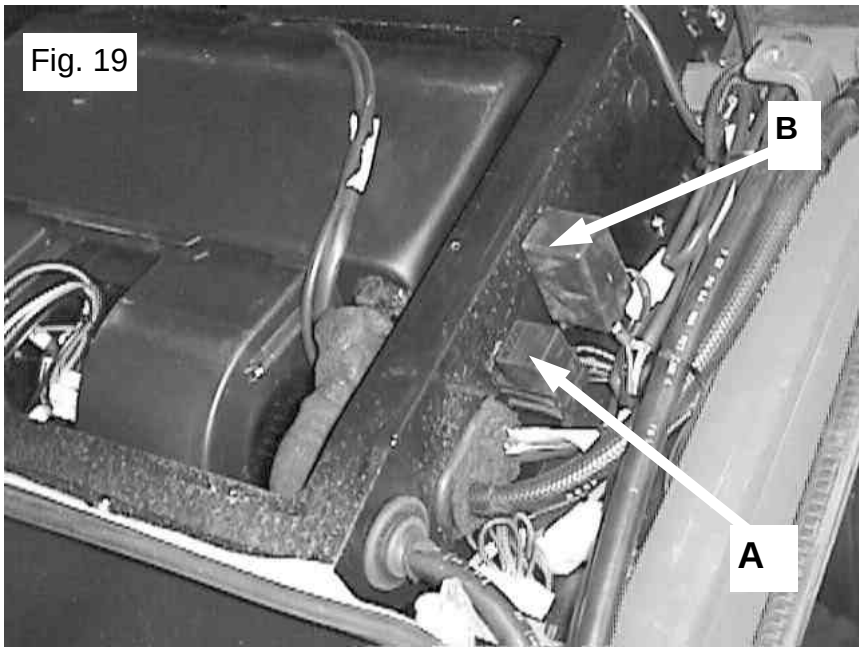
N.	DESCRIPTION
1	FRONT FIELD LIGHTS
2	ROTARY LAMP
3	ROTARY LAMP SWITCH
4	CABIN ROOF LAMP
5	FUSE BOX
6	WINDSCREEN WIPER MOTOR
7	WIPER KIT
8	WINDSCREEN WIPER SWITCH
9	REAR WINDSCREEN WIPER
10	AIR CONDITIONING COMPRESSOR
11	AIR CONDITIONING BULB
12	STARTING MOTOR
13	MAIN FUSE FOR SYSTEM PROTECTION
14	ENABLING RELAY
15	CABIN FEED CONNECTOR
16	FRONT RIGHT LIGHT
17	FRONT LEFT LIGHT
18	FRONT LIGHTS FEED CONNECTOR
19	REAR FIELD LIGHTS
20	REAR FIELD LIGHTS SWITCH
21	FRONT FIELD LIGHTS SWITCH

FUSE

N.	USERS
1	POWER SUPPLY FOR ROTARY LAMP SWITCH, CABIN ROOF LAMP
2	AIR CONDITIONING POWER
3	POWER SUPPLY FOR FRONT FIELD LIGHTS SWITCH
4	POWER SUPPLY FOR FRONT LIGHTS CONNECTOR
5	POWER SUPPLY FOR REAR FIELD LIGHTS SWITCH
6	POWER SUPPLY FOR WINDSCREEN WIPER SWITCH, REAR WINDSCREEN WIPER MOTOR, FRONT WINDSCREEN WIPER MOTOR



There is also the connector for the turn indicators and the power supply for the compressor (cable with sealed block).



Relay **A** of fig. 19 is the one that, having received 15V power by means of the orange wire from the tractor, distributes 15V power to all the key-activated users in the cab. The red wire (30) from the tractor is routed straight from the fuse box of the cab.

Relay **B** of fig. 19 is the one which, having received the enabling signal from the fan unit and thermostat installed in the condenser unit, starts the rear cooling fan installed in the rear part of the cab roof.

If the rear fan of fig. 20 fails to start within one minute when the air conditioning system is turned on, and after having turned on the fan unit in the cab, turn off the system and check the fuses of fig. 21. Failure of the rear fan to operate raises the pressure of the gas in the air conditioning circuit and this can lead to the maximum value of the circuit being activated.

Remember that if the system is not charged with an 0.8 kg quantity of gas (R 134 a), the compressor will fail to start and it will not be possible to check how the system operates.
The switch that turns on the air conditioning system and activates the compressor, receives an enabling signal from the pressure switch in the circuit.

Fig. 20

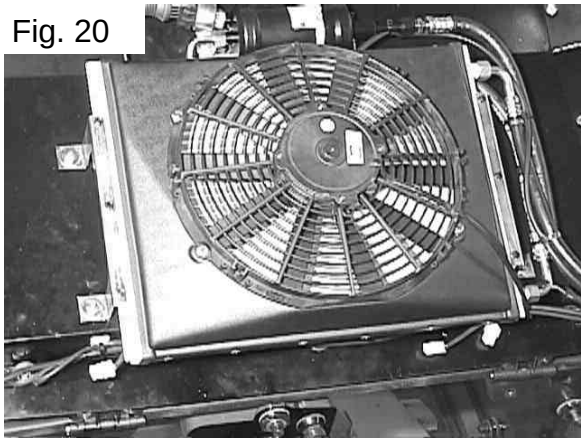
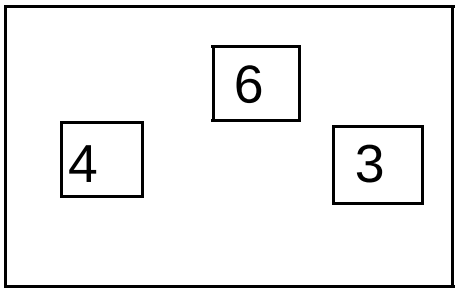


Fig. 22



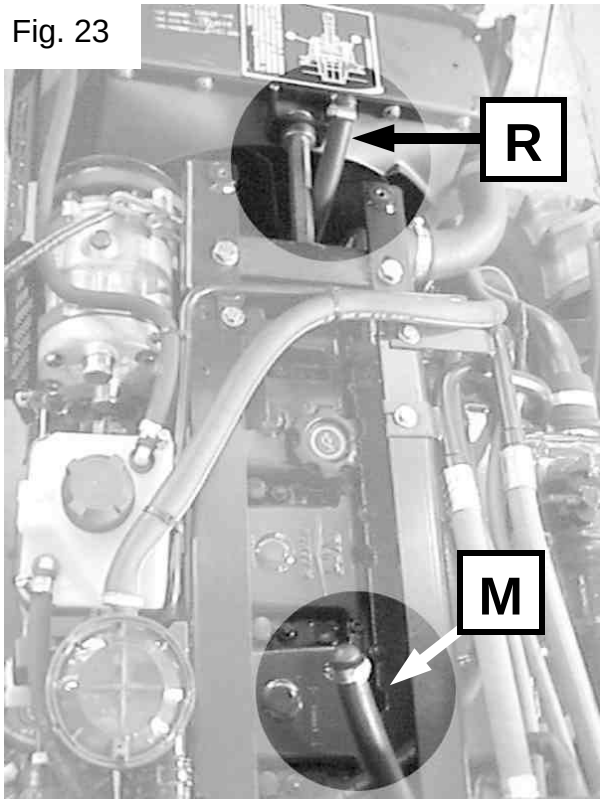
The wiring diagram of the thermostat is illustrated in fig. 22 (to be used if the part is replaced):
- 4 : yellow - green wire,
- 6 : light blue wire,
- 3 : green wire.

Fig. 21

Make sure that a good ground contact is ensured (eyelet under the screw fixed to the cab frame) near the two relays on the cab frame.
An uncertain ground contact can cause a series of faults amongst which failure of the air conditioning circuit's cooling fan to start.

The two air vents situated in the cab and pointing towards the operator should only be opened when the air must be re-circulated around the cab itself: in these conditions, the air is drawn from inside the cab instead of from the outside.
This function should be used when the cab must be cooled very quickly.

Fig. 23



The letters **M** and **R** in fig. 23 respectively indicate the delivery and return pipes of the cab heating system in the version with the VM engine.

Remember that delivery pipe **M** must be routed to the exchanger on the cab from the side with the cock.
In the version with J. Deere engine, the delivery pipe is near the turbine on the lh side of the engine while the return pipe is always on the water pump as shown in fig. 24.

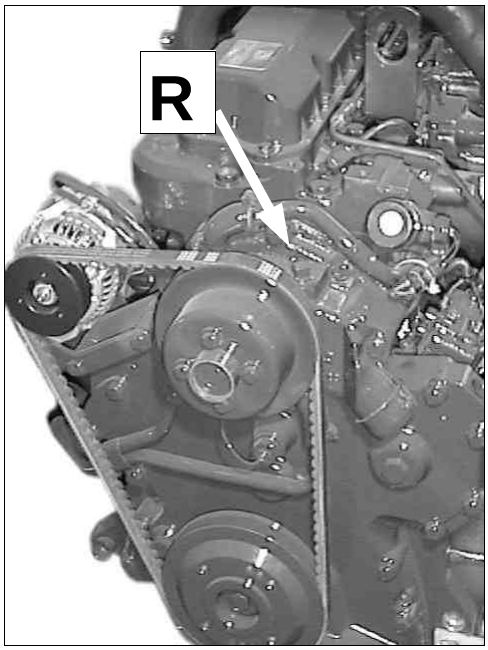
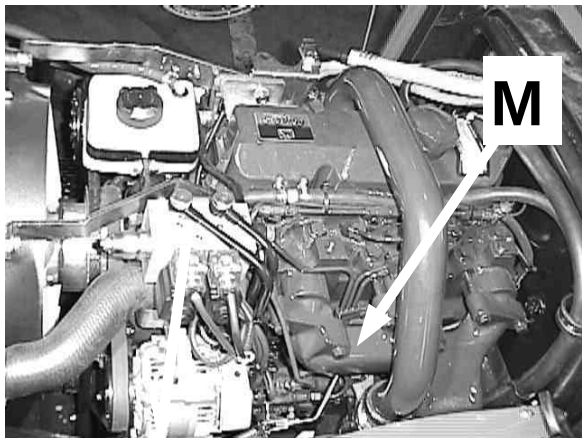
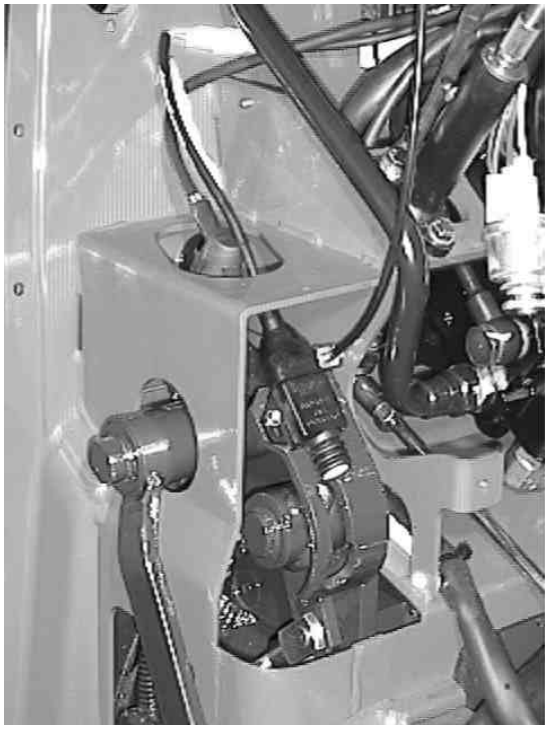


Fig. 24

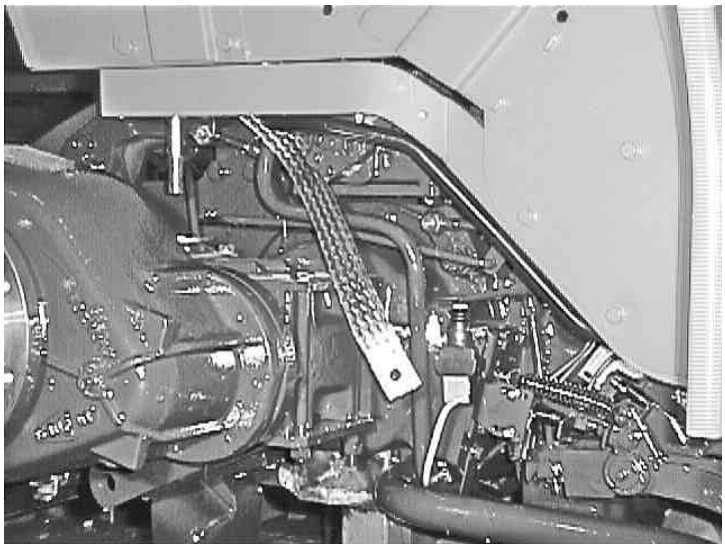


Letters **M** and **R** in fig. 24 respectively indicate the delivery and return pipes of the heating system in the cab for tractors equipped with J. Deere engines.

Here again, the situation is the same as described for the Star 85Q version, i.e. the delivery pipe **M** must be connected to the exchanger in the cab from the side with the cock.



The picture alongside shows the two switches installed on the two clutch assemblies: the PTO clutch and the main clutch.
The switch on the PTO clutch only turns on the indicator light to signal that the clutch is disengaged.
The switch on the main clutch is an ignition enabling switch that only allows the engine to start when the clutch pedal is depressed.



Since this family of tractors is entirely constructed on an integral-platform assembled on silent blocks, the copper braid shown in the picture alongside must be installed so as to transmit the ground from the chassis to the platform.

It is important to make sure that this contact is guaranteed to prevent the parts installed on the platform from operating in a faulty way.

FRONT POWER TAKE-OFF

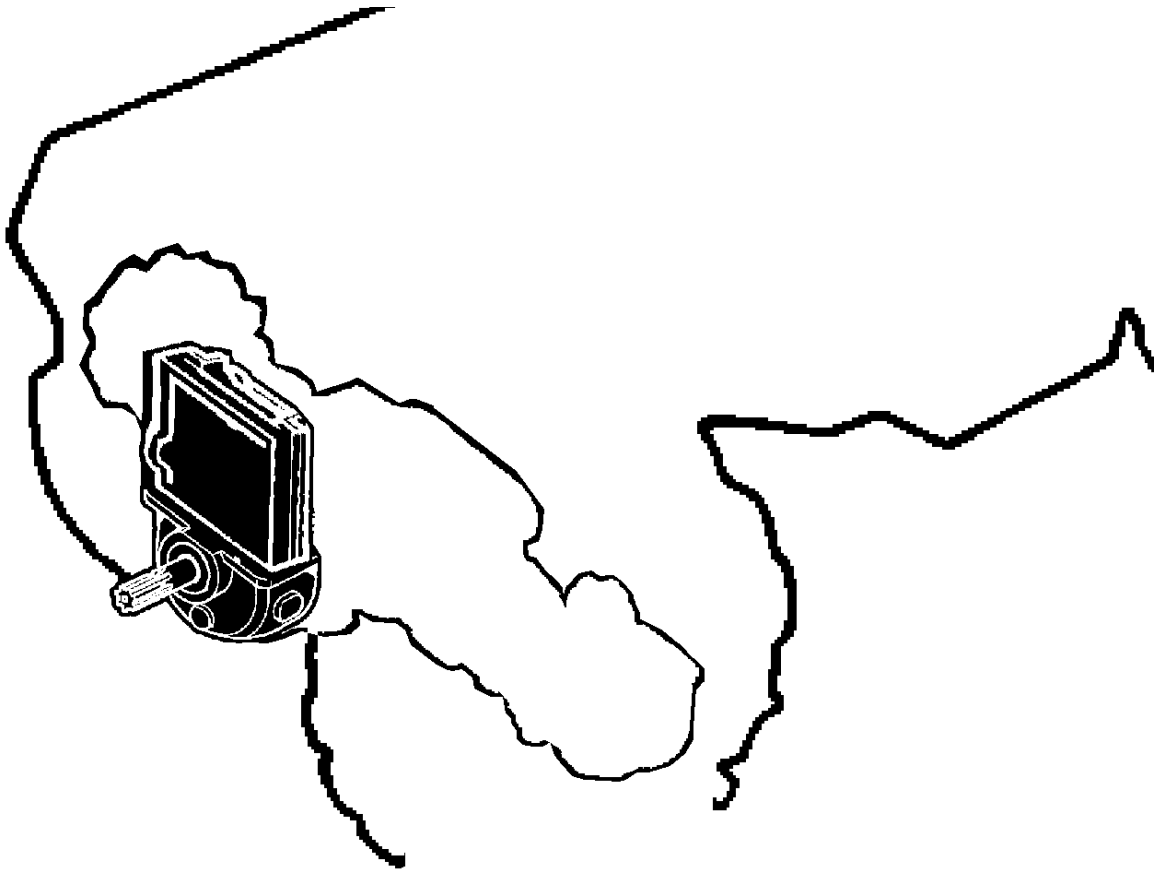


Fig. 1

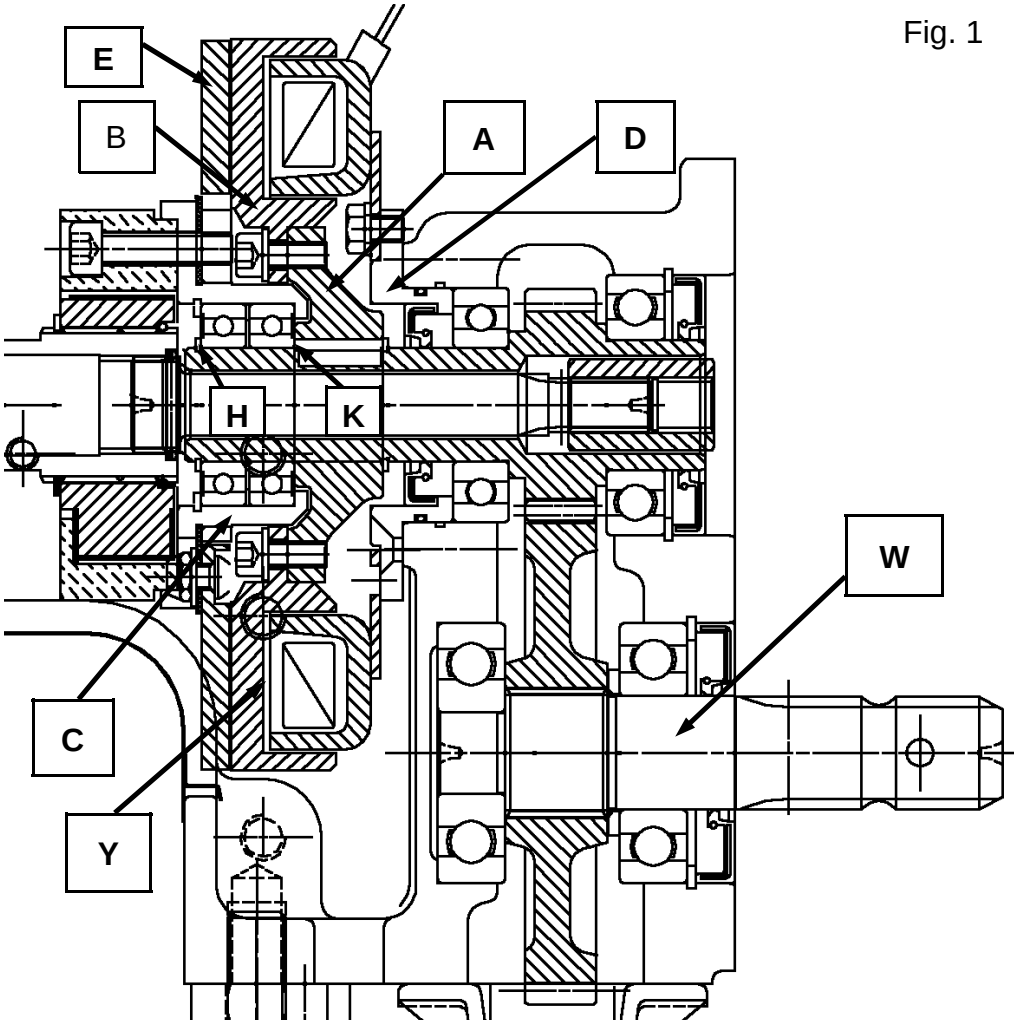


Fig. 2

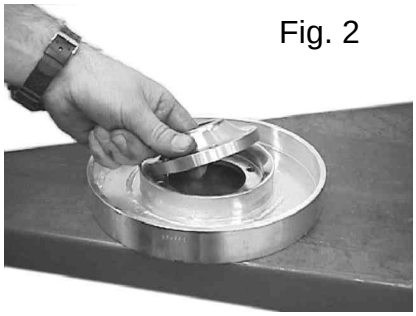


Fig. 3

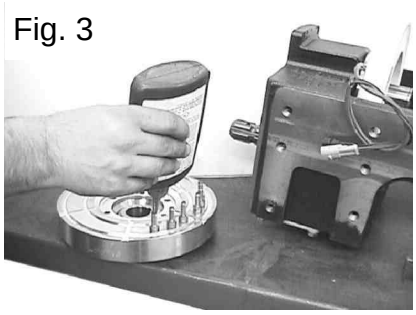


Fig. 1 illustrates the clutch assembly of the front power take-off.
The first thing to do is to pre-assemble part **A** of fig. 1 on part **B**.
Tighten the screws between the two parts to a 2.5 kgm torque value as illustrated in figs. 2 and 3, after having impregnated them with Loctite.

Now proceed by fitting the two screened bearings inside part **C** of fig. 1, as depicted in figs. 4 and 5, using a pair of circlip pincers to install the two circlips that hold the bearings in place.

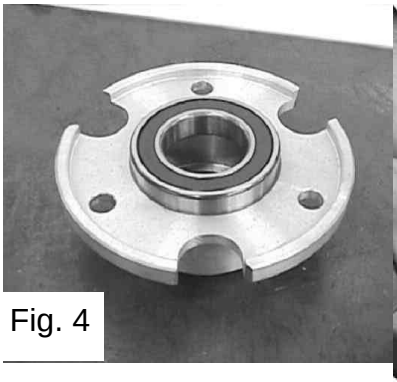
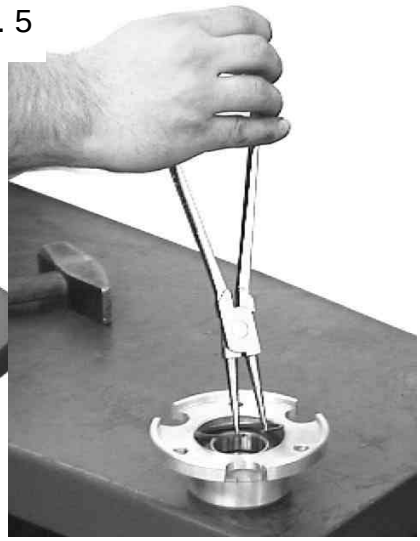


Fig. 4

Fig. 5



Now fit part **C** indise part **E** of fig. 1 as shown in fig. 6.

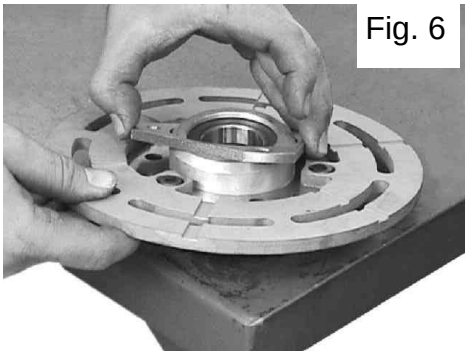
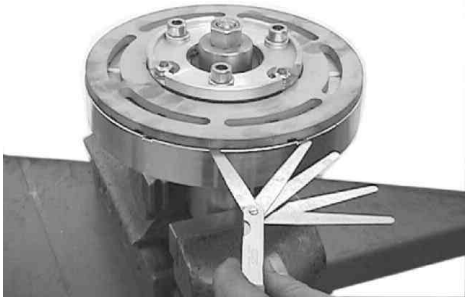


Fig. 6

In this case, the screws should be tightened to a 4 kgm torque value.

Using a centering shaft, position the keeper of the electromagnetic clutch in order to check the distance between the two plates, which must be between 0,4 and 0,8 mm, as shown in fig. 7. This value must be maintained all round the circumference.

Fig. 7

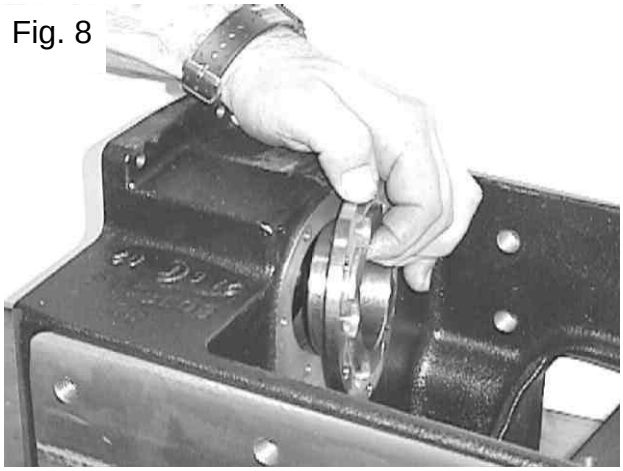


If the value is incorrect, the two 0.4 mm shims and the 0.2 mm shim on the part should be moved to points **H** and **K** of fig. 1 until the 0.4-0.8 mm gap shown in fig. 7 has been obtained.

All these inspections should be carried out on the test bench in order to establish the position of the shims (which will then be restored during assembly on the casting) in conditions of absolute safety.

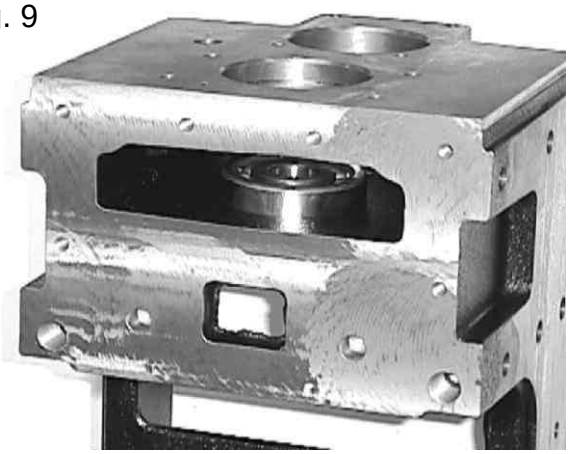
The gap indicated with the letter **Y** in fig. 1 is determined by the machining tolerances and must not be increased, or the clutch performances will be reduced.

Fig. 8



Once these bench tests have been made, proceed by truly assembling the individual pre-assembled and checked components on the casting that supports the front axle.
Proceed as shown in fig. 8 by installing the flange that supports the magneto coil, tightening the screws to a 2 kgm torque value and spreading Loctite 243 on the thread. Do not forget the O-Ring that acts as a seal to prevent oil leaks.

Fig. 9



Using a plug, assemble the bearings inside the casting as shown in fig. 9, starting from the lower shaft indicated by the letter **W** in fig. 1.

Now assemble the gears and relative shafts as shown in fig. 10.

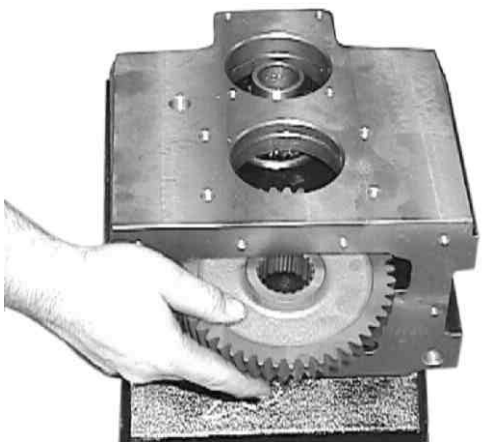


Fig. 10

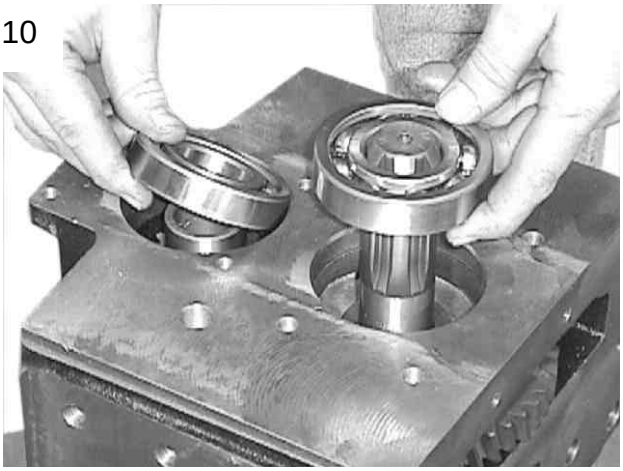


Fig. 11

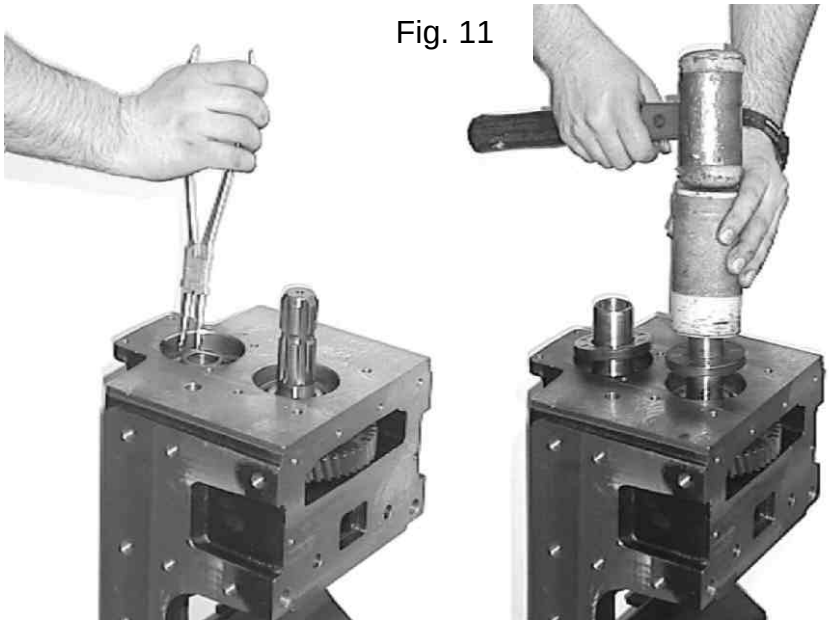
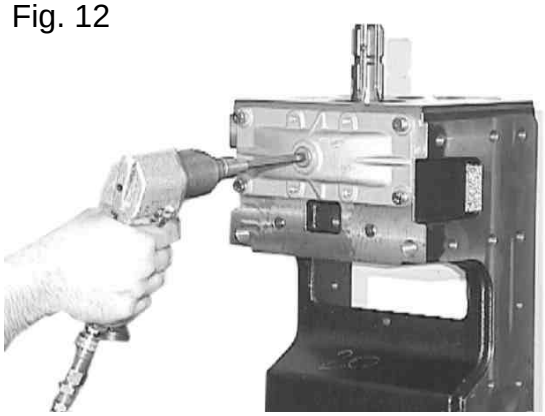


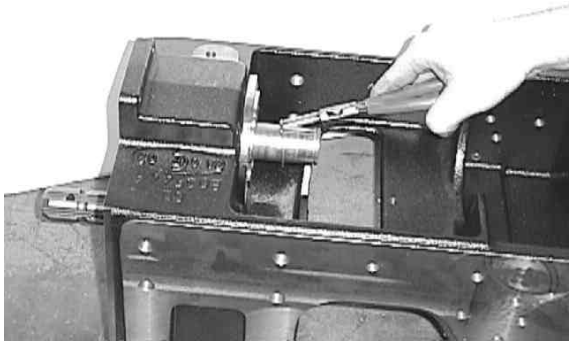
Fig. 12



Once these operations have been carried out, assemble the clutch assembly inside the front axle support.

Now position the circlips, the seals and lastly, close the lower part of the front PTO transmission with the cover of fig. 12, also installing the central oil draining plug.

Fig. 13



Once the flange of fig. 13 has been installed, proceed by assembling the magneto coil as illustrated in fig. 14, which is the fixed part of the electromagnetic clutch. Figs. 15 and 16 illustrate the successive phases, i.e. positioning of the shims previously determined on the test bench and successive assembly of the rotating part of the clutch.

Fig. 14

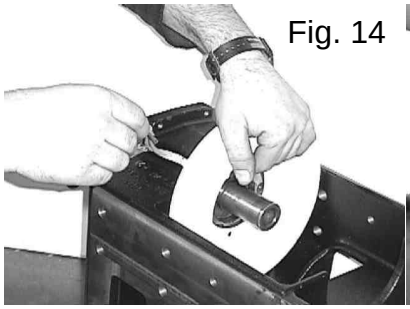


Fig. 15

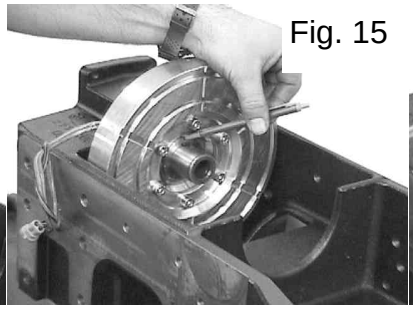
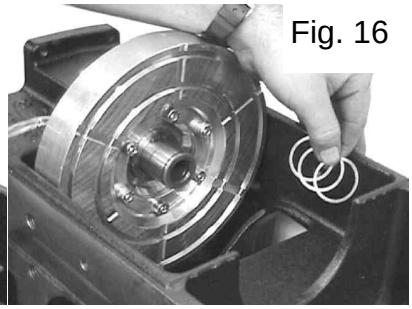
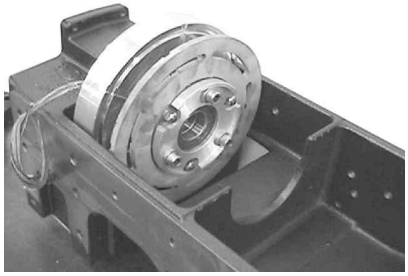
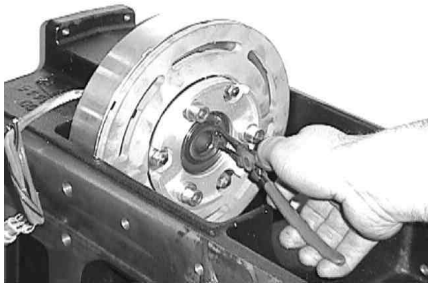


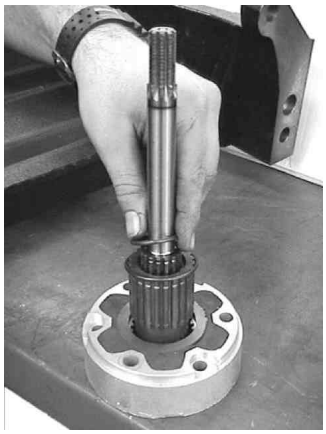
Fig. 16

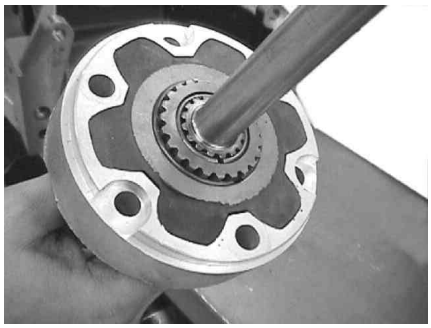


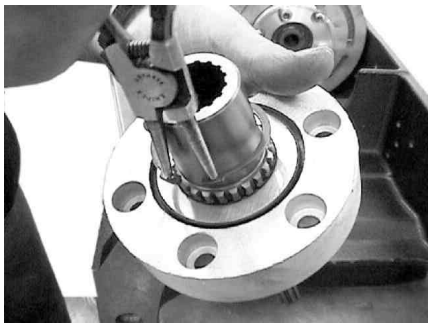


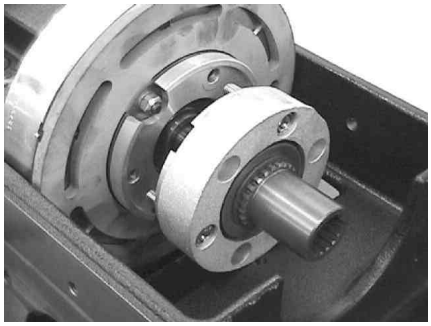
Once the mobile part has been re-assembled, it is advisable to check to make sure that the play between the keeper and the fixed part is between 0.4 and 0.8 mm. Now proceed by assembling the shafts and rubber damper which, when the axle support is fitted to the engine assembly, will be used for drive transmission from the pulley installed on the drive shaft.



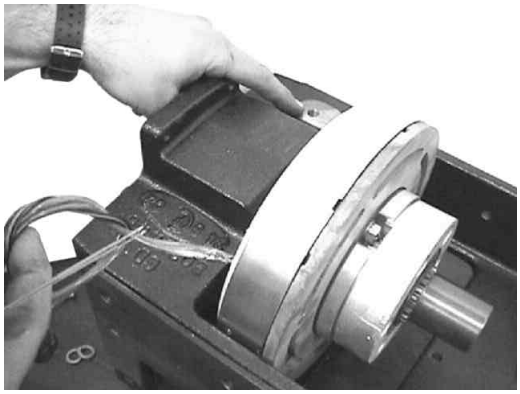








The pictures alongside and above illustrate the conclusive assembly sequence for the damper unit and splined shafts which drive the clutch and, thus, the PTO assemblLy and front hydraulic pump assembly. The screws that fix the damper should be tightened to a 3 kgm torque value and the thread spread with Loctite.



The picture alongside illustrates the complete clutch assembly. Note how the clutch cables come out of the lh side of the axle support, viewed from the driving direction. During the assembly phases, take care to prevent these cables from being damaged. Position them as shown in the picture when the coil is installed. This ensures that they are on the correct side of the tractor, where the electric wiring is routed.

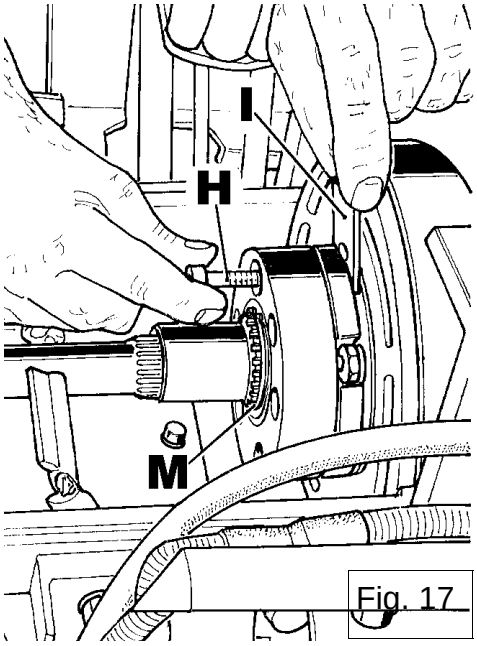


Fig. 17

The electromagnetic clutch is installed in the front part of the tractor, under the air filter support.
To inspect this component once the machine has been finished, remove the bonnet, the air filter and the air filter support.
Remember that the mobile disc of this component, which is initially 6.4 mm thick, is subjected to mechanical wear (up to 1-1.2 mm).

The clutch can be shimmed while it is being assembled: by inserting spacers I as shown in fig. 17, disc wear can be taken up and the performances of the clutch assembly maintained unchanged for a long period of time.

NOTE:
Consult the chapter about the electrical system for information about the electrical specifications of the clutch.

DRIVING TORQUES	Kgm
Electromagnetic clutch flange fixing screw	2.5
Damper fixing screw	3
Coil fixing screw	2
Clutch keeper fixing screw	4

TROUBLESHOOTING - CAUSES, REMEDIES

FAULTS	POSSIBLE CAUSES	REMEDIES
CLUTCH		
The clutch slips	**1)** - Clutch plate dirtied with oil **2)** - Clutch play incorrect	**1)** - Eliminate any oil leaks (replace the oil retainer of the main shaft if necessary). Thoroughly clean the flywheel and clutch casing. Replace the clutch plate if necessary. **2)** - Adjust the clutch rod. Overhaul the clutch assembly if the fault persists.
The clutch fails to disengage	**1)**- Wavy clutch plate. **2)**- Bent clutch disengaging lever. **3)**- Incorrectly adjusted pressure plate levers. **4)**- PTO clutch plate jammed on flywheel. **5)-** Clutch with too much play.	**1)**- Replace the clutch plate. **2)**- Replace the clutch disengaging lever. **3)**- Make sure that the levers are not worn. If this is not the case, adjust them. **4)**- Start the machine, repeatedly engage and disengage the PTO clutch with a large implement hitched. If the result is negative, disassemble the clutch and clean it. **5**)- Adjust the external links and the internal ones if necessary.

FAULTS	POSSIBLE CAUSES	REMEDIES
GEARBOX		
The gears disengage	**1)**- Synchromesh pack and speed gears with excessive float. **2)**- Incorrect synchronism between speed selector rod and sliding engagement sleeve. **3)**- Sliding speed engaging sleeve and gear with worn teeth causing the synchromesh to	**1)**- Restore the prescribed play. **2)**- Adjust the drive transmission by eliminating the play and replacing the rod, spring and selector ball, and rod control sleeves if necessary. **3)**- Replace the complete synchromesh units and selector gears if necessary.
The gears fail to engage.	**1)-** The clutch does not disengage. **2)-** Synchromesh with wavy brake ring **3)-** Synchromesh with excessively forceful brake preloading springs. **4)-** Synchromesh pack and speed gears with little float.	**1)-** Adjust the clutch as indicated. **2)-** replace the brake rings. **3)-** Replace the springs and chamfer the parts that contact them on the sliding sleeve. **4)-** Adjust the play to the correct value.
The final drive - reverse shuttle disengages	**1)-** Incorrect synchronism between the final drive selector rod and sliding gear. **2)** -Reverse gear with bush that creates an axial thrust.	**1)** - Adjust the drive transmission, eliminating the play and replacing the rod, ball and selector spring if necessary. **2)-** Replace the gear + bush assembly.
The final drive - reverse shuttle fails to engage.	**1)-** The clutch fails to disengage. **2)-** Ratio separator badly adjusted.	**1)-** Adjust the clutch as indicated. **2)-** Adjust the separator function by replacing the components of the device.

FAULTS	POSSIBLE CAUSES	REMEDIES
FRONT AXLE		
Noisy axle	**1)**- Axle bearing bushes with too much play. **2)-** Worn transmission sleeve. **3)-** Bevel gear pair not adjusted. **4**)- Differential lock not adjusted.	**1)** - Replace the bushes of the support and the sleeve of the transmission. **2)-** Replace the sleeve and check the alignment of the transmission shaft **3)-** Adjust the pinion - ring gear assembly correctly **4)-** Adjust the differential lock correctly.
REAR DIFFERENTIAL		
Noisy axle	**1)-** Differential lock control not adjusted. **2)-** Linkage inside differential lock not adjusted **3)-** Bevel gear pair not adjusted.	**1)-** Adjust the control **2)-** Adjust the linkages **3)-** Adjust the pinion - ring gear assembly
The differential lock fails to engage	**1)-** External control blocked. **2)-** Internal linkage not regulated **3)-** Sliding locking ring with impediment on crown wheel **4)-** Faults in the hydraulic circuit and/or electrical system.	**1)-** Release and adjust the control. **2)-** Adjust the linkage. **3)-** make the ring slide correctly on the crown wheel. **4)-** Check the components of the solenoid valve unit and the diff lock engaging switch.
The differential lock fails to disengage	**1)-** External control blocked. **2)-** Internal linkage not regulated. **3)-** Sliding locking ring with impediment on crown wheel. **4)-** Faults in the hydraulic circuit and/or electrical system.	**1) -**Release and adjust the control. **2)-** Adjust the linkage. **3)-** make the ring slide correctly on the crown wheel. **4)-** Check the components of the solenoid valve unit and the diff lock engaging switch.

FAULTS	POSSIBLE CAUSES	REMEDIES
FRONT FINAL DRIVES		
Noisy wheels	**1)-** Slack flange and rim fixing screws. **2)-** Float on the axle shafts **3)-** Noisy bearings.	**1)-** Torque the screws. **2)-** Eliminate the play as described. **3)-** Replace the bearings.
REAR FINAL DRIVES		
Noisy wheels	**1)**- Slack flange and rim fixing screws. **2)-** Float on the axle shafts **3)-** Noisy bearings	**1)**- Torque the screws. **2)-** Eliminate the play as described. **3)-** Replace the bearings

FAULTS	POSSIBLE CAUSES	REMEDIES
POWER TAKE-OFF		
The power take-off disengages	**1)-** Independent or synchronized PTO control not adjusted **2)-** 540-540E-1000 rpm selection control not adjusted. **3)-** Broken selector pad.	**1)-** Adjust the selection mechanism as prescribed. **2)-** Replace the selection control. **3)-** Replace the pad.
The power take-off fails to engage.	**1)**- The clutch fails to disengage. **2)-** Independent or synchronized PTO control not adjusted **3)-** Broken selector pad.	**1)**- Adjust the clutch as prescribed **2)-** Adjust the selection mechanism as prescribed **3)-** Replace the pad
The power take-off is noisy	**1)-** When implements that require little draft and turn in an uneven way are hitched. **2)-** Selection of the 540-540E-1000 rpm ratio not proportional to that of the implement. **3)-** PTO shaft with axial float.	**1)-** There is no type of remedy to a fault that concerns a modification to the implement. **2)-** Select an appropriate ratio. **3)-** Adjust the shaft as prescribed and make sure that the drivelines to which it is connected operate smoothly
DRIVE TRANSMISSION UNIT		
The clutch disengages	**1)-** Faulty solenoid valve unit. **2)-** Faulty electrical system. **3)-** Faulty drive engaging unit.	**1)-** Check the solenoid valve unit as described. **2)-** Check drive engaging switches on pedals and the hand controlled ones. Check the relays under the fixed bonnet. **3)-** After having made the above inspections, overhaul the drive engaging unit.
The drive fails to engage	**1)-** Pressure too low. **2)-** Leaking cylinder seal. **3)-** Faulty mechanics in the drive unit. **4)-** The electrical system or solenoid valve unit fail to function. **5)-** Hydraulic service pump out of service.	**1)-** Adjust the pressure to the correct value. **2)-** Replace the seal. **3)-** Overhaul the unit. **4)-** Check the fuses, check the power supplied to the valve unit, check the components of the electrical system (4WD switch, relays, etc.) using the diagram as a reference. **5)-** Replace the hydraulic service pump.
Noisy drive	**1)-** Wrong tyre pairing. **2)-** Irregular tyre pressure. **3)-** Worn transmission sleeves.	**1)-** Pair the tyres correctly. **2)-** Adjust the tyre pressure correctly. **3)-** Replace the sleeves.

FAULTS	POSSIBLE CAUSES	REMEDIES
BRAKES		
The machine fails to brake	**1)-** Brakes not adjusted. **2**)- Worn brake discs	**1)-** Adjust the emergency and parking brakes. **2)-** Replace the discs
The machine remains braked	**1)**- Brakes not adjusted. **2)-** Return springs broken. **3)-** Controls hardened because they are not lubricated.	**1)-** Afdjust the emergency and parking brakes. **2)-** Replace the springs. **3**)- Make sure that the controls operate smoothly.
Irregular braking action	**1)-** Brakes not adjusted	**1)-** Adjust the main brake and make sure that the braking action is simultaneous.
STEERING SYSTEM		
Lack of control when driving the machine	**1)**- Steering cylinder with worn retention rings. **2)-** Power steering system with badly adjusted anti-shock valves. **3)-** Air in the circuit.	**1)**- Replace the retention rings on the cylinder. **2)-** After thoroughly cleaning the valves, make sure that the pressure values are correct. Replace the power steering system if these values are not reached **3)-**Check all the clamps and the unions of the oil inlet circuit.
Oil leaks from the power steering system.	**1)-** Loosened unions. **2)-** Worn retention rings. **3)-** Clogged power steering discharge.	**1)-** Tighten the unions. **2)-** Restore the seal for the power steering system **3)-** Check the condition of the discharge pipe and make sure that the power lift's valve system operates correctly.
Difficult steering	**1)-** Lower pressure in the power steering system. **2)-** Air in the circuit. **3)-** LS priority valve badly adjusted. **4)-** Gear pump efficiency poor. **5)-** Steering column rusted. **6)-** Excessive load on front axle.	**1)-** Check and restore the maximum pressure in the circuit. **2)-** Carefully clean the intake circuit and make sure it is tight. **3)-** Clean and carefully refit the valve. Check it for wear and make sure that it operates smoothly **4)-** Overhaul. **5)-**Disassemble and lubricate the steering column. **6)-**Check the load on the front axle.

FAULTS	POSSIBLE CAUSES	REMEDIES
POWER LIFT		
The power lift lifts in a jerky way	**1)-** Clogged pump inlet filter. **2)-** Air in the inlet pipe of the hydraulic pump.	**1)-** Clean or replace the filter. **2)-** Check the inlet pipe and unions.
The power lift fails to operate	**1)-** Jammed pilot valve.	**1)-** Remove the valve system and release the pilot valve.
The power lift starts to lift but stops as soon as it senses the load, without the overpressure valve operating	**1)**- Draft rod badly adjusted.	**1)-** Adjust the draft control function.
The power lift fails to fully lower	**1)-** Position control lever badly adjusted	**1)-** Adjust the position control lever.
The power lift fails to lower	**1)-** Hydraulic lock engaged	**1)-** Unscrew the adjuster.
The lifting capacity fails to correspond to the prescribed value	**1)**- Worn retention rings on the valve gear. **2)-** Safety and overpressure valves badly adjusted. **3)-** Pump efficiency poor. **4)-** Worn springs and other mechanical components	**1)**- Remove the valve gear and replace the external retention rings **2)-** Adjust the valves. **3)-** Overhaul the pump **4)-** Overhaul the valve gear
The power lift has difficulty in bearing the load: there is a rhythmical swing when the engine is running while the load lowers when the engine is at a standstill	**1)-** Worn piston seal. **2)-** Cylinder overpressure valve badly adjusted. **3)-** Check valve badly adjusted. **4)-** Valve gear with dirty valves.	**1)-** Replace the seal. **2)-** Remove the casing and adjust the valve. **3)-** remove the valve gear and adjust the valve. **4)-** Remove the valve gear and clean the valves.
Rhythmic swinging occurs with the links in the end of upward travel position and the engine running. The load fails to lower when the engine is at a standstill.	**1)-** Incorrect adjustment of the position control lever's limit switch.	**1)-** Adjust the position control function by limiting the upward travel of the links.
The draft control function fails to operate: the power lift only lifts and lowers by means of the position lever	**1)-** Badly adjusted draft control lever. **2)-** 3rd point hitch with play	**1)-** Adjust the draft control lever. **2)-** Eliminate the play and adjust the lever + link correctly.

FAULTS	POSSIBLE CAUSES	REMEDIES
POWER LIFT		
The position control function fails to operate. The power lift only lifts and lowers by means of the draft control lever	**1)-** Position control lever not adjusted. **2)-** Faulty internal linkages.	**1)-** Adjust the position control lever. **2)-** Overhaul the linkages.
Pump overheated	**1)-** Excessive pressure **2)-** Cavitation. **3)-** Excessive back-pressure owing to incorrect hydraulic elements having been applied. **4)-** Control valves connected.	**1)-** Check the pressure **2)-** Clean the inlet components and check the unions. **3)-** Fit correct hydraulic elements. **4)-** Disconnect.
Pump with null pressure	**1)**- Pump shaft broken. **2)-** Sleeve spline ruined.	**1)-** Replace the pump. **2)-** Replace the sleeve.
Noisy pump	**1)-** Cavitation. **2)-** Imperfect seal on pump shaft. **3)-** Pump casing not hermetic.	**1)-** Clean components on the inlet side and check the unions. **2)-** Replace the oil seal. **3)-** Tighten the screws on the pump casing and replace the retention rings.
Oil in the circuit that becomes foamy and increases in volume in an abnormal way.	**1)-** Air in the circuit. **2)-** Pump cavitation.	**1)-** Check the oil level and bleed off the air. **2)-** Clean the inlet components.

FAULTS	POSSIBLE CAUSES	REMEDIES
ELECTRICAL SYSTEM		
The starter motor fails to operate	**1)-** Battery discharged or faulty. **2)-** Defective starter motor. **3)-** Defective ignition switch. **4)-** Battery cables tarnished or broken off at terminals. **5)-** Ignition switches on machine badly adjusted. **6)-** Independent PTO engaged.	**1)-** Recharge the battery. Replace it if it fails to remain charged. **2)-** Overhaul the starter motor or replace it. **3)-** Replace the switch **4)-** Clean the tarnished terminals or replace them. **5)-** Adjust the ignition switches or replace them if necessary. **6)-** Disengage the PTO.
The generator indicator light fails to go out even at a high engine rate	**1)-** Regulator inefficient. **2)-** The alternator fails to charge sufficiently.	**1)-** Replace the regulator. **2)-** Overhaul or replace the alternator.
The battery becomes deformed	**1)-** The battery is charged too much.	**1)-** Advise customers who work for many consecutive hours to turn on the headlights during work in order to lower the battery charge.
The water in the battery turns black.	**1)-** Faulty element.	**1)-** Replace the battery.
The revolution counter fails to operate.	**1)-** It is not receiving the powering pulse. **2)-** Instrument with irregular setting. **3)-** Faulty instrument.	**1)-** Repair the circuit. **2)-** Adjust the instrument. **3)-** Replace the instrument
The solenoid valves of the differential lock or 4WD fail to magnetize	**1)-** Control switches broken. **2)-** Solenoid valve coils broken. **3)-** Electrical system broken in some point.	**1)-** Replace the switches. **2)-** Replace the coils. **3)-** Repair the electrical system.

FAULTS	POSSIBLE CAUSES	REMEDIES
PLATFORM		
Vibrations on the platform	**1)-** The bodywork and chassis are touching each other. **2)-** The bodywork and power lift are touching each other	**1)-** Eliminate the contact. **2)-** Insert spacers between the bodywork and its supports.
Vibrations on the bonnet	**1)-** Precarious contact between bonnet and dashboard. **2)-** Contact between bonnet and fixed parts of the engine.	**1)-** Adjust the front supports of the bonnet. **2)-** Adjust the front supports of the bonnet.
ENGINE		
Engine efficiency poor	**1)-** Fuel filter clogged. **2)-** Partially clogged injector return. **3)-** Air in the circuit. **4)-** Injectors badly adjusted. **5)-** Air filter clogged.	**1)-** Replace the filter. **2)-** Remove the obstruction. **3)-** Make the circuit hermetic. **4)-** Overhaul the injectors. **5)-** Clean the filter. Replace the cartridge if necessary.
The engine starts badly	**1)-** Injection pump badly adjusted. **2)-** Injectors badly adjusted. **3)-** Fuel pump inefficient.	**1)-** Overhaul the pump. **2)-** Overhaul the injectors. **3)-** Replace the pump.