GROUP 0

GENERAL POINTS

MT 932 *Série 1*
MT 932 Turbo *Série 1*

FRONT AND REAR TYRES

	DIMENSIONS	PRESSURE	TYRE LOAD		PRESSURE ON THE CONTACT SURFACE HARD GROUND	PRESSURE ON THE CONTACT SURFACE LIGHT GROUND	AREA OF THE CONTACT SURFACE HARD GROUND	AREA OF THE CONTACT SURFACE LIGHT GROUND
STANDARD	**14,9x24 T35 Stabilarge 18PR DUNLOP**	**3,4 Bar**	Front unladen	1650 kg	5,7 kg/cm2	2 kg/cm2	290 cm2	830 cm2
			Front laden	4550 kg	9,4 kg/cm2	3,1 kg/cm2	485 cm2	1460 cm2
			Rear unladen	2200 kg	6,5 kg/cm2	2,2 kg/cm2	340 cm2	990 cm2
			Rear laden	850 kg	4,7 kg/cm2	1,6 kg/cm2	180 cm2	520 cm2
OPTION	**15,5/80-24 SGI TL 12PR GOODYEAR**	**4 Bar**	Front unladen	1650 kg	7,9 kg/cm2	2,1 kg/cm2	210 cm2	770 cm2
			Front laden	4550 kg	kg/cm2	kg/cm2	cm2	cm2
			Rear unladen	2200 kg	8,8 kg/cm2	2,4 kg/cm2	251 cm2	920 cm2
			Rear laden	850 kg	7,1 kg/cm2	1,8 kg/cm2	120 cm2	460 cm2
	400/70-20 T37 150B TL DUNLOP	**3,25 Bar**	Front unladen	1650 kg	7,3 kg/cm2	2,4 kg/cm2	225 cm2	700 cm2
			Front laden	4550 kg	10,6 kg/cm2	3,3 kg/cm2	430 cm2	1370 cm2
			Rear unladen	2200 kg	7,9 kg/cm2	2,5 kg/cm2	280 cm2	870 cm2
			Rear laden	850 kg	6,2 kg/cm2	2 kg/cm2	137 cm2	425 cm2
	440/70-24 T37 147B TL DUNLOP	**2,8 Bar**	Front unladen	1650 kg	6,3 kg/cm2	1,8 kg/cm2	260 cm2	910 cm2
			Front laden	4550 kg	9,4 kg/cm2	2,7 kg/cm2	485 cm2	1670 cm2
			Rear unladen	2200 kg	6,9 kg/cm2	2 kg/cm2	320 cm2	1110 cm2
			Rear laden	850 kg	5,1 kg/cm2	1,5 kg/cm2	166 cm2	580 cm2
	460/70 R24 IT520 TL 150A8 GOODYEAR	**2,8 Bar**	Front unladen	1650 kg	6,6 kg/cm2	1,7 kg/cm2	251 cm2	955 cm2
			Front laden	4550 kg	kg/cm2	2,7 kg/cm2	cm2	1696 cm2
			Rear unladen	2200 kg	7,7 kg/cm2	2 kg/cm2	287 cm2	1099 cm2
			Rear laden	850 kg	4,6 kg/cm2	1,2 kg/cm2	185 cm2	710 cm2
	17,5LR24 XM27 TL 145A8 MICHELIN	**3,5 Bar**	Front unladen	1650 kg	1,6 kg/cm2	kg/cm2	1030 cm2	cm2
			Front laden	4550 kg	3,3 kg/cm2	kg/cm2	1370 cm2	cm2
			Rear unladen	2200 kg	2 kg/cm2	kg/cm2	1090 cm2	cm2
			Rear laden	850 kg	0,9 kg/cm2	kg/cm2	930 cm2	cm2
	400/80-24 T37 153B DUNLOP	**3,2 Bar**	Front unladen	1650 kg	7,2 kg/cm2	2 kg/cm2	230 cm2	830 cm2
			Front laden	4550 kg	10,2 kg/cm2	2,9 kg/cm2	445 cm2	1560 cm2
			Rear unladen	2200 kg	7,9 kg/cm2	2,2 kg/cm2	280 cm2	1020 cm2
			Rear laden	850 kg	5,9 kg/cm2	1,6 kg/cm2	144 cm2	520 cm2
	445/70R24 IT510 151G GOODYEAR	**4,1 Bar**	Front unladen	1650 kg	8,5 kg/cm2	2,8 kg/cm2	195 cm2	587 cm2
			Front laden	4550 kg	10 kg/cm2	3,3 kg/cm2	456 cm2	1373 cm2
			Rear unladen	2200 kg	8,8 kg/cm2	2,9 kg/cm2	250 cm2	755 cm2
			Rear laden	850 kg	7,4 kg/cm2	2,4 kg/cm2	115 cm2	350 cm2

HYDRAULIC CIRCUIT

- Type of pump	Gear pump with flow divider
. Capacity	43,77 cm^3
- Lifting, tilting, telescoping, attachment circuit	
. Max. rating capacity unladen	105 L/mn
. Pressure	240 Bar
- Steering circuit	
. Max. rating capacity unladen	105 L/mn
. Pressure	140 Bar
- Filtration	
. Return	20 Micron
. Suction	125 Micron

	MT 732 Série A	MT 732 Turbo Série A
A	1200 mm	1200 mm
B	2560 mm	2560 mm
C	1393 mm	1393 mm
C1	1297 mm	1297 mm
D	4713 mm	4713 mm
D1	4617 mm	4617 mm
D2	3905 mm	3905 mm
E	5913 mm	5913 mm
F	1846 mm	1846 mm
F1	1846 mm	1846 mm
G	460 mm	460 mm
G1	440 mm	440 mm
G2	445 mm	445 mm
I	760 mm	760 mm
J	865 mm	865 mm
K	1040 mm	1040 mm
L	45 mm	45 mm
N	1690 mm	1690 mm
O	125 mm	125 mm
P2	47,5 °	47,5 °
P3	53 °	53 °
R	3475 mm	3475 mm
S	7548 mm	7548 mm
T	4185 mm	4185 mm
U1	2300 mm	2300 mm
U2	2550 mm	2550 mm
V	4770 mm	4770 mm
V1	1205 mm	1205 mm
V2	3675 mm	3675 mm
W	2260 mm	2260 mm
Y	11,9 °	11,9 °
Z	113,7 °	113,7 °

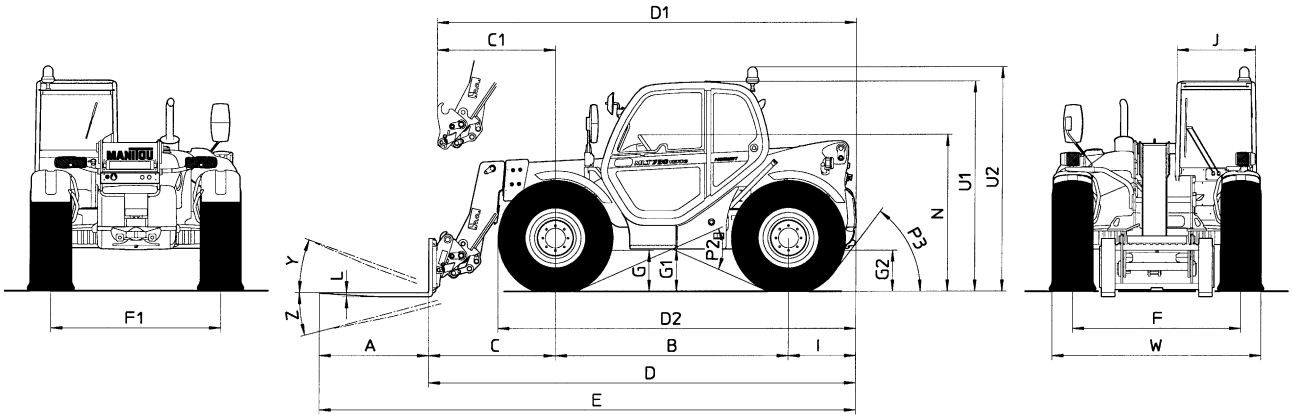
	MLT 629 ***Série 1***	**MLT 629** **Turbo *Série 1***
A	1200 mm	1200 mm
B	2560 mm	2560 mm
C	1142 mm	1142 mm
C1	1047 mm	1047 mm
D	4497 mm	4497 mm
D1	4603 mm	4603 mm
D2	3960 mm	3955 mm
E	5697 mm	5697 mm
F	1916 mm	1850 mm
F1	1916 mm	1850 mm
G	455 mm	455 mm
G1	440 mm	440 mm
G2	440 mm	440 mm
I	795 mm	795 mm
J	865 mm	865 mm
K	1260 mm	1260 mm
L	45 mm	45 mm
N	1690 mm	1720 mm
O	125 mm	125 mm
P2	47,5 °	47,5 °
P3	53 °	53 °
R	3500 mm	3475 mm
S	7322 mm	7322 mm
T	3995 mm	3995 mm
U1	2300 mm	2300 mm
U2	2550 mm *	2550 mm *
	2490 mm **	2490 mm **
V	4630 mm	4630 mm
V1	1205 mm	1205 mm
V2	3700 mm	3700 mm
W	2305 mm	2305 mm
Y	12 °	12 °
Z	133,9 °	133,9 °

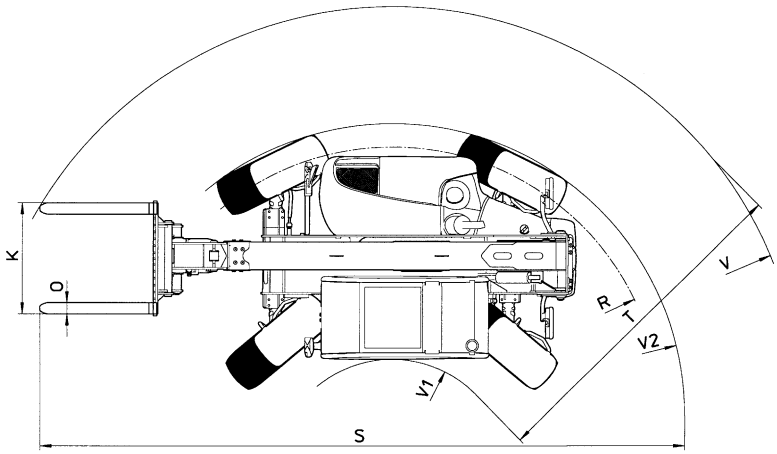
*** : 1ST ASSEMBLY**

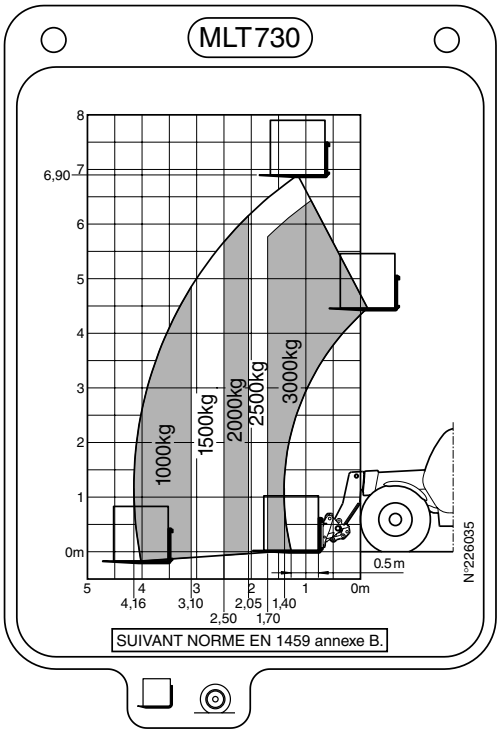
**** : 2ND ASSEMBLY**

DIMENSIONS AND LOAD CHART

MLT 730 *Série 1*
MLT 730 Turbo *Série 1*







LUBRICANTS AND FUEL

ORGANS TO BE LUBRICATED	CAPACITY	RECOMMENDATION	PACKAGING	PART NUMBER
I.C. ENGINE		MANITOU Oil	5 L.	581 847
MLT 629/730 *Série 1*	7,75 Litres	Engine PLUS SAE 15W / 40	25 L.	581 842
MLT 629/730 Turbo *Série 1*	7,75 Litres		55 L.	581 843
MLT 633/730 Turbo LS *Série 1*	7,75 Litres		209 L.	581 844
MLT 633/730 Turbo POWERSHIFT *Série 1*	7,75 Litres			
MLT 633/730 .120 LS *Série 1*	8,3 Litres			
MLT 633/730 .120 LS POWERSHIFT *Série 1*	8,3 Litres			
TRANSMISSION		MANITOU Oil	1 L.	62 148
MLT 629/730 *Série 1*	9 Litres	Automatic transmission	25 L.	487 655
MLT 629/730 Turbo *Série 1*	9 Litres		55 L.	546 217
MLT 633/730 Turbo LS *Série 1*	9 Litres		209 L.	546 195
MLT 633/730 Turbo POWERSHIFT *Série 1*	11 Litres			
MLT 633/730 .120 LS *Série 1*	9 Litres			
MLT 633/730 .120 LS POWERSHIFT *Série 1*	11 Litres			
ANGLE GEAR-BOX	2,25 Litres	MANITOU Oil Mechanical transmission for axles and boxes SAE 80W90	2 L. 25 L. 55 L. 209 L.	499 237 161 585 546 221 546 220
FRONT AXLE DIFFERENTIAL	7 Litres	MANITOU Oil Special immersed brakes	25 L.	545 608
REAR AXLE DIFFERENTIAL	7 Litres	MANITOU Oil Special immersed brakes	25 L.	545 608
FRONT WHEEL REDUCER	0,75 Litres	MANITOU Oil Mechanical transmission for axles and boxes SAE 80W90	2 L. 25 L. 55 L. 209 L.	499 237 161 585 546 221 546 220
REAR WHEEL REDUCER	0,75 Litres	MANITOU Oil Mechanical transmission for axles and boxes SAE 80W90	2 L. 25 L. 55 L. 209 L.	499 237 161 585 546 221 546 220
HYDRAULIC OIL TANK	125 Litres	MANITOU Oil Hydraulic ISO 46	25 L. 55 L. 209 L.	161 588 546 108 546 109
WINDSCREEN WASHER TANK		Windscreen washer fluid	1 L. 5 L. 30 L. 225 L.	490 402 486 424 505 527 490 432
BRAKING CIRCUIT		MANITOU Oil Mineral brake fluid	1 L.	490 408
JIB PADS		MANITOU Grease Multipurpose NLGI 2	1 Kg.	161 590
GREASING OF THE JIB		MANITOU Grease Multipurpose HD NLGI 2	1 Kg. 5 Kg.	554 973 554 974
GENERAL GREASING		MANITOU Grease Multipurpose HD NLGI 2	1 Kg. 5 Kg.	554 973 554 974
WHEEL REDUCER PIVOT GREASING		MANITOU Grease Multipurpose NLGI 2	1 Kg.	161 590
COOLING CIRCUIT		Cooling liquid	2 L.	473 076
MLT 629/730 *Série 1*	23,5 Litres	(Protection - 30 °C)	5 L.	470 077
MLT 629/730 Turbo *Série 1*	23,5 Litres		20 L.	470 078
MLT 633/730 Turbo LS *Série 1*	23,5 Litres		210 L.	470 079
MLT 633/730 Turbo POWERSHIFT *Série 1*	23,5 Litres	Cooling liquid	2 L.	554 002
MLT 633/730 .120 LS *Série 1*	25 Litres	(Protection - 25 °C)	5 L.	554 003
MLT 633/730 .120 LS POWERSHIFT *Série 1*	25 Litres		20 L.	554 004
			210 L.	554 005
FUEL TANK	120 Litres	Diesel fuel (*)		

MLT 633 LS Turbo Série A
MLT 633 -120 LS Série A
MLT 633 -120 LS POWERSHIFT Série A

FRONT AND REAR TYRES

	DIMENSIONS	PRESSURE	TYRE LOAD		PRESSURE ON THE CONTACT SURFACE HARD GROUND	PRESSURE ON THE CONTACT SURFACE LIGHT GROUND	AREA OF THE CONTACT SURFACE HARD GROUND	AREA OF THE CONTACT SURFACE LIGHT GROUND
STANDARD	**17,5LR24 XM27 TL 145A8 MICHELIN**	**3,5 Bar**	Front unladen	1550 kg	1,5 kg/cm2	kg/cm2	1010 cm2	cm2
			Front laden	4350 kg	3,2 kg/cm2	kg/cm2	1340 cm2	cm2
			Rear unladen	2000 kg	1,9 kg/cm2	kg/cm2	1075 cm2	cm2
			Rear laden	850 kg	0,9 kg/cm2	kg/cm2	930 cm2	cm2
OPTION	**14,9x24 T35 Stabilarge 18PR DUNLOP**	**3,4 Bar**	Front unladen	1550 kg	5,6 kg/cm2	1,9 kg/cm2	275 cm2	800 cm2
			Front laden	4350 kg	9,2 kg/cm2	3,1 kg/cm2	475 cm2	1420 cm2
			Rear unladen	2000 kg	6,2 kg/cm2	2,1 kg/cm2	325 cm2	950 cm2
			Rear laden	850 kg	4,7 kg/cm2	1,6 kg/cm2	180 cm2	520 cm2
	400/70-20 T37 150B TL 14PR DUNLOP	**3,25 Bar**	Front unladen	1550 kg	7,2 kg/cm2	2,3 kg/cm2	215 cm2	660 cm2
			Front laden	4350 kg	10,5 kg/cm2	3,3 kg/cm2	415 cm2	1330 cm2
			Rear unladen	2000 kg	7,7 kg/cm2	2,5 kg/cm2	260 cm2	810 cm2
			Rear laden	850 kg	6,2 kg/cm2	2 kg/cm2	137 cm2	425 cm2
	405/70R24 EM SPT9 TL 158A2 DUNLOP	**5 Bar**	Front unladen	1550 kg	7,2 kg/cm2	3,2 kg/cm2	215 cm2	490 cm2
			Front laden	4350 kg	7,9 kg/cm2	3,5 kg/cm2	550 cm2	1250 cm2
			Rear unladen	2000 kg	6,8 kg/cm2	3 kg/cm2	295 cm2	670 cm2
			Rear laden	850 kg	7,7 kg/cm2	3,4 kg/cm2	110 cm2	250 cm2
	440/70-24 T37 147B TL DUNLOP	**2,8 Bar**	Front unladen	1550 kg	6,2 kg/cm2	1,8 kg/cm2	250 cm2	870 cm2
			Front laden	4350 kg	9,3 kg/cm2	2,7 kg/cm2	470 cm2	1620 cm2
			Rear unladen	2000 kg	6,7 kg/cm2	1,9 kg/cm2	300 cm2	1040 cm2
			Rear laden	850 kg	5,1 kg/cm2	1,5 kg/cm2	166 cm2	580 cm2
OPTION	**15,5/80-24 SGI TL 12PR GOODYEAR**	**4 Bar**	Front unladen	1550 kg	7,6 kg/cm2	2 kg/cm2	205 cm2	760 cm2
			Front laden	4350 kg	12,1 kg/cm2	3,2 kg/cm2	360 cm2	1370 cm2
			Rear unladen	2000 kg	8,7 kg/cm2	2,3 kg/cm2	230 cm2	880 cm2
			Rear laden	850 kg	7,1 kg/cm2	1,8 kg/cm2	120 cm2	460 cm2
	460/70 R24 IT520 TL 150A8 GOODYEAR	**3,3 Bar**	Front unladen	1550 kg	8,6 kg/cm2	2,2 kg/cm2	180 cm2	690 cm2
			Front laden	4350 kg	11,9 kg/cm2	3,1 kg/cm2	365 cm2	1400 cm2
			Rear unladen	2000 kg	9 kg/cm2	2,4 kg/cm2	221 cm2	850 cm2
			Rear laden	850 kg	8,5 kg/cm2	2,2 kg/cm2	100 cm2	380 cm2
	445/70R24 IT510 151G GOODYEAR	**4,1 Bar**	Front unladen	1550 kg	8,4 kg/cm2	2,8 kg/cm2	185 cm2	555 cm2
			Front laden	4350 kg	9,9 kg/cm2	3,3 kg/cm2	438 cm2	1319 cm2
			Rear unladen	2000 kg	8,8 kg/cm2	2,9 kg/cm2	228 cm2	690 cm2
			Rear laden	850 kg	7,4 kg/cm2	2,4 kg/cm2	115 cm2	350 cm2
OPTION	**15,5R25 XHA MICHELIN**	**2,75 Bar**	Front unladen	1550 kg	2 kg/cm2	1 kg/cm2	760 cm2	1630 cm2
			Front laden	4350 kg	2,4 kg/cm2	1,1 kg/cm2	1795 cm2	3850 cm2
			Rear unladen	2000 kg	2,2 kg/cm2	1 kg/cm2	905 cm2	1947 cm2
			Rear laden	850 kg	1,8 kg/cm2	0,9 kg/cm2	465 cm2	996 cm2
	1200R20 X MINE D2 MICHELIN	**5 Bar**	Front unladen	1550 kg	3,1 kg/cm2	kg/cm2	500 cm2	cm2
			Front laden	4350 kg	5,6 kg/cm2	kg/cm2	780 cm2	cm2
			Rear unladen	2000 kg	3,7 kg/cm2	kg/cm2	540 cm2	cm2
			Rear laden	850 kg	2,2 kg/cm2	kg/cm2	380 cm2	cm2
OPTION	**500/65 R 24 TR FOREST MULTIPLUS TL NOKIAN**	**3,2 Bar**	Front unladen	1550 kg	2 kg/cm2	0,8 kg/cm2	770 cm2	1860 cm2
			Front laden	4350 kg	2,7 kg/cm2	1,6 kg/cm2	1590 cm2	2740 cm2
			Rear unladen	2000 kg	2,2 kg/cm2	1 kg/cm2	900 cm2	2030 cm2
			Rear laden	850 kg	1,5 kg/cm2	0,5 kg/cm2	560 cm2	1550 cm2
OPTION	**500-60/22,5 TWIN 404 12PR TRELLEBORG**	**2,5 Bar**	Front unladen	1550 kg	2,7 kg/cm2	1,4 kg/cm2	574 cm2	1107 cm2
			Front laden	4350 kg	2,7 kg/cm2	1,4 kg/cm2	1611 cm2	3107 cm2
			Rear unladen	2000 kg	2,7 kg/cm2	1,4 kg/cm2	741 cm2	1429 cm2
			Rear laden	850 kg	2,7 kg/cm2	1,4 kg/cm2	315 cm2	607 cm2

SPECIFICATIONS

- Level of sound pressure in the driver's cab LpA *(According to standard prEN 12053 : 1995)*	81 dB	
- Level of sound power in the LwA environment *(According to directive 2000 / 14 CE guaranteed)*	106 dB	
- Travel speed of the lift truck **(Except particular conditions)**		
. Forward	31,2 km/h	
. Reverse	10,1 km/h	
- Standard lift height	6900 mm	
- Rated capacity with standard attachment	3000 kg	
- Load center	500 mm	
- Weight of forks (Each)	72 kg	
- Lifting motions (Jib retracted)		
. Unladen lifting	6,7 s	39,8 m/mn
. Laden lifting	7,3 s	36,5 m/mn
. Unladen lowering	5 s	53,3 m/mn
. Laden lowering	4,7 s	56,7 m/mn
- Telescoping motions (Lifting jib)		
. Unladen extending	6,3 s	26,2 m/mn
. Laden extending	6,8 s	24,2 m/mn
. Unladen retracting	3,3 s	50 m/mn
. Laden retracting	3 s	55 m/mn
- Reverse tilt time unladen	3 s	48,7 °/s
- Forward tilt time unladen	2,6 s	56,2 °/s
- Lift truck weight with standard attachment		
. Unladen	7140 kg	
. Rated load	10140 kg	
- Axle weight with attached equipment (Transport position)		
. Front unladen	3330 kg	
Rated load	8640 kg	
. Rear unladen	3810 kg	
Rated load	1500 kg	
- Tensible strain at coupling hook		
. Unladen	5500 daN	
. Rated load	8600 daN	
- Break out force with bucket *(According to standard ISO 8313)*	5650 daN	

LUBRICANTS AND FUEL

I.C. ENGINE

ORGANS TO BE LUBRICATED	CAPACITY	RECOMMENDATION	PACKAGING	PART NUMBER
I.C. ENGINE		MANITOU Oil	20 L.	582357
MLT 629/730 Série A	7,75 Liters	API CG4	55 L.	582358
MLT 629/730 Turbo Série A	7,75 Liters		209 L.	582359
MLT 629/633/730 -120 LS Série A	8,3 Liters			
MLT 633/730 LS Turbo Série A	7,75 Liters			
MLT 633/730 -120 LS POWERSHIFT Série A	8,3 Liters			
MLT 730 Turbo POWERSHIFT Série A	7,75 Liters			
COOLING CIRCUIT		Cooling liquid	2 L.	473076
MLT 629/730 Série A	23,5 Liters	(Protection - 30 °C)	5 L.	470077
MLT 629/730 Turbo Série A	23,5 Liters		20 L.	470078
MLT 629/633/730 -120 LS Série A	25 Liters		210 L.	470079
MLT 633/730 LS Turbo Série A	23,5 Liters	Cooling liquid	2 L.	554002
MLT 633/730 -120 LS POWERSHIFT Série A	25 Liters	(Protection - 25 °C)	5 L.	554003
MLT 730 Turbo POWERSHIFT Série A	23,5 Liters		20 L.	554004
			210 L.	554005
FUEL TANK	120 Liters	Diesel fuel (*)		

TRANSMISSION

ORGANS TO BE LUBRICATED	CAPACITY	RECOMMENDATION	PACKAGING	PART NUMBER
TRANSMISSION		MANITOU Oil	1 L.	62148
MLT 629/730 Série A	9 Liters	Automatic transmission	25 L.	487655
MLT 629/730 Turbo Série A	9 Liters		55 L.	546217
MLT 629/633/730 -120 LS Série A	9 Liters		209 L.	546195
MLT 633/730 LS Turbo Série A	9 Liters			
MLT 633/730 -120 LS POWERSHIFT Série A	11 Liters			
MLT 730 Turbo POWERSHIFT Série A	11 Liters			
ANGLE GEAR BOX	2,25 Liters	MANITOU Oil	2 L.	499237
		Mechanical transmission for	25 L.	161585
		axles and boxes SAE 80W90	55 L.	546221
			209 L.	546220
TRANSMISSION UNIVERSAL JOINT		MANITOU Grease	1 Kg.	554973
		Multipurpose HD NLGI 2	5 Kg.	554974

JIB

ORGANS TO BE LUBRICATED	RECOMMENDATION	PACKAGING	PART NUMBER
JIB PADS	MANITOU Grease Multipurpose NLGI 2	1 Kg.	161590
GREASING OF THE JIB	MANITOU Grease Multipurpose HD NLGI 2	1 Kg. 5 Kg.	554973 554974

HYDRAULICS

ORGANS TO BE LUBRICATED	CAPACITY	RECOMMENDATION	PACKAGING	PART NUMBER
HYDRAULIC OIL TANK	125 Liters	MANITOU Oil Hydraulic ISO 46	25 L. 55 L. 209 L.	161588 546108 546109

BRAKE

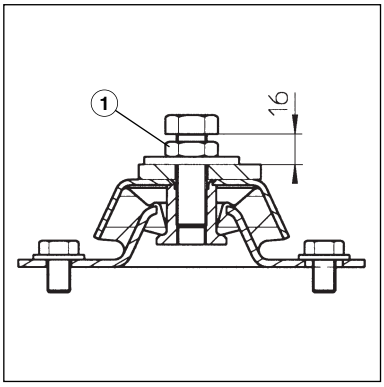
ORGANS TO BE LUBRICATED	RECOMMENDATION	PACKAGING	PART NUMBER
BRAKE CIRCUIT	MANITOU Oil Mineral brake fluid	1 L.	490408

CAB

ORGANS TO BE LUBRICATED	RECOMMENDATION	PACKAGING	PART NUMBER
CAB DOOR	MANITOU Grease Multipurpose HD NLGI 2	1 Kg. 5 Kg.	554973 554974
WINDSCREEN WASHER TANK	Windscreen washer fluid	1 L. 5 L. 30 L. 225 L.	490402 486424 505527 490432

REASSEMBLY OF THE I.C. ENGINE

- Reassemble by carrying out in reverse order the operations described in the chapter "REMOVAL OF THE I.C. ENGINE ONLY", also complying with the following instructions.



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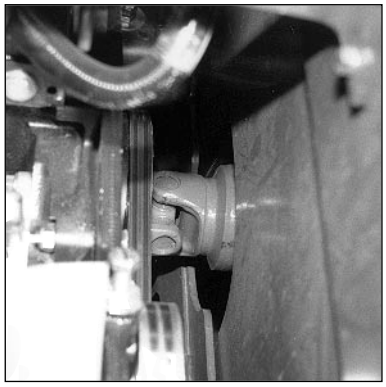
- Adjustment and tightening torque on the I.C. engine suspension (tightening torque on the nut 1 : 110 ± 10 N.m)



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- Apply standard MANITOU locking compound (part number 187526) on the universal joint mounting screws and reassemble (tightening torque : 68 N.m ± 10 %).

- Check the gearbox and cooling circuit levels and top up.
- Check that the lift truck is in good working order.

STANDARD TIGHTENING TORQUE TO BE USED WHEN NONE IS MENTIONED FOR REMOVAL AND REASSEMBLY OPERATIONS.

TIGHTENING TORQUE IN N.M (*)					
Ø thread	Class 5.6	Class 5.8	Class 8.8	Class 10.9	Class 12.9
M3	0,54	0,76	1,16	1,7	2
M4	1,24	1,74	2,66	3,91	4,57
M5	2,47	3,46	5,2	7,7	9
M6	4,29	6	9,1	13,4	15,7
M8	10,4	14,6	22	32	38
M10	20	28	44	64	75
M12	35	49	76	111	130
M14	57	79	121	178	209
M16	88	124	189	278	325
M18	122	171	261	384	449
M20	173	243	370	544	637
M22	238	334	509	748	875
M24	298	418	637	936	1095
M27	442	619	944	1386	1622
M30	600	840	1280	1880	2200

(*) - Tightening torques are given for black or galvanized screws with basic lubrication.
- Tightening torques are given for automatic reset torque setting type torque wrenches and direct reading dial torque wrenches.
- For further information, consult standard NF E25-030.

Chapters

The following pages contain a detailed table of contents.

23 Electrical equipment

Alternators

Starter motors

Starting aid

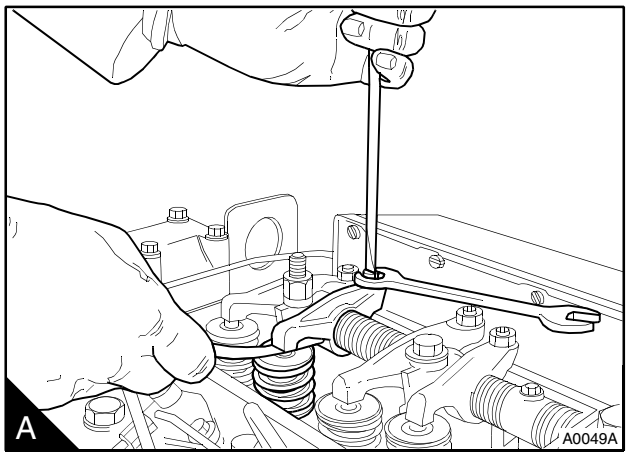
Thread sealant

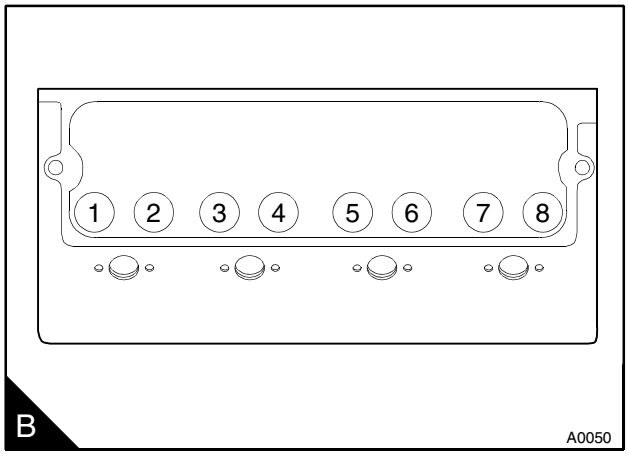
When setscrews or studs are fitted into holes which are tapped through the cylinder block, a suitable sealant must be used to prevent leakage.

Micro encapsulated anaerobic sealant (M.E.A.S) fasteners have been introduced instead of jointing compounds or other sealants when the fasteners are fitted in through holes into oil or coolant passages. The identification of these fasteners, as supplied, is by a red, blue, or other colour sealant around the fastener threads.

With M.E.A.S. sealed studs, the sealed end must be fitted into the cylinder head / cylinder block etc. Ensure that the threaded holes have a 1,59 mm (0.0625 in) 45° chamfer, to ensure that when the new fasteners are fitted the M.E.A.S. sealant is not removed. If the fasteners have to be removed and fitted again, the threads must be cleaned and a suitable sealant used.

Valve tip clearances





Notes:

- The valve tip clearance is measured between the top of the valve stem and the rocker lever (A). With the engine hot or cold, the correct clearances are 0,20 mm (0.008 in) for the inlet valves and 0,45 mm (0.018 in) for the exhaust valves. The valve positions are shown at (B).
- The sequence of valves from number 1 cylinder is shown in the table below. Number 1 cylinder is at the front of the engine.

Four cylinder engines

1 Rotate the crankshaft in the normal direction of rotation until the inlet valve (B7) of number 4 cylinder has just opened and the exhaust valve (B8) of the same cylinder has not closed completely. Check the clearances of the valves (B1 and B2) of number 1 cylinder and adjust them, if necessary.

2 Set the valves (B3 and B4) of number 2 cylinder as indicated above for number 4 cylinder. Then check / adjust the clearances of the valves (B5 and B6) of number 3 cylinder.

3 Set the valves (B1 and B2) of number 1 cylinder. Then check / adjust the clearances of the valves (B7 and B8) of number 4 cylinder.

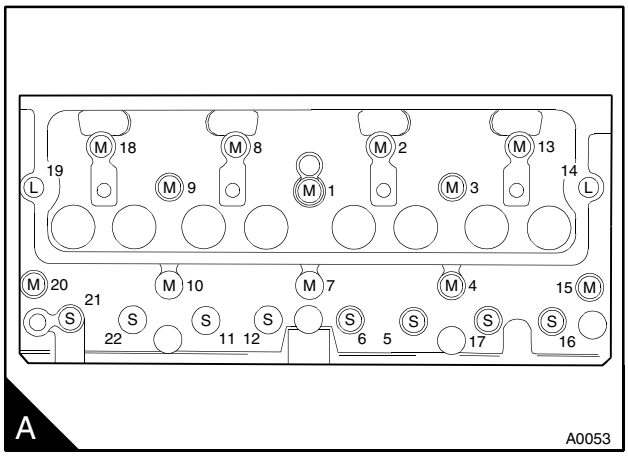
4 Set the valves (B5 and B6) of number 3 cylinder. Then check / adjust the clearances of the valves (B3 and B4) of number 2 cylinder.

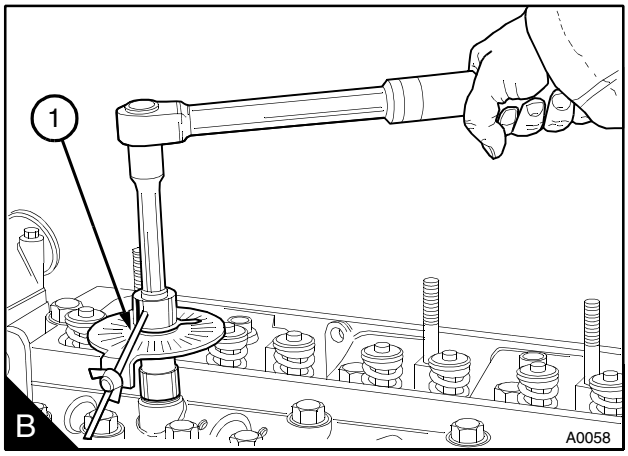
Cylinder and Valve number	1		2		3		4	
	1	2	3	4	5	6	7	8
Valve I = Inlet E = Exhaust	I	E	I	E	I	E	I	E

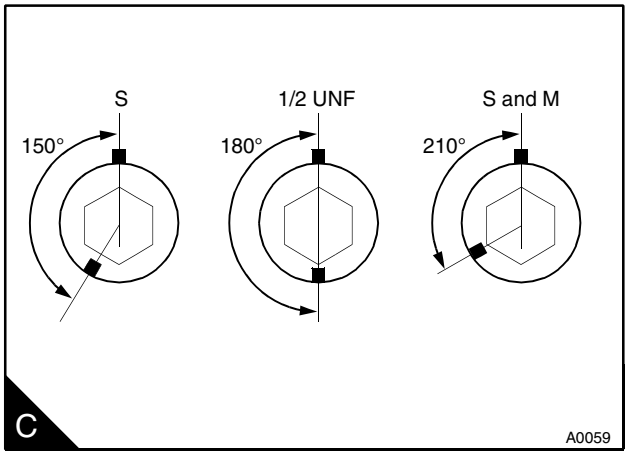
9 Tighten the M10 setscrews, in the correct sequence, a further part of a turn according to the length of the setscrews, see (A) and (C). Short setscrews (S) must be turned a further 120° (2 flats). Medium length setscrews (M) must be turned a further 120° (2 flats). Long setscrews (L) must be turned a further 150° (2.5 flats). The four 1/2 UNF setscrews in positions 2, 8, 13 and 18 must be turned 180° (3 flats).

A special tool (B) can be used to tighten all of the setscrews, instead of the method described in paragraph 9. Fit the tool between the socket and the handle. Position the stop (B1) against a suitable protrusion on the cylinder head to prevent movement of the degree dial in a clockwise direction. Rotate the pointer to align with the relevant angle on the degree dial for the length of setscrew. Tighten the setscrew until the pointer on the tool is aligned with the zero position on the degree dial.

If no tool is available, make a suitable mark on the cylinder head in line with a corner of each setscrew (C). Make another mark, at the correct angle (counter-clockwise), on the edge of the flange of each fastener according to the length of the setscrew. Tighten each setscrew in the correct sequence until the marks on the flange are next to, and in line with, the marks on the cylinder head.







10 Put the push rods in position. Ensure that the end of each push rod fits correctly in the tappet socket.

11 Fit the rocker assembly, see operation 12-1.

12 Set the valve tip clearances, see operation 12-5.

13 Fit the atomisers, see operation 20-3.

14 Fit the high-pressure fuel pipes; tighten the connection nuts to 22 Nm (16 lbf ft) 2,2 kgf m.

Caution: *Where access to the fuel injection pump outlet unions is possible, ensure that a separate spanner is used to prevent movement of the fuel injection pump outlets when the connections of the high pressure pipes are tightened.*

15 Fit the fuel filter and the bracket. Fit the low-pressure fuel pipes between the fuel injection pump and the fuel filter.

16 Fit the coolant by-pass connection; tighten the setscrews and hose clip.

17 If a compressor is fitted: Fit the coolant pipe between the cylinder head and the compressor. Then fit the pipe between the coolant by-pass and compressor.

18 Fit the oil cooler if it is integral with the cylinder block, see operation 21-11.

Continued

Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Cylinder head

Angle of valve seat:
- Inlet . . . . . 46° (88° included angle) or 31° (118° included angle)
- Exhaust . . . . . 46° (88° included angle) or 31° (118° included angle)

Leak test pressure . . . . . .200 kPa (29 lbf/in^2) 2,04 kgf/cm^2
Head thickness . . . . . 102,79/103,59 mm (4.047/4.078 in)
Finish grade of head face for cylinder head gasket . . . . . 1,10/3,20 micrometers
Diameter of parent bore for valve guide:
- Inlet . . . . . 13,00/13,027 mm (0.5118/0.5128 in)
- Exhaust . . . . . 14,00/14,027 mm (0.5512/0.5522 in)

Minimum permissible thickness after head face has been machined . . . . . 102,48 mm (4.035 in)

Inlet valves

Diameter of valve stem . . . . . .8,953/8,975 mm (0.3525/0.3533 in)
Clearance in valve guide . . . . . 0,025/0,069 mm (0.001/0.0027 in)
Maximum permissible clearance in valve guide:
- Production limit . . . . . 0,089 mm (0.0035 in)
- Service limit . . . . . 0,100 mm (0.008 in)

Diameter of valve head:
- Engine types AJ, AK, AM, AP, AQ, YG, YH, YK . . . . . 42,88/43,12 mm (1.688/1.698 in)
- Engine types AR and AS . . . . . 44,88/45,12 mm (1.776/1.767 in)

Angle of valve face . . . . . 45° or 30°
Full length, engine types AJ, AK, AM, AP, AQ, YG, YH, YK . . . . . 122,65/123,30 mm (4.829/4.854 in)
Full length, engine types AR and AS . . . . . 123,75/124,40 mm (4.872/4.897 in)
Seal arrangement . . . . . Rubber seal fitted to valve guide, colour green
Depth of valve head below the face of cylinder head
- Production limits, engine types AJ, AK, AM, AP, AQ, YG, YH, YK . . . . . .1,40/1,70 mm (0.055/0.067 in)
- Service limit, engine types AJ, AK, AM, AP, AQ, YG, YH, YK . . . . . .1,95 mm (0.077 in)
- Production limits, engine types AR and AS . . . . . 0,40/0,60 mm (0.016/0.024 in)
- Service limit, engine types AR and AS . . . . . 0,805 mm (0.032 in)

To fit

Special tools:

Piston replacer tool, PD.206

1 Ensure that the piston, the cylinder bore, the crank pin and the big end of the connecting rod are clean. Lubricate the piston and the cylinder liner with clean engine lubricating oil.

2 Rotate the crankshaft until the relevant crank pin is at its lowest position. Lubricate the crank pin with clean engine lubricating oil.

3 Fit the upper half of the shell bearings to the connecting rod. Ensure that the location tag is fitted correctly in its recess. Lubricate the bearing with clean engine lubricating oil.

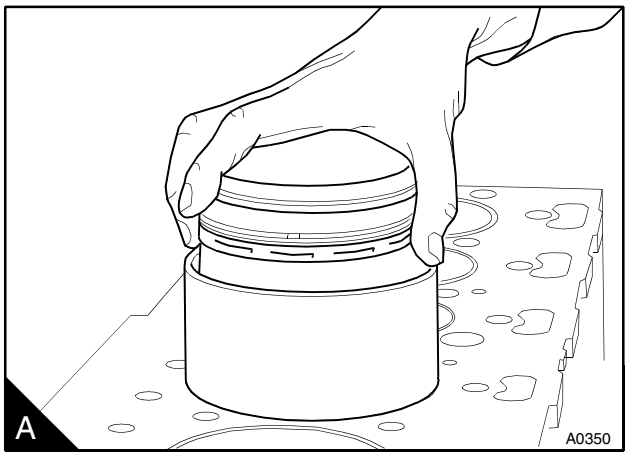
4 Put the piston replacer tool in position at the top of the relevant cylinder. The tool has a tapered bore to compress the piston rings when the piston and connecting rod assembly is fitted. Ensure that the smaller end of the tapered bore is towards the face of the cylinder block.

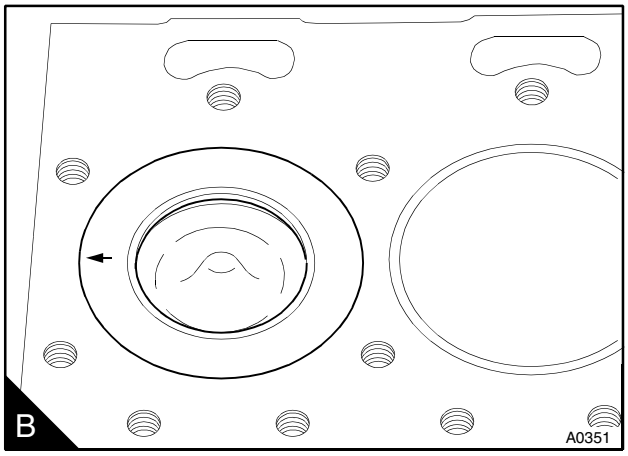
5 Put the piston ring gaps 120° apart. Pass the connecting rod through the piston replacer tool and allow the piston to enter the tool. The arrow mark on the top of the piston (B) must be towards the front of the engine.

Caution: *Ensure that the connecting rod will not hit the piston cooling jet as the connecting rod assembly is fitted.*

6 Push the piston and connecting rod assembly through the piston replacer tool (A) and onto the crank pin. The piston and connecting rod assembly must be rotated to ensure that the connecting rod will not hit the piston cooling jet as the assembly is fitted. When the connecting rod has passed the piston cooling jet, rotate the connecting rod until the arrow mark on top of the piston is towards the front of the engine.

Continued





14

Crankshaft assembly

General description

The crankshaft is a chrome-molybdenum forging which has five main journals for four cylinder engines and seven main journals for six cylinder engines.

End-float is controlled by thrust washers on both sides of the centre main bearing.

The main bearings have steel backs with a aluminium/tin bearing material except the centre main bearing of six cylinder engines, which has a bearing material of lead bronze with a lead finish. The main bearing caps are made of cast iron or spheroidal graphite (SG) iron.

The front and the rear oil seals are Viton lip seals with a dust lip to the outside of the main lip and with oil return grooves on the face of the main lip.

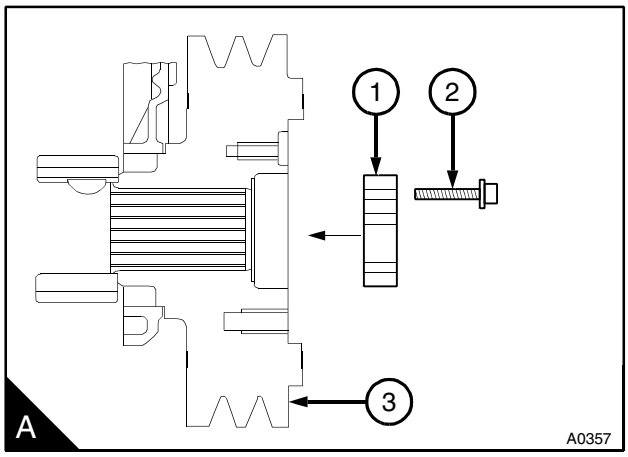
Warning! *Read the safety precautions for "Viton" seals on page 18.*

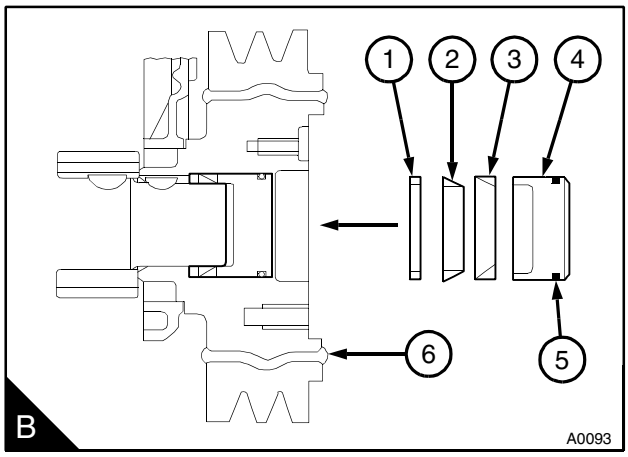
The crankshaft pulley (A3) of the four cylinder engine, usually fitted without a damper, is held in position by a plain thrust block (A1) and three setscrews (A2). The nose of the crankshaft is serrated for location.

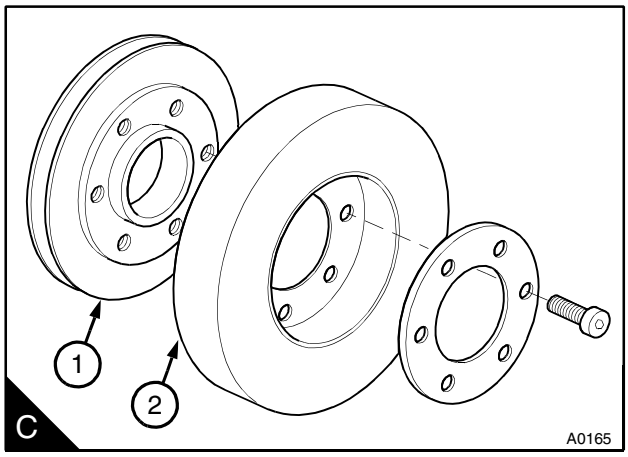
The location of the front pulley of six cylinder engines is by a key in the crankshaft nose and the pulley is held in position by a tapered rings arrangement (B).

An integral damper, with a rubber insert (B6) is built into the pulley of six cylinder engines and some four cylinder engines. Six cylinder engines have a viscous damper (C2) which is fastened to the front or rear face of the pulley (C1). All of the dampers are designed for the suppression of torsional vibrations in the engine crankshaft.

A balancer unit is fitted to certain four cylinder engines which have rigid mountings or which are part of the chassis or frame. The purpose of the balancer unit is to reduce the effect of the out-of-balance forces.







To fit

1 Clean the upper half of the shell bearing and lubricate the bearing surface with clean engine lubricating oil.

Caution: *Only the upper half of the bearing has lubrication holes and must be fitted to the cylinder block.*

2 Fit the plain end of the upper half of the bearing between the crankshaft journal and the side of the bearing housing which has the recess for the location tag. Slide the bearing into its housing until the tag on the bearing is fitted correctly in its recess in the housing.

3 Clean the lower half of the bearing and the cap, lubricate the bearing surface with clean engine lubricating oil.

4 Fit the bearing into the cap with the tag of the bearing fitted correctly in the recess in the cap.

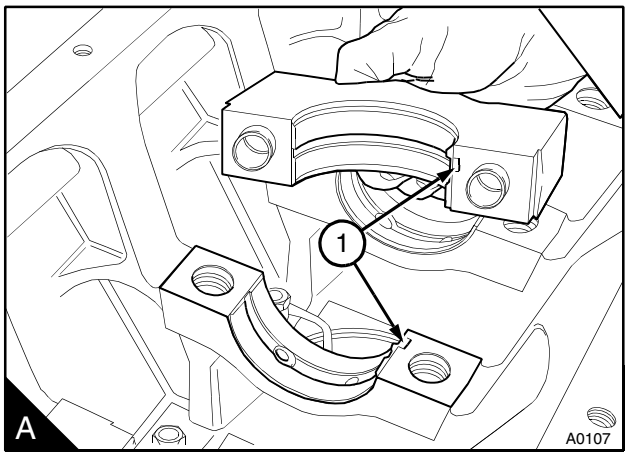
5 Ensure that the location thimbles are fitted correctly to the cap or to the cylinder block. Fit the bearing cap with the location tags of both bearings on the same side (A1).

6 Inspect the setscrews for damage and for distortion and renew them if necessary. Lightly lubricate the setscrew threads with clean engine lubricating oil. Fit the setscrews and tighten the setscrews gradually and evenly to 265 Nm (196 lbf ft) 27,0 kgf m.

7 Ensure that the crankshaft turns freely. If the thrust washers have been removed and fitted, check the crankshaft end-float, see operation 14-6.

8 Fit all the components which were removed for access to the main bearing cap.

9 Fit the lubricating oil sump, see operation 19-3 and fill it to the correct level with an approved lubricating oil.



To inspect 14-9

Inspect the bearings for wear and for other damage. If a bearing is worn or damaged, renew both halves of the shell bearings and check the condition of the other bearings.

1 Clean all the components before inspection.

2 Check the gear teeth and the splines of the drive shaft for wear or other damage. Renew the drive shaft if necessary.

3 Check the idler gear, needle roller bearing, hub and thrust washer for wear or other damage. Renew the components if necessary.

4 Check the drive gear for the balance weights for wear or other damage. Renew the gear if necessary.

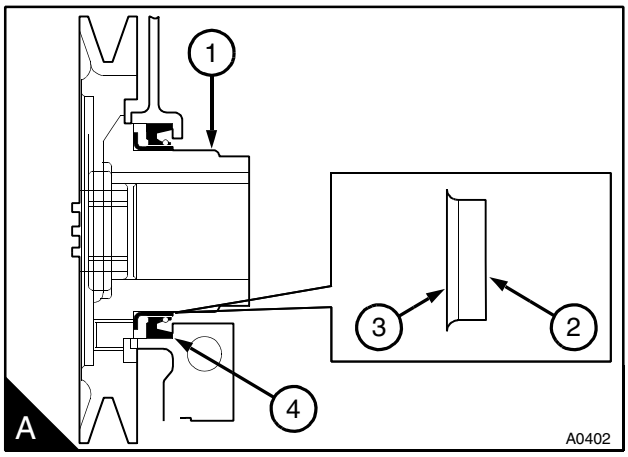
5 Check the balance weights for wear or other damage. If either balance weight is worn or damaged, both balance weights must be renewed.

6 Check the needle roller bearings for the drive shaft for wear or other damage. Renew the bearings, see operation 14-15, if necessary.

7 Check the bushes for the balance weights for wear or other damage. Renew the bushes, see operation 14-16, if necessary.

8 To inspect the lubricating oil pump, see operation 19-8.

To fit wear sleeve 15-3



To renew a worn crankshaft pulley, a wear sleeve (A2) is fitted over the spigot (A1).

1 Remove the crankshaft pulley, see operation 14-1 or operation 14-2.

Note: Full instructions and a special tool to fit the wear sleeve are in each service kit.

2 Fit the wear sleeve, in accordance with the manufacturer's instructions. It is not necessary to remove the flange (A3) of the wear sleeve after it has been fitted.

A new front oil seal (A4) must be used when a wear sleeve is fitted.

The dimension, to press the new oil seal into the timing case, with a wear sleeve fitted, is 10,20/10,70 mm (0.402/0.421 in), from the front face of the timing case.

3 Fit the crankshaft pulley, see operation 14-1 or operation 14-2.

To fit

1 Ensure that the sump joint is not damaged. If the joint is damaged, remove the sump and fit it with a new joint after the timing case has been fitted. The front section of the joint can be cut away and the front section of a new joint fitted, without the removal of the sump, but extreme care must be used to prevent possible leaks.

2 If the sump has been removed, fit the idler gear hub (A2) or (B2) to the front of the cylinder block; use the three setscrews of the idler gear to hold the hub in position. Ensure that the oil hole is at the top.

3 Ensure that the thrust washer for the camshaft is in position.

4 Fit a new joint for the timing case to the cylinder block. Cut the bottom ends of the joint to fit correctly. Apply POWERPART Jointing compound to the bottom ends of the joint.

5 Put the timing case in position. If the sump has not been removed, fit the idler gear hub, see , go to paragraph 2. Fit the four setscrews (A1), or three setscrews (B1) for engines fitted with a belt driven coolant pump, around the idler gear hub. Ensure that the bottom of the timing case is correctly aligned with the bottom of the cylinder block before the setscrews are tightened. Put the fan drive assembly and/or the alternator and its front support plate in position and fit and tighten the remainder of the setscrews of the timing case. If the front support plate has been separated from the alternator bracket, ensure that the right side of the plate is level with the machined face on the cylinder block where the alternator bracket is fitted. If a new timing case is fitted, remove the two studs from the timing case and clean the threads which fit into the timing case. Seal the threads with POWERPART Nutlock and fit the studs into the new timing case. Remove the setscrews from the idler gear hub.

6 If necessary, fit the lubricating oil sump, see operation 19-3, and fill it to the correct level with an approved oil.

7 Fit the camshaft gear, see operation 15-7 and the idler gear, see operation 15-4. Ensure that all the timing marks are correctly aligned.

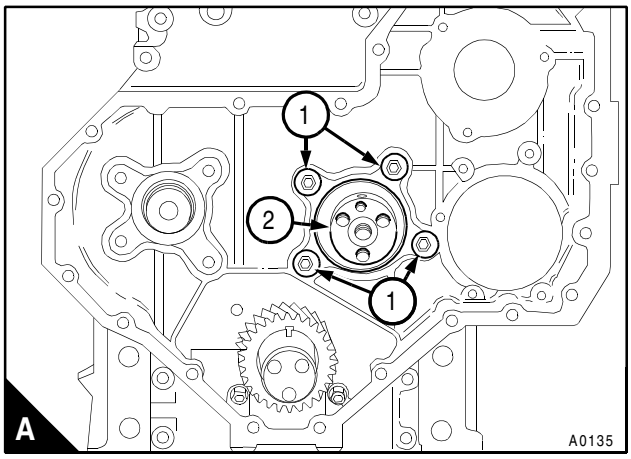
8 Fit the fuel injection pump and the drive gear, see section 20. Eliminate air from the fuel system, see section 20.

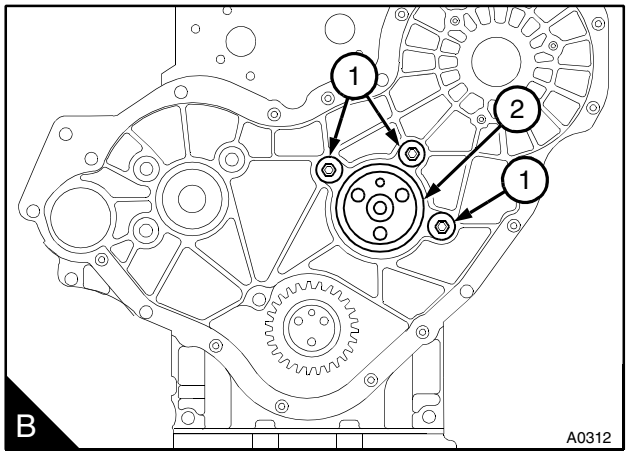
9 Fit the compressor and its drive assembly, if fitted, see operation 24-1.

10 Fit the timing case cover, see operation 15-1.

11 Fit the coolant pump, see operation 21-2.

12 Fit the crankshaft pulley, see operation 14-1 or , see operation 14-2.





13 If necessary, fit the fan drive pulley, see operation 21-10.

14 Fit the alternator, see operation 23-4 and the alternator front bracket.

15 Fit the drive belts, see operation 23-3 and adjust the belt tension, see operation 23-2.

16 Fit the fan, see operation 21-9.

17 Fill the cooling system.

To fit a partially finished liner

The liner is an interference fit in the parent bore. A special tool will be necessary to fit the liners, tool PD.150B can be used. If a liner is a very tight fit it may be necessary to use a hydraulic press.

Caution: *Do not hit a liner with a hammer.*

1 Clean thoroughly the parent bore of the cylinder block with an approved degreasing fluid.

2 Inspect the parent bore for damage and corrosion. Damaged cylinder blocks should be discarded.

3 Clean thoroughly the outer surface of the liner with an approved degreasing fluid.

4 Apply a small amount of engine oil around the top of the parent bore to assist the entry of the liner.

5 Engage the cylinder liner (A5) into the parent bore; ensure that the liner is vertical. Put the adaptor PD.150B-17A (A4) onto the top of the liner with the flame ring in the groove of the adaptor. Put the bearing (A3) into position in the recess in the top of the adaptor with the flat face of the bearing to the bottom of the recess.

6 Fit the threaded rod (A1) through the bearing, the adaptor and the liner until the handle (A2) is against the recess in the bearing. In this position adjust the threaded rod until the end is below the bottom face of the cylinder block.

7 Fit the adaptor PD.150B/6 (A6) onto the threaded rod; ensure that the flat face of the adaptor is against the bottom face of the cylinder block as shown (A). Fit the washer and the nut; ensure that the threaded rod is in the centre of the liner and tighten the nut onto the adaptor.

8 Lubricate the ratchet of the handle and the threaded rod with Shell Spirax oil or an equivalent oil. Operate the handle and press the liner into the fully fitted position.

9 Remove the tool PD.150B and thoroughly clean the top of the cylinder block.

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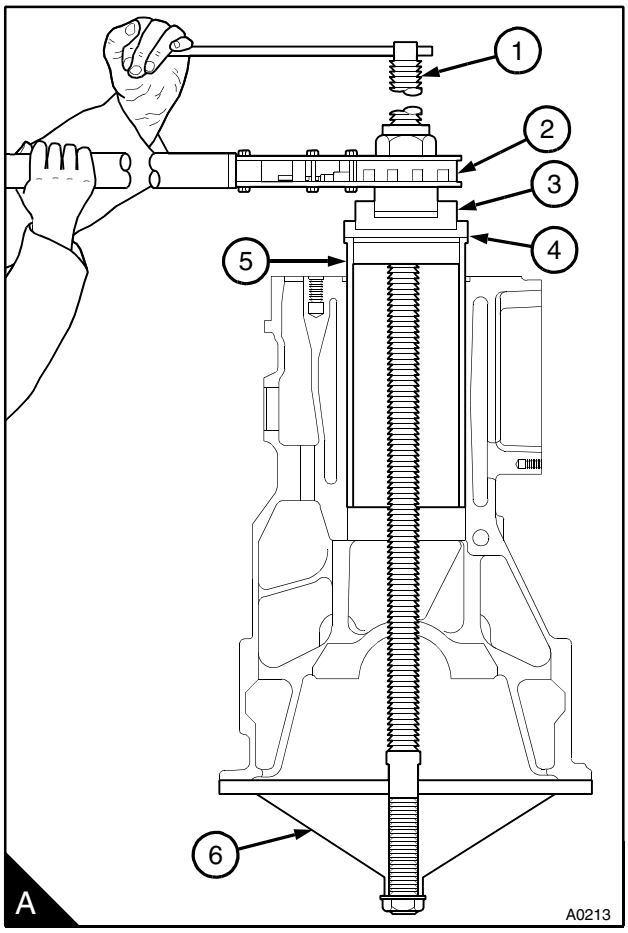


To check the timing of the fuel injection pump 17-4

Special tools:

Timing pin PD.245, Bosch fuel injection pumps

Timing pin PD.246, Lucas and Stanadyne fuel injection pumps

Caution: *Do not remove the nut (A2) which retains the hub (A4) to the shaft of the fuel injection pump. The hub is fitted permanently to the shaft. If the hub is moved, it will be necessary for a fuel injection pump specialist to correctly position the hub on the shaft with special test equipment available to Perkins distributors.*

1 Set the piston of number 1 cylinder to TDC on the compression stroke, see operation 17-1 or operation 17-2.

2 Remove the gear cover from the cover of the timing case. For gear driven coolant pumps: Remove the coolant pump, see operation 21-2.

Note: On the latest engines with belt driven coolant pumps, four tamper proof fasteners retain the fuel pump gear. Special tools and personnel with the correct training are necessary to remove these fasteners, refer to your nearest Perkins distributor.

3 Insert the timing pin (A1) through the hole (A5) in the fuel pump gear and the slot of the hub (A4). Push the pin fully into the hole (A3) in the body of the fuel pump. If the pin can be fully inserted then the pump timing is correct. There should be no resistance when the pin is inserted.

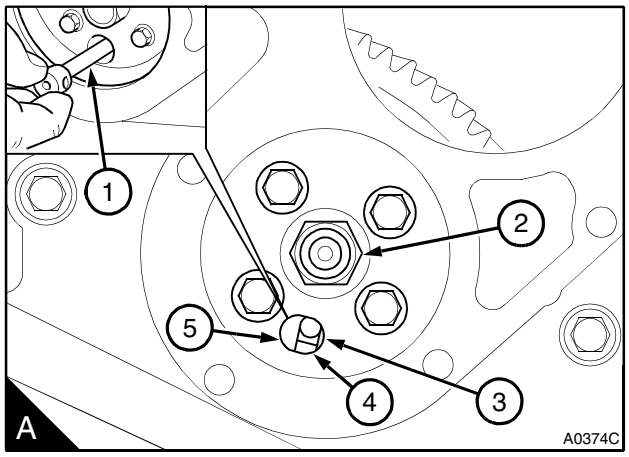
Note: The position for the timing pin for Lucas and Stanadyne fuel injection pumps is (A1). The position for the timing pin for Bosch EPVE fuel injection pumps is (B1).

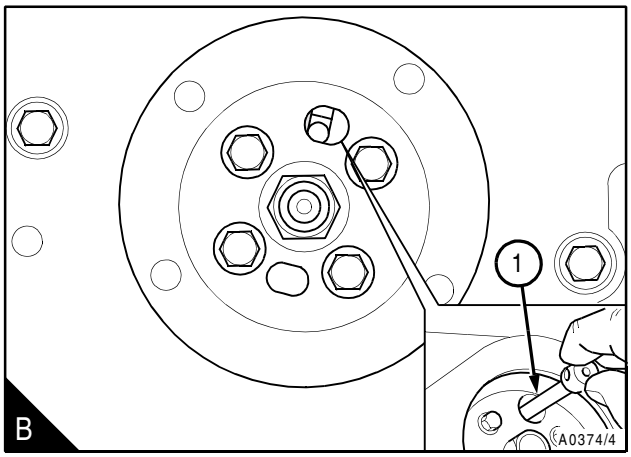
4 Remove the timing pin.

5 If the timing pin cannot be pushed into the pump body, check that the engine is correctly set at TDC on the number 1 cylinder compression stroke, see operation 17-1 or operation 17-2.

If the engine is set correctly at TDC on the number 1 cylinder compression stroke, but the pin does not fit into the hole, the fuel pump must be removed and set by a specialist.

6 Fit the gear cover to the cover of the timing case. For gear driven coolant pumps: Fit the coolant pump, see operation 21-2.

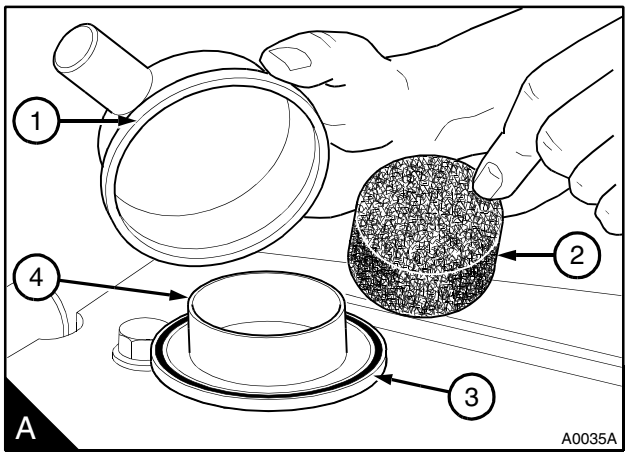




Engine breather

Open breathers fitted to New 1000 Series engines have a pipe connected to the rocker cover which will allow any crankcase pressure to pass directly from the engine. A gauze strainer (A) may be fitted to remove any oil mist and return it to the rocker cover.

Open breather



To clean and to renew 18-5

To clean

Note: It is not necessary to remove the body of the breather from the rocker cover to obtain access to the gauze.

1 Release the hose clip and remove the hose from the breather cover (A1). Release the breather cover from the body of the breather (A4). The cover is a press fit onto the body.

2 Remove and discard the plastic gauze (A2).

3 Clean the body of the breather with clean kerosene. Ensure that all of the kerosene is removed from the breather after cleaning.

4 If necessary, renew the "O" ring seal (A3).

5 Check that the inside of the breather pipe is clean. If the pipe is not clean, release the setscrews and remove the pipe. Wash the pipe with kerosene and dry it with low-pressure air.

6 Renew the plastic gauze.

7 Fit the cover to the breather body, ensure that it is securely fitted.

8 Fit the breather pipe and tighten the hose clips.

To renew

To renew the complete breather assembly the body of the breather must be removed from the rocker cover:

Note: The breather is fastened to the rocker cover by a screw thread on the bottom of the breather body.

1 Release the hose clip and remove the hose from the breather cover.

2 Fit a "C" spanner to the lugs at the bottom of the breather body and turn the spanner counterclockwise to release and discard the breather.

3 Clean the threads in the rocker cover and on the new breather assembly.

4 Fit the new breather by hand and tighten it into the rocker cover with the "C" Spanner.

5 Fit the breather pipe and tighten the hose clip.

Lubricating oil pump

To remove and to fit 19-6

For four cylinder engines fitted with a balancer unit, the oil pump is integral with the balancer unit, see section 14 for removal instructions.

The lubricating oil pump has a channel (B1) in the body of the pump. Lubricating oil from the front main bearing passes down the channel in the body of the pump to an oil hole in the idler shaft. The lubricating oil then passes through the hole in the idler shaft to the bush in the idler gear.

To remove

1 Drain the lubricating oil and remove the lubricating oil sump, see operation 19-3.

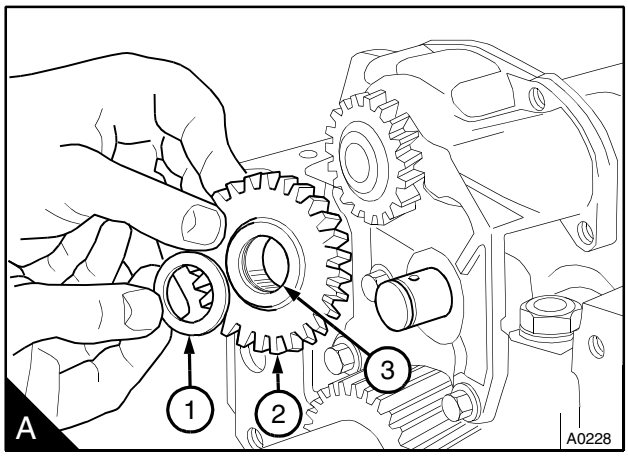
2 Remove the suction pipe and strainer, see operation 19-4.

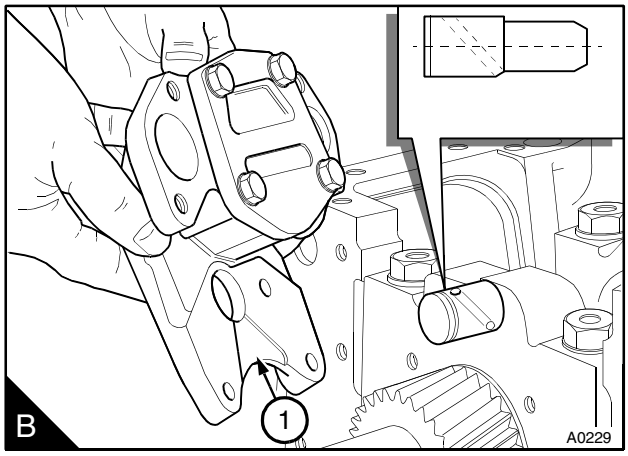
3 For four cylinder engines: Remove the oil pressure relief valve, see operation 19-9, and the delivery pipe. For six cylinder engines: Remove the delivery pipe of the oil pump.

4 The oil pump is fitted to number 1 main bearing cap. The oil pump can be removed with the main bearing cap, if a suitable spanner is available that will enable the torque to be applied correctly to the setscrews of the main bearing cap when it is fitted. If a suitable spanner is not available, the timing case must be removed, see operation 15-9.

5 Release the circlip which retains the idler gear of the oil pump and remove the washer (A1) and the idler gear (A2).

6 Release the setscrews and remove the oil pump (B).





Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Lubrication system

Lubricating oil pump - four cylinder engines

Type . . . . . Differential rotor, gear driven
Number of lobes. . . . . Inner rotor 6, outer rotor 7
Clearance of outer rotor to body:
- Without balancer unit . . . . . 0,15/0,34 mm (0.006/0.013 in)
- With balancer unit . . . . . 0,31/0,45 mm (0.012/0.017 in)

Clearance of inner rotor to outer rotor . . . . . 0,04/0,13 mm (0.0015/0.0050 in)
End-float of rotor assembly . . . . . 0,03/0,10 mm (0.001/0.004 in)

Lubricating oil pump - six cylinder engines

Type . . . . . Differential rotor, gear driven
Number of lobes:
- Inner rotor 4
- Outer rotor 5

Clearance of outer rotor to body . . . . . 0,15/0,34 mm (0.006/0.013 in)
Clearance of inner rotor to outer rotor . . . . . 0,04/0,13 mm (0.0015/0.0050 in)
End clearance (naturally aspirated engines)
- Inner rotor . . . . . 0,05/0,12 mm (0.002/0.005 in)
- Outer rotor . . . . . 0,04/0,11 mm (0.0015/0.0044 in)

End clearance (turbocharged engines)
- Inner rotor . . . . . 0,043/0,118 mm (0.0017/0.0046 in)
- Outer rotor . . . . . 0,031/0,106 mm (0.0012/0.0042 in)

Idler gear for lubricating oil pump

End float:
- Four cylinder engines . . . . . 0,012/0,643 mm (0.0005/0.0253 in)
- Six cylinder engines. . . . . 0,020/0,650 mm (0.0008/0.0256 in)

Inside diameter of bush (fitted) . . . . . 22,23/22,26 mm (0.875/0.866 in)
Outside diameter of idler shaft. . . . . 22,19/22,21 mm (0.873/0.874 in)
Clearance of bush of idler gear on shaft . . . . . 0,020/0,066 mm (0.0008/0.0026 in)

Canister type

Warning! *Discard the used canister and fuel oil in a safe place and in accordance with local regulations.*

***Cautions*:**

- *It is important that only the genuine Perkins parts are used. The use of a wrong canister or element can damage the fuel injection pump.*
- *Do not allow dirt to enter the fuel system. Before a connection is disconnected, clean thoroughly the area around the connection. After a component has been disconnected, fit a suitable cover to all open connections.*

1 Thoroughly clean the outside surfaces of the fuel filter assembly.

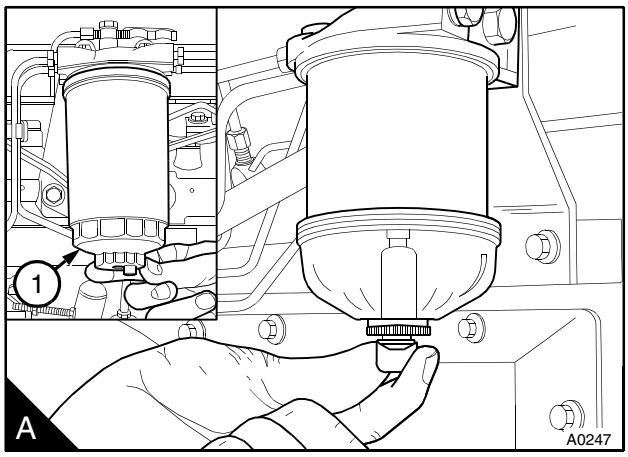
2 Loosen the drain device at the bottom of the filter (A1) and allow the water / fuel to drain into a suitable container.

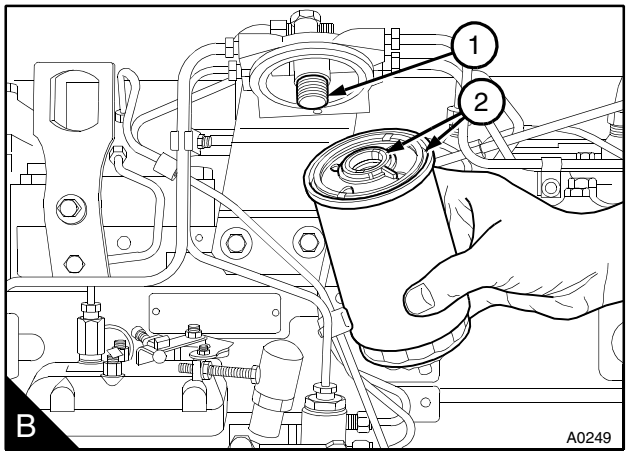
3 Use a strap wrench or similar tool to loosen the filter canister and remove the canister.

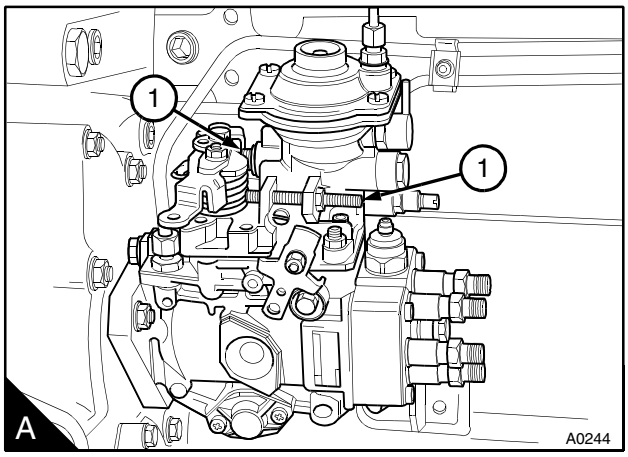
4 Ensure that the threaded adaptor (B1) is secure in the filter head and that the inside of the head is clean.

5 Lubricate lightly the top seals (B2) of the new canister with clean fuel. Fit the new canister to the filter head and tighten, by hand only.

6 Eliminate the air from the fuel filter, see operation 20-9, operation 20-12 and operation 20-15.







The engine conforms with USA (EPA/CARB) stage 1 and EEC stage 1 emissions legislation for agricultural and industrial applications.

The idle or maximum speed settings must not be changed by the engine operator, because this can damage the engine or the transmission.

Specialist equipment, which is available at your Perkins distributor, is needed to adjust the idle or maximum speed settings. The warranty of the engine can be affected if the seals on the fuel injection pump are broken during the warranty period by a person who is not approved by Perkins.

1 Operate the engine until it reaches its normal temperature of operation and check the idle speed. If necessary, adjustment can be made by the inner adjustment screw (A1). Release the lock nut and rotate the adjustment screw clockwise to increase the speed, or counter-clockwise to decrease the speed. When the speed is correct, tighten the lock nut. The setting of the idle speed can change for different applications. Normally the correct speed will be given in the manufacturer's handbook for the application. If it is not given, refer to your nearest Perkins distributor.

Caution: *The setting for the maximum no load speed can change for different applications. For the correct maximum no-load speed, check the emissions data plate fitted to the left side of the cylinder block before any adjustment is made to the maximum no load speed.*

2 With the engine at its normal temperature of operation, check the maximum no load speed. A typical maximum no load speed is 2860 rev/min. If necessary, this speed can be adjusted by the outer adjustment screw (A2). Release the lock nut and rotate the adjustment screw counter-clockwise to increase the speed or clockwise to decrease the speed. When the speed is correct, tighten the lock nut and seal the screw.

The person who fits the pump must ensure that the adjustment screw is suitably sealed against interference after it has been set initially.

To remove

1 Disconnect the battery before the fuel injection pump is removed from the engine.

2 Set the engine to TDC on the number 1 cylinder on the compression stroke, see operation 17-1 or , see operation 17-2.

3 Remove the gear cover from the cover of the timing case. For gear driven coolant pumps: Remove the coolant pump, see operation 21-3.

4 Insert the timing pin (A1) through the hole (A5) in the fuel pump gear and the slot of the hub (A4). Push the pin fully into the hole (A3) in the body of the fuel pump. If the pin can be fully inserted then the pump timing is correct. There should be no resistance when the pin is inserted.

Caution: *Use a second spanner to prevent movement of the high-pressure outlet when the union nut for each high-pressure pipe is released.*

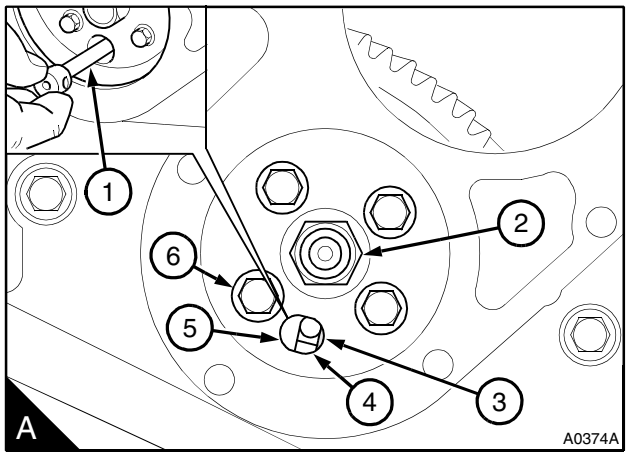
5 Remove the pipes, the cables and the connections for the cold start device (B2) and the electrical stop solenoid (B1) from the fuel pump.

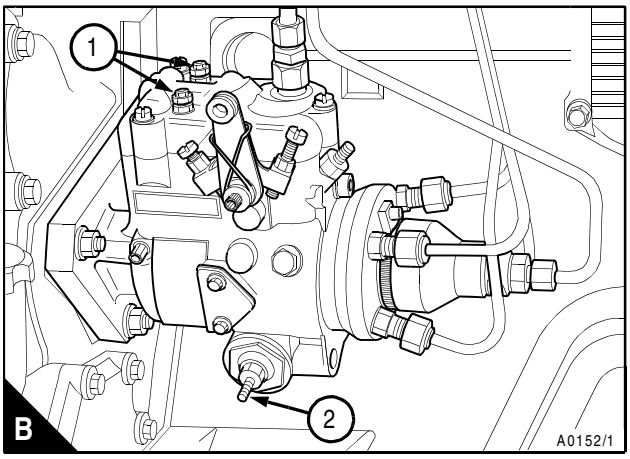
***Cautions*:**

- *Do not rotate the crankshaft when the pump is not on the engine; the loose fuel pump gear may damage the timing case. If it is necessary to rotate the crankshaft, fit the fuel pump temporarily to ensure that the gear is in the correct position. If the fuel pump is fitted temporarily in order to rotate the crankshaft.*
- *Do not release the nut (A2) from the fuel injection pump. The fuel pump hub is fitted to the shaft in the factory to ensure that the fuel pump is in the correct position for timing. If the hub is removed, the hub will need to be accurately fitted to the pump by use of special equipment available to Perkins distributors.*

6 Remove the four fasteners (A6) and release the fuel pump gear from the hub of the fuel injection pump.

7 Remove the nuts from the flange of the fuel pump and remove the pump.





Coolant pump - latest gear driven pumps

Caution: *Do not remove the pressed steel cover.*

The latest coolant pump has a pressed steel cover (A2) of the impeller housing. Early gear driven pumps have a steel cover fastened by setscrews.

Identification of the coolant pump is by the last four digits of the part number, for example 4131**E011**, stamped on the front of the pump body.

To remove and to fit 21-3

Consumable products:

POWERPART Threadlock

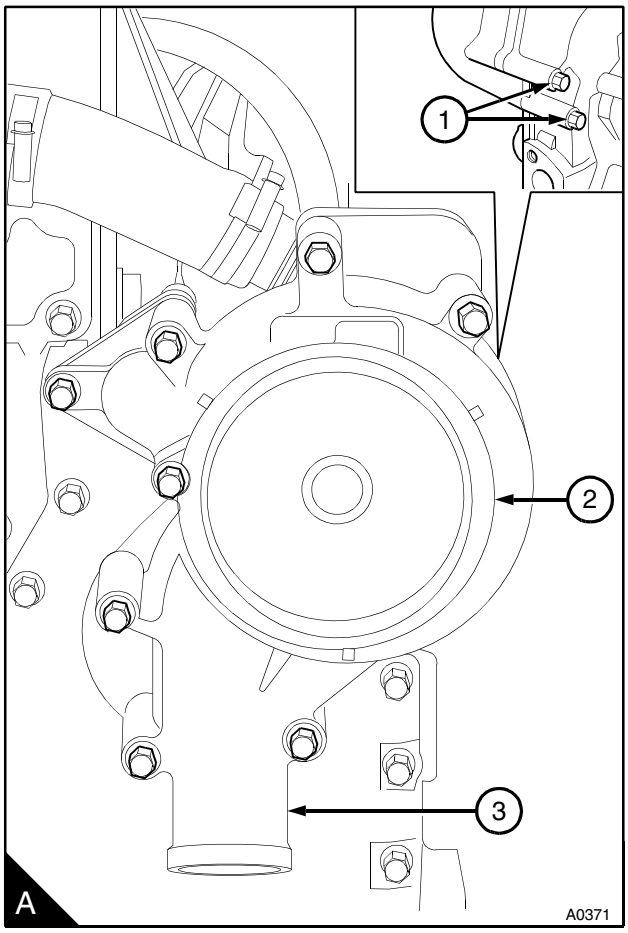
To remove

1 Drain the cooling system and disconnect the hose at the inlet connection (A3) of the coolant pump.

2 Release the two fasteners from the rear face of the timing case (A1).

3 Release the eight setscrews in (A) which retain the coolant pump to the cover of the timing case and remove the coolant pump.

4 Remove and discard the joint.



Caution: *Do not damage the sealing face of the oil seal housing during removal of the seal.*

5 Drill a 3.175 mm (0.125 in) hole through the top of the oil seal and fit a 25.4 mm (1.00 in) self-tapping screw. Insert a suitable lever through the coolant inlet of the pump body and apply the lever under the head of the self-tapping screw to remove the oil seal (A2). Discard the oil seal.

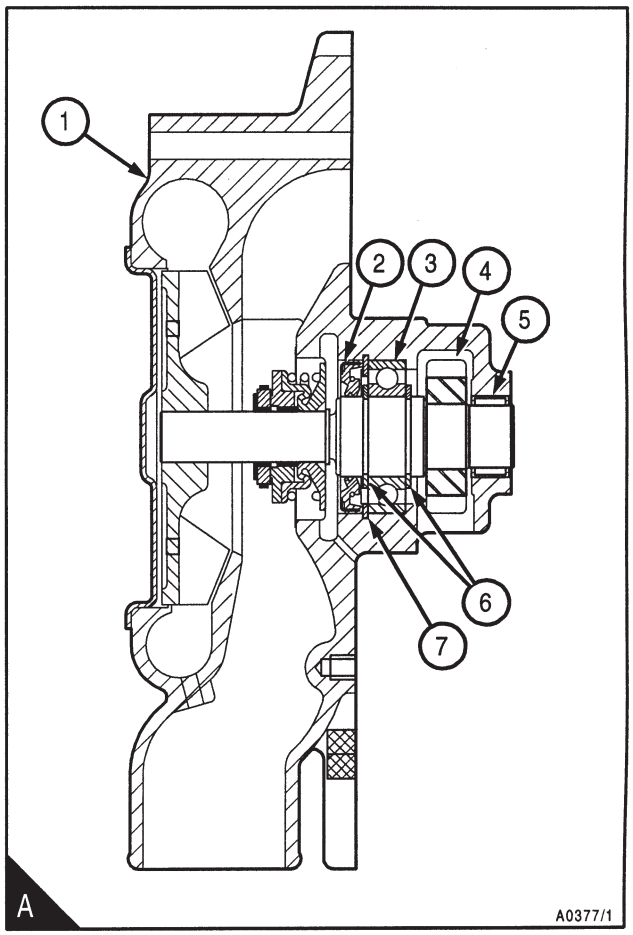
6 Remove and discard the circlip (A7).

7 Put the impeller end of the pump body (A1) face down on a suitable press. Press the drive gear end of the shaft through the gear (A4) and the pump body until the shaft and ball bearing assembly (A3) are released from the pump. Discard the bearing, the shaft and the two circlips (A6). The gear will also be released.

8 Inspect the gear for wear or other damage and renew it, if necessary.

9 Put the impeller end of the pump body face down onto a press. Use a suitable mandrel to engage the outer race of the needle roller bearing (A5). Press out the bearing and discard it.

IMPORTANT :
See chapter 26 - SERVICE BULLETIN Nr 97



5 Thoroughly clean the flange face of the cover and of the cylinder block.

Note: A liquid joint is used in the factory, this must be removed and a paper joint (A5), part number 3684R012, fitted in its place.

6 If an overhaul of the oil cooler is necessary, see operation 21-18.

To fit

1 If the four studs (A6) have been removed from the cylinder block flange and are to be fitted again, clean the threads in the cylinder block and on the studs. Apply POWERPART studlock, currently Loctite 270, before the studs are fitted to the cylinder block to prevent the leakage of coolant.

2 Put a new paper joint into position on the studs; the joint is fitted dry. Fit the oil cooler assembly (A3) to the cylinder block. Gradually and evenly tighten the fasteners (A2) to 22 Nm (16 lbf ft) 2,2 kgf m.

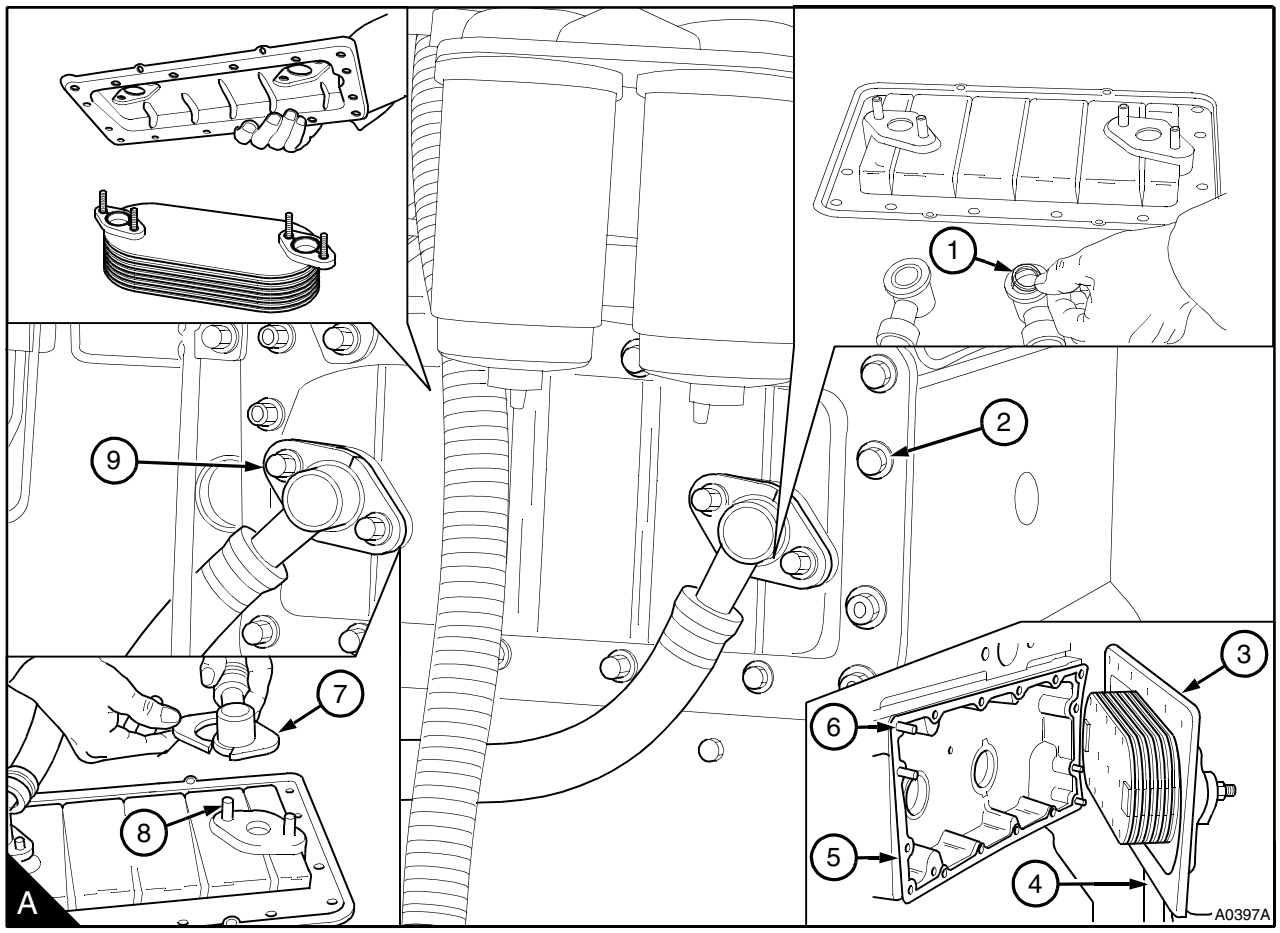
3 Clean the seats for the "O" rings and renew the "O" rings (A1) of the pipe connections.

Caution: *Do not remove the flanges (A7) and nuts (A9) from the studs (A8), before one of the oil pipes is fitted to the cover. This will ensure that the element is held in position on the cover (A3) while the oil pipes are fitted.*

4 Fit the oil pipes to the oil cooler and tighten the nuts to 22 Nm (16 lbf ft) 2,2 kgf m.

5 Fill the cooling system.

6 Operate the engine and check for oil or coolant leakage.



Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Coolant pump, early gear driven pump

Type	Centrifugal
Outside diameter of shaft	18,95/18,96 mm (0.7460/0.7465 in)
Diameter of bore of drive gear	18,90/18,92 mm (0.7441/0.7449 in)
Interference fit of drive gear on shaft	0,03/0,06 mm (0.0012/0.0024 in)
Diameter of bore of impeller	15,87/15,89 mm (0.6249/0.6257 in)
Outside diameter of shaft for impeller	15,91/15,92 mm (0.6264/0.6268 in)
Interference fit of impeller on shaft	0,02/0,05 mm (0.0007/0.0020 in)
Diameter of bore for bearing	38,06/38,08 mm (1.4983/1.4993 in)
Diameter of bearing	38,09/38,10 mm (1.4995/1.5000 in)
Interference fit of bearing in pump body	0,01/0,04 mm (0.0004/0.0016 in)
Dimension of impeller boss to front face of pump body (fitted)	7,7/8,0 mm (0.303./0.315 in)
Dimension of gear from rear flat face of pump body (fitted)	21,0/21,5 mm (0.827/0.846 in)
Dimension of gear from rear face of bearing (fitted)	0,47/1,53 mm (0.018/0.060 in)

Coolant pump, latest gear driven pump

Type	Centrifugal

Coolant pump, belt driven

Type	Centrifugal
Outside diameter of shaft for pulley	24,587/24,600 mm (0.9679/0.9685 in)
Inside diameter of bore of pulley	24,628/24,648 mm (0.9696/0.9704 in)
Clearance fit of pulley on shaft	0,03/0,06 mm (0.001/0.002 in)
Diameter of bore of impeller	15,872/15,893 mm (0.6248/0.6257 in)
Outside diameter of shaft for impeller	15,9055/15,9182 mm (0.6263/0.6267 in)
Interference fit of impeller on shaft	0,01/0,04 mm (0.0004/0.0016 in)
Impeller to body clearance	0,69/0,89 mm (0.027/0.035 in)
Impeller to body clearance, engine type AS	0,20/0,60 mm (0.008/0.024 in)
Diameter of bearing	62,000 mm (2.440 in)
Diameter of bore for bearing	62,019/62,000 mm (2.441/24.000 in)
Interference fit of bearing in pump body	0,01/0,04 mm (0.0004/0.0016 in)

Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Electrical equipment

The information which follows is general and can change with specific applications.

Alternators

Make and type

- . . . . . Lucas, AC5RS
- . . . . . Magneti Marelli, A127
- . . . . . Bosch KI and Bosch NI

Rating:

Lucas AC5RS 24V/55A

Magneti Marelli A127 . . . . . 12V/55A or 12V/65A or 12V/72A

Bosch KI. 12V/55A

Bosch NI 24V/55A

Rotation . . . . . Clockwise from drive end

To fit

1 Set the piston of number 1 cylinder to TDC, see operation 17-1 or , see operation 17-2.

2 Fit a new "O" ring (A5) in its recess in the drive housing. Lubricate the "O" ring with clean engine lubricating oil.

3 Rotate the crankshaft of the compressor until the mark (B1) or (C1) on the rear face of the crankshaft aligns with the 6A line (six cylinder engines) or the 4A line (four cylinder engines) on the label on the rear face of the compressor.

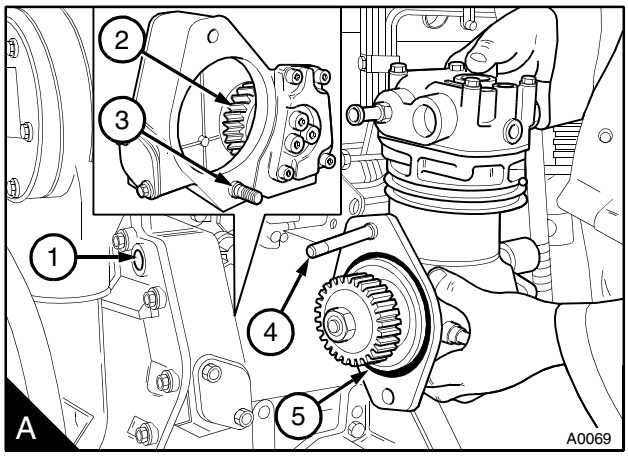
4 Push the shortest thread of the stud (A4) through the hole at the top of the compressor flange and fit the nut fully onto the thread. Engage the stud in the hole (A1) in the timing case. Slide the compressor onto the stud (A3) for the bottom of the flange.

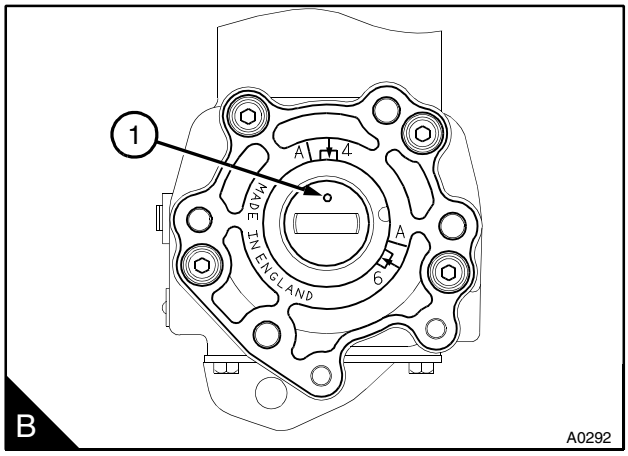
5 Slide the compressor forward until the teeth of the drive gear are against the teeth of the idler gear (A2). Slowly rotate the crankshaft of the compressor clockwise (from the rear) until the drive gear and the idler gear are in mesh.

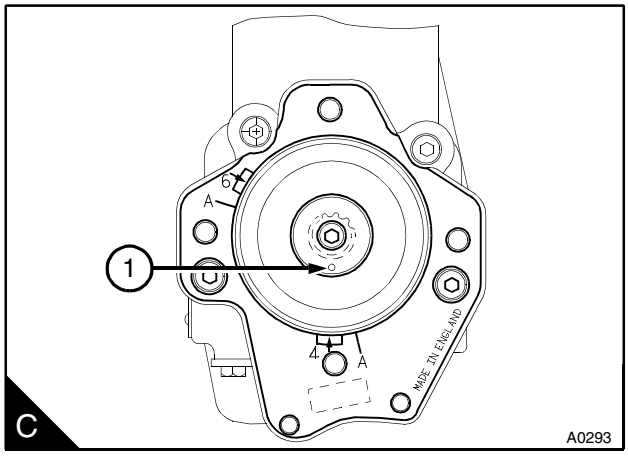
6 Carefully push the compressor forward until the spigot on the compressor is fully fitted in the timing case. In this position, the mark on the rear of the crankshaft should align with the dark area on the timing label marked 6 (six cylinder engines) or 4 (four cylinder engines).

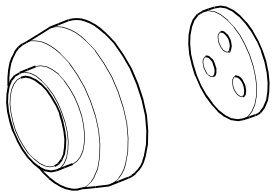
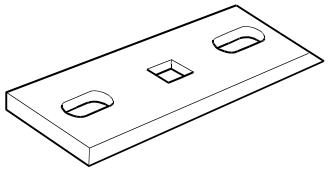
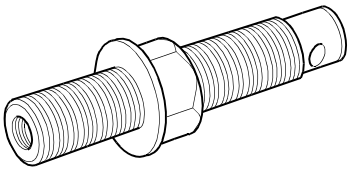
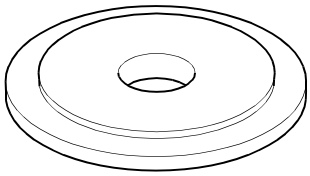
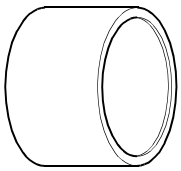
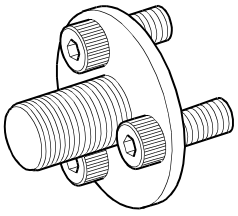
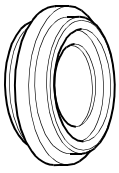
7 If the alignment is not correct, pull the compressor out of engagement and move the crankshaft of the compressor in the relevant direction to mesh with the next gear tooth. Carefully push the compressor assembly into position. Check that the mark on the rear of the crankshaft is in the correct position. Fit the nuts to the stud (A4) which passes through the timing case (A1) and to the stud at the bottom of the flange. Tighten the two nuts to 75 Nm (55 lbf ft) 7,6 kgf m.

Continued







Part number	Description	Illustration
PD.163A **MANITOU Réf. 474180**	Centralising tool for timing case cover (Six cylinder engines). Part number 21825574	
PD.165B **MANITOU Réf. 563035**	Crankshaft rotation adaptor for use with a 12,7 mm (0.5 in) square drive. Part number 21825576	
PD.170 **MANITOU Réf. 474181**	Replacer tool for seal of timing case cover (main tool). Part number 21825577	
PD.170-1 **MANITOU Réf. 474182**	Pressure plate for use with PD.170. Part number 21825578	
PD.170-2 **MANITOU Réf. 474183**	Sleeve for use with PD.170. Part number 21825579	
PD.170-3 **MANITOU Réf. 474184**	Fastener plate for use with PD.170. Part number 21825580	
PD. (1)	Adaptor for front seal for use with PD.170. Part number **(1)**	

Perkins

Service Bulletin

Please remove issue 1 of General Service Bulletin 139 dated June 2000 and put this issue in its place. More information has been added.

General **139 issue 2**

Canister lubricating oil cooler **August 2000**

This service bulletin affects 3.152, 4.236, 6.3544, 700 Series, 900 Series, 1000 Series and New 1000 Series engines.

Canister lubricating oil coolers are a type of plate oil cooler and are fitted either direct to the oil filter head and have a cover at the base, or between the oil filter head and the oil filter. If the engine has low oil pressure, remove the lubricating oil cooler and clean it before further checks for possible causes of the low oil pressure.

To remove and to fit the canister type lubricating oil cooler

To remove

1 Drain the cooling system.

2 Release the hose clips of the coolant pipes at the oil cooler (A3). Release the threaded adaptor (A5) from the lubricating oil cooler and pull the oil cooler (A6) from the hose connections and the filter head (A1).

To fit

1 Clean the joint face of the filter head (A2).

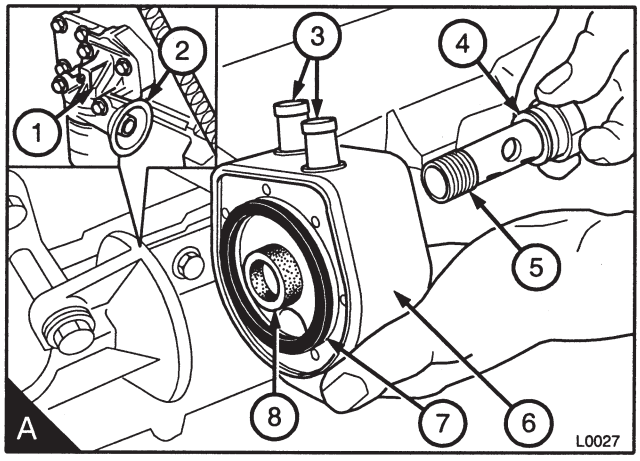
2 Check the washer (A4) and the seals (A7 and A8) for damage. Renew the washer and the seals if they are damaged or worn. Lightly lubricate the seals with clean lubricating oil.

3 Push the hose connections for the coolant pipes onto the lubricating oil cooler. Hold the oil cooler in position against the filter head and fit the threaded adaptor. Tighten the threaded adaptor to 57 Nm (42 lbf ft) 5,8 kgf m. Ensure that the hose connections are fitted correctly and tighten the hose clips.

4 Fill the cooling system.

5 If the oil filter is an attachement to the oil cooler, renew the filter. Check and correct the oil level in the sump.

6 Operate the engine and check for leakage of coolant or oil. Correct any faults. Check and correct the oil level in the sump.



Service period

The recommended service period for this type of oil cooler is 2000 hours.

To service the oil cooler

7 Remove the oil cooler from the engine.

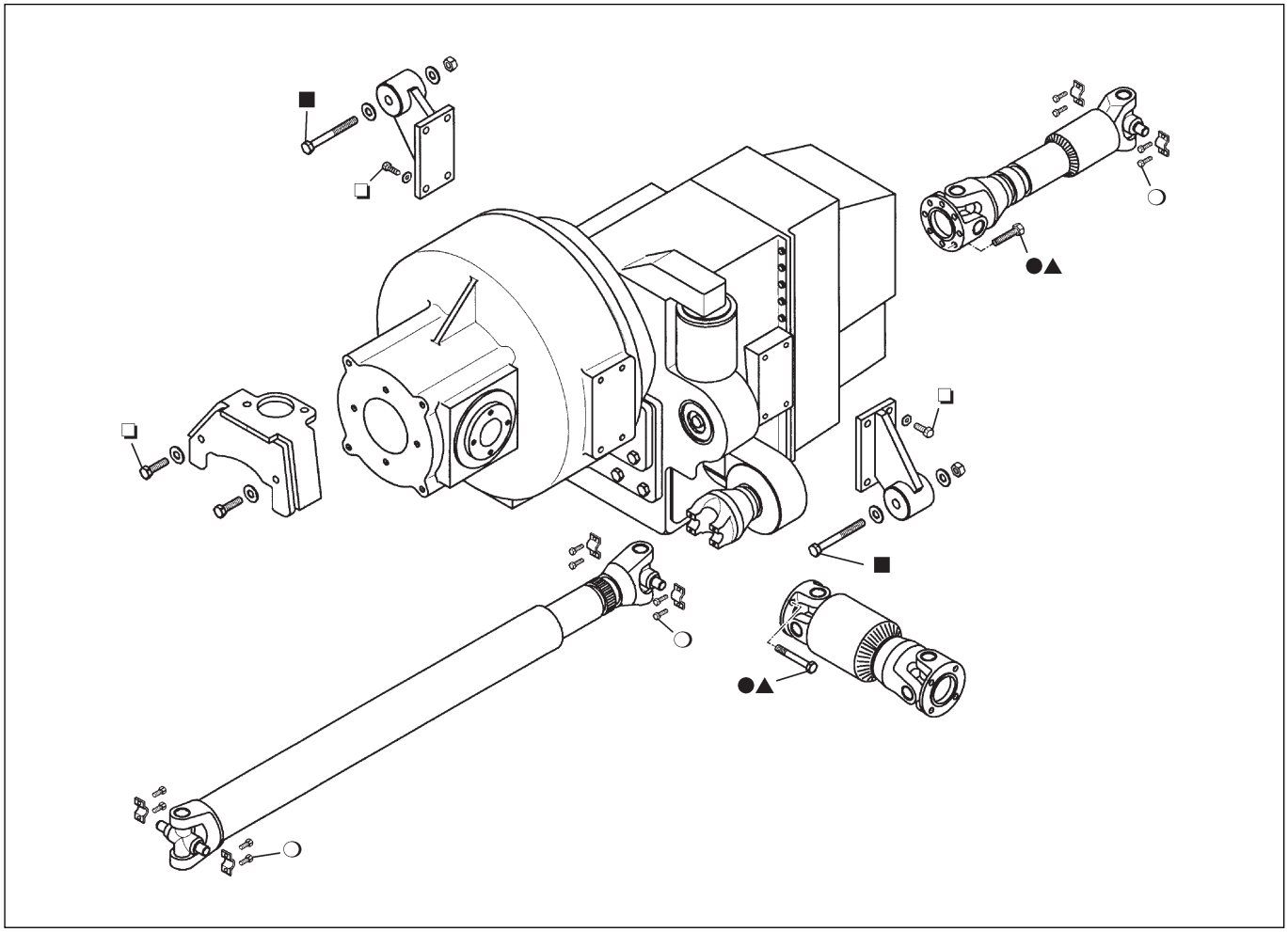
8 Clean thoroughly the outside of the cooler plates with a proprietary cleaning fluid. Clean thoroughly the inside of the cooler plates with clean water.

9 Fit the oil cooler to the engine.

End

REASSEMBLY OF THE ENTIRE TRANSMISSION

- Reassemble by carrying out in reverse order the operations described in the chapter " REMOVAL OF THE ENTIRE TRANSMISSION (GEARBOX + BEVEL GEAR) ", also complying with the following instructions.



27

TIGHTENING TORQUE : ❍ = 37 N.m ± 10 %
● = 67 N.m ± 10 %
❑ = 80 N.m ± 10 %
■ = 290 N.m ± 10 %
▲ = Screws mounted with standard MANITOU locking compound Ref : 187526

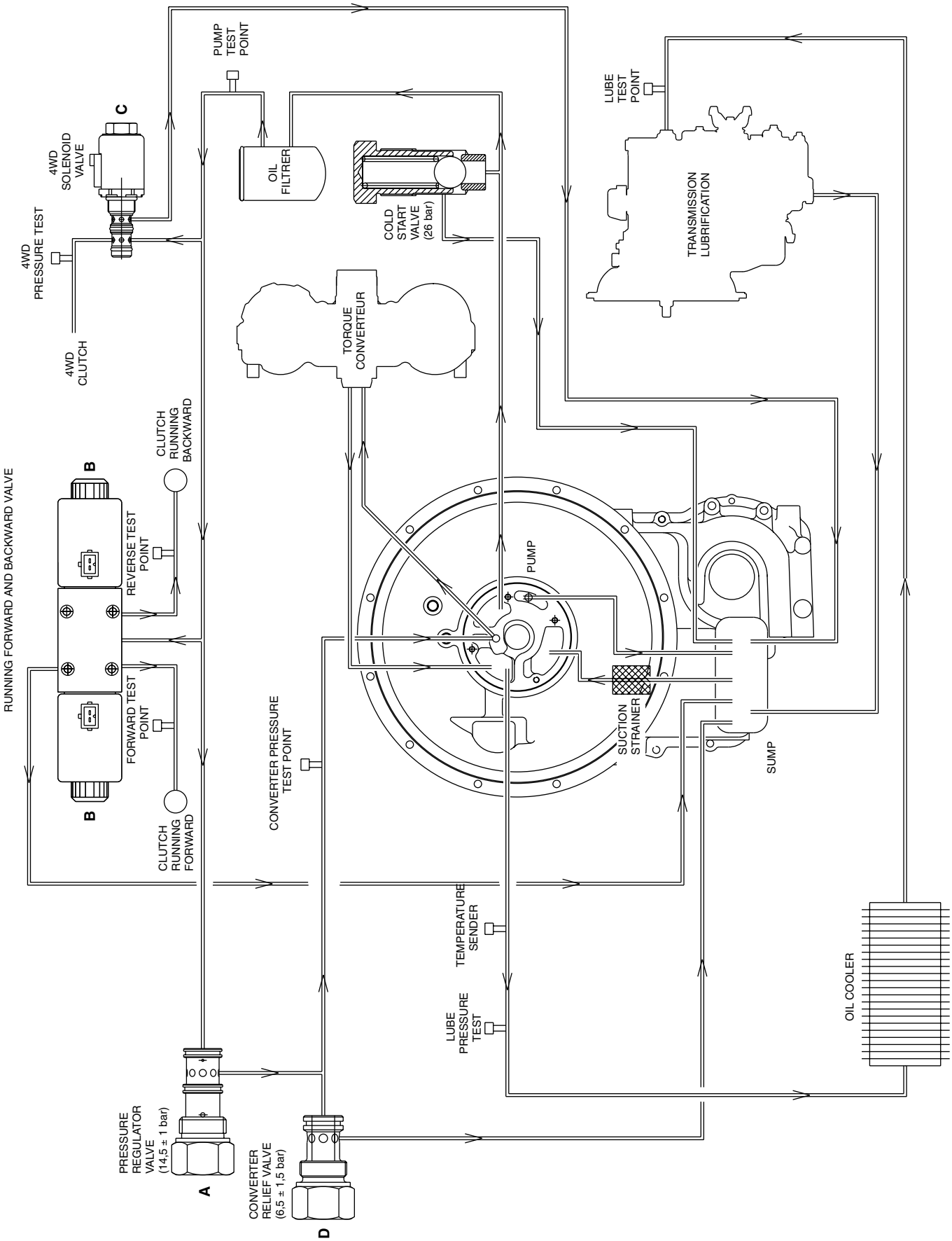
- Check the gearbox and brake circuit levels and top up.
- Check that the lift truck is in good working order.

GEAR BOX DISASSEMBLY

20-3-9 EN

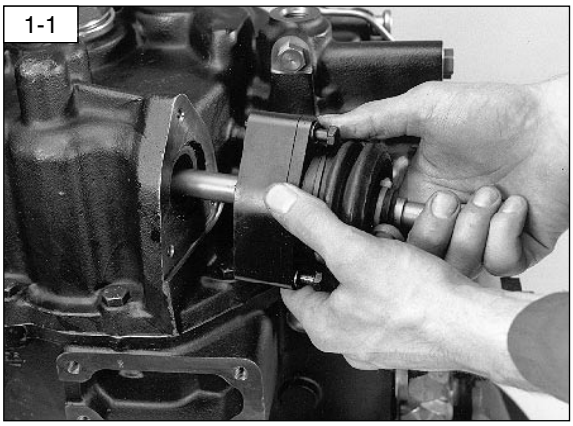
30 / 04 / 1999

TRANSMISSION HYDRAULIC CIRCUIT



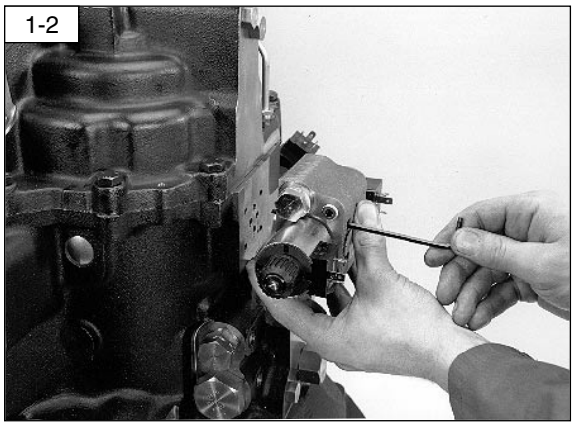
1 - TRANSMISSION DIS-ASSEMBLY

1-1



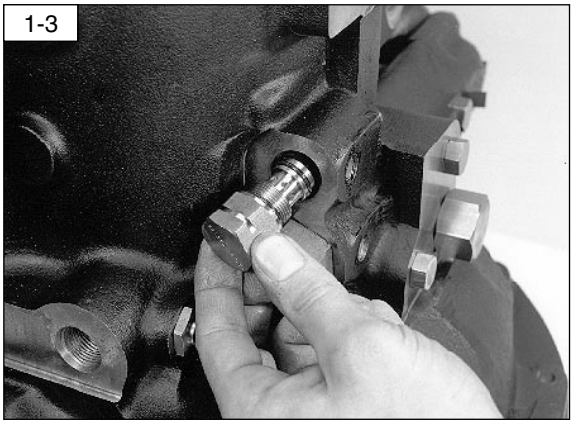
Invert the transmission on a suitable bench. For convenience the bench top should have a hole in it to accommodate the input shaft and pump. Remove 3 screws and withdraw the gear shift lever assembly.

1-2



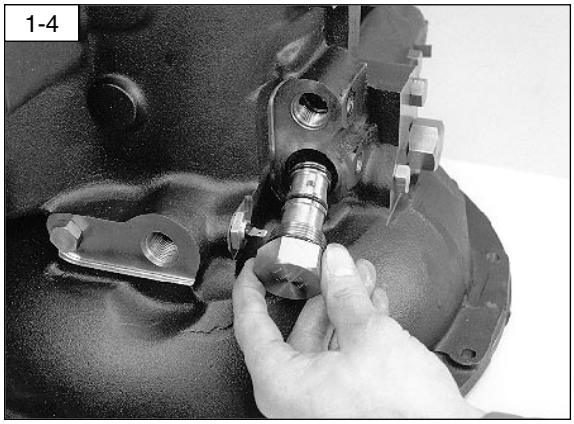
Remove 4 capscrews and withdraw the direction control valve.

1-3



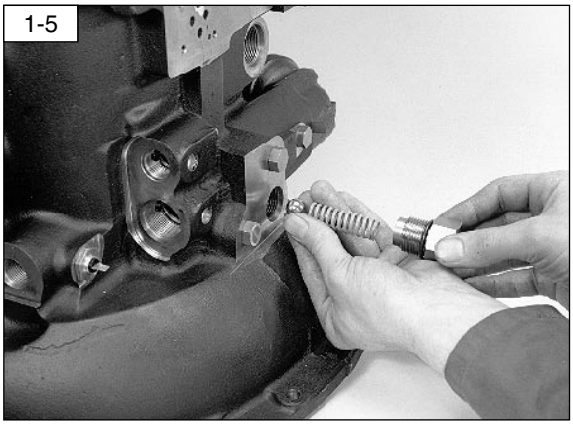
Remove the Converter Relief Valve.

1-4



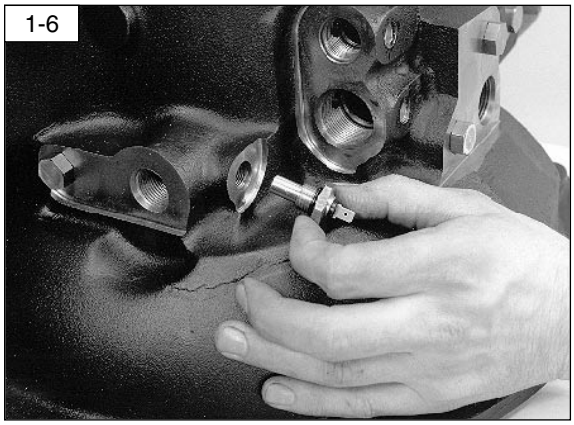
Remove the Pressure Regulator Valve.

1-5



Remove the cold start housing, spring and ball

1-6

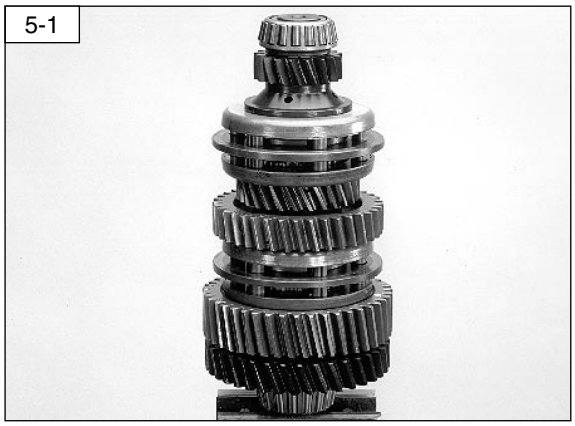


Remove the temperature sender.

5 - OUTPUT SHAFT DIS-ASSEMBLY AND RE-ASSEMBLY

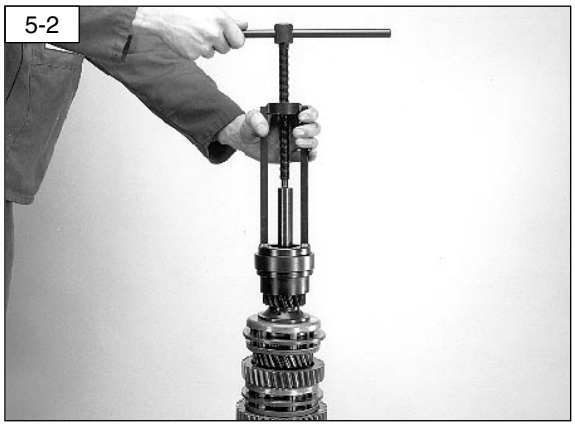
DIS-ASSEMBLY

5-1



Position the shaft assembly in a soft-jawed vice as shown.

5-2

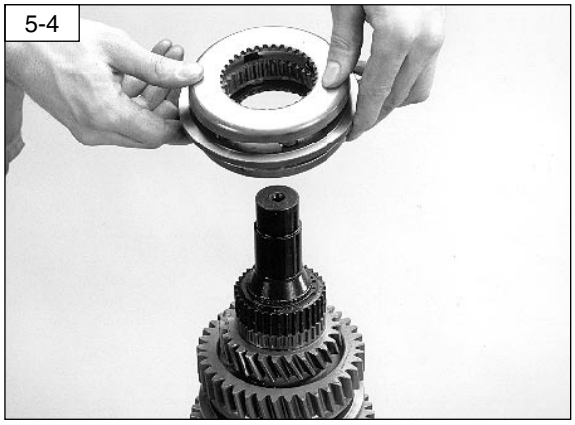


Using the appropriate bearing puller remove the front bearing.

5-3

Remove the thrust washer and 4th gear.

5-4

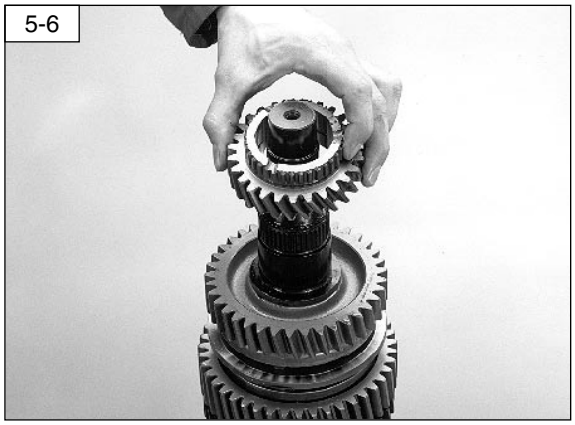


Remove the 3rd / 4th synchro assembly.

5-5

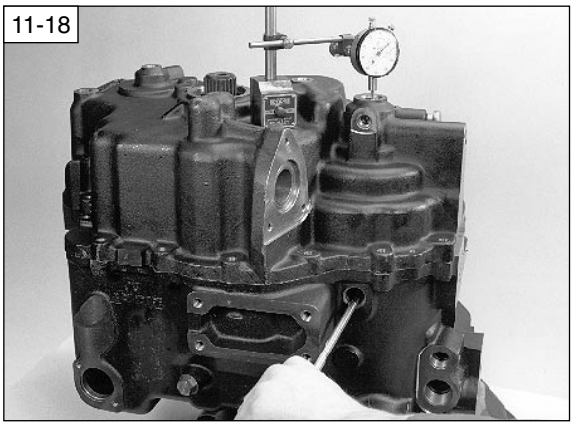
Remove the circlip and synchro hub.

5-6



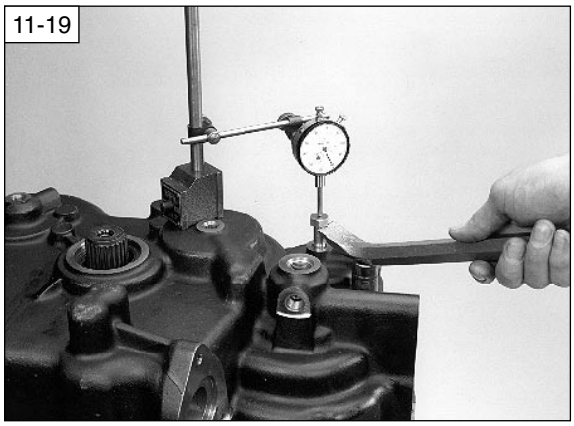
Remove the 3rd gear.

11-18



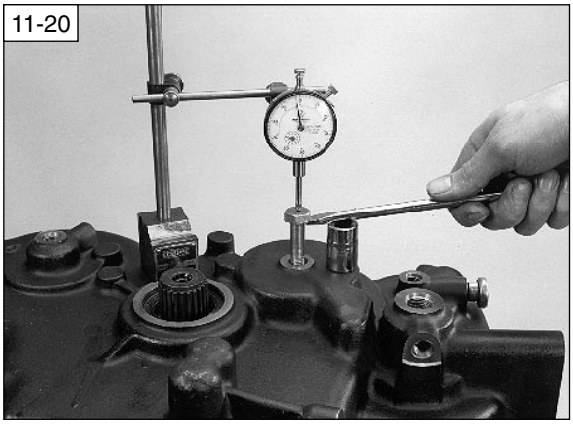
Position a D.T.I. on the end of the input shaft as shown, and using a suitable pry bar through the side access hole, measure and note the shaft end float.

11-19



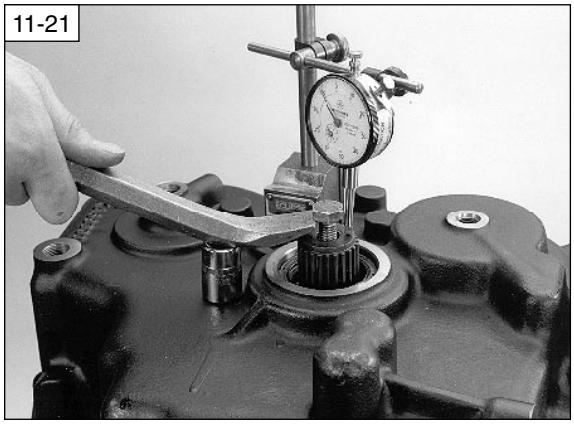
Attach a suitable shimming tool, (with a 12mm thread), to the end of the reverse idler shaft. Position a D.T.I. as shown, and using a pry bar lift the shaft, then measure and note the end float.

11-20



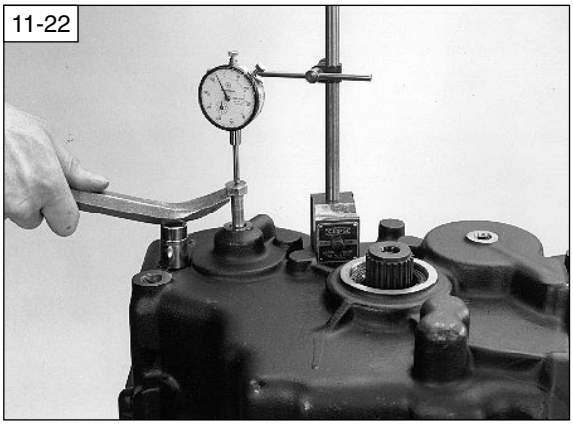
Attach a suitable shimming tool, (with a 12mm thread), to the end of the countershaft. Position a D.T.I. as shown, and using a pry bar lift the shaft, then measure and note the end float .

11-21



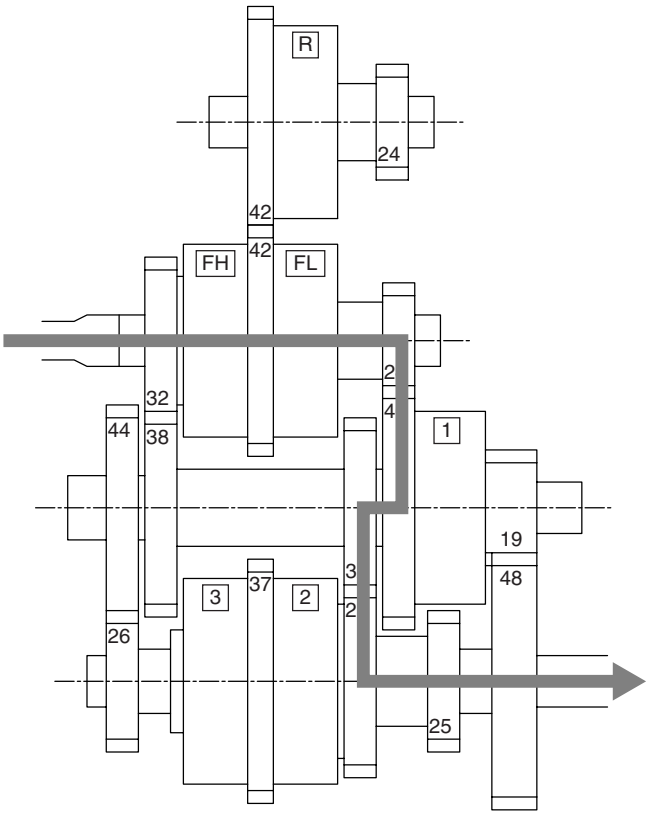
Attach a suitable shimming tool, (with a 12 mm thread), to the end of the output shaft. Position a D.T.I. as shown, and using a pry bar lift the shaft, then measure and note the end float.

11-22

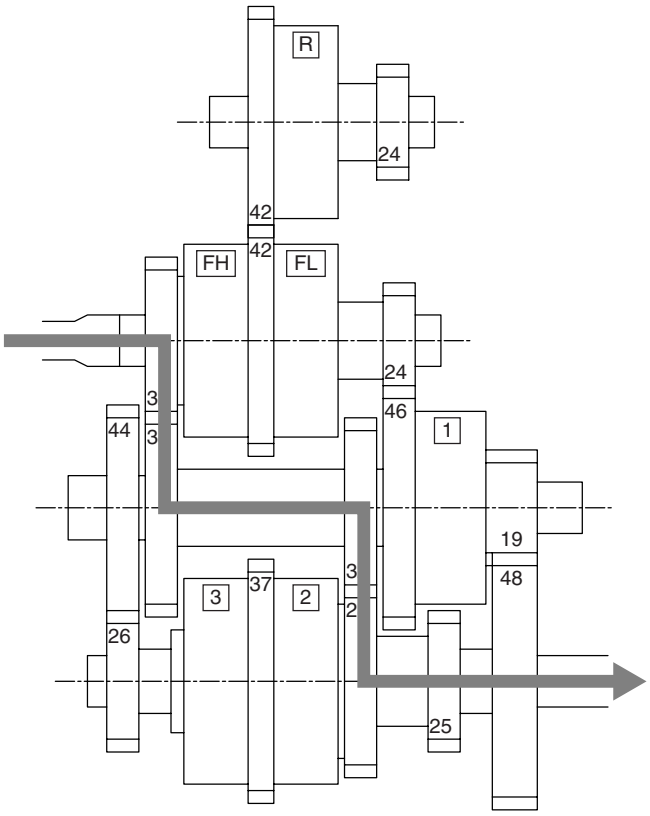


4WD VERSION : Attach a suitable shimming tool, (with a 12mm thread), to the end of the 4 wheel drive shaft. Position a D.T.I. as shown, and using a pry bar lift the shaft, then measure and note the end float.

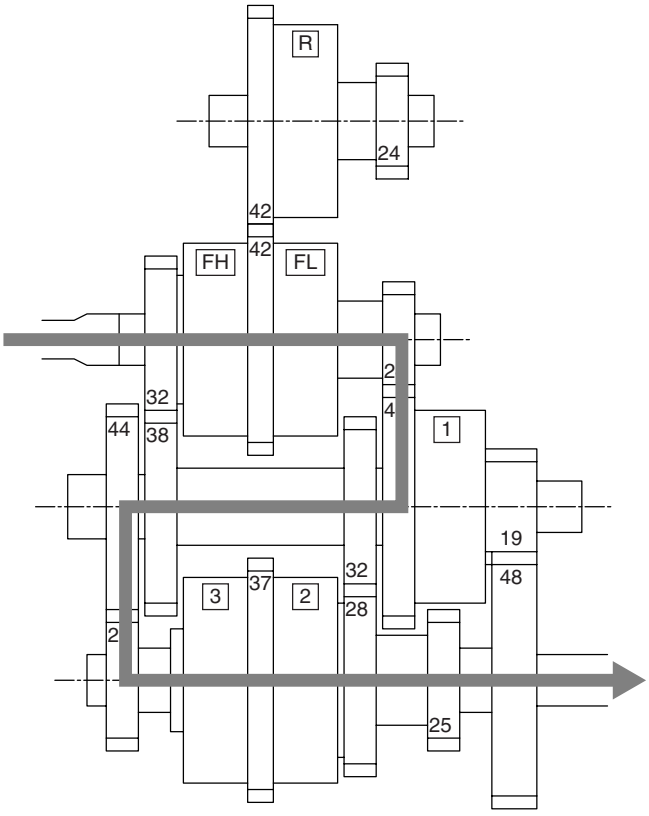
Remove the rear case and add or remove shims as necessary to give .001" to .003" end float on all shafts.
Repeat steps 11.17 to 11.22 until all shaft end floats are correct.



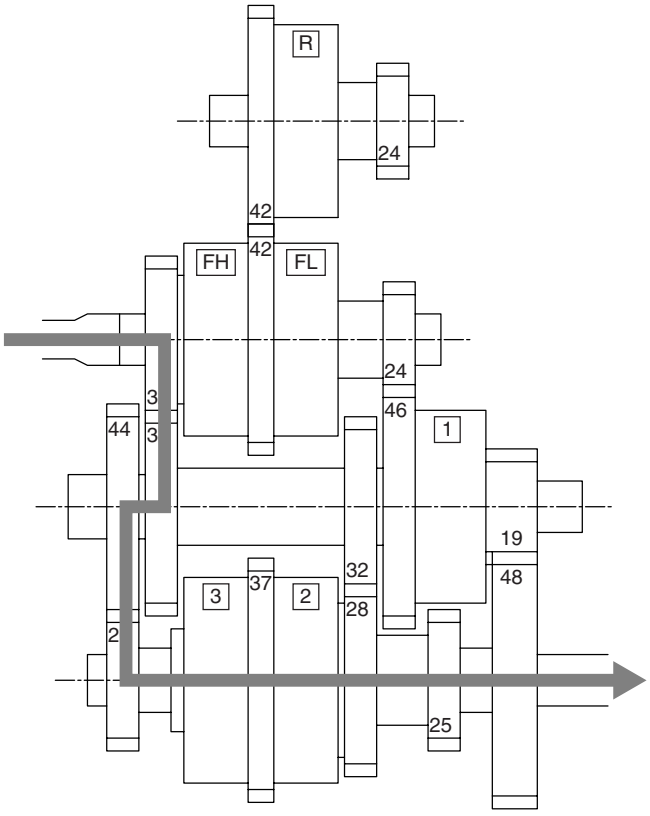
3rd GEAR FORWARDS



4th GEAR FORWARDS



5th GEAR FORWARDS

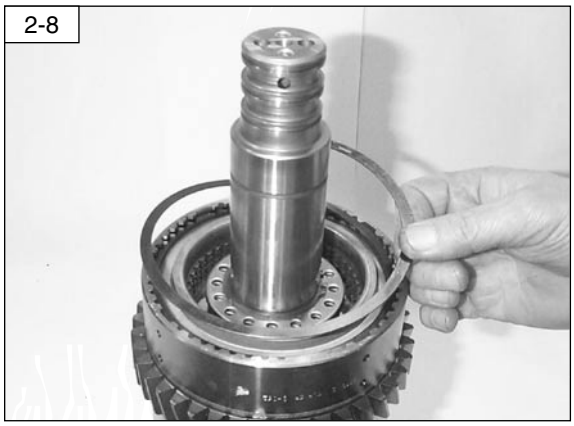


6th GEAR FORWARDS

2-7

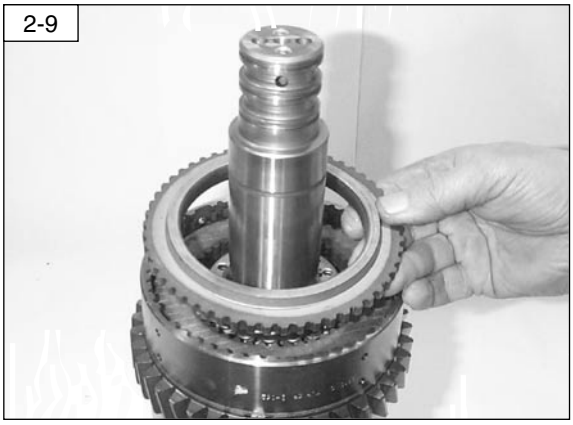
Remove the needle bearing and thrust washer.

2-8



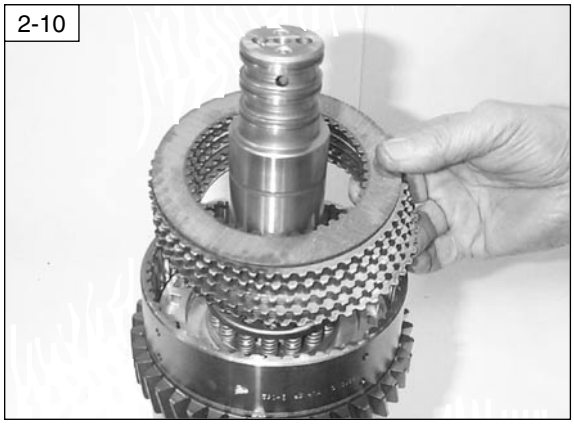
Remove the clutch pack spirol retaining ring.

2-9



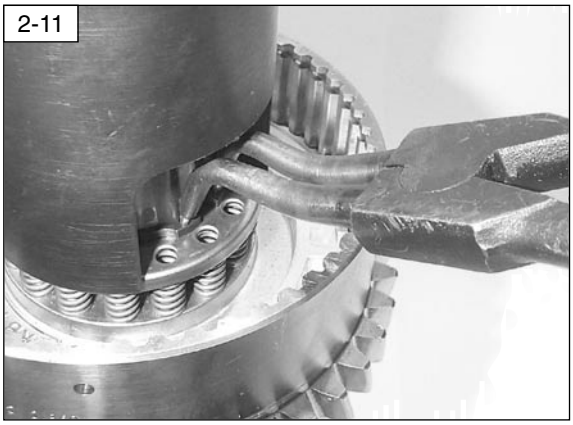
Remove the clutch pack retaining plate.

2-10



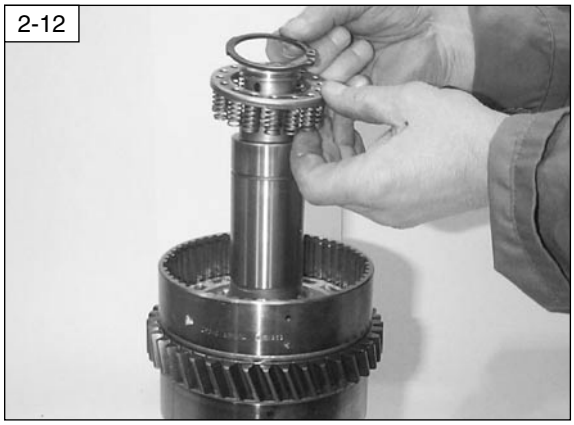
Remove the clutch pack.

2-11



Using the appropriate tool compress the piston spring pack and release the circlip.
(Tool No. 600746)

2-12



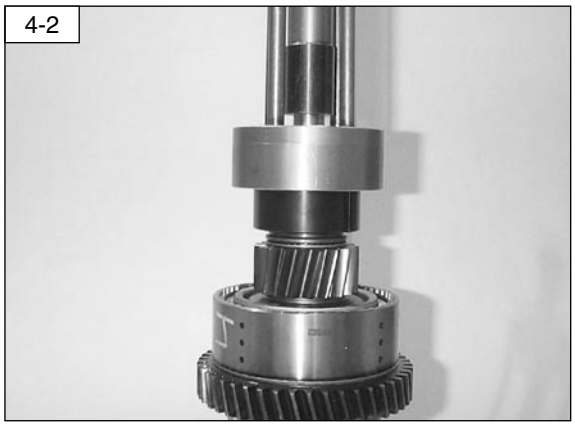
Remove the circlip and spring pack assembly.

4 - DISASSEMBLY AND RE-ASSEMBLY OF THE COUNTERSHAFT (Includes Speed Clutch 1 pack)

4-1

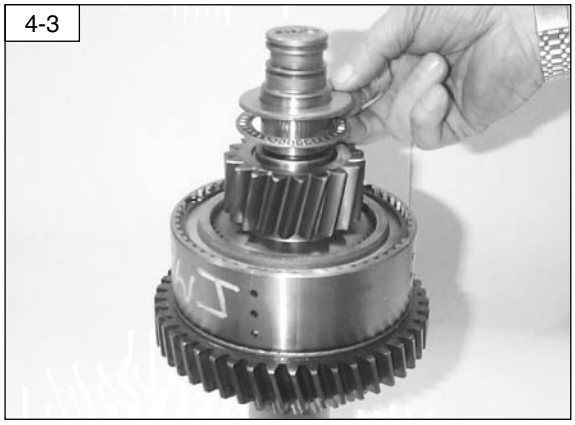
Position the shaft in a soft jawed vice as shown and remove and discard the 2 sealing rings.

4-2



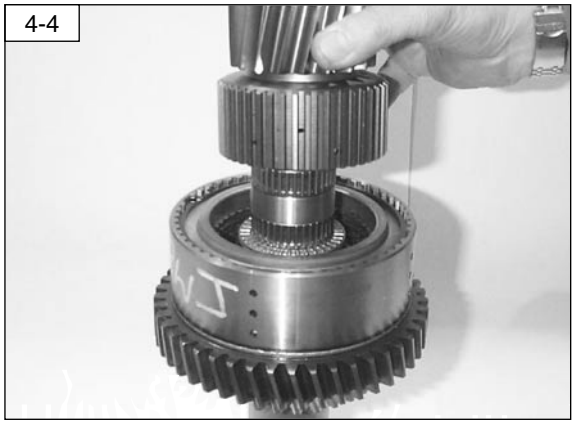
Using the appropriate bearing puller remove the rear bearing.
(Tool No. 563392)

4-3



Remove the thrust washer and needle bearing.

4-4



Remove the Speed Clutch 1 primary gear.

4-5

Remove the two bearings and spacer.

4-6

Remove the needle bearing and thrust washer.

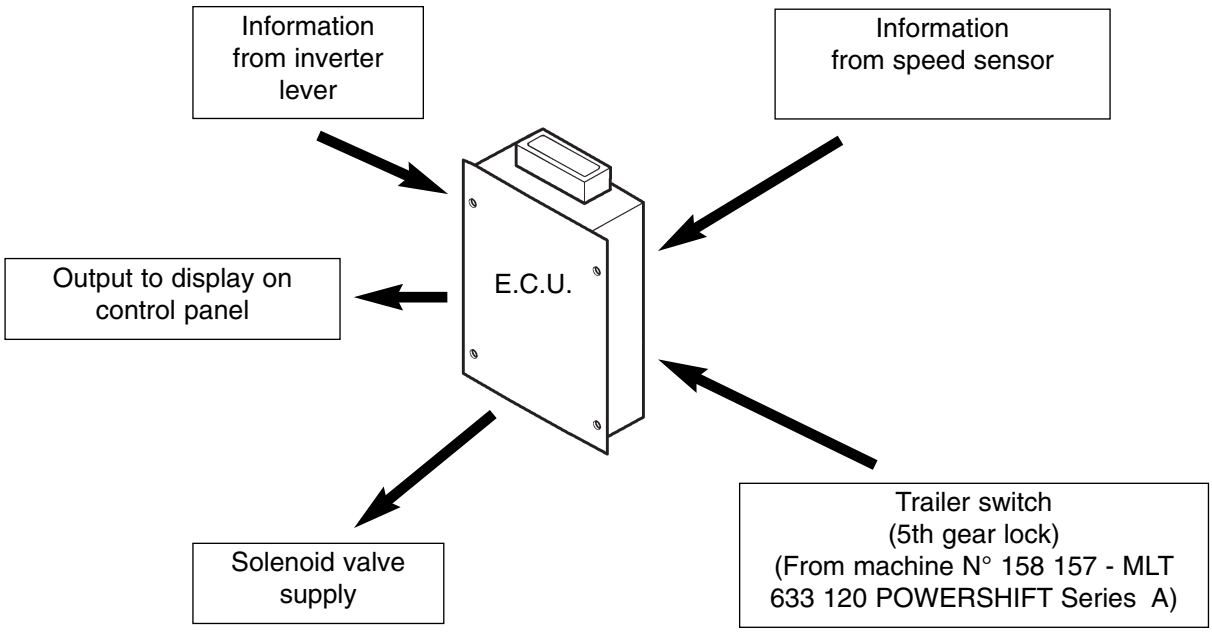
ELECTRICITY

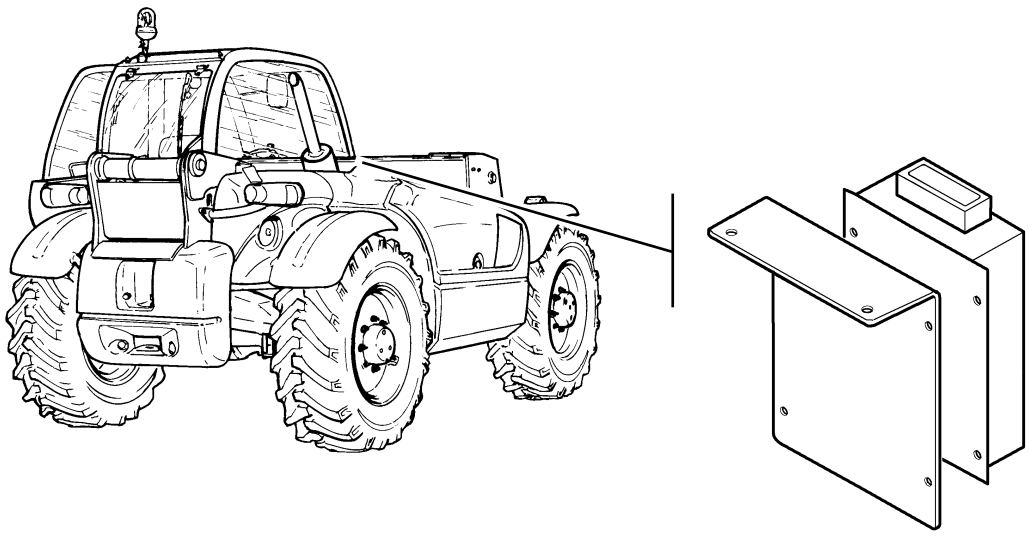
A - E.C.U.

The E.C.U (Electronic Control Unit) controls the transmission.
It controls several gearbox functions:

- gear changes
- kickdown function
- diagnostics on the harness to the solenoid valves
- diagnostics of inputs.

E.C.U operating process :





BEVEL GEAR MAINTENANCE

RECOMMENDED LUBRICANTS

Oil used by MANITOU

Oil MANITOU Mechanical transmission for axles and box SAE 80W90

Capacity

2.5 l

For good lubrication and a good operating temperature, it is very important to use an specified oil and to maintain the correct lever.

Oil replacing

It is recommended to change the oil in the following working periods :

After first 50 hours services.

Every 800 hours max.

Many factors having an influence on the oil changing require to increase the oil changing frequency.

Oil level

The level must be checked with the oil gauge dipstick, the oil must be located between both mini. and maxi marks.

* Do not fill above the maxi. level , then this could lead to an increase in temperature, because of the oil splash lubrication by the drive gears (emulsion and destruction of oil). This could also provoke outer leaks.

The purpose of drains is also to eliminate metallic particles of intern components, these metallic particles being the result of normal use.

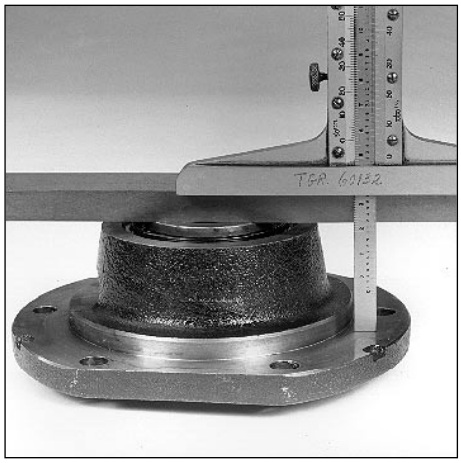
- 32 -

INPUT SHAFT REASSEMBLY

- Using suitable sized tubes, refit the bearing cups into the input shaft housing.

- 33 -

- Refit the inner bearing cone.



- 34 -

- Using suitable equipment measure the distance from the input housing mounting face to the rear of the inner bearing.
  Measurement A :

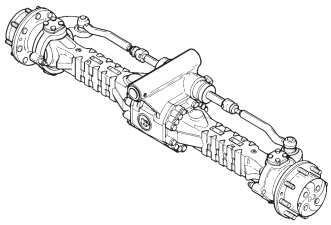
- 35 -

- Using a suitable press refit the input gear to the shaft taking care to correctly align the woodruff key with the keyway.

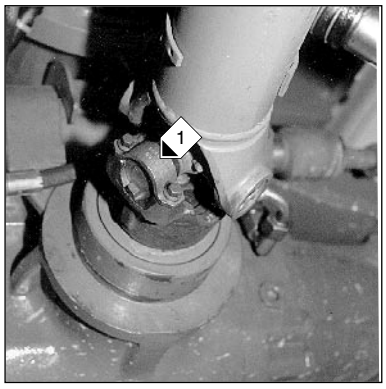
GROUP 30

AXLE ASSEMBLY

REMOVAL OF THE REAR AXLE WITH INTEGRATED ARTICULATION



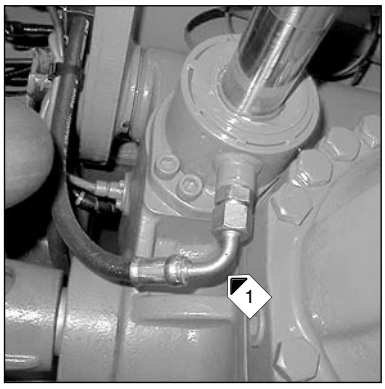
- Place the lift truck on level ground, with the parking brake applied, and the gear reverser and gear lever in neutral.
- Immobilize the lift truck and lower the arm.



1

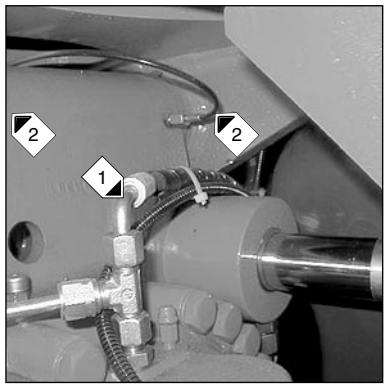
DISASSEMBLE THE REAR AXLE ASSEMBLY UNIVERSAL JOINT

- Disassemble the two universal joint collars 1 on either side of the universal joint.



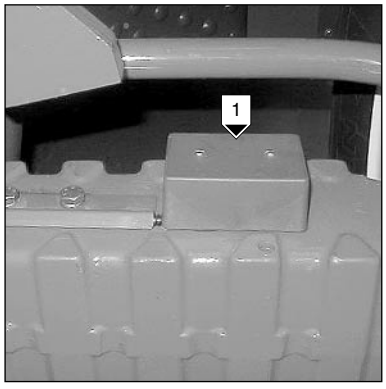
2

- Disconnect the two steering cylinder hoses 1.
- Seal the hoses and connectors.



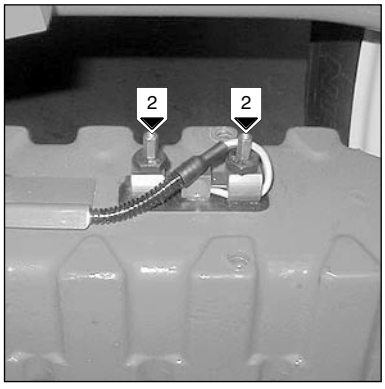
3

- Disconnect the brake fluid feed hose 1.
- Seal the hose and the connector
- Disengage the hose from the top of the rear axle assembly.
- Disconnect the two lubrication hoses 2.



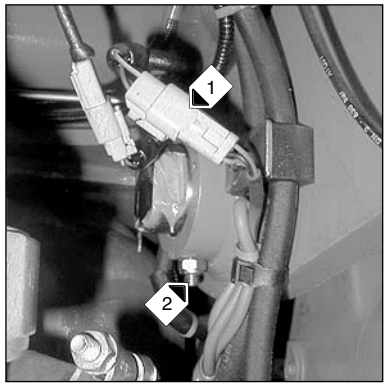
4

- Disassemble the strain gauge cover 1.



5

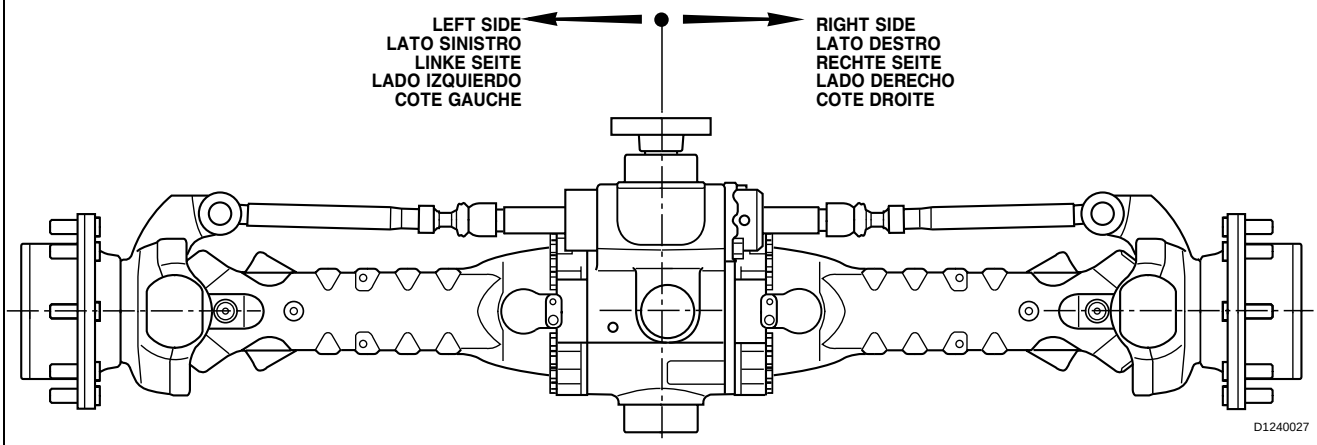
- Remove the two mounting screws 2.
- Disengage the strain gauge and fasten it so as to avoid shocks.



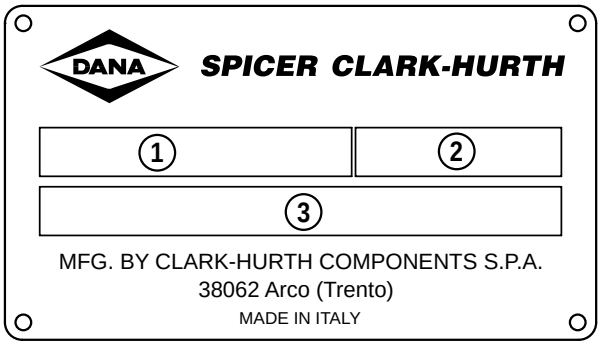
6

- Disconnect the wheel alignment sensor bundle 1.
- Remove the oscillation axle mounting screw 2 on the rear axle assembly bracket.

DEFINITION OF VIEWPOINTS - DEFINIZIONE VISTE - DEFINITION DER ANSICHTEN - DEFINICION VISTAS - DÉFINITION VUES



DATA PLATE - TARGA MATRICOLA - KENNUMMERNSCHILD - MATRICULA - PLAQUE D'IMMATRICULATION

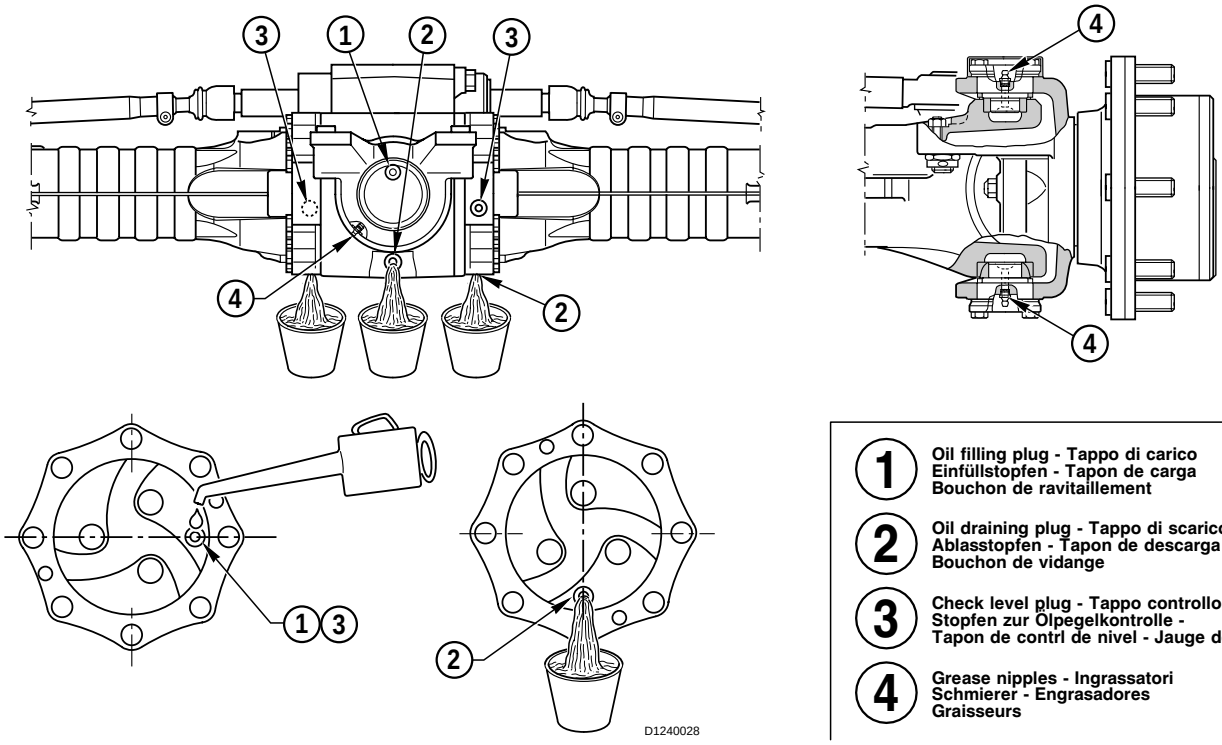


1 Type and model unit - modification index
Tipo e modello gruppo - indice di modifica
Typ und Modelleles Antriebes - Änderungsverzeichnis
Tipo y modelo grupo - indice de modificacion
Type et modéle de ensemble - tableau des modifications

2 Serial number
Numero di serie
Seriennummer
Número de serie
Numero de serie

3 Lubricant
Lubrificante
Schmieroel
Lubricante
Lubrificant

MAINTENANCE POINTS - PUNTI DI MANUTENZIONE - WARTUNGSSTELLEN - PUNTOS DE MANUTENCION - POINTS D'ENTRETIEN

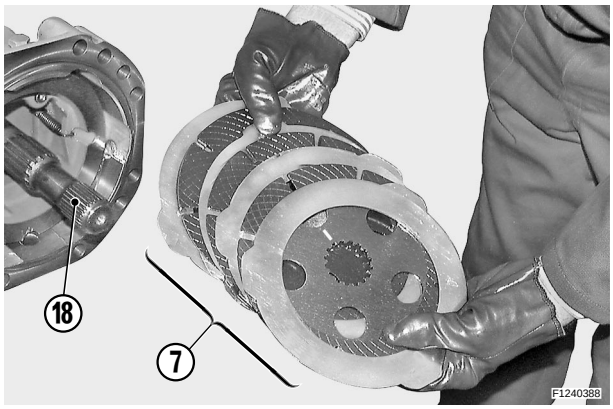


1 Oil filling plug - Tappo di carico
Einfüllstopfen - Tapon de carga
Bouchon de ravitaillement

2 Oil draining plug - Tappo di scarico
Ablasstopfen - Tapon de descarga
Bouchon de vidange

3 Check level plug - Tappo controllo livello
Stopfen zur Ölpegelkontrolle -
Tapon de contrl de nivel - Jauge de niveau

4 Grease nipples - Ingrassatori
Schmierer - Engrasadores
Graisseurs

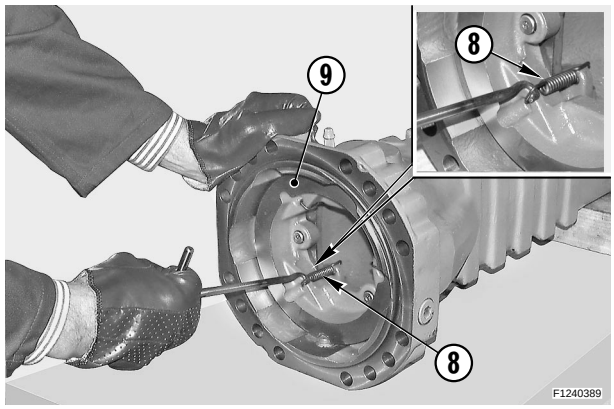


GB a

Remove the braking disks (7) and note down their order of assembly.

NOTE. 1 - If the disks do not need replacing, avoid switching their position.

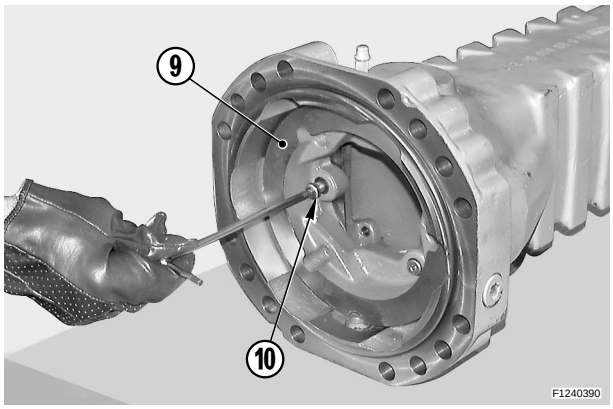
2 - Extract the u-joint (18).



GB b

Remove the reversal springs (8) from the piston (9).

NOTE. If the springs (8) are weak or deformed they must be replaced.

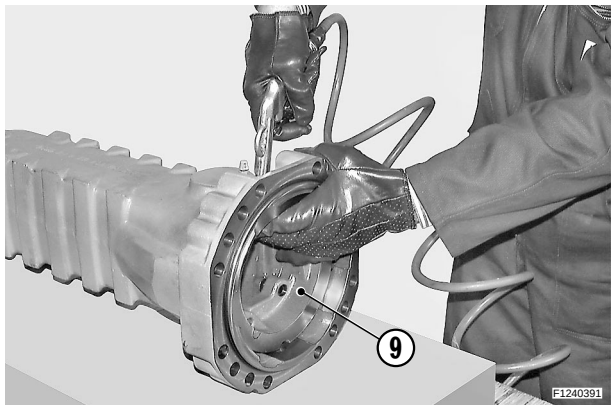


GB c

Remove the pin screws (10) guiding the piston (9).

CAUTION! If the screws are to be replaced, note down the different colours for the different brake gap.

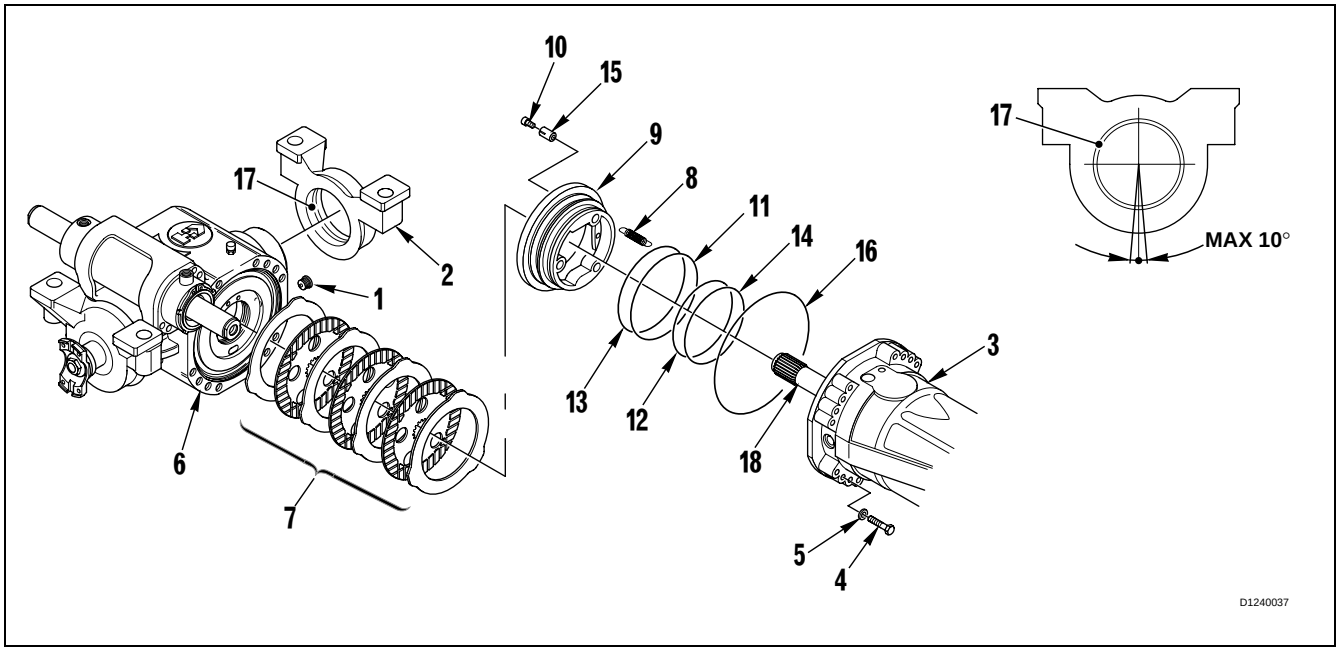
(See «HOW TO ASSEMBLE THE BRAKING UNITS»)



GB d

Slowly introduce compressed air through the connection of the braking circuit in order to extract the entire piston.

CAUTION! Hold on to the piston as it may be suddenly ejected and damaged.



a

ITA Lubrificare il terminale del doppio giunto cardanico (25) e montare il gruppo scatola snodo (1).
Prestare molta attenzione per non danneggiare gli anelli parapolvere e di tenuta.

D Das Endstuèck der Doppelgelenkwelle schmieren und das Gelenkgehaéuse-Aggregat (1) montieren.
Vorsicht: Staubschutzringe und Dichtungsringe nicht beschaédigen.

ESP Lubricar el terminal del semieje y montar el grupo caja de ròtula (1).
Tener mucho cuidado a fin de no danàr los segmentos de protecciòn.

F Lubrifier l'extrémité de joint de cardan double , puis monter le groupe du boõtier articulation (1).
Faire très attention à ne pas abòmer les bagues anti-poussiére et d'étanchéitè .

b

ITA Preparare una serie di spessori da 0,85 mm (3) da montare sotto il perno superiore (4).

D Eine Reihe von Unterlegscheiben 0,85 mm (3) zur Montage unter den oberen Bolzen (4) vorbereiten.

ESP Preparar una serie de espesores (3) de 0,85 mm para poner debajo del perno superior (4).

F Preparer un jeu de cales (3) 0,85 mm puor les monter sous le tourillon superieur (4).

c

ITA Montare sul perno (4) di fulcro snodo superiore una nuova guarnizione (3), lubrificare e montare il gruppo nella scatola snodo. Montare le viti (8) e serrarle a 140Nm.Controllare il senso di montaggio della guarnizione(3).

D Auf den Zentrierstift (4) des oberen Gelenks eine neue Dichtung 3) montieren, schmieren und das Aggregat in das Gelenkgehaèuse montieren. Die Schrauben (8) anbringen und zuschrauben 140Nm.

ESP Montar en el perno (4) de centro de la ròtula superior una junta nueva (3), lubricar y montar el grupo en la ròtula. Montar los tornillos (8) y apretarlos 140Nm.
Controlar el sentido de montaje de la guarniciòn.

F Monter sur le tourillon (4) du point d'appui articulation supèrieur, une garniture neuve (3), lubrifier et monter le groupe dans boõtier articulation. Monter les vis (8) et serrer 140Nm.
Contròler le sens de montage de la garniture.

d

ITA Lubrificare e montare il gruppo nella scatola snodo.

D Schmieren und das Aggregat in das Gelenkgeheause montieren.

ESP Lubricar y montar el grupo en la cja de la rotula.

F Lubrifier et monter le groupe dans boitier articulation.

e

ITA Montare il gruppo (19) nella scatola snodo (1). Montare le viti (15) e serrarle leggermente.
Controllare il senso di montaggio della guarnizione (10).

D Schmieren und das Aggregat (19)
in das Gelenkgehaéuse (1) montieren. Die Schrauben (15) anbringen und leicht zuschrauben.
Montagerichtung der Dichtungen (10) kontrollieren.

ESP Lubricar y montar el grupo (19) en la ròtula (1).
Montar los tornillos (15) y apretarlos ligeramente.
Controlar el sentido de montaje de la guarniciòn (10).

F Lubrifier et monter le groupe (19) dans boõtier articulation (1). Monter les vis (15) et serrer légérement.
Contròler le sens de montage de la garniture (10).

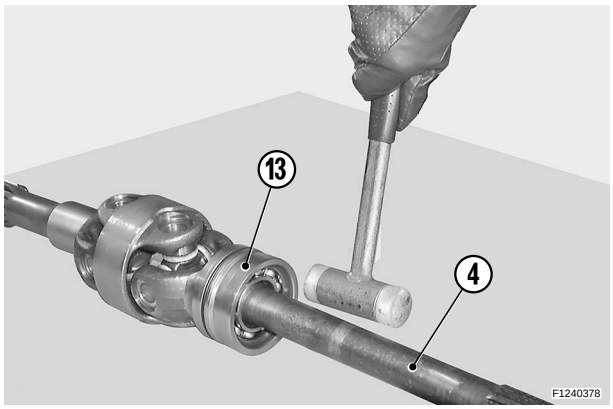
f

ITA Serrare in sequenza con il metodo incrociato, le nuove viti (15) di ritegno dei perni snodo inferiore e superiore.
Coppia di serraggio: 140 Nm

D Entgegengesetzt und abwechselnd die Schrauben (15) der unteren und oberen Gelenkstiften festschrauben.
Anzugsmoment: 140 Nm

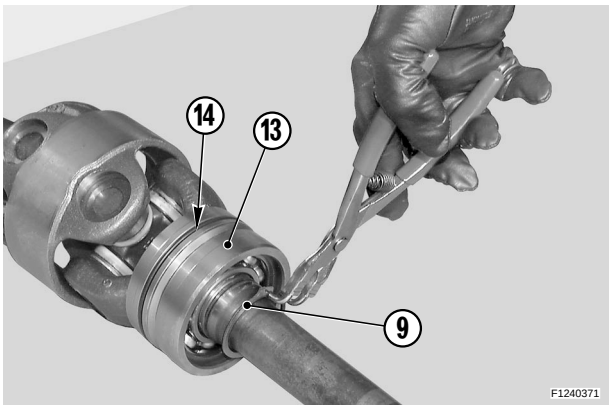
ESP Apretar en secuencia con el método cruzado, los tornillos (15) de retenciòn de las ròtulas inferior y superior.
Par de torsiòn: 140 Nm

F Serrer dans l'ordre, par le biais du mode croisè , les vis (15) de fixation des tourillons d'articulation inférieur et supérieur.
Couple de serrage: 140 Nm



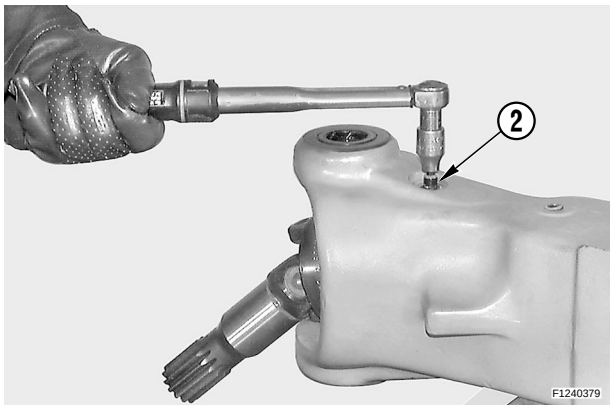
GB a

Heat the bearing in oil at an approx. temperature of 100°C and fit the entire bush (13) on the u-joint (4).



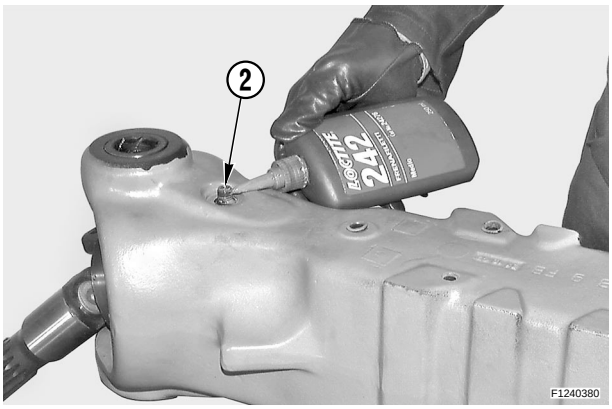
GB b

Fit the check ring (9) on the bushing unit (13); also put the O-ring (14) into position.



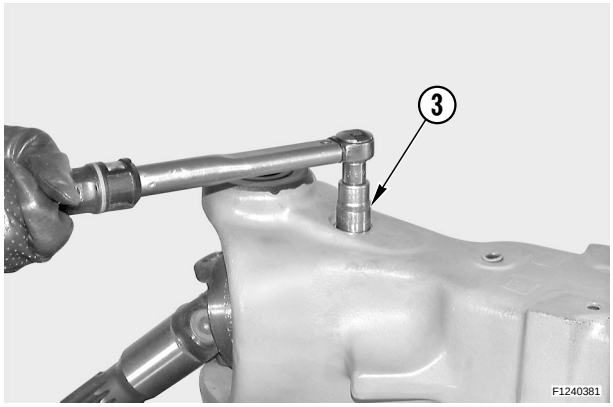
GB c

Insert the u-joint and tighten the top and bottom dowels (2).
Torque wrench setting: Max. 15 Nm.
NOTE. For u-joint coming with a bush, centre the point of the check dowels in the slot.



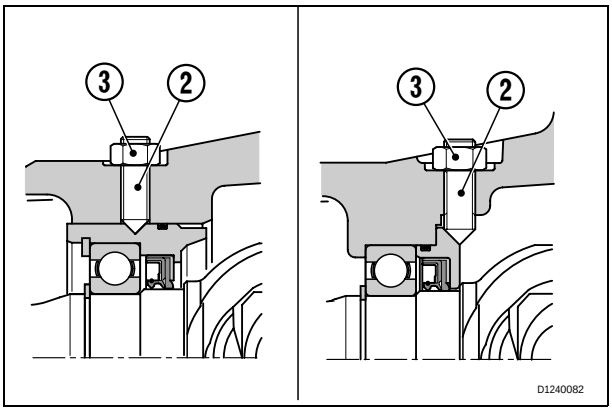
GB d

Apply Loctite 242 to the jutting parts of the dowels (2).



GB e

Screw the check nuts (3) of the dowels (2) and lock them using a dynamometric wrench.
Torque wrench setting: 122 Nm



a

ITA Lubrificare la bronzina (18) e la sede della scatola snodo (3).
Utilizzando l'attrezzo **T7** montare la bronzina (18).

D Das Bronzelager (18) und das Gelenkgehäuse (3) schmieren.
Mit einem Werkzeug **T7** das Bronzelager (18) montieren.

ESP Lubricar la chumacera (18) y el alojamiento de la caja de la rótula (3).
Montar la chumacera (18) utilizando la herramienta **T7**.

F Lubrifier le coussinet (18) et le logement du boîtier articulation (3).
A l'aide de l'outil **T7** monter le coussinet (18).

b

ITA Lubrificare la superficie esterna dell'anello di tenuta (17) e dell'anello centratore (16); montarli in sede utilizzando l'attrezzo **T8**.

D Die äußere Fläche des Kolbenringes (17) und des Zentrierringes (16) schmieren; die beiden Ringe mit einem Werkzeug **T8** montieren.

ESP Lubricar la superficie exterior del segmento de compresión (17) y del anillo de centraje (16); montarlos en un alojamiento utilizando la herramienta **T8**.

F Lubrifier la surface externe de la bague d'étanchéité (17), et de l'anneau de centrage (16), puis monter ceux-ci dans leur logement à l'aide de l'outil **T8**.

c

ITA Posizionare sotto la pressa la parte inferiore dell'attrezzo **T9A** e la ralla del cuscinetto esterno (8).

D Unter einer Presse den unteren Teil des Werkzeugs **T9A** und die Scheibe des äußeren Lagers (8) positionieren.

ESP Posicionar debajo de la prensa la parte inferior de la herramienta **T9A** y la rangua del cojinete exterior (8).

F Placer sous la presse la partie inférieure de l'outil **T9A** et la crapaudine du palier externe (8).

d

ITA Lubrificare le sedi dei cuscinetti e posizionare sull'attrezzo **T9A** il mozzo portaruota (7); posizionare la ralla del cuscinetto interno (15).
NOTA. Controllare l'orientamento della ralla.

D Die Lagersitze schmieren und am Werkzeug **T9A** die Radhalternabe (7) positionieren; die Scheibe des inneren Lagers (15) positionieren.
BEMERKUNG. Die Position der Scheibe beachten.

ESP Lubricar los alojamientos de los cojinetes y posicionar en la herramienta **T9A** el cubo portarruedas (7); posicionar la rangua del cojinete interior (15).
NOTA. Controlar la orientación de la rangua.

F Lubrifier le logement des paliers et placer sur l'outil **T9A** le moyeu porte-roue (7); placer la crapaudine du palier interne (15).
NOTE. Contrôler les sens de la crapaudine.

e

ITA Posizionare la parte superiore dell'attrezzo **T9B** e pressare a fondo le ralle nel mozzo portaruota (7).

D Das obere Teil des Werkzeugs **T9B** positionieren und die Scheiben in die Radhalternabe (7) fest eindrücken.

ESP Posicionar la parte superior de la herramienta **T9B** y presionar a fondo las ranguas en el cubo portarruedas (7).

F Placer la partie supérieure de l'outil **T9B**, puis presser à fond les crapaudines du moyeu porte-roue (7).

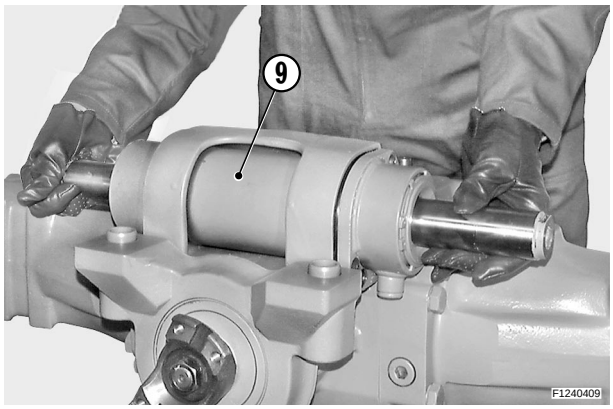
f

ITA Montare il cuscinetto (15) nella ralla interna.

D Lager (15) in die innere Scheibe montieren.

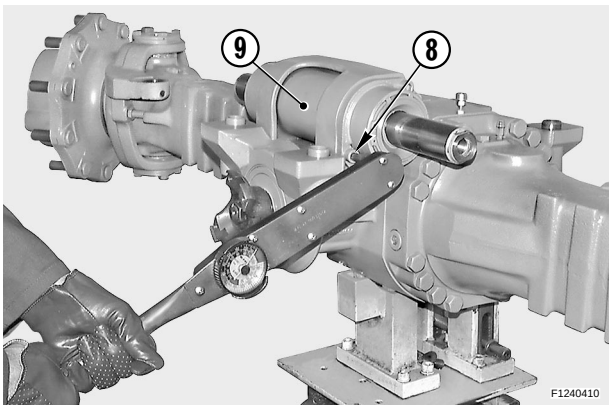
ESP Montar el cojinete (15) en la rangua interior.

F Monter le palier (15) dans la crapaudine interne.



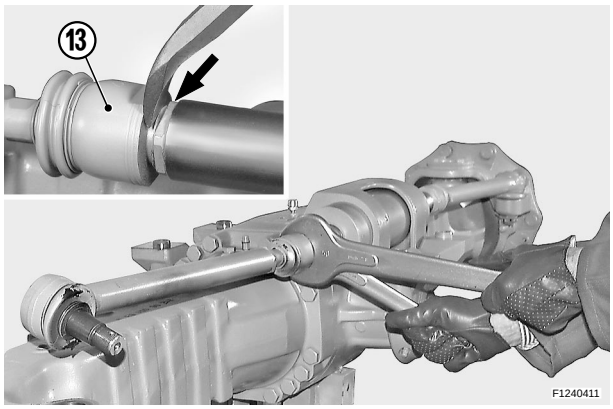
GB a

Check that the O-rings (15) of the axle unit are in good condition; lubricate the seats of the seals (15) and fit the steering cylinder (9) into its seat.



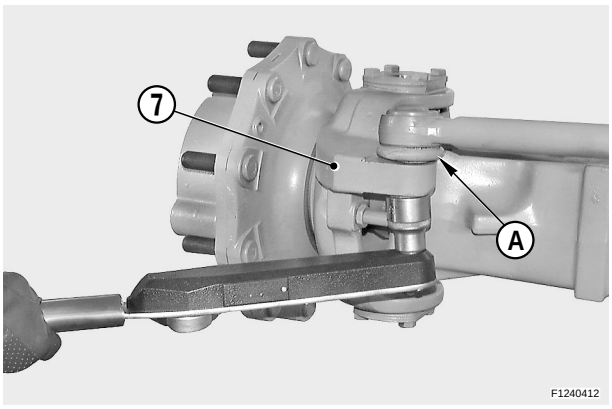
GB b

Lock the cylinder by cross- tightening the screws (8).
Torque wrench setting: 116–128 Nm



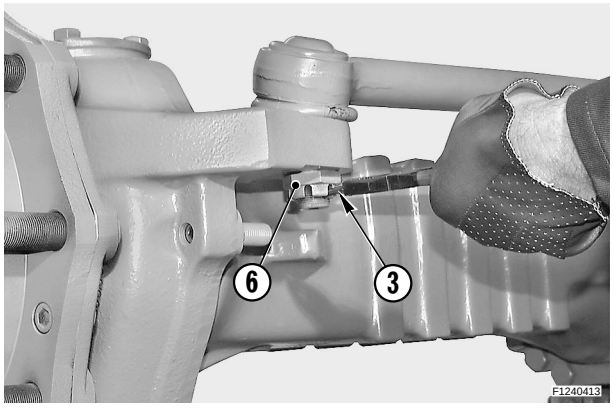
GB c

Apply Loctite 242 to the thread and connect the steering bars by screwing the terminals onto the piston stem.
Torque wrench setting: 240–270 Nm
NOTE. Versions with coupling require that the rim of the articulation (13) is riveted onto the surfaces of the piston stem.



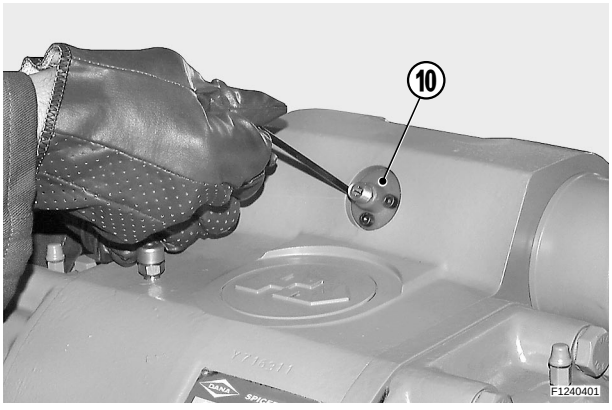
GB d

Insert the pins (4) in the steering case (7) and lock into position using a torque wrench setting of 260–290 Nm.
Find the position of the notching in relation to the hole of the cotter pins and tighten the nut (6) further.
CAUTION! Check that rubber guards (**A**) are intact.



GB e

Insert the cotter pins (3) and bend the safety stems.
CAUTION! Use new cotter pins.



GB f

Install the proximity (1) for checking piston centring - if applicable - and tighten the screws (10).
Torque wrench setting: 5–6 Nm

a

ITA Lubrificare con grasso ed installare nel cilindro (3) l'anello di tenuta (6) dello stelo, l'anello antiestrusione (7) e l'anello raschiatore (8).

ATTENZIONE! Controllare attentamente il posizionamento dell'anello antiestrusione (7).

D Mit Fett die Dichtung (6) des Schaftes, den Haltering (7) und den Abschaber (8) schmieren und in den Zylinder (3) montieren.

ACHTUNG! Sorgfältig die Position des Halterings (7) kontrollieren.

ESP Lubricar con grasa e instalar en el cilindro (3) el segmento de compresión (6) del vástago, el anillo antiextrusión (7) y el anillo raspador (8).

CUIDADO! Controlar atentamente el posicionamiento del anillo antiextrusión (7).

F Lubrifier avec du gras et installer dans le cylindre (3) la bague d'étanchéité (6) de la tige, l'anneau anti-extrusion (7) et l'anneau racleur (8).

ATTENTION! Contrôler attentivement le positionnement de l'anneau anti-extrusion (7).

b

ITA Lubrificare con grasso ed installare nella testata (2) l'anello di tenuta (6) dello stelo, l'anello antiestrusione (7) e l'anello raschiatore (8).

ATTENZIONE! Controllare attentamente il posizionamento dell'anello antiestrusione (7).

D Mit Fett die Dichtung (6) des Schaftes, den Haltering (7) und den Abschaber (8) schmieren und in den Kopf (2) montieren.

ACHTUNG! Sorgfältig die Position des Halterings (7) kontrollieren.

ESP Lubricar con grasa e instalar en la culata (2) el segmento de compresión (6), el anillo antiextrusión (7) y el anillo raspador (8).

CUIDADO! Controlar atentamente el posicionamiento del anillo antiextrusión (7).

F Lubrifier avec du gras et installer dans le cylindre (2) la bague d'étanchéité (6) de la tige, l'anneau anti-extrusion (7) et l'anneau racleur (8).

ATTENTION! Contrôler attentivement le positionnement de l'anneau anti-extrusion (7).

c

ITA Montare all'esterno della testata (2) la guarnizione (9).
ATTENZIONE!
1 - Per facilitare il montaggio, lubrificare con grasso la superficie esterna del pistone.
2 - Non arrotolare la guarnizione (9).

D Außen am Kopf (2) die Dichtung (9) montieren.
ACHTUNG!
1 - Um die Montage zu erleichtern, die äußere Kolbenfläche mit Fett schmieren.
2 - Die Dichtung (9) nicht wickeln.

ESP Montar fuera de la culata (2) la junta (9).
CUIDADO!
1 - Para facilitar el montaje, lubricar con grasa la superficie exterior del pistón.
2 - No enrollar la junta (9).

F Monter à l'extérieur de la culasse (2) la garniture (9).
ATTENTION!
1 - Pour rendre plus aisé le montage, lubrifier avec du gras la surface externe du piston.
2 - Ne pas enrouler les garnitures (9).

d

ITA Preparare il pistone (5) montando l'anello di guida (10), l'anello magnetico (11), l'OR (12) e la guarnizione (13).

ATTENZIONE! 1 - Per facilitare il montaggio, lubrificare con grasso.
2 - Se non è previsto il sensore di centratura, l'anello magnetico (11) è sostituito con un secondo anello di guida (10).

D Den Kolben (5) mit dem Führungsring (10), dem magnetischen Ring (11), den O-Ring (12) und der Dichtung (13) vorbereiten.

ACHTUNG! 1 - Um die Montage zu erleichtern, mit Fett schmieren.
2 - Wenn kein Zentrierungssensor vorgesehen ist, ist der magnetische Ring (11) mit einem zweiten Führungsring (10) ersetzt.

ESP Preparar el pistón (5) montando el anillo de guía (10), el anillo de imán (11), el OR (12) y la junta (13).
CUIDADO!1 - Para facilitar el montaje, lubricar con grasa.
2 - Si no ha sido previsto el sensor de centraje, el anillo de imán (11) es sustituido por un segundo anillo de guía (10).

F Préparer le piston (5) en montant l'anneau de guidage (10), l'anneau magnétique (11), la OR (12) et la garniture (13).

ATTENTION! 1 - Pour rendre plus aisé le montage, lubrifier avec du gras. 2 - Si le capteur de centrage n'est pas prévu, l'anneau magnétique (11) est remplacé par un second anneau de guidage (10).

e

ITA Applicare l'attrezzo **T18** sullo stelo lato opposto testata (2) e centrarlo nel cilindro (3) fino ad imboccare il pistone (5).

NOTA. Lubrificare leggermente con grasso le guarnizioni ed il cilindro.

D Das Werkzeug **T18** auf den Schaft an der dem Kopf (2) entgegengesetzten Seite anbringen und auf den Zylinder (3) zentrieren, bis es auf dem Kolben (5) sitzt.

BEMERKUNG. Die Dichtungen und den Zylinder leicht mit Fett schmieren.

ESP Aplicar la herramienta **T18** sobre el vastago lado opuesto culata (2) y centrarlo en el cilindro (3) hasta entrar en el piston. (5).

NOTA. Lubrificar ligermente con grasa las juntas y el cilindro.

F Appliquer l'outil **T18** sur la tige du côté opposé à la culasse (2) et centrer celui-ci dans le cylindre (3) jusqu'à engager le piston (5).

NOTE. Lubrifier légèrement les garnitures et le cylindre avec du gras.

f

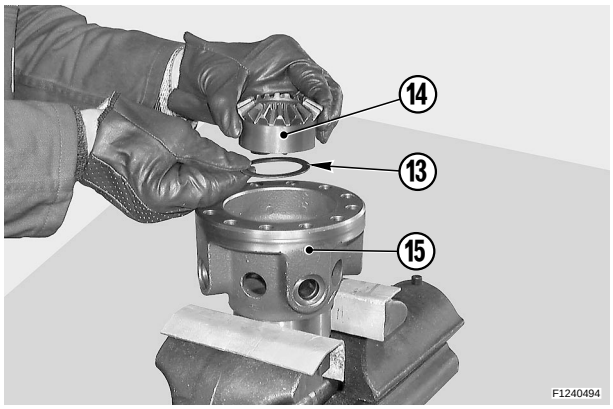
ITA Con un mazzuolo in materiale plastico, inserire il pistone (5) nel cilindro per circa 100 mm.

D Mit einem Gummihammer, den Kolben (5) in den Zylinder 100 mm lang schlagen.

ESP Con un martillo de material plástico, introducir el pistón (5) en el cilindro unos 100 mm.

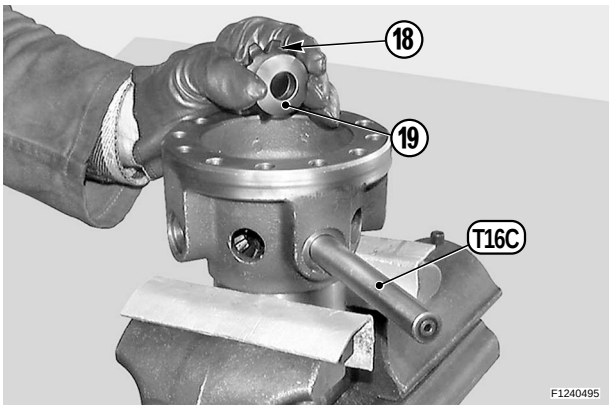
F A l'aide d'un maillet en matière plastique, introduire le piston (5) d'environ 100 mm dans le cylindre.

ASSEMBLING - ASSEMBLAGGIO - MONTIEREN - MONTAJE - MONTAGE



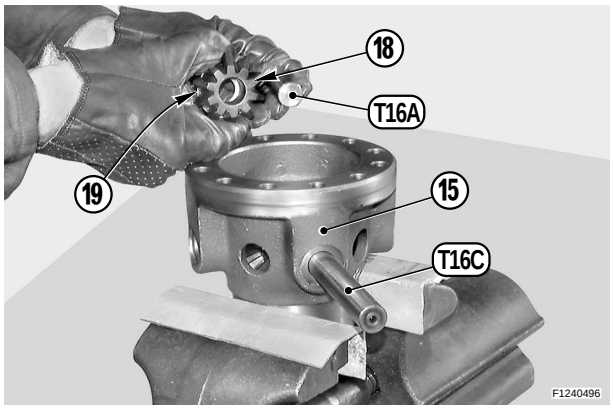
GB a

Insert the shim washer (13) and the planetary gear (14) in the differential carrier (15).



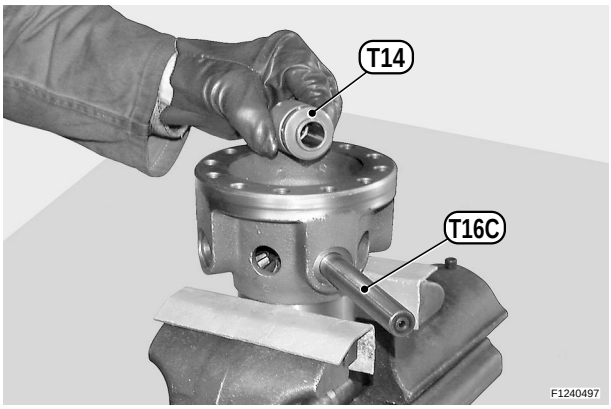
GB b

Position the shim washer (19) and the first planet wheel gear (18). Hold them in position using bar **T16C**.



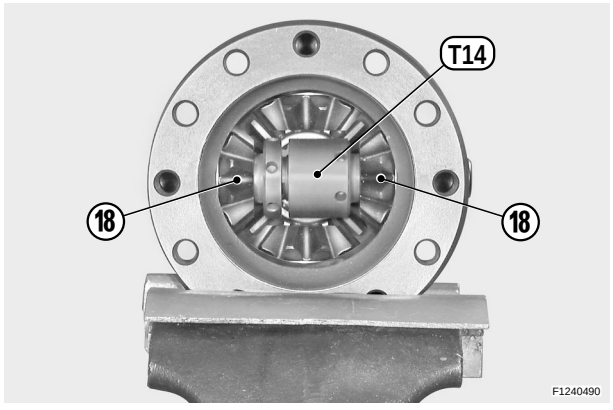
GB c

With the help of gudgeon **T16A**, position the second planet wheel gear (18) and the relative shim washer (19).



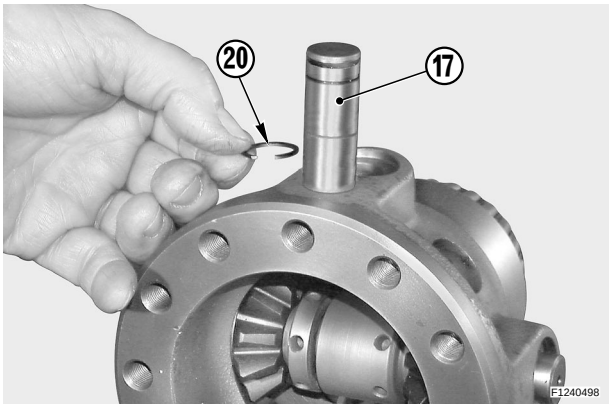
GB d

Insert tool **T14** between the two planetary gears (18). Line up the entire unit by pushing bar **T16C** all the way down until gudgeon **T16A** is ejected.



GB e

Lock tool **T14** behind the planet wheel gears (18).
After locking, remove bar **T16C**.



GB f

Fit the snap rings (20) onto the pins (17).

a

ITA Rimuovere i bracci completi ed il differenziale.
Per i dettagli, vedere «CONTROLLO USURA E SOSTITUZIONE DISCHI FRENO» e «RIMOZIONE GRUPPO DIFFERENZIALE».

D Komplette Arme und Differential abnehmen.
Siehe «VERSCHLEISS KONTROLLIEREN UND BREMSSCHEIBEN AUSWECHSELN» und «DIFFERENTIALAGGREGAT ABMONTIEREN».

ESP Remover los brazos completos y el diferencial.
Para los detalles véase «CONTROL DESGASTE Y SUSTITUCION DE LOS DISCOS DEL FRENO» y «REMOCION GRUPO DIFERENCIAL».

F Enlever complètement les bras complets et le différentiel.
Pour de plus amples détails, voir «CONTROLE USURE ET SUBSTITUTION DES DISQUES DE FREINAGE» et «DEPOSE DU GROUPE DIFFERENTIEL».

b

ITA Se lo smontaggio risulta faticoso, scaldare a circa 80°C il dado (1) di ritegno della flangia (2).
NOTA. Il riscaldamento ha lo scopo di allentare la presa del Loctite di bloccaggio del dado (1).

D Wenn das Abmontieren schwierig ist, die Mutter (1) zur Halterung des Flansches (2) auf ca. 80°C erwärmen.
BEMERKUNG. Durch das Erhitzen wird das Fett aufgeweicht, das die Mutter (1) blockiert.

ESP Si el desmontaje resulta difícil, calentar a unos 80°C la tuerca (1) de retención de la brida (2).
NOTA. El calentamiento tiene la finalidad de aflojar la adhesión del Loctite de bloqueo de la tuerca (1).

F Si démonter est difficile, chauffer l'écrou (1) de fixation de la flasque (2) à environ 80°C.
NOTE. Le chauffage à pour objet de ralentir la prise du Loctite de blocage de l'écrou (1).

c

ITA Applicare l'attrezzo **T20A** (oppure **T20B**) ed impegnarlo in modo da evitare la rotazione del pignone.
Allentare ed asportare il dado (1); asportare anche l'anello OR (3).

D Werkzeug **T20A** (**T20B**) so anbringen, daß das Rad nicht mehr drehen kann.
Mutter (1) lockern und abschrauben; O-Ring (3) ebenfalls abnehmen.

ESP Aplicar la herramienta **T20A** (**T20B**) y bloquearla a fin de evitar la rotación del piñón.
Aflojar y sacar la tuerca (1); sacar también el anillo OR (3).

F Appliquer l'outil **T20A** (ou **T20B**) engager ce dernier de manière à éviter la rotation du pignon.
Relâcher et enlever l'écrou (1) enlever également la garniture OR (3).

d

ITA Utilizzando un estrattore, rimuovere la flangia (2) completa della protezione (4).

D Mit einem Abzieher, Flansch (2) samt Schutzteil (4) abnehmen.

ESP Utilizando un extractor, remover la brida (2) completa con la protección (4).

F A l'aide d'un extracteur, enlever la flasque (2) complète de la protection (4).

e

ITA Rimuovere il supporto oscillante (5).

D Schwenkbare Halterung (5) entfernen.

ESP Remover el soporte oscilante (5).

F Enlever le support oscillant (5).

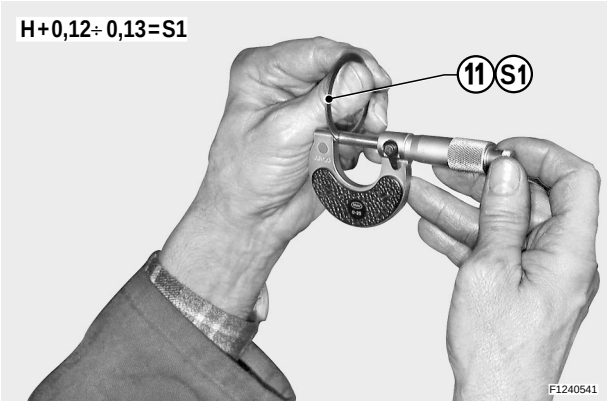
f

ITA Rimuovere l'anello di tenuta (6).

D Kolbenring (6) entfernen.

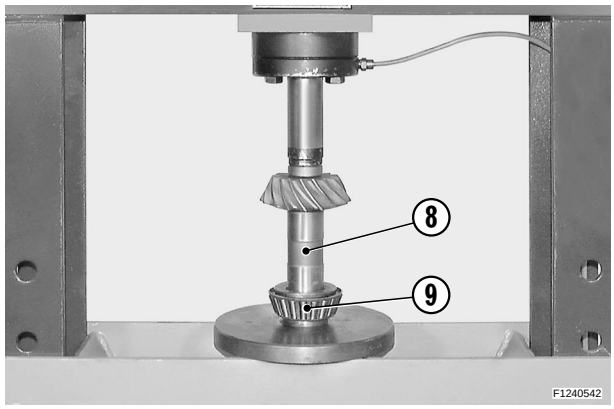
ESP Remover el segmento de compresión (6).

F Enlever la bague d'étanchéité (6).



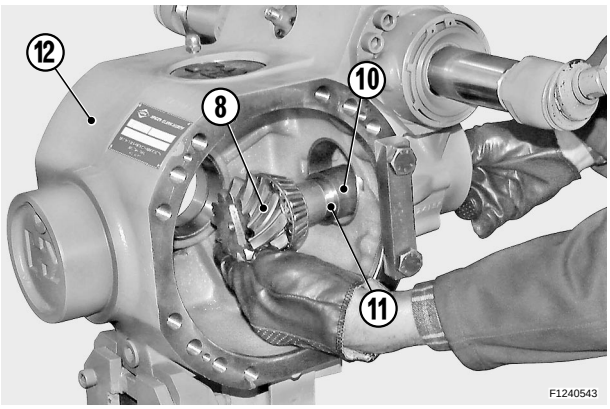
GB a

The variation is to be added to a set value of 0.12–0.13 mm., so as to obtain the size of shim "**S1**" (11) which will be inserted between the external bearing (13) and the distance piece (10) and subsequently, to determine the preload for the bearings.



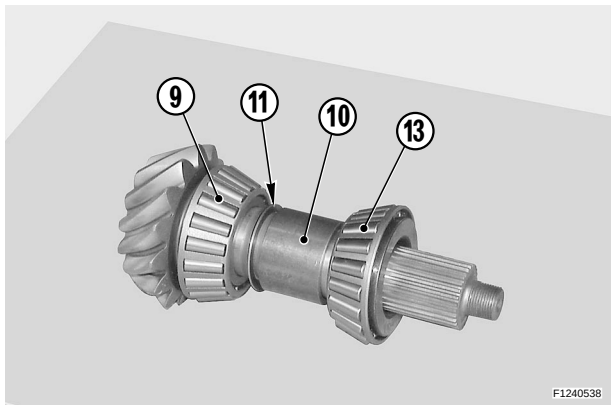
GB b

Position the internal bearing (9) and the pinion (8) under a press; force the bearing onto the pinion.



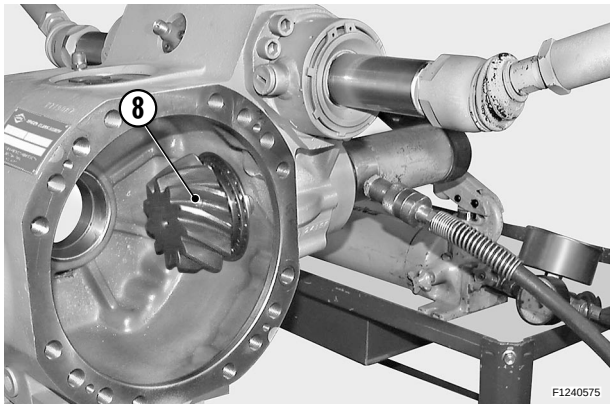
GB c

Fit the pinion (8), shim "**S1**" (11) and distance piece (10) in the main body (12).
NOTE. The finer shims must be placed in- between the thicker ones



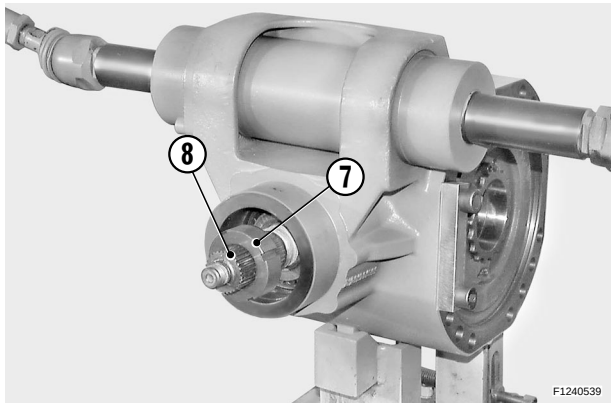
GB d

Insert the external bearing (13) in the central body in order to complete the pack arranged as in the figure.



GB e

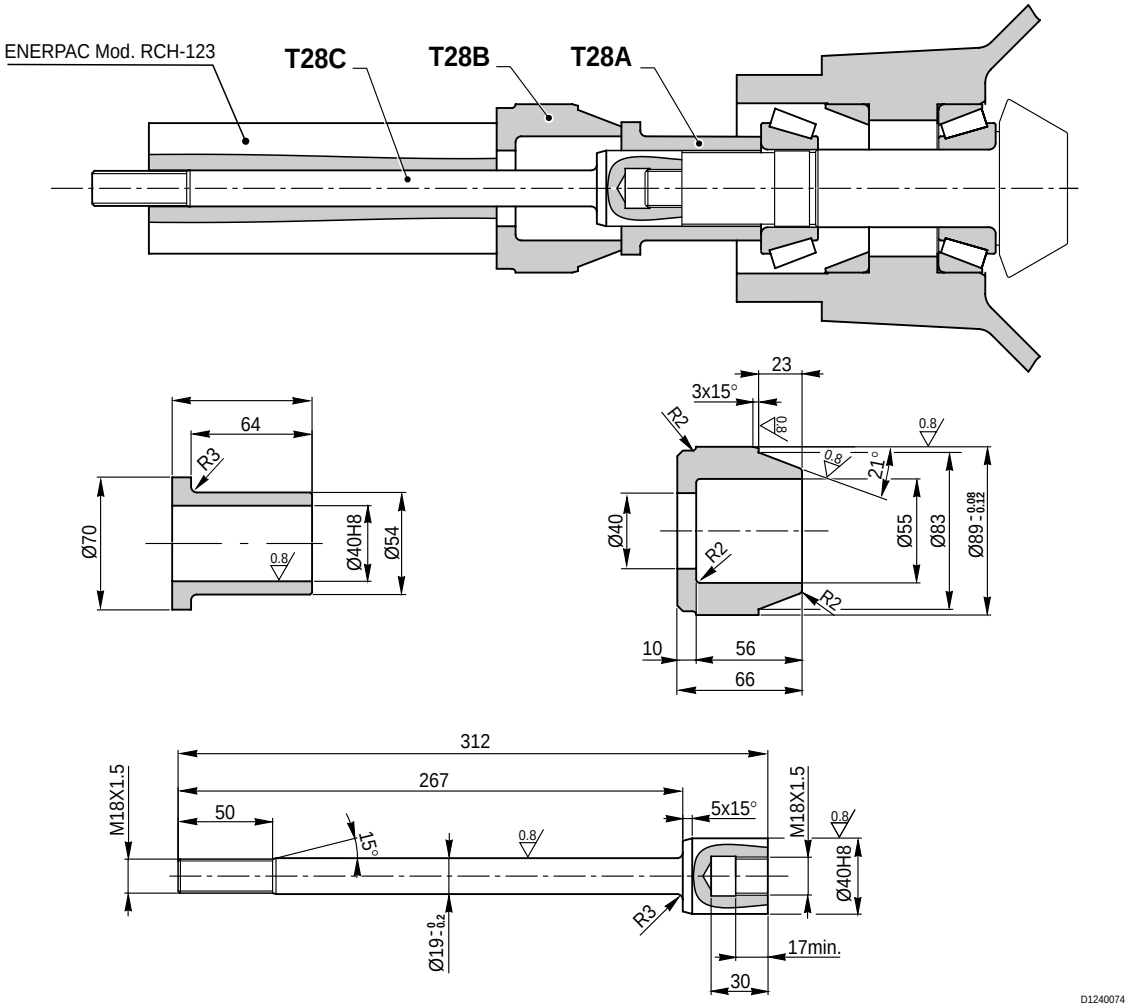
Connect the pinion (8) to the tie rod **T28A** and **T28B**; connect the tie rod **T28C** (see special tools) to the press and block.



GB f

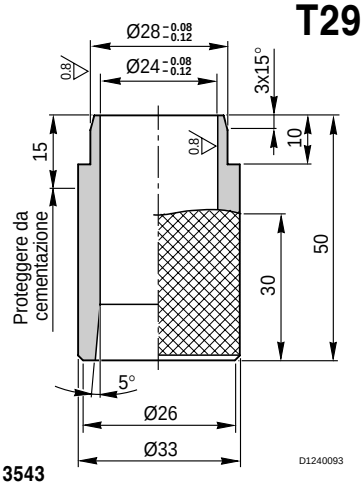
Apply Loctite 242 to the thread of the ring nut (7) and screw the nut onto the pinion (8).

T28



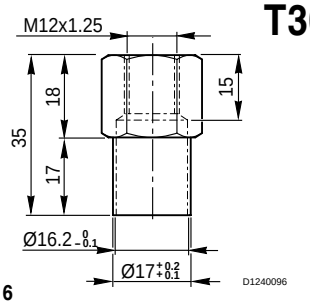
3329

T29



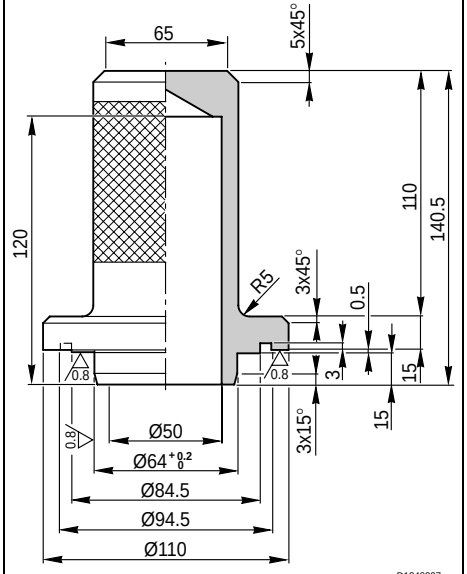
3543

T30



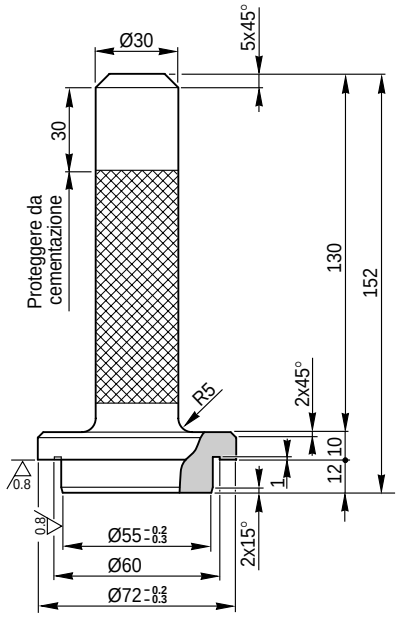
2316

T31



3739

T32



2317

INDEX - INDICE - INHALTSVERZEICHNIS - INDICE - INDEX

a

ITA Asportare dal corpo centrale assale (1) il gruppo differenziale (2) completo.
Per i dettagli, vedere «RIMOZIONE GRUPPO DIFFERENZIALE».

D Vom zentralen Achsenkörper (1) das vollständige Differentialaggregat (2) abnehmen.
Weitere Einzelheiten, siehe «DIFFERENTIALAGGREGAT ABNEHMEN».

ESP Sacar del cuerpo central axial (1) el grupo diferencial (2) completo.
Por los detalles, vease «REMOCION GRUPO DIFERENCIAL».

F Enlever le corps central essieu (1) le groupe différentiel (2) complet.
Pour tout détail, voir «DEPOSE DU GROUPE DIFFERENTIEL».

b

ITA Rimuovere le viti (3) di ritegno della corona (4).
NOTA. Annotare la posizione delle nicchie del foro centrale rispetto alle sporgenze dei dischi d'acciaio dei gruppi di frizione.

D Die Schrauben (3) zur Halterung des Kranzes (4) abnehmen.
BEMERKUNG. Die Position der Nischen des zentralen Lochs im Verhältnis zu den Stahlscheiben der Kupplungsaggregate anmerken.

ESP Remover los tornillos (3) de retenciòn de la corona (4).
NOTA. Anotar la colocaciòn de los nichos del agujero central respecto a las partes salientes de los discos de acero de los grupos de friciòn.

F Enlever les vis (3) de fixation de la couronne (4).
NOTE. Prendre note de la position des logements du trou central par rapport à la saillie des disques d'acier des groupes de friction.

c

ITA Se si deve sostituire, estrarre il cuscinetto (5); rimuovere la corona (4).

D Wenn es ausgewechselt werden muß, das Lager (5) heraus nehmen; Kranz (4) abnehmen.

ESP Si se debe de sobstituir, extraer el cojinete (5); remover la corona (4).

F Si on doit substituer, extraire le palier (5); enlever la couronne (4).

d

ITA Rimuovere l'ingranaggio planetario (6) ed il gruppo frizione (7) completo.

D Das Planetengetriebe (6) und das vollständige Kupplungsaggregat (7) abnehmen.

ESP Remover el engranaje planetario (6) y el grupo friciòn (7) completo.

F Enlever l'engrenage planétaire (6) et le groupe de friction (7) complet.

e

ITA Se si deve sostituire, estrarre il cuscinetto (8) dal corpo differenziale (9).

D Wenn es ausgewechselt werden muß, das Lager (8) vom Differentialkörper (9) heraus nehmen.

ESP Si se debe de sobstituir, extraer el cojinete (8) del cuerpo diferencial (9).

F Si on doit substituer, extraire le palier (8) du corps différentiel (9).

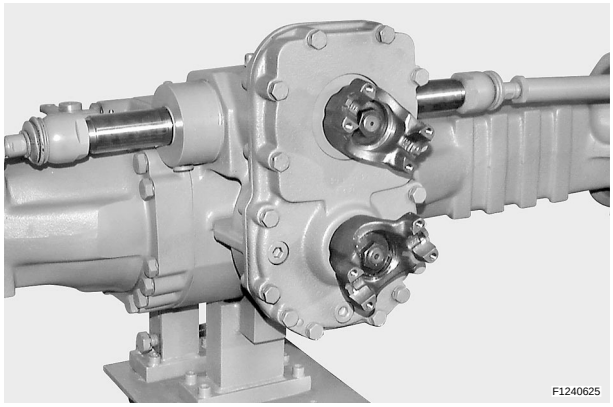
f

ITA Rimuovere gli anelli elastici (10) dai perni (11) degli ingranaggi satelliti (12).

D Die Kolbenringen (10) von den Stiften (11) der Planetengetriebe (12) abnehmen.

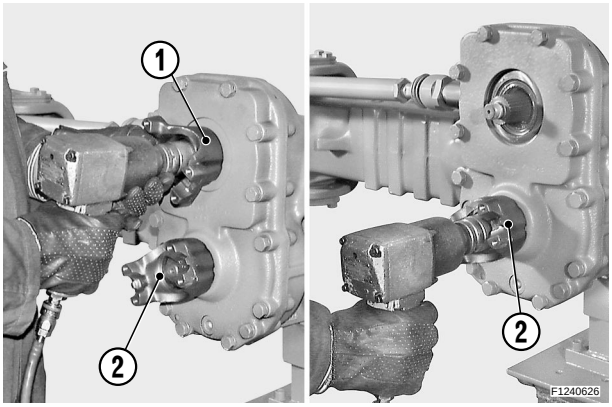
ESP Remover los segmentos elasticos (10) de los pernos (11) de los engranajes satelites (12).

F Enlever les anneaux à ressort (10) des axes (11) des engrenages satellites (12).



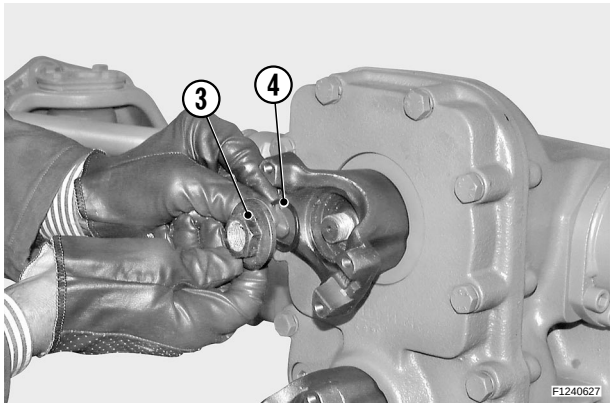
GB a

The figure shows the axle with incorporated reduction gear with Mechanic flanges; disassembly and assembly procedures also apply to DIN flanges.



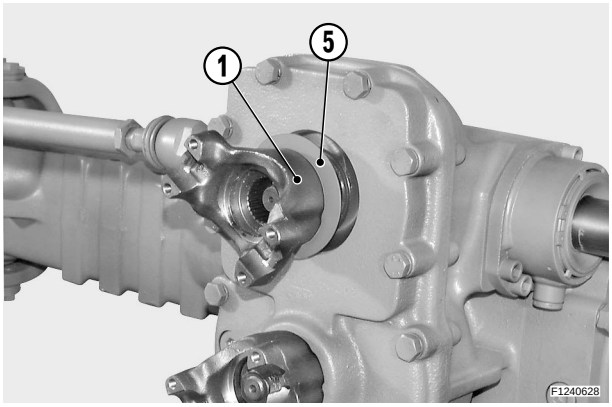
GB b

Unloose the check nuts on upper (1) and lower (2) flange.



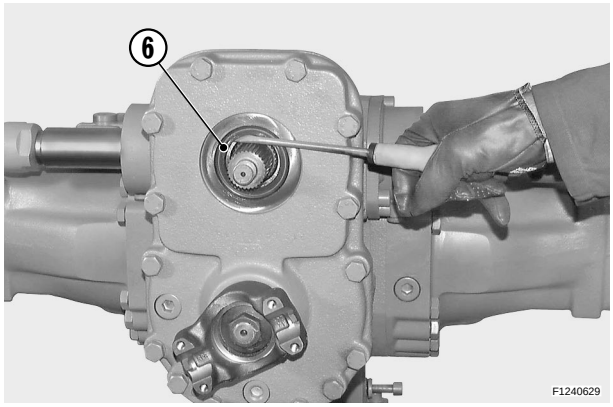
GB c

Draw out nuts (3) and O-rings (4).



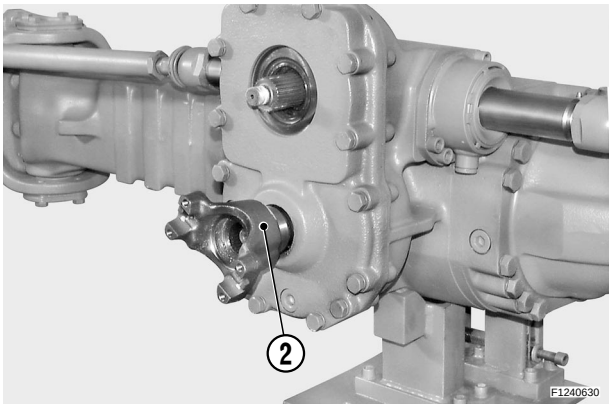
GB d

Remove the upper flange (2) together with dust ring (5).



GB e

Remove the snap ring (6) and discard it.



GB f

Remove the lower flange (2)

a

ITA Ricercare il valore degli spessori (23) e (24) ed inserire nel corpo riduttore (11) le ralle dei cuscinetti conici del pignone (Vedere «INSTALLAZIONE E REGISTRAZIONE PIGNONE CONICO»).
Utilizzando l'attrezzo **T7** inserire l'anello di tenuta (25) dopo averlo lubrificato con grasso.

D Die Größen der Unterlegscheiben (23) und (24) kontrollieren und in den Reduziererkörper (11) die Lagerscheiben des Rades einsetzen (Siehe «INSTALLATION UND EINSTELLUNG DES KEGELRADES»).
Mit Hilfe des Werkzeugs **T7** den zuvor eingefetteten Kolbenring (25) einsetzen.

ESP Buscar el valor de los espesores (23) y (24) y introducir en el cuerpo reductor (11) las ranguas de los cojinetes conicos del pinon (Vease «INSTALACION Y REGISTRACION PINON CONICO»).
Utilizando la herramienta **T7** introducir el segmento de compresion (25) despues de haberlo lubrificado con grasa.

F Chercher la valeur des cales (23) et (24), puis introduire dans le corps réducteur (11) les crapaudines des paliers coniques du pignon (voir «INSTALLATION ET REGLAGE DU PIGNON CONIQUE»).
A l'aide de l'outil **T7** introduire la bague d'étanchéité (25) après l'avoir lubrifiée avec du gras.

b

ITA Comporre il gruppo pignone come in figura, controllando che il distanziale (22) sia orientato correttamente.
NOTA. Lubrificare con grasso la superficie esterna del distanziale (22).

D Das Radaggregat wie in der Abbildung gezeigt zusammenbauen; dabei überprüfen ob das Distanzstück (22) auch richtig orientiert ist.
BEMERKUNG. Die äußere Fläche des Distanzstückes (22) mit Fett schmieren.

ESP Componer el grupo pinon como en figura, controlando que el distancial (22) sea orientado correctamente.
NOTA. Lubrificar con grasa la superficie exterior del distancial (22).

F Composer le groupe pignon comme sur la figure, contrôler si l'entretoise (22) est orientée correctement.
NOTE. Lubrifier avec du gras la surface externe de l'entretoise (22).

c

ITA Utilizzando gli attrezzi **T28C**, **T28D** e **T28B** collegati ad una pressa, inserire il gruppo pignone (20) completo.

D Mit Hilfe der an einer Presse angeschlossenen Werkzeuge **T28C**, **T28D** und **T28B**, das ganze Radaggregat (20) einsetzen.

ESP Utilizando las herramientas **T28C**, **T28D** y **T28B** conectar a un prensa, insertar el grupo pinon (20) completo.

F A l'aide des outils **T28C**, **T28D** et **T28B** reliés à une presse, introduire le groupe pignon (20) complet.

d

ITA Spalmare la filettatura del pignone con Loctite 242 ed avvitare la ghiera (19). Impegnare la chiave speciale **T30** sulla ghiera ed applicare il codolo **T29** sul pignone (20). Serrare la ghiera (19) con le modalità prescritte (Vedere «INSTALLAZIONE E REGISTRAZIONE PIGNONE CONICO») e controllare che la coppia di rotazione sia di 170÷220 Ncm.

D Radgewinde mit Loctite 242 schmieren und die Nutmutter (19) zuschrauben. Den Spezialschlüssel **T30** in die Nutmutter setzen und den Schaft **T29** auf das Rad (20) setzen. Nutmutter (19) laut Anweisungen fest ziehen (Siehe «INSTALLATION UND EINSTELLUNG DES KEGELRADES») und das Gegenmoment kontrollieren, das 170÷220 Ncm betragen muß.

ESP Pasar sobre la rosca del pinon Loctite 242 y entornillar la virola (19). Empenar la llave especial **T30** sobre la virola y aplicar el mango **T29** sobre el pinon (20). Apretar la virola (19) con las modalidades prescritas (Vease «INSTALACION Y REGISTRACION PINON CONICO») y controlar que el par de rotacion sea de 170÷220 Ncm.

F Enduire le filetage du pignon avec du Loctite 242 et visser l'anneau (19). Engager la clé spéciale **T30** sur l'anneau et appliquer l'embout **T29** sur le pignon (20). Serrer l'anneau (19) de la façon préconisée (voir «INSTALLATION ET REGLAGE DU PIGNON CONIQUE») et contrôler que le couple de rotation est de 170÷220 Ncm.

e

ITA Utilizzando una pressa, montare sull'ingranaggio superiore (12) i cuscinetti (14) ed il distanziale (16).
ATTENZIONE! Il distanziale (16) va posizionato tra il cuscinetto esterno e l'ingranaggio.

D Mit Hilfe einer Presse, die Lager (14) und das Distanzstück (16) auf das obere Zahnrad (12) montieren.
ACHTUNG! Das Distanzstück (16) muß zwischen dem äußeren Lager und das Zahnrad liegen.

ESP Utilizando una prensa, montar sobre el engranaje superior (12) los cojinetes (14) y el distancial (16).
CUIDADO. El distancial (16) viene colocado entre el cojinete exterior y el engranaje.

F A l'aide d'une presse, monter sur l'engrenage supérieur (12) les paliers (14) et l'entretoise (16).
ATTENTION! L'entretoise doit être placée entre le palier et l'engrenage.

f

ITA Lubrificare con grasso gli anelli di tenuta (15) e (6); posizionarli nel coperchio (9) utilizzando l'attrezzo **T32**.

D Die Kolbenringe (15) und (6) mit Fett schmieren; diese mit dem Werkzeug **T32** auf den Deckel (9) positionieren.

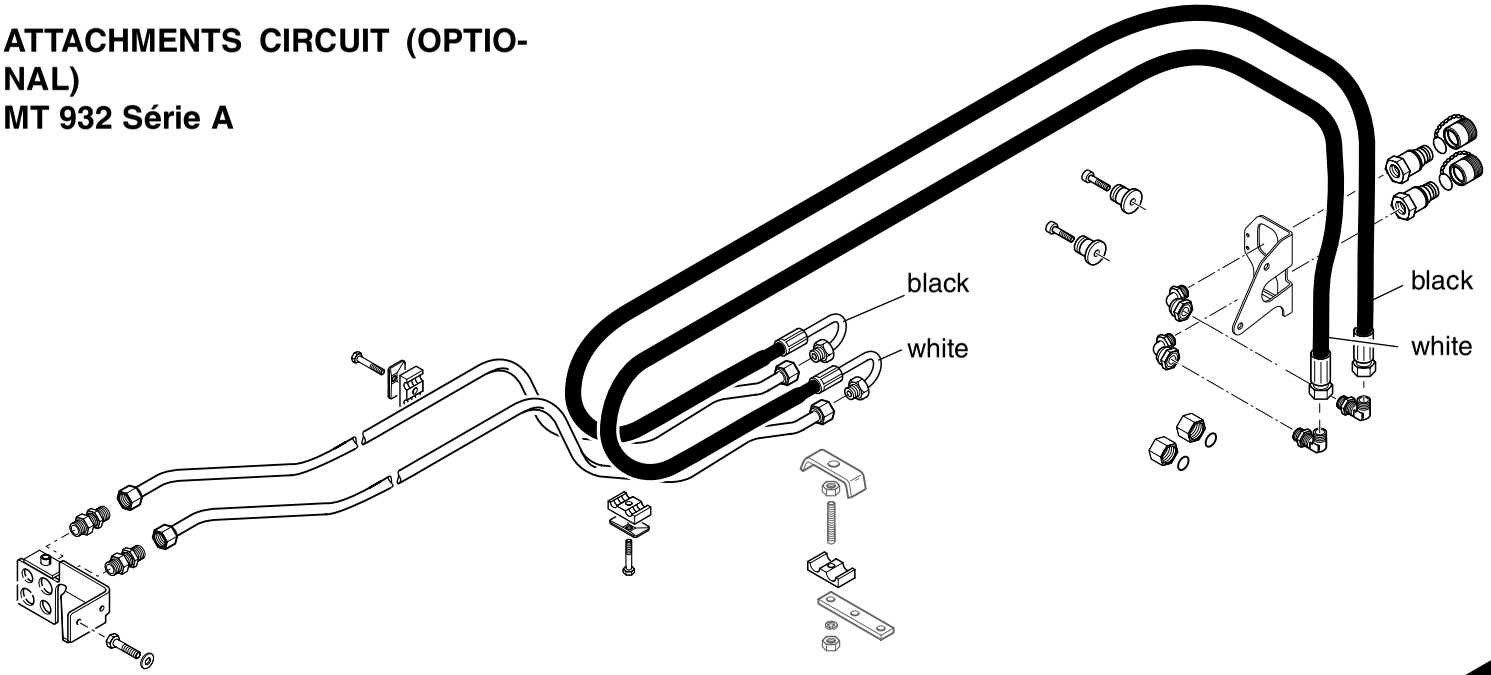
ESP Lubrificar con grasa los segmento de compresion (15) y (16); colocarlos en la tapa (9) utilizando la herramienta **T32**.

F Lubrifier avec du gras les bagues d'étanchéité (15) et (16): placer ces dernières dans le couvercle (9) à l'aide de l'outil **T32**.

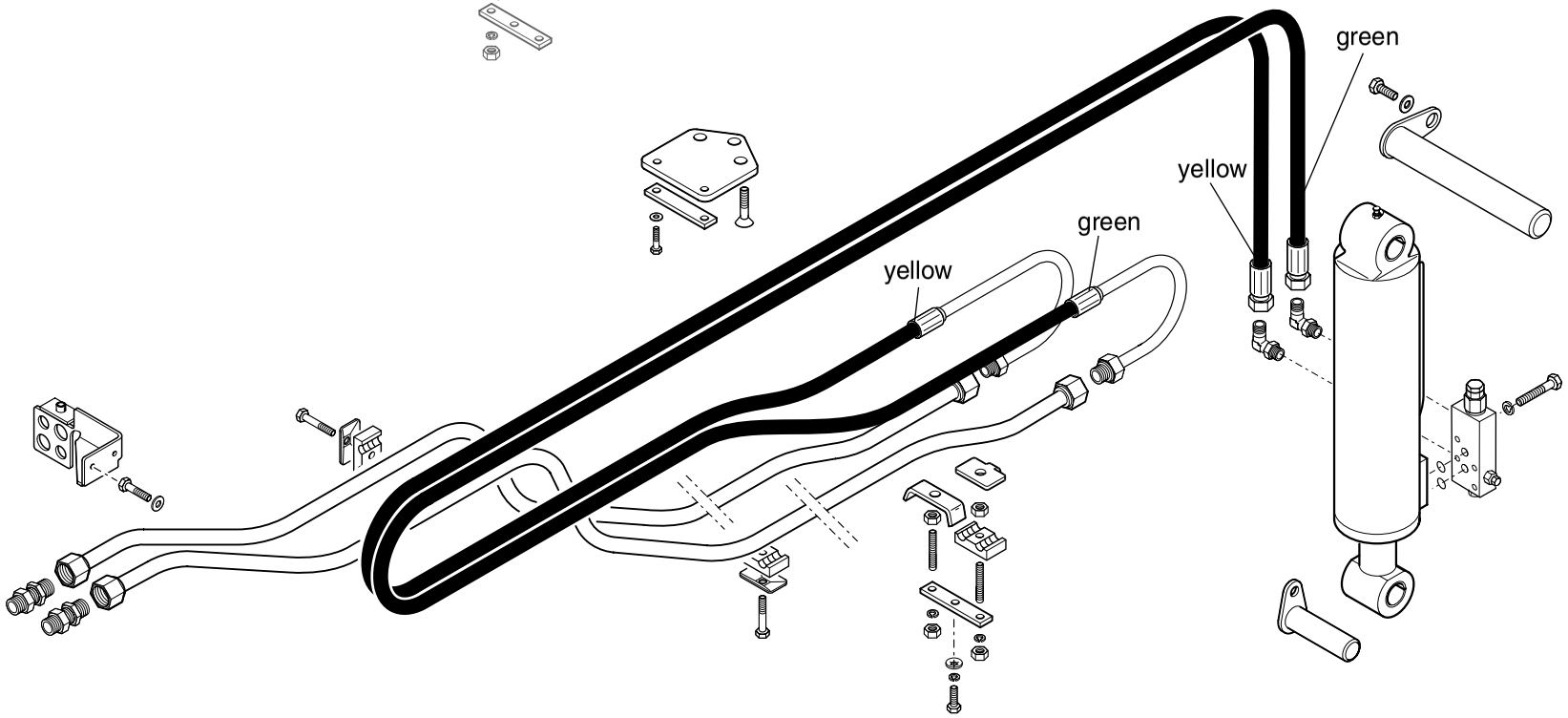
CONTENTS

BA	Power unit + Accumulator
CA	Suction strainer
D3	Driving valve bank 3 positions Position 1 : Steering short Position 2 : Steering front wheel Position 3 : Crabe position
FDAV	Front disk brake
FDAR	Rear disk brake
M	I. C. Engine
MA	Joystick M1 Attachment M2 Extending telescope M3 Attachment M4 Retracting telescope
MC	Master cylinder
N	Level
P	Hydraulic pump
PD	Steering pump
PFR(O)	Trailer braking fitting (Option)
PRF(O)	Drain-back fitting (Option)
R	Hydraulic tank
RLF	Braking oil tank
SC	Circuit selector
SCFR(O)	Trailer braking circuit selector (Option)
S2F	Selector 2 functions
VAFR(O)	Trailer braking valve (Option)
VDAR	Rear steering cylinder DE 90x45 C80x2
VDAV	Front steering cylinder DE 90x45 C80x2

ATTACHMENTS CIRCUIT (OPTIONAL)
MT 932 Série A



TILT CIRCUIT
MT 932 Série A



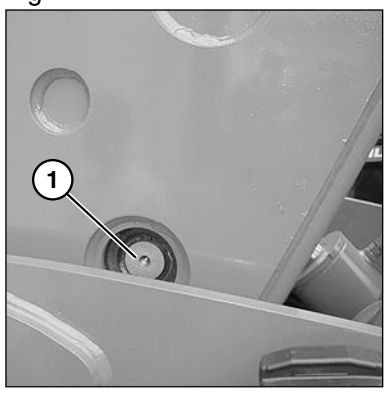
D - REMOVING THE TELESCOPIC CYLINDER FROM THE TOP OF THE JIB

- Leave 3 m in front of and 4 m behind the fork lift truck.
- Remove the two housings 1 (Fig. DA) from the rear of the jib.

Fig. DA

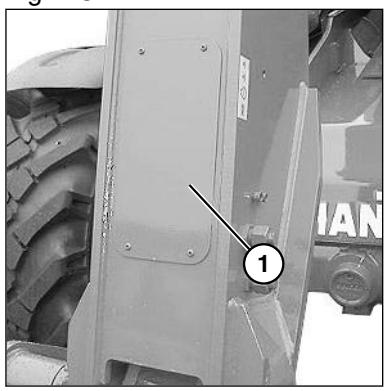
- Raise the jib fully.
- Remove the two circlips from the telescopic cylinder pin 1 (Fig. DB).
- Position the jib horizontally.

Fig. DB



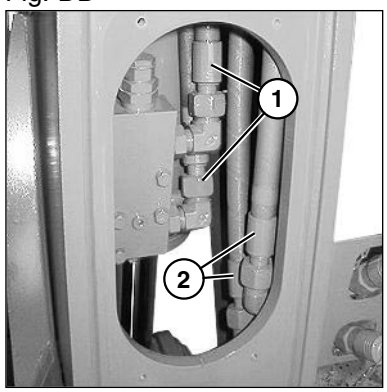
- Remove the closure panel 1 (Fig. DC) from the top of the jib.

Fig. DC



- Depressurise the jib hydraulic circuit.
- Disconnect and blank the tilt circuit hoses 1 (Fig. DD) and the attachments circuit hoses 2 (Fig. DD) if fitted.

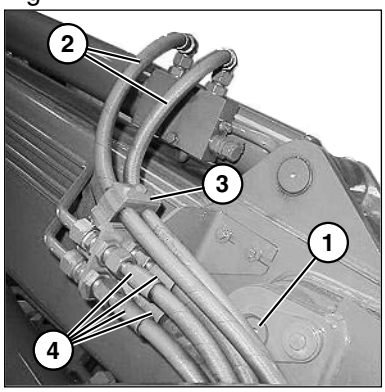
Fig. DD



I - REMOVING THE COMPLETE JIB

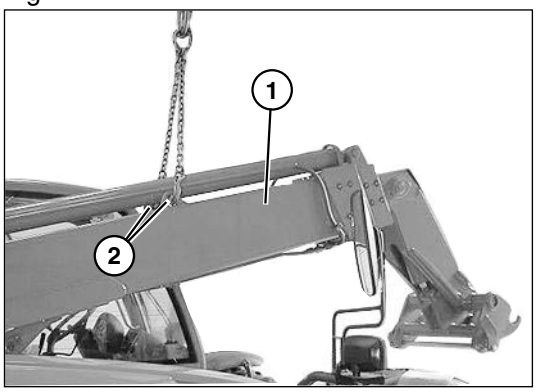
- Raise the jib sufficiently to access the compensation cylinder pin 1 (Fig. IA).
- Depressurise the jib hydraulic circuit.
- Disconnect and blank the two telescopic cylinder hoses 2 (Fig. IA).
- Remove the clips 3 (Fig. IA).
- Disconnect and blank the two or four attachments and tilt circuit hoses 4 (Fig. IA) (depending on assembly).
- Remove the compensation cylinder pin 1 (Fig. IA).
- Retract the compensation cylinder rod then tilt the cylinder towards the rear of the chassis.

Fig. IA



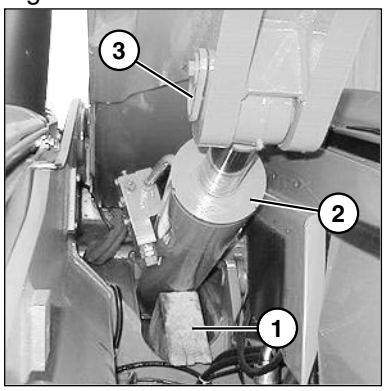
- Position the jib 1 (Fig. IB) as shown.
- Secure the jib with a sling at the **FRONT** rings 2 (Fig. IB) designed for this purpose.

Fig. IB



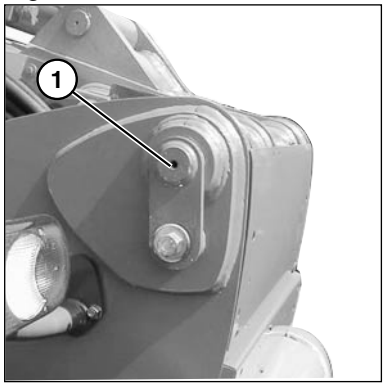
- Position a block 1 under the lifting cylinder 2 (Fig. IC).
- Remove the lifting cylinder pin 3 (Fig. IC).
- Retract the lifting cylinder rod.

Fig. IC



- Remove the oscillation pin 1 (Fig. ID) from the jib.
- Release the complete jib taking care not to let it hit the cab or the chassis.

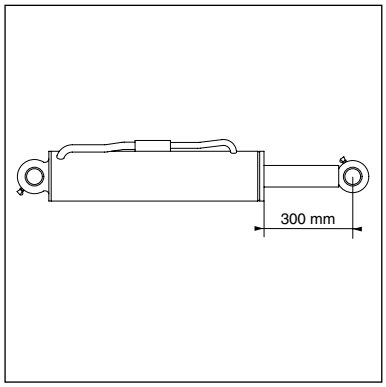
Fig. ID



REMOVAL OF THE TILTING CYLINDER

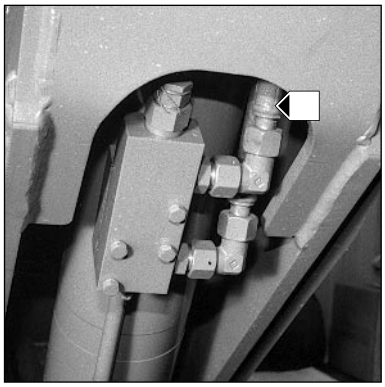
REMOVAL OF THE TILTING CYLINDER

- Place the lift truck on level ground, with the parking brake applied, and the gear reverser and gear lever in neutral.
- Place the jib in a horizontal position.
- Switch the ignition on the lift truck on and take off the pressure in the tilting circuit by operating the hydraulic control several times over.



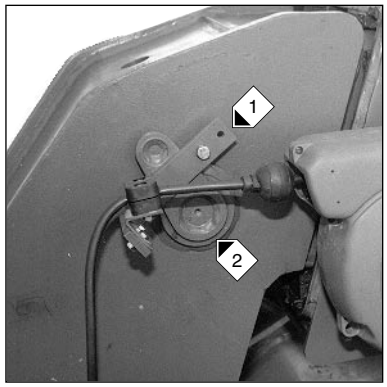
1

Do not extend the tilting cylinder rod by more than 300 mm to bring it clear of the jib head.



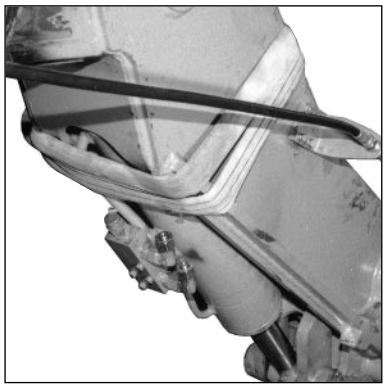
2

- Locate the tilting circuit paired hose connection, disconnect them and seal the inlet openings.



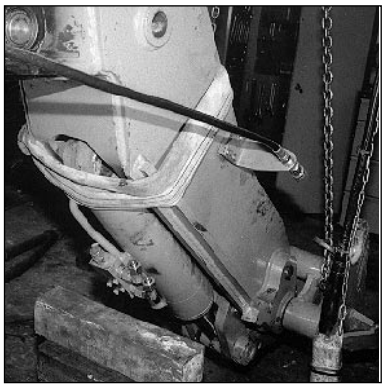
3

- Disassemble the electrical cable reel mounting 1 (Option).
- Remove the foot axle 2 on the tilting cylinder.



4

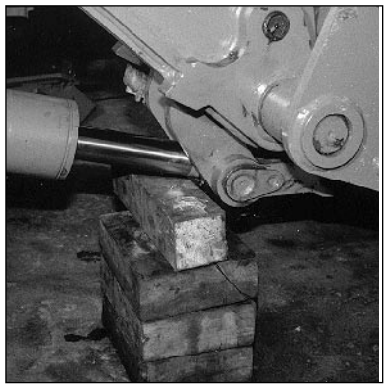
- Sling the tilting cylinder around the jib head.



5

- Use a pulley for instance to tilt the carriage in the digging direction so as to extend the jib head tilting cylinder and place it on a block.

The weight of the tilting cylinder requires caution.



6

- Secure the tilting cylinder under the rod.
- Remove the cylinder head axle and pull the tilting cylinder clear.

Care must be taken as the connecting rods swing when removing the tilting cylinder head axle.

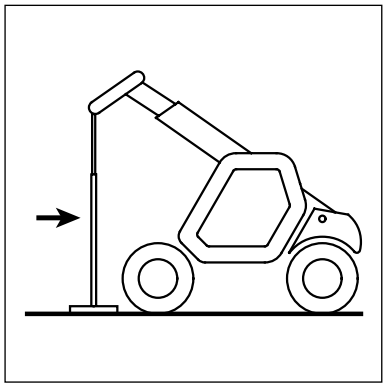
REMOVAL OF THE VALVE BANK

70-2-53-M32 EN

M29	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M30	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*		
M31		MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M32	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A*
M33		MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 Turbo LS *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M34	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 120 LS *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 120 LS *Série 1 et A*
M35		MLT 633 Turbo POWERSHIFT *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M36	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A*
M37		MLT 629 120 LS *Série A* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*

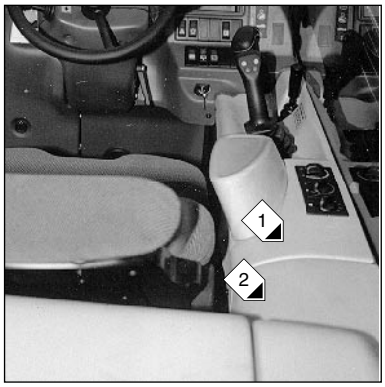
REMOVAL OF THE VALVE BANK

- Place the lift truck on level ground with the parking brake applied, and the gear reverser and gear lever in neutral.
- Fully retract the telescope.



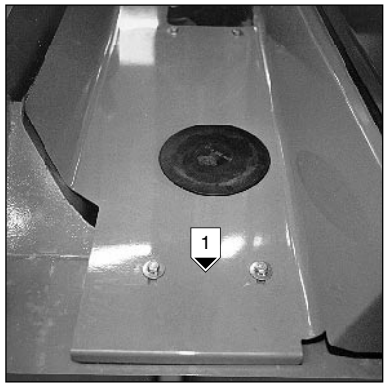
1

- Raise the jib and secure it in position with a stay.
- Take off the pressure in the circuits by operating the hydraulic controls several times over.



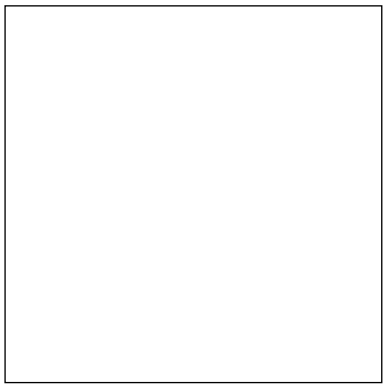
2

- Disassemble the consoles 1 and 2 inside the cab.



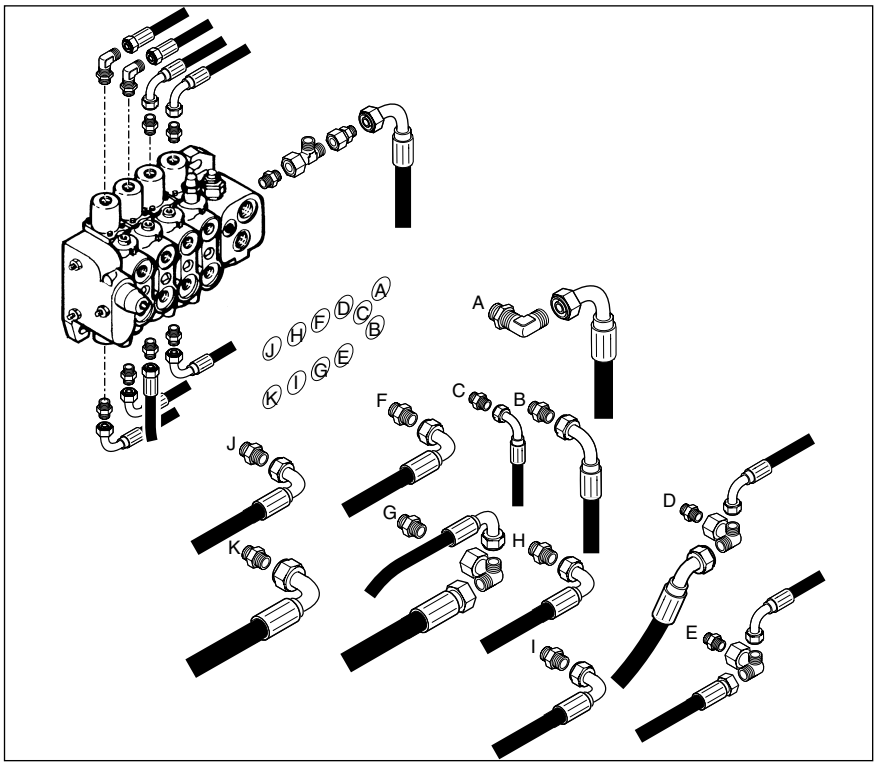
3

- Disassemble the protective plate 1 over the transmission.



4

- Place a receptacle under the valve bank to collect the oil.



5

- Start by locating the connection and direction of the hoses.
- Disconnect all steering hoses and seal all openings.
- Disconnect all hoses from "A" to "K" and seal all opening inlets as you proceed.

NB : You will need to disassemble certain connectors to access the inner hoses.

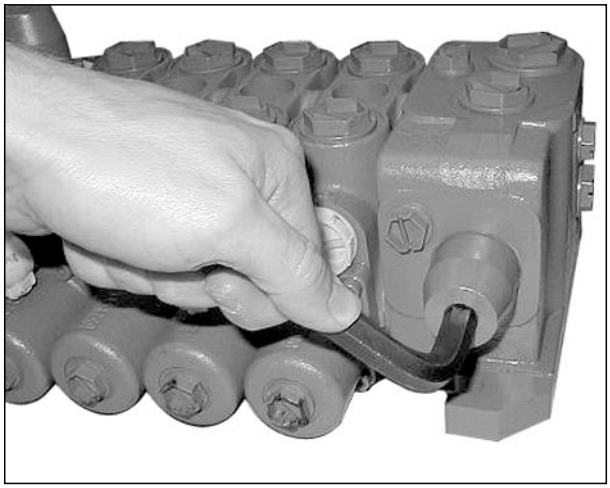
5.3 DISASSEMBLING THE FLOW DIVIDER GOVERNING SUBASSEMBLY

NB This operation does not require removal of the distribution block from the machine.

Machine switched off :
- Place all machine receivers connected to the distribution block in the idle position.
- Work the distribution slide valves to release the pressure build-up.

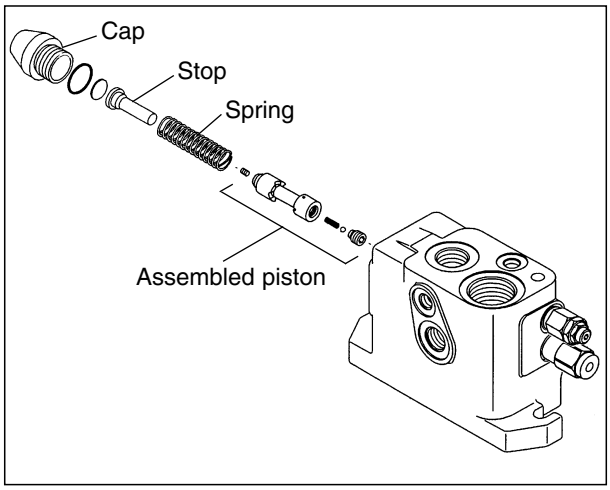
NB : Place a vacuum pump on the tank so as to reduce oil leakage during this operation.
Collect any leaking oil in an appropriate receptacle.

- Unscrew the cap with a 12 mm hexagon socket screws key.
- Remove the stop and spring.



Remounting : tightening torque : 90 ± 9 N.m.

- Change the faulty parts.
- Change the O ring joints on the caps.
- Re-assemble in reverse order of disassembly.



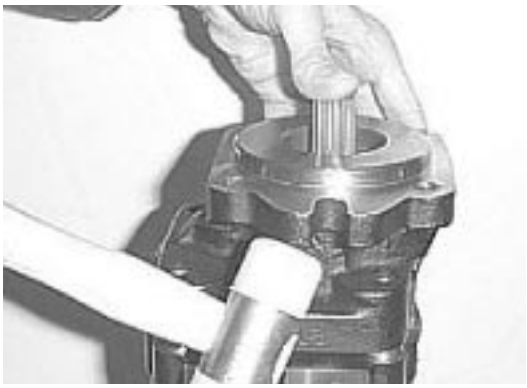
A

A5

Loosen the mounting screws using a wrench.

A6

Remove the screws.



A7

Position the pump vertically with the driveshaft pointing upwards.

Remove the front cover with a rubber mallet.

A8

Draw a mark with a felt tip on the bearing and the body to ensure correct part reassembly.

DISMANTLING THE MAIN HYDRAULIC PUMP

70-3-47 EN

09 / 09 / 2002

E - APPLICATION OF THE THREAD LOCKING MATERIAL

CHARACTERISTICS

Light thread locking material (Loctite 222)

Application on the locking ring threads.

Without activation agent		
Handling time	10 - 30	minutes
Use time	3 - 6	hours
(Placing of the cylinder under pressure)		
With N Loctite activation agent		
Handling time	10 - 20	minutes
Use time	2 - 4	hours
(Placing of the cylinder under pressure)		
Shearing strength	1,5 - 4	N/mm2

Medium thread locking material (Loctite 243)

Application on the M8 screws to lock the pistons.

Without activation agent		
Handling time	10 - 20	minutes
Use time	3 - 6	hours
(Placing of the cylinder under pressure)		
With N Loctite activation agent		
Handling time	5 - 15	minutes
Use time	2 - 4	hours
(Placing of the cylinder under pressure)		
Shearing strength	5 - 7,5	N/mm2

REMOVAL

If the parts fitted with locking material cannot be removed using standard tools, we recommend heating the glued area to T = 250°C, preferably using a hot air pistol rather than a blowpipe.

REMARK

If the temperature is near 0°C, we recommend using a Loctite activation agent for the assembly, in addition, this will limit the polymerisation time.

Faults noted by abnormal machine operation

SYMPTOMS	PROBABLE CAUSES A10V0 PUMP	PROBABLE CAUSES SX14 CONTROL VALVE	ADDITIONAL CHECKS	SOLUTIONS
Engine stalls when moving	1 - FR regulator faulty or seized			Remove and change regulation block (see unit 70-3-47)
	2 - FR regulator control incorrect		Check LS regulator of control valve	Change flow regulator or clean strainer (see unit 70-3-54-M33 section 5.2)
	3 - Anti-stalling device unadjusted		Check setting of anti-stalling limiter	Check and adjust pressure (see section 1.2)
	4 - Anti-stalling device faulty		Check operation of anti-stalling module	Check module (see section 1.3)
The engine remains charged after slide valves return to neutral		Flow regulator blocked		Change flow regulator or clean strainer (see unit 70-3-54-M33 section 5.2)

BA Power unit + Accumulator

CA Suction strainer
CR(O) Towing hook (Option)
CSP Piloted safety valve

D Valve bank 4 or 5 sections
- EA Attachment section
- EA(O) Attachment section (Option)
- EE Inlet section
- EI Tilting section
- EL Lifting section
- EF Outlet section
- ET Telescope section

D3 Driving valve bank 3 positions
- Position 1 : Steering short
- Position 2 : Steering front wheel
- Position 3 : Crab position

EVTF(O) Jib head electrovalve (Option)

FDAV Front disk brake
FDAR Rear disk brake
FR Return filter

M I. C. Engine
MA Joystick
- M1 Attachment
- M2 Extending telescope
- M3 Attachment
- M4 Retracting telescope

MC Master cylinder

N Level

P Hydraulic pump
PAAV Front attachment fitting
PAAV(O) Front attachment fitting (Option)
PAAR(O) Rear attachment fitting (Option)
PD Steering pump
PFR(O) Trailer braking fitting (Option)
PP Pressure point
PRF(O) Drain-back fitting (Option)

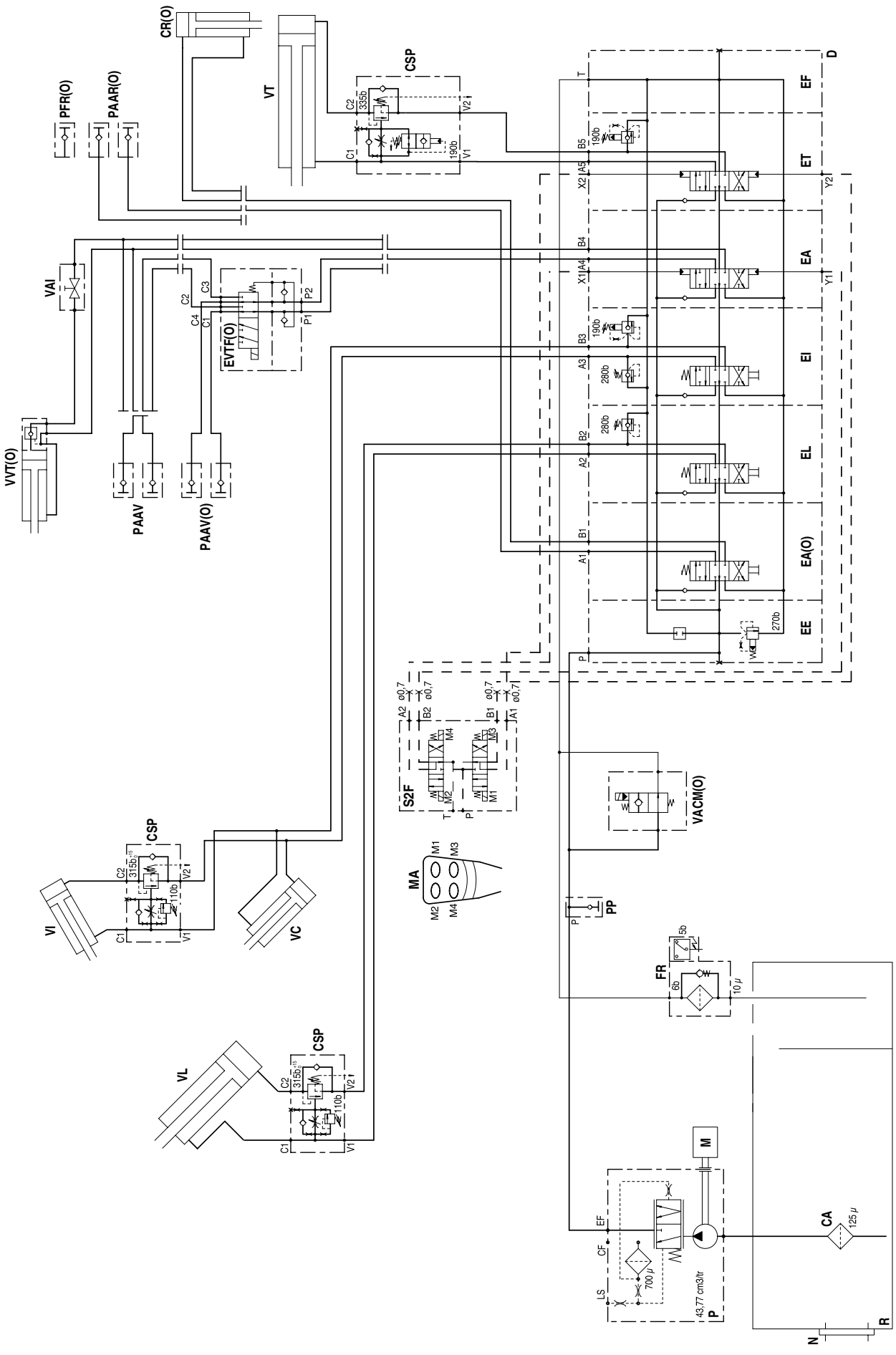
R Hydraulic tank
RLF Braking oil tank

SC Circuit selector
SCFR(O) Trailer braking circuit selector (Option)
S2F Selector 2 functions

VACM(O) Movements cut-off valve (Option)
VAI Insulation valve
VAFR(O) Trailer braking valve (Option)
VC Compensation cylinder DE 100x50 C310
VDAR Rear steering cylinder DE 90x45 C80x2
VDAV Front steering cylinder DE 90x45 C80x2
VI Tilting cylinder DE 120x60 C445 (MLT 6)
DE 130x65 C380 (MLT 7)
VL Lifting cylinder DE 130x70 C720 (MLT 6)
DE 140x70 C720 (MLT 7)
VT Telescoping cylinder DE 70x50 C2100 (MLT 6)
DE 70x50 C2750 (MLT 7)
VVT(O) Locking carriage cylinder DE 60x45 C183 (Option)

NOTE : 1 - The main relief valve's pressure, on inlet sections are given at engine's maximum rating.
2 - The secundary valve's pressure, are given at 1000 rpm of the engine.
3 - Pressure relief valve's control must be done at an oil temperature of 50°C.

HYDRAULIC DIAGRAM MLT 629 / 730 Turbo Série A *(1/2)*
MLT 730 Turbo POWERSHIFT Série A



BA Power unit + Accumulator

CA Suction strainer
CR(O) Towing hook (Option)
CSP Piloted safety valve

D Valve bank 4 or 5 sections
- EA Attachment section
- EA(O) Attachment section (Option)
- EE Inlet section
- EI Tilting section
- EL Lifting section
- ES Outlet section
- ET Telescope section

D3 Driving valve bank 3 positions
- Position 1 : Steering short
- Position 2 : Steering front wheel
- Position 3 : Crab position

EVTF(O) Jib head electrovalve (Option)

FDAV Front disk brake
FDAR Rear disk brake
FR Return filter

M I. C. Engine
MA Joystick
- B Extending telescope
- C Attachment
- D Retracting telescope
- E Attachment

MC Master cylinder

N Level

P Hydraulic pump
PAAV Front attachment fitting
PAAV(O) Front attachment fitting (Option)
PAAR(O) Rear attachment fitting (Option)
PD Steering pump
PFR(O) Trailer braking fitting (Option)
PP Pressure point
PRF(O) Drain-back fitting (Option)

R Hydraulic tank
RLF Braking oil tank

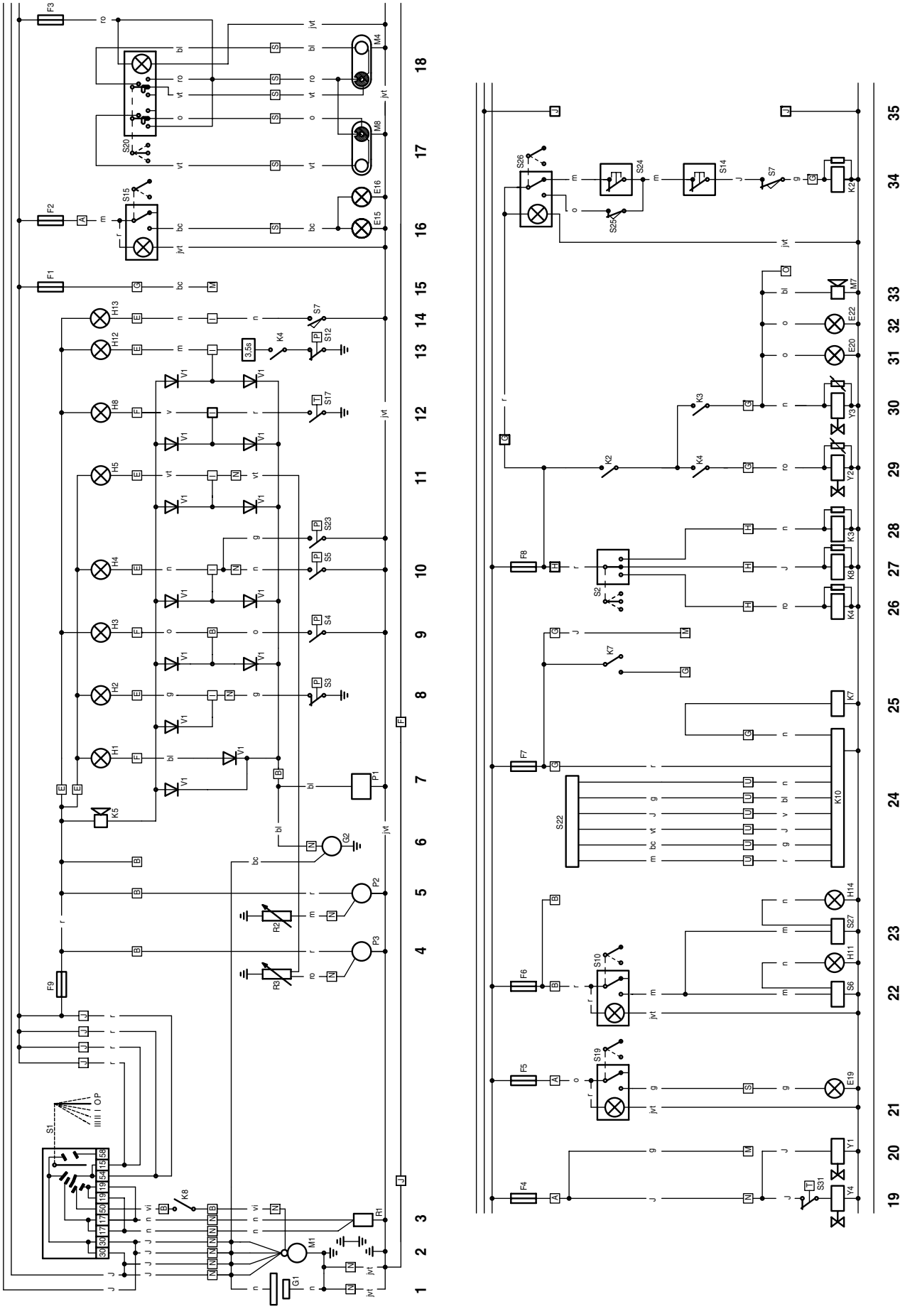
SC Circuit selector
SCFR(O) Trailer braking circuit selector (Option)
S2F Selector 2 functions
- 1 Telescoping
- 2 Attachment

S3F Selector 3 functions
- 1 Telescoping
- 2 Attachment
- 3 Attachment (Option)

VACM(O) Movements cut-off valve (Option)
VACR Idling checking valve
VAI Insulation valve
VAFR(O) Trailer braking valve (Option)
VC Compensation cylinder DE 100x50 C310
VDAR Rear steering cylinder DE 90x45 C80x2
VDAV Front steering cylinder DE 90x45 C80x2
VI Tilting cylinder DE 120x60 C445 (MLT 6)
DE 130x65 C380 (MLT 7)
VL Lifting cylinder DE 130x70 C720 (MLT 6)
DE 140x70 C720 (MLT 7)
VT Telescoping cylinder DE 70x50 C2100 (MLT 6)
DE 70x50 C2750 (MLT 7)
VVT(O) Locking carriage cylinder DE 60x45 C183 (Option)

NOTE : 1 - The main relief valve's pressure, on inlet sections are given at engine's maximum rating.
2 - The secundary valve's pressure, are given at 1000 rpm of the engine.
3 - Pressure relief valve's control must be done at an oil temperature of 50°C.

ELECTRIC DIAGRAM MT 732 / 932 + Turbo Série 1



ELECTRIC DIAGRAM MLT 629 / 730 Turbo Série 1

F3 - Rear windscreen wiper
Roof windscreen wiper (Option)
F4 - Engine stop electrovalve
F5 - Revolving light
F6 - Wheels alignment
Prearranged trailer braking (Option)
F7 - Load status indicator device
Hydraulics movements cut-off (Option)
F8 - Gear reverser
Transmission cut-off
F9 - Control instruments panel
F10 - Sound alarm
Stop switch
F11 - Jib head light (Option)
F12 - Indicator power supply
F13 - Heating
F14 - Free
F15 - Fuel reheating (Option)
F16 - Air conditioning (Option)
F17 - Electrovalve on jib head (Option)
Electrical jib provision (Option)
Rear hydraulic provision (Option)
Anti-theft device provision (Option)
F18 - Front working headlight (Option)
F19 - Rear defrosting (Option)
F20 - Pneumatic seat (Option)
F21 - Front windscreen wiper and windscreen washer
F22 - Free
F23 - Right sidelights + sidelights indicator light + control panel lighting
Service plate lighting (Option)
F24 - Left sidelights
F25 - Right indicators
F26 - Left indicators
F27 - Low beam + low beam indicator light + rear fog light
F28 - Main beam + main beam indicator light
F29 - Warning unit + roof light
(+) permanent (Option)
F30 - Lighting switch, horn and indicators

G1 - Battery
G2 - Alternator

H1 - Battery load indicator light
H2 - Engine oil pressure indicator light
H3 - Brake fluid indicator light
H4 - Brake fluid indicator light
H5 - Engine water temperature indicator light
H6 - Flashing lights/warning unit indicator light
H7 - Sidelights indicator light
H8 - Transmission oil temperature indicator light
H9 - Main beam indicator light
H10 - Warning unit indicator light
H11 - Front wheels alignment indicator light
H12 - Transmission oil pressure indicator light
H13 - Brake indicator light
H14 - Rear wheels alignment indicator light
H15 - Hourmeter module indicator light/rev counter
H16 - Engine water temperature module indicator light
H17 - Fuel level module indicator light
H18 - Low beam indicator light
H19 - Ventilation indicator light

K0 - Air conditioning relay (Option)
K1 - Transmission cut-off relay to hydraulic controls lever
K2 - Transmission cut-off relay
K3 - Reverse relay
K4 - Forward relay
K5 - Buzzer
K6 - Electrovalve on jib head (Option)
K7 - Hydraulic movements cut-off (Option)
K8 - Starting safety relay
K9 - Flashing light/warning unit
K10 - Overload safety module
K13 - Driving housing of progressiveness

M1 - Starter
M2 - Front windscreen wiper
M3 - Windscreen washer
M4 - Roof windscreen wiper (Option)
M5 - Sound alarm
M6 - Ventilation
M7 - Reverse gear sound alarm (Option)
M8 - Rear windscreen wiper

P1 - Hourmeter module/rev counter
P2 - Fuel level module
P3 - Engine water temperature module

R1 - Preheating resistor
R2 - Fuel sensor
R3 - Engine water temperature sensor

S1 - Key switch
S2 - Gear reverser
S3 - Engine oil pressure switch
S4 - Brake fluid
S5 - Air filter clogging
S6 - Front wheels alignment switch
S7 - Brake switch
S8 - Front windscreen wiper and windscreen washer switch
S9 - Sound alarm control
S10 - Wheels alignment switch
S11 - Warning unit switch
S12 - Transmission oil pressure
S13a - Sidelight lighting switch
S13b - Low beam/main beam lighting switch
S13c - Indicators lighting switch
S14 - Transmission cut-off switch to gear lever
S15 - Working headlight switch (Option)
S16 - Stop switch
S17 - Transmission oil temperature
S18 - Front working headlight switch (Option)
S19 - Revolving light switch
S20 - Rear/roof windscreen wiper switch
S21 - Ventilation switch
S22 - Overload strain gauge
S23 - Hydraulic return filter clogging
S24 - Transmission cut-off switch to hydraulic controls lever
S25 - Transmission cut-off switch to brake pedal
S26 - Transmission cut-off switch
S27 - Rear wheels alignment switch
S28 - Rear defrosting switch (Option)
S29 - Rear fog light switch
S31 - Cold start-up switch
S32 - Attachment switch
S33 - Attachment switch
S34 - Extended telescope switch
S35 - Retracted telescope switch

V1 - Fault test diode

Y1 - Engine stop electrovalve
Y2 - Forward electrovalve
Y3 - Reverse electrovalve
Y4 - Cold start-up electrovalve
Y5 - Attachment electrovalve
Y6 - Attachment electrovalve
Y7 - Extended telescope electrovalve
Y8 - Retracted telescope electrovalve
Y15 - Electrovalve of progressiveness

ELECTRIC DIAGRAM MLT 629 / 730 Série A

PRINCIPLE ELECTRIC CIRCUIT

1 - Battery
2 - Starter
3 - Preheating
4 - Engine water temperature
5 - Fuel level
6 - Alternator
7 - Hourmeter/rev counter
8 - Engine oil pressure
9 - Brake fluid
10 - Air filter/hydraulic return filter clogging
11 - Engine water temperature
12 - Transmission oil temperature
13 - Transmission oil pressure
14 - Hand brake
15 - Free
16 - Rear working headlight (Option)
17 - Rear cabin windscreen wiper
18 - Roof cabin windscreen wiper (Option)
19 - Cold start-up
20 - Engine stop electrovalve
21 - Revolving light
22 - Front wheels alignment detector
23 - Rear wheels alignment detector
24 - Overload safety system
25 - Hydraulics movements cut-off (Option)
26 - Forward relay
27 - Starting safety
28 - Reverse relay
29 - Forward electrovalve
30 - Reverse electrovalve
31 - L.H. rear reverse light
32 - R.H. rear reverse light
33 - Reverse gear sound alarm (Option)
34 - Transmission cut-off
35 - Autoradio (Option)
36 - Sound alarm
37 - L.H. stoplight
38 - R.H. stoplight
39 - Free
40 - Flasher unit / warning unit
41 - Flashing light / warning unit indicator light
42 - R.H. rear indicator
43 - R.H. front indicator
44 - L.H. rear indicator
45 - L.H. front indicator
46 - Warning unit / indicator light switch
47 - Roof light
48 - Ventilation
49 - Air conditioning (Option)
50 - Free
51 - Free
52 - Free
53 - Rear defrosting (Option)
54 - Free
55 - Front windscreen washer
56 - Front windscreen wiper
57 - Free
58 - Front working headlight (Option)
59 - Engine water temperature module lighting
60 - Fuel level module lighting
61 - Hourmeter / rev counter module lighting
62 - Sidelights indicator light
63 - R.H. rear sidelight
64 - Ventilation switch lighting
65 - R.H. front sidelight
66 - L.H. rear sidelight
67 - L.H. front sidelight
68 - L.H. front low beam
69 - R.H. front low beam
70 - Low beam indicator light
71 - L.H. rear fog light
72 - R.H. rear fog light
73 - L.H. front main beam
74 - R.H. front main beam
75 - Main beam indicator light
76 - Free
77 - Free

COLOUR CODING

bc : White	bl : Blue	g : Grey
j : Yellow	jvt : Yellow/Green	m : Brown
n : Black	o : Orange	r : Red
ro : Pink	vt : Green	v : Violet

CONNECTOR

A - Fuses/relay plate (Connection 13 pin)
B - Fuses/relay plate (Connection 13 pin)
C - Fuses/relay plate (Connection 13 pin)
D - Fuses/relay plate (Connection 6 pin)
E - Fuses/relay plate (Connection 8 pin)
F - Fuses/relay plate (Connection 8 pin)
G - Fuses/relay plate (Connection 21 pin)
H - Fuses/relay plate (Connection 5 pin)
I - Fuses/relay plate (Connection 7 pin)
J - Fuses/relay plate (Connection 8 pin + connection 2 pin)
K - Prearranged relay K1 (Option)
L - Prearranged relay K0 (Option)
M - Prearranged (Connection 8 pin + connection 1 pin) (Option)
N - Engine box
O - Prearranged rear (Connection 8 pin) (Option)
P - Lighting switch
Q - Heating ventilation
R - Air conditioning (Option)
S - Cab
T - Front windscreen wiper
U - Overload strain gauge

ELECTRICS COMPONENTS

E1 - R.H. rear light
E2 - R.H. front light
E3 - L.H. rear light
E4 - L.H. front light
E5 - L.H. stoplight
E6 - R.H. stoplight
E7 - R.H. rear sidelight
E8 - R.H. front sidelight
E9 - L.H. rear sidelight
E10 - L.H. front sidelight
E11 - L.H. front low beam
E12 - R.H. front low beam
E13 - L.H. front main beam
E14 - R.H. front main beam
E15 - R.H. rear working headlight (Option)
E16 - L.H. rear working headlight (Option)
E17 - L.H. front working headlight (Option)
E18 - R.H. front working headlight (Option)
E19 - Revolving light
E20 - L.H. rear reverse light
E21 - Roof light
E22 - R.H. rear reverse light
E23 - L.H. rear fog light
E24 - R.H. rear fog light

FUSES

F1 - Electric controls of hydraulic movements
Locking of hydraulic attachment (Option)
F2 - Rear working headlight (Option)
F3 - Rear windscreen wiper
Roof windscreen wiper (Option)

ELECTRIC DIAGRAM

80-6-M33 EN

M29	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M30	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*		
M31		MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M32	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A*
M33		MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 Turbo LS *Série 1 et A* MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M34	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 629 120 LS *Série A* MLT 633 Turbo LS *Série 1 et A* MLT 633 120 LS *Série 1 et A*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 120 LS *Série 1 et A*
M35		MLT 633 Turbo POWERSHIFT *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 Turbo POWERSHIFT *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*
M36	MT 732 *Série 1 et A* MT 732 Turbo *Série 1 et A* MT 932 *Série 1 et A* MT 932 Turbo *Série 1 et A*	MLT 629 *Série 1 et A* MLT 629 Turbo *Série 1 et A* MLT 633 Turbo LS *Série 1 et A* MLT 633 Turbo POWERSHIFT *Série 1*	MLT 730 *Série 1 et A* MLT 730 Turbo *Série 1 et A* MLT 730 Turbo LS *Série 1 et A* MLT 730 Turbo POWERSHIFT *Série 1 et A*
M37		MLT 629 120 LS *Série A* MLT 633 120 LS *Série 1 et A* MLT 633 120 LS POWERSHIFT *Série 1*	MLT 730 120 LS *Série 1 et A* MLT 730 120 LS POWERSHIFT *Série 1 et A*

20/ 09 / 2002

ELECTRIC DIAGRAM MLT 633 / 730 Turbo LS Série A
MLT 629 / 633 / 730 120 LS Série A