WORKSHOP MANUAL

Seat and headquarters:
V.le Ing. F. Cassani, 15
24047 Treviglio (BG)
Tel. 0363/4211
Telex: 311472 Samtra I

SILVER 80
SILVER 90
SILVER 100.4
SILVER 100.6

introduction

This publication is intended for the trained technician who must operate on our tractors.

It contains all general information relating to our tractor range, and in particular it highlights the inspection, overhauling and adjustment procedures as well as the main instructions for dismantling and reassembling operations.

The workshop manual is a natural summary for the mechanic who has attended the vocational training and specialization courses, which are held every year at our Service School, to permit him to perform a precise and qualified work on tractor.

Its contents are therefore an exhaustive reference book for the experienced mechanic who desires to refresh his memory on the sequence of the operations to be done. It is then good practice for every authorized dealer mechanic to have at his disposal this publication, so that it may be consulted quickly when necessary.

We wish to thank in advance for the cooperation all thos people, who will let us have their suggestions in order to make this publication more complete.

List of contents

SILVER 80 - 90 - 100.4 - 100.6 TRACTOR CONFIGURATIONS

SILVER 80 - 90	***2RM***	*WITH ROLL BAR*
	2RM	*WITH CAB*
	4RM	*WITH ROLL BAR*
	4RM	*WITH CAB*

SILVER 100.4 - 100.6	***4RM***	*WITH ROLL BAR*
	4RM	*WITH CAB*

CAB
- ventilation + heating
- with ventilation + heating + air conditioning

GEARBOX

Fully synchronised:
- 12 Forward 12 Reverse: 4 speeds x 3 ranges + Reverser
- 16 Forward 16 Reverse: 4 speeds x 4 ranges (including one creeper range) + Reverser;
- 24 Forward 12 Reverse: 4 speeds x 3 ranges + with Mini-reduction-Reverser
- 32 Forward 16 Reverse: 4 speeds x 4 ranges (including one creeper range) + Mini-reduction-Reverser
- 15 Forward 15 Reverse: 5 speeds x 3 ranges + Reverser
- 20 Forward 20 Reverse: 5 speeds x 4 ranges (including one creeper range) + Reverser

AGROSHIFT GEARBOX

- 45 Forward 45 Reverse: 5 speeds x3 ranges + Reverser + - - version
- 60 Forward 60 Reverse: 5 speeds x4 ranges (including one creeper range)

+ Reverser + - - version

CONTROLS
- mechanically operated rear PTO
- electrohydraulically operated rear PTO
- mechanically operated 4WD and differential locks
- electrohydraulically operated 4WD and differential locks
- electrohydraulically operated 4WD and differential locks + SBA System
- with electronic engine accelerator
- with Multifunction control (on models with electronic power-lift only)

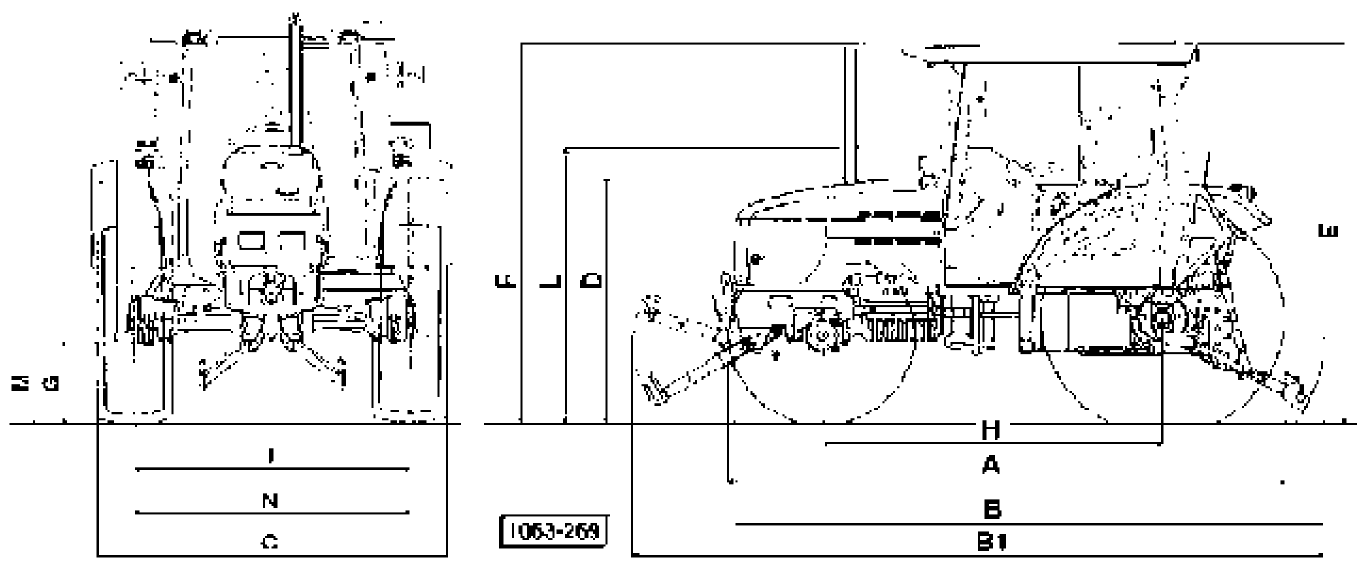
MECHANICALLY OPERATED REAR POWER-LIFT
- with supplementary rams
- without supplementary rams

ELECTRONIC REAR POWER-LIFT
- with supplementary rams
- without supplementary rams
- with slip control
- without slip control
- with SBA System + RADAR + Slip control

MAIN EQUIPMENT
- front PTO
- front lift
- high-capacity hydraulic pump 22.5 l/min
- hydraulic trailer braking
- 4-way or 6-way or 8-way control valves with "Flow Divider"
- PERFORMANCE MONITOR
- etc.

DIMENSIONS AND WEIGHTS

		SILVER 80-90 2 WD	SILVER 80-90 4WD	SILVER 100.4 4WD	SILVER 100.6 4WD
Max. length without linkage	(A) mm	3783	3783	3783	4108
- with rear linkage	(B) mm	4118	4118	4123	4413
- with front linkage	(B1) mm	-	4818	4818	5078
Min.-max. width min./max.	(C) mm	2000÷2500	2000÷2500	2000÷2500	2000÷2500
Max. height - at bonnet	(D) mm	1745	1745	1745	1770
- at cab/safety frame	(E) mm	2660	2660	2660	2685
- at silenceral	(F) mm	2635	2665	2635	2665
- at steering wheel	(L) mm	2010	2010	2010	2035
Ground clearance					
- beneath front axle	(G) mm	515	445	445	475
- beneath front axle, wheel zone	(G) mm	515	530	530	560
- beneath rear axle	(M) mm	475	475	475	500
- beneath tow bar	(M) mm	235	235	235	260
Wheel base	(H) mm	2468	2373	2468	2633
Front track	(I)				
min.	mm	1400	1500	1500	1600
standard	mm	1400	1600	1600	1700
max.	mm	2000	2000	2000	2000
Rear track	(N)				
min.	mm	1500	1500	1500	1600
standard	mm	1600	1600	1600	1700
max.	mm	2000	2000	2000	2000
Front tyres		7.50-18	14,9R24	420/70/24	16,9R34
Rear tyres		16,9R34	16,9R34	480/70/34	520/70/34
Operating weight with safety cab					
- without PTO - front lift and ballast	kg	3460	3850	3900	4250
with driver platform					
- without PTO - front lift and ballast	kg	3200	3600	3700	3940
Min. turning radius (with standard width)					
- without brakes	mm	3000	3000	3000	3500
- with brakes	mm	3600	5000	5600	5300



Prescribed lubricants and fuels

(amounts in litres)

Part to be supplied	Amt	Oil type	Product
Engine	11 **80-90** **100.4** 15 **100.6**	multi-grade engine oil SHPDO S+L+H OM - 1991 API CE- MIL-L-2104 E level CCMC D5 SAE 15W 40	**AKROS TURBO** **Special Formula SAME**
Gearbox and **Rear axle** **Power-lift** **Auxiliary Systems** **Hydrostatic steering**	71	S+L+H OT - 1891 API GL 4 SAE 10W30	**AKROS MULTI**
Front PTO	2,5		
Front - wheel drive • **Central axle** • **Side reductions**	10,5 2,5x2		
Brakes control	Max. level	ATF DEXRON II	**AKROS MATIC**
Lubrication points		NLGI 2 LITIO/Ca	**AKROS GREASE T2**
Fuel tank	140 180*		

* Optional, only for SILVER 100.6.

WARNING: The engine oil sump has been replenished in the factory with AKROS MOTOR OIL 30 SAE 30, to be replaced subsequently after 50 work hours.

It is advisable to always use the same type of oil when replenishing.

AKROS is available in the following types: SAE 30, SAE 40, SAE 15W40.

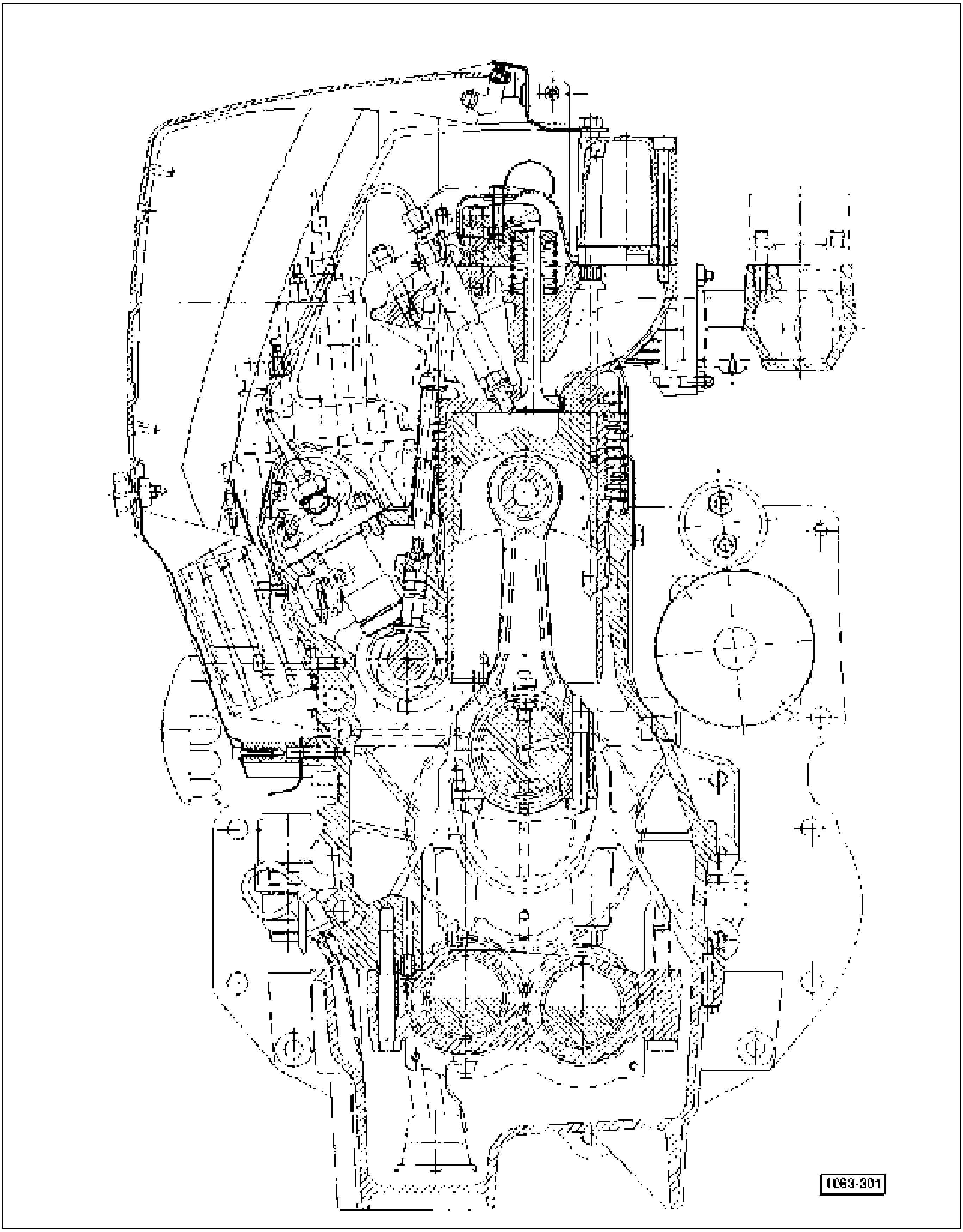


Fig. 1 - ***SILVER 80*** - Engine cross section - 4 cylinders.

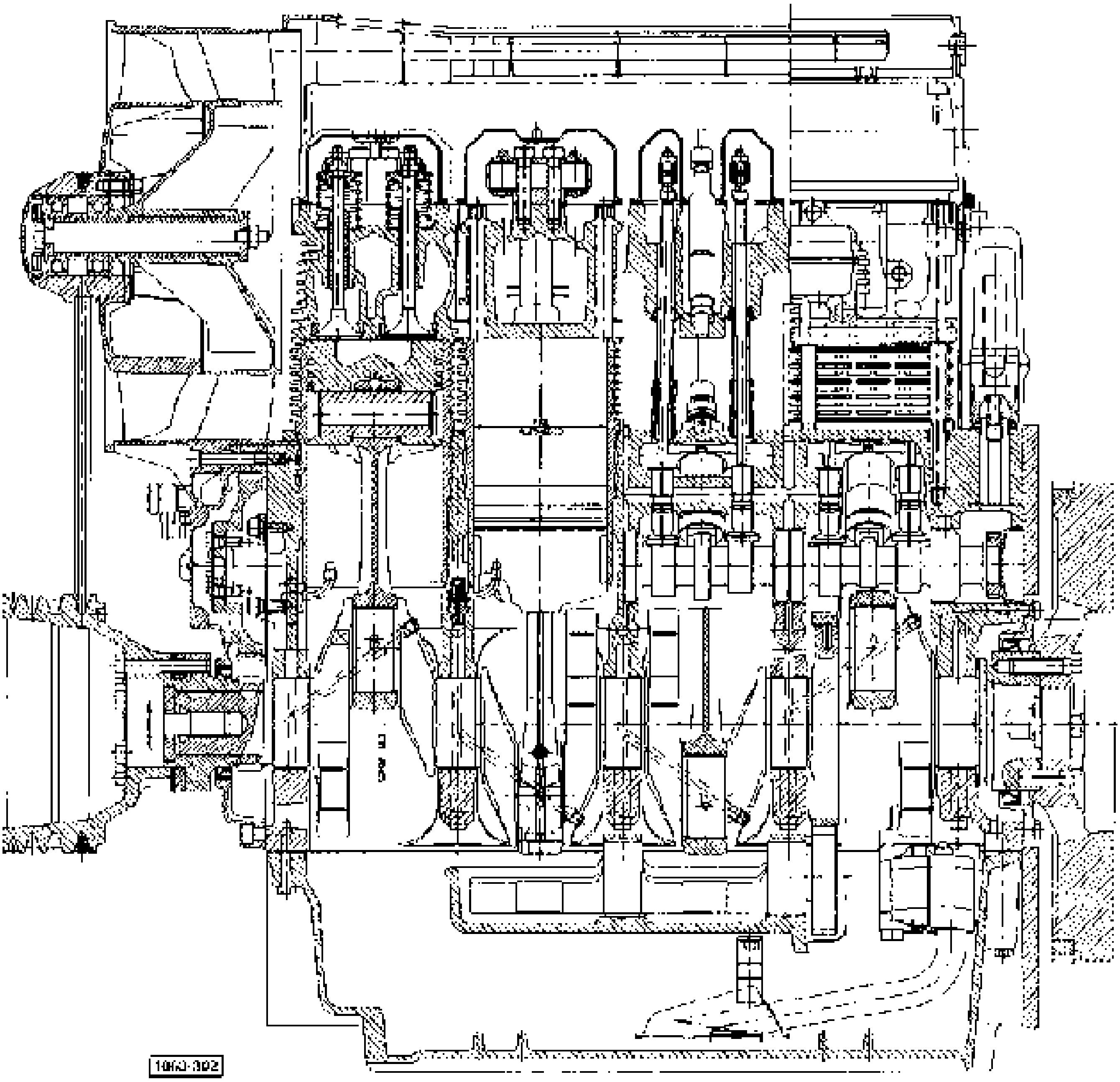


Fig. 2 - ***SILVER 80*** - Longitudinal section - 4 cylinders.

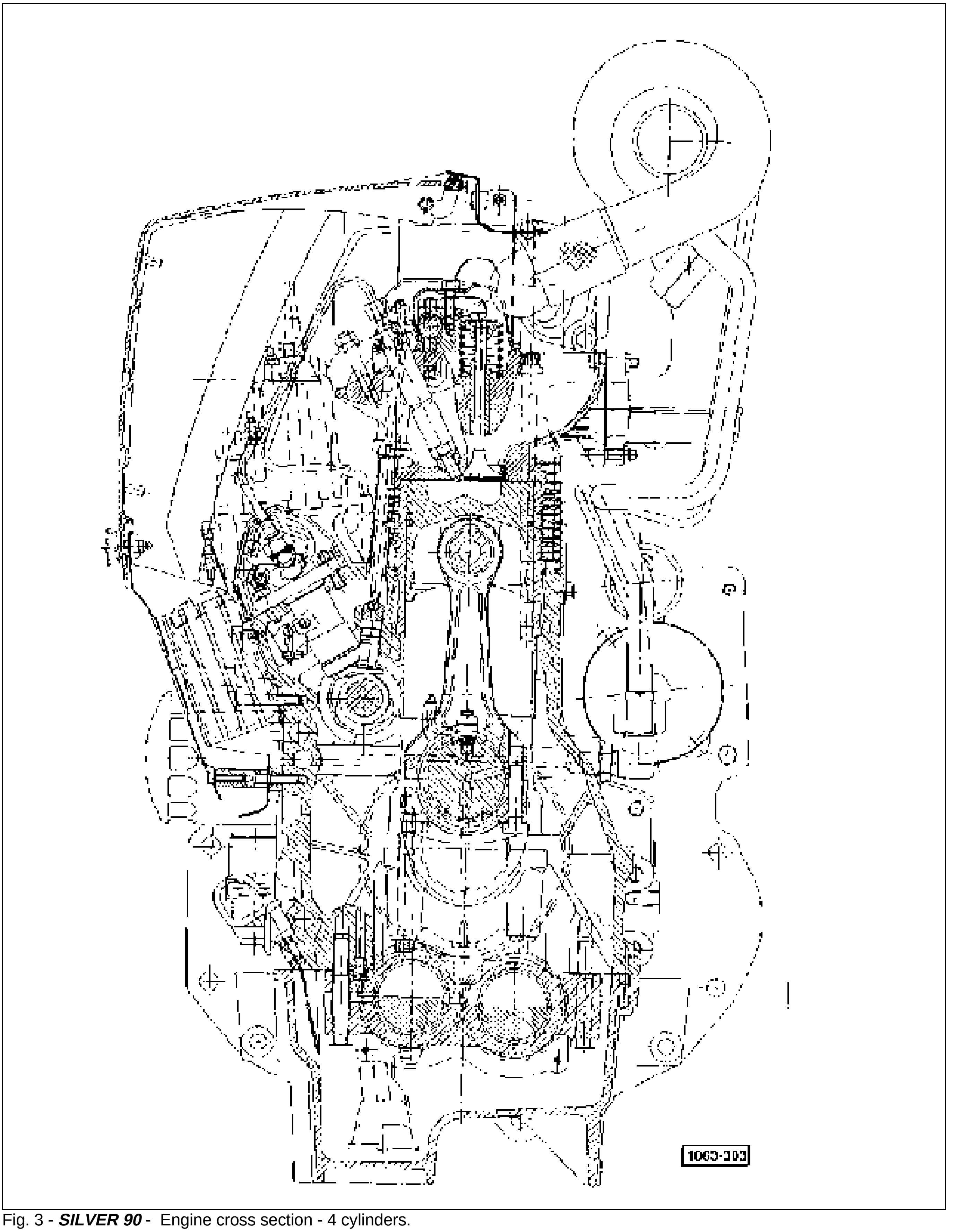


Fig. 3 - ***SILVER 90*** - Engine cross section - 4 cylinders.

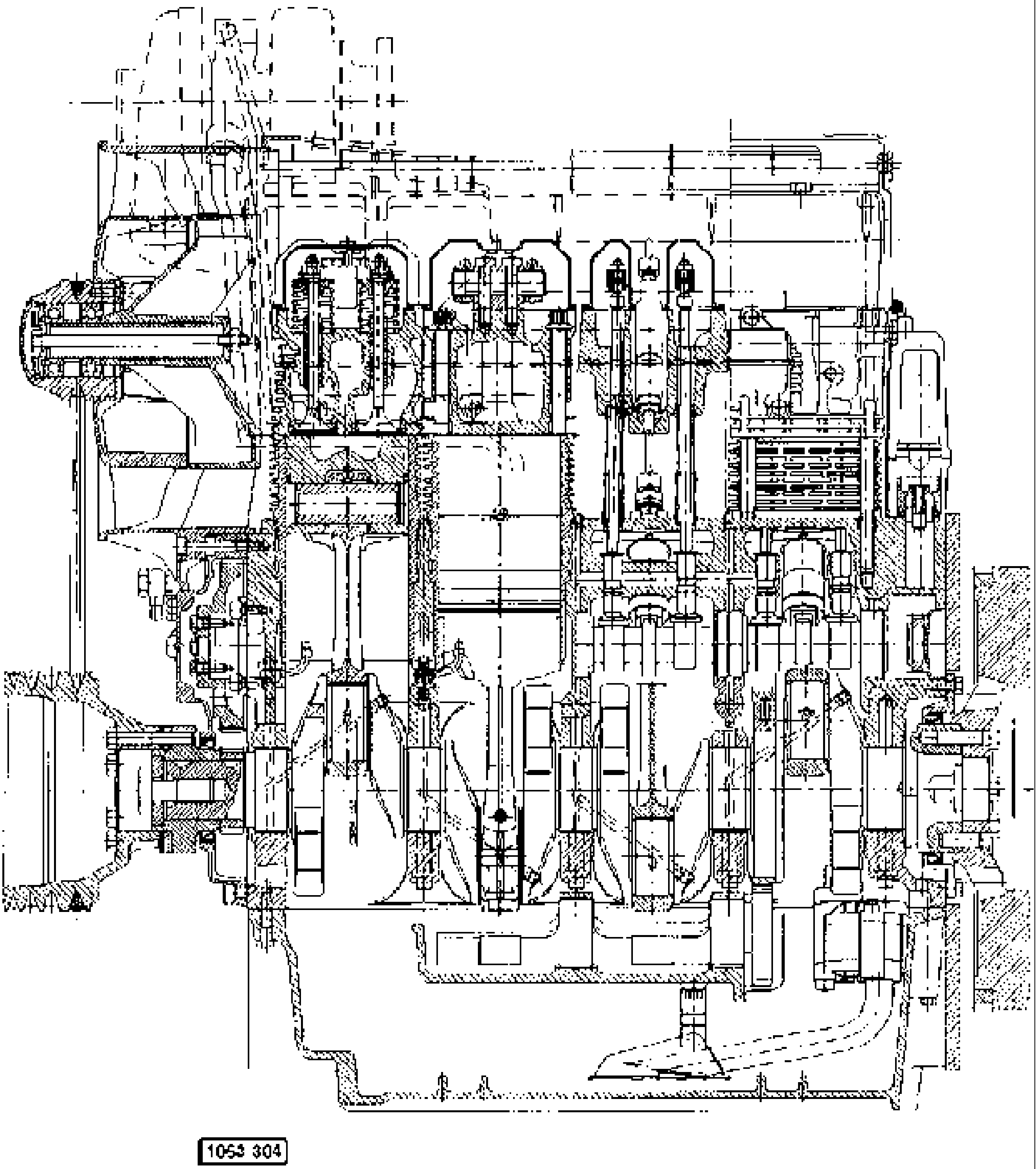


Fig. 4 - ***SILVER 90 –*** Longitudinal section - 4 cylinders.

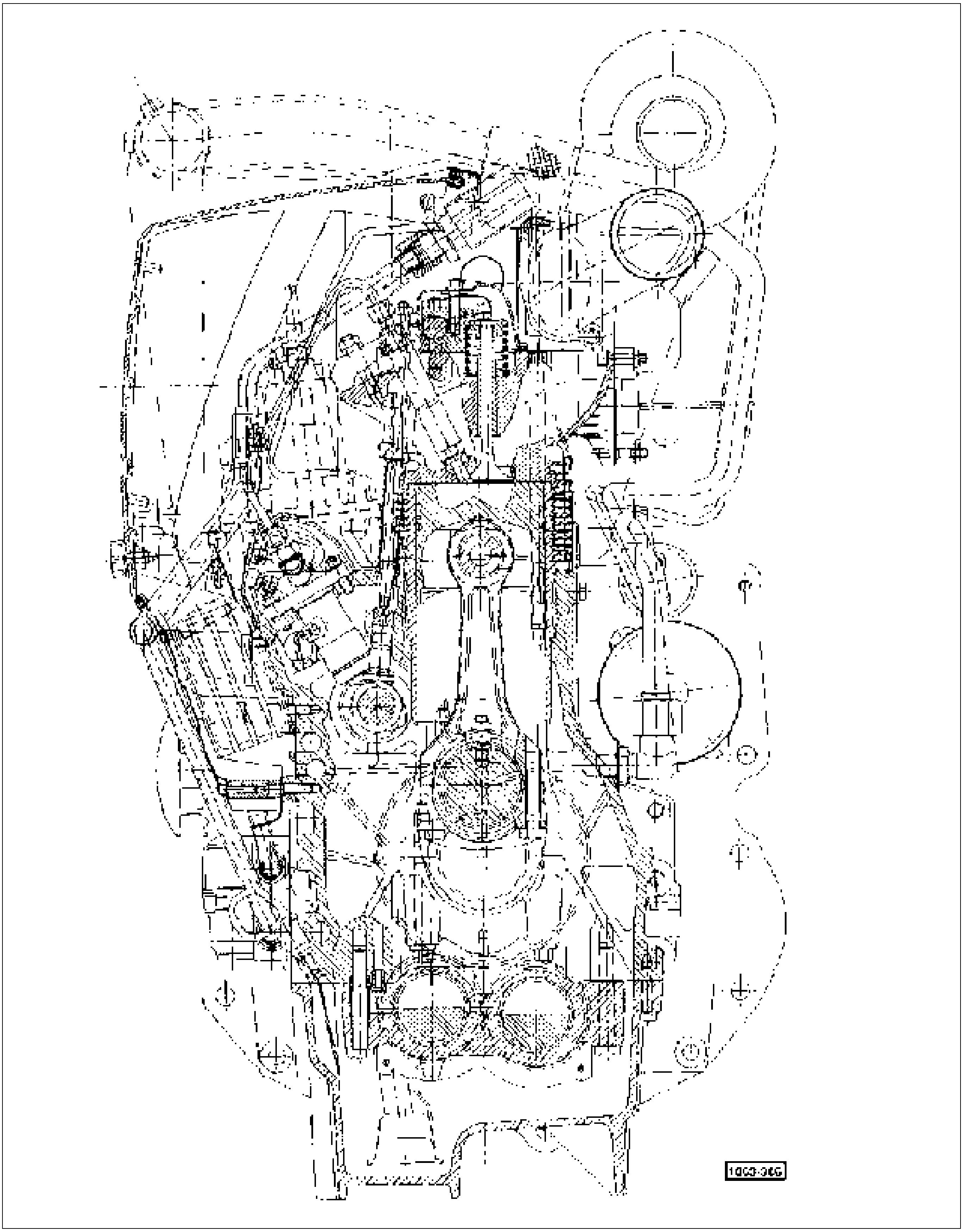


Fig. 5 - ***SILVER 100.4*** - Engine cross section - 4 cylinders.

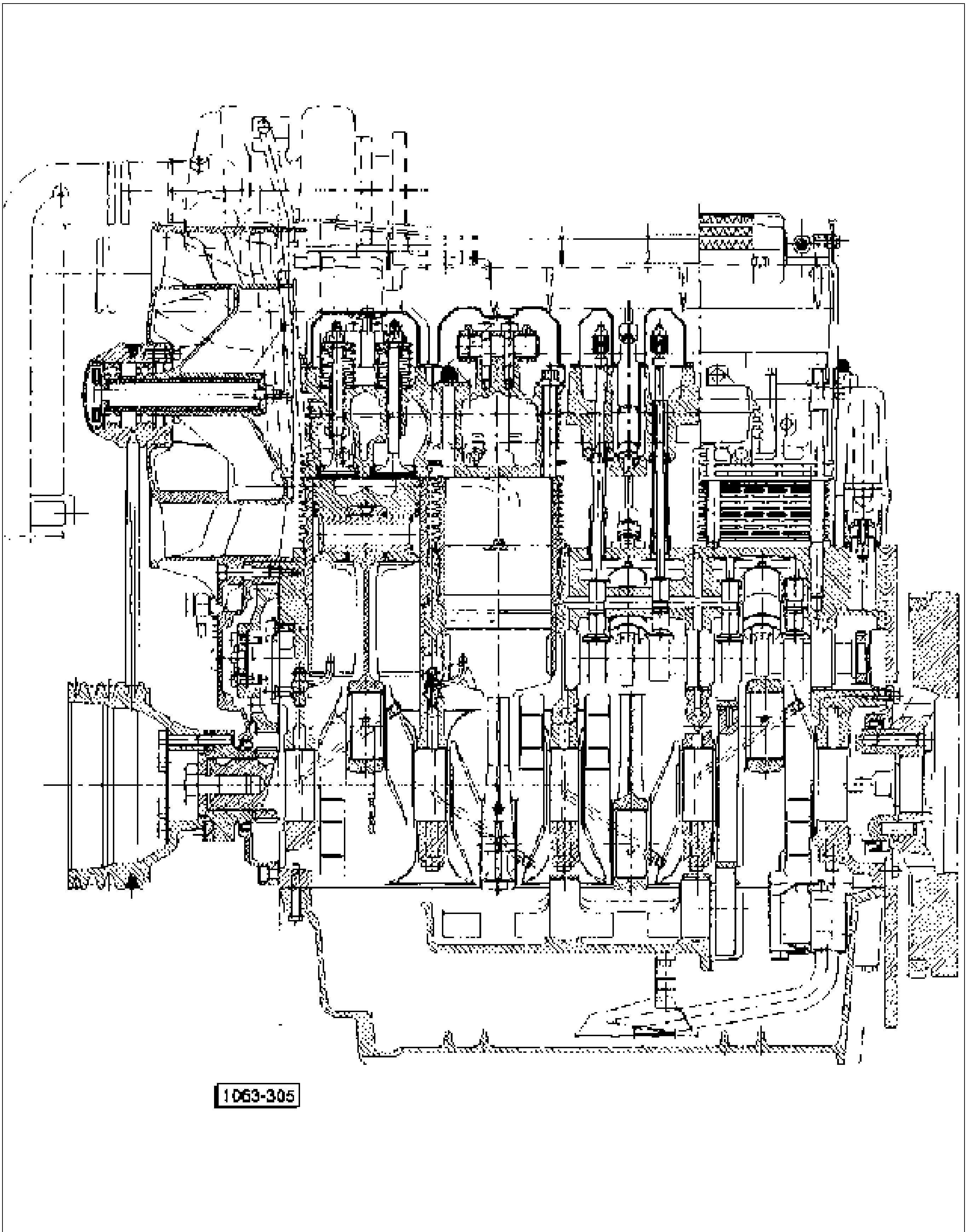


Fig. 6 - ***SILVER 100.4*** - Longitudinal section - 4 cylinders.

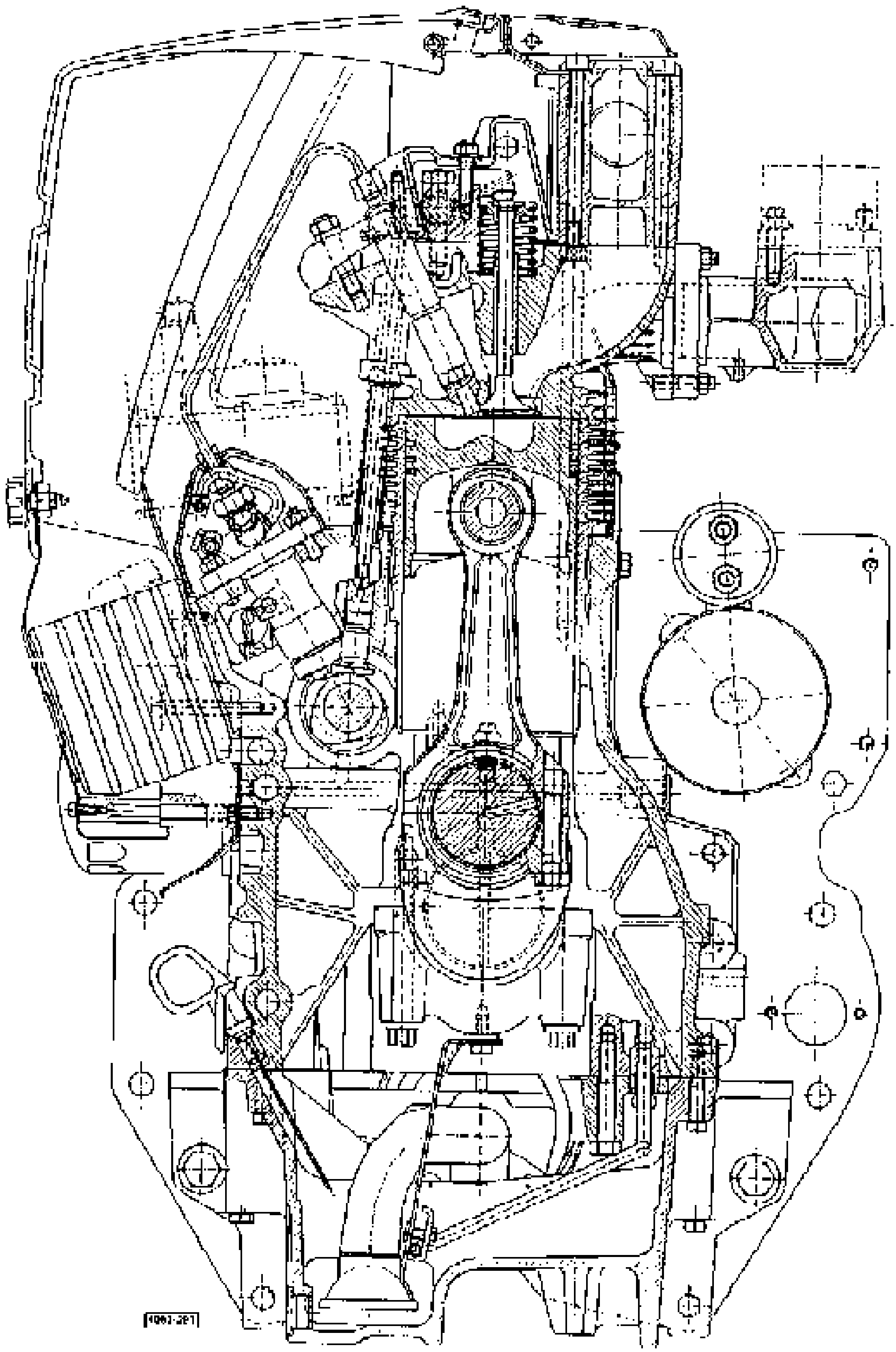


Fig. 7 - ***SILVER 100.6*** - Engine cross section - 6 cylinders.

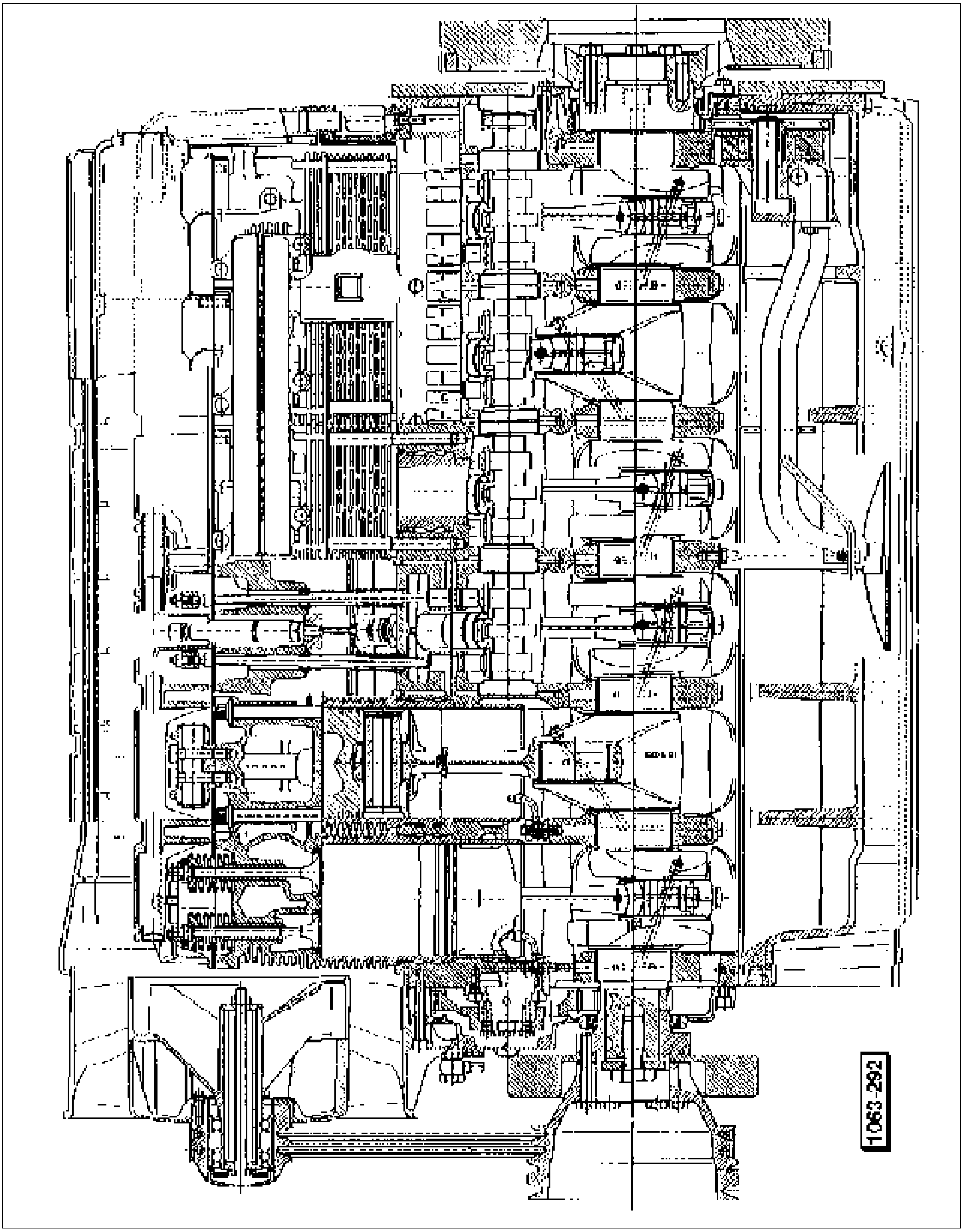


Fig. 8 - ***SILVER 100.6*** - Longitudinal section - 6 cylinders.

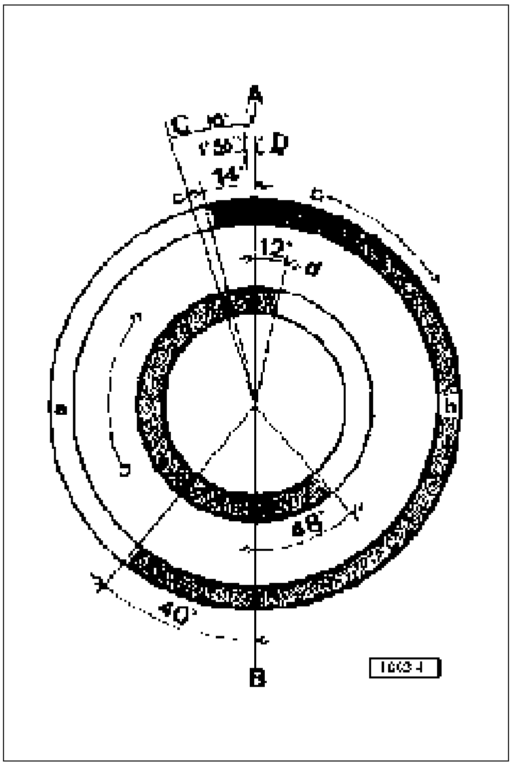
1 engine

general information

		Silver 80	Silver 90	Silver 100.4	Silver 100.6
ENGINE					
type		1000.4-A$_4$	1000.4-AT$_2$	1000.4-ATI$_1$	1000.6A$_1$
ciyle		diesel			
strokes		4	4	4	4
turbocharging		-	turbo	turbo	-
injection		DIRECT			
cylinder No		4	4	4	6
cylinder arrangement		IN LINE			
bore and stroke	mm	105 x 115,5			
stroke / bore ratio		1,1			
displacement	cm^3	4000,44	4000,44	4000,44	6000,66
compression ratio		17:1	16:1	16:1	17:1
max. output	HP CUNA	80	90	100	100
	KW	59	66	74	74
peack horsepower speed	r.p.m.	2500			
max. torque	Nm	274	328	375	367
	kgm	27,9	33,5	38,2	37,4
max. torque speed	r.p.m.	1400			
specific horsepower	kW/l	20	22,5	25	16,7
cooling		by air			
low idling speed	r.p.m.	650-700			
peak speed	r.p.m.	2680-2710	2680-2710	2680-2710	2680-2710
minimum lubricating oil pressure					
low idling speed (hot oil)	bar	≥0,5			
high idling speed (hot oil)	bar	≥3,5			
oil filter with replaceable cartrige	n.	1	1	1	2
type		044.1567.0	2.4419.340.0	2.4419.340.0	044.1567.0
filtering capacity	μ	15			
injector type		2.4729.140.0			
injector-holder type		KBEL 100 S 31			
calibration pressure	bar	180			
fuel filter		with replaceable cartrige			
type		2.4319.230.0	2.4319.230.0	2.4319.230.0	2.4319.240.0
valve arrangement		in-line vertical			
engine air filter		8"			
type		dry			

A - Top dead centre (TDC)
B - Bottom dead centre (BDC)
C - Injection advance
D - Valve overlap

a - Intake
b - Exhaust
c - Opening
d - Closing



Timing diagram

timing			by overhead valves and camshaft fitted into engine block
valve arrangement			vertical in-line
intake valve			
- opening before TDC			14°
- closing after BDC			40°
exhaust valves			
- opening before BDC			48°
- closing after TDC			12°
clearance between valves and rockers (cold engine)	mm	.	0.20
valve overlap (valve balancing)			1°55’
injection advance (geometric) before TDC			16°
piston stroke as to injection advance	mm		2.92

The valve opening and closing values indicated are the operating ones. With cold engine, these values apply to timing adjustment only after correcting the clearance between valves and rockers to 0.25 mm.

1 engine

lubrication system - specifications

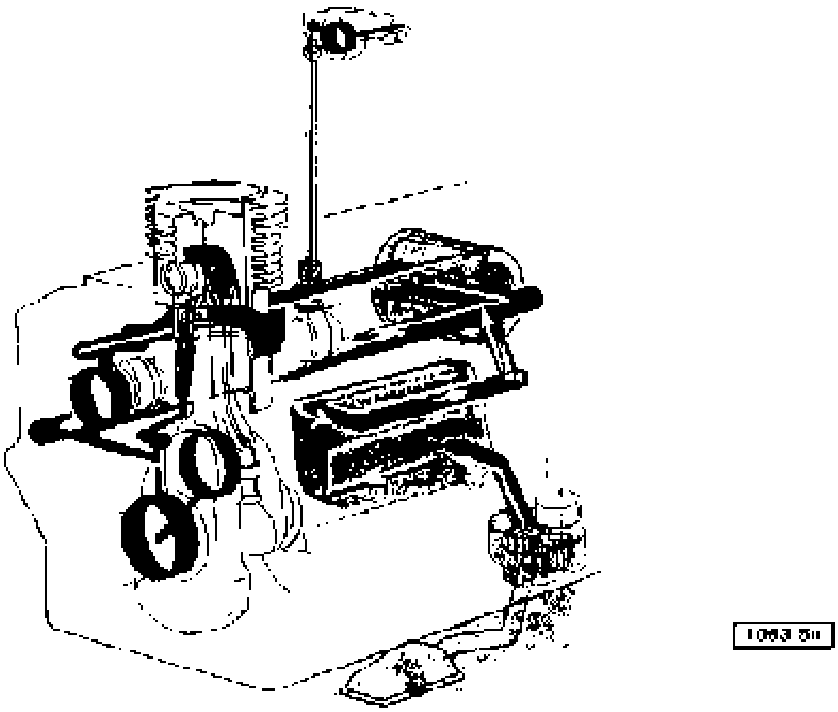


Fig. 9 - Lubrication diagram.

engine type		1000.4-A4	1000.4-ATI1 1000.4-AT2	1000.6-A1
lubrication			forced-type, gear pump-driven	
		and by camshaft controlled		and by crankshaft controlled
oil pump		065.1560.6/10	065.1560.6/10	007.0983.4
pump delivery rate at 2500 engine r.p.m. (dm^3/60 sec)	l/min	35	35	90
pressure relief valve calibration	bar	4,9÷5,9	4,9÷5,9	4,9÷5,9
piston cooling nozzle calibration	bar		1,5	
minimum lubricating oil pressure (hot oil)				
at low idling speed	bar		≥ 0,5	
at high idling speed	bar		≥ 3,5	
replaceable cartridge oil filter	n	1	1	2
type		044.1567.0	2.4419.340.0	044.1567.0
filtering capacity	μ	15	15	15
total filtering surface	cm^2	4000	4000	8000
oil sump capacity	(dm^3) l	11	11	15,5
oil radiator	no.	007.1679.3	007.1679.3	007.0775.3
type		4rows type	4 rows type	6 rows type
supplementary oil cooler type			009.7169.2 2 rows type (for 100 HP models only)	

fuel supply		by diaphragm pump
fuel pump ref. code	*SILVER 80 - 90 - 100.4*	2.4519.300.0
	SILVER 100.6	2.4519.310.0
pump delivery when pressure inside the circuit changes from 0 to 0.4 bar and engine is at peak speed (dm^3/h) l/h		
	SILVER 80 - 90 - 100.4	100
	SILVER 100.6	130
injection		by single-cylinder, immersed-type pump and camshaft-controlled plungers
- manufacturer		BOSCH
- type	1^{st} version	PFR 1K 90 A 503
	2^{st} version	PFR 1K 90 A 517
	3^{st} version	PFR 1K 90 A 542
- number of pumps used	4 cylinder engine	4
	6 cylinder engine	6
- injection order	4 cylinder engine	1-3-4-2
	6 cylinder engine	1-5-3-6-2-4
- plunger diameter	mm	9
- injection system residual calibrating pressure	bar	70
injectors		
- manufacturer		BOSCH
- injector type		DLLA 150 S 925
- injector holder type		KBEL 100S 31
- rated calibration pressure	bar	180
- injection pipe inside diameter	mm	1,5
cylinder pressure at sea level at 150 r.p.m. (with hot oil) measured by equipment no. 5.9030.500.6/10	bar	25÷30
dry air filter		
- filter ref. code		2.4249.420.0
- filter diameter		8"
fuel filter		with replaceable paper cartridge
- filter ref. code	*SILVER 80 - 90 - 100.4*	2.4319.230.0
	SILVER 100.6	2.4319.240.0
- filtering capacity	μ	1,5÷2

turbocharging - specifications

For SILVER 90 - 100.4 only
Before arriving at the combustion chamber, the air is passed through a heat exchanger where it is cooled and its specific gravity is increased in order to improve combustion and thus engine performance.

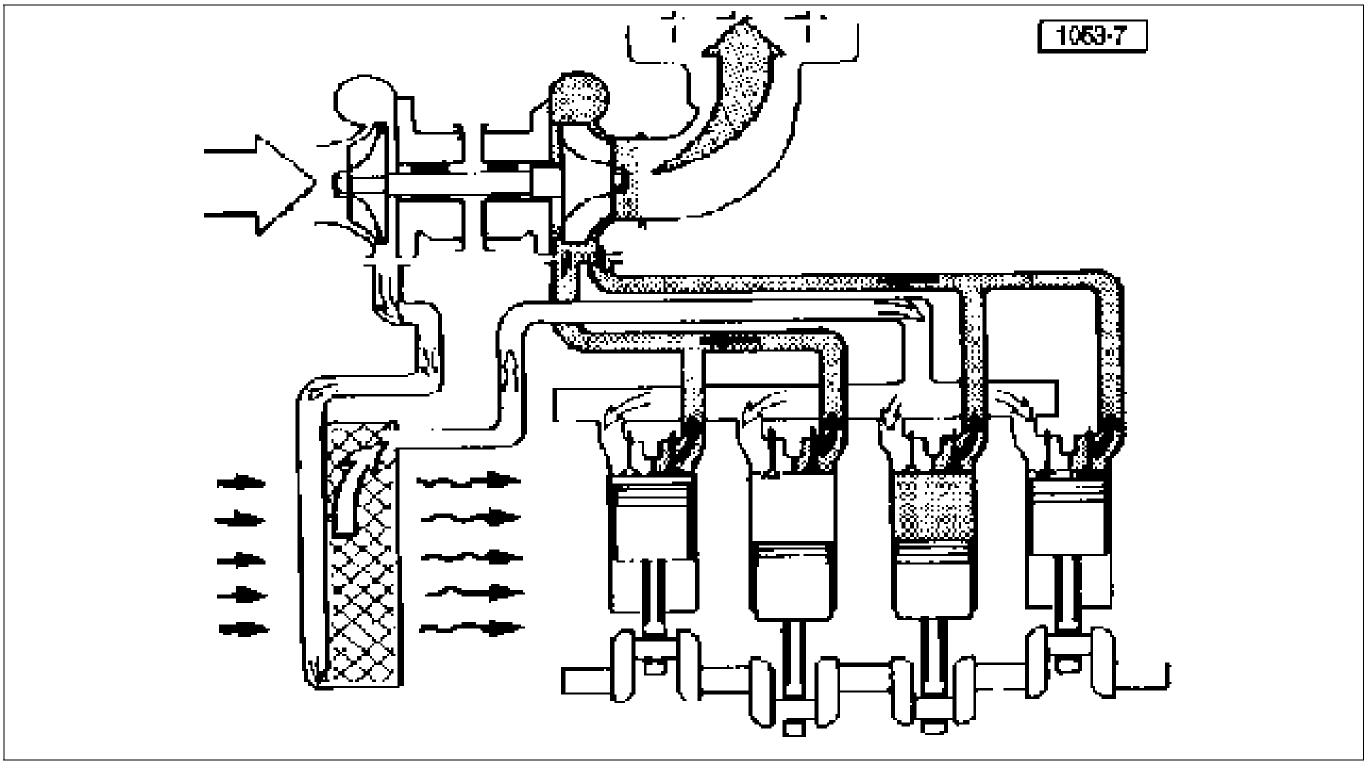


Fig. 10 - Turbocharger.

		SILVER 90	SILVER 100.4
turbine manufacturer		GARRETT TA31-50/0.82 A/R 57	SCHWITZER S 2A/61.17AL/060 W6
ref. code		007.0790.4	007.0921.4
compressor and turbine		with radial wheel	
impeller shaft		on floating bearings with oil seals	
lubrication system		linked to engine oil lubrication system	
operating revolving speed	r.p.m.	55.000 ÷ 85.000	
mean pressure in the duct at compressor exit:			
- at 1400 engine r.p.m.	bar	0.4	0.53
- at 2500 engine r.p.m.	bar	0.9	1.05
air flow rate under operating conditions:			
- at 1400 engine r.p.m.	m^3/sec	3.1	3.3
- at 2500 engine r.p.m.	m^3/sec	6.5	7.8
air temperature inside intake manifold:			
- at 1400 engine r.p.m.	°C	70°C	38°C
- at 2500 engine r.p.m.	°C	110°C	63°C

The cooling system consists of a ventilation unit composed by a fan, a stator and an air conveyor.

This system ensures high thermodynamic efficiency as well as prompt engine power availability after a cold start.

fan		with aluminium blades
fan diameter	mm	320
fan blade number		13

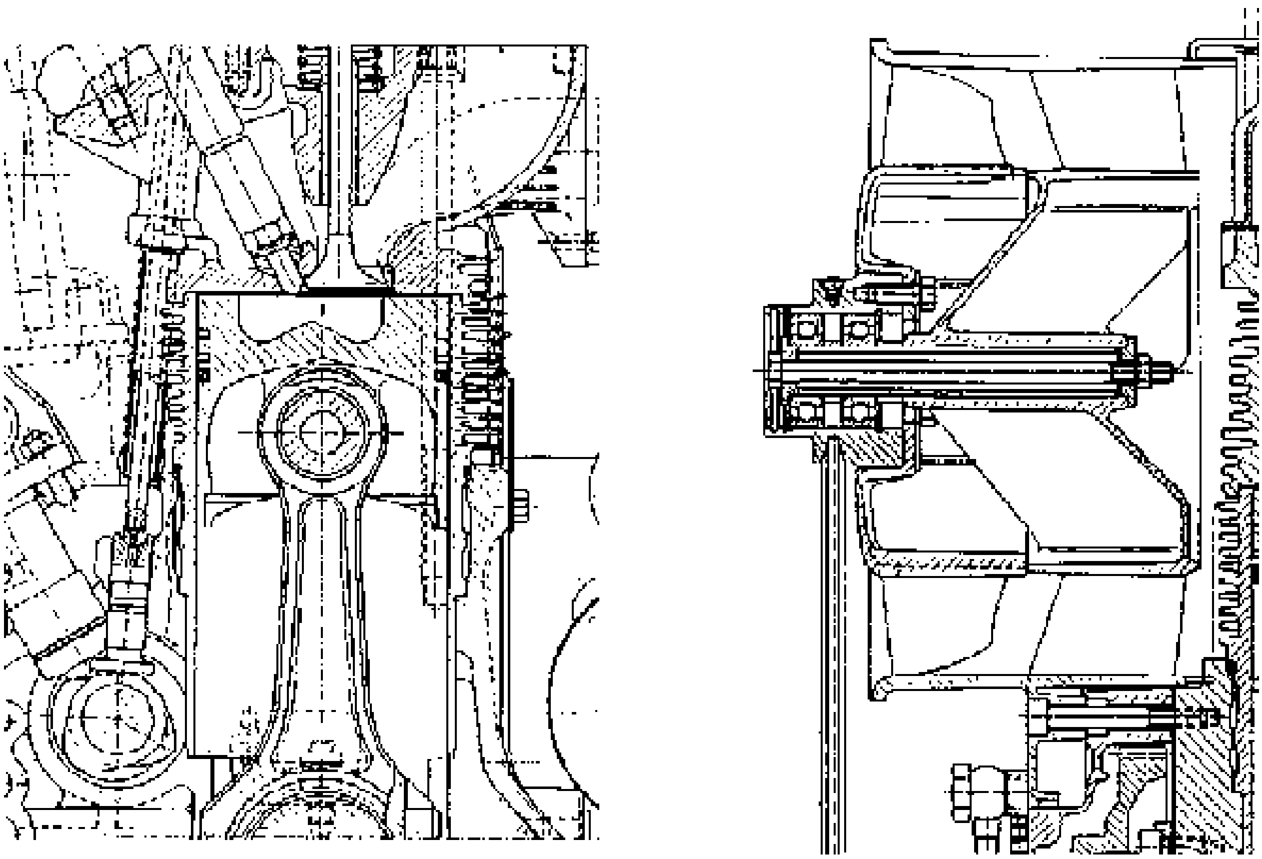


Fig. 11 - Cooling system.

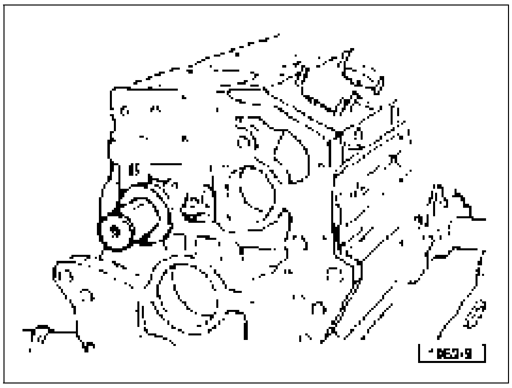


Fig.1 - Engine cylinder block.

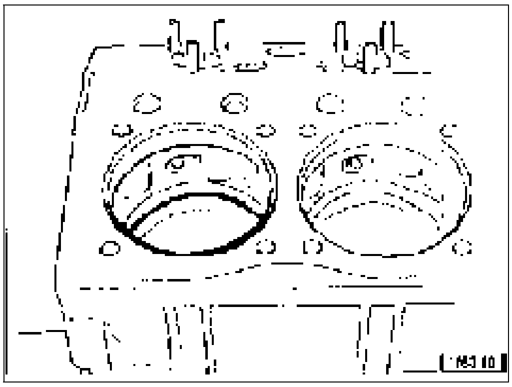


Fig. 2 - Oil chamber for cylinder cooling.

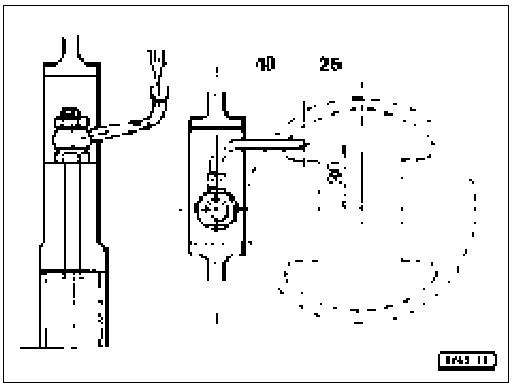


Fig. 3 - Piston cooling nozzles.

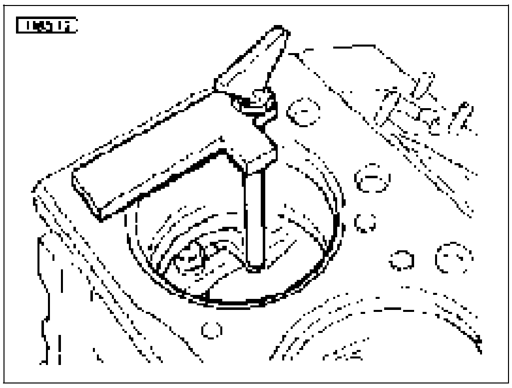


Fig. 4 - Piston cooling nozzle assembly.

Engine cylinder block

The one-piece engine cylinder block is a particularly sturdy casting. All oil passages necessary to piston lubrication and cooling are directly machined in it.

Whenever the engine is stripped, ensure that all passages are not obstructed. If necessary perform a thorough cleaning by compressed air after the block has been soaked in a water and soda or Diesel oil bath for some time, and all passage caps have been removed.

It is most important to make sure that neither the piston cooling nozzles nor the cylinder bottom cooling throats are obstructed as this could prevent the engine from running smoothly.

If the piston cooling nozzles have been removed, pay particular attention on reassembly so as to avoid any interference with piston stroke, since this would certainly result in a serious engine damage. For this reason we recommend using the special tool no. 5.9030.658.4, enabling the nozzles to be correctly positioned.

The tappet seat surfaces should be completely smooth.

Tappets must be fitted before installing the camshaft and with the cylinder block overturned. After fitting tappets, ensure these can move freely.

Installing bushings into the camshaft journals

Ascertain the camshaft journal bushings are correctly positioned, i.e. thoroughly aligned with the oil passages machined in the cylinder block.

Bushings should be positioned so that they may recess about 2 mm from the holes in the block, except the last bushing on flywheel side which should be flush with the block wall.

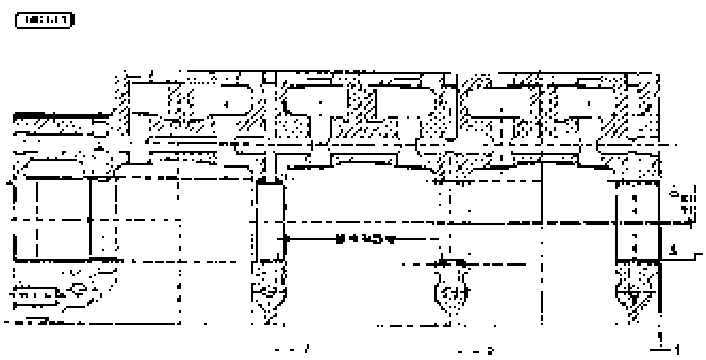


Fig. 5 - Camshaft journal bushings.

Adjusting backlash between the gear teeth of the auxiliary engine drive.

Maximum horsepower drawn should never exceed 30 HP.

Between engine plane and application base fit a number of shims to allow a 0.1 to 0.2 mm backlash may take place between the gear teeth.

The pack of shims should be put together by alternating metallic and isogene shims, the first and the last shims being of isogene (the first metal shim on engine side shall be 0.5 mm).

After dismantling the timing case gears, provision shall be made for a new timing keeping to the instructions given on page 84 prior to reassembly.

Make sure the idler gear shoulder rings are not excessively worn; also check the pin surface and the gear inside face for scoring.

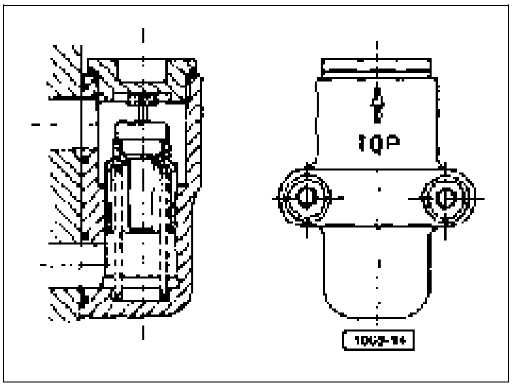


Fig. 6 - Engine oil thermostat.

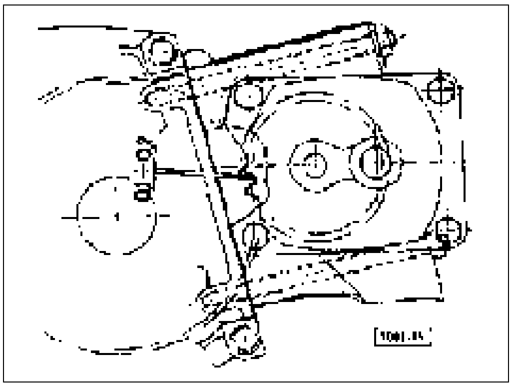


Fig. 7 - Drive gear toothing backlash.

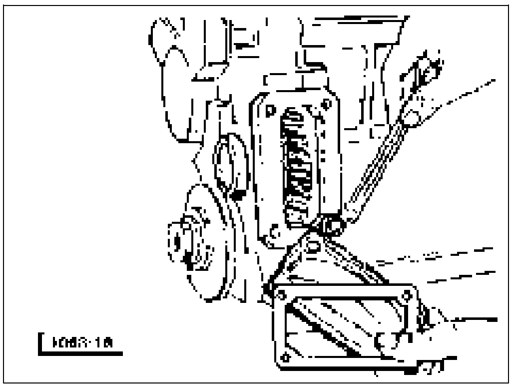


Fig. 8 - Aligning the timing case with the cylinder block.

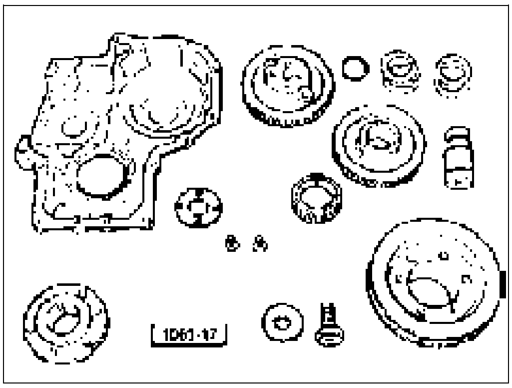


Fig. 9 - Timing case stripped components.

Air compressor or hydraulic pump support located between cylinder block and timing case.

The timing case is forged into an aluminium-based light alloy.

The use of no. 5.9030.634.0 tool is indispensable to obtain a thorough concentricity of the sealing ring to the crankshaft as well as the coplanarity of the auxiliary drive fixing surfaces.

On assembly true the case onto the idler gear pin after properly interposing the seal between timing case and cylinder block; then fit the screws without tightening fully.

Remove excess seal; use no. 5.9030.634.0 tool to obtain a thorough screw tightening. Remove the tool.

If pumps are removed from support, it will be necessary to apply some MOLYCOTE RB2 grease to lubricate the joint splines.

Should it be necessary to remove the support flange too, place bushing **A** as shown in figure 10 to perform reassembly.

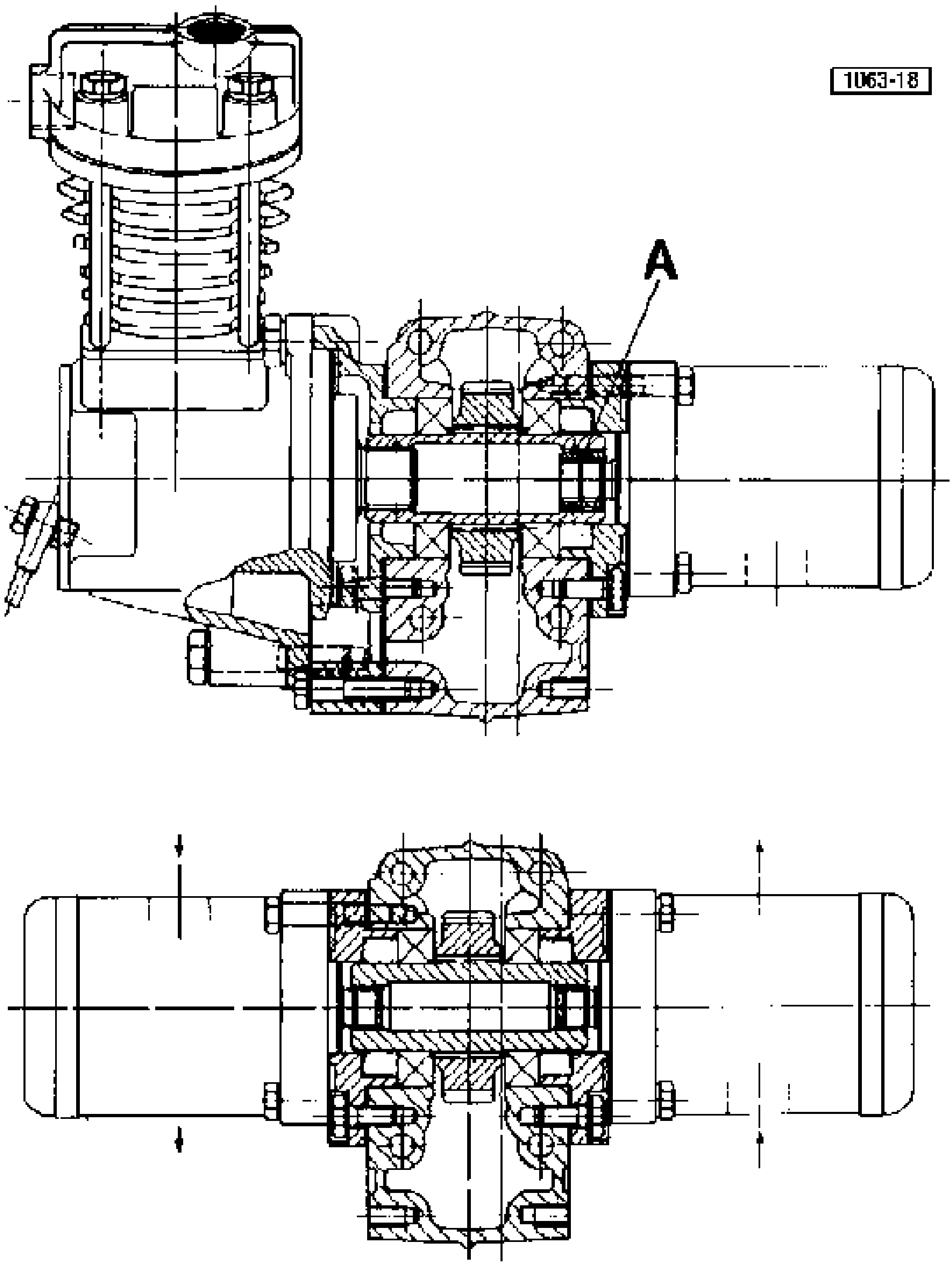


Fig. 10 - Auxiliary drive for either hydraulic pumps or air compressors.

Timing idler gear

Use a magnetic base dial gauge to check for correct tooth backlash between idler, engine gear and timing gear.

This backlash should not exceed 0.10 mm; otherwise the idler gear should be replaced by another one having the same thickness as the tooth located on the different pitch diameter, so that a correct tooth backlash may be established.

Identification among gears is provided with marks of different colours (either RED or YELLOW or GREEN) as illustrated in figure 11.

To each colour corresponds a well-defined tooth thickness value.

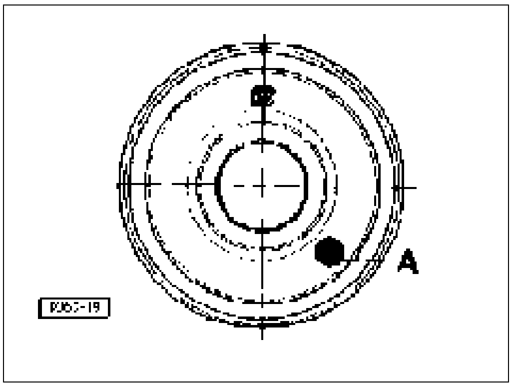


Fig. 11 - Timing idler gear.
A - Identification mark

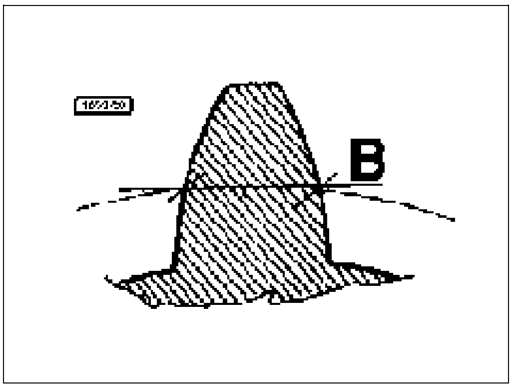
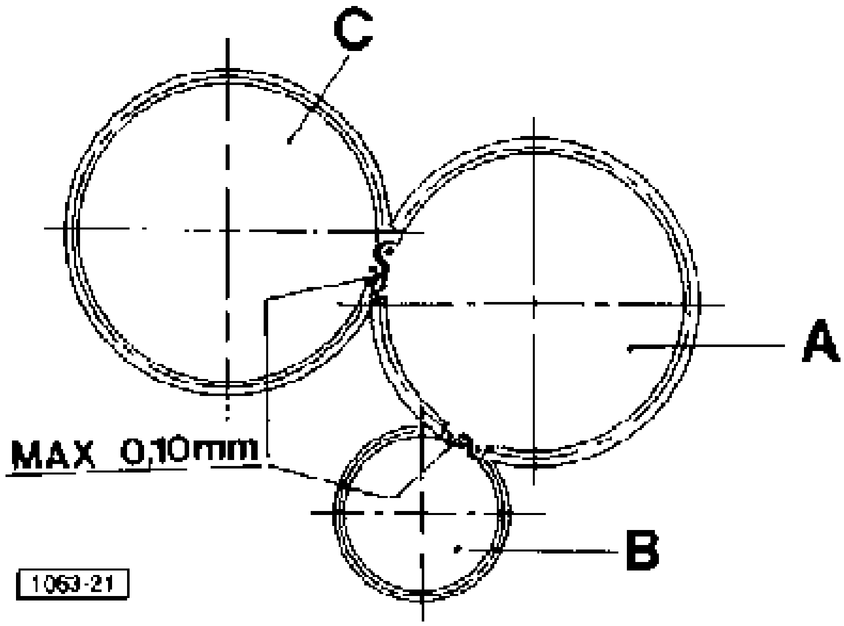


Fig. 12 - Gear toothing.
B - Gear tooth thickness

tooth thickness on the pitch diameter

ref. code 007.1177.0	RED colour	$= 3.829\ ^{-0.088}_{-0.044}$
ref. code 007.1178.0	YELLOW colour	$= 3.829\ ^{-0.009}_{-0.053}$
ref. code 007.1179.0	GREEN colour	$= 3.829\ ^{-0.018}_{-0.026}$



A - Idler gear **B** - Cranshaft driving gear **C** - Timing driving gear

Fig. 13 - Timing gear.

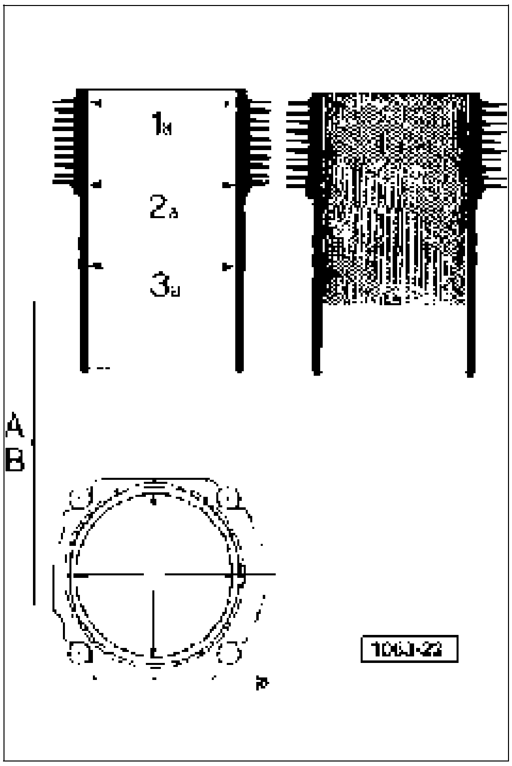


Fig. 1 - Cylinder wear check diagram.

Cylinders

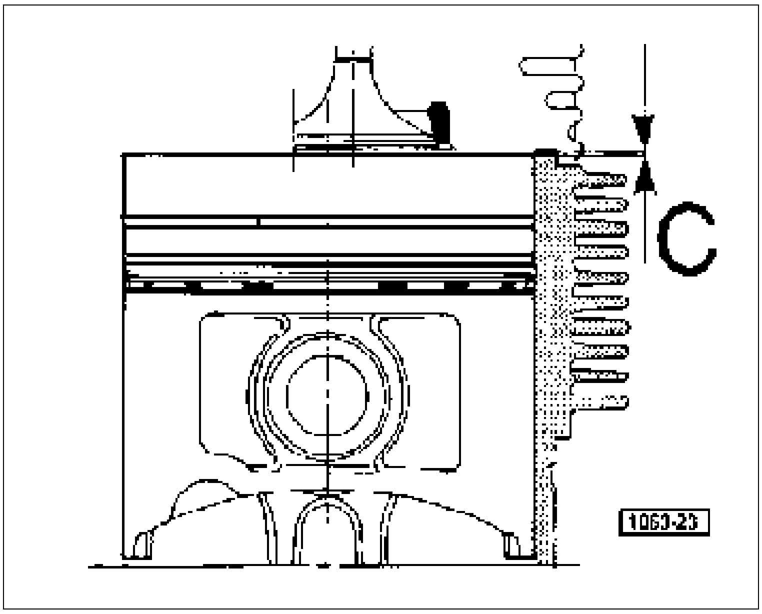


Fig. 2 - Cylinder-to-piston position.

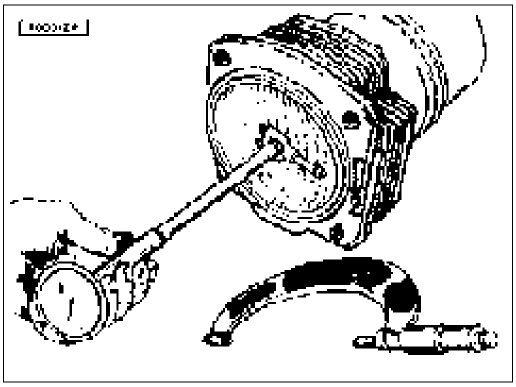


Fig. 3 - Measuring cylinder diameter.

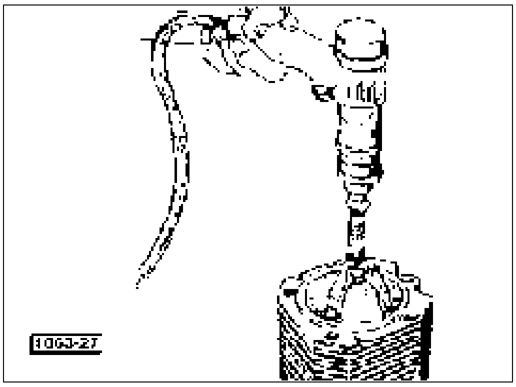


Fig. 4 - Cylinder inside roughening with No. 5.9030.349.0 equipment.

Overall cleaning

After removal, clean the cylinders with water and soda or Diesel oil; also perform a torough cleaning of the cylinder block parts forming the oil chamber for cylinder cooling.

Checking cylinders

Examine the cylinder surfaces for scoring, ovalization, taper and excessive wear.

An acceptable cylinder wear gives the cylinder a light tapered shape; but if barrel-shape wear is noticed, the cylinder should be replaced.

Measurements are to be taken on each single cylinder at three different levels, and also on to planes perpendicular to each other.

If the diameter measured is above the maximum wear limit, the cylinders should be replaced.

Whenever the piston rings are replaced because of excessive wear, also inspect the cylinder internal surface; if this is completely smooth, cylinder reboring will be necessary to permit the new piston rings to be properly bedded. Use the special tool to perform a swift to-and-fro movement along the cylinder internal wall in order to score the inner cylinder surface as shown in figure 1.

Using the following equipment:

5.9030.627.0	centesimal dial gauge
5.9030.433.0	dial gauge base
5.9030.631.4/10	cylinder pressing tool

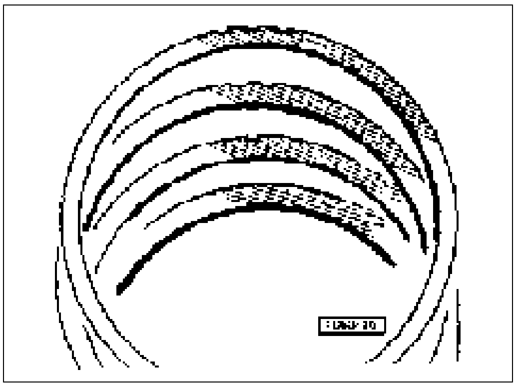


Fig. 5 - Cylinder head gasket.

ensure the piston crown at T.D.C. recesses from the head gasket bearing surface (see Fig. 6).

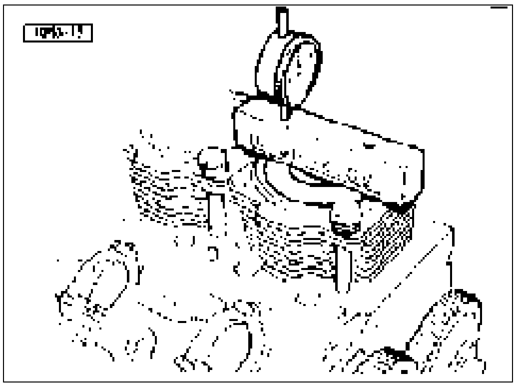


Fig. 6 - Checking piston position at T.D.C.

Move the dial gauge base until the gauge feeler lies on the cylinder surface and take reading from the dial.

Reset the dial gauge.

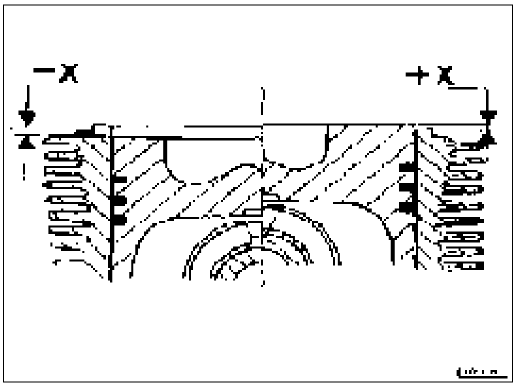


Fig. 7 - Determining the engine cylinder head gasket thickness.

Place the base so that the gauge feeler lies on the piston head at T.D.C. and take reading.

Choose the gasket to be fitted according to reading taken (also refer to item D in the table here below).

	Ø machining	Ø max wear
A inside diameter measured half-way along the cylinder mm	105.000 ${}^{-0}_{+0,022}$	105.100
B roundness errormm	0.020	0.080
C piston recess from the head gasket bearing face on cylinder mm	0.30÷0.40	
D determination of head gasket	thickness x reading	gasket thickness
gasket ref. code 0.085.1450.0 mm	-0.562 ÷ -0.300	0.5 without locating notches
gasket ref. code 0.085.1451.0 mm	-0.290 ÷ -0.110	0.7 with 1 locating notch
gasket ref. code 0.085.1453.0 mm	-0.100 ÷ +0.020	0.8 with 3 locating notches
gasket ref. code 0.085.1452.0 mm	+0.030 ÷ +0.178	1 with 2 locating notches

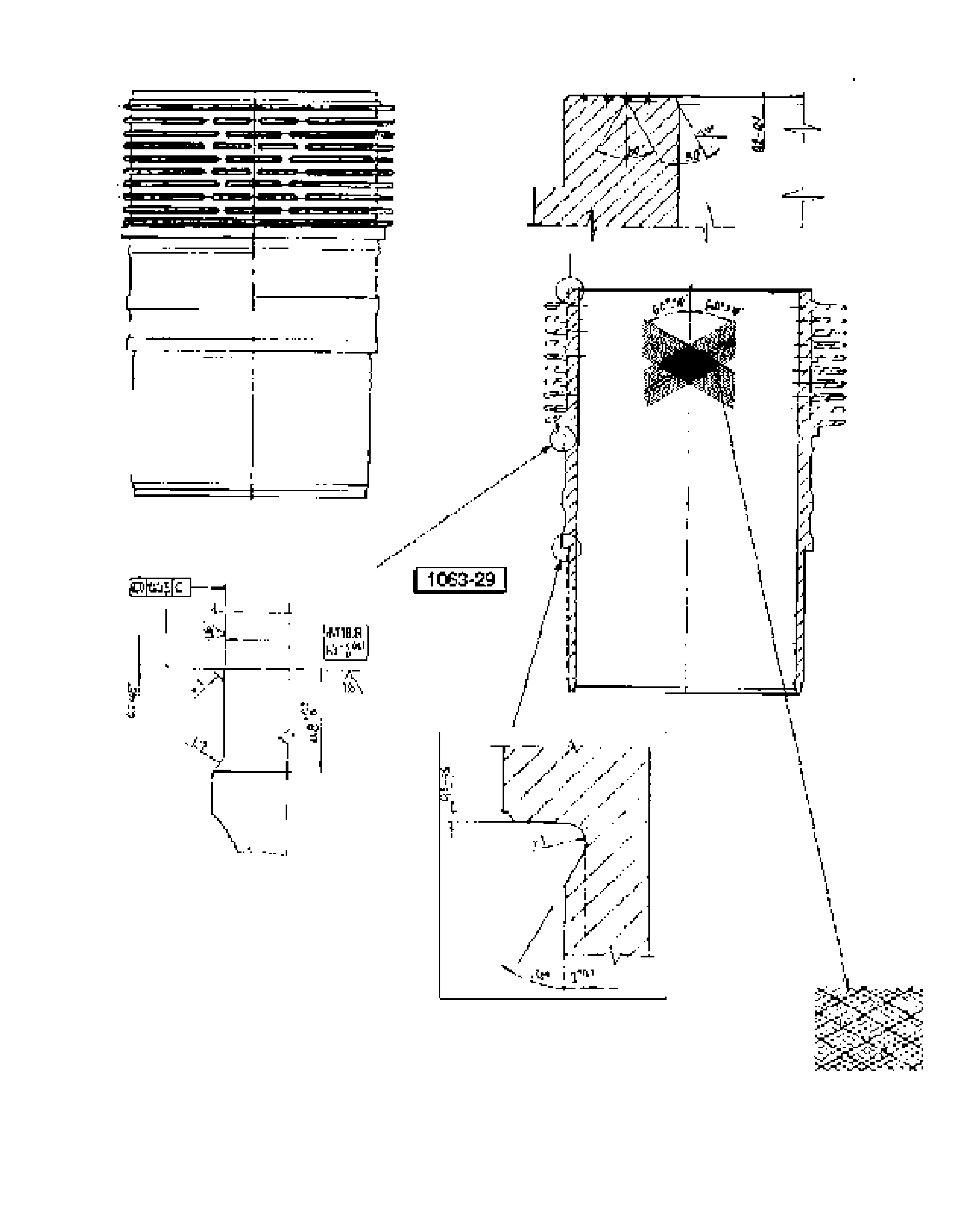


Fig. 8 - Engine cylinder.

Main bearings

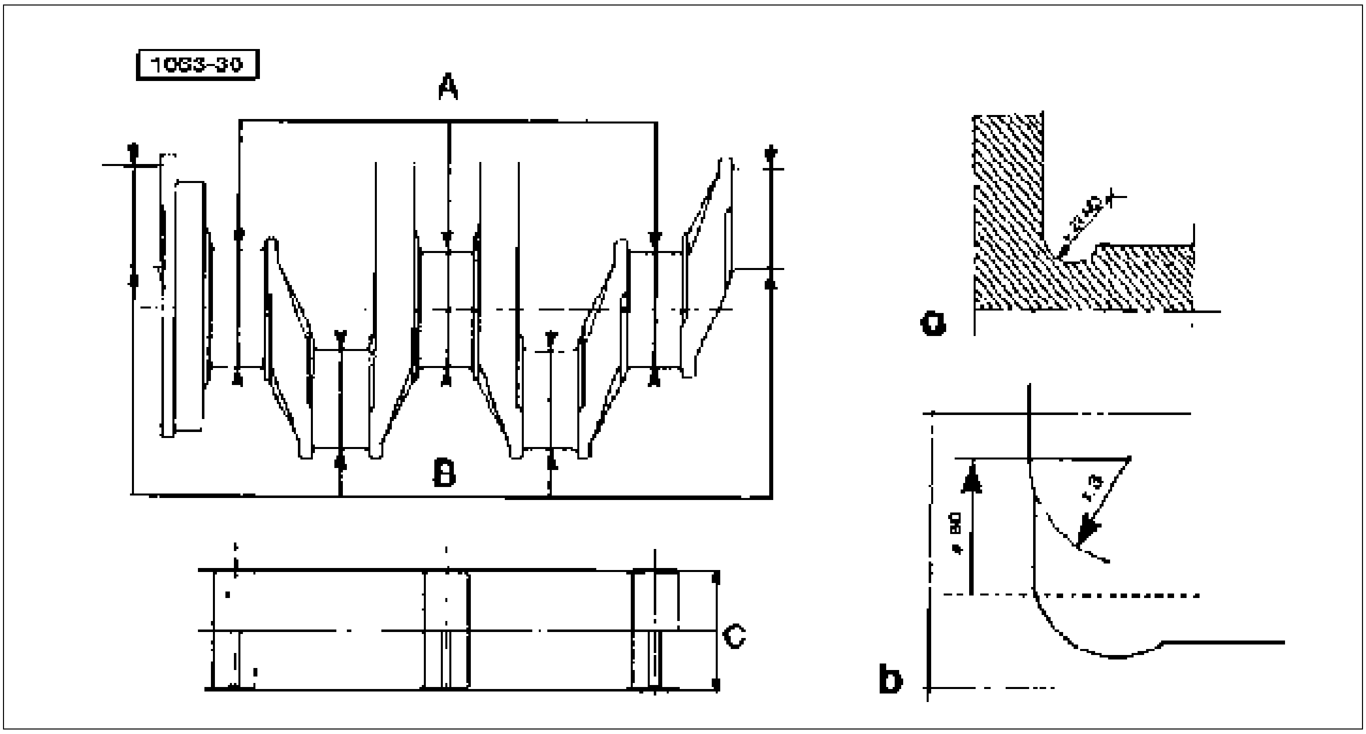


Fig. 9 - Crankshaft and main bearing dimensions.
a crankshaft main journal and big end journal machining.
b crankshaft tail journal machining.
c main bearing inside diameter

		Ø machining	Ø max. wear
— **A main journal diameter**	mm	$70.000^{-0.020}_{-0.040}$	69.900
— 1st grinding	mm	$69.750^{-0.020}_{-0.040}$	69.650
— 2nd grinding	mm	$69.500^{-0.020}_{-0.040}$	69.400
— max. journal taper allowed	mm	0.020	0.050
— max. main journal ovality allowed	mm	0.005	0.050
— max. journal boring diameter	mm	$74^{\ 0}_{-0.030}$	
— **B big end journal diameter**	mm	$63.500^{\ 0}_{-0.020}$	63.400
— 1st grinding	mm	$63.250^{\ 0}_{-0.020}$	63.150
— 2nd grinding	mm	$63.000^{\ 0}_{-0.020}$	62.900
— big end journal cilindricity	mm	0.020	0.050
— big end journal out-off-roudness	mm	0.005	0.050
— **C main bearing inside diameter**	mm	$70.000^{+0.018}_{+0.068}$	70.130
— 1st undersize	mm	$69.750^{+0.018}_{+0.068}$	69.880
— 2nd undersize	mm	$69.500^{+0.018}_{+0.068}$	69.650
— **crankshaft end play**	mm	0.105÷0.300	0.500

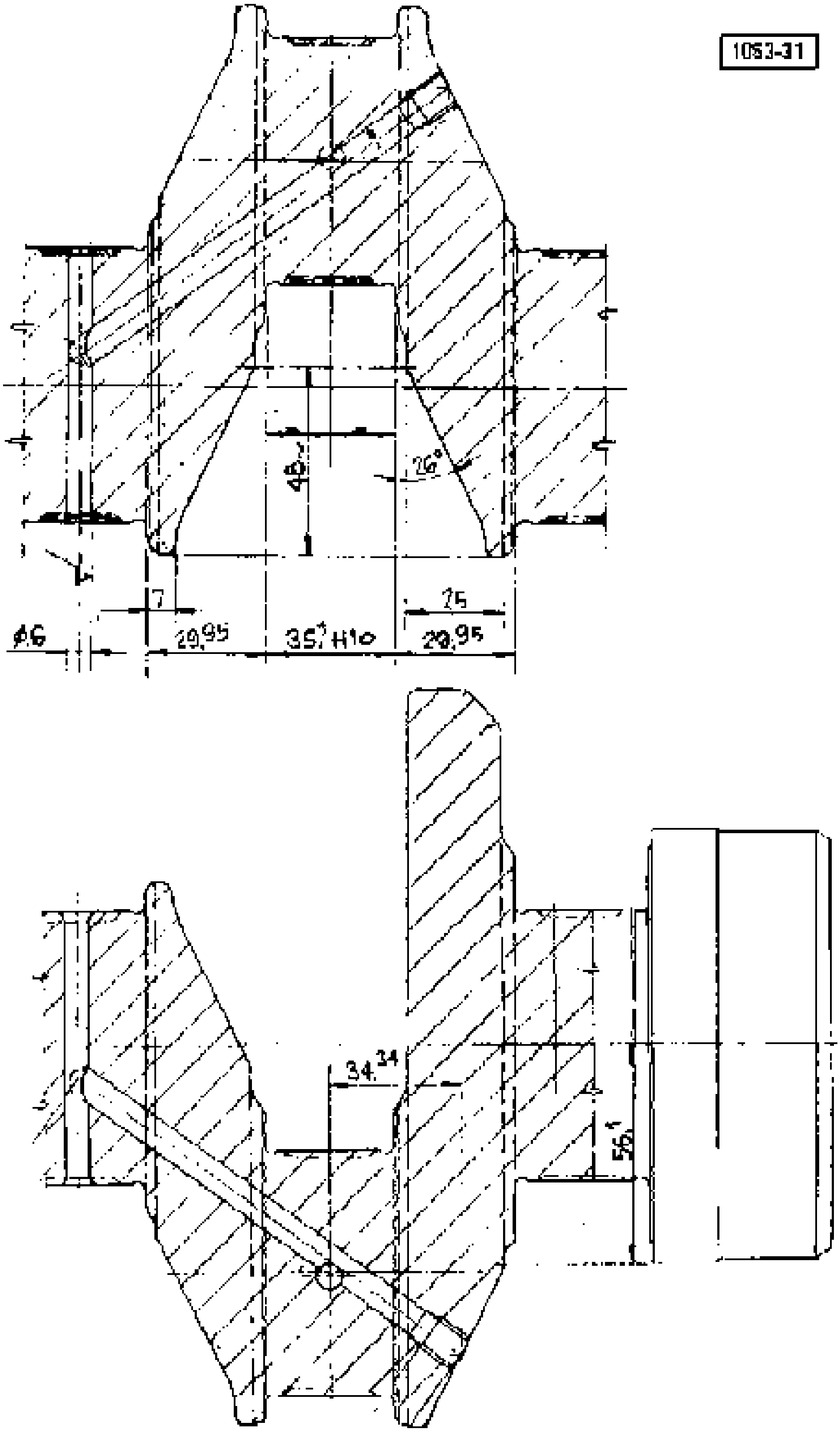


Fig. 10 - 6 - cylinder engine cranshaft.

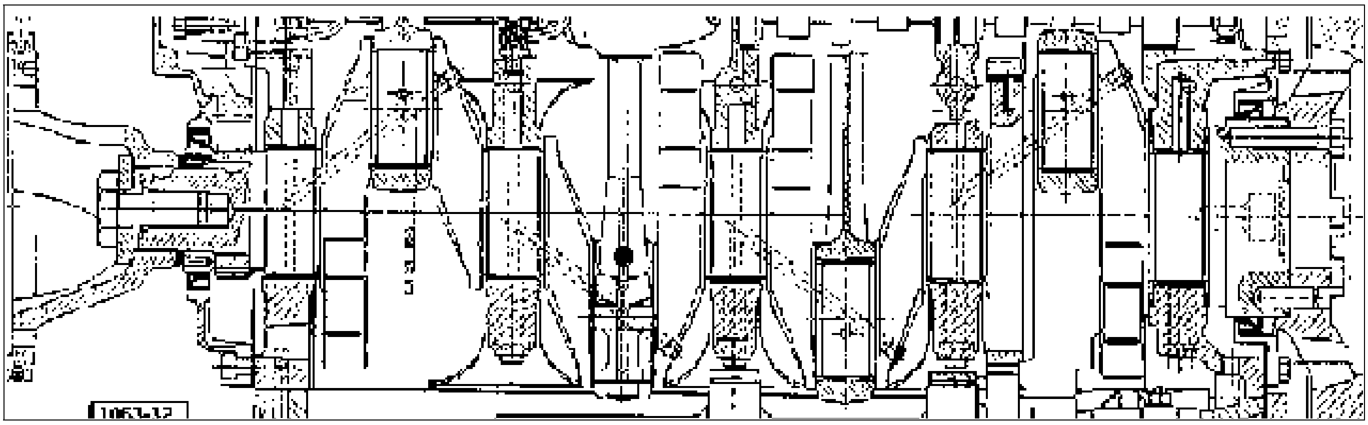


Fig. 11 - 4-cylinder engine crankshaft assemblcrankshaft

Crankshaft

The crankshaft is in nodular cast iron.
All operations must be carried out in compliance with the following standards:

1 - Metalloscope inspection of 100% of pieces; cracks are not permissible.

2 - When grinding the crankshaft, it should preferably rotate in the opposite direction to its normal rotation in the engine, but rotation in the same direction is permissible. During the polishing operation, however, the crankshaft must rotate only in the same direction as it normally rotates in the engine.
The surfaces must be polished and totally free of machining marks.

NB: the permitted values for crankshaft grinding are given on page 29.

3 -The emerging Ø6 mm oilways must be chamfered with a radius of 1.5 mm, and these chamfers must be free from machining marks.

4 - Round off all sharp edges.

5 -The crankshaft (complete with ring gear, in the case of 4-cylinder engines) and Ø12 mm dowel, must be balanced both statically and dynamically. The maximum permissible unbalance on the end supports is 150 g cm.

6 - Before assembly, degrease and thoroughly clean the crankshaft, including the oilways.

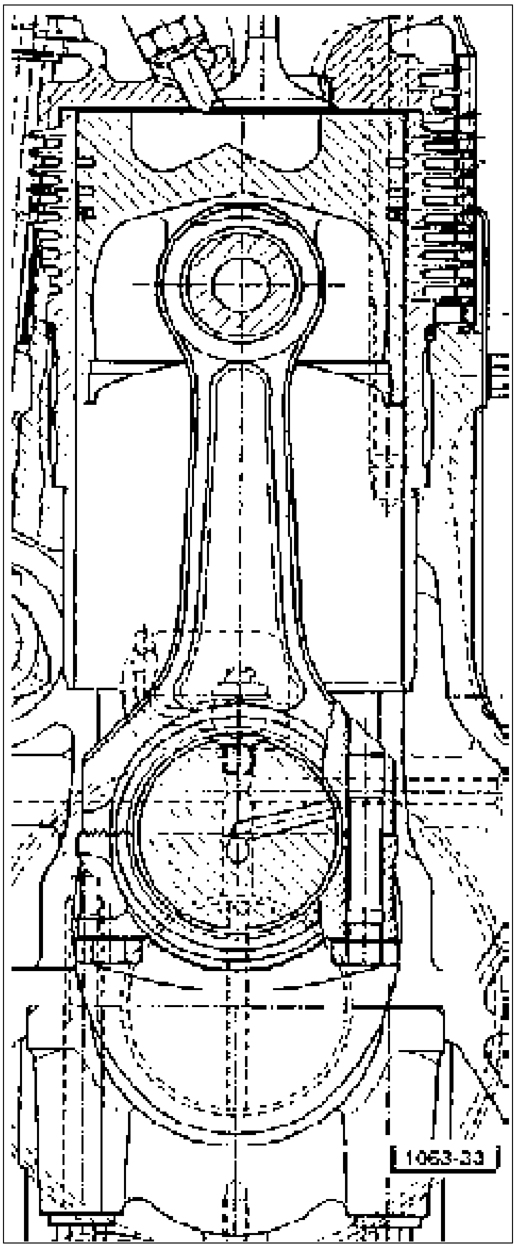


Fig. 12 - 4-cylinder engine crankshaft cross-section.

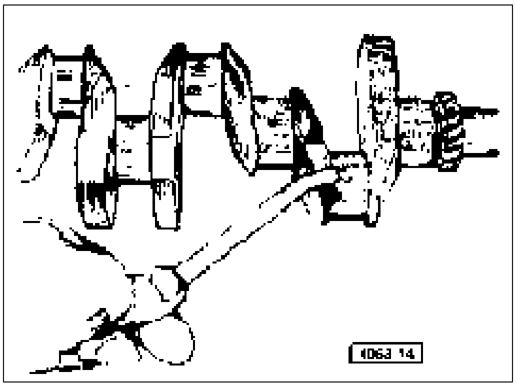


Fig. 13 - Cleaning crankshaft lubricating holes.

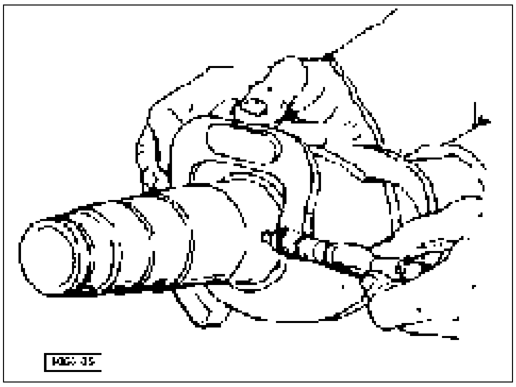


Fig. 14 - Checking crankshaft dimensions.

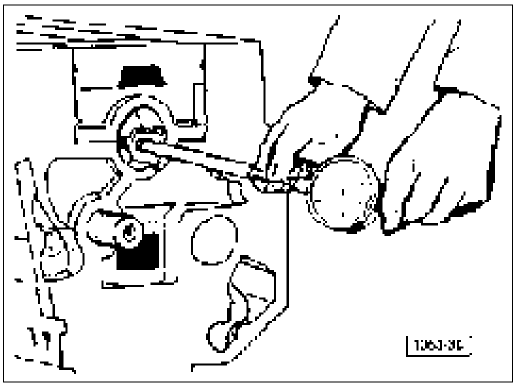


Fig. 15 - Checking main bearing inside diameter.

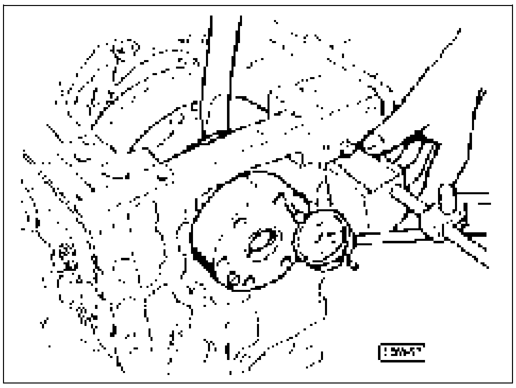


Fig. 16 - Checking crankshaft end play.

Crankshaft end play is adjusted by two-part spacer rings (see also specifications table) fitted onto the rear main bearing sides (flywheel side); these are provided with a projection preventing faulty assembly, the rings can be mounted after crankshaft installation too.

Each main bearing consists of two shells each being provided with a small tongue permitting it to be held in position inside the bearing cap seat. The upper bearing shell is provided with a cavity for oil flow.

Main bearing caps shall be positioned according to the numbering printed on their bodies and fixed to the block with two special securing screws, which can only be replaced with other original screws.

Checking crankshaft

After the crankshaft has been thoroughly cleaned examine it carefully.

Meticulously ascertain the main and big end journals do not show signs of seizure, otherwise rigrinding will be necessary. If the journals are cracked the crankshaft shall be replaced.

Using a micrometer gauge make sure the main journal diameters are not below the specifications given in the related table, otherwise a regrinding should be performed.

Checking crankshaft journal out-of-roundness and taper

With a micrometer gauge measure crankshaft journal taper and out-of-roundness amounts; if readings exceed the maximum allowances specified a regrinding shall be performed. (Refer to specification table).

Checking main bearings

Clean main bearings carefully and then examine the internal surfaces for indentation, scuffing, scratching or evident antifriction lining wear. If any replace the main bearings.

Check main bearing inside diameters with an internal comparator. If the diameters are found in excess of the maximum wear limits, the main bearings shall be replaced.

Main bearings are supplied as spare parts either with normal size or undersize inside diameters. The inside diameter undersize range is 0.25 to 0.50 mm.

Be very careful when installing the main bearings in order they can be correctly positioned. The bearing shells provided with a lubricating hole must be placed in the upper side (i.e. into the block forging and not into the main bearing caps).

Mounting main bearing caps

The numbers stamped on the main bearing caps must be on the same side as those stamped on the block.
Carefully check main bearing cap fixing screws for stretching, if so replace them with original screws only.
The screws are to be tightened progessively to 1 kgm (9.8 Nm) torque and subsequently to 3 kgm (30 Nm) torque then using no. 5.9030.640.0 tool furtherly tighten each single screw to an angle of 55°÷1'

Cleaning crankshaft and cylinder block internal passages

Cleaning of the lubricating oil passage should be made after all crankshaft and cylinder block overhauling operations have been accomplished. This cleaning can be carried out by using Diesel fuel or compressed air blasted into the passages.

Checking crankshaft end play (Fig. 16).

This check is performed with a magnetic base comparator operating as follows:

– place the magnetic base together with the comparator onto the crank-case and then make the comparator feeler contact one of the crankshaft ends.

– use a lever to move the crankshaft axially towards the comparator side until the comparator hand stops moving.

– reset the comparator and push the crankshaft with the lever towards the opposite side and then take the end play reading from the comparator dial.

This reading should be 0.10 to 0.27 mm; if higher than specified, some spacing half-rings with 0.10 to 0.20 mm oversize with respect to the nominal thickness shall be fitted. These half-rings are regularly supplied as spare parts.

Triangular-section gaskets should protrude as shown in figure 17.

In its rear portion the crankshaft is provided with a 3x30° chamfer. In addition the surface contacting the sealing ring has undergone a harde-ning process.

The oil seal must be fitted using tool 5.9030.628.0.

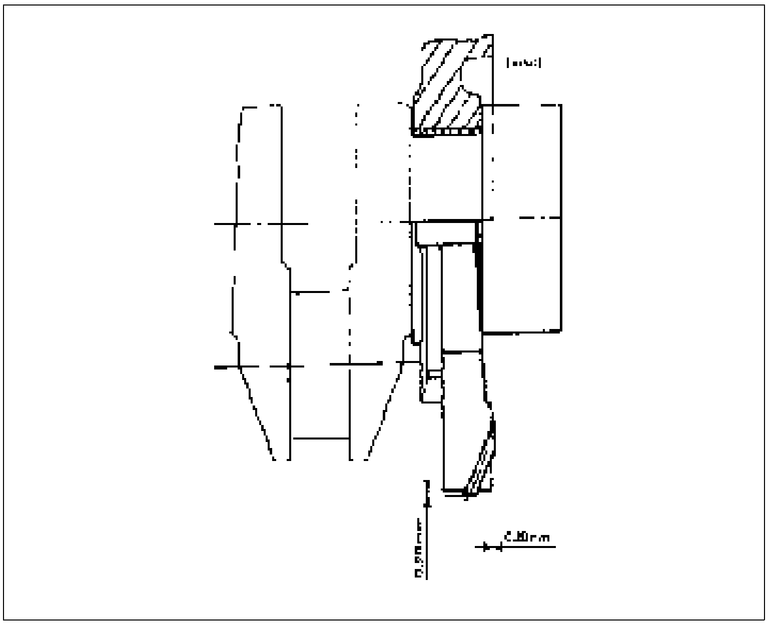


Fig. 17 - Main bearing cap gasket installation.

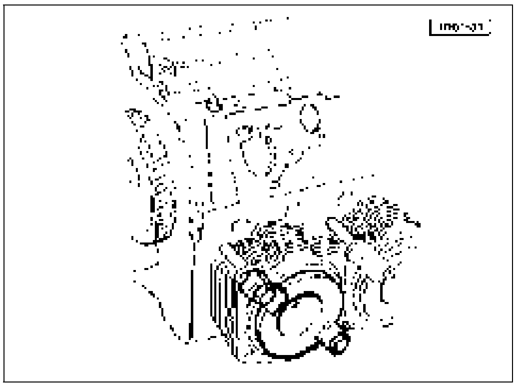


Fig. 18 - Special fixture for piston positioning during crankshaft installation.

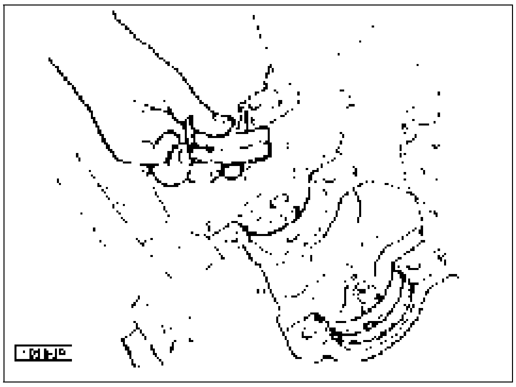


Fig. 19 - Mounting one holed main bearing shell into the cylinder block forging.

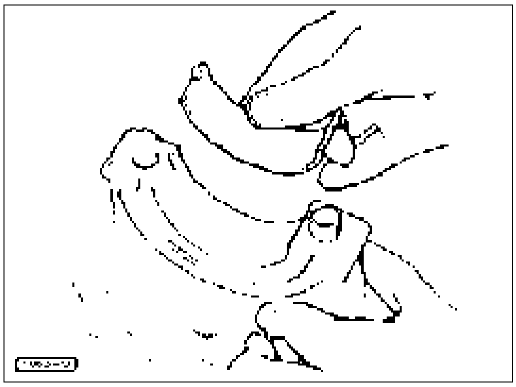


Fig. 20 - Fitting the one main bearing shell into the main bearing cap.

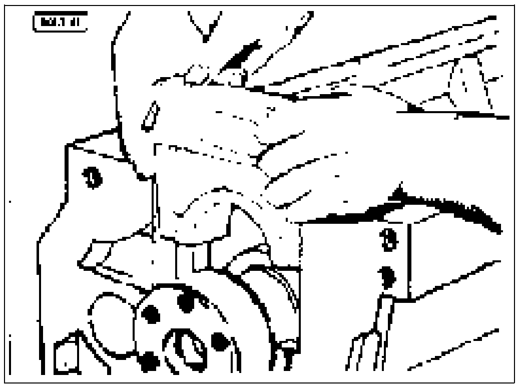


Fig. 21 - Installing the crankshaft main bearing caps.

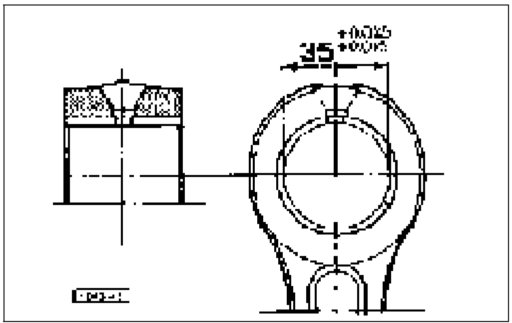


Fig. 22 - Fitting bushing into the con-rod small end.

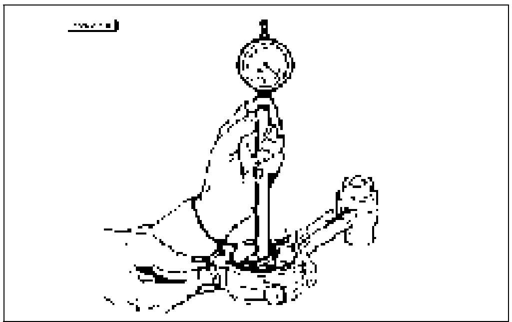


Fig. 23 - Checking con-rod for wear.

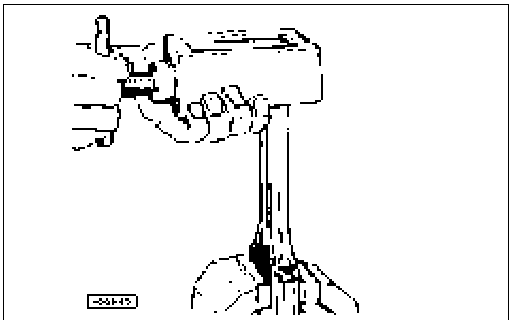


Fig. 24 - Pulling out/driving in con-rod bushing.

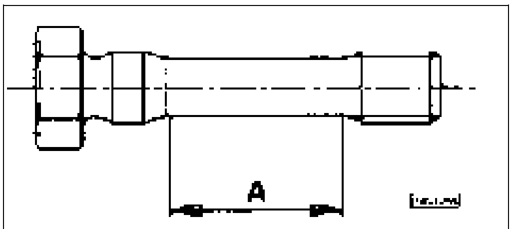


Fig. 25 - Checking the diameter of the connecting rod clamp bolts.

Connecting rods - connecting rod bearings and bushings (Fig. 26)

Checking connecting rod axis parallelism
(using no. 5.9030.651.4 special tool)
Place the connecting rod on the special tool and mount the comparator by loading the feeler 1 mm against the gudgeon pin.
Move the connecting rod from right to left and reset the comparator to zero when the comparator hand indicates the maximum reading. Remove the connecting rod from the tool and replace it after a 180° rotation along its longitudinal axis.

Repeat this operation and note the difference in reading compared with the previous taken. If the difference is above the specified tolerances, the rod shall be straightened by hand press .

Checking connecting rod bushing and bearings

Check connecting rod bushings and bearings for scoring or scuffing. Wear amount should not exceed specifications, otherwise they must be replaced.
After fitting the bushing, check that the diameter is as specified in figure 22.

Checking connecting rod weight

The difference in weight between one engine connecting rod and another must never exceed 20 gr.

Installing connecting rods

The screws are to be tightened progessively to 1 kgm (9.8 Nm) torque and subsequently to 3 kgm (29.5 Nm) torque then using no. 5.9030.640.0 tool furtherly tighten each single screw to an angle of 90° 1'

If these bolts are to be reused, check that the difference between the maximum and minimum diameter measured at the part denoted **A** (Fig 25) is less than 0,1 mm. If not, the bolt must be replaced.

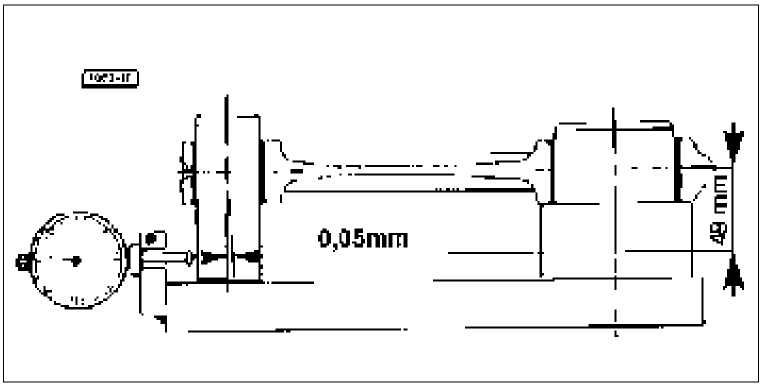


Fig. 26 - Checking con-rod axis parallelism.

		Ø machining	Ø max wear
connecting rod bearing inside diameter	mm	$63{,}500\ ^{+0{,}035}_{+0{,}075}$	63,620
1st undersize	mm	$63{,}250\ ^{+0{,}035}_{+0{,}075}$	63,370
2st undersize	mm	$63{,}000\ ^{+0{,}035}_{+0{,}075}$	63,120
connecting rod bushing inside diameter	mm	$35\ ^{+0{,}015}_{+0{,}025}$	35,060
maximum misalignment of the connecting rod smoll end axis (measured at 49 mm from con-rod centre line)	mm	0,05	

pistons - gudgeon pins - piston rings

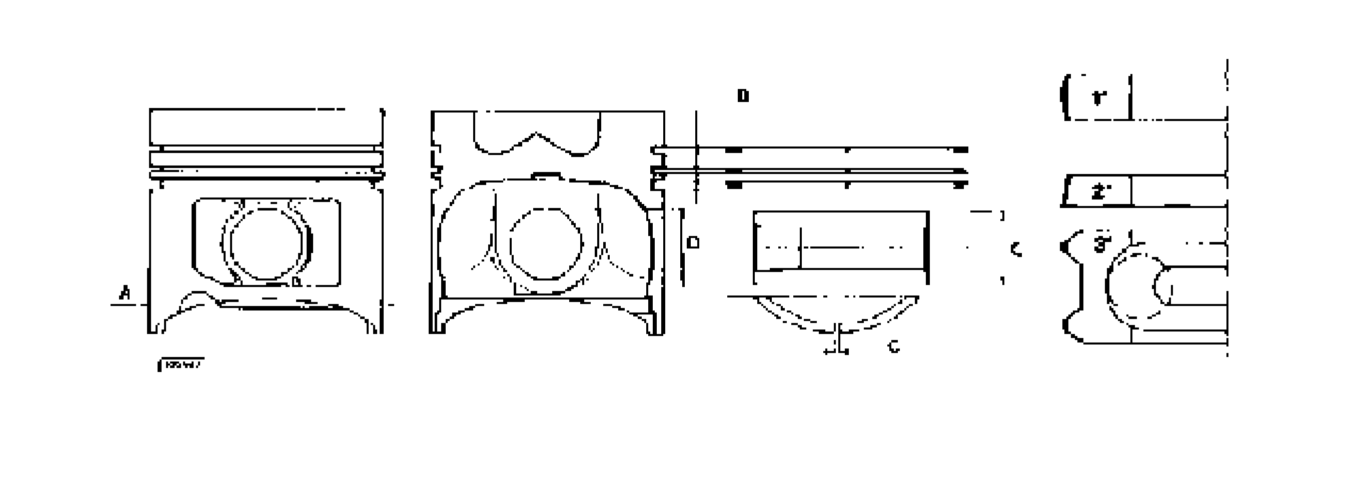


Fig. 27 - Piston, piston ring and gudgeon pin dimension.

		aspirated engine		turbocharged engine	
		Ø machining	Ø max. wear	Ø machining	Ø max. wear
A piston diameter at 90° of the gudgeon pin axis and at 10 mm from the bottom base	mm	104,9±0,007	104,680	104,9±0,007	104,680
B clearance betwen piston ring and piston ring gooves in piston (new piston ring)					
1st piston ring	mm	0,110÷0,145	0,250	0,145÷0,095	0,250
2st piston ring	mm	0.050÷0,085	0,150	0,080÷0,115	0,200
3st piston ring	mm	0,030÷0,065	0,150	0,030÷0.065	0,150
C piston ring and gap					
1st piston ring	mm	0,400÷0,650	1,500	0,400÷0,650	1,500
2st piston ring	mm	0,400÷0,650	1,500	0,400÷0,650	1,500
3st piston ring	mm	0,300÷0,600	1,500	0,300÷0,600	1,500
D inside diameter of gudgeon bore in piston	mm	$35^{+0,006}_{+0,012}$	35,020	$35^{+0,03}_{+0,09}$	35,020
E gudgeon pin diameter	mm	$35^{\;0}_{-0,006}$	34,970	$35^{\;0}_{-0,006}$	34,970

Pistons

Pistons are specially forged hypereutectic aluminium-silicone-alloy. The air-fuel mixing chamber machined in piston crown has toroidal shape. Both the part number and reference A (meaning air) are printed in piston top, i.e. the piston identification code.

Piston rings

Pay particular attention to the identification marks on the piston rings for correct assembly.
Inserting the first or the second piston ring upside down will result in either engine uneven operation or serious damage, even though the piston groove is the correct one. The figure above illustrates how assembly should be performed correctly.

Warning - When replacing piston rings in turbocharged engines pay particular attention that also the second piston ring be provided with external "CHROMIUM PLATED" sealing surface. (This to avoid installing improper, not chromium-plated rings belonging to aspirated engines).

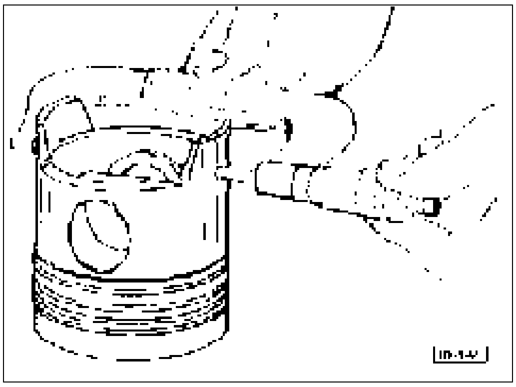


Fig. 28 - Measuring piston diameter.

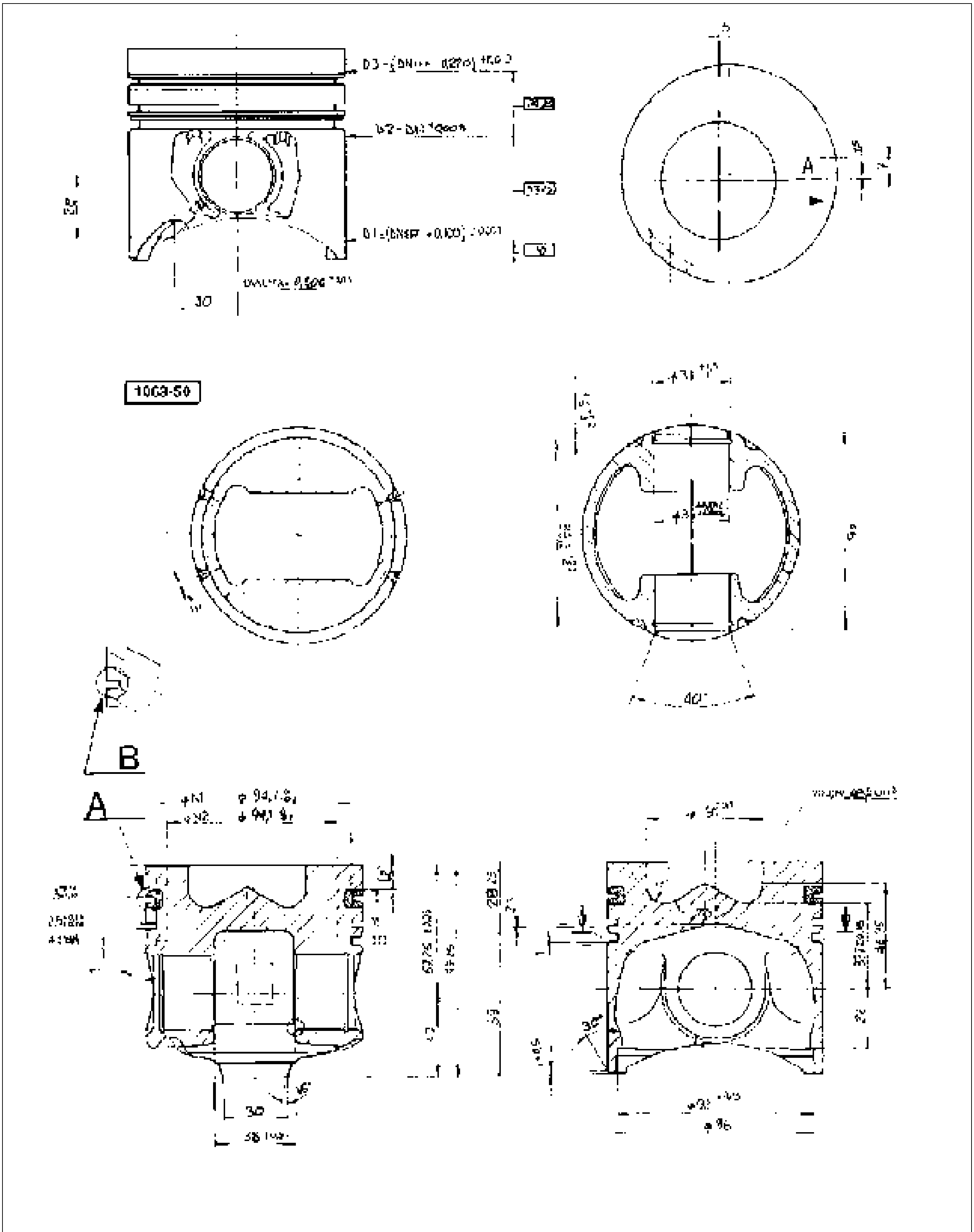


Fig. 29 - Pistons **A - for turbocharged engines** **B - for aspirated engines.**

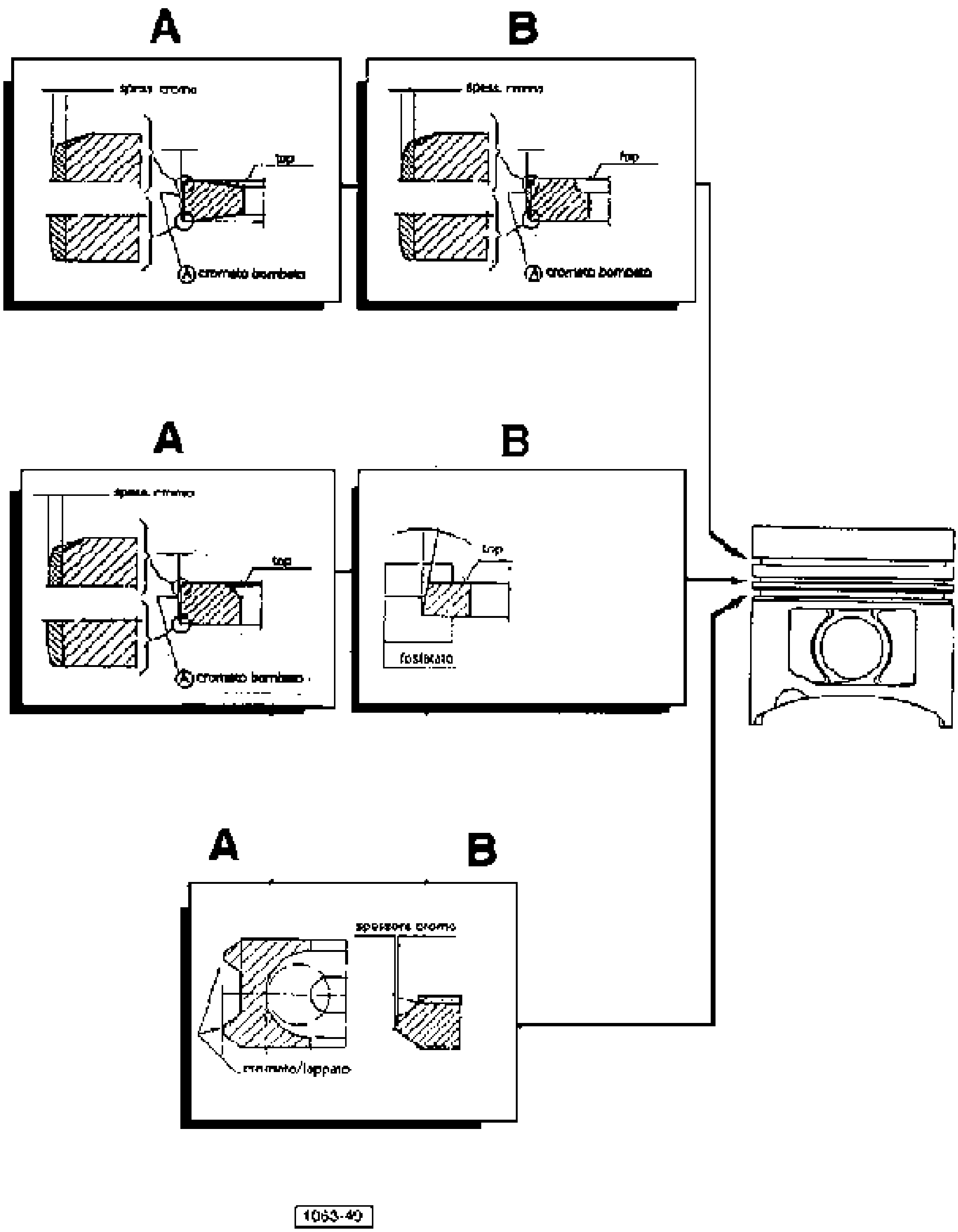


Fig. 30 - Indications for fitting piston rings.
A - turbocharged engines **B** - normally aspirated engines

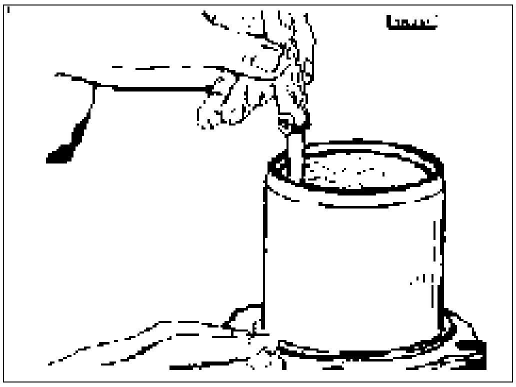


Fig. 31 - Checking piston ring end gap

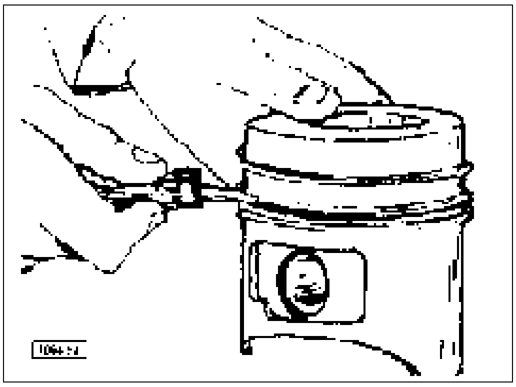


Fig. 32 - Checking clearance between piston rings and piston ring grooves in piston.

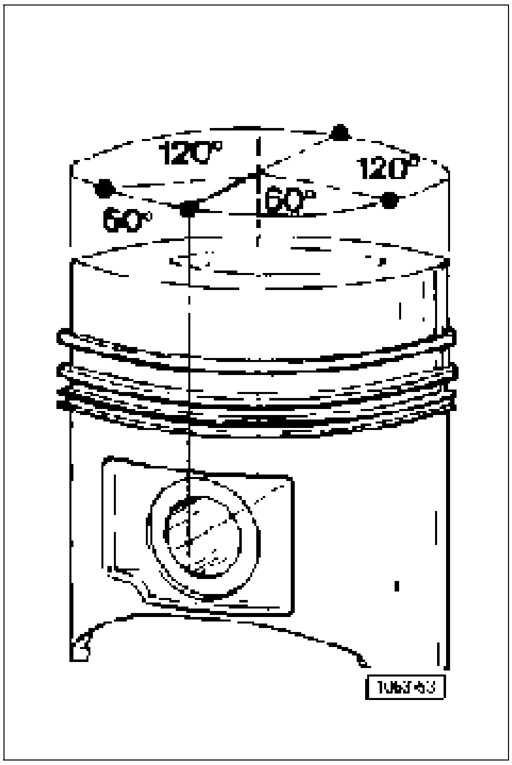


Fig. 33 - Correct assembly of piston rings.

Cleaning pistons

Descale piston crown and piston ring grooves using an emery cloth.

Remove any buildups from gudgeon snap ring seats.

After all parts have been thoroughly cleaned and before further checking is performed, examine them carefully for cracking or damage which may require replacement.

Light scoring o seizing signs can be removed with very fine emery cloth.

Checking pistons

Measure piston diameter with a micrometer gauge as shown in figure 28.

If the diameter measured is below the specifications given in table on page 35, the piston needs to be replaced.

Checking gudgeon pin and gudgeon pin seat in piston

If either gudgeon or related seat diameter measurement differs from specifications, the replacement of the worn-out part is recommended.

Check also gudgeon pin snap rings for proper elasticity or damage. If they are found not conforming to the operating conditions replace them.

Checking piston ring end gap

Both the compression ring and the oil control ring ends installed in the cylinder should not have a gap exceeding the specifications shown in table.

This check is carried out by inserting the piston rings into the cylinder so as the ring end gap can be measured with no. 5.9030.270.0 special thickness gauge, as shown in figure 31.

NOTE - Excessive clearance between piston rings and piston ring grooves in piston may cause high lubricant consumption as well as engine power loss.

Piston rings must be replaced each time piston is removed or cylinders are replaced.

Checking clearance between piston rings and piston ring grooves in piston

This check is to be made with new piston rings, as shown in figure 32, by inserting the piston ring into the groove and then the blade of no. 5.9030.270.0 thickness gauge. Refer to specifications table for maximum clearance allowance.

If the clearance measured exceeds the maximum allowance, piston shall be replaced.

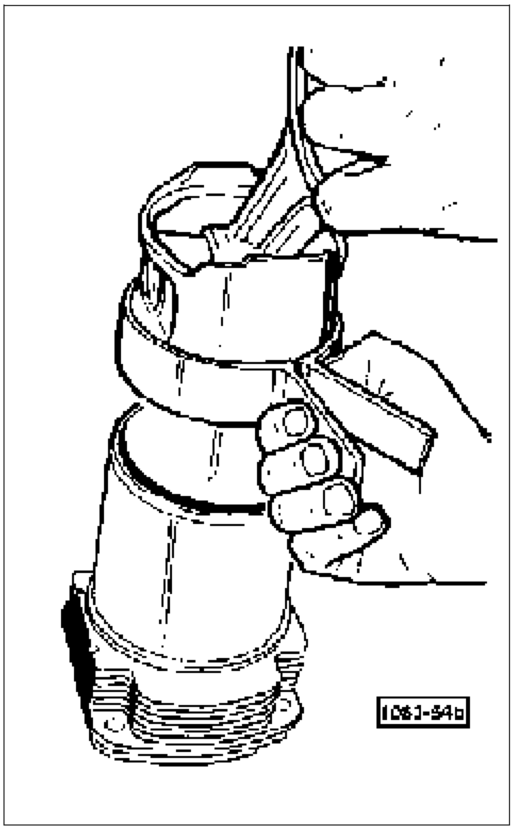


Fig. 34 - Installing piston into cylinder.

Installing piston rings

During cylinder assembly perform a proper orientation of the first piston ring so that its cut be moved by 60° from the gudgeon pin axis.

The other piston rings should be inserted with their cuts moved by 120° from each other.

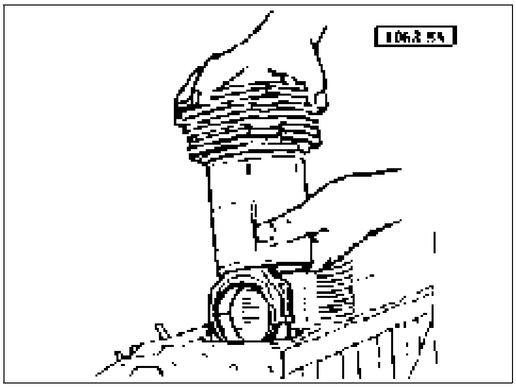


Fig. 35 - Installing piston and cylinder assembly.

Installing pistons into cylinders

Use no. 5.9030.654.0 ring clamping band as shown in figure 34 to install piston into the cylinder.

Afterwards insert piston and cylinder assemblies into the cylinder block.

NOTE - Pistons can be taken without removing the crankshaft, just withdrawing along with the connecting rods directly from the cylinders after removing both cylinder heads and connecting rod caps.

Before installing the cylinder liners, fit the O-ring seals code 2.1539.130.0.

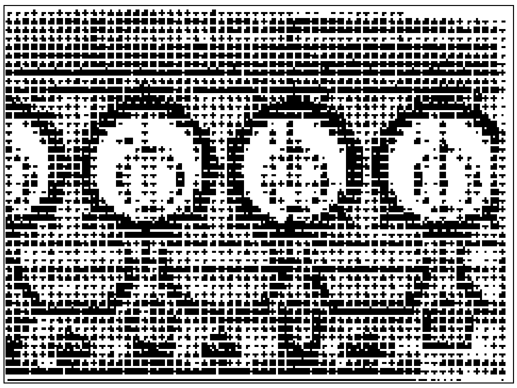


Fig. 36 - Correct orientation of piston and con-rod assembly.

The connecting rod-piston assembly must be assembled with the piston crown recess oriented towards the tappets (Fig. 36).

The big-end caps must be fitted so that the punched number appears on the same side as the number on the connecting rod.

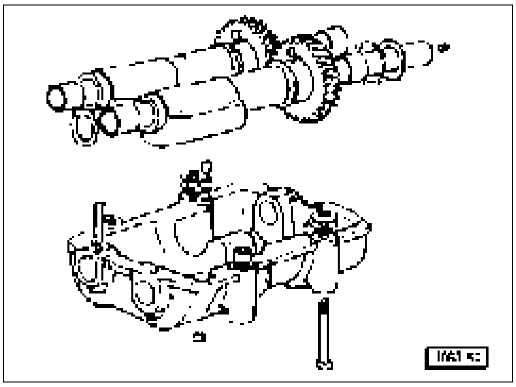


Fig. 37 - Counterweight assembly components.

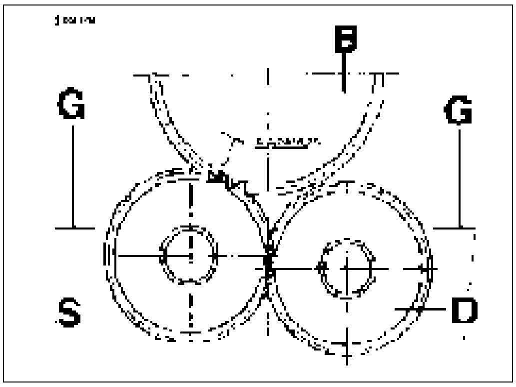


Fig. 38 - Counterweight assembly.

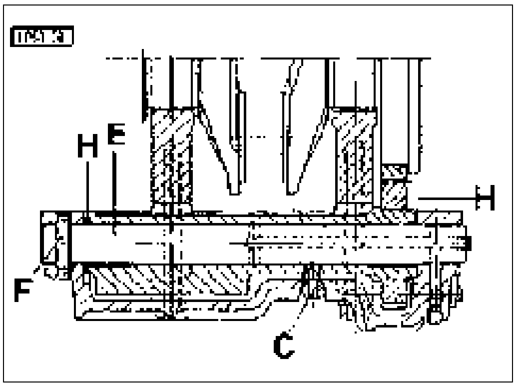


Fig. 39 - Counterweight assembly cutaway-view.

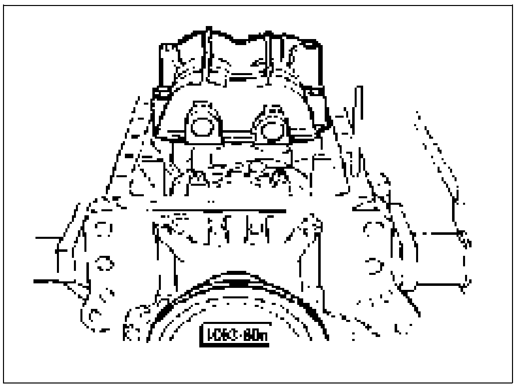


Fig. 40 - Engine-installed counterweights.

Counterweights for 4-cylinder engines

Specifications

counterweight end play	mm	0.10.43
backlash allowance between counterweight and crankshaft crown wheel teeth	mm	0.200.25
bushing inside diameter	mm	$26\ ^{+0.050}_{+0.075}$
max. wear	mm	26.150

Checking counterweights

Check counterweight bushing inside surface conditions. Ensure the inside diameter is not above specifications; otherwise replace bushings.
With bushing installed perform boring according to specifications given in the table above.

Installing and adjusting counterweights

Position the weight marked with **S** in the related support seat, then place weight **D** too, so that the engraved teeth coincide as shown in figure.

Fit gudgeons **E** and insert spacer washers **H**.
Be sure the counterweight end play is 0.1 to 0.43 mm. Complete installation by fixing gudgeons through special pins **F** and the weights with securing screw **C**.
Apply the support and weight assembly underneath the cylinder block so as the engraved counterweight **S** tooth engages between the two engraved teeth of crankshaft crown wheel **B**. Then fit a number of shims **G** until a 0.20 to 0.25 mm backlash between crankshaft crown wheel and weight **S** teeth is obtained.

Remove screw **C** and finally tighten the weight support securing screws to cylinder block also applying some Loctite 242.

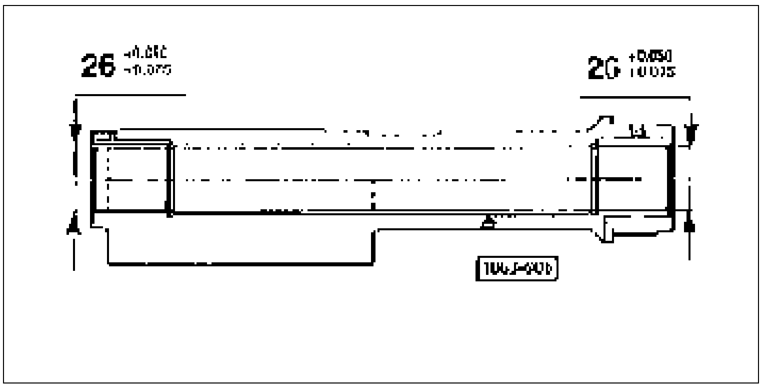


Fig. 41 - Installed counterwight bushings.

Engine flywheel

Before dismounting the flywheel it is advisable to remove two diametrically opposed screws replacing them with two stud bolts.

To replace the flywheel ring gear operate as follows:

— Immerse the flywheel into a water-filled container. Keep the flywheel lifted a few centimeters from the container bottom using some small iron blocks fitted under the ring gear teeth. The ring gear should be turned upwards and project a few millimeters from the water surface.

— Using a flame heat the ring gear all around the toothed sector until the flywheel is dropped to the container bottom due to heat expansion.

— Heat the new ring gear up to a temperature of about 200° C and position into flywheel housing. Ensure the tooth chamfers are turned upwards as shown in figure 43.

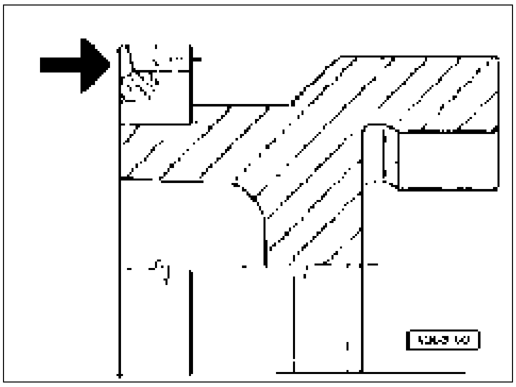


Fig. 43 - Ring gear position on engine flywheel.

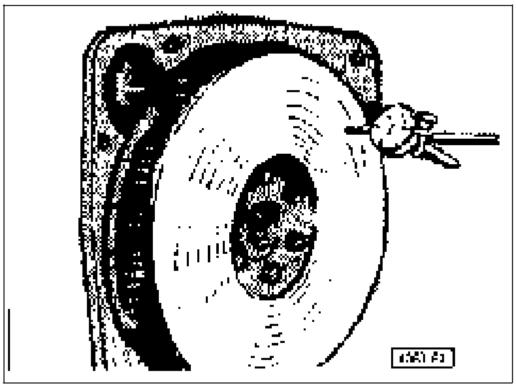


Fig. 44 - Checking flywheel face coplanarity.

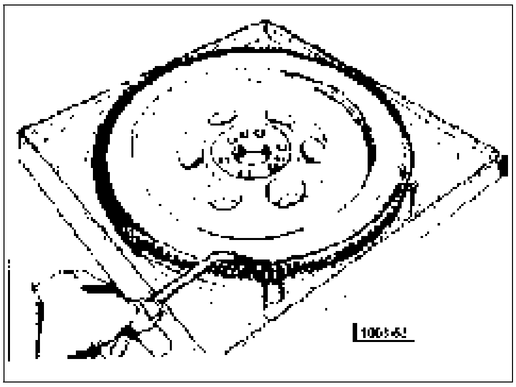


Fig. 45 - Removing flywheel ring gear.

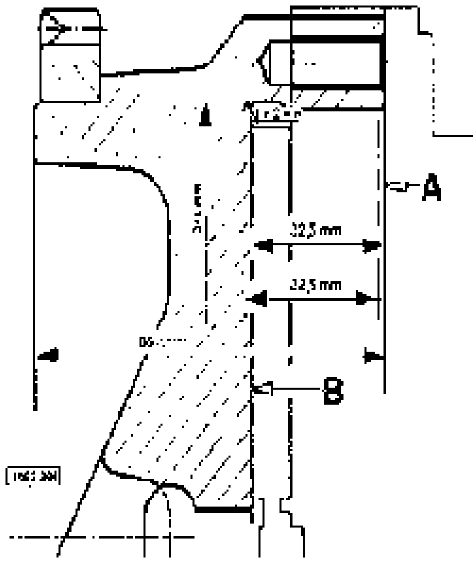


Fig. 42 - Machining depths for clutch matching surface of the flywheel.

Checks

Make certain that the sliding surface of the flywheel is not scored; material can be removed, if necessary, to a maximum depth of 0,5 mm, (surface roughness 1,6 mm).
Thereafter, reinstate the radius (r = 2 mm) at diameter 341 mm (see fig 42).
It is important that surface **A** should be lowered by the same amount as surface **B** in order to maintain dimension 32,5 unaltered and allow correct operation of the clutch assembly (see fig 42).

The flywheel contact surface should thoroughly be in the same plane as the clutch plate. This can be verified by fitting a magnetic base comparator as illustrated in figure 43 and rotating the fly-wheel by hand.

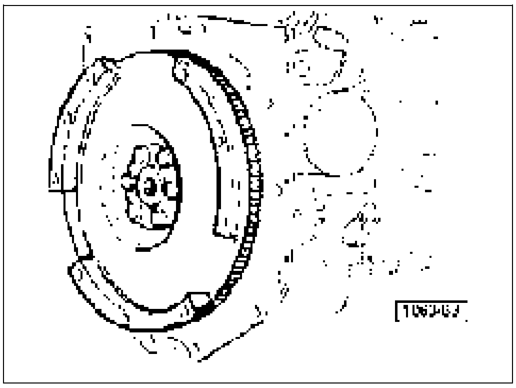


Fig. 46 - Engine flywheel.

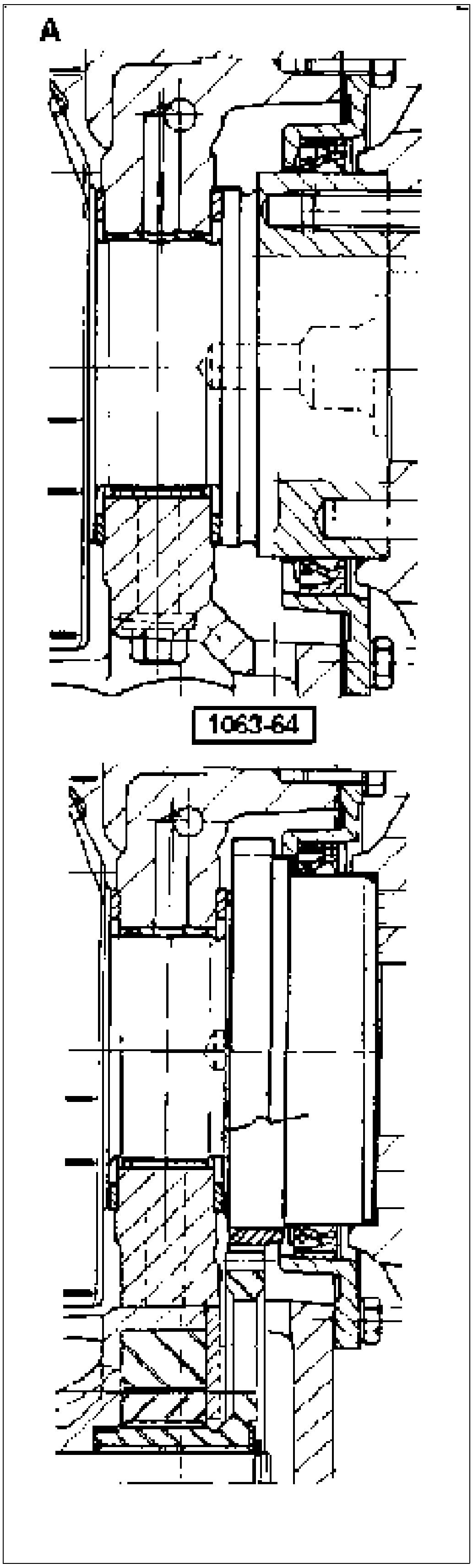


Fig. 47 - Rear flange cross-section.
A *- SILVER 80 - 90 - 100.4*
B *- SILVER 100.6*

Crankshaft removal procedure

— Remove engine from tractor and install on no. 5.9030.002.0 traveling stand for transfer on no. 5.9030.491.4 swivel bench.
— Remove the oil pan and the oil pump suction rose.
— After detaching the pulley belt take the pulley from the crankshaft along with the pulley hub.
— Dismount engine front case, rear flywheel, engine-to-gearbox connecting flange and sealing ring holding flange.
(In 4-cylinder engines also the counterweight assembly is to be removed).
— Remove big end caps and related bronze bushings.
— Remove main bearing caps and related bronze bushings.
— Remove the crankshaft and take the upper bronze bushings.

Installing the oil pump driving gear
SILVER 100.6

Heat gear **A** in a furnace to such a temperature that a difference in temperature of 100 °C between gear and shaft **B** is established.
Apply some LOCTITE 648 on the whole contact surface between crankshaft and the oil pump driving gear.
Mount gear **A** on shaft **B** as shown in figure until a 0.2 to 0.5 mm reading from crankshaft shouldering face is obtained.
After, with cold shaft, remove the tailings of LOCTITE on the crankshaft.
Ensure the oscillation error on diameter Ø 116 (concerning the gear) be restricted within 0.1 mm.

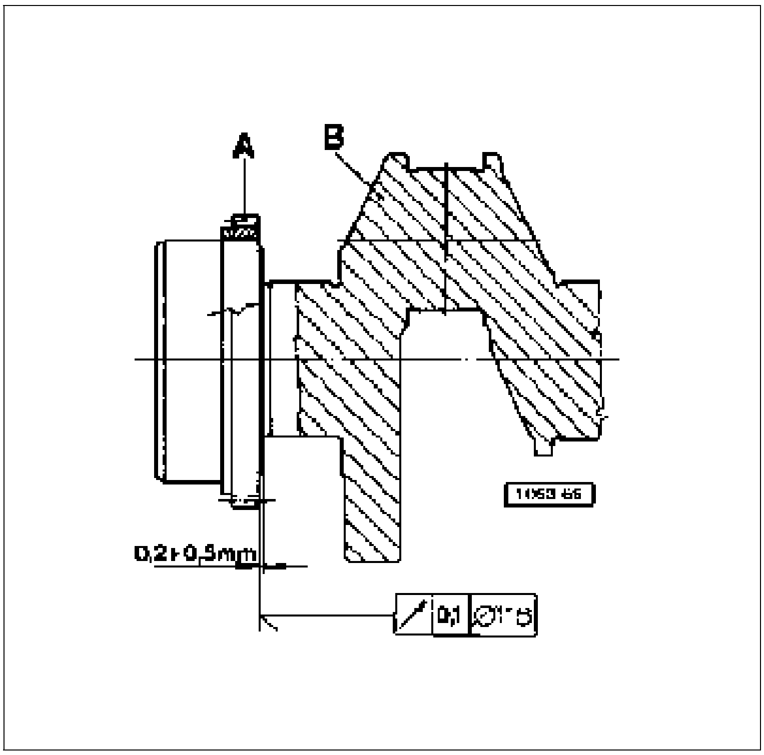


Fig. 48 - Oil pump driving gear - *SILVER 100.6.*

		Ø machining	Ø max. wear
Camshaft cam lift			
intake cam	mm	$6{,}86\ ^{+0{,}05}_{-0{,}05}$	6.30
exhaust cam	mm	$6{,}71\ ^{+0{,}05}_{-0{,}05}$	6,20
injection cam	mm	$8\ ^{+0{,}05}_{-0{,}05}$	7.50
Camshaft journal diameter	mm	$55\ ^{\ 0}_{-0{,}030}$	54.950
Camshaft bushing diameter	mm	$55\ ^{+0{,}060}_{-0{,}090}$	55.180
Idler gear bushing diameter	mm	$40\ ^{+0{,}025}_{-0{,}064}$	40.125
Idler gear pin diameter	mm	$40\ ^{\ 0}_{-0{,}025}$	39.950

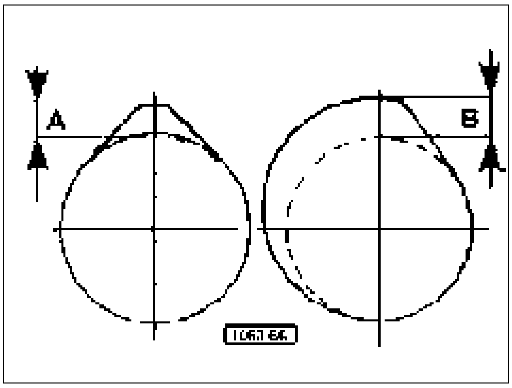


Fig. 1 - Timing system cams:
A - Valve cam; **B** - Injection cam.

The installation of single-cylinder injection pumps besides ensuring an even load distribution on the camshaft has permitted two bearings per camshaft journal to be mounted in the engine block, thus minimizing camshaft flexure.

A bimetallic bushing is inserted in each bearing to ensure very smooth camshaft operation. This can be replaced when wear exceeds the limits specified above.

All these features guarantee precise cam movement thus providing smooth timing system operation and regular fuel supply as well.

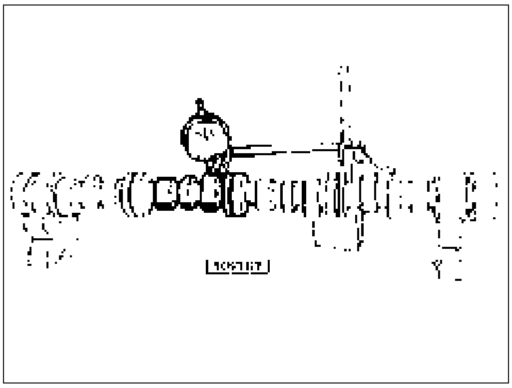


Fig. 2 - Checking cam wear.

The camshaft is held in position by a forked plate fitted on engine front side.

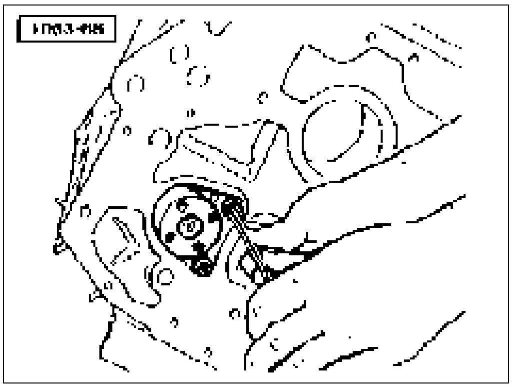


Fig. 3 - Camshaft fixing forked plate.

For 1000.4-A engines
The engine oil pump and engine governor driving gear is mounted at the rear camshaft end.

Prior to installing camshaft, the engine block should be turned upside down and the tappets inserted in the related seats in the block after having been properly lubricated with oil.

Make sure the tappets slide in their seats freely.

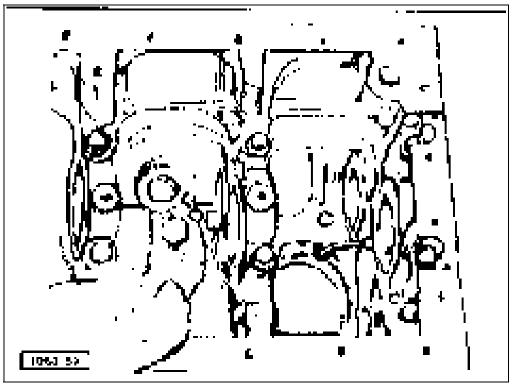


Fig. 4 - Installing tappets into the engine block.

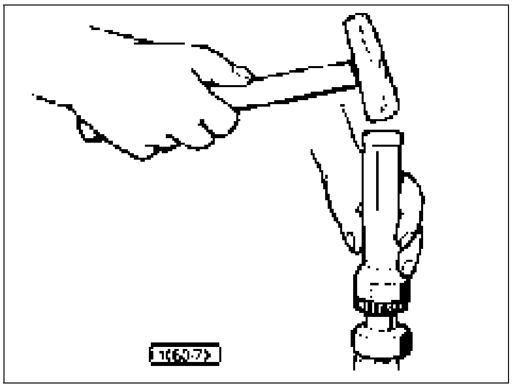


Fig. 5 - Installing the 1000.4 engine governor driving gear.

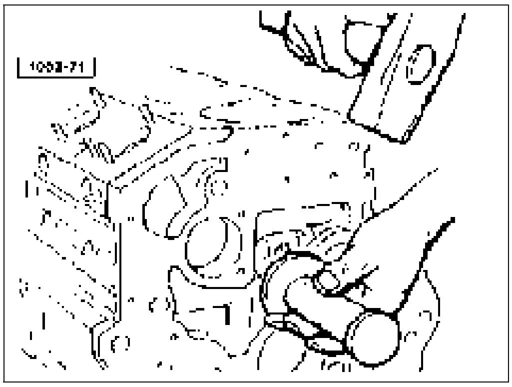


Fig. 6 - Inserting the camshaft bushings.

Checking camshaft

Examine both camshaft journal and cam surfaces: they must be thoroughly smooth and in perfect operating conditions.

If on the contrary cams show any sizing or scoring, it is convenient that both the camshaft and the bushings installed in the block be replaced. Only if a very small evidence of deterioration is noticed, this might be eliminated using a very fine grain abrasive stone.

To check for wear, place the camshaft on the special cross-shaped rests and apply a comparator feeler on each single cam then rotate the camshaft.

Minimum cam lift should never be below specifications, otherwise the camshaft should be replaced.

Checking camshaft bushings

Carefully examine bushing inside surface; should any seizing or evident wear of the antifriction lining be found replace the bushings.

If normal conditions are noticed, check the bushing inside diameters by means of an internal comparator. If the bushing inside diameters measured are in excess of the maximum wear limits specified, these shall be replaced.

Each time the bushings are replaced they must be bored.

Checking timing gear

Be sure the gear teeth are not spalled or excessively worn. Replace the gear, as necessary.

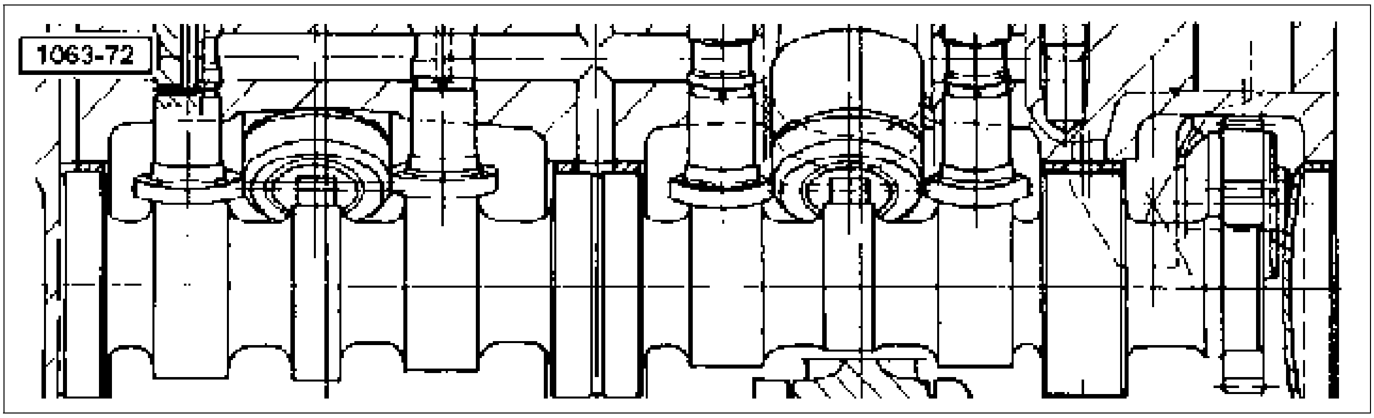


Fig. 7 - Camshaft.

Cylinder heads - valves - valve rockers

		Ø machining		Ø max. wear
A valve stem diameter	intake mm	$9\ ^{-0,013}_{-0,028}$		8.940
	exhaust mm	$9\ ^{-0,013}_{-0,028}$		8.940
B inside diameter of the valve guides installed in the heads	mm	$9\ ^{+0,040}_{+0,025}$		9.100
C valve seat angle with respect to valve	intake	$29°30'\ ^{0}_{-15'}$		
	exhaust	$44°30'\ ^{0}_{-15'}$		
D valve seat width on the valve seat insert	intake mm	1.55		1.7
	exhaust mm	2.20		2.,35
E valve recess from cylinder head level	intake mm	$0,8\ ^{+0,5}_{-0,1}$		1.8
	exhaust mm	$1\ ^{+0,5}_{-0,1}$		2
F valve seat taper	intake		$60°\ ^{0}_{-15'}$	
	exhaust		$45°\ ^{0}_{-15'}$	
G valve diameter	intake mm		44.2	
	exhaust mm		39.5	

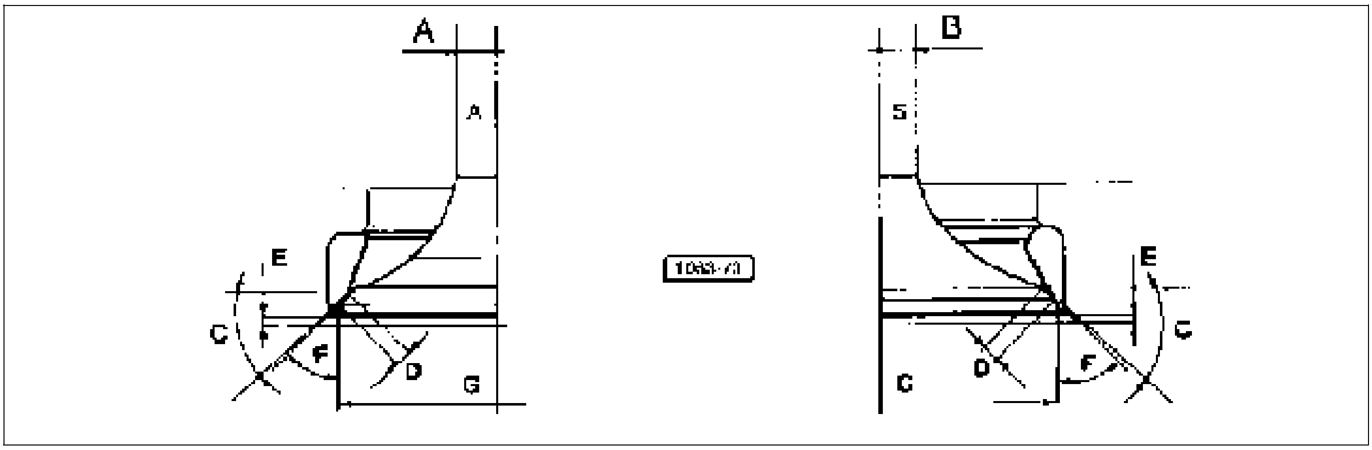


Fig. 1 - Main dimensions of valves and valve seat inserts.

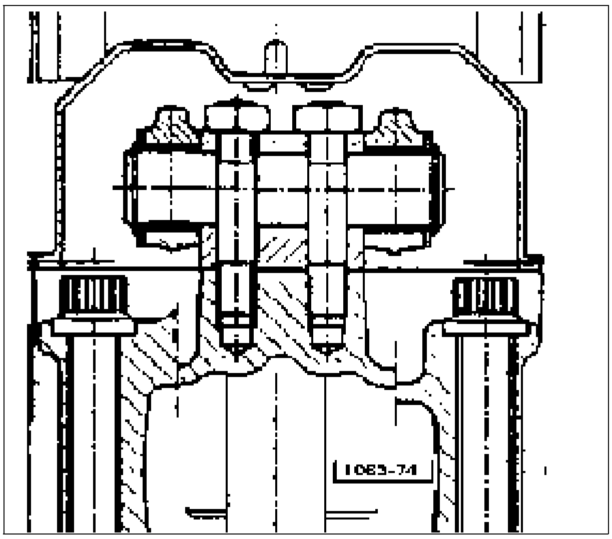


Fig. 2 - Rocker support assembly cross-section.

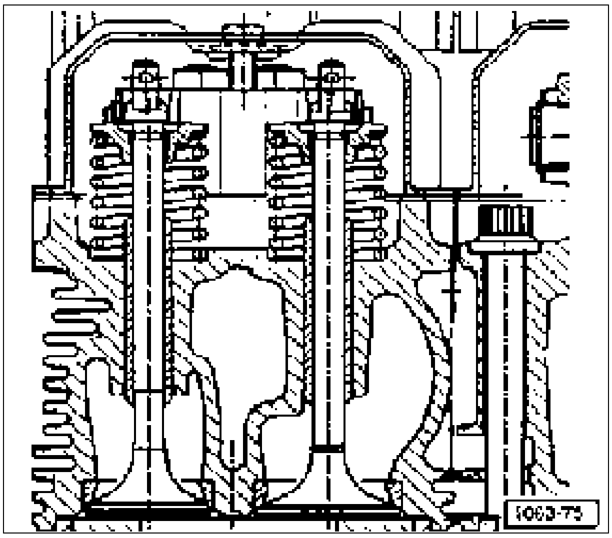


Fig. 3 - Engine cylinder head longitudinal section.

engine

cylinder head

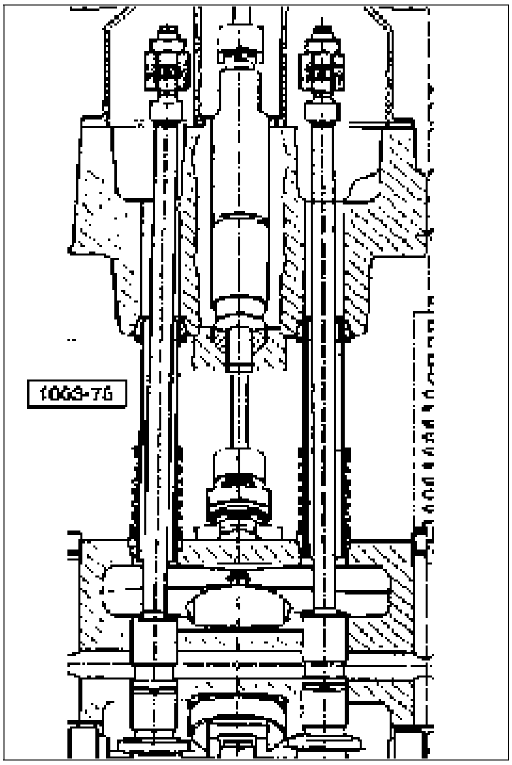


Fig. 4 - Tappet assembly.

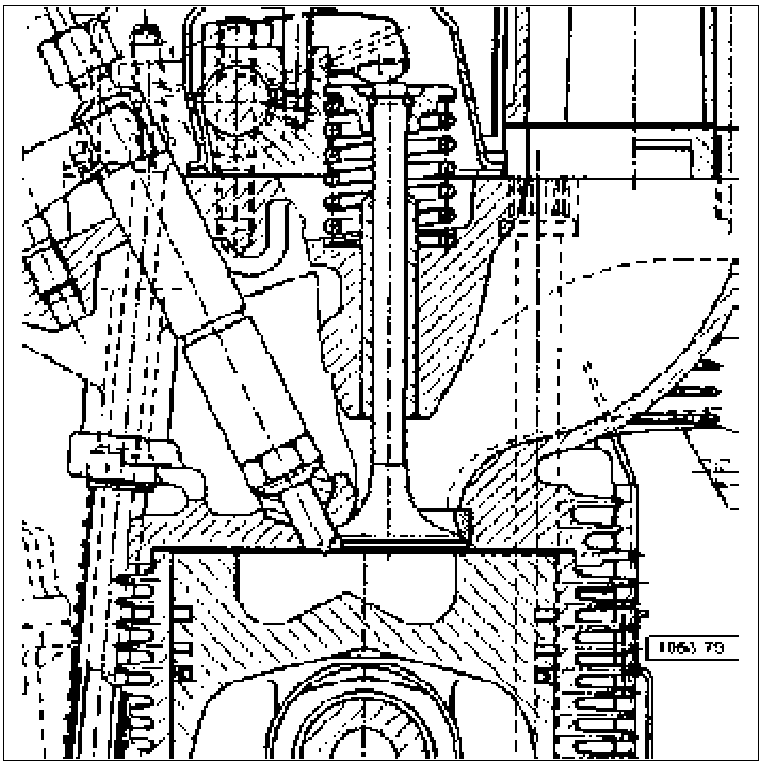


Fig. 5 - Cylinder head cross-section.

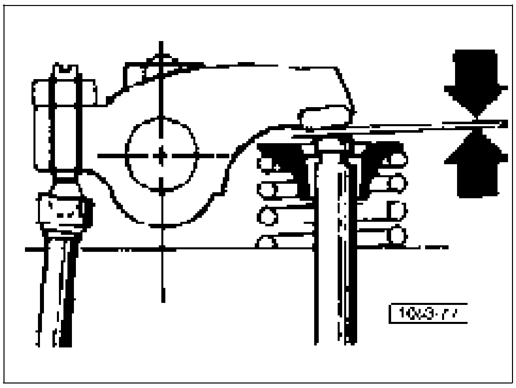


Fig. 6 - Clearance between valves and rockers.

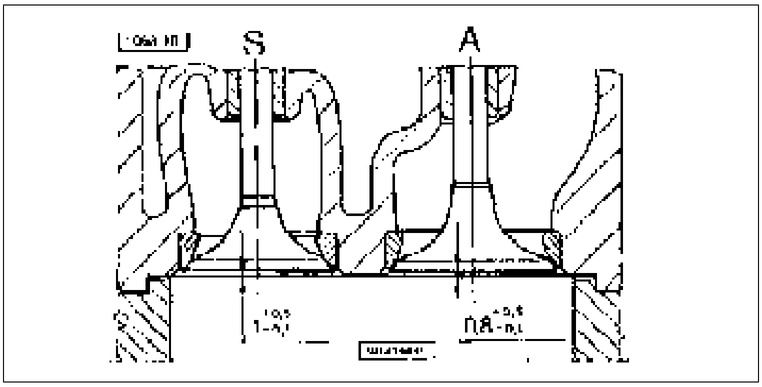


Fig. 7 - Valve recess from the cylinder head gasket bearing face.

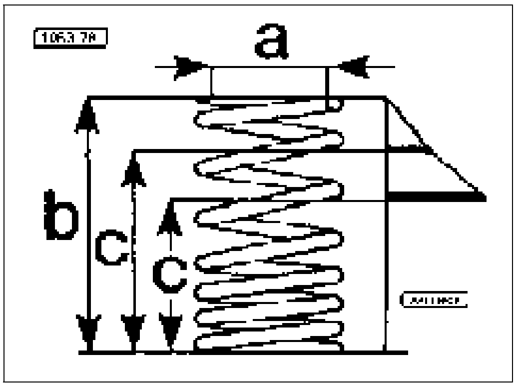


Fig. 8 - Main valve spring dimensions.

		Ø machining	Ø max. wear
Valve springs			
a inside diameter	mm	27.7	
b free spring length	mm	53.6	
c loaded spring length			
kg 15.85±5%	mm	42	
kg 19.60±5%	mm	39.6	
rocker arm bushing inside diameter (see fig. 10 on page 47)	mm	19 $^{+0.015}_{+0.025}$	19.060
rocker arm pin diameter (see fig. 10 on page 47)	mm	19 $^{0}_{-0.011}$	18.980
clearance adjustment between valve and rocker arm (cold)	mm	0.20	

Cleaning cylinder heads

Clean the cylinder heads thoroughly by removing any coking inside both exhaust and intake ducts. Also clean cylinder head cooling fins carefully.

Checking valve seats

First descale and clean valve seats and then inspect for either pitting or corrosion in the valve contact area, otherwise a new grinding (if light wear is found) or a replacement shall be provided.

To install new valve seat inserts operate as follows:
chill the valve seat inserts in liquid nitrogen for easier installation in the cylinder head by running fit.

Valve seat inserts are supplied as finished parts and do not require any further machining. On installation avoid knocking on the valve seats to prevent distortion.

NOTE - If no liquid nitrogen is available for valve seat insert chilling before installation, it is also possible to heat up the cylinder head to a temperature of 200° to 300°C.

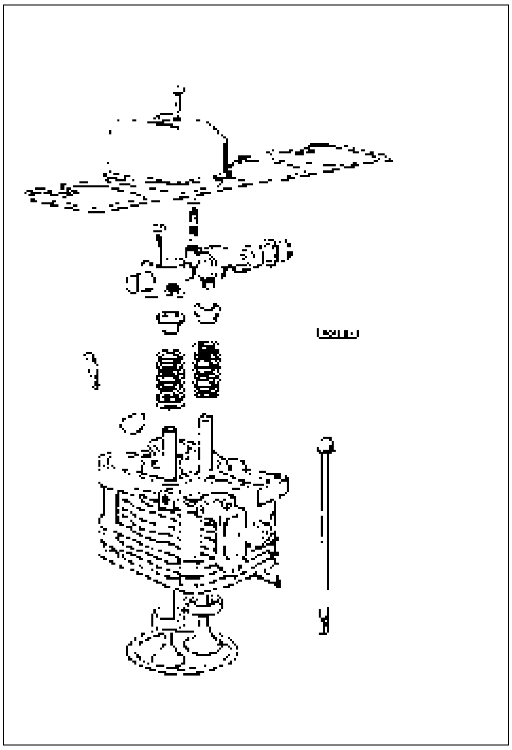


Fig. 9 - Cylinder heads, cylinders, valves and rocker arms.

Checking valves

Descale the valves with the special brush.

Make sure the valve seat is thoroughly intact, otherwise replace.

Check the valve stem for deformation, be sure the stem outside diameter is not below specifications.

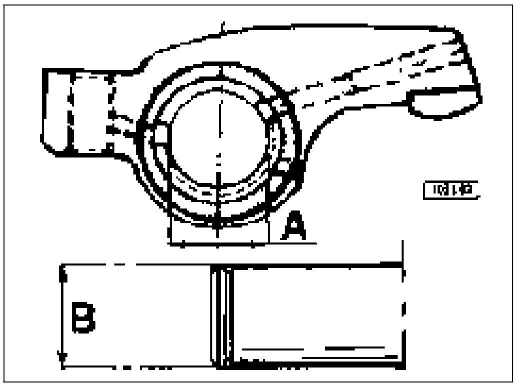


Fig. 10 - Bushing and rocker arm positions and wear check dimensions.
A - Rocker arm bushing inside diameter
B - Rocker arm pin outside diameter

Testing valve tightness

After grinding the valve seats, test valve tightness as follows: plug the intake and exhaust ports through the related valves and then pour in some petrol and check for any leaks (if new valves are installed a slight dripping is allowed).

Checking valve guides

Inspect valve guide boring inside surface. It should be thoroughly smooth and show no evidence either of seizing or scoring.

Use no. 5.9030.020.0 gauge (fig. 17) for measuring the valve guide inside diameter. Excessively worn guides are to be re-placed.
When re-installing the valve guides they should protrude 14.5±0.2 mm from the seat in the cylinder head.

Using no. 5.9030.626.0 tool for installation will enable this dimen-sion to be automatically obtained.

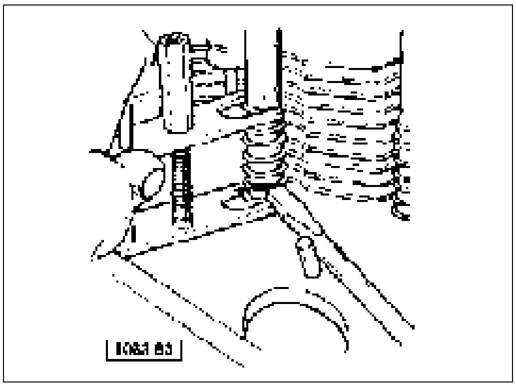


Fig. 11 - No. 5.9030.635.0 tool for tappet rod cap removal.

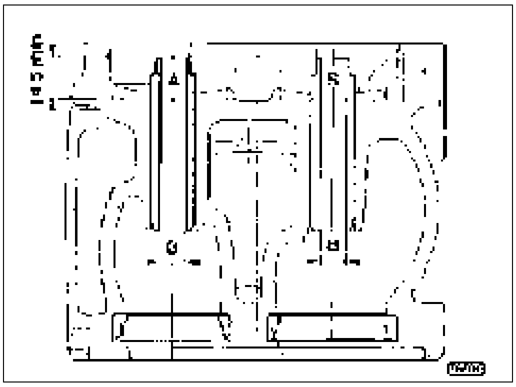


Fig. 12 - Valve seat inserts and valve guides.

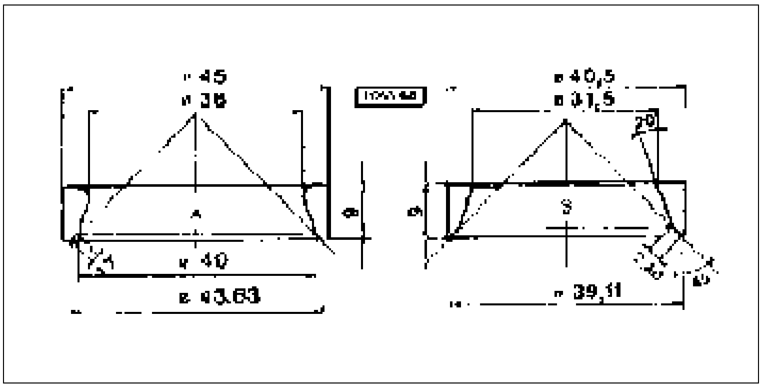


Fig. 13 - Valve seat inserts.

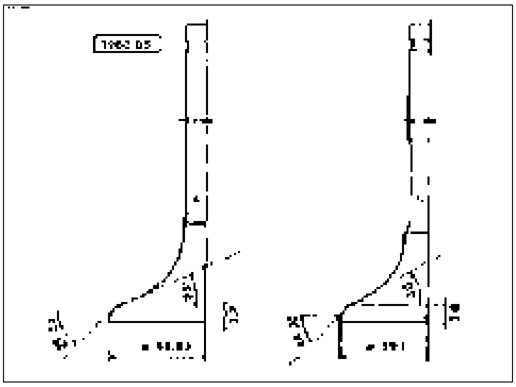


Fig. 14 - **A** - Intake valve
B - Exhaust valve.

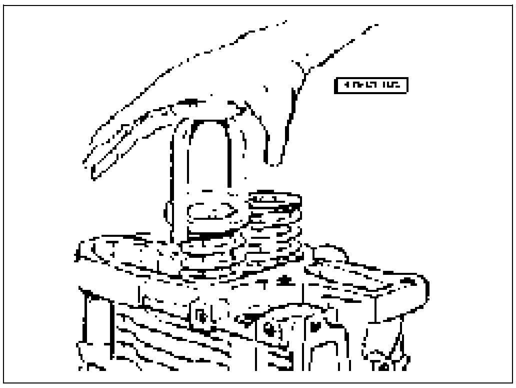


Fig. 15 - Using no. 5.9030.012.0 tool to remove valves.

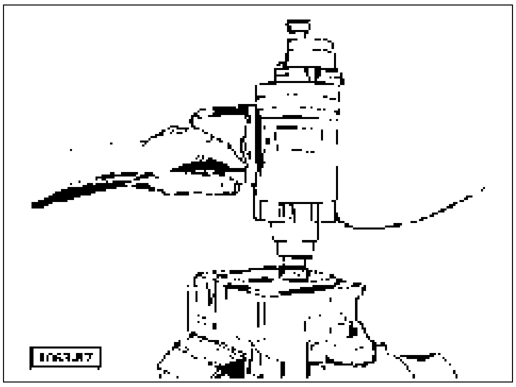


Fig. 16 - Grinding valve seats.

Checking push rods

Examine rocker arm push rods for deformation and the rocker arm contact ball seat for signs of seizing or roughness, if any, replace.

Make sure also the other push rod end in contact with the tappet does not show excessive wear or nicks.

Checking valve springs

Make sure the valve springs have not lost their elasticity.
Also inspect valve springs for rust or damaged lacquering.

Checking rocker arms

Ensure the rocker arm working area is thoroughly smooth and no nicks are shown.

Use a micrometer gauge to measure the rocker arm pin diameter; reading should not be lower than specifications, otherwise replace.

Check the rocker arm bushing for excessive wear, replace as necessary.

Check both rocker arms and valves for proper lubrication by running the engine at idling speed, ensure the oil flow rate is regular; should this not be the case the rocker arm bushing should be inspected for proper installation or the ducts checked for clogging.

Adjusting valve clearance

This adjustment is to be performed with a cold engine and piston at T.D.C. at the end of the compression stroke (both rocker arms shall be in uppermost position and detached from the valve stems).

Rotate the crankshaft until the above mentioned conditions are obtained, then use a thickness gauge to take clearance measurement.

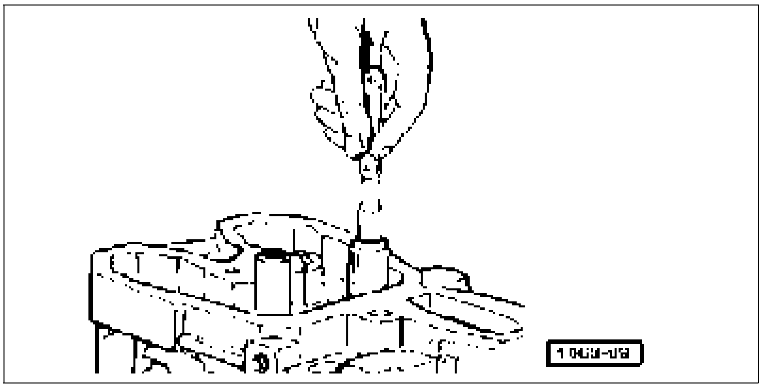


Fig. 17 - Checking valve guide wear.

Installing cylinder heads

Cylinder head securing screws should be tightened evenly following the cross sequence shown in figure to a 2 kgm (19 Nm) torque, then repeat tightening in the shown sequence to a 5 kgm (49 Nm) torque, finally use n. 5.9030.640.0 equipment to furtherly tighten the cap screws until each of them is locked by an angle of 90°±5'.
Before performing screw tightening, the use of plate **A** is recommended to align the cylinder heads correctly, as shown in figure 21.

Checking engine compression

Run the engine until the operating temperature is attained.
Remove the injection nozzle from the cylinder head and fit the special engine compression tester.
Ensure the injection pump is in STOP position.
Start the engine and let it turn until the peak pressure in the cylinders is obtained and then check the engine r.p.m.
Be sure the same checking procedure is applied for each single cylinder so as to provide even measurements.
Cylinder pressure should be 25 to 30 bar at sea level at 150 engine r.p.m. and with hot oil.
Any difference in readings should be no more than 10%. Altitude affects engine compression: 4% pressure loss every 300 m above sea level is usually recorded. To avoid incorrect readings, the battery should be thoroughly efficient. Lack of compression may be due either to piston ring or valve and valve seat or cylinder wear.

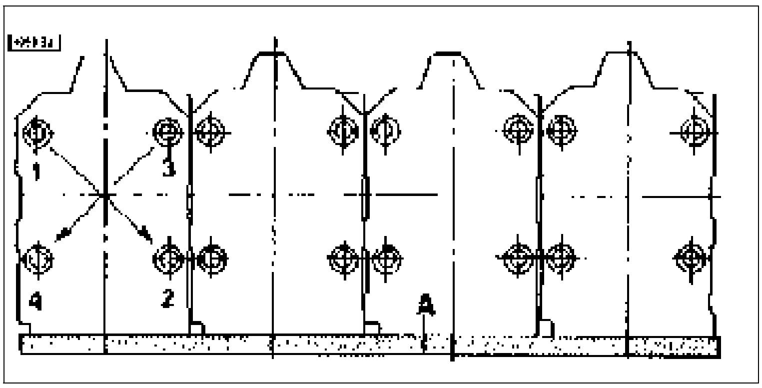


Fig. 21 - Using alignment plate A to install the cylinder heads and cap screw tightening order.

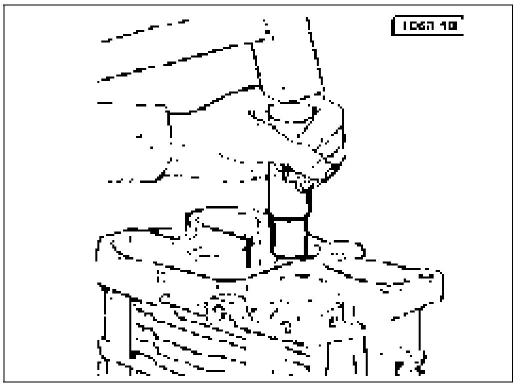


Fig. 18 - Inserting valve guides with the special tool.

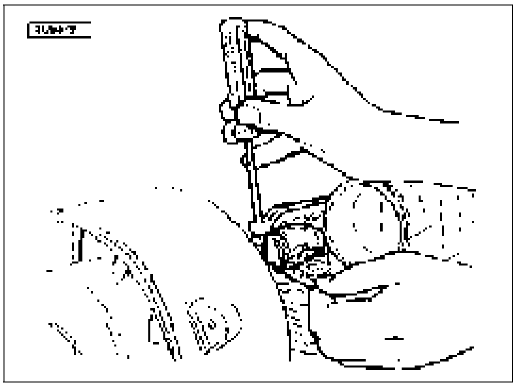


Fig. 19 - Adjusting valve clearance.

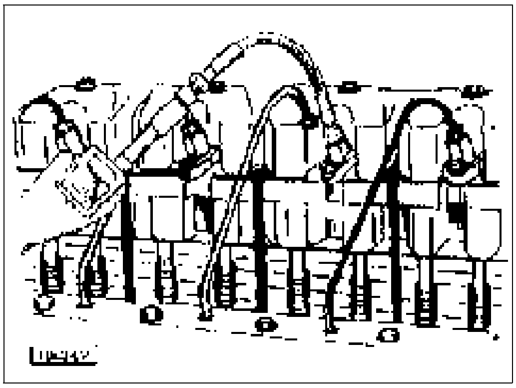


Fig. 20 - Checking cylinder compression.

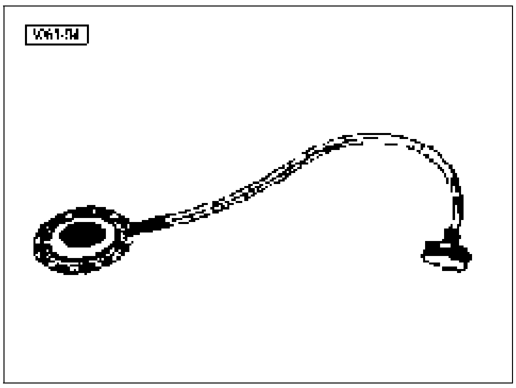


Fig. 22 - No. 5.9030.640.0 equipment for tightening the cylinder head securing screws angularly.

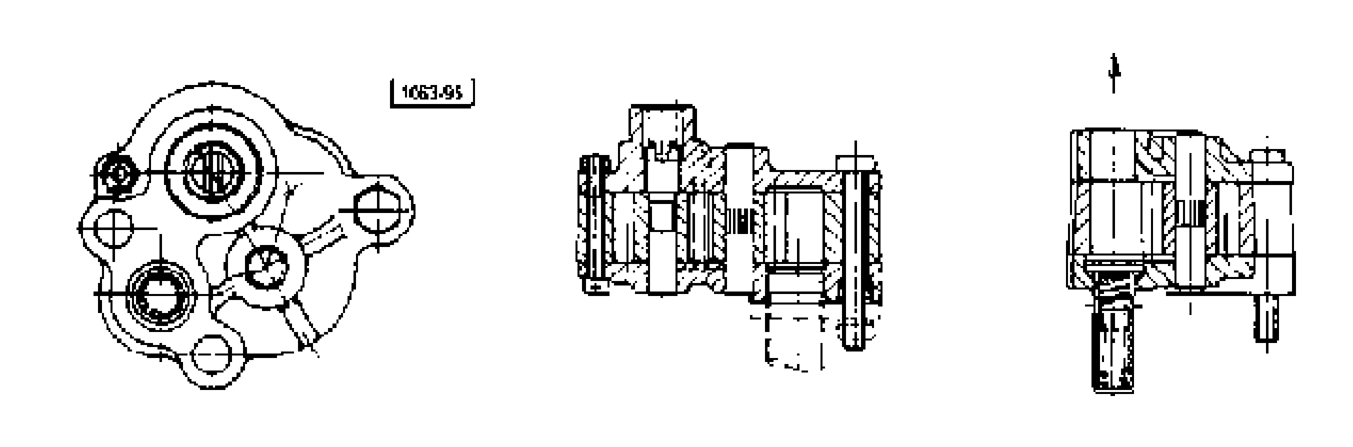


Fig. 1 - Oil pump assembly cross-section - *SILVER 80 - 90 - 100.4.*

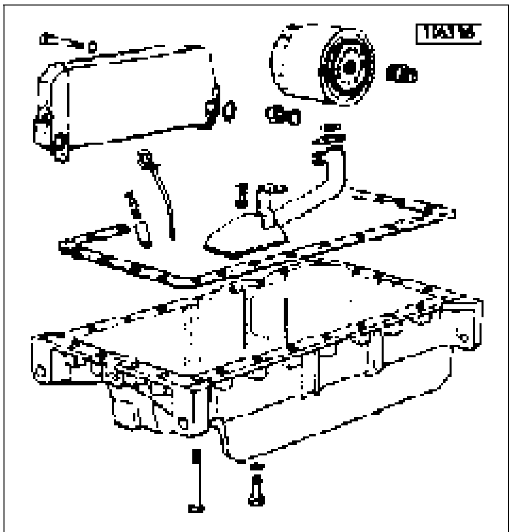


Fig. 2 - Oil radiator, oil filter and oil pan.

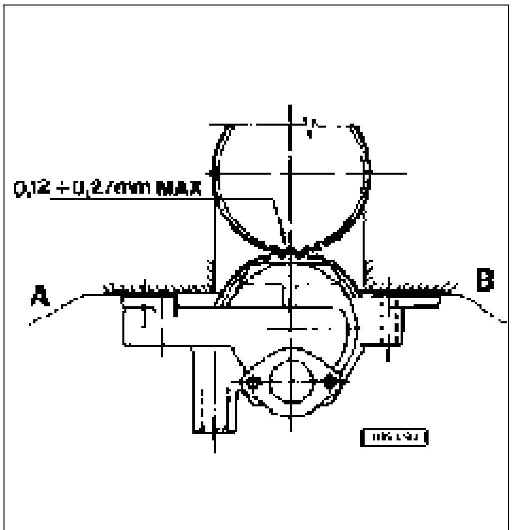


Fig. 3 - Oil pump - *SILVER 100.6.*

SILVER 80 - 90 - 100.4

Oil pump

Each time the oil pump is removed or installed, ensure the gears can rotate freely and there is no evidence of tool spalling or wear.

Otherwise the whole pump assembly must be replaced.

To perform a complete oli pump efficiency test insert an oil flow rate meter along with an oil pressure gauge between cylinder block and oil filter. Ensure readings correspond to specifications in page 18 table.

Checking pressure relief valve

Using the special fitting connect the valve to no. 5.9030.520.4 equipment and make sure the valve calibrating pressure is 4.9 to 5.9 bar. If this is not the case the valve should be replaced.

Warning: whenever the oil pan is removed, ensure the prefilter wire mesh located under the oil rose pipe is thoroughly clean.
Engine oil pressure can also be checked on the special dashboard-mounted indicator.

Engine oil level should never be below the minimum level notch on dipstick.

SILVER 100.6

Shimming the engine oil pump

Between engine oil pump support and engine block fit the same number of shims **A** - ref. code 007.0972.0 and **B** - ref. code 007.0973.0, so that the backlash between oil pump and crankshaft gear teeth is 0.12 to 0.27 mm.

SILVER 100.6

Fitting shims between engine oil pan and front support

Between engine oil pan **C** and front support **A** it is required that shims be fitted so that a ±0.1 mm alignment with the engine block plane may be obtained.

Mount the oil pan onto engine block paying particular attention the rear planes are thoroughly aligned (engine flywheel side).

With no. 5.9030.272.0 centesimal gauge and no. 5.9030.433.0 gauge base measure the difference in dimension between oil pan **C** front plane and engine block plane **B**. This difference in reading should be 0.35 to 0.95 mm (make sure the oil pan plane always recesses from engine block plane).

Install the front support placing a number of shims which permits both planes to be aligned within a ±0.1 mm allowance.

WARNING: Reading and shimming should be performed both on the front right-hand and the front left-hand side of the oil pan as shown in figure.

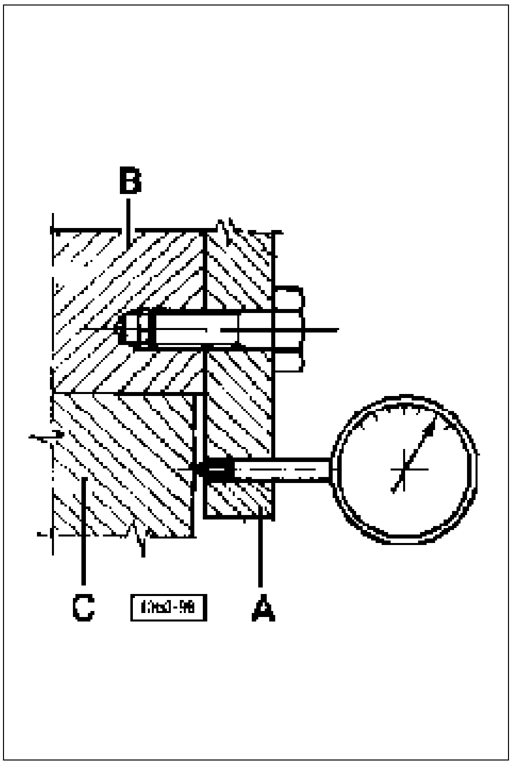


Fig. 4 - Measuring the difference in dimension between oil pan and engine block planes.

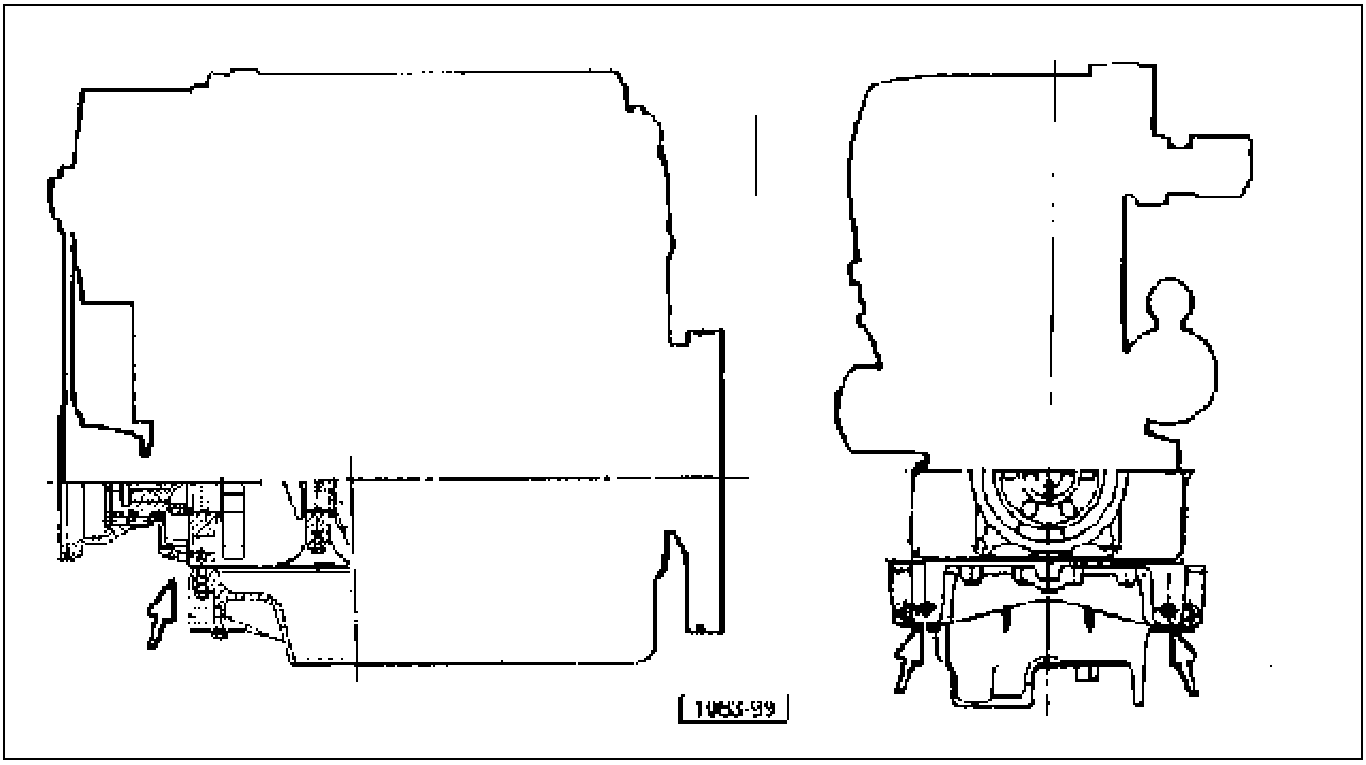


Fig. 5 - Positions for reading dimension difference between front oil pan and engine block planes.

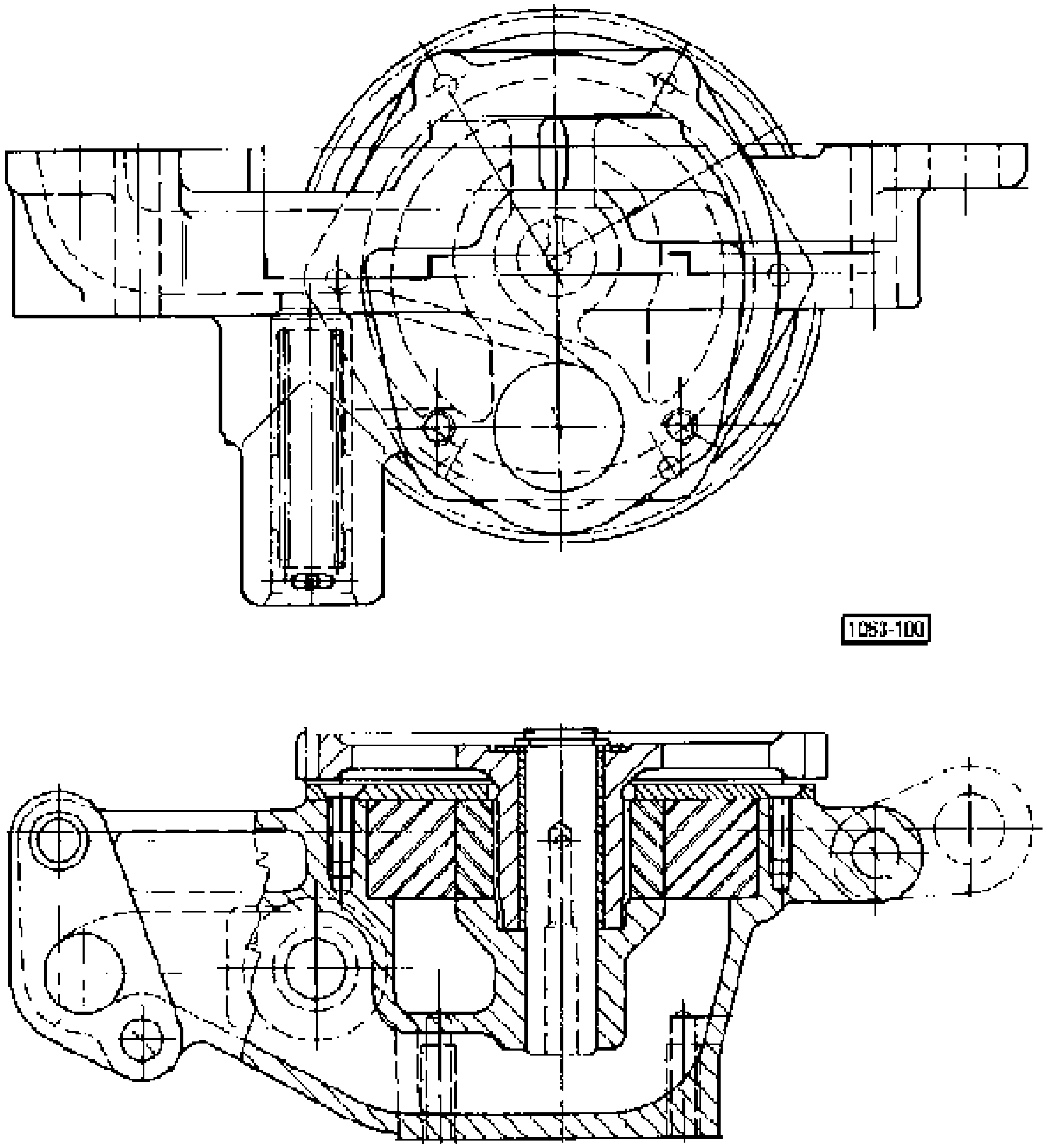


Fig. 6 - Oil pump section *SILVER 100.6*

Fuel injection nozzles

Checking fuel injection nozzles

The checks on injection nozzle operating conditions include injection nozzle spraying efficiency and calibration.

However, it is recommended that the utmost cleanliness rules be strictly observed and a thorough test on the hydraulic seal of the different system fittings be performed. As a matter of fact even a small leakage would invalid the tests carried out.

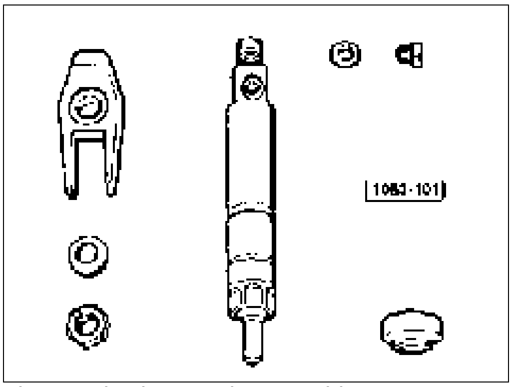


Fig. 1 - Injection nozzle assembly.

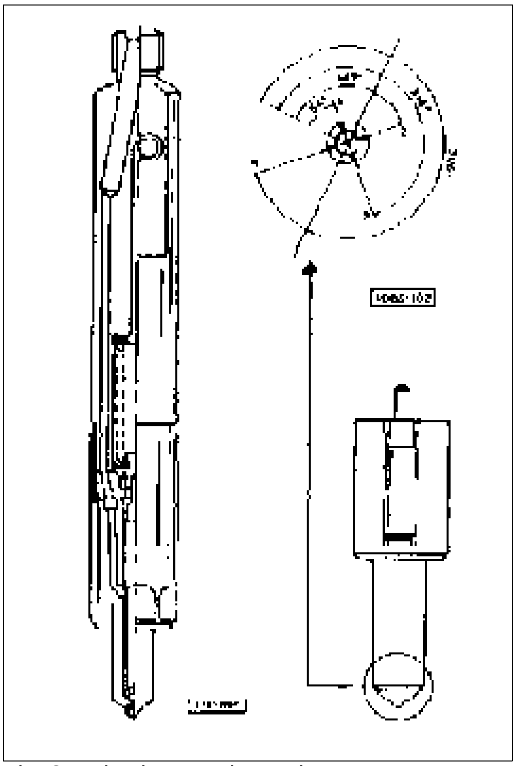


Fig. 2 - Injection nozzle section.

Injection nozzle calibration

Check pressure reading at which the nozzle needle begins to be lifted from its seat thus determining the injection starting.

This pressure should be within the recommended specifications. For this reason, each time that calibrating pressure readings differ from specifications the injection nozzle should be adjusted as required.

To perform the above checks, the use of a pump connected to the injection nozzle to be tested by a piping is unavoidable.
(Prior to performing the test the fuel recovery plug should be removed).

The following procedure shall apply:
Operate the pump lever (fig. 4) a few times to force any air out of system.

Slowly operate the pump lever and notice the pressure reading right in the moment the injection begins. This pressure should be 180 bar. If readings differing from that specified are indicated, it will be necessary to adjust the pressure spring by simply adding or removing the special spring preloading shims.

To gain access to spring adjustment, remove first the lower cap of the injection nozzle holder and then add or remove shims bewteen spring and flat cap until the desired nozzle calibrating pressure is obtained.

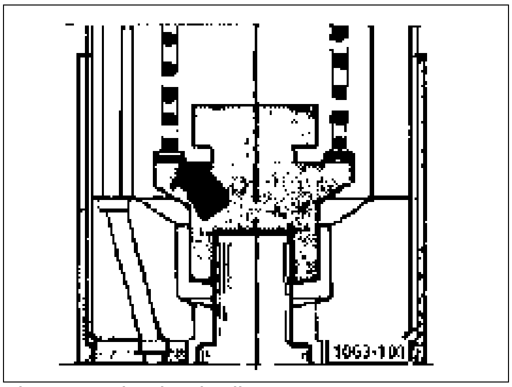


Fig. 3 - Spring load adjustment.

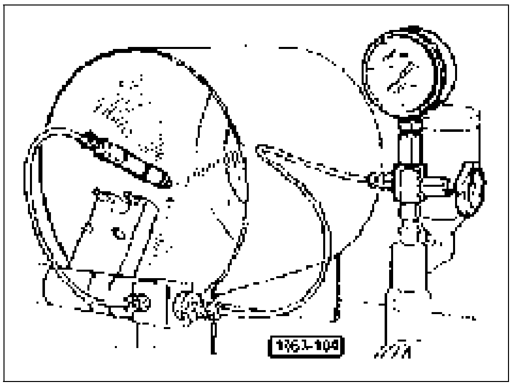


Fig. 4 - Checking injection nozzle spraying efficiency.

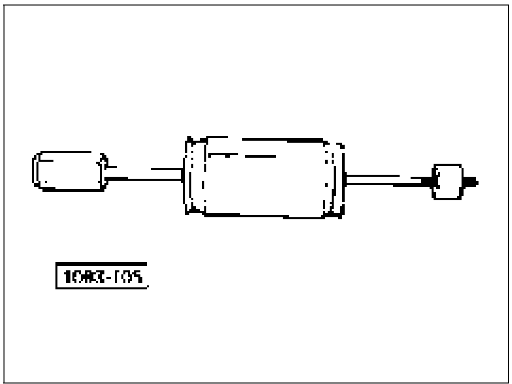


Fig. 5 - No. 5.9030.618.4 tool used to remove injection nozzle from seat.

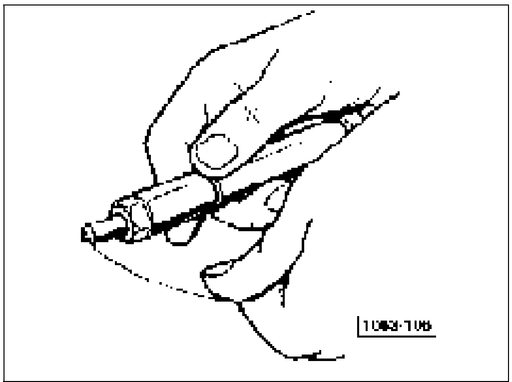


Fig. 6 - Cleaning injection nozzle with a piano wire.

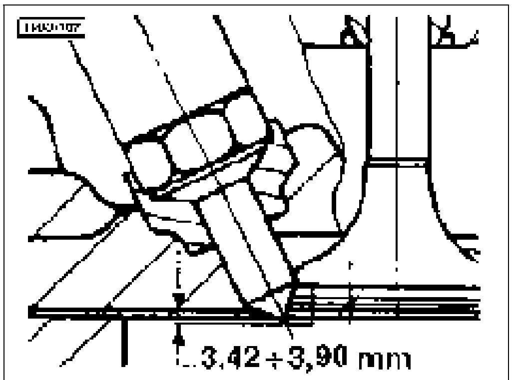


Fig. 7 - Injection nozzle projection from the cylinder head face.

Checking injection nozzle seat tightness

Checking the injection nozzle seat tightness is very important as this permits to verify whether there is any fuel dripping from the injection nozzle before the calibrating pressure is reached.

This test is carried out by operating the hand pump until a pressure reading about 10% lower than the calibration pressure is attained. Take care this pressure be maintained by oppotunely pressing on the hand pump lever, so as to compensate the pressure drop which otherwise would be caused by the fuel dripping between pin and nozzle holder body.

Under these conditions the injection nozzle should never drip; otherwise consult an injection pump specialist.

Checking injection nozzle spraying efficiency

Connect the injection nozzle to a pump and operate the pump lever repeatedly so that the operating conditions may be reproduced.

Fuel must be sprayed from the nozzle holes in form of finely atomized jets, which should all be equal in size. There should be as many jets as there are holes in the injection nozzle.

Otherwise, clean the nozzles by removing first the residual carbon deposits from the nozzle holes with a Ø 0.26 mm steel wire and then clean them thoroughly with a Ø 0.28 mm wire, this having the same diameter as the nozzle spraying holes.

Injection nozzle projection from the cylinder head face plane

Make sure the injection nozzle projects 3.42 to 3.90 mm from the cylinder head face plane.

MECHANICAL-TYPE ENGINE GOVERNOR

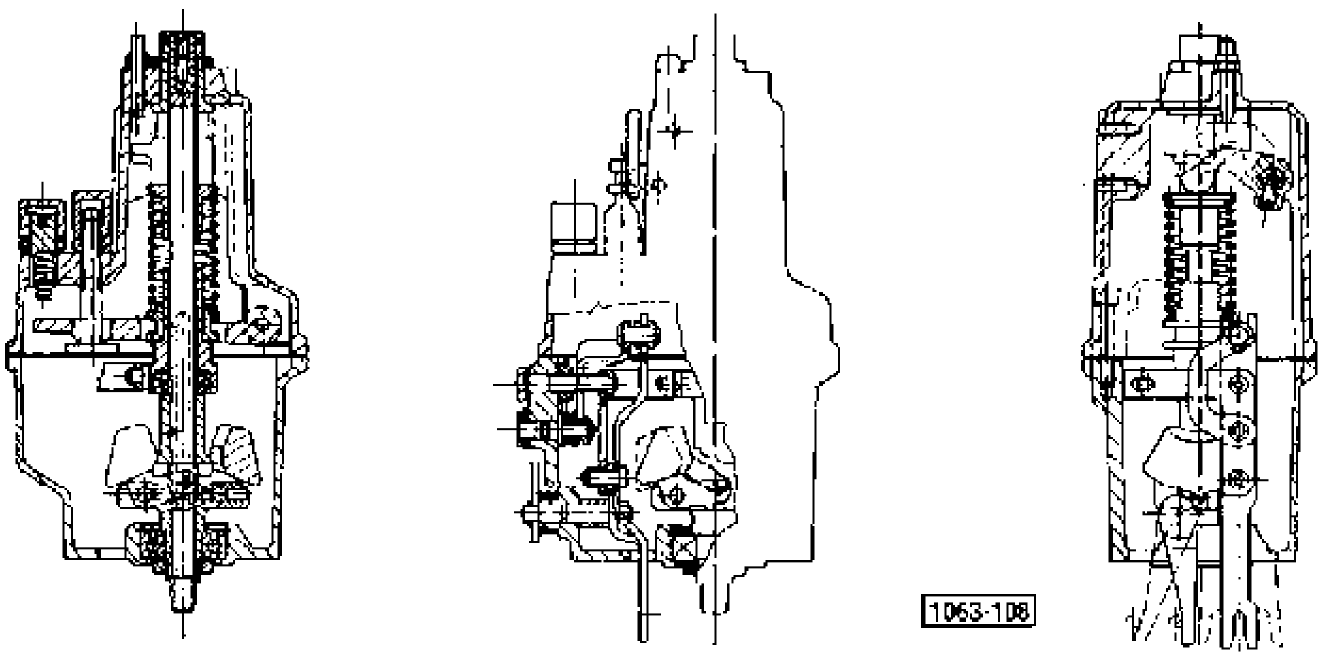


Fig. 8 - Engine governor assembly longitudinal sections.

Mechanical-type engine governor

The engine injection pump governor assembly is a very advanced design both for specific operating features and easy servicing.

The engine governor has been developed as a complete unit on which either repairs or adjustments can be performed after removal from engine.

Besides facilitating operations, also it offers the advantage of being swiftly replaced or temporarily interchanged with a unit of same type and specifications, thus preventing the machine from lying idle in the event of mechanical interventions on it.

The following equipment is also provided with the governor assembly:

Automatic extra fuel supply

Whenever the engine is turned off, extra fuel is automatically supplied to the combustion chamber by this unit; this ensures a prompt engine starting response.

(To be sure this automatic supply function is not prevented in very cold weather, we recommend releasing the engine fuel shut-off control - STOP - immediately after the engine has been stopped).

Engine fuel shut-off

This control permits the engine to be stopped effortlessly, as it directly operates the pump control rod and no connection to the governor assembly is provided.

Anti-hunting

This device limits the engine speed variation when this turns at fast idling speed.

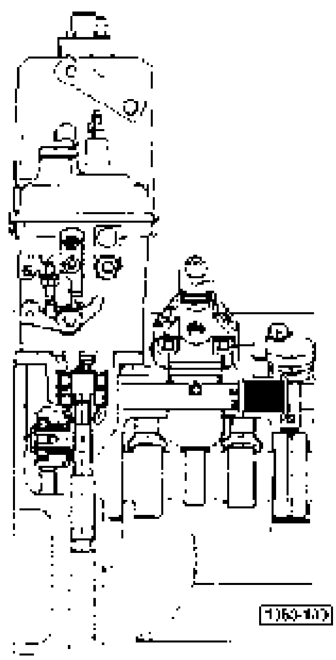


Fig. 9 - Engine governor transmission assembly.

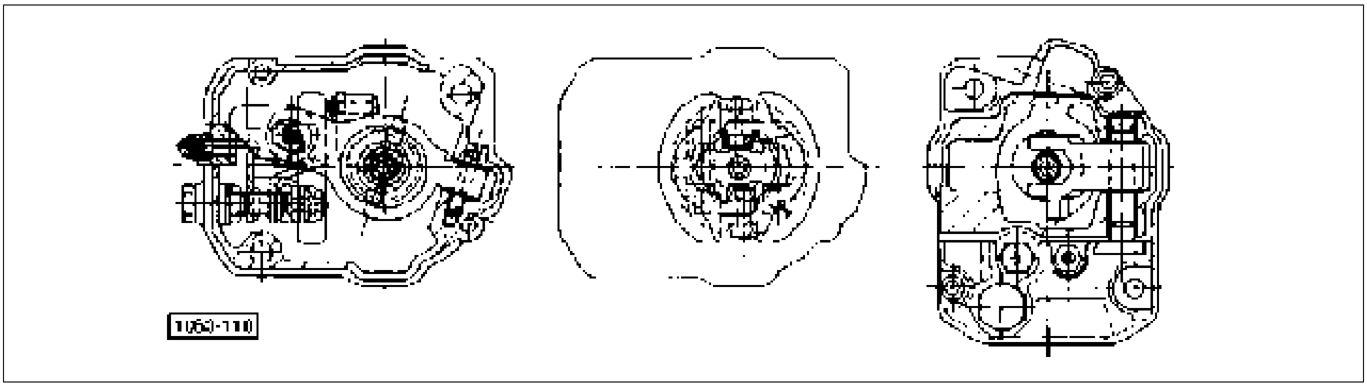


Fig. 10 - Engine governor assembly cross-section.

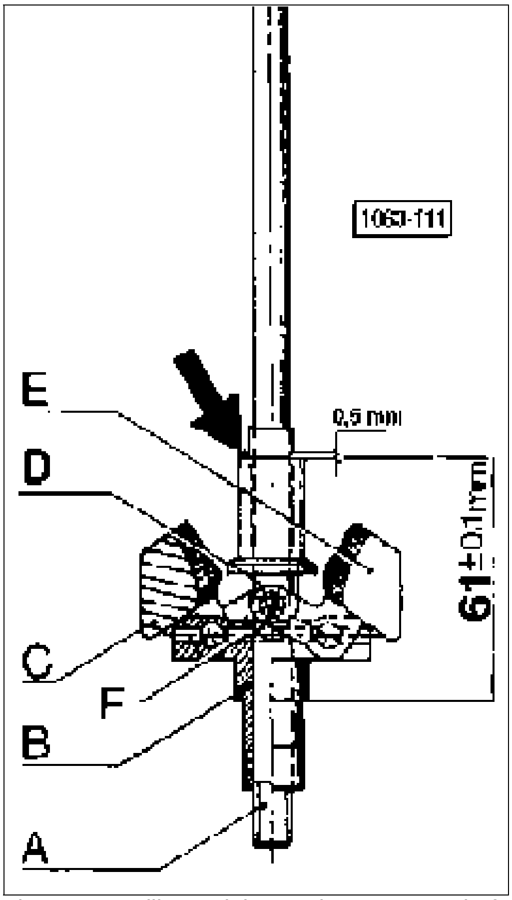


Fig. 11 - Installing weights on the governor shaft.

Mounting governor weights (Fig. 11)

Apply Loctite 601 to the crankshaft surface **A** in contact with support **B**, then fit the support to the crankshaft, positioning the two pieces to allow fitting of dowel **F**. Fit the weights **C** and **E** to the support by means of plates **D** inserted in the groove of the sliding sleeve.
Open weight **C** against the stop thereby holding the weight whose plate rests on the coupling and releasing the other one, then move the coupling against the locked plate. Be sure the dimension reading is 61±0.1 mm, as shown in Fig. 11, otherwise add or remove shims (ref. code 2.1589.160.0 and 2.1589.161.0) to/from the position indicated by the arrow.

Installing governor assembly

Lower casing

Install the engine STOP control levers, both internal and external ones, then insert the plate and related stop screws (see items **a** in fig. 14).
Place bearing **A** (fig. 13) into the casing and fit levers **B** and **C** (fig. 13) along with the full assembly components (**b** fig. 14).
Warning: Before installing lever **C** be sure this has a 20 mm portion showing absolutely no indentation (see figure 13).
Install the shaft and mounted weights securing to the bearing with the special nut.
Install bearing **D** as well as the sliding coupling and fit the eccentric screw **E** into the casing, paying attention the chiseling on the screw head is in the upper position.

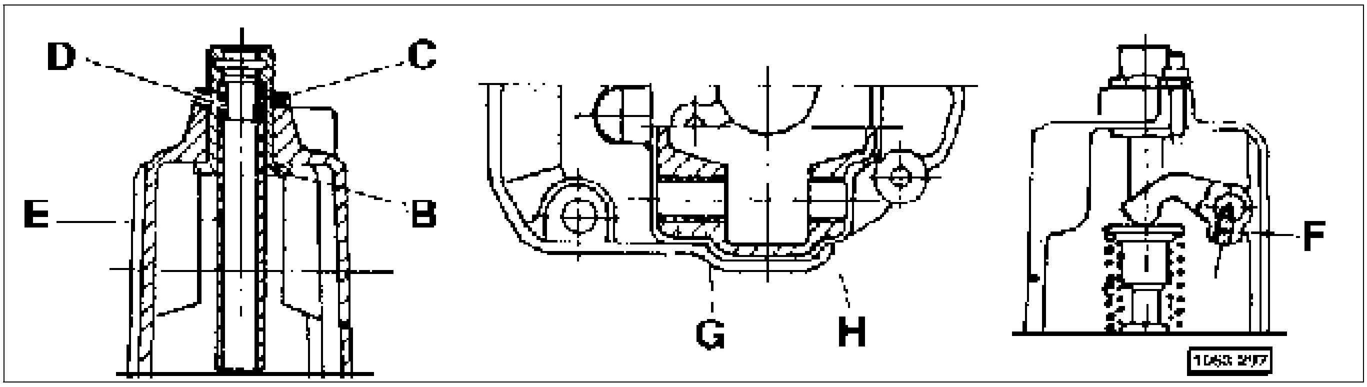


Fig. 12 - Governor sealing points with LOCTITE.

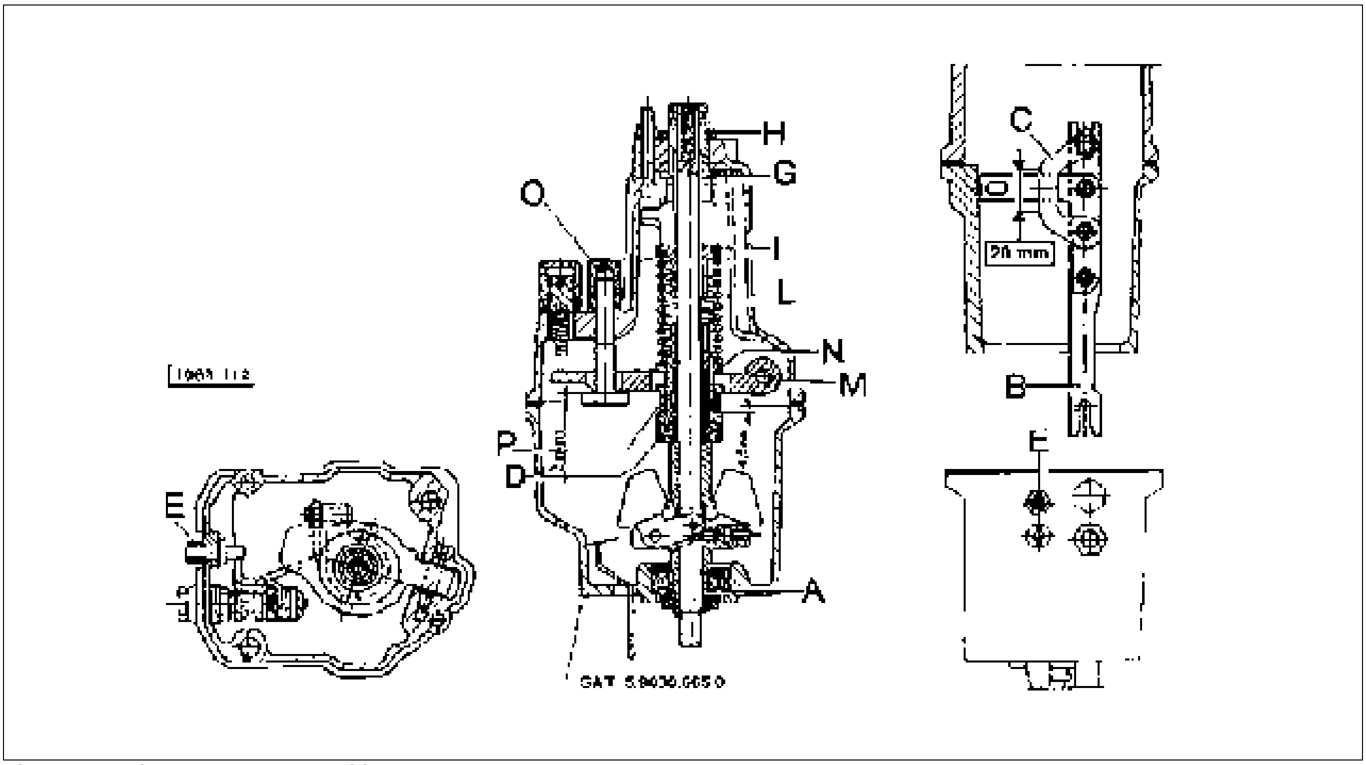


Fig. 13 - Engine governor assembly.

POINTS WHERE ADHESIVES ARE TO BE APPLIED

referring to fig 12
Before assembly, smear the outer surface of the bush **D**, the tube **E** and the fitting **B** with Loctite 601.

Before assembly, smear the outer surface of bush **G** and bush **H** with Loctite 601.

Before tightening nut **C**, smear the thread with Loctite 270.

Before assembly, smear the thread of the lever securing screw **F** with Loctite 270.

Adjusting engine speed equalizer

Fix the housing to a support.
Turn the eccentric screw E fig. 13 to obtain a distance of 4.5+0.1 mm. between the upper edge of the governor housing and the edge of the sliding sleeve.

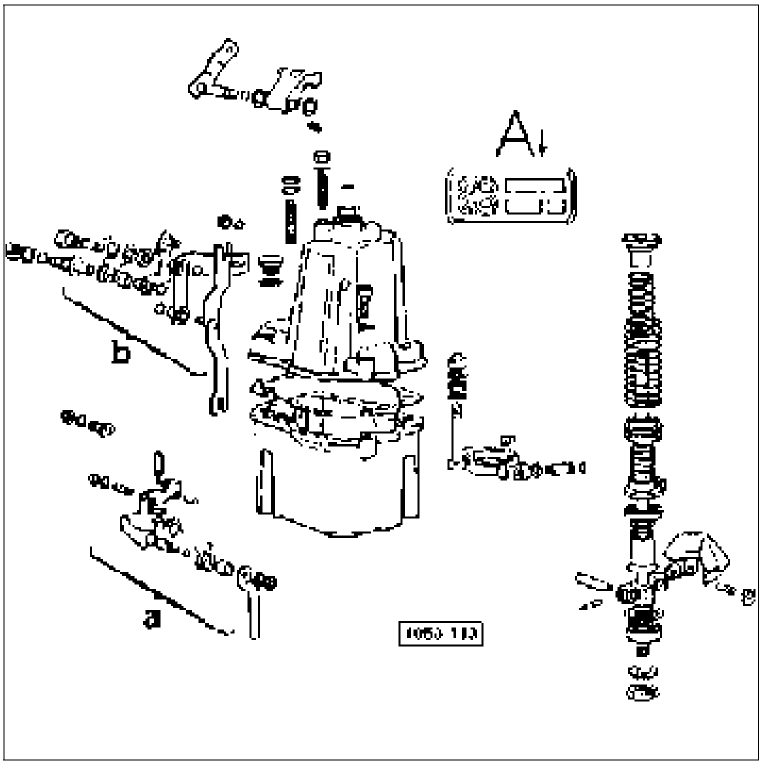


Fig. 14 - Engine governor assembly components
A - Identification plate

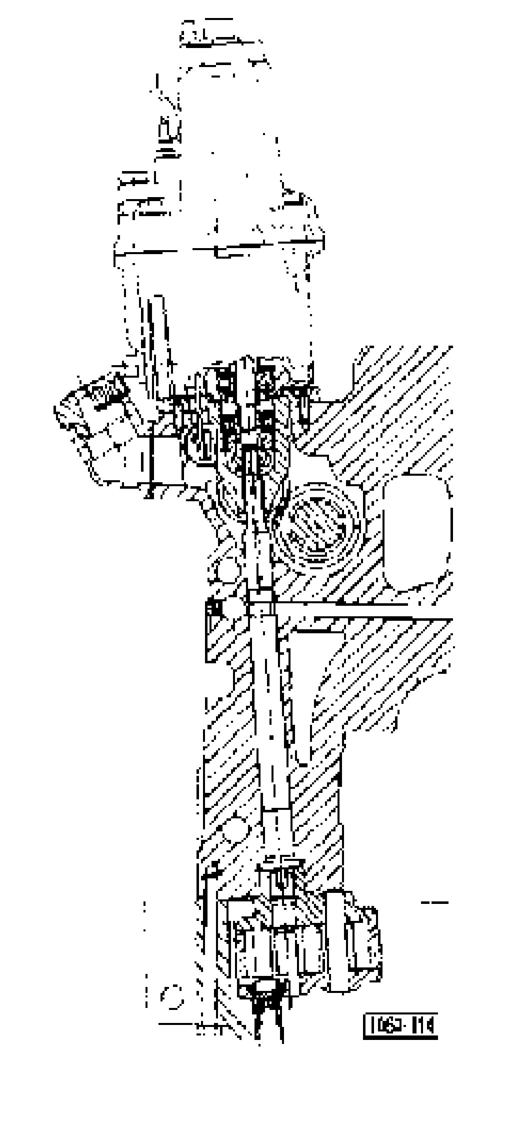


Fig. 15 - Engine-mounted governor unit.
(For engine 4-cylinders with governor mechanical type).

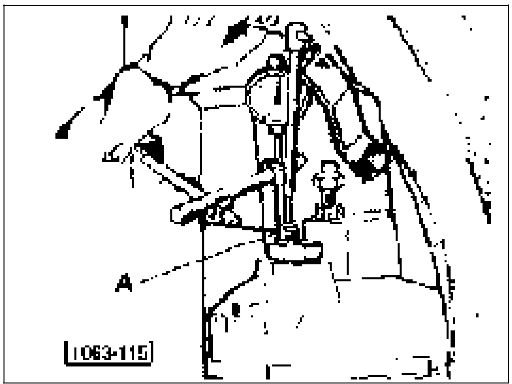


Fig. 16 - Tractor-installed engine governor unit.

Upper casing (Fig. 13)

Fit the minimum and maximum accelerator control lever travel stop screws into the upper casing.
Mount bushing **G** with the relevant O-ring using nut **H**; install the accelerator internal and external control levers.
Position spring-holder cap **I** and springs **L**; secure lever **M** and inserted coupling **N** into casing.
Install travel stop rod **O**.

Positioning governor lever M

Operate travel stop rod **O** with an Allen wrench until the distance between the lower casing edge and the travel stop rod head corner is about 2 mm, as shown in figure 13.
Connect the upper to the lower casing, first positioning the automatic extra fuel supply unit spring **P** on coupling **N**.

Calibrating engine governor

Engine governor calibration is very easy and requires no special equipment. The procedure recommended permits all lever plays produced during engine running to be removed, since this adjustment can be performed with engine governor assembled and engine running.
This setting is to be effected when external operations which may involve engine governor, injection pump or injection pump control rack replacement are performed.

Important - Whenever the governor is removed from engine, the cable connected to the battery positive pole should be disconnected so that a sudden engine start may be prevented.
Observe the following procedure:
— start the engine and then bring to a 2000±100 r.p.m. by means of the hand throttle (avoid subjecting the engine to dragging loads and ensure it is not hunting).
— Using an Allen wrench (fig. 16) loosen the fuel maximum delivery adjusting screw (turn it anticlockwise) until the engine is about to stop (or keeps on running through the automatic operation of the extra fuel supply unit stabilizing at 300 to 500 r.p.m.).

Warning: locating this condition requires most accuracy and meticulous operating procedure and namely:
— locate approximately the point where the engine r.p.m. starts drooping;
— screw in the adjusting screw of about 3 turns to permit the engine to be stabilized at 2000 r.p.m.;
— loosen first the adjusting screw two full turns and then continue loosening by about 30° movements at a time and wait 2 to 3 seconds after each screw movement until the engine stop point is located.

With the engine stopped, place the contact point of a dial gauge on the head of screw **A** (fig. 16), zero the gauge, then screw in the screw the number of turns indicated in the table, to obtain the gauge reading indicated below:

ENGINE TYPE	r.p.m.	HP	No of tightening turns of the adjusting screw
1000.4-A4	2500	80	6.3/4 (6,75 mm)
1000.4-AT2	2500	90	8.1/2 (8,5 mm)
1000.4-ATI1	2500	100	9 (9 mm)
1000.6-A1	2500	100	5.1/2 (5,5 mm)

NOTE: This adjustment can be performed at an engine oil temperture not less than 80 °C.

Tighten the lock nut.

Full-load fuel delivery governor operation depending on turbocharging pressure

L.D.A. valve ***(Ladedruckabhängiger Vollastanschlag - Full-load fuel delivery stop valve)***

NOTE: Before adjusting the L.D.A. valve it is first required the governor calibration be carried out.

This calibration should be performed after locking the L.D.A. valve as follows:
— loosen nut **O** and screw in screw **N** until plate **G** is contacting the valve casing.
— after calibration is ended loosen screw **N** of 2.1/4 turns and lock the nut.

As regards governor calibration follow the procedure referred to on previous page.

No. of turns of the governor calibrating rod adjusting screw: 10 (10 mm).

L.D.A. valve adjustment

To be performed only in the event of valve stripping with governor removed from engine. The injection pump rod control lever should not be constrained.

Do not loosen the two screws securing the valve casing to the governor, should it be necessary first mark their positions so that on reassembly an equal amount of shimming washers may be fitted in the same positions.

After removing the L.D.A. valve cover, unscrew nut **F**, remove the underlying diaphragm and spring; then rotate nut **C** a few turns and install diaphragm again. Pull tie rod **B** upwards until feeling the contact between pin **D** and lever **E.**

Screw on nut **F** until bringing plate **G** against the valve casing. Remove guard **H** from the top and lower downward, then remove pin **I** and withdraw tie rod **B** from top.

Screw nut **C** against plate **G** and afterwards unscrew by half a turn.

Holding nut **C** in position tighten nut **F**, loosen ring nut **L** and place bushing **M** against the valve casing face, then unscrew by 3/4 turn. Lock ring nut **L**, install spring and tie rod **B**.

Adjusting L.D.A. valve operating stroke

After installing L.D.A. valve cover drive screw **N** until plate **G** contacts the valve casing, then loosen screw by 2.1/4 turns and finally lock with nut **O**.

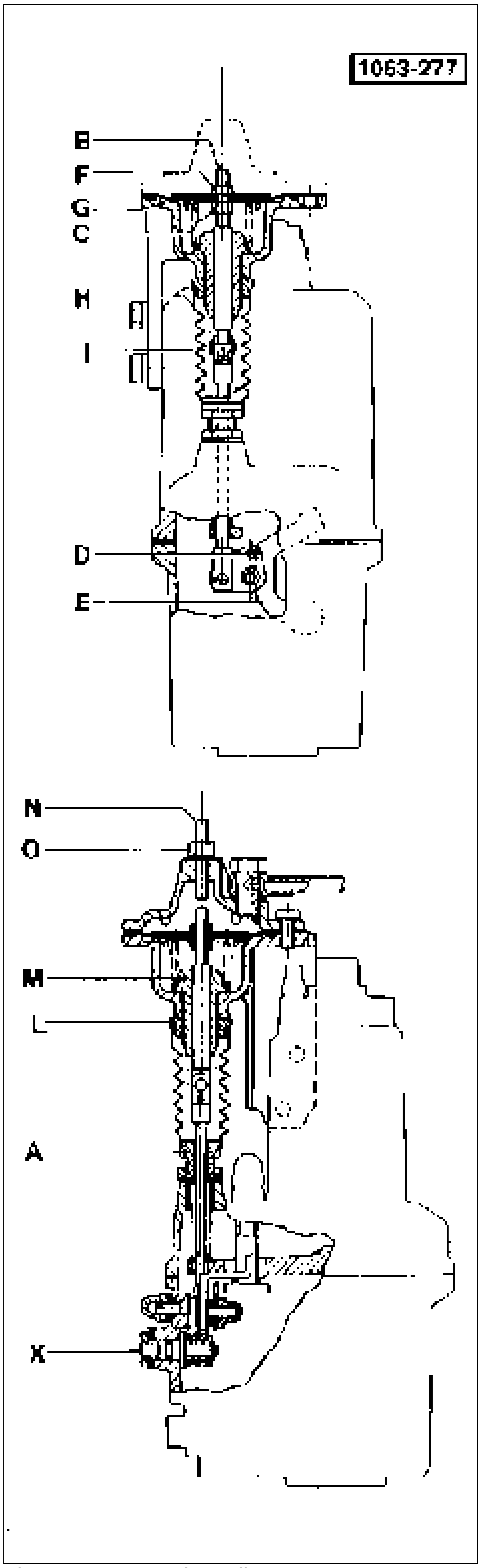


Fig. 17 - L.D.A. valve adjustment.
SILVER 100.4

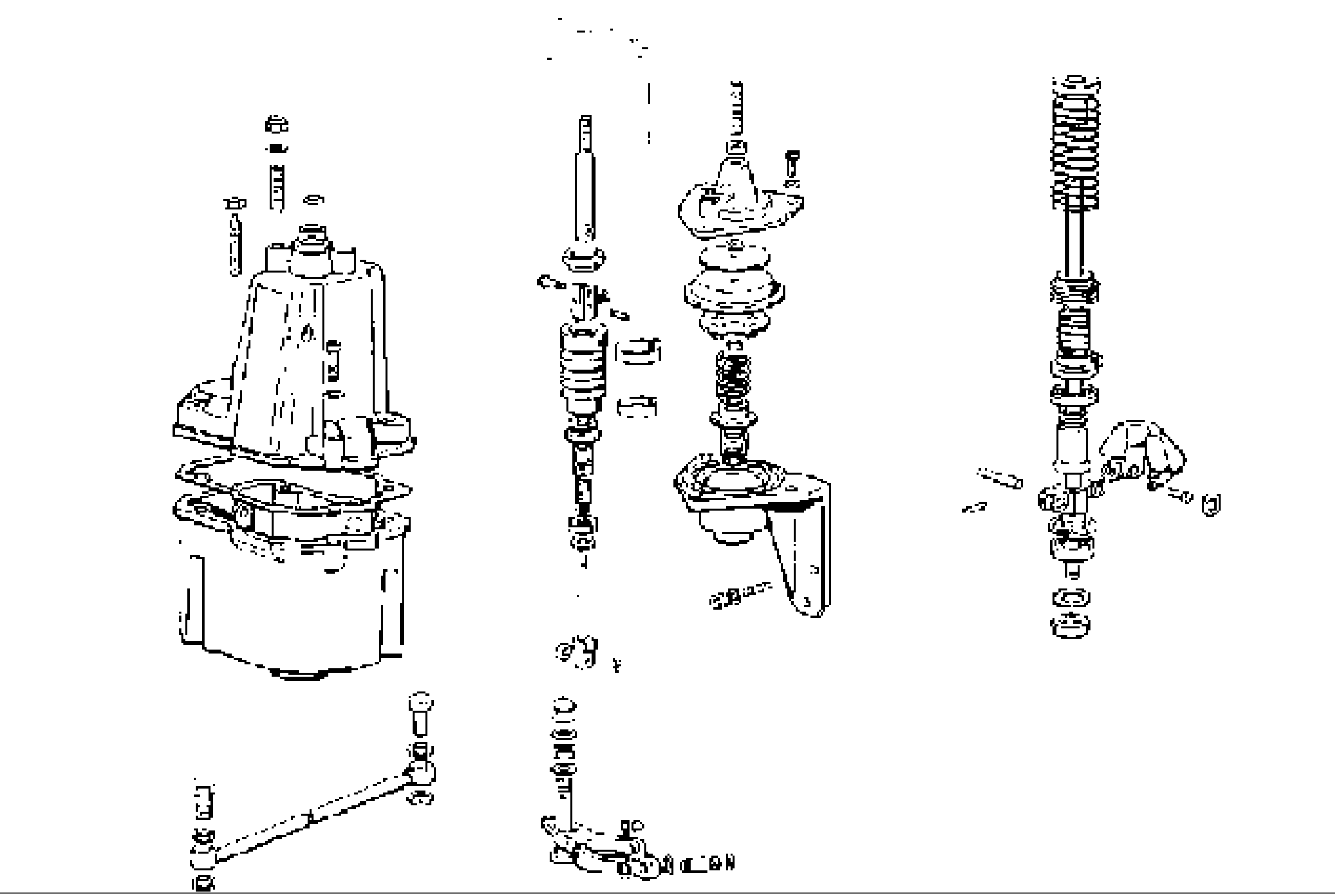


Fig. 18 - Engine governor assembly with L.D.A. valvel ***SILVER 100.4.***

FITTING AND ADJUSTING THE EXTERNAL CONTROLS OF THE MECHANICAL GOVERNOR

Accelerator pedal (fig. 19).
Attach the control cable **A** to bracket **C** and then to lever **D**; fit spring **P**.
Adjust the position of the rubber **G** to obtain a distance of 100 mm as shown in figure 19; tighten locknut **Q**.

Hand throttle control
Attach cable **B** to bracket **E** and then to lever **F**; apply a force **f = $5^{\pm 0.5}$** to lever **F** and screw in the self-locking nut **R** until the force applied no longer moves the lever.

Connecting the pedal and hand throttle cables to the governor.
Attach the two cables to bracket **H** using the two snap rings **I**;
To adjust the accelerator pedal cable, screw in nut **L** until the cable is fully tensioned, then tighten locknut **M**.
Bring the hand throttle lever to the "**MAX**" position and push lever **F** to its travel limit; screw in nut **N** until the cable is fully tensioned and then tighten locknut **O**.
Lubricate the surfaces of the governor lever in contact with nuts **L** and **N** using "Molikote Gn" grease.

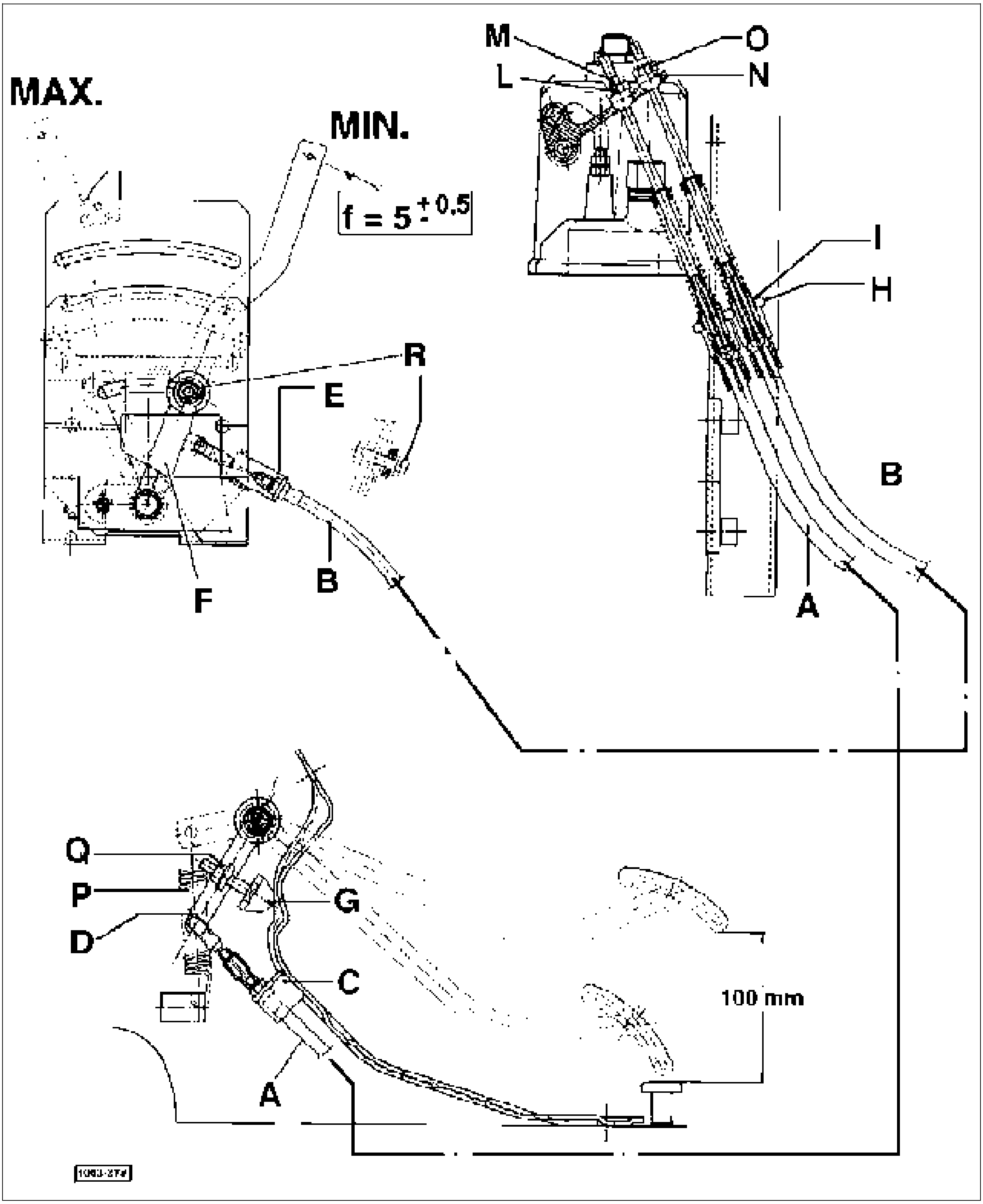


Fig. 19 - Fitting and adjusting the external controls of the mechanical governor.

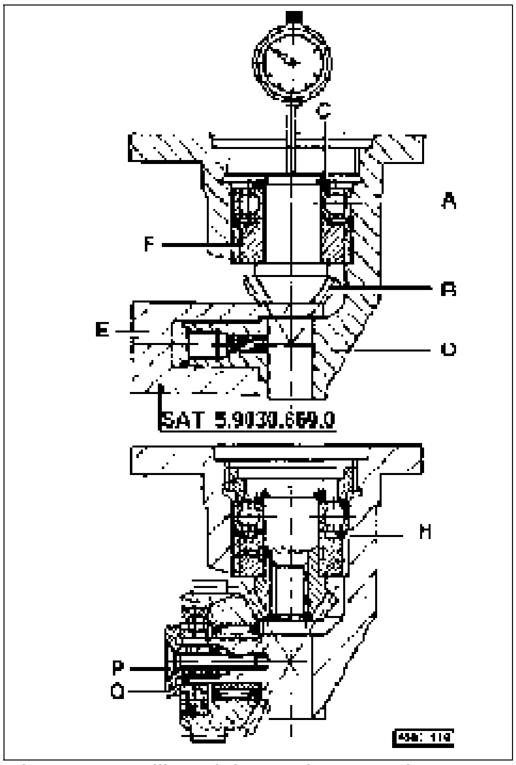


Fig. 20 - Installing pinion and crown whee

Engine governor control assembly

Installing pinion (Fig. 20)

First insert bearing **A** in pinion **B** placing a pack of shims **C** (ref. codes 2.1589.146.0, 2.1589.147.0, 2.1589.153.0) between both until assembly clearance has been fully removed.
Position the preinstalled assembly in support **D** so that pinion head rests on tool **E** as shown in figure 20.

Fit a comparator resting its feeler on pinion end and then set it to zero.
Remove the tool previously fitted and push the pinion until bearing **A** stops against ring **F**, then take comparator reading.
This reading corresponds to the thickness shims **H** to be placed in the position indicated in figure 20.

Tighten the ring nut fully and hit in three different points to prevent it from becoming loose.

Installing crown gear (Fig. 20 and Fig. 21)

Install cage **I** with rollers and place as shown in figure.
Insert ring **M** and crown gear **N** in the support then tighten ring nut **O** to allow for a tooth radial backlash of 0.03 to 0.08 mm; then tighten screw **P** ensuring the ring nut remains in position.

Warning: screw **P** is to be mounted after applying a little amount of Loctite 270.

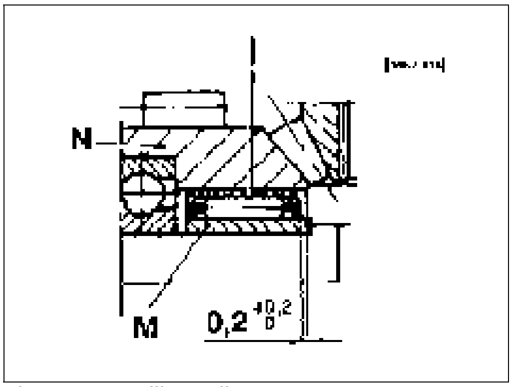


Fig. 21 - Installing roller cage.

Installing the control assembly into the cylinder block (Fig. 22)

Fit some shims **A** (ref. code 065.2560.0 - figure 22), so as a 0.06 to 0.018 mm backlash between the governor drive gear teeth is obtained.

In any case one shim at least needs to be fitted.

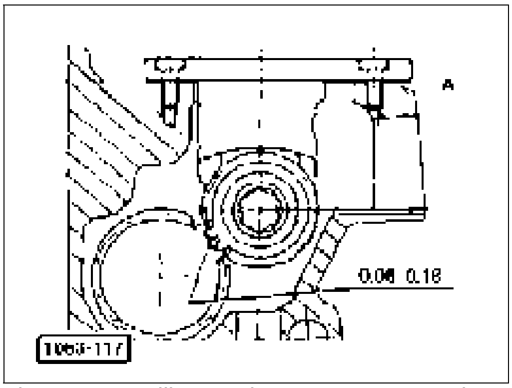


Fig. 22 - Installing engine governor control assembly into the cylinder block.

Adjusting anti-hunting device (Fig. 23)

This adjustment is to be made only in the event of engine hunting at engine maximum idling speed.

Loosen bush **A** until being sure that spring **B** is not protruding inside the governor casing.
Start the engine and run to peak speed.
Screw in the bush so as to bring the spring close to the hunting system until hunting dampening is felt.

Warning: the engine idling speed variation obtained through the anti-hunting device should never exceed 20 r.p.m.

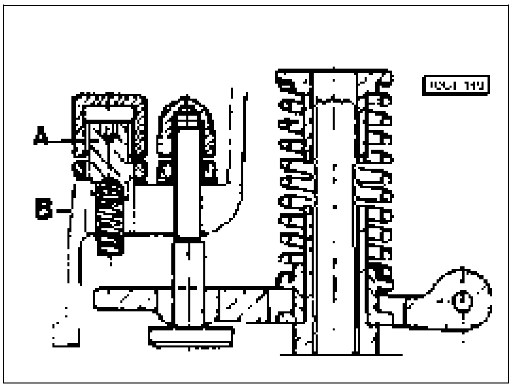


Fig. 23 - Engine anti-hunting system..

Sealing engine governor

The governor is fitted with sealing points, indicated in figure 23 bis, with the letters **A - B - C - D - E - F**.

Before starting any operations during the warranty period consult the local After-Sales Service.

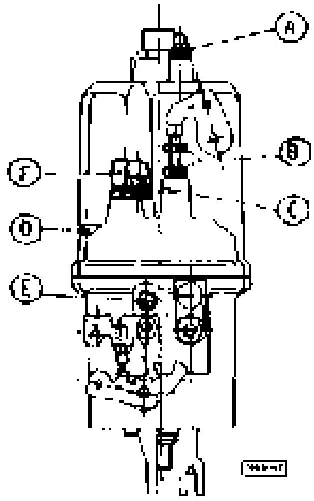


Fig. 23 bis - Governor sealing points.

Installing the governor (fig. 24)

Fit the governor by engaging the control fork **A** in the pawl **B** of the pump control shaft and securing it in position with the relative screws.
Then manually check through the injection pump control rod access window that the control rod moves freely and that the STOP control operates correctly.

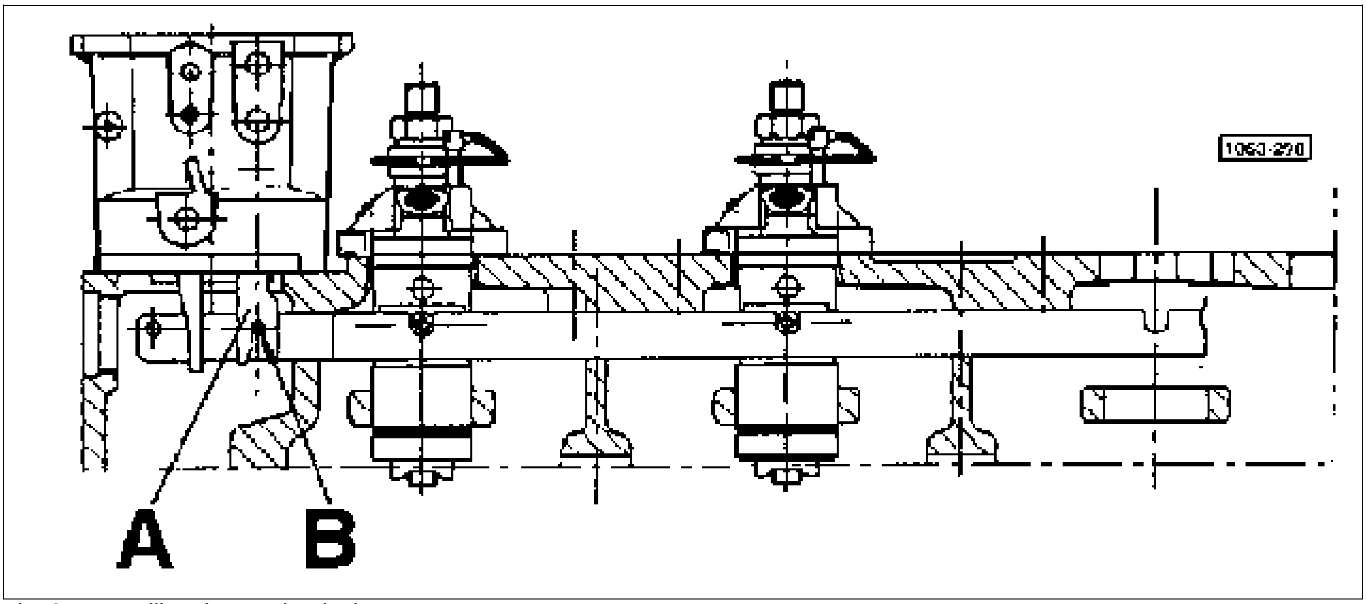


Fig. 24 - Installing the mechanical governor.

ELECTRONIC ENGINE GOVERNOR

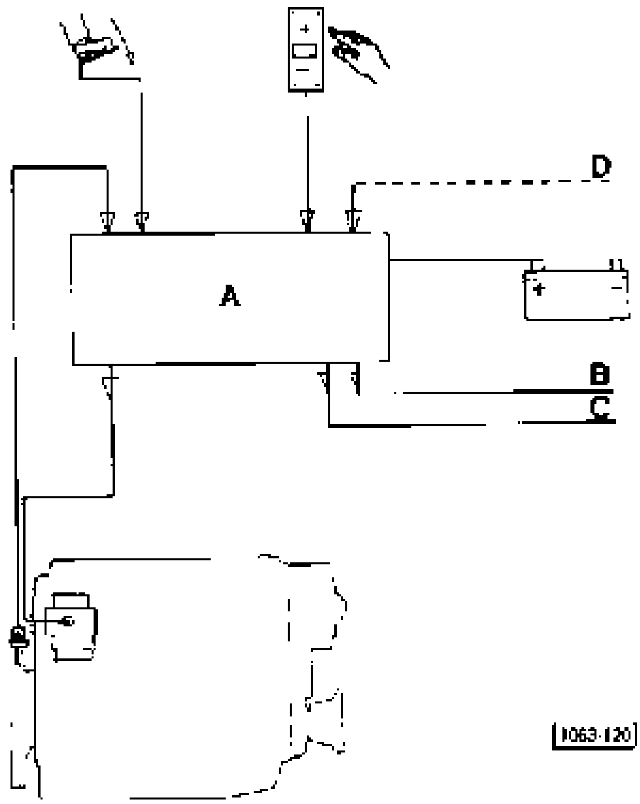
General information

The electronic engine speed governor consisting of a REG2MK microprocessor permits an accurate and stable engine r.p.m. control to be obtained. The system includes an ELECTRIC ACTUATOR, a MAGNETIC PICK-UP acting as a speed recorder, a PUSH-BUTTON PANEL with LED indication (hand throttle) and a POTENTIOMETER located on the accelerator pedal.

Specifications

power supply	8 to 15 V DC
card electrical input	35mA + actuator current
maximum actuator current output	6 A
PICK-UP input	5 to 30 Vrms
operating temperature range	-40 to +85 °C
humidity rate	0 to 100% non condensed
control	isochronous or with statism
speed range	600 to 2700 r.p.m.
overspeed	set at 3500 r.p.m.
reliability	70 °C

The engine governor receives the speed signal in form of electric signal from a pick-up facing the engine flywheel ring gear and controls the actuator installed on engine by an electronic control unit.
The control unit is fully digital type and contains the mode of operation defined for each engine model in form of permanent storage programs (EPROM).
Communications towards the control unit may be entered by an EXTERNAL PROGRAMMER equipped with specific functions enabling certain parameters to be diagnosed and set



A - ELECTRONIC CONTROL UNIT

B - DIAGNOSTICS

C - SPEED CONSUMPTION

D - PROGRAMMER

Fig. 25 - Configuration of the electronic engine control system.

Engine r.p.m. governor operation:

Engine r.p.m. governor consists of the following parts:
— electronic control card on microprocessor;
— magnetic pick-up on engine flywheel;
— potentiometer on accelerator pedal;
— hand throttle push-button control panel and self-diagnosis LEDs;
— magnetic actuator controlling the engine injection pump rack rod.

The engine r.p.m. is selected by the operator through the accelerator pedal: the potentiometer connected to pedal supplies the card 1 to 4 V voltage corresponding to a r.p.m. varying from minimum to maximum r.p.m. available.

The magnetic pick-up located against the flywheel ring gear teeth generates a voltage whose frequency is proportional to the engine r.p.m.

The electronic control unit compares the engine r.p.m. from the pick-up with the potentiometer reference thus setting up a current in the actuator so that the desired engine r.p.m. may be established.
The adjustment constants are preset in governor storage and for this reason cannot be altered.
The push-button panel permits further adjusting functions to be selected.
Three push buttons are provided in the push-button panel:
— UP
— HOLD/RESET
— DOWN
In addition, close to HOLD/RESET push button it is located a special LED providing signalling and self-diagnosing functions.

NOTE: The hand throttle control forming part of the multifunction type handset, incorporated into the seat armrest, is described in the chapter devoted to the cab.

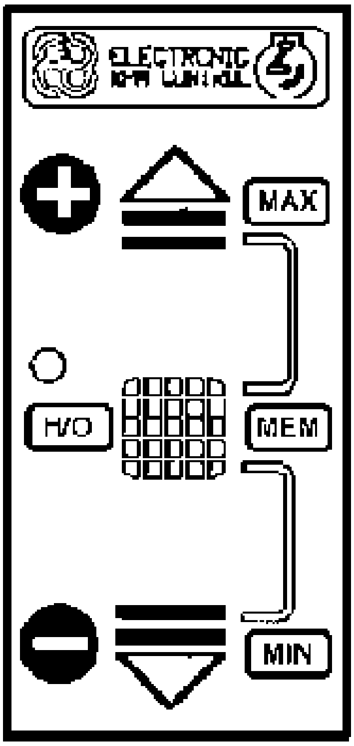


Fig. 26 - Electronic accelerator manual control.

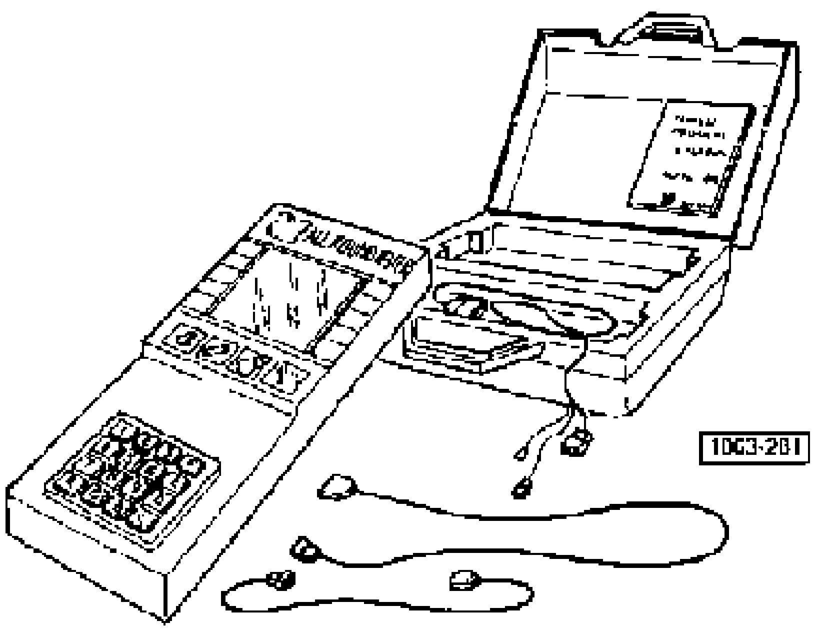


Fig. 27 - Tester (SAT 5.9030.730.6) for checking the governor.

isochronous operation: depressing push button HOLD/RESET makes the LED light up and the governor keep the r.p.m. rigorously constant.
operation with statism: if the HOLD/RESET push button is pressed again the LED is switched off and the governor operates with a r.p.m. droop of about 7% from idling to full-load speed. This engine running mode is useful when driving tractor on public roads.
fixed-speed hand control: this helps reproduce the hand throttle control.

functions:
— isochronous operating mode;
— speed statism operating mode;
— 600 to 2700 RPM speed adjustment;
— hand throttle digital control;
— idling speed under variable statism of 600 to 1500 r.p.m.;
— speed under variable isochronous operating mode from previous idling speed to 2500 r.p.m.;
— limitation of the peak horsepower varying with the speed;
— protection operation and fault self-diagnosis.

protections:
— pick-up signal loss protection;
— actuator terminal short-circuit protection;
— overspeed protection;
— battery polarity reversal protection;
— power supply loss protection;
— microprocessor fault protection.

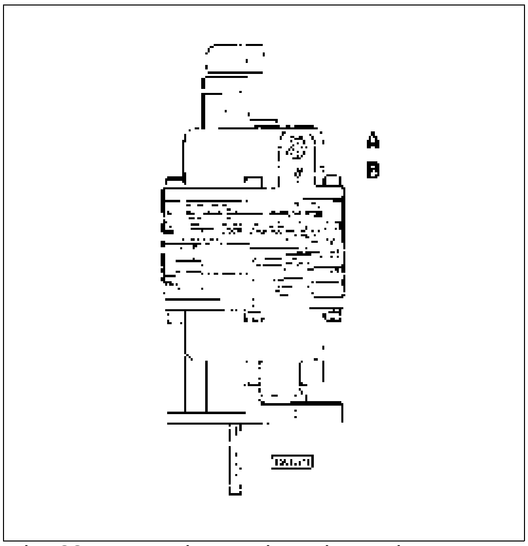


Fig. 28 - Protection against electronic governor actual access.

Installing components

The installation of the various components should be carried out with battery disconnected.

— the positive of the key subsequently supplying power to the card is directed towards battery +.

— the card power supply in-series fuse is 7.5 A.

Note: the metal box housing the card is connected to battery negative through a card-internal connection.

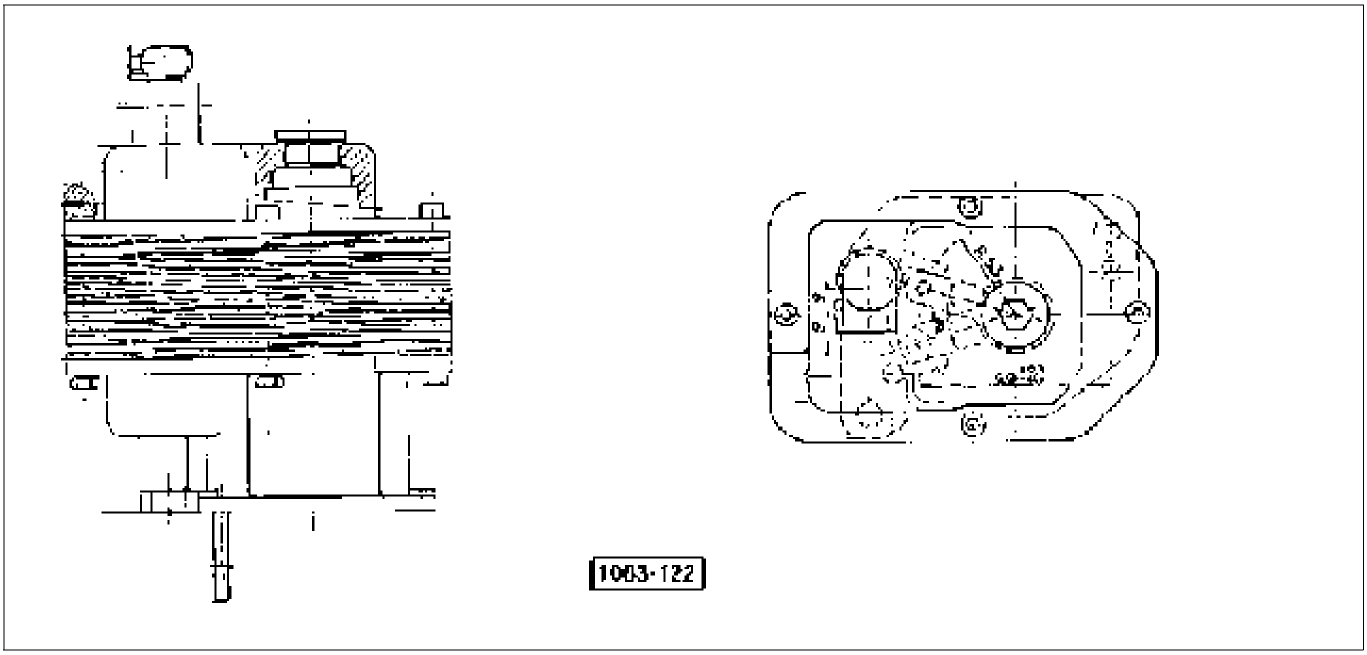
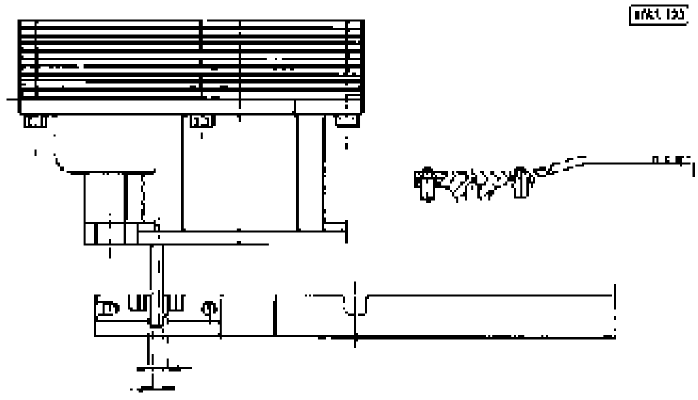


Fig. 29 - Views of the electronic governor actuator.

Installing and checking actuator

When installing the actuator take note of the following:
— **the actuator lever should move the pump rod freely and without friction;**
— a free rod must return in stop position;
— the actuator rod must be matched to the pump rod fork with a slight play.
WARNING:
The actuator is provided with cover **A** (Fig. 28) to protect the access to the injection pump control rod stroke adjusting device.
This cover is secured to the actuator by means of self-tapping rivet **B** (Fig. 28).



Calibration on a specific test bench:
power supply 2A $\pm$ 0,01
rod stroke 11,5 $^{+0,2}$ mm

Fig. 30 - Positioning the injection pumps actuator and control rod clevis.

Calibrating the governor actuator

Calibrating the actuator is a most delicate operation.
This should be performed in case of external interventions including actuator replacement.
Operate as follows:
— Turn on the engine and run to 2000± 100 r.p.m. using the hand throttle.
The engine should never be subjected to dragging loads, make sure the red LED on hand throttle control lever is illuminated.
— Remove plug **A** (Fig. 31) to gain access to the actuator spring for spring load setting and loosen screw **B** (Fig. 31) until first the engine r.p.m. droops and then the engine stops.
WARNING: locating this condition requires most accuracy and meticulous operating procedure and namely:
— locate approximately the point where the engine r.p.m. starts drooping;
— with engine stationary lock the screw **B** (Fig. 31) of a number of turns as shown in table below.

TRACTOR TYPE	ENGINE R.P.M.	HP	ADJUSTING SCREW B TIGTHENING TURN NO.
SILVER 80	2100	80	**3,75**
SILVER 90	2100	90	**3,25**
SILVER 100.4	2100	100.4	**4,75**
SILVER 100.6	2100	100.6	**3**

CAUTION: When fitting plug **A** operate so as any alteration of the adjusting screw **B** position may be prevented.

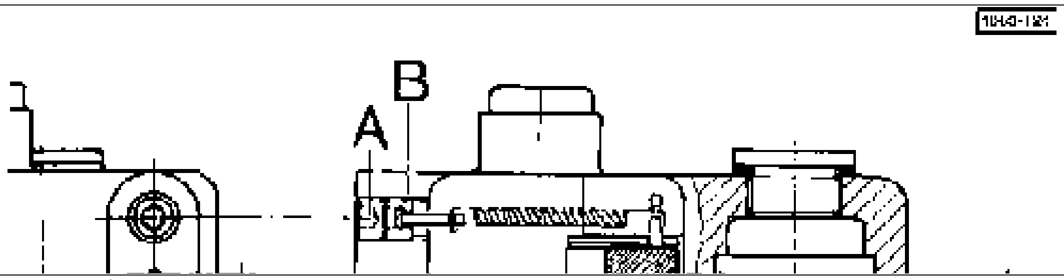


Fig. 31 - Setting the rpm control actuator.

Installing and checking the pick-up

The pick-up should be installed in the following manner:
Adjustment of a new pick-up
Screw the pick-up in the 1.5 pitch threaded hole M16 placed on the bell until contacting the ring gear then tighten the locknut.
Adjustment of an operating pick-up
If the pick-up has already been operated, after screwing against the ring gear loosen by 1/2 turn and then lock so as 0.65 to 0.75 mm gap may be obtained.

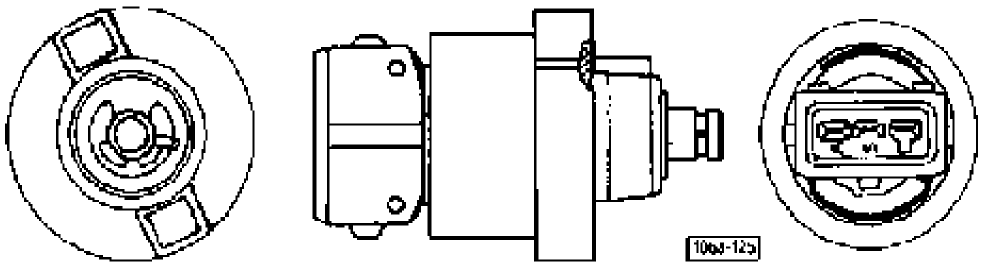


Fig. 32 - Pedal accelerator potentiometer.

INSTALLING AND CHECKING THE PEDAL ACCELERATOR (Fig. 33)

Mount potentiometer **P** on support **S**, use special plate **Q** and pin **T** to obtain correct positioning and fixing.
Fit lever **L**, bushing **B**, washer **R** and snap ring **G**. Connect the electric circuit as shown in figure and use a 5 **V** battery to provide power supply.
setting engine low idling speed
— Turn screw **V2** until a **VU** voltage = 1000±30 mV is obtained; then lock nut **E2**.
setting engine fast idling speed
— Move lever **L** against screw **V1** and operate the screw until a **VU** voltage = 4000 ±30 is obtained; then lock nut **E1**.
adjusting accelerator pedal stroke
— Move accelerator pedal **A** against stop **F** placed on platform (top acceleration position as shown in figure 33).
— Turn adjusting nut **D** until lever **L** contacts the stop screw and then tighten locknut **C**.
— Loosen nut **E1**, loosen screw **V1** of 2 full turns and lock nut **E1** again**.**

Putting into operation the electronic governor

Switch on dashboard with the ignition key.
If the LED on the accelerator control card blinks, decode the fault (refer to SELF-DIAGNOSIS section). Depressing push button HOLD the LED should illuminate, depressing HOLD button a second time the LED should go out.

If the LED does not light up operate as follows:
Make sure the card is properly supplied (12 V, no. 20 fuse in fusebox).
Check for card operation measuring actuator voltage. This voltage should be 0.1 to 0.6V direct voltage.
Otherwise, either the card is not operating or the actuator is disconnected or defective.
After these checks are concluded and being sure all is in good order, start the engine, remove the upper actuator cap and insert a 5 mm Allen wrench on the injection pump control rod drive pin so that the injection pump control rod may be moved to stop position, when irregular engine running is noticed after starting the engine.
Keep on checking ensuring the pick-up voltage be at least a 10V alternate voltage and the direct current measured on the actuator with engine running unloaded at low idling speed be 1.5 to 1.7A.

If the engine does not start operate as follows:
Ensure pick-up voltage during starting attempt be at least 3V, otherwise check for pick-up correct installation.
Make sure the battery voltage during starting stage never drops below 5.5V.
Ascertain the actuator current during starting stage is at least 2.5A and the actuator moves the injection pump rod.
Check hand control functions through the push-button panel and the hand throttle LED.
Ensure the pedal potentiometer voltage is 1 to 4V.

Note: The hand throttle control push-button panel LED, besides signalling the HOLD condition also helps in diagnosing malfunctions.

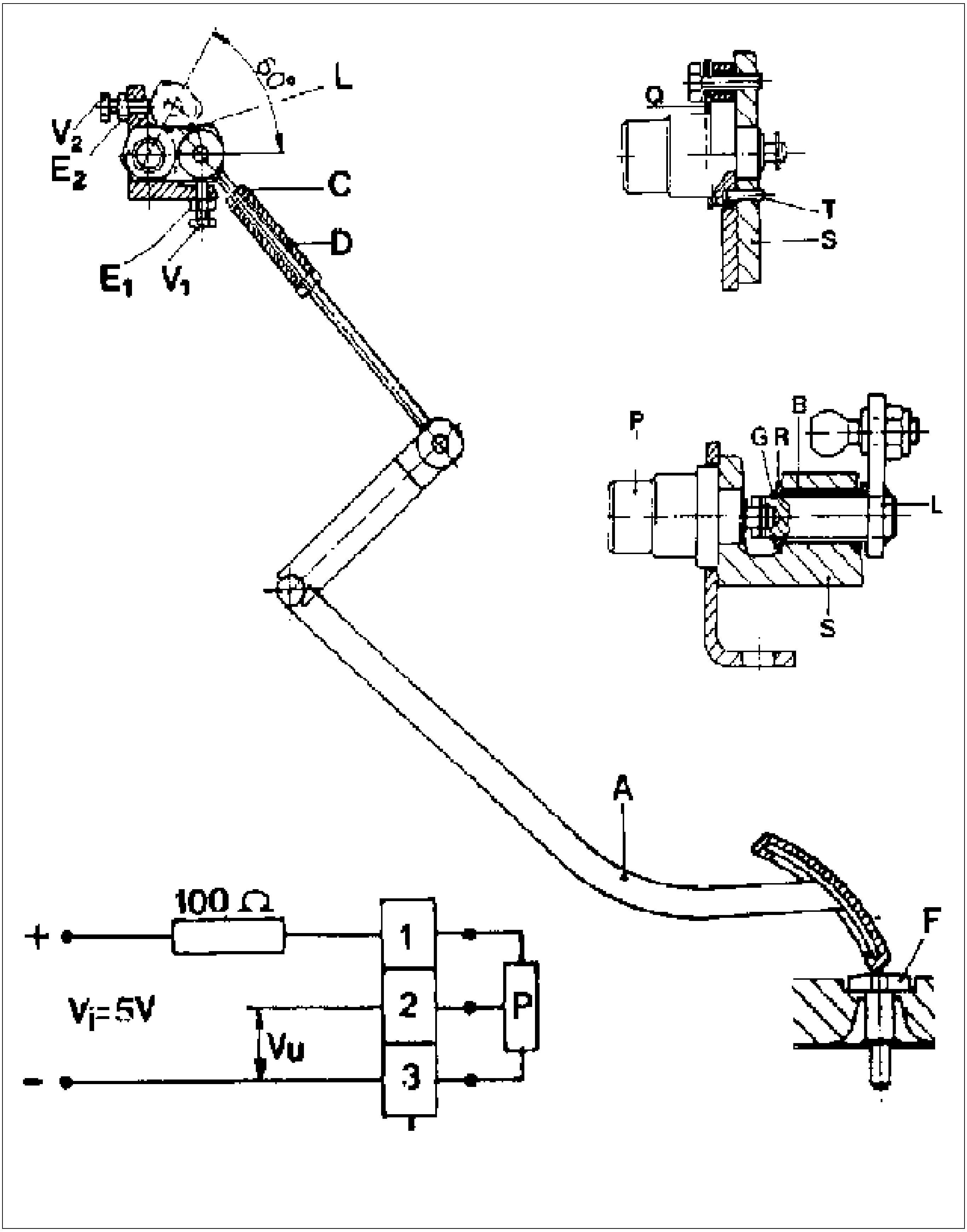
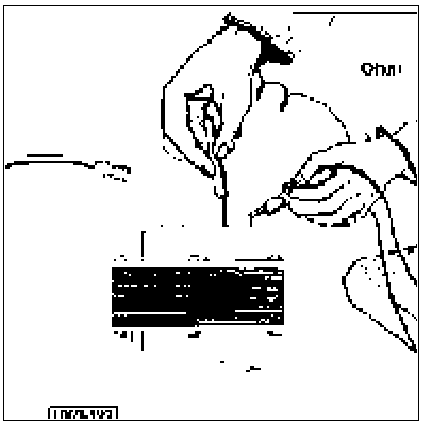


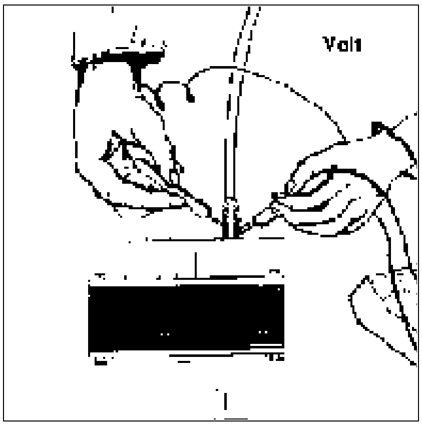
Fig. 33 - Pedal accelerator adjustment diagram.

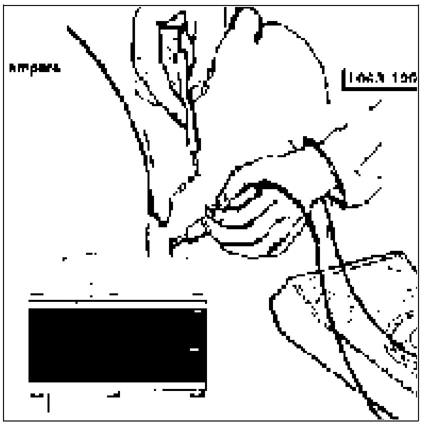
VOLTAGE SPECIFICATIONS UNDER NORMAL OPERATING CONDITIONS

Voltage measurements should be taken with power supplied by the switched on ignition key, whilst resistance measurement should be performed with battery disconnected.

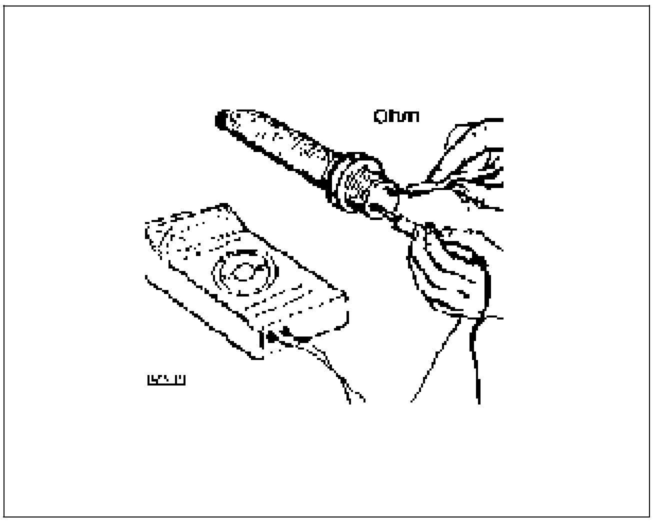
UNIT	MEASUREMENT		CONDITION
• **actuator** :	— resistance	2.3± 0.5 ohm open circuit	— between terminals — between terminals and earth
	— current	0.15÷ 0.3A 1.5÷ 1.7A 1.9÷ 2.4A	— card supplied — engine idling — full-load engine running
	— voltage	0.3÷ 0.8V 3.6÷ 4V 4.5÷ 5.8V	— card supplied — engine idling — full-load engine running

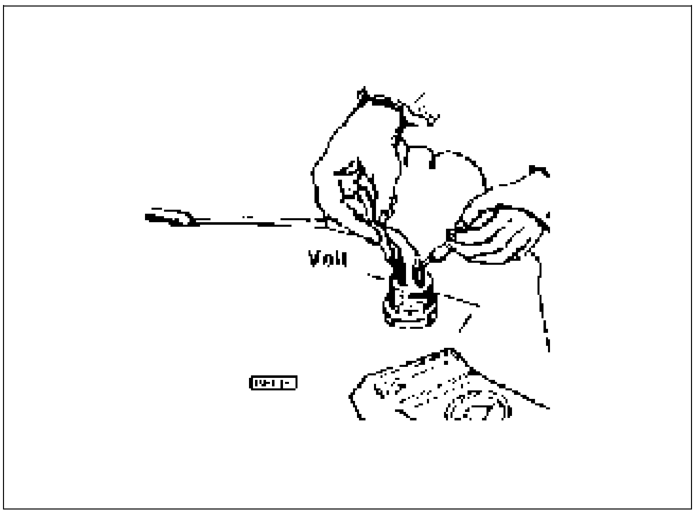






UNIT	MEASUREMENT		CONDITION
• **pick-up**	— resistance	1000± 200 ohm open circuit	— between terminals — between terminals and earth
	— voltage	3V alternated voltage 10V alternated voltage	— during engine starting — engine idling





UNIT	MEASUREMENT		CONDITION
• **REG2MK card (governor)**	— actuator voltage		— 1A-2A pins
	— battery voltage	+8 ÷ 15V	— 3A-4A pins
	— accelerator voltage	4.7 ÷ 5.2V 1.4 ± 0.2V 0 ÷ 0.1V	— 8A-6A pins — min-max pedal 7A-6A pins — 6A-3A pins
	— UP push button	5 ± 0.2V 0 ÷ 0.1V	— 9A-12A pins not depressed — 9A-12A pins depressed
	— HOLD push button	5 ± 0.2V 0 ÷ 0.1V	— 10A-12A pins not depressed — 10A-12A pins depressed
	— DOWN push button	5 ± 0.2V 0 ÷ 0.1V	— 11A-12A pins not depressed — 11A-12A pins depressed
	— pick-up voltage		— 12A-13A pins
	— led control	0 ÷ 0.3V 1 ÷ 3V	— 16A-12A pins led off — 16A-12A pins led on
	— hand throttle control unit voltage	+8 ÷ 15V	— 3B-2B pins
	— serial input	0 ÷ 5.2V	— 4B-2B pins
	— serial output	0 ÷ 5.2V	— 5B-2B pins

VOLTAGE SPECIFICATIONS UNDER NORMAL OPERATING CONDITIONS

UNIT	MEASUREMENT		CONDITION
• **push button card (hand throttle)**	— UP push button	5 ± 0.2V 0 ÷ 0.1V	— 2-3 pins not depressed — 2-3 pins depressed
	— HOLD push button	5 ± 0.2V 0 ÷ 0.1V	— 4-3 pins not depressed — 4-3 pins depressed
	— DOWN push button	5 ± 0.2V 0 ÷ 0.1V	— 5-3 pins not depressed — 5-3 pins depressed
	— led control	0 ÷ 0.3V 1 ÷ 3V	— 1-3 pins, led on — 1-3 pins, led off

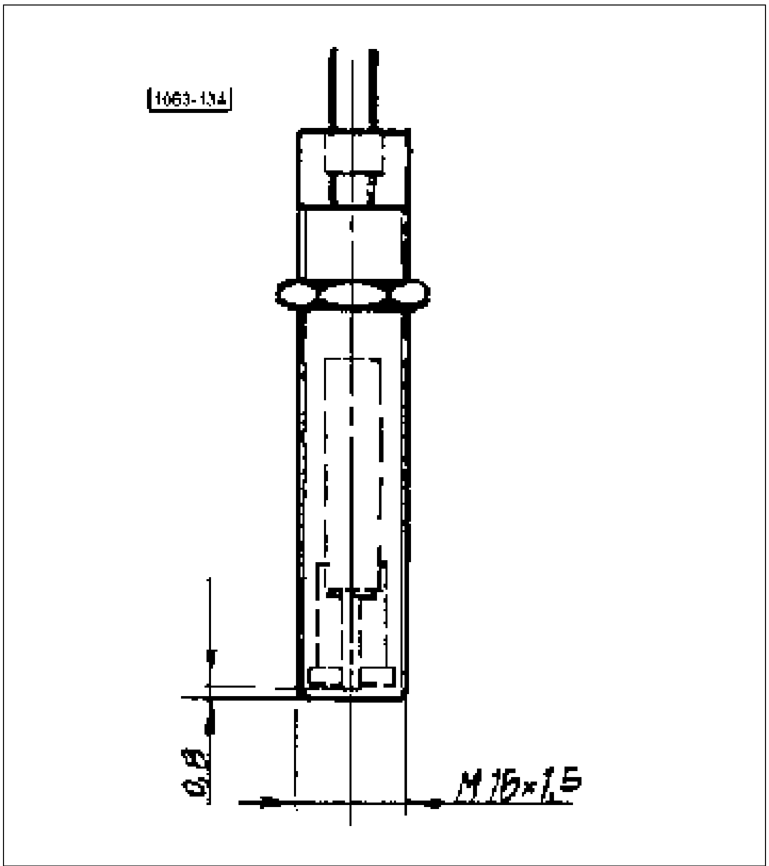


Fig. 34 - Pick-up.

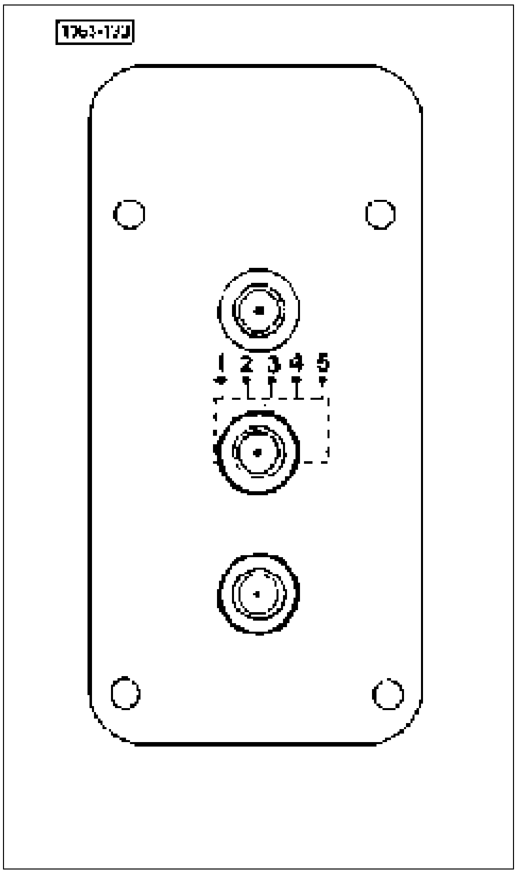


Fig. 35 - Hand throttle.

DIAGNOSING MALFUNCTIONS

Operating as follows the self-diagnosing system is in a position to diagnose any failures and warn the operator through the led located on the hand throttle control push-button panel.

FAILURE	NO. OF LED BLINKS	LIKELY CAUSE
• pick-up	• 4	— pick-up failure pick-up disconnected
• actuator	• 2	— actuator short-circuited actuator disconnected
• potentiometer	• 3	— potentiometer failure potentiometer disconnected
• overspeed	• 1	— actuator locked pick-up disconnected
• storage	• 5	— parameter storage not programmed or defective

WARNING: Should any failure be found operate from the control push-button panel and take the number of LED blinks. This LED blink number will permit the repairing technician to readily perform replacement through the correct spare part needed.

Setting the maximum speed to 30 km/h

When so required by local regulations, the maximum speed can be limited to **30 km/h** by means of the engine control unit and a vehicle speed sensor mounted on the gearbox.

The maximum speed is set as follows:
— Connect the **"ALL ROUND TESTER"** and calibrate the engine speed following the normal procedure.
— Call up the main menu and press button 4 **"MANUAL PROGRAMMING"** , enter the password (supplied by our technician), consult the table below to find the correct parameter for the rear tyres fitted to the tractor, and then select this parameter using the keypad.

SILVER 80-90-100.4-100.6 **1st version** (see the serial number at pag. 133)

80-90-100.4 CV		100.6 CV	
Pneus	**Parameter**	**Pneus**	**Parameter**
16.9 x 34	5483	14.9 R 38	5351
16.9 R 34	5483	480 / 70 R 34	5494
18.4 R 30	5673	520 / 70 R 34	5316
18.4 R 34	5305	16.9 R 38	5149
13.6 R 38	5520	480 / 70 R 38	5149
480 / 70 R 34	5483		
14.9 R 38	5340		
520 / 70 R 34	5305		

SILVER 80-90-100.4-100.6 **2nd version** (see the serial number at pag. 133)

80-90-100.4 CV		100.6 CV	
Pneus	**Parameter**	**Pneus**	**Parameter**
16.9 x 34	4639	14.9 R 38	4527
16.9 R 34	4639	480 / 70 R 34	4648
18.4 R 30	4800	520 / 70 R 34	4498
18.4 R 34	4480	16.9 R 38	4356
13.6 R 38	4670	480 / 70 R 38	4356
480 / 70 R 34	4639		
14.9 R 38	4518		
520 / 70 R 34	4480		

Press **C** to confirm the selection, and then press **E** twice to exit the programme.

Checking the calibration.
With the tractor stationary, check that the engine speed reaches the maximum rpm;
Then, with the tractor moving, engage top gear and accelerate to maximum speed; in this condition the engine speed should be between **1700 and 1900 rpm.**

NB: the control unit's diagnostic procedure includes the alarm **"speed sensor faulty or not connected"**. This alarm is signalled with six flashes of the LED on the hand throttle.

Fuel injection pumps

The single-cylinder fuel injection pumps are equipped with a constant-pressure backflow valve (short G.D.V. valve).

The plunger load is evenly distributed over the whole camshaft, since an equal-distance distribution is provided.

The G.D.V. valve keeps pressure inside the injection pipes to a high level during the intermediate pump delivery phases.

This ensures engine smooth running even at low operating speed, higher engine performance as well as more favourable torque curves, besides suppressing any nozzle dribbles resulting in unburnt gas, poor injection nozzle efficiency and engine detonation.

Readings must be taken with the electrical systems powered (ignition keyswitch on), whereas resistance must be measured with the battery disconnected.

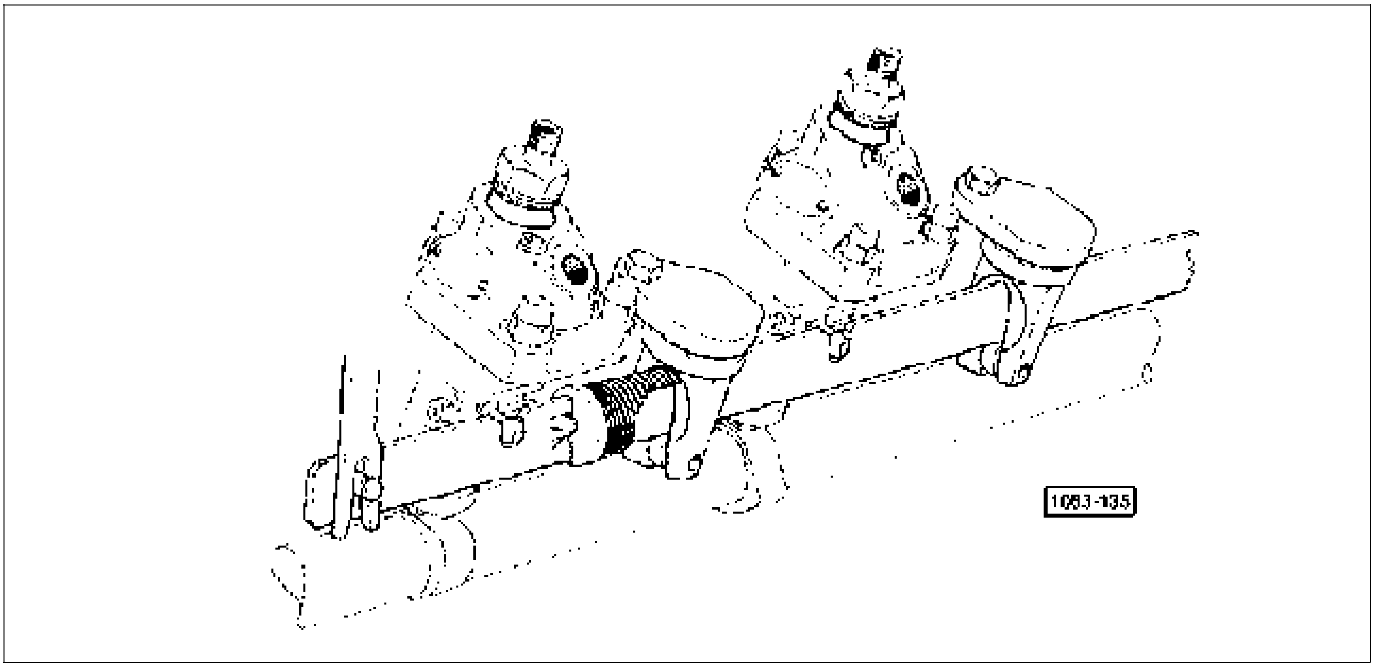


Fig. 1 - Injection pump control assembly.

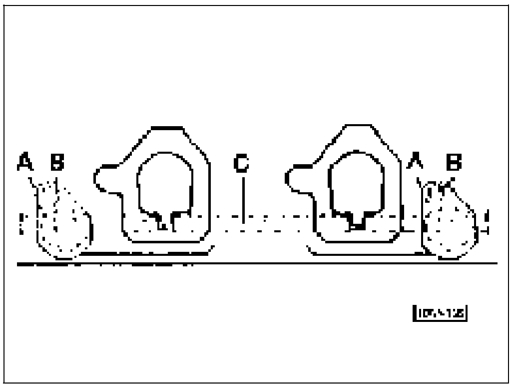


Fig. 2 - Mounting positions of the injection pump control bar guide supports.

Injection pump control system

The injection pumps are simultaneously controlled by a blank sheet steel bar which besides ensuring the required stiffness has particular lightweight properties to prevent excessive friction and inertia under operating conditions.

This bar controls the injection pumps operating through specially arranged slots and is connected to the engine governor by a ratchet.

The injection pump control bar is guided by a couple of block-mounted supports provided with slide rings.

Installing injection pump control bar guide supports (Fig. 2)

Install supports **A** with related O-rings, rollers and lockpins using screws **B** into the engine block. Insert the injection pump control bar **C** into the supports and tighten screws **B** and ensure that the bar is free to slide inside the support. (The two supports equipped with sliding rollers should be placed at both bar ends).

Warning - When the injection pumps are removed operate the engine shutoff control (STOP) so as to bring the rack rod dog back to the injection pump centre line. This permits it to be passed through the special aperture in the engine block.

Check is made visually through the sight windows in the engine block.

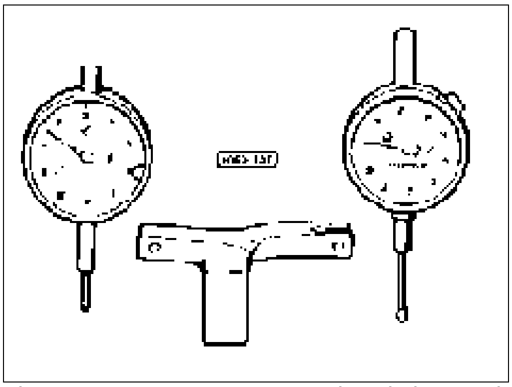


Fig. 3 - No. 5.9030.616.4 engine timing equipment.

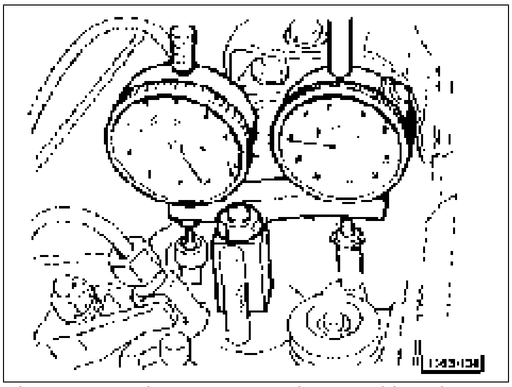


Fig. 4 - Equipment mounting position for 1st cylinder timing.

Engine timing

- **valve timing**

This should be carried out before injection pump calibration.

Raise the first cylinder piston to upper position; remove the rocker arm support, remove intake valve spring and drop valve onto piston head then insert a snap ring into the valve stem.

Fasten no. 5.9030.616.4 equipment on piston head as shown in figure (the comparator indicating 25 mm stroke reading should be placed on the engine valve).

After raising piston to T.D.C. position set to zero the comparator fixed to the valve stem. When the concerned cam rest race has been located also reset the comparator applied to the intake valve tappet head.

Turn the crankshaft clockwise until a 17.27 mm piston stroke has been completed. Then rotate the camshaft until a 3.93±0.1 mm intake cam lift is obtained.

Fit the timing gear and bring the timing gear marked tooth into contact with both idler gear marked teeth. Press on the gear anticlockwise when tightening the securing screws until any backlash between teeth is taken up.

Take the equipment and proceed with the injection pump setting operations.

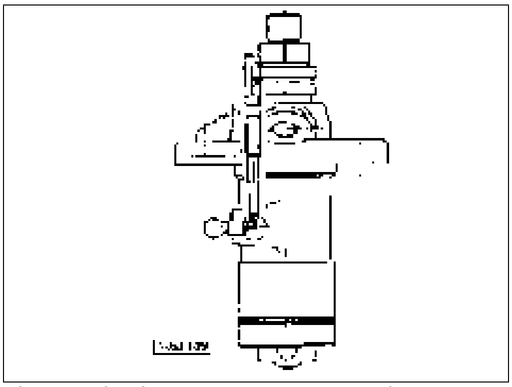


Fig. 5 - Injection pump 2.4619.050.0/20.

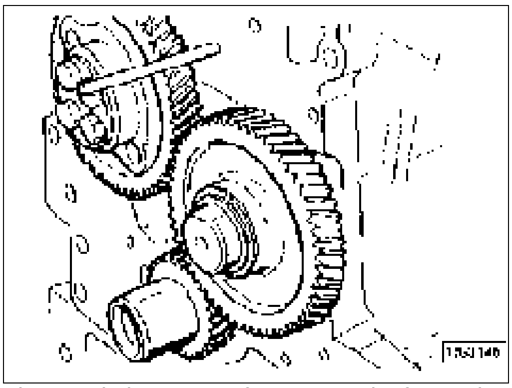


Fig. 6 - Timing gear reference marks for engine timing.

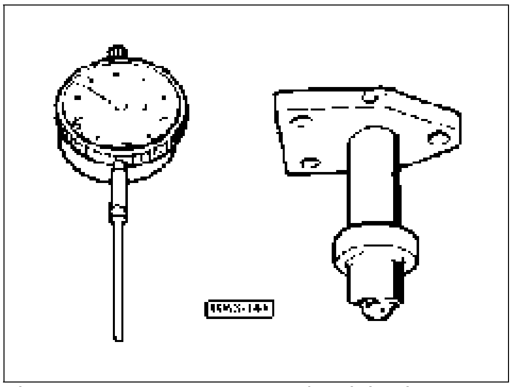


Fig. 7 - No. 5.9030.617.4 /10 injection pump timing equipment.

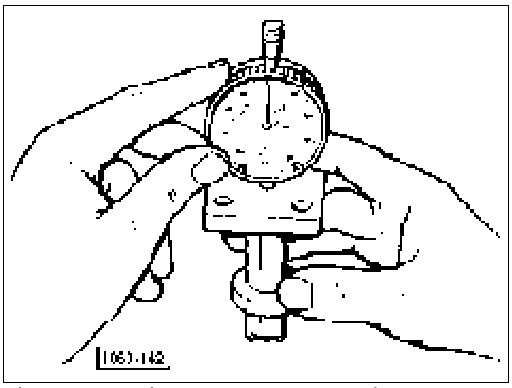


Fig. 8 - Resetting no. 5.9030.617.4 /10 comparator-equipped tool.

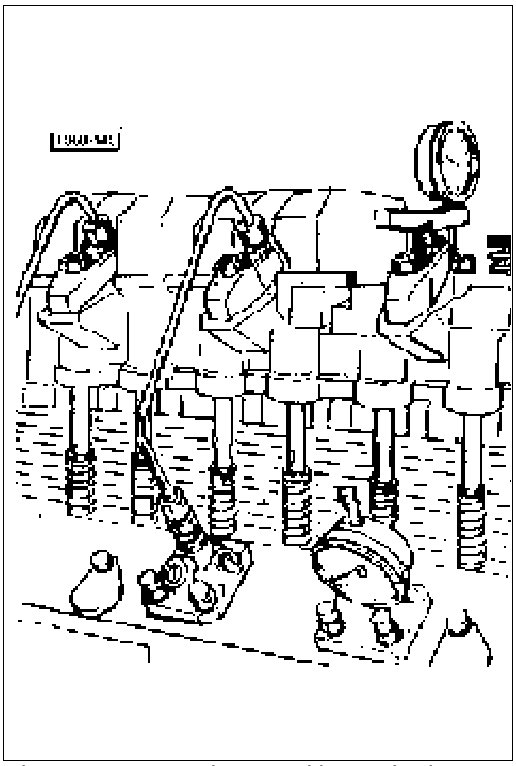


Fig. 9 - Mounting position of the no. 5.9030.617.4/10 equipment fitted with comparator.

- **Injection pump calibration 2.4619.050.0/20 (fig. 10) (BOSCH injection pump equipped with a lock pin for the control rod).**

After valve timing has been successfully concluded undertake this calibration by using no. 5.9030.617.4/10 equipment in addition to the equipment already positioned on the first cylinder and excepting the comparator on the valve tappet rod.

To each shim pack add a pack of shims equal to the value stamped on the pumps.

Injection pump calibration is to determine a 80.4 mm dimension between the pumps-to-block fixing surface and the corresponding cam races, considering the position they find when the injection is being started; (Fig.10).

Rotate the crankshaft to move the 1st cylinder piston into T.D.C. position (compression stroke end, valves closed) and set to zero the comparator attached to the valve stem; the same procedure as described in valve timing section shall apply.

Rotate the shaft in a counter-clockwise direction until a reading of 2.92 mm is shown on the dial gauge; this value corresponds to a timing advance of 16°.
Correct positioning takes place when through anticlockwise rotation either the 2.92 mm set point is exceeded, soon after coming back to such a dimension through clockwise crankshaft rotation so that any clearances may be taken up.

Fit the special no. 5.9030.617.4 comparator. To reset the comparator rest the comparator measuring roll onto a flat surface.

Insert the tool into the first injection pump seat and take measurement reading from the comparator dial to align the bearing face with the engine block. This reading corresponds to shim pack **X**.

To each pack of shims **X** add a number of shims **Y** being equal to the dimension stamped on injection pump flange, so as to obtain a total shim packing (**X** + **Y**) to be put between injection pump and engine block, this permitting a 80.4 mm standard dimension to be determined.

Repeat this operation for each injection pump, fitting tool 5.9030.616.4 to the corresponding cylinder.

Warning - Install the injection pump after applying some Silastik 738 silicone between shims, engine block and injection pump.

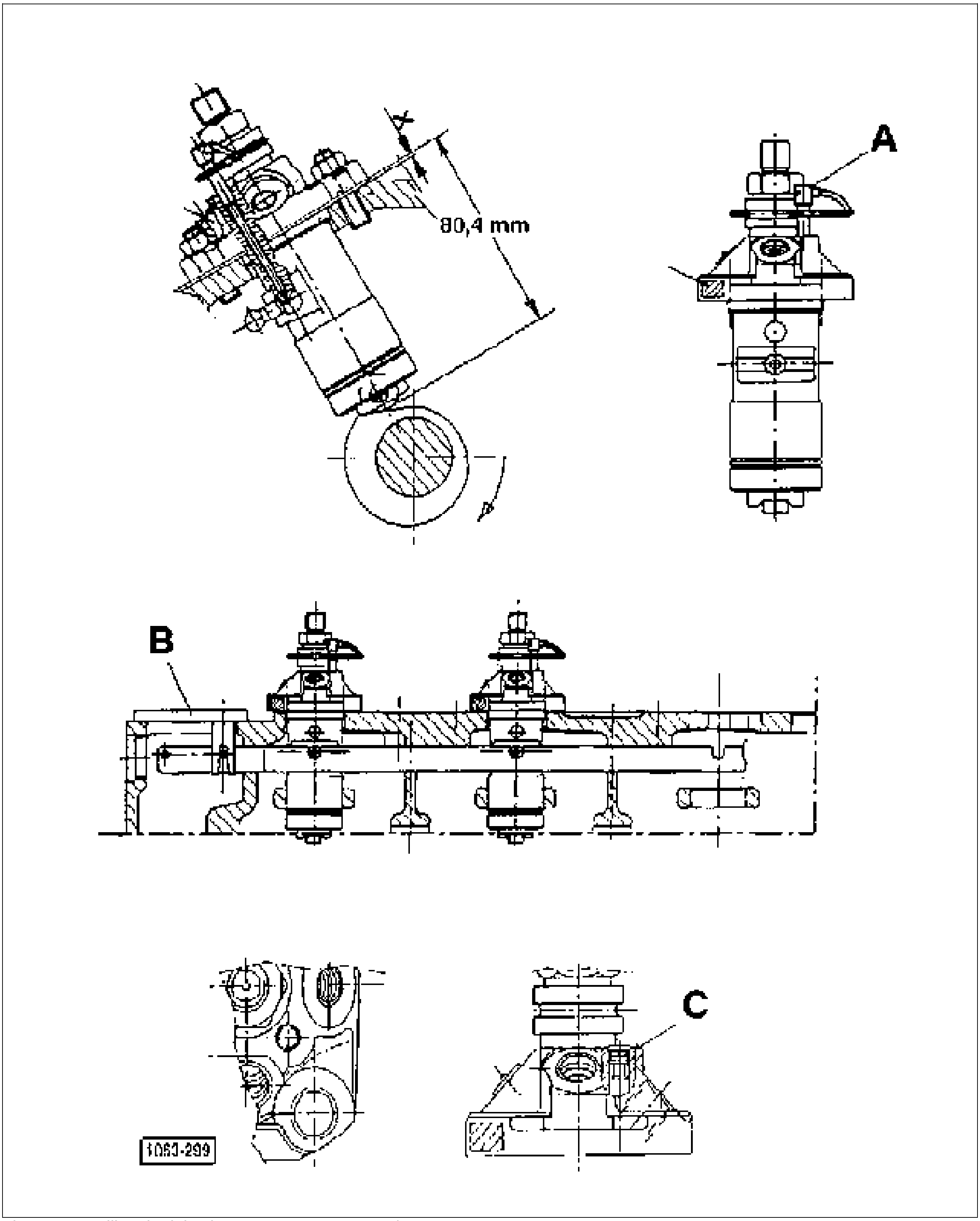


Fig. 10 - Installing the injection pumps 2.4619.050.0/20.

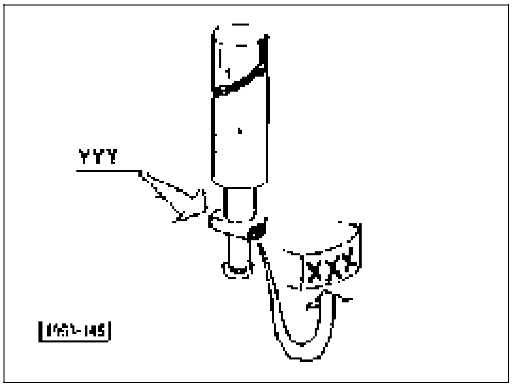


Fig. 11 - Injection pump plunger identification marks.

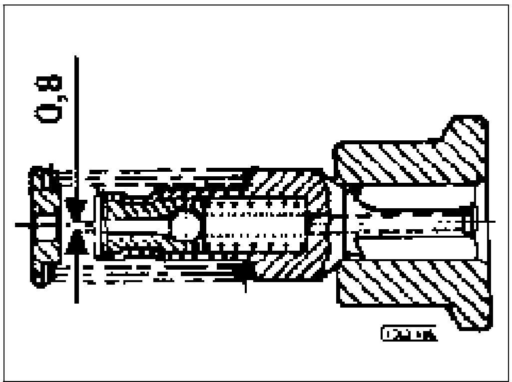


Fig. 12 - Injection pump G.D.V. valve.

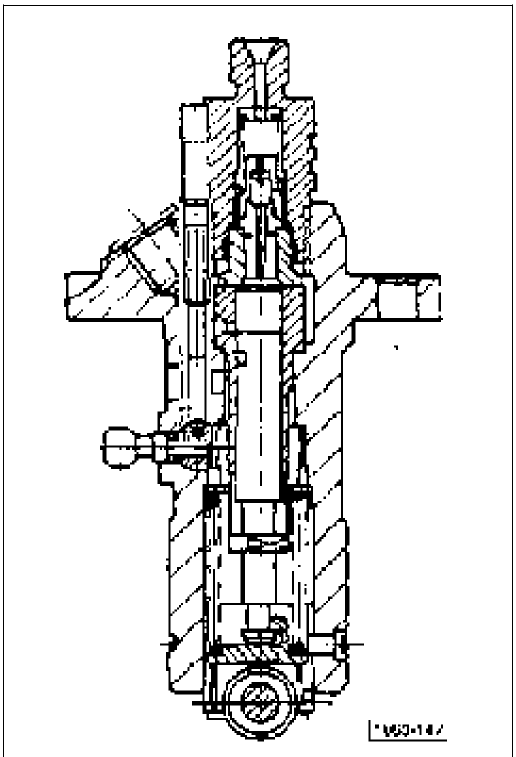


Fig. 13 - Injection pump section 2.4619.050.0/20.

Positioning the pumps (fig. 10).

Before positioning the pumps, lock the control rod using tool 5.9030.728.0, which is to be positioned with the governor removed and as shown in figure 10.
Then position each injection pump (interposing a shim pack of the predetermined thickness), so that the dog engages the fork in the control rod.

Rotate the pump clockwise until you feel the dog fully engage the fork, then tighten the retaining screw.

NB: The pump must be positioned with the injection cams in b.d.c. position.

Remove tool (**B** Fig. 10), release the pump by removing the lock pin **A** (Fig. 10); fit the governor and the rear plug (flywheel end).
Check that the rod moves freely and that the STOP control operates correctly.

Servicing

All the pumps are interchangeable as all the plungers are of the same type.

N.B: new plungers can be identified from the markings in the positions shown in figure 11.

Removal and refitting of an injection pump without replacing components.

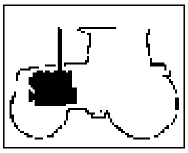
This operation does not require the use of any special tools. Refit the pump using a shim pack of the original thickness.
Hold the pump control rack in position using lock pin **A** (fig. 10) to. To do this, operate the STOP control lever so that the pin engages the relative notch on the pump control rod rack.
Install the pump (also equipped with a rack lock pin) in the cylinder block, making sure that the dog engages in the fork of the control rod; then rotate the pump in a clockwise direction whilst simultaneously pushing the control rod through the engine inspection flange towards the front of the engine.

Removal and refitting of a pump after replacing one or more components

Before installation the pump must be re-calibrated on a test bench. Remove any previous timing marks and stamp a new notch and dimension (**Y**) on the pump.
Refit the pump using a shim pack (see fig. 16) according to the new dimension stamped on the pump (always make a note of the old value stamped on the pump before erasure, in order to facilitate calculation of the new shim pack thickness) and follow the instructions given in the previous point.

Replacing a pump

The thickness of the shim pack (**X +Y**) must be corrected by first removing shims to the thickness
indicated on the previous pump and then adding shims to the value indicated on the new pump.



Replacement of camshaft or cylinder block
In the event of camshaft or cylinder block replacement, the valve and injection pump timing procedures must be repeated, but the injection pumps will not require re-calibration.
Install the new pump in the cylinder block with the control rack locked in position, making sure that the dog engages the control rod and following the instructions on page 74 (pump positioning).

Replacing the injection pumps control rod
Proceed to refit the new rod following the directions on page 74 (pumps), and complete all operations relative to the positioning of the injection pumps.

Injection pump calibration 2.4619.030.0 2.4619.050.0 and 2.4619.050.0/20 on the BOSCH test bench

Type BOSCH 1 K 90 A 503, type 1 K 90 A 517 and type BOSCH 1 K 9 A 542
Injection pump calibration is of crucial importance to the correct engine running. Injection pump calibration procedure should be carried out by specialized workshops provided with the following BOSCH equipment:

— Injection	2.4719.200.0/10
— Injection pipe	Ø 6 x 1,5 x 267
— Test oil	ISO 4113 a temp. 40°C
— Fuel supply fuel	0,4±0,05 bar
— Camshaft (Special tool)	No. 1 688 901 025
—	(with 7 mm cam lift)
— Outlet with metering orifice	Ø 1 mm

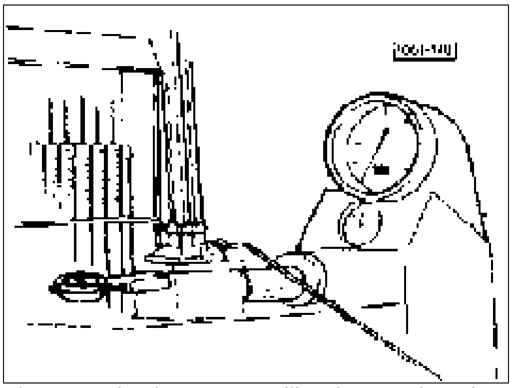


Fig. 14 - Injection pump calibration test bench.

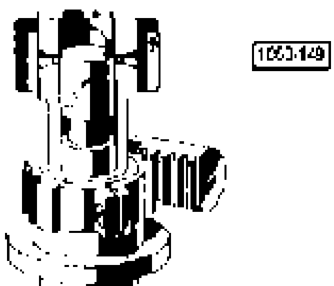
Calibration specifications

test conditions	r.p.m.	deviation from X* in mm	delivery mm^3/lift
1st test	750	+3	83÷89
2nd test	300	+3,5	12,5÷13,5
3nd test	1300	+3	72÷78
4nd test	100	+9	78÷93

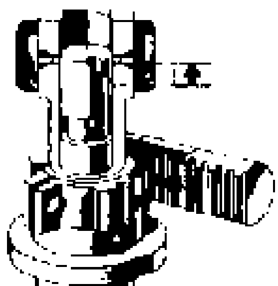
*X - Centre position of the pawl the injection pump obtained with BOSCH special tool.

Injection pump specifications

— Nominal delivery prelift at	X+3 = 2,4÷2,5
— Reflux valve	70 bar
— Depth of start retard notch	0,5 mm
— Retard notch cut-in	X+ 7 mm



A No fuel delivery, fuel flows back from the longitudinal groove


B Partial delivery, correct adjustment permits fuel backflow with partial stroke


C Peak delivery, stroke corresponding to maximum fuel delivery

Fig. 15 - Injection pump plungers.

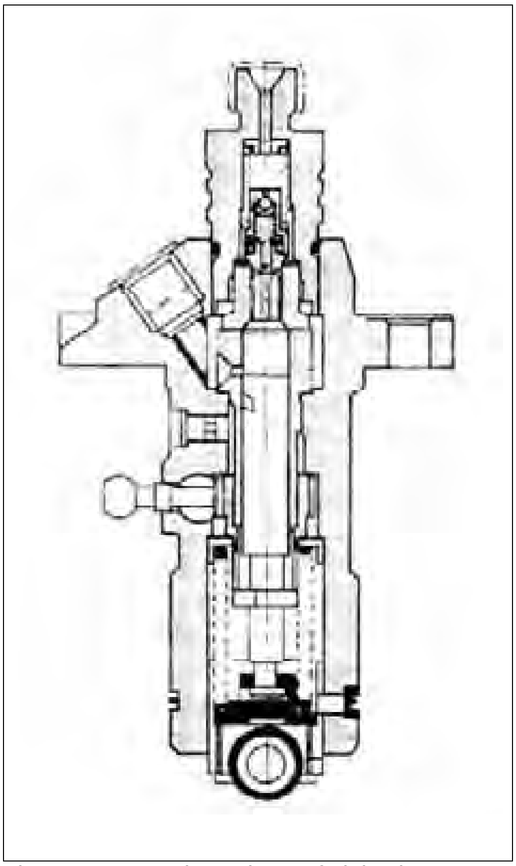


Fig. 16 - Section view of injection pump 2.4619.050.0

NB: The timing procedure for injection pumps with p/n 2.4619.050 (fig 16) is the same as given already for pumps with p/n 2.4619.050.0/20, whereas the pumps are positioned internally of the block as follows:

Fit the pump control rod into the block and position the pumps, aligning the notches on the block with those of the single pumps (see fig 17).

Check that the rod slides freely; then fit the actuator and the cap to the rear (flywheel) end.

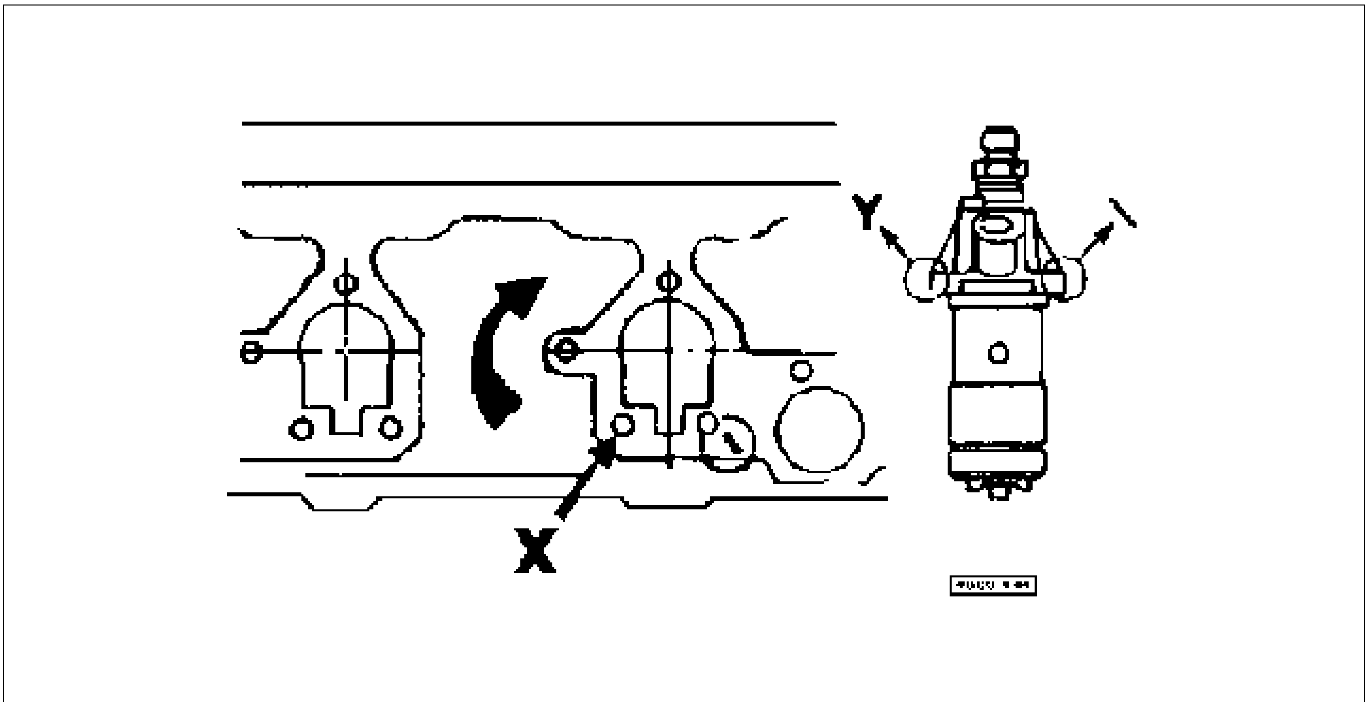


Fig. 17 - References stamped on pump 2.4619.050.0 and block for pump shimming and positioning .
X = Shim pack to reline the bearing face of the pump on the engine block
Y = Value of the shim pack stamped on the pump
**** = Notch for the positioning of the pump on the engine block

Fuel prefilter

Strip the fuel prefilter by releasing holding spring **A**.
Clean cup **B** and cartridge **C** with a compressed air jet and ensure each single component is fully sound, if not replace.
Should any water be found in the glass cup bottom, loosen securing dowel **D** and wait until fuel comes out without air bubbles.

Fuel filter

To replace the filter cartridge, remove the cartridge retaining screw in the upper body, remove the old cartridge and replace with a new cartridge of the original type.
Check the seal between the new cartridge and the cover. Position the cartridge and replace the retaining screw.

Draining water from fuel filter

To drain off any water from the filter, loosen the screw in the bottom of the filter housing and drain off all fuel mixed with water. When clean fuel appears, re-tighten the screw.

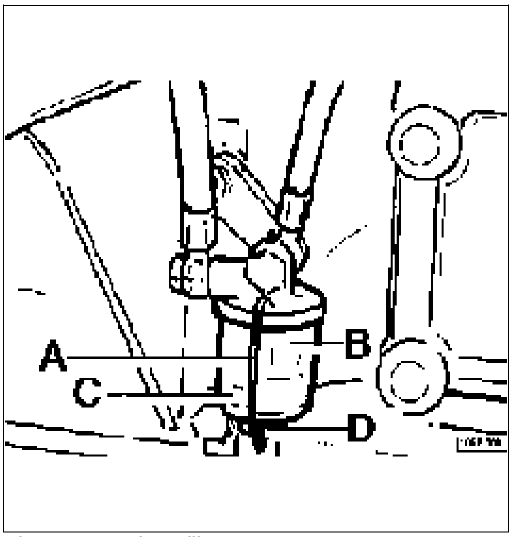


Fig. 18 - Fuel prefilters.

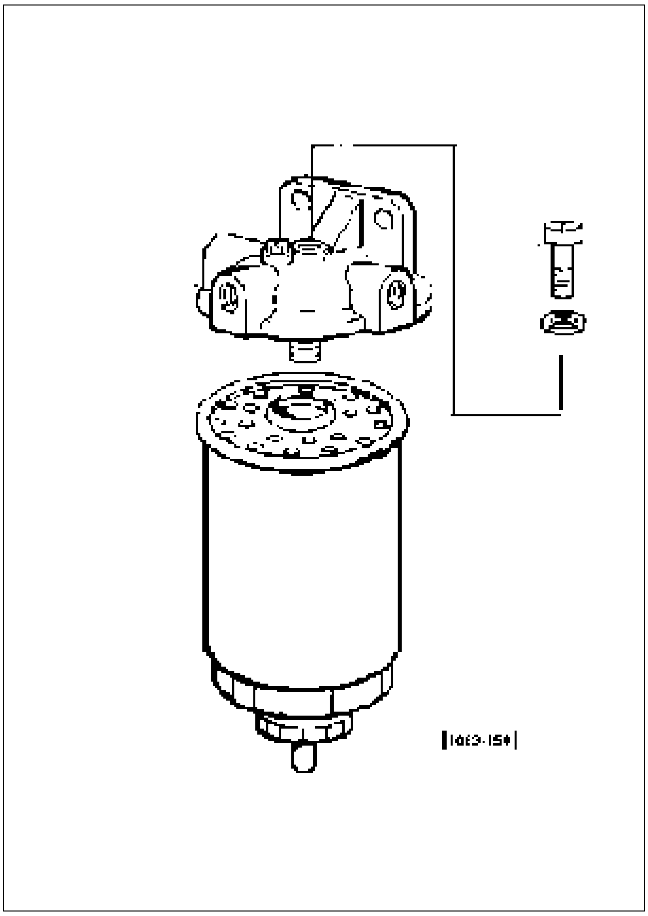


Fig. 19 -Fuel filters (the Silver 100.6 is equipped with 2 filter cartridges)

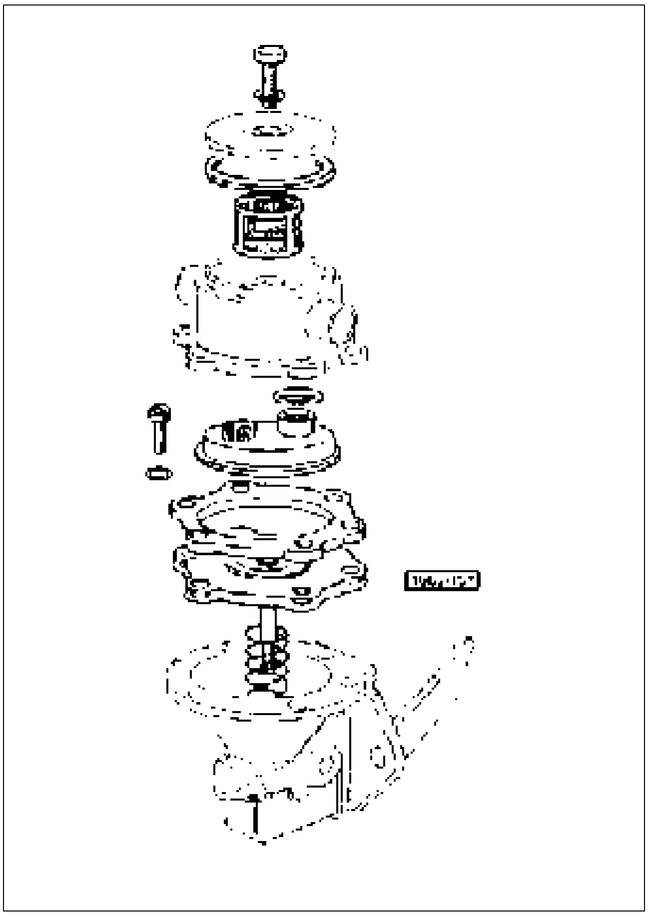


Fig. 20 - Fuel supply pump.

Checking the fuel supply pump efficiency (A.C. pump)

This check can be performed by measuring the pump delivery (see on page 19).

If necessary, carry out inner filter cleaning or replcae any items being part of the assembly under overhaul. Full pump assembly replacement is recommended only if pump casing cracks are noticed.

Bleeding the air from the fuel supply system

The system air-bleeding operation should be made whenever pipe lines are disconnected or there is air in the fuel supply system.
Operate as follows:
Be sure the fuel tank is filled, then loosen the bleeding valve located in the fuel filter upper side, press on the fuel pump hand control lever until the fuel flows out without air bubbles. Tighten the retaining screw.

NOTE: While operating the pump control lever, ascertain that a certain resistance is felt. Otherwise set starter going so as to locate the pump priming position (camshaft control cam at B.D.C.).

Loosen injector pipes only if necessary, set starter going until fuel free of air bubbles flows out of the loosened pipe fittings. Thereafter tighten fittings to the specified torque.

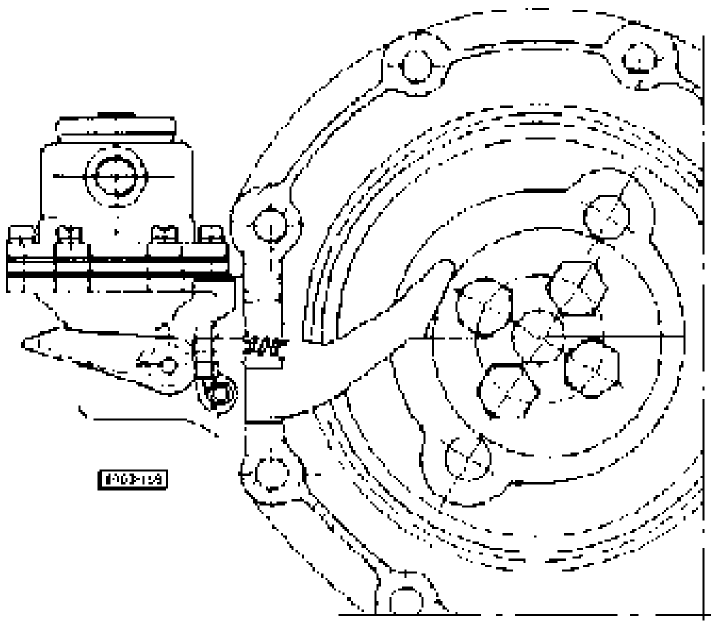


Fig. 21 - Fuel supply pump control.

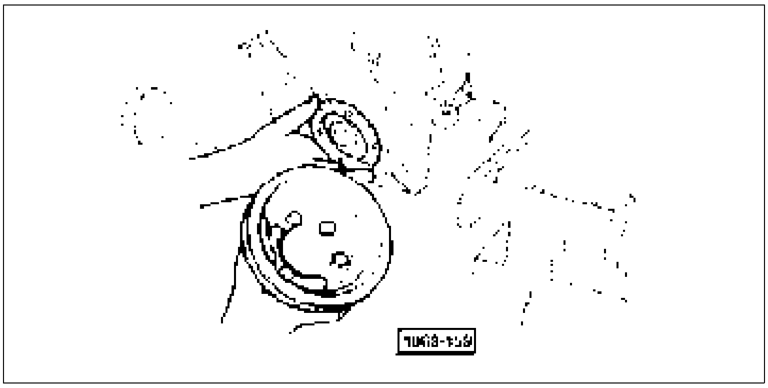


Fig. 1 - Shimming engine pulley.

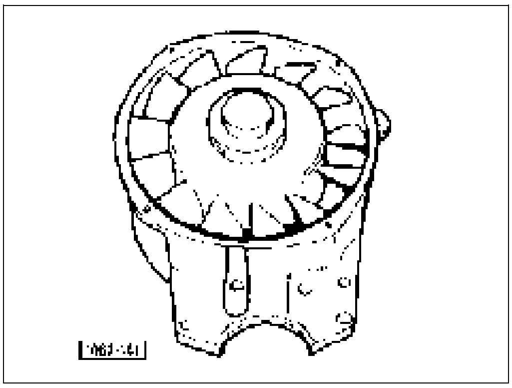


Fig. 2 - Fan assembly.

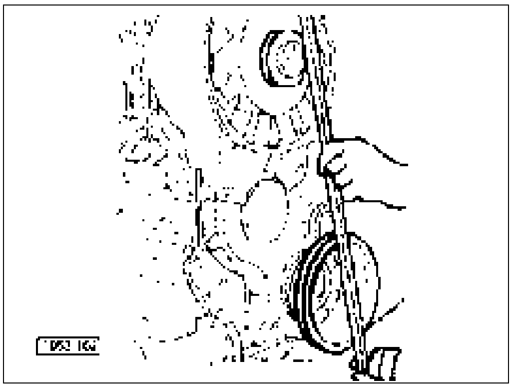


Fig. 3 - Checking pulley alignment.

Fan assembly

No specific servicing is required for fan assembly. Occasionally check bearings for proper sliding, replace if necessary.

Aligning fan pulley to engine pulley (Fig.1 and Fig. 3)

Both pulleys should be thoroughly aligned. Fit a straight rod on the bigger pulley face and ensure it is aligned to that of the other pulley.
If not, remove or add shims to the crankshaft pulley in the position indicated by the arrow **B** (see figure 5).
Any extra shims are to be positioned under the heads of the pulley retaining bolts.

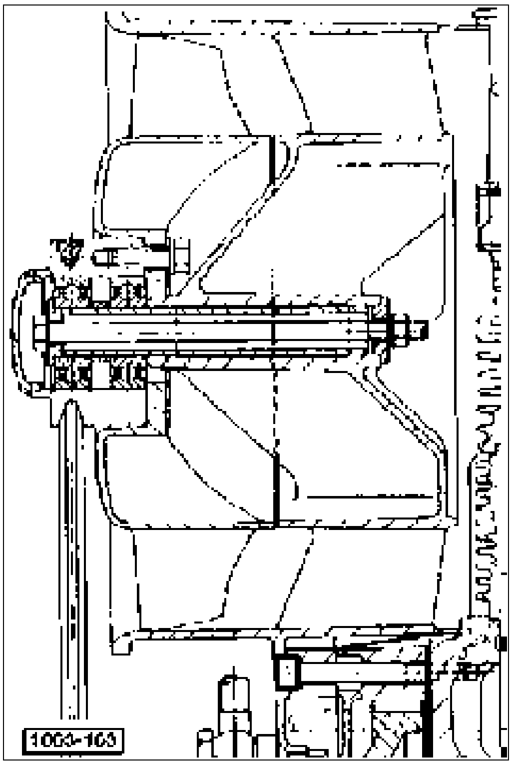


Fig. 4 - Fan assembly cutaway view.

Aligning alternator pulley to engine pulley (Fig.5)

Fit the alternator and measure the amount of misalignment using a straightedge across the face of the crankshaft pulley.
Fit shims of this value between the pulley and the support in position **A**.

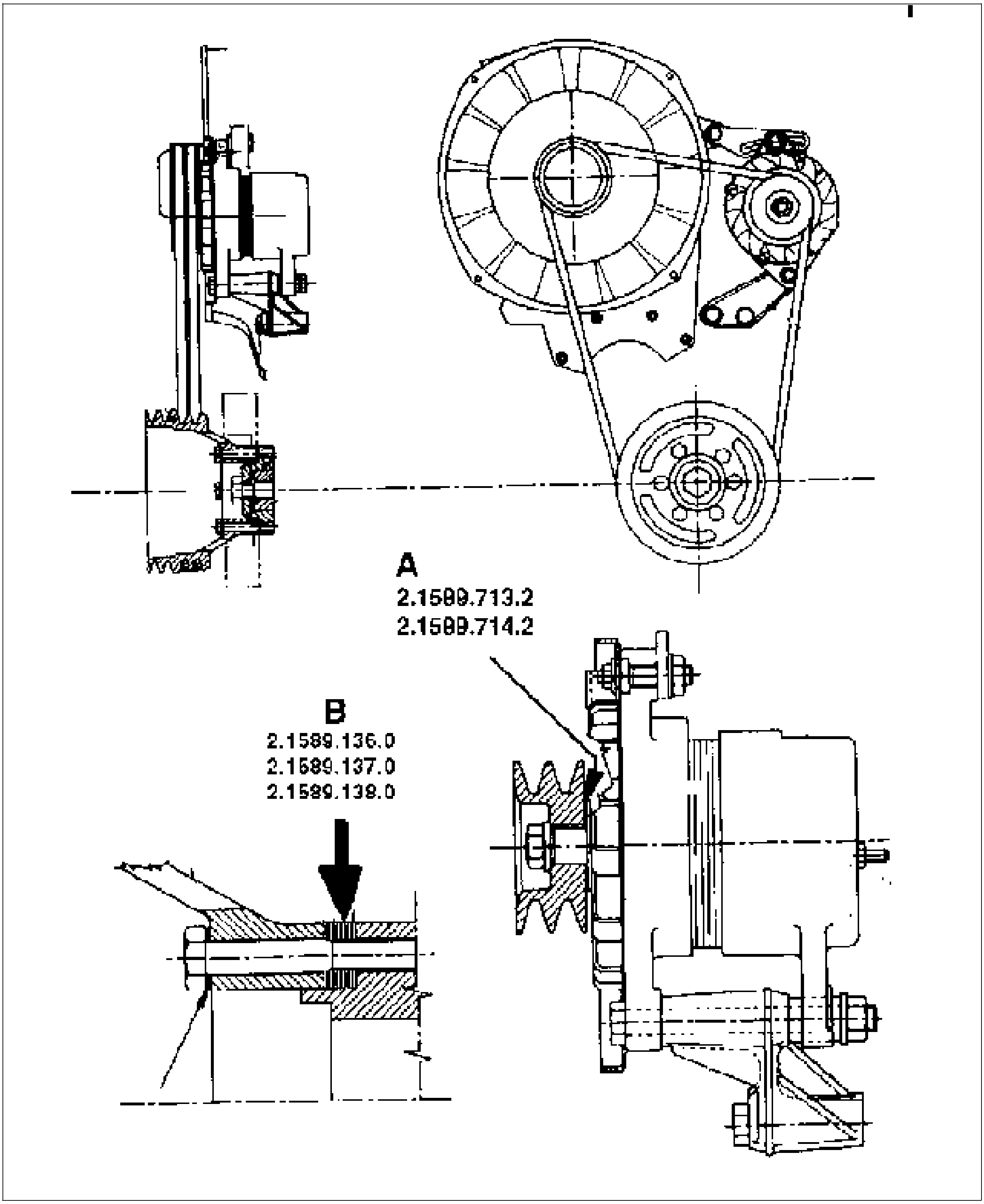


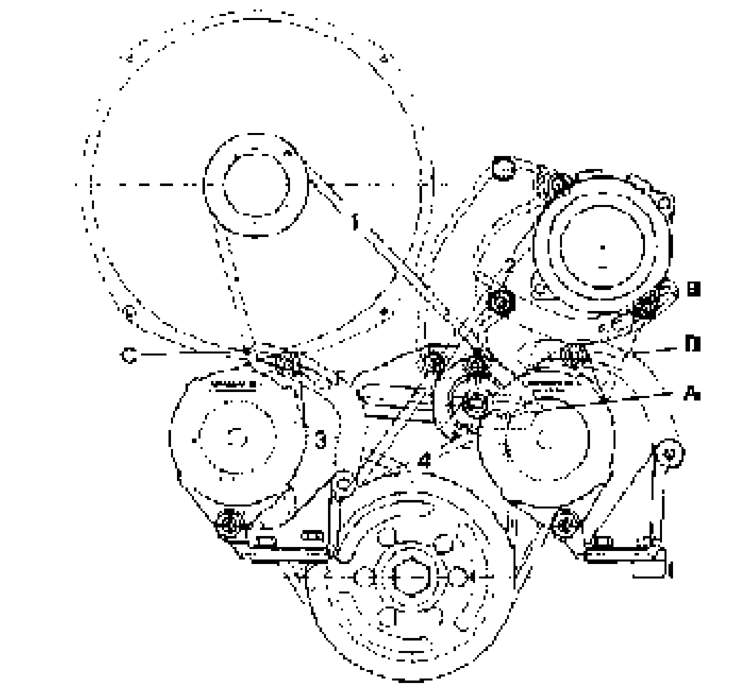
Fig. 5 - Installing the alternator pulley tightener and aligning engine, fan, alternator pulleys.

ADJUSTING BELT TENSION

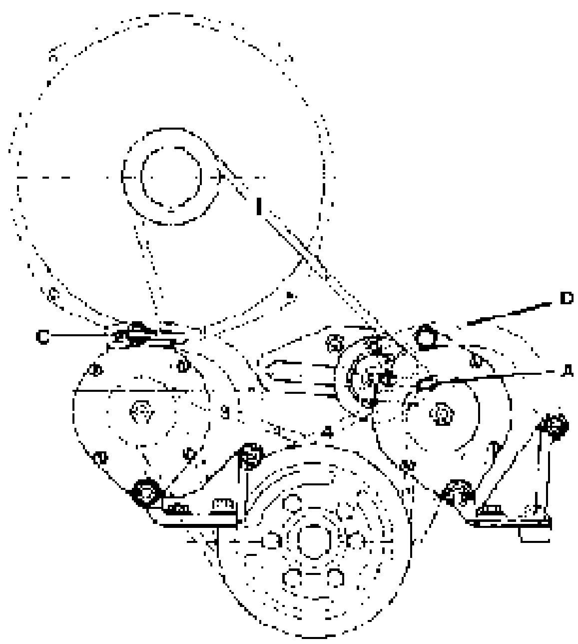
Adjusting the belt tension turning screws **A-B-C-D**, see figure undersigned; operate as follows:

turn the adjusting screws until to obtain the belt settling, exerting finger pressure to the middle of the longest section; the belt should deflect approximately 20 mm (for belts with reference **1**-**2**) and 15 mm (for belts with reference **3**-**4**).

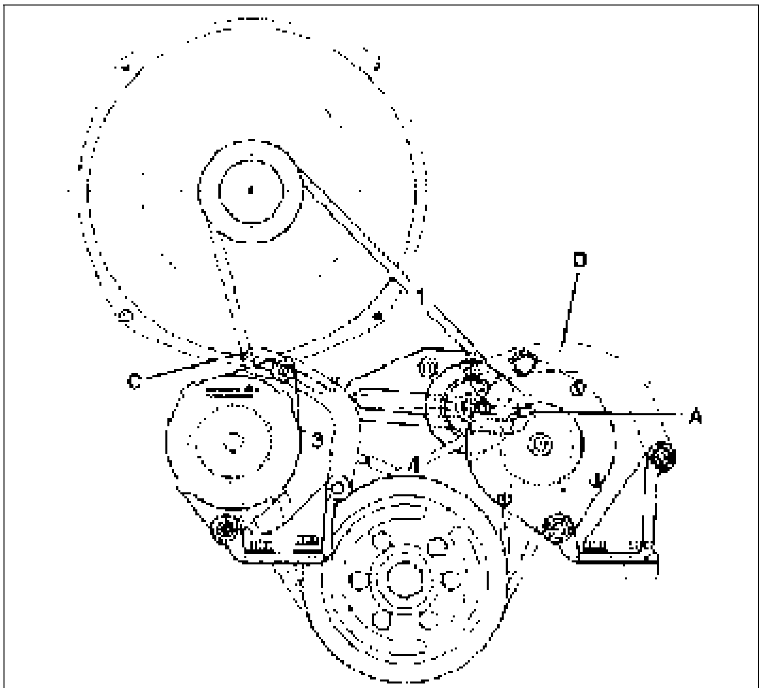
NOTE - check with the hand on the middling point of the length tug of the belt.



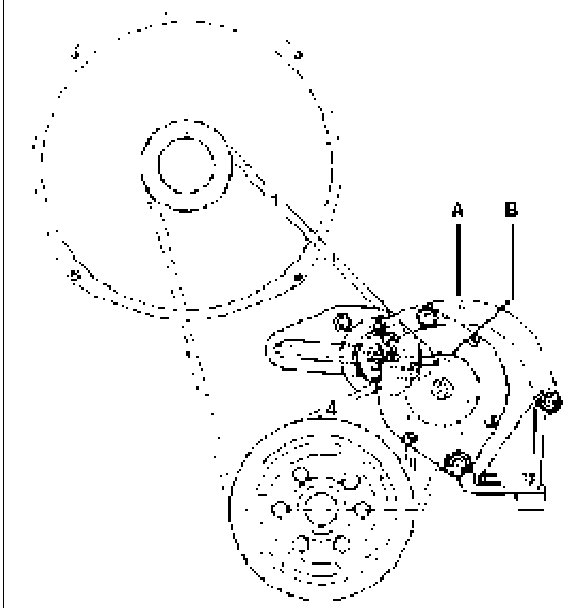
- with heating and air-conditioning system



- with heating system and without air-conditioning system



- with enhanced heating system and without air-conditioning system



- without heating and air-conditioning system

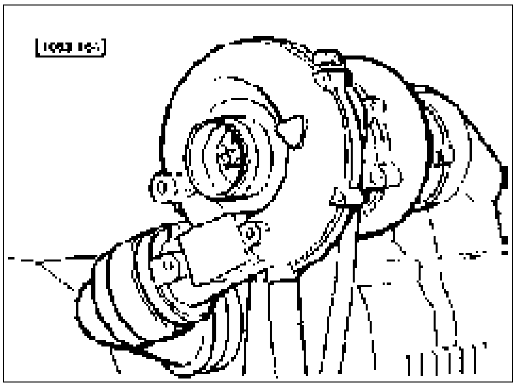


Fig. 1 - Turbocharger.

Turbocharging *SILVER 90 - 100.4*

The turbocharger assembly covers the function of forcing more air into the cylinders. This also allows the diesel fuel delivery capacity to be proportionally increased.

Mixture increase is necessary to obtain greater engine power.

The turbocharger assembly is an extremely simple and rational design and consists of a turbine and a compressor.

The turbine is operated by the exhaust gases from the engine (in this way, a part of the gases' kinetic energy which otherwise would be wasted is recovered). The turbine drives the compressor, which compresses the air sucked in the cylinder intake duct through the filter.

Tests

A precise test on turbocharger efficiency can only be performed on a test bed.

Tests performed with turbocharger mounted on engine can only give approximate results.

Before starting checking operations make sure the engine fuel supply system is operating correctly.

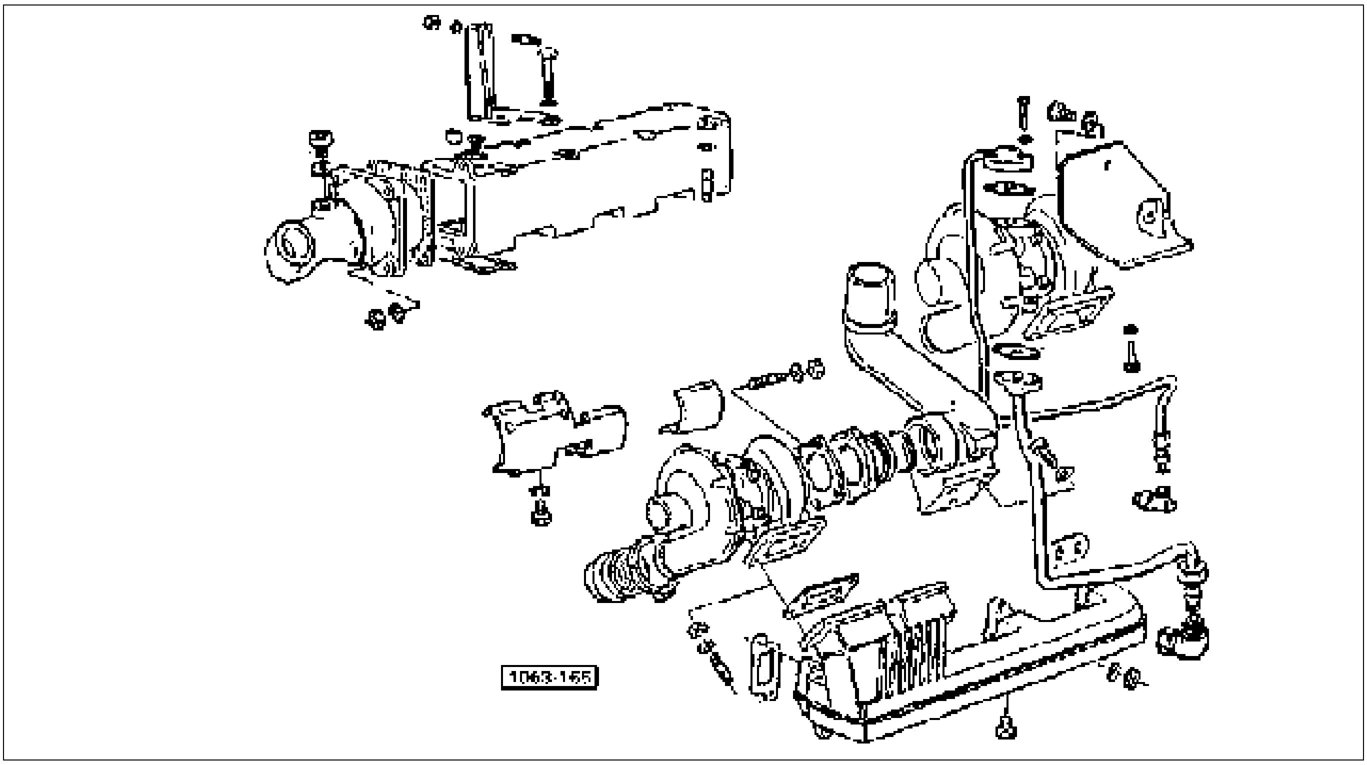


Fig. 2 - Turbocharger rotor and exhaust mufflers.

Checking pressure in the duct at turbocharger exit (Fig. 3)

Remove the intake pipe plug and fit no. 5.9030.515.0 pressure gauge.

Start the engine and ensure that both peak horsepower speed and maximum torque speed pressures correspond to the specifications indicated in related table.

Out of specifications readings may be due to poor air filter efficiency which should therefore be checked.

Also check couplings for distorsion or tearing; replace as necessary.

If trouble persists, remove turbocharger side covers and check impeller blades for dirt build-up.

All carbon deposits should be removed using a plastic brush.

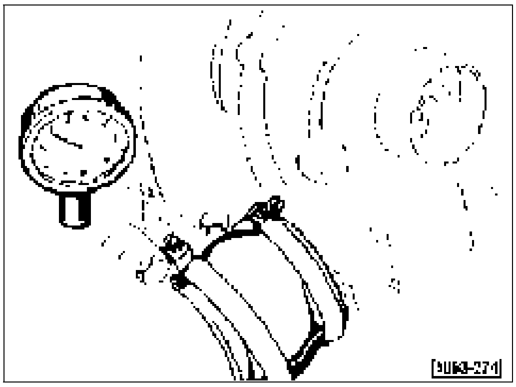


Fig. 3 - Checking pressure inside the intake pipe.

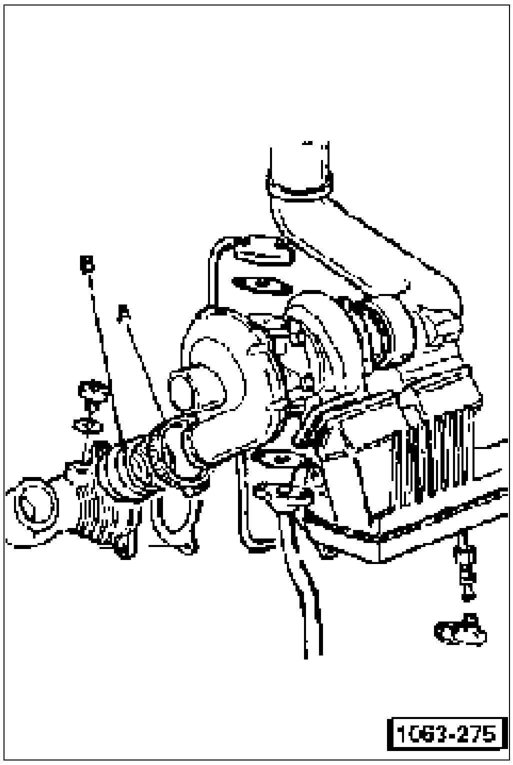


Fig. 4 - Manifolds-to-turbocharger connecting couplings.

Checking exhaust pipes

Be sure the exhaust pipes enable the exhaust gases to be properly expelled; otherwise remove any carbon deposits.

If after performing the above checks the turbocharger is not operating smoothly a thorough overhaul shall be carried out.

Removal (Fig. 4 and Fig. 5)

Disconnect the lubricating pipes from cylinder block.

Loosen the pipe-to-turbocharger securing screws and remove together with gaskets.

Ease-off clamps **A** and remove coupling **B** connecting turbocharger to intake manifold, (Fig, 4)

Loosen the two coupling fixing clamps placed between air filter and turbocharger and remove coupling.

Warning: conveniently plug the turbocharger ducts to prevent any foreign matters from entering.

Unloose the 4 screws securing the turbocharger **A** manifolds to exhaust manifold **B** as well as the nuts fastening the muffler support **C** both to turbocharger and exhaust pipe, then remove the turbocharger, (Fig, 5).

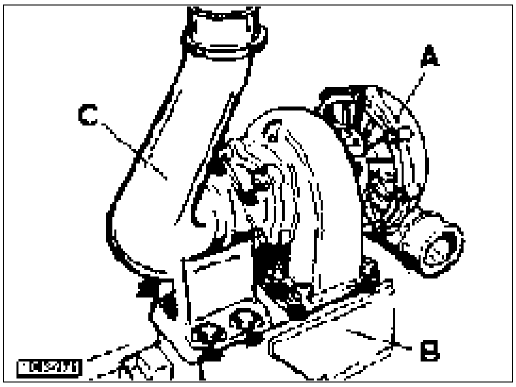


Fig. 5 - Turbocharger separation.

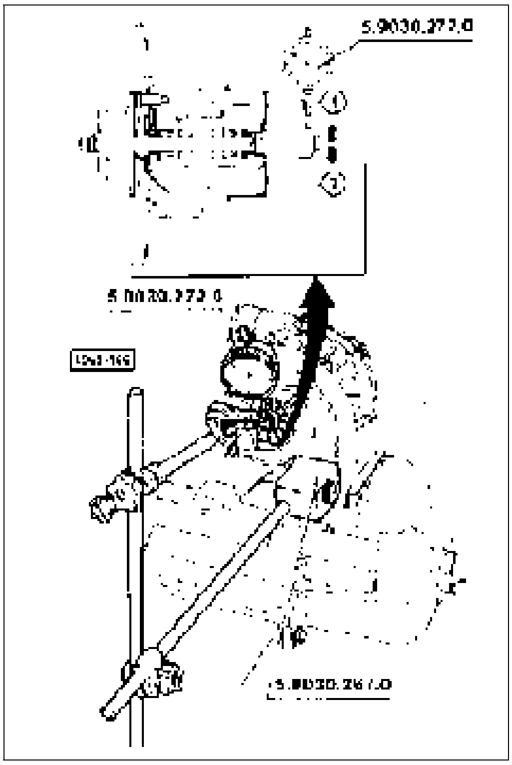


Fig. 6 - Checking rotor shaft radial play.

Checking rotor shaft radial play - turbine side (Fig. 6)

Place a dial gauge through the related magnetic base in such a way that feeler rests on the turbocharger rotor shaft as illustrated in figure 6.

Set dial gauge to zero and press the hub first downward and then upward taking the readings shown by the dial hand.

The difference in readings shall result in the rotor shaft radial play and this shall not exceed 0.46 mm.

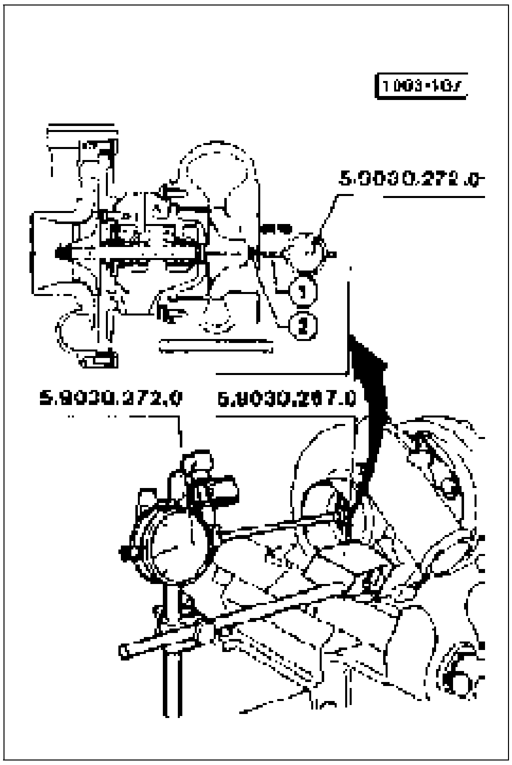


Fig. 7 - Checking rotor shaft end play.

Checking rotor shaft end play (Fig. 7)

Fit the dial gauge through the related magnetic base in such a way that feeler rests on the turbocharger rotor shaft end as illustrated in figure.

Set dial gauge to zero and move the shaft first to the right and then to the left taking readings shown by the dial hand.

The difference in both readings shall be the rotor shaft end play and this shall not exceed 0.16 mm.

If the amount of axial or radial play exceeds the prescribed value, remove the turbocharger and take it to a specialised service centre for a general overhaul.

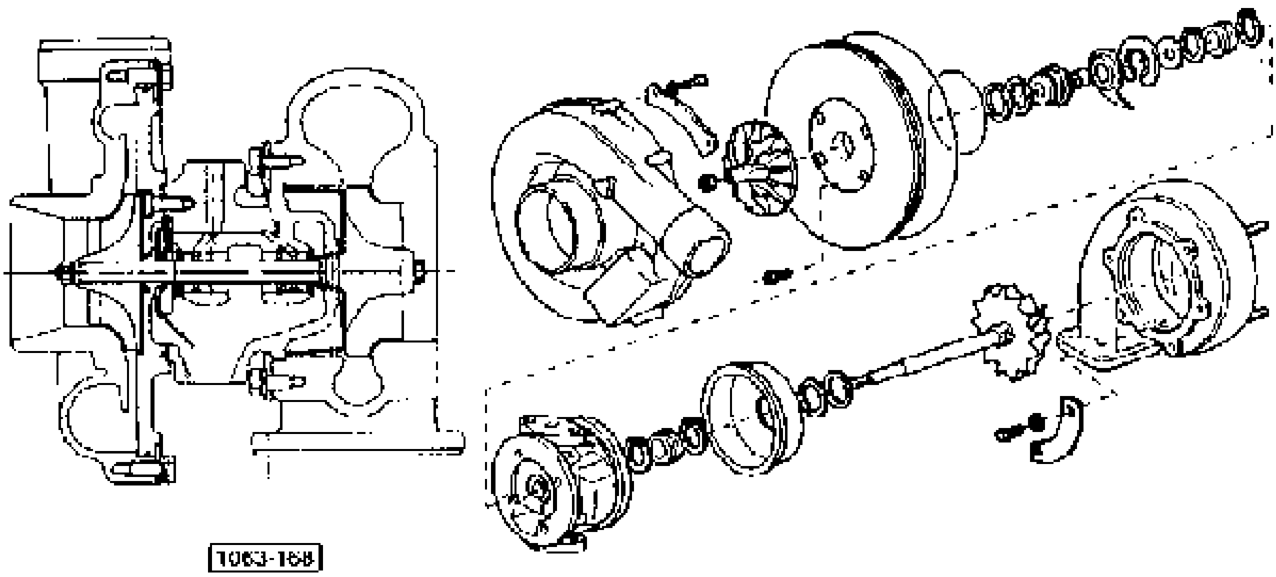


Fig. 8 - Turbocharger assembly components..

Installing turbocharger on engine (Fig. 9)

Secure the turbocharger assembly to its mounting. First fit coupling **A** to turbocharger assembly and next muffler support **B** to the exhaust manifold fixing with the securing screws.
Tighten first support **B** securing nuts and then the coupling securing nuts.
Connect the lubricating pipes.

Warning: Never race a cold engine. Run the engine just above low idling speed for a minute or two so as to allow the oil to warm up progressively (the turbocharger si lubricated by the engine oil) thus ensuring the rotor to be thoroughly lubricated.
After some hours' heavy work, let it run idling for a few minutes before stopping. This is to prevent the rotor from continuing to rotate through inertia without receiving a sufficient lubrication.
Since the turbocharger under normal working rate rotates at very high speeds (55.000 to 110.000 r.p.m.), even a few seconds' oil lack may lead to irreparable damage.

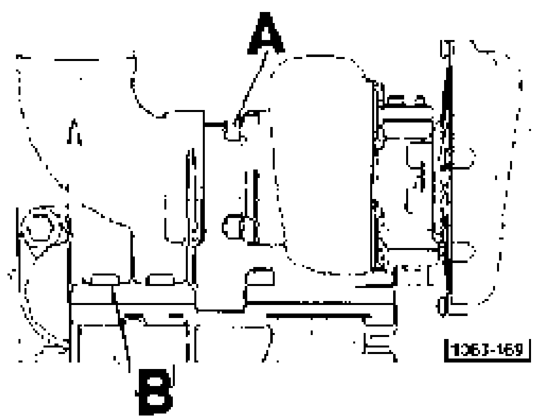
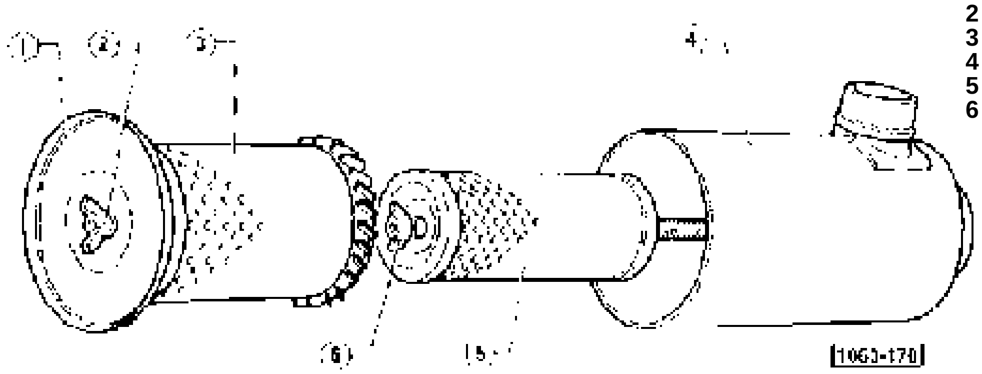


Fig. 9 - Turbocharger assembly on engine.

Engine air filter

If a blocked air filter indicator switch is to be replaced, make sure the new switch to be installed has same setting specifications checking the reference stamped on it.

— Aspirated engine blocked air filter indicator switch setting is 0.94 to 0.93 bar.



1 - Filter cover
2 - Wing nut
3 - Outer filter cartridge
4 - Filter housing
5 - Inner filter safety cartridge
6 - Wing nut

Fig. 10 - Engine air filter.

Tightening torques

Before tightening all screws should be degreased, cleaned and lubricated with engine oil.

	Kgm	Nm
engine flywheel securing screws	11	108
rocker arm support securing screws	4	39
injection nozzle bracket fixing nuts	4	39
inejction pipe fixing nuts	2,5÷3	24÷29
securing bolts for pressed steel rocker cover	0,5	5
securing bolts for aluminium rocker cover	1	10
counterweight housing securing screws (4-cylinder engines)	8	78
front pulley securing screws	34÷36	315÷350
oil pump securing screws	4	39
oil pan securing screws	2,5	24
rear oil seal cover retaining bolts	2,5	24,5
front casing retaining bolts	2,5	24,5
main bearing cap bolts	see page 32-33	
big-end bearing cap bolts	see page 34	
tightening the cylinder head bolts	see pages 49	

Engine air filter

Warning
It is important that the warning light, which shall be lit when the air filter is clogged, is always working efficiently. This check can be carried out by starting the engine and briefly blocking the air intake pipe by means of a plug (never touch it with your hands).

The filter cartridge should be thoroughly clean, if not, it shall be cleaned or washed.

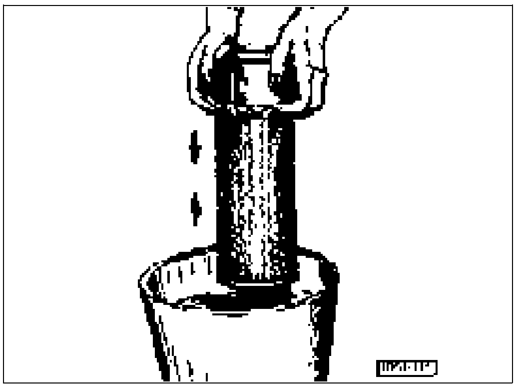


Fig. 11 - Washing the filter cartridge.

Cleaning with compressed air

This method is used when the filter cartridge is clogged with dust.

Direct a compressed air jet at a maximum pressure of 7 bar from the inside outwards of the filter cartridge, afterwards blow the air over the whole surface by moving the air jet along the foldings in the paper until all dust has been removed.

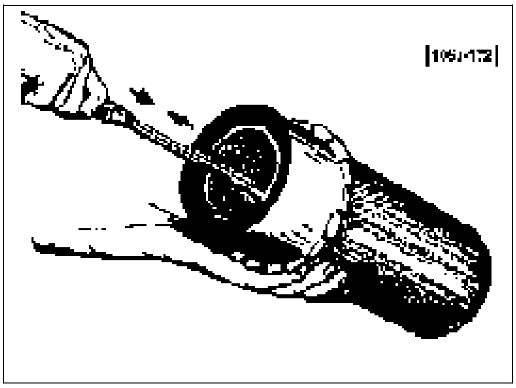


Fig. 12 - Cleaning the filter cartridge with compressed air.

Washing with water

This method is particularly recommended when the filter cartridge is obstructed by oily substances and consists of washing the filter cartridge in clean water.

Rinse the cartridge with a jet of water directed from the inside outwards at a maximum pressure of 3 bar.

Let the cartridge dry 24 hours at room temperature in a dust-free environment.

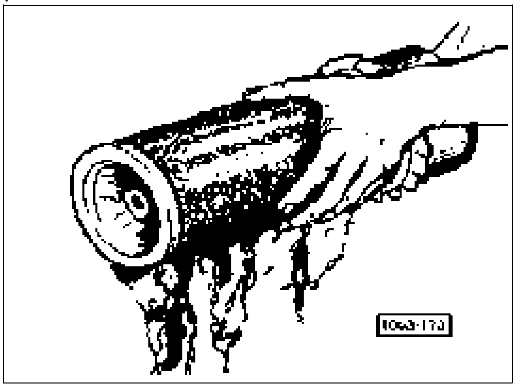


Fig. 13 - Using a water jet to remove any residual left on the filter cartridge.

Reassembling the cartridge

Clean the inside of the filter body with a dry cloth and make sure that the cartridge has not become deformed in any way.

Also check that the paper of the filtering cartridge is not torn by introducing a light source into the cartridge interior and visually inspecting its outside surface to see if any light shows through. If no light source is available, carefully examine the external surface of the cartridge folded paper.

Should any holes or tears be found, regardless of their size, the filter cartridge should be replaced at once.

The inner safety cartridge should never be cleaned but only replaced every six times the main cartridge is cleaned.

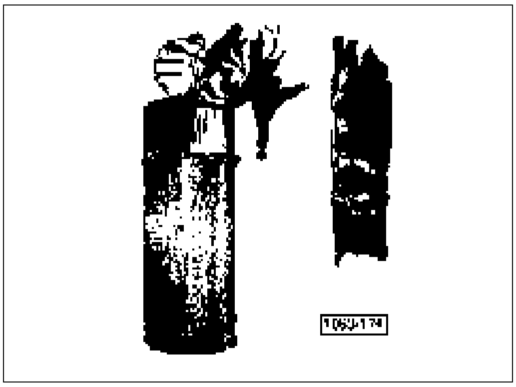


Fig. 14 - Using a light source to check the filter cartridge folded paper conditions.

Instructions for engine assembly

Be sure all plugs have been removed, then carefully clean the cylinder block and the lubricating passages with cleaning solvent and afterwards perform drying using compressed air
All sealing rings and gaskets should be replaced on assembly.
The use of proper tools is of prime importance to the correct performance of all mechanical operations.
Prior to reassembly use some engine oil to lubricate the faces of all components subject to relative motion.
The use of special grease is needed for some components so as they can be correctly held in position and assembly operations facilitated.
Pay particular attention to the direction of assembly of some items by directly referring to the exploded views illustrated.

WARNING: Before refitting the engine you must lubricate the following parts:
— cylinders (internal surface);
— pistons;
— crankshaft (main journals and crankpins);
— connecting rods (small end bearing for gudgeon pin);
— valves (stems);
— rocker arms (bushes);
— oil pump and governor drive shaft;
— cam shaft (journals and cams);
— oil pump control rod and bevel gear drive.

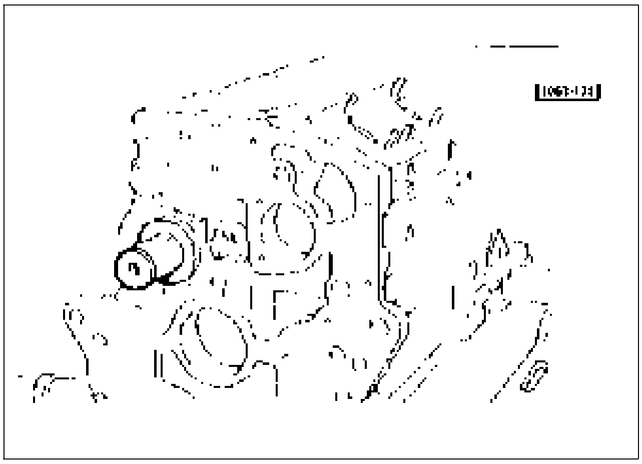


Fig. 1 - Before assembling the engine clean the block properly, fit all plugs and fasten it to no. 5.9030.491.4 swivel bench, then install the cooling nozzles positioning them as shown on page 22;

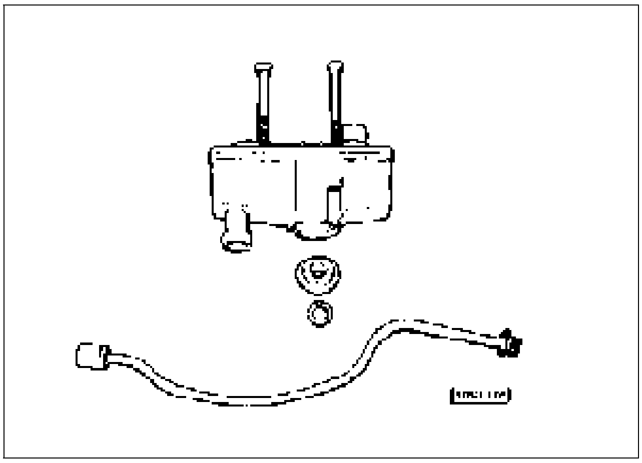


Fig. 2 - Components of the engine oil vapour breather unit;

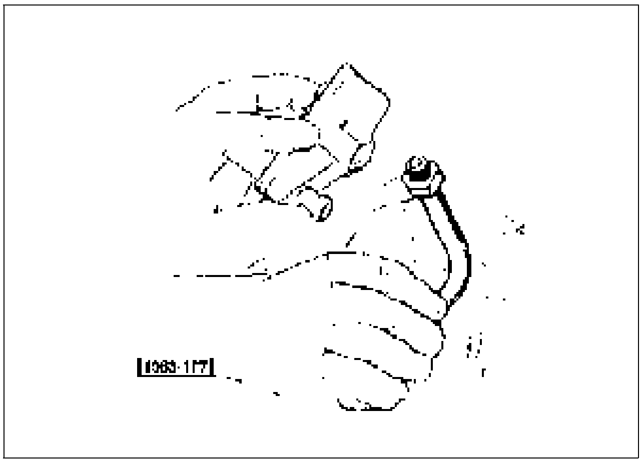


Fig. 3 - Fit the breather unit pipe providing oil return to engine into the cylinder block;

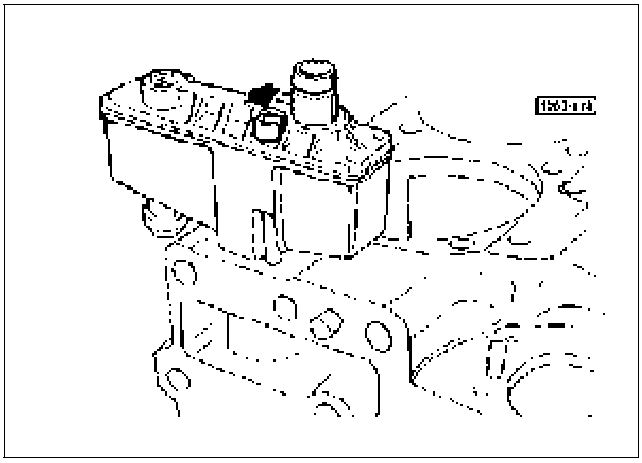


Fig. 4 - Install the oil vapour decantation unit in the engine block using the two securing screws;

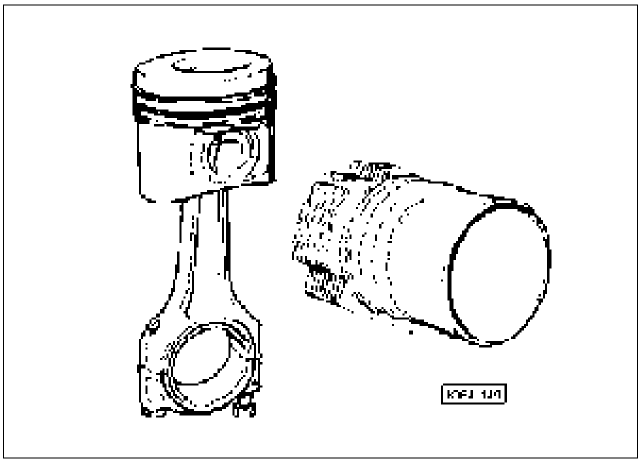


Fig. 5 - Install the piston rings on piston and then connect piston to connecting rod;

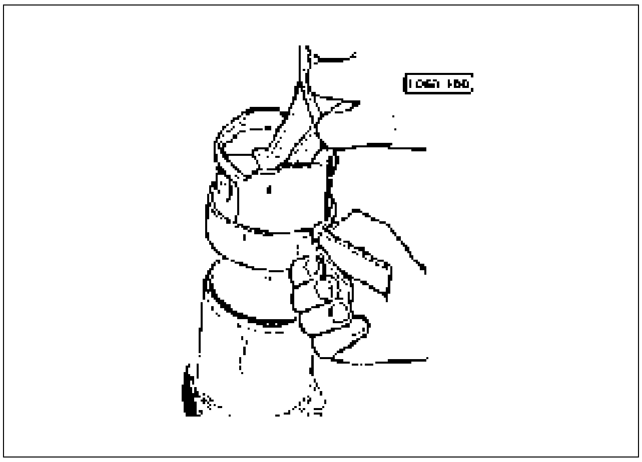


Fig. 6 - Fitting the piston-connecting rod assembly into the cylinder;

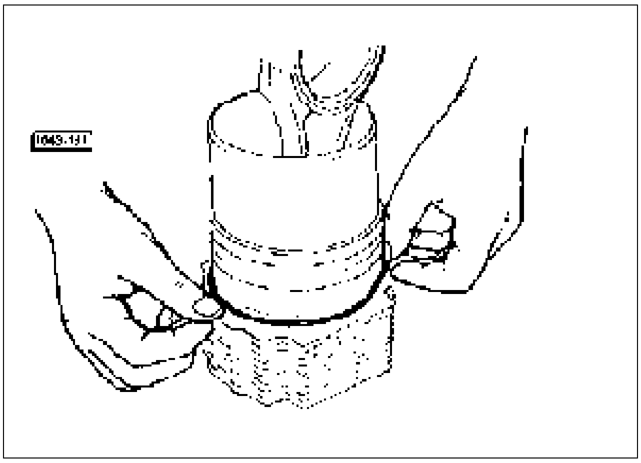


Fig. 7 - Fit the O-rings on the cylinder;

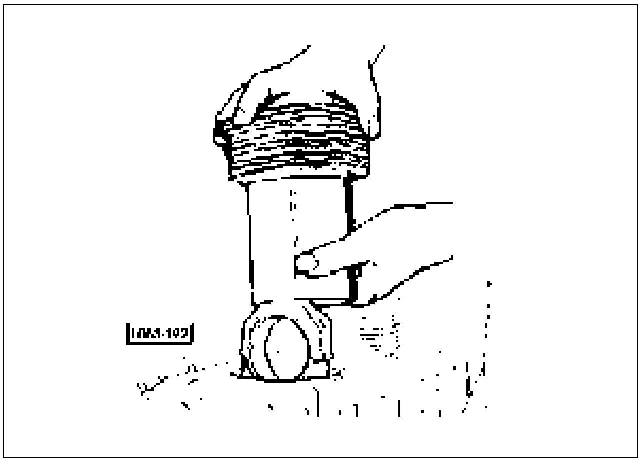


Fig. 8 - Installing the cylinder-piston-connecting rod assembly in the engine block;

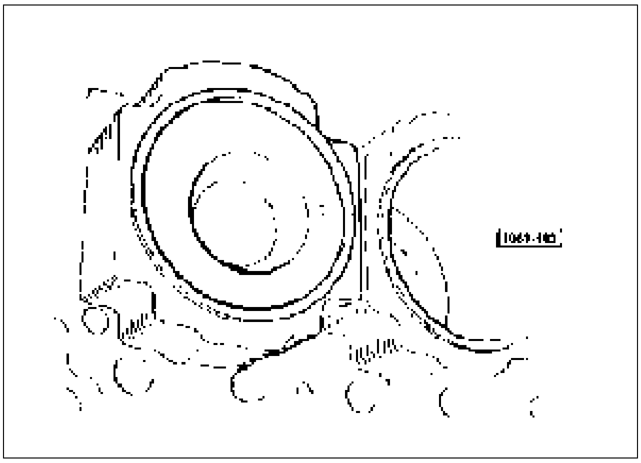


Fig. 9 - Orient the piston combustion chamber towards the injection pump side, secure the piston-connecting rod assembly by means of no. 5.9030.631.4/10 equipment, then turn the engine upside down;

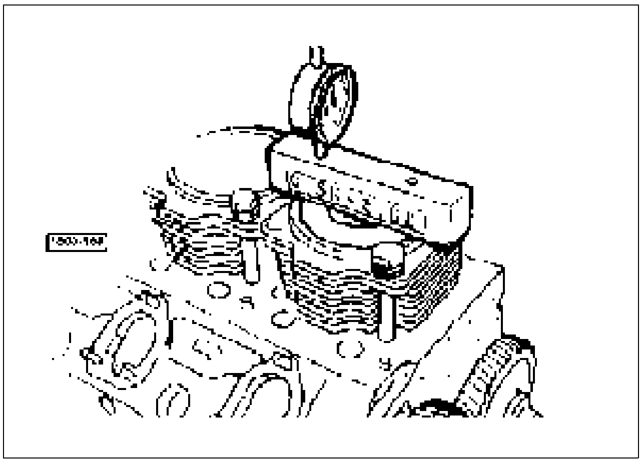


Fig. 10 - Checking for correct cylinder and assembled piston positioning at T.D.C. Measure the piston protrusion from cylinder and select the suited gasket type to be fitted between cylinder and cylinder head as shown on page 27;

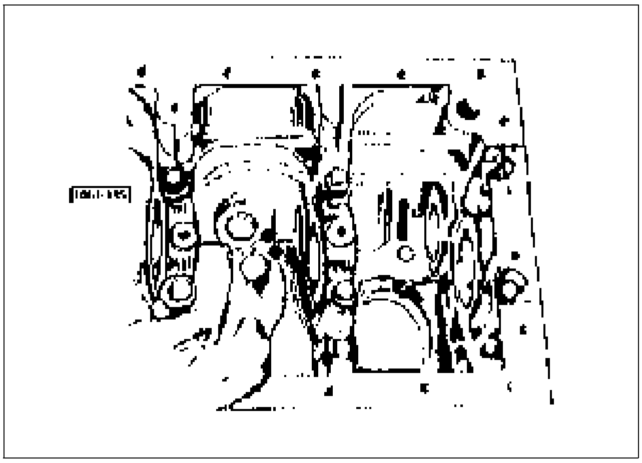


Fig. 11 - Fit the tappet plates into their seats in the block after lubricating with engine oil;

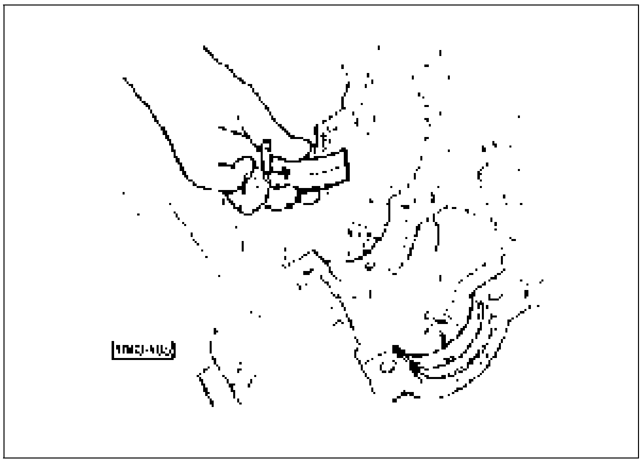


Fig. 12 - Place the upper crankshaft main bearing shells in their seats in the engine block. These main bearing shells are distinguished from the lower shells as they are provided with a lubricating hole;

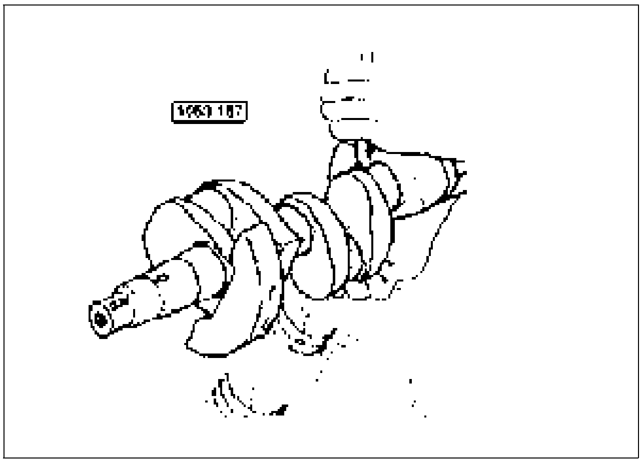


Fig. 13 - Install the crankshaft in the engine block. We recommend using a hoist for accomplishing this operation;

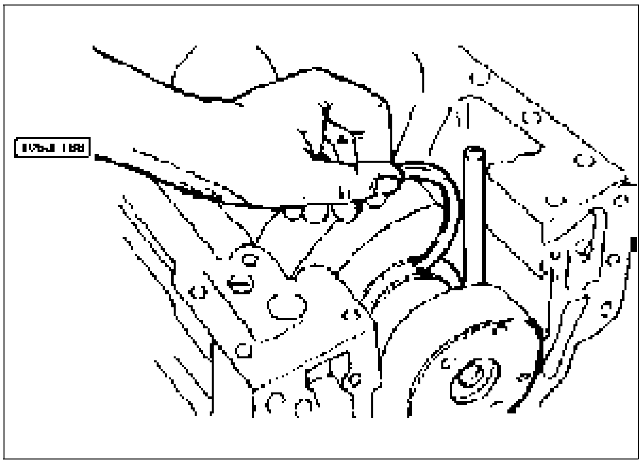


Fig. 14 - Fit the two crankshaft half shoulder rings into the rear block support;

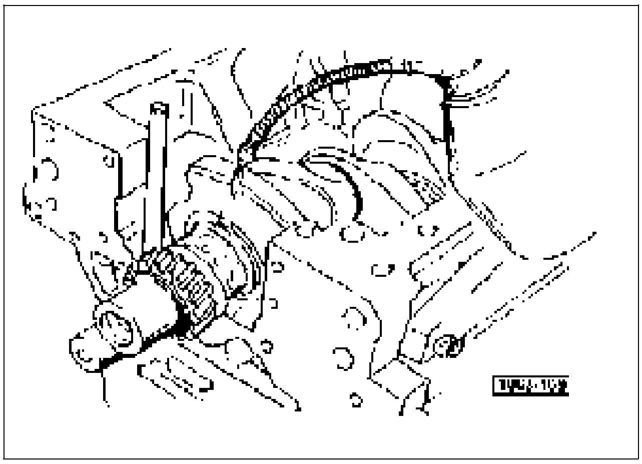


Fig. 15 - Oil the crankshaft main journals and big end journals;

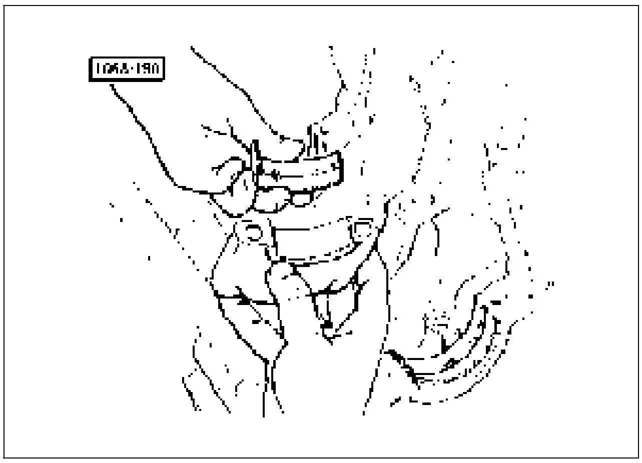


Fig. 16 - Fit the main bearing shells into the crankshaft main bearings. (All main bearing shells are provided with a ratchet. This ratchet should be completely engaged in its seat);

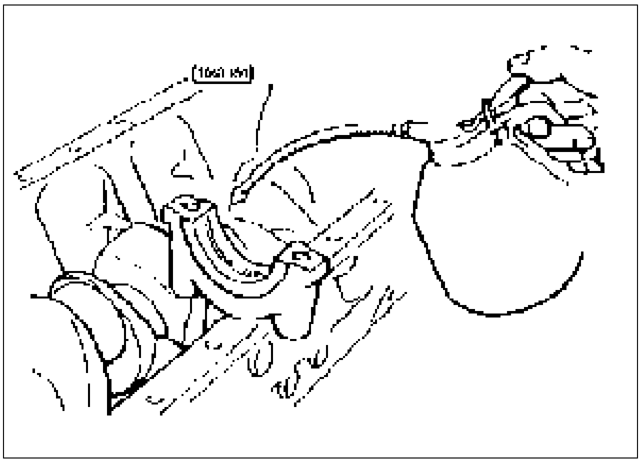


Fig. 17 - Oil the crankshaft main bearing shells;

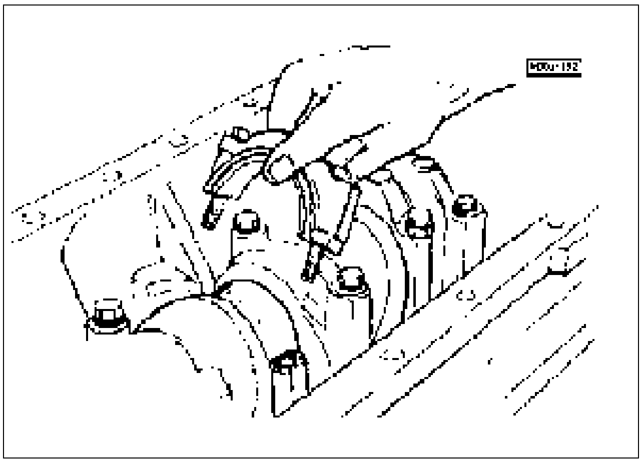


Fig. 18 - Fit the big end cap bearing shells in the related seats and then install the big end caps;

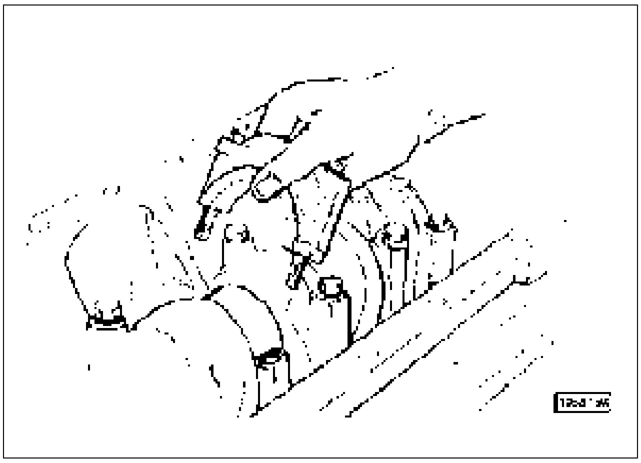


Fig. 19 - Install the intermediate crankshaft main bearing taking care the numbers stamped on the bearing correspond to those stamped on the crankcase. (Numbers should all be oriented in the same direction);

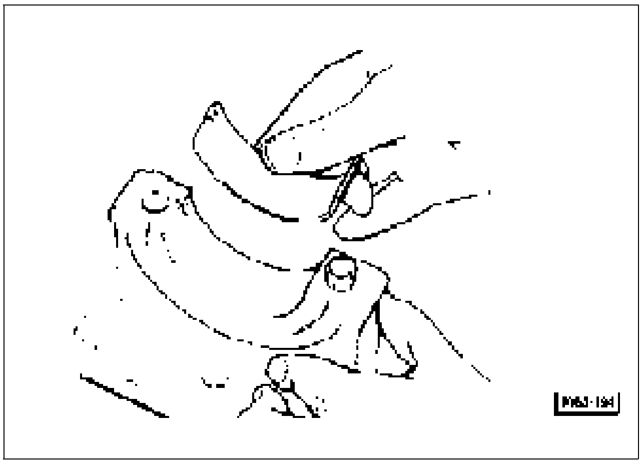


Fig. 20 - Install the main bearing shells in the front and rear crankshaft bearings. Shoulder half rings shall be secured in the rear bearing after applying some grease;

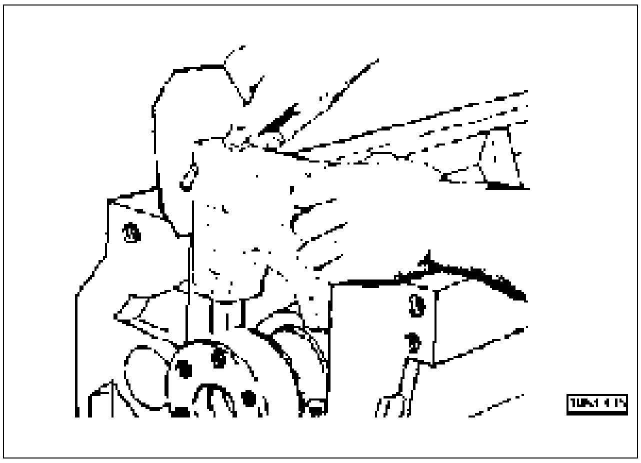


Fig. 21 - Install the gaskets in the front and rear main bearings; then fit bearings easing them into the engine block using sheet metal slides and tapping gently;

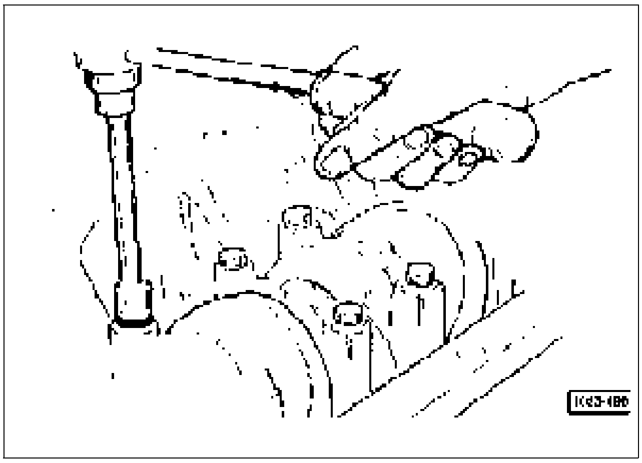


Fig. 22 - The main and big end bearings securing screw threads should be covered with LOCTITE 242. Thereafter tighten the securing screws using tool no. 5.9030.640.0; following the instructions on pages 32 - 33 - 34;

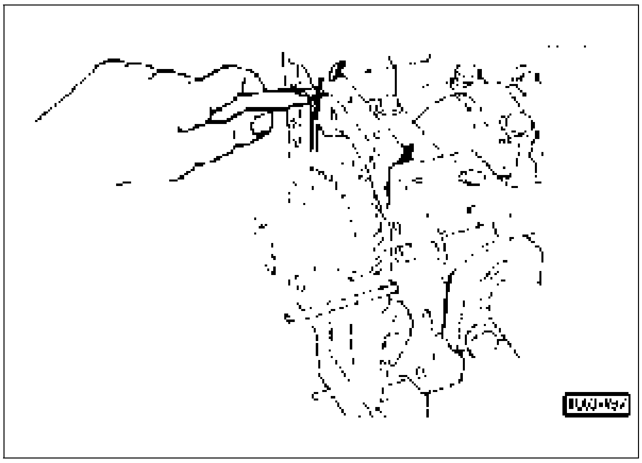


Fig. 23 - Protruding gaskets should be cut flush with the engine block at the front and rear side;

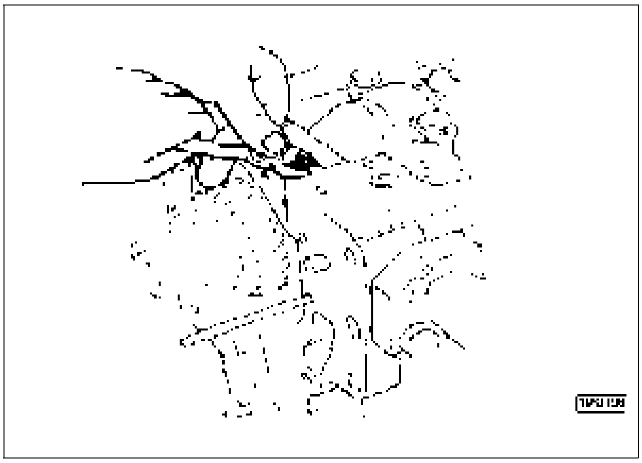


Fig. 24 - Using a suitable tool cut the rubber gaskets protruding from block oil sump face according to specifications given on page 33. Smear some sealant on the rubber gaskets in the block;

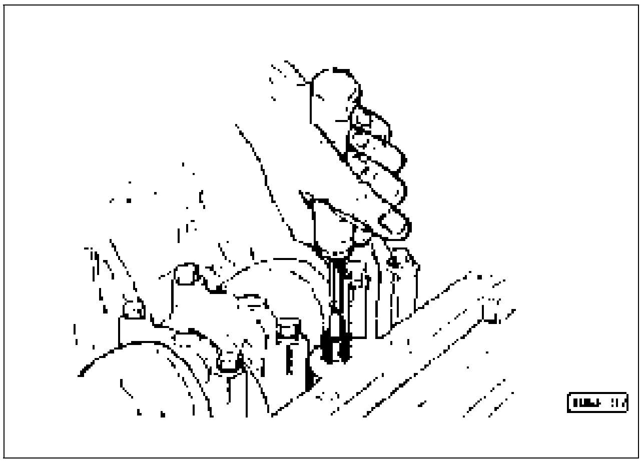


Fig. 25 - Use a screwdriver to fit the screw plug in the position shown in figure;

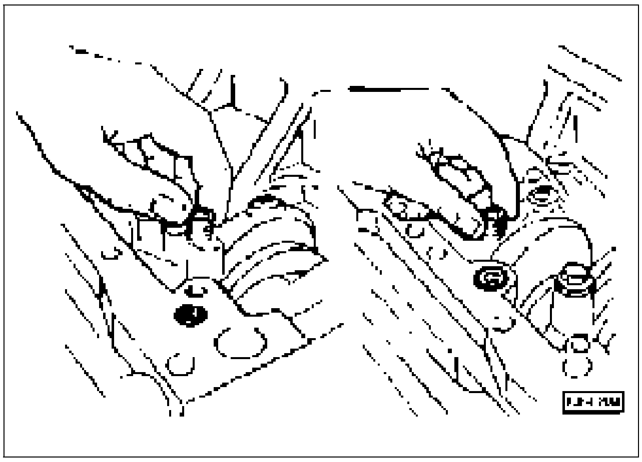


Fig. 26 - Install the socket head screw plugs in the positions shown in figure;

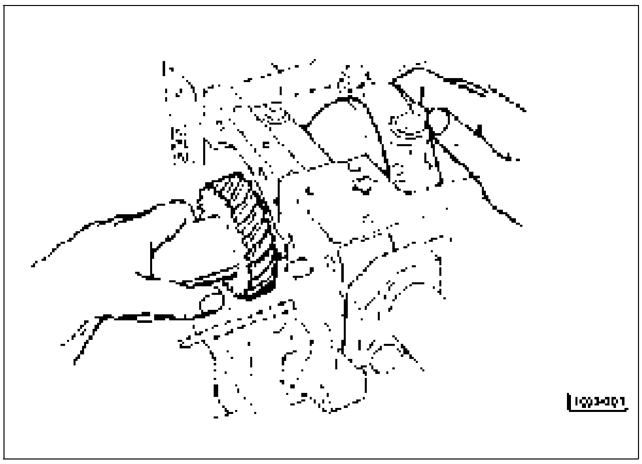


Fig. 27 - Turn the crankshaft and make sure it can rotate freely and no interference between pistons and spray nozzles occur, then measure the crankshaft end play;

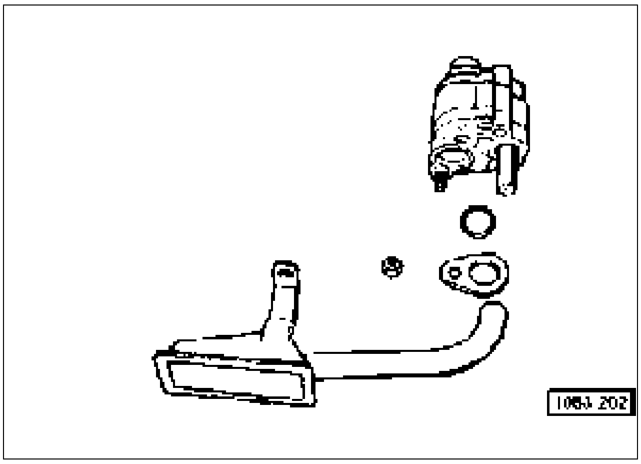


Fig. 28 - *SILVER 80-90-100.4* - ONLY - Fit the oil pump and after securing to engine block check gears for free sliding. Install the oil pipe rose;

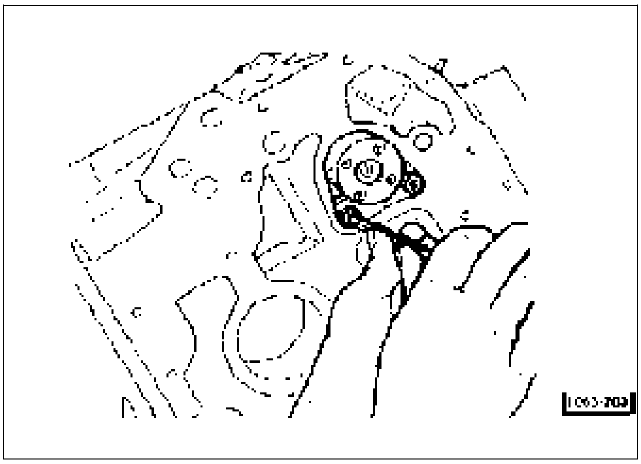


Fig. 29 - Install the camshaft in crankcase. Mount the forked flange permitting the camshaft to be positioned. Make sure the camshaft is free to rotate with a slight amount of end float. **Warning** - If the timing gear has been removed or replaced a new valve timing should be performed;

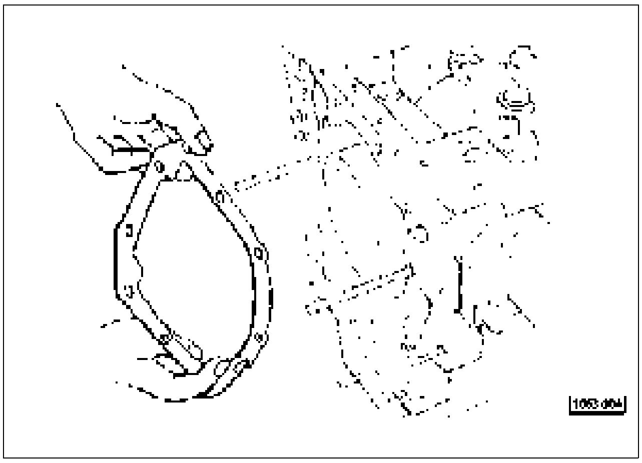


Fig. 30 - Fit the crankshaft rear flange gasket;

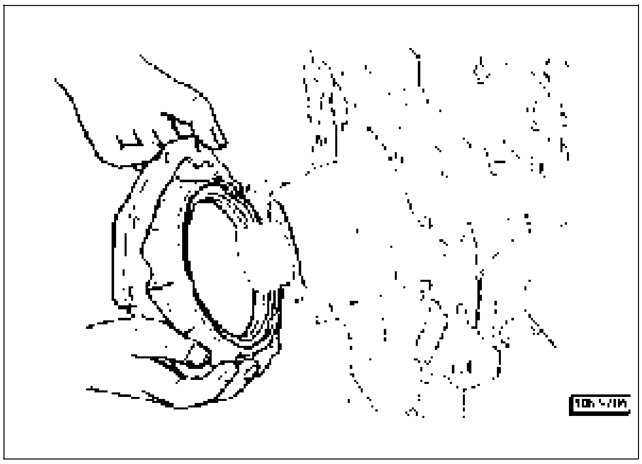


Fig. 31 - Using a guard ring install the flange. Warning - The ring inserted into flange should never be greased. Cover the securing screws with a sealing compound. Interpose the copper washers and tighten to the specified torque as indicated on page 90;

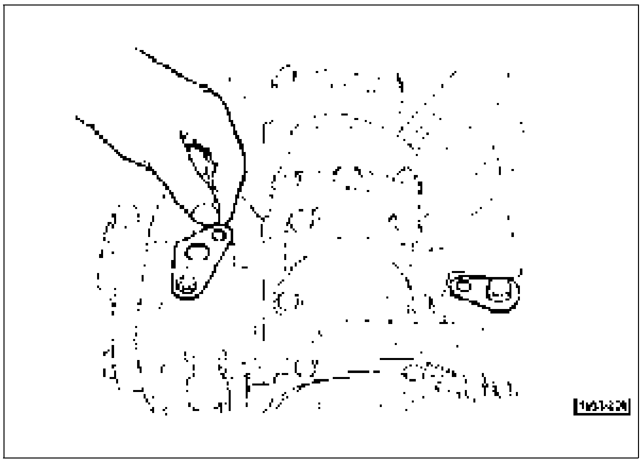


Fig. 32 - *SILVER 100.6* ONLY - Fit two packs of shims between oil pump and engine block. (Shim packs should be so that a gear backlash as indicated on page 50 may be established);

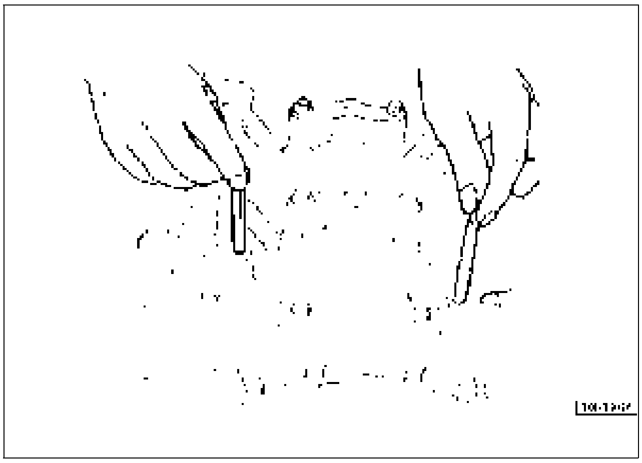


Fig. 33 - *SILVER 100.6* ONLY - To assemble the oil pump correctly place two guide pins (or two screws) as shown in figure;

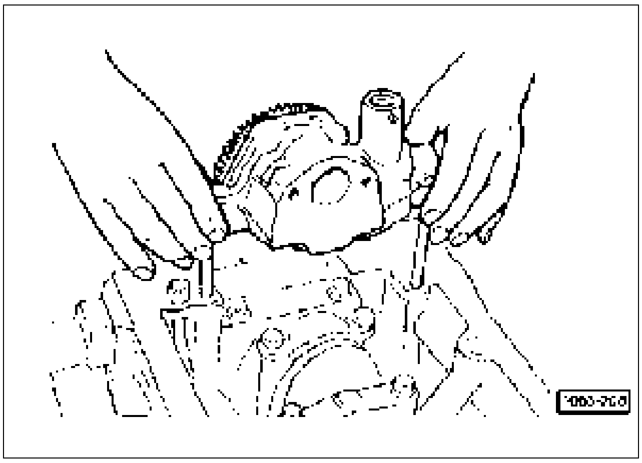


Fig. 34 - *SILVER 100.6* ONLY - Install the whole engine oil pump assembly;

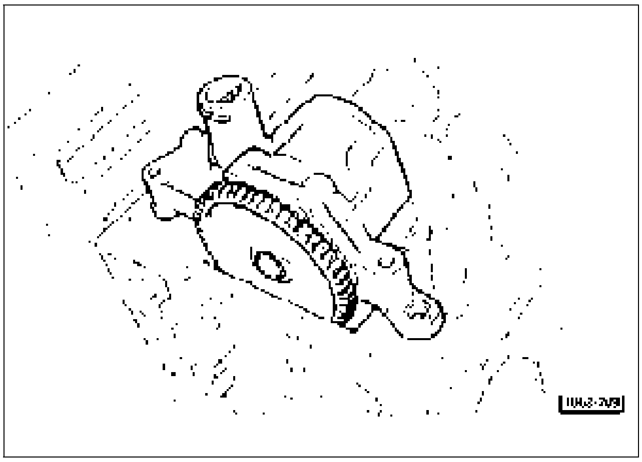


Fig. 35 - *SILVER 100.6* ONLY - Engine block mounted oil pump;

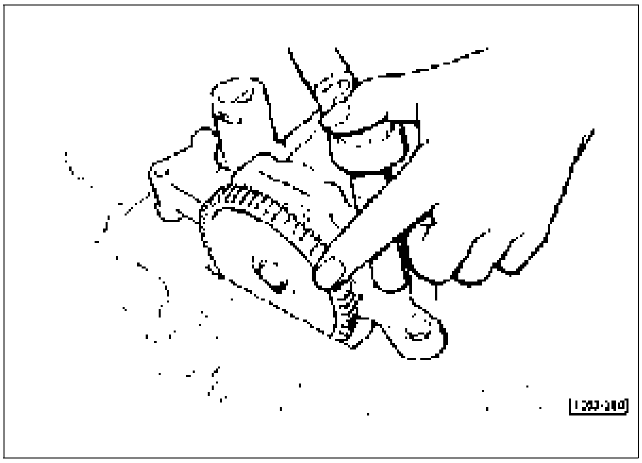


Fig. 36 - *SILVER 100.6* ONLY - Tighten the engine oil pump securing screws to the specified torque;

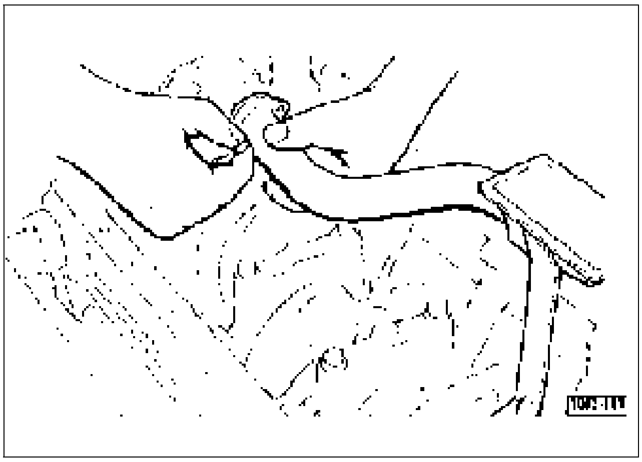


Fig. 37 - *SILVER 100.6* ONLY - Install the oil pipe rose;

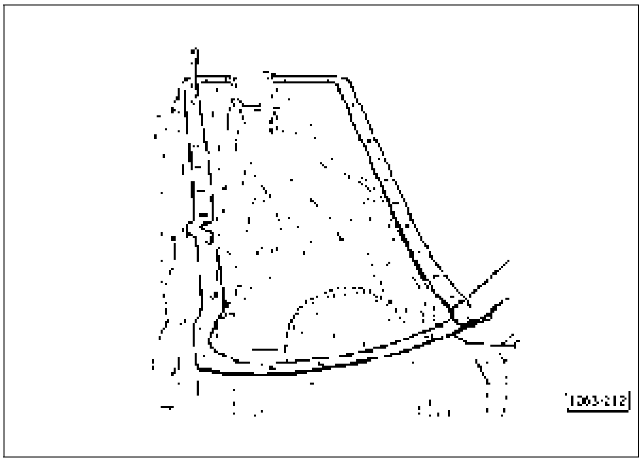


Fig. 38 - Place the engine oil pan gaskets;

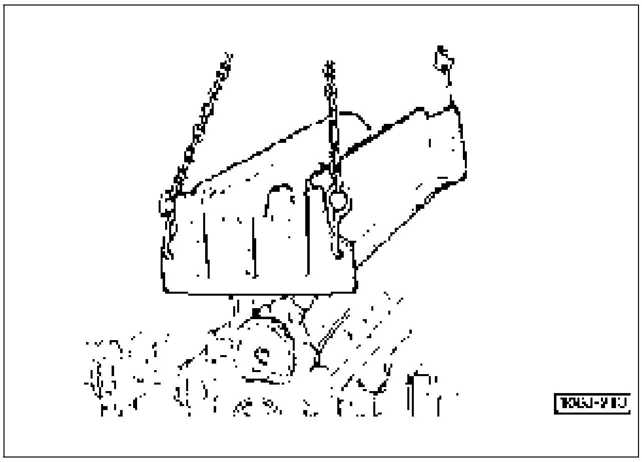


Fig. 39 - Install the engine oil pan;

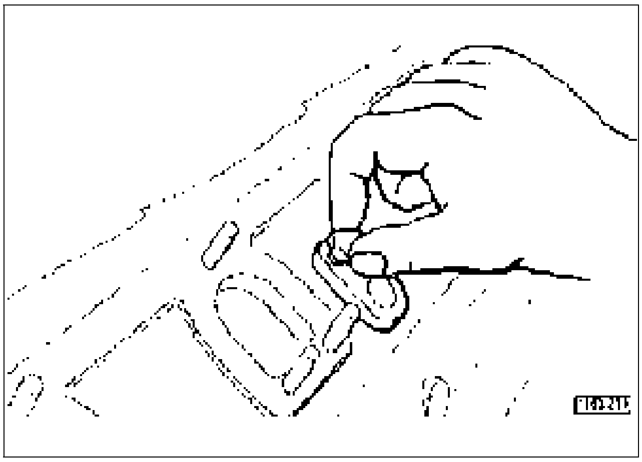


Fig. 40 - Place the injection pump control rod guide supports in the block and lock with the related securing screws;

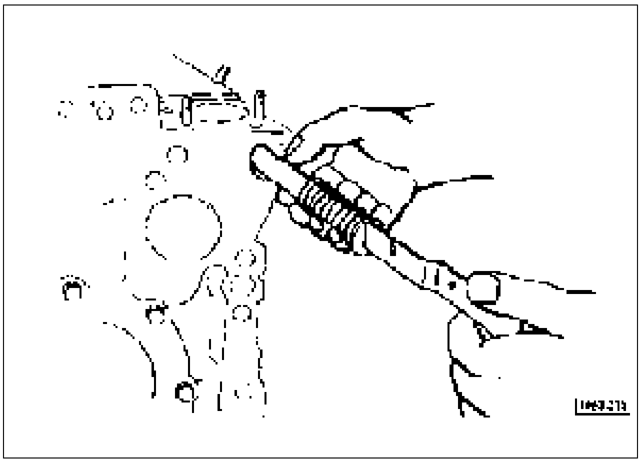


Fig. 41 - Insert the injection pump control rod in the its seat in the cylinder block along with pressure spring and stop cap. Make sure it is free to move inside the guide supports;

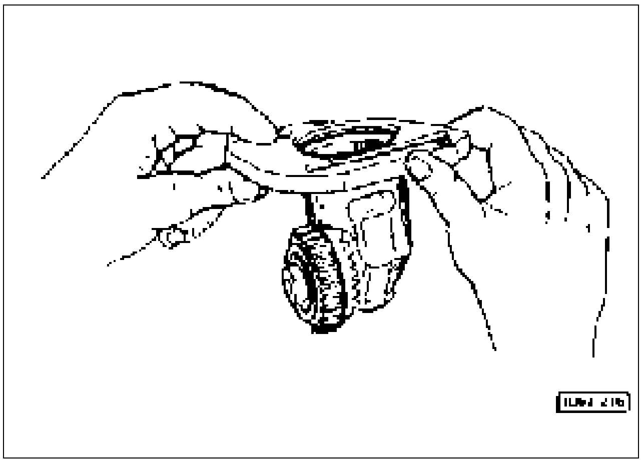


Fig. 42 - ONLY FOR TRAKTORS WITH ELECTRONIC GOVERNOR ONLY - Assemble the square transmission controlling both engine governor and oil pump. As to assembly and adjustment procedures see instructions on page 62;

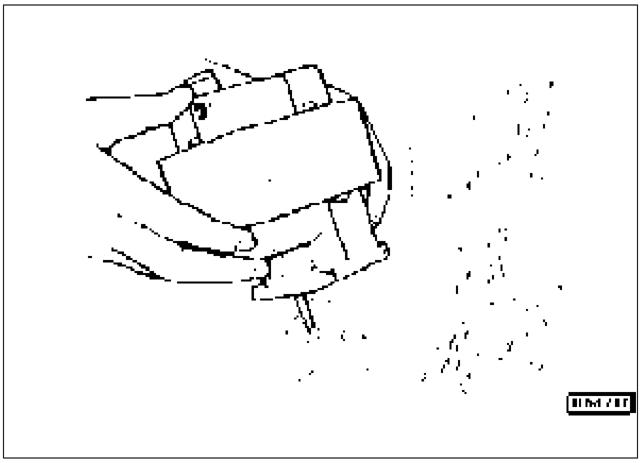


Fig. 43 - FOR TRAKTORS WITH ELECTRONIC GOVERNOR ONLY - After inserting a sealing ring on the stem fit the engine actuator support in the block;

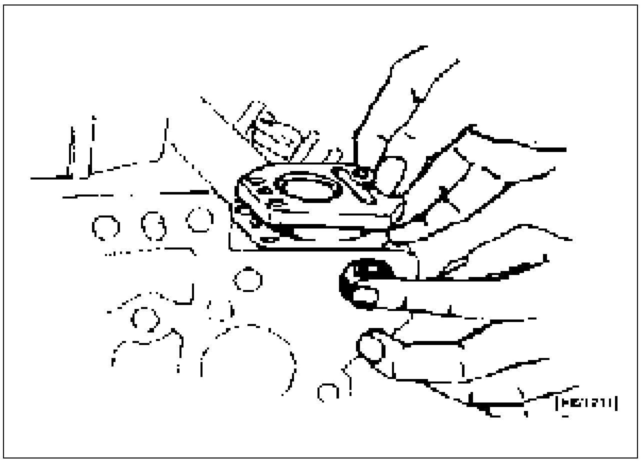


Fig. 44 - FOR TRAKTORS WITH ELECTRONIC GOVERNOR ONLY - Install the square transmission in its seat in the block placing the special backlash adjusting shims between the gear teeth (see instructions on page 62);

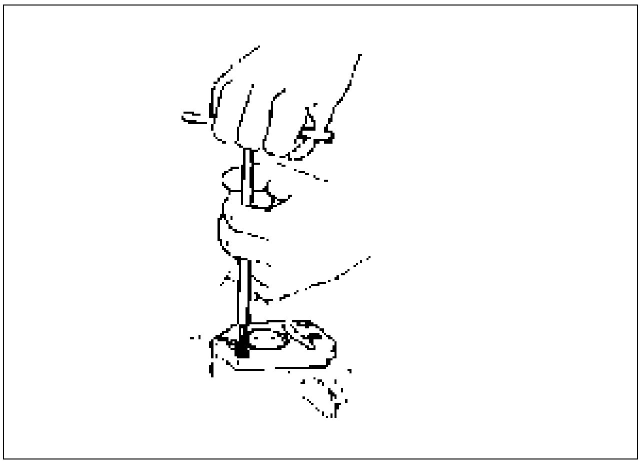


Fig. 45 - Fix the square transmission to the block tightening the related securing screws;

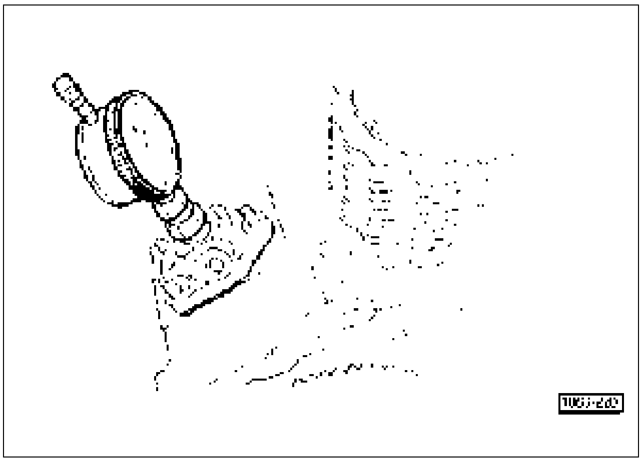


Fig. 46 - Only if necessary, determine the shim pack amounts to be fit between injections pumps and engine block (see instructions on page 76);

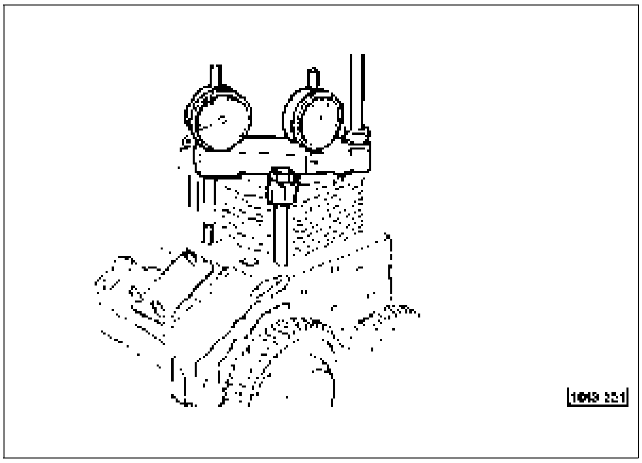


Fig. 47 - If the timing gear has been removed from the shaft carry out valve timing for timing the engine as indicated on page 75;

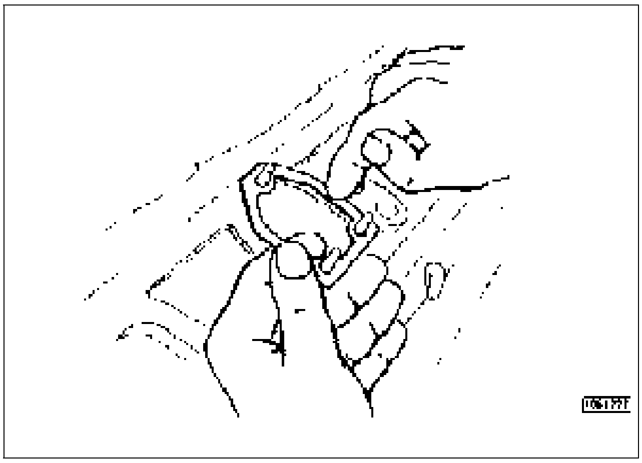


Fig. 48 - After smearing the shim faces with some sealing adhesive place the shim packs between pumps and block. Subsequently perform injection pump installation;

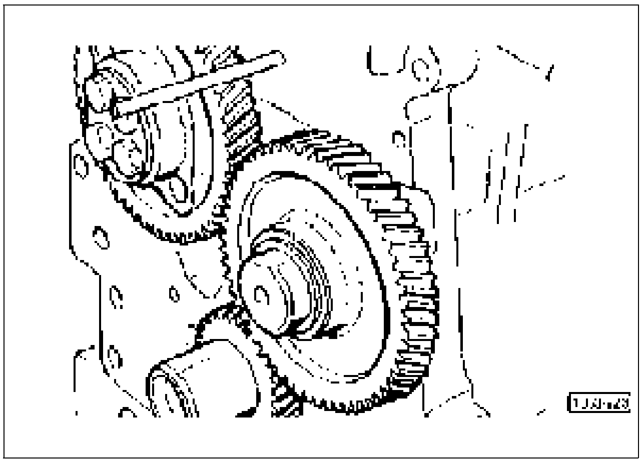


Fig. 49 - After the timing gear has been secured to shaft, fit the idler gear taking care the chiselings on teeth be in the same line. If one of these three gears must be replaced, valve timing procedure shall be repeated;

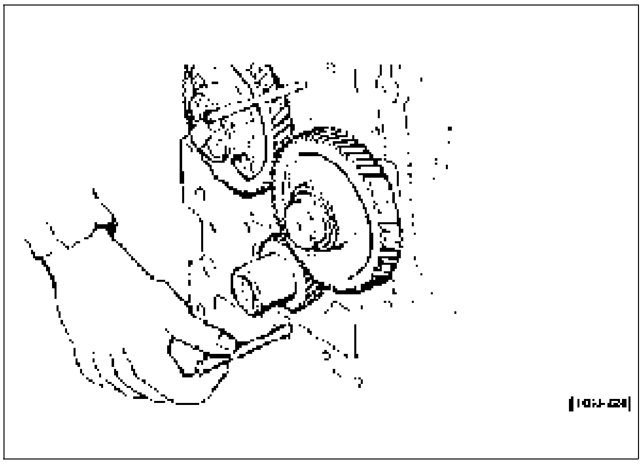


Fig. 50 - Fit some locating pins or studs to centre the timing case correctly during assembly;

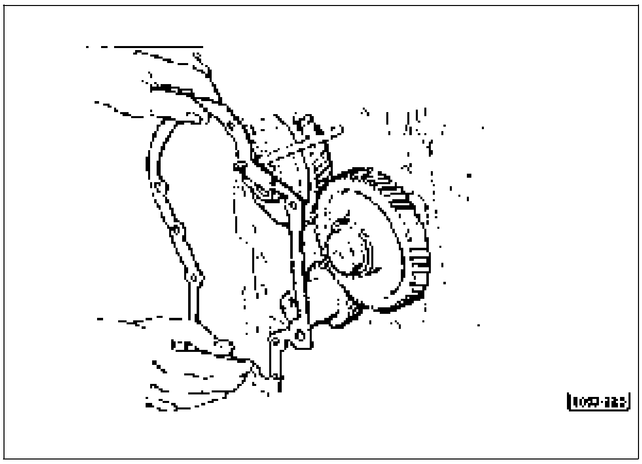


Fig. 51 - Place the isogene gasket between engine block and timing case;

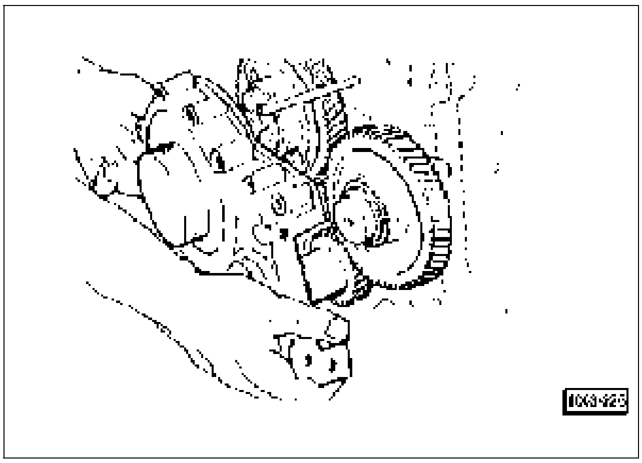


Fig. 52 - The timing case should be installed paying attention not to damage the sealing ring lip fitted inside;

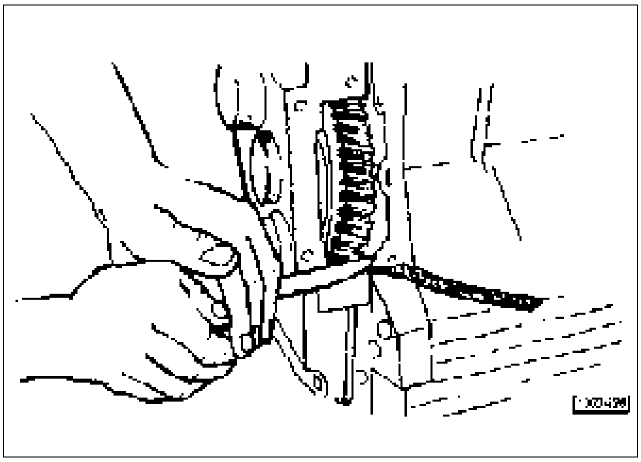


Fig. 53 - Remove excess gasket from the face used to fix external applications;

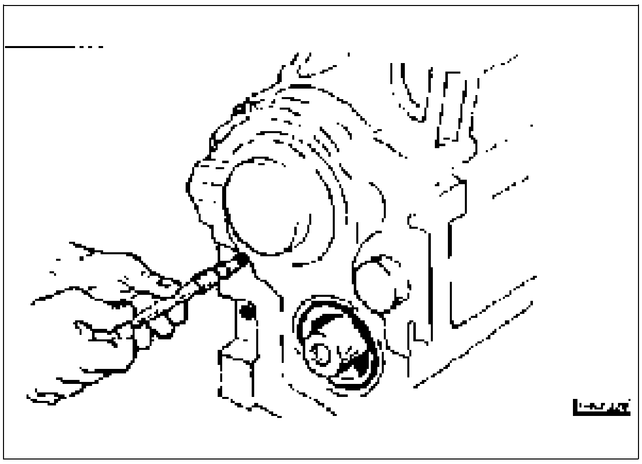


Fig. 54 - Insert all timing case securing screws but do not tighten fully;

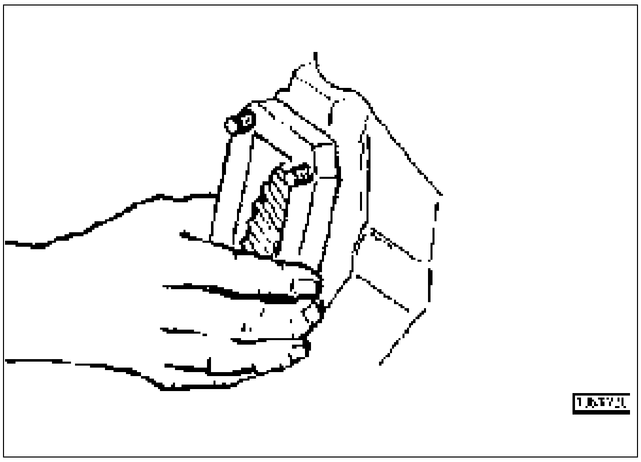


Fig. 55 - Fit no. 5.9030.634.0 tool as shown in figure to obtain thorough concentricity between sealing ring and crankshaft as well as a full coplanarity of the external application fixing faces, then fully tighten the timing case securing screws. Remove the tool;

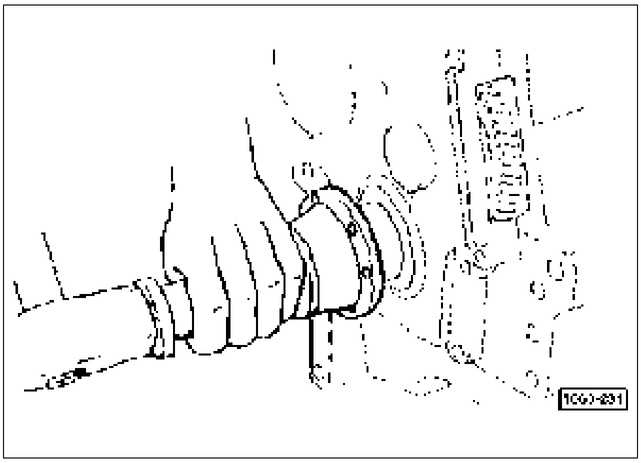


Fig. 56 - Using a suitable plug fit the pulley hub to the crankshaft;

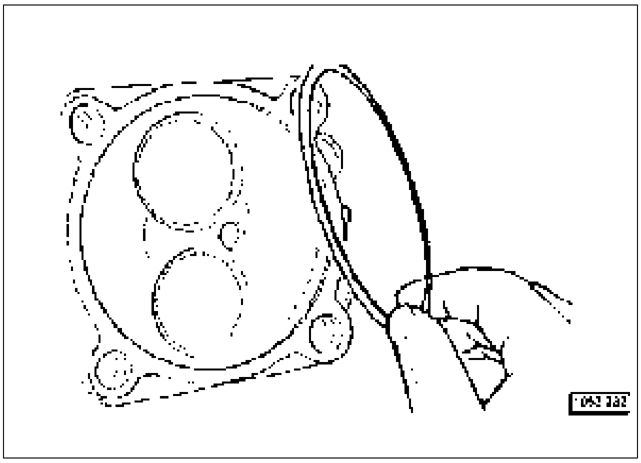


Fig. 57 - Fit gaskets between cylinder heads and cylinders (see instructions on page 27);

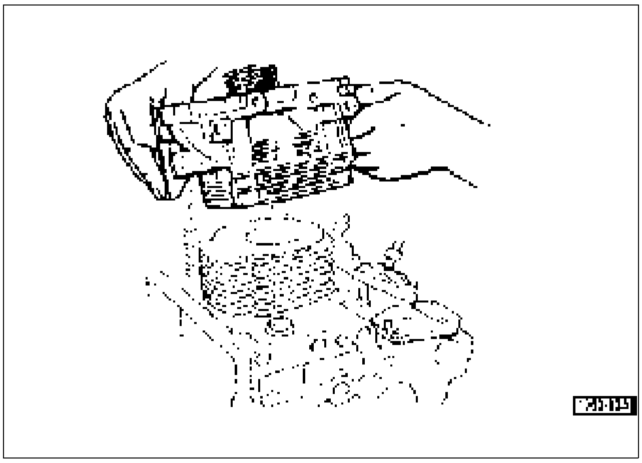


Fig. 58 - After preassembling the heads install on engine;

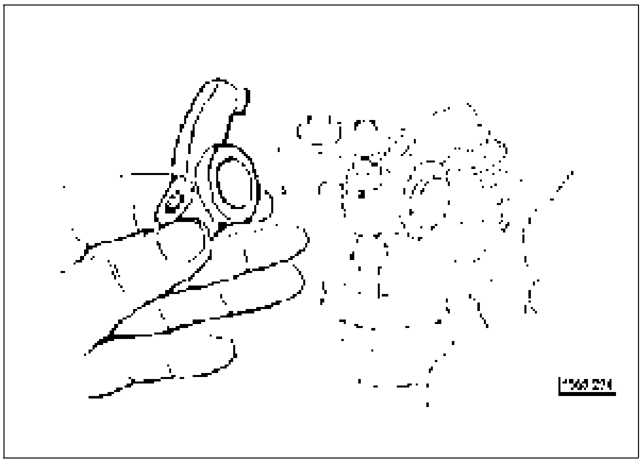


Fig. 59 - Insert the tappet rods, fit the rocker arms and the rocker arm supports;

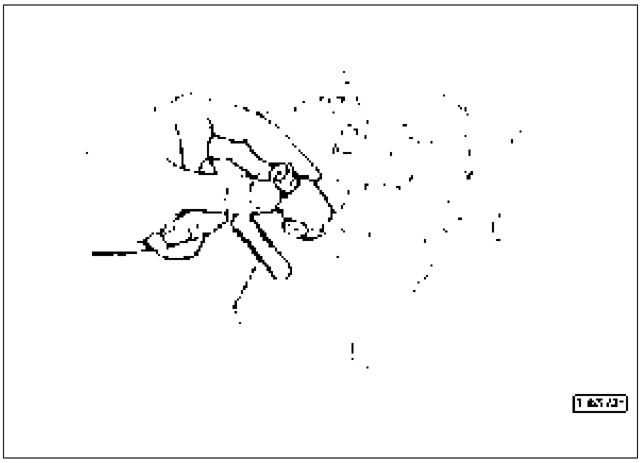


Fig. 60 - Install the injection nozzles in their seats;

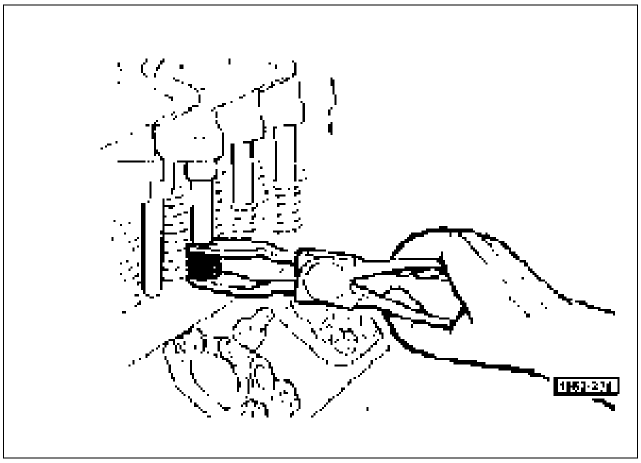


Fig. 61 - Using a special tool fit the rod cover pipes and the positioning springs;

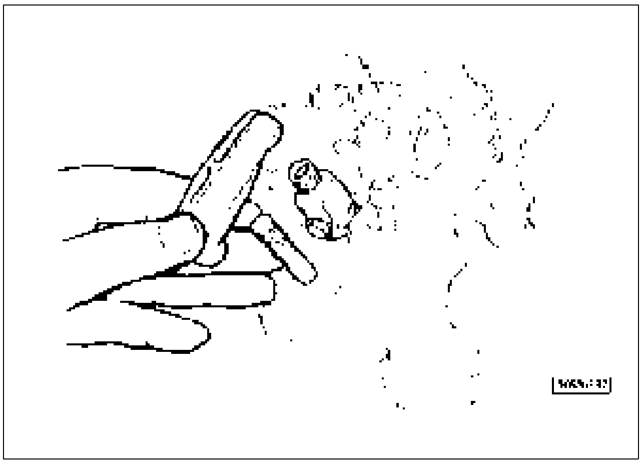


Fig. 62 - Using a plug thoroughly insert the injection nozzles in their seats orienting the fuel rejection hole towards the fixing bracket. Install the injection nozzle fixing brackets tightening the securing screws to the torque specified in the table on page 90;

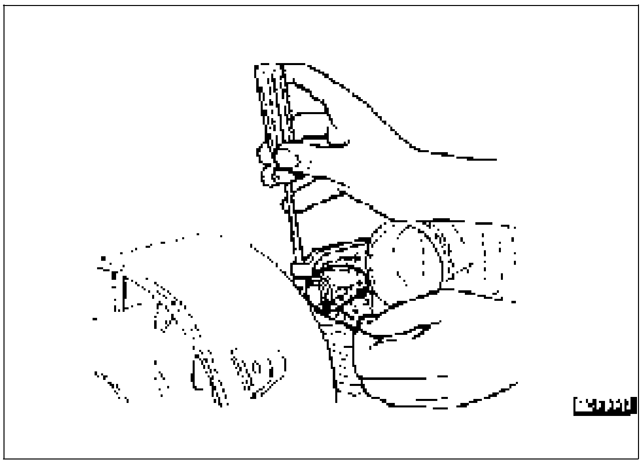


Fig. 63 - Adjust valve and rocker arm clearance;

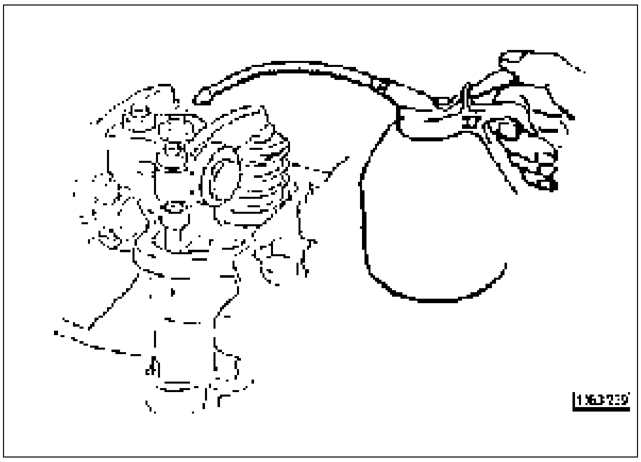


Fig. 64 - Oil valve caps and valve springs;

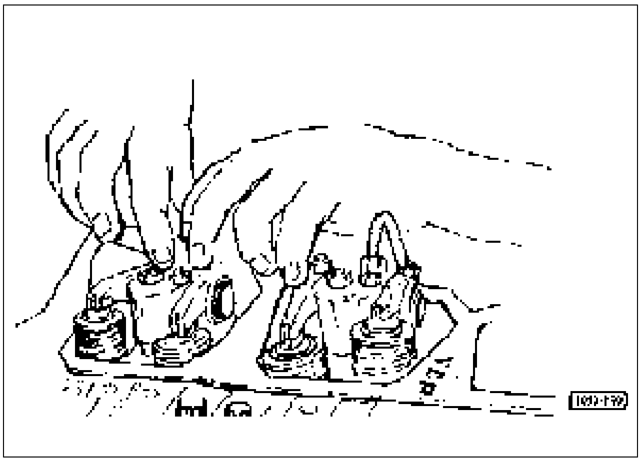


Fig. 65 - Fit gaskets between heads and caps. Orientation shall be provided according to "TOP" indication on them;

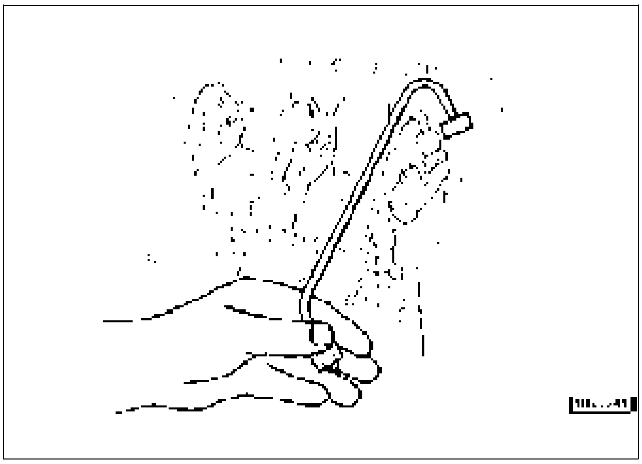


Fig. 66 - Install pump-to-injector pipes as well as the fuel recovery pipes from injection pumps and injectors;

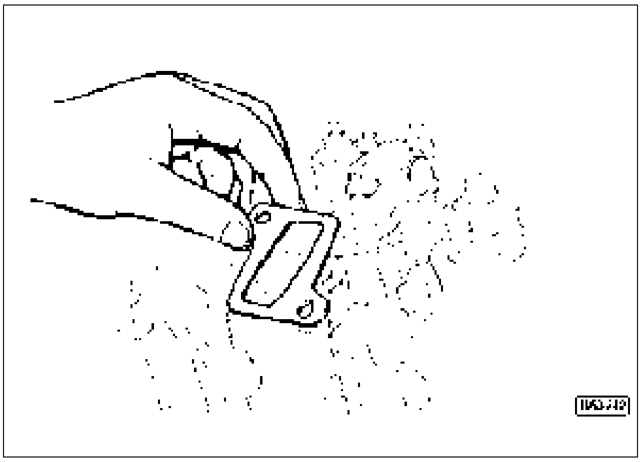


Fig. 67 - Install gaskets between heads and intake manifold;

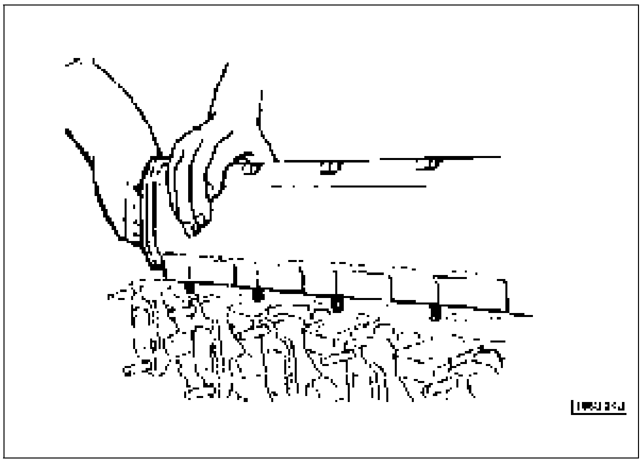


Fig. 68 - Install the intake manifold;

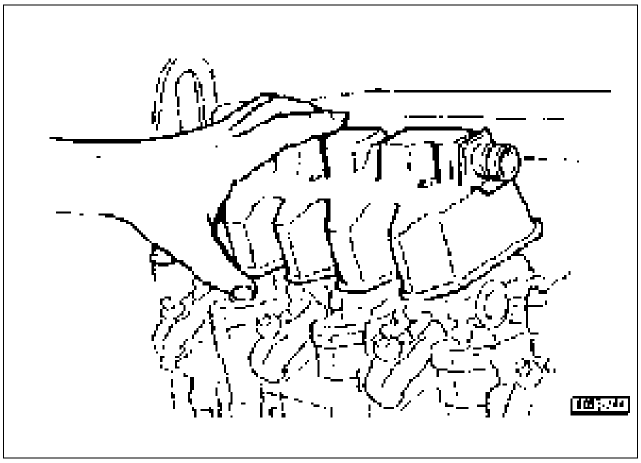


Fig. 69 - Install the head caps;

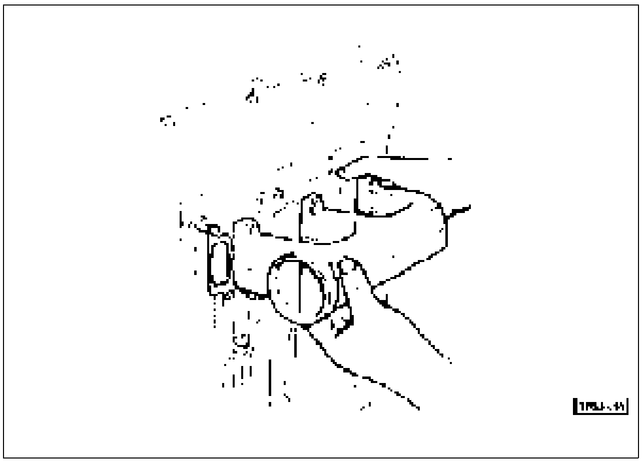


Fig. 70 - Fit the exhaust manifold gaskets. Install the exhaust manifold;

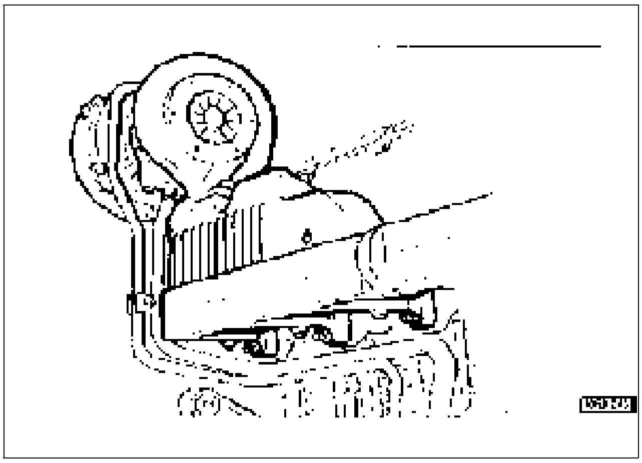


Fig. 71 - On turbocharged engines: install the turbocharger assembly following the instructions given on page 89;

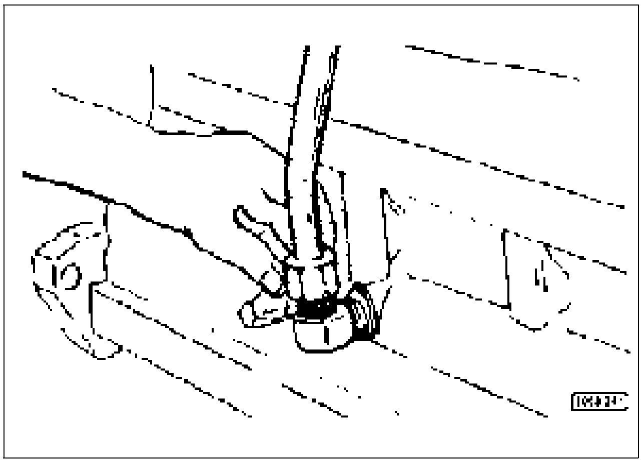


Fig. 72 - On turbocharged engines: connect the turbocharger oil delivery and return pipes;

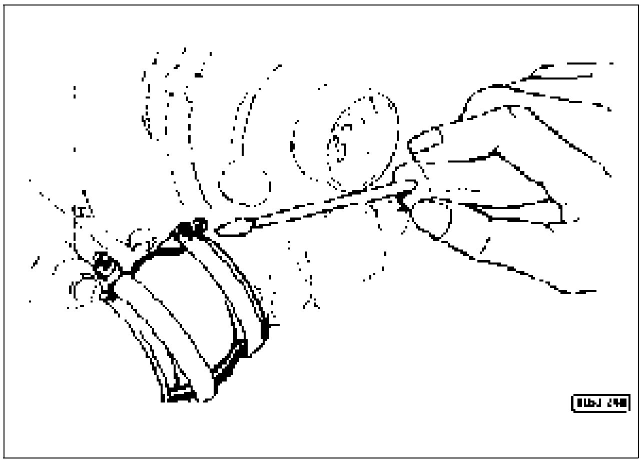


Fig. 73 - On turbocharged engines: place the rubber hose connecting the turbocharger to the intake manifold and secure with two clamps;

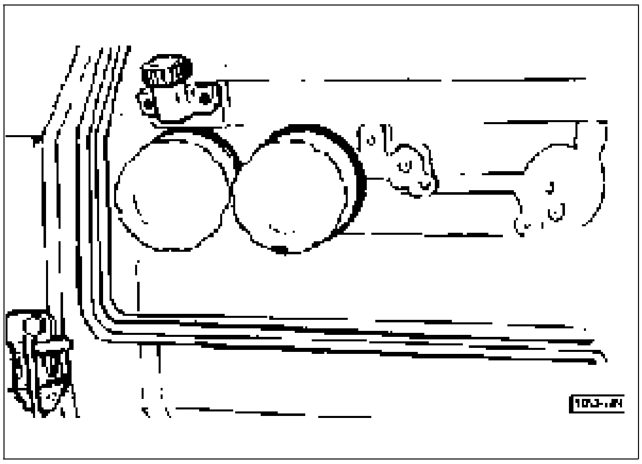


Fig. 74 - Fit the oil filler and engine oil filters; then fit the fuel filters and the fuel prefilter. Connect the fuel lines;

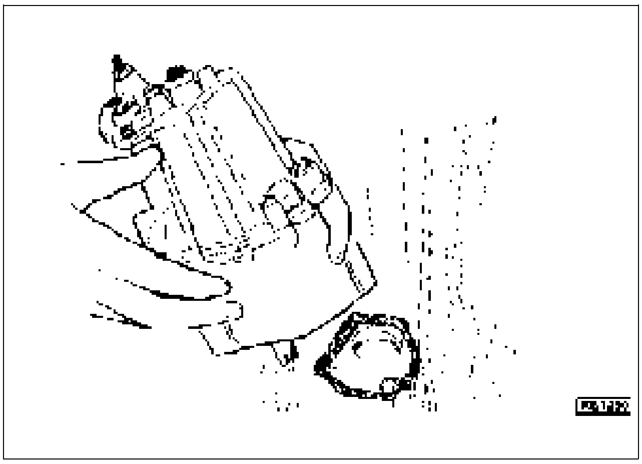


Fig. 75 - FOR TRAKTORS WITH MECHANICAL GOVERNOR ONLY - Install the engine governor taking care the control frok engages in the pump control rod ratchet correctly; make sure it is properly fit in its seat and then tighten with both securing screws;

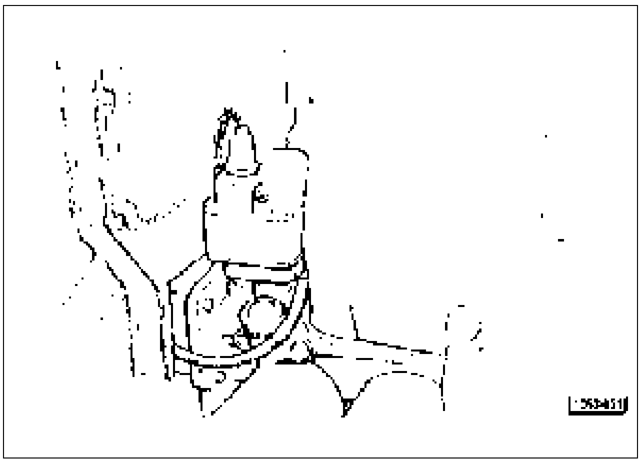


Fig. 76 - FOR TRAKTORS WITH ELECTRONIC GOVERNOR ONLY - Install the governor actuator assembly together with the electronic control unit;

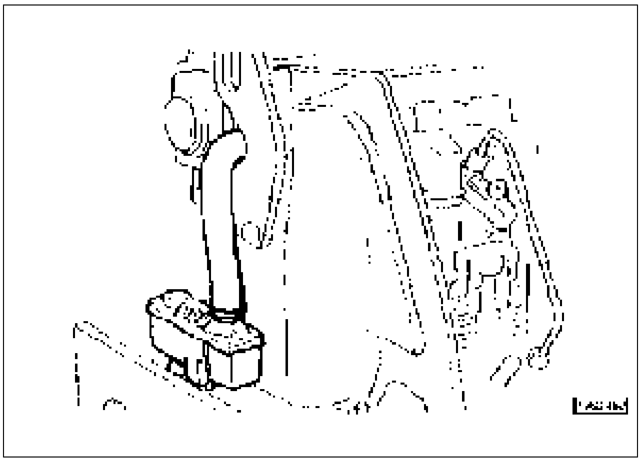


Fig. 77 - Fit the head vapour breather pipe and the rear deflector;

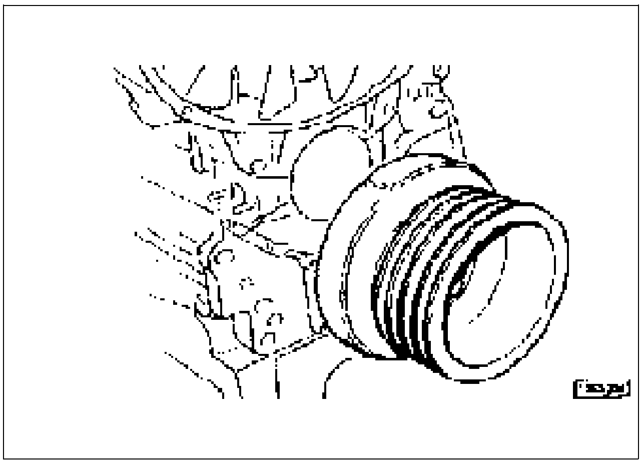


Fig. 78 - Install the front pulley along with damping flywheel on SILVER 100.6. The hub should be centred onto the shaft. Then tighten the securing screws to the torque specified on page 90. Apply pulley to hub;

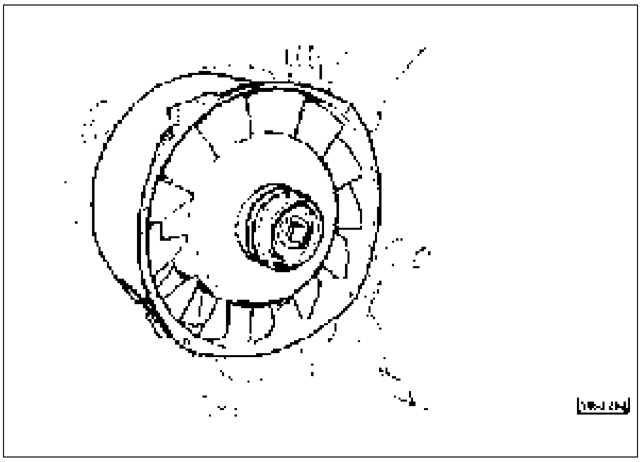


Fig. 79 - Install the engine fan assembly;

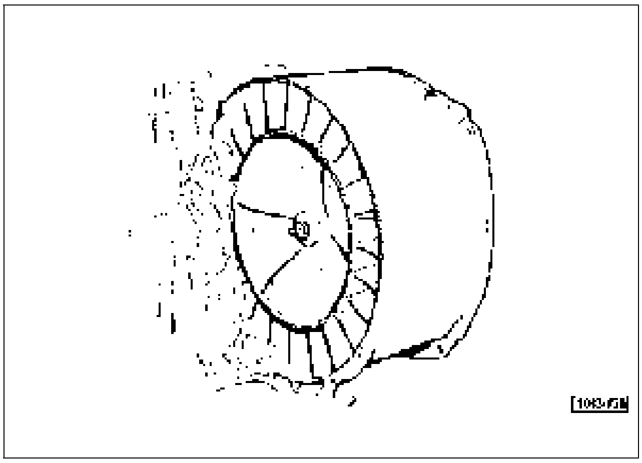


Fig. 80 - Fan assembly;

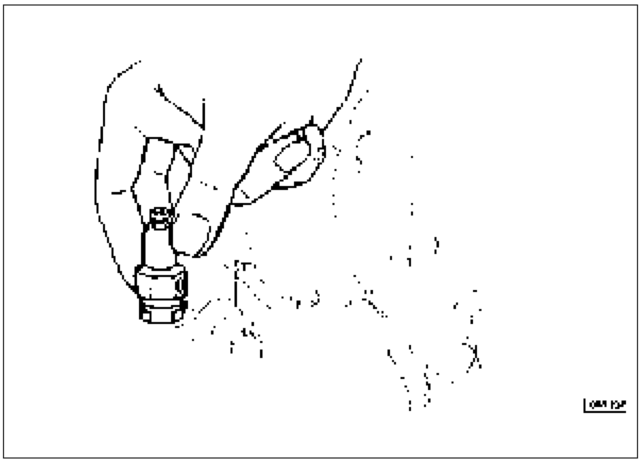


Fig. 81 - Install the thermostarter;

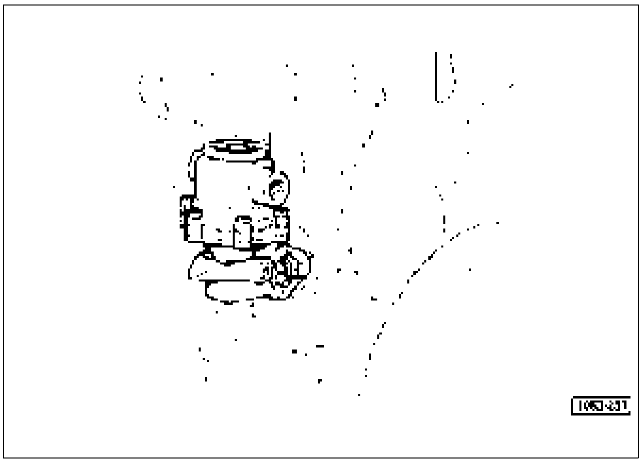


Fig. 82 - Install the fuel pump and the fuel filters and when required the fuel prefilter. Fit the fuel system lines;

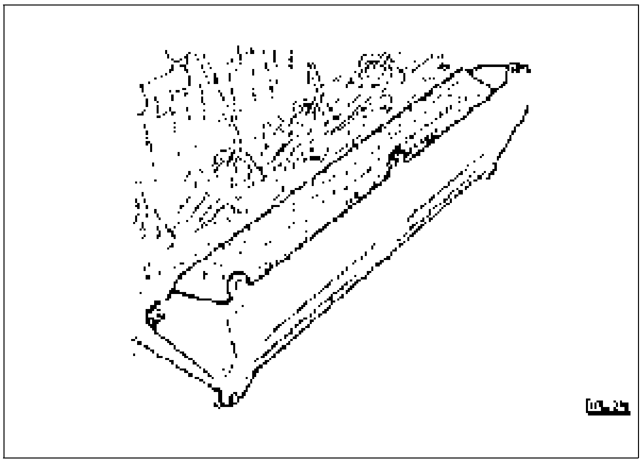


Fig. 83 - Install the engine oil radiator;

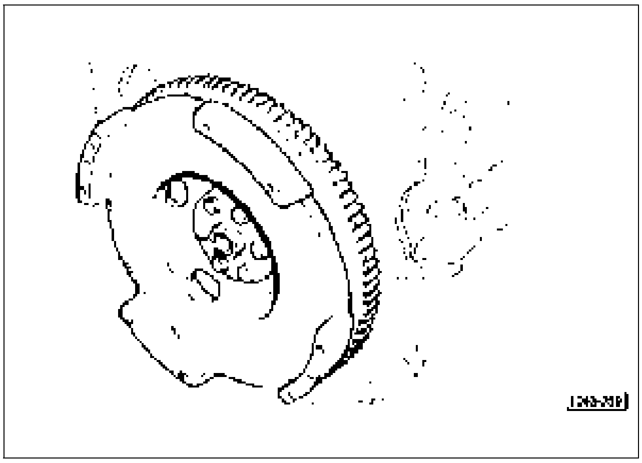


Fig. 84 - Install the injection pump guard. If required, install the external application auxiliary drive unit interposing a number of shims so that between the gear teeth the requierd backlash may be established (also refer to page 25 instructions). Install the engine flywheel;

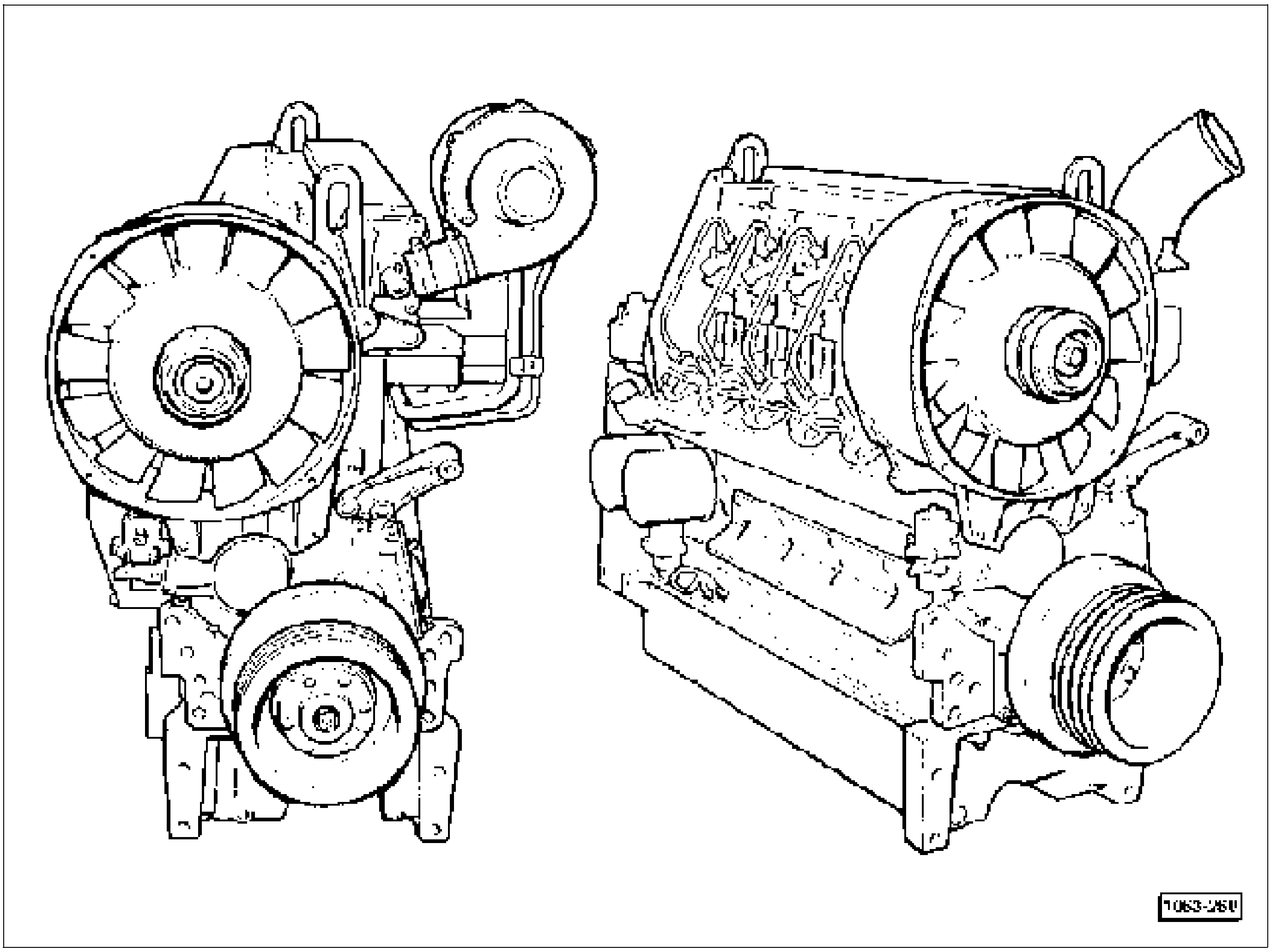


Fig. 85 - Engine views.

Reassembling the engine on tractor

To perform engine reassembly on tractor two operators are required.
— Install the clutch assembly onto the engine flywheel.
— Secure two eye-bolts to engine and hook it to a hoist, then lift from swivel bench.
— Position the engine so as it may be centred on the studs inserted in gearbox front part.
Warning: when carrying out these operations take great care to prevent any shock between engine and gearbox.
After truing engine onto gearbox studs, use a suitable spanner to rotate the crankshaft until the gearbox shafts are centred in both the clutch plate and the engine flywheel flange broachings.
— Tighten all securing screws and nuts to the specified torques.
— Place a suitable stand under the engine (insert a squared wooden piece between both parts and always keep the hoist tension wires taut).
— Bring the front tractor section close to engine and adjust both assembly positions so as to make connection easier.

Silver 80 - 90 - 100.4 **only.**
Between engine oil pan and front support insert a suitable pack of shims so as both parts may contact fully.
Centre the front support onto the engine studs (should it be hard to do so the use of a lever is recommended).
Complete reassembly following in the reversed order the operating procedures described in the preceding pages.
Fill the engine oil pan with oil keeping to the amount, type and specifications as described on page 11.

Silver 100.6 **only.**
— See instructions on page 51.
For all models, tighten nuts and bolts to the value specified in figure 1 following the sequence 1° - 2° - 3° indicated.

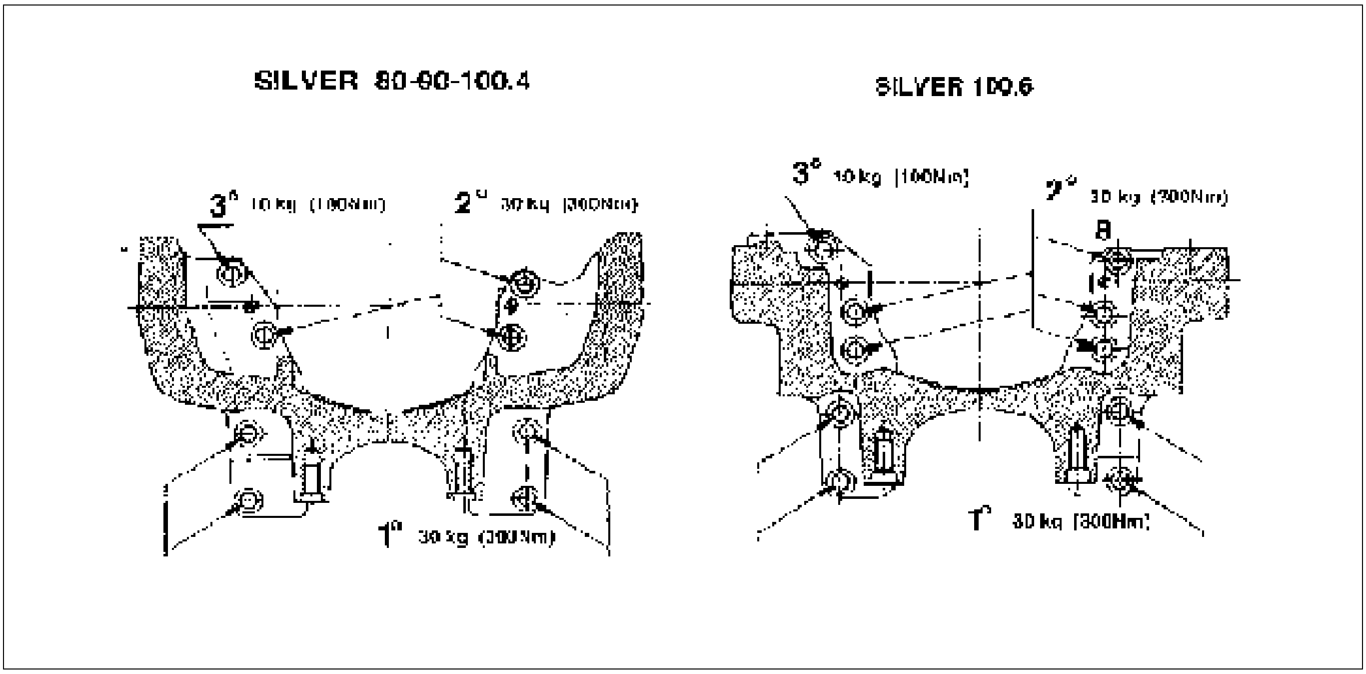


Fig. 1 - Tightening the nuts and bolts securing the front support to the engine.

Carry out the following operations:

— bleed the air from the hydrostatic steering hydraulic control;
— adjust accelerator control;
— bleed the air from both the fuel supply and fuel injection systems;
— start the engine, let it warm up suitably and check engine r.p.m.
— top up brake fluid and bleed the air from the braking system
— on tractors equipped with an air-conditioning system, provide filling as required.

1 engine

diagnosing malfunctions

engine won't run when started	check battery charge	charged battery	battery terminals oxidized	clean battery contacts and tighten terminals
		discharged battery	recharge battery	
	starter failure	consult a motor vehicle electrician for having the defective parts replaced		
engine difficult to start or won't restart after a stop	check fuel level	top up fuel level in tank		
		inspect fuel filter for cleanliness	clean filter, replace if necessary	
	inefficient injection system	a metal noise is heard when engine idles	out-of-adjustment pumps, excessive advance	recalibrate the pumps
		air in the fuel system	perform air bleeding	
			defective fuel pump or pump control	replace defective parts
		out-of-calibration injection nozzles	calibrate	
	check thermostarter	clean or replace		
	insufficient compression	check clearance between valves and rockers	restore correct backlash	grind or replace valves, cylinder head gaskets and piston rings
			check valves for efficient operating conditions	replace pistons and cylinders
clear exhaust smoke	check injection pump setting	perform a new setting	check piston rings and cylinders for wear	replace worn-out parts
		make sure there is no excessive clearance between valves and valve guides	replace worn-out parts	
	check injectors for proper cleanliness	clean scrupulously		

dark exhaust smoke	check air filter cartridge for blocking	clean or replace		
		check injectors for proper efficiency	restore calibration according to specifications	
	out-of-calibration engine governor	adjust governor and provide a new calibration		
poor engine response after a sudden acceleration	check air filter cartridge for clogging	check for proper fuel filter cleanliness	clean or replace filters	bleed the system
	make sure no air is within the fuel system	bleed the air in system		
	insufficient compression in the cylinders	check clearance between valves and rockers	restore correct clearance	grind or replace valves, cylinder head gaskets and piston rings
			check valve efficiency	replace pistons and cylinders
engine won’t keep constant r.p.m.	make sure neither air nor water are in the injection system	empty the tank and fill with decanted diesel fuel	bleed air from system	
		check injectors for correct calibration		
engine overheating	check belt tension	operate the related belt tightener		
	check cooling system efficiency	clean carefully		
	inspect pumps for proper timing	retime as necessary		
		check injectors for correct calibration	restore specified calibration	
	measure pressure in the duct at compressor exit	clean the turbocharger		

Gearshift clutch

General specifications

The clutch, a single stage type, comprises a friction disc, a pressure plate and a diaphragm spring.
The hydrostatic control is self-adjusting: a master cylinder operated by the pedal directs oil to the slave cylinder mounted to the left hand side of the intermediate housing, which in turn operates the clutch release lever.

technical specifications	*SILVER 80-90-100.4*	*SILVER 100.6*
P/n (clutch mechanism)	008.4184.3	
Type of clutch	single disc dry organic facing	single disc segmental with 6 segments
Type of operation	hydrostatic with automatic take-up of free travel	
Disc p/n	008.9937.3	009.6533.3
Disc diameter (mm)	330	330
Minimum permissible thickness of disc (mm)	6,7	6,4
Thickness of friction disc (mm)	9.7÷10.3	9.4÷10
Type of facing material on friction disc	F202	Cerametallik
Type of master cylinder	Benditalia 3/4"	
Type of oil	AKROS MATIC	

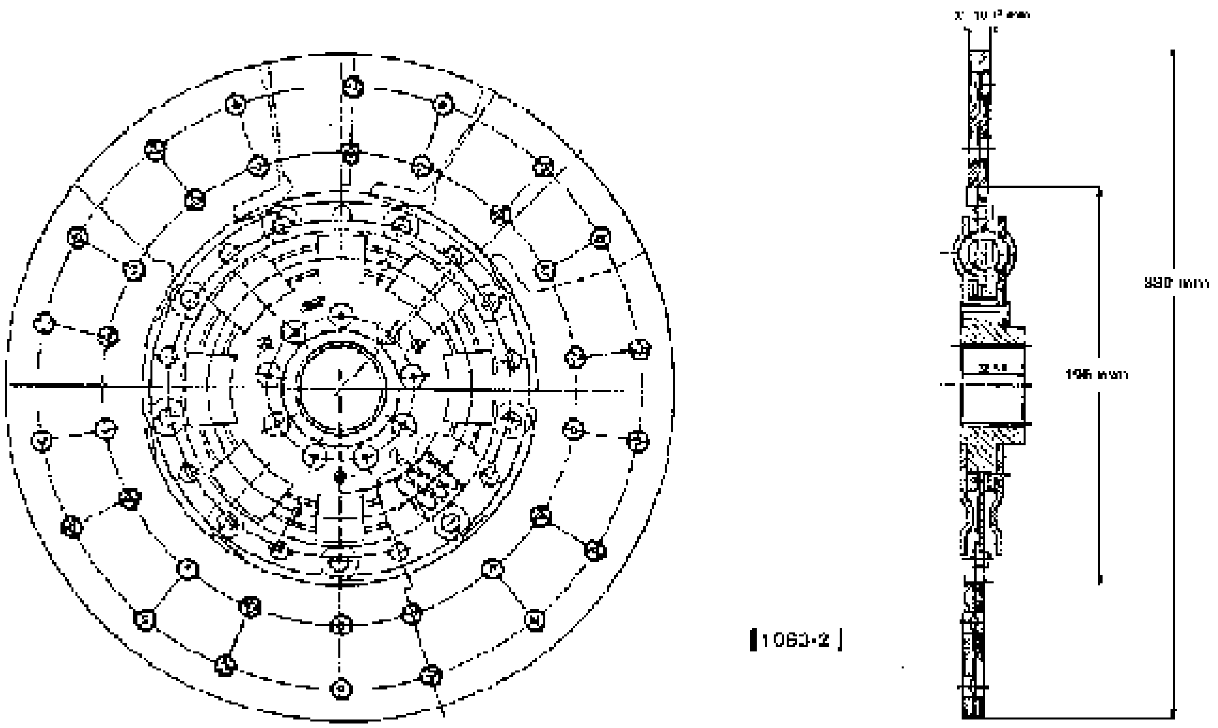


Fig. 1 - Friction disc for ***SILVER 80-90-100.4***

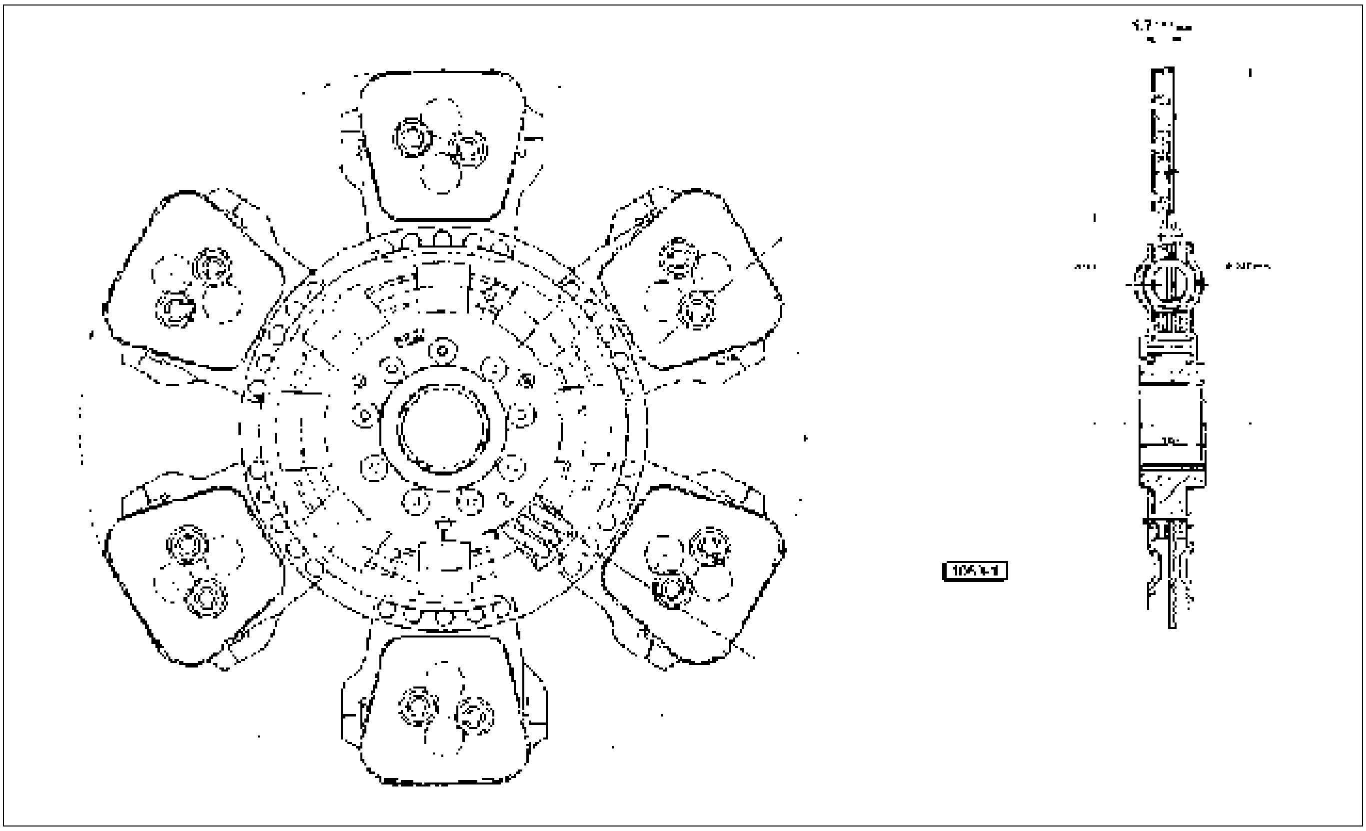


Fig. 2 - Friction disc for ***SILVER 100.6***.

CAUTION: *In the event the transmission being split to gain access to the clutch assembly, the pickup (A, fig 3) must be removed to avoid its being damaged by the teeth of the engine flywheel.*

IMPORTANT: *If there are signs of scoring on the surface of the flywheel, the surface must be machined smooth following the directions of page 37.*

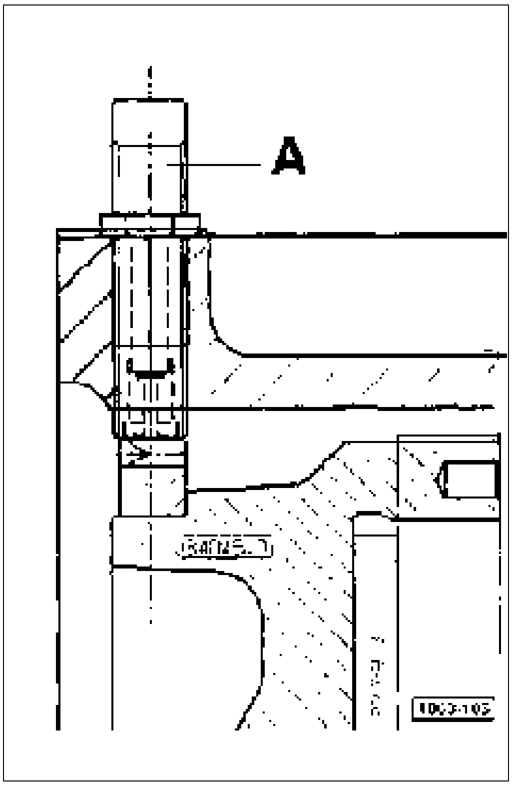


Fig. 3 - Engine rpm pickup.

Spring specifications to Belleville washer for the clutch engagement

Load on the pressure plate	Nm	11000

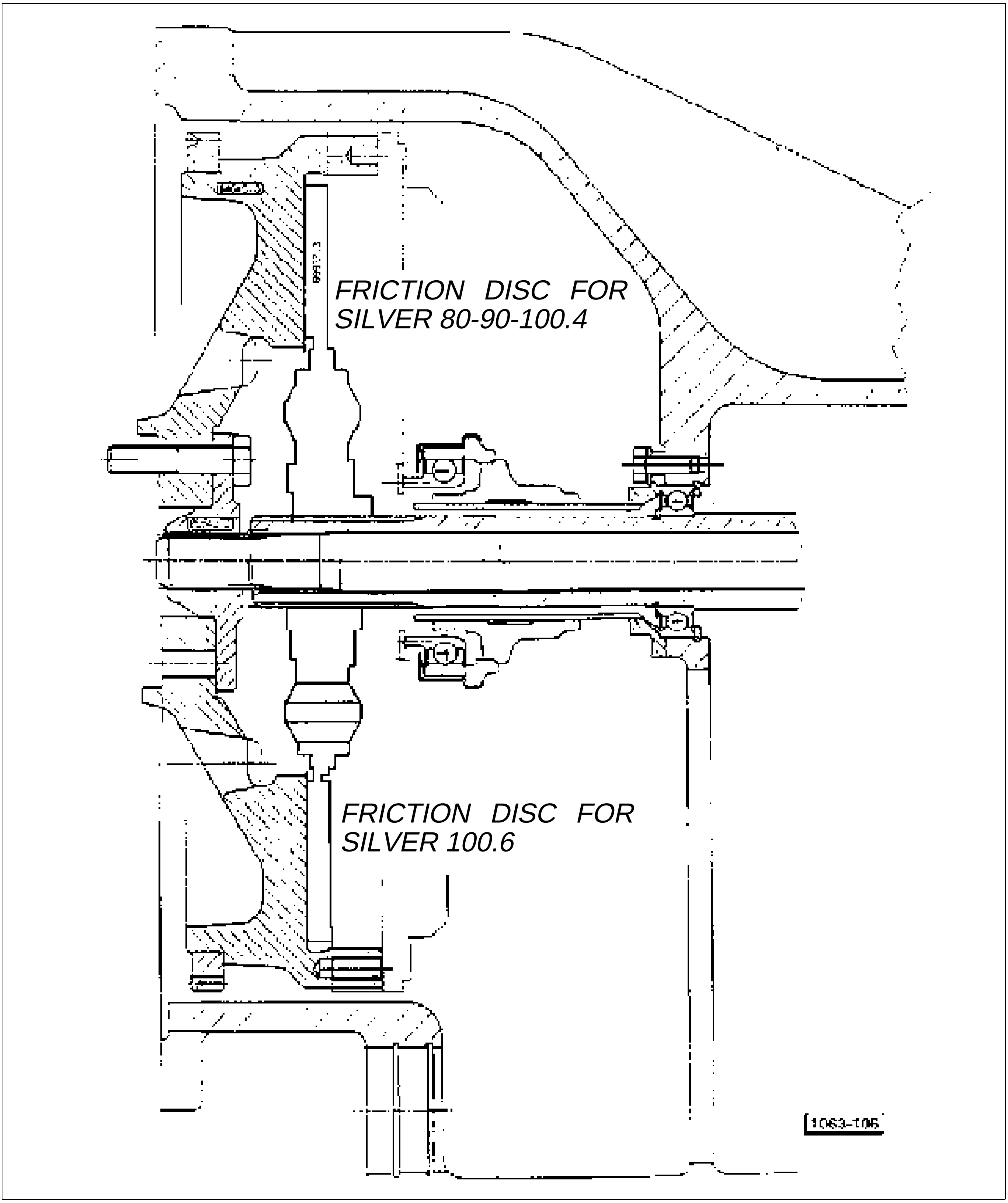


Fig. 4 - Clutch assembly.

IMPORTANT: In the event of the friction disc being removed, care must be taken during refitment to position the components correctly, as indicated, since the disc is not symmetrical.

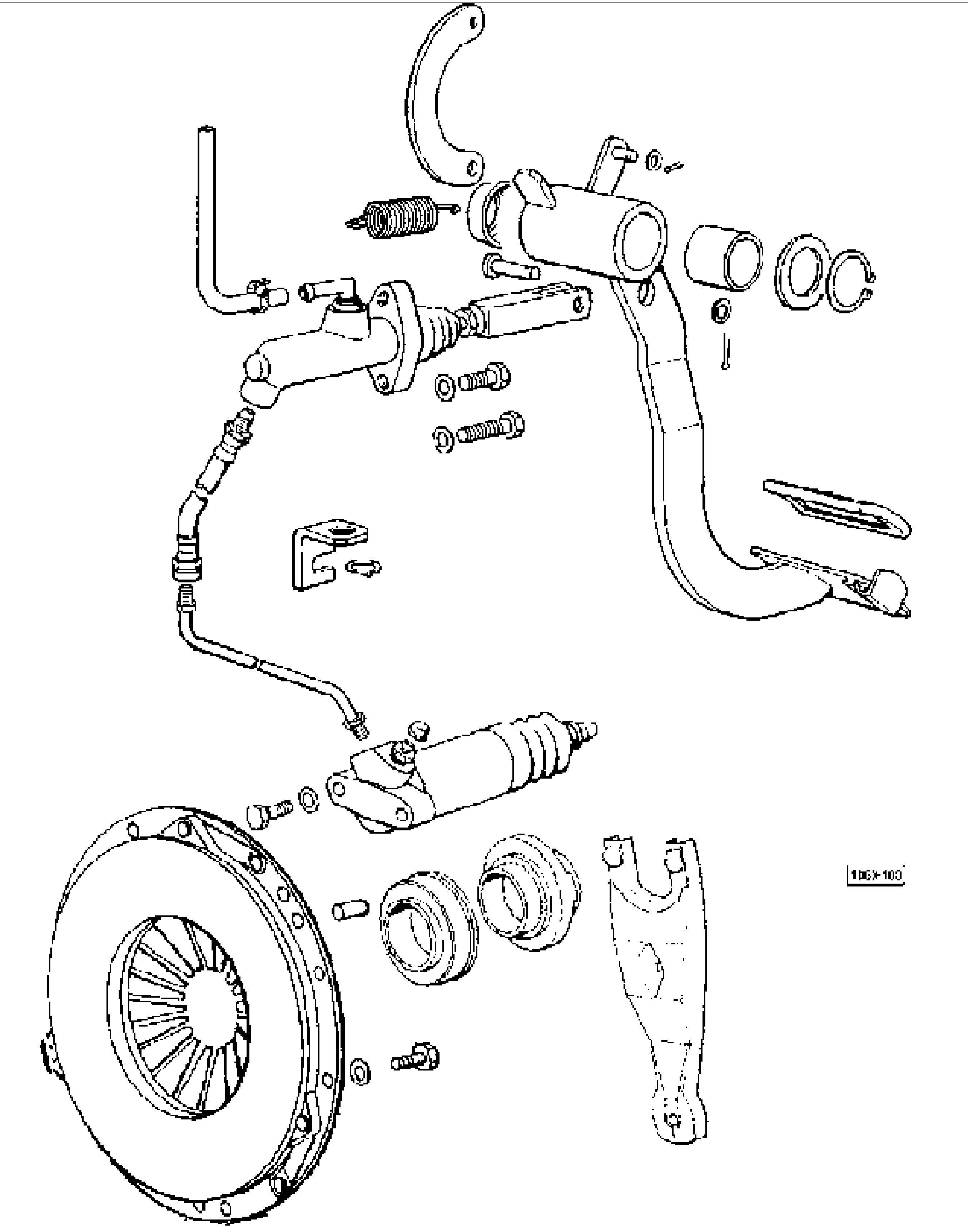


Fig. 5 - Components of clutch assembly (friction disc not shown).

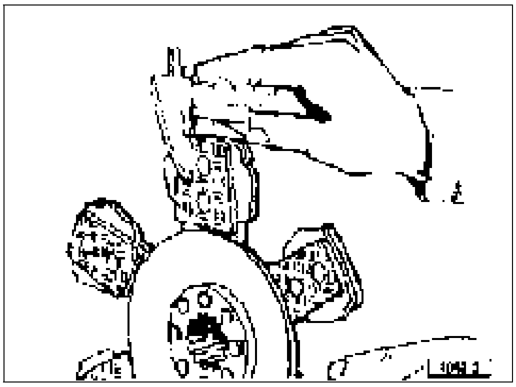


Fig. 6 - Checking clutch disk thickness.

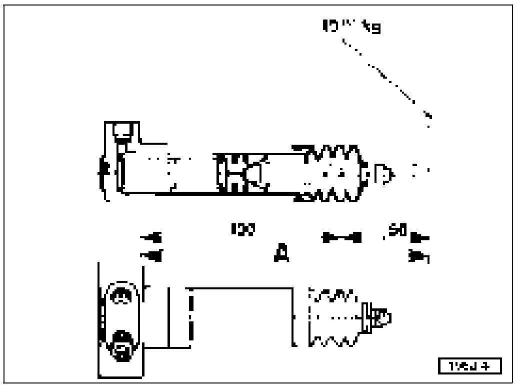


Fig. 7 - Clutch assembly hydraulic operating cylinder.

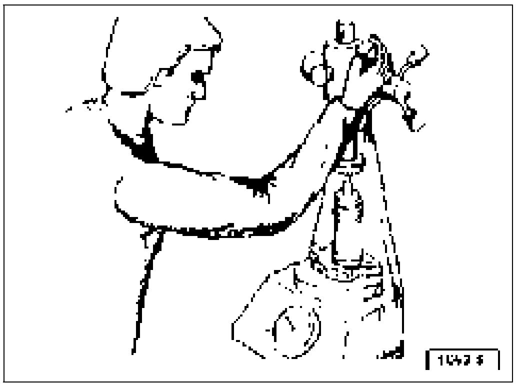


Fig. 8 - Checking operating cylinder inside spring efficiency.

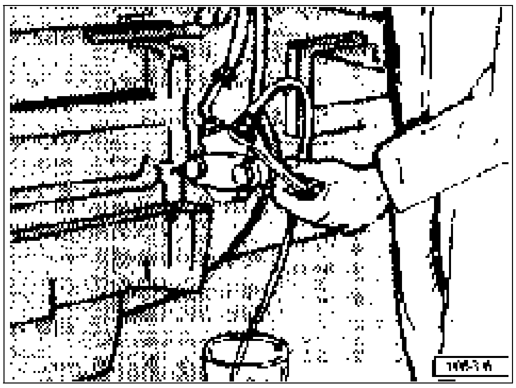


Fig. 9 - Bleeding the air from the clutch hydraulic circuit.

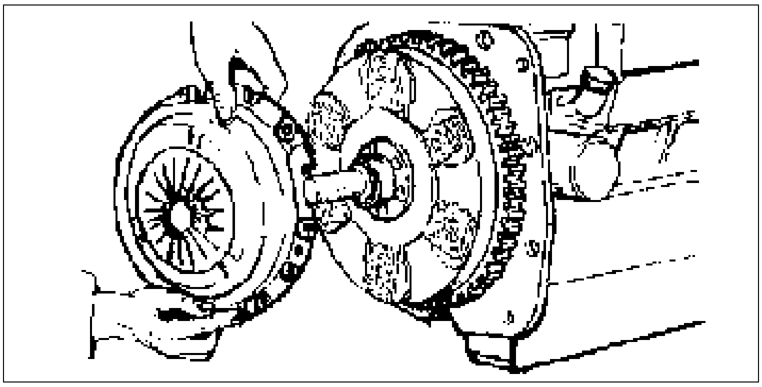


Fig. 10 - Installing clutch assembly through n. 5.9030.256.4/10 equipment.

Cecking clutch

Check the disk lining for signs of chipping and the disk friction face for scoring which may prevent the clutch from operating properly.

Check that the sliding surface of the engine flywheel is not scored; if signs of scoring are evident, machine the surface as indicated on page 37.

Check the disk thrust plate for scoring or bluish areas caused by tempering and also ensure the diaphragm-type spring has not lost its efficiency; if so the whole clutch assembly shall be replaced.

Be sure the clutch disk is free to move in its housing and the friction lining securing rivets are duly riveted.

Should any wear be found on the thrust bearing or the diaphragm-type spring, an exhaustive check over the spring operating conditions (installed in the disk thrust lever operating cylinder, see Fig 7) shall be performed; replace if necessary.
On reassembly ascertain dimension **A** (see Fig 7) between the operating cylinder fixing face and the push rod contacting the engagement lever is 180 mm.

NOTE: To facilitate correct clutch disk assembly the use of no. 5.9030.256.4/10 centering tool is recommended.
Warning: with engine running, never ride the clutch pedal with your foot to prevent the clutch disk from being damaged because of overheating.
Important: The thrust bearing is prelubricated, and must never on any account be cleaned with fuel oil or other solvents as these will render the prelubrication treatment ineffective.

Adjusting clutch control pedal

Make sure the distance between pump fixing surface and fork hole centre is **187±1** (Fig. 17) otherwise loosen nut **A** and operate adjusting stay rod **B** (Fig. 17).

Bleeding air from the hydraulic circuit

Operate the clutch pedal several times, then keeping the clutch pedal in fully depressed position, slightly unscrew and soon after tighten the air bleeding screw valve again (this being located on thrust lever operating cylinder). This operation should be repeated as many times as the oil flows out of the bleeding screw valve without air bubbles.

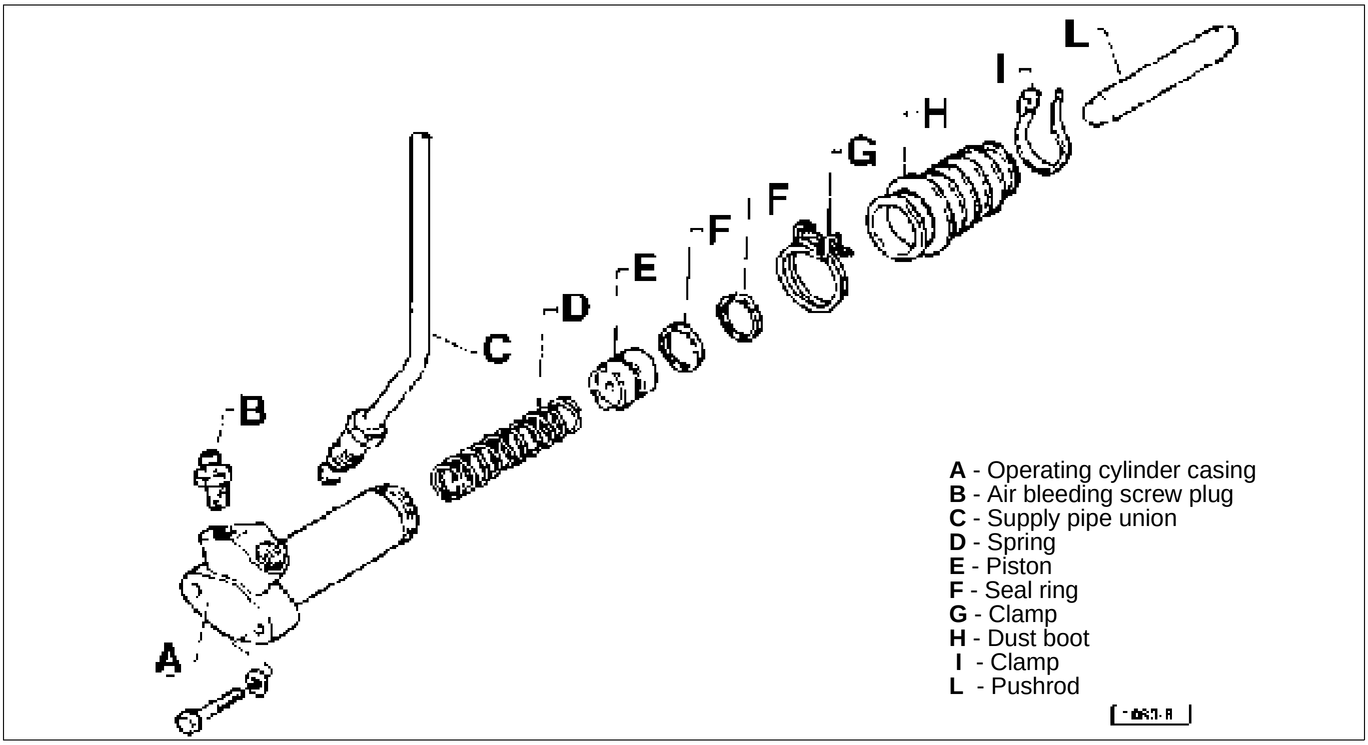


Fig. 11 - Clutch operating cylinder.

Stripping the slave cylinder (Fig 11)

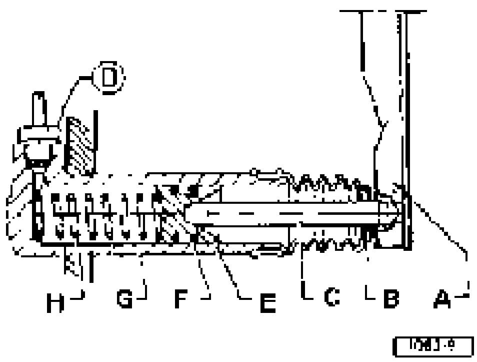
Loosen the clip **G** and remove together with the boot **H**. Withdraw the piston carefully from the cylinder, blasting with compressed air at low pressure to assist removal. Remove the spring **D** from the cylinder and loosen the bleed screw **B**.
Remove the seals **F** fom the piston **E.**
CAUTION: When cleaning the components of the cylinder, use only specifically formulated brake and clutch fluids (see page 110). Do not use petrol, paraffin or other mineral oils as these will damage parts in rubber.

Inspections

— Check both internal and external piston surfaces for scratching. Replace if required.
— Make sure the seal ring grooves are duly clean; blow the grooves with compressed air if necessary.
— Inspect seal ring, dust boot conditions as well as spring efficiency, worn-out parts should be replaced.
— Ensure the air bleeding hole is free from impurities.

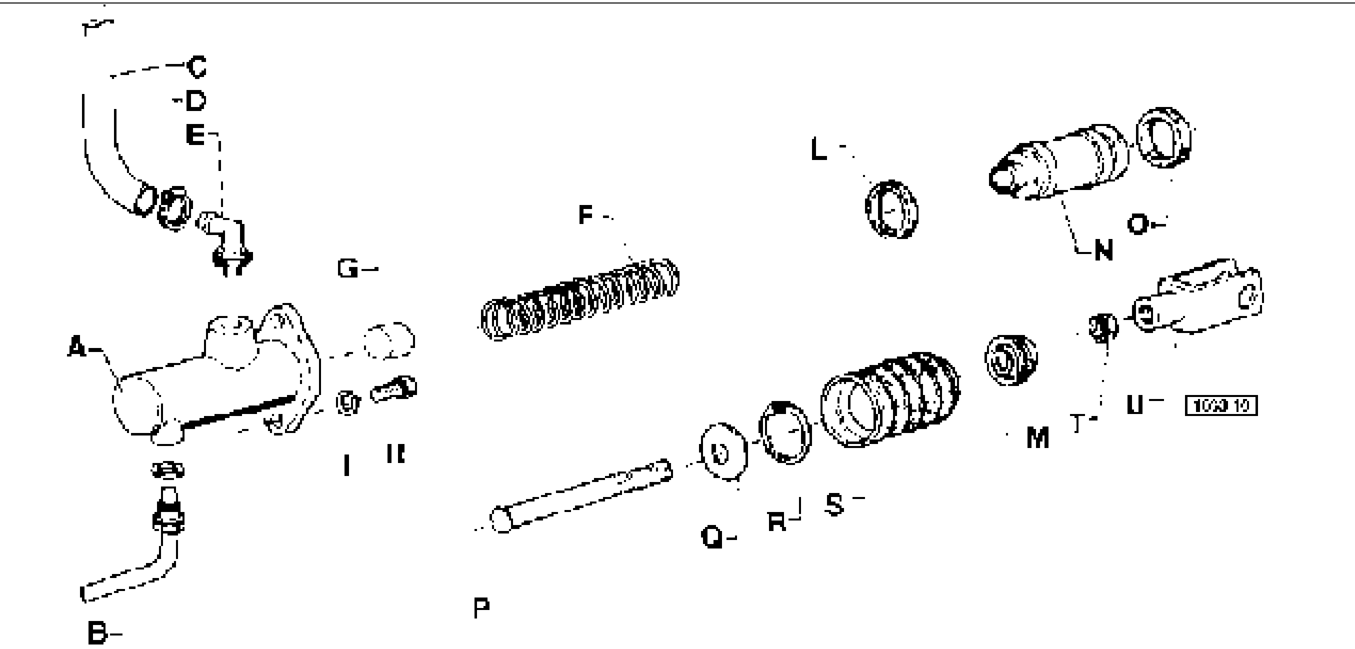
Notes on refitment

— When reconnecting the transmission housing, check that the clutch fork remains correctly positioned and free to rock on its fulcrum pivot. This can be ensured by removing the side plug from the flange of the intermediate housing and viewing the fork through the hole. In the event of the fork pivot being unseated, reposition correctly with the aid of a screwdriver inserted through the hole vacated by the plug.
— Before refitting the slave cylinder, fill with the recommended oil so as to facilitate the subsequent bleeding procedure.
— Once all components are correctly and securely in place, bleed the hydraulic circuit.



A - Control lever
B - Dust boot
C - Pushrod
D - Piston
E - Seal ring
F - Cylinder casing
G - Spring
H - Union

Fig. 12 - Clutch operating cylinder cutaway view.



A Hydraulic pump
B Delivery pipe union
C Delivery pipe
D Clamp
E Union
F Spring
G Spring holder
H Spring
I Shoulder ring
L Seal ring
M Spacer ring
N Piston
O Seal ring
P Rod
Q Support disk
R Snap ring
S Guard boot
T Nut
U Yoke

Fig. 13 - Clutch hydraulic pump parts.

Stripping the master cylinder

Referring to figure 15, remove the protective boot **E**, dislodge the circlip **B** and withdraw the rod **D** together with the disc **C**.
Remove the piston together with the spacer, the seal, the backup washer and the spring beneath.

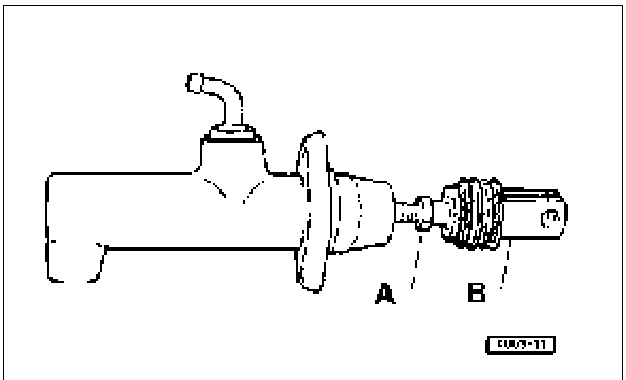


Fig. 14 - Clutch pump control positioning.
1 - Locknut
2 - Yoke

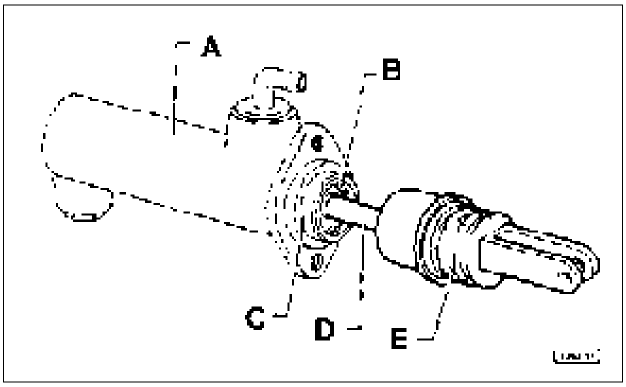


Fig. 15 - Pump control seal ring.
A - Pump
B - Snap ring
C - Support disk
D - Rod
E - Guard boot

Inspections and checks

WARNING: To clean and wash the hydraulic pump components use only the oil type recommended for brakes and clutch (see page 106). Never use petrol, kerosene or other mineral oils to prevent damaging the rubber parts.

Inspect both internal and external piston sliding surfaces for scratching. Replace if required.

Make sure the seal ring grooves are duly clean; blow the grooves with compressed air if necessary.
Inspect seal ring, dust boot conditions as well as spring efficiency, worn-out parts should be replaced.

Inspect all pump internal compartments, apertures and passages and make sure these are properly clean and free from foreign matters.

Check that the spring is neither lazy nor deformed; replace if necessary.

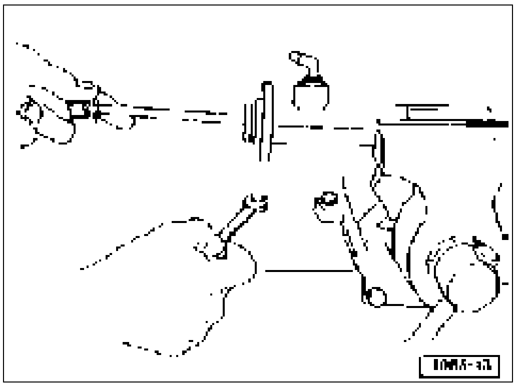


Fig. 16 - Removing the oil pump inside parts.

Reassembly

Reassemble the cylinder, repeating the disassembly steps in reverse order and observing the following directions:
— Lubricate surfaces engaged in relative sliding contact, using the recommended oil (see page 110).
— Verify correct operation of the cylinder, making certain that the piston is able to complete its full stroke unimpeded.

In the event that the fork linking the master cylinder with the pedal has been removed, check that with the push rod fully extended, the distance between the reference surface of the cylinder and the centre of the hole in the fork is as indicated in figure 17.

If not (referring to fig 14), remove the boot, loosen the lock nut **A** and screw or unscrew the fork **B** to obtain the prescribed clearance, then retighten the lock nut and reposition the boot.

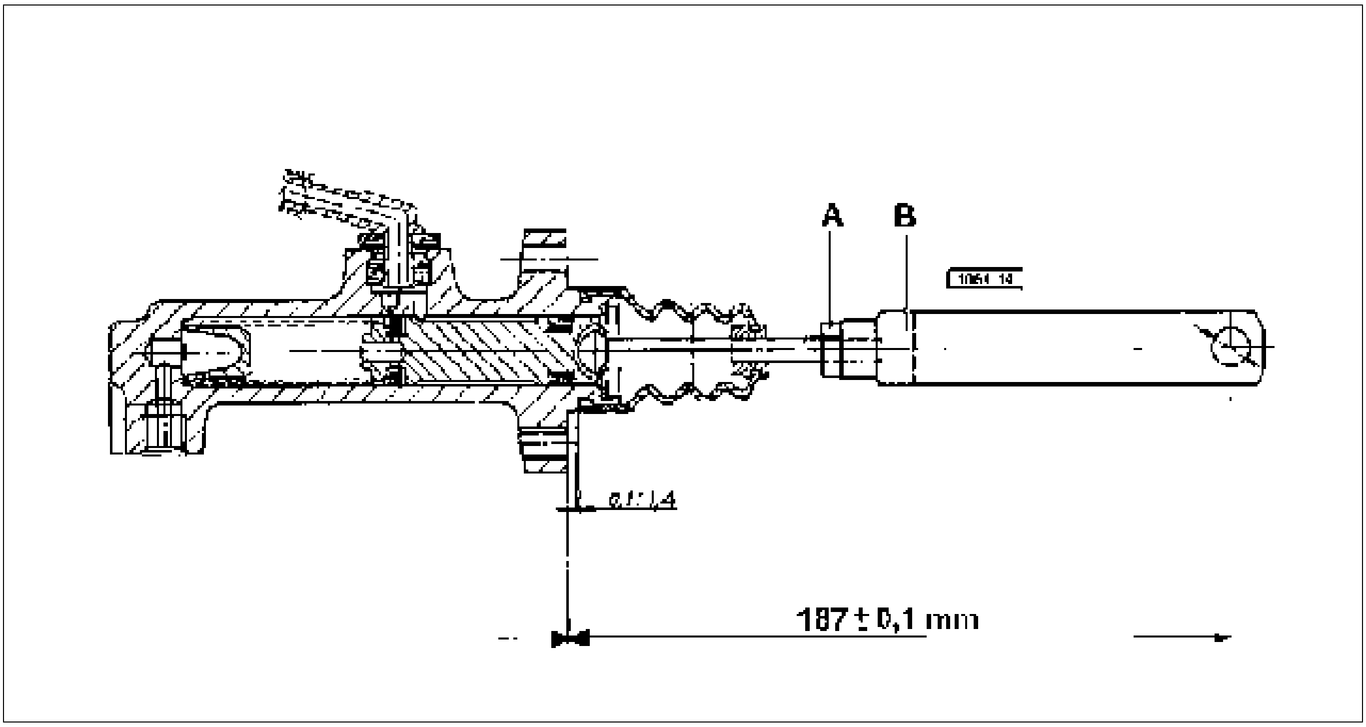


Fig 17 - Section through clutch master cylinder.

2 clutch and transmission

diagnosing malfunctions

clutch slips	lubricant in clutch housing	renew the front gearbox oil seal and the rear engine oil seal	clean oil seal contact surfaces with petrol	replace clutch disk
	clutch worn	check condition of clutch disk	check condition of the spring disk	fit new clutch assembly
	thrust bearing sticking	clean surfaces and apply grease	replace thrust bearing	clean or replace the disk
clutch jerks	clutch disk surfaces dirty	clean the friction surfaces	replace clutch disk	
	clutch disk warped	clutch disk surfaces dirty	replace clutch disk	
		clutch disk worn disk	replace clutch disk	
clutch fails to disengage	difficulty in engaging gears when engine running	clutch disk warped	replace disk	
		hydraulic pump inefficient	check the stroke of the clutch control piston and replace any worn parts	
		clutch disk stuck to flywheel	clean contact surfaces with a wire brush and petrol	
clutch noisy when disengaged	worn parts in clutch engagement mechanism	replace parts		

Agroshift unit

The **Agroshift** unit is composed of an **epicyclic speed reducer** and **three oil-immersed multiple disc clutches** (**LOW - MED - HIGH**)
The unit is located between the clutch-coupled shaft and the gearbox.
The speed reducer is engaged and disengaged selectively by way of the three clutches, which are operated electrohydraulically from a button mounted to the knob of the shift lever.

Selecting the control, the **MED** clutch releases as the force of the belleville discs is overcome by hydraulic pressure; at the same time, the **HIGH** clutch engages, locking the planet carrier of the epicyclic train to the relative housing so that drive is transmitted to the range input shaft with no speed reduction whatever.

Selecting the control, the **MED** clutch releases as the force of the belleville discs is overcome by hydraulic pressure; at the same time, the **LOW** clutch engages, and the shaft carrying the sun wheel is locked to the structure of the transmission housing. As a result, the planet carrier is made to rotate as one with the epicyclic housing and drive is transmitted to the layshaft at a speed reduction of 0.695 (the ratio between the annulus and the sun wheel gear teeth).

Selecting the control, the Agroshift unit is isolated from hydraulic pressure altogether and the belleville discs are able to engage the **MED** clutch, with the result that the shaft in mesh with the larger planet wheel is locked to the transmission housing. This gives a reduction of 0.828, by reason of the compound ratio between the planet wheels and the flange of the speed reducer in mesh with the range input shaft.

Technical specifications

Clutch				
maker		SAME - DEUTZ FAHR GROUP		
number of friction discs		4	2	2
diameter of friction discs	mm	129,5	129,5	129,5
overall thickness of assembled friction discs				
maximum wear		-	16,96	10,35
nominal		16÷16.2	18,15÷18,65	11,55÷12,05
number of intermediate discs		3 +1	2 + 1	2 + 1
disc lubrication pressure	bar	5	5	5
maximum pressure	bar	18	18	18
piston thrust	Kg	1986	1986	1986
	Nm	19463	19463	19463
Oil filter				
filtration capacity	micron	25	25	25
Epicyclic speed reducer				
- LOW		1 + (32/72) = 1,444		
- MEDIUM		1 + (20x18) : (72x24) = 1,208		
- HIGH		1		

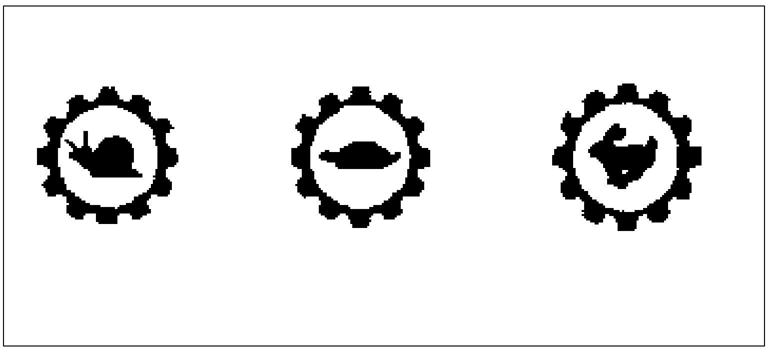


Fig. 1 - Range selection indicators mounted to the instrument panel.

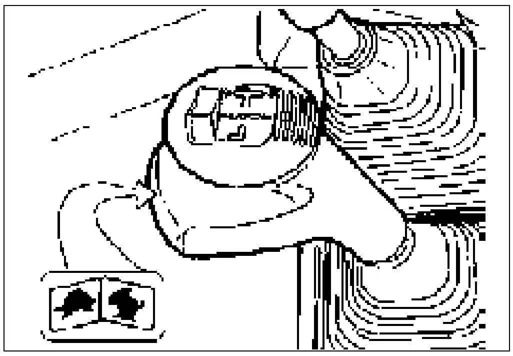


Fig. 2 - Plate indicating selection of electro-hydraulic control.

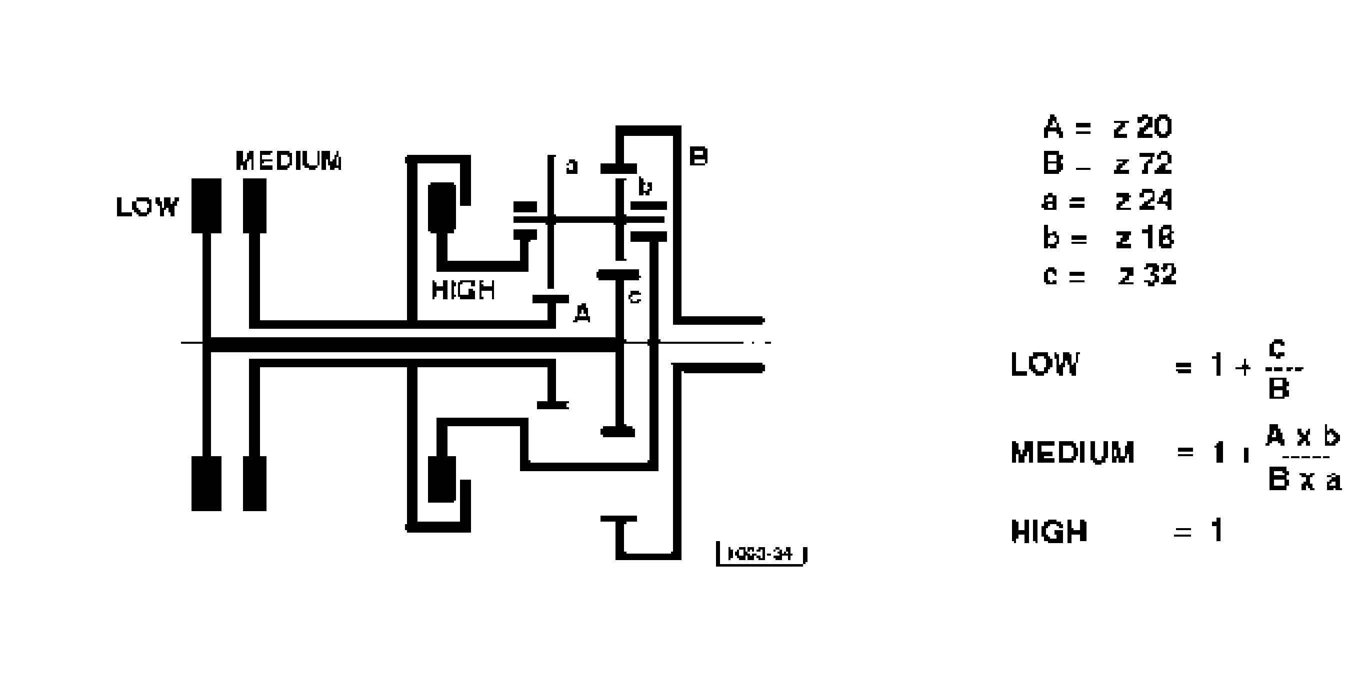


Fig. 3 - Diagram illustrating operation of the AGROSHIFT system.

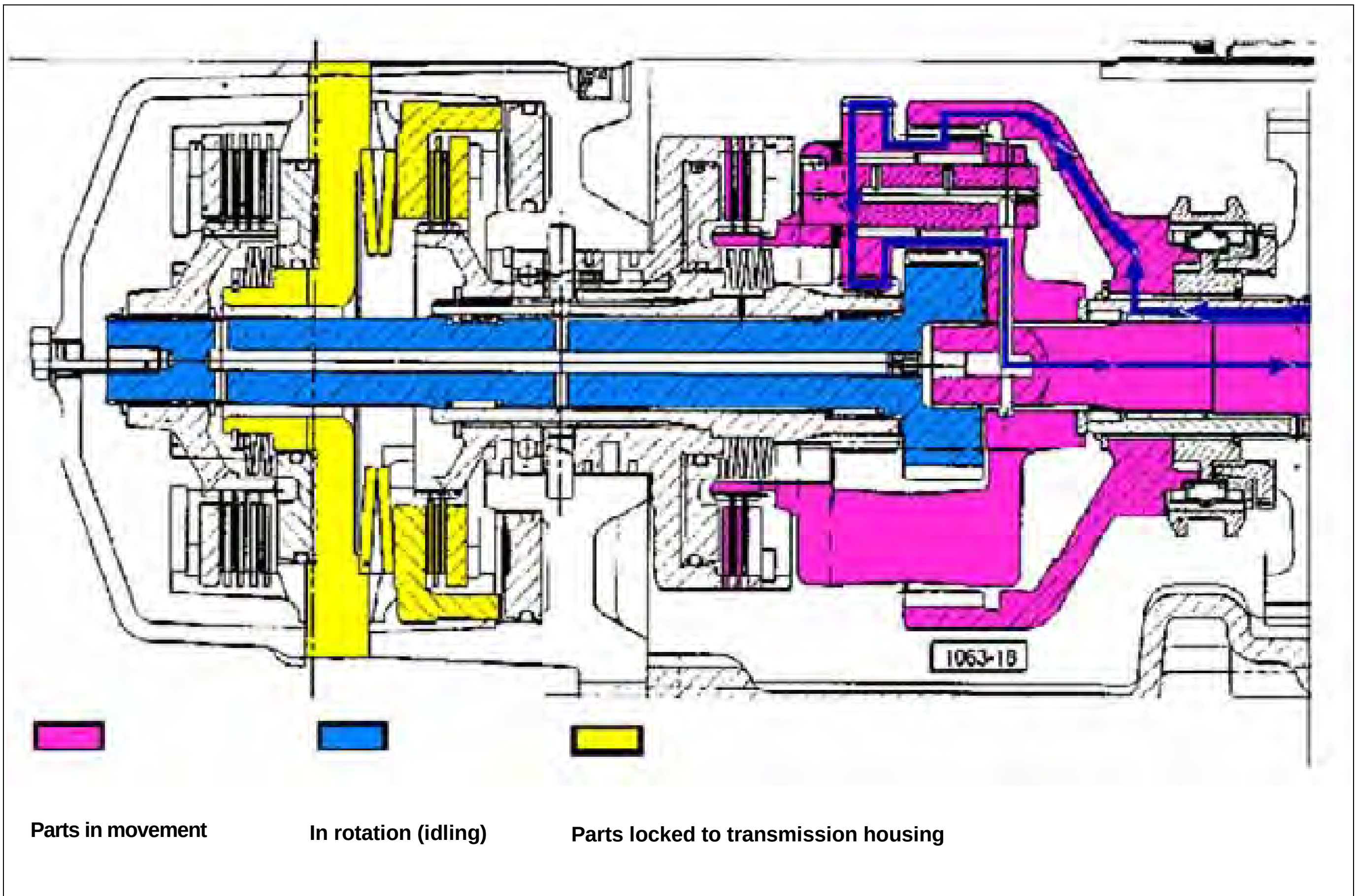


Fig. 4 - Diagram showing engagement of AGROSHIFT with MED range selected.

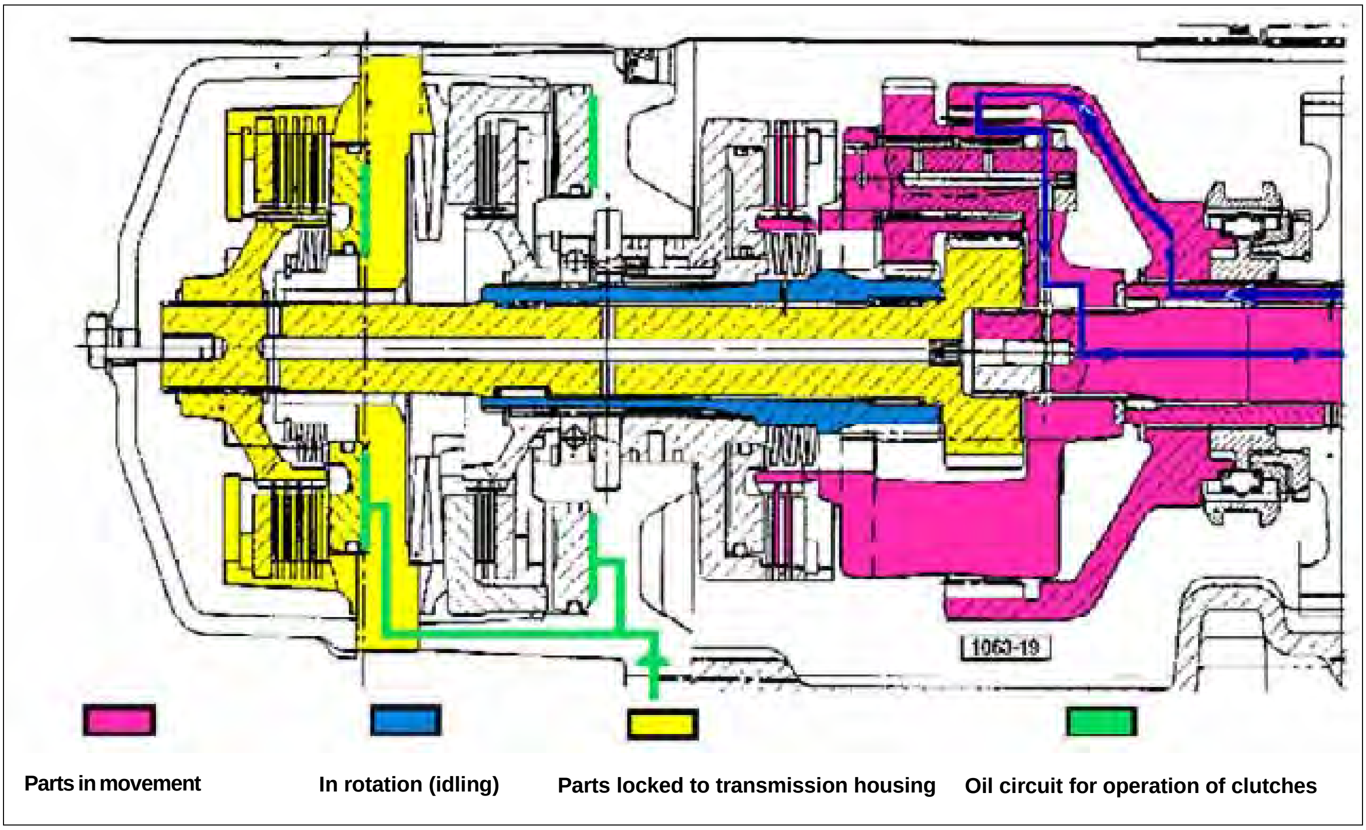


Fig. 5 - Engagement of AGROSHIFT with LOW range selected.

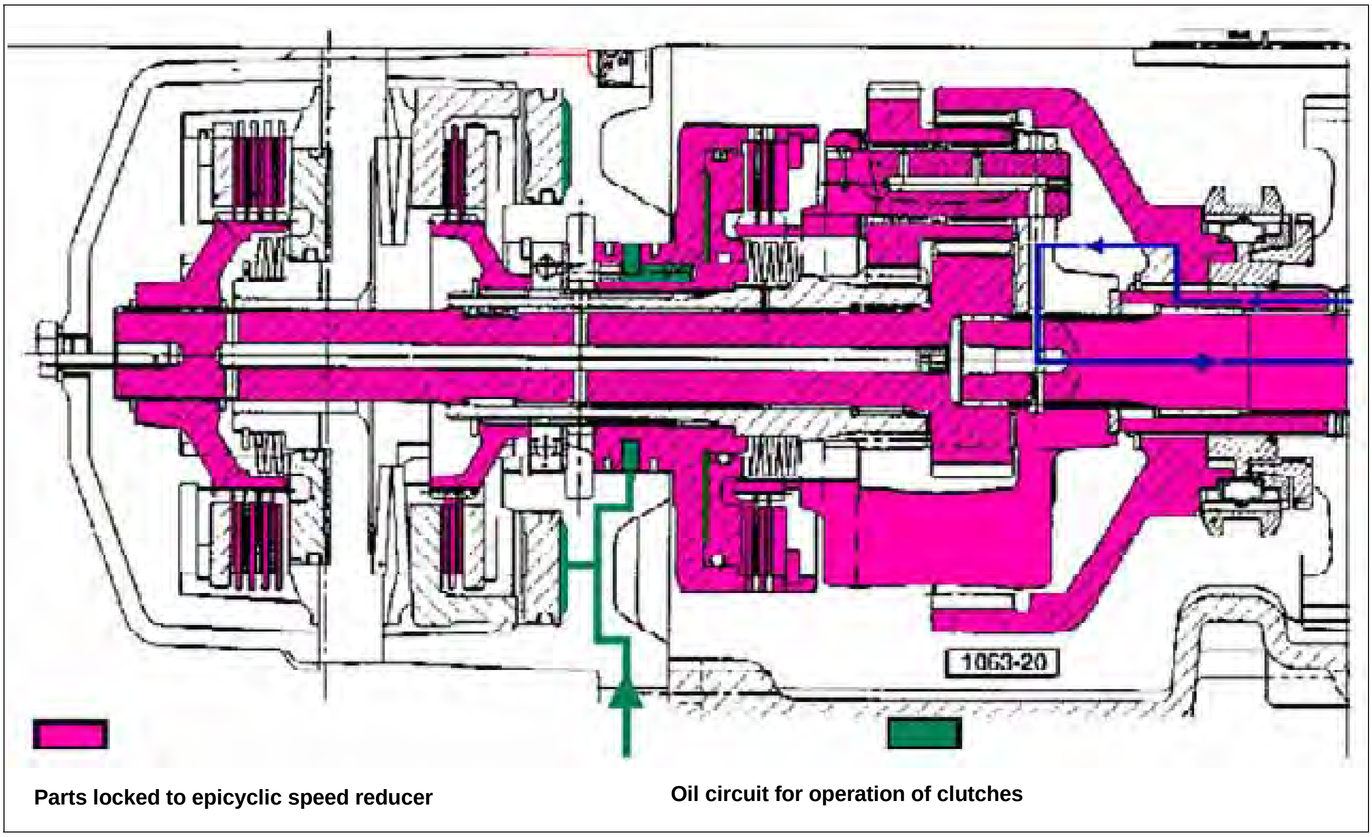
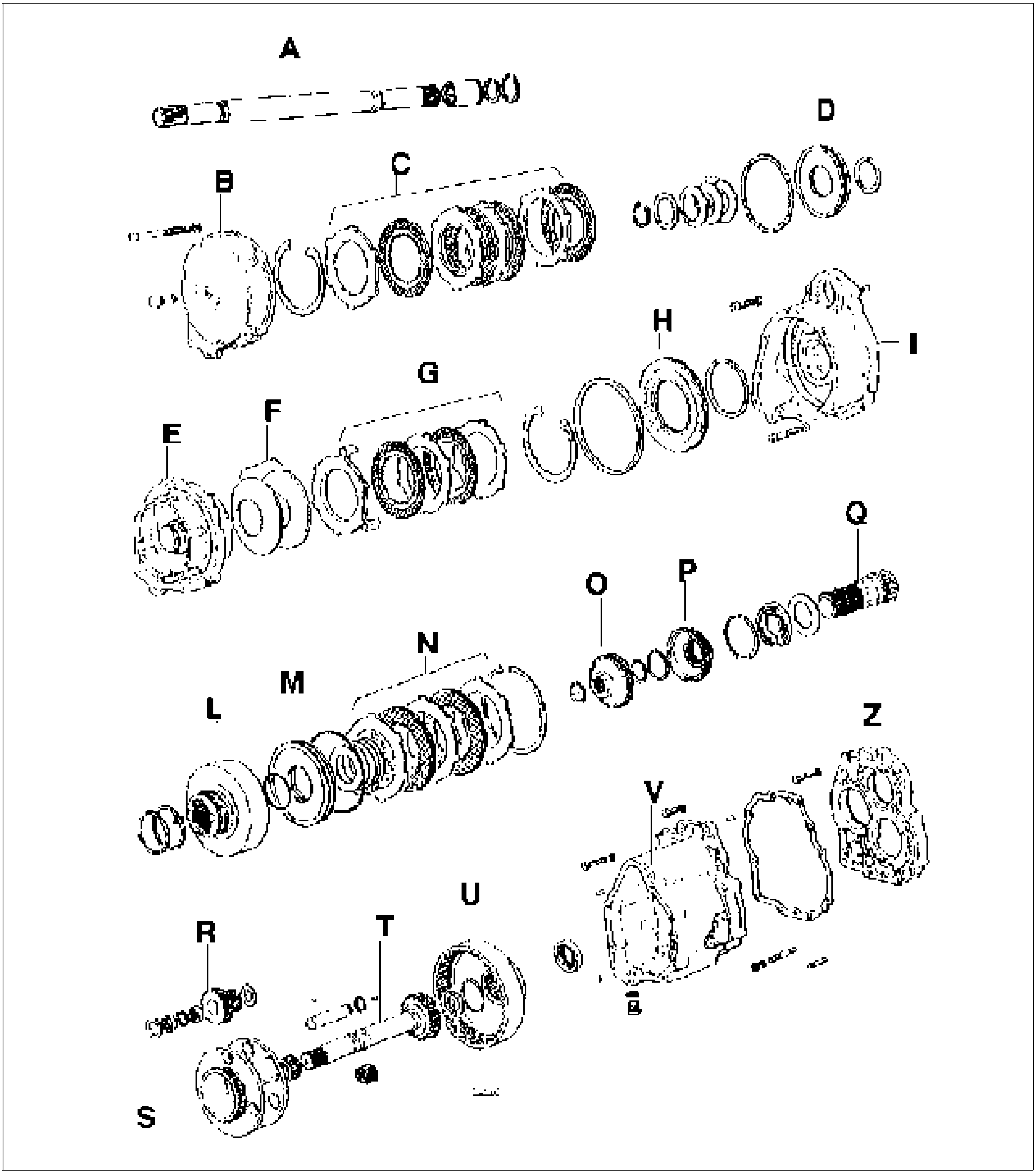


Fig. 6 - Diagram showing engagement of AGROSHIFT with HIGH range selected.

clutch transmission

agroshift

A - gearshift clutch shaft
B - cover
C - LOW clutch
D - LOW clutch piston
E - clutch housing
MEDIUM - LOW
F - MEDIUM clutch belleville discs
G - MEDIUM clutch
H - MEDIUM piston
I - flange
L - HIGH clutch housing
M - HIGH clutch piston
N - HIGH clutch
O - LOW clutch hub
P - MEDIUM clutch hub
Q - MEDIUM clutch shaft
R - planet wheel
S - epicyclic speed reducer
T - LOW shaft
U - epicyclic annulus
V - flange
Z - flange



Agroshift unit.

Fitment of the AGROSHIFT unit

To accommodate the AGROSHIFT system, the basic transmission with standard issue **layshaft A** and **range input shaft B** must be equipped instead with special shafts **A** = p/n 009.7644.3/10 and **B** = p/n 009.7643.3/10).

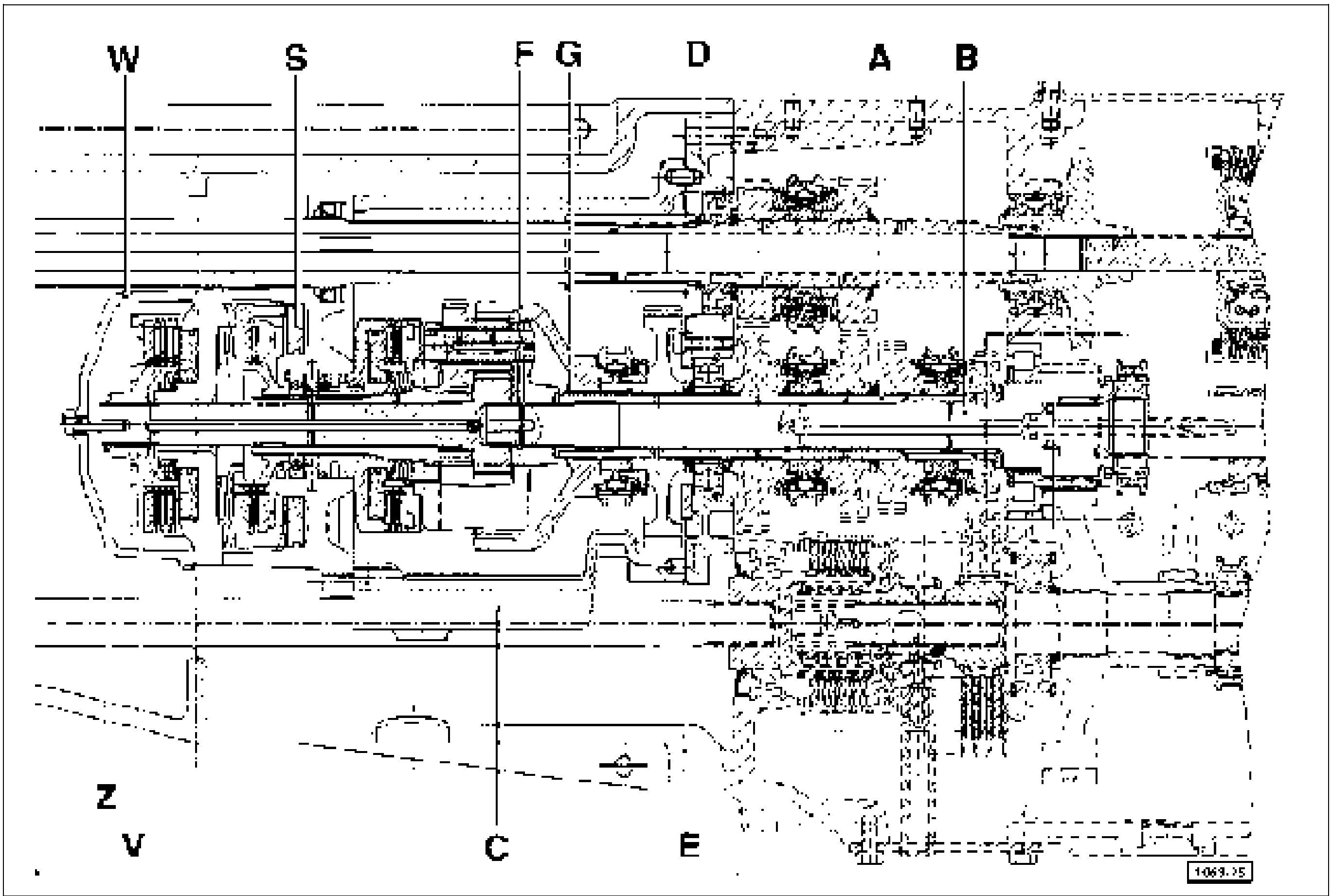


Fig. 7 - Components of the AGROSHIFT unit.

Note: No special tools are required for reassembly of the unit, other than one M8x1,25x30 bolt which is used to keep the centre shaft **Z** in position when adjusting end float in the **AGROSHIFT** unit.

Proceed to assemble the unit, observing the following directions:

— Secure the housing **C** p/n 007.6743.3 to the flange **D** p/n 007.3461.0, locating the gasket **E** p/n 255.3356.0 between the two.

— Fit the input wheel **F** p/n 009.7645.0 to the layshaft, securing with the circlip **G**.

— Working at the bench, preassemble the LOW shaft **H** p/n 007.6139.3/40 with the planet carrier flange **I** p/n 008.5677.0 (Fig 8).

— When fitted to the shaft, the planet wheels must be positioned so that the punched countermarks coincide with the reference marks on the planet carrier flange (Fig 8).

— Working at the bench, preassemble the MEDIUM shaft **L** p/n 007.6149.0/20 and the belleville discs **M** p/n 007.6149.0 (Fig 9).

— Position the HIGH clutch complete with all its component parts in the relative housing **N** p/n 007.6745.3. Take care that the VESPEL seals are correctly positioned, to avoide damage.

— Fit the unit to the MEDIUM shaft, while holding the shaft vertical (Fig 9).

— Fit the oil baffle **O**, the bearing **P** and the circlip **Q** (Fig 9).

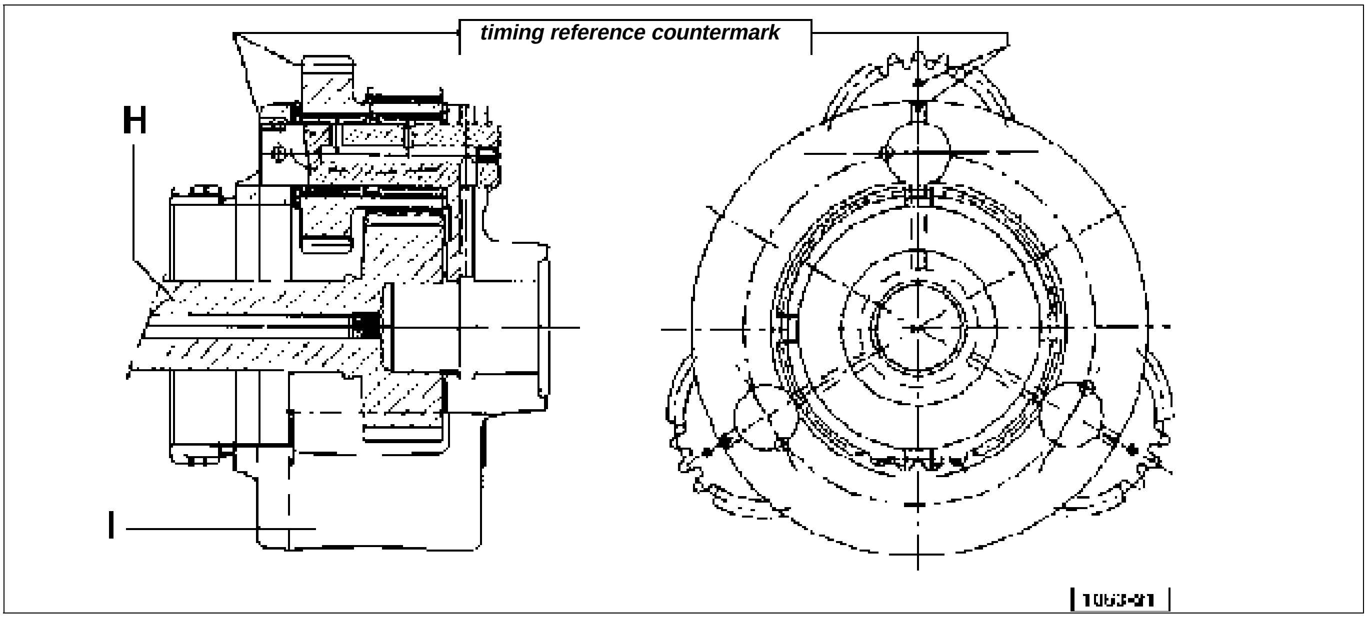


Fig. 8 - Timing the epicyclic speed reducer of the AGROSHIFT unit.

— Fit the MEDIUM hub **R** p/n 009.7649.0/10, securing with the respective circlip and compacting the belleville discs **M** with the relative press.
— Fit the MEDIUM actuator piston **S** p/n 008.5669.0, having first located the relative O-rings.
— Working at the bench, preassemble the friction discs of the MEDIUM - LOW housing **T** p/n 007.6744.3 (fig 10). Align the discs initially using the housing itself as a reference, then compress the belleville discs **U** p/n 2.1499.127.0.
— Position the MEDIUM - LOW assembly in the housing **N** applying sealant (Pianermetic 510) to the mating surfaces.
— **CAUTION** : take care when applying sealant not to foul the clutch oil inlet ports.
— Fit the planet carrier assembly to the shaft **L**, position the hub **V** p/n 008.0213.0 and fit the circlip **Z**.
— Fit the cover **W** p/n 007.6198.0 (fig 7), applying sealant (Pianermetic 510) to the mating surfaces.

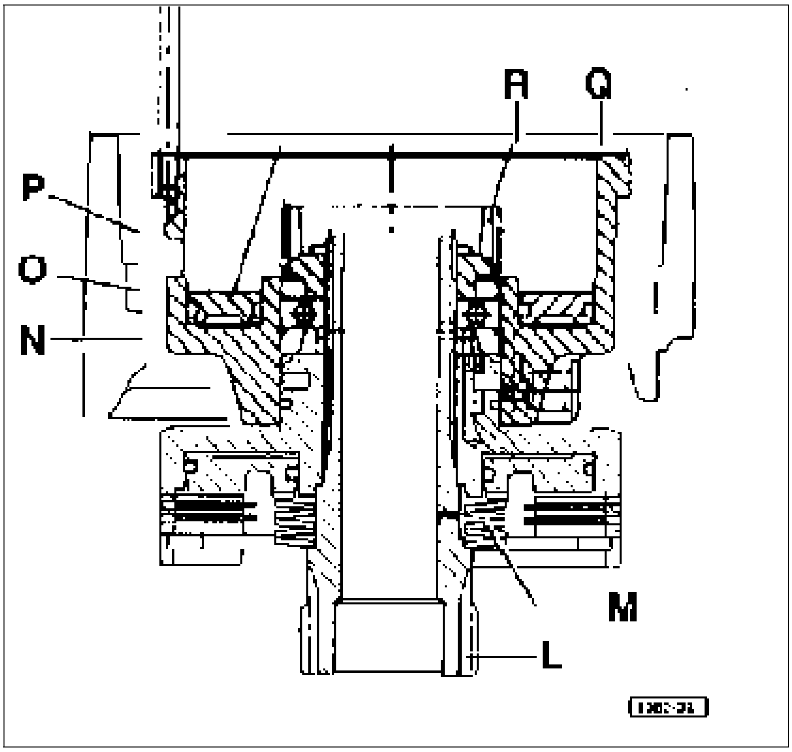


Fig. 9 - Preassembly of parts on MEDIUM shaft.

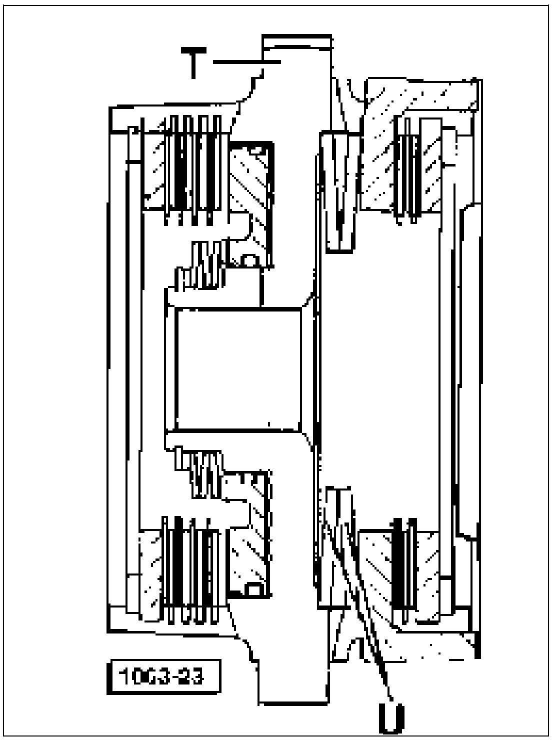


Fig. 10 - Preassembly of MEDIUM-LOW clutches MEDIUM-LOW.

ADJUSTMENT OF END FLOAT IN THE AGROSHIFT UNIT (fig 11)

Screw one M8x1,25x30 bolt ***finger tight*** into the cover **W** (fig 11), so as to hold the centre shaft of the H-M-L unit in position during the adjustment.
Measure dimensions **X** and **Y** with a gauge then calculate **(X - Y - 1 mm)** , which gives the thickness of the thrust washer **K** to fit.
Example: values measured **X = 135.64** **Y = 131.56**

(135,64 - 131,56 - 1) = 3,08 ~ 3 mm (washer required is p/n 2.1599.729.0/10)

IMPORTANT: the thrust washer must be selected from those available to give either the exact thickness, or the next thickness down from the value calculated.

washer p/n	2.1599.724.0/10	thickness 2 mm
	2.1599.725.0/10	thickness 2.2 mm
	2.1599.726.0/10	thickness 2.4 mm
	2.1599.727.0/10	thickness 2.6 mm
	2.1599.728.0/10	thickness 2.8 mm
	2.1599.729.0/10	**thickness 3 mm**
	2.1599.730.0/10	thickness 3.2 mm
	2.1599.731.0/10	thickness 3.4 mm
	2.1599.732.0/10	thickness 3.6 mm
	2.1599.733.0/10	thickness 3.8 mm
	2.1599.734.0/10	thickness 4 mm

Locate the preassembled unit **J** in the AGROSHIFT housing, applying sealant (Pianermetic 510) between the mating surfaces of the housings; take care that the sealant is kept well clear of the oil inlet ports.
Remove the temporary positioning bolt to free the centre shaft of the H-M-L unit, then fit the special plug together with a sealing washer.

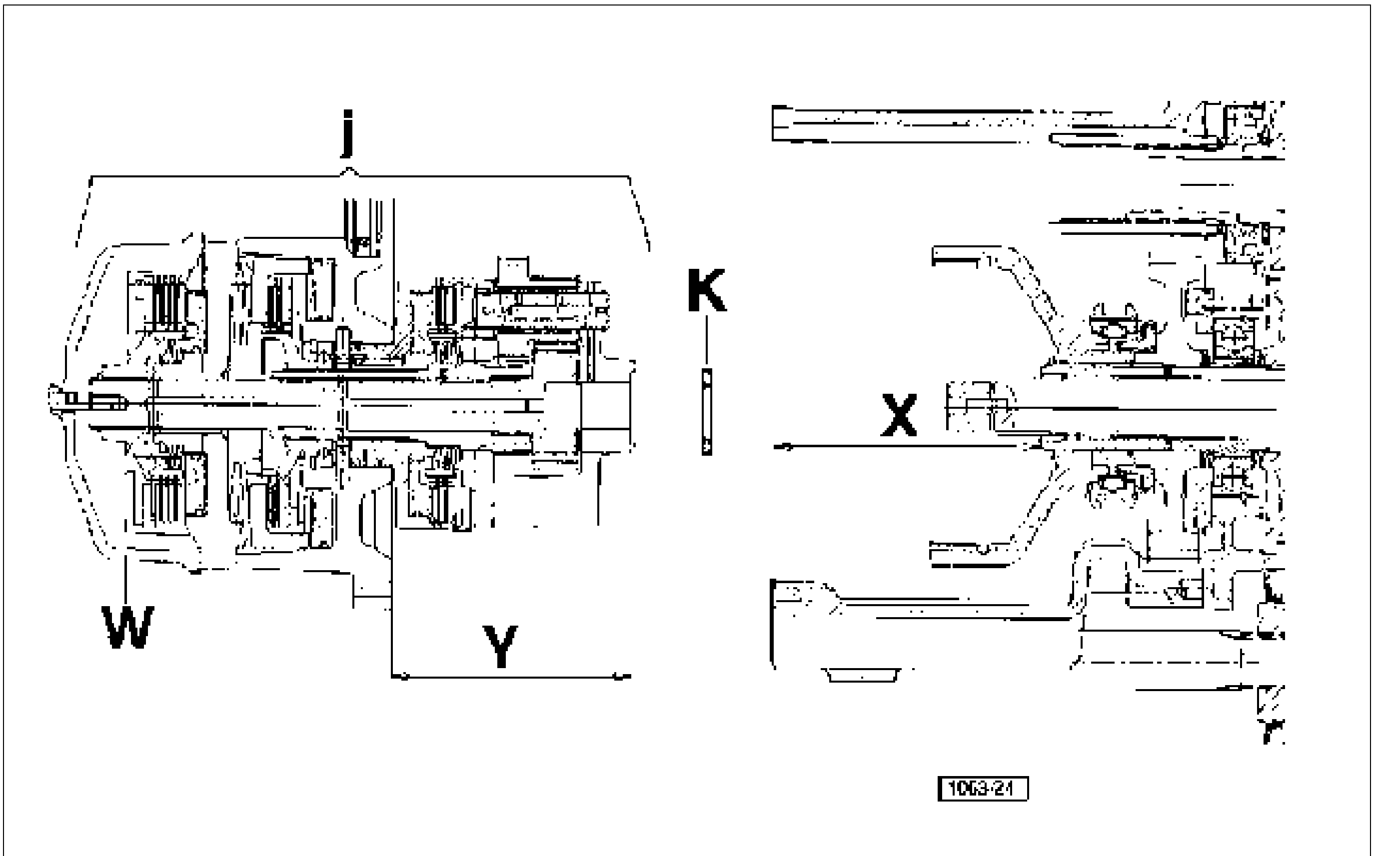
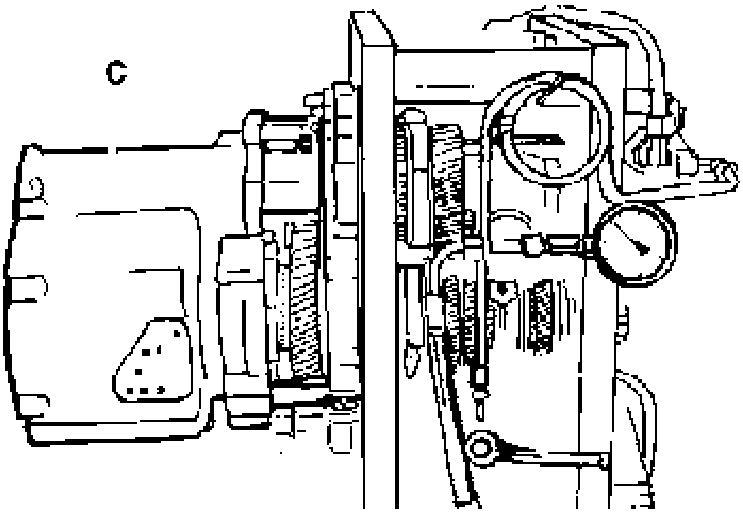
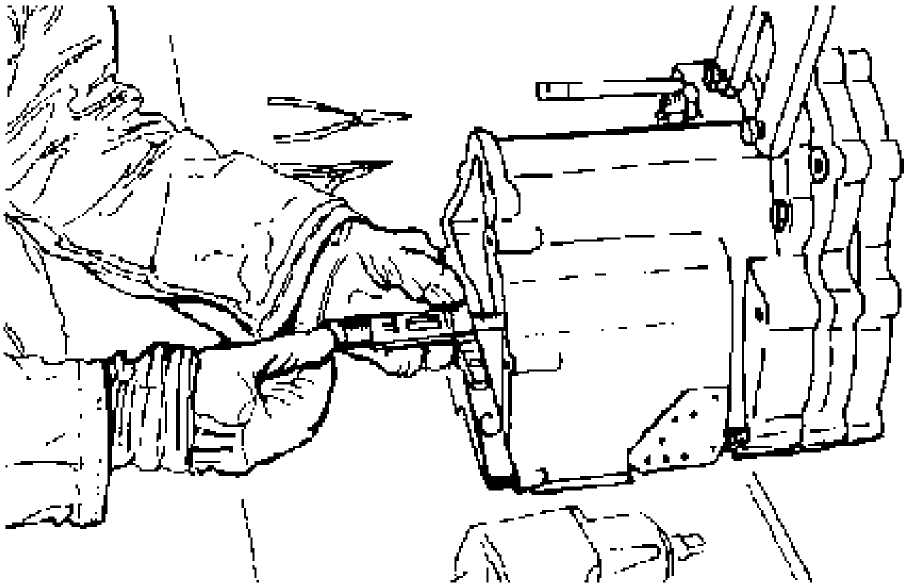


Fig. 11 - Location of the preassembled AGROSHIFT unit in its housing.

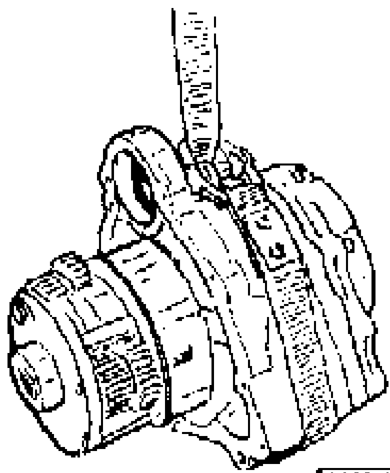
MAIN OPERAZIONS INVOLVED IN ASSEMBLY OF AGROSHIFT UNIT



1 - Offer the housing **C** to the gears of the transmission and secure in place.



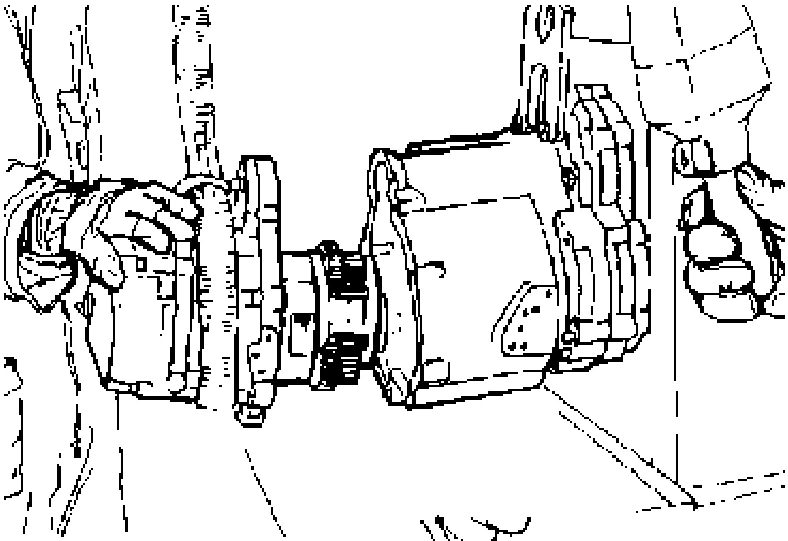
2 - Measure dimension **X** (see fig 11) for adjustment of end float in the **Agroshift** unit.



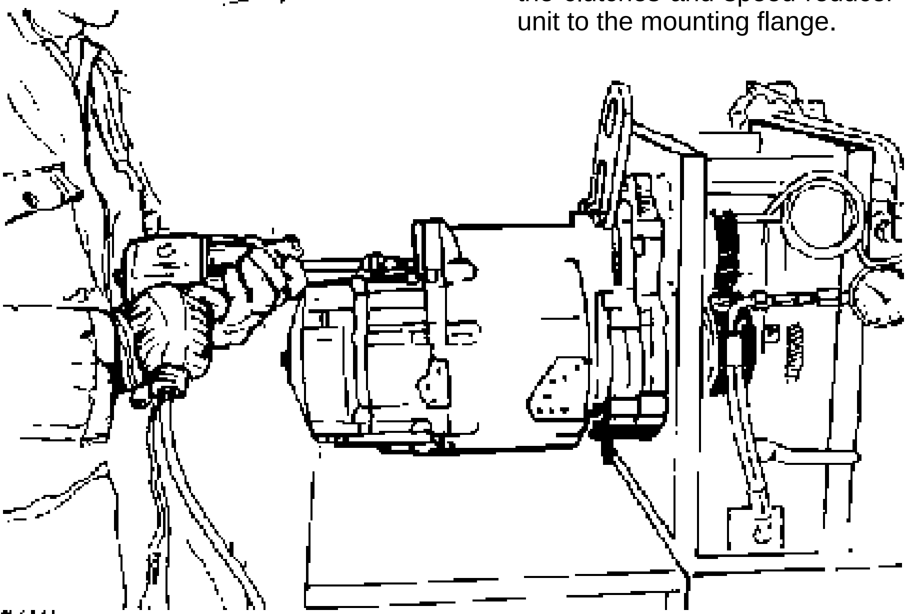
3 - Sling the clutches and speed reducer assembly to a hoist so as to facilitate assembly operations inside the housing **C**.

1063-189

4 - Locate the speed reducer unit complete with clutches in the mounting flange.

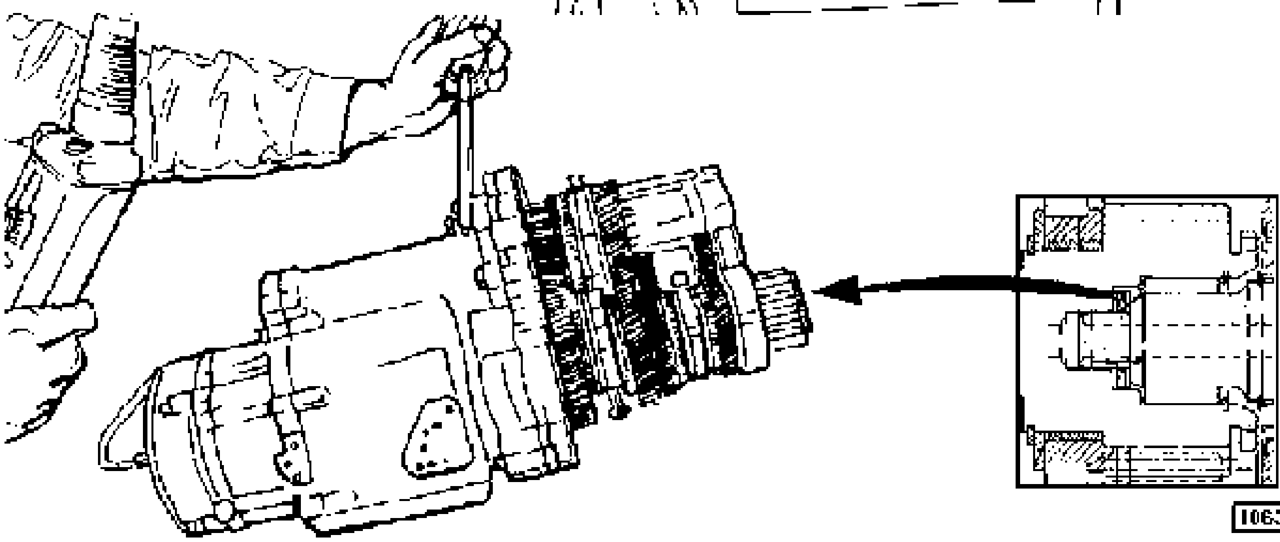


5 - Tighten the securing bolts of the clutches and speed reducer unit to the mounting flange.

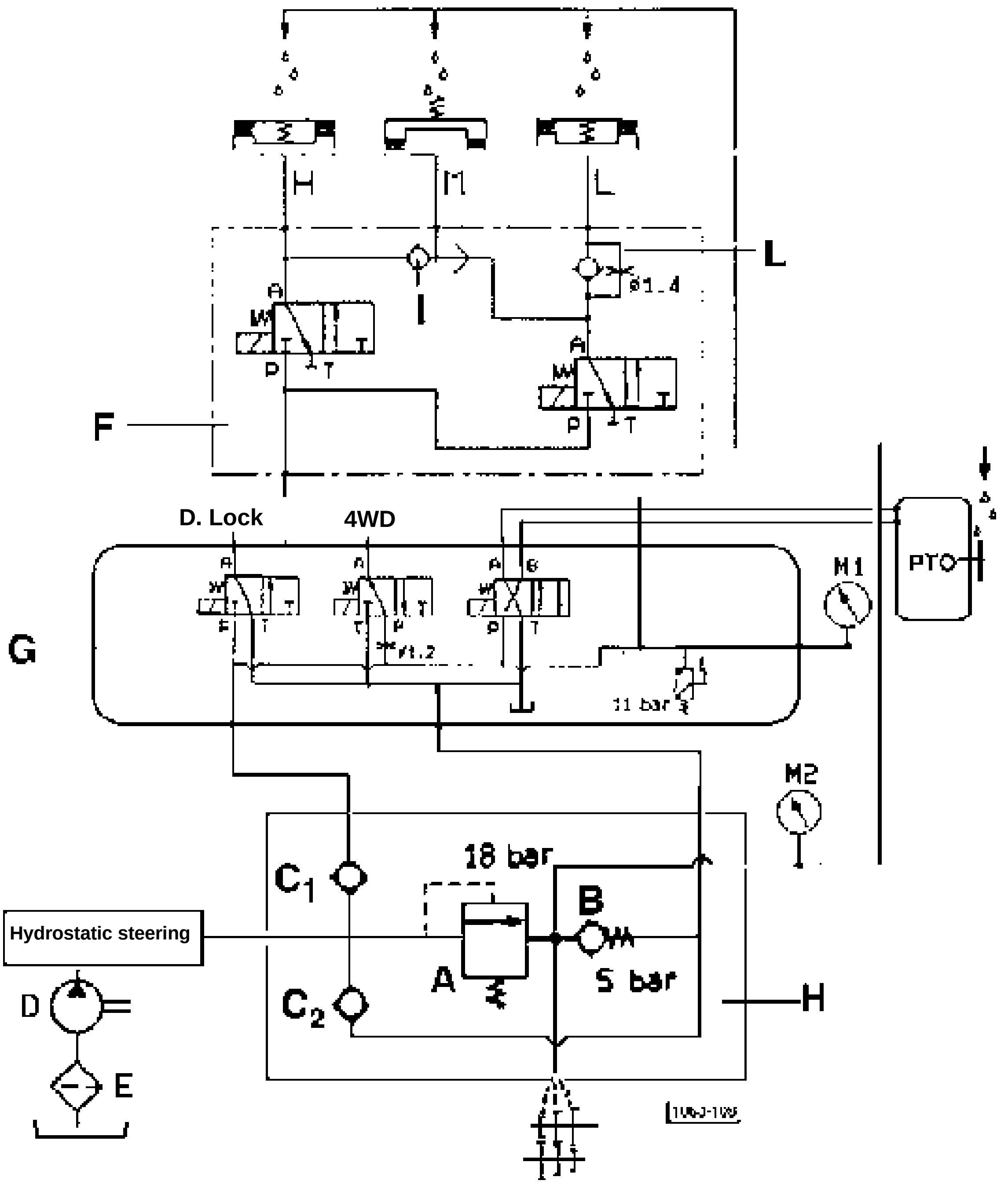


6 - Sling the **Agroshift** unit to a hoist, together with the gearshift assembly, and locate in the rear transmission housing.

Caution: Position the thrust bearing in the range input shaft seating as illustrated below.



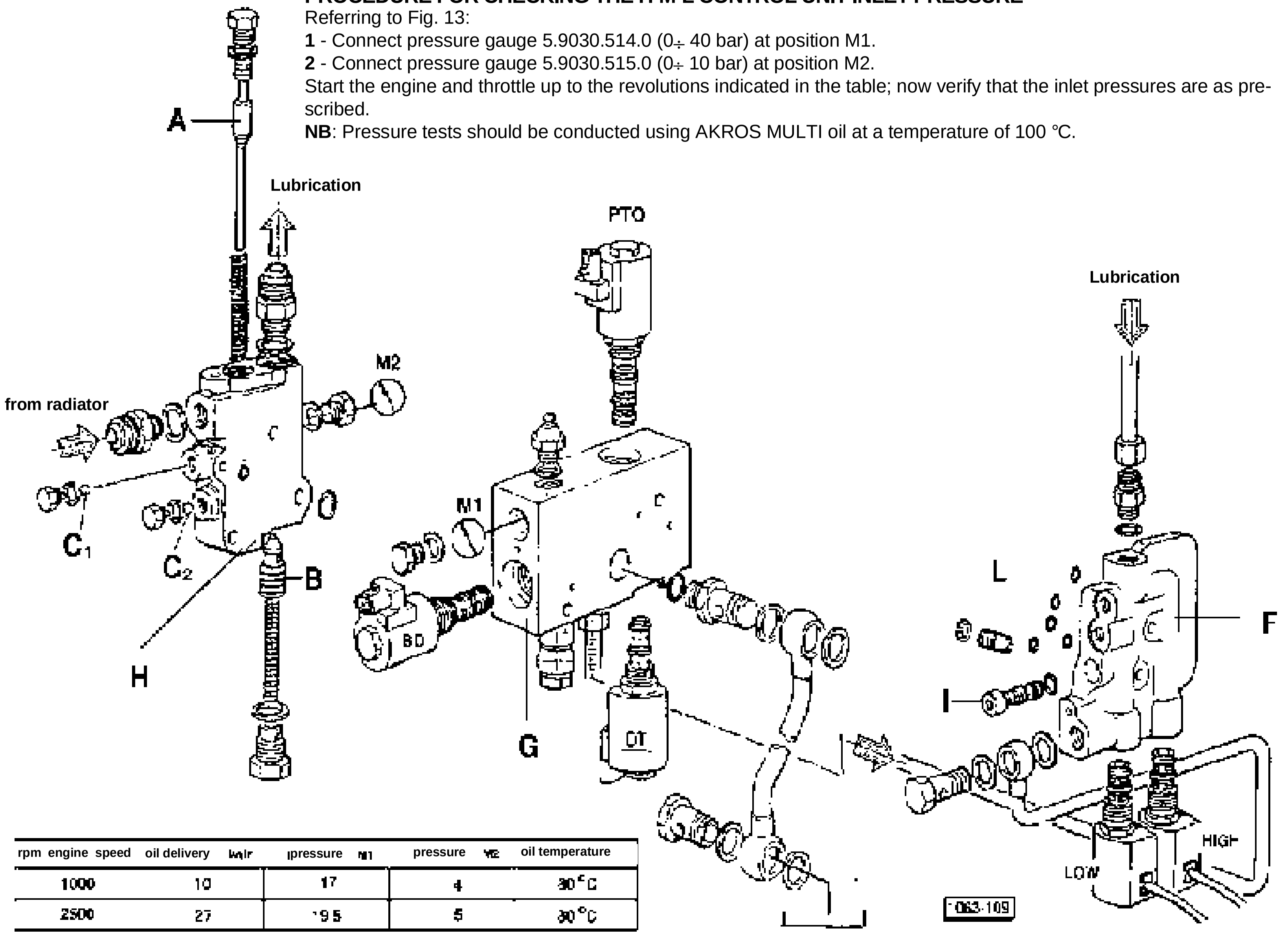
1063-170



A - sequence valve (operating pressure 18 bar)
B - transmission lubricant pressure regulator (setting 4 bar)
C - check valve 30 l/min
D - oil pump (flow rate 10 ÷ 30 l/ min)
E - suction filter (25 m)
F - solenoid valves assembly
G - power unit for electrohydraulic control functions
H - oil pressure control valves assembly
I - bistable valve
L - modulating valve
M1 - pressure gauge scale 0 ÷ 40 bar
M2 - pressure gauge scale 10 bar
T - return

Fig. 12 - Hydraulic diagram illustrating operation.

PROCEDURE FOR CHECKING THE H-M-L CONTROL UNIT INLET PRESSURE
Referring to Fig. 13:
1 - Connect pressure gauge 5.9030.514.0 (0÷ 40 bar) at position M1.
2 - Connect pressure gauge 5.9030.515.0 (0÷ 10 bar) at position M2.
Start the engine and throttle up to the revolutions indicated in the table; now verify that the inlet pressures are as prescribed.
NB: Pressure tests should be conducted using AKROS MULTI oil at a temperature of 100 °C.



rpm engine speed	oil delivery l/min	pressure M1	pressure M2	oil temperature
1000	10	17	4	30 °C
2500	27	19.5	5	30 °C

Fig. 13 - Electrohydraulic control unit for AGROSHIFT system.

A - sequence valve
B - pressure regulator
C - check valve
F - solenoid valves assembly
G - power unit for electrohydraulic control functions
H - oil pressure control valves assembly
I - bistable valve
L - modulating valve
M1 - pressure gauge scale 0÷40 bar
M2 - pressure gauge scale 10 bar

clutch transmission

agroshift

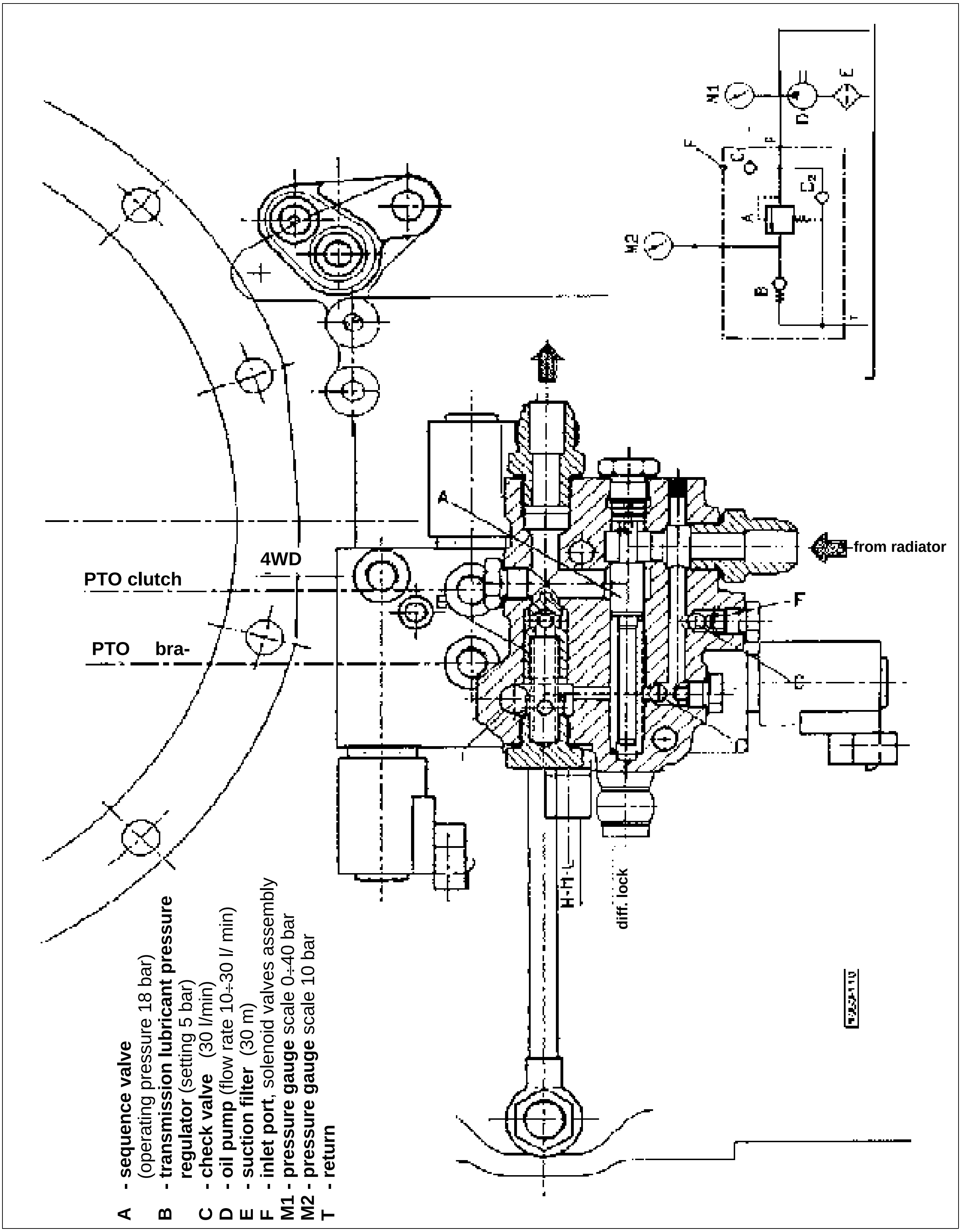


Fig. 14 - AGROSHIFT pressure control valves assembly.

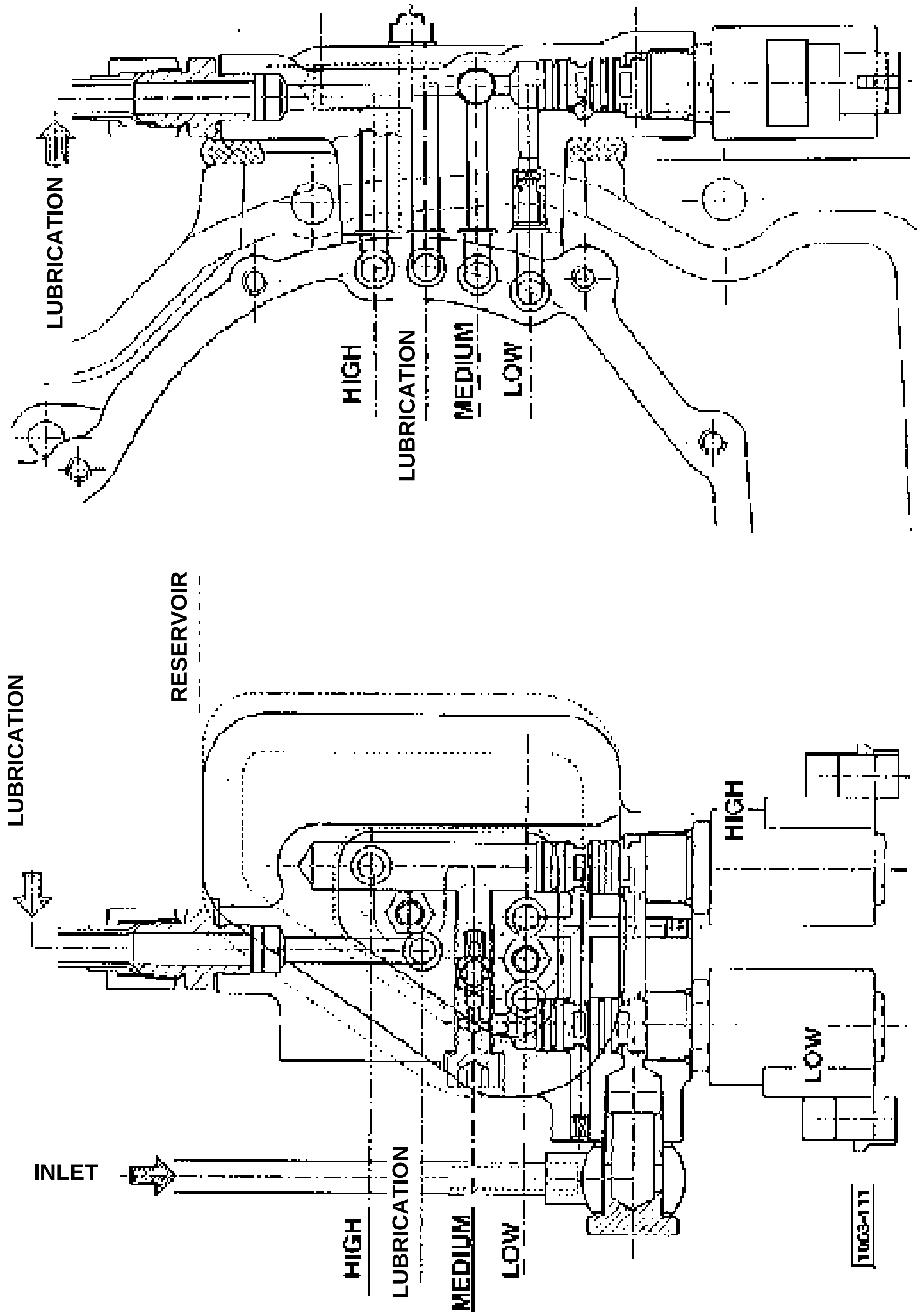


Fig. 15 - Hydraulic control circuit.

clutch slips	check the clutch assembly hydraulic system	replace the defective parts	
		examine piston and manifold seal rings	replace defective parts
	check piston for free stroke	remove any roughness preventing piston from sliding freely	
	check for clutch disk wear	replace the clutch disks	
clutch won't disengage	inspect the control mechanism	replace defective parts	
	inspect the disks	burnt disks	replace the disks
		jammed disks	remove any roughness preventing disks from sliding freely
	piston jammed in seat	relpaced the piston	

Spring specifications

LOW clutch release springs (belleville)		
spring type		2.1499.133.0
inside diameter	mm	45,5
external diameter	mm	70
unloaded spring	mm	4

MEDIUM clutch engagement springs		
spring type		2.1499.127.0
inside diameter	mm	60
external diameter	mm	130

General specifications

The basic transmission utilizes a 4 or 5 speed synchromesh gearbox with 3 speed ranges.
A reverse shuttle, fitted as standard, gives a total 12 forward and 12 reverse speeds with the 4-speed box.
Options include Creeper, and Underdrive (in place of or in addition to the creeper), giving a total of:
16 forward and 16 reverse (with Creeper);
24 forward and 12 reverse (with Underdrive);
32 forward and 16 reverse (with Creeper and Underdrive);
Each version is also available with 30 or 40 km/h top speed.

Technical specifications

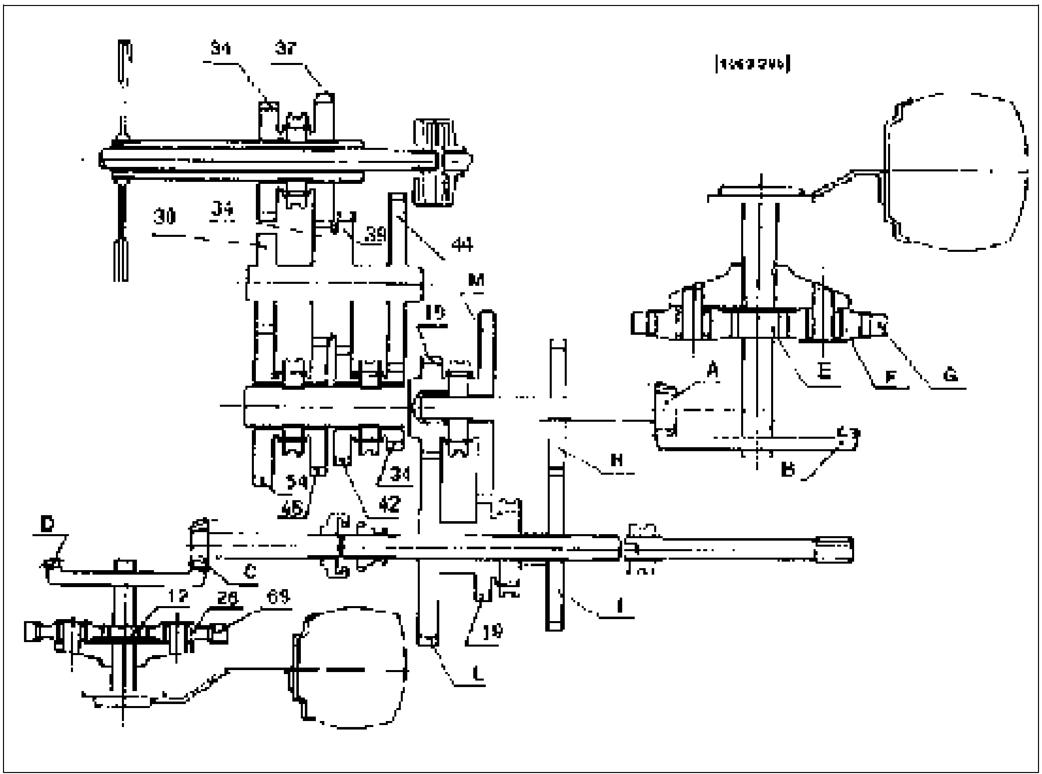
number of speeds				**12 FWD + 12 REV**
gearbox ratios:	4-speed	(5-speed)		
		(1st gear)		18/48 = 1/2,6667
	1st gear	(2nd gear)		30/54 = 1/1,8000
	2nd gear	(3rd gear)		34/46 = 1/1,3529
	3rd gear with underdrive	(4th gear)		39/40 = 1/1,0256 38/42 = 1/1,1053
	4th gear	(5th gear)		44/34 = 1/0,7727
shuttle:		forward reverse		37/34 = 1/0,9189 34/30 = 1/0,8824
range ratios:		low	1st version 2nd version	(19/58)x(19x59)= 1/9,4792 (19/48)x(19x58)= 1/7,7119
		medium	1st version 2nd version	(19/58)x(40/39) = 1/2,9763 (19/48)x(28/33) = 1/2,9774
		high		1
rear axle ratios: bevel gear pair	*Silver 80-90-100.4* *Silver 100.6* *Silver 80-90-100.4* *Silver 100.6*	30 km/h 30 km/h 40 km/h 40 km/h		8/41 = 1/5,1250 9/41 = 1/4,5555 10/39 = 1/3,9000 11/38 = 1/3,4545
epicyclic final drive	*Silver 80-90-100.4* *Silver 100.6*			(12/12+69) = 1/6,7500 (11/11+73) = 1/7,6364
overall ratio	*Silver 80-90-100.4* *Silver 100.6* *Silver 80-90-100.4* *Silver 100.6*	30 km/h 30 km/h 40 kmlh 40 kmlh		1/34,5938 1/34,7884 1/26,3076 1/26,3799
backlash between crownwheel and pinion teeth		(mm)		0,18 ÷ 0,24
underdrive				35/38 = 1/1,0857
creeper		1st version 2nd version		(19/58)x(19/59)x(26/75)x(39/40) = 1/26,6603 (19/48)x(19/58)x(26/75)x(33/28) = 1/26,2184
shuttle shaft and layshaft end float		(mm)		0,15 ÷ 0,60
end float of shuttle gears (or underdrive)		(mm)		0,15 ÷ 0,60
reference distance for adjustment of bevel gear pair - with mechanical differential lock - with hydraulic differential lock		 (mm) (mm)		 4 ± 0,1 2,5 ± 0,1

Transmission configurations with 5 speed gearbox

Optional: **AGROSHIFT**, allowing clutchless selection of all available ratios - - - across a 3-speed band, giving a total of:
45 forward and 45 reverse speeds, without Creeper option
60 forward and 60 reverse speeds, with Creeper option.

3 transmission

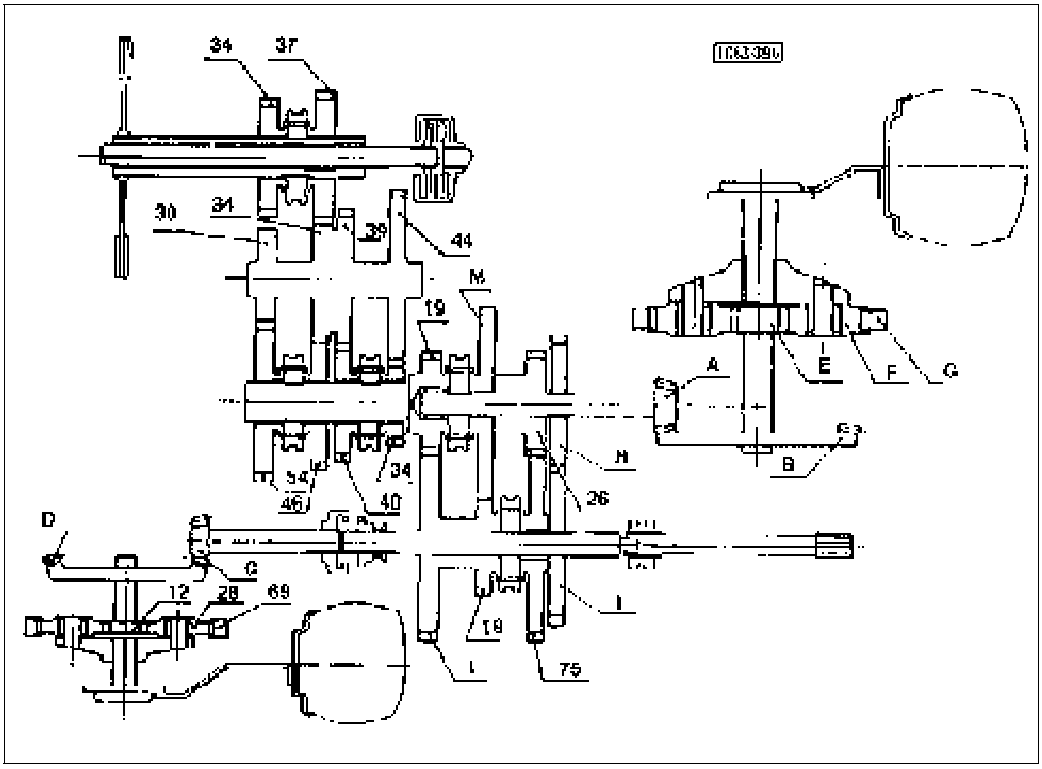
31 gearbox



Up to serial number:	
SILVER 80	1441
SILVER 90	1829
SILVER 100.4	1335
SILVER 100.6	1547
H = 39	
I = 40	
L = 58	
M = 59	
C / D = 10/38	30 km/h
C / D = 11/32	40 km/h
From serial number:	
SILVER 80	1442
SILVER 90	1830
SILVER 100.4	1336
SILVER 100.6	1548
H = 33	
I = 28	
L = 48	
M = 58	
C / D = 8/37	30 km/h
C / D = 10/35	40 km/h

Fig. **1** - 4 speed synchromesh gearbox with 3 ranges (12 FWD + 12 REV).

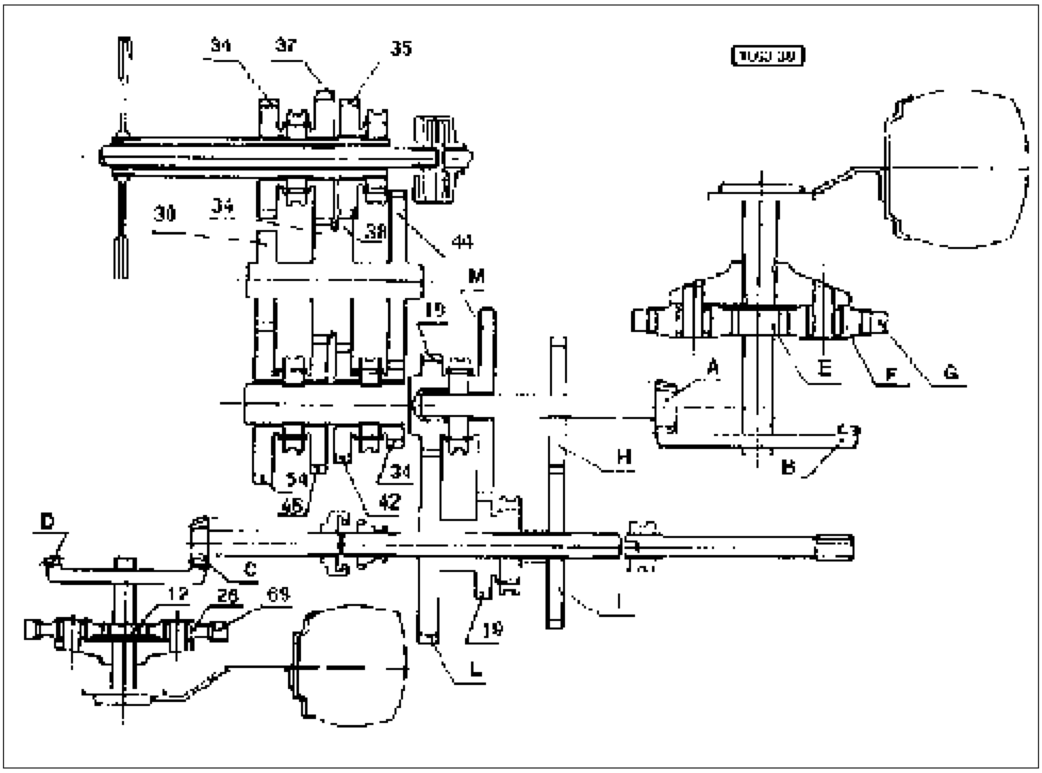
Silver 80-90-100.4	*30 km/h*	***A***= *8*	***B***= *41*	***E***= *12*	***F***= *69*	***G***= *27*
	40 km/h	***A***= *10*	***B***= *39*	***E***= *12*	***F***= *69*	***G***= *27*
Silver 100.6	*30 km/h*	***A***= *9*	***B***= *41*	***E***= *11*	***F***= *73*	***G***= *30*
	40 km/h	***A***= *11*	***B***= *38*	***E***= *11*	***F***= *73*	***G***= *30*



Up to serial number::	
SILVER 80	1441
SILVER 90	1829
SILVER 100.4	1335
SILVER 100.6	1547
H = 39	
I = 40	
L = 58	
M = 59	
C / D = 10/38	30 km/h
C / D = 11/32	40 km/h
From serial number:	
SILVER 80	1442
SILVER 90	1830
SILVER 100.4	1336
SILVER 100.6	1548
H = 33	
I = 28	
L = 48	
M = 58	
C / D = 8/37	30 km/h
C / D = 10/35	40 km/h

Fig. **2** - 4 speed synchromesh gearbox with 3 ranges + creeper (16 FWD + 16 REV).

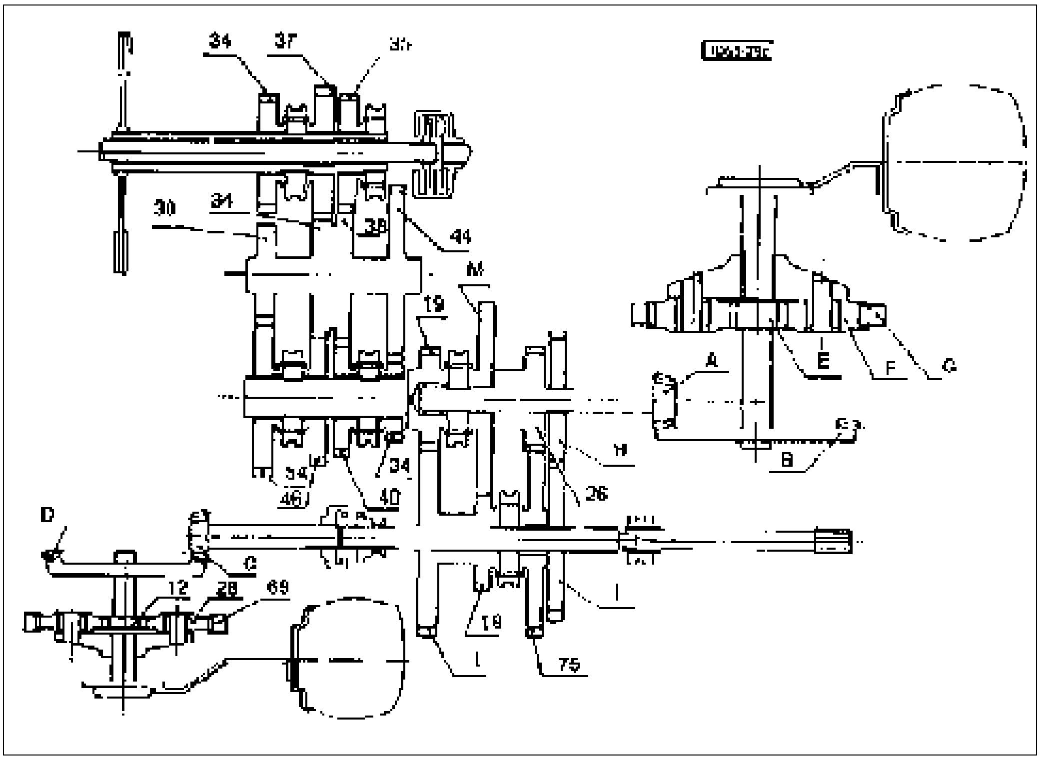
Silver 80-90-100.4	*30 km/h*	***A***= *8*	***B***= *41*	***E***= *12*	***F***= *69*	***G***= *27*
	40 km/h	***A***= *10*	***B***= *39*	***E***= *12*	***F***= *69*	***G***= *27*
Silver 100.6	*30 km/h*	***A***= *9*	***B***= *41*	***E***= *11*	***F***= *73*	***G***= *30*
	40 km/h	***A***= *11*	***B***= *38*	***E***= *11*	***F***= *73*	***G***= *30*



Up to serial number:		
SILVER 80	1441	
SILVER 90	1829	
SILVER 100.4	1335	
SILVER 100.6	1547	
H = 39		
I = 40		
L = 58		
M = 59		
C / D = 10/38	30 km/h	
C / D = 11/32	40 km/h	
From serial number:		
SILVER 80	1442	
SILVER 90	1830	
SILVER 100.4	1336	
SILVER 100.6	1548	
H = 33		
I = 28		
L = 48		
M = 58		
C / D = 8/37	30 km/h	
C / D = 10/35	40 km/h	

Fig. **3** - 4 speed synchromesh gearbox with 3 ranges + underdrive (24 FWD + 12 REV).

Silver 80-90-100.4	*30 km/h*	***A****= 8*	***B****= 41*	***E****= 12*	***F****= 69*	***G****= 27*
	40 km/h	***A****= 10*	***B****= 39*	***E****= 12*	***F****= 69*	***G****= 27*
Silver 100.6	*30 km/h*	***A****= 9*	***B****= 41*	***E****= 11*	***F****= 73*	***G****= 30*
	40 km/h	***A****= 11*	***B****= 38*	***E****= 11*	***F****= 73*	***G****= 30*



Up to serial number:		
SILVER 80	1441	
SILVER 90	1829	
SILVER 100.4	1335	
SILVER 100.6	1547	
H = 39		
I = 40		
L = 58		
M = 59		
C / D = 10/38	30 km/h	
C / D = 11/32	40 km/h	
From serial number:		
SILVER 80	1442	
SILVER 90	1830	
SILVER 100.4	1336	
SILVER 100.6	1548	
H = 33		
I = 28		
L = 48		
M = 58		
C / D = 8/37	30 km/h	
C / D = 10/35	40 km/h	

Fig. **4** - 4 speed synchromesh gearbox with 3 ranges + creeper + underdrive (32 FWD + 16 REV).

Silver 80-90-100.4	*30 km/h*	***A****= 8*	***B****= 41*	***E****= 12*	***F****= 69*	***G****= 27*
	40 km/h	***A****= 10*	***B****= 39*	***E****= 12*	***F****= 69*	***G****= 27*
Silver 100.6	*30 km/h*	***A****= 9*	***B****= 41*	***E****= 11*	***F****= 73*	***G****= 30*
	40 km/h	***A****= 11*	***B****= 38*	***E****= 11*	***F****= 73*	***G****= 30*

3 transmission

31 gearbox

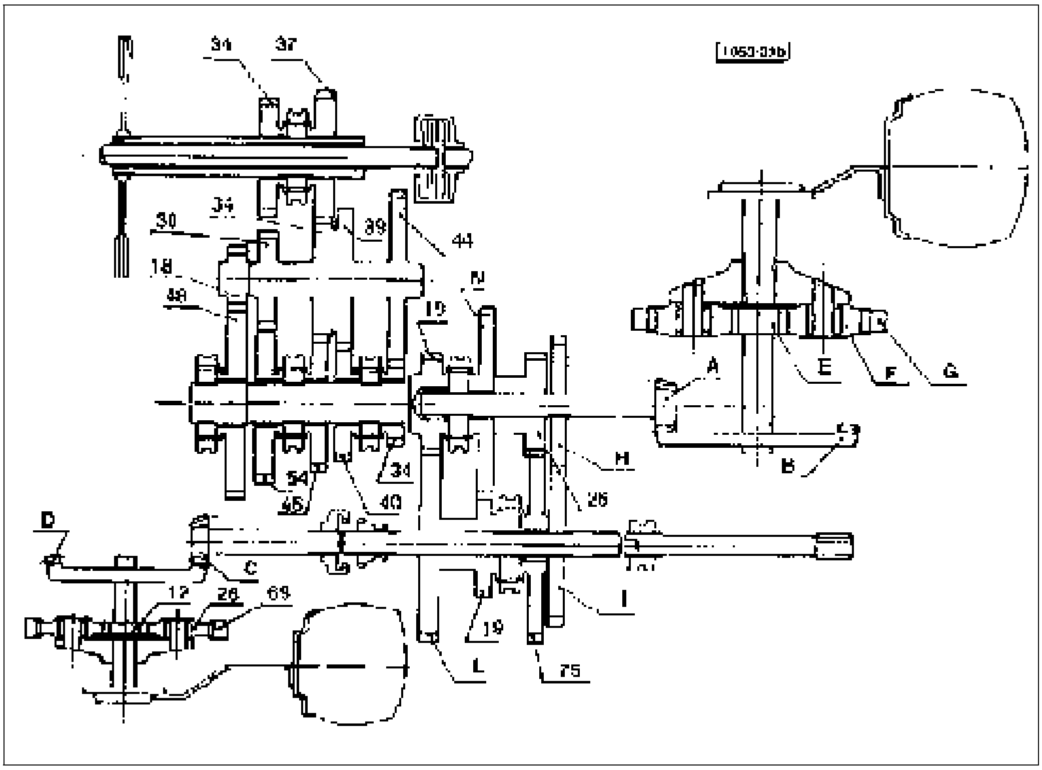


Fig. **5** - 5 speed synchromesh gearbox with 3 ranges + creeper (20 FWD + 20 REV) - transport duties.

Silver 80-90-100.4	*30 km/h*	***A**= 8*	***B**= 41*	***E**= 12*	***F**= 69*	***G**= 27*
	40 km/h	***A**= 10*	***B**= 39*	***E**= 12*	***F**= 69*	***G**= 27*
Silver 100.6	*30 km/h*	***A**= 9*	***B**= 41*	***E**= 11*	***F**= 73*	***G**= 30*
	40 km/h	***A**= 11*	***B**= 38*	***E**= 11*	***F**= 73*	***G**= 30*

Up to serial number:		
SILVER 80	1441	
SILVER 90	1829	
SILVER 100.4	1335	
SILVER 100.6	1547	
H = 39		
I = 40		
L = 58		
M = 59		
C / D = 10/38		30 km/h
C / D = 11/32		40 km/h
From serial number:		
SILVER 80	1442	
SILVER 90	1830	
SILVER 100.4	1336	
SILVER 100.6	1548	
H = 33		
I = 28		
L = 48		
M = 58		
C / D = 8/37		30 km/h
C / D = 10/35		40 km/h

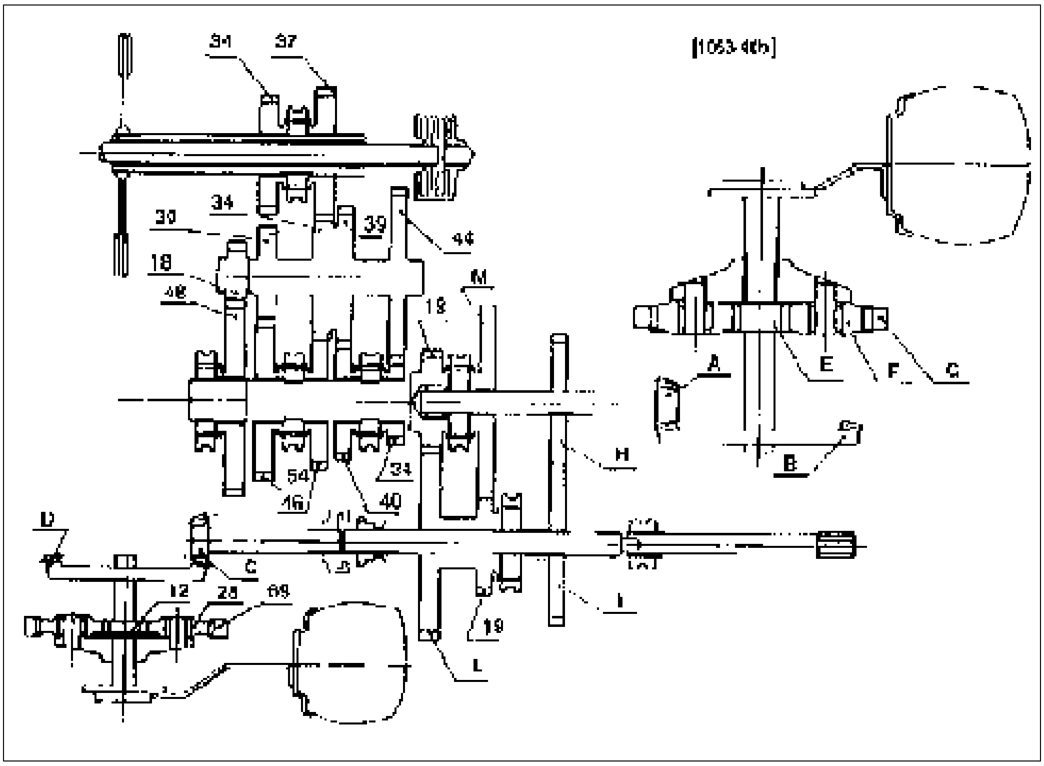
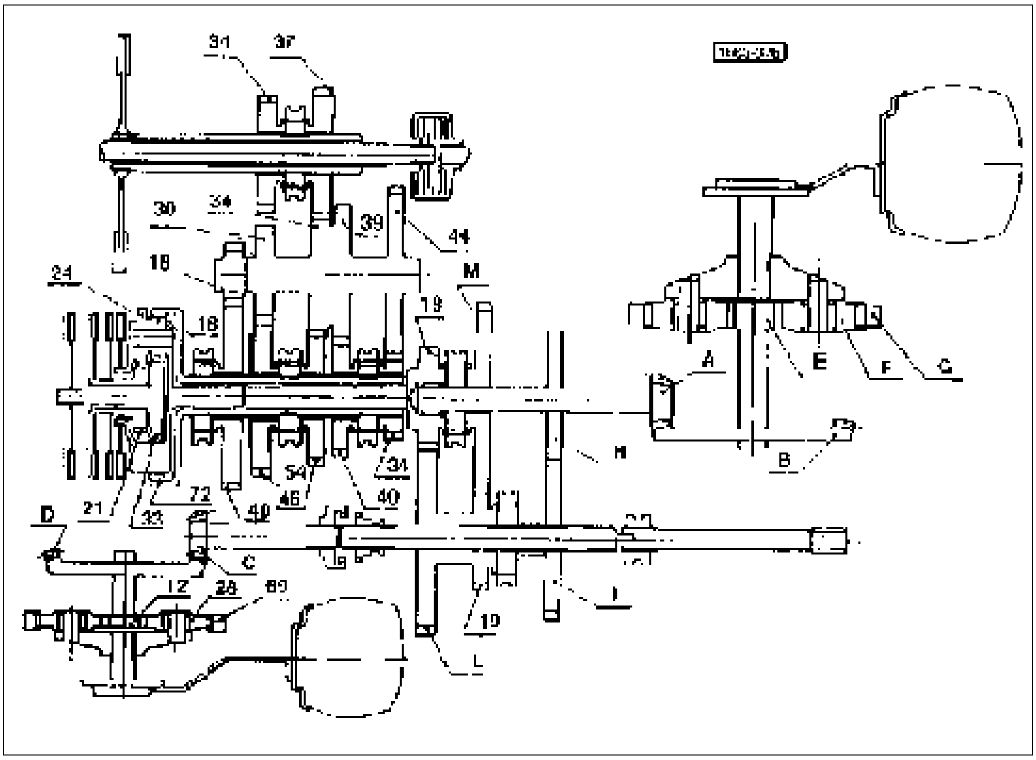


Fig. **6** - 5 speed synchromesh gearbox with 3 ranges (15 FWD + 15 REV) - transport duties.

Silver 80-90-100.4	*30 km/h*	***A**= 8*	***B**= 41*	***E**= 12*	***F**= 69*	***G**= 27*
	40 km/h	***A**= 10*	***B**= 39*	***E**= 12*	***F**= 69*	***G**= 27*
Silver 100.6	*30 km/h*	***A**= 9*	***B**= 41*	***E**= 11*	***F**= 73*	***G**= 30*
	40 km/h	***A**= 11*	***B**= 38*	***E**= 11*	***F**= 73*	***G**= 30*

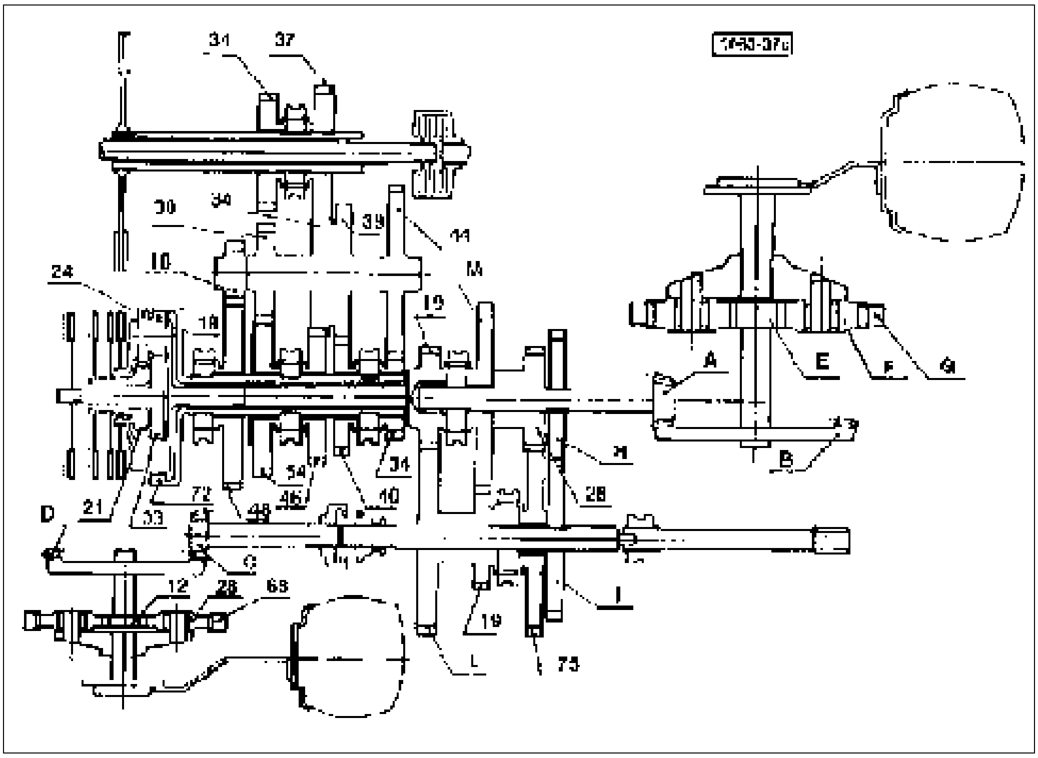
Up to serial number:		
SILVER 80	1441	
SILVER 90	1829	
SILVER 100.4	1335	
SILVER 100.6	1547	
H = 39		
I = 40		
L = 58		
M = 59		
C / D = 10/38		30 km/h
C / D = 11/32		40 km/h
From serial number:		
SILVER 80	1442	
SILVER 90	1830	
SILVER 100.4	1336	
SILVER 100.6	1548	
H = 33		
I = 28		
L = 48		
M = 58		
C / D = 8/37		30 km/h
C / D = 10/35		40 km/h



Up to serial number:	
SILVER 80	1441
SILVER 90	1829
SILVER 100.4	1335
SILVER 100.6	1547
H = 39	
I = 40	
L = 58	
M = 59	
C / D = 10/38	30 km/h
C / D = 11/32	40 km/h
From serial number:	
SILVER 80	1442
SILVER 90	1830
SILVER 100.4	1336
SILVER 100.6	1548
H = 33	
I = 28	
L = 48	
M = 58	
C / D = 8/37	30 km/h
C / D = 10/35	40 km/h

Fig. **7** - 5 speed synchromesh gearbox with 3 ranges + AGROSHIFT (45 FWD + 45 REV).

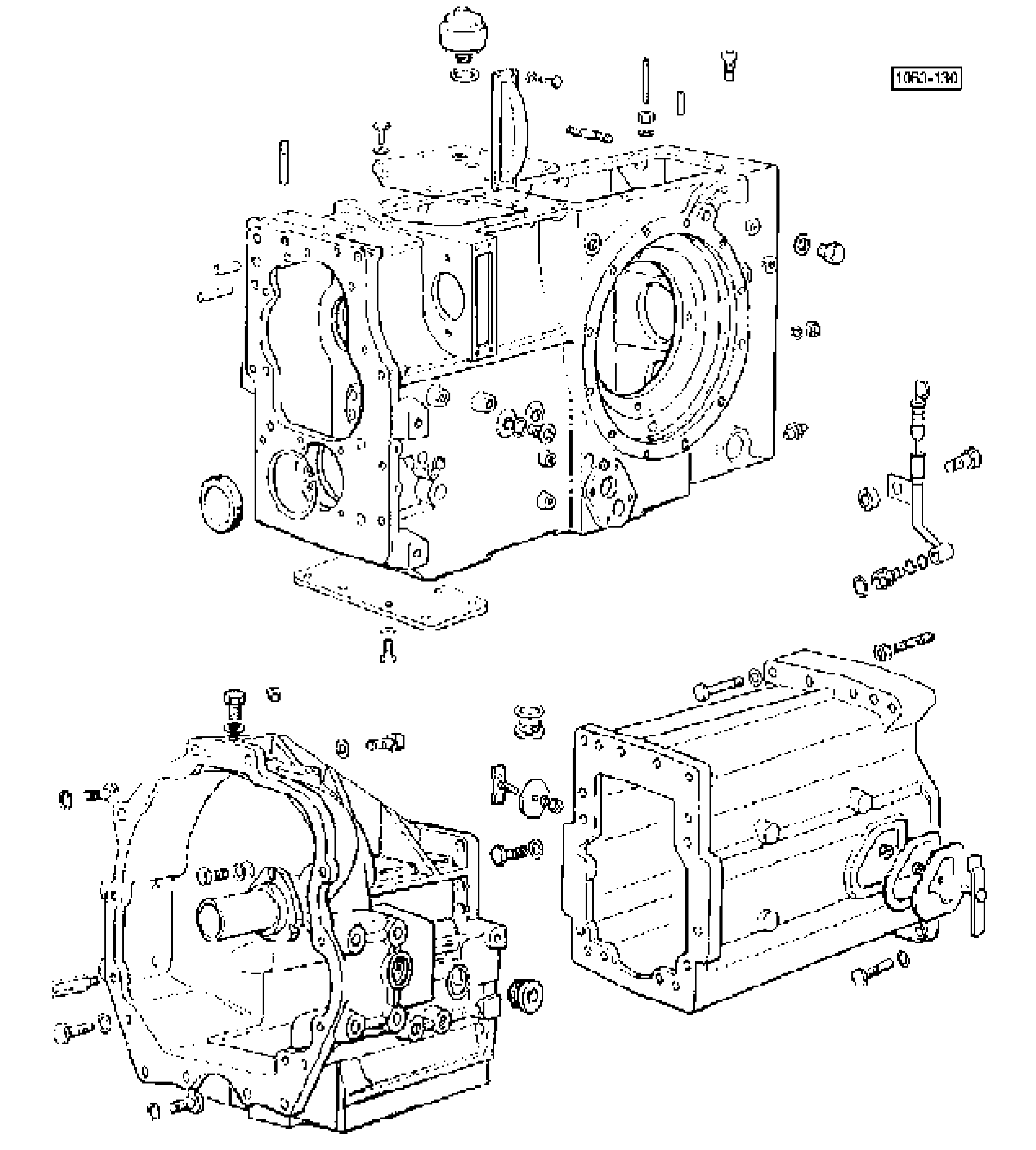
Silver 80-90-100.4	*30 km/h*	***A**= 8*	***B**= 41*	***E**= 12*	***F**= 69*	***G**= 27*
	40 km/h	***A**= 10*	***B**= 39*	***E**= 12*	***F**= 69*	***G**= 27*
Silver 100.6	*30 km/h*	***A**= 9*	***B**= 41*	***E**= 11*	***F**= 73*	***G**= 30*
	40 km/h	***A**= 11*	***B**= 38*	***E**= 11*	***F**= 73*	***G**= 30*



Up to serial number:	
SILVER 80	1441
SILVER 90	1829
SILVER 100.4	1335
SILVER 100.6	1547
H = 39	
I = 40	
L = 58	
M = 59	
C / D = 10/38	30 km/h
C / D = 11/32	40 km/h
From serial number:	
SILVER 80	1442
SILVER 90	1830
SILVER 100.4	1336
SILVER 100.6	1548
H = 33	
I = 28	
L = 48	
M = 58	
C / D = 8/37	30 km/h
C / D = 10/35	40 km/h

Fig. **8** - 5 speed synchromesh gearbox with 3 ranges + creeper + AGROSHIFT (60 FWD + 60 REV).

Silver 80-90-100.4	*30 km/h*	***A**= 8*	***B**= 41*	***E**= 12*	***F**= 69*	***G**= 27*
	40 km/h	***A**= 10*	***B**= 39*	***E**= 12*	***F**= 69*	***G**= 27*
Silver 100.6	*30 km/h*	***A**= 9*	***B**= 41*	***E**= 11*	***F**= 73*	***G**= 30*
	40 km/h	***A**= 11*	***B**= 38*	***E**= 11*	***F**= 73*	***G**= 30*



Rear and front transmission and intermediate housings.

The need arises to tow the tractor, even for short distances, keep the engine running so as to ensure that the transmission lubrication pump can operate. (If the engine will not start, the machine should be loaded onto a truck and carried).

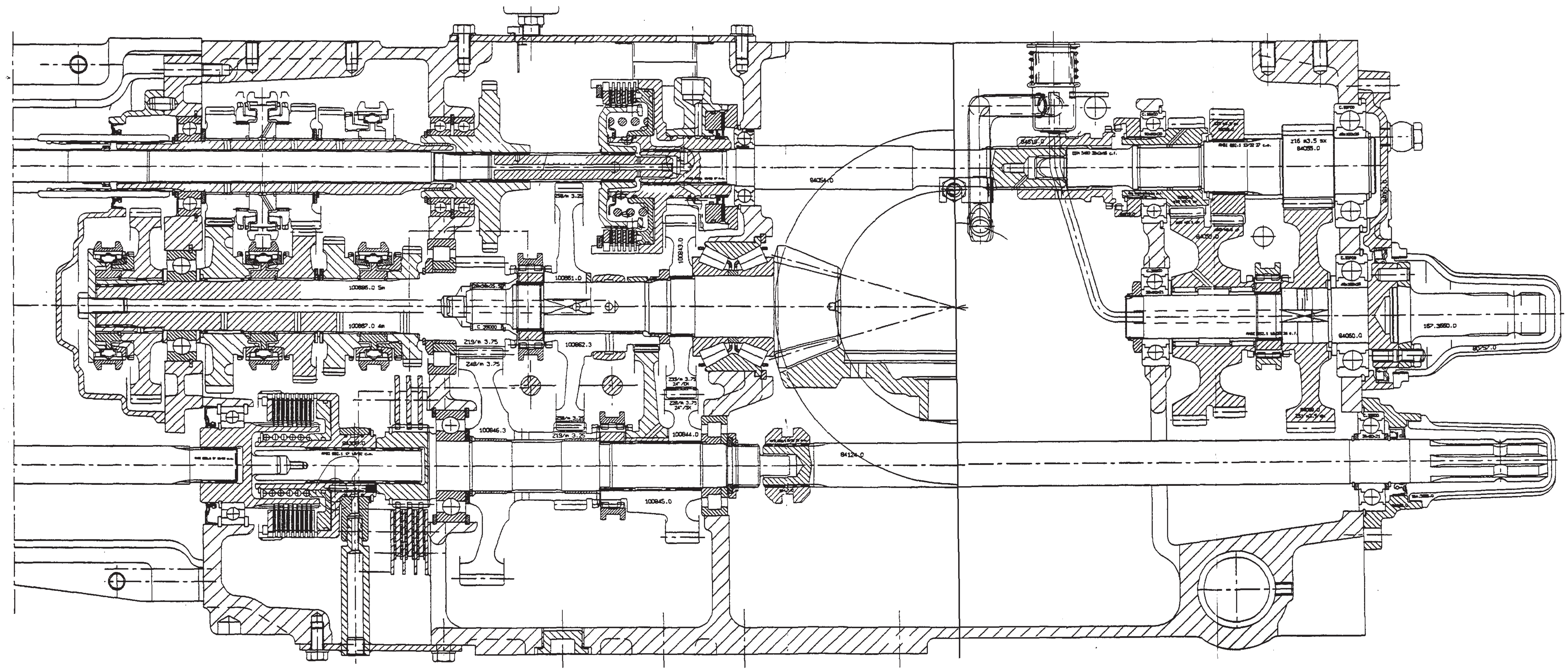


Fig. 9 - Longitudinal section through transmission (version with SBA and Silver 100.6 P.T.O. speed reduction; for Silver 80 - 90 - 100.4 P.T.O. see fig 4, page 165).

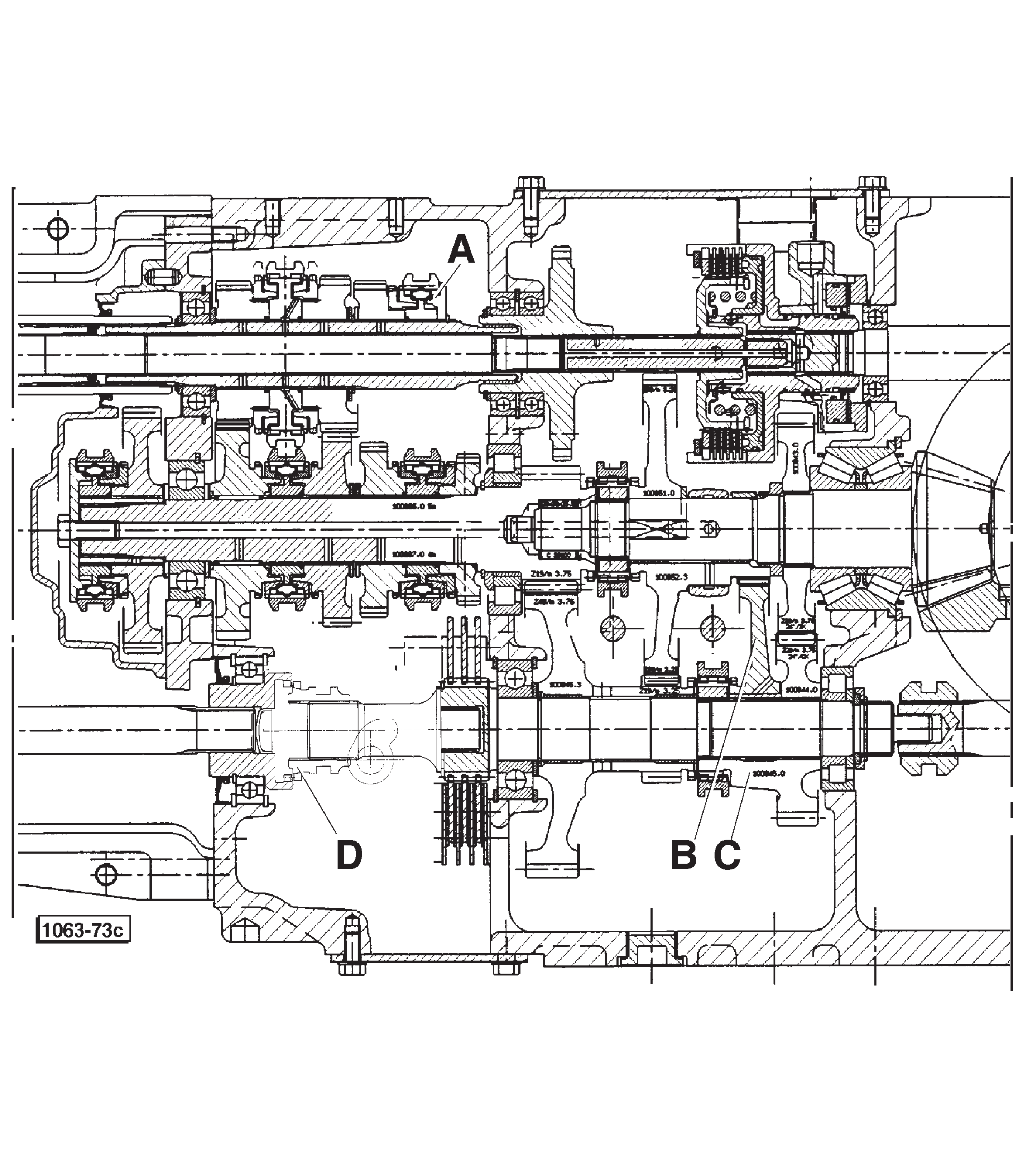


Fig. 10 - Gearbox longitudinal section (models without S.B.A.).
A - Models with mini-reduction, **B** - Models with super-reduction, **C** - Models without super-reduction, **D** - 4WD engagement for models without S.B.A.

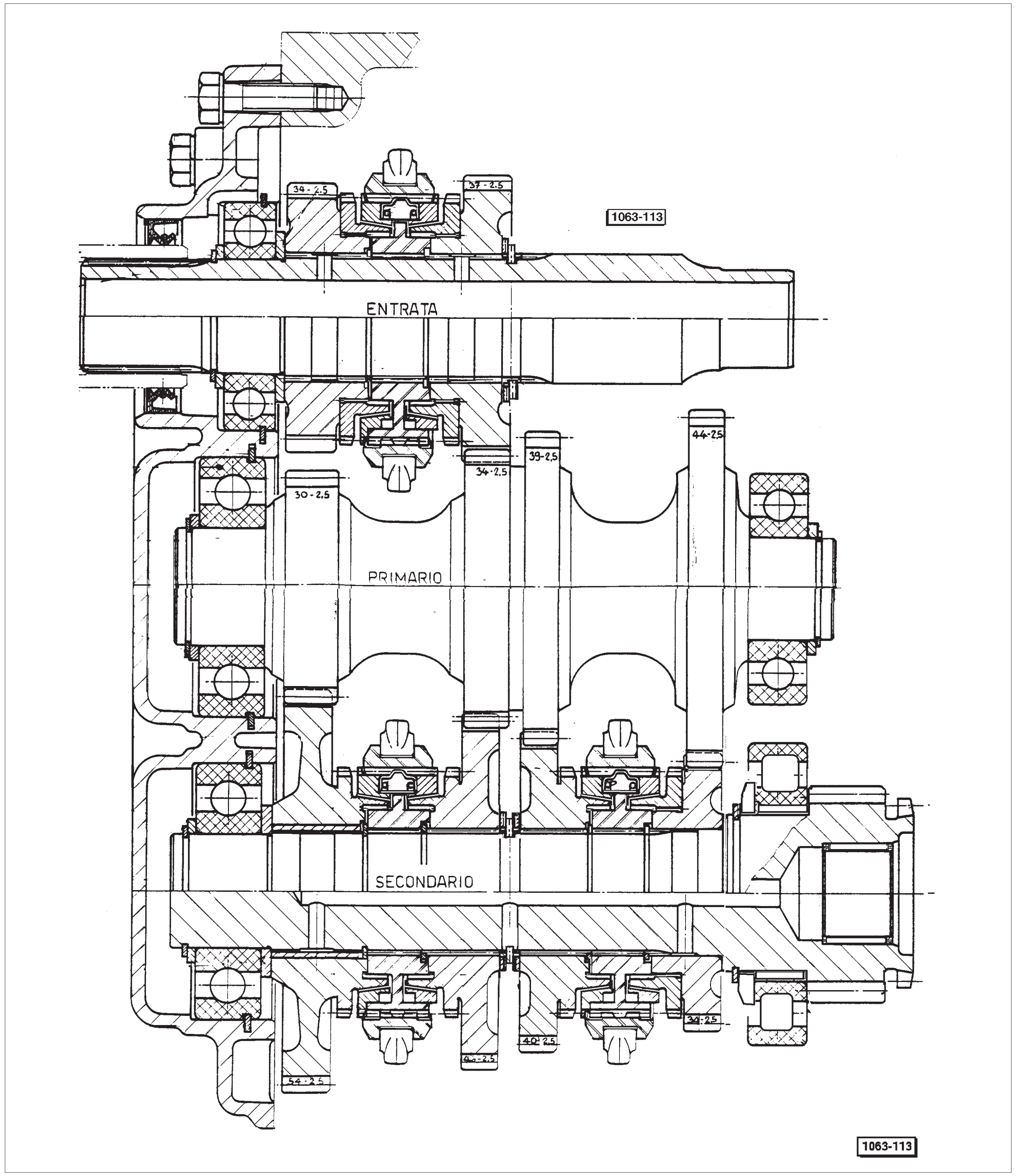


Fig. 11 - 4 speed gearbox (longitudinal view).

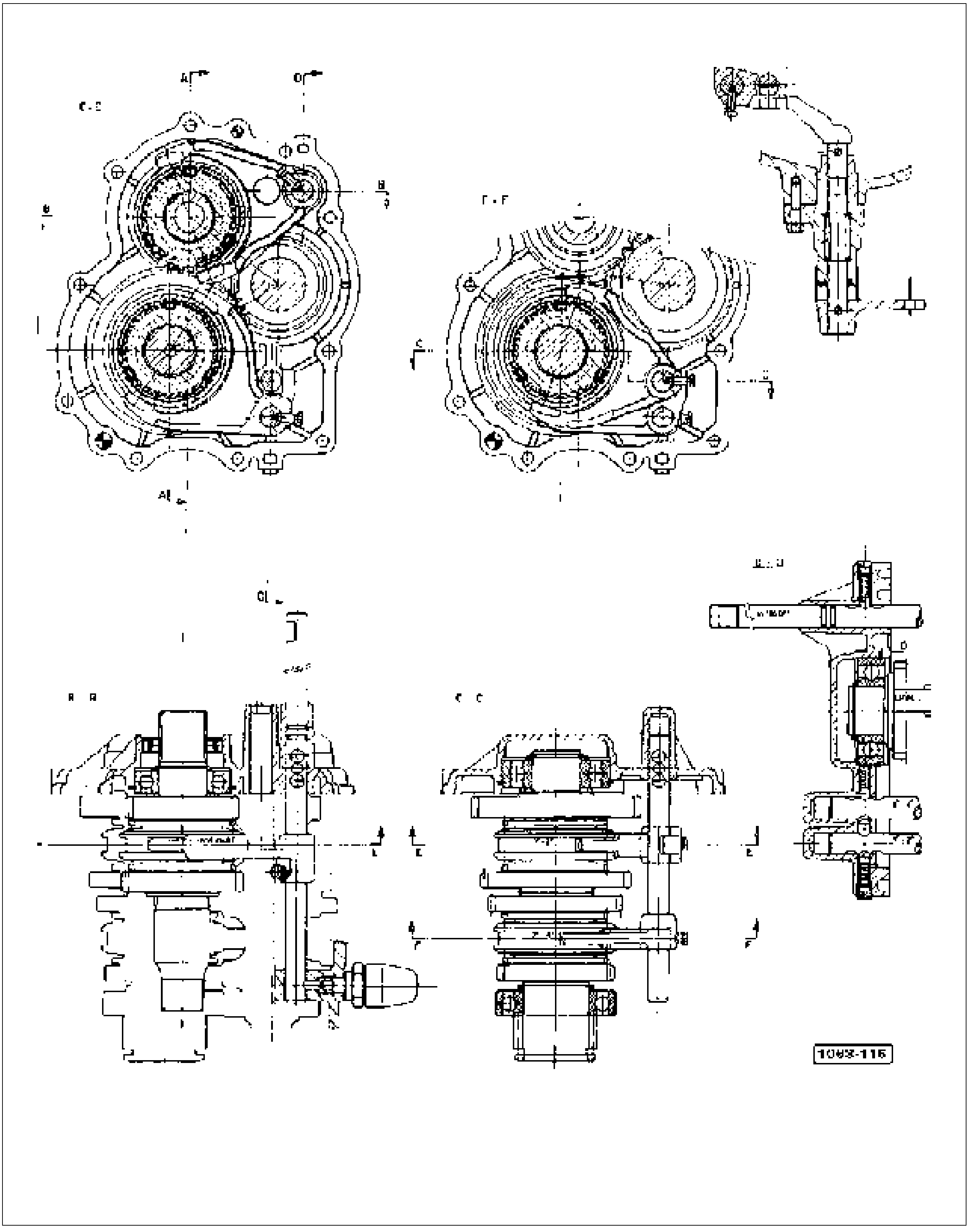


Fig. 12 - 4 speed gearbox (views).

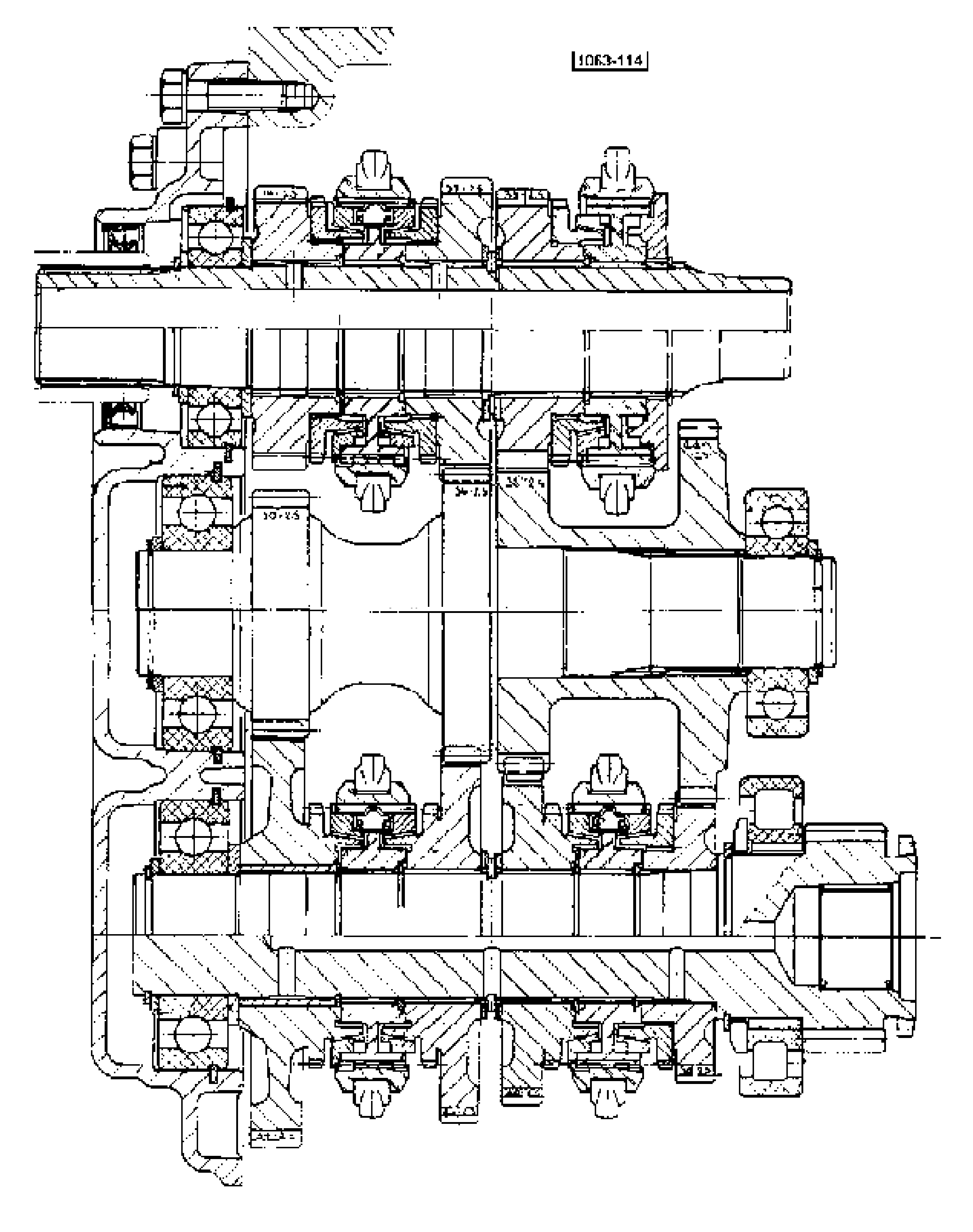


Fig. 13 - Gearbox with MINI-REDUCTION

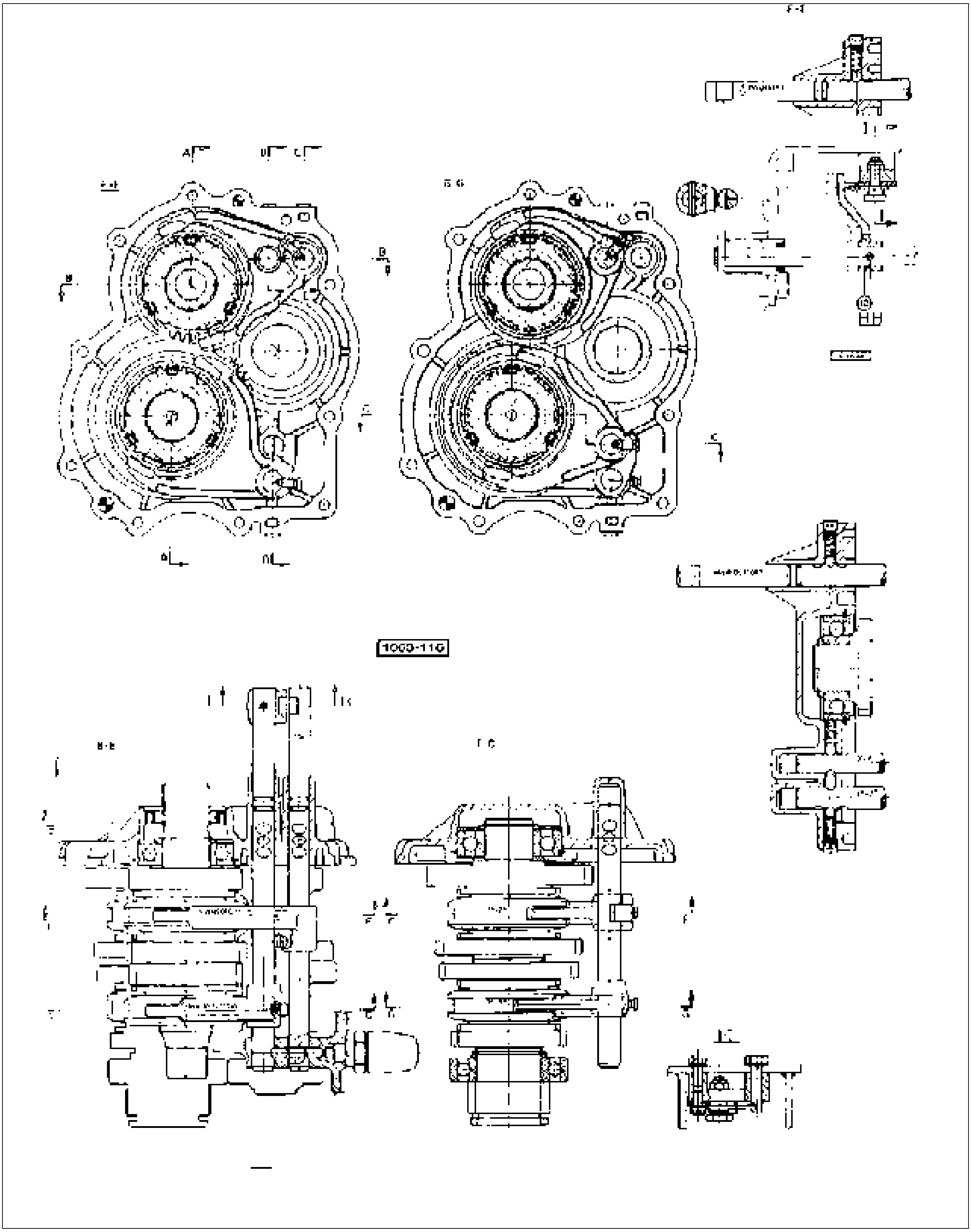


Fig. 14 - Gearbox with MINI-REDUCTION (views).

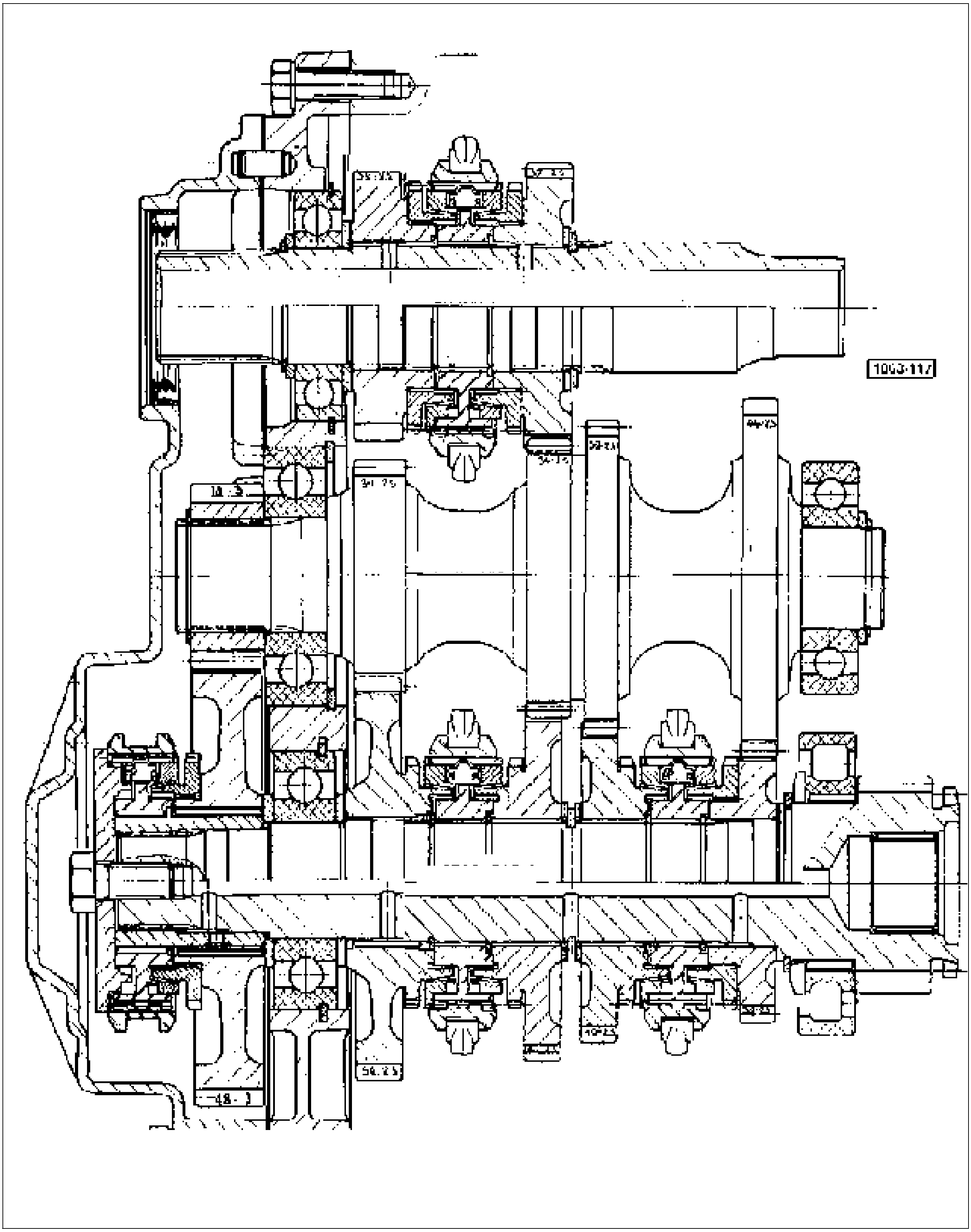


Fig. 15 - 5 speed gearbox.

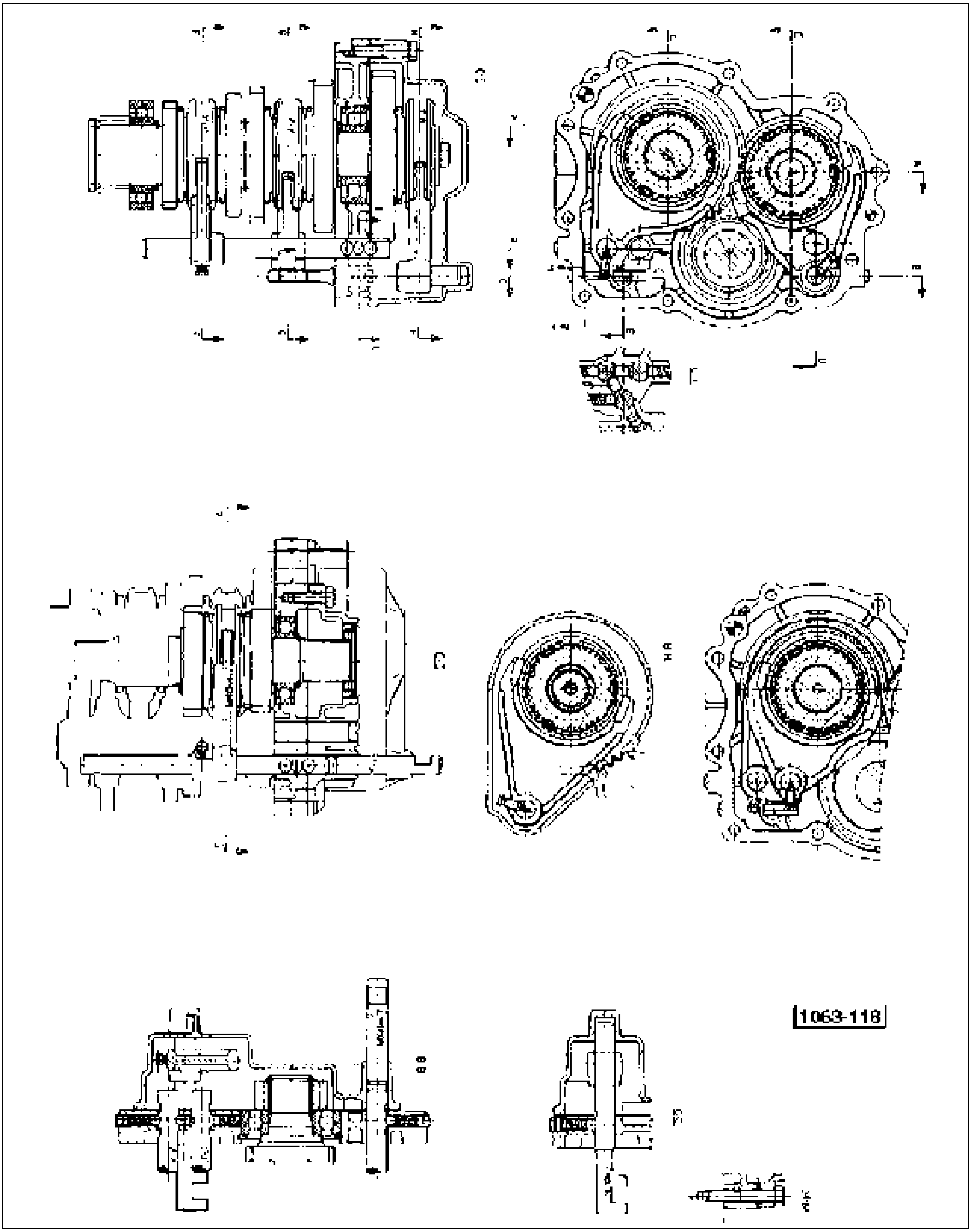


Fig. 16 - 5 speed gearbox (views).

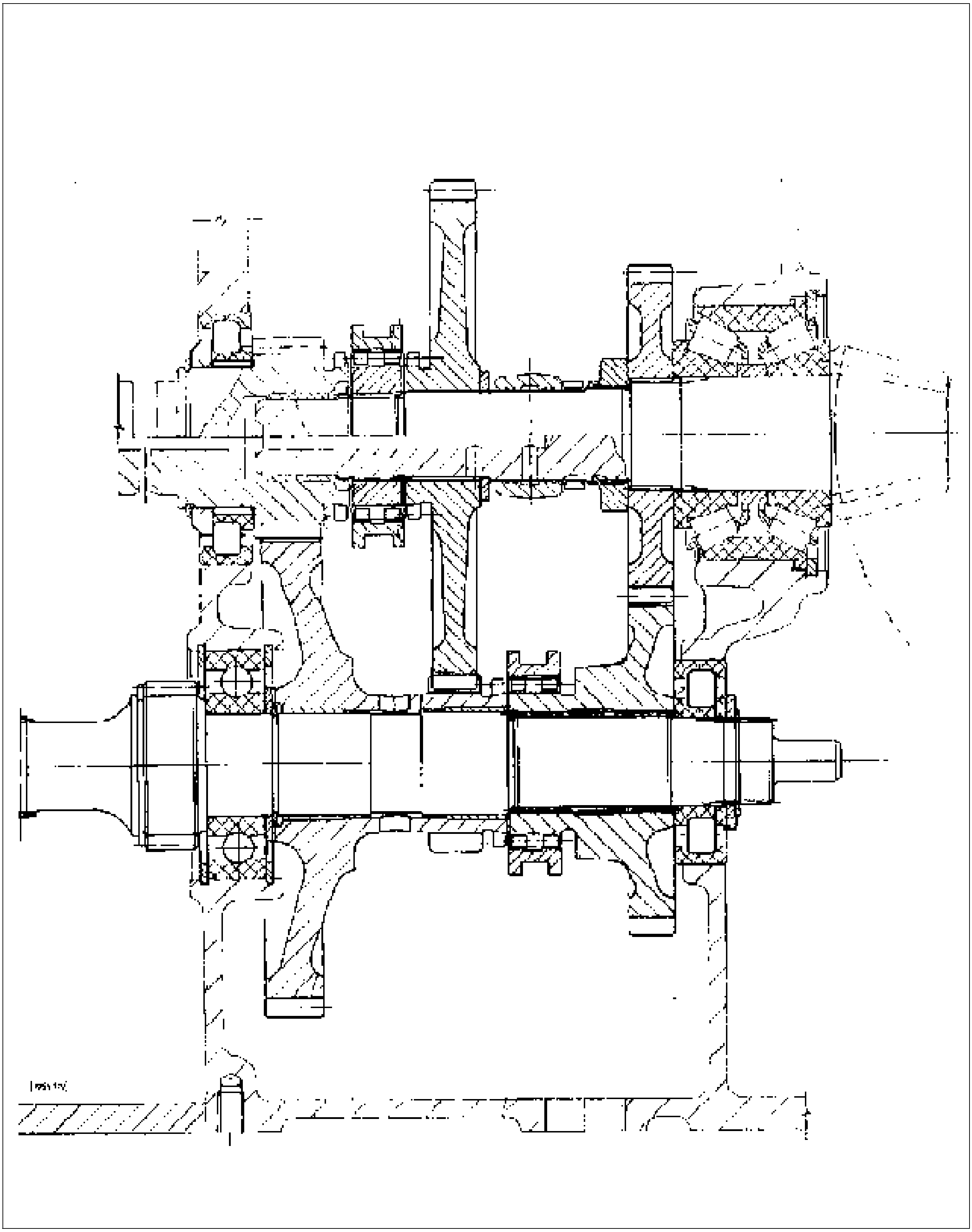


Fig. 17 - Range speed reduction assembly without creeper.

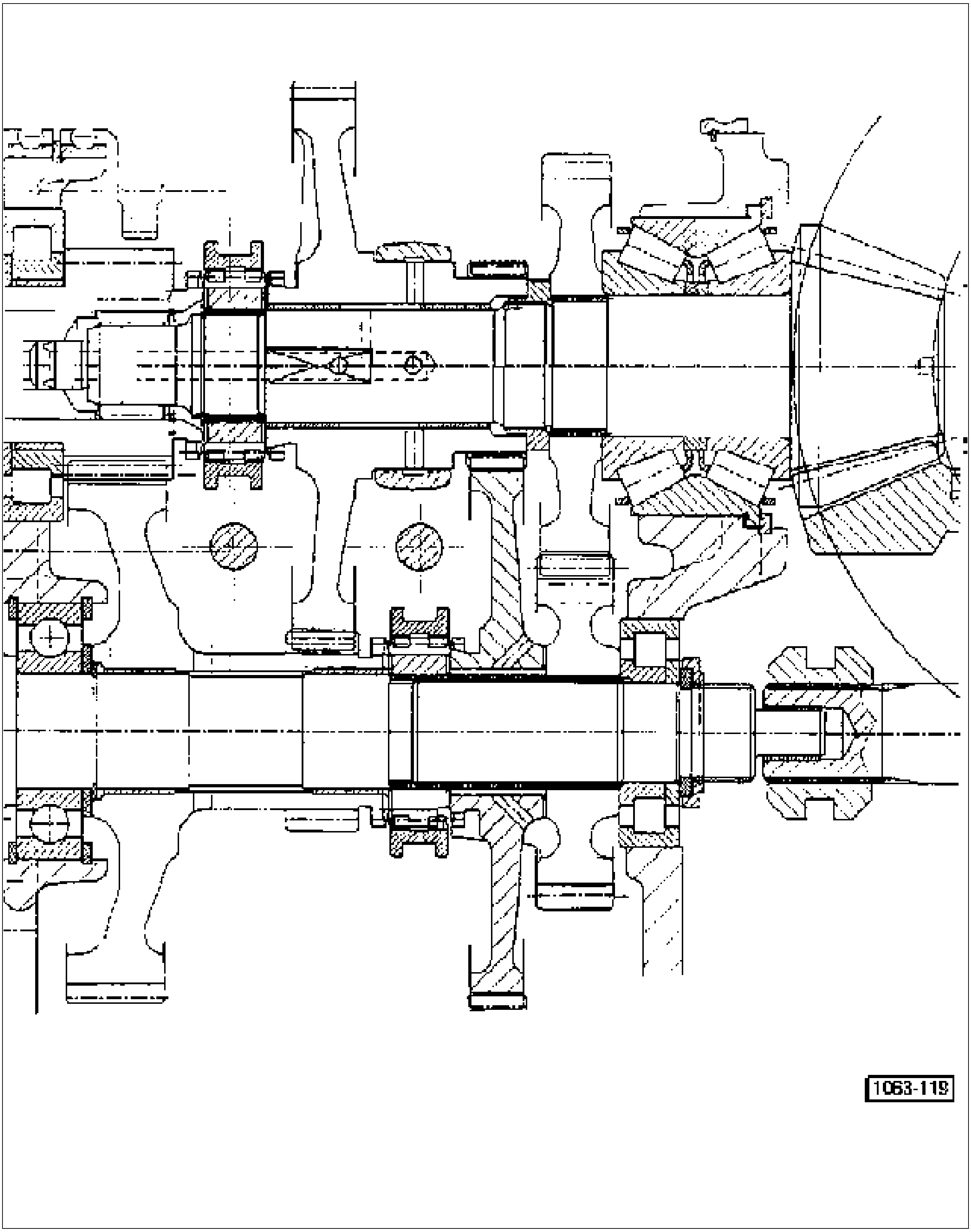


Fig. 18 - Range speed reduction assembly with creeper.

Gearbox removal

The complete gearbox assembly can be removed from the tractor very easily without requiring prior removal of the cab or platform, which can be supported during the operation by two props under the two rear “silent-block” mountings(Fig. 19)

To facilitate removal of the gearbox assembly we recommend the use of the mobile track stands 5.9030.002.0 and a hoist.

— Position the aforementioned stands and remove the rear tractor wheels.
— Remove the fuel tank after first disconnecting the fuel supply/return pipes and the electrical lead from the fuel gauge sensor.
— Detach the two gear and range control rods from the gearbox. Remove the four screws securing the control lever support to the gearbox and push the support downwards to disengage the internal reverser lever from the notch on the control rod.
— Disconnect the oil supply pipe to the hydrostatic steering control valve at the point of connection to the vibration dampers.
— Disconnect all the linkage rods from the levers located on the left-hand side of the driver’s seat (PTO SYNCHRO and PTO NORMAL-ECONOMICAL selection), the parking brake linkage, and the support for the power-lift control levers (on models with mechanical lifts only).
— Disconnect the P.T.O. clutch control (on tractors not equipped with electrohydraulic controls).
— Disconnect the bowdens from the auxiliary hydraulic control valves.
— Disconnect the oil supply pipe to the front lift (if fitted).
— Disconnect the oil supply pipe to the pressure control valve located on the right-hand side of the gearbox.
— Disconnect the oil supply pipe to the front differential lock, or detach the control linkage on tractors not equipped with electrohydraulic controls.
— Disconnect the electrical leads from the draft sensor and position sensor of the electronic lift control (if present).
— Disconnect the electrical leads connected to the raising valve and the lowering valve of the power-lift control (on tractors equipped with electronic power-lift control).
— Disconnect the electrical lead connected to the radar (if fitted).
— Disconnect the lead connected to the wheel speed sensor (on tractors fitted with electronic power-lift control).
— Disconnect the rear brake pipes.

Remove the bolts securing the cab to the 4 silent-block mountings.

With the aid of a hoist, push the rear gearbox assembly backwards, whilst keeping the parts aligned axially to allow the shafts to disengage their couplings.

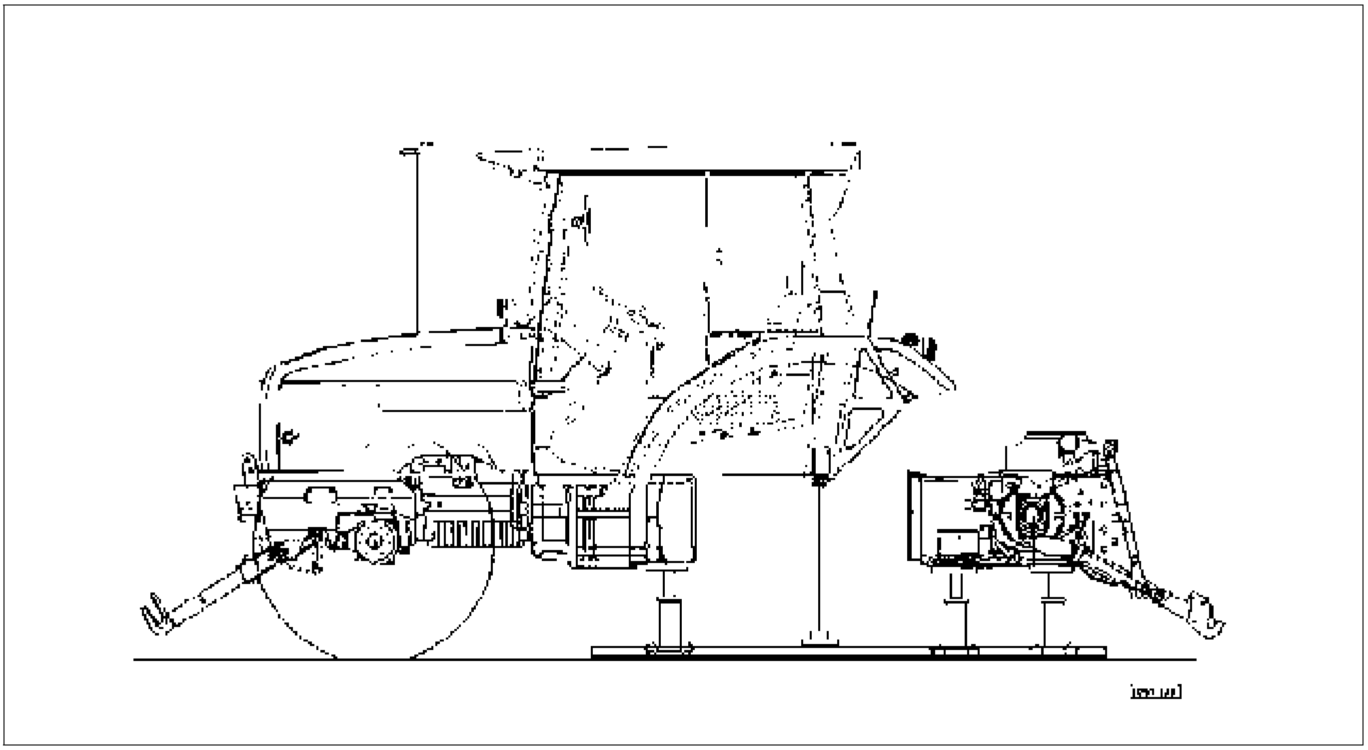


Fig. 19 - Gearbox removal.

Stripping the gearbox

The three gearbox shafts are installed on a flange which also serves as the front gearbox cover.

The whole assembly can be easily removed first loosening the cover fixing screws and then withdrawing the whole unit making use of a hoist, as shown in figure 21.

Prior to this operation, use a magnet to extract the pins securing the control rods to the gearbox (on gearboxes equipped with mini-reduction there are three such pins). See detail C in figure 44 on page 158).

To remove the shafts first disengage the rod forks loosening the securing screws, then take the snap rings from inside the cover seats and withdraw the shafts one after the other in sequence with little movements which should not exceed 5 mm at a time.

The same procedure is to be performed in reversed order when reassembling.

If one or more assembly components are to be replaced, it may be necessary to replace the snap rings indicated in figure 28 with new ones of the same type but having different thicknesses.

These should be inserted into seats freely without resulting in any clearance in the part assembly.

The same instruction applies to the spacing washers contacting the snap rings located either at the reverse gear unit shaft or the secondary shaft end.

All washers must be fitted with their oil drain sections opposed to the counterparts.

After assembly, on applying an axial load to the entire synchroniser assembly, an end-float of 0.15-0.60 mm should be obtained (a higher value indicates that the synchroniser is excessively worn and therefore must be replaced).

Make sure that all parts are free to move and the engagement occurs evenly.

Forks must be placed on the rods in such a way that they will not rub against the synchronizer sleeve groove sides.

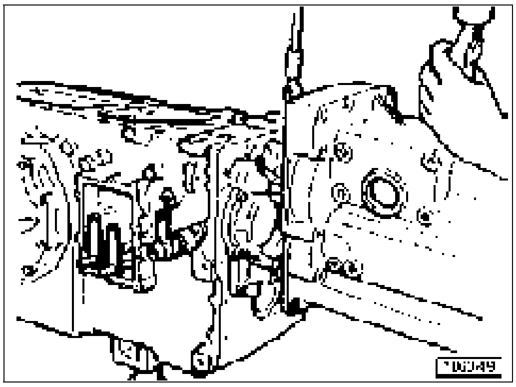


Fig. 20 - Separeting the gearbox .

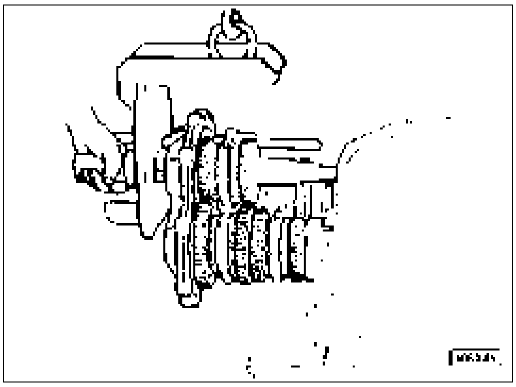


Fig. 21 - Removing the whole gearbox assembly.

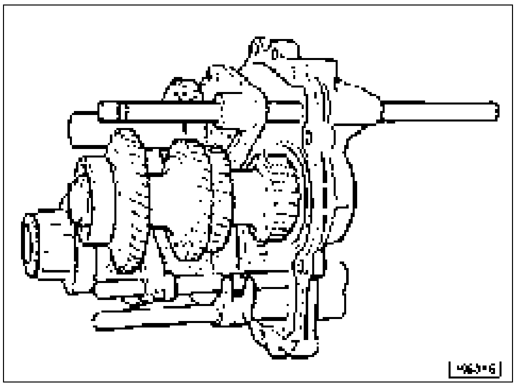


Fig. 22 - Gearbox assembly.

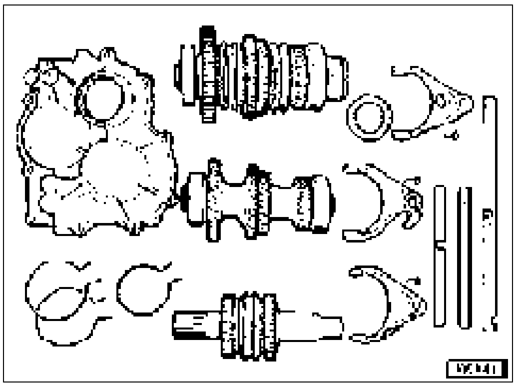


Fig. 23 - External controls detailed.

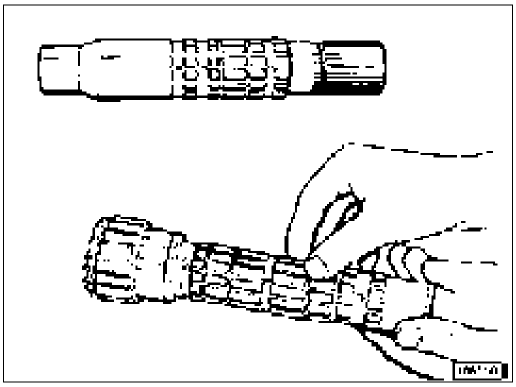


Fig. 24 - Checking the gearbox shafts removed.

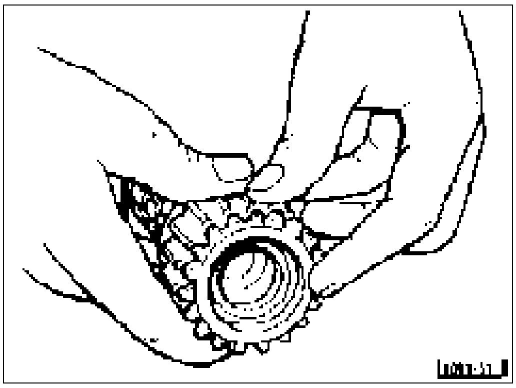


Fig. 25 - Checking bushing for wear.

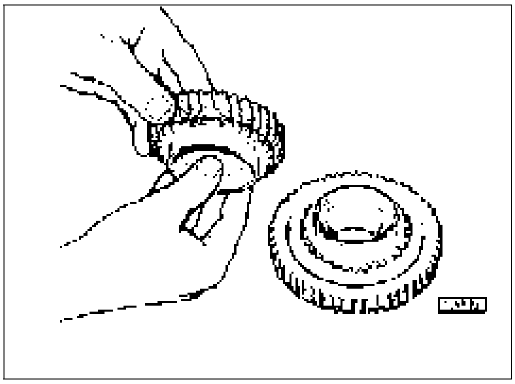


Fig. 26 - Checking gear teeth for wear.

Examining parts removed

Gearbox case

Gearbox case should show no cracks, bearing seats must not be worn or damaged.

If seriuos damage or excessive wear is occured replace the parts concerned.

Whenever the gearbox is disassembled clean all sealing surfaces removing old adhesive and applying some new on all surfaces evenly when reassembling.

Shafts

Examine shafts for excessive wear and shaft splines for pitting, these should allow the gears to slide freely.

Gears

Examine gear teeth for wear or damage and make sure these work on the whole contact surface.

Check also the gear-mounted bushings for seizing: if so replace them.

Synchronizers

Check the ring inside tapered portion for excessive wear or damage and be sure the gear part being frictioned by the synchronizer does not show signs of scoring which may prevent the gear from meshing correctly.

To check the synchronizer ring for wear, measure the distance from the friction cone; reading should be $1.25\ ^{+0.30}_{-0.15}$ mm with a new synchronizer or drop to zero when the ring is maximally worn.

Bearings

Bearings should be in perfect conditions without showing excessive radial or end play.
Holding the bearings pressed by hand and making them simultaneously turn in both directions of rotation a free sliding as well as no roughness at all should be felt.
Examine the taper roller bearings for proper working conditions, these should be neither worn nor overheated, replace as soon as poor working efficiency is suspected, as an abnormal bearing operation may result in either gear tooth seizure or noisy gearbox.

Warning: oil leakages from the clutch-disk-to-gearbox shaft or the engine-flywheel-to-P.T.O.-clutch shaft may be stopped when the assembly procedure is performed with the utmost care and operating in such a way that the splined parts are prevented from damaging the O-ring and also providing a thorough cleaning of the parts prior to being installed.

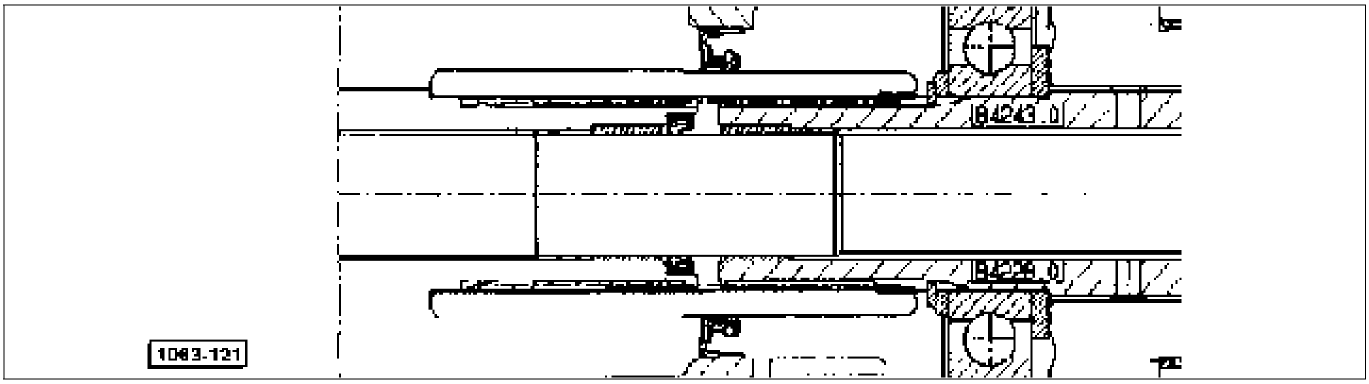


Fig. 27 - Shafts from clutch plate to gearbox.

INSTALLING CIRCLIPS OF VARIABLE THICKNESS

Shims **A** are to be selected on assembly from those indicated in figure 28, so that all bearing play is eliminated when the circlips are fitted in their respective seatings.
The synchroniser hubs are held in position on the shaft by circlips **B**; select circlips of an appropriate thickness from those indicated in figure 28 so that all synchroniser hub play is eliminated.

SPACER
A

2.1599.414 0	40x50x3
2.1599.423.0	40x50x2,9
2.1529.424.0	40x50x2,8
2.1599.425.0	40x50x2,7

SNAP RING
B

2.1422.032.7	45x1,5
2.1499.059.0	45x1,8

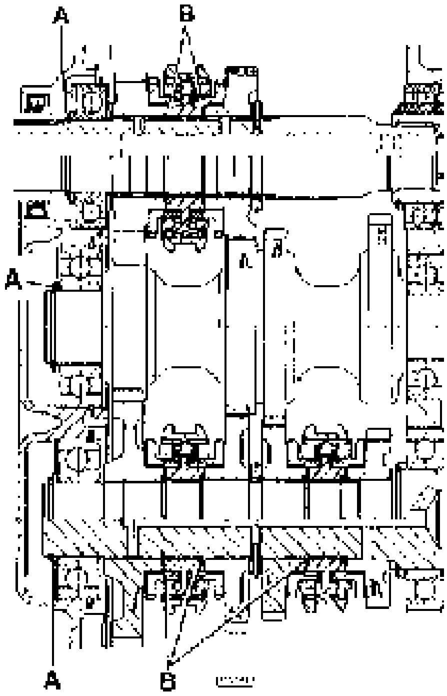


Fig. 28 - Positioning the gearbox shaft shims and synchroniser circlips.

NOMINAL DIMENSIONS OF GEARBOX BUSHES

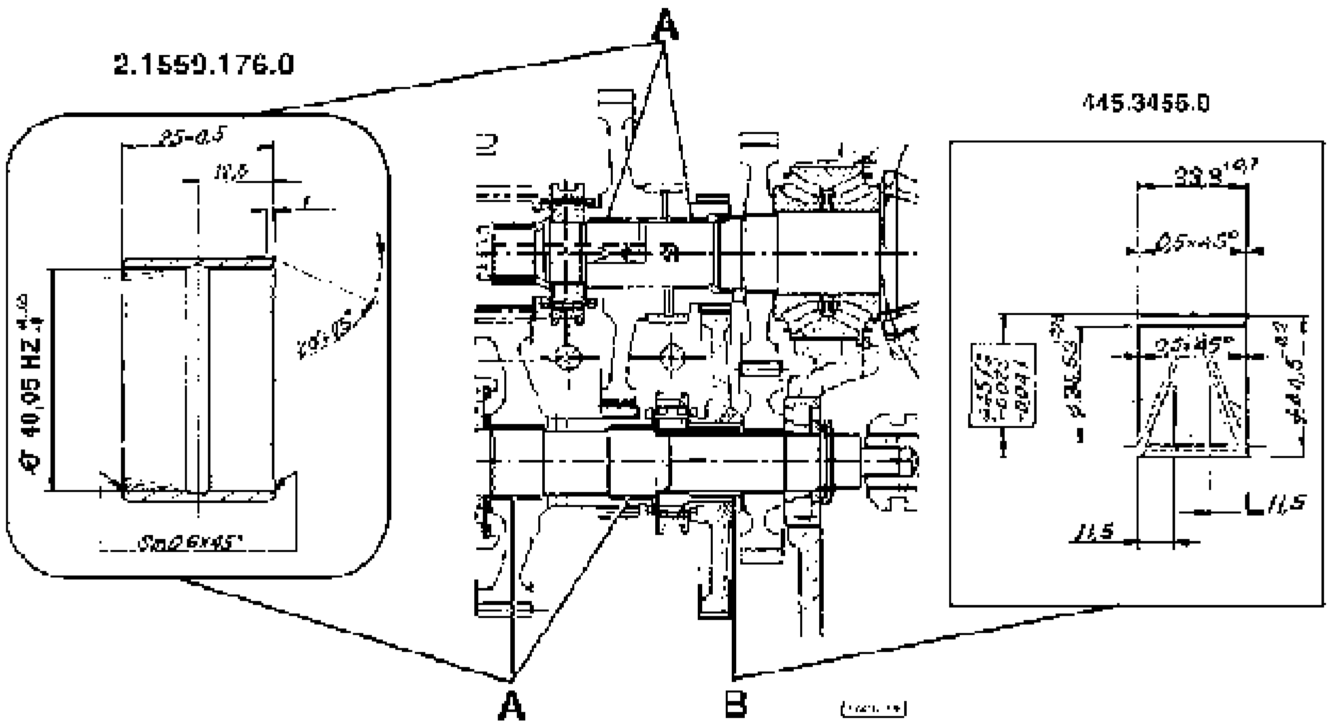


Fig. 29 - Bushes installed in the gears of the reduction gear unit.

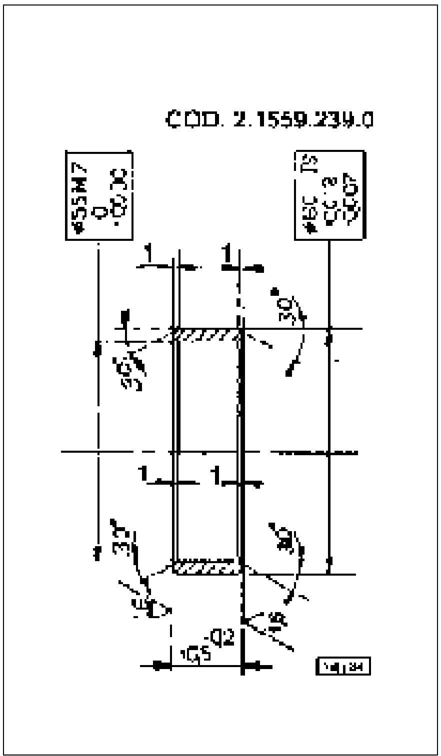


Fig. 30 - Nominal dimensions of layshaft bush 2.1559.239.0 (all transmission versions).

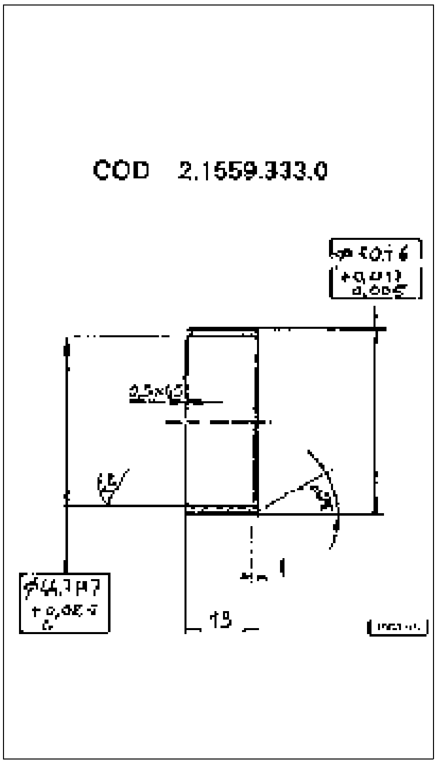


Fig. 31 - Nominal dimensions of layshaft bush 2.1559.333.0 (all transmission versions).

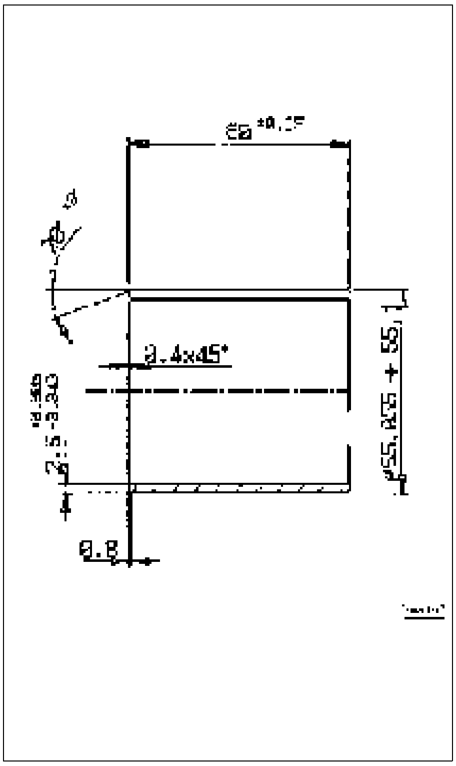


Fig 32 - Nominal dimensions of layshaft bush 2.1552.316.0 (all transmission versions with Agroshift).

INSTALLING THE INTERMEDIATE SHAFT BEARING - (TRANSMISSIONS WITH MINI-REDUCTION ONLY)
The intermediate shaft bearing for *Silver 100.4 -100.6* must be installed without a retaining circlip (see figure 33).
(If this bearing is purchased as a replacement part, it will be supplied with the circlip installed in the groove; this circlip must be removed prior to installation on the aforementioned models).

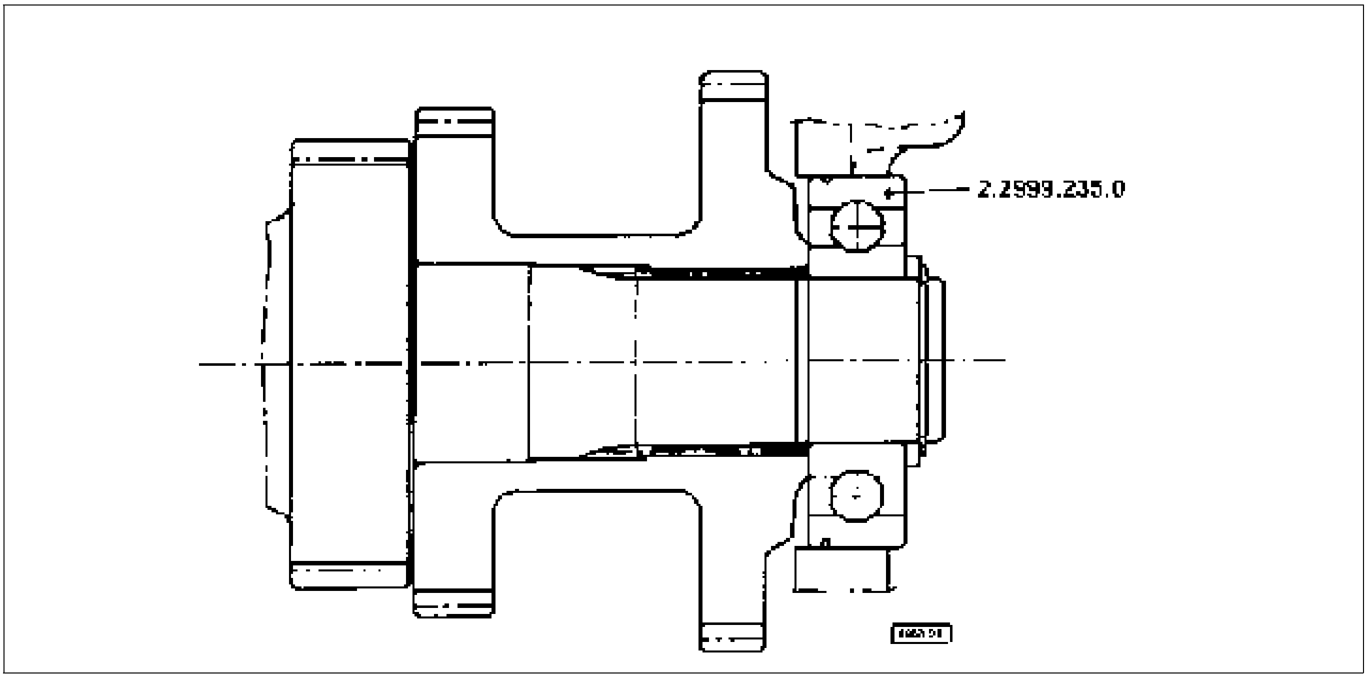


Fig. 33 - Assembly of the intermediate shaft bearing.

ADJUSTING SECONDARY SHAFT END FLOAT FOR THE 5-SPEED GEARBOX

1 - (For all models) - Interpose a calibrated shim **A** selected from the following four thickness:

- **A** code 2.1559.737.0 thickness 2.15 mm;
- **A** code 2.1559.738.0 thickness 2.30 mm;
- **A** code 2.1559.739.0 thickness 2.45 mm;
- **A** code 2.1559.740.0 thickness 2.60 mm;

in order to completely eliminate all end float of the secondary shaft.

2 - (For Agroshift models only) - Proceed as follows: after having installed bearing **F** and shaft **B**, measure the stand-in **C** of the face of the bearing relative to the wall of the gearbox casing whilst pushing the bearing towards the rear of the gearbox casing. Install shims **D** to the same thickness as the value measured, and check, after installation of flange **E**, that there is no play or preload on the bearing.

- **D** code 2.1580.304.0 thickness 0.5 mm;
- **D** code 2.1580.303.0 thickness 0.2 mm
- **D** code 2.1580.310.0 thickness 0.05 mm

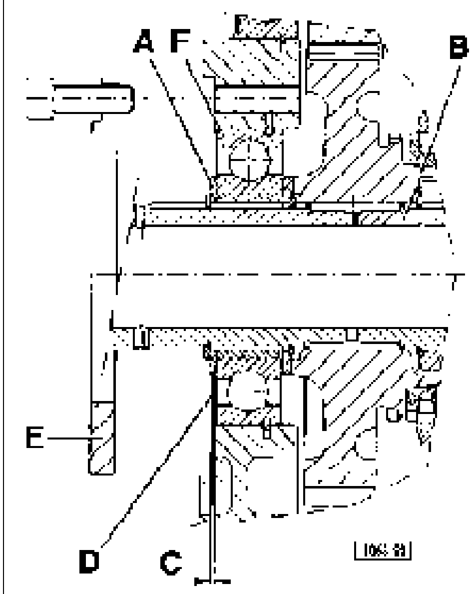
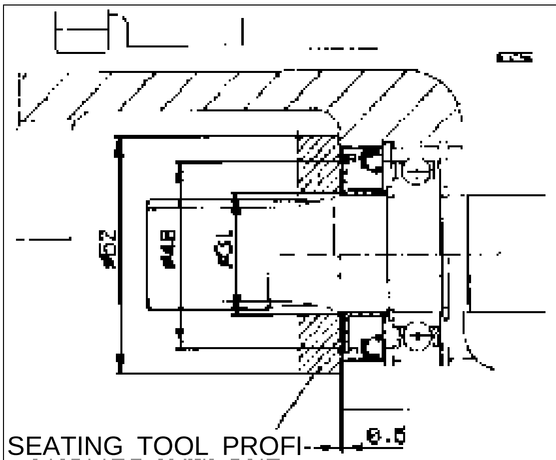


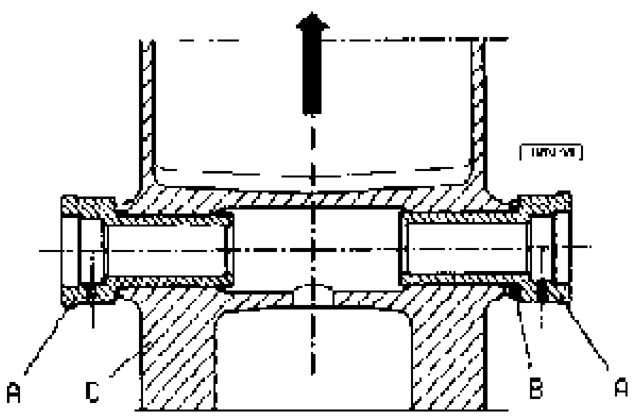
Fig. 34 - Shimming up the secondary shaft.



Fitment of waterproof seal p/n 2.1529.106.0 to the 4WD transfer shaft.

The seal is fitted using a special seating tool. Position the ring as indicated and press in until recessed 0.1 mm from the face of the transmission housing.
The dimensions illustrated are for fabrication of the tool.

Fig. 35 - Fitment of waterproof seal to 4WD transfer shaft.



Fitment of spring rod bushes in transmission housing

Chill the two bushes **A** in liquid nitrogen and press fully home into the transmission housing **C**.
The two bushes must be positioned with the threaded hole directed to the rear as illustrated (the arrow indicates the direction of movement of the tractor).
NB: on 80 - 90 HP machines, position distance rings **B** between the bushes and the housing.

Fig. 36 - Fitment of spring rod bushes to transmission housing (machines equipped with electronic lift system).

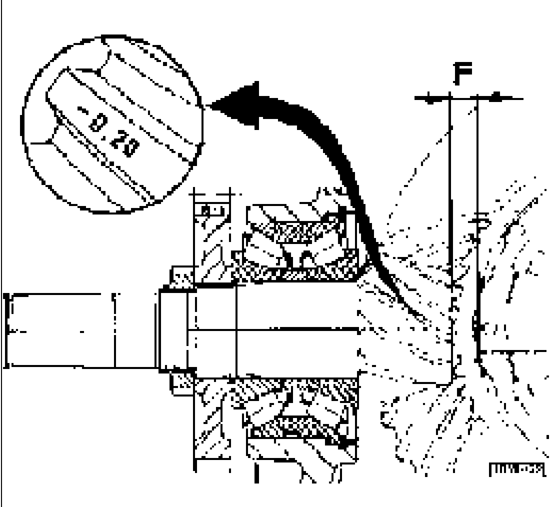


Fig. 37 - Value stamped on a tooth of the pinion.

E - SNAP RING

2.1499.061.1	120X3,4
2.1499 062.1	120x3,5
2.1499 063.1	120x3,6
2.1499.064.1	120x3,7
2.1499.065.1	120x3,8
2.1499.666.1	120x3,9
2.1499.067.1	120x4,0
2.1499.068.1	120x4,1

Fig. 38 - Select circlips of suitable thickness for the amount of bevel pinion play.

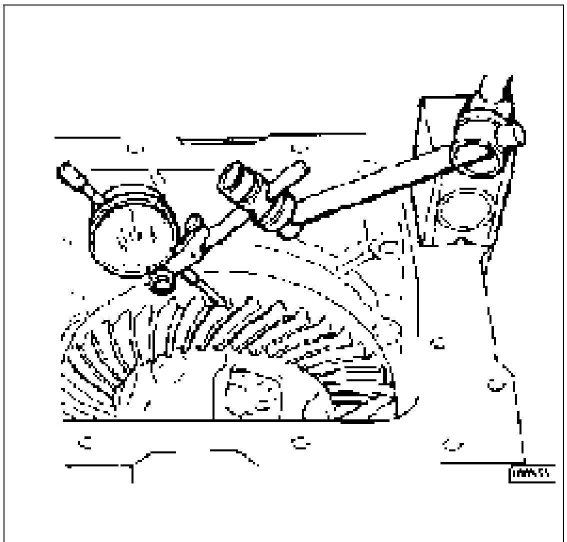


Fig. 39 - Checking backlash between bevel pinion and ring gear teeth.

Adjusting the bevel drive (see figs. 40 and 41)

Fit the pinion in the gearbox casing together with the bearing pack **A** (without interposing shims), install gear **B** and tighten the lock ring to a torque of : 44 ÷ 48 Kgm (440÷480 Nm).

Fit the differential case without the crown wheel; install shims for the tapered roller bearings **D** and **E** so that they rotate freely in their seatings but a slight preload can be felt; then install a shim of thickness 0.1 mm. to preload the bearings.

Adjust the distance **F** between the differential case and the head of the pinion by installing shims in position **G** indicated in figure 40; the exact measurement of this adjustment is obtained by adding or subtracting the value stamped on the side of one of the pinion teeth to the value of: 4 mm (models not equipped with SBA system) or 2.5 mm (models equipped with SBA system).

The bearing assembly is held in position **C** by a circlip (selected from those supplied in oversizes from 3.4÷4.1 mm. (see figure 38) to fit perfectly in the bearing seating and prevent all bearing play.

Fit the crown wheel to the differential case and, using a dial gauge, measure the backlash between the pinion and the crown wheel; the backlash should be between 0.18÷ 0.24 mm (see figure 39), if not, remove shims from the pack **D** and add them to pack **E** to bring the crown wheel closer to the pinion, or vice versa to move it further away.

NB: On completion of bevel drive adjustment, slacken off the ring nut, apply Loctite 270 to the thread, then re-tighten to a torque of 44 ÷ 48 Kgm (440÷480 Nm) and secure the pinion lock nut by staking.

Tighten the crown wheel bolts to a torque of 10÷12 kgm (98÷117).

Refitting the bevel drive without replacing any components

No adjustment is necessary. Fit the original shim packs and check that the distance between the head of the pinion and differential case is as specified.

Replacing the crown wheel bearings

Fit shims of a suitable thickness to obtain a bearing preload of 0.1 mm. This done, check the backlash between the pinion and the crown wheel and adjust if necessary.

Replacing the pinion bearings

If one of the components is damaged, the entire bearing assembly must be replaced (as the supplier will determine the configuration of the assembly according to the dimensional tolerances) after which the bevel drive must be adjusted.

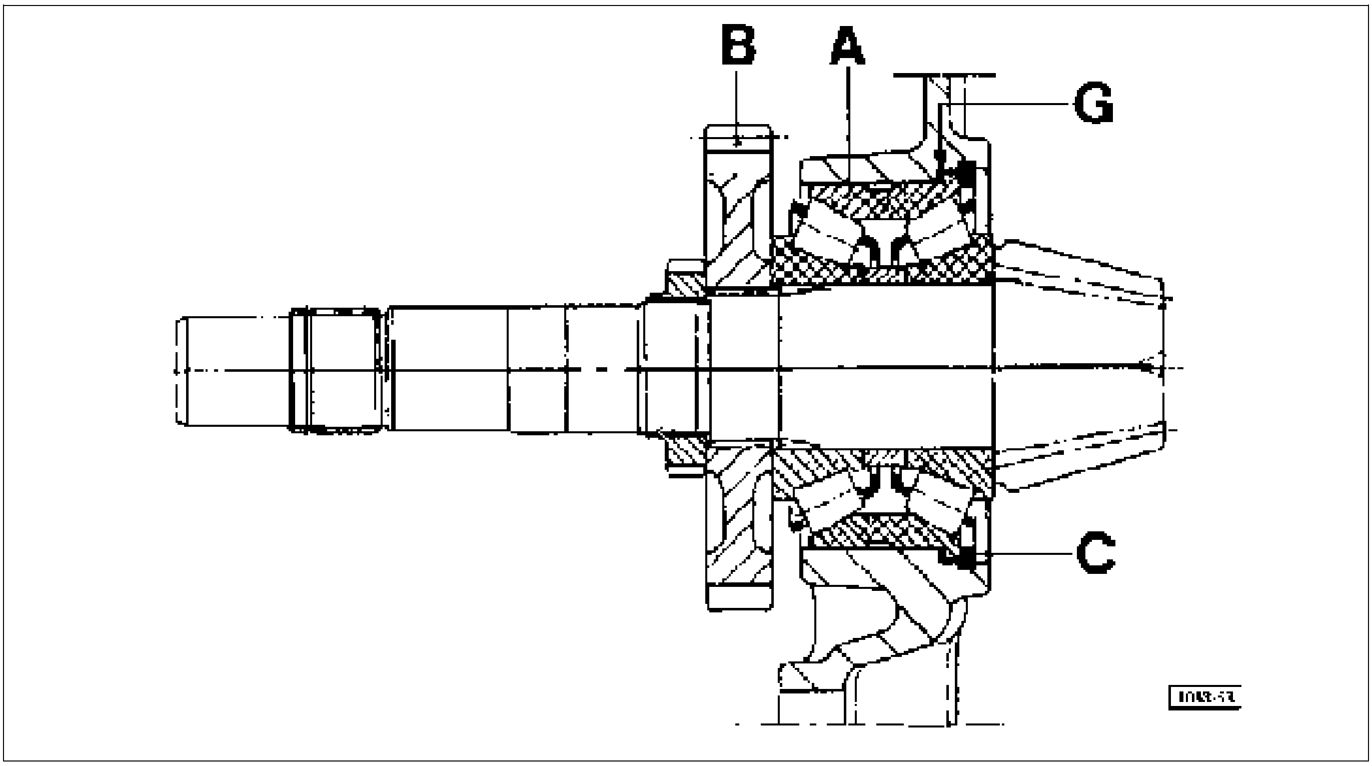
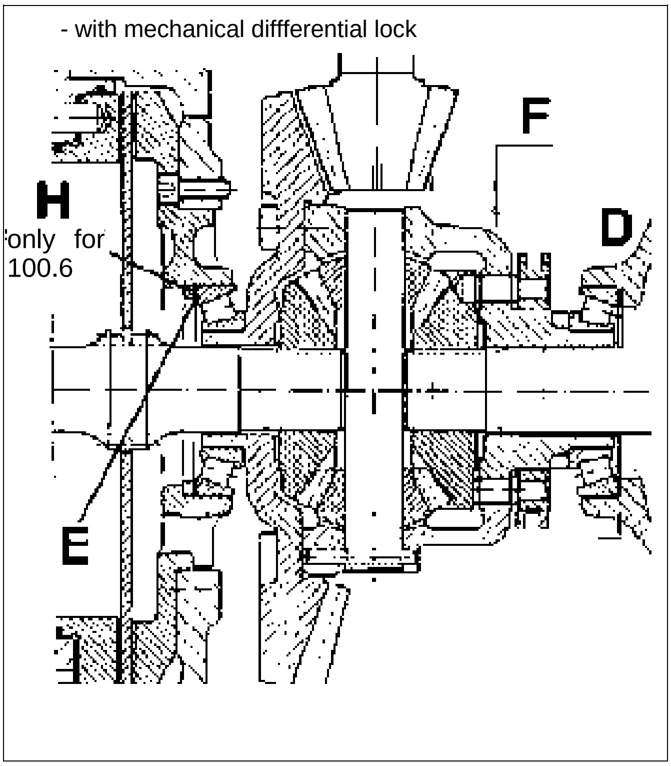


Fig. 40 - Installing bevel pinion shims.



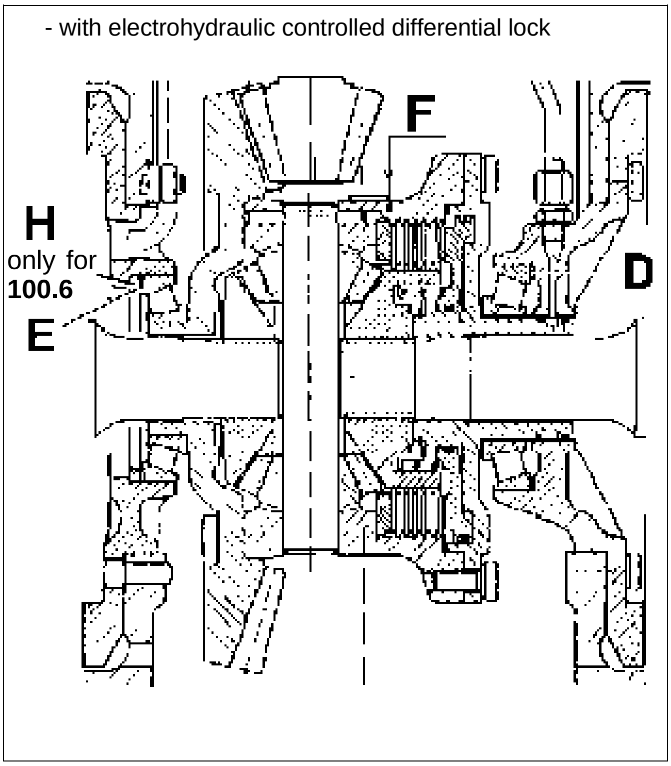


Fig. 41 - Installing bevel drive shims (the two figures show the differential units on the Silver 100.6.
The differential units for Silver 80 - 90 - 100.4 are of the same shape but different dimensions; in addition they are fitted without the spacer H).

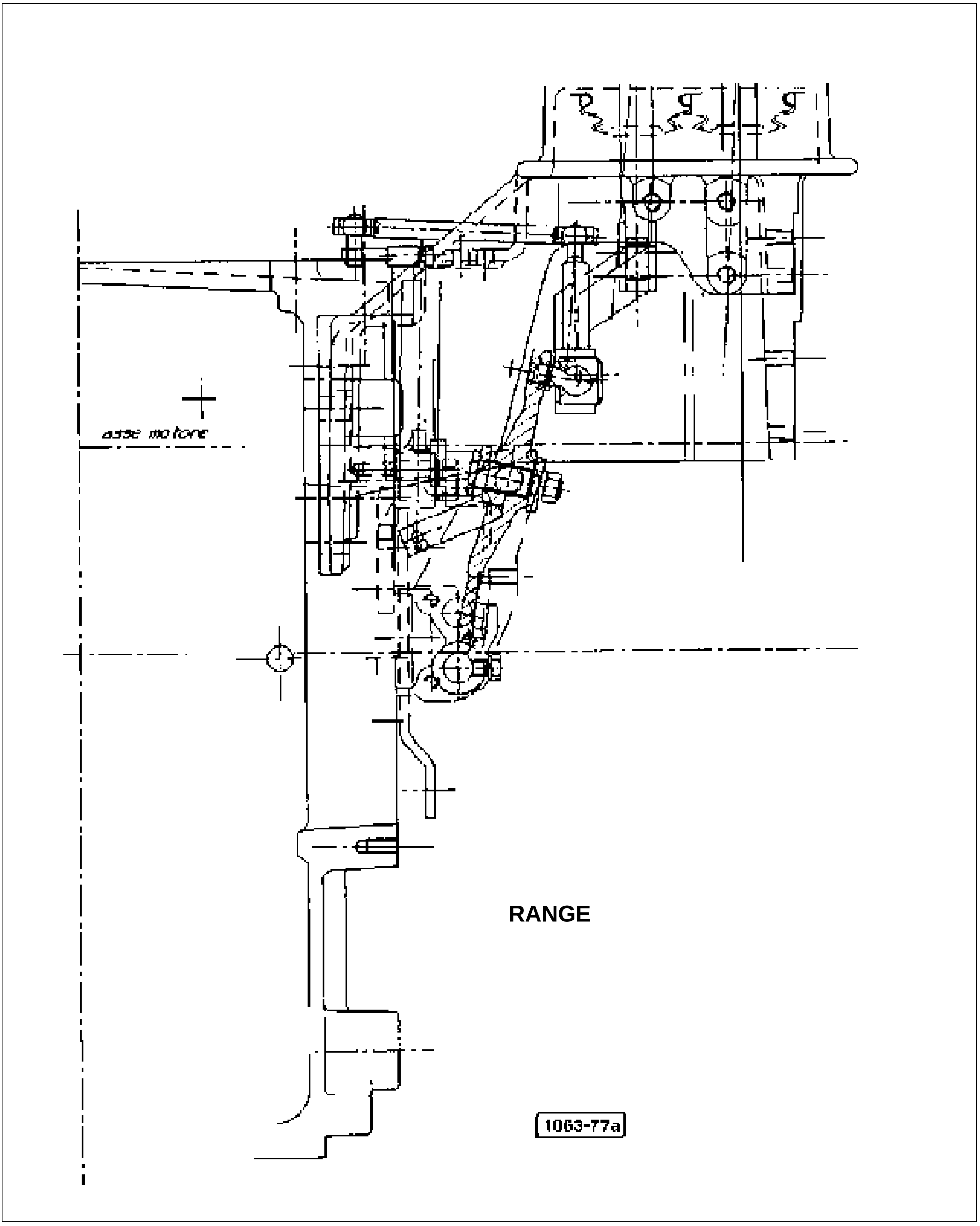


Fig. 42 - Speed range controls.

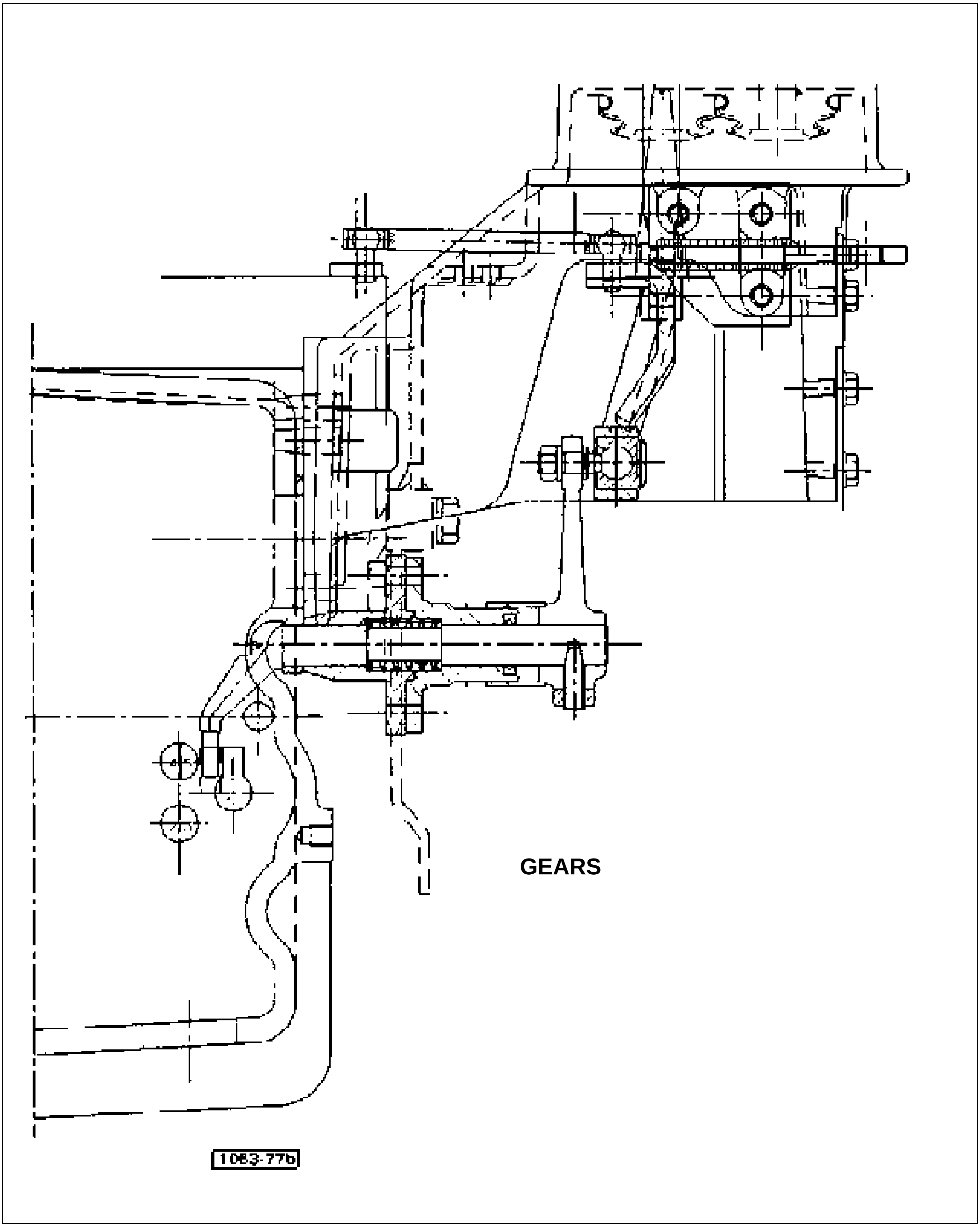


Fig. 43 - Gearshifting controls.

transmission

primary shaft - secondary shaft - reduction gear unit

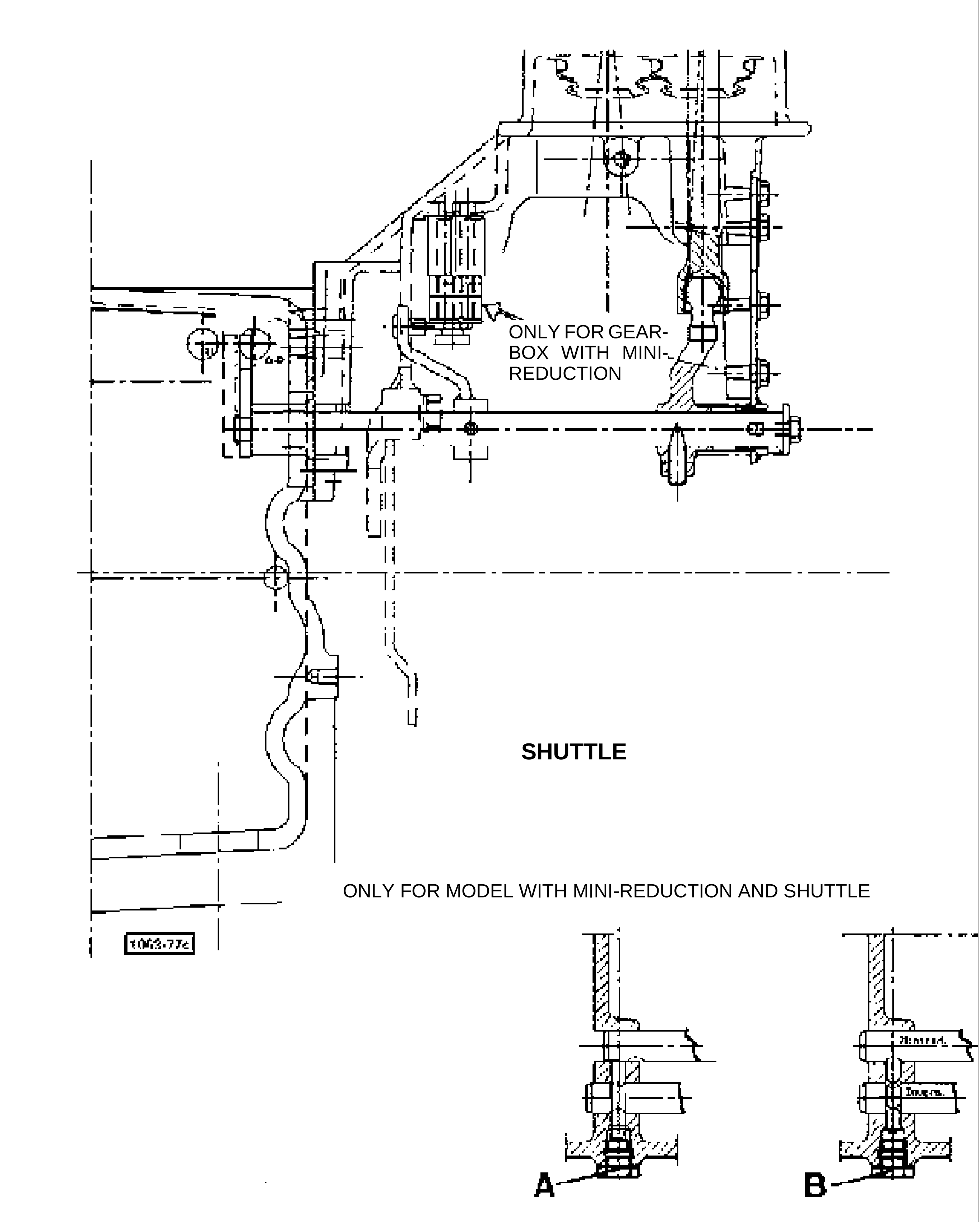


Fig. 44 - Reverser controls.
A - Model without mini-reduction
B - Model with mini-reduction (neutral position)

GEAR CONTROL LINKAGE SLEEVES AND BALL JOINTS TO BE LUBRICATED ON ASSEMBLY

Before assembly, fill the chambers **A,** with MOLIKOTE grease.
Grease the ball joints **B,** with MOLIKOTE grease.
Fit bush **C**, applying LOCTITE 601 to surface indicated in the figure.

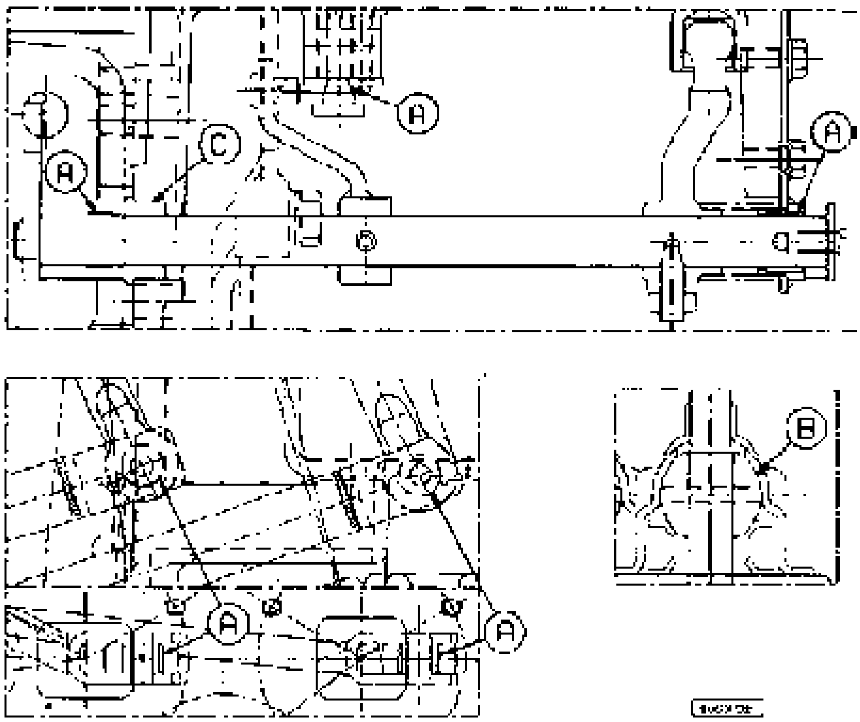


Fig. 45 - Sleeve, ball joints

Tightening torques

before tightening all screws should be cleaned and lubricated with engine oil.

		kgm	Nm
bolts securing front housing to transmission housing		8,6	85
bolts securing intermediate and transmission housings		14	140
bolts securing H-M-L cover		3	30
bolts securing engine to transmission housing		14	140
bolts securing lift housing to transmission housing		8,6	86
crownwheel bolts		12,5	125
bevel pinion lock nut		44 ÷ 48	440 ÷ 480
bolts securing differential flanges		3,3 ÷ 4,1	32 ÷ 40
bolts securing differential cage to halfshaft		13,5 ÷16,8	130 ÷ 164
	- Silver 80 - 90 - 100.4	17,5	170
	- Silver 100.6	6	60
rear bracket fixing bolts			
	- Silver 80 - 90 - 100.4	8,6 ÷ 9,6	84 ÷ 94
	- Silver 100.6	17	170
rear bracket fixing bolts	- Silver 100.6	12	120
P.T.O. shaft lock nut		16 ÷18	160 ÷ 180
bolts securing transmission to engine flange		9 ÷ 11	88 ÷ 107

Main assembly operations involving transmission housing, rear axle, hydraulic lift and engine.

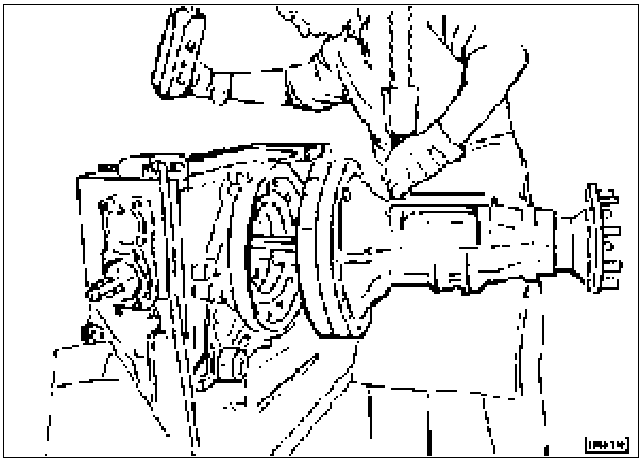


Fig. 46 - **Important:** to facilitate assembly of the trumpet housing, it is good policy to fit centralizer dowels p/n 5.9030.537.0 to the transmission housing. Apply sealant (Pianermetic 510) to the surface of the trumpet housing.

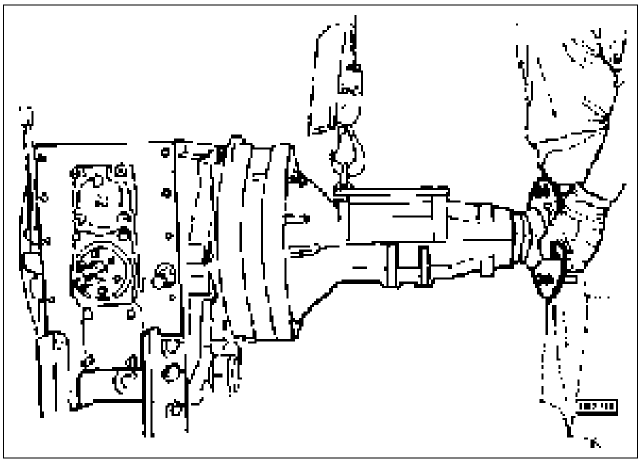


Fig. 47 - Position the trumpet housing using a hoist, taking care to locate the halfshaft in the epicyclic train internally of the housing.

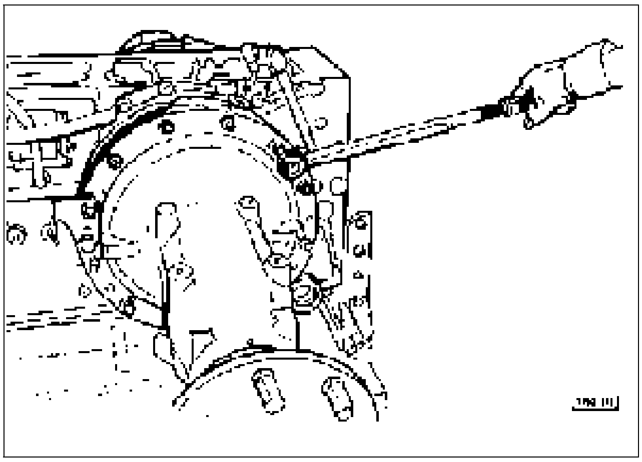


Fig. 48 - Having located the bolts, tighten with a torque wrench to **8,5 kgm** for Silver 80 - 90 - 100.4 machines and **17 kgm** for a Silver 100.6.

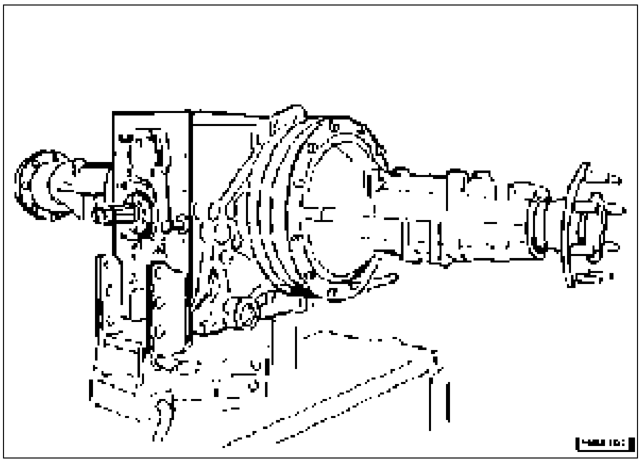


Fig. 49 - Rear transmission housing complete with trumpet housings.

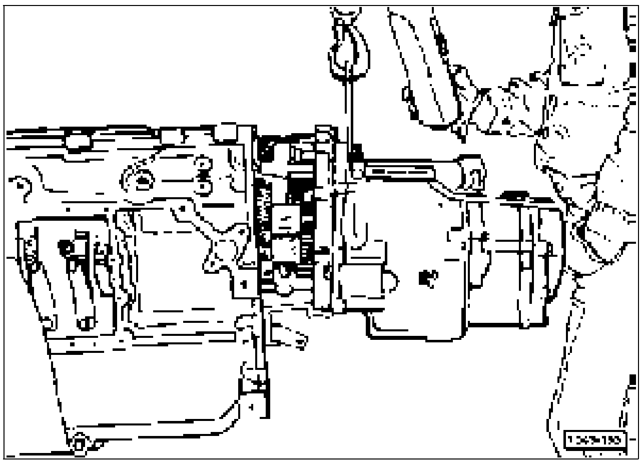


Fig. 50 - Install the Agroshift unit and gearshift assembly, complete, in the rear transmission housing. Apply Silastic 738 sealant to one of the mating surfaces before uniting (on machines without Agroshift, proceed with fitment as for standard gearshift only).

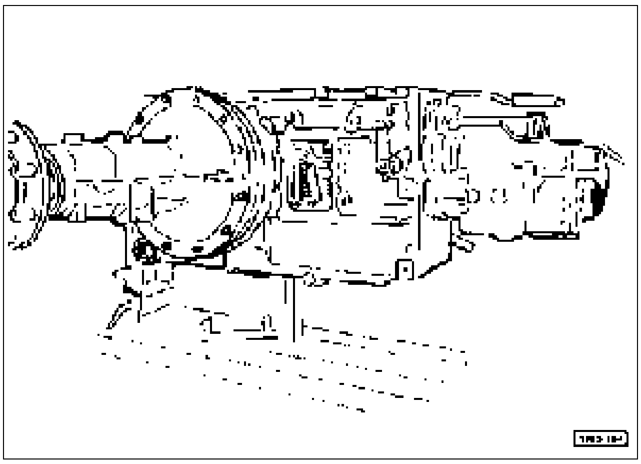


Fig. 51 - Transmission housing complete with Agroshift unit.

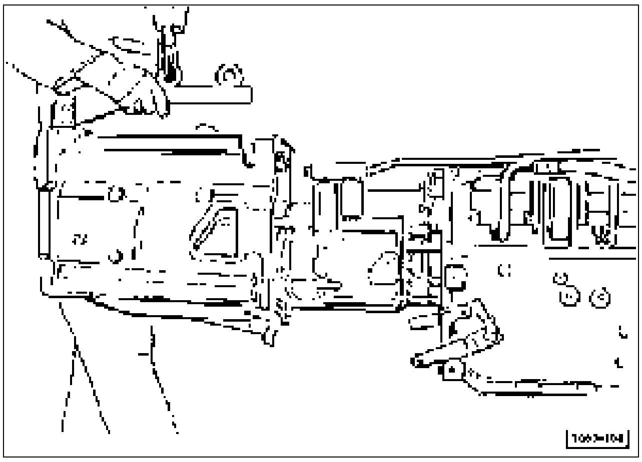


Fig. 52 - Using a hoist, unite the front and rear transmission housings.

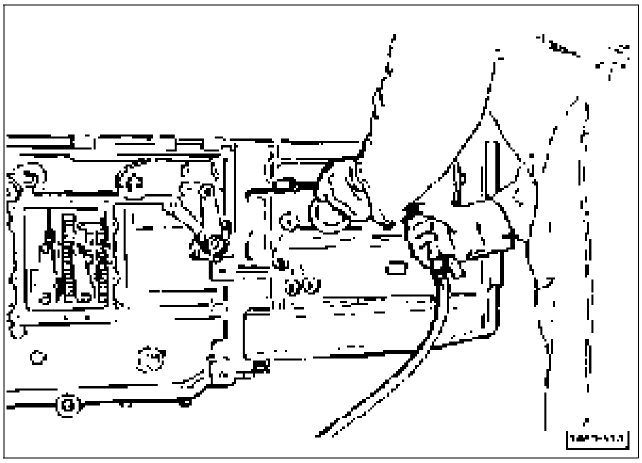


Fig. 53 - Secure the housing, torquing the bolts to **12 kgm.**

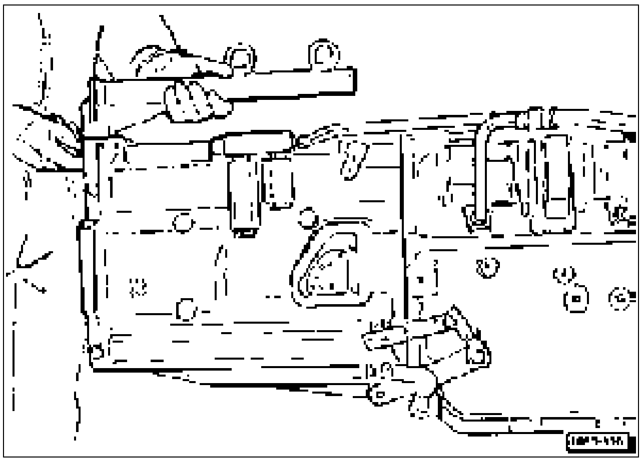


Fig. 54 - Detach the lifting gear from the front housing.

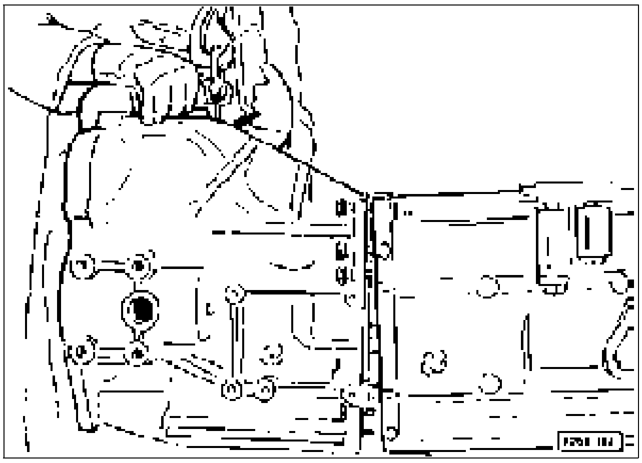


Fig. 55 - Using a hoist, offer the intermediate housing to the front transmission housing.

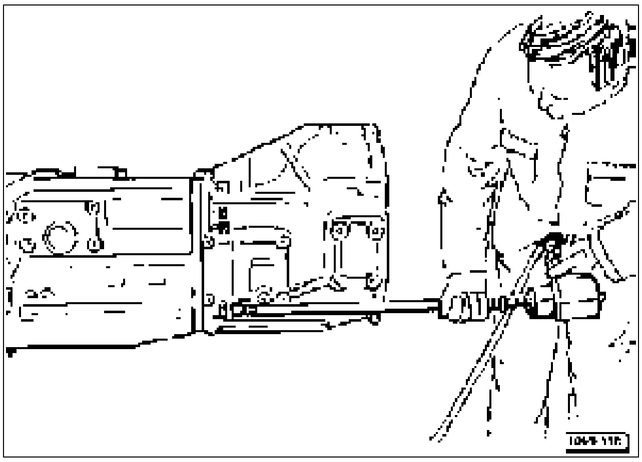


Fig. 56 - Secure the intermediate housing, torquing the bolts to **14 kgm.**

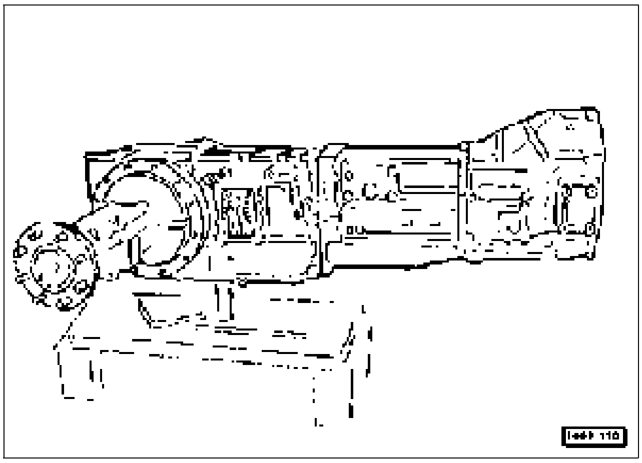


Fig. 57 - Transmission housing, complete.

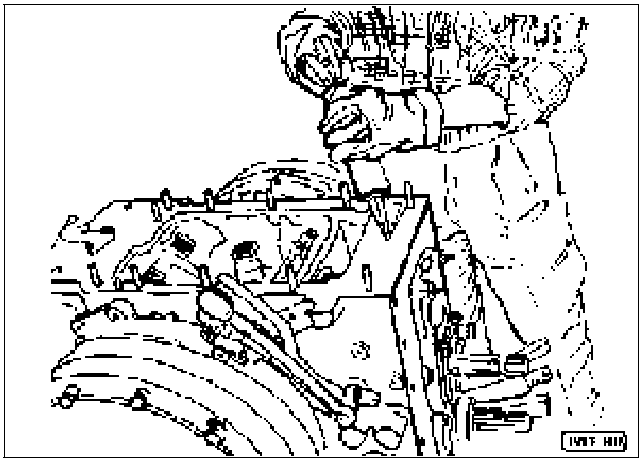


Fig. 58 - Lay a bead of sealant (Pianermetic 510) on the top surface of the transmission housing where the lift housing is to sit.

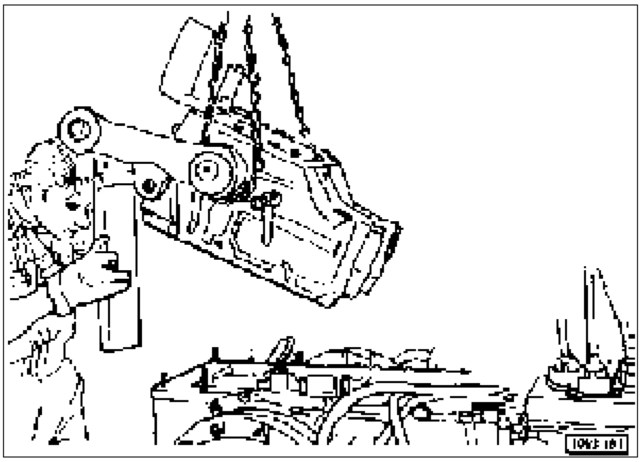


Fig. 59 - Using a hoist, position the hydraulic lift over the transmission housing.

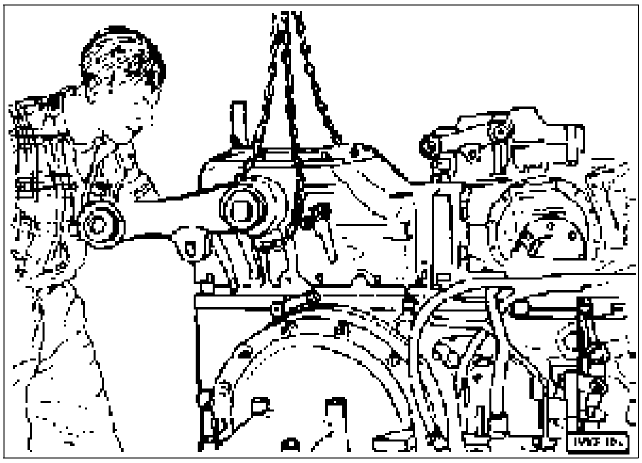


Fig. 60 - Settle the lift housing on top of the transmission housing.

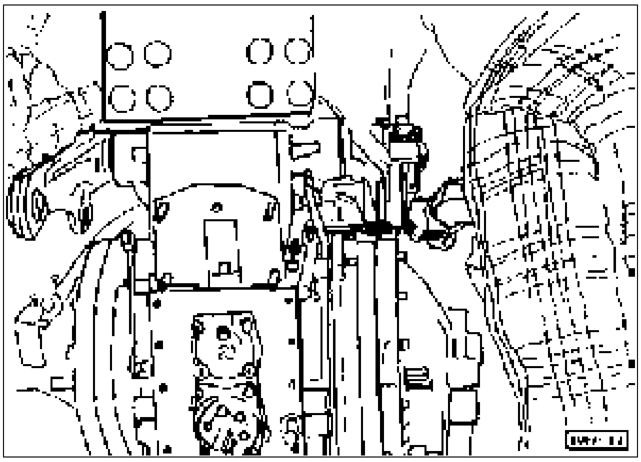


Fig. 61 - Proceed to tighten the bolts securing the lift housing to the transmission housing, torquing to **8,6 Kg.**

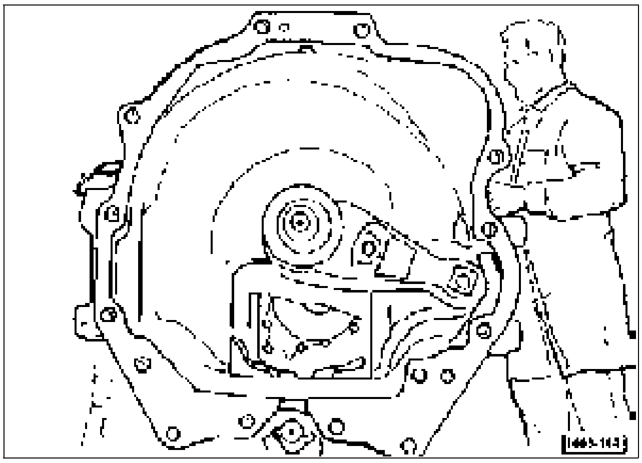


Fig. 62 - Locate the thrust bearing control mechanism in the intermediate housing, complete with operating lever.

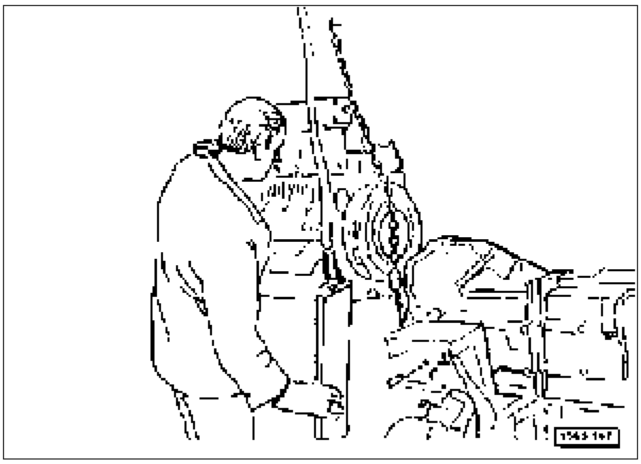
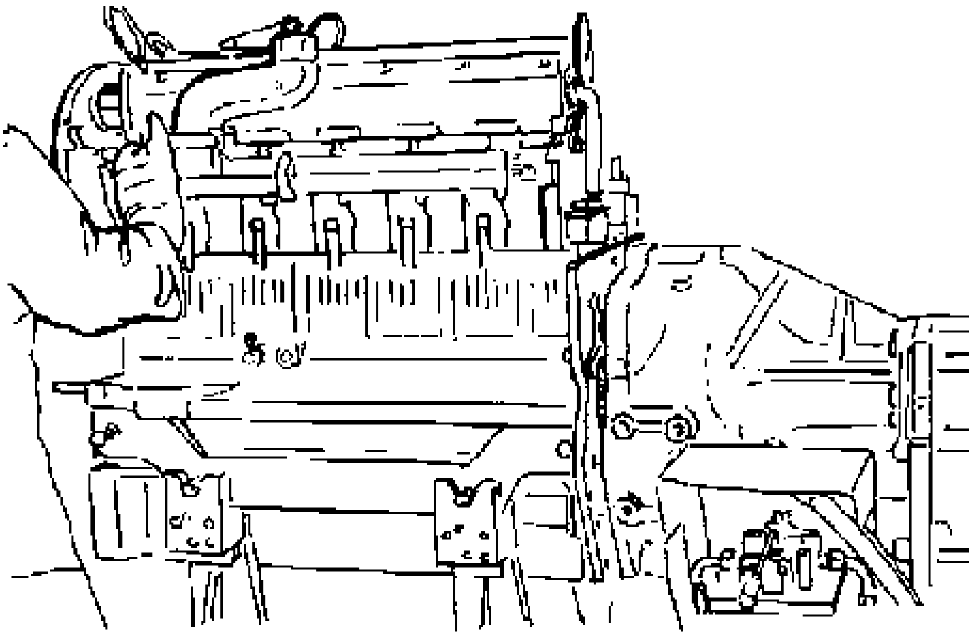


Fig. 63 - Using a hoist, position the engine in contact with the intermediate housing.



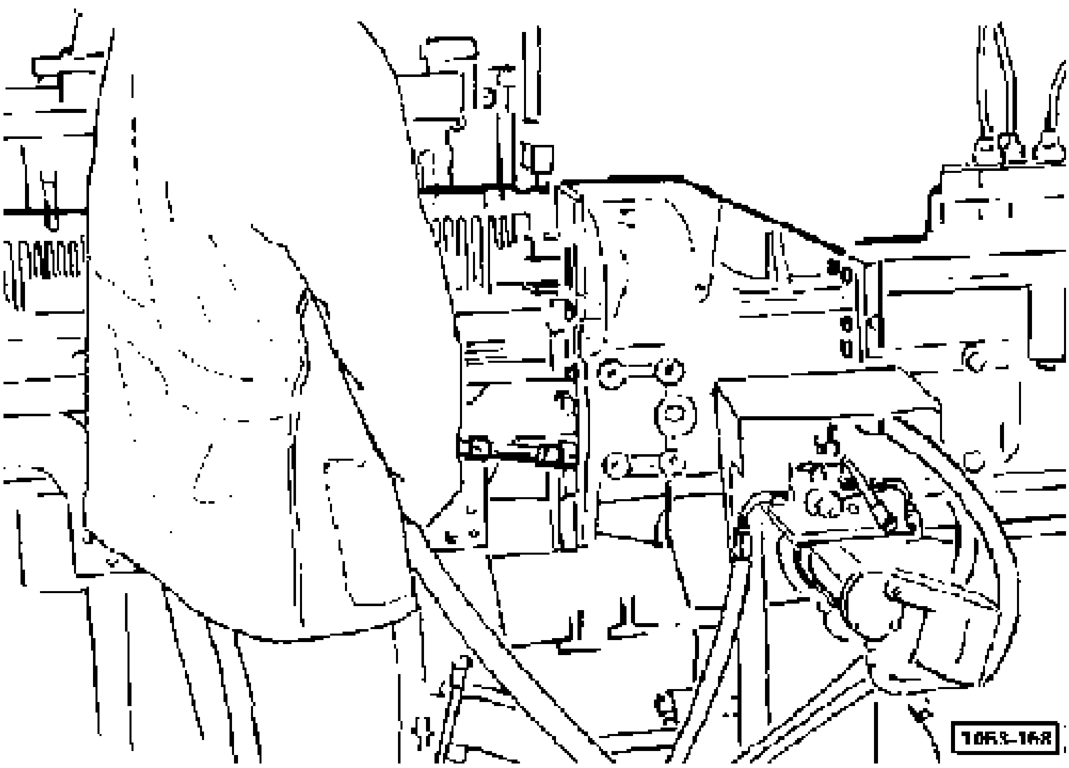


Fig 64 - Position the engine, manoeuvring in such a way that the shaft projecting from the gearbox couples without difficulty into the hub of the clutch assembly. Thereafter, locate the bolts securing the engine to the flange of the intermediate housing, and torque to **14 kgm.**

Rear power take-off

Engine speed power take-off
The engine-coupled rear P.T.O. can be equipped with a mechanically or electrohydraulically operated clutch.

The P.T.O. shaft can be operated at 540 or 1000 rev/min, engaged by means of a first selector. A second selector allows operation of the P.T.O. in standard mode (540/1000) or ECONOMY mode (775/1300).
Both selectors utilize a sliding sleeve with a radial coupling action.

The control linkage is mechanical and must be operated with the parts motionless.
The P.T.O. shaft rotates clockwise as viewed from the rear of the tractor.

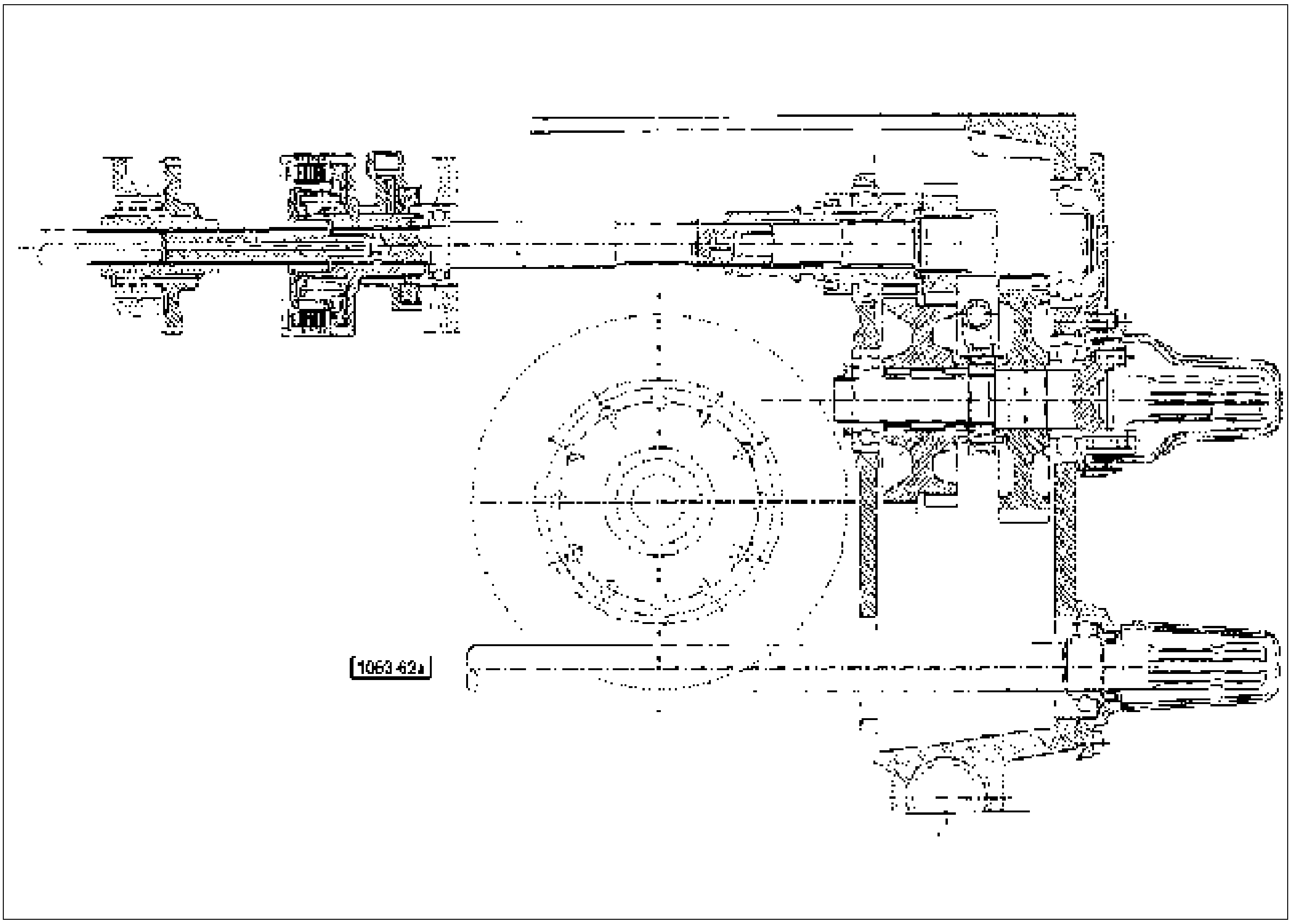


Fig 1 - Longitudinal section through rear implement and live P.T.O. unit - *SILVER 100.6.*

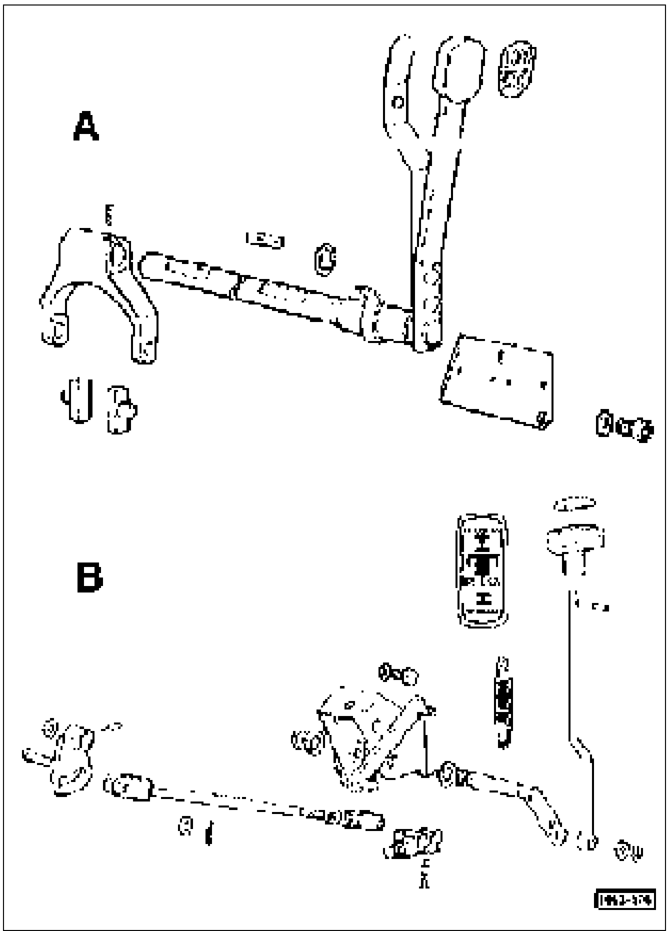


Fig. 2 - **A** - 540-1000 rpm selector.
B - Standard-Economy P.T.O. mode selector.

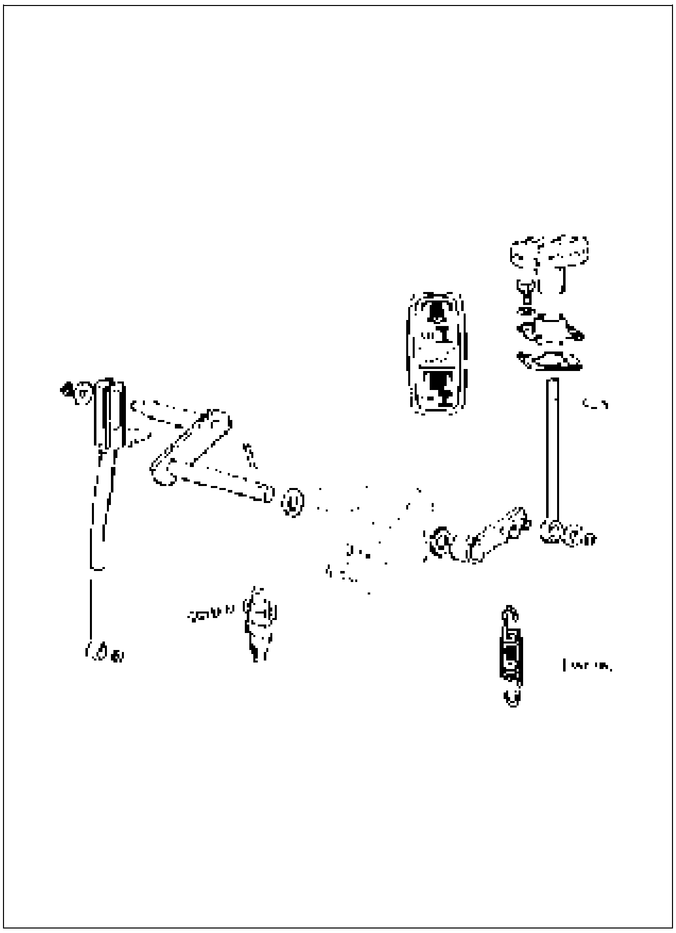


Fig. 3 - Live P.T.O. Syncro control.

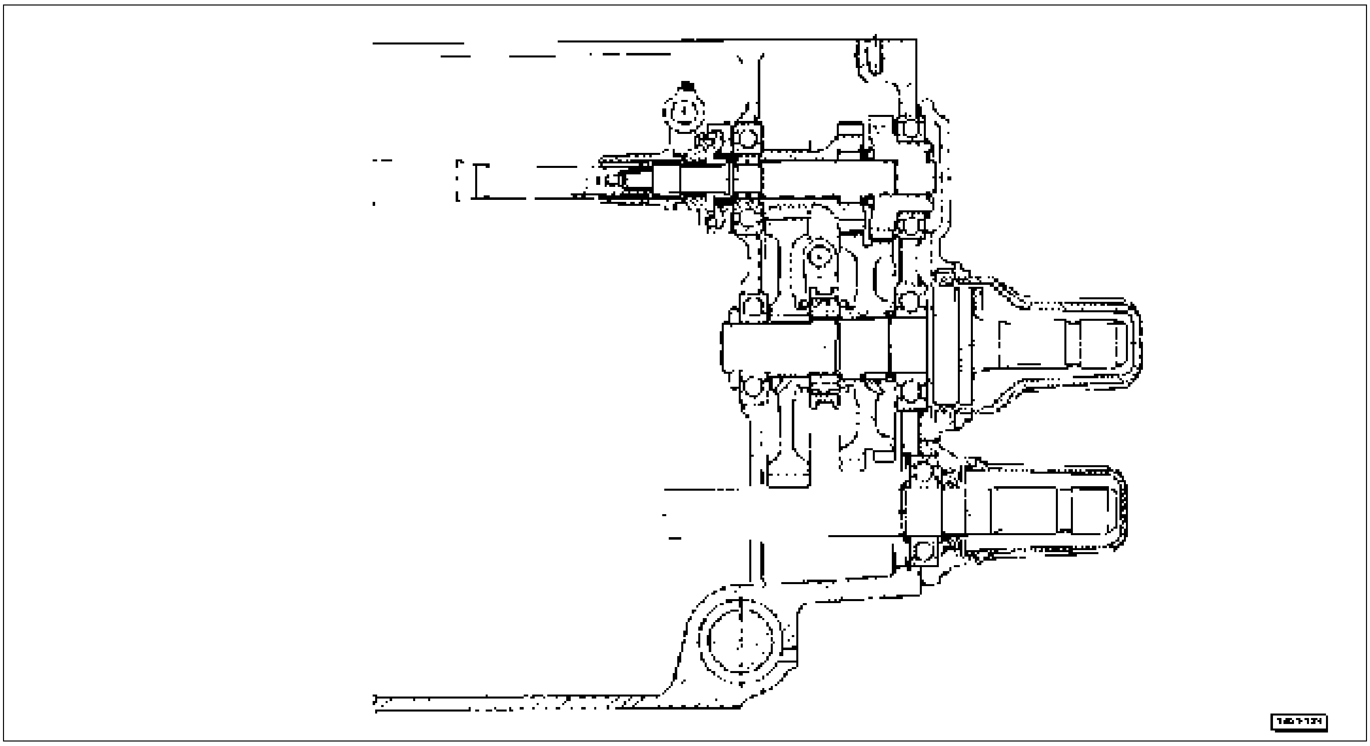
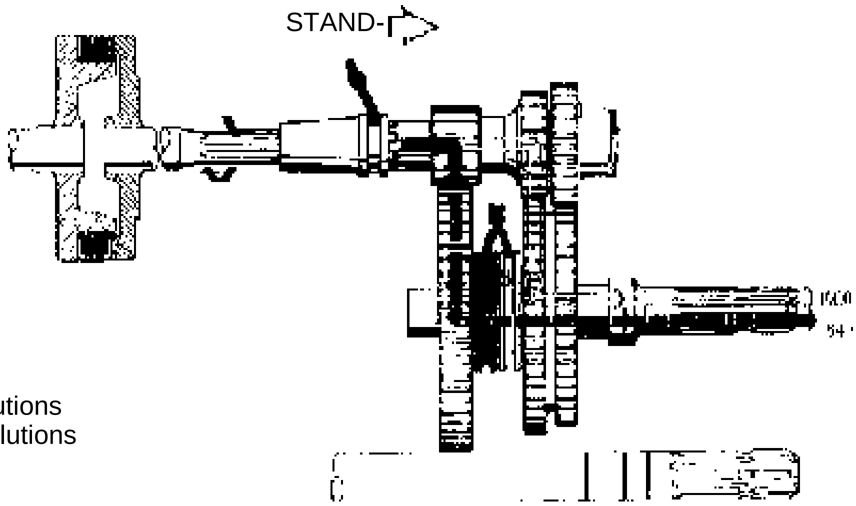


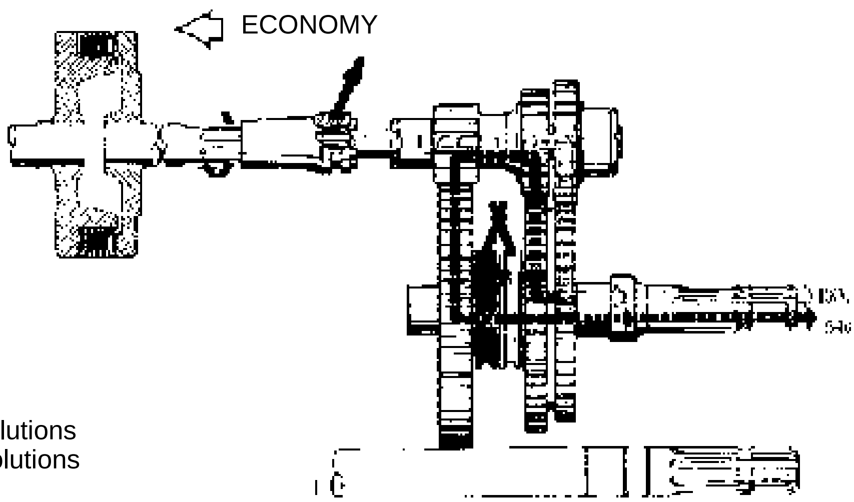
Fig. 4 - Longitudinal section through rear implement and live P.T.O. assembly - *SILVER 80 - 90 - 100.4* .

OPERATION OF POWER TAKE-OFF - *SILVER 80 - 90 - 100.4*



STANDARD speeds
540 rev/min at 2200 engine revolutions
1000 rev/min at 2450 engine revolutions

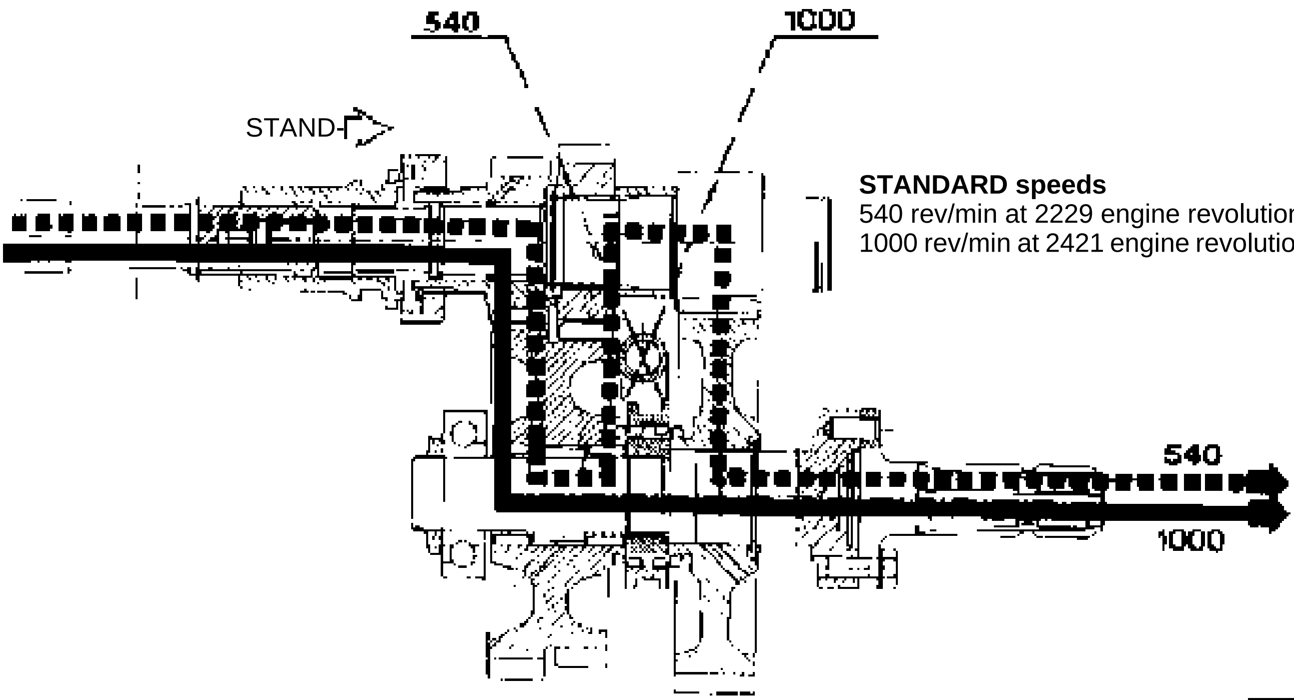
Fig. 5 - STANDARD speeds.



ECONOMY speeds
540 rev/min at 1717 engine revolutions
1000 rev/min at 1913 engine revolutions

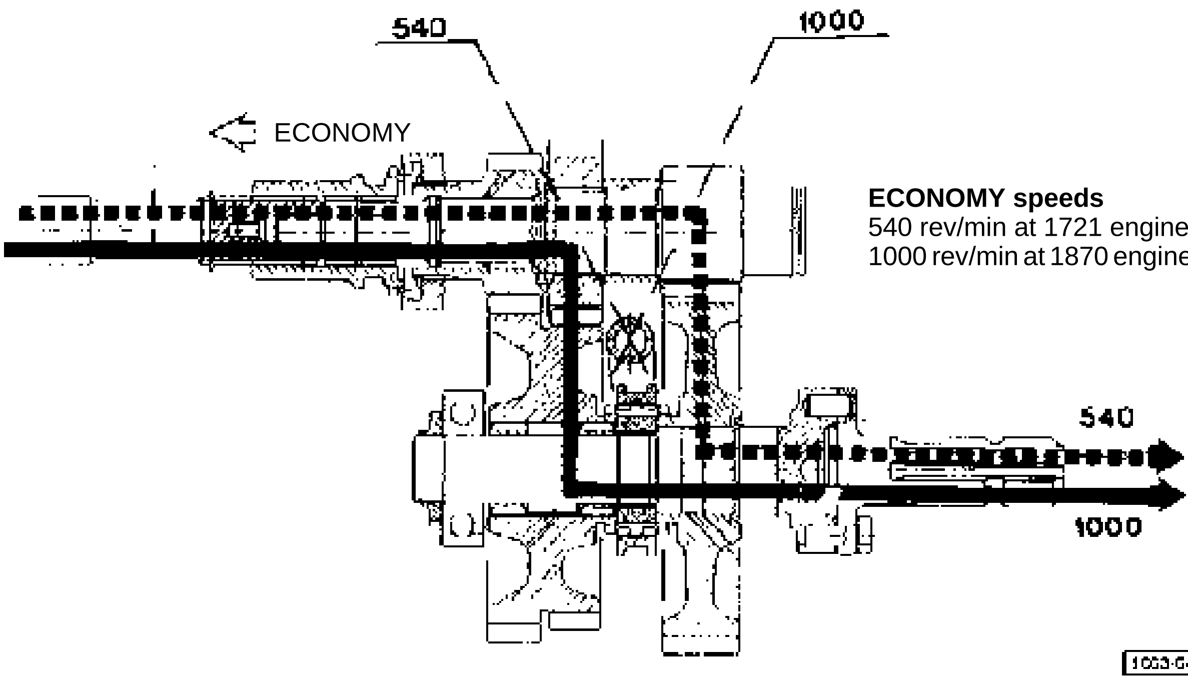
Fig. 6 - ECONOMY speeds.

OPERATION OF POWER TAKE-OFF - *SILVER 100.6*



STANDARD speeds
540 rev/min at 2229 engine revolutions
1000 rev/min at 2421 engine revolutions

STANDARD speeds.



ECONOMY speeds
540 rev/min at 1721 engine revolutions
1000 rev/min at 1870 engine revolutions

ECONOMY speeds.

Technical specifications

power tak-off	PTO r.p.m. / engine r.p.m. at maximum horsepower speed	engine r.p.m. / PTO r.p.m.	PTO r.p.m. / engine r.p.m. at fast idling speed	PTO r.p.m. / engine r.p.m. at low idling speed
540 r.p.m. (2229 giri/mot.)	606 / 2500	4,1278	642÷649 / 2650÷2680	158÷170 / 650÷700
1000 r.p.m. (2421 engine r.p.m.)	1033 / 2500	2,4211	1095÷1107 / 2650÷2680	268÷290 / 650÷700
775 r.p.m. (2470 engine r.p.m.)	784 / 2500	3,1875	831÷841 / 2650÷2680	204÷220 / 650÷700
1300 r.p.m. (2430 engine r.p.m.)	1337 / 2500	1,8695	1417÷1434 / 2650÷2680	348÷374 / 650÷700

P.T.O. ratios	***SILVER 80 - 90 - 100.4***			***SILVER 100.6***	
540 rev/min	(14/57)	1/4,0714	=	(19/46)x(43/23)x(16/51)	1/4,1278
1000 rev /min	(20/49)	1/2,450	=	(19/46)	1/2,4211
775 rev /min	(23/44)x(49/20)x(14/57)	1/3,1791	=	(16/51)	1/3,1875
1300 rev /min	(23/44)	1/1,9130	=	(23/43)	1/1,8696

Live power take-off
Live power take-off is available at an independent rear shaft. Live P.T.O. is engaged with a specific selector (fig 7).

P.T.O. revolutions per wheel revolution		***SILVER 80 - 90 - 100.4***	***SILVER 100.6***
- 30 km/h	1st version	33,729	33.919
	2nd version	40,771	40,999
- 40 km/h	1st version	25,667	25,721
	2nd version	31,026	31,090

1a version - up to S/N: *SILVER 80* (S/N.1441) - *SILVER 90* (S/N.1829) - *SILVER 100.4* (S/N. 1335).
1a version - up to S/N: *SILVER 100.6* (S/N.1547)
2a version - from to S/N: *SILVER 80* (S/N.1442) - *SILVER 90* (S/N.1830) - *SILVER 100.4* (S/N. 1336).
2a version - from to S/N: *SILVER 100.6* (S/N.1548)

Adjustment of the Standard-Economy selector control linkage
Shift the sleeve into position **A** - STANDARD, and adjust the control linkage by turning the set screw **B** until in contact with the rear support and then tightening the lock nut **C**.
Shift the sleeve into position **D** - ECONOMY, and adjust the control linkage by turning the set screw **E** until in contact with the rear support and then tightening the lock nut **F**.

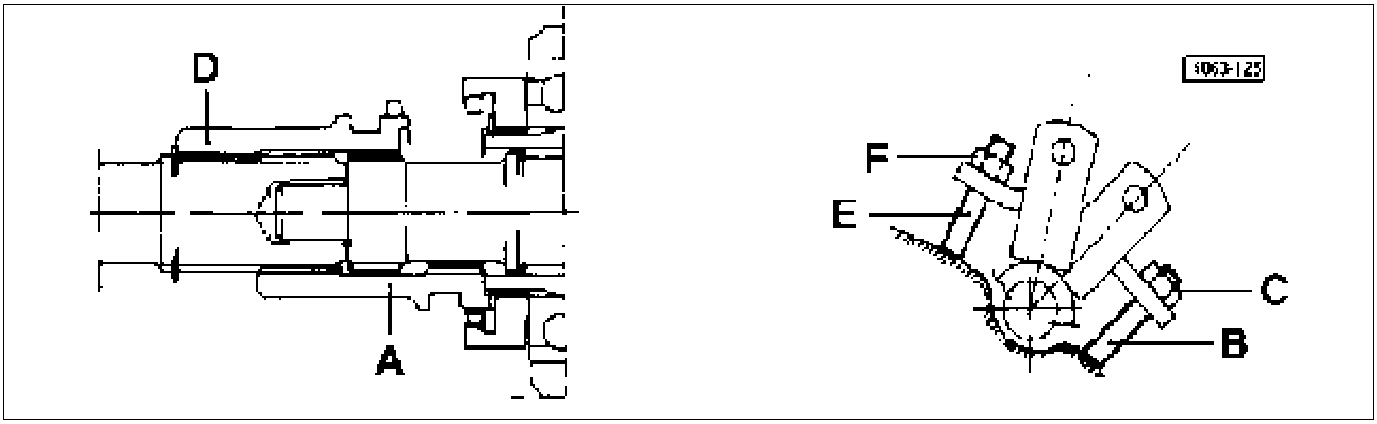
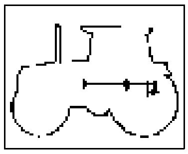


Fig. 7 - Adjustment of the STANDARD-ECONOMY selector control linkage.



Fitting the P.t.o. shaft

Before fitting the stud screws, clean off all traces of oil or grease from threaded parts; apply Loctite 242 to the threads before inserting.

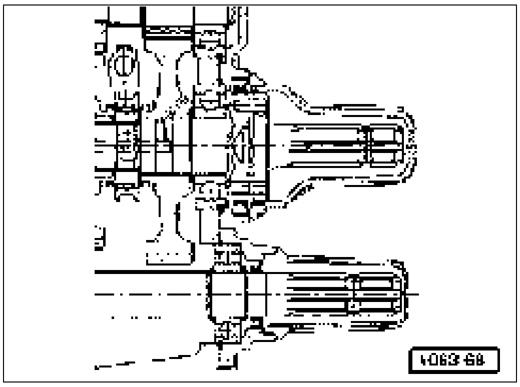


Fig. 8 - External power take-orr shaft terminal.

Power take-off clutch

General specifications

The power take-off clutch is an oil-immersed multidisc type, hydraulically engaged.

The oil needed to operate the clutch is drawn from the transmission, appropriately filtered and directed to the gear pump mounted to the left hand side of the transmission housing.

The clutch can be operated mechanically or electrohydraulically. The mechanical type of linkage operates directly on the directional control valve, allowing oil to flow under pressure to the actuator piston. In the case of the electrohydraulic control, a solenoid valve opens the circuit, allowing oil to flow to the piston. In either case, the effect of applying hydraulic pressure is to compress the driving and driven discs of the clutch assembly together and transmit rotation to the projecting P.T.O. shaft.

Also operated hydraulically by way of the same directional control valve is a second piston; this acts on a brake that immobilizes the disc carrier when the clutch is disengaged, thereby preventing rotation of the P.T.O. shaft.

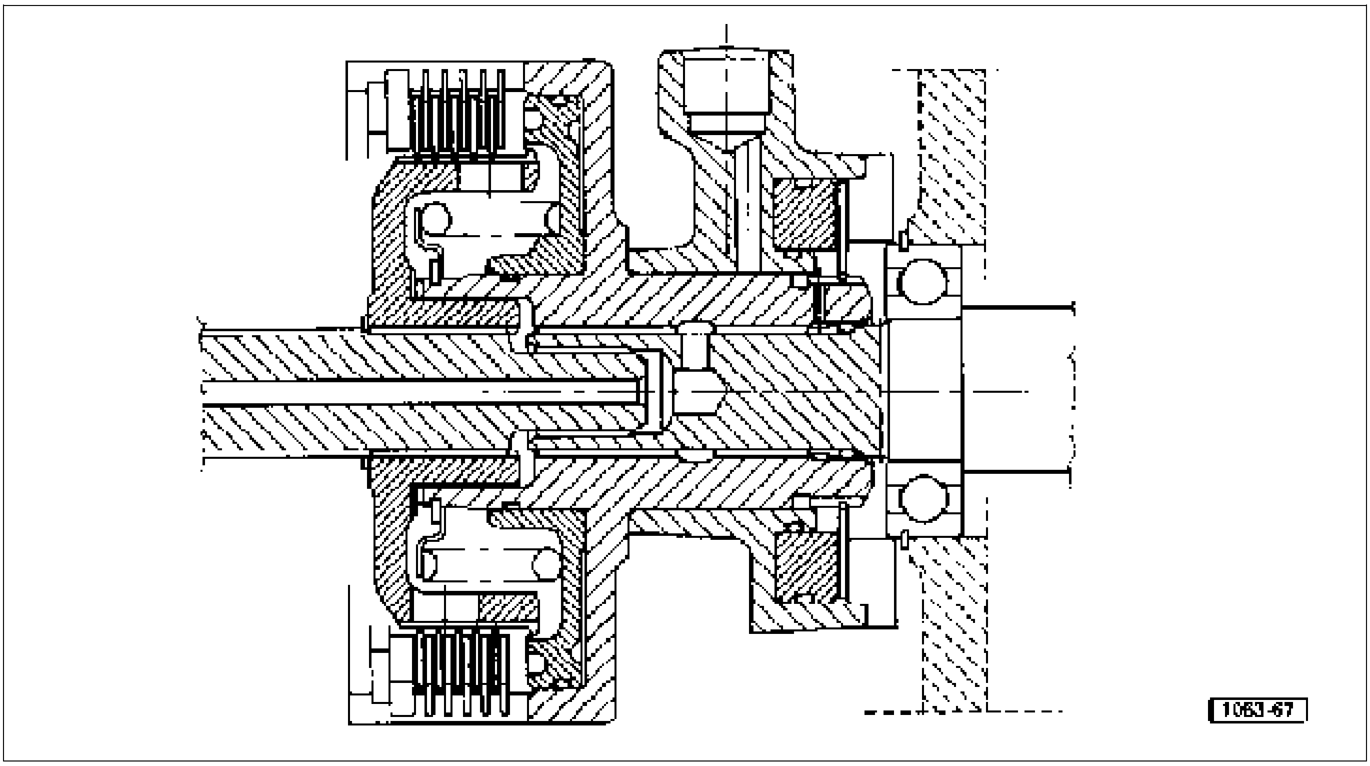


Fig. 9 - Section through the P.T.O. clutch assembly.

Specifications

P.T.O clutch

clutch			multidisk, oil-bath clutch with axial piston
number of clutch disks			5
diameter of clutch disks			124.5
thickness of assembled friction discs	minimum maximum	mm mm	26 27.75
number of intermediate discs			5
disc lubrication pressure		bar	2 to 3
P.T.O. clutch relief pressure setting		bar	12^{+2}_{0}
P.T.O. pressure control valve		bar	18
restrictor valve		mm	3
brake apply cylinder free travel	minimum maximum	mm mm	2.8 3.6
directional control valve spool travel		mm	18

Spring specifications

piston return spring			2.4019.373.1
diameter of wire		mm	6.5
external diameter		mm	79.5
spring relaxed		mm	61.5
spring compressed	kg 75 (735 N) kg 79 (782 N)	mm mm	30 28

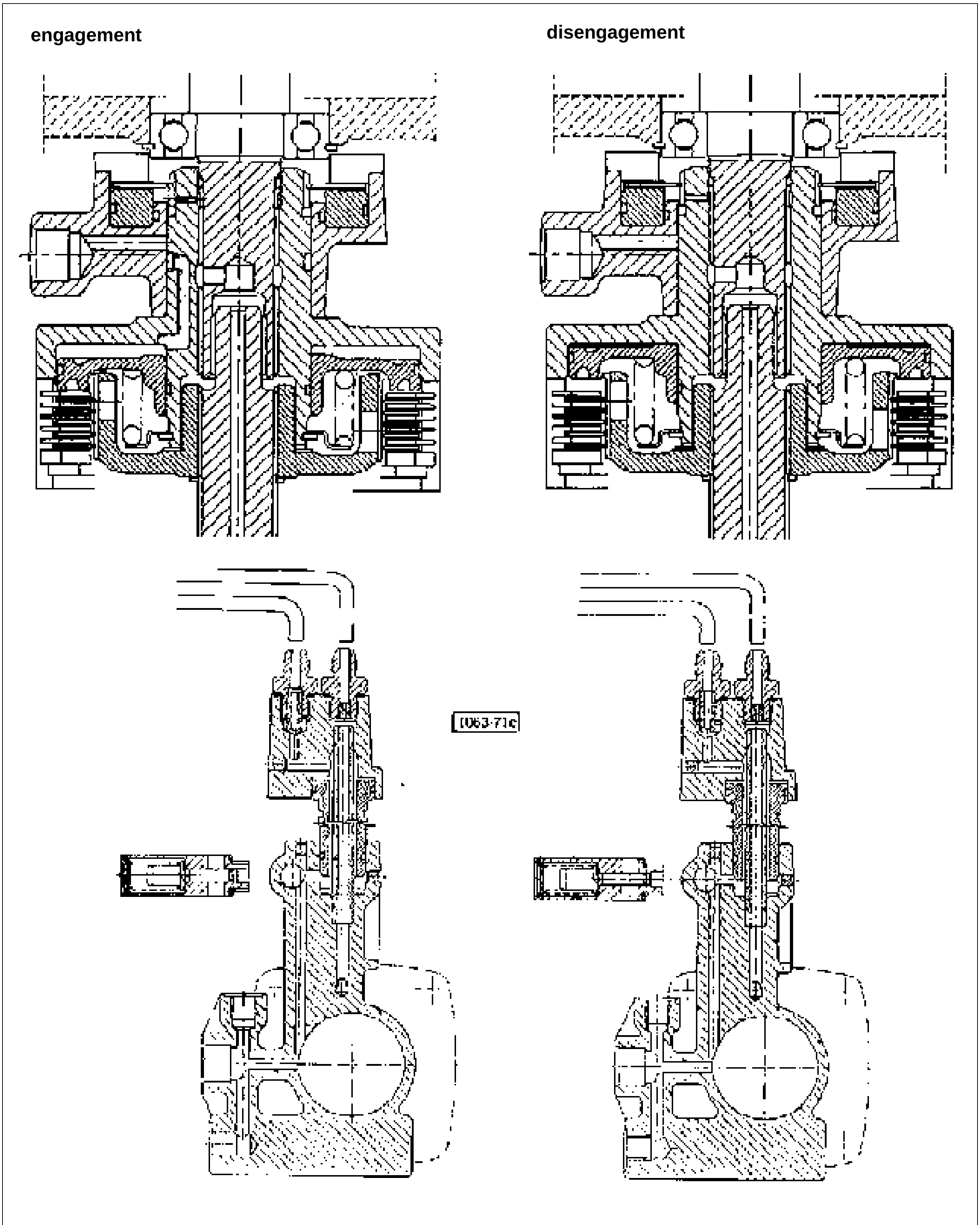


Fig. 10 - Rear P.T.O. control for machines with electrohydraulically operated clutch.

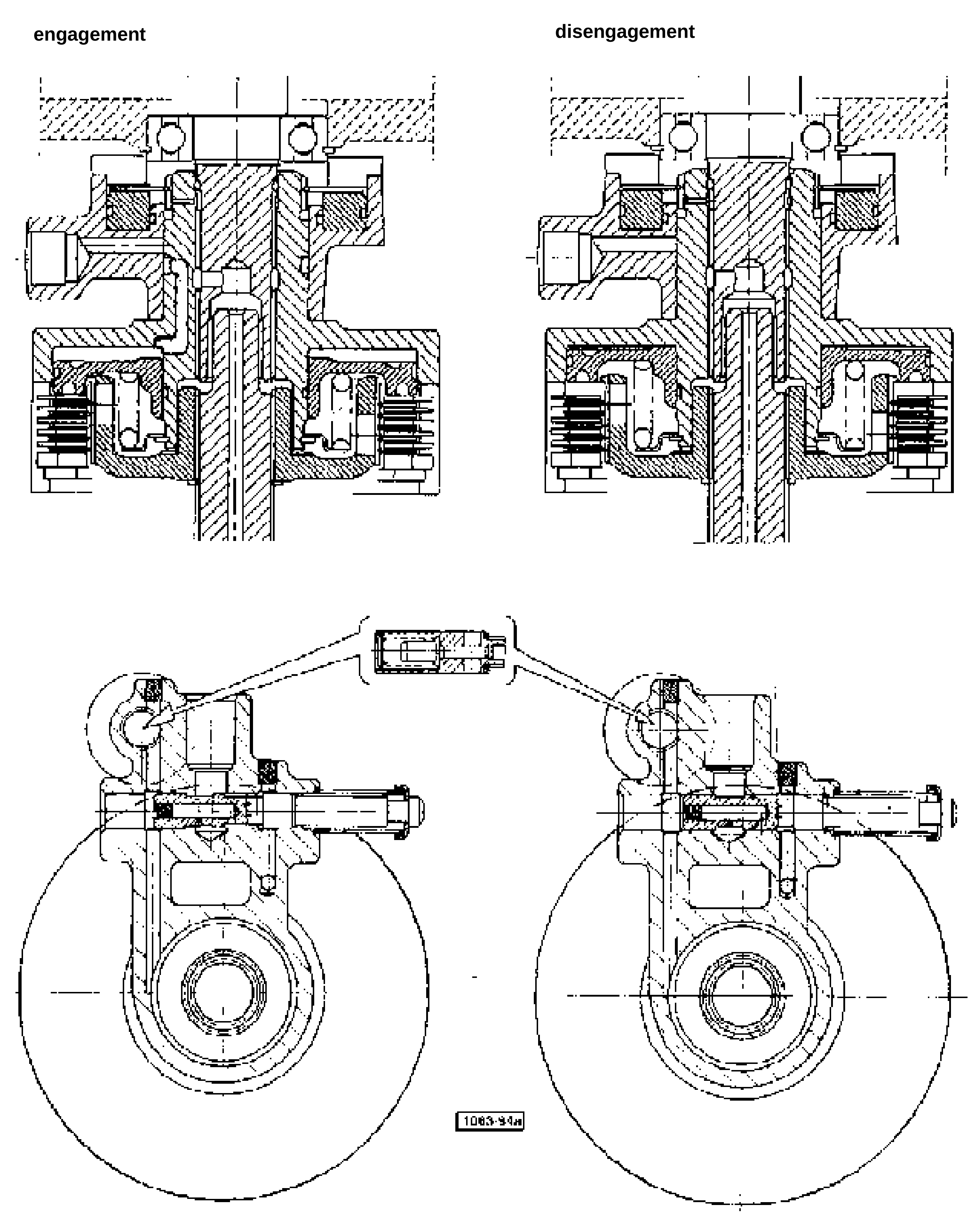


Fig. 11 - Rear P.T.O. control for machines with mechanically operated clutch.

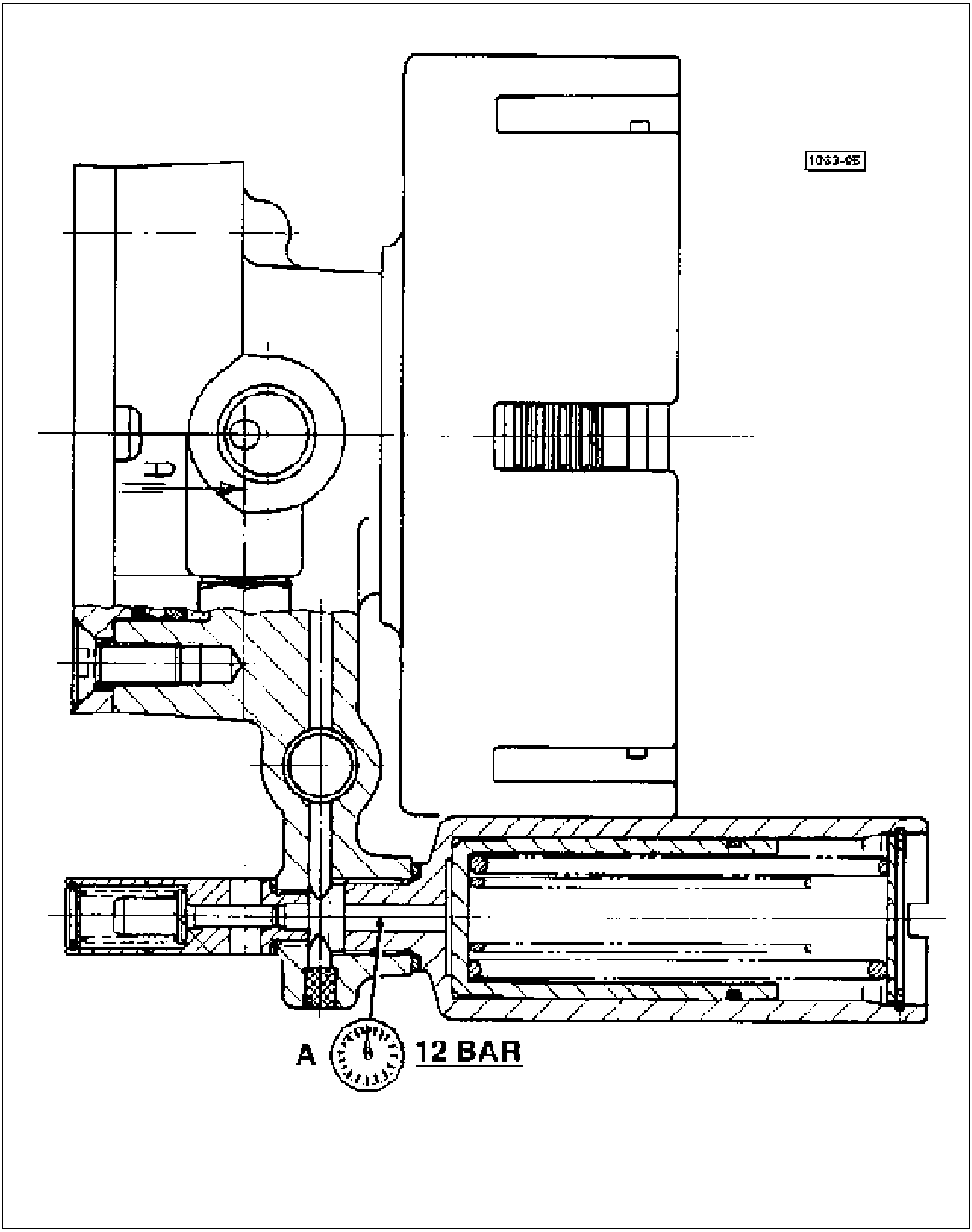


Fig. 12 - Operating pressure control valve for mechanically or electrohydrauliclly operated P.T.O. clutch assembly.
A - Gauge utilized to check operating pressure in the P.T.O. circuit.

Inspecting the clutch

Check the friction surfaces of the clutch discs for signs of wear or distress, and replace if necessary.

The actuator piston must be replaced if scoring is evident.

The hub must be replaced if any depressions are discernible along the tips of the splines enabling the sliding movement of the clutch discs.

Test the operational efficiency of the piston return spring, which must perform to the specifications given in the table; replace if necessary.

Check that the control valve spool is not scored.

The seals of the clutch actuator piston and the brake apply piston must be replaced if significantly worn, likewise the brake disc.

Whenever the unit is reassembled, make certain that the oil ducts of the clutch housing are cleaned thoroughly, using compressed air if need be.

Checking the clearance between discs

When new discs are installed, check that the clearance A (fig 13) is between 0.5 and 2 mm.
If the clearance is greater that the maximum permissible value, add one shim p/n 2.1599.499.0 at the position arrowed.

Caution: it is recommended that the operating pressure of the P.T.O. clutch circuit be tested only when the unit is being fully overhauled. The test is made by connecting a pressure gauge directly to the clutch assembly in place of the damper.

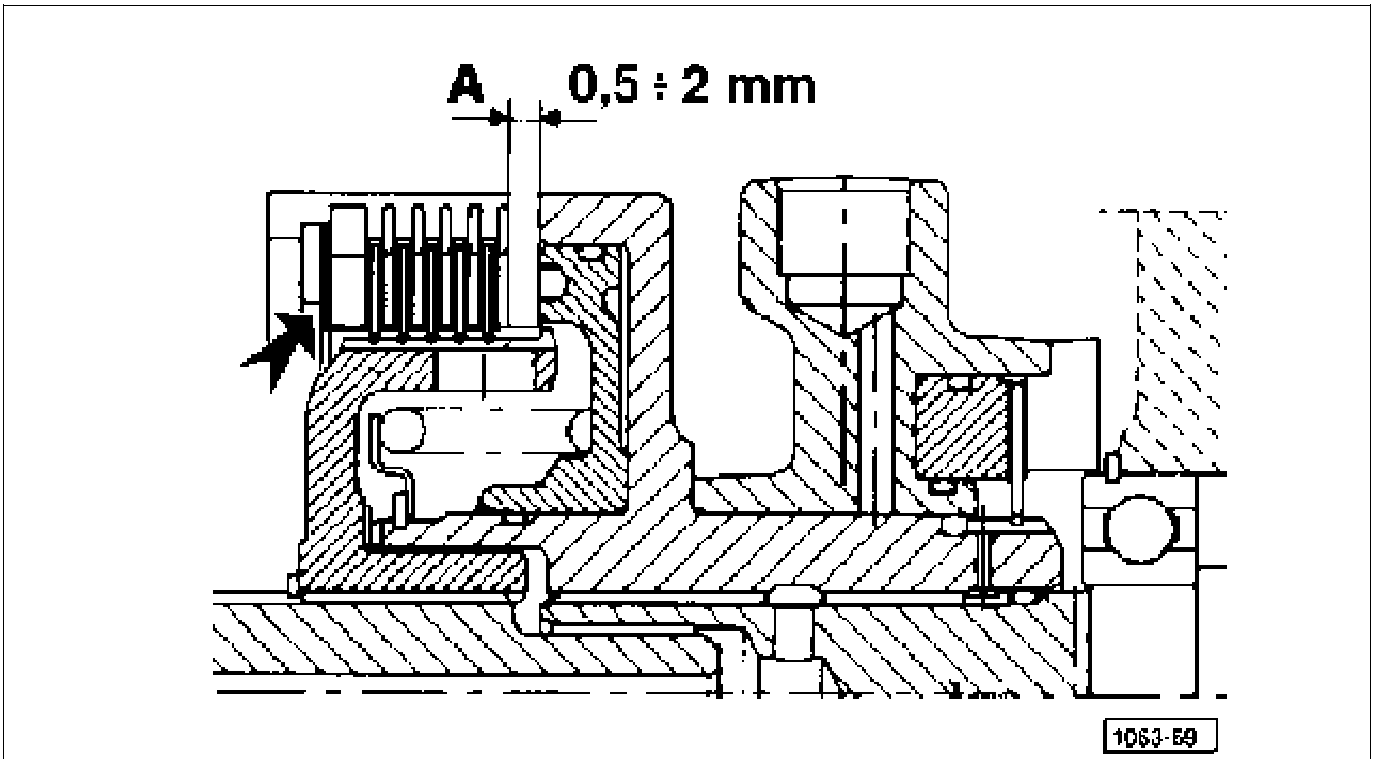


Fig. 13 - Checking the disc clearance.
A - If clearance is greater than prescribed, add 1 x shim 2.1599.499.0.

Testing pressures in the clutch assembly

Connect adaptor 5.9030.517.4 to the hydraulic pressure port of the electrohydraulic control unit (on machines equipped with electrohydraulic controls) as indicated in fig 14, or to the port of the coupler assembly (machines with mechanical controls) and fit pressure gauge 5.9030.514.0.
Allow oil to circulate through the directional control valve and read the gauge, which should show **18 bar** approx.
For pressure testing procedures and prescribed values, refer to the "electrohydraulic controls" chapter.

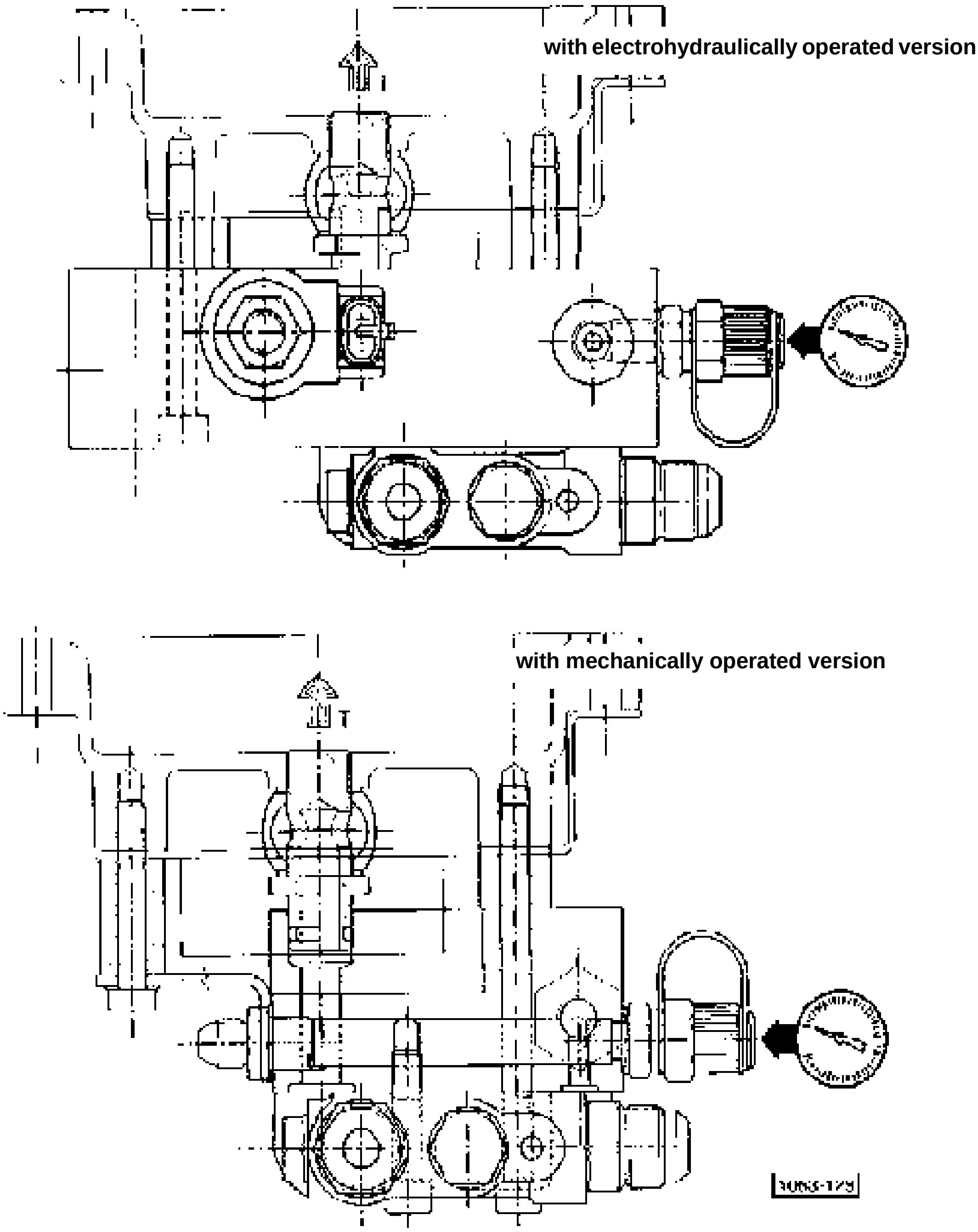


Fig. 14 - Verification of operating pressure in the P.T.O. clutch hydraulic power circuit.

Checking end float on the front shaft of the P.T.O. clutch

Fit circlip **A** and thrust washer **B** p/n 2.1599.761.0 to the front shaft of the P.T.O.; locate the shaft in the clutch assembly and push toward the forward end of the tractor until fully against the seal as indicated in Fig **C**, then verify that the distance between the washer **B** and the clutch hub is not less than 1 mm.
If the end float measured is less than 1 mm, remove washer **B**.

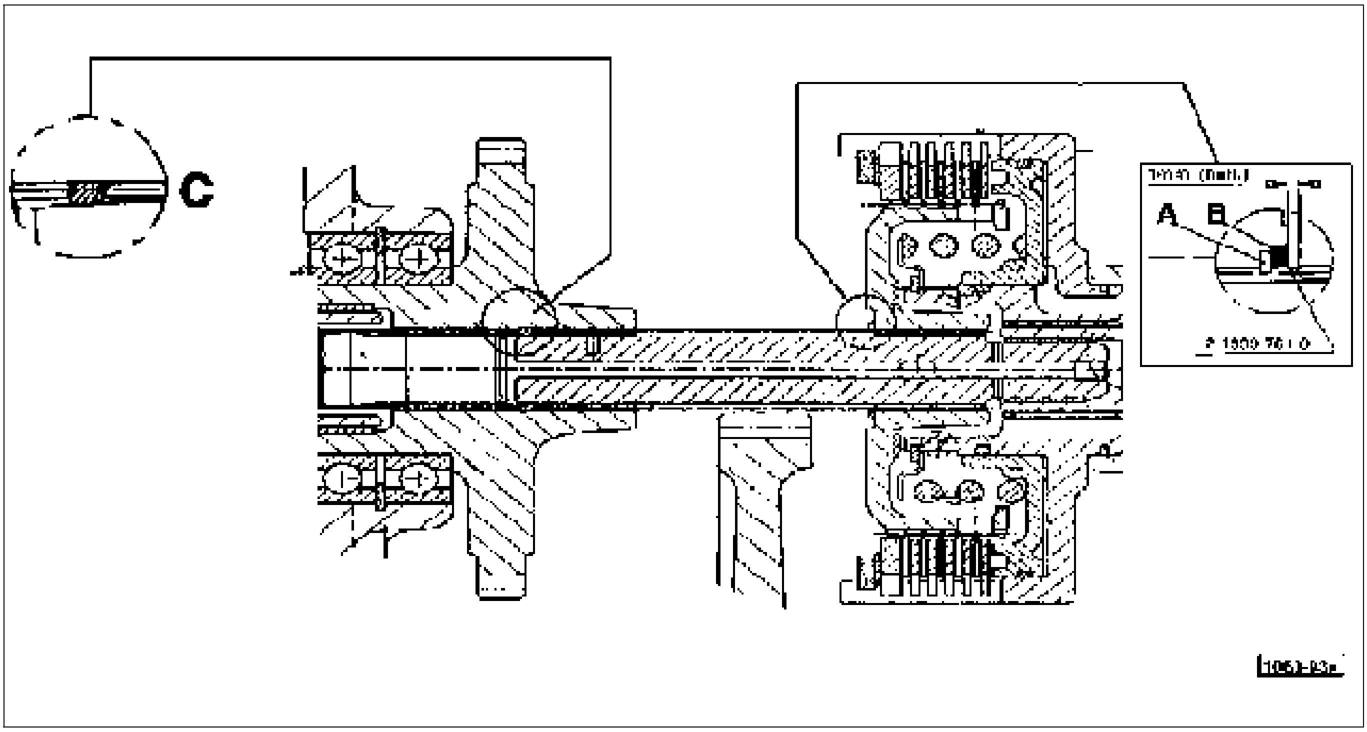
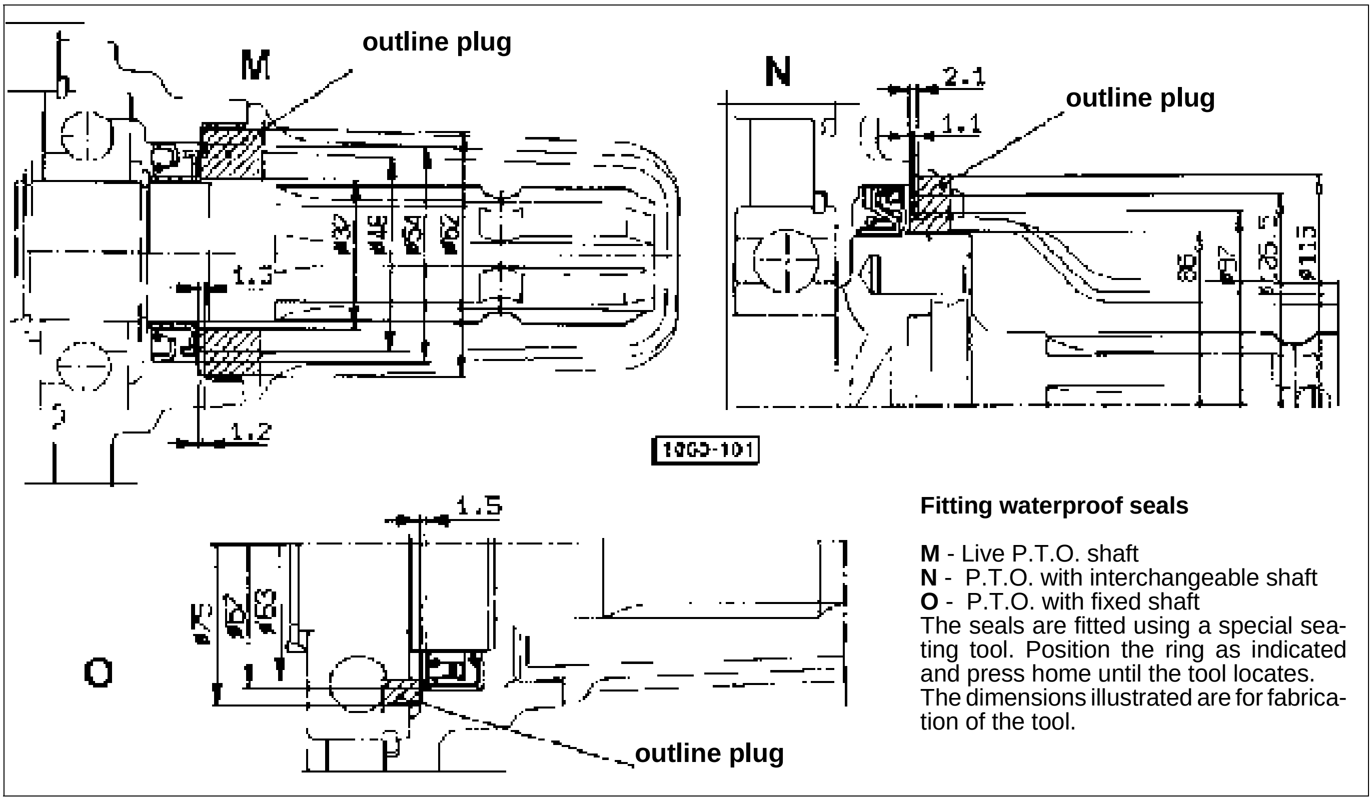


Fig. 15 - Checking end float on the front shaft of the P.T.O. clutch.



Fitting waterproof seals

M - Live P.T.O. shaft
N - P.T.O. with interchangeable shaft
O - P.T.O. with fixed shaft
The seals are fitted using a special seating tool. Position the ring as indicated and press home until the tool locates. The dimensions illustrated are for fabrication of the tool.

Fig. 16 - Fitment of waterproof seals.

ESSENTIAL OPERATIONS FOR REFITMENT OF THE REAR P.T.O. ASSEMBLY

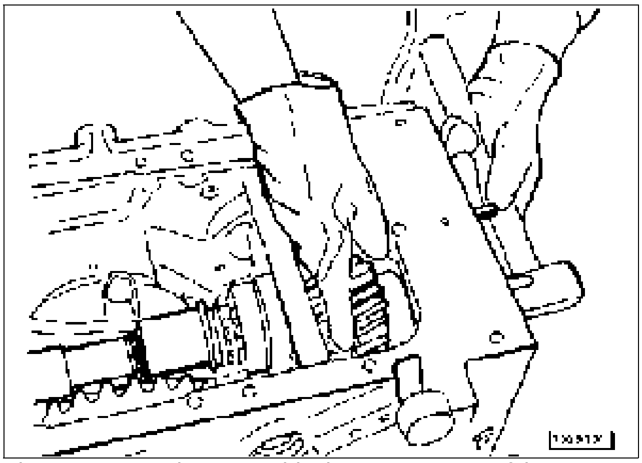


Fig. 17 - Proceed to assemble the components of the P.T.O. final reduction unit (540 - 1000 rev/min). Locate the shaft connecting the P.T.O. clutch to the final reduction, complete with the STANDARD/ECONOMY selector sleeve.

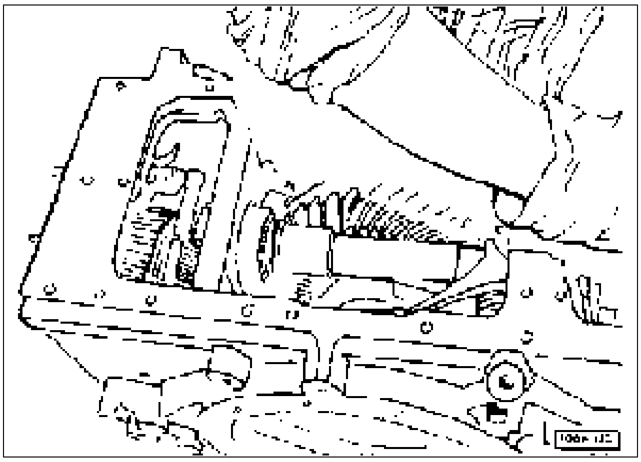


Fig. 18 - Push the drive shaft into the speed reduction assembly, aligning the parts so that the shaft is correctly positioned.

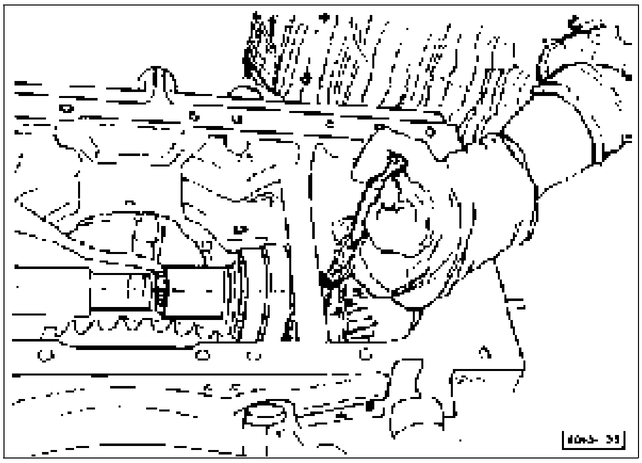


Fig. 19 - Position the spacer in contact with the gear so that the circlip seat of the 540 rpm gear uppermost remains fully exposed.

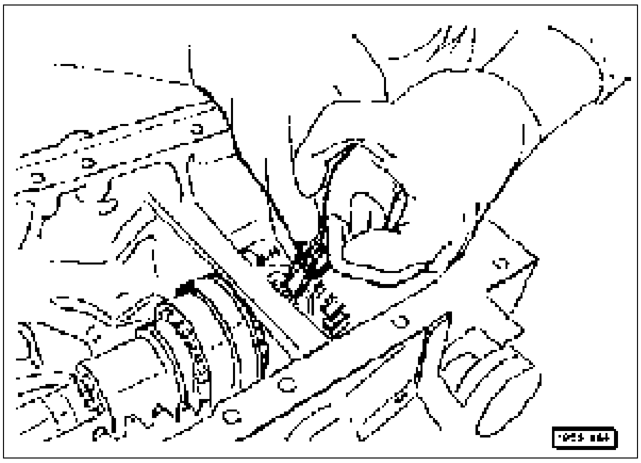


Fig. 20 - Locate the circlip in its seat, using a pair of bent tip ring pliers.

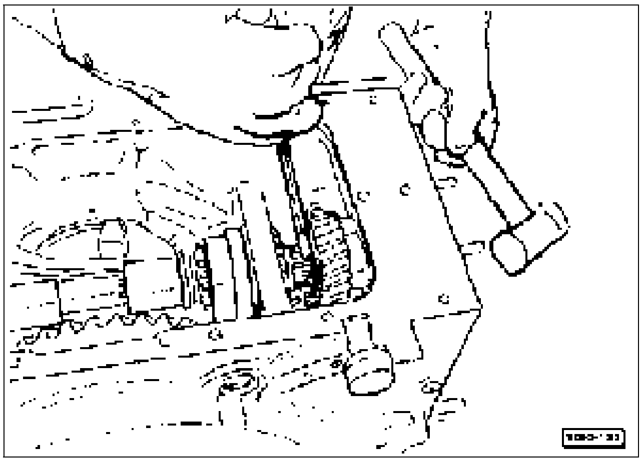


Fig. 21 - Ensure the circlip is properly seated by tapping gently with a screwdriver. Strike the end of the shaft, if necessary, to assist location of the circlip in its groove.

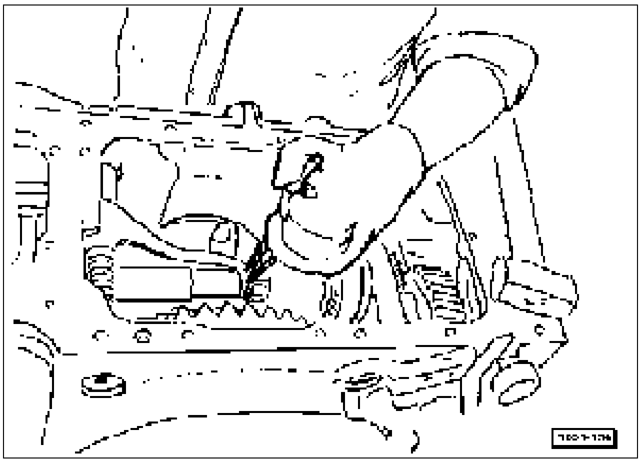


Fig. 22 - Position the STANDARD-ECONOMY selector sleeve travel limit circlip on the shaft.

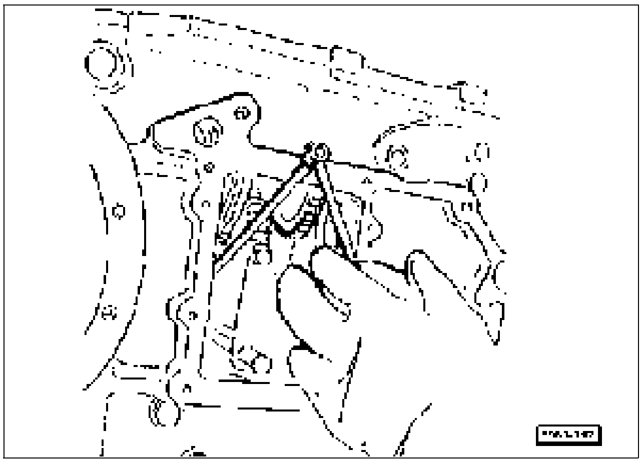


Fig. 23 - Locate the lubrication pipeline internally of the transmission housing, making the connection to the coupling positioned on the bevel pinionshaft. The line is secured by screwing the nut onto the coupling.

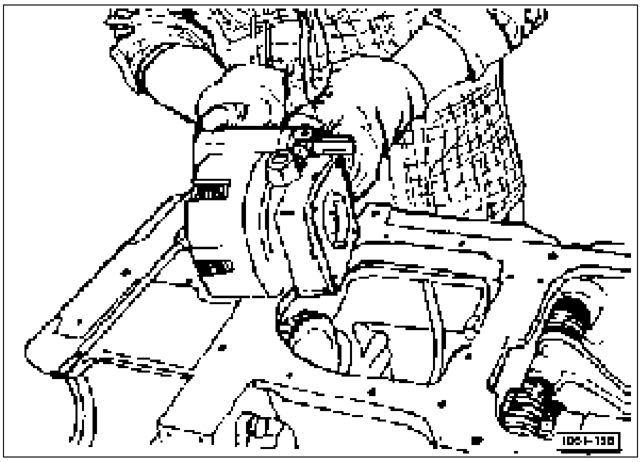


Fig. 24 - Position the complete P.T.O. clutch assembly in the transmission housing.

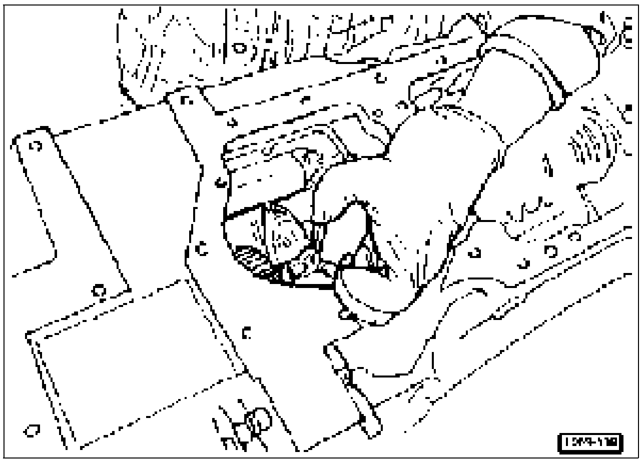


Fig. 25 - Locate the stop circlip on the input shaft of the P.T.O. clutch assembly.

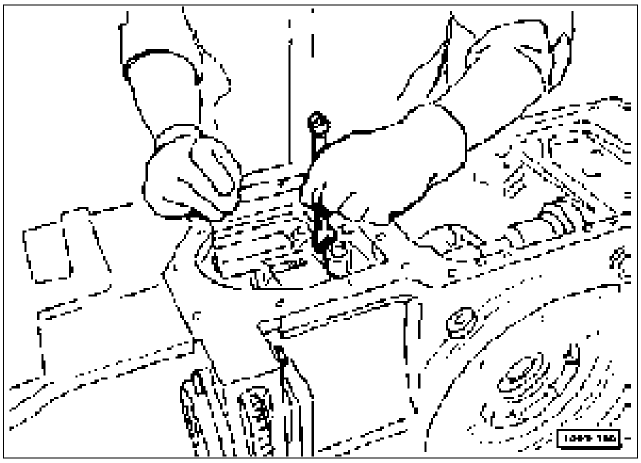


Fig. 26 - Secure the lubrication pipeline to the clutch.

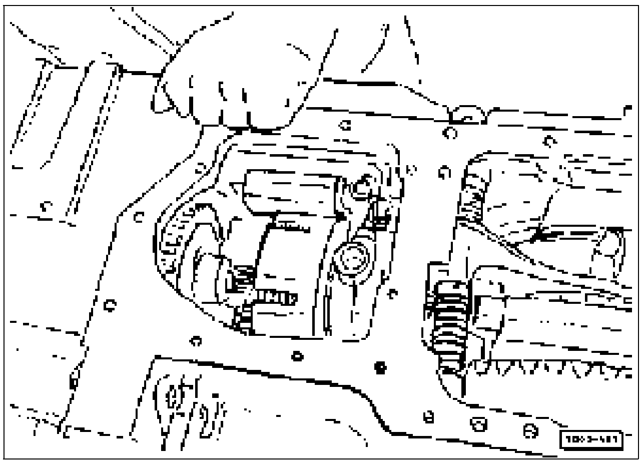


Fig. 27 - Check that all parts have been fitted correctly.

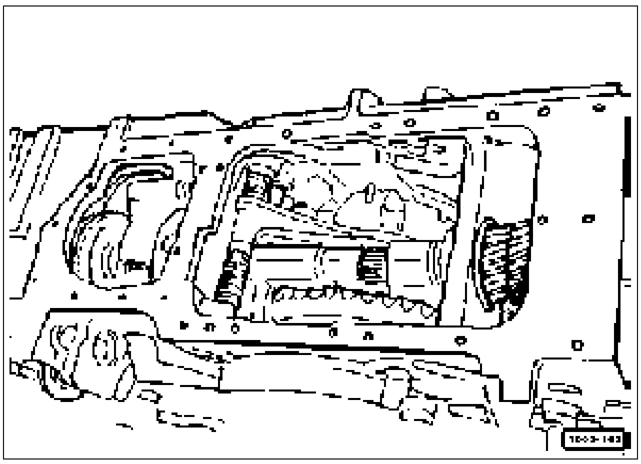


Fig. 28 - Complete the assembly by fitting the rear differential lock control fork.

Diagnosing malfunctions

clutch slips	check the clutch assembly hydraulic system	replace out-of-setting valve springs		
		check piston and oil manifold seal rings	replace defective parts if necessary	
	check piston for free stroke	remove any roughness preventing piston from sliding freely		
	check the clutch disk for wear	replace the clutch disks		
clutch won't disengage	incomplete distributor valve travel, electrovalve fault	check the control mechanism	replace defective parts	replace disks
		check the clutch disks	burnt disks	
			jammed disks	remove any roughness preventing free disk sliding
	piston jammed in seat	replace the piston if necessary		

Rear axle

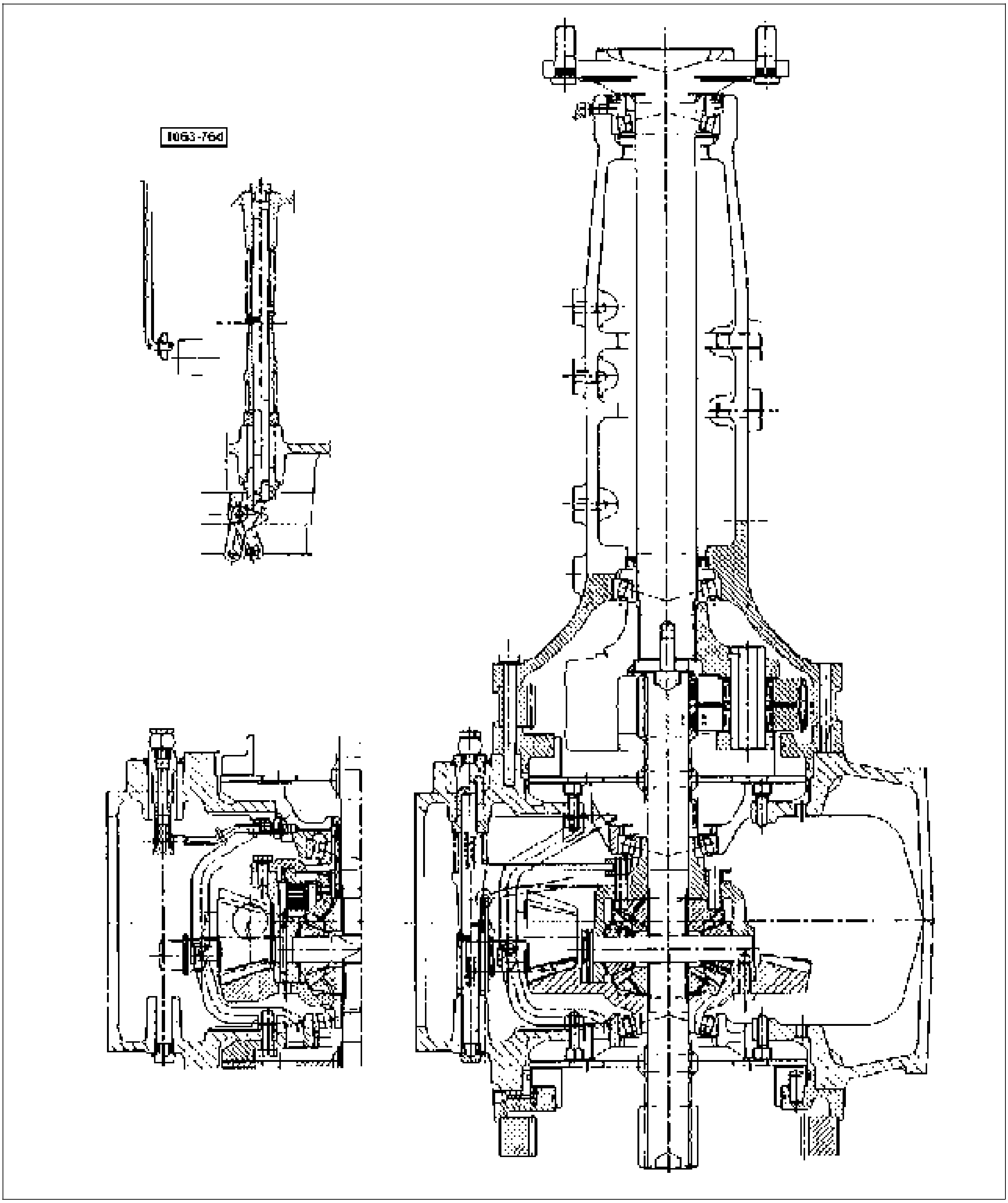


Fig. 1 - Rear axle for *SILVER 80 - 90 - 100.4* machines.

Rear axle

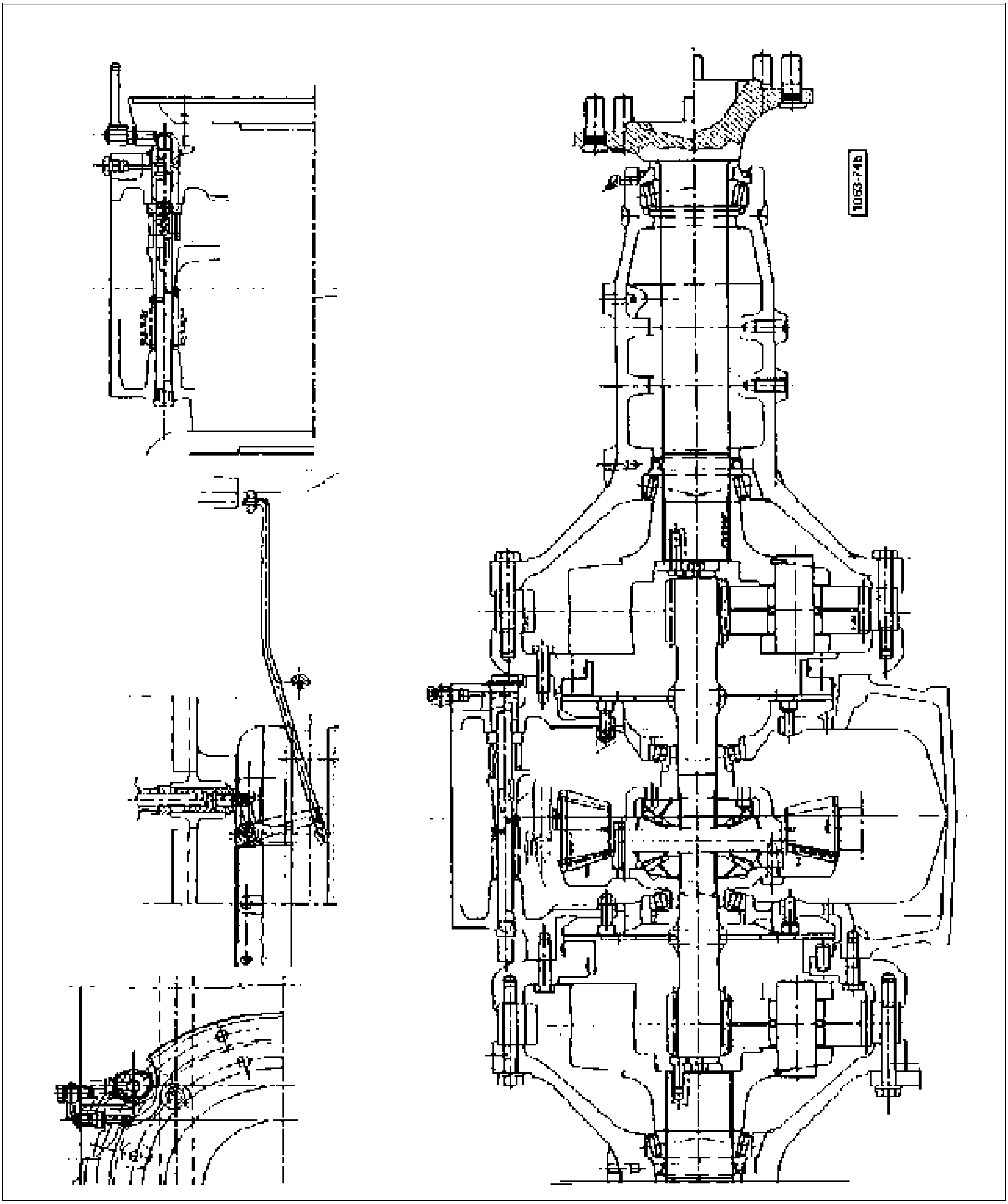


Fig. 2 - Rear axle for *SILVER 100.6* machines with mechanical differential locking.

Rear axle

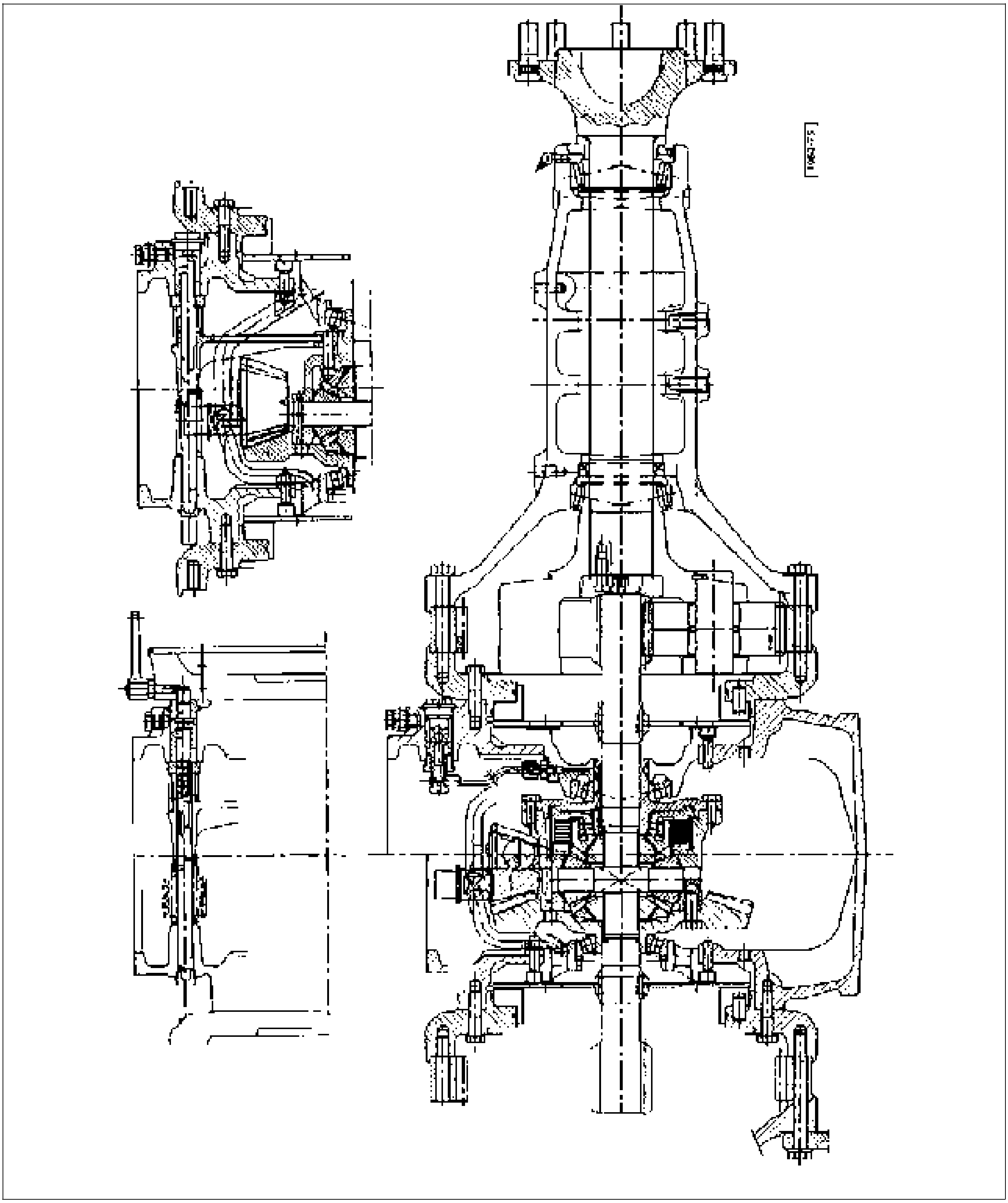


Fig. 3 - Rear axle for *SILVER 100.6* machines with hydraulic differential locking and SBA system.

Assembly of rear halfshafts

Each halfshaft is secured to the planet carrier of the relative epicyclic final drive unit by way of a plate located in the seating of the carrier and secured to the inside face of the halfshaft with a bolt.

The correct positioning of the halfshaft in the trumpet housing is determined by a set of shims **A** indicated in figs 5 and 6.

Proceed as follows:

— fix the halfshaft in a vertical position in such a way that it cannot be rotated;
— press the bearing cups **B** and **C** into the respective seats of the stub axle;
— locate the O-ring **D** and bearing **E**, slide the stub axle onto the halfshaft, fit bearing **F** and then position the planet carrier;
— fit the flange **H** with the fully machined face directed toward the halfshaft, then torque the bolt **G** (or the three bolts **G**, in the case of a Silver 100.6) to 30 Nm (3 kgm).
— Turn the stub axle through about 10 revolutions and check that the bolts are still torqued to the correct value.
— If the bolts have loosened, retorque to 30 Nm.
— remove the flange **H** and measure the distance **X** between the face of the halfshaft and that of the planet carrier flange; now refit the flange **H**, together with shims corresponding to the distance measured, minus 0.02mm.
— For **Silver 80 - 90 - 100.4** machines, smear the thread of the single bolt with Loctite 270 and torque to 177 Nm (18 kgm), For a **Silver 100.6**, smear the threads of the three bolts with Loctite 270 and torque to 63 Nm (6,5 kgm).

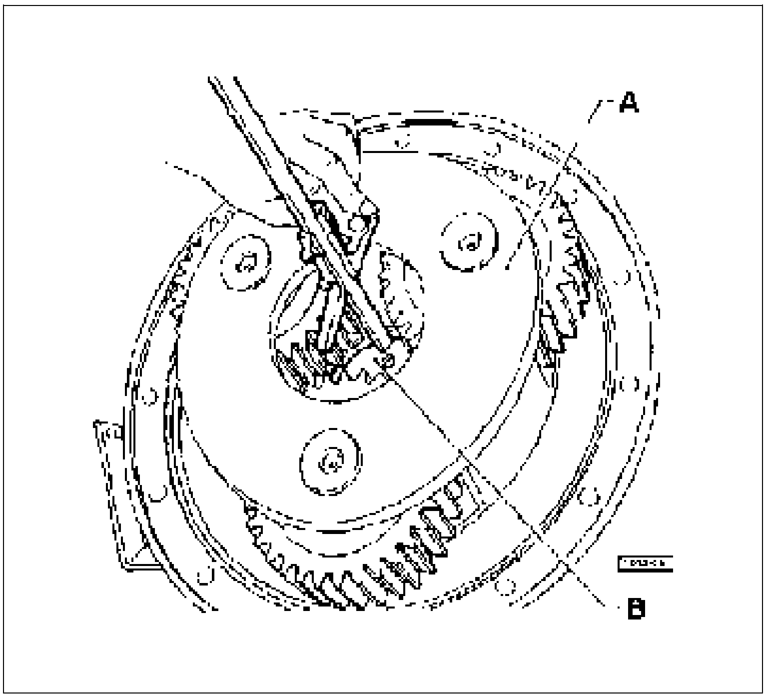


Fig. 4 - Halfshaft securing plate.
A - Planet carrier housing
B - Spacer

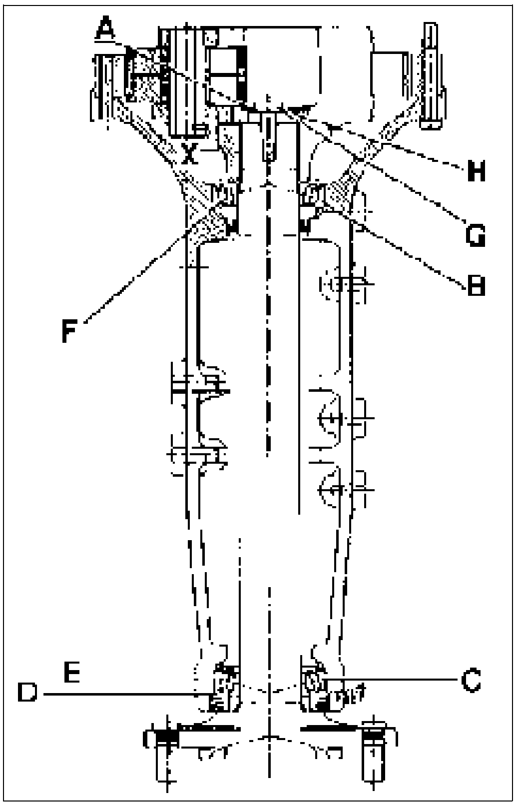


Fig. 5 - Fitment of rear stub axles.
SILVER 80 - 90 - 100.4.

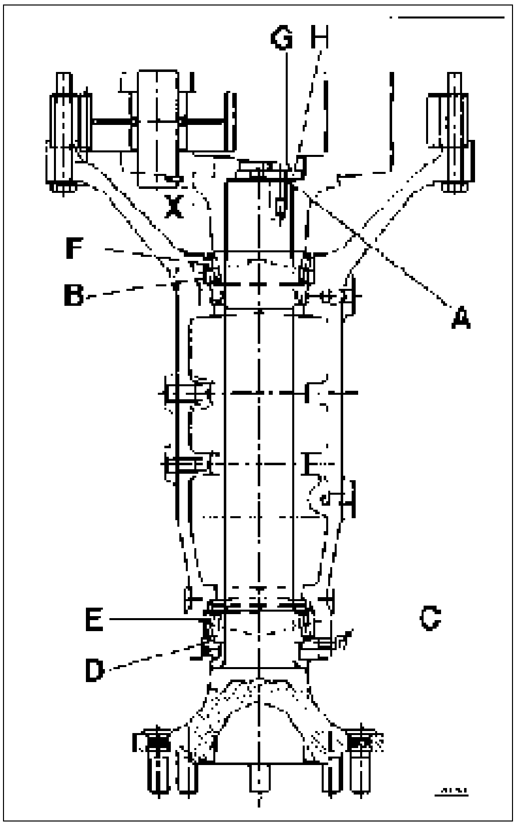


Fig. 6 - Fitment of rear stub axles.
SILVER 100.6.

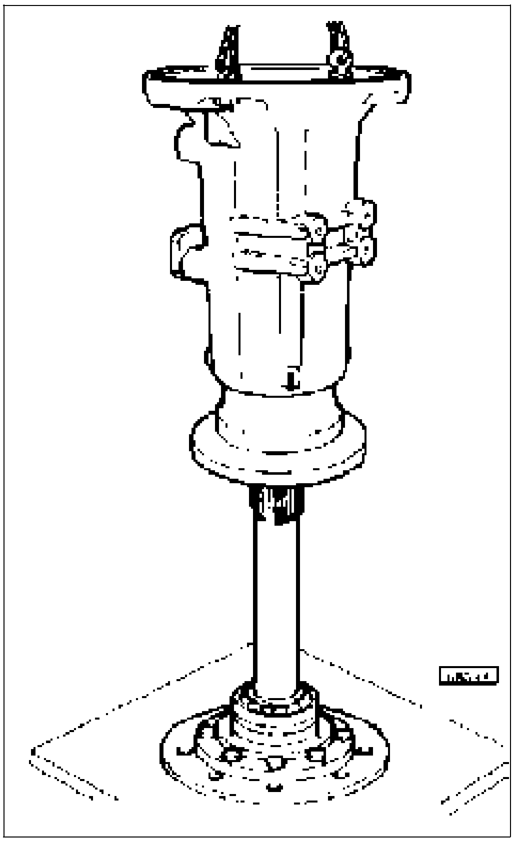


Fig. 7 - Fitment of stub axle to halfshaft.

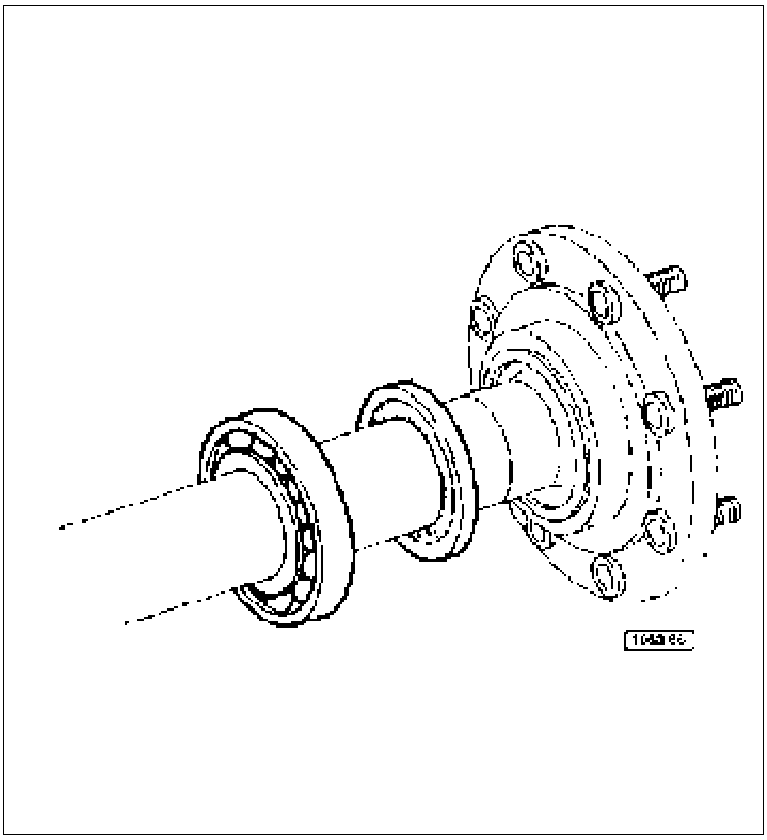


Fig. 8 - Fitment of bearing to halfshaft.

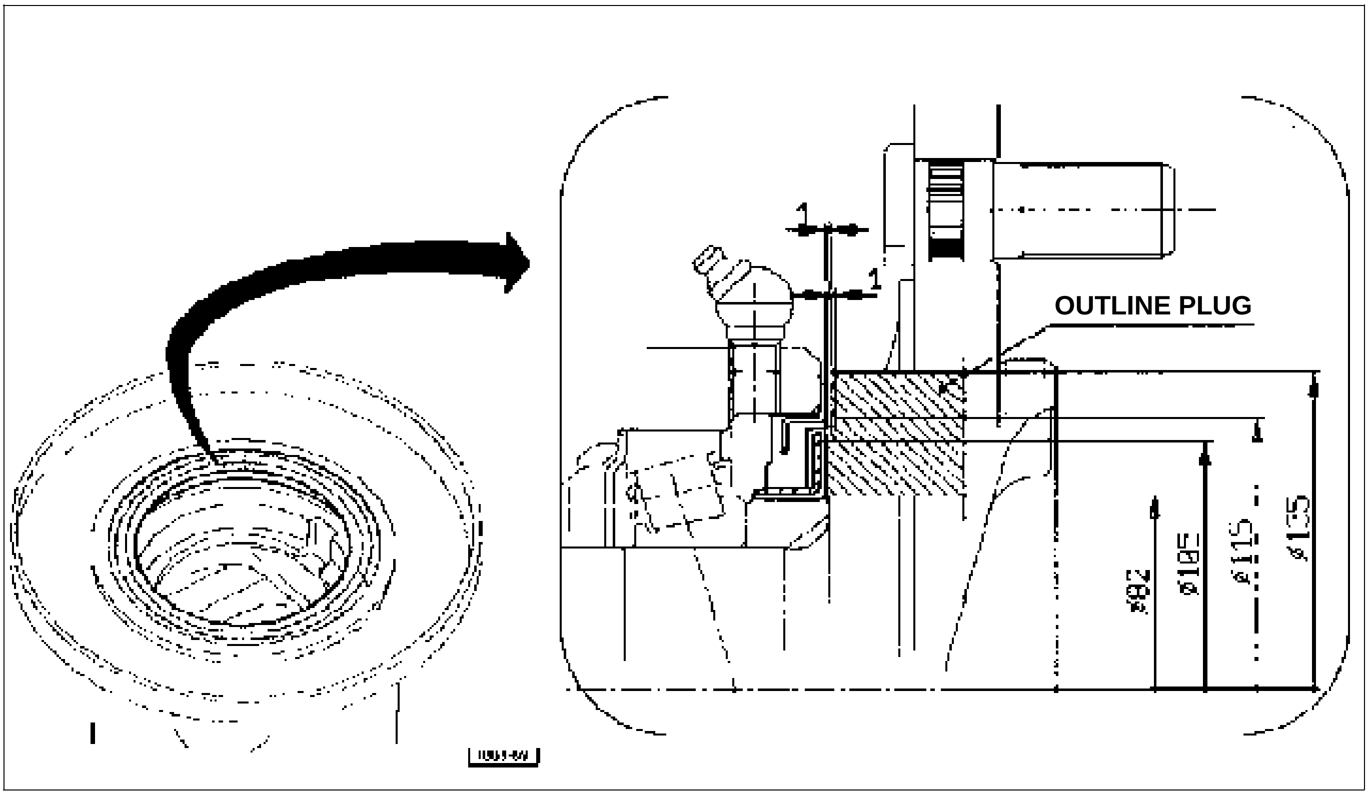


Fig. 9 - Fitment of O-ring to stub axle.

Removing and stripping the epicyclic hub assembly

Undo the three bolts (Silver 100.6 machines) securing the planet carrier housing **B** (fig 10) to the halfshaft (on all other Silver models, the spacer has just one bolt at centre).

Screw puller p/n 5.9030.618.4/10 (fig 11) to the locking spacer **A**, interposing a reducer if necessary.

Remove the spacer and the flange, and recover the shims behind.

Remove the epicyclic unit and separate into component parts, proceeding as follows:

1 - Using a hammer and punch, drive out the pin by which each shaft **A** is retained in the relative planet wheel **B** (fig 12).

2 - Remove the shaft and separate the planet wheel together with the needle bearing and the two thrust washers.

3 - Remove the bearing **A** from the flange of the epicyclic unit **B**, using a suitable puller (fig 13).

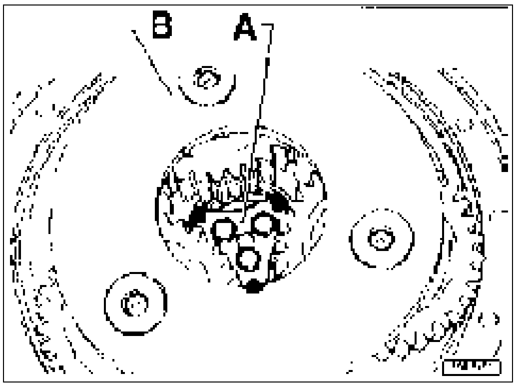


Fig. 10 - Removal of locking spacer (the spacer illustrated is that of a Silver 100.6; on other Silver models the spacer has just one bolt at the centre).
A - Spacer
B - Planet carrier housing

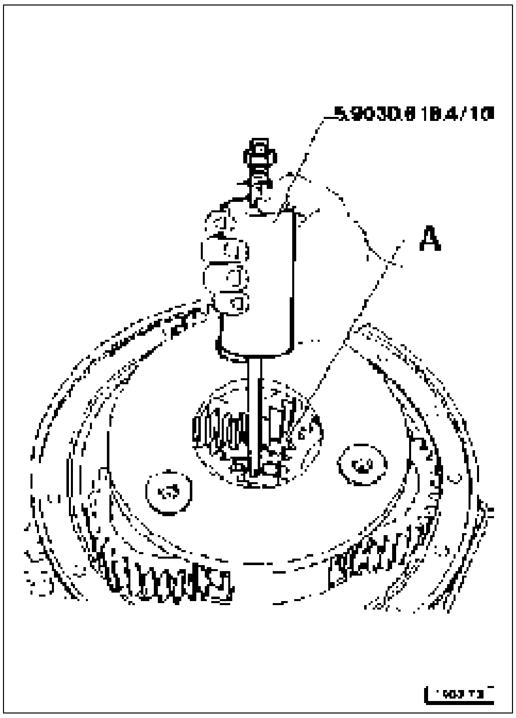


Fig. 11 - Removal of spacer.
A - Locking spacer

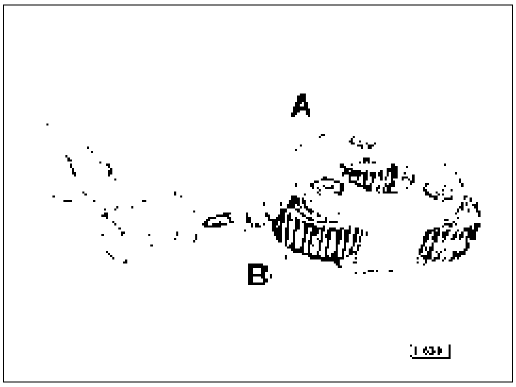


Fig 12 - Epicyclic final drive unit.
A - Shaft
B - Planet wheel

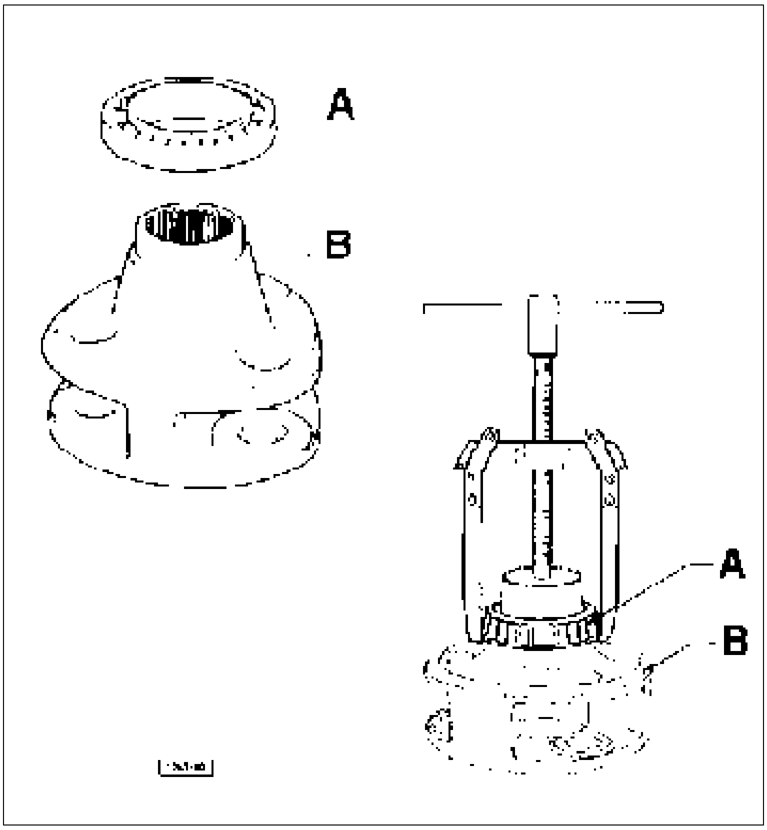


Fig. 13 - Removal of bearing from epicyclic hub flange.

2-W.D. front extendible axle

General information

The wide sideways front axle swinging obtained through excellent anchoring, not only makes it possible to operate the tractor nimbly on steep slopes but also permits the axle to be easily removed from tractor when any repair is to be performed. End play check is the only operation required on axle reassembly.

The telescopic-type axle is extremely rugged and enables the tread to be adapted to any work requirements without removing the hydrostatic steering cylinder.

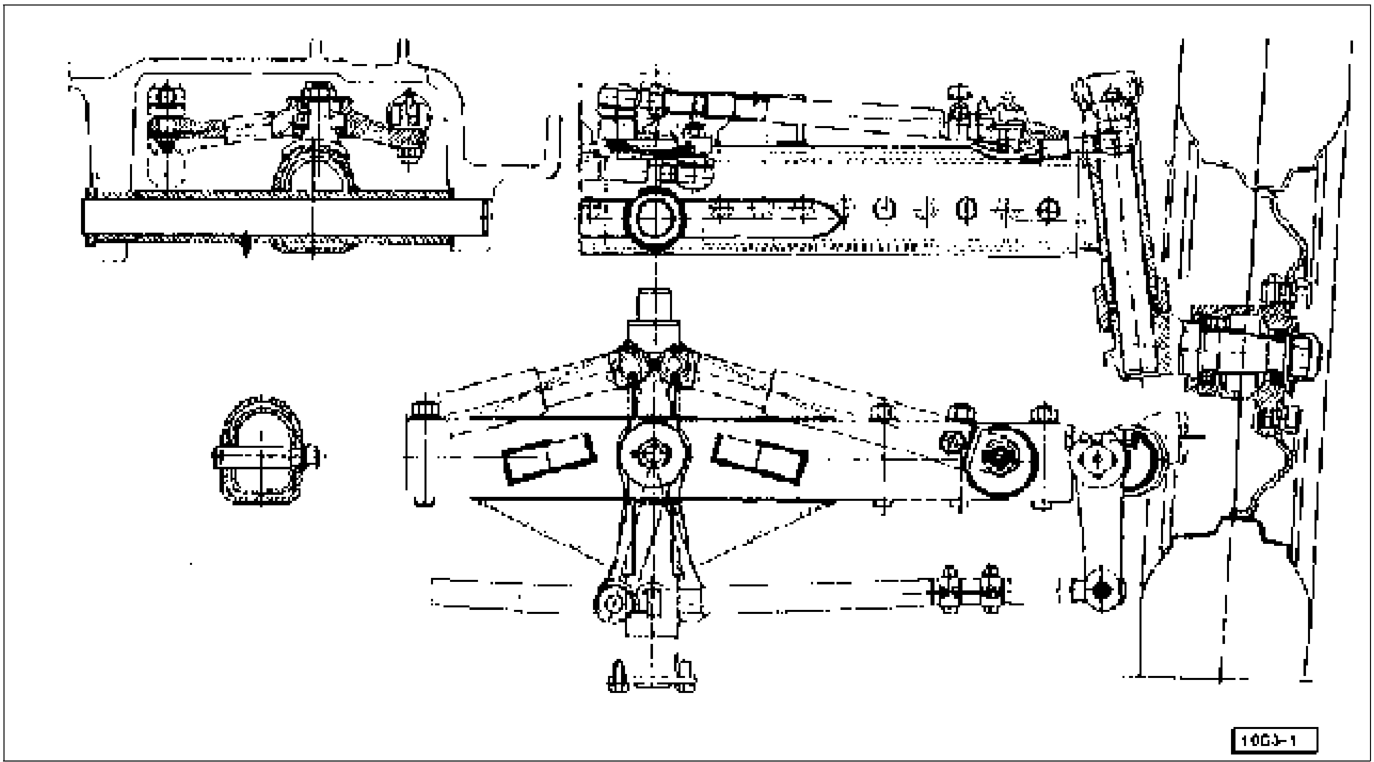
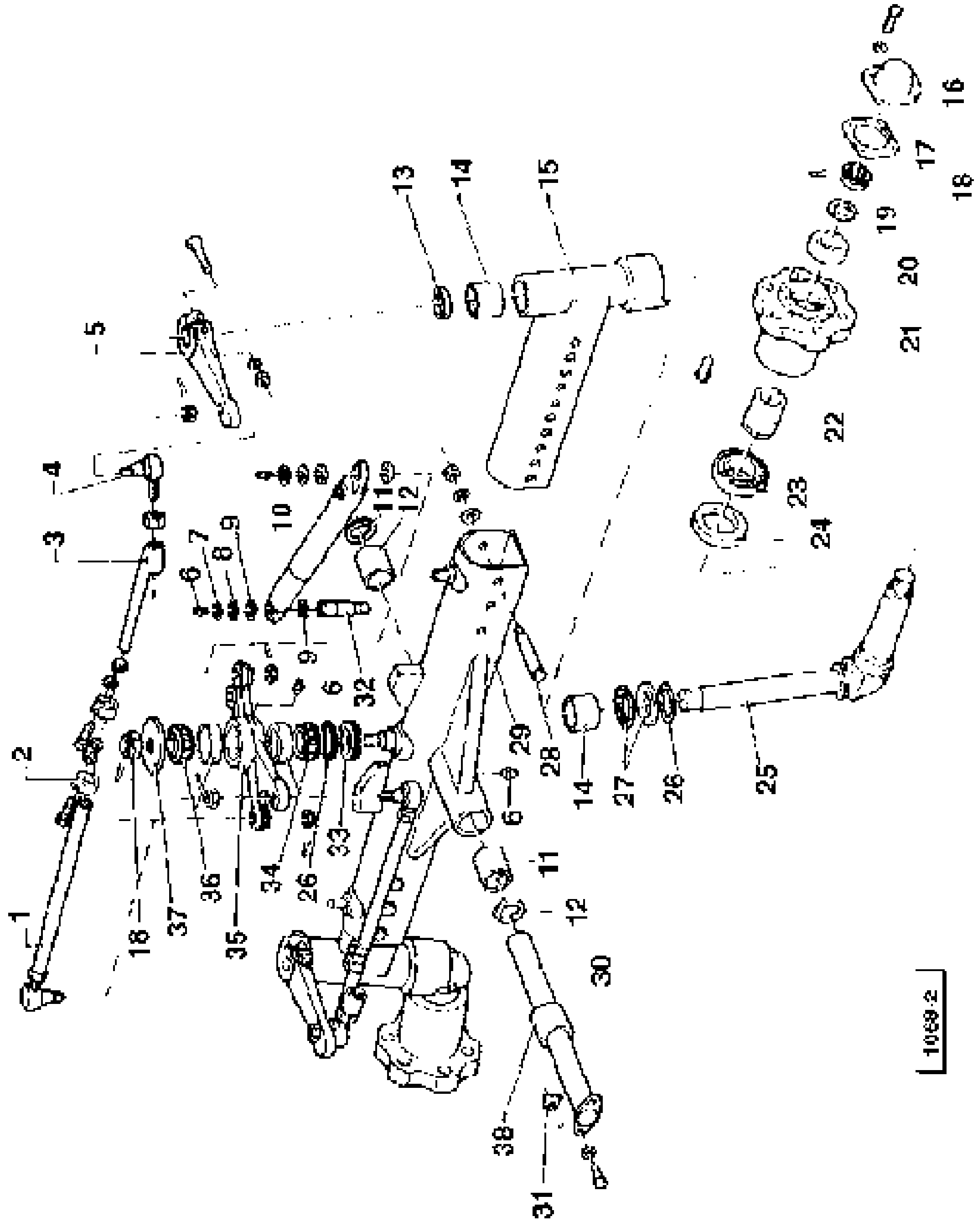


Fig. 1 - Extendible front axle.

Specifications

toe-in	mm	2 to 6
wheel caster angle		0°
axle swinging angle		12°
tyre inflating pressure	bar	2.4
lubricating grease type		AKROS GREASE T2
steering angle		70°



1 steering track rod
2 clamp
3 sleeve
4 ball-and-socket joint
5 external steering lever
6 lubricating nipple
7 snap ring
8 thrust ring
9 seal ring
10 power steering cylinder
11 shoulder ring
12 bushing
13 seal ring
14 bushing
15 side LH axle
16 cover
17 seal ring
18 castellated nut
19 shoulder ring
20 external bearing
21 wheel hub
22 spacer ring
23 internal bearing
24 retaining ring
25 wheel shaft
26 O-ring
27 axial bearing
28 pin
29 centre axle
30 axle securing pin
31 shims
32 pin
33 disk
34 lower taper roller bearing
35 centre steering lever
36 upper taper roller bearing
37 cover
38 spacer ring

Fig. 2 - Front axle assembly parts.

Removing the axle from the front support

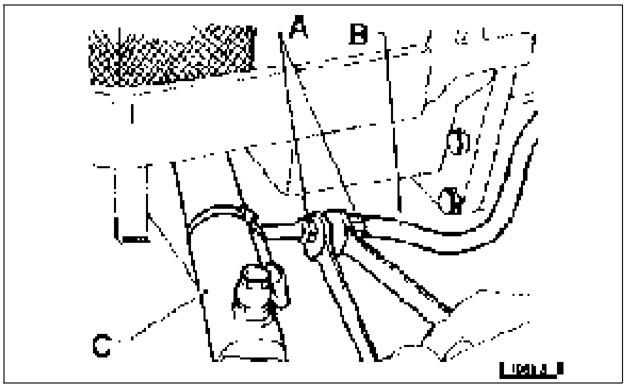


Fig. 3 - Place some suitable vessels beneath the steering control cylinders, then loosen control cylinders **A** unions **C** from hoses **B** side.

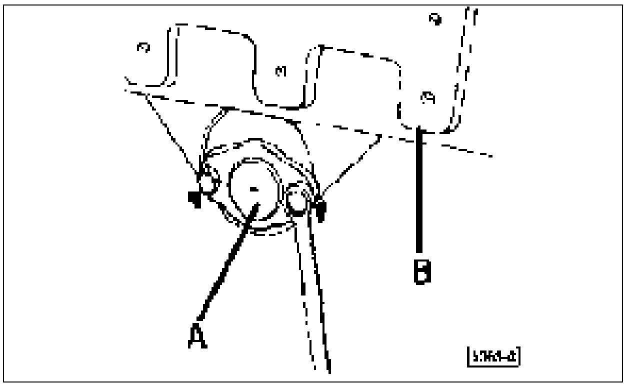


Fig. 4 - Loosen both securing screws of pin **A** to axle support **B**.

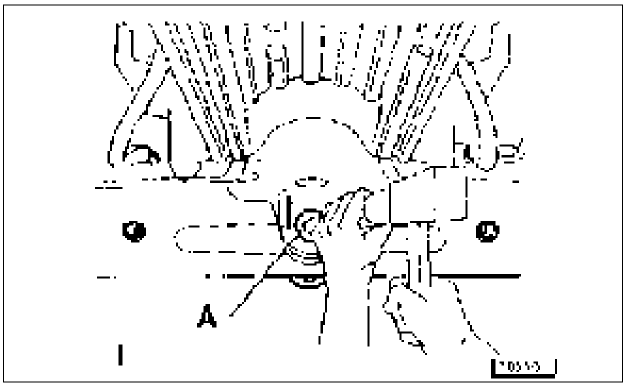


Fig. 5 - Using a light-alloy hammer and punch to tap on rear pin end **A**.

WARNING: Keep the shim packs separated so that the correct position can be restored on reassembly.

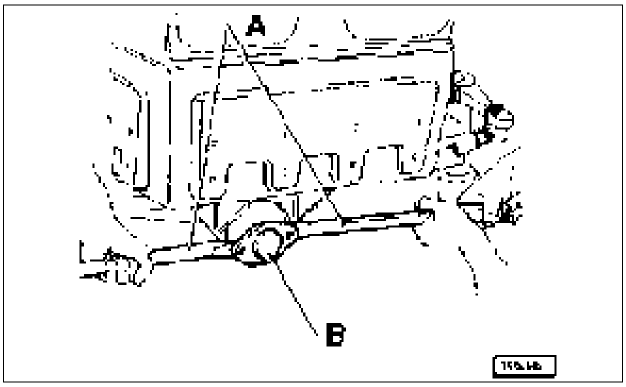


Fig. 6 - By way of both levers **A** withdraw pin **B** forward and recover the shims interposed between flange and front support. Ensure the securing pin surface shows no flattening, craking or chipping, replace the pin if necessary.

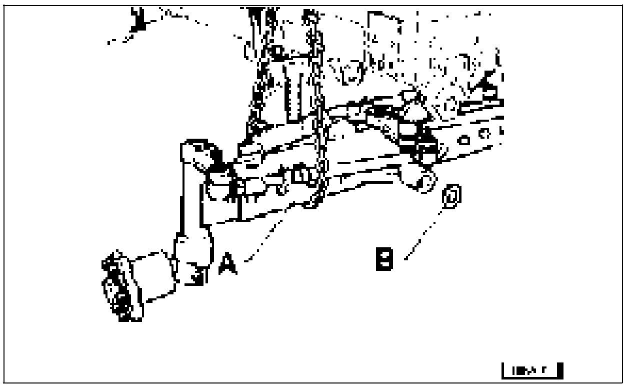


Fig. 7 - Remove the axle from the front support by tapping a few times the axle centre portion with the hammer.
Lower axle **A** very slowly and make sure that no hindrance is produced during lowering, then remove shoulder rings **B.**

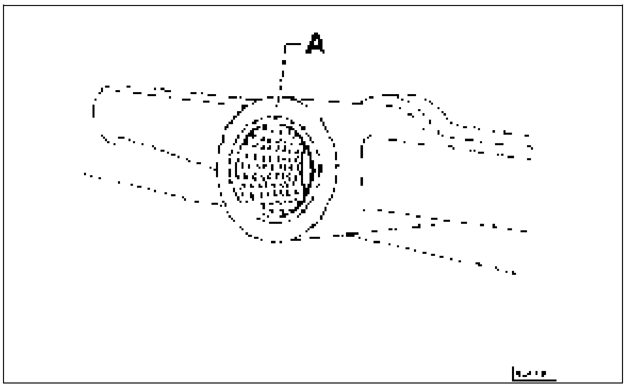


Fig. 8 - Ensure that bushes **A** of the centre axle are not worn, checking for well-evident indentations, remove the bushes by hammer and punch if necessary.

Carry out installation according to the following procedure:

— Use very fine abrasive paper to remove any signs of oxidation from both pin and front support.

— Bushes and pin should be properly lubricated with the specified grease type.

— Coat the front support shoulder rings with grease to make positioning easier.

— Making use of a light alloy hammer and punch tap on spacer **F** so as it may be moved toward the front side.

— Insert pin **E** into the spacer and fit front shoulder ring **B**.

— Lift the axle and insert the pin into bush **C**.

— Place rear shoulder ring **D** and push the pin almost fully inward.

— Fit shims **G** adjusting as instructed on page 194 and then drive front axle pin securing screws **H**.

— Restore the oil level in the hydrostatic steering system also bleeding the air, (see to chapter Hydrostatic steering).

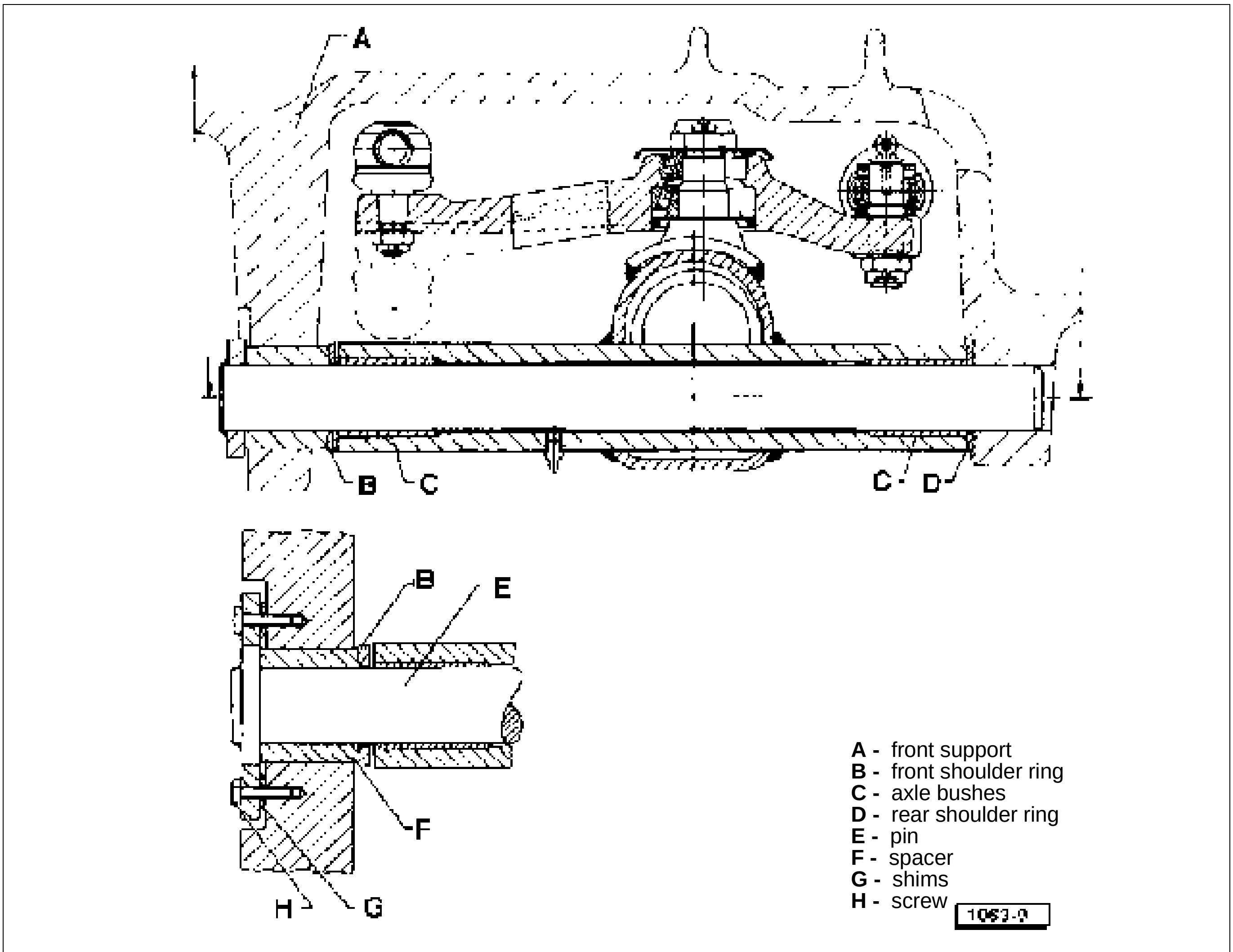
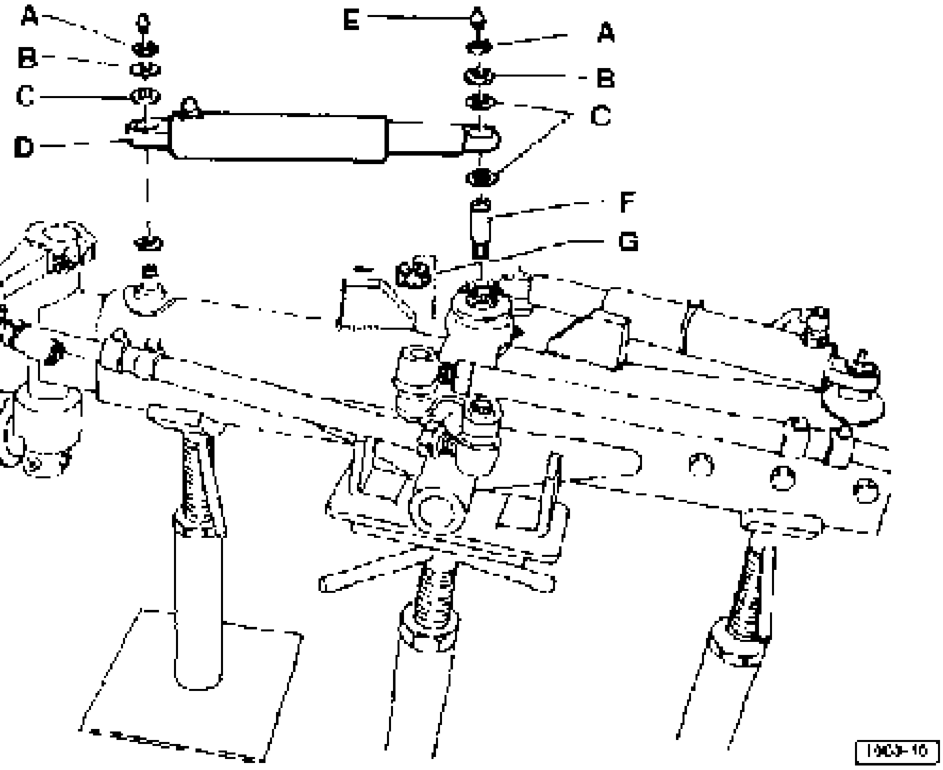


Fig. 9 - Front axle longitudinal section.

4 drive axles - axles

42 2-W.D. extendible axle



A - Snap ring
B - Thrust ring
C - Seal ring
D - Power steering cylinder
E - Grease nipple
F - Pin
G - Castellated nut

Fig. 10 - Front axle.

A - Castellated nut
B - Ball-and-socket joint
C - External steering lever

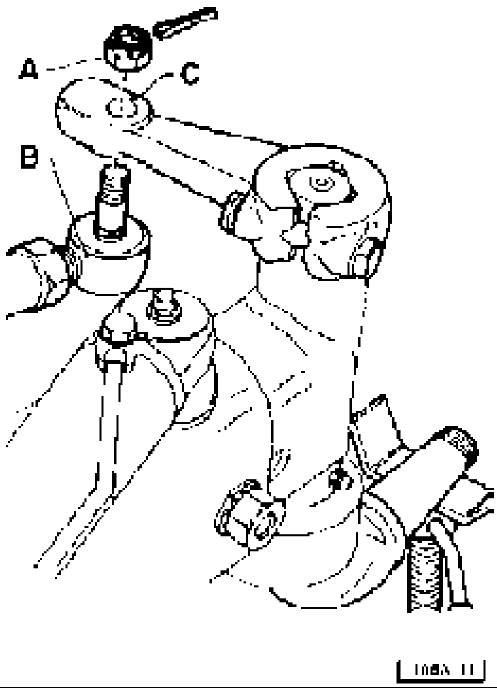


Fig. 11 - Steering arms.

— check steering rod ball-and-socket joints for damage or wear and make sure these are able to rotate freely and without excessive play inside their seats. Replace if necessary.

— Ensure the rubber ball joint guard is intact, otherwise replace the ball joints.

— Examine the operating rods for damage or warping. Replace if required.

A - Steering rods
B - Ball-and-socket joints
C - Centre steering lever

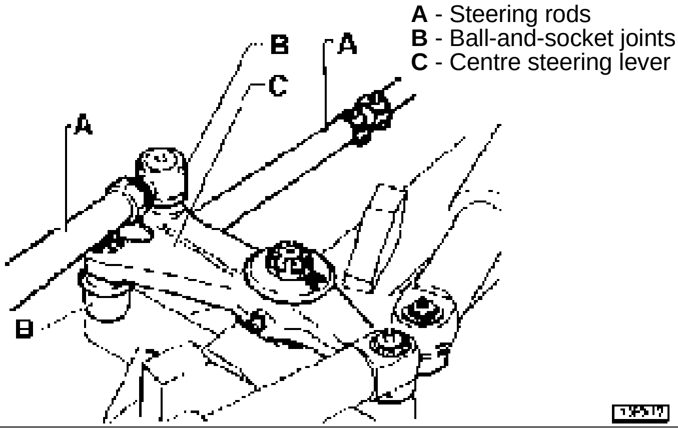


Fig. 12 - Steering linkage.

Centre steering lever

— Use a universal puller to remove centre lever **A** together with bearing **B**.

— Still using a universal puller (see fig. 15) remove bearing **C** and disk **B** along with O-ring **A**.

— Make sure the centre lever is not warped or damaged, otherwise replace.

— Carefully examine the bearings turning them slowly, if the bearing is sound no vibrations, noise nor slight jam-ups shall be felt.

— Fix centre lever **A** in a vice if required, and using a light-alloy hammer and punch remove tapered bearing outside races **B**, located in the centre hole (Fig. 14), taking care to remove first the upper race having smaller diameter by tapping from inside outward.

— Re-install the centre lever operating in reversed removing order and accordingly with the following procedure:

- Before assembly carefully lubricate the tapered-roller bearings and related races.

- Before mounting the lower bearing in the axle fit a new disk and a new O-ring.

- When installing the castellated nut keep to the following instructions:

  - Tighten the nut fully to bed the bearings properly.

  - Loosen the nut and tighten again until all plays have been taken up, then fit a new check pin.
    If the hole in the pin is not in the same line as the cut in the nut, tighten the nut furtherly as long as a new check pin can be inserted.

- When the reassembly is completed perform pin and bearing lubrication with the specified grease type just operating the lubricating nipples placed on the lever.

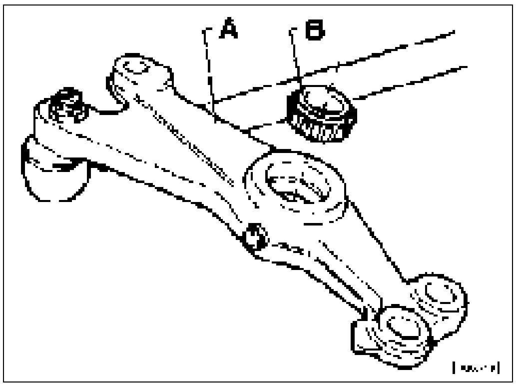


Fig. 13 - Centre steering lever.
A - Centre steering lever
B - External bearing races

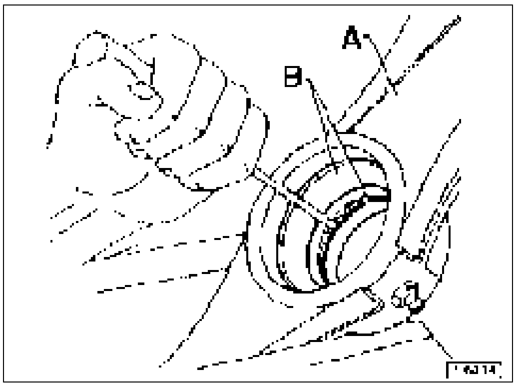


Fig. 14 - Centre steering lever bearing.
A - Centre steering lever
B - Upper tapered-roller bearing

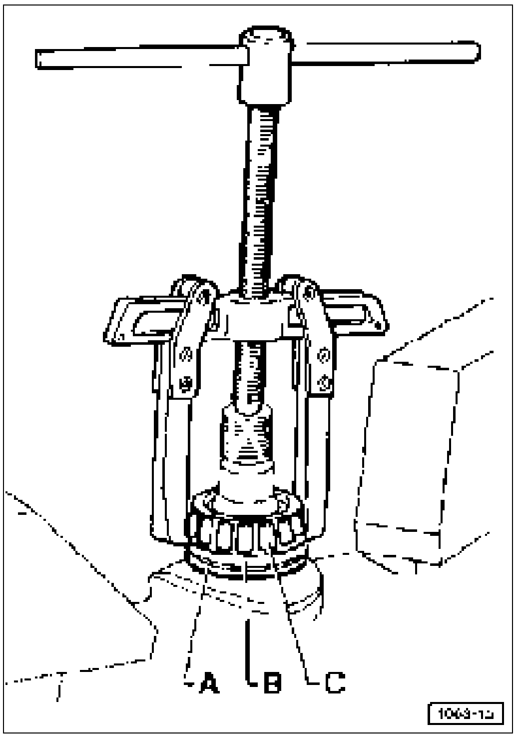


Fig. 15 - Removing the centre steering lever Cbearing.
A - O-ring
B - Disk
C - Tapered-roller bearing

drive axles - axles

2-W.D. extendible axle

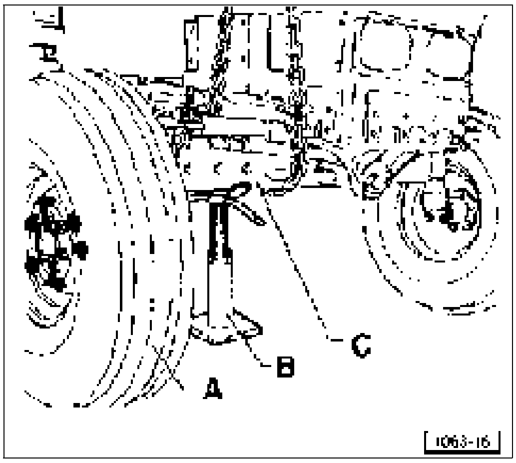


Fig. 16 - Removing the wheel hub.
A - Tractor wheel
B - Safety stand
C - Front axle

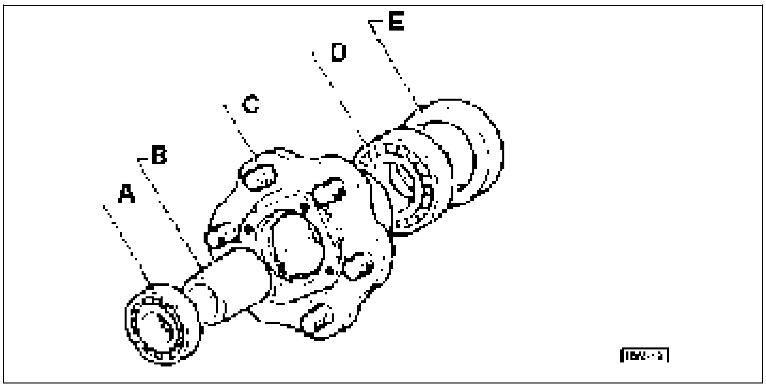


Fig. 19 - Wheel hub parts.

1 - Front ball bearing
2 - Spacer
3 - Wheel hub
4 - Rear ball bearing
5 - Retaining ring

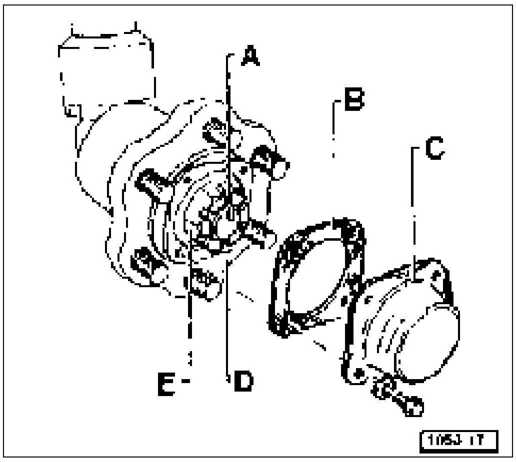


Fig. 17 - Removing the guard cover.
A - Check pin
B - Gasket
C - Cover
D - Hub
E - Nut

Wheel hub

— Using a universal puller withdraw whole wheel hub **B** from pin, (Fig. 18).
— Make use of a suitable puller to remove front ball bearing **A** and take spacer **B**, (Fig. 19).
— Remove retaining ring **E** by prising, then using a proper puller remove rear ball bearing **D**, (Fig. 19).
— Before assembly coat bearings **B** and **D** and new retaining ring **A** with the recommended grease, (Fig. 20).
Carefully insert retaining ring **A** using a light-alloy hammer and punch.
— Install wheel hub **C** onto pin **G** tapping slightly with the hammer for proper bedding.
— Tighten castellated nut **E** to the prescribed torque.
Make sure the nut cut is duly aligned with the check pin hole in the pin, otherwise tighten the nut furtherly to make them coinciding and re-install the check pin.
— Ensure wheel hub **C** end play is 0.12 to 0.48 mm with respect to wheel shaft pin **G**.

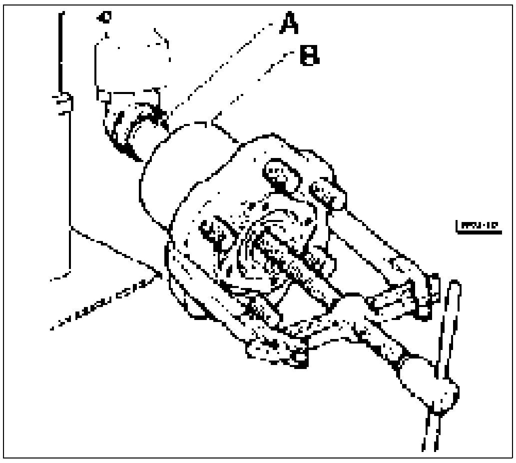


Fig. 18 - Using a puller to remove the wheel hub.
A - Wheel hub shaft pin
B - Whole wheel hub

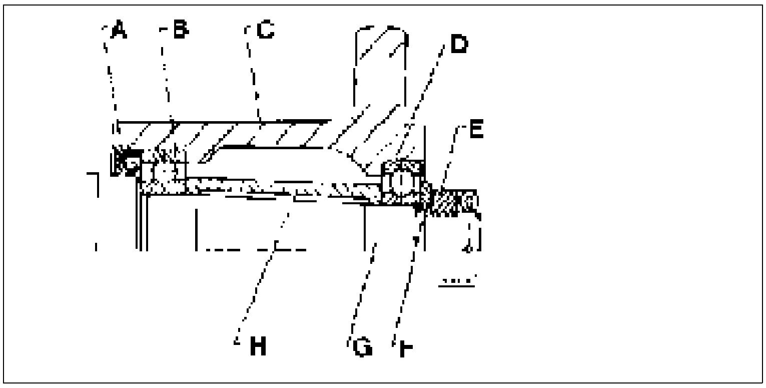


Fig. 20 - Cutaway view of the wheel hub.

A - Retaining ring
B - Internal ball bearing
C - Wheel hub
D - External ball bearing
E - Castellated nut
F - Shoulder ring
G - Wheel shaft pin
H - Spacer

Inspections and checks

Clean bearings and the other parts carefully, then dry using compressed air. Carefully examine the bearings turning them slowly, if the bearing is sound no vibrations, noise nor slight jam-ups shall be felt.

Carefully examine bearing race and rolling member conditions ensuring no scoring, marking, grinding signs due to foreign matter abrasion are noticed, otherwise replace the bearing.

WARNING: Should a bearing be no more serviceable, both the internal and the external bearings must be replaced.

Make sure the wheel shaft has suffered no damage and threading is whole, replace if required.

Ascertain clearance hole **A** permitting the external cover to be fixed is not obstructed by foreign matters, if so remove any clogging to allow hub **B** to be properly lubricated.
Wash any components carefully and dry with compressed air.

Be sure no signs of oxidation are visible on the wheel shaft, if so remove with very fine abrasive paper.

Check the shaft for either warp or damage, if so replace the shaft. Carefully inspect the axial bearing making sure no grinding, scoring or marking are evident neither on the rolling members nor on the bearing races, otherwise replace the worn parts.

Check side axle upper and lower bushes **B** for wear, ascertaining they still show evidence of the purpose-made indentations, otherwise replace.

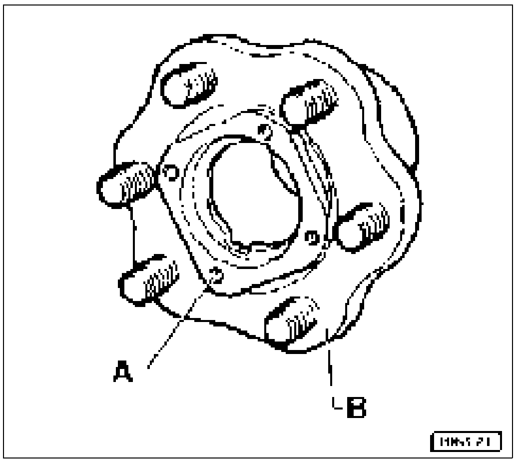


Fig. 21 - Wheel hub lubricating hole.
A - Clearance hole
B - Wheel hub

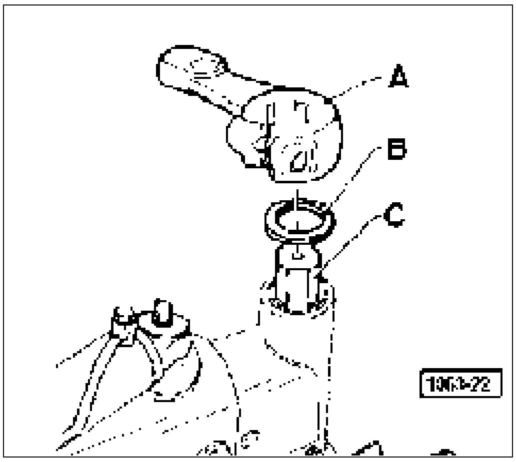


Fig. 22 - Removing the steering lever.
A - External steering lever
B - Gasket
C - Wheel shaft

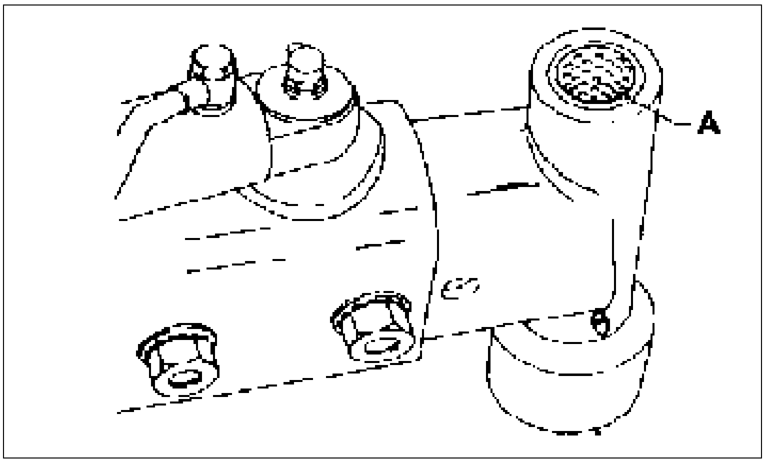


Fig. 24 - Wheel pivot bushes.
A - Clearance hole

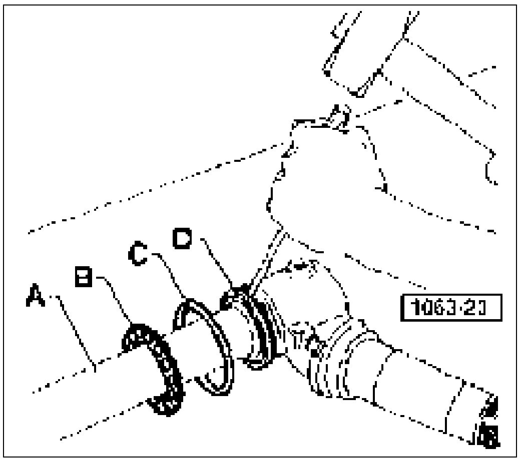


Fig. 23 - Removing the wheel pivot axial bearing.
A - Wheel shaft
B - Axial bearing
C - O-ring
D - Axial bearing race

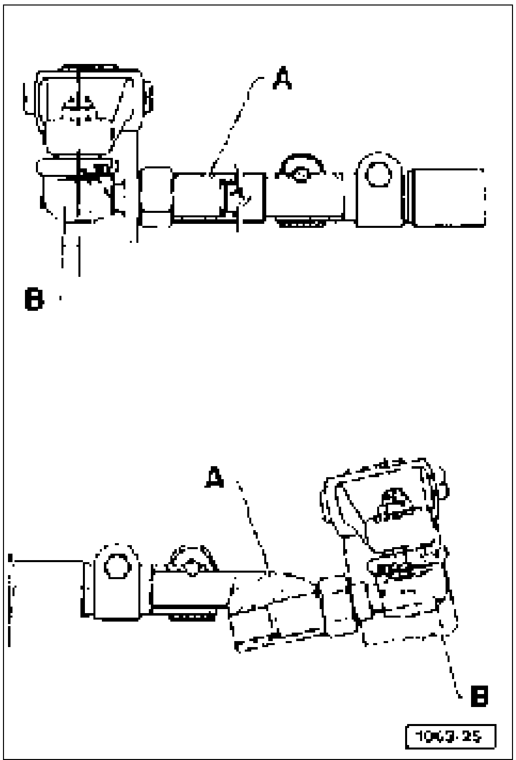


Fig. 25 - Steering linkage.
A - Sleeve
B - Steering knuckle

Correct steering rod assembly (Fig. 25)

Rotate sleeve **A** around its axis so that knuckle **B** attains the position shown in figure, i.e. make sure the knuckle working angle is 90°, then insert and tighten both sleeve securing bolts.

Adjusting end play (Fig. 26)

Push the axle backward and using a thickness gauge ensure maximum play "**G**" is not above 0.4 mm.

If the reading exceeds specifications, operate as follows:

— Loosen screws **E** securing pin **B** to front support **A.**

— Slightly move the pin to take a number of shims D from underneath the flange so that the correct play may be restored.

— Lock screws E and check play once again.

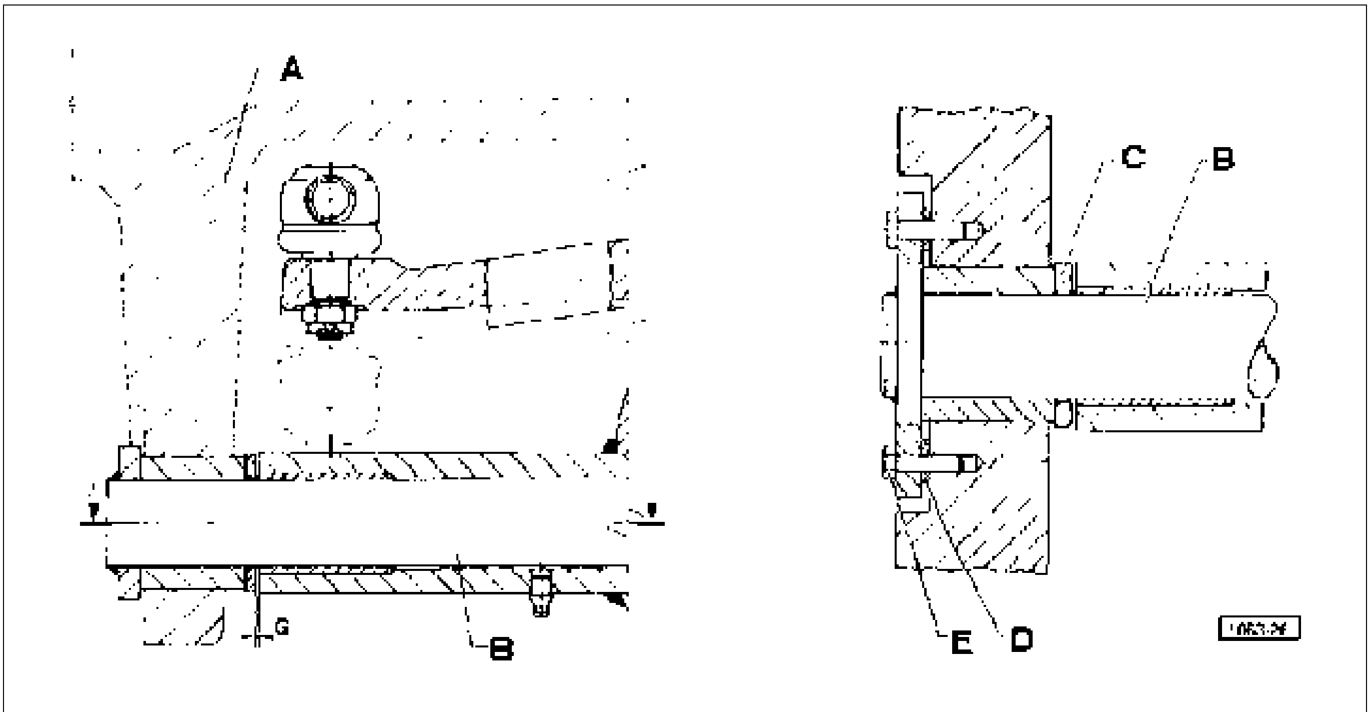


Fig. 26 - Adjusting the front axle end play.
A - Front support
B - Pin
C - Shoulder ring
D - Shims
E - Screw

FRONT-WHEEL DRIVE

The front-wheel drive is designed so that the front axle centre coincides with the transmission shaft centre of rotation.
The latter, directly linked without universal joints, transmits the movement to the front wheels through a centre differential unit and two final epicyclic reducers installed in the wheel hubs.

Specifications

front drive axle ratios

gearbox reduction gear-front-wheel drive	30 km/h	1st version	39/40 = 1/1,0256
	30 km/h	2nd version	33/28 = 1/0,84849
	40 km/h	1st version	39/40 = 1/1,0256
	40 km/h	2nd version	33/28 = 1/0,84849
bevel gears	30 km/h	1st version	10/38 = 1/3,8000
	30 km/h	2nd version	8/37 = 1/4.6250
	40 km/h	1st version	11/32 = 1/2,9091
	40 km/h	2nd version	10/35 = 1/3,5000
final epicyclic reducer			(12/12+69)=1/6,7500
total reduction	30 km/h	1st version	1/26.3066
	30 km/h	2nd version	1/26,4891
	40 km/h	1st version	1/20,1391
	40 km/h	2nd version	1/20,0458
mechanical ratio (front wheel turn nos. each rear wheel turn)			
SILVER 80 - 90 - 100.4	30 km/h	1st version	1,3150
	30 km/h	2nd version	1,3060
	40 km/h	1st version	1,3072
	40 km/h	2nd version	1,3133
SILVER 100.6	30 km/h	1st versione	1,3224
	30 km/h	2nd version	1,3133
	40 km/h	1st version	1,3099
	40 km/h	2nd version	1,3160
bevel gear teeth backlash	mm		0,15 ÷ 0,20
front drive axle end play	mm		0,1 ÷ 0,4
front drive axle swinging			10°
steering angle			50°
toe-in			see specification table here below
wheel caster angle			7°
camber			1°

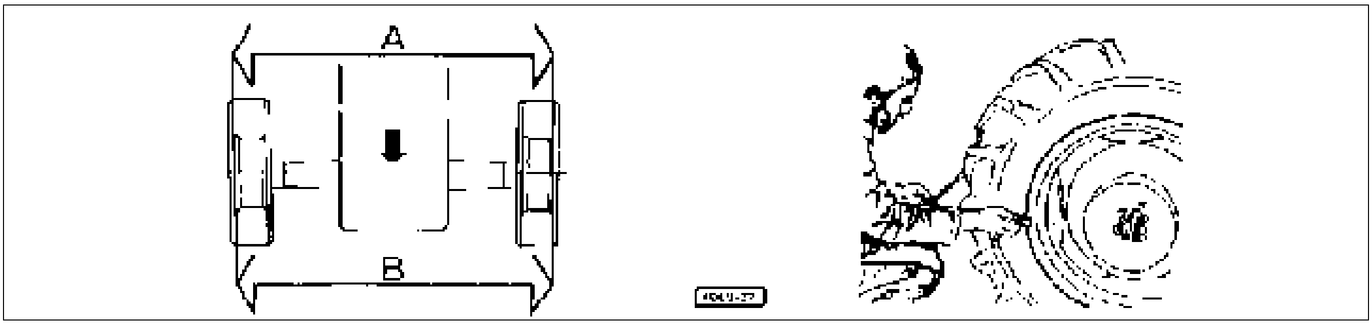


Fig. 1 - Measuring front wheel toe-in and front wheel geometry.

Adjusting toe-in

Adjust the front wheel tie rod so as difference A-B shown in figure 1 be:

wheel rim keying diameter		A-B mm	
		2-W.D.	4-W.D.
up to 20"	(508 mm)	2 to 6	0±2
20" to 30"	(509 to 762 mm)	3 to 6	0±3
over 30"		3 to 6	0±3,5

Adjusting steering angles

Make sure the front drive wheel steering angle is as specified in table above.
Otherwise adjust by way of the special setscrews or spacers.

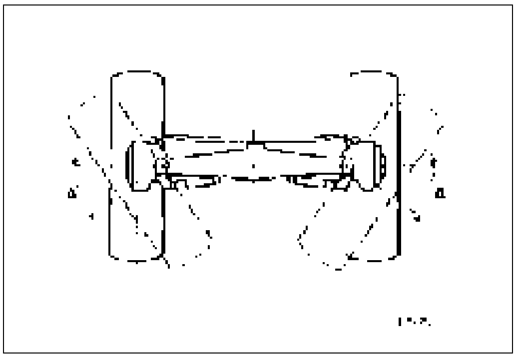


Fig. 2 - Front-wheel drive steering angles.

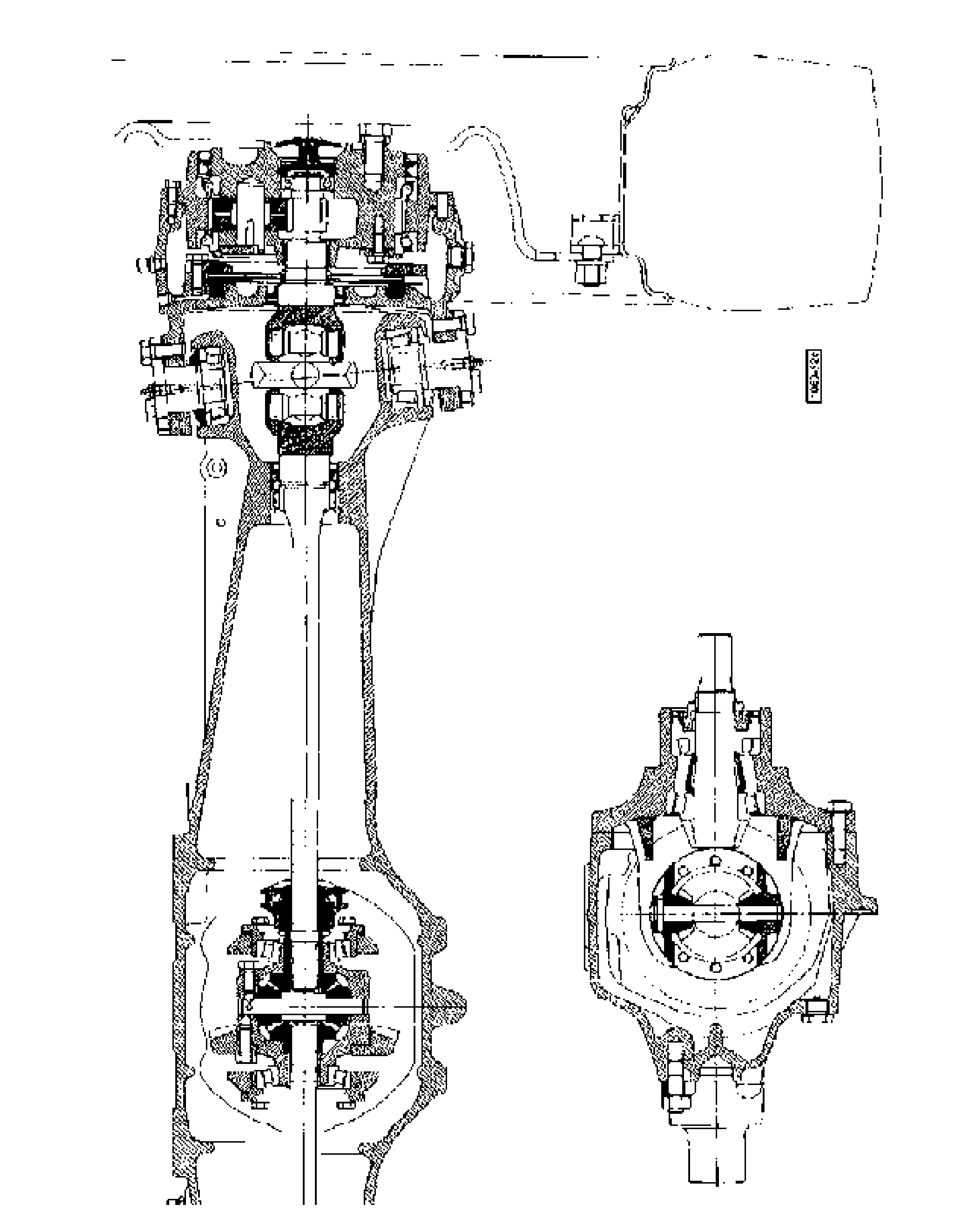


Fig. 3 - Longitudinal section through front drive axle (basic version); details of the version with steering angle sensor for SBA system are given in the next chapter.

Inspections and checks

Carry out a thorough check and adjust the end play as follows:

— Move the axle forward tapping with a non-ferrous metal hammer.

— Use thickness gauge **A** (see Fig. 5), to make sure that the end play between shoulder ring **B** and differential housing **C** is within specifications given in the related table (see page 195). If the end play is correct loosen the four nuts securing front swivel support **C** to drive axle **A** and add or remove a number of shims **B** enough to obtain the recommended end play.

— Bleed the air from the brake system.

— Check the toe-in and adjust the differential lock operating rod if necessary.

— Tighten the swivel support securing nuts to the specified torque.

Swivel support securing nuts

front	89 Nm	(9,1 kgm)
rear	142 Nm	(14,5 kgm)

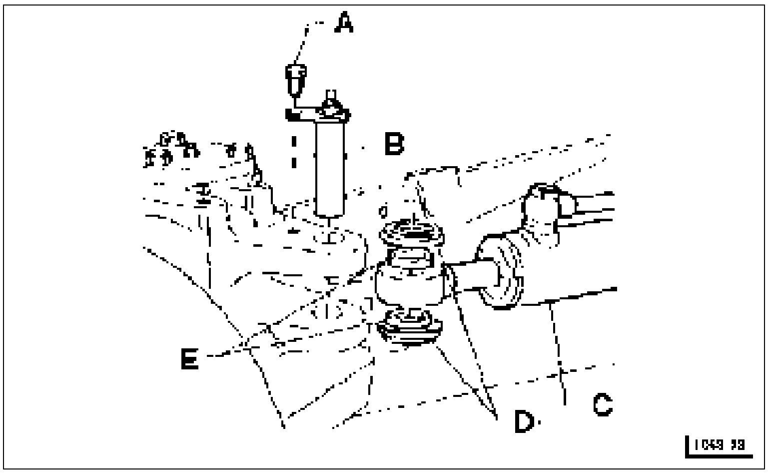


Fig. 7 - Power steering cylinder securing pin.
A - Pin securing pin
B - Power steering cylinder fixing pin
C - Power steering hydraulic cylinder
D - Dust cover
E - Spacers

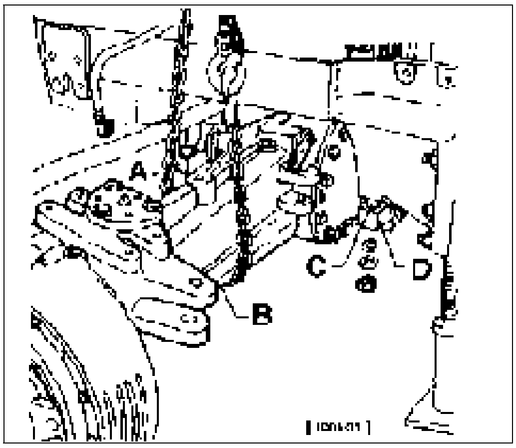


Fig. 4 - Removing/Installing the front drive axle.
A - Swivel supports
B - Front axle
C - Spacers
D - Swivel support

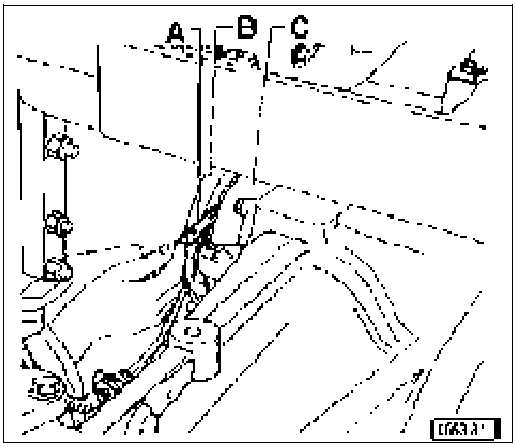


Fig. 5 - Checking the front axle end play.
A - Thickness gauge
B - Shoulder ring
C - Differential housing

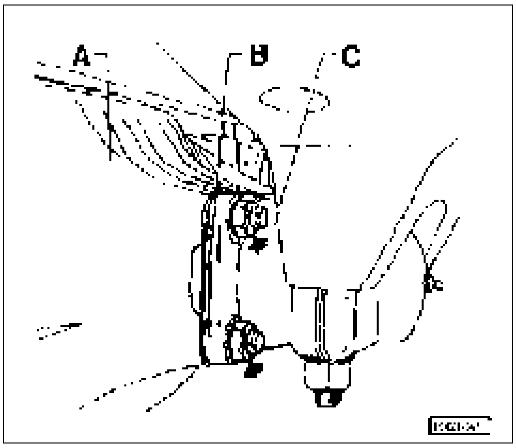


Fig. 6 - Front axle end play check point.
A - Front drive axle
B - Shims
C - Front swivel support

WHEEL HUB

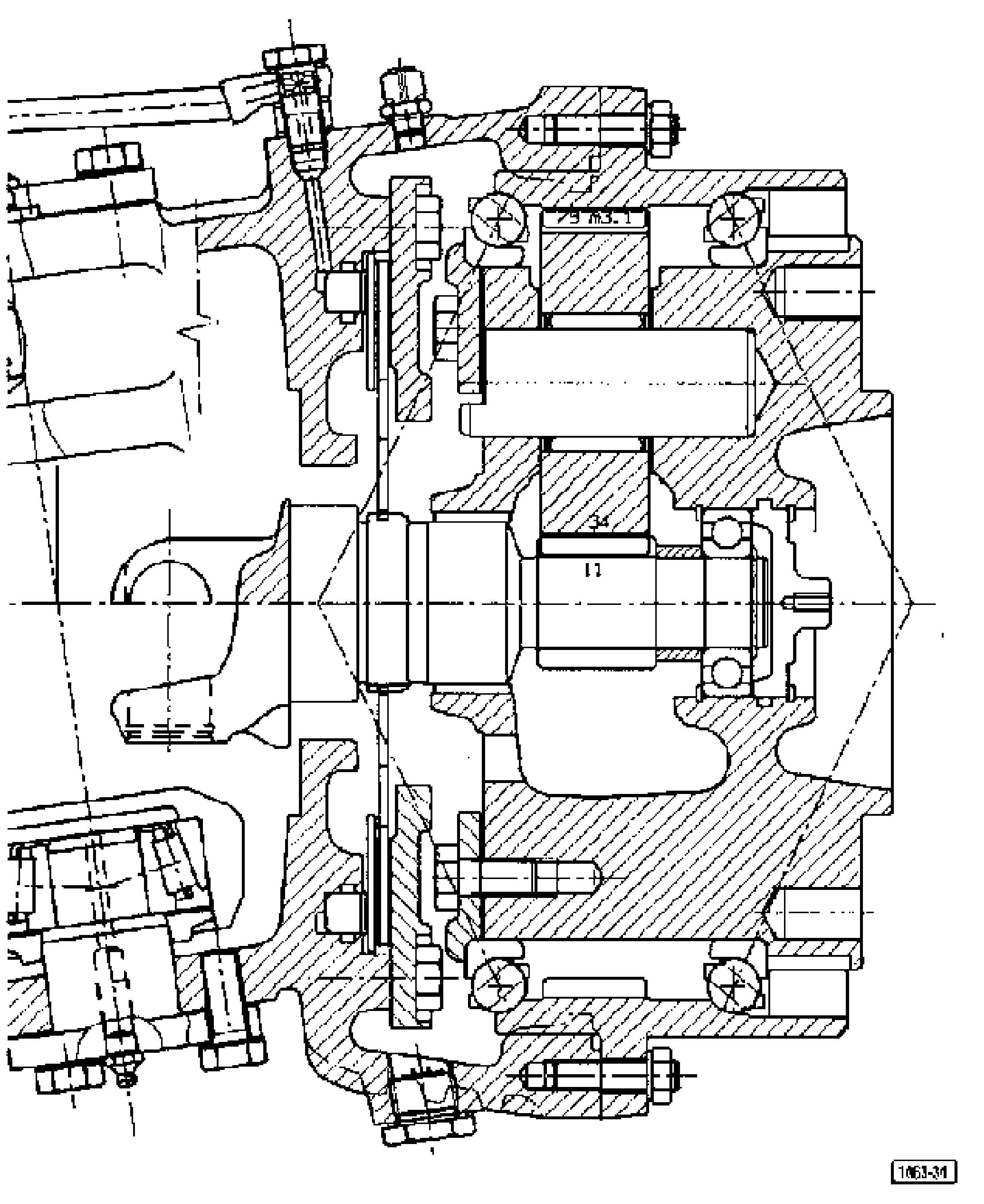


Fig. 8 - Front wheel hub parts.

Final epicyclic reducer

Disassembling the hub

1 - If the operation involves the bevel gear pair, removal is enabled simply by extracting the two hub swivel pins; the hub can then be distanced together with the halfshaft.

2 - If the operation involves the hub, proceed as follows:
- — remove the protective cap located at the centre of the epicyclic housing.
- — remove the circlip from its groove.
- — fit puller p/n 5.9030.618.4/10 and remove the flange (see fig 9).
- — remove the circlip from the groove at the end of the halfshaft.
- — screw two bolts into the holes indicated by the arrows (see fig 9) and separate the hub from the epicyclic housing.

WARNING: Use a non-ferrous metal hammer and punch to tap on ferrous parts for removal if necessary.

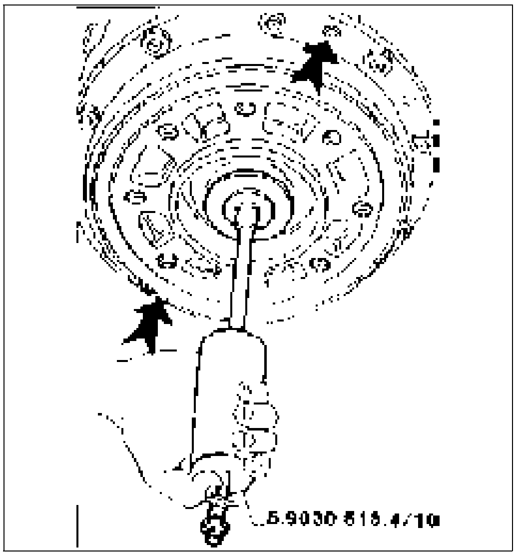


Fig. 9 - Removing the hub flange with SAT no. 5.9030.618.4/10 tool.

Stripping down the epicyclic

Remove the ten securing bolts from the flange of the housing, then remove the flange and the shims beneath.

Rest epicyclic reducer **A** on two wooden blocks as shown in figure and using a press and a punch operate on planetary carrier case centre **B** until the planetary carrier, bearing **C** and seal ring **D** can be removed from the bottom.

NOTE: If oil leaks are noticed from seal ring **D**, this ring can be removed from its groove without requiring the planetary carrier case to be dismounted.

In any case, when seal ring **D** is removed the damage it usually has to undergo is to such an extent to require replacement.
Tap with a hammer and a punch on bearings **C** and **E** when having to remove, if necessary.
Take planetaries **A** securing pins **B**; remove the planetaries and take roller cages **C**.

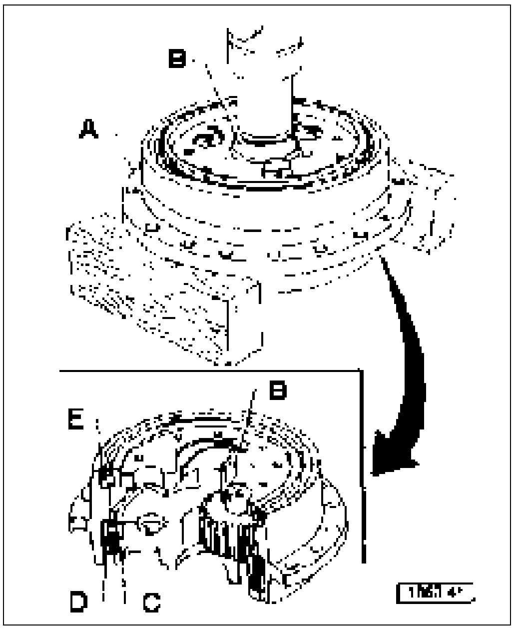


Fig. 10 - Disassembling the epicyclic reducer.
A - Epicyclic reduction gear
B - Planetary carrier case
C - Bearing
D - Seal ring
E - Bearing

Installation

Re-install the disassembled bearing **C** (Fig.10), in the planetary carrier case paying attention to the assembly direction.
Install planetaries **B** with bearings **C** (Fig.11) into the planetary carrier case taking care to turn the pin dogs towards the hub centre.
Make the planetary and the crown wheel teeth match avoiding any damaging when inserting the planetary carrier into the external case.
Install bearing **C** if previously disassembled, use a hammer and a punch to tap slightly and evenly on the outer race surface.

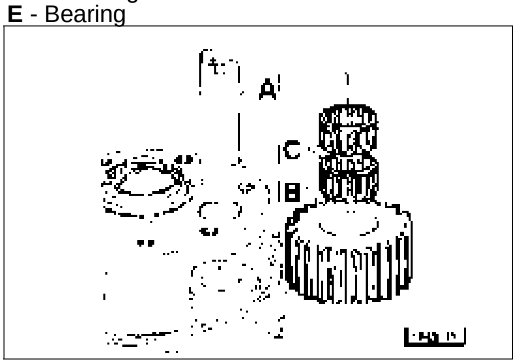


Fig. 11 - Epicyclic reduction gear planetaries.
A - Pins
B - Planetaries
C - Roller cage

Shimming epicyclic reducer bearings

Fit a number of shims between the planetary carrier flange and the pin fixing plate, until the bearing rotate freely, even though a slight bearing preloading can be felt, then remove one 0.05 mm shim from the shim pack.

Fit a new seal ring .

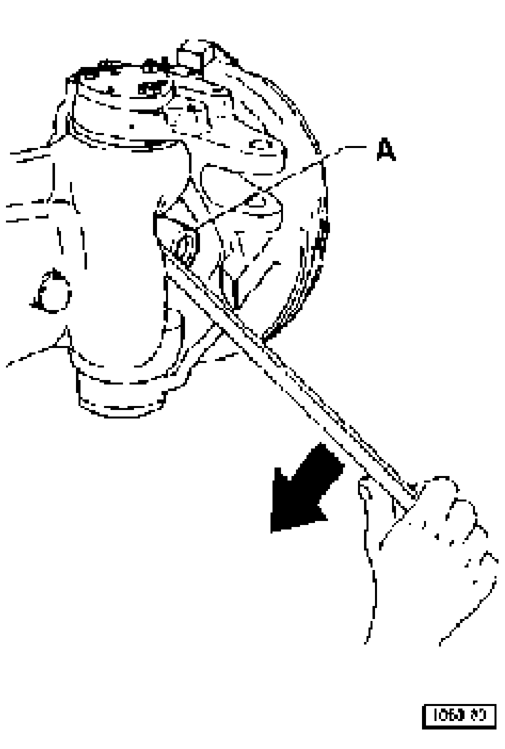


Fig. 12 - Prising with a lever to hold the axle shaft in position when mounting the final epicyclic reducer.

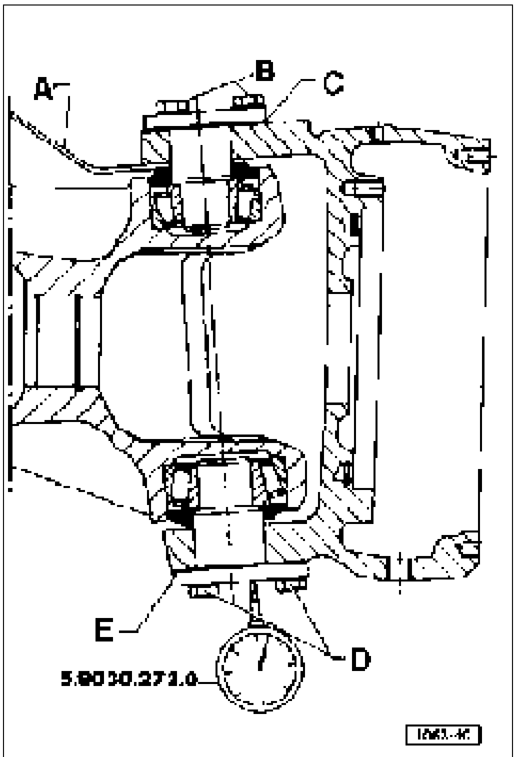


Fig. 13 - Checking wheel hub clearance.
A - Lever
B - Screws
C - Pack of shims
D - Screws
E - 0.5 mm shim.

The following procedure should be observed on reassembly:

1 - Brakes

Replace the brake control piston O-rings and insert piston in its seat with the oil grooves turned outwards.

2 - Final epicyclic reducer

Install the final epicyclic reducer holding the axle shaft in position as shown in figure 12 by prising on cross journal **A** outwards; this to prevent the axle shaft from moving inwards.

3 - Axle shafts

When inserting the axle shaft pay attention not to damage the roller bearing or the seal ring. The axle shaft end should be correctly introduced into the differential gear planetaries. Make sure the axle shaft is free to rotate without any hindrance.

4 - Forks

After installing the bearings and the dust rings mount the fork by placing one 0.5 mm shim under the lower pin, then fit the pin, use a hammer if necessary, finally tighten the securing screws.
Fit a pack of shims thicker than the one taken on removal under the upper pin. Install the pin tightening the securing screws.

Adjusting wheel fork bearing preloading

In the pack of shim to be put together for adjustment it is always advisable to group more shims in one: as an example, it is better one 0,2 mm shim be used instead of two 0,1 mm shims.

Fit no. 5.9030.267.0 magnetic base with no. 5.9030.272.0 centesimal dial gauge onto the drive axle and then place the gauge feeler perpendicularly to the lower pin close to centre and set to zero.
Using lever **A** as shown in figure, move the fork fully upwards and read the clearance on gauge dial. Loosen the two screws **B** and remove shims from pack **C** so that any clearance may be taken up without preloading the bearings.

WARNING: The clearance amount should be reduced gradually by repeating reading with the dial gauge each time so that the bearings are not preloaded.

After all clearance has been taken up, remove a 0.10 to 0.15 mm shim pack, so that a correct bearing preloading can be obtained. Tighten screws **B** and **D** to the specified torque.

After correctly performing adjustment, ensure the shaft taper roller bearing slide in their seats freely, even though a slight preloading is felt.

Side hubs

Disassemble the twin universal joints if required, keeping to the following procedure:

— Remove both snap rings **A** from one cross journal **B**. A non-ferrous metal hammer and punch may help in carrying out this operation, (see Fig. 14).

— Fix the joint fork in a vice provided with protective jaws.

— Tap with a hammer on wheel shaft fork **A** (see Fig. 16), so that the bearing may be removed from its seat in fork **A** and taken from the top. Separate cross joint **D** from the fork.

— Following the same procedure separate the cross joint from the universal joint fork as well as from the axle shaft fork.

— Recover bearing rollers **A** along with dust rings **B**.

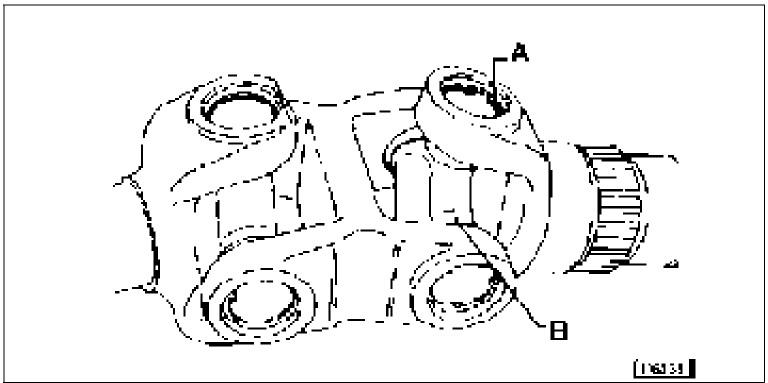


Fig. 14 - Twin universal joint.
A - Snap ring
B - Twin universal joint cross journal

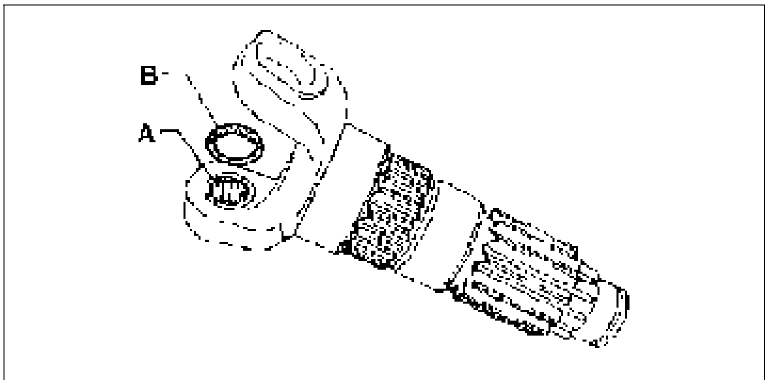


Fig. 15 - Axle shaft twin-type universal joint bearing.
A - Rollers
B - Dust rings

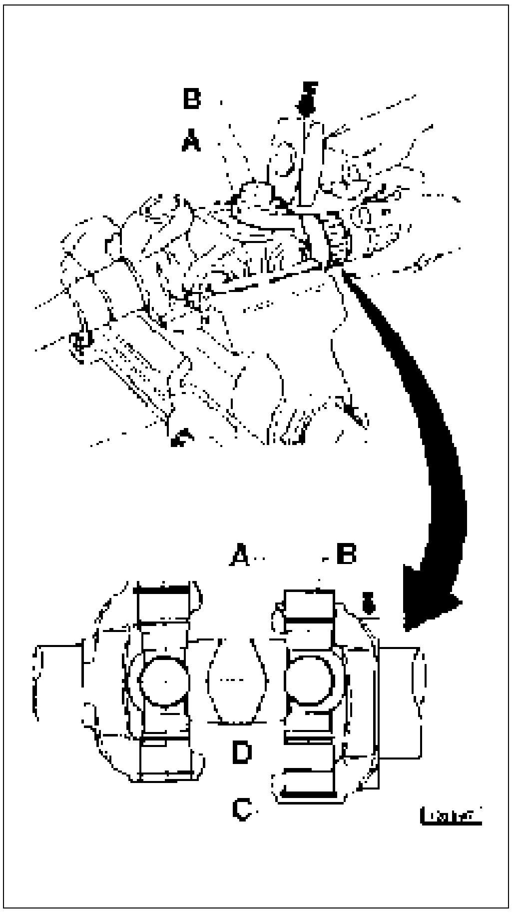


Fig. 16 - Disassembling the twin-type universal joint from the axle shaft.
A - Wheel shaft forks
B - Roller bearing
C - Roller bearing
D - Cross joint

Pins

Check differential spider pin and final epicyclic reducer planetary holder pin surfaces for damaging; otherwise both pins are to be replaced. Follow the same procedure for pin housings.

Axle shafts

Check for excessive wear: splines should not be nicked and permit a free gear movement.
Spider forks should not be warped and bearings shall slide freely.

Gears

Make sure all gear toothing is neither worn nor damaged, teeth should work on the whole contact face.

Bearings

Examine bearings for proper working conditions, ensure they show neither excessive radial nor end play.

Holding the bearings pressed by hand and making simultaneously turn in both directions of rotation, these should slide freely and no sliding friction felt.

TIGHTENING TORQUES

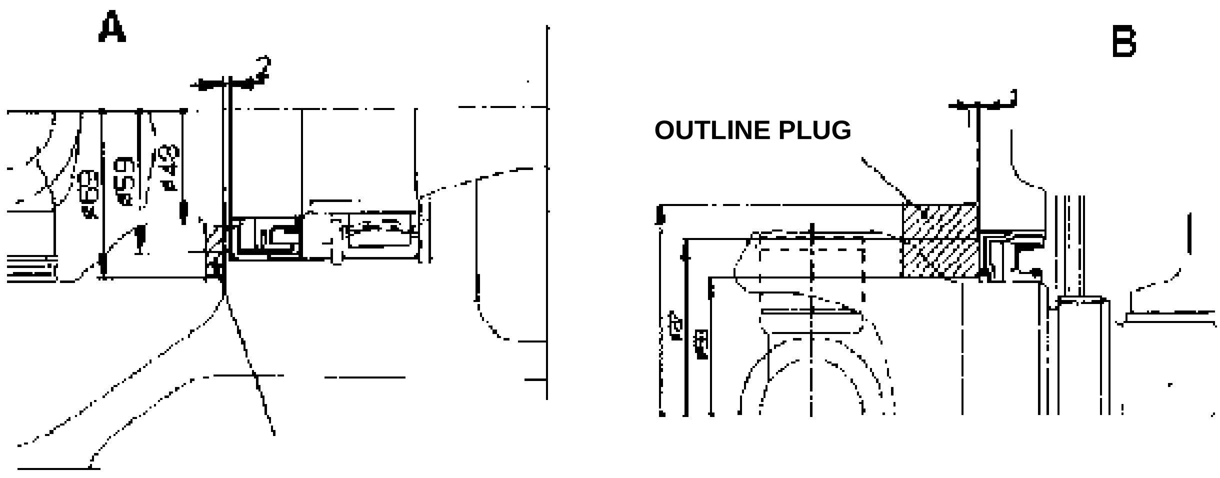
Before tightening all screws should be degreased and cleaned.

		kgm	Nm
Differential/bevel gear securing screws		7.5	73
Bevel pinion fixing nut		21 to 23	206 to 226
Bearing holding flange securing screws		9.7	95
Fork flange securing screws		5.5	54
Axle swivelling pivot securing screws			
	- rear pin	14.5	142
	- front pin	9.1	89
Engine front support securing screws		30	294
Hydraulic cylinder fixing pin		16	157
Ball-and-socket joint castellated nuts		12	119
Transmission shaft flange securing screws*		5	49
Differential housing half securing screws		11.5 to 12	113 to 118

*Coat the nut with a small amount of Loctite 242.

Check periodically that the wheel bolts are correctly tightened.

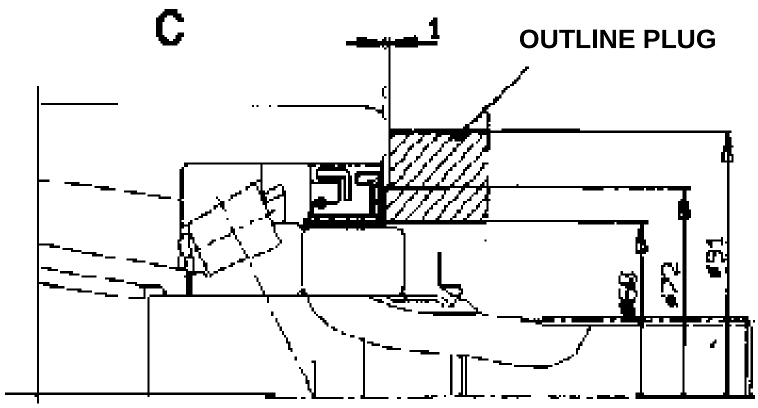
r Front wheel bolts	2WD	(M20x1,5) 490 Nm	(50 kgm);
r Front wheel bolts	4WD	(M18x1,5) 360 Nm	(36,8 kgm);
r Rear wheel bolts		(M20x1,5) 490 Nm	(50 kgm).



Fitment of waterproof seals

A - inner halfshaft
B - outer halfshaft
C - bevel pinion
D - hub

The seals are fitted using a special seating tool. Position the ring as indicated and press home until the tool locates.
The dimensions illustrated are for fabrication of the tool.



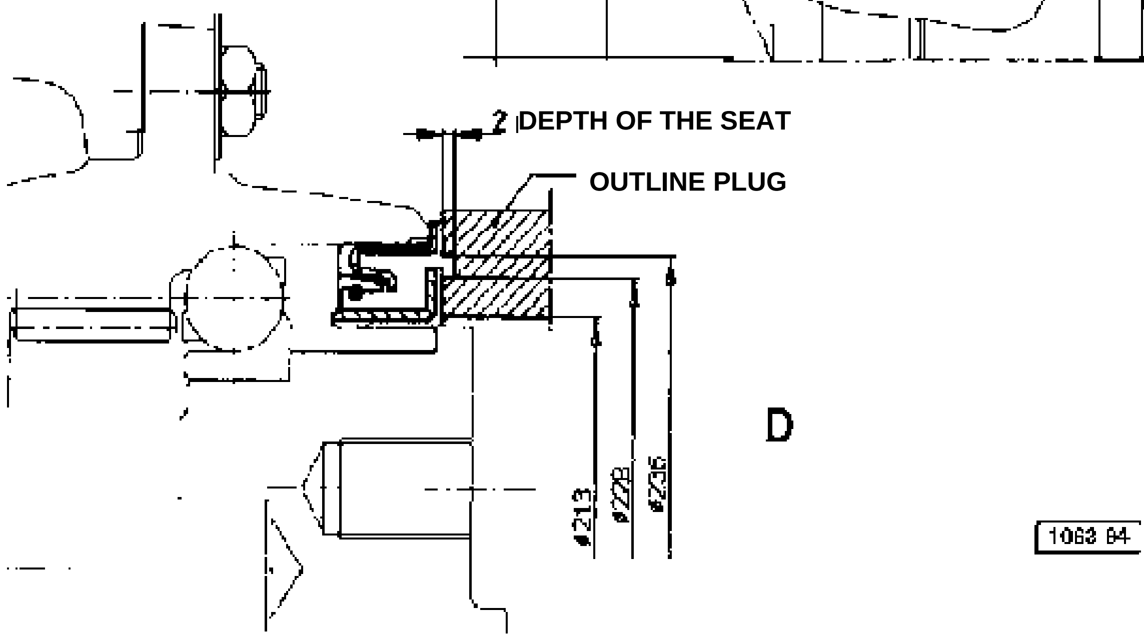


Fig. 17 - Waterproof seals.

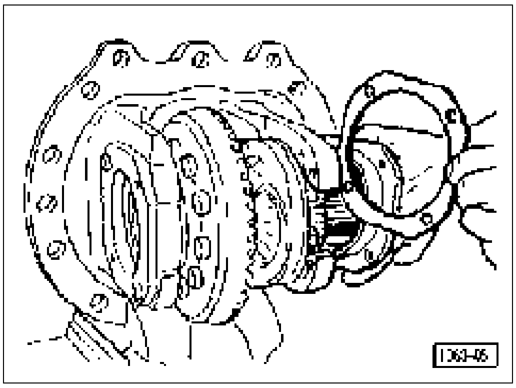


Fig. 18 - Shimming the bevel pinion bearings.

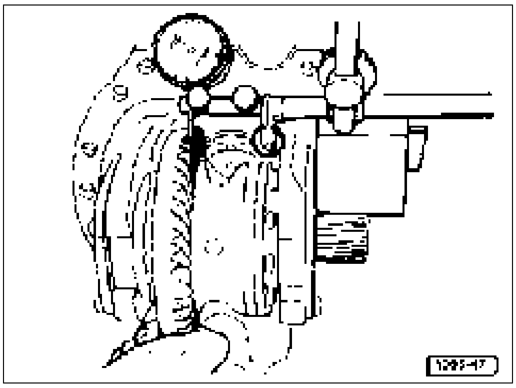


Fig. 19 - Measuring the backlash between bevel pinion and ring gear teeth.

Adjusting bevel gears

1 - Assemble the differential housing, inserting a number of shims between the bearing flanges and the carrier such as will give a preload of 0.04 mm at the bearings.

2 - Remove the differential housing again and fit the pinion, inserting a first pack of shims **A** to a thickness of 0.50 mm and a further pack **B** of thickness such that when the lock nut is torqued to 206÷226 Nm (21÷23 kgm), the bearings are able to turn freely in their seats while discernibly subject to a slight preload (no more than 0.04 mm):

3 - Adjust the distance **E** between the differential housing and the end of the pinion by adding or removing shims at pack **A**.

The exact measurement for this adjustment is obtained by adding or subtracting the value stamped on one tooth of the pinion to or from a value of 1 mm.
Warning: having adjusted the distance between the differential housing and the end of the pinion, the preload adjustment must be repeated to re-establish the thickness of the pack of shims **B**.

4 - Refit the differential housing and measure the backlash between the crownwheel and pinion teeth with a comparator: the gap must be between 0.15 and 0.20 mm; if not, the crownwheel can be brought closer to the pinion by removing shims from **C** and adding to **D**, or distanced by removing from **D** and adding to **C**.

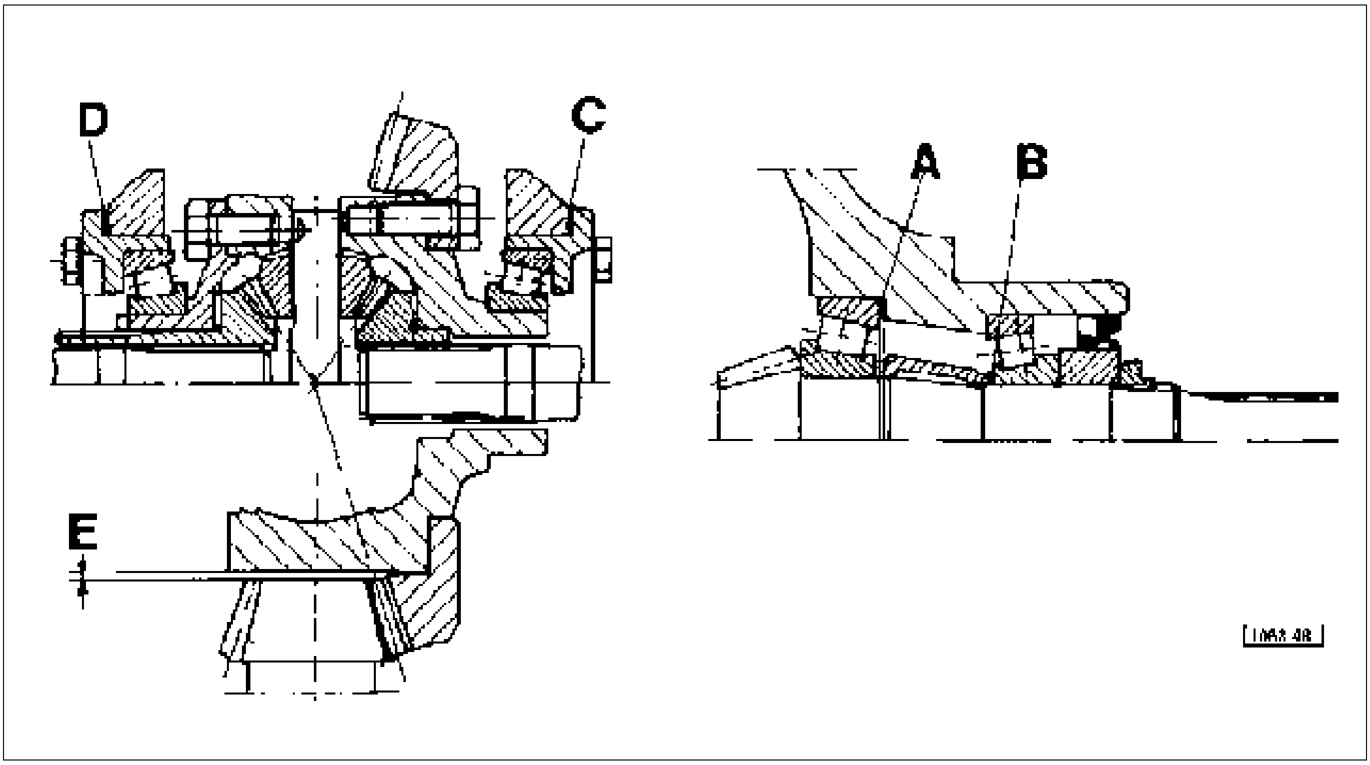


Fig. 20 - Adjusting the bevel gears.

Internal adjustment of mechanical type differential lock (fig 22)

(For adjustment of the external control linkage, see the "controls" chapter).

1 - Assemble the components, locating all shims **A** on the side of the circlip **B**; the overall thickness of the shims must be such that clearance at the spacer **C** is between 0 and 0.05 mm.

2 - Move the sleeve **D** and check that the flat surface **E** engages the ball **F** at the position indicated in fig 22.

3 - If this is not the case, remove the circlip **B**, and transfer a pack of shims 0.20 mm thick to the other side of the spacer **C**, in position **G**.
Complete the assembly and check that the condition of point 2 is satisfied; if not, repeat the procedureadjusting the mechanical-type differential lock internally

Installing the differential assembly into the drive axle

Swivel the assembly so that the differential lock sleeve is brought in the same side as the internal control lever. The sleeve should be moved outwards to enable the lever pad to be housed inside the groove. After positioning the differential into the drive axle, check the differential lock for proper engagement operating the control lever and rotating the bevel pinion by hand.

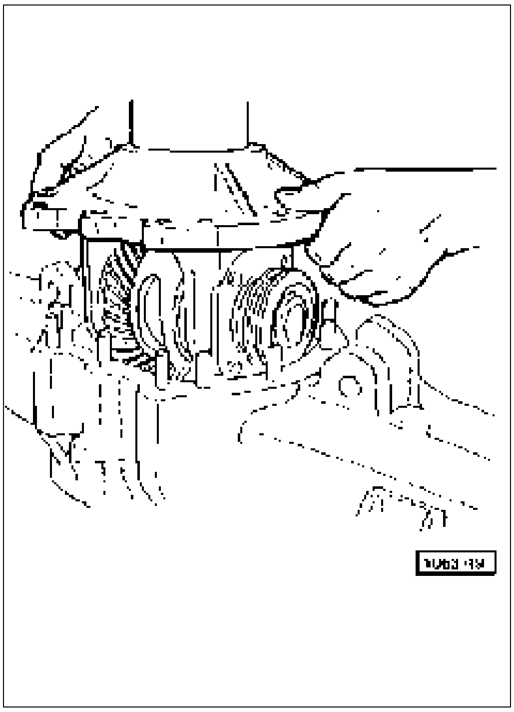


Fig. 21 - Swivelling the differential assembly in the drive axle.

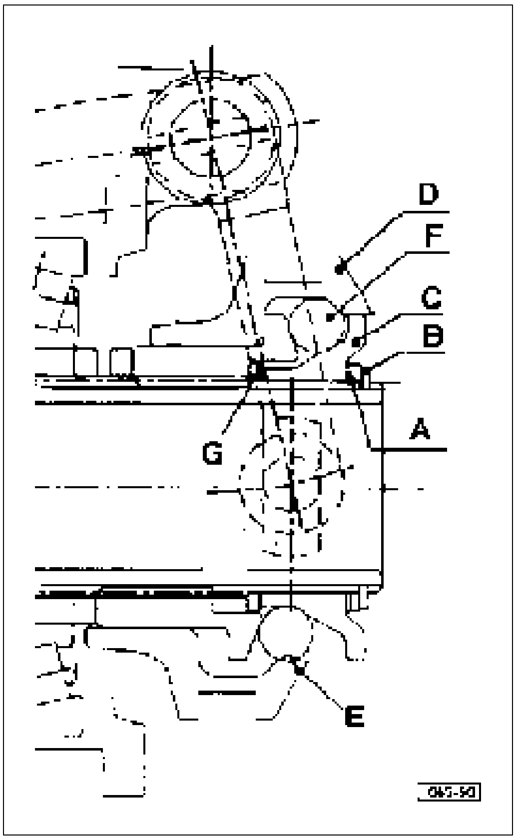


Fig. 22 - Differential lock adjusting references.

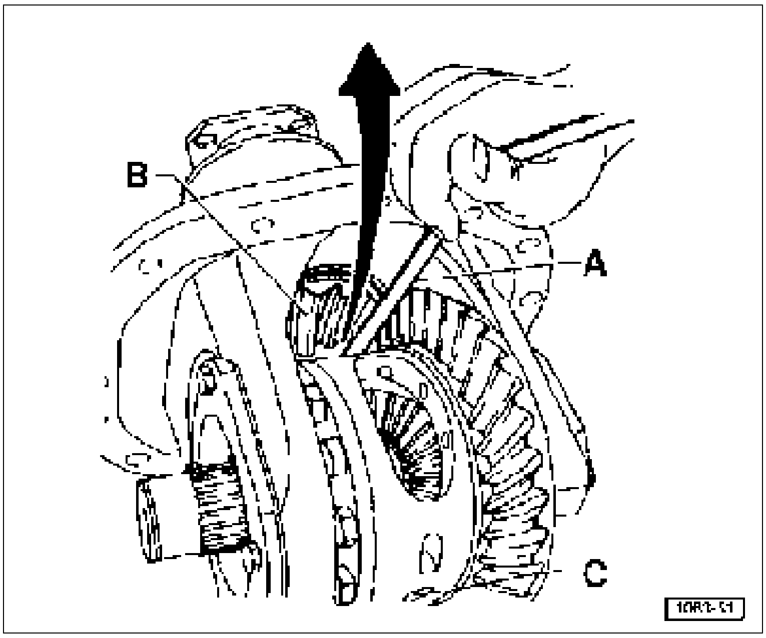


Fig. 23 - Checking the difference between the bevel pinion head and the differential housing ground surface.
A - Thickness gauge
B - Bevel pinion head
C - Differential planetary carrying pin

Diagnosing malfunctions

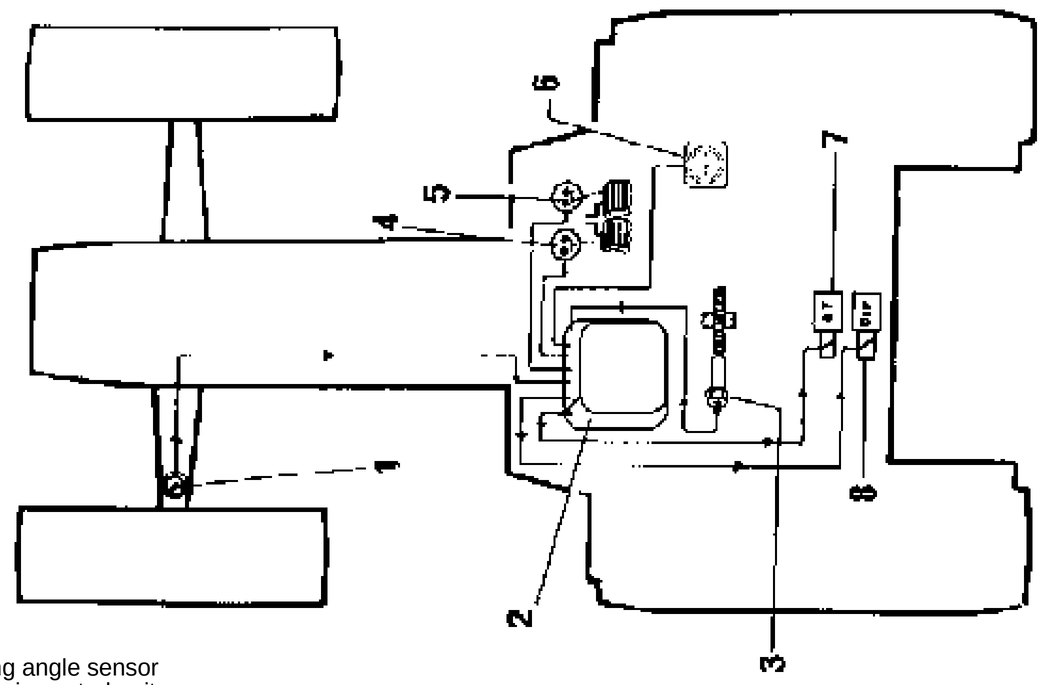
cross journal wear	front drive axle overloaded	use only front loaders approved by tractor manufacturer	ballast tractor at rear side	
oil leaks	check seal rings for wear	replace worn-out seal rings		
	oil breather pipe blocked	clean		
tyre wear	even wear	use 4-W.D. on agricultural land only	excessive tractor use for road transportation	Mount proper tyres
	uneven wear	check wheels for correct toe-in	adjust as necessary	
wheel oscillation	check tyres for wear	replace if necessary		
	check steering knuckles for wear	replace as necessary		
	inspect the taper roller bearings of the hub	replace as necessary		

SBA System

General specifications

The console of a machine equipped with the SBA System has the usual two buttons used by the driver to operate the electrohydraulically controlled differential and 4WD functions, and in addition, a third button marked “AUTO”
Pressing this third button, the SBA system is activated and will control both functions automatically in the following manner:
— four wheel drive remains normally engaged in the field, but will disengage automatically on the road whenever the ground speed exceeds 15 km/h;
— the differentials remain locked as long as the ground speed stays below 10 km/h and the wheels are not steered at any angle wider than 20°;
— the differentials remain locked as long as the wheels are not steered at any angle wider than 5° and the ground speed remains between 10 and 15 km/h, so as to optimize the balance between grip and handling when negotiating bends;
— the differential locks release automatically, regardless of the steering angle, whenever the ground speed exceeds 15 km/h;
— the differential locks will always release if the brakes are applied on one side only using just one pedal to assist steering, in anticipation of an angle exceeding 20°.

When the SBA button is released, the driver can resume direct control of the four wheel drive and differential lock functions using the two dedicated buttons.
As the SBA system deactivates, 4WD will engage or disengage and the differentials lock or release according to the current on/off status of the electrohydraulic controls.
The electronic control unit of the SBA system remains powered up, but is inhibited from influencing the two functions.
The moment the SBA button is pressed, the built-in indicator lights up and the four-wheel drive and differential lock functions are piloted in response to the operating conditions, overriding the current on/off status of the electrohydraulic controls.
WARNING: SBA should be deselected when travelling on the highway at sustained ground speeds (over 15 km/h). The system provides no benefit in this type of situation, and if suddenly deactivated could trigger unwarranted operation of the four-wheel drive and differential lock functions via the electrohydraulic controls (depending on their current on/off status).



1 - steering angle sensor
2 - electronic control unit
3 - driving speed sensor (in km/h)
4 - LH braking sensor
5 - RH braking sensor
6 - S.B.A. control
7 - four-wheel drive engagement/disengagement control solenoid valve
8 - differential lock engagement/disengagement control solenoid valve

Fig. 1 - SBA System

SETTING THE ANGLE OF THE SBA SENSOR POSITIONING PLATE

Apply Loctite 601 around the periphery of the mounting surface afforded by plate **E** (Fig 3); proceed to seat the plate, positioning it so as to obtain an angle of 90° ± 2° between the longitudinal axis of the axle and the flat surface of the pin.

WARNING: to ensure correct assembly, position the rubber coupling **A** on the plate after fitting the yoke **B** and before fitting the pivot **C** (see Fig 2).

FITTING THE STEERING ANGLE SENSOR

When positioning the sensor **D,** make certain that the flat surface of the pin is faultlessly aligned with the outline of the hole in coupling **A** (see Fig 2), then tighten the sensor fixing screws.

NB: There is no need to position the sensor in relation to the slots; during the subsequent setup procedure, the All Round Tester will identify the initial position and assign a value corresponding to a steering angle of 0°.

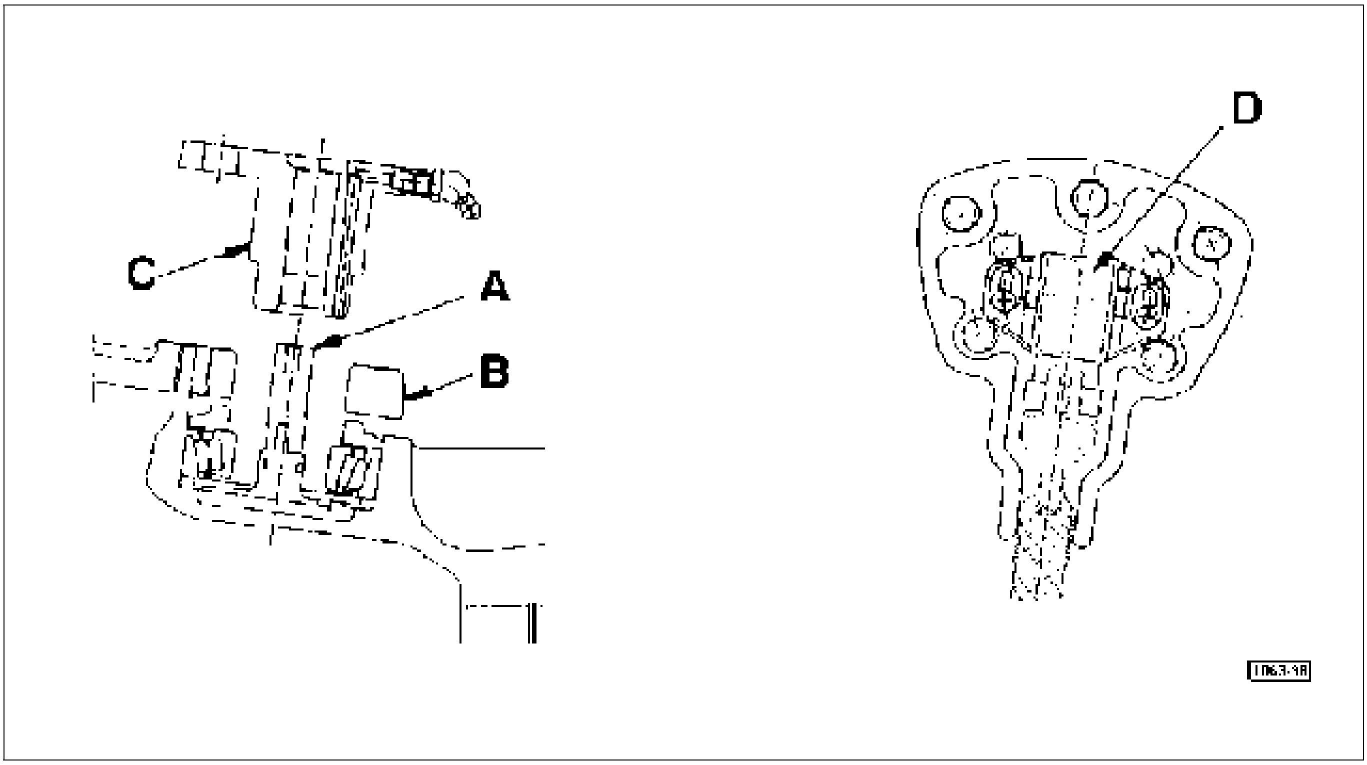


Fig. 2 - Fitting the steering angle sensor potentiometer.

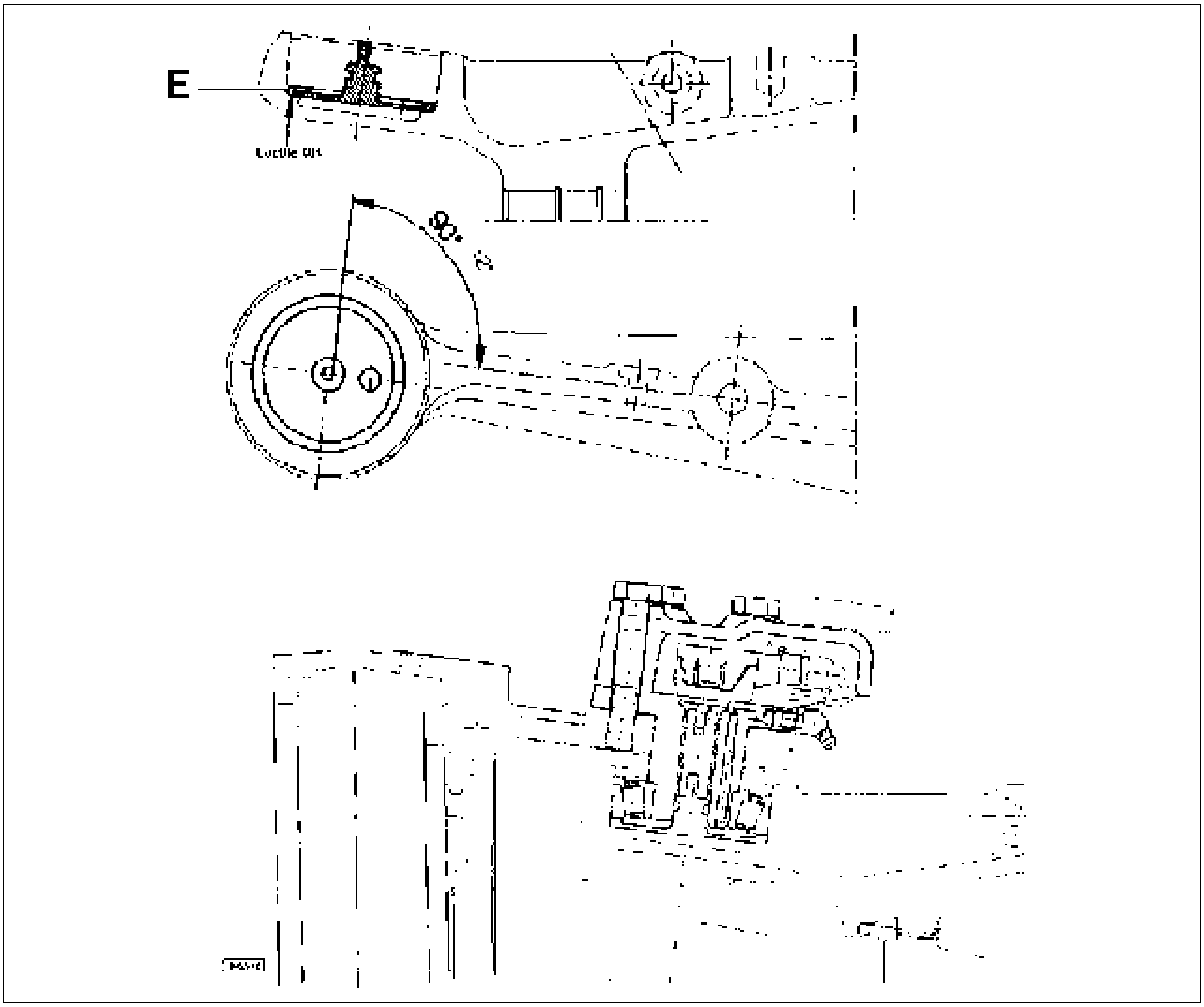


Fig. 3 - Potentiometer housing (steering angle sensor).

REMOVING THE DIFFERENTIAL UNIT FROM THE FRONT AXLE
1 - remove the hubs and halfshafts
2 - remove the differential retaining bolts and the two pins **A** (Fig 5), using a hex socket wrench.

Warning: to enable removal, shift the unit sideways to the left so that the differential clutch can disengage.

STRIPPING THE FRONT DIFFERENTIAL LOCK CLUTCH (Fig 4).
When the need arises to service the differential lock clutch, proceed as follows:

1 - unscrew the bolts and remove the two halves of the thrust washer from the groove in the differential gear shaft;
2 - remove the clutch flange **F**, then remove the discs for inspection and/or replacement;
3 - remove the clutch housing **G** and thrust bearing **H**;
4 - remove the actuator piston **I** by blasting with compressed air directed through the inlet.
Check the condition of the O-rings **L** and **M** and renew if necessary.
5 - If the differential unit is to be removed altogether, unscrew the retaining bolts and remove the flange **N**.
With the flange exposed, check the condition of the O-ring **O**.

ADJUSTMENT OF FRONT AXLE BEVEL GEAR PAIR ON MACHINES WITH SBA SYSTEM

Having installed the bevel pinion following the directions on page 204, install the crown wheel utilizing the appropriate number of shims **A**, p/n 146.4653.0 and 146.4654.0, torque the lock nut **B** to between 8 and 12 Nm (0.8 - 1.2 kgm), then verify that backlash between the crown wheel and pinion teeth is between 0.15 and 0.20 mm. If not, adjust by adding or removing shims at pack **A.**

Rotate the differential through at least 10 full turns, then retorque the lock nut **B** to between 2 and 4 Nm (0.2 - 0.4 kgm); this will ensure that the bearings are neither slack nor preloaded.
Stake the lock nut **B** at one point only, using a suitable punch.

Remove the bolts **C**, apply Loctite 242 to the threads, then replace and torque to between 39 and 43 Nm (4 - 4,4 kgm).

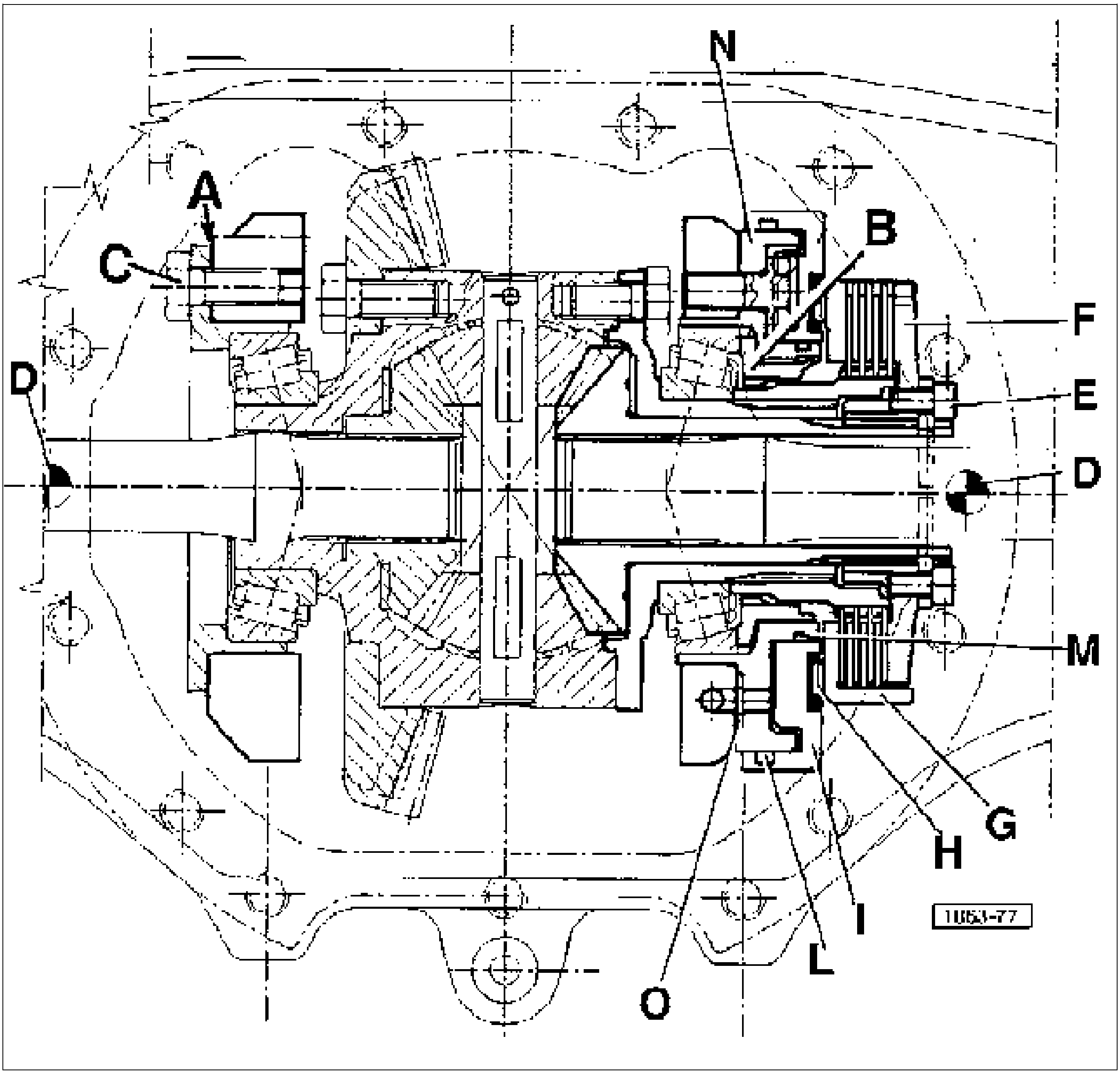


Fig. 4 - Section through differential unit on machine with SBA system.

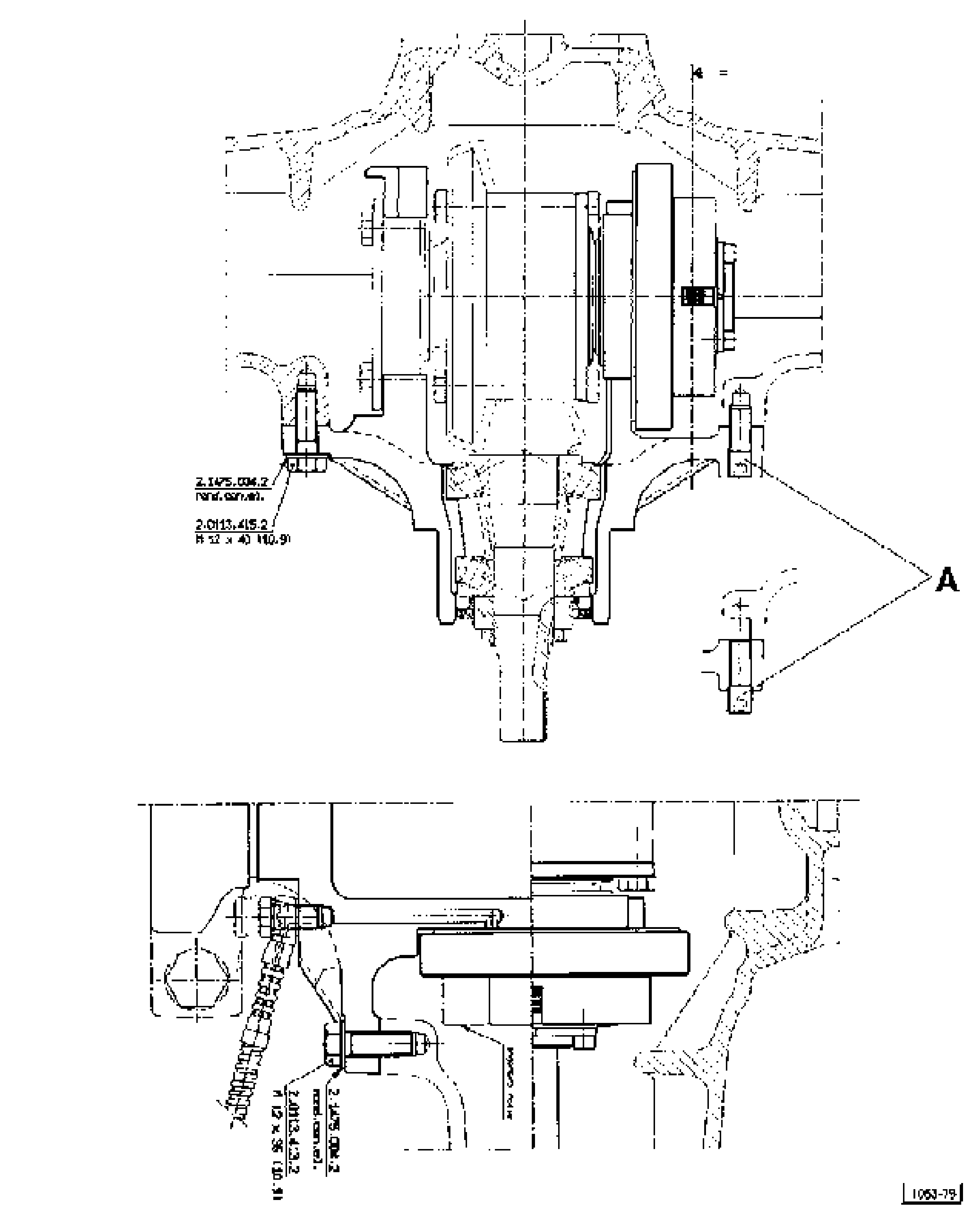


Fig. 5 - Hydraulically operated differential unit on machine with SBA system.

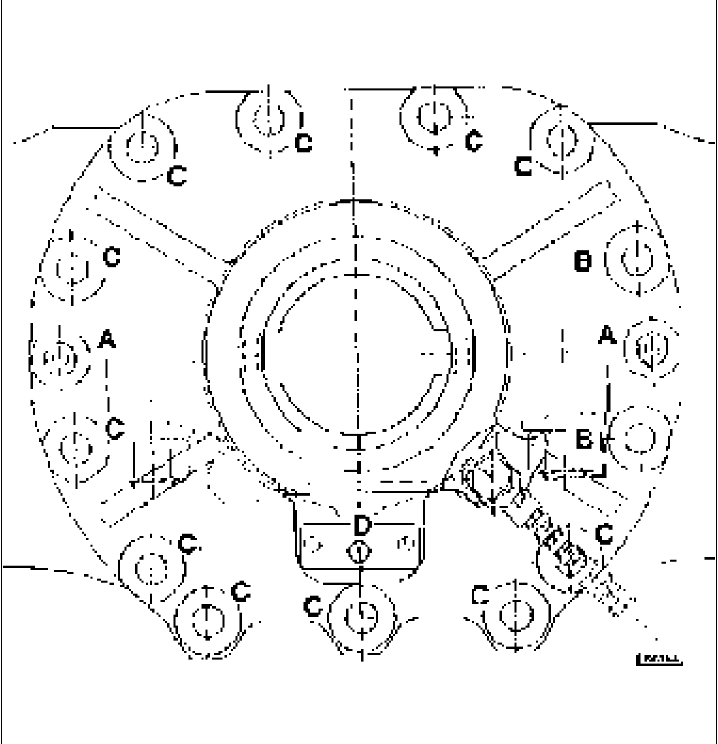


Fig. 6 - Installing the differential in the axle.

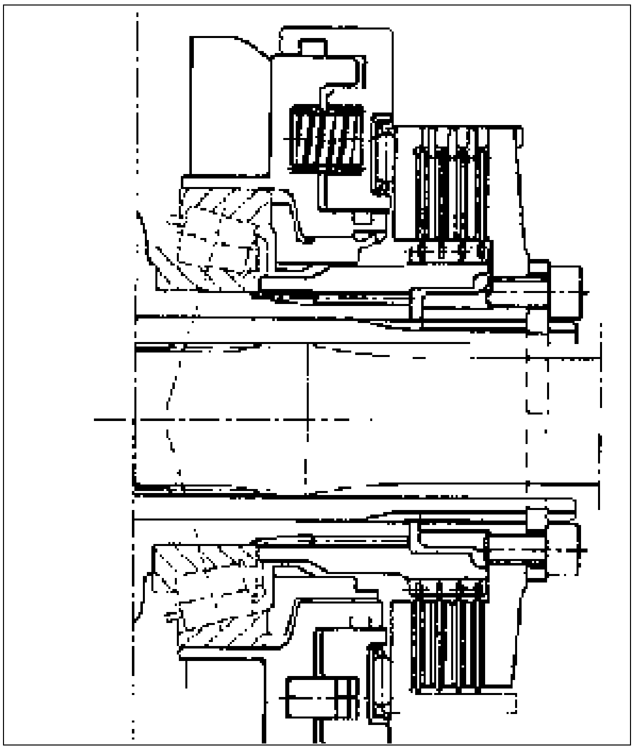


Fig. 7 - Differential lock clutch.

Installation of differential unit in front axle

To refit the differential unit, repeat the removal operations described on page 209 in reverse order. In addition:
— Apply Loctite 272 to the threads of the 2 studs at **A**, p/n 2.1699.434.0 (fig 6).
— Apply Loctite 270 to the threads of the 2 bolts at **B**, p/n 2.0113.413.2 (fig 6).
— Apply Loctite 270 to the threads of the 11 bolts at **C** p/n 2.0113.415.2.
— Torque the two bolts **B** - **C** to 107 Nm (11 kgm).

NB: Position the plate with the hole **D** directed downwards

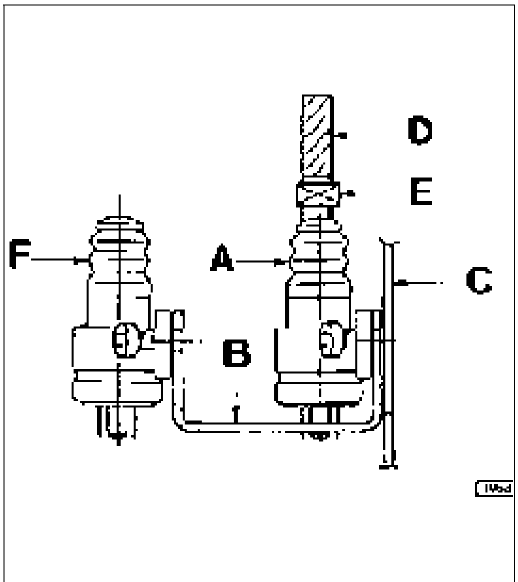


Fig. 8 - SBA System brake sensor.

Assembly and positioning of the SBA system brake switches

Position switch **A** on mount **B** and fix to part **C**, without tightening the screws.

Locate 1 x 4 mm spacer **E** between the pedal **D** and the feeler of the switch.

Press the switch against the spacer so that the slider is at its travel limit, then tighten the screws.

Repeat the procedure for the remaining switch **F**.

Four wheel drive engagement clutches for machines with SBA system

Technical specifications

clutch		oil-immersed multiple disc with axial piston
number of friction discs		9
disc diameter (mm)		106
thickness of assembled friction discs		
	minimum (mm)	32.4
	maximum (mm)	34.2
number of intermediate discs		10
maximum pressure setting (bar)		18
piston return spring		
wire diameter (mm)		5
external diameter (mm)		50
length relaxed (mm)		70
length compressed		
	under 492.1 N (48.2 kg) load (mm)	35
	under 514.1 N (50.3 kg) load (mm)	33.8

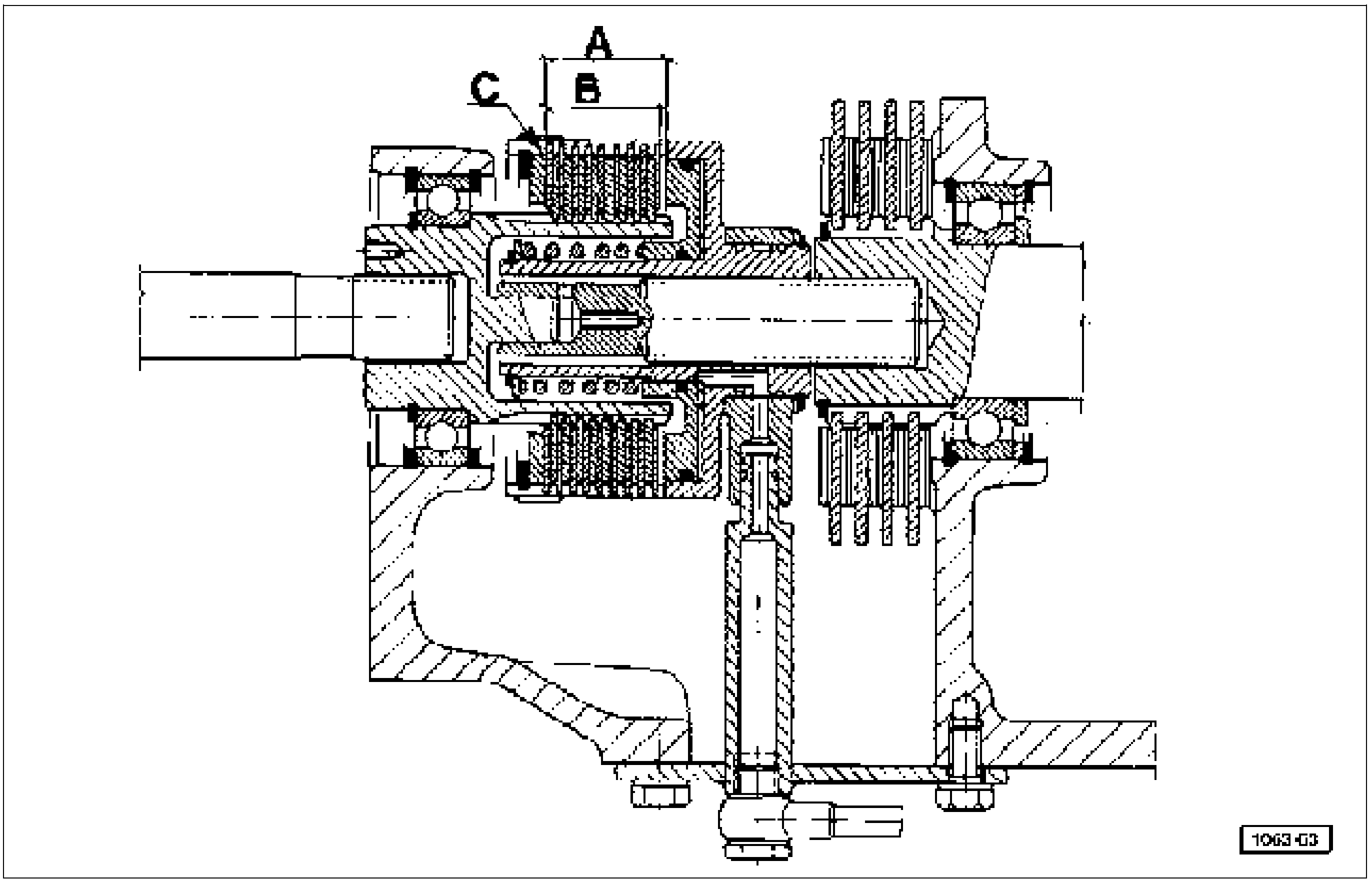


Fig. 9 - Section through four-wheel drive engagement clutch
Check the clearance of the assembled discs (distance A - B).
If the clearance is greater than 3 mm, add a further intermediate disc C at the position illustrated.

Front and rear differential lock clutches for machines with SBA system

Technical specifications

		front differential	rear differential
clutch		oil-immersed multiple disc with axial piston	
number of friction discs		4	6
disc diameter (mm)		110	148,8
thickness of assembled friction discs	minimum (mm)	13	23.7
	maximum (mm)	13.6	24.78
number of intermediate discs		3	6
maximum pressure setting (bar)		18	
piston return spring			
number of springs		4	1
wire diameter (mm)		1.6	5
external diameter (mm)		13	90
length relaxed (mm)		24.1	58
length compressed	under 68.6 N (7 kg) load (mm)	15,7	-
	under 97.3 N (10 kg) load (mm)	12.2	-
	under 255 N (25 kg) load (mm)	-	21
	under 283 N (27.8 kg) load (mm)	-	17

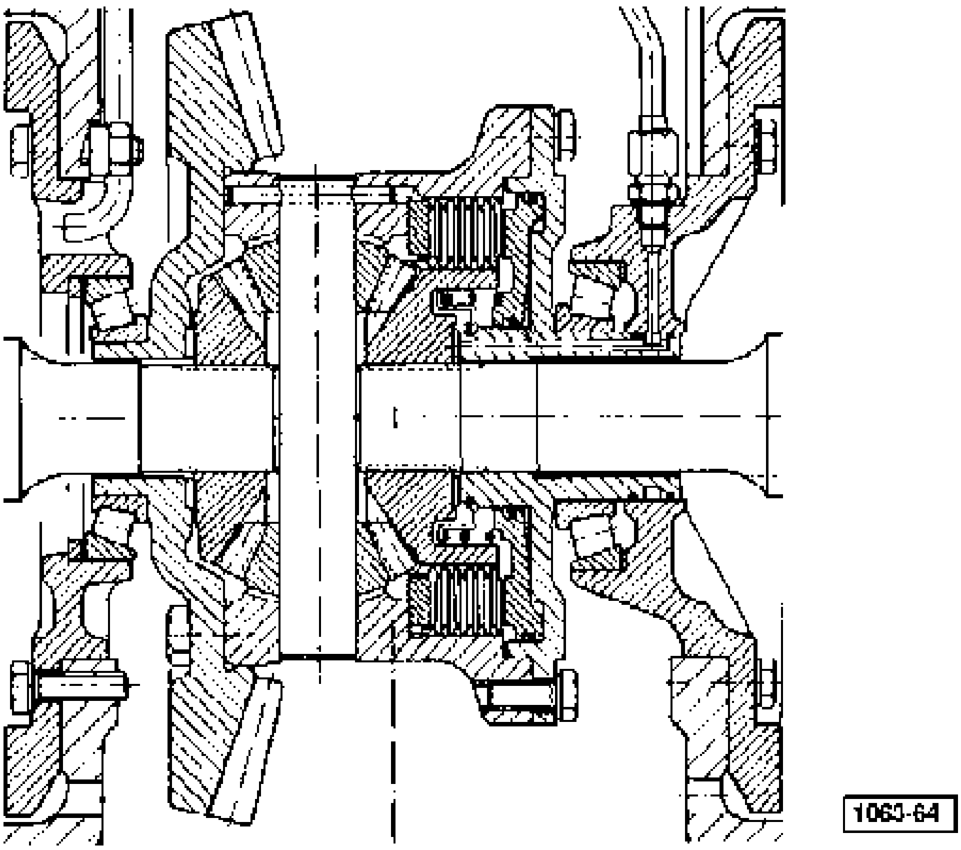


Fig. 10 - Rear differential lock on machine with SBA system.

Brakes

General information
The service brakes are located between gearbox and final epicyclic reducers and assure a precise and safe braking action. In addition, the four-wheel drive tractor models are also equipped with integral braking system providing braking on all tractor wheels.

The braking system is sintered-lining, oil-immersed disk type. The right-hand brake control is completely independent from the left-hand brake control; this allows the tractor turning radius to be conveniently reduced (this operation is only possible when working on farm land and never during transport operations on public roads). The braking system is provided with the "SEPARATE BRAKES" valve which enables the front wheel braking to be excluded.

Each brake pedal controls a hydraulic pump which delivers oil under pressure to a disk thrust plate, which causes the brake disk to lock.
Operating both brake pedals simulteneously by coupling them with the special joining latch, opens an oil duct connecting both hydraulic circuits to balance the baking pressure on the wheels. Brake maintenance is limited to an easy adjustment and a system air bleeding if necessary. The parking brake has mechanical control and acts on transmission downstream of gearbox.

Pulling the control lever upwards makes the brake disks pack together thus locking the shaft being constantly meshed with the wheels. Maintenance is very easy and consists of replacing the friction pads when worn or adjusting the control lever travel.

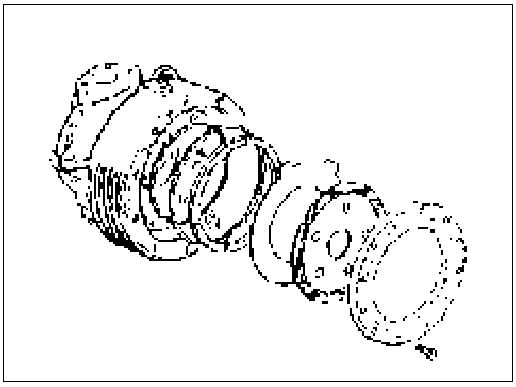


Fig. 1 - Front service brakes.

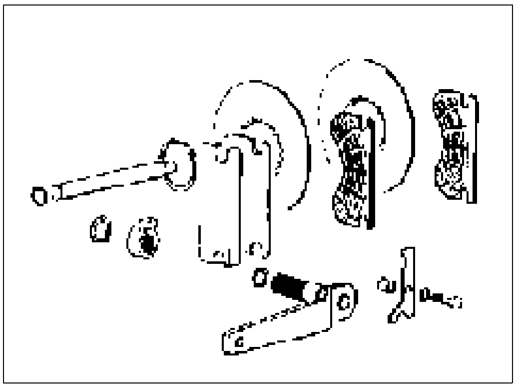
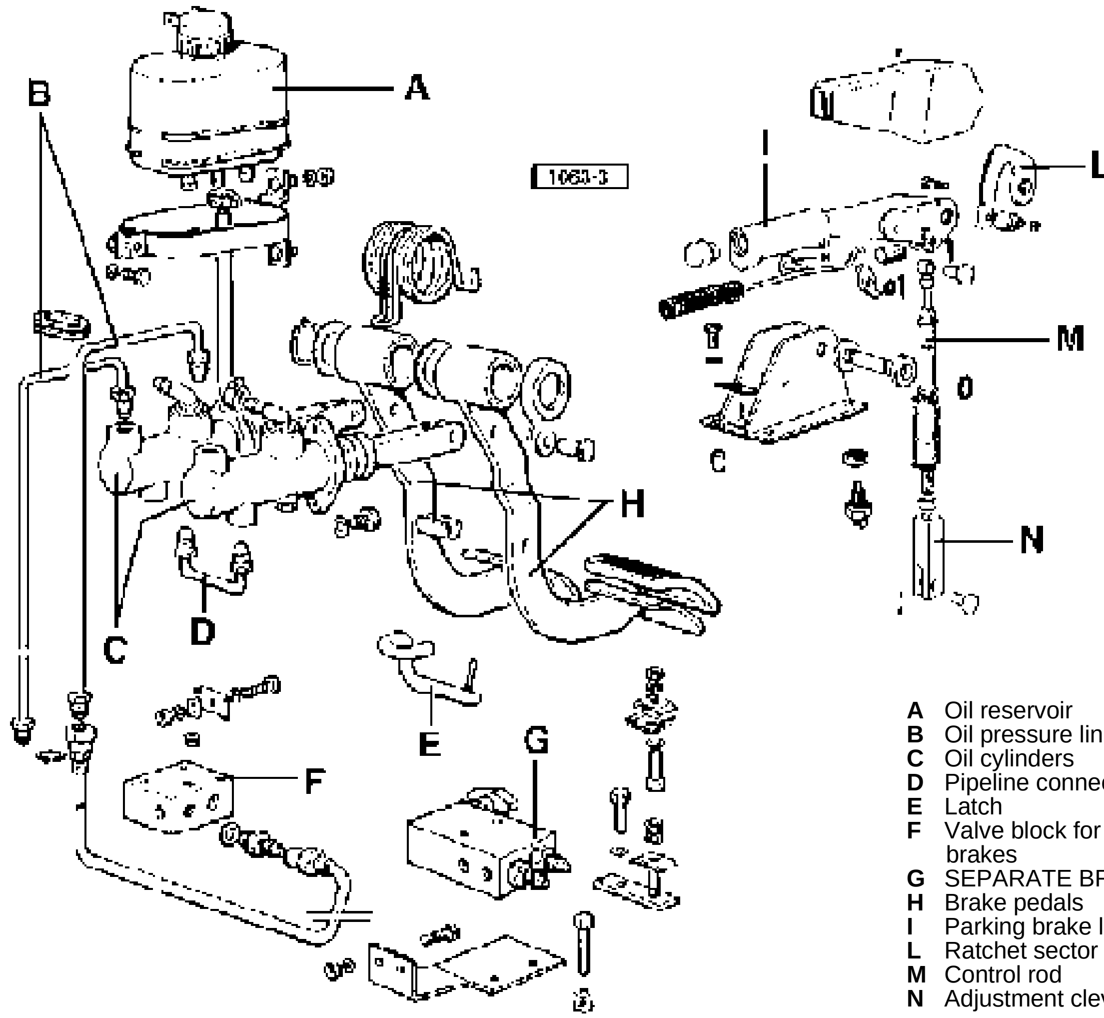


Fig. 2 - Parking brake parts.

Specifications

service brakes		**front**	**rear**
manufacturer		SAME - DEUTZ FAHR GROUP	
brake type		oil-immersed disks	
number of disks each brake		1	1
brake disk outside diameter	mm	223.4	280
original brake disk thickness	mm	4.80	7
brake disk minimum thickness allowable	mm	4.40	6
brake pedal free travel	mm	40	
braking piston max. play	mm	1.15	
hydraulic pump type		benditalia Ø 1"	
"hydrostop" fitting tightening torque	kgm Nm	2 19.5	
parking brake			
brake type		oil-immersed disks	
number of braking pads	double braking surface single braking surface	No.2 No. 2	
original braking pad thickness	double mm single mm	5 3.5	
braking pad minimum thickness allowable	double mm single mm	4.3 3.2	
brake disk no.		3	
parking brake control lever travel	mm	100	



A Oil reservoir
B Oil pressure lines
C Oil cylinders
D Pipeline connecting cylinders
E Latch
F Valve block for types without front brakes
G SEPARATE BRAKES valve
H Brake pedals
I Parking brake lever
L Ratchet sector
M Control rod
N Adjustment clevis

Fig. 3 - Brake control assembly parts.

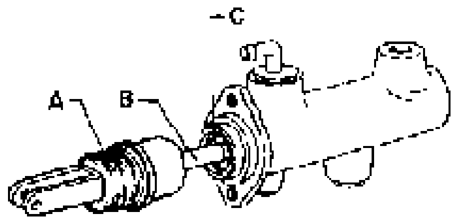


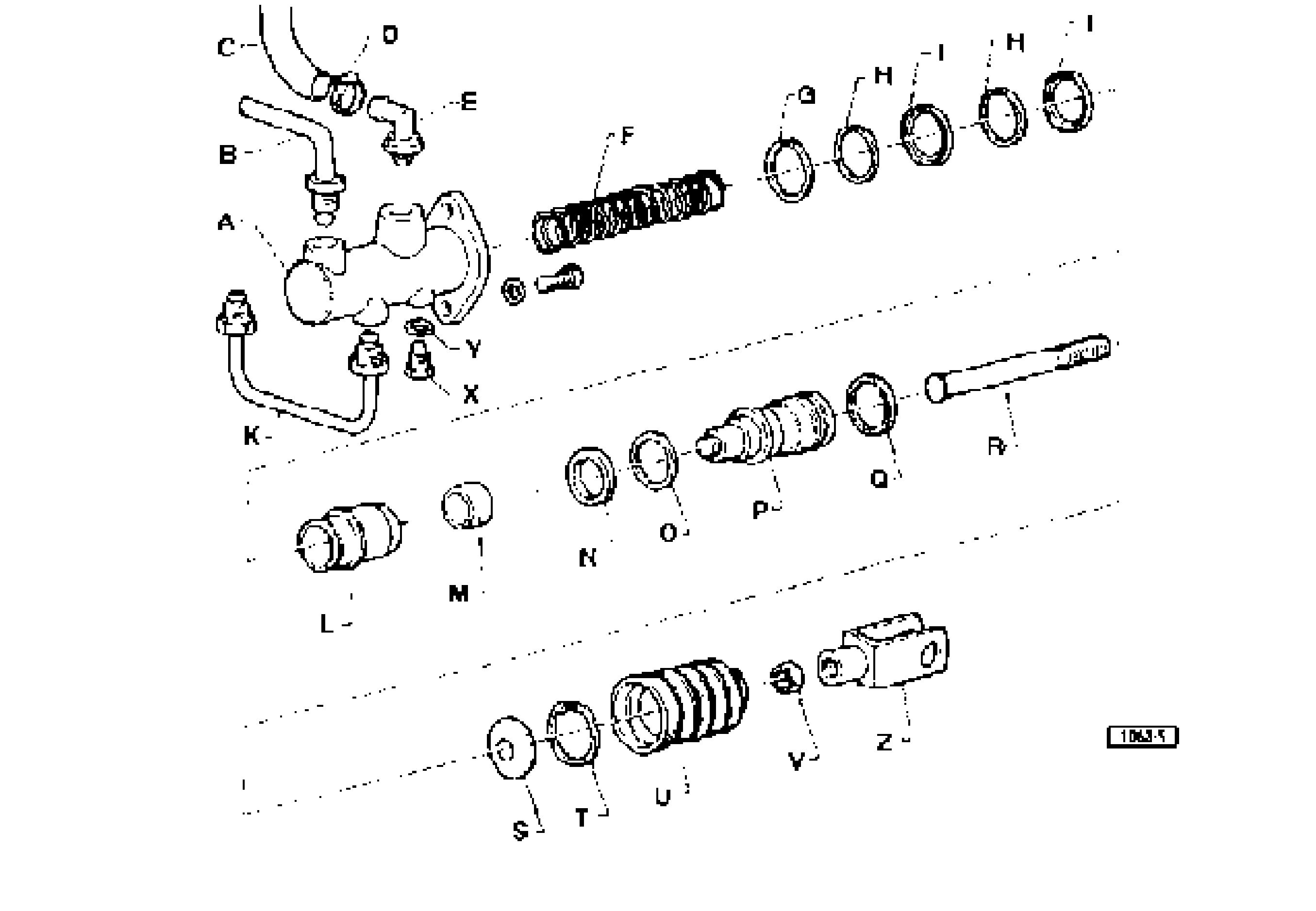
Fig. 4 - Brake pump control unit.

Hydraulic pump

Disassebly and checking procedure

Referring to fig 4:
— Remove guard boot **A**, take snap ring **B** and withdraw rod **C** along with the support disk.

Referring to fig 6:
— Fix the pump in a vice provided with protective jaws and pushing pistons into the pump partly, as shown in figure 6, loosen the piston retaining screws and then remove the pistons together with the spring down below.



A Pump
B Delivery pipe union
C Delivery pipe
D Clamp
E Pipe fitting
F Spring
G Snap ring
H Spacer
I Seal ring
L Intermediate piston
M Spring
N Seal ring
O Washer
P Piston
Q Seal ring
R Rod
S Support disk
T Snap ring
U Guard boot
V Nut
Z Fork
X Stop screw
Y Gasket
K Pump union pipe

Fig. 5 - Brake pump assembly parts.

— Examine the cylinder interior and the pistons for either scoring or rust. Replace if necessary.

— Check cylinder and pistons for wear. If excessive plays are noticed replace either the whole piston or the whole cylinder assembly.

— Inspect sealing rings and dust guard boot, replace any worn parts.

— Inspect all pump internal compartments, apertures and passages and make sure all is properly clean and free from foreign matters.

— Ensure the springs are neither yielded nor warped. Replace if necessary.

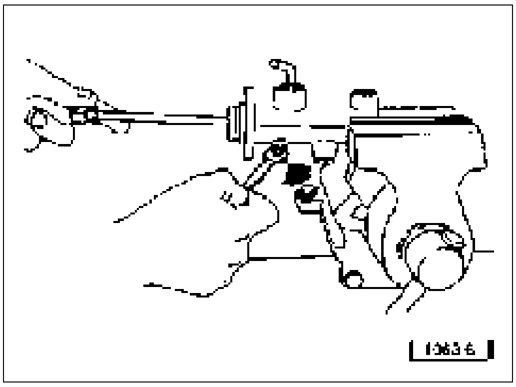
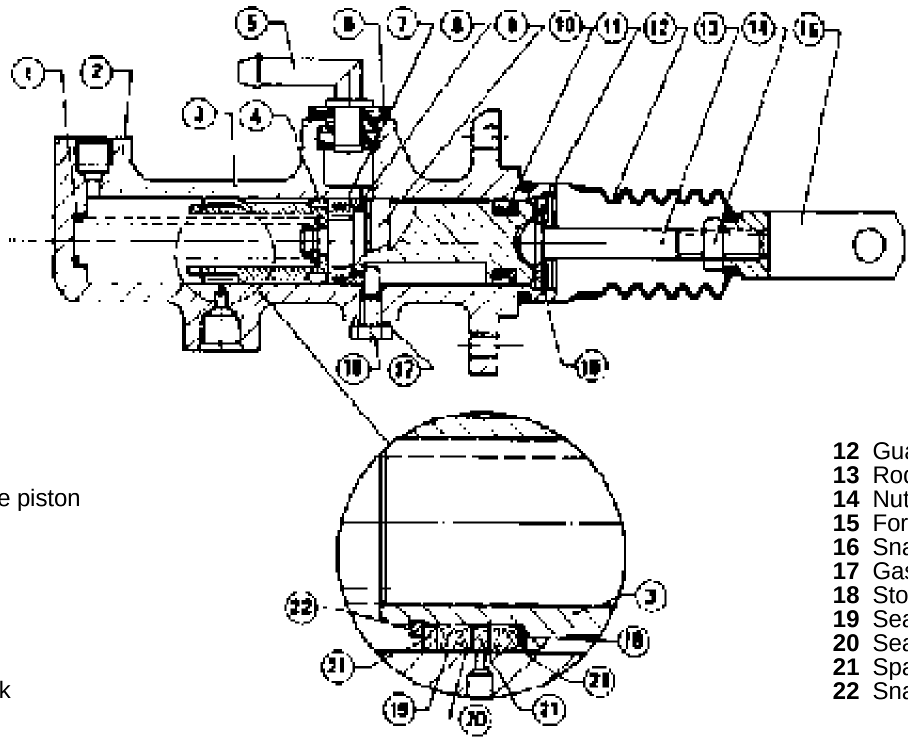


Fig. 6 - Piston retaining screw.



1 Spring
2 Pump
3 Intermediate piston
4 Spring
5 Pipe fitting
6 Gasket
7 Seal ring
8 Washer
9 Piston
10 Seal ring
11 Support disk
12 Guard boot
13 Rod
14 Nut
15 Fork
16 Snap ring
17 Gasket
18 Stop screw
19 Seal ring
20 Seal ring
21 Spacer
22 Snap ring

Fig. 7 - Cutaway view of the brake pump assembly.

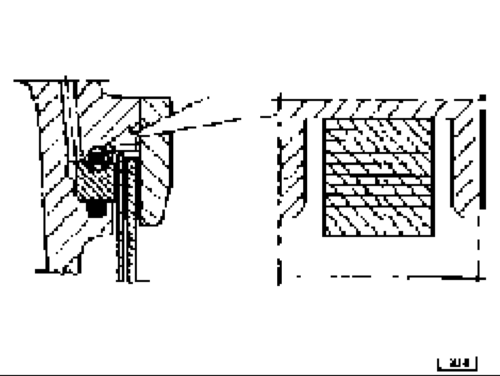


Fig. 8 - Installing the front brake disk pressure piston seal ring.

Assembly of brake master cylinder (see fig 5).
Screw the front piston **L** and the rear piston **P** together, then check that there is clearance between the two.
Insert the pistons into the cylinder, checking that the recess afforded by the outer piston **P** is aligned correctly with the seat of the limiter screw **X**.
Verify correct operation of the cylinder, making certain that the pistons complete their full travel freely.

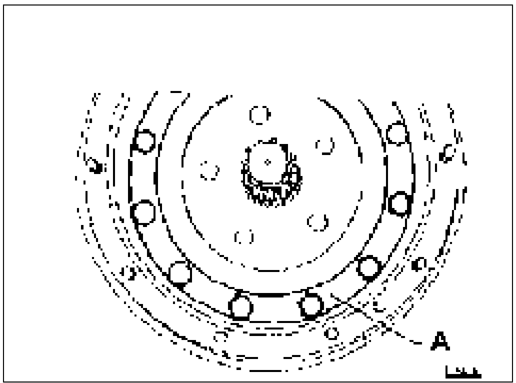


Fig. 9 - Brake assembly flange
A - Brake assembly flange

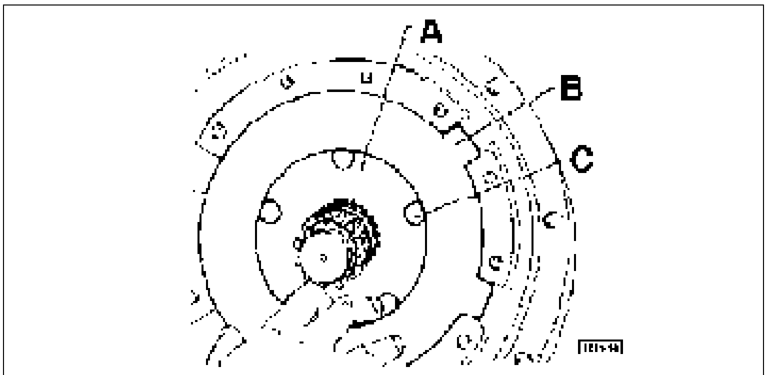


Fig. 10 - Brake assembly.
A - Brake disks
B - Intermediate disk
C - Brake control piston

Inspecting and checking brake assembly

Check the ground surfaces contacting the brake disks for excessive scoring.

If excess wear is found replace the worn-out parts.

Check disk conditions and tickness, compare with specifications table.

Examine the brake disk broaching for wear or damage.

If excessive oil consumption is noticed, check the piston rings as follows:

Connect no. 5.9030.520.4 hydraulic pump to the oil delivery circuit; if the hydraulic circuit is not fully oil-tight under a 1,5 bar pressure, the rings must be replaced.

Perform a thorough check on each single brake.

Mark piston and brake housing case with a reference near to a locating pin so as to make reassembly easier.

Coat the brake housing case seal ring contacting surfaces of piston **A** with recommended grease, see figure 12.

Carefully mount piston into the brake housing case.

Fit the brake housings and halfshaft trumpet housings, repeating the removal operations in reverse order and observing the following directions.

Coat the brake housing case inner surface as well as both epicyclic gear crown wheel surfaces with recommended sealant.

Tighten the securing nuts of the brake housings and trumpet housings to the prescribed torque (see values below)

- brake housing bolts : 32÷40 Nm (3,3÷4,1 kgm);
- trumpet housing bolts: 84÷94 Nm (8,6÷9,6 kgm)

Adjusting service brake pedals

Operate right-hand pump fork **A** (figure 14) to adjust brake pedal position, until the most suited position for the operator is attained, and in such a way that the pedal may complete its whole travel freely when braking.

Operate left-hand pump fork **B** (figure 14) to adjust the related brake pedal so that the coupling latch holes are in the same line.

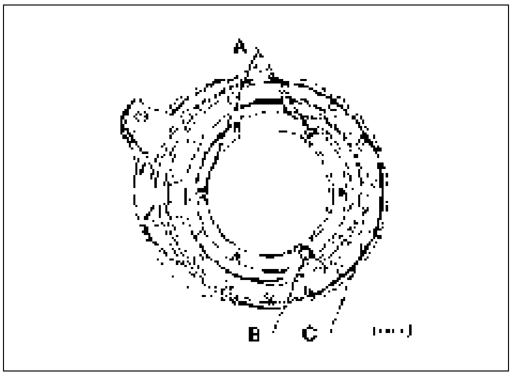


Fig. 11 - Brake housing case.
A - Locating pins
B - Brake housing case

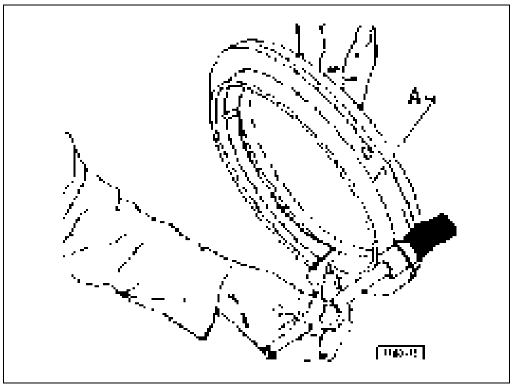


Fig. 12 - Coating the piston surface in contact with the seal ring with recommended grease.
A - Piston

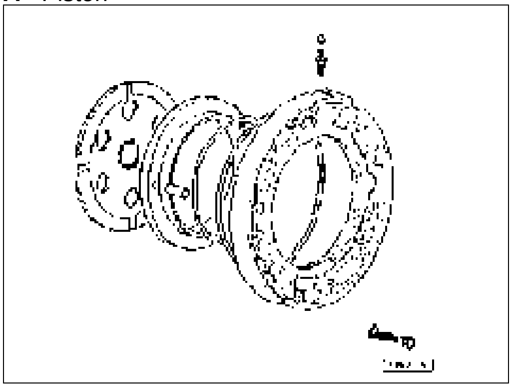


Fig. 13 - Rear brake assembly

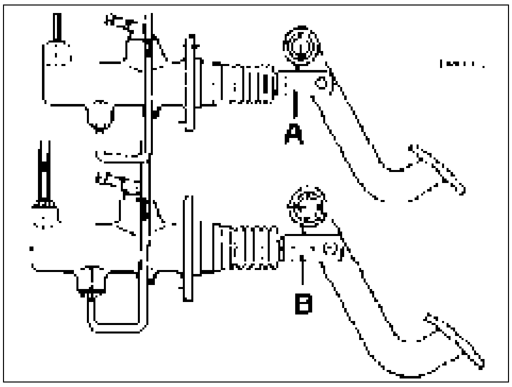


Fig. 14 - Adjusting service brake pedals.

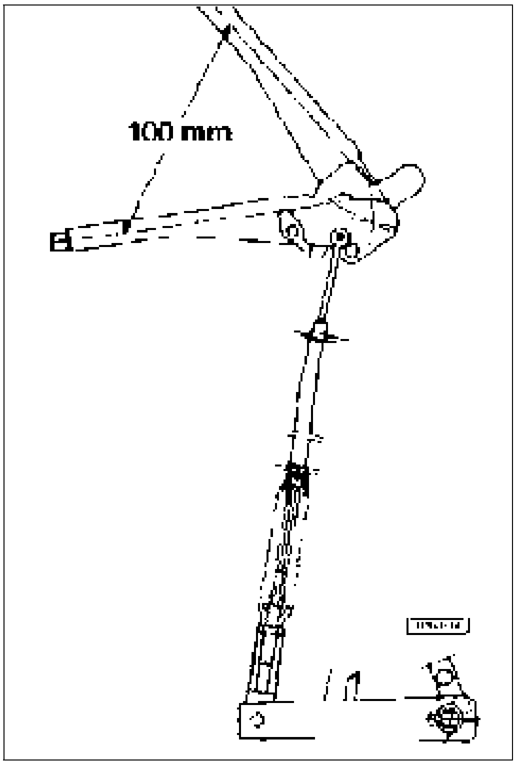


Fig. 15 - Parking brake checking and adjusting dimension.

The parking brake, completely independent from the service brakes, is applied by pulling the special hand lever upwards.

Once the parking brake is applied the related pilot lamp on the dashboard lights up.

Checking parking brake pads

Examine the brake pads for wear. If brake pad thickness is out of specifications these shall be replaced.

Brake pads can be dismounted after removing the lower brake pad lockpin, this permits access through the cover placed under the gearbox to be gained.

Before installing new brake pads, check lockpin seal ring conditions, replace if necessary.

Parking brake control lever overall travel

This travel should be 100 mm, otherwise operate the special adjusting screw until the specified dimension is obtained.

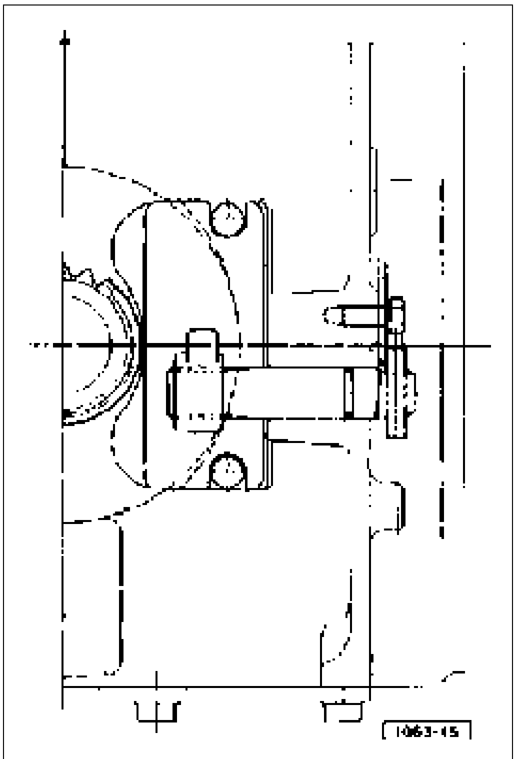


Fig. 16 - Parking brake.

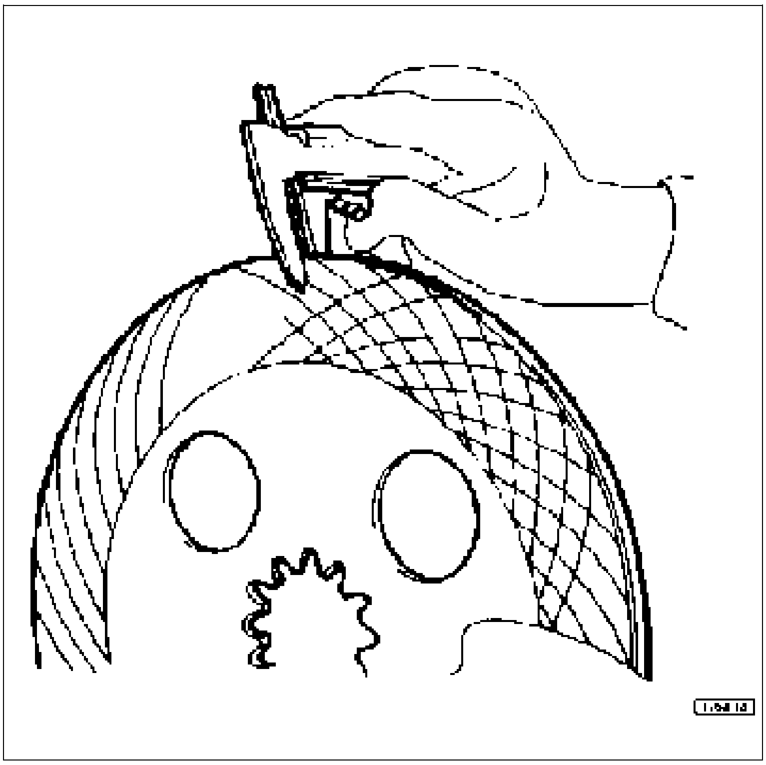


Fig. 17 - Measuring the brake disk thickness.

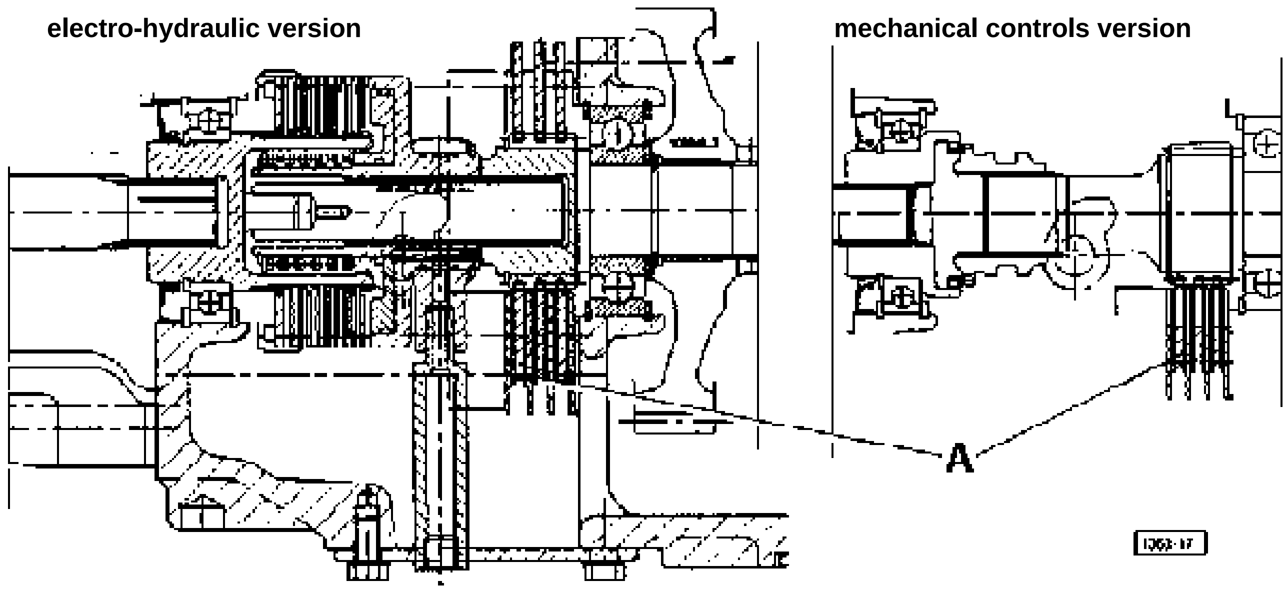


Fig. 18 - Parking brake assembly; (**A**- BRAKES DISK).

Bleeding air from the brake hydraulic system

Operate as follows:

— unhook pedals by removing the coupling latch: afterwards place the "SEPARATE BRAKES" valve control in OFF position;

— operate the right-hand brake pedal several times;

— by holding the pedal in fully depressed position, slightly unscrew and tighten soon after the relevant air bleeding valve on the rear right-hand brake.

This operation should be repeated until such time as the oil flows out of the bleeding valve without air bubbles.

Repeat the same procedure on the front right-hand brake by acting on the related air bleeding valve.

Follow the same procedure on the front and rear left-hand brakes making use of the related air bleeding valves.

Use only AKROS MATIC fluid (international specification ATF DEXRON II) in the brake control circuit.

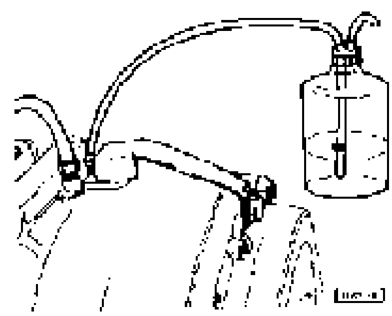


Fig. 19 - Bleeding the air from the front service brake hydraulic system.

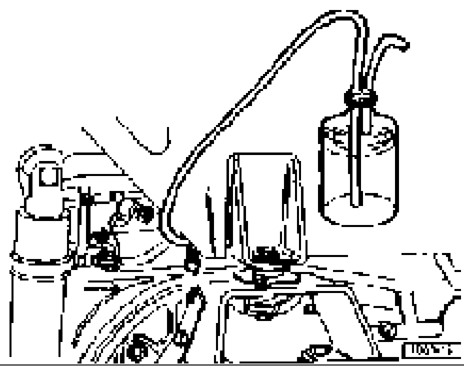


Fig. 20 - Bleeding the air from the rear service brake hydraulic system.

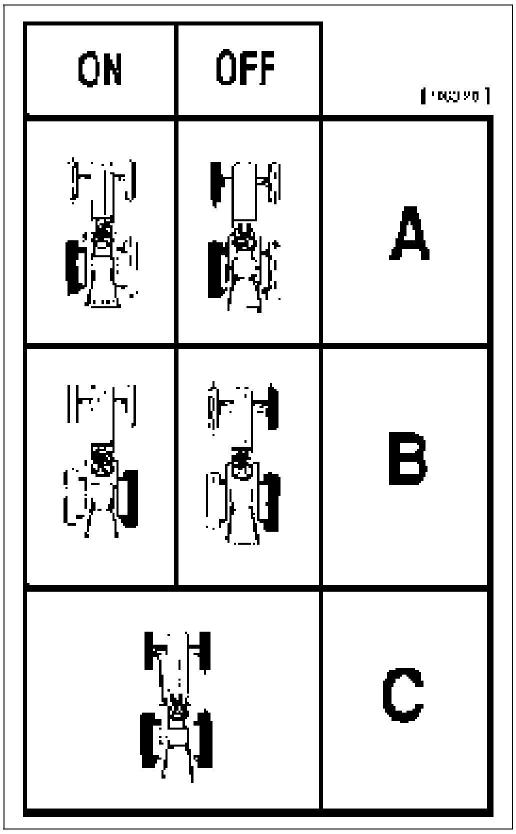


Fig. 21 - Different braking action diagram.

"Separate Brakes" valve

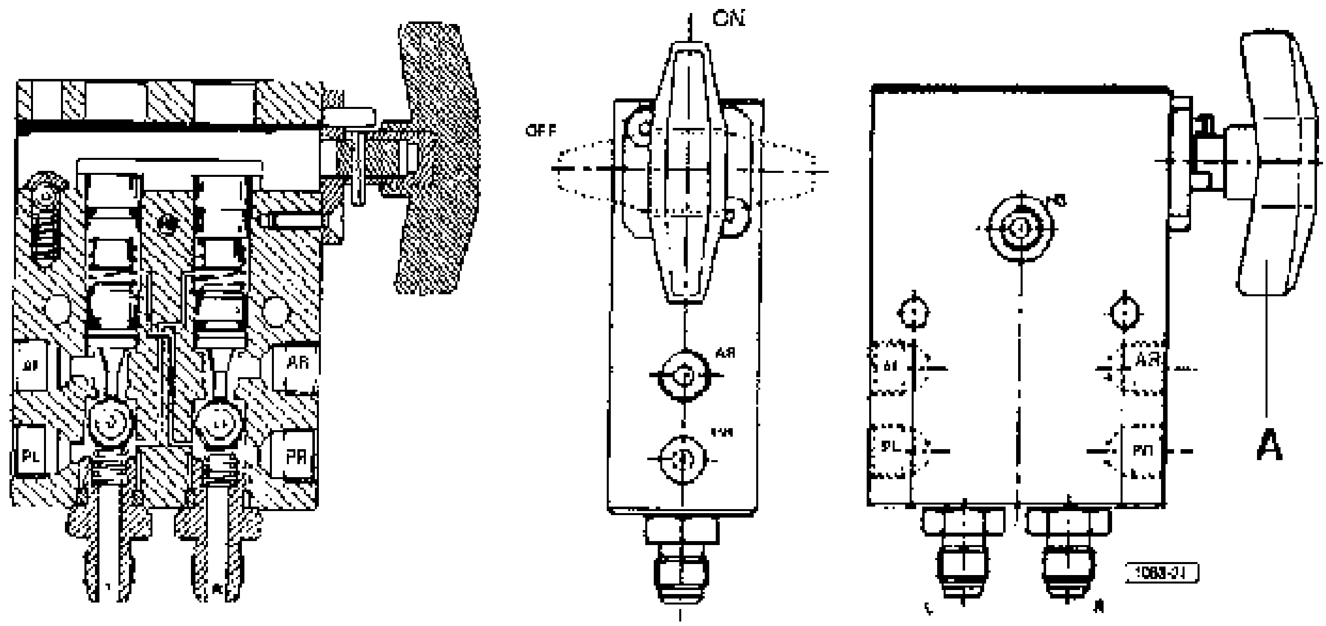
The "SEPARATE BRAKES" valve permits the front wheel side-slip to be removed when performing independent braking. (This prevents cultivation damage as the front wheel is under no braking action).

The valve operation can be stopped by operating the special control tap **A**.

When both brake pedals are operated at the same time (coupled pedals), the braking of the four wheels will be always obtained.

IMPORTANT: The "idrostop" sensor must be installed in the SEPARATE BRAKES valve housing, smearing Loctite 542 on the screw thread.

A = LH brake pedal
B = RH brake pedal
C = Both when coupled



Hydraulic connections

PR- Rear RH brake
L - LH brake pedal pump
AL- Front LH brake
R - RH brake pedal pump

AR- RH front brake
PL- Rear LH brake
H - STOP pressure switch

Fig. 22 - "SEPARATE BRAKES" valve.

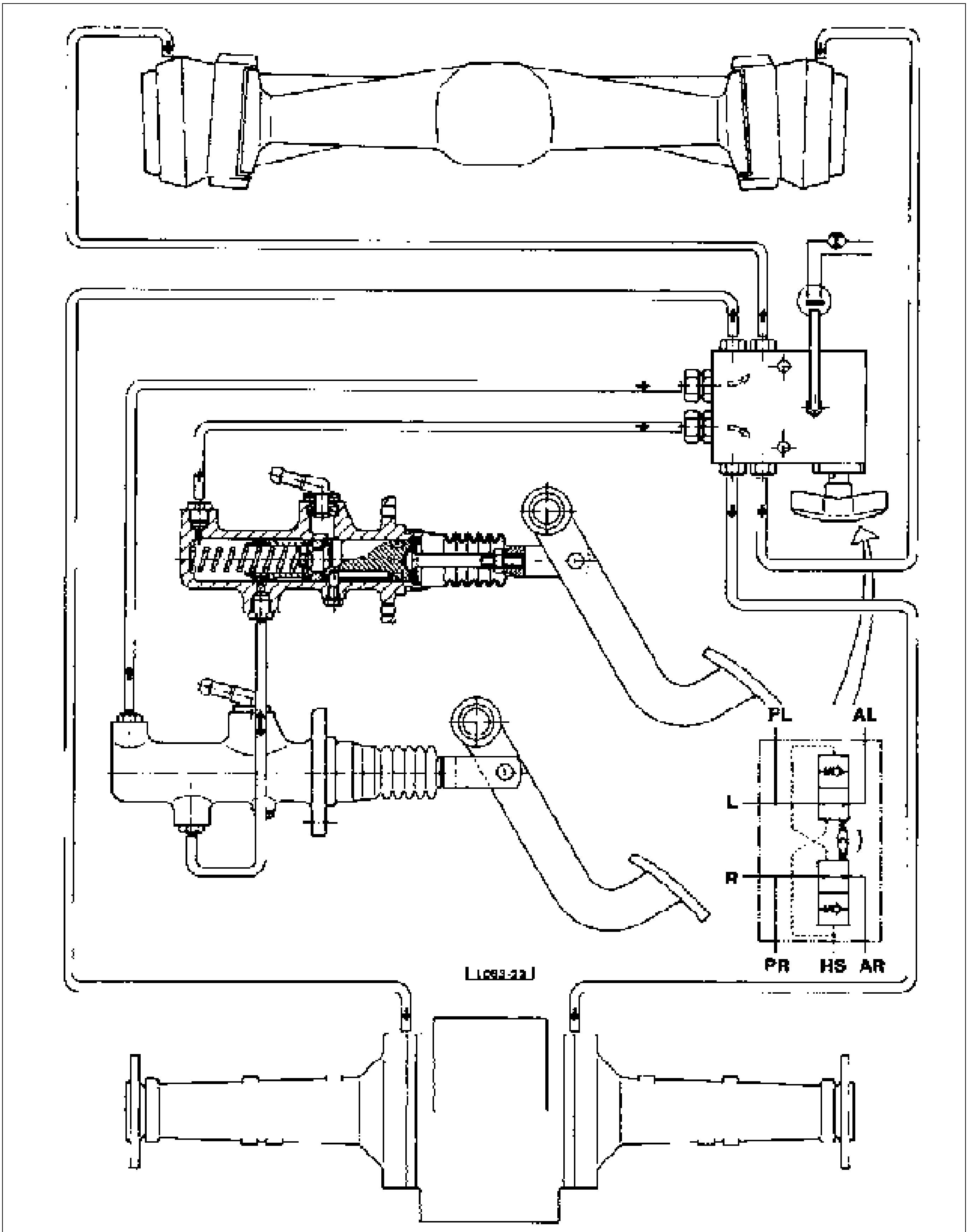


Fig. 23 - "SEPARATE BRAKES" valve hydraulic systems.

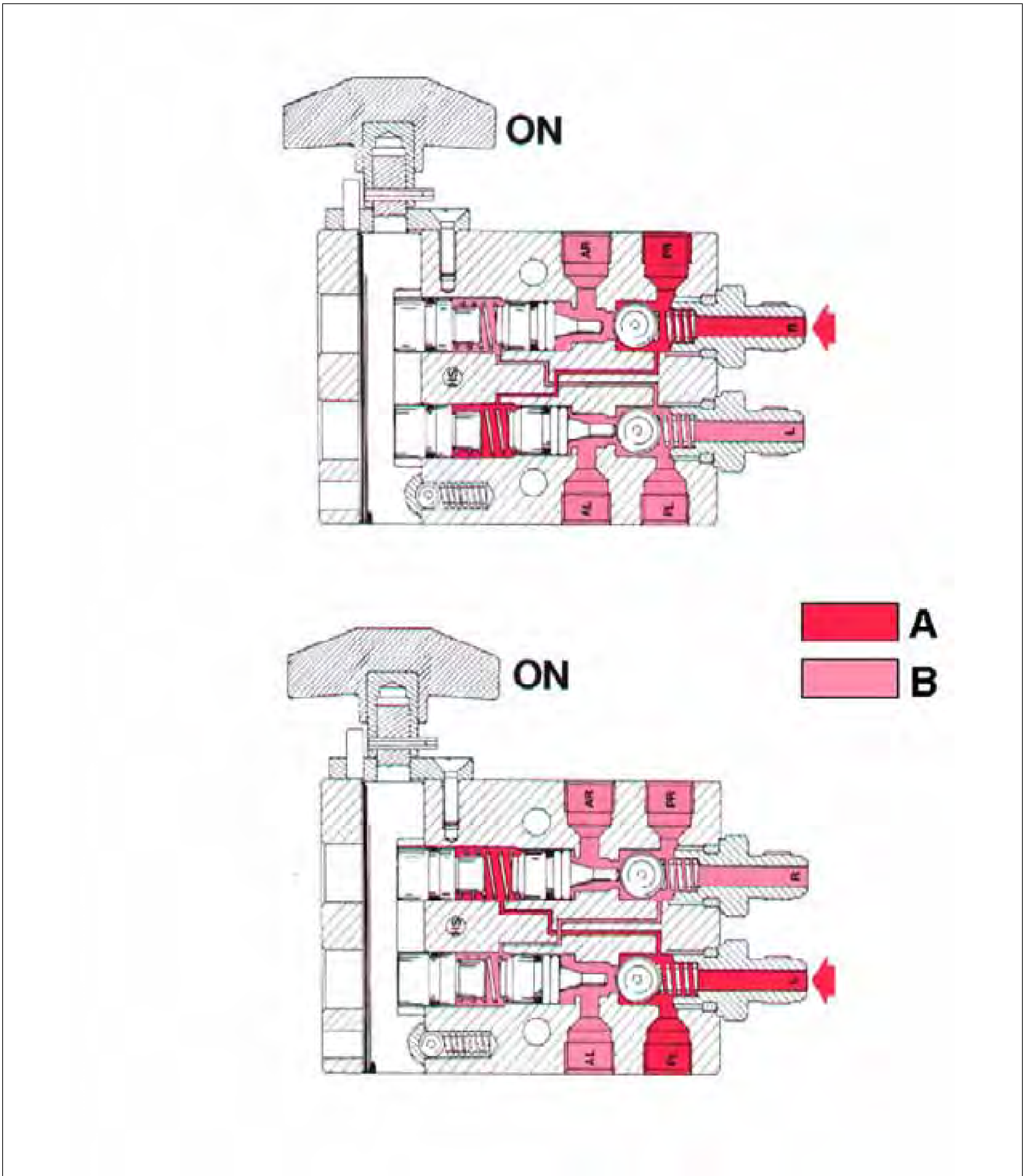


Fig. 24 - Brake hydraulic system schematic diagram with tap in position "ON".
A - oil pressure
B - discharge oil

Hydraulic connections
PR- Rear RH brake
L - LH brake pedal pump
AL- Front LH brake
R - RH brake pedal pump
AR- RH front brake
PL - Rear LH brake
H - STOP pressure switch

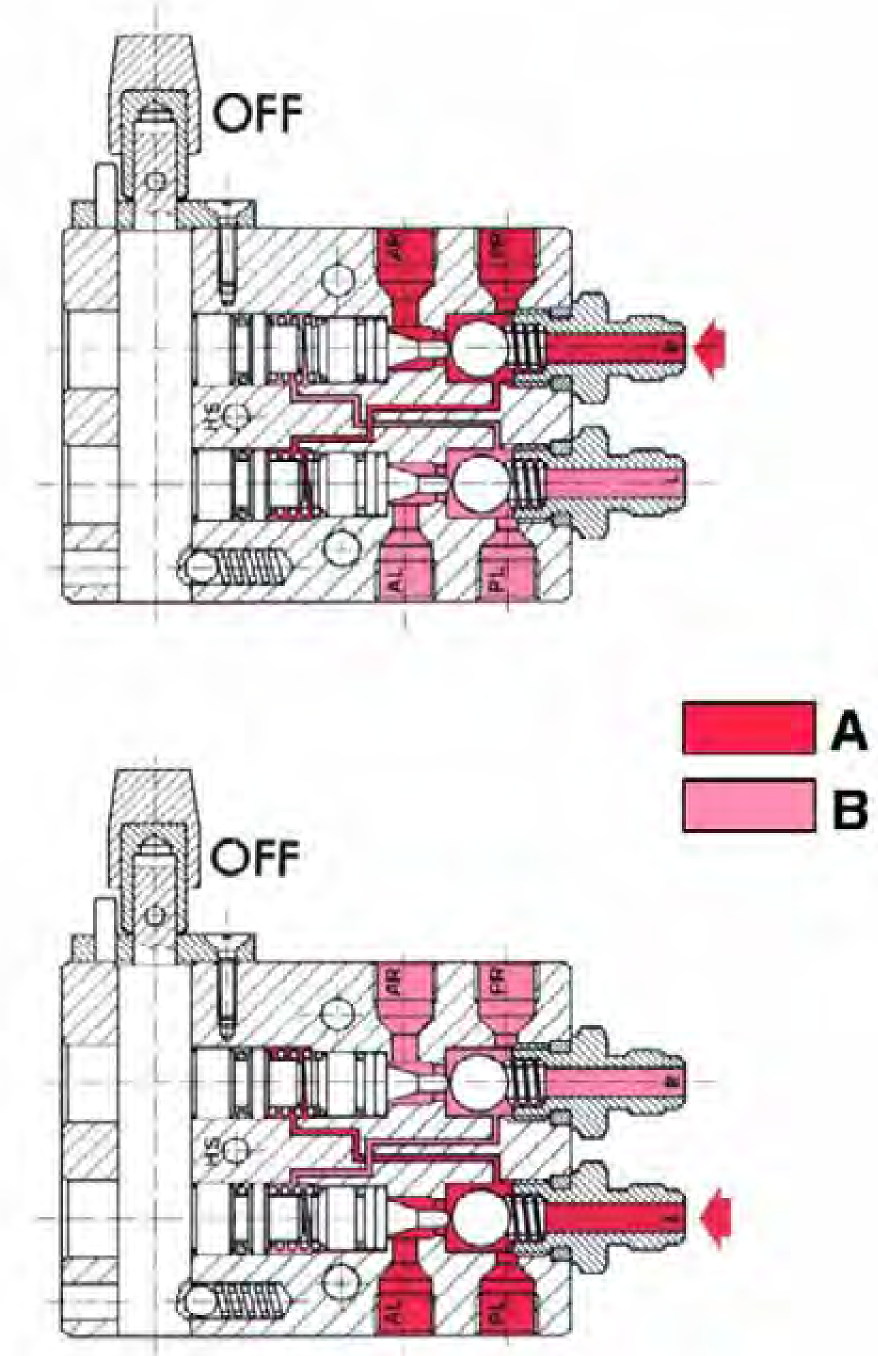


Fig. 25 - Brake hydraulic system schematic diagram with tap in position "OFF".
A - oil pressure
B - discharge oil

Hydraulic connections

PR- Rear RH brake
L - LH brake pedal pump
AL- Front LH brake

R - RH brake pedal pump
AR- RH front brake
PL - Rear LH brake
H - STOP pressure switch

Diagnosing malfunctions

poor braking	make sure no air is inside system	bleed the air
	check for correct adjustment	bleed the air
	check brake disks for wear	adjust
uneven braking	make sure the recommended oil type is used	replace
	check for correct adjustment	adjust
noisy braking	make sure the recommended oil type is used	replace
	check brakes disk	replace

Electronic power-lift

Electronic control unit: operator panel

The electronic control unit is housed in a plastic box of which the top part accommodates all panel components. Two versions are made: for machines with SBA System and machines without SBA System.
The box is totally enclosed so as to prevent the entry of water.
A backlit panel comprises knobs, buttons and Leds.
The control unit is powered directly from the positive terminal of the 12 V battery; current is controlled by a 5 amp fuse installed in the main fuse box.

1 - Control Unit
2 - Electro-hydraulic command valve
3 - Hydraulic pump
4 - Draft sensor
5 - Position sensor
6 - Remote lift/lower buttons
7 - Radar sensor
8 - Wheel speed sensor

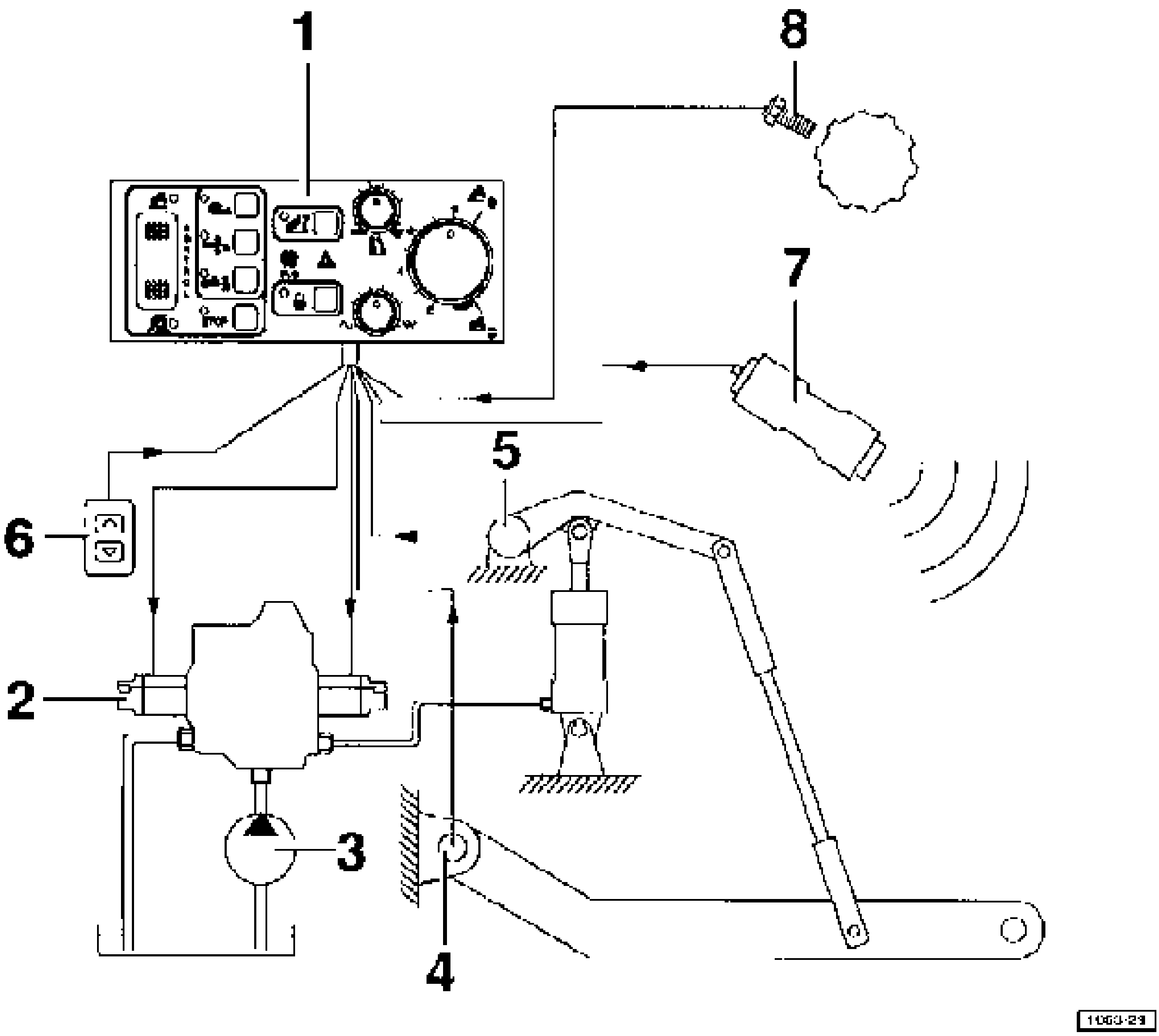
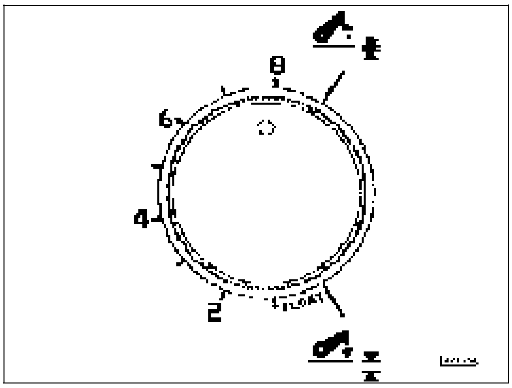


Fig. 1 - Electronic power-lift functional diagram.



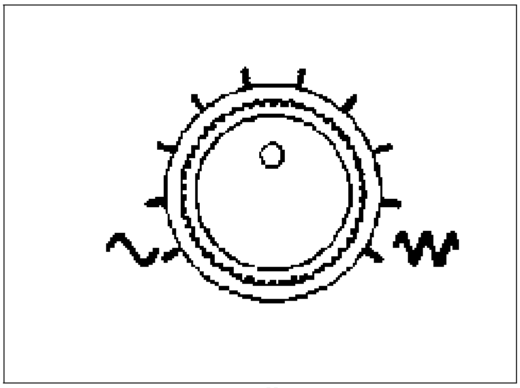
Work depth control

ELECTRONIC POWER-LIFT

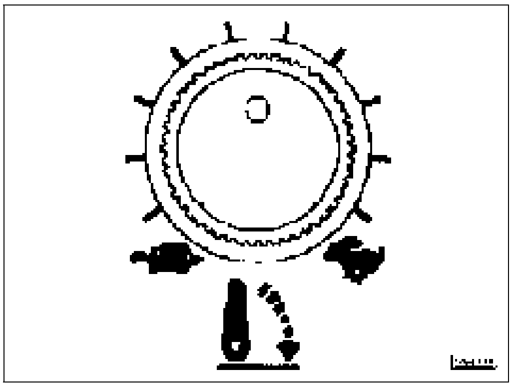
The lift console incorporates the following controls:

Work depth control.
Work depth is regulated by this knob.

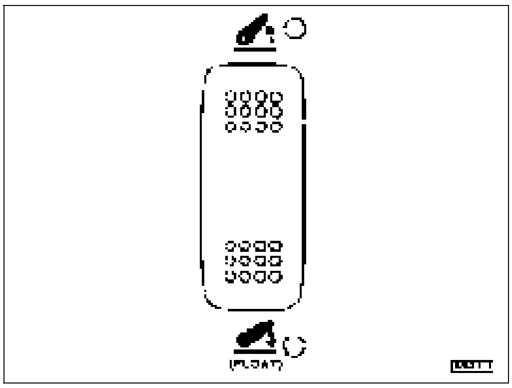
— Turn knob clockwise to reduce depth.
— Turn knob completely anti-clockwise to activate the permanent FLOAT mode.


Response control adjustment

Response control adjustment
The knob regulates the responsiveness of the control system
— Turn the knob anti-clockwise to reduce response control; the system will respond to large changes in the control system only.


Speed of descent adjustment

Speed of descent adjustment
The knob regulates the speed of descent.
This command regulates speed of descent only, but not draft control response.
— Turn the knob anti-clockwise to reduce descent speed.


Raise and lower switch

Raise and lower switch

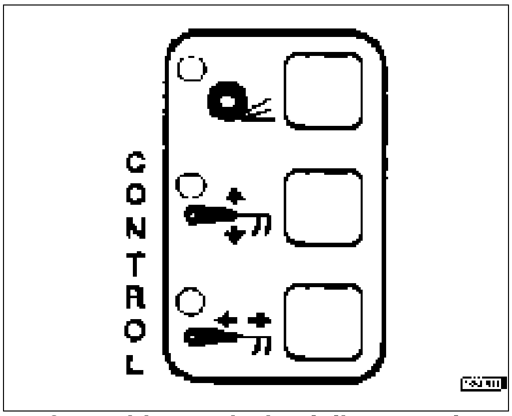
— RAISE COMMAND: if the upper part of this switch is pressed, the lift will be raised to maximum height, or to limited height if the limitation command has been made. An indicator lamp will be illuminated during lifting.

— CONTROLLED DESCENT COMMAND or FLOAT: if the lower part of this switch is pressed momentarily, controlled descent is activated. If command is held pressed, the FLOAT command will be activated.
An indicator lamp will be illuminated during lowering.
NB: This function can NOT be used to adjust the Up or Down travel limit of the lift arms.

Slip control button
This command selects the corresponding control function. The colour of the left hand lamp will indicate whether this function has been activated as a main (red) or secondary (green) control.
NB: This function will be active only if the lift system is equipped with wheelslip control.

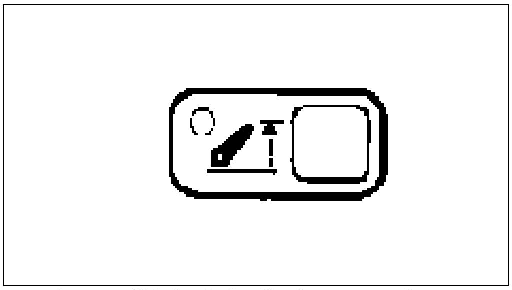
Position control button
This button selects the corresponding control function. The colour of the left hand lamp will indicate whether this function has been activated as a main (red) or secondary (green) control.

Draft control button
This button selects the corresponding control function. The colour of the left hand lamp will indicate whether this function has been activated as a main (red) or secondary (green) control.



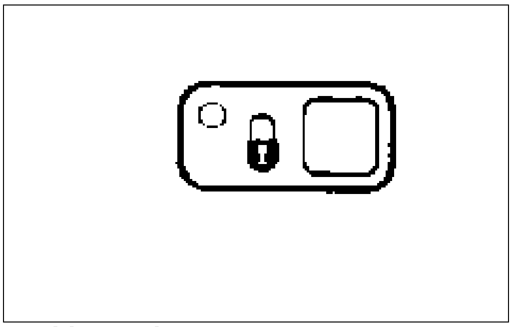
Draft, position and wheelslip control

Maximum lift height control
Activates and deactivates the facility of limiting the maximum lift height. Pressing the switch, the red indicator alongside lights up and the system memorizes the position of the lift arms. Every time the Up control is operated thereafter, the lift arms will cease upward movement at the memorized limit position



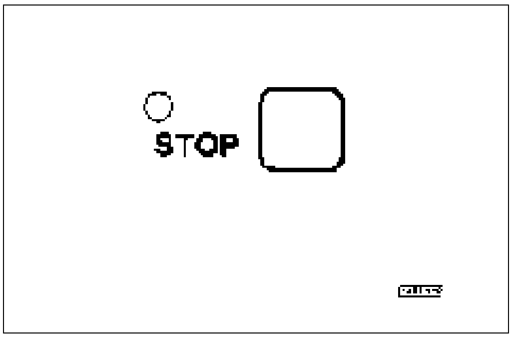
Maximum lift height limit control

Block or transport button (Maximum height)
Activates and de-activates total block of the control panel. The red lamp next to the button is illuminated when function is activated.
NB: Pressing the switch, the control unit immediately pilots the lift ram to elevate the implement to the maximum height (effectively the transport position).



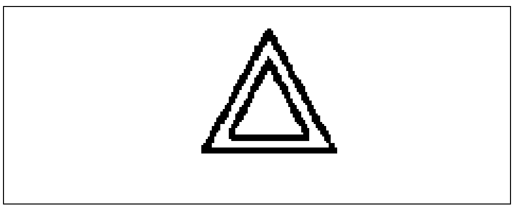
Position lock or transport control

STOP
Temporarily stops lift movement; the red lamp next to the button is illuminated when function is activated.
Caution: this control is especially important, as it allows the hydraulic lift to be immobilized immediately in the event of danger.



STOP

ALARM INDICATOR
In the event of a fault affecting one or more components of the system, a red indicator will blink.



ALARM INDICATOR

Technical specifications

manufacturer			SAME - DEUTZ FAHR GROUP
hydraulic power-lift type			by electronics administration
hydraulic pump type	standard pump		2.4529.740.0
	with oversized pump		2.4529.780.0/10
hydraulic pump delivery (peak engine r.p.m.):	standard pump	l/min	41
	with oversized pump	l/min	57,5
pressure relief valve setting		bar	180+10
minimum allowable piston diameter:	SILVER 80 - 90	mm	109.900
	SILVER 100.4 - 100.6	mm	124,900
maximum auxiliary hydraulic cylinder:	SILVER 80 - 90	mm	110,050
	SILVER 100.4 - 100.6	mm	125,050
maximum auxiliary hydraulic cylinder	SILVER 80 - 90	mm	42
	SILVER 100.4 - 100.6	mm	50
Lifting capacity with load concentrated on the lower link ball ends at rear wheel centre height:	SILVER 80 - 90		mm 3157
	SILVER 100.4 - 100.6		mm 3897
- with auxiliary hydraulic cylinders	SILVER 80 - 90		mm 4329
	SILVER 100.4 - 100.6		mm 4339
- hydraulic cylinder securing screws		kgm	30
		Nm	300
power-lift oil level pipe tightening torque	SILVER 80 - 90	kgm	13,5
		Nm	132

Operation

The electronic lift is controlled by a control unit and a control panel.
The electronic control unit comes in the standard or **SBA** (automatic diff-lock, 4WD and Slip control) versions.
The electronic rear lift control is comprised of a system which, on the basis of incoming information gathered by a series of sensors and of the operating mode set by the operator on the control panel, pilots two proportional solenoid valves of a hydraulic directional control valve. The latter in turn controls one hydraulic cylinder, which move the lift arms carrying the implement.

Main control switch

The following description refers to Fig 2).
The main control consists in a rocker switch located on the left of the console and used by the driver to move the implement up (5 - Fig 2) and down (6 - Fig 2). The device is proportioned in such a way as to ensure ease of operation.

When the top half (5 - Fig 2) of the switch is depressed (the same effect is produced whether Up is depressed momentarily or pressed and held), the lift arms will be elevated to their maximum height and then stop, causing the **STOP** indicator, positioned alongside the switch (5 - Fig 2) to light up.

Touching the bottom half (6 - Fig 2) of the switch for less than half a second, the lift arms descend to the controlled operating position and the **STOP** light goes out.

Pressing and holding the bottom half (6 - Fig 2) of the switch, the lift will operate in **FLOAT** mode; in this case the descent solenoid valve remains activated.

Stop switch
When the system is in control mode, following operation of the Down switch (6 - fig 2), the driver can immobilize the lift arms by pressing the **STOP** button (4 - Fig 2). In this instance the up/down solenoid valve is deactivated.

To restore control mode, the Down switch (6 - Fig 2) must be pressed again.
As long the **STOP** condition is maintained, the red indicator on the left of the relative switch remains alight.
In the **STOP** condition, the indicator lights denoting the type of control selected (draft, position, wheelslip) will continue to blink.

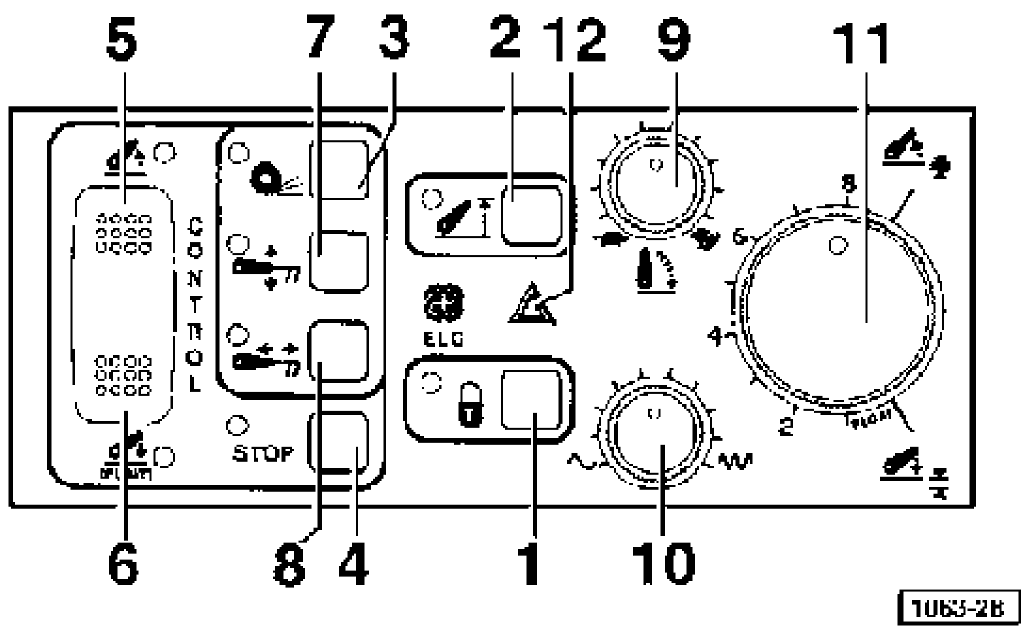


Fig. 2 - Electronic lift controls.

1 - Lock control
2 - Maximum raise button
3 - Slip control button
4 - STOP button
5 - Raise button
6 - Lower button
7 - Position control button
8 - Draft control button
9 - Lowerig speed button
10 - Response adjustment control
11 - Work depth control
12 - Alarm lamp

Selecting the type of control

Three buttons (3, 7 and 8 - Fig 2) are used to select the type of control, namely wheelslip, position and draft respectively. Each of these functions can be selected as main or secondary.

An indicator on the right hand side of the button denotes the status of the relative function:

— **Indicator off = Deselected**
— **Red indicator = Main**
— **Green indicator = Secondary**

When a given function is selected as the main control, the signals from the various sensors (position sensors for position control, draft sensors for draft control, Radar plus wheel speed and draft sensors for wheelslip control) are monitored continuously by the computer, and each marginal variation in level triggers a corrective movement of the lift arms to maintain the selected set point.
<u>When any function is selected as secondary</u>, the computer again monitors the signals from the various sensors continuously, but a movement of the arms is triggered only on exceeding a preset threshold.
<u>To select any function as a main control function</u>, the driver must press the relative button when the system is idle and the STOP indicator alight. If a main control function has already been selected, this must first be deselected by pressing the relative button, and the button of the required function then pressed. A main control can only be selected in the STOP condition. Only one main control function can be activated at a time.
<u>To select any function as secondary</u>, the relative button must be pressed only with the system in the control mode (STOP light off).

Setting the maximum height

Pressing the top half (5 - Fig 2) of the rocker switch, the implement is lifted to the maximum height. If during the ascent movement the height button (2 - Fig 2) is pressed, the implement stops rising and the indicator on the left of the switch lights up to denote that a maximum height limit is selected. Thereafter, every time the top half (5 - Fig 2) of the rocker switch is pressed, the implement will be raised by the lift arms to the height memorized previously, and held there.

To remove the limiting function, the height button (2 - Fig 2) must be pressed and held for 3 seconds, until the indicator light goes out.

Lock and Unlock button

When switched on, the system will default to Lock mode.
In this condition
➡ The console will not acknowledge any command;
➡ The red indicator alongside the Lock button (1 - Fig 2) is alight;
➡ position control only is activated, and the position will be corrected if the implement drops due to the pressure relief valve being activated or if pressure drops internally of the rams.

To unlock the system, the Lock button (1 - Fig 2) must be pressed and held for 3 seconds, until the relative indicator light finally goes out; as soon as this condition is satisfied, the pre-Lock status of the console is restored and when the machine is switched off the system will be in the STOP condition.

To lock the system, the driver must press the button (1 - Fig 2). In this instance the implement is lifted to the maximum height or the selected limit and will remain there, governed by the same position-only control conditions described above. The system will also lock every time the implement remains at the maximum height or the selected limit for more than 3 minutes.

External buttons
The implement can be raised and lowered using the two buttons outside the cab.
These buttons will operate only if the console is in the Unlock configuration.
If either one of these buttons is pressed with the system in control mode, a STOP is triggered and the selected movement then follows.
To enable precision control and at the same time allow speed of movement, the system is designed to react slowly to initial pressure on the button and then pick up speed after a few seconds have elapsed.

Main control knob
This knob (11 - Fig 2) adjusts the soil engaging depth of the implement.
Turning the knob clockwise reduces the depth.
When the knob is turned fully anticlockwise, FLOAT mode remains permanently activated.

Descent speed control knob
This knob (9 - Fig 2) controls the rate at which the implement descends.
The control is applied only to the speed of the Down movement, and not to the speed of reaction.
Turning the knob anticlockwise, the rate of descent becomes slower.

Response control knob
This knob (10 - Fig 2) regulates the sensitivity with which the control system responds.
Turning the knob clockwise, sensitivity is reduced to a minimum and the system reacts only to substantial variations in the control signal.

UP and DOWN indicators
Two lights associated with the top half (5 - Fig 3) and the bottom half (6 - Fig 2) of the main switch indicate the activation of the up and down solenoid valve.

Alarm indicator
The middle of the console carries a triangle symbol. Whenever any trouble arises with the electronic lift control system, the triangle will blink.
To determine the exact nature of the fault or malfunction, the user must call out a service technician who will connect an ALL ROUND TESTER to the system.
This is a pendant device that will check out the 10 most recent alarms triggered, thereby facilitating the diagnosis of any faults that might be occurring intermittently.

The alarms fall into two categories:
➡ **Hazard alarms (inhibiting)**
➡ **Warning alarms (non-inhibiting).**

ALL ROUND TESTER

The tester is connected to the diagnostics socket on the right hand side of the instrument panel, and allows dialogue with the control unit of the electronic lift system.
To enable communication, a PASSWORD must first be entered to gain access to the control unit.
The password is installed by the tractor manufacturer during factory testing.
If the diagnostics facility needs to be utilized for any reason, proceed as follows:

— stop the engine and switch off the ignition
— connect the tester to the diagnostics socket
— switch on the panel by pressing and holding key **[A]**
— the tester will prompt **"PASSWORD:"**
— press keys **[1] [2] [3] [F]**
— press key **[2]**
— press keys **[1] [Ø] [Ø] [Ø] [1] [1] [1]**
— press key **[E]**
— press key **[E]**
— the tester is now programmed for operation

Should it happen (having enabled the communication line) that the tester fails to establish a connection with the lift control unit, check the connection between Pin 21 of the connector at the lift control unit and Pin 7 of the diagnostics socket; if there is no apparent fault with the connection, have the tester checked over by a specialist technician.
The software of the electronic lift control unit is programmed to display a series of video pages by way of the ALL **ROUND TESTER:** these are illustrated below.

Menu 0

```
S+L+H  S.p.A.

ELECTRONIC
LIFT
SOFTWARE VERSION
1.00   ss
HW  VERSION  2.0
SERIAL NO.  1194

1- ENGINE ECU

PRES  BOTTON_
```

Menu 1.1

```
TESTS

1 - CONTROL PANEL
2 - EXTBTTN/C.  UNIT
3 - DYNAMIC TEST
4 - SELF  -  DIAGNOSIS
5 - SBA

( _ ) SELECTION_

( E )  EXIT
```

Menu 1.

```
REAR LIFT

1 - TEST
2 - CALIBRATIONS
3 - TARE MAX.  POS.
4 - LIMITS
5 - MONITOR
6 - ALARMS
7 - TARE STEERING

( _ )  SELECTION
```

Menu 1.1.1

```
CONTROL PANEL

POT.  LEVEL            101%
POT.  SENSIT.          102%
POT.  SEED             102%

EV  UP  BUTTON         - R-
EV  DW  BUTTON         - R-
SLIP    BUTTON         - R-
POS.    BUTTON         - R-
DRAFT   BUTTON         - R-
STOP    BUTTON         - R-
MAX  HEIGH  BUT        - R-
TRANSP.     BUTT.      - R-

( E )  EXIT
```

Menu 1. 1. 2

EXT. BUTT. / C. UNIT

S+L+H S.p.A.

RAISE - R -

LOWER - R -

(E) EXIT

Menu 1. 1. 3

DYNAMIC TEST

POSITION	9%
DRAFT	30%
EV RAISE	0.00A
EV LOWER	0.00A

(F) RAISE
(D) LOWER
(C) MSTOP

(_) SELECTIONP

(E) EXIT

Menu 1. 2

CALIBRATIONS

1 - WHEELS

2 - RADAR

3 - MAN / AUTO

(E) EXIT

Menu 1. 1. 4

SELF - DIAGNOSIS

EV RAISE	OK
EV LOWER	OK
DRAFT SENSOR	OK
POS. SENSOR	OK
WHEEL SENSOR	OK

(F) REPEAT

(E) EXIT

Menu 1. 1. 5

SBA TEST

STEERING SENS.	OK
STEERING	/ - 04 - /
BRAKE	- R -

SBA BOTTONS

MANUAL

DIF : 4 WD

(E) EXIT

Menu 1. 2. 1

WHEELS CONSTANT

CURRENT	5376
NEW	5483

(C) CONFIRM
(A) CANCEL

(E) EXIT

Menu 1. 2. 1. 1

CONFIRM DATA

S+L+H S.p.A.

CURRENT = 6500

NEW = 0

(C) CONFIRM
(A) CANCEL

(E) EXIT

Menu 1. 2. 2

RADAR CONSTANT

CURRENT = 6500

NEW = 0

(D) DELETE

(E) EXIT

Menu 1. 2. 3

AUTOMATIC CALC.

CURRENT = MAN

NEW = 0

(C) CHANGE STATUS

(E) EXIT

Menu 1. 3

TARE MAX. POS.

CURRENT = 920

NEW = 184

MOVE ARMS TO
MAXIMUN HEIGHT
USING EXTERNAL
BUTTONS

(E) EXIT

Menu 1. 4

LIMITS

1 - POSITION 2%

2 - DRAFT 4%

3 - PRIM. SLIP. 40%

4 - SEC. SLIP. 60%

(_) SELECTION_

(E) EXIT

Menu 1. 5

MONITOR

POSITION 9%

DRAFT 30%

WHEELSP 0.0 km/h
RADARSP 0.0 km/h

SLIP 0%

STEERING / - 04 - /

(E) EXIT

Menu 1. 6

LIST OF ALARMS

S+L+H S.p.A.

(D) ERASE LIST

(E) EXIT

Menu 1. 7

CALIB. STEERING

CURRENT = 152

NEW = 168

STRAIGHTEN
WHEELS AND PRESS (E)

(E) EXIT

The **DATA MONITOR** can be used to select wheelslip **"LIMITS"** by way of the wheelslip table video page (refer to the relative chapter **"DATA MONITOR"** for directions on how to access the table).

Selecting the **type of soil** and the **type of wheelslip**, the corresponding values stored in memory (and indicated in the table) are adopted automatically, and cannot be changed manually.

WHEELSLIP TABLE						
	LIGHT SOIL		**NORMAL SOIL**		**HEAVY SOIL**	
Wheelslip	**Main**	**Secondary**	**Main**	**Secondary**	**Main**	**Secondary**
Min.	70	35	65	35	60	40
Med.	65	45	60	50	50	55
Med. / Max.	60	60	50	65	45	70
Max	40	70	45	75	40	75

Display of alarm code.
To enable swift identification of the type of alarm triggered, the triangle blinks in such a way as to generate code numbers, each associated with an exact alarm condition.

ALARM CODES TABLE

Codes	Description of alarm	Type of alarm
11	EPROM (Program Memory), Immobilizing alarm	**immobilizing alarm**
12	Position control sensor disconnected	
13	Up and/or down solenoid valve short circuit	
14	Up solenoid valve disconnected	
15	Down solenoid valve disconnected	
21	Internal fault at control unit	
22	Position control sensor incorrectly set	
23		
24		
25		
31	Draft control sensor disconnected	**warning alarm**
32	Draft control sensor not correctly set	
33	Wheel speed sensor faulty	
34	RADAR fault	
35	EPROM fault (CPU data memory)	
41		
42		
43		
44		
45		
51	Steering sensor disconnected	
52		
53		
54	Wrong wheel constant	
55	Wrong RADAR constant	

A code number is indicated as follows:
— triangle alight continuously for 2 seconds
— successive blinks of 0.3 s duration corresponding to tens
— triangle alight continuously for 0.8 s
— successive blinks of 0.3 s duration corresponding to units
— repetition of cycle until alarm deactivates.

RESIDENT DIAGNOSTICS

Alarm 11 (EPROM fault)

This alarm is activated if the diagnostics detect a fault in the memory of the electronic control unit that stores the operating program. The fault will be indicated when the system is switched on, and the operation of the lift remains inhibited. A fault of this nature can only be remedied by replacing the electronic control unit.

Alarm 12 (Position sensor disconnected)

This alarm will be activated in the event that:
— The sensor is faulty
— The wiring is defective or not connected to the sensor
— The wiring is short circuited to earth
— The electronic control unit is faulty

To remedy the trouble, check initially:
— That the position sensor connector and the relative wiring are properly connected
— That the lead connecting the sensor to the electronic control unit is electrically sound
— That the lead is not short circuiting

Alarm 13 (Short circuit on up/down solenoid valve)

This alarm will be triggered if there is any trouble with either of the two directional control solenoid valves.
To remedy the trouble (raise and lowering) proceed as follows:
— Connect the All Round Tester to the control unit;
— Access **menu 1 (LIFT P.)** and select option **1 (Tests)**;
— From the **"Tests"** page, select option **3 (Dynamic test);**
— Take the lift arms up or down pressing the switch "**F**" or "**D**" on the keyboard of the ALL ROUND TESTER; on display appear the indication which the valve solenoid is fault.

A fault can be attributable to:
— Short circuit at the valve solenoid
— Short circuit in the wiring
— Electronic control unit faulty

Alarm 14 (Up solenoid valve disconnected)

This alarm will be activated in the event that:
— The Up solenoid valve has developed an electrical fault (permanently open)
— The wiring is defective or not connected to the valve solenoid
— The electronic control unit is faulty

To remedy the trouble, check initially:
— That the solenoid connector and the relative wiring are properly connected
— That the lead connecting the solenoid to the electronic control unit is electrically sound

Alarm 15 (Down solenoid valve disconnected)

This alarm will be activated in the event that:
— The Down solenoid valve has developed an electrical fault (permanently open)
— The wiring is defective or not connected to the valve solenoid
— The electronic control unit is faulty

To remedy the trouble, check initially:
— That the solenoid connector and the relative wiring are properly connected
— That the lead connecting the solenoid to the electronic control unit is electrically sound

Alarm 21 (Internal fault at the electronic control unit)

This alarm will be activated in the event that the electronic control unit detects a fault in its own internal circuitry.

A fault of this nature can only be remedied by replacing the electronic control unit.

Alarm 22 (Position sensor incorrectly set)

This alarm will be activated if the setting procedure has not been carried out properly.

To rectify the problem, set the sensor as indicated in the directions under the chapter "Procedure for setting up the electronic lift".

Alarm 31 (Draft sensor disconnected)

This alarm will be activated in the event that:
— The sensor is faulty
— The wiring is defective or not connected to the sensor
— The wiring is short circuited to earth
— The electronic control unit is faulty

To remedy the trouble, check initially:

— That the draft sensor connector and the relative wiring are properly connected
— That the lead connecting the sensor to the electronic control unit is electrically sound
— That the lead is not short circuiting

Alarm 32 (Draft sensor incorrectly set)

This alarm will be activated if the setting procedure has not been carried out properly.

To rectify the problem, set the sensor as indicated in the directions under the chapter "Procedure for setting up the electronic lift".

Alarm 33 (Wheel speed sensor faulty)

This alarm will be activated in the event that:
— The sensor is not connected
— The sensor has developed an electrical fault
— The wiring is no longer intact
— The electronic control unit is faulty

To remedy the trouble, check initially:
— That the sensor connector and the relative wiring are properly connected
— That the lead connecting the sensor to the electronic control unit is electrically sound

Alarm 34 (Radar faulty)

This alarm will be activated in the event that:

— The Radar is not connected
— The Radar has developed a fault
— The wiring is defective or short circuiting
— The electronic control unit is faulty

To remedy the trouble, check initially:

— That the connector of the device and the relative wiring are properly connected
— That the lead connecting the device to the electronic control unit is electrically sound
— That the lead is not short circuiting to earth

Alarm 35 (EPROM fault)

This alarm will be activated if parametric system configuration data stored by the internal memory of the electronic control unit has become corrupted.
A fault of this nature can only be remedied by replacing the electronic control unit.

Alarm 51 (Steering sensor disconnected - versions with SBA system only)

This alarm will be activated in the event that:

— The sensor is faulty
— The relative wiring is not connected to the sensor
— The wiring is short circuited to earth
— The electronic control unit is faulty

To remedy the trouble, check initially:

— That the steering sensor connector and the relative wiring are properly connected
— That the lead connecting the sensor to the electronic control unit is electrically sound
— That the lead is not short circuiting to earth

Alarm 54 (Wrong wheel constant)

This alarm will be activated if the constant entered for the wheel speed sensor has been set to zero (signifying no sensor), although the electronic control unit continues to receive signals confirming that the sensor is installed and connected. In this instance the fault is due simply to incorrect programming of the electronic control unit.

To rectify the problem, check first that the wheel speed sensor is in fact mounted to the transmission housing, then proceed as follows:

Connect the All Round Tester to the control unit;

— Access **menu 1 (LIFT P.)** and select option **2 (settings);**
— With the settings menu displayed, enter the correct value of the **"WHEELS"** parameter, following the directions given in the "Procedure for setting up the electronic lift".

Alarm 55 (Wrong RADAR constant)

This alarm will be activated if the constant entered for theRADAR sensor has been set to zero (signifying no sensor), although the electronic control unit continues to receive signals confirming that the sensor is installed and connected. In this instance the fault is due simply to incorrect programming of the electronic control unit.

To rectify the problem, check first that the RADAR unit is in fact mounted to the tranmission housing, then proceed as follows:

— Connect the All Round Tester to the control unit;
— Access menu 1 (LIFT P.) and select option 2 **(settings)**;
— With the settings menu displayed, set the **"RADAR"** parameter to 6500.

Procedure for replacing the EPROM in the electronic lift control unit

— Remove the control unit from the console on the right hand side of the driver, and disconnect from the relative wiring harness.
— Remove the 6 screws from the back and detach the cover.
— Detach the retaining clip from the EPROM and remove by drawing upwards.
NB: the type of resident software is indicated on the EPROM. Example: **SOL 1.00SS**
— Fit the new EPROM, which must be positioned with the notch on one of the two shorter sides directed toward the microprocessor (square flat component positioned to one side). Care must be taken when positioning to align all pins correctly with the respective sockets.
— Refit the cover and check for correct operation. In the event of faulty operation, run the software installation procedure, following the directions below.

Procedure for setting up the electronic lift

Correct procedure for setting up the electronic control system of the hydraulic lift and for checking the operation of electrical component parts.

RADAR / No RADAR
If the tractor is not equipped with the RADAR device, the electronic control unit must be informed that this component is not installed. The procedure is as follows:
— Connect the All Round Tester to the control unit;
— Access the "Lift P" menu and select option **2 (settings);**
— With the settings menu displayed, select option **2 (RADAR)** and replace value 6500 with zero “0”.
Quit the menu.

Entering the type of tyre
In order to enable a correct calculation of wheelslip, a parameter must be entered that will inform the control unit as to the type of rear tyre in use. The procedure is as follows:

Connect the All Round Tester to the control unit.
Access the "**Lift P**" menu, and select option **2** to bring up the **"settings"** menu.
Select **1 (Wheels)** and enter the value indicated in the following table:

SILVER 80-90-100.4-100.6 ***1st version*** (see serial number to page 133).

80-90-100.4 HP			100.6 HP		
Pneus	**40 km/h version** (or 30 km/h with electronic limitation)	**30 km/h version**	**Pneus**	**40 km/h version** (or 30 km/h with electronic limitation)	**30 km/h version**
16.9 x 34	5483	7205	14.9 R 38	5351	7057
16.9 R 34	5483	7205	480 / 70 R 34	5494	7245
18.4 R 30	5673	7455	520 / 70 R 34	5316	7010
18.4 R 34	5305	6971	16.9 R 38	5149	6790
13.6 R 38	5520	7255	480 / 70 R 38	5149	6790
480 / 70 R 34	5483	7205			
14.9 R 38	5340	7018			
520 / 70 R 34	5305	6971			

SILVER 80-90-100.4-100.6 2nd version (see serial number to page 133).

80-90-100.4 HP			100.6 HP		
Pneus	**Version 40 Km/h** (or 30 km/h with electronic limitation)	**Version 30 Km/h**	**Pneus**	**Version 40 Km/h** (or 30 km/h with electronic limitation)	**Version 30 Km/h**
16.9 x 34	4639	6096	14.9 R 38	4527	5971
16.9 R 34	4639	6096	480 / 70 R 34	4648	6170
18.4 R 30	4800	6308	520 / 70 R 34	4498	5931
18.4 R 34	4488	5898	16.9 R 38	4356	5745
13.6 R 38	4670	6138	480 / 70 R 38	4356	5745
480 / 70 R 34	4639	6096			
14.9 R 38	4518	5938			
520 / 70 R 34	4488	5898			

IMPORTANT: If there is no SBA system installed, and no RADAR device fitted to the tractor, this parameter must be set to zero.

AUTO-MAN procedure for entering the wheel constant relative to a tyre not listed in the table

1 - Connect the ALL ROUND TESTER to the diagnostics socket of the tractor, which is exposed by lifting the flap on the right hand side of the instrument panel.

2 - Turn the ignition key to supply power to the control unit, select option **"2" [Lift P.],** then press any key to return to the main menu, and press **"2"** again to select **SETTINGS**. With the relative video page displayed, press **"3"** followed by **"C"** for change status, and the **SETTINGS** page will be switched to **"AUTO"** mode.

3 - Press **"E"** to exit and return to the **"SETTINGS"** page with **"AUTO"** mode activated.

4 - Start the engine, take the lift arms up to maximum height and press the position lock switch (with the padlock symbol).

5 - Select any gear that will allow the tractor to run at a ground speed above 10 km/h for longer than 30 seconds; this is the time required by the control unit to compute the new value, which will then be displayed alongside the **"WHEELS"** caption.

6 - Having stopped the tractor, press **"3"** then **"C"** on the keyboard of the ALL ROUND TESTER, and the **"SETTINGS"** page will be returned to **MANUAL** mode.

IMPORTANT: remember to carry out this last operation, otherwise the tester will not be enabled for the entry of parameters.

Setting the maximum lift height
To offset any possible misalignment in the mounting of the position control sensor (3, fig 3, page 246), a setting is made using the maximum lift height as a reference value.
The setting procedure is as follows:

- Connect the All Round Tester to the control unit
- Using the external controls mounted to the fender, raise the lift arms to their maximum height (notch on right hand lift arm aligned with notch on lift housing, see fig 10).
- Select option **3** (max position setting) from the **"Lift P"** video page;
- Having accessed the " **max position setting"** menu, press **"E"**;
- This accesses the **"confirm data" menu**; press **"C"** to confirm.

Setting up the draft control sensor

The draft force generated through the lift system is monitored by way of a strain gauge that measures the deformation of a spring rod. For maximum monitoring precision, the sensor must be properly set up.

Proceed as follows:

— Connect the All Round Tester to the electronic control unit. Access the **"Lift P"** menu and select option 5 (monitor);
— Position the lift arms at mid height, without any implement attached;
— Check the "draft" parameter in the monitor video page. If the value is other than 30%, remove any mechanical protectors that may be fitted to the sensor and adjust in such a way that the reading shows 30%. Retighten and secure the lock nut on the threaded body of the sensor and reinstate the protectors (see figs 11 and 12, pages 256 - 257).

Setting up the steering sensor

Some machines (only those with the SBA system) also have a steering sensor mounted to the left hand end of the front axle. To ensure the SBA system operates with optimum efficiency, the sensor must be set up initially.
Proceed as follows:

— Connect the All Round Tester to the electronic control unit. Access the **"Lift P"** menu and select option 7 (steering).
— Position the wheels absolutely straight and press **"E"** at the tester.

Verify the operational efficiency of the system's electrical components.

LIFT

Multifunction control handset mounted to seat armrest
— Connect the All Round Tester to the control unit.
— Access the **"Lift P"** menu and select option **1 "Tests".**
— From the **"Tests"** page, select option **2 "Ext button/handset"**
— Press the Up button at the handset and check that the letter **"P"** appears alongside the **"Up"** caption on the tester display; check also that the caption **"handset"** appears.
— Press the Down button at the handset and check that the letter **"P"** appears alongside the **"Down"** caption on the tester display; check also that the caption **"handset"** appears.

External buttons
— Connect the All Round Tester to the control unit.
— Access the **"Lift P"** menu and select option 1 **"Tests".**
— From the **"Tests"** page, select option **2 "Ext button/handset"**
— Press the external Up button mounted to the fender, and check that the letter **"P"** appears alongside the **"Up"** caption on the tester display; check also that the caption **"external"** appears.
— Press the external Down button mounted to the fender, and check that the letter **"P"** appears alongside the **"Down"** caption on the tester display; check also that the caption **"external"** appears.
— Repeat the test for both buttons mounted to the fender.

Position control sensor

— Connect the All Round Tester to the control unit.
— Start up the engine.
— Access the **"Lift P"** menu and select option **1 “Tests".**
— From the **"Tests"** page, select option **3 “Dynamic test".**
— From the **"Dynamic Test"** page, press **"F"** at the tester and verify that the lift arms elevate to the maximum height (notch on right hand lift arm aligned with notch on lift housing, see fig 10) before stopping. At this point, check that a value of between 95% and 100% appears alongside the caption **"position"**. Verify also during the movement of the arms that a value greater than 1.00 A appears alongside the caption **"Up S/valve".**

Press **"D"** at the tester and verify that the lift arms drop to the minimum height before stopping. At this point, check that a value of between 0 and 5% appears alongside the caption **"position".** Verify also during the movement of the arms that a value greater than 1.00 A appears alongside the caption **"Down S/valve".**

SBA SYSTEM

— The following procedure is to be carried out only on machines equipped with SBA (control unit with EPROM type 1.00SS).
— Connect the All Round Tester to the control unit.
— Access the **"Lift P"** menu and select option **1 “Tests".**
— From the **"Tests"** page, select option **5 "SBA"**
— Check that the indication **"OK"** appears alongside the caption **“steer sensor"**.
— Turn the steering wheel and check for a corresponding variation in the value alongside the caption **"steer"**.
— Straighten the wheels and check that the value alongside **"steer"** is zero.
— Depress the left hand and right hand brake pedals in alternation and check that the letter **"P"** (pressed) in place of "R" (released) alongside the caption "brake".
— Depress and release the SBA buttons on the right hand panel (AUTO, 4WD, DIFF) and check that "manual" changes to "auto", "DIFF” changes to "DIFF" in "REVERSE" and "4WD" changes to "4WD" in "REVERSE".

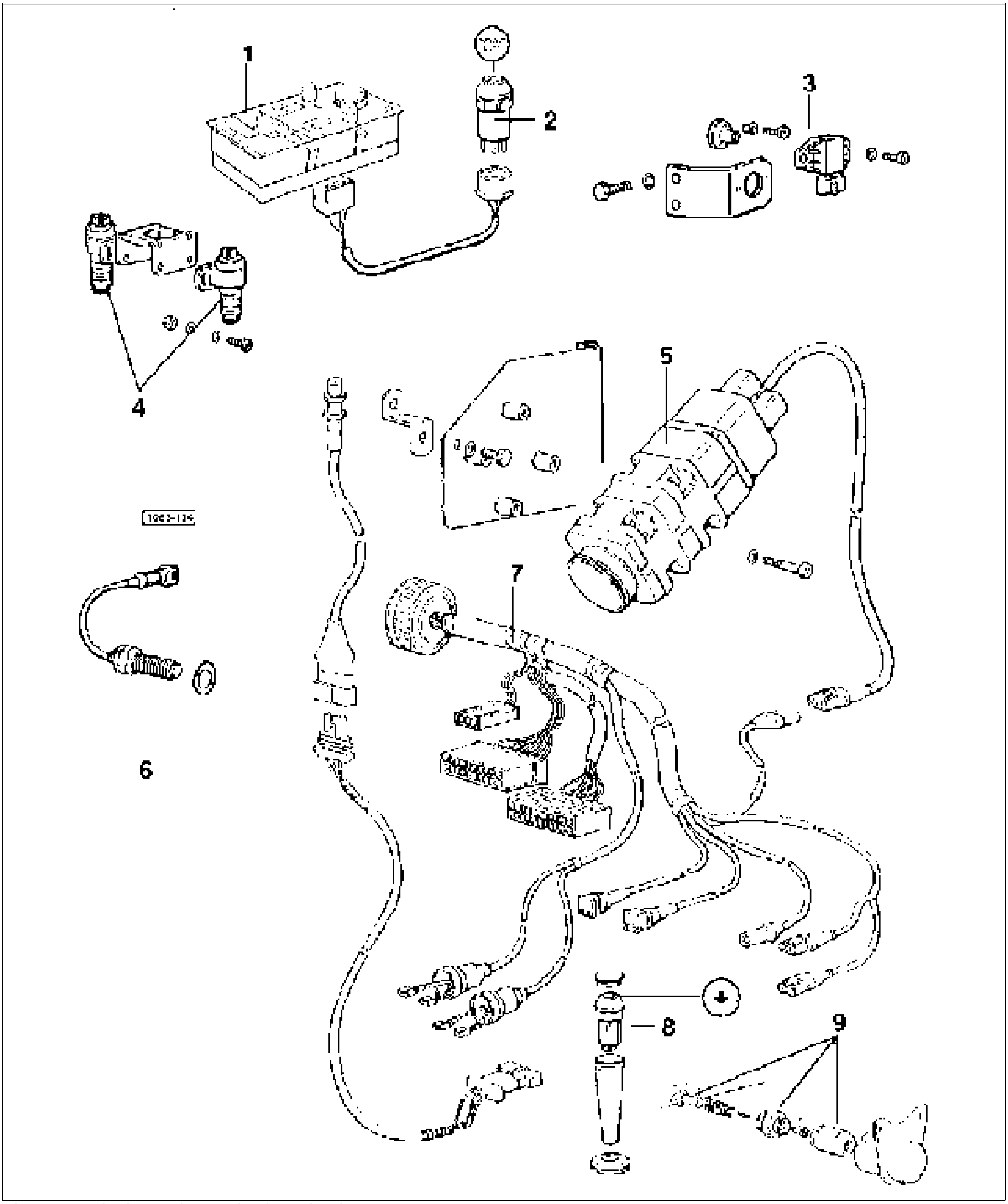


Fig. 3 - Monitoring and control unit, and radar.

1 - Electronic control unit and operating controls
2 - SBA System control
3 - Position control sensor
4 - Brake switches (with SBA System)
5 - Radar
6 - Transmission speed sensor
7 - Wiring harness
8 - External lift controls mounted to fenders
9 - Draft control sensor

Solenoid operated control valve, hydraulic lift

His is an open centre directional control valve equipped with two solenoid valves governing the up and down movements of the lift arms.
The two solenoid valves are piloted directly from the electronic control unit.
Never connect the solenoid valves directly to an electrical power source, as this would result in irreparable damage.

The hydraulic section of the control valve assembly comprises the following parts:
— **1** implement lift flow control valve
— **2** valve spool
— **3** implement down check valve
— **4** shock valve
— **5** rate of drop valve
— **6** check valve
— **7** down valve control element
— **8** implement down solenoid valve

The electrical section of the control valve assembly comprises the following parts:
— **9** lift arms Down solenoid valve
— **10** lift arms Up solenoid valve

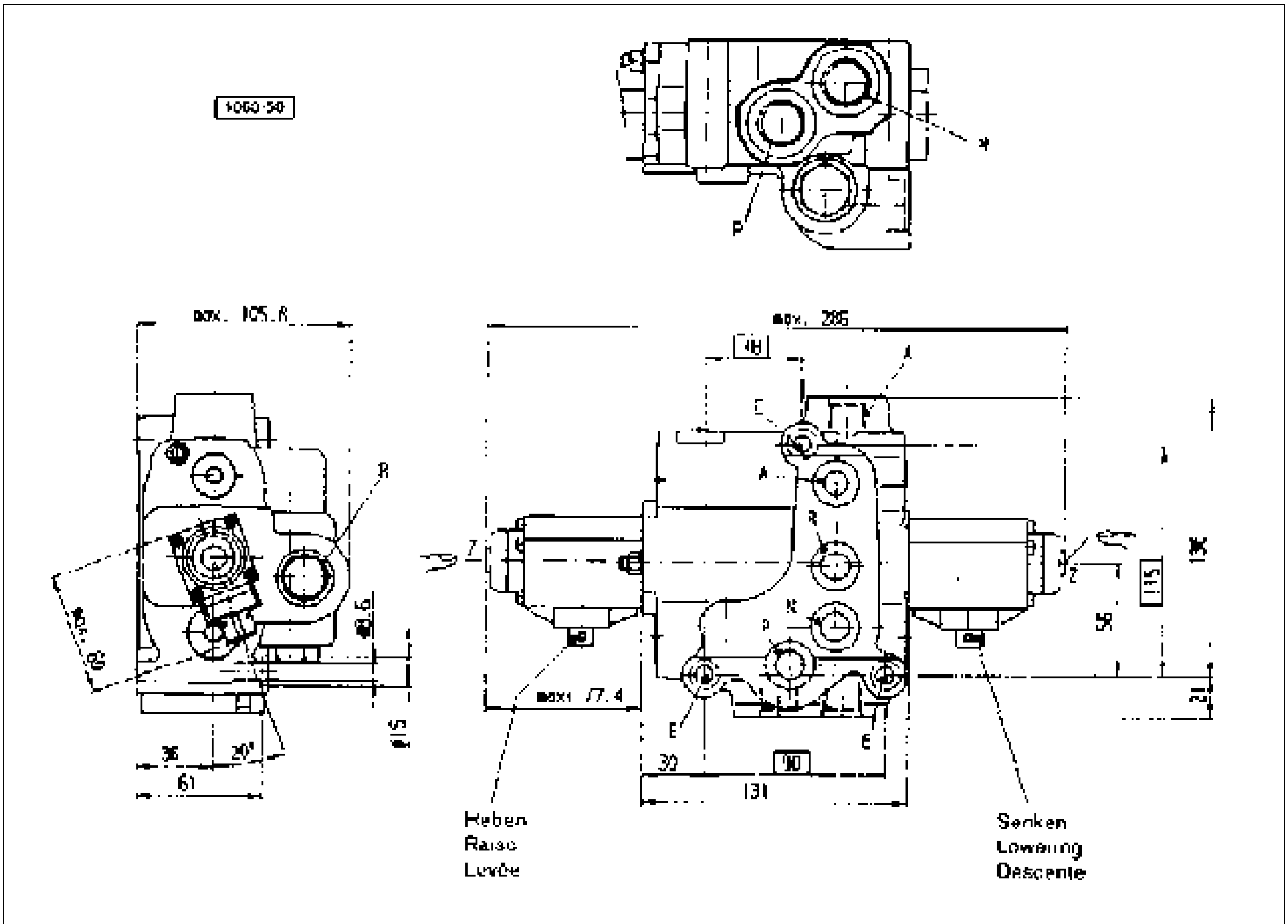
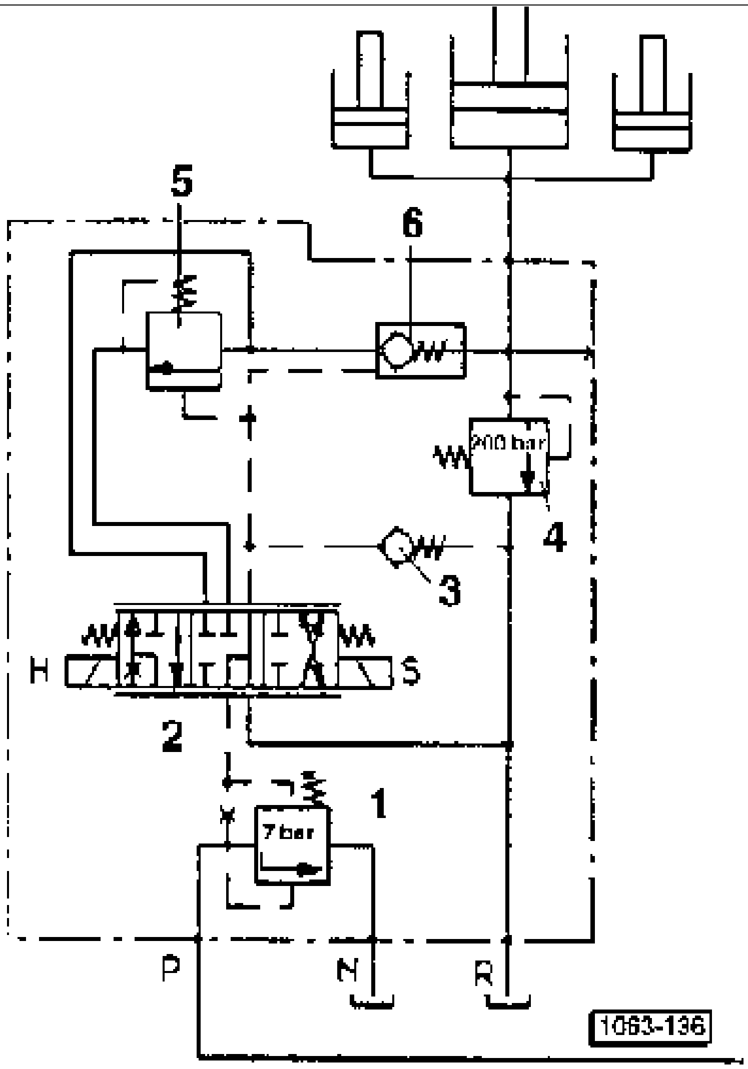


Fig. 4 - Dimensioned diagram of hydraulic directional control valve.



1 - flow control valve
2 - valve spool
3 - minimum pressure control valve
4 - shock valve
5 - rate of drop valve
6 - check valve
H - Up
S - Down

Fig. 5 - Hydraulic distributor operating diagram.

Control of lift system operating pressure
The operating pressure, controlled by the valve associated with the auxiliary spool valves, is checked by connecting gauge 5.9030.513.0 to one of the valve work ports and proceeding as follows:
Start the engine, apply the parking brake in the interests of safety, then operate the directional control valve and verify the relief valve pressure setting. This should be 180 bar; if the setting is found not to be correct, readjust by means of the setscrew (refer also to chapter on "auxiliary spool valves").

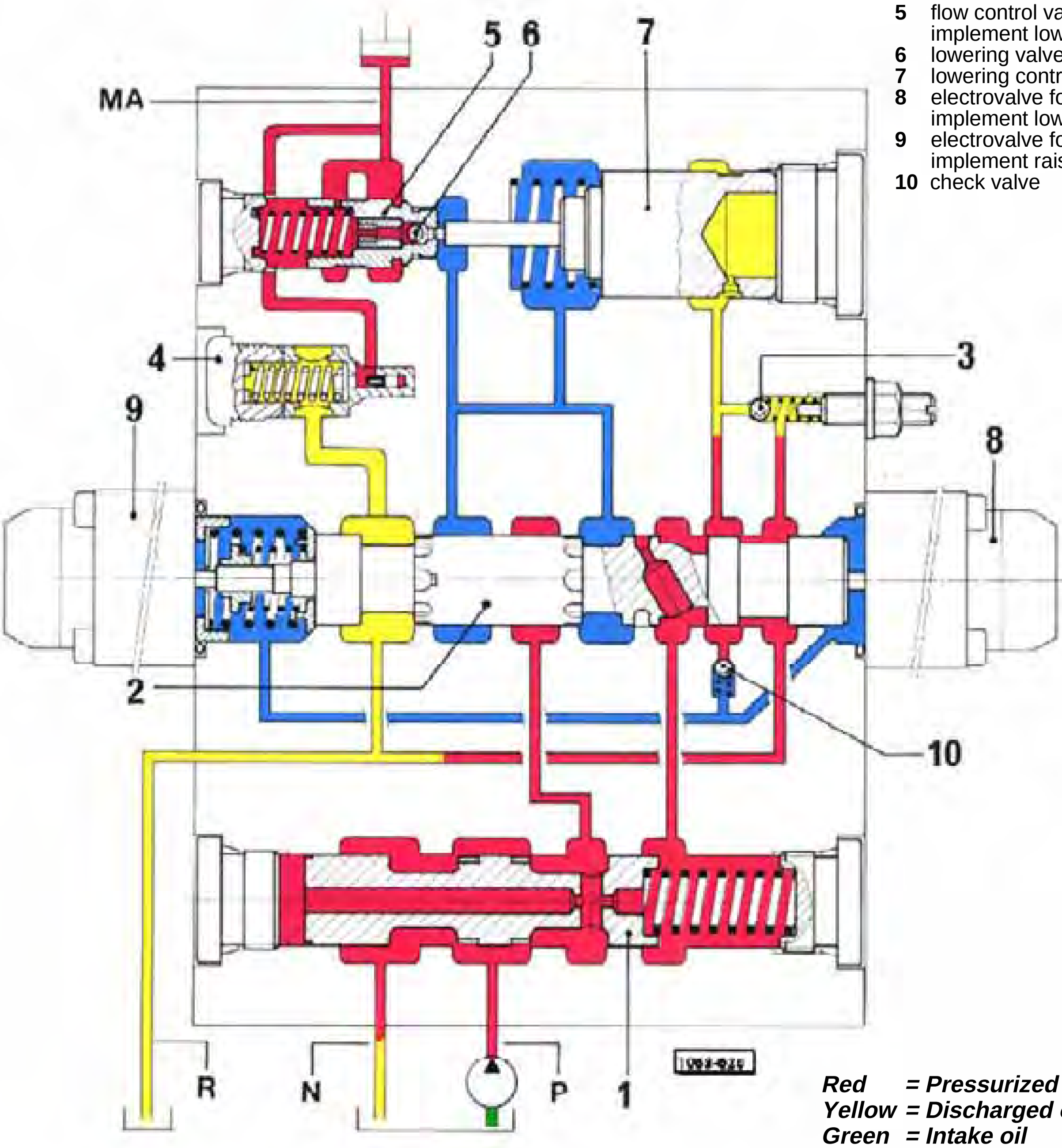
Electro-hydraulic power-lift distributor

neutral position (load holding)

When the two electrovalves are not supplied with current, the oil amount delivered by the pump is directly routed into manifold **N** by check valve **1** (equipped with a spring set at 2.5 bar). Flowing through manifold **N**, the oil is then discharged. The oil is "trapped" inside the lifting system by valves **5** and **6**.
The system is protected by antishock valve **4**, set at 210 bar, permitting the pressure peaks produced by the implement dynamic mass to be suppressed.

P = oil under pressure from the hydraulic pump
N = oil discharge manifold
R = oil return manifold from lifting piston
MA = lifting cylinders

1 flow control valve for implement lifting
2 electrovalve stem
3 nonreturn valve for implement lowering
4 antishock valve
5 flow control valve for implement lowering
6 lowering valve
7 lowering control valve
8 electrovalve for implement lowering
9 electrovalve for implement raising
10 check valve

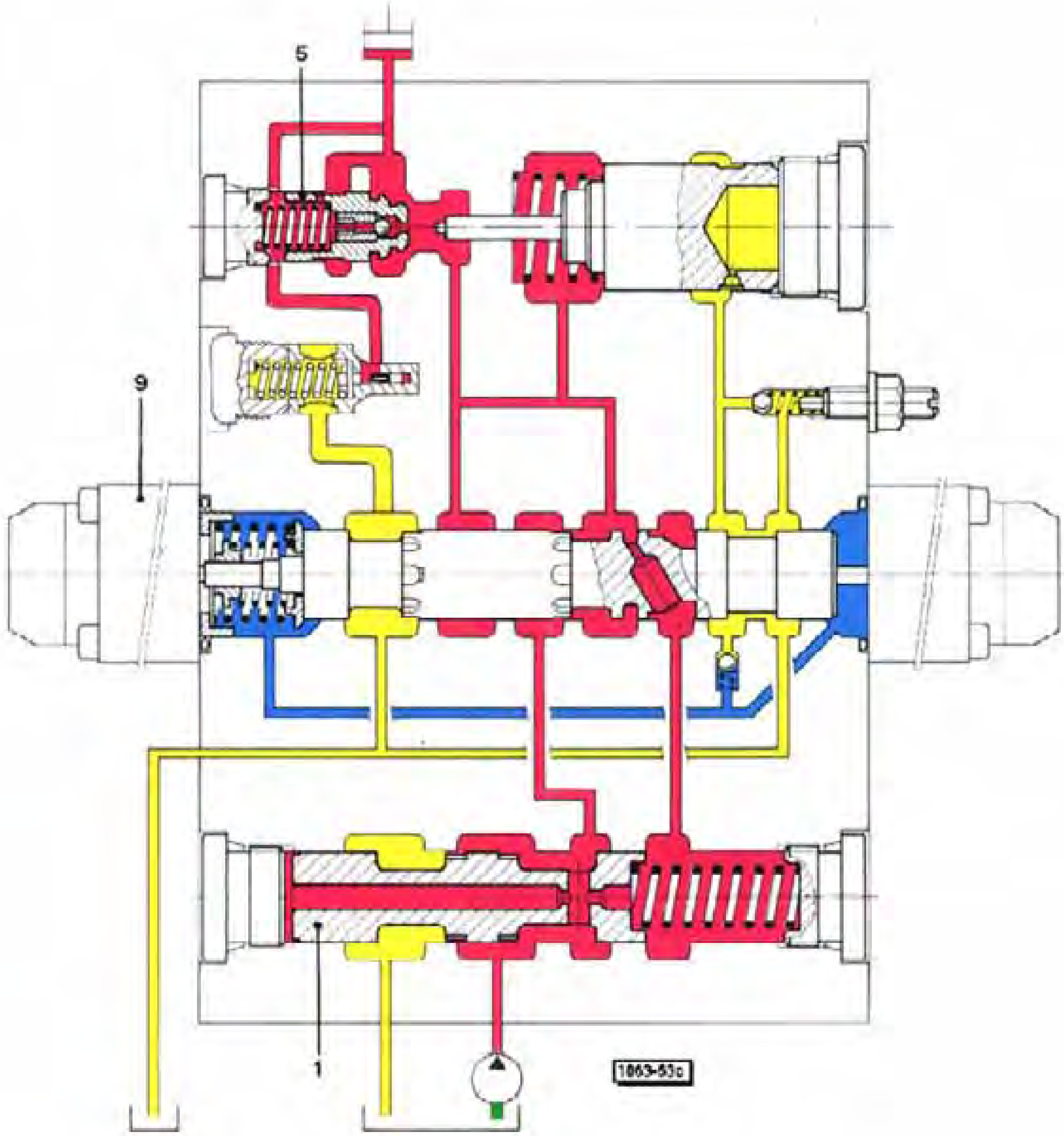


Red = Pressurized oil
Yellow = Discharged oil
Green = Intake oil
Blue = Low pressure oil

Electro-hydraulic power-lift distributor

implement raising

Implement raising is obtained by supplying current to electrovalve **9**, whose stem is moved to the left.
Flow control valve **1**, under the thrust of the pressurized oil, also moves to the left, permitting flow control valve **5** to be opened by the oil flow which enters the power-lift system.

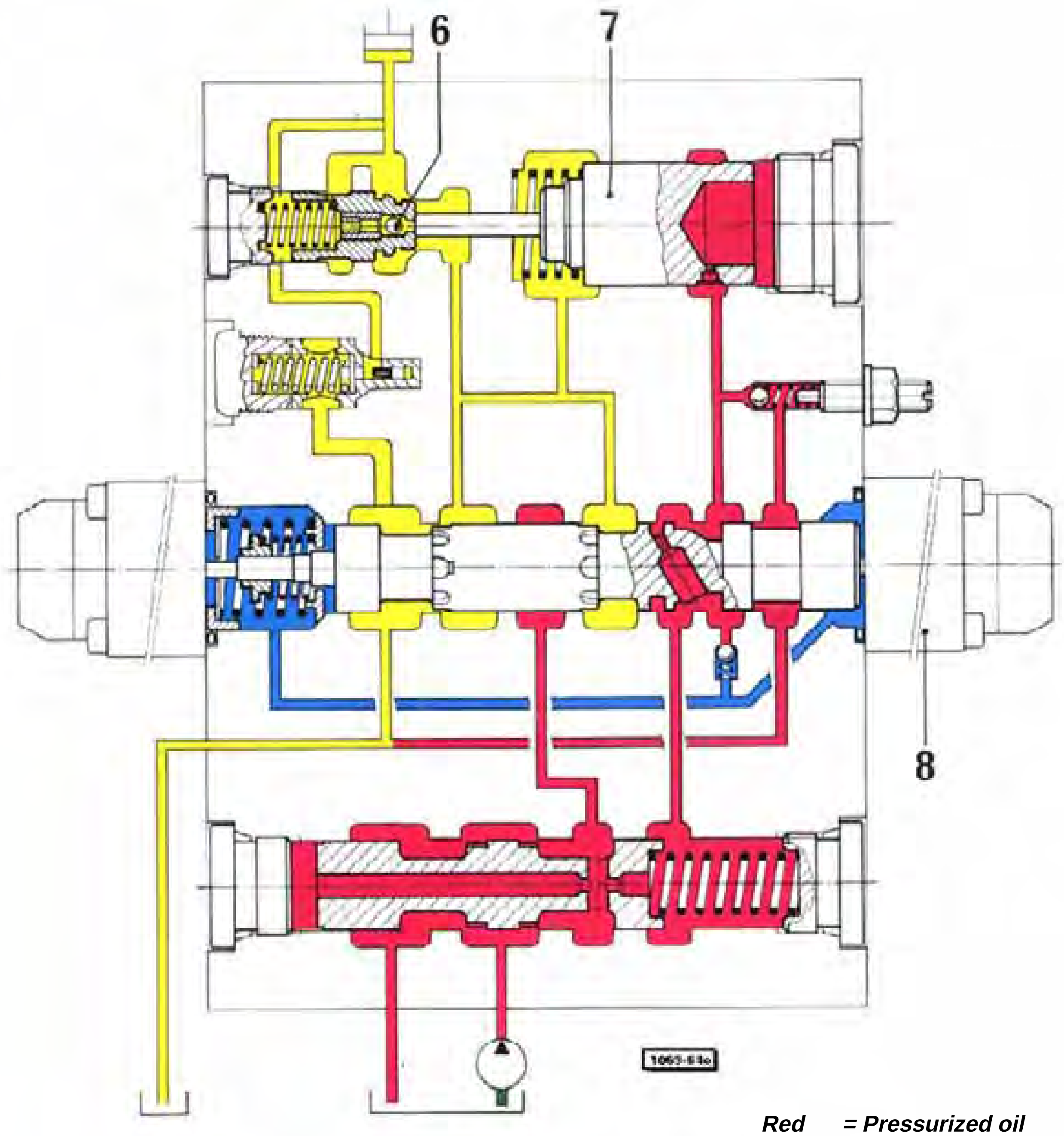


Red = Pressurized oil
Yellow = Discharged oil
Green = Intake oil
Blue = Low pressure oil

Electro-hydraulic power-lift distributor

implement lowering

Implement lowering takes place when electrovalve **8** starts sending current; in this case the valve stem will be moved to the right. The oil flow from the pump is conveyed by the electrovalve stem onto the thrust surface of piston **7**, which opens the lowering valve **6** by means of a pushrod.
The oil in the lifting system can thus return in the draining system causing the lowering of the lifting arms.



Electro-hydraulic distributor

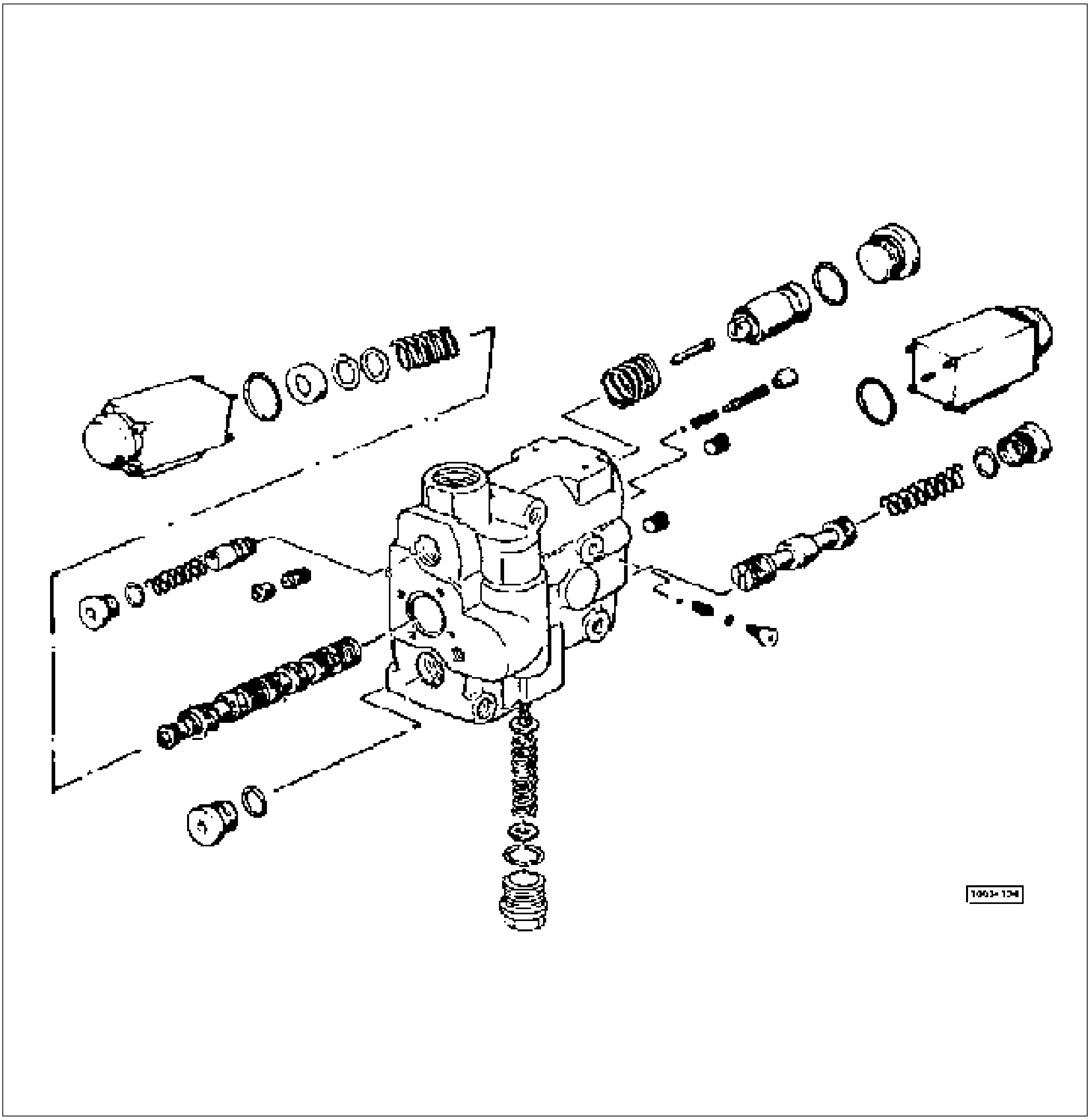


Fig. 6 - Electro-hydraulic electronic power-lift distributor.

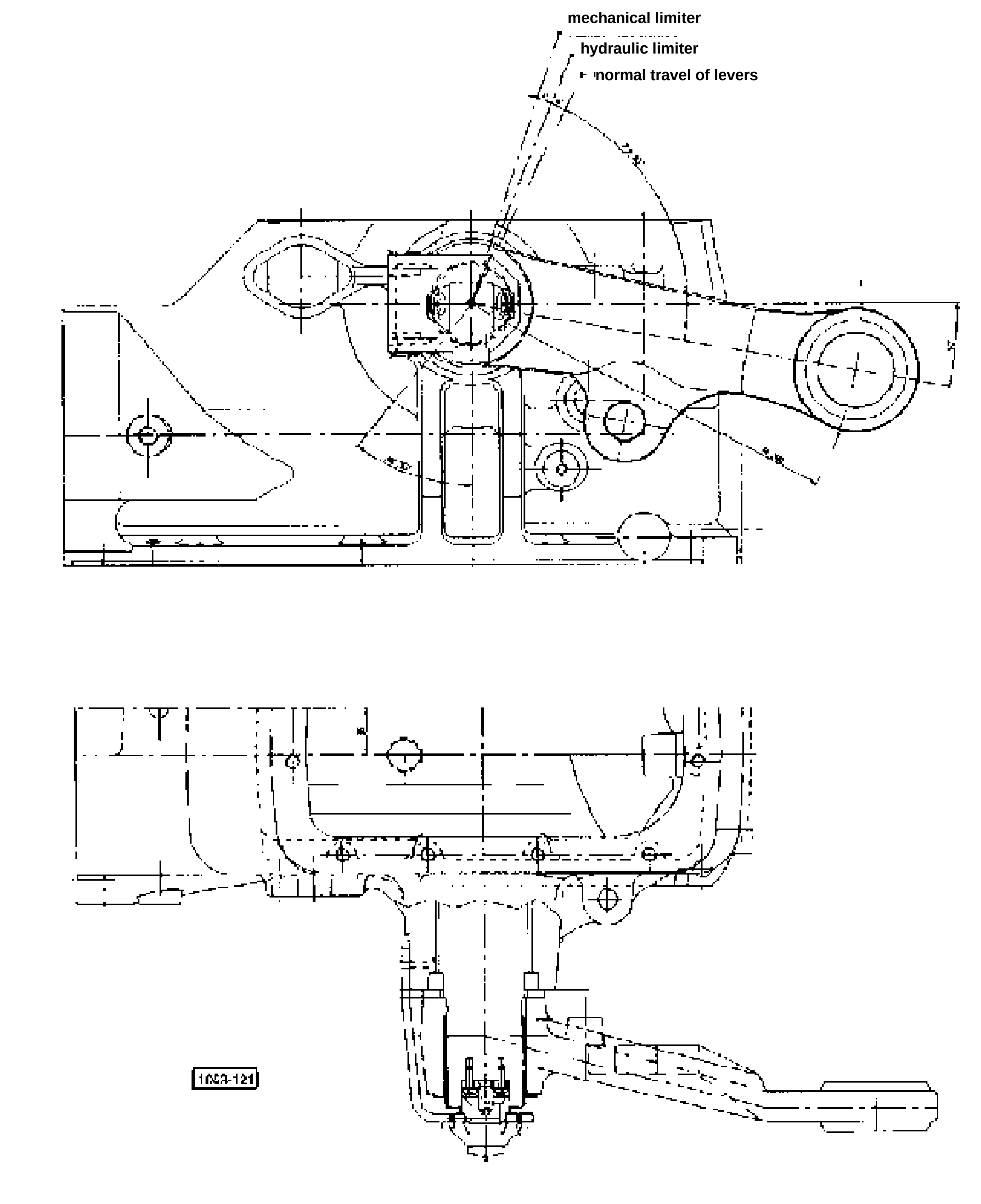


Fig. 7 - Position control sensor fitted to lift arms cross shaft - ***SILVER 100.4 - 100.6***.

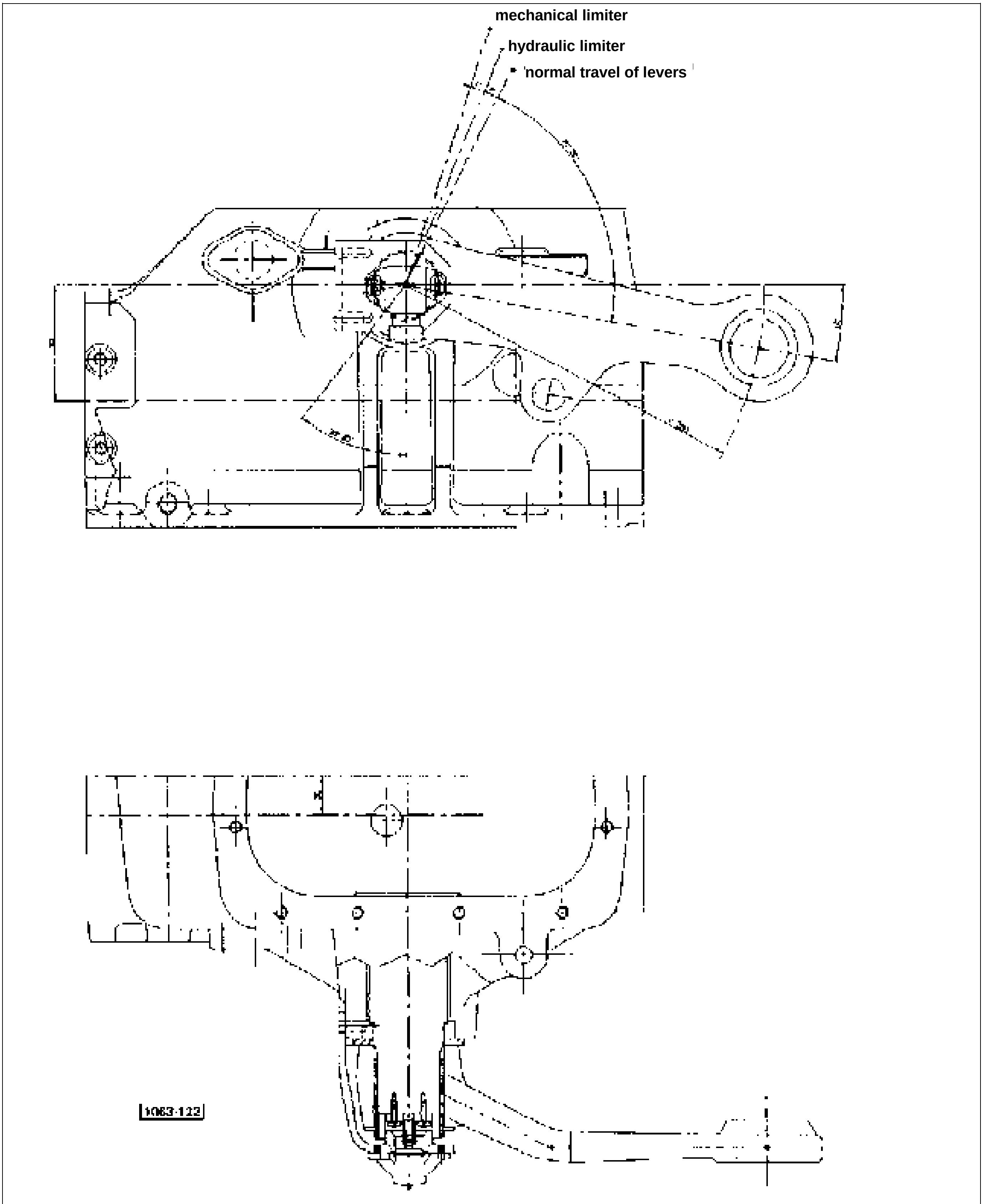


Fig. 8 - Position control sensor fitted to lift arms cross shaft ***- SILVER 80 - 90.***

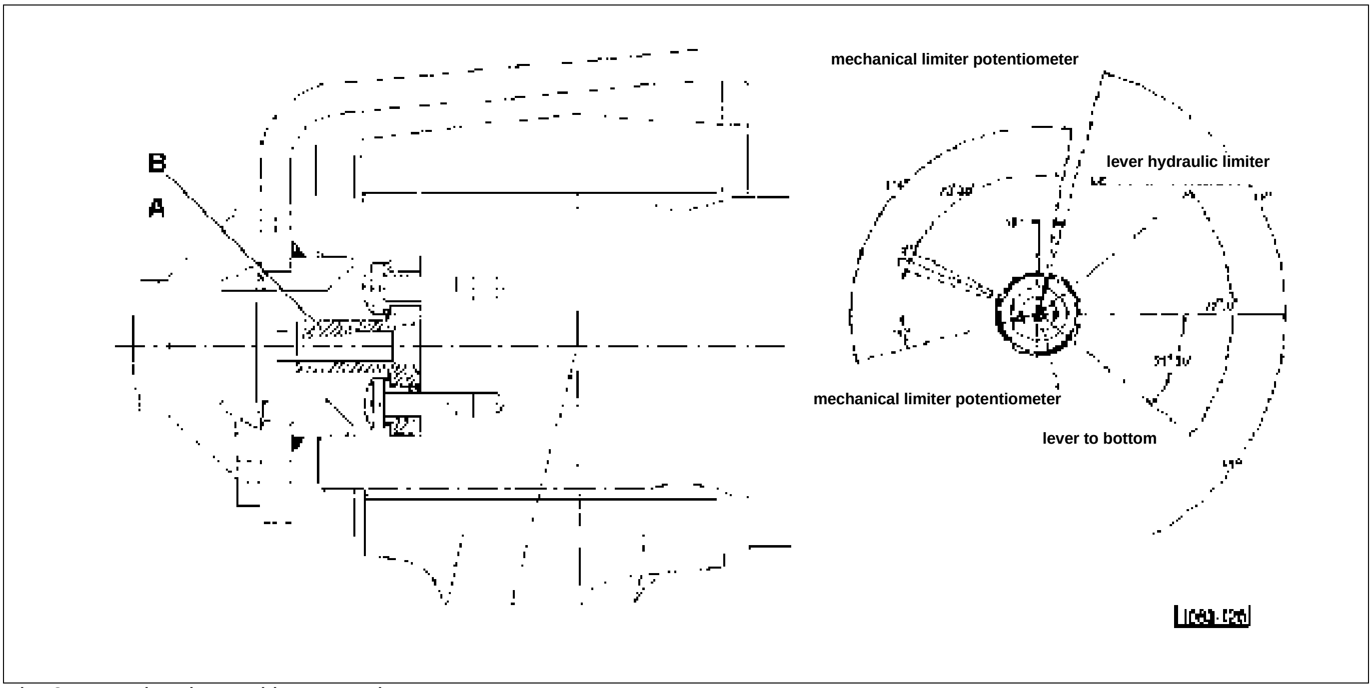
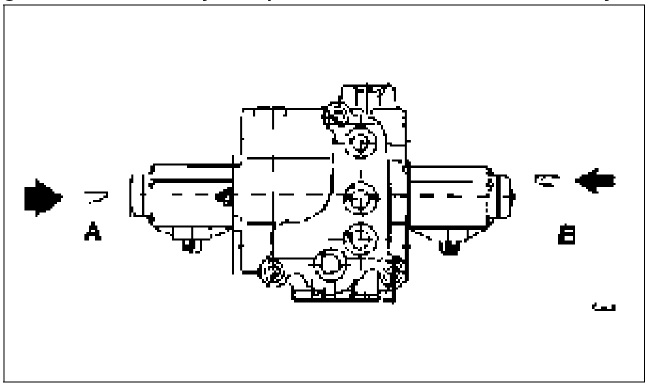


Fig. 9 - Locating the position control sensor.

FITMENT OF LIFT ARMS POSITION CONTROL SENSOR
When positioning the sensor **A** make certain that the flat surface of the pin is faultlessly aligned with the outline of the hole in coupling **B.**
This done, tighten the fixing screws.
NB: There is no need to position the sensor in relation to the slots; during the subsequent setup procedure, the All Round Tester will identify the initial position and assign a value of zero as being the angle of the lift arms (see page 243).

Operation of the directional control solenoid valves (Fig.10)
1st function: **A** - Up
2nd function: **B** - Down
CAUTION: Operate the manual Up control button located on the solenoid valve of the lift system control valve assembly only when absolutely unavoidable, and with the engine at low throttle.
Release the button before the arms reach maximum height, as this manual facility by-passes the automatic cutoff generated both by the position control sensor and by the safety limit switch.



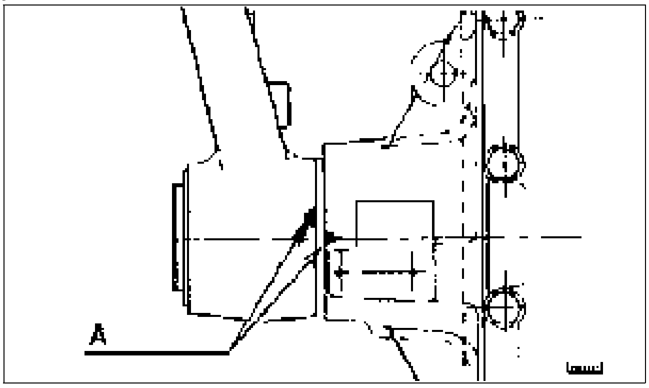


Fig. 10 - Manual push buttons for electrohydraulic directional control valve and reference notches determining maximum lift height position.

WHEN OPERATING THE LIFT "UP" FUNCTION USING THE BUTTON AT THE DIRECTIONAL CONTROL VALVE, MAKE ABSOLUTELY CERTAIN TO STOP SHORT OF MAXIMUM HEIGHT, AND ALWAYS KEEP THE ENGINE AT LOW THROTTLE.

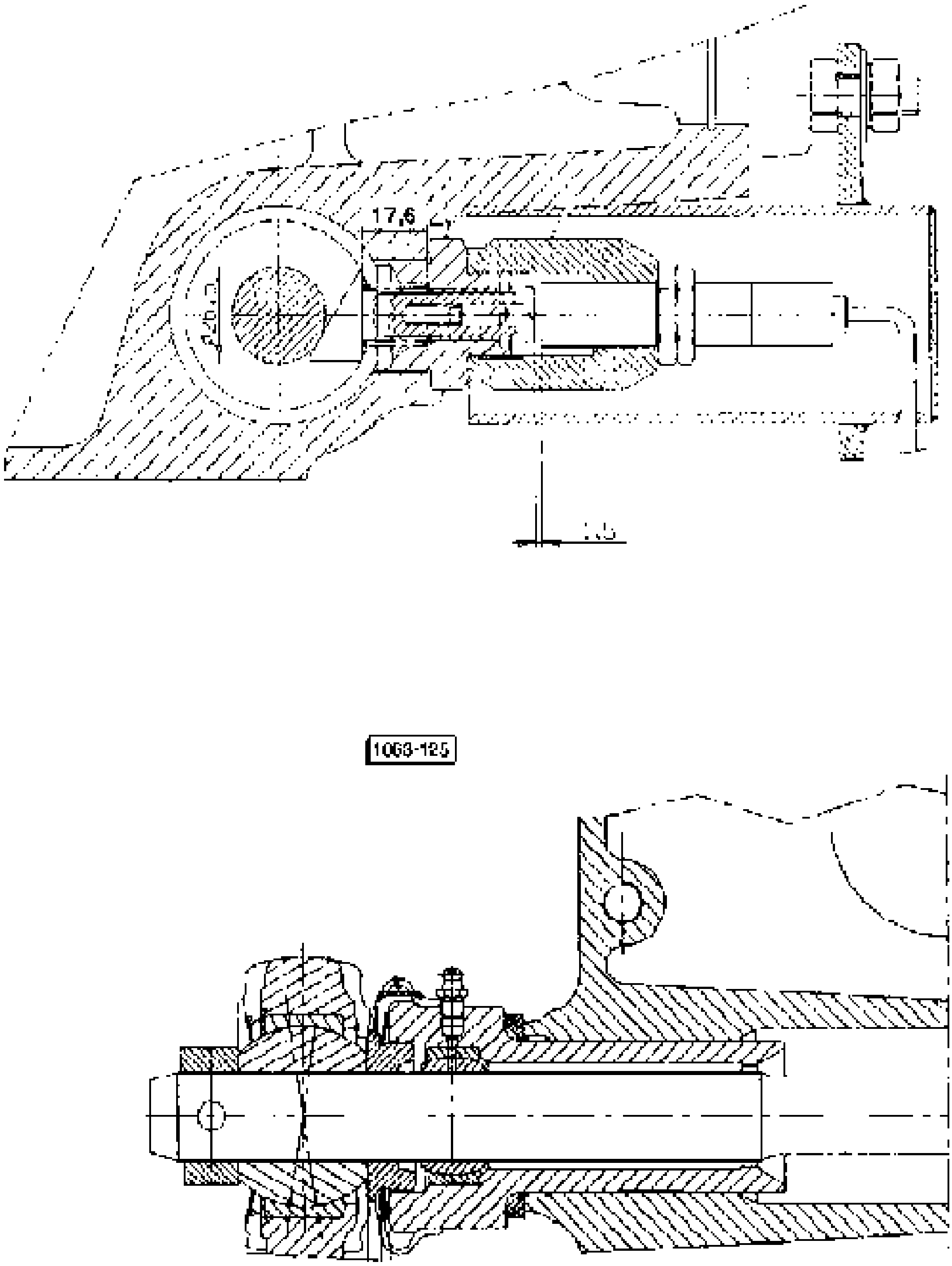


Fig. 11 - Draft control sensor and response control - ***SILVER 80 - 90***.

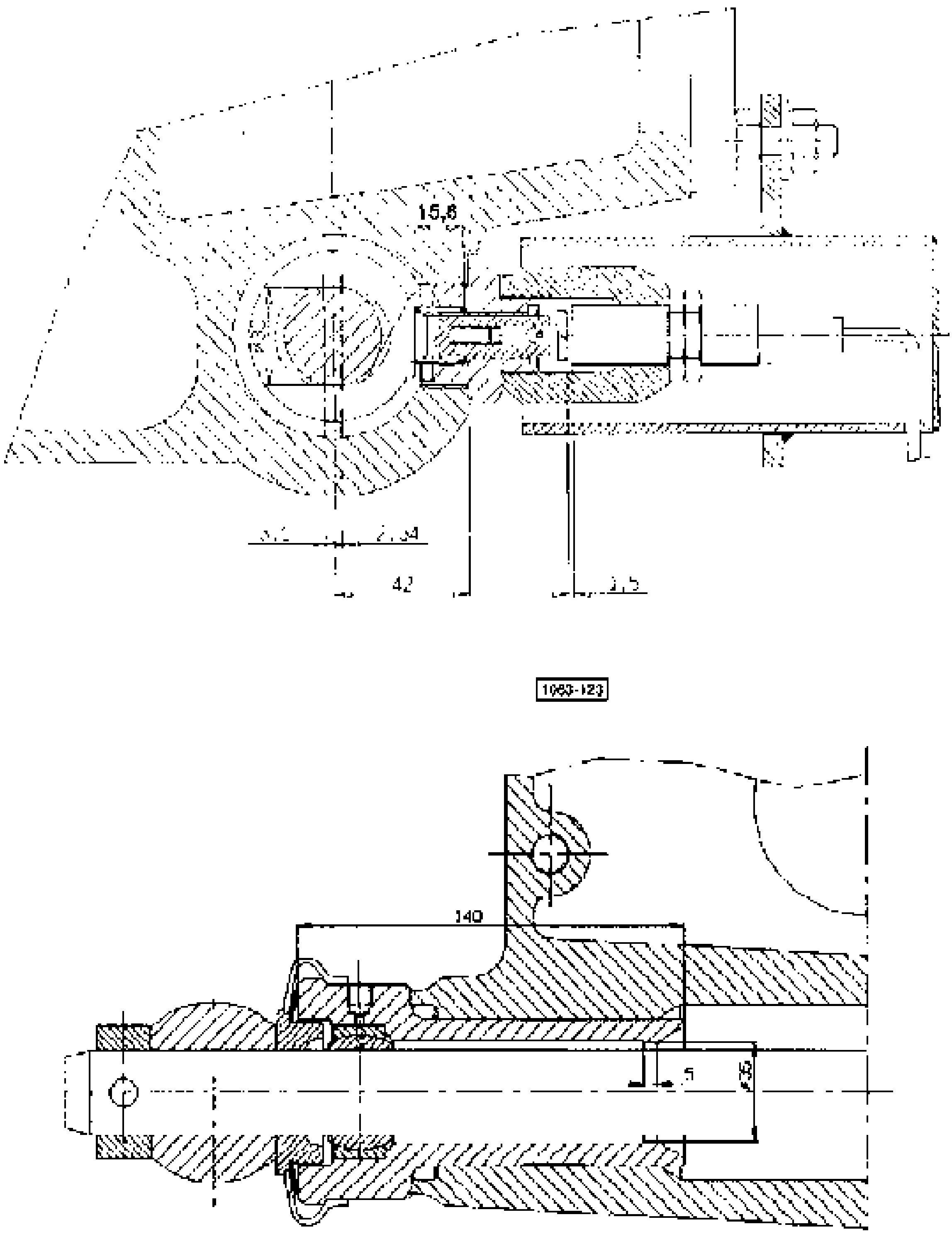


Fig. 12 - Draft control sensor and response control - ***SILVER 100.4 - 100.6.***

CORRECT FITMENT OF DRAFT CONTROL SENSOR
Screw the sensor tightly into its seating and verify that the notch **A** is facing downwards.
Tighten the sensor **B** to a torque of 150 Nm (15 kgm approx.).
When installing, smear a small quantity of Loctite 242 on the thread **C** of the sensor.

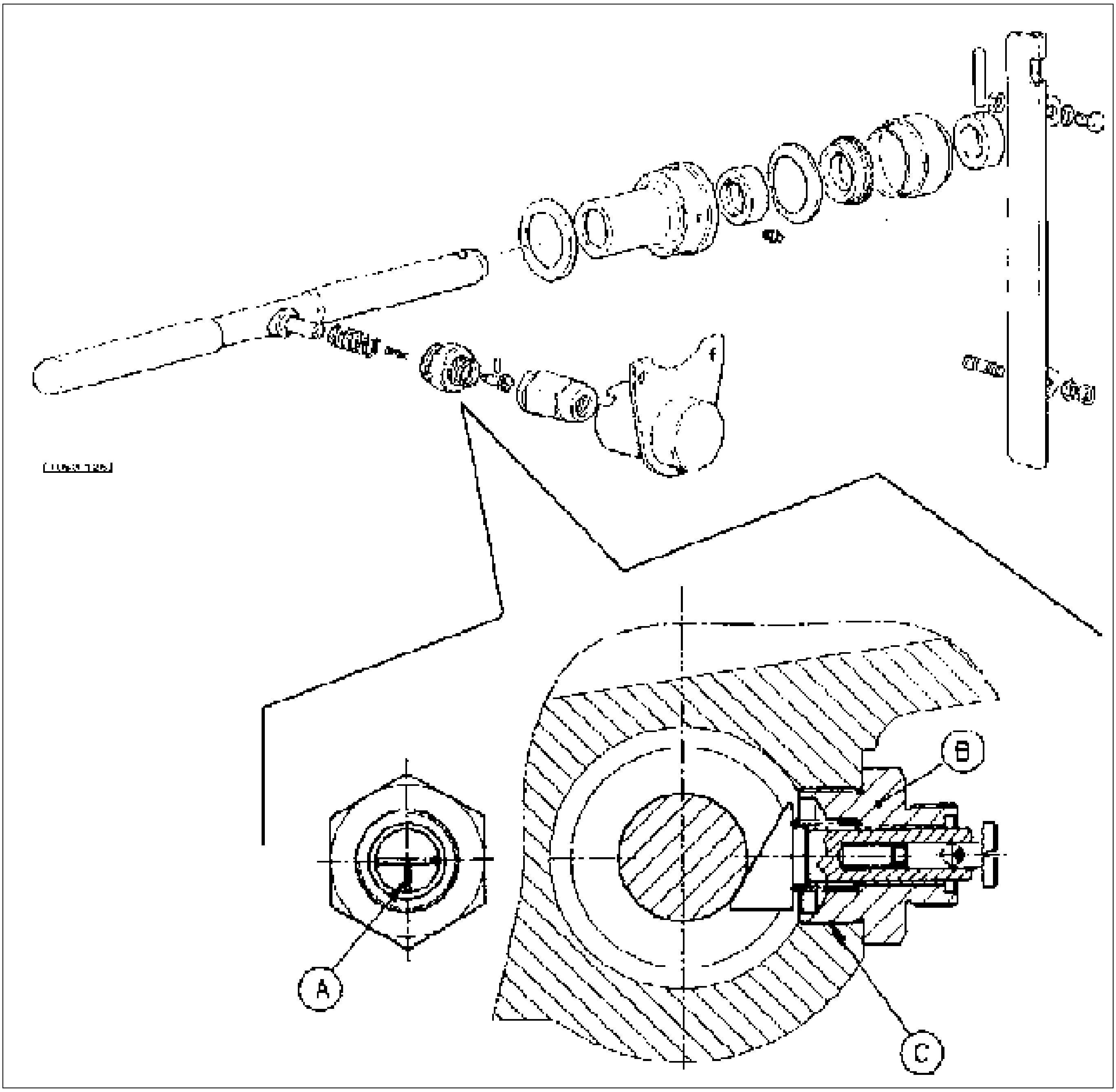


Fig. 13 - Component parts of the draft control system.

Onboard radar

The "ONBOARD RADAR" emits some signals thereafter providing measurement of both the transmitted signal frequency and the return signal frequency.

The latter changes depending upon the impact speed of the pulse against one target (DOPPLER effect) and according to ground nature and condition, consequently the radar will be able to transmit certain parameters to the electronic control unit.

The processing of these signals through the onboard computer will enable the real tractor advancing speed to be defined.

Specification

read-out capacity	0,4 to 70 km/h
accuracy	±1%
output signal	$36{,}6\frac{Hz}{km/h}$ o $132\frac{imp}{m}$
supply voltage	9÷16 V cc
weight	2 kg
manufacturer	p. ex.Dickey-John

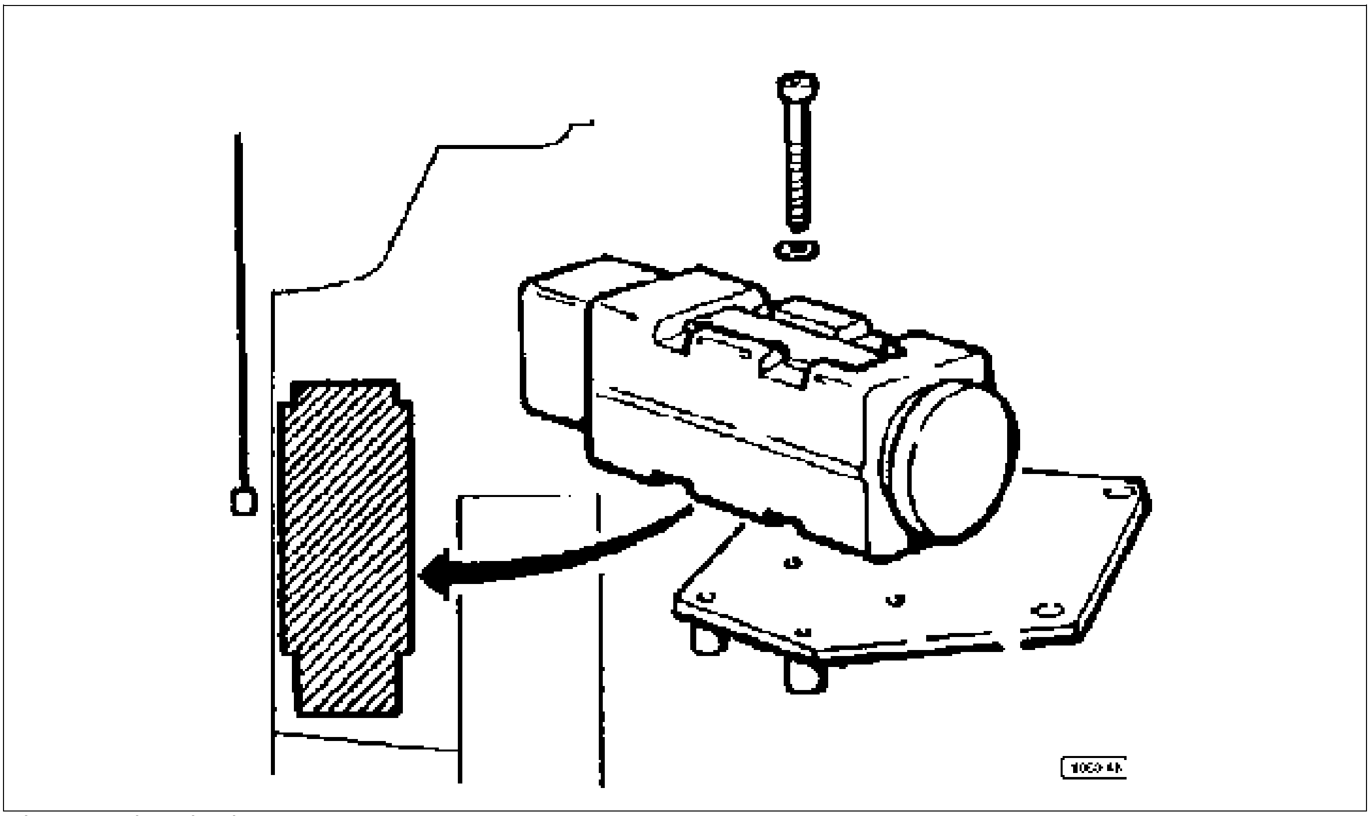


Fig. 14 - Onboard radar.

ELECTRONIC POWER-LIFT SAFETY PRECAUTIONS

Electronic equipment as well as a number of very delicate electronic components are installed on the tractor.
These latter in particular, do not tolerate any inversion of polarity, overvoltage, connection error, etc.
These electronic apparatuses are equipped with both internal and external protecting devices, however, the following should be observed:

- Before performing any operations with any electric components switch off the instrument panel.
- Absolutely avoid using either screwdrivers or lamps to detect current; use proper diagnosing instruments only (such as testers).
- Connectors should be either connected or disconnected without forcing. Never use screwdrivers to prize when disconnecting and always keep to correct polarity when connecting.
- If a fault is located within an area controlled by the centre electronic control unit, do not replace the control unit at once, but first check both sensors and actuators for correct operation.
- When replacing defective an electronic control unit loosen the securing screws only and avoid loosening other screws which may be parts covering different functions, such as setscrews.
- Make sure neither sensor nor connector contacts have oxidized.

— Do not use any arc-welding set in proximity to electric systems.

— Usually sensors are mounted at gauged distances. Do not replace washers or vary locknut distances.

— Prevent short circuits or inversions of polarity.

— When having to operate with microprocessor-controlled devices or systems, never disconnect them when still energized, first turn the ignition key into "STOP" position.

— Should the tractor be submitted to a new baked finish, it is recommended to remove all electronic apparatuses from the tractor.

— Never drive any tester prods into either connector or apparatus multiple taps (as these tend to deformation thus endangering the contacts).

— Avoid checking voltage by sparking, that is by generating a short circuit between cables or toward the earth.

— Never reverse the polarity or exchange wire position in multiple connectors.

HOW AN ELECTRONIC SYSTEM MUST BE INSPECTED

Elements to be inspected:
— Sensors
— Electronic control units
— Actuators

1) Check for proper system power supply as follows:
— Current attains the connector inserted into the apparatus;
— Current attains connector;
— Earthing;
— Correct voltage rating.

2) Check downstream components: sensors.

3) Check upstream components.

CHECKING MECHANICAL PARTS

Check that the external and internal lift arm splines are free of dents or any serious signs of wear; if these are discernible, the levers must be replaced.

Inspect the bushes supporting the lift arms cross shaft; there should be no scoring or evidence of excessive wear. Inspect the lift arm/assistor cylinder pivot bushes; these must be free from signs of wear and securely seated in the relative bosses.

Check the diameters of the cylinder rods and glands, comparing them with the values indicated in the tables of maximum permissible wear limits.

Verify then the splines of the lifting shaft; there should be no excessive wear and the shaft journal surfaces must be not damaged.

NB: Whenever cylinders are stripped down for inspection and servicing, the seals must be replaced.

FITTING THE LIFT ARMS CROSS SHAFT CRANK LEVER SET SCREW

Follow the same directions as given on page 265, in the “mechanical lift system” chapter.

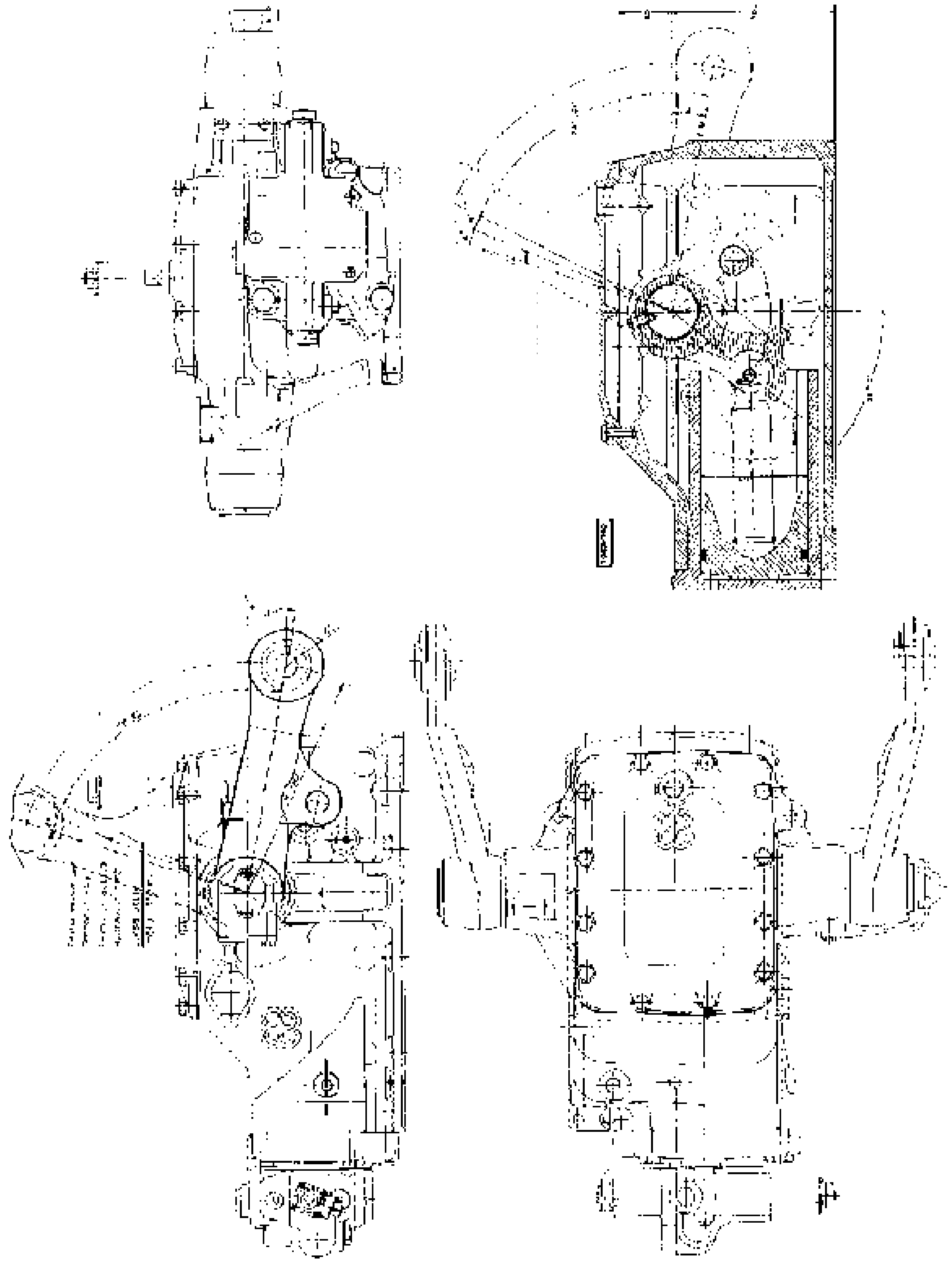


Fig. 15 - Illustrations of the lift housing.

Original type "load sensing" hydraulic power-lift

The original type LOAD SENSING hydraulic power-lift makes the tractor a comprehensive working machine. Comfortably placed within immediate operator's reach, this system provides implement draft, working position and drop speed control (the latter is adjusted through the "Valvematic device"). In addition, the combined draft-position control can be obtained by suitably positioning both control levers (mixed control).
The automatic draft control device, directly connected to the lower links, assures prompt lifting response and extraordinary sensing in detecting even the slightest implement load variations. The hydraulic power-lift is equipped with a horizontally installed internal hydraulic cylinder. The hydraulic circuit distributor is open-centre type. The oil is drawn from the gear case by a high-delivery hydraulic pump (the same as the auxiliary hydraulic distributor valves) and strained by flowing through a replaceable cartridge filter. Before attaining the power-lift the oil flows first through the auxiliary hydraulic distributors.

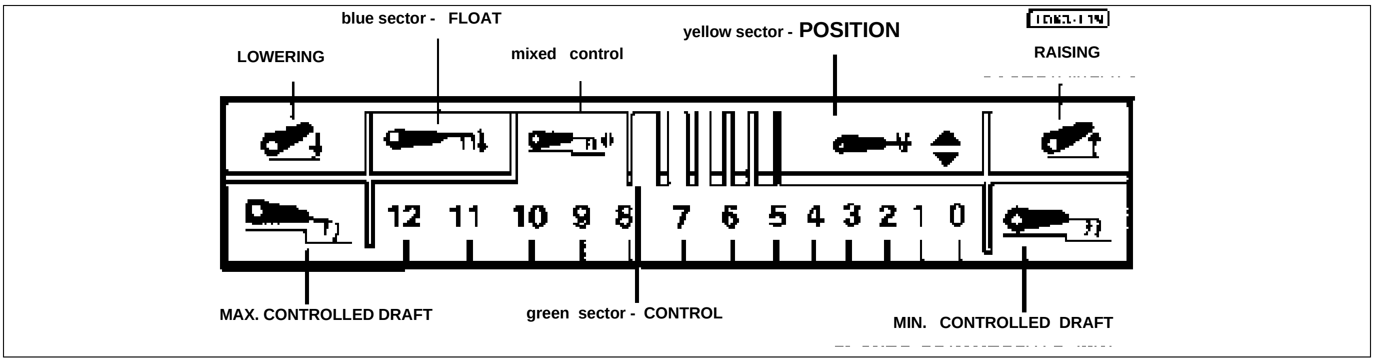
maker			SAME - DEUTZ FAHR GROUP
			with open centre control valve
type of lift	standard pump		p/n 2.4529.740.0
	high flow pump		p/n 2.4529.780.0/10
rated flow of pump (at maximum engine revolutions):	standard pump	l/min	41
	high flow pump	l/min	57,5
relief valve setting (bar)		bar	180+10
minimum permissible diameter of ram piston	SILVER 80 - 90	mm	109.900
	SILVER 100.4 - 100.6	mm	124,900
maximum permissible diameter of ram cylinder	SILVER 80 - 90	mm	110,050
	SILVER 100.4 - 100.6	mm	125,050
assistor cylinder piston rod diameter(mm)		mm	42
rated lift capacity with load bearing on link ends at height of rear wheel centres (kg):	SILVER 80 - 90	kg	3084
	SILVER 100.4 - 100.6	kg	4156
- with assistor cylinders	SILVER 80 - 90	mm	4226
tightening torque of ram fixing bolts		kgm	28 ÷ 30
		Nm	275 ÷ 295
tightening torque of lift system oil level pipe	SILVER 80 - 90	kgm	13,5
		Nm	132

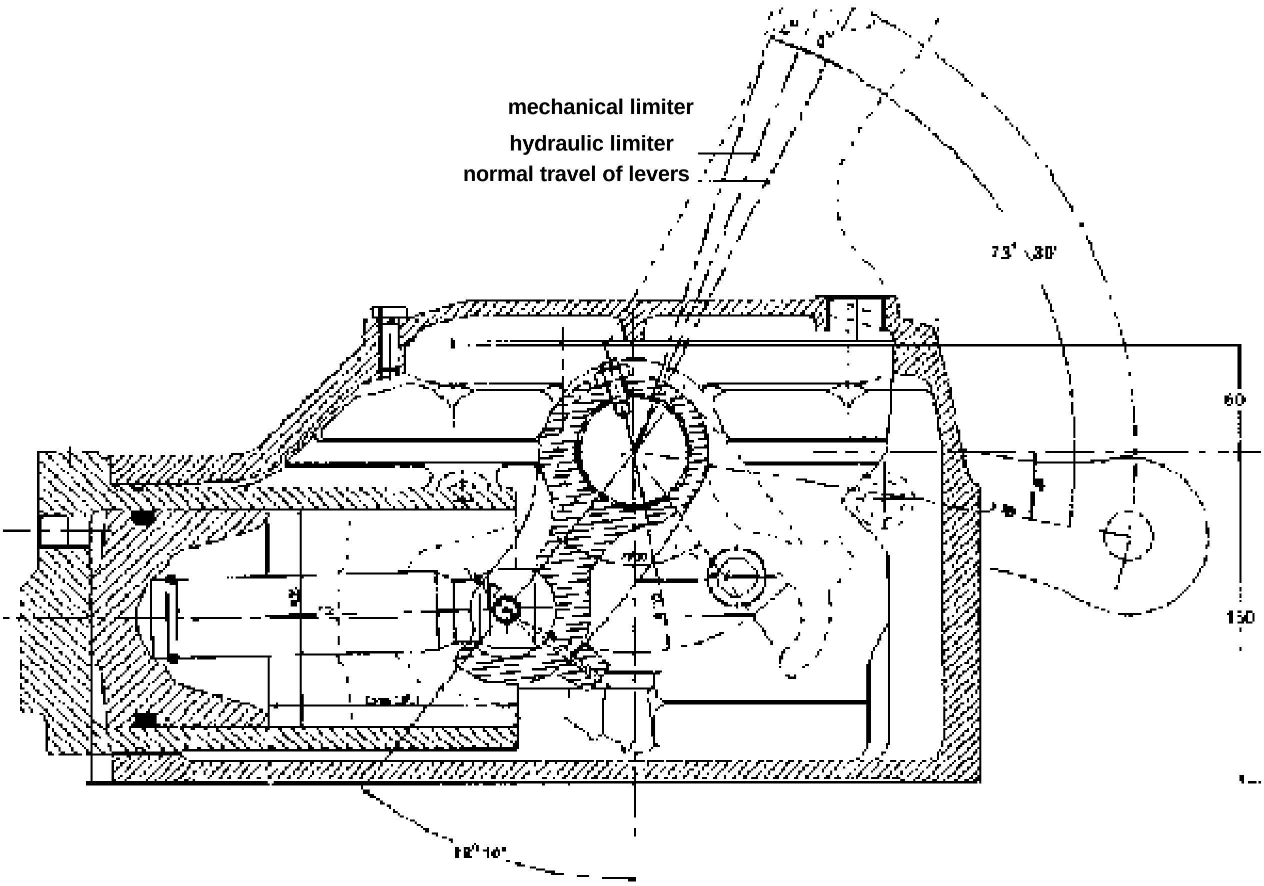
CONTROLS

The manual controls for the lift system are grouped together on a relative console located to the driver's right.

Lever with yellow knob: this is used to raise and lower the implement (Up/Down part of quadrant coloured yellow), to select the requisite operating position when utilizing position control, and to select mix control (draft and position combined: the part of the quadrant banded yellow and green).
The range of action allowed to the yellow lever is also indicated by a blue sector of the quadrant, and can be adjusted by positioning a movable stop with thumb a screw which allows the repeated selection of a given lift height.

Lever with green knob: this allows selection of the soil engaging depth, which is controlled automatically according to the resistance encountered by the implement from the ground.
The range of action is indicated by the green coloured sector in divisions from 0 to 12.





In the event that the bushes need renewing, position the replacements as illustrated

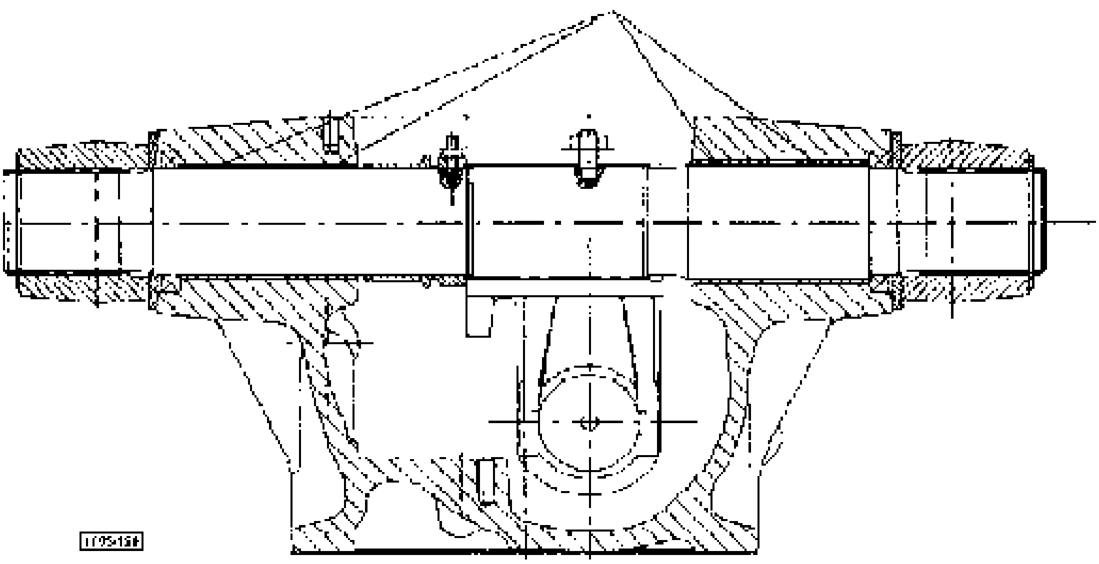


Fig. 1 - Mechanical components of hydraulic lift system

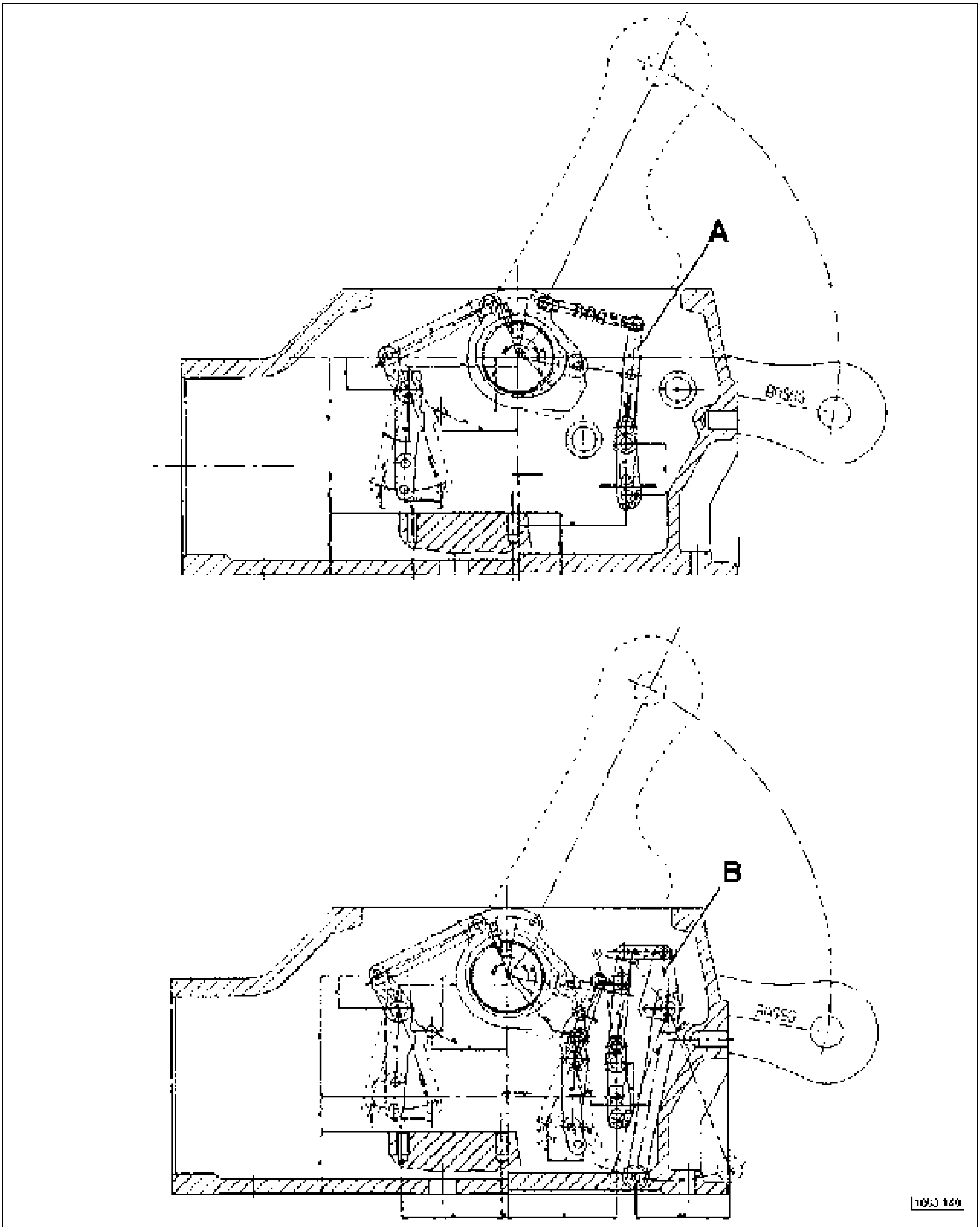


Fig. 2 - Controls located internally of lift housing
A - "POSITION CONTROL" linkage **B** - "DRAFT CONTROL" linkage.

FITMENT OF CROSS SHAFT CRANK LEVER SET SCREW

To ensure correct fitment of the set screw **A** to the crank lever **B**, apply LOCTITE 242 to the thread.
Turn the screw into the relative socket of the cross shaft **C** until fully home, then loosen half a turn and tighten the nut **D**.

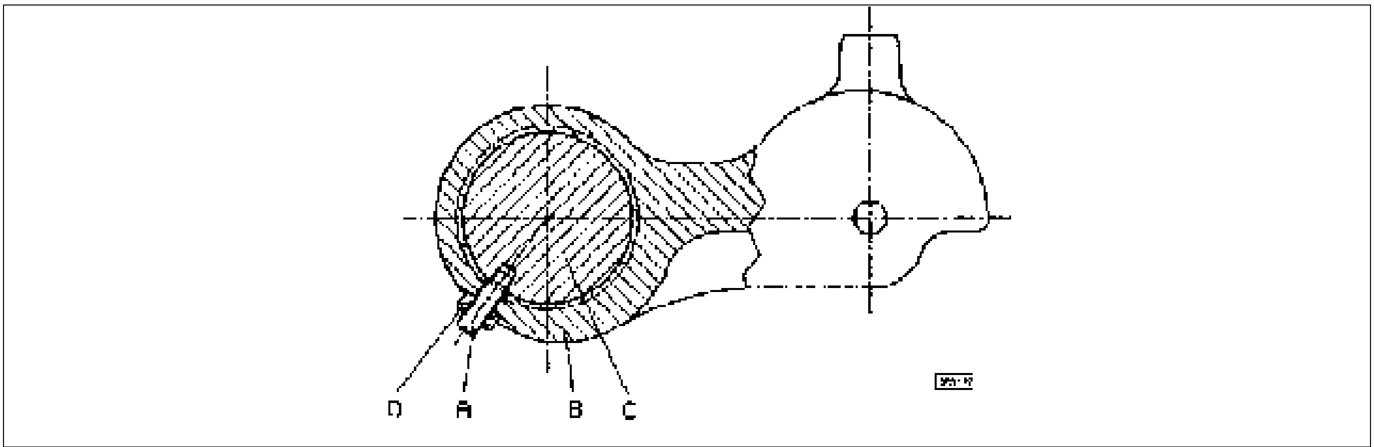


Fig. 3 - Fitment of set screw to cross shaft crank lever inside lift housing.

FITMENT OF CROSS SHAFT CAM SET SCREW

To ensure correct fitment of the set screw **A** to the cam **B**, apply LOCTITE 242 to the thread.
Turn the screw into the relative socket of the cross shaft **C** until fully home, then loosen half a turn and tighten the nut **D**.

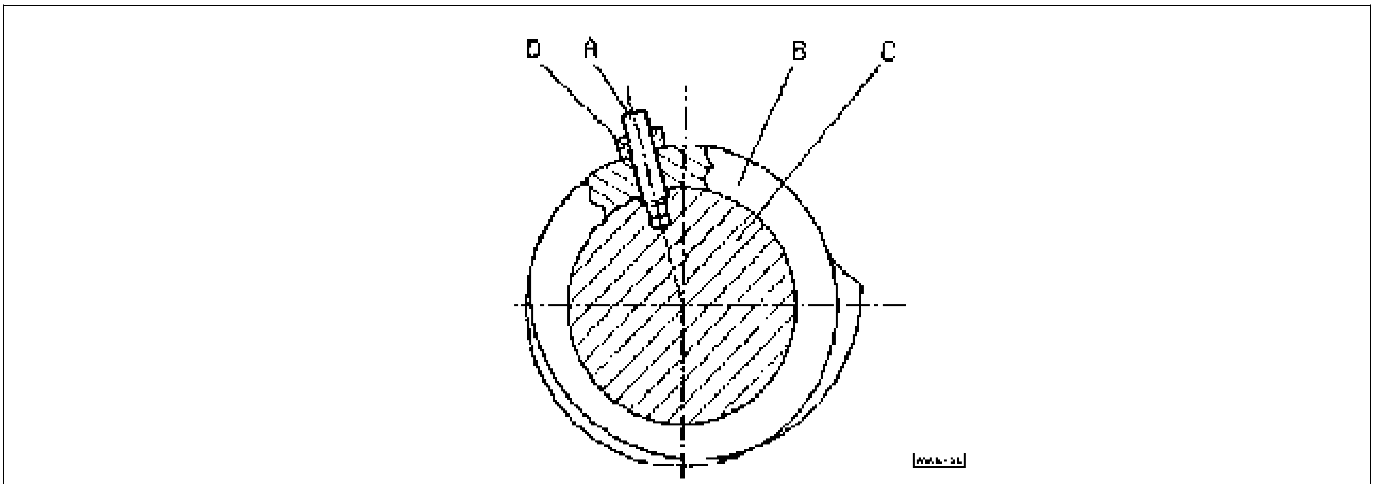


Fig. 4 - Fitment of set screw to cross shaft cam.

Fitment of piston seal

When fitting, position the seal on the piston as illustrated below.

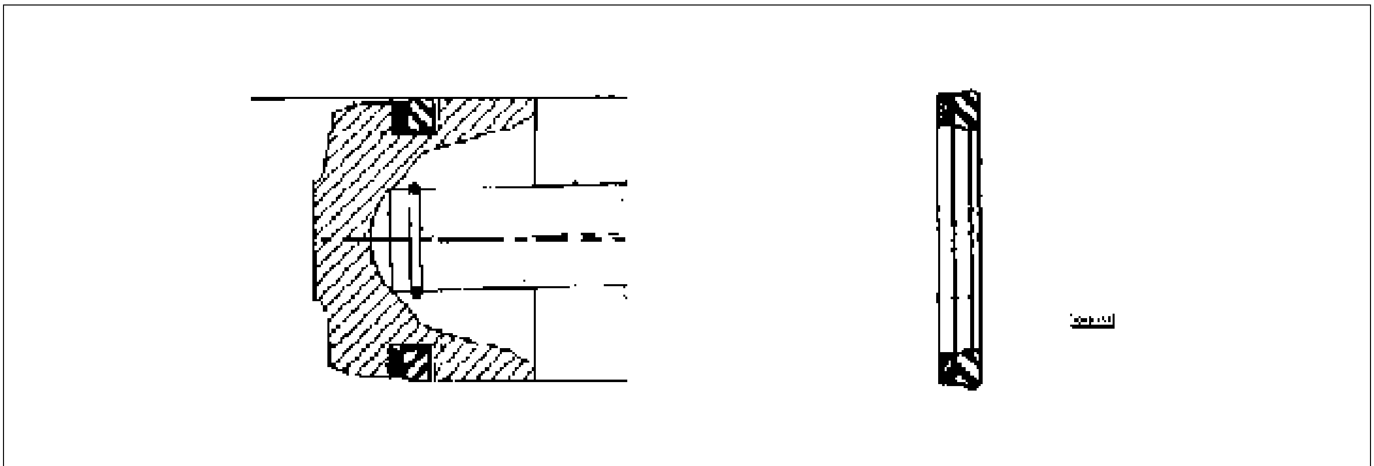
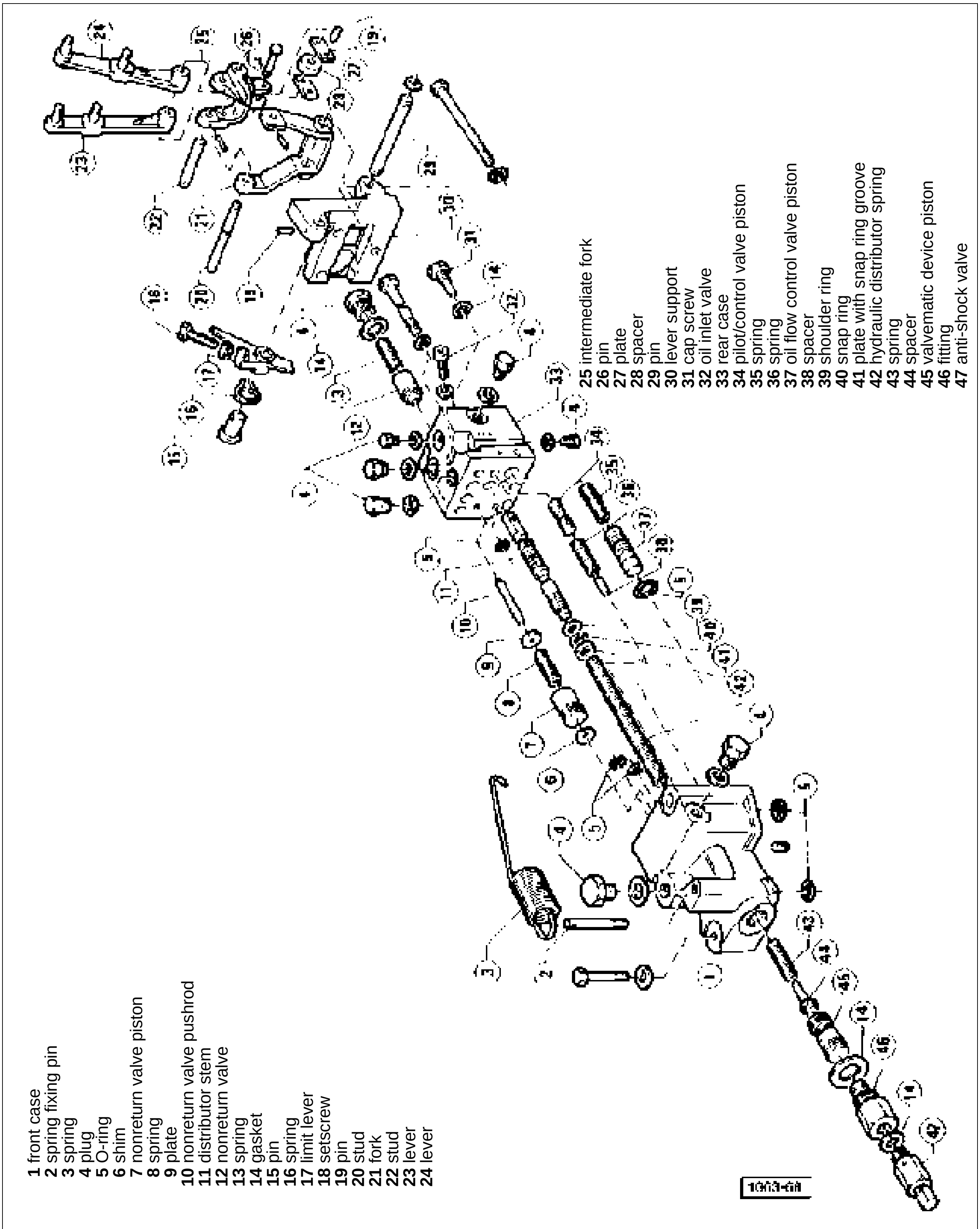


Fig. 5 - Fitment of piston seal.



Hydraulic distributor assembly.

1 Valvematic
2 Shock valve
3 Unloading valve
4 Directional control valve
5 Enabling pilot valve
6 Enabling valve
7 Inlet valve
8 Down actuator piston

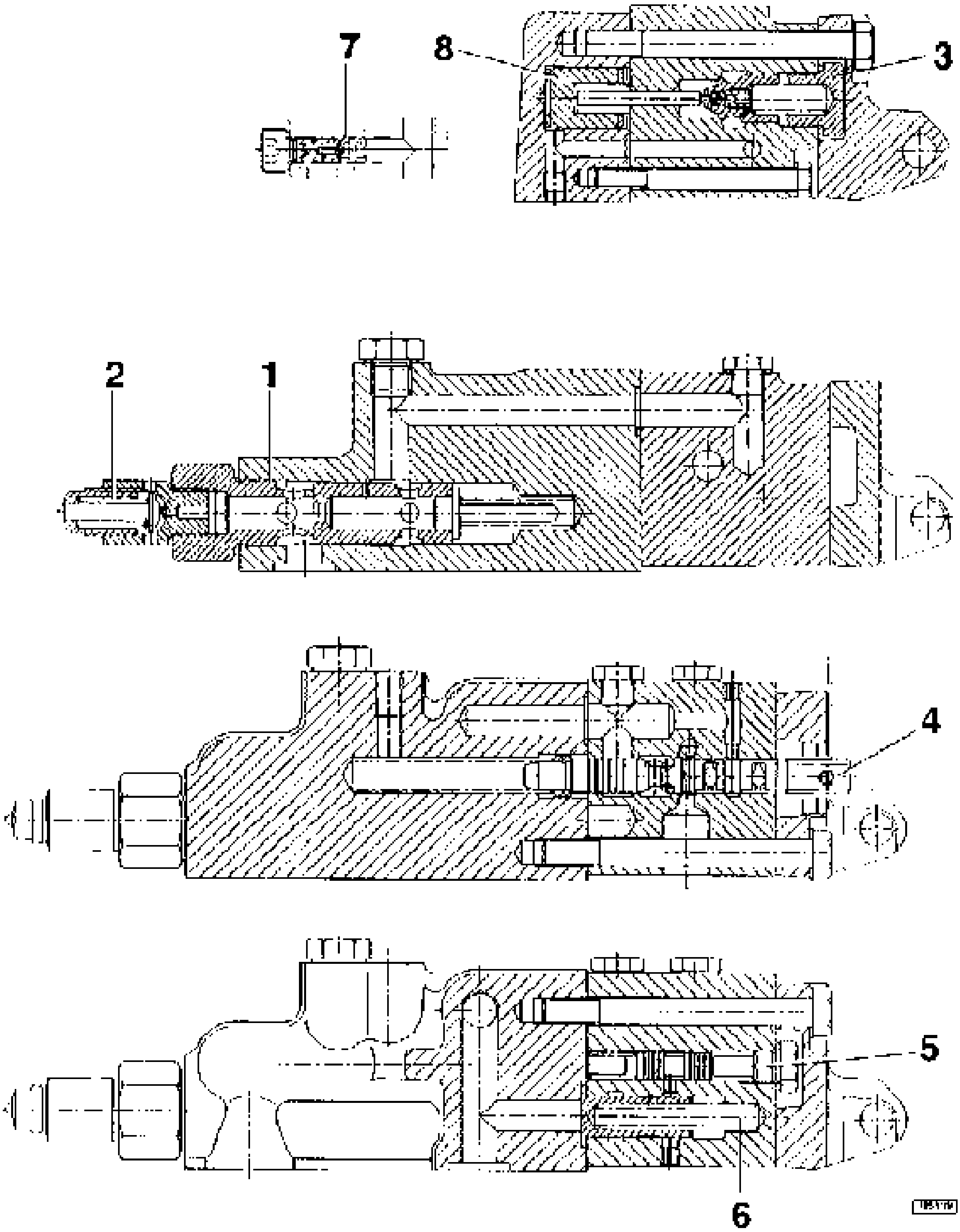
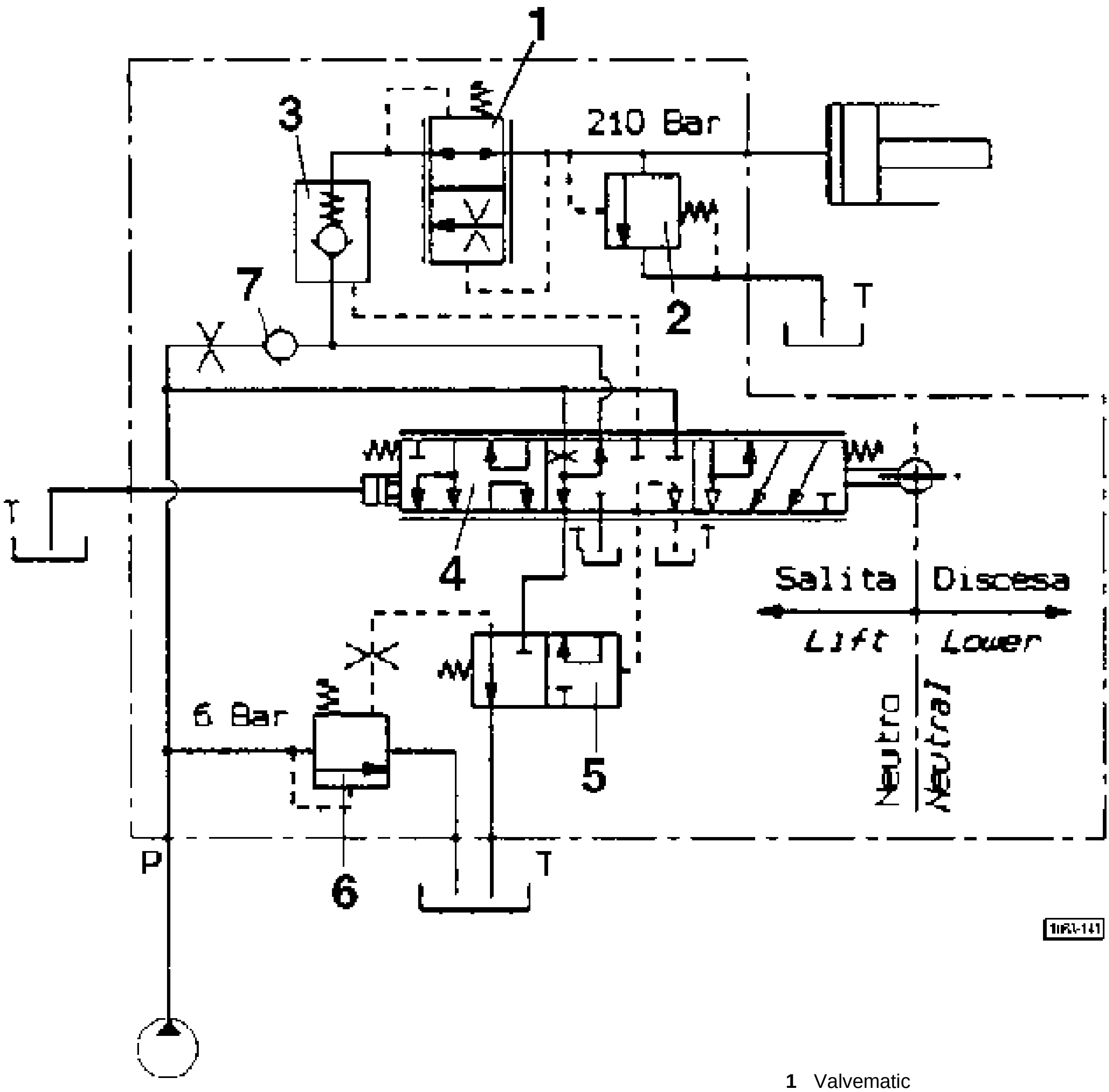


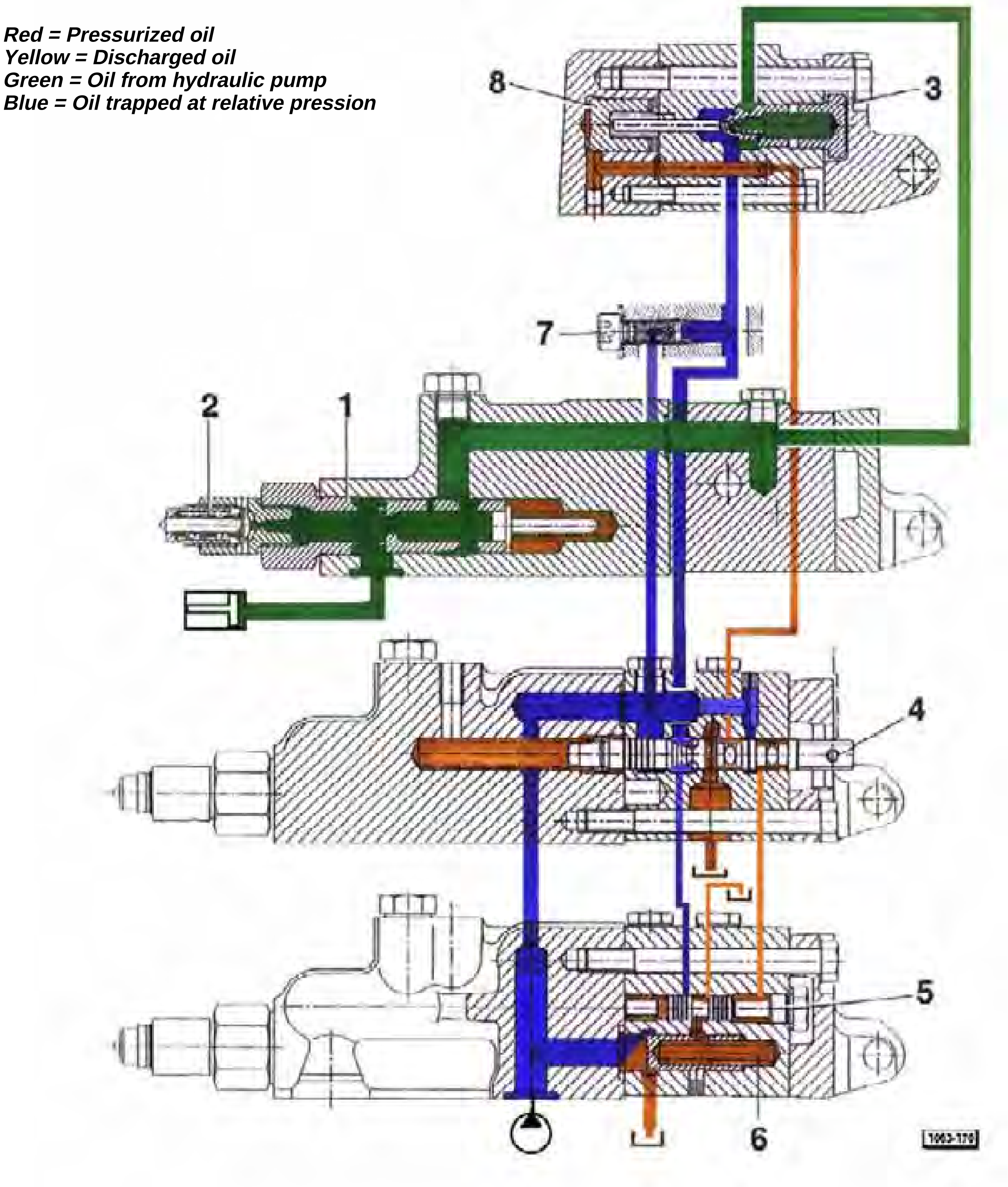
Fig. 6 - Hydraulic distributor section.



1 Valvematic
2 Shock valve
3 Unloading valve
4 Directional control valve
5 Enabling pilot valve
6 Enabling valve
7 Down actuator piston
P Pompe
T Exhausted

Fig. 7 - Lift system - hydraulic diagram.

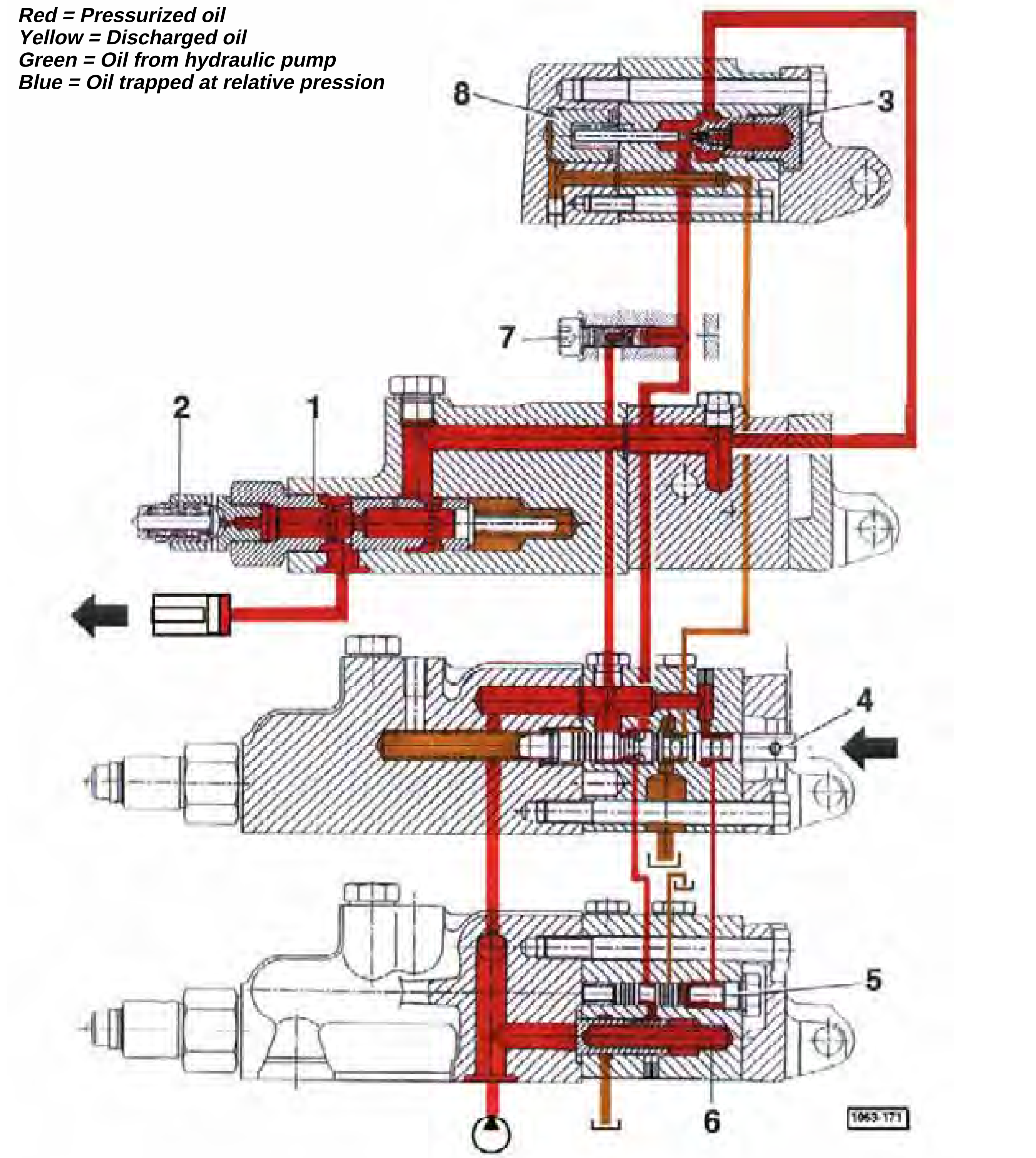
neutral position



1 Valvematic
2 Shock valve
3 Unloading valve
4 Directional control valve
5 Enabling pilot valve
6 Enabling valve
7 Inlet valve
8 Down actuator piston

Fig. 8 - Hydraulic power-lift distributor.

lifting position

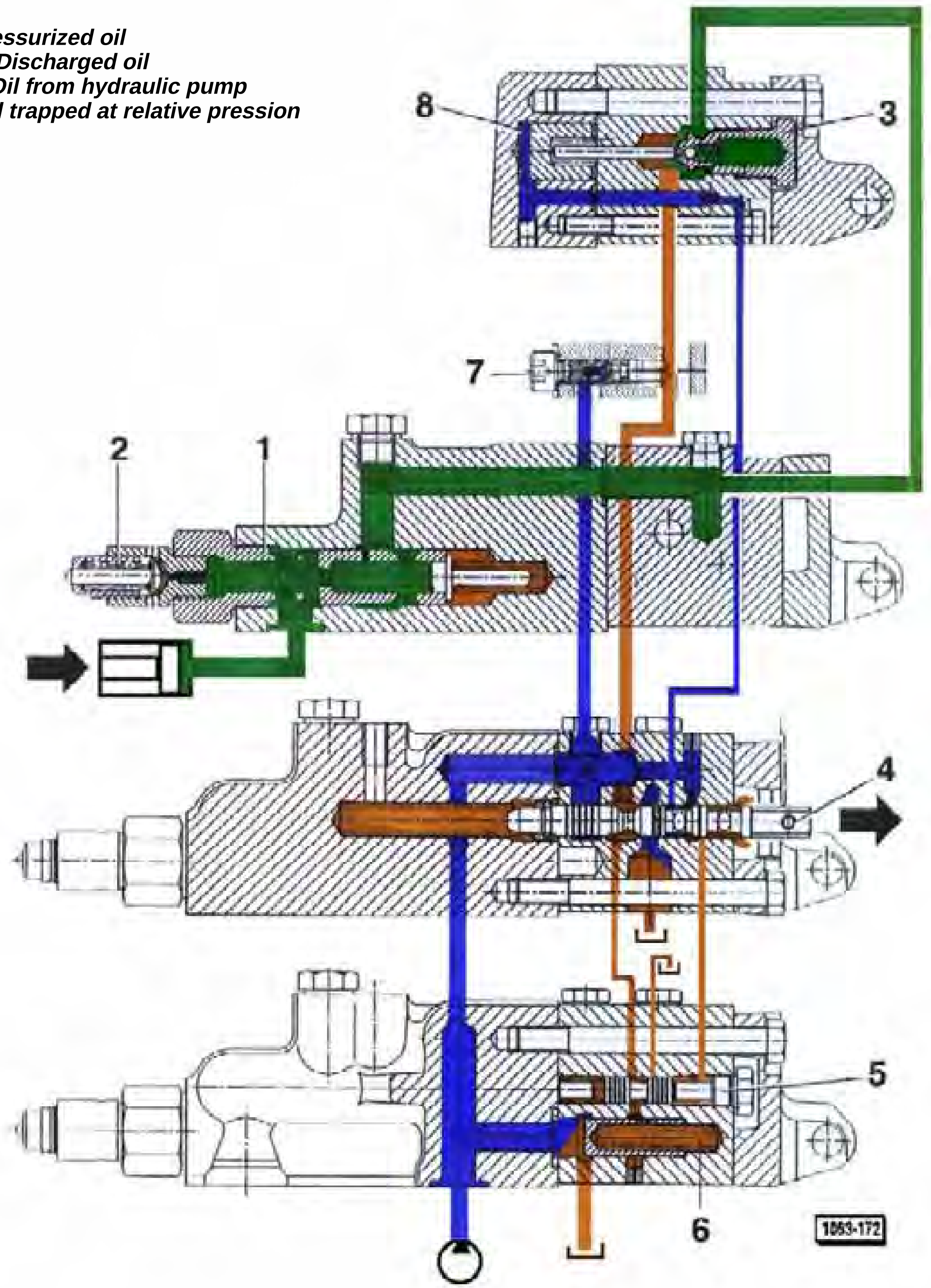


1 Valvematic
2 Shock valve
3 Unloading valve
4 Directional control valve
5 Enabling pilot valve
6 Enabling valve
7 Inlet valve
8 Down actuator piston

Fig. 9 - Lift system - directional control valve.

lowering position

Red = Pressurized oil
Yellow = Discharged oil
Green = Oil from hydraulic pump
Blue = Oil trapped at relative pression



1 Valvematic
2 Shock valve
3 Unloading valve
4 Directional control valve
5 Enabling pilot valve
6 Enabling valve
7 Inlet valve
8 Down actuator piston

Fig. 10 - Lift system - directional control valve.

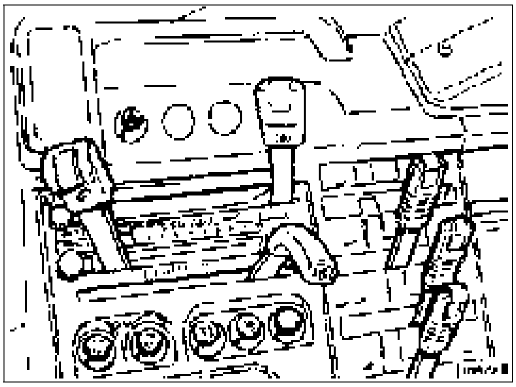


Fig. 11 - Control lever positions for lifting control lever adjustment (yellow).

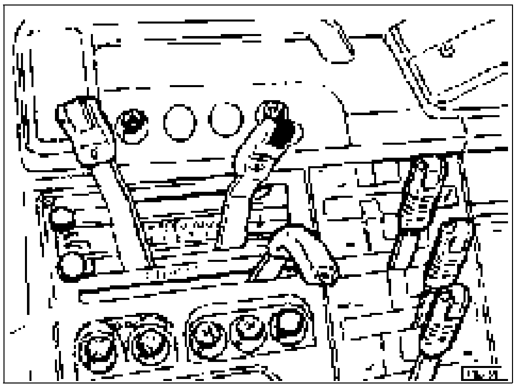


Fig. 12 - Control lever positions for working depth control lever adjustment (green).

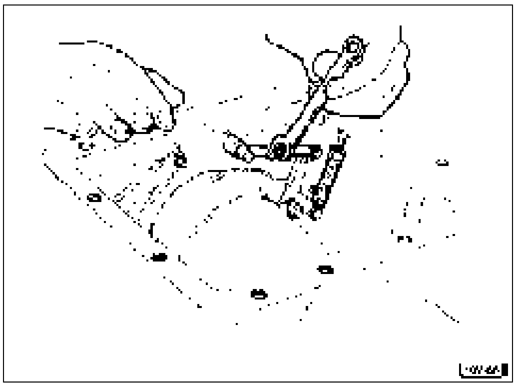


Fig. 13 - Adjusting lifting lever regulating tie rod (yellow).

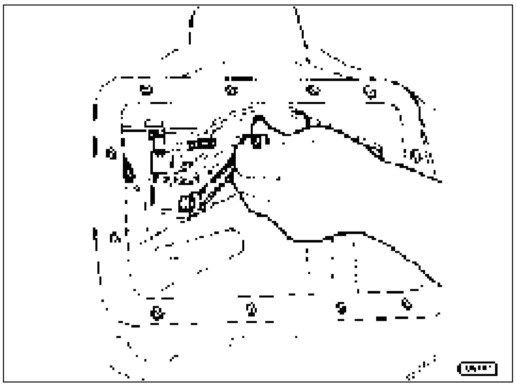


Fig. 14 - Adjusting green lever setscrew.

Adjusting power-lift system

NOTE: Before beginning with power-lift adjustment procedure apply a 200 kg weight to the 3-point hitch.

Adjusting lifting control lever (yellow)

Figs. 11 - 13 - 15 - 16
With engine running, move the yellow lever all the way back and the green lever all the way forward and ensure:
— lever **A** is contacting its own stop **B**; otherwise adjustment is obtained through fork **C**;
— the lifting piston upper edge is fully aligned with the cylinder edge; otherwise operate tie rod **E**.

Adjusting working depth control lever (green)

Figs. 12 - 14 - 15 - 16
With engine running, move the yellow lever forward against its stop, just before "FLOAT" position, and the green lever onto number 4 in its sector, then operate as follows:
— ensure the power-lift piston protrudes $5^{\,0}_{-1}$ mm from cylinder, otherwise screw **F** should be adjusted;
— bring the green lever fully forward and then move it backward gradually, making sure that the lifting action begins when number 4 position is approached; otherwise operate fork **G**.

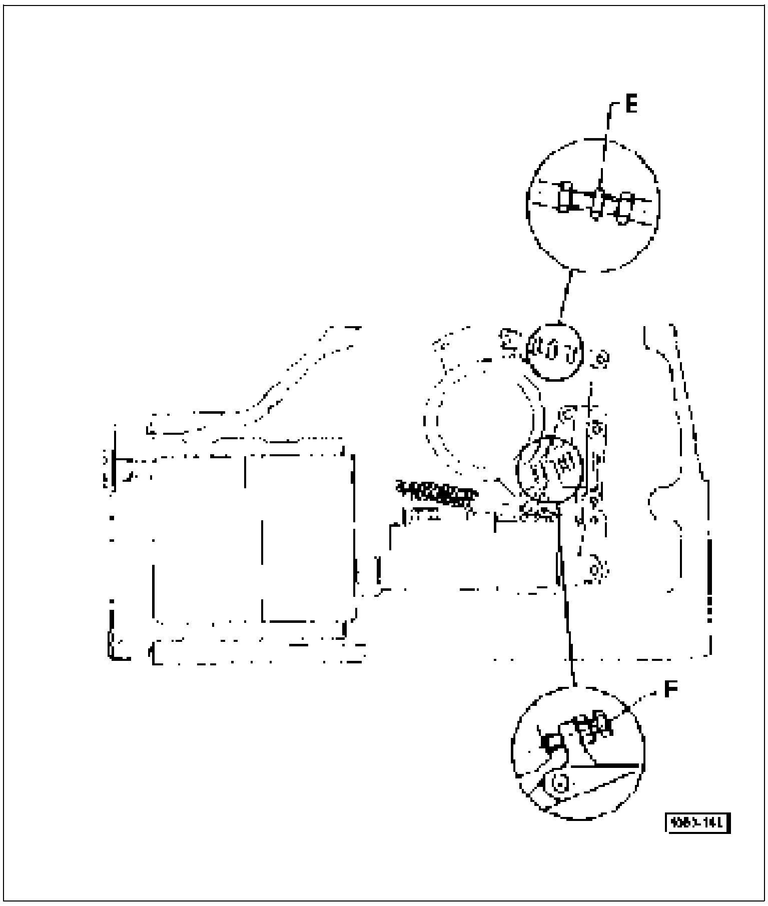


Fig 15 - Rod and screw for adjustment of yellow and green levers.
E - Yellow lever stop rod
F - Green lever adjustment screw

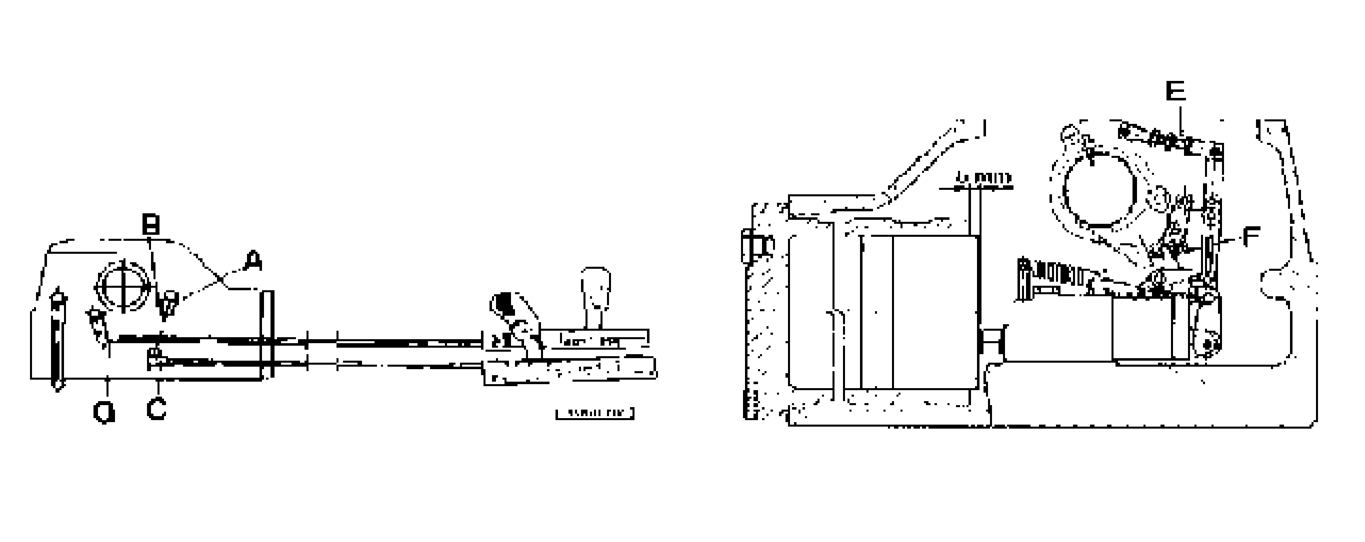


Fig. 16 - Adjustament diagram.

Checking the lifting system

— Check both external and internal lever splines for cracking or evident wear; replace as necessary.
— Make sure the lifting piston and the cylinder diameters are within acceptable wear limits comparing the related specifications tables.
— Examine the lifting arm shaft bushings for scoring or excessive wear.
— Examine also the lifting arm to hydraulic cylinder connecting pin bushings for wear and firm installation in their seats on the arms.
— Measure the cylinder inside control rod and the cylinder-mounted bushing diameters and compare with maximum wear limit specifications as given in the related table.
— Check also the lifting shaft splines for excessive wear and the ground surfaces contacting the bearing bushings for damage.

NOTE: Whenever the hydraulic lifting cylinders are disassembled gaskets should be replaced.

Checking the operating pressure of the lift system

The operating pressure, controlled by the valve associated with the auxiliary spool valves, is checked by connecting gauge p/n 5.9030.513.0 to one of the valve work ports and proceeding as follows:
Start the engine, apply the parking brake in the interests of safety, and operate the directional control valve, reading the pressure setting of the safety valve. This should be 180 bar; if the setting is found not to be correct, readjust by means of the setscrew (Refer also to chapter on "auxiliary spool valves").

Removing the directional control valve from the lift housing

The following operations do not require the lift to be removed from the tractor:
1 - Remove the cover of the lift housing.
2 - Remove the shock valve from the forward end of the control valve; this done, remove the relative mounting as well.
3 - Using a screwdriver, release the spring from the pin at the rear end of the valve, then unscrew the pin itself and remove.
4 - Addressing the rear end of the valve, release the spring of the draft control levers with a screwdriver; remove the spring.
5 - Unseat the circlips, then remove the levers and rods of the valve control mechanism.
The steps thus far can be performed working both from inside and from outside the lift housing.
6 - Unscrew the valve fixing bolt located at the front end of the assembly.
7 - Using a wrench of appropriate shape, undo the second bolt located under the lift arms cross shaft;
(this bolt must be unscrewed completely, even though it cannot be removed before the valve assembly is distanced from the lift housing).
8 - Lift the control valve assembly clear.

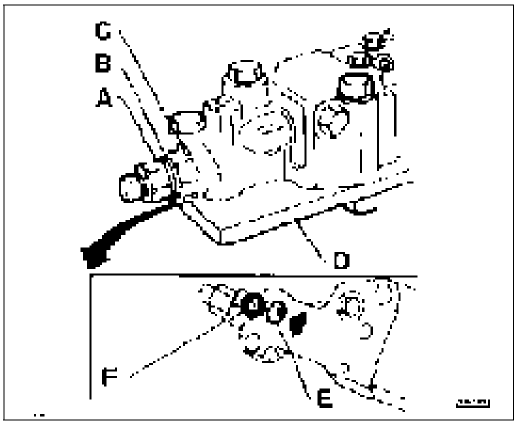


Fig. 17 - Hydraulic distributor seal ring.
A Anti-shock valve
B Gasket
C Fitting
D Plate
E Oil delivery hole to power-lift cylinder
F O-ring

Checking distributor when assembled - Fig. 17

Before taking the distributor to pieces perform the nonreturn valve tightness test operating as follows:

1. Fit O-ring **F** into hole **E** groove as shown in figure and then secure plate **D** underneath the distributor using two bolts, so that hole **E** be thoroughly sealed.

2. Loosen anti-shock valve **A** holding fitting **C** locked with a spanner. Remove the valve along with underlying gasket **B**.

3. Connect hydraulic pump no. 5.9030.520.4 to fitting **C**; Pressurize the oil through the pump and make sure no oil leaks from the distributor.

4. Should any leaks be noticed, this could be caused by the poor nonreturn valve efficiency. For this reason the hydraulic distributor shall be completely overhauled.

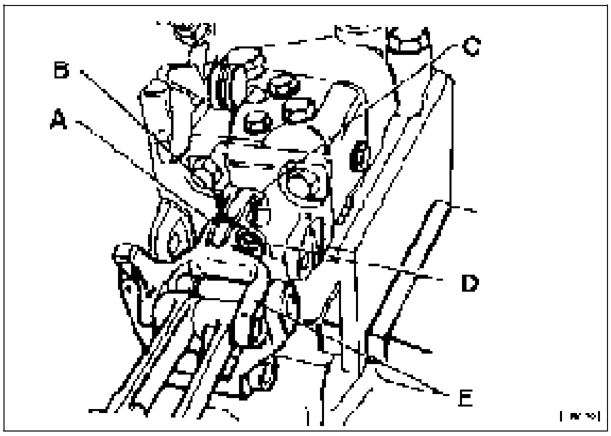


Fig. 18 - Hydraulic distributor control levers.
A Spacer
B Plate
C Distributor stem
D Pin
E Lever assembly

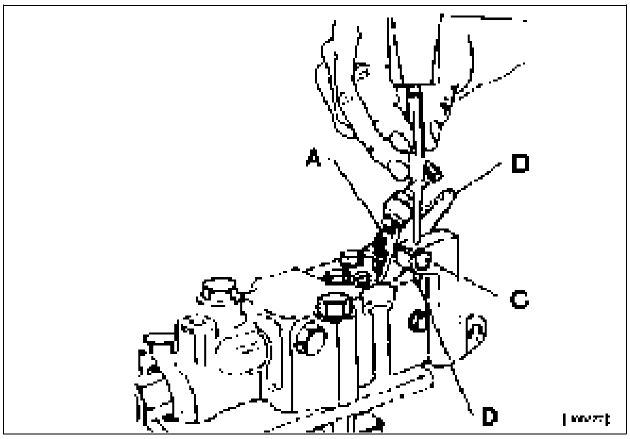


Fig. 20 - Removing the distributor ratchet return spring.
A Spring
B Limit lever
C Pin
D Pin

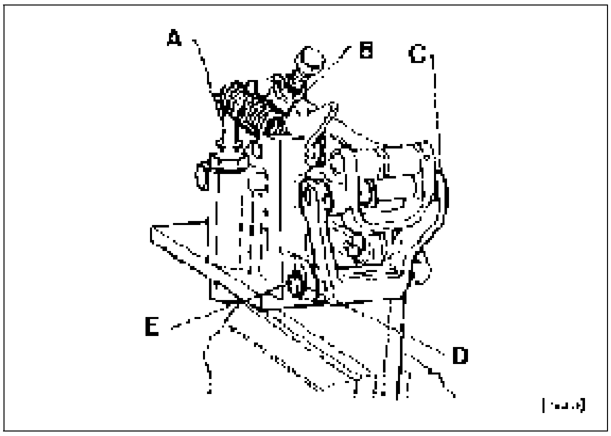


Fig. 19 - Removing the ratchet return spring.
A Spring securing pin
B Springs
C Fork
D Snap ring
E Pin

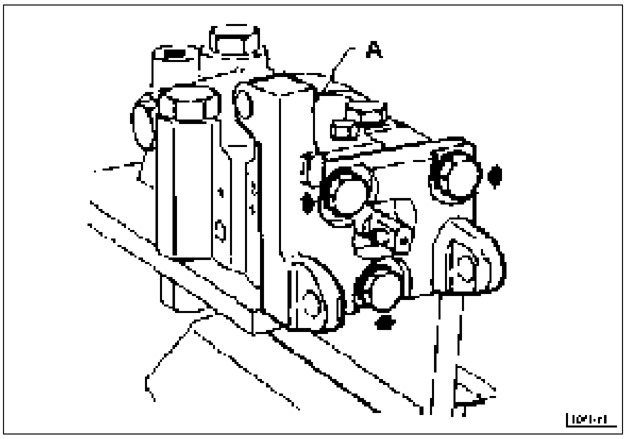


Fig. 21 - Hydraulic distributor control mechanism support.
A Lever support

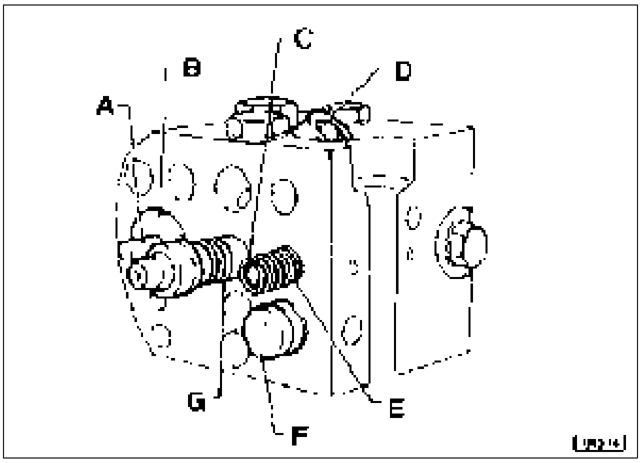


Fig. 22 - Hydraulic distributor case.
A Nonreturn valve pushrod
B Plate
C Spacer
D Oil inlet valve
E Pilot/Control valve spring
F Oil flow control valve piston
G Hydraulic distributor stem

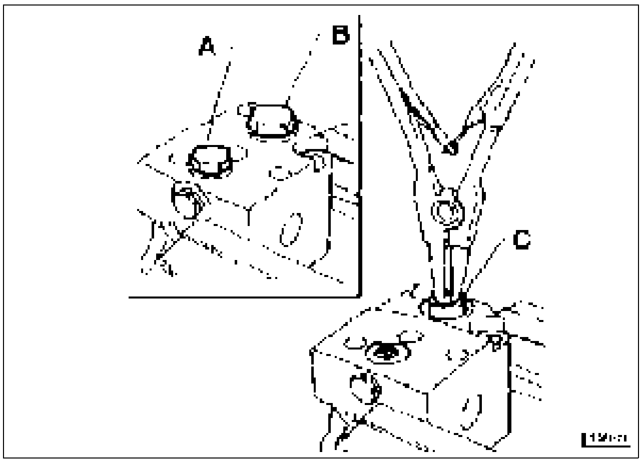


Fig. 24 - Disassembling the nonreturn valve.
A Pilot/Control valve cap screw
B Nonreturn valve cap screw
C Nonreturn valve

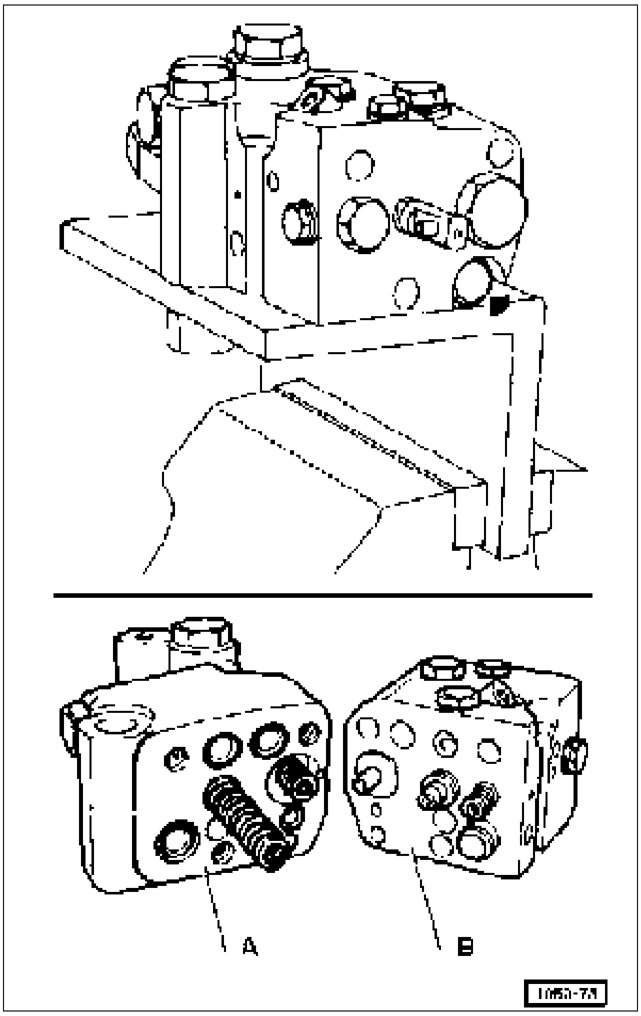


Fig. 23 - Stripping the hydraulic distributor.
A Front case
B Rear case

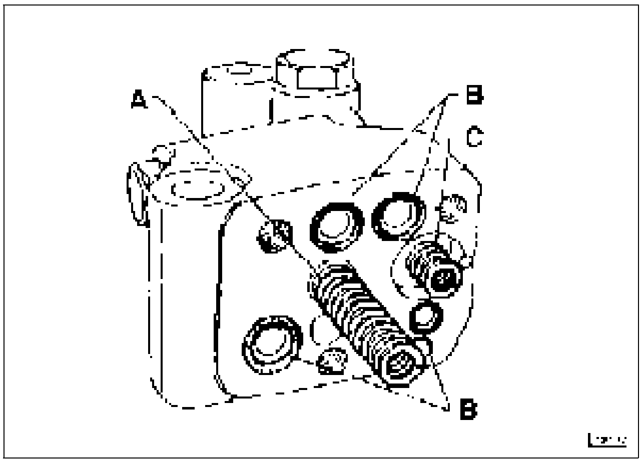


Fig. 25 - Disassembling the springs and the sealing rings.
A Hydraulic distributor spring
B O-ring
C Spring

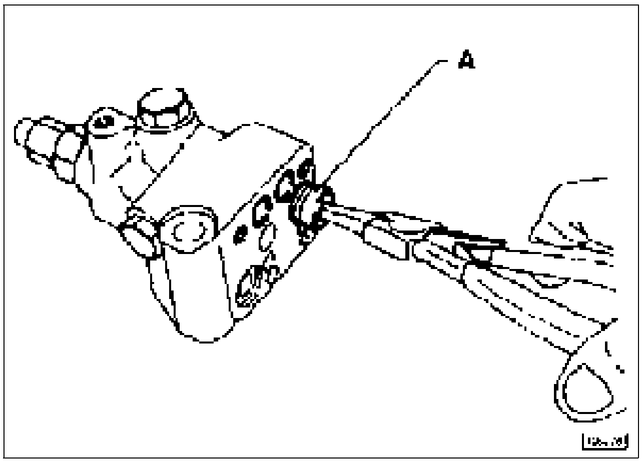


Fig. 26 - Hydraulic distributor, front portion.
A Nonreturn valve piston

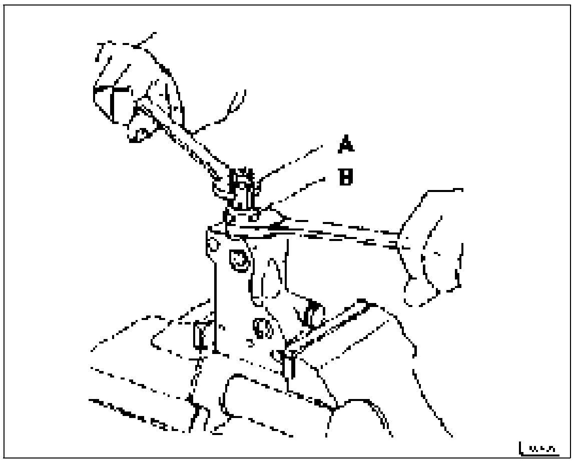


Fig. 27 - Disassembling the anti-shock valve.
A Anti-shock valve
B Fitting

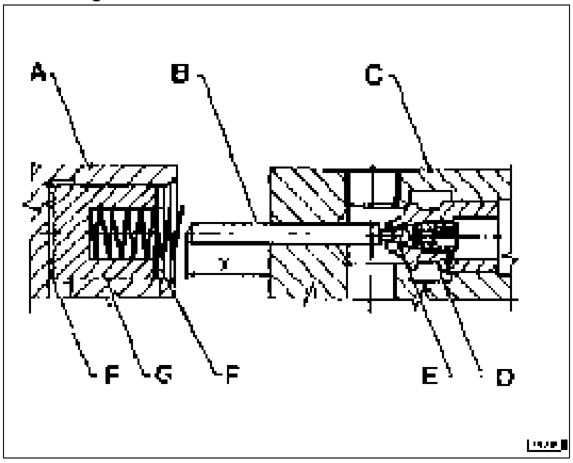


Fig. 28 - Oil discharging valve pushrod.
A Front case
B Nonreturn valve pushrod
C Rear case
D Nonreturn valve
E Ball
F Shim
G Non return valve piston

Inspection and checks

1 - Carefully clean all hydraulic distributor parts.

2 - Check that the valve spool, the various pistons located internally of the valve body and the relative seats are not scored or unduly worn.

3 - Check that the main valve spool and the pistons of the various circuit valves slide freely in their bores.

4 - Using a comparator, measure the projection **Y** of the push rod **B** in relation to the valve body **C**; this dimension must be **18,5 mm** measured with the valve **D** seated. Check that the seats of valves **D** and **E** are completely fluid tight; if there is any leakage due to the presence of foreign matter, clean thoroughly or, if in doubt, replace the valve.
Important: Test the check valve **E** for leakage by blasting with compressed air.

5 - Verify that the calibration of the various springs is as indicated on page 280.

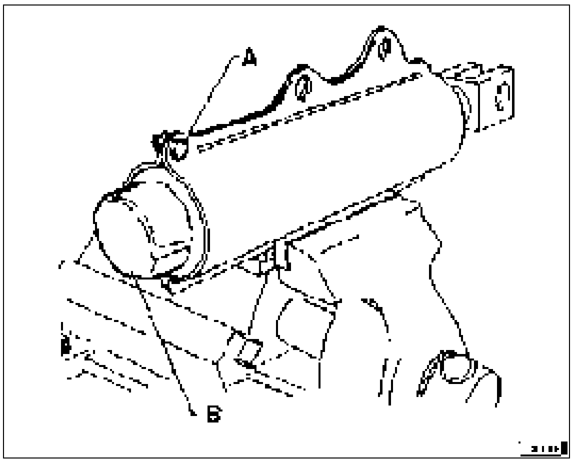


Fig. 29 - Load sensing element.
A Bolt
B Cover

Reassembling the lift

Proceed to refit the various parts removed, reversing the order of the steps described above and observing the following directions.

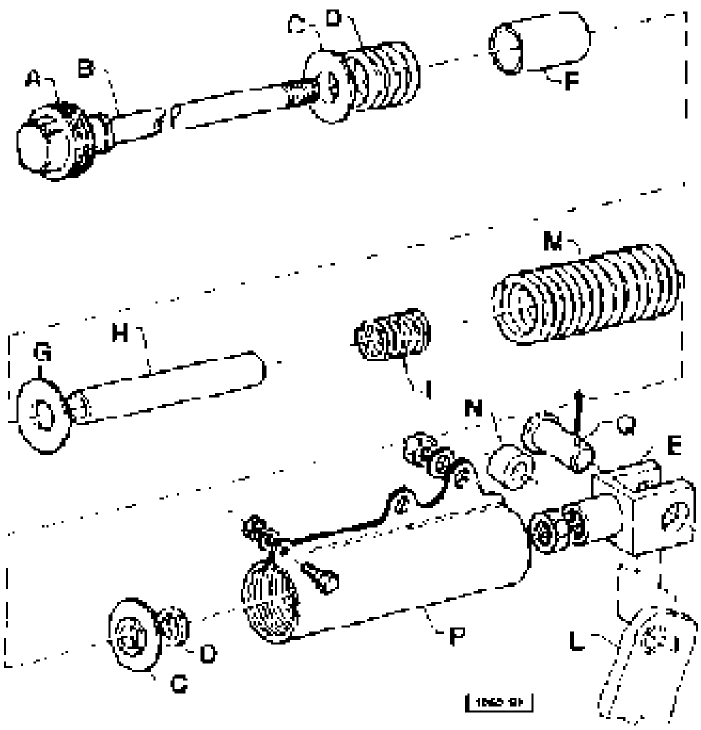
Degrease the threads of plugs and fitting with a suitable solvent.

Replace all copper gaskets and O-rings.

Smear the threads of plugs with the specified sealant.

When securing the shock valve to the control valve housing, torque to 78 ± 5 Nm (8 ± 0,5 kgm).

Sensing arm



A Cover
B Tie rod
C Shoulder ring
D Front spring
E Fork
F Front spacer
G Ring
H Rear spacer
I Centre spring
L Sensing arm control lever
M Rear spring
N Spacer
O Spacer ring
P Sensing arm box
Q Pin

On **Silver 80 - 90 - 100.4** machines, the two parts **F** and **C** are assembled as a single piece.

Fig. 30 - Sensing arm parts.

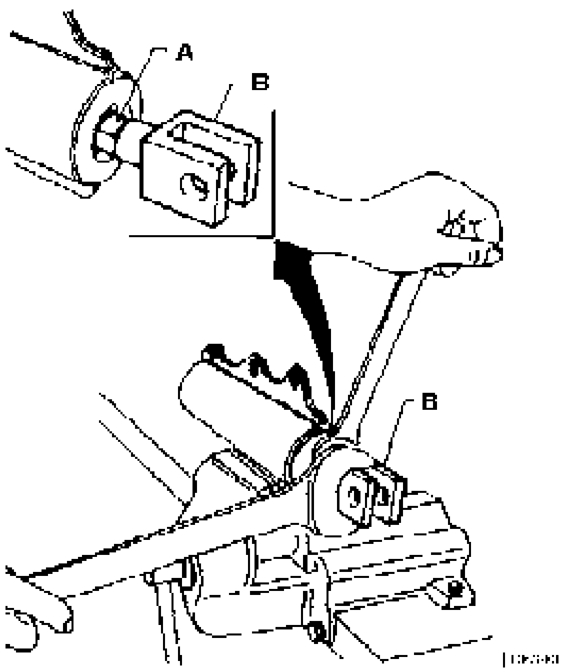


Fig. 31 - Removing the sensing arm fork.
A Nut
B Fork

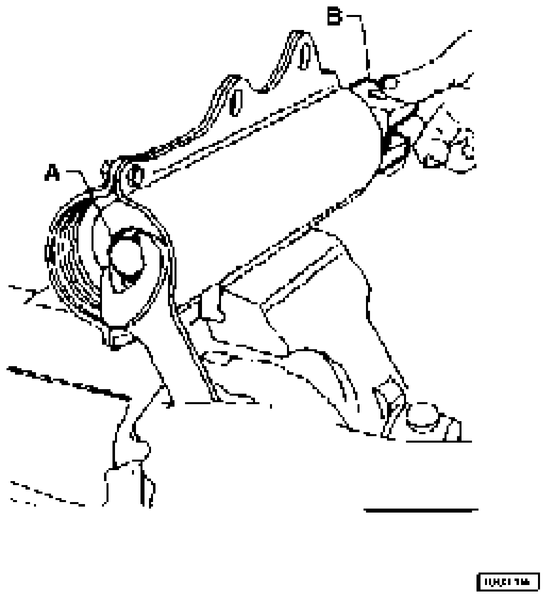


Fig. 32 - Sensing arm part stripping.
A Tie rod
B Fork

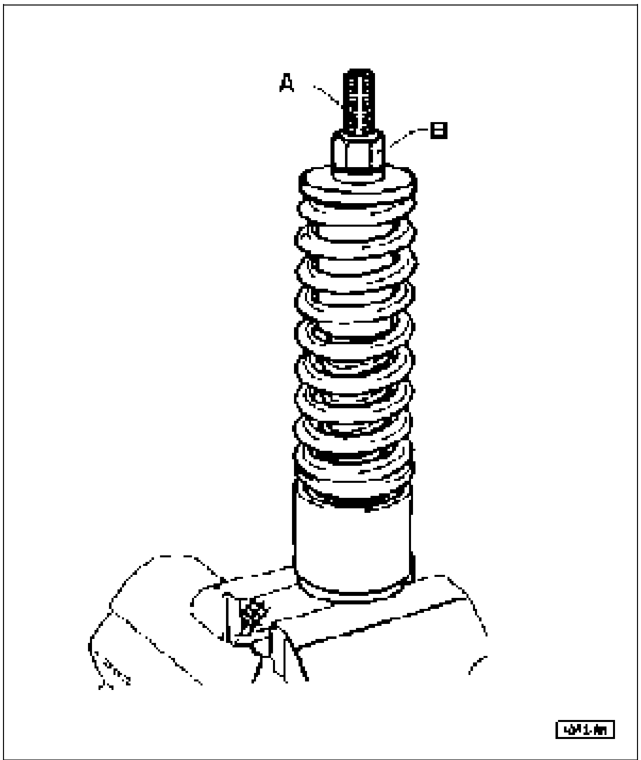


Fig. 33 - Sensing arm spring.
A Tie rod
B Nut

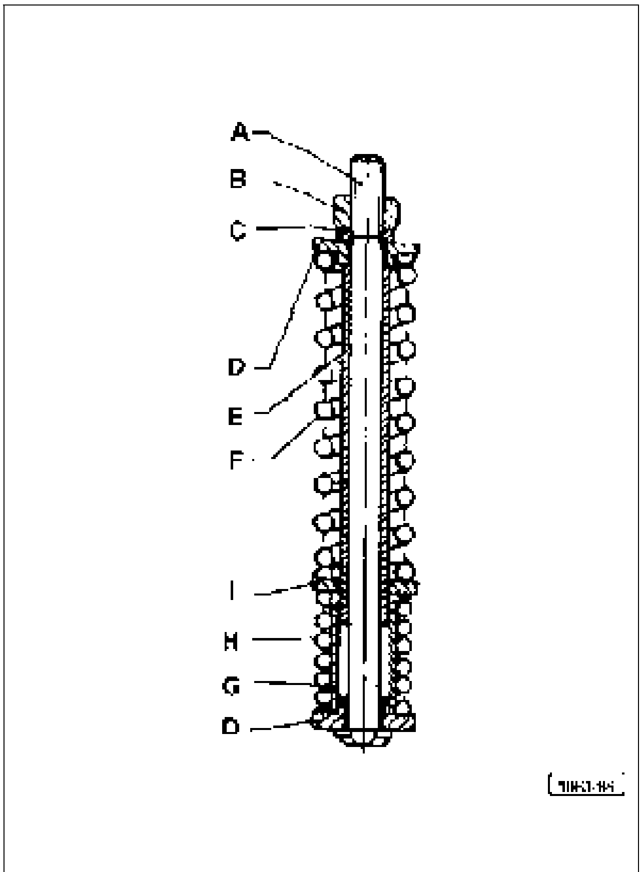


Fig. 34 - Sensing arm inside parts.
A Tie rod
B Nut
C Spacer
D Shoulder rings
E Front spacer
F Rear spring
G Rear spacer
H Front spring
I Ring

On **Silver 80 - 90 - 100.4** machines, the two parts **G** and **D** are assembled as a single piece.

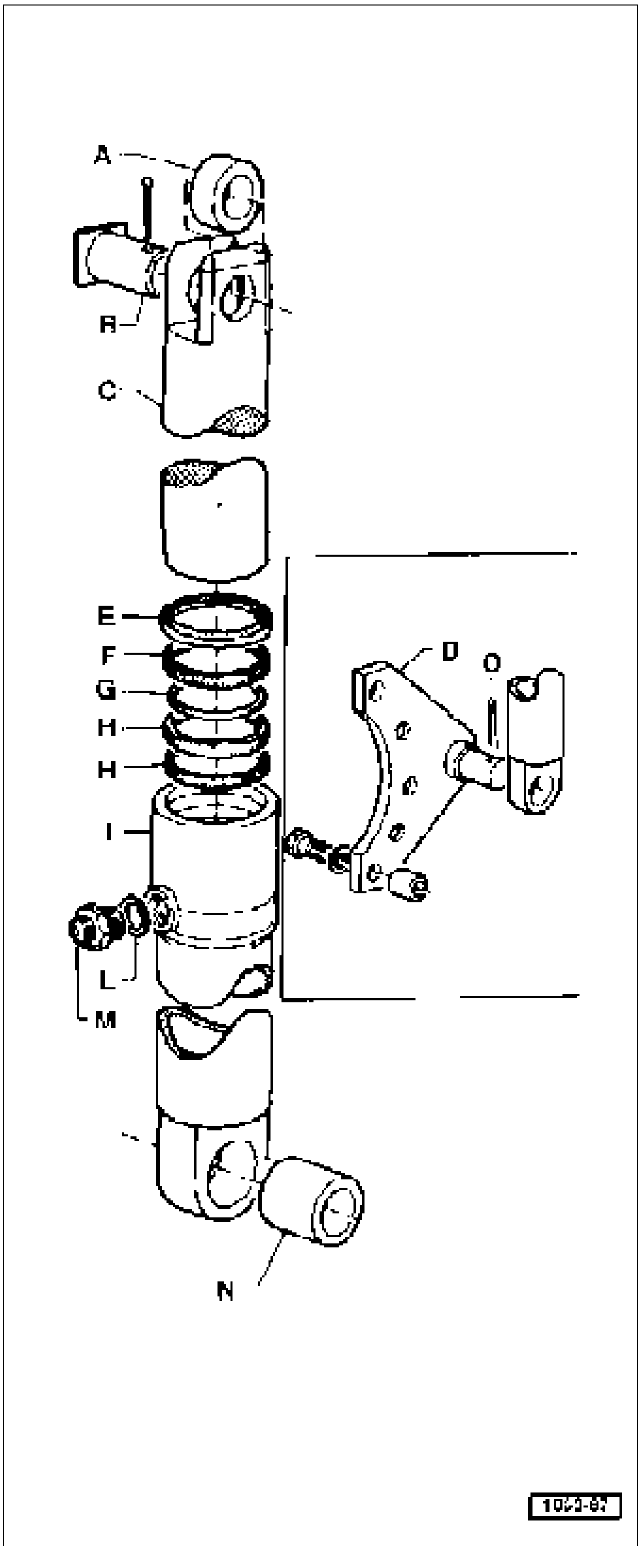


Fig. 35 - Auxiliary hydraulic lifting cylinders.

A	Bushing	**H**	Seal ring
B	Upper pin	**I**	Cylinder
C	Stem	**L**	Gasket
D	Bracket	**M**	Fitting
E	Oil retainer ring	**N**	Spacer
F	Guide ring	**O**	Snap ring
G	Teflon ring		

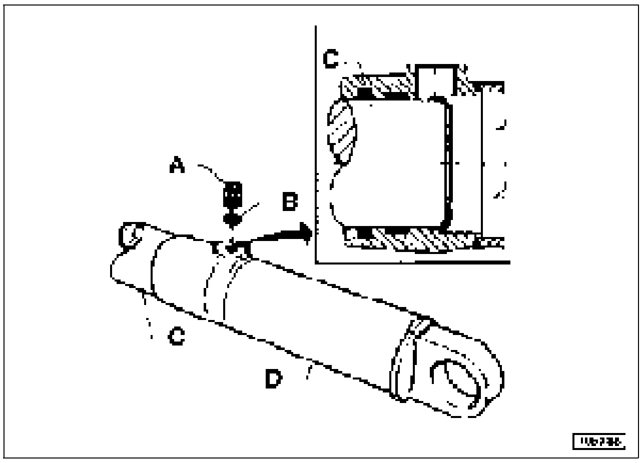


Fig. 36 - Hydraulic distributor stem.

A	Fitting	**C**	Stem
B	Gasket	**D**	Cylinder

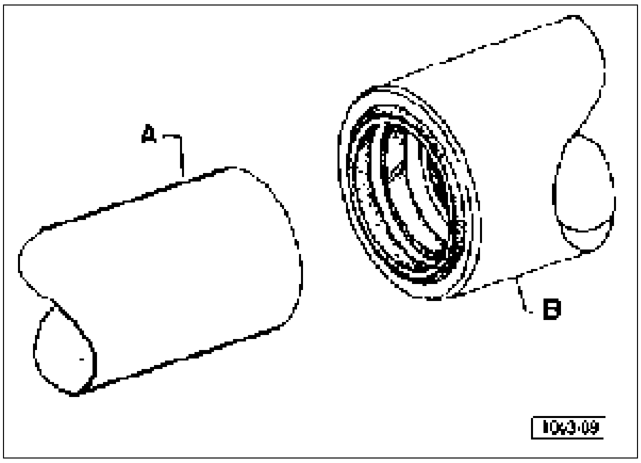


Fig. 37 - Removing the stem from cylinder.
A Stem
B Cylinder

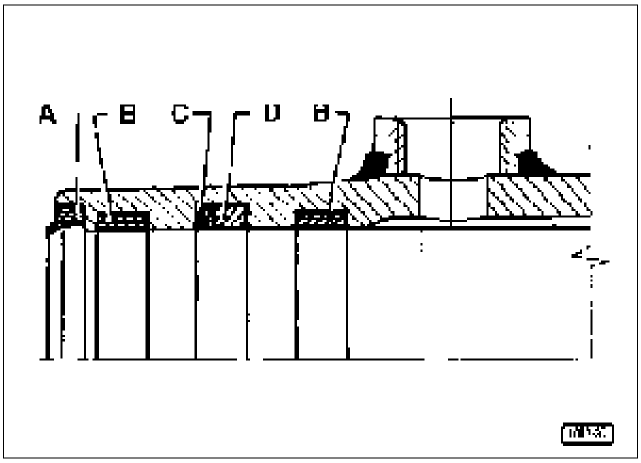


Fig. 38 - Distributor internal seal rings.
A Oil retainer
B Guide ring
C Teflon ring
D Seal ring

Power-lift distributor valve spring setting specifications

Oil flow control valve spring

no. of springs used	no.	1
wire diameter	mm	1.4
external diameter	mm	7.8
released spring	mm	54
loaded spring	(N 40.4) - kg 4.115 mm	47.5
	(N 66) - kg 6.727 mm	43.4

Pilot valve spring

no. of springs used	no.	1
wire diameter	mm	0.9
external diameter	mm	7.8
released spring	mm	25.5
loaded spring	(N 21) - kg 2.133 mm	15.2
	(N 28.5) - kg 2.899 mm	11.5

Hydraulic distributor spring

no. of springs used	no.	1
wire diameter	mm	1.2
external diameter	mm	10.4
released spring	mm	110
loaded spring	(N 43) - kg 4.4 mm	65
	(N 39) - kg 4 mm	60

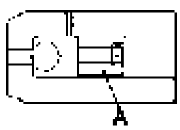
Nonreturn valve spring

no. of springs used	no.	2
wire diameter	mm	1.1
external diameter	mm	8.8
released spring	mm	25
loaded spring	(N 29) - kg 2.96 mm	17
	(N 43) - kg 4.43 mm	13

Valvematic spring

no. of springs used	no.	1
wire diameter	mm	1.2
external diameter	mm	9,5
released spring	mm	57,3
loaded spring	(N 41,3) - kg 4,2 mm	35
	(N 54,3) - kg 5,5 mm	25,8

Diagnosing malfunctions

implement will not raise or raise too slowly	check power-lift for overloading	check the pressure to work		
	check pump for proper operation	air in the circuit	check the tightening of the filters	
		check the level of oil in the transmission	top-up as necessary	
		replace filters	check the flow rate	replace the oil pumpe
	check the relief valve for proper setting	clean the relief valve	replace filters	
implement can be raised only partially	check power-lift for proper adjustment	remove the valve, clean or replace as necessary		
to a slow implement lowering	ensure the lowering valve is not jammed in seat	check the relief valve		
	pressure relief valve remaining open continuously	check the screw **A** internal of the lowering valve; may be montage as shown in figure		
hitch chatters when raised	look for any oil leaks	check the sell ring of the hydraulic cylinder	replace the lowering valve and anti-shock valve if necessary	
continuous relief valve oil discharging operation with lower links in top lifting position	check for proper adjustment			

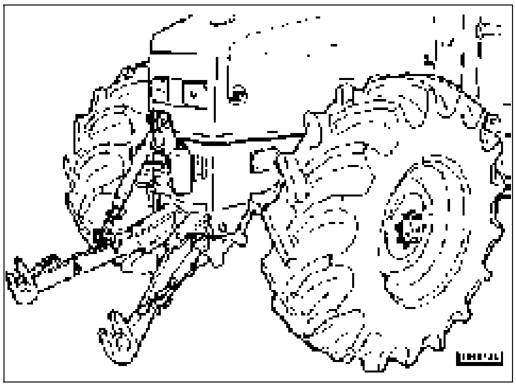


Fig. 1 - Front power-lift.

General information

On request the tractor can be equipped with the front hydraulic lifting system.

It is operated by means of two hydraulic cylinders actuated by the related control lever placed at the right-hand side of the operator driving position.

The lever controls a single-acting distributor valve linked to the rear tractor power-lift case.

Specifications

power-lift type		with two hydraulic cylinders and removable arms
hydraulic cylinder type		single-acting
oil supply		from the rear auxiliary hydraulic distributor
peak operating pressure	bar	180
cylinder stem diameter	mm	50
lifting stroke	mm	170
distance between both lower link ends	mm	865
lifting capacity	kg	1500

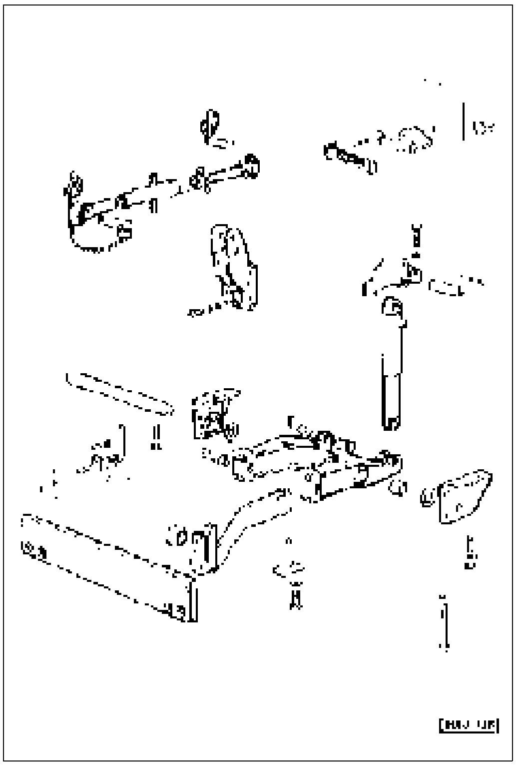


Fig. 2 - Front hydraulic power-lift parts.

Inspections

Ensure that the cylinder pin bushings are not worn and be sure these are firmly secured in their seats.

NOTE: Replace gaskets after each hydraulic lifting cylinder disassembly.

Hydraulic pressure accumulator and anti-shock valve for the front power-lift

The front power-lift is equipped with a pressure accumulator and related anti-shock valve permitting a better hydraulic system performance and a reduced front axle strain to be respectively obtained.

A - **Front hydraulic lifting cylinders (n° 2)**

B - **Oil pressure accumulator**

volume	liter	0,700
nitrogen preloading pressure	bar	130
peak operating pressure	bar	250

C - **Anti-shock valve**

D - **Lowering speed control valve**

E - **Load holding valve (allows oil to be held internally of cylinders with implements in raised position during transit).**

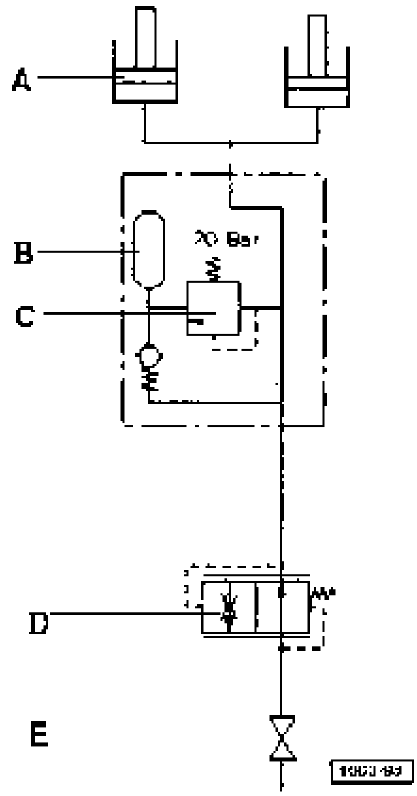


Fig. 3 - Operating diagram.

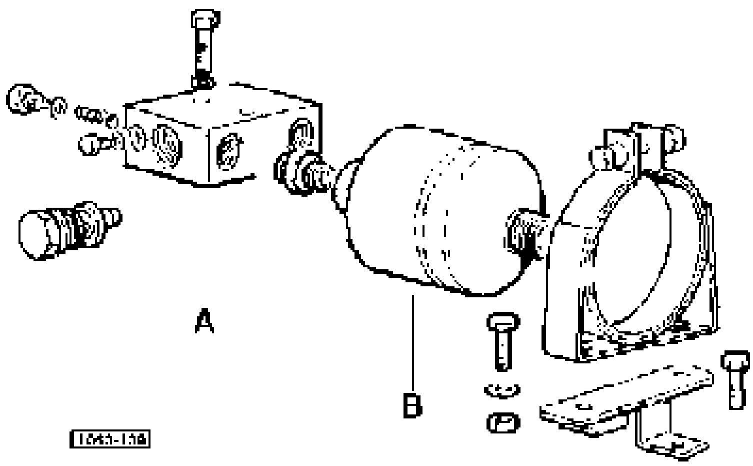


Fig. 4 - Damping unit parts.
A - anti-shock valve
B - accumulator

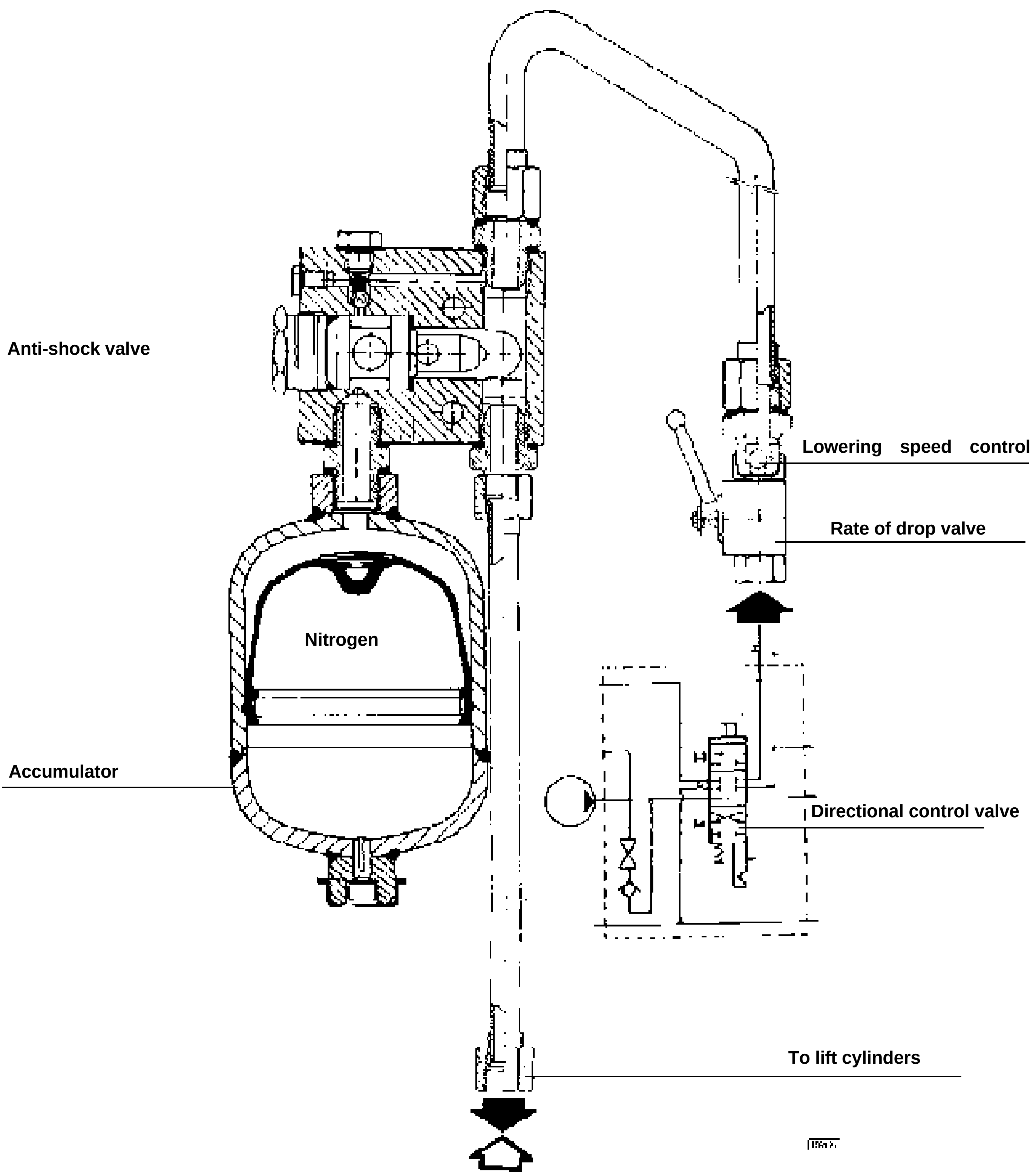


Fig. 5 - Oil pressure accumulator and anti-shock valve. (The directional valve to which is connecting, is convertable into single-acting. For the operations to see auxiliary systems chapter).

Front power take-off

General information

The power take-off clutch is a multidisk, oil-bath and electro-hydraulic control type.

The front power take-off is directly linked to the crankshaft by means of a flexing coupling; while the shaft-end is equipped by an universal joint.

The oil used for P.T.O. operation is contained in the P.T.O. casing.

A specific gear pump installed on the P.T.O. shaft sucks the oil, which flows first through a filter for being subsequently routed under pressure to the clutch assembly through an electro-hydraulic distributor.

The oil is cooled in a special radiator ad is strained through a second (15 micron) filter placed on the pressurized circuit located between oil pump and hydraulic distributor.

A maximum 57 kgm (560 Nm) torque can be transitted to the hitched implement in this way, i.e. 80 CV max. (or 58 kW). To avoid these standards may be exceeded it is recommended that a special joint having proper specifications be installed between implement and P.T.O.

The P.T.O. shaft rear teminal has clockwise direction of rotation (with respect to the driving position).
Control is electro-hydraulic type and is provided by the relevant switching knob.

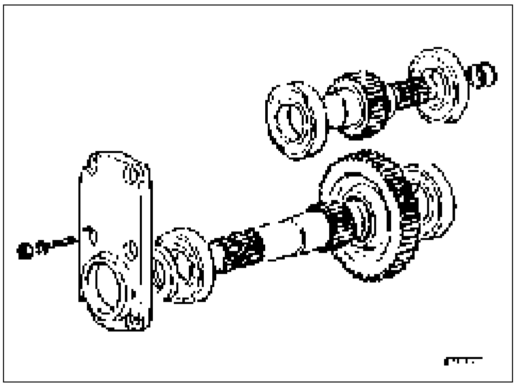


Fig. 1 - Front PTO shaft terminal.

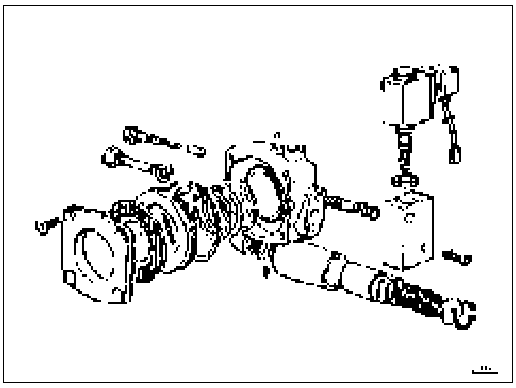


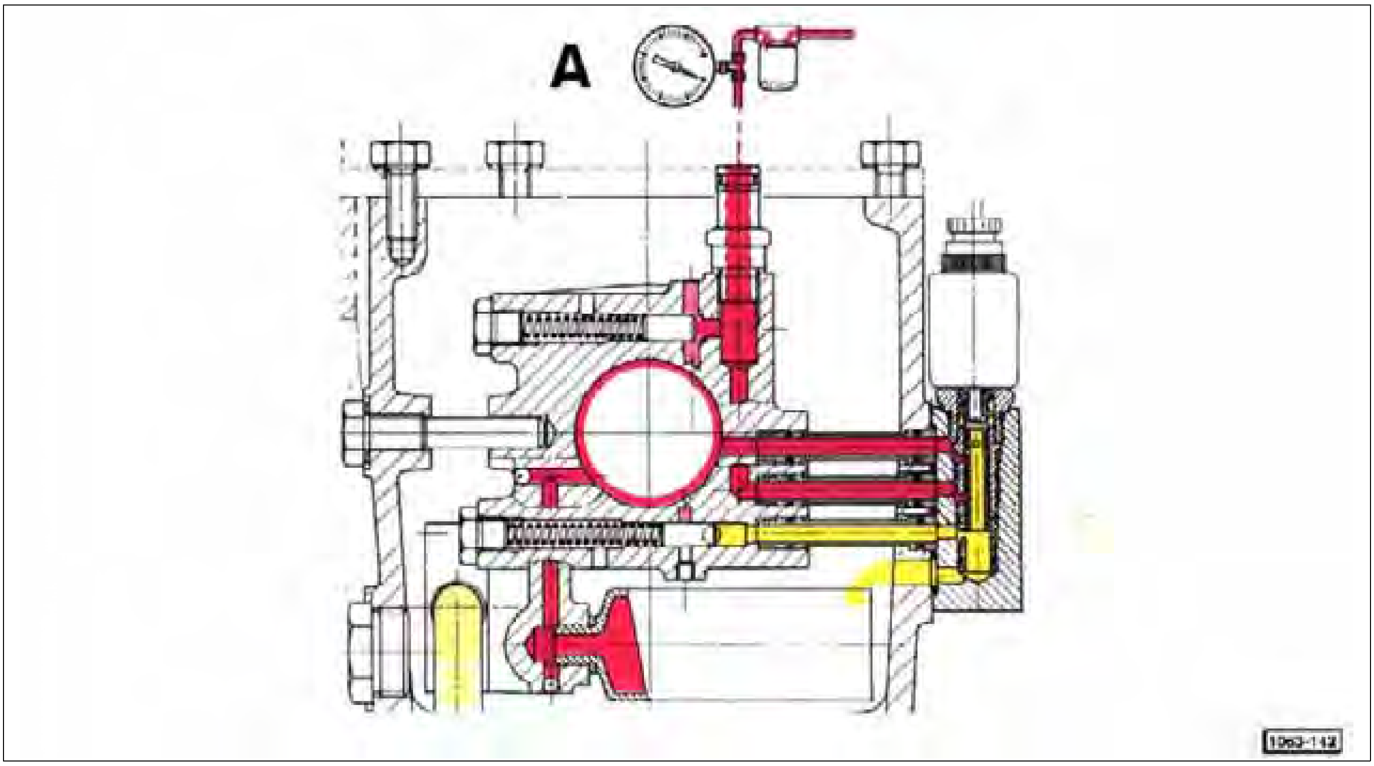
Fig. 2 - Front PTO clutch assembly.

Specifications

clutch

manufacturer		SAME - DEUTZ FAHR GROUP
clutch disk no.		4
clutch disk diameter	mm	124.5
clutch disk set thickness	- max. wear mm - standard wear mm	20.80 21.80 to 22.20
counterdisk number		4+1 (spacer)
disk lubricating pressure	bar	1.5
peak calibrating pressure (to press the disks together): - of brake disk - of clutch disk	 bar bar	 4 13
piston axial thrust	kg	1523
brake disk braking torque (peak pressure)	kgm	1
hydraulic pump		gear type
oil flow rate (at engine peak speed) at 2500 engine r.p.m.	 (dm3/min) litre/min.	 12
oil filter	code no.	9012.424.2
filtering capacity	micron	90
filtering surface	cm2	222
hydraulic distributor stroke	mm	1.5
ratio between engine and P.T.O. r.p.m.s		1/2.400
rear P.T.O. shaft terminal		1.3/8" - 6 splines
direction of rotation		clockwise (with regard to driving position)
oil reservoir capacity	litre (dm3)	2.5
oil type		AKROS MULTI 10W30 (API-GL4)

engagement stage



A - Checking the clutch assembly engagement pressure **(10÷13 bar).**

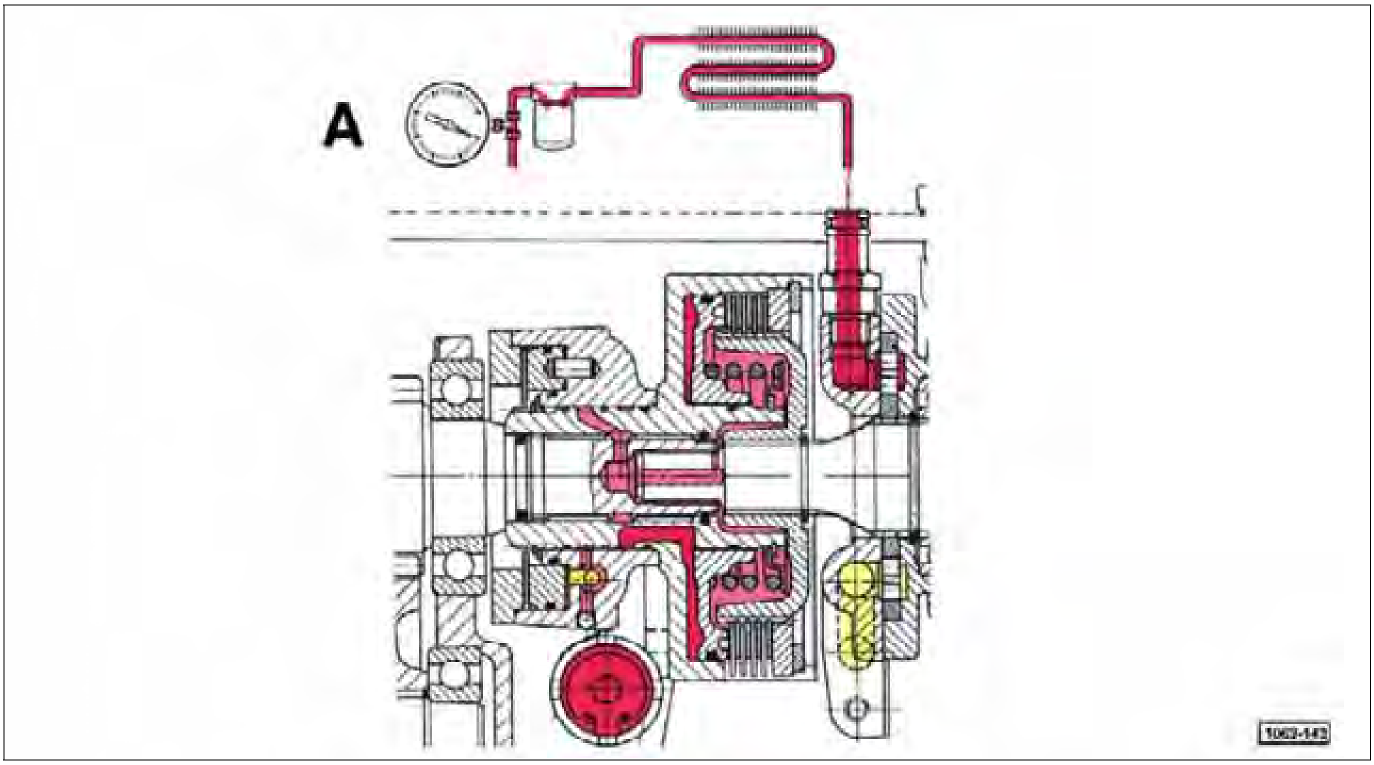
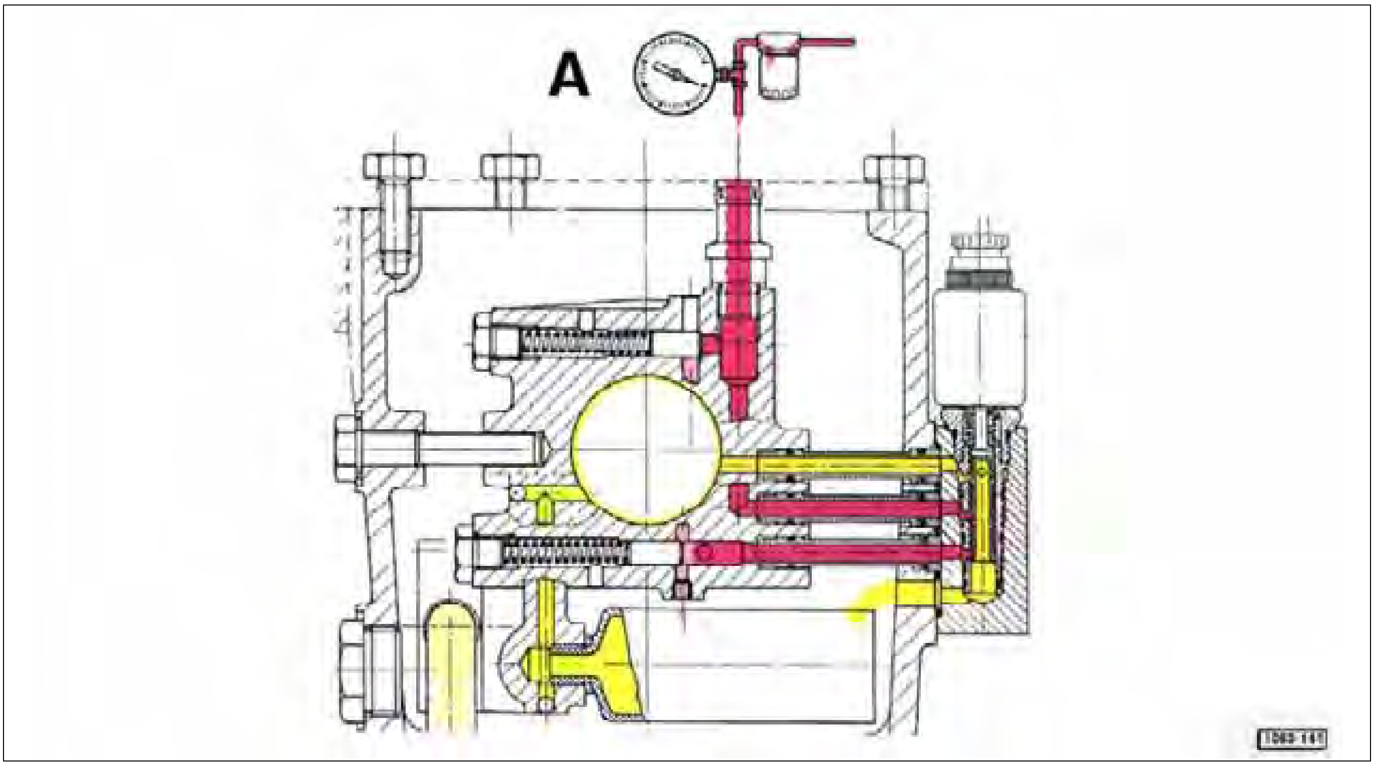


Fig. 3 - Front P.T.O. clutch hydraulic circuit (engagement stage).

disengagement stage



A - Checking clutch assembly engagement pressure **(4÷6 bar).**

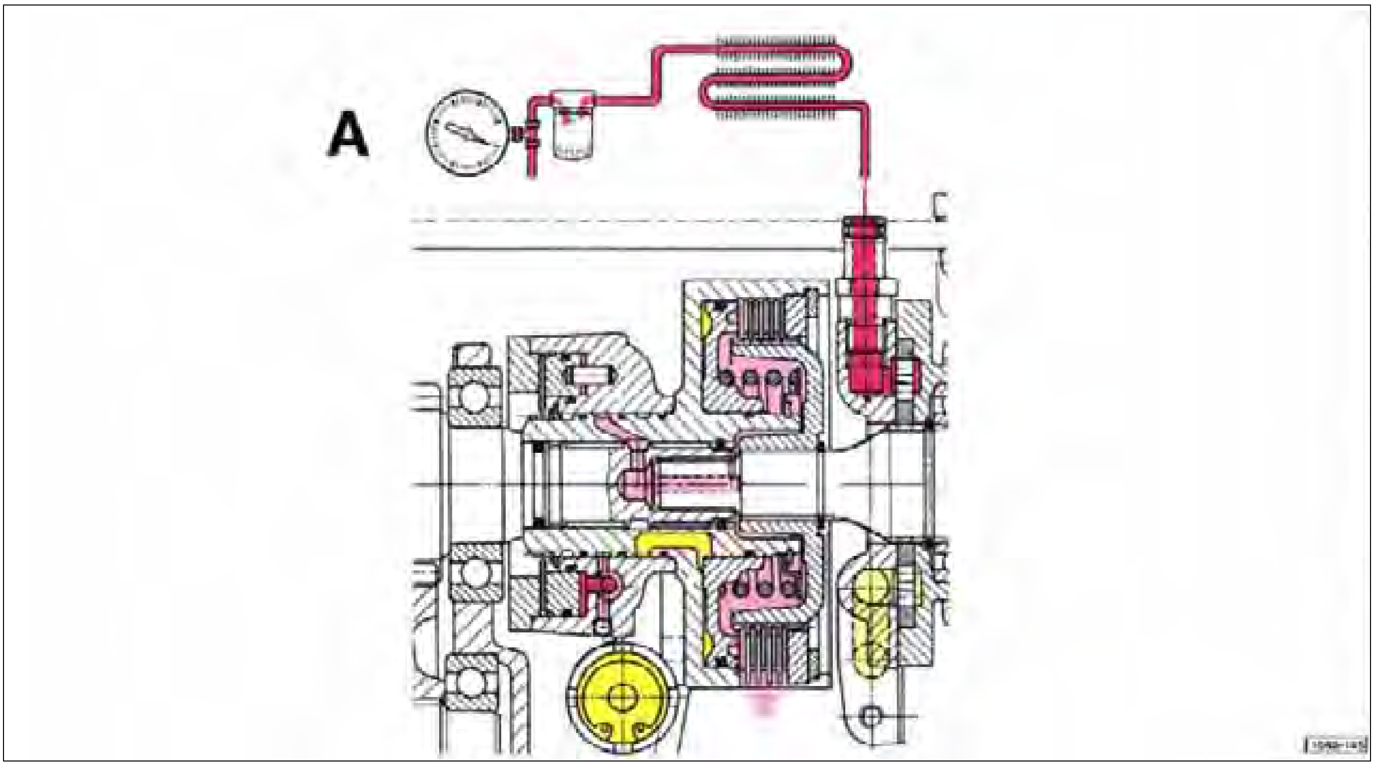


Fig. 4 - Front P.T.O. clutch hydraulic circuit (disengagement stage).

Apply some LOCTITE 510 (red) on the screw threads.

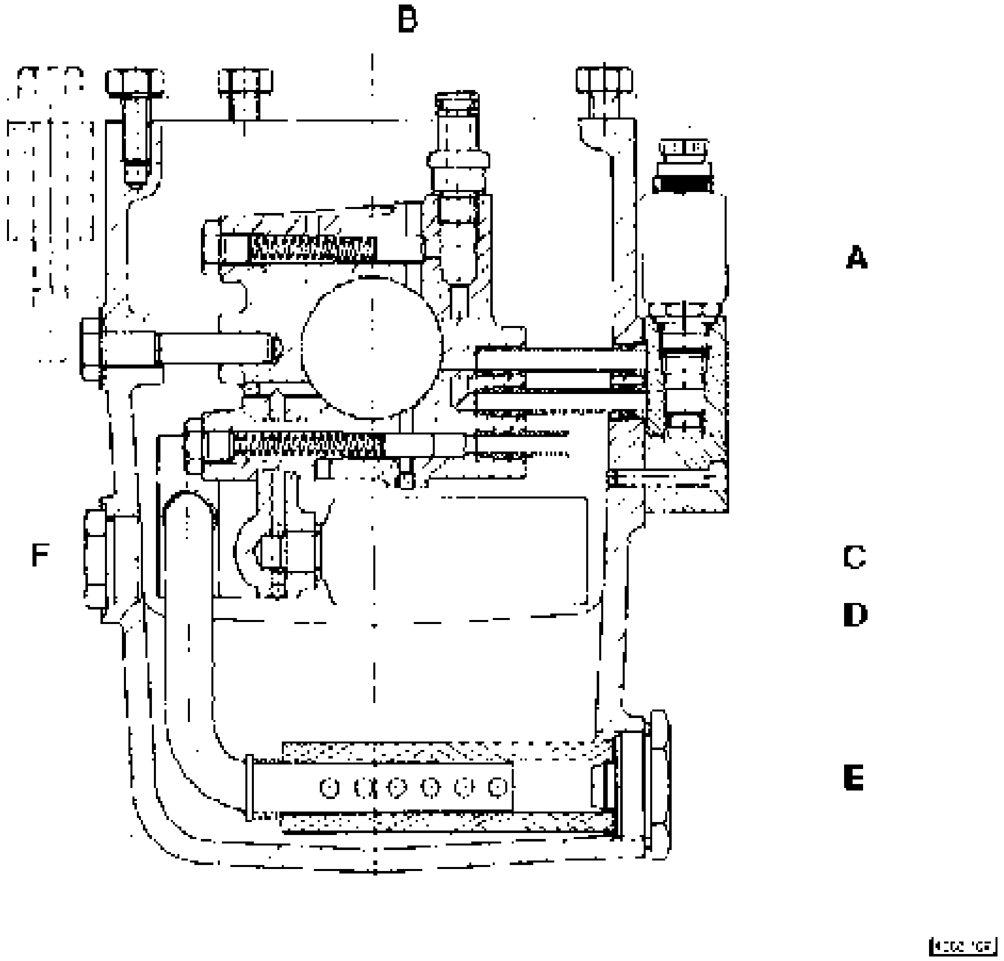


Fig. 5 - Longitudinal section of the front P.T.O. assembly.

A - Solenoid valve
B - Clutch pressure control valve
C - Solenoid operated brake apply pressure control valve
D - Clutch engagement pressure accumulator
E - Strainer
F - Oil level indicator plug

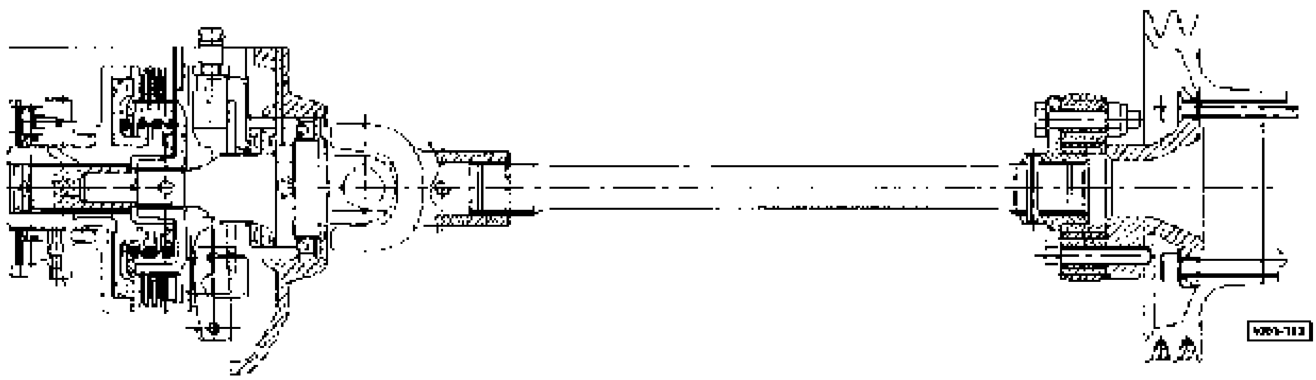


Fig. 6 - Front P.T.O. shaft flexing coupling.

Apply some LOCTITE 510 (red) on the screw threads.

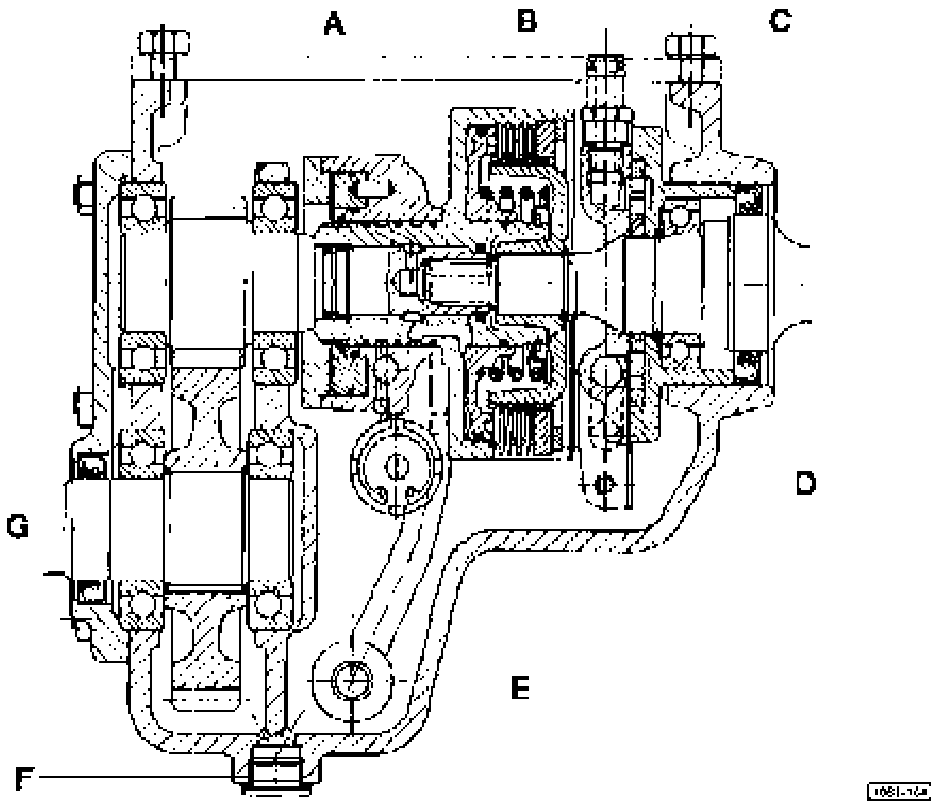


Fig. 7 - Cross-section of the front P.T.O. assembly.

A - Brake disc
B - Clutch discs
C - Oil pump
D - Input shaft
E - Strainer
F - Oil drain plug
G - P.T.O. shaft

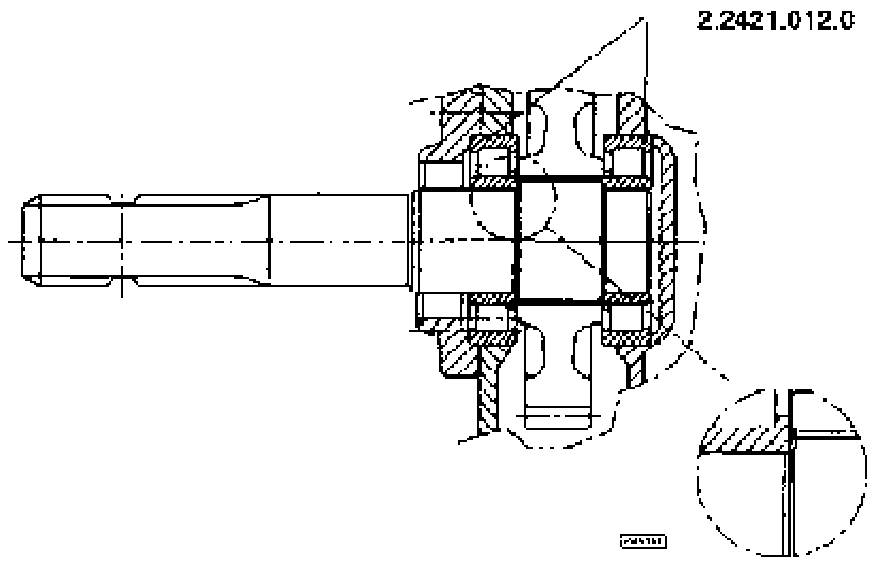


Fig. 8 - Top view of front P.TO.
Correct fitment of front P.T.O. shaft bearing
Locate the bearing 2.2421.012.0 with the shoulder directed toward the gear as indicated in fig 8.

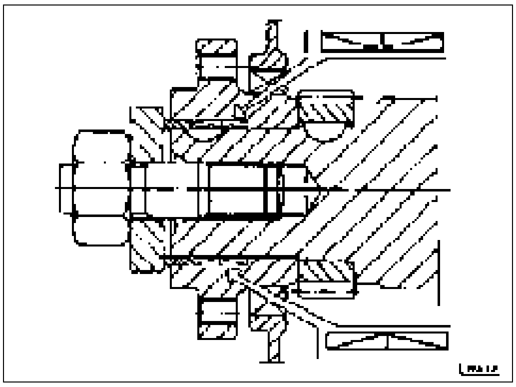


Fig. 9 - "RING-FEEDER" rings installed.

Installing "RING-FEEDER" rings

Install all the parts following the order shown in figure.

Thoroughly tighten the pulley hub on engine crankshaft to 34±1.5 kgm (333±15 Nm).

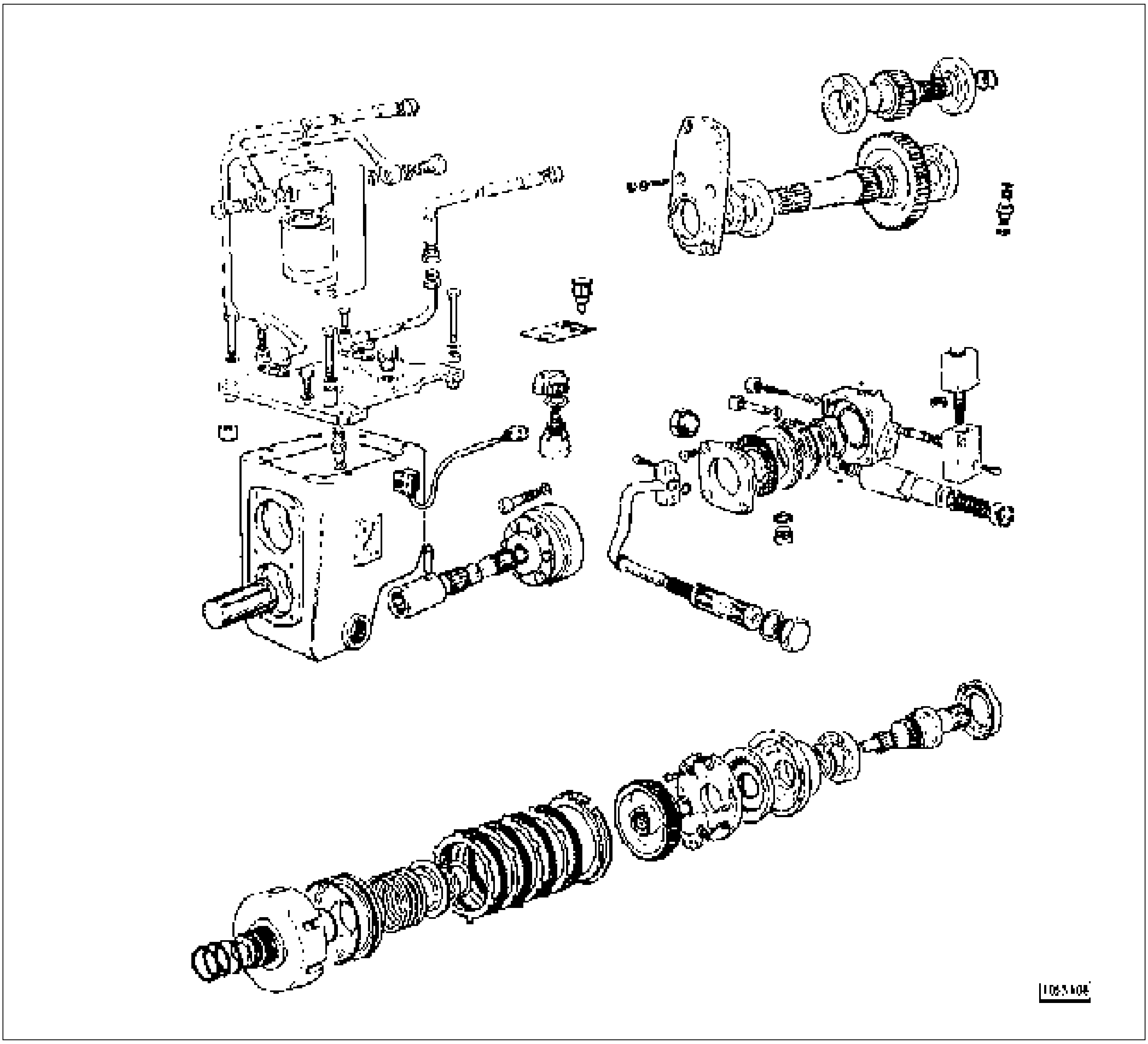


Fig. 10 - Frront PTO assembly parts..

Checking clutch

Make sure that the clutch disk friction linings are neither worn nor torn, if so replace the disks. The control piston should be replaced if signs of scoring are noticed.
If the splined sliding surface of the clutch disk hub is sunk in its upper part, the hub should be replaced.
Check the efficiency of the piston return spring. The spring specifications should correspond to those indicated in the specific table. Replace if necessary.
The clutch and brake piston sealing rings as well as the brake disk itself should be replaced if excessively worn.
If either the rotary seals or the relevant seats are worn, these should be replaced.
Every time the assembly is taken to pieces, carefully clean the oil passages in the clutch casing; use compressed air if required.

Check the clearance of the clutch friction discs
With new discs in place, check that distance **A** (Fig 11) is between 0,5 and 2 mm.
If the clearance is greater than the maximum value indicated, add 1 x shim p/n 2.1599.499.0 at the position arrowed.

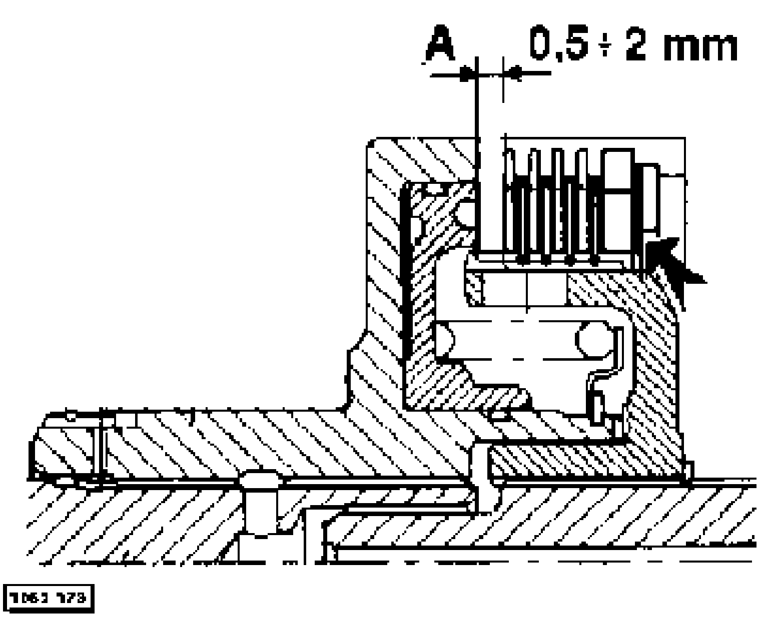


Fig. 11 - Checking disk clearance of front power-take-off.

Checking the clutch assembly engagement pressure

Fit no. 5.9030.517.4 equipment to the oil supply pipe using no. 5.9030.632.0/10 union as shown in figure 3 at pages 286-287 and then connect no. 5.9030.514.0 oil pressure gauge.
With the P.T.O. engaged
Let the oil circulate within the clutch casing and then be sure the following conditions are established: with engine running at peak idling speed the pressure reading should be 13±1 bar; with engine running at the lowest idling speed the pressure reading should be 10±1 bar.
NOTE: Make sure the P.T.O. shaft terminal is turning.

With the P.T.O. disengaged
Let the oil circulate within the distributor casing and then be sure the following conditions are established: with engine running at peak idling speed the pressure reading should be 6±0.5 bar; with engine running at the lowest idling speed the pressure reading should be 4±0.5 bar.
NOTE: Make sure the P.T.O. shaft terminal is being braked.

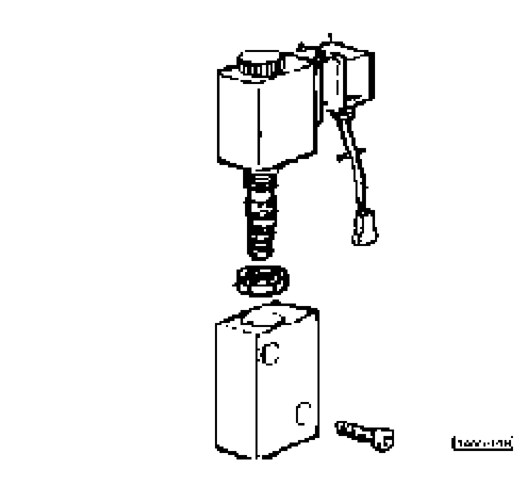


Fig. 12 - Electro-hydraulic control valve.

5 vehicle

59 front power take-off

Diagnosing malfunctions

clutch slipping	Verify activation of the solenoid valve	replace the solenoid valve if necessary	
	check piston for free stroke	replace the springs of inefficient valves	recheck pressure
		inspect O-rings on piston and manifold	replace the defective parts
	verify movement of piston	remove any roughness preventing smooth action	replace the solenoid valves if necessary
	inspect clutch discs for wear	replace discs	
P.T.O. brake does not apply	Check the solenoid operated control valve	replace the solenoid valve if necessary	
	Check engagement pressure	inspect O-rings and replace if necessary	
	piston jammed	replace out-of-setting valve springs	

Spring specifications

piston return spring	code no.	2.4019.373.1
wire diameter	mm	6.5
external diameter	mm	79.5
released spring	mm	61.5
loaded spring	- kg 75.7 (Nm 742) mm	30
	- kg 79.7 (Nm 782) mm	28

hydraulic system valve springs	code no.	2.4019.179.1
no. of springs used		2
wire diameter	mm	1.2
external diameter	mm	8.8
released spring	mm	63
loaded spring	- kg 3.6 (Nm 35) mm	44.6
	- kg 4.6 (Nm 45) mm	39.5

Hydrostatic steering
no. 290.6310.4/10 Danfoss type

General information

There in no direct mechanical connection between the wheels and the steering wheel and therefore no vibration can reach the driver.
Turning the steering wheel operates a rotary distributor connected to an oil flow control shutter permitting the pressure oil to be directed to the hydraulic cylinder in the amount necessary to provide the desired steering action.

The steering system is an open-centre reactive type: the user can directly feel the steering response on the steering wheel and perform a prompt correction of the driving direction.
In addition, the remarkable wheel caster angle will help increase the wheel self-centering effect as the wheels will automatically get in a straight line when the steering wheel is released.

The hydraulic circuit is fully independent. The oil drawn from the gearbox flows first through a high-delivery filter before being routed under pressure to the distributor by a pump constantly in mesh driven by the engine and fitted on gearbox left-hand side.
Two powerful single-acting cylinders, connected to the front wheel hubs, ensure the thrust necessary to steering under any working conditions.

Oil returning from the power steering unit is cooled by a radiator in the engine compartment and then directed to the unit piloting the electrohydraulic controls and sole function to lubricate the gearbox.
Moreover this system offers the advantage that the tractor can be driven also in the event of either a pump failure or an engine stop. A valve within the distributor will allow the oil to be drawn from the discharge circuit through the oil control shutter, whenever a pressure drop occurs in the pump delivery circuit.

hydraulic directional control valve		
p/n		290.6310.4/10
type of valve		OSPC 80 OR open centre with feedback control
relief valve setting (bar)		150
clearance between spool and sleeve	(mm)	0.03
turns of steering wheel before road wheels respond		
	- engine running	0° - 2°
	- engine at standstill	0° - 6°

steering cylinders (single acting)		
working stroke of piston rod	(mm)	171
rod diameter (mm)	2WD	42
	4WD	50
pushing force (kN)	2WD	13,6
	4WD	19
steering wheel turns to full lock		2.17

tightening torques		
valve cover securing screws	(Nm / kgm)	29 / 3
cylinder securing bolt	(Nm / kgm)	155 /16

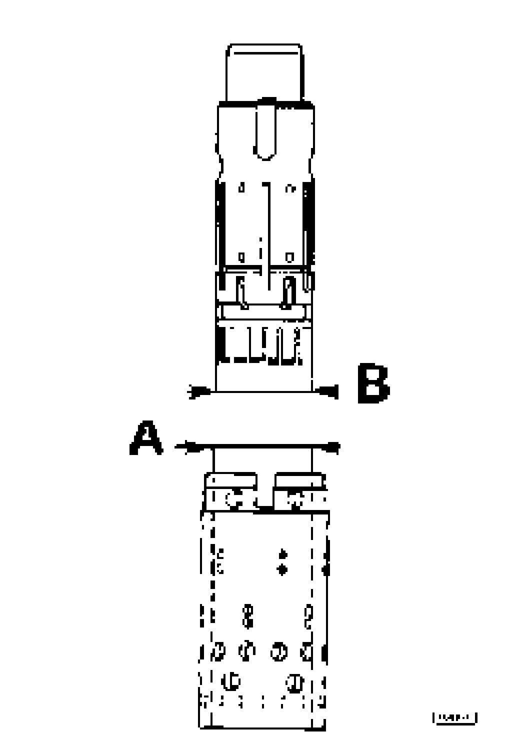


Fig. 1 - Fit diameter between internal and external elements of the control valve.

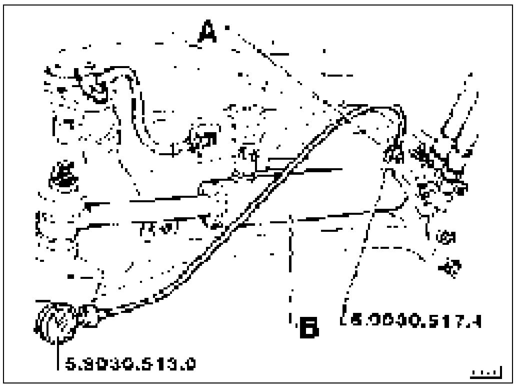


Fig. 2 - Testing pressure in the hydraulic steering circuit.
A fitting
B cylinder

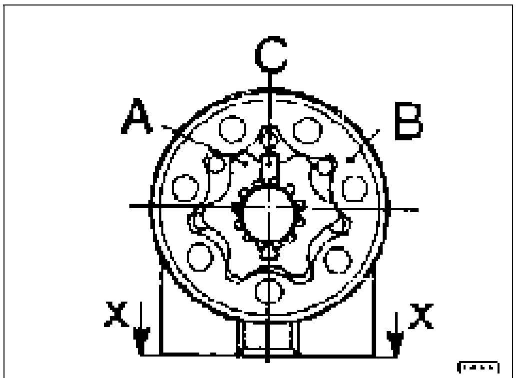


Fig. 3 - Correct assembly of orbital pump unit

Inspections and checks

Steering pump

Clean all component parts of the pump thoroughly, using petrol.

Check that the gears are not unduly worn, otherwise repalce.

Directional control valve

Clean all parts of the valve thoroughly.
Check, utilizing a comparator for internal dimensions, that the clearance between spool and sleeve (**A - B** - Fig 1) is no greater that 0.03 mm: otherwise replace.
The two components are not available separately as spare parts.

Check the setting of the pressure relief valve.

Couple pressure gauge 5.9030.513.0 by means of adaptor 5.9030.579.0 to the fitting of the left hand steering cylinder (as indicated in fig 2).

Start the engine and allow to idle for a few minutes; then, with the steering on full right hand lock, turn the wheel further until the hand of the gauge stabilizes at around the maximum pressure. If this is different to the maximum operating pressure (150 bar), adjust the setscrew (**A** - fig 10, page 300) of the valve until the requisite value is re-established in the circuit.

Repeat the same sequence of operations with the pressure gauge and adaptor fitted to the right hand steering cylinder, this time on the left hand lock.

Bleeding the hydraulic circuit

Start the engine and allow to idle at minimum rpm.

Loosen the two fittings at the cylinder and turn the steering wheel each way until oil emerges devoid of air bubbles.

Assembly of orbital pump unit

Locate the rotor **A** in the stator **B** as illustrated, making certain that the pin **C** is perpendicular to the plane x - x of the valve body as indicated in fig 3.

Steering wheel shaft

Verify the integrity of the steering column, and in particular, make certain that the surfaces of the bearings are not scored, also that the splines are neither damaged nor showing signs of excessive wear.
Do not grease or oil the bearing inside the sleeve.

Check that the steering column rotates freely, without sticking, but also without excessive play.
Before refitting the rubber boot A (Fig 4), smear the steering column B with the specified grease at the position indicated in fig 4.

Having tightened all components, check that the steering wheel continues to operate correctly even when at its two height adjustment limit positions (fully raised and fully lowered).

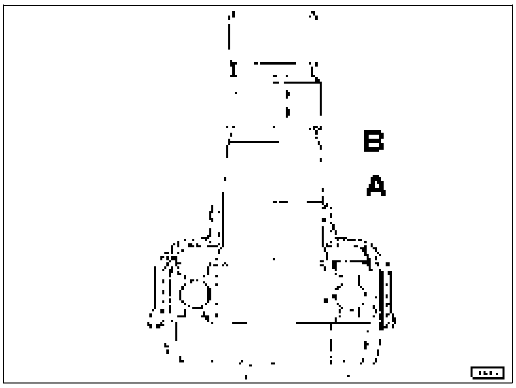


Fig. 4 - Section through steering wheel shaft
A Rubber boot
B Steering column

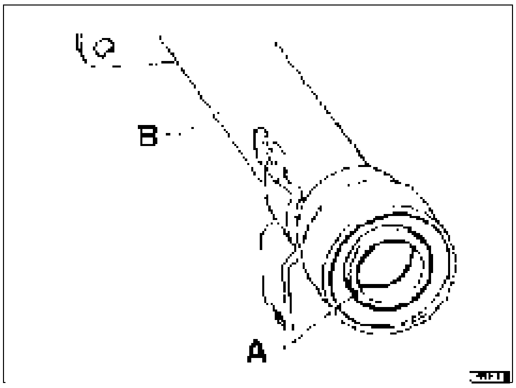
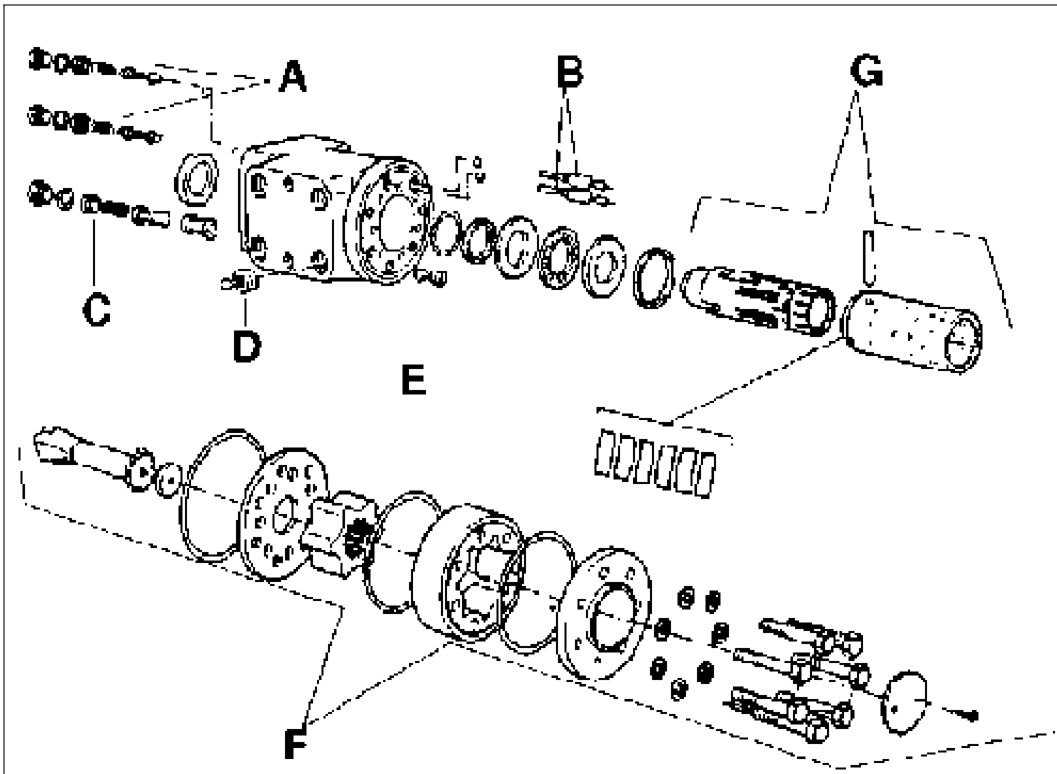


Fig. 5 - Steering column.
A Bearing
B Sleeve

Steering cylinders

Clamp the cylinder in a vice and withdraw the piston E (fig. 7);
If necessary, remove the circlip F (fig. 8) from its groove with the aid of a suitable tool to allow withdrawal of the ball end G (fig. 8).

If necessary, remove the seal (C - fig. 7) from the cyilinder with the aid of a screwdriver.



A - Shock valves for reversible driving position
B - Anticavitation valves
C - Pressure relief valve (150 bar)
D - Emergency steering check valve
E - By-pass valve (redirects return flow to inlet)
F - Orbital pump unit
G - Directional control valve

Fig. 6 - Components of directional control valve.

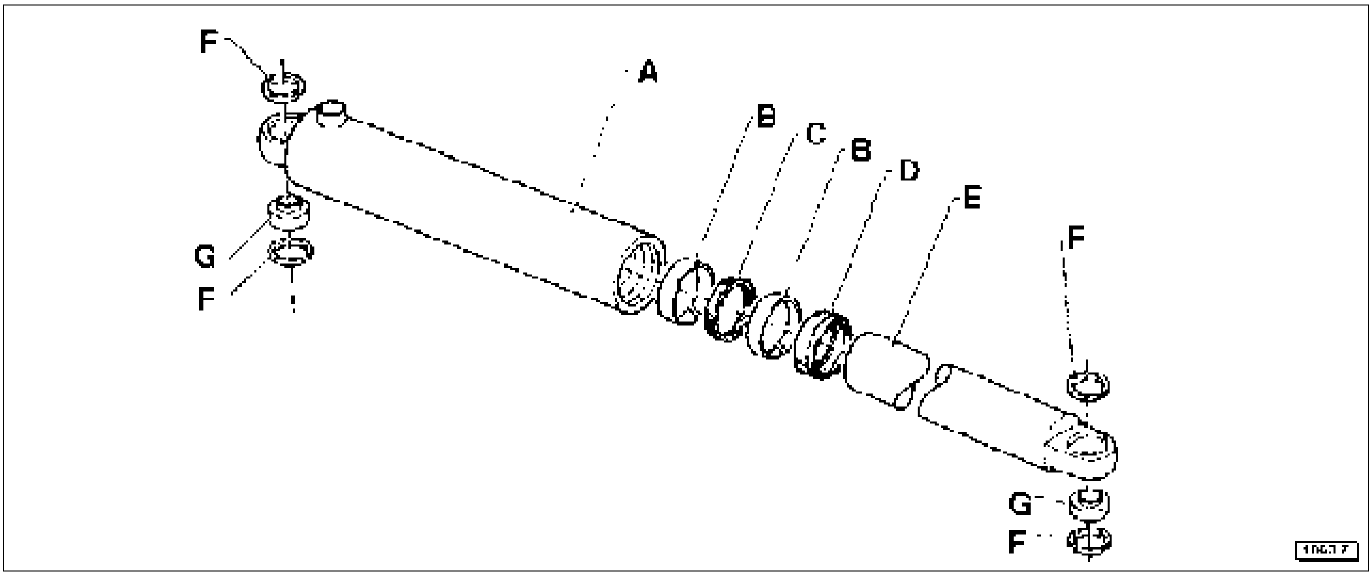


Fig. 7 - Single acting cylinder.
A Cylinder
B Rod guide
C O-ring
D Wiper
E Piston
F Circlip
G Ball end

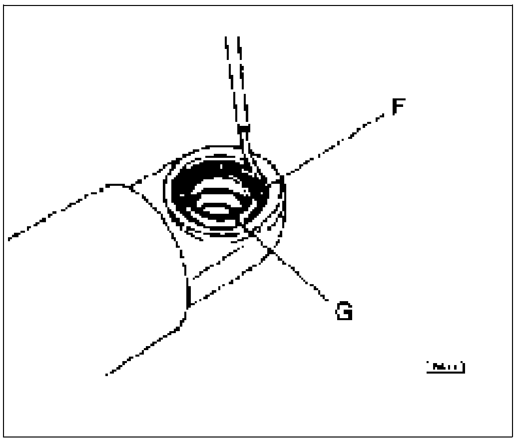


Fig. 8 - Ball joint.
F Circlip
G Ball joint

Servicing

Verify the integrity of the O-ring and wiper seals. Replace any components showing signs of wear or damage.

Inspect the sliding surfaces both of the rod and of the cylinder for signs of scoring, heavy wear or any kind of damage; if any of these are discernible, replace the affected component.

Check for correct operation of the ball end, ensuring that it betrays no signs of heavy wear, scoring or oxidation, the presence of which dictates replacement.
Lubricate the wiper seals and ball end with care.

Reassemble the cylinder, repeating the dismantling operations in reverse sequence.

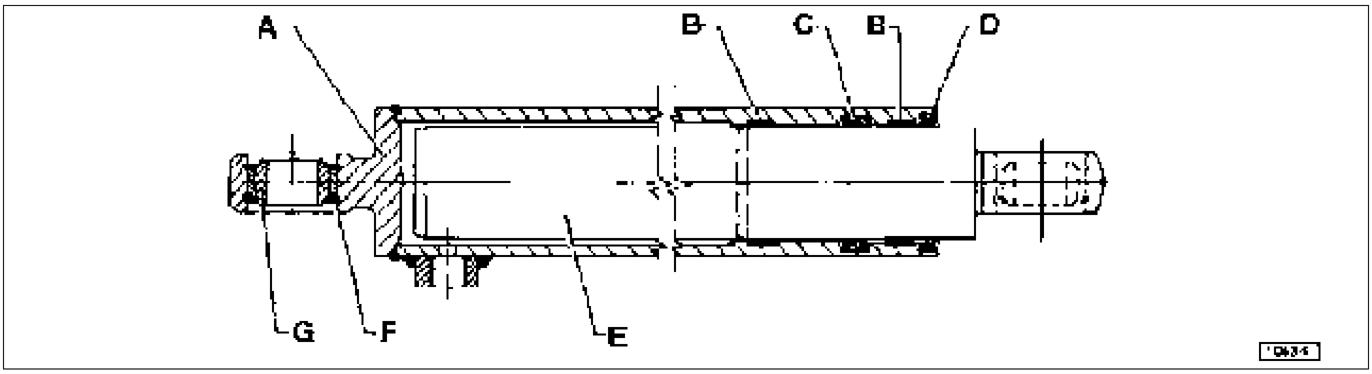
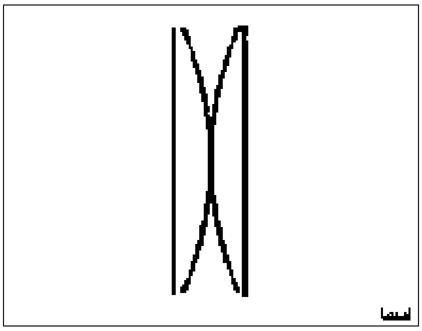
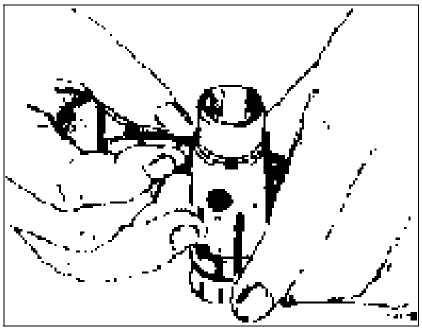


Fig. 9 - Section through single acting cylinder.
A Cylinder
B Rod guide
C O-ring
D Wiper
E Piston
F Circlip
G Ball end

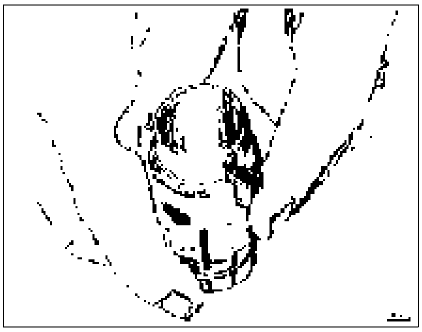
Instructions for the hydrostatic steering distributor assembly



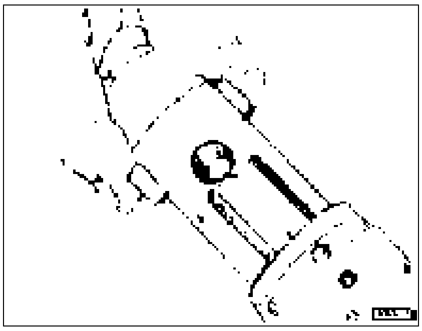
1 - Insert the spring set (blue) as shown in figure.



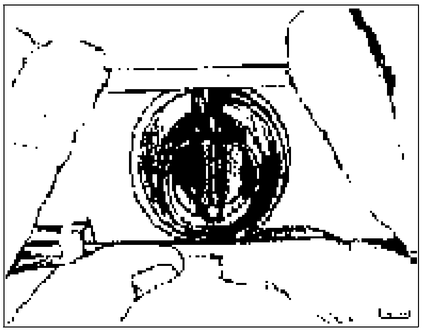
2 - Insert first the two external spring blades into the rotary distributor and subsequently the two internal ones.



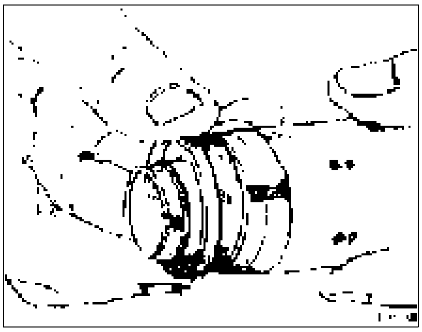
3 - Press the spring blades to align in centre position.



4 - Reassemble the rotary distributor.

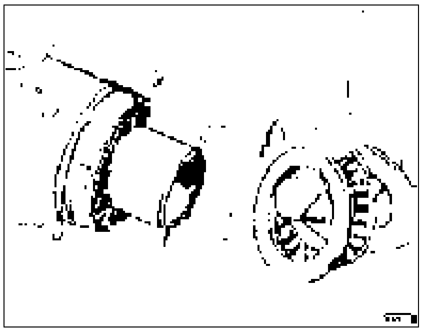


5 - Act on springs in such a way they are prevented from projecting outwards with respect to the rotary distributor outside surface.

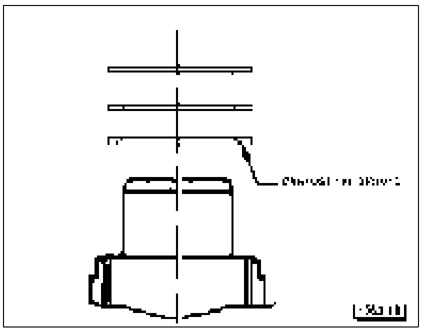


6 - Fit the spacer onte the distributor.

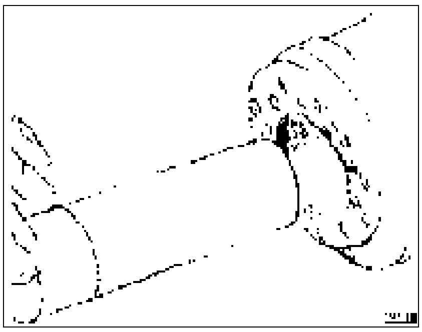
7 - Insert the drive pin into the cylinder.



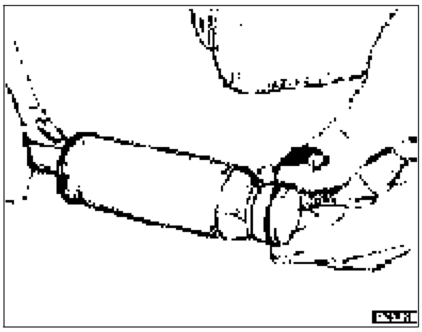
8 - Install the axial bearing following the assembly order shown in next figure.



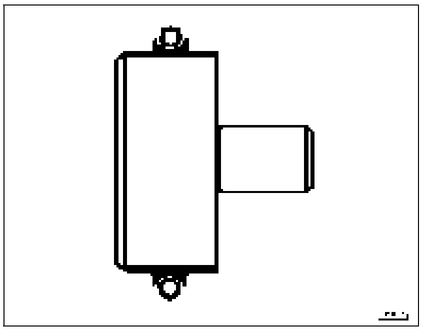
9 - Axial bearing installation.



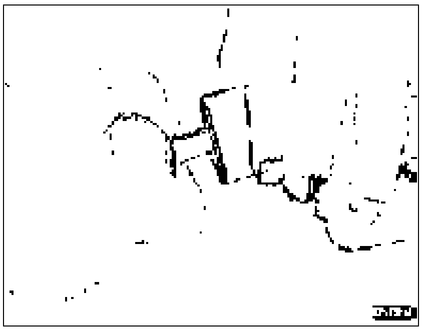
10 - Use no. 5.9030.480.0 tool to fit the seal ring.



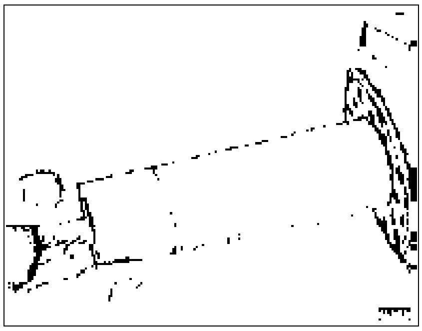
11 - Insert the O-ring after fitting the tool sleeve into the distributor case.



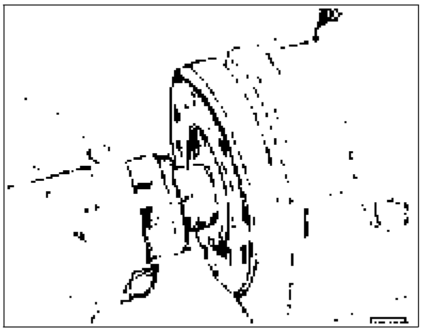
12 - O-ring as installed on the plug.



13 - Insert the O-ring into the sleeve and press until it is fully inserted.

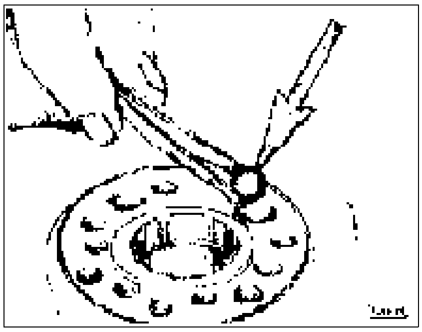


14 - Pull out the tool.

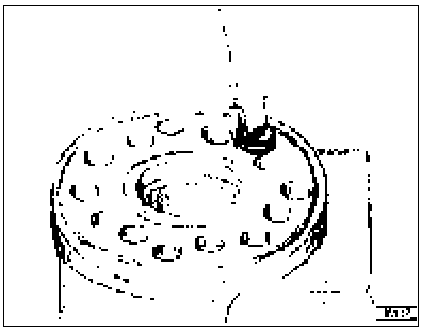


15 - Insert the distributor from the bottom trying to make installation easier alternately rotating in both directions.

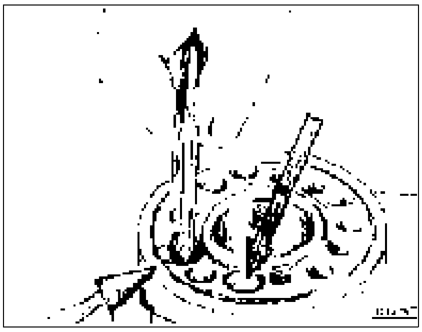
16 - Press the distributor until the plug is pushed out of the opposite side.



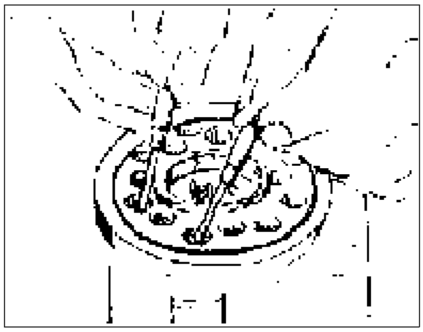
17 - Turn the distributor case upside down holding the rotary distributor in place and iserting the shunt valve as indicated by the arrow in figure.



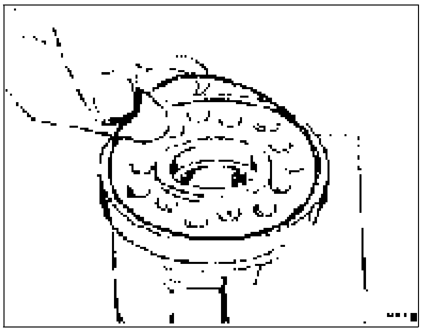
18 - Screw down the valve grub screw in its seat.



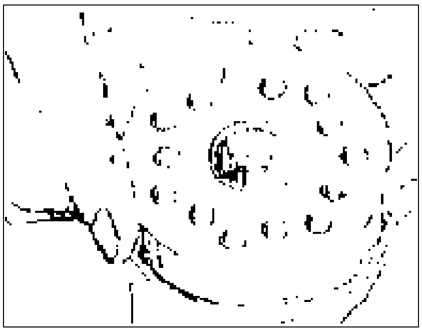
19 - Insert the balls as shown by the arrow.



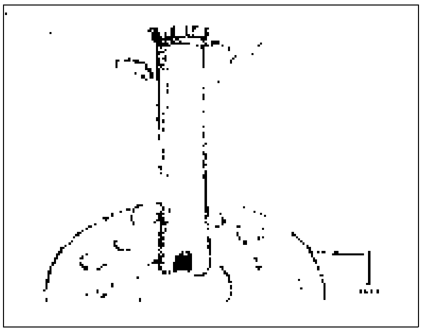
20 - Insert the two pins in the same positions as previously shown.



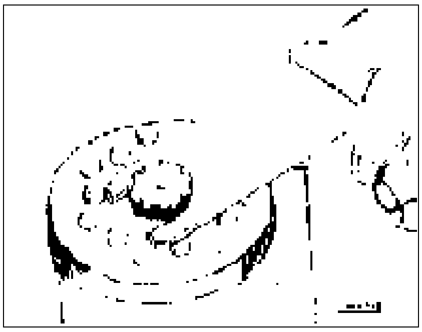
21 - Fit the seal ring in the related seat.



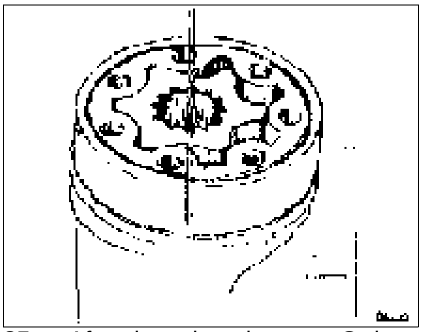
22 - Fit the spacer in such a way the holes in it are in the same line as the corresponding grooves.



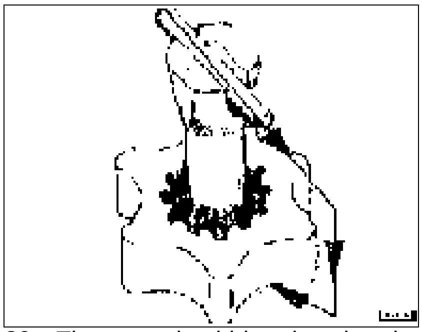
23 - Insert the drive shaft in the distributor so that the notching may engage into the pin in a position being parallel to the distributor face.



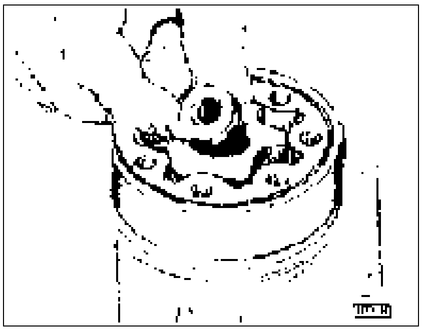
24 - Place the fork as shown in figure so as the drive shaft may be held in position.



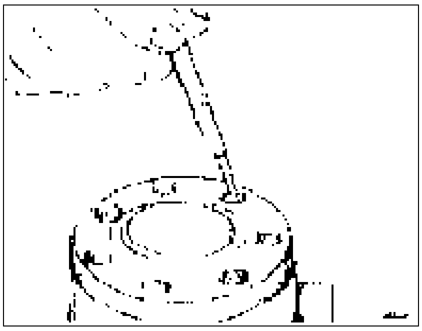
25 - After inserting the two O-rings properly lubricated into the oil flow control shutter fit the stator positioning as shown in figure.



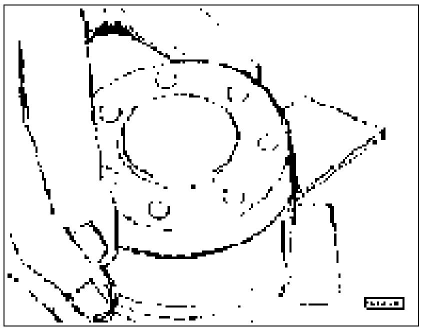
26 - The rotor should be placed to the stator and then swiveled with regard to the drive shaft as shown in figure.



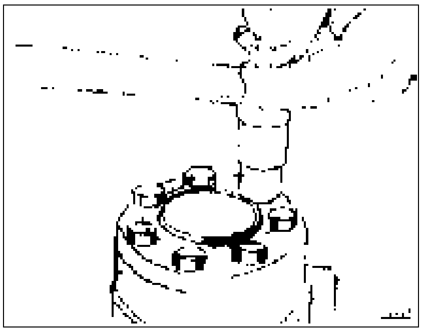
27 - Place the spacer ring. (only for those models which the spacer is fitted).



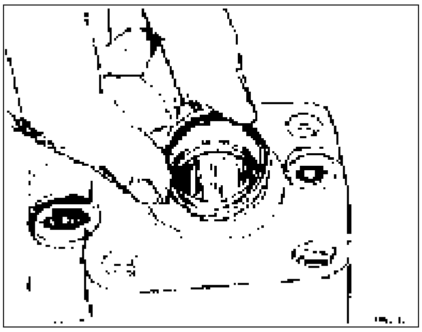
28 - Install the pin screw in the special hole (the ball valve hole).



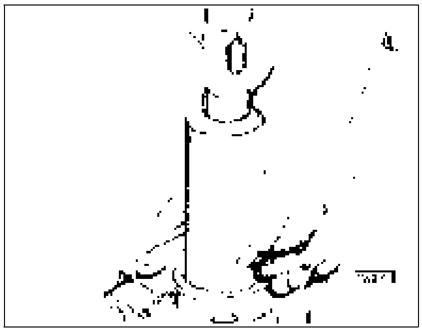
29 - Fit the cover.



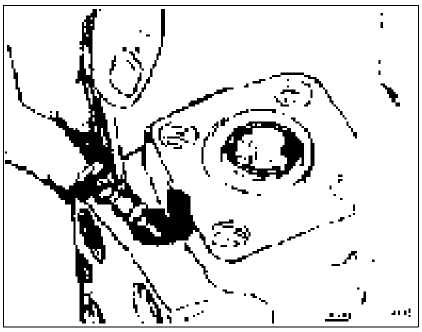
30 - Fix the cover with the securing screws by tightening to the recommended torque.



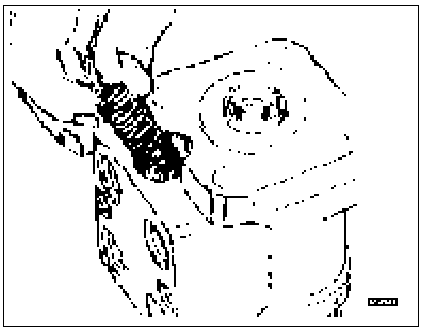
31 - Fit the seal ring.



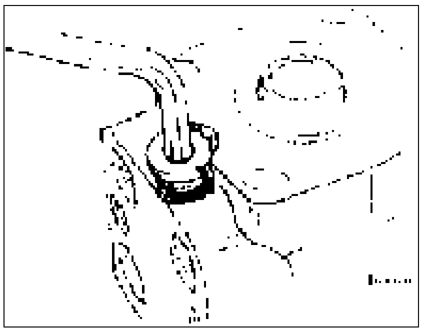
32 - Insert the seal ring into its seat.



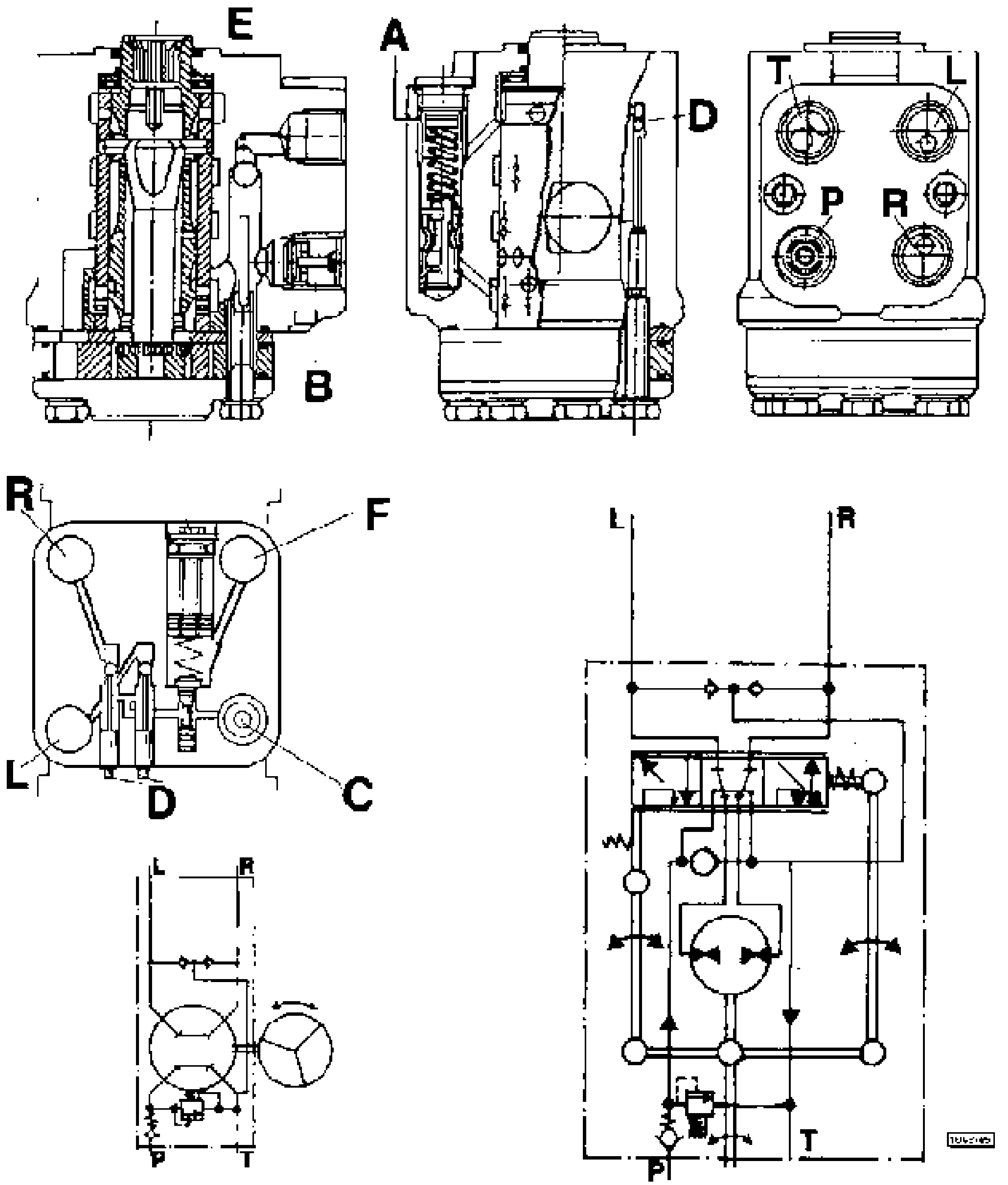
33 - Install the pressure relief valve.



34 - Insert the spring.



35 - Fit the pressure relief valve cap screw.

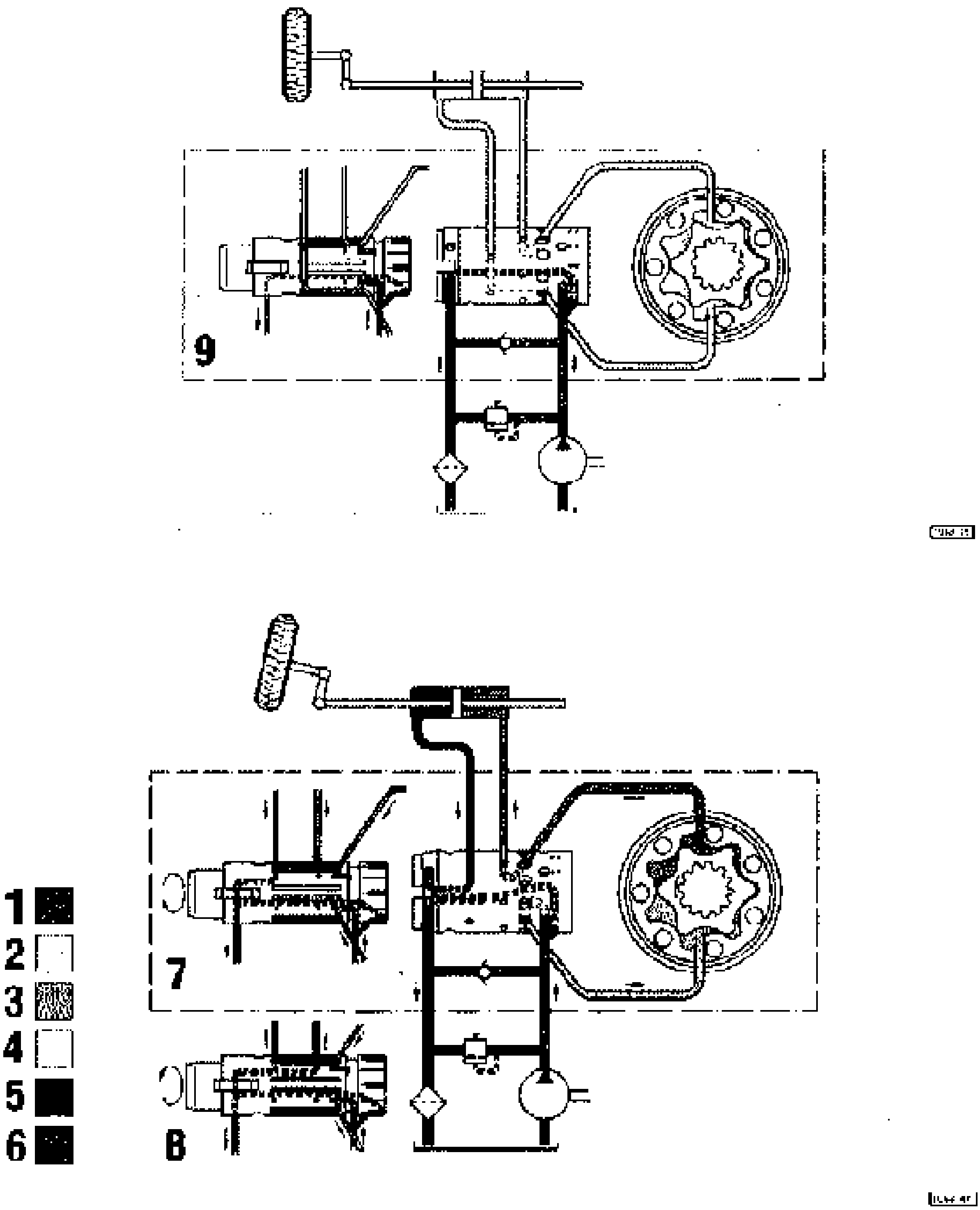


A - pressure relief valve
B - check valve
C - from pump
D - anticavitation valve

E - emergency steering check valve
F - return flow
L - to left hand cylinder
R - to right hand cylinder

P - pump
T - tank

Fig. 10 - Distributor cross-section.



1 - oil to the main pump
2 - oil to the flow control shutter
3 - oil to the steering cylinder

4 - oil trapped in closed circuit
5 - oil in the discharging line
6 - oil in the aspirating line

7 - right-hand rotation
8 - left-hand rotation
9 - neutral position

Fig. 11 - Reactive-type, open-centre hydraulic distributor schematic diagram.

Mechanical controls

Given the constructional simplicity of these controls, a sequence of drawings is given here illustrating the single component parts of each one.
Only certain of these require any adjustment, in which case reference is made to the chapter covering the assembly with which the control is associated.

Fig 1 - Mechanically operated P.T.O. clutch
Fig 2 - Economy P.T.O. selector - external linkage
Fig 3 - Economy P.T.O. selector - internal linkage
Fig 4 - P.T.O. selector
Fig 5 - Live P.T.O. control linkages
Fig 6 - Four wheel drive selector
Fig 7 - Mechanically operated front differential lock
Fig 8 - Throttle control linkages

CAUTION: It is important that linkage rods with an adjustable clevis are adjusted in such a way that the associated control levers can complete their full travel between maximum and minimum positions without impediment.

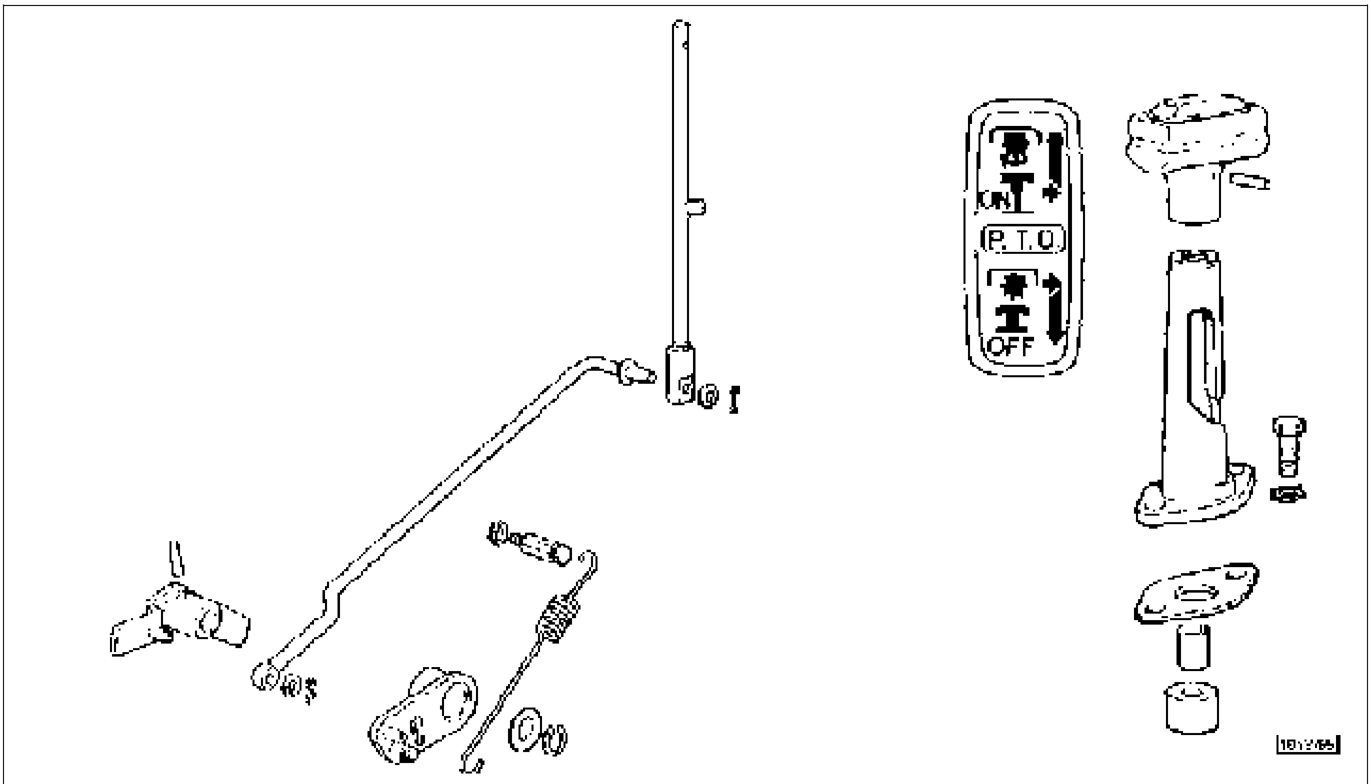


Fig. 1 - Mechanical operated P.T.O. clutch.

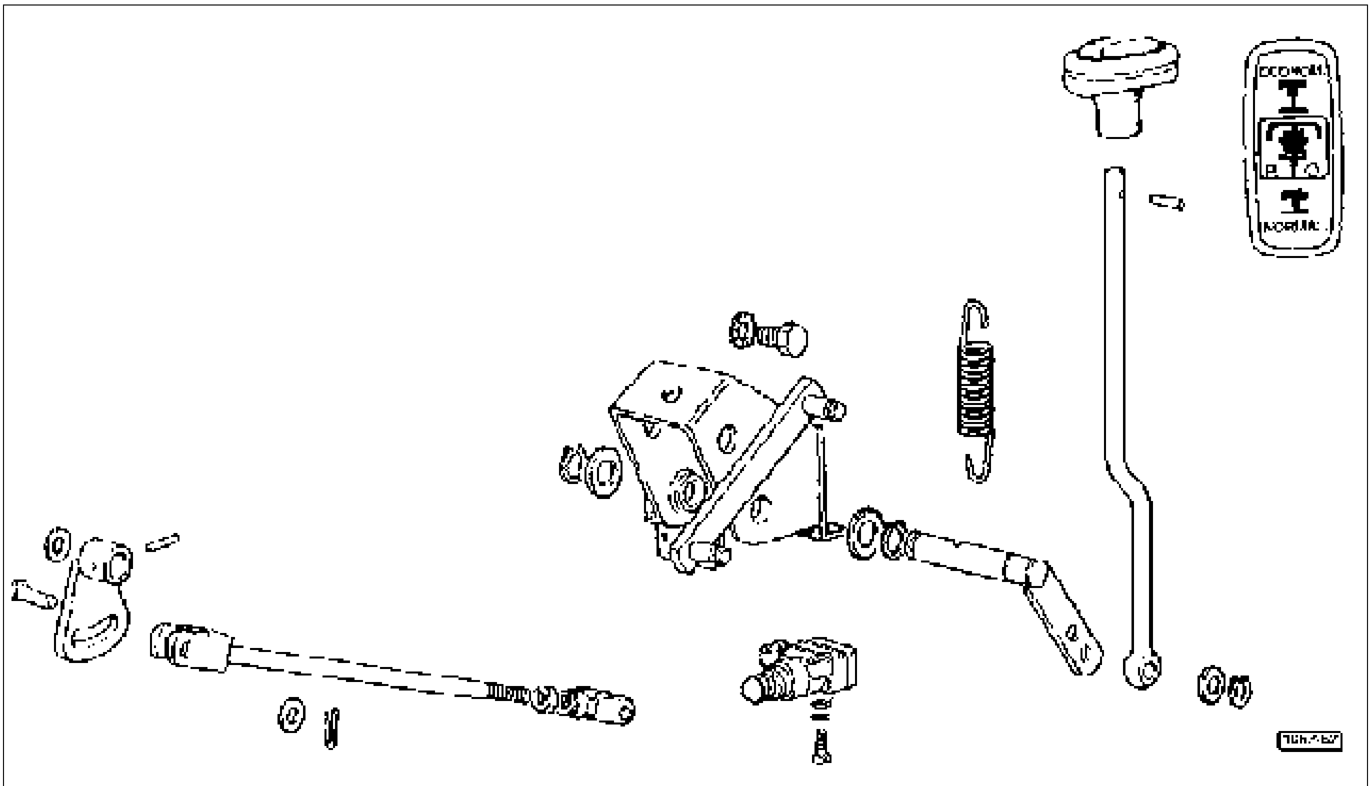


Fig. 2 - External selector linkage for Economy P.T.O. (for adjustment procedure see chapter 36 - power take-off).

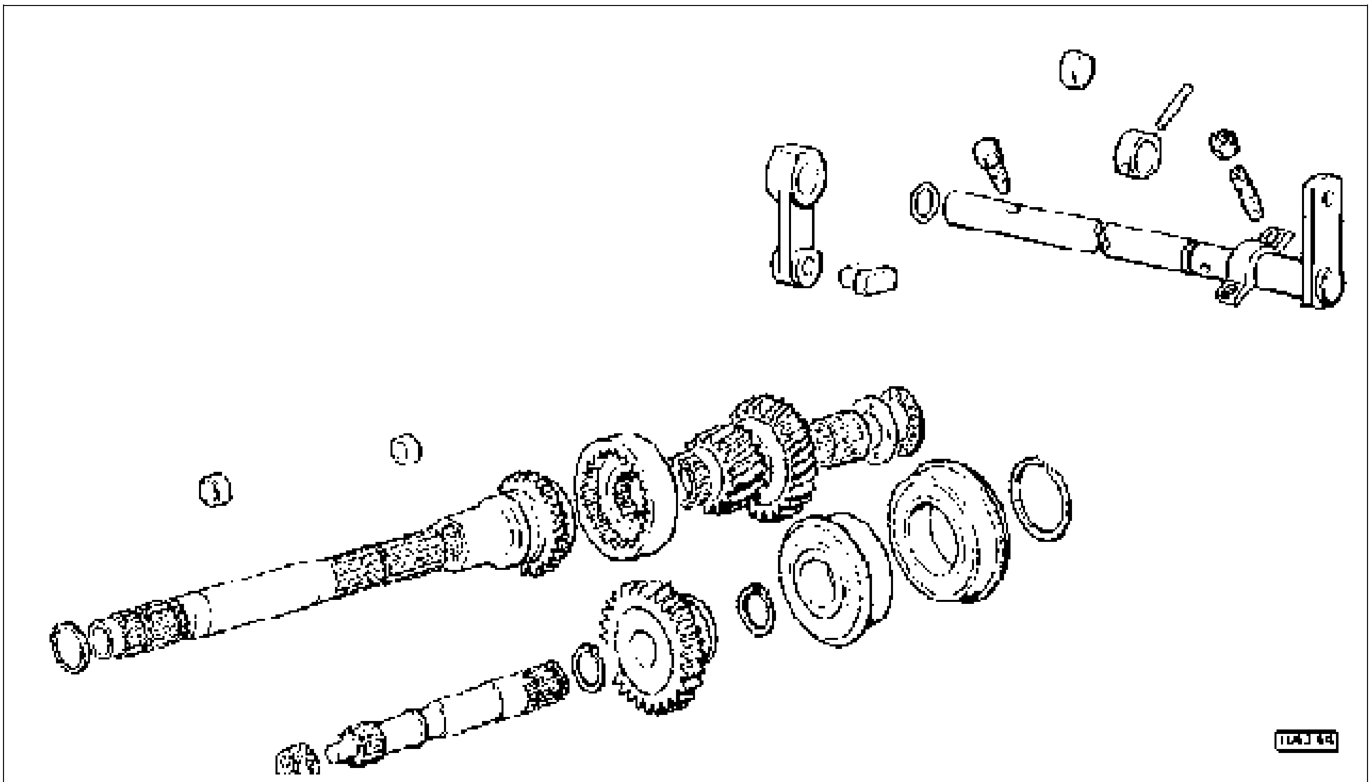


Fig. 3 - Internal selector linkage for Economy P.T.O. - SILVER 80 - 90 (for adjustment procedure see chapter 36 - power take-off).

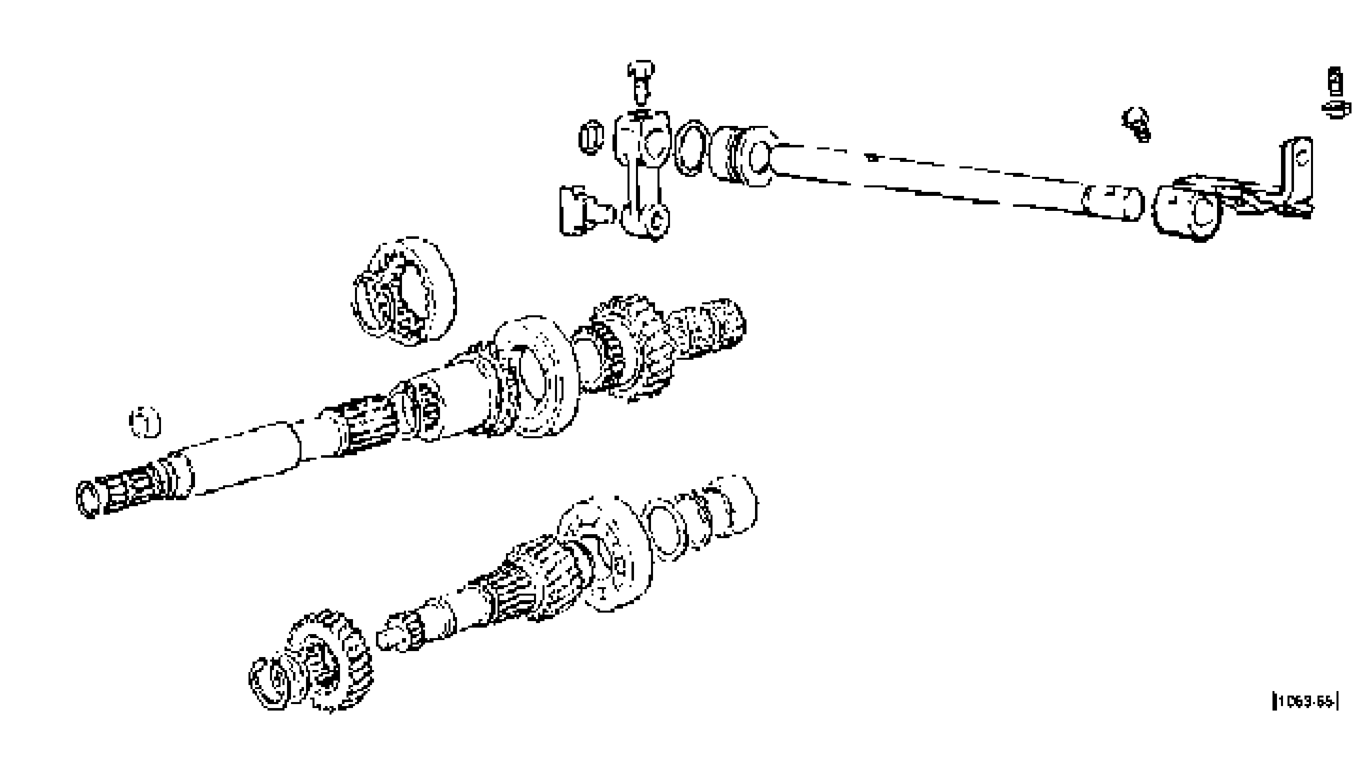


Fig. 3 /A - Internal selector linkage for Economy P.T.O. - SILVER 100.4 - 100.6 (for adjustment procedure see chapter 36 - power take-off).

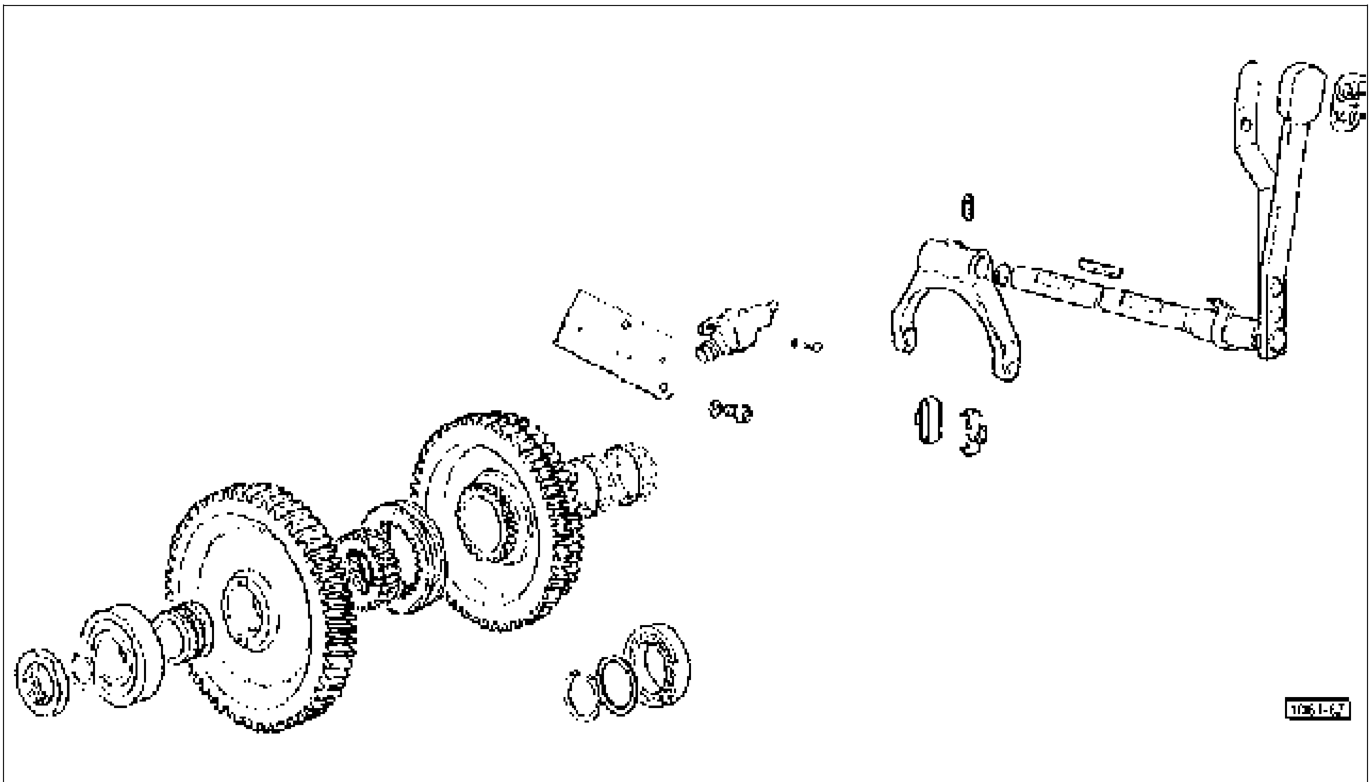


Fig. 4 - P.T.O. 775/1000 rpm selector (Economy P.T.O.) - SILVER 80 - 90 (for adjustment procedure see chapter 36 - power take-off).

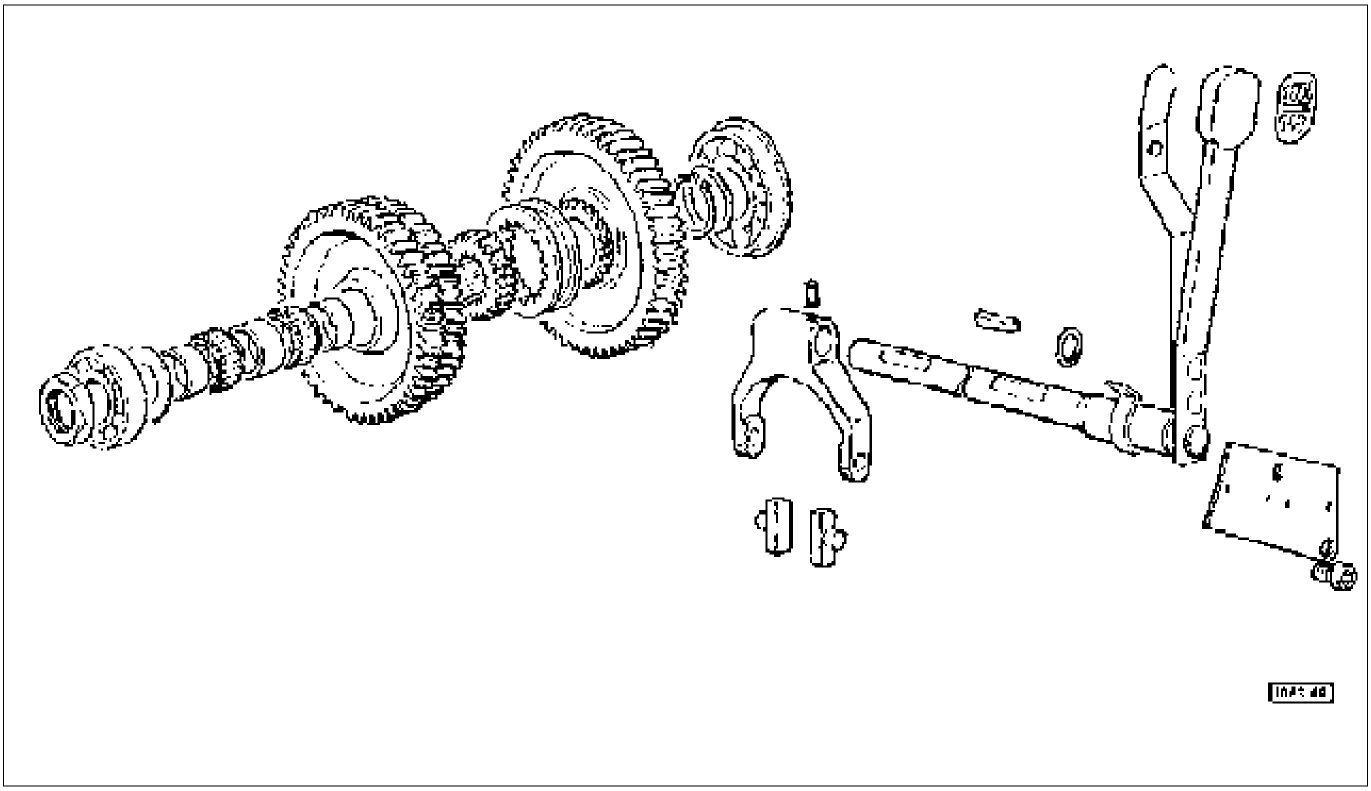


Fig. 5 - P.T.O. 775/1000 rpm selector (ECONOMY P.T.O.) - SILVER 100.4 - 100.6.

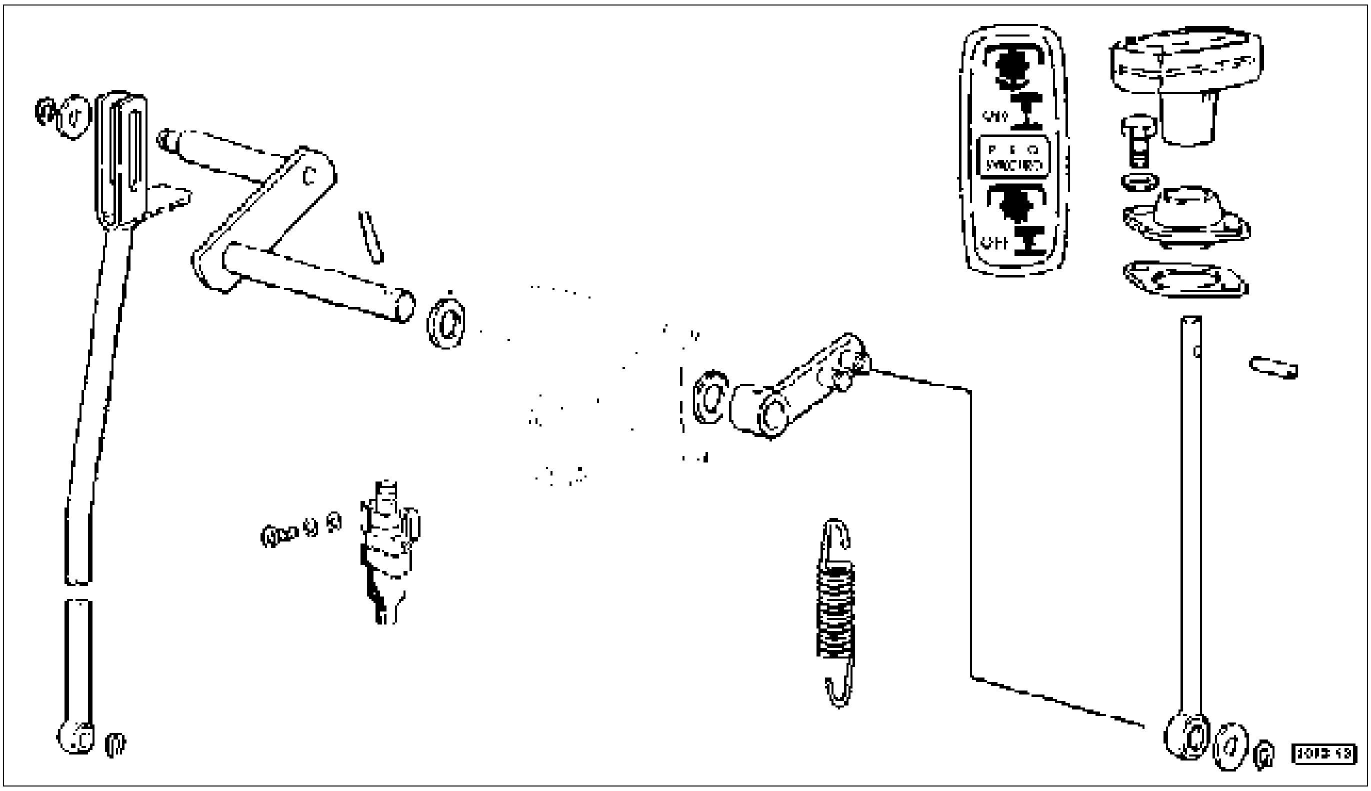


Fig. 6 - External selector linkage for live P.T.O.

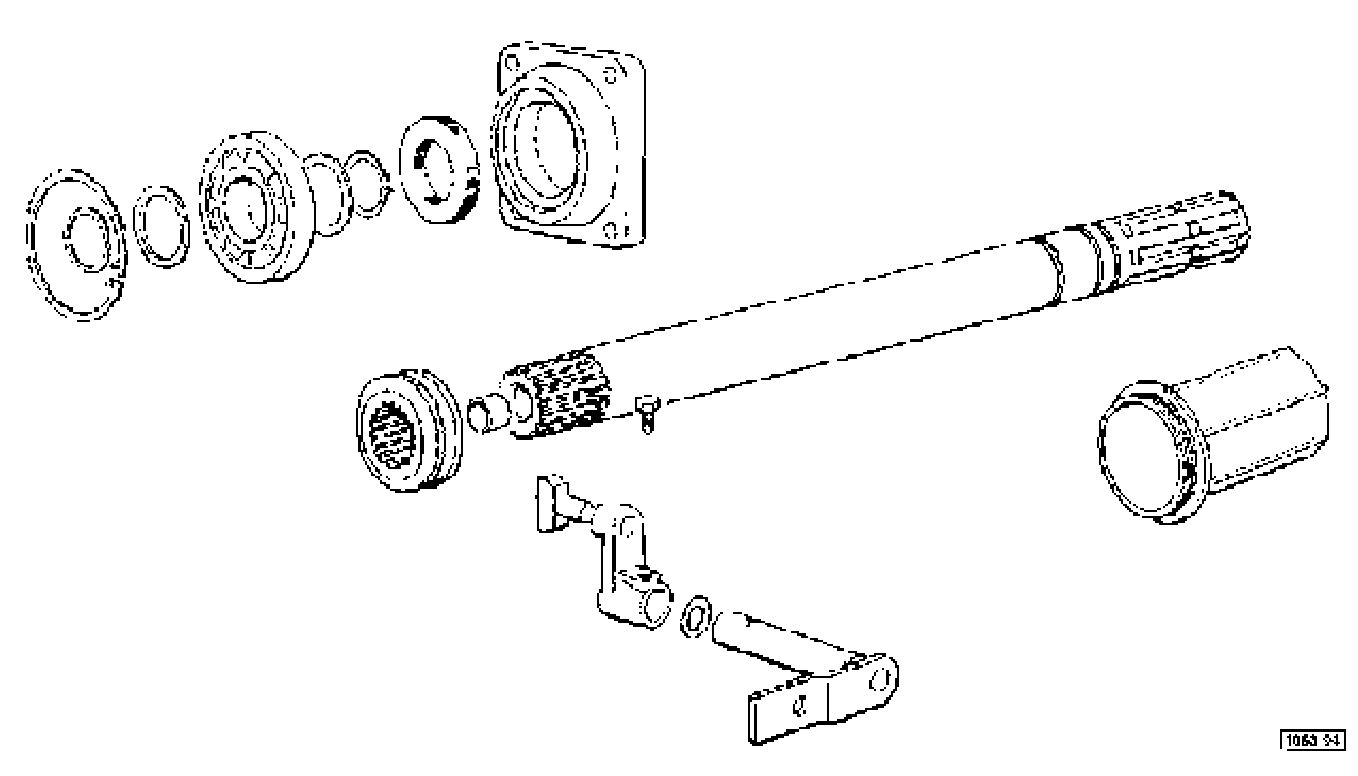


Fig. 7 - Internal selector linkage for live P.T.O. syncro.

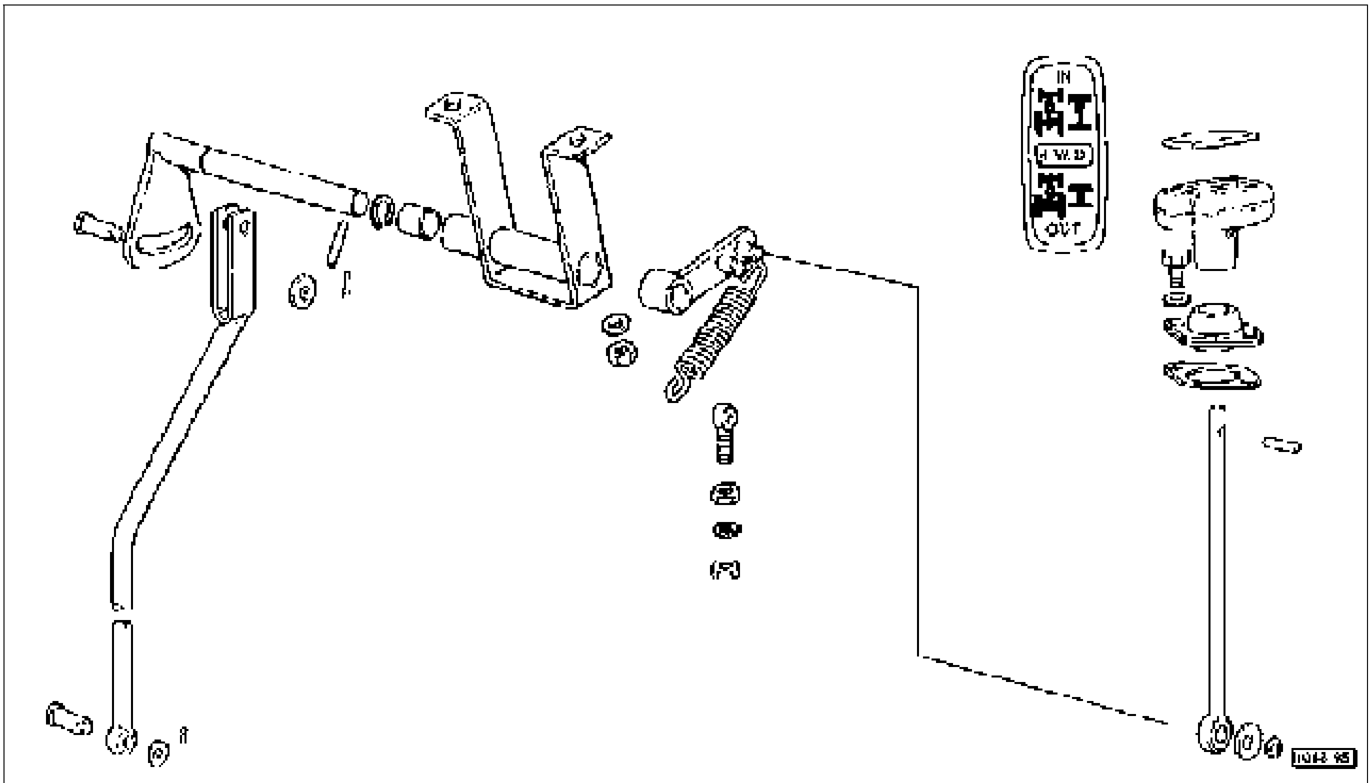


Fig. 8 - External selector linkage for 4WD.

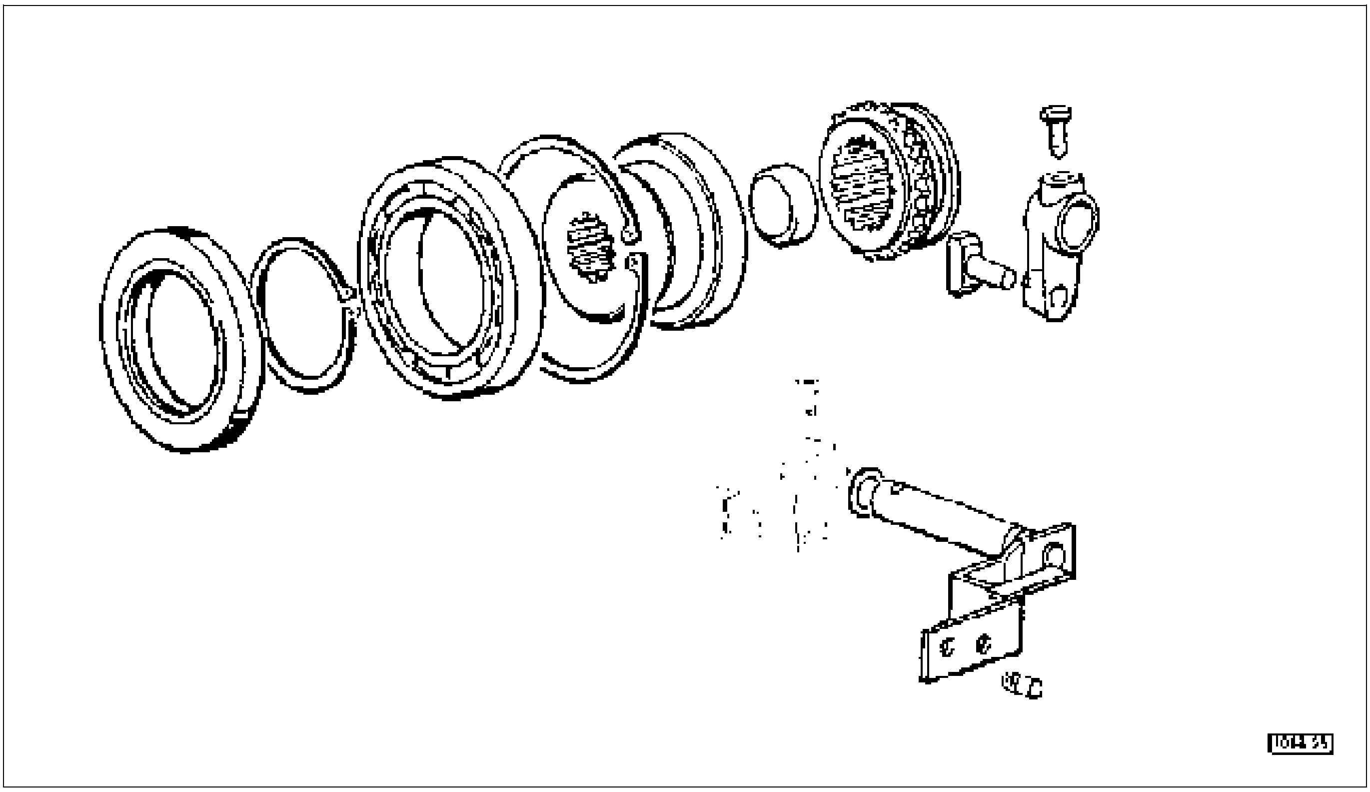


Fig. 9 - Internal selector linkage for 4WD.

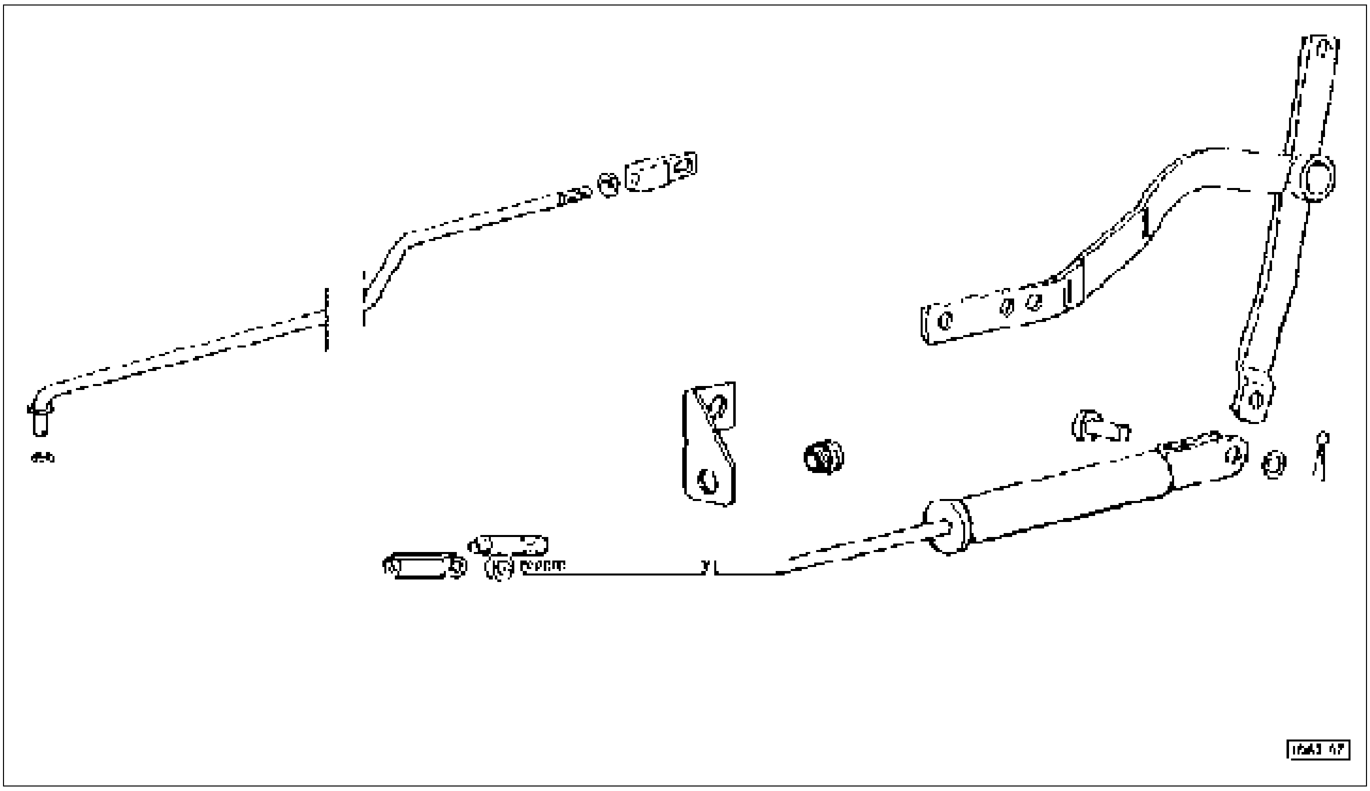


Fig. 10 - External mechanical linkage operating front differential lock.

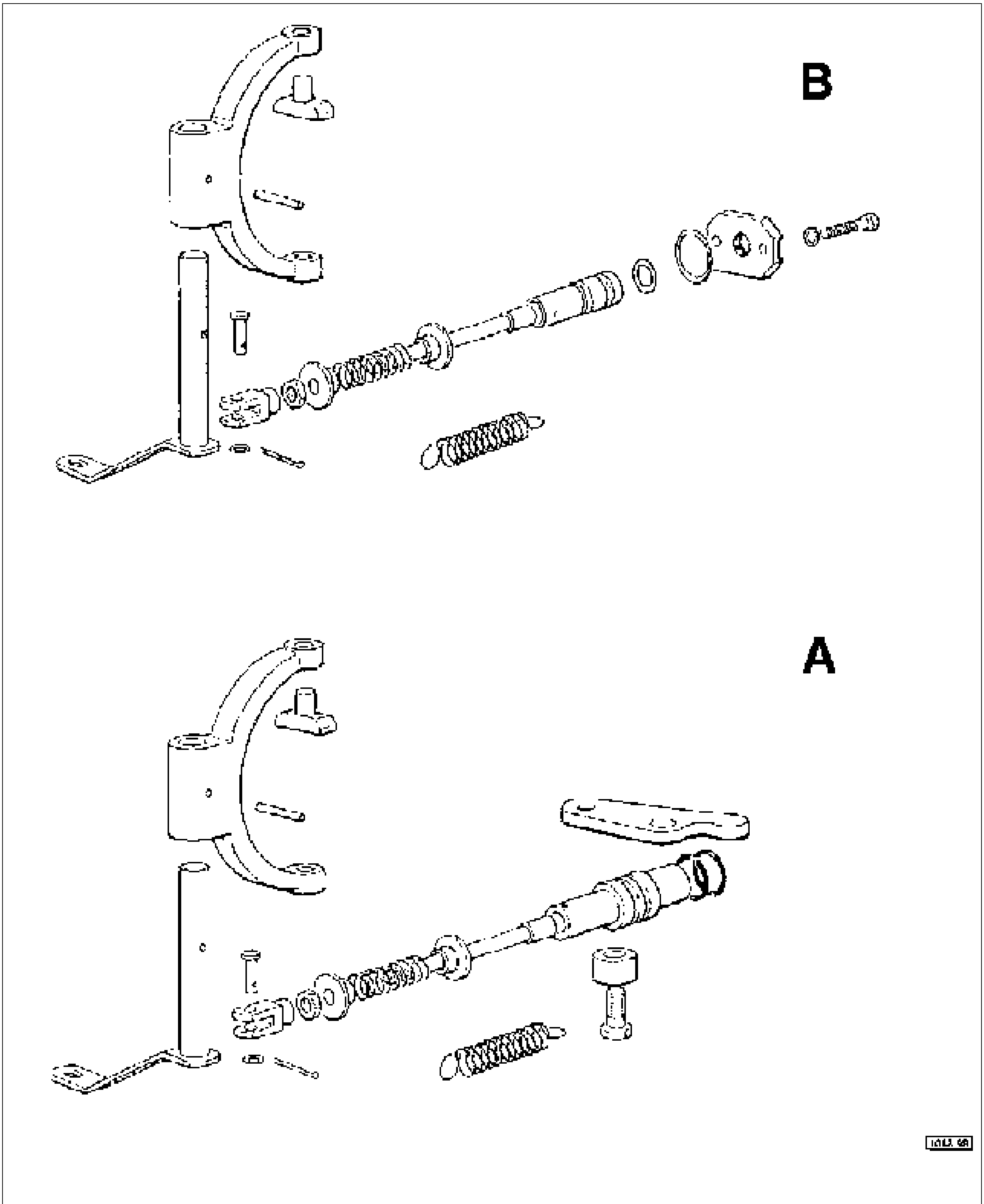


Fig. 11 - Internal mechanical linkage operating front differential lock. **A** mechanical **B** - electrohydraulic (for adjustment procedure see page 327).

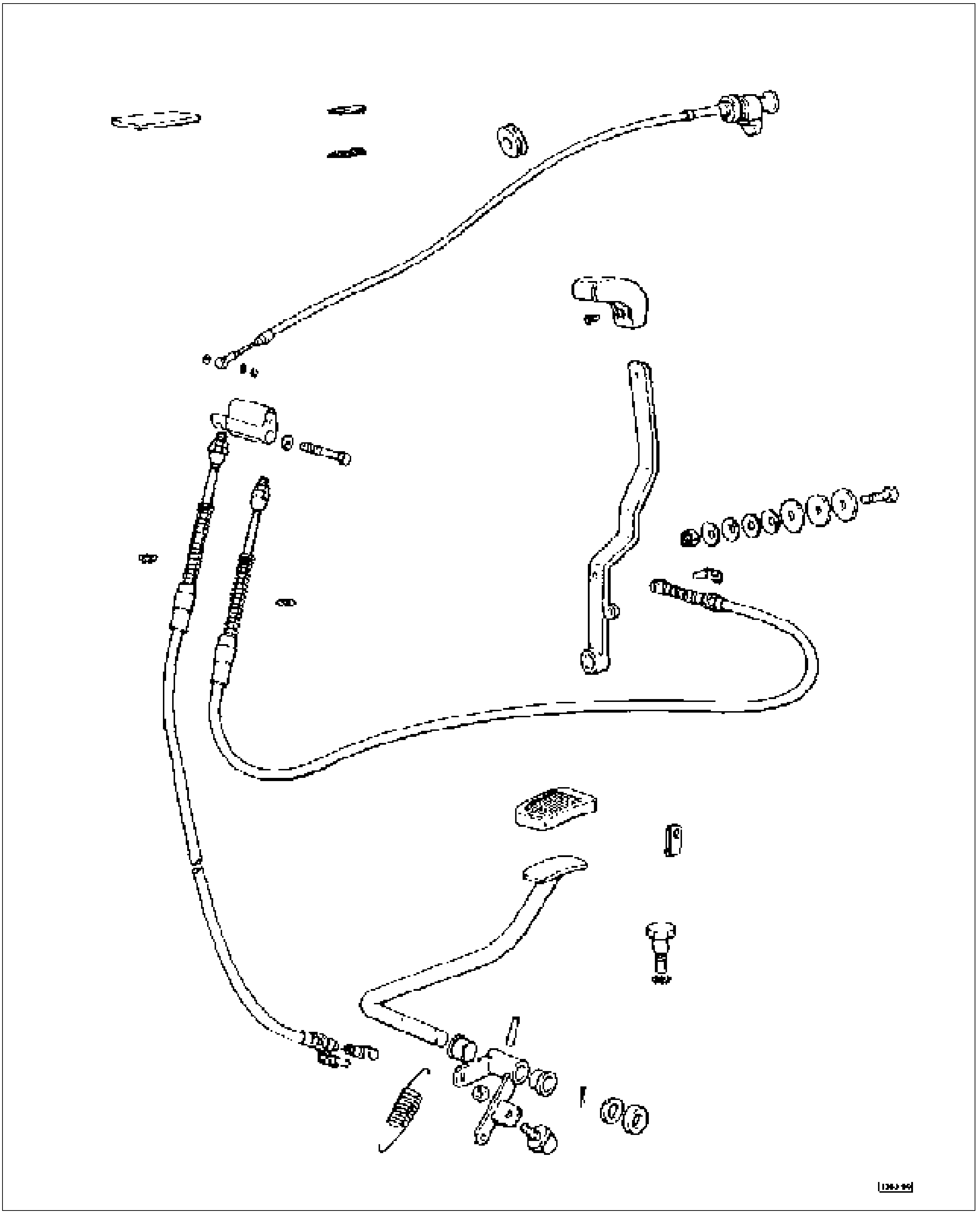


Fig. 12 - Mechanical type throttle control linkage. (For adjustment procedures see pages 60 - 61).

Electrohydraulic controls

Electrohydraulic controls allow the driver to work less laboriously, as the tractor is made easier to handle. Electohydraulically controlled functions can be operated effortlessly, with swiftness and precision.

Front and rear differential locks

The differential locks are operated by pressing the relative button on the console to the right of the driver; the button will remain depressed, with the built-in indicator alight.

Engagement of the differential locks is also confirmed by a dedicated indicator at the Check Panel.
To release the locks, simply press the button a second time.

Four wheel drive

Four wheel drive is engaged by pressing the relative button on the console to the right of the driver; the button will remain depressed, with the built-in indicator alight.
Engagement of four wheel drive is also confirmed by a dedicated indicator at the Check Panel.

To disengage four wheel drive, press the button a second time (release the accelerator pedal before pressing the button to deselect four wheel drive, as this will facilitate disengagement; both the ON and OFF states are indicated at the check panel).

SBA System (installed only on machines with cab)

The SBA System is activated by pressing the AUTO button. This system pilots the operation of the differential lock and the four wheel drive functions automatically, taking priority over the relative electrohydraulic controls (see also chapter on SBA System, which contains a description of how the two functions are interlocked).

An indicator incorporated into the AUTO button lights up when the system is activated.

Front power take-off

The electrohydraulically operated front P.T.O. clutch is engaged by pressing the relative button, positioned on the console to the right of the driver. The button is self-locking and has a built-in indicator that lights up to denote the activated condition. Pressing a second time disengages the clutch.

Engagement of the front P.t.o. is also confirmed by a dedicated indicator at the Check Panel.

Rear power take-off

The rear P.T.O. clutch can be either mechanical in operation (illustrated in the previous heading), or electrohydraulic, and is engaged by pressing the relative button positioned at the console on the driver's right. The button is self-locking and has a built-in indicator that lights up to denote the activated condition. Pressing a second time disengages the clutch.

In addition to the button illumination, the engaged condition is confirmed by relative indicator at the Check Panel, where further indicators also give the current operating speed of the P.T.O. shaft.

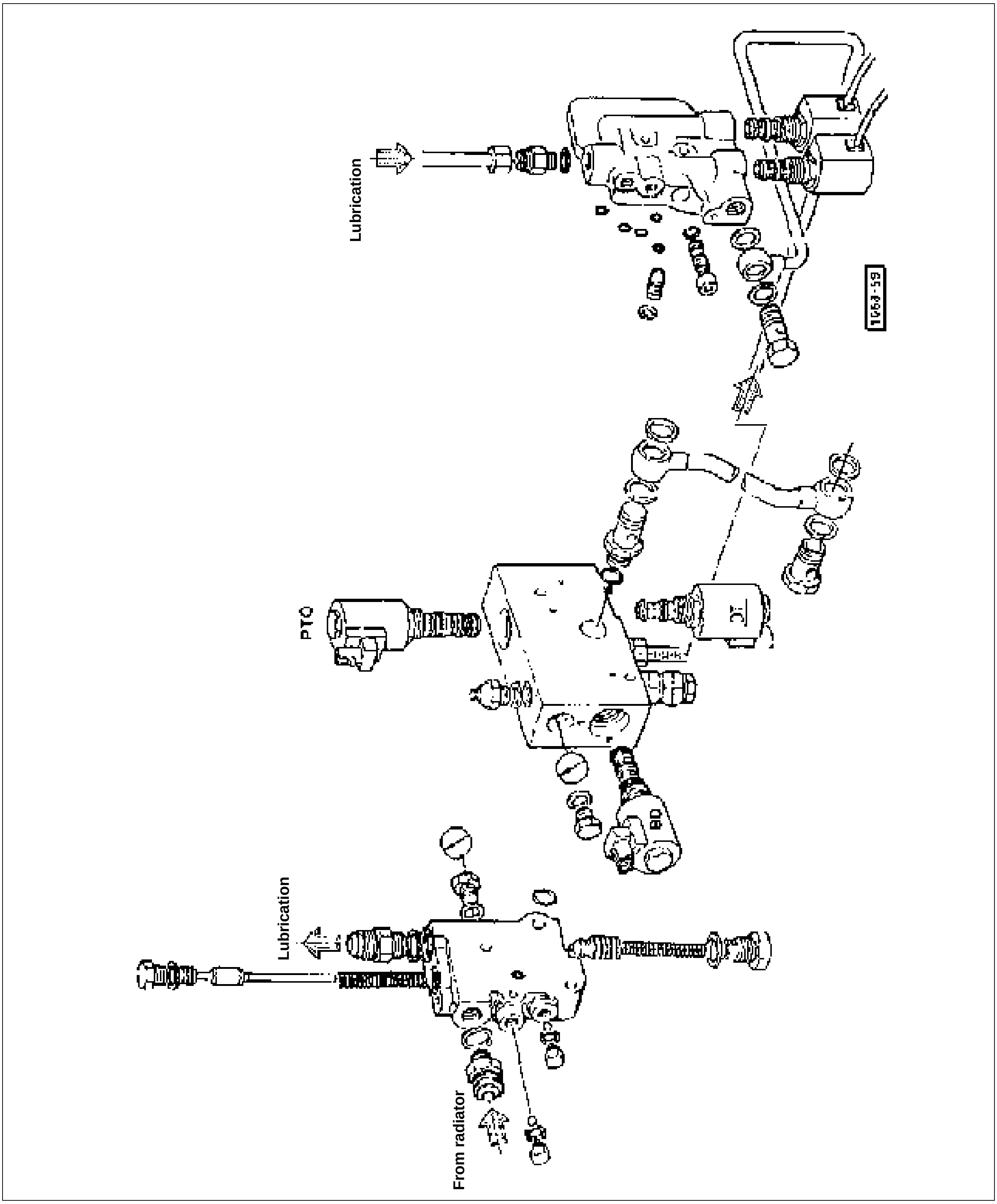
Transmission

With **Agroshift**, the driver can modify the speed given by each ratio selected with the range and gear shift levers, across a band of three adjustments: - - The changes are made electrohydraulically, without operating any pedals, but simply by pressing a button mounted to the knob of the gearshift lever.

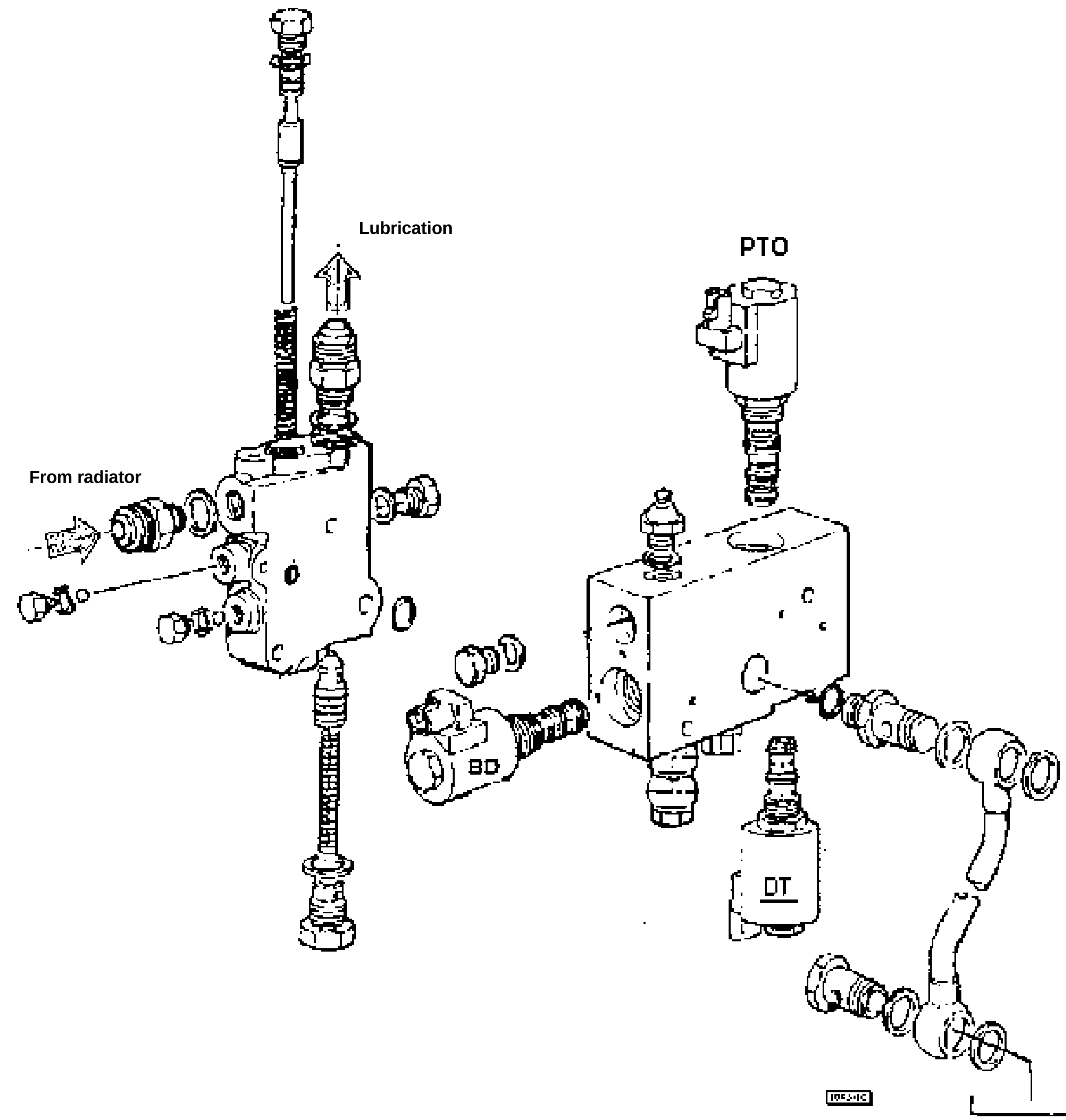
The Agroshift system utilizes a set of three multiple disc clutches.

Configuration of systems

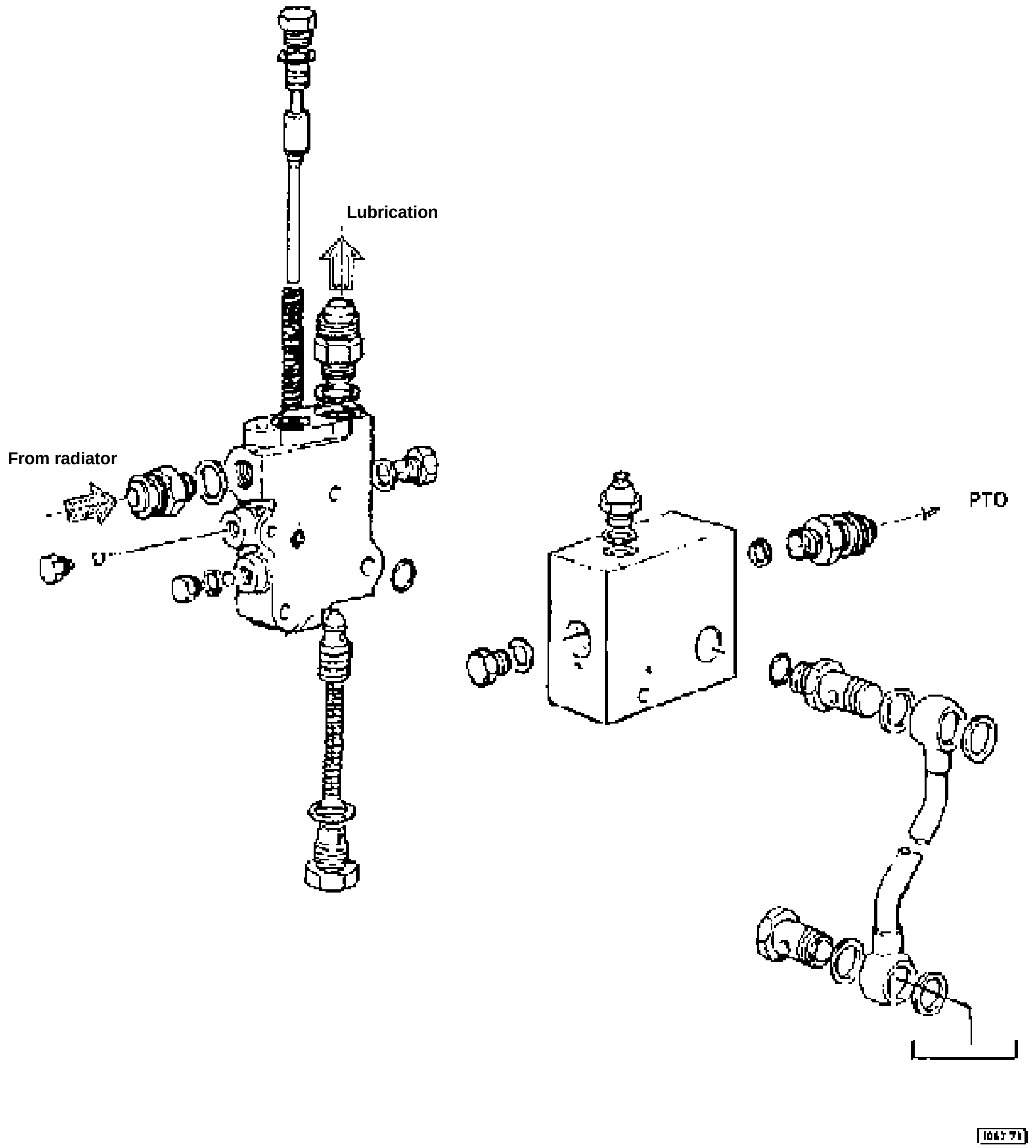
1 - Machine with electrohydraulic controls operating differential lock, four wheel drive and power take-off, and equipped with AGROSHIFT.



2 - Machine with electrohydraulic controls operating differential lock, four wheel drive and power take-off, not equipped with AGROSHIFT.

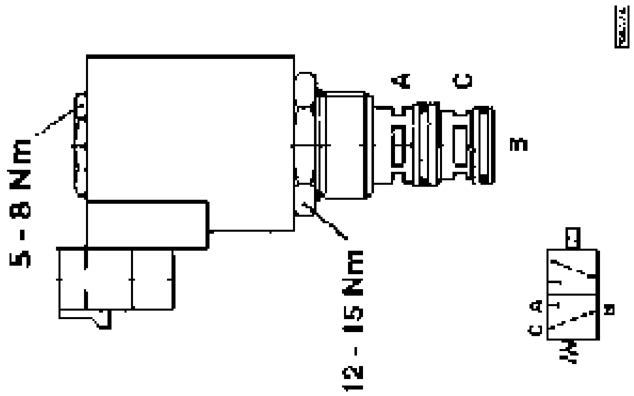


3 - Machine with mechanical controls



Specifications

Solenoid operated valve controlling four wheel drive engagement, differential lock and equipped with AGROSHIFT - machine without SBA SYSTEM.

part number	dimensions	max. delivery rate l/min	max. pressure bar
2.3719.670.0		**12**	**210**

Before tightening the lock nut, smear the thread with LOCTITE 242 (blue).

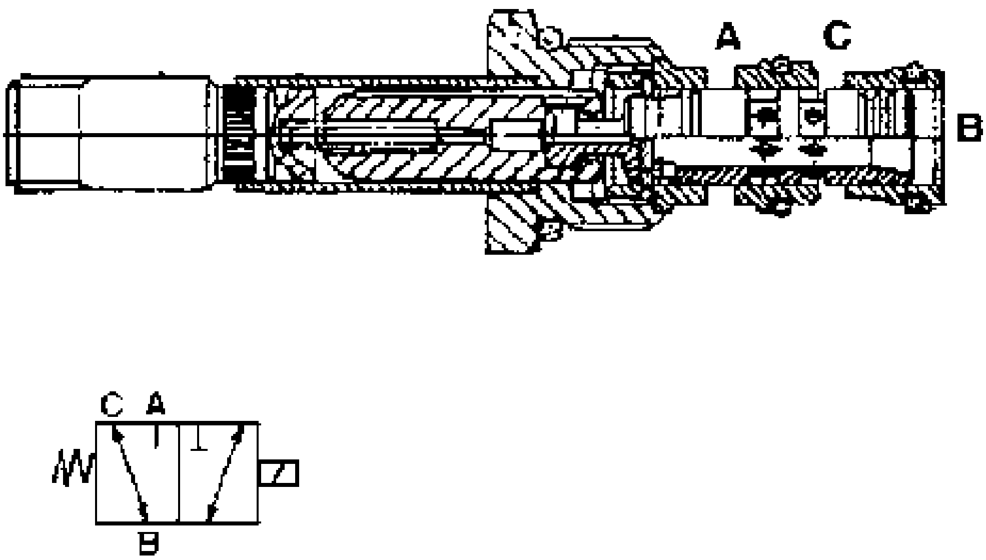
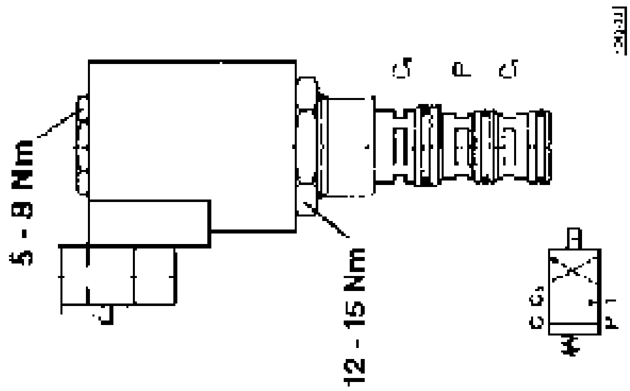


Fig. 1 - Selenoid valve.

Solenoid operated valve controlling the rear P.T.O. clutch.

part number	dimensions	max. delivery rate l/min	max. pressure bar
2.3719.680.0		**12**	**210**

Before tightening the lock nut, smear the thread with LOCTITE 242 (blue).

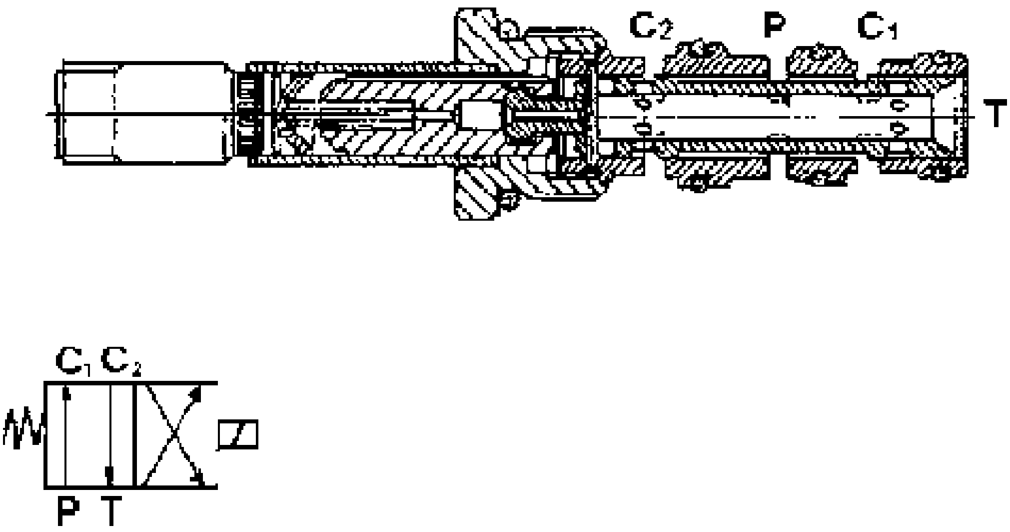
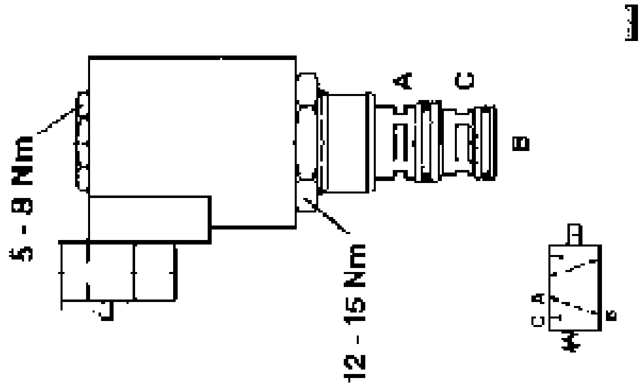


Fig. 2 - Solenoid valve.

6 controls

68 electro-hydraulic controls

Solenoid operated valve controlling four wheel drive engagement - machine with SBA SYSTEM.

part number	dimensions	max. delivery rate l/min	max. pressure bar
2.3719.690.0		**12**	**210**

Before tightening the lock nut, smear the thread with LOCTITE 242 (blue).

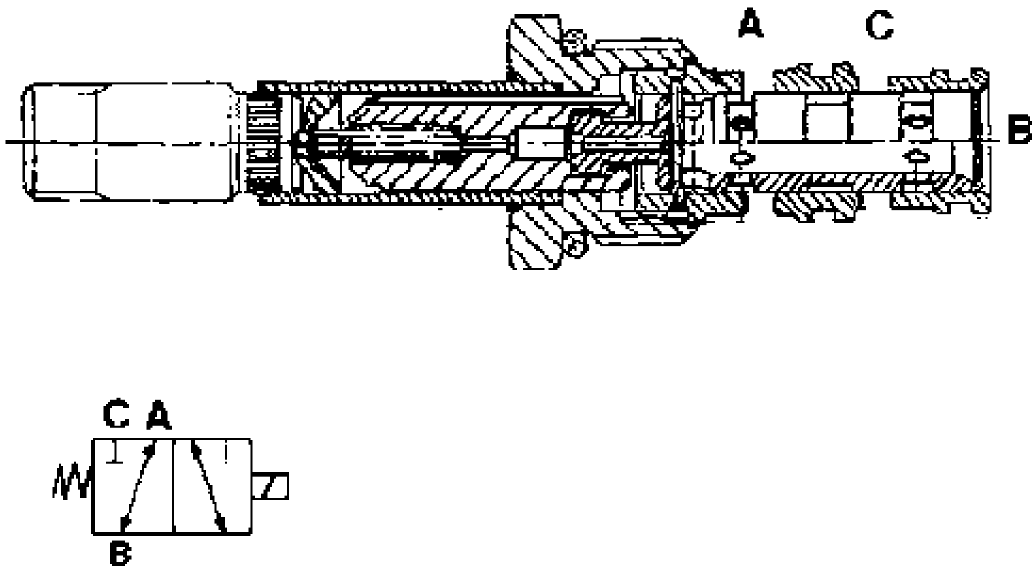
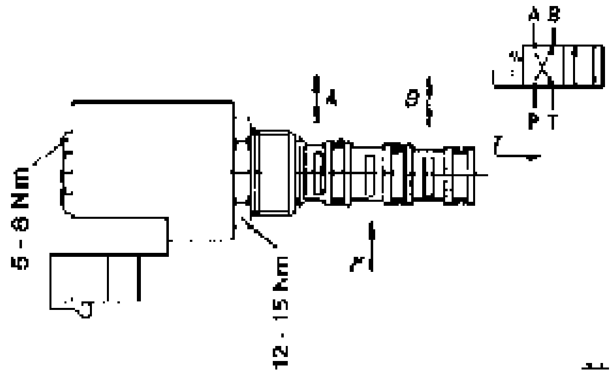


Fig. 3 - Solenoid valve.

Solenoid operated valve controlling the front P.T.O. clutch.

part number	dimensions	max. delivery rate l/min	max. pressure bar
007.5339.0/10		**12**	**210**

Before tightening the lock nut, smear the thread with LOCTİTE 242 (blue).

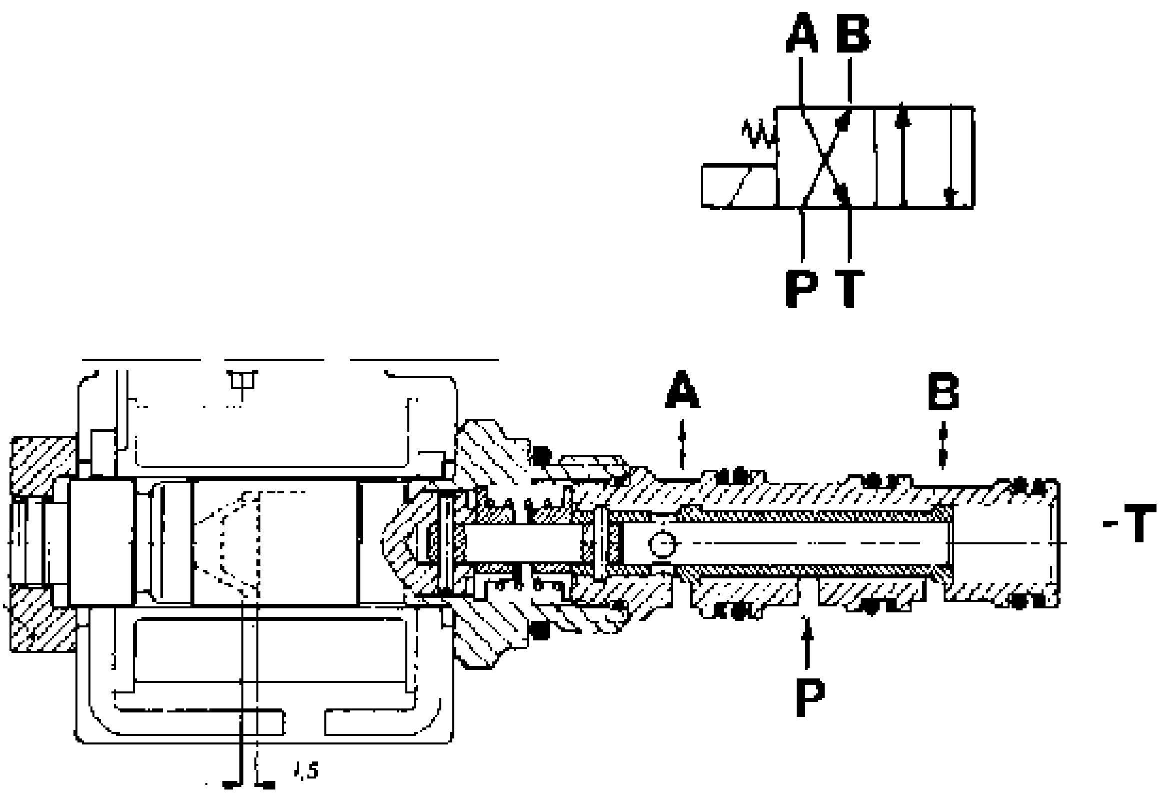
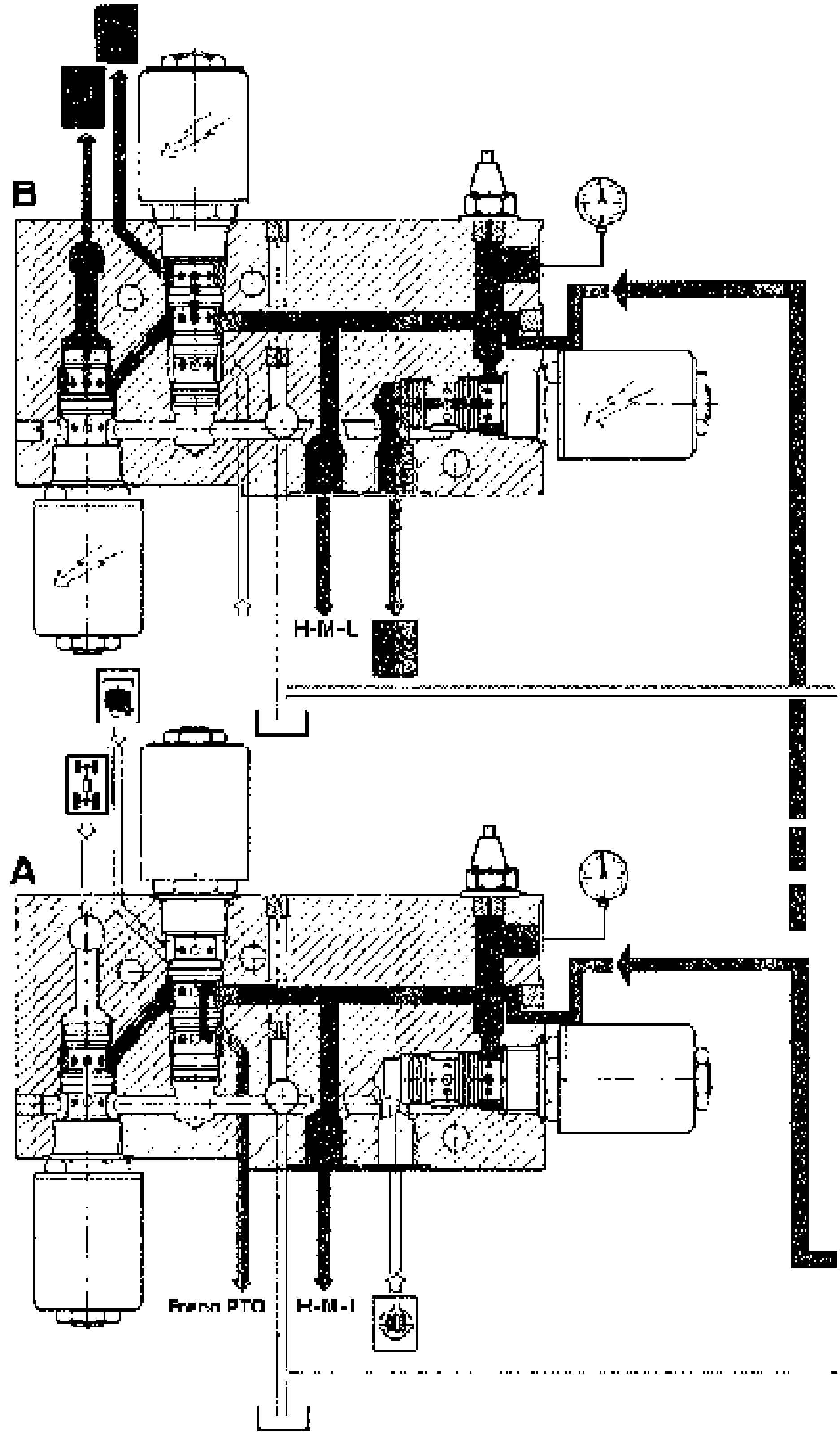


Fig. 4 - Solenoid valve.

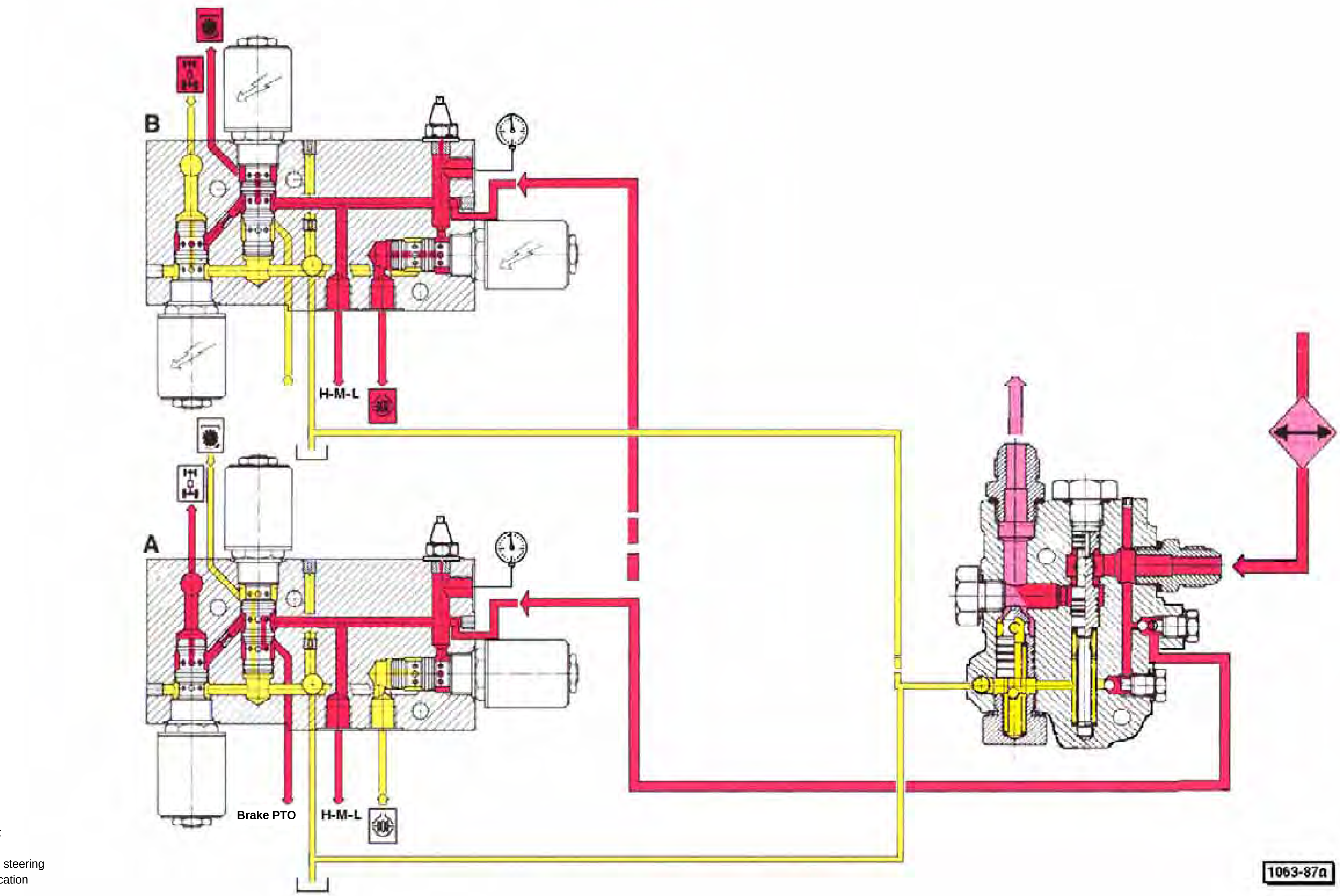
Hydraulic power unit (machine with SBA SYSTEM).



A - desengagement
B - engagement

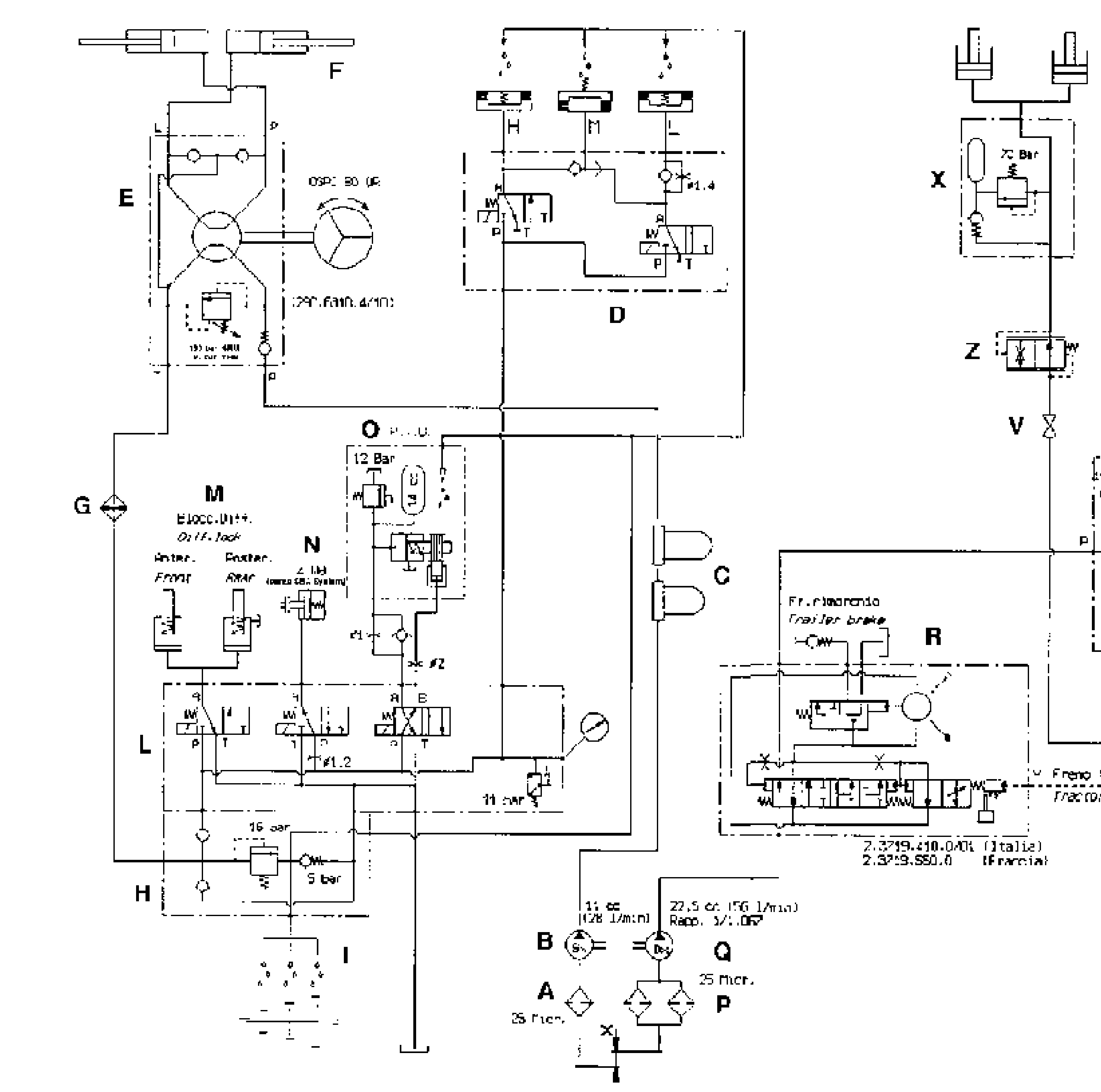
Fig. 5 - Hydraulic power unit operating diagram - machine with SBA SYSTEM.

Hydraulic power unit (machine without SBA SYSTEM).



A - desengagement
B - engagement
C - from hydrostatic steering
D - to gearbox lubrication

Fig. 6 - Hydraulic power unit operating diagram - machine without SBA SYSTEM and with pressure control valve.



A - oil filter
B - oil pump
C - resonators
D - AGROSHIFT
E - power steering directional control valve
F - steering cylinders
G - heat exchanger
H - pressure control valves assembly
I - transmission lubrication
L - hydraulic power unit
M - differential lock
N - four wheel drive coupler
O - rear P.T.O. clutch
P - oil filters
Q - hydraulic pump
R - hydraulic trailer brake control valve
S - auxiliary spool valve
T - hydraulic circuit for electronic type lift system
U - lift cylinders
V - front lift load holding valve
Y - front lift cylinders
Z - pressure control valve
X - front lift shock valve

Fig. 7 - Hydraulic circuit diagram for machine equipped with electrohydraulic controls.

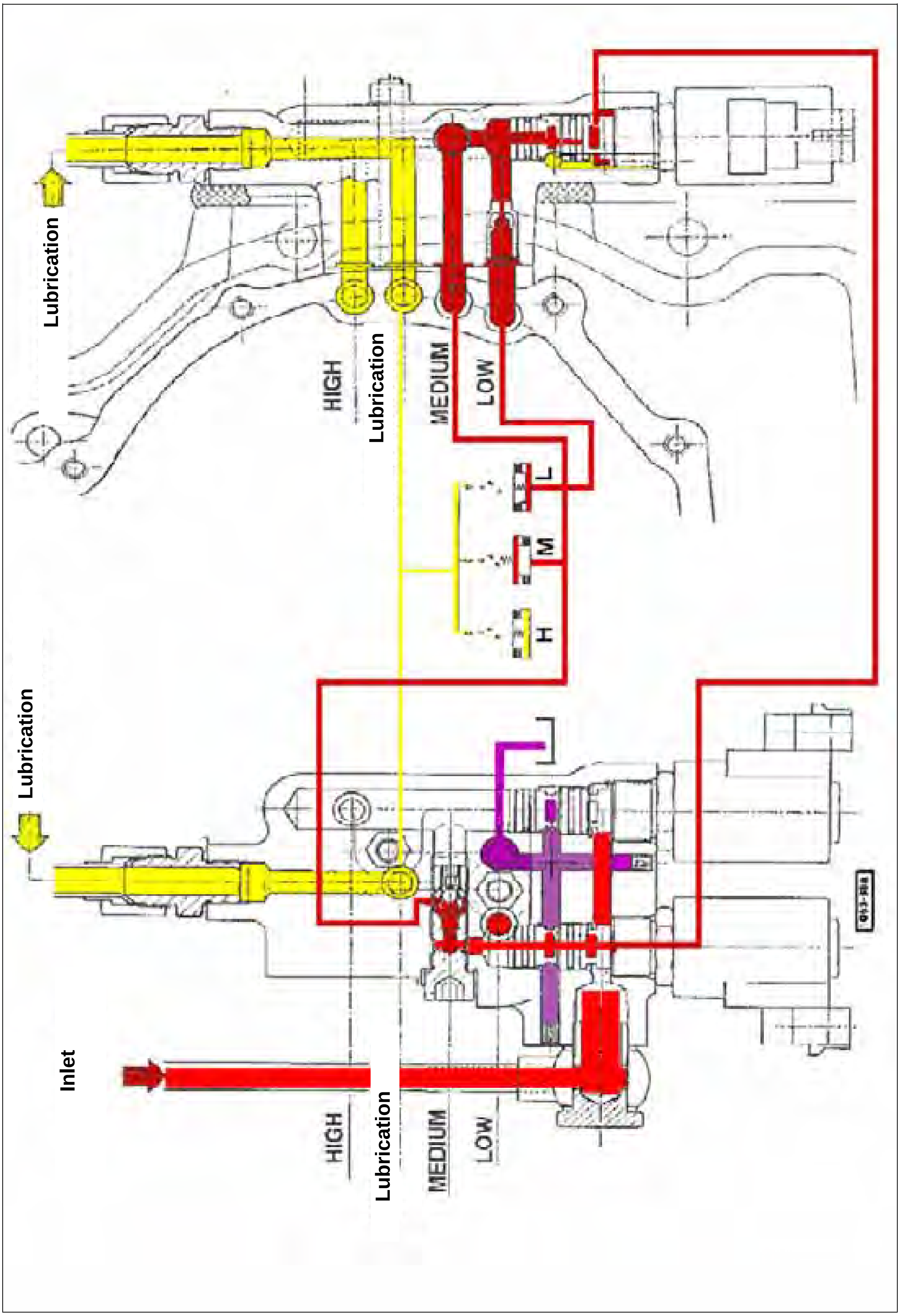


Fig. 8 - Agroshift solenoid valves - **Engagement of LOW clutch**.

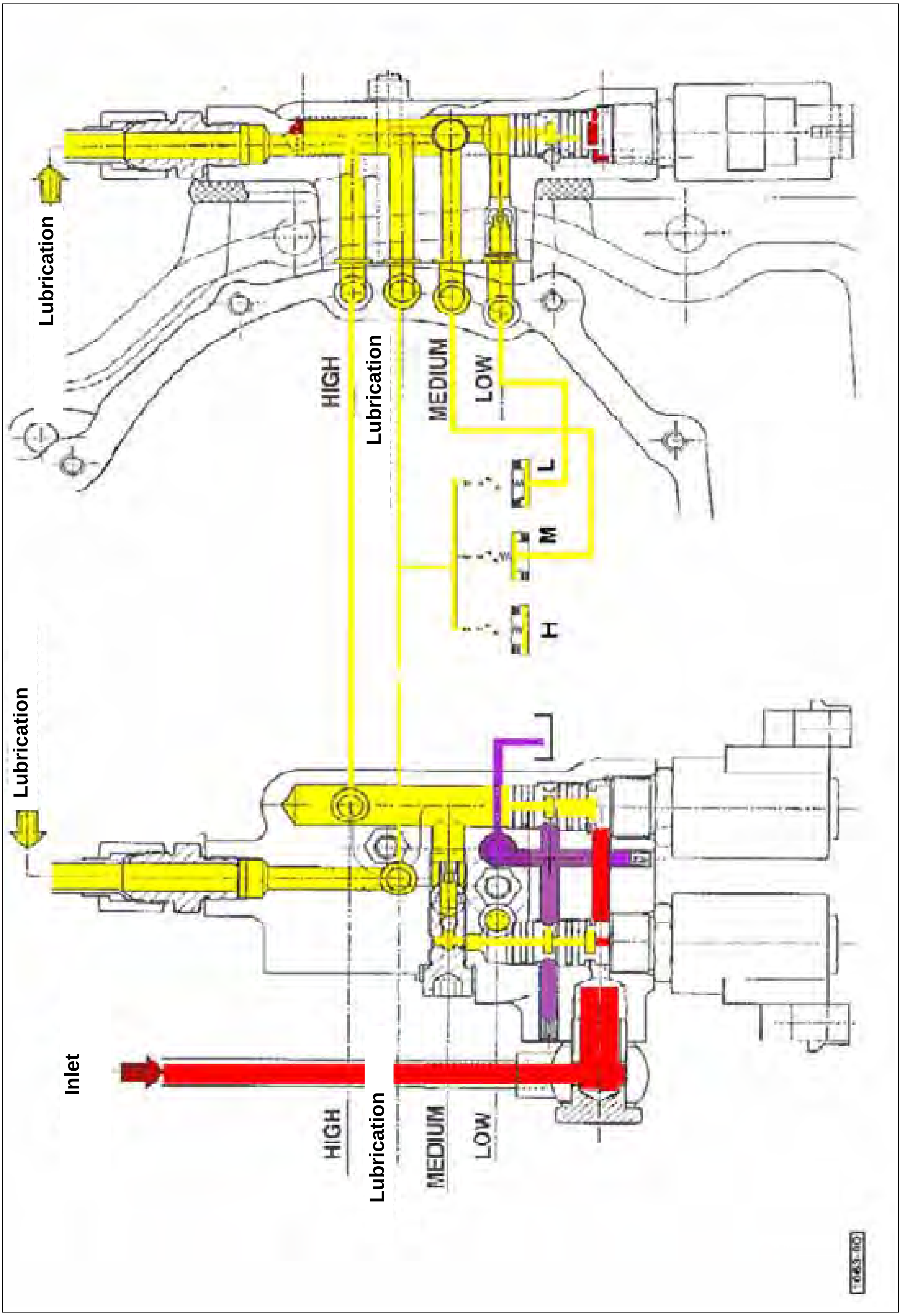


Fig. 9 - Agroshift solenoid valves - **Engagement of MEDIUM clutch**.

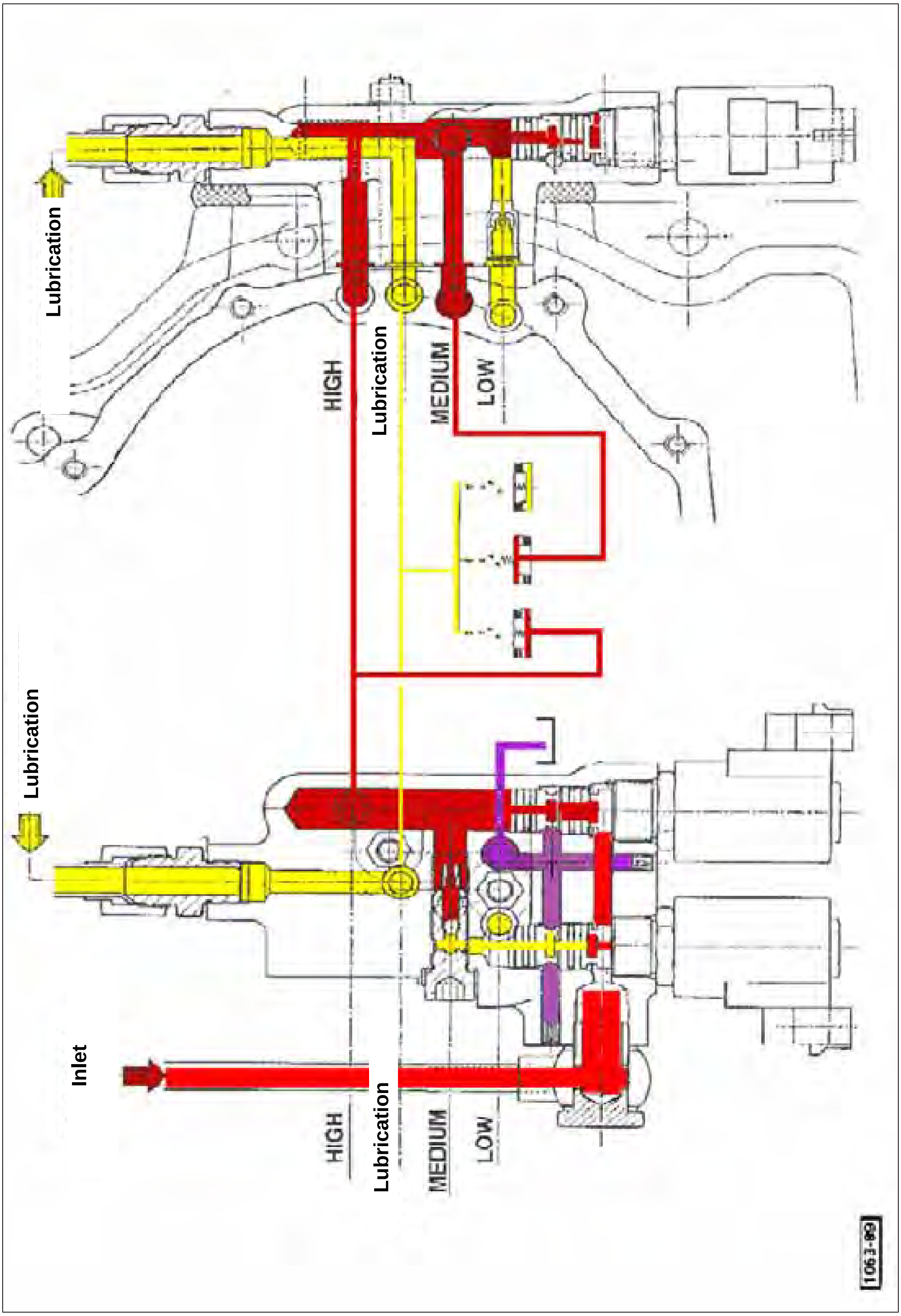


Fig. 10 - Agroshift solenoid valves - **Engagement of HIGH clutch**.

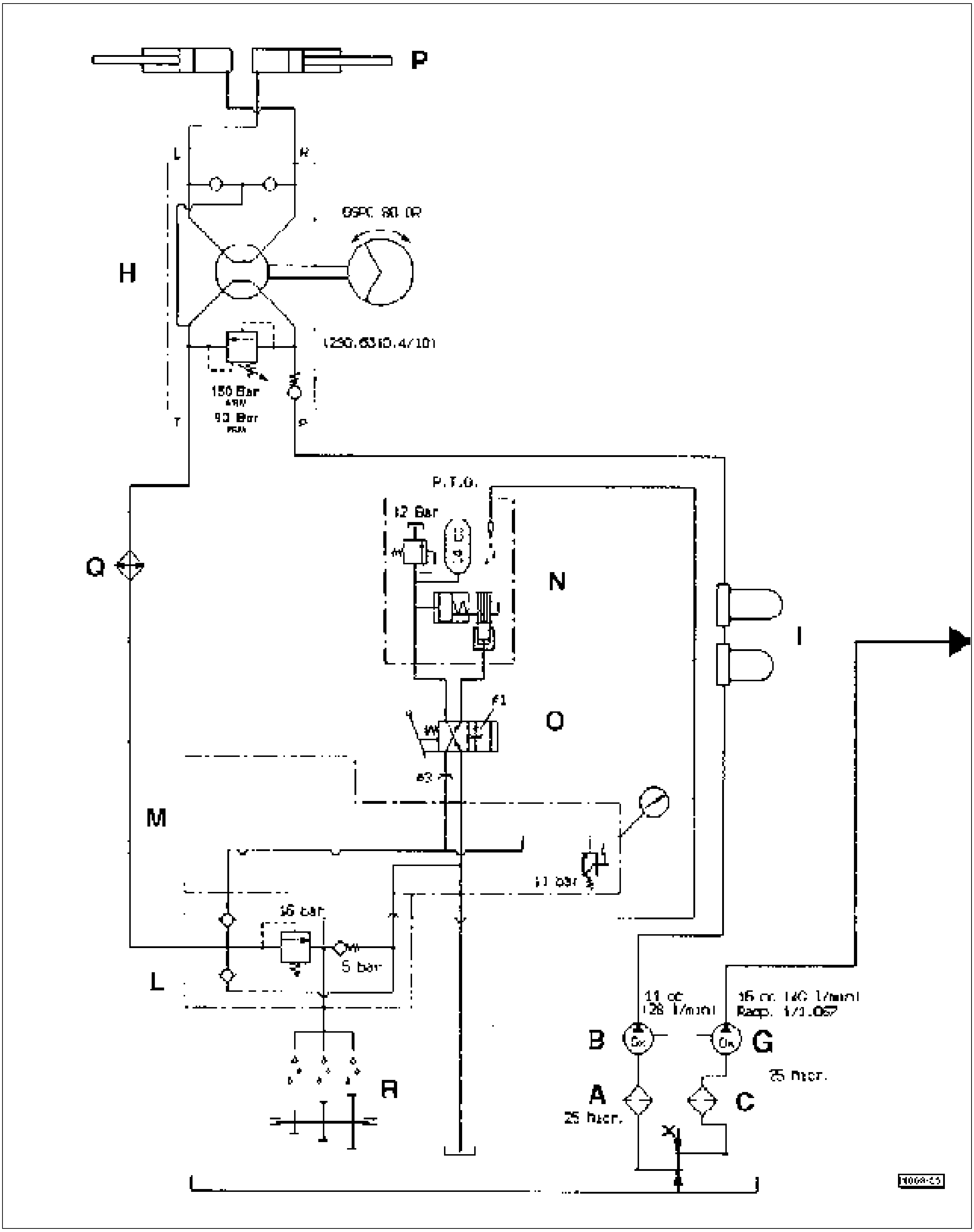
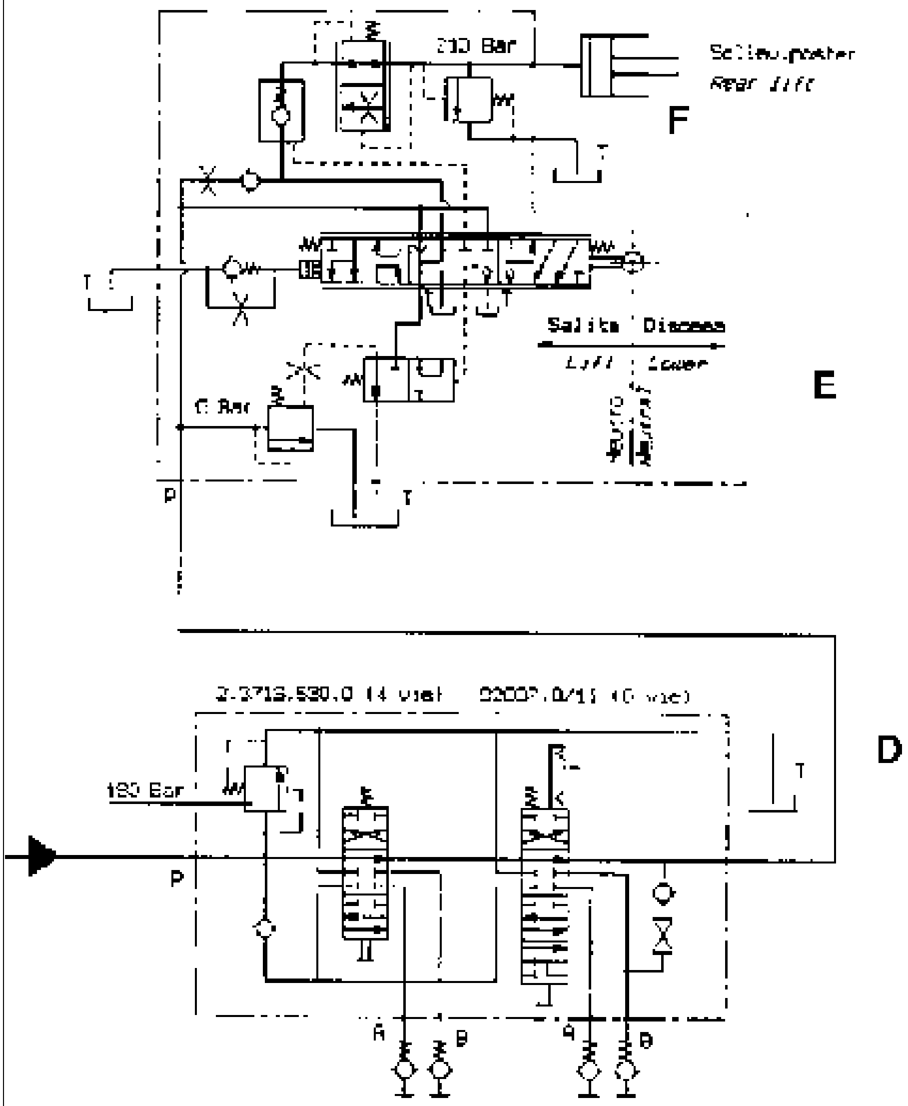


Fig. 11 - Hydraulic circuit diagram for machine not equipped with electrohydraulic controls.



A - oil filters
B - oil pump
C - oil filter
D - auxiliary spool valve
E - hydraulic circuit for mechanical type lift system
F - lift cylinders
G - hydraulic pump
H - power steering directional control valve
I - resonators
L - pressure control valves assembly
M - valve mounting
N - rear P.T.O. clutch
O - rear P.T.O. clutch directional control valve
P - steering cylinders
Q - heat exchanger
R - transmission lubrication

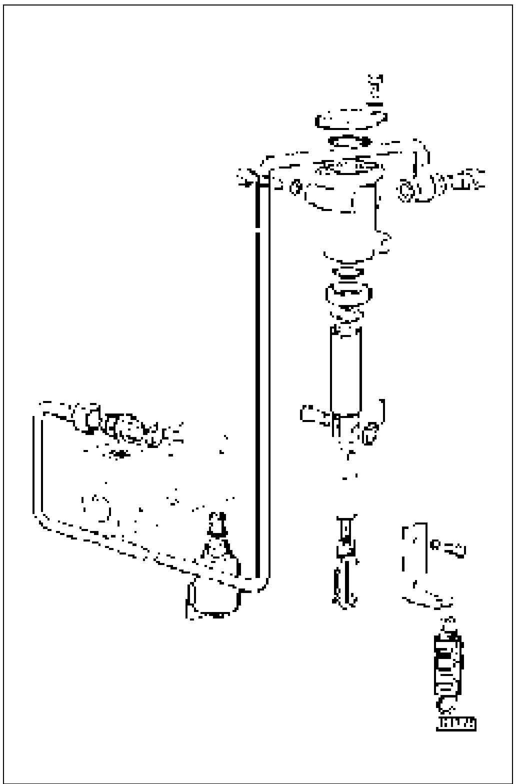


Fig. 12 - Four wheel drive control system (machine without SBA System).

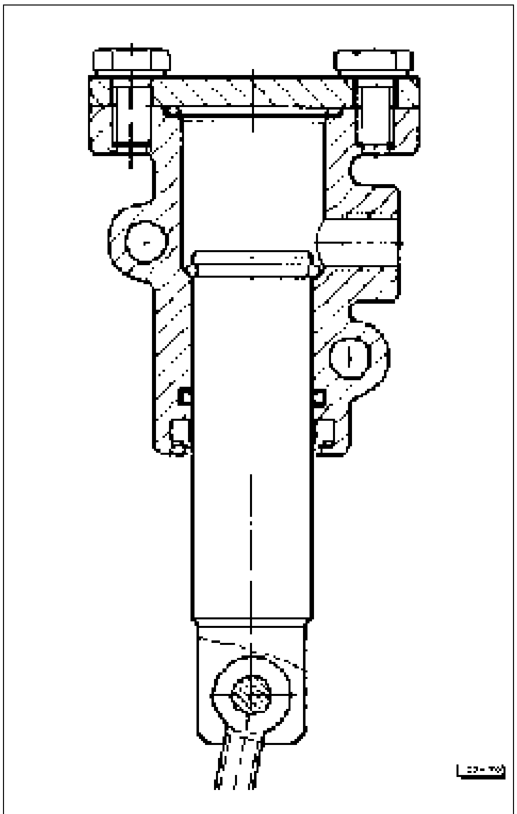


Fig. 13 - Single acting cylinder for disengagement of four wheel drive.

Rear differential lock control cylinder for machines not equipped with SBA SYSTEM

The rear differential lock is operated by a single acting cylinder; the release movement is produced by the action of return springs which expand when the cylinder depressurizes.

To remove the cylinder from its mounting, disconnect the oil fitting and release the lock nut **A**.

When refitting the cylinder, check that the circlip **B** is properly seated in its groove, then tighten the lock nut fully.

Check also that the lock engages with travel of approximately 12 mm (see fig 14 and fig 15).

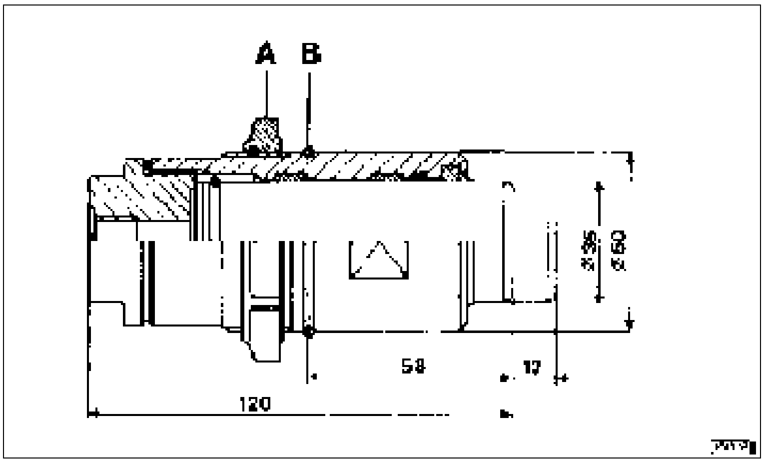


Fig. 14 - Rear differential lock control cylinder for machines not equipped with SBA SYSTEM.

Four wheel drive disengagement cylinder for machines not equipped with SBA SYSTEM.

Four wheel drive is disengaged through the agency of a single acting cylinder brought into operation when the function is not required.

When four wheel drive is selected by pressing the relative button, the solenoid valve causes oil to exhaust from the hydraulic control circuit; in this situation, the return spring is able to expand and apply the coupler.

Adjustment of front and rear differential lock control mechanism for machines not equipped with SBA System

Adjust the yoke **A** and the lock nut **B** to obtain a preload on the spring **C** such as will give a clearance **X** that allows contact with the piston **E** (with spring **D** attached), when this is positioned flush with surface **F** in the electrohydraulically operated version, and a projection of 18,5 mm in the mechanically operated version; check also that the shoes of the yoke do not rub against the sides of the coupling sleeve.
For adjustment of the coupler, refer to the chapter on four wheel drive with SBA System.

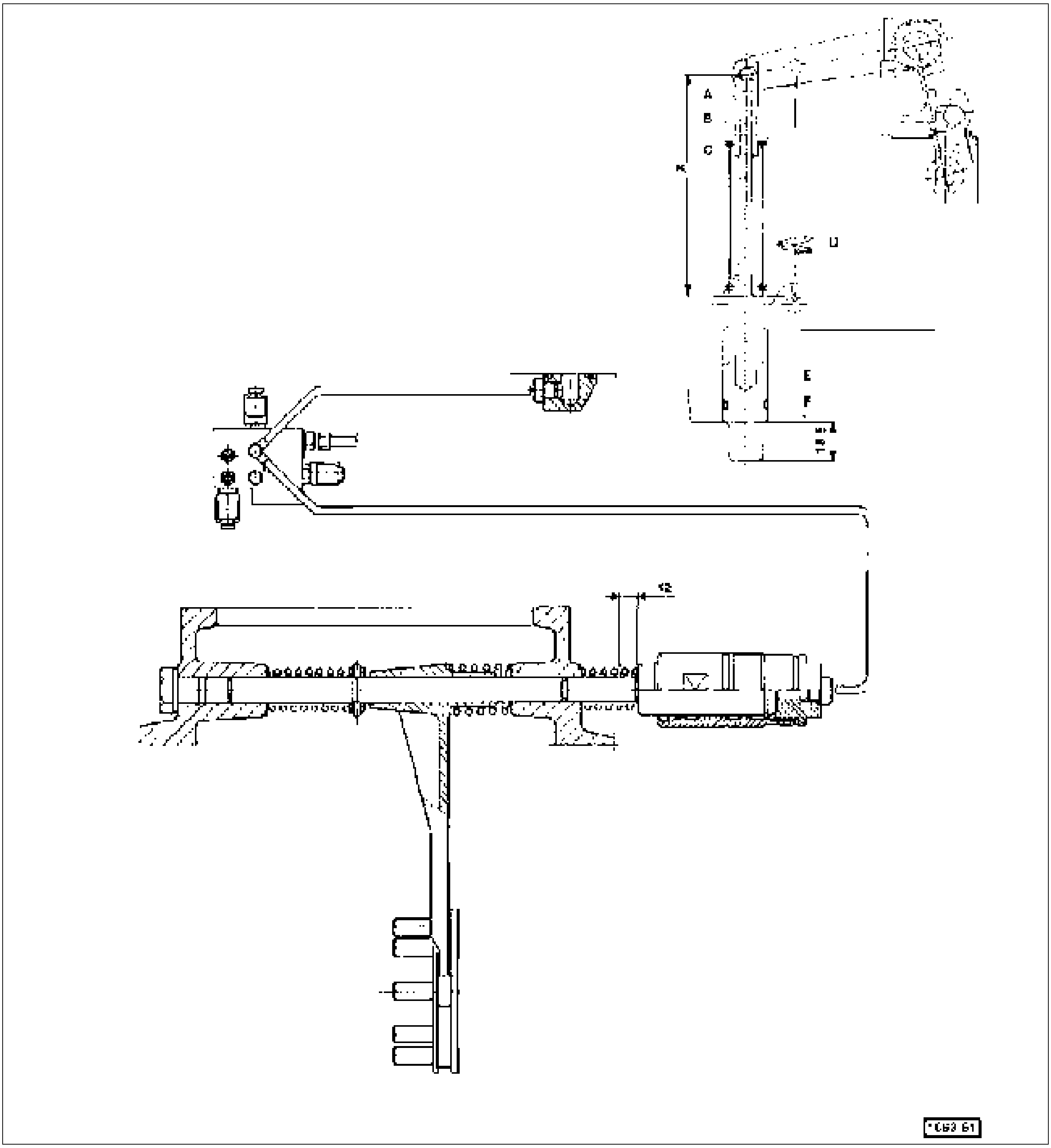


Fig. 15 - Front and rear differential lock control linkage for machines not equipped with SBA System.

Adjustment of four wheel drive control linkage for machines not equipped with SBA SYSTEM

Disconnect the four wheel drive engagement spring **A** and adjust the yoke **B** in such a way that the pivot **C** can be inserted with the lever **D** forced in the direction indicated by the arrow and with the piston **E** drawn downwards.

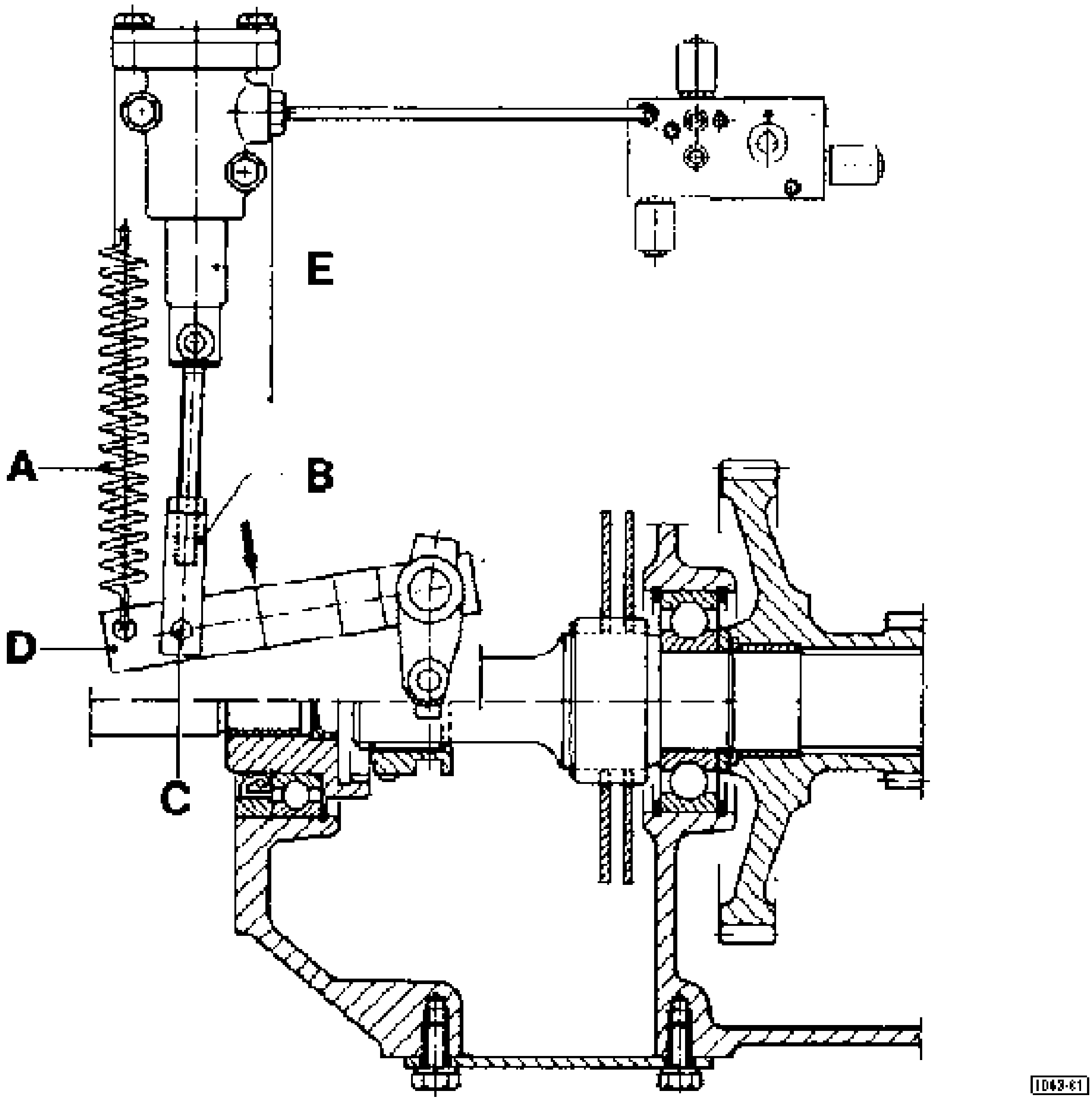


Fig. 16 - Four wheel drive engage/disengage controls for machines not equipped with SBA system.

MULTIFUNCTION CONTROL HANDSET (only available for machines equipped with electronic lift and engine with electronic rpm control).

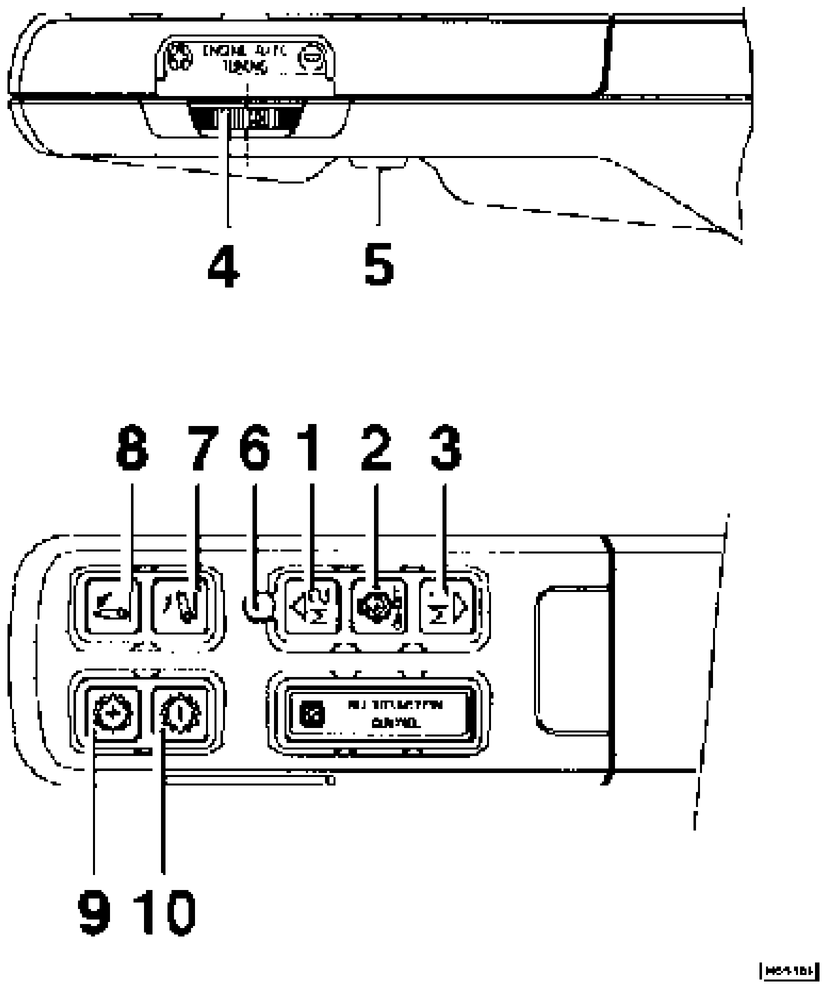


Fig. 1 - Multifunction control unit

1 - MAXIMUM memory storage and recall
2 - Temporary memory/storage and recall
3 - MINIMUM memory storage and recall
4 - Precision engine speed regulator
5 - Permissive pushbutton
6 - Memory engaged lamp and ISOCRONA speed regulator
7 - Lower rear lift
8 - Raise rear lift
9 - AGROSHIFT increase gear change
10 - AGROSHIFT lower gear change

THE MULTIFUNCTION CONTROL UNIT IS FITTED TO THE RIGHT ARM REST OF THE DRIVER'S SEAT.

The unit controls:
the engine
the transmission
the rear lift

ENGINE CONTROLS
Memory setting
Buttons 1, 2, 3 (in the top of the unit) and 4 (on the side; see Fig. 1) control the storage and recall of two non-volatile memories, **M1** and **M2** (retained even when the machine is turned OFF), and one volatile memory. The lamp (6) (see figure 1) indicates when the memory is engaged and the maintenance of constant engine speed.

To operate, proceed as follows:
Press button 3 (**M1**) (see Fig.1), for more than 3 seconds to memorise the current engine speed. The lamp will flash to indicate that the information has been stored, then will remain on. The memory will not store engine speeds exceeding 1,500 rpm; the system will refuse to memorise, the current value will not be altered and the lamp will not change status.
Press button 1 (**M2**) and hold for three seconds to permanently memorise the current engine speed. The lamp will flash to indicate that the information has been stored, then will remain on. The memory will not store engine speeds below 1,500 rpm; the system will refuse to memorise, the current value will not be altered and the lamp will not change status.

Press **M1** and button 5 (**PERMISSIVE**) and hold at the same time to recall the previously stored engine speed and to proceed with constant engine speed regulation. The lamp will indicate engagement of the function.
Press and hold **M2** and **PERMISSIVE** at the same time to recall the previously stored engine speed and to proceed with constant engine speed speed regulation. The lamp will indicate engagement of the function.
Press button 2 (**ON/OFF**) when lamp is off to memorise temporarily the current engine speed and to proceed with constant engine speed regulation. The lamp will indicate engagement of the function.

Press the **ON/OFF** button when lamp is on to erase all memories. The lamp will go out, constant engine speed regulation will be disengaged; speed will by determined by the pedal accelerator (the engine will drop to idling speed when the pedal is released).

Manual engine speed regulation
Turn the wheel 4 (fig. 1) on the side of the control unit to regulate engine speed manually.
To operate, proceed as follows:
— turn the wheel clockwise to increase current engine speed
— turn the wheel counter clockwise to reduce current engine speed.

Speed is regulated regardless of stored memories. The control system will check regulator movement and speed of wheel rotation; engine speed will increase in relation to the amount and speed of regulator movement by the operator.

Transmission control
Buttons 9 and 10 (see Fig. 1), respectively increase and decrease gear ratio in the **AGROSHIFT** gearbox.

To operate, proceed as follows:
Press pushbutton 9 to increase the gear change. To change gear up again, release button and press again. Once the highest gear has been reached, this status will be maintained even if the button is pressed again.
Press pushbutton 10 to gear down. Follow above procedure to continue gearing down.

Bear in mind that the **AGROSHIFT** gear will not change with the movement of the gear lever.
The gear is all way set to"**TORTOISE**" speed when the engine is turned ON.

Rear electronic lift control
Press buttons 7 and 8 to control rear lift arm movement.

To operate, proceed as follows:
Press button 8 to raise lift to maximum or limited height. Once raised, the lift will not change position even if the button is pressed again.
Press button 7 (Fig. 1), for less than 0.5 sec. for lift control mode. The lift arms will be lowered until control system balance has been reached. Hold button pressed for **Float** mode; release button to return to control mode. Control buttons will only function if lift control system has been unlocked prior to operation.

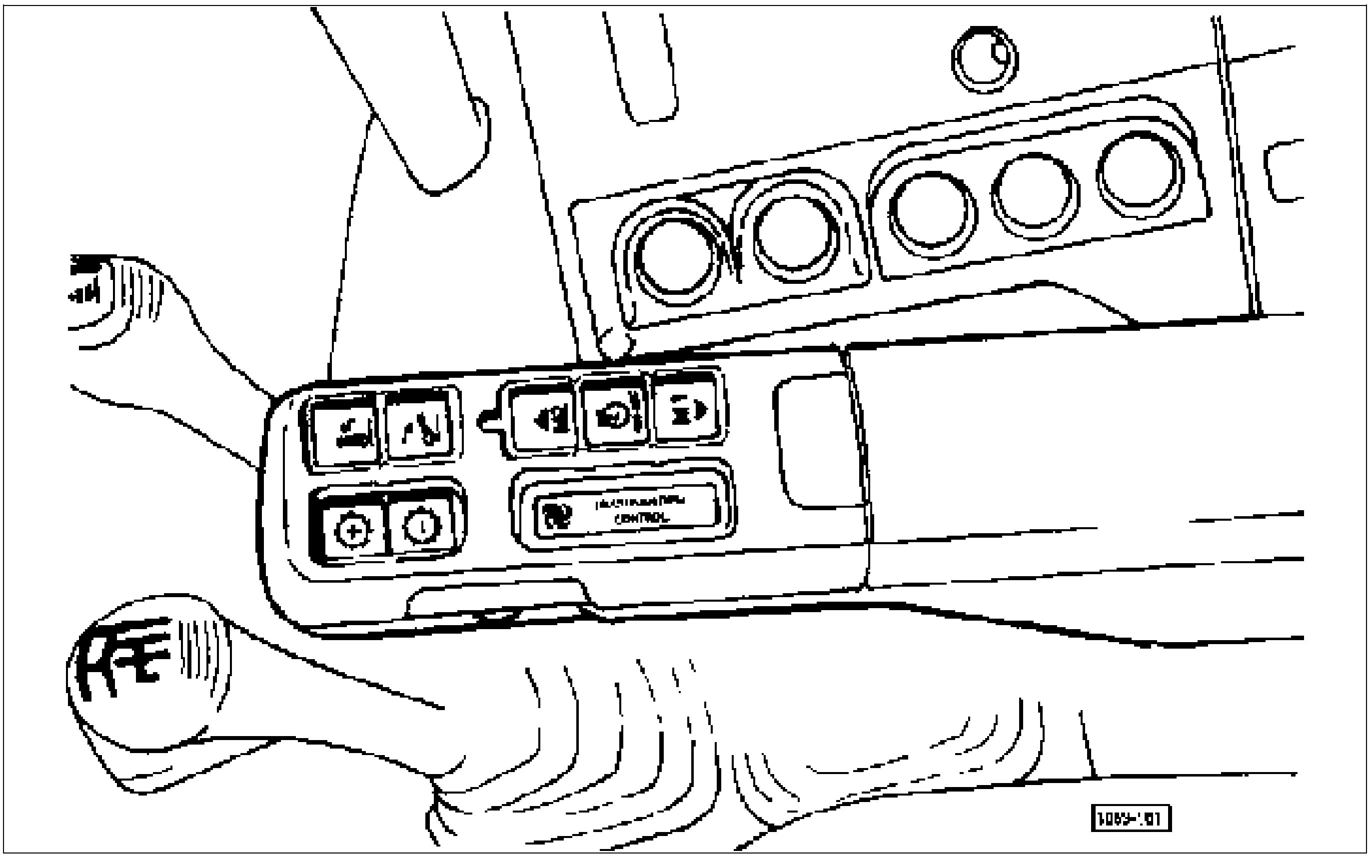


Fig. 2 - Multifunction control handset.

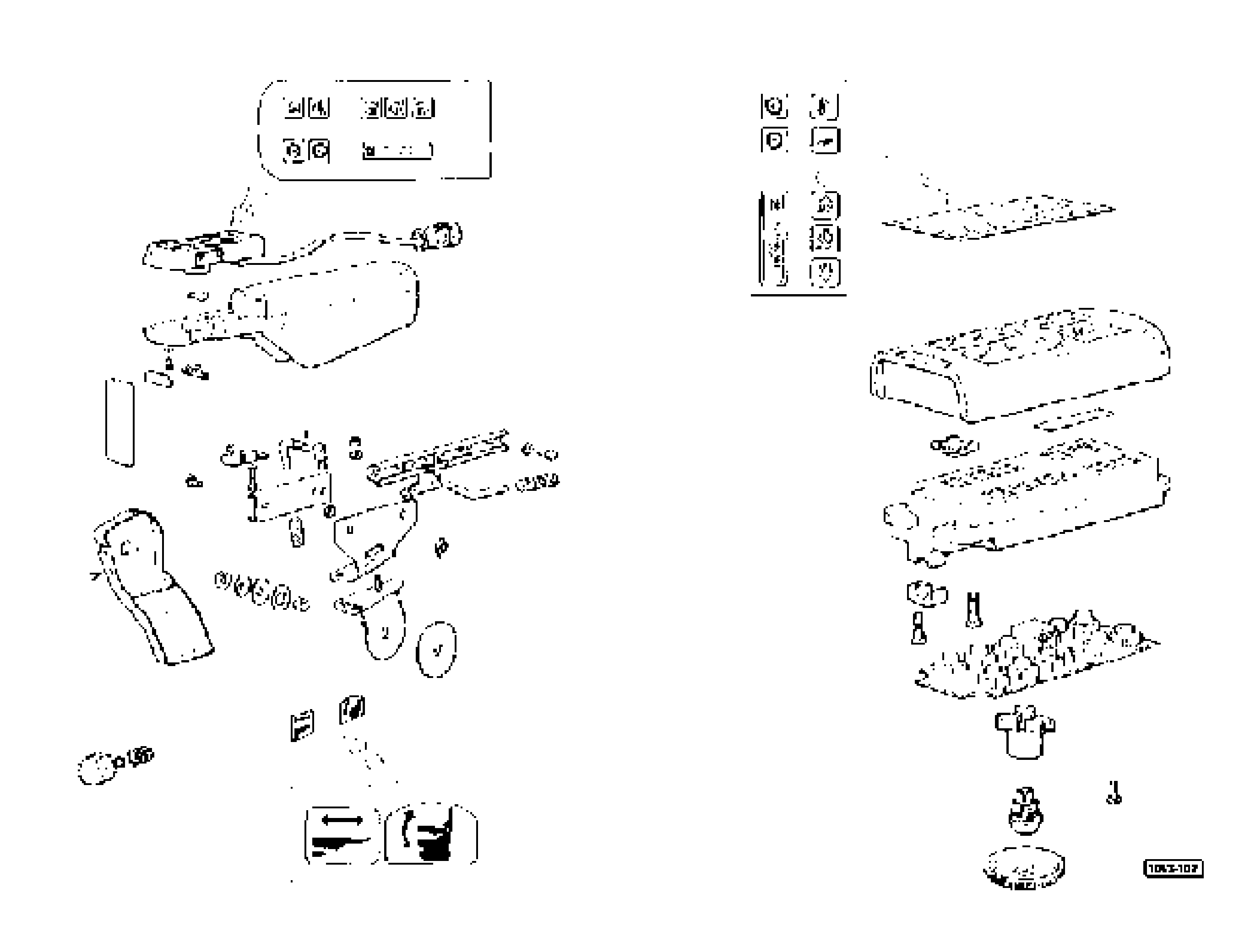


Fig. 3 - Seat armrest and multifunction control handset.

Assembly of seat armrest with multifunction control handset (Fig 4)
Fix the bracket **A** to the support **B,** utilizing the washers **C** and the lock nut **D**, then torque the nut to 10 Nm (1 kgm approx).
Fit parts **E - F - G** and tighten the nut **H**, so that the lever **E** allows relative movement between the bracket **A** and the support **B** when in position **X** and disallows movement when the lever is in position **Y**.

Fitting the multifunction control handset to the armrest (Fig 4)
Fit the outer section **L** to the bracket **N** by means of the screws **M**. Offer the inner section **O** to the outer section **L**, positioning it in the intermediate longitudinal part. Secure both sections to the armrest **P** together with the spacer **Q** by means of the screws **R**, having first smeared the threads with Loctite 242.
Make certain that the cable **S** is positioned correctly as indicated in fig 4.

Fitting the armrest to the seat (Fig 4)
Fit parts **T - U - V - Z - J - W** in sequence to the bracket **I**, which is preassembled with the seat.
Apply a restraining torque of 5 Nm (5 kgm) to the front end of the armrest and tighten the lock nut **K** to the point at which the armrest can no longer be turned.

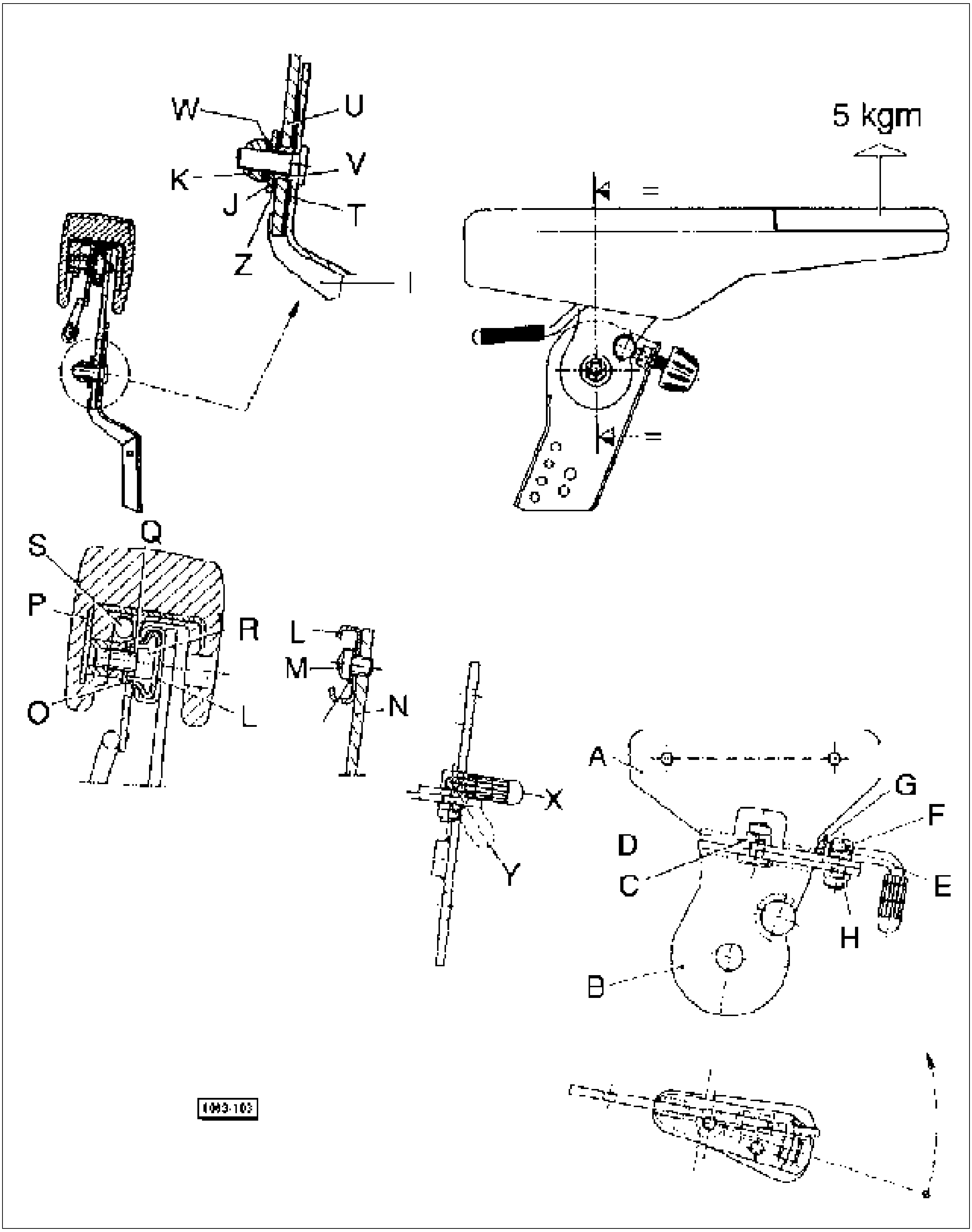


Fig. 4 - Fitting the multifunction control handset to the driver seat.

Data Monitor

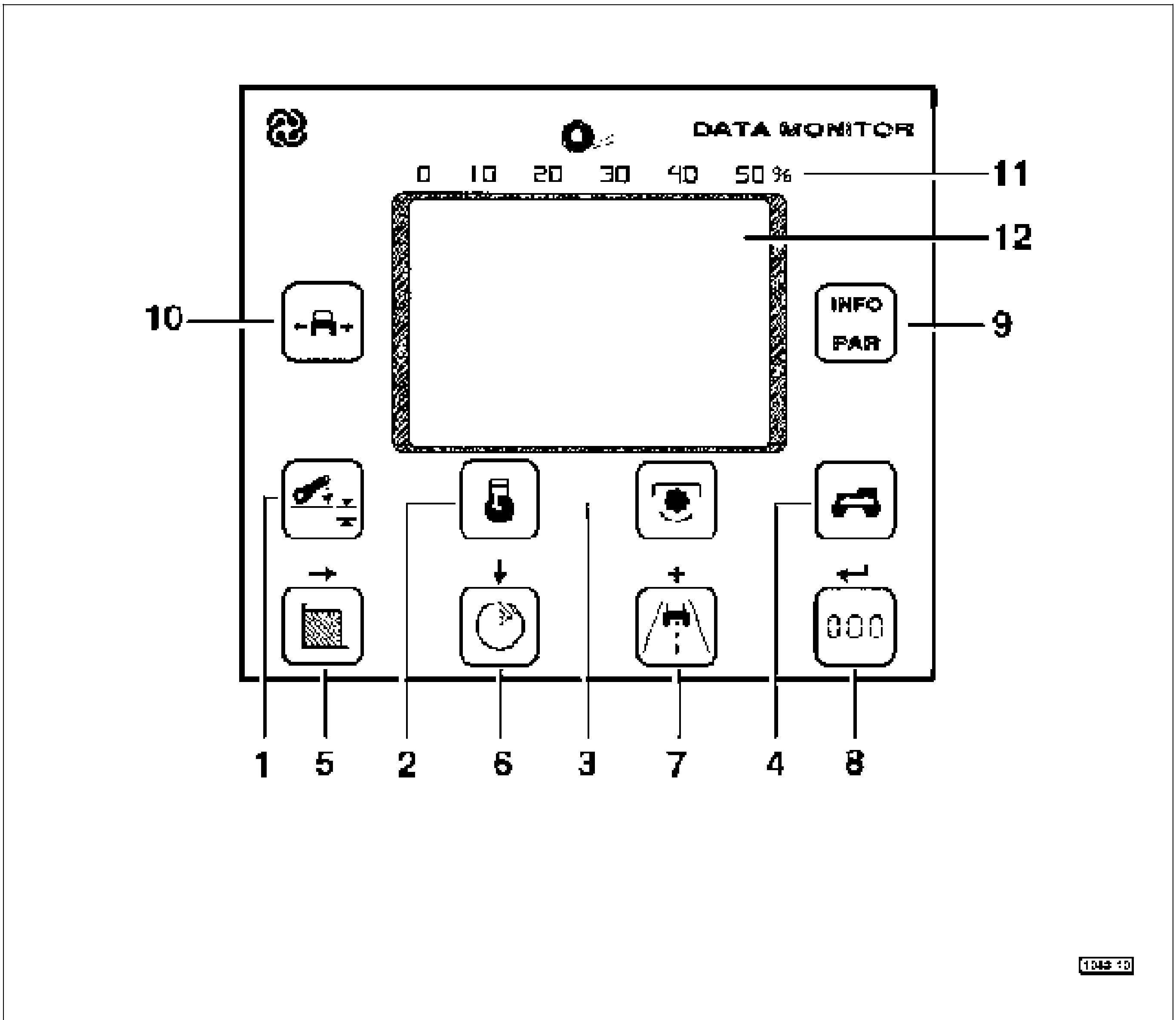


Fig. 1 - Data monitor
1 - Ploughing depth pushbutton
2 - Engine speed pushbutton
3 - PTO speed pushbutton
4 - Vehicle speed pushbutton
5 - Area worked
6 - Work time
7 - Distance covered
8 - Reset (for function 1, 5, 6, 7 only)
9 - INFO selection pushbutton (data monitor function)/PAR (lift function parameters) - This pushbutton allows the exit from the current display.
10 - Implement width pushbutton
11 - Slip scale (percentage)
12 - Display area

The DATA MONITOR is located on the driver’s instrument panel.

This unit displays various information concerning the tractor (speed, rpm, wheel slip, etc.) and performs work quantity calculations.

The data display provides data concerning tractor operations, and allows the operator to read and also vary the function parameters of the electronic control unit.

The DATA MONITOR is enclosed in a plastic housing. The front panel features a 128 x 64 pixel graphic display and 10 pushbuttons, and is tilted towards the operator to facilitate read-out.

Both the display and the keypad are illuminated for use at night.

A 20 pin connector for hooking up to the electric circuit of the tractor is situated on the rear panel of the unit, which is also connected to a series of sensors and electronic control units installed on the tractor.

The system has two distinct functions:
— as a tractor DATA MONITOR
— as a data terminal for connection to the control unit.

DATA MONITOR

The monitor displays the following data:

Engine speed

Vehicle speed

PTO speed

Ploughing depth

Wheel slide

Distance covered

Ploughing area

Work time

Each function (excepting slide which is constantly displayed) is selected by pressing a specific pushbutton. The last three listed functions can be reset by pressing the Reset button.

Data concerning area worked and work time are updated only when the implement connected to the rear lift is in operating position (i.e. below the pre-set limit).

Many functions are available in either the metric or the imperial system, according to preference. The measurement system used is displayed next to the read-out and symbol.

An icon reproducing the symbol on the select buttons helps the operator to identify the function data displayed.

The monitor displays 4 measurement values in the following order:
A BAR GRAPH with data relating to slip in the top part of the screen.
These data are constantly displayed.
Three numerical displays are arranged in the lower part of the screen; the lowest display is larger than the other two.
Press a pushbutton for the relative data to appear in enlarged form at the bottom of the display; previously displayed data will move upwards on the screen, while the uppermost value will disappear.

Engine speed
The control unit receives information regarding engine speed from the engine speed sensor.
The information is given in rpm in four digits; the least significant is always zero (i.e. XXX0).

Vehicle speed
Radar and gearbox sensors provide this information on the data monitor. Information supplied by the Radar (if present and operative) will be used to calculate speed; otherwise the gearbox sensor will be used.
Speed is displayed in km/h or in MPH, depending on the constant P5 setting, and in three digits, the third being a decimal (i.e. XX.X).

PTO speed
The monitor displays the rear power-take-off (PTO) speed in relation to engine speed.
Three sensors on the PTO levers inform the control unit whether rotation is at 540 rpm, or ECO rpm, or 1,000 rpm, thereby allowing correct speed calculation.
The value is displayed in 4 digits, the least significant of which is always zero (XXX0).

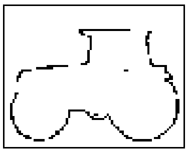
Slip
Comparison of the speed detected by the Radar and the gearbox sensor gives the slip percentage.
This information is given in the form of a BAR GRAPH at the top of the display.
The scale is between 0% and 50% by steps of 2%, and is situated above the display monitor.

Area worked
The area worked can be expressed in hectares or acres, depending on the P5 setting, and is displayed in 4 digits (of which the last two after the decimal point, i.e. XX.XX).
The value increases only when the implement is in a lowered position.
To reset: press the reset button and hold. The 4 digits will flash for three seconds, then the display will return to zero.
This procedure only applies when a area worked value is displayed at the bottom of the monitor.

Implement width
Implement width must be set before the area worked can be calculated.
Press the relevant pushbutton on the keypad to visualise width information. Use the **"arrow right" and "+"** buttons (suitables respectively with 5 and 7, see Fig. 1 to page 334), to move from one digit to another; increase the value selected.
Width is displayed in centimetres or inches.
The constant is given in four digits, the last of which after the decimal point (i.e. XXX.X).
The current implement width is displayed on the monitor.
Follow the instructions given to leave the mode. Memorise the new data as necessary.
If the mode is not left within 10 seconds of the last data entry, the system will automatically commute the information to standard display, without accepting the latest data entries.

Work time
The monitor displays the time spent since the last display reset. The data counter will only increase when the implement is in a lowered position.
The time value is given in 4 digits, with a colon separating hours from minutes (i.e. HH:MM).
Follow the procedure described for area worked to reset.

Distance covered
This value indicates the distance covered since resetting.
The measurement is in metres or yards, and is given in four digits (XXXX).
The distance counter increases regardless of the position of the lift.
Follow the procedure described for "Area worked" to reset.



Ploughing depth
This function measures the relative movement of the lift arms, commencing from the reference height configured by the operator. Reference height is established by resetting the ploughing depth counter when the lift arms are positioned at the desired height.
Follow the procedure described above to reset.
Depth is displayed in centimetres or inches, and in given in four digits, the last of which after a decimal point (XXX.X).
If the lift arms are above the reset value, a zero value will be displayed.

Personalizing the operation of the Performance Monitor
To customize the operation of the Performance Monitor, the programming functions must be accessed by pressing and holding **INFO/PAR** (Performance Monitor/Data Terminal) when the ignition key is turned to power up the system.
The list of internal programs will be displayed.
The **"down arrow"** key (6, fig 1) can now be used to move cyclically through the programs and the functions contained in each one, and the **"right arrow"** key (5, fig 1) to position on the digits of the values displayed. Pressing the **"+"** key (7, fig 1) increases the value of the selected digit.
A newly entered value is saved by pressing the **[←]** key (8, fig 1).
To quit, press **"INFO/PAR"** (9, fig 1).

LIST OF FUNCTIONS PROGRAMMED INTO THE PERFORMANCE MONITOR

Engine speed
One impulse per 10 revs

Radar
(RADAR impules per 100 metres)/2

Wheel speed sensor
(Impulses per 100 metres)/4

Language
Italian
French
English
Spanish
German
Portuguese

Unit of measure
metric
imperial

PTO/Engine ratio
Engine RPM : 540 RPM PTO

Data terminal
In this configuration, the Performance Monitor functions as a terminal by which certain operating parameters of the electronic lift control unit can be displayed graphically and updated using the keys.
The switch from Performance Monitor to Data Terminal mode is effected by pressing the **INFO/PAR** key at the top right of the panel.

Each time the key is pressed, the system will toggle from one mode to the other. **The system will always default to Performance Monitor mode when powered up.**

Setting up the Performance Monitor
For the Performance Monitor to operate correctly, a number of parameters must first be entered so that the system can be tailored to suit the configuration of the tractor on which it is installed.

These parameters are accessed by turning the ignition key while pressing and holding the **INFO/PAR** key positioned at the top right of the panel.

The following menu will appear:

PARAMETERS MENU

LANGUAGE

PARAMETERS

PTO CONSTANTS

CONTRAST

INFORMATION

[↓] **:** **[** ← **]** **INFO**

The **[** ↓ **]** key (6, fig 1) is used to move from one line to the next; the **[** ← **]** key (8, fig 1) is used to access the menu selected.
Pressing **"INFO/PAR"** (9, fig 1) returns the system to on-board computer mode.

Entering the type of engine.
Select **"PARAMETERS"** from the parameters menu, then select **"Engine make"** with the **[** ↓ **]** key (6, fig 1) and press **[** ← **]** (8, fig 1).
A video page with the engine parameter will appear. Proceed to enter the correct parameter, using **[** → **]** (5, fig. 1) to move from one digit to another and **[+]** (7, fig. 1) to increase the value of the selected digit.

Having entered the correct value, press **"INFO/PAR"** (9, fig. 1) to return to the previous menu.
Enter one of the two values listed in the table, according to the type of engine (air-cooled or water-cooled) fitted to the tractor.

AIR cooled engines	**WATER cooled engines**
155 (ØØ1551)	**129 (ØØ129)**

Entering the tyre size
Select **"PARAMETERS"** from the parameters menu.
Select **"Engine make"** with the **[** ↓ **]** key (6, fig 1) and press **[** ← **]** (8, fig 1).
A new video page will appear showing the value of the wheels parameter.
Proceed to enter the correct parameter, using **[** → **]** (5, fig 1) to move from one digit to another and **[+]** (7, fig 1) to increase the value of the selected digit.

Having entered the correct value, press **[** ← **]** (8, fig 1) to save, then **"INFO/PAR"** (9 fig. 1) to return to the previous menu.

According to the type of tyre fitted, enter the following values:
SILVER 80-90-100.4-100.6 1st version (see serial number to page 133).

80-90-100.4 HP			100.6 HP		
Pneus	**40 km/h version** (or 30 km/h with electronic limitation)	**30 km/h version**	**Pneus**	**40 km/h version** (or 30 km/h with electronic limitation)	**30 km/h version**
16.9 x 34	5483	7205	14.9 R 38	5351	7057
16.9 R 34	5483	7205	480 / 70 R 34	5494	7245
18.4 R 30	5673	7455	520 / 70 R 34	5316	7010
18.4 R 34	5305	6971	16.9 R 38	5149	6790
13.6 R 38	5520	7255	480 / 70 R 38	5149	6790
480 / 70 R 34	5483	7205			
14.9 R 38	5340	7018			
520 / 70 R 34	5305	6971			

SILVER 80-90-100.4-100.6 2nd version (see serial number to page 133).

80-90-100.4 HP			100.6 HP		
Pneus	**Version 40 Km/h** (or 30 km/h with electronic limitation)	**Version 30 Km/h**	**Pneus**	**Version 40 Km/h** (or 30 km/h with electronic limitation)	**Version 30 Km/h**
16.9 x 34	4639	6096	14.9 R 38	4527	5971
16.9 R 34	4639	6096	480 / 70 R 34	4648	6170
18.4 R 30	4800	6308	520 / 70 R 34	4498	5931
18.4 R 34	4488	5898	16.9 R 38	4356	5745
13.6 R 38	4670	6138	480 / 70 R 38	4356	5745
480 / 70 R 34	4639	6096			
14.9 R 38	4518	5938			
520 / 70 R 34	4488	5898			

Automatic acquisition of tyre data
When the parameter for a given tyre is not known, the correct parameter can be computed by the system.
To perform this type of operation, access the "**PARAMETERS**" menu, select "Wheel data" and press the **[←]** key (8, Fig 1);
When the new video page appears, select "MANUAL" or "AUTOMATIC" with the **[↓]** key (6, Fig 1), then press **[←]** (8, Fig 1) to confirm.
Press **"INFO/PAR"** (9 Fig. 1) to return to the previous menu.
If automatic acquisition is selected, the control unit will compute the parameter and then restore "MANUAL".
In order to calculate the correct value automatically, the computer will wait until such time as the implement is in the "up" position and the ground speed of the tractor has been maintained above 10 km/h for at least 30 seconds.

Entering the P.T.O.
Select **"PTO constants"** from the parameters menu**.**
Access the **"Machine type"** menu, use the **[↓]** key (6, Fig 1) to select the type of tractor, and press **[←]** (8, Fig 1) to confirm.
Press **"INFO/PAR"** (9 fig. 1) to return to the previous menu.

Entering the unit of measure system
Units of measure can be displayed in metric or imperial.
The factory setting is metric. If imperial is necessary or preferred, select "**unit of measure**" from the "**PARAMETERS**" menu and press **[←]** (8, Fig 1).
A new video page will appear: use **[↓]** (6, Fig 1) to select METRIC or IMPERIAL, and press **[←]** (8, Fig 1) to confirm. Press **"INFO/PAR"** (9, Fig 1) to return to the previous menu.

Contrast adjustment
This allows adjustment of the BLACK-and-WHITE contrast on the display screen. To effect the adjustment, access the "**PARAMETERS**" menu, select **"CONTRAST"** and press the **[←]** key (8, Fig 1) to confirm. A set of numbers and bars will be displayed on the screen. The preferred level of contrast is obtained by pressing **[↓]** (6, Fig 1) to reduce or **[+]** (7 Fig. 1) to increase.
Press **[←]** (8, Fig 1) to confirm, then **"INFO/PAR"** (9, Fig 1) to return to the previous menu.
Pressing and holding key 11 when power is supplied to the system, the level of contrast will be as per the factory.

About the on-board computer
When power is supplied to the system, pressing the **"INFO/PAR"** key (9, Fig 1) will bring up a video page showing essential information about the type of program installed.

Verifying correct operation of the Performance Monitor
Press "**INFO/PAR**" and execute the following procedure:
If the computer has been powered up for less than 30 seconds, a “please wait” message is displayed; thereafter, the video page illustrated above will appear.
If the page in question does not appear, conversely, this means that there is a problem in the interface with the lift system, and the connections between the two units must therefore be checked over.

LIGHT SOIL

MEDIUM SOIL

HEAVY SOIL

MIN WHEELSLIP

MED WHEELSLIP

MED / MAX WHEELSLIP

[↓] : [←] INFO

PERFORMANCE MONITOR RETROFIT PROCEDURE
Parts required:

PERFORMANCE MONITOR	***p/n 009.7680.0***
BLANKING PLUG	***p/n 010.0839.4***
EPROM for machines equipped with SBA System	***p/n 010.2090.2 sw 1.00***
EPROM for machines not equipped with SBA System	***p/n 010.2090.0 sw 1.00***
PLASTIC CLIP	

To ensure correct installation of the equipment, observe the following directions with due care and attention:
1 - Remove the electronic lift control unit (1, fig 3 - page 246) from its slot. Remember when carrying out this step that the unit is retained by means of a snap fit.
2 - Disconnect the unit from the electrical system of the machine by rotating the black multiway connector.
3 - Unfasten the 6 securing screws of the rear cover and locate the printed circuit board to enable replacement of the EPROM with the new type.
This involves removing the plastic clip by which the EPROM is secured to the base.
Caution: Before installing the new EPROM, check that it is marked with the letters SBA, in the event that the machine is equipped with SBA system; similarly, if the vehicle is not equipped with the system, the EPROM should not be marked SBA.

— Position the new EPROM, with the notch on one of the two shorter sides facing toward the microprocessor (the flat square component alongside). Care must be taken when positioning, to ensure that all contacts are aligned with the respective sockets.
— Refit the cover and reconnect the unit to the original wiring harness.
— Looking through the slot which houses the control unit, locate the white multiway connector coupled to the wiring of the lift system only (see electrical diagram of **sheet 9** in electrical systems chapter).
— Remove the blanking plug from the Performance Monitor bay, withdraw the connector identified previously and plug into the Performance Monitor; now insert the Performance Monitor into the bay, applying pressure sufficient to snap the case into position.
— Insert the lift control unit into its slot.
— Insert the blanking plug (supplied with the kit) to the right of the Performance Monitor.
— Proceed with setup operations, following the directions given on page 338.

Platform

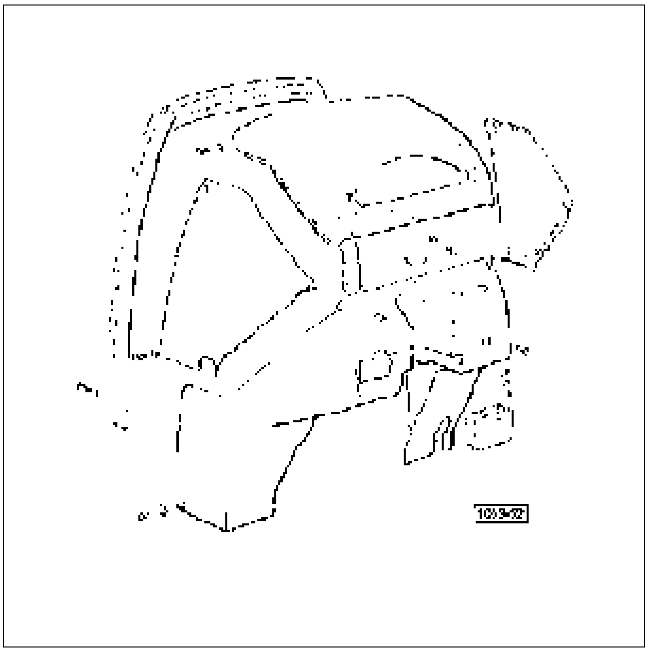


Fig. 1 - Internal claddings of instrument panel.

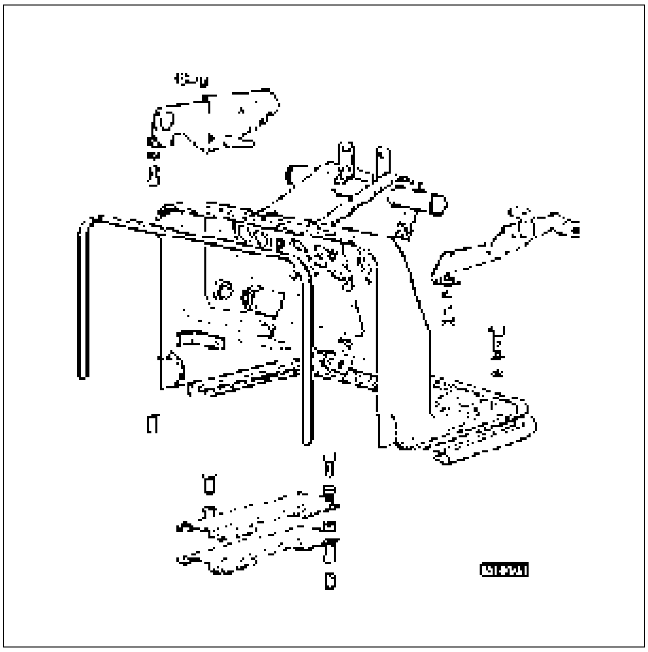


Fig. 2 - Brake and clutch pedal bracket.

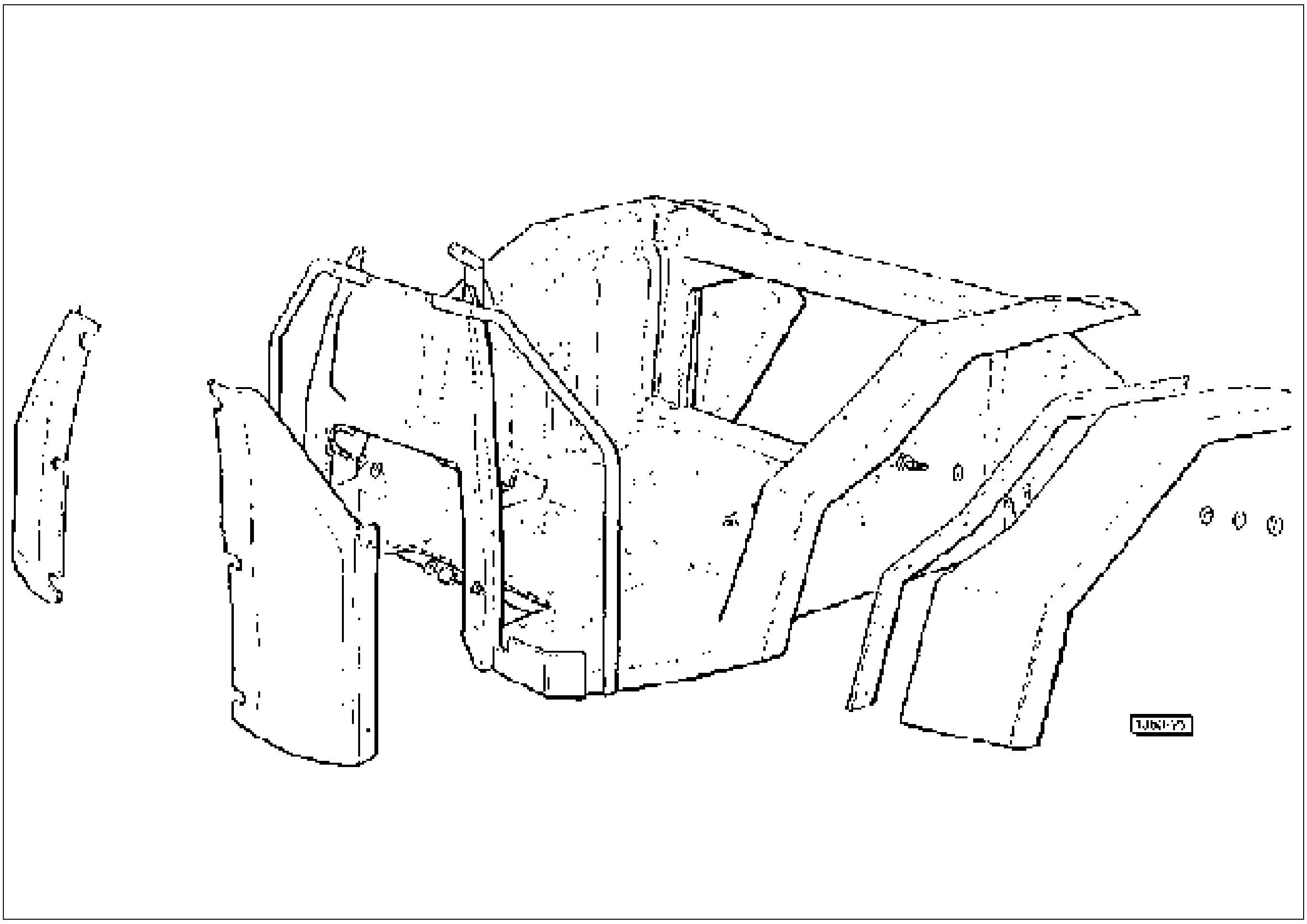


Fig. 3 - Structure of the platform.

Cab

General specifications

The cab responds to international standards in terms both of safety and of internal noise levels. The enclosure is equipped with ventilation, heating and air conditioning systems.

Versions available are:

— Cab with ventilation and heating
— Cab with ventilation, heating and air conditioning

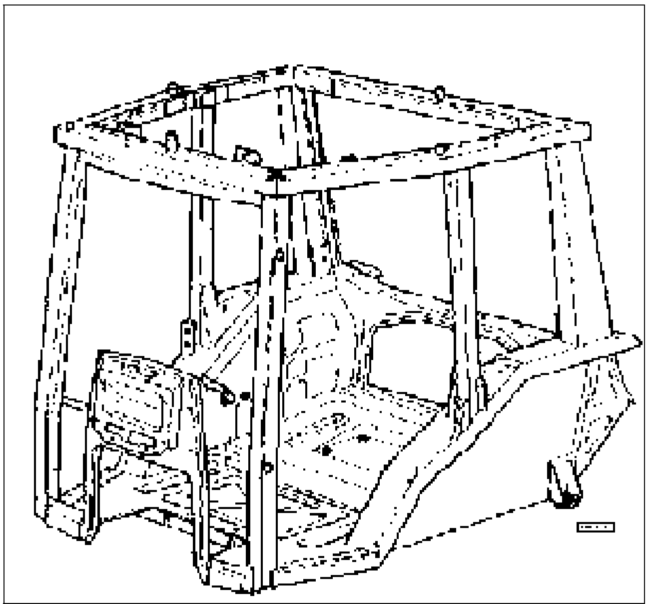


Fig. 4 - Structure of cab.

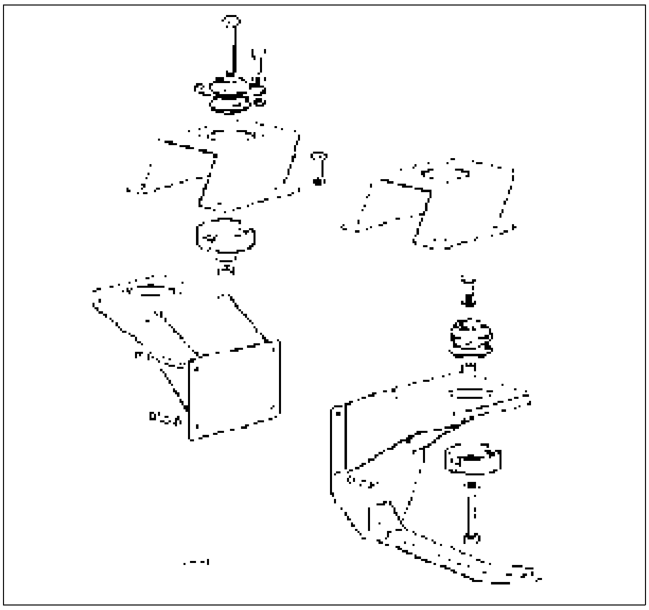


Fig. 5 - Cab mounts.

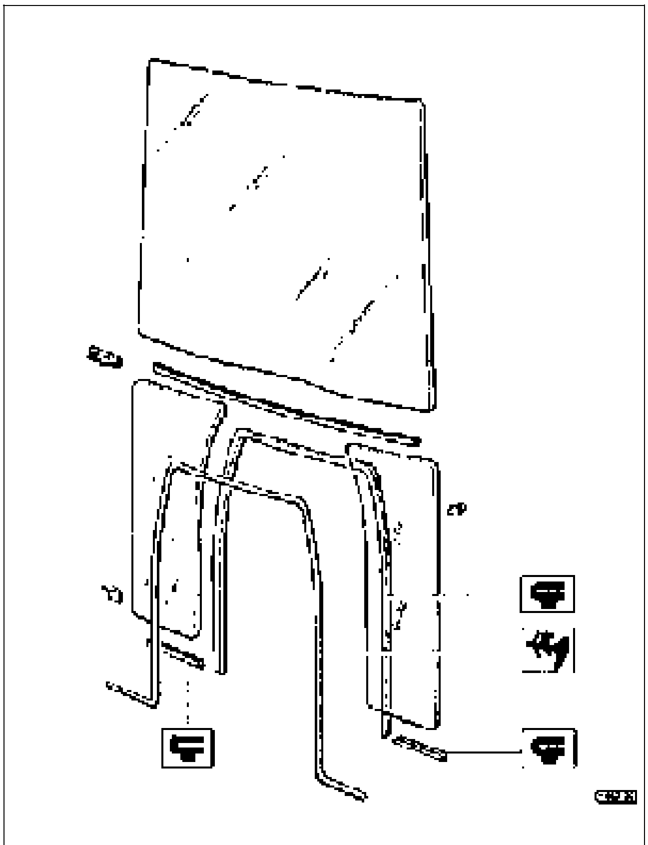


Fig. 6 - Front window glass and seals.

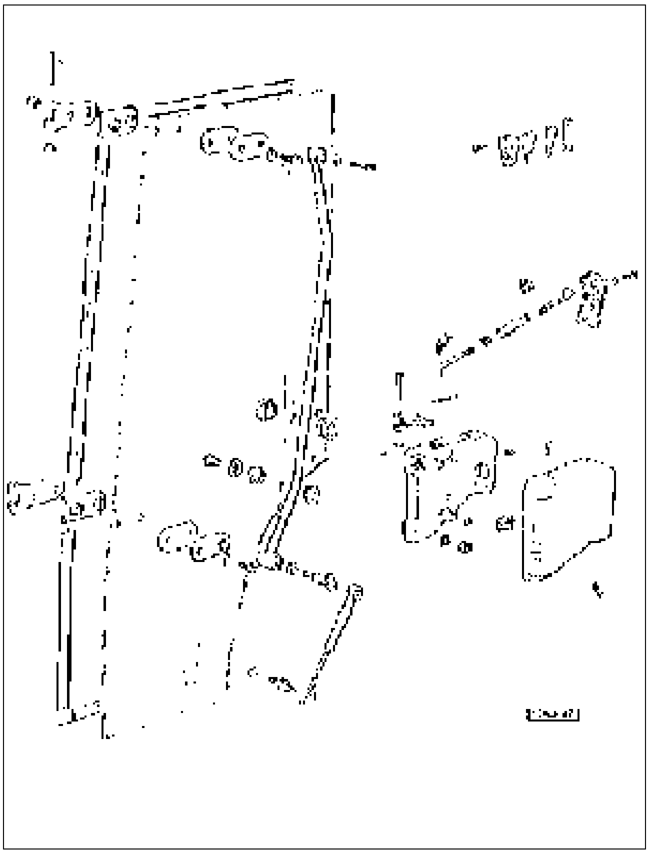


Fig. 7 - Cab doors.

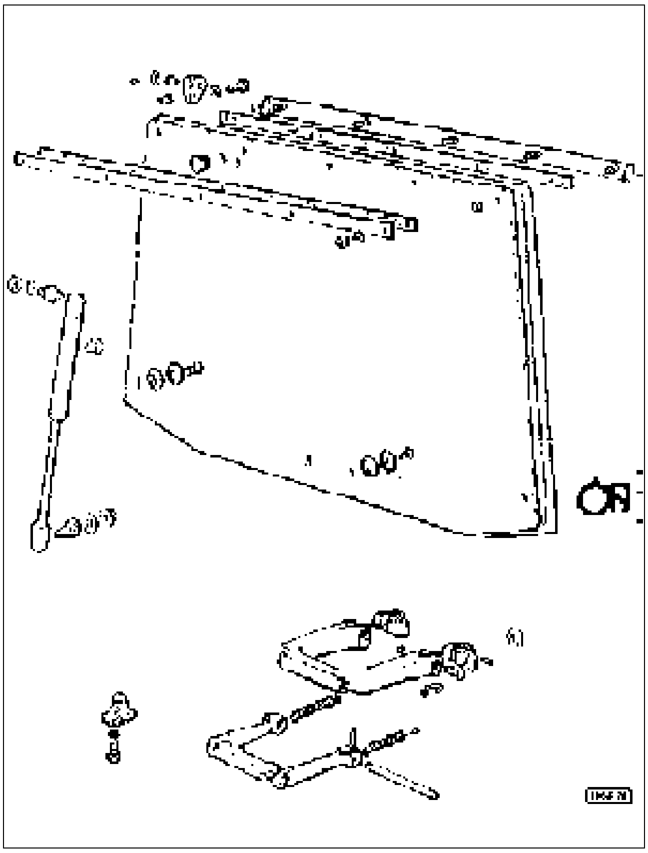


Fig. 8 - Rear window.

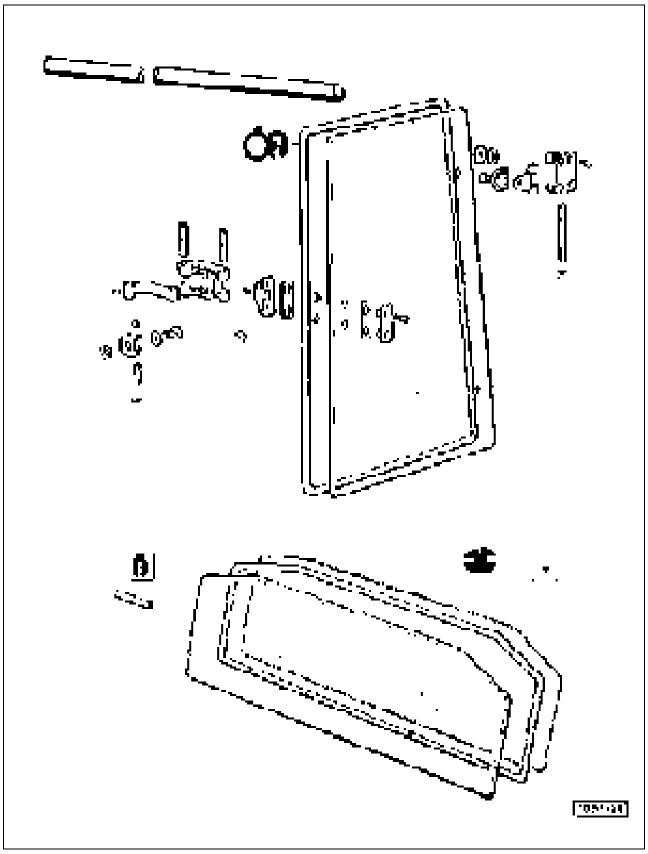


Fig. 9 - Side windows and rear window.

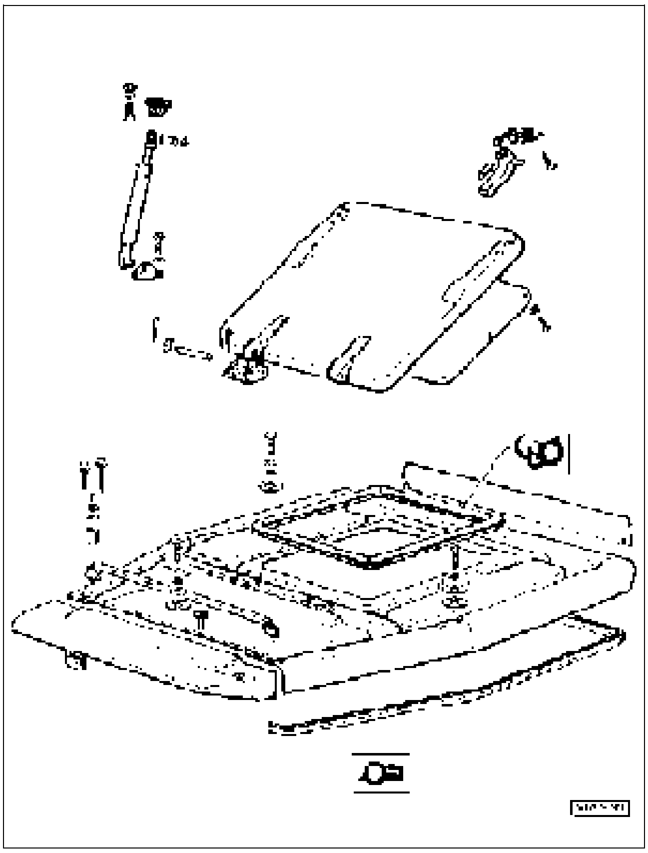


Fig. 10 - Cab roof.

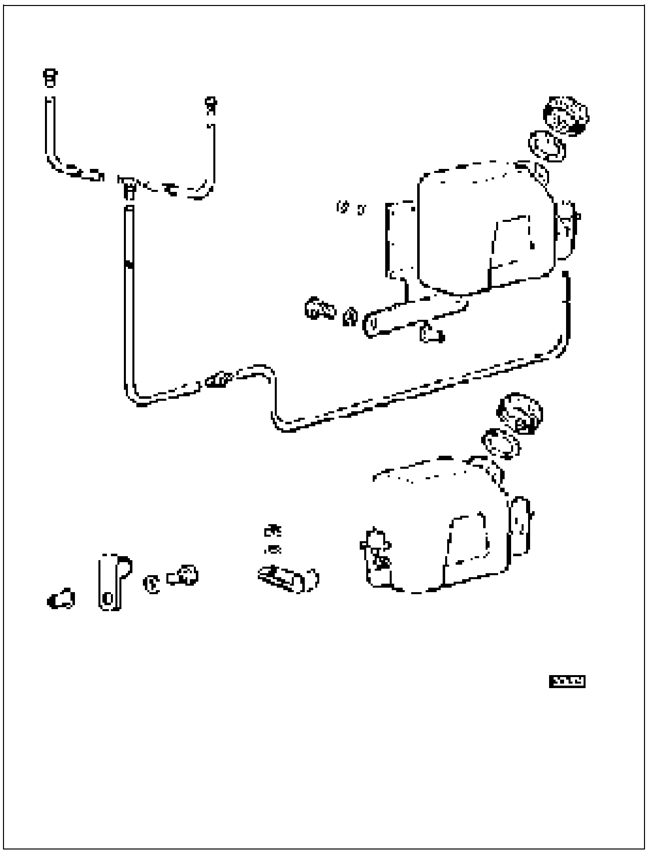


Fig. 11 - Screenwash pump and liquid container.

Directions for fitment of windscreen and bulkhead glass

Preparation of surfaces
Clean the edge of the glass thoroughly, in particular the part along which adhesive is to be applied, using a cloth moistened with GURIT-ESSEX VP 4604 degreaser.

Clean the painted surface of the cab body with which the adhesive will make contact, using CHLOROETHENE or HEPTANE.

Apply GURIT-ESSEX PRIMER 5001 evenly to the degreased surface of the glass, and allow to dry for at least 10 minutes.

Apply GURIT-ESSEX PRIMER 5002 evenly to the cleaned paintwork, and allow to dry for at least 10 minutes.

Applying the adhesive
Cut the triangular applicator nozzle to an isosceles shape measuring approximately 10 mm across the base and 15 mm high.

Apply the adhesive, GURIT-ESSEX BETASEAL, to the primed surface of the glass.

Squeeze out the adhesive applying uniform pressure and with the gun held in a vertical position.

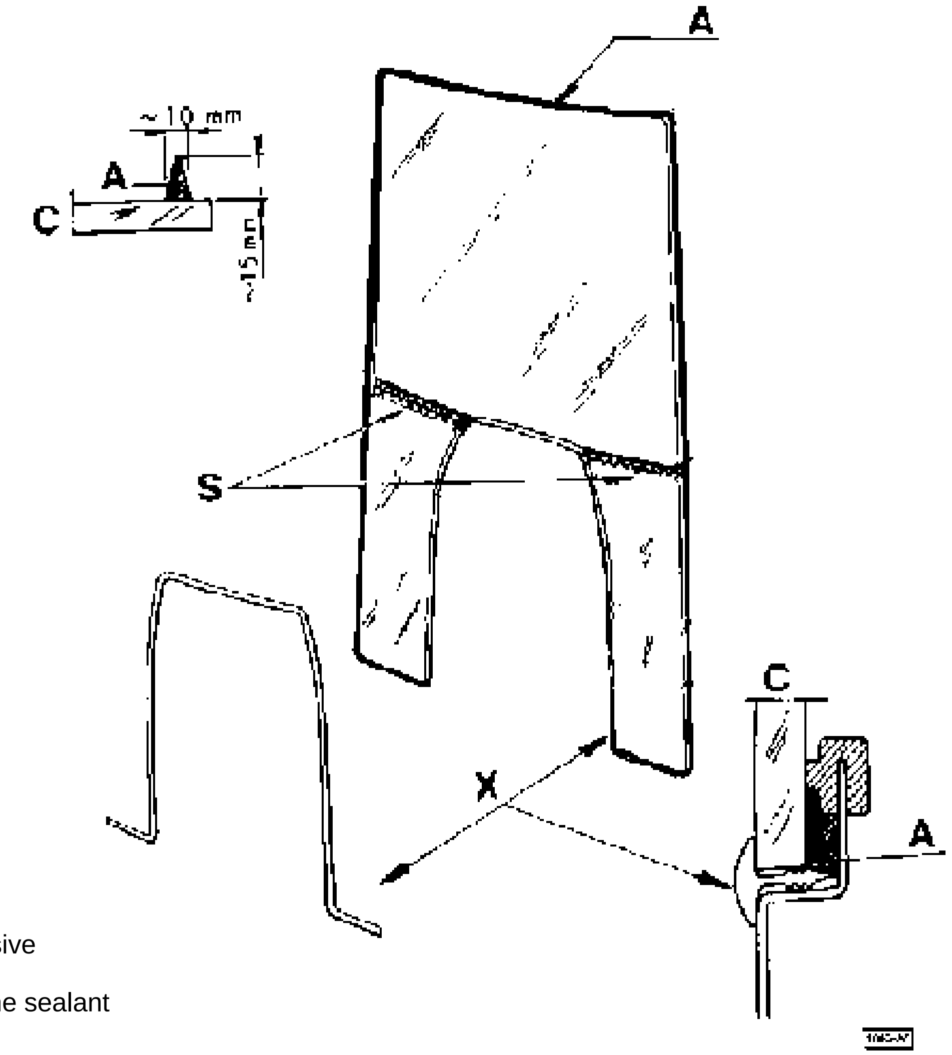
Position the glass in its seating within 5 minutes, applying pressure uniformly around the periphery until the edge locates against the spacer lugs.

Sealant
With the windscreen and the two bulkhead glasses in place, two corresponding gaps remain on either side of the bulkhead. Cover each gap from the inside of the cab with a length of masking tape.

Fill the gaps from the outside with a silicon sealant such as BOSTIK SL 503 (BOSTON).

Thereafter, remove the masking tape.

Seal
Fit the trim seal X as indicated in the diagram attached.



A - adhesive
C - glass
S - silicone sealant
X - seal

Fig. 12 - Fitting the front window glass.

Fitting the seals for the rear window, side windows and doors
Apply the seal to the edge of the glass, positioning it in such a way that the bulbous side is directed toward the interior of the cab; the ends should join in alignment with the bottom hinges, in the case of the doors and side windows, whereas for the rear window, the join should be located mid way along the bottom edge.
Once the entire periphery of the glass has been banded, cut off the excess rubber in such a way that the two joined ends are faultlessly in abutment.
Apply liquid rubber compound to the two ends of the seal so that the internal metal clip will not rust over time.
Insert two rubber connectors p/n 010.1502.0 into the holes of the profile and stick the two joined ends with an adhesive such as "Bostik 5242/C", or alternatively " AREXONS UNIVERSAL".
As an alternative to the two rubber connectors, it is also acceptable to use two lengths of 6 mm sheath for electrical cables and glue the ends with Loctite 401.

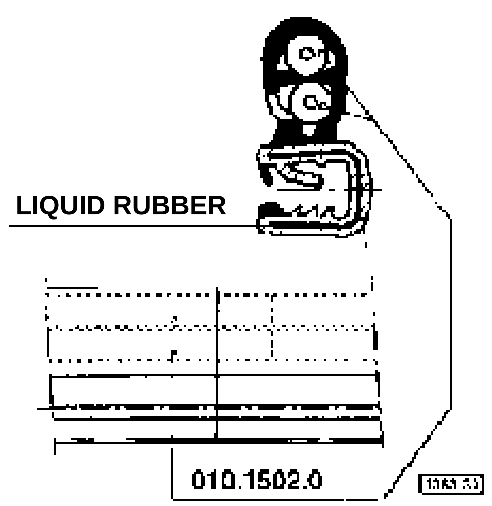


Fig. 13 - Positioning the seals.

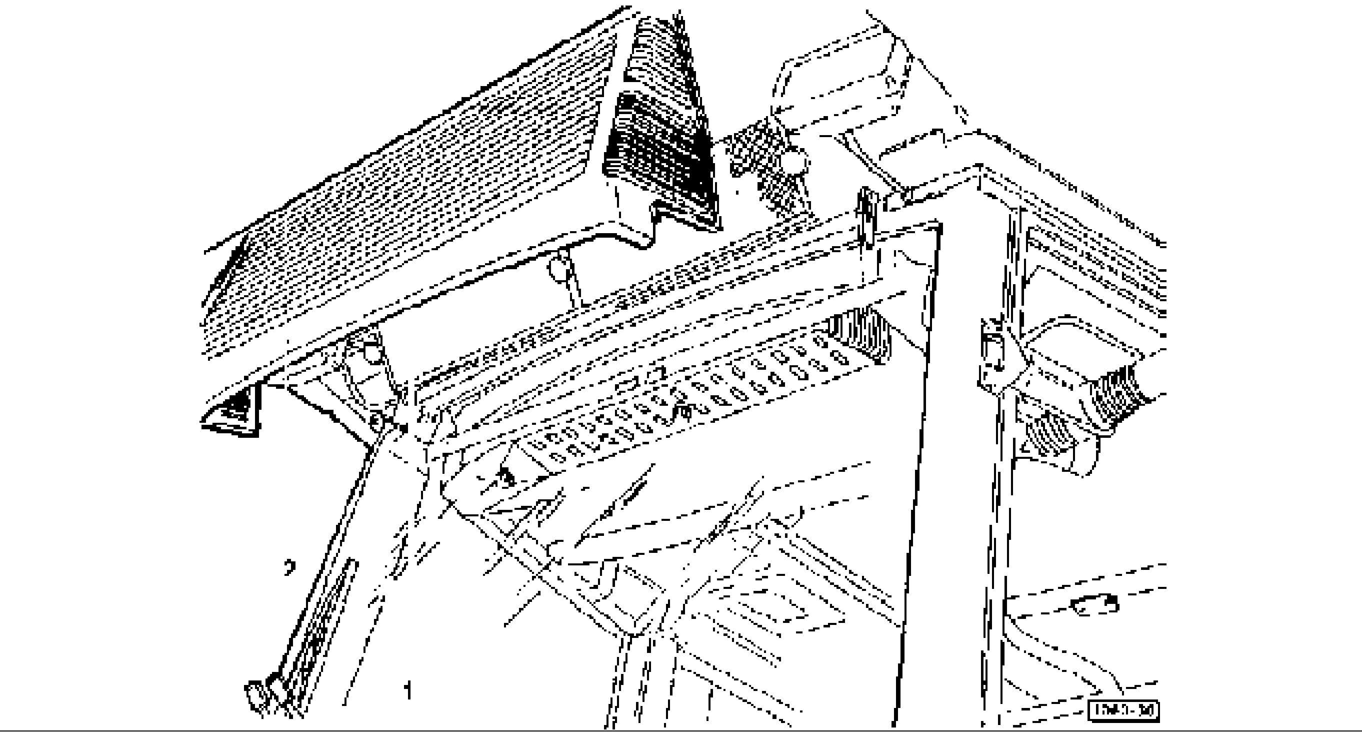


Fig. 13/a - Cab air filter unit.
1 - Air filter
2 - Protective grille.

Cab air filter

Periodically (as dictated by operating conditions): clean the filter.
The 2 knobs retaining the grille also support the filter itself; these must therefore be unscrewed so that the filter can be removed.
The filter is cleaned as follows:
— blast with compressed air (6 bar max) in the direction opposite to that of normal filtration, until all accumulated dust has been dislodged;
— wash for about 15 minutes in a solution of detergent and water at 40 °C;
— rinse clean in running water;
— leave to dry naturally at ambient temperature.
Important: the filter must be replaced if damaged, or renewed routinely after cleaning 6 times.

Screen wash

Periodically (as dictated by operating conditions):
check the level of screenwash liquid in the plastic container located at the rear of the machine.
In the event of the jet being rendered defective by an obstruction, this will be remedied generally by freeing the nozzle outlet with a pin.
If necessary, reposition the nozzle so that the jet strikes the screen at the top of the sweep made by the wiper blade.
It is good policy during winter months to add antifreeze solution to the screenwash liquid, or methyl alcohol.
Warning: it is important that all glass in the cab is kept thoroughly clean.
The rear view mirrors must always be kept clean and properly positioned.

Screen wipers (front and rear)

The wiper blade has a bayonet fitting.
The blade is removed by lifting the catch of the central mounting.

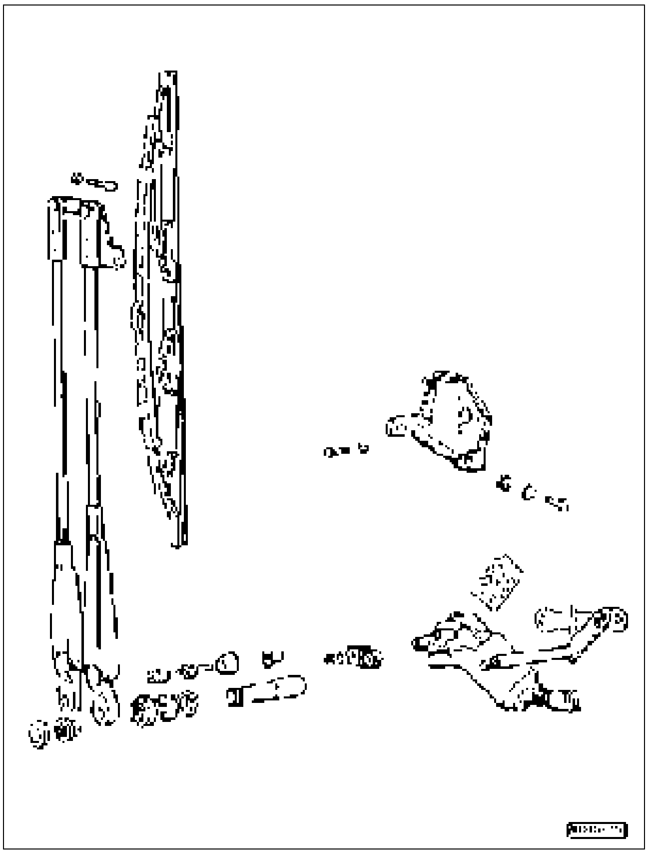


Fig. 14 - Front screen wiper.

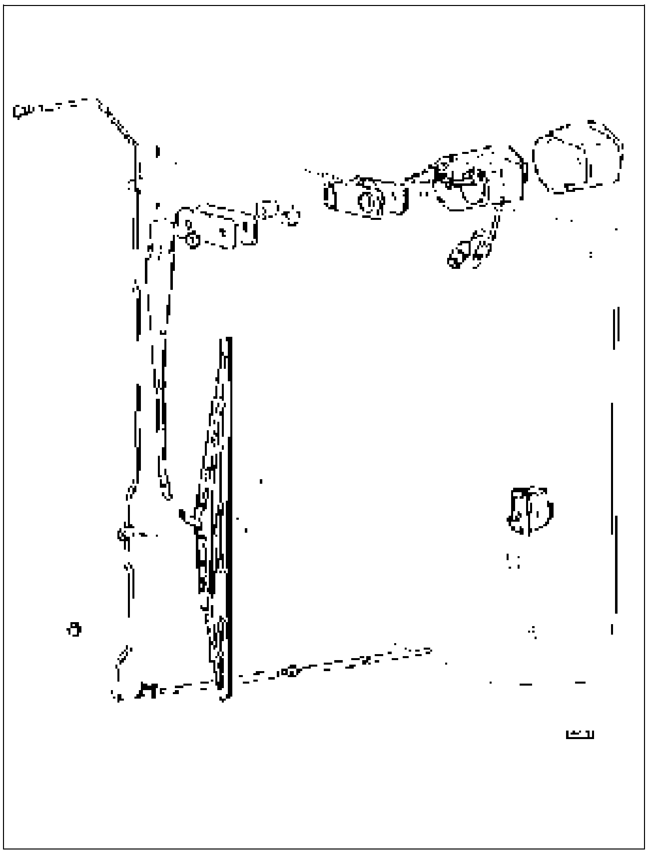


Fig. 15 - Rear screen wiper.

Removal of the cab and platform

The machines of this family can be equipped with cab, or with platform only. Directions are given here for the removal of the cab and platform, as this represents the complete sequence of operations; ignoring the part relating specifically to the cab, the same directions remain good for a machine with platform only.

PROCEED AS FOLLOWS:

Remove the engine hood and the exhaust silencer
— unscrew the eight bolts by which the hood is secured at front and rear to the end brackets and intermediately to the air intake duct.

Disconnect the following from the heater unit
— fan unit heater leads.
— fan unit motor leads.

Disconnect the following control linkages:
— throttle (machines with mechanical throttle linkage only).
— fuel cutoff (machines with mechanical throttle linkage only).

Located on the left hand side of the transmission housing and under the cab or platform:
— differential lock pedal (machines without electrohydraulic controls).
— hydraulic lift (machines with mechanically operated lift only).
— P.T.O. clutch (machines without electrohydraulic controls).
— four wheel drive coupler (machines without electrohydraulic controls).

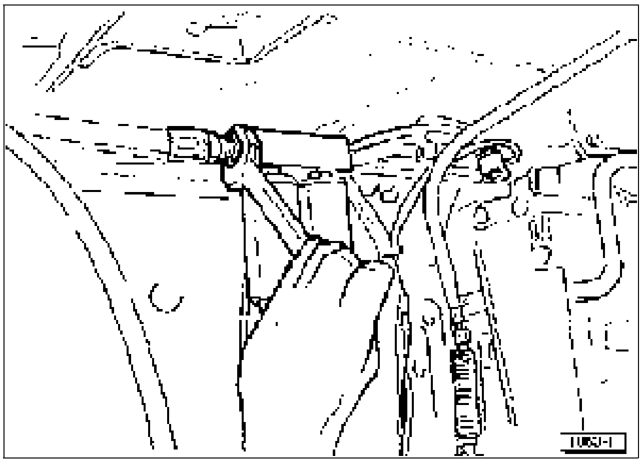


Fig 16 - Detach the oil suction line between the resonators and the power steering control valve, disconnecting at the position as illustrated.

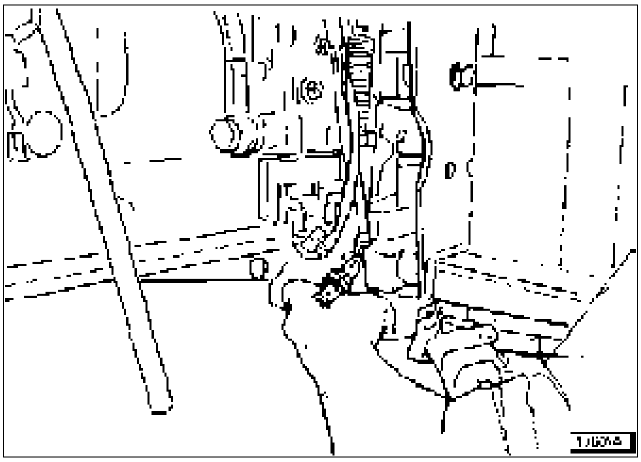


Fig 17 - Detach the protective casing from the AGROSHIFT control valve assembly and disconnect the power leads from the solenoid valves (machines equipped with Agroshift only). Thereafter, disconnect the bowden cable from the handbrake lever mounted to the right hand side of the transmission.

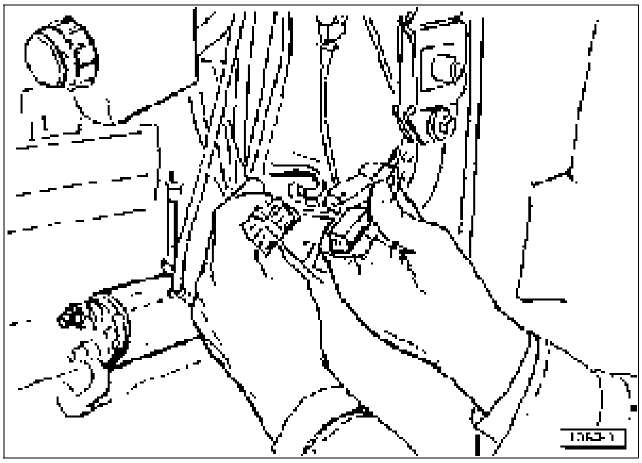


Fig. 18 - Unplug the two 2-pin connectors from the single 4-pin socket carrying the supply of current (red leads), located at the front of the cab on the right hand side.

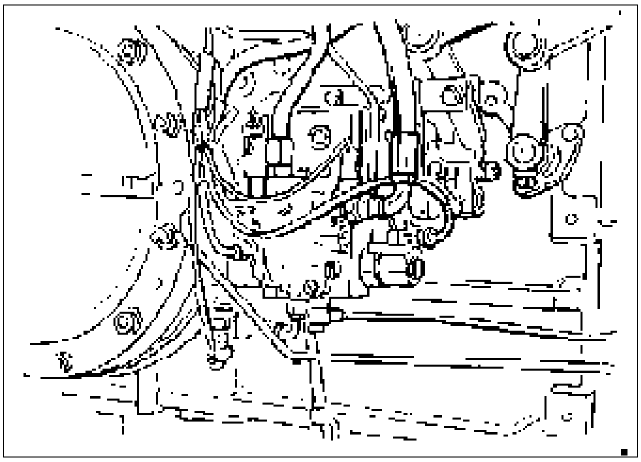


Fig. 19 - On machines equipped with electrohydraulic control functions, disconnect the leads from the solenoid valves operating the P.T.O. clutch, the four wheel drive coupler and the front and rear differential lock actuators.

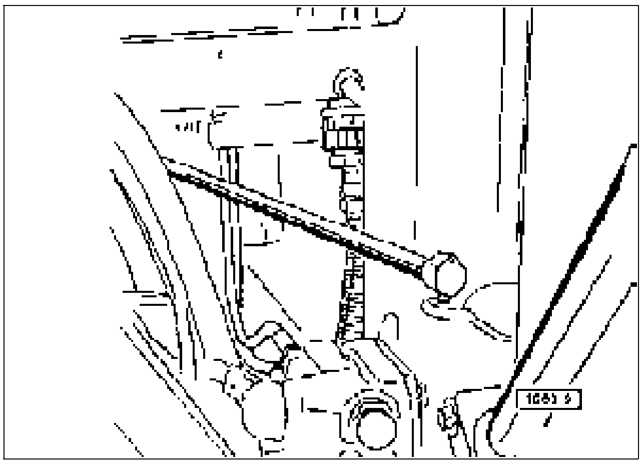


Fig. 20 - Unplug the multiway socket at the rear of the cab on the right hand side. Then uncouple the control rod connected to the external Up/Down lever (mechanically operated lift system only).

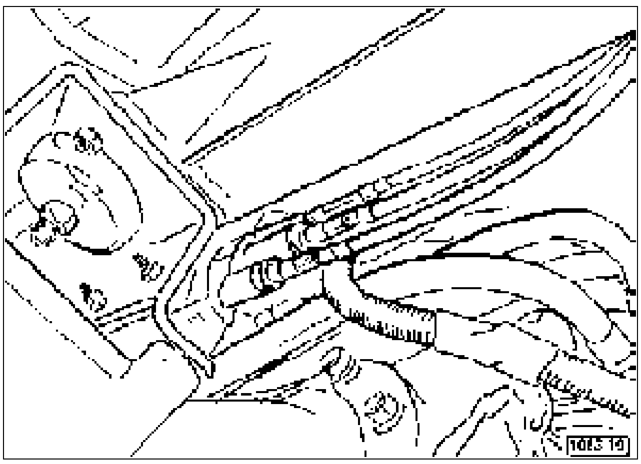


Fig. 21 - Reach under the cab on the right hand side and disconnect the auxiliary spool valve bowden cables.

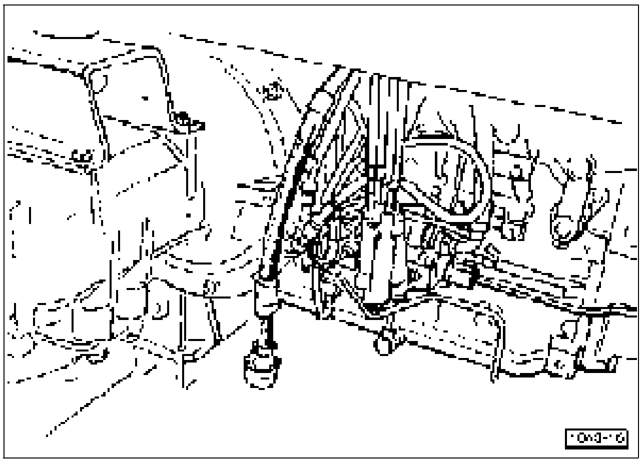


Fig. 22 - Position both the auxiliary spool valve bowden cables and the multiway socket wiring as illustrated, so as to avoid snagging or entanglement when lifting the cab.

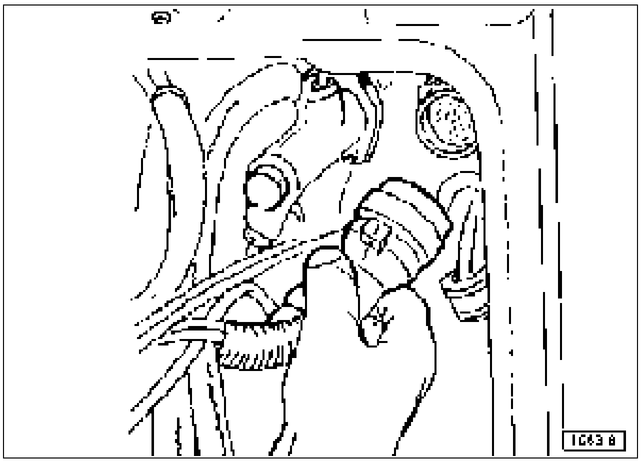


Fig. 23 - Unplug the multiway electrical socket connected to the front of the cab on the left hand side.

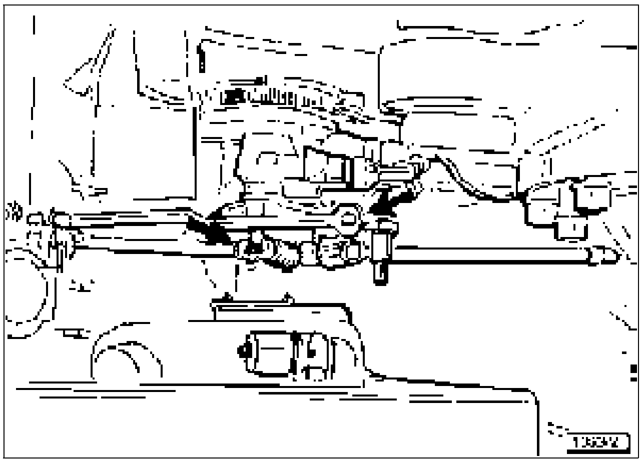


Fig. 24 - Disconnect the Economy/Standard and live P.T.O. control linkages at the position indicated in the illustration by the arrows.

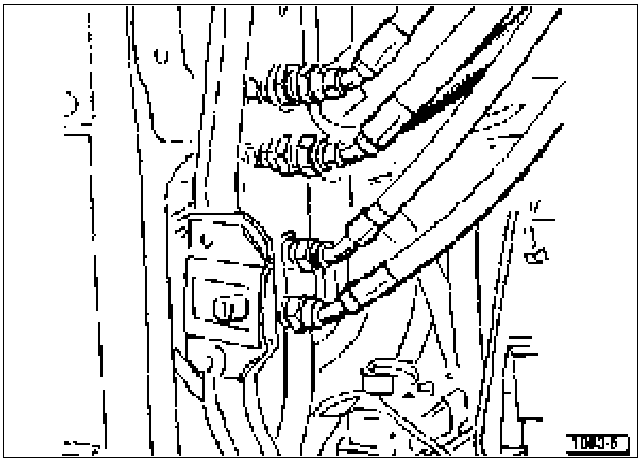


Fig. 25 - Disconnect the oil lines as illustrated:
- 2 x hydrostatic power steering line;
- 2 x oil flow and return lines to and from the oil radiator located at the front of the engine compartment.
Also, disconnect the front lift oil line.

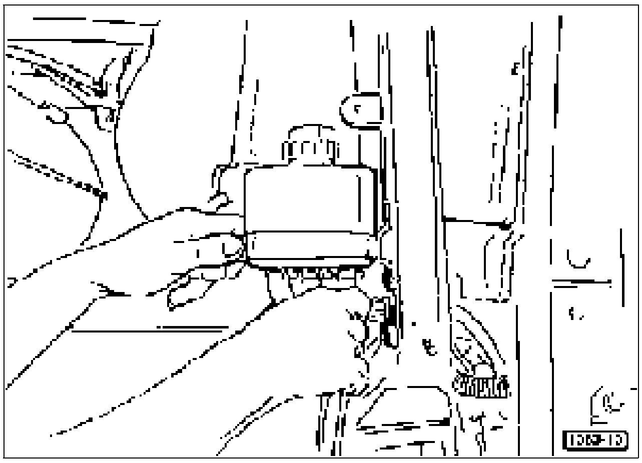


Fig. 26 - Loosen the clip securing the brake and clutch fluid reservoir and detach the reservoir from the cab.

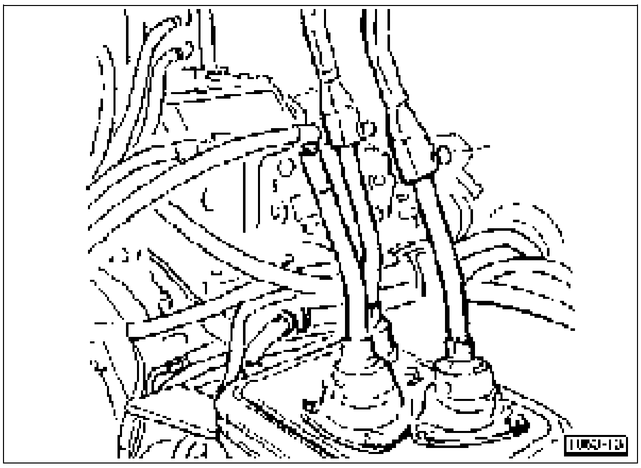


Fig. 27 - Remove the rubber boots and free the ends of the 3 shift levers, loosening the screw at the bottom of each one.

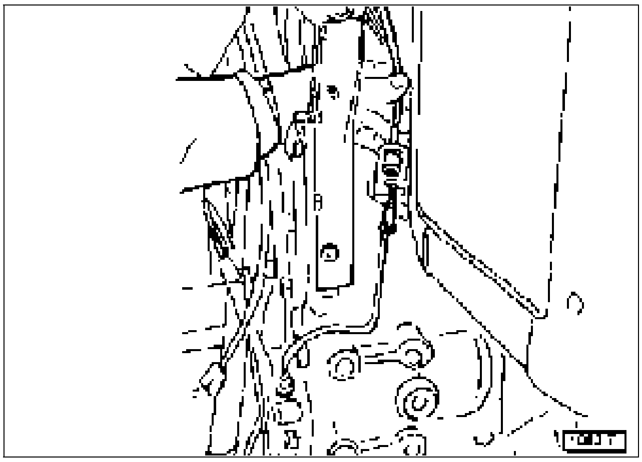


Fig 28 - Disconnect the oil line of the gearshift clutch circuit.

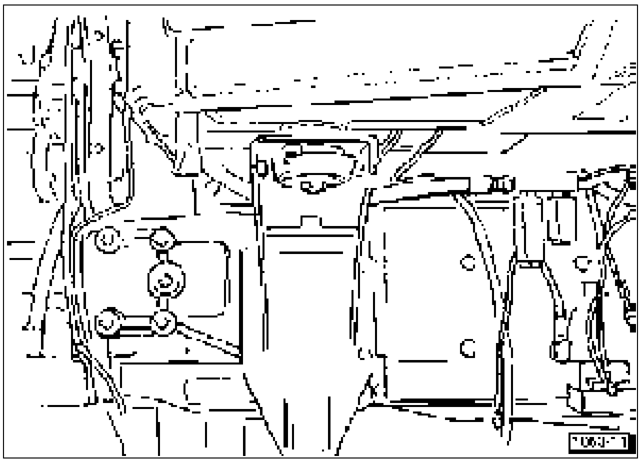


Fig 29 - Remove the bolts anchoring the cab to the front silent-blocks (left and right hand side).

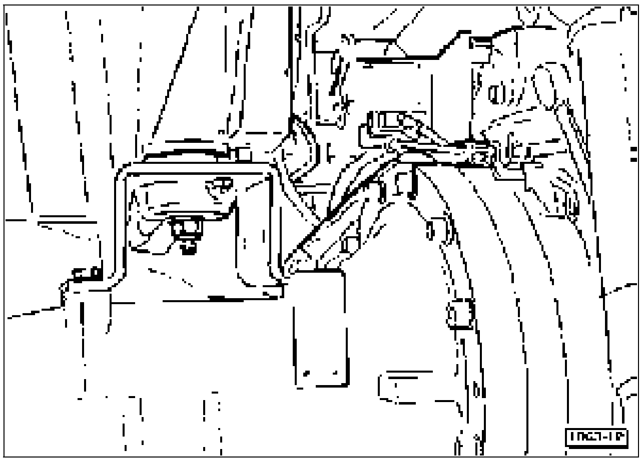


Fig. 30 - Remove the bolts anchoring the cab to the rear silent-blocks (left and right hand side).

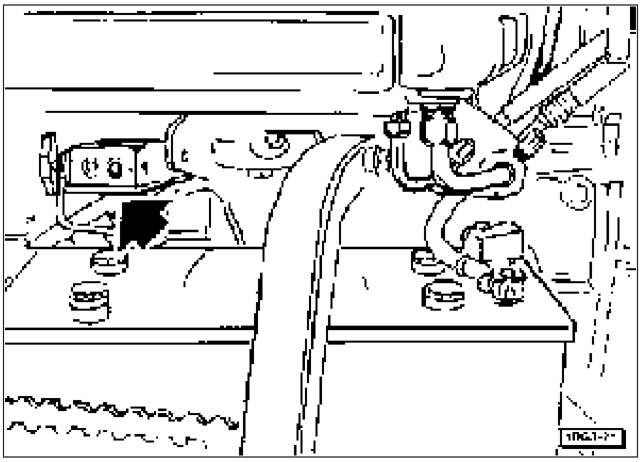


Fig. 31 - Disconnect the front and rear brake oil lines from the Separate Brakes valve, located beneath the cab on the right hand side.

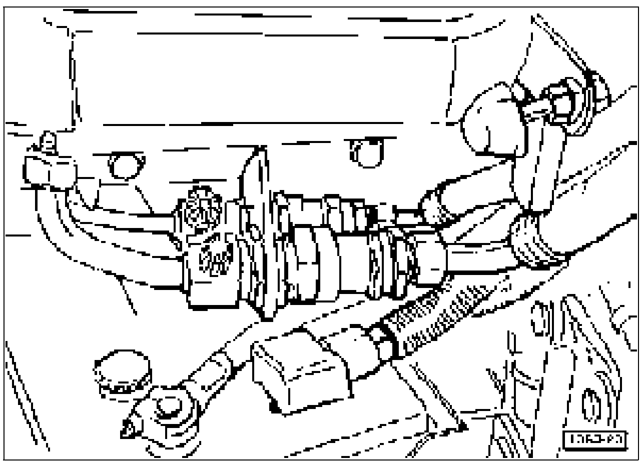


Fig. 32 - Disconnect the refrigerant lines of the air conditioning system at the front right of the cab (machines with air conditioning only).

Remove the battery.

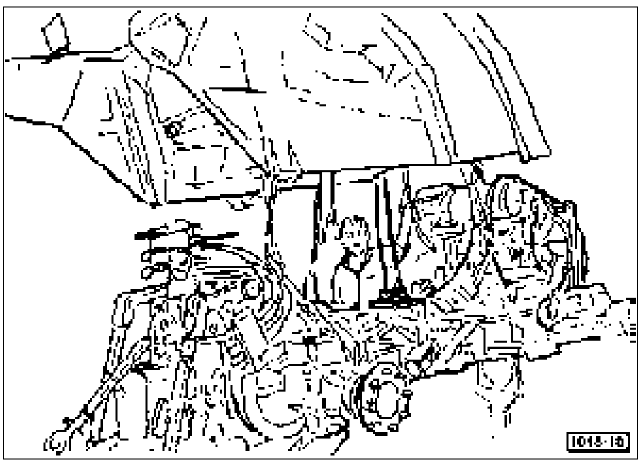


Fig. 33 - Sling the cab to a hoist, proceeding as follows: remove the four 12 mm diameter roof bolts and replace with 4 eye bolts.
Using a suitable equalizing beam, lift the cab gradually, by small degrees, and disconnect the blocks of the electrical system located beneath the cab platform.

Having elevated the cab 10 to 20 cm, disconnect all wiring located under the platform and connected with components mounted to the body, namely:
— lead connected to electronic lift draft control sensor (if fitted).
— lead connected to electronic lift position control sensor (if fitted).
— lead connected to fuel tank float.
— lead connected to hydraulic trailer brake control valve (if fitted).
— lead connected to engine pickup (machines with electronic rpm control system).
— lead connected to engine rpm sensor(machines with electronic rpm control system).
— lead connected to wheel speed sensor (machines with electronic lift system)
— lead connected to RADAR unit (if fitted).
— lead connected to electronic rpm control actuator.

Remove the cab.

CAUTION: make absolutely certain when lifting the cab that all wiring, hoses and mechanical linkages have been disconnected, and that the structure separates without impediment from the tractor body.

IMPORTANT: If the fuel tank is also to be removed, disconnect the hose from the injection system return pipe.

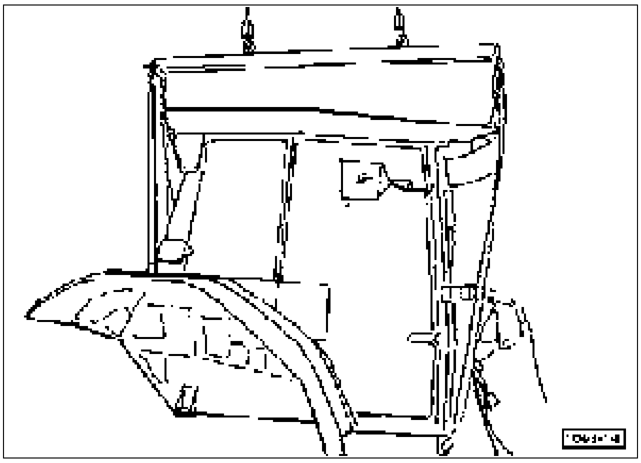


Fig. 34 - Set the cab down on suitable blocks and proceed with operations on the vehicle.

Refitting the cab or platform

The cab is replaced by repeating the removal operations described above, in reverse sequence.

Bowden cables for auxiliary spool valves (see fig 35) are best connected before repositioning the cab or platform on the vehicle, as this will simplify operations.

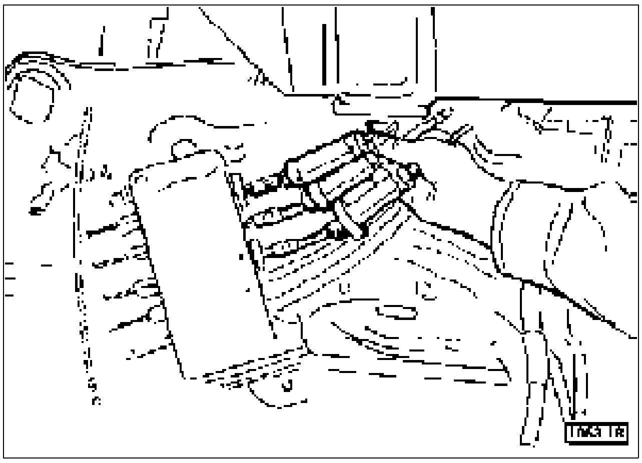


Fig. 35 - Connecting the auxiliary spool valve bowden cables before refitting the cab to the tractor.

Electric heater

The heater unit is made in two versions:
- **standard version**, with power supplied by 65 A alternator and an electronic control unit located in the ventilation unit.
- **cold climate version** (for countries or territories typified by low temperatures). Better voltage output is obtained at low crankshaft speeds by utilizing an 85 A alternator (rated 70 A on data plate) with built-in voltage regulator.

In both versions, a heater alternator provides the power source for a heater unit comprising a resistance element and an electric fan by which warm air is directed into the cab.

The heater unit is installed under the engine hood and mounted directly to the front bulkhead of the cab, in such a way that if the cab is removed the heater remains attached. The air conditioning and ventilation unit is completely separate from the heater, being located in the roof of the cab behind the head lining.

Technical specifications

65 A alternator (MARELLI 12V 65A)	cod. 2.9439.480.0
85 A alternator (ISKRA AAK5117 12V 70A)	cod. 2.9439.470.0
electronic control unit for standard system	98707.69.0
heater resistance element	3200 W
fan nut tightening torque	35 Nm (3,4 kgm)

1 Demister
2 Warm air
3 Air intake
4 Potentiometer
5 Selector / Fan

Components:
A 65A alternator
R heater alternator field coil

E Electronic circuit board
TR Thermistor (NTC resistor)
S Thermal overload cutout
RE Heater element
M Electric fan unit

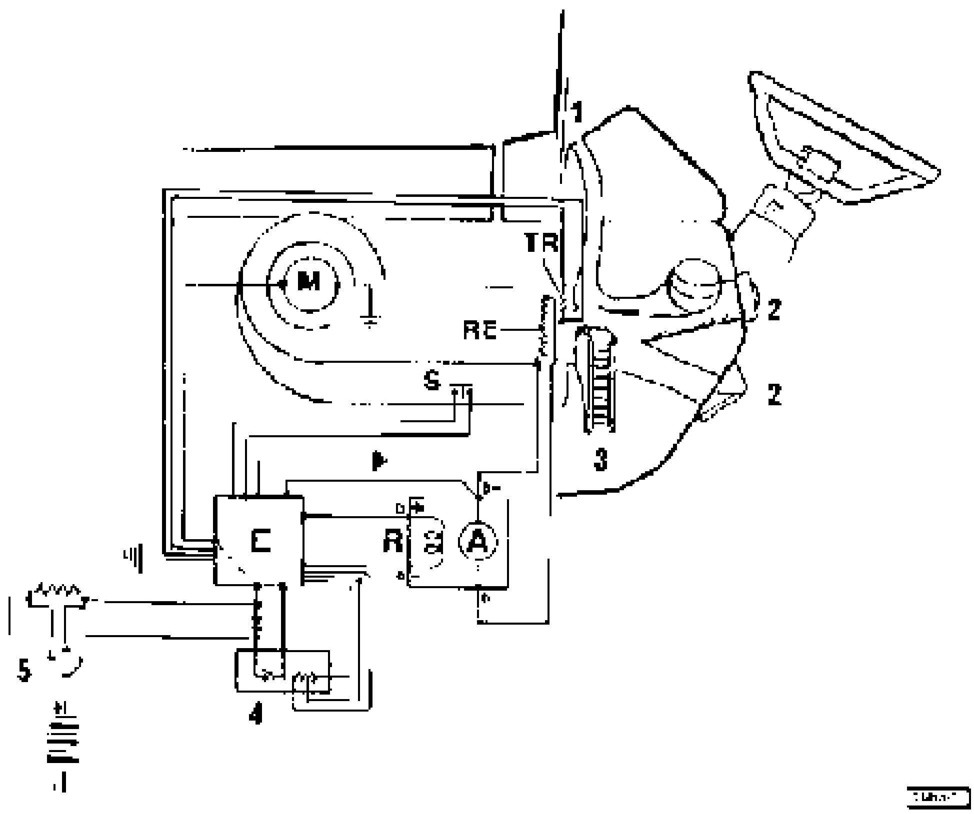
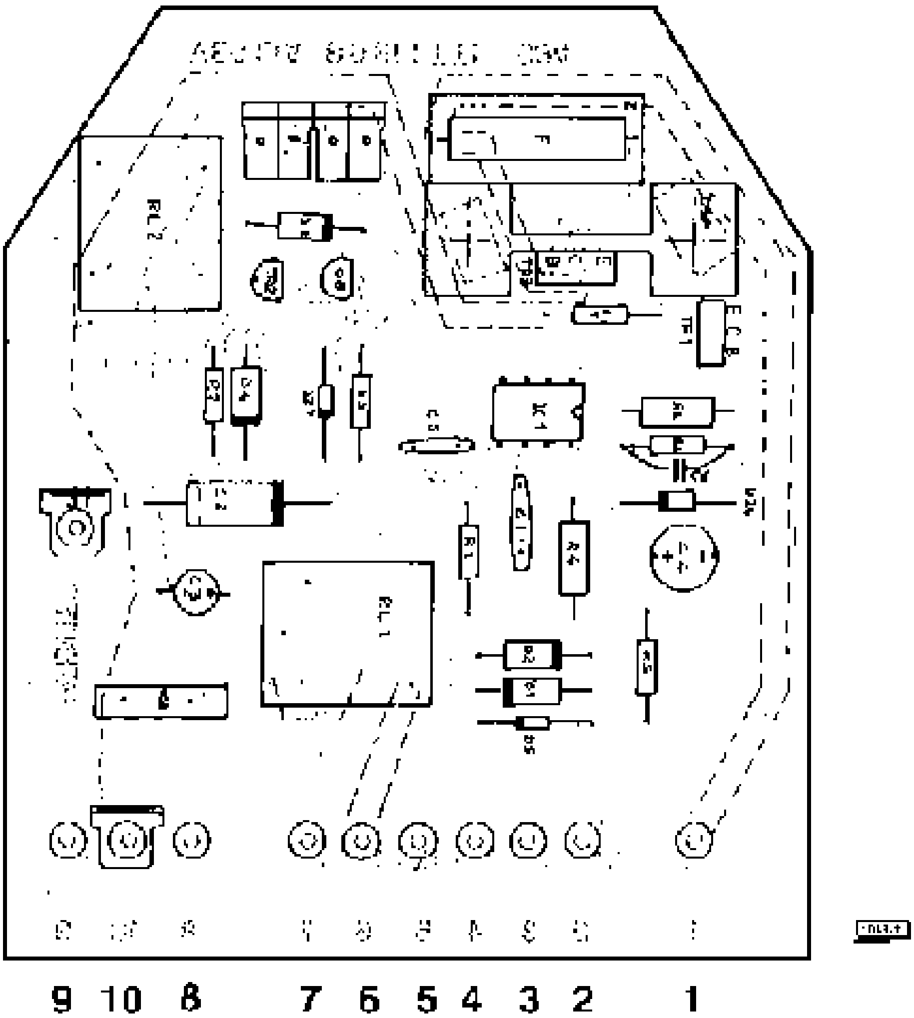


Fig. 1 - Configuration of "STANDARD" ventilation and heating unit.

Warnings:

— Always make certain before starting the engine that the heating system is switched off, to avoid overloading the battery.
— Following prolonged use at full power, the system should not be switched off suddenly but allowed first to run for a few seconds at the minimum setting so that the heater has time to cool down.
— In the event of the engine being run at minimum rpm for any length of time with the heating system on, select the minimum heat setting also.



Numbers: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 denote the connections between the control unit and the relative wiring (see fig 3 ref T, page 357).

Fig. 2 - Electronic circuit board (control unit) of ventilation and heating unit.

Diagnostics

Important: to ensure smooth operation, all wiring connections in the cab heating system must be secure, clean, and free from any traces of rust.
Loose connections or oxidation on surfaces will significantly reduce the effectiveness of the heating system.

The heating alternator drive belt must always be correctly tensioned, to ensure that the alternator receives a steady input horsepower of 4.5HP approx.

Checks must be carried out employing suitable instruments; the use of makeshift contrivances such as indicator lights with leads and clips is to be avoided, as these can cause serious damage to the system.

TRACING FAULTS IN STANDARD TYPE HEATING SYSTEM (WITH 65 A ALTERNATOR)

Proceed as follows:

1 - With the engine off, switch on the system by turning the potentiometer control to the initial contact, and adjust the fan speed control.

— Check that warm air emerges from the outlets, and if not, use a voltmeter to test for power at the fan switch. If there is no voltage reaching the switch, check the wiring and the connections between the switch and the battery, also the relative fuses located in the fuse box.

2 - With the potentiometer at the initial contact and the fan on (engine off):

A - Check that the brown lead is connected securely to terminal **DF** of the heater alternator, and the white lead to terminal **D+** of the heater alternator.

B - Test the voltage between contact 7 (fig 3) and contact 12 (fig 3) of the heating system control unit (printed circuit board T in fig 3).
The voltmeter should read read the following values:

- potentiometer at minimum setting = 0.5 V
- potentiometer rotated half way = 5 V
- potentiometer at maximum setting = 10 V

If the voltmeter readings are correct but the system fails to operate as it should, proceed to run the check of paragraph **3**; if the system still fails to operate correctly thereafter, run the check of paragraph **4**.

3 - Check that voltage registers at the controls, turn the ignition key to the **OFF** position and disconnect the black lead from terminal **B+** of the heater alternator, then test the resistance between **B+** and **B-**, which normally should be 1 ohm. If the circuit is found to be open, locate the cause. Reconnect the black lead to terminal **B+** when done.

4 - With the potentiometer at the initial contact, test the voltage between contact 6 (fig 3) and contact 10 (fig 3), which is GND, of the printed circuit board at the heating system control unit (T, fig 3). The voltmeter should read **12V**.
If this is not the case, check the wiring connections with the fuse box.

5 - With the potentiometer at the initial contact and fan speed **I** selected, test the voltage between contact 10 and contact 12 of the control unit PCB. The voltmeter should read **12V**.
If this is not the case, check the connections and the relative wiring between the fan control switch and the potentiometer. Also, check the connections between the potentiometer and contact 8 of the circuit board.

6 - Verify the efficient operation of the thermal overload cutout. With the potentiometer at the initial contact and the fan on, test the voltage between contact 9 and contact 10 of the control unit PCB. The voltmeter should read **12V** in open circuit conditions.
Detach the connector from contact 4 of the PCB and place a jumper across the two terminals of the violet leads wired to the thermal overload cutout. If no voltage registers, with the tester connected to contacts 9 and 10 of the PCB, the thermal overload cutout must be replaced.

7 - With the potentiometer rotated beyond the initial contact and the fan on, test the voltage between contact 1 and contact 7 of the heating system control unit PCB, or between the two terminals **DF** and **D-** of the heater alternator.
If the voltmeter fails to produce a reading, proceed as follows:
— check the integrity of the fuse mounted to the control unit PCB
— check the wiring and connections between the alternator and the heater unit
— check the operational efficiency of the alternator
If the fault persists, the printed circuit board of the electronic control unit must be replaced.

8 - If when placed between contact 1 and contact 7 of the control unit PCB and the alternator, the voltmeter gives a constant reading of **5V** absorbed even on rotating the potentiometer right or left, this means that either the potentiometer or the temperature sensor (thermistor) is faulty.

9 - With the engine running at 1000 rev/min and the heating system on (fan operating and potentiometer rotated beyond the initial contact), test the voltage at terminals **B+** and **B-,** which should register as follows:

- potentiometer at minimum setting = 1 V
- potentiometer rotated half way = 24 V
- potentiometer at maximum setting = 33 V

With the engine at full throttle, a maximum voltage of **52 V** should register, although in practice the voltage will vary normally between **40** and **45 V.**
In the event that conspicuously lower readings are observed, check the alternator drive belt, and if necessary the alternator itself.

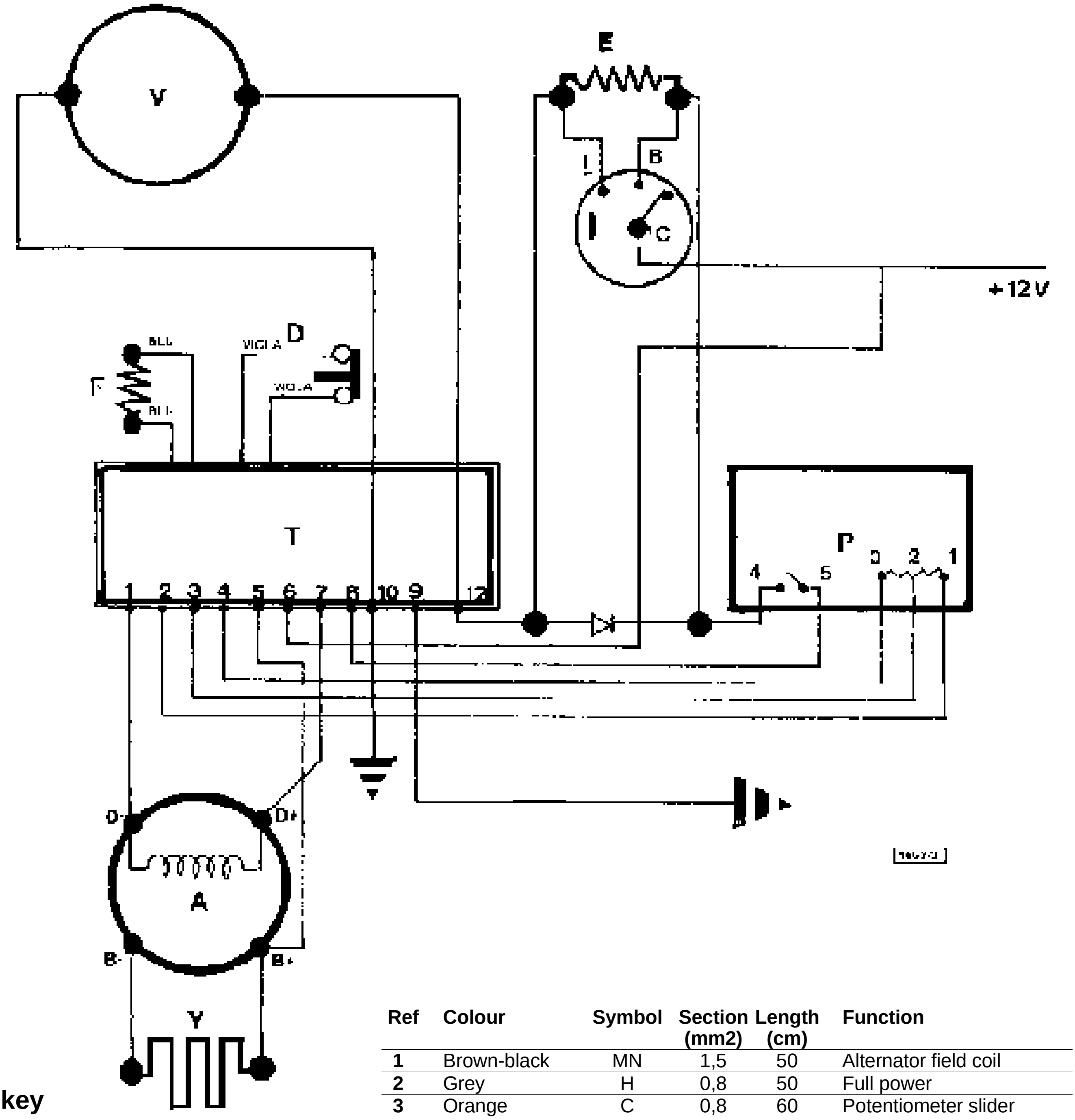
10 - **A** - If the heating system starts up but fails to operate correctly, then either the resistance heater element is not in good condition, or the wiring connections between the alternator and the heater unit have worked loose.

B - Rotate the potentiometer to the maximum setting and bring the engine to full throttle. If the alternator output rises to 56 V and then drops suddenly to zero (due to the electronic control unit cutting in), the system must be reactivated by returning the potentiometer back to zero and then rotating to the right beyond the initial contact.
The excessive rise in voltage is due either to connections working loose or to a fault at the heater element.

C - If the system produces heat with the fan operating both at speed **I** and at speed **II**, but air flow is obtained only on speed **II**, this means that there is a short circuit at the speed control diode. Replace the diode.

D - If the system produces heat with the fan operating at speed **I** but not when the selector is set at speed **II**, then the speed control diode is remaining open. Replace the diode.

Electrical diagram - heating system



Ref	Colour	Symbol	Section (mm2)	Length (cm)	Function
1	Brown-black	MN	1,5	50	Alternator field coil
2	Grey	H	0,8	50	Full power
3	Orange	C	0,8	60	Potentiometer slider
4	Green	V	0,8	50	Potentiometer "0"
5	Yellow	G	1,5	50	Potentiometer positive
6	Black-white	BN	1,5	60	Speed switch
7	White	B	1,5	60	Alternator field +
8	Blue-white	AB	0,8	60	Potentiometer strength
9	Orange-black	CN	0,8	70	Indicator lamp
10	Black	N	2,5	60	Ground
12	Red-black	RN	2,5	100	Motor +

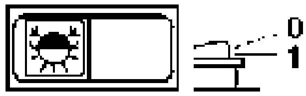
key

- **V** Electric fan heater unit
- **E** Fan heater element
- **I** Fan heater switch
- **D** Thermal overload cutout
- **T** Electronic control unit
- **P** Heater potentiometer
- **F** Thermistor
- **A** Alternator
- **Y** Heater element

Fig. 3 - Electrical diagram - ventilation and heating system.

Cold climate electrical system

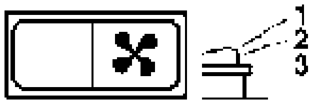
1 - On-off switch
(Two positions, as indicated in the figure alongside).
Pressing the switch, the built-in indicator lights up and the electric fan will operate at speed **I**.



On/off switch

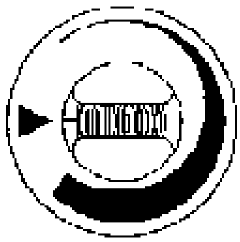
Heater fan control switch
(Three positions, as indicated in the figure alongside).

— Switch at position **1** (fan operates at speed **I**, due to activation of the on-off switch).
— Switch at position **2 -** fan operates at speed **II**
— Switch at position **3 -** fan operates at speed **III**



Heater fan control

Heat control potentiometer
— Rotating the control clockwise around the red sector (beyond the initial contact), the power input to the heater unit is increased progressively.



Heat control potentiometer

This type of system is essentially similar in construction to the standard system, but with the following differences:

2 - **The potentiometer** is coupled directly to the field coil of the heater alternator (this version has no electronic control unit).

3 - The system incorporates **two thermal overload cutouts** set respectively at **70°C** and **100°C**. The first of these (**normally open**) serves to prevent temperature peaks in the heater unit when switched off immediately after a prolonged period of operation; the second (**normally closed**) functions as the safety device providing thermal overload protection for the overall system.

NB: If the air flow temperature rises to 70 °C with the fan operating at speed **I** or speed **II**, the first thermal overload device will trip and switch in fan speed **III**; this will take place even with the ignition key in the **OFF** position.

A first relay located above the fuse box is connected to the fan control. When the fan control is set to speed **I** or speed **II**, current flows to the fan speed resistor, passing through terminals 87B and 30 of the relay. With speed **III** selected, conversely, the relay passes current (12 V) by way of terminals 87 e 30, direct to the fan motor, by-passing the speed control resistor.
A second relay, also located above the fuse box, is connected to the **alternator voltage regulator** and will operate whenever the second thermal overload cutout trips on sensing an air flow temperature of 100°C. The contacts are wired to cut off the flow of current from the regulator to the field coil.

4 - Whenever the potentiometer is rotated beyond the initial contact, the fan automatically switches in at speed **I**.

5 - The alternator has a higher ampere rating. Performance is superior to that of the standard system at speeds of rotation above 1500 rev/min; at lower speeds the performance of the two systems remains identical.
The alternator is equipped with a solid state regulator that replaces the printed circuit board (the electronic control unit in the standard two speed system.)
The regulator includes an electronic circuit by which the voltage component of the current output is limited to a maximum value of 48 Vdc .

6 - Power supply: There are two power lines to the alternator, protected by 15 amp and 30 amp fuses located in the tractor fuse box.

CAUTIONS: to ensure smooth operation, all wiring connections forming part of the cab heating system must be secure, clean, and free from any traces of rust.
Loose connections or oxidation on surfaces will significantly reduce the effectiveness of the heating system.

The heating alternator drive belt must always be correctly tensioned, to ensure that the alternator receives a steady input horsepower of 4.5HP approx.

Checks must be carried out employing suitable instruments; the use of makeshift contrivances such as indicator lights with leads and clips is to be avoided, as these can cause serious damage to the system.

FAULT DIAGNOSIS

PROCEED AS FOLLOWS:
(The positions of the on-off and fan control switches indicated here refer to the illustrations on page 357)

1 - With the ignition key in the **ON** position (engine at standstill) and the heater and fan control switch at position **1,** the on-off switch indicator should be alight, the fan in operation and a flow of warm air established. If not, check the wiring and connections between the controls and the fuse box (wires connected to the 15 A fuse), and inspect the fuse itself.

If the fuse and the connections are found to be in good order, apply a voltmeter to the 6-pin connector near the fuse box, connecting the “**+**” prod to terminal 5 (red - 2,5 power) and the “**-**” prod to terminal 4 (2 black leads - 1, 5), as indicated in Fig 4. The meter should give a reading of 12 V if the contacts are healthy. If not, other parts of the system need checking.

Again with the ignition key in the the **ON** position (engine at standstill) and the heater and fan control switch at position **1,** apply the voltmeter to the terminals of the first and second relays (see fig 4) and check that the reading is 12 V. Now turn the ignition key to the **OFF** position and disconnect the wiring contacts of the heater switch. With this same switch at position **1**, check with the tester that it passes current and is therefore operating efficiently. This done, reinstate the contacts.

2 - With the ignition key in the **ON** position (engine at standstill) and the heater and fan control switch at position **1**, apply the “**+**” prod of the voltmeter to terminal 5 (yellow/blue - 1) of the 6-way potentiometer and the “**-**” prod to terminal 1 (green lead - 1), as indicated in Fig 4. The reading should be 12 V.
Next, transfer the “**-**” prod from terminal 1 of the potentiometer to terminal 4 (black/white lead). In the event that the reading given is other than 12 V, detach the leads from the potentiometer and verify that current passes between terminals 4 and 5. If not, replace the potentiometer.

3 - With the ignition key in the **ON** position (engine at standstill), the heater and fan control switch at position **1** and the potentiometer activated, apply the “**+**” prod of the voltmeter to terminal 3 (grey - 1) and the “**-**” prod to terminal 1 (green lead - 1), as indicated in Fig. 4. The reading should be 12 V. If not, check the alternator relay located at the rear of the fuse box. Then proceed as in step 7.

4 - With the ignition key in the **ON** position (engine at standstill), the heater and fan control switch at position **1** and the potentiometer activated, apply the “**+**” prod of the voltmeter to terminal 2 (orange - 1) and the “**-**” prod to terminal 1 (green lead - 1), as indicated in Fig. 4. The reading should be 12 V.

Turning the potentiometer steadily clockwise, check that the voltmeter gives the following readings:

- Potentiometer at minimum setting = 1 V
- Potentiometer rotated half way = 6 V
- Potentiometer at maximum setting = 12 V

If the voltmeter fails to give a reading, inspect the wiring connections at the potentiometer and check for any traces of oxidation. Clean if necessary and reinstate.
If the values indicated by the meter are low, check that the heater alternator drive belt is properly tensioned.

5 - With the ignition key in the **ON** position (engine running at 1000 rev/min), the heater and fan control switch at position **1** and the potentiometer activated, test for the correct voltage input at the heater resistance element while rotating the potentiometer:

- Potentiometer at minimum setting = 1 V
- Potentiometer rotated half way = 10 V
- Potentiometer at maximum setting = 26 V

If the voltmeter gives no reading, check the wiring connections, which must be sound, clean, and free from any traces of oxidation.
If the readings are low, check that the heater alternator drive belt is properly tensioned. Recheck the voltage input at the heater element, this time with the engine running at 2500 rev/min, while rotating the potentiometer. The voltmeter should give approximately the following readings:

- Potentiometer at minimum setting = 1 V
- Potentiometer rotated half way = 14 V
- Potentiometer at maximum setting = 38 V

6 - If there is no supply of current from the alternator, stop the engine and disconnect the black lead running from the alternator to the heating system. Verify the continuity of the resistance with a tester, which should give a reading of 1 ohm or thereabouts; if the value registers high or infinite, then one of the elements is defective.

7 - With the ignition key in the **ON** position, the heater and fan control switch at position **1** and the potentiometer activated, check that current is reaching the 12-pin connector of the heating unit.
If not, proceed to carry out the following tests:

A - Check the voltage, applying the "**+**" prod of the meter to terminal 10 (blue/white - 1) and the "**-**" prod to terminals 4 and 5 (black leads - 1,5), as indicated in fig 4. The voltmeter should give a reading of 6.2 V approx. With the "**-**" prod connected to earth, the reading should be 12 V.

B - Check the voltage, applying the "**+**"prod of the meter to terminal 11 (violet - 1) and the "**-**" prod to terminals 4 and 5 (black leads - 1, 5), as indicated in fig 4. The voltmeter should give a reading of 6.2 V approx.

C - If the meter fails to give any reading in steps **A** and **B**, turn the ignition key to the **OFF** position, unplug the 12-pin connector from the heater unit and test for continuity at contacts 10 and 11 of the heater unit; the tester should give a reading of **0 ohm**. Conversely, if the resistance value is infinite, this means that the second thermal overload cutout (100 °C) has remained open and the corresponding relay is disallowing the passage of current to the alternator field coil.

8 - Insufficient ventilation (the revolutions of the electric fan unit are clearly affected by a low battery charge):

A - **Fan control switch on speed I** .
With the ignition key in the **ON** position (engine at standstill) and the fan control switch at position **1**, the voltage at contact 5 (black/white lead - 1, 5) should be 12 V, whereas the voltage at contact 4 (green lead - 2, 5) must be 6 V. (These tests must be made with the second prod of the voltmeter connected to earth).

B - **Fan control switch on speed II** .
With the ignition key in the **ON** position (engine at standstill) and the fan control switch at position **2**, the voltage between contact 1 (red/black lead - 1, 5) and earth should be 12 V, whereas the voltage between contact 4 (green lead - 2, 5) and earth must be 8.5 V.

C - **Fan control switch on speed III** .
With the fan control switch at position **III**, the ventilation system relay is caused to cut in, with voltage at terminal 87 and contact at the connection of the red/black lead 2, 5 of the fan control switch. As the relay trips, voltage passes to terminal 30 in association with contacts 1 and 2 of the 12-pin connector.

If the right ventilation is not obtained, test contact 4 (blue lead - 1) of the fan control switch and check that the voltage is 12 V. Then test relay terminals 85 (brown/white lead - 1) and 86 (red/white lead - 1). If there is voltage registering at these terminals, the relay cannot operate.

9 - The fan continues to operate at maximum speed whether the ignition key is in the **ON** or the **OFF** position (this should happen only when the temperature of the air flow rises above 70 °C).

A - Unplug the 12-pin connector from the heating system and place the tester across contacts 7 (brown lead - 1) and 8 (brown/white lead - 1) of the connector (heater side); a high value of resistance (ohms) should register. Conversely, if there is little or no resistance, then the first thermal overload cutout (70° C) is closed. If this happens when the heater element is cold, the thermal overload device must be replaced.

B - If the first thermal overload cutout (70 °C) is open, remove the ventilation system relay; the fan unit should shut off. If the fan does not stop, check continuity across terminals 87 and 30 of the relay. If the contact is found to be open, then the relay is functioning correctly and can be retained. If not, replacement is required.

If the fan runs slow, check the wiring thoroughly.

10 - The heating system equipment includes 4 diodes.

D1 = diode on blue lead connecting the fan control switch and terminal 85 of the relay.
With the ignition key in the **OFF** position, remove the relay and check with the voltmeter; current must flow from the fan control switch toward the relay connector, and not the other way.

D2 = diode located between the leads (brown/white and black/red) of ventilation relay terminals 85 and 86.
With the ignition key in the **OFF** position, remove the relay and check with the voltmeter; current must flow from terminal contact 86 toward terminal contact 85, not the other way.

D3 = diode located between terminal 85 of the heater alternator control relay and terminal 86 of the ventilation control relay.
With the ignition key in the **OFF** position, remove both relays and check with the voltmeter; current must flow from terminal 86 toward terminal 85 of the connector, but not the other way.

D4 = diode located on the lead between terminal 86 of the ventilation control relay and the junctions connecting with leads coming from contact 5 (black - 1, 5) of the 12-pin connector and from contact 3 (black - 1, 5) of the 6-pin connector.

Remove the ventilation control relay and ensure that the potentiometer is in the **OFF** position, then check with a special purpose voltmeter that current flows from terminal 86 toward contact 3 of the 6-pin connector, not the other way.

Caution: the voltmeter used for testing the diodes must be calibrated 0.5 V full scale.

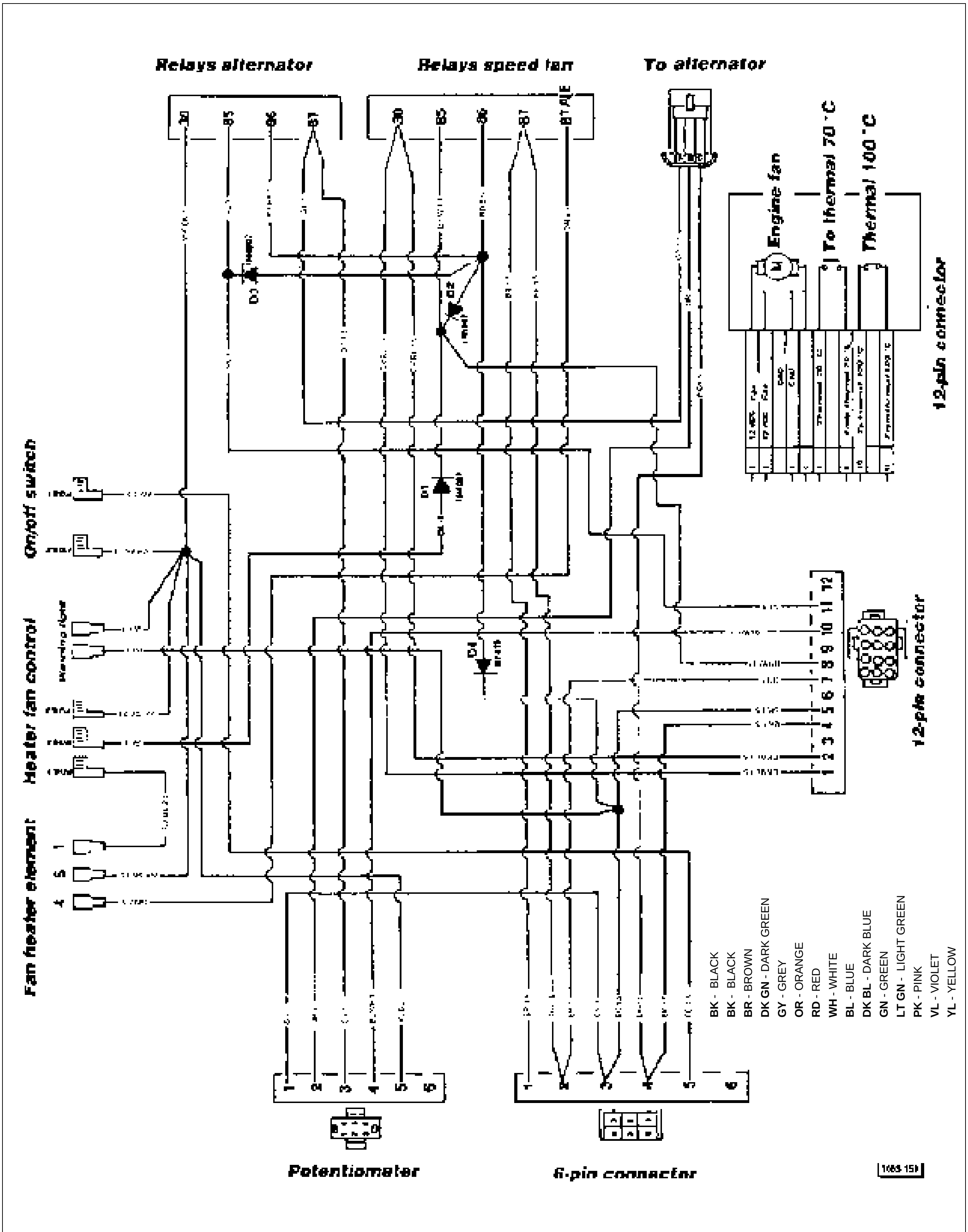


Fig. 4 - Electrical diagram - cold climate ventilation and heating system.

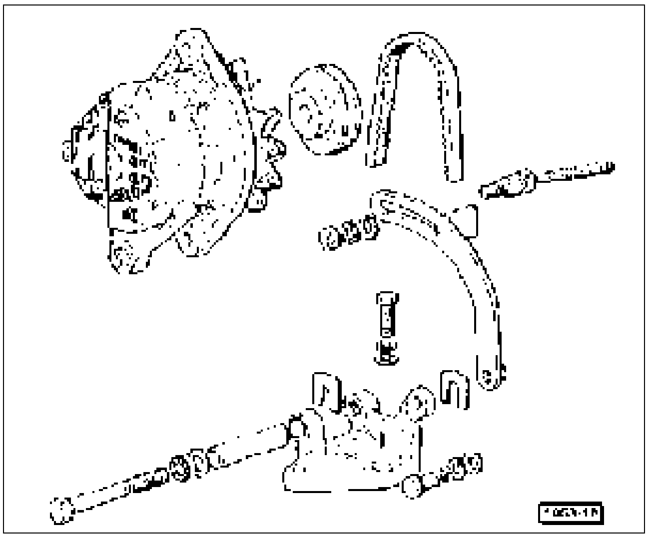


Fig. 5 - 65 A alternator for standard heating system.

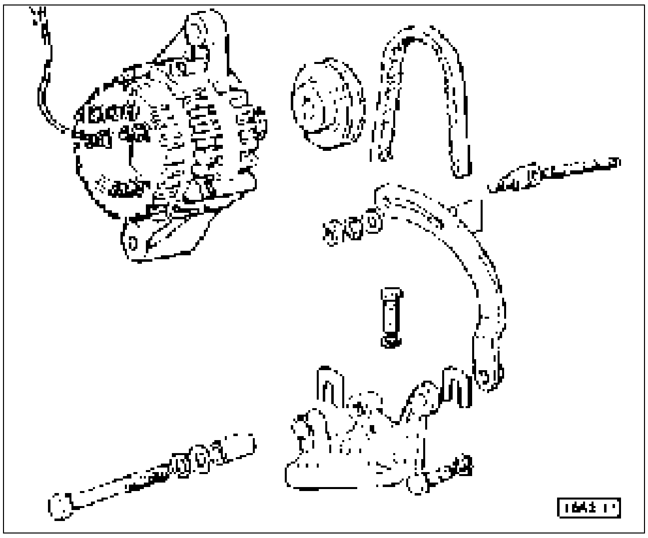


Fig. 6 - 85 A alternator for cold climate heating system.

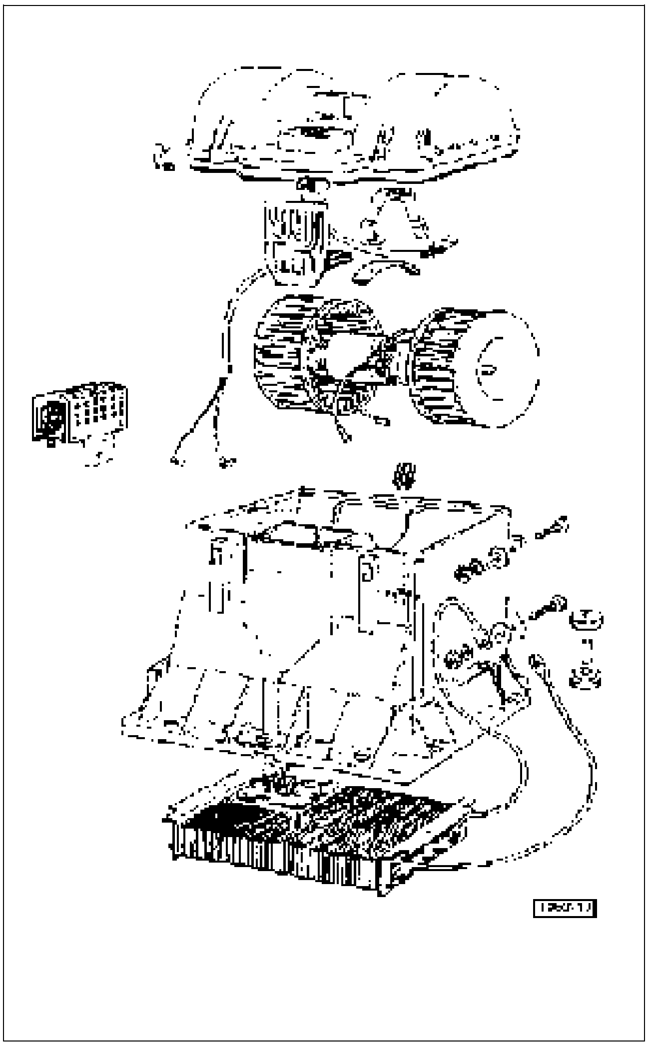


Fig. 7 - Main components of heater unit.

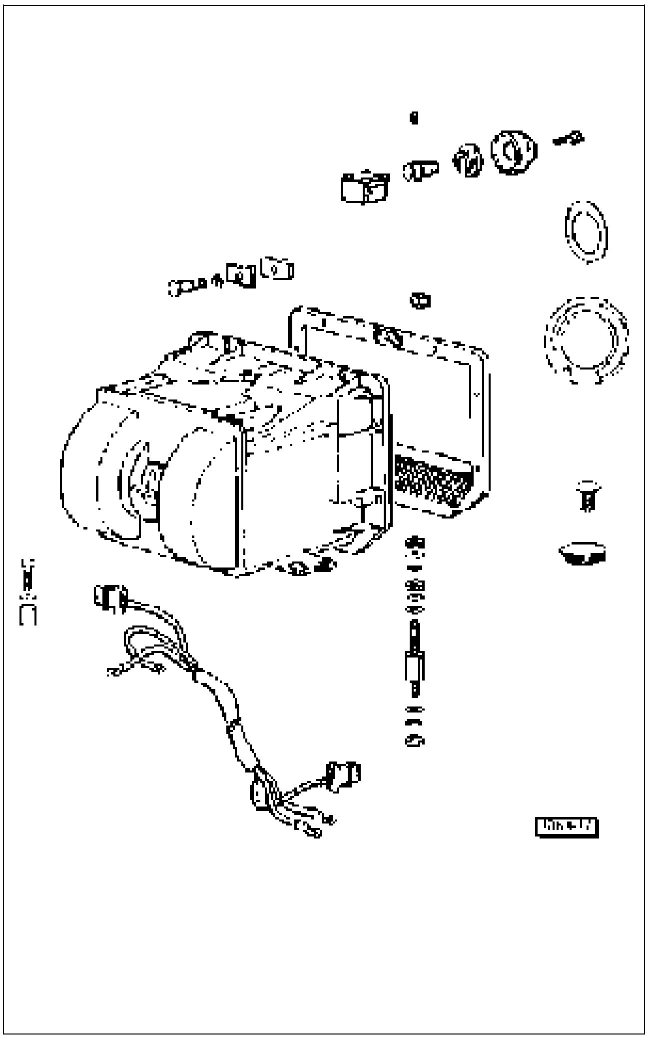


Fig. 8 - Heater unit.

Air conditioning unit for cabs

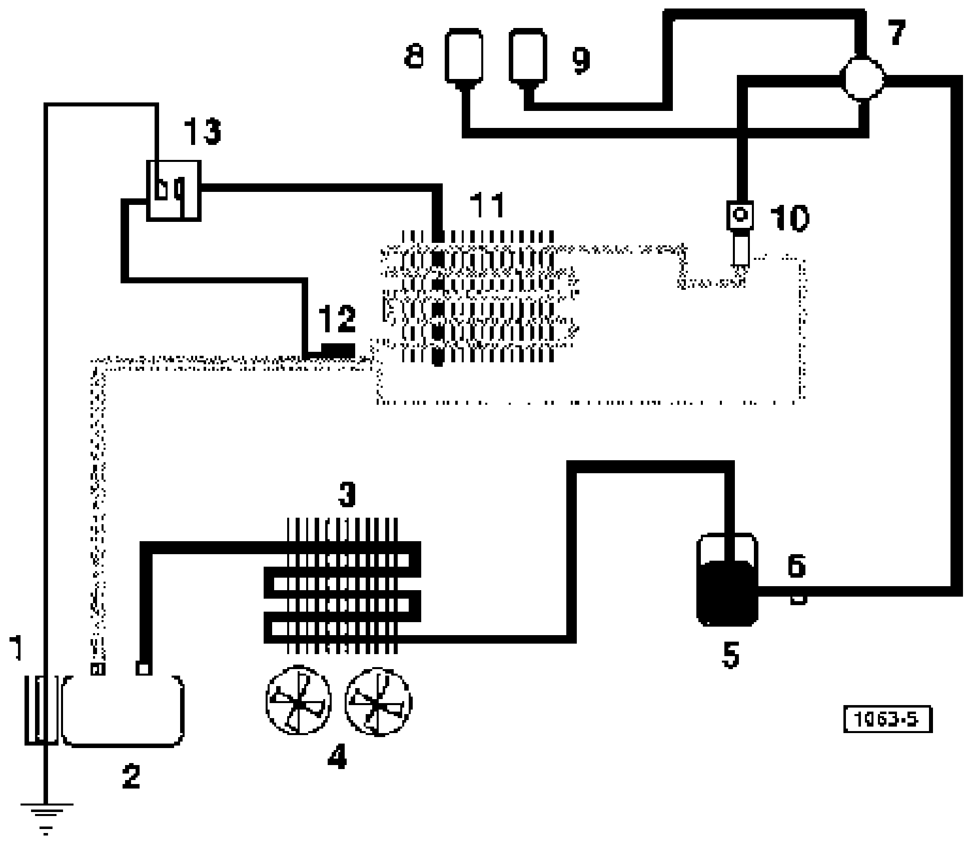
The air conditioning system will operate only with engine running and the 3-speed electric fan unit switched on.

Technical specifications

type of refrigerant		R 134 a
inlet circuit pressure (*):	high	2.5 bar
-	normal	0.8 ÷ 2.5 bar
-	low	0.8 bar
delivery circuit pressure	bar	see page 355
quantity of refrigerant in circuit	g	1800
quantity of oil	cc	250
type of oil (Suniso 5 GS)		SP20
minimum pressure switch setting	bar	2
maximum pressure switch setting	bar	27
electric fan pressure switch setting		close at 15 bar - open at 11 bar
tightening torque for pipeline fittings	Nm (kgm)	58 (6)

(*) *Pressure is influenced by ambient temperature; in normal operating conditions, with a temperature of 27 °C, pressure in the delivery circuit will be 12 bar.*

Pressure in the same system will register at around 16 bar with an ambient temperature of 38 °C.



1 Electromagnetic coupling
2 Compressor
3 Condenser
4 Fan
5 Filter
6 Sight glass
7 Minimum pressure switch
8 Electric fan control pressure switch
9 Maximum pressure switch
10 Expansion valve
11 Evaporator
12 Bulb
13 Potentiometer

Fig. 1 - Diagram showing operation of air conditioning system.

Operation and maintenance of the air-conditioning system

Air-conditioning process

The cooler is provided with a three-speed fan which aspirates the air from the cab interior thereafter forcing it across the radiant block, thus making it cool down.

The heat exchange occurring between the gaseous coolant and the air lapping the walls of the cooler radiant block results in air cooling.

The conditioned air undergoes a humidification process, as the low temperature inside the cooler causes a great deal of condensate to deposit on the external walls of the cooler. This condensate is subsequently conveyed under liquid state outside the cab through a special drainage system.

The coolant at the cooler exit is still under gaseous state and has a temperature of 5 to 10°C, in spite of the thermal exchange that has taken place, and then it is aspirated by the compressor again.

How to operate the system

Before starting the air-conditioning system set the electric fan onto the desired speed. If the electric fan is switched off, the conditioning system will not start.

The air-conditioning system is turned on by progressively rotating the control potentiometer clockwise, which is located in the front top section of the cab compartment. Rotate it anticlockwise to turn the system off.

Warning: Before starting the engine, always make sure the air-conditioning system is switched off so that the battery will not be overloaded.

When the air-conditioning system is operating, the pivotable air diffusers should never be completely closed.

To obtain a quick cab environment cooling the following is recommended:

— fully open the air recirculation grating and the pivotable air diffusers;

— turn first the fan control and then the potentiometer control all the way out;

— open the doors a few seconds so as to let the hot air out of the cab compartment if the tractor has stood under the sun radiation for a long period;

— adjust the system according to personal preference when the desired temperature has been attained.

Checking the air-conditioning system charge

System fully charged (refrigerant entirely in liquid state) System fully discharged (refrigerant entirely in gaseous state)	**Sight glass clear**
System not fully charged Refrigerant in part gaseous and part liquid state	**Sight glass cloudy (Bubbles or foam visible)**

Switching on the air conditioning

The system is activated by way of the 3 speed electric fan switch.
Once the potentiometer is moved beyond the initial contact, a voltage of 12 V is generated between terminal B (red wire) and the brown wire terminal of the potentiometer.

Electromagnetic coupling

Engagement and disengagement is piloted by the temperature control potentiometer, and by the pressure switch located at the demoisturizing filter which cuts in respectively at: 2 bar and 27 bar.

Pressure switches

Pressure switch (positioned on demoisturizing filter)
Comprises 3 switches:
— 1 controlling minimum pressure
— 1 controlling maximum pressure
— 1 controlling the electric fan of the condenser. The electric fan unit is interlocked to the pressure switch, which is set:
  - to close the circuit at 15 bar
  - to open the circuit at 11 bar

Electric fan unit

By-pass the pressure switch (place jumpers across the two terminals of the pressure switch and the 2 leads of the fan unit)

If the fan operates: the pressure switch is defective

If the fan does not operate:
a) check the fuse;
b) check the relay.

Tracing faults in the electric fan unit

Fault	Causes	Action
Fan does not start	Defective pressure switch	*Replace pressure switch*
	Defective relay	*Replace relay*
	Defective electrical or mechanical part of motor	*Replace fan unit*

Relay

place a jumper across terminals **30** and **87a**; if the fan comes into operation, the relay needs to be replaced.

Water dripping from the points at which condensate drain lines are connected to the conditioning unit

The problem can be overcome by loosening the clip that fastens the drain line to the cab upright and pulling the tube downwards, so that the water can run away freely.

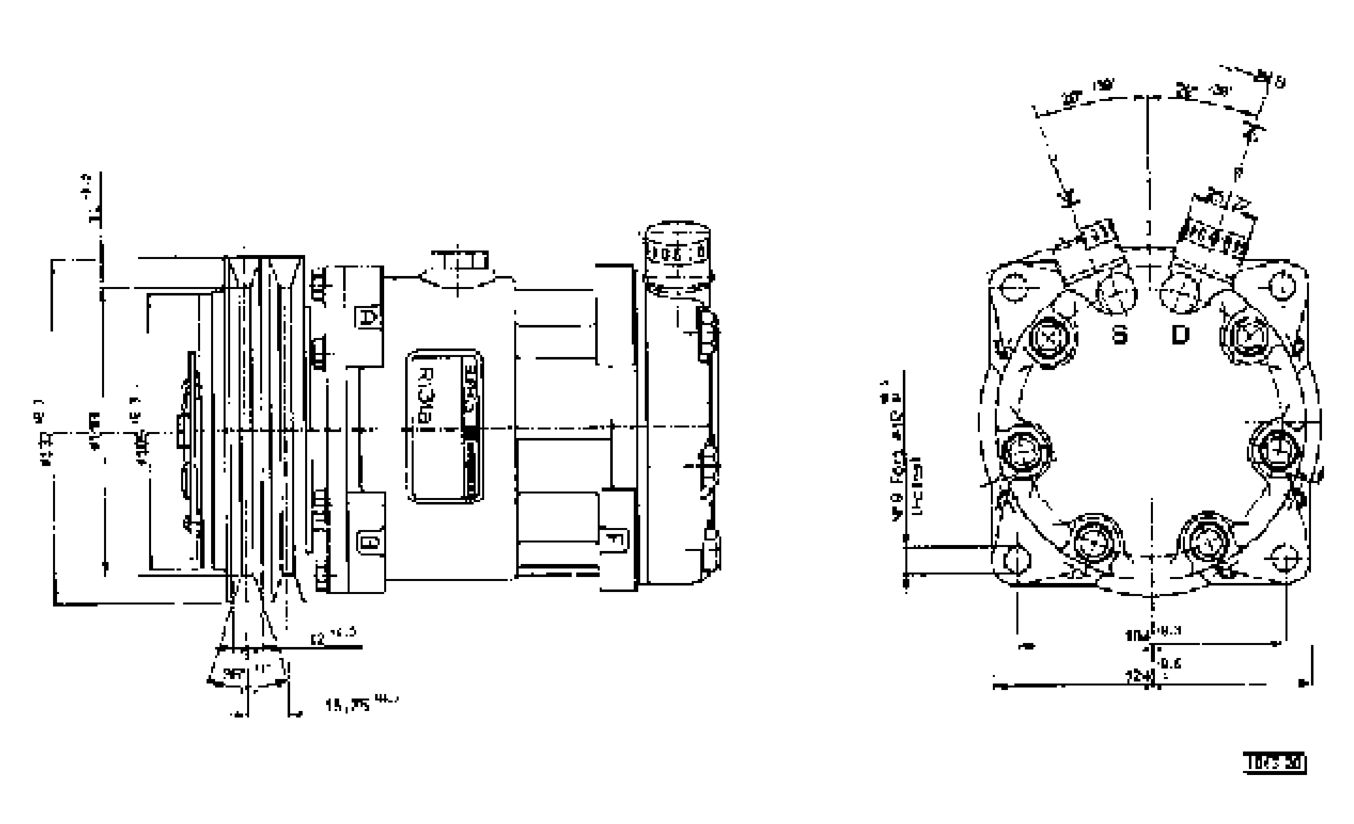


Fig. 2 - Compressor, air conditioning system.

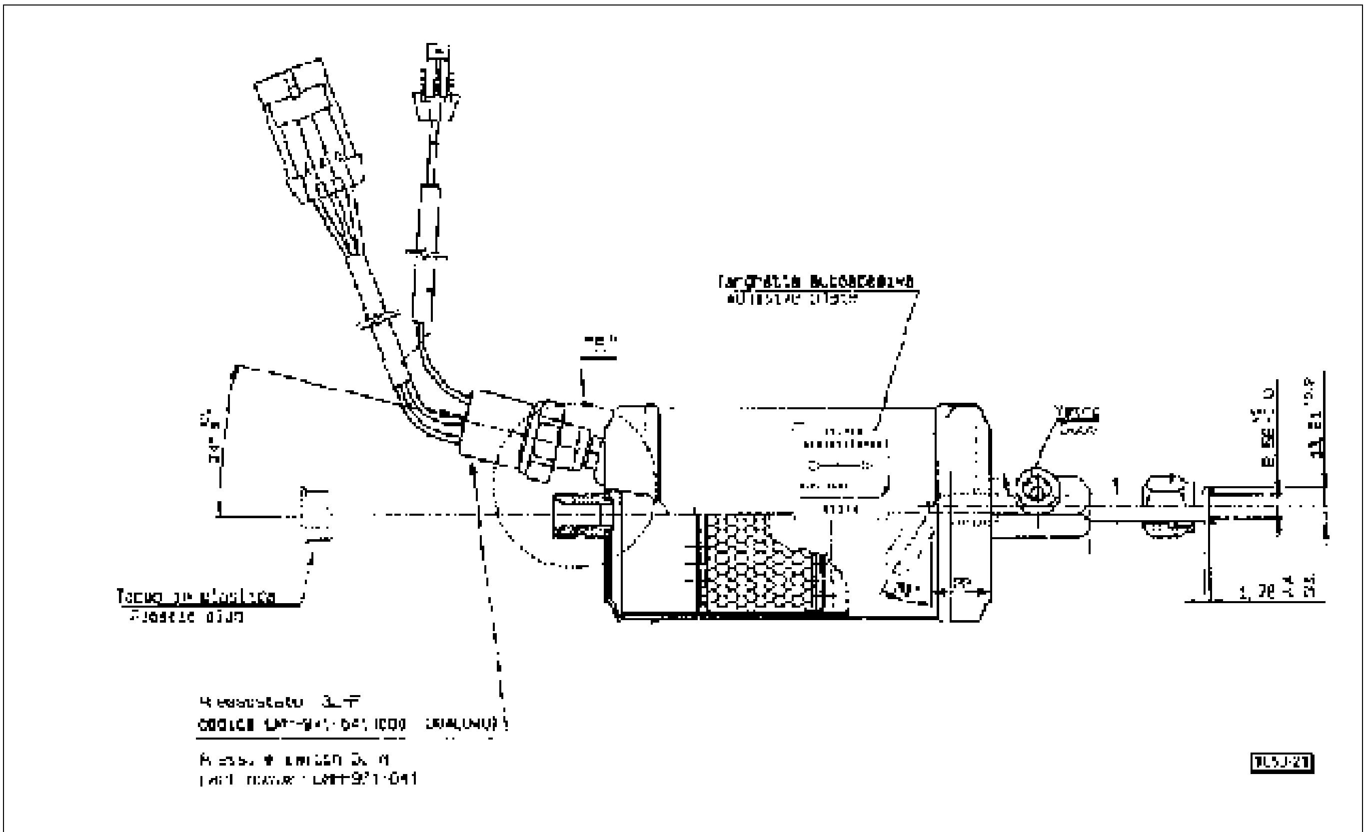


Fig. 3 - Demoisturizing filter, air conditioning system.

Checking system

Check belt tension: under finger pressure applied to the mid point between the two pulleys, belt should not deflect more than 8 to 10 mm maximally.

Always keep condenser fins duly clean.

Cleaning should be carried out by a water or air jet (be careful not to bend the fins, use the special combing tool to straighten them again).

Ascertain the compressor is firmly secured to tractor and the pulleys are properly aligned.

Warning: When removing the strainer or the air-conditioning unit it is required to plug the inlet and the outlet pipes at once, this is to prevent both dust and moisture from entering.

Even a few minutes’ exposure to the environmental humidity makes it necessary to replace the filter.

System safety elements

Minimum pressure switch (7 Fig. 1).
Switches the system off when a failure causes the pressure to drop below 2 bar within the high pressure circuit.

Maximum pressure switch (9 Fig. 1).
Switches the system off when pressure exceeds 27 bar inside the circuit as a result of an excessive setting or a failure (high pressure area).

Condenser fan control pressure switch (8 Fig. 1).
Switches the condenser fan on when coolant attains the same pressure of the switch setting pressure.

Note: The above three safety devices are grouped inside the thermostatic bulb located on the dehydrator filter.

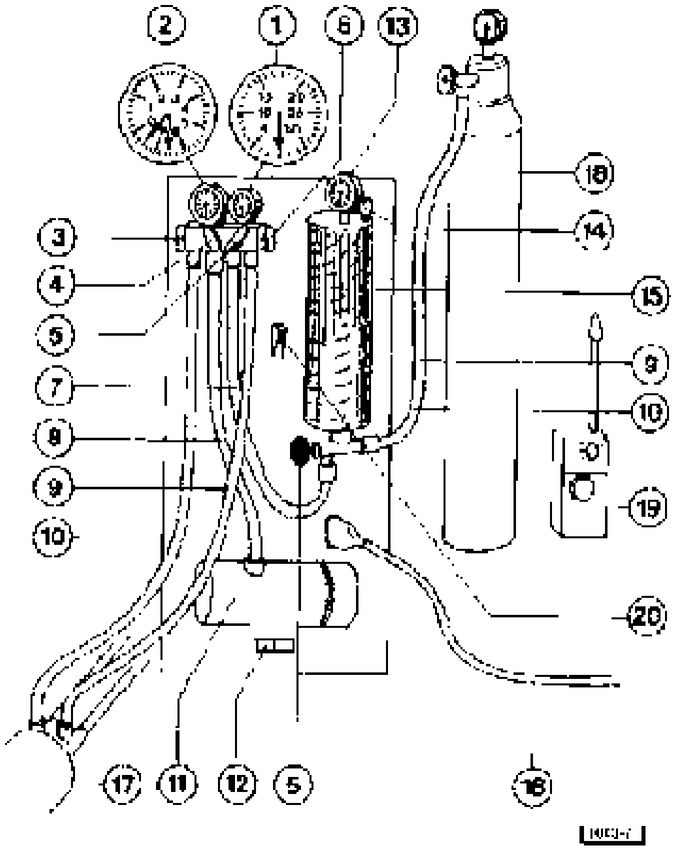
Temperature regulation

Temperature regulation is obtained through the potentiometer, which automatically regulates the temperature of the air flow from the radiator according to the environmental temperature, through a combined action with the fan.

A pressure switch located on the electric circuit opens and closes the electric circuit of the compressor electromagnetic coupling as a consequence of the potentiometer operation. When the circuit is open the pulley will be idling, on the other hand, when the circuit is closed, this will operate integrally with the compressor shaft.

Charging the system

with recharging station p/n 5.9030.508.6



1 High pressure gauge
2 Low pressure gauge
3 Low pressure valve
4 Vacuum pump valve
5 Metering pipeline valve
6 Recharge pipeline valve
7 Metering pipeline
8 Vacuum pump pipeline
9 Low pressure circuit recharge pipeline (blue)
10 High pressure circuit recharge pipeline (red)
11 Vacuum pump
12 Electric switch
13 Metering gauge
14 Air bleed valves
15 Metering unit
16 Electrical power supply
17 Compressor
18 Refrigerant bottle
19 Electric leak detector
20 Electric heater element for refrigerant

Fig. 4 - Charging station for air conditioning circuit.

Filling the metering unit

Connect the refrigerant bottle to the metering unit by means of the high or low pressure hose (9 - 10, Fig. 4).
Make certain that the valve (5, Fig. 4) is securely shut, then open the valve of the bottle.
As the refrigerant flows into the metering unit, open and shut the air bleed valve (14, Fig. 4) intermittently.
Read the value given by the hand of the metering unit pressure gauge (13, Fig. 4) and position the value against the indicator.
Once 1800 grams of refrigerant have been transferred into the metering unit, close the valve of the bottle and detach the hose.

Refilling the system with oil

Connect the high pressure hose (9, Fig. 4) of the recharge station by way of the smaller diameter valve **A** (Fig. 4/a) positioned on the pipeline connecting with fitting **D** (Fig. 2) at the compressor (mounted in the engine compartment), and the low pressure hose (10, Fig. 4) of the station by way of the larger diameter valve **B** (Fig. 4/a) positioned on the pipeline connected with fitting **S** (Fig. 2) at the compressor; then activate the pump for 30 minutes approx to establish a vacuum in the circuit. The valves (3 - 4 - 5 - 6, Fig. 4) must remain open during this operation.

Filling the system with oil

Detach the low pressure hose from the recharge station and immerse the end in a graduated vessel containing 300 g approx of SUNISO 5 GS or equivalent oil. Allow 250 grams of the oil to be drawn into the circuit.
Reconnect the hose to the station.

Filling the system with R134a refrigerant

When the low pressure gauge (2, Fig. 4) registers a minimum value (760 mm Hg) that remains stable for between 5 and 10 minutes, close the valve (E, Fig. 4).
Open the filler valve (5, Fig. 4) and wait until the specified quantity (1800 g) of refrigerant has entered the system.
In the event that the flow of refrigerant contained in the metering unit should be interrupted, warm the unit by means of the electric heater (20, Fig. 4), rechecking the pressure on the relative gauge.

Should this not be sufficient, start the engine and throttle up to 1200 rev/min approx. Switch on the air conditioning system, and the R 134a refrigerant will be drawn directly into the circuit by the compressor.

Close the filler valve (5, Fig. 4), and check with the leak detector that there is no escape of fluid from the fittings of the circuit. Should any leaks be detected, these must be eliminated, and the refrigerant reintroduced.

Caution: In the event of oil leaks being detected, the circuit must be emptied completely and the entire recharge procedure recommenced.

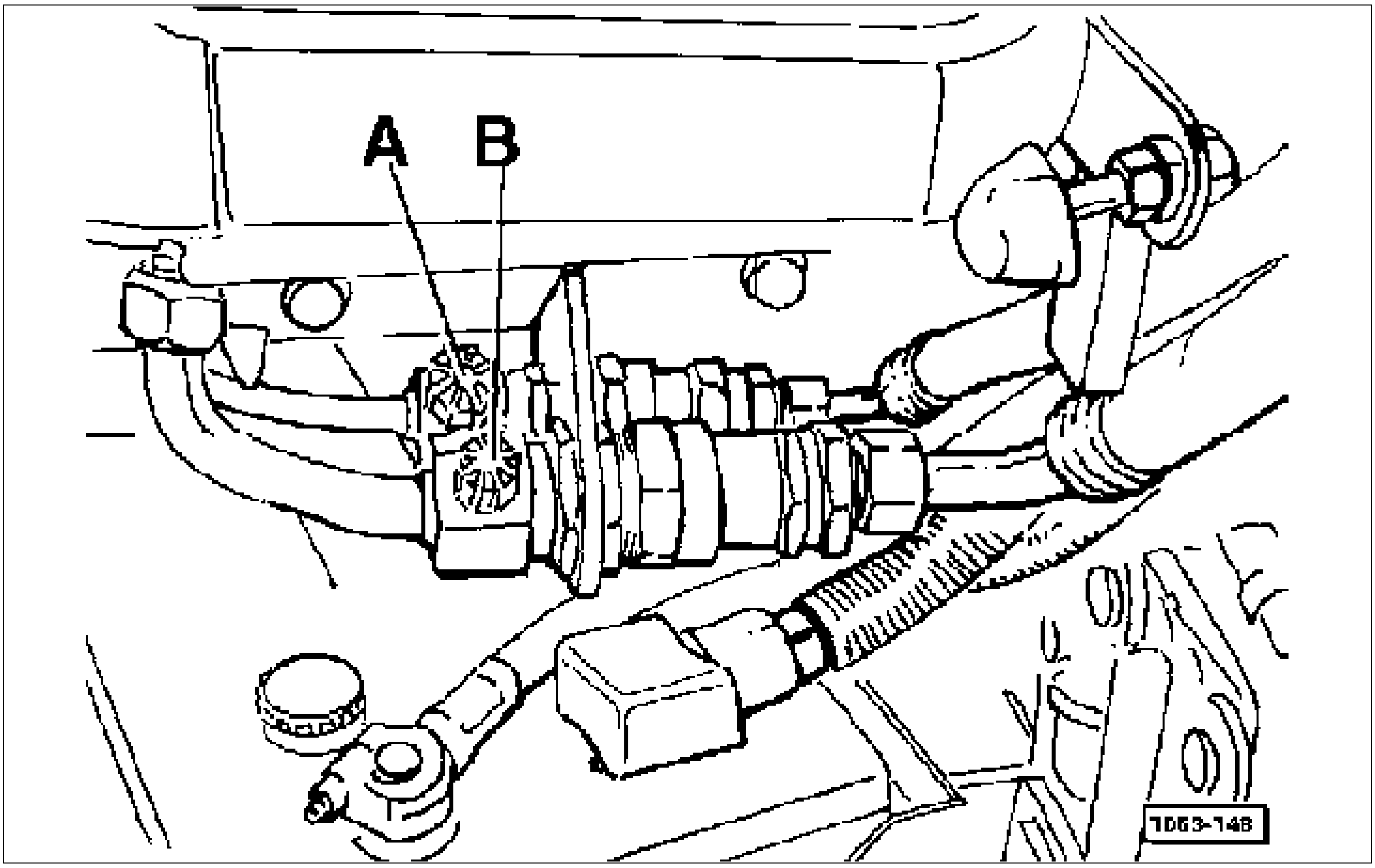


Fig. 4/a - Valves for connection of the tractor to the air conditioning recharge and service station.
A - "HIGH PRESSURE" valve
B - "LOW PRESSURE" valve

Final checks

Once all the refrigerant has been put into the air conditioning circuit, check (with the engine running and the system in operation) that the high pressure gauge shows a value of between 15 and 20 bar, and the low pressure gauge a value between 1.5 and 2.5 bar.

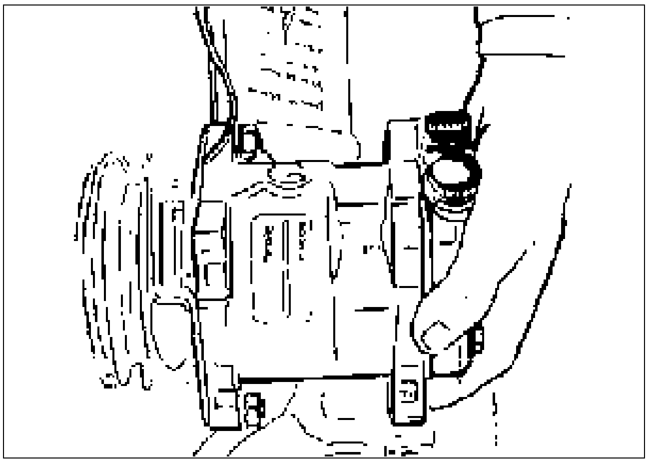
VERIFYING OPERATION OF THE SYSTEM AFTER RECHARGING

The system can be regarded as performing to its full capabilites when the delivery pressure gauge shows the following values:

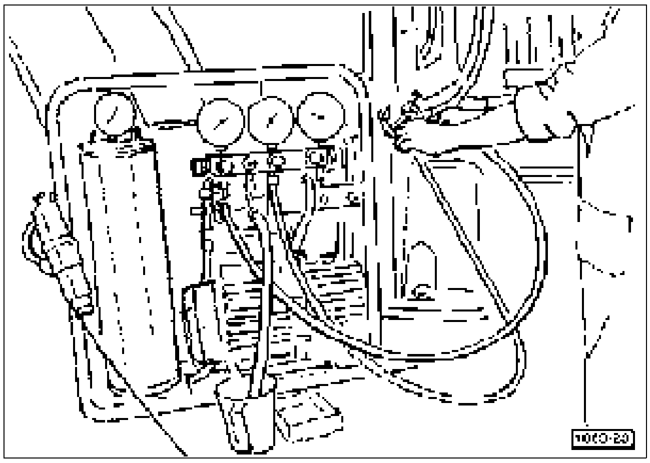
Ambient temperature °C	Delivery circuit pressure
27	12 bar
32	14 bar
35	15 bar
38	17 bar
40	18 bar
43	20 bar

The temperature values indicated are those likely to be encountered in the course of a typical twelve month period.

Having established that the system is operating correctly, detach the high and lower pressure hoses of the station from the tractor and check again with the leak detector that there is no escape of fluid from any part of the system.



CAUTION: use only R 134a refrigerant as indicated on the data plate attached to the compressor of the air conditioning system.

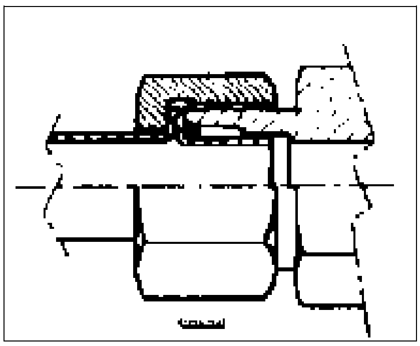


Connecting the tractor to the air conditioning system recharge and service station.

Directions for tightening air conditioning system pipeline fittings.

All fittings have an internal seal. Screw the two parts of the fitting together by hand until the nut is finger tight, then holding the one part steady with a fixed wrench, apply a torque wrench to the nut and tighten to the value indicated in the table.

Type	Thread	Tightening torque
6	5/8 - 18 UNF	13,6 ÷ 20,3 Nm (1,4 ÷ 2,1 kgm)
7	3/4 - 16 UNF	33,5 ÷ 2393 Nm (3,3 ÷ 4,0 kgm)
8	7/8 - 14 UNF	35,5 ÷ 42,0 Nm (3,6 ÷ 4,3 kgm)
9	1 1/16 - 14 UNF	40,3 ÷ 47,5 Nm (4,1 ÷ 4,8 kgm)



Replacing the compressor drive belt

A - Remove the engine hood side panels.
B - Lift out the battery.
C - Loosen the compressor bracket and fit the belt;
D -Refit all parts removed previously and tension the belt, making certain that the pulleys are correctly aligned.

Alignment of crankshaft and alternator pulleys

The two pulleys must be faultlessly aligned. Alignment is checked by offering a straightedge to the face of the larger pulley and verifying that the face of the smaller pulley occupies the same plane.
crankshaft pulley - alternator pulley
Realignment is obtained by adjusting the position of the crankshaft pulley in relation to the alternator pulley, adding a suitable number of shims (p/n 2.1589.136.0 - 2.1589.137.0) in abutment with the crankshaft pulley.

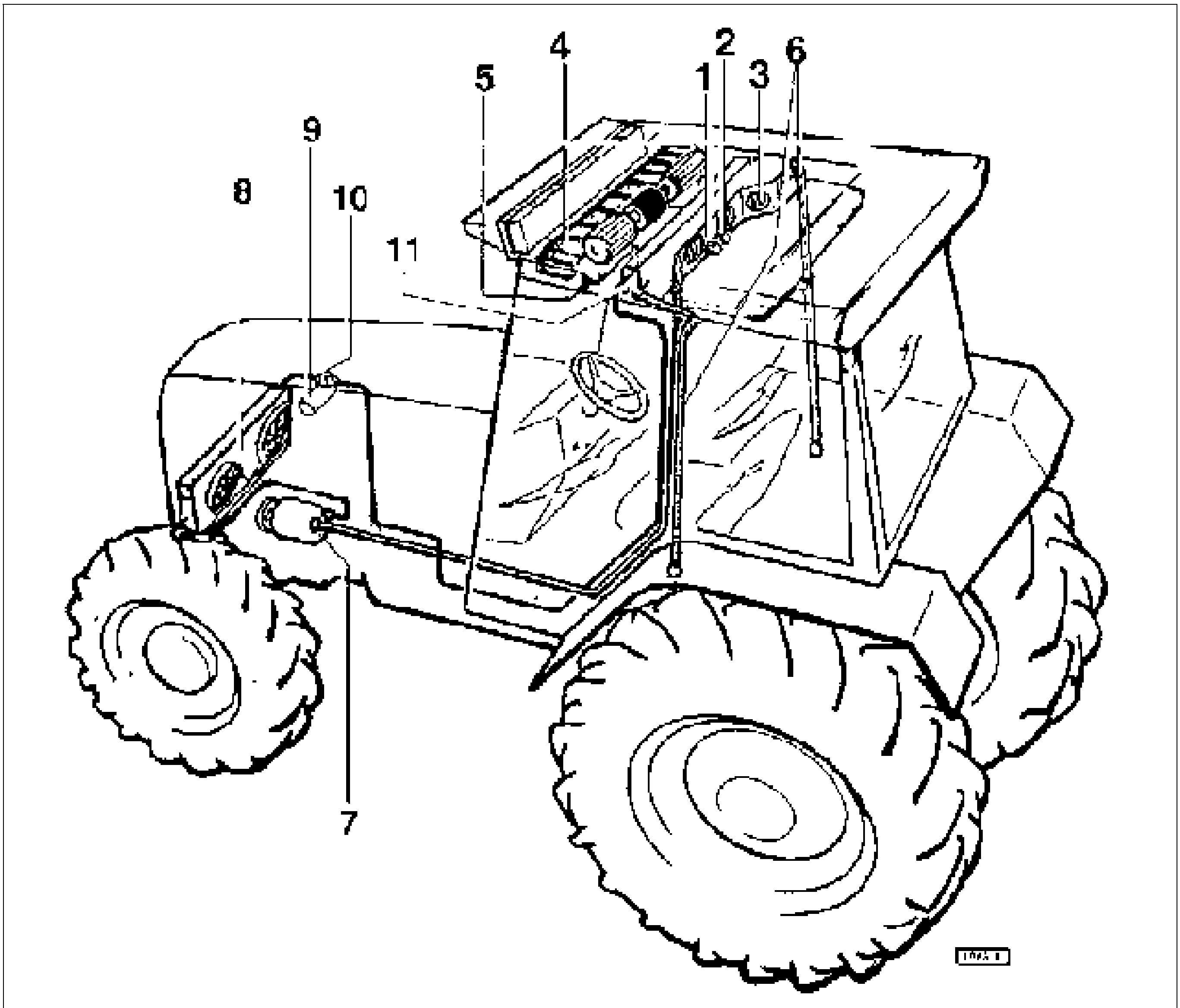


Fig. 5 - Air conditioning unit
1 - Thermostat
2 - Fan control
3 - Air recycle oulets
4 - External air intake grille
5 - Directional vents
6 - Condensate drain pipes
7 - Compressor
8 - Condenser and cooling fans
9 - Demoisturizing filter
10 - Pressure switch bulb
11 - Expansion valve

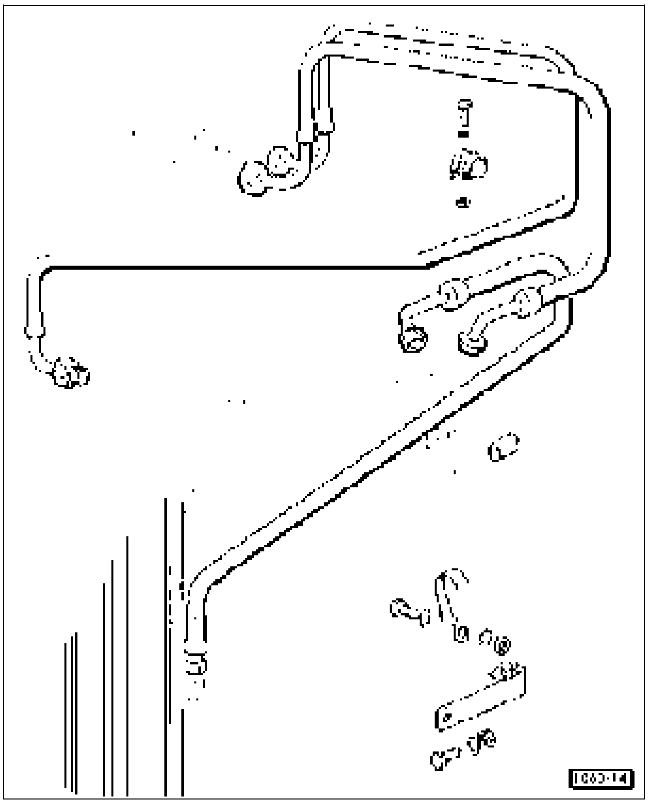


Fig. 6 - Air conditioning system pipelines from compressor to condenser and from condenser to demoisturizing filter.

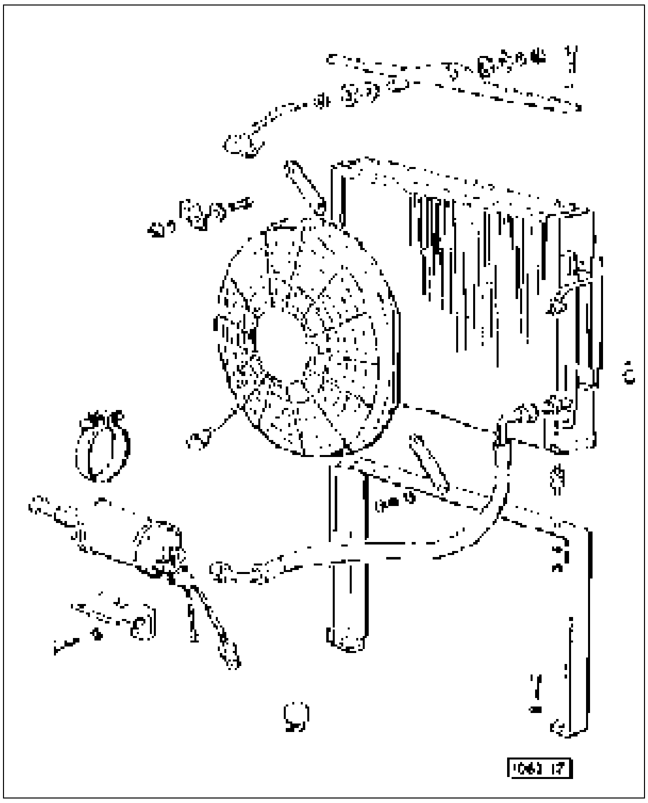


Fig. 7 - Condenser and demoisturizing filter unit.

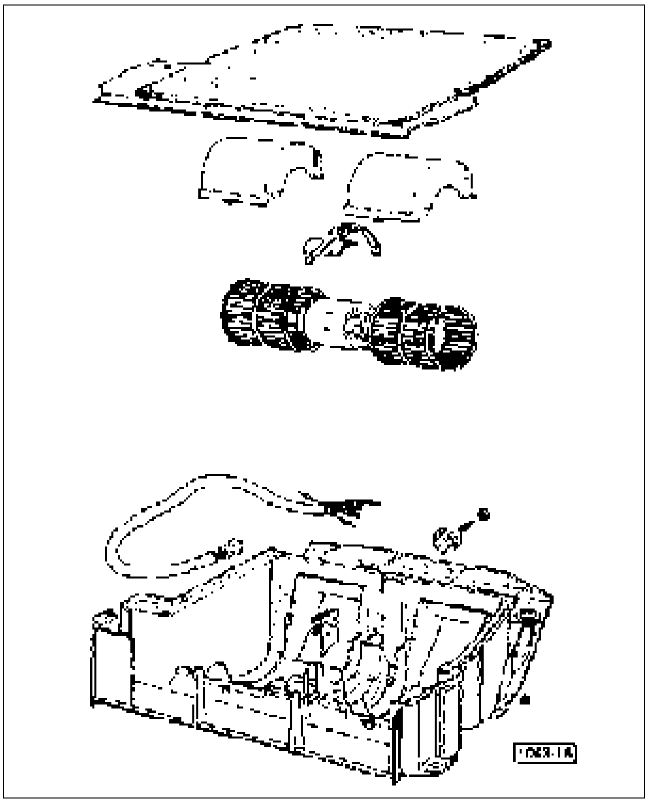


Fig. 8 - Ventilation unit.

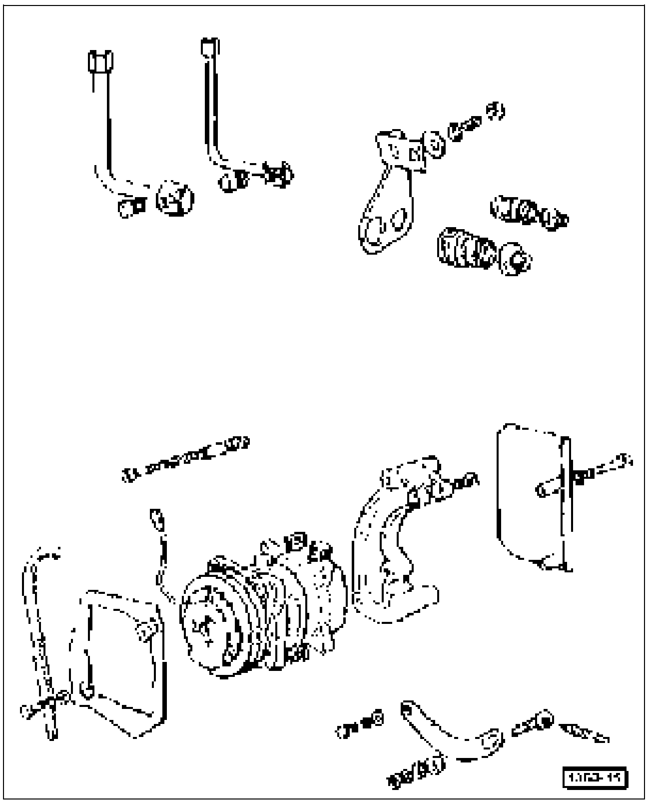
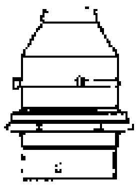


Fig. 9 - Air conditioning compressor.

Electrical connections for installation of air conditioning kit

In the event of air conditioning being fitted to a tractor already in service, the wiring supplied with the kit must be connected to the central harness of the machine. This figure shows the tractor connector to enable identification of the air conditioning system pin allocation, also the wiring specific to the air conditioning system and indications for the connection of each single terminal.



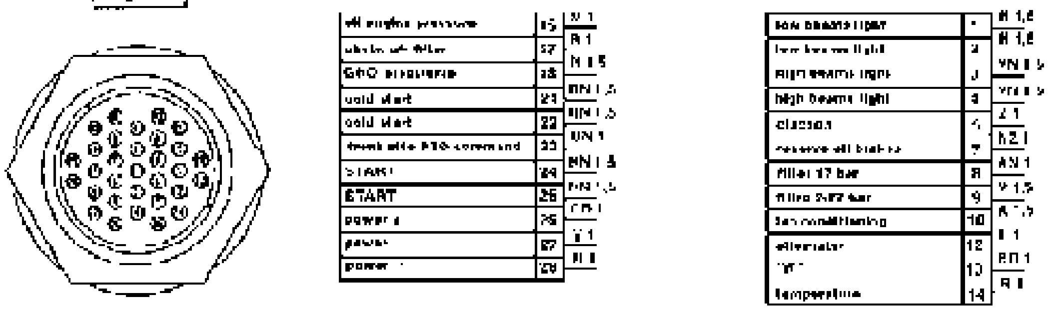
Points to observe when making connections

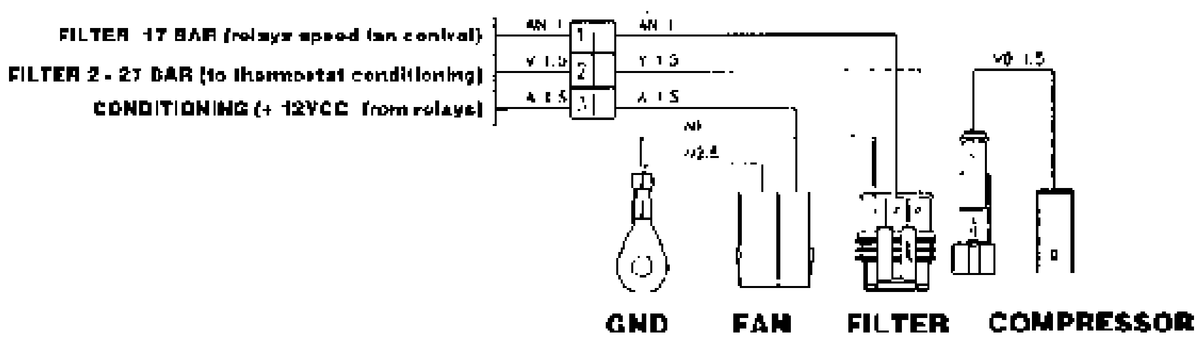
The wires of the air conditioning system must be routed to the connector (25 pin round female) of the central wiring harness.

The figure below indicates the positions of the wires and their functions.

To make the connection, remove the wires at positions 8, 9 and 10, route into a three way block and connect with an extension as indicated in the diagram below.

If the round male connector has a plastic cap, connect the extension cable into the front section wiring harness after having removed the plugs at positions 8, 9 and 10.





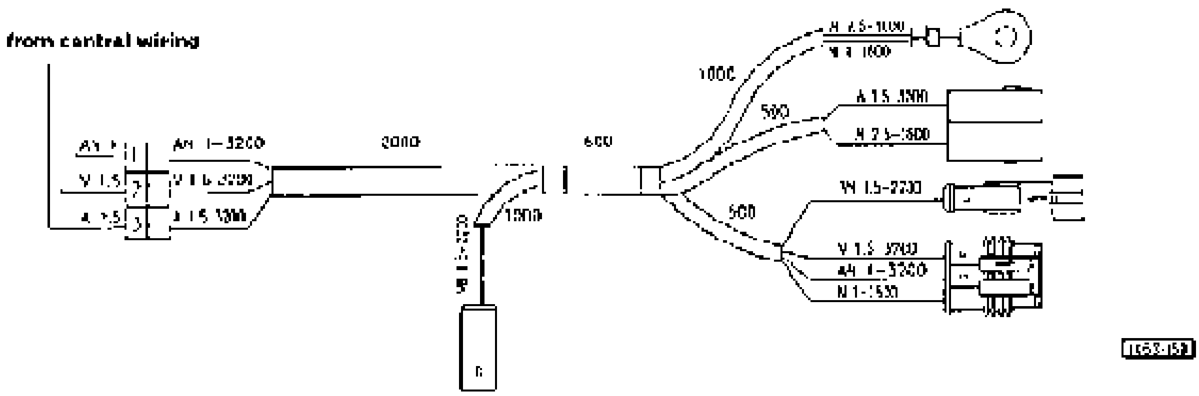


Fig. 10 - Wiring harness for air conditioning kit.

Diagnosing malfunctions

LOW PRESSURE CIRCUIT

excessive pressure	excessive pressure in the high pressure circuit	compressor not operating smoothly	overcharged circuit	release system pressure through the compressor needle valves
	too a low pressure in the high pressure circuit	pressures inside both high and low pressure circuits tend to balance	expansion valve jammed up	replace the valve
normal pressure	excessive pressure in the high pressure circuit	bubbles are visible through the filter inspection glass	air in the circuit	dehydrate the circuit
	normal pressure in the high pressure circuit	poor system efficiency	Out-of-setting compressor needle valves	replace the valves
excessively low pressure		after some working time	humidity inside the circuit	replace the filter and bleed the air. Recharge the circuit
	normal pressure in the high pressure circuit	expansion valve jammed up	replace the expansion valve	
		blocked circuit	change the part and replace the filter	
	low pressure in the high pressure circuit	discharged system	recharge system	
system fails to operate	burnt fuse	replace the fuse		
	disconnected wires	connect the wires		
poor system efficiency	coolant leaks	inspect with a leak-finder	stop the leakage and recharge the system	

Hydraulic system

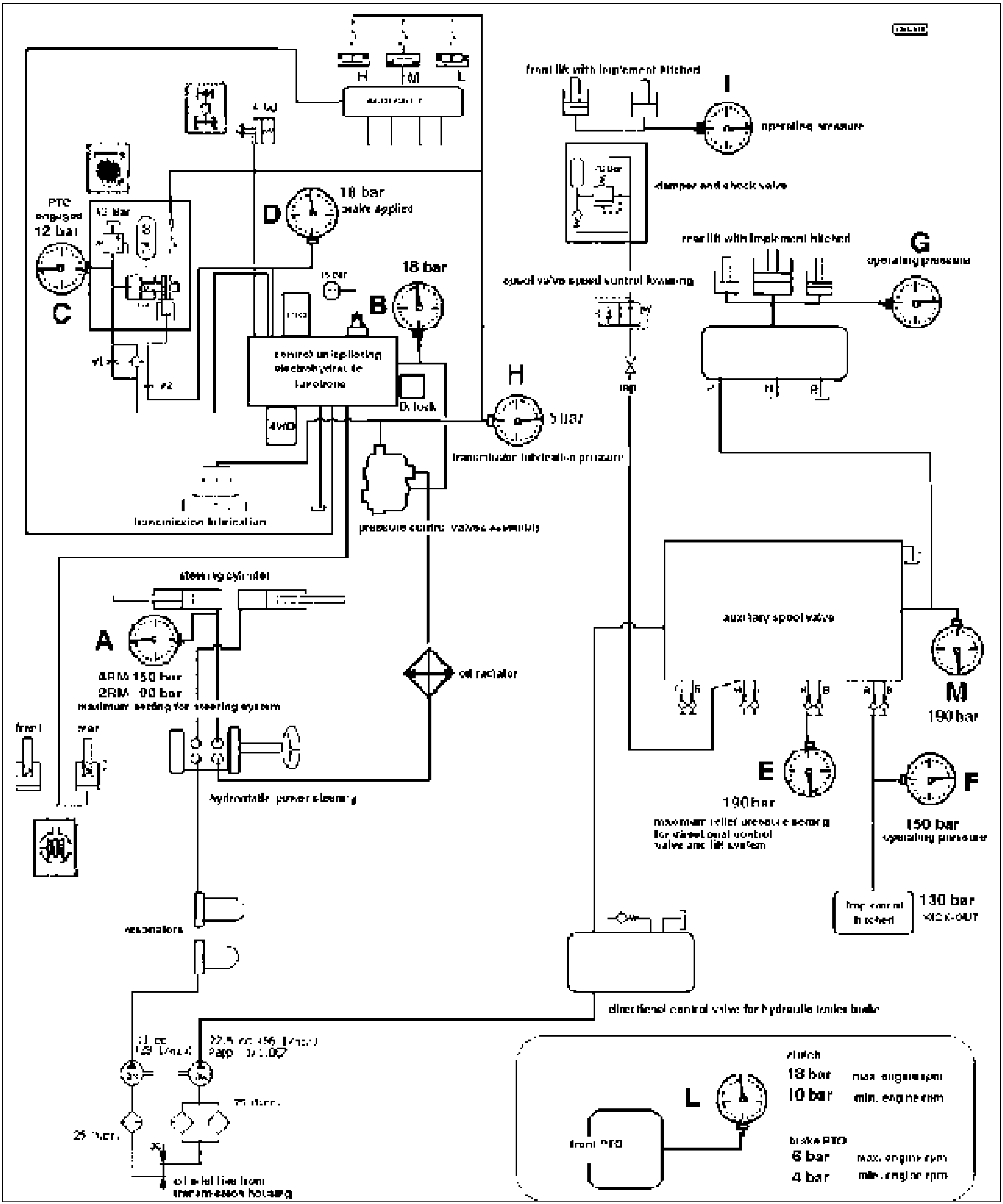


Fig. 1 - Points provided for measurement of oil pressures in the tractor's hydraulic system (see references on page 377).

REFERRING TO FIGURE 1:

A *- Maximum hydrostatic power steering pressure (see page 320).*

B *- Oil pressure in electrohydraulic control circuits for - P.T.O. - 4WD - Differential lock - H-M-L shift (see page 294).*

C *- Rear P.T.O. clutch engage pressure (see pages 173 - 175).*

D *- Rear P.T.O. brake apply pressure (see pages 173 - 175).*

E *- Relief pressure setting for auxiliary spool valves - front and rear lift (see pages 248 - 273 - 388).*

F *- Auxiliary spool valves operating pressure and kickout setting (see page 388).*

G *- Hydraulic lift operating pressure for machines with assistor cylinders (see pages 248 - 273).*

H *- Transmission lubrication pressure (see page 320).*

I *- Front lift operating pressure (see pages 282 - 283).*

L *- Front P.T.O. pressures (see pages 286 - 287).*

M *- Hydraulic lift operating pressure for machines without assistor cylinders (see pages 248 - 273).*

Oil filters

The oil filters are mounted to the left hand side of the transmission at the rear end, and are easily replaced; before removal, however, some 15 litres of oil must be drained from the transmission housing so as to bring the level below the position of the filter cannister and prevent spillage.
Filters must be replaced whenever the blockage indicator lights up at the instrument panel.
The filter blockage pressure switch is set at 0.5 bar, and must be replaced with another of identical specifications if faulty. Ensure that the replacement is stamped with the correct 0.5 bar setting.
Whenever the transmission is stripped down for servicing or overhaul, clean the mesh strainer fitted to the bottom of the housing.

CAUTION - Operate the lift system and auxiliary spool valves only when the blockage indicator is no longer alight.

IMPORTANT - If during normal operation of the machine the "SERVICE" indicator should light up, switch off the engine immediately and proceed to locate the trouble.

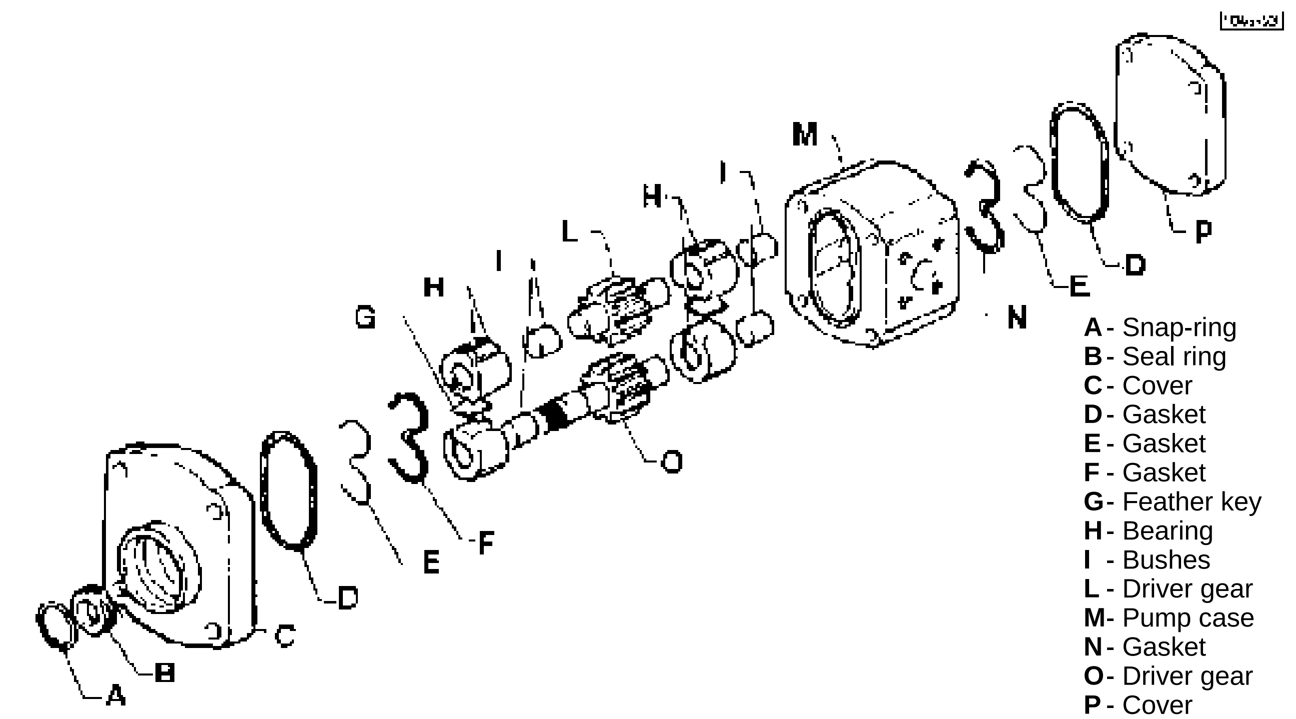
Hydraulic pumps

The hydraulic pumps require no servicing or adjustment even after a long period of operation, although the splines of the pump shaft must be inspected with care: there must be no signs of wear or damage.

Checking the relief valves of the hydraulic lift system

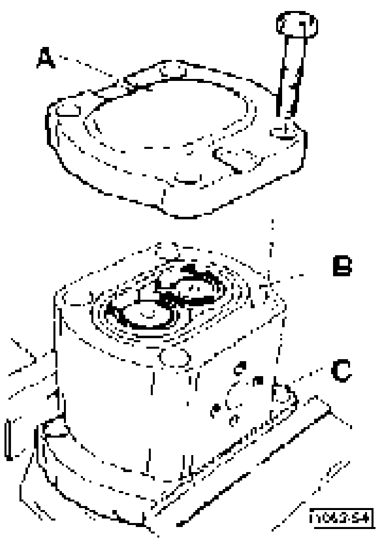
Using tool 5.9030.520.4, check that the circuit pressure relief valve incorporated into the auxiliary spool valves is set at 190 bar and the system pressure shock valve at 210 bar.
Remember that for the lift to function correctly, operating pressure in the circuit should not exceed 150 bar.
The operating pressure can be measured by coupling a gauge to the oil pressure line between the directional control valve and the lift; for machines with assistor cylinders, the gauge can be coupled to the pressure line connecting with the assistors.

Stripping the hydraulic pump



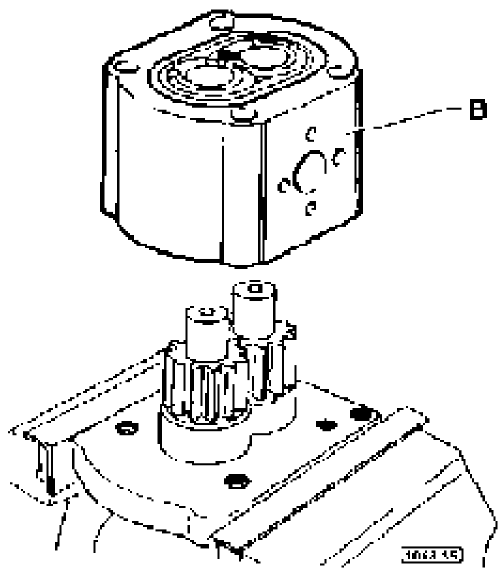
A - Snap-ring
B - Seal ring
C - Cover
D - Gasket
E - Gasket
F - Gasket
G - Feather key
H - Bearing
I - Bushes
L - Driver gear
M - Pump case
N - Gasket
O - Driver gear
P - Cover

Fig. 2 - Component parts of the hydraulic pump assembly.



A - Cover
B - Pump case
C - Base

Fig. 3 - Pump assembly cover.



B - Pump case

Fig. 4 - Pump case.

Removal

The pump is secured to the tractor by 2 of the 4 bolts holding the pump assembly together. These two bolts are diagonally opposite. Having removed the pump from the vehicle, the components are freed by unscrewing the two remaining bolts which keep the cover **A** (see fig 3) clamped to the frame **C** and the pump body **B**; this done, remove the washers and then the cover.

Using a proper pointed tool remove gasket **E** and then take the bearings from their seats by pushing from inside outwards and being careful the connecting pin neither be lost nor damaged.

Mark with a reference the position of the bearings with respect to the pump case; then remove paying attention the connecting pin neither be lost nor damaged.

Block the pump case in a vice as shown in figure and then remove snap ring **F**.

Remove the seal ring.

WARNING - If pump bearings, pinions or casing are found to be damaged or worn, these parts cannot be repaired because of their construction tolerances.

When performing checks, in the warranty period, because of an oil leakage or an excessive and irregular delivery pressure, only the gaskets indicated in the spare parts lists can be replaced.

After checking the pump for wear due to abrasion from impurities and for any other visible damage, when reassembling use, in any case, a new set of gaskets.

It is also indispensable to mark each single part to reinstall correctly.

B - Pump case
C - Base
D - Bearings
G - Gears
I - Screw

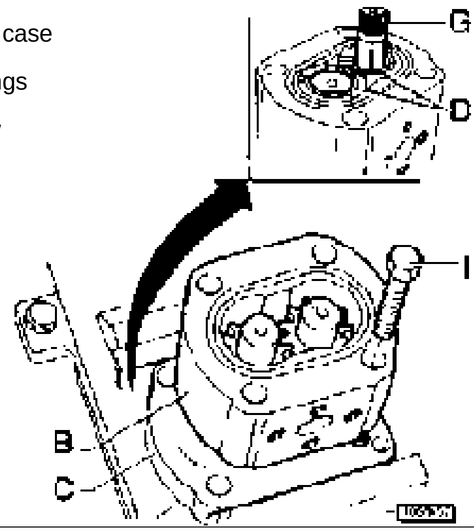
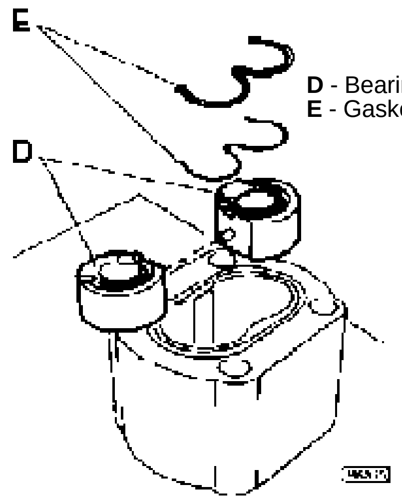
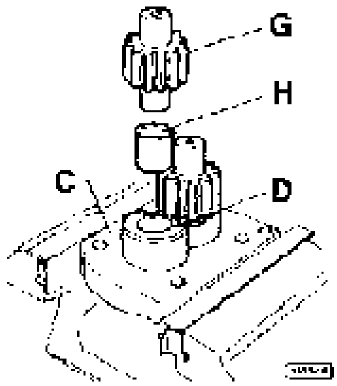


Fig. 5 - Pump disassembly.



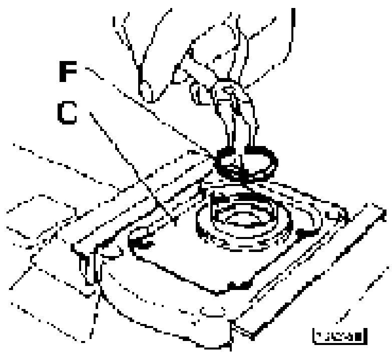
D - Bearing
E - Gasket

Fig. 6 - Internal pump case parts.



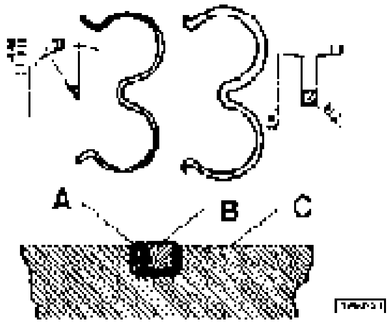
C - Housing
D - Bearing
G - Gear
H - Bush

Fig. 7 - Pump gears.



C - Base
F - Snap ring

Fig. 8 - Snep ring removal.



A - Stop ring
B - Gasket
C - Bearings

Fig. 9 - Inside seals.

Inspections and checks

After removing all gaskets, both on the covers and in the pump casing, carefully clean all parts using a proper solvent.

Carefully dry all parts with compressed air; this is to avoid that any solvent residuals may damage the gaskets on reassembly.

Visually check the pump case internally and ascertain it is not damaged.

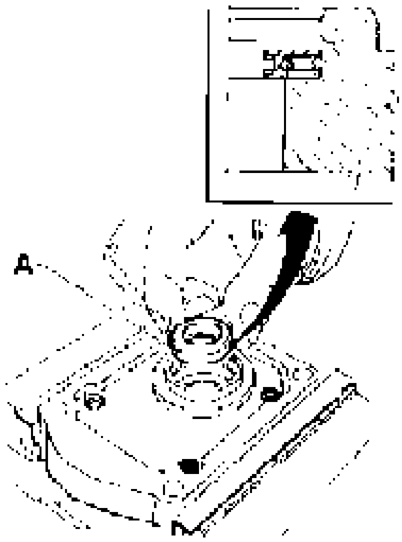
Check both pinions and bearings for wear, abrasion due to foreign matters or cavitation.

NOTE:
Should any damage, wear or in any case a component replacement be required, with the exception of the gaskets, the entire pump must be replaced.

WARNING:
Do not press onto the stop ring to prevent any damage.

Use a dial gauge to make sure the stop ring height be $2.1^{+0.05}_{-0.15}$ mm, otherwise replace taking care the new stop ring installed be measured accordingly.

If reading is above specification fit the new ring in reversed position and perform a grinding using a very fine emery cloth.



A - Seal ring

Fig. 10 - Seal ring.

Assembly

Before assembly all parts shall be oiled.

Correctly position the gaskets in their seats paying particular attention stop ring **A** and gasket **B** be correctly fitted into bearings **C**.

Coat the cover inner side with a slight grease layer then apply to pump case and tightening the four securing screws to the recommended torque.

WARNING:
The securing screws should be tightened gradually making also sure that rotors are not hampered in their movements.

Tightening torques

Pump cover securing screws:
- M8 2 kgm (20 Nm)
- M10 5 kgm (49 Nm)

Restore the recommended oil level and then bleed the air from the hydraulic circuit.

Auxiliary hydraulic spool valves

Auxiliary spool valves are used to control hydraulically operated external implements.
The controls consist in 2 levers for a 4-way valve, or 3 levers for a 6-way valve, or 4 levers for an 8-way valve. The levers are located on the driver's right hand side.

Auxiliary hydraulic spool valves:

— **4-way**
- 2 way double acting
- 2 way double acting convertible to single acting, with spool detent

— **6-way**
- 2 way double acting convertible to single acting, with kickout
- 2 way double acting convertible to single acting, with spool detent
- 2 way double acting with float position

— **8-way with flow divider**
- 2 way double acting convertible to single acting, with kickout
- 2 way double acting convertible to single acting, with spool detent
- 2 way double acting with float position
- 2 way double acting

NB: with the auxiliary spool valve in use (unless a Flow Divider is incorporated), the operation of the hydraulic lift system remains inhibited (except in FLOAT position).
Important: the lever should be recentred to the neutral position as soon as the external actuator has reached its stroke limit, to ensure that the hydraulic circuit does not remain pressurized any longer than strictly necessary; prolonged pressure will result ultimately in the hydraulic system being subjected to hazardous levels of stress.
Auxiliary spool valves levers must always be in the neutral position when external services are not in use.

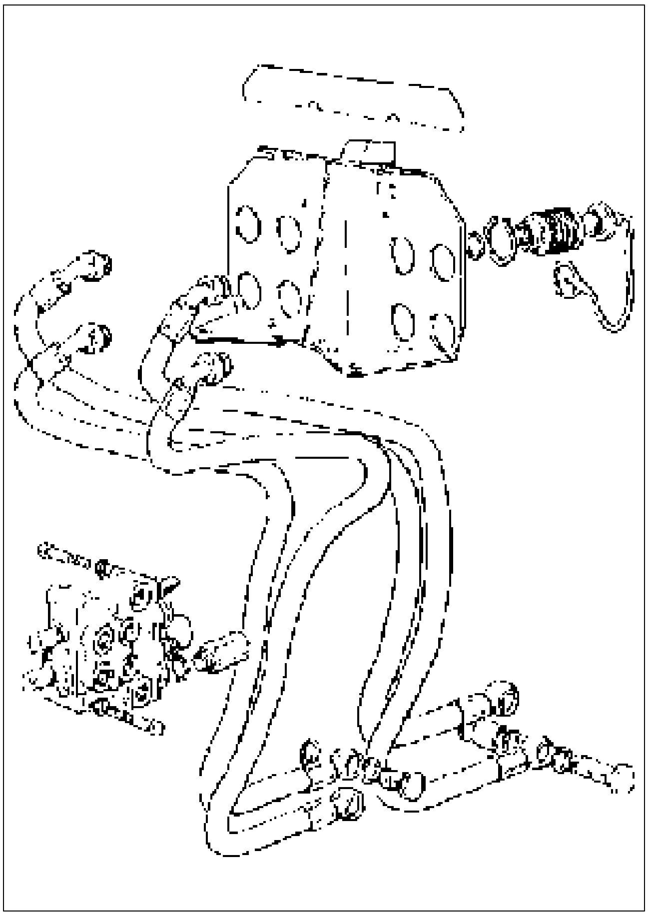


Fig. 1 - 4-way auxiliary hydraulic spool valves.

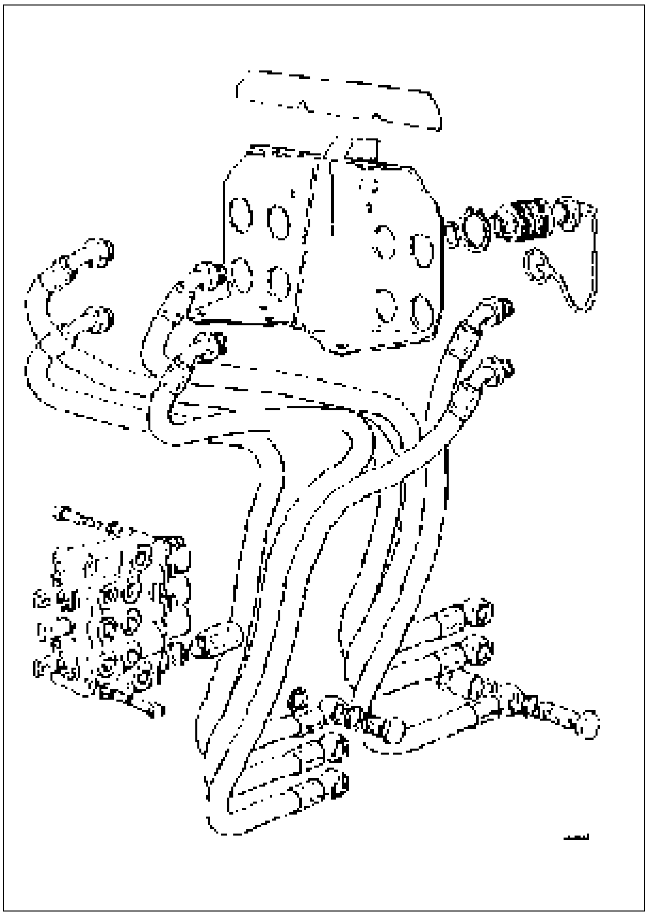


Fig. 2 - 6-way auxiliary hydraulic spool valves.

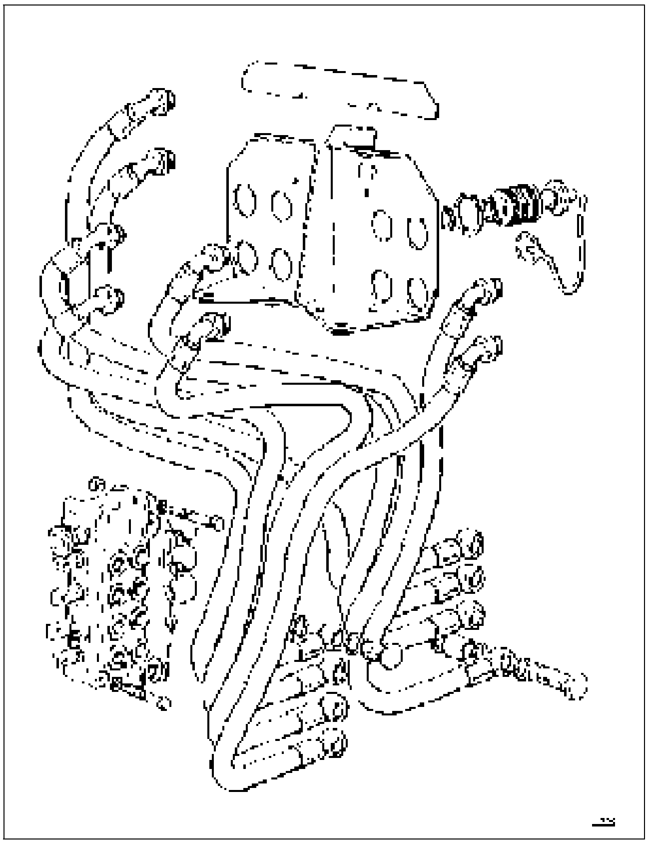


Fig. 3 - 8-way auxiliary hydraulic spool valves.

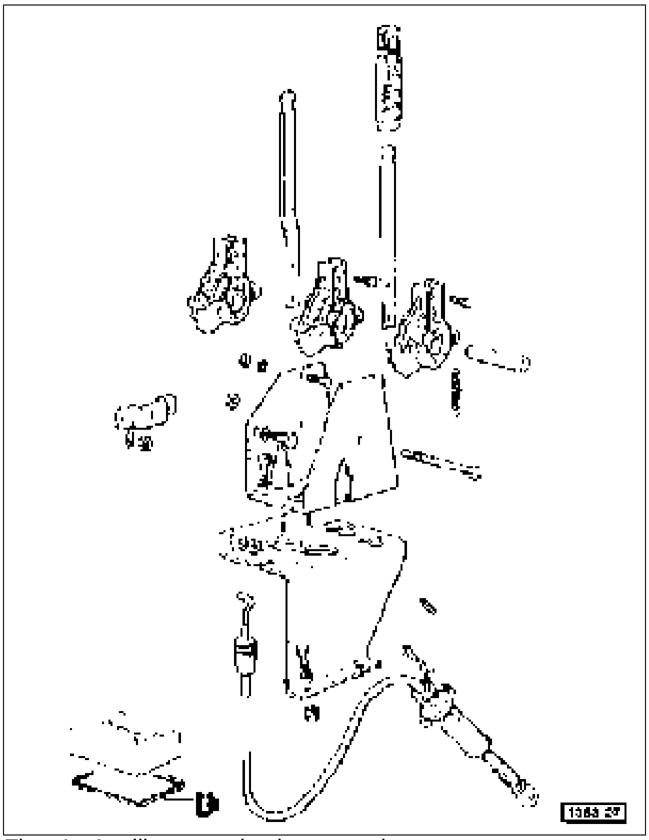


Fig. 4 - Auxiliary spool valve controls.

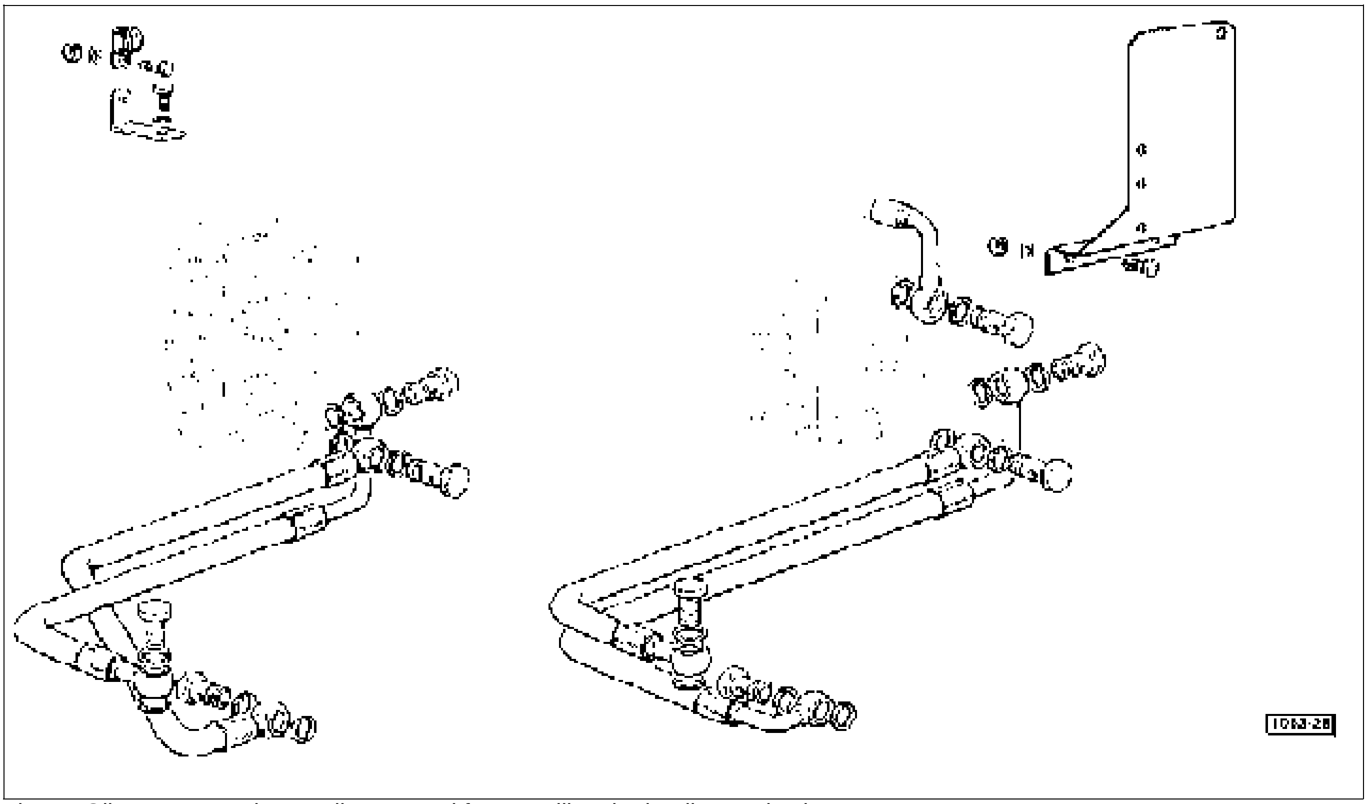


Fig. 5 - Oil pressure and return lines to and from auxiliary hydraulic spool valves.

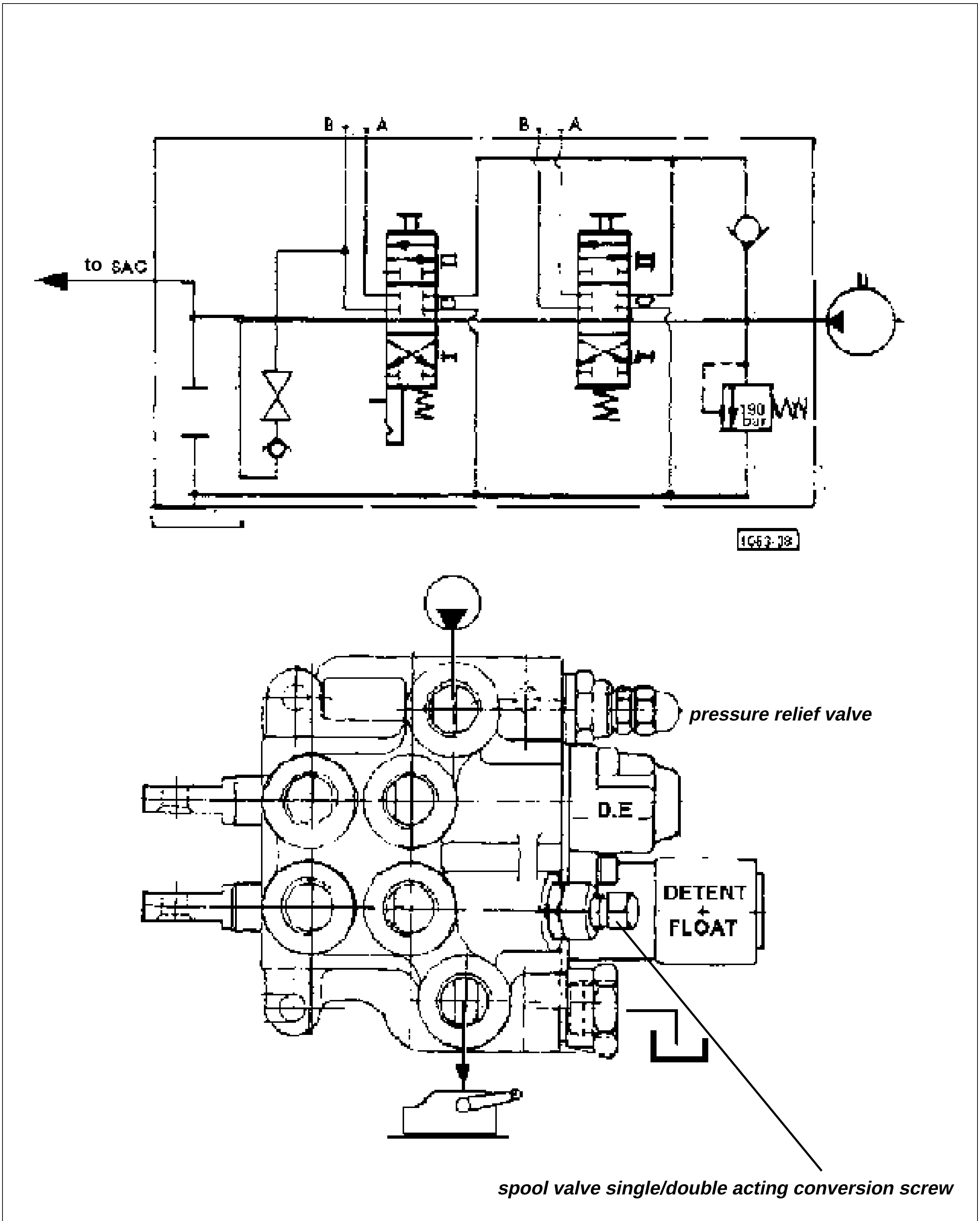


Fig. 6 - 4-way auxiliary hydraulic spool valve.

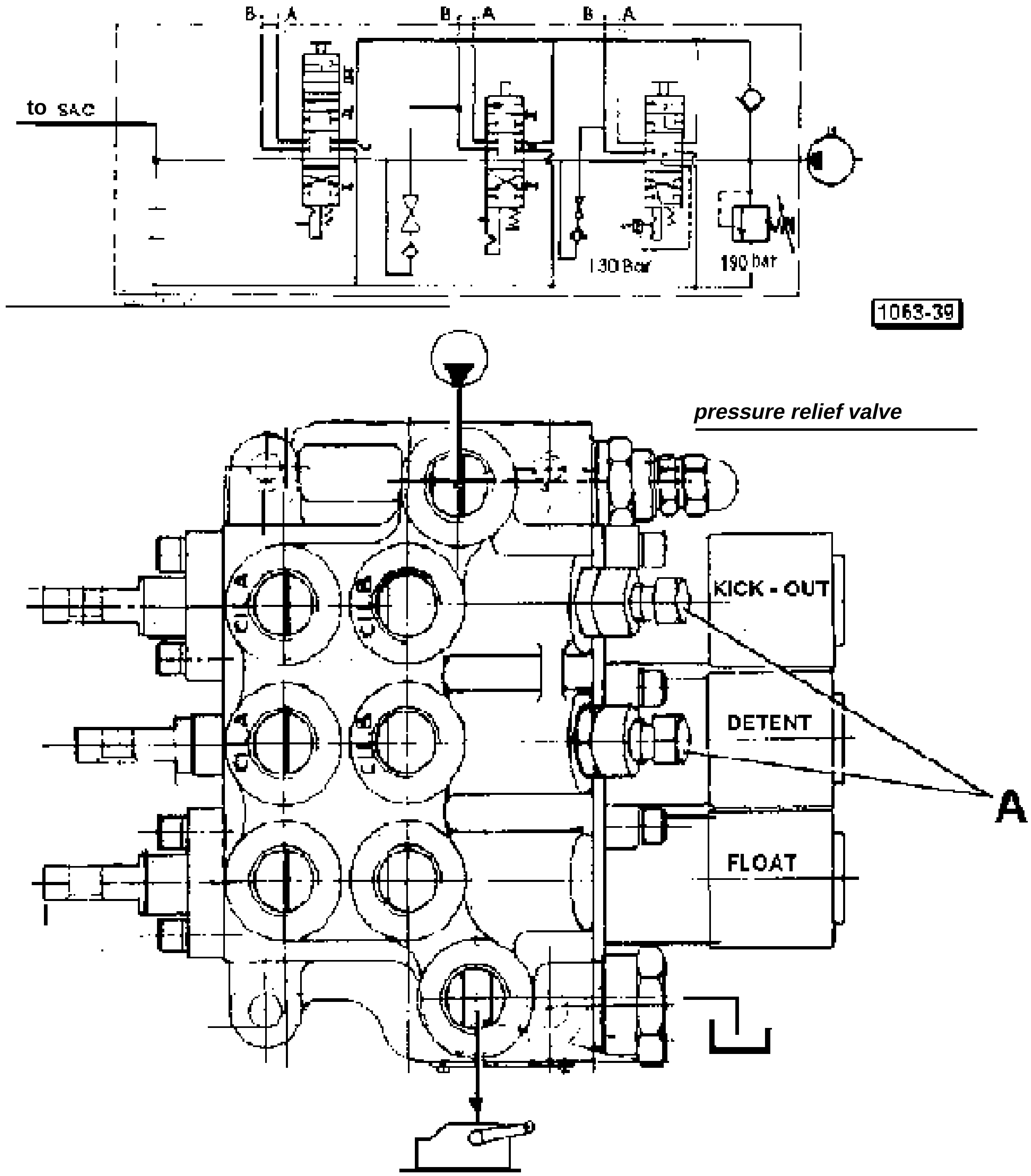


Fig. 7 - 6-way auxiliary hydraulic spool valve.
A - spool valve conversion screws allowing selection of single or double acting operation.

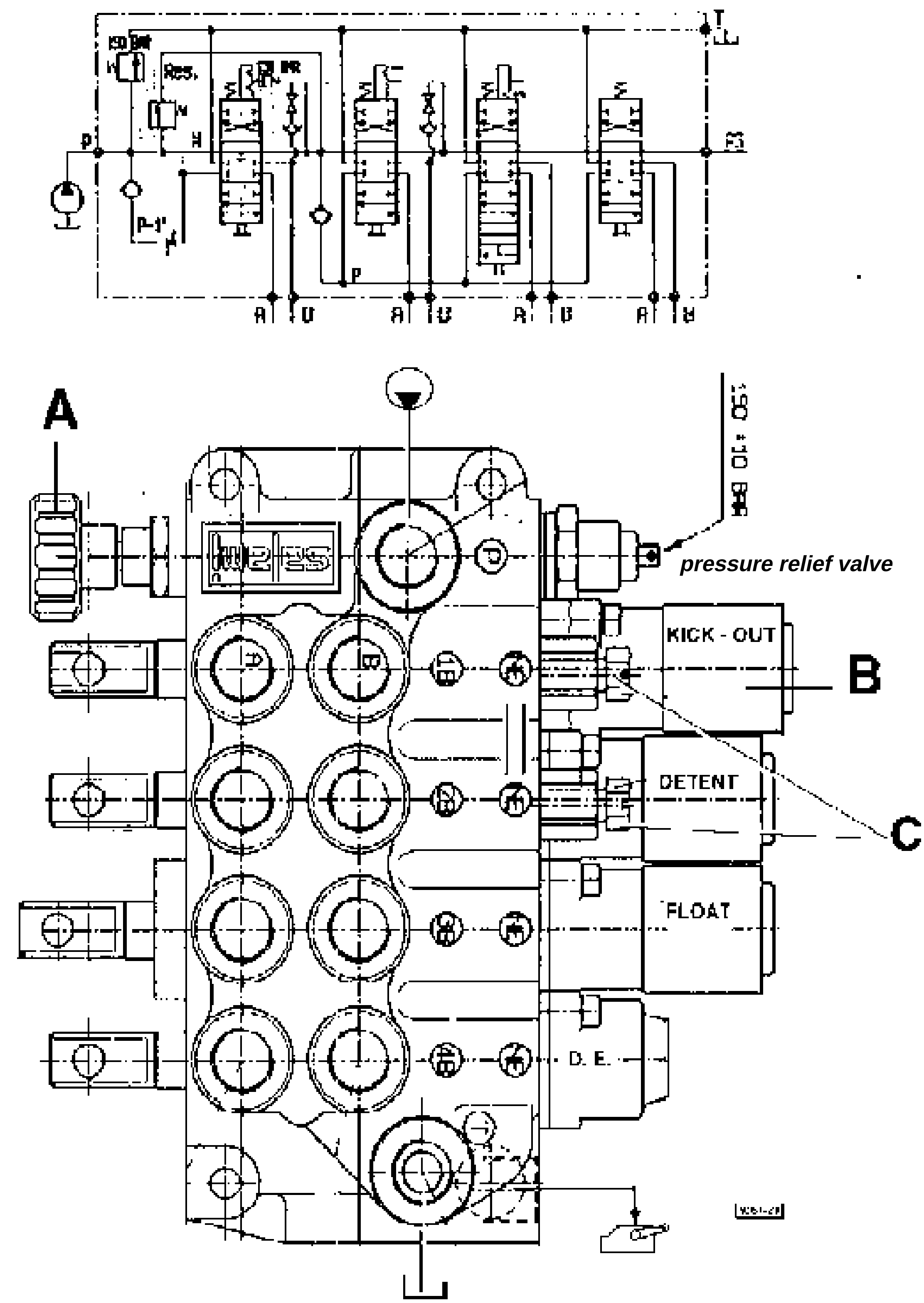
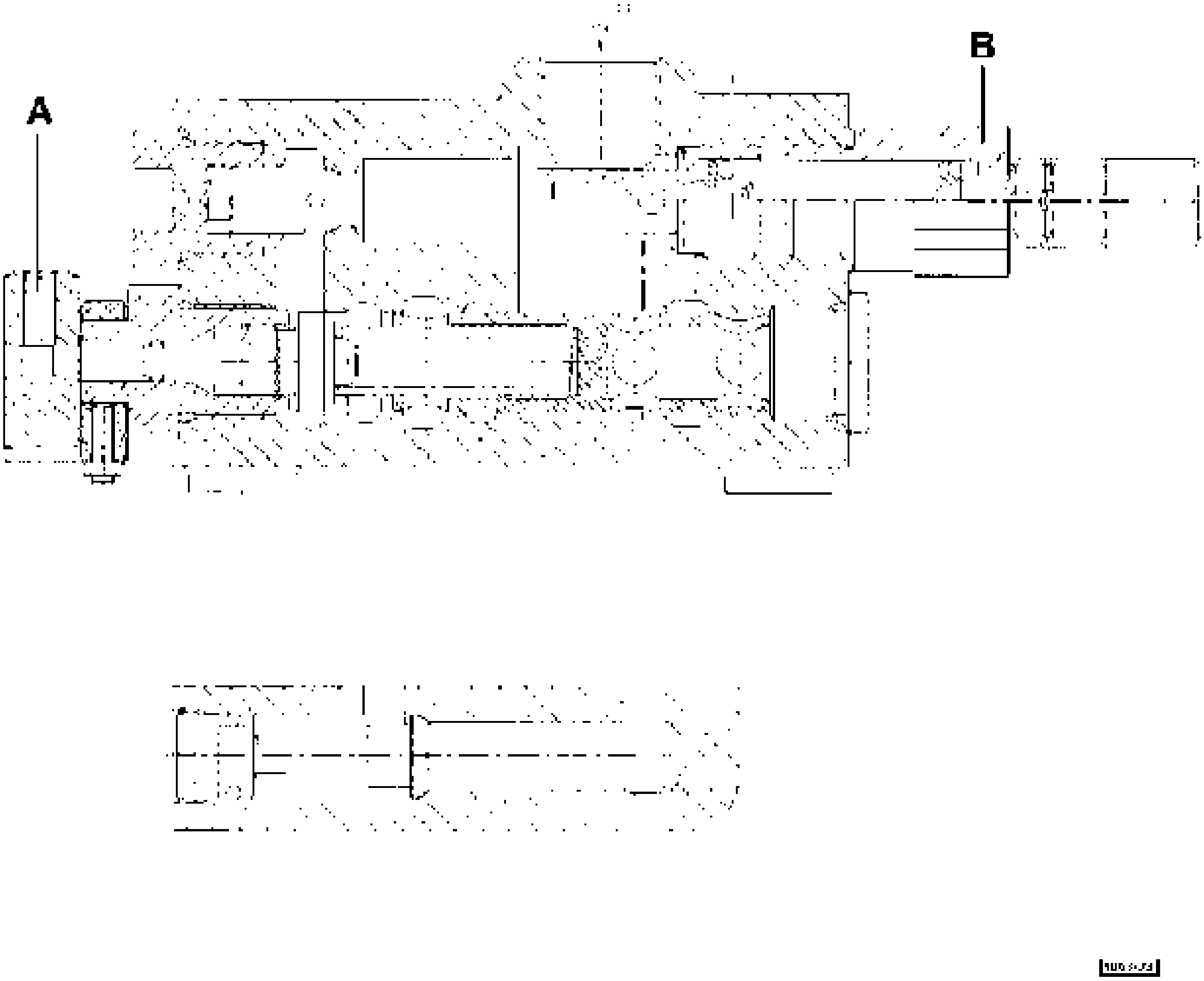


Fig. 8 - 8-way auxiliary spool valve:
A - Flow Divider **B** - KICKOUT **C** - Screws allowing conversion from double to single acting operation

Pressure relief valve and FLOW DIVIDER for 8-way auxiliary spool valve



NOTE : The 8-way auxiliary spool valve incorporates a FLOW DIVIDER **A** which ensures that oil can be delivered at a constant flow rate of between 3 and 42 l/min to the 2-way kickout section (first valve alongside the flow divider, see **B**, fig 8).
The flow divider is adjusted by rotating the knob in the direction as arrowed.

NB: Even when the flow divider is shut off by turning the knob fully in the direction marked (**-**), a residual flow of oil will continue to reach the valve at a steady rate of 3 l/min.

Fig. 9 - Section through 8-way spool valve.
A - Flow divider
B - Pressure relief valve.

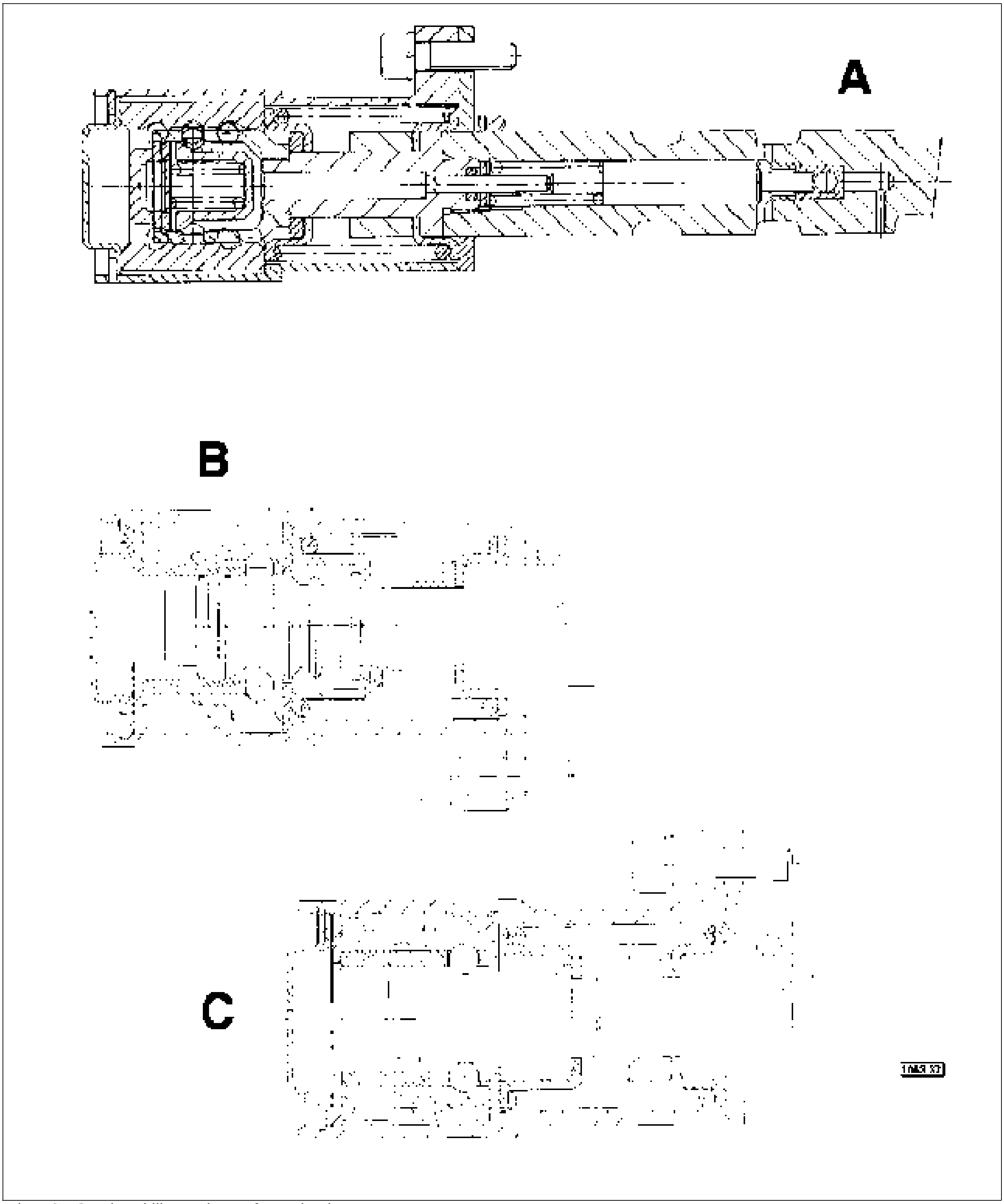


Fig. 10 - Sectional illustrations of spool valves
A - Section through kickout element.
B - Partial section through double acting spool valve with float position.
C - Partial section through double acting spool valve.

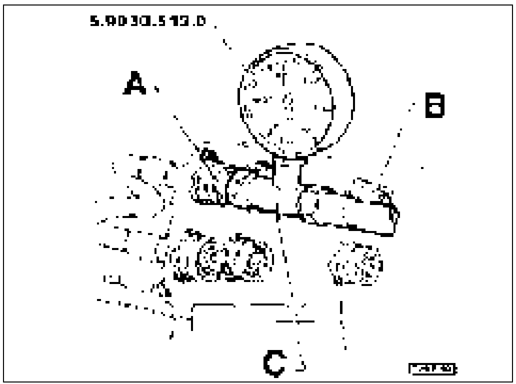


Fig. 11 - Checking the operating pressure of auxiliary spool valves.
A - Quick coupler
B - Implement oil line
C - Tee

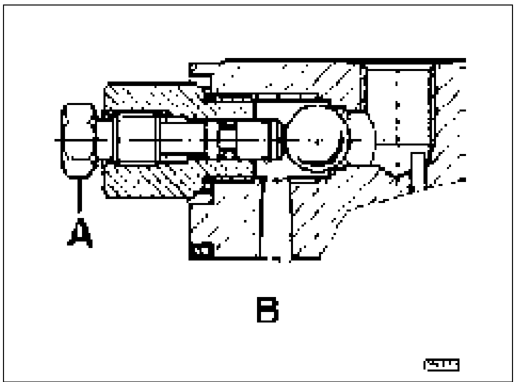


Fig. 12 - **A** conversion screw allowing conversion from double to single acting operation; **B** conversion screw lock washer.

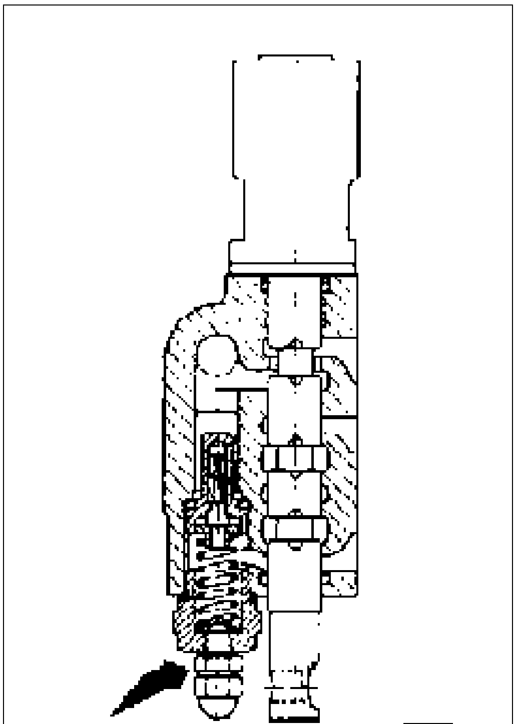


Fig. 13 - Longitudinal section through 4/6-way spool valve.

Checking the pressure relief valve setting

The setting of the pressure relief valve must always be 190 bar, and can be checked by fitting gauge p/n 5.9030.513.0 to either of the valve work ports and operating the relative lever. If the gauge reading is not correct, adjust the pressure relief valve (see pages 383 - 384 - 385).

NOTE: Remember that the purpose of the relief valve is to maintain pressure in the hydraulic lift circuit within a given safety limit, in this instance 190 bar.

Checking the operating pressure (see fig 11)

To verify the operating pressure of an implement connnected to the work ports of the auxiliary spool valves, proceed as follows:

— Connect a Tee between quick coupler **A** and the implement pressure line **B**.
— Connect pressure gauge p/n 5.9030.513.0 to the Tee.
— Start the engine, apply the parking brake in the interests of safety, and operate the spool valve connected to the implement.
— The gauge will show the operating pressure currently registering in the circuit.
The operating pressure depends on the weight of the hitched implement, and should not normally exceed 150 bar.

Conversion of auxiliary spool valves from double acting to single acting operation (see fig 12)

Where particular requirements dictate, a double acting spool valve can be converted to operate in single acting mode.

To effect the conversion from double to single acting, hold the fitting secure and loosen the screw **A** by between 4 and 5 turns.

NOTE: Once slack, the screw is best rotated by hand to avoid applying excessive force and unseating the lock washer **B**; if this were to happen, the washer would find its way into the hydraulic circuit and disallow normal operation of the lift system.

The conversion from single to double acting operation is effected by tightening the screw **A** fully.

Checking the surface of the valve spools

Check that the machined surface of the spool is free of scoring or any other kind of wear.

Fitting the bowden cables of auxiliary hydraulic spool valves (see fig 14)

Secure the levers **A** to the clamps **D**, applying a small quantity of Loctite 242 to the screws **C**.
Connect the lever end of the bowden cable, inserting the smaller bore of the bushing **H** into the bracket **G** as indicated in figure 14, then attaching the hook **E** to the lever boss.
Secure the spool valve levers in the neutral position.
Connect the remaining end of the cable, making certain that the terminal socket **P** is screwed fully onto the threaded end **O**. The socket **P** is secured to the valve spool by means of the pin **Q**.
NOTE: in the event that the hole of the valve spool and that of the socket do not coincide exactly, the socket can be slackened off by up to one quarter of a turn.
Screw the cap **M** fully into contact with the spool valve. Locate the flange **R** in contact with the valve and tighten the screw **N**, though not fully at this stage. Tighten the cap **M** further, to the point at which all clearance has been taken up, then tighten the lock nut **L**.
Fully tighten the screw **N.**

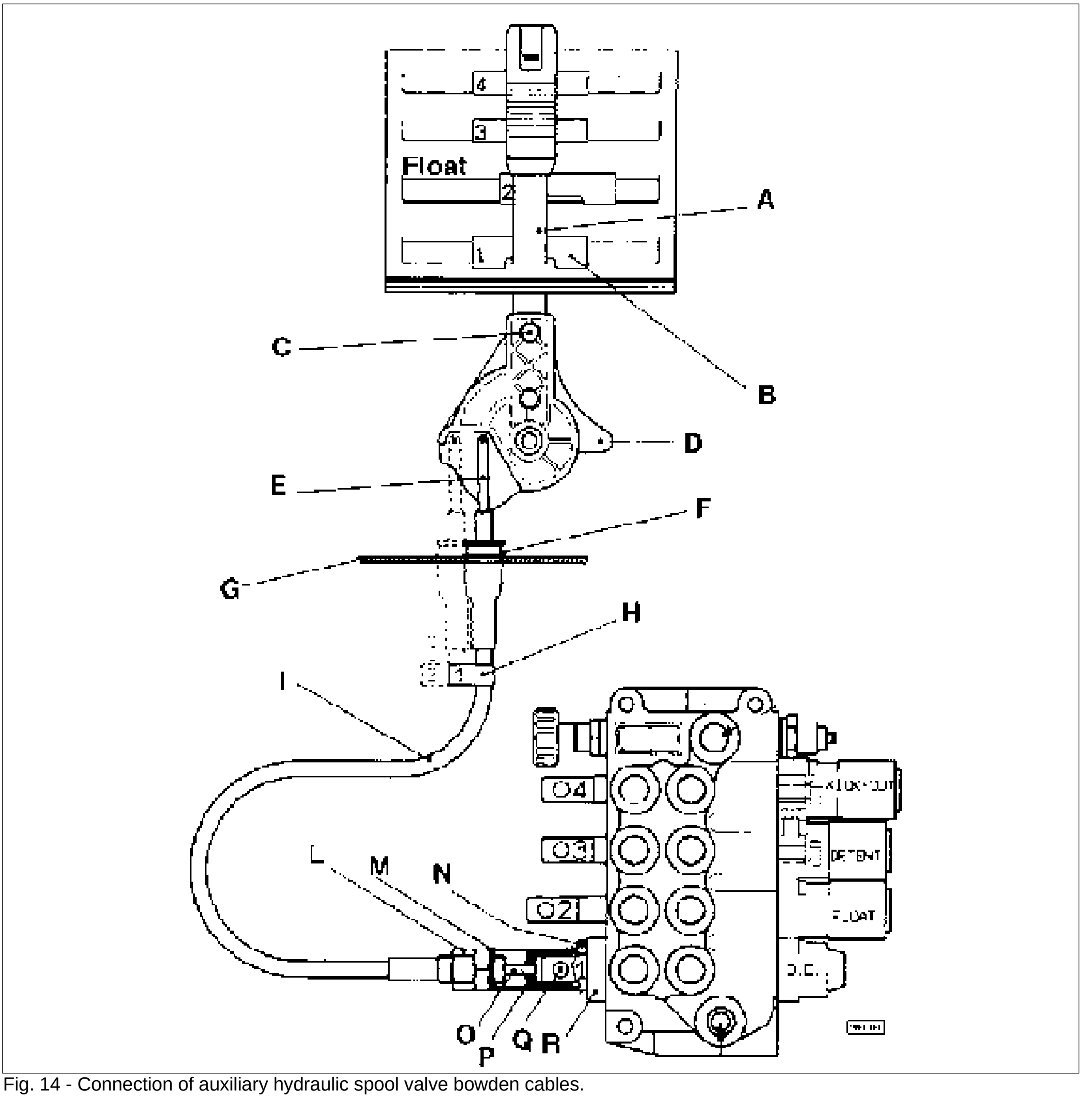


Fig. 14 - Connection of auxiliary hydraulic spool valve bowden cables.

Fitting the oil lines to auxiliary hydraulic spool valves.

These must be fitted as indicated in figure 15 and in accordance with the data in the table below.

At the moment of assembly, apply a small quantity of Loctite 572 to the spool valve fitting.

REF	P/N	LENGTH mm
A - B	008.9698.3	950
C - D	008.9699.3	850
E - F	008.9700.3/10	730
G - H	008.9701.3/10	630

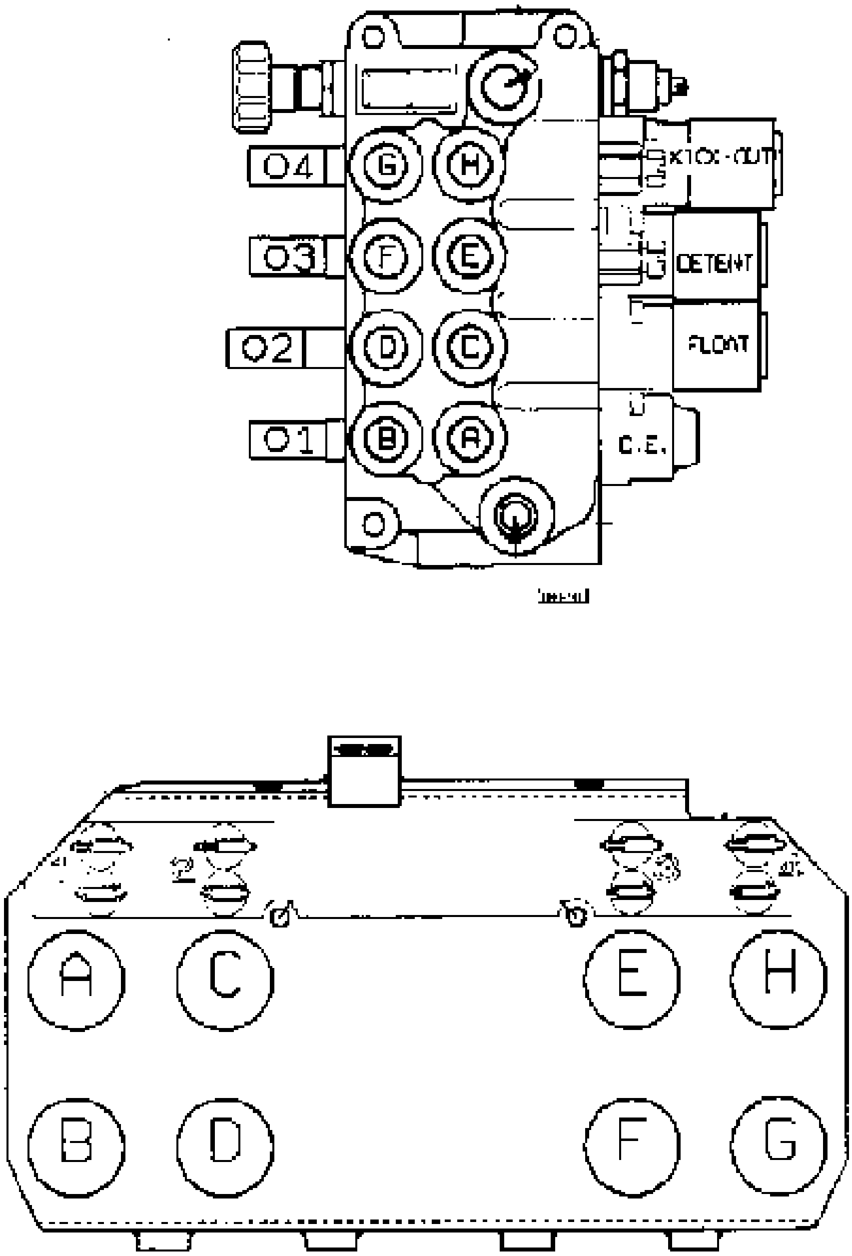


Fig. 15 - Fitment of oil lines to auxiliary hydraulic spool valves.

Trailer hydraulic braking system

The tractor can be equipped with a trailer hydraulic braking system on request.
For trailers with **"safety brake"** (ITALY version), the system is equipped with a specific distributor.

The oil used is drawn from the tractor's main hydraulic system by a special distributor.

This distributor is activated by a valve which is hydraulically connected to the tractor hydrostatic braking system control.

Trailer hydraulic braking distributor unit

Specifications (see Fig. 4)

P	supply
N	services connections
B	trailer brake connection
T	oil discharge
Y	trailer braking system connection (in series)
E	parking brake signaling pressure switch

Supply	l/min	20 ÷ 80
Constant pressure in **B** (only for distributor ITALY version)	bar	12.5 ± 2
Maximum pressure in **B** (only for distributor ITALY version)	bar	135 ± 5
Maximum operating pressure in **N** (only for distributor ITALY version)	bar	200
Working temperature	°C	-20 + 100
Supply in **P**		with hydraulic mineral oil
Pilot **Y** (supplied from below)		with hydraulic mineral oil

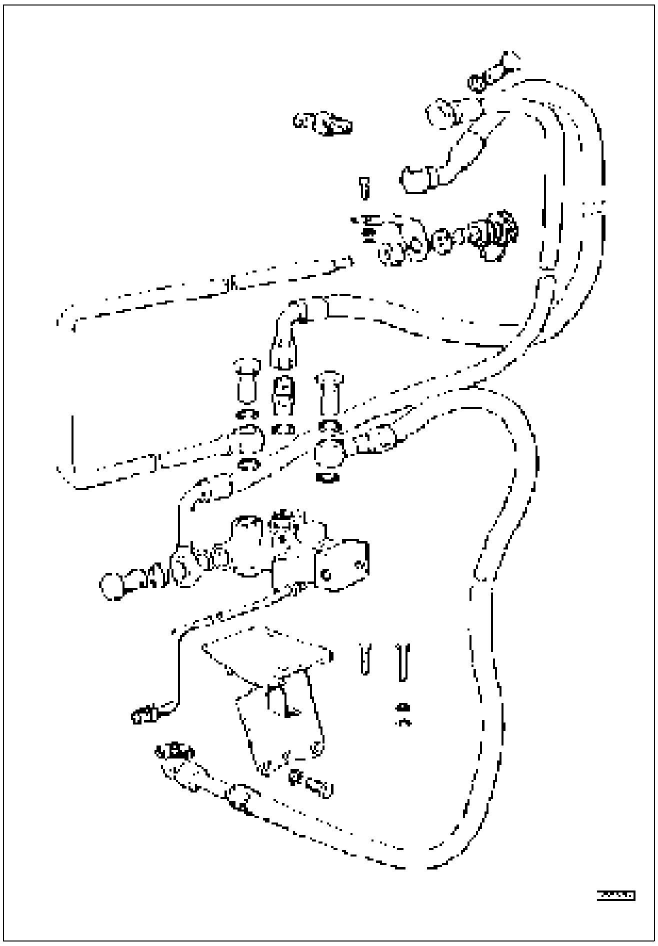


Fig. 1 - Component parts of trailer braking system (FRANCE version).

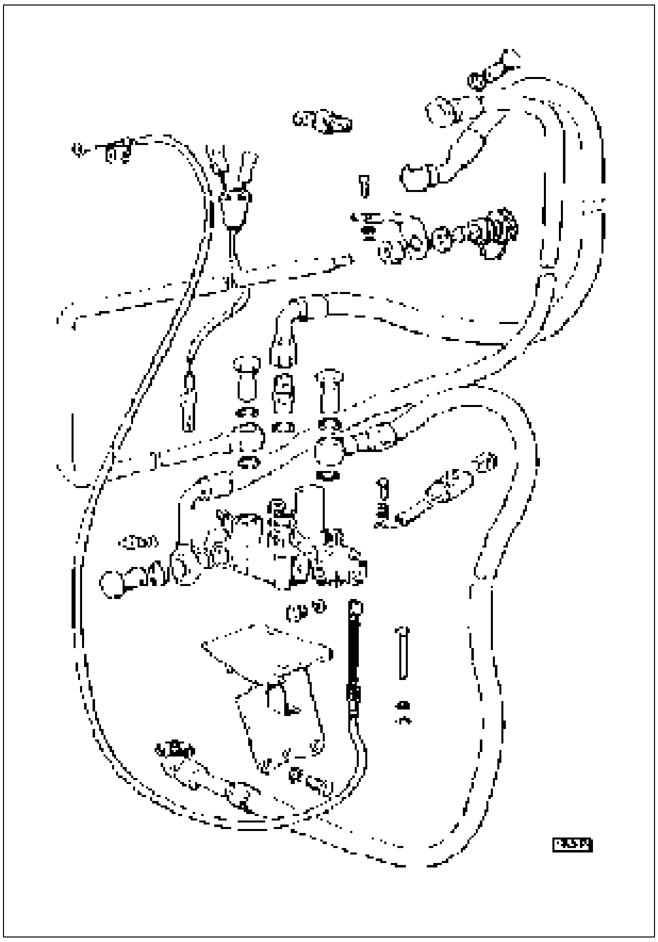


Fig. 2 - Component parts of braking system for trailer equipped with safety brake (ITALY version).

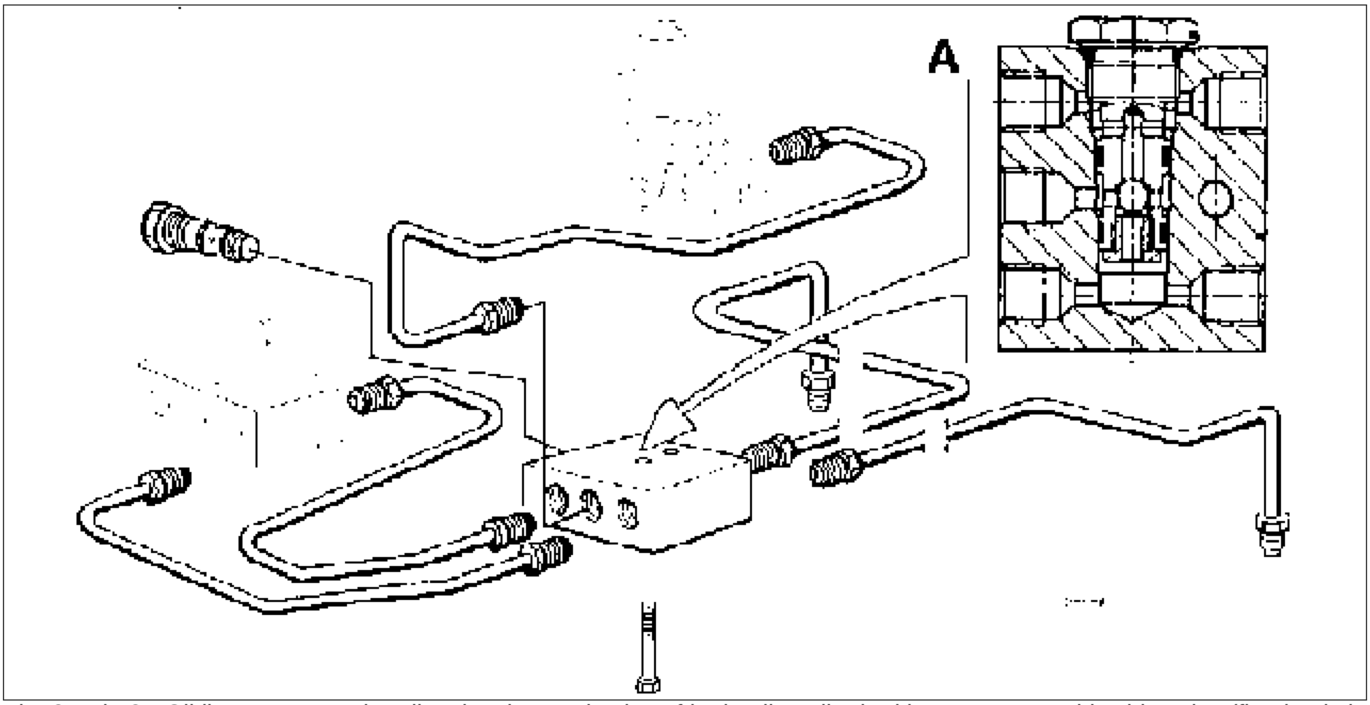


Fig. 3 - Fig 3 - Oil lines connected to directional control valve of hydraulic trailer braking system. **A** - bistable valve (fitted only in conjunction with ITALY version of the control valve) allows trailer brake to be applied even when tractor brakes are operated independently.

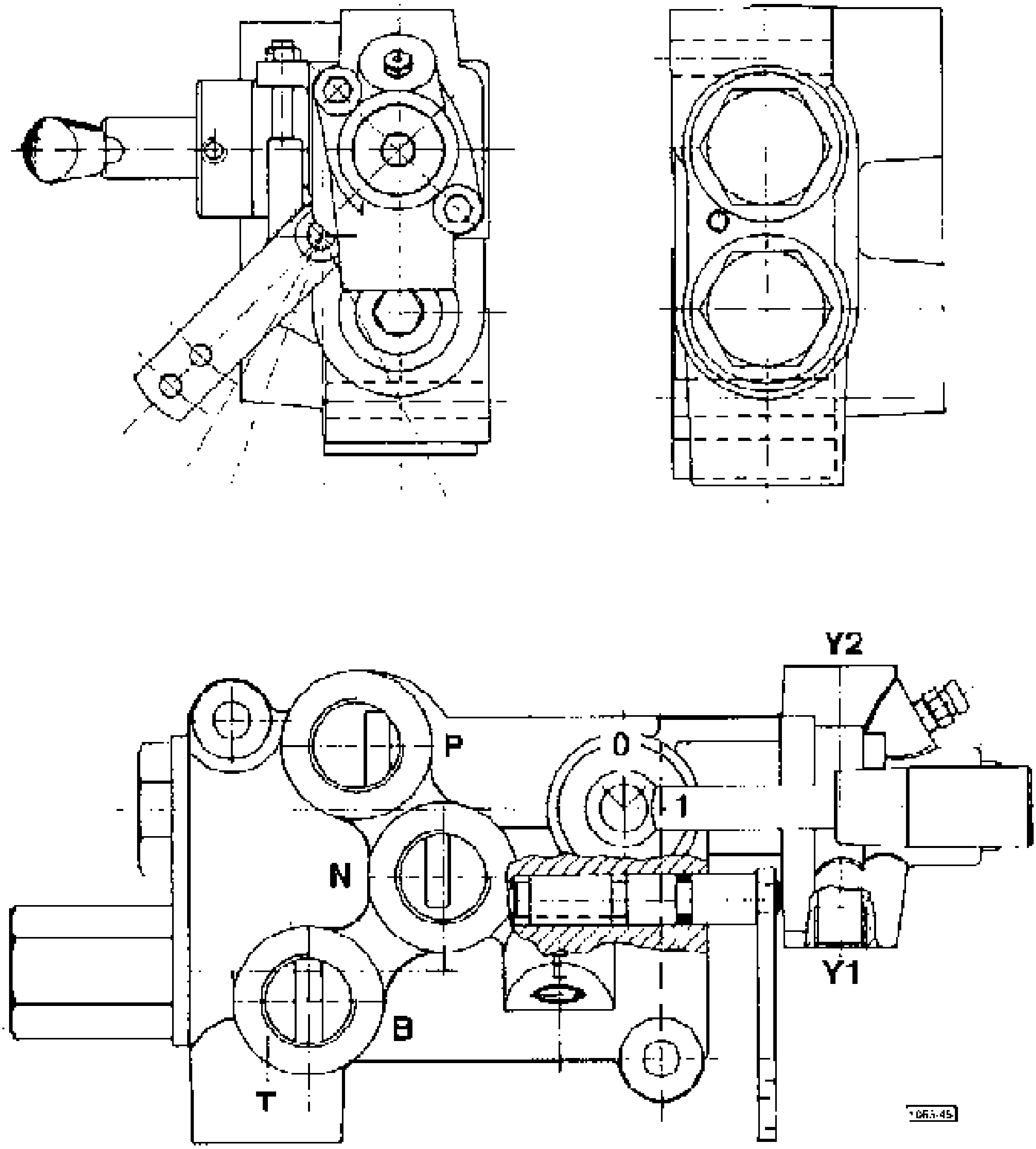


Fig. 4 - Hydraulic brake control valve for trailer **equipped with safety brake** (ITALY version).

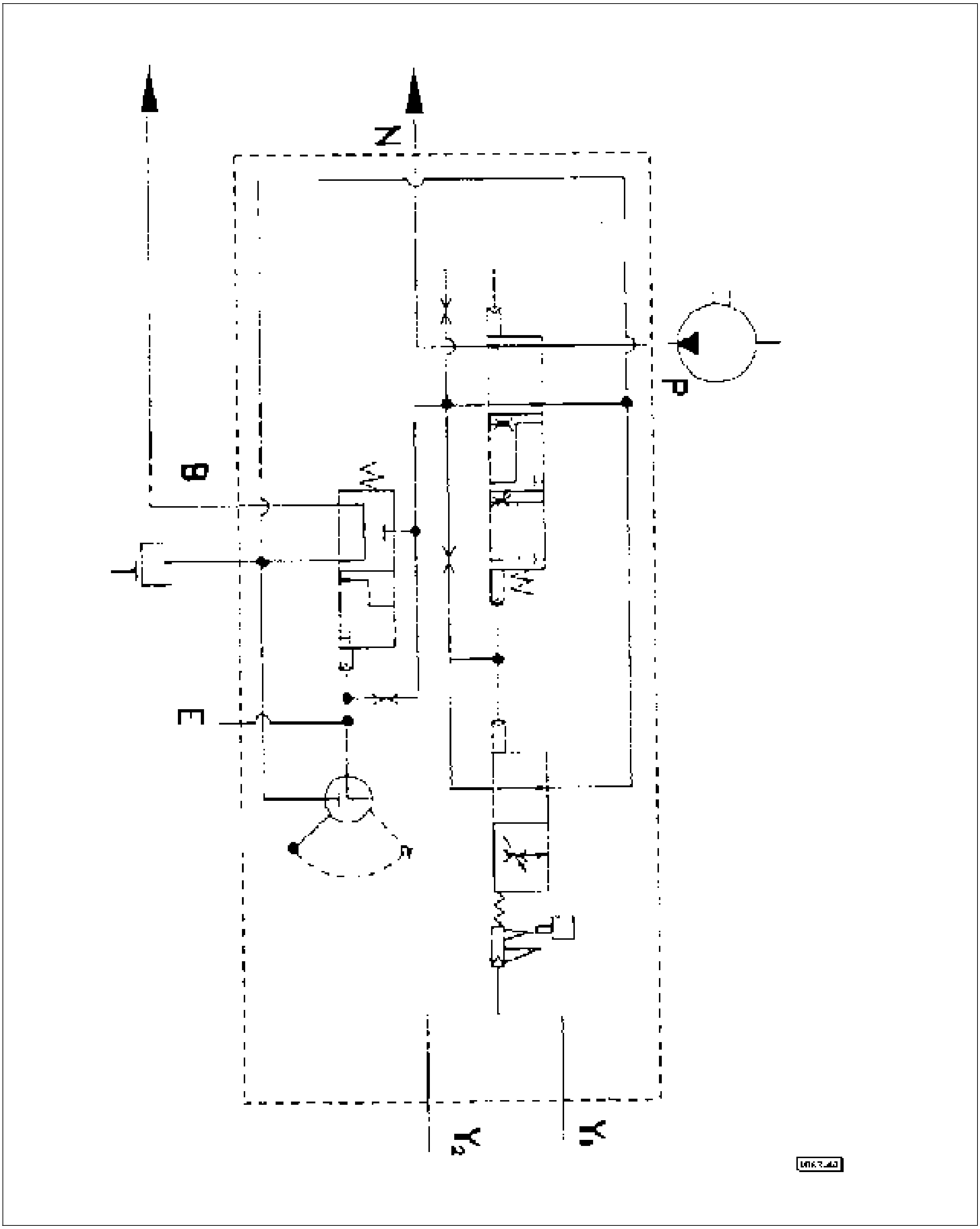


Fig. 5 - Hydraulic diagram of brake control valve for trailer **equipped with safety brake** (ITALY version).

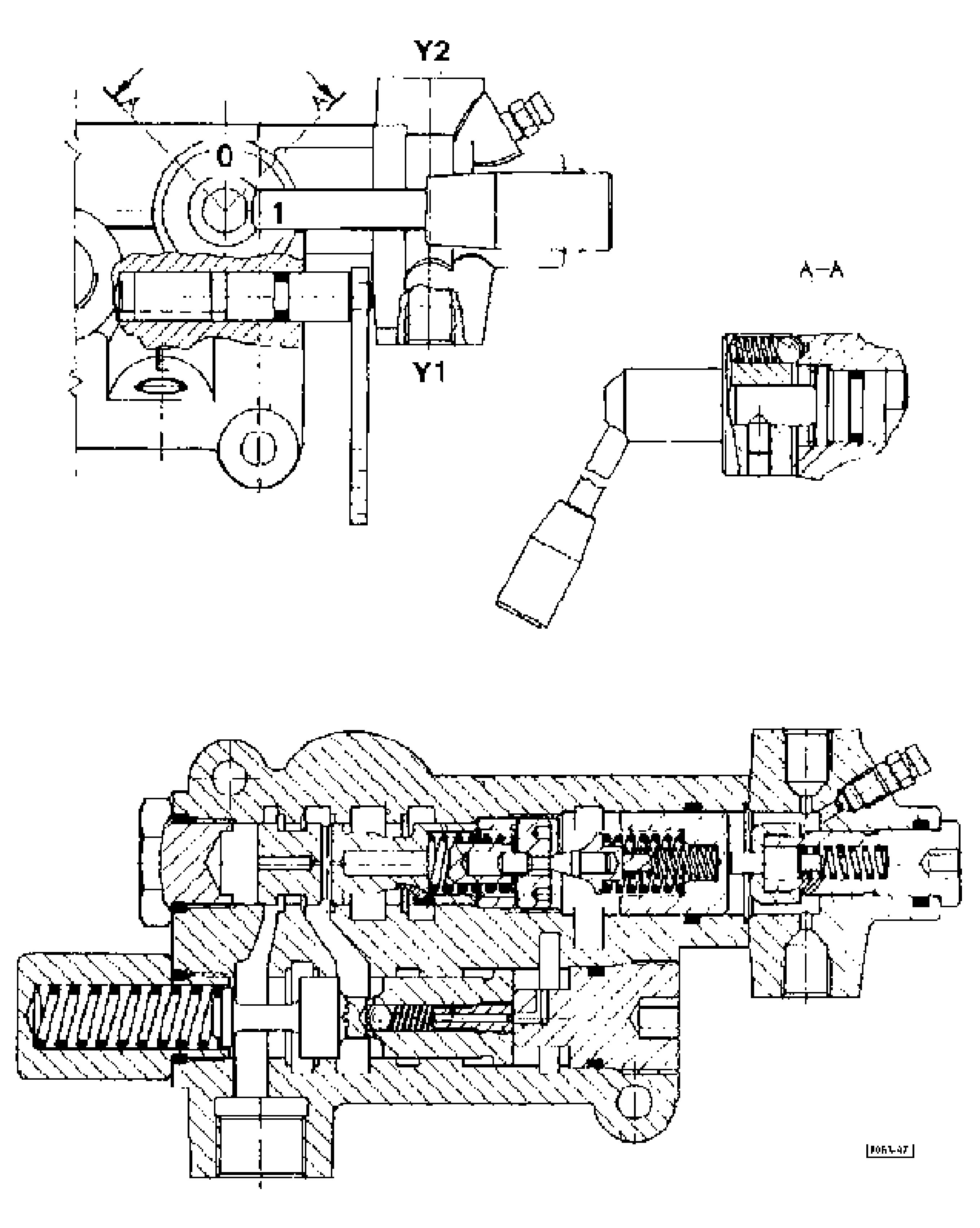


Fig. 6 - Section through brake control valve for trailer **equipped with safety brake** (ITALY version).

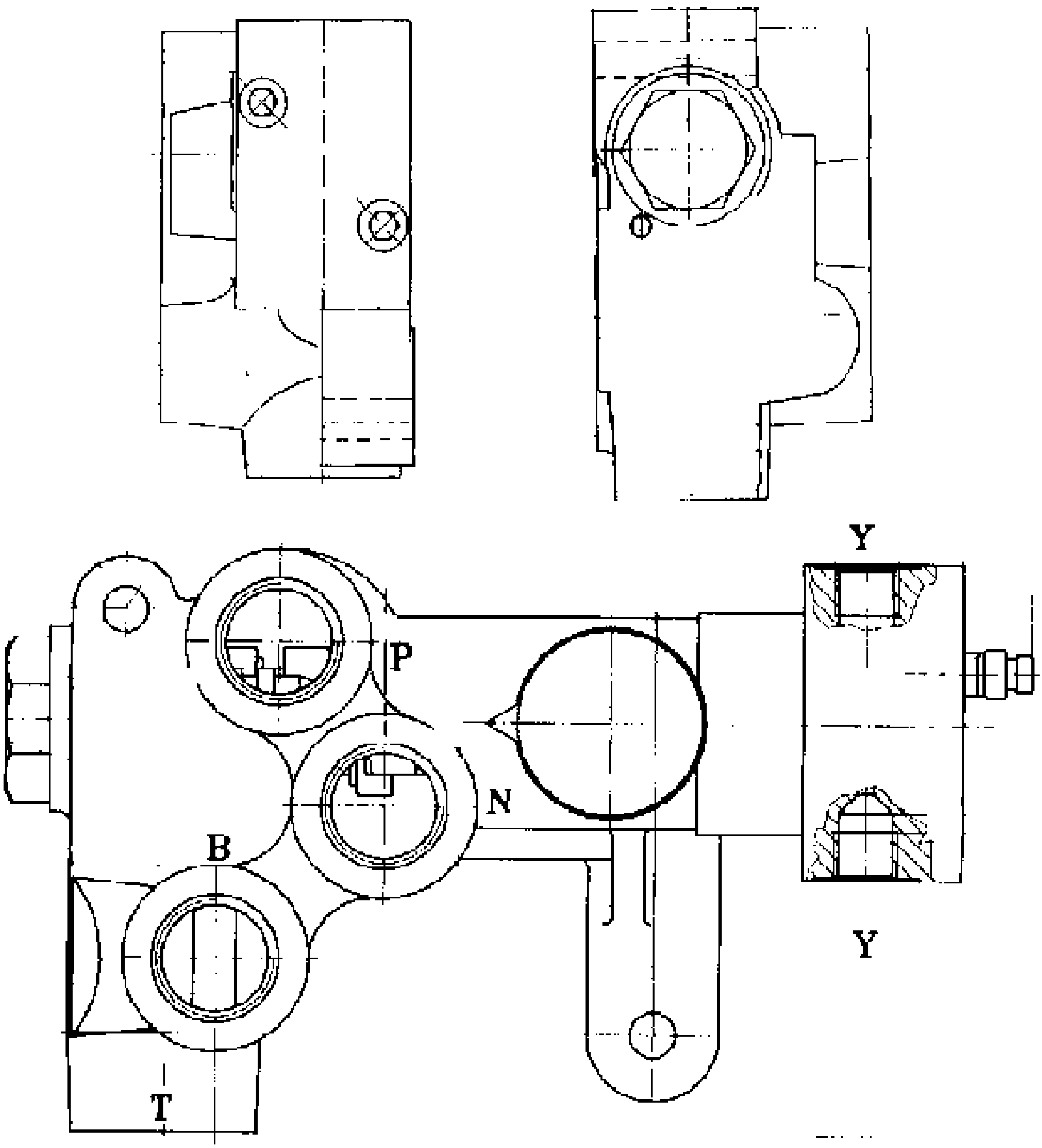


Fig. 7 - Hydraulic trailer brake control valve (FRANCE version).

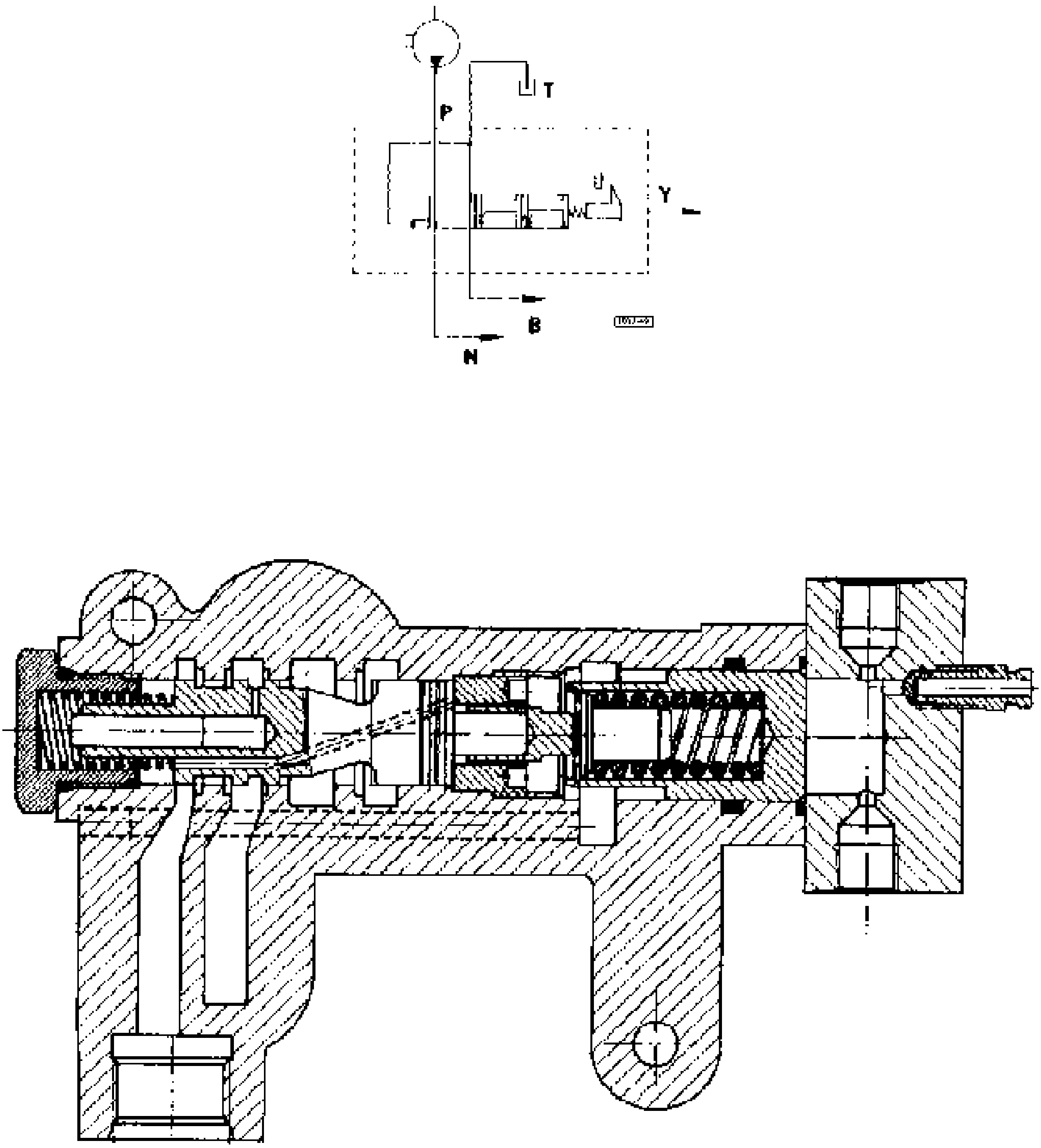


Fig. 8 - Section through trailer brake control valve, with hydraulic diagram (FRANCE version).

Installing the hydraulic braking valve for trailers equipped with "safety brake" (ITALY version)

For correct valve and related controls installation, it is necessary to proceed as follows:

— Secure the distributor to the tractor and connect the various oil tubes;

— Bring the tractor parking brake lever to position **A** (4th notch of the toothed sector) and carry out the parking brake adjustment so that, in this position, the tractor is braked.
Then bring the parking brake lever to position **B** (stop notch).

— Keeping the parking brake lever in position **B**, hook the hose fork to lever **Y**, pushing it against stop screw **X**.
Then connect the hose to lock plate **C** by means of the special adjusting nuts.
Under these conditions, acting on the parking brake hand lever of the tractor synchronizes the tractor and trailer stationary braking.

— Connect the wiring of the pressure switch, that is screwed on the distributor, to the specific warning light installed on the instrument panel of the dashboard.
Then, when engaging the parking brake, the tractor warning light and the trailer warning light will light up at the same time.

CAUTION:
— When the trailer is hitched to the tractor, the lever on the distributor must **always** be in position **1**.
— When the trailer is not hitched to the tractor or it is in the process of being hitched/unhitched, the distributor lever must **always** be in position **0** in order to exclude the main hydraulic system valve.

On the hydraulic distributor is placed a sensor (**E** Fig, 9). This sensor active the warning light on the dashboard, when the trailer brakes is operated.

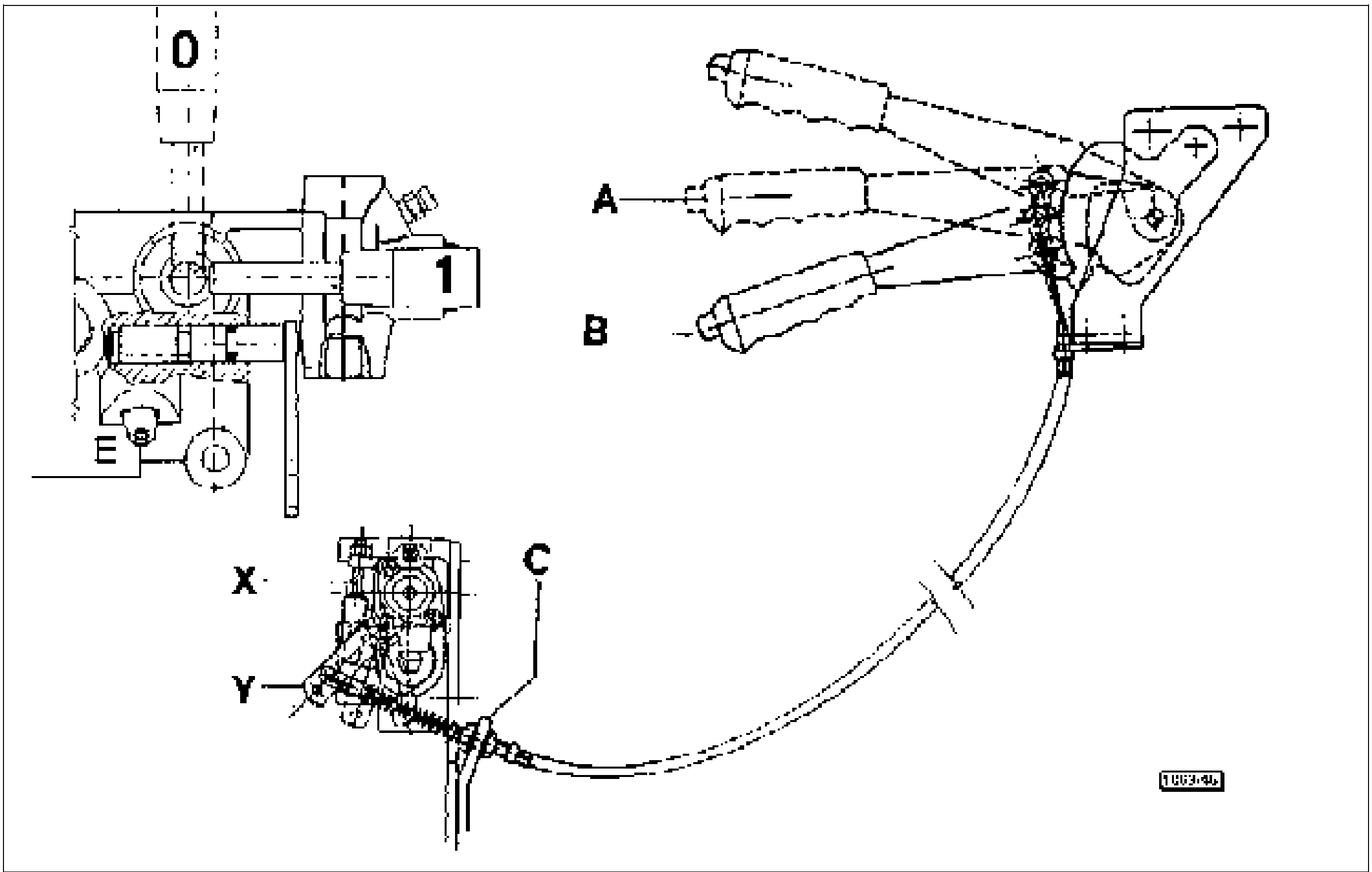


Fig. 9 - Diagram illustrating adjustment of brake control valve for trailer **equipped with safety brake** (ITALY version).

General specifications

The electrical system is fully equipped for use on the road, with sidelights, main/dipped beam headlamps, direction indicators doubling as hazard warning lights, and work lights, all fully in compliance with legal requirements as embodied in the highway code.

There are four essential components and assemblies: battery, alternator, starter motor, and auxiliaries.

The system operates at a nominal 12 Volts (the maximum voltage in operation is 14,3±0,5 V).

The battery charge level is indicated by a relative meter on the instrument panel.

Technical specifications

battery

type		maintenance free
voltage	V	12
discharge capacity over 20 hours	Ah	120 (176 or 180 Ah in cold climates)
rated current	A	500 (650 or 750 A in cold climates)

starter motor

p/n		2.9619.340.0 (MARELLI) 2.9619.290.0 (BOSCH) 2.9619.350.0 (ISKRA)
voltage	V	12
nominal rated power	HP	4 approx (3 kW approx)
electromagnetic control		with bendix type pinion engagement

alternator

RECHARGE SYSTEM		
p/n	65A	2.9439.390.0
	85A	2.9439.450.0
HEATING SYSTEM	65A	2.9439.480.0
	85A	2.9439.470.0
type		three-phase
nominal rated voltage	V	12
pulley nut tightening torque	Nm	62 (5,5 kgm)

GENERAL SAFETY DIRECTIONS

PRECAUTIONS AGAINST DAMAGE TO ELECTRICAL AND ELECTRONIC EQUIPMENT

— Disconnect any electronic equipment from the system when the tractor is placed in any environment where temperatures are likely to exceed 80 °C.

— Remove battery connections when carrying out servicing or repair operations on the electrical system.

— Avoid overvoltages in the electrical system. Always remove battery and alternator connections before carrying out welding operations or when recharging the battery from the mains.

— Never disconnect the battery while the engine is running.

— In the event that the battery needs topping up, use only distilled or demineralized water; top up only when the battery is AT REST and at AMBIENT TEMPERATURE (allow time for cooling after operation and following recharge).

— Never carry out servicing operations on the electric heating system with the engine running.

— When washing the tractor, ensure that the alternator and starter motor are well protected. These components must not be sprayed or splashed directly with water.

PRECAUTIONS AGAINST ACCIDENT AND INJURY

WHEN COMMENCING ANY KIND OF WORK:

— Turn off the main ignition switch.

— Disconnect the battery; remember that electric shocks discharged through the human body will damage pace-makers.

— The battery generates powerful and inflammable gases when recharging, which if ignited can cause the battery itself to explode.

— Do not make temporary or makeshift connections to the battery, as these can cause dangerous sparks.

— The electrolyte in the battery is a solution of dilute sulphuric acid; if splashed on the skin, wash straight away with plenty of water and sodium bicoarbonate.

— Seek attention immediately from a doctor if electrolyte is splashed into the eyes.

— Never allow the battery near a naked flame.

— Keep a safe distance from a recharging battery when testing or measuring, and always wear suitable eye protection.

— Make certain that the electrical system and all its components are inspected and serviced periodically; any faults must be eliminated without delay, and parts subject to everyday wear replaced at the recommended intervals.

— Ensure that trailers are fitted with regulation lights.

IMPORTANT REMINDERS

The maker declines all liability in respect of any damages resulting from operations performed other than in the recommended manner and/or by unskilled hands.

— To ensure smooth operation of the machine, use only genuine replacement parts.

JUMP START UTILIZING ANOTHER BATTERY

NB: Emergency starting with the aid of a battery charger is not recommended.

PRECAUTIONS

The battery may be that of another tractor, but must in any event have the same rated voltage (and therefore an identical number of cells).

1 - Make certain the two vehicles are not in contact with one another.

2 - Ensure that all auxiliary services are switched off.

3 - Make certain the flat battery is securely connected to earth, that the filler caps are properly tightened and that the electrolyte is up to the correct level.

PROCEDURE:

A - Connect the two batteries as indicated in figure 1 (part **A**).

B - If the jump battery is that of another tractor, start the engine and run at approximately 1/4 of full throttle.

C - Turn the ignition key to start the engine of the stranded tractor, following the procedure given in the operator's handbook.

D - Remove the jump leads following the sequence as indicated in figure 1 (part **B**).

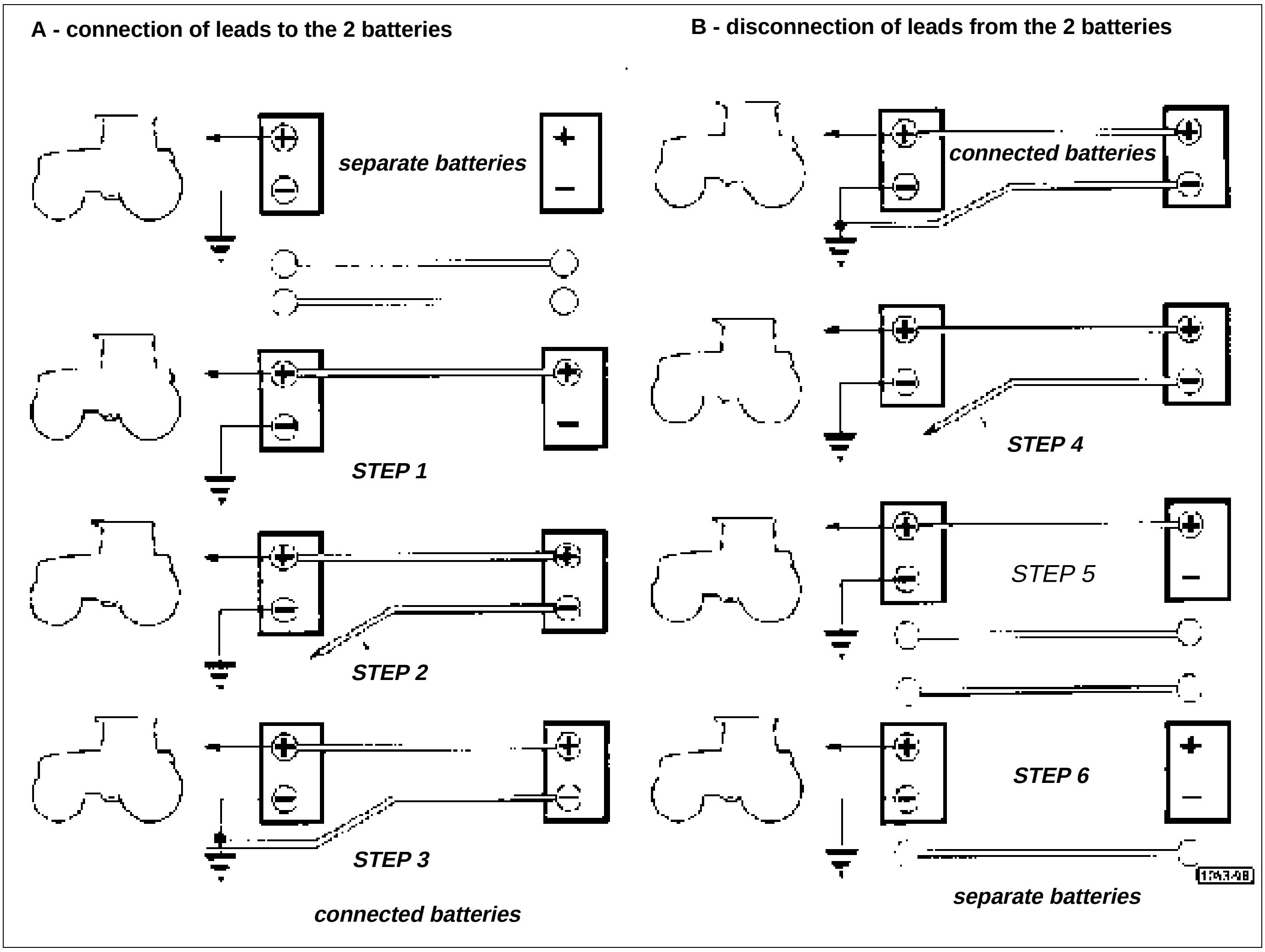


Fig. 1 - Diagram of battery connections and relative leads.

PRACTICAL HINTS

Before installing a battery, and periodically thereafter:
— Check over the electrical system, giving particular attention to connections; make certain there are no traces of oxidation and that there is no loss of current.
— Check the alternator and the voltage regulator setting. If the charging voltage is inordinately high, distilled water will be consumed at a high rate, whereas a low voltage will not charge the battery sufficiently.
— Check the charge level of a new battery with a density indicator or voltmeter; if the density is less than 1.25 kg/l or the no-load voltage after at least 3 - 4 hours at rest is lower than 12.5 V, proceed to recharge.
Install the battery in the machine with care, utilizing the anchorages provided.

When connecting the battery to the system:
— secure the clamp
— before connecting the negative, make certain there is no sparking on contact with the corresponding terminal of the battery. Sparks are due to insulation defects that must be located and eliminated.
— Tighten the clamps on the terminals, smearing with petroleum jelly.

TABLE OF WIRING COLOUR CODES

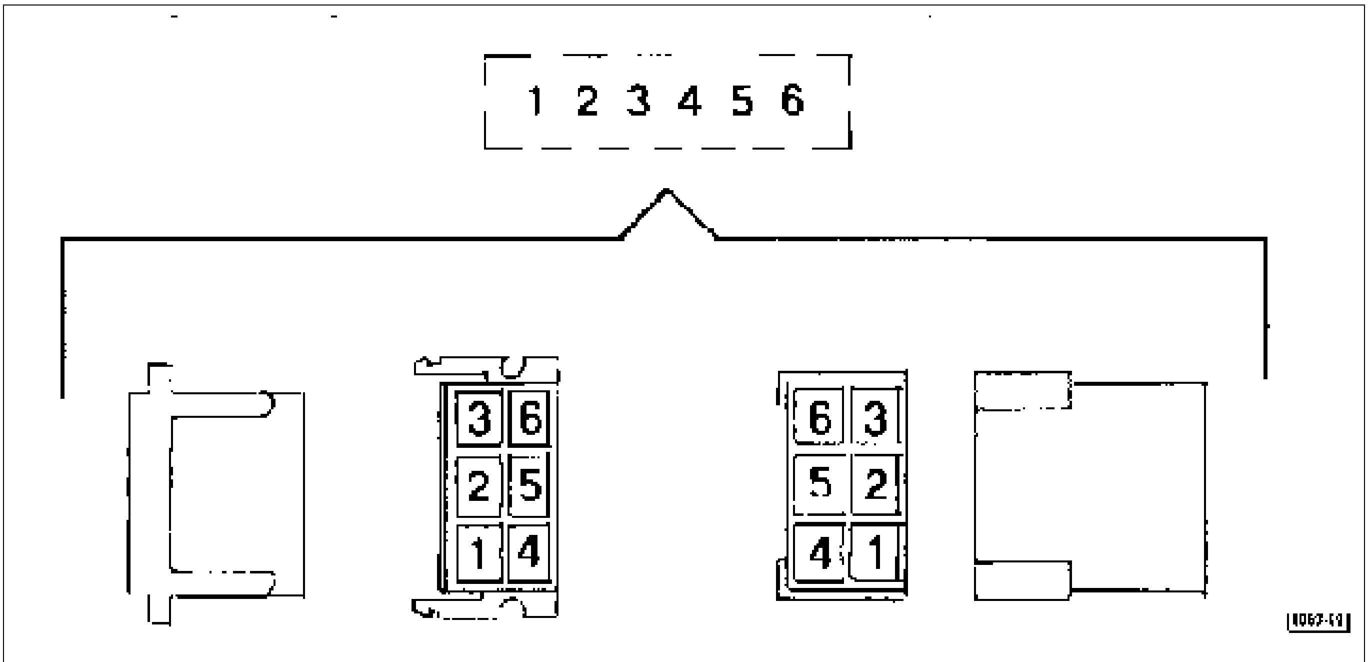
BK	=	***BLACK***
BL	=	***BLUE***
BR	=	***BROWN***
DK BL	=	***DARK BLUE***
DK GN	=	***DARK GREEN***
GN	=	***GREEN***
GY	=	***GREY***
OR	=	***ORANGE***
PK	=	***PINK***
RD	=	***RED***
VL	=	***VIOLET***
WH	=	***WHITE***
YL	=	***YELLOW***

EXAMPLE:

DK BL/WH 1 680

DK BL/WH	=	*DARK BLUE WITH WHITE LINE*
1	=	*CROSS SECTION OF WIRE (mm)*
680	=	*LENGTH OF WIRE (mm)*

EXAMPLE OF CONNECTORS (CAN BE 4-PIN, 6-PIN OR 8-PIN)

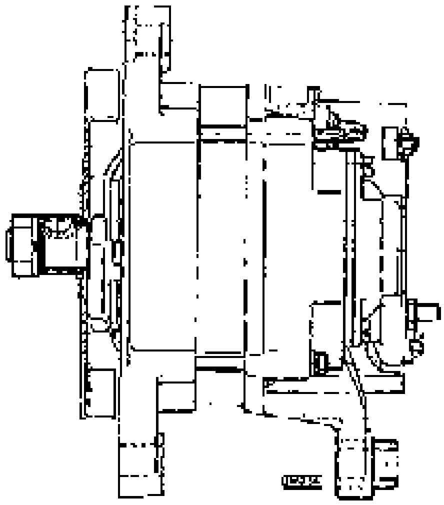
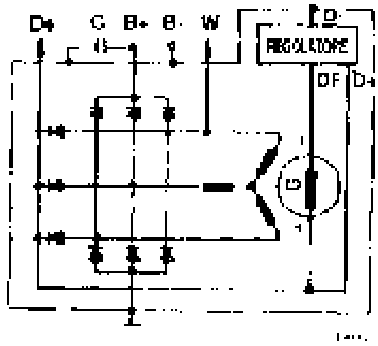


RECHARGE SYSTEM

65A ALTERNATOR

ISKRA AAK3563 14V 65A

p/n 29439.390.0

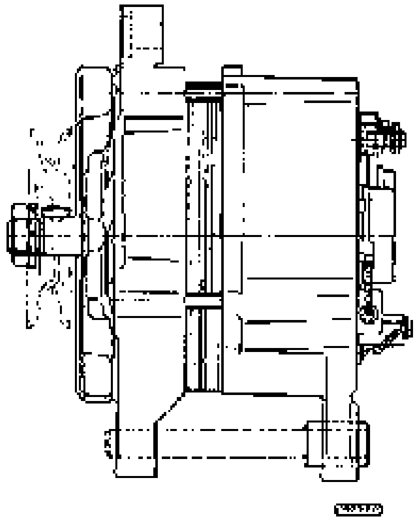
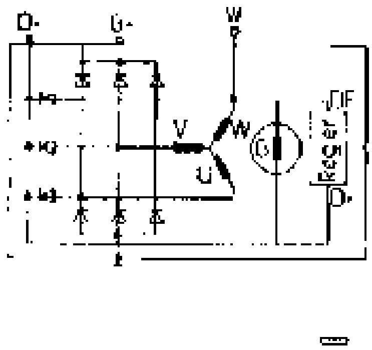



RECHARGE SYSTEM

65A ALTERNATOR

BOSCH K1-14V 65A 20

p/n 29439.390.0

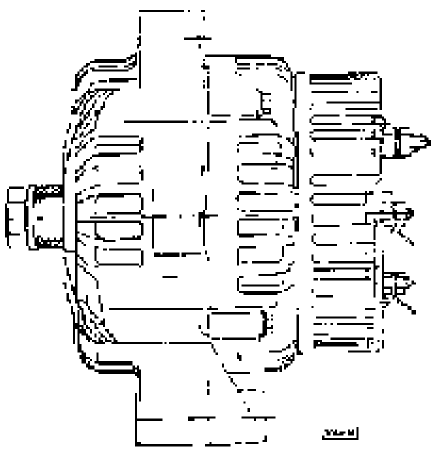
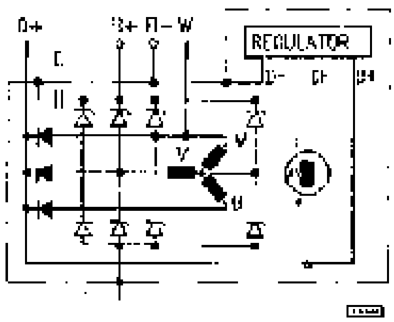



RECHARGE SYSTEM

85A ALTERNATOR

ISKRA AAK5115 14V 85A

p/n 29439.450.0

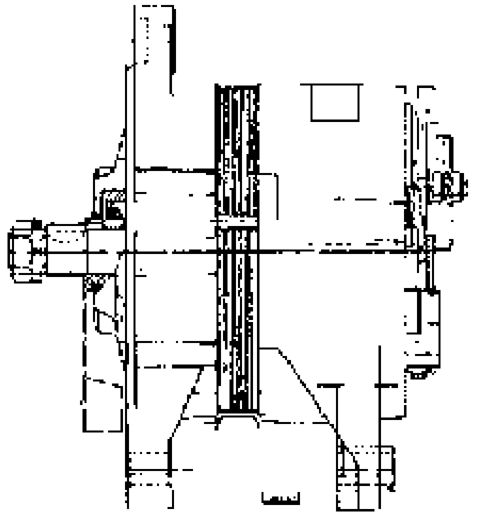



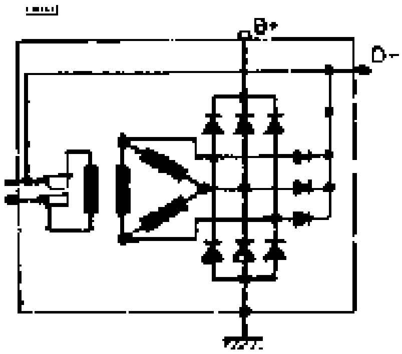
HEATING SYSTEM

65A ALTERNATOR

MARELLI 12V 65A

p/n 2.9439.480.0



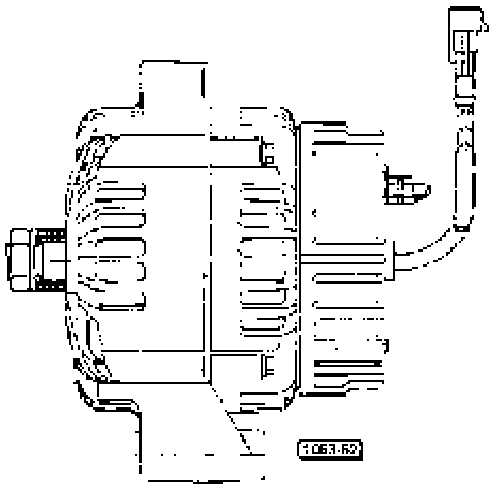


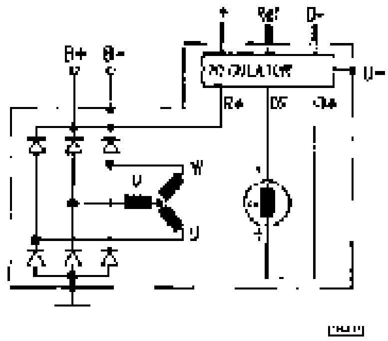
HEATING SYSTEM

70A ALTERNATOR

ISKRA AAK5117 12V 70A

p/n 2.9439.470.0



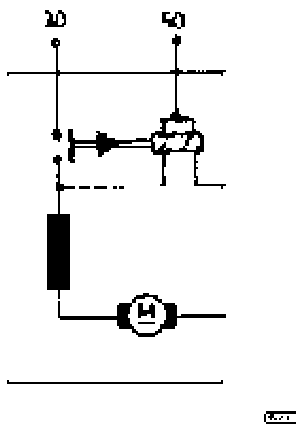


STARTING SYSTEM

ISKRA
p/n 2.9619.350.0

MARELLI
p/n 2.9619.340.0

BOSCH
p/n 2.9619.290.0/10.0



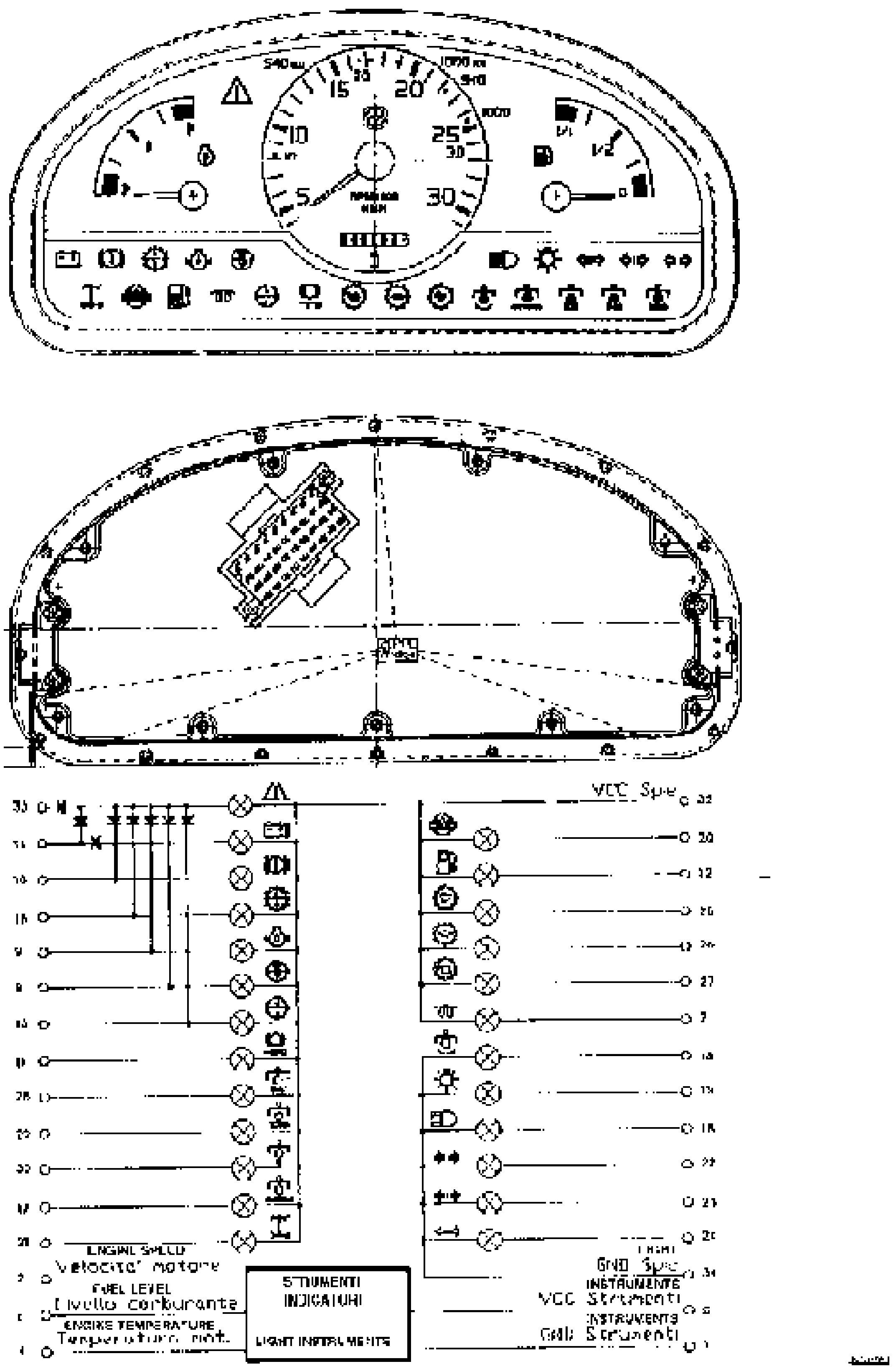


Fig. 2 - Check panel incorporated into instrument fascia, for machines without cab.

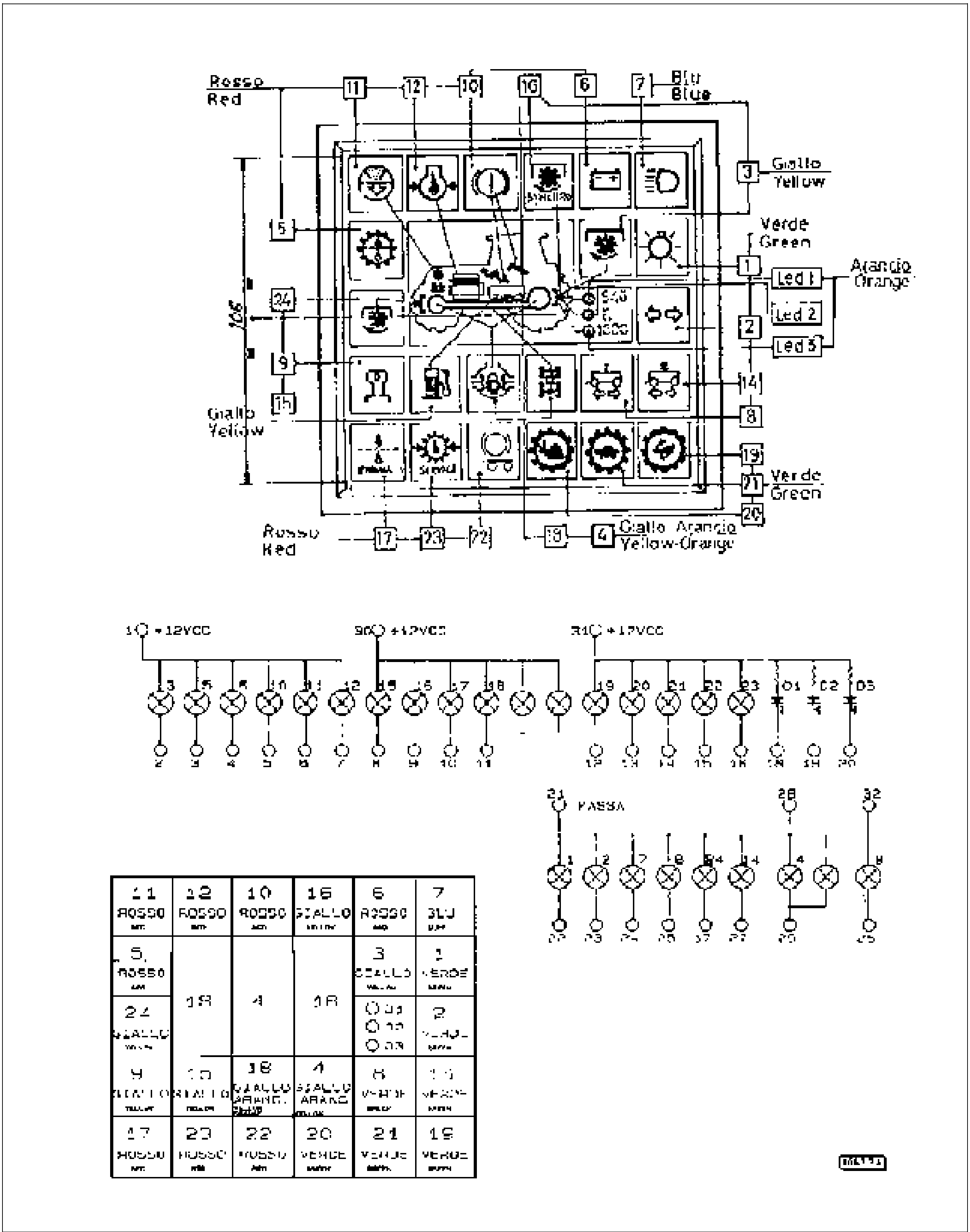
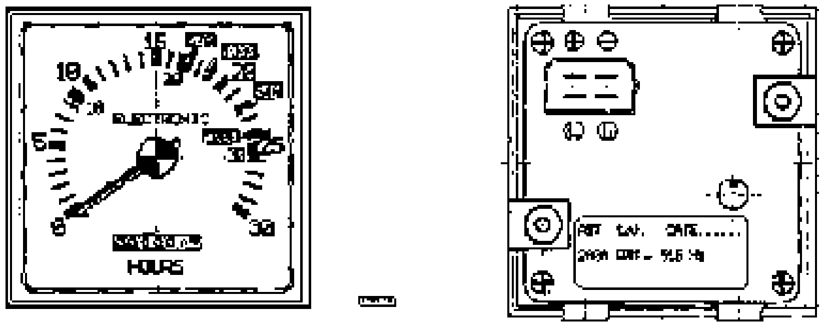


Fig. 3 - Check panel incorporated into instrument area, for machines with cab.

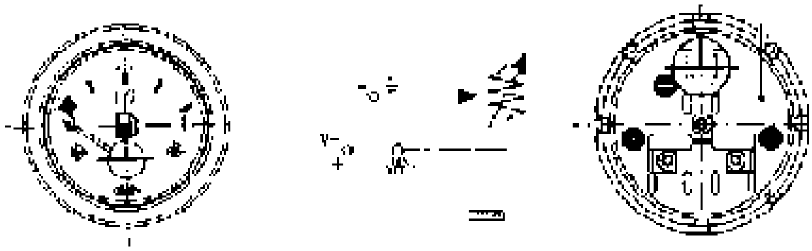
SPEEDOTACHODOMETER
(machines with cab)

30 km/h cod. 2.7049.840.0/10

40 km/h cod. 2.7049.850.0/10

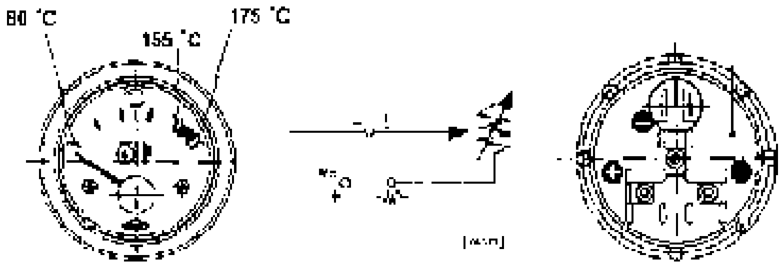


FUEL LEVEL PRESSURE GAUGE
(machines with cab)



ENGINE TEMPERATURE GAUGE

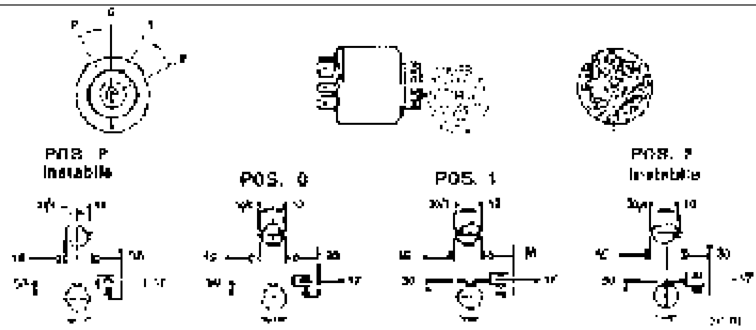
(machines with cab)



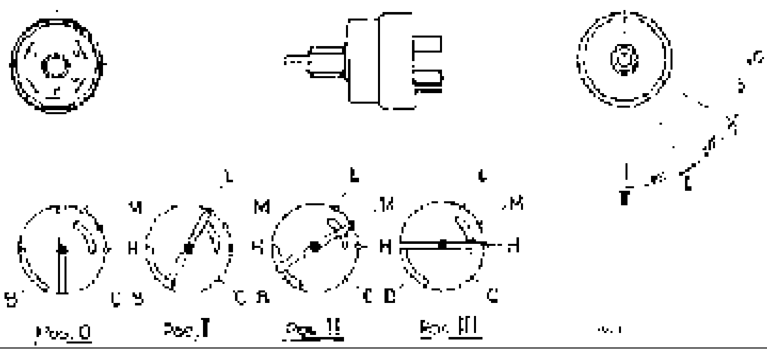
IGNITION KEY
machines with mechanical throttle linkage

p/n 2.7659.071.0/30

machines with electronic rpm
p/n 2.7659.127.0



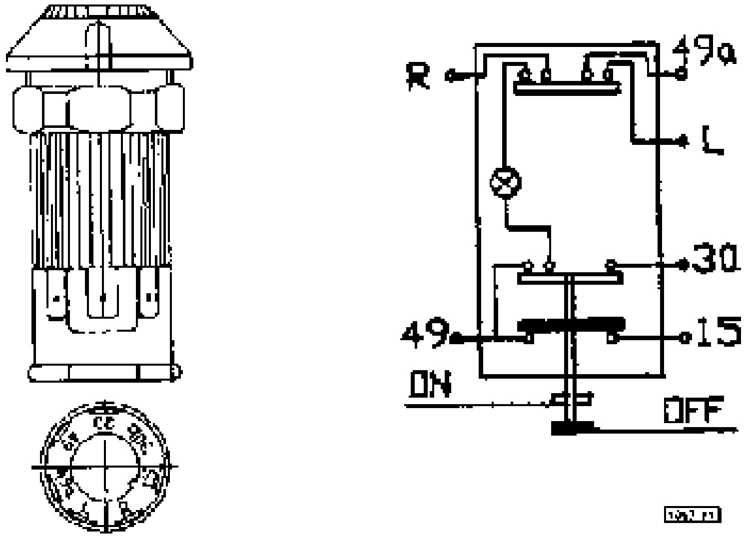
VENTILATION CONTROL
machines with cab



PUSH BUTTON CONTROL

p/n 2.7659.110.0

HAZARD WARNING LIGHTS



PUSH BUTTON CONTROL

p/n 2.7659.118.0

PTO CLUTCH

DIFFERENTIAL LOCK

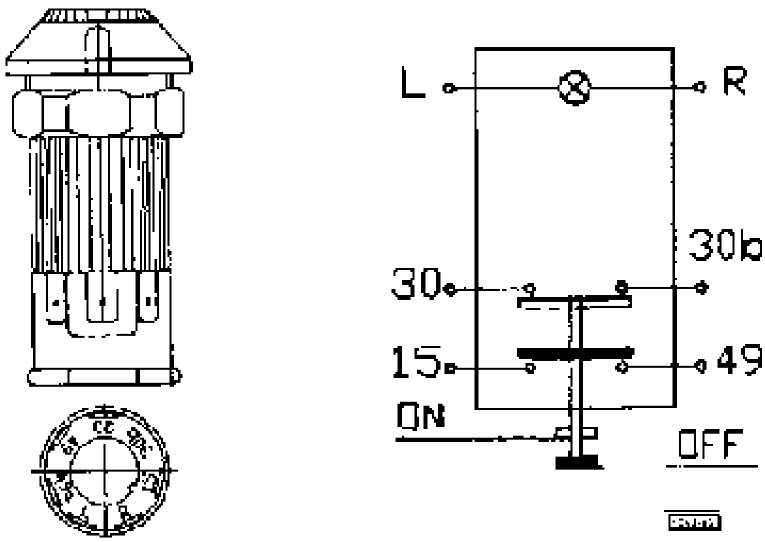
4WD COUPLER

SBA SYSTEM

FRONT WORK LIGHTS

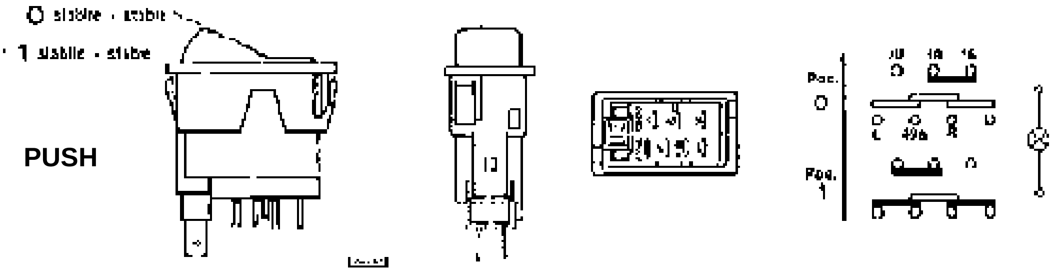
REAR WORK LIGHTS

BEACON



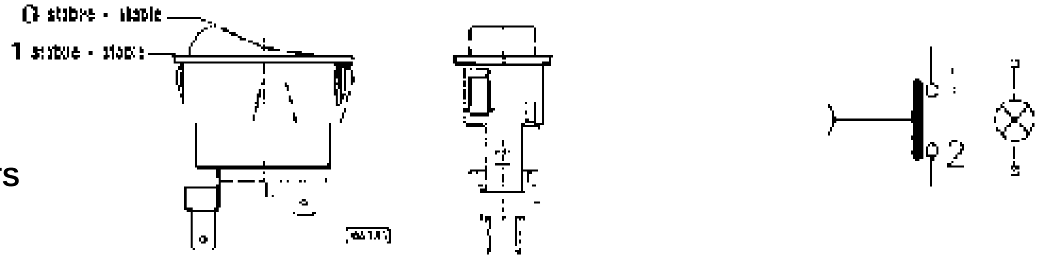
HAZARD WARNING PUSH BUTTON

p/n 2.7659.080.0



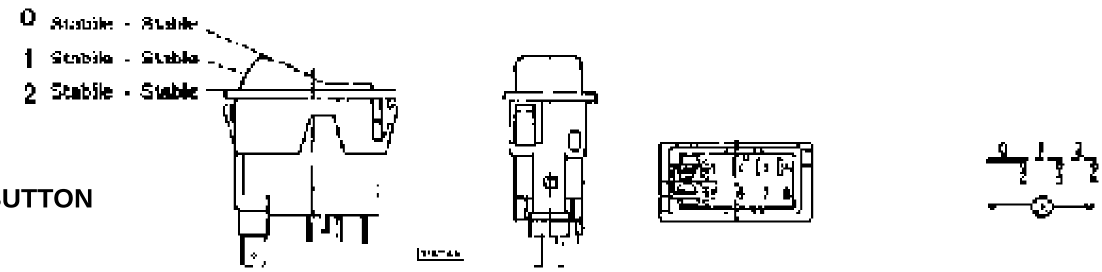
FRONT WORK LIGHTS
(SIDE)

p/n 2.7659.132.0



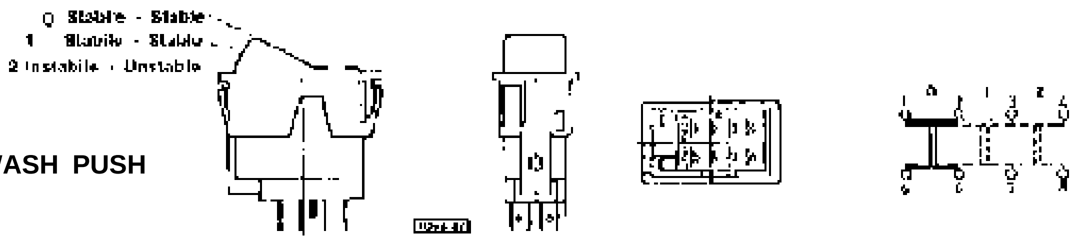
HEATER PUSH BUTTON
(2-SPEED)

p/n 2.7659.075.0



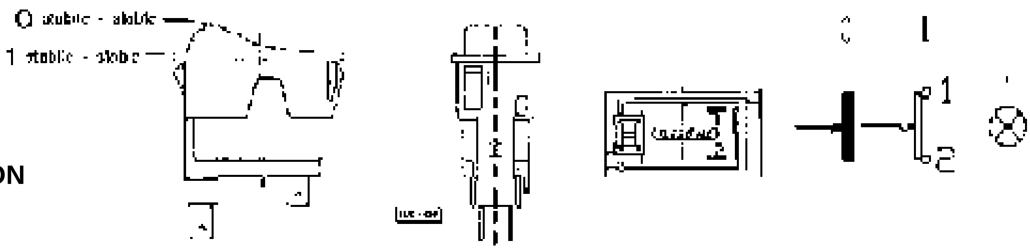
SCREEN WIPER-WASH PUSH BUTTON

p/n 2.7659.072.0



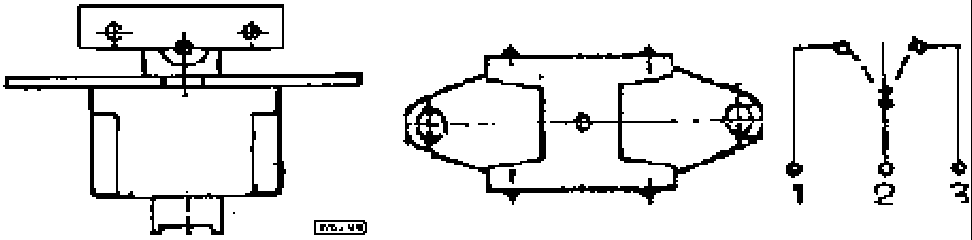
BEACON PUSH BUTTON

p/n 2.7659.126.0



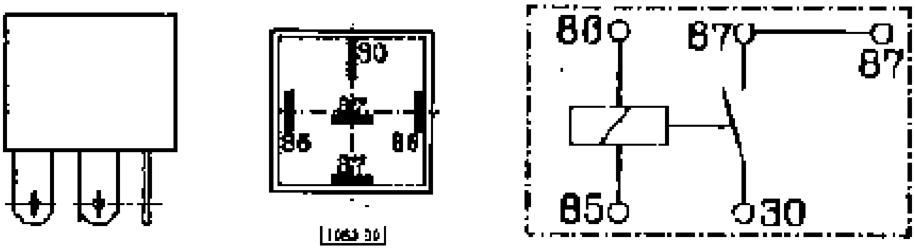
AGROSHIFT BUTTON

p/n 2.7659.085.0



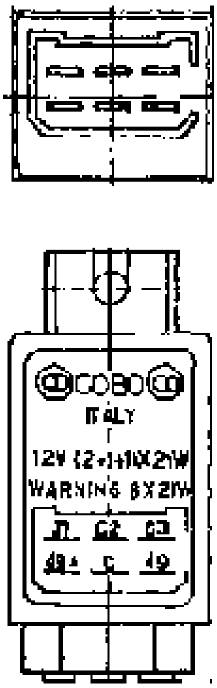
RELAY

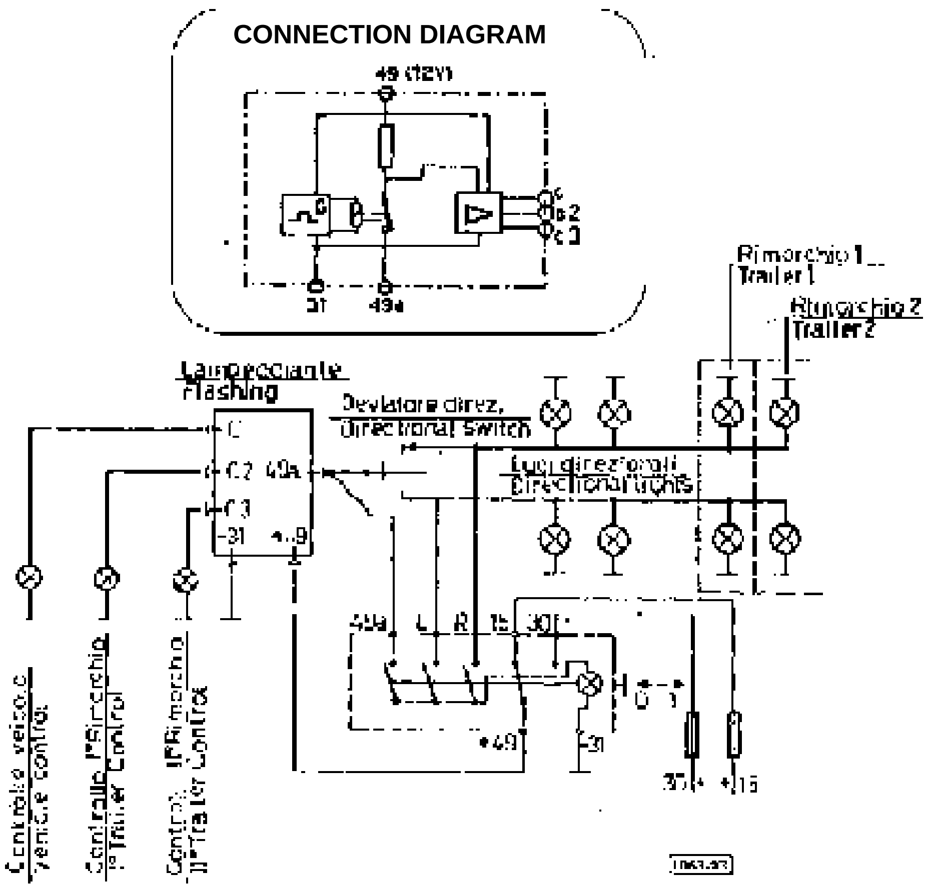
p/n 2.7659.107.0



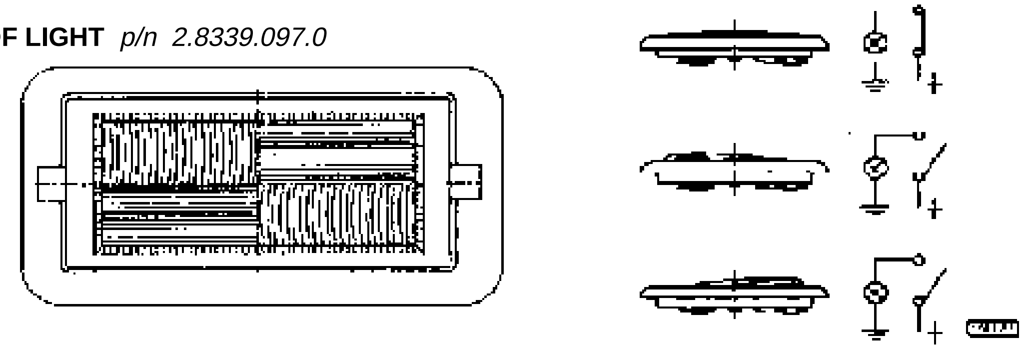
ELECTRONIC FLASHER UNIT

p/n 2.8639.004.0

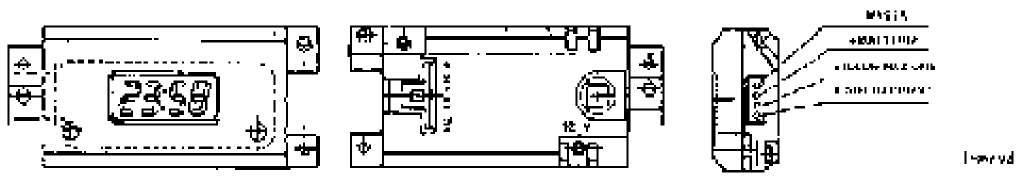




INTERIOR ROOF LIGHT *p/n 2.8339.097.0*



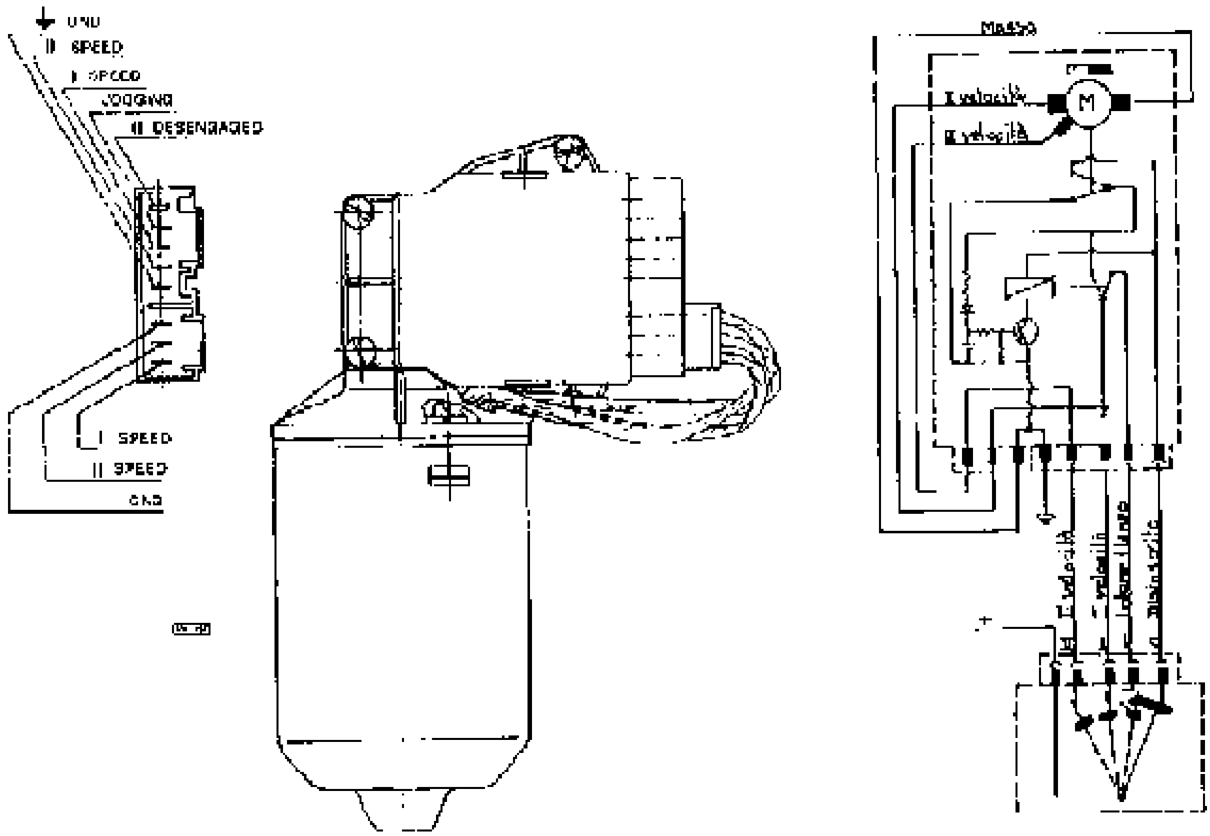
DIGITAL CLOCK *p/n 2.9389.002.0*



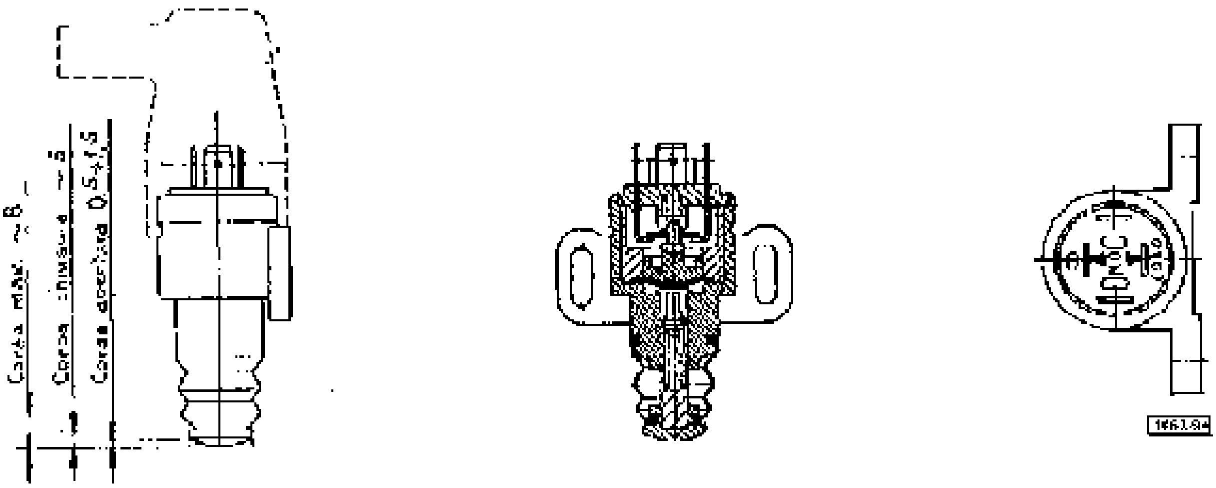
SCREEN WIPER MOTOR

p/n 2.9019.070.0 - front

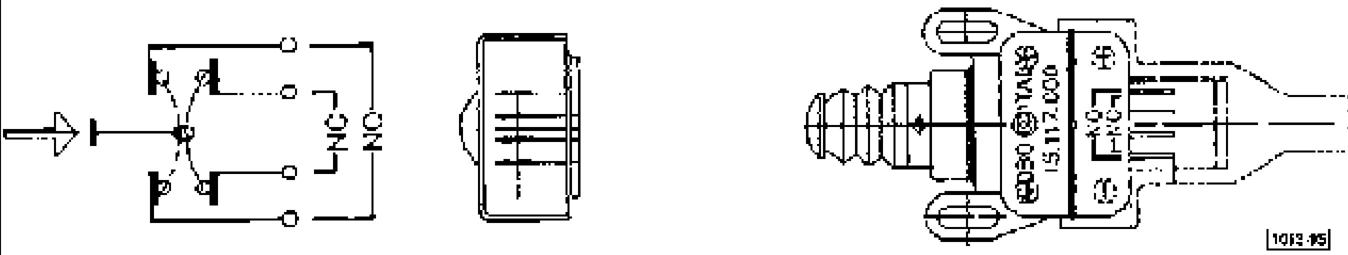
p/n 9241.557.4/10 - rear



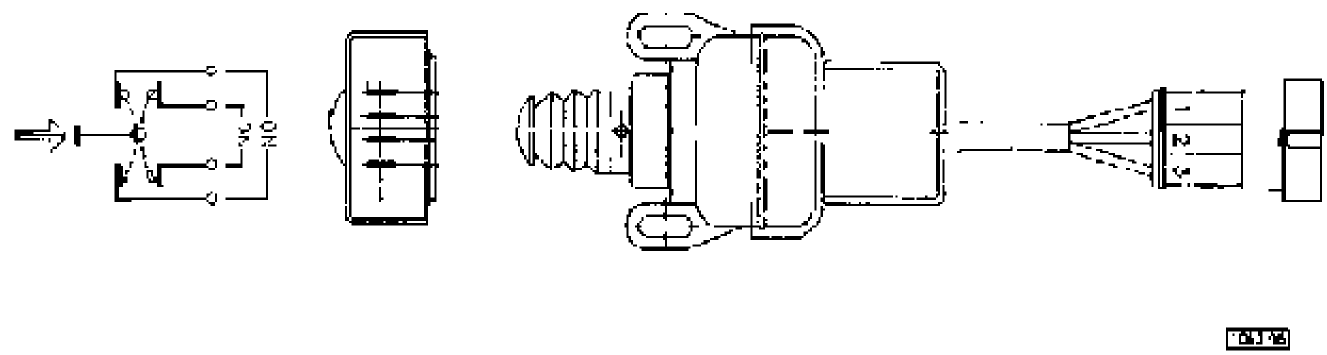
BRAKE SWITCHES FOR MACHINES WITH SBA *p/n 2.7649.100.0*



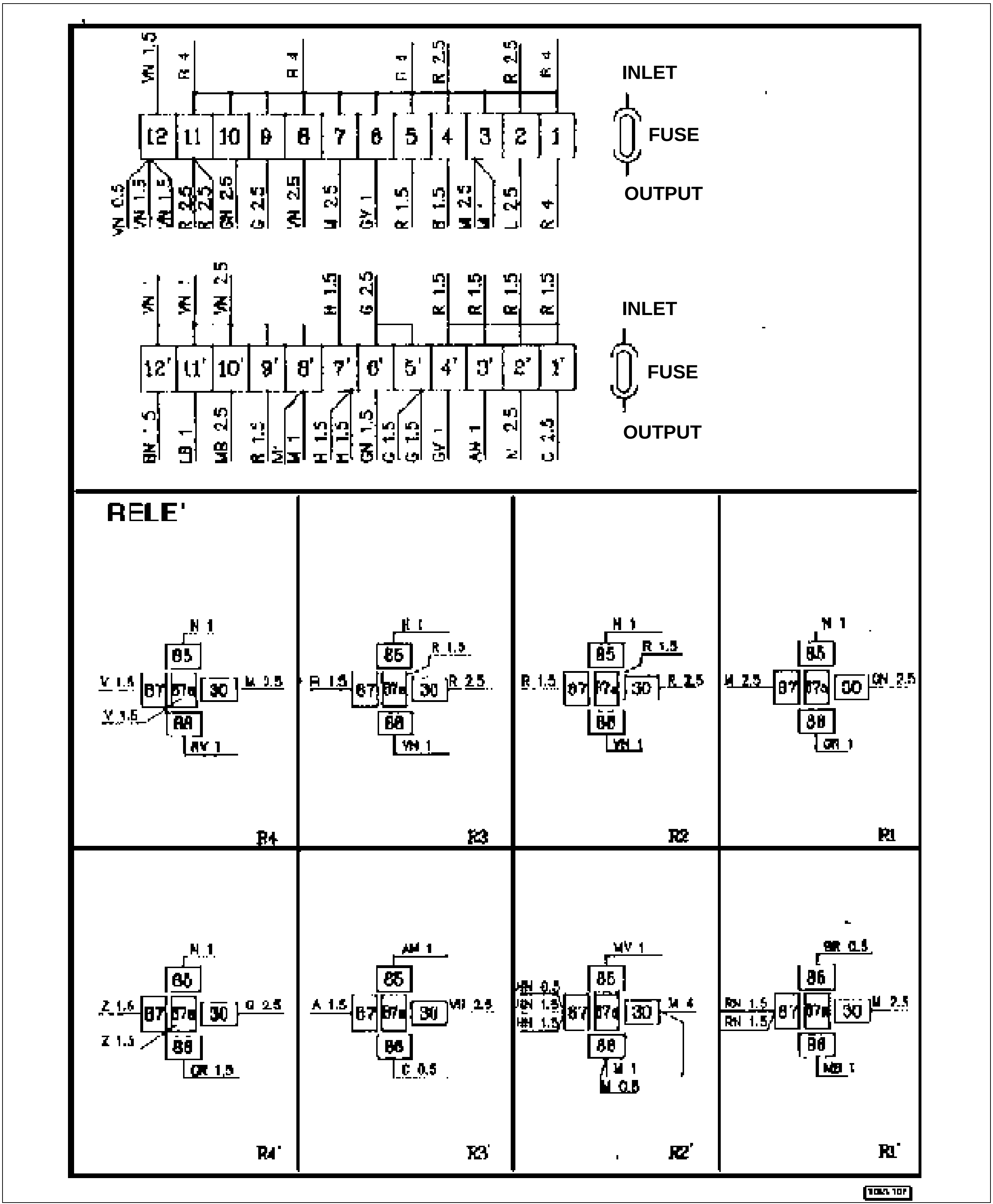
SWITCH CONTROLLING: differential lock - P.T.O. clutch - 540 1000 rpm/min P.T.O. speed selector - Economy P.T.O. - Live P.t.o. - electric starter system.
p/n 2.7659.097.0



4WD ENGAGEMENT INDICATOR SWITCH *p/n 2.7659.096.0/10*

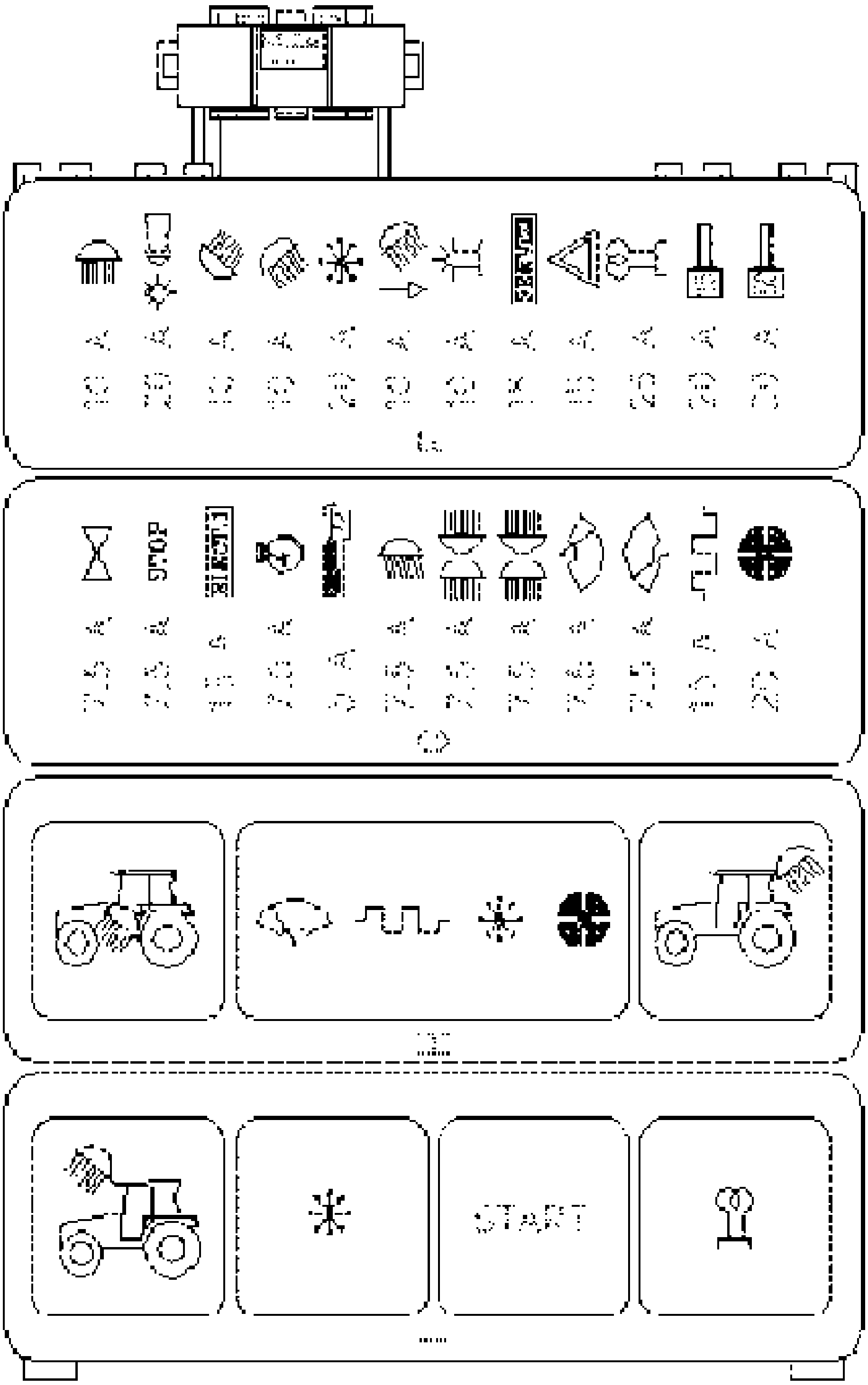


Colours of wires connected to fuse box

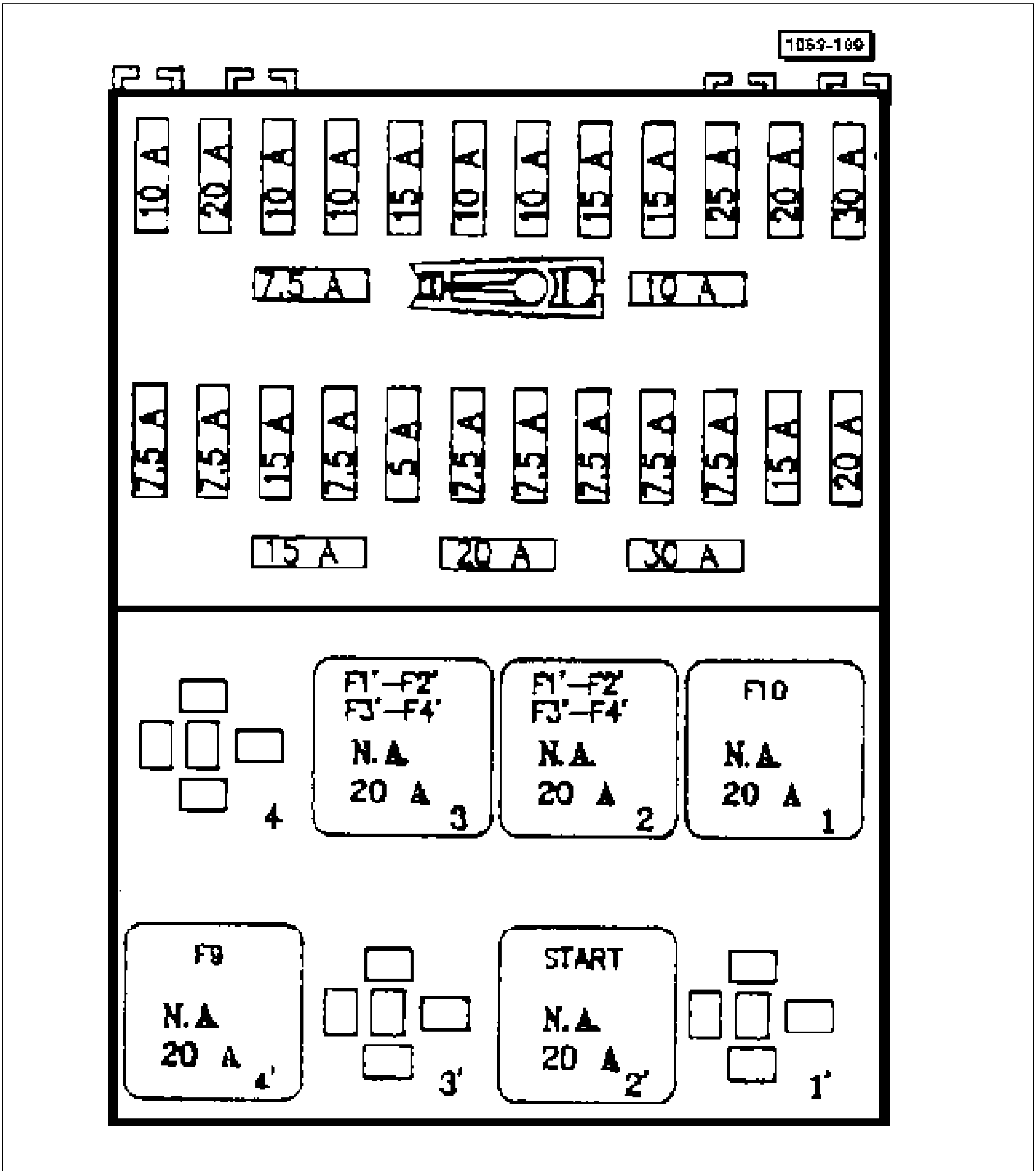


M - brown	**Z** - violet	**S** - pink	**C** - orange	**B** - white yelL	**G** - yellow
V - green	**N** - black	**R** - red	**A** - light blue	**L** - dark blue	**H** - grey

Fuse box

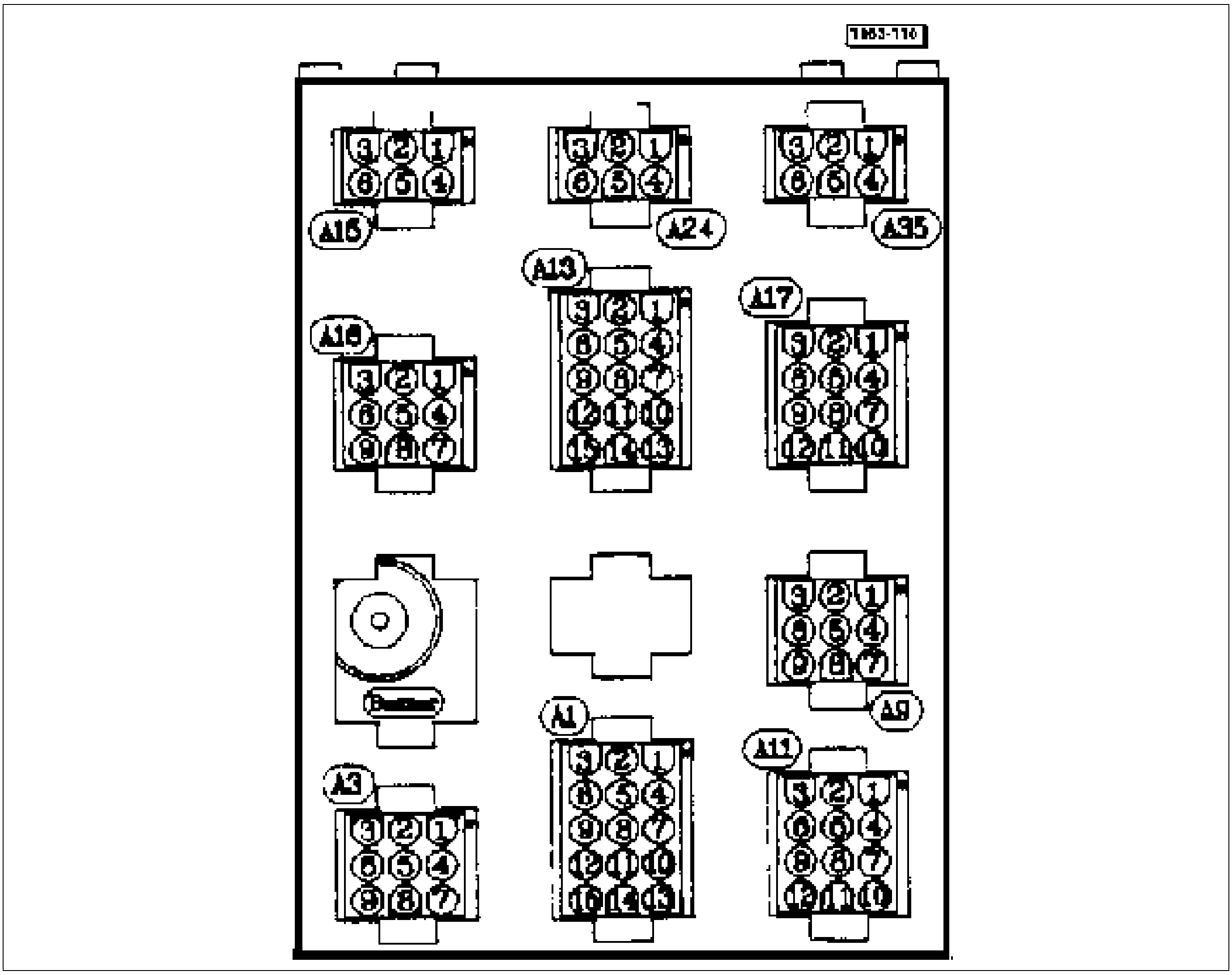


Arrangement of relays and fuses in terminal strip



1 Relay - rear work lights
1' Relay - thermostart
2 Relay - cab ventilation
2' Relay - starter motor
3 Relay - screen wiper and cab heater
3' Relay - air conditioning system
4 Relay - front side work lights
4' Relay - front roof work lights

Connectors plugged into fuse box (see also page 417)

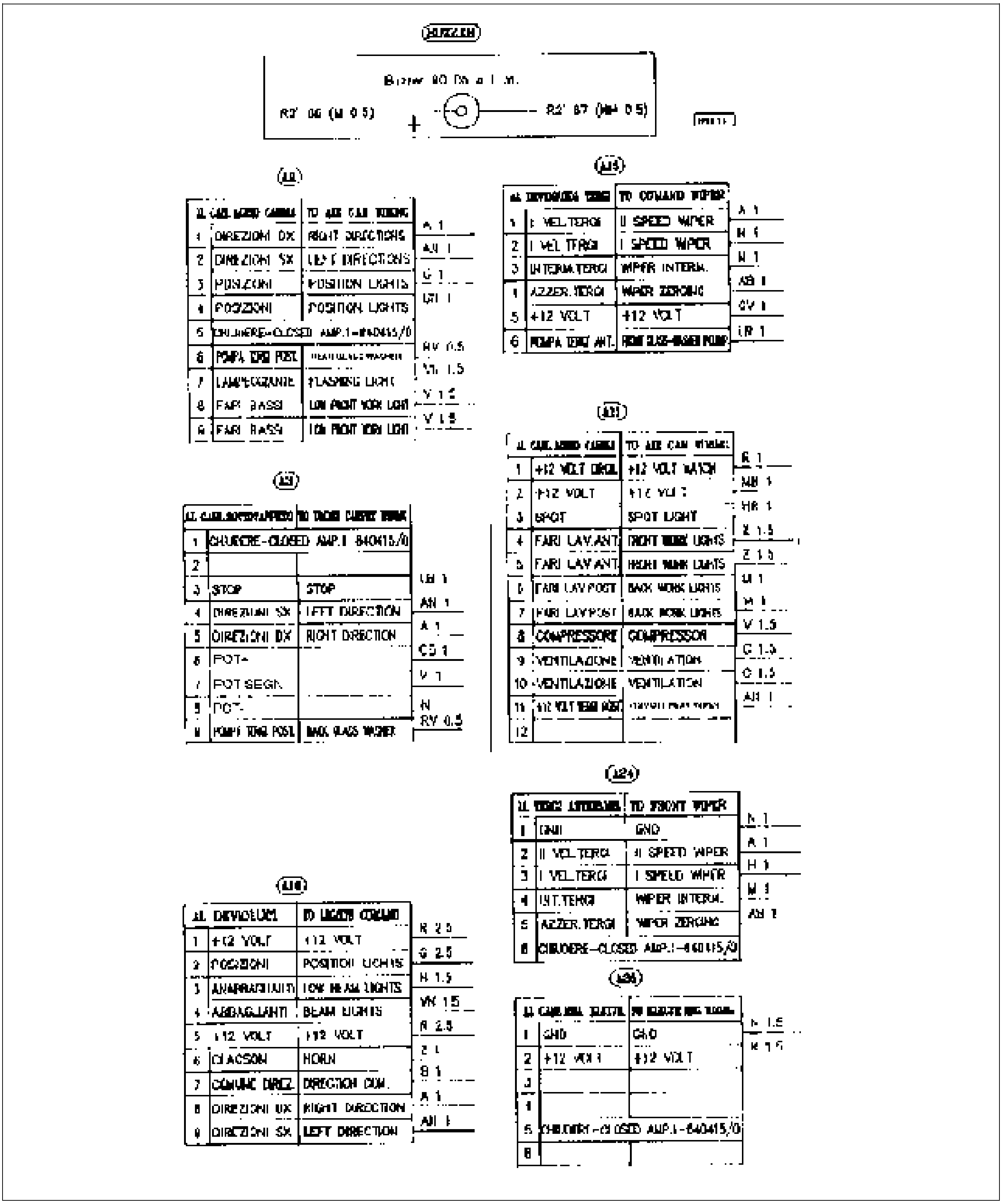


A 13		
TO CHECK PANEL		
1	POSITION LIGHTS	GN 0.5
2	LOW BEAM LIGHTS	VN0.5
3	+12 VOLT	MB1
4	RESERVE LIGHT	HN1
5	D+ GENERATOR	L1 L1
6	OIL ENGINE PRESSURE	M1 M1
7	II TRAILER LIGHT	Z1
8	DIRECTIONS	RN 0.5
9	I TRAILER LIGHT	AR0.5
10	GND	N1
11	AIR FILTER OBSTRUC.	B1
12	COLD START LIGHT	S1
13	4 WHEEL DRIVE	AR1
14	FRONT SIDE PTO	MN1
15	+12 VOLT	MB1

A 1		
TO UNDERMAT WIRING		
1	POSITION LIGHTS	G1.5
2	POSITION LIGHTS	GN1
3	+12 VOLT	R1
4	HAND BRAKE	NZ1
5	FRONT GLASS WASHER	LR1
6	+12 VOLT	MB1.5
7	+FRONT PTO	MN1/MN1
8	REAR PTO	MV1
9	4WD LIGHT	AR1
10	FUEL LEVEL	C05
11	FUEL LIGHT	HN1
12	"W"	BR1
13	+12 VOLT	M1
14	+12 VOLT	M1
15	CLOSED	

A 17		
TO INSTRUMENTS WIRING		
1	POSITION LIGHTS	GN 0.5
2	FUEL LEVEL INDICATOR	C 0.5
3	+12 V FLASHING LIGHT	VG1.5
4	BACK WORK LIGHTS	RG 1
5	FRONT WORK LIGHTS	GR 1.5
6	SPOT LIGHT	HR 1
7	+12 VOLT	MB 1
8	GND	N 0.5
9	LOW FRONT WORK LIGHTS	RV 1
10	"W"	BR1
11	TEMPERATURE IND.	R1 R1
12	OUT FLASHING LIGHT	VG1.5

Wires connected to fuse box (see also page 416)



ELECTRICAL WIRING

CAB WIRING

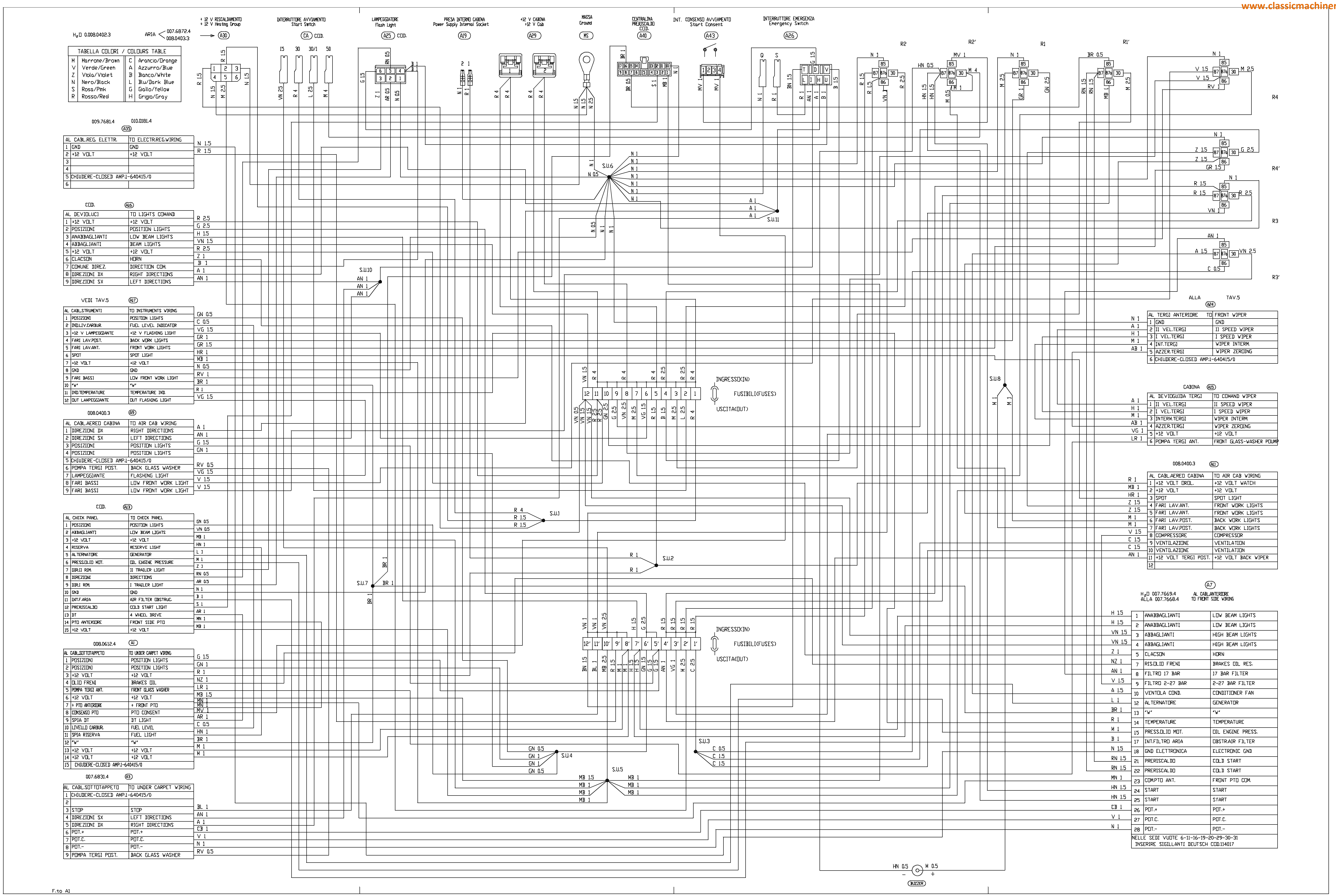
CENTRAL WIRING	**008.0610.4/40**
UNDERMAT WIRING (H-M-L shift + electronic lift + multifunction control)	**007.6831.4/30**
UNDERMAT WIRING(electrohydraulic controls + H-M-L shift)	**008.0612.4/40**
OVERHEAD WIRING	**008.0400.3/10**
ELECTRIC HEATER WIRING	**008.0403.3/20**
COLD CLIMATE ELECTRIC HEATER WIRING	**007.6872.4/10**
SBA SYSTEM SELECTOR SWITCH WIRING	**007.6830.3/10**
ELECTRONIC LIFT SYSTEM WIRING	**009.7712.4/40**
ELECTRONIC RPM CONTROL WIRING	**009.7681.4/20**
ELECTRONIC RPM CONTROL WIRING (with multifunction control)	**010.0181.4/10**
H-M-L SHIFT CONTROL UNIT WIRING	**007.6844.3**
ELECTRONIC RPM CONTROL WIRING (with speed limiter)	**0100404.4**
ELECTRONIC RPM CONTROL WIRING (with speed limiter and multifunction control)	**010.0405.4**

PLATFORM WIRING

CENTRAL WIRING	**009.6885.4/20**
UNDERMAT WIRING (with mechanical controls)	**009.6886.4/20**
UNDERMAT WIRING (electrohydraulic controls + H-M-L SHIFT)	**007.6829.4/20**
REAR WORK LIGHTS AND FLASHER UNIT WIRING	**009.6934.3/10**
FRONT WORK LIGHTS WIRING	**009.6887.3**

CHASSIS WIRING

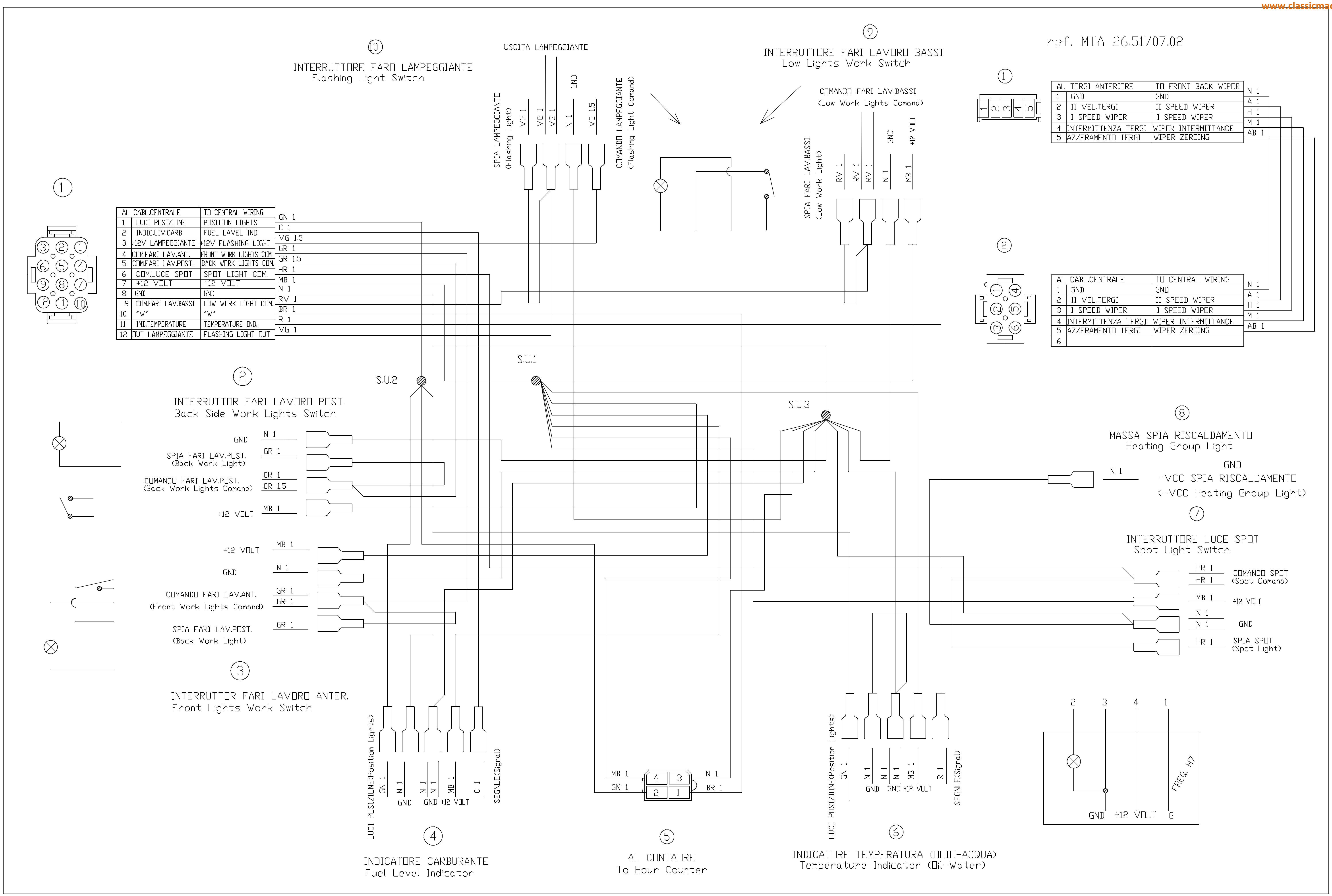
BATTERY LEADS (6 cylinders)	**009.7072.3**
BATTERY LEADS (4 cylinders)	**009.7071.3**
UNDERSTEP BATTERY LEADS	**007.6848.3**
65 A FRONT END WIRING	**008.0611.4/40**
85 A FRONT END WIRING	**007.7668.4**
REAR END WIRING (electrohydraulic controls)	**008.0613.4/40**
REAR END WIRING (mechanical controls)	**008.0379.4/40**
STEERING ANGLE SENSOR WIRING	**007.6847.3/20**
DRAFT CONTROL SENSOR WIRING	**009.3937.3**
ELECTRIC HEATER WIRING	**008.0404.3**
HIGH POWER ELECTRIC HEATER WIRING	**007.6873.3**
H-M-L SHIFT LEVER WIRING	**008.0395.3**

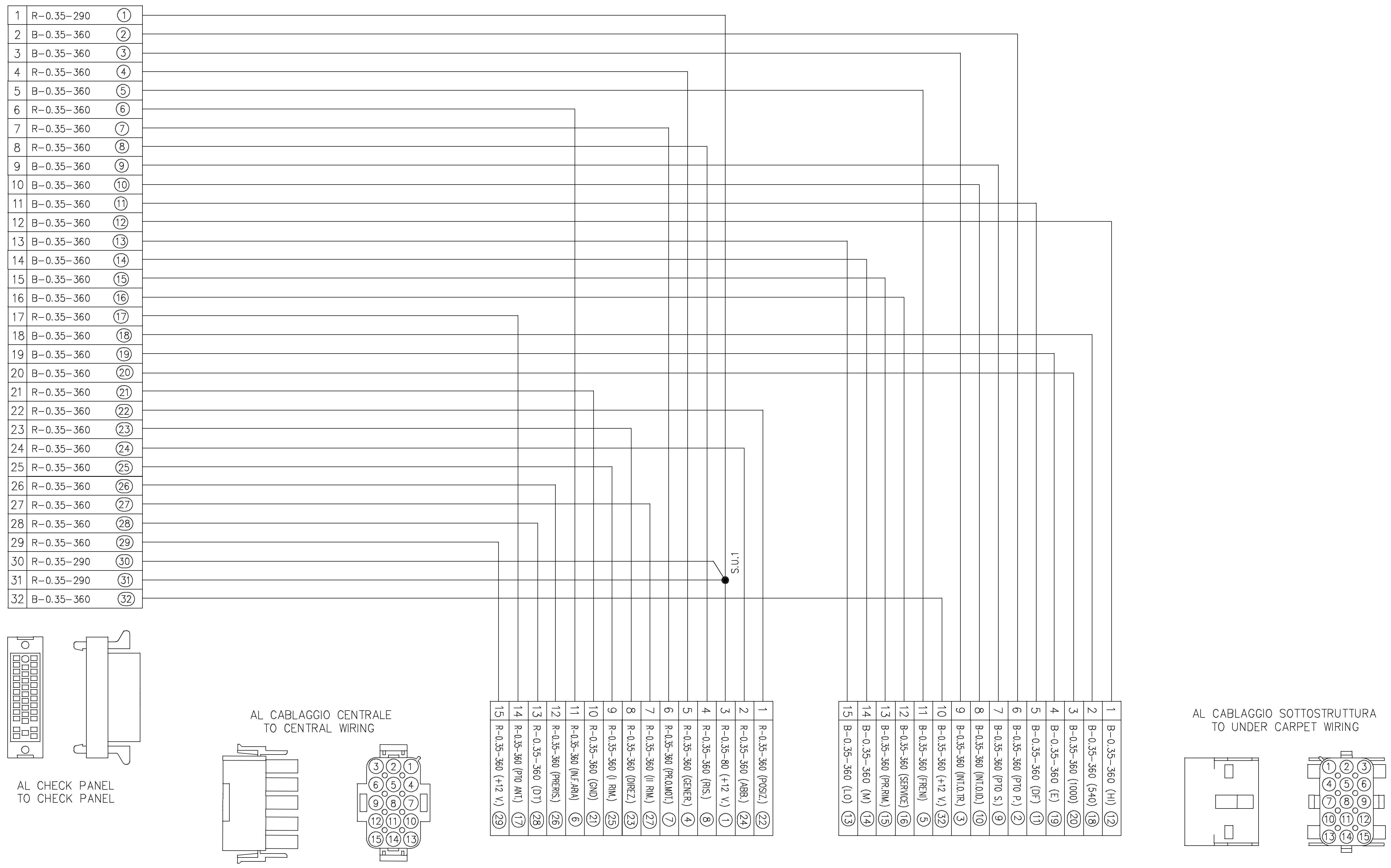


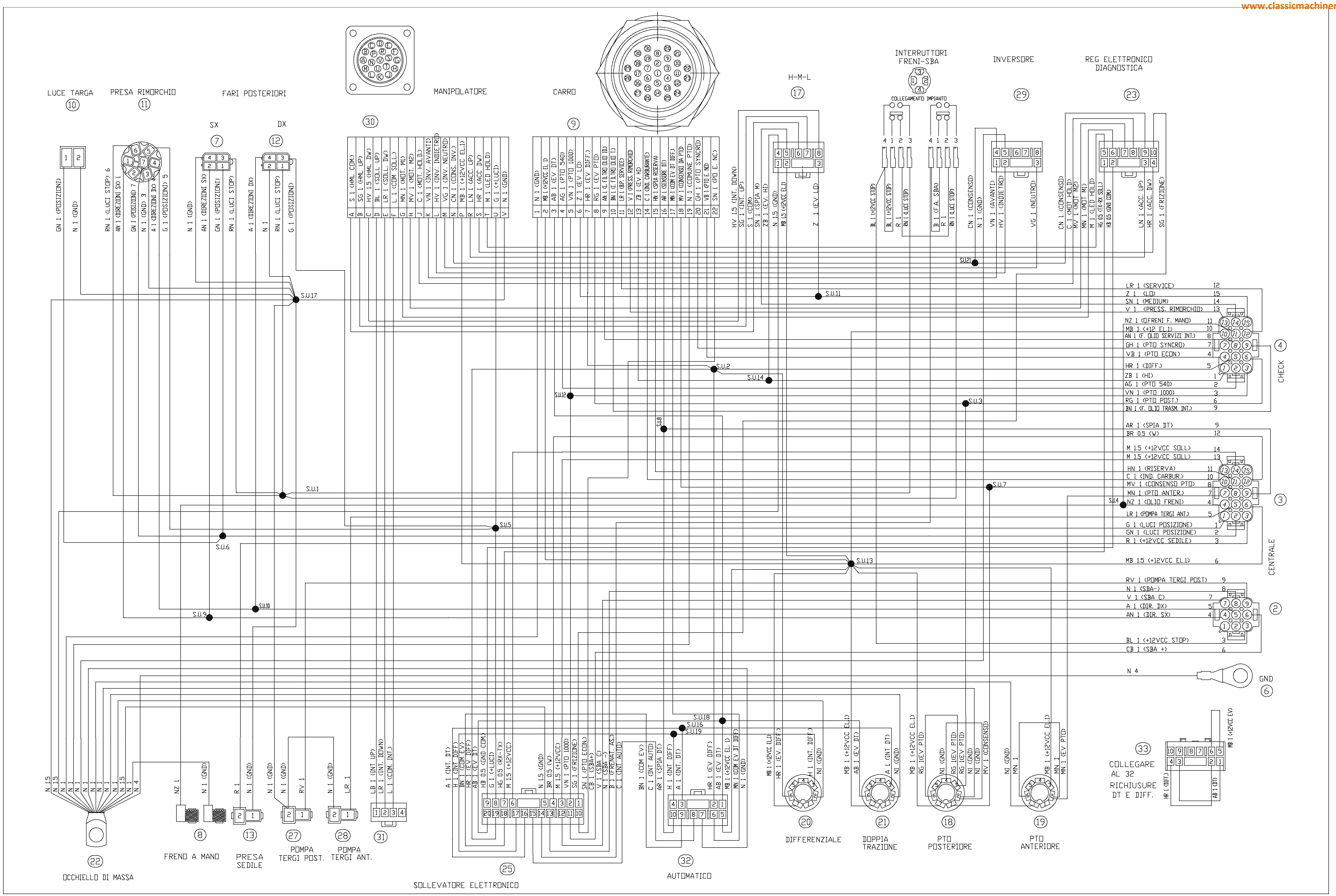
CAB WIRING

SHEET 1 - CENTRAL WIRING

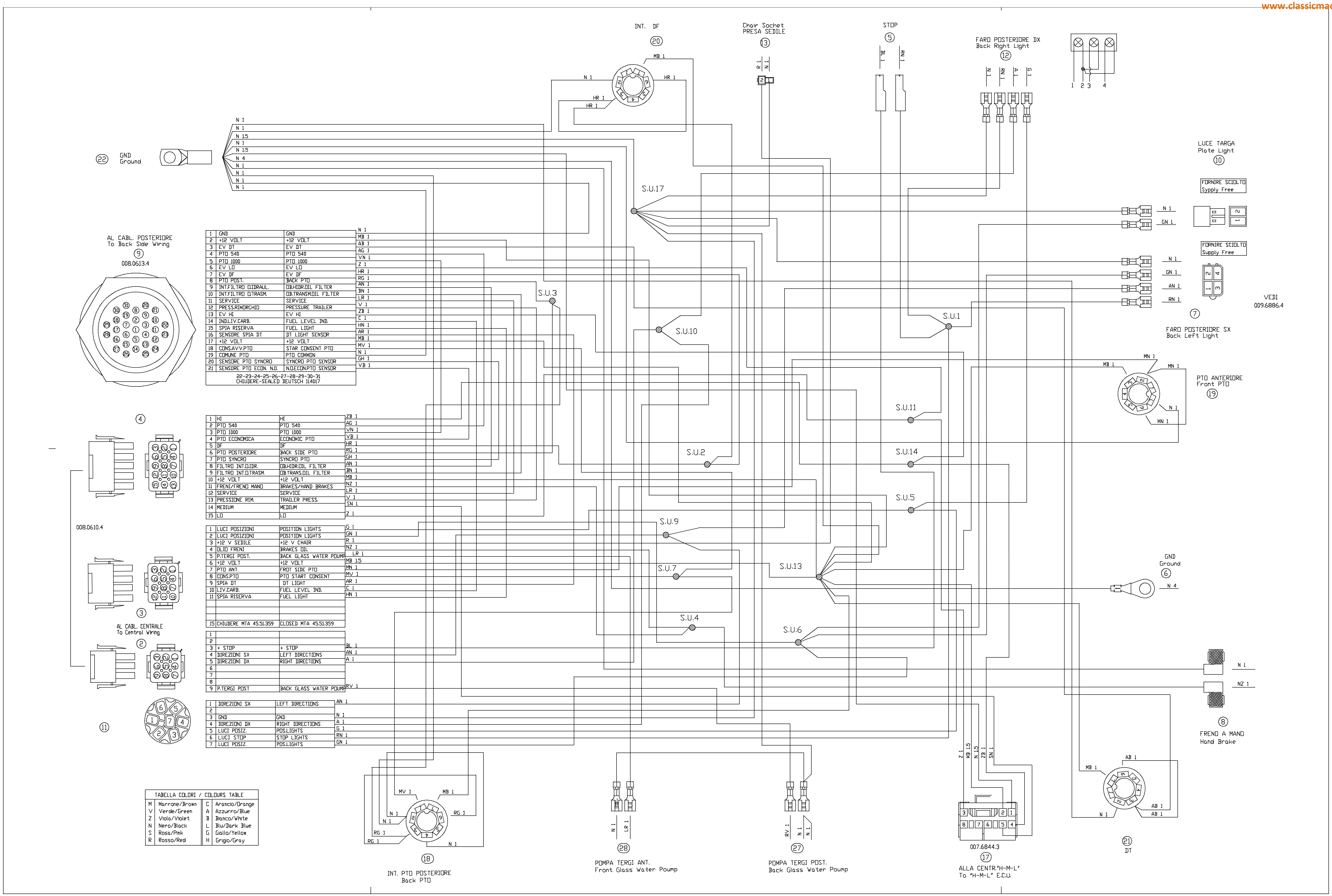
008.0610.4/40


ref. MTA 26.51707.02
1
AL CABL.CENTRALE | TO CENTRAL WIRING
1 LUCI POSIZIONE | POSITION LIGHTS | GN 1
2 INDIC.LIV.CARB | FUEL LAVEL IND. | C 1
3 +12V LAMPEGGIANTE | +12V FLASHING LIGHT | VG 1.5
4 COM.FARI LAV.ANT. | FRONT WORK LIGHTS COM. | GR 1
5 COM.FARI LAV.POST. | BACK WORK LIGHTS COM. | GR 1.5
6 COM.LUCE SPOT | SPOT LIGHT COM. | HR 1
7 +12 VOLT | +12 VOLT | MB 1
8 GND | GND | N 1
9 COM.FARI LAV.BASSI | LOW WORK LIGHT COM. | RV 1
10 "W" | "W" | BR 1
11 IND.TEMPERATURE | TEMPERATURE IND. | R 1
12 OUT LAMPEGGIANTE | FLASHING LIGHT OUT | VG 1
10
INTERRUTTORE FARO LAMPEGGIANTE
Flashing Light Switch
USCITA LAMPEGGIANTE
SPIA LAMPEGGIANTE (Flashing Light)
VG 1
VG 1
VG 1
N 1
GND
VG 1.5
COMANDO LAMPEGGIANTE (Flashing Light Comand)
9
INTERRUTTORE FARI LAVORO BASSI
Low Lights Work Switch
COMANDO FARI LAV.BASSI
(Low Work Lights Comand)
SPIA FARI LAV.BASSI (Low Work Light)
RV 1
RV 1
RV 1
N 1
GND
MB 1
+12 VOLT
1
AL TERGI ANTERIORE | TO FRONT BACK WIPER
1 GND | GND | N 1
2 II VEL.TERGI | II SPEED WIPER | A 1
3 I SPEED WIPER | I SPEED WIPER | H 1
4 INTERMITTENZA TERGI | WIPER INTERMITTANCE | M 1
5 AZZERAMENTO TERGI | WIPER ZEROING | AB 1
2
AL CABL.CENTRALE | TO CENTRAL WIRING
1 GND | GND | N 1
2 II VEL.TERGI | II SPEED WIPER | A 1
3 I SPEED WIPER | I SPEED WIPER | H 1
4 INTERMITTENZA TERGI | WIPER INTERMITTANCE | M 1
5 AZZERAMENTO TERGI | WIPER ZEROING | AB 1
6
S.U.1
S.U.2
S.U.3
2
INTERRUTTOR FARI LAVORO POST.
Back Side Work Lights Switch
GND N 1
SPIA FARI LAV.POST. (Back Work Light) GR 1
COMANDO FARI LAV.POST. (Back Work Lights Comand) GR 1 GR 1.5
+12 VOLT MB 1
+12 VOLT MB 1
GND N 1
COMANDO FARI LAV.ANT. (Front Work Lights Comand) GR 1 GR 1
SPIA FARI LAV.POST. (Back Work Light) GR 1
3
INTERRUTTOR FARI LAVORO ANTER.
Front Lights Work Switch
8
MASSA SPIA RISCALDAMENTO
Heating Group Light
N 1
GND
-VCC SPIA RISCALDAMENTO
(-VCC Heating Group Light)
7
INTERRUTTORE LUCE SPOT
Spot Light Switch
HR 1 HR 1 COMANDO SPOT (Spot Comand)
MB 1 +12 VOLT
N 1 N 1 GND
HR 1 SPIA SPOT (Spot Light)
LUCI POSIZIONE (Position Lights) GN 1
N 1 GND
N 1 N 1 GND
MB 1 +12 VOLT
C 1
SEGNLE (Signal)
4
INDICATORE CARBURANTE
Fuel Level Indicator
MB 1
GN 1
4 3
2 1
N 1
BR 1
5
AL CONTAORE
To Hour Counter
LUCI POSIZIONE (Position Lights) GN 1
N 1 GND
N 1 N 1 GND
MB 1 +12 VOLT
R 1
SEGNLE (Signal)
6
INDICATORE TEMPERATURA (OLIO-ACQUA)
Temperature Indicator (Oil-Water)
2 3 4 1
FREQ. H7
GND +12 VOLT G

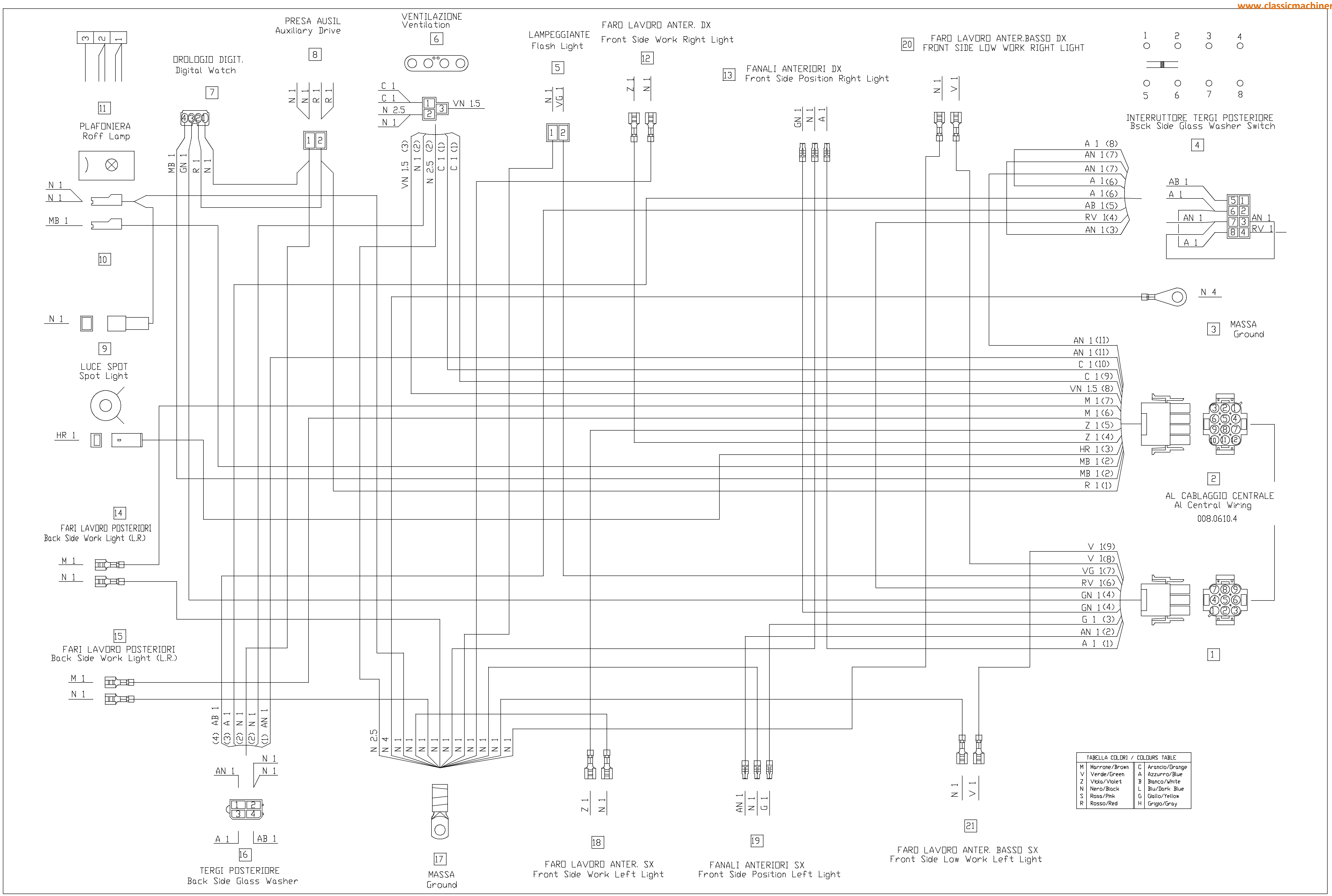

1 R-0.35-290 1
2 B-0.35-360 2
3 B-0.35-360 3
4 R-0.35-360 4
5 B-0.35-360 5
6 R-0.35-360 6
7 R-0.35-360 7
8 R-0.35-360 8
9 B-0.35-360 9
10 B-0.35-360 10
11 B-0.35-360 11
12 B-0.35-360 12
13 B-0.35-360 13
14 B-0.35-360 14
15 B-0.35-360 15
16 B-0.35-360 16
17 R-0.35-360 17
18 B-0.35-360 18
19 B-0.35-360 19
20 B-0.35-360 20
21 R-0.35-360 21
22 R-0.35-360 22
23 R-0.35-360 23
24 R-0.35-360 24
25 R-0.35-360 25
26 R-0.35-360 26
27 R-0.35-360 27
28 R-0.35-360 28
29 R-0.35-360 29
30 R-0.35-290 30
31 R-0.35-290 31
32 B-0.35-360 32
S.U.1
AL CHECK PANEL
TO CHECK PANEL
AL CABLAGGIO CENTRALE
TO CENTRAL WIRING
15 R-0.35-360 (+12 V.) 29
14 R-0.35-360 (PTO ANT.) 17
13 R-0.35-360 (DT) 28
12 R-0.35-360 (PRERIS.) 26
11 R-0.35-360 (INF.ARIA) 6
10 R-0.35-360 (GND) 21
9 R-0.35-360 (I RIM.) 25
8 R-0.35-360 (DIREZ.) 23
7 R-0.35-360 (II RIM.) 27
6 R-0.35-360 (PR.OMOT.) 7
5 R-0.35-360 (GENER.) 4
4 R-0.35-360 (RIS.) 8
3 R-0.35-80 (+12 V.) 1
2 R-0.35-360 (ABB.) 24
1 R-0.35-360 (POSIZ.) 22
15 B-0.35-360 (LO) 13
14 B-0.35-360 (M) 14
13 B-0.35-360 (PR.RIM.) 15
12 B-0.35-360 (SERVICE) 16
11 B-0.35-360 (FRENI) 5
10 B-0.35-360 (+12 V.) 32
9 B-0.35-360 (INT.D.TR.) 3
8 B-0.35-360 (INT.D.D.) 10
7 B-0.35-360 (PTO S.) 9
6 B-0.35-360 (PTO P.) 2
5 B-0.35-360 (DF) 11
4 B-0.35-360 (E) 19
3 B-0.35-360 (1000) 20
2 B-0.35-360 (540) 18
1 B-0.35-360 (H) 12
AL CABLAGGIO SOTTOSTRUTTURA
TO UNDER CARPET WIRING



CAB WIRING   SHEET 3 - UNDERMAT WIRING (H-M-L shift + electronic lift + multifunction control)   **007.6831.4/30**



CAB WIRING SHEET 4 - UNDERMAT WIRING (electrohydraulic controls + H-M-L shift) **008.0612.4/40**


PRESA AUSIL
Auxiliary Drive
VENTILAZIONE
Ventilation
LAMPEGGIANTE
Flash Light
FARO LAVORO ANTER. DX
Front Side Work Right Light
FARO LAVORO ANTER.BASSO DX
FRONT SIDE LOW WORK RIGHT LIGHT
OROLOGIO DIGIT.
Digital Watch
FANALI ANTERIORI DX
Front Side Position Right Light
PLAFONIERA
Roff Lamp
INTERRUTTORE TERGI POSTERIORE
Bsck Side Glass Washer Switch
MASSA
Ground
LUCE SPOT
Spot Light
AL CABLAGGIO CENTRALE
Al Central Wiring
008.0610.4
FARI LAVORO POSTERIORI
Back Side Work Light (L.R.)
FARI LAVORO POSTERIORI
Back Side Work Light (L.R.)
TERGI POSTERIORE
Back Side Glass Washer
MASSA
Ground
FARO LAVORO ANTER. SX
Front Side Work Left Light
FANALI ANTERIORI SX
Front Side Position Left Light
FARO LAVORO ANTER. BASSO SX
Front Side Low Work Left Light
TABELLA COLORI / COLOURS TABLE
M Marrone/Brown
V Verde/Green
Z Viola/Violet
N Nero/Black
S Rosa/Pink
R Rosso/Red
C Arancio/Orange
A Azzurro/Blue
B Bianco/White
L Blu/Dark Blue
G Giallo/Yellow
H Grigio/Gray

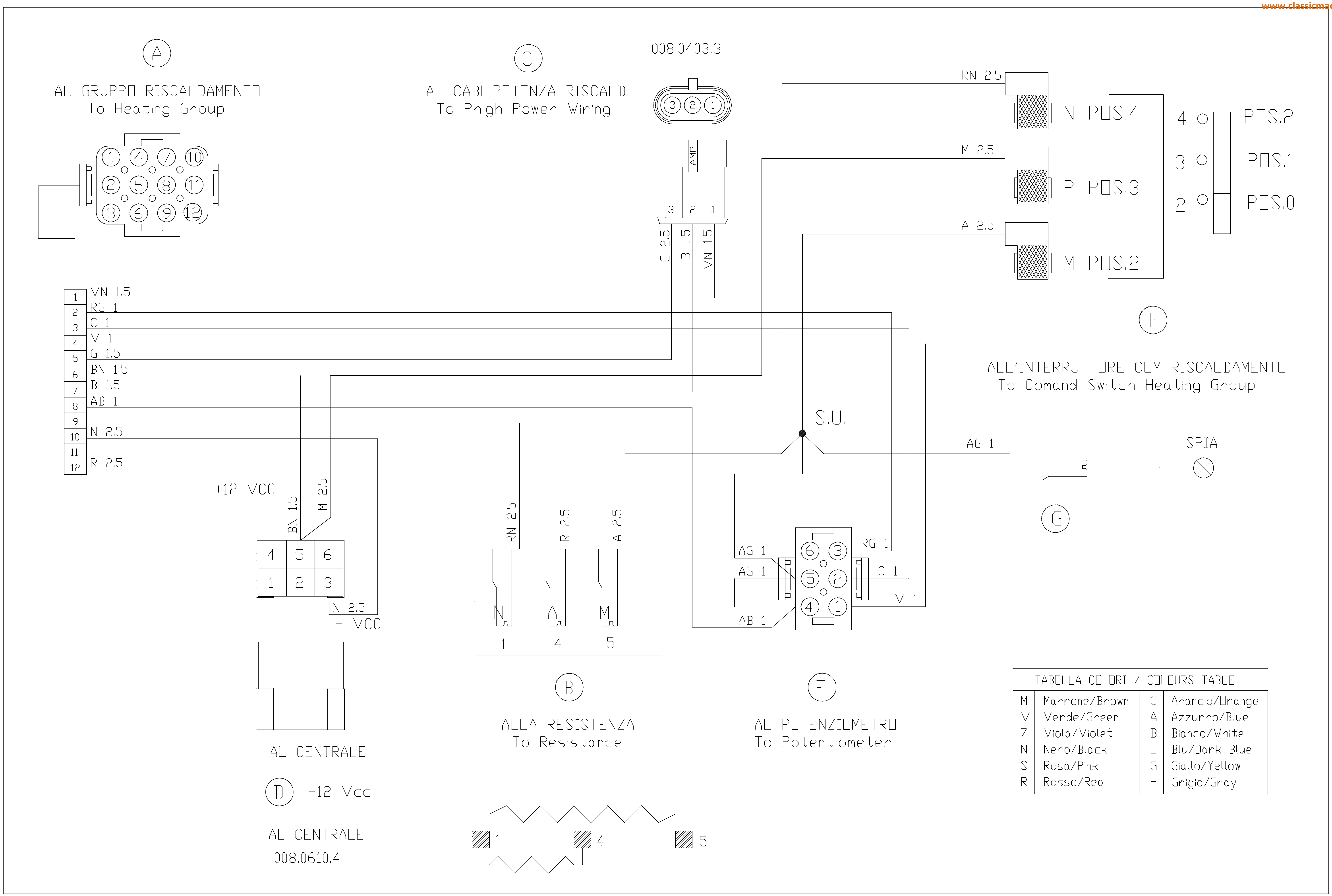


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

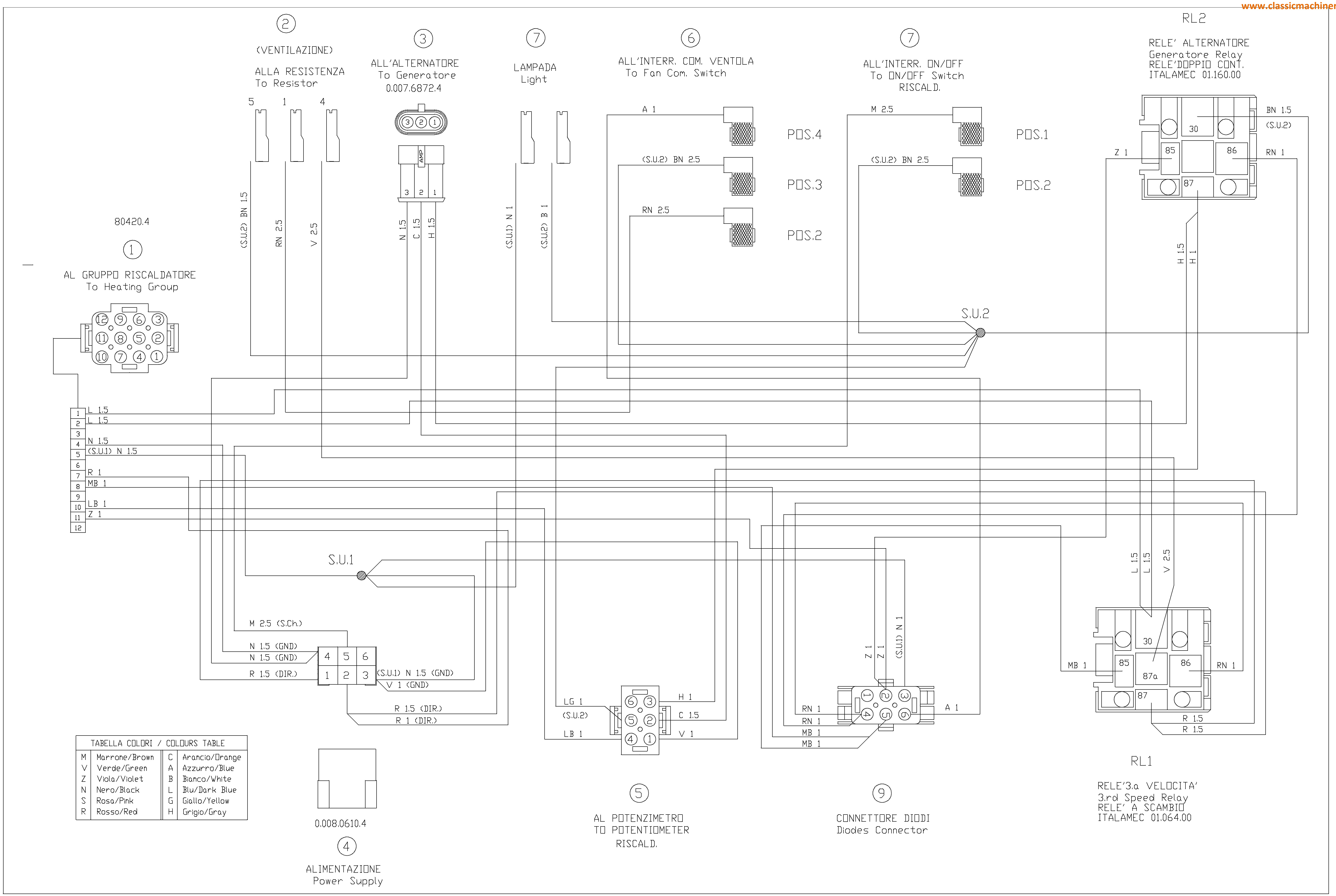


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

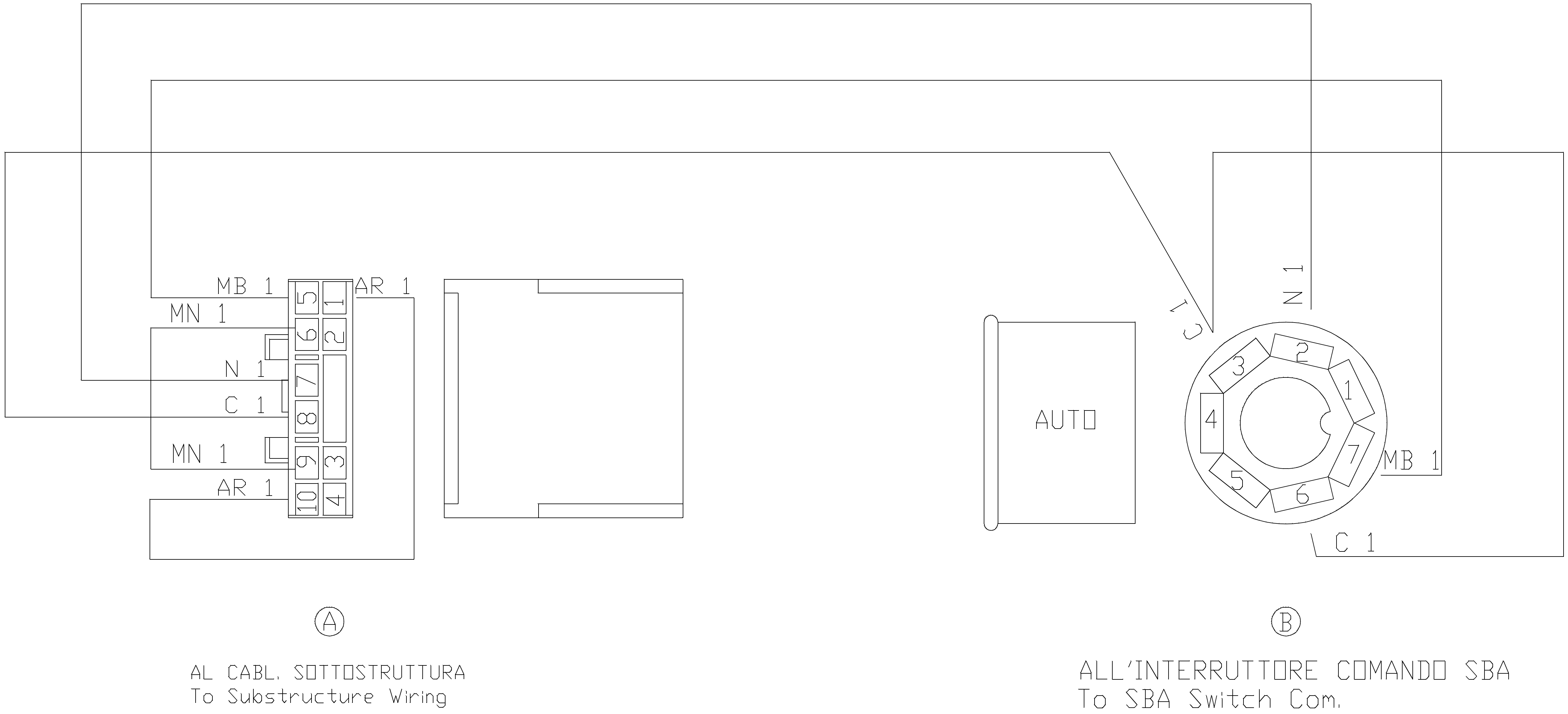


TABELLA COLORI / COLOURS TABLE

M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

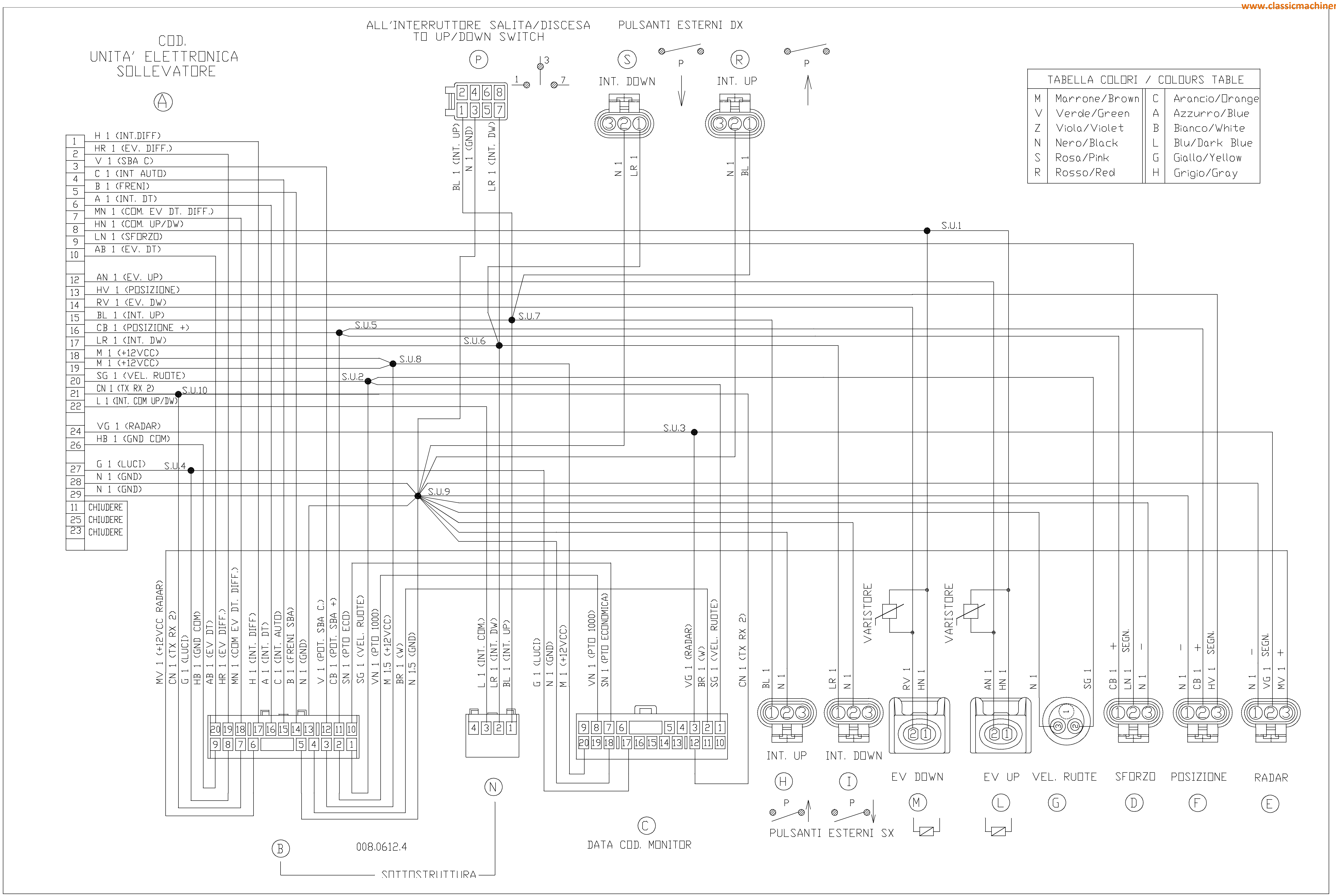


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

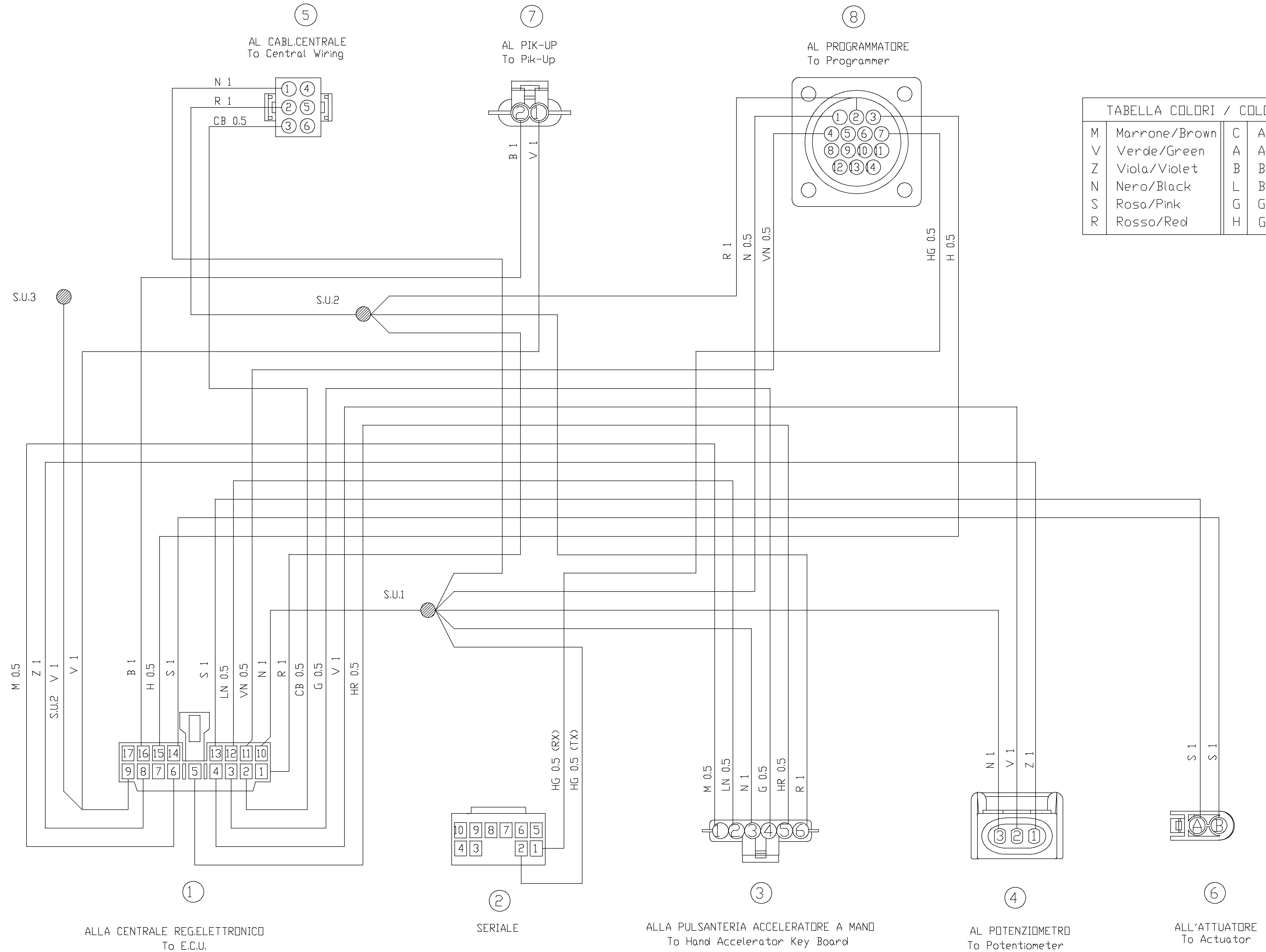


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

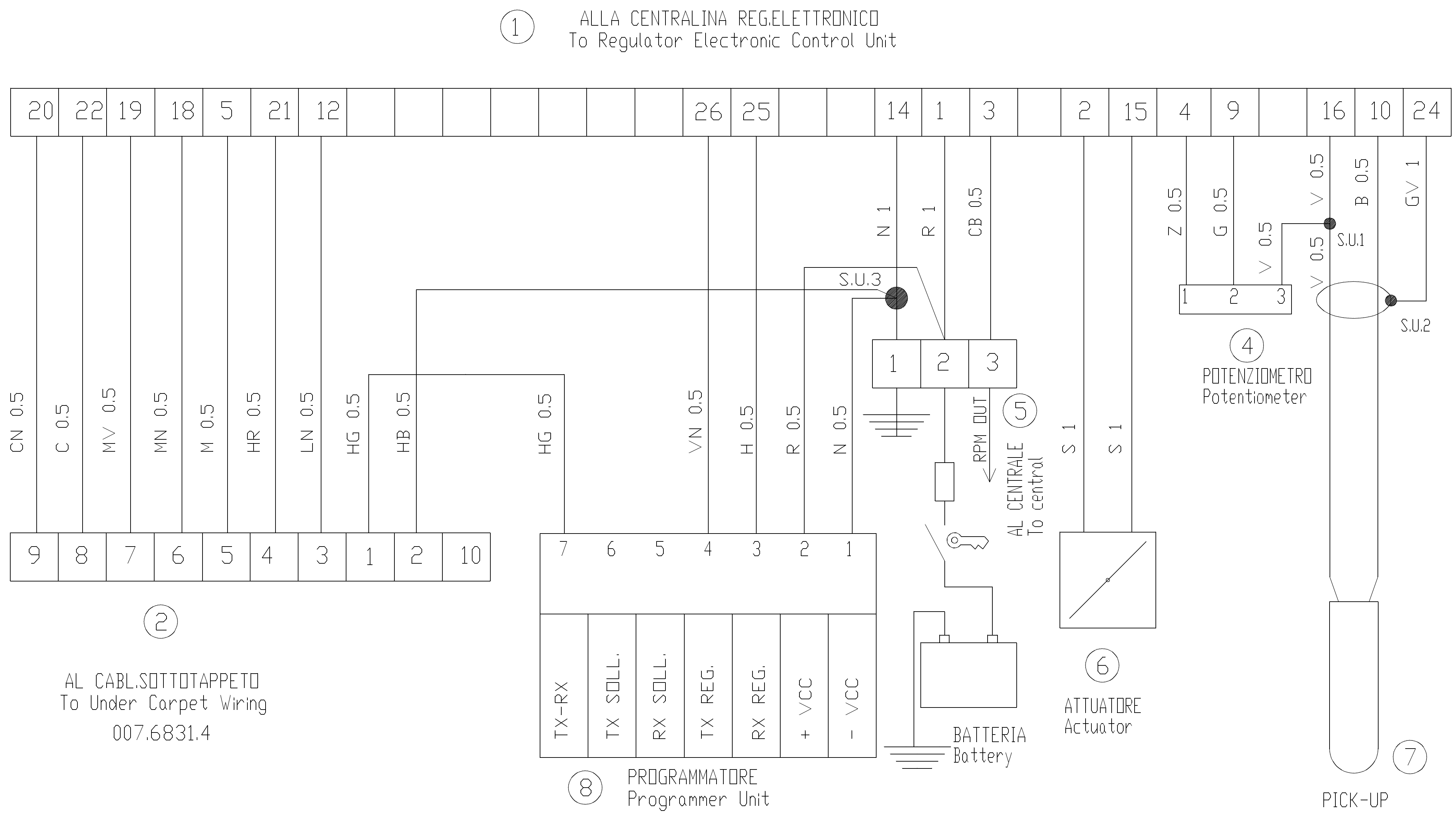


TABELLA COLORI			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

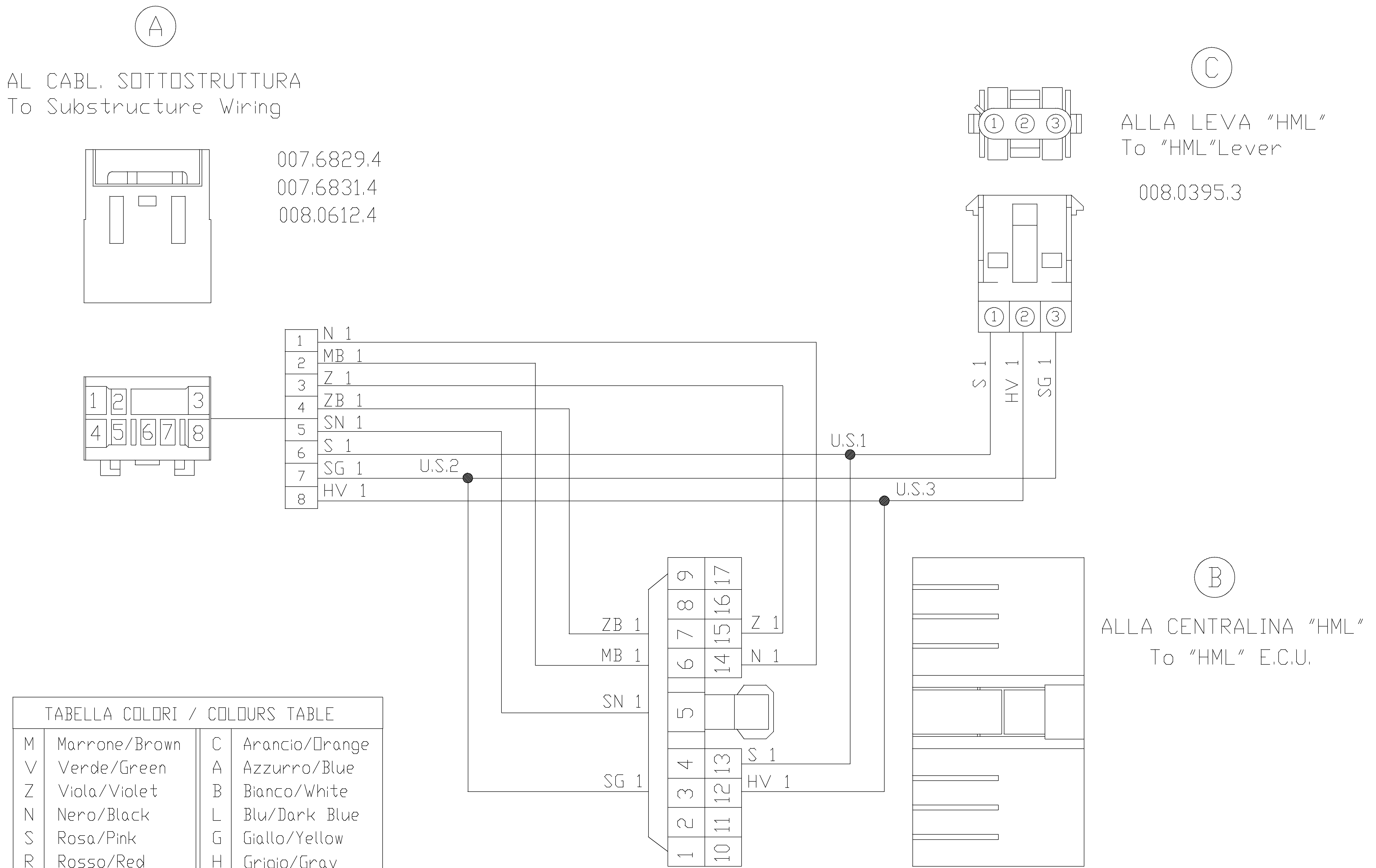


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

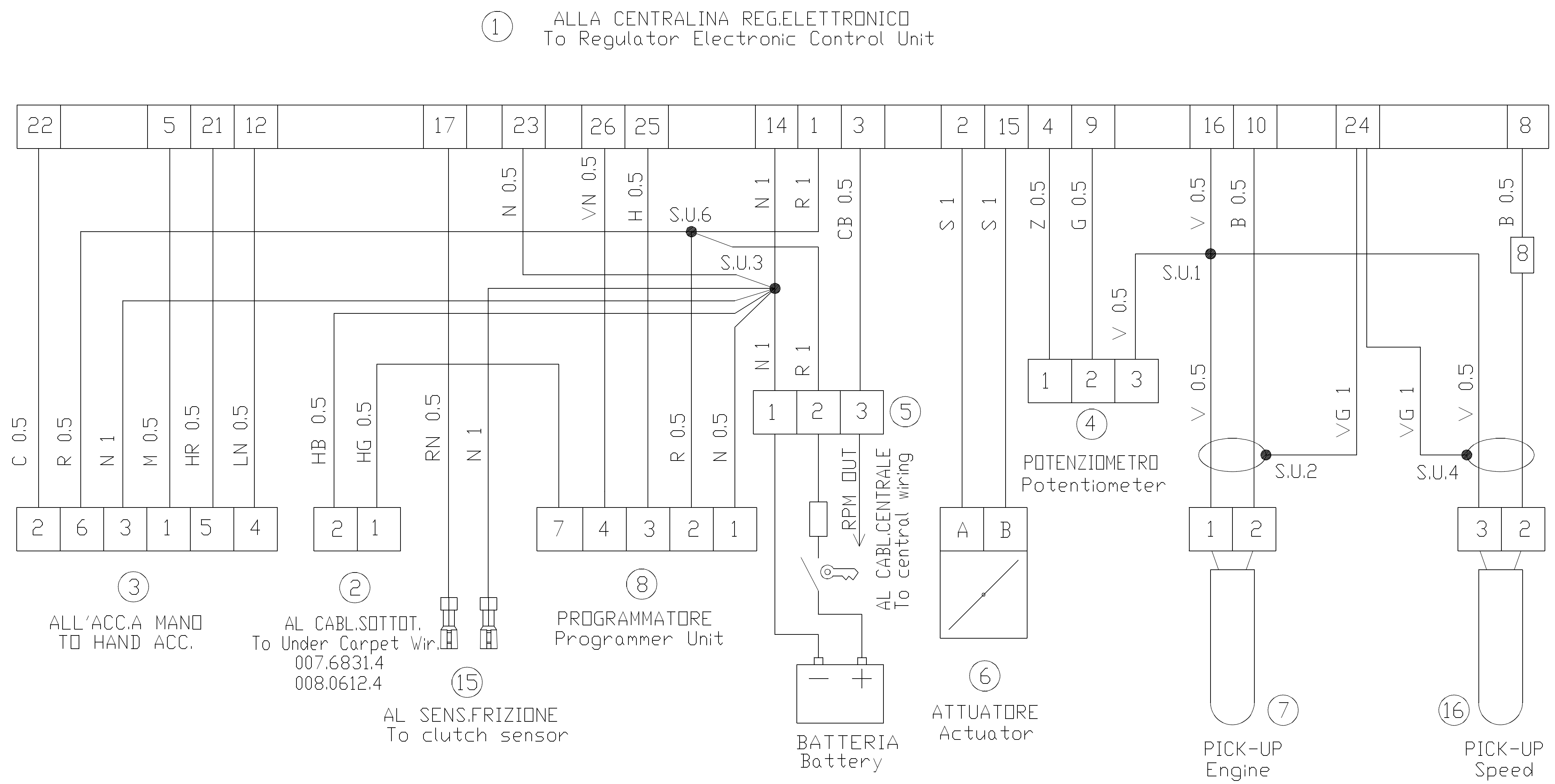


TABELLA COLORI			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

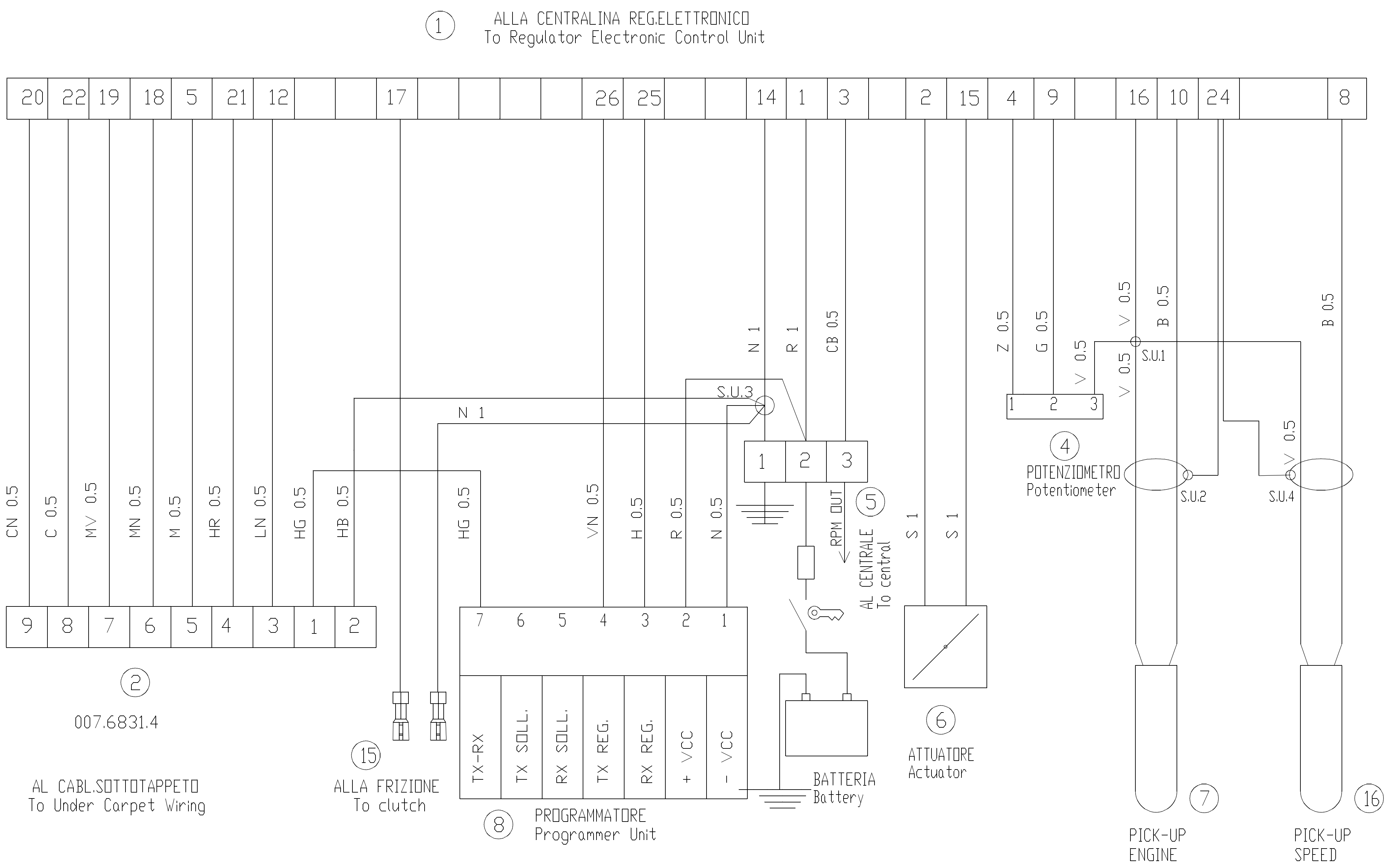
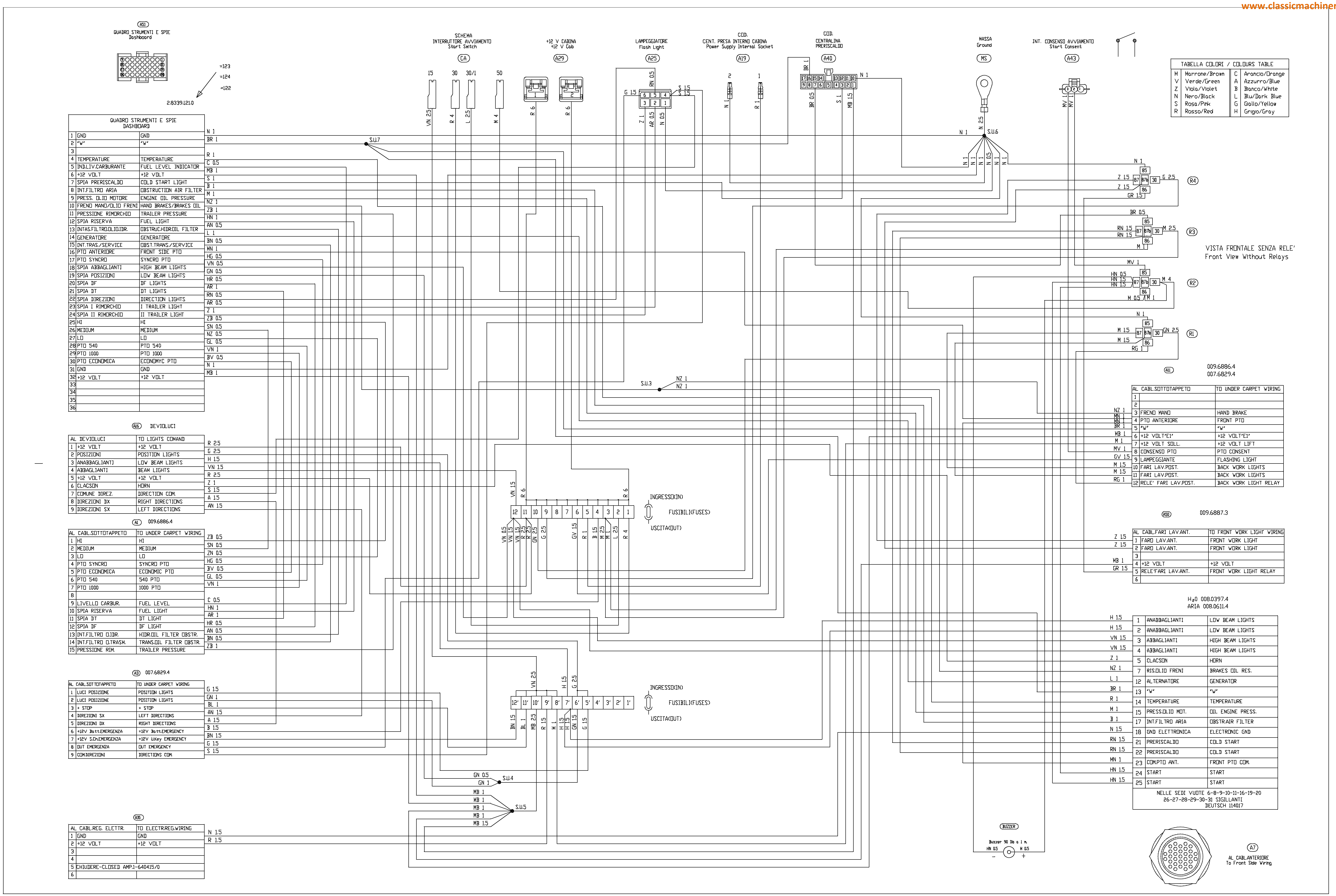


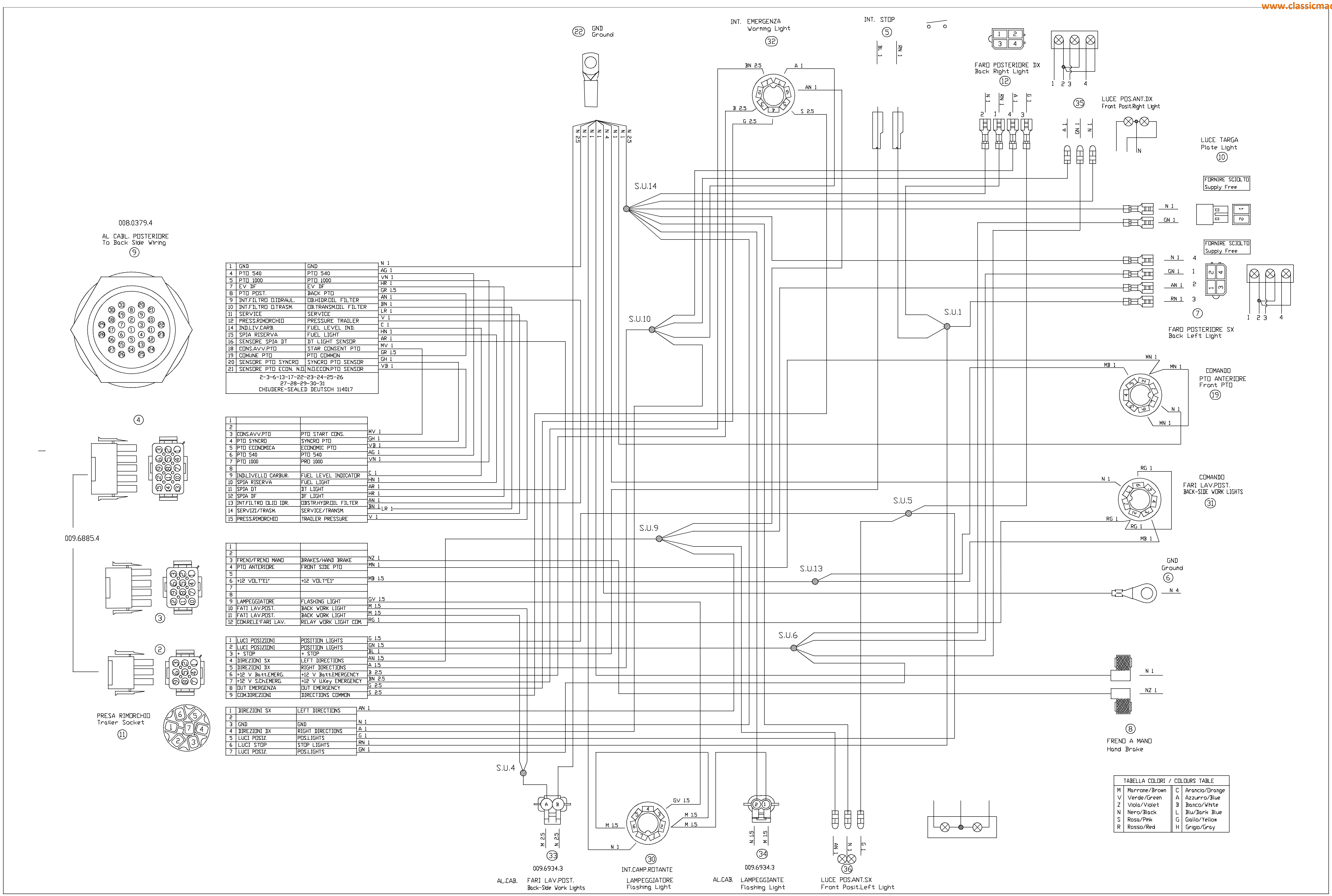
TABELLA COLORI			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

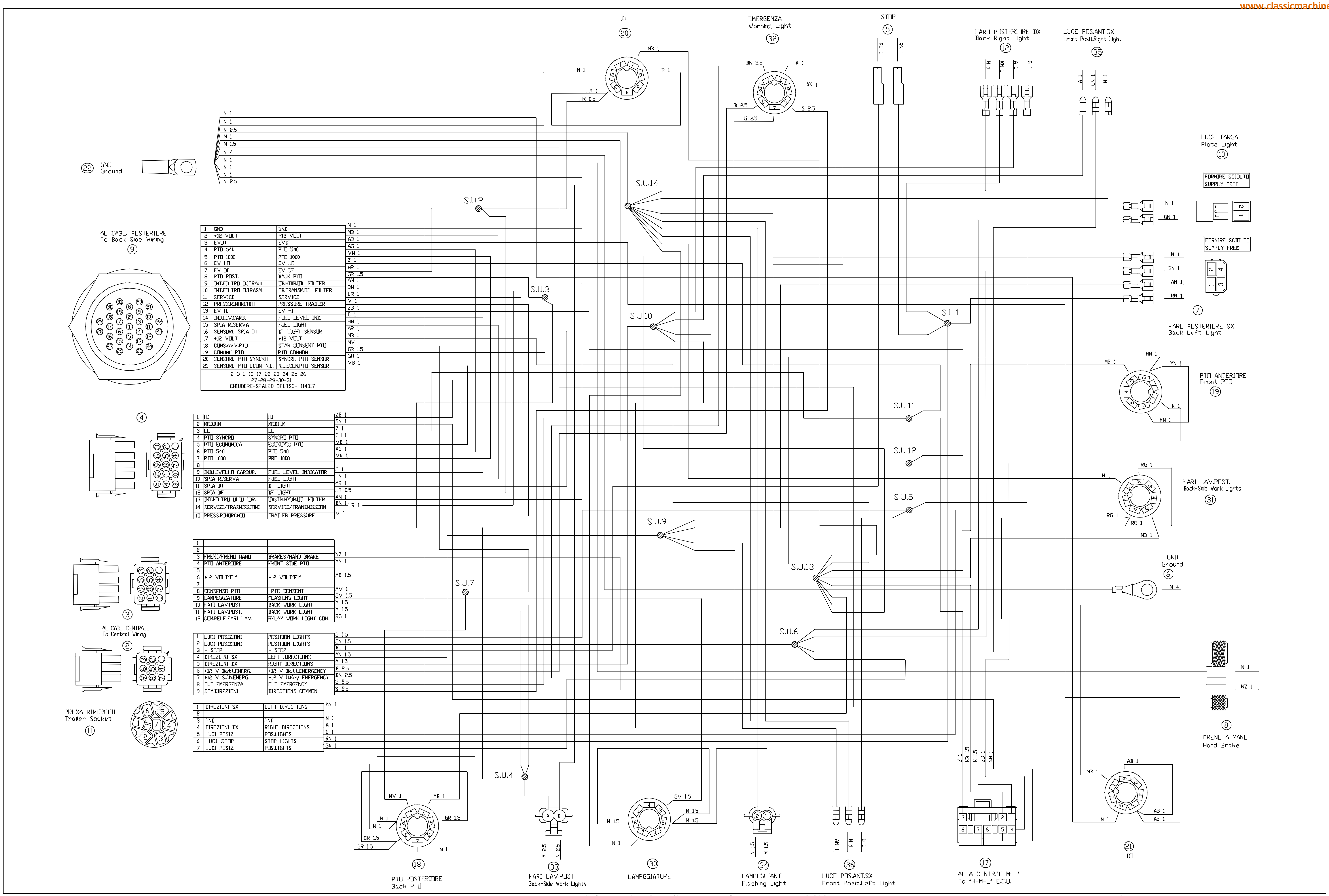


PLATFORM WIRING

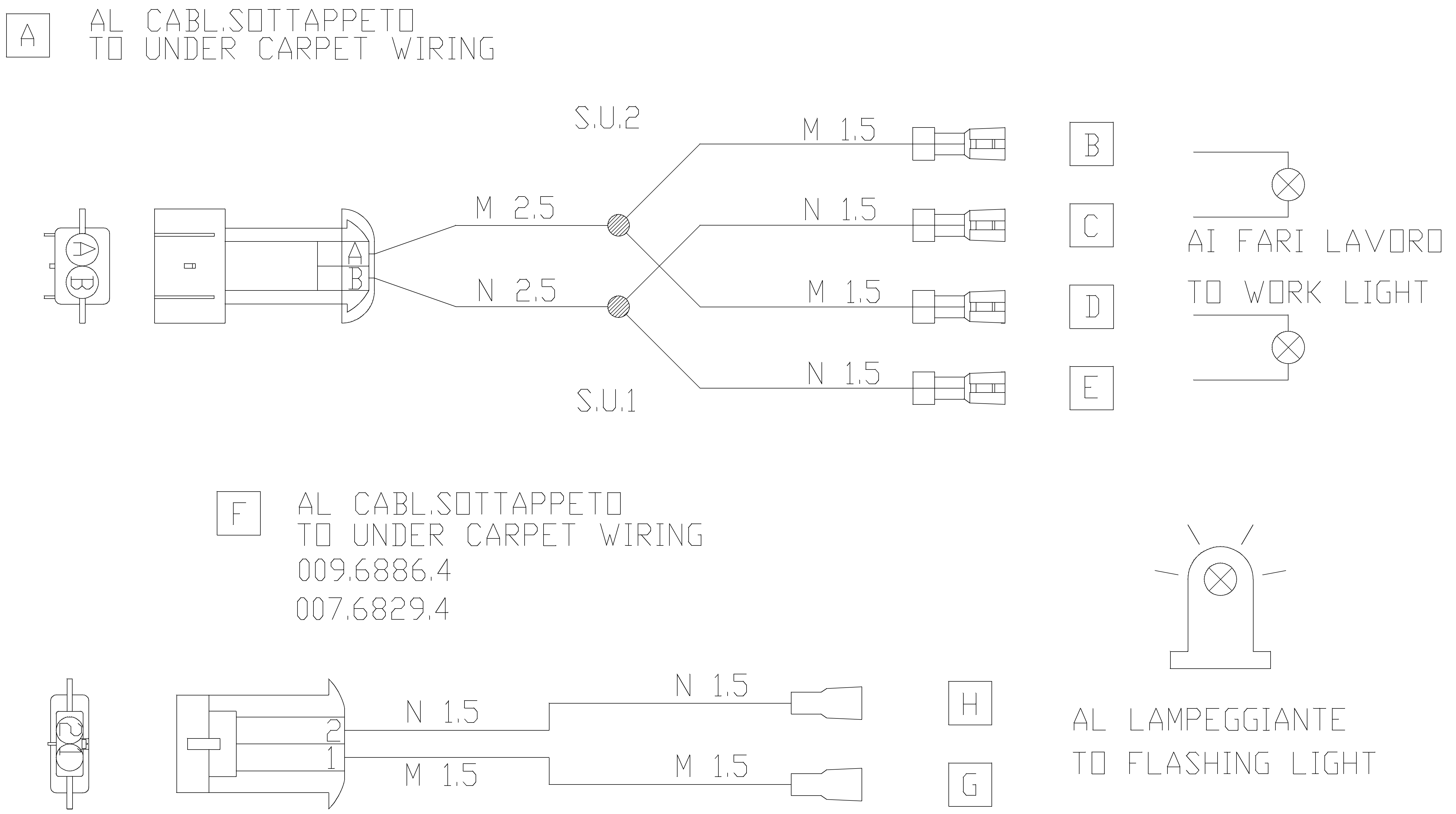
SHEET 15 - CENTRAL WIRING

009.6885.4/20


GND Ground 22
INT. EMERGENZA Warning Light 32
INT. STOP 5
FARO POSTERIORE DX Back Right Light 12
LUCE POS.ANT.DX Front Posit.Right Light 35
LUCE TARGA Plate Light 10
FORNIRE SCIOLTO Supply Free
FORNIRE SCIOLTO Supply Free
FARO POSTERIORE SX Back Left Light 7
COMANDO PTO ANTERIORE Front PTO 19
COMANDO FARI LAV.POST. BACK-SIDE WORK LIGHTS 31
GND Ground 6
FRENO A MANO Hand Brake 8
S.U.14
S.U.10
S.U.1
S.U.5
S.U.9
S.U.13
S.U.6
S.U.4
008.0379.4
AL CABL. POSTERIORE To Back Side Wiring 9
1 GND GND N 1
4 PTO 540 PTO 540 AG 1
5 PTO 1000 PTO 1000 VN 1
7 EV DF EV DF HR 1
8 PTO POST. BACK PTO GR 1.5
9 INT.FILTRO O.IDRAUL. OB.HIDR.OIL FILTER AN 1
10 INT.FILTRO O.TRASM. OB.TRANSM.OIL FILTER BN 1
11 SERVICE SERVICE LR 1
12 PRESS.RIMORCHIO PRESSURE TRAILER V 1
14 IND.LIV.CARB. FUEL LEVEL IND. C 1
15 SPIA RISERVA FUEL LIGHT HN 1
16 SENSORE SPIA DT DT LIGHT SENSOR AR 1
18 CONS.AVV.PTO STAR CONSENT PTO MV 1
19 COMUNE PTO PTO COMMON GR 1.5
20 SENSORE PTO SYNCRO SYNCRO PTO SENSOR GH 1
21 SENSORE PTO ECON. N.O. N.O.ECON.PTO SENSOR VB 1
2-3-6-13-17-22-23-24-25-26
27-28-29-30-31
CHIUDERE-SEALED DEUTSCH 114017
4
009.6885.4
1
2
3 CONS.AVV.PTO PTO START CONS. MV 1
4 PTO SYNCRO SYNCRO PTO GH 1
5 PTO ECONOMICA ECONOMIC PTO VB 1
6 PTO 540 PTO 540 AG 1
7 PTO 1000 PRO 1000 VN 1
8
9 IND.LIVELLO CARBUR. FUEL LEVEL INDICATOR C 1
10 SPIA RISERVA FUEL LIGHT HN 1
11 SPIA DT DT LIGHT AR 1
12 SPIA DF DF LIGHT HR 1
13 INT.FILTRO OLIO IDR. OBSTR.HYDR.OIL FILTER AN 1
14 SERVIZI/TRASM. SERVICE/TRANSM. BN 1 LR 1
15 PRESS.RIMORCHIO TRAILER PRESSURE V 1
3
1
2
3 FRENI/FRENO MANO BRAKES/HAND BRAKE NZ 1
4 PTO ANTERIORE FRONT SIDE PTO MN 1
5
6 +12 VOLT'E1' +12 VOLT'E1' MB 1.5
7
8
9 LAMPEGGIATORE FLASHING LIGHT GV 1.5
10 FATI LAV.POST. BACK WORK LIGHT M 1.5
11 FATI LAV.POST. BACK WORK LIGHT M 1.5
12 COM.RELE'FARI LAV. RELAY WORK LIGHT COM. RG 1
2
1 LUCI POSIZIONI POSITION LIGHTS G 1.5
2 LUCI POSIZIONI POSITION LIGHTS GN 1.5
3 + STOP + STOP BL 1
4 DIREZIONI SX LEFT DIRECTIONS AN 1.5
5 DIREZIONI DX RIGHT DIRECTIONS A 1.5
6 +12 V Batt.EMERG. +12 V Batt.EMERGENCY B 2.5
7 +12 V S.Ch.EMERG. +12 V U.Key EMERGENCY BN 2.5
8 OUT EMERGENZA OUT EMERGENCY G 2.5
9 COM.DIREZIONI DIRECTIONS COMMON S 2.5
PRESA RIMORCHIO Trailer Socket 11
1 DIREZIONI SX LEFT DIRECTIONS AN 1
2
3 GND GND N 1
4 DIREZIONI DX RIGHT DIRECTIONS A 1
5 LUCI POSIZ. POS.LIGHTS G 1
6 LUCI STOP STOP LIGHTS RN 1
7 LUCI POSIZ. POS.LIGHTS GN 1
33 009.6934.3
AL.CAB. FARI LAV.POST. Back-Side Work Lights
30 INT.CAMP.ROTANTE
LAMPEGGIATORE Flashing Light
34 009.6934.3
AL.CAB. LAMPEGGIANTE Flashing Light
36 LUCE POS.ANT.SX Front Posit.Left Light
TABELLA COLORI / COLOURS TABLE
M Marrone/Brown
V Verde/Green
Z Viola/Violet
N Nero/Black
S Rosa/Pink
R Rosso/Red
C Arancio/Orange
A Azzurro/Blue
B Bianco/White
L Blu/Dark Blue
G Giallo/Yellow
H Grigio/Gray



PLATFORM WIRING SHEET 17 - UNDERMAT WIRING (electrohydraulic controls + H-M-L shift) 007.6829.4/20


A
AL CABL.SOTTAPPETO
TO UNDER CARPET WIRING
S.U.2
M 1.5
B
M 2.5
N 1.5
C
A
B
N 2.5
M 1.5
D
N 1.5
E
S.U.1
AI FARI LAVORO
TO WORK LIGHT
F
AL CABL.SOTTAPPETO
TO UNDER CARPET WIRING
009.6886.4
007.6829.4
N 1.5
N 1.5
H
2
1
M 1.5
M 1.5
G
AL LAMPEGGIANTE
TO FLASHING LIGHT

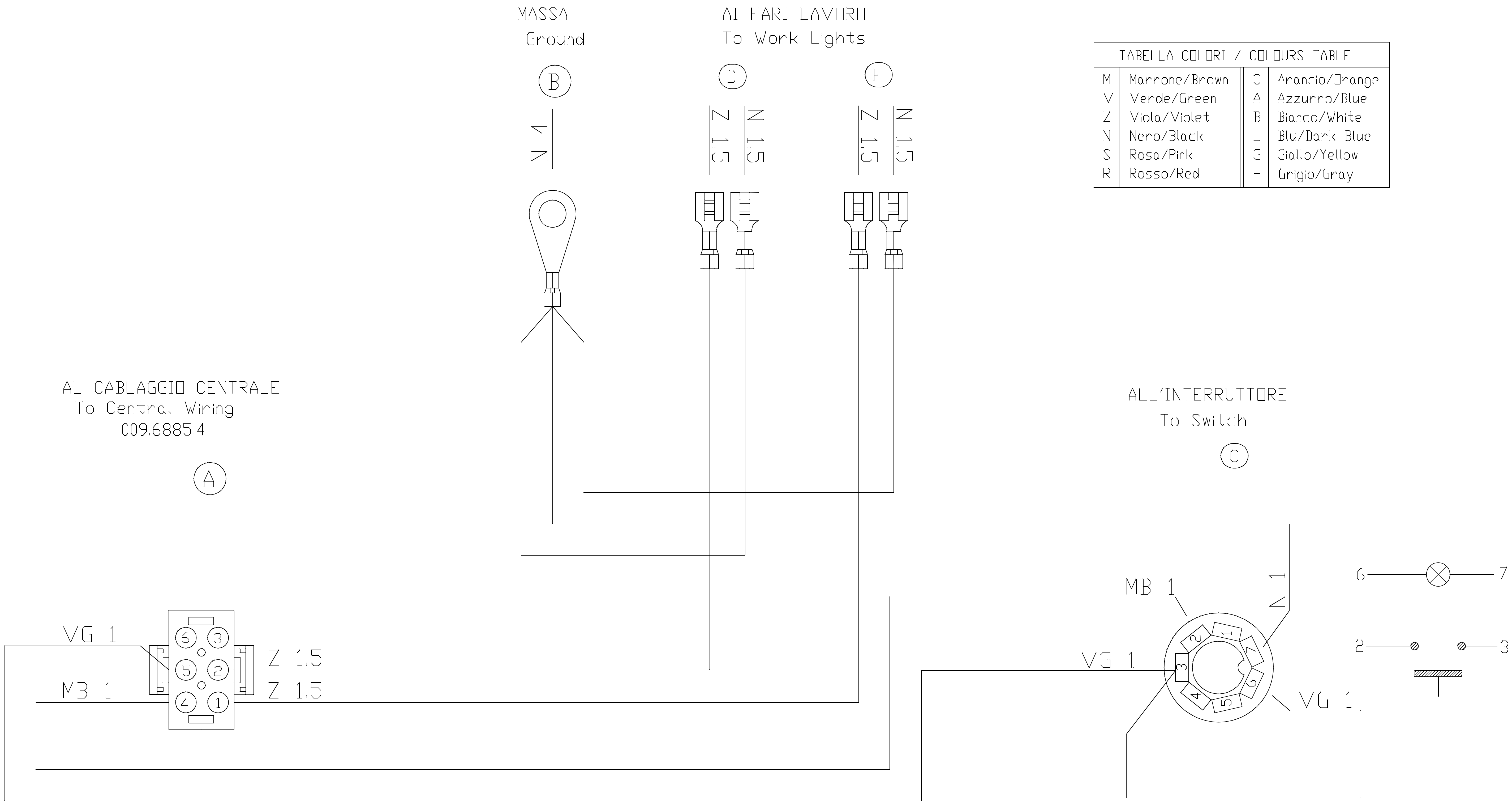
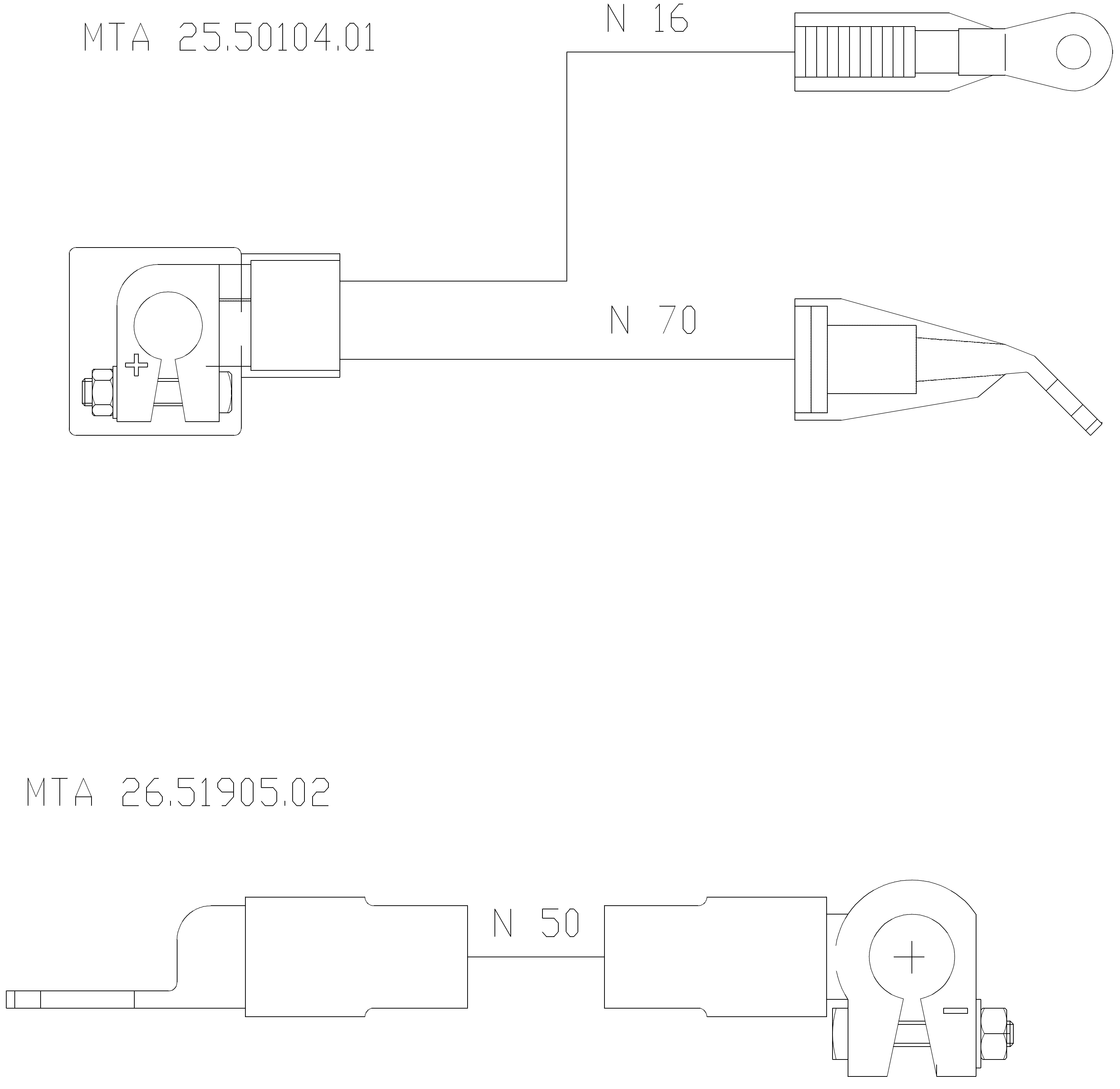
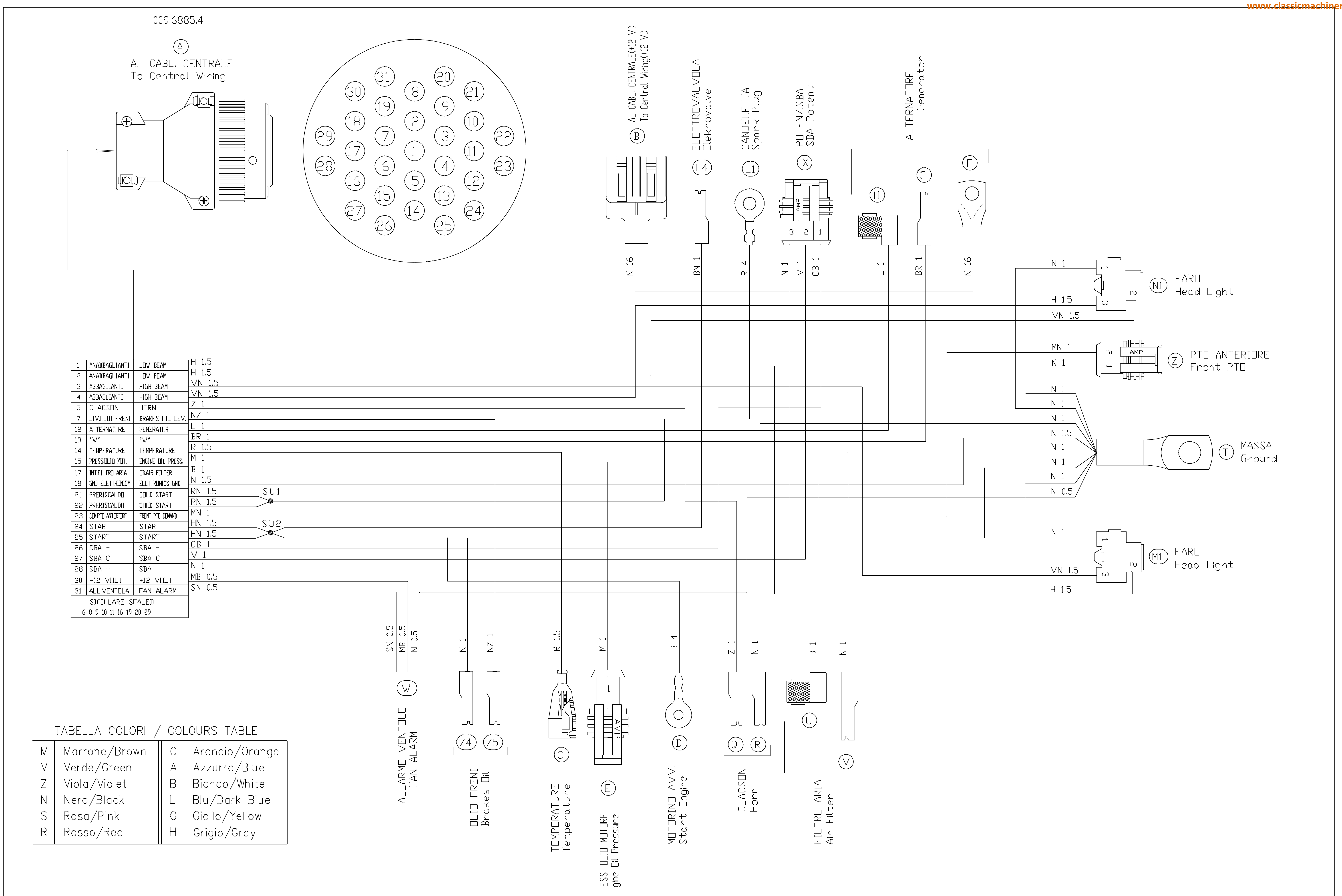


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

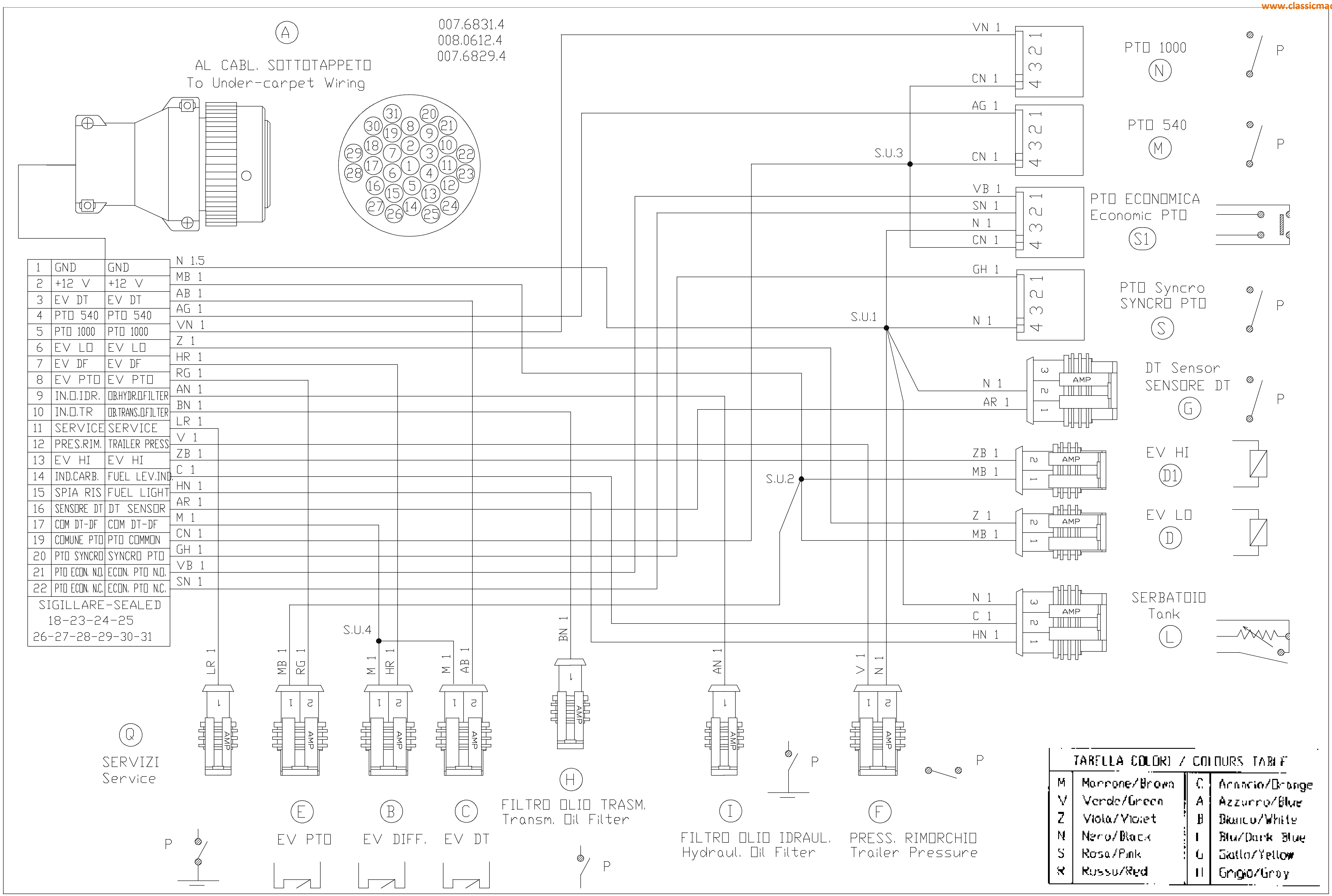


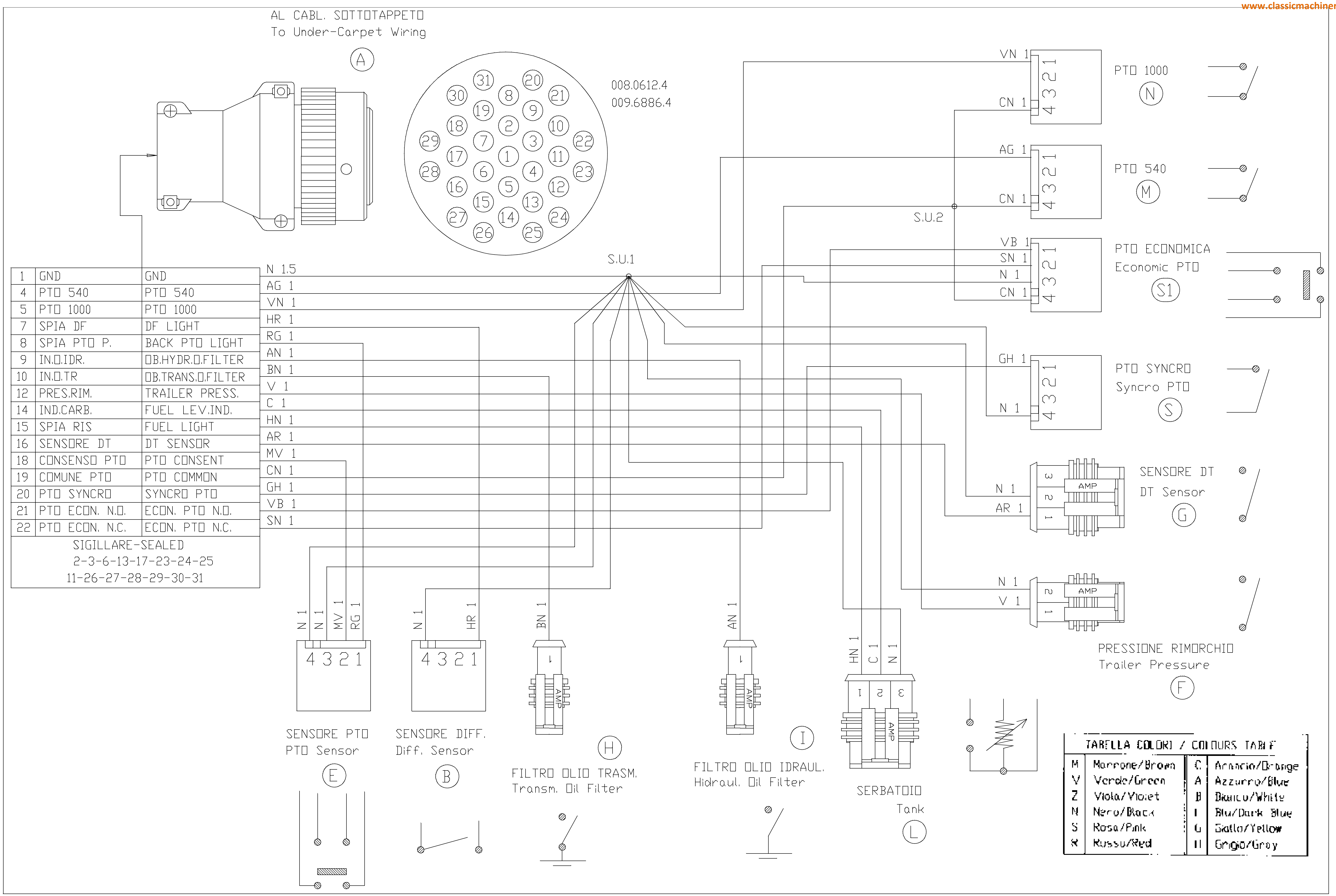
SHEET 20 - BATTERY LEADS (4 cylinders) **009.7071.3** (6 cylinders) **009.7072.3** (with front P.T.O. 4 - 6 cylinders) 007.6848.3



1	ANABBAGLIANTI	LOW BEAM	H 1.5
2	ANABBAGLIANTI	LOW BEAM	H 1.5
3	ABBAGLIANTI	HIGH BEAM	VN 1.5
4	ABBAGLIANTI	HIGH BEAM	VN 1.5
5	CLACSON	HORN	Z 1
7	LIV.OLIO FRENI	BRAKES OIL LEV.	NZ 1
12	ALTERNATORE	GENERATOR	L 1
13	"W"	"W"	BR 1
14	TEMPERATURE	TEMPERATURE	R 1.5
15	PRESS.OLIO MOT.	ENGINE OIL PRESS.	M 1
17	INT.FILTRO ARIA	OBAIR FILTER	B 1
18	GND ELETTRONICA	ELETTRONICS GND	N 1.5
21	PRERISCALDO	COLD START	RN 1.5
22	PRERISCALDO	COLD START	RN 1.5
23	COMPTO ANTERIORE	FRONT PTO COMAND	MN 1
24	START	START	HN 1.5
25	START	START	HN 1.5
26	SBA +	SBA +	CB 1
27	SBA C	SBA C	V 1
28	SBA -	SBA -	N 1
30	+12 VOLT	+12 VOLT	MB 0.5
31	ALL.VENTOLA	FAN ALARM	SN 0.5
	SIGILLARE-SEALED 6-8-9-10-11-16-19-20-29		

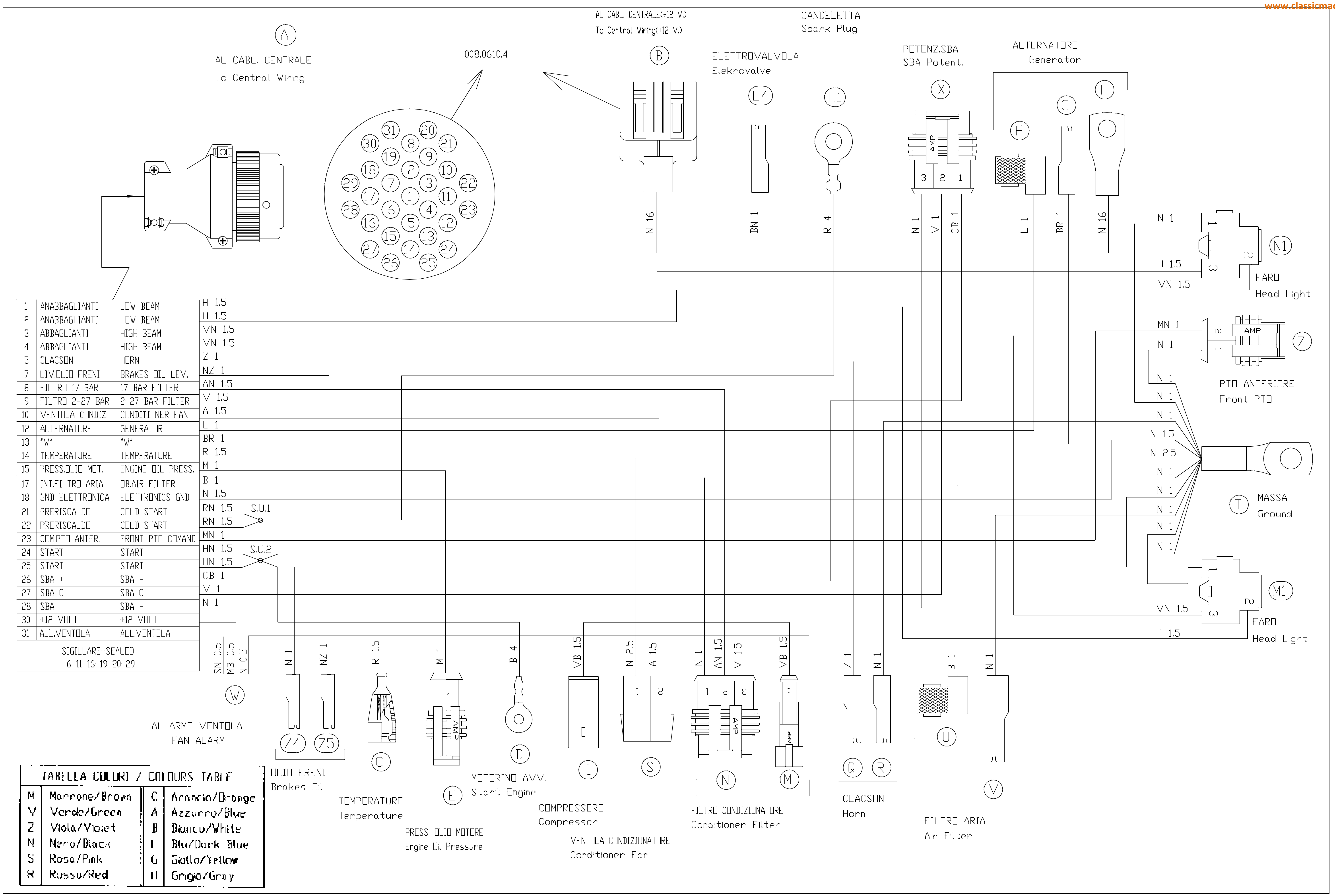
TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray


AL CABL. SOTTOTAPPETO
To Under-carpet Wiring
007.6831.4
008.0612.4
007.6829.4
1 GND GND
2 +12 V +12 V
3 EV DT EV DT
4 PTO 540 PTO 540
5 PTO 1000 PTO 1000
6 EV LO EV LO
7 EV DF EV DF
8 EV PTO EV PTO
9 IN.O.IDR. OB.HYDR.O.FILTER
10 IN.O.TR OB.TRANS.O.FILTER
11 SERVICE SERVICE
12 PRES.RIM. TRAILER PRESS.
13 EV HI EV HI
14 IND.CARB. FUEL LEV.IND.
15 SPIA RIS FUEL LIGHT
16 SENSORE DT DT SENSOR
17 COM DT-DF COM DT-DF
19 COMUNE PTO PTO COMMON
20 PTO SYNCRO SYNCRO PTO
21 PTO ECON. N.O. ECON. PTO N.O.
22 PTO ECON. N.C. ECON. PTO N.C.
SIGILLARE-SEALED
18-23-24-25
26-27-28-29-30-31
N 1.5
MB 1
AB 1
AG 1
VN 1
Z 1
HR 1
RG 1
AN 1
BN 1
LR 1
V 1
ZB 1
C 1
HN 1
AR 1
M 1
CN 1
GH 1
VB 1
SN 1
S.U.1
S.U.2
S.U.3
S.U.4
PTO 1000
PTO 540
PTO ECONOMICA
Economic PTO
PTO Syncro
SYNCRO PTO
DT Sensor
SENSORE DT
EV HI
EV LO
SERBATOIO
Tank
SERVIZI
Service
EV PTO
EV DIFF.
EV DT
FILTRO OLIO TRASM.
Transm. Oil Filter
FILTRO OLIO IDRAUL.
Hydraul. Oil Filter
PRESS. RIMORCHIO
Trailer Pressure
AMP
P
TABELLA COLORI / COLOURS TABLE
M Marrone/Brown
V Verde/Green
Z Viola/Violet
N Nero/Black
S Rosa/Pink
R Rosso/Red
C Arancio/Orange
A Azzurro/Blue
B Bianco/White
L Blu/Dark Blue
G Giallo/Yellow
H Grigio/Grey



CHASSIS WIRING

SHEET 23 - REAR END WIRING (mechanical controls) **008.0379.4/40**



1	ANABBAGLIANTI	LOW BEAM	H 1.5
2	ANABBAGLIANTI	LOW BEAM	H 1.5
3	ABBAGLIANTI	HIGH BEAM	VN 1.5
4	ABBAGLIANTI	HIGH BEAM	VN 1.5
5	CLACSON	HORN	Z 1
7	LIV.OLIO FRENI	BRAKES OIL LEV.	NZ 1
8	FILTRO 17 BAR	17 BAR FILTER	AN 1.5
9	FILTRO 2-27 BAR	2-27 BAR FILTER	V 1.5
10	VENTOLA CONDIZ.	CONDITIONER FAN	A 1.5
12	ALTERNATORE	GENERATOR	L 1
13	"W"	"W"	BR 1
14	TEMPERATURE	TEMPERATURE	R 1.5
15	PRESS.OLIO MOT.	ENGINE OIL PRESS.	M 1
17	INT.FILTRO ARIA	OB.AIR FILTER	B 1
18	GND ELETTRONICA	ELETTRONICS GND	N 1.5
21	PRERISCALDO	COLD START	RN 1.5
22	PRERISCALDO	COLD START	RN 1.5
23	COMPTO ANTER.	FRONT PTO COMAND	MN 1
24	START	START	HN 1.5
25	START	START	HN 1.5
26	SBA +	SBA +	CB 1
27	SBA C	SBA C	V 1
28	SBA -	SBA -	N 1
30	+12 VOLT	+12 VOLT	
31	ALL.VENTOLA	ALL.VENTOLA	

TABELLA COLORI / COLOURS TABLE

M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Grey

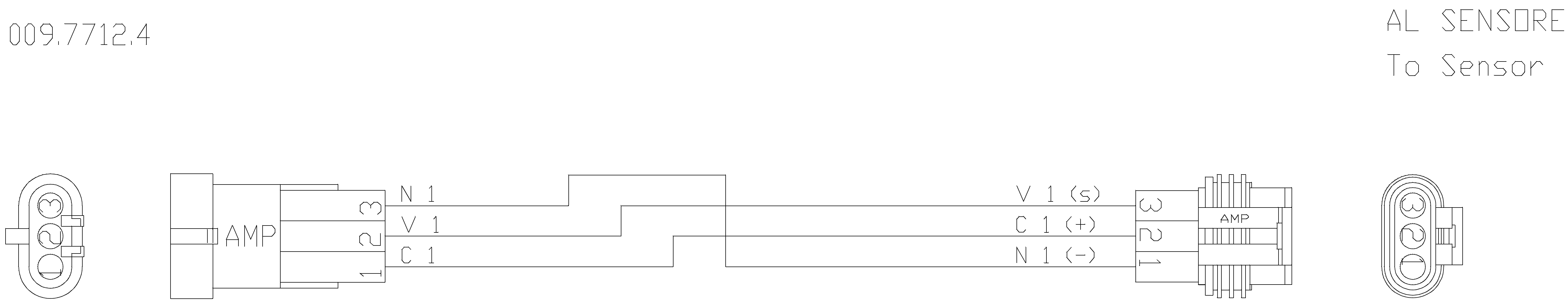
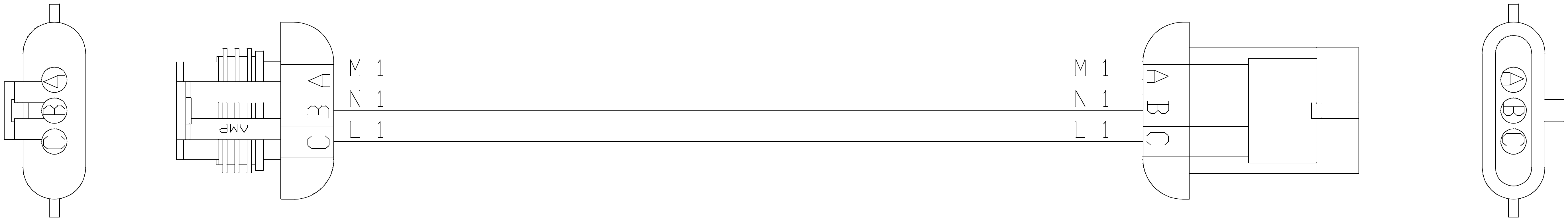


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

CABLAGGIO
SOLL.
009.7712.4



SENZA SFORZO
CONNETTORE MTA 44.233550
Connector

CONNETTORE MTA 44.233660
Connector

TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

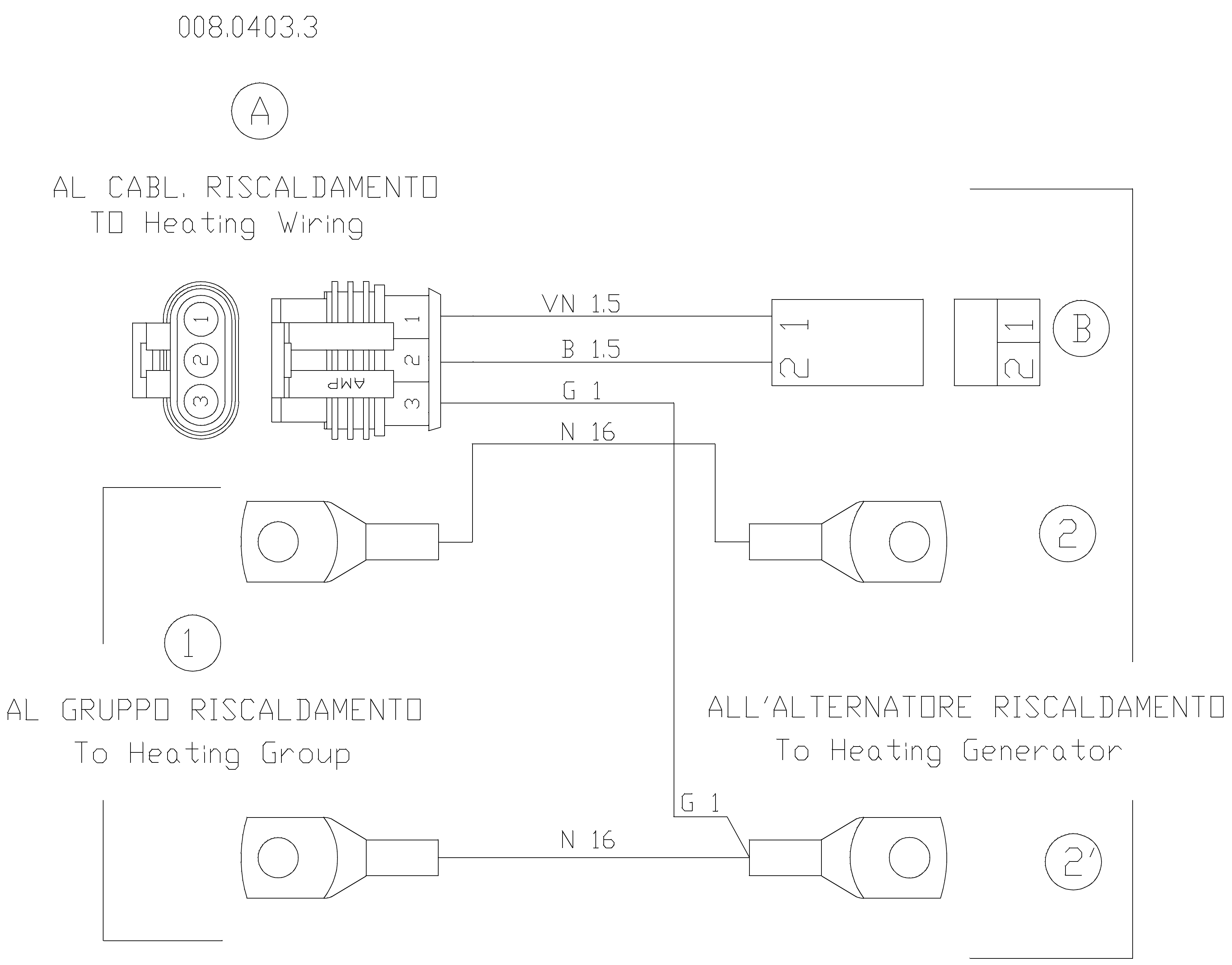
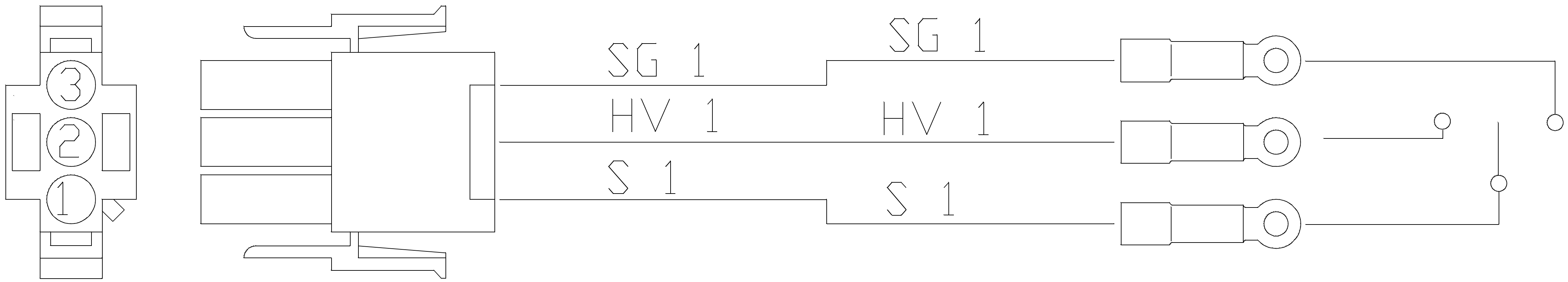


TABELLA COLORI / COLOURS TABLE

M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray



A AL CABL.SOTTOTAPPETO
To Under-Carpet Wiring
007.6844.3

B ALLA LEVA HI-LO
To HI-LO Lever

TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

Appendice

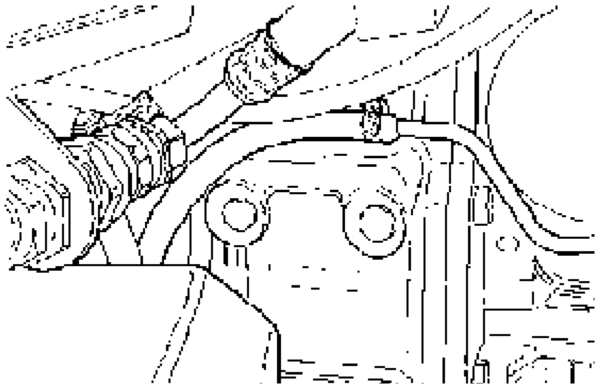
CONVERSION TABLE

FROM	TO	multiply by:
inch	cm	2.540
cm	inch	0.394
foot	m	0.305
m	foot	3.281
yard	m	0.914
m	yard	1.094
Eng. miles	km	1.609
km	Eng. miles	0.622
Sq.in.	cm^2	6.452
cm^2	Sq.ft.	0.155
Sq.ft.	m^2	0.093
m^2	Sq.ft.	10.77
Sq.yard	m^2	0.833
m^2	Sq.yard	1.197
Cu.in.	cm^3	16.39
cm^3	Cu.in.	0.061
Cu.ft.	litres	28.36
litres	Cu.ft.	0.035
Cu.yard	m^3	0.763
m^3	Cu.yard	1.311
Imp.gall.	litres	4.547
litres	Imp.gall.	0.220
US gall.	litres	3.785
litres	US gall.	0.264
pint	litres	0.568
litres	pint	1.762
quart	litres	1.137
litres	quart	0.880
oz.	kg	0.028
kg	oz.	35.25
lb.	kg	0.454
kg	lb.	2.203
lb.ft.	kgm	0.139
kgm	lb.ft.	7.233
lb/in.	kg/m	17.87
kg/m	lb/in.	0.056
lb./sq.in.	kg/cm^2	0.070
kg/cm^2	lb/sq.in.	14.22
lb./Imp.gall.	kg/litres	0.100
kg/litres	lb./Imp.gall.	10.00
lb./US gall.	kg/litres	0.120
kg/litres	lb./US gall.	8.333
lb./cu.ft.	kg/m^3	16.21
kg/m^3	lb./cu.ft.	0.062
cu.ft./lb.	m^3/kg	0.062
m^3/kg	cu.ft./lb.	16.21
Nm	kgm	0.102
kgm	Nm	9.81
kW	cv	1.36
cv	kW	0.736
bar	kg/cm^2	1.014
kg/cm^2	bar	0.981
dm^3	l	1
l	dm^3	1

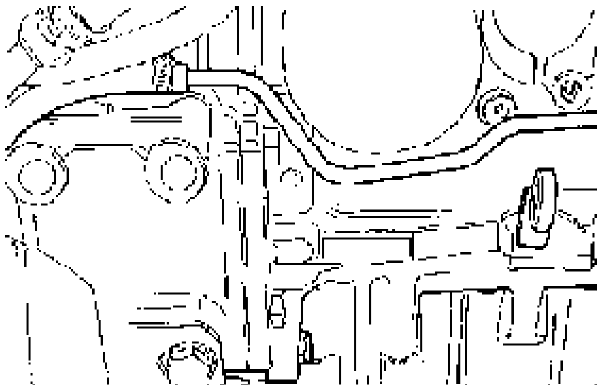
HOW TO ORDER SPARE PARTS

To ensure perfect tractor efficiency thus avoiding serious drawbacks, and to optimize your investment and the operational expenses, the use of "ORIGINAL SPARE PARTS" is recommended.
Spare parts orders must specify the following:

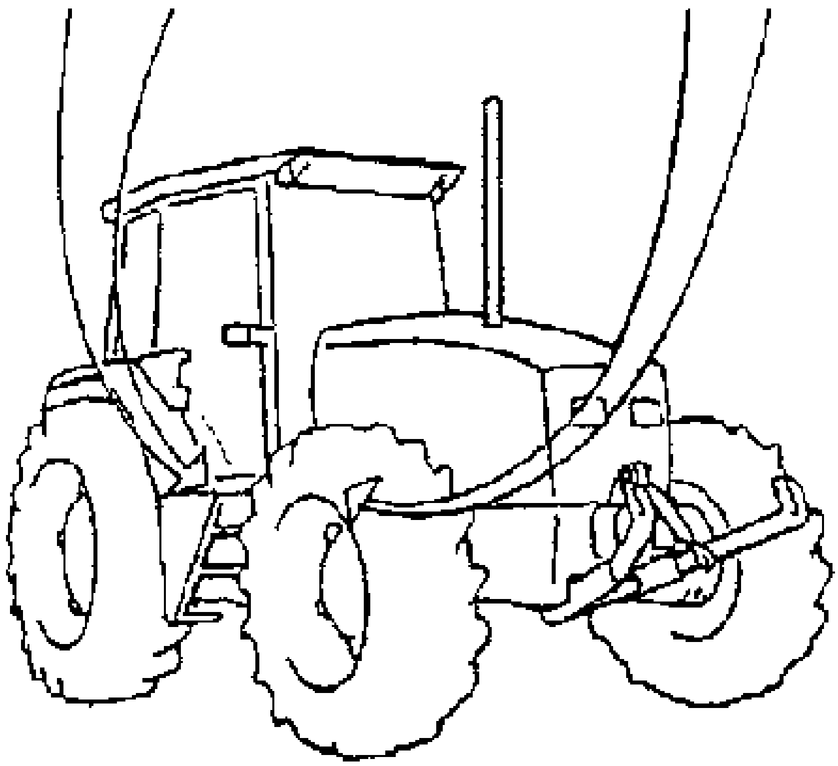
— Tractor serial number and engine serial number (if the engine is concerned)
— Spare part name and reference code.



TRACTOR FRAME TYPE AND SERIAL NUMBER



ENGINE TYPE AND SERIAL NUMBER



La differenza tra i tempi di aggiornamento in stampa e i tempi delle modifiche tecniche (variando queste ultime continuamente, ciò al fine di offrire prodotti sempre più qualificati) impongono di dichiarare, per correttezza, che i dati contenuti nella presente edizione sono suscettibili di variazione in qualsiasi momento e che quindi non sono impegnativi.

Le temps qui s'écoule entre la mise à jour en impression et les modifications techniques (ces dernières changeant continuellement afin d'offrir aux utilisateurs des produits toujours plus qualifiés) nous oblige a vous signaler que les données de la présente publication pourraient être susceptibles de variations. Elles sont données sans engagement de notre part.

Because of the possible time lag between the introduction of technical modifications (an on-going process the aim of which is to offer products which are being continually improved) and the latest update of the manual, we must point out, for the sake of correctness,that the data contained in this edition are liable to change at any time and are therefore not binding.

Der zeitliche Unterschied zwischen der Aktualisierung der Druckschriften und der Durchführung technischer Veränderungen (die ständig vorgenommen werden, um immer hochwertigere Erzeugnisse auf den Markt zu bringen) erfordern aus Gründen der Korrektheit des Hinweises, dass die in dieser Ausgabe enthaltenen Daten jederzeit geändert werden können und deshalb unverbindlich sind.

La diferencia entre los tiempos necesarios para poner al dia la impresiòn y los tiempos de las modificaciones tècnicas (las que se verifican continuamente, con el objeto de ofrecer productos cada vez màs calificados) nos imponen declarar, por corrección, que los datos contenidos en la presente ediciòn estàn sujetos a variaciones en cualquier momento y que portanto no son obligativos.

A diferença entre os tempos necessãrrios para actualizar a impressão e os tempos das modificacões técnicas (que se verificam continuamente, a fim de oferecer um produto cada vez mais qualificado), obrigam-nos a declarar, que os dados contidos neste manuel são susceptiveis de variacão em qualquer momento e que portanto não são vinculatórios.

NOTES

**Company with Quality System
Certified in compliance with ISO 9001:2000**

SAME DEUTZ-FAHR ITALIA S.p.A.

società del Gruppo SAME DEUTZ-FAHR

307.1063.3.0

SUPPLEMENT TO WORKSHOP MANUAL

SILVER 80
SILVER 90
SILVER 100.4
SILVER 100.6

HYDRIVE

La differenza tra i tempi di aggiornamento in stampa e i tempi delle modifiche tecniche (variando queste ultime continuamente, ciò al fine di offrire prodotti sempre più qualificati) impongono di dichiarare, per correttezza, che i dati contenuti nella presente edizione sono suscettibili di variazione in qualsiasi momento e che quindi non sono impegnativi.

Le temps qui s'écoule entre la mise à jour en impression et les modifications techniques (ces dernières changeant continuellement afin d'offrir aux utilisateurs des produits toujours plus qualifiés) nous oblige a vous signaler que les données de la présente publication pourraient être susceptibles de variations. Elles sont données sans engagement de notre part.

Because of the possible time lag between the introduction of technical modifications (an on-going process the aim of which is to offer products which are being continually improved) and the latest update of the manual, we must point out, for the sake of correctness,that the data contained in this edition are liable to change at any time and are therefore not binding.

Der zeitliche Unterschied zwischen der Aktualisierung der Druckschriften und der Durchführung technischer Veränderungen (die ständig vorgenommen werden, um immer hochwertigere Erzeugnisse auf den Markt zu bringen) erfordern aus Gründen der Korrektheit des Hinweises, dass die in dieser Ausgabe enthaltenen Daten jederzeit geändert werden können und deshalb unverbindlich sind.

La diferencia entre los tiempos necesarios para poner al dia la impresiòn y los tiempos de las modificaciones tècnicas (las que se verifican continuamente, con el objeto de ofrecer productos cada vez màs calificados) nos imponen declarar, por corrección, que los datos contenidos en la presente ediciòn estàn sujetos a variaciones en cualquier momento y que portanto no son obligativos.

A diferença entre os tempos necessãrrios para actualizar a impressão e os tempos das modificacões técnicas (que se verificam continuamente, a fim de oferecer um produto cada vez mais qualificado), obrigam-nos a declarar, que os dados contidos neste manuel são susceptiveis de variacão em qualquer momento e que portanto não são vinculatórios.

"HYDRIVE" - ELECTRO-HYDRAULIC SHUTTLE CONTROL

All types of gearbox may be equipped on request with an electro-hydraulic "HYDRIVE" instead of the mechanical reverse shuttle (see operating diagram in Fig. 1).
This consists of a multi-disc oil bath clutch which allows forward and reverse gears to be selected without use of the clutch pedal.
The HYDRIVE control lever is located on the left under the steering wheel (Fig. 2)
The direction of travel is displayed on a LED display panel on the right of the control panel.

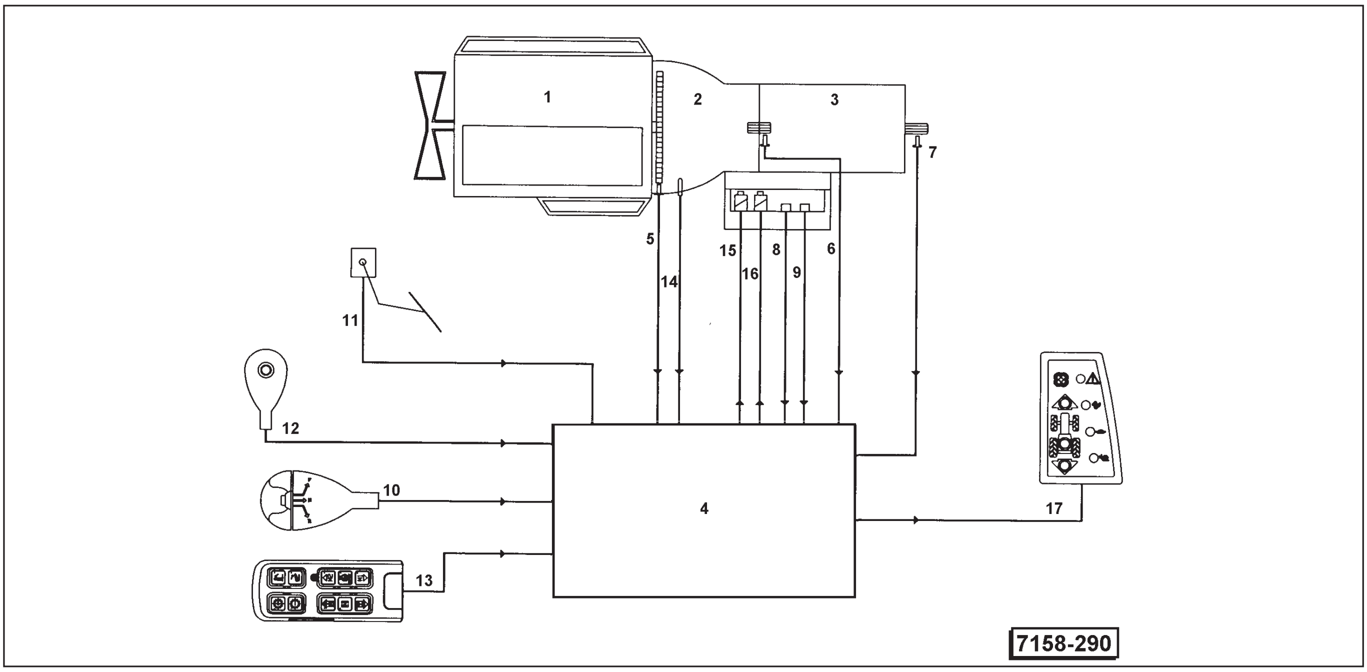


Fig. 1 - Electro-hydraulic inversor system.

1 - Engine
2 - Inversor
3 - Gearbox
4 - Electronic control unit
5 - Speed sensor on inversor input shaft
6 - Speed sensor on inversor output shaft
7 - Speed sensor on gearbox output shaft
8 - Oil pressure indicator
9 - Pressure at the output of the proportional solenoid valve
10 - Inversor control stalk
11 - Clutch pedal position sensor
12 - Automatic clutch control button on gear lever
13 - Multifunction armrest (optional)
14 - Temperature sensor
15 - Proportional solenoid valve
16 - FORWARD/REVERSE solenoid valve
17 - Inversor and Agroshift display

Updating the EPROM OF CONTROL UNIT 010.8967.4 (HYDRIVE + AGROSHIFT)

— Install the replacement EPROM so that the notch is in correspondence with the screenprinting of the printed circuit, then connect the “ALL ROUND TESTER”.
— Turn the ignition key to the first position and select “HML_&_REV" from the list of control units on the display. Check that the software version corresponds to that indicated on the EPROM in the control unit then press a key to continue.
— From the main menu **select 0**; you will be prompted to enter a **Password**; the correct password for the **V10F** version of the control unit is **12345**.
— From the main menu **select 1-Calibration** and from the calibration menu **select 0**; you will now be prompted to re-enter the password (i.e. 12345).
— From the “Calibration” menu **select 1- Clutch pedal** and check that 0% pedal value (pedal in rest position) is = 95 and that 100% pedal value (full travel position) is = 190; The control unit is now initialised with the new EPROM.
— If the pedal % values differ from those indicated above, turn the ignition key to position 0 and then repeat the procedure from step 2.
— Return the key to position 0 and then turn back to position 1. Calibrate the clutch pedal selecting the options relevant to the tractor in question.

Warning: on tractors with HARD-SOFT, the option “Rg.Mot.El.” must be kept disabled (-).

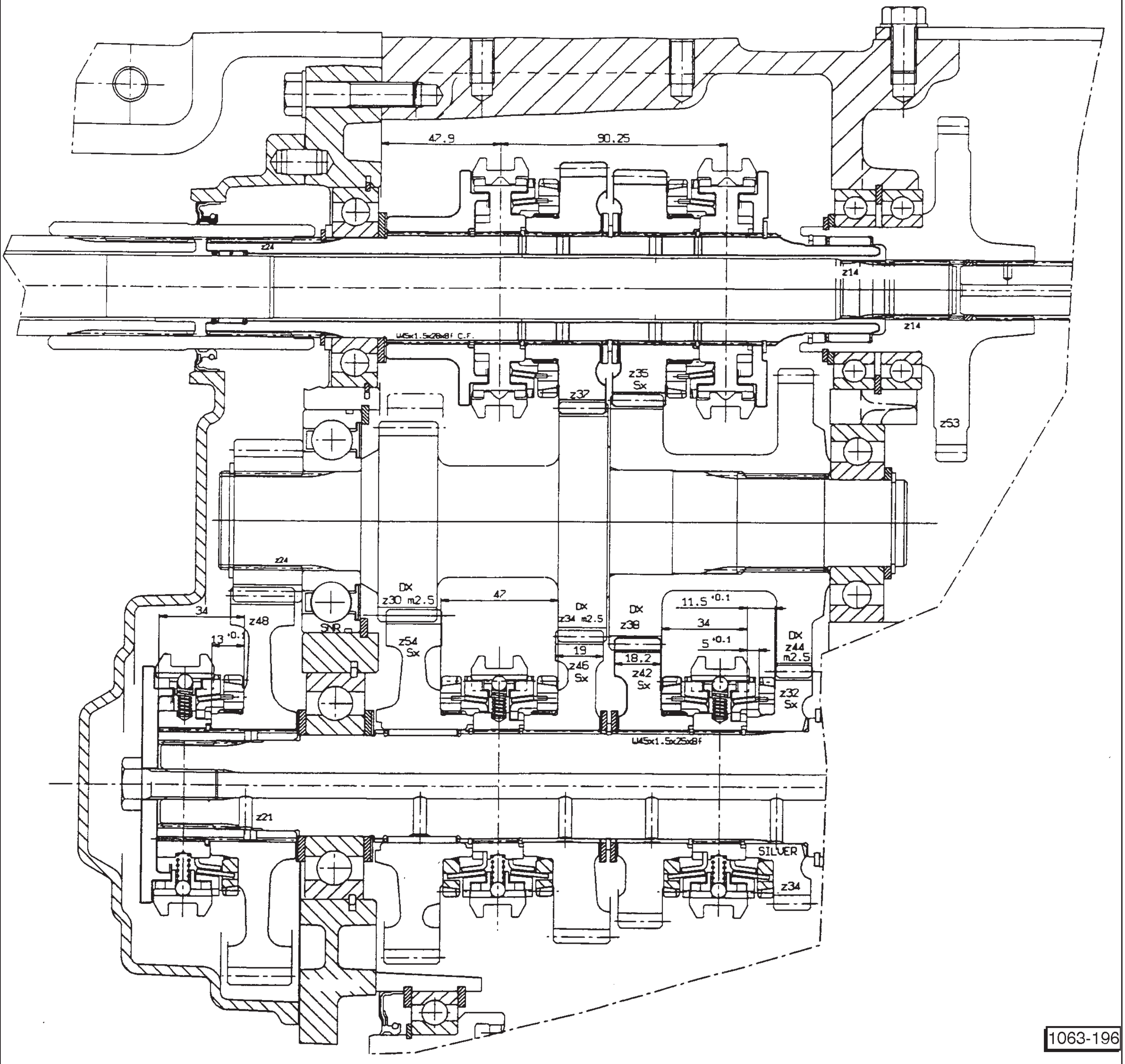


Fig. 2 - HYDRIVE with minireduction.

Menu 1

TESTS AVAILABLE

MENUS

1 - ENGINE ECU

2 - HML & REV

SELECTION:__

Menu 2

HML & REVERSER

FIRMWIRE S 1.4 A

PRESS A KEY

Menu 3

MENUS

1 - CALIBRATIONS
2 - TESTS
3 - CLUTCH CALIBRATION
4 - ALARMS

Menu 4

CALIBRATION

1 - CLUTCH ped.

2 - OPTIONAL

(E) EXIT

Menu 5

CLUTCH CALIBRATIONS

FULLY DEPRESS CLUTCH

AND PRESS (B) TO SAVE

THE 0% VALUE, THEN RELEASE AND PRESS

(A) TO SAVE THE 100% VALUE

CURRENT VALUE - 000% - 095
SENSOR MEAS. - > 172
CURRENT VALUE - 100% - 190

(E) EXIT

Menu 6

SELECT

DISABLE / ENABLE

1 - ARMREST JOYSTK.	X
2 - GROUP – HML	X
3 - EL. ENG. GOV.	X
4 - NOT USED--	
5 - EVP - COMAT.	--
6 - EVP - DISA	X
7 - EVP - BOSCH	--
8 - NOT USED--	

KEY:
X = ENABLED -- = DISABLED
(B) SAVE (C) RENEW

(E) EXIT

Menu 7

TESTS MENU

1 - TEST EVS
2 - AUTOTEST EVS
3 - TEST H/W

(E) EXIT

Menu 8

SOLENOID VALVE TESTS

REVCM	20.5V
A - REV	00.0V
1 - EVP	0.00A
2 - EVD	0.00A
B - HML	00.0V
3 - EVL	0.00A
4 - EVM	0.00A
5 - EVH	0.00A
EN - AL	
ENREV	----------------------
ENHML	----------------------

(C) RESET

(E) EXIT

Menu 9

DIAGNOSTICS

(IN ORDER OF PRIORITY)

NO ALARM

(E) EXIT

Menu 10

HARDWARE TEST

VOUT	------	05.0 V
V6 V2	------	07.3 V

A) BEEP --------------------

(E) EXIT

Menu 11

TEST & MONITORS

WARNING ! ! ! !

IN THE MONITORS THE TRACTOR IS 100% OPERATIVE!

0 - MISC.
1 - CONTROLS
2 - DIAGNOSTIC

(E) EXIT

Menu 12

PRX - PEDAL	00000
PRX - AUTOM.	00000
PRX . TOTALE	00000

ENGINE PED. 000% : POW -125% |
TRANSMISS. T.OIL = 020
GEAR: 3 z A M NR

RPM 00000 - SVC
REV. RPM 00000
WH. Km/h 00.0
|-( )-|------

(E) EXIT

Menu 13

```
          / - CONTROL - STG
          |          FWD
          \ - - _C_/_F_-|_ _REV
                     |
CLU. PED.            | - - - - - -
SW -                 |   | C.B -
PS -                 | - - - - - -
- - - - - - - - - - - - - - - - - -
JOYSTK.
/ - - - - - - - -    / - - - - - -
:FWD:                | HML +
:REV:                | HML +
: - - - - - :        \ - - - - -
: - CNS - :
( E ) EXIT
```

Menu 14

```
DIAGNOSTICS
(IN ORDER OF PRIORITY)

   NO ALARM

( E ) EXIT
```

Menu 19

```
SHUTTLE CALIBRATION
F = 000  O  ALRN  4  0
Fill Oil TMPK           1.32
Filling  RPMK           1.10

PRX . CLU. FWD.         07.8
PRX . CLU. REV.         08.0

ADI . CLU. FWD.         0.49
ADI . CLU. REV.         08.0

CORRECTION              01090
FILLG. TIME             00000
EVP - CURRNT            00000
( E ) EXIT
```

Menu 20

```
END OF CALIBRATION
COMPLETED               OK !

PRX . CLU. FWD.         05.5
PRX . CLU. REV.         05.5

ADI . CLU. FWD.         0.60
ADI . CLU. REV.         0.60

( E ) EXIT
```

Menu 15

```
CALIBRATION MENU

1 - MANUAL CALIBRATION
2 - AUTOMATIC CALIBRATION

EXIT
```

Menu 16

```
SET TRACTOR

- LEVEL
- 1500 RPM
- OIL Tmp. = 35G.C.
- NORMAL RANGE
- GEAR 2nd H

PRESS KEY
```

Menu 21

```
ALARM LIST
(FROM MOST RECENT)

NO ALARM

(C) CANCEL ALARM
( E ) EXIT
```

Menu 22

Menu 17

```
SHUTTLE CALIBRATION
F = 000  0  MURN  4  0
Fill Oil TMPK                 1.32
Filling  RPMK                 1.10
( 1 ) F 1   4)   5)   6)   7)   SF
PRX . CLU. FWD .              07.8
PRX . CLU . REV.              08.0
( 2 ) F 2   9)      A / M
ADI . CLU. FWD.               0.49
ADI . CLU. REV.               08.0
( F )  SAVE DATA   A) - B) + C) - D) +
CORRECTION                    01090
FILLG. TIME                   00000
EVP - CURRNT                  00000
( E ) EXIT
```

Menu 18

```
SET TRACTOR
- LEVEL
- 1500 RPM
- OIL Tmp. = 35 G.C.
- NORMAL RANGE
- GEAR 2nd  H

PRESS KEY AND THEN SELECT DI-
RECTION FOR CALIBRATION!

WAIT UNTIL MACHINE MOVES OFF
THEN SELECT NEUTRAL!
```

LIST OF ALARMS

CODES	MESSAGE on the TESTER	DESCRIPTION
11	"EvL State No OK"	Failure of the low range Elecro-valve
12	"EvL ShortCircuit"	Short-Circuit of the low range Electro-valve
13	"EvL Open Circuit"	Disconnected low range Electro-valve
14	"Sens. RPM Open"	Disconnected engine speed sensor
15	"Sns.Tmp Oil Open"	Disconnected oil temperature sensor
	"Sns.Tmp Oil S.C."	Short-Circuit oil temperature sensor
16	"Direct.Lev. Open"	Disconnected direction commands on the armrest
	"Direct.Lev. S.C."	Short-Circuited direction commands on the armrest
	"Direct.Lev. N. V."	Disconnected direction commands on the armrest
21	"EvM State No OK"	Failure of the medium range Elecro-valve
22	"EvM ShortCircuit"	Short-Circuit of the medium range Electro-valve
23	"EvM Open Circuit"	Disconnected medium range Electro-valve
24	"Sens.Wheel Open"	Disconnected speed sensor
25	"Display Fault"	Disconnected or broken led bar. This message is only dysplayed by the tester
26	"SteeringN/C Open"	Consent/neutral command signal disconnected
	"SteeringN/C S.C."	Consent/neutral command signal short-circuited
31	"EvH State No OK"	Failure of the high range Elecro-valve
32	"EvH ShortCircuit"	Short-Circuit of the high range Electro-valve
33	"EvH Open Circuit"	Disconnected high range Electro-valve
34	"Sens. Revrs Open"	Disconnected inverter speed sensor
35	"Pos. Pedal open"	Disconnected clutch pedal sensor
	"Pos.Ped.S.C./Open"	Disconnected or short-circuited clutch pedal sensor
	"Pos. Pedal N.V."	Broken clutch pedal sensor
36	"SteeringF/B Open"	Direction command signal disconnected
	"SteeringF/B S.C."	Direction command signal short-circuited
	"SteeringF/B N.V."	Broken direction command button
41	"HML+ButtonPushed"	Damaged HML increase button

42	"HML-ButtonPushed"	Damaged HML increase button
43	"Missed Power Inf"	Absence of engine power signal
44	"EvP State No OK"	Failure of the proportional Electro-valve
45	"Pos.Ped. “B” Open"	Disconnected clutch pedal sensor
46	"ShortCirc.Buzzer"	Short-Circuited connection to the beeper
51	"EvD State No OK"	Failure of the directional Electro-valve
52	"EvD ShortCircuit"	Short-Circuit of the directional Electro-valve
53	"EvD Open Circuit"	Disconnected directional Electro-valve
54	EvP ShortCircuit"	Short-Circuit of the proportional Electro-valve
55	"HMLrelay St.N.V."	Internal failure to the ECU (PWM or HML relay)
	"S.C. HML Power"	
	"REVrelay St.N.V."	
	"S.C. REV Power"	
	"Polarizz.Com.REV"	
	" Alim. Amplif. opr"	
	"ClutchPedalSens"	
56	"EvP Open Circuit"	Disconnected proportional Electro-valve
61	"ServicePrxMissed"	Loss of main hydraulic service pressure. Failure in the hydraulic circuit
62	"PressurePropport"	Low pressure after the proportional electro-valve. Sensor or proportional Electro-valve failure
63	"E2PROM Fault"	Replace the E2PROM
64	"Configurat.Error"	Program configuration error. Check the setting of the HML Group Electro-valves
71	"Sens.Revrs C.C."	Short-Circuited inverter speed sensor
72	"Sens.RPM C.C."	Short-Circuited engine speed sensor
73	"Slip Clt. Revrs"	High slippage of the inverter clutch
74	"Miss PrssProprt"	Low pressure after the proportional Electro-valve. Sensor or proportional Electro-valve failure
75	"S.C. HML Group"	HML Group Short-Circuited.Check in the wiring
76	"S.C. REV Group"	Short-Circuited inverter Group. Check the wiring

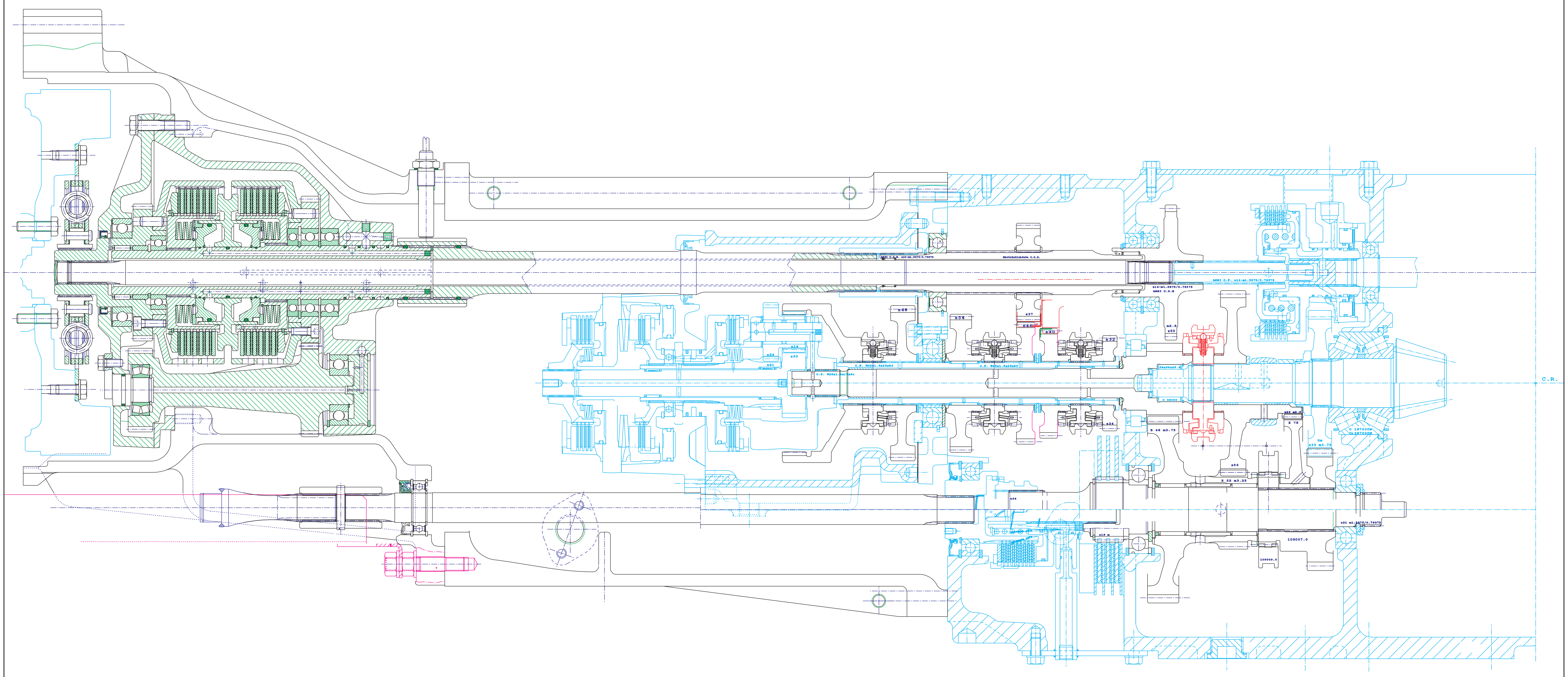


Fig. 3 - Longitudinal section through transmission with HYDRIVE.

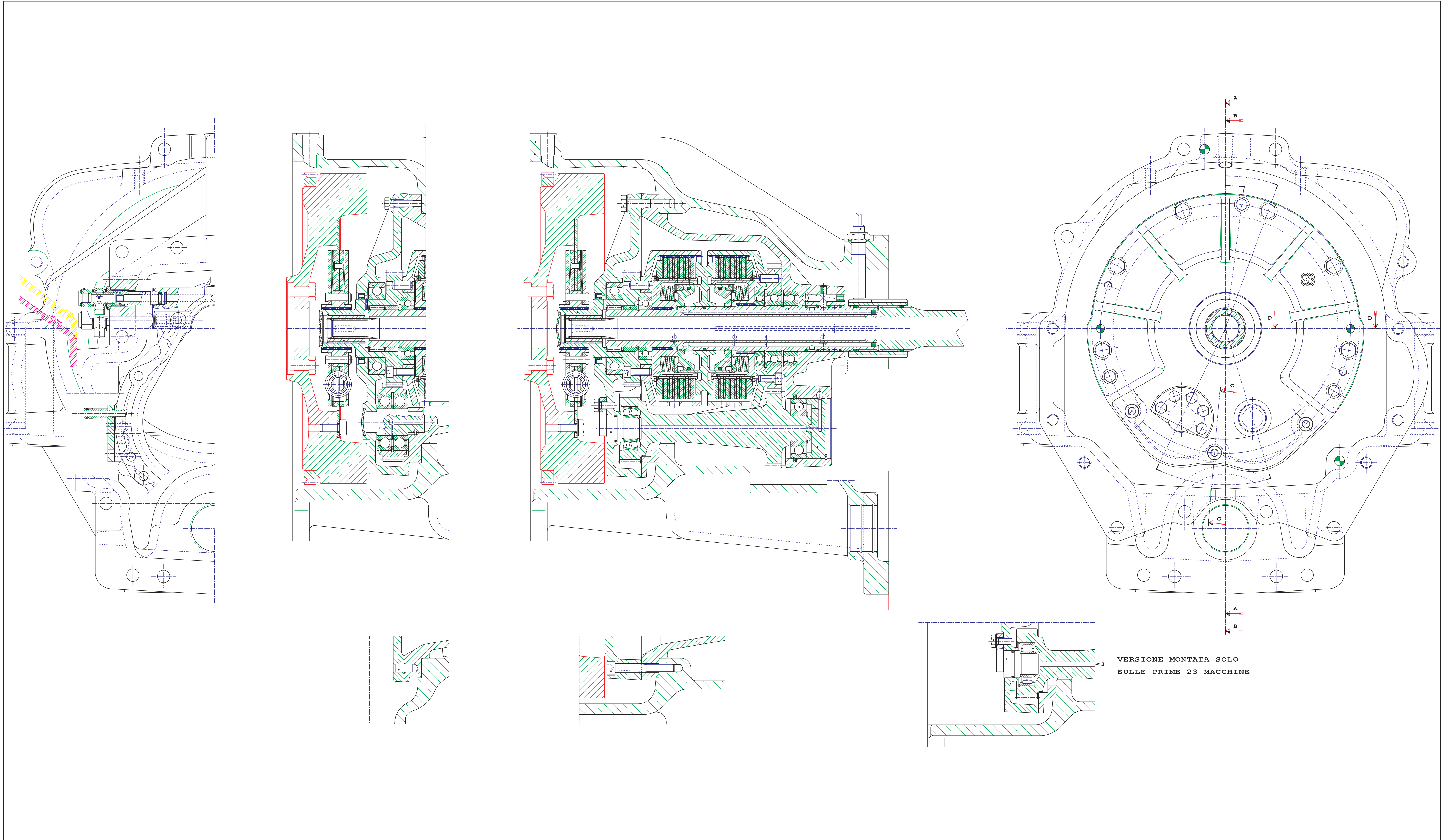


Fig. 4 - Hydrive.

INSTALLATION OF THE SHUTTLE UNIT

Pre-assembly of the Belleville springs

Arrange the Belleville springs on the hubs as shown in figure 5 and position the snap ring.

During assembly, ensure that the voids in the clutch plates are aligned with the voids in the bell housings as shown in detail **A** and as indicated by arrows **B** in figure 6.
Note: the voids in the housings are aligned with the series of oil drain holes.

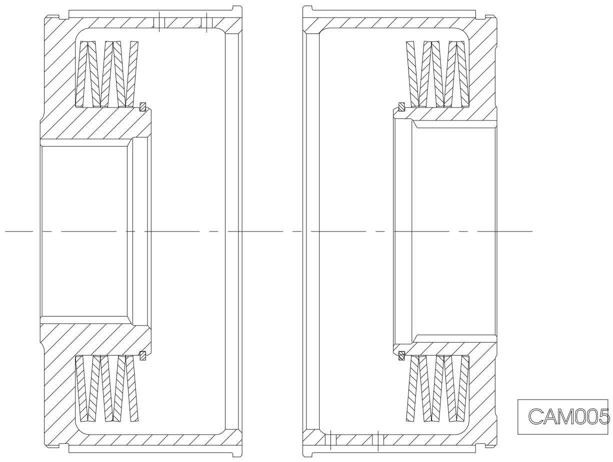


Fig. 5 - Shuttle hubs with Belleville springs.

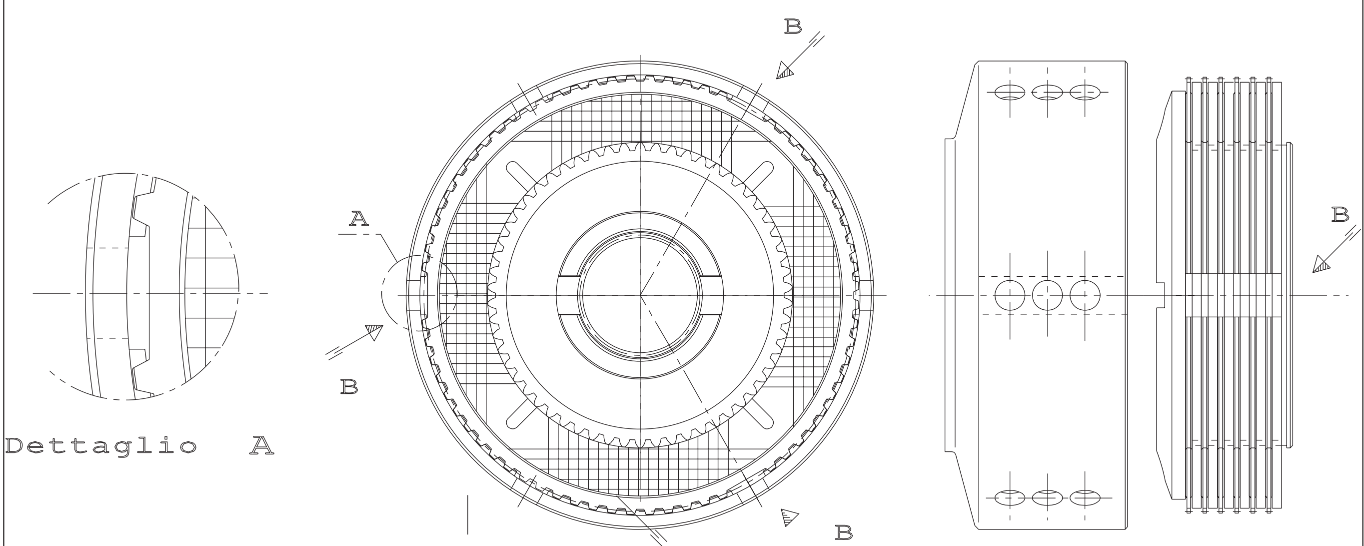


Fig. 6 - Assembly of compound gears on the relative housings.

Assembly of the compound gears
Assemble the gears with the relative housings by inserting the locating dowels and tightening the screws to a torque of 20 Nm; prior to assembly, apply Loctite 270 to the threads.

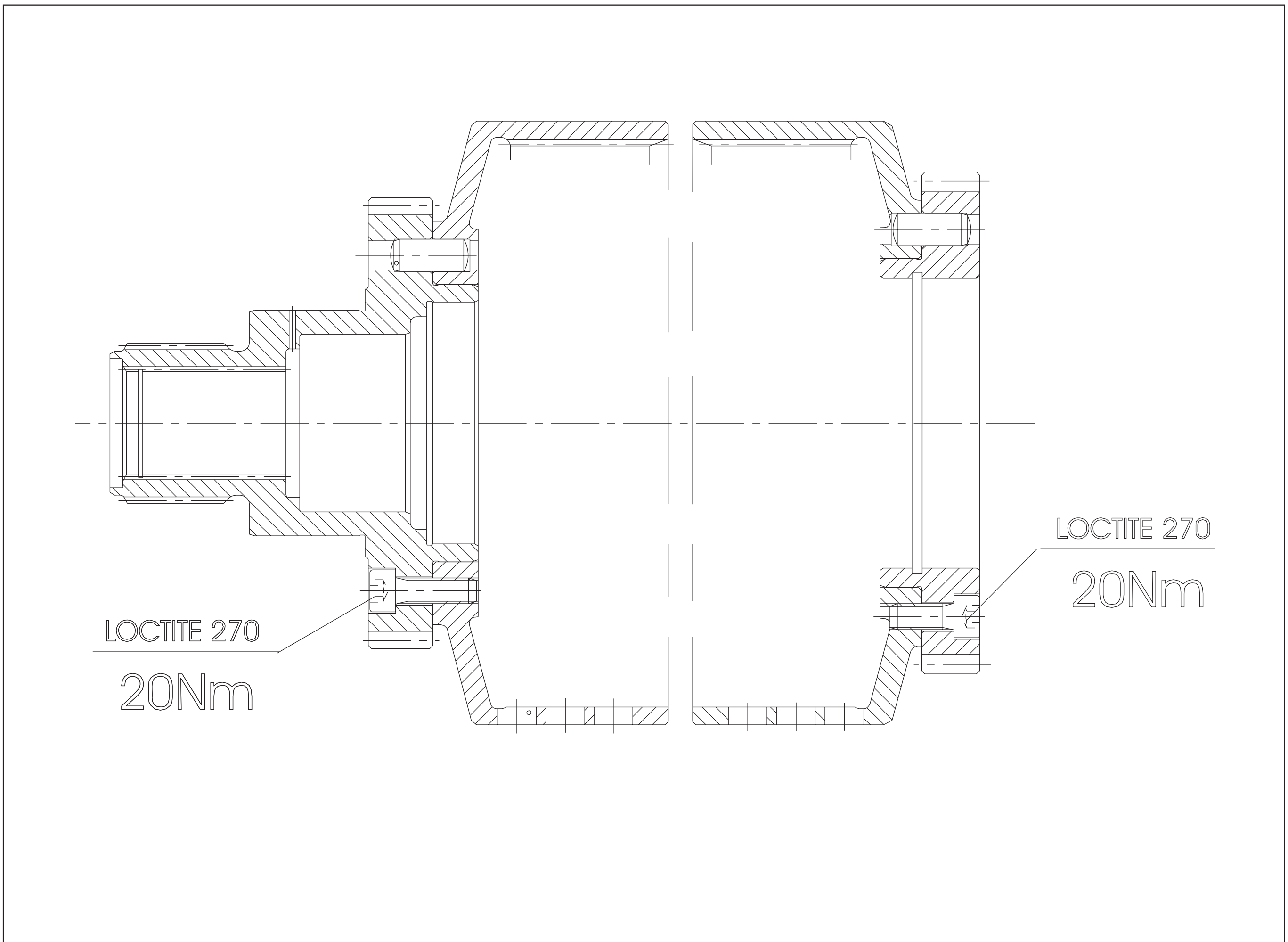


Fig. 7 - Assembly of compound gears and relative housings.

Adjustment of the shuttle unit

Pre-assemble front cover **A** and measure the end play in the position indicated in the detail of figure 8; install shims to obtain an end play of 0.05 to 0.15.

Covers **A** should be fixed after having set the end play; apply the sealant PIANERMETIC to the screw threads and tighten screws to a torque of 25Nm.

Installation of the shuttle unit
Before connecting the shuttle unit to the engine, check that the specific flywheel is fitted and attach the flexible coupling without applying grease to the splines.

Install the shuttle unit and tighten the screws to a torque of 50 Nm.

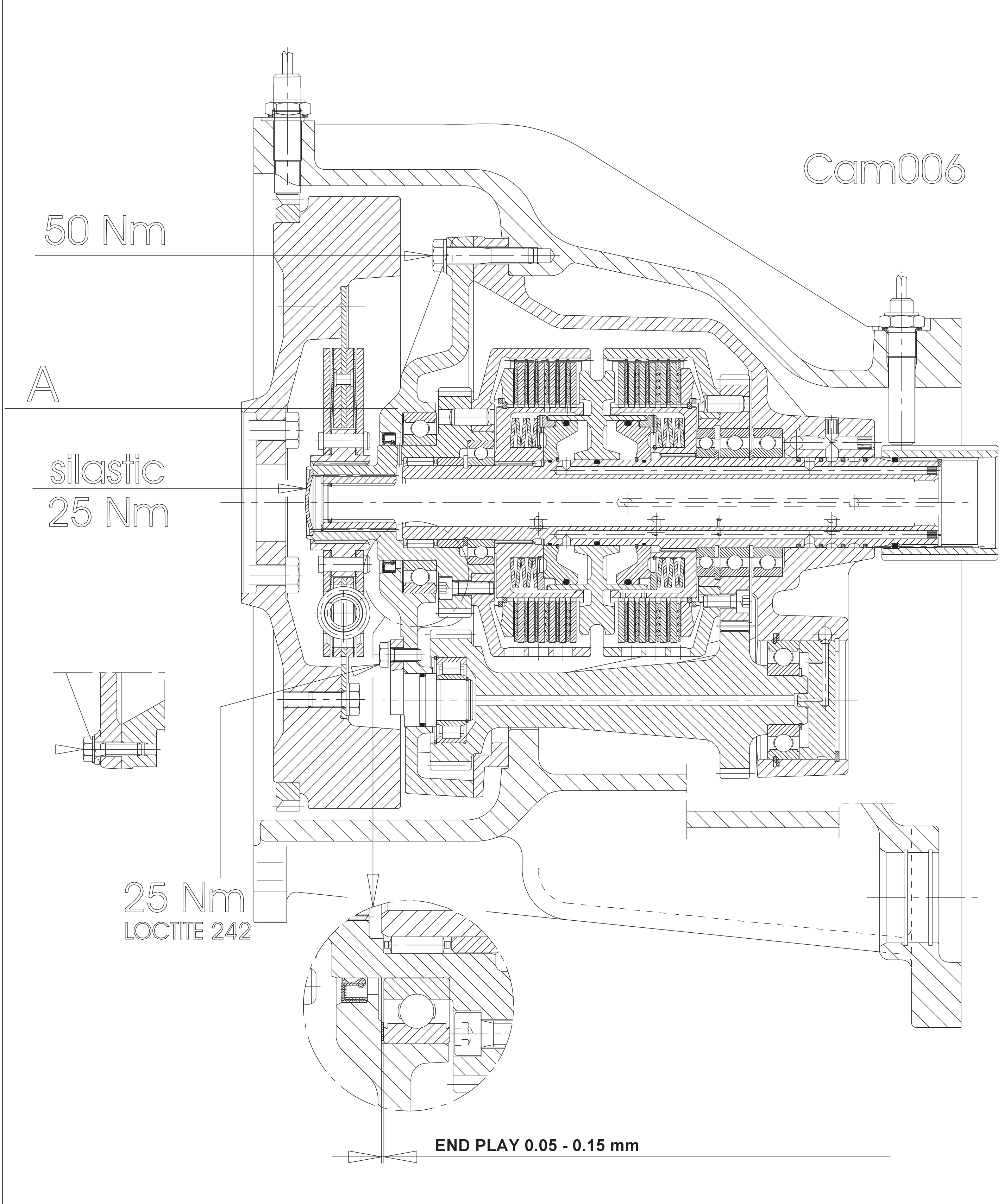


Fig. 8 - Adjusting the end play of the shuttle unit.

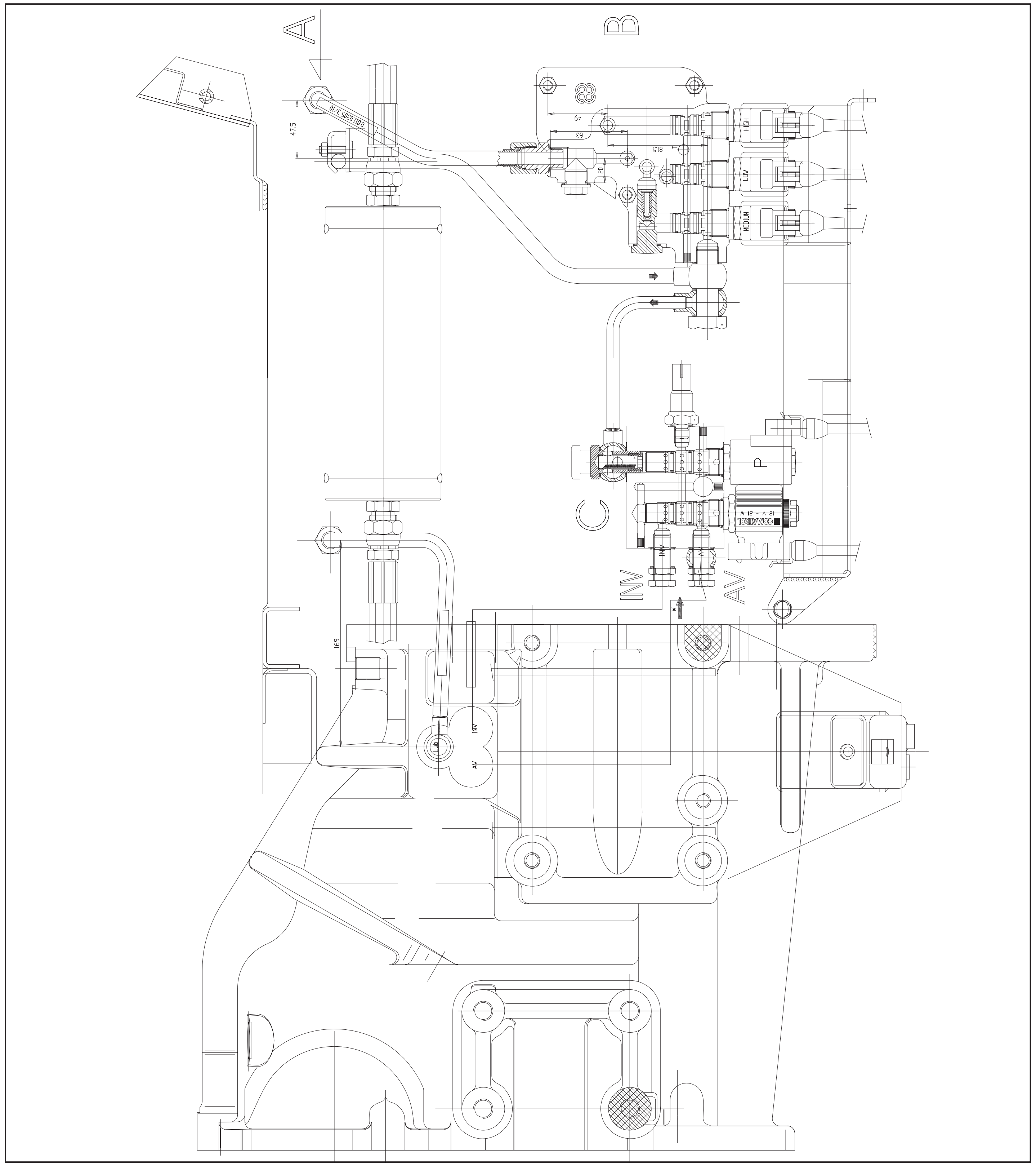
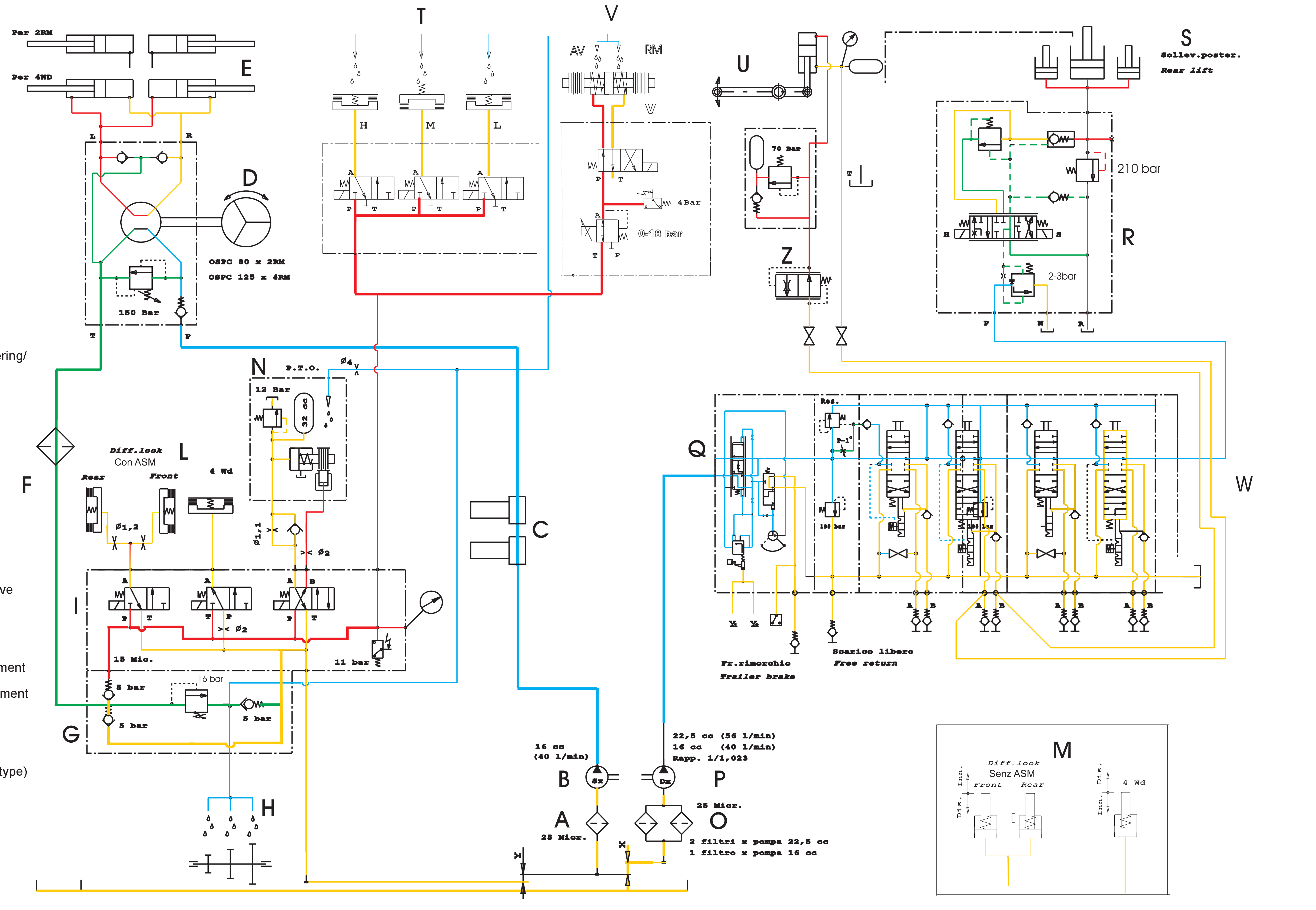


Fig. 9 - Hydraulic circuit of Agroshift and Hydrive controls.

A - Oil from hydraulic power unit for the PTO - BD - 4WD controls
B - Agroshift solenoid control valves (H - M - L)
C - Hydrive solenoid control valves
AV - Forward gears
INV - Reverse gears

Yellow = Oil discharge (or intake)
Blue = Low pressure oil
Green = Return line from hydrostatic steering/ exhaust line from lift
Red = Pressurised oil



A - Oil filter
B - Oil pump
C - Acoustic filter
D - Power steering directional control valve
E - Steering cylinders
F - Oil cooler
G - Pressure control valves assembly
H - Transmission lubrication
I - Hydraulic power unit
L - Differential locking and 4WD engagement with ASM
M - Differential locking and 4WD engagement without ASM
N - Rear P.T.O. clutch
O - Oil filter
P - Hydraulic pump
Q - Hydraulic trailer brake control valve
R - Hydraulic circuit of the lift (electronic type)
S - Rear lift cylinders
V - Hydrive unit
T - Agroshift unit
U - Front lift
Z - Holding valve and antishock group
W - Auxiliary spool valve

Fig. 10 - Hydraulic diagram (version with Agroshift and with Hydrive).