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GENERAL:
Safety precautions

WARNING

This symbol is your safety alert sign.
It means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

AVOID ACCIDENTS

Most accidents occuring in the workshop are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason MOST ACCIDENTS CAN BE PREVENTED by recognizing the real cause and doing something about it before the accident occurs.
Regardless of the care used in the design and production of any type of equipment, there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.
A careful operator is the best insurance against an accident. The complete observance of one simple rule would prevent many thousand serious injuries each year.

That rule is:
ATTENTION: Never attempt to clean, oil or adjust a machine while it is in motion.

SAFETY PRECAUTIONS

GENERAL

- Study the Operator's Manual before starting, operating, maintaining, fuelling or servicing machine.
- Do not wear rings, wrist watches, jewelry or loose or hanging apparel, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as authorized for the job. Examples: Hard hats, safety shoes, heavy gloves, ear protectors, safety glasses or goggles.
- Machine should not be serviced with anyone in the operator's seat unless they are qualified to operate the machine and are assisting in the service.
- Never attempt to operate the machine or its tools from any other position that seated in the operator's seat.
- Never lubricate, service or adjust a machine with the engine running, except as called for in the Operator's Manuals.
- Shut off engine and check that hydraulic oil is no longer under pressure before removing caps and covers.
- Carry out all servicing operations with maximum care and attention.
- Shop or field service platforms and ladders used to maintain or service machinery should be constructed and maintained according to local or national requirements.
- Never check or fill fuel tanks, storage batteries or use starter fluid while smoking or near open flames, due to the presence of flammable fluid.
- Brakes are inoperative when manually released for servicing. Provision must be made to maintain control of the machine by blocking or other means.
- Ensure that the fuel gun is in contact with the filler when refuelling. To reduce the chance of a static electricity sparking maintain contact until after fuel flow is cut off.
- Use only designated towing or pulling attachment points. Use care in making attachment. Be sure pins and locks as provided are secure before pulling. Stay clear of drawbars, cables or chains under load.
- To move a disabled machine, use a trailer or low body truck if available.
- Load and unload on level ground affording full support to the trailer wheels.
- Use only grounded auxiliary power source for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shock.

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SPECIFICATION

	115-90 115-90 DT	130-90 Turbo 130-90 Turbo DT	140-90 Turbo 140-90 Turbo DT	160-90 Turbo 160-90 Turbo DT	180-90 Turbo 180-90 Turbo DT
Engine type (all versions)	FIAT Nat. aspirated 8065.05.000 (FIAT pump)	FIAT turbo- charged 8065.25.010 (FIAT pump)	FIAT turbo- charged 8065.25.000 (FIAT pump)	FIAT turbo- charged 8365.25.503 (FIAT pump)	FIAT turbo- charged 8365.25.502 (BOSCH pump)
WEIGHTS					
Operating weight (including lift, implement attachment, ballast weight support, tow hook and ROPS cab:					
— 2-wheel drive	4580 kg 10,099 lb	5210 kg 11,488 lb	5810 kg 12,811 lb	6190 kg 13,649 lb	6330 kg 13,958 lb
— 4-wheel drive	5010 kg 11,047 lb	5590 kg 12,326 lb	6350 kg 14,399 lb	6760 kg 14,906 lb	6890 kg 15,192 lb
ENGINE					
Type	Diesel 4-stroke, Nat. aspirated	Diesel 4-stroke, turbocharged	Diesel 4-stroke, turbocharged	Diesel 4-stroke, turbocharged	Diesel 4-stroke, turbocharged
Injection	direct				
No. of cylinders	6				
Cylinder sleeves	dry, press fit			wet	
Bore × stroke	104 × 115 mm (4.094 × 4.527 in)			115 × 130 mm (4.527 × 5.118 in)	
Displacement	5861 cm^3			8102 cm^3	
Compression ratio	17 to 1	16.5 to 1	16.5 to 1	15.5 to 1	15.5 to 1
Max. horsepower DGM/DIN, metric	84.6 kW (115 HP)	95.7 kW (130 HP)	103 kW (140 HP)	117.7 kW (160 HP)	132.4 kW (180 HP)
Max. output speed	2500 rpm			2200 rpm	





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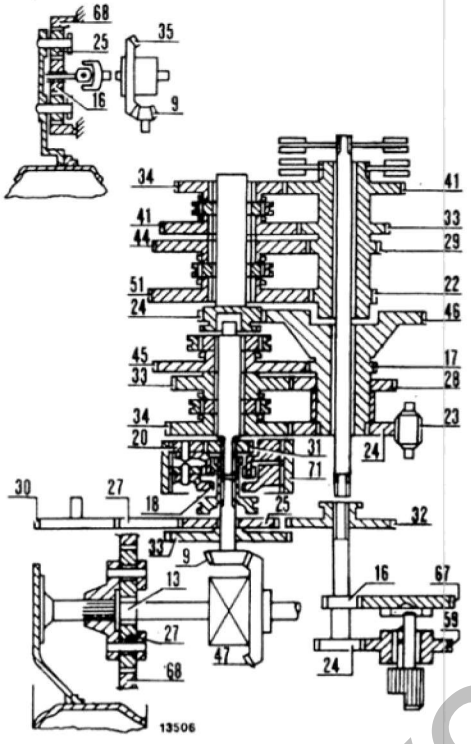
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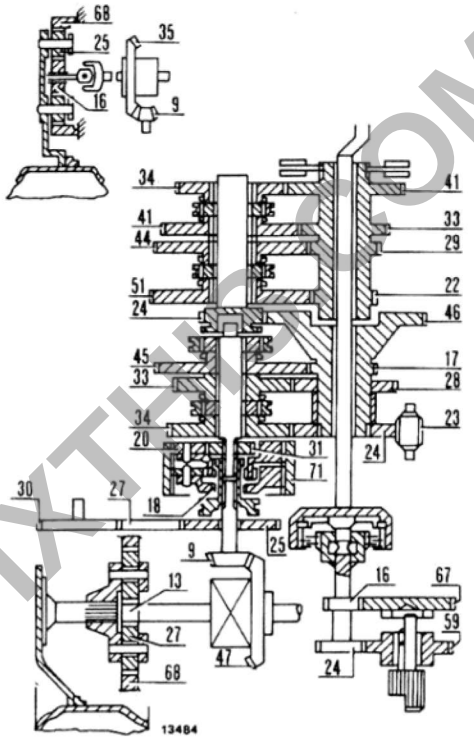
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POWER TRAIN SCHEMATICS

115-90 (12-24 speed)



130-90 Turbo and 140-90 Turbo (12-24 speed)



GEAR	Tractor speeds at maximum engine speed and with rear tyres:																			
	115-90						130-90 Turbo 140-90 Turbo				140-90 Turbo		160-90 Turbo						180-90 Turbo	
	18.4/15-38		23.1/18-34		16.9/14-38		18.4/15-38		23.1/18-34		20.8/38		18.4/15-38		23.1/18-34		20.8/38		20.8/38	
	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH	KPH	MPH
1 Low splitter	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12	0.2	0.12
2 »	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19
3 »	0.35	0.22	0.35	0.22	0.34	0.21	0.35	0.22	0.36	0.22	0.4	0.25	0.35	0.22	0.36	0.22	0.4	0.25	0.4	0.25
4 »	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.6	0.37	0.6	0.37
1 Nor. splitter	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25
2 »	0.6	0.37	0.7	0.43	0.6	0.37	0.6	0.37	0.6	0.37	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43
3 »	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50	0.8	0.50
4 »	1.2	0.74	1.2	0.74	1.1	0.68	1.2	0.74	1.2	0.74	1.2	0.74	1.2	0.74	1.2	0.74	1.3	0.81	1.3	0.81
1 High splitter	1.0	0.62	1.0	0.62	0.9	0.56	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62
2 »	1.5	0.93	1.5	0.93	1.4	0.87	1.5	0.93	1.5	0.93	1.5	0.93	1.5	0.93	1.5	0.93	1.5	0.93	1.5	0.93
3 »	1.8	1.12	1.8	1.12	1.7	0.06	1.8	1.12	1.8	1.12	1.9	1.18	1.8	1.12	1.8	1.12	1.9	1.18	1.9	1.18
4 »	2.7	1.68	2.7	1.68	2.6	1.61	2.7	1.68	2.7	1.68	2.8	1.72	2.7	1.68	2.7	1.68	2.8	1.74	2.8	1.74
1 Low	2.0	1.24	2.1	1.30	2.0	1.24	2.0	1.24	2.1	1.30	2.1	1.30	2.1	1.30	2.1	1.30	2.2	1.37	2.2	1.37
2 »	3.1	1.93	3.2	1.90	3.0	1.86	3.1	1.93	3.2	1.99	3.3	2.05	3.1	1.93	3.2	1.99	3.3	2.05	3.3	2.05
3 »	3.8	2.36	3.8	2.36	3.7	2.30	3.8	2.36	3.9	2.42	4.0	2.48	3.8	2.36	3.9	2.42	4.0	2.48	4.0	2.48
4 »	5.7	3.54	5.8	3.60	5.5	3.41	5.7	3.54	5.8	3.60	6.0	3.73	5.8	3.60	5.8	3.60	6.0	3.73	6.0	3.73
1 Normal	4.6	2.86	4.6	2.86	4.4	2.73	4.6	2.86	4.6	2.86	4.8	2.92	4.6	2.86	4.7	2.92	4.9	3.04	4.9	3.04
2 »	7.0	4.35	7.1	4.41	6.8	4.22	7.0	4.35	7.1	4.41	7.4	4.60	7.1	4.41	7.2	4.47	7.4	4.60	7.4	4.60
3 »	8.6	5.34	8.7	5.41	8.3	5.16	8.6	5.34	8.7	5.41	9.0	5.59	8.6	5.34	8.7	5.41	9.1	5.65	9.1	5.65
4 »	12.8	7.95	13.0	8.08	12.4	7.70	12.8	7.95	13.0	8.08	13.5	8.39	12.9	8.02	13.1	8.14	13.6	8.45	13.6	8.45
1 High	10.4	6.46	10.5	6.52	10.0	6.21	10.4	6.46	10.5	6.52	10.9	6.77	10.5	6.52	10.6	6.59	11.0	6.83	11.0	6.83
2 »	15.8	9.82	16.0	9.94	15.3	9.51	15.8	9.82	16.0	9.94	16.6	10.31	16.0	9.94	16.2	10.07	16.8	10.44	16.8	10.44
3 »	19.3	11.99	19.6	12.18	18.6	11.56	19.3	11.99	19.6	12.18	20.3	12.61	19.5	12.12	19.8	12.30	20.5	12.74	20.5	12.74
4 »	29.0	18.02	29.3	18.21	27.9	17.34	29.0	18.02	29.3	18.21	30.4	18.89	29.2	18.14	29.6	18.39	30.7	19.08	30.7	19.08
1 Rev. splitter	0.3	0.19	0.3	0.19	0.3	0.19	0.3	0.19	0.4	0.25	0.4	0.25	0.3	0.19	0.4	0.25	0.4	0.25	0.4	0.25
2 »	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.5	0.31	0.6	0.37	0.5	0.31	0.5	0.31	0.6	0.37	0.6	0.37
3 »	0.7	0.43	0.7	0.43	0.6	0.37	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43	0.7	0.43
4 »	1.0	0.62	1.0	0.62	0.9	0.56	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62	1.0	0.62
1 Reverse	3.8	2.36	3.9	2.42	3.7	2.30	3.8	2.36	3.9	2.42	4.0	2.48	3.8	2.36	3.9	2.42	4.0	0.25	4.0	0.25
2 »	5.8	3.60	5.9	3.67	5.6	3.48	5.8	3.60	5.9	3.67	6.1	3.79	5.9	3.67	5.9	3.67	6.2	3.85	6.2	3.85
3 »	7.1	4.41	7.2	4.47	6.9	4.29	7.1	4.41	7.2	4.47	7.5	4.66	7.2	4.47	7.3	4.54	7.5	4.66	7.5	4.66
4 »	10.7	6.65	10.8	6.71	10.3	6.40	10.7	6.65	10.8	6.71	11.2	6.96	10.8	6.71	10.9	6.77	11.3	7.02	11.3	7.02

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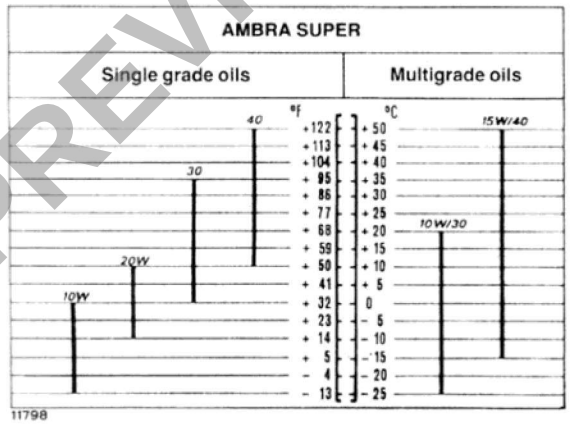
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CAPACITIES

DESCRIPTION	LUBRICAN FIAT RECOMMENDED PRODUCT	115-90			130-90 Turbo		
		litres	pints	kg	litres	pints	kg
Sump and filter oil	**Oliofiat AMBRA SUPER**	15.2	26¾	13.7	15.2	26¾	13.7
Sump oil		13.3	23½	12	13.3	23½	12
Sensing bar support oil	**Oliofiat TUTELA MULTI F**	1.2	2	1.1	1.2	2	1.1
Transmission oil (standard shift)		18.3	32¼	16.5	18.3	32¼	16.5
Live front axle oil:							
— axle casing		10.8	19	9.7	10.8	19	9.7
— final drives (each)		2.1	3¾	1.9	2.1	3¾	1.9
Rear transmission (bevel drive, final drives, brakes) and lift oil:							
— 2-wheel drive		54.2(2)	95½	48.8(2)	56.5	99½	50.8
— 4-wheel drive		55.5(3)	97¾	50 (3)	58.9	103¾	53
POWER-SHIFT Transmission oil	**Oliofiat TUTELA GI/M**	—	—	—	—	—	—
Brake fluid	**Oliofiat AMBRA SUPER 10 W**	0.48	¾	0.45	0.48	¾	0.45
Clutch fluid		0.37	¾	0.35	0.37	¾	0.35
Front hub grease	**Oliofiat TUTELA G9**	—	—	—	—	—	—
Lubricator grease		—	—	—	—	—	—
Coolant (incl. expansion tank):							
— without cab	Water and **FIAT "PARAFLU 11"**	17	30	—	17	30	—
— with cab		19	33½	—	19	33½	—
Windshield washer fluid	Water and **FIAT "DP1"** (1)	2	3½	—	2	3½	—
Fuel (diesel oil):							
— Main tank	Diesel oil	180	317	—	180	317	—
— Auxiliary tank		100	176	—	100	176	—

SAE VISCOSITY OF OIL IN RELATION TO OUTDOOR TEMPERATURE



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TORQUE DATA

DESCRIPTION	Thread size	Torque		
		Nm	kgm	ft.lb
Engine block and cylinder head - valve gear - crank gear - Section 10				
Capscrew, cylinder head, (115-90, 130-90 Turbo and 140-90 Turbo, C_1, pages 19 and 20)	See tables below and on page 6, section 12			
Nut, cylinder head (160-90 Turbo and 180-90 Turbo, C_1, pages 21 and 22)	M16 × 1.5	226	23	166
Capscrew, main bearing cap (115-90, 130-90 Turbo and 140-90 Turbo, C_2)	See table below			
Capscrew, main bearing cap (160-90 Turbo and 180-90 Turbo, C_2)	M16 × 1.25	235	24	173
Capscrew, connecting rod cap (115-90, 130-90 Turbo and 140-90 Turbo, C_3)	See table below			
Capscrew, connecting rod cap (160-90 Turbo and 180-90 Turbo, C_3)	M14 × 1.5	118	12	87
Capscrew, flywheel (all models, C_4)	See table below			
Capscrew, rocker shaft brackets: — 115-90, 130-90 Turbo and 140-90 Turbo (C_5) — 160-90 Turbo and 180-90 Turbo (C_5)	 M8 × 1.25 M10 × 1.25	 24 49	 2.5 5	 18 36
Nut, crankshaft pulley hub (115-90, 130-90 Turbo and 140-90 Turbo, C_6)	M30 × 1.5	294	30	217
Capscrew, crankshaft pulley hub (160-90 Turbo and 180-90 Turbo, C_6)	M22 × 1.5	559	57	412
Fuel system - Section 15				
Capscrew, rear cover to GARRETT turbocharger (15, page 3)	—	10	1	7
Nut, GARRETT turbocharger turbine shaft (3)	—	see text		
Capscrew, GARRETT turbocharger compressor housing (13) to turbine housing (14)	—	15	1.5	11
Nut, HOLSET turbocharger turbine shaft (13)	—	18	1.8	13

ANGULAR TIGHTENING TORQUE DATA

DESCRIPTION	Thread size	Torque			Angle
		Nm	kgm	ft.lb	
Capscrew, cylinder head (115-90, 130-90 Turbo and 140-90 Turbo)	M12 × 1.25	60	6.1	44	90° + 90°
Capscrew, main bearing cap (115-90, 130-90 Turbo and 140-90 Turbo)	M14 × 1.5	80	8.2	59	90°
Capscrew, connecting rod cap (115-90, 130-90 Turbo and 140-90 Turbo)	M11 × 1.5	40	4.1	29.6	60°
Capscrew flywheel: — 115-90, 130-90 Turbo and 140-90 Turbo — 160-90 Turbo and 180-90 Turbo	 M12 × 1.25 M16 × 1.5	 40 100	 4.1 10.2	 29.6 73.7	 60° 60°

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— Drain rear drive housing.

— Disconnect accelerator link, engine shut-off cable from injection pump and tractormeter angle drive, fuel delivery and leak-back lines and lift inlet and outlet lines.

— Wherever possible, remove radiator.

— On DT versions, remove drive shaft with guard and front differential lock delivery line.

— For 160-90 Turbo and 180-90 Turbo, remove lines connecting transmission housing with oil cooler. On heated cab versions, disconnect water inlet and outlet lines to cab. On air conditioned versions disconnect lines from connectors with valves.

— Position stand under engine oil pan, placing two wooden wedges between front axle and support.

— Using two slings **293769**, hoist front axle support, remove six screws and separate front axle from engine, acting on front wheels.

— Hoist the engine using lift hook **290740/1** as shown on page 3, remove screws and bolts retaining engine to transmission and separate engine from transmission.

INSTALLATION

Reverse the removal procedure noting the following points:

— When assembling engine and transmission, slide transmission clutch and P.T.O. clutch shafts smoothly into associated driven splined hubs (115-90) or into transmission clutch driven plate hub and flywheel mounted P.T.O. splined hub (115-90 H, 130-90 Turbo, 140-90 Turbo, 160-90 Turbo and 180-90 Turbo).

— Strictly adhere to the torque data specified in the table.

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Apply equal pressure simultaneously on both ends of the shaft, pushing first towards the dial gauge and then in the opposite direction, checking that the gauge total indicator reading is below .53 mm (.021 in). If the reading is not as specified, disassemble and repair the unit as necessary.

On completion of the bearing end float and radial clearance check, install retaining ring (14, page 3) and the compressor body, ensuring that the reference marks applied on both compressor body and center body on disassembly are in alignment.
Install turbine body and tighten the collar nut (11).

TROUBLESHOOTING

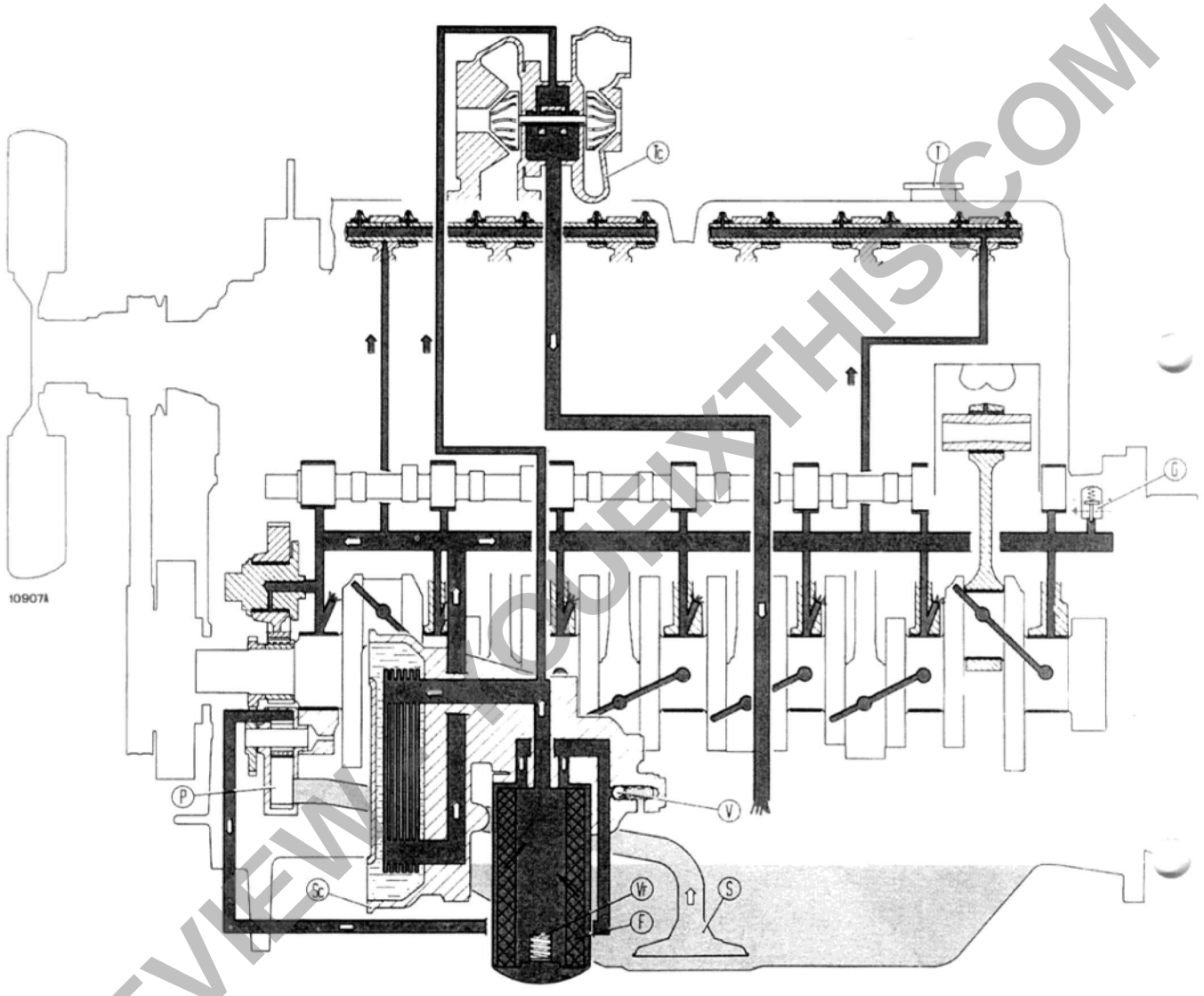
Defect	Cause	Remedy
1. Turbocharger noise or vibration.	a. Inadequate bearing lubrication.	Check lubrication system and overhaul turbocharger.
	b. Excessive end float and radial clearance.	Check float and clearance and overhaul turbocharger.
	c. Turbine or compressor wheel out of balance owing to damage or accumulation of foreign material.	Overhaul and, if necessary, replace damaged wheels.
2. Low engine power.	a. Injection pump out of adjustment.	Calibrate pump.
	b. Intake and exhaust manifold leakage.	Check intake and exhaust system, including nuts and bolts retaining turbocharger and manifold.
3. Low turbocharging pressure, high exhaust gas temperature and smoky exhaust.	Clogged air cleaner.	Carry out air cleaner maintenance.

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Lubrication system diagram (180-90 Turbo).

F. Filter - G. Low engine oil pressure sending unit - P. Pump - S. Suction filter - Sc. Oil cooler - T. Oil filler plu
relief valve - Vf. Filter bypass valve (cuts in when inlet pressure is 1.5 to 1.7 bar - kg/cm^2 or 21 to 24 psi highe
pinion - 2. Camshaft gear - 3. Idler gear - 4. Injection pump drive ge

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VALVE GEAR

(continued)

	115-90, 130-90 Turbo, 140-90 Turbo		160-90 Turbo, 180-90 Turbo	
	mm	in	mm	in
Tappets				
Tappet O.D.	14.950 to 14.970	.5886 to .5894	26.939 to 26.960	1.0606 to 1.0614
Tappet clearance in housing on engine block	.030 to .068	.0012 to .0027	.040 to .094	.0016 to .0037
— maximum wear clearance	.15	.006	.15	.006
Tappet oversize	.1-.2-.3	.004-.008-.012	.3-.4-.5	.012-.016-.020
Rockers				
Rocker bushing O.D.	21.006 to 21.031	.8270 to .8280	—	—
Rocker bore diameter	20.939 to 20.972	.8244 to .7902	—	—
Bushing interference fit in rocker	.034 to .092	.0013 to .0036	—	—
Rocker bracket bore diameter	18.016 to 18.034 (1)	.7093 to .7100 (1)	21.050 to 21.080	.8287 to .8299
Rocker shaft diameter	17.982 to 18.000	.7079 to .7087	21.015 to 21.036	.8273 to .8281
Rocker shaft clearance in bracket	.016 to .052	.0006 to .0020	.014 to .065	.0005 to .0026
— maximum wear clearance	.15	.006	.15	.006
Rocker spacer spring length				
— free	59.5	2.3425	96	3.7795
— under				
– 46 to 52 N, 4.7 to 5.3 kg (10.4 to 11.7 lb)	44	1.72323	—	—
– 25 N, 2.5 kg (5.5 lb)	—	—	62	2.4409
Valves, guides and springs				
Valve head diameter				
— Inlet	45.300 to 45.500	1.783 to 1.791	48.200 to 48.500	1.898 to 1.909
— Exhaust	37.500 to 37.750	1.476 to 1.486	40.700 to 41.000	1.6023 to 1.6141
Valve stem diameter	7.985 to 8.000	.3144 to .3149	7.945 to 7.960	.3128 to .3134
Valve face angle				
— 115-90, 130-90 Turbo and 140-90 Turbo — Inlet	60°30′ ± 7′		—	
— 115-90, 130-90 Turbo and 140-90 Turbo — Exhaust	45°30′ ± 7′		—	
— 160-90 Turbo and 180-90 Turbo	—		45°15′ to 45°20′	
Valve clearance				
— Timing check	.45	.0177	.41	.0161
— Normal (cold or warm)				
— inlet	.25	.0100	.30	.0118
— exhaust	.35	.138	.50	.0197
Useful cam lift				
— inlet	5.250	.2067	7.04	.277
— exhaust	5.677	.223	6.84	.269
Valve lift				
— inlet	9.31	.366	12.46	.490
— exhaust	10.07	.396	12.10	.476

(follows)

(1) Fitted and reamed.

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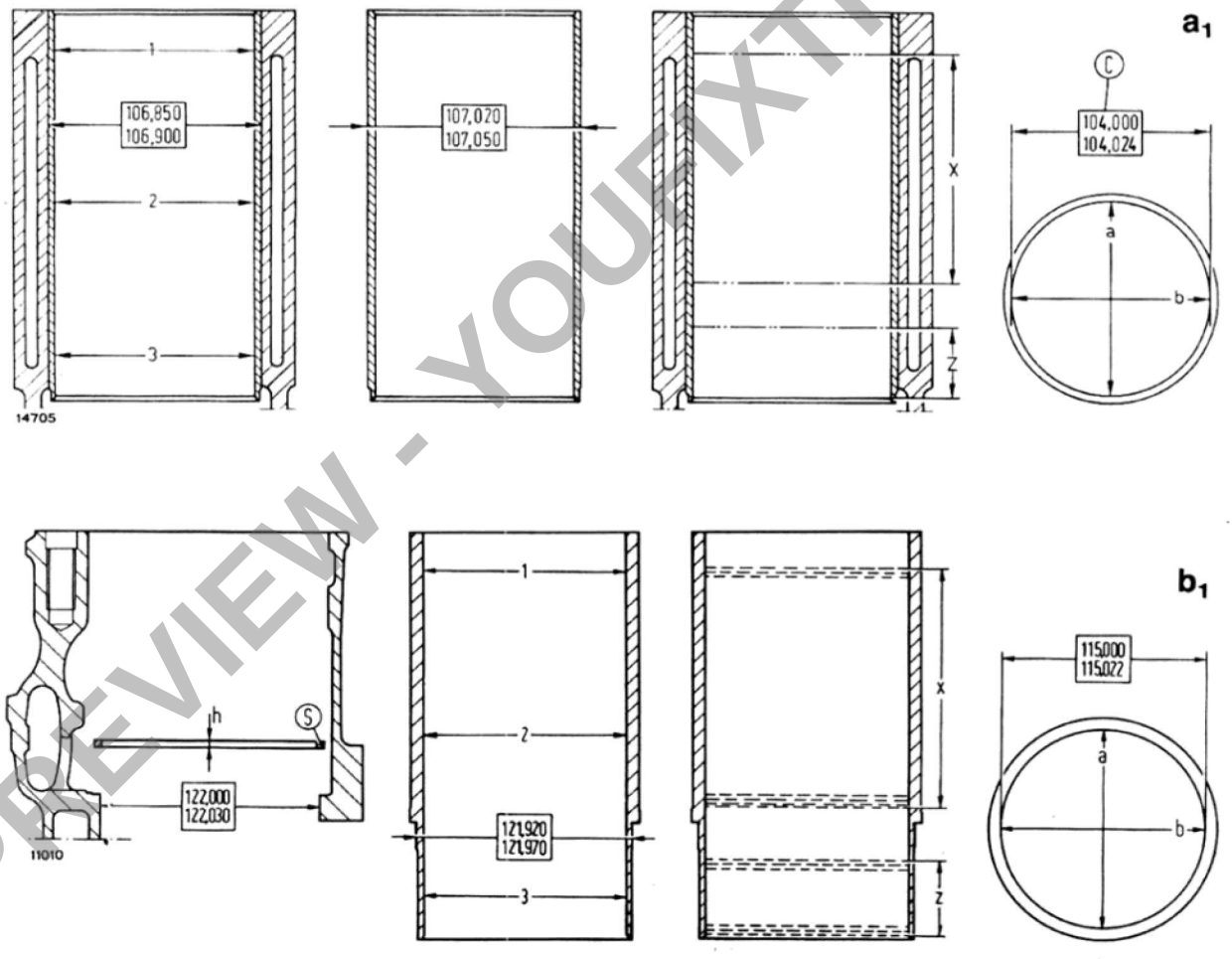
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CYLINDER SLEEVES

To inspect for wear proceed as follows:
— Measure the sleeve bore diameter over the swept area (X).
— The diameter reading should be taken in both the upper and lower part of the swept area in plane (a) parallel to the crankshaft and in plane (b) at right angles to it.
— Compare the readings to establish the amount of sleeve ovality and taper.

To check the piston working clearance measure the sleeve bore diameter over (Z) in plane (b) only.

If ovality or taper in excess of .12 mm (.0048 in), 115-90, 130-90 Turbo and 140-90 Turbo, or .15 mm (.0060 in), 160-90 Turbo and 180-90 Turbo, or piston working clearance in excess of .3 mm (.012 in) is detected, rebore (or renew) the sleeves to the oversize values envisaged (see page 1, section 10). After machining, check the size by taking 2 dial gauge readings at right angles (a and b) and at 3 depths (1,2 and 3). Subsequently, fit replacement pistons of suitable size and weight (see page 4, section 10).



Sleeve and block inspection data

a.b. Sleeve bore measurements at right angles - a_1. Models 115-90, 130-90 Turbo and 140-90 Turbo - b_1. Models 160-90 Turbo and 180-90 Turbo - C. Sleeve fitted bore diameter - h. Protrusion shim thickness (for values see section 10, page 1) - S. Protrusion shims - Z. Sleeve wear inspection length for assessment of piston fit (on plane b at right angles to crankshaft) - X. Sleeve wear inspection length (swept area) for assessment of ovality and taper on planes a and b - 1, 2, 3. New or re-bored sleeve bore measuring depth on planes a and b.

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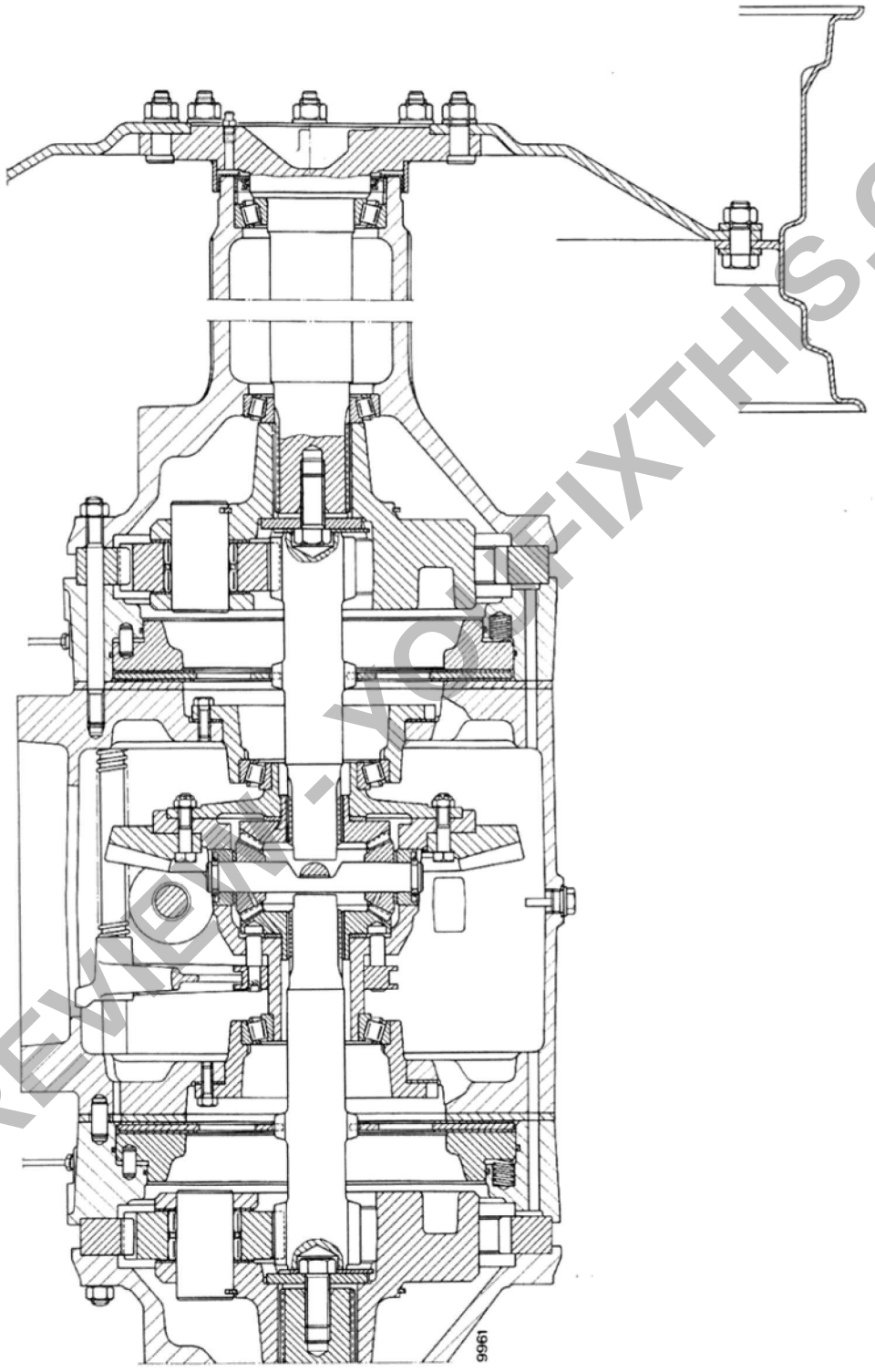


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POWER TRAIN:
Sections



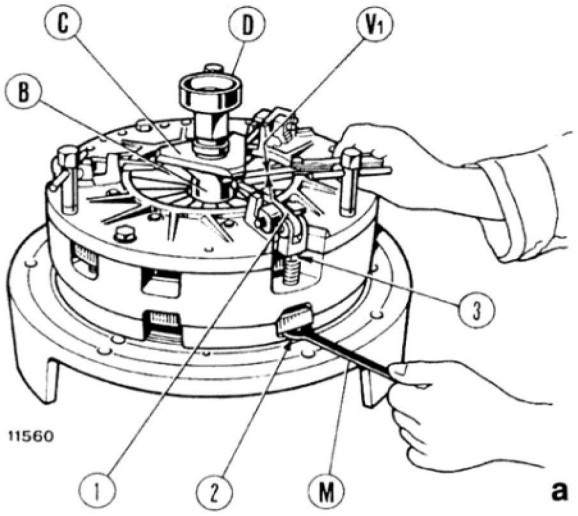
Power train cross section - 115-90 Tractors.

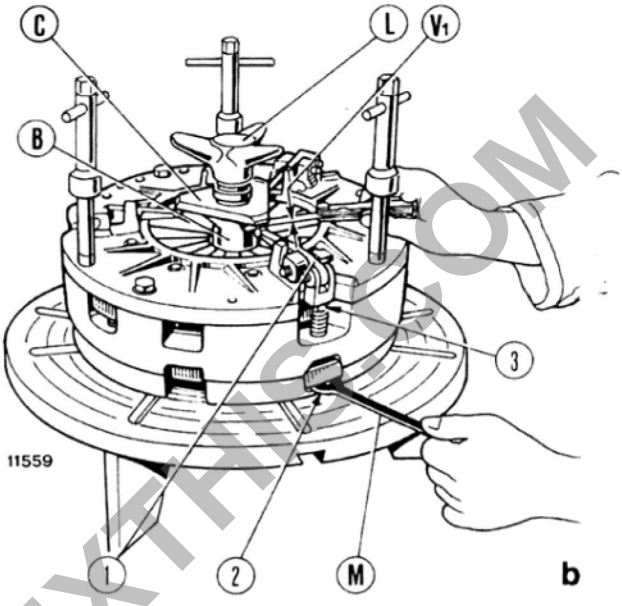
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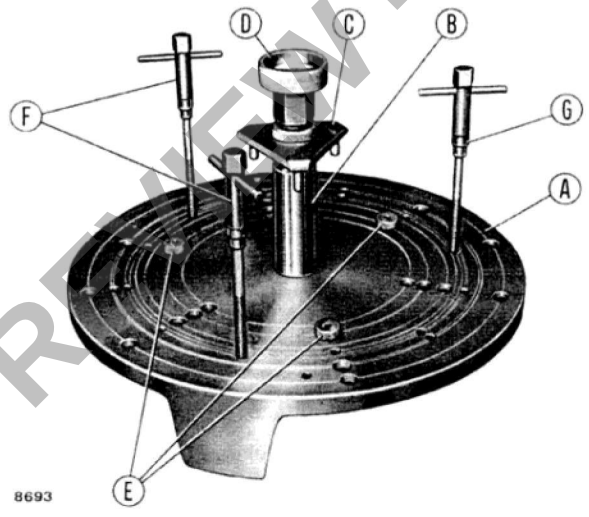


Checking and adjusting VALEO 12″/12″ PTO clutch release lever alignment on the bench using tool 291291/2 (fig. a) or universal tool 293650 (fig. b).

B. Spacer - C. Register - D. Nut - L. Knob - M. Wrench from set **293763** - V_1 = 1 mm (.004 in) for universal tool **293650** or 1.2 mm (.06 in) for tool **291291/2**. Clearance to be obtained between release lever ends (1) and register (C) - 1. Release levers - 2 and 3. Adjusting screw and lock nut.

LUK 12″/12″ CLUTCH OVERHAUL (115-90)

To disassemble, assemble and adjust the clutch use tool **291291/2**, or universal tool **293650.**

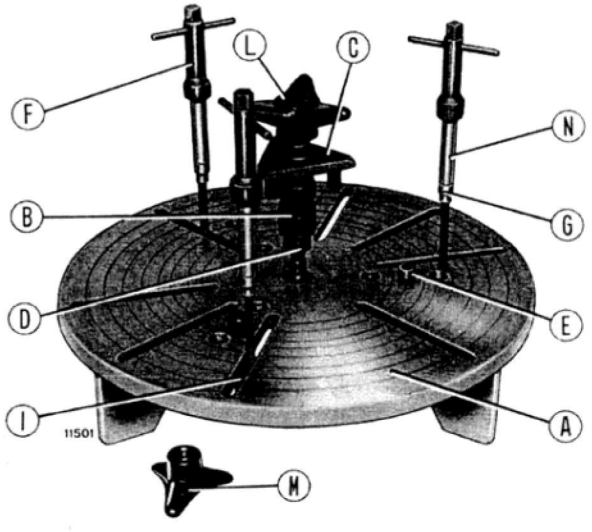


Parts of tool 291291/2 for LUK 12″/12″ clutch adjustment.

A. Base plate **292598** - B. Spacer **50.001** (to be constructed with reference to diagram on page 3) - C. Register **292939/1** - D. Nut **292344** - E. Locators **293733** - F. Fasteners **291293/1** - G. Fastener guide bushings **291293/1**.

To install clutch on tool **291291/2**, proceed as follows:

— place spacer (B) on base plate (A) and three locators (E) over 241 (9.5 in) PCD;



Parts of universal tool 293650 for LUK 12″/12″ clutch adjustment.

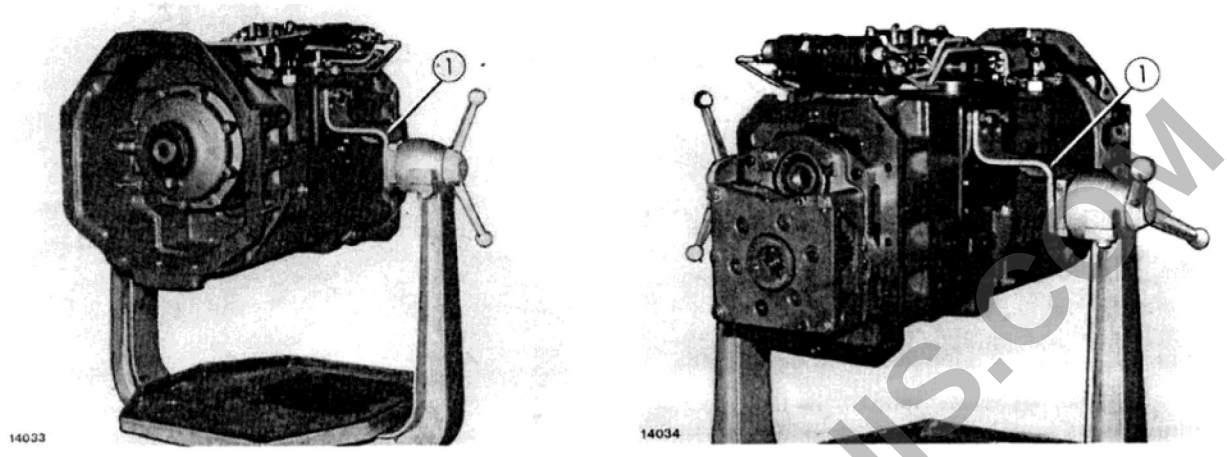
A. Base plate **293332/2** - B. Spacer **293741** - C. Register **293731** - D. Spacer locknut **293730** - E. Locators **293726** - F. Fasteners **293725** - G. Fastener guide bushings **293734**. - I. Pads **293755** - L. Register knob **293739**. - M. Locator knobs **293740**. - N. Fastener spacers **292345.**

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Power shift transmission installed on revolving stand 290086.

DISASSEMBLY

⚠ CAUTION ⚠

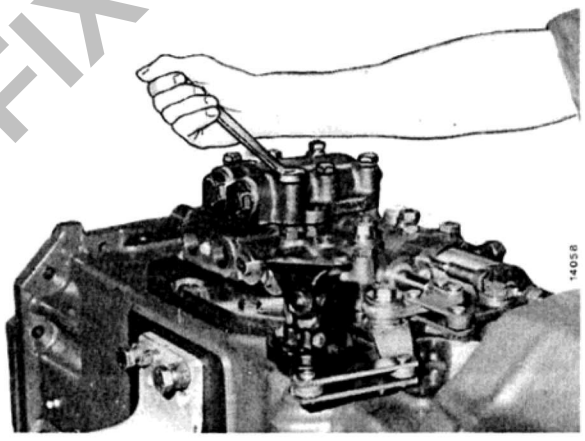
Handle all parts with care. Do not put hands or fingers between parts. Wear safety items such as goggles, safety shoes and gloves.

To facilitate disassembly operations, place transmission/rear transmission housing on revolving stand **290086** and secure through brackets **293868** (1). The proceed as follows:

— remove control valve and accumulator pipe fitting from transmission housing, retarder valve unit, control valve, transmission housing cover and accumulators. Remove control valve and accumulator pipes;

— take off brackets and remove accumulators;

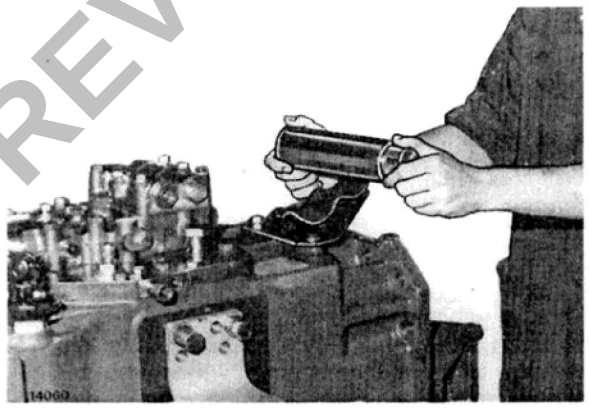
— remove control valve retaining screws and take off retarder valve unit;



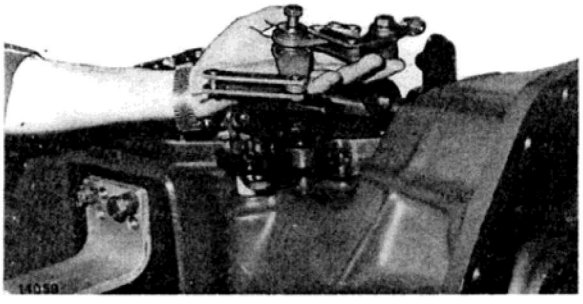
Removing (installing) retarder valves.

— disconnect pivots and lift off entire control valve linkage assembly as shown below;

— remove retarder valve nozzles (72, page 18) from control valve body;



Removing (installing) accumulators.



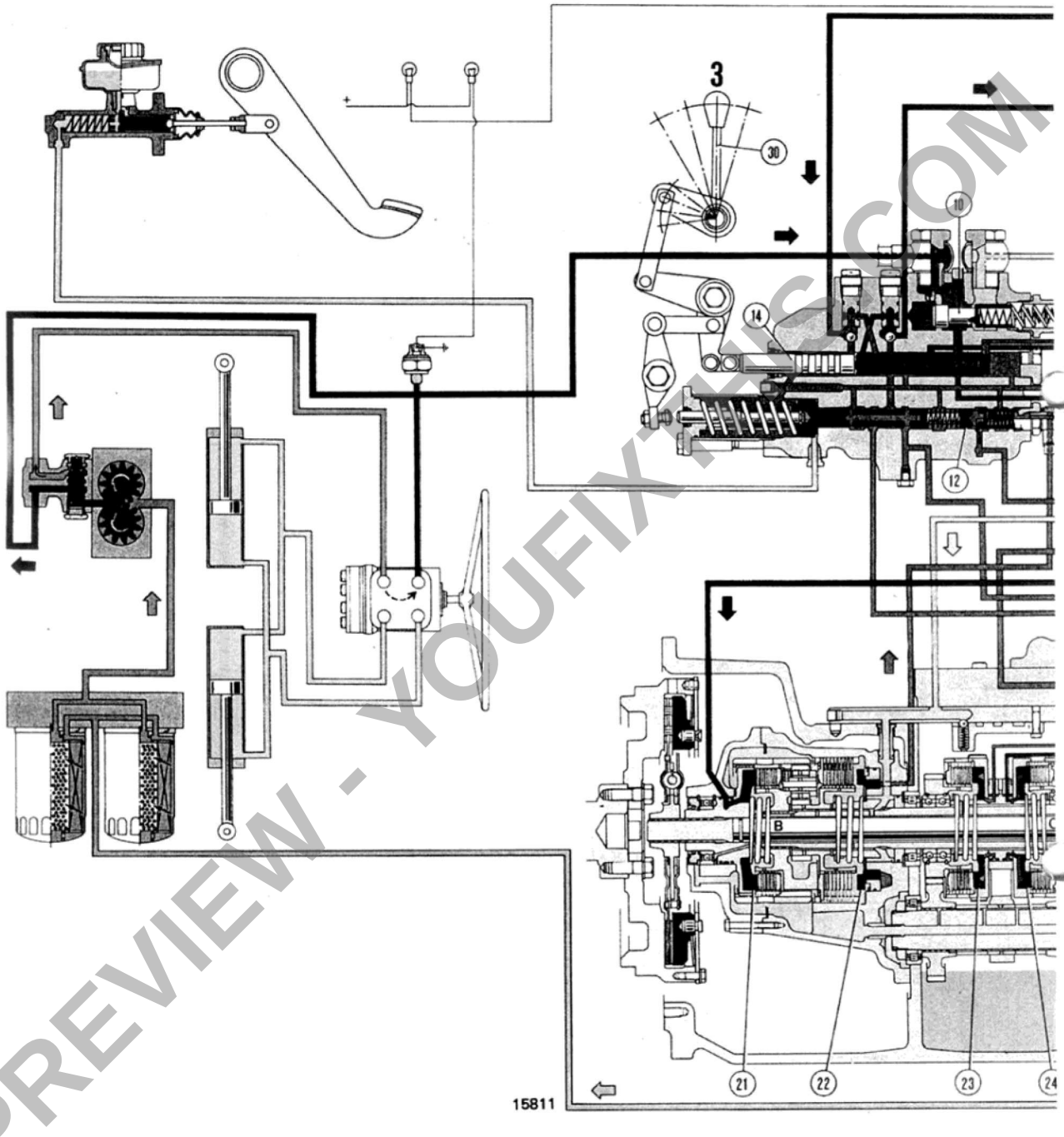
Removing (installing) control valve linkage.

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THIRD GEAR (CLUTCHES B AND C)

When gear lever (30) is shifted to third, spindle (14) takes up position shown to connect clutch piston D (23) to exhaust through dump valve (19) and accumulator (18, page 38) and to connect top chamber of retarder valve (16, page 38) to exhaust through moving nozzle (28). Consequently, clutch A piston (22) is connected to exhaust through inching valve (12) and retarder valve (16, pa
At the same time, pres
spindle (14) and reta
accumulator (17) and

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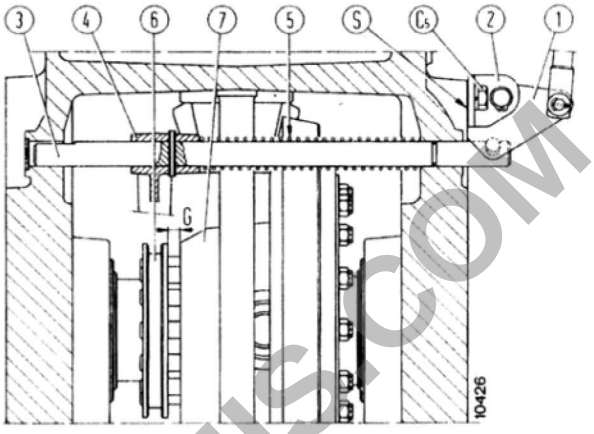
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Thickness of R.H. side gear test shim (Sp, page 20) = 3.00 mm.
Measured dimension (H_3, page 20) = 47.17 mm.
Measured dimension (H_4, page 20) = 47.64 mm.
R.H. side gear end play (Gd, page 20) = $H_4 - H_3$ = 47.64 − 47.17 = 0.47 mm.
Difference between clearances =
Gd − Gs = 0.47 − 0.41 = 0.06 (value out of tolerance).
Replace the second shim with a 3.05 mm final shim, giving:

— measured dimension H_3 = 47.22 mm;

— R.H. side gear end play
Gd = $H_4 - H_3$ = 47.64 − 47.22 = 0.42 mm;

— difference between the two clearances =
Gd − Gs = 0.42 − 0.41 = 0.01 (correct value).



Adjusting mechanical differential lock sleeve (115-90).

C_5. Capscrew - G = 10.5 to 10.8 mm (0.41 to 0.42 in). Sleeve clearance relative to differential cage - S. Sleeve position shim - 1. Control lever - 2. Lever support - 3. Fork rod - 4. Fork - 5. Spring - 6. Sleeve - 7. Differential cage.

MECHANICAL DIFFERENTIAL LOCK ASSEMBLY AND ADJUSTMENT (115-90)

Proceed as follows:

— install differential lock components using tool **291477** to compress return spring (5) and to permit insertion of roll pin retaining fork (4) to rod;

— install bevel drive and differential assembly on the associated supports;

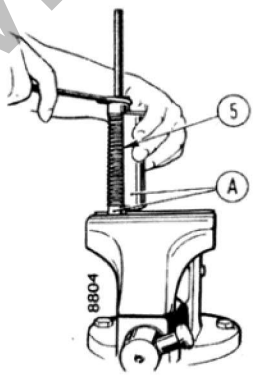
— check the clearance between sleeve (6) and differential cage (7); the correct clearance (G) is 10.5 to 10.8 mm (0.41 to 0.42 in);

— to adjust, alter thickness of shims (S) between support (2) and rear transmission housing.

Note - To facilitate mechanical differential lock sleeve adjustment, make gauge **50041** as shown below.
The 10.5 to 10.8 mm gauge face is used for 115-90 tractors, while the 8.1 to 8.2 mm face is used for 55-90, 60-90, 70-90, 80-90, 90-90 and 100-90 tractors.

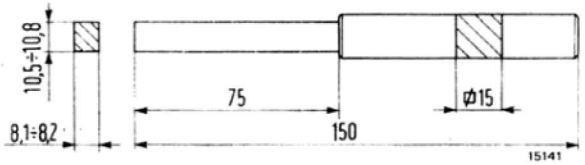
Mechanical differential lock control pedal adjustment (115-90).

Pedal distance (H, page 22) from platform must be approx. 59 mm (2.32 in) for cabless tractors, and approx. 83.5 mm (3.29 in) for tractors with cab; this in order to secure differential lock sleeve engagement. To obtain this distance, adjust fork (1) or opposite fork (2) and lock with nut (3 or 4).



Assembling mechanical differential lock.

A. Tool **291477** - 5. Spring.



Mechanical differential lock sleeve adjustment gauge for 115-90 (also used for 55-90, 60-90, 70-90, 80-90, 90-90 and 100-90 tractors).

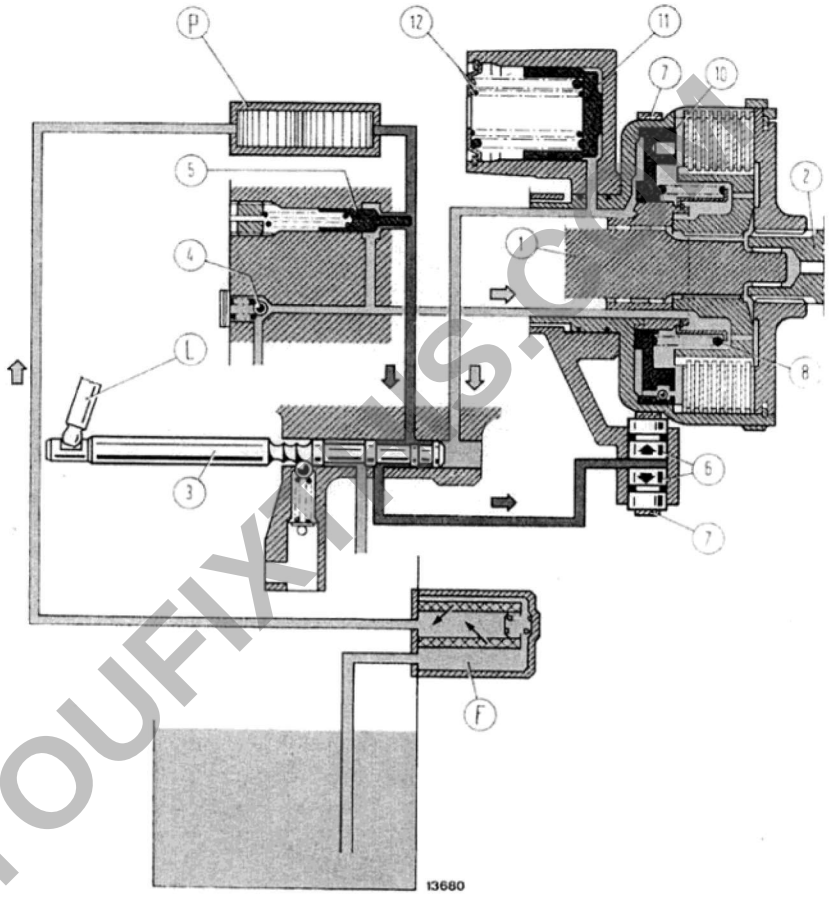
Dimensions in mm. Mark gauge with number **50041**. Material 40Cr Mo4.

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Clutch applied and brake off.

causes oil to drain through the associated ports. Oil from piston (10) is also drained through quick unload valve (9), which takes up the position shown as a result of centrifugal force exerted by clutch housing rotation.
When lever (L) is moved further forward, spool establishes communication between pump delivery port and brake control pistons (6), which move in the direction indicated by the black arrows, thus wrapping brake band (7) around the clutch housing.

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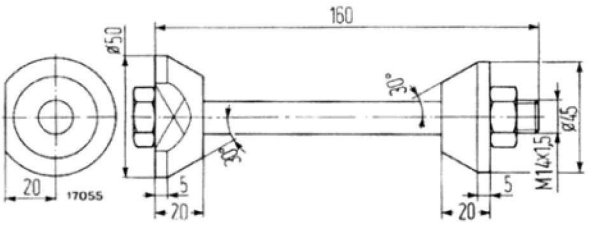
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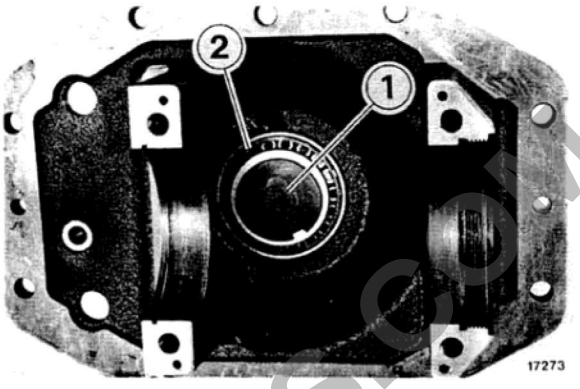
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Fixture to be Shop-built for bevel drive pinion position adjustments.

Dimensions in mm. Mark No. **50048** on fixture.
Note - Recommended material: C40 steel.



Installing fixture 50048 (1) on differential carrier.

2. Bevel drive pinion front bearing.

Secure the differential carrier to axle housing after having first thoroughly cleaned and degreased their mating faces and applied a 2 mm (0.8 in) thick bead of jointing compound as shown on page 24. The types of jointing compounds are listed on page 6, Sect. A.
Re-assemble the side final drives by reversing the disassembly operation sequence.
After assembly, fill up the axle housing with the specified lube oil grade.

BEVEL DRIVE GEAR ADJUSTMENTS

⚠ WARNING ⚠

Lift and handle all heavy parts using a suitable hoist. Ensure that all units or parts are supported by suitable slings or hooks. Check that no one is in the vicinity of the lifted load.

1. Bevel drive pinion positioning shim thickness determination (S_2, pages 7 and 8, Sect. 42)

Proceed as follows:

— Build in the Shop the special fixture **50048** as instructed in figure above.

— Fit fixture **50048** (1) complete with bevel pinion bearing inner rings on the differential carrier already provided with the bearing outer rings.

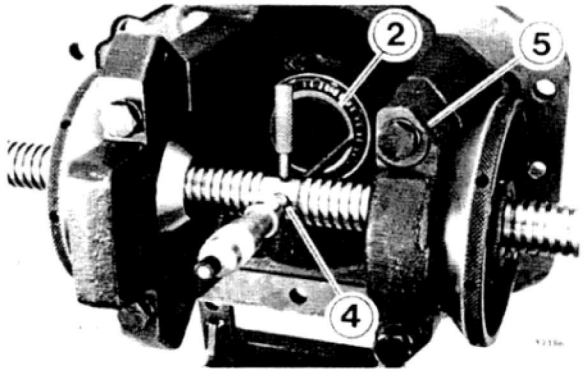
— To ensure suitable bedding of bearings, rotate the fixture while screwing in its nut.

— Place tool **293400/1** (4) in differential carrier, complete with bearing outer rings, bevel ring gear bearing LH adjuster ring (G_S, page 23) and shim (S_1, page 23), retaining ring (27, page 23) and differential case carrier caps.

— Torque the differential carrier cap screws to 176 Nm (18 kgm or 139 ft lb).

— Screw in or out the cones of tool **293400/1** (4) so as to position micrometer bar towards the bearing inner ring (2) and takeup any play between tool cones (4) and bevel ring gear bearing outer rings.

— Move micrometer bar into contact with bearing inner ring (2) and read dimension (H_5) obtained.



Determining the thickness of bevel drive pinion positioning shim (S_2, pages 7 and 8, Sect. 42).

2. Bevel drive pinion front bearing - 4. Tool **293400/1** - 5. Differential case carrier caps.

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TORQUE DATA

DESCRIPTION	Thread	Torque		
		Nm	kgm	ft.lb
Lift - section 51				
Capscrew, lift to rear transmission housing (C_1, page 4)	M 12×1.25	98	10	72
Capscrew, control valve top cover	M 8×1.25	32	3.3	23
Capscrew, guard and control support	M 8×1.25	25	2.6	19
Capscrew, auxiliary cylinder lower pin	M 10×1.25	59	6	43
Capscrews, lift arm to shaft (C_2, page 4)	M 16×1.5	221	22.5	163
Safety valve, cylinder	M 28×1.5	64	6.5	47
Capscrew, inner lift arm	M 16×1.5	152	15.5	112
Auxiliary cylinder - section 51				
Lockring, piston (C_1, page 7)	—	711	72.5	524
Cylinder head (C_2)	—	2059	210	1519
Screw, piston (C_3)	—	245	25	180
Cylinder head (C_4)	—	294	30	217
Hydraulic pump - section 52				
Capscrews	M 6×1	8	.8	6
Nuts, pump covers	M 10×1.25	41	4.2	30
3-point linkage and implement attachment - section 53				
Capscrews, sensing bar support	M 18×1.5	294	30	217
Capscrew, draught control relay lever support	M 8×1.25	25	2.6	19
Capscrew, top link support	M 18×1.5	348	35.5	257

TRAILER BRAKE CONTROL VALVE TROUBLE SHOOTING

Fault	Cause	Remedy
Valve operation erratic (more than two pulses per second).	Faulty check valve seals (3, page 10, section 54).	Disassemble and clean check valve.
Valve fails to operate.	Restriction (9) obstructed.	Disassemble and clean flow regulator (1).

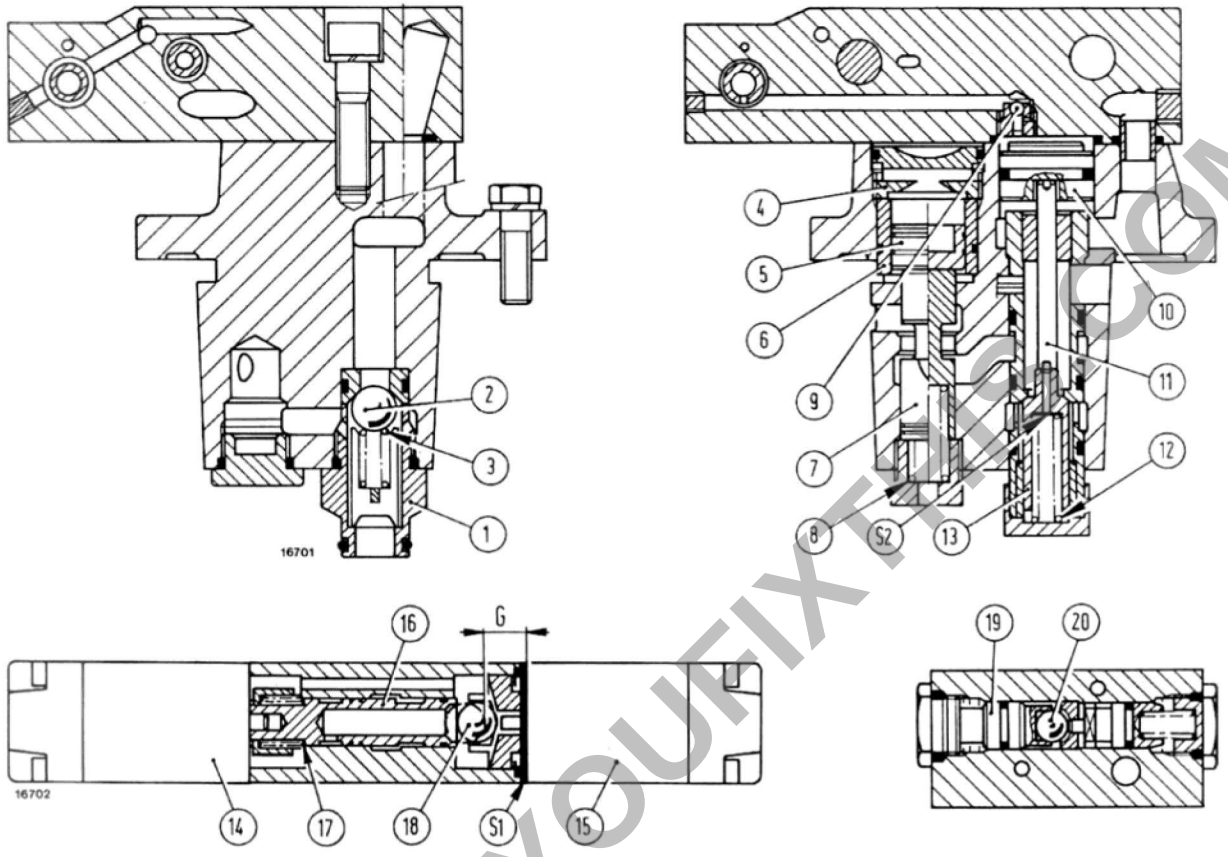
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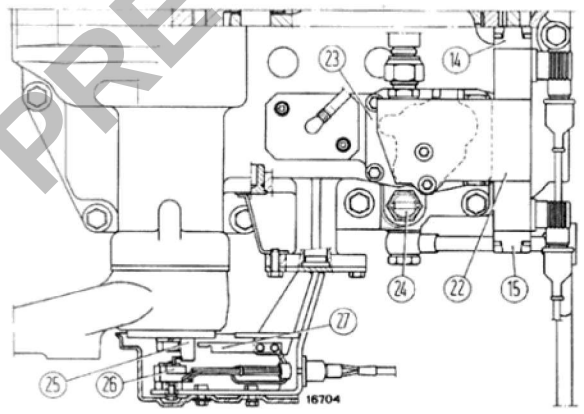
Fiat II sidan 404

HYDRAULIC LIFT UNIT: Electronically-controlled lift



Sections through the electronic lift control valve.

G = 11 to 11.5 mm (.433 to .453 in). Oil return valve ball fit clearance - S_1. Oil return solenoid shim - S_2. Oil return valve spring shim - 1. Oil delivery connection - 2. Check valve - 3. Check valve spring - 4. Pilot valve connection - 5. Pilot valve piston- 6. Pilot valve piston barrel - 7. Pilot valve poppet - 8. Pilot valve spring - 9. Check valve with restrictor - 10. Oil return valve piston - 11. Oil return valve poppet control pin - 12. Oil return valve spring - 13. Oil return valve poppet - 14. Oil delivery control solenoid - 15. Oil return control solenoid - 16. Control valve spool - 17. Spool return spring - 18. Oil return valve ball - 19. Oil delivery pressure regulating valve - 20. Pressure regulating valve ball.



Electronically controlled lift unit top view.

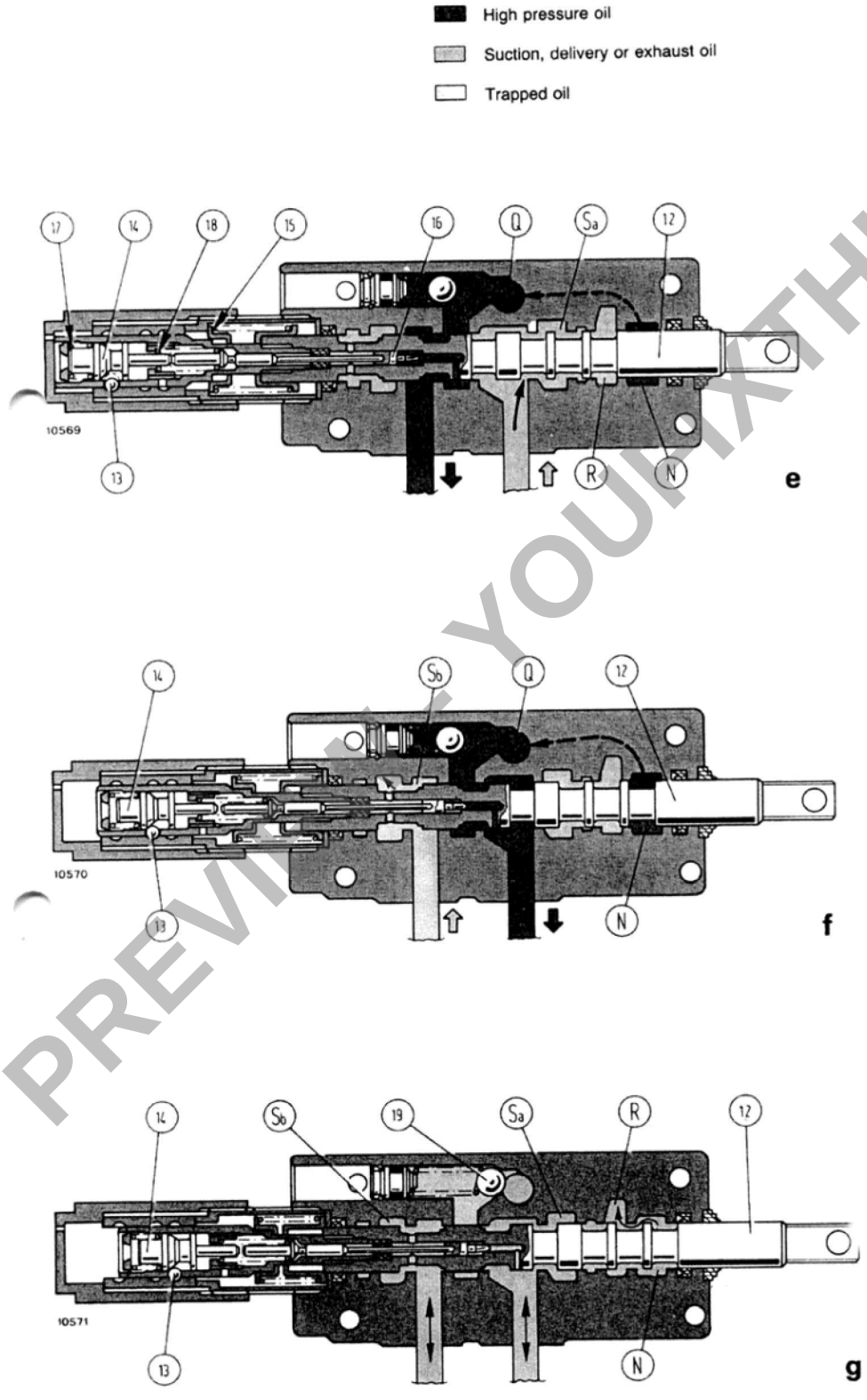
14. Oil delivery control solenoid - 15. Oil return control solenoid - 22. Electrohydraulic control valve - 23. Hydraulic control valve - 24. Cylinder pressure limiting valve - 25. Lift arm RH retaining washer - 26. Position sensor - 27. Stroke end limiter.

Print No. **603.54.252.01** *- XI - 1988*

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