FIAT
Trattori

55-90 80-90
60-90 90-90
70-90 100-90

WORKSHOP MANUAL

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SERVIZI TECNICI DI ASSISTENZA

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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.
- Disconnect batteries and label all controls to indicate operation in progress. Restrain machine and any equipment to be lifted.
- 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.
- Anchor tractor to truck or trailer loading platform and block wheels as requested by carrier.
- 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

ENGINE	55-90 55-90 DT	60-90 60-90 DT	70-90 70-90 DT	80-90 80-90 DT	90-90 90-90 DT	100-90 100-90 DT
Type	4-stroke diesel, naturally aspirated					
Injection	Direct					
Number of cylinders	3		4		5	6
Sleeves	Dry, pressed in engine block					
Bore and stroke	100x115 mm. (3.94x4.53 in)	104x115 mm. (4.09x4.53 in)	100x115 mm. (3.94x4.53 in)	104x115 mm. (4.09x4.53 in)	104x115 mm. (4.09x4.53 in)	100x115 mm. (3.94x4.53 in)
Displacement	2710 cm³	2931 cm³	3613 cm³	3908 cm³	4885 cm³	5419 cm³
Compression ratio	17:1					
Max. horsepower DGM/DIN	40,5 kW (55 Hp)	44 kW (60 Hp)	51,5 kW (70 Hp)	58,9 kW (80 Hp)	66,2 kW (90 Hp)	73,6 kW (100 Hp)
Max. output speed	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2500 rpm
Max. torque speed	1500 rpm	1500 rpm	1500 rpm	1500 rpm	1500 rpm	1500 rpm
Main bearings	4		5		6	7
Oil pan	Iron					
Balancer	—		Flyweight, engine oil pan			—
Valve Gear	OH valves, push rod operated					
Inlet — Opens: BTDC	3°					
Inlet — Closes: ABDC	23°					
Exhaust — Opens: BBDC	48°30'					
Exhaust — Closes: ATDC	6°					
Valve clearanc — for timing check	0.45 mm (0.018 in)					
— Normal - Inlet	0.25 mm (0.010 in)					
- Exhaust	0.35 mm (0.014 in)					
Fuel System Air cleaner	Oil bath or dry, automatic drain centrifugal precleaner					
Fuel filters (on feed pump delivery)	Two, in line					
	replaceable paper cartridge, water separator integral with first filter				Integral cartridge both with water separator.	
Feed pump	Double diaphragm					
— Operation	Cam					
Injection pump	Distributor					

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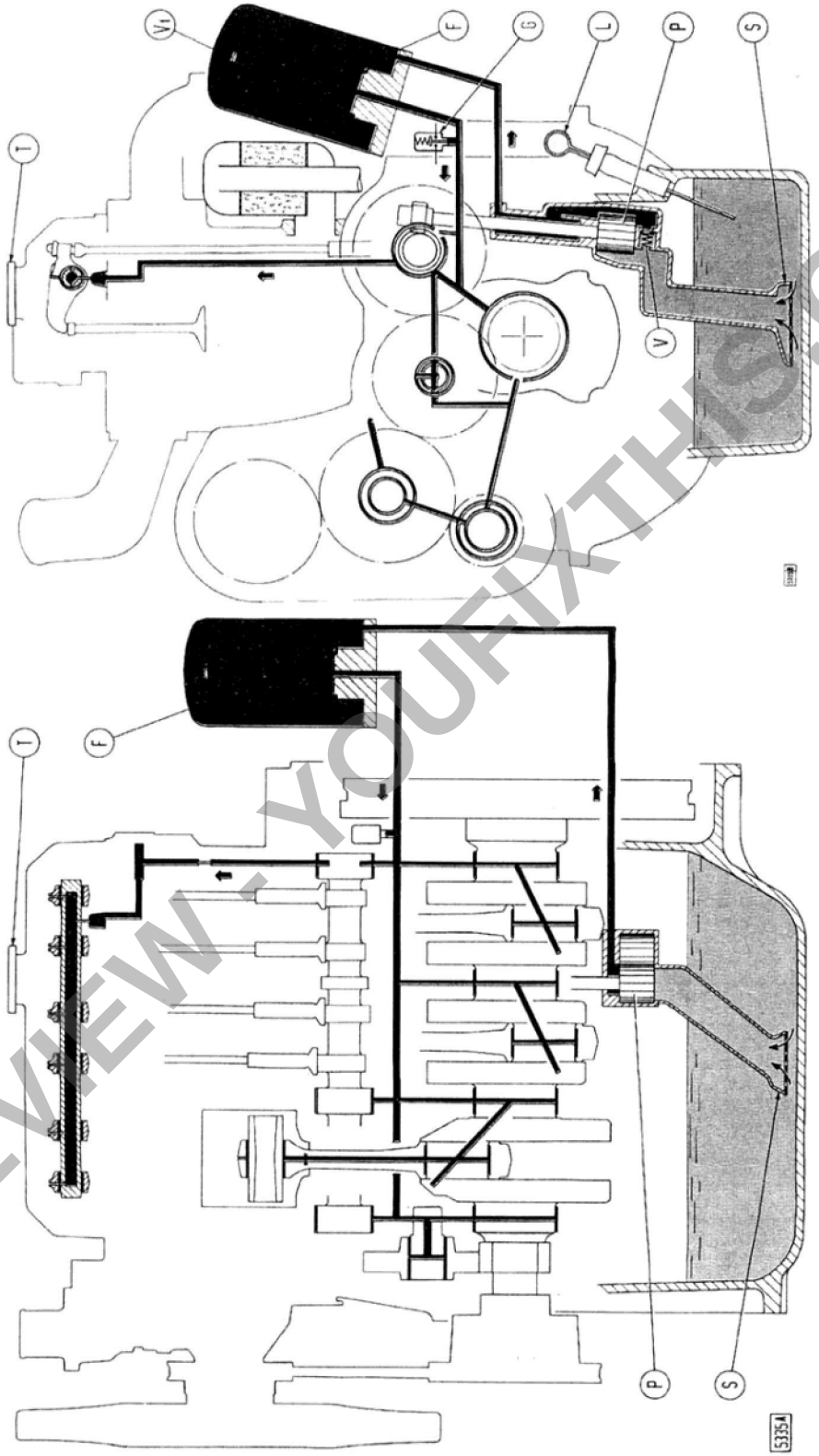

Lubrication System Diagram (55-90 and 60-90).

F. Filter - G. Oil pressure sending unit - L. Dipstick - P. Pump - S. Suction filter - T. Oil filler cap - V. Relief valve - Vf. By-pass valve (cuts in when inlet pressure is 1.5 to 1.7 bar or 22 to 25 psi higher than outlet pressure).

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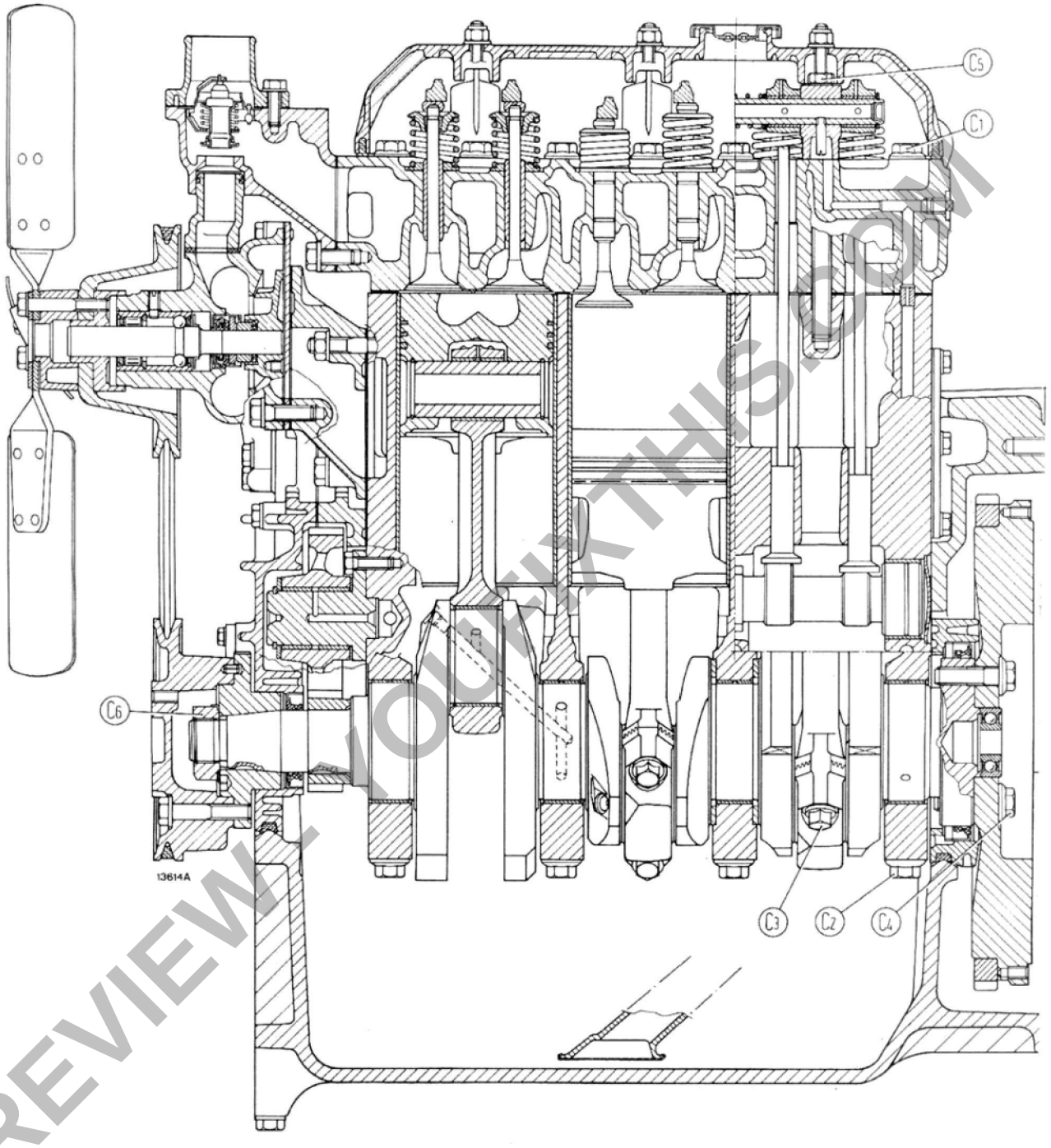

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Longitudinal and cross sections through

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ANGULAR TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread size	Pre-torque			Angle
		Nm	kg-m	ft. lb	
Cap screw, cylinder head (C_1, pages 23, 24, 25 and 26) (*)	M12 × 1.25	60	6.1	44	90° + 90°
Cap screw, main bearing caps (C_2) (*)	M14 × 1.5	80	8.2	59	90°
Cap screw, con rod caps (C_3) (*)	M11 × 1.5	40	4.1	29	60°
Cap screw, flywheel (C_4) (*)	M12 × 1.25	40	4.1	29	60°

(*) Where screws are to be re-used, see drawings and notes, page 22.

TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread size	Tightening torque		
		Nm	kg-m	ft. lb
Cap screw, rocker bracket (C_5, pages 23, 24, 25 and 26)	M8 × 1.25	24	2.5	18
Nut, crankshaft pulley hub (C_6)	M30 × 1.5	294	30	217
Capscrew, balancer flyweights (70-90 and 80-90)	M12 × 1.25	110	11.2	8.11

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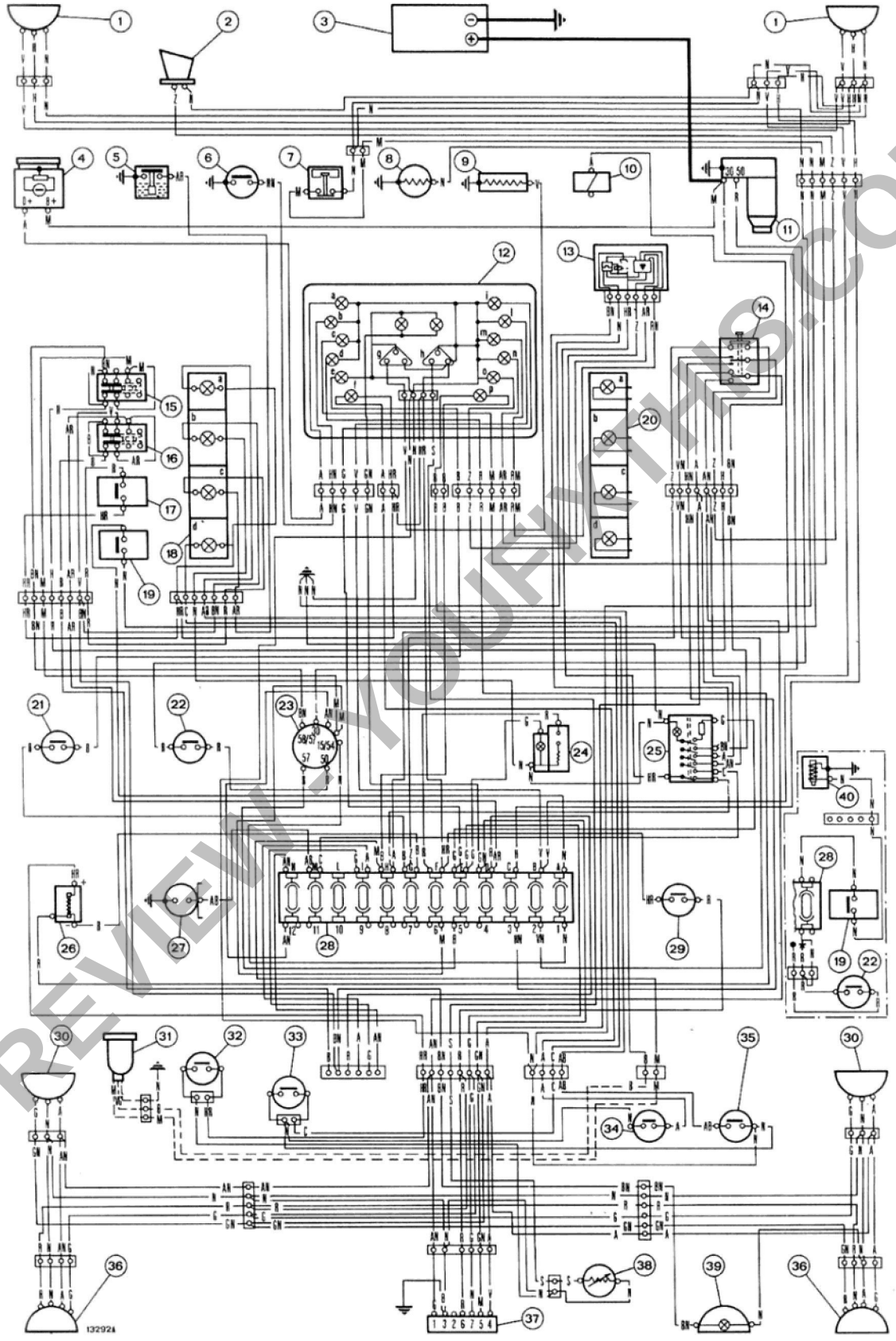

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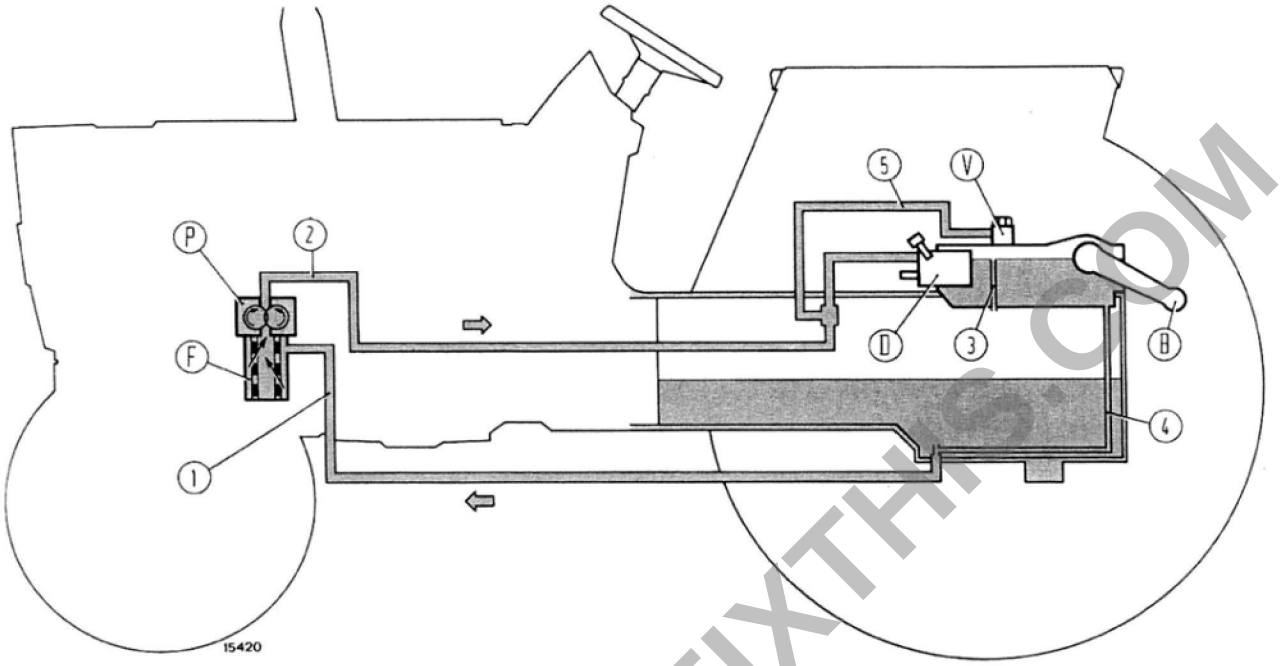
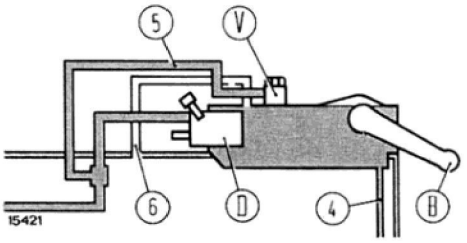


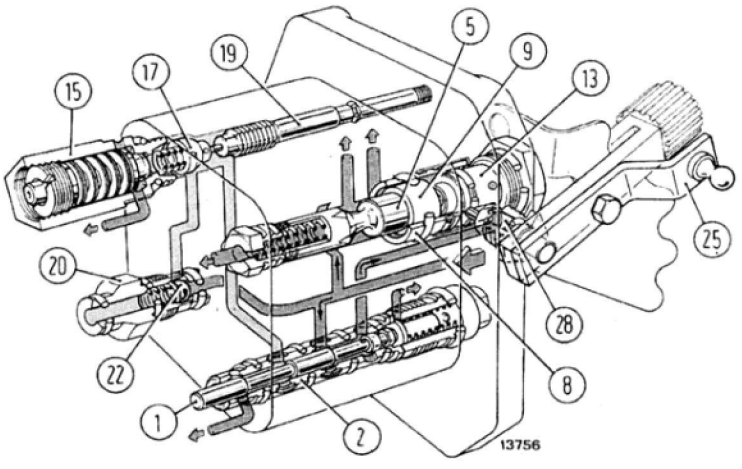


a

Lift hydraulic system schematics

a. Detail of 90-90 and 100-90 - B. Lift arm - D. Control valve - F. Paper cartridge oil filter - P. Engine valve gear driven hydraulic pump - V. Lift body mounted relief valve - 1. Suction line drawing from transmission housing - 2. Delivery line to control valve - 3. Oil level pipe in lift body (55-90, 60-90, 70-90 and 80-90) - 4. Oil drain pipe - 5. To relief valve - 6. Vent (90-90 and 100-90)

Pressure oil
Inlet, delivery or exhaust oil
Trapped oil



Hydraulic control valve schematics

Note: Oil flow refers to neutral phase.

1. Spool - 2. Spool seat - 5. Plunger - 8. Piston seat - 9. Piston - 13. Plug - 15. Cylinder safety valve - 17. Response control valve - 19. Response control valve adjusting pin - 20. Oil delivery fitting to lift cylinder - 22. Check valve - 25. Sensitivity pin lever - 28. Draught sensitivity pin.

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LIFT TROUBLE SHOOTING CHART

FAULT	CAUSE	REMEDY
1. Lift fails to operate.	**a.** Governor stuck open.	Remove foreign particles from drain holes (T_1, T_2 and T_3, page 20) and inspect filter.
	b. Inefficient pump.	Inspect pump.
2. Erratic lift movement during raise.	**a.** Clogged oil filter.	Inspect filter and replace cartridge as necessary.
	b. Ingress of air in pump suction line.	Check for faulty connections and seals.
3. Lift fails to hold the load in raised position. Continuous pitching motion with the engine running. Upon stopping the engine the load is lowered.	**a.** Oil leakage past spool seals (2, page 5).	Replace seals.
	b. Leakage past spool.	Remove, check for leakage, clean and replace damaged parts. Inspect filter.
	c. Check valve leakage.	Remove, inspect and clean.
	d. Leakage past lift piston gland or lift cylinder seal (20, page 5).	Replace the seals.
	e. Safety valve leakage or incorrect setting.	Replace the seals.
4. Relief valve cracks off with lift arms in maximum raised position.	Lift arm travel out of adustment.	Adjust travel.
5. Insufficient or inadequate lifting power	**a.** Incorrect relief valve setting.	Replace or, if installed on remote control valves, adjust.
	b. Incorrect safety valve setting.	Replace valve.
	c. Poor pump performance (usually accompanied by increased raise time).	Check pump performance and overhaul or replace as necessary.

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MODEL 55-90 - CALIBRATION DATA BOSCH INJECTION PUMP TYPE VE 3/11F 1250 L 163-1-4794587 - 4800682 (Provisional data)

ASSEMBLY DATA

Pump rotation (drive side) Anti-clockwise
Firing order 1-2-3
Plunger lift to spill cut-off
0.2 ± 0.02 mm (0.008 ± 0.0008 in)
Plunger lift for pump timing on engine 1 mm (.039 in)
Pump timing 6° ± 1° B.T.D.C., cylinder No. 1 in compression stroke
Delivery connection of cylinder No. 1: Marked with letter **A.**

TEST PLAN

Test machine complying with ISO 4008.
Injectors complying with ISO 4010: 1688901020 with pad 1680 103 096.
Release pressure
172 to 175 bar (175 to 178 kg/cm² or 2483 to 2492 psi).
Fuel pressure 0.2 bar (0.2 kg/cm², 2.8 psi).
Lines (as per ISO 4093.2) 6x2x840 mm.
Graduate drain time 30".
Test fluid ISO 4113 at 40° ± 2°C.

ADJUSTMENT VALUES

Operation description	rpm	Advance piston stroke mm	Fuel pressure bar (kg/cm²)	Delivery cm³/1000 shots	Transfer pressure bar (kg/cm²)	Spread cm³/1000 shots
Full load delivery	800	0.8 to 1.2	3.8 to 4.4	64.5 to 65.5	0.2	3.5
Idle speed limit	350	—	—	21 to 25	0.2	3
Starting delivery	150	—	—	100 to 120	0.2	—
Full throttle limit	1350	—	—	32 to 38	0.2	—

TEST VALUES

Advance device check			Fuel pressure check			Back leakage		
	rpm	mm		rpm	bar (kg/cm²)		rpm	cm³/100 shots
	600	0 to 0.6		600	3.0 to 3.6 (2.8 to 3.8)			
	800	0.8 to 1.2						
	1200	4.4 to 5.2		800	(3.8 to 4.4)			
				1200	5.6 to 6.2			

DELIVERY CHECK

Full throttle stop				Idle speed shut-off			
rpm	Delivery cm³/1000 shots	Transfer pressure bar (kg/cm²)		rpm	Delivery cm³/1000 shots	Transfer pressure bar (kg/cm²)
1400 to 1460	0	0.2				
1350	32 to 38	0.2		475	≤ 2	0.2
1250	62.5 to 65.5	0.2		425	4 to 10	0.2
800	64.5 to 65.5	0.2		350	21 to 25	0.2
500	56.5 to 59.5	0.2				
250	≤ 55	0.2				

Note - Check values are shown in bracktes.

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ENGINE BLOCK - CYLINDER HEAD

	mm	
	55-90, 70-90, 100-90	60-90, 80-90, 90-90
Engine Block		
Cylinder bore diameter in engine block	102.850 to 102.900 mm (4.049 to 4.051 in)	106.850 to 106.900 mm (4.206 to 4.208 in)
Sleeve O.D.	103.020 to 103.050 mm (4.056 to 4.057 in)	107.020 to 107.050 mm (4.213 to 4.215 in)
Sleeve interference fit in block	0.120 to 0.200 mm (0.005 to 0.008 in)	
Sleeve diameter oversize	0.2 mm (0.008 in)	

	mm		in	
	55-90, 70-90, 100-90	60-90, 80-90, 90-90	55-90, 70-90, 100-90	60-90, 80-90, 90-90
Sleeve bore diameter	100.000 to 100.024(1)	104.000 to 104.024(1)	3.937 to 3.938	4.094 to 4.095
Maximum ovality and taper due to wear (2)	0.12		0.005	
Sleeve bore oversize	0.4 - 0.8		0.016 - 0.031	
Camshaft bushing housing bore diameter				
55-90, 60-90, 70-90 and 80-90 — Front	54.780 to 54.805		2.1567 to 2.1577	
55-90, 60-90, 70-90 and 80-90 — Intermediate	54.280 to 54.305		2.1370 to 2.1379	
55-90, 60-90, 70-90 and 80-90 — Rear	53.780 to 53.805		2.1173 to 2.1183	
90-90 and 100-90 — Front	55.280 to 55.305		2.1764 to 2.1774	
90-90 and 100-90 — Intermediate front	54.780 to 54.805		2.1567 to 2.1577	
90-90 and 100-90 — Intermediate rear	54.280 to 54.305		2.1370 to 2.1379	
90-90 and 100-90 — Rear	53.780 to 53.805		2.1173 to 2.1183	
Tappet housing bore diameter	15.000 to 15.018		0.590 to 0.591	
Tappet oversize	0.1 - 0.2 - 0.3		0.004 - 0.008 - 0.012	
Main bearing housing bore diameter	84.200 to 84.230		3.3149 to 3.3161	
Cylinder head				
Valve guide housing bore diameter in head	13.950 to 13.983		0.5492 to 0.5505	
Valve guide oversize	0.2		0.0079	
Valve seat dimensions	Section 12, page 2			
Valve stand-in	0.7 to 1.0		0.027 to 0.039	
— Maximum stand-in allowed	1.3		0.051	
Injector stand-out	0.05 to 0.7		0.002 to 0.027	
— Maximum stand-out allowed	1.0		0.039	
Cylinder head height	92		3.622	
Maximum head skimming depth	0.5		0.020	

(1) After reaming.
(2) Measure in ring swept area, parallel and perpendicular to engine centerline.

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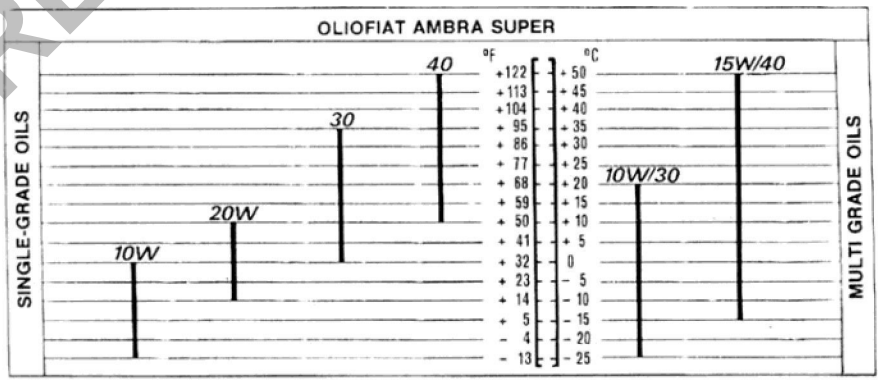
DESCRIPTION	FIAT RECOMMENDED PRODUCTS	LIQUID AND LUE									
		CAPACIT									
		55-90			60-90			70-90			
		dm³ (litres)	gall.	kg	dm³ (litres)	gall.	kg	dm³ (litres)	gall	kg	dm (litre
Sump and filter oil	**Oliofiat AMBRA SUPER** (see table below)	7.5	1½	6.8	7.5	1½	6.8	11.7	2½	10.5	11
Sump oil		6.7	1½	6	6.7	1½	6	10.5	2⅓	9.5	10
Air cleaner oil		0.8	1⅔ pints	0.7	0.8	1⅔ pints	0.7	0.8	1⅔ pints	0.7	0
Power steering circuit oil	**Oliofiat TUTELA MULTI F**	2.0	½	1.8	2.0	½	1.8	2.0	½	1.8	2
Transmission oil		—	—	—	—	—	—	—	—	—	-
Live front axle oil:											
— Axle casing		4.3	¾	3.9	4.3	¾	3.9	6.1	1⅓	5.5	6
— Planetary drives (each)		0.8	1⅔ pints	0.7	0.8	1⅔ pints	0.7	1.2	½	1.1	1
Rear transmission (transmission, bevel drive, brakes, final drives and lift oil) for 55-90, 60-90, 70-90 and 80-90 or (Bevel drive, brakes, final drives and lift oil for 90-90 and 100-90).											
— 2-wheel drive		50	11	45	50	11	45	54	11¾	48.5	5
— 4-wheel drive		50.5	11⅓	45.5	50.5	11⅓	45.5	54.4	11¾	49	5
Brake fluid	**AMBRA SUPER 10 W**	0.45	¾ pint	0.4	0.45	¾ pint	0.4	0.45	¾ pint	0.4	0
Front wheel hub oil	**Grassofiat TUTELA G9**	—	—	—	—	—	—	—	—	—	-
Pressure lubricators		—	—	—	—	—	—	—	—	—	-
Coolant (1)	Water and FIAT **"PARAFLU 11"**	12	2½	—	12	2½	—	14	3	—	
Windshield washer fluid	Water and **"DP1"** (2)	2	½	—	2	½	—	2	½	—	
Fuel											
— Main tank	Diesel oil	~95	20¾	—	~95	20¾	—	~95	20¾	—	~
— Auxiliary tank		—	—	—	—	—	—	—	—	—	-

(1) Including expansion tank. Cab versions: add 2 litres or 3 pints for 55-90, 60-90, 70-90 and 80-90, or 3 litres (5 pints) for 90-90 and 100-9
(2) Detergent fluid effective down to -10°C in 50-50 mixture. For temperatures below - I use DPI without water.



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REMOVAL

⚠ CAUTION ⚠

Lift and handle all heavy parts by means of a suitable lift. Ensure that assemblies or parts are supported by suitable slings and hooks. Ensure that no one is in the vicinity of load to be lifted.

Proceed as follows:

— Engage handbrake and chock rear wheels. If possible, remove front ballast weights.

— Remove side panels, side reinforcements, top hood and exhaust silencer.

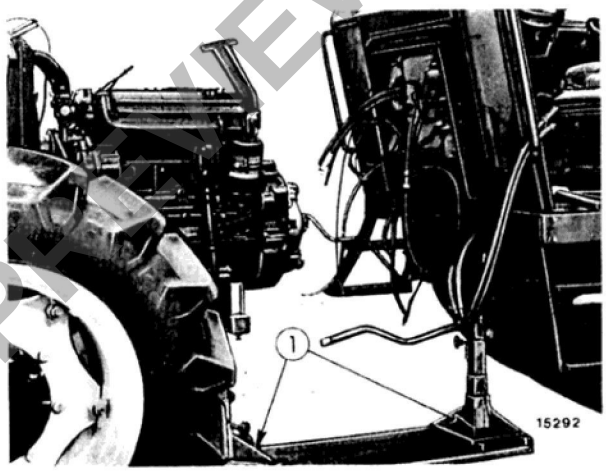
— Disconnect and isolate battery negative lead. Disconnect throttle link, engine shut-off cable, starter leads, dashboard leads and tractor meter leads.

— Shut off fuel cock and disconnect fuel lines from lift pump, filters and injector leak-off. Drain power steering reservoir and disconnect steering lines. Drain oil from transmission/rear transmission housing (55-90, 60-90, 70-90 and 80-90) or from rear transmission (90-90 and 100-90 and disconnect hydraulic lift lines from oil pump.

— Disconnect brake lines and plug holes.

— On 4-wheel drive tractors, remove front drive shafts and associated guard.

— On cab versions, drain engine coolant and disconnect heater inlet lines. On air conditioned versions, disconnect refrigerant pipes from hoses.



Removing - Installing Engine.
1. Trolley with guides **292320**.

— Disconnect hoses from radiator and intake manifold.

— Position trolley with guides **292320** so that stationary section is under clutch bell housing and mobile section is under the oil pan. For 70-90 and 80-90, take care not to damage the sheet metal bottom of the pan. Chock the front axle to prevent it from swinging and make sure the entire unit is firmly supported.

Where front ballast weights cannot be removed, they should be supported with a hoist to prevent the engine from pitching forward.

— Remove clutch bell housing capscrews and separate engine together with front axle from tractor (to remove the three top screws, take off the plastic plug under the control board and work through the slot).

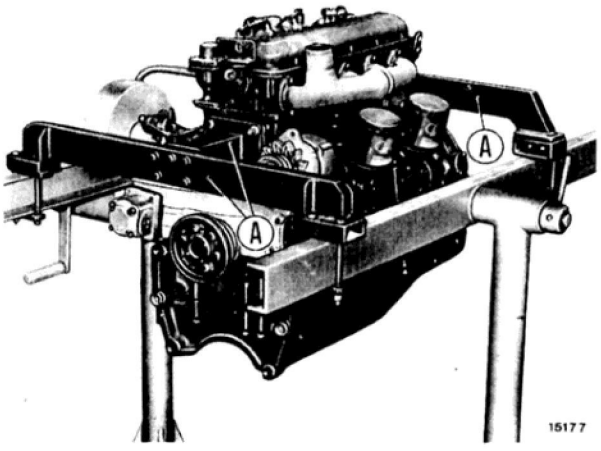
— Hoist the engine using hook **290740/1**, jack up the front axle, remove the screws retaining engine to axle assembly and separate engine.

— Remove water pump and fan and secure engine to rotary stand **290090** using bracket set **293860** (A, B, and D, page 6)

INSTALLATION

⚠ CAUTION ⚠

Use suitable tools to align holes. Never use fingers or hands.



Engine in Position on Rotary Stand 290090. (90-90).
A. Bracket set **293860**.

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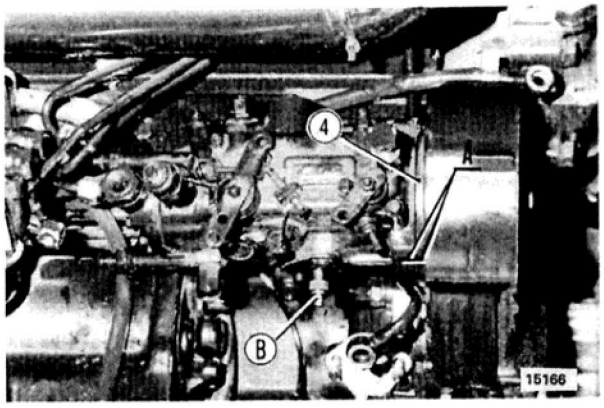


Adjusting C.A.V. DPS injection pump timing
A. Timing marks - B. Tool **292411** - 4. Spacer.

— Insert shaft in drive gear and secure through associated nut. Start nuts (C_1).

— Turn pump body to align timing marks (A) on pump and spacer (4).

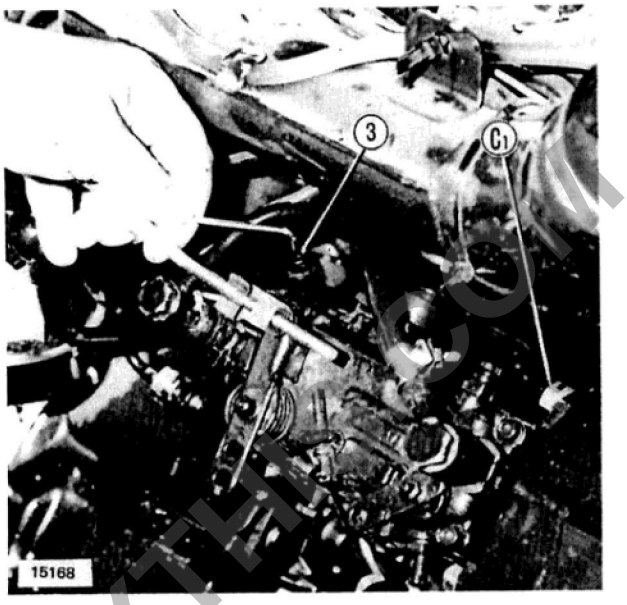
— Tighten pump nuts (C_1). Install fuel pump, connect fuel lines and vent circuit as described in the relevant section.

If timing marks (A) are missing or are suspected to be incorrect, adjust as follows:

— Bring piston No. 1 to T.D.C. in compression stroke (valves closed), in this position, timing pointer is aligned with INIEZ. C.A.V. mark.

— Remove plug (1, page 4) from side cover and install timing tool **292411** (B).

— Install shaft in drive gear, secure through associated nut and start pump nuts (C_1).



View of injection pump on engine.
C. Nuts - 3. Vent screw.

— Turn pump body until spindle of tool **292411** (B) enters notch on pump shaft, i.e., until spindle moves towards pump.

— Tighten pump nuts (C_1), apply timing marks (A) on pump flange and spacer (4), and install fuel pump.

— Remove tool **292411** (B) from cover hole and tighten plug (1) to 4.5 Nm (0.45 kgm or 3.25 ft.lb).

— Connect fuel lines and vent circuit as described in the relevant section.

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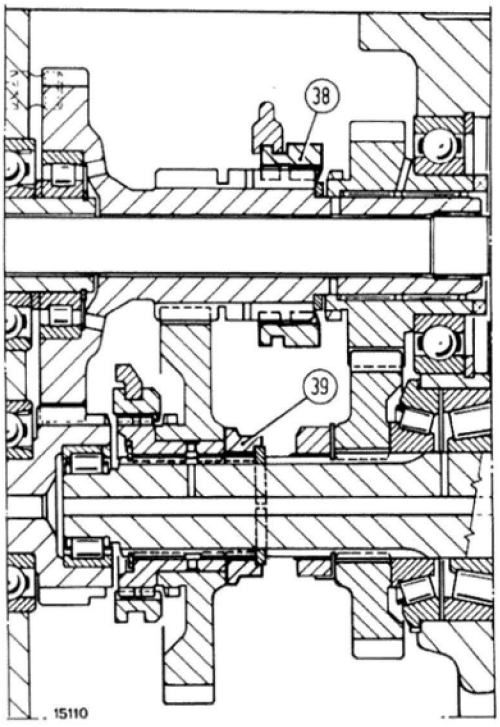

Detail of splitter for tractors equipped with reverser.
38. Normal range drive gear - 39. Spacer.

Before assembling transmission housing to clutch housing, thoroughly clean and degrease mating surface and apply a 2 mm (0.08 in) bead of jointing compound as shown in figure on page 3.

Jointing compound types to be applied are indicated on page 6, section A.

If units have been disassembled, install clutch housing on engine-front axle assy after smearing **grasso-fiat TUTELA G9** in clutch driven disc slots. Clean and degrease mating surfaces and apply one of the jointing compounds indicated on page 6, section A.

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AUXILIARY CYLINDER
STANDARD ON 100-90 - OPTIONAL ON 90-90)

(continued)

Bore x stroke	50x150 mm (1.96x5.9 in)
Total displacement	295 cm³ (17.9 in³)
Piston diameter	49.960 to 50.000 mm (1.966 to 1.968 in)
Cylinder head ID	50.025 to 50.050 mm (1.969 to 1.970 in)
Piston clearance in cylinder head	.025 to .090 mm (.0009 to .0035 in)
Lower cylinder pivot diameter	29.870 to 30.000 mm (1.175 to 1.181 in)
Pivot housing bore diameter	30.110 to 30.240 mm (1.185 to 1.190 in)
Pivot clearance in housing	.110 to .370 (.004 to .014 in)
Upper pivot diameter	27.979 to 28.000 mm (1.101 to 1.102 in)
Pivot housing bore diameter in piston	28.065 to 28.149 mm (1.104 to 1.108 in)
Pivot clearance in housing	.065 to .170 mm (.002 to .006 in)

TRAILER BRAKE VALVE TROUBLE SHOOTING CHART

Fault	Cause	Remedy
Jerky braking with more than two pulses/second.	Leakage past check valve (3, page 10, sec. 54).	Remove and clean check valve.
Valve does not brake.	Restriction (9) obstructed.	Remove and clean output regulator (1).

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