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Group 5
SPECIFICATIONS

SERIAL NUMBERS

The engine serial number is stamped into the name plate at the lower right of the cylinder block.

NOTE: If ordering engine parts, indicate all digits of the serial number on the name plate.

The name plate showing the tractor serial number is located on the right-hand side of the front support.

NOTE: If ordering tractor parts, (excluding engine parts), indicate all digits of the serial number on the name plate.

MODEL NUMBERS

The injection pump, injection nozzles, the alternator, starting motor and the hydraulic pump have model numbers to facilitate identification of different makes of a given unit.

SPECIFICATIONS

ENGINE

Number of cylinders 3

Cylinder liner bore . . . . . 106.5 mm (4.19 in.)

Stroke . . . . . 110 mm (4.33 in.)

Displacement . . . . . 2940 cm^3 (179 cu.in.)

Compression ratio
(-271533CD) . . . . . 16.2 : 1
(271534CD-) . . . . . 16.8 : 1

Maximum torque at
1300 rpm . . . . . 188 Nm (138 ft.lbs.)

Firing order . . . . . 1 - 2 - 3

Valve clearance (engine hot or cold)
Intake valve . . . . . 0.35 mm (0.014 in.)
Exhaust valve . . . . . 0.45 mm (0.018 in.)

Fast idle . . . . . 2650 rpm

Slow idle . . . . . 650 rpm

Working speed range . . . . . 1500 to 2500 rpm

PTO power* . . . . . 37 kW (50 HP)
(at 2500 rpm engine speed and
650 rpm powershaft speed)

ENGINE CLUTCH

Dual-stage dry disk clutch, foot-operated (on tractors with continuous running PTO)

Single-stage dry disk clutch with torsion damper (isolator), foot-operated (on tractors with independent PTO)

ELECTRICAL SYSTEM

Batteries . . . . . 2 x 12 volts, 55 ampere-hours

or . . . . . 1 x 12 volts, 55 ampere-hours

Starting motor . . . . . 12 volts, 3 kW (4 HP)

Alternator . . . . . 14 volts, 28 amps.

Battery terminal grounded . . . . . negative

* With the engine run in (more than 100 hours of operation) and having reached operating temperature (engine and transmission); measured by means of a dynamometer. Permissible variation ± 5 %.

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Group 25
TRACTOR SEPARATION

SEPARATING BETWEEN ENGINE AND TRACTOR FRONT END

REMOVAL

For safety disconnect ground straps from batteries.

Remove front end weights (if equipped).

Remove radiator cap and fuel tank cap. Remove radiator side grille screens and hood. Install radiator and fuel tank caps. Remove tool box and side frames.

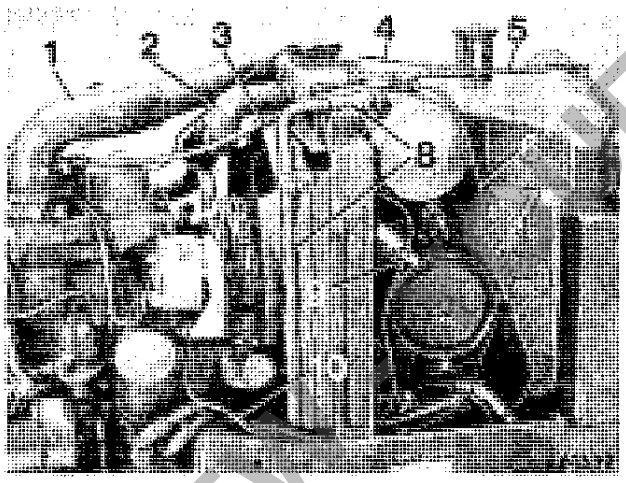


Fig. 1 — Separating between Tractor Front End and Engine

1 Air intake pipe
2 Upper water hose
3 Leak-off and bleed line
4 Fuel return line
5 Support rod
6 Leak-off and bleed line
7 Cable of fuel gauge sending unit
8 Return oil line
9 Cable of air cleaner restriction warning switch
10 Fuel inlet line, tank to fuel transfer pump

Disconnect air intake pipe (see 1, fig. 1) at engine intake manifold and at air cleaner.

Disconnect leak-off and bleed lines 3 and 6 at hydraulic oil reservoir.

Remove support rod 5 at top of radiator. Disconnect fuel return line 4 at fuel tank.

Disconnect cable 9 at air cleaner restriction warning switch and disconnect cable 7 at fuel gauge sending unit.

Drain coolant and disconnect upper and lower water hoses at radiator.

Only on tractors equipped with oil cooler: Remove hose elbow between hydraulic oil reservoir and oil cooler at oil cooler end. Disconnect return oil line at bottom of oil cooler.

Only on tractors without oil cooler: Disconnect return oil line 8 at top and bottom hose and remove.

NOTE: Plug lines and openings immediately with plugs or caps to prevent loss of oil and entering of dirt into the system.

Remove screws securing fan shroud to radiator and slide over fan to the rear.

Remove screws securing radiator to front axle support and lift out radiator to the left of tractor.

Close fuel shut-off valve at bottom of fuel tank.

Disconnect fuel inlet line 10 at fuel tank and fuel transfer pump. Remove transfer pump and fuel inlet line.

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STANDARD TORQUES

Recommended torques in Nm and ft. lbs. for UNC and UNF cap screws

Head marking (identifying strength)	 or 6.8*		 or 10.9**		 or 12.9***	
Thread-O.D. (in.)	Nm	ft.lbs.	Nm	ft.lbs.	Nm	ft.lbs.
1/4	—	—	15	10	20	14
5/16	—	—	30	20	40	30
3/8	—	—	50	35	70	50
7/16	50	35	80	55	110	80
1/2	80	55	120	85	170	120
9/16	100	75	180	130	240	175
5/8	150	105	230	170	320	240
3/4	260	185	400	300	580	425
7/8	220****	160****	600	445	930	685
1	340	250	910	670	1400	1030
1-1/8	450	330	1240	910	1980	1460
1-1/4	650	480	1700	1250	2800	2060

NOTE: A variation of ± 10% is permissible for all torques indicated in this chart.

Torque figures indicated above and in the Specifications sections of this manual are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual.

* Regular bolts and cap screws
** Tempered steel high strength bolts and cap screws
*** Tempered steel extra high strength bolts and cap screws
**** Bolts and screws 7/8 in. and larger are often formed hot rather than cold, which accounts for the lower torque.

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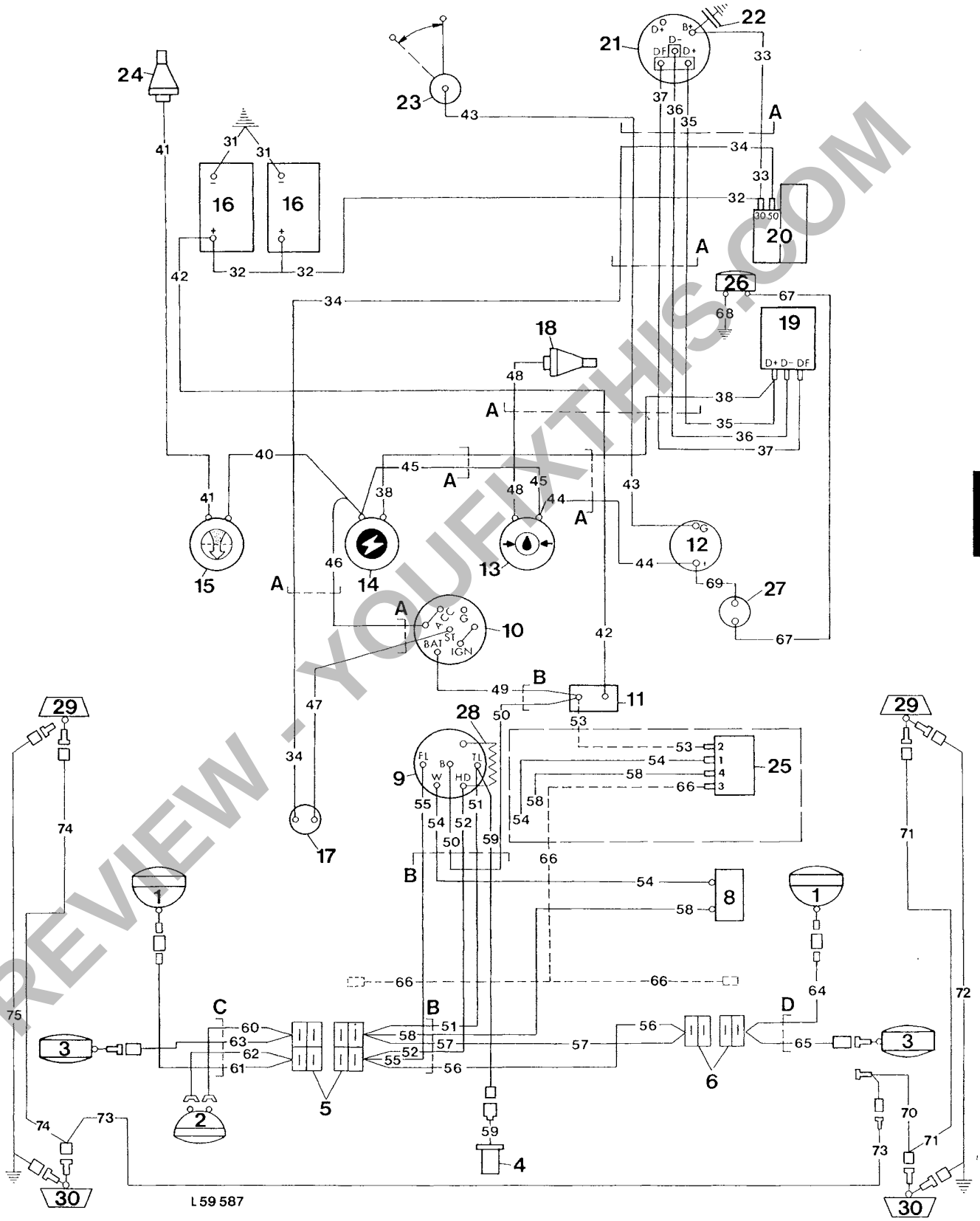


Fig. 3 — Wiring Diagram

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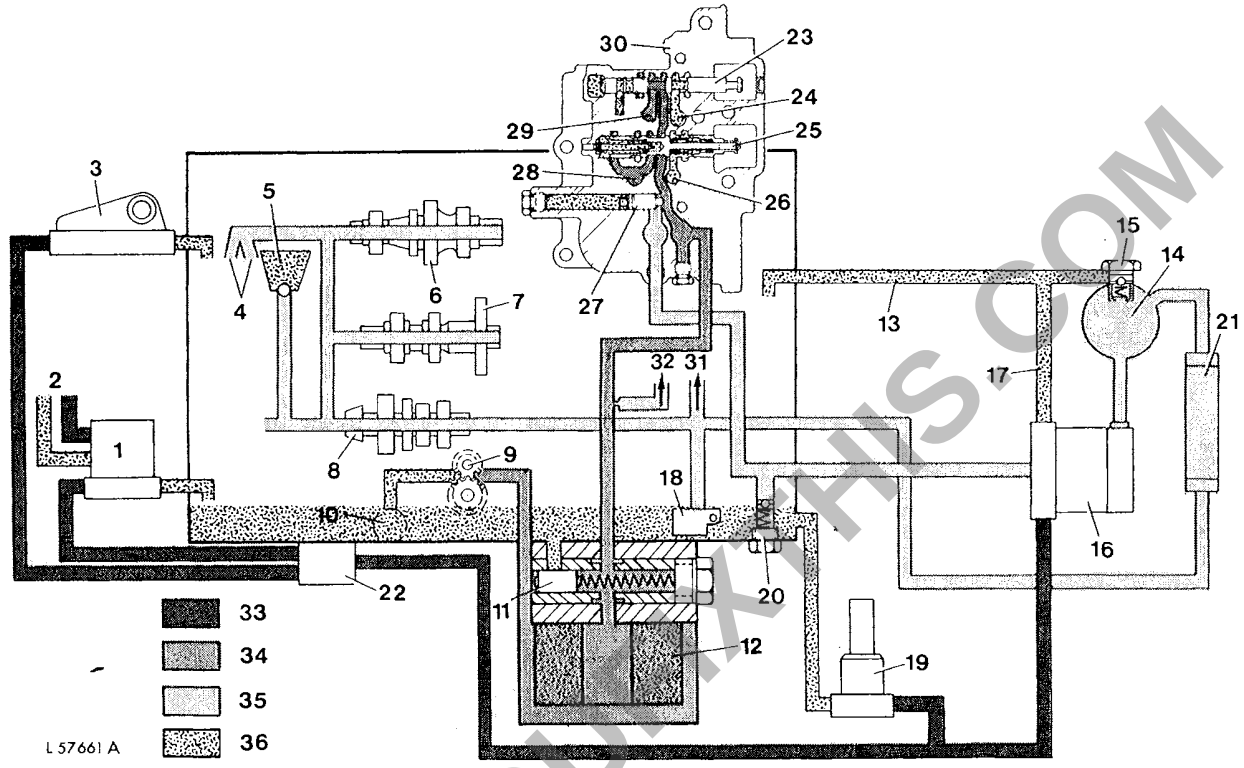


Fig. 2 — Complete Hydraulic System (Tractor With Hi-Lo Shift Unit, Oil Cooler, Independent PTO and Power Steering)

1 Selective control valve
2 To and from couplers
3 Rockshaft
4 Lube oil to final drives
5 Transmission oil cup
6 Transmission drive shaft
7 Countershaft
8 Differential drive shaft
9 Transmission oil pump
10 Intake screen
11 By-pass valve of transmission oil filter
12 Transmission oil filter
13 Bleed line
14 Hydraulic oil reservoir
15 Check valve
16 Hydraulic pump
17 Leak-off and bleed line
18 Brake valve
19 Power steering
20 Surge relief valve
21 Oil cooler
22 Pressure control valve of power steering
23 Hi-Lo control valve assembly
24 To Lo-brake of Hi-Lo shift unit
25 Control valve of independent PTO
26 To PTO brake
27 Pressure regulating valve
28 To PTO clutch
29 To Hi-clutch of Hi-Lo shift unit
30 Transmission shift cover
31 To Lo-brake of Hi-Lo shift unit (lubrication)
32 To Hi-clutch and front bearing bushings of Hi-Lo shift unit (lubrication)
33 High pressure oil
34 Medium pressure oil
35 Low pressure oil
36 Pressure-free oil

OPERATION

Transmission oil pump 9 (see figs. 1 and 2) draws oil from the main oil reservoir (transmission case) through intake screen 10 and pushes it through transmission oil filter 12.

The transmission oil filter 12 is provided with a by-pass valve 11 located between inlet and outlet of the filter. This by-pass valve causes the oil drawn in by the oil pump to be returned to the main oil reservoir if a specified pressure differential is reached between inlet and outlet of transmission oil filter due to filter restriction (see Specifications).

On tractors neither equipped with Hi-Lo unit nor with independent PTO, oil passes from transmission oil filter directly to the hydraulic pump. These tractors have a check valve 19 (fig. 1) installed in the inlet line to the hydraulic pump, ensuring that when the engine is stopped or engine clutch is disengaged (transmission oil pump is then not operating), oil does not flow back. On tractors equipped with Hi-Lo shift unit or independent PTO the operation of the check valve is carried out by the pressure regulating valve 27 located in the transmission shift cover 30 (fig. 2).

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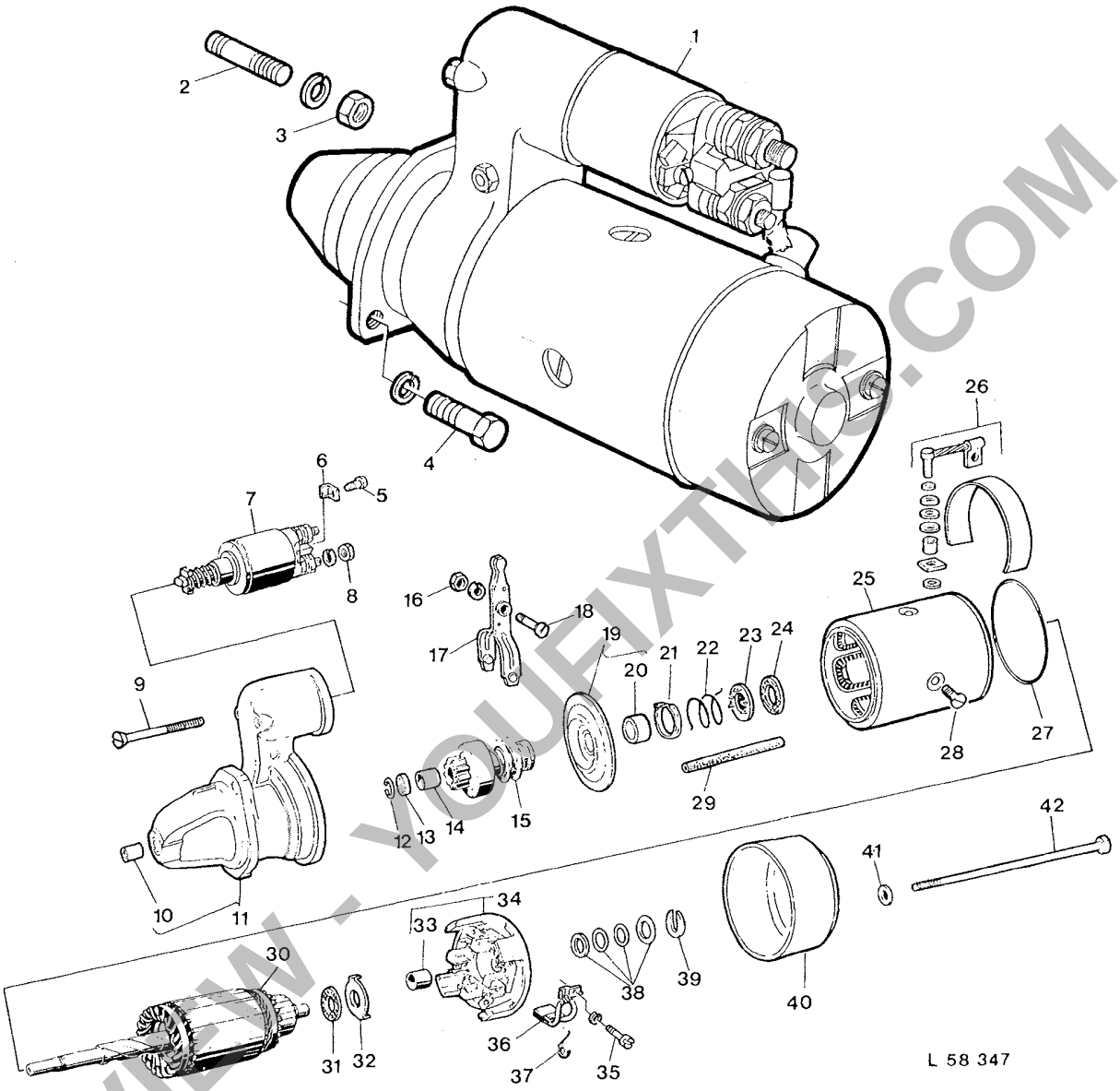


Fig. 7 — Starting Motor, Exploded View

1 Starting motor assembly
2 Stud
3 Hex. nut
4 Cap screw
5 Special screw
6 Clamping bracket
7 Solenoid switch
8 Hex. nut (4 used)
9 Countersunk screw (3 used)
10 Bushing
11 Drive end frame assembly
12 Snap ring
13 Stop ring
14 Bushing
15 Drive with pinion
16 Hex. nut
17 Engaging lever
18 Pivot screw
19 Center bearing
20 Bushing
21 Spring seat
22 Spring
23 Brake seat
24 Brake washer
25 Field frame
26 Motor terminal
27 O-ring
28 Countersunk screw (4 used)
29 Insulating tube (2 used)
30 Armature
31 Brake washer
32 Special washer
33 Bushing
34 Commutator end frame
35 Special screw (4 used)
36 Carbon brush (4 used)
37 Carbon brush spring (4 used)
38 Shims
39 Fixing washer
40 End frame cover
41 Washer (2 used)
42 Special screw (2 used)

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Group 5
GENERAL INFORMATION, DIAGNOSING MALFUNCTIONS

GENERAL INFORMATION

The tractor is equipped with a 3-cylinder vertical in-line, valve-in-head, 4-cycle Diesel engine with direct fuel injection.

The "wet" cylinder liners can be replaced one at a time. The pistons are of forged aluminium alloy and cam-ground. Each piston has two single, cast-iron compression rings and one oil control ring. All ring grooves are above the piston pin. The case-hardened piston pins are full floating and are held in place by two snap rings each.

The crankshaft is a one-piece, heat-treated, steel forging. It is supported in four replaceable two-piece main bearings machined to close tolerances.

The connecting rods are provided with a bronze bushing and a two-piece, replaceable bearing cap each.

A camshaft supported in the cylinder block controls the valves and drives the fuel transfer pump.

The intake and exhaust valves are supported in the cylinder head. The valve stems slide in bores in the cylinder head. The rocker arm shaft assembly is fitted on top of the cylinder head.

The engine is supplied with lubricating oil by a gear pump. The lubricating oil passes through a full-flow oil filter in the main oil circuit. To ensure engine lubrication, the oil filter is provided with a by-pass valve which opens when the filter element is restricted. Lubrication oil is cooled by means of an oil cooler.

The engine has a pressure cooling system consisting of the radiator, water pump, multi-blade fan and thermostat.

DIAGNOSING MALFUNCTIONS

ENGINE WILL NOT CRANK

Dead batteries

Bad battery connections

Defective key switch or start safety switch

Starting motor solenoid defective

Starting motor defective

ENGINE HARD TO START OR WILL NOT START

Loose or corroded battery connections
Low battery output

Excessive resistance in starter circuit

Too high viscosity crankcase oil

Water, dirt or air in fuel system

Fuel filter restricted

Stuck shut-off knob

Dirty or faulty fuel injection nozzles

Defective injection pump

Defective fuel transfer pump

Shut-off valve at fuel tank closed

Injection pump out of time

ENGINE RUNS IRREGULARLY OR STALLS FREQUENTLY

Coolant temperature too low

Insufficient fuel supply

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Section 10
GENERAL

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GROUP 25 — TRACTOR SEPARATION

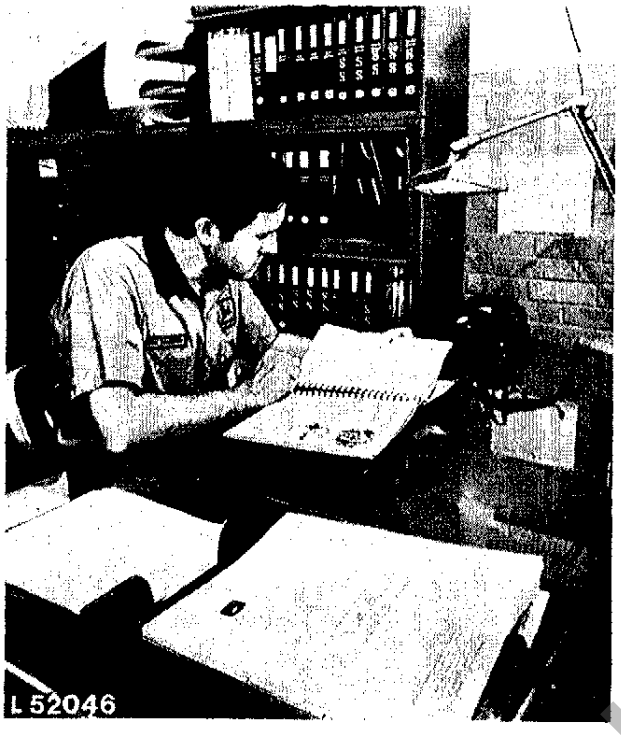
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INTRODUCTION



Use FOS Manuals for Reference

This technical manual is part of a twin concept of service:

- **FOS Manuals — for reference**
- **Technical Manuals — for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover basic theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic types* of failures and their causes. FOS Manuals are for training new personnel and for reference by the experienced technician.

Technical Manuals are concise service guides for a specific machine. Technical Manuals are on-the-job guides containing only the vital information needed by an experienced technician.



When any serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to indentify the reference.



Use Technical Manuals for Actual Service

Some features of this technical manual:

- *Table of contents at front of whole Manual*
- *Contents at front of each Section*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications at end of each Group*
- *Special tools at end of each Group*

This technical manual was planned and written for you — an experienced technician. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.



This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

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ABNORMAL ENGINE NOISE

Incorrect engine timing

Worn main or connecting rod bearings

Excessive crankshaft end play

Loose main bearing caps

Foreign material in combustion chamber

Worn piston pin bushings and pins

Scored pistons

Worn timing gears

Excessive valve clearance

Worn cam followers

Bent push rods

Worn camshaft

Worn rocker arm shaft

Insufficient engine lubrication

DETONATION OR PRE-IGNITION

Oil picked up by intake air stream (intake manifold)

Dirty or faulty fuel injection nozzles

Improper engine timing

Nozzle tip holes enlarged

Nozzle tips broken

Carbon build-up in combustion chamber



NOTE: Overall and detailed information on engine troubles and repair see also "Fundamentals of Service, Engines" manual.

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Group 30
ENGINE LUBRICATION SYSTEM

GENERAL INFORMATION

SYSTEM

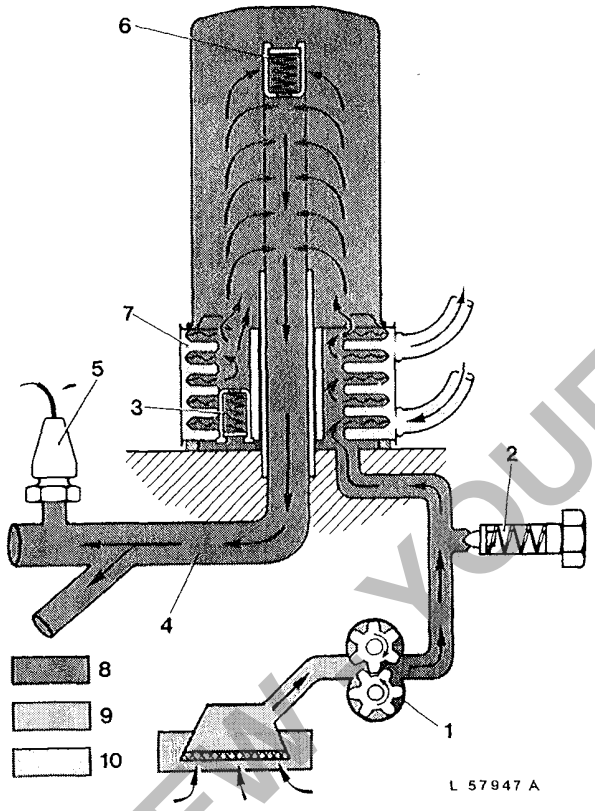


Fig. 1 — Engine Lubrication System

1 Oil pump
2 Oil pressure regulating valve
3 Oil cooler by-pass valve
4 Main oil gallery
5 Oil pressure sending unit
6 Oil filter relief valve
7 Oil cooler
8 Engine lubricating oil
9 Pressure free oil
10 Coolant from engine cooling system

The engine lubrication system is an internal force-feed and splash-type. It has a positive displacement, gear-type pump with an internally adjustable pressure regulating valve, a full flow oil filter, a strainer in the pump intake tube and a pressure warning switch in the flywheel housing. Tractors are further equipped with an oil cooler (see fig. 1).

OIL PUMP AND OIL PRESSURE REGULATING VALVE

Oil enters the pump through the strainer and the pump intake tube and is discharged into an oil tube; via the oil cooler leading to the oil filter and to the main oil gallery running alongside of cylinder block.

An externally adjustable pressure regulating valve is located at the front of cylinder block in the oil gallery. It controls oil pressure before the oil enters the oil filter and it provides constant pressure in the main gallery and in the complete lubrication system.

The valve consists of a valve cone held against a seat by a spring and plug. Pressure may be adjusted by changing the number of shims behind the valve plug. If oil pressure exceeds spring pressure, the valve cone is raised from the seat, permitting oil to bypass to the crankcase and maintain constant pressure.

OIL COOLER

The engine oil cooler is mounted externally on the right-hand side of the cylinder block. Oil pumped by means of the gear-type pump to the oil cooler is cooled by coolant from the engine cooling system (see fig. 1). A bypass valve located in the inlet side of the oil cooler allows uncooled oil to flow directly to the oil filter if there is not enough oil flowing through the oil cooler. e.g. if oil cooler has become restricted.

OIL FILTER

The oil filter is mounted on the right-hand side of the cylinder block. It is a full-flow type with a spin-on type replaceable element. If the filter clogs, a bypass valve in the element opens to keep a full flow of oil to vital engine parts.

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IMPORTANT: Do not use screw drivers or similar tools for this as they might damage the injection nozzle irreparably.

As long as the carbon stop seal is in good condition, no carbon deposits will form in the cylinder head bore and the injection nozzle can therefore be removed without using a tool.

REMOVAL OF THE FUEL PRESSURE LINES

NOTES

Carefully clean fuel pressure lines, injection nozzles and injection pump externally before removing lines to prevent dirt, entering the nozzles and pump through the exposed openings. Plug the openings immediately with caps or plugs. Each fuel pressure line is fitted to the injection pump and nozzle free of tension. Consequently, do not bend lines when removing them, as this reduces their durability. Before removing one or all fuel pressure lines, remove the two clamps.

IMPORTANT: When loosening the union nut of the fuel pressure line, hold male union firmly.

REPAIR

Clean nozzle with 16488 brass brush. See "Special Tools".

IMPORTANT: Do not attempt to test or disassemble nozzles unless the proper service tools are available. Technical Manual TM-1064 "Fuel Injection Equipment-Roosa Master" contains specifications, special service tools, and testing procedures necessary to service the Roosa Master Injection nozzles.

INSTALLATION

INSTALLING ONE OR SEVERAL INJECTION NOZZLES

NOTE: If the injection nozzle cannot be removed by hand from the cylinder head, it is likely that carbon deposits have formed in the cylinder head bore. To clean, remove the cylinder head (see section 20). Remove oil carbon from cylinder head bore with special tool No. JDE 39.

IMPORTANT: Always turn the tool clockwise through the bore even when pulling back, otherwise tool will get dull.

Then blow out bore with compressed air.

Make sure that the sealing surface of the cylinder head, on which the seal washer 5 will be resting, is smooth and free of damage or dirt which could prevent proper sealing. Dirt and roughness could cause distortion to nozzle when the attaching screw is tightened, making the valve stick.

IMPORTANT: Before installing the injection nozzle, make sure nozzle is clean and free from oil or grease. Do not grease or oil the nozzles.

Remove plug from cylinder head bore and insert nozzle into the cylinder head with a twisting motion. Fit the forked end of clamp 15 over the nozzle connecting piece and place spacer ring 26 (see fig. 2) on the cylinder head. Slide washer and three spring clamps over cap screw 25 and screw the cap screw into the cylinder head, (see fig. 2), but only finger tight. Connect the fuel pressure line and lightly tighten union nut for bleeding; tighten cap screw 25 to the specified torque.

When all injection nozzles are installed, slide hex. nuts 21 and grommets 22 (see fig. 1) over nozzle bodies. Screw leak-off caps 20 into hex. nuts and tighten to specified torque (see Torques for Hardware). Connect leak-off lines to caps (see fig. 2).

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Group 5

ENGINE CLUTCHES AND CLUTCH LINKAGE

DIAGNOSING MALFUNCTIONS

CLUTCH SLIPS

Worn or burned clutch facings

Oil or grease on clutch facings

Insufficient clutch pedal free travel

Release levers out of adjustment

Operator riding clutch pedal

CLUTCH GRABS OR CHATTERS

Clutch disk facings loose, gummed, worn or glazed, clutch disk bent or warped

Clutch disk loose at hub (loose rivets or insufficiently pre-stressed springs)

Clutch disk hub tight on shaft (does not slide freely)

Tight or binding clutch fork shaft

Cracked or broken pressure plate

Pressure plates sticking

Defective diaphragm spring

Excessive transmission backlash

Clutch throw-out bearing damaged, dirty, worn or improperly lubricated

Clutch release levers out of adjustment

CLUTCH NOISE (when engaged)

Drive shaft or disk splines worn

Clutch disk loose at hub rivets

Torsion damper defective

Flywheel loose on crankshaft flange

CLUTCH DRAG

Drive shaft splines and/or clutch disk hub distorted or rough

Clutch disk hub tight on clutch shaft

Clutch disk facings loose or oil-soaked

Clutch disk warped or bent

High spots on clutch disk

Defective diaphragm spring

Clutch parts worn

Excessive clutch pedal free travel

Excessive clutch face run-out (flywheel not seated properly)

CLUTCH PEDAL PULSATION

Broken or missing clutch pedal return spring

Clutch release levers out of adjustment

Flywheel not seated properly

Bent crankshaft flywheel flange

Bent clutch fork shaft

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HI-LO SHIFT UNIT

NOTE: Refer to fig. 6 for parts identification. For repair of transmission oil pump see section 70, group 15.

Check transmission oil pump cover 19 for wear and damage, especially sliding area of pump gears 16 and 17. Replace cover, if necessary.

Check Lo-brake piston 34 and Hi-clutch piston 44 for wear or damage. Replace sealing rings 33 and O-rings 35.

Check spring washers 32 for damage or flattening; place each washer on a flat support with cupped side down and measure height of washer (see Specifications).

Check disks 28 and separator plates 29 for wear. Make sure grooved pattern of disk facings is not worn or rubbed off. Otherwise replace disk. Check disk splines for broken teeth. For thickness of an individual disk as well as total stacked height of a new disk pack see Specifications.

Check planet pinion carrier 36 for cracks or other damage and replace, if necessary.

Inspect brake hub 30, gear and hub of drive shaft 47, sun gear 40 and planet pinions 43 for chipped or worn teeth. Replace parts, if necessary.

50

NOTE: If one or two planet pinions must be replaced, install a complete set (3) of pinions as they are matched and are available only as a complete set.

Check needle bearings 42 supporting planet pinions for worn spots.

Check transmission input shaft 2 for wear and damage and replace, if necessary. Replace sealing rings 1,4 and 6 on input shaft. When replacing sealing ring 4, first remove retaining ring 5 from input shaft.

Now, if necessary, pull oil tube 3 out of input shaft. Press new oil tube in retaining ring 5. Slide sealing ring 4 on retaining ring and push oil tube with retaining ring and sealing ring in transmission input shaft.

Examine drive shaft 47 for wear or damage. If bushing 46 is damaged, remove it from shaft and press in new bushing with open ends of oil grooves facing outward. Replace sealing rings 1 on drive shaft.

Inspect oil manifold 9 and its bushing for damage. Replace complete oil manifold, if necessary.

Check Hi-Lo housing and hollow drive shaft 54 (forming an integral unit) for damage. Check oil seal 52 and bushing 51 for serviceability. Press in new oil seal with numbered side facing driver.

If necessary, remove unserviceable bushing 51 from Hi-Lo housing. Press in new bushing until driver is flush against housing.

ASSEMBLY

NOTE: Refer to fig. 6 for parts identification.

When assembling, principally reverse disassembly procedure. Observe the following:

When installing annular pistons, make sure O-rings are not inverted or damaged when pistons are pressed into clutch drum or planet pinion carrier. Do not mix up pistons.

Place a spring washer 32 on piston with cupped side facing upward. Then place second spring washer on first washer with cupped side facing downward. Put other two washers, cupped side to cupped side, over first pair.

Compress washer spring pack as shown in fig. 5 until snap ring 31 can be inserted in groove, using a press and special tool No. JDT 24.

CAUTION: Be careful when compressing spring washer pack.

Install two needle bearings 42 into each planet gear.

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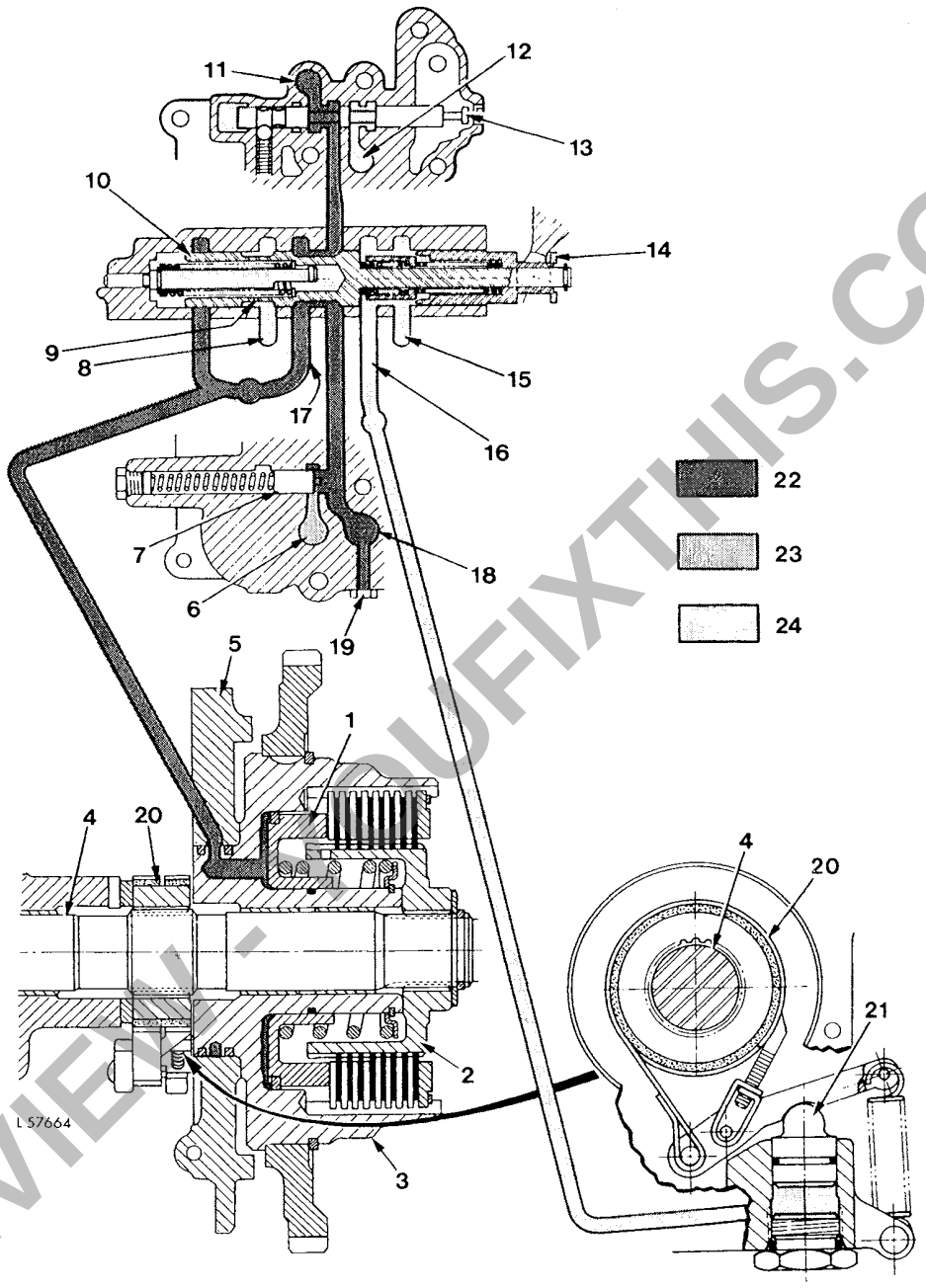


Fig. 1 — Hydraulic Circuit Flow Diagram of Independent PTO

1 PTO clutch piston
2 Disk hub
3 Clutch drum
4 PTO clutch shaft
5 Front transmission cover
6 Passage for oil flowing to hydraulic pump
7 Pressure regulating valve
8 Oil passage to transmission case (return oil from PTO clutch)
9 Oil orifice
10 Spool of PTO control valve
11 Oil flow to manifold and Hi-disk clutch
12 Oil flow to manifold and Lo- disk brake
13 Spool of Hi-Lo control valve
14 PTO clutch valve actuator (engaged position)
15 Oil passage to transmission case (return oil from PTO brake)
16 Pressure oil passage to PTO brake
17 Pressure oil passage to PTO clutch
18 Oil passage from transmission oil pump
19 Port for checking regulating valve pressure
20 Brake band
21 Brake piston
22 Pressure oil (approx. 9 bar = 130 psi)
23 Intermediate pressure oil
24 Pressure-free oil

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SPECIFICATIONS

Item	Measurement	New Part Dimension	Wear Tolerance
REVERSER			
Forward clutch			
Clutch shaft	O.D. at pilot bearing	16.98 to 16.99 mm (0.6684 to 0.6690 in.)	
Clutch disk	Thickness	2.85 to 3.00 mm (0.112 to 0.118 in.)	2.79 mm (0.110 in.)
	Groove depth	0.25 to 0.51 mm (0.010 to 0.020 in.)	0.20 mm (0.008 in.)
Separator plate	Thickness	2.16 to 2.41 mm (0.085 to 0.095 in.)	
Clutch piston	Thickness	16.76 to 17.27 mm (0.660 to 0.680 in.)	
	I.D.	95.48 to 95.53 mm (3.759 to 3.761 in.)	
	O.D.	161.16 to 161.42 mm (6.345 to 6.355 in.)	
Drum bushing	I.D.	39.80 to 39.90 mm (1.567 to 1.571 in.)	
Spring washers	Free height	4.64 mm (0.183 in.)	4.14 mm (0.163 in.)
Reverse brake			
Spring washers	Free height	3.63 mm (0.143 in.)	3.12 mm (0.123 in.)
Brake disk	Thickness	2.85 to 3.00 mm (0.112 to 0.118 in.	2.79 mm (0.110 in.
	Groove depth	0.25 to 0.51 mm (0.010 to 0.020 in.)	0.20 mm (0.008 in.)
Separator plate	Thickness	2.16 to 2.41 mm (0.085 to 0.095 in.)	
Sun gear	I.D.	39.99 to 40.25 mm (1.5745 to 1.5845 in.)	
	Number of teeth	25	
Brake piston	Thickness	16.76 to 17.27 mm (0.660 to 0.680 in.)	
	O.D.	167.64 to 167.89 mm (6.600 to 6.610 in.)	
	I.D.	95.48 to 95.53 mm (3.759 to 3.761 in.)	
Clutch shaft	O.D. (rear of gear)	28.42 to 28.47 mm (1.119 to 1.121 in.)	
	O.D. (front of gear)	31.85 to 31.90 mm (1.254 to 1.256 in.)	
	Number of teeth	17	
Planetary assembly			
Pinion shaft	O.D.	16.754 to 16.764 mm (0.6596 to 0.6600 in.)	
	Length	81.92 to 82.68 mm (3.225 to 3.255 in.)	

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OIL OVERHEATING

Oil of improper viscosity in system
Use proper oil

Oil cooler malfunction
Clean and repair oil cooler

Stroke control valve of hydraulic pump sticking
Repair valve

Crankcase outlet valve of hydraulic pump sticking in open position
Check valve for foreign particles

OIL IN SYSTEM FOAMING

Too little oil in system
Add oil, check system for leakage

Water in oil
Drain oil and refill

Improper oil viscosity
Use oil of proper viscosity

Oil lines bent or dented
Replace lines

Air leak in hydraulic pump inlet line
Tighten line connections or replace lines

HYDRAULIC PUMP

NO PUMP OUTPUT

Adjust stroke control valve of pump

Stroke control valve of pump stuck open

Pump shaft broken

ERRATIC PUMP OPERATION

Stroke control valve not seating properly
Check valve seat for damage or foreign particles

Leaking inlet or outlet valves, defective O-rings
Repair valves, replace O-rings of valve plugs

Piston springs not balanced
Check springs for broken coils or unequal tension

Pump pistons stuck
Check pistons for burrs or dirt. If required, replace parts

PUMP NOISE OR SQUEAL

Stroke control valve guide binding
Smoothen sharp edge on lower end of guide. Adjust system pressure

Loose pump drive coupler parts
Tighten screws and nuts to the specified torque

Air bubble in stroke control valve chamber
Bleed valve chamber by backing off adjusting screw of valve until spring pressure is relieved. Air will escape through threads. Then adjust stroke control valve adjusting screw

PUMP SLOW OUT OF STROKE

Pump shaft quad ring groove in pump housing worn
Replace pump housing and quad ring

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ROCKSHAFT HOUSING ASSEMBLY

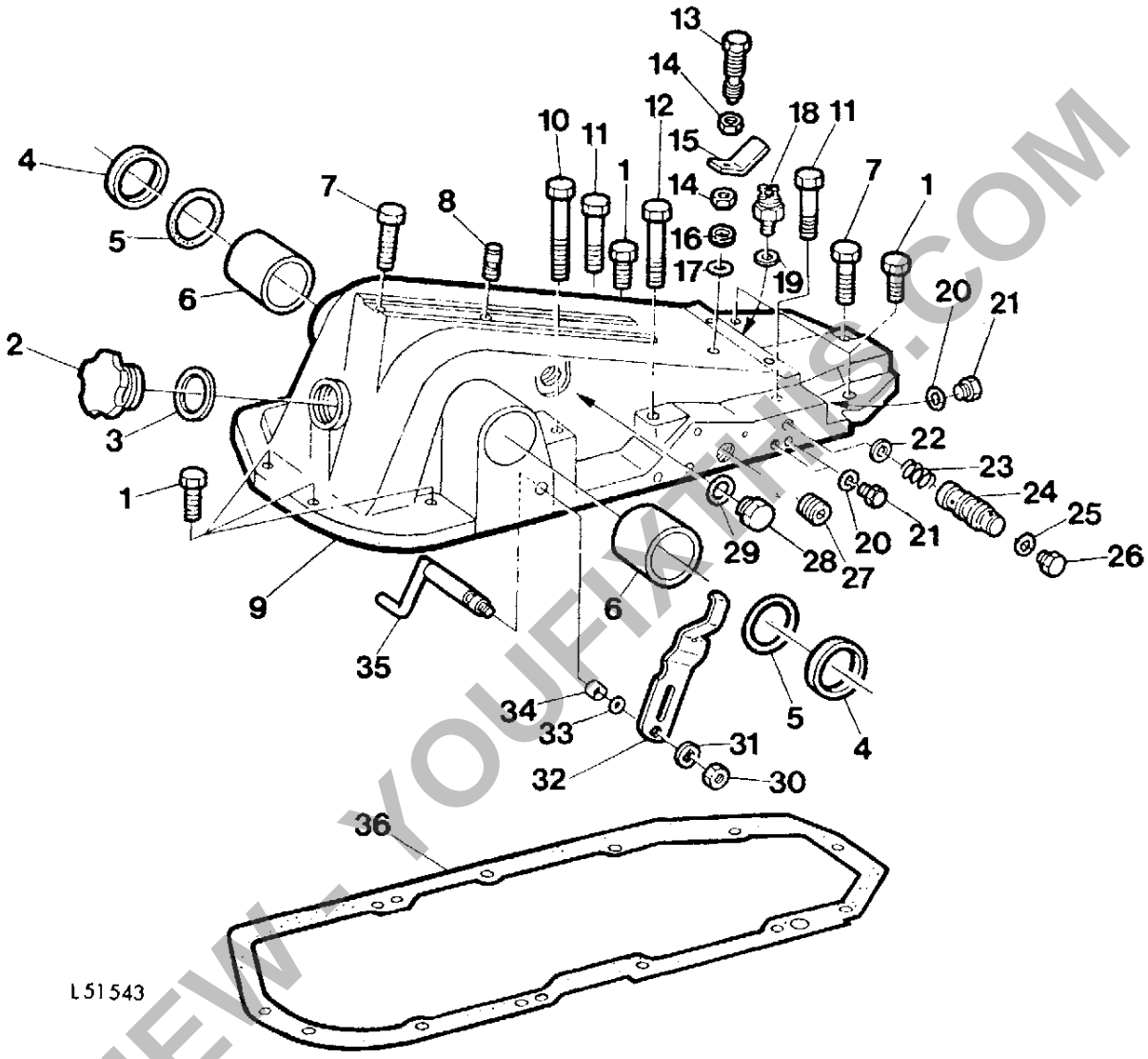


Fig. 5 — Exploded View of Rockshaft Housing

1 Cap screws
2 Oil filler cap
3 Seal ring
4 Back-up rings
5 O-rings
6 Bushings
7 Cap screws
8 Special screw
9 Rockshaft housing
10 Cap screw
11 Cap screws
12 Cap screws
13 Special screw (regulating rate of drop)
14 Lock nuts
15 Link
16 Seal ring
17 O-ring
18 Start safety switch
19 Aluminium washer (use as required)
20 O-rings
21 Plugs
22 Shim (use as required)
23 Spring
24 Spool of flow control valve
25 O-ring
26 Plug
27 Plug
28 Plug
29 O-ring
30 Hex. nut
31 Washer
32 Selector lever
33 O-ring
34 Bushing (selector lever shaft)
35 Selector lever shaft
36 Gasket

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