FIATALLIS®

FD195L
CRAWLER DOZER

SERVICE MANUAL

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FD195L
CRAWLER DOZER

SERVICE MANUAL

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SECTION 7	ELECTRICAL
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SAFETY RULES

GENERAL

Study the Operation and Maintenance Instruction Manual before starting, maintaining, fueling, or servicing machine. Read and heed all machine-mounted safety signs before starting, operating, maintaining, fueling, or servicing machine.

Machine-mounted safety signs have been color coded yellow with black borders and lettering for **warning** and red with white borders and lettering for **danger** points.

Do not allow unauthorized personnel to service or maintain this machine.

Do not wear rings, wrist watches, jewelry, 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, reflector vests, or respirators, depending on job conditions. Consult your employer for specific safety equipment requirements.

Keep operator's compartment, stepping points, grab rails and handles clean and free from foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate machine.

Do not jump on or off machine. Keep two hands and one foot, or two feet and one hand, in contact with steps and grab rails and handles at all times.

Do not use controls or hoses as handholds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Controls also may be moved inadvertently causing accidental machine or equipment movement.

Never attempt to operate the machine or its tools from any other position than seated in the operator's seat. Keep head, body, limbs, hand and feet inside operator's compartment at all times to reduce exposure to hazards outside the operator's compartment.

Be careful of slippery conditions on stepping points, hand rails, and on the ground.

Always wear non-slip safety boots or shoes.

Get off machine only when it is fully stopped. Always check height, width and weight restrictions in the working area, and be sure the machine will not exceed these limitations.

Be sure the exact locations of gas lines, utility lines, sewers, overhead and buried power lines and other obstructions or hazards are known. Such locations should be precisely marked by the proper authorities to reduce the risk of accidents. Obtain shutdown or relocation of any such facilities before starting work, if necessary. Know the working range of the machine.

Provide clearance for rear superstructure swing by barricading area to discourage entry.

Never exceed the lifting capacity of the machine. Stay within the lifting limits shown on the load charts provided with the machines.

START UP

Do not start or operate an unsafe machine. Walk completely around machine before mounting. Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check that steering and attachment controls are in hold (neutral) position and, also, that safety lever is released before moving. Advise the proper maintenance authority of any malfunction part or system. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure all people in the area are clear of the unit before moving the machine or its attachments. Sound horn.

Obey flagman, safety signals and signs.

Due to the presence of flammable fluid, never check or fill fuel tanks, storage batteries, or use starter fluid near lighted smoking materials or open flame or sparks.

Starting fluid is flammable. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers. Store containers in cool, well ventilated place secure from unauthorized personnel. **Do not puncture or burn containers.** Follow the recommendations of the manufacturer for storage and disposal.

Never use starter fluid near lighted smoking materials or open flame or sparks due to the presence of flammable fluid.

Make sure nobody is near the work area of the excavator before starting the machine, or before swinging or moving in any direction.

Adjust all mirrors for visibility towards the rear of the machine.

Be sure the throttle setting is adequate for the contemplated operation.

If controls or other hydraulic systems feel spongy have the machine checked for air in the systems. Presence of air in these systems could cause improper control and result in an accident. See the Operation and Maintenance Instruction Manual for corrective procedures.

OPERATING

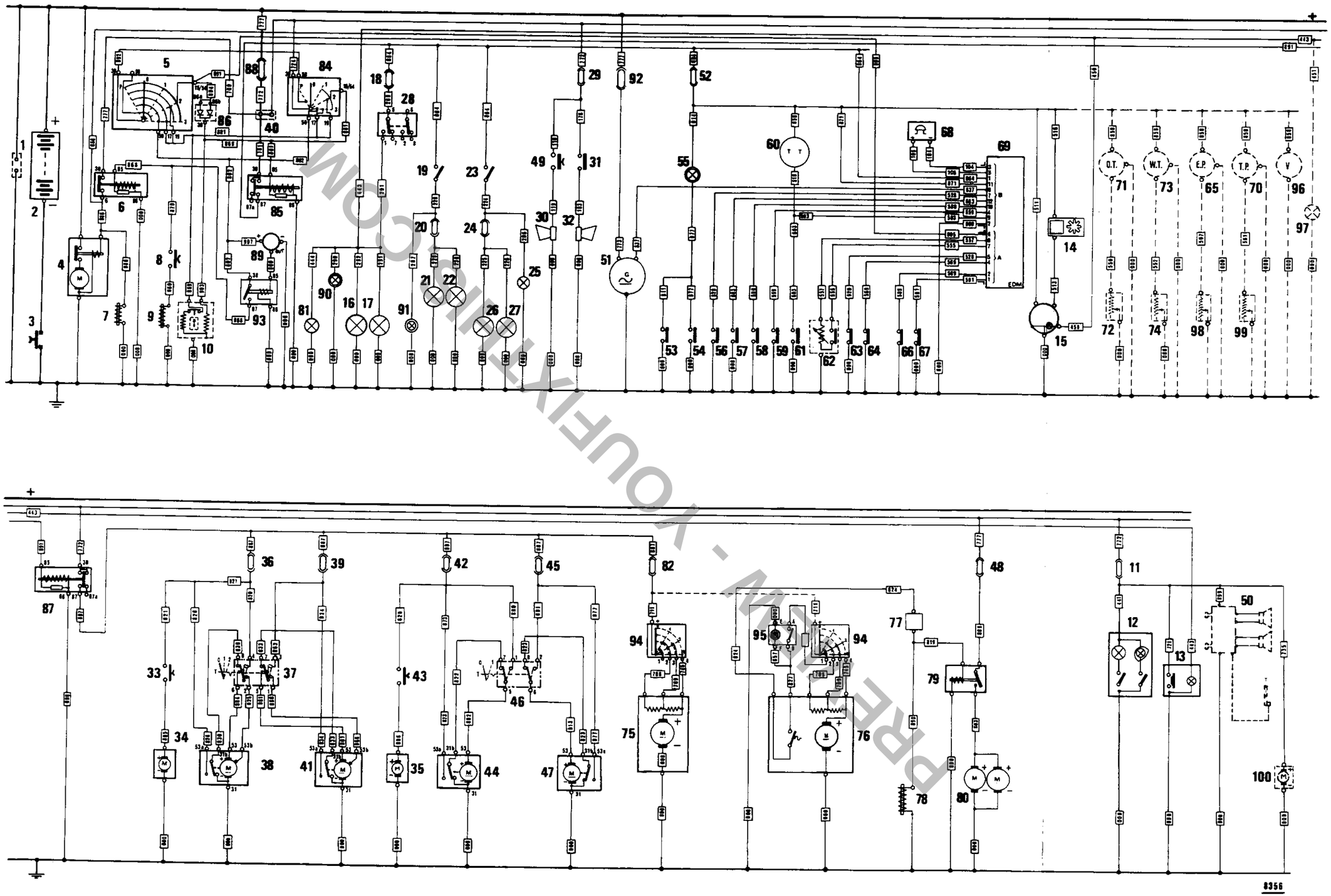
Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases which would otherwise concentrate in the ambient air.

Keep operator's compartment clear of loose objects. Do not use machine to carry loose objects by means other than attachments designed for such objects.

Do not carry riders.

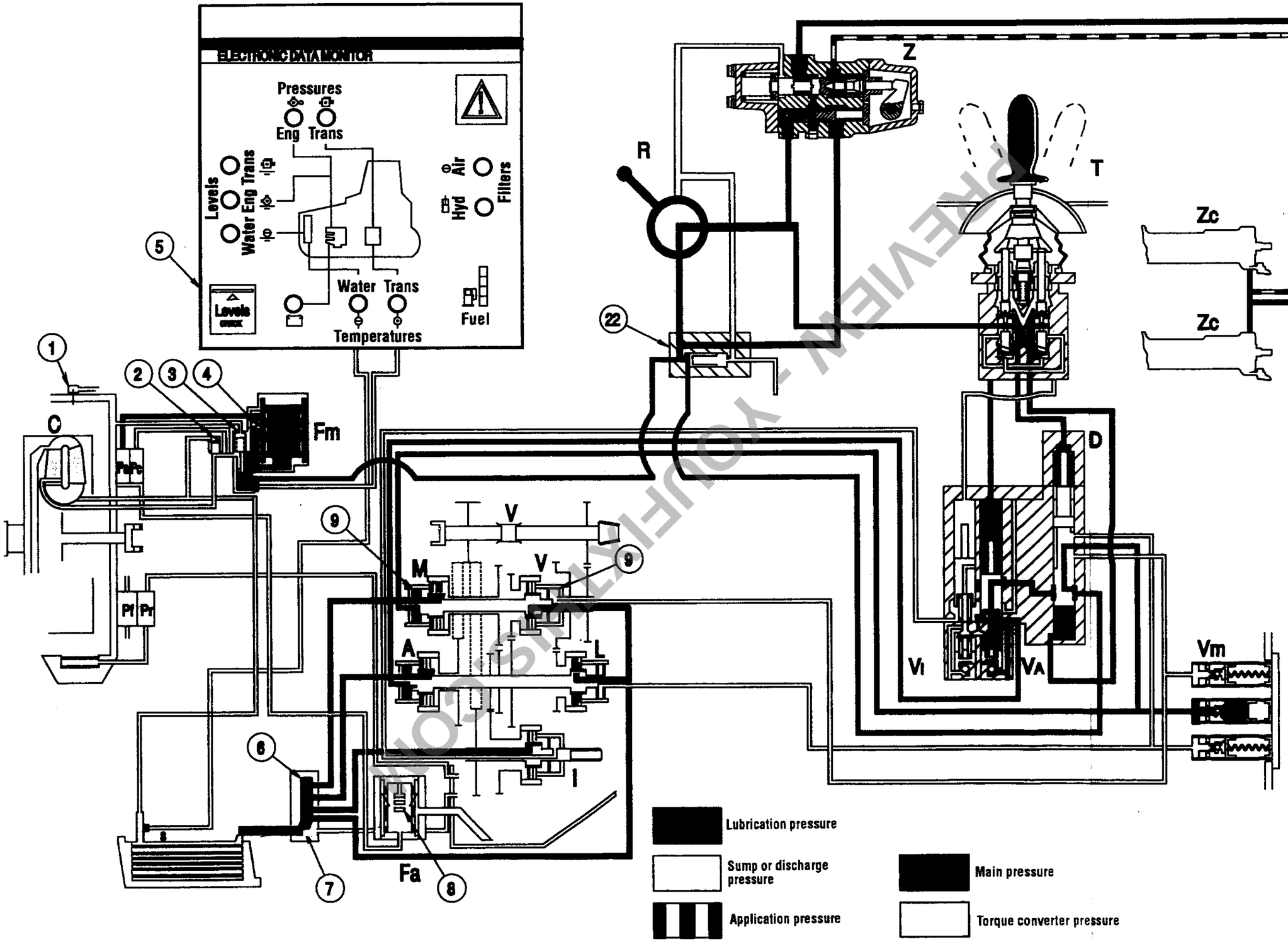
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PREMIUM - MACK
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TRANSMISSION HYDRAULIC SCHEMATIC
(2nd - forward)



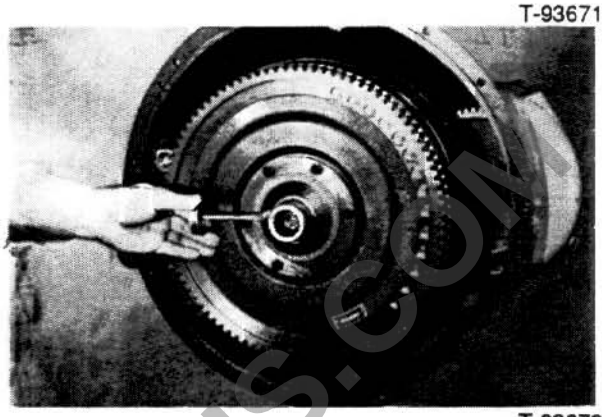
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2.4.1.2 INSTALLATION

2.4.1.2.1
Installation of converter is reverse procedure of removal with the following exceptions.

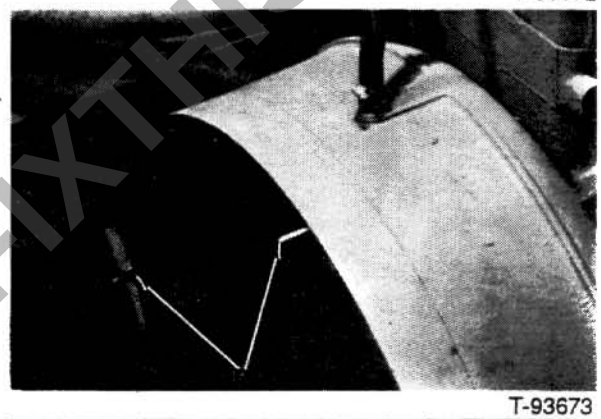
Apply a coating of anti-seize lubricant to the stub shaft on the converter.

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2.4.1.2.2
Install aligning studs on the flywheel housing.

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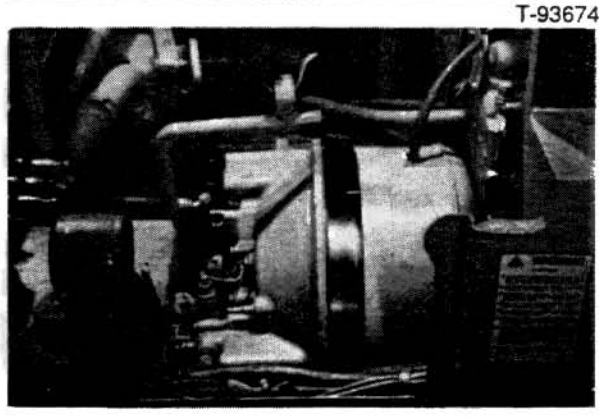
2.4.1.2.3
Apply a coating of liquid gasket to the mating surfaces of the converter and flywheel housing.

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2.4.1.2.4
Install the converter and tighten capscrews to specified torque (6.8 - 7.4 daNm).

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NUTS (ZNT)					SCREWS (ZNT/DEIDR)		
Resistance class: 10 (R80)					Resistance class: 10.9 (R100)		
Diameter and step mm	Normal daNm	Low type daNm	with polyamide ring		Diameter and step mm	Normal ZNT daNm	Selflocking ZNT daNm
			normal da Nm	low type daNm			
M6x1	1.3	1.2	-	-	M6x1	1.3	-
M8x1.25	3.2	2.6	3.9	3.2	M8x1.25	1.3	3.5
M10x1.25	7.2	5.2	8.2	6.2	M10x1.25	7.1	7.9
M10x1.5	6.5	5	7.7	6	M10x1.5	6.5	7
M12x1.25	13	8.7	14.5	10.2	M12x1.25	12.7	13.9
M12x1.75	11	8.1	12.9	9.6	M12x1.75	11	12
M14x1.5	19.5	13	21.6	15	M14x1.5	20	22
M14x2	18	12.5	20	14.6	M14x2	18	19
M16x1.5	30	17	34	20	M16x1.5	30	33
M16x2	-	-	-	-	M16x2	-	-
M18x1.5	45	25	50	29	M18x1.5	45	48
M18x2.5	-	-	-	-	M18x2.5	-	-
M20x1.5	60	30.5	64.5	35	M20x1.5	60	65
M20x2.5	-	-	-	-	M20x2.5	-	-
M22x1.5	80	41	-	-	M22x1.5	80	90
M22x2.5	-	-	-	-	M22x2.5	-	-
M24x2	100	47	108	52.5	M24x2	100	110
M24x3	-	-	-	-	M24x3	-	-
M27x2	95	40.1	-	-	M27x2	100	-
M30x2	130	49.4	-	-	M30x2	140	-
M33x2	170	-	-	-	M33x2	190	-
M36x3	220	-	-	-	M36x3	240	-

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SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Low lube oil pressure indicator light turns on with engine running.	Low transmission oil level	Operator's manual	Pull dipstick and check level	Fill transmission with specified oil and to proper level
	Blocked converter pump suction filter			Clean the filter
	External leakage allowing air to enter pump		If oil foams, check for leakage	Correct leakage
	Defective hose		Restriction in suction hose	Replace or clean hose
	Incorrect oil	Operator's manual	Compare oil specification with factory data	Drain old and replace with the specified grade and quantity of oil.
	Defective indicator		Nothing seems to correct problem	Replace indicator

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FLUID CAPACITY

ITEM	QUANTITY L	REFILL
Cooling system	40	Mixture of water and reputable high quality commercial permanent fluid (providing adequate oxidation, foaming, corrosion, scaling and freezing protection down to -35°C (31°F)
Fuel tank	345	Diesel Fuel ASTM N.2 - D Grade TT of reputable quality and Make
Crankcase	15	Engine oil to MIL - L - 2104 C or API Service CD
Converter / transmission	27,5	AFT Type A SUFFIX A
Bevel gear - steering clutches - brakes	32	Engine oil to MIL - L - 2104 D or API Service CD
Hydraulic system - "AD"version	69 (°)	Hydraulic oil to MIL-H- 24459 or DIN 51524 / 51525
Final Drives (each)	18	Oil for mechanical drives MIL-L-2104 D
Track idlers and rollers	7 (°)	Engine oil to MIL - L - 2104 D or API Service CD
Grease fittings	- -	Lithium - calcium base grease, N. L. G. I. no. 2 consistency
Cab tilting system	0,5 (°)	

Oil quantities indicated are for periodical changes as detailed in the drainage and refill instructions for each item, as applicable.

(°) First supply.

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LUBRICATION AND SERVICE GUIDE

EVERY 10 HOURS	TRACK FRAME INBOARD SUPPORTS - Lubricate
EVERY 100 HOURS	BEVEL GEAR/STEERING CLUTCHES AND BRAKES - Check oil levels FINAL DRIVES - Check oil level HYDRAULIC SYSTEM - Check oil level FUEL TANK - Drain condensation BLADE CYLINDER ARTICULATION - Lubricate
EVERY 250 HOURS	FUEL BOWL FILTER - Clean FIRST FUEL FILTER - Change ENGINE OIL - Change ALTERNATOR AND FAN BELTS - Check tension
EVERY 500 HOURS	ENGINE OIL FILTER - Change SECOND FUEL FILTER - Change CONVERTER/TRANSMISSION - Change oil and filters maintenance HYDRAULIC SYSTEM - Change return oil filter STEERING CLUTCHES AND BRAKES - Filters maintenance ENGINE COOLANT INHIBITOR FILTER - Change
EVERY 1000 HOURS	ENGINE - Fuel injectors calibration ENGINE - Valves adjustment check BEVEL GEAR/STEERING CLUTCH AND BRAKES - Change oil FINAL DRIVES - Change oil DRIVE SHAFT - Grease fittings TRACK FRAME OUTBOARD SUPPORTS - Lubricate BATTERIES - Check electrolyte level
EVERY 2000 HOURS	HYDRAULIC SYSTEM - Change oil RADIATOR - Change coolant ENGINE AIR CLEANER - Replace elements
WHEN REQUIRED (Operations to be performed whenever Electronic Data Monitor lights)	ENGINE OIL - Check level and top-up CONVERTER/TRANSMISSION - Check oil level and top-up RADIATOR - Add coolant HYDRAULIC SYSTEM - Change return oil filter AIR CLEANER - Clean elements
WHEN REQUIRED	TRACKS - Check sag IDLERS AND ROLLERS FUEL SYSTEM BLEEDING

Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel

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1.4 REPAIR PROCEDURES

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1.4.1 ENGINE & CONVERTER

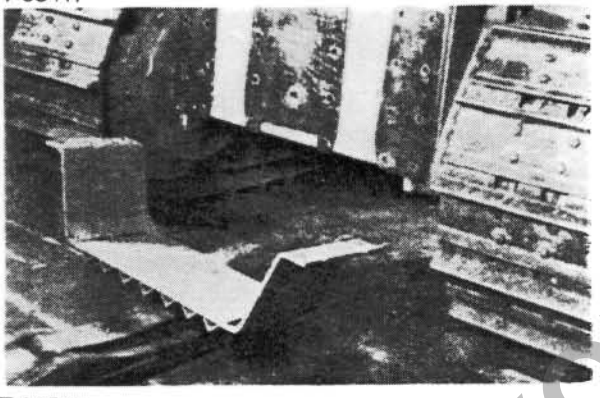
1.4.1.1 REMOVAL

1.4.1.1.1

Place machine on a level surface. Turn master electrical switch to the "OFF" position. Tag the unti with a "DO NOT START" tag.

Refer to the OPERATOR COMPARTMENT Section of this manual and tilt the operator compartment.

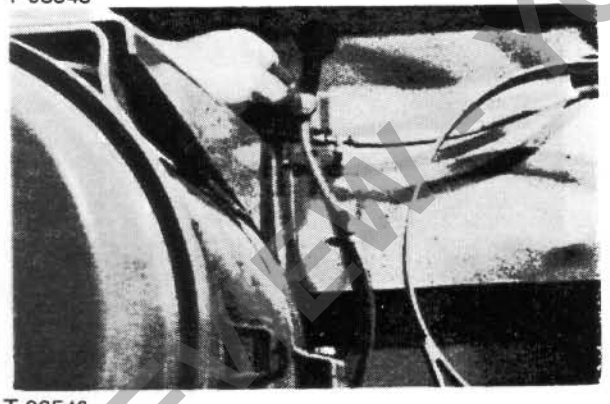
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1.4.1.1.2

Remove the center belly guards.

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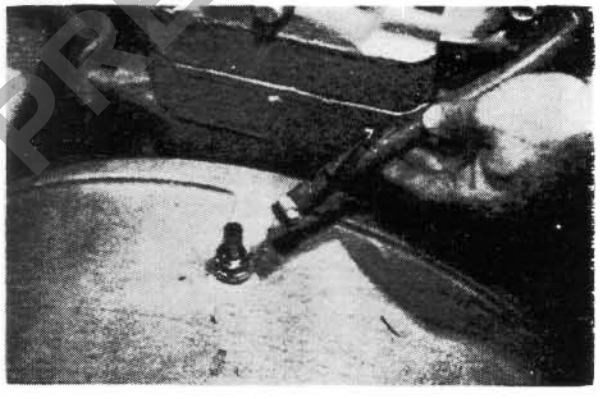


1.4.1.1.3

Disconnect windshield and door window washer hoses from engine, hood and side doors support.

NOTE: Plug lines to keep from draining reservoirs.

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1.4.1.1.4

Disconnect vent hose from flywheel housing from vent.

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SPECIFICATIONS

ENGINE

Make and Model: FIAT 8365.25.541
Diesel cycle, 4-stroke, direct-injection, with exhaust gas driven turbocharger.
Number of cylinders: 6
Bore x Stroke: 115 x 130 mm (4.5 x 5.12 in)
Total Piston Displacement: 8102 cc (494,3 cu. in)
Compression ratio: 16 to 1
Rated speed: 2000 RPM
Rated speed at max. torque: 1400 RPM

Lubrication System

Type : Force-fed by gear pump.
Oil filters: Strainer on pump suction line. Full flow in delivery line through a replaceable element.
Engine oil cooled by heat-exchanger connected to the engine panel.
Low oil pressure warning light in DATA MONITOR PANEL.

Engine valves

Overhead valve, camshaft in cylinder block.
Intake:
- Opens - B.T.D.C. 11°
- Closes - A.B.D.C. 27°

Exhaust:
- Opens - B.B.D.C. 55°
- Closes - A.T.D.C. 17°

Valve clearance:
- Intake 0.30 mm (0.0118 in)
- Exhaust 0.50 mm (0.1968 in)

Fuel system

Fuel pump, piston type.
In line injection pump, integral all-speed governor and automatic advance variator.
Setting of injection pump to engine: 23°±30' before T.D.C. and cyl. 1 in the compression stroke (beginning of delivery).
Firing order : 1-5-3-6-2-4
Fuel injectors release pressure: 200 - 208 bar.
Throwaway cartridge fuel filters.
Dry type, paper - cartridge air cleaner with centrifugal separator. Restriction indicator light on dashboard (EDM).

Cooling System

Coolant, force-circulated by centrifugal pump.
Radiator: 6 tube row core.
Fan: 7 blade, pusher.
Coolant circulation between engine and radiator governed by thermostat.
Engine coolant temperature and level indicators on dashboard (EDM).

Starting

By electric motor.

POWER TRAIN

Converter / Transmission

Hydraulic torque converter .
Stall torque ratio 2.7 to 1.
Transmission providing three speeds forward and three reverse, controlled by hydraulic powershift mechanism acting on five clutches.
Pilot control gearshift lever located on the left side of the operator.
Safety lock in "locked" position prevents the use of gearshift lever and applies automatically the brakes.
Torque converter/transmission oil cooling through heat exchanger with coolant recirculated from radiator.
Oil filtration: two full-flow filters, one mesh type and magnetic rod on suction line and one with cartridge and built-in by pass valve on delivery line.

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GENERAL

The service intervals indicated herein refer to normal operating conditions; during the initial break-in period and under particularly severe service conditions, other intervals may be needed.

Use this list to coordinate maintenance scheduled at the same intervals.

Before proceeding with any service operation lower equipment to the ground and turn off the engine.

It is advisable to change oil immediately after stopping the machine as warm oil will drain out more easily along with any suspended deposits and scale.

Before and after lubrication accurately clean any fittings, covers and plugs to prevent dirt from entering the system.

Lubrication is an essential part of preventive maintenance, controlling to a great extent the useful life of the unit. Different components require different lubricants, and some components in the unit require more frequent lubrication than others. It is important that the instructions regarding types of lubricant, and the frequency of their application, be followed. Periodic lubrication of moving parts reduces to a minimum, the possibility of mechanical failures.

Machine should be on level ground when checking oil levels, draining oils or topping up.

Do not tamper with fuel injection equipment settings. Lead seals may be removed by authorized personnel only ; otherwise, warranty will be invalidated.

To reach inside the engine compartment, open the side panels pushing the button indicated after unlocking with the appropriate key.



To reach the steering clutches/brakes filters and to drain condensed water from the system, remove the bolts A and the rear panel.



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AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home or on the highway, 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 construction of any type of equipment there are 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 prevent many serious injuries each year. The rule is:
never attempt to clean, oil or adjust a machine while it is in motion.

WARNING

On machines having hydraulically, mechanically, and/or cable controlled equipment (such as shovels, loaders, dozers, scrapers, etc.) be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing. If it is necessary to have the hydraulically, mechanically, and/or cable controlled equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical devices used for controlling the equipment.

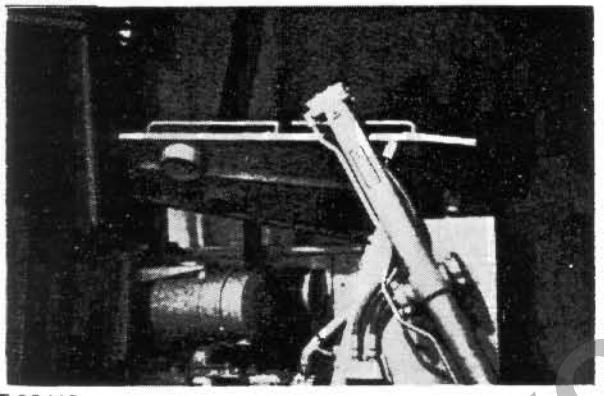
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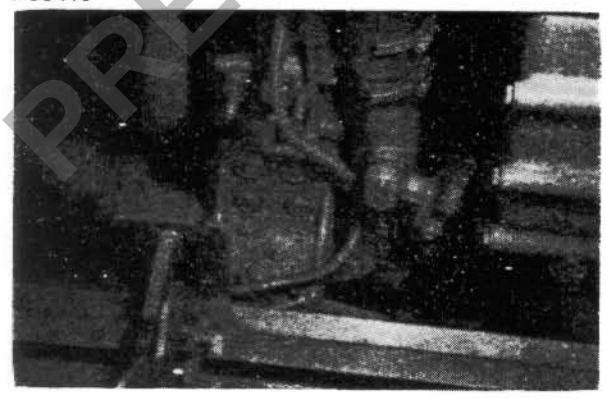
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T-93412



T-93410



1.4.7 RADIATOR

1.4.7.1 REMOVAL

1.4.7.1.1

Turn master electrical switch to the "OFF" position. Tag the unit with a "DO NOT START" tag.

⚠ WARNING

Always turn the master switch to the "OFF" position before cleaning, repairing, servicing or parking the machine to prevent injury.

1.4.7.1.2

Remove hood assembly.

⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided.

1.4.7.1.3

Remove radiator pressure cap.

⚠ DANGER

Fluid under pressure - Turn cap or cover slowly to relieve pressure before removing.

1.4.7.1.4

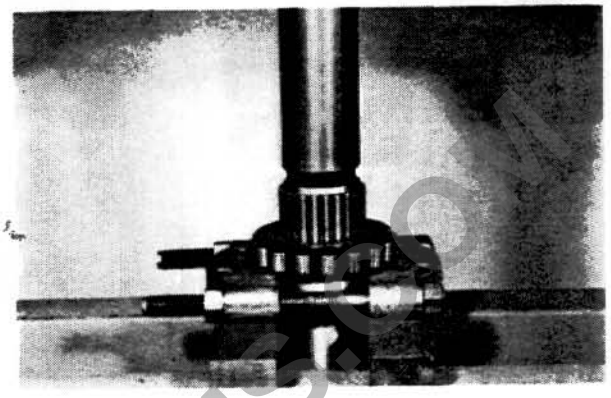
Remove drain plug and drain radiator.

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2.4.1.3.37
Using a suitable press, remove rear bearing from shaft.

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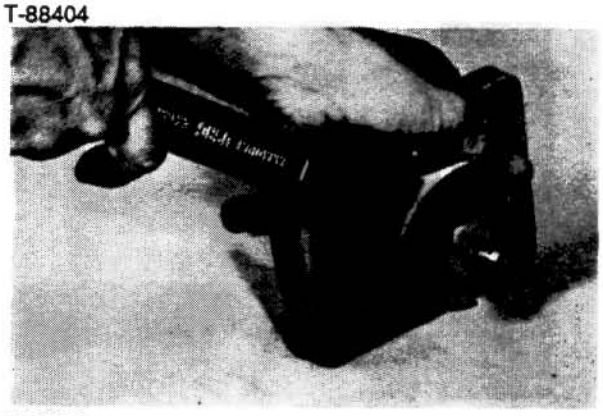


2.4.1.4 ASSEMBLY
For assembly reverse procedures of disassembly with the following additions:
2.4.1.4.1
If dowels, sleeve or sealing ring were removed from carrier, install new parts.
2.4.1.4.2
Replace all o-rings, seals and gaskets with new parts.
2.4.1.4.3
When necessary to heat a bearing, use a suitable bearing heater and heat to 121°C (250°F).
2.4.1.4.4
When necessary to freeze a bearing or part, place the part in dry ice for four hours prior to installation.
2.4.1.4.5
Pay attention to the correct assembly of oil deflector (see 2.4.1.3.8).
See also Section MODIFICATIONS, 2.7.3 (from no. 60319).

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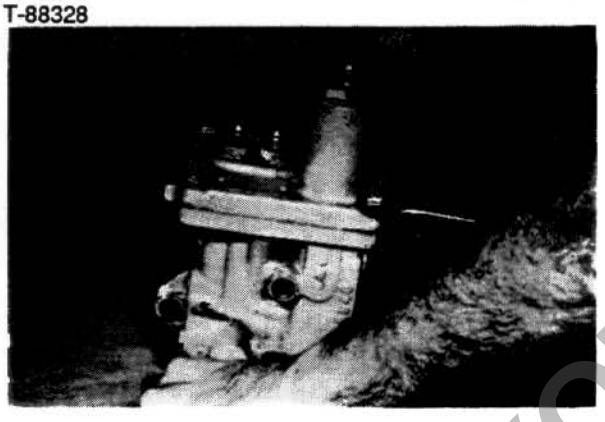
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2.4.3.2.15
Install adapter and new seal washer.

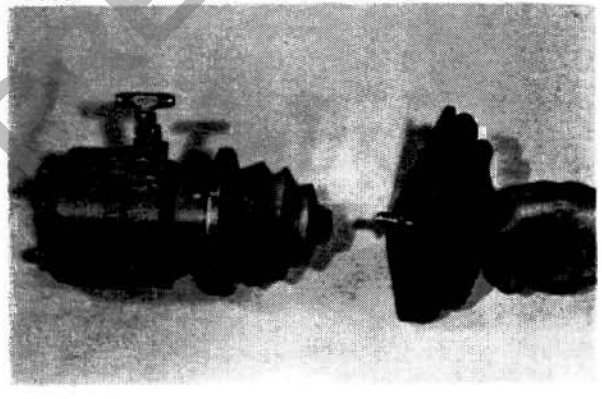
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2.4.3.2.16
Using a new gasket, install cover and spool assembly on valve body.

2.4.3.3 TRANSMISSION PILOT CONTROL
Transmission is controlled by a power shift hand lever (pilot control assembly) fixed to a support to the left side of the operator. Movement of this lever, hydraulically shifts spools in the transmission control valve which in turn controls the transmission clutches.

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2.4.3.3.1
Unscrew hand lever grip assembly and remove with square boot.

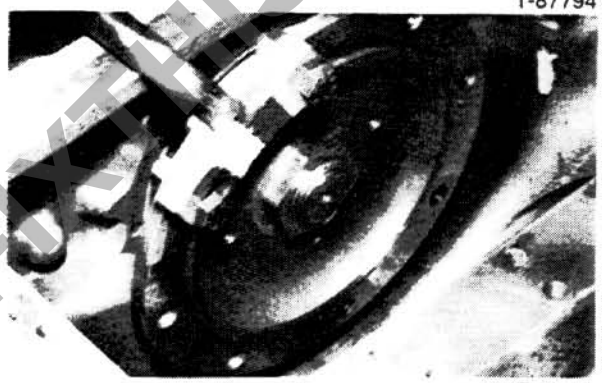
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3.4.1.32
If the steering clutches have not been removed, remove them as described in the *STEERING CLUTCHES and BRAKES* section of this manual.

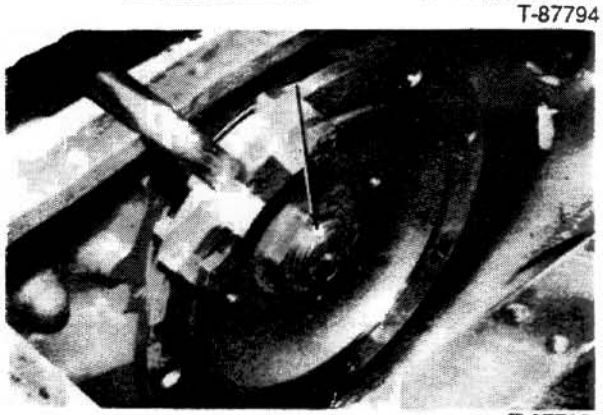
3.4.1.33
Install locking clamp (75291579) to the steering clutch hub as shown.

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3.4.1.34
Unstake the steering clutch hub nut.

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3.4.1.35
Remove the steering clutch hub nut.

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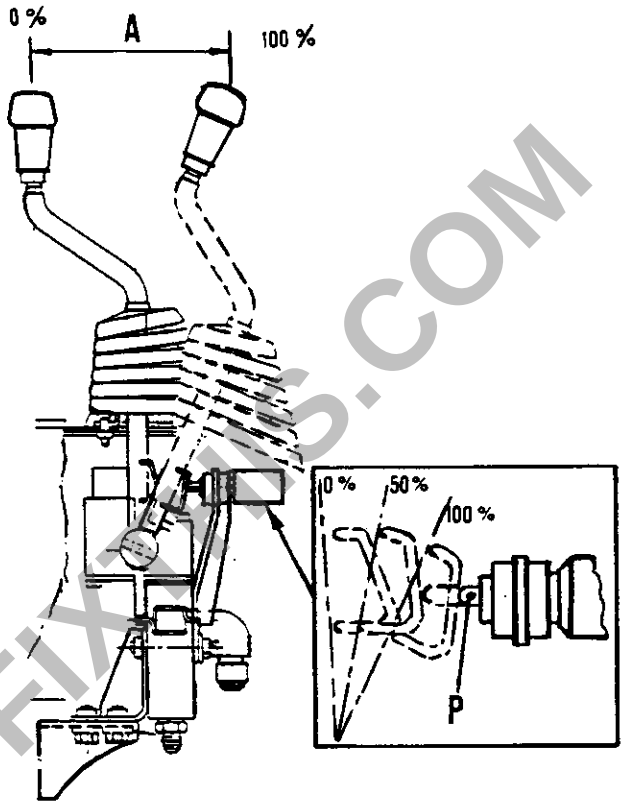
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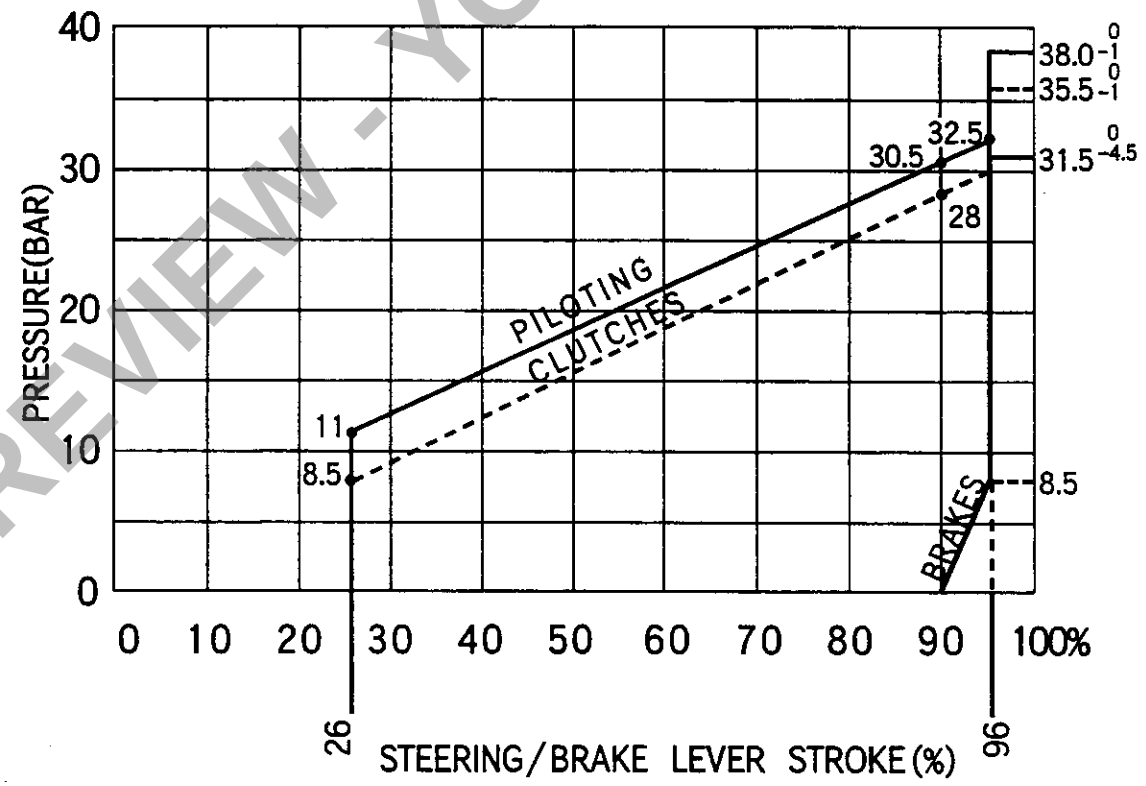
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4.3 TESTING

Position by means of a suitable device to check the stroke (a) of steering/brake clutch levers (see figure).
By pulling the lever at about 26% of its stroke, the pressure gauges (PLH and CLH) display pressures according to the diagram.
If you pull the lever further on, a gradual pressure increase is displayed on the gauges (PLH and CLH), and at about 90% of the stroke you will notice a pressure increase on the gauge (BLH).
Repeat the test with another lever and check main diagram points.
In case of slight differences between prescribed and measured pressure, the causes can be: low oil level, clogged filter, wrong oil.
If measured pressures are not within the foreseen nominal tolerance, check and/or change manipulator and valve.

ADJUSTING THE MODERATOR ROD
Pull the lever until about 50% of its stroke and screw rod (P) to stop.
Unscrew by half a turn.

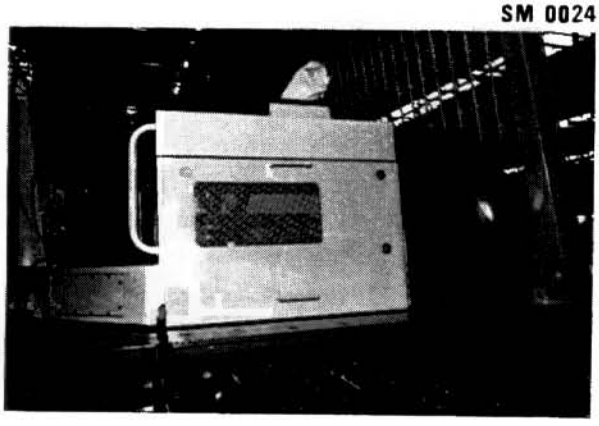




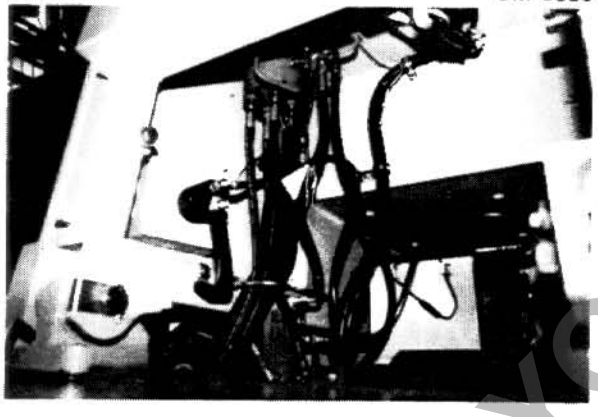
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SM 0024



SM 0025



4.4.3 STEERING & BRAKE PILOT VALVE

4.4.3.1 REMOVAL
4.4.3.1.1
Open left side access panel.

4.4.3.1.2
Remove the three hoses from servodrive and tag.

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(b) Bevel pinion adjustment:

- Place a starting thickness of **3mm (.118 in.)** shims under the pinion carrier and secure the carrier with four capscrews only. Tighten capscrews to specified torque.

- Measure the distance **(D)** between the pinion and the machined reference on the ring gear shaft.
- Shim pack theoretical thickness **(St)** will be **$St = S_1 (D-18)$**
  18 is the nominal value in mm of the difference between the pinion and the ring gear shaft.

- Shim pack final thickness **(S)** shall be equal to the recorded theoretical thickness **(St)** if the correction factor marked on the pinion is zero **(0)**. If **(Q)** is other than zero, (in which case it is marked in tenths of a millimeter and is preceded by a plus (+) or minus (-)) the shim pack thickness **(S)** will be **$S-St \pm Q$**.

Example:

Installed shim pack thickness **$S_1 = 3$ mm**
Actual distance **(D)** measured **18.2 mm**
Correction factor marked on pinion **(Q) = 0.3 mm**
Shim pack theoretical thickness:

$St = S_1 - (D-18)$
$St = 3 - (18.9 - 18)$
$St = 3 - 0.9$
$St = 2.1$

Shim pack final thickness:

$S = St \pm Q$
$S = 2.1 + 0.3$
$S = 2.4$ mm

When rounding off is necessary, use **-0.1 mm** increments.

(c) Bevel ring gear and pinion backlash adjustment:

- Install a dial indicator to the end of a ring gear tooth and check the backlash at **120°** intervals.

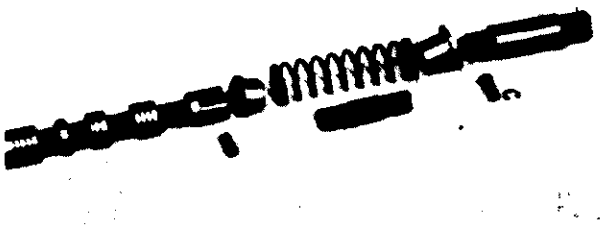
- The standard backlash is **0.25 – 0.33 mm** (or an average of **0.3 mm**).

- To increase or decrease backlash values, remember there is a fixed ratio of **1 to 1.35** between backlash and ring gear shifts. To reduce the backlash by **1mm** remove from shim pack **(Sd)** a thickness of **1.35mm** and add it to shim pack **(Ss)**.

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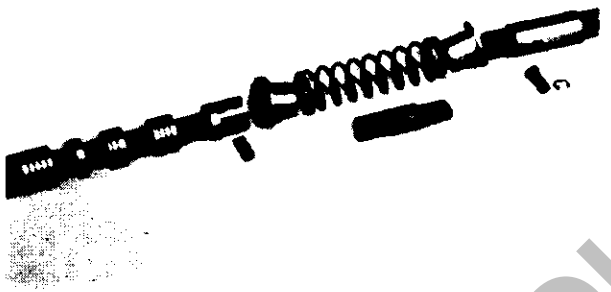
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T-92830



5.4.3.3.10
The dozer lift spool components consist of the spool, roll pin, a short spring retainer, spring, link, a long spring retainer, pin, snap ring and pin.

T-92832



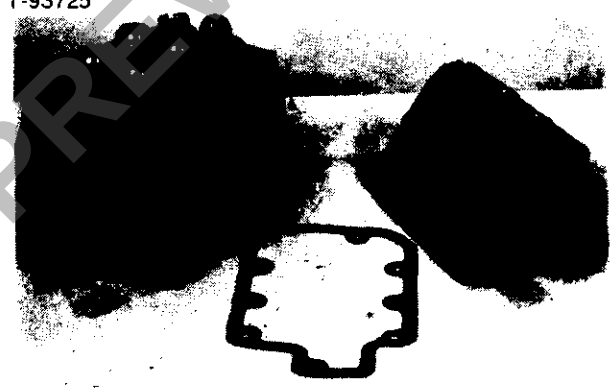
5.4.3.3.11
The dozer tilt components consist of the spool, roll pin, two long spring retainers, spring, spacer, link, pin, snap ring and pin.

T-92832



5.4.3.3.12
The ripper spool components are the same as the dozer tilt spool.

T-93725



5.4.3.3.13
Remove the front cover and gasket.

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6.4.4 TRACK CARRIER ROLLER

6.4.4.1 REMOVAL

6.4.4.1.1

Loosen track chain tension. Block up chain. Using a suitable hoist and sling, remove roller.

⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks.

T-88491



6.4.4.2 DISASSEMBLY

6.4.4.2.1

Remove plug and drain the oil.

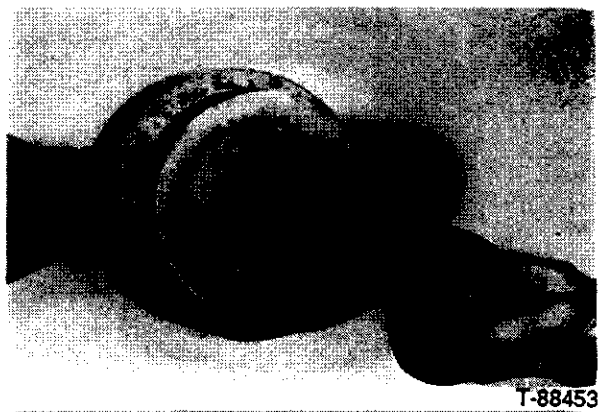
T-88451



6.4.4.2.2

Remove end cover.

T-88452



6.4.4.2.3

Remove thrust plate.

T-88453



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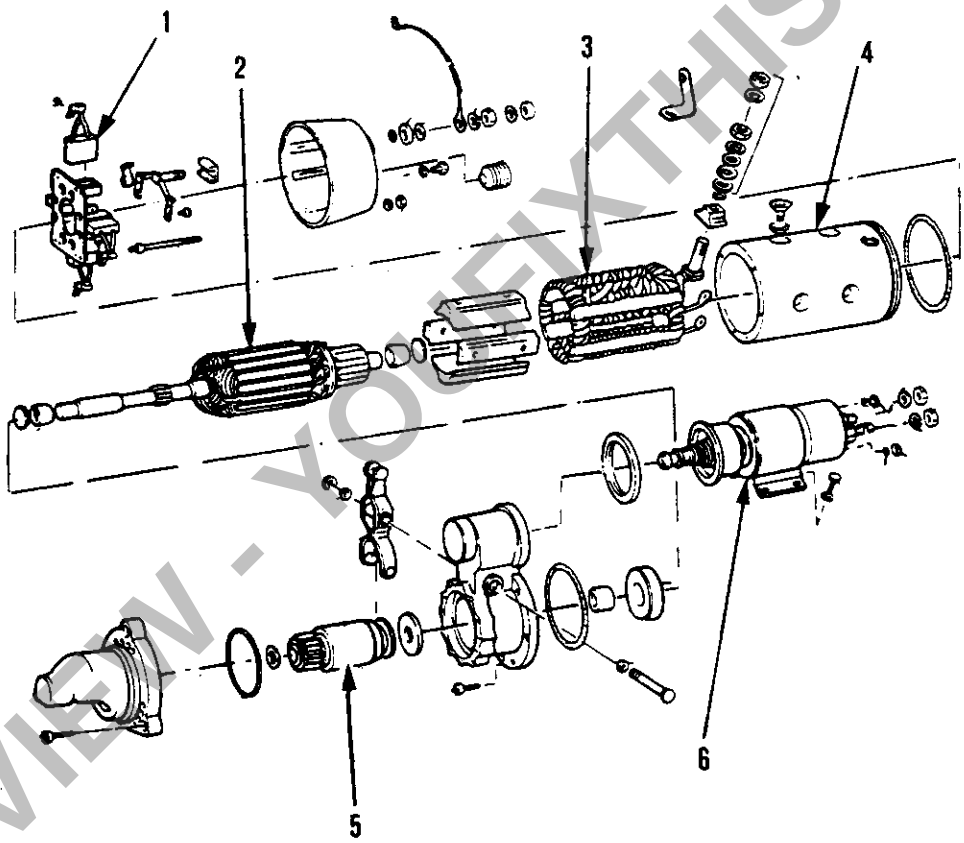
"Start motor"

DISASSEMBLY

Disconnect the start motor from machine and disassemble according to the figure below.
- For some operations use a plastic hammer.
- After disassembly, wash quickly the components with "electrical liquid". Pay attention to the safety rules, because of the liquid volatility, and always wear gloves and glasses. Clean the washed parts by compressed air and clean cloths.

- Check that the disassembled parts do not have worn or damaged points. Change the pieces that have been damaged by a short-circuit.

- Always change brushes, gaskets and washers.



Disassembled parts of the BOSCH start motor KE 24 V

1. Brushes - 2. Rotor - 3. Inductor winding - 4. Case - 5. Start pinion - 6. Electromagnet

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