TABLE OF FLUID CAPACITIES

ITEM	QUANTITY Litri	Fluids and lubricants Ambra	VISCOSITY GRADE	Outdoor temperat. of reference	International Classification
Cooling system	18 (20)	Agriflù	Agriflù mixed with 50% water protects down to - 35 °C (- 31 °F)	Down to - 35°C	Mixture of water and antifreeze at 50%. The mixture provides oxidation, foaming, corrosion, scaling and freezing protection properties down to - 35 °C (- 31 °F).
Fuel reservoir	270	–	–	–	DIESEL FUEL ASTM No. 2D Grade TT of reputable quality and make
Engine	14.2 (17)	Super Gold	API CF-4/SG MIL-L-2104E ACEA E2	15W-40 10W-30	-10 to +50 -30 to +20
		Super Gold HSP*	API CH 4 ACEA E3	15W-40	-10 to +50
Torque converter Transmission	31 (40)	Hydropower	SAE 10W	All season	ATF Type A Suffix A
Transmission housing steering/brakes	94	Super Gold	SAE 15W - 40	-15 to 40 °C (5 to 104 °F)	API CF-4/SG oppure CCMC D4 oppure MIL-L-2104 E
			SAE 10W - 30	- 25 to 20 °C (-13 to 68 °F)	
Equipment hydraulic system	63	HI-TECH 46	ISO 46	-20 °C to 50 °C	DIN 51524 PART - 1 DIN 51524 PART - 2 ISO VG 46
Final drives (each)	24	Hypoide 90	SAE 80W - 90	All season	API GL5 oppure MIL-L-2105
Idlers Rollers and track chains	4	Super	SAE 15W - 40	-15 to 40 °C (5 to 104 °F)	API CE oppure CCMC D4 oppure MIL-L-2104 E
			SAE 10W - 3	- 25 to 20 °C (-13 to 68 °F)	
Grease fittings		MG2	NLGI2 consistency	All season	–
Cab tilting pump	0.5	Hydropower	SAE 10W	All season	ATF Type A Suffix A

Note: The quantities of oil indicated are those required for periodic changes.
- ( ) Quantity of first filling.

In the event engine oil with classification “CH4” is used, the change interval can be extended to 500 hours providing that the ambient temperature does not exceed 38 ° C (100 °F) and that the percentage of sulphur in the fuel does not exceed 0.5 %. In case of particularly heavy duty operation, reduce the greasing intervals.

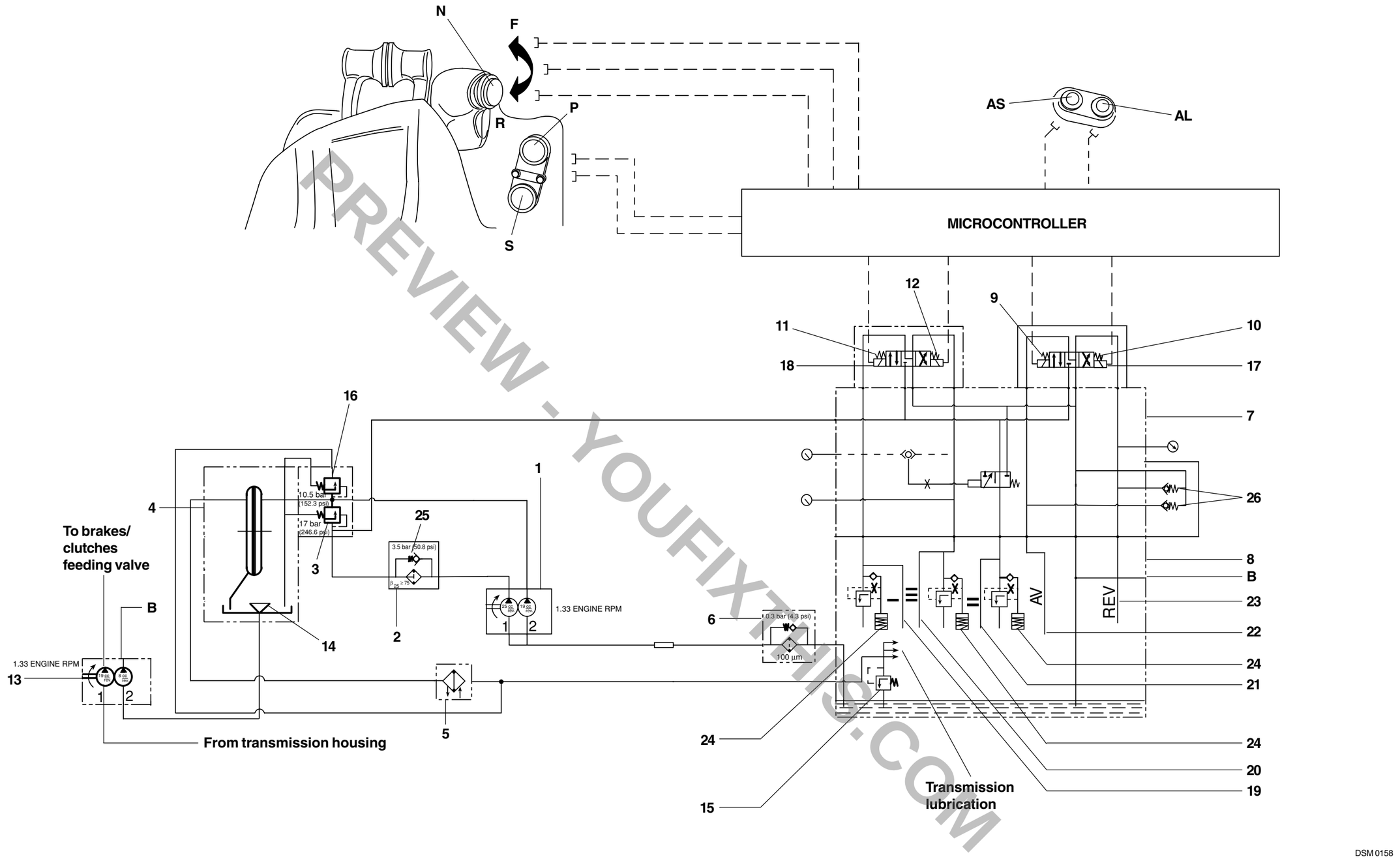
If the content of sulphur of the fuel exceeds 0.5 %, change the engine oil as follows:

Down to 0.5 % sulphur	Periodical change
From 0.5 to 1 %	Half normal interval
Over 1 %	One quarter normal interval

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

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DSM 0158

Fig. 2-1 Torque converter hydraulic diagram

1. Transmission/torque converter pump - **2.** Oil filter (delivery) - **3.** Pressure relief valve (17 bar, 246.6 psi) - **4.** TWIN-DISC torque converter - **5.** Heat exchanger - **6.** Oil filter (suction) - **7.** Control valve - **8.** Transmission housing - **9.** FORWARD speed solenoid - **10.** REVERSE speed solenoid - **11.** 1st speed solenoid - **12.** 3rd speed solenoid - **13.** Brake/scavenge pump - **14.** Mesh filter - **15.** Lube oil pressure relief valve (3 bar, 43.5 psi) - **16.** Torque converter safety valve (10.5 bar, 152.3 psi) - **17.** FORWARD/REVERSE control valve spool - **18.** 1st - 3rd control valve spool - **19.** To 1st speed clutch pack - **20.** To 3rd speed clutches pack - **21.** 2nd speed clutch pack - **22.** To FOR speed clutch pack - **23.** To REV speed clutch pack - **24.** 1st - 2nd - 3rd speed modulating valves - **25.** Filter clogging valve - **26.** FOR/REV modulating valves - **B.** To transmission housing - **F.** Forward speed - **R.** Reverse speed - **P.** Upshifting - **S.** Downshifting - **N.** Neutral - **AS.** Auto-shift function - **AL.** Auto kick-down function.

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3.1.1 FINAL DRIVES
(final drive exploded view and section)

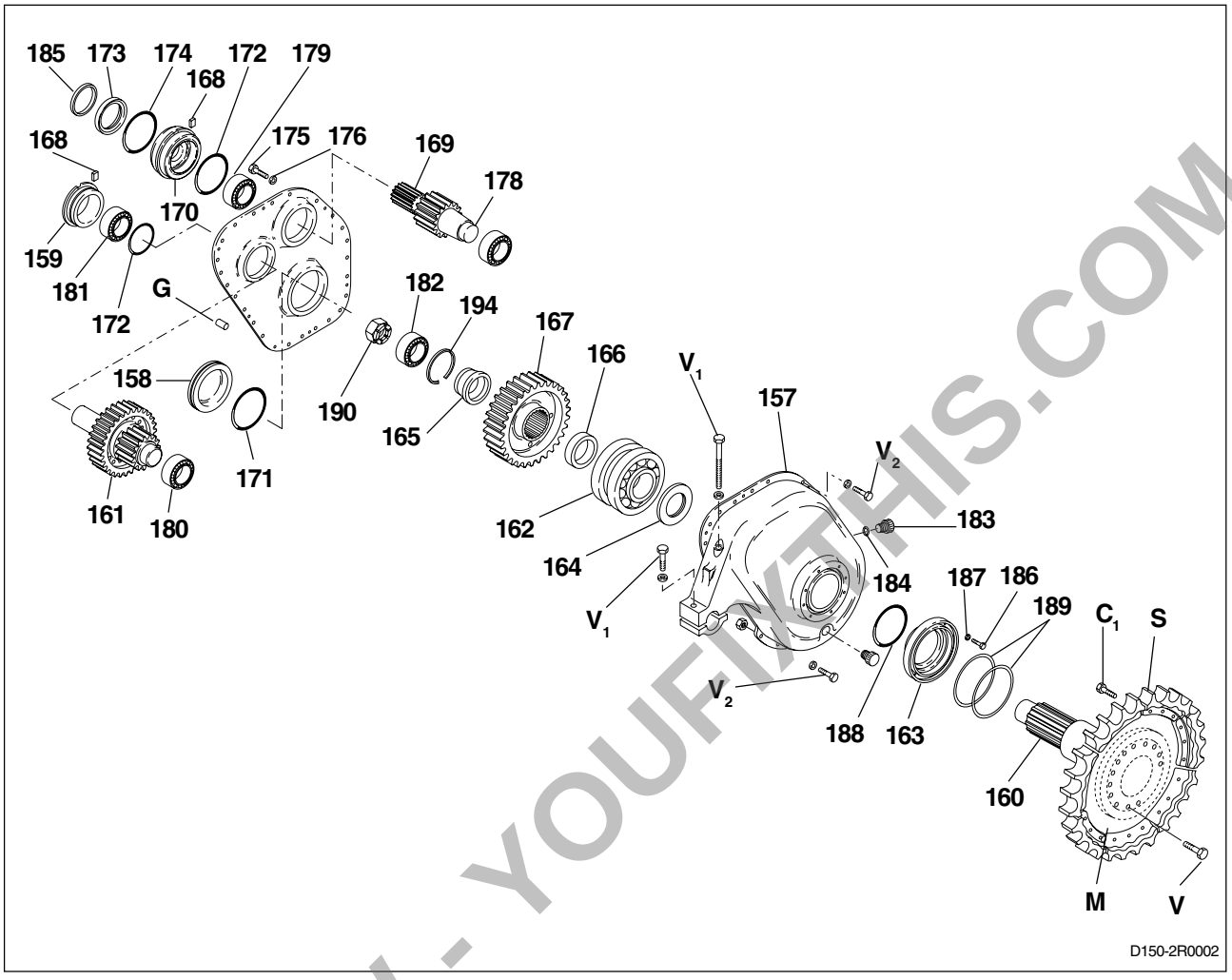


Fig. 3.2 Final drive exploded view

C. Final drive cover - **G.** Dowel - **V.** Sprocket hub securing screw (M20x1.5) - **V_1.** Final drive securing screw to PIVOT SHAFT (M24x2x260) (M24x2x130) - **V_2.** Final drive securing screw to transm. housing (M16x1.5) - **C_1.** Segment securing screws (M22x1.5) - **S.** Sprocket segments - **M.** Sprocket hub - **157.** Housing - **158.** Cover - **159.** Bearing housing - **160.** Sprocket shaft - **161.** Driven or idle gear **- 162.** Bearing - **163.** Housing - **164.** Spacer - **165.** Spacer - **166.** Spacer - **167.** Sprocket gear - **168.** Plate - **169.** Driving gear - **170.** Bearing housing - **171.** O-Ring 3.53 x 171 - **172.** O-Ring 3.53 x 142.50 - **173.** O-Ring 3.53 x 183.7 - **174.** O-Ring 3.53 x 190.1 - **175.** Screw TE M16x1.5x65 - **176.** Washer 16x30x3 - **178.** Roller bearing 40x90x33 - **179.** Roller bearing 70x150x35 - **180.** Roller bearing 70x150x51 - **181.** Roller bearing 55x120x43 - **182.** Bearing - **183.** Plug M27x2x16 - **184.** O-Ring 3x24 - **185.** Seal - **186.** Screw TE M12x50 - **187.** Washer 12x24 - **188.** O-Ring 3.53 x 215.5 - **189.** Front seal - **190.** Beaded ringnut - **194.** Circlip 170.

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2.4 PROCEDURES FOR THE REPAIR OF THE TORQUE CONVERTER

2.4.1 REMOVAL

Turn the main switch into position "OFF". Place a *"DO NOT OPERATE"* warning signal on the machine. Please refer to the Section "CAB" of this Manual to tilt the cab.

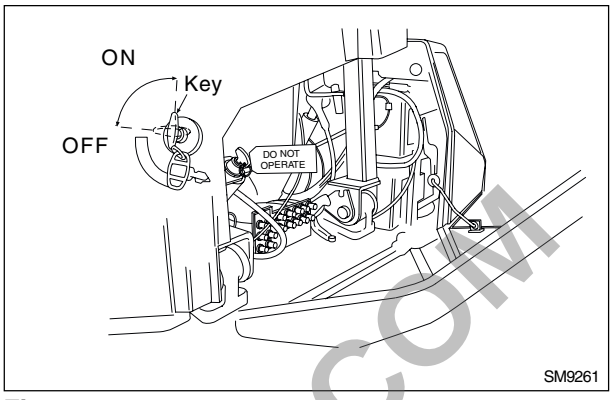


Fig. 2-8

Remove the central lower guard.

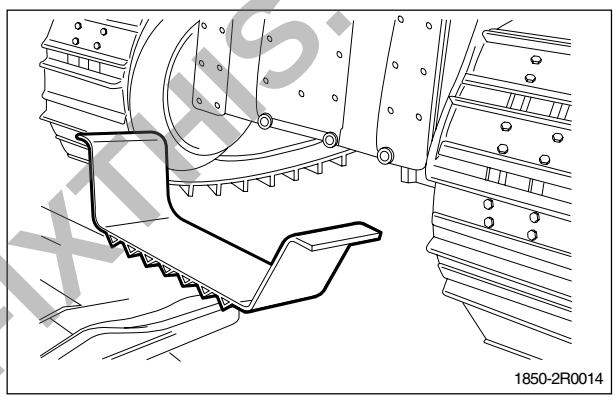


Fig. 2-9

Drain the transmission oil through the draining plug.

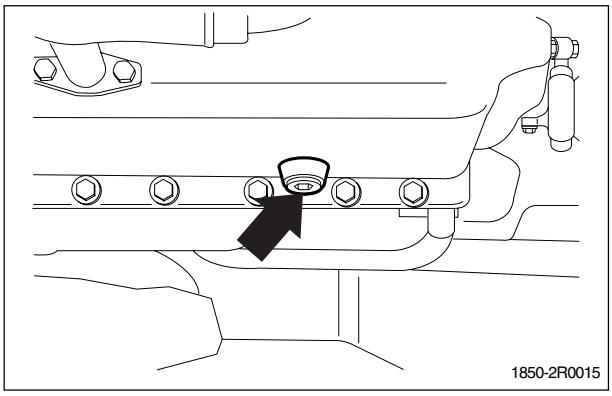


Fig. 2-10

Drain the oil from the torque converter housing through the draining plug.

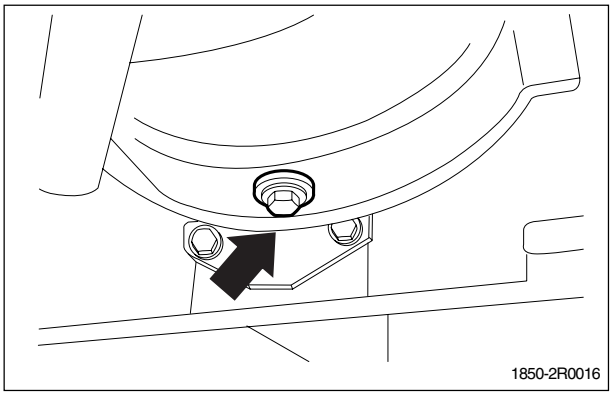


Fig. 2-11

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TABLE OF TIGHTENING TORQUES

When the tightening torque of bolts and nuts is not indicated in the single sections, this can be obtained from the table here below:

NUTS (ZNT)					SCREWS (ZNT / DEIDR)		
Class of strength: 10 (R 80)					Class of strength: 10.9 (R 100)		
Diameter and pitch mm	normal daNm (lb.ft.)	low type daNm (lb.ft.)	with polyamaide ring		Diameter and pitch mm	normal ZNT daNm (lb.ft.)	autoblocc. ZNT daNm (lb.ft.)
			normal daNm (lb.ft.)	low type daNm (lb.ft.)			
M6 x 1	1.3 (9.6)	1.2 (8.8)	-	-	M6 x 1	1.3 (9.6)	-
M8 x 1.25	3.2 (23.6)	2.6 (19.2)	3.9 (28.7)	3.2 (23.6)	M8 x 1.25	1.3 (9.6)	3.5 (25.8)
M10 x 1.25	7.2 (53)	5.2 (38.8)	8.2 (60.4)	6.2 (45.7)	M10 x 1.25	7.1 (52.3)	7.9 (58.2)
M10 x 1.5	6.5 (47.9)	5 (36.8)	7.7 (56.8)	6 (44.2)	M10 x 1.5	6.5 (47.9)	7 (51.6)
M12 x 1.25	13 (95.8)	8.7 (64.1)	14.5 (106.9)	10.2 (75.2)	M12 x 1.25	12.7 (93.6)	13.9 (102.5)
M12 x 1.75	11 (81.1)	8.1 (59.7)	12.9 (95.1)	9.6 (70.8)	M12 x 1.75	11 (81.1)	12 (88.5)
M14 x 1.5	19.5 (143.8)	13 (95.8)	21.6 (159.2)	15 (110.6)	M14 x 1.5	20 (147.5)	22 (162.2)
M14 x 2	18 (132.7)	12.5 (92.2)	20 (147.5)	14.6 (107.6)	M14 x 2	18 (132.7)	19 (140.1)
M16 x 1,5	30 (221.2)	17 (125.3)	34 (250.7)	20 (147.5)	M16 x 1.5	30 (221.2)	33 (243.3)
M16 x 2	-	-	-	-	M16 x 2	-	-
M18 x 1.5	45 (331.8)	25 (184.3)	50 (368.6)	29 (213.8)	M18 x 1.5	45 (331.8)	48 (353.9)
M18 x 2.5	-	-	-	-	M18 x 2.5	-	-
M20 x 1.5	60 (442.3)	30.5 (224.9)	64.5 (475.5)	35 (258)	M20 x 1.5	60 (442.3)	65 (479.2)
M20 x 2.5	-	-	-	-	M20 x 2.5	-	-
M22 x 1.5	80 (589.8)	41 (302.2)	-	-	M22 x 1.5	80 (589.8)	90 (663)
M22 x 2.5	-	-	-	-	M22 x 2.5	-	-
M24 x 2	100 (737.3)	47 (346.5)	108 (796.2)	52.5 (387)	M24 x 2	100 (737.3)	110 (811)
M24 x 3	-	-	-	-	M24 x 3	-	-
M27 x 2	95 (700.4)	40.1 (295.6)	-	-	M27 x 2	100 (737.3)	-
M30 x 2	130 (958.4)	49.9 (368)	-	-	M30 x 2	140 (1032)	-
M33 x 2	170 (1253.4)	-	-	-	M33 x 2	190 (1400.9)	-
M36 x 3	220 (1622.1)	-	-	-	M36 x 3	240 (1769.5)	-

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4.2 TROUBLESHOOTING

4.2.1 DIAGNOSIS ON DISPLAY

The display has 5 text fields to signal the following messages:

A. Work hourmeter signal

The engine hours are signalled by the lighting for about 1 second when the instrument board carries out the general test. To re-visualise the engine hours, it is necessary to switch off and switch on again with the starter key. The engine hours stay ON as far as the engine is inoperative.

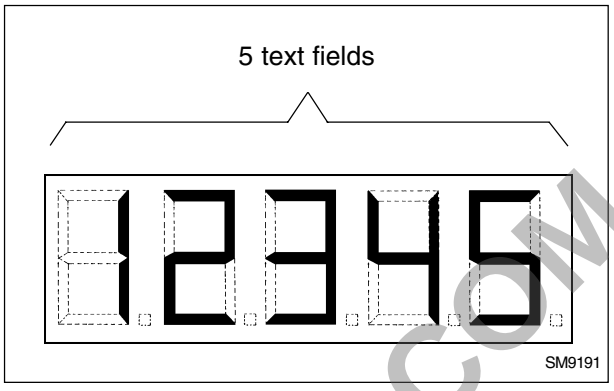


Fig. 4-17

or

B. Gear engaged + failure code

- The first field indicated the gear engaged.
- The second field indicates, in the event of failure, digit E.
- The 3rd 4th 5th fields indicate the failure type coded that are distinguished by two types.

Failure code of a single component of the brakes/ clutches and transmission control system (see table 1)
Failure codes for more than one component (see table 2)

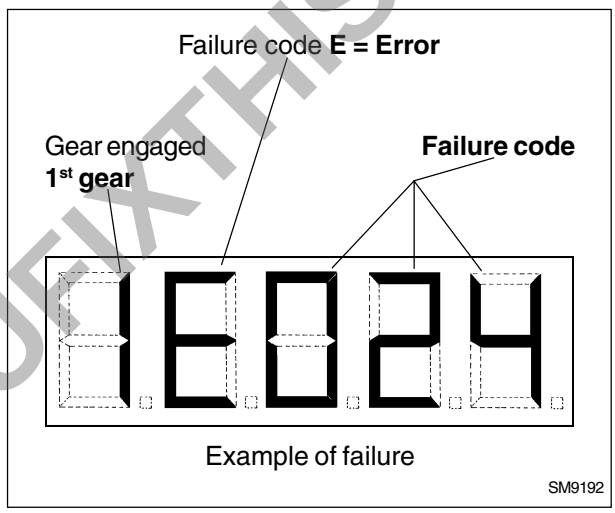


Fig. 4-18

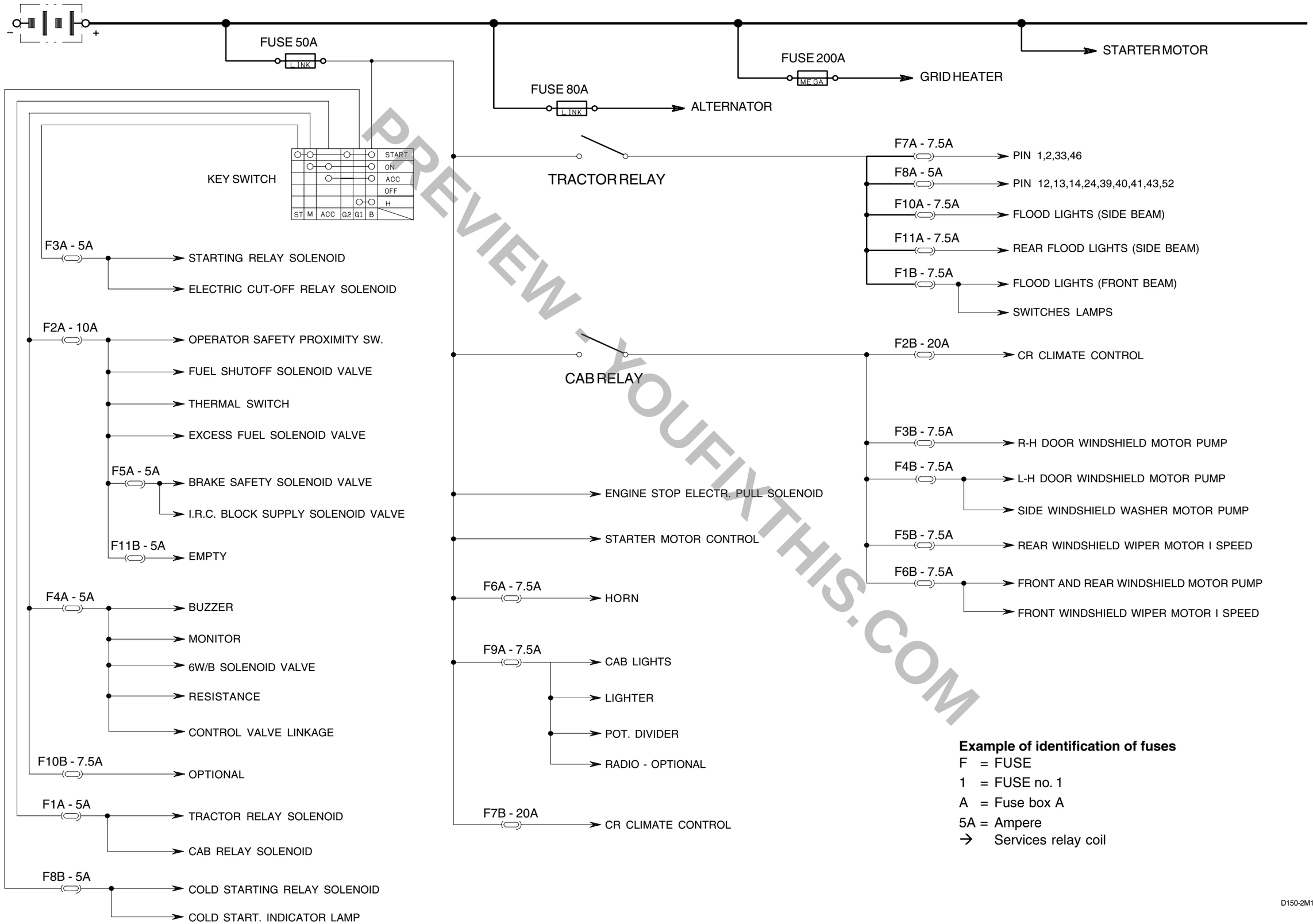
In the event the display shows one of the following failure code, identify the failed component from table 1.

TABLE 1

Failed component	Failure code
Solenoid, left proportional valve	**001**
Solenoid, right proportional valve	**002**
Solenoid, Forward "F" gear	**004**
Solenoid, Reverse "R" gear	**008**
Solenoid, 1st gear	**016**
Solenoid, 3rd gear	**032**
Solenoid, left steering lever	**064**
Solenoid, right steering lever	**128**

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7.1 PROTECTION TREE ELECTRIC DIAGRAM



Example of identification of fuses

F = FUSE
1 = FUSE no. 1
A = Fuse box A
5A = Ampere
→ Services relay coil

D150-2M132

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⚠ WARNING

Study carefully this Manual before starting, operating, maintaining, fuelling or servicing the machine.

Read and heed all safety rules before any intervention.

SAFETY RULES

- Do not allow unauthorised personnel to operate service or maintain this machine.
- Do not wear rings, wrist watches, jewellery, loose or hanging apparels, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Keep operator's compartment, stepping points, grabrails and handles clear of foreign objects, oil, grease, mud or snow accumulation to minimise the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with step grab rails and handles at all times.
- Do not use controls or hoses as hand holds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Also, controls may be inadvertently moved causing accidental machine or equipment movement.
- Never attempt to operate the machine or its tools from any position other than seated in the operator's seat.
- Keep head, body, limbs, hands 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. Wear safety boots or shoes that have a high slip resistant sole material.
- Do not leave the machine until it is completely stopped.
- Check the seat safety belt at least twice a year. If there are signs of wear or fraying or other signs of weakness that could lead to failure, replace it.

STARTING

- NEVER START NOR OPERATE AN UNSAFE MACHINE. Before operating a machine, always ensure that any unsafe condition has been satisfactorily remedied.
- Check brakes, steering and attachment controls before moving. Advise the proper maintenance authority of anymalfunctioning 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 conditions.
- Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. WALK COMPLETELY AROUND the machine before mounting. Sound horn.
- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.
- Fasten your seat belt (when provided).
- Obey all flag signals and signs.
- Due to the presence on the machine of flammable fluids, never check or fill fuel reservoirs or batteries near open flames, smoking materials or sparks.
- REMEMBER THAT STARTING FLUID IS FLAMMABLE. Follow strictly the recommendations printed on containers and in the Operation and Maintenance Manual.
- DO NOT PUNCTURE OR BURN CONTAINERS.
- Containers must be stored in fresh, well ventilated places, out of reach of unauthorised persons. Follow strictly the instructions provided by the Manufacturer.
- Never use these products near open flames, smoking materials or sparks.

OPERATION

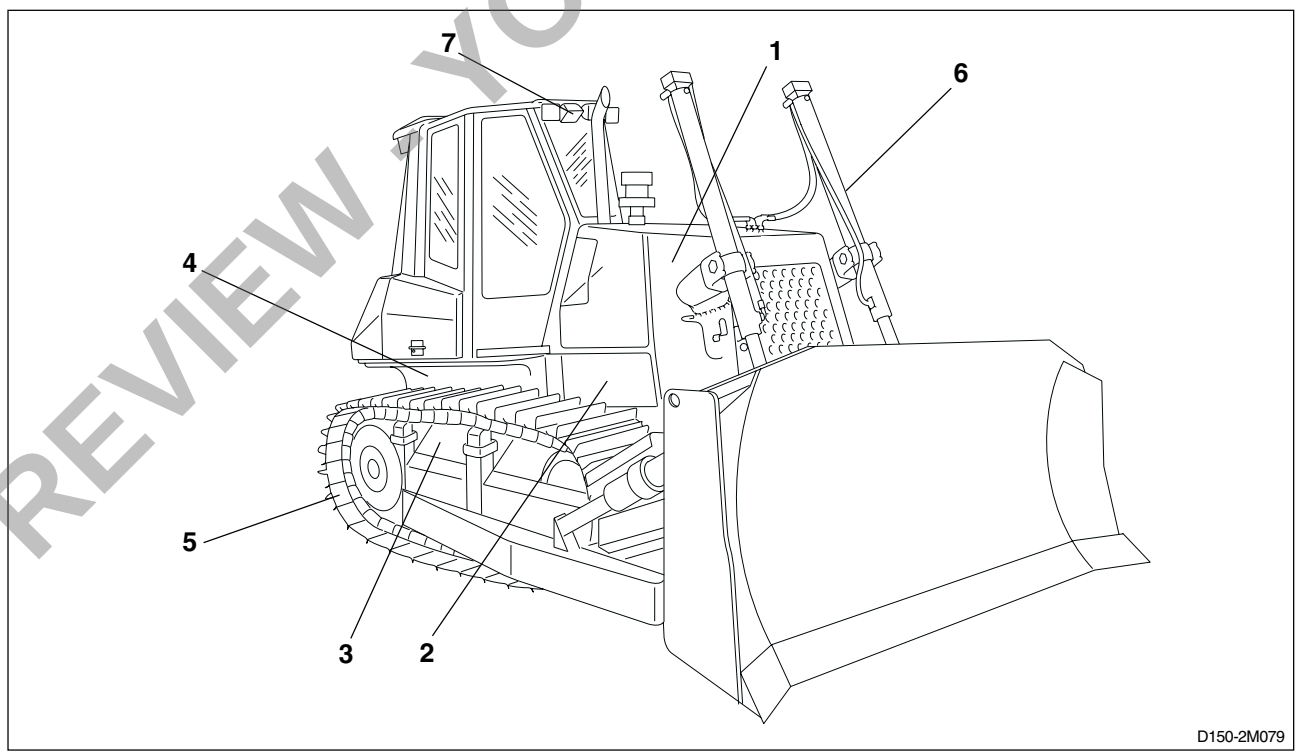
- Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.
- Roll Over Protective Structures are required on loaders, dozers, graders, excavators. NEVER OPERATE machines without ROPS.
- Make sure the Operator's compartment is free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.

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SUMMARY

GENERALITIES	**SECT. 0**
ENGINE	**SECT. 1**
TRANSMISSION	**SECT. 2**
FINAL DRIVES	**SECT. 3**
BRAKES AND STEERING DIFFERENTIAL	**SECT. 4**
UNDERCARRIAGE	**SECT. 5**
DOZER EQUIPMENT HYDRAULIC SYSTEM	**SECT. 6**
ELECTRICAL SYSTEM	**SECT. 7**



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REMOVAL AND INSTALLATION OF ROTATING SEALING RINGS

Remove the rings as follows:

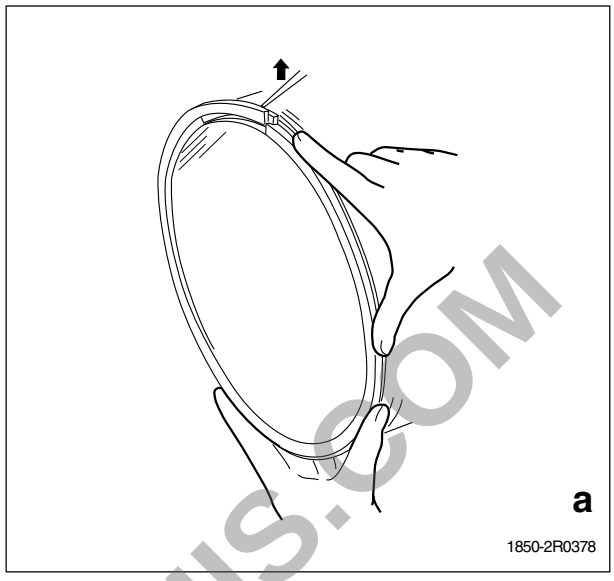
- press the ring so that one end and part of the inner circumference adhere to the bottom of the relevant seat (**a**);

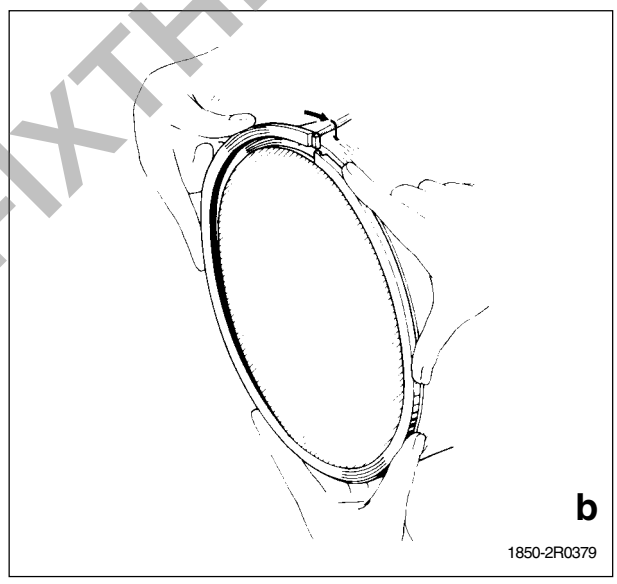
- keep the ring in the above position and, using a scriber on the opposite end, free the detent as shown in figure (**a**).

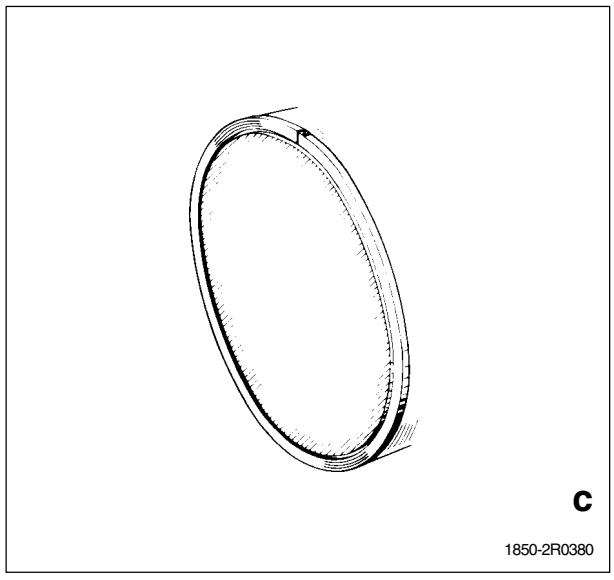
Re-install the elastic rings as follows:

- press the ring so that one end and part of the inner circumference adhere to the bottom of the relevant seat (**a**);

- install the ring in the above mentioned position and lift and move the free end (**b**) until the two detents (**c**) are correctly hooked.







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Tilt the cab and proceed with the following operations.
Disconnect the transmission temperature sensor wire.

Disconnect the return piping between heat exchanger and torque converter.

Disconnect the breather piping between torque converter and transmission.

Disconnect the piping between the main pressure relief valve and valve blocking in neutral.

Disconnect the feeding piping between brake pump and steering and brake control valve.

Remove the propeller shaft between transmission housing and torque converter.

Disconnect the brakes pump suction pipe and the delivery and recovery pipes from the scavenger pump of the torque converter.

Remove the scavenger and brakes pump from the torque converter.

Disconnect the connection pipe from the front part of the torque converter.

Make a lifting bracket and secure it to the propeller shaft flange on the torque converter. Holding the torque converter with an appropriate lifting device, remove the securing screws to the flywheel housing and remove the torque converter.

WARNING

Lift and handle all heavy parts with a lifting device of appropriate capacity.
Make sure that the parts are secured by appropriate slings and hooks.

2.4.2 RE-INSTALLATION

The re-installation of the torque converter is performed reversing the removal operations, with the following exceptions.

Install the dowels on the flywheel housing.

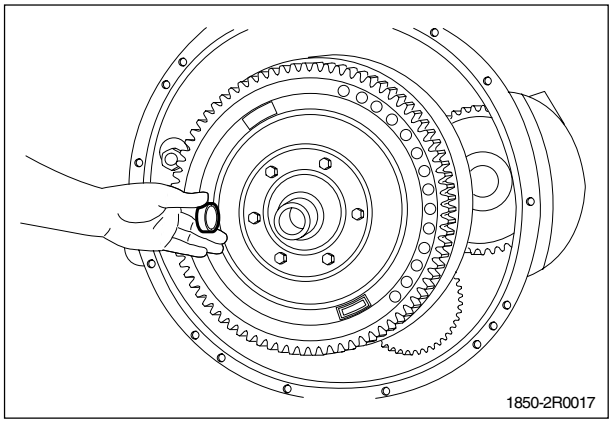


Fig. 2-12

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Install the hub-clutch assembly on the reverse clutch hub-housing assembly. Check that the outer steel ring is correctly oriented with respect to the housing.

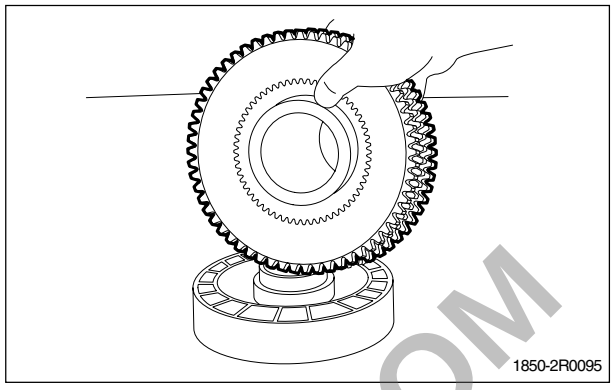


Fig. 2-150

Install the reverse clutch drum on the clutch assembly.

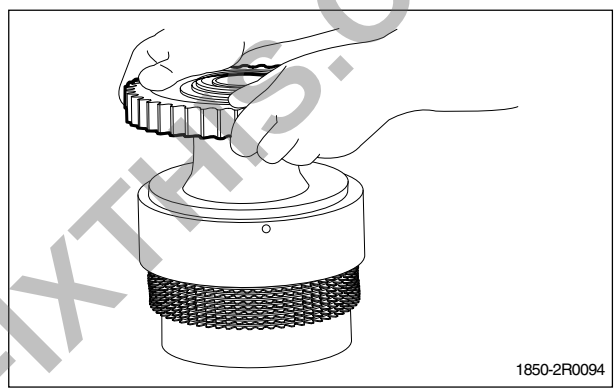


Fig. 2-151

Install two brackets (**P/N 380001470**) on the reverse clutch assembly.

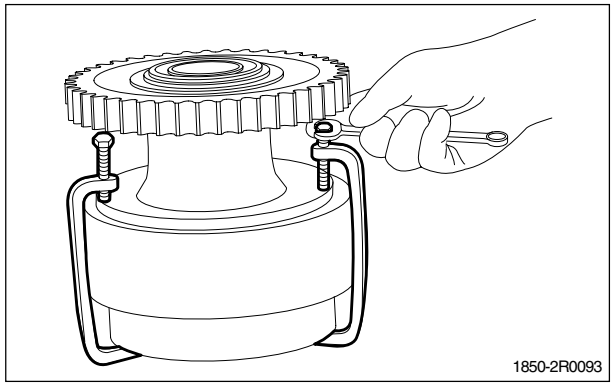


Fig. 2-152

2.5.7 MODULATING VALVES (Disassembly / Assembly)

Note – *The three modulating valves are identical.*

Remove the circlip from the modulating valve.

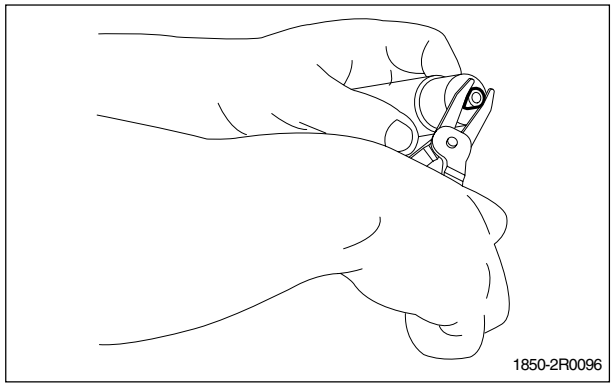


Fig. 2-153

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If necessary, adjust the seat to insert the key. Repeat the same operations on the sprocket shaft bearing housing, as well.

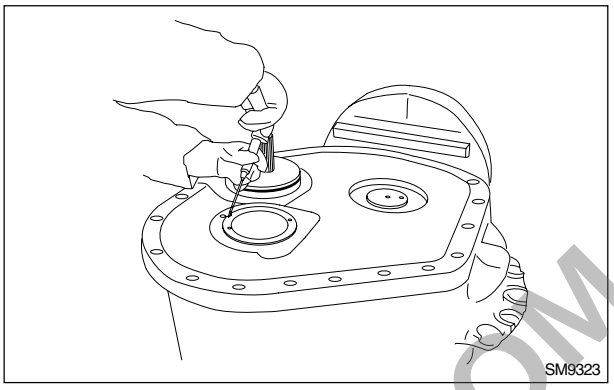


Fig. 3-51

Apply **LOCTITE 518** in the stop races seats and insert them.

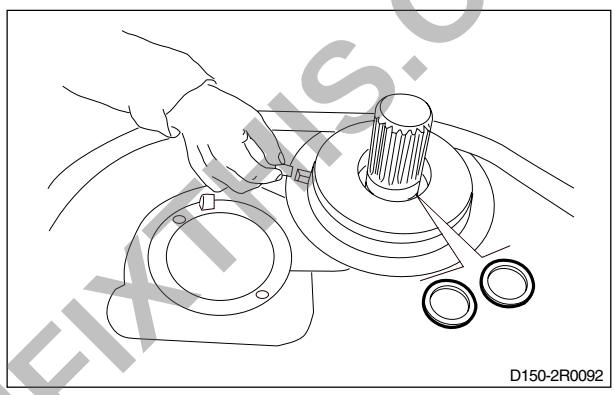


Fig. 3-52

Use an installer (**B**) (**P/N 380001473** and **380001447**) to fit the two driving gear oil seals, with surfaces oriented as illustrated in detail **A** for seal installation

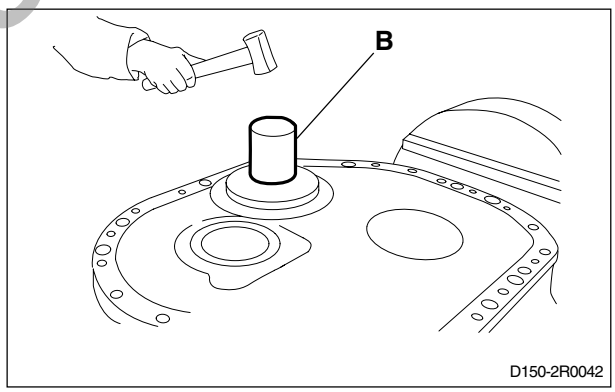


Fig. 3-53

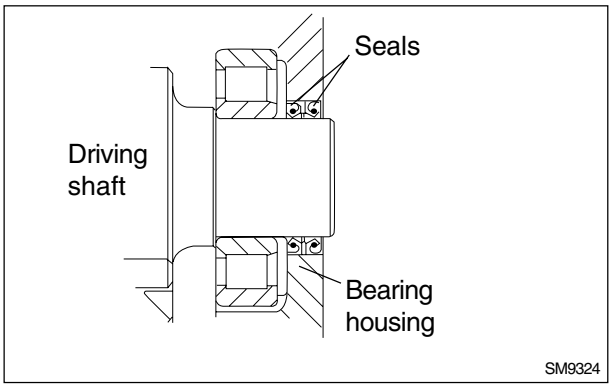


Fig. 3-54

Detail **A** - Seal installation.

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- Drain the oil from the transmission housing, by removing plug **A** from the rear side of the machine and let the oil drop completely (capacity of housing about 46 litres, 12 gal.).

- Remove the track chains as described in **SECTION 5 - UNDERCARRIAGE** of this Manual..

- Remove the final drive as described in **SECTION 3 - FINAL DRIVE** of this Manual.

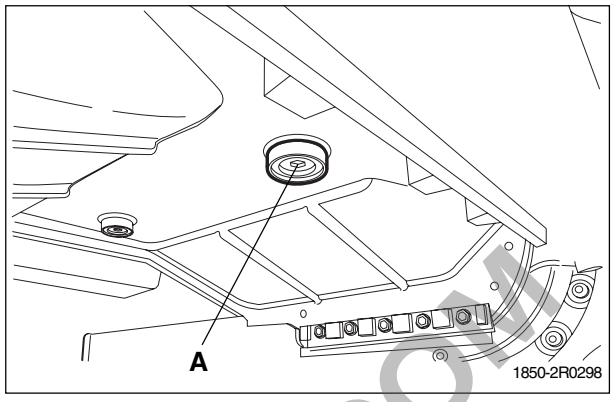


Fig. 4-35

Tilt the cab as described in the **Operation and Maintenance Manual**.

Note – *Label the pipes before disconnecting them. Disconnect all pipes connected to the housing and from hydraulic motor (**5**) the relevant pipes (**1** - **2** - **3** - **4**).*

Remove all screws (**6**) securing housing cover (**7**).

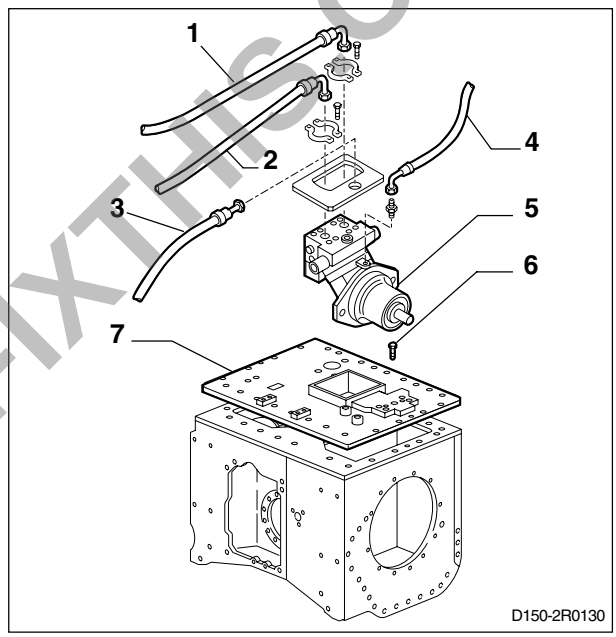


Fig. 4-36

Arrange a hoisting tackle, to remove the cover, equipped with suitable lifting hooks.
Install three eyebolts (M10x1.5; M12x1.75; M14x1.5) as illustrated in the figure and lift the cover together with the transmission housing.

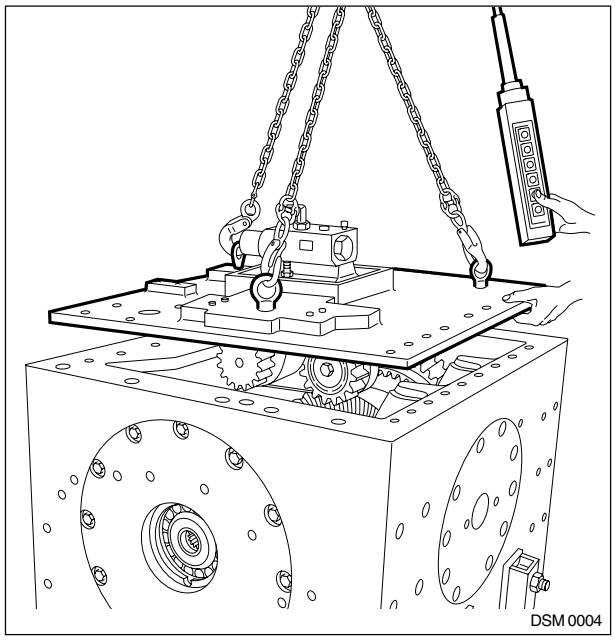


Fig. 4-37

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Installation of brake group

Insert the three outer O-Rings (**1**) on the central brake drum.

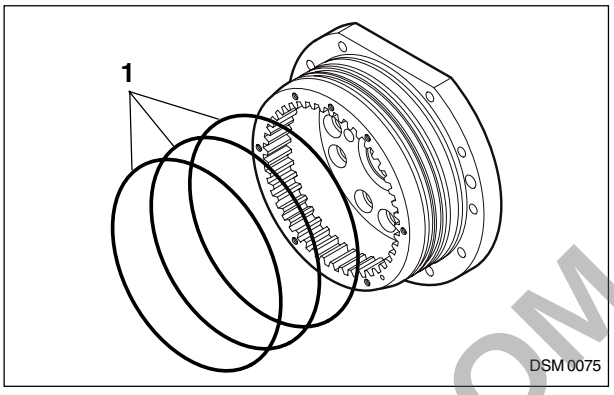


Fig. 4-167

Insert the two O-Rings (**2**) and (**3**) on guide disc (**4**) then insert on it bearing (**5**) securing it with safety ring (**6**).

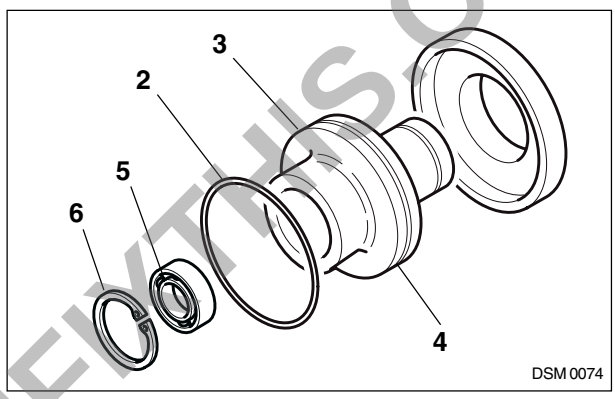


Fig. 4-168

Insert the 12 springs (**7**) on the brake drum then insert brake piston (**8**) and seal (**9**) securing finally guide disc (**10**) with screws (**11**).

WARNING

Handle all heavy parts with the utmost attention. Never place hands and fingers between one part and another. Wear approved personal protection devices such as glasses, gloves and safety shoes.

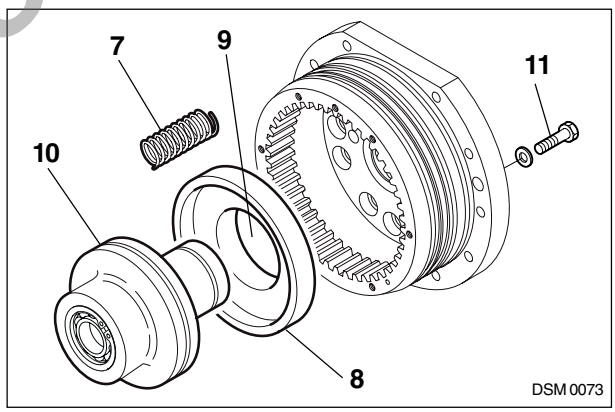


Fig. 4-169

Insert in central brake drum (**12**) driven discs (**14**) and drive (**13**).

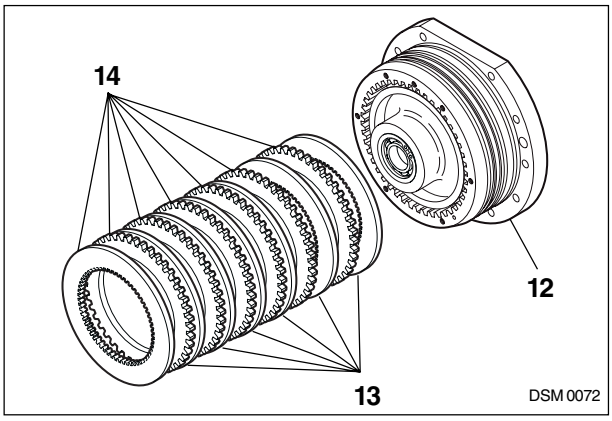


Fig. 4-170

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1. Track frames

Each track frame is composed of a frame made with material with high mechanical specifications fabricated with boxed section bars. Inside, fully enclosed track tensioner devices are mounted, protected from the entry of loose materials.
The two frames are hinged, at the back, on the PIVOT SHAFTS, whereas, in the front, the connection is provided by a suspended cross-member, hinged centrally and to the frame of the machine on the sides.
Thus, each track frame is allowed to pivot independently from the other one.
The alignment of the track frames is provided, frontally, by guides, the position of which is adjusted by shims.

The following components are mounted on the track frames:
- bottom rollers
- track chain support rollers
- idler and track tensioner device

2. Track frame bottom rollers

The rollers, for the standard version, are 7.3 of which double flange and 4 single flange, whereas for the LGP version they are 8.3 of which double flange and 5 single flange. They are made with special steel, surface treated for better standing wear and abrasion. These rollers, mounted in the lower side of each track frame, support the weight of the machine, the pins turn on lubricated bushes. The sealing is provided by metal 8long-life) seals.

3. Track chain support rollers

The support rollers support the upper section of the track chain. Each roller is secured by supports, to the track frames. The shafts turn on lubricated bushes and the sealing is provided by long-life seals.

4. Track chain tensioner device

The track chain tensioner device has a dual function: to keep the track chains tense and to absorb the shocks transmitted by the idler. The tension of the track chain is provided by a hydraulic device composed of a cylinder and a piston connected to the fork of the idler through a rod.
To stretch the chain, grease is pumped inside the cylinder, causing the forward movement of the piston and the idler connected to it.
It must be noted that the spring is normally pressed, but it does not provide its action against the track chain.

5. Idler

The idler, of a spring type, located in the front side of each track frame, is connected to the track chain tensioner hydraulic device by a yoke and a rod against the adjusting cylinder piston. The tensioner effort and the absorption of shocks received by the track chain while working, are transferred through this system. For this reason, the idler is not rigidly connected to the track frame body, but it is allowed to slide on guides, which must be properly aligned by adjusting shims. The shafts turn on lubricated bushes. The sealing is provided by metal (long-life) seals.

6. Track chain

The track chain is essentially, made of:
- Pins
- Bushes
- Links
- Shoes
- Split link
- Frontal seals

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7.4 MONITOR SENDERS

– Location on the engine

1. Air cleaner clogging sensor.
2. Engine coolant max. temperature switch and sensor.
3. Engine rpm sensor.
4. Engine oil low pressure sensor (Setting 1 ± 0.2 bar, 14.5 ± 2.9 psi).
5. Alternator.

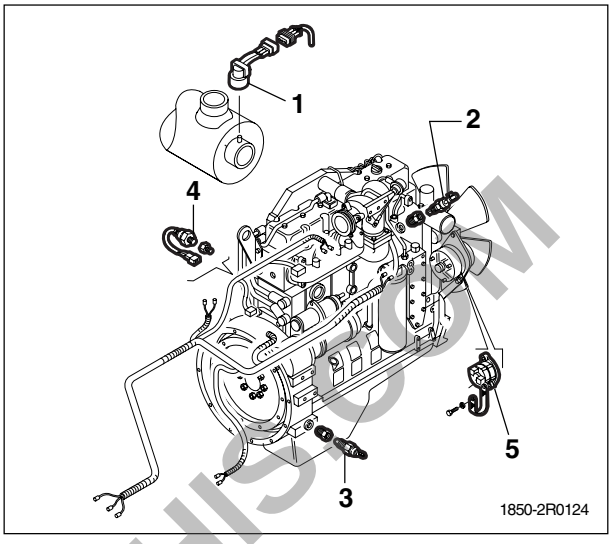


Fig. 7-20

– Location on oil - fuel tanks

6. Fuel level and reserve indicator sensor.
7. Hydraulic oil filter clogging sensor.
8. Brakes - clutches oil low pressure sensor (Setting 11.5 bar, 166.8 psi).
9. Transmission oil low pressure sensor (Setting 11.5 bar, 166.8 psi).
10. Transmission oil high temperature sensor (119 °C, 246 °F).

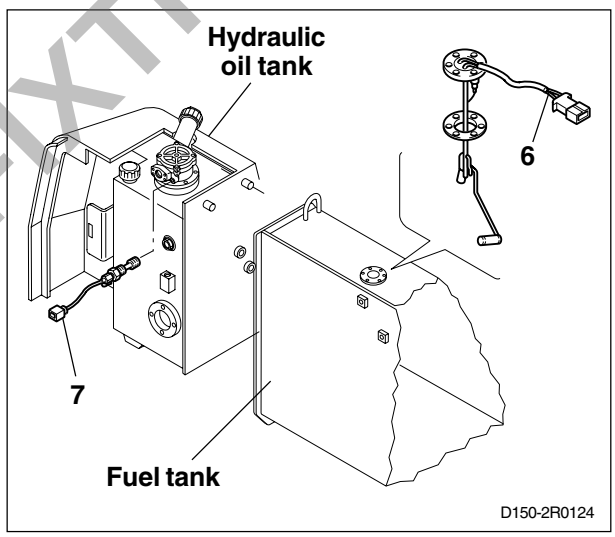


Fig. 7-21

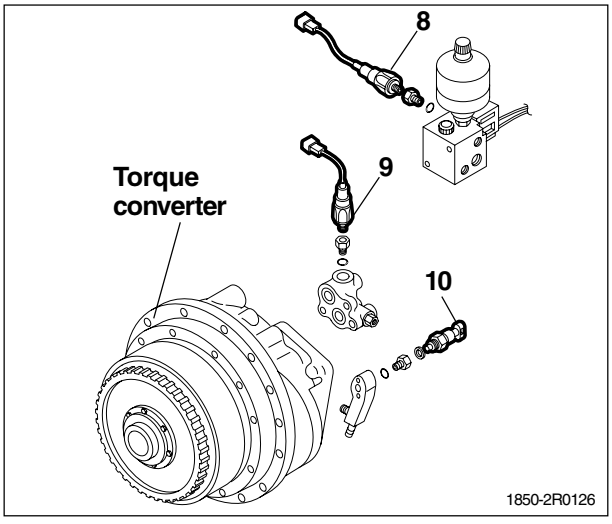


Fig. 7-22

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