

# SERVICE MANUAL

**Dozer Crawlers DC150**  
**Includes LGP**



**NEW HOLLAND**  
**CONSTRUCTION**

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## SAFETY RULES

- Handle all parts carefully. Keep hands and fingers away from structures, gears or moving parts. Use and wear always the appropriate protections
- Compressed air systems can have water deposits created by moisture condensation due to changes of atmospheric conditions. If required, discharge deposits, as instructed.

### STARTING

- Do not run the engine in closed areas without proper ventilation to remove deadly exhaust fumes.
- Do not place head, body, limbs, feet, hands or fingers, near rotating fans or belts. Be especially alert near pusher fans.

### ENGINE

- Loosen the radiator cap very slowly, to release pressure from the system, before removing it. All coolant level top-ups must be performed with engine OFF.
- Avoid that flammable materials touch exhaust parts. Should this be possible, provide the necessary protections.
- Do not run engine when refuelling and use care if the engine is hot due to the increased possibility of a fire if fuel is spilled.
- Never attempt to check or adjust fan belts when engine is running.
- Do not adjust engine fuel pump when machine is moving.
- Do not lubricate the machine with engine running.
- Do not run the engine with air intakes, door or protections open.

### ELECTRICAL SYSTEM

- Disconnect batteries prior to any intervention on machine or electrical system (cleaning, repair, maintenance).
- Should booster batteries be used, remember to connect both ends of the booster cables in the proper manner (+) with (+) and (-) with (-). Avoid short-circuits of the terminals. Follow thoroughly the instructions of this Manual.
- Before any work, make sure that the main switch is OFF.
- BATTERY GAS IS HIGHLY FLAMMABLE. Leave battery box open to improve ventilation when recharging

batteries. Never check charge by placing metal objects across the posts. Keep sparks or open flames away from batteries. Do not smoke near battery to guard against the possibility of causing an explosion.

- Before any work, make sure that there are no fuel or electrolyte leakages; eliminate them before proceeding with further work. When recharging batteries in closed ambients, make sure that there is appropriate ventilation to prevent possible accidental explosions due to the accumulation of gases generated during the recharge.

### HYDRAULIC SYSTEM

- Fluid escaping under pressure from a very small hole can be almost invisible and can have sufficient force to penetrate the skin. Use a piece of cardboard or wood to search for suspected pressure leaks. DO NOT USE HANDS. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.
- Stop the engine and release all pressures in the system before removing panels, housings, plugs or covers.
- In case pressures must be measured, use instruments of adequate capacity. Always follow the recommended procedures.

### TOOLS

- Keep head, body, limbs, feet, fingers or hands away from bucket, blade or ripper when in raised position.  
  
Prior to any work, install all safety devices according to current rules and regulations.
- In case equipment on the machine must be operated by hydraulic systems, remember to proceed only after seating in the operator's compartment. Make sure that there are no personnel in the operating area of the machine. Alert people before operating using the horn and by voice. Move the equipment very carefully.
- Do not use machine to transport loose objects, unless proper devices for this purpose are provided.

## TABLES OF TECHNICAL DATA

<b>ENGINE</b>	Engine	CUMMINS 6BT 5.9
	Type	4 stroke, vertical in-line, direct injection, turbocharged, after-cooled, low emission
	Bore and stroke	102 x 120 mm (4 x 4.7 in)
	Total displacement	5.8 litres (1.53 US gal)
	Number of cylinders	6
	Net power at flywheel (SAE J1349)	140 HP / 104 kW (at 2100 rpm)
	Net power at flywheel (DIN 6270)	140 HP / 104 kW (at 2100 rpm)
	Net power at flywheel (ISO 9249)	140 HP / 104 kW (at 2100 rpm)
	Net power at flywheel (EEC 80/1269)	140 HP / 104 kW (at 2100 rpm)
	Maximum torque	60 daNm(44.25 lbf-ft) (at 1600 rpm)
	Speed at max. power	2100 rpm
	Max. idle speed	2300 rpm
	Low idle speed	950 rpm
	Fuel consumption (at maximum power)	23.8 kgph (52.47 lbph)
	Starter motor	24 V - 6.8 kW (9.11 hp)
	Alternator	24 V - 70 A
	Battery	2 x 12 V - 100 Ah
	Radiator	Air - water with in line tubes and core
	Dimensions of radiator core	930 x 453 x 114 mm (36.6 x 17.83 x 4.48 in)
	Pressure of radiator cap	1.0 bar (14.2 psi)
Water pump flow	145 l/min (38.30 US gpm)	
Fan	Blowing, plastic made, 9 blade, diam 28 mm (1.10 in)	
Air cleaner	Dry, 2-stages with safety element and centrifugal separator, clogging indicator	
Exhaust silencer	Horizontal dimensions dia 655 x 228 mm (26.18 x 8.97 in)	
<b>TRANSMISSION SYSTEM</b>	Torque converter	Single stage, single phase, 13 mm (0.51 in) in diam. Stall ratio 2.33 : 1 The drive shaft operates through a gear train: – equipment pump – transmission pump and torque converter pump – oil scavenger pump and brakes-steering clutch pump
		"Power-shift" three forward and three reverse speed transmission, with FINGER TIP CONTROL type gearshift. Neutral button allows the directly cutting-off of the speed engaged, bringing the transmission into neutral. AUTO KICK DOWN function button and AUTO SHIFT function button. Modulating valves on FOR and REV, speed engagement modulating valve.

Whenever possible, press bushings into their correct position using a press.

In the event it is necessary to use a hammer to install a bushing, use an appropriate punch to avoid damaging the bushing.

Lubricate ball bearings prior to their installation. Lubricate the sealing lip of all seals, prior to their installation.

Whenever possible, install new seals; in particular new gaskets must be used on engine cylinder heads.

Use screws with the dimensions and grade indicated, referring to the part number of the Spare Parts Catalogue.

When indicated, safety washers, split pins and locking wires etc. must be used.

Comply with the prescribed tightening torques indicated in the "Tightening torques" section of this Manual, using an appropriate torque wrench.

Self-locking nuts must be replaced at each disassembly, to ensure a constant good performance against loosening.

## HIGH PRESSURE PIPES, CONNECTIONS, HOSES AND PIPES

This chapter provides correct recommendations and procedures to be followed during the disassembly of pipes and relevant connections.

- Keep all internal and external threads clean;
- Remove cleanliness, plugs just before connecting the pipes, Plug all open connections immediately.

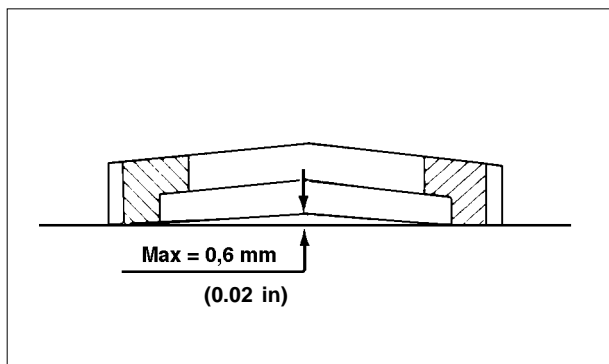


Fig.4

- Do not use or reuse semi-flanges out of shape more than 0.6 mm (0.02 in) in the center (see Fig.5).
- Make sure that the seats of O-rings are undamaged.
- Lubricate all O-Rings.
- Make sure that O-Rings are in place in their seat.
- Tighten evenly so as to avoid distortion or damages to O-Rings.
- Install pipes and support bands letting the latter slightly loosen (tighten the band only after tightening the connections).
- Make sure that the hoses reach the corresponding part to be connected to without forcing their position.
- In the event a hose is mounted straight, let enough space to absorb contractions caused by pressure.
- Hoses must not be rolled (see Fig.5) or touching one another or touching other parts, especially if moving.

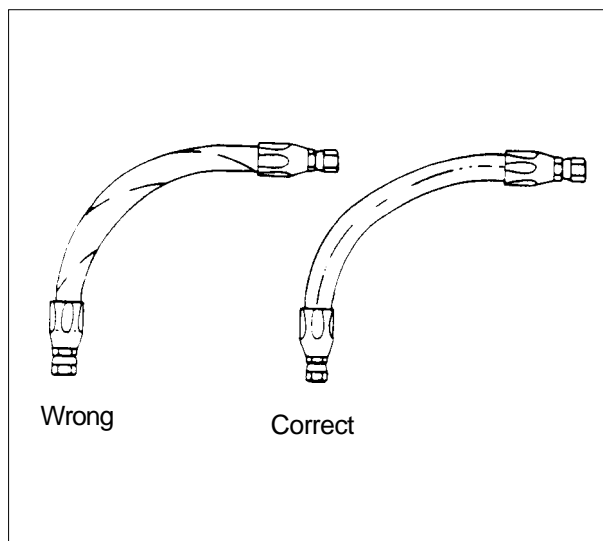


Fig.5

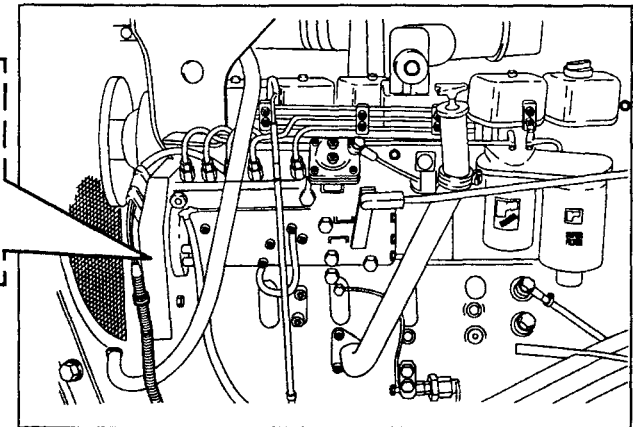
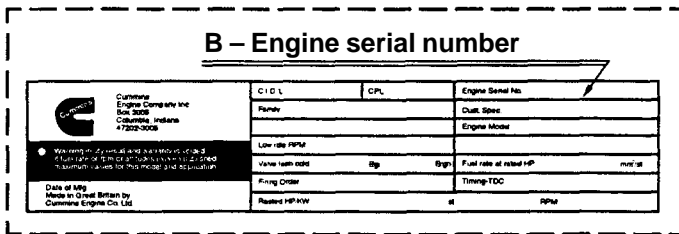
### 1.1.2 Engine identification

#### Engine data plate

The engine data plate includes identification data and other important information relative to the engine.

Always have the following engine data available when communicating with a Cummins authorised repair Center. The information on the data plate are essential when ordering spare parts.

To order parts it is necessary to specify  
 Serial number of the engine (E.S.N.)  
 Check list of the parts (CPL)



Engine are designated as follows:

The first digit indicates the number of cylinders, the letter to follow identifies the series of the engine, the remaining alpha digits indicate the air intake (T = turbo charged) and the last digits indicate the total displacement in liters.

**Model nomenclature of industrial engine**

**6 B T A 5.9**

No. of cylinders 6  
 Series B  
 Turbocharger T  
 Aftercooler A  
 Total displacement 5.9

The total displacement of the engine is 5.88 liters (1.55 US gal), the bore is 102 mm (4.01 in) and the stroke 120 mm (4.72 in).

The firing order is the same as for all other 6-cylinder, in-line Cummins engines, 1-5-3-6-2-4.

**Specifications of engine 6B 5.9**

<b>Total displacement</b>	<b>litres 5.88 (1.55 US gal)</b>
<b>Bore</b>	<b>mm 102 (4.01 in)</b>
<b>Stroke</b>	<b>mm 120 (4.72 in)</b>
<b>Firing order</b>	<b>1-5-3-6-2-4</b>

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TROUBLE	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
<b>Transmission pressure normal; low power in certain speeds and oil overheating</b>	Discs worn or war-ped			Replace defective components
<b>Transmission pressure low in a given speed</b>	Leakages in piping of defective speed		Check if seals or pipes are damaged	Overhaul the transmission and replace defective parts
<b>Engine oil level increases and transmission oil level drops</b>			Together with trouble for low power output	Clean scavenger filter
	Crankshaft sealing ring damaged			Replace crankshaft sealing ring
				Replace pump

Pull out the bearing left in the housing.

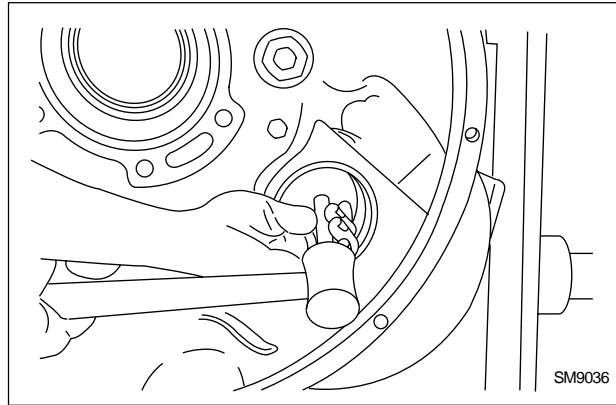


Fig.22

Remove the seal assembly from the housing.

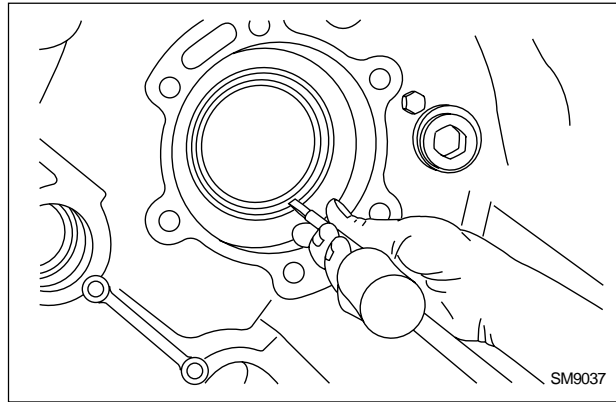


Fig.23

Remove the bearing snap ring from the equipment pump drive, and remove the spacer and the bearing from the shaft.

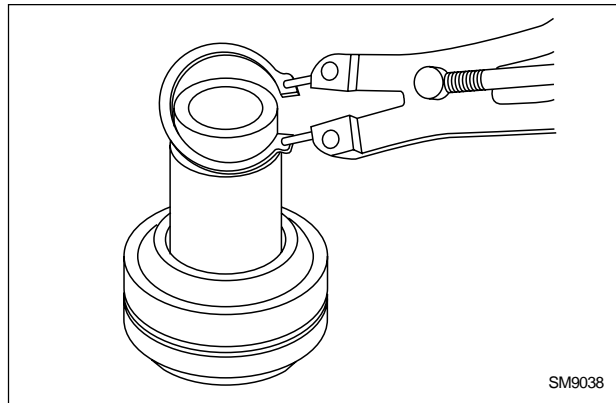


Fig.24

Place the equipment pump drive shaft on a vertical press of appropriate capacity to remove the inner race of the bearing from the shaft.

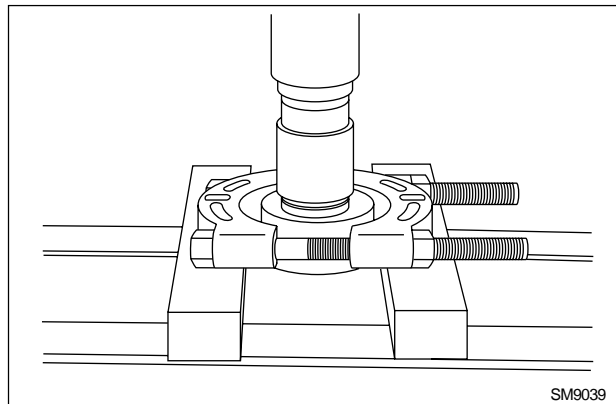


Fig.25

Remove the side covers.

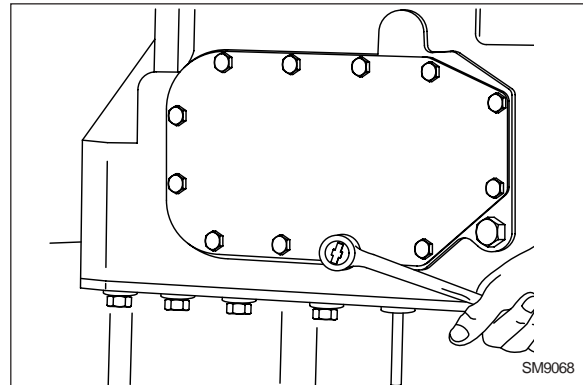


Fig.55

Remove the screws securing the front cover (please note that two screws must be removed from the bottom).

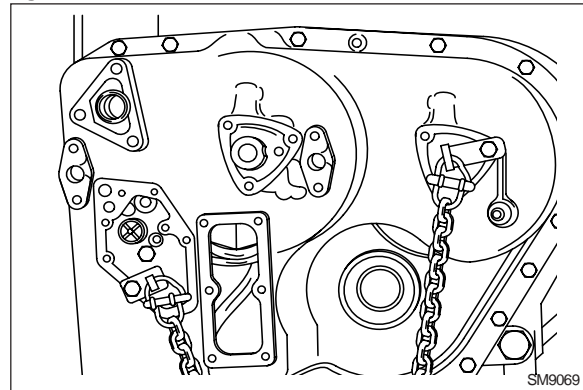


Fig.56

Remove the front cover of the housing, lifting it with an appropriate winch.



**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. Use the lifting eyes provided for this purpose.*

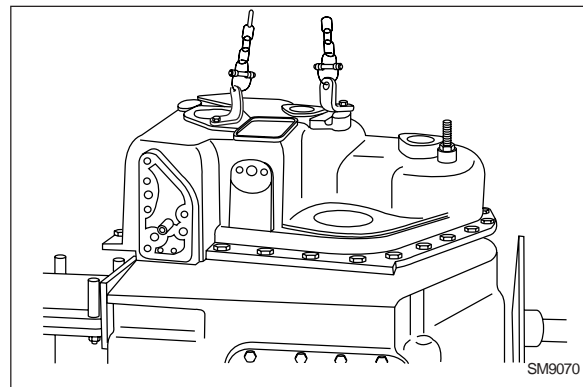


Fig.57

Turn the housing and remove the high range control and lube pipes.

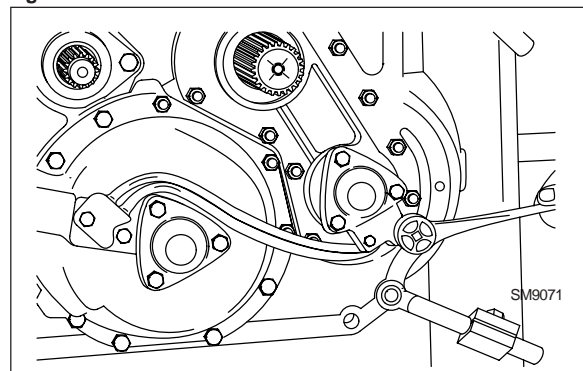


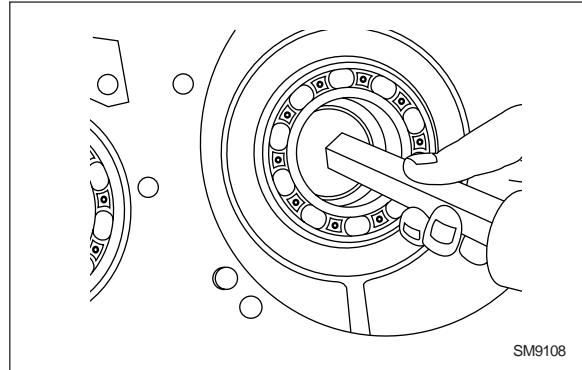
Fig.58

Remove the output shaft and the bearing using an appropriate punch.



**WARNING**

*It is dangerous hitting hardened steel parts with tools different from hammers made of mild-steel or non-ferrous metals. When these components are remove or installed, always wear safety glasses with side shields, heavy gloves, etc., to reduce the chances of injuries.*



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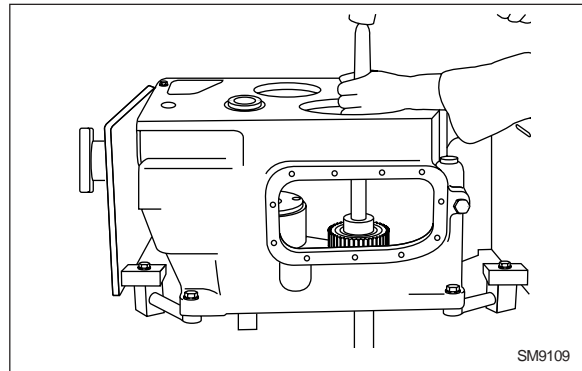
**Fig.95**

Using an appropriate punch, pull out the output shaft through the bearing and the gear.



**WARNING**

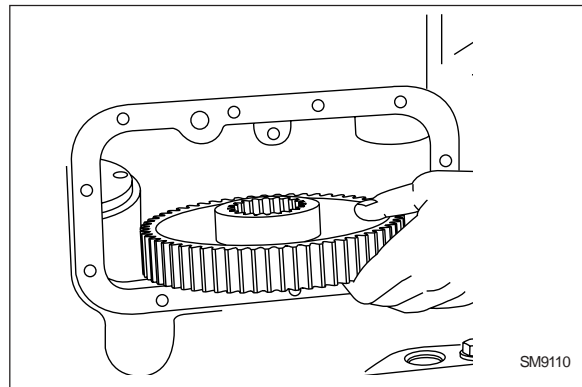
*It is dangerous hitting hardened steel parts with tools different from hammers made of mild-steel or non-ferrous metals. When these components are remove or installed, always wear safety glasses with side shields, heavy gloves, etc., to reduce the chances of injuries.*



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**Fig.96**

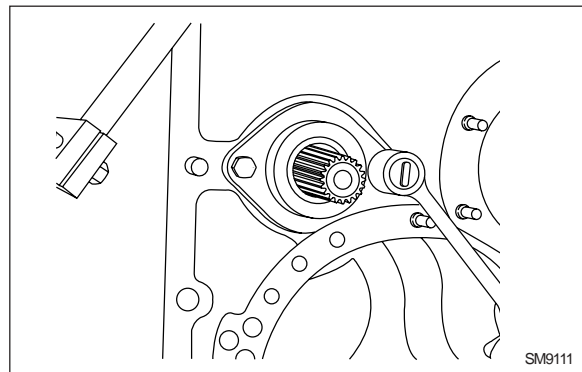
Remove the output shaft gear.



SM9110

**Fig.97**

Remove the PTO shaft securing screws and seal holder.



SM9111

**Fig.98**

Remove the clutch pack from the hub.

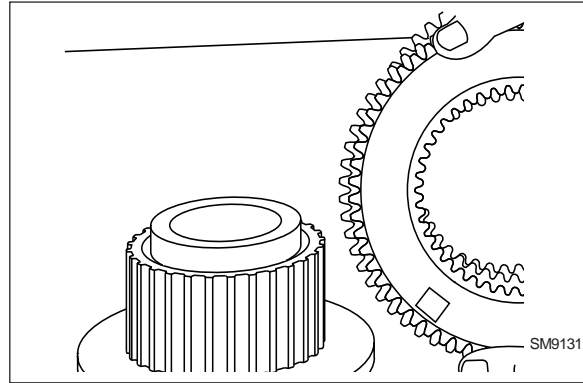


Fig.134

Measure the thickness of all the friction and steel discs; replace them if they are not within the tolerance limits.

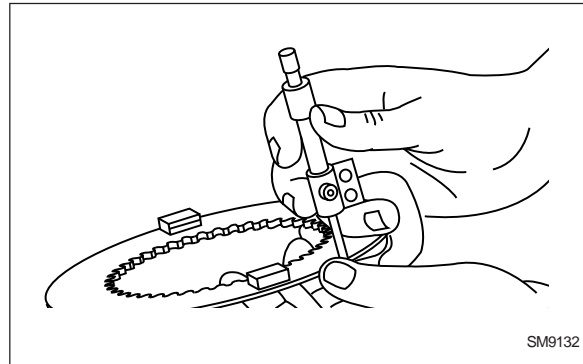


Fig.135

Press the return spring using a long thread screw.

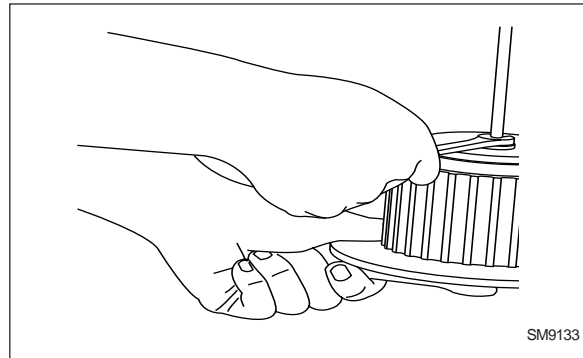


Fig.136

Remove the snap ring..

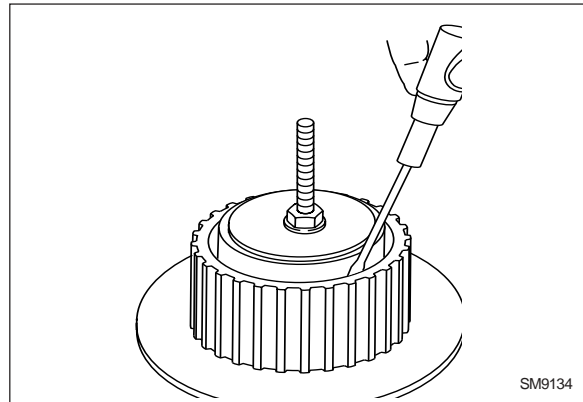


Fig.137

### 2.6.3 TRANSMISSION DATA

#### Transmission clutches

	mm	in
A Out. diameter of forward-reverse speeds and First - Second ranges clutches fixed piston (large)	169.894 to 169.957	6.688 to 6.691
Inner diameter forward speed mobile piston (large)	170.000 to 170.063	6.692 to 6.695
Piston play	0.043 to 0.169	0.001 to 0.006
B Out. diameter of forward-reverse speeds and First - Second ranges clutches fixed piston (small)	59.924 to 59.970	2.359 to 2.361
Out. diameter of forward-reverse speeds and First - Second ranges mobile piston (small)	60.000 to 60.046	2.362 to 2.364
Piston play	0.030 to 0.122	0.001 to 0.004
C Outer diameter of Third range drive piston	194.600 to 194.700	7.661 to 7.665
Inner diameter of high range on First range gear piston	195.000 to 195.072	7.677 to 7.679
Piston play	0.300 to 0.472	0.011 to 0.018
D Inner diameter of Third range drive piston	80.036 to 80.066	3.151 to 3.152
Out. diameter of high range on First-Second and Third ranges drive gear hub	79.940 to 79.970	3.147 to 3.148
Piston play	0.066 to 0.126	0.002 to 0.004
E Outer diameter of clutch control spools	19.770 to 19.800	0.778 to 0.779
Inner diameter of clutches control spools	20.016 to 20.020	0.788 to 0.788
Clearance between seat and spool	0.22 to 0.25	0.008 to 0.009
G Specifications of clutch springs		
Spring free length (Third speed)	83.5	3.29
Spring free length (First,Second,Foward,Reverse)	83.0	3.27
Press. load at 35 mm (1.378 in) Third	65.5 to 72.5 daNm	261.8 to 534.7 lbft
Press. load at 65 mm (2.559 in) (First-Second-Foward-Reverse)	315.5 to 348.5 daNm	2327 to 2570.18 lbft

#### DATA OF CLUTCH DISCS PACK ASSEMBLY

Clutch	(X) Piston stroke (*)		(Y) Clutch pack dimens. (**)	
	mm	in	mm	in
FORWARD	4 to 5	0.16 to 0.20	60.4 to 60.8	2.38 to 2.39
REVERSE	3 to 4	0.12 to 0.16	48.25 to 48.65	1.90 to 1.91
First SPEED	3 to 4	0.12 to 0.16	48.25 to 48.65	1.90 to 1.91
Second SPEED	3 to 4	0.12 to 0.16	48.25 to 48.65	1.90 to 1.91
Third SPEED	2 to 3	0.08 to 0.12	36.1 to 36.5	1.42 to 1.44

(\*) Check by measuring the stroke of the mobile piston.

(\*\*) Check pre-loading the clutch pack with a load of 197 daNm (1452 ft lbs). When the discs are worn, spare discs are available to reestablish the setting, to be used in lieu of as many inner toothed discs.

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### 3.2.5 Description of installation of front seals (long life)

Examine the metal rings, checking that the wear faces are free from scratches, dents and signs of wear, due to misalignment or planarity errors.

Replace both metal rings (**1, Fig. 23**) and rubber rings (**2**), even if one only is defective.

Do not mate a used metal ring with a new one or rings salvaged from different seal pairs.

To install the seals, comply with the following rules:

1. Eliminate all sharp corners and burrs; clean the rubber ring seats thoroughly.
2. Clean the rubber rings thoroughly.
3. Press each metal ring (**1**) in to the relevant rubber ring (**2**) (see detail **a**)
4. Make sure that the metal ring is properly installed, by checking that dimension (**3**) (detail **b**) is constant on the entire circle.
5. Manually Install each pair of rings into the seats on the rubber ring, as illustrated (see detail **c**).
6. Before completing the assembly (detail **d**) clean with a lint free rag sealing faces (**4**) and smear a thin film of oil on them.

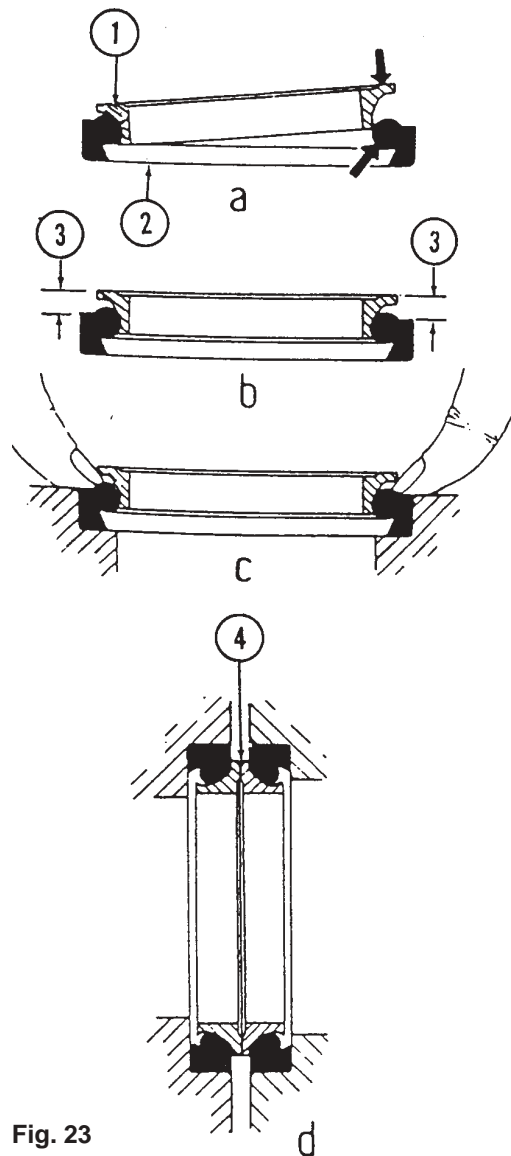


Fig. 23

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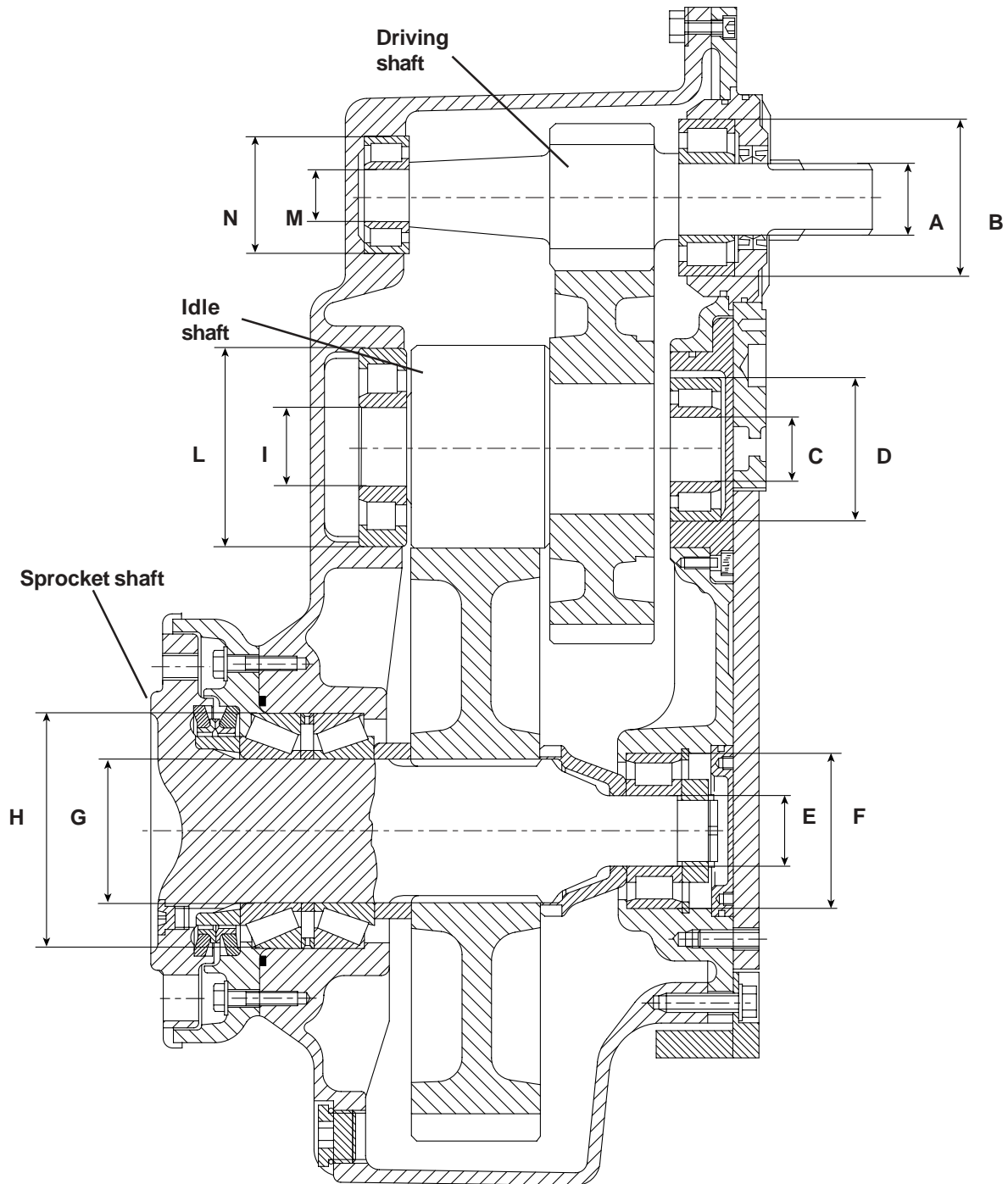


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### 3.3 SPECIFICATIONS AND DATA

#### 3.3.1 Final drive shaft and bearing fittings



SM9000B

**Fig. 55 - Sectional view of final drive**

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### 4.3.3 BRAKE SYSTEM PRESSURE TEST (with brake pedal)

Connect a 30 bar (435 psi) scale capacity pressure gauge to pressure pick-up point (1 - 2 - 6) on the diagnostic panel.

Start the engine and perform forward/reverse maneuvers, actuating, at the same time, the brake pedal, to warm-up the oil. Bring the engine to operating speed.

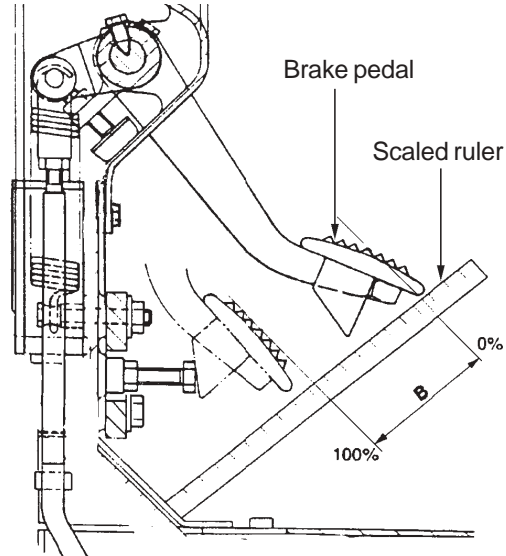
Place a scaled ruler to measure stroke (B) of the brake pedal.

Refer to the diagram in the figure, and press the brake pedal to 20% of its stroke. The pressure measured by the pressure gauge must be practically constant, at the levels indicated by the diagram.

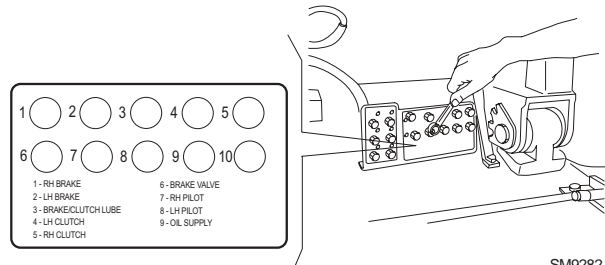
Continuing the pressing of the pedal from 22% through 32% of its stroke, the pressure gauge must show a pressure drop. When pressing the brake pedal further, a pattern of the type indicated by the diagram must be found, until the pressure drops instantly to zero, once the pedal stroke exceeds 75%.

Slight pressure discrepancies between the values measured and those listed in the diagram could be caused by: low oil level, clogged filters, oil with inappropriate specifications.

**NOTE:** The pressures measured can be considered acceptable when they are included within the dotted area on the diagram. In the event they are below the constant line, it is necessary to overhaul or to replace the control valve.

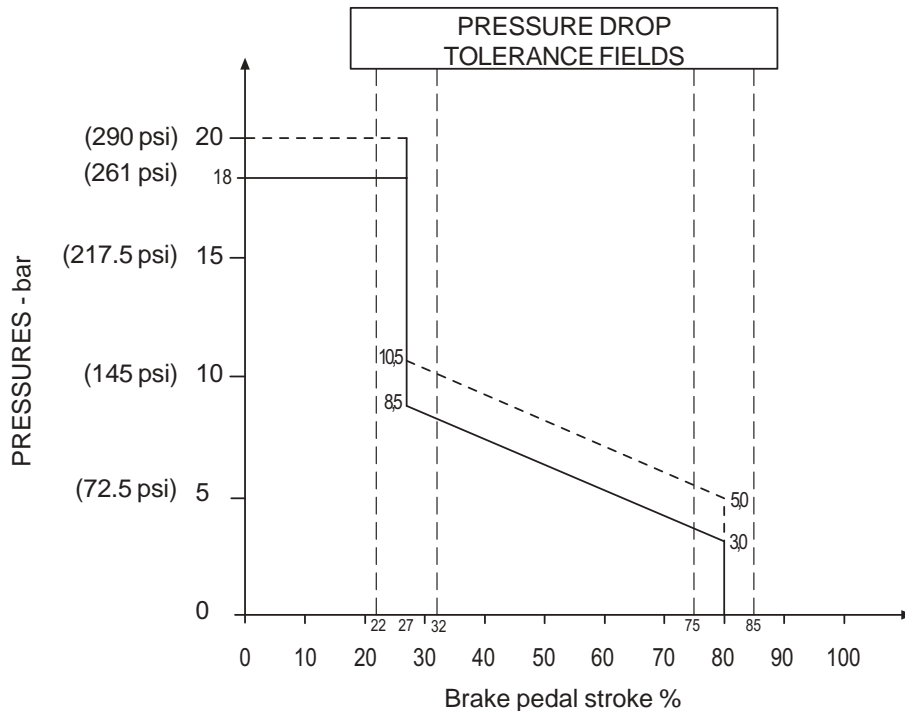


SM9200A



SM9282

1 R.h. brake pressure pick-up point  
2 L.h. brake pressure pick-up point



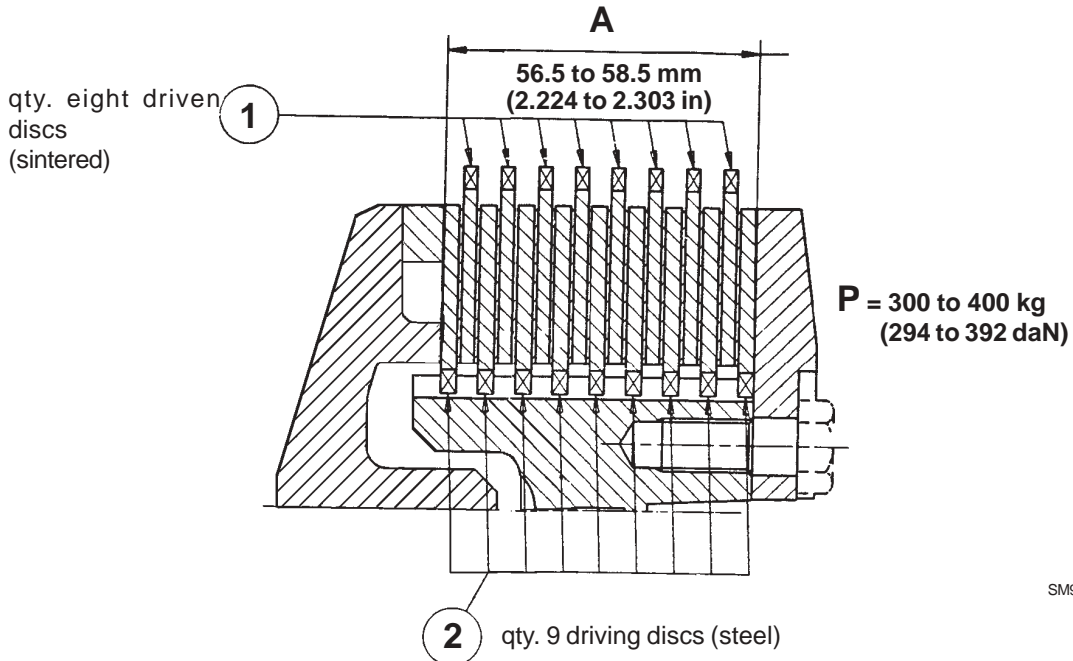
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**CHECK AND INSPECTION OF STEERING CLUTCH PACKS**

Check that the warping, on each disc (2, Fig.21) of the clutch pack is less than 0.03 mm (0.0012 in), check also it on driven discs (1):

- the maximum thickness difference between the surface of sintered material should not exceed 0.05 mm (0.0019 in);
- said surfaces must be free from abnormal wear due to dirt circulating with the oil or to dry operation of the clutches, or pitted zones.

After checking the discs, in accordance with the instructions above, reassemble each clutch pack (A) (8 driven discs and nine driving discs) and pressure plate (4) on the drum and check, under a press, that the total thickness (A) of the pack is 56.5 to 58.5 mm (2.224 to 2.303 in) under a load of 300 to 400 kg (661.5 to 882 lb). In case of discrepancy, add one or more standard or undersized driving disc, from the side indicated by the arrow.

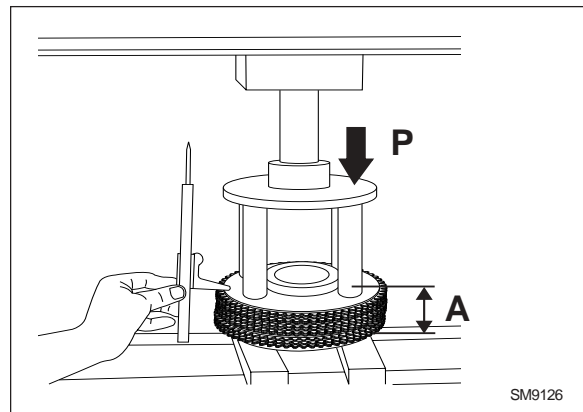


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**Fig.21, Disk in clutch pack**

**DEFINITION AND INSPECTION OF THE CLUTCH DISC PACK**

Obtain thickness (A, Fig.22) under a press load (P) selecting the thickness of discs (1 and 2) accordingly.



SM9126

**Fig.22**

**Quantity of discs per clutch and thickness**

- 1 - Driven (with sintered faces) ..... qty eight discs, thickness 4.2 to 4.5 mm. (0.16 to 0.18 in)
- 2 - Driving (steel) ..... qty nine discs, thickness 2.42 to 2.58 mm. (0.09 to 0.10 in)

Remove the cover using a prybar inserted into the appropriate slots in the cover itself.

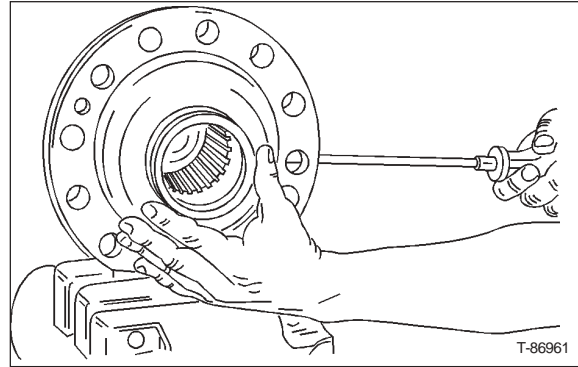


Fig.51

Remove the O-Ring from the cover.

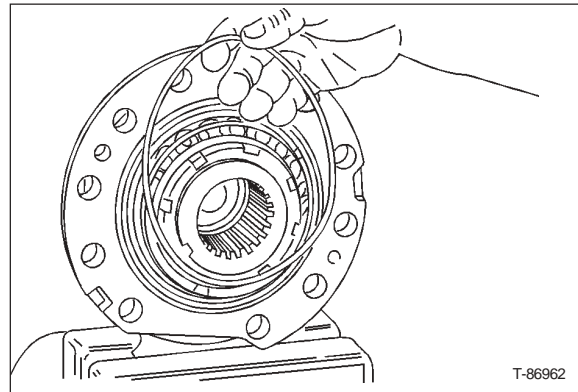


Fig.52

Install two clamps on the appropriate bracket.

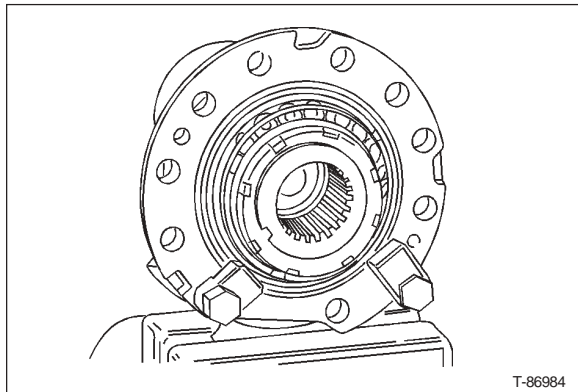


Fig.53

Straighten the safety wing.



**WARNING**

*It is dangerous to strike hardened steel parts with tools other than a soft steel or non-ferrous metal mallet. When removing or reinstalling these parts, always wear safety glasses with side shields, gloves, etc. to reduce the possibility of injuries.*

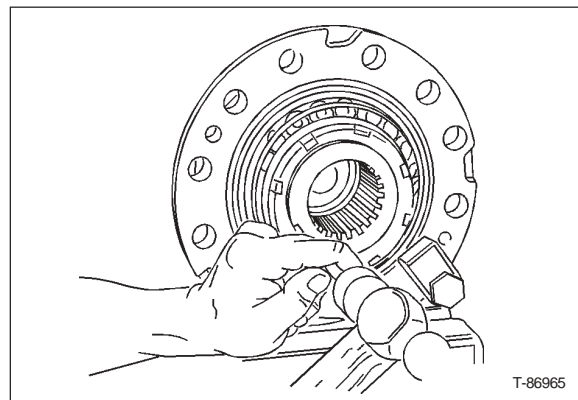


Fig.54

#### 4.4.4.9 SETTING THE PINION GEAR CROWN BACKLASH

Check the backlash between pinion and gear crown using a dial gauge placed perpendicularly against a tooth of the gear crown.

**NOTE:** It is recommended that two readings are taken at 120° then average the three readings.

The backlash measured on the side of the gear crown teeth must be **G = 0.25 to 0.33 mm (0.010 to 0.012 in)**, or an average of about **0.3 mm (0.011 in)**.

During the plus or minus adjustments of said setting to the prescribed value, please keep in mind that the ratio between this backlash and the one relative to the axial one of the crown must equal **1: 1.35**.

In the specific case, the axial play of the gear crown is equal to thickness (**Ss**) of the shims to be inserted in the left housing:

$$Ss = (G - 0.012 \text{ in.}) \times 1.35$$

The thickness of shims (**Sd**) to be inserted on the right housing is:

$$Sd = Sc - Ss$$

**Example:**

Being the backlash:

$$G = 1.5 \text{ mm (0.059 in.)}$$

Total thickness of the shims already determined:

$$Sc = 4 \text{ mm (0.157 in.)}$$

Total thickness of left housing shims:

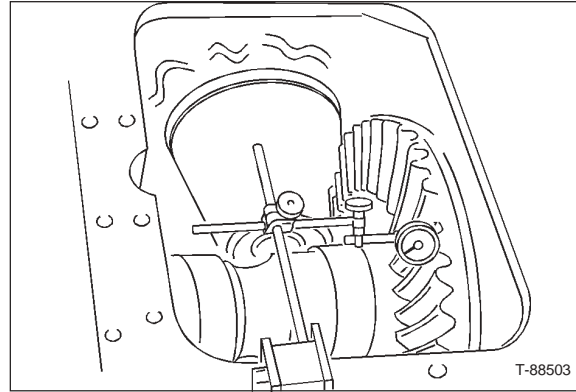
$$\begin{aligned} Ss &= (G - 0.012 \text{ in.}) \times 1.35 \\ &= (0.059 - 0.012 \text{ in.}) \times 1.35 \\ &= 0.047 \text{ in.} \times 1.35 \\ &= 1.62 \text{ mm (0.063 in.)} \end{aligned}$$

Total thickness of right housing shims:

$$\begin{aligned} Sd &= Sc - Ss \\ &= 0.157 \text{ in.} - 0.063 \text{ in.} \\ &= 2.38 \text{ mm (0.094 in.)} \end{aligned}$$

These values must be rounded off respectively to **1.65 mm (0.065 in)** and **2.4 mm (0.094 in)**.

**NOTE:** When required, round off always to the higher value with 0.05 mm (0.002 in) increment.



**Fig.88**

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## 5.4 REPAIR PROCEDURES

### 5.4.1 TRACK CHAIN (removal/installation)

#### Removal

Lift and place blocks of an appropriate thickness under the transmission housing and the cross-member so that the track chains do not touch the ground.

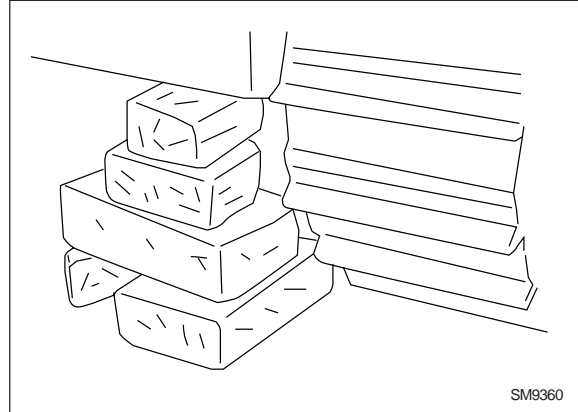


Fig. 6

Remove the cover on the track frame and loosen the tension of the track chain, as described in section 5.3 LOOSENING THE TRACK TENSION.



#### WARNING

*Fluid under pressure. Do not loosen track tension by loosening pressure relief valve  $V_s$  (Fig.4). Do not remove the grease fitting mounted on the adjusting valve.*

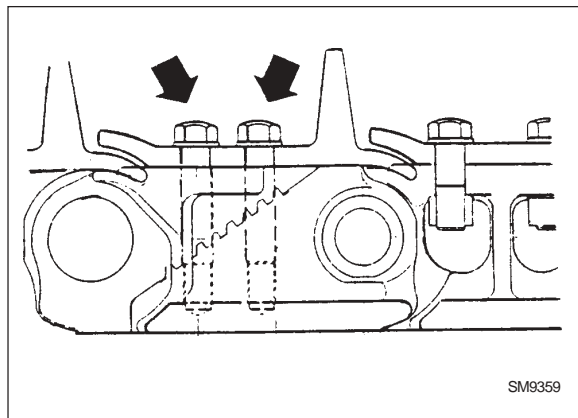


Fig. 7

Remove the screws securing the shoe indicated (Fig. 7) from the master link.

Remove the shoe and split the master link.

Using a proper hoist and sling, remove the chain from the machine.



#### WARNING

*Lift and handle all heavy parts with lifting devices of adequate capacity. Make sure that parts are properly supported and hooked. Use the lifting eyes provided for this purpose.*

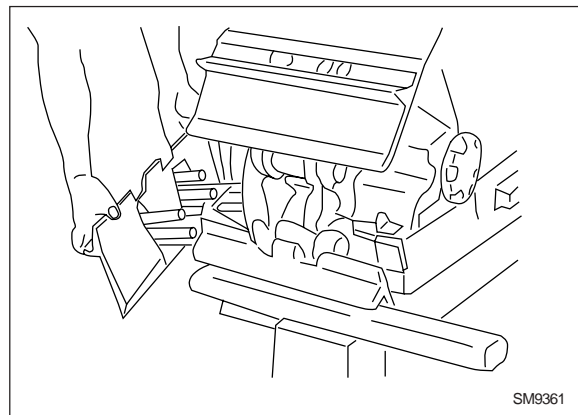
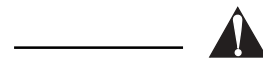


Fig. 8



#### WARNING

*When removing the track chains, sling the two end links and spread the track chain slowly, using a hoist. Make sure that the zone where the track chain is going to be placed is completely free and no personnel are in the vicinities.*

Start the machine and moving forward slowly, disengage the track chain from the sprocket, the support rollers and the idler.

## Overhaul

Remove the roller from the machine and proceed as described below.

1. Mount and lock the roller in a vice using tool (A, Fig 36), remove plug (1) and drain the lube oil.
2. Remove roller support retaining plate (2).
3. Use a screw puller (B, Fig.37) to pull out supports (3) from the roller shaft.

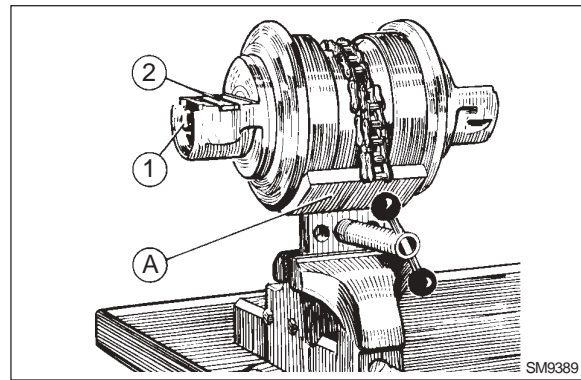


Fig. 36

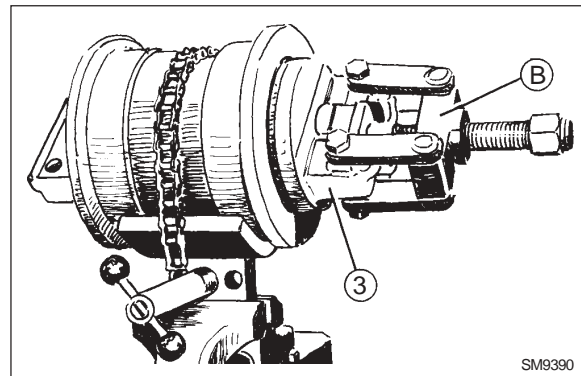


Fig. 37

In the event this operations becomes difficult, use portable press (B, Fig.38), equipped with the tooling illustrated, to pull out the supports. Remove the O-Rings on the roller shaft.

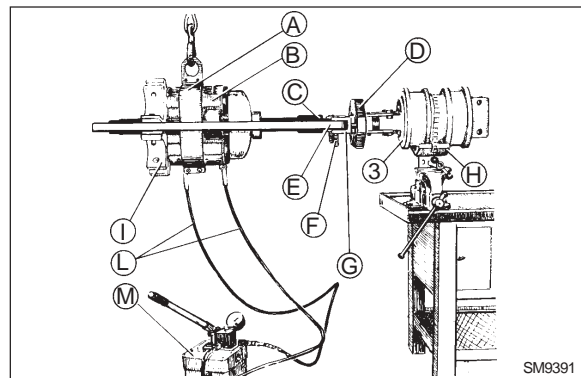


Fig. 38

4. Remove screws (1, Fig.43) securing the bush housings and pull out housing assemblies (2, Fig.39) pushing roller shaft (1) using a universal puller or a stand press. Match the front seals to avoid mismatching during reassemble.
5. In case of replacement, pull out bushings (1) from the housings (2) using an appropriate punch.

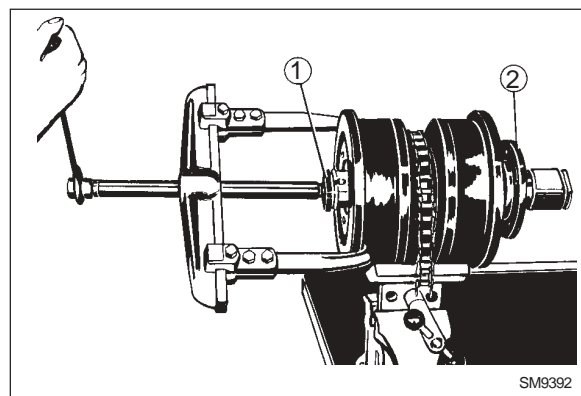
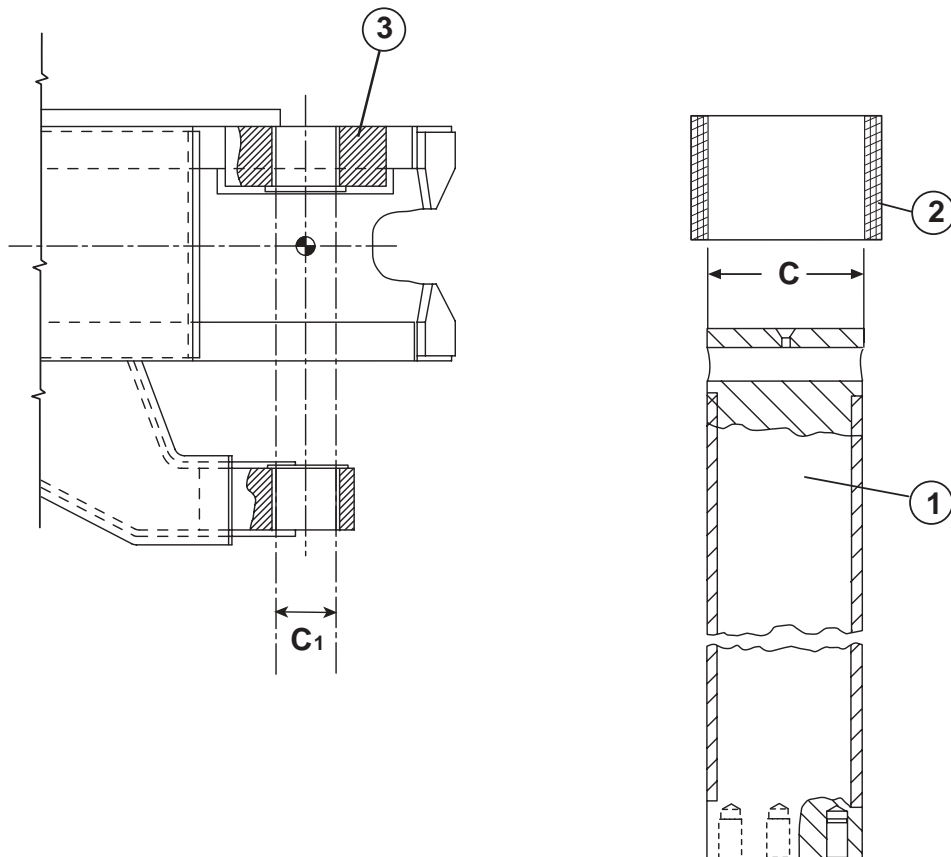


Fig. 39

## PIVOT SHAFT

	Min.	Max	Min.	Max
<b>C. PIVOT SHAFT</b>				
- Shaft diameter	119.946	120.000 mm	4.722	4.724 in
- Phenolic bushing inner diameter		110 H6		
<b>C1. PIVOT SHAFT</b>				
- Bushing outer diameter	14.280	114.330 mm	0.562	4.501 in
- Bushing seat diameter on track frame		114 H8		

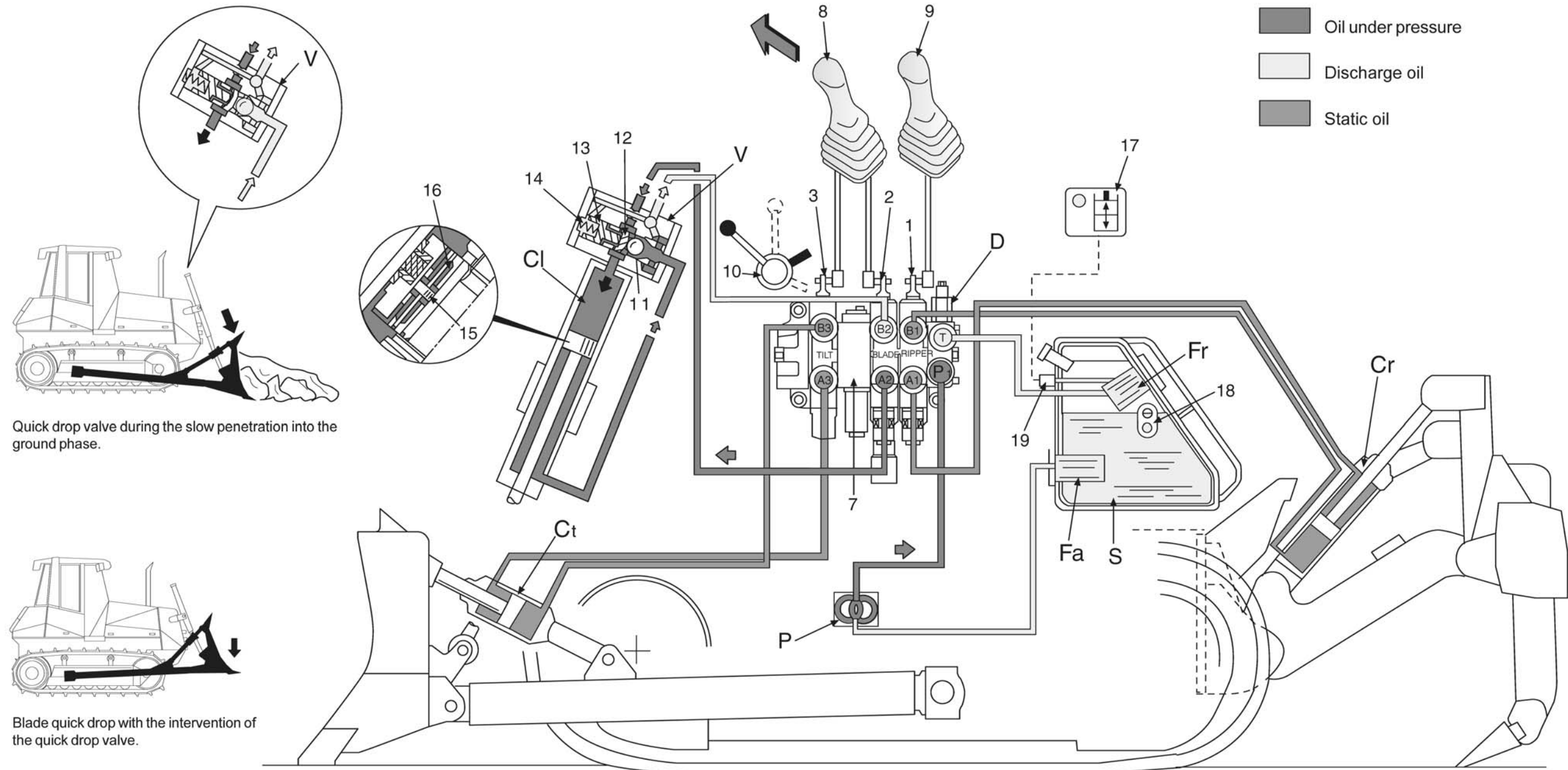


SM9409A

Fig. 53 - Pivot Shaft hinging

1. PIVOT SHAFT; 2. Phenolic bushing; 3. Track frame body;

**EQUIPMENT HYDRAULIC SYSTEM DIAGRAM**  
(The machine is shown in Bulldozer configuration)



Quick drop valve during the slow penetration into the ground phase.

Blade quick drop with the intervention of the quick drop valve.

1. Ripper control spool; 2. Blade control spool; 3. Tilt control spool; 7. Flow reduction valve (70 ± 81 lt/min) (18.49 ± 21.40 US gpm); 8. Blade and tilt control spool; 9. Ripper control spool; 10. Safety lever; 11. Ball; 12. Piston; 13. Quick drop valve piston; 14. Spring; 15. Stroke end valve; 16. Stroke end valve seat; 17. Filter (Fr) clogging indicator light; 18. Min and max level indicator; 19. Return oil filter (Fr) clogging pressure switch; P. Supply pump; D. Control valve; S. Hydraulic oil reservoir; V. Quick drop valve; Fa. Suction filter; Cl. Blade control cylinder; Cr. Ripper control cylinder; Ct. Tilt control cylinder; Fr. Return filter.

## 6.4 REPAIR PROCEDURES

### 6.4.1 HYDRAULIC OIL RESERVOIR (Removal/installation)

#### Removal

Turn the main switch into "**OFF**" to turn-off the electrical system and apply a sign "**DO NOT OPERATE**" on the switch as illustrated.



#### WARNING

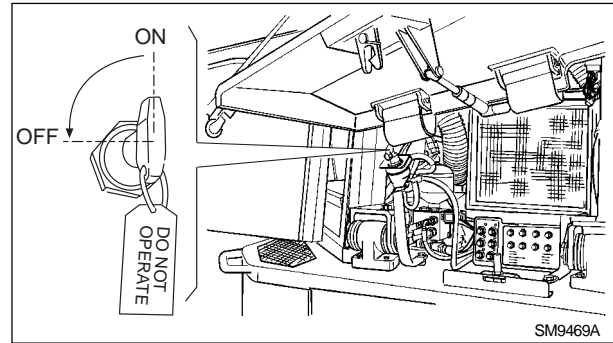
*To minimize the risk of fires or explosions, prior to performing any welding operation on the fuel reservoir, it is recommended that the reservoir fully drained, all pipes should be disconnected, protecting their ends, and the inside of the reservoir should be steam cleaned. Also all traces of fuel around the area must be removed before starting welding.*

*Flood the reservoir with carbon dioxide (CO<sub>2</sub>) before and during the welding operation.*

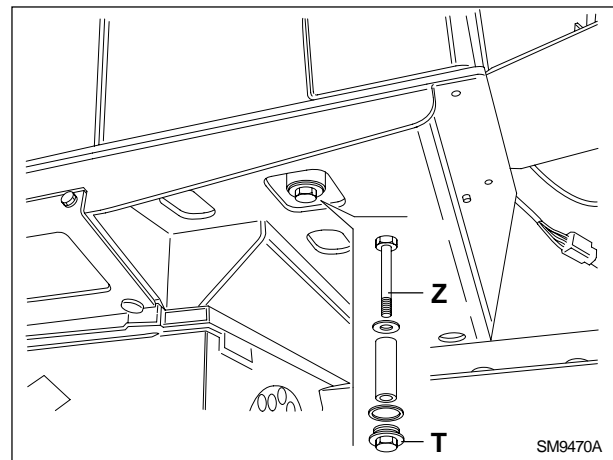
*While welding, all caps and covers must be removed and all the other openings kept open to provide ventilation.*

Then, proceed as follows:

- lift the machine;
- drain the hydraulic oil from the reservoir using a container of at least 70 Lt (18 USGal) capacity, loosening the appropriate plug (**T**, Fig.8) located under the reservoir and magnetic rod (**Z**);
- disconnect the oil delivery and return pipes to the equipment control valve;

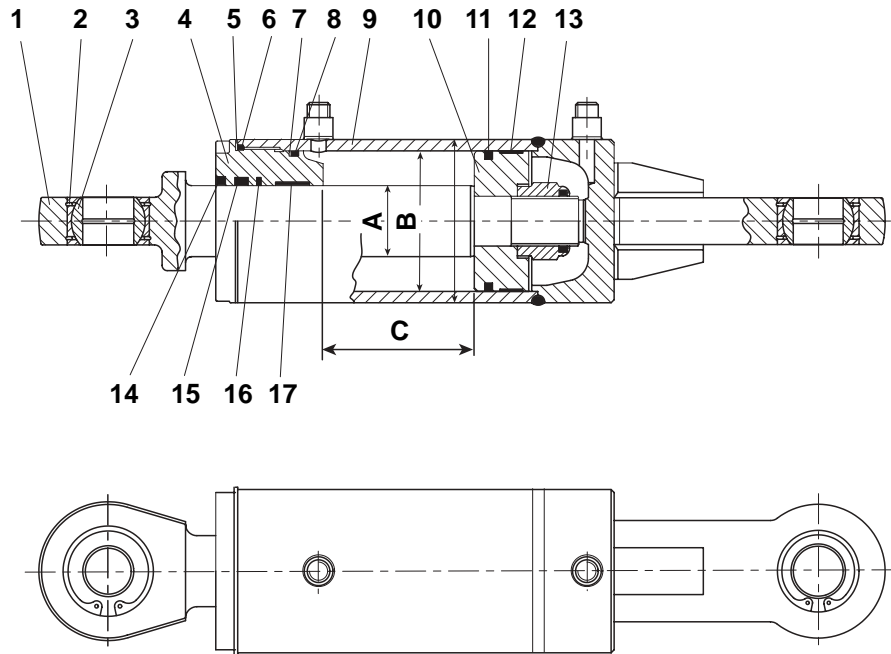


**Fig. 7 - Electrical system main switch**



**Fig. 8 - Hydraulic oil reservoir**

6.5.6 BLADE TILT CONTROL CYLINDER (PAT version)



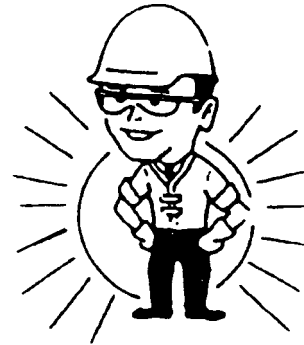
**Fig. 22 - Blade tilt cylinder section**

- A. Cylinder rod nominal diameter ..... 63 mm (2.48 in)
- B. Piston nominal diamete ..... 125 mm (4.92 in)
- C. Cylinder rod stroke ..... 135 mm (5.31 in)
- C<sub>2</sub>. Front sleeve tightening torque ..... 74 daNm (545.75 ft lbs)
- C<sub>3</sub>. Piston securing nut M42x2  
tightening torque ..... 177 ± 10 daNm (1305.37 ± 73.75 ft lbs)

1.	Rod
2.	Circlip
3.	Ball joint
4.	Front sleeve
5.	Securing plate
6.	O-Ring
7.	Backup ring
8.	O-ring
9.	Cylinder sleeve ass.ly
10.	Piston
11.	Piston seal
12.	Piston guide ring
13.	Piston securing nut
14.	Mud scraper
15.	Piston rod seal
16.	Buffer ring
17.	Rod guide ring

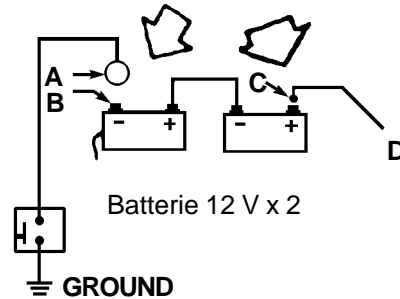
# SAFETY RULES

**WARNING:** When working on the electrical system, always wear safety glasses and remove rings, wrist watches and any metal jewelry.

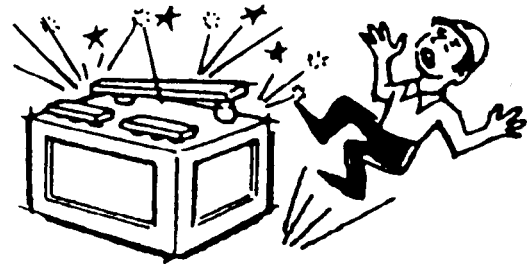


**WARNING:** Prior to inspection or repair work on electrical components, DISCONNECT GROUND CABLE "A" from the battery negative terminal "B". DISCONNECT CABLE "D" FROM POSITIVE TERMINAL "C".

## DISCONNECTS



**WARNING:** NEVER REST METAL OBJECTS on the battery to prevent dangerous short-circuits.



**WARNING:** FUMES FROM THE BATTERY ELECTROLYTE ARE FLAMMABLE. Never generate sparks nor bring free flames near the batteries. The emission of fumes is stronger when recharging. SM9500

**WARNING:** BATTERY FUMES ARE DANGEROUS if in contact with the skin or materials.

**WARNING:** Beware when maintaining the battery.



SM9539



## CORRECT

SM9538

Use a flashlight to inspect the level of the battery electrolyte. Always perform the inspection with engine inoperative.

Do not charge the battery or start the engine with jumper cables if the battery is frozen. Warm-up the battery to 15°C (60°F) otherwise it could explode.

**1. AIR CLEANER CLOGGING SENSOR**

**WIRES**

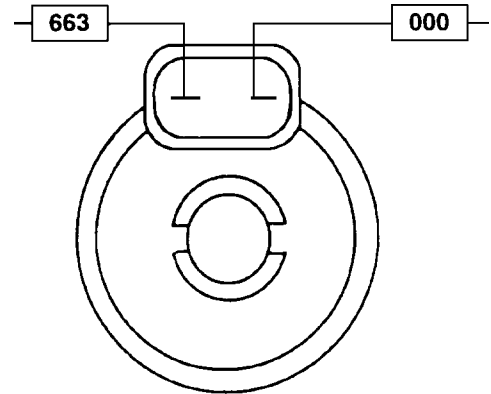
- 663** To monitor
- 000** To ground

Setting: (closing of contact) 62 mbar ± 8°C.

LOCATION - Left front side of machine, over the air cleaner.

**Installation notes.**

The depression switch must be tightened manually, without using tools.



SM9517

Fig.20

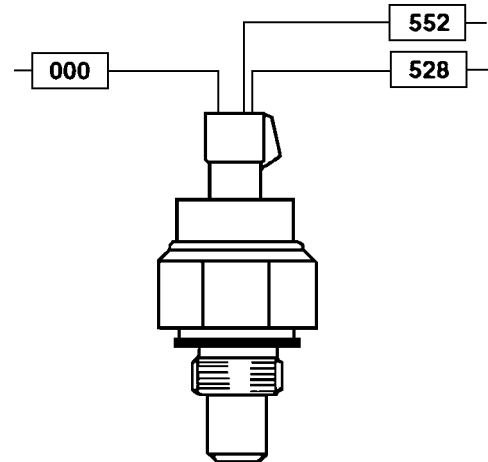
**2. ENGINE COOLANT MAXIMUM TEMPERATURE SWITCH**

**WIRES**

- 552** to monitor
- 000** To ground

- Thread: M16 x 1.5
- Setting: 100° ± 3 °C
- Wrench: 22 mm (0.866 IN)
- Torque wrench: 2.5 daNm (18.43 ft lbs)

LOCATION - Right front side of machine, on engine.



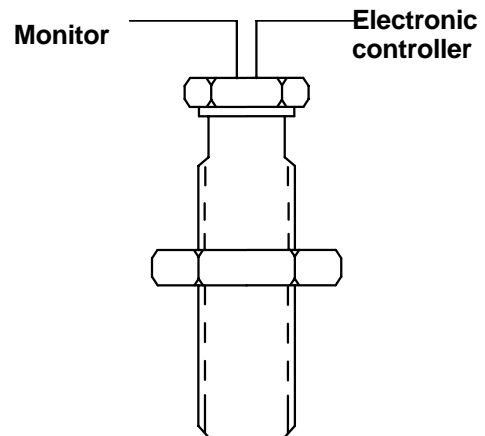
SM9518

Fig.21

**3. ENGINE RPM**

- Thread: 3/4 - 16 UNF
- Wrench: 29 mm (1.141 IN)
- Torque wrench: 1.9 to 2.5 daNm  
(14.01 to 18.43 ft lbs)

LOCATION - On engine flywheel housing



SM9519

Fig.22

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