
PREVENT ACCIDENTS

The majority of accidents and injuries which occur in industry, on the farm, at home or on the road, 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 taking the necessary precautions, before the accident occurs.

Regardless of the care used in design and construction of any type of equipment, there may be conditions that cannot be completely safeguarded against, without interfering with reasonable accessibility and efficient operation.

A careful operator and / or technician is the best insurance against accidents. The complete observance of one simple rule would prevent many thousands of serious injuries each year.

This rule is: Never attempt to clean, lubricate or adjust a machine while it is in motion.

WARNING

Before carrying out any maintenance operation, adjustment and or repair on machines equipped with attachments, controlled hydraulically or mechanically, make sure that the attachment is lowered and safely set on the ground. If it is necessary to have the 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 device used for controlling the equipment.

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Technical Information
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Front tyres	16.9-24 R4	16.9-28 R4	440/80 R28 IT530	440/80 R28 IT520
Rear tyres				
A	4413 (173.74)	4477 (176.25)	4467 (175.86)	4474 (176.14)
B	3269 (128.7)	3333 (131.22)	3323 (130.82)	3330 (131.10)
C	2583 (101.69)	2647 (104.21)	2637 (103.81)	2644 (104.09)
D	208 (8.18)	144 (5.66)	154 (6.06)	147 (5.78)
E	893 (35.15)	830 (32.67)	827 (32.55)	826 (32.51)
F	1449 (57.04)	1344 (52.91)	1348 (53.07)	1342 (52.83)
G	1381 (54.36)	1318 (51.88)	1315 (51.77)	1314 (51.73)
H	1534 (60.39)	1427 (56.18)	1431 (56.33)	1425 (56.10)
α	44.3°	44°	44°	44°
β	59.6°			
χ	42.3°			

mm (in)

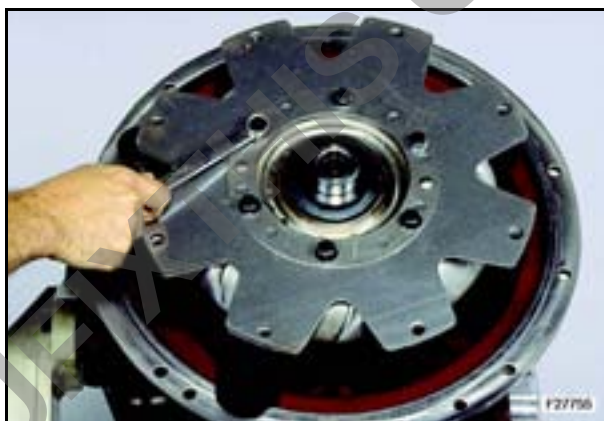
2.4 INSPECTION

Inspect the splines on the converter hub for wear or damage and the weld joints for cracks. If the hub is worn or damaged and/or the weld joints cracked, a new converter must be installed. A new drive plate should also be installed if it is warped.

2.5 DISASSEMBLY AND ASSEMBLY

DISASSEMBLY

Remove the drive plate screws.



Remove the drive plates.

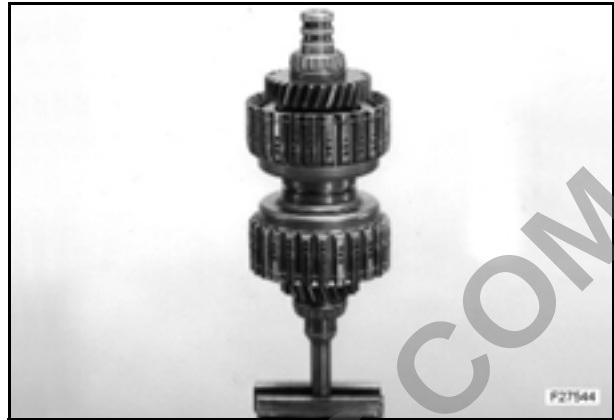


Remove the torque converter assy.



INPUT SHAFT DISASSEMBLY

Position the shaft in a soft jawed vice as shown.



Remove and discard the 3 sealing rings.



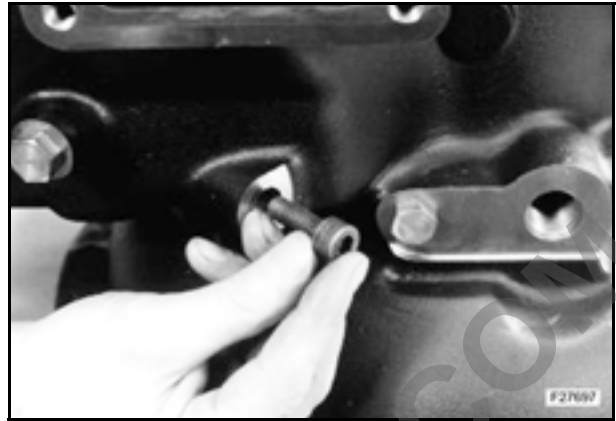
Using the appropriate bearing puller **380002683** remove the rear bearing.



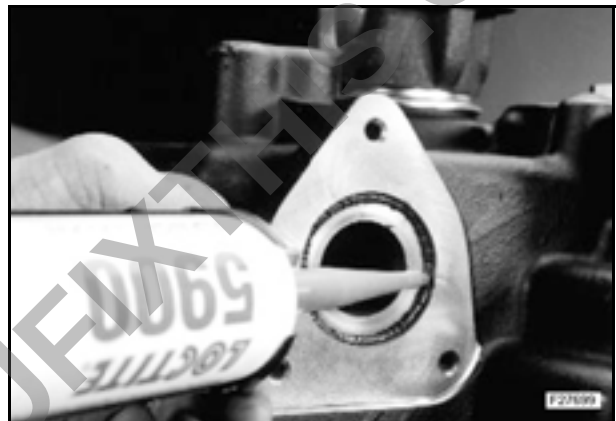
Remove the thrust washer and the thrust bearing.



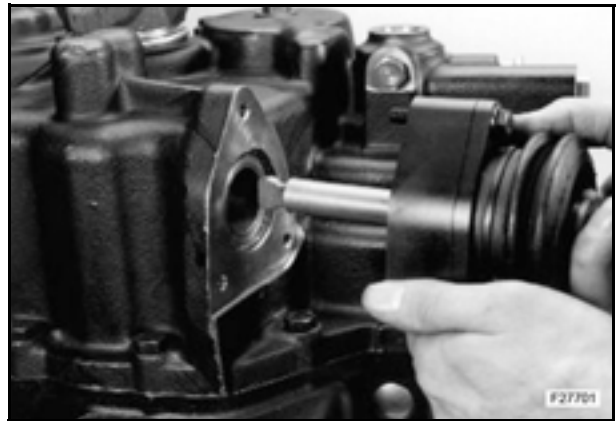
Refit the 4th gear lock out screw, (when this feature is not required a shorter blanking screw is fitted). On some applications an additional sealing plug may be fitted.



Apply a bead of RTV joint compound (Loctite 5900) to the gear case.



Refit the gear lever assembly and tighten the three bolts to a torque of 16-24 Nm (12-18 lbs.ft).



Refit the filter housing and gasket. Tighten the two bolts to a torque of 45-64 Nm (33-47 lbs.ft).

NOTE: do not use sealant on this gasket as it is graphite coated.



CONTROL VALVE OPERATION FORWARD, SECOND GEAR WITH 4WD ENGAGED

Pressure oil from the system regulating valve flows to the pressure reducing valve.

The pressure lowers to 5.5 bar (80 psi). This oil flows to the 6 solenoids.

Oil also supplies the modulation valve.

When the powershift lever is moved forward and twisted anti clock wise a electrical signal is sent to:

- Oil flows from the system pressure regulating valve at 20 bar (290 psi) through the 4WD spool to engage the 4WD clutch.
- System pressure also flows through the range modulation valve, then through the 1st 2nd spool to engage the 2nd gear clutch.
- The high low solenoid which energizes allowing pilot oil to flow to the shift spool. This will allow oil to flow to the low clutch.
- The neutral forward solenoid which energizes allows pilot pressure to flow to the shift spool this will allow oil to flow on to the forward low shift spool.
- The modulation valve has a reducing current from the microprocessor, pilot pressure gradually increases acting on the boost valve and it multiplies pilot pressure.
- The oil from the boost valve is modulated allowing a steady increase of pressure to act on the forward low clutch pack which gradually takes up drive until clutch pressure reaches 20 bar (290 psi).

1. Transmission sump
2. Transmission breather
3. Suction strainer
4. Gerotor oil pump
5. Pressure oil filter
6. Filter by-pass valve 4.3 bar (62.4 psi)
7. System pressure test port 20 bar (290 psi)
8. System pressure regulating valve 20 bar (290 psi)
9. Oil to converter system
10. Pressure reducing valve 5.5 bar (80 psi)
11. 2nd/1st Solenoid
12. 2nd/1st shift spool
13. 2nd gear clutch
14. 1st gear clutch
15. Range modulation solenoid
16. Range modulation spool
17. Range modulation restriction
18. 4WD solenoid
19. 4WD shift spool
20. 4WD clutch
21. High/low solenoid
22. High/low shift spool
23. Forward high clutch
24. Forward low clutch
25. Neutral reverse solenoid
26. Neutral reverse shift spool
27. Reverse clutch
28. Neutral forward solenoid
29. Neutral forward shift spool
30. Electronic modulation valve 0-5.5 bar (0-80 psi)
31. Accumulator
32. Pressure booster 0-20 bar (0-290 psi)

Loosen the suction tube retainer screw.



Remove suction tube retainer screw and lock washer.



Remove the suction tube retainer ring.



Remove the suction tube O-ring and the washer.



Install one outer half disc with friction material down.



Install the modulator spring with large diameter up to the backing plate.



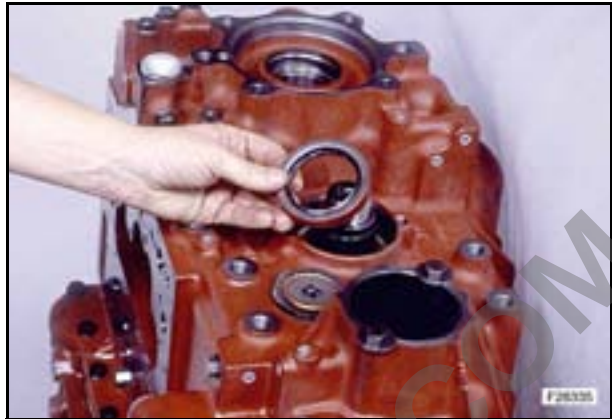
Install the backing plate.



Install the backing plate snap ring.



Position the upper output seal.



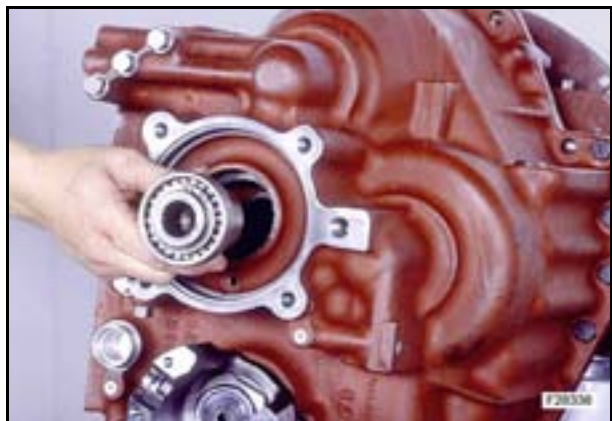
Tap the seal into the place.



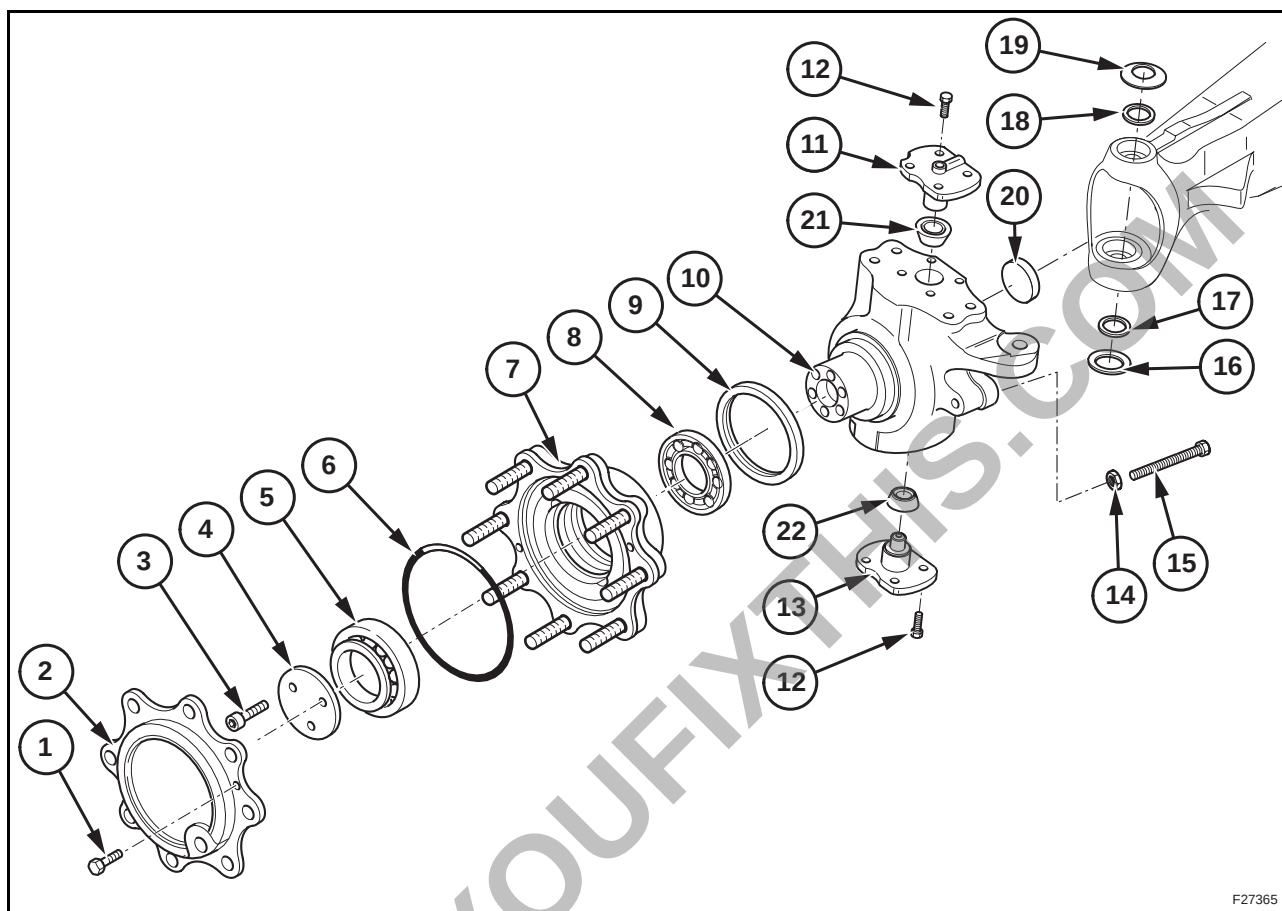
Install the upper output flange, the O-ring, the washer and the nut and tighten the nut to 339 - 407 Nm (250-300 lbf.ft).



Install the pump drive shaft assembly into the housing.



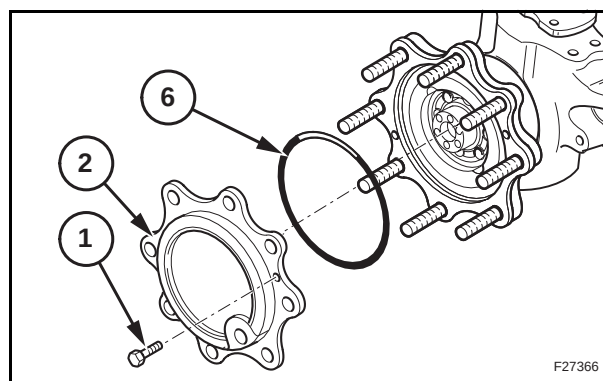
WHEEL HUB



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Disassembly

Unscrew and remove the fastening screws (1) of the cover (2). Remove the cover (2) and the O-ring (6).

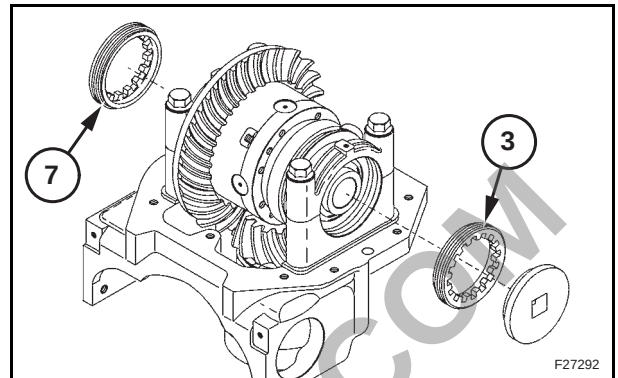


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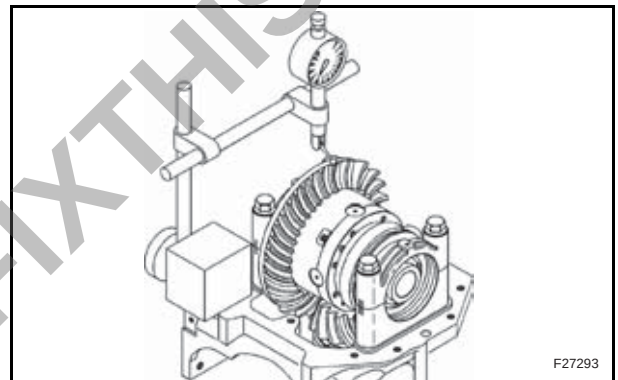
Assemble the adjuster ring nuts (3) and (7) to the differential support.

Tighten both ring nuts (3) and (7) with special tool **380000406**, till the backlash is eliminated and the differential bearings are slightly preloaded.

Check that the differential bearings are well settled; if necessary, knock slightly with a soft hammer, in order to properly set the bearings in position.



Position a magnetic-base dial gauge on the differential support, so that the feeler stylus touches the surface of one tooth of the ring gear with a 90° angle.



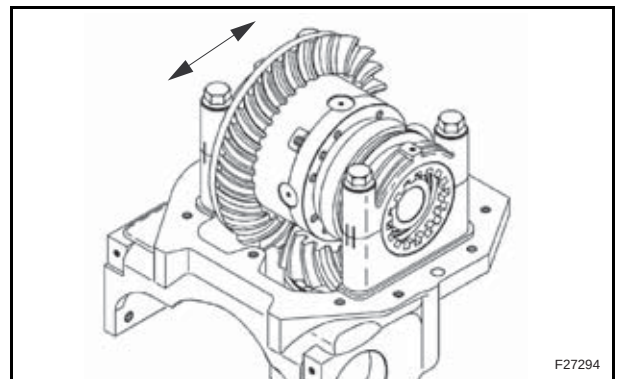
Lock the pinion and move the crown gear alternatively and note the pinion-ring gear backlash, measured with the comparator.

Repeat the operation on 2 or more points (teeth), rotating the crown gear, so that to obtain an average value.

Check if the measured backlash value is within the requested range:

$$0.18 \div 0.25 \text{ mm } (0.007 \div 0.010 \text{ in})$$

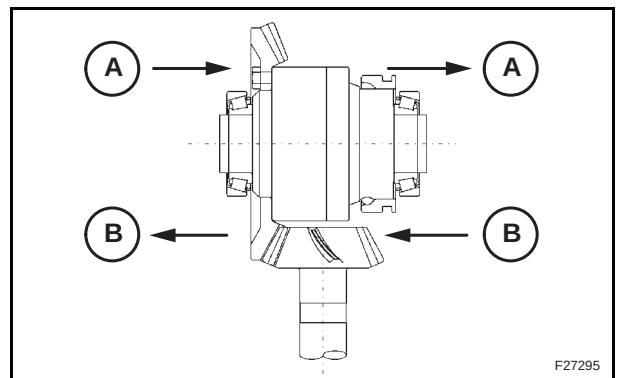
Carry out the adjustment by operating on the ring nuts with the appropriate tool **380000406**.



Adjust the ring nuts (3) and (7), remembering that:

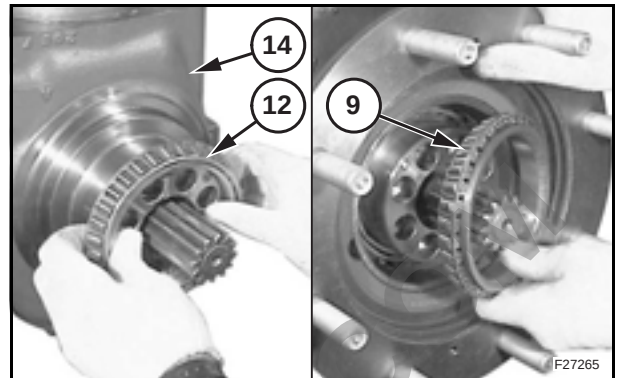
(A)- if the measured backlash is greater than the given tolerance range, unscrew the adjuster ring nut (3) and screw in the adjuster ring nut (7) by the same measure.

(B)- if the measured backlash is less than the given tolerance range, unscrew the adjuster ring nut (7) and screw in the adjuster ring nut (3) by the same measure.



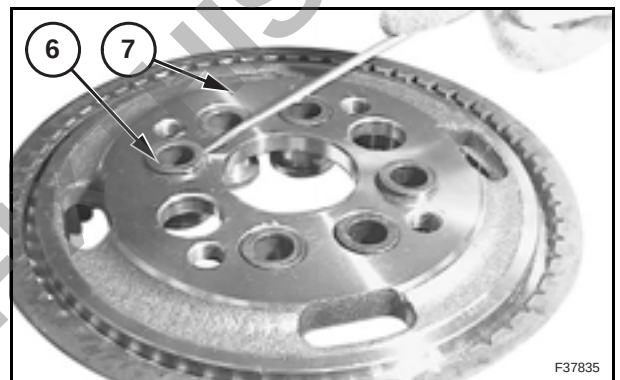
Assemble the bearing (12) onto the swivel housing end (14).

Assemble the wheel hub (11) on the swivel housing (14) and fit the bearing (9).

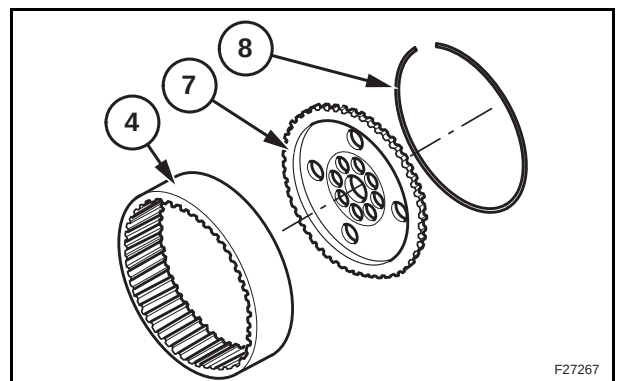


Position the ring gear carrier (7) on a workbench and force the bushes (6) to the carrier surface level with the special tool **380002667**.

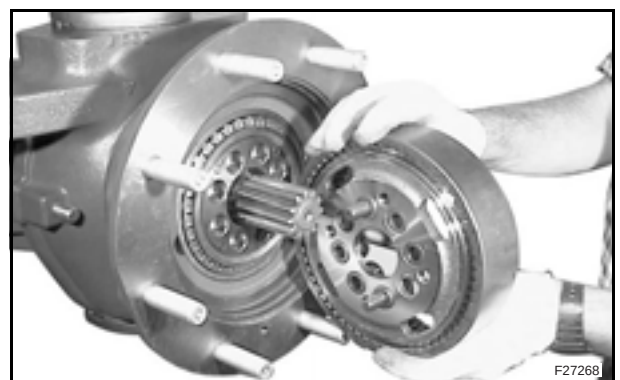
At least two bushes (diametrically-opposed) should be set slightly higher than the carrier surface level to be used as dowel pins.



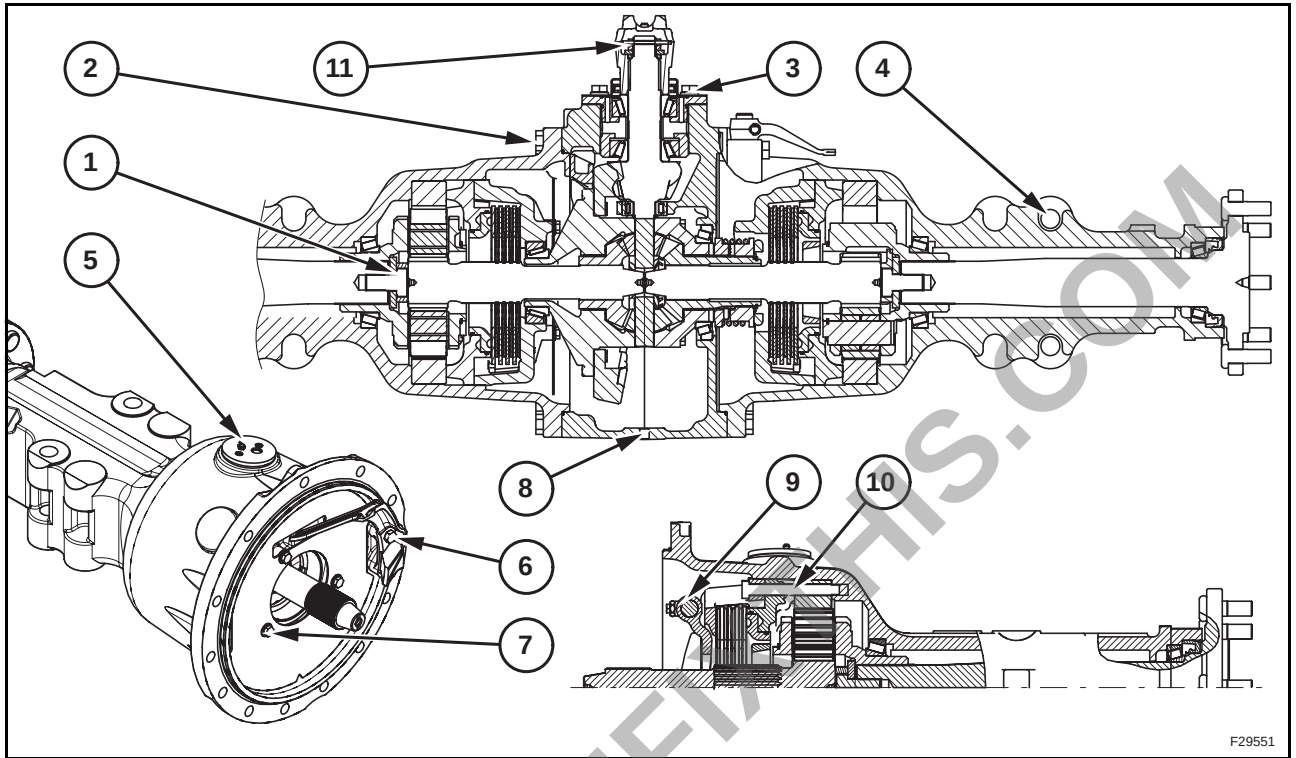
Preamble the ring gear carrier (7) and the ring gear (4) with the retaining ring (8).



Assemble the ring gear carrier assy on the wheel hub using the two projecting bushes as dowel pins and screw in the relevant screws in order to put the ring gear in contact with the wheel hub.



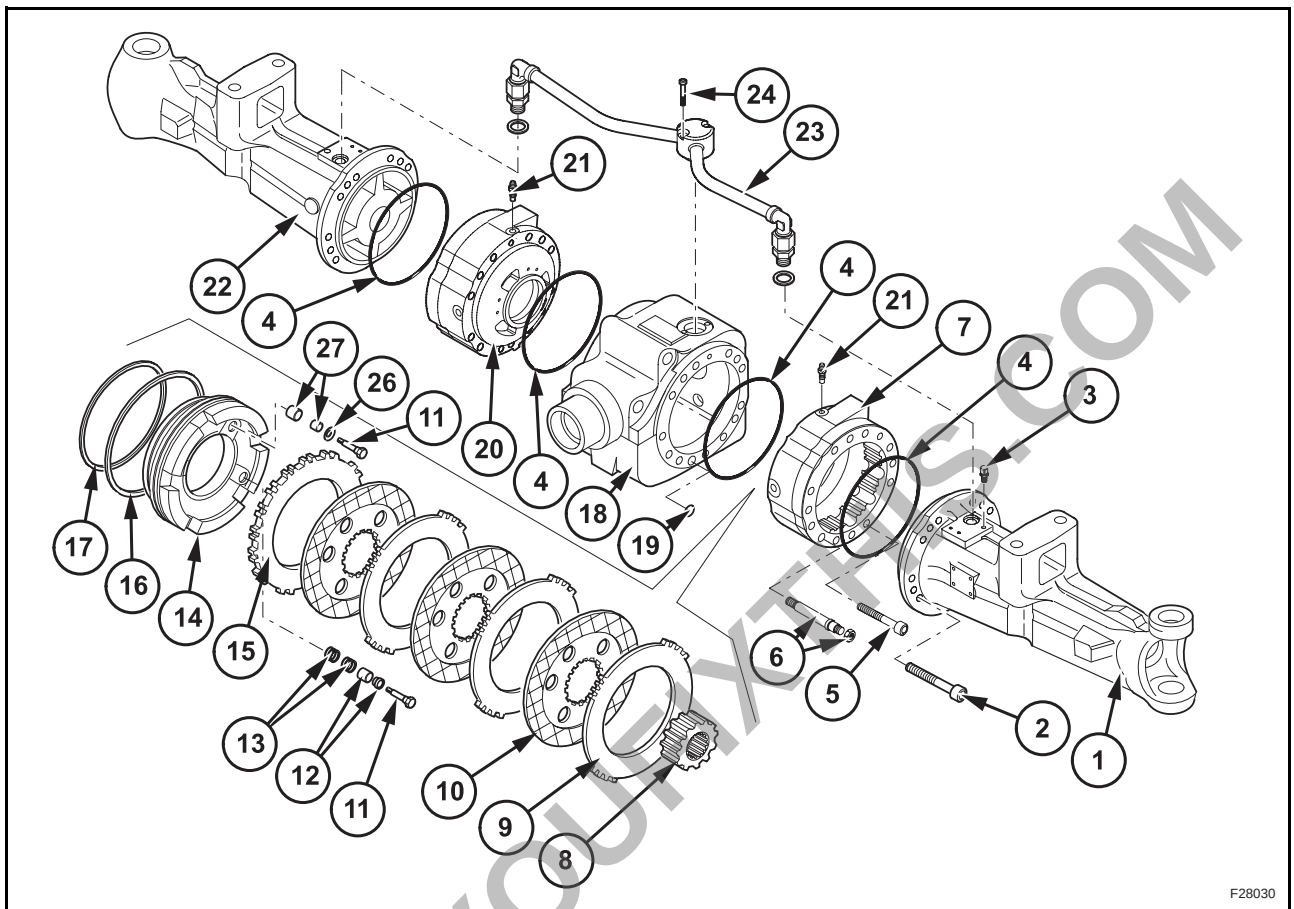
MOUNTING SCREW TORQUE



- | | |
|--|--|
| 1. Screw of half shaft: 554÷626 Nm (409÷462 lbf.ft) | 5. Screw: 11÷14 Nm (8÷10 lbf.ft) |
| 1. Screw of axle assy - rear RH or LH: 190÷231 Nm (140÷170 lbf.ft) | 6. Screw of block: 57÷76 Nm (42÷56 lbf.ft) |
| 2. | 7. Screw of baffle oil: 43÷51 Nm (32÷38 lbf.ft) |
| 3. Screw of front flange: 136÷170 Nm (100÷125 lbf.ft) | 8. Plug: 27÷34 Nm (20÷25 lbf.ft) |
| 4. Screw to fixed rear axle to the chassis: 800 Nm (590 lbf.ft) | 9. Screw: 32÷41 Nm (24÷30 lbf.ft) |
| | 10. Screw of housing rear brake: 204÷245 Nm (150÷189 lbf.ft) |
| | 11. Right nut: 406 Nm (300 lbf.ft) |

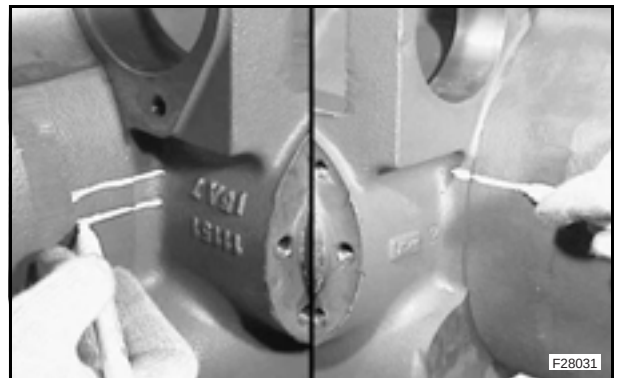
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AXLE BODY AND BRAKES

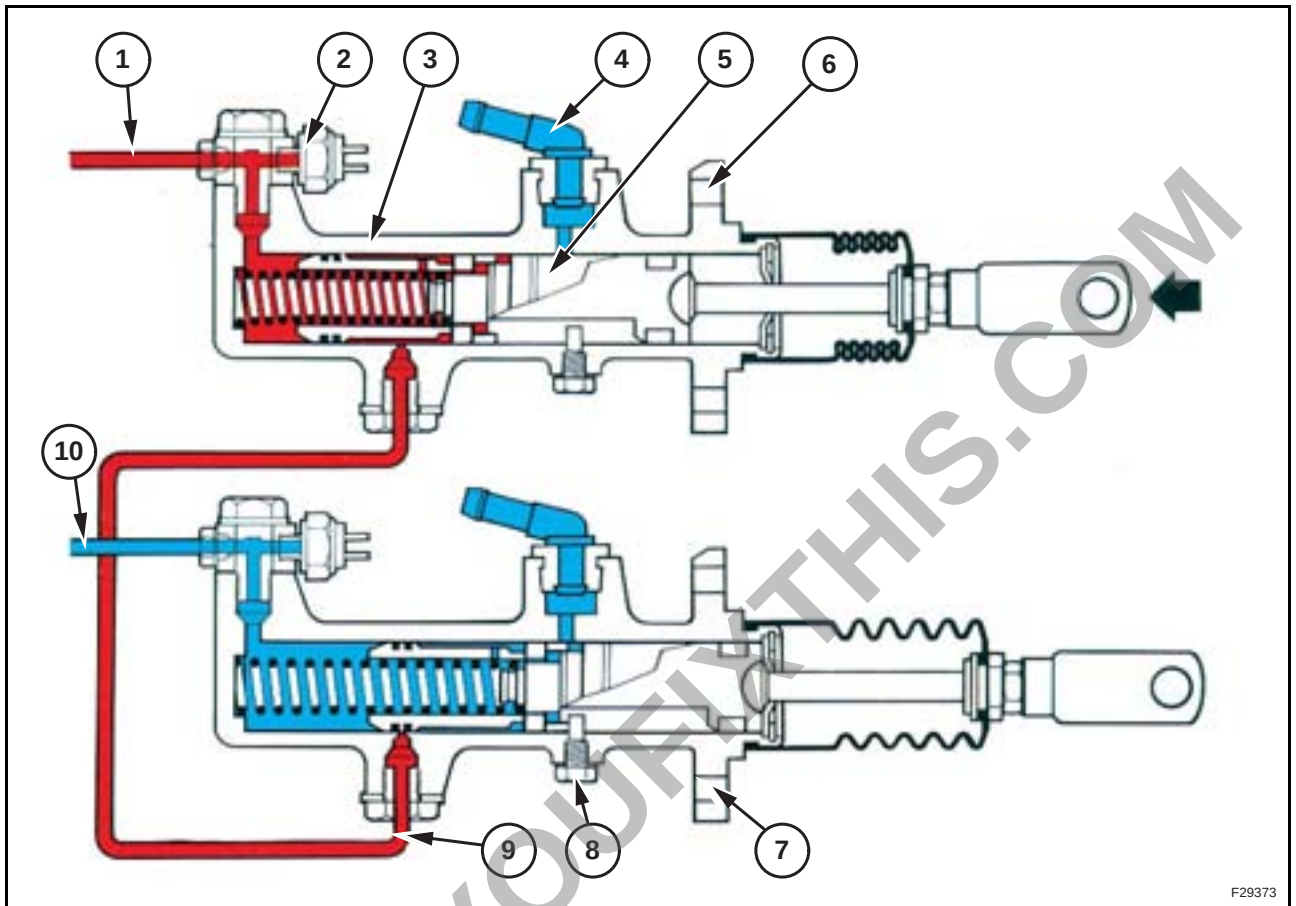


Disassembly

Put alignment marks on the axle beam body and on the differential supporting flanges, in order to identify the right side and the left side with certainty.



CYLINDER WITH ONE BRAKE PEDAL DEPRESSED



— Pressurized brake oil
— Tank oil (no pressure)

1. Oil to cylinder (right hand side)
2. Pressure switch
3. Secondary spool
4. Tank inlet
5. Primary spool

6. Cylinder body
7. Cylinder body
8. Primary spool stop
9. Balancing pipe
10. Oil to cylinder (left hand side)

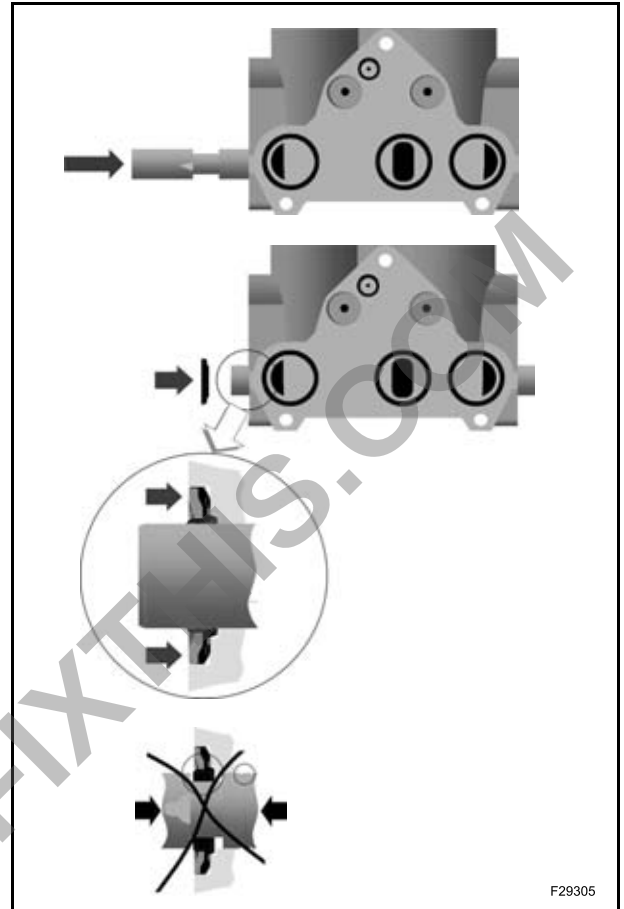
When using one brake to assist turning, the brake cylinder being applied operates only one brake. This is achieved by the pressure port being blocked by the two seals on the cylinder not being operated.

Precautions to be taken for replacing the spool lip seal.

- Place the spool in the working section.
- Slide the lip seal perpendicularly onto the spool, positioning the metal part of the lip seal on the outside of the spool.

⚠ WARNING

The lip seal must be fitted on the end of the spool so that it is not damaged by the spool grooves (N) and its tightness is not damaged.



Mechanical detent system spool

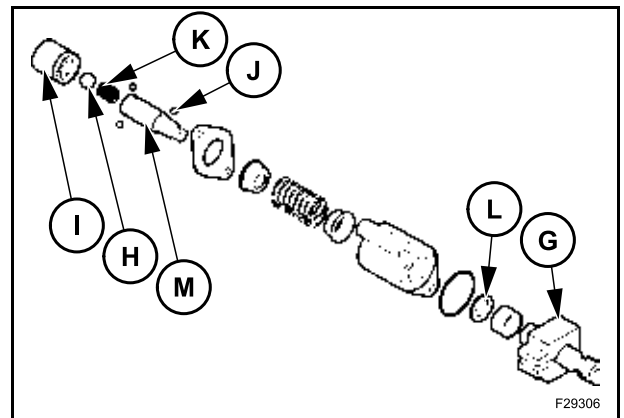
Disassembly

- Remove the tongue and the cover sides.
- Use a spool clamp (G) and a vice to secure the spool.
- Using a metal rod (minimum length = 80 mm (3.15 in), diameter 6) push the central ball (H) while extracting the detent bush (I).
- Mark the orientation of the detent bush for the reassembly.
- Remove the balls (J) and the spring (K) from the adapter (M).

Reassembly

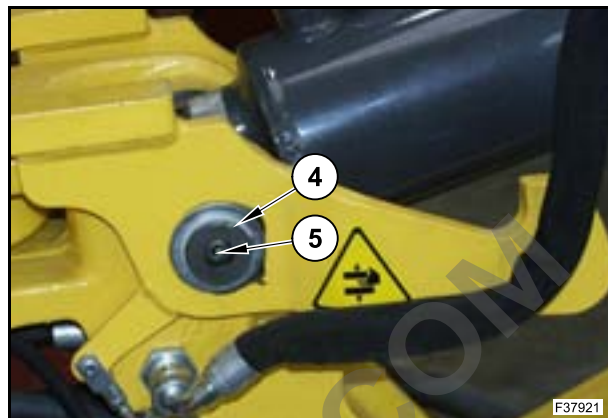
- Introduce the spring (K) into the adapter (M).
- Place the 3 balls (J) into the radial holes of the adapter (M) and use grease to prevent them from falling.
- Position the central ball (H) against the spring (K).
- Slip the detent bush (I) onto a metal rod.
- Using the metal rod, press the central ball (H) into the adapter (M), then slide the detent bush (I) onto the adapter, making sure that the 3 balls are still in place.

NOTE: make sure that the orientation of the detent bush is respected.



Disconnect the hydraulic hoses. Remove the stop ring (4) and extract the pin (5).

NOTE: accurate positioning of the cylinder prior to hose disconnection will aid pin removal.



Remove the backhoe attachment boom cylinder.

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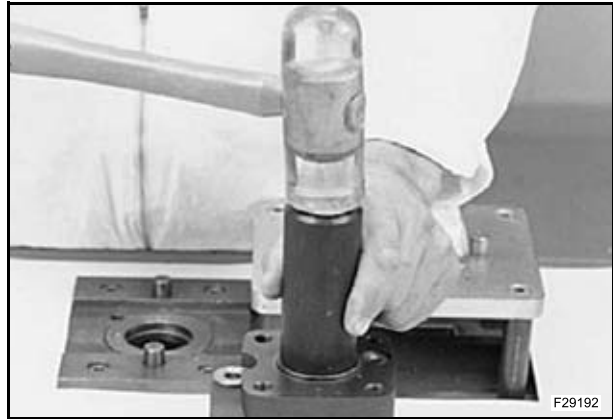
Screw plug with seal ring into the two shock valves and tighten them with a torque of 30 ± 10 Nm (22 ± 7.3 lbf.ft).



Position the seal ring (24) into the housing.

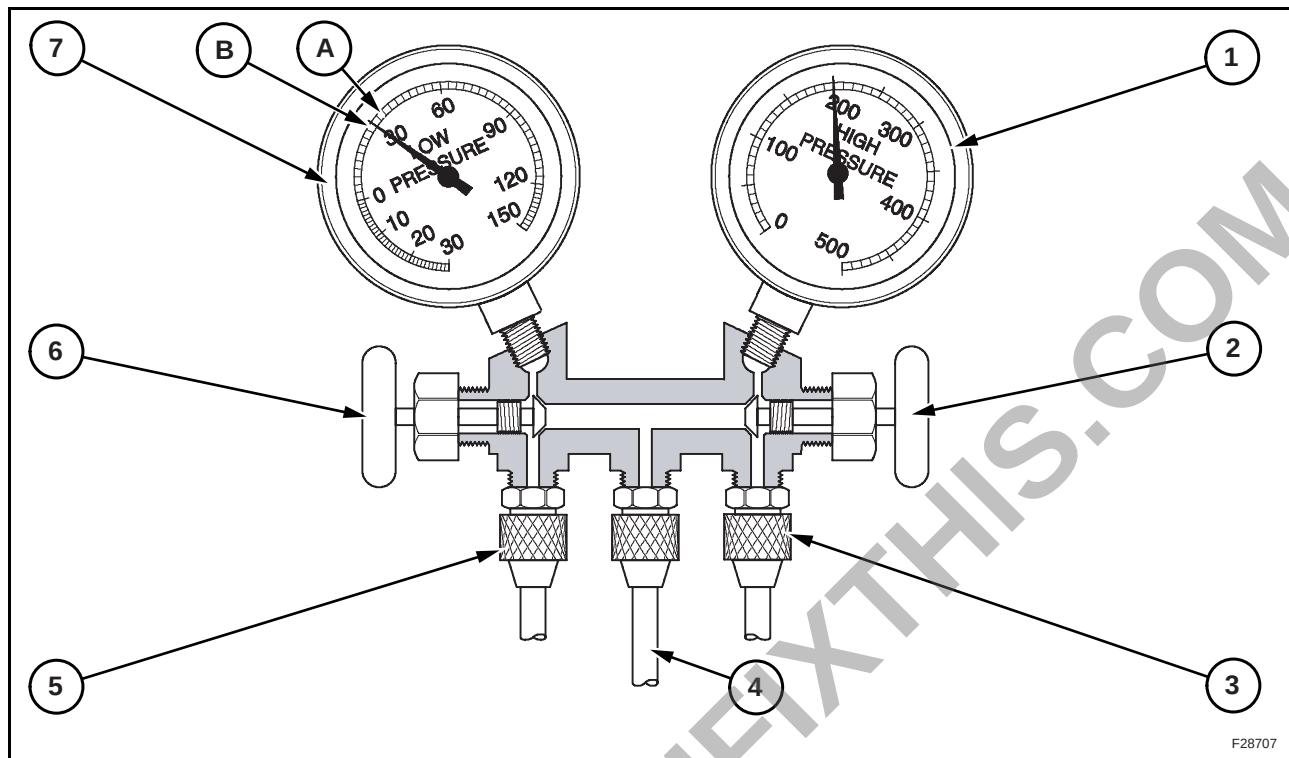


Install the seal ring into the housing using the special tool and a plastic hammer.



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PERFORMANCE TEST EXAMPLE 10



Performance test example 10

1. High side normal
2. High side hand valve closed
3. High side hose connected to high side service connector
4. Not used
5. Low side hose connected to low side service connector
6. Low side hand valve closed
7. Low side gauge
Compressor cycles on at 2.3 bar (33 psi)
Compressor cycles off at 1.9 bar (28 psi)

PROBLEM

Compressor cycles (cuts in and out) too rapidly.

CAUSE

Thermostatic switch defective.

CONDITIONS*

Low side pressure readings too high during both ON and OFF compressor cycles and between cycles. Readings should be:

- 0.8-1.0 bar (11.6-14.5 psi) - cycle (OFF)
- 2.5-2.7 bar (36-39 psi) - cycle (ON)
- 1.7-1.9 bar (25-28 psi) - between cycles.

High side pressure normal. Gauge should read 13.3-14.8 bar (193-215 psi).

CORRECTIVE PROCEDURES

1. Stop engine and shut off A/C.
2. Replace thermostatic switch with switch of same type.
3. Make sure the switch's temperature sensor is installed in the same position and depth (in evaporator core) as previous.

4. Performance test the system.

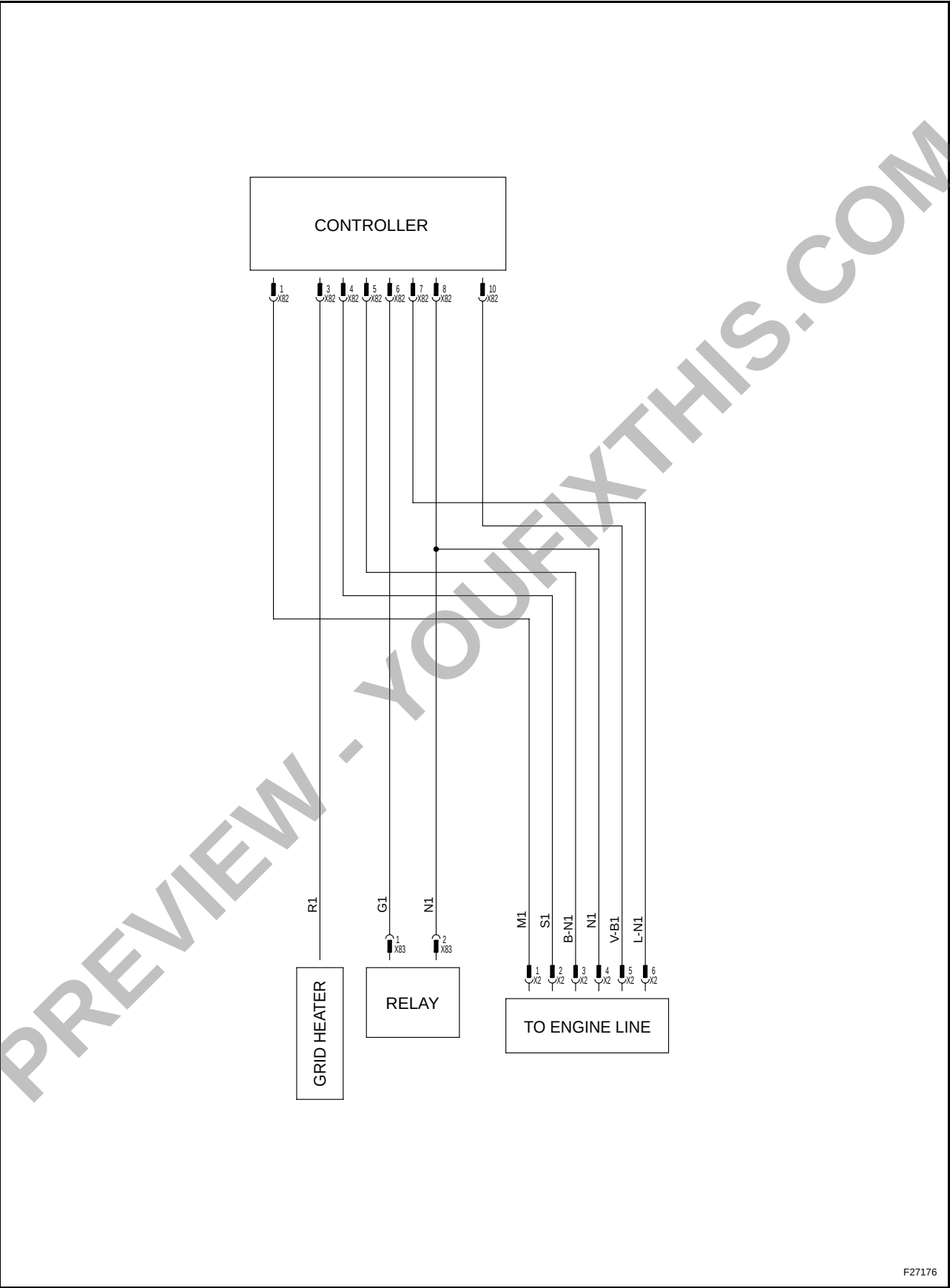
DIAGNOSIS

Defective thermostatic switch.

NOTE: * test procedure based upon ambient temperature of 35 °C (95°F).

For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart.

COLD START DIAGRAM



NAME	DESCRIPTION
S141	Front work light switches
S142	Ride control switch
S143	Hydraulic speed control switch
SB1	Battery master switch
ST1	Side instrument cluster
ST2	Front instrument cluster
ST3	4x1 bucket control lever
X1	Engine line interface - 18-way connector
X2	Preheating relay (optional) - 2-way connector
X4	Air filter sensor - 2-way connector
X5	Fuel level sensor - 2-way connector
X7	Reverse travel buzzer - 2-way connector
X8	4WD solenoid valve - 2-way connector
X9	Front wiring - 5-way connector
X10	General line interface - 31-way connector
X12	General cab line interface - 5-way connector
X14	Anti-theft device - 11-way connector
X15.1	Start connector
X15.2	Start connector
X17	Seat option
X21	10-way diagnostic connector
X23	2-way connector
X24	Accelerator knob - 6-way connector
X25	Foot accelerator
X26	Loader attachment sensor - 3-way connector
X27	Number plate light - 2-way connector
X28	Rear left light - 4-way connector
X29	Rear right light - 4-way connector
X30	Speed control solenoid valve - 2-way connector
X32	Horn - 2-way connector
X34	Ride control - 2-way connector
X35	Hand hammer button - 2-way connector
X36	Rear hammer button - 2-way connector
X37	Rear right light - 4-way connector
X38	Rear right light - 4-way connector
X39	Rear windshield wiper motor - 4-way connector
X40	Rear right light - 4-way connector
X41	Blower motor - 2-way connector
X42	Right direction indicator - 4-way connector

NAME	DESCRIPTION
X43	Beacon lamp - 4-way connector
X44	Front left light - 4-way connector
X45	Front left light - 4-way connector
X47	Rear left light - 4-way connector
X48	4-way connector
X49	6-way connector
X50	Front right lights - 4-way connector
X51	Front left lights - 4-way connector
X52	Front left direction indicator - 4-way connector
X53	8-way connector
X54	Radio - 8-way connector
X55	2-way connector
X56	2-way connector
X57	2-way connector
X58	Left direction indicator - 4-way connector
X58	Front right light (optional) - 5-way connector
X64	Air conditioning switch - 1-way connector
X67	Alternator - 3-way connector
X69	Air conditioning pressure switch - 2-way connector
X72	From pilot control cable
X80	2-way connector
X81	2-way connector
X83	EGS connector
X84	EGS connector
X85	EGS connector
X87	Left general line interface - 13-way connector
X88	Right side general line interface - 17-way connector
X106	Engine control unit - 89-way connector
X107	Water in fuel sensor - 3-way connector
X110	Air conditioning - 3-way connector
X111	Air conditioning - 9-way connector
X121	7-way connector
X125	12-way connector
X128	Optional
X130	12-way connector
X131	13-way connector
X133	5-way connector
X144	2-way connector
X201.P	Pilot control - 1-way connector
X201.S	Pilot control - 1-way connector

Features adjustable during setup:

- backlighting dimming and contrast control,
- maintenance/service interval customization;
- storage of error codes;
- "grid heater" presence:
it is possible to select or deselect the "grid heater" option;
- low temperature idle speed setting:
when the engine coolant temperature is below 10 °C, the unit will change from a normal low idle to a low temperature idle which can be adjusted between 975 and 1500 rpm. The default setting is 1000 rpm;
- high idle speed setting (2500 rpm maximum).

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7. BATTERY

For the loader backhoe models two different kinds of installation are provided:

- with one battery.
- with two batteries (for cold climates).

7.1 SPECIFICATIONS

Single battery

Voltage: 12 V
Capacity (20 h): 95 Ah
Discharge current: 900 A
Weight with electrolyte: 25 kg (55 lbs)

Double battery

Voltage: 12 V
Capacity (20 h): 60 Ah
Discharge current: 600 A
Weight with electrolyte: 17 kg (37.5 lbs)

7.2 DESCRIPTION AND OPERATION

All models feature one or two 12 V, negative ground, "maintenance free" lead calcium (Pb-Ca) type battery, of six cell construction.

IMPORTANT: "Maintenance Free" means that under normal charging conditions the battery does not lose water from the electrolyte. Conditions that may cause water loss include prolonged charging above 14.4 V where gassing occurs as it approaches full charge. This can be caused by a faulty charging system or boost/recovery charging equipment.

The battery has four major functions:

- To provide a source of current for starting, lighting and instrumentation.
- To help control the voltage in the electrical system.
- To furnish current when the electrical demands exceed the alternator output.
- To support quiescent loads from radio and micro processor memory.

1. LOADER ATTACHMENT CONTROLS

WITH STANDARD LOADER BUCKET

Located on the right of the steering wheel, this nine position lever operates all the loader attachment controls. The speed of movement of each control depends on the angle to which the lever is tilted. In the intermediate position, two movements can be obtained simultaneously.

WITH 4x1 LOADER BUCKET

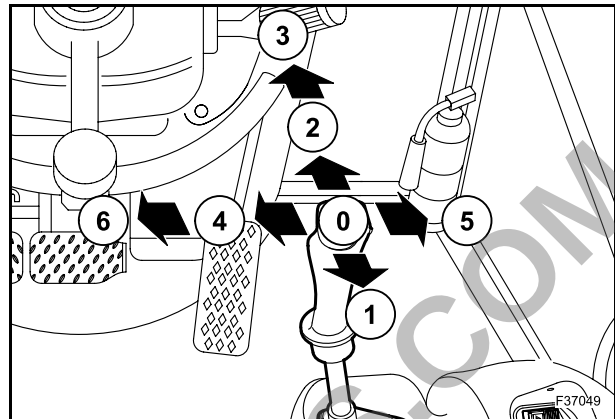
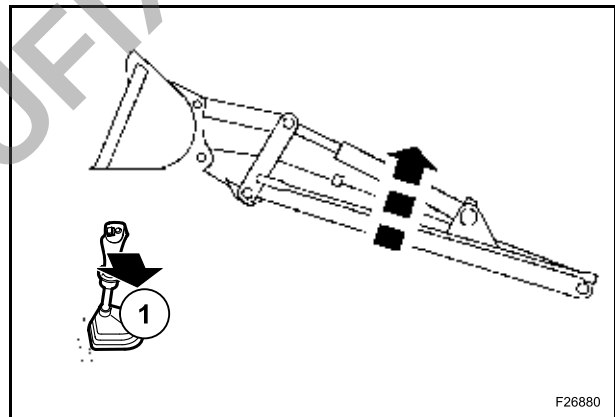
The function of the lever is identical to that of the machine fitted with the standard loader bucket, with the addition of the clam control.

NEUTRAL AND HOLD

With the lever in the neutral/hold position (0), the attachment movement can be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

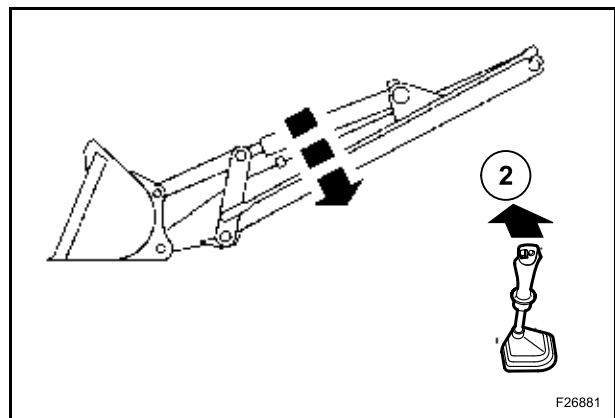
RAISING THE LOADER ATTACHMENT

With the lever in position (1), the attachment rises.



LOWERING THE LOADER ATTACHMENT

With the lever in position (2), the attachment lowers.



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