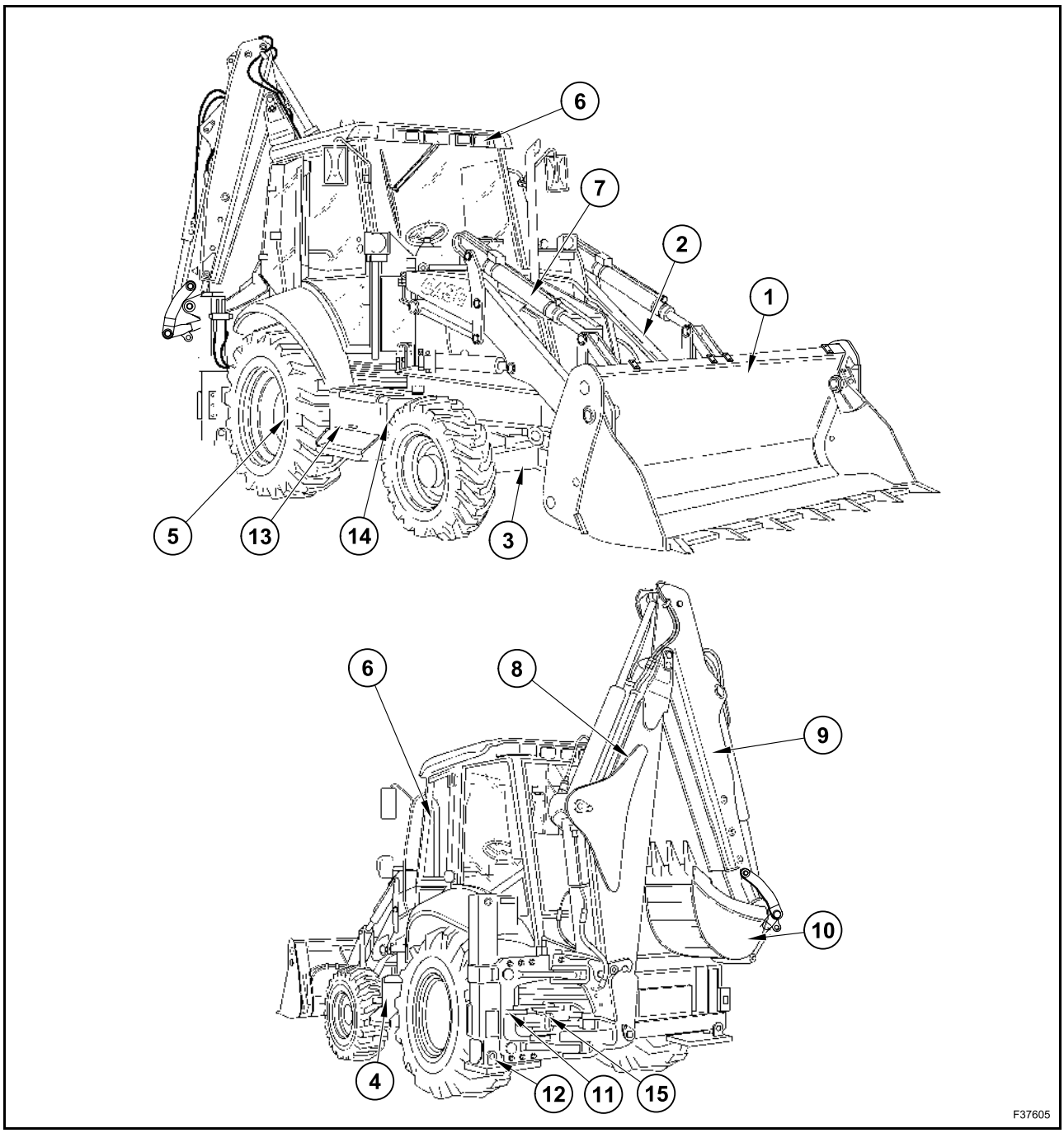
SAFETY PRECAUTIONS

- Carefully follow specified repair and maintenance procedures.
- Do not wear rings, wristwatches, jewels, unbuttoned or flapping clothing such as: ties, torn clothes, scarves, open jackets or shirts with open zips which could get hold into moving parts.
  We advise to use approved safety clothing such as: anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are certified operators to assist in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated.
- Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations should be carried out with the greatest care and attention.
- Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.
- Disconnect the batteries and label all controls to warn that the Machine is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks and accumulator batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- Brakes are inoperative when they are manually released for maintenance purposes. In such cases, the machine should be kept constantly under control using blocks or similar devices.
- The fuel filling gun should remain always in contact with the filler neck.
  Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity buildup.
- Use exclusively specified towing points for towing the machine. Connect parts carefully. Ensure that foreseen pins and/or locks are steadily fixed before applying traction.
  Do not stop near towing bars, cables or chains working under load.
- To transfer a failed machine, use a trailer or a low loading platform trolley if available.
- To load and unload the machine from the transportation mean, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the forwarder.
- For electrical heaters, battery-chargers and similar equipment use exclusive auxiliary power supplies with a efficient ground to avoid electrical shock hazard.
- Always use lifting equipment and similar of appropriate capacity to lift or move heavy components.
- Pay special attention to bystanders.
- Never pour gasoline or diesel oil into open, wide and low containers.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Wear protection goggles with side guards when cleaning parts using compressed air.
- Do not exceed a pressure of 2.1 bar, in accordance with local regulations.
- Do not run the engine in a closed building without proper ventilation.
- Do not smoke, use open flames, cause sparks in the nearby area when filling fuel or handling highly flammable liquids.
- Do not use flames as light sources when working on a machine or checking for leaks.
- Move with caution when working under a Machine, and also on or near a Machine. Wear proper safety accessories:
  helmets, goggles and special footwear.
- During checks which should be carried out with the engine running, ask an assistant to sit at the operator's seat and keep the service technician under visual control at any moment. In case of operations outside the workshop, drive the machine to a flat area and block it. If working on an incline cannot be avoided, first block the Machine carefully. Move it to a flat area as soon as possible with a certain extent of safety.
- Ruined or plied cables and chains are unreliable. Do not use them for lifting or trailing. Always handle them wearing gloves of proper thickness.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stop near the fastening point, trailing chains or cables.
- The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.
- Do not pile up grease or oil soaked rags: they constitute a great fire hazard. Always place them into a metal container. Before starting the Machine or its attachments, check, adjust and block the operator's seat. Also ensure that there are no persons within the Machine or attachment operating range.
- Do not keep in your pockets any object which might fall unobserved into the Machine's inner compartments.

2. IDENTIFICATION OF MAIN COMPONENTS

SIDESHIFT VERSION (590SR for example)



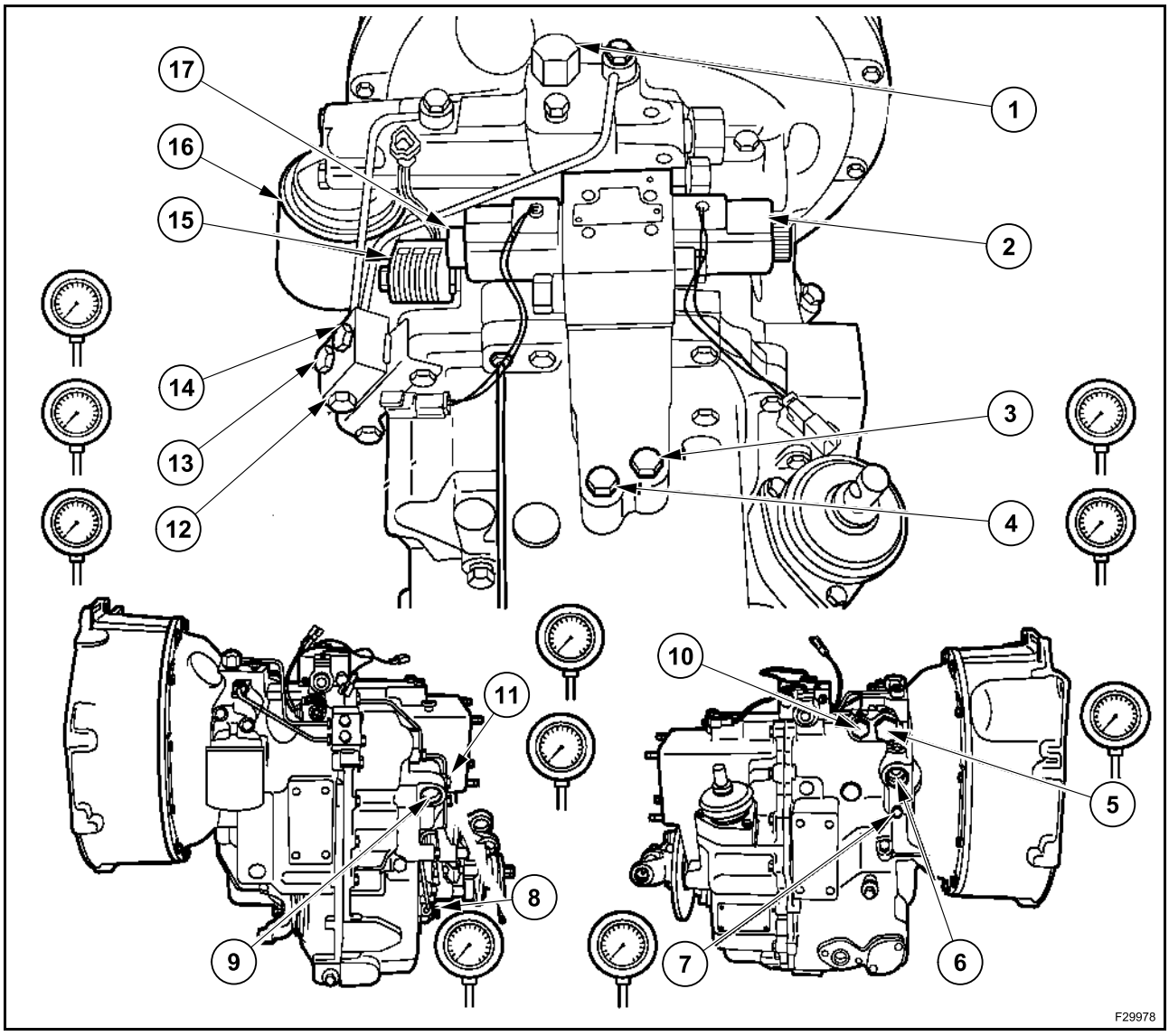
1. Loader bucket
2. Loader arm
3. Front axle
4. Fuel tank
5. Rear axle
6. Operator's compartment
7. Engine guard
8. Backhoe attachment boom
9. Dipper or telescopic dipper
10. Backhoe bucket
11. Backhoe attachment sideshift carriage
12. Stabilizers
13. Battery box
14. Hydraulic oil tank
15. Swing cylinders

TYRES	FRONT	REAR
2WD	11L-16F	18.4-26
4WD	12.5/80-18	18.4-26

Dimensions	2WD with standard bucket	4WD with standard bucket
A	4130 mm	4250 mm
B	3345 mm	3460 mm
C	2550 mm	2685 mm
D	45°	45°
E	45°	45°
F	875 mm	830 mm
G	2950 mm	2950 mm
H	240 mm	120 mm
I	2060 mm	1973 mm
J	2175 mm	2175 mm
K	1325 mm	1325 mm
L	1630 mm	1630 mm
M	5865 mm	5778 mm
N	4000 mm	4000 mm
P	2430 mm	2430 mm
Q	2250 mm	2250 mm
Performance	**2WD**	**4WD**
Lifting capacity at maximum height	3325 kg	3450 kg
Breakout force	6556 daN	6537 daN

LOADER BUCKETS			
Type	**Normal operation**	**4x1**	**6x1 (with forks)**
Heaped capacity	1.00 m^3	1.00 m^3	1.00 m^3
Width	2250 mm	2250 mm	2250 mm
Weight	410 kg	800 kg	960 kg

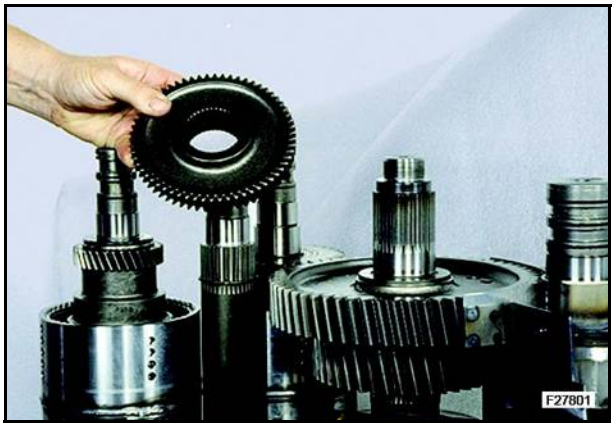
1.6 TRANSMISSION HYDRAULIC VALVES AND PRESSURE TEST POINTS



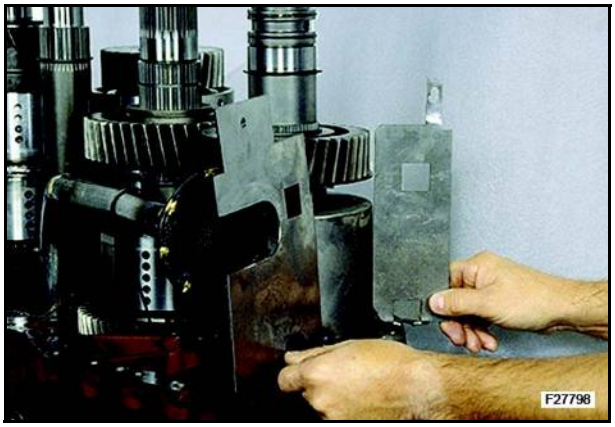
NOTE: all pressure test ports are 9/16 in UNF thread size.

1. **Cold start oil pressure relief valve**
   26 bar reference only
2. **Forward travel solenoid valve**
   13.7-15.2 bar
3. **Test port for reverse clutch pack**
   13.7-15.2 bar
4. **Test port for forward clutch pack**
   13.7-15.2 bar
5. **System pressure sequencing valve**
   13.7-15.2 bar
6. **Oil flow OUT to cooler**
7. **Oil OUT to cooler, test port**
   6.5 bar
8. **Front wheel drive test point**
   13.7-15.2 bar
9. **Oil flow IN from cooler**
10. **Torque converter pressure regulating valve**
    7-11 bar
11. **Oil in from cooler, test port**
    3.5 bar
12. **Backhoe attachment boom lock supply**
    13.7-15.2 bar
13. **System pressure test point**
    13.7-15.2 bar
14. **Converter pressure oil test port**
    7-11 bar
15. **Front wheel drive solenoid**
    13.7-15.2 bar
16. **Oil filter**
17. **Reverse solenoid valve**
    13.7-15.2 bar

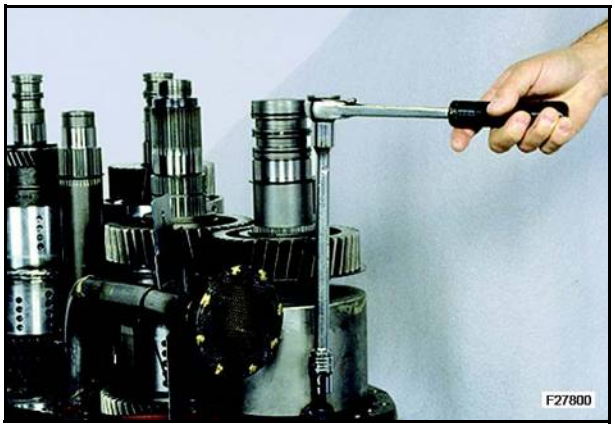
Forward high gear removed.



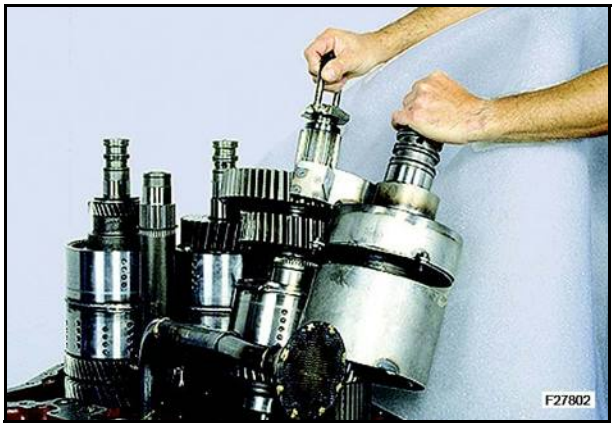
Remove the baffle plate screws, remove the baffle plates.

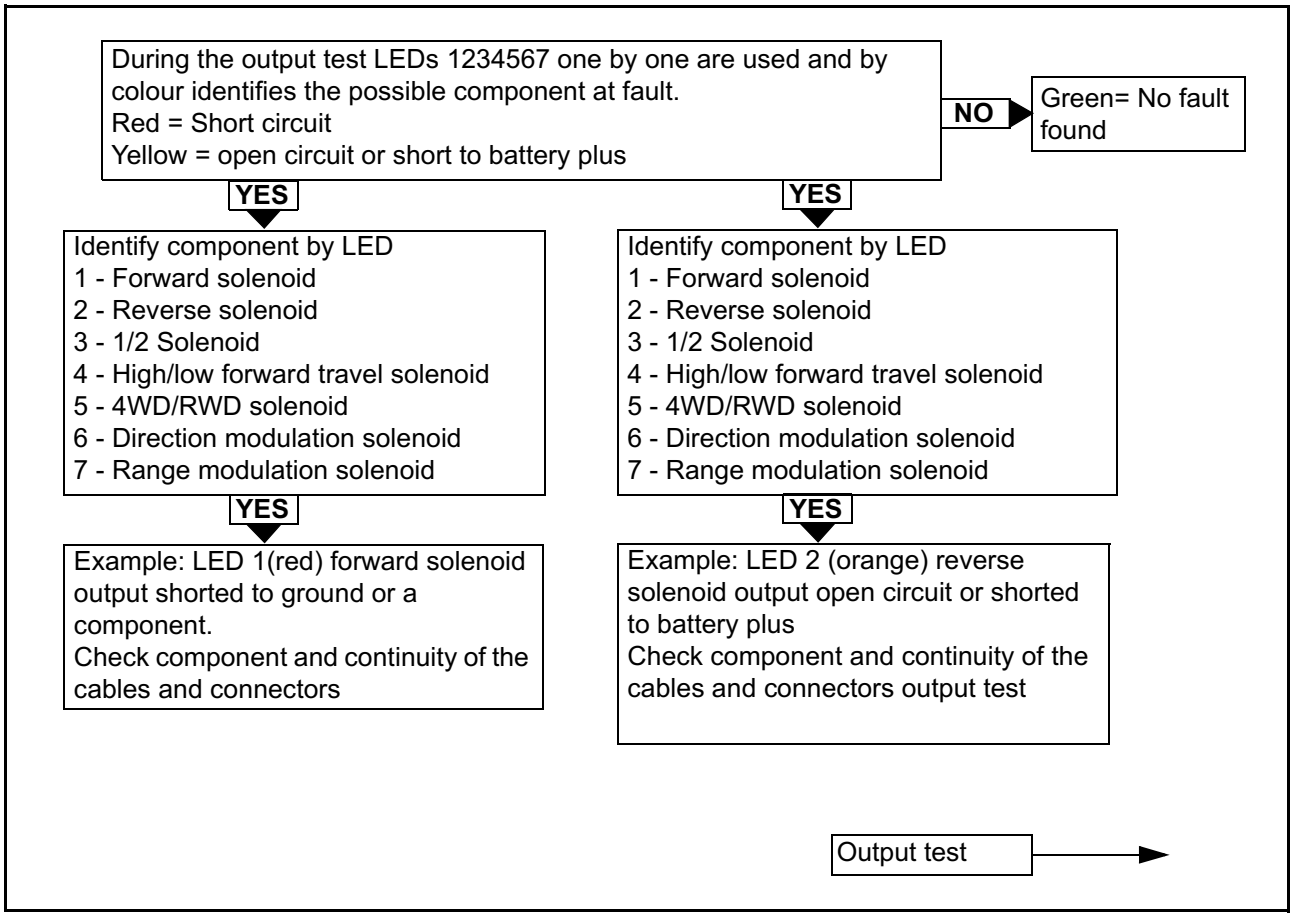


Remove the oil baffle to the converter housing screws, do not remove the oil baffle from the output shaft.

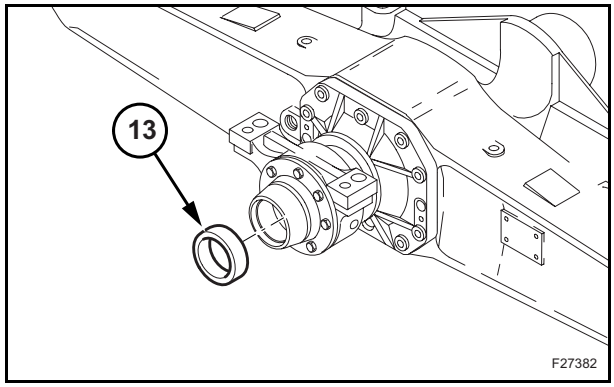


Remove the output shaft, the 2nd shaft and the oil baffle at the same time.

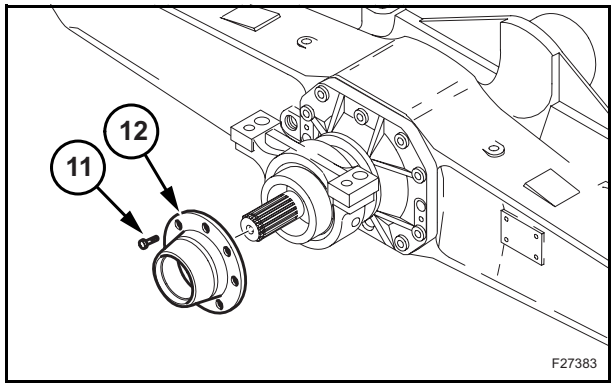



During the output test LEDs 1234567 one by one are used and by colour identifies the possible component at fault.
Red = Short circuit
Yellow = open circuit or short to battery plus
NO
Green= No fault found
YES
YES
Identify component by LED
1 - Forward solenoid
2 - Reverse solenoid
3 - 1/2 Solenoid
4 - High/low forward travel solenoid
5 - 4WD/RWD solenoid
6 - Direction modulation solenoid
7 - Range modulation solenoid
Identify component by LED
1 - Forward solenoid
2 - Reverse solenoid
3 - 1/2 Solenoid
4 - High/low forward travel solenoid
5 - 4WD/RWD solenoid
6 - Direction modulation solenoid
7 - Range modulation solenoid
YES
YES
Example: LED 1(red) forward solenoid output shorted to ground or a component.
Check component and continuity of the cables and connectors
Example: LED 2 (orange) reverse solenoid output open circuit or shorted to battery plus
Check component and continuity of the cables and connectors output test
Output test

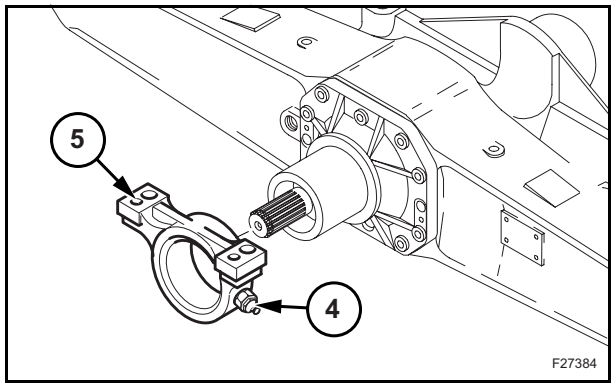
Remove the seal ring (13).



Unscrew the screws (11) and remove the flange (12).

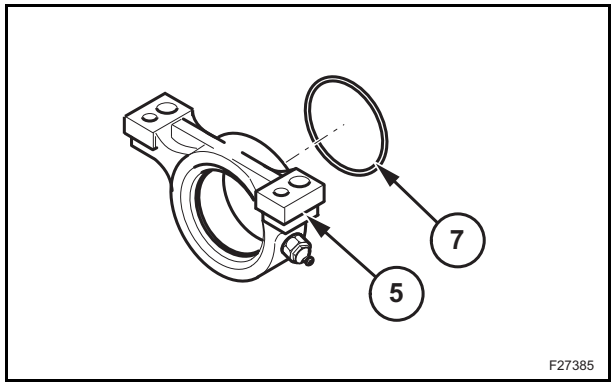


Loosen the bolt (4).
Take the rear support (5) out from the differential support.

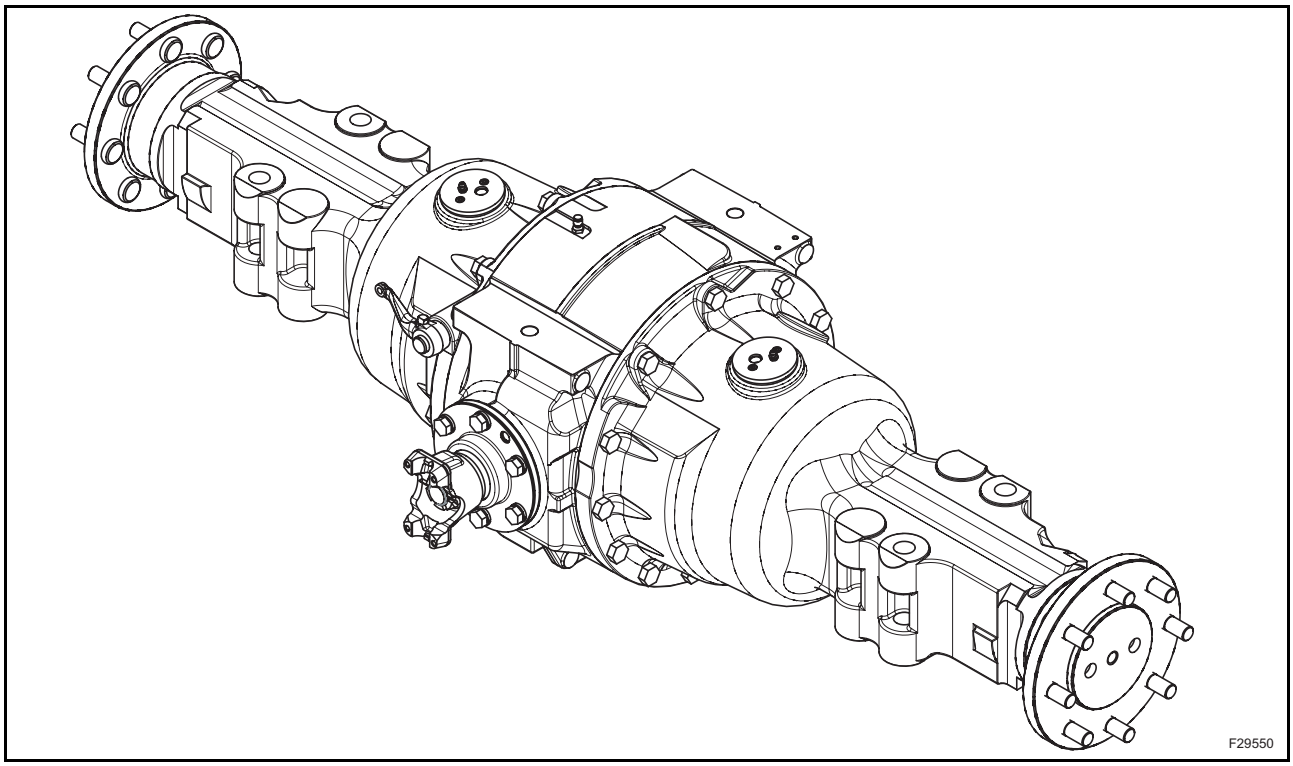


Remove the O-ring (7) from the rear support (5).

NOTE: this is a destructive operation for the O-ring (7).



1.2 SPECIFICATIONS

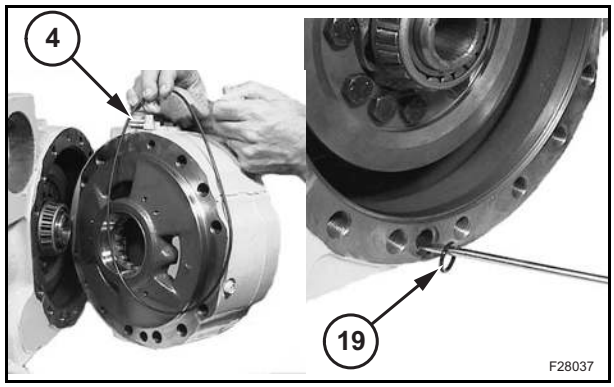


POWERSHIFT	POWERSHUTTLE	RATIO
/	•	4.62:1
•	/	4.11:1

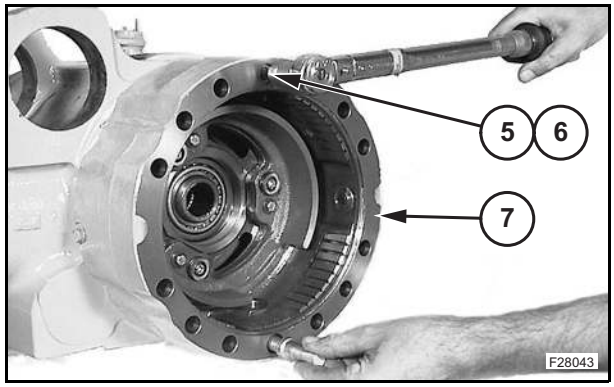
LUBRICATION

Oil capacity: 21.2 litres
Oil specification: Akcela Hy-Tran Ultra MAT3525 + AoA Axle oil additive (0.8 litres)

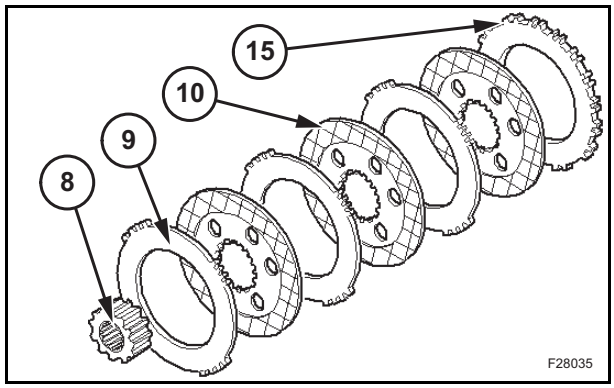
Assemble the new O-rings (4) and (19).



Assemble and tighten the upper screw (5) and the lower screw (6) fastening the brake flange (7) to the specified torque.

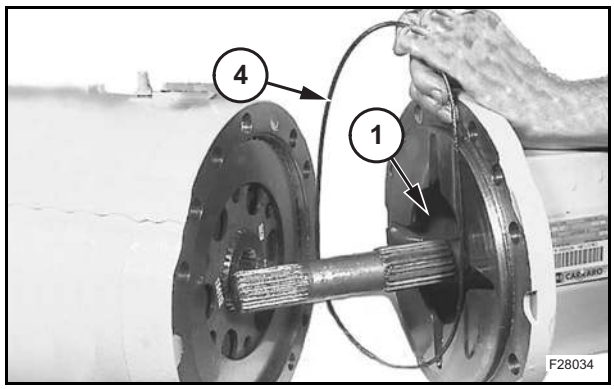


Assemble the brake disks (9), the intermediate brake disks (10), the gear (8) and the brake counter-disc (15).



Assemble the new O-ring (4).
In order to place the axle beam correctly, position the half-beam (1) check the reference marks carried out during disassembly.

NOTE: if new brake pads are installed, before assembling, they should be dipped in the required oil.



Two or more hydraulic circuits operating

When two or more hydraulic systems operate, each system will operate at a different pressure.

If pump flow to a specific system is not controlled, the system requiring a lower operating pressure will work faster than the system requiring a higher pressure, because the flow will have to overcome less resistance.

To prevent this situation, the pressure compensating valve regulates the oil flow directed to the system operating at a lower load.

When two spools are operated simultaneously pump pressure is applied to the metering element of the pressure compensating valve in both valve sections.

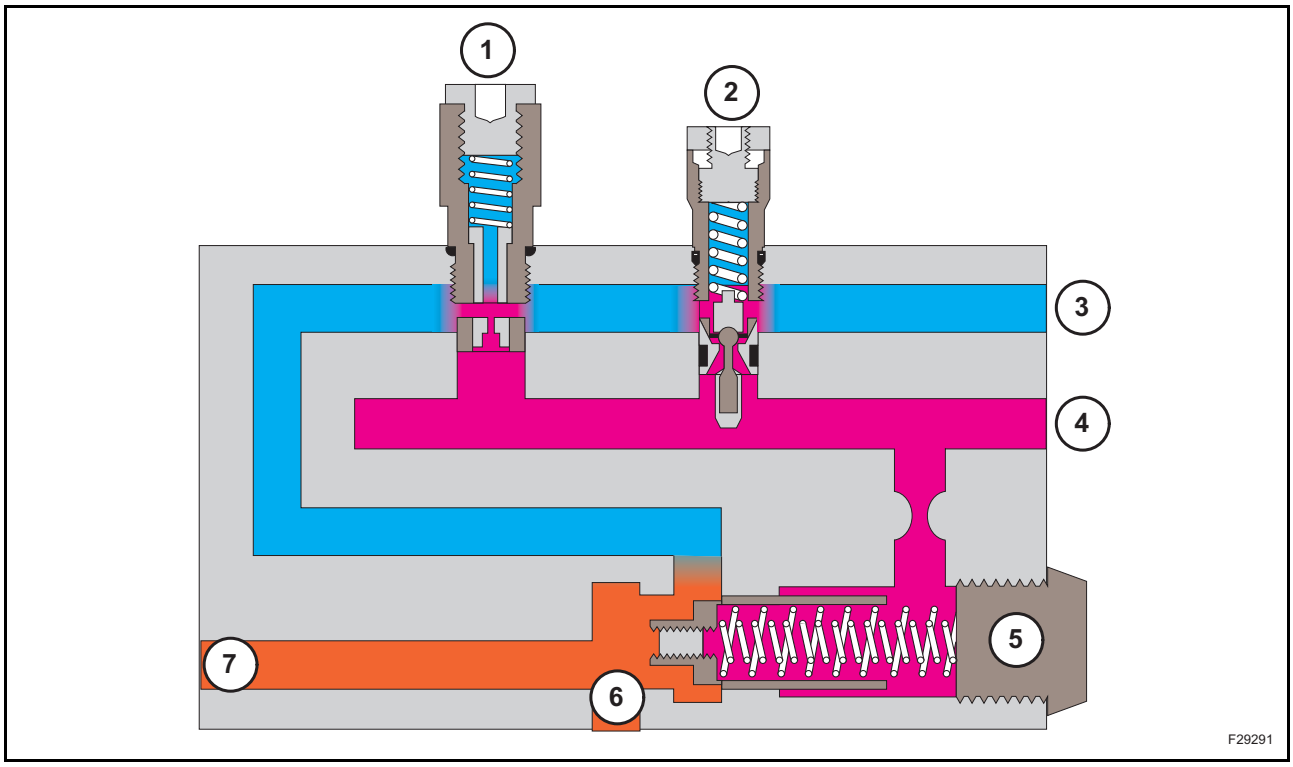
Both metering elements therefore move upwards allowing oil to flow to the load check valves. At the same time the aperture in the spool portion of the pressure compensating valve is uncovered to allow operating pressure to be sensed in the load sensing gallery.

Pump pressure will rise until it exceeds the pressure of the check valve of the system operating at the heaviest load and the pressure in the load sensing line has a value similar to that of the high pressure.

The pressure required to operate the system with a lower load is now too high and, if not limited, it will result in this system operating instead of and faster than the system with a higher load.

To compensate for this condition, the load sensing pressure moves the metering element of the pressure compensating valve in the system with a lower load downwards and restricts the flow to the system.

This balancing of flow and pressure according to the load ensures that both systems operate simultaneously and at a balanced flow rate.

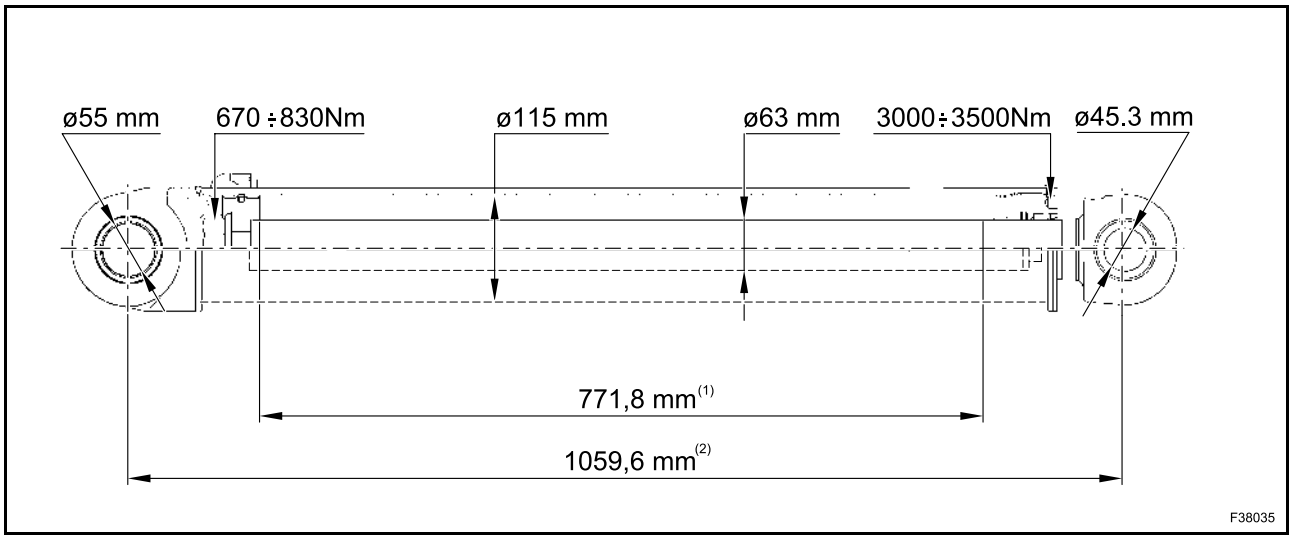


Load sense relief valve operating

Pump pressure at 210 bar
Load sense pressure at 195 bar
Return to oil tank

1. Load sense bleed orifice 1 l/min
2. Load sense limiter (system relief valve)
3. Return to oil tank
4. Load sense line
5. Pump flow balancer (unload) valve
6. Pump flow IN
7. To backhoe control valves

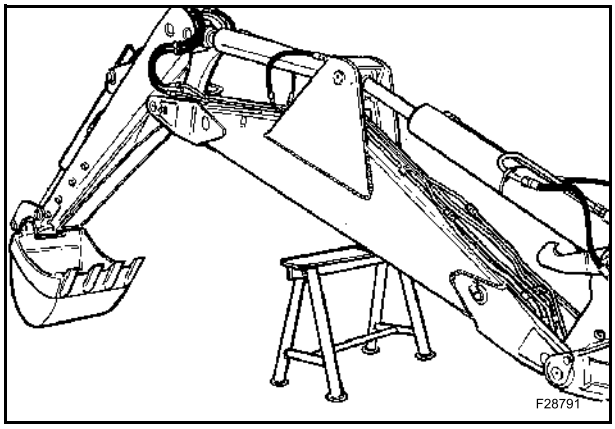
5.5 BACKHOE ATTACHMENT DIPPER CYLINDER



(1) Stroke
(2) Completely retracted

CYLINDER REMOVAL

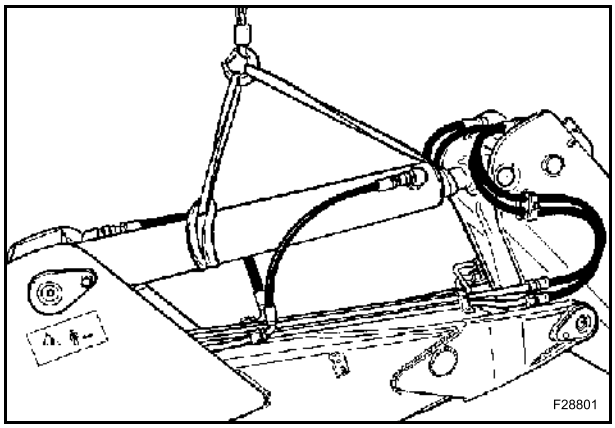
Park the machine on a flat surface and position the backhoe on the ground. Support the backhoe elements for cylinder removal using a suitable stand.



⚠ WARNING
Always support the structural members so that they will be stable and safe to work around.

Stop the engine and move the backhoe attachment control levers through all operating positions to relieve any residual pressures in the system.

Position a sling or other suitable lifting equipment around the cylinder.



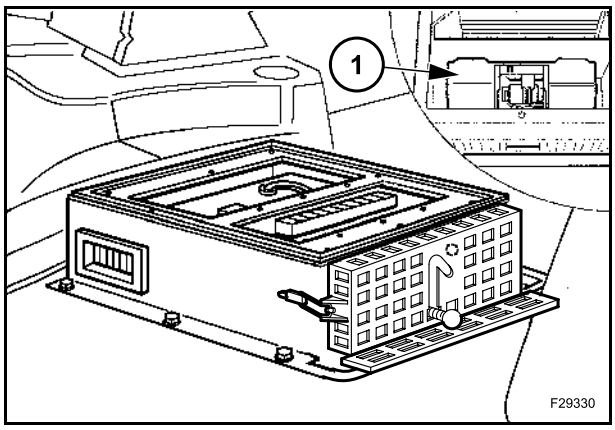
HYDRAULIC PUMP

PROBLEM	CAUSE	CORRECTION
System noisy	Worn or damaged pump gears or pressure plates	Make a hydraulic pump performance test.
	Aeration: air entering the systems at: suction tube, pump shaft, fittings or cylinder ring nuts	Make a hydraulic pump performance test.
	Cavitation: restrictions in the system at the suction line or at the suction screen in the tank	Make a visual check and/or a hydraulic pump performance test.
	Water in the system	Visual check.
	Vibrations in the lines	Check system relief valve, adjust/ overhaul as necessary.
	Cold hydraulic oil	Visual check.
	Wrong type oil being used	Check the hydraulic oil operating temperature. Investigate/drain and top up.
Hydraulic oil drain through tank breather	Tank overfilled	Check the hydraulic oil level.
	Aeration: air entering the system at: suction tube, pump shaft, fittings or cylinder ring nuts	Make a hydraulic pump performance test.
	Cavitation: Restriction of the suction filter in the tank	Make a visual check and/or a hydraulic pump performance test.
Oil heating	Oil supply low	Fill the tank.
	Contaminated oil	Drain the tank and refill with clean oil.
	Setting of relief valve too high or too low	Drain the tank and refill with clean oil. Test relief valves.
	Oil in system too light	Drain the tank and refill with oil with the correct viscosity.
	Oil cooler fins blocked	Clean the oil cooler.
Shaft seal oil leakage	Worn shaft seal	Replace shaft seal and inspect pump.
Foaming oil	Low oil level	Fill the tank.
	Air in the suction system	Check/tighten suction line.
	Wrong oil type	Drain and refill with correct oil.

Blower motor

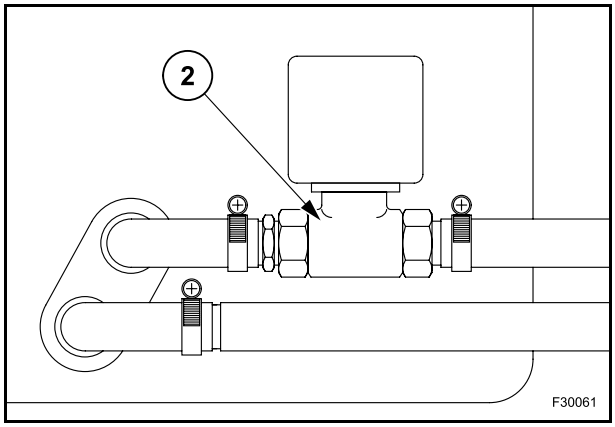
The blower motor (1) can be removed by removal of the attaching hardware and disconnection of the wiring connector.

Check the blower is working, if not check fuse and continuity of blower motor. If defective replace the blower unit as an assembly.



Heater control valve

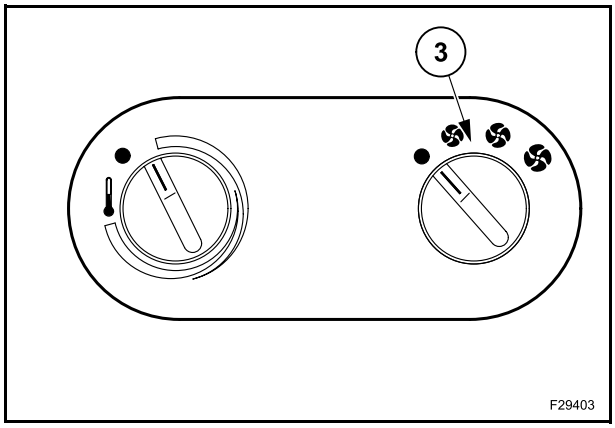
To service the control valve (2) disconnect the hoses and the control cable and remove. Check the operation of the valve and if tight or worn replace.



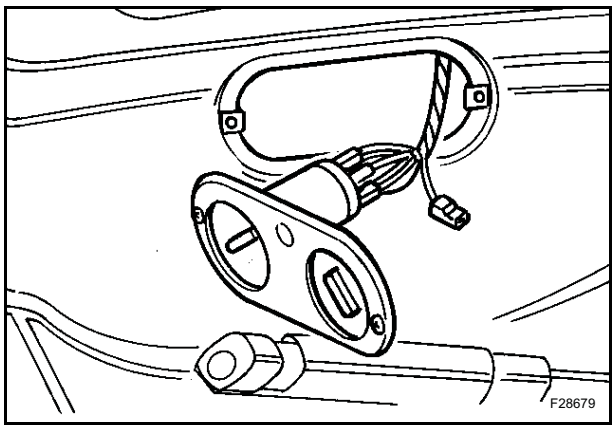
Heater control panel

The blower motor is operated by a 3 position switch (3) which through a variable potentiometer increases or decreases voltage to the blower motor.

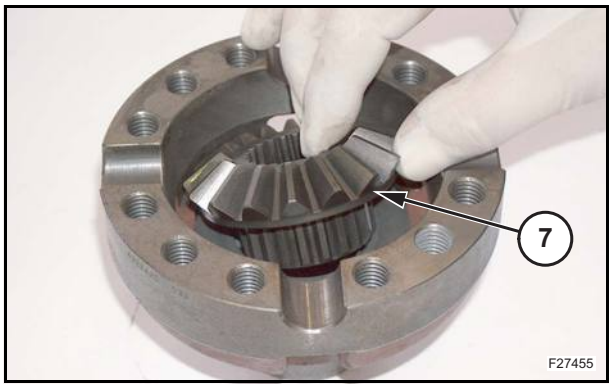
The heater valve is operated by a control cable which will push or pull the valve into an open or closed position.



Both of the above are mounted to the right of the driver's seat and can be accessed by removal of the control panel for repair or replacement.

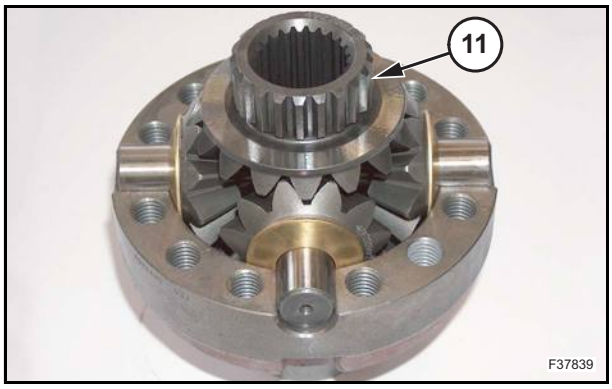


Assemble the gear (7).

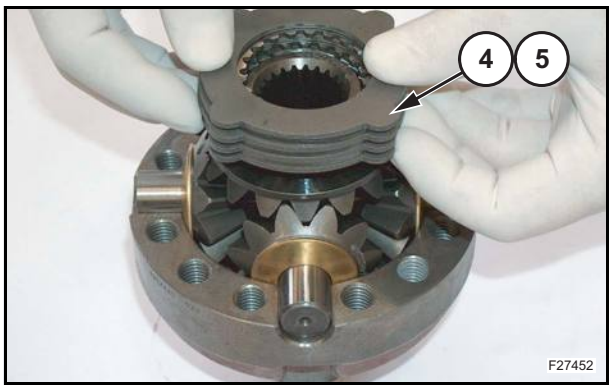


Position the shaft (10), the gears (8) and the spherical washers (9).

Assemble the gear (11).



Assemble discs (4) and (5).



PILOT SCHEMATIC