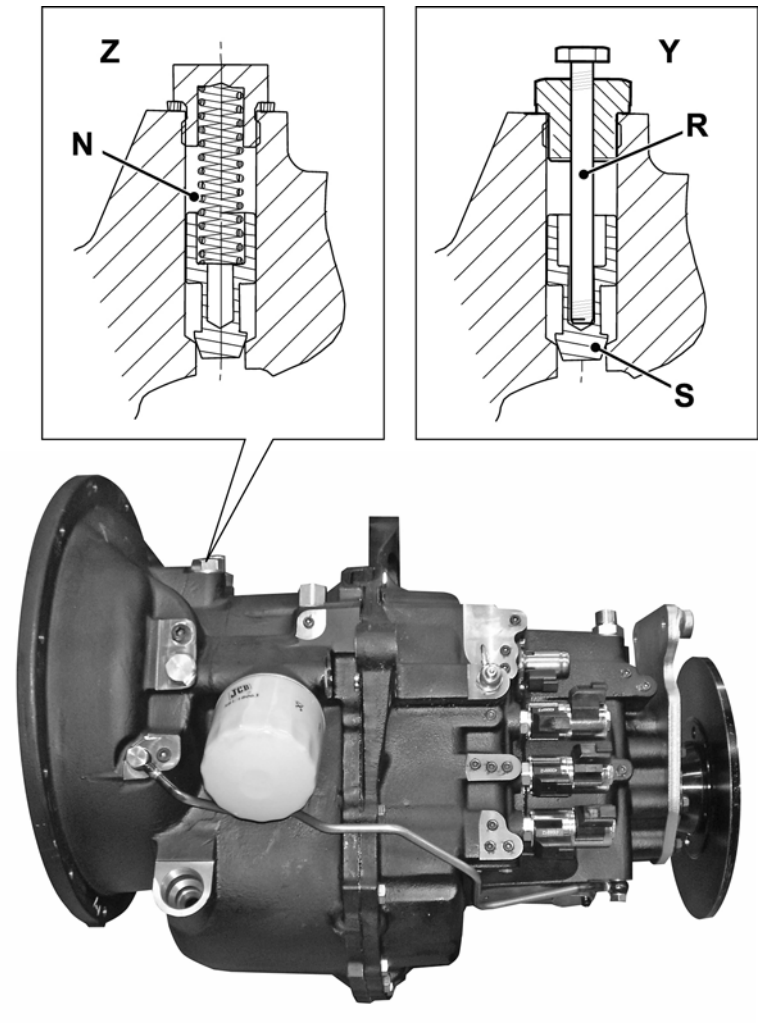


C089390

Fig 17. Bypassing the Converter Relief Valve

Converter Out Pressure and Oil Cooler Flow Rate

⇒ *Fig 18. (F5-43)*

Note that the converter out pressure and oil cooler flow rate are affected by the torque converter relief valve operation. Before carrying out tests check the operation of the relief valve. ⇒ *Converter Relief (Safety Valve) Pressure (F5-38)*

1 Stop engine, connect a 0-20 bar (0-300 lbf/in^2) pressure gauge and flowmeter into the converter out line as shown at **C** and **K** respectively.

Note: *The flow meter may cause back pressure. If the torque converter relief valve is not by-passed, it may open and cause false readings.*

2 Run the engine at 1000 rev/min with transmission in neutral. The pressure gauge indicates the **Converter Out Pressure** and the flowmeter indicates the **Oil Cooler Flow Rate**. Make sure that the readings are correct. ⇒ *Specifications (F5-3)*

A high pressure together with low flow could be caused by a blocked oil cooler. Low pressure could be caused by a faulty pump or internal leakage.

3 Repeat step 2, with engine running at 2000 rev/min note gauge readings. ⇒ *Specifications (F5-3)*

4 Stop engine, remove test gauges and refit hoses to original position. Remember to remove the torque converter relief valve by-pass assembly and refit the relief valve, (ball, spring and cover/plug).

Lubrication Pressure

⇒ *Fig 18. (F5-43)*

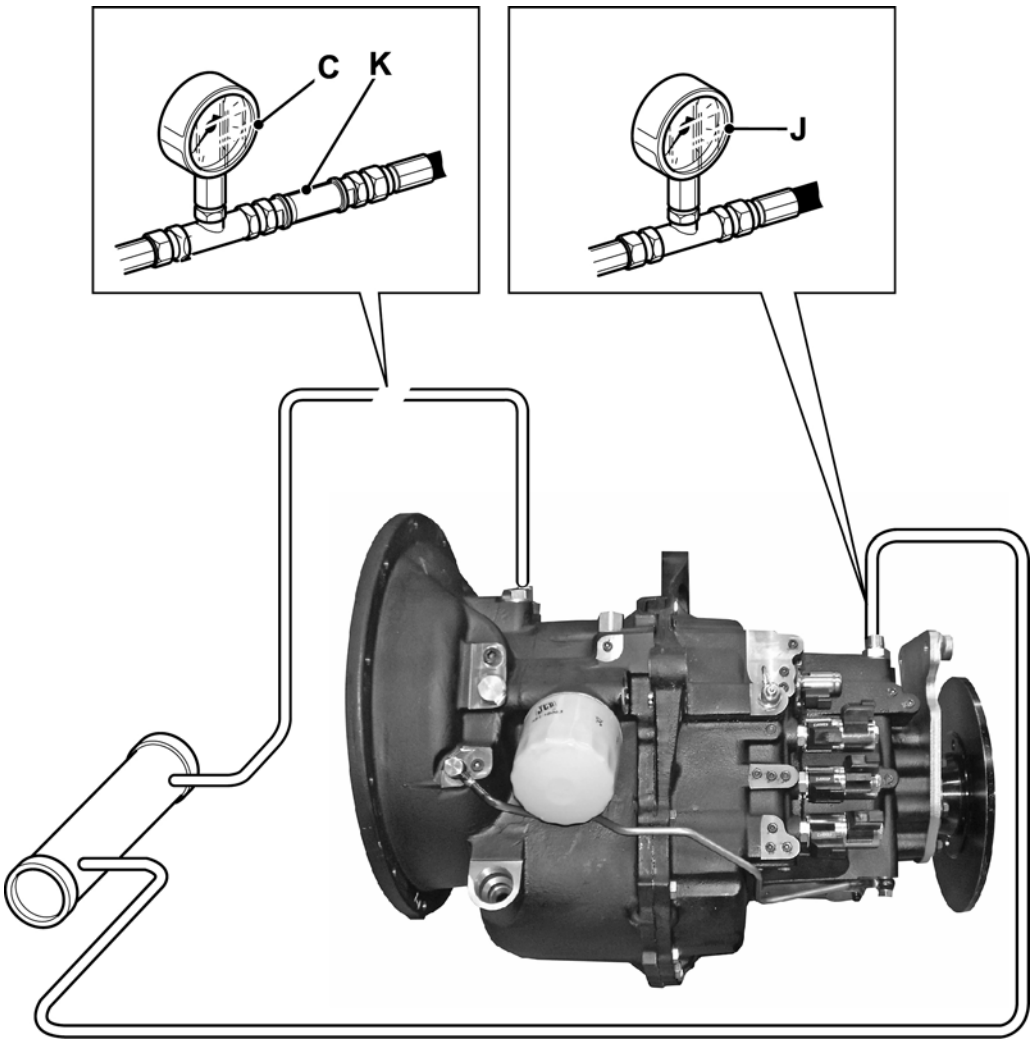
Note that the lubrication pressure is affected by the torque converter relief valve operation and back pressure in the oil cooler circuit. Before carrying out tests check the operation of the relief valve. ⇒ *Converter Relief (Safety Valve) Pressure (F5-38)*

1 Stop engine, connect a suitable pressure gauge into the return line from the oil cooler to the transmission as shown at **J**.

2 Start the engine and run at 1000 rev/min. With the transmission in neutral the pressure gauge will indicate the **Lubrication Pressure** which should be correct. ⇒ *Specifications (F5-3)*

3 Repeat step 2 and note gauge readings with engine running at 2000 rev/min. If the pressure is high the oil cooler may be blocked. ⇒ *Converter Out Pressure and Oil Cooler Flow Rate (F5-42)*

4 Stop engine and remove pressure gauge.



C089400

Fig 18. Converter Out, Lubrication Pressure Tests

Isolating a Suspect Clutch

⇨ *Fig 14. (F5-35)*

1 Stop engine, connect a 0-20 bar (0-300 lbf/in²) pressure gauge to test connector **A** (mainline pressure test point).

2 Make sure that both sides of all four wheels are chocked. Apply the footbrake and parking brake.

Note: *When fully engaged, the parking brake electrically disconnects the transmission drive; this prevents the machine from being driven with the parkbrake on. Therefore, so that we can complete the test, move the parkbrake lever fractionally forward until the warning light is just extinguished; hold the lever in this position for the duration of the test. DO NOT move the lever too far forward, otherwise the parkbrake will not be fully operational. Alternatively, disconnect the switch at the park brake.*

3 Start engine and run at 1000 rev/min, engage 1st gear forward. Record the pressure reading. Repeat the test for all gears in forward drive and record the pressure readings as shown in the following example:

Gear Select	Ratio Clutch	Mainshaft or Layshaft Clutch	bar	lbf/in²
1st	Forward Low	Layshaft	9.65	140
2nd	Forward High	Layshaft	8.62	125
3rd	Forward Low	Mainshaft	9.65	140
4th	Forward High	Mainshaft	8.62	125

Readings should not vary between clutches by more than 0.7 bar (10 lbf/in²). In the example shown, we can see that pressure is low when 2nd and 4th gear forward is selected, indicating clutch leakage.

From the table we can see that the forward high clutch is used for selection of both 2nd and 4th gear forward. We know from the table that the mainshaft and layshaft clutches are working normally (1st and 3rd gear selection show normal operating pressure). So we can assume that the forward high clutch is leaking.

Note: *If necessary, repeat above test using reverse clutch ratios.*

By carrying out `Individual Clutch Leakage Tests', we can confirm that the forward high clutch is leaking.
⇨ *Individual Clutch Leakage Test (F5-45)*

Individual Clutch Leakage Test

In the following procedures the forward high clutch is tested, therefore in step 2 a pressure gauge is connected to the forward high clutch test point.

When testing other suspect clutches connect a gauge to the relevant suspect clutch test point. ⇨ ***Pressure Test Points (F5-34)*** Because the forward high clutch is suspect, a gear must be selected that will use the forward high clutch, in this instance 2nd gear forward.

1 Stop engine, connect a 0-20 bar (0-300 lbf/in^2) pressure gauge to test connector **A**, mainline pressure test point.

2 Connect a 0-20 bar (0-300 lbf/in^2) pressure gauge to test connector **D** forward high ratio clutch test point.

3 Remove the electrical connector from the layshaft clutch solenoid **3029**. This will ensure that only the forward high clutch is energised when 2nd gear forward is selected.

4 Make sure that both sides of all four wheels are chocked. Apply the footbrake and parking brake.

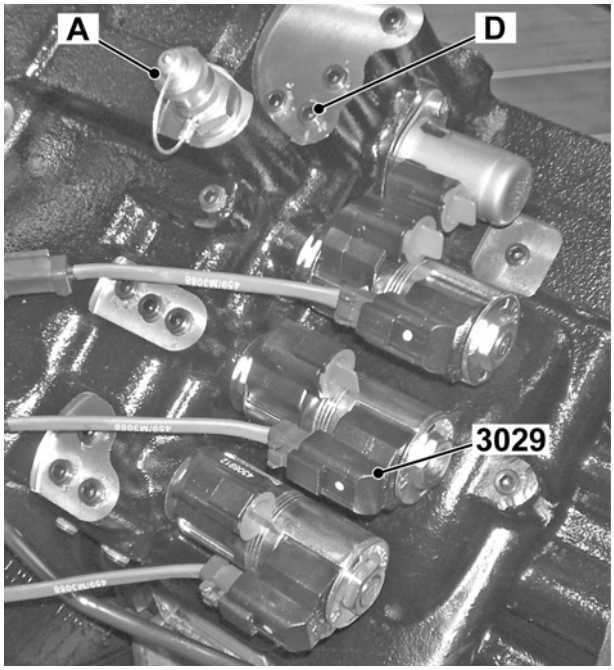
Note: *When fully engaged, the parking brake electrically disconnects the transmission drive; this prevents the machine from being driven with the parkbrake on. Therefore, so that we can complete the test, move the parkbrake lever fractionally forward until the warning light is just extinguished; hold the lever in this position for the duration of the test. DO NOT move the lever too far forward, otherwise the parkbrake will not be fully operational. Alternatively, disconnect the switch at the park brake.*

5 Start engine and run at 1000 rev/min, select 2nd gear forward. Note the pressure readings on both gauges, which should not vary by more than 0.7 bar (10 lbf/in^2) If the difference on the gauges is greater than 0.7 bar (10 lbf/in^2) do the following:

a Stop the engine and interchange the gauges.

b Start the engine and run at 1000 rev/min, select 2nd gear forward. If the difference on the gauges is still greater than 0.7 bar (10 lbf/in^2) dismantle the forward high clutch for servicing.

c If after interchanging the gauges, the readings are different than at step 5, have the gauges calibrated and repeat the testing procedure.



C089760-C1

Fig 19.

Flushing the Transmission Oil

If the transmission oil has been contaminated with water or incorrect oil types, the transmission must be flushed to effectively remove the contaminated oil.

Flush the transmission as described below:

1 Park the machine and make it safe. Obey the care and safety procedures. ⇨ *Related Topics (F5-2)*

2 Drain the oil from the powershift gearbox. Remove the suction strainer, refer to routine maintenance. ⇨ *Related Topics (F5-2)*

3 Clean the suction strainer with a suitable solvent. Follow the solvent manufacturer's instructions on safety.

4 Refit the suction strainer.

5 Renew the oil filter, refer to routine maintenance. ⇨ *Related Topics (F5-2)* Note that the filter is remotely mounted on some machines.

6 Drain the oil from the bevel gearbox, refer to routine maintenance. ⇨ *Related Topics (F5-2)*

7 Fill the transmission with fresh JCB Special Transmission Fluid. Check the oil level, refer to routine maintenance. ⇨ *Related Topics (F5-2)* Ensure that the filling procedure is strictly adhered to.

Important: *When filling the transmission with oil it should be noted that the bevel gearbox housing will* ***NOT*** *be filled with oil until the engine is started. For this reason the powershift gearbox must be filled to the `dry' capacity if the bevel gearbox has been removed or the oil drained. For the correct quantity of oil, see Section 3* ***Lubricants and Capacities****.* ⇨ *Related Topics (F5-2)*

8 Start the engine and run the machine until the normal operating temperature is reached (between 50 - 100 °C).

9 Stall the torque converter for 5 seconds. ⇨ *Torque Converter Stall Test (F5-32)*

DO NOT stall the torque converter for longer than 10 seconds or the transmission oil will overheat.

10 Continue running the engine under normal conditions for 5 minutes then repeat step 8. Continue this procedure for 30 minutes, if possible during machine operation.

11 Allow the machine to cool then drain the transmission oil through the suction strainer aperture.

12 Test the oil for contamination. If the oil is still contaminated, repeat the flushing procedure from step 2.

13 If the oil is clean, refit the suction strainer, fit a new oil filter and refill the transmission with fresh JCB Special Transmission Fluid. Check the oil level, refer to routine maintenance. ⇨ *Related Topics (F5-2)*

PS764 Gearbox SYSTEM

Introduction

This topic contains information about a machine SYSTEM. The system has some devices that connect either mechanically, hydraulically or electrically. Make sure you are referring to the correct system. Refer to the applications table.

Descriptions and procedures relate to the system and not the individual devices. For information about the devices refer to the relevant topics.

This topic is intended to help you understand what the system does and how it works. Where applicable it also includes fault finding, test and service procedures.

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
1	***Service Tools***	ALL
1	***Stall Speed Combinations***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Fluids Lubricants and Capacities***	ALL
3	***Transmission***	***Changing the Transmission Oil and Filter*** ***Checking the Oil Level***
C	***Fuses and Relays***	ALL
C	***Electrical Harness SYSTEM***	ALL
F	***⇨ PS760 Gearbox (F8-1)***	ALL
F	***⇨ Transmission Oil Cooler - Liquid to Liquid (F12-1)***	***⇨ Removal, Testing and Replacement (F12-3)***
K	***Engine***	***Removal and Replacement***

(1) You must obey all of the relevant care and safety procedures.

Table 2. Service Tools

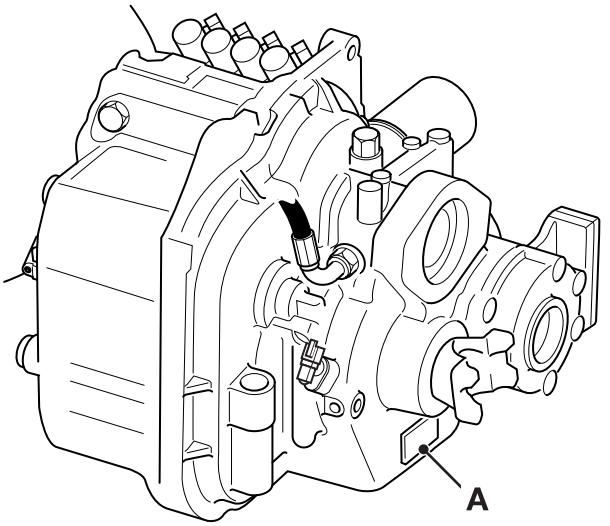
The table lists the service tools you will need to do some of the procedures in this topic. Make sure you have the correct service tools BEFORE you start the procedures	
Tool Part Number	**Description**
460/15708(1)	Flow Test Adaptor
892/00229(1)	Flow Meter
892/00253(1)	Hydraulic Pressure Test Kit and Relevant Adaptors
892/00270(1)	Load Valve
998/10650	Pressure gauge kit

(1) Tool available from JCB Service, refer to Section 1 - Service Tools

Specifications

When ordering replacement parts, always quote the details on the unit identification plate. In the case of gear replacements, always check the part number stamped on the gear, and the number of teeth.

The gearbox serial number is stamped on the unit identification plate **1-A** as shown.



A401030-C2

Fig 1.

Designation;
PS764 (4 wheel drive) - Integral brake

Table 3. Gearbox

Description	Full electro-hydraulic transmission unit with input, reverse, layshaft, mainshaft, and 4 wheel drive clutch packs giving 4 forward and 4 reverse speeds. Electrically (relay) controlled gear selection. Integral wet multi-plate park brake.			
Weight (dry)	4WD	242 kg (533 lb)		
Gear Ratios		Forward		
	1st	6.17:1		
	2nd	3.32:1		
	3rd	1.86:1		
	4th	1.00:1		
Converter Pressures (in neutral)		bar	kgf/cm^2	lbf/in^2
Converter In at 50 ^0C	1000 rev/min	1.4 - 2.2	1.4 - 2.2	20.3 - 31.9
	2000 rev/min	5.8 - 6.9	5.9 - 7.0	84.1 - 100.0
Converter In at 100 ^0C	1000 rev/min	0.5 - 1.3	0.5 - 1.3	7.2 - 18.9
	2000 rev/min	2.5 - 3.5	2.5 - 3.7	36.2 - 50.8
Converter Out at 50 ^0C	1000 rev/min	0.6 - 1.6	0.6 - 1.6	8.7 - 23.2
	2000 rev/min	2.8 - 3.8	2.9 - 3.9	40.6 - 55.1
Converter Out at 100 ^0C	1000 rev/min	0.2 - 1.0	0.2 - 1.0	2.9 - 14.5
	2000 rev/min	1.0 - 1.9	1.0 - 1.9	14.5 - 27.6
Converter Inlet Relief Pressure (max.)		7.1	7.2	103.0
Lubrication Pressure (in neutral)				
Oil at 50 ^0C	1000 rev/min	0.2 - 0.9	0.2 - 0.9	2.9 - 13.1
	2000 rev/min	1.1 - 2.1	1.1 - 2.1	16.0 - 30.5
Oil at 100 ^0C	1000 rev/min	0.1 - 0.4	0.1 - 0.4	1.5 - 5.8
	2000 rev/min	0.4 - 1.4	0.4 - 1.4	5.8 - 20.3

Main Line Pressure (in neutral)				
Oil at 50 ^{0}C	1000 rev/min	11.0 - 13.0	11.2 - 13.3	159.5 - 188.5
	2000 rev/min	13.0 - 15.2	13.3 - 15.5	188.5 - 220.5
Oil at 100 ^{0}C	1000 rev/min	10.2 - 12.2	10.4 - 12.4	147.9 - 176.9
	2000 rev/min	11.4 - 14.5	11.6 - 14.8	165.3 - 210.3
Clutch Pressure	All clutch pressures should be the same as mainline pressure to within 0.7 bar (10 lbf/in^2) [4WD clutch pressure within 1.4 bar (20 lbf/in^2]			
Flow Rates (in neutral)		L/min	US gal/min	UK gal/min
Cooler oil flow at 50 ^{0}C	1000 rev/min	8.5 - 11.0	2.1 - 2.9	1.9 - 2.4
	2000 rev/min	17.0 - 25.1	4.5 - 6.6	3.7 - 5.5
Cooler oil flow at 100 ^{0}C	1000 rev/min	6.2 - 9.5	1.6 - 2.5	1.4 - 2.1
	2000 rev/min	15.0 - 19.5	4.0 - 5.2	3.3 - 4.3
Pump oil flow at 100 ^{0}C	1000 rev/min	11.5 - 15.6	3.0 - 4.1	2.5 - 3.4
	2000 rev/min	24.0 - 33.0	6.3 - 8.7	5.3 - 7.3
Control Solenoid Valves	3 way, 2 position, normally closed, integral suppression diode.			
Initial coil current draw	1.68 amps @ 12 volts & 20 ^{0}C			

Note: *For new gearboxes (i.e. under 100 hours service), or gearboxes that have been fully serviced, the pressures will be slightly higher than those shown (approximately 0.7 - 1.0 bar; 10 - 15 lbf/in^2).*

Table 4. Torque Converter

Torque Converter	
Torque Converter Dia.	310 mm (12.2 in.)
Torque Converter Identification	W300
Torque Multiplication at Stall	2.02:1