SERVICE MANUAL

LOADALL (ROUGH TERRAIN
VARIABLE REACH TRUCK)
506-36, 507-42, 509-42, 510-56, 512-56

EN - 9823/1700 - ISSUE 1 - 07/2018

This manual contains original instructions, verified by the manufacturer (or their authorized representative).

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Foreword

The Operator's Manual

⚠

You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

Contents

01 - Machine

03 - Attachments, Couplings and Load Handling

06 - Body and Framework

09 - Operator Station

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03 - Model and Serial Number

Introduction

This manual provides information for the following model(s) in the JCB machine range:

Model	From:	To:
506-36	1402020	
507-42	1402020	
509-42	1402020	
510-56	1402020	
512-56	1402020	

12 - Mechanical Tow

Health and Safety

⚠ **WARNING** Examine the tow hitch and the trailer draw bar towing ring for signs of wear before each use. A badly installed or worn hitch or towing ring could cause loss of the trailer and injury to yourself or other people.

WARNING Do not exceed the permitted limits on trailer gross weight or hitch load. The machine may become unstable.

WARNING Make sure the trailer hitch has correctly engaged and locked before driving off.

WARNING Make sure you never use this component if any part of it is missing, defective or damaged in any way. Always install a new replacement component

WARNING Make sure you only tow when the hitch and eye are fixed or one fixed and one rotating. If both the hitch and eye are allowed to rotate they will lock up during reverse manoeuvres and both components will be damaged due to reduced lateral articulation.

Preparation

⚠ **WARNING** You will be working close into the machine for these jobs. Lower the attachments. Remove ignition key and disconnect the battery. This will prevent the engine being started.

Make the machine safe before you start a greasing procedure.

You can complete most of the greasing procedures with the boom lowered. If you raise the boom to get access for greasing, you must install the maintenance strut on the boom.

Clean

Keep all intakes and grilles clear from snow, ice and debris.

Debris can collect under the boom. Remove all debris from under the boom.

Thoroughly dry the piston rams and protect them with clean transmission or hydraulic oil if necessary.

Figure 23.

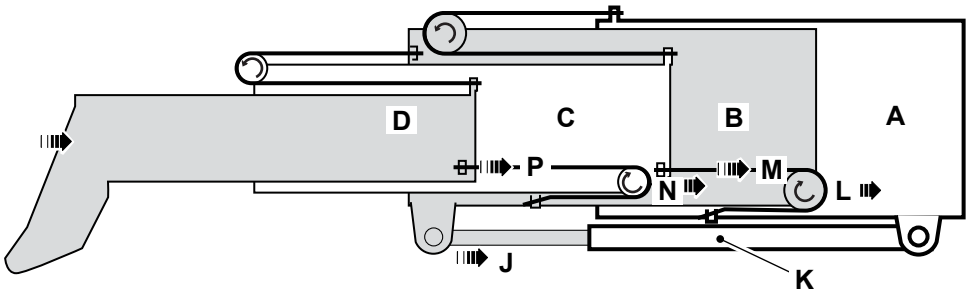


Table 7.

Item	Description
A	Outer lift arm
B	1st intermediate lift arm
C	2nd intermediate lift arm(1)
D	Inner lift arm
J	Piston rod
K	Hydraulic ram
L	Chain roller 3
M	Retraction chain 1
N	Chain roller 4
P	Retraction chain 2

(1) 4 section lift arm only

At the same time the chain roller 4 attached to the 2nd intermediate lift arm section, causes the retraction chain 2 to pull the inner lift arm section inside the 2nd intermediate lift arm section.

Hydraulic hoses and pipes 3 stage (3 section) lift arm

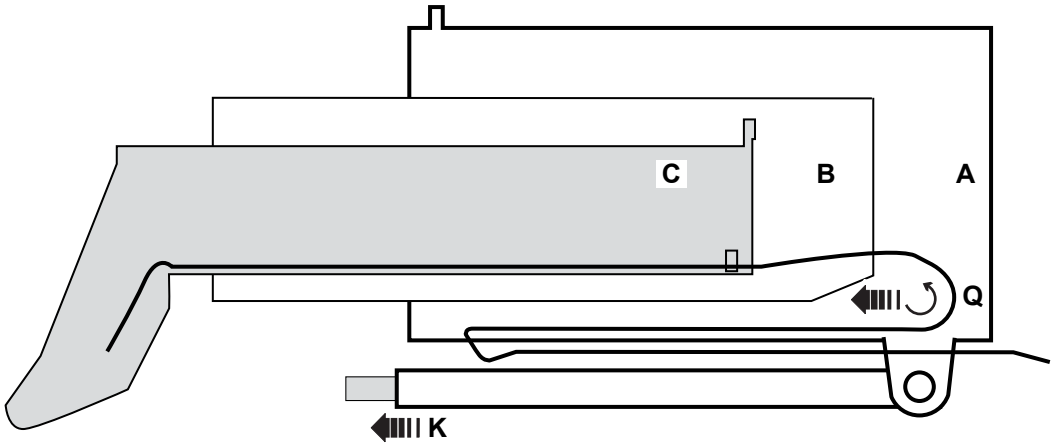
When the lift arm extends and retracts, the hydraulic hoses and pipes connected to the tilt and auxiliary services extend and retract at the same time.

Extend

When the lift arm extends the extend ram pulls the intermediate lift arm out from inside the outer lift arm. At the same time the chain system extends the inner lift arm.

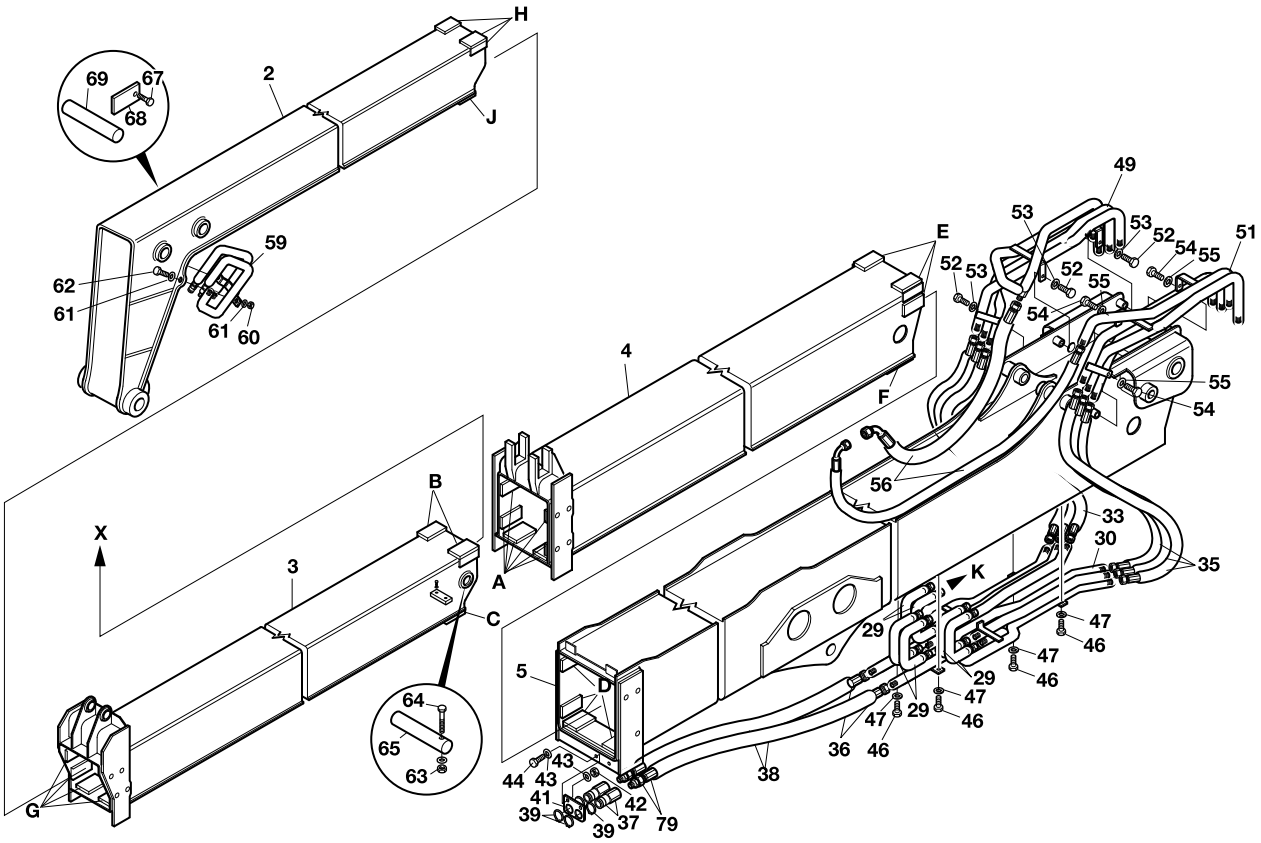
The hydraulic hoses are clamped to the outer lift arm and inner lift arm sections and are pulled out with the lift arm sections.

Figure 24.



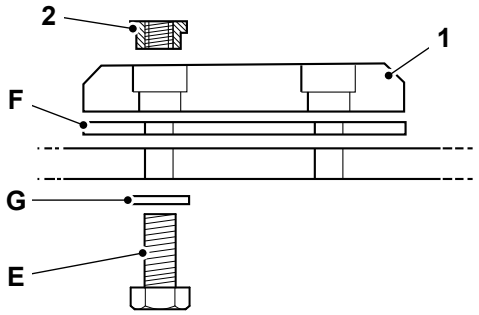
A Outer lift arm
B Intermediate lift arm
C Inner lift arm
K Hydraulic ram
Q Guide roller

Figure 50. 4 Stage Lift Arm (1 of 2)



2 Inner lift arm
3 Second intermediate lift arm
4 First intermediate lift arm
5 Outer lift arm
29 'U' pipes
30 External pipe assembly
32 Pipe clips
33 Right hand external hoses
35 Left hand external hoses
36 Connections 2
37 Connections 3
38 Auxiliary hoses
39 Circlips
40 Auxiliary couplings
41 Bracket
42 Nuts 5
43 Washers 5
44 Bolts 5
46 Bolts 6
47 Washers 6
49 Right hand external pipe assembly
51 Left hand external pipe assembly
52 Bolts 7
53 Washers 7
54 Bolts 8
55 Washers 8
56 Tilt ram hoses
57 Nuts 9
59 Auxiliary pipe assembly
61 Washers 9
62 Bolts 9
63 Nut 10
64 Bolt 10
65 Rear location pin
66 Spacer
67 Bolt 11
68 Plate
69 Front inner ram location pin
A Front wear pads 1
B Top and side wear pads 1
C Bottom wear pads 1
D Front wear pads 2
E Top and side wear pads 2
F Bottom wear pads 2
G Front wear pads 3
H Top and side wear pads 3
J Bottom wear pads 3

Figure 83.



E Wear pad bolt
F Shim
G Washer
1 Wear pad
2 Threaded insert

Side wear pads- Shimming

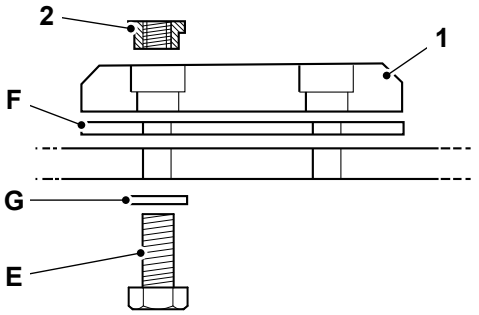
The following procedure applies to both front and rear side wear pads.

1. Measure the distances between the lift arm side faces which must be in the limit given. Refer to Body and Framework- Lift Arm, Technical Data (PIL 06-12).
2. If this dimension is less than the limit, install shims under the side wear pads to restore the dimension.
3. Slacken the side wear pad bolts and install shims as required. Divide number of shims equally each side to ensure that inner lift arm runs centrally within the outer lift arm.
4. Measure the total thickness of shims under each pad.
5. Add or remove the correct number of plain washers under the heads of wear pad bolts. Make sure that the thread engages to the specified depth. Refer to (PIL 06-12-00).

   Length/Dimension/Distance: 8 –12 mm
6. Do not install spring washers.
7. Install the shims again and tighten the bolts to the specified torque value.

   Torque: 98 N·m

Figure 84.



E Wear pad bolt
F Shim
G Washer
1 Wear pad
2 Threaded insert

4 Stage (4 Section) Lift Arm

The shims are installed under the pads for the adjustment of the lift arm clearance. Partly worn pads may be shimmed to restore correct lift arm clearance.

On 4 stage (4 section) machines, shim the 1st intermediate lift arm to the outer lift arm. Repeat the procedure for the 2nd intermediate lift arm to the 1st intermediate lift arm and the inner lift arm to the 2nd intermediate lift arm.

Install new wear pads when the clearances are out of specification. The clearances must be measured, the chamfer is not a guide to the amount of wear remaining.Refer to Figure 85.

Make sure that the threaded insert remains a tight fit in the wear pad and does not rotate when tightened. If the insert is loose in the wear pad, install a new wear pad and threaded insert.

Make sure that the wear pads are fitted in the correct way to prevent fouling.

The wear pad bolts are not all the same. Make sure to use the correct bolts for each wear pad. Refer to Body and framework- lift arm, refer to (PIL 06-12).

The number of washers under the bolt changes depending on the shim thickness. Make sure you fit the correct number of washers for the thickness of shims. Refer to (PIL 06-12).

Do not install spring washers.

Retract Chains Remove And Install- 4 Stage (4 Section) Lift Arm

Remove

1. Raise the lift arm to the horizontal position and fully retract the lift arm. Support the front end of the lift arm.
2. Make the machine safe. Refer to (PIL 01-03).
3. Follow the general safety precautions. Refer to (PIL 01-03).
4. Remove lift arm rear cover.

Inner retract chain

1. Remove the split pin 1 and the adjustment nut 1 from the inner retract chain at the rear of the lift arm.
2. Remove the split pin 2 and the adjustment nut 2 from the inner retract chain anchor at the front of the first intermediate lift arm.
3. Tie strong cord of sufficient length to the front of the retract chain. The cord will be used during installation.
4. Put wire through the hole in the chain adjuster in place of the split pin 2.
5. Attach the cord to the wire. This will allow the cord to pass through the chain adjuster brackets.
6. From the front of the machine pull the chain out of the lift arm. Make sure that the cord is accessible at both ends of the lift arm.
7. Inspect chain components. Refer to (PIL 06-12-66).

Outer retract chain

1. Remove the split pin 3 and the adjustment nut 1 from the outer retract chain at the rear of the lift arm. To get access to the adjustment nut 1 do the following steps:
   1.1. Remove the split pin 1 and the adjustment nut 2.
   1.2. Disconnect the inner retract chain.
   1.3. Remove the chain roller pivot and the roller.
2. Remove the split pin 2 and the adjustment nut 3 from the outer retract chain anchor at the front of the outer lift arm.
3. Tie strong cord of sufficient length to the front of the retract chain. The cord will be used during installation.
4. Put wire through the hole in the chain adjuster in place of the split pin 2.
5. Attach the cord to the wire. This will allow the cord to pass through the chain adjuster brackets.
6. From the rear of the machine pull the chain out of the lift arm. Make sure that the cord is accessible at both ends of the lift arm.
7. Inspect chain components. Refer to (PIL 06-12-66).

Install

1. Keep chains clean. Do not let them drag on the ground.
2. At the rear of the lift arm, attach the chains to the cord used during removal.
3. From the front of the machine use the cords to pull the chains through the lift arm.
4. Do not reuse the nyloc nut type adjusters.

Outer retract chain

1. Fasten the outer retract chain at the front of the outer lift arm.
2. Put new adjustment nuts 3. Do not tighten now.
3. Remove the cord, fasten the outer retract chain at the rear of the lift arm and fit a new adjustment nut 1.
4. Turn the nut to set the chain rear anchor to the specified value. Refer to Table 22.
5. Turn the adjustment nut 3 to set the outer retract chain anchor to the correct initial position.

Inner retract chain

1. If chain roller has been removed, reinstall the roller and its pivot.
2. Fasten the inner retract chain at the inner retract chain anchor at the front of the first intermediate lift arm.
3. Put new adjustment nut 3. Do not tighten now.
4. Remove cord, fasten the inner retract chain at the rear of the lift arm.
5. Put new adjustment nut 2. Do not tighten now.
6. Turn the adjustment nut 3 and the adjustment nut 2 to set the chain to the correct initial position. Refer to Table 22.

Digit 7	Engine Type
S	SF turbocharged and aftercooled 74 kW
R	SE turbocharged and aftercooled 97 kW

Table 29.

Digit 8	Gearbox Model
E	3 Speed (PS750)
F	3 Speed (PS760)
G	4 Speed (PS750)
H	4 Speed (PS760)
J	6 Speed (PS760)
M	4 Speed (SS700)
N	4 Speed (PS750)

Table 30.

Digit 9
Random check letter. The check letter is used to verify the authenticity of a machine's PIN

Table 31.

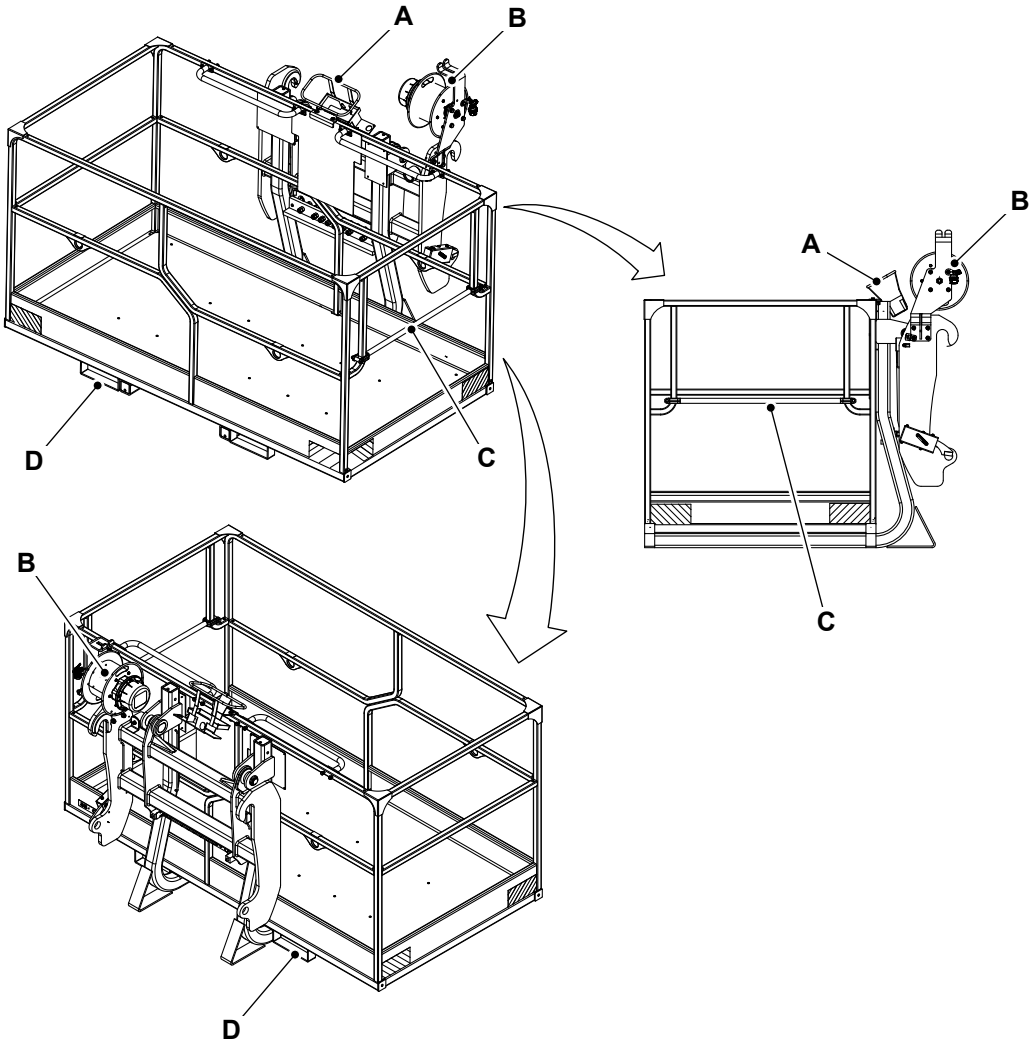
Digit 10	
Year of manufacture.	
7 = 2007	D = 2013
8 = 2008	E = 2014
9 = 2009	F = 2015
A = 2010	G = 2016
B = 2011	H = 2017
C = 2012	

Table 32.

Digit 11 to 17
Machine serial number. Each machine has a unique serial number.

Component Identification

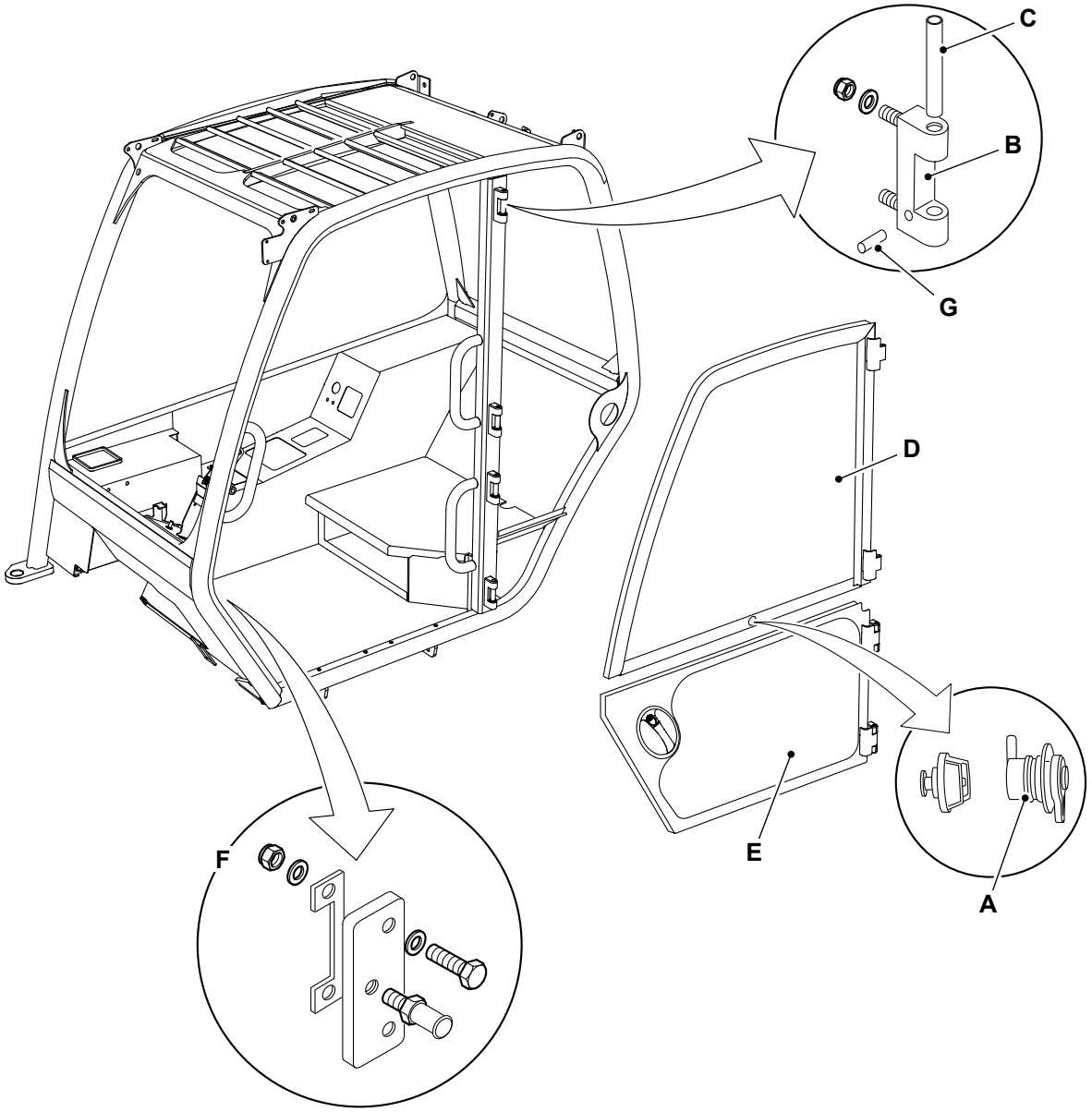
Figure 140. Work Platform - Fixed Type (365 kg)



A Cradle- remote control
B Cable reel
C Mounting assembly
D Fork sleeves for (transportation when removed from the machine)

C Cab front cover
D Steering unit
E Cab earth strap
F Chassis electrical harness
G Hitch cable
H Fuel tank filler neck
J Filler hose clip

Figure 172. Two piece door assembly



A Locking handle
B Hinge assembly
C Hinge pin
D Door- upper
E Door- lower
F Door catch assembly
G Securing pin (or grub screw)

00 - General

Introduction 09-53
Health and Safety 09-54

Introduction

The safety labels are strategically placed around the product to remind you of possible hazards.

If you need eye-glasses for reading, make sure you wear them when reading the safety labels. Do not over-stretch or put yourself in dangerous positions to read the safety labels. If you do not understand the hazard shown on the safety label, then refer to Safety Label Identification.

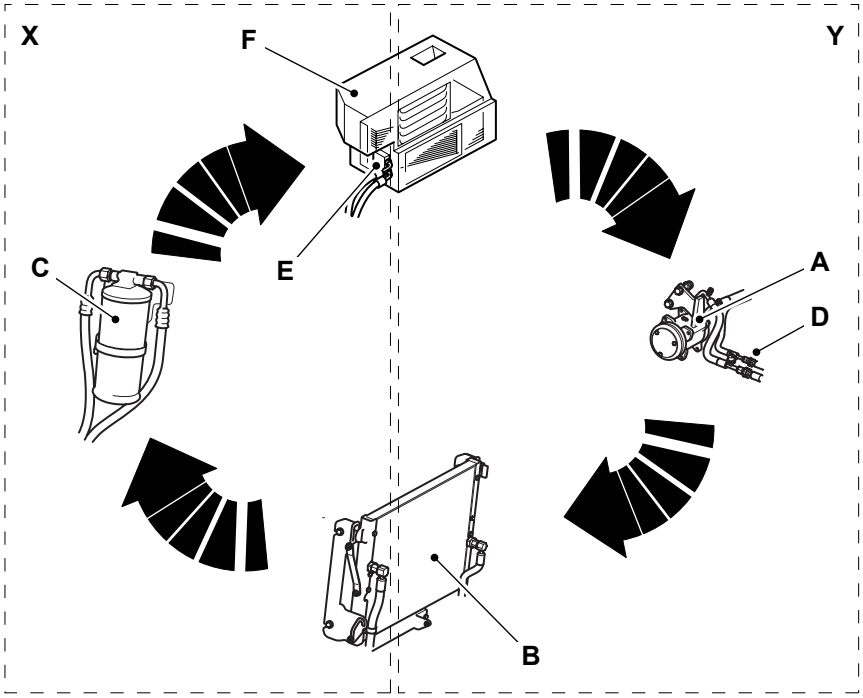
Keep all of the safety labels clean and readable. Replace a lost or damaged safety label. Make sure the replacement parts include the safety labels where necessary. Each safety label has a part number printed on it, use this number to order a new safety label from your JCB dealer.

condenses on the evaporator matrix and is drained away through condensate.

Cool de-humidified air is emitted through air vents into the cab.

The low temperature, low pressure, high heat content refrigerant gas, is now drawn by suction back to the compressor, where the cycle is completed.

Figure 191.



A Compressor
B Condenser matrix
C Receiver drier
D Binary pressure switch
E TXV
F Evaporator matrix
X Refrigerant is in liquid state
Y Refrigerant is in gas state

System control

The system is a manual control type and is set to on or off by switch. There is no automatic control of the cab air temperature.

Refrigerated air will be heated by the heater matrix If the heater control is not set to ‘cold’.

You can control the system by activating and deactivating the compressor electromagnetic clutch. When current is fed to the field coil of the compressor clutch, a magnetic field develops between the field coil and the armature which pulls the field coil, complete with clutch assembly, onto the compressor rotor. Since the clutch assembly is turned constantly by the crankshaft pulley drive belt, the compressor armature turns, starting the refrigeration cycle.

Current is fed to the field coil through a series of switches.

1. The manual air conditioning on/off switch in the control console.
2. The high and low level binary pressure switch located in the pipework near to the compressor. This switch is not adjustable.
3. The freeze protection thermostat switch located inside the HVAC unit. This switch is not adjustable.

When the air conditioning switch is set to on the refrigeration system is active. The system operates within fixed temperature and pressure limits controlled by the freeze protection thermostat switch and the binary pressure switch. The system does not respond to changes in the cab air temperature.

If the compressor runs continuously condensate on the evaporator matrix will freeze and the system will not be effective. The freeze protection thermostat switch has its sensor probe installed in the evaporator matrix. When the temperature of the probe is near 0 °C (32.0 °F) the thermostat switch contacts open. The compressor clutch disengages, closing down the refrigeration cycle. As the temperature of the probe increases the

Remove and Install

Air Conditioning Maintenance

The air conditioning system is a closed loop system and contains pressurised refrigerant. No part of the system should be disconnected until the system has been discharged by a refrigeration engineer or a suitably trained person. You can be severely frostbitten or injured by escaping refrigerant.

The heating and ventilation unit (HV) contains a blower unit and heat exchanger matrix. It is located under the right front side of the cab.

The HVAC (Heating Ventilation Air Conditioning) unit is the same as the HV unit but also contains an evaporator matrix and thermostat.

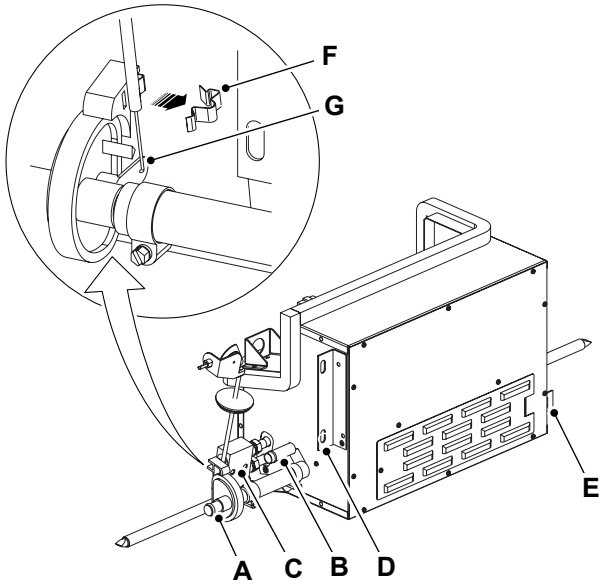
Put labels on all the hoses before removal for easy installation.

Remove

Get access to the TXV (Thermal Expansion Valve) by lowering the unit without disconnecting the hoses. In this case it is not necessary to discharge the refrigerant.

1. Make the machine safe.
   Refer to: PIL 01-03.
2. Install the safety strut.
   Refer to: PIL 06-69.
3. To remove the HVAC unit it is necessary to discharge the refrigerant from the system.
   Refer to: PIL 12.
4. Drain the cooling system.
   Refer to: PIL 21.
5. If installed, remove the cab side cover to get access to the HVAC unit.
6. Disconnect the heater hoses from the heater valve and from the heater matrix.
7. Disconnect the HVAC hoses from the TXV (if installed).
8. Remove the clip and disconnect the cable from the heater valve.
9. For 526-56 machines only:
   - 9.1. Remove the cab frame from the machine.
     Refer to: PIL 09-00-03.
   - 9.2. Remove the chassis side cover from the machine.
     Refer to: PIL 06-06-13.
10. Remove the bolt 1 and bolt 2 which secure the HVAC unit to the machine.
11. Carefully remove the unit sufficiently to access the electrical harness connector at the rear.
12. The electrical harness connector is located behind the unit and cannot be disconnected until the unit is pulled away from the machine.
13. Disconnect the electrical connector.
14. Remove the assembly from the machine.

Figure 204.



A Heater valve
B Heater matrix
C TXV (If installed)
D Bolt 1
E Bolt 2
F Clip
G Cable

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
   - 1.1. Make sure that the TXV is installed correctly with the diaphragm, located below the valve.

Check (Condition)

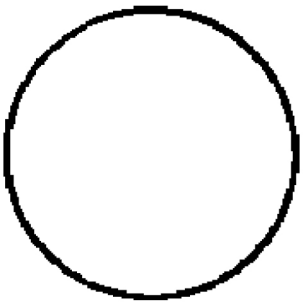
1. Make the machine safe with the lift arm lowered.
   Refer to: PIL 01-03.
2. Clean the sight glass on the top housing of the receiver drier.
3. Check the sight glass.
   3.1. Make sure that the sight glass is clear.
4. Check the pipe connections to the receiver drier for signs of cracks or wear.
5. Make sure that the pipes are correctly clamped.
   5.1. If necessary, replace the pipes and clamps.
6. Do not remove the pipes from the charged HVAC (Heating Ventilation Air Conditioning) system.

Sight glass indications

An approximate indication of the condition of the refrigerant is seen through the receiver drier sight glass.

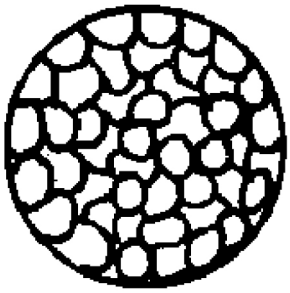
1. Clear - No fault show unless the system cannot supply cool air. The indication then is that the system is completely discharged of refrigerant. Refer to Figure 211.

Figure 211.



2. Foam or bubbles - Refrigerant is low and needs of charging. Some slight bubbling is to be expected when R134a refrigerant is used. Refer to Figure 212.

Figure 212.



3. Clouded - Dessicant breakdown in the receiver drier. Refer to Figure 213.

Figure 213.

Acronyms Glossary

CAN	Controller Area Network
CCV	Crankcase Ventilation
DC	Direct Current
DTI	Dial Test Indicator
ECM	Engine Control Module
ECU	Electronic Control Unit
ESOS	Engine Shut-Off Solenoid
FEAD	Front End Accessory Drive
LMS	Loadall Monitoring System
PTO	Power Take-Off
RPM	Revolutions Per Minute
TDC	Top Dead Centre

Table 80. Engine - RPM Surges

Cause	Remedy
Fuel level low.	Check the level in the fuel tank, use sight gauge or dipstick. Replenish as required.
Pedal/ Hand Throttle position sensor (TPS) system defective.	Check the throttle assembly.
Fuel injection lines leaking.	Replace defective fuel lines. Do not repair defective fuel lines. If there is a fuel leak remove and discard the necessary components and install new ones.
Fuel tank cap vent/breather blocked.	Inspect and rectify as required. Replace cap if necessary.
Fuel is aerated.	Check the fuel system for loose connections and possible air ingress points. Rectify and bleed the fuel system.
Electrical sensor fault.	Check the electrical connections at the sensors.
One or more fuel injectors worn or malfunctioning.	Check the electrical connections at the injectors.
Worn or malfunctioning high pressure fuel pump.	Do all the necessary fault finding checks before removal of the high pressure fuel pump.

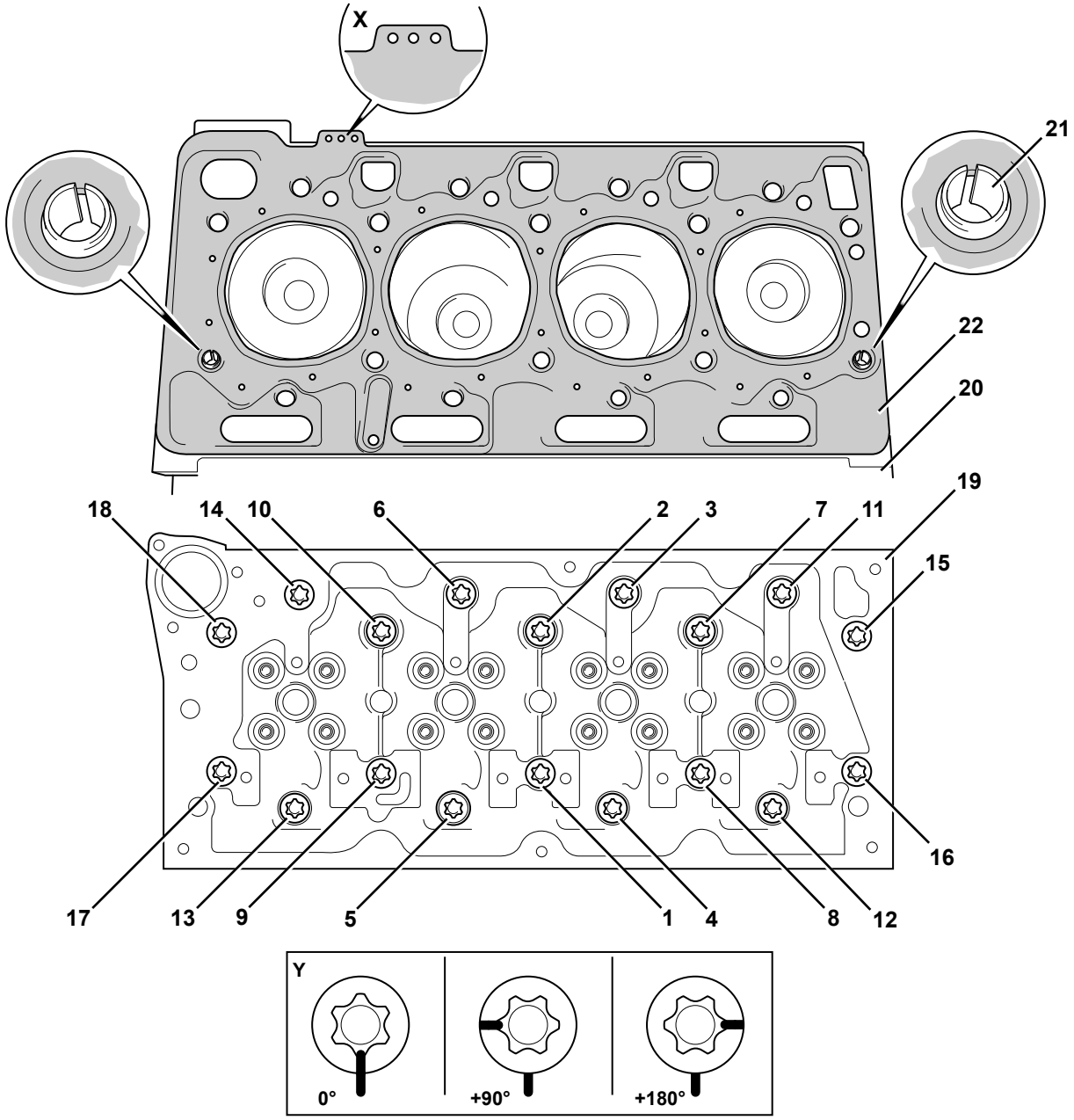
Table 81. Engine - Vibration Excessive

Cause	Remedy
Engine not running smoothly/misfiring.	See Also: Table 75. Engine - Poor Running at Idle
Oil level incorrect.	Check oil level.
Fan damaged or accessories faulty.	Check/replace the vibrating component. Refer to the machine's service manual for correct installation and torque figures.
Fan hub faulty.	Inspect/replace the fan hub. Refer to the machine's service manual for correct installation and torque figures.
Engine mounts over-tightened, damaged or loose.	Check/replace engine mounts.
Inlet and exhaust valve clearances set incorrectly.	Set the valve clearances to the recommended clearances.
Engine compression low in one or more cylinders.	Check the engine compression.
Alternator bearing worn or damaged.	Check/replace the alternator.
Flywheel housing misaligned.	Check/repair flywheel alignment.
Electrical sensor fault.	Check the electrical connections at the sensors.
Driveline components worn or unbalanced.	Check and inspect driveline components such as propshafts. Refer to the relevant section of the service manual for correct installation and torque figures.

Table 82. Engine - Exhaust Smoke Excessive (Black Smoke)

Cause	Remedy
Engine being lugged down.	Check for added loading from malfunctioning accessories or driven units, brakes dragging and other changes in vehicle loading. Disengage the hydraulic controls.
Air intake or exhaust system blocked.	Visually check the air intake and exhaust system for blockage or obstruction - remove as required. Check the air filter elements for signs of blocking - replace as required.
Air leak between the turbocharger and the intake manifold.	Check/repair leaks in the air crossover tube, hoses, or manifold cover.
Intercooler faulty.	Check for blocked cooler matrix.

Figure 233.



1-18 Cylinder head fixing bolts (x18)
20 Crankcase
22 Cylinder head gasket
19 Cylinder head
21 Location dowels (x2)

06 - Front Oil Seal

Remove and Install

Special Tools

Description	Part No.	Qty.
Crankshaft Front Oil Seal Installation Tool	892/01157	1

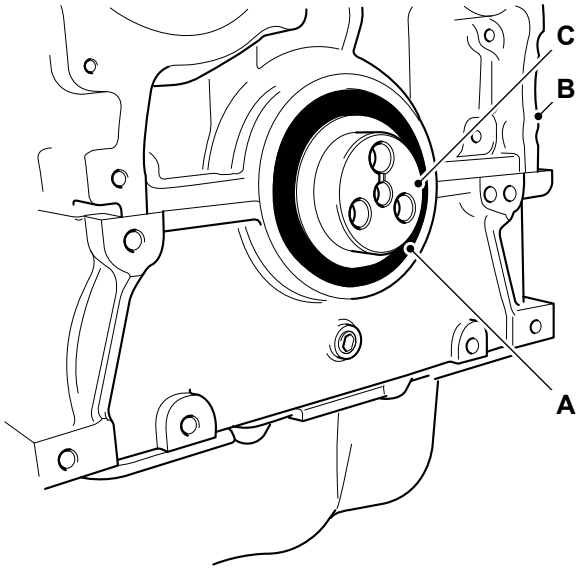
Before Removal

1. This procedure requires service parts. Make sure you have obtained the correct service parts before you start, refer to Parts Catalogue.
2. Make sure that the engine is safe to work on. If the engine has been running, let it cool before you start the service work.
3. Get access to the engine.
4. Remove the drive belt, refer to (PIL 15-18).
5. Remove the crankshaft pulley, refer to (PIL 15-12-12).

Remove

1. Use a suitable lever behind the lip of the seal, carefully prise out the oil seal from the counterbore in the crankcase. Take care not to scratch or damage the counterbore or the crankshaft hub. Damaged or dirty sealing faces will cause the oil seal to fail.

Figure 248.



A Crankshaft oil seal
B Crankcase
C Crankshaft hub

Install

1. Make sure that the counterbore and the crankshaft hub are clean and free from damage and corrosion. Use a suitable degreasing agent to clean all traces of oil and grease from the counterbore. Important: The oil seal has a special coating and MUST be installed dry without lubricant.
2. Dismantle the seal installation tool. Bolt the centre body to the crankshaft hub, using the bolts. Refer to Figure 249.

   Special Tool: Crankshaft Front Oil Seal Installation Tool (Qty.: 1)
3. Install the oil seal on to the centre body. Make sure that the seal is installed the correct way around. Assemble the outer sleeve on to the centre body and install the screw. Refer to Figure 249.

Adjust

Adjustment is not possible with this drive belt. A spring loaded tensioning unit ensures that the FEAD (Front End Accessory Drive) belt is kept at the correct tension.

Remove and Install

Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Stop the engine and let it cool down.
3. Use a socket of the specified size to locate on to the hexagon spigot nut, carefully rotate the tensioner against the spring force in the direction shown. Do not use excessive force or the tensioner will be damaged.

   Dimension: 16 mm
4. Keep holding the tensioner against the spring force and lift the belt off the drive tensioner pulley.
5. Slowly release the spring force by rotating the tensioner unit in the opposite direction.

Notes:

00 - General

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Component Identification 15-139
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Check (Condition) 15-141
Calibrate 15-141
Remove and Install 15-143
Disassemble and Assemble 15-146

Introduction

The piston is acted upon by the pressure of the expanding combustion gases in the combustion chamber space at the top of the cylinder. This force then acts downwards through the connecting rod and on to the crankshaft.

The pistons are cast from aluminium alloys for increased strength and improved fatigue life.

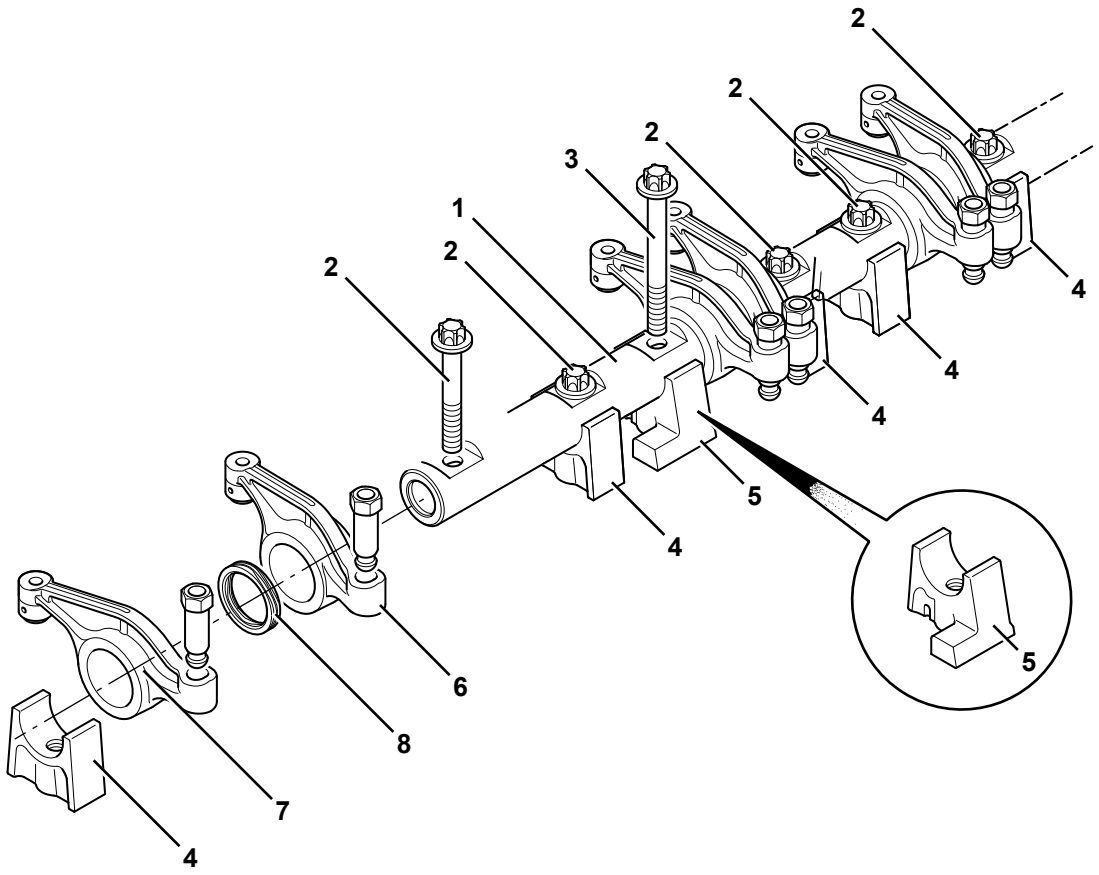
The connecting rod is attached to the piston by a swivelling piston pin. This pin is mounted within the piston, The pin itself is of hardened steel and is fixed in the piston, but free to move in the connecting rod. The pins are prevented from moving sideways and the ends of the pin digging into the cylinder wall by circlips.

Disassemble and Assemble

Before Disassembly

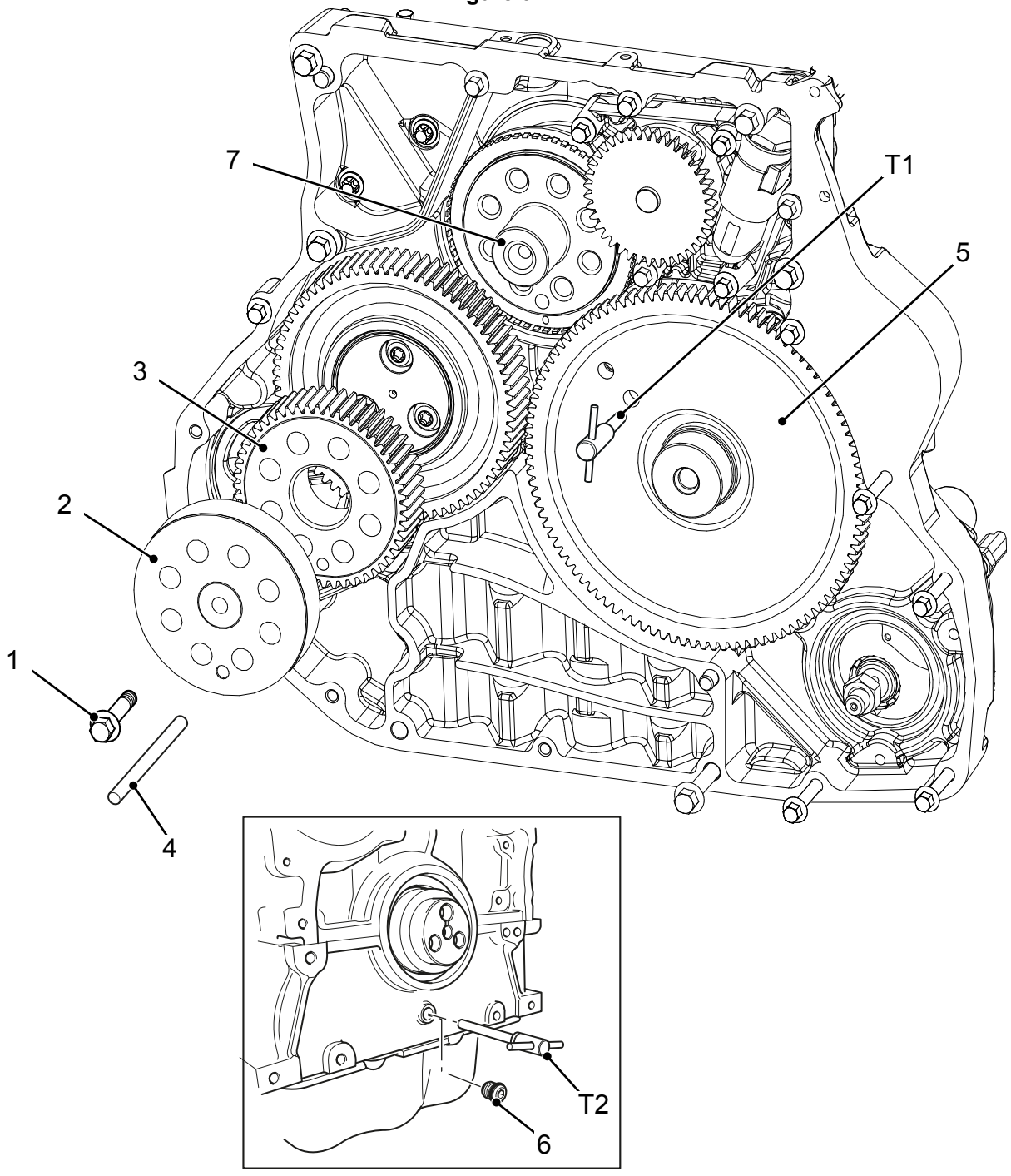
1. Remove the rocker cover. Refer to (PIL 15-42).
2. Remove the rocker assembly. Refer to (PIL 15-42).

Figure 303.



1 Rocker shaft
2 Rocker shaft fixing bolts (x7)
3 Rocker shaft - Oil feed pedestal fixing bolt (x1)
4 Pedestals (x7)
5 Oil feed pedestal (x1)
6 Rockers - inlet (x4)
7 Rockers - exhaust (x4)
8 Wave washers (x8)

Figure 317.



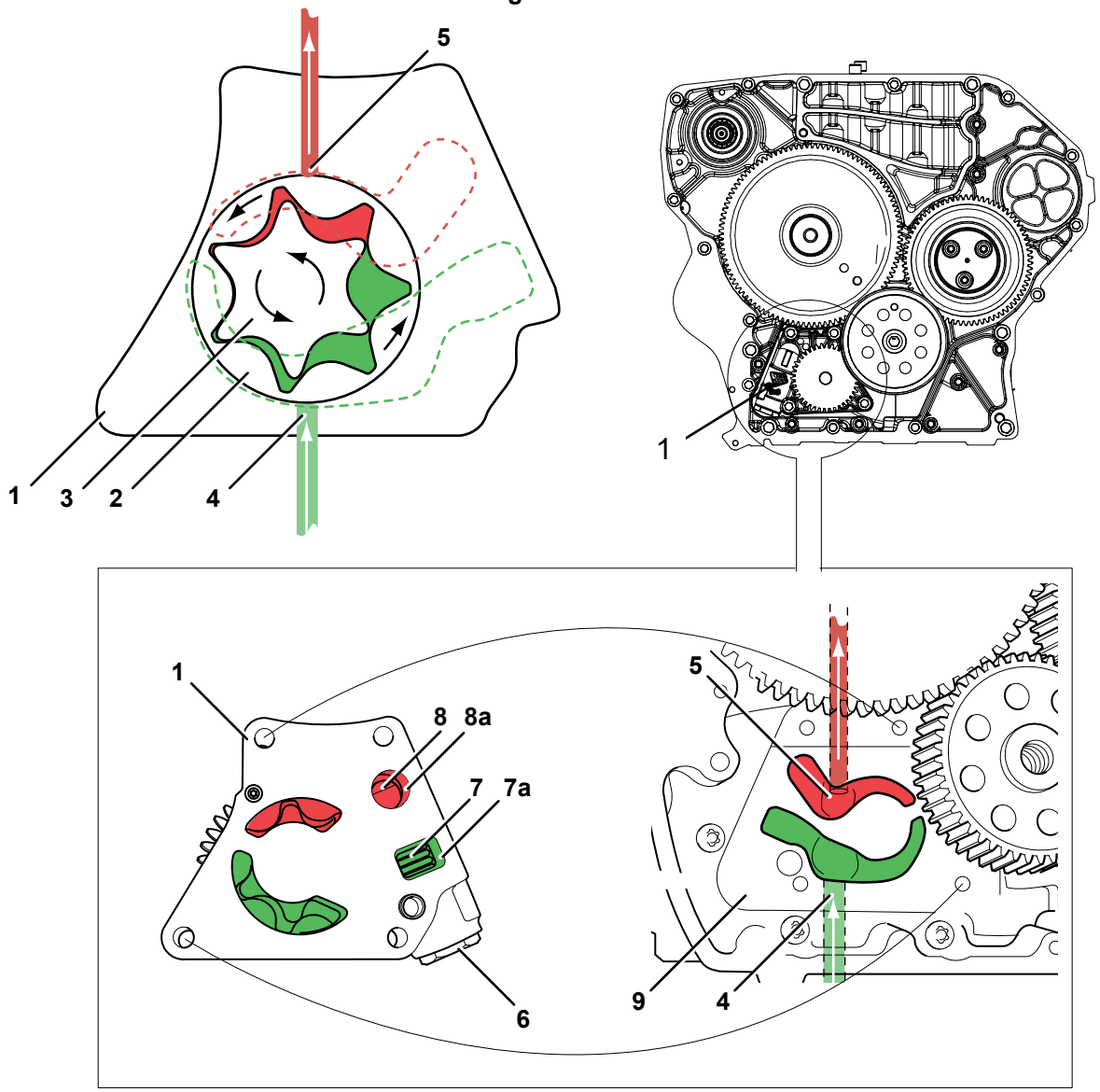
1 Drive gear and flywheel hub fixing bolt
2 Flywheel hub
3 Crankshaft gear
4 Location dowel
5 Camshaft drive gear
6 Blanking plug - crankcase
7 Crankshaft - gear location spigot
T1 Timing pin - camshaft
T2 Timing pin - crankshaft

Remove

1. Remove the flywheel hub fixing bolt and remove the flywheel hub.
2. Remove the crankshaft gear from the crankshaft. Make sure you retrieve the location dowel.

Component Identification

Figure 326.



1 Oil pump
2 Outer rotor
3 Inner rotor
4 Inlet port
5 Outlet port
6 Relief valve assembly
7 Relief valve spring
7a Relief valve port (return to inlet port 4)
8 Relief valve spool
8a Relief valve pressure port (connected to port 5)
9 Oil pump connecting ports (engine bed plate)

Check (Condition)

Charging Circuit Test

1. Make sure that all the battery and alternator connections are in place, secure and making good metal - to - metal contact, especially the earth connections to chassis and engine.
2. Adjust the alternator drive belt tension if necessary and make sure that the battery is well charged.
3. Turn the ignition switch to the ON position. Oil pressure and "No Charge" warning lights should glow. If any light fails, re-check the connections.
4. Start the engine; all warning lights should extinguish rapidly. If the "No Charge" warning light remains ON, re-check the alternator drive belt tension and that the battery is charged. If the oil pressure warning remains on stop the engine Immediately and investigate the engine lubrication system.

Check 1

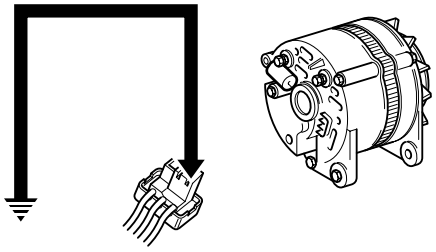
With the ignition switch ON, check that the heater motor and screen wiper will operate.

If they operate normally, check the warning light bulb for a blown filament.

Simultaneous failure of all items indicates a fault at the ignition switch. Check for cable disconnection before condemning the switch itself.

If the 'No Charge' warning bulb is in good order, withdraw the triple plug from the back of the alternator. Make a temporary connection between the small terminal in the plug and earth as shown below. If the 'No Charge' warning bulb still fails to light, check the cable for continuity. If the bulb now lights, check the alternator for a defective regulator.

Figure 334.



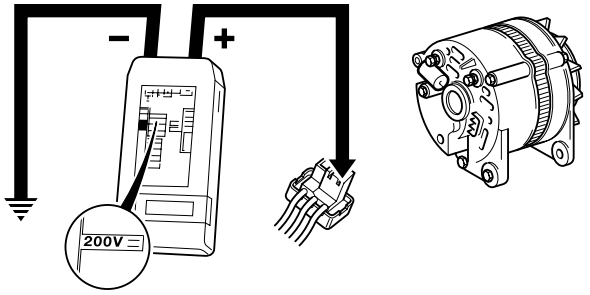
Check 2

The following checks should be made using an analogue (moving pointer) type Multimeter.

1. Stop the engine and turn the ignition switch to OFF.
2. Withdraw the alternator plug and connect the Multimeter between the large terminals and earth. With the Multimeter set to measure,

   Voltage: 12 V

Figure 335.



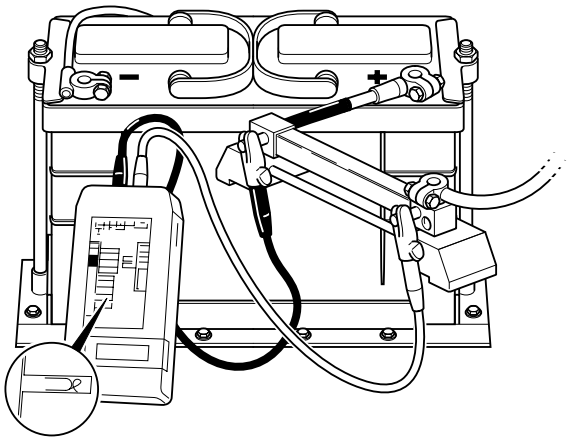
   2.1. The Multimeter should show battery voltage.

   2.2. If the reading is zero, check the cables for continuity, particularly at the starter terminals.

3. If the voltage is correct, check the alternator.

Alternator Charging Test

Figure 336.



1. Make sure that all battery and alternator connections are in place, secure and making good metal to metal contact, especially the earth connections to chassis and engine.
2. Make sure that the alternator drive belt tension is correctly adjusted.
3. If the battery is in a fully charged condition, before commencing the test switch on the working lights for

   Duration: 3 min

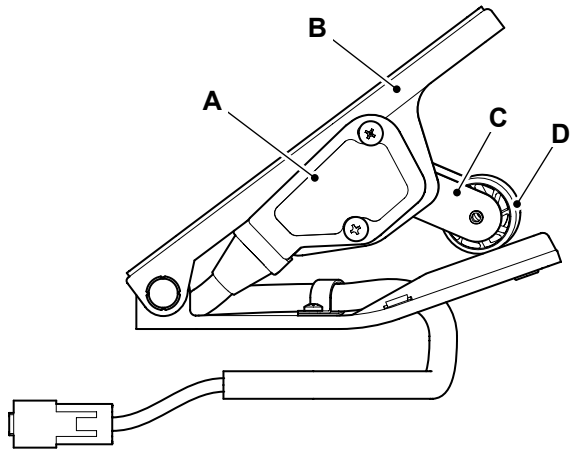
Operation

The throttle pedal sensor (TPS) converts the movement from the pedal into an electrical signal for interpretation by the Engine ECU (Electronic Control Unit), variflow pump ECU hi(if installed) or the hydraulic control ECU.

The the movement of the throttle pedal is transmitted from the footplate to the roller and the swing arm on the throttle position sensor (TPS) unit. A variable resistor within the TPS unit changes the voltage output in relation to the position of the pedal.

Two signals are output from the unit, a track 1 signal and a track 2 signal. One signal varies the voltage by the angle below the foot pedal pad. The other signal varies the voltage by the angle above the foot pedal pad. Both signals will always add up to 5 V. Refer to engine- sensor, refer to (PIL 15-84).

Figure 351.



A Throttle position sensor unit
B Throttle pedal
C Swing arm
D Roller

Operation

The oil pressure switch contacts open when the engine oil pressure is below 0.6bar.

Check (Operation)

1. For the full inspection and testing procedure, refer to the help files in ServiceMaster.

Fault-Finding

Fault

Fuel Consumption Excessive	Table 131.	Page 18-8
Fuel/Oil- Leaking from Exhaust Manifold	Table 132.	Page 18-8
General Fuel System Faults	Table 133.	Page 18-8

Table 131. Fuel Consumption Excessive

Cause	Remedy
Additional load on engine.	Check/repair accessories and vehicle components. Refer to the equipment manufacturer's procedures
Operator technique.	Review operation for correct gear shifts, deceleration and idling
Fuel leaks.	Check for external leaks at the fuel tank, fuel lines, filters and lift pump WARNING: Do not repair defective fuel lines. If there is a fuel leak remove and discard the necessary components and install new ones.
Air intake or exhaust leaks.	
Engine compression low in one or more cylinders.	Check the engine compression.
One or more engine injectors worn or malfunctioning.	Check the electrical connections at the injectors.
Inlet and exhaust valve clearances set incorrectly.	Set the valve clearances to the recommended clearances.

Table 132. Fuel/Oil- Leaking from Exhaust Manifold

Cause	Remedy
Operating for extended periods under light or no load conditions.	Review operation for correct gear shifts, deceleration and idling.
Air intake or exhaust leaks.	
Exhaust leak at the Manifold or Turbocharger.	Check/repair leaks in the manifold or turbocharger gaskets. Check for a cracked manifold.
Valve guide seals are leaking.	Replace valve guide stem seals as required.
One or more engine injector worn or malfunctioning.	Check the electrical connections at the injectors.

Table 133. General Fuel System Faults

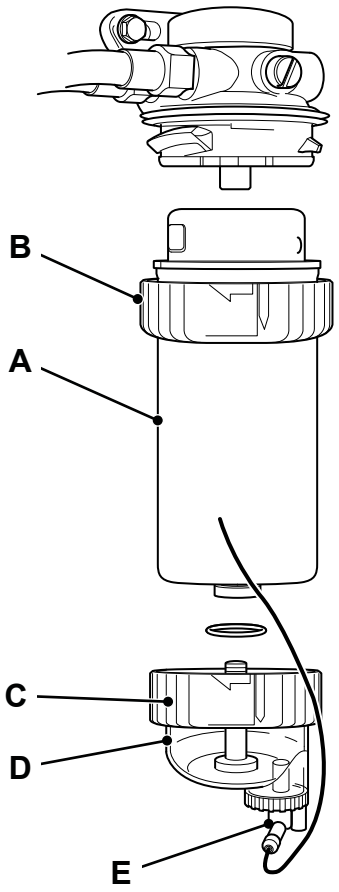
Cause	Remedy
Fuel supply fault	Check the low pressure circuit connections are secure.
	Check the fuel pressure in low circuit/tank level.
	Check the fuel type.
	Check for the external diesel fuel leaks.
	Check the filter is not blocked.
	Check the fuel lift pump operation.
	Replace/repair as necessary.

Remove and Install

Remove

1. Make the machine safe.
2. Get access to the filter.
3. On machines with a fuel shut off valve, set the valve to isolate the fuel supply.
4. Drain the water separator bowl.
5. Disconnect the water in fuel sensor.
6. Release the locking ring and remove water separator bowl. Any fuel and water mix drained must be disposed of in accordance with local regulations. Do not reuse the drained fuel.
7. Release the locking ring and remove the filter element, discard the element.

Figure 378.



A Filter Element
B Filter element locking ring
C Water separator bowl locking ring
D Water separator bowl
E Water in fuel electrical connector

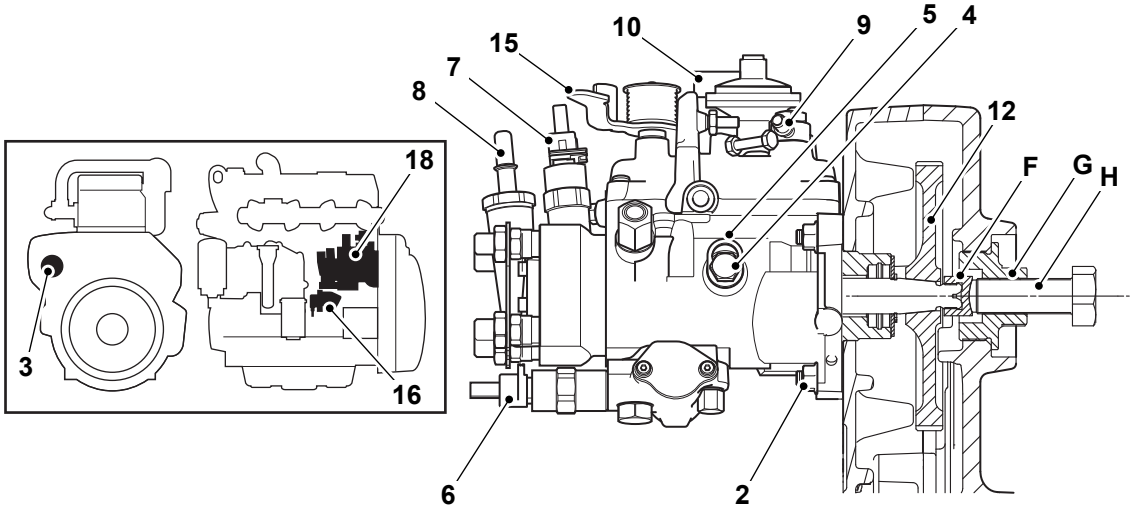
Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Install a new filter element and secure in position with the locking ring.
3. Make sure that the water in fuel electrical connector is correctly installed.
4. On machines with a fuel shut-off valve, set the valve to connect the fuel supply.

Component Identification

(For: JCB 4.4 T3 Mech Turbo, JCB 4.4 T3 Mech Turbo and Aftercooled)

Figure 398. DP 210/310



1 Fuel injection pump
2 Pump fixing nuts (x3)
3 Injection pump gear cover
4 Injection pump lock bolt
5 Keyhole washer
6 Cold start advance solenoid
7 ESOS (Engine Shut-Off Solenoid)
8 Fuel line connector (inlet)
9 Fuel bleed-off connector
10 Turbo boost vacuum pipe (if installed)
11 Drive shaft nut
12 Drive gear
14 Injection pump oil seal
15 Throttle lever
16 Fuel lift pump

03 - Inlet Manifold

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Component Identification 18-78
Check (Condition) 18-78
Remove and Install 18-79

Introduction

The inlet manifold (or intake manifold) supplies combustion air to the cylinders in compression ignition engines or the air/fuel mixture for spark ignition engines (except most direct injection spark ignition engines). Even distribution of the air or air/fuel is important to optimize the efficiency and performance of the engine.

The manifold is required to be air tight under pressure and vacuum conditions and can be required to provide mounting points for sensors, grid heaters, throttle bodies and other components depending on the engine type and specification.

Health and Safety

⚠ **WARNING** Do not open the high pressure fuel system with the engine running. Engine operation causes high fuel pressure. High pressure fuel spray can cause serious injury or death.

Notice: Do not allow dirt to enter the fuel system. Before disconnecting any part of the fuel system, thoroughly clean around the connection. When a component has been disconnected, for example a fuel pipe, always install protective caps and plugs to prevent dirt ingress. Failure to follow these instructions will lead to dirt entering the fuel system. Dirt in the fuel system will seriously damage the fuel injection equipment and could be expensive to repair.

Table 152.

Item	Description
A	Air cleaner / fuse box support bolts
B	Fuel sedimentor and pump
C	Air to air inter cooler matrix
D	Hydraulic oil cooler matrix (if installed)
E	Fixing points
F	Hydraulic hoses- Fan Motor/Oil Cooler
G	Solenoid valve- reversible fan (if installed)
H	Fan speed sensor
J	Proportional fan speed control solenoid
K	Engine coolant radiator matrix
L	Radiator top hose connection
M	Inter cooler inlet hose connection
N	Fixed Speed Cooling fan and hydraulic motor assembly (55KW engines)
P	Variable Speed Cooling fan and hydraulic motor assembly (81, 93 and 108 KW engines)
Q	Inter cooler outlet hose connection
R	Radiator bottom hose connection

Notes:

93 - Hose

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Check (Leaks)

Special Tools

Description	Part No.	Qty.
Pressure Gauge (0-70 Bar)	892/00346	1

Consumables

Description	Part No.	Size
JCB Hydraulic Fluid HP 15	4002/0501	1 L
	4002/0503	5 L

⚠ **WARNING** Before working on the brake system, make sure that the machine is on solid level ground. Put blocks on all wheels to prevent the machine rolling.

WARNING Do not use the machine with any part of its brake system disconnected or inoperative. When the test has been completed, make sure all brake system components are installed and the system is operating correctly.

The most common reason for internal piston seal leakage is a build-up of axle contamination as a result of excessive brake wear caused by extended service periods.

Two types of internal leakage can occur within the axle or hub:

1. Low Pressure Leaks- Seal damage, or scoring to seal component surfaces, caused by a build-up of metal particles.
2. High Pressure Leaks- Mechanical leakage past a badly damaged or perished seal.

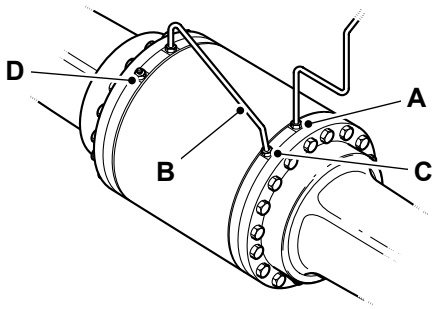
The low pressure leak test should be performed first. Low pressure leaks are difficult to find using a high pressure test- seals and other components can distort and form a seal under pressure.

The following procedures explain how to check for low or high pressure leaks without the need to dismantle the axle first. The test must only be done when the axle is COLD.

1. Make the machine safe. Refer to (PIL 01-03).
2. Disconnect the brake piston feed pipe (or hose, as applicable) at port 1.
3. Plug all the open ports and hoses to prevent contamination.
4. Completely remove the pipe and install a plug at port 2.
5. Fill both brake piston housings with JCB Light Hydraulic Fluid through the port 1 and port 3.

   Consumable: JCB Hydraulic Fluid HP 15

Figure 467.



A Port 1
B Pipe
C Port 2
D Port 3

6. Test for a low pressure leak as follows:

   6.1. Install an adaptor with a piece of clear tube to the brake piston port.

   6.2. Make sure you keep the tube vertical during the test. Use tape to attach the tube to the side of the machine.

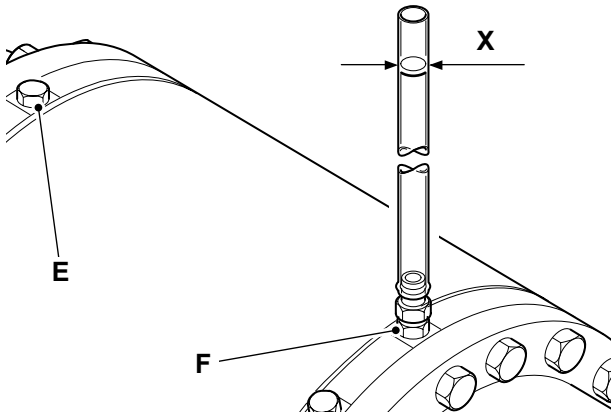
   6.3. Fill the tube until approximately three quarters full with the correct Hydraulic Fluid.

   6.4. Use a suitable pen to mark the level line of the brake fluid on the tube.

   6.5. After approximately 30 minutes, check if the level has dropped below the original marked line. If it has, check the brake piston seal for slight nicks, cuts or generally for wear.

   6.6. Repeat the step 6.1 to step 6.5 at port 4.

Figure 468.



E Port 4
F Brake piston port
X Brake fluid level line

00 - General

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Technical Data 24-42
Operation 24-43
Check (Operation) 24-43
Adjust 24-44

Introduction

The park brake also called the hand brake is a latching brake usually used to keep the vehicle stationary. It is also used to prevent a vehicle from rolling when the operator needs both feet to operate the clutch and throttle pedals.

The park brake usually consists of a cable directly connected to the brake mechanism on one end, and to a hand-operated lever, on the floor at the side of the driver.

Remove and Install

(For: PS750 MK4)

Special Tools

Description	Part No.	Qty.
Flange Spanner	992/04800	1

Remove

1. If installed remove the park brake caliper.
2. Bend back the stake nut locking ring.
3. Clean the brake disc and the gearbox around the brake disc. Make sure no contamination enters the gearbox when the brake disc is removed.
4. Hold the brake disc with the service tool and remove the output shaft stake nut. Discard the stake nut.

   Special Tool: Flange Spanner (Qty.: 1)
5. Remove the washer.
6. Lift off the brake disc. If necessary use a soft faced mallet to remove the brake disc.
7. Do not use a steel hammer, damage can occur to the output shaft bearing.
8. If necessary remove the oil seal. Do not damage the seal housing.

Install

1. Make sure that the oil seal interface on the brake disc is clean and free from wear or damage.
2. If necessary install a new oil seal. Lubricate the lips of the seal.
3. Install the brake disc onto the output shaft.
4. Install the washer.
5. Hold the brake disc with the service tool.
6. Install a new stake nut.
7. Progressively tighten the nut to the correct torque value.
8. Stake the nut to the shaft with a square ended staking tool.

Item	Description
V	Steer mode control valve
(T and A / B and P)	(Steer mode valve ports connected internally for crab steer)

Machines with steer rams

2-wheel steer selected

With the spool of the steer mode control valve in the 2-wheel steer position there is a hydraulic connection between the steer unit and the front steer rams. Steer mode control valve ports are internally connected. The oil feed to the rear axle steer rams is blocked by the spool assembly and the axle is held in the straight ahead position by the locked-up hydraulic oil in the rams.

When the steering wheel is turned, only the front axle rams are operated by the steering unit.

If the steering wheel is turned to the left, the oil flow is reversed and the machine will turn in the opposite direction.

Figure 510.

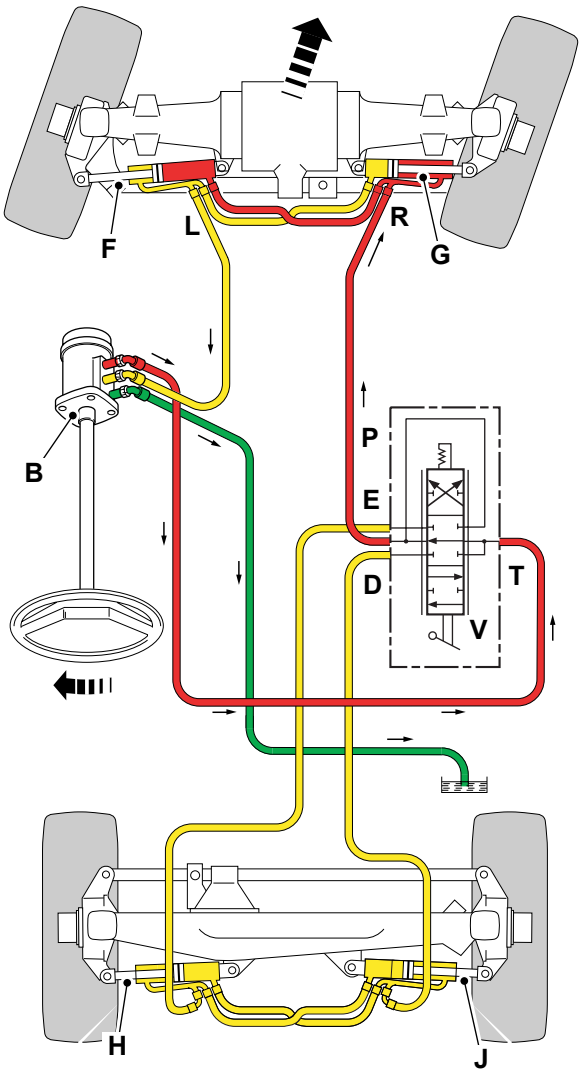


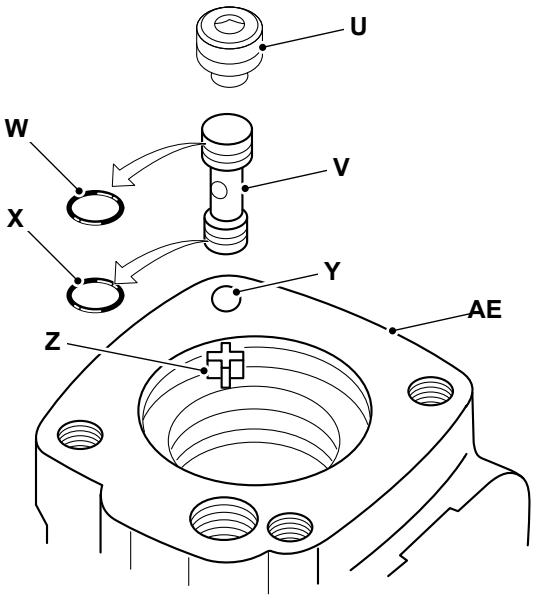
Table 201.

Item	Description
B	Steer unit
D	Steer mode control valve port
E	Steer mode control valve port
F	Front steer ram
G	Front steer ram
H	Rear steer ram
J	Rear steer ram
L	Left side
P	Steer mode control valve port
R	Right side
T	Steer mode control valve port

Assemble

1. Check the condition of all the components of the steering valve. Refer to (PIL 25-06).
2. Assemble the check valve as follows: Refer to Figure 526.
   2.1. Put the lower check ball retainer into the valve housing.

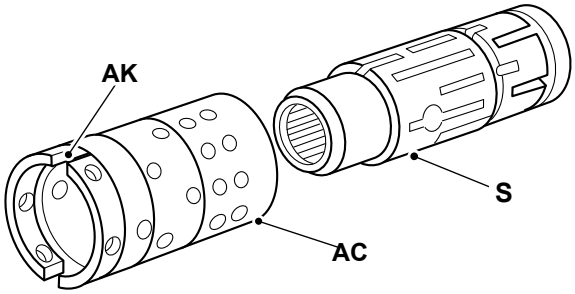
Figure 526.



U Setscrew
V Check valve seat
W O-ring 2
X O-ring 3
Y Check ball
Z Lower check ball retainer
AE Valve housing

   2.2. Make sure that the lower check ball retainer is straight in the valve hole and not on its edge.
   2.3. Install the check ball into the valve housing.
   2.4. Lubricate the O-ring 2 and O-ring 3 and install them on the check valve seat.
   2.5. Keep the check valve seat on the valve housing open end and then push the seat fully into the valve housing.
   2.6. Make sure that you do not twist or damage the O-ring 2 and O-ring 3.
   2.7. Install the setscrew. Make sure that the top of the setscrew is slightly below the valve housing top surface.
   2.8. Tighten the setscrew to the correct torque valve.
3. Assemble the spool and sleeve as follows: Refer to Figure 527.
   3.1. Slide the spool into the sleeve.

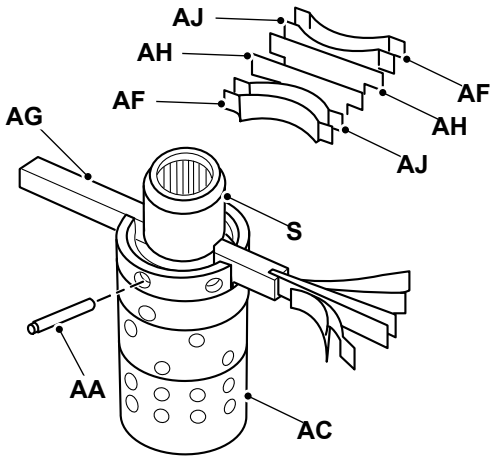
Figure 527.



S Spool
AC Sleeve
AK Spring slot

   3.2. Rotate the spool to make sure it rotates freely.
   3.3. Make sure that the spring slots in the spool and the sleeve fully aligns.
4. Install the spring assembly on the sleeve and spool as follows: Refer to Figure 528.
   4.1. Insert the spring installation tool through the aligned slots in the sleeve and spool.

Figure 528.



S Spool
AA Pin
AC Sleeve
AF Low torque spring
AG Spring installation tool
AH Spring spacer
AJ Centering spring

   4.2. Assemble a set of low torque springs, extend edge downward, with a pair of spring spacers between two sets of centering springs.

00 - General

Check (Condition) 25-65
Remove and Install 25-67
Disassemble and Assemble 25-70

Check (Condition)

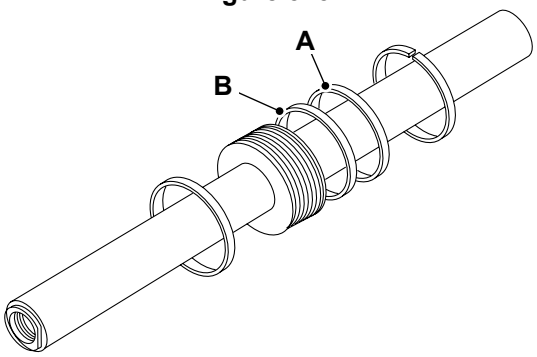
Check Energiser Seals

If there is difficulty in steering the machine and routine fault finding indicates power track rod leakage, it is possible that the rectangular section piston head seal on the power track rod piston head is installed incorrectly i.e. twisted.

Check the front and rear power track rods as follows:

1. Disassemble the ram. Refer to Steering System-Track Rod. Refer to (PIL 25-18).
2. Remove the piston seal and check to see if the energiser seal has been installed twisted or rolled.
3. Inspect the cylinder bore and piston rod for scoring, nicks and burrs.

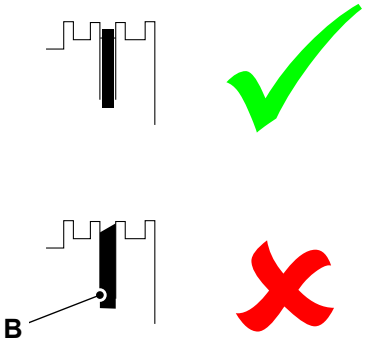
Figure 545.



A Piston seal
B Energiser seal

4. Assemble the ram with new seals. Make sure that the energiser seal is not twisted or rolled. Check the white installation marks.

Figure 546.



B Energiser seal

5. To prevent damage to the seals, clamp the cylinder in a vertical position and lower the piston rod assembly into the cylinder during installation.

06 - Semi-Automatic Gearbox

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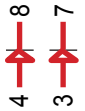
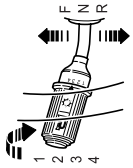
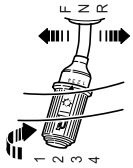
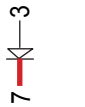
27-06-95 Coupling Yoke 4WD 27-227

Figure 579.

Gearbo x Function	Column Switch L/ H 1013	Relay 204 8 Dump	Relay 202 8 Park brake	Relay 201 8 Forward	Relay 203 2 Reverse	Relay 200 8 Drive	Diode Gat e - Gearbox 7014	Relay 201 7 Forward Hi/ Lo	Relay 200 9 Driveshaft	Gearbox Solenoids
1st GEAR	14-12	1-4	6-9				8	6-9	8-10, 6-7	3022 ,3029
FORWARD	7-4			3-5, 1-2	1-4	4-1				
1F										
2nd GEAR	14-9	1-4	6-9				2-6, 1-5	8-10, 6-7	8-10, 6-7	3021 ,3029
FORWARD	7-4			3-5, 1-2	1-4	4-1				
2F										
3rd GEAR		1-4	6-9					6-9	6-9	3022 ,3033
FORWARD	7-4			3-5, 1-2	1-4	4-1				
3F										
4th GEAR	14-13	1-4	6-9				3-7, 6	8-10, 6-7	6-9	3021, 3033
FORWARD	7-4			3-5, 1-2	1-4	4-1				
4F										

Converter relief (safety valve) pressure

The purpose of the torque converter relief valve is to protect the torque converter from excessive oil pressure. Excessive oil pressure can be generated when the transmission oil temperature is below 50 °C (121.9 °F) and/or the engine is run at over 2000 RPM.

In this event the relief valve opens and returns oil directly to the transmission sump, bypassing the torque converter, cooler and clutch lubrication circuits, protecting against damage due to excessive pressure.

For this reason it is essential that the transmission oil should be more than 50 °C (121.9 °F) and the engine should run between idle and 1000 RPM when you test the relief valve.

1. Connect a pressure gauge of the specified limit to the converter inlet and converter relief valve pressure test point. Refer to Figure 585.

   Pressure: 0 –20 bar (0.0 –289.9 psi)
   Special Tool: Pressure Gauge (0-40 Bar) (Qty.: 1)

2. Install a load valve into the converter out line. Make sure the load valve is fully open before starting the test. Refer to Figure 585.

3. Do not allow the pressure to exceed more than the specified value, or else it can damage the converter seals. Refer to Figure 585.

   Pressure: 8.3 bar (120.3 psi)

4. Start the engine and run at 1000 RPM. With the transmission in neutral, slowly screw down the load valve and monitor the gauge reading which should increase to the converter relief (safety) valve pressure setting. Refer to Figure 585.

5. The gauge pressure will fall, once the valve has opened. This is normal relief valve operation and does not indicate a fault. If necessary reset the load valve and perform the test again, carefully watch the pressure gauge. Refer to Figure 585.

6. If the converter relief valve opens at a pressure higher than specified then the valve is faulty. Refer to Figure 585.

7. A low opening pressure indicates a leaking pump to casing seal or a faulty converter relief valve. Refer to Figure 585.

8. Stop engine, remove test gauges and the load valve. Refer to Figure 585.

9. Install hoses to their original position. Refer to Figure 585.

Bypassing the converter relief valve

During some powershift pressure and oil flow tests it is advisable to temporarily bypass the converter relief valve. If the relief valve opens at the time of the following tests it will cause false results.

- Converter out pressure/Oil cooler flow rate
- Converter in pressure
- Lubrication pressure
- Torque converter stall test

Before you bypass the torque converter relief valve make sure that the mainline pressure is correct and that the transmission oil filter is fitted.

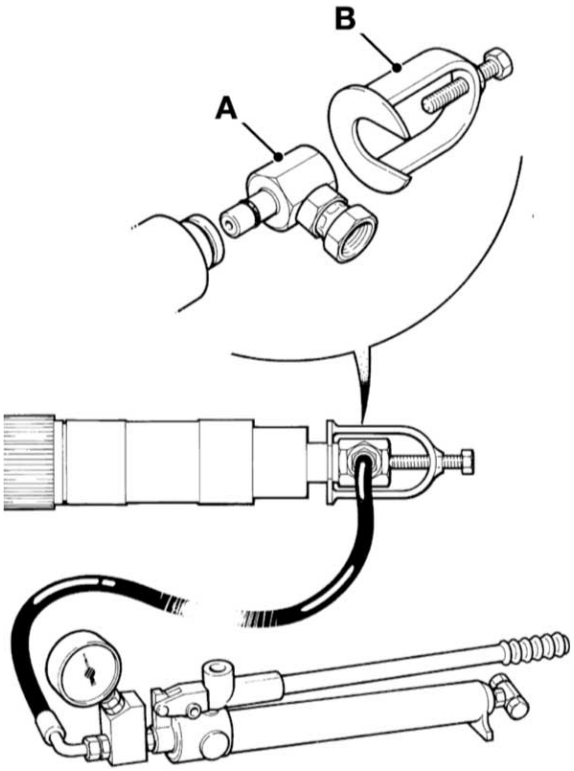
To temporarily bypass the relief valve (prevent the valve from opening) proceed as follows:

1. Stop the engine and remove the relief valve. Refer to Figure 586.

2. Carefully remove the spring. Refer to Figure 586.

3. Obtain a suitable plug, drill and tap the centre then install a locking bolt. Refer to Figure 586.

Figure 598.



A Adaptor (Part of 993/59300)
B Clamp (Part of 993/59300)

Remove and Install

(For: PS750 MK3)

Special Tools

Description	Part No.	Qty.
Drive Coupling Spanner	892/00812	1

Consumables

Description	Part No.	Size
JCB Threadlocker and Sealer (Medium Strength)	4101/0250	0.01 L
	4101/0251	0.05 L

Remove

1. The following 2/4 wheel drive variants may be installed:
   1.1. Selectable 2/4 wheel drive. Gearbox installed with a 4WD clutch unit.
   1.2. Permanent 4 wheel drive. Gearbox installed with a 4WD output shaft.
   1.3. Permanent 2 wheel drive. Gearbox installed with a blanking cover over the 4WD housing.
2. If applicable remove the 4WD clutch shaft assembly or 4WD output shaft assembly (permanent 4 wheel drive variant) as follows:
   2.1. Remove the 11 bolts that attach the 4WD clutch assembly.
   2.2. Remove the 4WD clutch and shaft assembly from the housing.
   2.3. If the 4WD clutch assembly is to be disassembled then hold the yoke with the service tool.

   Special Tool: Drive Coupling Spanner (Qty.: 1)
   2.4. Loosen the retaining nut before you remove the complete assembly.
   2.5. Note: If the flywheel housing flange is the SAE (circular) type, it will be necessary to remove the SAE flange before the 4WD clutch unit can be removed. Install the SAE flange after removing the 4WD clutch unit.

N Thrust washer 1
Q Thin thrust washer 1
S Thin thrust washer 2
U Circlip 2
W Shim (if installed)
Y Counter plates
AA Piston
AC Thrust washer 2
P Thrust bearing 1
R Needle roller bearings
T Thrust bearing 2
V Outer pressure end plate
X Friction plates
Z Inner pressure end plate
AB O-ring 3 (Piston)

11 - Clutch - Forward (Input)

Component Identification

Component Identification 27-121
Clean 27-123
Check (Condition) 27-123
Remove and Install 27-124
Disassemble and Assemble 27-125

Figure 642.

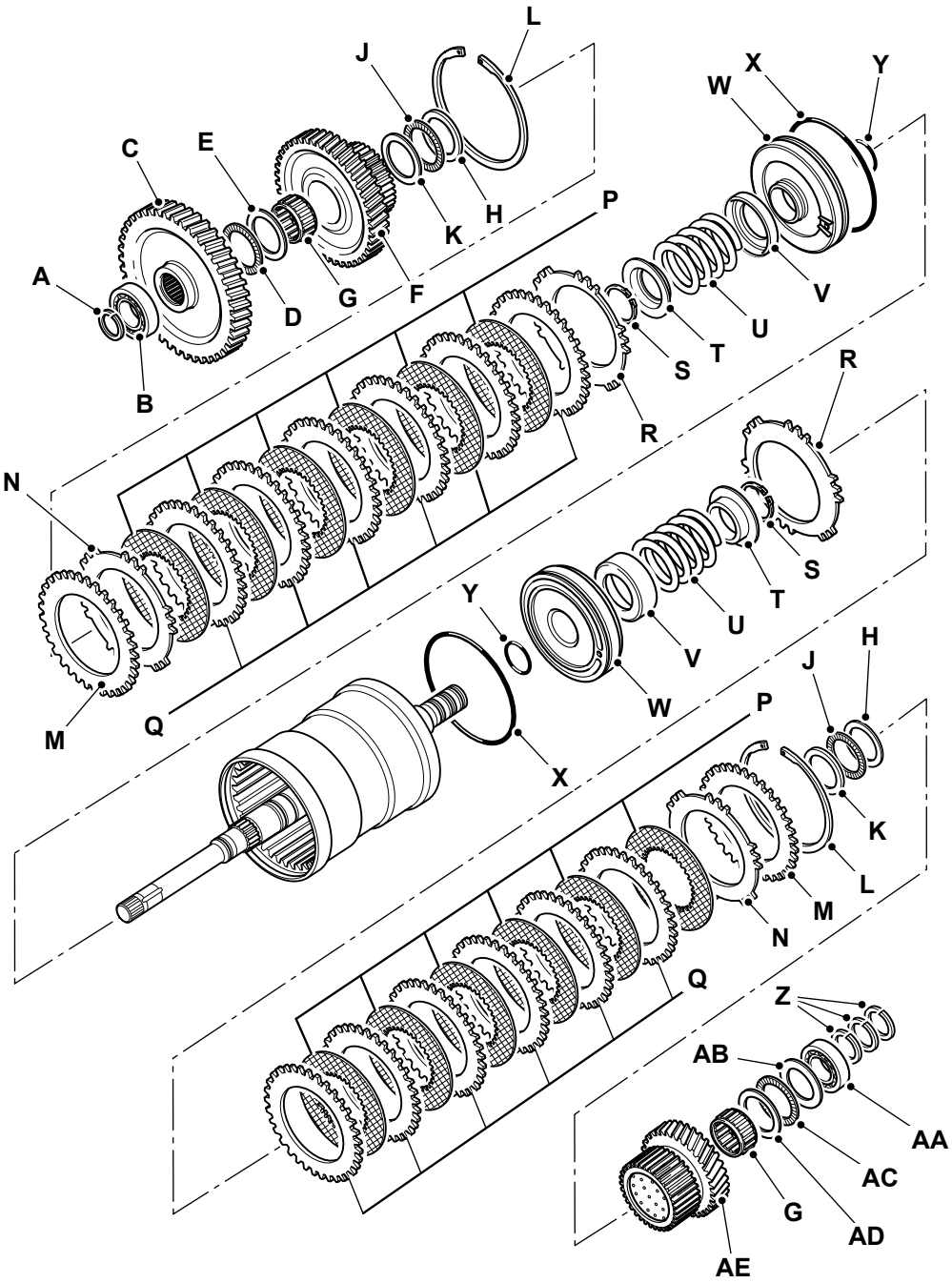
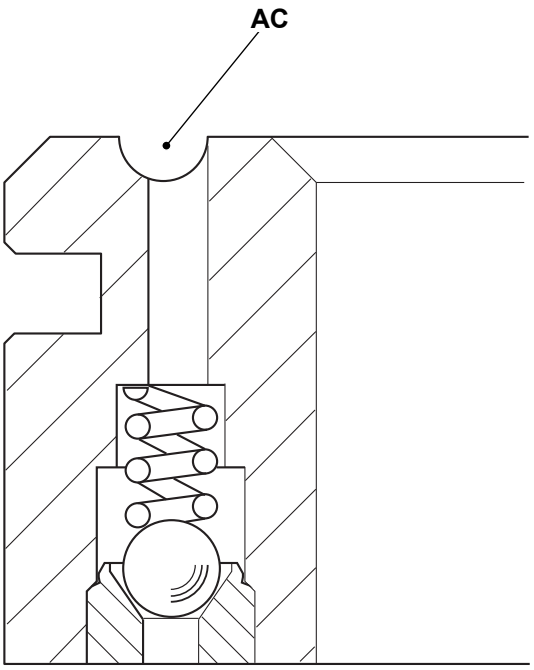


Figure 662.



AC Valve orifice

7.2. There should not be any leakage on the other side of the ball.

7.3. If there is leakage then the piston or the valve assembly must be replaced with a new one.

8. If the bronze bush is to be replaced then make sure that the oil grooves must align with the oil feed drillings in the hub.

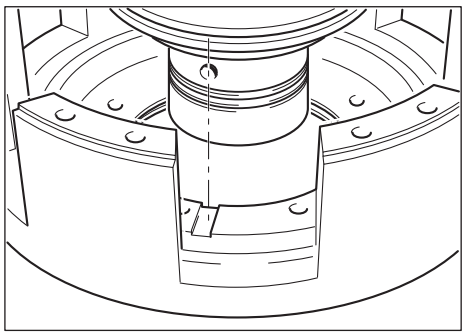
9. Use a suitable mandrel to push the bush until it is 0.5mm below the end face of the hub.

   Special Tool: Mandrel (Qty.: 1)

10. Lubricate and install a new O-ring 1 to the drum.

11. Align the oil feed holes in the hub with the oil feed slots in the drum. Refer to Figure 663.

Figure 663.



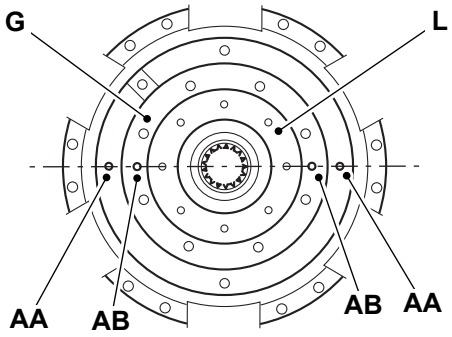
12. Keep the hub square to the drum to avoid damage to the O- ring 1.

13. Install the socket head capscrews.

14. Gradually tighten the capscrews to the correct torque value.

15. Align the threaded holes in the piston with the guide hole in the hub. Refer to Figure 664.

Figure 664.



G Piston
L Hub
AA Threaded holes in piston
AB Guide holes in hub

16. Locate the piston inside its groove.

17. Locate the larger dowel (dowel2) pins on the pressure plate into the drilled holes in the piston.

18. Use a suitable press to push the pressure plate and the plate will push the piston down.

19. Remove the pressure plate and make sure that there is no evidence of damaged seals in the form of small slices of seal material.

20. If damage is suspected, remove the piston, install new seals and then assemble again.

21. Make sure that the pressure plates are aligned correctly.

22. Replace the oil baffle plate on the locating dowel 1.

23. Install new springs.

24. Remove any debris that may have been pushed from the bolt holes into the hub.

25. If the drum and the hub are separated then the outer bearing and the capscrews must be replaced with a new one.

26. Before you install the outer bearing make sure that the spring is installed already.

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21 - Pressure Maintenance Valve (PMV)

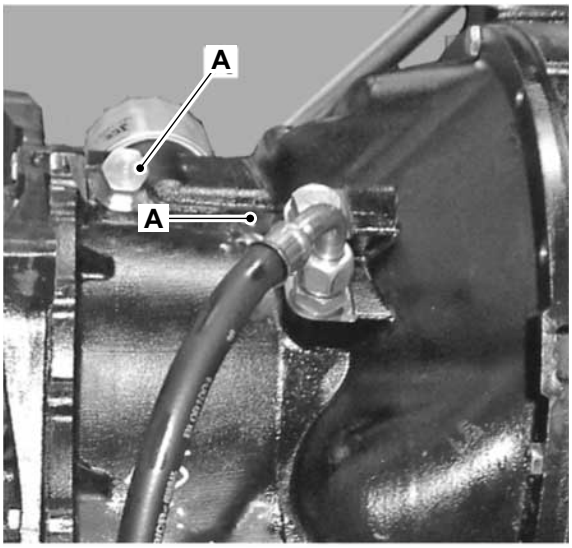
Remove and Install

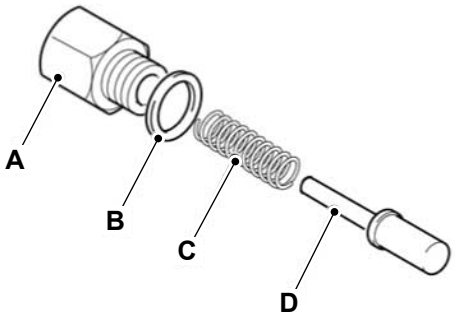
(For: PS750 MK4)

Remove

1. Clean the area around the valve and the gearbox case.
2. Do not allow particles of grit to fall into the gearbox.
3. Remove the plug then the sealing washer, the spring and the valve spool.

Figure 692.





A Plug
B Sealing washer
C Spring
D Valve spool

54 - Main Shaft

Introduction 27-190
Check (Condition) 27-191
Remove and Install 27-191

Introduction

The main shaft receives its power from the engine and transmits the power to other components in the gearbox.

Refer to Driveline, Semi-Automatic Gearbox, Output Shaft, Introduction (PIL 27-06-58).

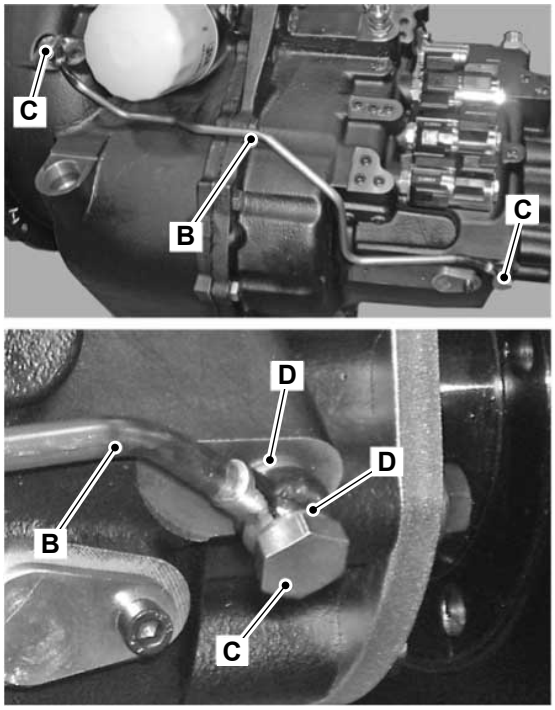
85 - Oil Feed Pipe

Remove and Install

Remove

1. Remove the adaptor bolts 1.
2. Remove all the sealing washers 1 (x4).
3. Remove the external oil feed pipe.

Figure 726.



B External oil feed pipe
C Adaptor bolts 1 (x2)
D Sealing washers 1 (x4)

Install

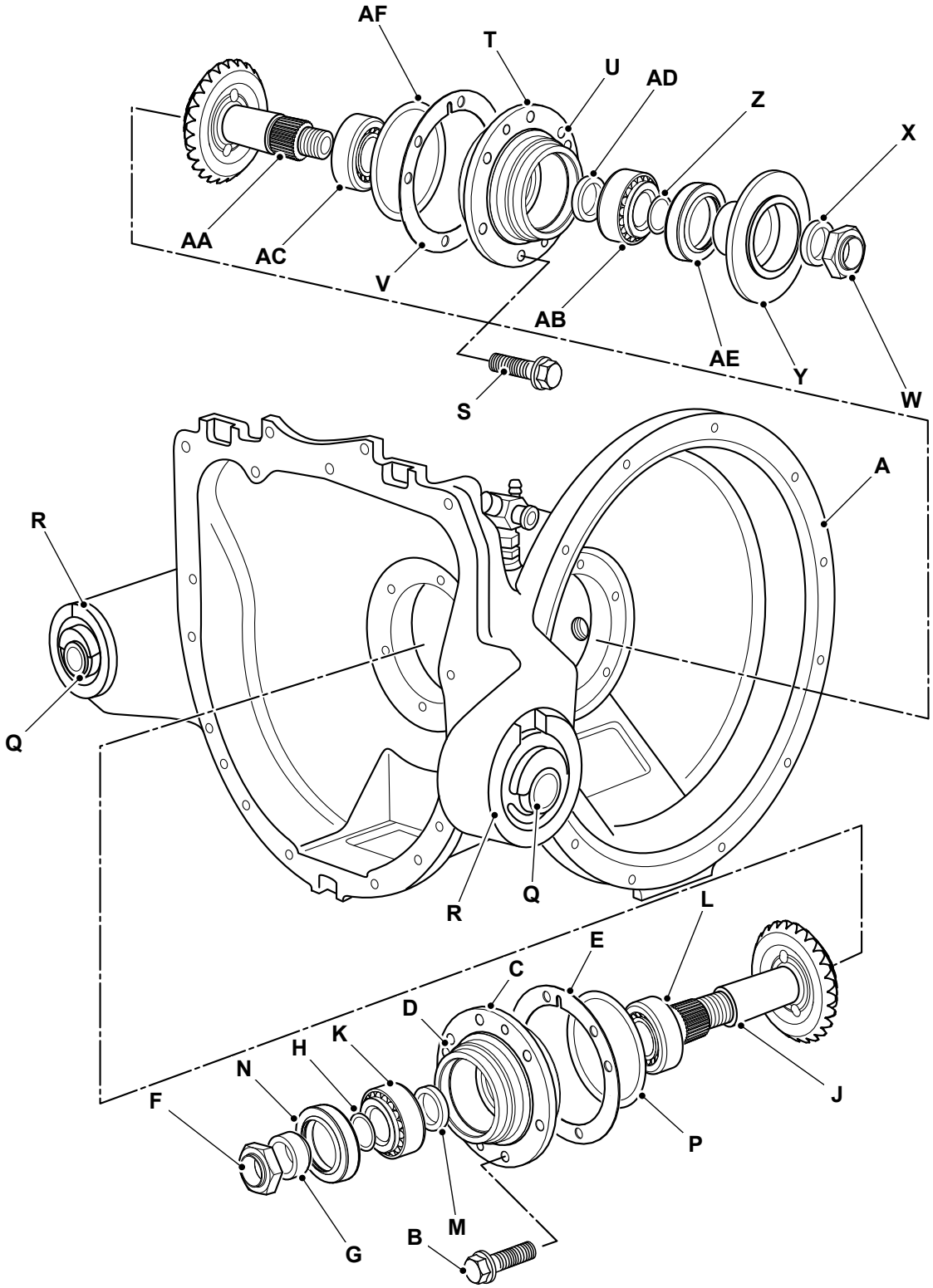
1. Install the external oil feed pipe with the adaptor bolts 1 and the sealing washers 1.
2. Tighten the bolts 1 to the correct torque value.

Table 288. Torque Values

Item	Description	Nm
C	Adaptor bolts 1	26.5

Calibrate

Figure 748.



A Gearbox housing

B Bolt 1

Operation

The torque converter is similar to a fluid coupling, which utilises the centrifugal force exerted in the transmission oil to transmit power from the engine to the gearbox. It multiplies the torque from the engine and functions as a combined clutch and infinitely variable reduction gearbox.

The torque converter is enclosed in a casing and consists of three basic parts, the impeller, reaction member and turbine.

The impeller is driven by the engine.

The reaction member does not rotate. Its hub engages with a splined tube on the gearbox oil pump and is held stationary.

The turbine is engaged with the splined end of the gearbox input shaft.

The impeller driven by the engine, forms one set of shaped blades, it can be likened to a centrifugal pump imparting energy to the transmission oil. This energy is transferred to another set of shaped blades, which form the turbine. The turbine is connected to the gearbox and converts the energy back to a mechanical torque.

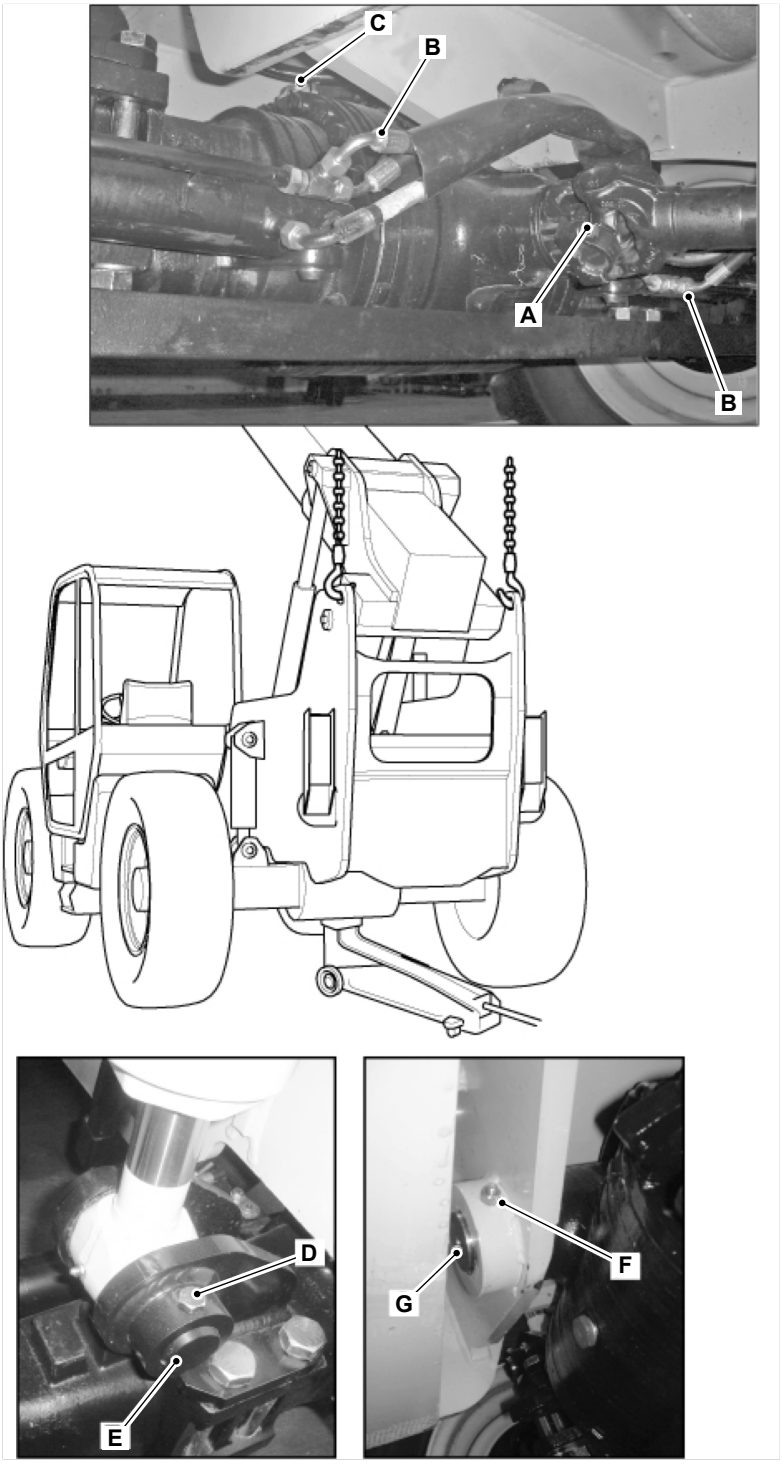
When the impeller is rotating faster than the turbine, the fixed reaction member causes some of the energy in the oil to be transferred back to the impeller. This has the effect of multiplying the torque available.

When the impeller (input) is running much faster than the turbine (output) there is a substantial circulation of transmission oil around the blades. The oil circulation is maximum when the turbine (output) is stalled, and is almost zero when the impeller and turbine speeds are equal i.e. the ratio is near 1:1. If the turbine (output) is stalled whilst the impeller (input) is revolving, all the power is dissipated as heat.

Because of the absence of a direct mechanical connection between the engine and the gearbox, the flexibility of the torque converter drive greatly reduces wear on the transmission, absorbing shocks and torsional vibration from the engine. The engine cannot be stalled due to overload, as the fluid coupling slips.

For illustration refer to Component Identification (PIL 27-14-00).

Figure 786. SD80 3 Piece Steer Drive Axle- Integral Brakes

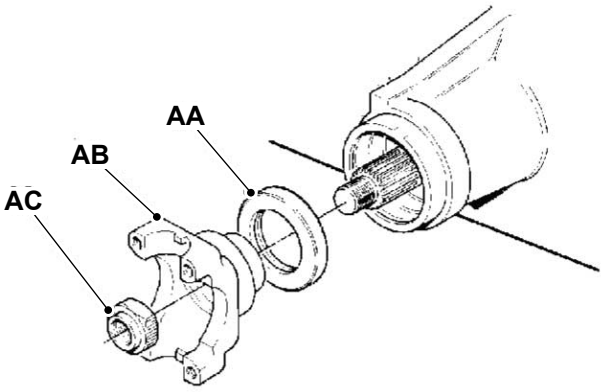


A Bolt 1
B Hydraulic feed hose
C Brake hose
D Bolt 2
E RAS ram pivot pin
F Bolt 3
G Axle pivot pin

38. Install the sleeve. Refer to Figure 805.
39. Tighten the adaptor to the specified value, to protect against bearing damage while spacer selection is verified and make sure that the pinion is free to rotate. Refer to Figure 805.

    Torque: 50 N·m
40. Check there is no end float and pinion is free to turn smoothly by hand. Refer to Figure 805.
41. Remove the adaptor and install the stake nut. Refer to Figure 805.
42. Check that rolling torque is less than 2.0 Nm. If the rolling torque exceeds 2.0 Nm, check that the shaft is assembled correctly. Refer to Figure 805.
43. If the pinion is not free to rotate then check the correct size spacer is installed or not. Refer to Figure 805.
44. If rolling torque measured at step 42 is too high then install the next larger size spacer. If the rolling torque is too low then install the next smallest size spacer. Refer to Figure 805.
45. If a correct spacer is not available from the range, check that drivehead is assembled correctly. Refer to Figure 805.
46. Remove the stake nut and the sleeve. Refer to Figure 805.
47. Lubricate the seal lips and then install the new oil seal. Refer to Figure 807.

Figure 807.



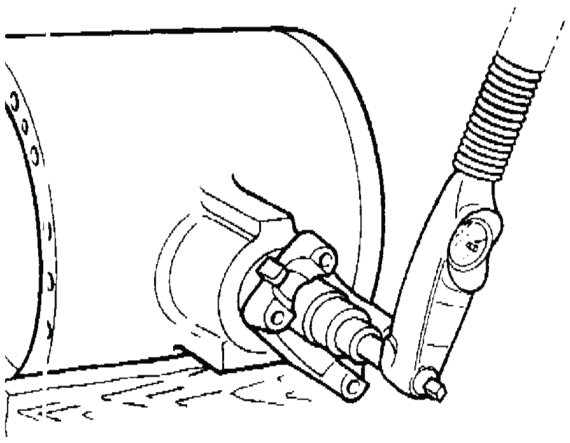
AA Oil seal
AB Coupling yoke
AC Stake nut

48. Install the coupling yoke and the new stake nut. Refer to Figure 807.
49. Gradually tighten the stake nut to the minimum specified torque value, occasionally rotate the coupling yoke. Refer to Figure 807.

    Torque: 250 N·m
50. If the correct size spacer is selected, the rolling torque should be within the specified torque value including the seal drag. Refer to Figure 807.

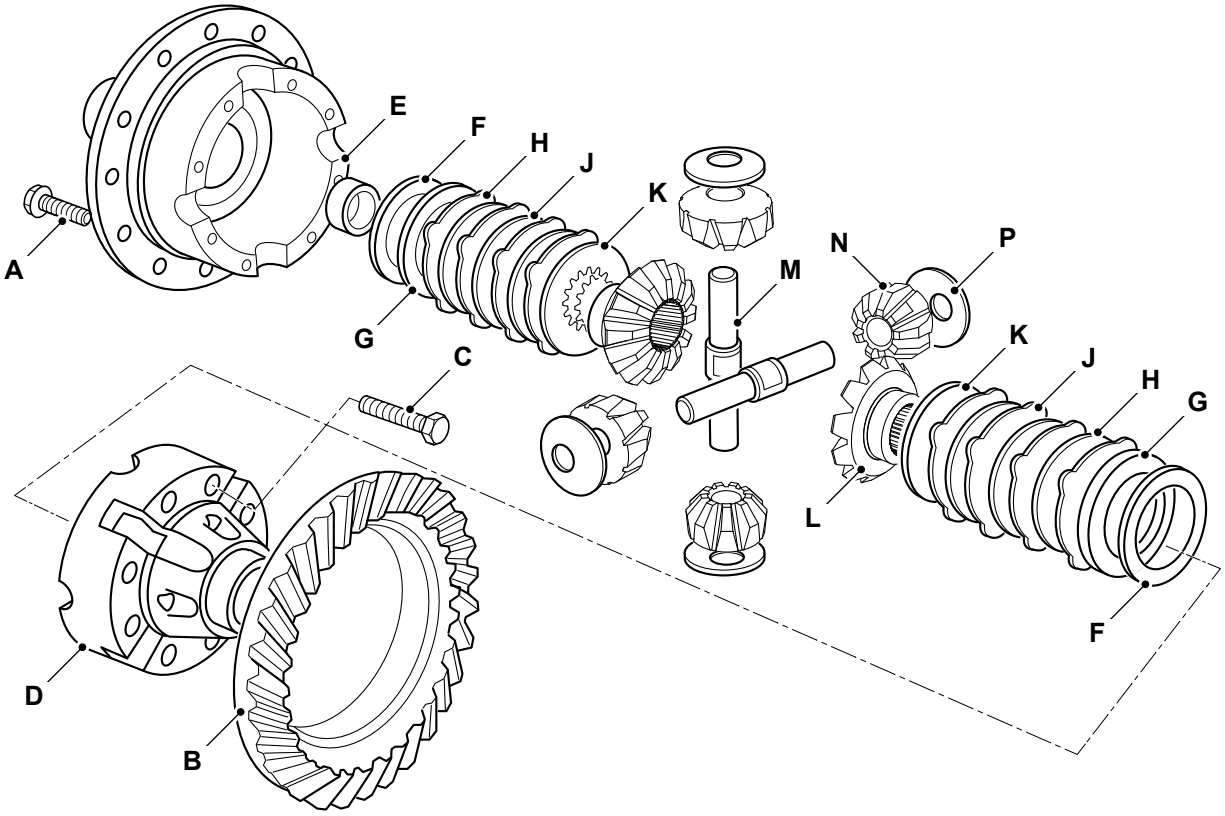
    Torque: 2.3 –3.4 N·m
51. When the torque value is correct, use a square-ended staking tool to stake the nut to the pinion shaft. Refer to Figure 807.
52. The stake nut tightening torque value can be increased to a maximum of 300 Nm if the pinion rolling torque does not exceed the maximum of 3.4 Nm. Refer to Figure 807.

Figure 808.



53. If the brake piston housing is removed then install one at the opposite end to the crownwheel. Refer to Figure 810.
54. Apply Loctite 574 to the drivehead mating face, then install the brake piston housing. Refer to Figure 810.
55. Make sure that the mark made between the drivehead and the brake piston housing at the time of disassembly is aligned. Refer to Figure 810.
56. Install the crownwheel/ differential assembly into the drivehead. Refer to Figure 809.

Figure 826. Limited Slip Differential (LSD)



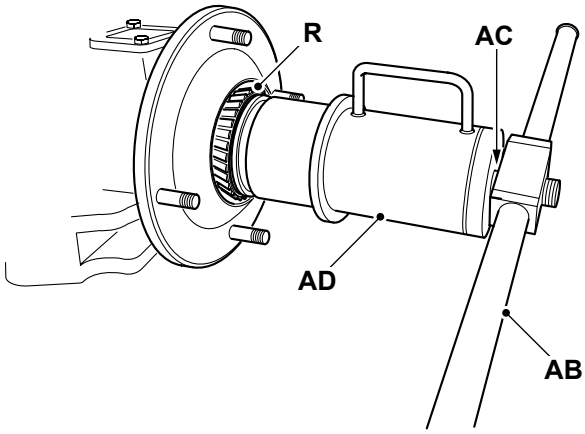
A Verbus-ripp bolts
B Crownwheel
C Bolts
D Differential assembly case
E Differential assembly case
F Shims
G Shims
H Counter plates
J Friction plates
K Pressure plates
L Side gears
M Trunnion pins
N Bevel gears
P Thrust washers

Assemble

1. Install the following components into the crownwheel half of the differential assembly:
   1.1. Trunnion pins.
   1.2. Side gears with pressure plates.
   1.3. Counter plates.
   1.4. Friction plates.
   1.5. Bevel gears.
   1.6. Thrust washers.
2. Do not install the shims at this stage.
3. Align the two halves of the differential assembly with the bolts. Make sure that the marks made during disassembly are aligned.
4. Use a DTI (Dial Test Indicator) (or feeler gauges), with two screwdrivers or suitable levers, gently apply pressure to prise the side gear away from the trunnion pins.

8. Lightly apply oil on the inner wheel bearing cone.
9. Position the bearing carrier (complete with inner bearing) onto the axle stub over the extension shaft.
10. Assemble the bearing press as shown. Refer to Figure 850.

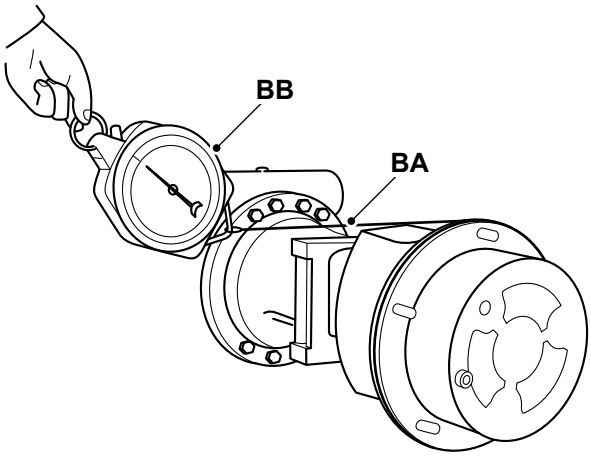
Figure 850.



R Outer wheel bearing
AB Handle
AC Thrust washers (x2)
AD Reaction tube

11. Slide the reaction tube over the extension shaft (the wide opening towards the bearing).
12. Make sure that the bearing and bearing carrier are properly positioned against the axle stub.
13. Attach the handle and make sure that the thrust bearing is installed between the two thrust washers.
14. Slowly turn the handle to press the inner wheel bearing correctly into position, then remove the handle and reaction tube.
15. Install the outer wheel bearing cone into the bearing carrier.
16. Assemble the reaction tube and handle onto the extension shaft.
17. Slowly turn the handle to press the outer bearing correctly into position until the free play is removed.
18. Remove the handle and reaction tube.
19. Assemble the annulus ring onto the annulus carrier and then install the internal clip.
20. Make sure that the dowels are correctly installed.
21. Attach the annulus assembly to the axle stub shaft in the same angular position based on the marks made during installation.
22. Install the new verbus-ripp bolts.
23. Do not tighten the verbus-ripp bolts at this stage.
24. Measure the seal drag rolling force:

Figure 851.



BA Cord
BB Spring balance

24.1. Install the planet gear carrier.
24.2. Do not install the sun gear.
24.3. Wrap a cord around the planet gear carrier flange and attach a spring balance to it as shown. Refer to Figure 851.
24.4. Pull the spring balance so that the hub rotates, do this several times to let the seal bed in and record the reading.
24.5. Remove the planet gear carrier.

25. Tighten the verbus-ripp bolts to the correct torque value.
26. Measure the rolling force:

26.1. Install the planet gear carrier.
26.2. Do not install the sun gear.
26.3. Wrap a cord around the planet gear carrier flange and attach a spring balance to it as shown.
26.4. Pull the spring balance so that the hub rotates and record the reading.
26.5. To calculate the rolling force, subtract the seal drag force (24.4) from the value obtained in the step 26.4.
26.6. The rolling force should be within the specified range.

Torque: 2 –22 N·m

26.7. If the values are outside the limits specified then check if the seal is installed correctly,

Component Identification

Main Component Identification

Figure 866.

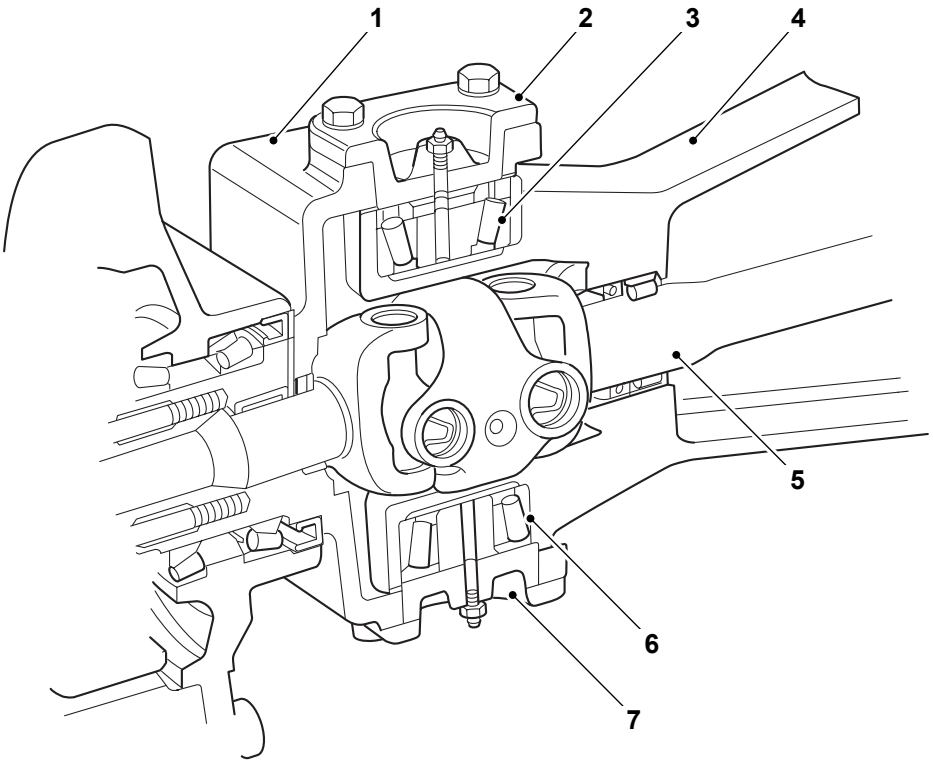


Table 343.

Item	Description
1	Hub swivel
2	Trunnion (upper)
3	Bearing (taper roller)
4	Axle arm
5	Driveshaft
6	Bearing (taper roller)
7	Trunnion (lower)

Check (Pressure)

Checking Pump Flow

Check the pump flow. Refer to Hydraulic System- Gear Pump, refer to (PIL 30-11).

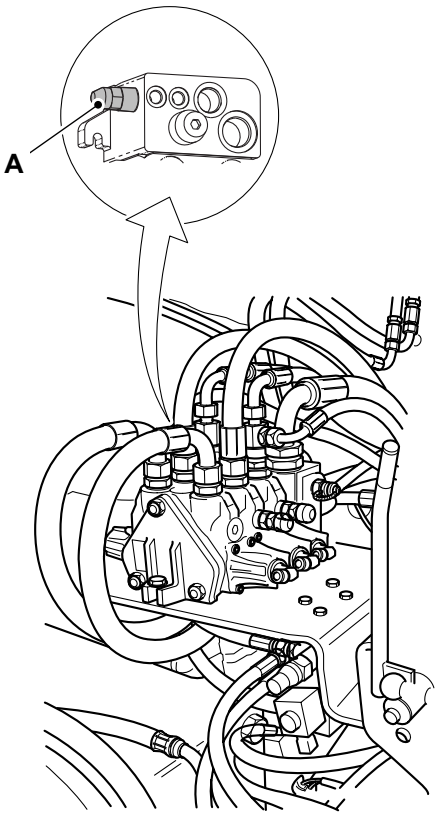
Load Sense Relief Valve (LSRV)

The maximum pressure that the main hydraulic system can get is set by the LSRV (Load Sense Relief Valve) at the control valve block inlet section.

Make sure that the temperature of the hydraulic fluid is 50 °C (121.9 °F).

To check the LSRV setting, do the procedure that follows:

Figure 878.

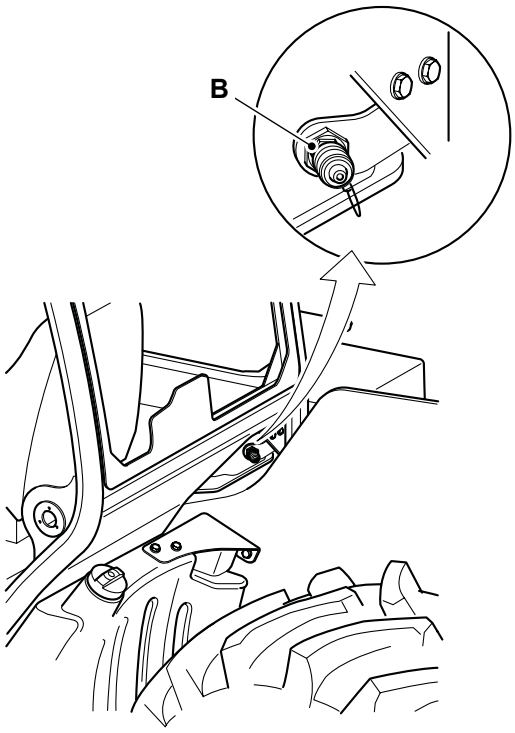


A LSRV

1. Connect a pressure gauge of the specified value to the main system pressure point located behind the cab.

   Pressure: 0 –400 bar (0.0 –5,797.1 psi)

Figure 879.



B Main system pressure test point

2. Operate the engine at 1500 RPM (Revolutions Per Minute).
3. Lower the boom and hold the boom ram in the fully closed position and check the LSRV setting.
4. Note the maximum reading on the pressure gauge. Make sure that the maximum pressure is as per the specified value. Refer to Hydraulic System- Load Sense System, refer to (PIL 30-00).
5. If the pressure is incorrect, adjust the LSRV. Refer to Hydraulic system- General- Adjust, refer to (PIL 30-00).

Auxiliary Relief Valve (ARV's)

1. Do not run the engine at maximum speed. There will be large increase in the pressure recorded.
2. Make the machine safe with the lift arm lowered. Refer to (PIL 01-03).
3. Release the hydraulic pressure. Refer to (PIL 30-00).
4. Follow the general safety precautions for the hydraulic system. Refer to (PIL 30-00).
5. Connect a pressure gauge of the specified value to the test point.

   Pressure: 0 –400 bar (0.0 –5,797.1 psi)

30 - Rear Axle Stabilization (RAS) System

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Component Identification

36 - Interlock System

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Fault-Finding 30-70

Introduction

(For: 507-42 [T2/T3], 509-42 [T2/T3], 510-56 [T2/T3], 512-56 [T2/T3])

510-56, 512-56 and 514-56 machines use a system of interlocks to prevent the operation of the machine (beyond pre-set limits) unless the boom and stabilizer legs are moved to the correct position. The interlock logic is shown in the table and on a decal found in the cab.

The interlock system prevents the operation of the sway and stabilizer functions at the same time.

Figure 907.

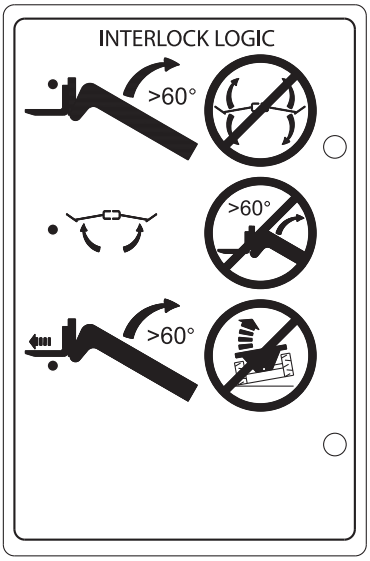

Table 378.

Interlock	Machine Status	Active Interlock	To Deactivate Interlock
A	Boom angle more than 60 °	Stabilizer isolation.	Lower the boom to less than 60 °
B	Stabilizers retracted.	Boom angle limited to a maximum 60 °	Lower the stabilizers. The stabilizer indicator lights must come ON).
C	Boom angle more than 60 ° and extended more than 6.5 m	Sway isolation.	Retract the boom to less than 6.5 m or lower the boom to less than 60 °.

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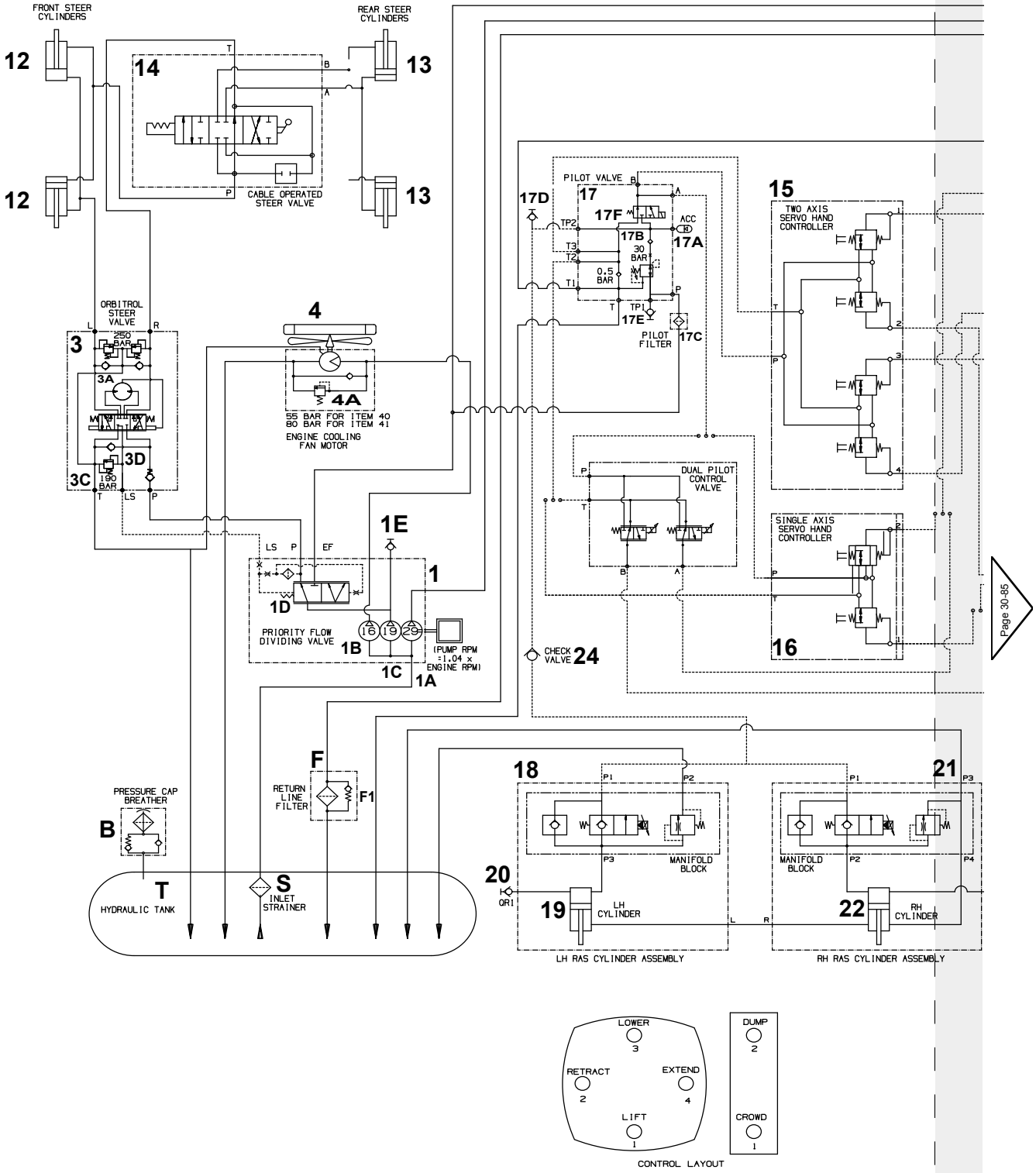
Figure 916. (Part 1 of 2)



7.3. Pull on handle, the element should separate from its canister. Discard the old element.

7.4. Remove and discard the seal.

7.5. Clean the inside of canister.

Install

1. Install the new element.

   1.1. Install a new seal 1.

   1.2. Make sure that seal 2 is installed in the new element.

   1.3. Push the element into its canister and rotate the element 90° to lock it into position. Check that the element has locked into position by pulling on the handle.

   1.4. Install the element assembly in the hydraulic tank.

   1.5. Install the spring and gasket.

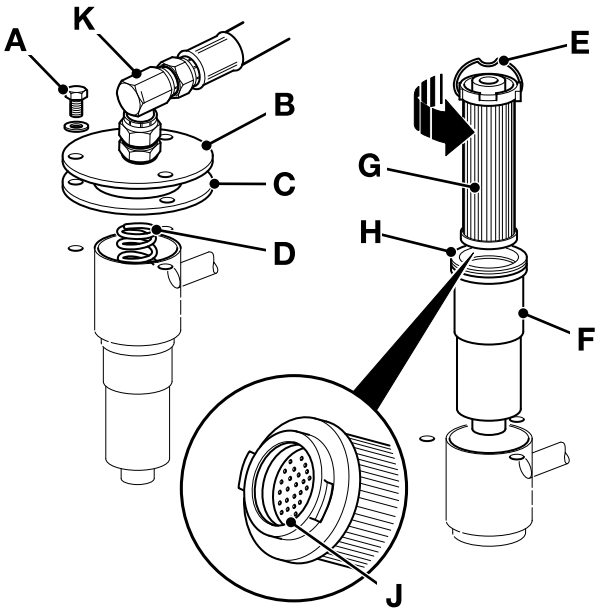
   1.6. Install the cover plate and tighten the screws.

2. Check oil level and replenish as required through filler.

3. Install the filler cap.

4. Close the rear cover.

Figure 920.



A Screws
B Cover plate
C Gasket
D Spring
E Handle
F Canister
G Element
H Seal 1
J Seal 2
K Hose

06 - Lift Arm

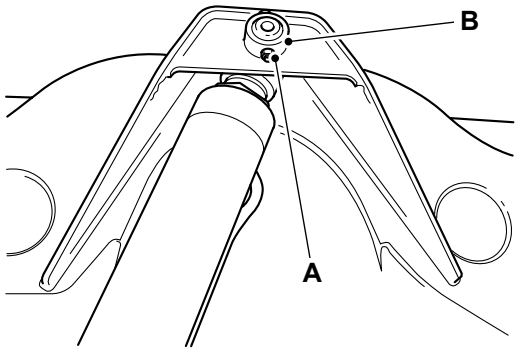
Remove and Install

Follow the general safety precautions for rams during removal and installation. Refer to (PIL 30-15).

Remove

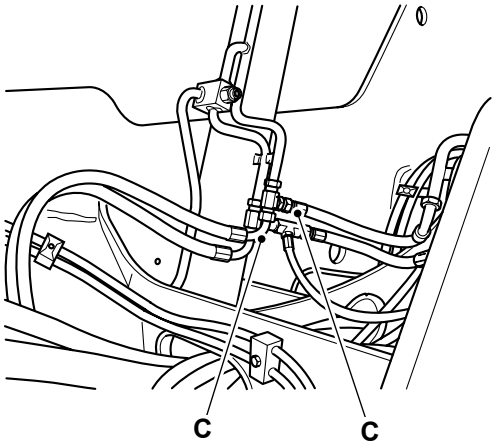
1. Raise the lift arm to get access to the lower pivot of the lift ram. Retract the lift arm fully. Support the front end of the lift arm.
2. Make the machine safe. Refer to (PIL 01-03). safe.
3. Follow the general health and safety procedures Refer to (PIL 01-03).
4. Remove the bolt 1 and take out the upper pivot pin.
5. Select the lift arm lower operation and bring down the ram until it is just closed.
6. Discharge the hydraulic pressure. Refer to (PIL 30-00).
7. Disconnect the hydraulic feed pipes and install plugs on the hydraulic pipes.
8. Remove the wheel to access the drive out lower pivot pin.
9. Support the ram.
10. Remove the bolt 2 and take out the lower pivot pin.
11. Remove the ram from the machine.

Figure 938.



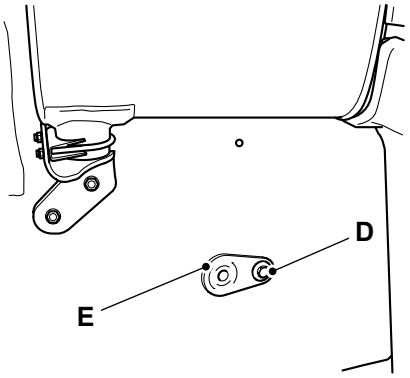
A Bolt 1
B Upper pivot pin

Figure 939.



C Feed pipes

Figure 940.



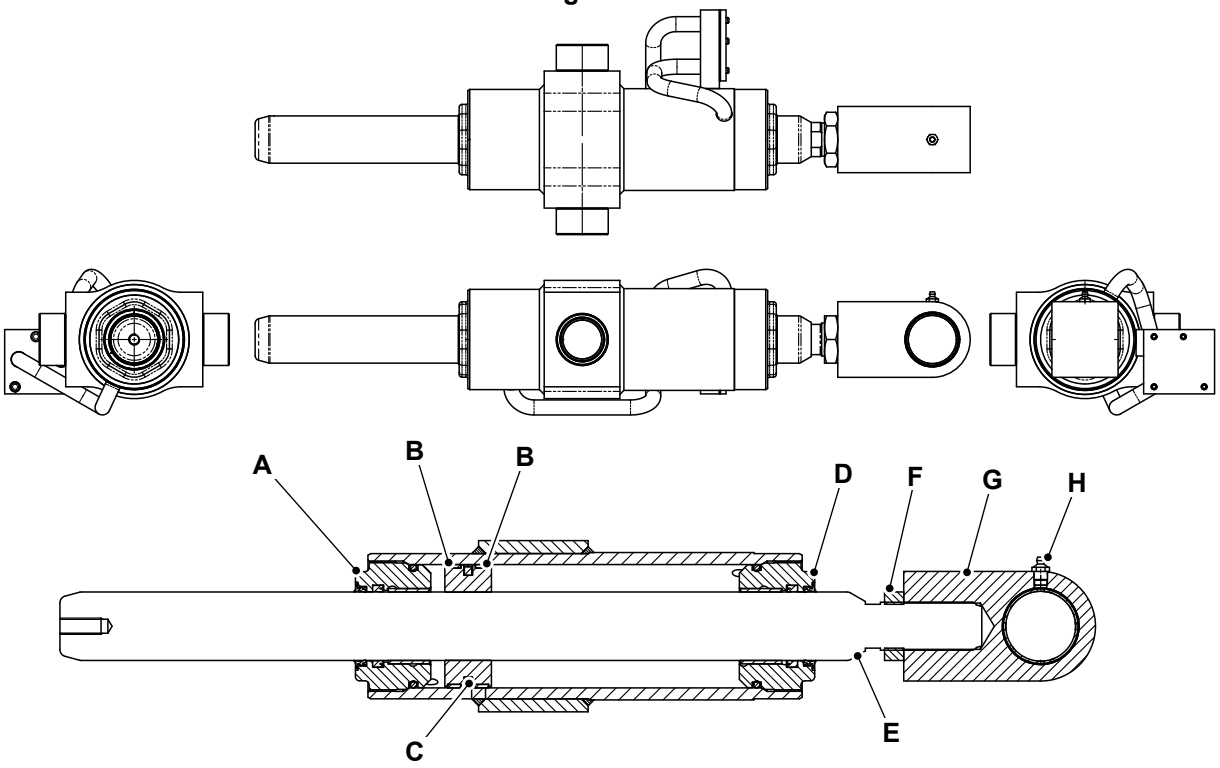
D Bolt 2
E Lower pivot pin

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
   1.1. Grease the ram pivot pins. Refer to (PIL 06-30).
   1.2. Check the hydraulic oil level. Refer to (PIL 30-00).
   1.3. Tighten fastenings to the correct torque value. Refer to (PIL 72-00).

Component Identification

Figure 960.



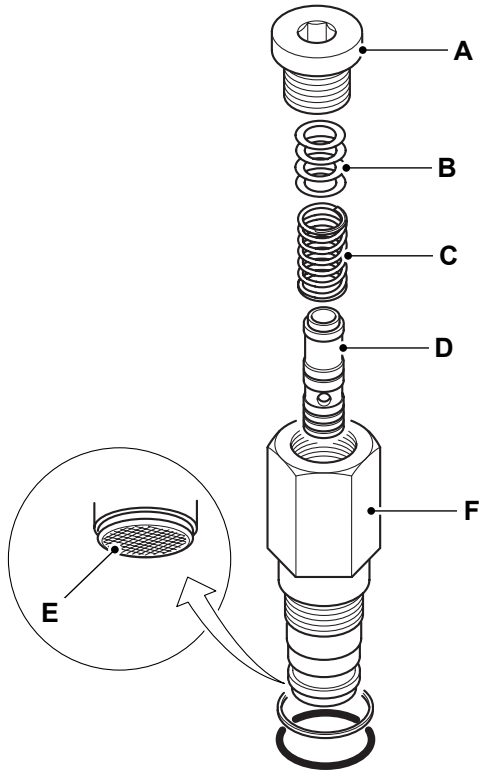
A End cap 90 x 50 S-E assembly
B Piston seal
C Wear ring
D End cap 90 x 50 S-E assembly
E Piston rod head assembly
F Nut
G Eye end
H Grease nipple

Disassemble and Assemble

Disassemble

1. Loosen and remove the top plug.
2. Carefully remove the shims, the spring and the piston.
3. Remove the O-rings and the seals with the correct round tool. Make sure that no damage is caused to the seal grooves.
4. Discard all the O-rings and the back-up rings.
5. Do not use worn or damaged items.

Figure 982.



A Top plug
B Shims
C Spring
D Piston
E Filter gauze
F Valve body

Assemble

1. The assembly procedure is the opposite of the disassembly procedure.
2. When assembling do the following steps also:
   2.1. Clean the valve components in the correct solvent.
   2.2. Lubricate the parts with JCB hydraulic fluid before you assemble them. Make sure that all the parts move freely.
   2.3. Install new O-rings and back-up rings.
   2.4. Make sure to install the filter gauze in the correct orientation.

Table 411. Torque Values

Item	Description	Nm
F	Valve body	20

Operation (Hydraulic)

(For: 506-36 [T2/T3], 507-42 [T2/T3], 509-42 [T2/T3], 510-56 [T2/T3], 512-56 [T2/T3], Flowshare System)

A typical layout is shown. For machine specific information, refer to hydraulic system- general, refer to (PIL 30-00).

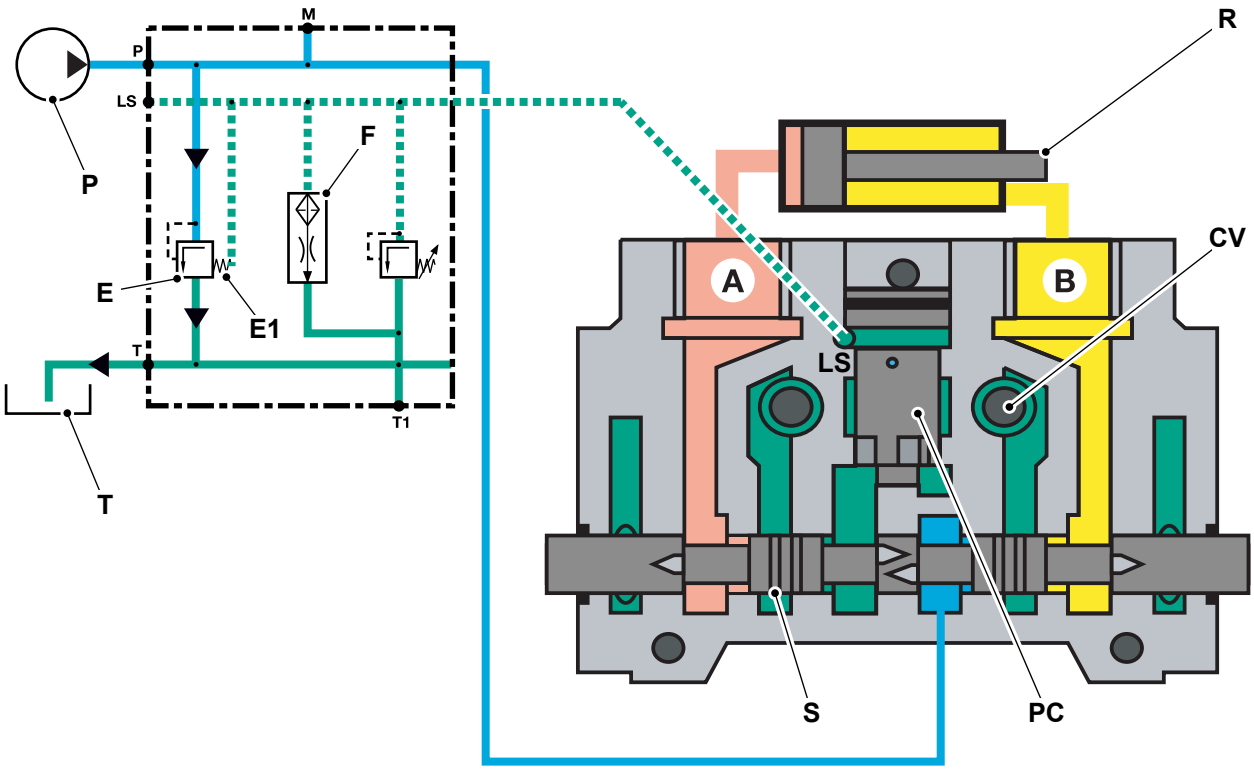
No Service Selected (All Spools in Neutral)

When the spools are in the neutral position, the oil from the pump flows to each service spool and is dead ended. This generates sufficient pressure of about 15 bar (217.4 psi) to overcome the spring. The oil flows across the flushing valve spool assembly to the tank. Any load acting on the service ram is held by the service spool.

Oil in the load sense gallery is vented to the tank across the flow regulator valve. This allows the load sense pressure to decay when no service is selected. If the flow regulator valve is blocked, a reduced flow rate will be evident.

The pressure compensator valve and load hold check valves are closed.

Figure 992.



A Service gallery
E Flushing valve spool
F Flow regulator valve
P Pump
R Service ram
T Tank
CV Load hold check valve
E1 Spring
LS Load sense gallery
PC Pressure compensator valve
S Service spool

Assemble

1. The assembly procedure is the opposite of the disassembly procedure. Additionally do the following steps.

   1.1. Clean the valve components in an appropriate solvent. Make sure that the mating faces of the valve sections are thoroughly clean before assembly.

   1.2. Install new O-rings located between the valve sections. Make sure the O-ring seals are not trapped or damaged.

   1.3. Lubricate the parts with hydraulic fluid before you assemble them. Make sure that all the parts move freely.

   Consumable: JCB Hydraulic Fluid OP 46

   1.4. If the tie rods were removed, apply sealant to the threads before you install it again. Tighten to the specified torque value.

   Consumable: JCB Threadlocker and Sealer (Medium Strength)

Table 435. Torque Values

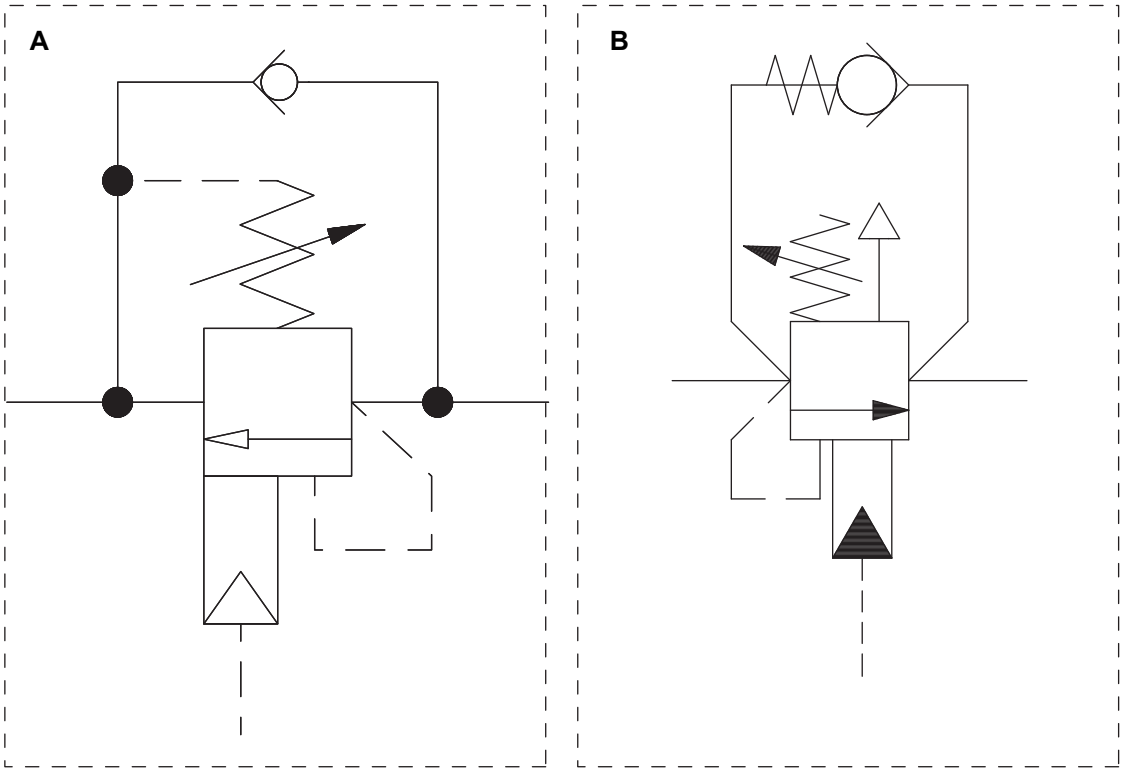
Item	Description	Nm
K	Tie rod nuts	43

Hydraulic Operation and Schematics

Valve schematic

The schematic diagrams show a typical system. For information about machine specific schematics, refer to hydraulic system- general, schematic circuit, refer to (PIL 30-00-50).

Figure 1027. Typical Valve Schematics



A Extend counterbalance valve

B Tilt counterbalance valve

03 - Lift Arm

Technical Data 30-268
Remove and Install 30-269

Technical Data

Refer to hydraulic system, hose, lift arm, component identification (PIL 30-93-03).

00 - Electrical System

Contents **Page No.**

33-00-00 General 33-3
33-00-50 Schematic Circuit 33-8
33-00-90 Earth Point 33-140

Figure 1068. (Part 2 of 2)

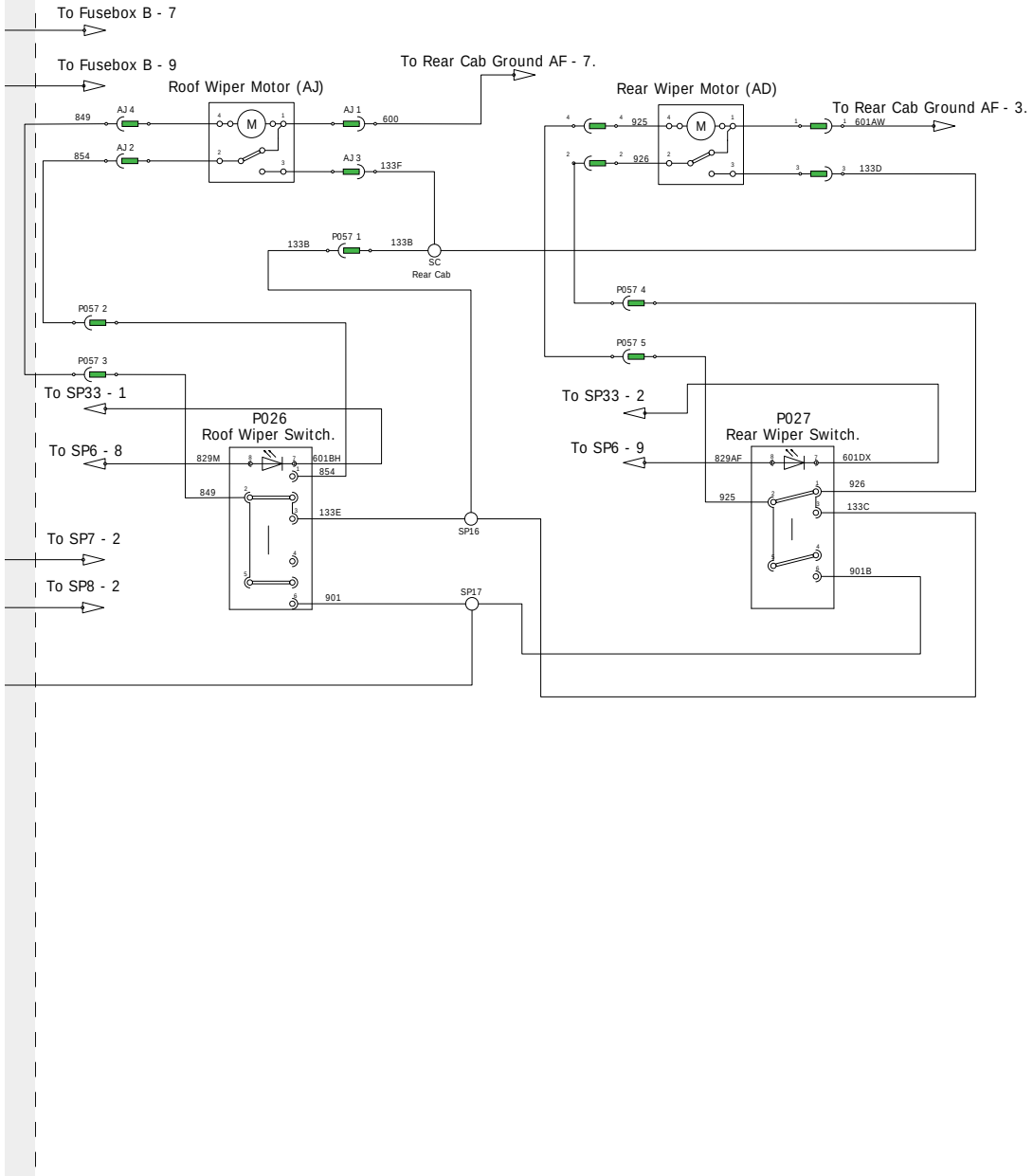


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Figure 1074. (Part 1 of 2)

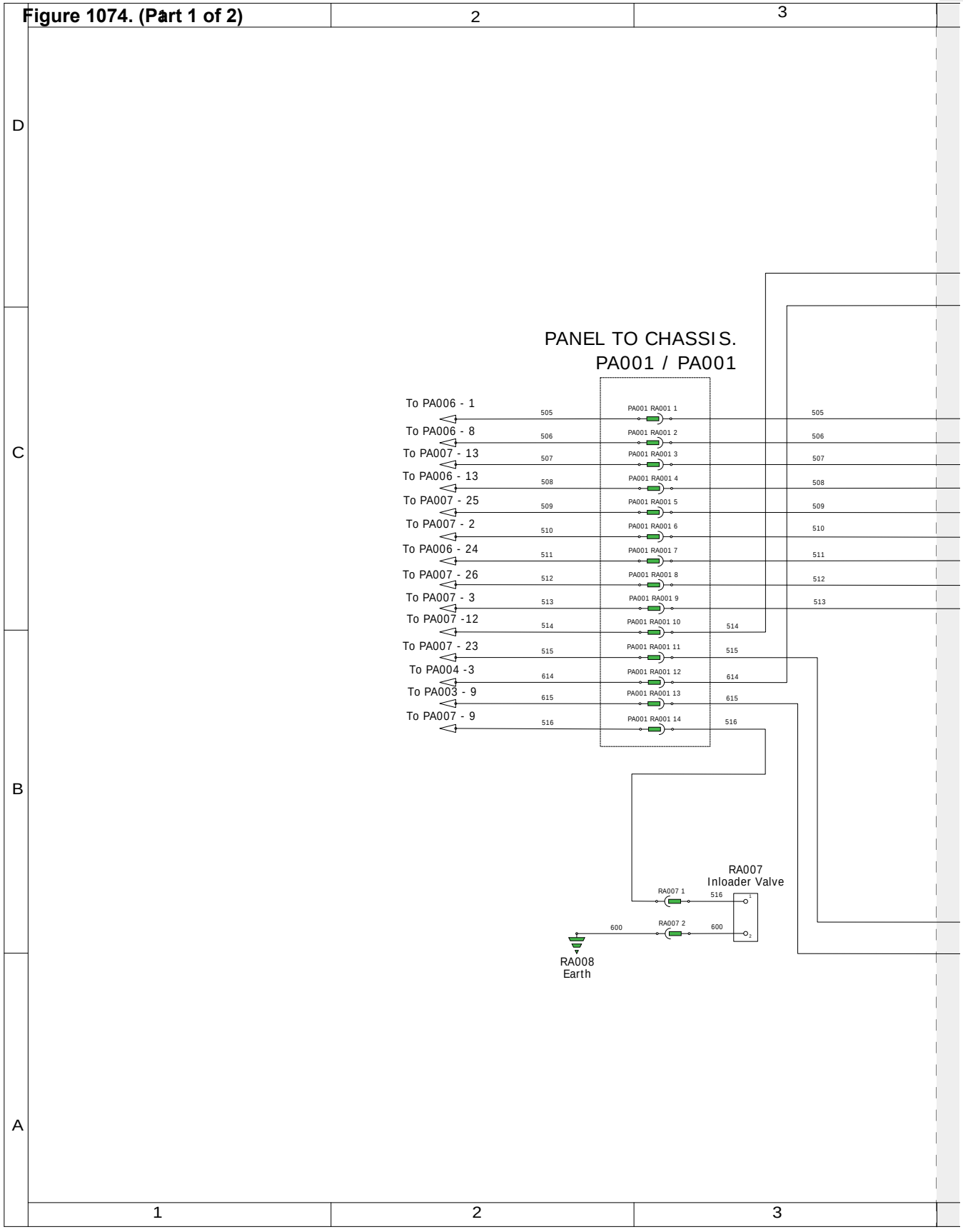

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Figure 1080. Speed sensors, Immobiliser and Transmission control - 332/F0906 Issue 2 (Sheet 5 of 16)

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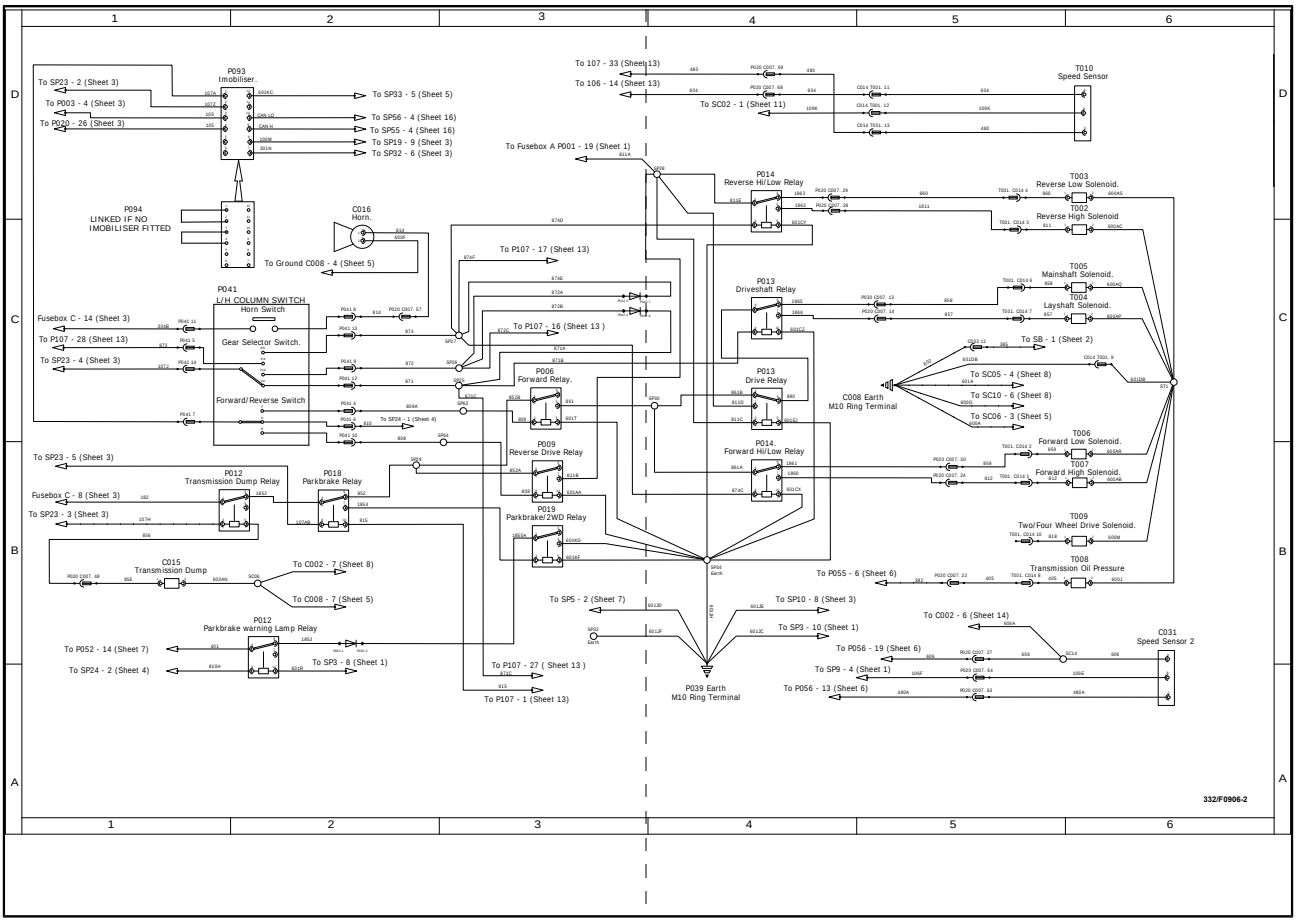
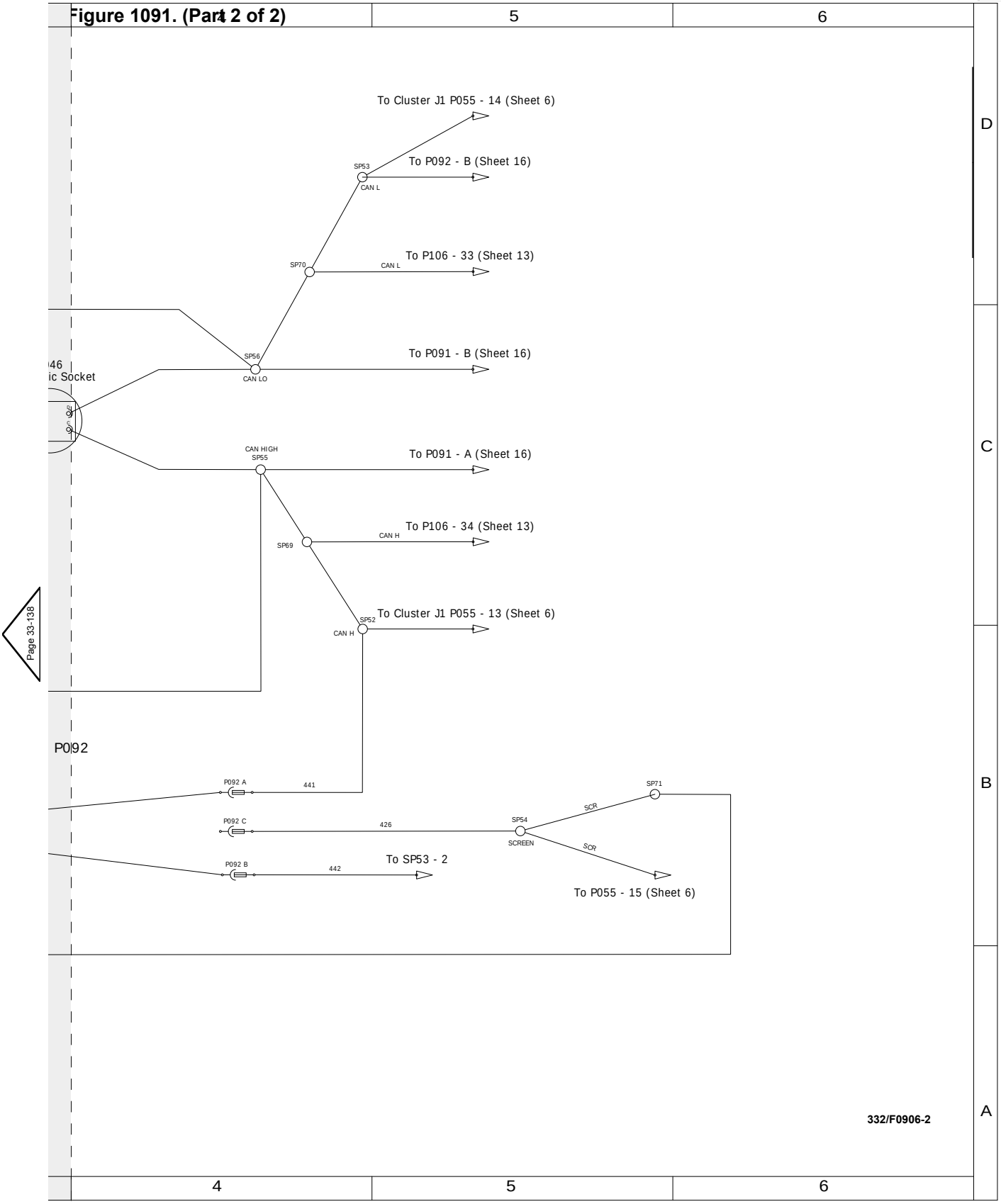


Figure 1091. (Part 2 of 2)

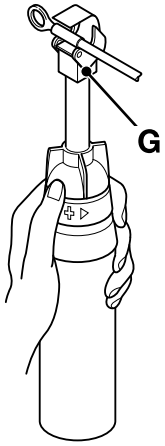


09 - Power Distribution

Contents **Page No.**

33-09-00 General 33-163
33-09-03 Fuse 33-165
33-09-06 Relay 33-168

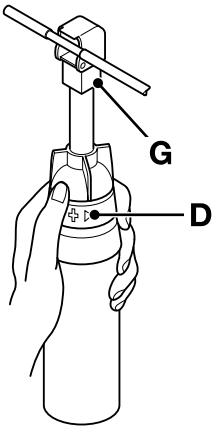
Figure 1120.



G Side wings

3.9. Side wings up, reflector head opening reduced. In this mode the heating is done only by the hot gas (use for dark coloured plastic splices).

Figure 1121.



D Red ring
G Side wings

Check (Condition)

This section describes how to use electrical measuring devices that are used in electrical fault finding.

Use of Multimeters

In order to obtain the maximum benefit from the fault finding information contained in the Electrical Section, it is important that the technician fully understands the approach to fault finding and the use of the recommended test equipment, in this case a FLUKE 85 or AVO 2003 digital multimeter, or a moving pointer analogue multimeter. The approach is based on a fault finding check list. In tracing the fault from the symptoms displayed you will be directed to make measurements using a multimeter. These instructions are intended to cover the use of the recommended meters.

1. Make sure that the test leads are plugged into the correct sockets. The black test lead should be plugged into the black socket (sometimes, this socket is also marked by a -, or E or marked as COMMON or COM). The red test lead should be plugged into the red socket marked with +, V or Ω.

2. When you make a measurement, make sure that the test probes have a good clean contact with bare metal, free from grease, dirt, and corrosion as these can cause a false reading.

3. When you measure a voltage, make sure that the correct range is selected, that it is set to the selector value equal to or greater than that you are about to measure. e.g. If asked to measure 12 Volts, set the selector to the 12V range. If there is no 12V range, set the selector to the next range higher, 20V for instance. If the meter is set to a range that is too low, it may be damaged. e.g. setting to the 2V range to measure 12V.

Measuring DC Voltage

1. Select the correct range on the multimeter.

   1.1. On the digital multimeter, turn the switch to position B.

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Figure 1129, (Part 1 of 2)

B001
Proximity Switch

Cav ID	Tag	Size	Destination
1	903	1.0	B002-1
2	1855	1.0	B002-2
3	1854	1.0	B002-3
4	605C	1.0	B002-4

4 Way DT06 Socket Housing : 1 : 7214/0025
4 Way DT06 Wedge : 1 : 7214/0016

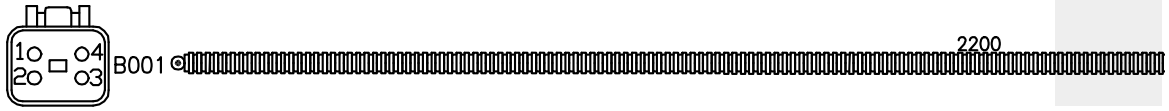

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Figure 1134. Instrument Panel Harness - 332/D8488-1 (Sheet 2 of 6)

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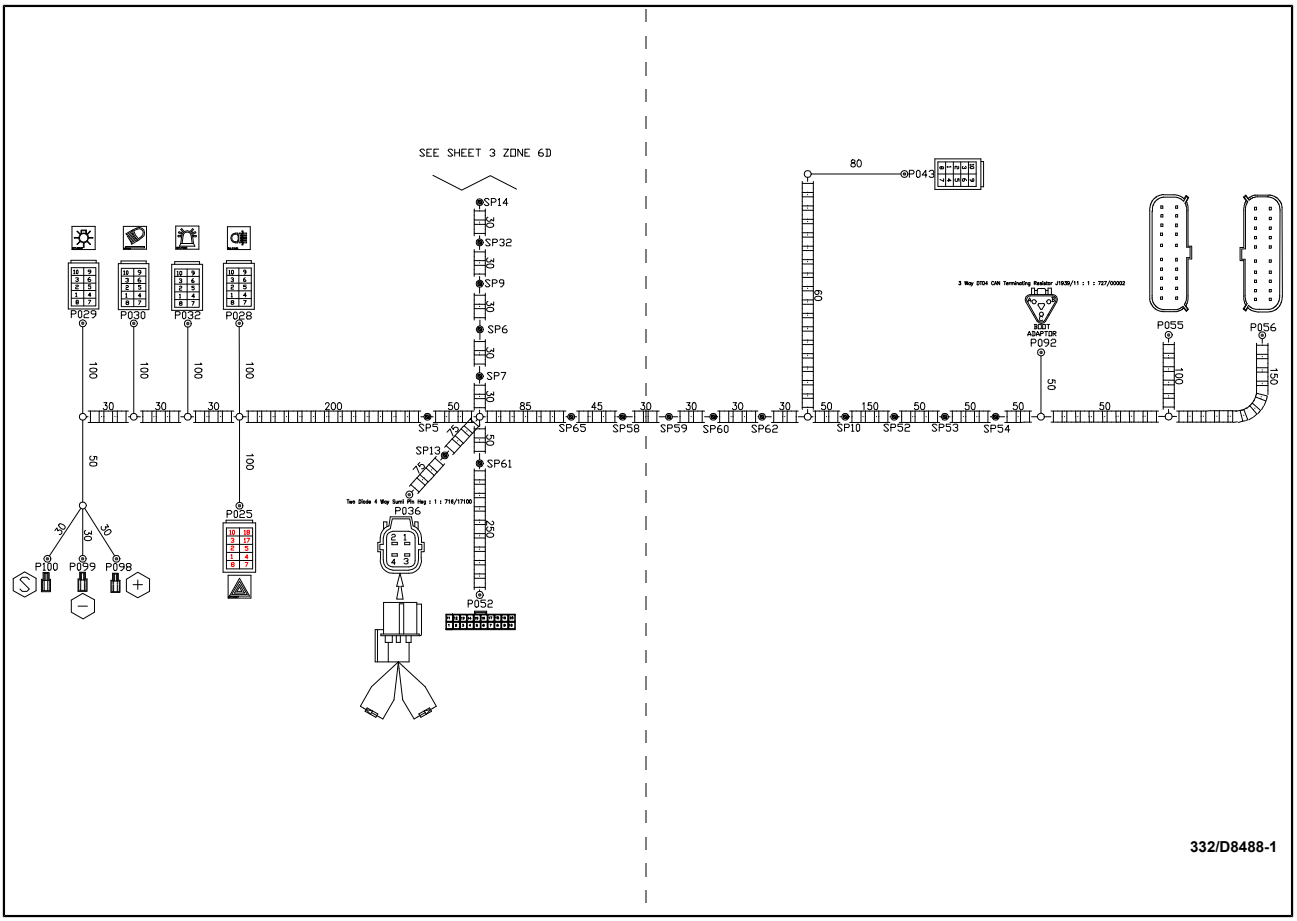
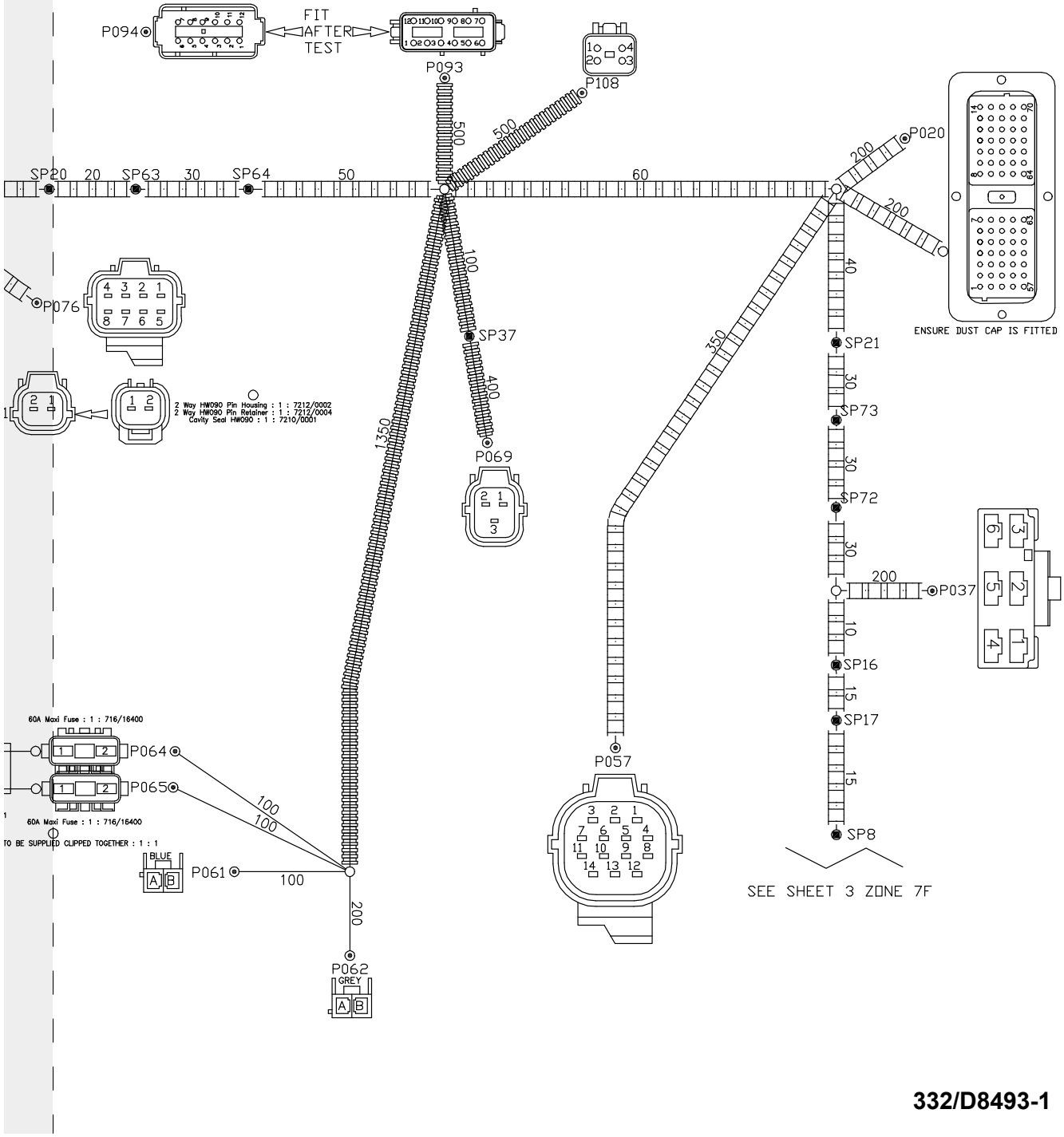


jure 1145. (Part 2 of 2)



332/D8493-1

Figure 1151. (Part 1 of 2)

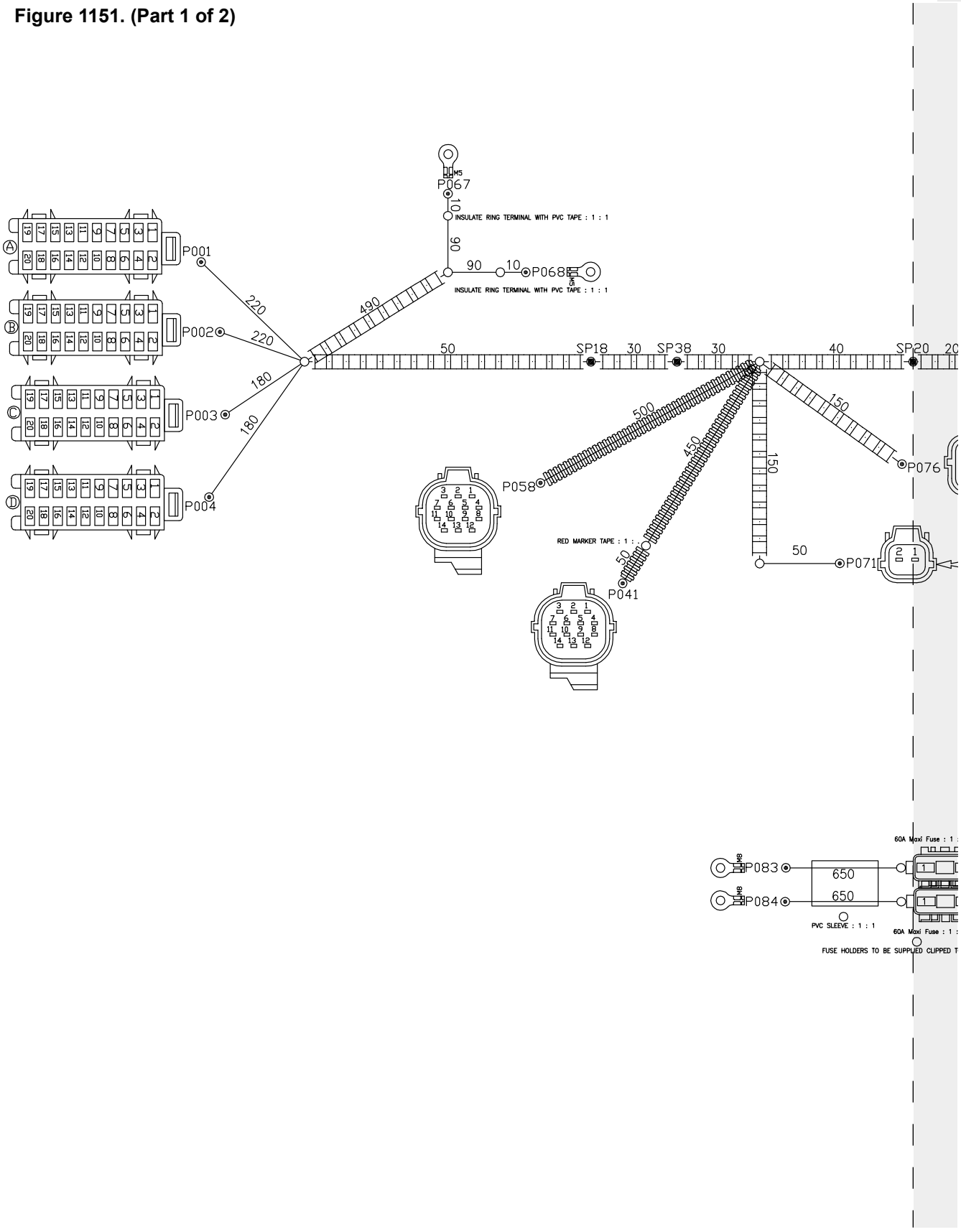


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Figure 1157. 332/F9477-1

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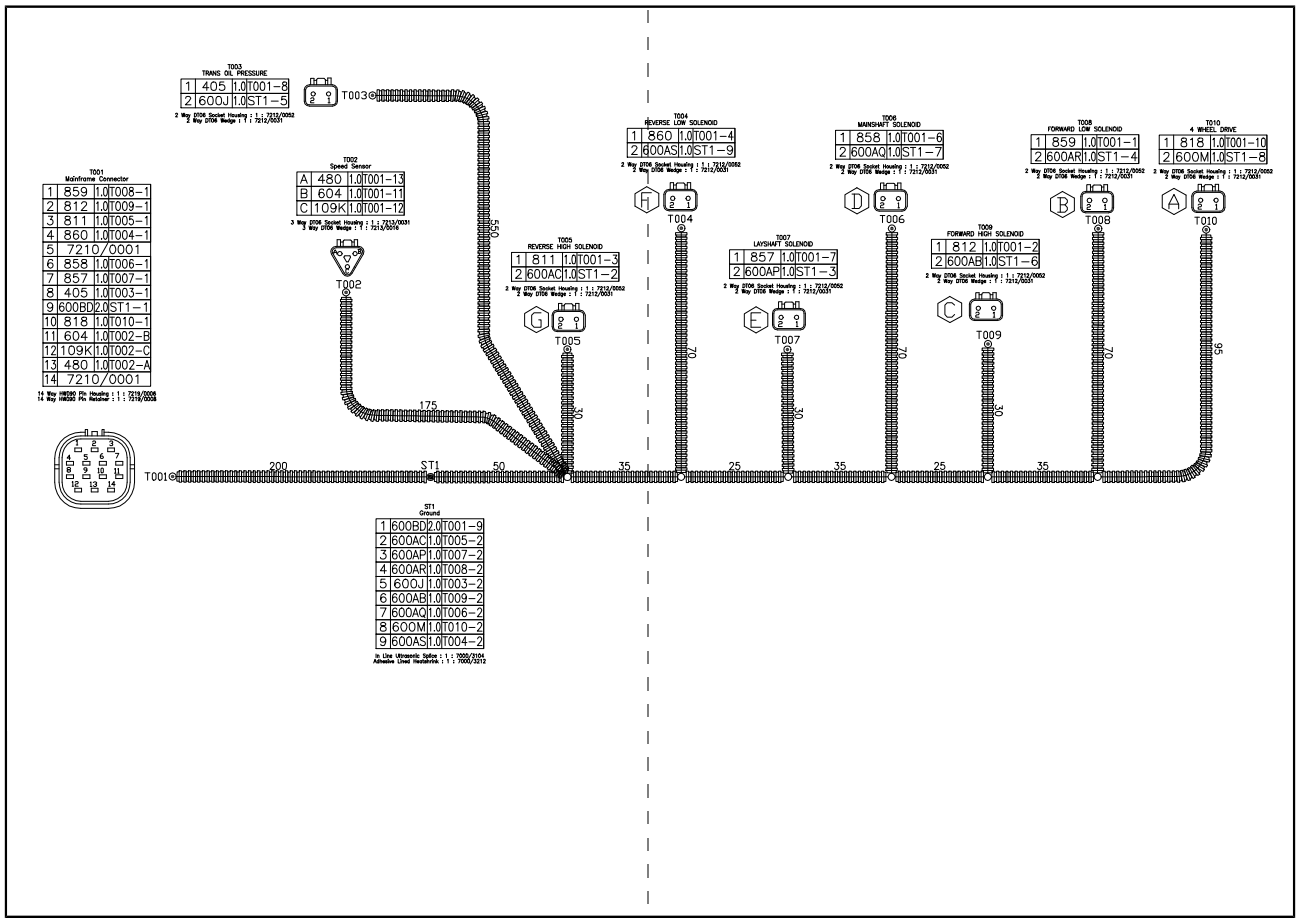


39 - Road Lights

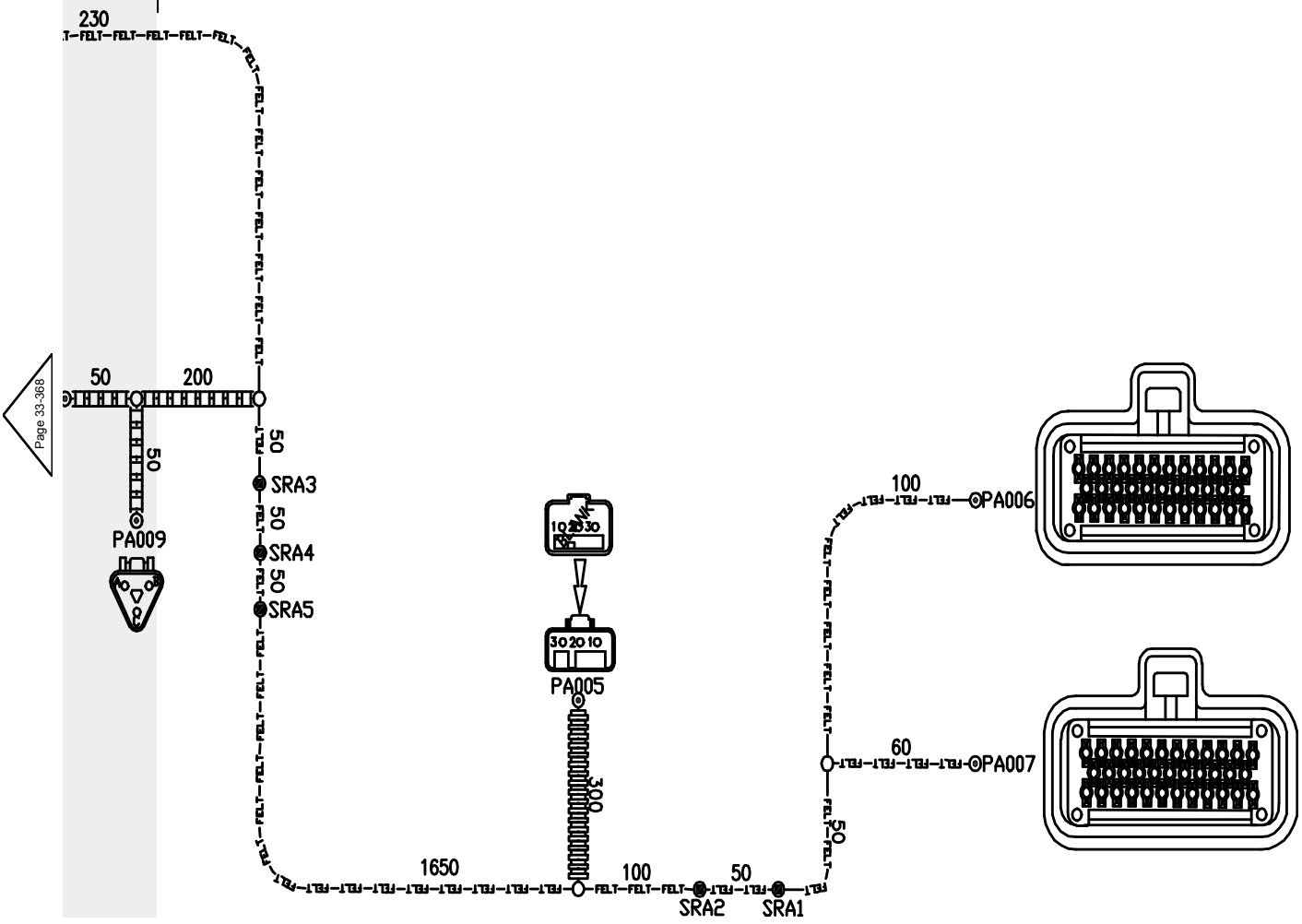
Diagram

(For: 506-36 [T2/T3], 507-42 [T2/T3], 509-42 [T2/T3])

Figure 1163. Stabiliser / Headlights Harness 721/12107-1..... Page 33-347

Stabiliser / Headlights Harness

1168. (Part 2 of 2)



Right Side Instrument Panel

⚠ **Notice:** Make sure you do not touch the electrical connector pins on electronic instruments. Make sure you put protective caps on harness connectors and the connectors on the instruments.

Remove

1. Make the machine safe.

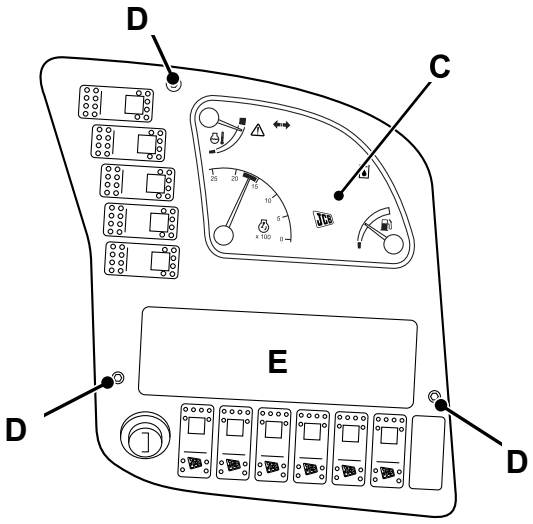
   Refer to: PIL 01-03-27.

2. Follow the general health and safety procedures.
3. Remove the radio (if installed).
4. Remove the screws (x3) that hold the main switch and instrument panel in place. Disconnect all connections and remove the panel.

Install

1. The installation procedure is the opposite of the removal procedure.

Figure 1180. Right Side Instrument Panel



C Electronic instruments
D Retaining screws (x3)
E Radio (if installed)

Figure 1217.

5. Press the information switch for 2 seconds to adjust the date.
6. Press the information switch for 2 seconds to switch between the day, month and year values. Use the arrows to adjust the values.

Figure 1218.

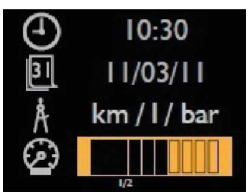
7. Press the information switch for more than 2 seconds to confirm the setup.

Brightness

To adjust the brightness of gauge backlight or display screen:

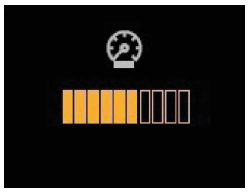
1. Go to the machine setup screen.
2. Press the navigation arrows to select the brightness band.

Figure 1219.



3. Press the information switch for more than 2 seconds.
4. Press the navigation arrows to increase or decrease the brightness.

Figure 1220.



5. Press the information switch for more than 2 seconds to confirm the setup.

Automatic Refresh Inhibit

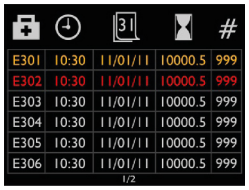
Use this menu item enable/disable the automatic refresh.

1. Go to the machine setup screen.
2. Press the navigation arrows to select the inhibit feature.
3. Auto refresh inhibit active (tick mark), auto refresh inhibit not active (X mark).
4. Press the information switch for more than 2 seconds to confirm the setup.

Fault Log

The fault log screen provides information on the active and previously active faults on the machine. The fault log display screen shows the fault code, time, date, engine hours and number of times that the fault has been active. By default, the fault log display shall only show the active faults. It shall be possible to view active and historical faults by going to the diagnostic menu. Faults shall be displayed in the colour of their severity (critical = red, warning = yellow, trivial = gray).

Figure 1221.



If a service fault or critical acknowledgeable fault is recognised by the machine electronic system a fault icon and fault code is displayed on the right side of the home screen. The fault indicator is illuminated amber or red. The buzzer sounds momentarily when a fault is active. The code will remain until it is acknowledged by pressing the information button.

Remove and Install

(For: 507-42 [T2/T3], 509-42 [T2/T3], 510-56 [T2/T3], 512-56 [T2/T3])

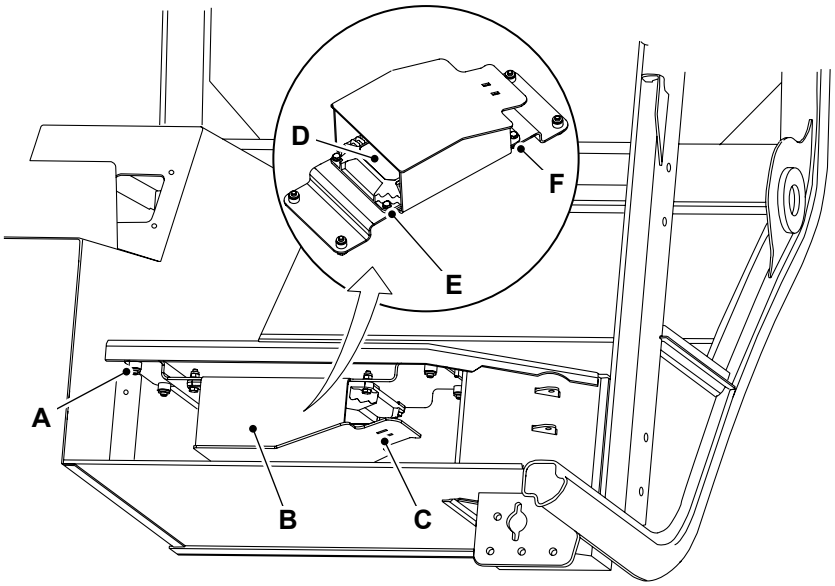
The ECU (Electronic Control Unit) is a non-serviceable part. Any units returned under warranty found to have been tampered with will invalidate any claim.

The ECUs are configured at the factory for each machine variant and are not interchangeable between machines.

Remove

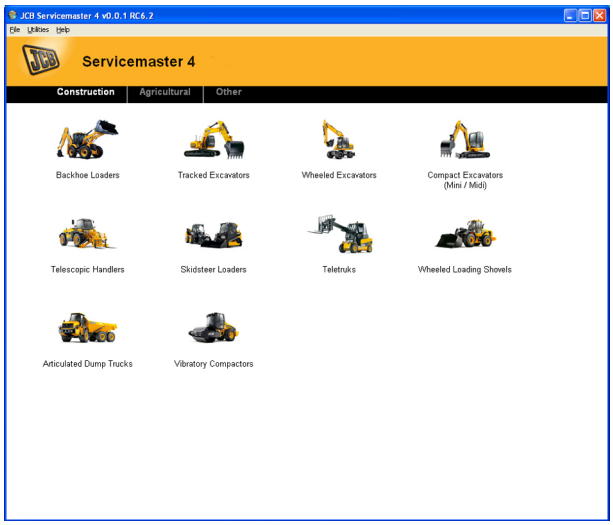
1. Make the machine safe. Refer to (PIL 01-03).
2. Follow the general safety precautions for the hydraulic system. Refer to (PIL 30-00).
3. Support the RAS (Rear Axle Stabilization) ECU and bracket.
4. Remove the bolts 1 (x4) which secure the ECU bracket to the underside of the drivers seat platform.
5. Remove and discard the cable tie.
6. Remove the bolts 2 (x4) and nuts which secure the ECU to the mounting bracket.
7. Remove the ECU from the bracket.
8. Disconnect the ECU harness connectors and position them away from the ECU.

Figure 1249.



A Bolts 1
B Bracket
C Slots
D ECU
E Bolts 2
F Nuts

Figure 1261. Typical Front Screen



Once the user has clicked on the applicable machine type they will be able to select the tool they require from a list of the tools available for that machine range. Below are screen-shots showing the different machine tool sets.

Servicemaster Tools

Servicemaster tool sets are different for each machine range. When you have navigated to the correct machine type via the front end, you will be greeted with the relevant tools for that particular machine. These tools are accessed by a single click on the icon of the tool you require. There are 6 main tools within Servicemaster, these are:

Figure 1262. Machine/Engine Set-up tool

View and change engine and machine specification data stored in the engine ECU. Settings include:

- Parameter settings
- Option/Attachment control
- Alternative Language Support
- Model/Serial Number Identification

Figure 1263. Diagnostics tool

View engine operating parameters in real time. Perform engine electrical actuator tests. View, save or clear ECM fault code log.

Figure 1264. Flash Programmer tool

View ECM software file version. Upload and Reprogramme software updates to the ECM memory. Upload revisions to software.

Figure 1265. Data Logger tool

Running Data Collection, Operating Data, Statistics, Device Error Log Recording.

Figure 1266. Service History

Engine Hour records, Service Dealership Codes.

Figure 1267. Help

Comprehensive information about engine related sensors, actuators and ECM fault codes.

Additional Service Tool

As well as the tools stated above there are also third party tools for some of the machine ranges which will need to be installed. These tools are denoted by the following symbol:

Hydraulics ECU Diagnostic Pages

The information on the diagnostic pages is constantly updated in real-time. The status of the ECU electrical inputs and outputs is displayed using:

- Simulated LEDs: The LEDs change colour depending on the status of the inputs and outputs.
- Numerical values: i.e. Volts, PWM (Pulse Width Modulation) output, current.

Switches

The status of each of the switch inputs to the ECU is shown. Where there are two switch inputs, 'NO' (Normally Open) and 'NC' (Normally closed) inputs are shown. The status is displayed using the simulated LEDs.

Variable inputs

The voltage of the variable inputs is shown. The voltages can be observed during operation and their values compared to expected readings.

Digital outputs

The status of the digital outputs from ECU are displayed using the simulated LEDs.

Valve outputs

The status of the digital outputs from the ECU to the hydraulic solenoid valves is displayed using the simulated LEDs. The current value of the solenoid outputs can be monitored to make sure they both meet specifications.

Diagnostic procedure

Use of the diagnostics pages requires operation of the relevant machine system at the same time. If necessary get the help of an assistant. In the event of a system fault, the applicable diagnostic page can be used to check the operation of all the relevant electronic and electrical devices. Operate the system and view the diagnostics page to see if the system devices respond as expected. For example: There is no voltage change shown when the servo control lever is operated in the relevant axis. This may indicate a fault with the servo lever or its wire interconnection.

Fault Code	Description	Warning Display Colour	Severity
D219	Water in fuel sensor short circuit		
D228	Reversing fan output short circuit		
D229	Brake Pressure Supply Out Of Range Low		Stop now
D230	Brake Pressure Supply Out Of Range High		Stop now
D231	Brake pressure supply low		Stop now
D232	Brake pressure option fault		Stop now
D300	CANbus communication fault		
RAS (Rear Axle Stabilization) diagnostic LED (Light Emitting Diode) blink code	RAS system fault warning	Amber	Service
RAS diagnostic LED blink code	RAS system critical fault	Red	Stop now
RAS diagnostic LED blink code	Control valve spool switch critical fault	Red	Stop now
Z000	Error logs erased		
Z111	Error logs full		
Z200	Vehicle serviced		

Transmission 'T' Codes

Table 491.

Fault Code	Description	Warning Display Colour	Severity
T000	Column switch neutral out of range error	Amber	Service
T001	Column switch forward out of range error	Amber	Service
T002	Column switch reverse out of range error	Amber	Service
T003	Column switch short circuit	Red	Stop Now
T004	Column switch open circuit	Red	Stop Now
T005	Joystick F/N/R switch short circuit	Amber	Service
T006	Joystick F/N/R switch open circuit	Amber	Service
T007	Joystick CANbus fault	Amber	Service
T008	Joystick F/N/R neutral fault	Amber	Service
T009	Joystick F/N/R forward fault	Amber	Service
T010	Joystick F/N/R reverse fault	Amber	Service
T011	Pump forward solenoid (high side) - short circuit to battery	Red	Stop Now

Fault Code	Description	Warning Displays	Severity
L039	Boom retract solenoid - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L040	Boom retract solenoid - short circuit to ground	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L041	Boom retract solenoid - short circuit to battery	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L042	Boom extend/retract solenoid return - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L043	Boom extend/retract solenoid return - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L044	Boom extend/retract solenoid return - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L045	Auxiliary ‘A’ solenoid - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L046	Auxiliary ‘A’ solenoid - short circuit to ground	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L047	Auxiliary ‘A’ solenoid - short circuit to battery	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L048	Auxiliary ‘B’ solenoid - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L049	Auxiliary ‘B’ solenoid - short circuit to ground	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L050	Auxiliary ‘B’ solenoid - short circuit to battery	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L051	Auxiliary ‘A’/’B’ solenoid return - open circuit	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service
L052	Auxiliary ‘A’/’B’ solenoid return - short circuit to ground	MIL lamp activated (Amber). Message displayed on LCD. Buzzer activated for 1 second.	Service

Fault Code	Description	Warning Display Colour	Severity
U0100-00	CAN communication error: ECU confirmed absent (#0)	No Display	Trivial
U0101	CAN bus-line open from general unit	No Display	Trivial
U0107	TSC1 Time out error	Red	Critical
U010A-88	CAN communication error: EGR communications	No Display	Trivial
U010C-88	CAN communication error: VGT communications error	No Display	Trivial
U0121-00	CAN communication error with ABS	No Display	Trivial
U0401-00	CAN communication error: checksum error	No Display	Trivial
U0401-00	CAN communication error: message frozen	No Display	Trivial
U0401-00	CAN communication error: message intermittent	No Display	Trivial
U0401-00	CAN communication error: out of range	No Display	Trivial
U0401-00	CAN communication error: timeout	No Display	Trivial
U0408	TSC1 Checksum test	Red	Critical
U0408	TSC1 Rolling count test	Red	Critical
U0411	EGR no transmission/ not received failure (for CAN)	Red	Critical
U040B-00	CAN communication error: EGR calibration	No Display	Trivial
U040B-00	CAN communication error: EGR obstruction	No Display	Trivial
U040B-4B	CAN communication error: EGR overtemperature	Amber	Operator
U040B-96	CAN communication error: EGR hardware	No Display	Trivial
U040B-97	CAN communication error: EGR obstruction	Amber	Operator
U040B-98	CAN communication error: EGR overtemperature	Amber	Operator
U040D-00	CAN communication error: VGT end-of-line learnt position	No Display	Trivial
U040D-00	CAN communication error: VGT spanlearn	No Display	Trivial
U040D-54	CAN communication error: VGT spanlearn	Amber	Operator
U040D-96	CAN communication error: VGT hardware	Amber	Operator
U040D-97	CAN communication error: VGT obstruction	No Display	Trivial
U040D-98	CAN communication error: VGT overtemperature	Amber	Operator
U040D-9A	CAN communication error: VGT position	No Display	Trivial

As the machine gets closer to its stability limit the boom hydraulic services slow down and then stop.

The system is an enhancement to the devices that JCB currently install as standard, for example loadcharts and boom extension markers. The system must not to be relied upon as the primary source of protection for the machine. Duty of care is still with the operator/site agent to:

1. Know the mass and load centre of loads being handled.
2. Know boom angle and extension that will be required to place the load (this can be checked by doing a dry run first without the load).
3. While moving the load, obey lift charts, boom extension markers and LLMI indications.

The system has two working modes- Load Control Mode and Ground Work Mode. There is an additional Emergency Override mode.

The system will not protect against the instability due to the stabiliser legs being lifted or due to the misuse of the chassis levelling (sway) function (if either of these options are installed). Refer to the operators manual.

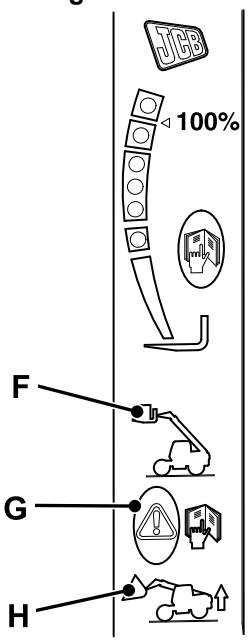
Make sure you check the correct functioning of the system at the start of each working day.

The use of handling attachments for unit loads (for example, bales or bulk bags) can cause a significant increase in the overturning moment through use of the crowd and dump operations. Make sure that the use of such attachments does not take the machine beyond its stability limit. Refer to machine load charts.

The system is designed to help you to work more safely- it is not a substitute for skill and common sense!

Refer to Operation, Hydraulic, (PIL 66-00) and Operation, Electrical, (PIL 66-00).

Figure 1353.



F Active symbol (green)
G Mode button
H Not active symbol (amber)

Table 502.

Item	Description	Function
F	Mode change button	
G	Load Control mode symbol	Lit when Load Control mode selected, flashes when red LED is lit (in Load Control mode)
H	Ground Work mode symbol	Lit when Ground Work mode selected

00 - Fasteners and Fixings

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Notes:

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