

# SERVICE MANUAL

FASTRAC (AGRICULTURAL TRACTOR)  
**8290, 8330**

EN - 9813/5000 - ISSUE 2 - 08/2016


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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.

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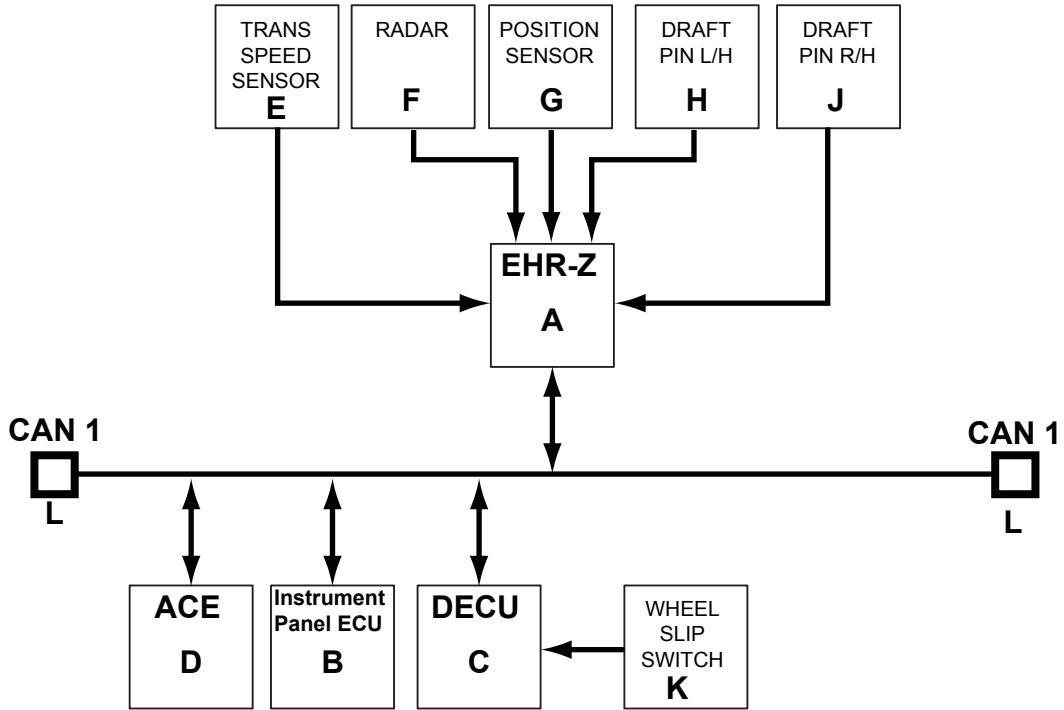


## 12 - Hitch

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Diagram

Figure 16.



- A Rear hitch ECU (Electronic Control Unit)
- C DECU (Display Electronic Control Unit)
- E Transmission speed sensor
- G Rear hitch position sensor
- J Draft pin RH (force sensor)
- L CAN (Controller Area Network)1

- B Instrument panel ECU
- D Auxiliary control ECU
- F Radar unit
- H Draft pin LH (force sensor)
- K Wheel slip control function ON/OFF switch

## **00 - General**

### **Check (Condition)**

1. Make sure that all of the guards and protective devices are in position, secured by their locking devices and free from damage.
2. Inspect all of the steelwork for damage. Include the following:
  - 2.1. Examine all of the pivot point welds.
  - 2.2. Examine the condition of all the pivot pins.
  - 2.3. Check that the pivot pins are correctly in position and secured by their locking devices.
3. Check the steps and handrails are undamaged and correctly attached.
4. Check for broken, cracked or crazed window glass and mirrors. Replace the damaged items.
5. Check that the lamp lenses are undamaged.
6. Check that all of the safety and instructional labels are undamaged and in position. Install new labels where necessary.
7. Note any damaged paintwork for future repair.
8. Inspect the machine for broken or loose fasteners.



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## Introduction

Pivot pins are a short shaft or pin that supports something that turns. Pivot pins are installed in numerous positions on the machine. There is usually a greasing point associated with the pivot pin. Make sure that the pivot points are greased at regular intervals. Refer to the Machine Maintenance Schedules. Refer to (PIL 78-24).

## Slide Hammer Kit

The slide hammer kit is used to remove pivot pins that must be extracted, i.e. cannot be 'knocked through'. The purpose of this description is to explain how the kit and the various components are used to remove the pivot pins.

The adaptors that form part of the kit have a screwed thread at each end. One of the threads will always be M20 size, this is to accommodate the end stops. The other end of the adaptor will have varying thread sizes to suit the different size of threads in the pivot pins.

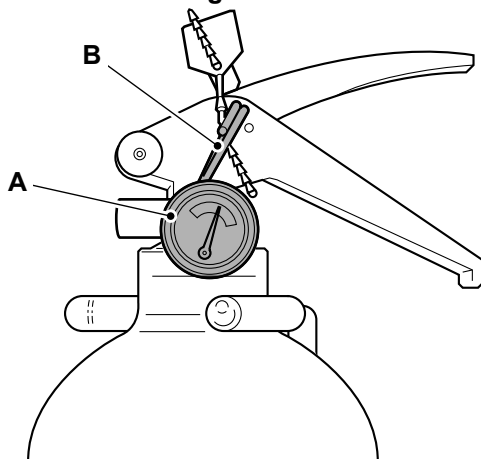
## 00 - General

### Introduction

In addition to the operator check the extinguisher must be serviced every 12 months by a suitably qualified person.

1. Examine the fire extinguisher for damage and leaks.
2. Make sure the fire extinguisher is correctly attached.
3. Make sure that the gauge indicates that the extinguisher is charged i.e. the needle is in the green segment
  - 3.1. If the needle is in or very near the red segment at either end of the gauge, the extinguisher must be serviced or replaced.
4. Make sure the safety pin is correctly installed.

**Figure 38.**



- A** Gauge  
**B** Safety Pin

**00 - General**

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**Introduction**

The service procedures, explain how to correctly remove and install panes of glass that are directly bonded to the cab frame apertures. When you carry out any service procedure, you must always refer to the relevant safety precautions, Health and Safety (PIL 09-09).

1. Always wear safety glasses during removal and replacement.
2. Use protective gloves - heavy duty leather gauntlet type gloves when cutting out the broken glass, non-slip type gloves when handling/moving panes of glass, surgical type gloves when you use the polyurethane adhesives.
3. Wear protective overalls.
4. Do not smoke - the activators and primers used in the procedures are highly flammable.
5. Do not attempt to handle or move panes of glass unless you are using glass lifters.

Several special tools are required to successfully complete the removal and replacement procedures. Reference is made to the tools in the procedures. The majority of these tools can be obtained locally and the remainder from JCB Service.

The work must only be carried out in a dry, frost free environment. A protective canopy may be required or the machine/frame must be moved to a sheltered area.

In damp or wet conditions, hinged doors and window frames can be removed from the machine and taken to a more suitable (dry) environment.

Glass should not be replaced at temperatures below 5°C (41.0°F).



## **35 - Clutch Pedal**

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## **Introduction**

The clutch pedal pivots on a shaft common with the brake pedal. The spring makes sure that the pedal automatically returns to the up position, where the clutch is engaged. Adjustable stop bolts control the maximum up and down positions.



## **00 - General**

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## **Introduction**

The operator station is installed with plastic trim panels.

The components such as electrical switches are located behind some of the operator station panels.

Do the following when you remove and install the trim panels.

1. Make sure that you disconnect and connect the applicable harness connectors.
2. Do not force the panels away from the operator station frame.
3. Make sure that you remove all the fasteners.
4. If the operator station panel is replaced with a new one, move the applicable components to the new trim panels.



## 12 - Heating, Ventilating and Air-Conditioning (HVAC)

00 - General

00 - General

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**W** Receiver drier  
**Y** HP (High Pressure) refrigerant hose and pipes  
**AA** LP switch

**X** LP (Low Pressure) refrigerant hose and pipes  
**Z** HP switch



## 00 - General

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## Introduction

The HVAC (Heating Ventilation Air Conditioning) unit and the automatic temperature control system contains a blower motor, evaporator, heater radiator, filters and a thermostat.

The HVAC unit is located in the operator station underneath the operator seat.



### 00 - General

#### Introduction

The condenser is a device used to condense a substance from its gaseous to its liquid state, the refrigerant changes state to a high pressure, high temperature liquid but with a lower heat content.

Refer to HVAC (Heating Ventilation Air Conditioning) Component Identification (PIL 12-00).



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## Introduction

The crankcase is the main body of the engine, to which other engine parts are attached. The crankcase is the housing for the crankshaft. The enclosure forms the largest cavity in the engine and is located below the cylinders. It is integral with the cylinder bank and forms an engine block. It has an opening in the bottom to which an oil sump is attached with a gasket and bolted joint.

The crankcase protects the crankshaft and connecting rods from foreign objects it also keeps the engine oil contained and allows the oil to be pressurised and also provide the rigid structure with which to join the engine to the transmission.

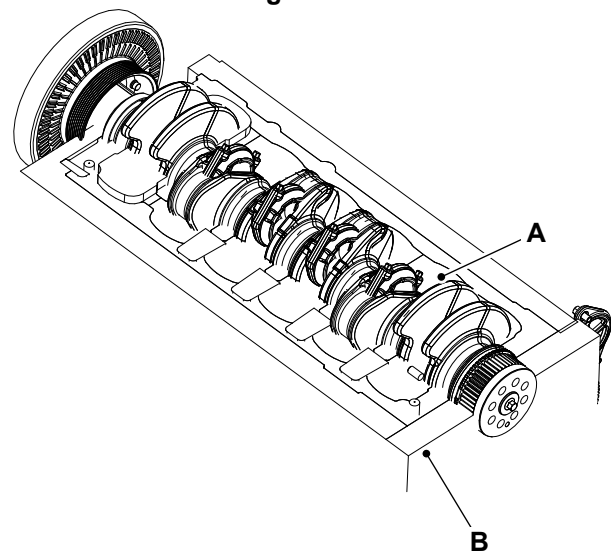
Wet and replaceable cylinder liners are supported at the middle of the crankcase, which reduces vibrations and directs the coolant circulation mainly to the upper part of the liners.

The seal between the lower part of the cylinder liner and the crankcase is achieved by O-rings (x3). The O-rings are installed in grooves in the liners. The upper part is sealed by the cylinder head gasket.

The camshaft is located in the crankcase. There are separate bearing sleeves in all camshaft bearing locations and the drilling for the camshaft rear end is covered with a plug.

There are spaces on both sides of the rear main bearing for guide bearing shims/crankshaft thrust bearings.

**Figure 100.**



- A Crankshaft
- B Crankcase

## 12 - Crankshaft

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## Introduction

The camshaft is an important component in an internal combustion engine.

The relationship between the rotation of the camshaft and the rotation of the crankshaft is of critical importance. Since the valves control the flow of the air/fuel mixture intake and exhaust gases, they must be opened and closed at the appropriate time during the stroke of the piston. For this reason, the camshaft is connected to the crankshaft directly, via a gear mechanism.

When the engine runs the crankshaft drives the camshaft via gears. The camshaft opens and closes the inlet and exhaust valves and via push rods in time with the four stroke cycle, refer to Engine-Operation (PIL 09-00).

## **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.



## 27 - Crankcase Ventilation Filter

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## Component Identification

Refer to Piston- Component Identification (PIL 15-36).

## Check (Condition)

1. Check the connecting rod for signs of damage and excessive wear.
2. Make sure that you change the connecting rod screws when you open the connecting rod.

The connecting rods are divided into weight classes with intervals of 0.02kg. The weight class is stamped on the side face of the connecting rod. Refer to Connecting Rod - Technical Data (PIL 15-33).

All the connecting rods in one engine should be of the same weight class. The greatest permissible weight difference is 0.02kg.

## **00 - General**

### **Introduction**

The engine manifold is split into two sections, refer to inlet manifold (PIL 18-24-03) and exhaust manifold (PIL 18-24-04).



## 51 - Timing Gear

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## Remove and Install

### Remove

1. Make the machine safe. Refer to (PIL 01-03).
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 flywheel.
4. Remove the bolts and withdraw the flywheel from the crankshaft hub.

### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Clean the contact surfaces on the crankshaft rear flange and on the flywheel.
3. Use suitable studs as a guide when you install the flywheel on the crankshaft rear flange.
4. Tighten the bolts to the correct torque value.  
Torque: 150N·m

## Remove and Install

You must remove and install the engine and the gearbox together as a complete unit.

### Remove

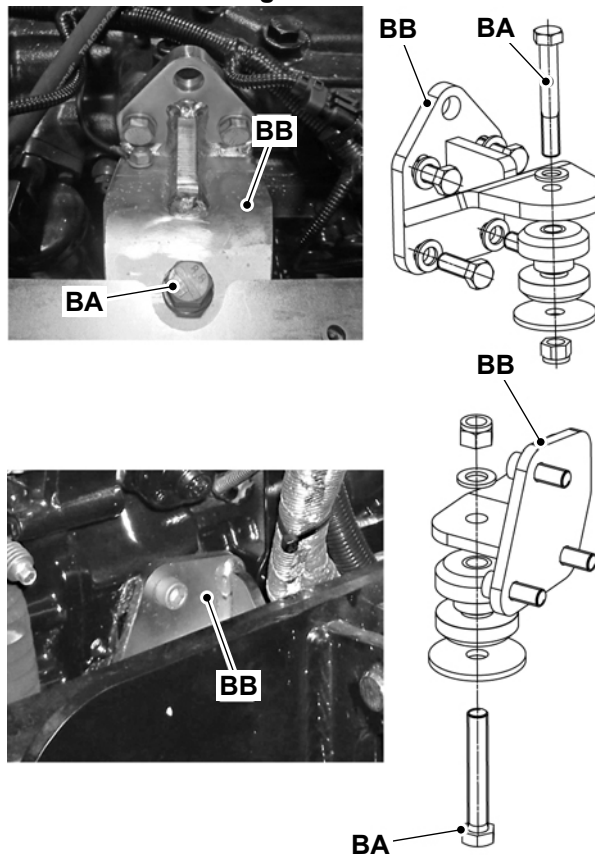
1. Make the machine safe. Refer to (PIL 01-03).

2. Remove the operator station. Refer to (PIL 09-00).

3. Remove the engine. Refer to (PIL 15-00).

4. Remove the bolts 3 from the gearbox and the engine chassis mounts.

**Figure 189.**



**BA** Bolts 3

**BB** Mounts

### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Clean the engine, gearbox and machine chassis thoroughly.
3. Check the condition of the engine and gearbox mounts. If necessary, replace any damaged mounts.



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## Introduction

The electric starter motor is either a permanent-magnet or a series-parallel wound direct current electric motor with a starter solenoid mounted on to it. When the current from the battery is applied to the solenoid, through the key-operated ignition switch, the solenoid engages a lever that pushes out the drive pinion on the starter driveshaft and meshes the pinion with the starter ring gear on the flywheel of the engine.

The solenoid also closes high current contacts for the starter motor, which begins to turn. Once the engine starts, the key-operated ignition switch is opened, a spring in the solenoid assembly pulls the pinion gear away from the ring gear, and the starter motor stops. The starter motor pinion is clutched to the drive shaft through an overrunning clutch which permits the pinion to transmit drive in only one direction. Drive is then transmitted through the pinion to the flywheel ring gear, but if the pinion remains engaged (as for example because the operator fails to release the key as soon as the engine starts, or if there is a short and the solenoid remains engaged), the pinion will spin independently of the drive shaft, this prevents the engine driving the starter.

The starter motor is only designed for intermittent use, the electrical components are designed only to operate for a time period of 30 seconds before overheating.



## 15 - Manifold Absolute Pressure

## Introduction

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The MAP (Manifold Absolute Pressure) sensor also called boost pressure sensor, provides instantaneous manifold pressure information to the ECM (Engine Control Module). The data is used to calculate air density and determine the engine's air mass flow rate, which in turn determines the required fuel metering for optimum combustion and influence the advance or retard of ignition timing.

## Remove and Install

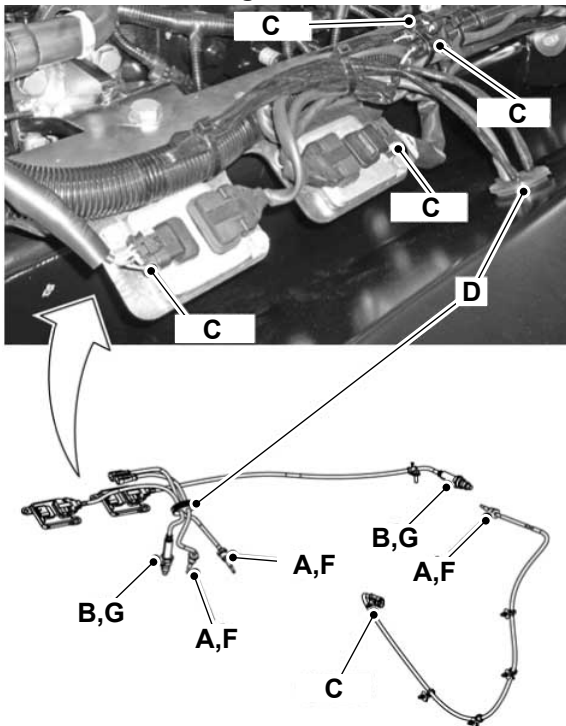
### Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Remove the RH pannier. Refer to (PIL 06-06).
3. Disconnect the electrical connectors located at the top of the chassis adjacent to the RH pannier.
4. Remove the grommet.
5. Remove the collars 2 from the NOx (Nitrogen Oxide) temperature sensor.
6. Remove the NOx temperature sensors from the machine.

**Table 56. Torque Values**

Item	Description	Nm
G	Collars 2	50

**Figure 218.**



- A** Exhaust temperature sensor
- B** NOx temperature sensor
- C** Electrical connectors
- D** Grommet
- F** Collar 1
- G** Collar 2

### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Tighten the collars to the correct torque value.

## Clean

### Cleanliness Requirements

Important: Additional cleaning must be carried out prior to working on the high pressure fuel system. It is extremely important the high pressure fuel components and the adjacent parts of the engine are meticulously cleaned before any components are removed. Refer to:-Effects of Contamination.

Before starting work on the high pressure fuel system, make sure that the working environment is suitable. Refer to:-Maintenance Environment, Common Rail Fuel Injection.

1. Refer to: Fuel - Health and Safety (PIL 18-00).
2. Clean the machine, prior to completing any maintenance work.
3. Clean the engine, refer to: Engine - Clean (PIL 15-00).
4. Remove the hoses, electrical harnesses and ancillaries to improve access and expose any remaining trapped dirt close to the relevant high pressure components.
5. Wash away any remaining dirt or debris and then dry the area using a compressed air jet. When the area is dry use a soft clean brush to remove sand or grit particles that remain.

### Effects of Contamination

Whilst the requirement for a good level of cleanliness is well known and common practice, the introduction of high pressure common rail fuel injection necessitates working to new levels of cleanliness.

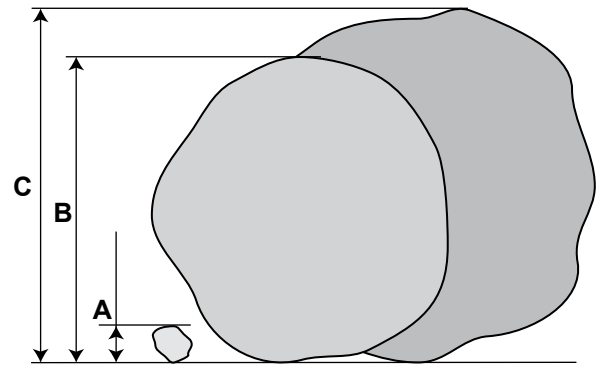
Once inside the system, fuel circuit contaminants greatly affect the performance and life of the fuel injection equipment. For example, contaminants in the fuel pump will develop internal wear to cause internal leakage and hence lower discharges. Use of poor quality fuels and poor maintenance could also lead to contaminants entering the fuel injectors. There is a possibility of catastrophic equipment failure if debris should prevent the injectors from fully closing. The main contaminants can be classified as follows:

- Solid Particles - sand, fibres, metallic particles, welding scale, sealing materials and wear particles etc.
- Liquid - usually water and incompatible oils and greases.
- Gases - Air, sulphur dioxide etc. which can create corrosive compounds if dissolved in the fluid.

These contaminants can appear during manufacture, assembly, operation and maintenance.

The main filter is rated at 2 micron = 0.002 mm (0.0007874 in). The pre-filter is rated at 5 micron. Listed are a few typical comparisons of micron size:

Figure 222.



- A** 8 Microns
- B** 70 Microns
- C** 100 Microns

- Red Blood Cell = 8 microns (0.008 mm, 0.000315 in).
- Human Hair = 70 microns (0.07 mm, 0.00275 in).
- Grain of Salt = 100 microns (0.1 mm, 0.00394 in).
- The smallest particle visible to the naked eye is 40 microns (0.00157in) approximately.

The main filter and pre-filter must be changed in accordance with the applicable service schedule and procedures. The water in fuel sensor must be maintained to ensure correct operation at all times.

The potential for engine damage due to fuel contamination is much greater when using common rail injection technology than with mechanical injection systems. This is because common rail requires components with smaller manufacturing tolerances, especially the fuel injectors. In addition, common rail operates at much higher fuel pressures, over five times that of mechanical systems.

Similar pressures are used by commercial water jet cutting machines to cut metal. Fortunately clean diesel fuel has lubricating qualities that prevents erosion of components but it is obvious that contaminated fuel will cause serious damage at such high pressures.

### Maintenance Environment, Common Rail Fuel Injection

Depending on circumstances engine maintenance may be required in various working environments. Obviously procedures are best carried out in a

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**Introduction**

Fuel at rail pressure is continuously supplied to the injectors via high pressure fuel pipes.

The high pressure fuel injector fuel pipes consist of thick walled, seamless steel tubing. The ends of the tubes are formed with conical nipples for sealing in the sealing cones on the common rail and on the injector at port. It is essential that the tubes are maintained and installed correctly for safe and effective engine operation.

Important: If the high pressure fuel pipes are removed for any reason they must be renewed. Installing the original fuel pipes will cause fuel leaks at the pipe connections.

Fuel injection takes place when the solenoid coil is energised by the ECM (Engine Control Module).

**Combustion**

The engine employs a direct injection system. Fuel is injected directly into the cylinder, the mixing taking place in the combustion chamber which is recessed into the crown of the piston.

The process of mixing starts during the induction stroke and continues throughout the compression stroke. The inlet porting and combustion chamber are carefully designed to ensure that when the fuel is injected it is mixed thoroughly with the air.

The multi-point injector and high injection pressure ensure a good distribution of fuel throughout the air which aids mixing. The mixing process continues until combustion is complete.

To further enhance efficient combustion, the ECM initiates several separate injections of fuel during the compression stroke. The timing of the fuel injections is also varied by the ECM depending on engine operating parameters, refer to (PIL 33-45).

## Operation

The pump draws fuel from the tank, through the water separator, pumping it through the fuel filter and into the fuel injection pump. The pump has a built in protection against running dry and will shut down after 2min if no fuel is present.

Refer to fuel and exhaust system, filter, component identification, (PIL 18-09).

## Check (Operation)

If the fuel lift pump is suspect, measure the delivery flow rate.

### Flow Test

1. Make the machine safe, refer to (PIL 01-03).
2. Disconnect the fuel hose from the outlet of the pump/ filter assembly.
3. Connect a length of fuel hose from the pump outlet to a suitable fuel container.  
Volume: 5L
4. Activate the fuel pump. Do not attempt to start the engine.
5. Run the pump. The fuel flow must be equal to or greater than the value shown.

Duration: 1min  
Flowrate: 2.5L/min

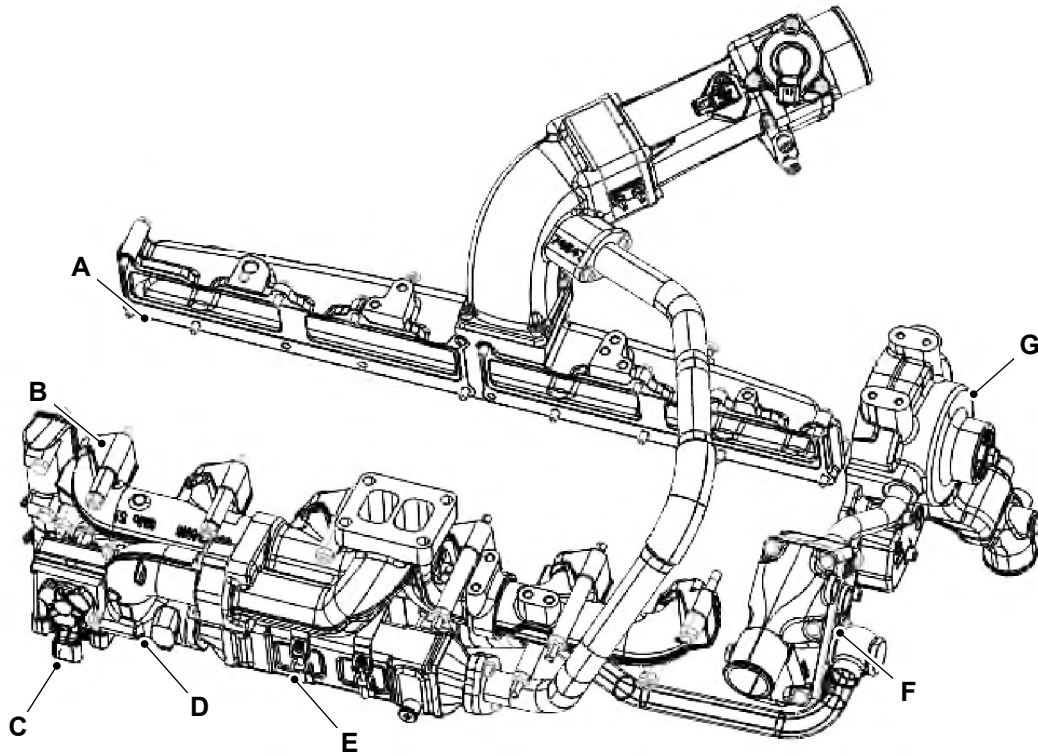
### Machines with Electronic Control Fuel Injection

When the ignition is set to ON the ECM (Engine Control Module) energises the fuel lift pump. If the engine is not started the pump is de-energised after a period of 24s. A fuel pump flow test can be carried out during this period of time. Minimum expected fuel flow. 1L in 24s.

Alternatively use the JCB engine diagnostic tool within Servicemaster to energise the fuel pump (fuel lift pump test). After a 5s delay the pump runs for a period of 24s.

## Component Identification

Figure 236.



- A Intake manifold
- C EGR (Exhaust Gas Recirculation) actuator
- E EGR cooler

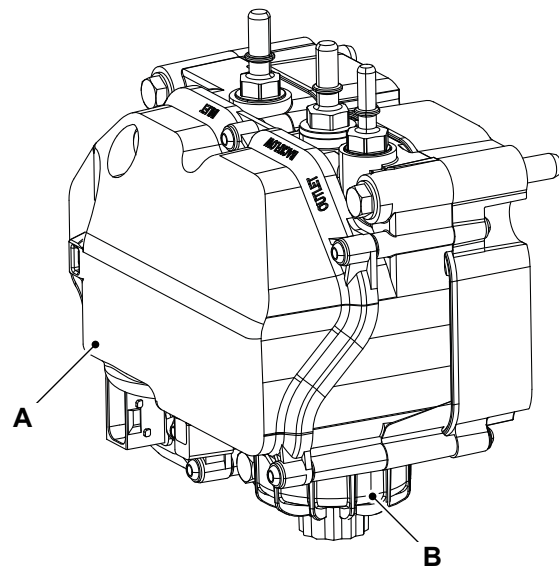
- B Exhaust manifold
- D EGR valve
- F Thermostat
- G Coolant pump

## Remove and Install

### Remove

1. Perform the DEF (Diesel Exhaust Fluid) emptying routine using ServiceMaster.
2. Get access to the DEF supply module. The supply module is installed on the right hand side of the right hand pannier door.
3. Remove the filter cover.

**Figure 243.**



- A** Supply module  
**D** Filter cover

4. Use the filter extraction tool to remove the filter from the supply module. The filter extraction tool is supplied with each new filter.
  - 4.1. Insert the split end into the filter element. Gently rotate the tool to position it in the correct position. Then rotate the tool in a clockwise motion to engage the tool with the filter.

## **18 - Catalyst**

### **Introduction**

The SCR (Selective Catalytic Reduction) catalyst is the location where the DEF (Diesel Exhaust Fluid) reacts with the exhaust gases to reduce the amount of NO<sub>x</sub> (Nitrogen Oxide) emissions.

DEF consists of water and urea. When injected into the exhaust gases, the heat converts the DEF into ammonia and carbon dioxide. The ammonia reacts with the NO<sub>x</sub> in the exhaust gases to convert them into nitrogen and water.

It is the catalytic surfaces within the catalyst that allow the reaction to take place. In order for optimum conversion, the SCR catalyst temperature needs to be greater than 200°C (391.7°F).

The SCR catalyst is located in the exhaust system.



## 00 - General

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## Introduction

Fuel at rail pressure is continuously supplied to the injectors via high pressure fuel pipes. The high pressure fuel injector pipes consist of thick walled, seamless steel tubing. The ends of the tubes are formed with conical nipples for sealing in the sealing cones on the common rail and on the injector at port.

It is essential that the pipes are maintained and installed correctly for safe and effective engine operation.

The high pressure fuel pipes connect the injectors to the common rail. The injectors inject fuel in response to a supply of electrical current from the ECM (Engine Control Module). During fuel injection some fuel bleeds off the injectors and back to tank via the low pressure bleed off pipes.

Important: If the high pressure fuel pipes are removed for any reason they must be renewed. Installing the original fuel pipes will cause fuel leaks at the pipe connections.



## 00 - General

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## Introduction

The engine coolant radiator is part of a cooling pack which is designed to provide all the machine systems cooling requirements as follows:

- Engine cooling system
- Engine induction system
- Engine fuel
- Gearbox
- Air conditioning
- External hydraulic system
- Front PTO (Power Take-Off).

**00 - General**

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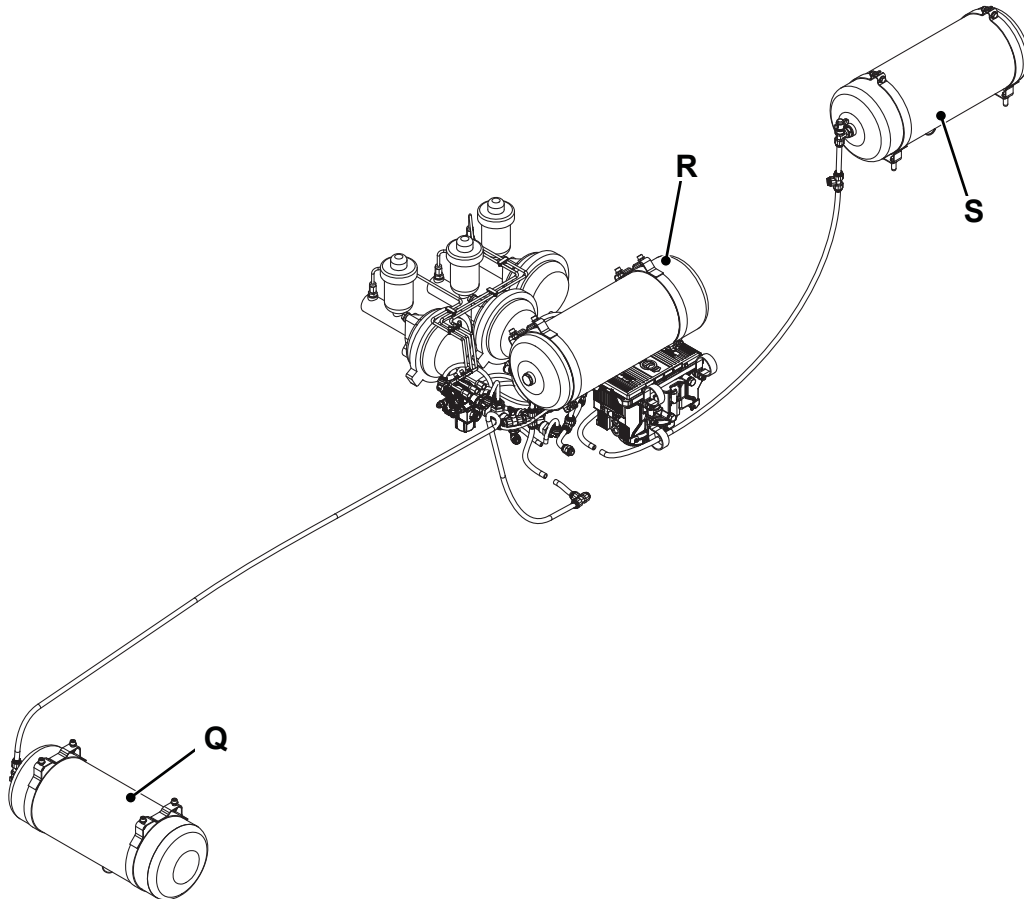
**Introduction**

The thermostat is located between the engine and the radiator. The function of the thermostat is to block the flow of coolant to the radiator until the engine has warmed up to a sufficient temperature.

When the engine is cold, no coolant flows through the engine. Once the engine reaches its operating temperature, the thermostat opens. By letting the engine warm up as quickly as possible, the thermostat reduces engine wear, deposits and emissions.

There are two thermostats installed on the engine. The smaller thermostat is a single acting thermostat which opens at 79°C (174.1°F). The other thermostat is a double acting thermostat which opens at 83°C (181.3°F).

Callout	Description	Location
N	Pneumatic pipe lines	-
P	Hydraulic brake lines	-

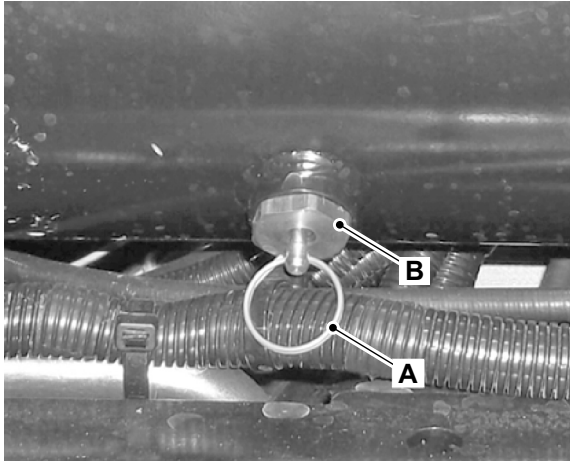
**Figure 286. Air Tank**

**Table 85. Air Tank**

Callout	Description	Location
Q	Front brake air tank	Chassis mounted forward of the front axle
R	Trailer brake air tank	RH pannier
S	Rear brake air tank	Chassis mounted, RH side adjacent to auxiliary valve assembly

## Check (Operation)

1. Make the machine safe. Refer to (PIL 01-03).
2. Discharge the air pressure from one tank at a time.
3. Pull the ring to one side to open the valve.

**Figure 295.**



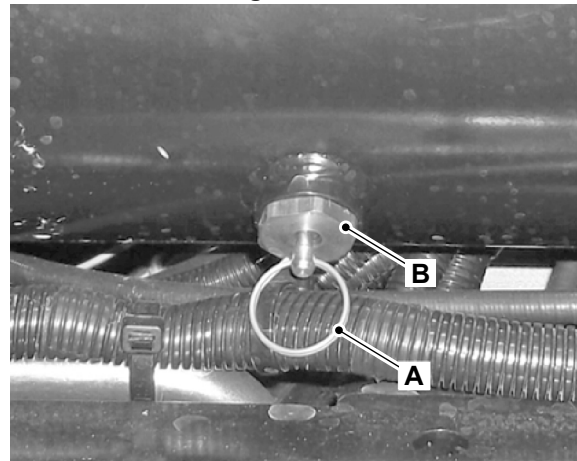
**A** Ring  
**B** Valve

4. When the air pressure is discharged, switch on the ignition and release the park brake.
  - 4.1. Make a note that the LCD (Liquid Crystal Display) screen will show the message AIR TANK 1, AIR TANK 2 or AIR TANK 3 as applicable.
  - 4.2. Make sure that the brake pressure warning light comes on.
5. Start the engine.
6. Make sure that an audible warning sounds until the air tank is charged.
7. Stop the engine.
8. Do the steps 3 to step 7 for the remaining air tanks.
9. If the warnings do not operate correctly rectify the fault. Do not operate the machine with a defective air pressure warning system.

## Check (Pressure)

1. Charge the pneumatic system.
  - 1.1. Start the engine.
  - 1.2. Make sure that the brake pressure warning light goes off.
2. Make the machine safe. Refer to (PIL 01-03).
3. Pull the ring to one side to open the valve.

**Figure 296.**



**A** Ring  
**B** Valve

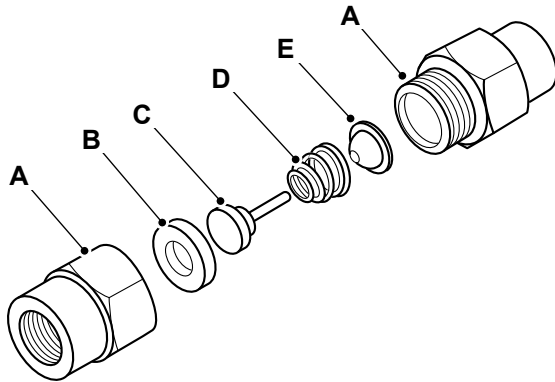
4. Make sure that all the water is expelled from the tank.
5. Make a note that the amount of the water expelled from the tank is a guide to the functioning of the air drier.
6. Charge the pneumatic system again. 1

## Disassemble and Assemble

### Disassemble

1. Make the machine safe. Refer to (PIL 01-03).
2. Use the alphabetical sequence shown on the illustration as a guide to disassembly. Refer to Figure 305.
3. Make sure that you obtain the correct parts kit for replacement.
4. Make a note that the packing, plunger, spring and the ball are available as a kit.

**Figure 305.**



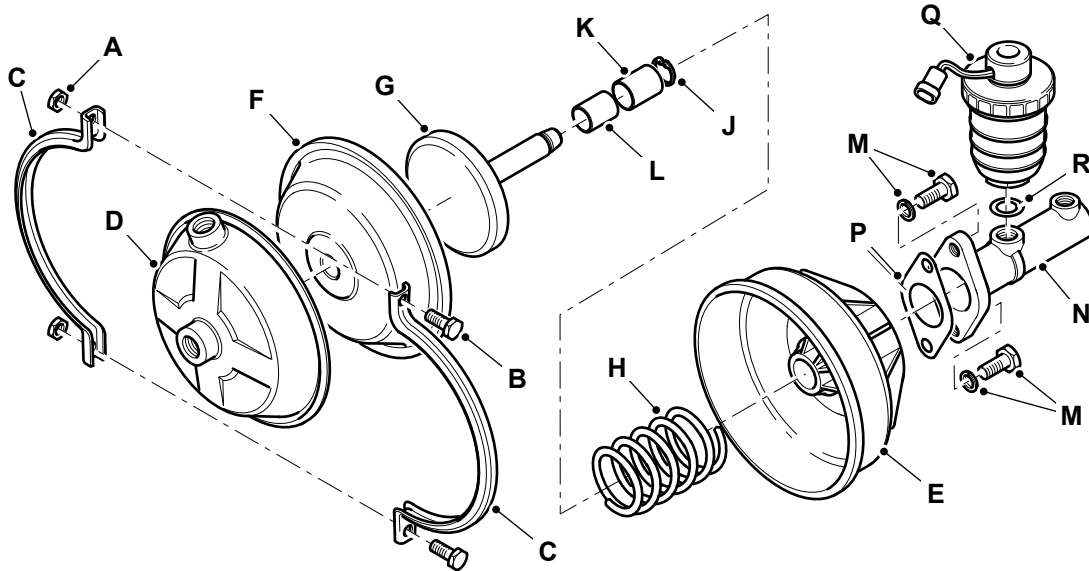
- A** Valve body
- B** Packing
- C** Plunger
- D** Spring
- E** Ball

### Assemble

1. The assembly procedure is the opposite of the disassembly procedure. Additionally do the following step.
2. If applicable, do the Servicemaster ABS (Anti-lock Braking System) diagnostic checks. Refer to (PIL 33-57).

## Component Identification

Figure 314.



- A Nut
- C Retainer clip
- E Rear case
- G Piston
- J Circlip
- L Guide pin
- N Master cylinder
- Q Tank level switch

- B Bolt 1
- D Front case
- F Diaphragm
- H Spring
- K Bush
- M Bolt 2
- P Gasket



## 18 - Park Brake

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## Introduction

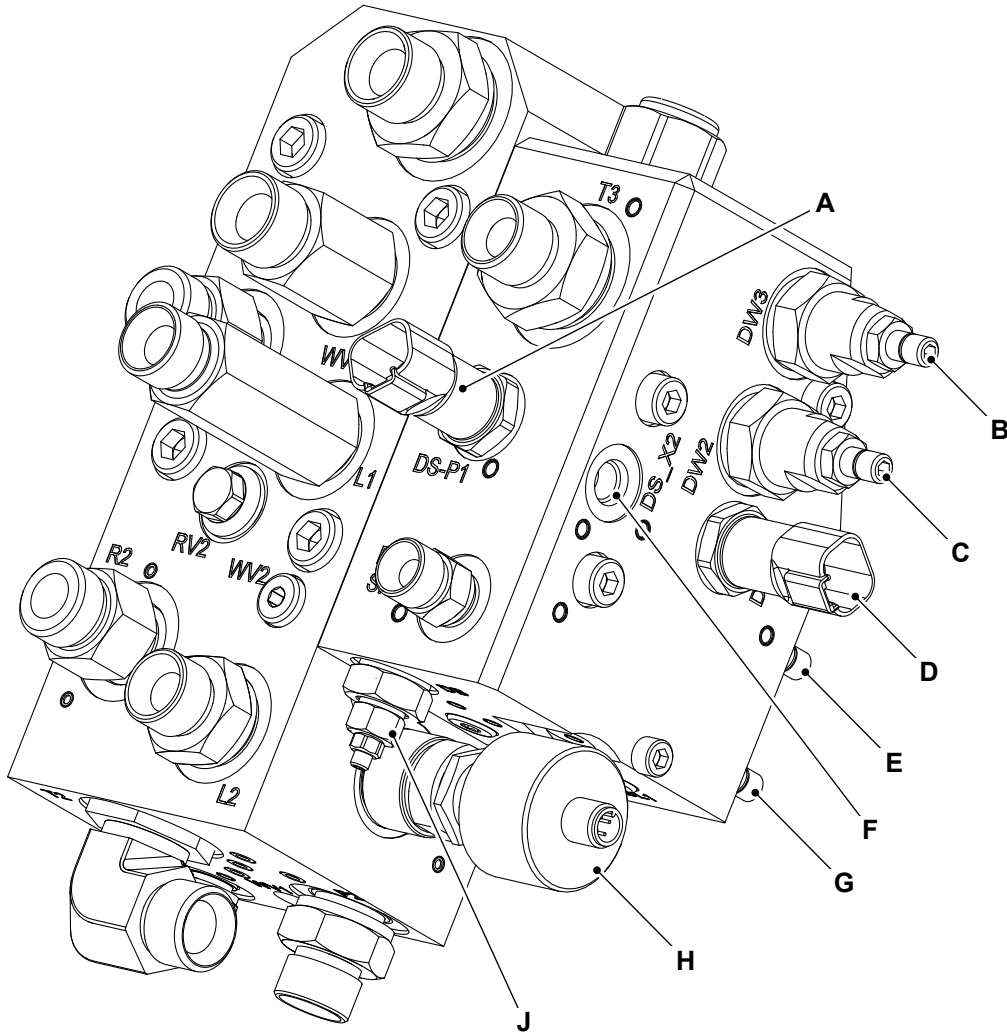
The variable ratio steering is controlled by the GPS (Global Positioning System) control unit. The system enables variable ratio steering. This means that the displacement of the front axle power track rod can be changed for the same amount of steering wheel rotation, changing the steering ratio.

00 - General

Component Identification

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Figure 350.



- |   |  |
|---|--|
| <p><b>A</b> Pressure transducer 1 (Gearbox)</p> <p><b>C</b> Relief valve 1 (120bar (1,739.1psi))</p> <p><b>E</b> Relief valve 2 (120bar (1,739.1psi))</p> <p><b>G</b> Unloader valve 2 (30bar (434.8psi))</p> <p><b>J</b> Relief valve 3 (60bar (869.6psi))</p> | <p><b>B</b> Unloader valve 1 (30bar (434.8psi))</p> <p><b>D</b> Pressure transducer 2 (Engine)</p> <p><b>F</b> GPS (Global Positioning System) override pressure transducer</p> <p><b>H</b> Emergency steering spool position switch</p> |
|---|--|

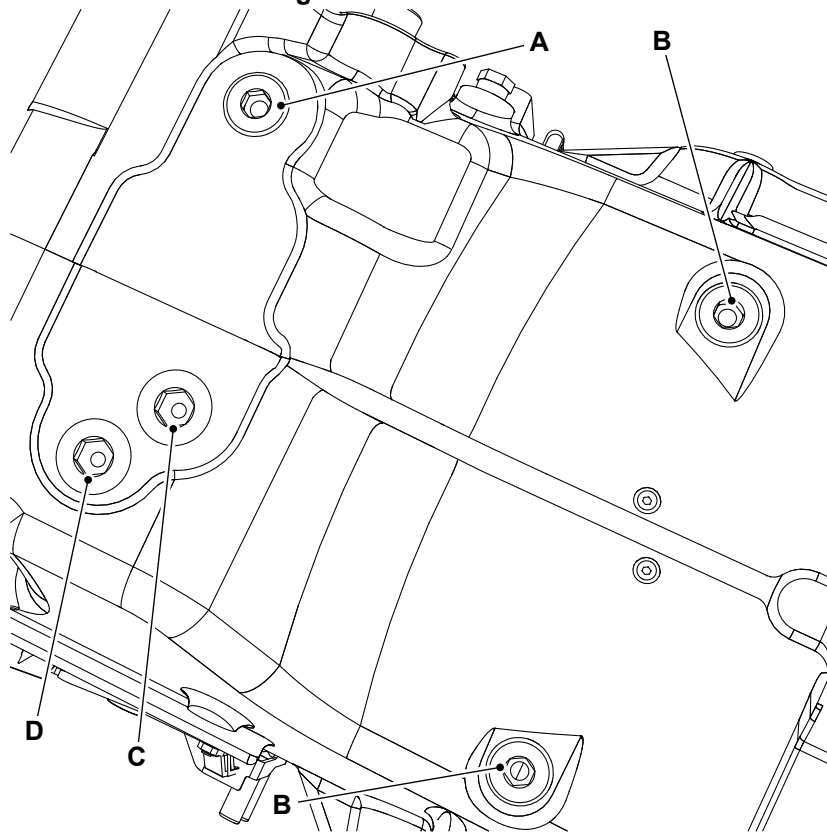


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**Figure 362. Bottom side**



**A** Oil drain plug and access to flushing valve

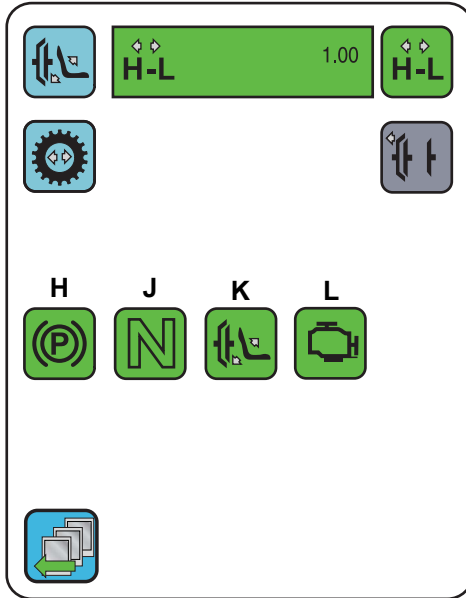
**C** Access plug to flexible clamp nuts

**B** Access plug to high pressure relief valve - reverse

**D** Access plug to high pressure relief valve - forward

- 5.1. Park brake engaged.
- 5.2. Neutral selected.
- 5.3. Press and hold down the clutch.
- 5.4. Set the engine to 600-900 RPM.

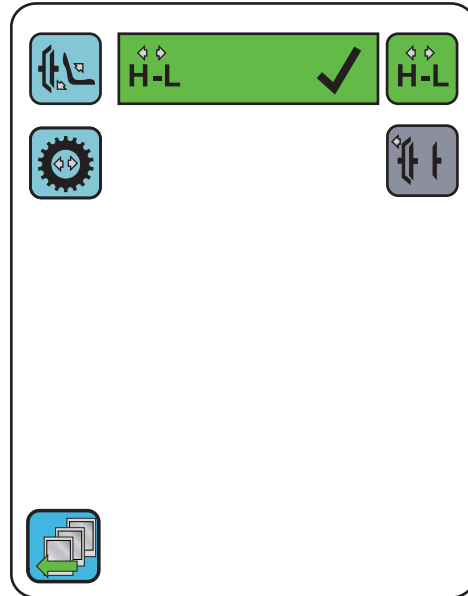
**Figure 379.**



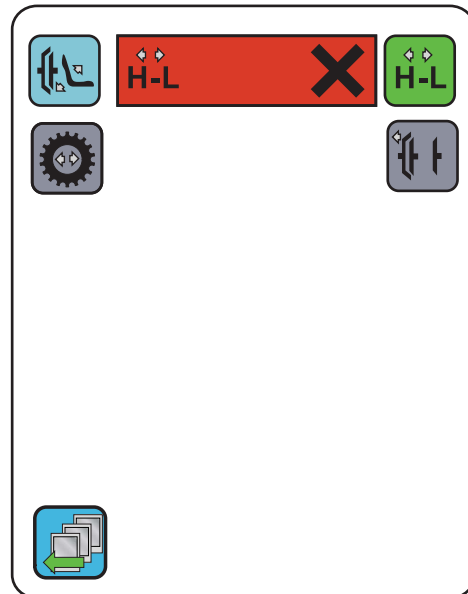
- H** Park brake engaged
- J** Neutral selected
- K** Engine set to 600-900 RPM
- L** Clutch held in down position

6. When all the pre-requisites have been satisfied, they will all be highlighted green and the system will then start counting up in the display box as it does the calibration process.
7. Make a note that all the pre-requisites must be held throughout the calibration process.
8. When calibration is complete, a calibration successful or calibration unsuccessful screen will appear. Refer to Figure 380. and Refer to Figure 381.

**Figure 380. Calibration Successful**



**Figure 381. Calibration Unsuccessful**



9. If the calibration unsuccessful screen appears, a fault code will be generated.

### Transmission Ratio Calibration

1. Make a note that the transmission ratio icon will not be live until the transmission range calibration procedure is completed.
2. Select the transmission ration icon.

## Operation

The CVT (Continuously Variable Transmission) gearbox does not contain a friction clutch. The hydraulic pressure inside the hydraulic loop between the hydraulic pump and hydraulic motor controls the smooth drive take-up and release. The drive take-up and release is controlled when the clutch pedal is operated or when the engine speed is varied between idle and 1400 RPM (Revolutions Per Minute).

The clutch pedal has no mechanical or hydraulic connection to the transmission. Instead an electrical position potentiometer detects the position of the clutch pedal. The DECU (Display Electronic Control Unit) processes the signal from the potentiometer and sends through the CAN (Controller Area Network) bus to the gearbox ECU (Electronic Control Unit). Then the gearbox ECU sends the applicable electrical current to the turbo clutch valve. The current is also dependant on engine speed. The turbo-clutch solenoid is proportional, it controls a PRV (Pressure Relief Valve) which changes its setting in proportion to the controlling current.

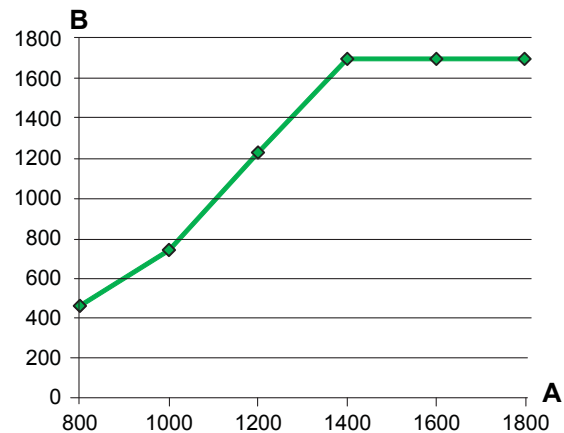
The turbo clutch PRV is connected directly to the hydraulic loop pressure through shuttle check valve. The shuttle check valve moves to connect the turbo clutch PRV to the hydraulic pressure when the transmission is set to forward or reverse drive.

When operator presses the neutral button, presses the clutch pedal fully or selects neutral there is no current to the turbo clutch solenoid. The PRV opens and oil at hydraulic loop pressure is connected to the gearbox sump. With no pressure in the hydraulic loop, there is no output from the gearbox.

To build pressure in the hydraulic loop current must be applied to the turbo clutch solenoid valve. The pressure setting of the PRV increases in proportion to the current applied. In this way smooth and progressive control of the drive take up and release is achieved. The electronic control system also operates the turbo clutch to prevent engine stall.

When the engine speed is less than 1400 RPM the gearbox ECU reduces the maximum current sent the turbo clutch solenoid. This limits the pressure in the hydraulic loop, reduces the load on the engine and prevents engine stall.

**Figure 438. Turbo clutch solenoid current Vs Engine speed**



**A** Engine speed (RPM)

**B** Turbo clutch solenoid current (mA)

Safety PRV opens at 540bar (7,826.1psi) and protects the transmission from damage in the event of a turbo clutch PRV failure.

## Transmission Hydraulic Pressure Sensors

The gearbox ECU monitors the hydraulic loop pressure with the use of HP (High Pressure) sensors. The signals from the sensors are compared and if the result is not as expected, the gearbox ECU logs the applicable fault codes.

The gearbox ECU can detect if the machine rolls backwards when forward drive is selected by means of the pressure values in the hydraulic loop. In this event the gearbox ECU controls the turbo clutch valve to increase the pressure in the hydraulic loop and bring the machine to a stop.

## Speed Limit Solenoid Control Valve

The gearbox ECU controls the speed limit solenoid control valve. The solenoid valve controls the oil flow to the speed governor piston which limits the movement of the actuator unit control shaft. Refer to (PIL 27-13).

The solenoid is proportional and the control valve spool movement is proportional to the current applied to the solenoid.

## 00 - General

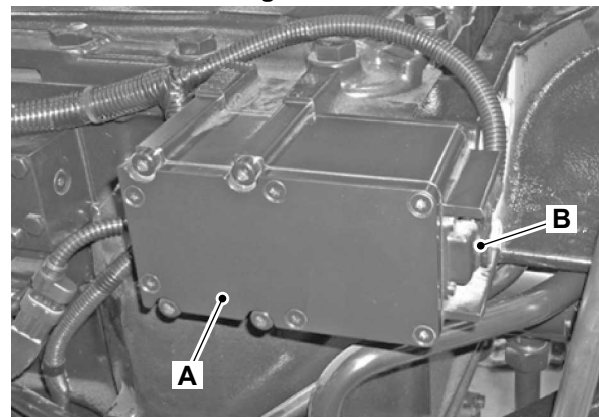
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## Introduction

The gearbox actuator unit is mounted on the RH side of the gearbox. It controls the CVT (Continuously Variable Transmission) hydraulic pump and motor swash angles.

The electrical connector connects the gearbox actuator unit to the gearbox ECU (Electronic Control Unit) which controls the actuator through the CAN (Controller Area Network) bus.

**Figure 446.**



- A** Gearbox actuator unit
- B** Electrical connector

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## Introduction

The PTO (Power Take-Off) is a method for taking power from a power source, such as an engine, and transmitting it to an application such as an attachment or a separate machine.

It usually comprises a splined output shaft on a machine, designed so that a PTO shaft, a type of driveshaft, can be easily connected and disconnected, and a corresponding input shaft on the application end.

The front PTO gearbox is installed directly onto the engine. A propshaft connected to the PTO gearbox drives the transfer box installed on the chassis.



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## Introduction

The rear rigid axle incorporates a 540/1000 or 750/1000 RPM (Revolutions Per Minute) PTO (Power Take-Off) with hydraulic shifting.



## 00 - General

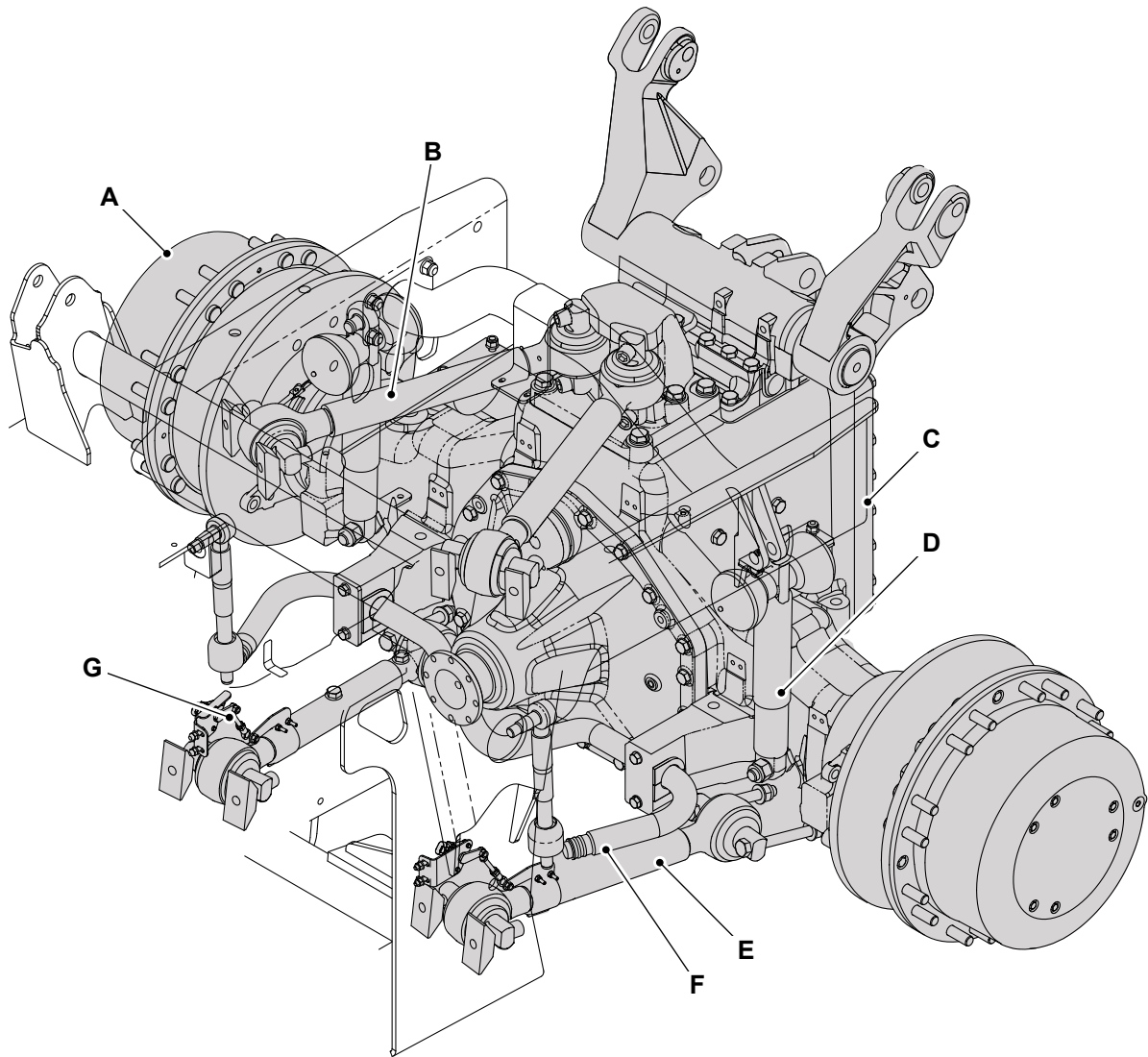
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## Introduction

The front PTO (Power Take-Off) gearbox is installed on the engine with a coupling onto the crankshaft.

## Component Identification

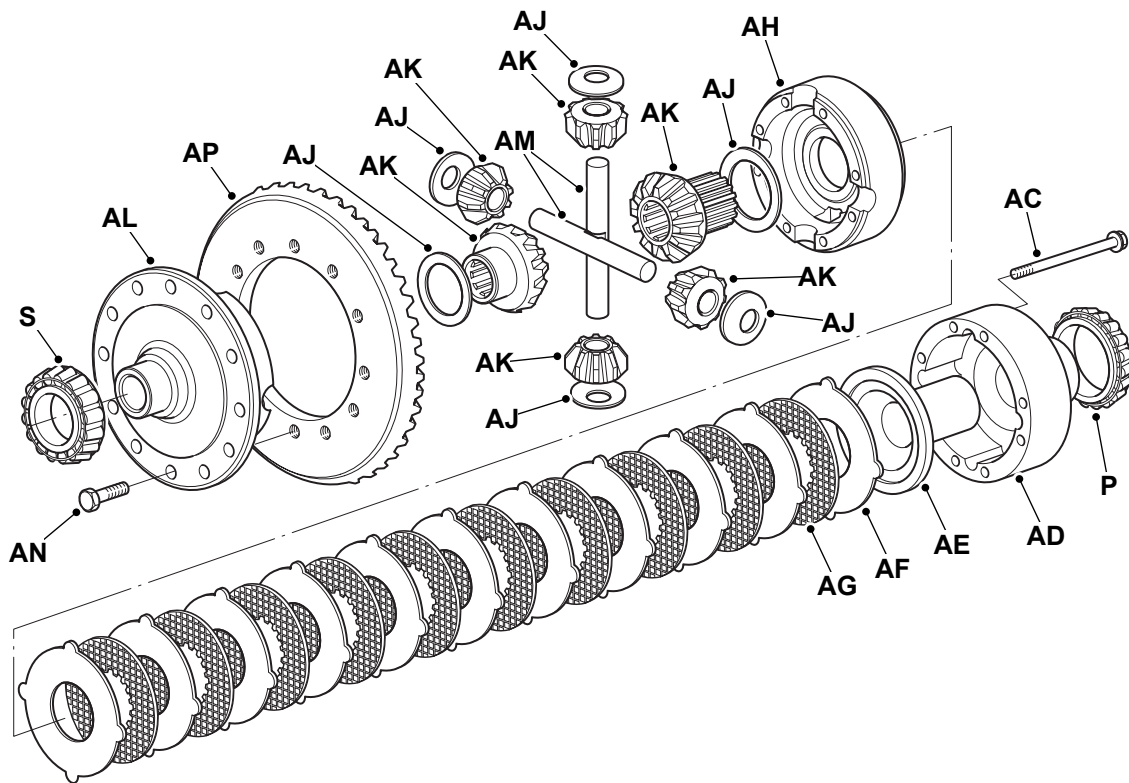
Figure 523.



- A Rear axle
- C Rear PTO (Power Take-Off)
- E Rear lower link arm
- G Potentiometer

- B V-link arms
- D Hydraulic suspension cylinder
- F Anti-roll bar

Figure 536.



- P** Bearing 1
- AC** Bolts 2
- AE** Actuating sleeve
- AG** Friction plates
- AJ** Thrust washers
- AL** Differential case half 1
- AN** Bolts 3

- S** Bearing 2
- AD** Differential lock case
- AF** Counter plates
- AH** Differential case half 2
- AK** Bevel gears
- AM** Trunnion pins
- AP** Crownwheel

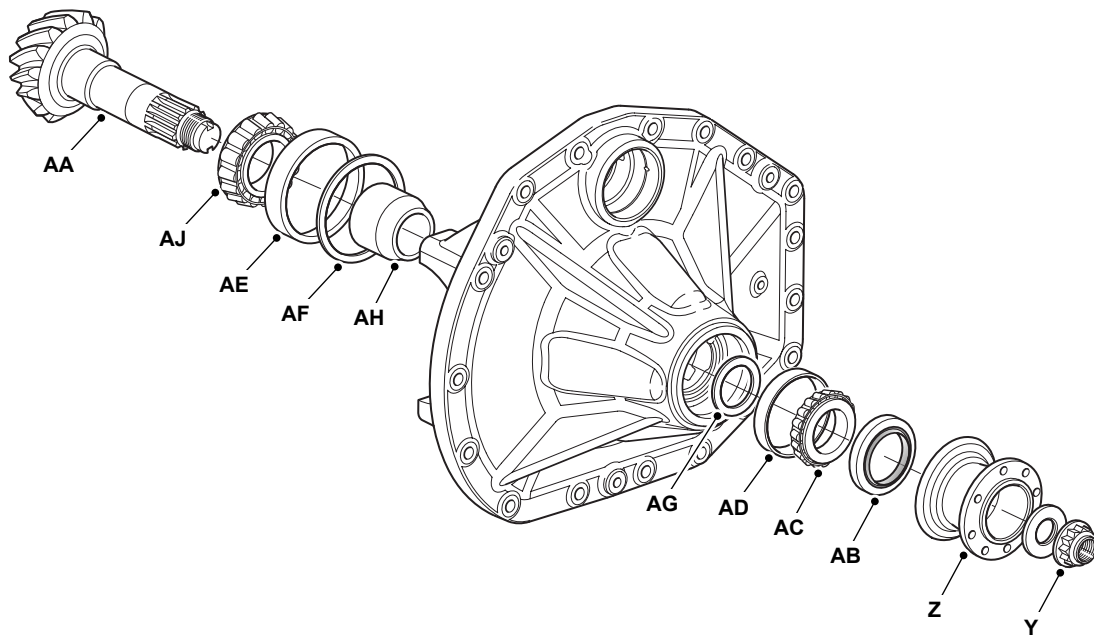
28. Remove the counter plates (x11) and friction plates (x10) from the differential bevel gear.
29. Disconnect the differential case halves.
30. Remove the bevel gears, trunnion pins and thrust washers from the differential case halves.
31. Remove the thrust washers from both the differential case halves.
32. Remove the bolts 3.
33. Remove the differential assembly from the crownwheel.

- 1.1. Heat the bearings in oil or in oven to specified temperature.  
 Temperature: 90–110°C (193.9–229.8°F)
- 1.2. Do not use the flame.
- 1.3. Lightly apply oil to all bearings.
- 1.4. Soak the seals in the axle oil for specified duration.  
 Duration: 30min

**Assemble**

1. Before you assemble, do as follows.
  2. Install the trunnion pins, bevel gears and thrust washers into the differential case half 2. Refer to Figure 536.
  3. Put the differential case half 1 on its correct position. Align the match mark letters.
  4. Install the counter plates (x11) and friction plates (x10).

**Figure 550.**



- Y** Pinion nut
- AA** Pinion shaft
- AC** Bearing 3
- AE** Bearing cup 2
- AG** Pre-load shim
- AJ** Bearing 4

- Z** Drive flange
- AB** Shaft seal
- AD** Bearing cup 1
- AF** Depth shims
- AH** Spacer

- 22. Remove the bearing 3.
- 23. Tap the bearing cups to remove them.
- 24. Remove the pinion bearing depth shim.
- 25. Remove the pinion bearing pre-load shim, spacer and bearing 4 from the pinion shaft.

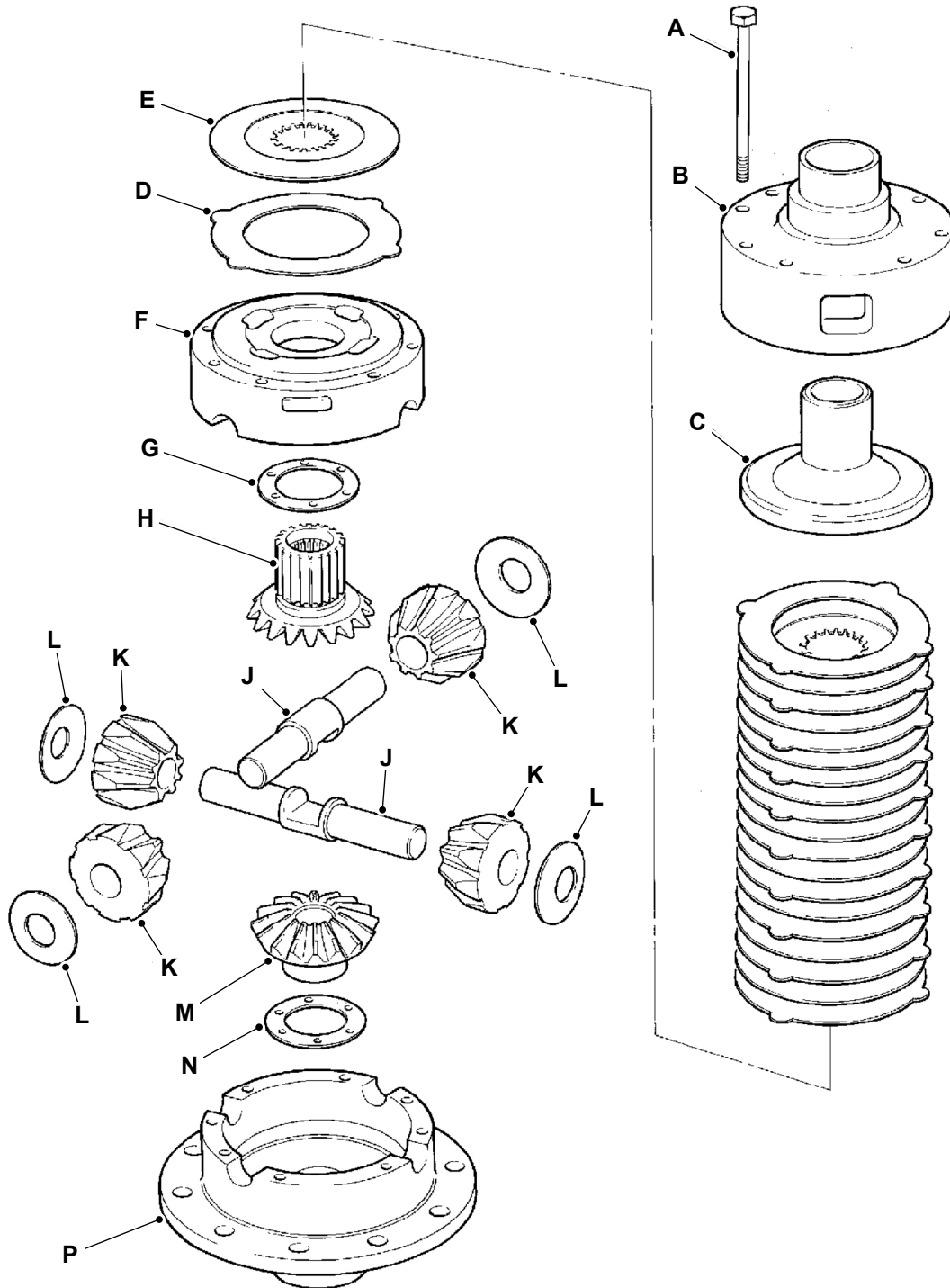
- 26. Remove the bolts 3.
- 27. Remove the differential lock case.
- 28. Remove the actuating sleeve.

**00 - General**

**Component Identification**

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**Figure 562.**



**A** Bolts  
**C** Actuating sleeve  
**E** Friction plates (x10)

**B** Lock case  
**D** Counter plates (x11)  
**F** Case half 1

11. Apply sealant to the threads of the stud.

Consumable: JCB High Strength Threadlocker

12. Install the stud.

13. Install the driveshaft.

14. Make sure that the inner end locates in the splines of the differential gear.

15. Install the sleeve.

16. Apply sealant to the threads of the bolt 2.

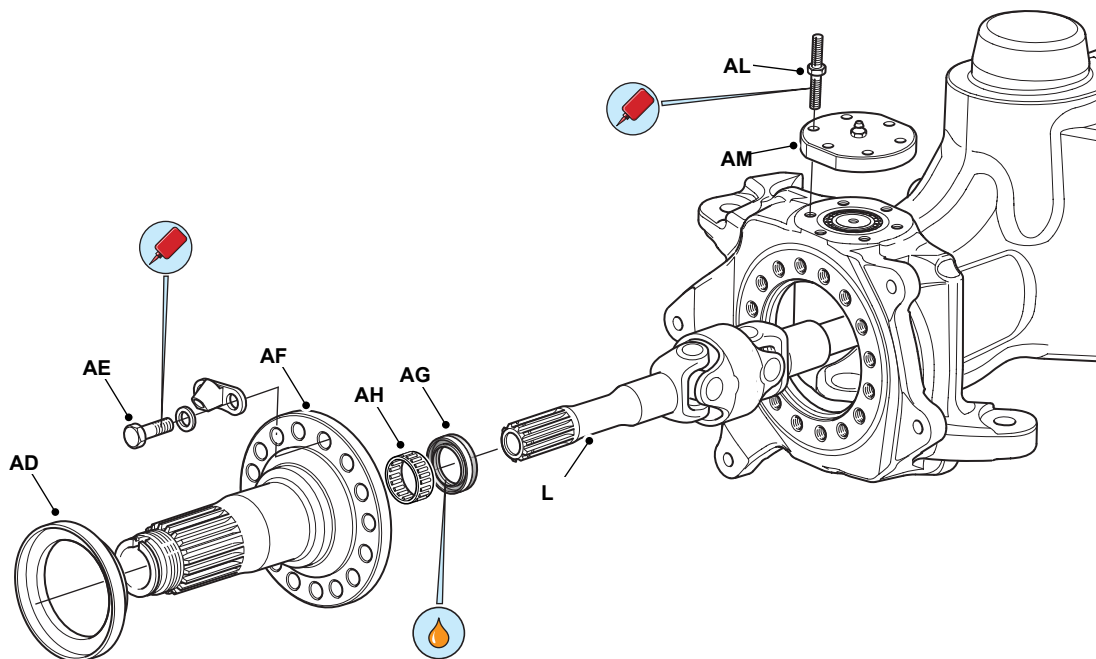
Consumable: JCB Threadlocker and Sealer (High Strength)

17. Install the bolt 2.

18. Tighten the bolt 2 to the correct torque value.

19. Install the dust shield guard.

**Figure 574.**



**L** Driveshaft  
**AE** Bolt 2  
**AG** Seal 2  
**AL** Stud

**AD** Dust shield guard  
**AF** Sleeve  
**AH** Bearing 3  
**AM** Cover 2

20. Install the outer race of the outer wheel bearing 1.

21. Install the outer race of the inner wheel bearing 2.

22. Make sure that recesses are correctly seated in the wheel hub.

23. Put the inner race of the inner wheel bearing 2 at its correct position.

24. Apply gasket on the outer rim of seal 1.

Consumable: JCB Multi-Gasket

25. Install the seal as shown. Refer to Figure 575.

26. Apply grease to the seal lips.

Consumable: Special HP Grease

27. Lubricate the new O-ring 2.

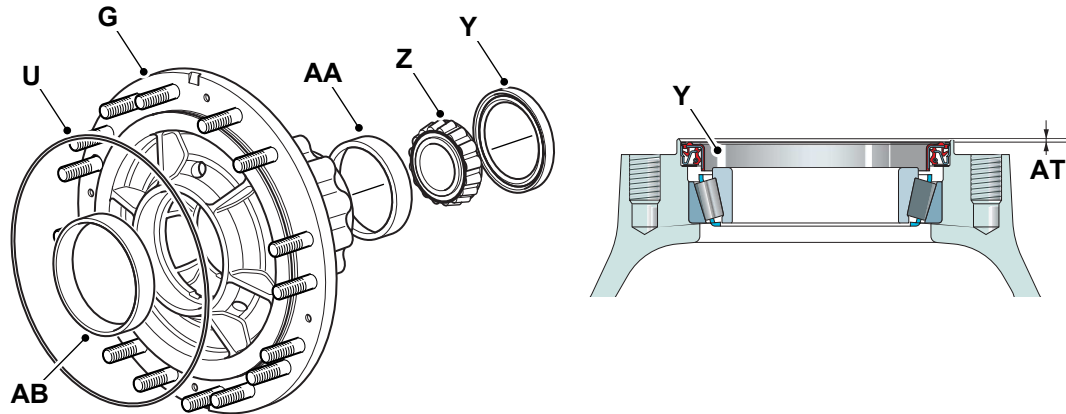
28. Install the O-ring 2 and spacer 1.

29. Install the brake disc.

30. Install the bolt 1 (x14).

31. Tighten the bolt 1 to the correct torque value.

Figure 594.

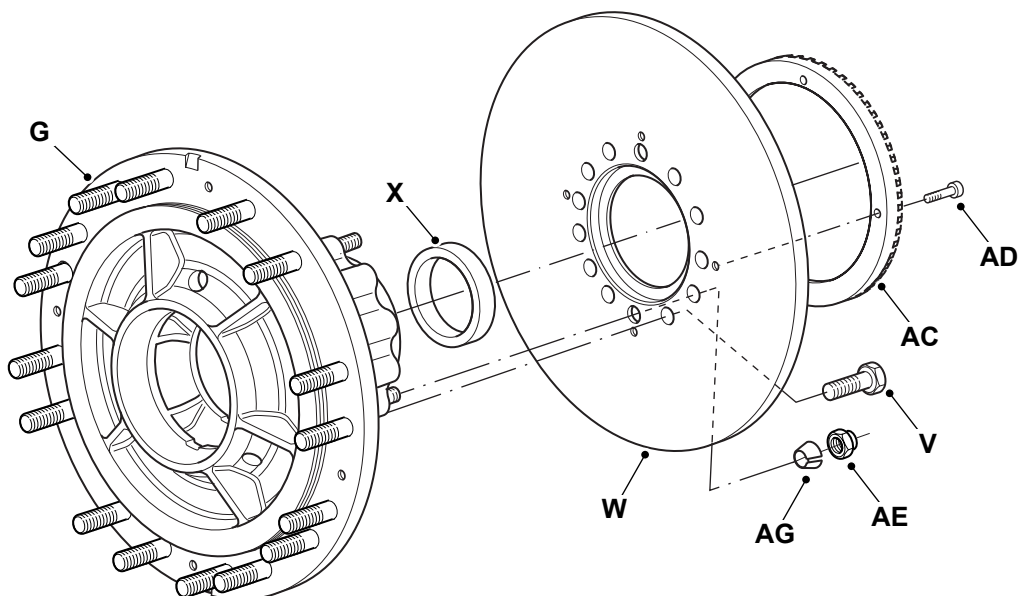


**G** Wheel hub  
**Y** Seal  
**AA** Bearing race 2  
**AT** 2mm

**U** O-ring 2  
**Z** Bearing 2  
**AB** Bearing race 1

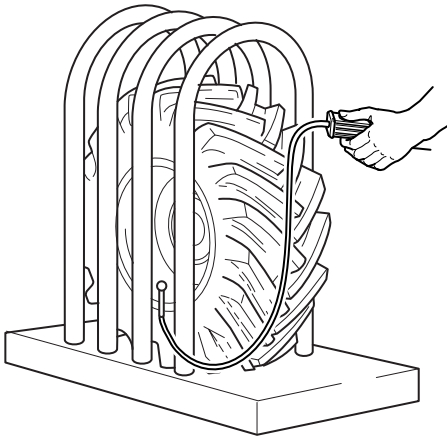
- |   |  |
|---|--|
| <p>15. Install the spacer 1.</p> <p>16. Install the brake disc.</p> <p>17. Install the bolt 1, nut and spacer 2.</p> <p>18. Tighten the bolt 1 to the correct torque value.</p> | <p>19. Install the pole wheel.</p> <p>20. Install the bolt 2.</p> <p>21. Tighten the bolt 2 to the correct torque value.</p> |
|---|--|

Figure 595.



**G** Wheel hub  
**W** Brake disc  
**AC** Pole wheel

**V** Bolt 1  
**X** Spacer 1  
**AD** Bolt 2  
**AG** Nut

**Figure 603.**

2. Prepare the equipment.
  - 2.1. Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tyre pressure.
  - 2.2. Use an air hose fitted with a self-locking air chuck and remote shut-off valve.
3. Add the air.
  - 3.1. Make sure that the air hose is correctly connected to the tyre valve. Clear other people from the area. Stand behind the tread of the tyre while adding the air.
  - 3.2. Inflate the tyre to the recommended pressure. Do not over-inflate.



## 28 - Suspension

00 - General  
00 - General

---

Description	Data
Current	1.5A
Voltage	12V
Control valve accumulator	
Pre-charge pressure	75bar (1,087.0psi) nitrogen gas
Volume	0.4L

*(1) There are two gas springs per suspension cylinder, one low pressure and one high pressure. The pressure in bar is stamped on the accumulator body.*



Y Relief valve 2

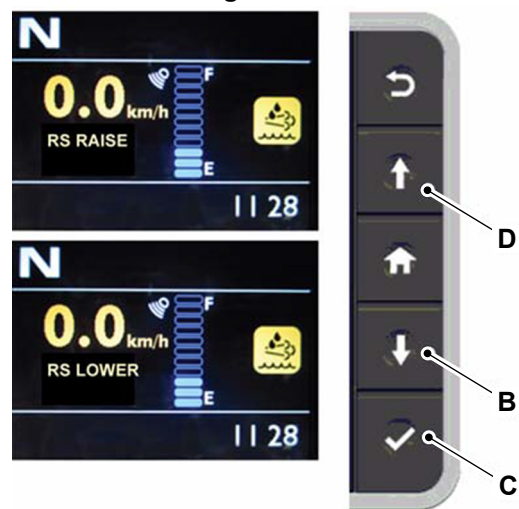
**Figure 636.**

**A**
**A** Transport lock

- Do the rear suspension calibration.

### Rear Suspension Calibration

- Use the down button to move to the next step.
- Use the up button to move back to previous step.
- Start the engine.
- Press the down button. The display will show RS RAISE.
- Press and hold the tick button. The rear suspension will start to raise. The display will flash RS RAISE when the rear suspension is operating.
- Keep the button pressed until the rear suspension reaches the limit of its travel and stops rising.
- Position the suspension calibration blocks between the rear axle and the chassis bump stops.
- Press the down button. The display will show RS LOWER.
- Press and release the tick button. The rear of the machine will lower onto the calibration blocks. The display will show the sensor values as it lowers.

**Figure 637.**


- B** Down button
- C** Tick button
- D** Up button

- Allow the machine to settle on the calibration blocks for the specified duration.

Duration: 10s

- Press the tick button. The display will show xxOKxx, if the calibration value is acceptable.
- Press the down button. The display will show RS REL.
- Press and hold the tick button to raise the rear suspension.
- Remove the suspension calibration blocks.
- Do the front suspension calibration procedure.

**Figure 638.**


- B** Down button
- C** Tick button



## 15 - Control Rod

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**00 - General**

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**Introduction**

The suspension potentiometers are used to measure the suspension ride height position. If any of the potentiometers are replaced the suspension system must be re-calibrated. Refer to Suspension, Potentiometer- Calibrate (PIL 28-90) and Suspension- Calibrate (PIL 28-00).

**Table 150. Energy Transmissions and Conditioning**

Symbol	Description
	Working line, return or feed
	Pilot control
	Drain lines
	Flexible pipe
	Line junction
	Crossing lines
	Air bleed
	Line plugged, also pressure test point
	Line plugged with take off line
	Quick release couplings - connected
	Quick release couplings - disconnected
	Reservoir - return line above fluid level
	Reservoir - return line below fluid level
	Header tank
	Pressure sealed tank
	Accumulator

Symbol	Description
	Filter or strainer
	Water trap
	Cooler - with no indication of coolant flow
	Cooler - indicating direction of coolant flow
	Heater

**Table 151. Control Mechanisms**

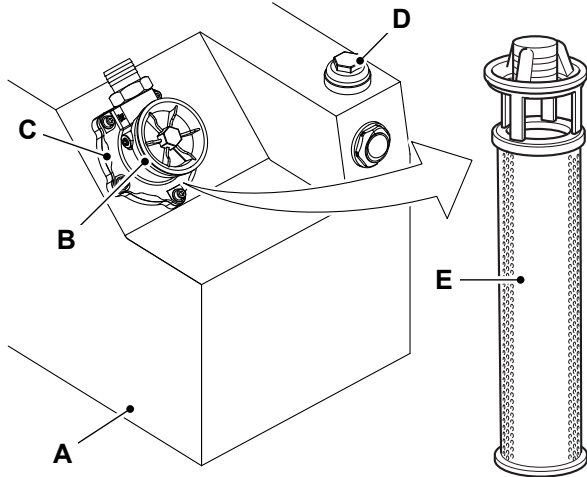
Symbol	Description
	Rotating shaft - one direction
	Rotating shaft - two directions
	Detent
	Locking device
	Over centre device
	Simple linkage
	General control
	Push button operated
	Lever operated
	Pedal operated
	Stem operated
	Spring operated
	Roller operated
	Roller trip operated (one directional)
	Solenoid one winding
	Solenoid two windings

## Remove and Install

### Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Discharge the hydraulic pressure. Refer to (PIL 30-00).
3. Remove the filter end cap.
4. Remove the filter element. The filter element is an integral part of the end cap.
5. Remove and discard the O-rings.

**Figure 669.**



- A** Filter cap
- B** Tank filler cap
- C** Sealing element
- D** Spring
- E** Filter element
- F** O-ring
- G** Filter housing

### Install

1. Clean the around and inside of the filter housing.
2. Inspect the O-ring for defects. If necessary, replace it.
3. Put the filter assembly in the filter housing.
4. Tighten the filter end cap.

should be kept to a minimum. If leaving for more than one week, apply a light coating of suitable grease or petroleum jelly to the exposed part of the ram piston rod.

2. Use genuine JCB parts when replacing parts.
  - 2.1. If parts other than genuine JCB parts are used, the desired results may not be obtained. Use only genuine JCB parts.
3. Caution during dismantling and reassembly.
  - 3.1. Dismantling the ram while it is still installed on the machine can be dangerous as unexpected movements of the machine can occur. Remove the ram from the machine and then dismantle.
  - 3.2. If reassembled with dirty hands, foreign matter can enter the ram causing a shorter life span and also the other hydraulic equipment may be damaged. Reassemble in a clean state.
  - 3.3. Follow the instructions in the diagrams regarding torque tightening for screwed parts. If the torque is too high or too low, it can cause damage.

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Remove and Install .....	30-79
Disassemble and Assemble .....	30-82

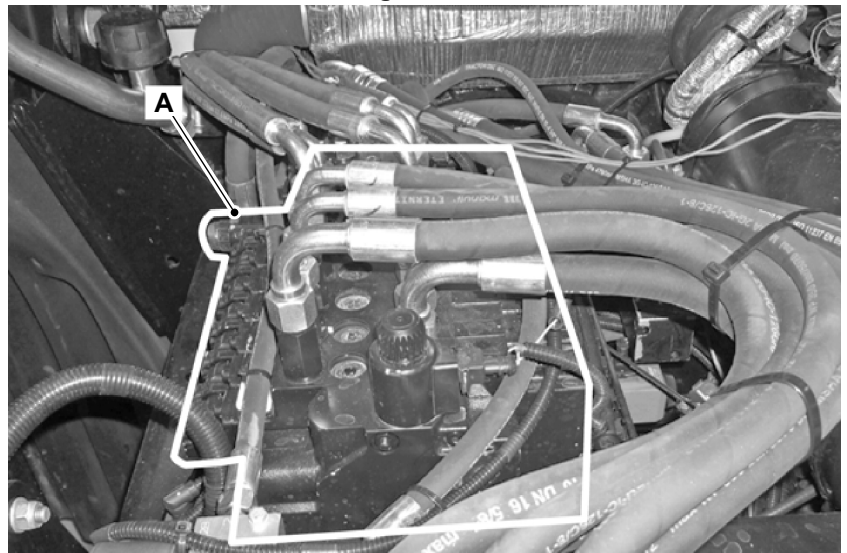
## Introduction

The external hydraulics system comprises an electronically controlled attachment control valve block mounted on top of the chassis at the rear of the operator station.

The attachment control valve block is made up of individual spool valve slices and end manifolds held together with tie rods. Sealing elements between the slices enable hydraulic oil flow within the valve. The attachment control valve block controls front and rear hitches and external hydraulic services for operation of hydraulic implements.

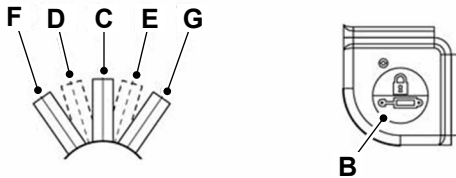
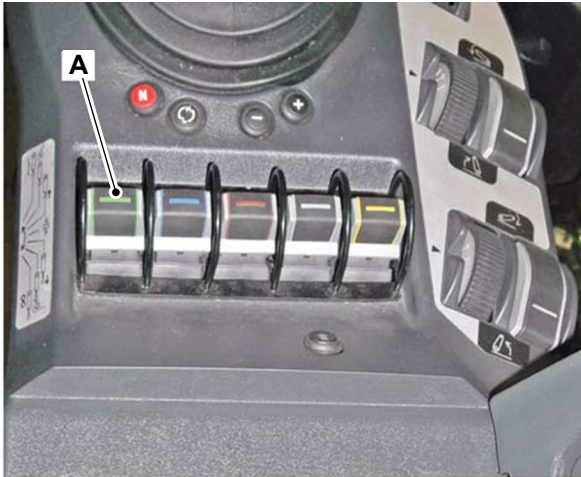
Machines can have up to eight spool valves depending on the specification.

**Figure 679.**



**A** Attachment control valve block

Figure 688.



- A Green spool lever
- B Transportation lock button
- C Central neutral position
- D Position 2
- E Position 1
- F Maximum retracted position
- G Maximum extended position

4. Before the master buzzer stops sounding, slowly extend the green spool lever from its central neutral position to position 1, then retract to position 2 and again bring back to the central neutral position.
5. The instrument panel will display a code and then begin to count down for the specified duration.  
 Duration: 25s

Figure 689.



**Spool Slices Currently Configured**

After you access the configuration mode, the spool slices which are connected and configured will be displayed on the dashboard. If the slices are all configured the prefix X is shown. Some examples of the spool slice configuration are as follows. Make a note that the illustrations may differ from the display on the machine.

Table 159. Spool Slices Currently Configured

Spool Slice Configuration	Description
	No slices connected OR CAN (Controller Area Network) 2 wiring or supply fuse fault OR non-compatible slice connected, return slices to Bosch state.
	Seven slices connected and configured.
	One or more slices connected but none yet configured. 0 indicates Bosch state

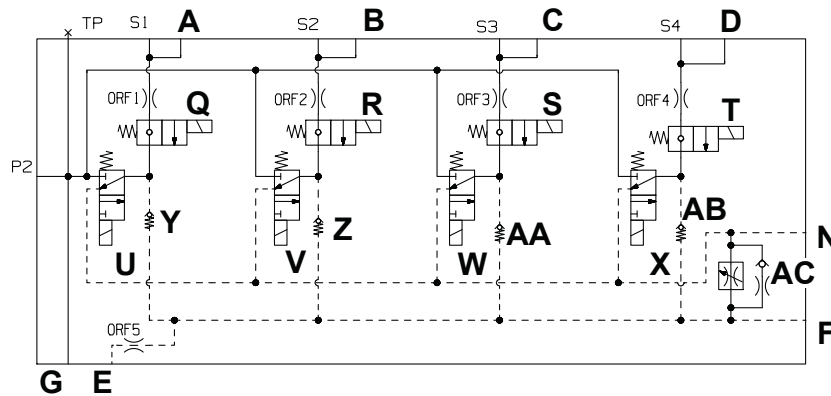
## Diagram

For: Double Acting ..... Page 30-91

For: 8290, 8330 ..... Page 30-92

(For: Double Acting)

**Figure 701.**

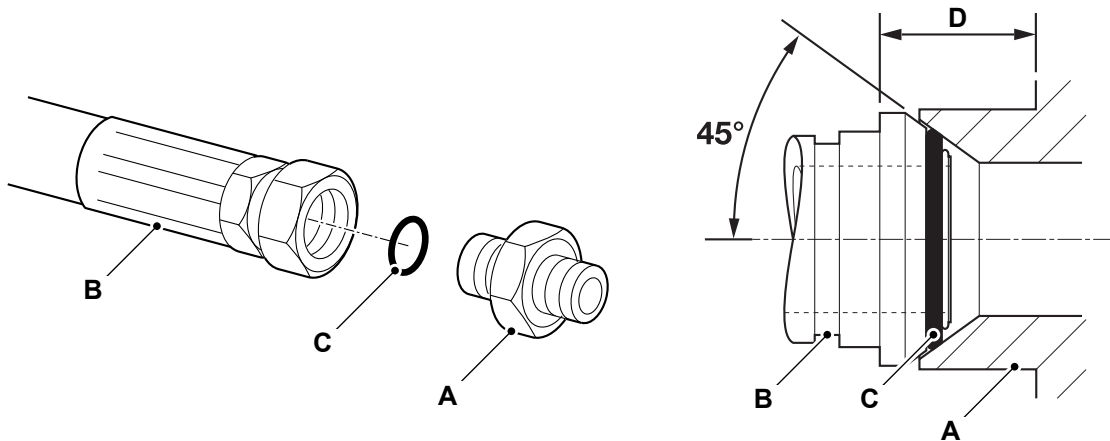


- |   |   |
|---|---|
| <b>A</b> Port - To rear RH suspension cylinder                        | <b>B</b> Port - To rear LH suspension cylinder                        |
| <b>C</b> Port - To front RH suspension cylinder                       | <b>D</b> Port - To front LH suspension cylinder                       |
| <b>E</b> LS (Load Sense) connection - To main hydraulic pump          | <b>F</b> LS connection - To pre-load valve                            |
| <b>G</b> Main hydraulic pump  | <b>N</b> Tank   |
| <b>Q</b> Solenoid control valve - rear RH suspension cylinder, lower  | <b>R</b> Solenoid control valve - rear LH suspension cylinder, lower  |
| <b>S</b> Solenoid control valve - front RH suspension cylinder, lower | <b>T</b> Solenoid control valve - front LH suspension cylinder, lower |
| <b>U</b> Solenoid control valve - rear RH suspension cylinder, raise  | <b>V</b> Solenoid control valve - rear LH suspension cylinder, raise  |
| <b>W</b> Solenoid control valve - front RH suspension cylinder, raise | <b>X</b> Solenoid control valve - front LH suspension cylinder, raise |
| <b>Y</b> Check valve - rear RH suspension cylinder                    | <b>Z</b> Check valve - rear LH suspension cylinder                    |
| <b>AA</b> Check valve - front RH suspension cylinder                  | <b>AB</b> Check valve - front LH suspension cylinder                  |
| <b>AC</b> LS gallery, drain control                                   |   |

BSP Hose Size	Nm	kgf m	lbf ft
in			
1 1/4	305.0	31.0	225.0
1 1/2	305.0	31.0	225.0

### Torque Stop Hose System

Figure 710.



**A** Adaptor

**C** O-ring

**E** Minimum dimension fixed by shoulder.

**B** Hose

**D** Shoulder

Torque-Stop hoses installed into adaptors seal onto an 'O' ring which is compressed into a 45° seat machined into the face of the adaptor port. To prevent

the 'O' ring being damaged as a result of over tightening, Torque-Stop hoses have an additional shoulder, which acts as a physical stop.

**Table 167. BSP 'Torque Stop' Hose - Torque Settings**

BSP Hose Size	Hexagon (A/F)	Nm	kgf m	lbf ft
in.	mm			
1/8	14.0	14.0	1.4	10.0
1/4	19.0	27.0	2.7	20.0
3/8	22.0	40.0	4.1	30.0
1/2	27.0	55.0	5.6	40.0
5/8	30.0	65.0	6.6	48.0
3/4	32.0	95.0	9.7	70.0
1	38.0	120.0	12.2	89.0
1 1/4	50.0	189.0	19.3	140.0
1 1/2	55.0	244.0	24.9	180.0

## Fault-Finding

### Fault

Battery fault

Table 171.

Page 33-5

General Relay Fault

Table 172.

Page 33-5

Electrical Network - CAN (Controller Area Network) Bus system

Table 173.

Page 33-6

ECM Faults

Table 174.

Page 33-6

**Table 171. Battery fault**

Cause	Remedy
Battery Voltage	Switch on the ignition key and check the battery voltage with a multimeter. If the specific gravity of the battery is below 9 volt and above 16 volt, charge or replace the battery.
Battery connection fault	Disconnect the electrical connection from the battery. Check for signs of corrosion or contamination in the battery terminals, clean the terminals. Repair as necessary. If no fault is found proceed to ECM (Engine Control Module) connection faulty.
ECM connection faulty	Disconnect the harness from ECM and inspect. Check seals are in place, check for signs of corrosion or contamination. If ECM pins are damaged, replace ECM and re-flash appropriate calibration (see Re-flashing an ECM). If harness is damaged, repair or replace as necessary. Check the resistance between the vehicle chassis ground and ECM ground, if the resistance is high repair the ECM ground. If no fault is found proceed to 'Battery charge circuit fault'.
Battery charge circuit fault	Check the battery charge circuit, if the circuit is found faulty repair as necessary. If no fault is found raise a Techweb Helpdesk call.

**Table 172. General Relay Fault**

Cause	Remedy
Relay supply voltage fault	Perform the relay test routine. If relay supply voltage is found fault, proceed to 'Relay connection faulty'. If relay supply voltage is OK, raise Techweb Helpdesk Call.
Relay connection faulty	Check the condition of relay to harness connection, make sure the seals are in place, check for signs of corrosion or contamination. Repair/replace as necessary. If no fault is found, proceed to ECM connection fault.



**Figure 733. HVAC**

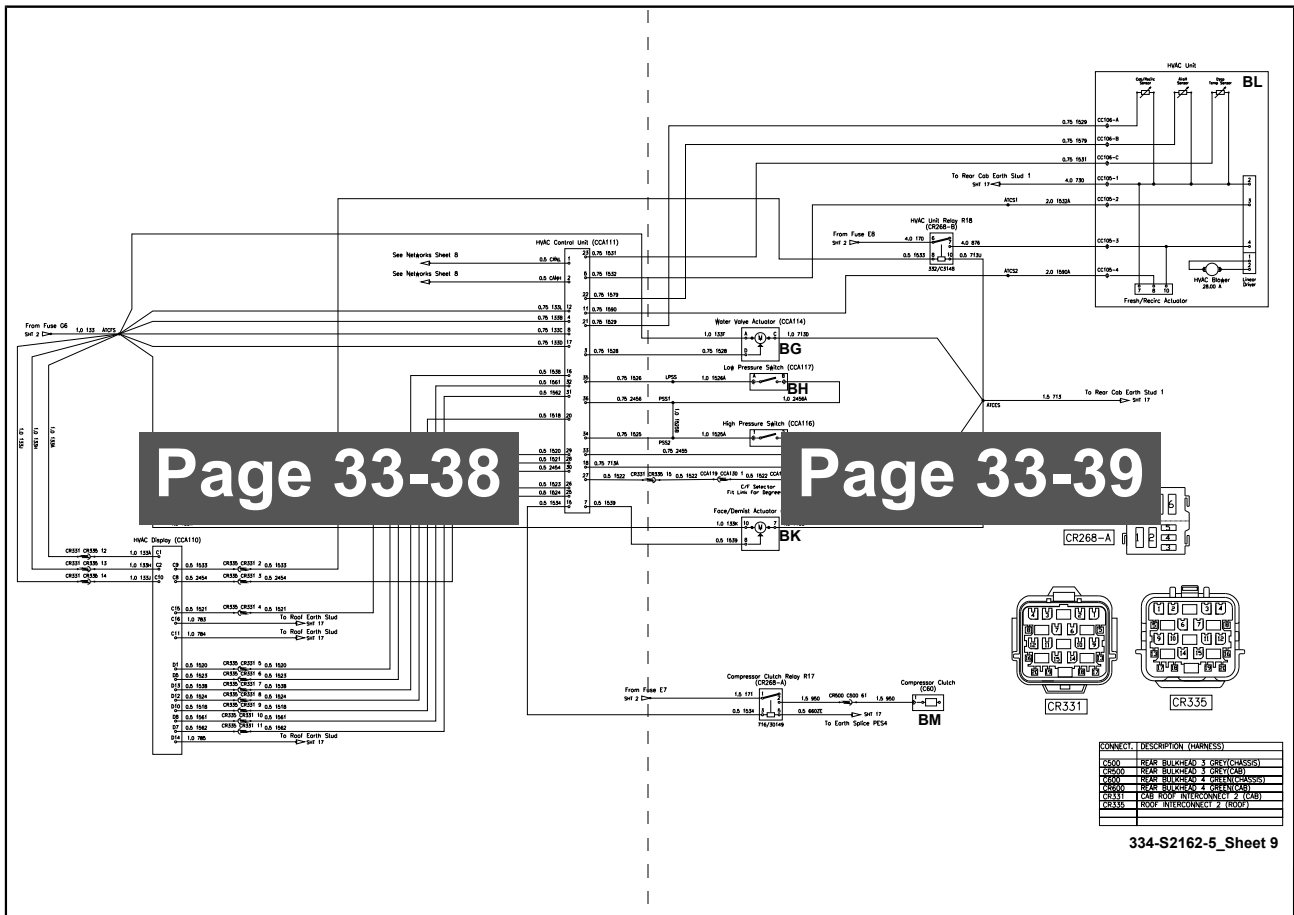
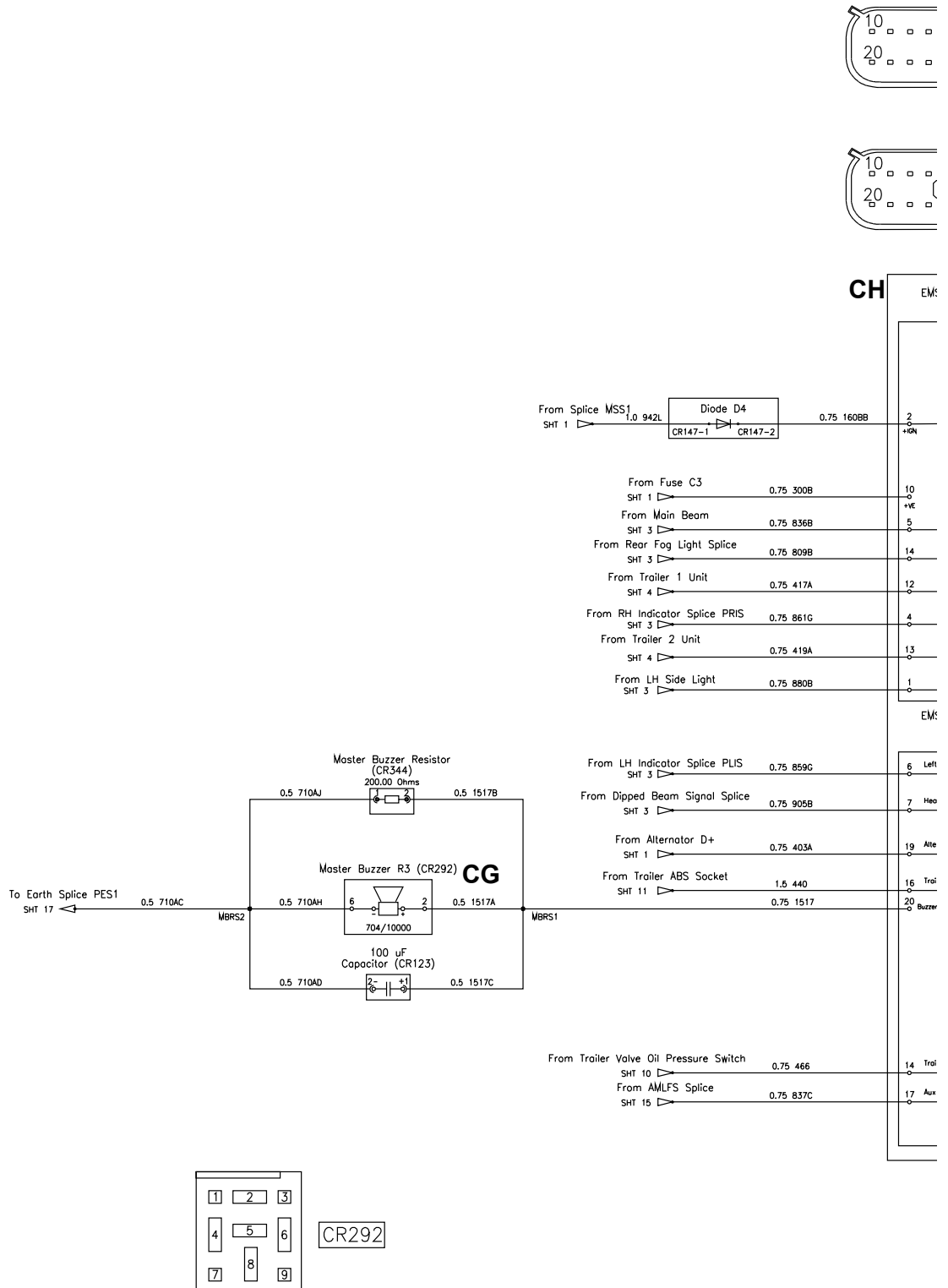
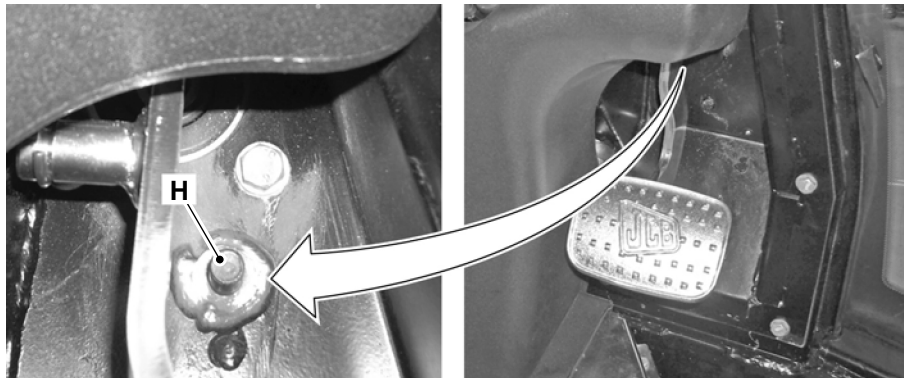


Figure 738. (Part 1 of 2)



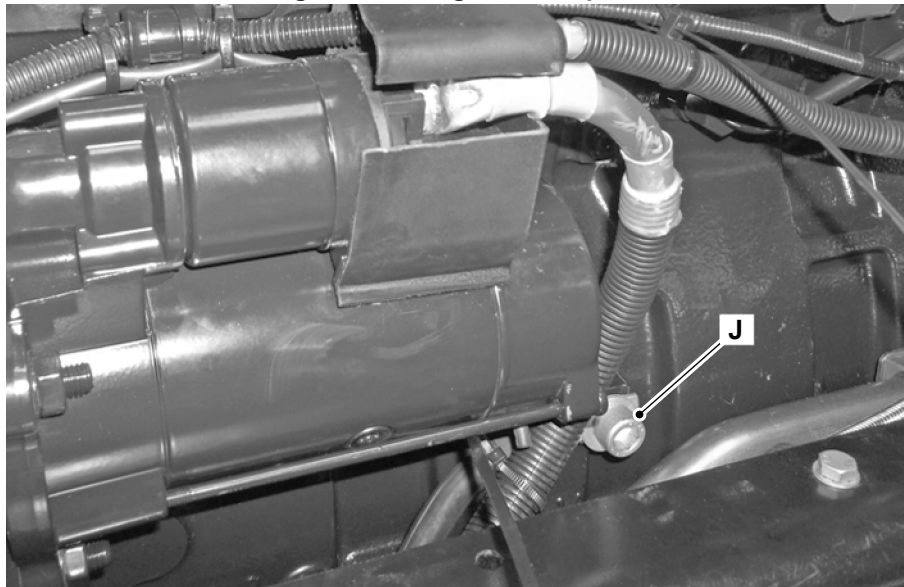
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Figure 747. Operator station front bulkhead earth point



H Operator station front bulkhead earth point

Figure 748. Engine earth point



J Engine earth point



## 09 - Power Distribution

Contents	Page No.
33-09-00 General .....	33-87

lead to the existing harness and secure using the crimp tool. Note that each of the splices detailed is colour-coded to make size and range readily visible. They are secured using the corresponding size and matching colour-coded jaws of the crimp tool to ensure joint security. This tool also incorporates a ratchet closing mechanism which will not release until the splice is fully closed to the correct compression size.

Special Tool: Wiring Splice (1.5-2.5mm Blue, contains 50 off) (Qty.: 1)

Special Tool: Wiring Splice (3-6mm Yellow, contains 50 off) (Qty.: 1)

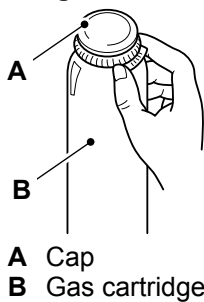
Special Tool: Wiring Splice (0.5-1.5mm Red, contains 50 off) (Qty.: 1)

3. With the Butane heater assembly, seal the connection.

Special Tool: Butane Heater (Qty.: 1)

- 3.1. Remove the cap from the end of the disposable gas cartridge.

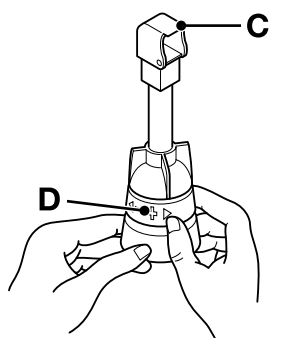
**Figure 763.**



A Cap  
 B Gas cartridge

- 3.2. Before assembling the gas cartridge to the reflector element, turn the red ring to the left, (in the direction of the minus sign marked on the ring).

**Figure 764.**

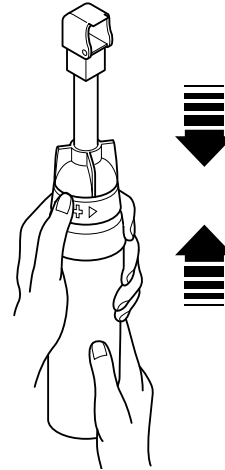


C Reflector element  
 D Red ring

- 3.3. Position the tube hanging down from inside the reflector assembly into the hole at the top of the gas cartridge. Then press the gas cartridge up into the reflector assembly as far as possible until the two elements are

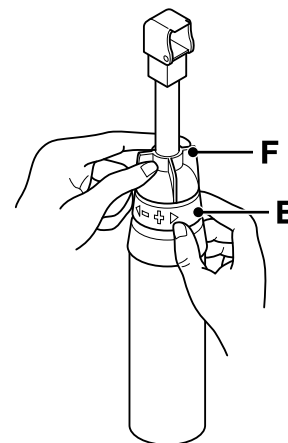
clashed firmly together. An audible click will be heard.

**Figure 765.**



- 3.4. Turn the small ring so that the air holes are completely closed.

**Figure 766.**



E Small ring  
 F Air holes

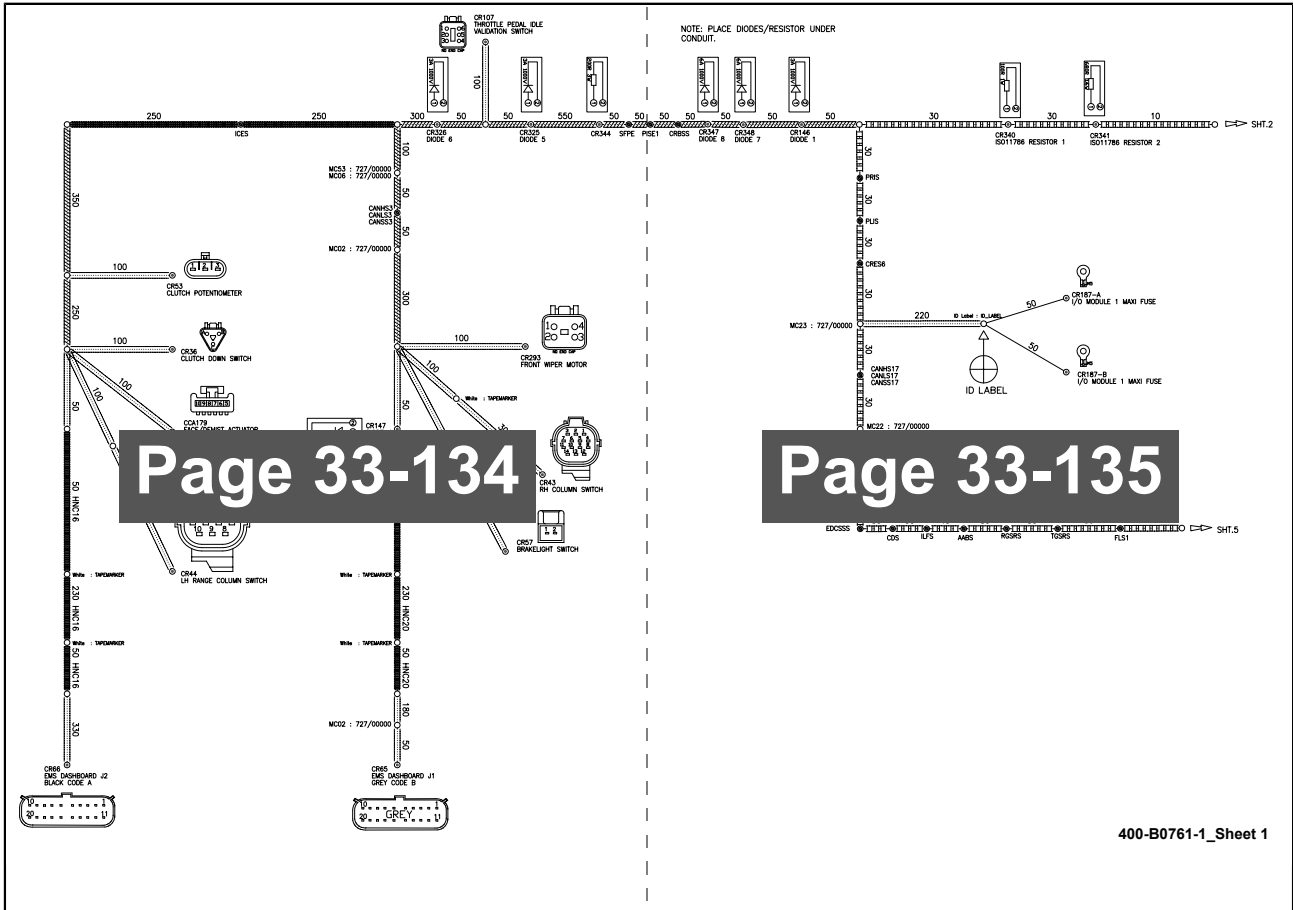
- 3.5. Turn the red ring to the right (in the direction of the plus sign) in order to turn on the gas. Important: Before turning the heater on, make sure that the cartridge is not hotter than the reflector element. This may occur if the cartridge is held in the hand for a long time. The temperature difference between the cartridge and the reflector element may cause long yellow flames to appear on ignition.



# 12 - Operator Station

## Diagram

Figure 783. 400-B0761 (sheet 1 of 12)



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Figure 793. (Part 2 of 2)

ICES  
INSTRUMENT CLUSTER  
EARTH SPLICE

Tag	Size	Destination
1 711AA	0.75	CR65-9
2 711A	1.0	SFPE-4
3 711AB	0.75	CR66-4
4 711AC	0.75	CR66-9

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

IGNS1  
IGNITION 1 SPLICE

Tag	Size	Destination
1 010J	1.0	CR294-5
2 010A	1.5	CR12E-17
3 010C	2.0	CR12E-19
4 010B	2.0	CR12E-1
5 010G	4.0	CR12E-15
6 010H	1.0	CR12E-3
7 010F	1.0	CR12E-7
8 010K	1.0	CR12E-9
9 010E	1.0	CR12E-11
10 010	6.0	CR33-8
11 010L	1.5	CR12E-13
12 010M	0.5	CR12H-9
13 010N	0.5	CR12H-11
14 010P	0.5	CR12H-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

IGNS2  
IGNITION SPLICE 2

Tag	Size	Destination
1 015	6.0	CR3-5
2 015A	0.5	CR12F-5
3 015G	1.0	CR12F-9
4 015C	0.5	CR12F-11
5 015E	0.5	CR12F-19
6 015R	0.5	CR12F-13
7 015B	1.5	CR12F-7
8 015D	2.0	CR12F-15
9 015P	4.0	IGNS2A-4
10 015N	4.0	IGNS2B-7
11 015T	0.75	CR12G-7
12 015K	1.0	CR12F-1
13 015J	1.0	CR12F-3
14 015X	0.5	CR12H-7

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

IGNS2A  
IGNITION SPLICE 2A

Tag	Size	Destination
1 015PC	0.75	CR12G-1
2 015PD	0.75	CR12G-3
3 015PE	0.75	CR12H-5
4 015P	4.0	IGNS2-9
5 015PB	1.5	CR12H-13
6 015PA	0.5	CR12H-15
7 015PF	1.5	CR12H-17

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

IGNS2B  
IGNITION SPLICE 2B

Tag	Size	Destination
1 015NC	0.75	CR12G-13
2 015ND	0.5	CR12G-15
3 015NE	1.0	CR12G-17
4 015NB	1.0	CR12G-11
5 015NF	1.5	CR12G-19
6 015NA	1.0	CR12G-9
7 015NI	4.0	IGNS2-10

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

ILFS  
INTERIOR LIGHTS FEED SPLICE

Tag	Size	Destination
1 324A	0.5	CR500-53
2 324	1.0	CR12C-4
3 324B	0.5	CR330-1
4 324C	0.5	CR330-2

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

LHLSL  
LH SIDELIGHT SPLICE

Tag	Size	Destination
1 880U	0.5	CR276-8
2 880B	0.75	CR65-1
3 880	1.0	CR254-1
4 880A	0.5	CR190-10
5 880T	0.5	CR7-10
6 880R	0.5	CR8-10
7 880E	0.5	CR190-13
8 880S	0.5	CR314-2
9 880P	0.5	CR330-10
10 880J	0.5	CR600-51

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

MBRS1  
MASTER BUZZER  
RESISTOR SPLICE 1

Tag	Size	Destination
1 1517C	0.5	CR123-1
2 1517B	0.5	CR344-1
3 1517A	0.75	CR66-20
4 1517A	0.5	CR292-2

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

MBRS2  
MASTER BUZZER  
RESISTOR SPLICE 2

Tag	Size	Destination
1 710AD	0.5	CR123-2
2 710AC	0.5	PES1-8
3 710AJ	0.5	CR344-2
4 710AH	0.5	CR292-6

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

MBSS  
MAIN BEAM SIGNAL SPLICE

Tag	Size	Destination
1 836B	0.75	CR65-5
2 836	2.0	CR254-6
3 836A	2.0	CR400-58

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

MSS1  
MAINTAINED SUPPLY SPLICE 1

Tag	Size	Destination
1 942	1.0	CR264-7
2 942G	1.0	CR142-5
3 942L	1.0	CR147-1
4 942C	1.0	CR400-10
5 942P	1.0	CR53-2

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

LPSS  
LOW PRESSURE SWITCH SPLICE

Tag	Size	Destination
1 1526A	1.0	CCA117-A
2 1526	0.75	CCA111-35

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

ORWFLS  
OUTER REAR  
W/LIGHTS FEED SPLICE

Tag	Size	Destination
1 1844	0.5	CR272-3
2 1844B	0.5	CR324-2
3 1844A	0.5	CR347-2

Adhesive Lined Heatshrink : 7000/3212

OFWFLS  
OUTER FRONT  
W/LIGHTS FEED SPLICE

Tag	Size	Destination
1 1840	0.5	CR270-3
2 1840A	0.5	CR348-2
3 1840B	0.5	CR323-2

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PES1  
PANEL EARTH 1 SPLICE

Tag	Size	Destination
1 710	1.5	CR38-1
2 710A	0.5	CR290-6
3 710G	0.5	CR69-1
4 710AB	0.5	CR264-5
5 710AE	0.5	CR233-10
6 710AF	0.5	CR273-10
7 710AA	0.5	CR265-5
8 710AC	0.5	MBRS2-2
9 710AG	0.5	CR265-10
10 710AK	0.5	CR276-10
11 710AL	0.5	CR276-5
12 710AM	0.5	CR277-5

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PES2  
PANEL EARTH SPLICE 2

Tag	Size	Destination
1 635ZC	1.0	ECU6-7
2 635	3.0	CR38-1
3 635C	1.5	DSC5-1
4 635ZH	0.5	CR274-10
5 635U	1.5	CR304-1
6 635B	1.5	CR339-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PES3  
PANEL EARTH 3 SPLICE

Tag	Size	Destination
1 720H	0.5	CR68-10
2 720	1.0	CR38-1
3 720S	0.5	CR109-1
4 720U	0.5	CR223-11

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PES4  
PANEL EARTH SPLICE 4

Tag	Size	Destination
1 660D	0.5	E9-1
2 660Z	1.5	CR82A-1
3 660	2.0	CR38-1
4 660ZE	0.5	CR268-5
5 660F	1.0	CR33-7
6 660ZF	0.5	CR7-9
7 660ZJ	0.5	CR8-9

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PISE1  
PANEL IGNITION SPLICE E1

Tag	Size	Destination
1 120	2.0	CR12E-2
2 120A	2.0	CR43-8
3 120C	2.0	CR293-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PLIS  
PANEL LEFT INDICATOR

Tag	Size	Destination
1 859B	1.5	CR400-51
2 859	1.5	CR68-5
3 859G	0.75	CR66-6
4 859A	0.5	CR314-3
5 859CA	1.5	CR191-3
6 859FC	1.0	CR190-6
7 859H	0.75	CR349-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PRIS  
PANEL RIGHT INDICATOR SPLICE

Tag	Size	Destination
1 861B	1.5	CR400-52
2 861	1.5	CR68-18
3 861G	0.75	CR65-4
4 861A	0.5	CR315-3
5 861CA	1.5	CR191-4
6 861FC	1.0	CR190-7
7 861H	0.75	CR350-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PSS1  
PRESSURE SWITCH SPLICE 1

Tag	Size	Destination
1 2456A	1.0	CCA117-B
2 2456	0.75	CCA111-36
3 1525B	1.0	PSS2-3

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

PSS2  
PRESSURE SWITCH SPLICE 2

Tag	Size	Destination
1 1525	0.75	CCA111-34
2 1525A	1.0	CCA116-1
3 1525B	1.0	PSS1-3

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

RGRS  
RADAR GROUND SPEED  
RESISTOR SPLICE

Tag	Size	Destination
1 536	0.5	ECU3-29
2 536B	1.0	CR340-1
3 536A	1.0	CR341-1

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

RHLS  
RH SIDELIGHT SPLICE

Tag	Size	Destination
1 860T	0.5	CR82B-1
2 860E	0.5	CR330-7
3 860	1.0	CR254-10
4 860S	0.5	CR315-2
5 860G	0.5	CR330-4
6 860F	0.5	CR330-5
7 860D	0.5	CR600-50
8 860X	0.5	CR276-3

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

RSS2  
RADAR SIGNAL SPLICE 2

Tag	Size	Destination
1 500B	0.5	E1-16
2 500AB	0.5	ECU1-11
3 500	0.5	CR400-19

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

SES  
SENSOR EARTH SPLICE

Tag	Size	Destination
1 725	0.5	E1-15
2 715	0.5	CR400-23
3 725B	0.5	CR600-19
4 725A	0.5	CR600-22

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

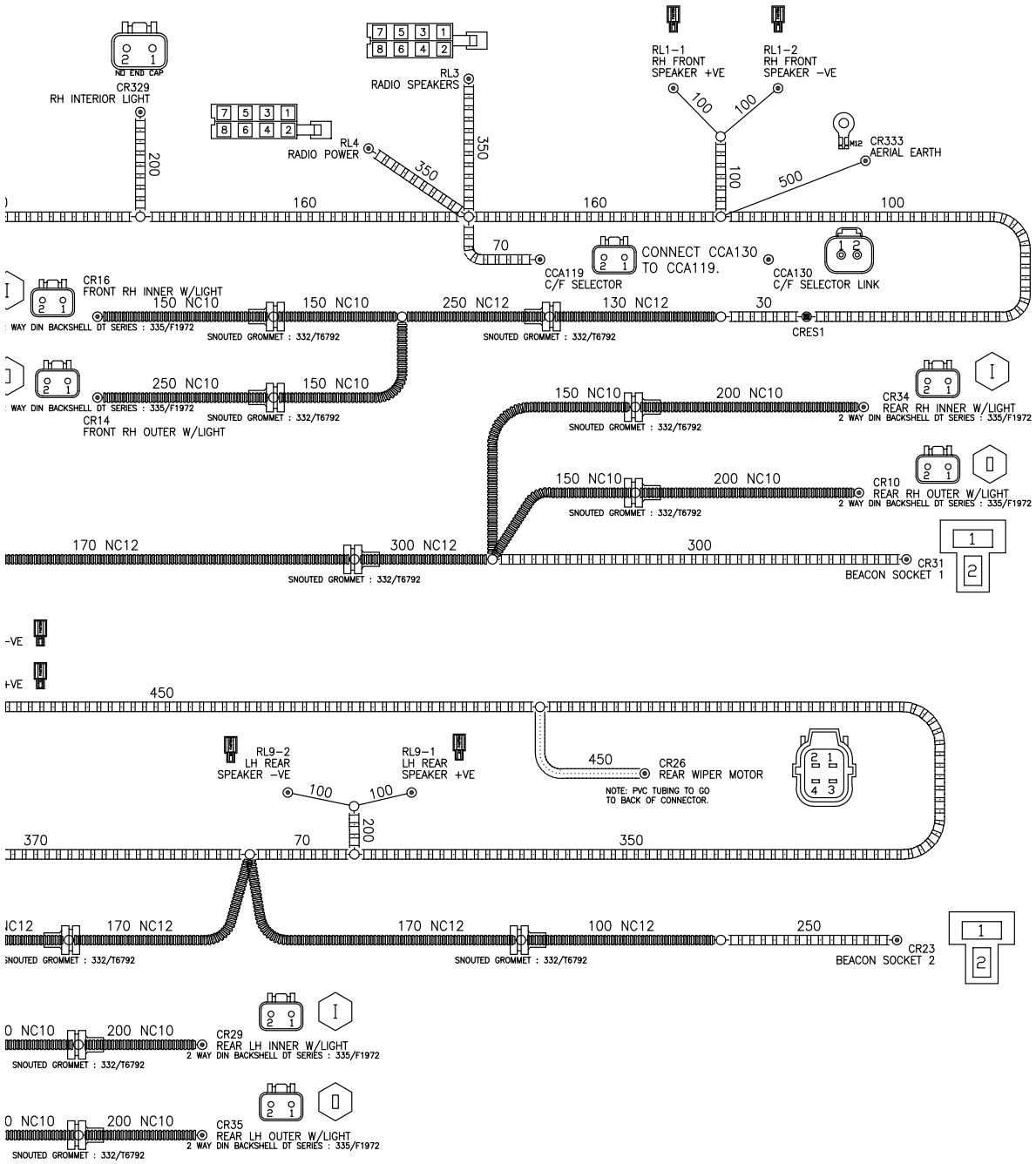
SFPE  
FRONT PANEL EARTH SPLICE

Tag	Size	Destination
1 675JF	0.5	CR400-4
2 711E	1.0	CR44-1
3 711	3.0	CR38-1
4 711A	1.0	ICES-2

In Line Ultrasonic Splice : 7000/3104  
Adhesive Lined Heatshrink : 7000/3212

Page 33-164

Figure 799. (Part 2 of 2)



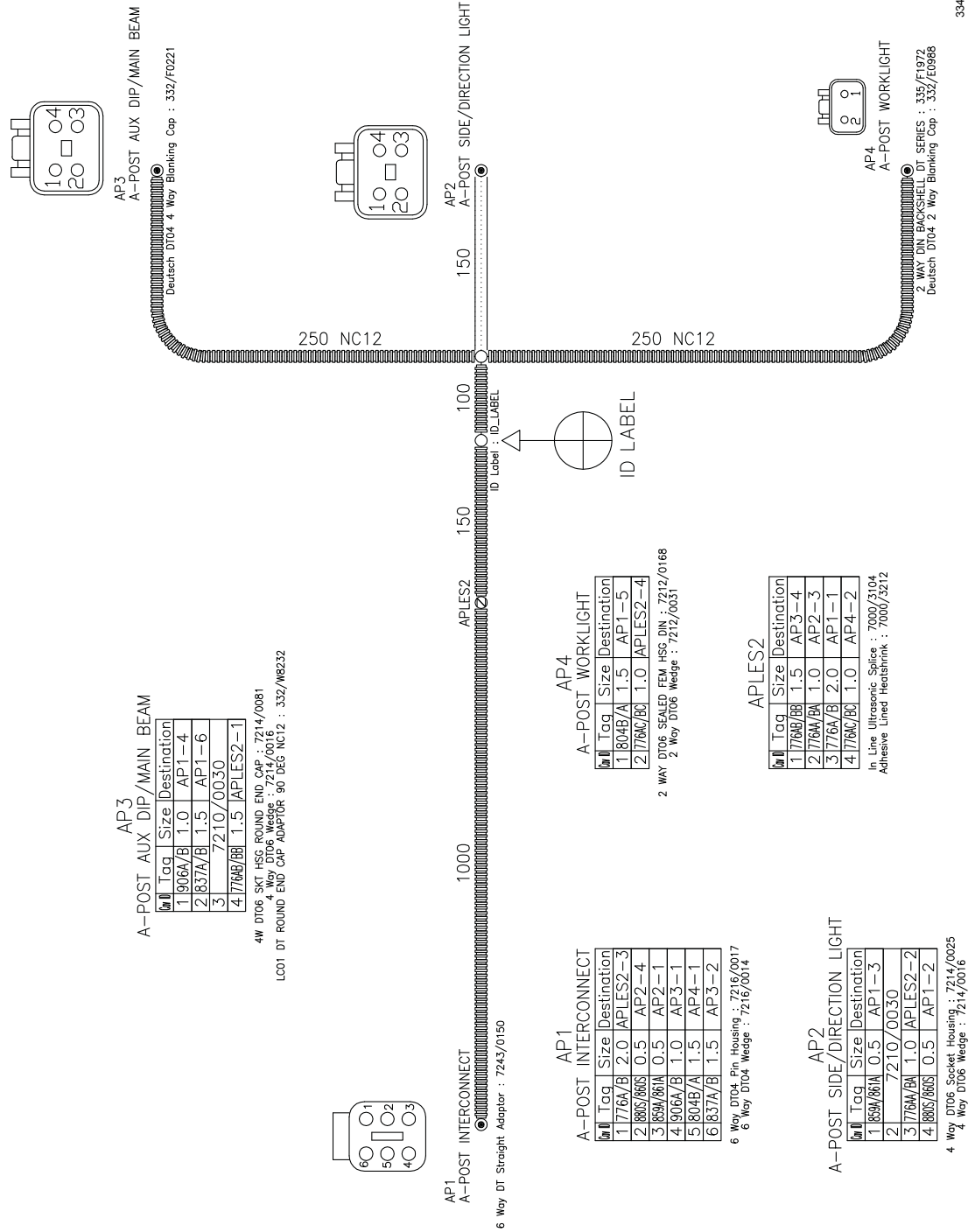
Page 33-180

400-B0760-1\_Sheet1

36 - Work Lights

Diagram

Figure 807. 334-S7698 (Sheet 1 of 1)

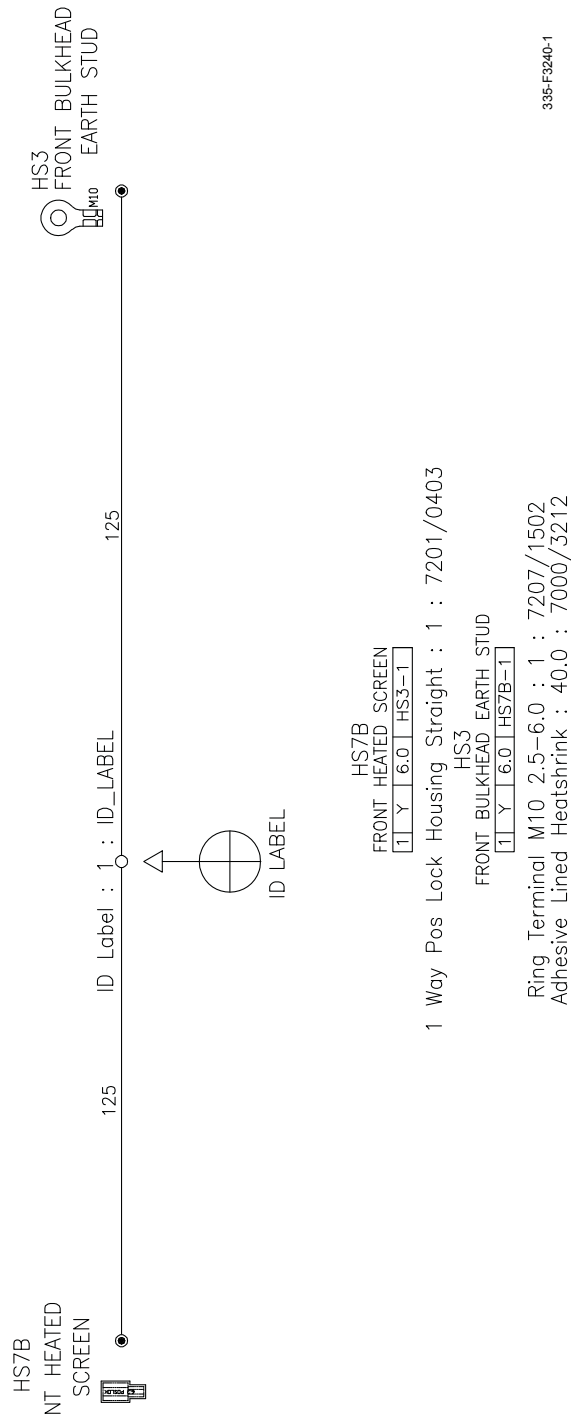


334-S7698-2

97 - Front Window

Diagram

Figure 819. 335-F3240 (Sheet 1 of 1)





## **12 - Heating, Ventilating and Air-Conditioning (HVAC)**

[Introduction](#) ..... [33-229](#)  
[Remove and Install](#) ..... [33-230](#)

### **Introduction**

The HVAC (Heating Ventilation Air Conditioning) interior switch is located in the operator station roof on the RH side. It is mounted into the roof control panel with the mounting frame.

The HVAC interior switch controls the HVAC system. It is not connected to a CAN (Controller Area Network) bus.

Item	Description
1-9	ABS (Anti-lock Braking System)ECU
1-10	Switch membrane 1 - CAN enabled device
1-11	Switch membrane 2 - CAN enabled device
1-12	LiveLink ECU
1-13	Input/Output (I/O) Module
1-15	Diagnostic connector
CANbus 2 Network Devices	
1-6	Central Control ECU <sup>(1)</sup>
2-1	CAN enabled auxiliary valve spool solenoids
CANbus 3 Network Devices	
1-2	Suspension ECU <sup>(1)</sup>
1-3	DECU <sup>(1)</sup>
3-1	PVED electric steering ECU
3-2	Steering angle sensor - CAN enabled device
3-3	GPS (Global Positioning System)ECU
3-4	Diagnostic connector
CANbus 4 Network Devices	
4-1	NOx (Nitrogen Oxide) engine upstream exhaust gas sensor - CAN enabled device
4-2	NOx engine downstream exhaust gas sensor - CAN enabled device
4-3	Engine EGR (Exhaust Gas Recirculation) valve - CAN enabled device
4-4	Engine wastegate actuator - CAN enabled device
4-5	Engine ECU - Engine harness connector
4-6	Diagnostic connector.
CANbus 5 Network Devices	
1-8	Gearbox ECU <sup>(1)</sup>
5-1	Gearbox electronic actuator

(1) Also connected to CANbus 1.

(2) Also connected to CANbus 2.

(3) Also connected to CANbus 3.

(4) Also connected to CANbus 5.

Other operating parameters may initiate automatic engine shut down by the ECM. For example low engine oil pressure or sensor faults.

### **Engine Fault Diagnostics**

Since the ECM continually scans for expected inputs from all connected devices it is capable of detecting related electrical faults. These faults are datalogged in the ECM memory. By connecting diagnostics software any faults recorded can be displayed in code form. This assists service personnel when tracing faults with the fuel injection system.

In addition to fault datalogging, the ECM will respond to some faults by shutting the engine down, thus preventing serious engine damage.

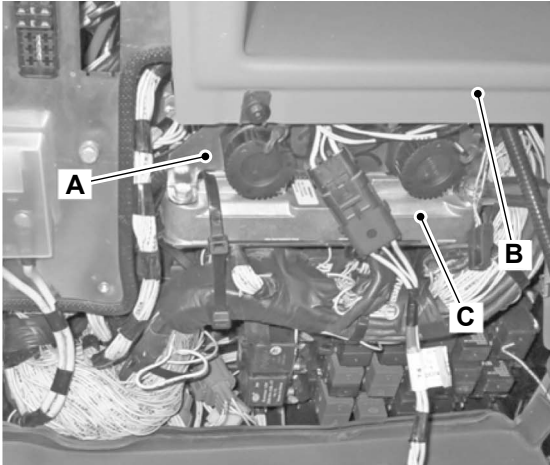
The ECM also has the facility to drive cab mounted warning devices such as coolant temperature and oil pressure displays.

### **Calibrate**

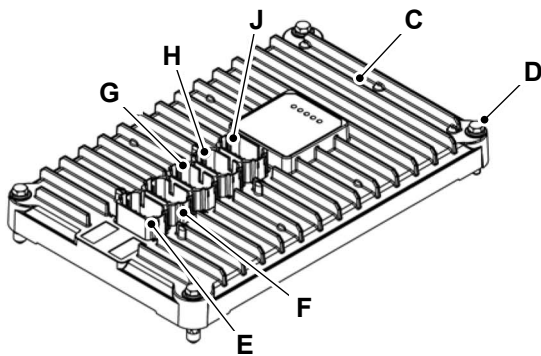
The calibration of the ECM (Engine Control Module) is carried out with the SisuTronic EEM4 service tool. Refer to (PIL 33-57).

Connect the ECM to the laptop with the adaptor (AGCO Part number 8370 79553) and the extension cable (AGCO Part number 8368 62483). Follow the instructions on the Win EEM4 program to calibrate the ECM.

**Figure 856.**



- 4.1. Use the Servicemaster Flashloader tool to install the operating software.



- A** Bracket
- B** Rear RH corner trim panel
- C** Suspension ECU
- D** Screws
- E** Electrical connector J1 - CR255
- F** Electrical connector J2 - CR256
- G** Electrical connector J3 - CR257
- H** Electrical connector J4 - CR258
- J** Electrical connector J5 - CR259

### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Do not replace the suspension ECU with one from another machine. They may look the same but the electronic software will be different.
3. The electrical connectors have different alignment keys. Identify the correct connector locations.
4. If you install a new suspension ECU, do as follows:



Item	Information	Description
		3 - 2WD (Two Wheel Drive) selected
		4 - 4WD and differential lock selected
		5 - 2WD automatically selected
		6 - 4WD automatically selected
		7 - 4WD and differential lock automatically selected
19	Rear PTO (Power Take-Off) software control state <sup>(2)</sup>	
20	Front PTO software control state <sup>(2)</sup>	
21	Internal DECU temperature	
22	Rear hitch calibration state	Shown as follows: <sup>(1)</sup>
		0 = Normal operation
		16 = Sensor not connected
		32 = Sensor not calibrated
		48 = Waiting for hitch lift
		64 = Hitch is moving up
		80 = Hitch is at upper limit
		96 = Waiting for hitch lower
		112 = Hitch is moving down
		128 = Hitch is at lower limit
		255 = Calibration failed
23	Throttle state	
24	Brake pedal switches state	Shown as follows:
		0 = Fault
		1 = Brake pedal pressed
		2 = Brake pedal not pressed
		3 = Intermediate state <sup>(3)</sup>

(1) Calibrated device. Refer to (PIL 33-45).

(2) Use Servicemaster diagnostics.

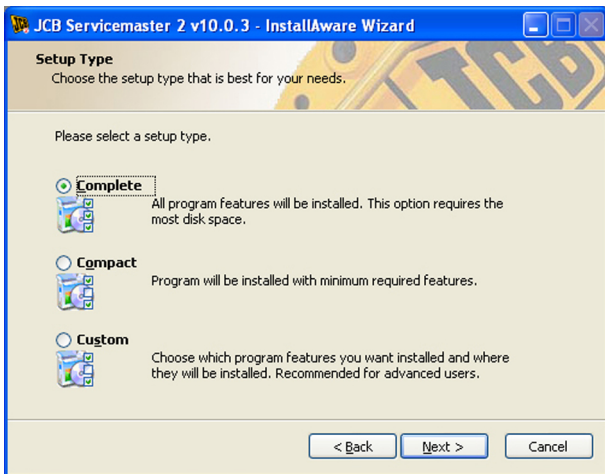
(3) If the pedal remains in an intermediate state fault code P0431 is logged after a pre-set time period.



## **57 - Electronic Diagnostic**

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33-57-03 Servicemaster .....	33-313
33-57-90 Fault Codes .....	33-336

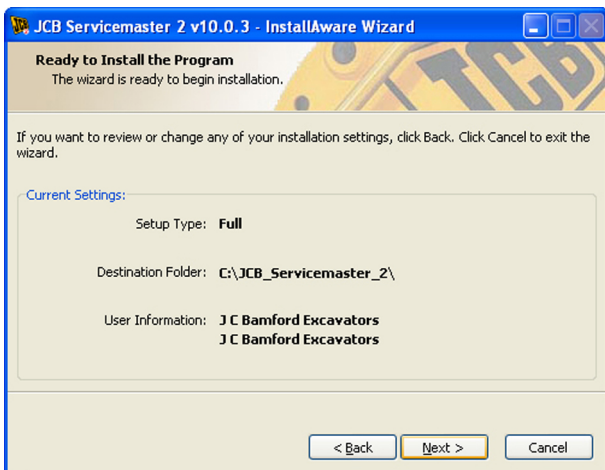
**Figure 912.**



11. The "Ready to Install this Program" screen will show you its setup location in your computer. Refer to Figure 913.

11.1. Click the "Next" option to start installation.

**Figure 913.**

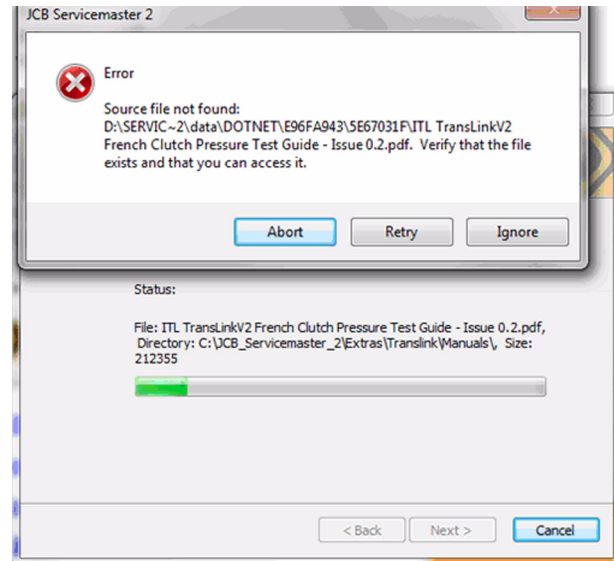


12. The language "Error" windows will appear on the screen during the installation process. Refer to Figure 914.

12.1. Click the "Ignore" option to skip the error windows.

12.2. These language "Error" windows will be installed after through the web update of Servicemaster.

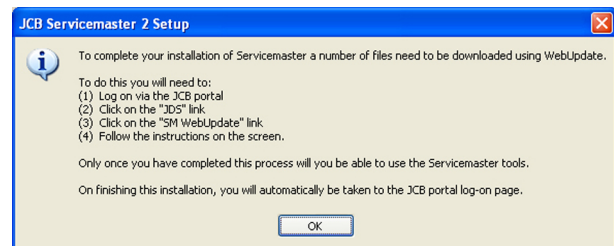
**Figure 914.**



13. A new message window will appear on the screen, after the installation. Refer to Figure 915.

13.1. Click the "OK" button.

**Figure 915.**



14. A new "Completed" message will appear on the "JCB Servicemaster\_2V10.0.3 Installation Wizard" screen. Refer to Figure 916.

14.1. Click the "Finish" option.

14.2. The JCB portal will open for Servicemaster web update, after the installation.

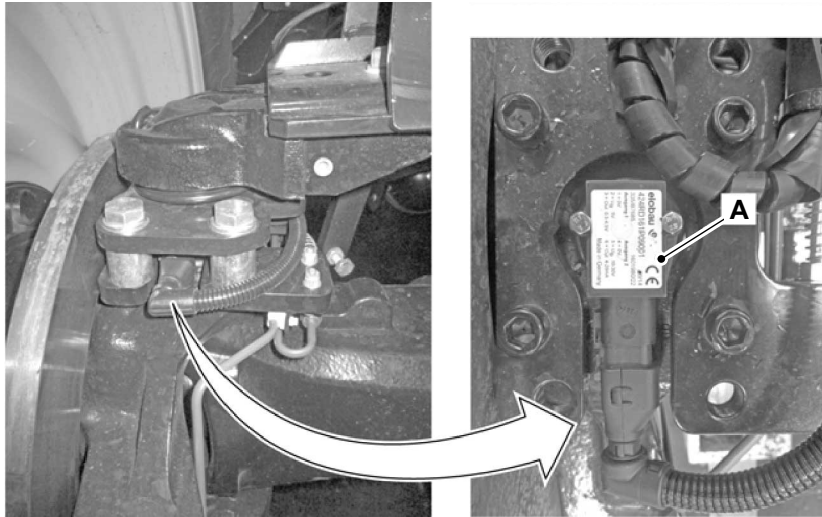
## 18 - Steer Angle

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## Introduction

The front axle is installed with a steer angle sensor. The front steer angle sensor is installed at the right hand hub swivel on the front axle.

Figure 951.



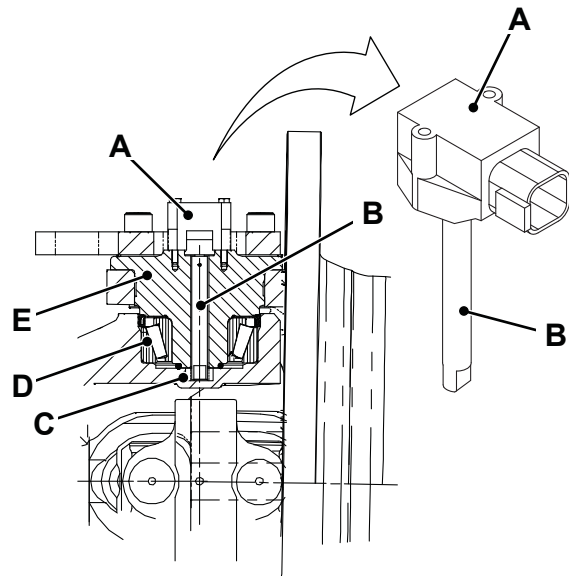
A Front steer angle sensor

## Operation

Each steer angle sensor has an integral actuating shaft which locates in a slot in the axle arm. When the steering operates the hub swivel rotates on the trunnion bearing and the sensor rotates about its actuating shaft.

The front steer angle sensors have a blue identification mark.

Figure 952.



- A Steer angle sensor
- B Actuating shaft
- C Slot
- D Trunnion bearing
- E Hub swivel



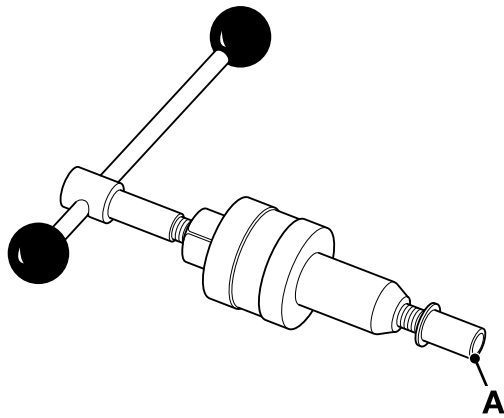
## 06 - Bolts

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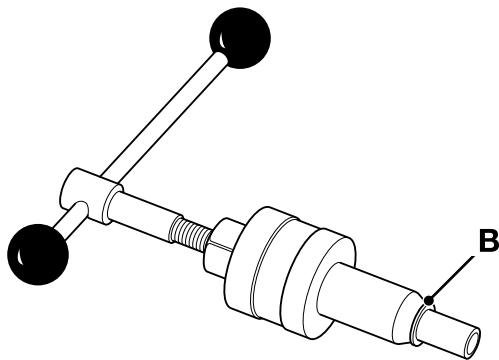
Figure 966.



A Threaded insert

4. Wind the body of the installation tool down the threaded mandrel until it touches the head of the threaded insert.

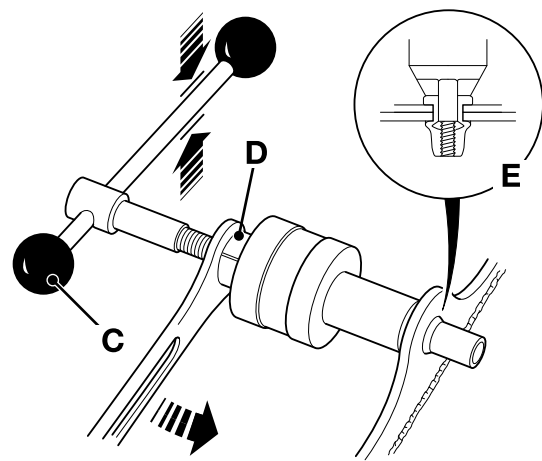
Figure 967.



B Head of threaded insert

5. Insert the threaded insert (assembled to the tool) into the hole drilled in step 1.
6. Hold handle and at the same time draw the mandrel into the installation tool by turning nut. The threaded insert will contract in length and form an upset (smooth bulge) seating itself against the body/ framework. Note: The thread of the threaded insert must not be stripped, take care when upsetting the threaded insert.

Figure 968.



C Handle  
D Nut  
E Body/Framework

7. Remove the installation tool.

## **00 - General**

### **Introduction**

#### **New Oil**

There are no special precautions needed for the handling or use of new oil, besides the normal health and safety practices mentioned in the relevant section of this service manual.

#### **Used Oil**

Used engine crankcase lubricants contain harmful contaminants. Here are precautions to protect your health when handling used engine oil:

1. Avoid prolonged, excessive or repeated skin contact with used oil.
2. Apply a barrier cream to the skin before handling used oil.
3. Note the following when removing engine oil from skin:
  - 3.1. Wash your skin thoroughly with soap and water.
  - 3.2. Using a nail brush will help.
  - 3.3. Use special hand cleansers to help clean dirty hands.
  - 3.4. Never use petrol, diesel fuel, or paraffin for washing.
4. Avoid skin contact with oil soaked clothing.
5. Don't keep oily rags in pockets.
6. Wash dirty clothing before re-use.
7. Throw away oil-soaked shoes.

#### **First Aid**

**EYES** - In the case of eye contact, flush with water for 15 minutes. If irritation persists, get medical attention.

**SWALLOWING** - If oil is swallowed do not induce vomiting. Get medical advice.

**SKIN** - In the case of excessive skin contact, wash with soap and water.

**SPILLAGE** - Absorb on sand or a locally approved brand of absorbent granules. Scrape up and remove to a chemical disposal area.

**FIRES** - Extinguish with carbon dioxide, dry chemical or foam. Firefighters should use self-contained breathing apparatus.



## 00 - General

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## Introduction

This section contains information on primers, solvents, cleaning solutions etc. that are in use at JCB.

All primers and solvents should be used at all times in line with the manufacturer's recommendations.

### Approved primers and solvents

The table shown in Technical Data shows the approved primers and solvents available to use on JCB machines. The table also provides basic details to help with the selection of primers and solvents. More up to date information can be found on the manufacturer's website.

## 00 - General

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## Introduction

**▲ Notice:** Consult your fuel supplier or JCB dealer about the suitability of any fuel you are unsure of.

## Diesel Specification

You must use ultra low sulphur diesel to the following specifications or the machine warranty will not be valid.

- EN590: 2009 or,
- ASTM D975-09b 1-D or 2-D.

These specifications meet the following requirements:

**Table 243.**

	<b>Requirement</b>	<b>Test Method</b>
Density 15°C (59.0°F)	0.82 - 0.84 kg/dm <sup>3</sup>	EN ISO 3675: 1998, EN ISO 12185
Viscosity 40°C (103.9°F)	2.0 - 4.5 mm <sup>2</sup> /s	EN ISO 3104
Sulphur Content	Max 15mg/kg	EN ISO 14596: 1998
Cetane number	Min 51	EN ISO 5165: 1998
Water content	Max 200 mg/kg	pr EN ISO12937: 1996
Lubricity/ HFRR	Max 460 micron meter	ISO 12156-1

## Biodiesel

Fuels according to EN 590:2009 may contain up to 7% Fatty Acid Methyl Ester (FAME) type biodiesel according to EN 141214:2008.

Fuels according to ASTM D975-09b may contain up to 5% FAAE (fatty acid alkyl ester) type biodiesel according to ASTM D6751-08.

Greater proportions of biodiesel are not allowed.

## Low Temperature Fuels

Special winter fuels may be available for engine operation at temperatures below 0°C (32.0°F). These fuels have a lower viscosity. They also limit wax formation in the fuel at low temperatures. (Wax forming in the fuel can stop the fuel flowing through the filter.)

## **00 - General**

### **Introduction**

The tools shown are the special tools required for completing the procedures described in this manual. These tools are available from JCB Service or in some instances can be manufactured locally.

Before you use a tool or piece of equipment, it is essential that it is inspected for damage and checked for correct operation.

Electronic equipment and measuring equipment should be used in accordance with the manufacturer's recommendations and in accordance with information contained within the relevant service manual section.

Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.

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