# 06 - Safety Warnings

## Introduction

In this manual and on the machine, there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

The signal word 'DANGER' indicates a hazardous situation which, if not avoided, will result in death or serious injury.

The signal word 'WARNING' indicates a hazardous situation which, if not avoided, could result in death or serious injury.

The signal word 'CAUTION' indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The signal word 'Notice' indicates a hazardous situation which, if not avoided, could result in machine damage.

The safety alert system (shown) also helps to identify important safety messages in this manual and on the machine. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.

**Figure 1. The safety alert system**



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## Health and Safety

⚠ **WARNING** Do not lean out of the cab to operate the quickhitch levers. If the controls are moved accidentally you could be killed or injured.

**WARNING** Always install the quickhitch latch hook locking pin (mechanical only). Failure to install the pin will result in possible failure of the latching mechanism. Such a failure could result in the sudden release of an attachment from the machine and you or others could be killed or seriously injured.

**WARNING** The attachment will move when released. Stand clear and to one side when releasing the attachment.

**WARNING** Attachments that are installed with the use of loader or excavator quickhitches must not be used to transport or lift persons if the machine is not designed and equipped to do so.

**CAUTION** When the quickhitch is attached to the machine, allowance must be made for the weight of the quickhitch on the rated operating load. The mass of the Quickhitch is stamped on the data plate.

## Remove and Install

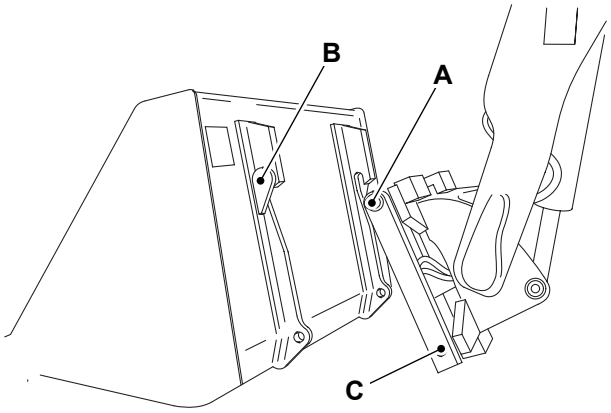
⚠ **WARNING** Keep other people clear of the area while you disengage the attachment. If a second person is to be involved in this procedure, ensure that he keeps clear of the machine and attachment until signalled by you to proceed.

### Installing Changezee Quickhitch Attachments

Various auxiliary attachments can be used with the Changezee Quickhitch. The following procedures show a shovel being installed/removed.

1. Set the attachment on firm level ground. Use safe and correct lifting equipment to move the attachment.
2. If there is already an attachment fitted to the machine then remove it.
3. Position the machine so that the Changezee Quickhitch carriage is parallel to the attachment.
4. Lower the machine arm to bring the pivot shaft below the level of the hooks.

**Figure 7.**




**A** Pivot shaft
**B** Hooks
**C** Changezee Quickhitch locking pins

5. Engage the attachment:
   5.1. Drive the machine slowly forward, stop the movement when the pivot shaft touches the attachment.
   5.2. Engage the park brake and set the transmission to neutral.
   5.3. Raise the machine arm so that the pivot shaft engages with the hooks.
6. Engage the lock pins:
   6.1. Make sure that the park brake is engaged and the transmission is set to neutral.

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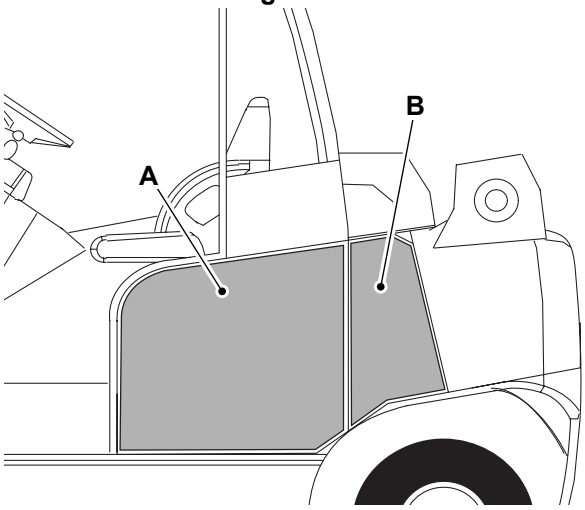
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# 06 - Engine Compartment

## Open and Close

There are two engine compartment panels, a main panel and a fuse panel.

**Figure 12.**




**A** Engine main panel
**B** Engine fuse panel

### Engine Main panel

⚠ **WARNING** The engine has exposed rotating parts. Switch off the engine before working in the engine compartment. Do not use the machine with the engine cover open.

#### Open

1. Make the machine safe.
   Refer to: PIL 01-03.
2. Use the ignition key to unlock the panel.

#### Close

1. Push the panel shut.
2. Use the ignition key to lock the panel.

### Engine Fuse panel

#### Remove

1. Make the machine safe.
   Refer to: PIL 01-03.
2. Pull the panel to remove it.

#### Install

1. Position the panel.
2. Push the panel to install it.

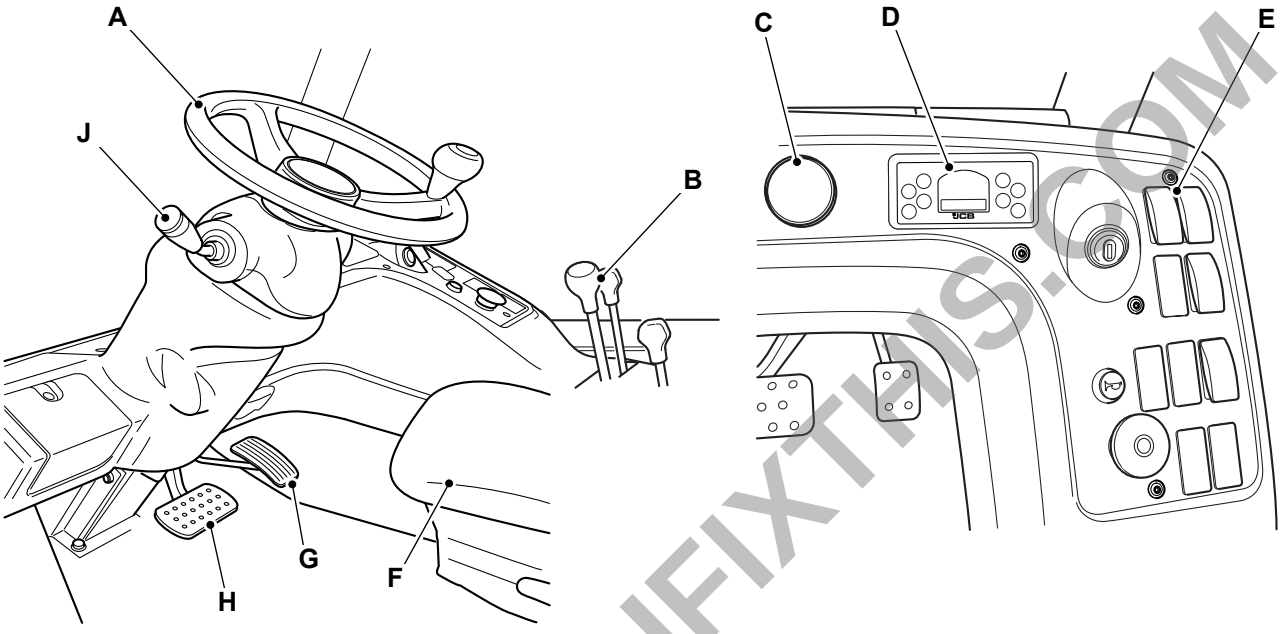
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## Component Identification

Figure 34.




**A** Steering wheel
**B** Lift arm controls
**C** Coolant temperature gauge
**D** Instrument panel (option)
**E** Console switches
**F** Operator Seat
**G** Accelerator pedal
**H** Brake pedal
**J** Gear lever

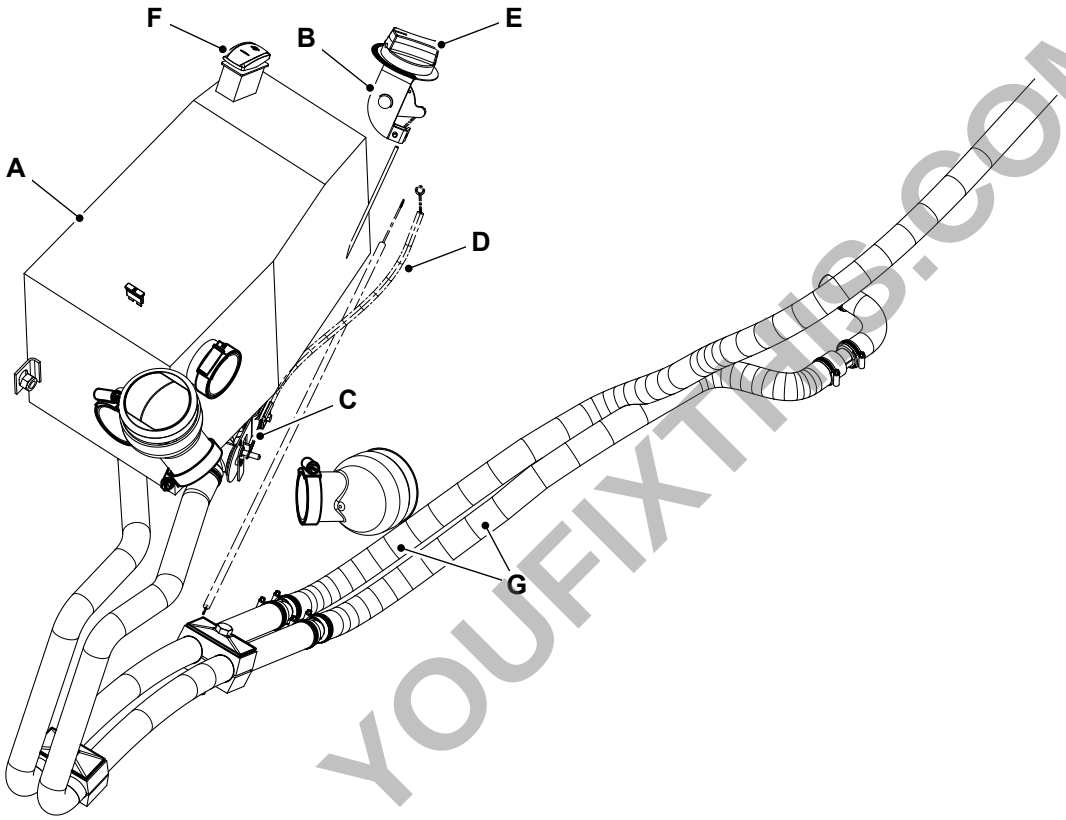
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## Component Identification

Figure 76.




**A** Heater unit
**B** Rotary cable control
**C** Heater valve
**D** Cable control (Heater valve)
**E** Control knob
**F** Actuator
**G** Heater hoses

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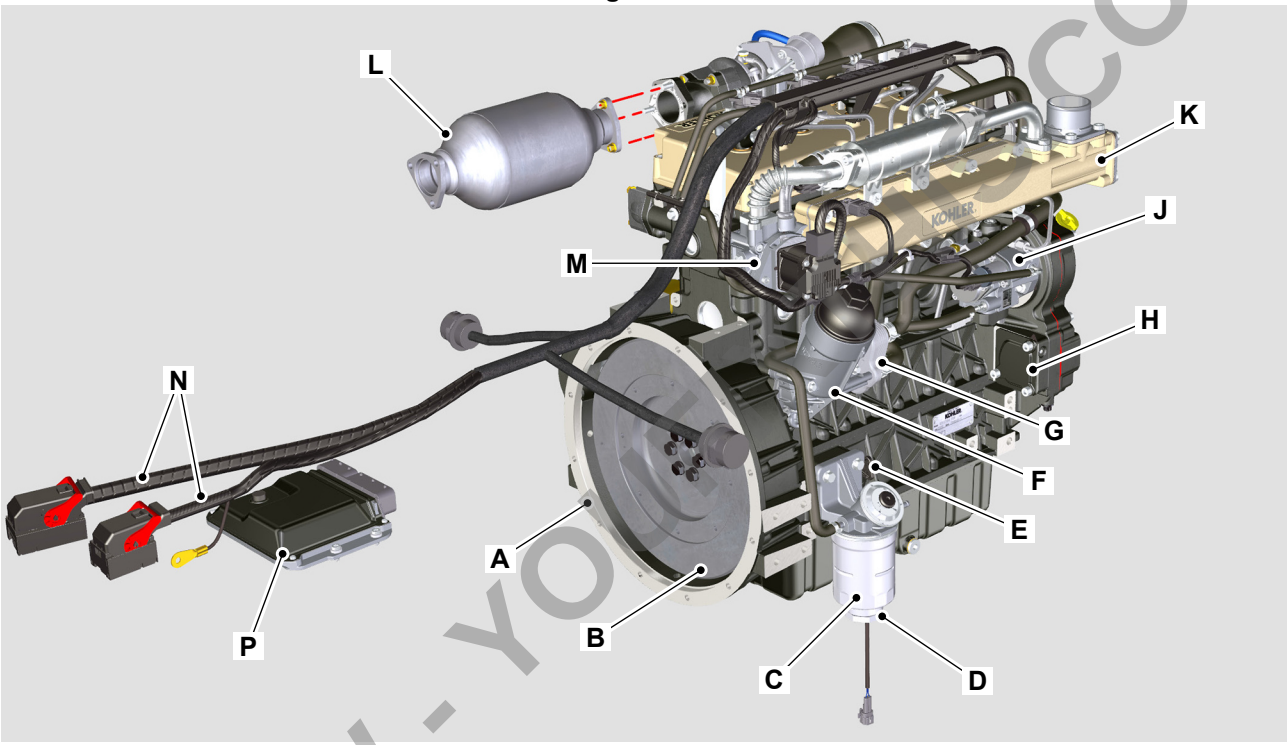
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# Component Identification

## External

The following identifies the main components of a typical engine assembly visible from the exterior. Some variants may differ in detail.

**Figure 83.**




**A** Flywheel housing (PIL 15-54)
**B** Flywheel (PIL 15-54)
**C** Fuel filter (PIL 18-09)
**D** Fuel filter drain plug (PIL 18-09)
**E** Dipstick (PIL 15-45)
**F** Oil filter (PIL 15-21)
**G** Oil cooler (PIL 15-69)
**H** PTO (Power Take-Off) cover (If fitted)
**J** High pressure fuel pump (PIL 18-18-15)
**K** Inlet manifold (PIL 18-24-03)
**L** Catalytic converter (PIL 18-24-18)
**M** EGR (Exhaust Gas Recirculation) valve (PIL 18-27)
**N** Engine harness (PIL 33-12-09)
**P** ECM (Engine Control Module)(PIL 33-45-06)

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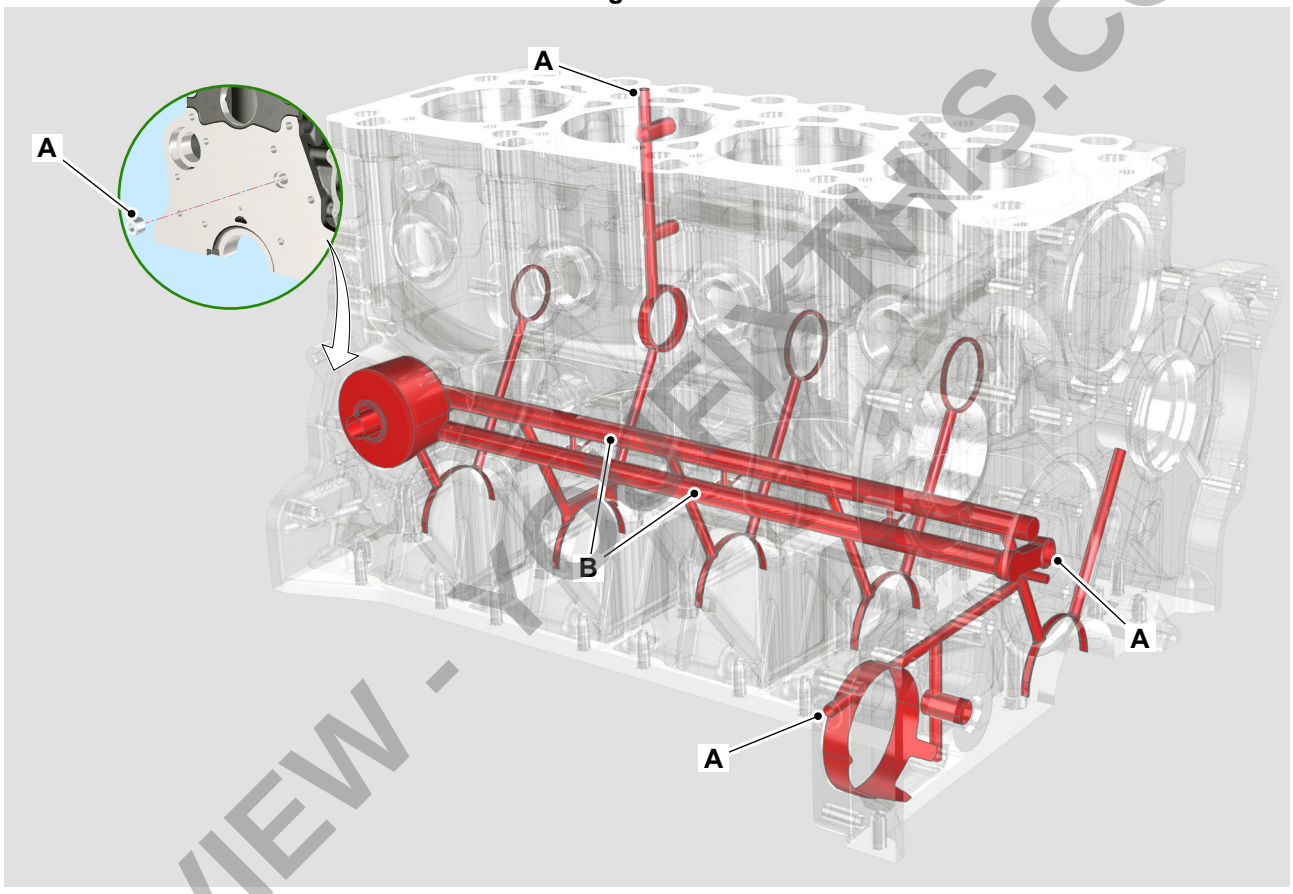
# Clean

## Oil pipes

Important: Make sure you keep a safe distance from all of the open ports.

1. Remove all the plugs.
2. Put a pipe cleaner in all the open ports to clean the oil pipes,as shown.
3. Use a compressed air line to remove any remaining oil.
4. Install all the plugs with Loctite.

**Figure 98.**




**A** Plug

**B** Oil pipe

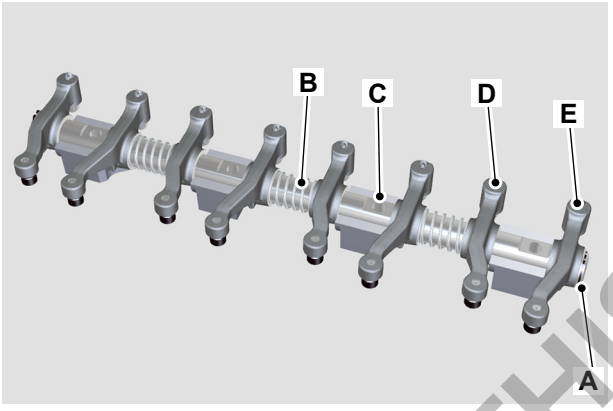
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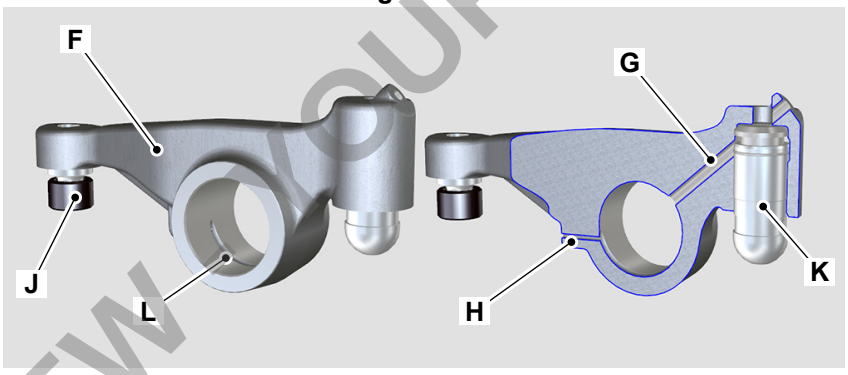
## Component Identification

Figure 245.




**A** Rocker arm shaft
**B** Rocker arm distancing spring
**C** Rocker arm shaft support
**D** Exhaust rocker arm
**E** Intake rocker arm

Figure 246.




**F** Rocker arm body
**G** Hydraulic tappet oil refill line
**H** Valve tappet lubrication line
**J** Valve tappet
**K** Hydraulic tappet
**L** Oil flow line

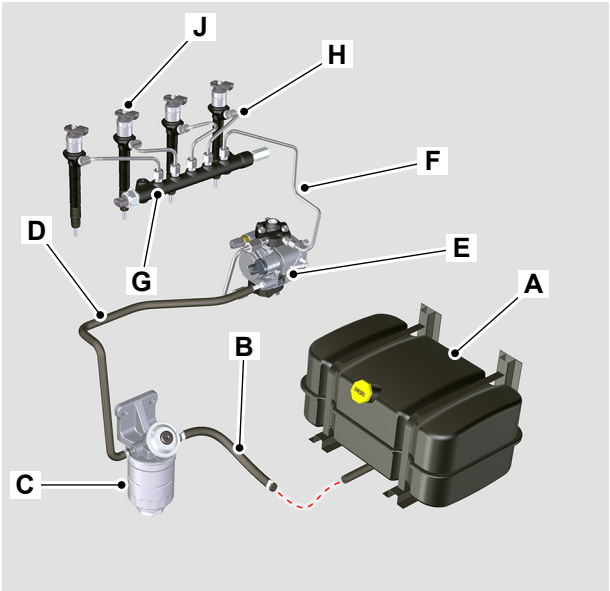
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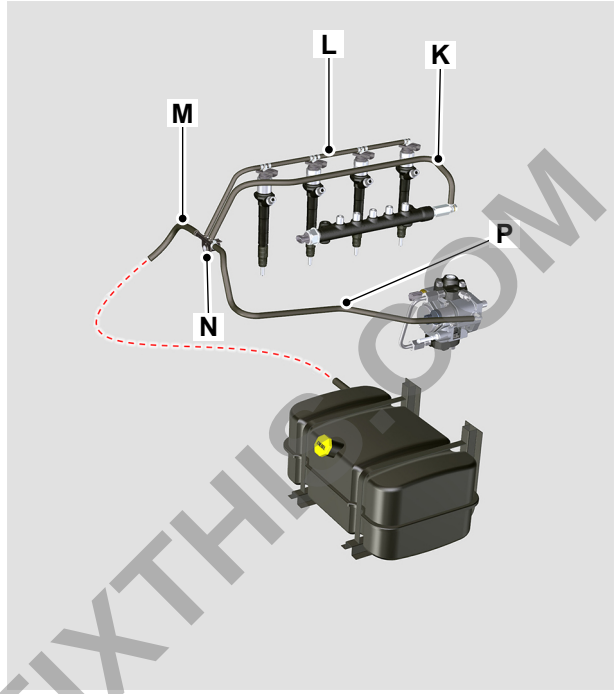
## Component Identification

**Figure 413. Fuel Supply-High Pressure**




**A** Fuel tank
**B** Fuel pipe under low pressure from the tank to the fuel filter
**C** Fuel filter
**D** Fuel pipe under low pressure from the fuel filter to the high pressure pump
**E** High-pressure pump
**F** Fuel pipe under high pressure from the high pressure pump to the rail
**G** Rail
**H** Fuel pipes under high pressure from the rail to the electronic injectors
**J** Electronic injectors

**Figure 414. Fuel Supply-Low Pressure**




**K** Fuel return pipe under low pressure from the rail to the fuel distributor
**L** Fuel return pipe under low pressure from the electronic injectors to the fuel distributor
**M** Fuel return pipe under low pressure from the distributor to the fuel tank
**N** Fuel distributor under low pressure
**P** Fuel return pipe under low pressure from the injection pump to the fuel distributor

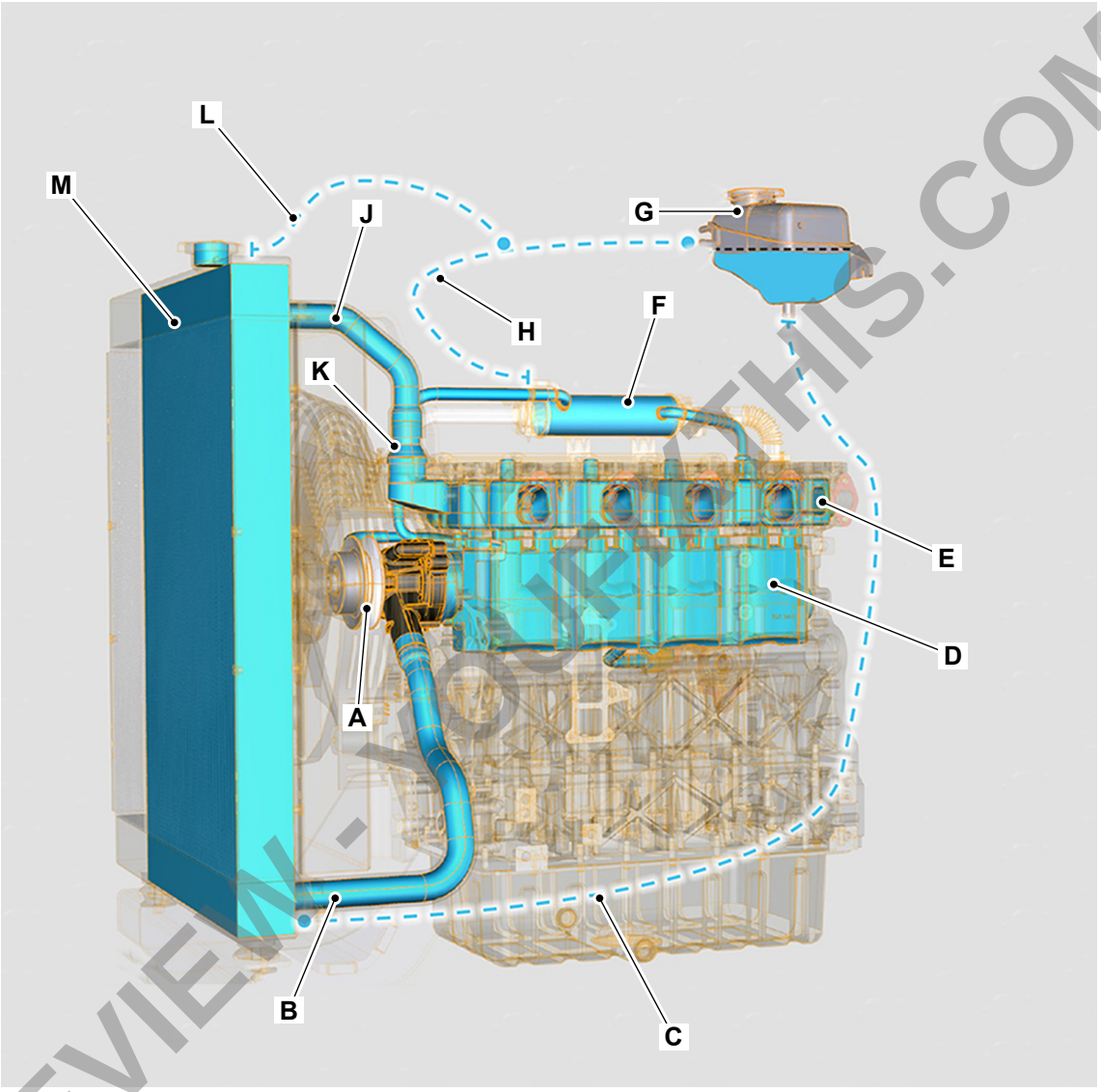
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## Component Identification

Figure 504.




**A** Water pump
**B** Coolant intake
**C** Return from expansion tank
**D** Coolant cylinder
**E** Coolant cylinder head
**F** EGR cooler coolant
**G** Expansion tank
**H** Vent line to expansion tank
**J** Coolant to radiator
**K** Thermostatic valve
**L** Vent line from radiator to expansion tank
**M** Coolant into radiator

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## 00 - General

Introduction ..... 24-3
Health and Safety ..... 24-4

## Introduction

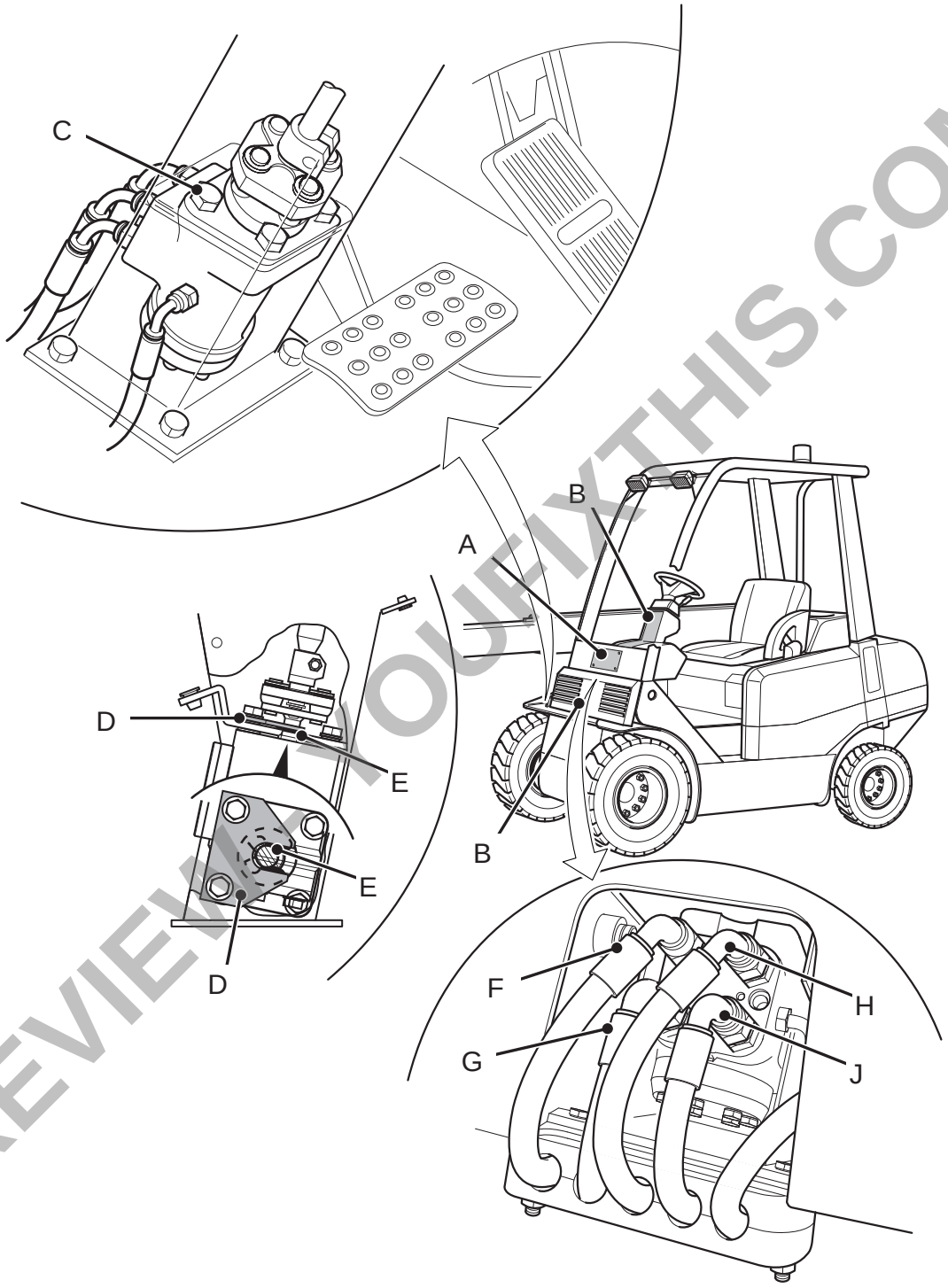
Each front wheel motor has an integral brake pack. The brake is of the “always on” type. The hydraulic pressure from the hydraulic pump P1 is used to supply the brake port of the motor through the brake release valve to release the brake. When the brake port receives no pressure supply the brake comes on.

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**Figure 538.**



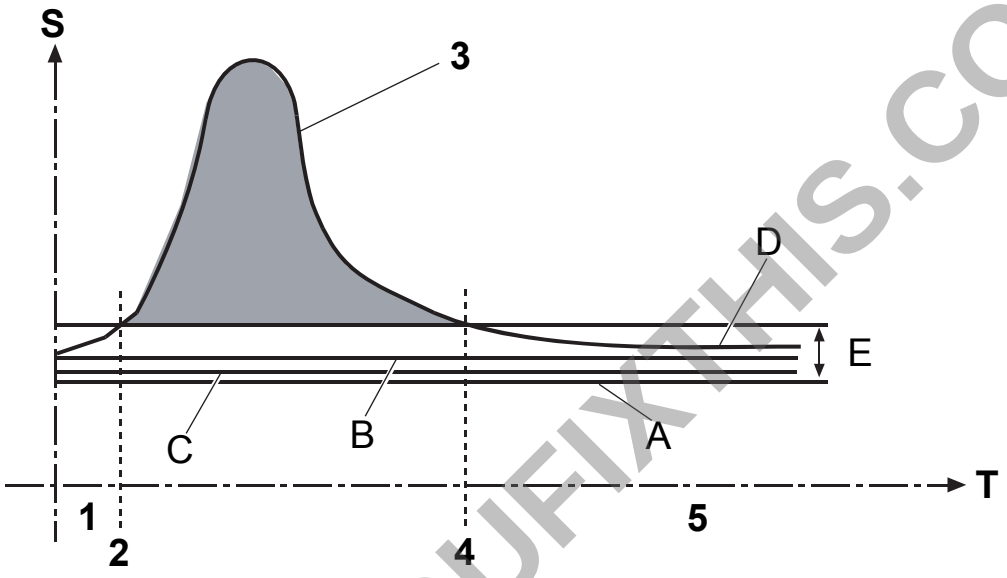

**A** Column guard
**B** Access cover (x2)
**C** Bolt
**D** Keep plate
**E** E-clip
**F** Hose (Steer right)
**G** Hose (Steer left)
**H** Tank hose
**J** Pressure hose



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- At 2nd point - Wheel 4 exceeds upper tolerance band (The reference speed is based upon the slowest wheel i.e. wheel 1).
- At 3rd point - Flow to the motor of wheel 4 is reduced proportionally to the percentage of slippage.
- At 4th point - The speed of wheel 4 is controlled to the upper tolerance speed.
- At 5th point - Full traction, within the given tolerance band is achieved.

**Figure 544. Slip Detection Graph**




**A** Wheel 1
**B** Wheel 2
**C** Wheel 3
**D** Wheel 4
**E** Tolerance band
**S** Wheel speed (X axis)
**T** Time (Y axis)

(For: 2WD)

The 2WD (Two Wheel Drive) machines have only two front drive motors.

## Torque Convertor Response (TCR)

The machine uses a hydrostatic transmission that imitates a true torque convertor. The two proportional electrically operated solenoids control the pump output. The throttle is cable operated to provide an operator "feel" and a direct engine response.

A dashboard mounted optional mode switch gives the operator two responses - work and travel. These are preset and non adjustable.

The depressing of the inching/ brake pedal reduces the pump displacement to slow the vehicle speed. There is no service requirement for the brake components other than the calibration.

The system has JCB fault diagnosis ability. In the event of a transmission breakdown, use the fault codes and JCB Servicemaster to diagnose the faults. Refer to: PIL 33-57-03.

The laptop computer and a connection lead will be required for brake sensor calibration. Some of the benefits of the system are:-

1. Torque convertor response with hydrostatic efficiency.
2. Simple error identification.
3. Mechanical throttle linkage for improved throttle response.
4. Simple sensor replacement procedures.
5. Optional mode switch to allow operator adjustment of drive response "in cab".

(For: TLT 30D High Lift [T4F])

This system has four wheel motors, anti-slip valves, wheel speed sensors on each wheel motor and a steer angle sensor. The steer angle sensor monitors the steering angle.

An ASC (Anti Slip Control System) is installed to improve the traction. An ECU (Electronic Control Unit) monitors the wheel speed and the steering



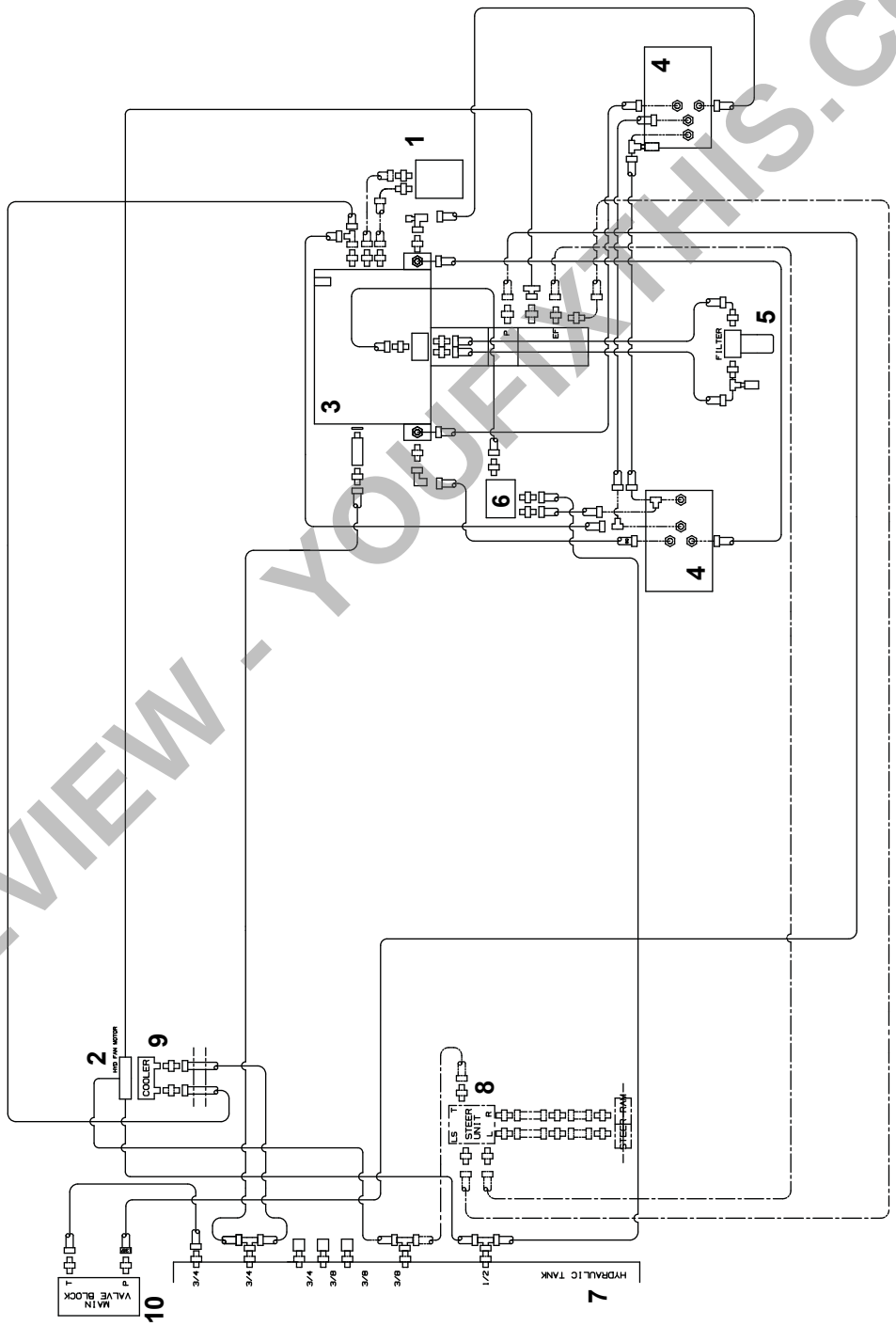
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## Diagram

For: 2WD ..... Page 30-20
For: 4WD ..... Page 30-22

(For: 2WD)

**Figure 604.**



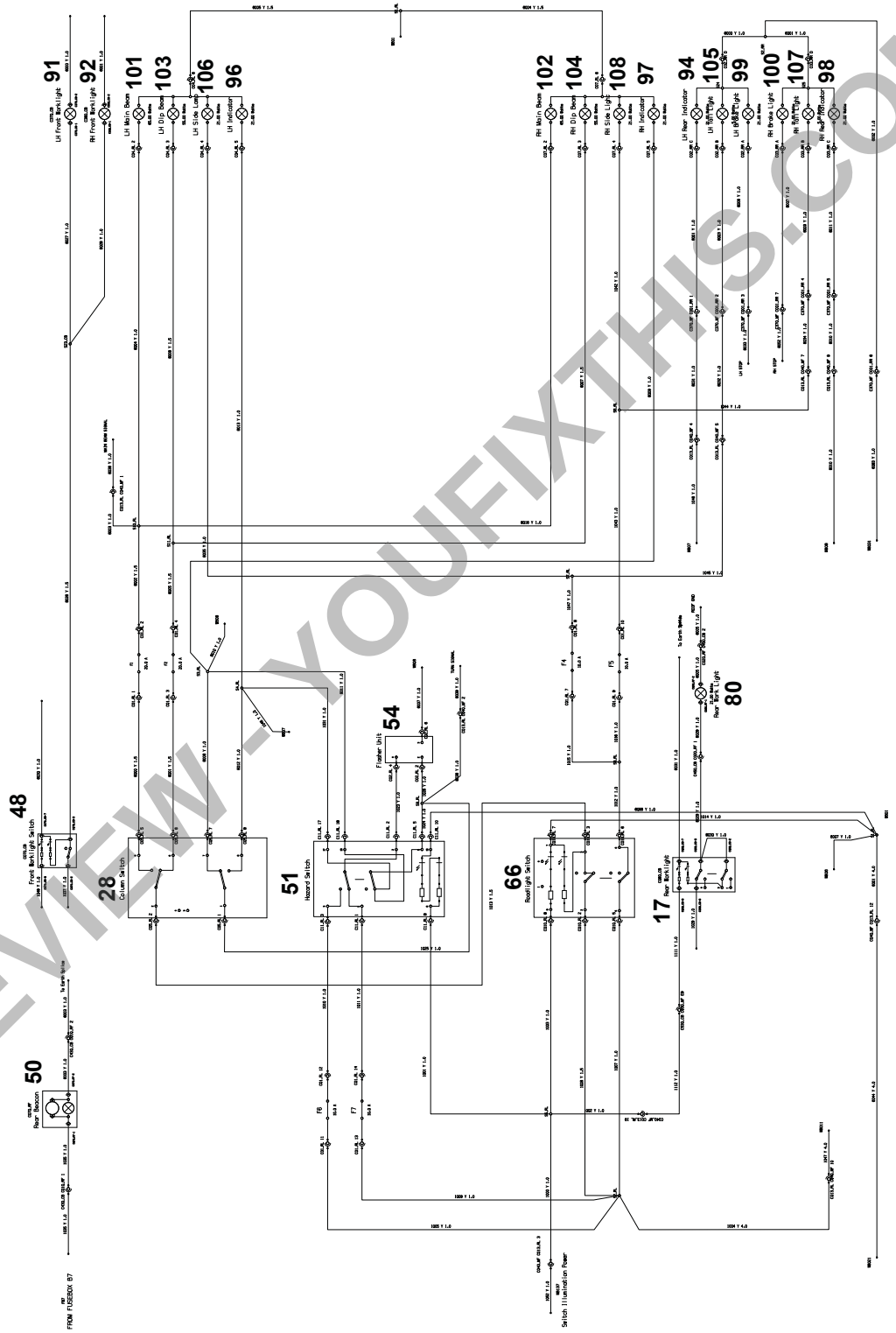

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(For: TLT 35D [T4F])

**Figure 674. 333-U5094 Sheet 1 of 9 - Electrical lights**

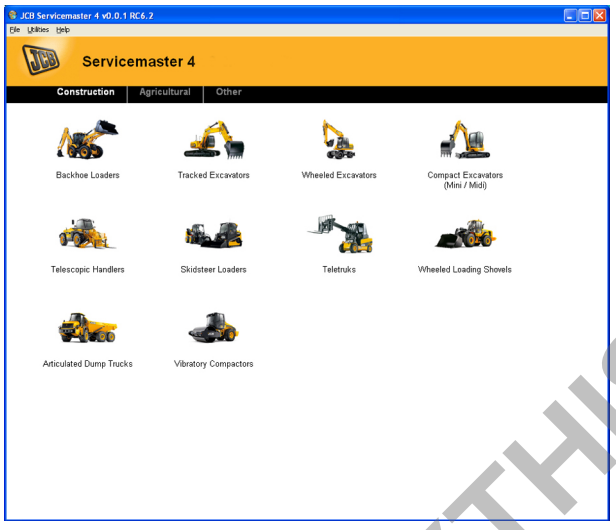


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**Figure 756. Typical Front Screen**




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 757. 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 758. Diagnostics tool**



View engine and machine operating parameters in real time. Perform system tests. View, save or clear ECU fault code log.

**Figure 759. Flash Programmer tool**



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

**Figure 760. Data Logger tool**



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

**Figure 761. Help**



Comprehensive information about ECU connected devices.



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## Technical Data

From JCB standard STD00019 issue 15.

1. This information does not apply to:-

   1.1. Hydraulic fittings (i.e. BSP, SAE O-ring boss, UNF, four bolt split flange and JIC), Refer to (PIL 30-97).

   1.2. Locking type fasteners (those with a nylon insert, or with distorted thread nuts such as Cleveloc).

2. For information on fastener conditions, refer to fasteners and fixings, bolts, general, introduction (PIL 72-06-00).

**Table 224. Torque Settings - UNF S Fasteners**

| Bolt Size | Treads per Inch | Hexagon (A/F) | Condition 1 | Condition 2 |
|---|---|---|---|---|
| in | in | in | N·m | N·m |
| (1/4 in) | 28 | 7/16 | 11.2 | 10 |
| (5/16 in) | 24 | 1/2 | 22.3 | 20 |
| (3/8 in) | 24 | 9/16 | 40 | 36 |
| (7/16 in) | 20 | 5/8 | 64 | 57 |
| (1/2 in) | 20 | 3/4 | 98 | 88 |
| (9/16 in) | 18 | 13/16 | 140 | 126 |
| (5/8 in) | 18 | 15/16 | 196 | 177 |
| (3/4 in) | 16 | 1 1/8 | 343 | 309 |
| (7/8 in) | 14 | 1 15/16 | 547 | 492 |
| (1 in) | 12 | 1 1/2 | 814 | 732 |
| (1 1/8 in) | 12 | 1 7/8 | 1,181 | 1,063 |
| (1 1/4 in) | 12 | 2 1/4 | 1,646 | 1,481 |

**Table 225. Torque Settings - UNF X Fasteners**

| Bolt Size | Treads per Inch | Hexagon (A/F) | Condition 1 | Condition 2 |
|---|---|---|---|---|
| in | in | in | N·m | N·m |
| (1/4 in) | 28 | 7/16 | 17.6 | 15.9 |
| (5/16 in) | 24 | 1/2 | 35.2 | 31.6 |
| (3/8 in) | 24 | 9/16 | 64 | 57 |
| (7/16 in) | 20 | 5/8 | 101 | 91 |
| (1/2 in) | 20 | 3/4 | 155 | 139 |
| (9/16 in) | 18 | 13/16 | 221 | 199 |
| (5/8 in) | 18 | 15/16 | 310 | 279 |
| (3/4 in) | 16 | 1 1/8 | 542 | 488 |
| (7/8 in) | 14 | 1 15/16 | 864 | 777 |
| (1 in) | 12 | 1 1/2 | 1,285 | 1,156 |
| (1 1/8 in) | 12 | 1 7/8 | 1,865 | 1,679 |
| (1 1/4 in) | 12 | 2 1/4 | 2,598 | 2,339 |

**Table 226. Torque Settings - Coarse Metric Grade 8.8 Fasteners**

| Bolt Size | Tread Pitch | Hexagon (A/F) | Condition 1 | Condition 2 |
|---|---|---|---|---|
| mm | mm | mm | N·m | N·m |
| 4 | 0.7 | 7 | 2.9 | 2.6 |
| 5 | 0.8 | 8 | 5.8 | 5.2 |
| 6 | 1 | 10 | 9.9 | 9 |
| 8 | 1.25 | 13 | 24 | 22 |
| 10 | 1.5 | 17 | 47 | 43 |
| 12 | 1.75 | 19 | 83 | 74 |
| 14 | 2 | 22 | 132 | 119 |
| 16 | 2 | 24 | 205 | 184 |
| 20 | 2.5 | 30 | 400 | 360 |
| 24 | 3 | 36 | 690 | 621 |
| 30 | 3.5 | 46 | 1,372 | 1,235 |
| 36 | 4 | 55 | 2,399 | 2,159 |

**Table 227. Torque Settings - Coarse Metric Grade 10.9 Fasteners**

| Bolt Size | Thread Pitch | Hexagon (A/F) | Condition 1 | Condition 2 |
|---|---|---|---|---|
| mm | mm | mm | N·m | N·m |
| 4 | 0.7 | 7 | 4 | 3.6 |
| 5 | 0.8 | 8 | 8.1 | 7.3 |
| 6 | 1 | 10 | 13.9 | 12.5 |
| 8 | 1.25 | 13 | 34 | 30 |
| 10 | 1.5 | 17 | 67 | 60 |
| 12 | 1.75 | 19 | 116 | 104 |
| 14 | 2 | 22 | 185 | 167 |
| 16 | 2 | 24 | 288 | 259 |
| 20 | 2.5 | 30 | 562 | 506 |
| 24 | 3 | 36 | 971 | 874 |
| 30 | 3.5 | 46 | 1,930 | 1,737 |
| 36 | 4 | 55 | 3,374 | 3,036 |

**Table 228. Torque Settings - Coarse Metric Grade 12.9 Fasteners**

| Bolt Size | Thread Pitch | Hexagon (A/F) | Condition 1 | Condition 2 |
|---|---|---|---|---|
| mm | mm | mm | N·m | N·m |
| 4 | 0.7 | 7 | 4.8 | 4.4 |
| 5 | 0.8 | 8 | 9.8 | 8.8 |
| 6 | 1 | 10 | 16.6 | 15 |
| 8 | 1.25 | 13 | 40 | 36 |
| 10 | 1.5 | 17 | 80 | 72 |
| 12 | 1.75 | 19 | 139 | 125 |
| 14 | 2 | 22 | 223 | 200 |
| 16 | 2 | 24 | 345 | 311 |

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## Technical Data

(For: TLT 35D [T4F])

JCB recommend that you use the JCB lubricants shown as they have been verified by JCB for use on JCB machines. However, you could use other lubricants that are equivalent to the JCB standards and quality or offer the same machine component protection.

**Table 235.**

| Item | Capacity | Fluid/Lubricant | JCB part number | Container size[1] | Specification |
|---|---|---|---|---|---|
| Fuel tank | 55L | Diesel oil. Refer to (PIL 75-18) | | | Refer to (PIL 75-18) |
| Engine oil | 11.2L | JCB Ultra performance 5W40 | 4001/3405U | 20L | API CJ4, ACEA E6-E9, Low SAPS |
| Cooling system | 11L | JCB Antifreeze HP Coolant/Water | 4006/1120 | 20L | ASTM D3306, ASTM D4985, ASTM D6210, SAE J1034, BS6580 (1992), AFNOR NF R15-601 |
| Hydraulics system | 62.5L | JCB Optimum Performance 46 | 4002/2005 | 20L | DIN 51524, ISO 11158, SS 155434, Denison, HF-0, HF1, HF2, AFNOR 48-603 |
| Refrigerant | 0.75kg | Tetrafluouroethane | R134a | | R134a |
| Grease points | | JCB Special HP Grease | 4003/2017 | 0.4kg | Lithium based NLGI No.2 consistency including extreme pressure additives |
| | | JCB Special MPL-EP Grease[2] | 4330/1501 | 0.4kg | |
| Boom runways | | JCB Waxoyl[3] | 4004/0502 | 5L | - |

*(1) For information about the different container sizes that are available (and their part numbers), contact your JCB dealer.*
*(2) JCB HP Grease is the recommended specification grease, if using JCB Special MPL-EP then the greasing must be carried out more frequently.*
*(3) Important: Waxoyl contains turpentine substitute, which is inflammable. Keep flames away when applying Waxoyl. Waxoyl can take a few weeks to dry completely. Keep flames away during the drying period. Do not weld near the affected area during the drying period. Take the same precautions as for oil to keep Waxoyl off your skin. Do not breathe the fumes. Apply in a well-ventilated area.*

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# 06 - Pre-start Cold Checks, Service Points and Fluid Levels

## Introduction

More frequent checks of engine components than the engine manufacturer recommends do not invalidate emissions warranty.

**Table 254.**

| Component | Task | 10 | 50 | 500 | 1,000 | 1,500 | 2,000 |
|---|---|---|---|---|---|---|---|
| Forks/Attachments/Optional Equipment | | | | | | | |
| As required | Lubricate | O | O | □ | □ | □ | □ |
| As required | Check (condition) | O | O | □ | □ | □ | □ |
| Forks | Check (condition) | O | O | □ | □ | □ | □ |
| Body and Framework | | | | | | | |
| General | Clean | O | O | □ | □ | □ | □ |
| General | Check (condition) | O | O | □ | □ | □ | □ |
| Boom/pivot pins | Lubricate | | O | □ | □ | □ | □ |
| Apply waxoyl to wear pad runways | Lubricate | | | □ | □ | □ | □ |
| Boom wear pad mounting bolt torque | Check (condition) | | | □ | □ | □ | □ |
| Hinges | Lubricate | | | □ | □ | □ | □ |
| Operator Station | | | | | | | |
| Operator protective structure | Check (condition) | O | O | □ | □ | □ | □ |
| Seat, seat belt | Check (condition) | O | O | □ | □ | □ | □ |
| Engine | | | | | | | |
| Oil | Check (Leaks) | O | O | □ | □ | □ | □ |
| Oil | Check (level) | O | O | □ | □ | □ | □ |
| Oil and filter[1] | Replace | | | □ | □ | □ | □ |
| FEAD belt | Check (condition) | | O | □ | □ | □ | □ |
| FEAD belt | Replace | | | | □ | □ | □ |
| Air inlet security/air cleaner elements | Check (condition) | O | O | □ | □ | □ | □ |
| Security of engine and pump mountings | Check (condition) | | | □ | □ | □ | □ |
| Fuel level | Check | O | O | □ | □ | □ | □ |
| Air Filter | | | | | | | |
| Air filter (outer)[2] | Replace | | | □ | □ | □ | □ |
| Air filter (inner) | Replace | | | | | | □ |
| Air filter (dust valve) | Clean | | | | □ | □ | □ |
| Fuel System | | | | | | | |
| Main fuel filter/sedimenter | Replace | | | □ | □ | □ | □ |
| Main fuel filter/sedimenter | Clean (drain) | | O | □ | □ | □ | □ |



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Notes:

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## Firing Order

A cylinder is said to be firing, when the fuel/air mixture ignites and the piston is about to start its power stroke.

From the stages described, it can be seen that number 1 cylinder will be next to fire. Number 3 cylinder is starting its compression stroke and is next in the cycle, followed by cylinders 4 and 2. The firing order is therefore; 1, 3, 4, 2.

The stages in the four stroke cycle for each cylinder are as follows:

**Table 10. The Four Stroke Cycle**

| Cylinder number | Piston operation | Valve operation |
|---|---|---|
| 1 | The piston is at the top of its Compression stroke and is about to start its Power stroke. | Inlet and exhaust valves closed |
| 2 | The piston is at the bottom of its Power stroke and is about to start its Exhaust stroke. | Inlet valves closed, exhaust valves about to open |
| 3 | The piston is at the bottom of its Induction stroke and is about to start its Compression stroke. | Exhaust valves closed, inlet valves about to close. |
| 4 | The piston is at the top of its Exhaust stroke and is about to start its Induction stroke. | Valve Operation Exhaust valves about to close, inlet valves about to open |

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## 00 - General

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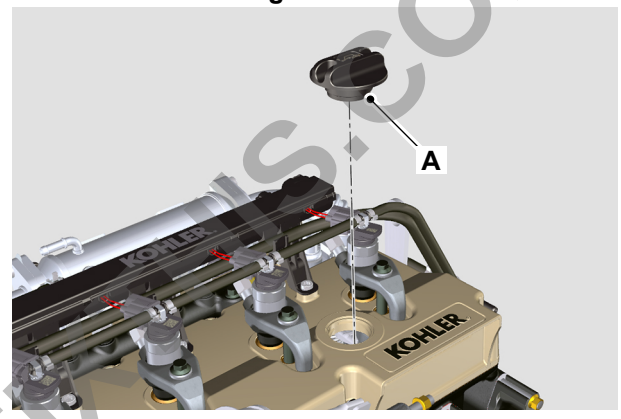
## Introduction

The oil filler cap covers a hole in the crankcase where the recommended engine oil can be added.

There are two locations on this engine:

- Top of the rocker cover

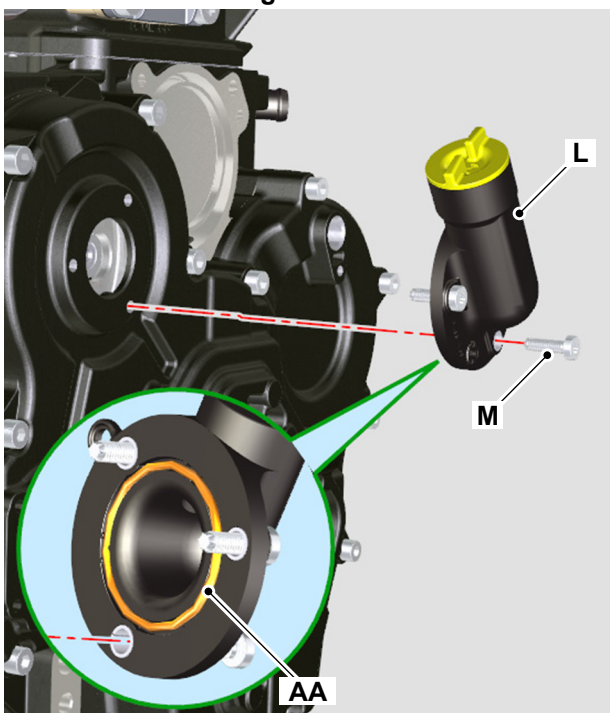
**Figure 336.**




**A** Rocker cover filler

- Side of the timing gear case

**Figure 337.**




**L** Side oil filler

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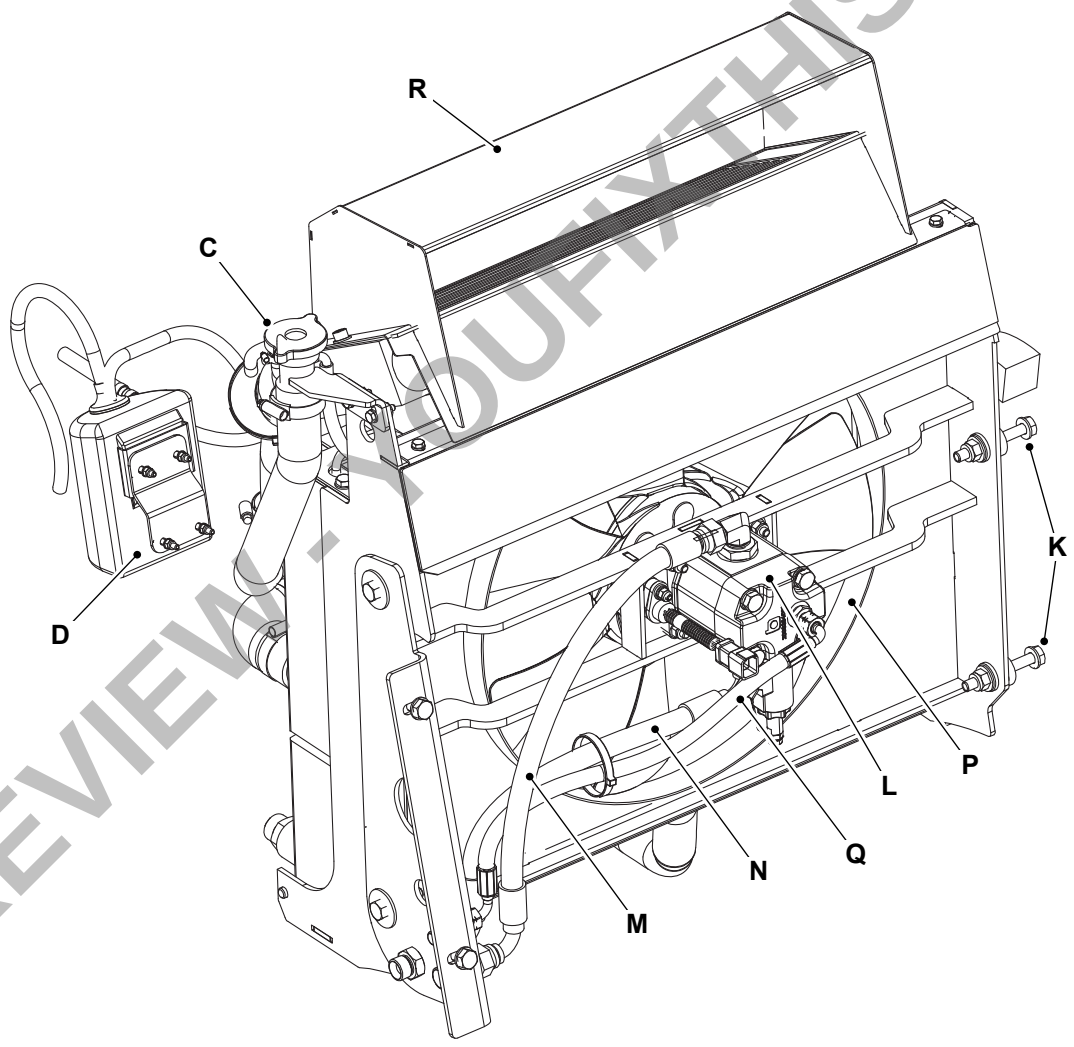
# 06 - Charge Air Cooler (CAC)

## Remove and Install

### Remove

1. Make the machine safe with the lift arm lowered. Refer to (PIL 01-03).
2. Open the engine side panel. Refer to (PIL 06-06).
3. Tilt the operator station. Refer to (PIL 09-00).
4. Remove the fixings and remove the top cover.
5. Disconnect the CAC (Charge Air Cooler) hoses.
6. Remove the bolts from both the sides of the CAC.
7. Remove the CAC from the cooling pack.

**Figure 515.**




**C** Pressure hose
**K** Cooling pack mounting bolt (x4)
**M** High pressure hose
**P** Fan
**R** Top cover
**D** Expansion tank
**L** Fan motor
**N** Hose
**Q** Hose

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## Remove and Install

**Working Under the Machine**

Make the machine safe before getting beneath it. Make sure that any attachments on the machine are correctly attached. Engage the park brake, remove the ignition key, disconnect the battery. If the machine has wheels use blocks to prevent unintentional movement.

***Notice:*** *Ensure that dirt etc. does not enter the hydraulic system during this job.*

Change the filter in line with the machine maintenance schedules. Refer to Operator's manual.

### Remove

1. Make the machine safe with the lift arm lowered.
   Refer to: PIL 01-03.
2. Loosen the hydraulic tank filler cap and allow all pressure to discharge.
3. Remove the filler cap.
4. Raise and support the boom (for access only).
5. Remove the front access cover.
   Refer to: PIL 06-06-12.
6. If necessary, drain and flush the hydraulic tank.
   Refer to: PIL 30-00-00.
7. Remove and discard the filter canister.
8. Make sure that you dispose of the old filter in accordance with the your local Health and Safety regulations.

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# 54 - Window Washer/Wipe

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