SERVICE MANUAL

ENGINE

JCB T2/3 Mech Engine 4 Cyl

EN - 9806/7050 - ISSUE 2 - 10/2017

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

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Foreword

The Operator's Manual

⚠

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

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

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

Contents

01 - Machine
06 - Body and Framework
09 - Operator Station
15 - Engine
18 - Fuel and Exhaust System
21 - Cooling System
33 - Electrical System
72 - Fasteners and Fixings
75 - Consumable Products
78 - After Sales

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01 - Machine

Contents **Page No.**

01-00 Introduction
- 01-00-00 General 01-3
- 01-00-04 Product Compliance 01-4
- 01-00-06 Intended Use 01-5

01-03 Safety
- 01-03-03 Safety - Yours and Others 01-7
- 01-03-06 Safety Warnings 01-8
- 01-03-09 General Safety 01-9
- 01-03-12 Maintenance Safety 01-10
- 01-03-18 Operating Safety 01-11
- 01-03-21 Worksite Safety 01-12
- 01-03-24 Risk Assessment 01-13

01-06 About this Manual
- 01-06-00 General 01-15

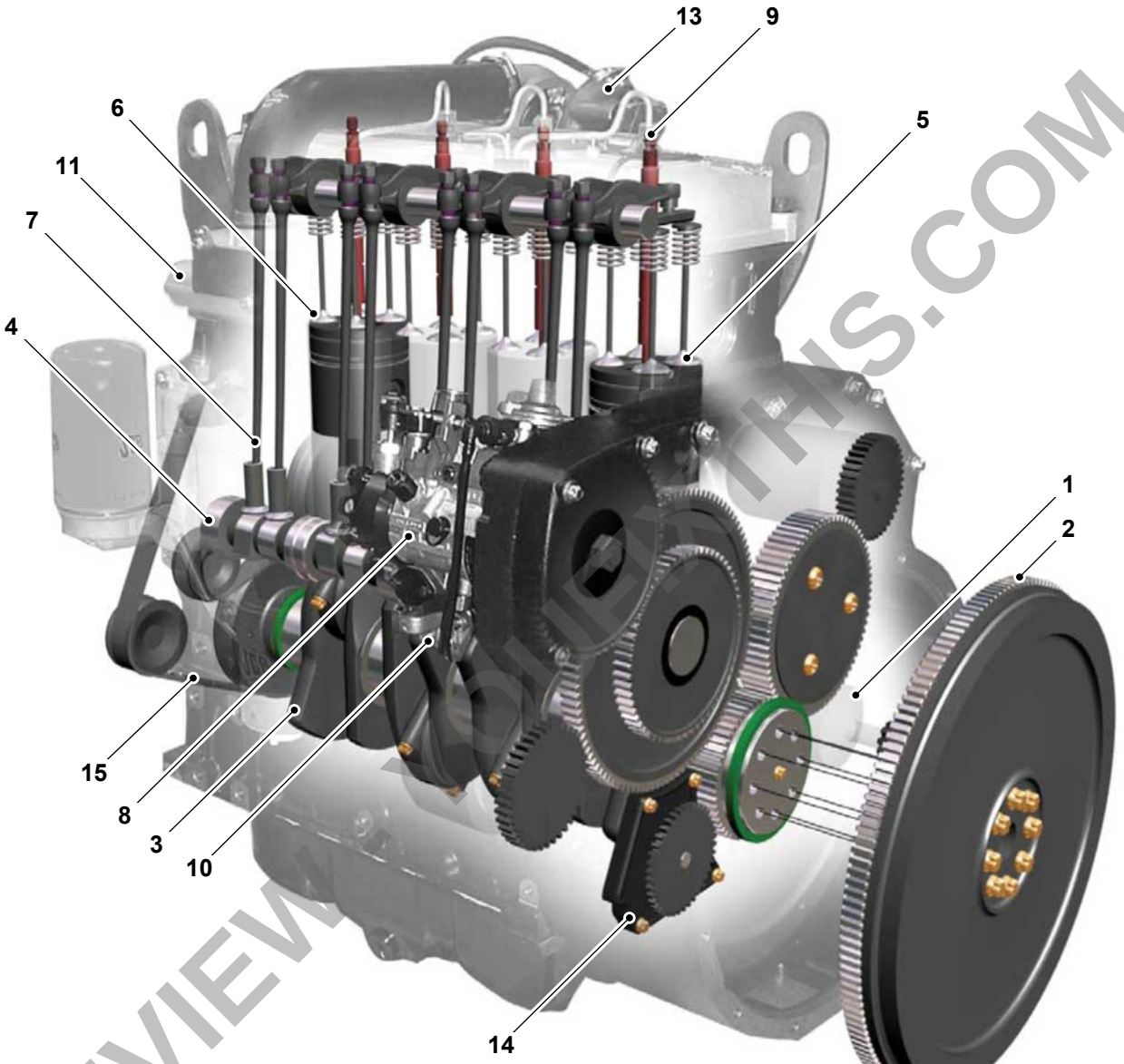
01-09 Description
- 01-09-00 General 01-17

01-12 Operation
- 01-12-00 General 01-19

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Figure 3.



1 Starter motor
2 Flywheel
3 Crankshaft
4 Camshaft
5 Inlet valves (x8)
6 Exhaust valves (x8)
7 Push rods (x8)
8 Fuel injection pump
9 Fuel injectors (x4)
10 Fuel lift pump
11 Inlet manifold
13 Turbocharger
14 Lubrication oil pump
15 Front end drive belt

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Fault-Finding

Fault

Engine - Will Not Start or Difficult to Start (No Exhaust Smoke)	Table 8.	Page 15-15
Engine - Will Not Start or Difficult to Start (Exhaust Smoke)	Table 9.	Page 15-16
Engine - Will Not Crank or Cranks Slowly	Table 10.	Page 15-16
Engine - Starts Then Stops	Table 11.	Page 15-17
Engine - Poor Running	Table 12.	Page 15-17
Engine - Poor Running at Idle	Table 13.	Page 15-18
Engine - Noise Excessive	Table 14.	Page 15-18
Engine - Compression Knocks	Table 15.	Page 15-19
Engine - Reduced Power Output	Table 16.	Page 15-19
Engine - Will Not Reach Maximum RPM	Table 17.	Page 15-20
Engine - RPM Surges	Table 18.	Page 15-21
Engine - Vibration Excessive	Table 19.	Page 15-21
Engine - Exhaust Smoke Excessive (Black Smoke)	Table 20.	Page 15-21
Engine - Exhaust Smoke Excessive (White/Blue Smoke)	Table 21.	Page 15-22
Engine - Will Not Shut Off	Table 22.	Page 15-22
Lubricating Oil - Consumption Excessive	Table 23.	Page 15-22
Lubricating Oil - Contaminated	Table 24.	Page 15-23
Lubricating Oil - Pressure Low	Table 25.	Page 15-23
Lubricating Oil - Pressure High	Table 26.	Page 15-23

Table 8. Engine - Will Not Start or Difficult to Start (No Exhaust Smoke)

Cause	Remedy
No fuel in supply tank.	Check the level in the fuel tank, use sight gauge or dipstick. Replenish as required.
Ignition or starter electrical system failure.	Check the operation of the starter switch. Check the correct electrical wires for open or short circuits.
Improper starting procedure.	Verify proper starting procedure.
Fuel Filter blocked with water or other contamination.	Drain fuel/water separator or replace fuel filter.
Defective fuel lift pump (fuel supply inadequate).	Check that the lift pump operates and delivers fuel to the high pressure fuel pump. Check the correct electrical wires for open or short circuits. Check fuses.
Fuel is aerated.	Check the fuel system for loose connections and possible air ingress points. Rectify and bleed the fuel system.
Fuel inlet restriction.	Maximum inlet restriction to fuel lift pump must not exceed 100mm Hg.
Air intake or exhaust system blocked.	Visually check the air intake and exhaust system for blockage or obstruction. Remove as required. Check the air filter elements for signs of blocking. Replace as required.
Fuel drain return line blocked, not connected properly.	Verify that the fuel return line is not obstructed and connected to the top of the fuel tank.
One or more fuel injectors worn or malfunctioning.	Check the electrical connections at the injectors.
Electrical sensor fault.	Check the electrical connections at the sensors.
Worn or malfunctioning high pressure fuel pump.	Do all the necessary fault finding checks before removal of the high pressure fuel pump.
Injectors Contaminated.	Check the injectors. Use the Servicemaster test procedure in Servicemaster Tools Actuator Test. Test and replace as required.

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Before Removal

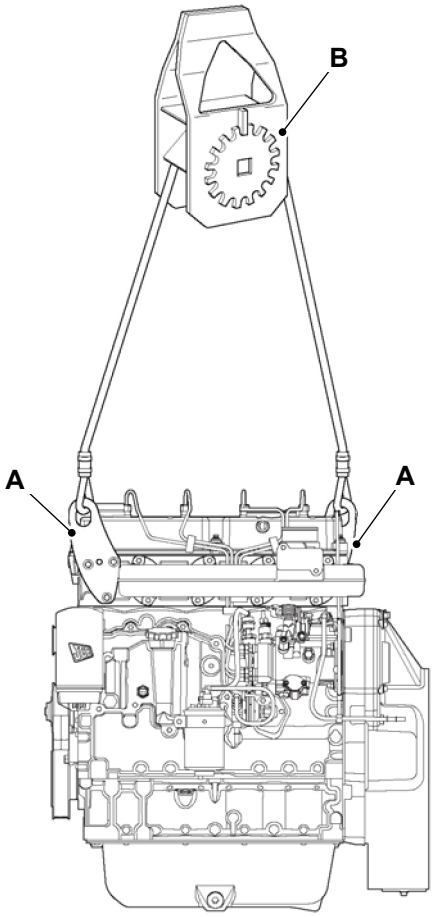
1. Make sure that the engine is safe to work on. If the engine has been running, let it cool before you start the service work.
2. Position the machine on firm level ground. Make the machine safe, refer to (PIL 01-03).
3. Get access to the engine.

Remove

1. Disconnect and remove the battery, refer to (PIL 33-03).
2. Drain the engine oil, refer to (PIL 15-21).
3. Drain the engine coolant, remove the cooling pack refer to (PIL 21-03).
4. Discharge the hydraulic pressure, refer to (PIL 30-00).
5. Drain the hydraulic tank. Disconnect and plug the hydraulic suction and delivery lines at the transmission pump and gear pump. Label the hoses to ensure correct reassembly. refer to (PIL 30-00).
6. Disconnect and plug the hydraulic cooler hoses. Label the hoses to ensure correct reassembly
7. Disconnect the exhaust system.
8. Label the cab heater hoses at the engine block connectors. Release the hose clips and remove the hoses.
9. Disconnect the wiring connections from the starter motor, refer to (PIL 15-75).
10. Disconnect the wiring connections from the alternator, refer to (PIL 15-72).
11. Disconnect the wiring connections from the engine sensors and actuators, refer to (PIL 15-84).
12. Disconnect the electrical connector at the oil level sensor (if installed).
13. Disconnect the fuel supply line at the fuel lift pump and the spill line at the fuel injection pump. Cap all hoses and ports to prevent ingress of dirt.
14. Disconnect the electrical harness at the engine harness.
15. Uncouple the electrical harness at the ECM machine side connector. Important: Do not touch the connector pins on theECM or harness connectors. Cover the connectors to prevent contamination.
16. Ensure that all relevant harnesses and hoses are unclipped from the engine and tied out of the way.
17. Disconnect and plug the hoses at the hydraulic pump.
18. Disconnect the wiring to the hydraulic pump.
19. Remove the gearbox to engine retaining bolts, pull the transmission and converter clear of the engine, make sure that the converter stays mounted on the gearbox shaft.
20. Attach slings to the engine lifting eyes.

    Special Tool: Lifting Brackets (Qty.: 1)
21. Take the weight of the engine on the hoist and remove the engine mounting bolts.
22. Withdraw the engine in a level attitude until the hydraulic pump is clear of the chassis. Raise the engine to lift it clear of the machine.
23. Lower the engine into a suitable stand that is capable of supporting the weight of the engine.

Figure 14.



A Lifting bracket mounting bolts
B Lifting equipment

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Technical Data

Table 5. Basic Engine Data - 444 Engine

Engine variants (Tier 2/stage 2)	
- SA	Naturally aspirated
- SB	Turbocharged
- SC	Turbocharged with inter-cooler
Engine variants (tier 3):	
- SG	Naturally aspirated
- SD	Turbocharged
- SF	Turbocharged with inter-cooler
Rated speed	
Vehicle applications	2200 RPM (Revolutions Per Minute)
Generator set application - 50 Hz	1500 RPM
Generator set application - 60 Hz	1800 RPM
Weight (dry):	
- SA, SG	472kg
- SB, SC, SD, SF	477kg
Number of cylinders	4
Nominal bore size	103mm
Stroke	132mm
Cylinder arrangement	In line
Combustion cycle	4-stroke
Firing order	1-3-4-2
Displacement	4.399L
Compression ratio	
- SA	18.6 : 1
- SB	18.3 : 1
- SC	17.5 : 1
- SD	17.2 : 1
- SF	17.2 : 1
Engine compression	see Note(1)
Direction of rotation (viewed from front {crankshaft pulley} end)	Clockwise
Valves	4 per cylinder
Valve clearances measured at the valve end of the rocker (measured cold):	
- Inlet	0.19–0.27mm
- Exhaust	0.56–0.64mm
Lubricating oil pressure(2)	>4.6bar (66.7psi)
Combustion system	Direct injection
Fuel injection pump	Rotary mechanical

(1) Compression variance between each cylinder should be no greater than 3.5bar (50.7psi).
(2) Engine at normal operating temperature and maximum revs.

Table 6. Basic Engine Data - 448 Engine

Engine variants (tier 2/stage 2)	
- DA	Naturally aspirated
- DB	Turbocharged
- DC	Turbocharged with inter-cooler
Engine variants (tier 3):	
- DG	Naturally aspirated
- DD	Turbocharged
- DF	Turbocharged with inter-cooler
Rated speed	
Vehicle applications	2200 RPM
Generator set application - 50 Hz	1500 RPM
Generator set application - 60 Hz	1800 RPM
Weight (dry):	
- DA, DG	472kg
- DB, DC, DD, DF	477kg
Number of cylinders	4
Nominal bore size	106mm
Stroke	135mm
Cylinder arrangement	In line
Combustion cycle	4-stroke
Firing order	1-3-4-2
Displacement	4.765L
Compression ratio	
- DA	18.6 : 1
- DC	18.1 : 1
Engine compression	see Note(1)
Direction of rotation (viewed from front {crankshaft pulley} end)	Clockwise
Valves	4 per cylinder
Valve clearances measured at the valve end of the rocker (measured cold):	
- Inlet	0.19–0.27mm
- Exhaust	0.56–0.64mm
Lubricating oil pressure(2)	>4.6bar (66.7psi)
Combustion system	Direct injection
Fuel injection pump	Rotary mechanical

(1) Compression variance between each cylinder should be no greater than 3.5bar (50.7psi).
(2) Engine at normal operating temperature and maximum revs.

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Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Important: It is vitally important that the torque converter is installed at the gearbox and engine flywheel correctly. Failure to locate the converter correctly will result in damage to the gearbox oil pump on engine start up.
3. Fill the cooling system with the correct mix of coolant fluid.
4. Fill and Check the hydraulic fluid level.
5. Fill and Check the engine oil levels.
6. On completion, check the hydraulic and cooling system for leakage and levels.
7. Check the function of all hydraulic services.

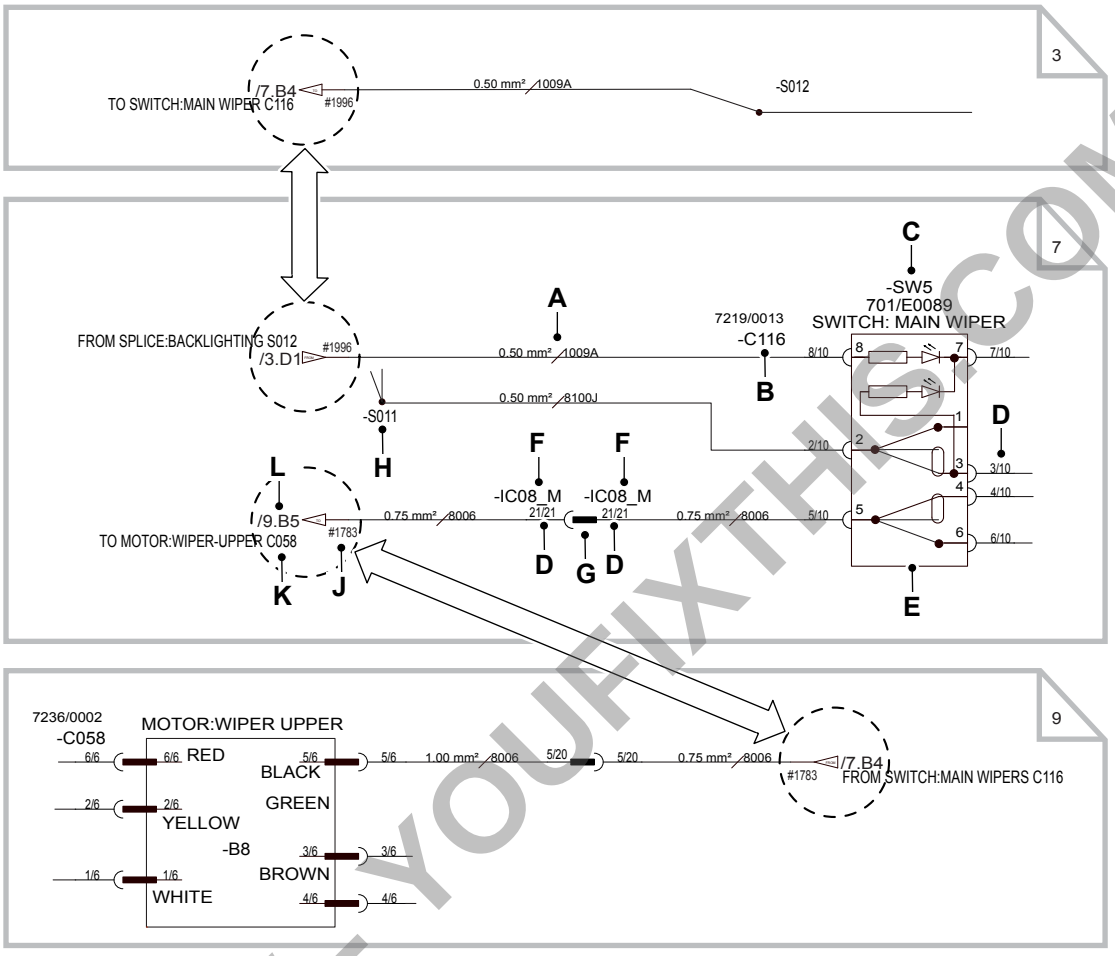
Table 27. Torque Values

Item	Nm
A	47

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Figure 206.



A Wire size (area) and number
B Device harness connector code
C Device description
D Connector pin number (wire location / total)
E Device internal schematic
F Harness inter-connector codes
G Harness inter-connector symbol
H Splice code and symbol
J Destination reference number
K Destination (harness connector code)
L Destination (diagram sheet and grid)

To help locate a wire destination from other diagram sheets use the grid reference. This identifies the applicable location zone on the sheet in a similar way to a map reference.

Due to space limitations, the grid is sometimes omitted.

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

Introduction

The following maintenance procedure refers to the JCB engine only. It does not apply to the machine or equipment in which it is installed. Consult the manufacturers operation manual for further information.

Table 121. All Applications Except Generator Set Applications.

Pre-start Cold Checks Service Points and Fluid Levels	Operation	10h	50h	500h	1,000h	1,500h	2,000h	8,000h
ENGINE								
Oil level	Check	O	O	□	□	□	□	□
Coolant Quality/ level	Check	O	O	□	□	□	□	□
Coolant or Oil Leaks	Check	O	O	□	□	□	□	□
Water Sedimenter	Check for Contamination and Drain		O	□	□	□	□	□
Fuel Filter (both machine mounted filter)	Change			□	□	□	□	□
Oil and Filter(1)	Change			□	□	□	□	□
All Hoses - Condition	Check			□	□	□	□	□
Radiator(2)	Clean			□	□	□	□	□
Front End Accessory Drive (FEAD) Belt Condition	Check			□	□	□	□	□
Air Cleaner Outer Element(2)	Change				□	□	□	□
DEF (Diesel Exhaust Fluid) Filter (if installed)(4)	Change				□	□	□	□
Crankcase Ventilation Filter	Change					□	□	□
Air Cleaner Inner Element	Change						□	□
Valve Clearances(3)	Check and Adjust						□	□
Oil Filler and Dipstick O-rings	Change						□	□
Cooling system	Drain and Fill						□	□
Front End Accessory Drive (FEAD) Belt	Change							□
Injectors(3)	Change							□
Injector(s) Leak-Off Rail(3)	Change							□
High Pressure Fuel Lines(3)	Change							□

(1) If operating under arduous conditions, do an engine oil flush (use the normal recommended engine oil) every 250 hours. Change the engine oil and filter every 250 hours.
(2) If operating in dusty adverse working environments, do these jobs more frequently.
(3) These jobs must be done by a qualified engineer.
(4) Change DEF filter more regularly under arduous conditions.

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Notes:

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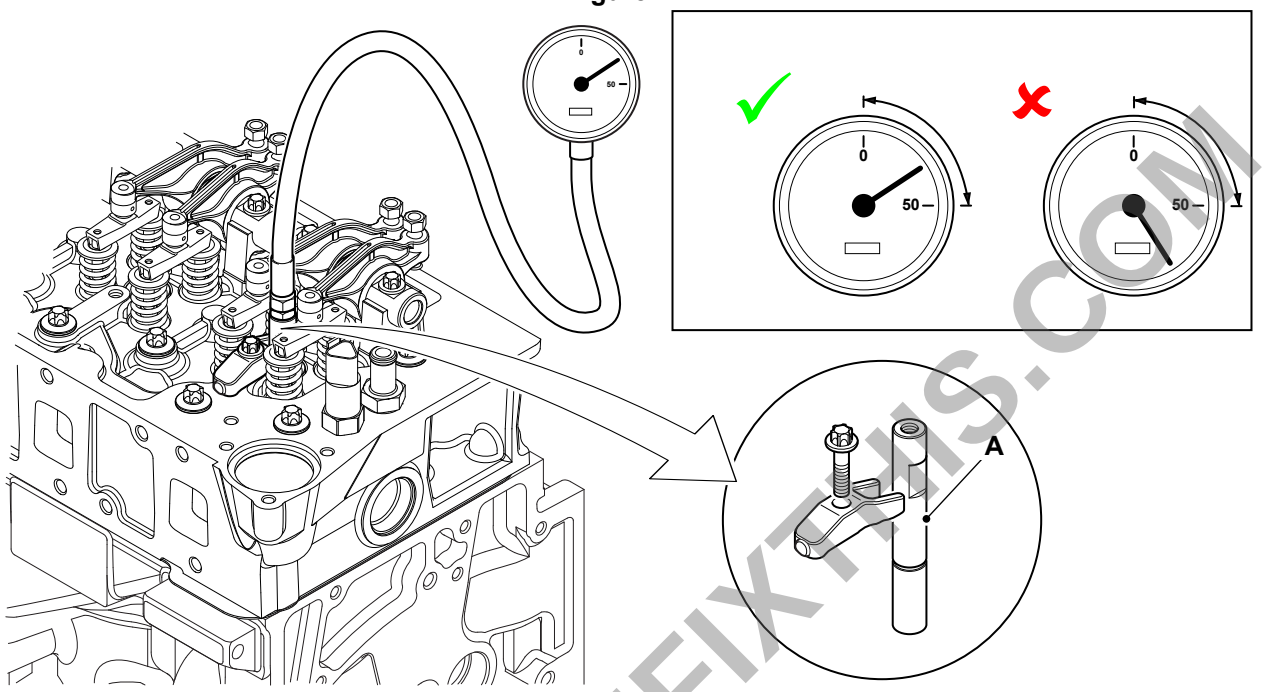
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Notes:

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Figure 11.



A Dummy injector

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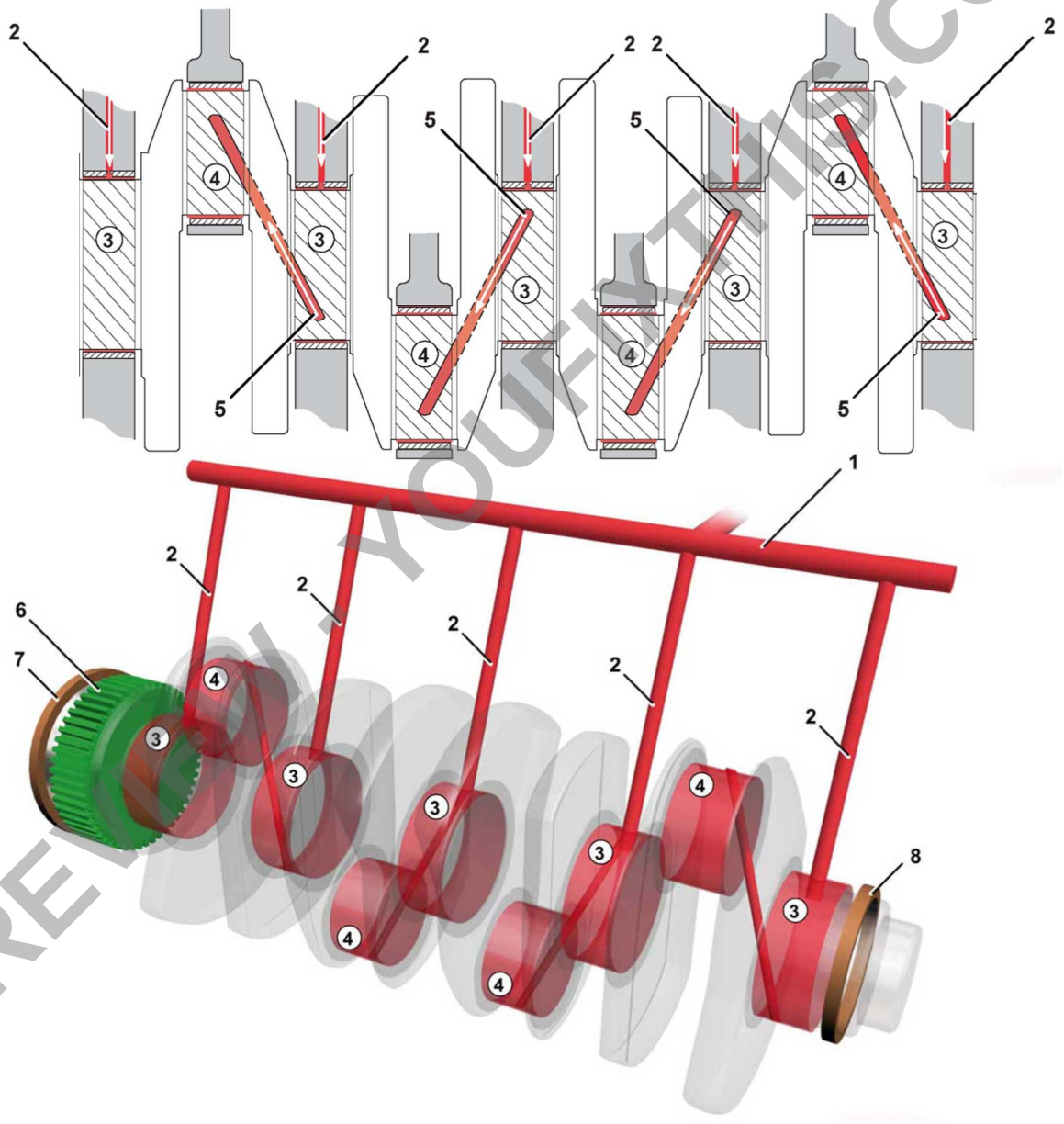
Operation

Refer to Camshaft-Operation PIL 15-15-00 .

Lubrication

Oil is fed from the main gallery via five drillings, one to each of the main bearings. A groove around the diameter of the upper main bearing shell allows oil transfer to cross drillings in the crankshaft to feed each of the big end bearings. Crankshaft gear is 'splash' lubricated. Front and rear crankshaft oil seals prevent oil leakage from, and dirt ingress to, the engine.

Figure 22.



1 Main gallery
2 Drillings (x5)
3 Main bearings
4 Big end bearings
5 Cross drillings
6 Crankshaft gear
7 Crankshaft oil seal
8 Crankshaft oil seal

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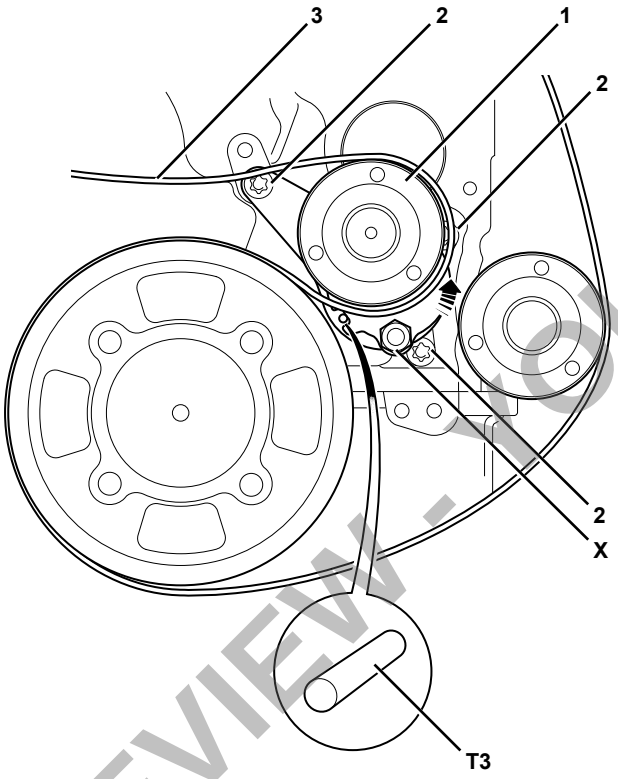
21 - Tensioner

Remove and Install

Before Removal

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 engine.
4. Remove the drive belt, refer to (PIL 15-18).

Figure 55.



1 Drive belt tensioner pulley
2 Fixing bolts (x3)
3 Drive belt
T3 Locking pin
X Spigot nut

Remove

The drive belt tensioner is a non-serviceable item. If the drive belt tensioner or the idler wheel is faulty or damaged it must be renewed as a complete assembly.

1. To remove the tensioner assembly, remove the bolts and lift the tensioner pulley from the cylinder block.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the bolts to the correct torque value.
3. Install the drive belt, refer to (PIL 15-18).
4. Make sure that the drive belt is under tension and the locking pin is removed before starting the engine. Refer to Drive Belt - Adjust (PIL 15-18).

Table 39. Torque Values

Item	Nm
2	24

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Technical Data

Table 41. Connecting Rods Data

Connecting rod type[1]	Split fracture
Connecting rod bore diameter	77–77.01mm
Connecting rod side clearance	
min	0.05mm
max	0.4mm
Big end bearings	
Width	32.5–33mm
Thickness (at centre)	1.99–1.981mm
Small end bearings	
Inside diameter	40.034–40.02mm

(1) Split fracture type connecting rods MUST NOT be dot punched or etched in anyway during disassembly - refer to relevant service procedures.

Component Identification

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

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Disassemble

1. Lift out the rocker shaft fixing bolts, then slide the pedestals, rockers and wave washers off the rocker shaft as shown. Label the pedestals and rockers to make sure that they are installed in the correct positions on assembly.
2. Check the rocker shaft and rocker bushings for signs of damage and excessive wear. Refer to Check (Condition) (PIL 15-42).

Assemble

1. The assembly procedure is the opposite of the disassemble procedure. Additionally do the following steps.
2. Lubricate the rocker shaft and rocker bearing bushes with clean engine oil.
3. Make sure that the rockers and pedestals are installed in their original positions along the rocker shaft. Note the position of the oil feed pedestal.
4. Insert the rocker shaft fixing bolts to hold the rockers and pedestals loosely in position before fitting the assembly into the cylinder head. Note the position of the longer bolt.

After Assembly

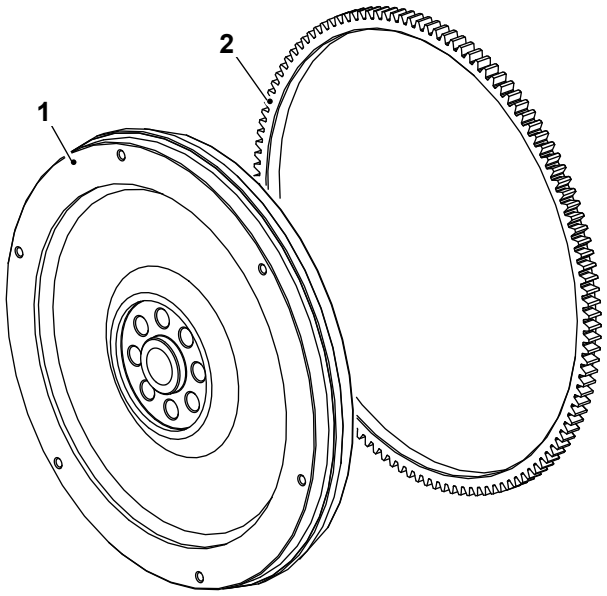
1. Install the rocker assembly. Refer to (PIL 15-42).
2. Install the rocker cover. Refer to (PIL 15-42).

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Component Identification

Figure 106.



1 Flywheel
2 Flywheel gear ring

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12.6. Open or short circuited power (stator) windings.

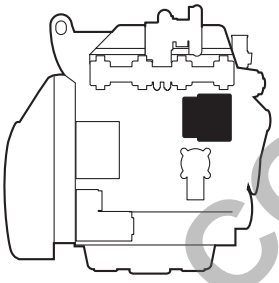
13. To check for a fault, disconnect the capacitor and repeat the charging test. Renew the capacitor if necessary.

14. To check for faults with the slip rings, bushes or regulator, remove the regulator and brush box assembly. Check the condition of the brushes and, if necessary, clean the slip rings using extra-fine glass paper. The regulator may only be renewed.

15. Faults with the rectifier, rotor and stator may be checked only by removing and dismantling the alternator for further testing.

Remove and Install

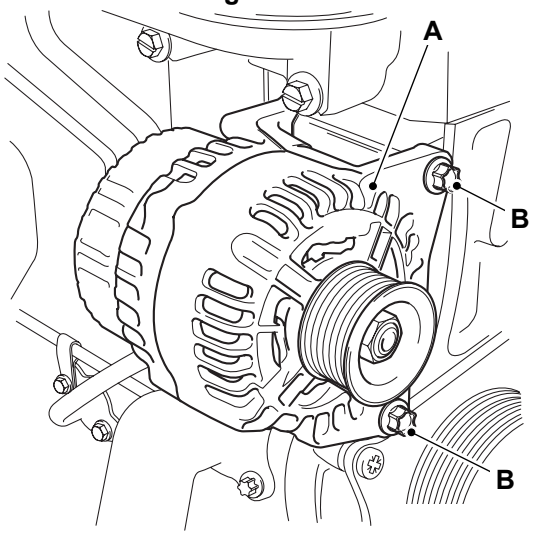
Figure 120. Alternator location



Remove

1. Disconnect the negative (-) lead followed by the positive (+) lead from the battery terminals.
2. Remove the alternator (accessory) drive belt.
3. Disconnect the electrical leads from the alternator terminals. Label the leads to make sure that they are installed in the correct positions on assembly.
4. Undo the alternator securing bolts and lift the alternator away from the cylinder block mounting.

Figure 121.



A Alternator
B Securing bolts

Inspect

1. Check the brushes for wear. Renew the brushes if the length is less than

   Length/Dimension/Distance: 8mm

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09 - Cold Start Advance

Introduction 15-258
Check (Condition) 15-259
Remove and Install 15-260

Introduction

The cold start advance solenoid consists of an electrical solenoid and a valve which allows extra fuel to spray into the inlet manifold at specific temperatures for starting purposes. The fuel is supplied to this valve by the electric fuel pump.

Under cold starting conditions, the solenoid is energised that opens the fuel valve allowing jets of fuel to spray into the inlet manifold and mix with the incoming air, thus richening the air/fuel mixture to help in cold starting conditions.

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00 - General

Clean

The diesel tank must be drained if there is a chance the fuel is contaminated or it has been filled with the incorrect fuel.

1. Make the machine safe. Refer to (PIL 01-03).
2. Drain the diesel tank.
3. Drain the fuel from the low pressure fuel pipes.
4. Replace the fuel filters.
5. Refill the tank to the specified level with clean diesel.

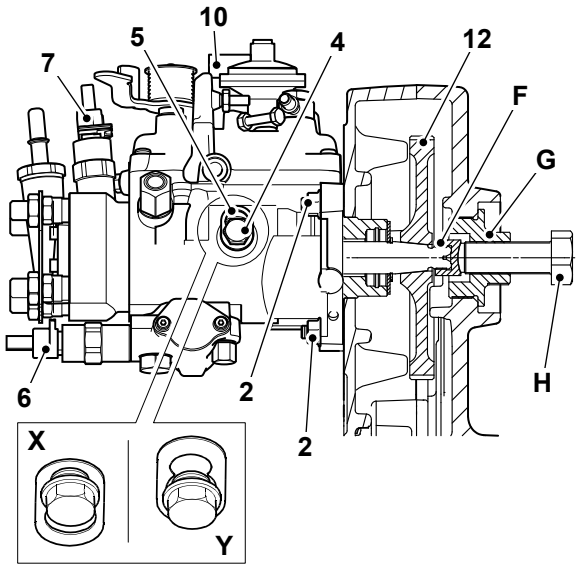
   Percentage: 25%
6. Start the engine and leave it to run for the specified time period.

   Duration: 10min
7. Stop the engine.
8. Drain the water separator and the main fuel filter. Refer to (PIL 18-12-00).
9. If there was any water or other liquid in the water separator, repeat 6 to 8.

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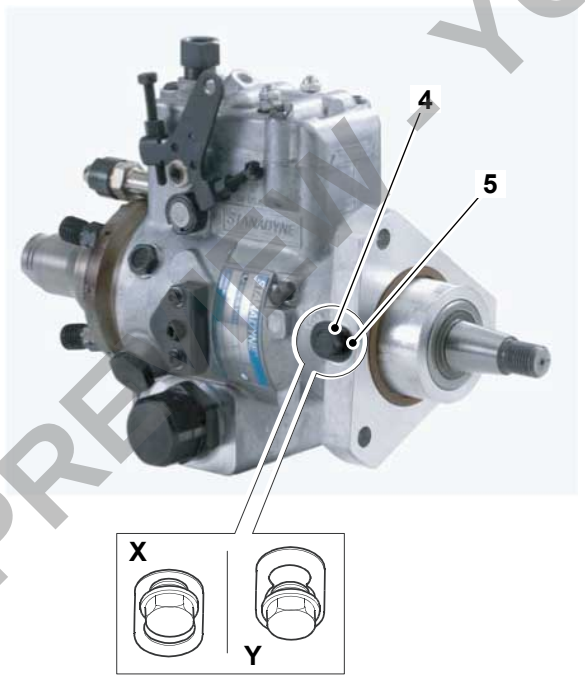
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Figure 168. DP210/310 Pump (If Installed)



2 Retaining nuts
4 Lock bolt
5 Keyhole washer
12 Pump drive gear
F Service tool- reaction cap
G Service tool- threaded adapter
H Service tool- bolt
X Keyhole washer position
Y Keyhole washer position

Figure 169. DB4 Pump (If Installed)



4 Lock bolt
5 Keyhole washer
X Keyhole washer position
Y Keyhole washer position

11. Undo and remove the pump retaining nuts (X3). Be sure to remove all 3 nuts (not shown on DB4 pump). Use the correct spanner to undo the nut nearest to the engine block.

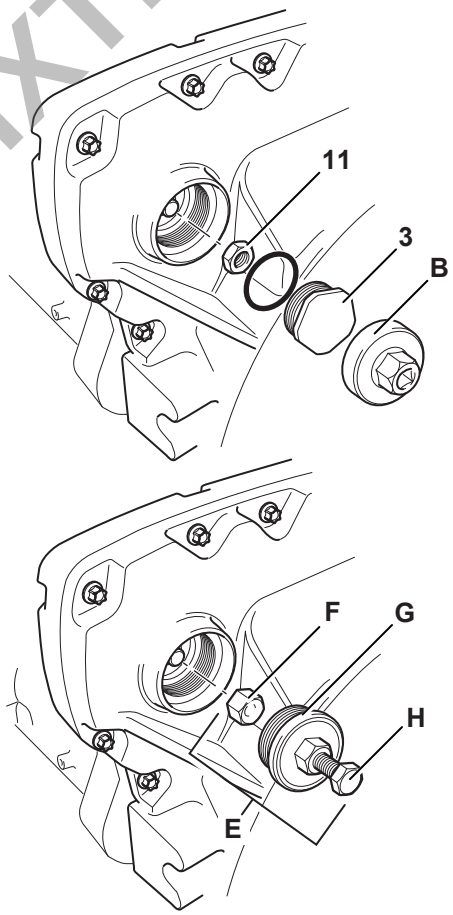
12. Install the reaction cap over the pump shaft. Screw the service tool to the housing. Using a suitable ratchet drive and socket screw in the bolt (service tool) until resistance is felt.

    Special Tool: Pump Gear Removal Tool (Qty.: 1)

13. The injection pump drive gear is located on a taper on the pump drive shaft. There is no mechanical locking key. To remove the pump the taper lock must be 'broken'. Support the fuel injection pump. Tap the end of bolt with a soft faced hammer. When the taper 'breaks' there will be an audible sound.

14. Remove the service tools 12 and withdraw the pump from the flywheel housing.

Figure 170.



3 Fuel injection pump gear cover
11 Drive shaft nut
B Service tool
F Reaction cap (service tool)
G Service tool
H Bolt (service tool)

14.1. Do not remove the engine locking pin at this stage.

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03 - High Pressure Pipe

Remove and Install

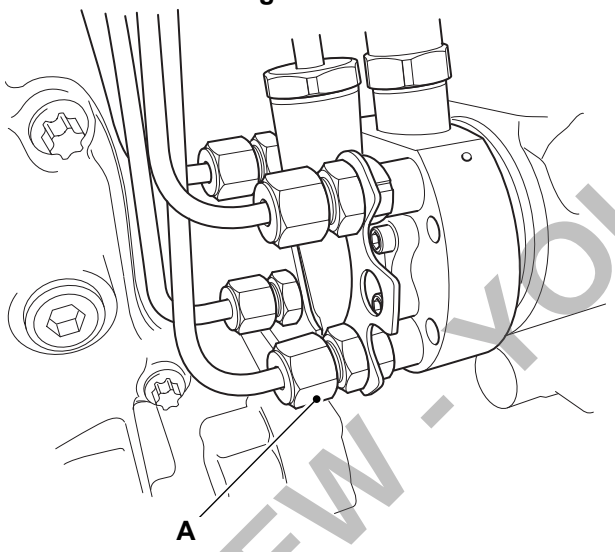
Injector Fuel Pipes

Before Removal

1. 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..
2. Clean off all dirt and debris from around the fuel pipe connectors.

Do not attempt to repair fuel pipes or connectors. If a fuel pipe or connector is damaged the fuel pipe assembly must be renewed.

Figure 189.

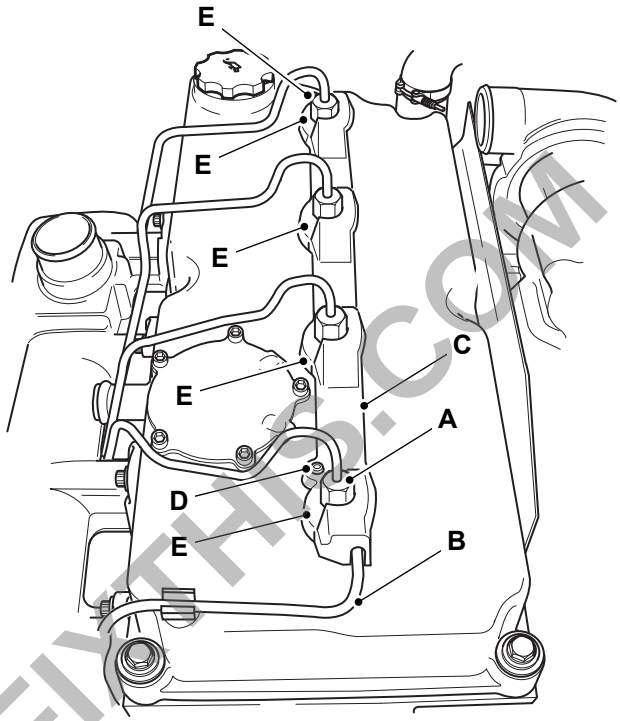


A High pressure fuel pipes

Remove

1. Remove the protective cover. Push out the four plastic segments. Remove the screws and lift off the cover.
2. Remove the fuel pipe in pairs, starting with the pipes for cylinder C and D.

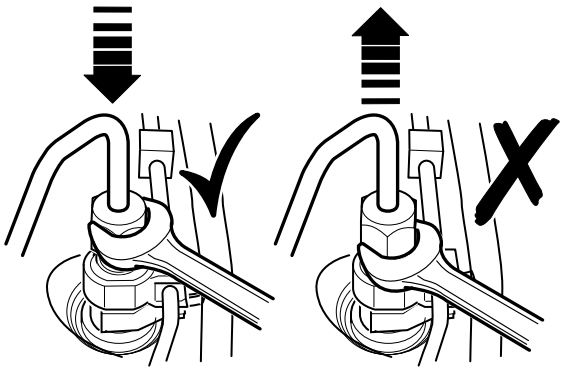
Figure 190.



A High pressure fuel pipes
B Bleed-off fuel line
C Protective cover
D Screws - protective cover
E Removable inserts protective cover

3. Use the 17mm deep socket special tool at the top of nut. This will prevent damage to the nut.

Figure 191.



4. Remove the nuts at the fuel injection pump and injectors and lift the fuel pipes away.
5. Repeat step 4 to remove the other fuel pipes A and B.
6. Seal all the open ports, use the correct parts from the service kit.
7. Discard the old fuel pipes.

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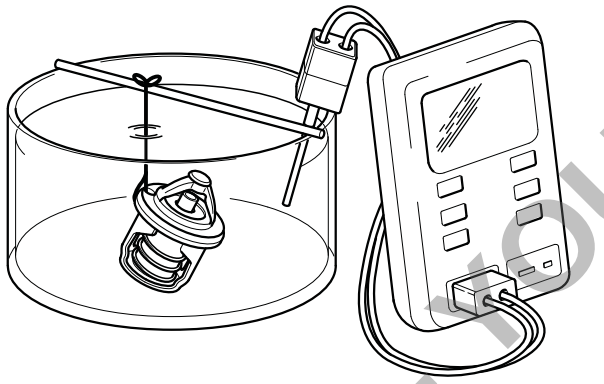
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Check (Operation)

A period of 3–5min before the thermostat valve starts to operate is normal because of the time required to heat soak the thermostat.

1. 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.
2. Remove the thermostat housing and the thermostat. Refer to (PIL 21-12).
3. Suspend the thermostat in a suitable container of coolant. Use an external heat source to gradually increase the temperature of the coolant. Note: When working with boiling water, all the necessary safety precautions must be taken. Refer to Figure 202.

Figure 202.



4. Use a thermometer to measure the temperature of the coolant.
5. When the coolant reaches the operating range of the thermostat the valve should start to open, the movement of the valve plate should be evident.
6. Record the start to open temperature, the fully open temperature and the amount of valve lift travel when fully open. Compare this with the data in Technical Data (PIL 21-00).

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Measuring Resistance

1. Make sure that there is no power to the part of the circuit you are about to measure.
2. Connect one probe at one end of the component or wire to be checked and the other probe at the other end. It does not matter which way round the two probes are placed.
3. Select the correct range on the multimeter.
   - 3.1. On the digital multimeter. Turn the switch to position C and check that the W sign at the right hand side of the display window is on. If the F sign is on instead, press the blue button G to change the reading to Ω. Touch the meter lead probes together and press the REL3 key on the meter to eliminate the lead resistance from the meter reading.
   - 3.2. On the AV0 meter, move the right hand slider switch to position B, and the left hand slider switch to the appropriate Ohms (Ω) range.
   - 3.3. On an analogue meter, move the dial to the appropriate Ohms (Ω) range.

Measuring Continuity

1. Make sure that there is no power to the part of the circuit you are checking for continuity.
2. Connect one probe to one end of the component or wire to be checked and the other probe to the other end. It does not matter which way round the two probes are placed.
3. Select the correct range on the multimeter.
   - 3.1. On the digital multimeter, turn the switch to position C and check that the beeper symbol appears at the left hand side of the display window. If the F sign is on instead, press the button labelled F. If there is continuity in the circuit, the beeper will sound. If there is no continuity (open circuit), the beeper will not sound.
   - 3.2. On the AV0 meter, move the right hand slider switch to position B, and the left hand slider switch to position C. If there is continuity (i.e. very low resistance) between two points the buzzer will sound.
   - 3.3. On an analogue meter, turn the dial to the lowest Ohms (Ω) range. If there is continuity (i.e. very low resistance) between two points the needle will move across fully (or almost fully) to the right hand side of the scale.

Measuring Frequency

The AVO meter and the analogue meter are not capable of measuring frequency, therefore a digital multimeter must be used.

1. Insert the black plug into the COM socket on the meter and attach the probe to the nearest suitable earth point on the chassis, for example, the battery negative terminal.
2. Insert the red probe into socket J.
3. Turn the selector switch to position A and depress G repeatedly until F is highlighted on the top row of the display.
4. Press button H once.
5. Touch or connect the red probe to the frequency source to be measured. Press and hold the button if an average reading is required.

Testing a Diode or a Diode Wire

A diode wire is a diode with male connector installed on one end and a female connector installed on the other end. The diode is sealed in heatshrink sleeving. To test a Diode or a Diode Wire.

1. On the digital multimeter:
   - 1.1. Turn the switch to position D.
   - 1.2. Press the HOLD button and check that the H sign appears at the top right hand side of the display window.
   - 1.3. Connect the black probe to the end of the diode with a band or to the male connector of the diode wire. Connect the red probe to the other end of the diode or diode wire. If the beeper does not sound the diode or diode wire is faulty.
   - 1.4. Connect the red probe to the end of the diode marked with a band, or to the male connector of the diode wire, the black probe should be connected to the other end of the diode or diode wire. If the beeper sounds or the meter does not read O.L., the diode or diode wire is faulty.
   - 1.5. Press the HOLD button and check that the H sign disappears from the right hand side of the display window.
2. On the AV0 meter:
   - 2.1. Move the right hand slider to position A, and the left hand slider switch to position C.
   - 2.2. Connect the black probe to the end of the diode marked with a band, or to the male connector of the diode wire, the red probe should be connected to the other end of the

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21 - Refrigerant

Introduction 75-12
Health and Safety 75-13

Introduction

Refrigerants are the basic ingredient of all air conditioning systems and are used to transfer the heat energy around the system. Refrigerant type R134a is used in the air conditioning system. It's full chemical name is: 1, 1, 1, 2 - Tetrafluoroethane (CH^2FCF^2).

R134a is a HFC (Hydrofluorocarbon) and is non-toxic, non-flammable and non-explosive at normal atmospheric temperature and pressure. It can be flammable under certain pressure and air mixtures.

Due to environmental concerns, the use of ozone depleting chlorofluorocarbons (CFCs) in the air conditioning systems is being gradually phased out. The R-12 refrigerant used in some systems contains CFCs. Air conditioning systems using R-134a refrigerant are not compatible with systems using R-12 refrigerant. No attempt should be made to charge R-134a systems with R- 12 refrigerant.

Important: Refer to the safety procedures within the Air conditioning section before handling refrigerants.

Good installation practice is required to avoid the release of refrigerant into the atmosphere. Refrigerant R134a contains no chlorine and has an Ozone Depleting Potential (ODP) of zero, and a Global Warming Potential (GWP) of 0.1.

PAG Type Refrigerant Oil

The system requires a PAG type refrigerant oil to lubricate the compressor. The oil mixes with the refrigerant and is carried around the system.

It is important that the recommended grade of refrigerant oil is used. Mineral oil is not suitable for R134a refrigerant systems. Do not mix oil types.

The compressor is supplied with an oil charge, but additional oil will be required when the receiver drier is replaced. The oil is added to the compressor through the oil filling plug before the evacuation procedure is started.

Only use fresh, unused oil. Oil that has been exposed to the air will have absorbed water.

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