SENR9678-01
August 2003

Systems Operation Testing and Adjusting

C-10 and C-12 Truck Engines

MBJ1-Up (Engine)
MBL1-Up (Engine)

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below

- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

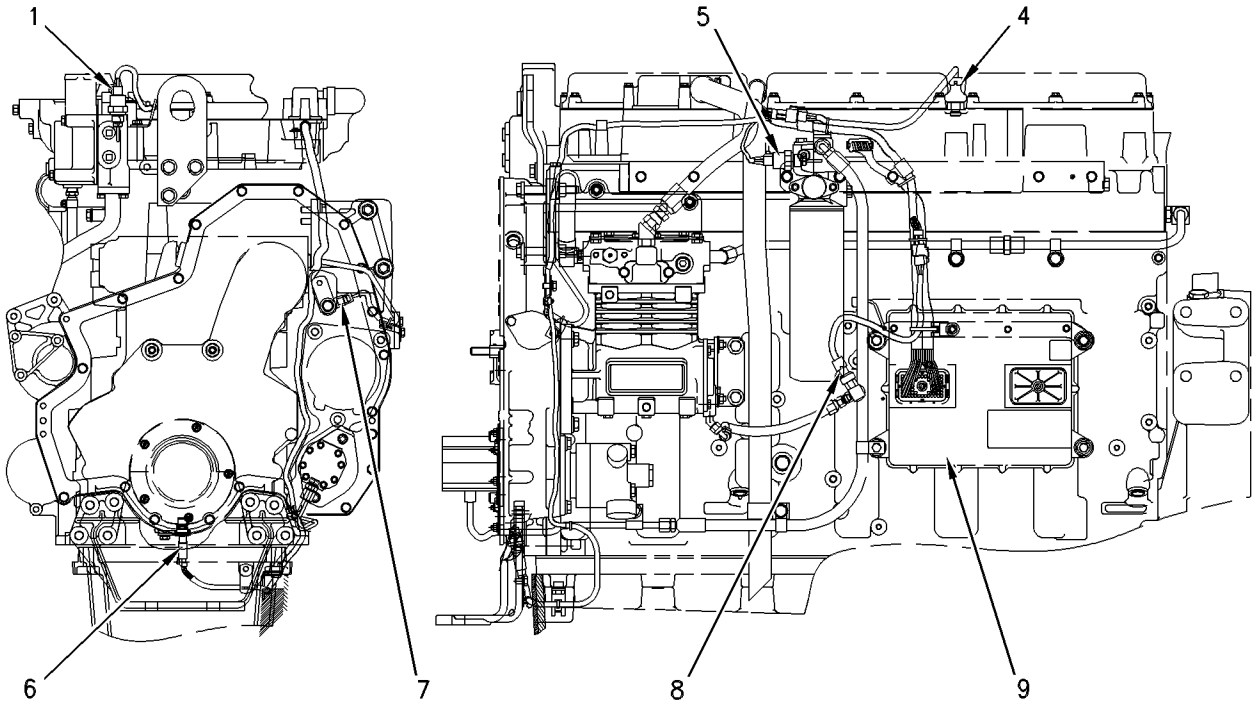


Illustration 4 g00499283

Front view and left side view

(1) Coolant temperature sensor
(2) Inlet air temperature sensor
(3) Boost pressure sensor
(4) Atmospheric pressure sensor
(5) Fuel temperature sensor
(6) Crankshaft position sensor
(7) Camshaft position sensor
(8) Oil pressure sensor
(9) Engine control module (ECM)

The electronic control system is integrally designed into the engine's fuel system and the engine's air inlet and exhaust system in order to electronically control the fuel delivery and the injection timing. The electronic control system provides increased timing control and fuel air ratio control in comparison to conventional mechanical engines. Injection timing is achieved by precise control of injector firing time, and engine rpm is controlled by adjusting the firing duration. The ECM energizes the solenoid in the unit injector in order to start the injection of fuel. Also, the ECM de-energizes the unit injector solenoids in order to stop injection of fuel. Refer to the Systems Operation, "Fuel System" topic for a complete explanation of the fuel injection process.

The engine uses the following types of electronic components:

- Inputs
- Controls
- Outputs

An input component is one that sends an electrical signal to the ECM. The signal that is sent varies in one of the following ways:

- Voltage
- Frequency
- Pulse width

The variation of the signal is in response to a change in some specific system of the vehicle. The ECM sees the input sensor signal as information about the condition, environment, or operation of the vehicle.

A control component (ECM) receives the input signals. Electronic circuits inside the control component evaluate the signals from the input components. These electronic circuits also supply electrical energy to the output components of the system. The electrical energy that is supplied to the output components is based on predetermined combinations of input signal values.

An output component is one that is operated by a control module. The output component receives electrical energy from the control component. The output component uses that electrical energy in one of two ways. The output component can use that electrical energy in order to perform work. The output component can use that electrical energy in order to provide information.

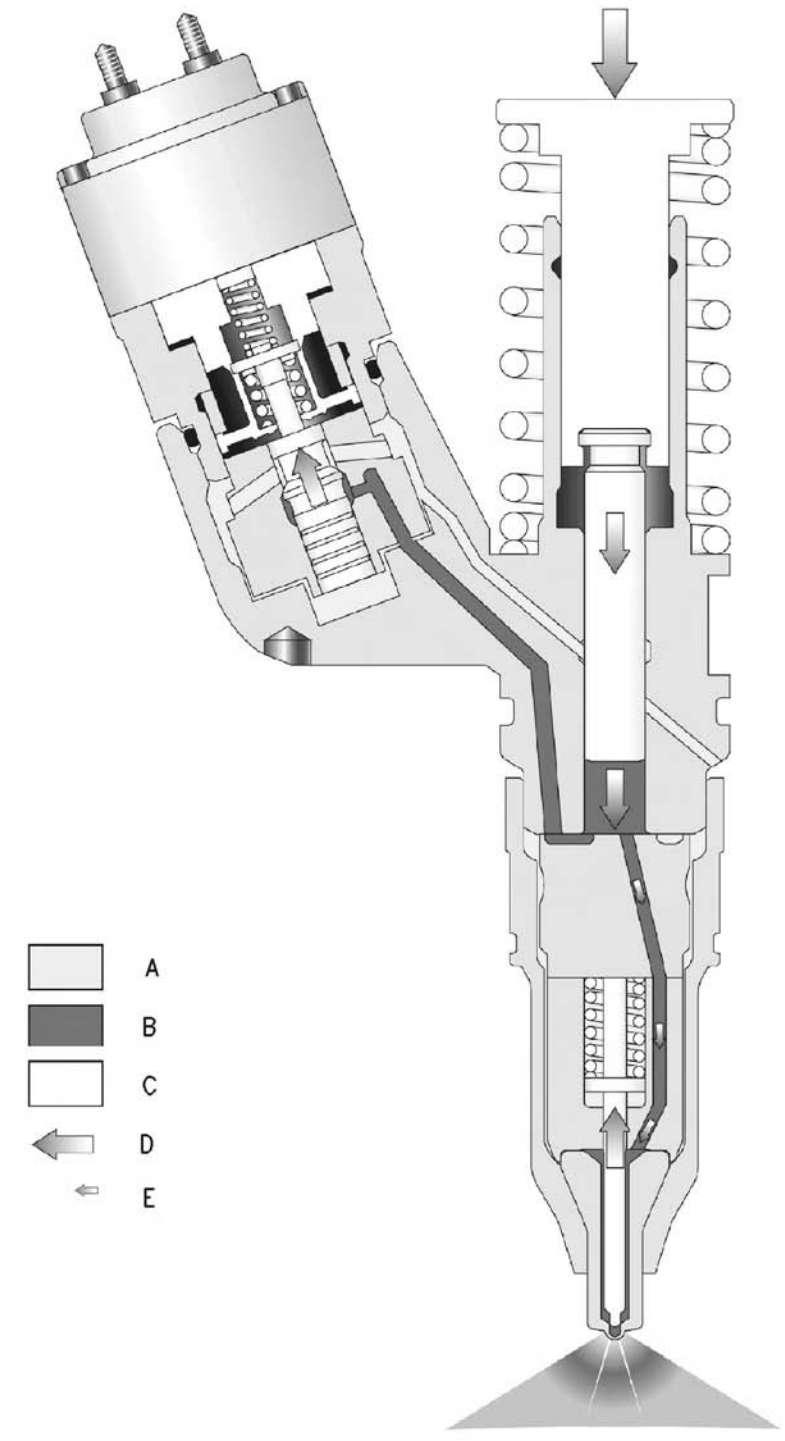
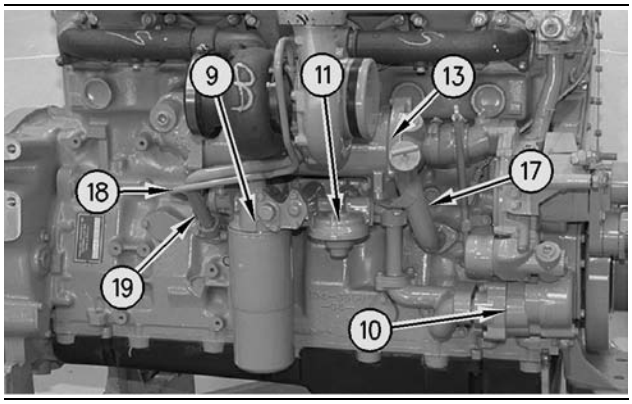


Illustration 10 g00660658

Injection

(A) Fuel supply pressure.
(B) Injection pressure
(C) Moving parts
(D) Mechanical movement
(E) Fuel movement.



g00421818

Illustration 18

Right side of engine

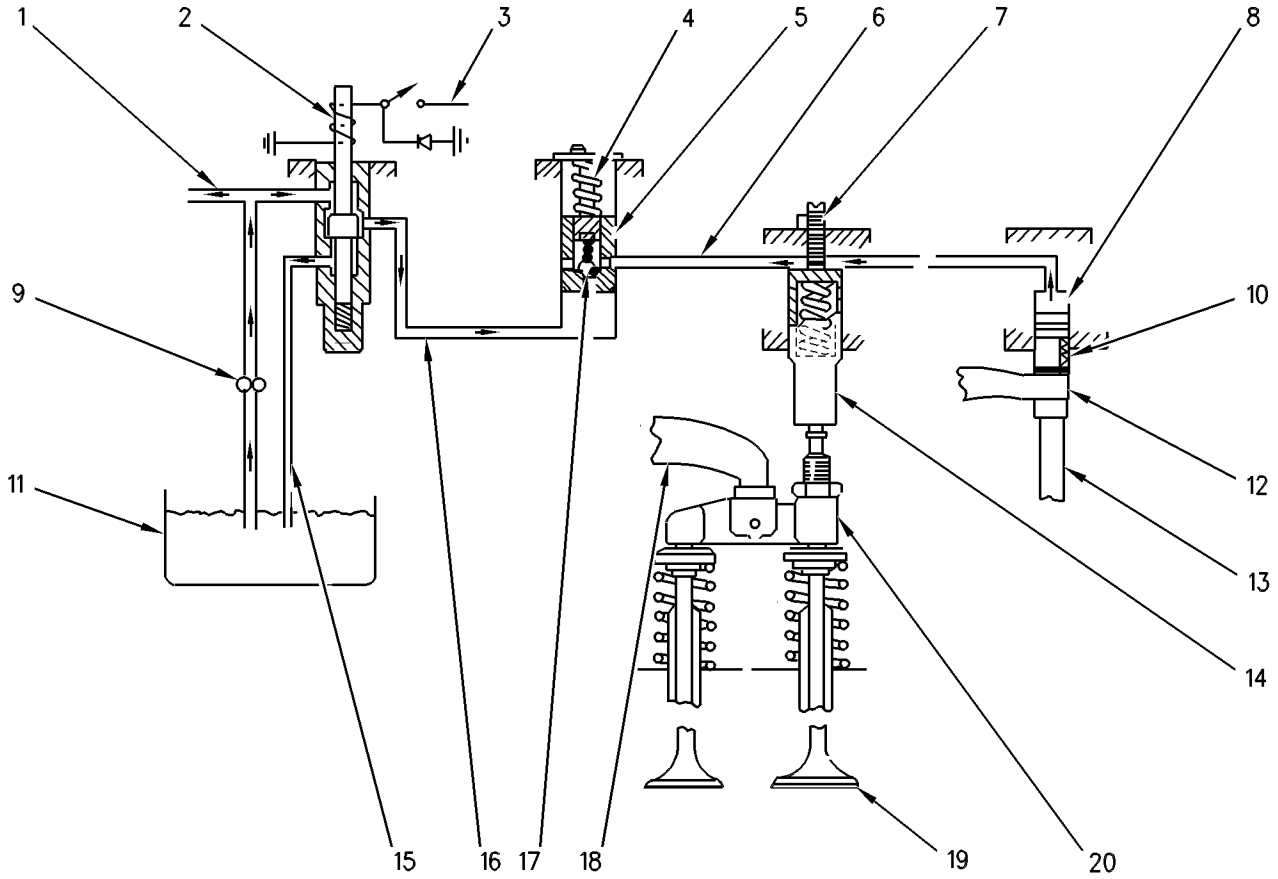
(9) Primary engine oil filter
(10) Engine oil pump
(11) Secondary oil filter (not shown)
(13) Engine oil cooler
(17) Engine oil filler
(18) Oil supply line to turbocharger
(19) Oil drain line from turbocharger

The lubrication system supplies 110 °C (230 °F) filtered oil at approximately 275 kPa (40 psi) at rated engine operating conditions. Oil pump bypass valve (16) is controlled by the engine oil manifold pressure, rather than the oil pump pressure. The engine oil manifold pressure is independent of the pressure drop that is caused by the engine oil filter and the engine oil cooler.

Oil cooler bypass valve (12) maintains the engine oil temperature to 110 °C (230 °F). High pressure relief valve (15), which is located in the filter base, protects the filters and other components during cold starts. The opening pressure of the high pressure relief valve is 695 kPa (100 psi). Secondary oil filter (11) is a five micron filter which filters five percent of the oil flow before returning the oil to the sump. The opening pressure of the oil filter bypass valve is 170 kPa (25 psi). Engine oil pressure sensor (3) is part of the engine protection system.

The turbocharger cartridge bearings are lubricated by oil supply line (18) from the main oil gallery, and oil drain line (19) returns the oil flow to the sump.

Operation of the Compression Brake



g00501985

Illustration 35

Schematic for master-slave circuit

(1) Rocker arm shaft oil passage
(2) Solenoid valve
(3) Lead wire
(4) Spring
(5) Control valve
(6) High pressure oil passage
(7) Slave piston adjustment screw
(8) Master piston
(9) Engine oil pump
(10) Spring
(11) Engine oil pan
(12) Fuel injector rocker arm
(13) Fuel injector pushrod
(14) Slave piston
(15) Oil drain passage
(16) Low pressure oil passage
(17) Ball check valve
(18) Exhaust valve rocker arm
(19) Exhaust valve
(20) Exhaust bridge assembly

The compression brake is operated by engine oil that is distributed around the studs. This oil is supplied through the supports for the rocker arm shaft. Solenoid valve (2) controls the oil flow in the compression brake housing.

3. Check fuel API with a 9U-7840 Fluid and Fuel Calibration Gp for low power complaints. The acceptable range of the fuel API is 30 to 45 when the API is measured at 15 °C (60 °F), but there is a significant difference in energy within this range. Refer to Tool Operating Manual, NEHS0607 for API correction factors when a low power problem is present and API is high.

Note: A correction factor that is greater than 1.000 may be the cause of low power and/or poor fuel consumption.

4. If fuel quality is still suspected as a possible cause to problems regarding engine performance, disconnect the fuel inlet line, and temporarily operate the engine from a separate source of fuel that is known to be good. This will determine if the problem is caused by fuel quality. If fuel quality is determined to be the problem, drain the fuel system and replace the fuel filters. Engine performance can be affected by the following characteristics :

- Cetane number of the fuel
- Air in the fuel
- Other fuel characteristics

i01909716

Fuel System - Prime

SMCS Code: 1258-548

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE
Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.

NOTICE
Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

If the fuel system runs out of fuel or if air is introduced into the fuel system, the system must be primed prior to starting the engine.

Before you begin this procedure, check that the following conditions are satisfied:

- Ensure that the fuel tanks are filled with clean diesel fuel.
- Turn the key switch to the OFF position.

Review the following illustrations in order to locate the components for your application. Locate the air purge plug (1), fuel priming pump (2) (if equipped), and the ball valve assembly (3) (if equipped).

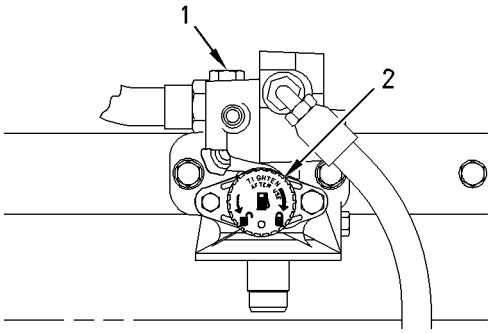


Illustration 45 g00995175

Fuel filter base that is mounted directly to the fuel supply manifold

Typical example

(1) Air purge plug
(2) Hand priming pump (if equipped)

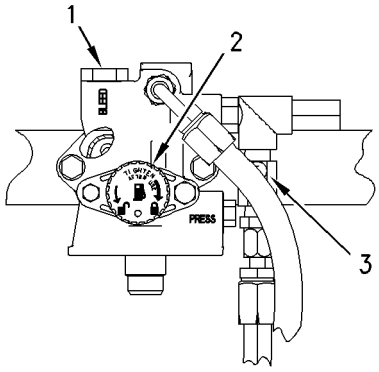


Illustration 46 g00995236

Fuel filter base that is mounted directly to the fuel supply manifold

Typical example

(1) Air purge plug
(2) Hand priming pump (if equipped)
(3) Ball valve assembly (if equipped)

5. Multiply the value from Step 4 by 1.8.

6. Compare the result from Step 5 to the value that follows.

Back pressure from the exhaust must not be more than the following amount:

Maximum back pressure ..... 10.0 kPa (40 inch of H_2O)

Catalytic Converter/Muffler

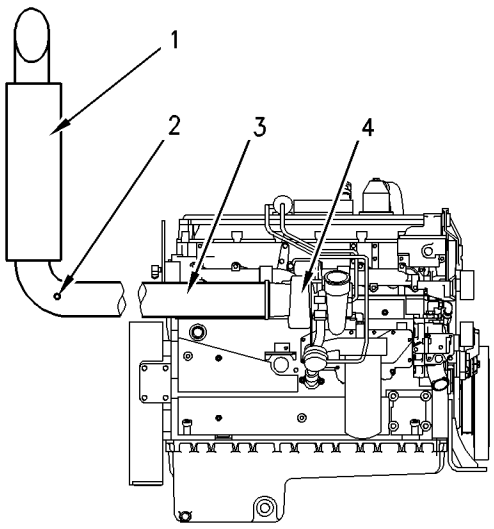


Illustration 63 g00678914

Typical example

(1) Catalytic converter/muffler
(2) Test location
(3) Exhaust piping
(4) Turbocharger

1. Connect the pressure port of the differential pressure gauge to test location. The test location should be located on a straight length of exhaust pipe. This back pressure tap should be located as close as possible to the turbocharger or the exhaust manifold.

2. Leave the vacuum port of the differential pressure gauge open to the atmosphere.

3. Start the engine. Run the engine in the no-load condition at high idle until the engine reaches normal operating temperature.

4. Record the value.

5. Multiply the value from Step 4 by 1.8.

6. Compare the result from Step 5 to the value that follows.

Back pressure from the exhaust must not be more than the following amount:

Maximum back pressure for engines with a Catalytic converter/muffler ..... 14.9 kPa (60 inch of H_2O)

If the maximum back pressure is within the allowable limits, refer to Troubleshooting, “Low Power/Poor or No Response to Throttle”.

If the back pressure exceeds 14.9 kPa (60 inch of H_2O), replace the catalytic converter/muffler.

i01896277

Turbocharger - Inspect

SMCS Code: 1052-040

WARNING

Hot engine components can cause injury from burns. Before performing maintenance on the engine, allow the engine and the components to cool.

WARNING

Personal injury can result from rotating and moving parts.

Stay clear of all rotating and moving parts.

Never attempt adjustments while the machine is moving or the engine is running unless otherwise specified.

The machine must be parked on a level surface and the engine stopped.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

b. Place the appropriate feeler gauge between rocker arm and the valve bridge. Then, turn the adjustment screw in a clockwise direction. Slide the feeler gauge between the rocker arm and the valve bridge. Continue turning the adjustment screw until a slight drag is felt on the feeler gauge. Remove the feeler gauge.

c. Tighten the adjustment locknut to a torque of 30 ± 7 N·m (22 ± 5 lb ft). Do not allow the adjustment screw to turn while you are tightening the adjustment locknut. Recheck the valve lash after tightening the adjustment locknut.

9. Remove the timing bolt from the flywheel after all adjustments to the valve lash have been made. Reinstall the timing cover on the flywheel housing.

For information that relates to the adjustment of the electronic unit injector, refer to Testing and Adjusting, “Electronic Unit Injector - Adjust”.

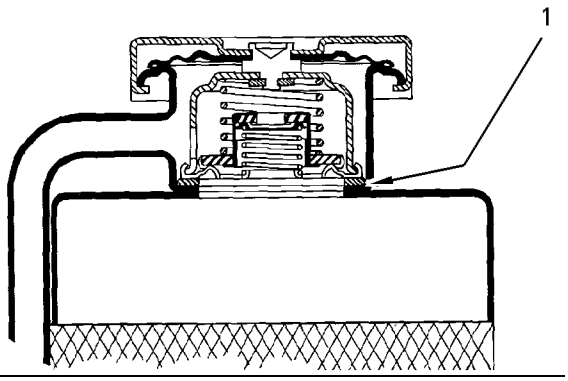


Illustration 80 g00296067

Typical schematic of filler cap

(1) Sealing surface of both filler cap and radiator

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

To check for the amount of pressure that opens the filler cap, use the following procedure:

1. After the engine cools, carefully loosen the filler cap. Slowly release the pressure from the cooling system. Then, remove the filler cap.

   Carefully inspect the filler cap. Look for any damage to the seals and to the sealing surface. Inspect the following components for any foreign substances:

   - Filler cap
   - Seal
   - Surface for seal

   Remove any deposits that are found on these items.

2. Install the filler cap on the 9S-8140 Pressurizing Pump.

3. Look at the gauge for the exact pressure that opens the filler cap.

4. Compare the gauge's reading with the opening pressure that is listed on the filler cap.

5. If the filler cap is damaged, replace the filler cap.

Testing The Radiator And Cooling System For Leaks

Table 17

Required Tools		
Part Number	**Part Name**	**Quantity**
9S-8140	Pressurizing Pump	1

Use the following procedure in order to check the cooling system for leaks:

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

1. After the engine is cool, loosen the filler cap slowly and allow pressure out of the cooling system. Then remove the filler cap from the radiator.

2. Ensure that the radiator is full of coolant.

3. Install the 9S-8140 Pressurizing Pump onto the radiator.

4. Take the pressure reading on the gauge to 20 kPa (3 psi) more than the pressure on the filler cap. The pressure on a typical filler cap is 48.3 kPa (7 psi) to 103.42 kPa (15 psi).

5. Check the radiator for leakage on the outside.

6. Check all connection points for leakage, and check the hoses for leakage.

The cooling system does not have leakage only if the following conditions exist:.

- You do NOT observe any outside leakage.

Compression Brake

i01896342

Slave Piston Lash - Adjust

SMCS Code: 1119-025

⚠ WARNING

To prevent possible injury, do not use the starter to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring valve clearance.

⚠ WARNING

This engine uses high voltage to control the fuel injectors.

Disconnect electronic fuel injector enable circuit connector to prevent personal injury.

Do not come in contact with the fuel injector terminals while the engine is running.

Note: The engine valve lash must be adjusted before adjusting the slave piston lash.

For information that relates to the adjustment of the engine valve lash, refer to Testing and Adjusting, “Engine Valve Lash - Inspect/Adjust”.

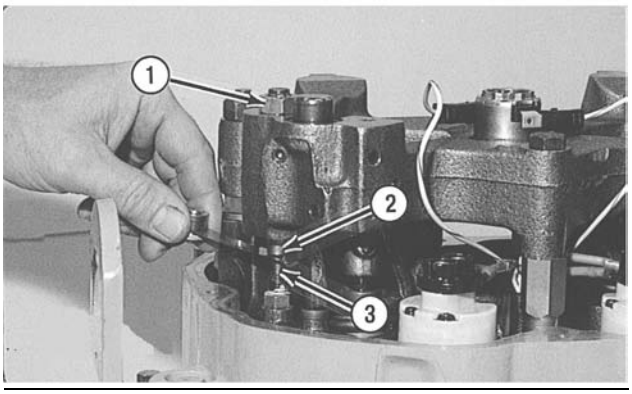
Table 26

Slave Piston Lash Setting Jake Brake Compression Brakes	
Serial Number Prefix	**Slave Piston Lash Setting**
3CS1-UP 2PN1-UP 8YS1-UP	0.64 ± 0.08 mm (0.025 ± 0.003 inch)
2KS1-UP 9NS1-UP	1.02 ± 0.08 mm (0.040 ± 0.003 inch)
1YN1-UP	1.14 ± 0.08 mm (0.045 ± 0.003 inch)
MBJ1-UP MBL1-UP	1.40 ± 0.08 mm (0.055 ± 0.003 inch)

Note: Slave piston lash is measured between the slave piston and the actuating pin that is on the exhaust valve bridge. Make all adjustments to the slave piston while the engine is stopped and the exhaust valves are closed.

Use the following procedure to adjust the slave piston lash on cylinders 1, 3, and 5:

1. Put the No. 1 piston at the top center position on the compression stroke. Refer to Testing and Adjusting, “Finding Top Center Position for No. 1 Piston”.



g00481680

Illustration 98

Compression brake

Typical example

(1) Adjusting screw and locknut
(2) Slave piston
(3) Actuating pin

2. Loosen adjustment locknut (1).

3. Place the appropriate feeler gauge between slave piston (2) and screw assembly (3). Then, turn the adjustment screw in a clockwise direction. Slide the feeler gauge between the slave piston and the screw assembly. Continue turning the adjustment screw until a slight drag is felt on the feeler gauge. Remove the feeler gauge.

4. Tighten adjustment locknut (1) to a torque of 35 N·m (25 lb ft). Recheck the slave piston lash after tightening the locknut.

5. Continue to check the slave piston lash for each of the cylinders that have been designated for adjustment. After each adjustment, tighten the nut for valve adjustment screw to a torque of 35 N·m (25.0 lb ft) and check the adjustment again.

6. Remove the timing bolt and turn the flywheel by 360 degrees in the direction of engine rotation. This will put the No. 6 piston at the top center position on the compression stroke. Install the timing bolt in the flywheel.

   To make an adjustment to the slave piston lash on cylinders 2, 4, and 6, follow steps 2 through 5.

7. Remove the timing bolt from the flywheel after all adjustments have been performed. Reinstall the timing cover on the flywheel housing.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below

- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL