Your Ultimate Source for OEM Repair Manuals

FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

2009 JEEP Wrangler Rubicon OEM Service and Repair Workshop Manual

Go to manual page

YOUR CURRENT VEHICLE

Cylinder Leakage Test

CYLINDER LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Cylinder leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion pressure loss.

Perform the following cylinder leakage test steps:

1. Check the coolant level and fill as required. DO NOT install the radiator cap.
2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
3. Remove the spark plugs.
4. Remove the oil filler cap.
5. Remove the air cleaner hose.
6. **Calibrate the tester according to the manufacturer's instructions.** The shop air source for testing should maintain a regulated air pressure at 552 kPa (80 psi).
7. Perform the test procedures on each cylinder according to the tester's manufacturer instructions. Set the piston of the cylinder to be tested at Top Dead Center (TDC) on the compression stroke.
8. As each cylinder is pressurized, listen for the air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with **no more** than 25% leakage.

If leakage is greater then 25%, refer to CYLINDER LEAKAGE DIAGNOSIS CHART below:

CYLINDER LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
	4. Leaking valve guide seals.	4. Replace valve guide seals (Refer to Engine/Cylinder Head/SEAL(S), Valve Guide/Removal and Installation)(Refer To List 12).

Refer To List:

List 1

- 09 - Engine, 2.0L / Engine Block / SEAL, Crankshaft Oil, Rear / Removal and Installation
- 09 - Engine, 3.6L / Engine Block / SEAL, Crankshaft Oil, Rear / Removal and Installation

List 2

- 09 - Engine, 2.0L / Lubrication / PAN, Oil / Removal and Installation
- 09 - Engine, 3.6L / Lubrication / PAN, Oil / Removal and Installation
- 09 - Engine, 5.7L / Lubrication / PAN, Oil / Removal and Installation

List 3

- 09 - Engine, 2.0L / Engine Block / SEAL, Crankshaft Oil, Front / Removal and Installation
- 09 - Engine, 3.6L / Engine Block / SEAL, Crankshaft Oil, Front / Removal and Installation
- 09 - Engine, 5.7L / Engine Block / SEAL, Crankshaft Oil, Front / Removal and Installation

List 4

- 09 - Engine, 2.0L / Engine Sensors / Removal and Installation
- 09 - Engine, 3.6L / Engine Sensors / Removal and Installation
- 09 - Engine, 5.7L / Engine Sensors / Removal and Installation

List 5

- 09 - Engine, 2.0L / Standard Procedure
- 09 - Engine, 3.6L / Standard Procedure
- 09 - Engine, 5.7L / Standard Procedure

List 6

- 09 - Engine, 2.0L / Lubrication / PUMP, Engine Oil / Removal and Installation
- 09 - Engine, 3.6L / Lubrication / PUMP, Engine Oil / Removal and Installation
- 09 - Engine, 5.7L / Lubrication / PUMP, Engine Oil / Removal and Installation

List 7

- 09 - Engine, 2.0L / Lubrication / Standard Procedure
- 09 - Engine, 3.6L / Lubrication / Standard Procedure
- 09 - Engine, 5.7L / Lubrication / Standard Procedure

CONDITION	POSSIBLE CAUSES	CORRECTIONS
	round	
	7. Loose flywheel or torque converter	7. Tighten to correct torque.

Refer To List:

List 1

- 09 - Engine, 2.0L / Lubrication / Standard Procedure
- 09 - Engine, 3.6L / Lubrication / Standard Procedure
- 09 - Engine, 5.7L / Lubrication / Standard Procedure

List 2

- 09 - Engine, 2.0L / Cylinder Head / Diagnosis and Testing
- 09 - Engine, 3.6L / Cylinder Head / Diagnosis and Testing
- 09 - Engine, 5.7L / Cylinder Head / Diagnosis and Testing

List 3

- 09 - Engine, 2.0L / Cylinder Head / Cylinder Head Assembly / Removal and Installation
- 09 - Engine, 3.6L / Cylinder Head / Cylinder Head Assembly / Removal and Installation
- 09 - Engine, 5.7L / Cylinder Head / Cylinder Head Assembly / Removal and Installation

List 4

- 09 - Engine, 2.0L / Cylinder Head / Standard Procedure
- 09 - Engine, 3.6L / Cylinder Head / Standard Procedure
- 09 - Engine, 5.7L / Cylinder Head / Standard Procedure

CONDITION	POSSIBLE CAUSE	CORRECTION
	system	
	4. Dirty fuel injector(s)	4. Test and replace as necessary (Refer to Appropriate Diagnostic Information).

Refer To List:

List 1

- 09 - Engine, 2.0L / Ignition Control / COIL, Ignition / Removal and Installation
- 09 - Engine, 3.6L / Ignition Control / COIL, Ignition / Removal and Installation
- 09 - Engine, 5.7L / Ignition Control / COIL, Ignition / Removal and Installation

List 2

- 09 - Engine, 2.0L / Technical Specifications
- 09 - Engine, 3.6L / Technical Specifications
- 09 - Engine, 5.7L / Technical Specifications

List 3

- 09 - Engine, 2.0L / Valve Timing / Standard Procedure
- 09 - Engine, 3.6L / Valve Timing / Standard Procedure
- 09 - Engine, 5.7L / Valve Timing / Standard Procedure

List 4

- 09 - Engine, 2.0L / Engine Sensors / Removal and Installation
- 09 - Engine, 3.6L / Engine Sensors / Removal and Installation
- 09 - Engine, 5.7L / Engine Sensors / Removal and Installation

List 5

- 09 - Engine, 2.0L / Ignition Control / SPARK PLUG / Removal and Installation
- 09 - Engine, 3.6L / Ignition Control / SPARK PLUG / Removal and Installation
- 09 - Engine, 5.7L / Ignition Control / SPARK PLUG / Removal and Installation

List 6

- 09 - Engine, 2.0L / Fuel System / ASSEMBLY, Fuel Pump / Removal and Installation
- 09 - Engine, 3.6L / Fuel System / ASSEMBLY, Fuel Pump / Removal and Installation
- 09 - Engine, 5.7L / Fuel System / ASSEMBLY, Fuel Pump / Removal and Installation

List 7

- 09 - Engine, 2.0L / Cylinder Head / Cylinder Head Assembly / Removal and Installation

1. Check the oil level at least 15 minutes after a hot shutdown.
2. If the oil level is low, top off with the proper viscosity and American Petroleum Institute (API) service level engine oil. Add one bottle of MOPAR® 4-In-1 Leak Detection Dye into the engine oil.
3. Tamper proof the oil pan drain plug, oil filter, dipstick and oil fill cap.
4. Record the vehicle mileage.
5. Instruct the customer to drive the vehicle as usual.
6. Ask the customer to return to the servicing dealer after accumulating 500 miles. Check the oil level at least 15 minutes after a hot shutdown. If the oil level is half way between the “FULL” and “ADD” mark, continue with the next step.
7. Using a black light, re-check for any external engine oil leaks and repair as necessary. If no external engine oil leaks are present, continue with oil consumption diagnosis.

OIL CONSUMPTION DIAGNOSIS

1. Check the Positive Crankcase Ventilation (PCV) system. Make sure the system is not restricted and the PCV valve has the correct part number and correct vacuum source (18-20 in. Hg at idle below 3000 ft. above sea level is considered normal).
2. Perform a cylinder compression test and cylinder leakage test using the standard cylinder leakage tester and following manufacturers suggested best practices (Refer to Engine/Diagnosis and Testing)(Refer To List 1).

   NOTE

   Verify the spark plugs are not oil saturated. If the spark plugs are oil saturated and compression is good it can be assumed the valve seals or valve guides are at fault.

3. If one or more cylinders have more than 25% leak down further engine tear down and inspection will be required.

TOP 19 REASONS THAT MAY LEAD TO ENGINE OIL CONSUMPTION

1. **Tapered and Out-of-Round Cylinders** -

   The increased piston clearances permit the pistons to rock in the worn cylinders. While tilted momentarily, an abnormally large volume of oil is permitted to enter on one side of the piston. The rings, also tilted in the cylinder, permit oil to enter on one side. Upon reversal of the piston on each stroke, some of this oil is passed into the combustion chamber.

2. **Distorted Cylinders** -

YOUR CURRENT VEHICLE

Relative Compression Test - Mopar Scope

RELATIVE COMPRESSION TEST - MOPAR SCOPE

0:00 / 6:12

NOTE

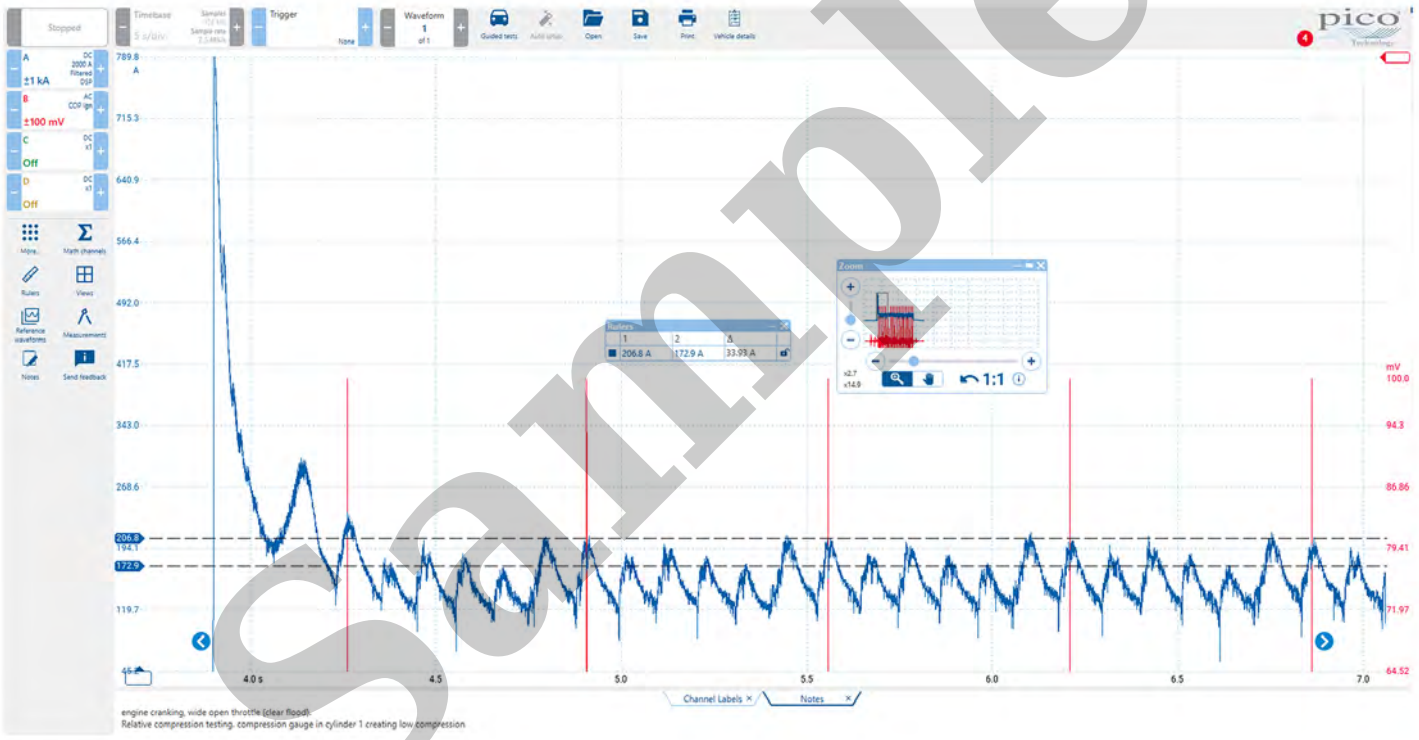
This procedure does not apply to a Hybrid vehicle that does not have a starter motor.

A relative compression test can be performed to quickly determine if a cylinder has a mechanical issue causing a lack of compression and misfire condition. This can be done by checking the amperage draw of the starter motor with an oscilloscope during engine cranking. The amount of peak amperage for each cylinder during a compression stroke will increase or decrease in relation to cylinder compression. If a cylinder has low compression due to a mechanical issue, the amperage draw by the starter motor will also be lower when that cylinder is on the compression stroke. Follow the steps below to perform a relative compression test with the oscilloscope.

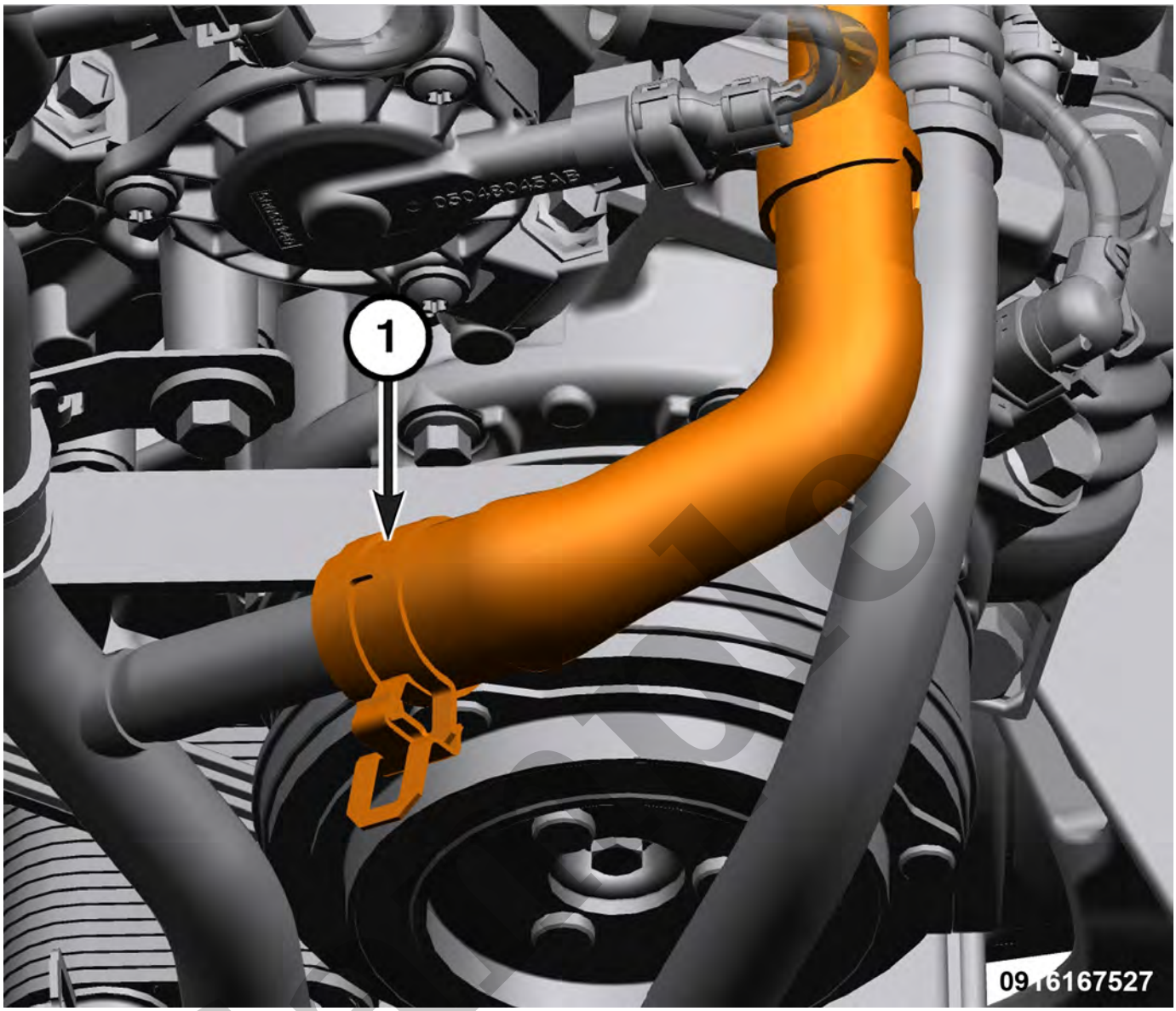
NOTE

It is important to note when performing this check that the peak amperage can vary from vehicle to vehicle, even with the same size engines. There are many variables that can affect this such as the starter motor capacity and age, battery type and capacity, etc. For this reason it is best to compare the cylinders across the engine on the vehicle being tested. Saved readings from another vehicle with the same engine should only be used as a guideline for what is considered normal.

Below is an example of the same vehicle with low compression in cylinder 1. The spark plug was removed and a compression hose was inserted in the cylinder to simulate compression loss. In this example the red channel is showing ignition coil 3 firing as a sync. Using the firing order of 1-2-3-4-5-6 you can see that cylinder 1 is much lower than the cylinders with maximum current draw. In this example cylinder one is lower than all other cylinders. The cylinders before cylinder 1 are closer to the normal readings in the graph above but the cylinders directly after cylinder 1 are slightly higher than the graph above when all cylinders were good. This is normal with a low cylinder. With low compression in a cylinder the starter draw will decrease due to less resistance for the starter to fight on the compression stroke. The lack of compressed air aiding the piston as it travels back down on the combustion stroke will cause an in-rush on the following cylinder(s). If a cylinder has low compression, the difference for the faulty cylinder should be obvious. An actual compression test and cylinder leakage test should be performed to determine the issue.

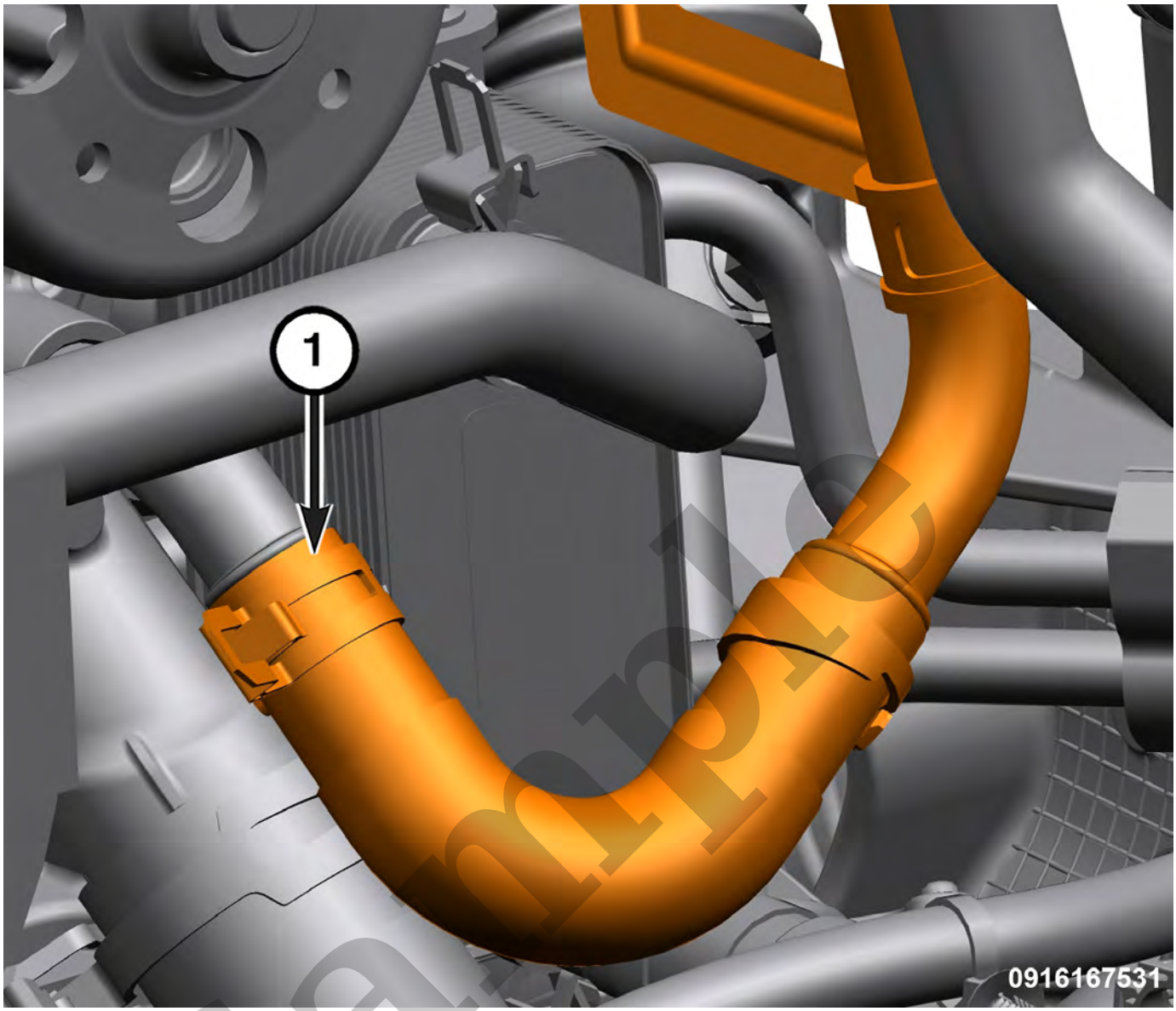


2830176269



1 - Return Hose

14. Remove the heater core return hose.



1 - Coolant Tube

18. Remove the coolant tube from the water pump and remove the tube.