

LAB - Vacuum Test



Students: 1. _____
 2. _____
 3. _____

Fill in each box with the appropriate information.
 Be sure to have the Instructor's initials before moving on to the next step. These are there to ensure everything is SAFE and CORRECT. Each team member must be able to answer questions from your instructor to receive credit for this lab.

LAB CREDITS

ALL ENGINES: **1 LAB**

VEHICLE IDENTIFICATION

Year:		Make:	
Model:		Mileage:	

A vacuum test measures how much your engine is drawing in air. It measures the amount of vacuum in the intake manifold, below the closed throttle plate. A typical engine would like to see a vacuum reading between 18-21inHg. Vacuum is measured in Inches of Mercury (inHg).

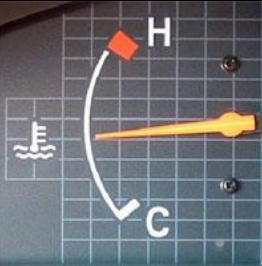
Readings outside of 18-21inHg are likely a result of:

- Worn piston rings and/or cylinders
- Leaking intake system gaskets
- Leaking valves
- Ignition system faults
- Fuel system faults
- Plugged exhaust system

It is important to judge engine performance by the general location and action of the needle on a vacuum gauge, rather than just by a vacuum reading. Vacuum is measured in inches of mercury (in. Hg).

CONNECTION

1	<p>Find a vacuum port on the intake manifold that the gauge can connect to while the engine is running. You may find some on or near the Throttle Body or Intake Plenum.</p> <p>Check with your instructor if you aren't sure which one to use.</p>	
2	<p>Connect the (running) Shop Exhaust Extraction system to the vehicle exhaust pipe(s)</p>	

3	Start the engine and have it running at operating temperature.	
TESTING		
4	IDLE TEST <ul style="list-style-type: none"> Allow the engine to idle normally. Record the reading: <input data-bbox="412 520 818 583" type="text"/> in.Hg Describe the needle movement: <input data-bbox="412 642 818 831" type="text"/> 	<p>Normal Engine: On a normal engine accelerate to around 2000 rpm and then quickly release the throttle plate. The engine should snap right back to a steady 17-21 in.Hg.</p> <p>Steady low between 5-10 in.Hg: Indicates that the engine has a leak in the intake manifold or the intake gasket. This leak should be easy to find because it would be making a loud hissing noise.</p>
5	CRUISE TEST <ul style="list-style-type: none"> Slowly increase rpm to 3000rpm. We want to see the same or higher vacuum as idle. Record the reading: <input data-bbox="412 1062 818 1125" type="text"/> in.Hg Describe the needle movement: <input data-bbox="412 1184 818 1373" type="text"/> 	<p>Steady low between 10-15 in.Hg: Indicates late valve timing. There's a good chance the vehicle has jumped timing. Check the timing belt or chain depending on the application.</p> <p>Steady low between 15-18 in.Hg: Indicates retarded ignition timing. Advance the timing on the distributor to correct this problem.</p> <p>Fluctuating Needle: Indicates there's a problem with a valve or a there's an engine misfire.</p> <p>Needle drops during acceleration: Indicates a restriction in the exhaust or intake. This is typically due to a clogged CAT or muffler.</p>
6	SNAP TEST <ul style="list-style-type: none"> Snap the throttle open to about 2000rpm. We want to see vacuum drop to about 5inHg or less, then rebound to 21inHg or more. What was the lowest the vacuum gage dropped to: What was the highest reading the needle rebounded to: 	<input data-bbox="1146 1556 1455 1619" type="text"/> in.Hg <input data-bbox="1146 1633 1455 1696" type="text"/> in.Hg
STOP!		INSTRUCTOR'S INITIALS: <input data-bbox="1263 1759 1455 1841" type="text"/>



Normal Vacuum
Steady 17-21 Hg



Leaking Intake Manifold
Steady Low 5-10 Hg



Check Valve Timing
Steady Low 10-15 Hg



Check Ignition Timing
Steady Low 15-18 Hg



Sticking Valve or Misfire
Fluctuating Needle



Clogged Exhaust
Needle Drops While Accelerating

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Based on your observation, what do you suspect may be wrong with this engine?

Shut the vehicle off, return the exhaust extraction system, return your tools to the tool room, tidy up your work area.

STOP!

INSTRUCTOR'S INITIALS: