Instructions for  
Vacuum and Fuel  
Pressure Tester Kit

Cranking vacuum tests

1. Start engine and allow it to warm  
   to normal operating temperature.  
   Stop engine. To prevent the  
   engine from starting, disable the  
   ignition system.
2. Remove the air filter. Back out the  
   idle speed screw (see Figure 1)  
   until the throttle valve is tighly  
   closed. If the carburetor is also  
   equipped with an idle air bleed  
   screw, turn the screw clockwise  
   until it bottoms lightly. In both  
   cases, count the number of turns  
   so the screws can be returned to  
   their original positions after the  
   tests.
3. If the vehicle is equipped with an  
   idle stop solenoid (See Figure 1 ),  
   disconnect the electrical wire at  
   the base of the solenoid under the  
   rubber boot or at the connector  
   as shown.
4. If the engine is equipped with a  
   PCV (Positive Crankcase  
   Ventilation) system, remove the  
   PCV valve at the engine rocker  
   arm cover (see Figure 2) and plug  
   the valve on the bottom with tape  
   or other suitable means.
5. Using the hose supplied, connect  
   the Vacuum Gauge to a source of  
   manifold vacuum. This may be a  
   fitting on the carburetor below the  
   throttle plate, or a fitting in the  
   intake manifold. See Figures 2  
   and 9.
6. Crank the engine and note  
   Vacuum Gauge reading.

(After testing, return adjustment

screws to their original positions.)

rubber cover cover solenoid

The general condition of an engine  
is indicated by one of three possible  
gauge readings:

1. (Figure 3) A reasonably steady  
   vacuum reading of 4 inches or  
   more on emission controlled  
   engines, and 10 inches or more

Fig. 3

on non-emission controlled engines  
(pre-1968) indicates correct engine  
vacuum. Readings may vary  
considerably on different engines,  
but should not fall below these  
minimums. (See manufacturer's  
specifications).

1. (Figure 4) An excessively low,  
   steady vacuum is caused by a  
   condition which affects all cylinders  
   equally.

Check for:

1. Leaking carburetor flange gasket.
2. Worn carburetor throttle shaft.
3. Leaking vacuum lines.
4. Improper valve timing.
5. Slow engine cranking due to:

* Battery
* Battery cable connections
* Defective starter motor
* Excessive mechanical drag in engine

caused by:

1. Tight fitting pistons in

rebuilt engine.

1. Thickened oil due to

excessive oxidation.

1. (Figure 5) A reading which pulses  
   unevenly indicates a leaky condition  
   which affects one or more, but not  
   all cylinders.

Fig. 5

NOTE: A certain amount of even  
pulsing is normal, notably on 6 and 4  
cylinder engines, and does not  
necessarily indicate a leaky condition.  
Check for:

1. Burned or stuck valve.
2. Intake manifold leak at one cylinder.
3. Worn intake valve guide.
4. Broken piston or piston rings.

Running vacuum test

While performing a running vacuum  
test, it is possible to obtain a different  
gauge indication than that obtained  
under the cranking vacuum test.

1. Connect the vacuum gauge to a  
   source of manifold vacuum. See  
   Figures 2 and 9.

Fig. 6

1. Run the engine at normal operating  
   temperature and idle speed
2. (Figure 6) A steady reading between  
   15 and 22 inches indicates a  
   mechanically sound engine.
3. (Figure 7) A pointer which sweeps  
   or wanders erratically through  
   several inches indicates a  
   malfunction affecting all cylinders  
   unequally and inconsistently. To  
   help isolate the troubled area, run  
   the engine at about 2000 RPM. If  
   the pointer steadies, check for:
4. Ignition and/or timing.
5. Carburetor mixture adjustment at  
   idle. If the sweep gets larger, check  
   for weak or broken valve springs. If  
   the sweep becomes shorter and  
   more rapid, check for:
6. Carburetor or intake manifold leaks.
7. Sticky valves.

Exhaust restriction test

With vacuum gauge connected to a  
source of manifold vacuum, increase  
engine speed to 2000 RPM, maintain  
this speed, and note the vacuum  
gauge reading. A gradually decreasing  
vacuum reading may indicate a  
restricted exhaust system.(Partially  
blocked muffler or tailpipe.)

Positive crankcase ventilation (pcv)  
valve test

1. Unplug the PCV valve, plugged  
   previously with a piece of tape  
   (Step 4, Cranking Vacuum Tests)  
   and crank engine.
2. If the PCV valve is operating  
   properly, the vacuum will drop to  
   about one-half the value noted in  
   Step 6, Cranking Vacuum Tests.
3. A reading much lower than one-half  
   indicates excessive flow which could  
   upset the proper carburetor air/fuel  
   ratio causing rough idling and  
   burned valves.
4. No change in the vacuum indicates a  
   clogged PCV valve.
5. Return the idle screw (and idle air  
   bleed screw) to its original position.  
   (See Step 2, Cranking Vacuum  
   Tests).
6. Re-enable the ignition system.
7. Re-connect the wire to the idle  
   stop solenoid.
8. Re-connect all hoses and  
   vacuum lines.
9. Re-install the PCV valve in its  
   proper location

PCV system test

1. Operate the engine at normal  
   temperature and idle speed.
2. Remove the hose connected  
   between the air cleaner and valve  
   cover or oil filler/breather cap as  
   shown in Figure 8. Plug the oil  
   dipstick tube to prevent an air leak-
3. Hold the vacuum gauge with rubber  
   universal adaptor firmly over the  
   valve cover hole or filler/breather  
   cap opening.
4. A properly working PCV system will  
   draw a vacuum of about 3 to 5  
   inches within 10 seconds.
5. If there is very little or no change in  
   the gauge reading in the first 10 to  
   15 seconds of the test the PCV  
   valve is clogged or frozen, or there  
   is excessive air leakage in the  
   vacuum hose between the intake  
   manifold and PCV valve (or other  
   leakage into the crankcase).
6. Repair or replace the defective parts  
   as needed and reconnect hoses.

Distributor vacuum advance  
mechanisms

The amount of spark ignition advance  
needed is determined by the intake  
manifold vacuum and engine speed.  
The vacuum advance mechanism in  
the distributor is connected to the  
intake manifold or carburetor by a  
rubber hose. To measure the amount  
of vacuum at any RPM, disconnect the  
hose from the distributor and insert a  
"Tee" connector (Item 4, Figure 12) in  
line with this hose and another back  
to the distributor as shown in Figure 9.  
Also, connect the gauge to the "Tee"  
as shown.

On many systems, little or no vacuum is  
applied to the distributor at idle-, as the  
throttle is opened wider (engine RPM  
increases),the vacuum gradually  
increases. The manifold vacuum drops  
when the engine is accelerated in  
proportion to the amount of throttle  
advance. The gauge should read

between 18 and 21 for normal engines.  
Check vehicle manual for your car for  
proper value.

If the vacuum gauge does not change  
or changes very little with a change in  
RPM as described above, the vacuum  
hose may be open or cracked, or the  
diaphram in the advance mechanism  
may be punctured.

NOTE: The vacuum reading can appear  
to be normal during the above tests  
while the advance mechanism is  
defective; that is, frozen due to rust,  
dirt or corrosion.

Fuel pump testing  
CAUTION: Use extreme care in  
disconnecting fuel lines. Catch all  
gasoline in a container and discard.  
Leaking gasoline is a serious fire  
hazard.

Before testing, check tightness of all  
fittings and connections.

Check the rubber fuel lines at the fuel  
pump for deterioration, such as  
splitting, cracking and spongyness.

If leaks are evident in lines or fittings,  
repair or replace as necessary. If  
leakage is detected in the pump at the  
diaphragm flange, in the sheet metal  
cover, or in casting breather holes,  
replace the fuel pump. Check fuel level  
and remove any kinks in the fuel line. It  
is not necessary to remove the fuel  
pump for any of these inspections.

1. Disconnect the fuel line between the  
fuel pump and the carburetor and  
attach the vacuum gauge hose to  
the fuel line, using adaptors as  
necessary. (See Figure 10).

NOTE: The fuel in the carburetor fuel  
bowl will be sufficient to run the  
engine for these tests.

2. Operate the engine at idle. Hold  
gauge at carburetor height and note  
the reading. Stop engine and  
re-connect fuel line.

Compare the observed reading with  
the manufacturer's specifications. If  
specifications are not immediately  
available, fuel pump pressure can be  
considered satisfactory if it is between  
4 and 6 PSI, with lower readings for  
smaller displacement engines. If  
pressure reading falls outside this  
range, consult the manufacturer's  
specifications before replacing the  
fuel pump.

Volume test

1. Operate engine with fuel line  
   connected to fill carburetor fuel  
   bowl. Stop engine.
2. Disconnect the fuel line at the  
   carburetor and connect a flexible  
   hose to the fuel line using the  
   adapter as shown in Figure 11.  
   Insert the other end of the hose  
   in a proper gasoline container.

Fig. 11 Carburetor

1. Have an assistant start the  
   engine. While holding the  
   gasoline can, carefully collect the  
   discharge from the fuel pump for  
   exactly 30 seconds. The assistant  
   must count off the time precisely  
   and turn off the engine after the  
   30 seconds to get an accurate  
   measurement. Reconnect the  
   fuel line to the carburetor.
2. Remove the gasoline from the  
   engine area. Pour the contents  
   of the gasoline can into another  
   container marked off in fluid  
   ounces such as a kitchen  
   measuring cup. Record the  
   fuel quantity.
3. After taking all measurements,  
   return the fuel to the vehicle’s  
   gas tank.

Consult the manufacturer's  
specifications for required fuel  
delivery rate. If specifications are  
not readily available, use the  
following table as a guide.

Engine Ozs.Collected

Displacement (CID) (30 seconds)

Up to 225 8

225 to 350 11

Over 350 16

If the above conditions are not met,

replace or repair the defective  
components.