
**MOTORVAC
TECHNOLOGIES**

EVAP-II
**LEAK
CHEK** TM

Nitrogen Vapor Machine With UV Technology

**VEHICLE EVAPORATIVE EMISSIONS
LEAK DETECTION SYSTEM**

For Use By Qualified Automotive Technicians

OPERATORS MANUAL

MTI EVAP-II LEAKCHEK MANUAL
REV.A 1/18/2006
P/N 200-8919

Cautions and Usage Tips:

TO PREVENT PERSONAL INJURY AND / OR DAMAGE TO VEHICLE OR EQUIPMENT



- Use a non-combustible gas such as Nitrogen to test EVAP system.
- Use this equipment in the manner specified by the manufacturer.
- Understand operating procedures / Follow all safety precautions.
- Correctly connect power supply to battery and chassis ground.
- Top-off smoke-producing solution throughout the year. Change the smoke-producing solution once a year to keep fluorescence fresh.
- Use only UltraTraceUV™ Smoke Solution No. 400-1035 . Altering the solution, hoses, cables or any other replacement parts will void the warranty; may cause tester malfunction; may cause damage to the vehicle, to property or may cause personal injury.
- To view the dye deposit, use an ultraviolet light that emits 412nm within its viewing scale.
- Wear yellow glasses that are provided with the UV light to view dye.
- Do not use with running vehicle engine.
- Do not perform test near source of spark or ignition.
- Never leave the tester's hoses or power cables connected to the vehicle for extended periods of time if tests aren't being performed.
- The 12V DC battery source you use to power the tester must be in good condition and fully charged.
- Wear eye protection that meets OSHA standards.
- Tester input pressure must be 50-125 PSI (3.4-8.5 bar)
- Store and operate the tester in upright position.



- Purge and fill the system with smoke prior to leak testing.
- A bright halogen spotlight is an excellent way to highlight the smoke exiting a leak.
- When testing an engine's intake or exhaust system for leaks, it is recommended that the engine be cold. Small leaks may be sealed due to thermal expansion.

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Congratulations! You are in possession of the most useful, yet simple to operate Evaporative Emissions (EVAP) System diagnostic tester available today. The technology in the *MotorVac EVAP-II* versatile 12-volt design was specifically developed to OEM specifications for diagnosing vehicle EVAP system leaks. The nitrogen-based technology in this tester is CE Certified; EVAP-Approved Technology that has been approved, and is in fact required, for EVAP testing by the majority of automakers that use smoke technology. Additionally, the *MotorVac EVAP-II* will also find intake manifold system leaks, exhaust system leaks and under-dash vacuum system leaks. It will also diagnose many other closed systems where you may suspect a leak, as well as pinpointing wind and water leaks entering the vehicle's passenger and trunk compartments. Its unique design allows the operator to confirm the integrity of the system being tested by utilizing a metered-air system. If the tool has confirmed a leak in the system being tested, the tool then introduces a special non-toxic diagnostic marked-vapor (smoke) into the system. To locate the source of the leak you simply look for the smoke exiting the leak or use a good quality conventional ultraviolet (UV) lamp (with an ultraviolet scale that covers 412nm) to view the UV deposit left behind, pinpointing the exact location of the leak.

Note: The MotorVac EVAP-II arrives filled with a full charge of Smoke-Producing Solution that will last approximately 500 tests. Be sure and top-off the solution regularly.

Dual-Phase Operation:

Unique to its patented design, the *MotorVac EVAP-II* leak tester is a Dual-Phase tool. **Phase-one** utilizes an inert gas such as Nitrogen to test the integrity of the vehicle's fuel vapor recovery system by quickly determining if in fact a leak exists. **Phase-two** quickly finds the leak utilizing both visual-vapor (smoke) and UltraTraceUV technology. UltraTraceUV is a unique patented chemical that bonds to the smoke allowing an ultraviolet 'fingerprint' to be deposited at the exact location of the leak.

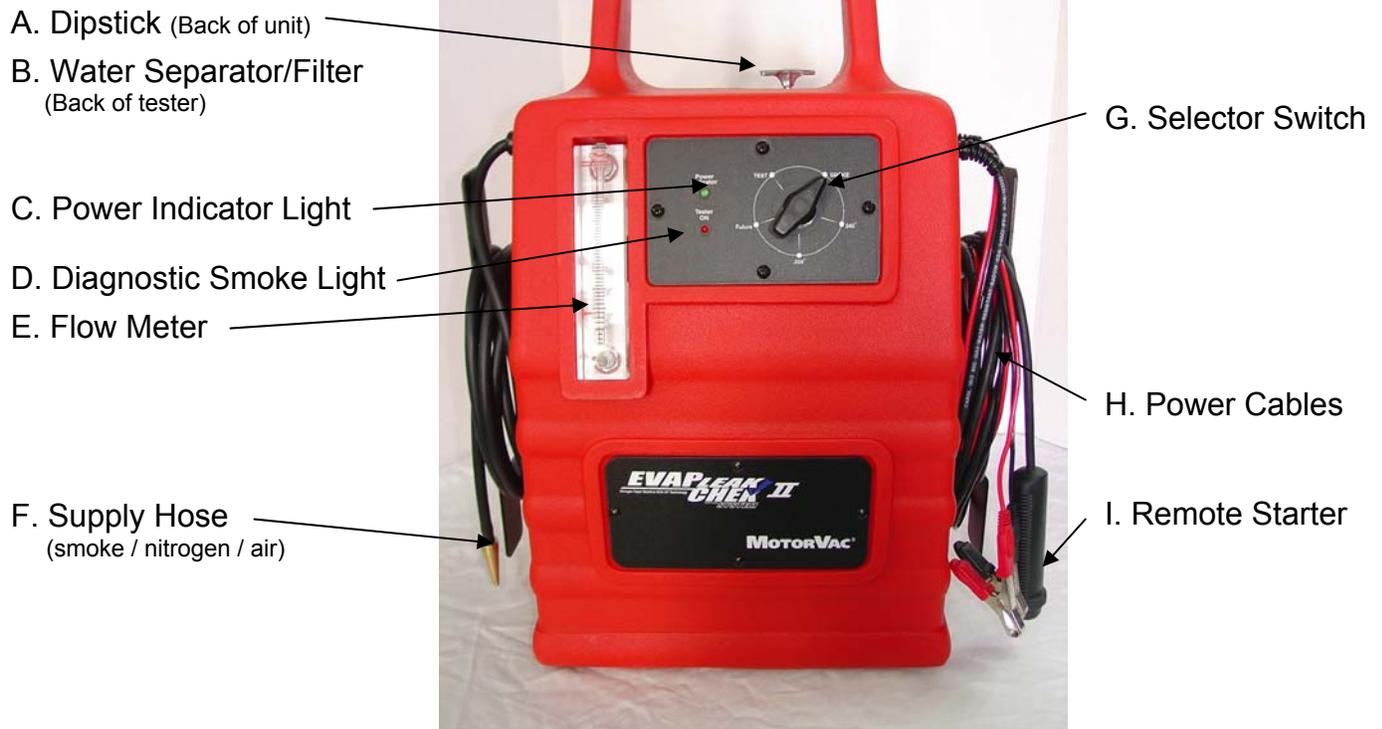
This dual-phase operation is accomplished automatically. Your *MotorVac EVAP-II* automatically sets the critical pressure that must be maintained during EVAP testing. You don't need to set flow rates and you don't need to be concerned with ambient temperatures or barometric pressures. The *MotorVac EVAP-II* will not spill its solution regardless of the position you set it in and is refillable by the end-user when the smoke-producing solution is depleted. The smoke it produces, as well as the UltraTraceUV dye, is non-toxic and non-corrosive. The *MotorVac EVAP-II* needs no assembly; it is self-calibrating and requires no maintenance other than an annual replacement of the smoke solution.

Read this manual in its entirety prior to performing any actual tests on a vehicle. This leak tester is to be operated by a properly trained and qualified professional only.

Technical Specifications:

<i>MotorVac EVAP-II</i>			
Height	23 in. (58.4 cm)	Supply pressure	13.0 in. W.C. (0.47 psi) (0.032 bar)
Width	18 in. (45.7 cm)	Supply volume	15 liters per minute
Depth	9 ½ in. (24.1 cm)	Operating temp. range	45°F to 140°F (7.2°C to 60°C)
Weight	17 lb. (7.6 kg)	Air supply line (<i>Clear</i>)	12 feet (3.6m)
Ship weight	20 lb. (9.0 kg)	Smoke supply line (<i>Black</i>)	12 feet (3.6m)
Power supply	12-volt DC	Power supply line	12 feet (3.6m)
Amperage usage	15 amps.	Remote starter cable	12 feet (3.6m)

Tester Overview:



Component Description

A. Smoke Solution Dipstick: use to maintain proper smoke solution level throughout the year, as well as access port to drain and fill the tester with solution during its yearly smoke solution change maintenance.

B. Water Separator/Filter: assures a clean supply of Nitrogen or Air. Connect either shop air or nitrogen to the fitting on the filter.

C. Power Indicator Light (green): Turns ON when power leads are connected to the battery.

D. Diagnostic Smoke Light (red): Turns ON during smoke production.

Note: Green and Red lights also serve as diagnostic lights for the tester. Refer to Troubleshooting section of manual for more information.

E. Flow Meter: with its pointer-flag is used to establish a quick Pass / Fail when determining if the vehicle being tested has a .040" or .020" leak. It's also used to determine flow in a system.

F. Supply Hose: used in Phase-one and Phase-two tests to introduce nitrogen or vapor with nitrogen into the EVAP system to verify its integrity and to identify the leaks. It's also used to introduce vapor with compressed air to determine leaks in systems other than the EVAP system.

G. Selector Switch: is used to select the functions of the tester as explained in this manual.

H. Power Cables: connect to 12-volt DC power.

I. ON / OFF Remote Starter Button: is used to operate the tester and is on a 5-minute timer.

Accessories: Included

(except where labeled “Optional”)

	<p>No.060-0006 – EVAP Service Port Adapter (small) connects to factory service port on some vehicles.</p> <p>No.060-0005 – Service Port Adapter (standard size) connects to factory service port on most OBD-II vehicles.</p> <p>No. 060-0004 – Schrader Removal / Installation Tool fits both sizes of Schrader valves in vehicles with factory OBD-II service port fittings.</p>
 <p>Two included</p>	<p>No. 200-8687 – Exhaust Cones are used to either introduce smoke into the exhaust system; into any system that fits the cone’s tapered size; is used as an exhaust plug when testing a dual exhaust system; or exhaust plug when testing the intake vacuum system.</p>
	<p>No. 200-3110 – Cap Plug Kit is used to seal the intake ducting of the engine being tested. They may be used to seal either the inside diameter of an opening, or flip them over and seal the opening at the outside diameter.</p>
	<p>No. 060-0007 –OPTIONAL Smoke Diffuser allows the operator to lay down a thick path of smoke along doors, sunroof, windshield and window seams so any air disturbance, caused by exiting internal cabin pressure, may be observed.</p>
	<p>No. 070-2005 – OPTIONAL Inert Gas Supply Hose has a 25 ft. length. The 1/4” end is used to connect to the gas supply and the quick-disconnect to the tester.</p>
	<p>No.400-1035 –OPTIONAL UltraTraceUV™ Smoke Solution MotorVac EVAP-II™ arrives with a full charge of solution – enough to perform approximately 500 tests before needing to refill.</p> <p>We recommend replacing the tester’s solution once a year in order to keep the solution’s fluorescence fresh and the tester operating in a like-new condition for many years to come, since the solution also serves as a lubricant for the MotorVac EVAP-II™.</p>

Initial Assembly:

The *MotorVac EVAP-II* requires no assembly, except perhaps the installation of the air/gas fitting onto the water separator/filter on the back of the tester (Figure on next page).

Note: *The MotorVac EVAP-II arrives filled with a full charge of Smoke-Producing Solution that will last approximately 500 tests. However, much like a vehicle's engine, check and top off the EVAP-II's solution throughout the year. Then once a year, replaced the solution in order to keep its fluorescence active and the tester operating in a like-new condition for many years to come.*

Evaporative Emissions System Overview:

The vehicle's Fuel Vapor Recovery System is the most neglected part of the vehicle's emission system, according to the Environmental Protection Agency (EPA).

The vehicle's EVAP system is used to collect fuel vapors from the fuel tank. These vapors are stored in a canister filled with activated charcoal. The EVAP system allows the fuel vapors to be drawn from the canister and combust during certain operating conditions. This process is called canister purging since the fuel vapors are purged from the canister. OBD-II requires Powertrain Control Module (PCM) monitoring for proper operation of the EVAP system and for possible leaks to the atmosphere.

A faulty EVAP system will allow hydrocarbons (HC) to escape into the atmosphere. **Factory emission tests have determined that an EVAP system with a leak as small as .020 can yield an average of 1.35 grams of HC per vehicle driven mile. This is over 30-times the current allowable exhaust emissions standard.** In addition to causing HC emissions, failure of this system wastes fuel and many times creates customer-complaints of "gasoline odors". With the introduction of On Board Diagnostics (OBD), the vehicle is capable of determining that its evaporative system has a leak. Unfortunately it can not tell you the location of the leak. Prior to the technology in the *MotorVac EVAP-II*, determining where a leak in the EVAP system was had been a difficult and time-consuming challenge.

Dual-Phase Function in the EVAP System:

Unique to its patented technology, the *MotorVac EVAP-II* serves a Dual-Phase function. **Phase-one** tests the integrity of the vehicle's evaporative emissions system by quickly determining if in fact a leak exists. **Phase-two** quickly finds the leak by utilizing Diagnostic Smoke leak detection technology, including its UltraTraceUV marked-vapor dye solution.

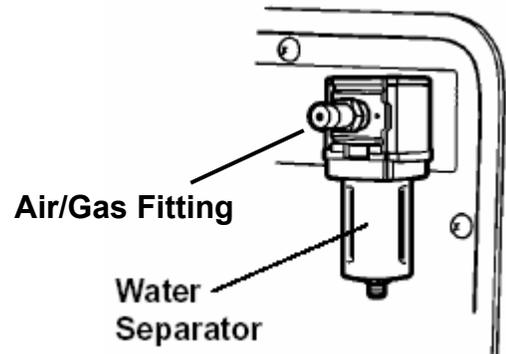
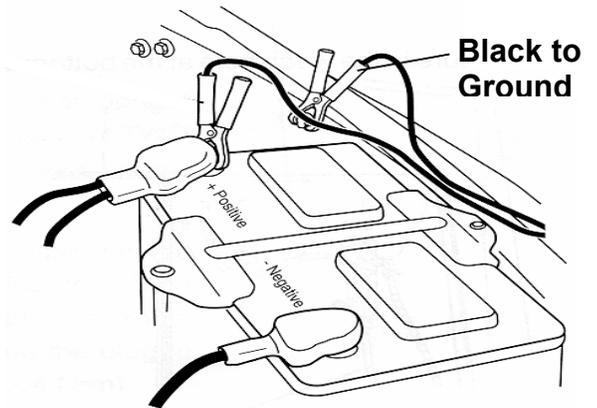
This dual-phase operation is accomplished automatically. Your *MotorVac EVAP-II* automatically sets the critical pressure and flow rates that must be maintained during fuel vapor recovery leak testing. Your *MotorVac EVAP-II* is spill-proof, is self-calibrating, and requires a minimum amount of maintenance.

Tester Hookup:

1. Connect the *MotorVac EVAP-II*'s Red power cable to a 12-Volt DC power supply. If you are using a battery, be sure it is in good condition and fully charged!
2. Connect the *MotorVac EVAP-II*'s Black ground cable to the vehicle's chassis ground. DO NOT connect to battery ground! A spark in the vicinity of the battery can cause an explosion! Check to see that the *MotorVac EVAP-II*'s green 'Power Indicator' lamp is on, indicating battery contact.
3. Connect either Nitrogen or shop air (depending on which system is being tested) to the *MotorVac EVAP-II*'s water-separator located on the back of the machine. Be sure supply pressure to the machine is between 50 psi and 125 psi.

> **When testing EVAP systems:** Connect the tester to a non-combustible gas source, such as nitrogen.

> **When testing systems other than EVAP:** Connect the tester to shop air.



Because of the vehicle EVAP System's volatile fumes, most automakers require you use a non-combustible gas such as nitrogen when testing the Evaporative System. However, the *MotorVac EVAP-II* is also designed to perform its functions with conventional shop-air, if being used to test systems other than the EVAP System.

Prior to performing EVAP tests:

When the vehicle's engine is turned off, the OBD-II EVAP System is generally venting in one form or another. Use a scanner and 'close' the EVAP System in order to perform any leak tests. **Remember ALL tests with the *MotorVac EVAP-II* are performed with the engine off!**

It is best to perform all testing in calm air, so that the smoke exiting the leak will not be blown away impairing your view of the leak.

Evaporative System Test & Diagnosis:

Phase One:

1. Verify the vehicle's fuel level is below the base of the fuel tank neck.
2. Determine if the vehicle's EVAP system you are testing is governed by a .040" or .020" acceptable leak requirement standard. Position the Selector Switch, on the EVAP-II's control panel, to the correct standard. (See Figure 1)
3. Turn ON the MotorVac EVAP-II by pressing the ON / OFF button and observe the measurement of the flow meter's indicator ball. Note: ON / OFF switch is on a 5-minute timer.
4. Position the flow meter's red 'pointer flag' so that it aligns with the measurement observed in the previous step (See Figure 2). Press ON / OFF switch to turn the tester off.

Note: This flow meter measurement indicates the vehicle's Pass / Fail line for that particular leak Standard.

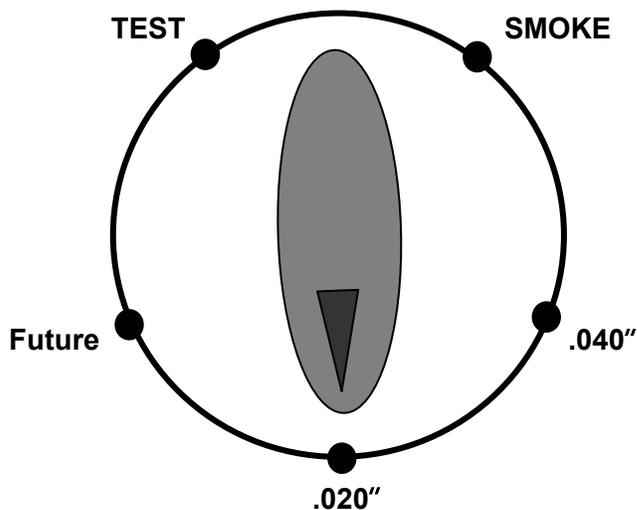


Figure 1

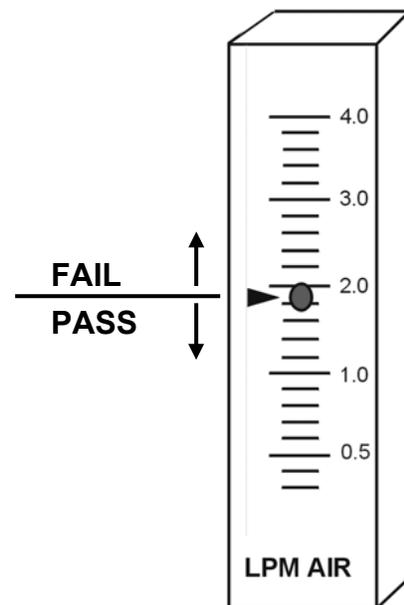


Figure 2

NOTE: The 'Future' setting, on the control switch, is reserved for another standard, should future requirements change.

5. Locate the vehicle EVAP Service Port; remove the green cap and the Schrader valve that is inside the Service Port. (Figure 3)

WARNING: The Schrader valve is installed with a left-hand thread!

IMPORTANT: The EVAP Service Port on OBD-II vehicles was designed with a Schrader valve prior to considering Diagnostic Smoke as a means for diagnosing EVAP leaks. It has been determined that this smoke, when passed through this Schrader valve, will have a tendency to partially condense and not be as dense and as effective as when it comes directly out of the MotorVac EVAP-II. For this reason, when testing with smoke, you must remove the Schrader Valve prior to introducing Diagnostic Smoke into the EVAP system. Use the tool provided and turn in a *clockwise* rotation in order to remove it.

6. Install the correct EVAP Service Port Adapter that is provided with the tester. (Figure 4)
7. Insert the MotorVac EVAP-II supply hose into the EVAP Service Port Adapter. (Figure 5)

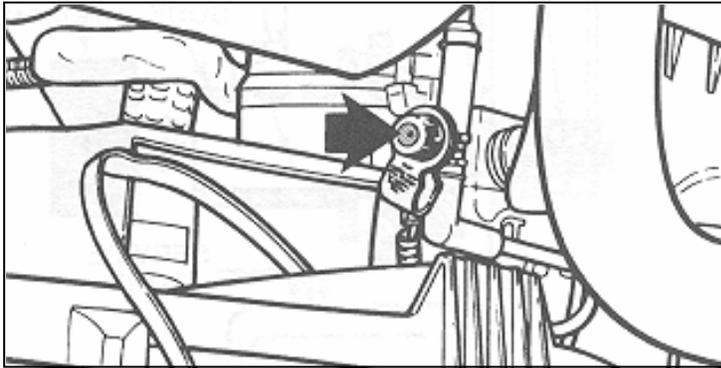


Figure 3

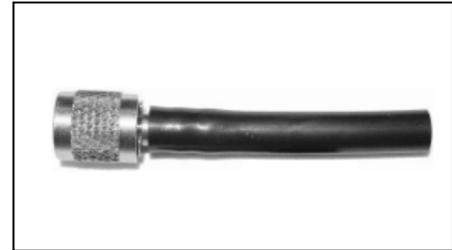


Figure 4

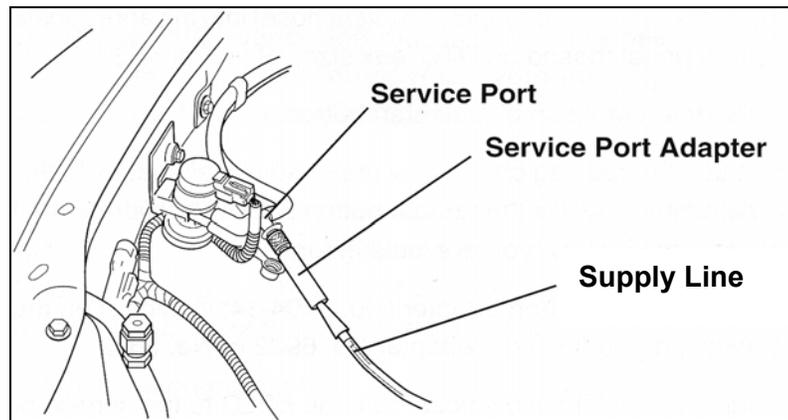


Figure 5

Note: When testing a vehicle without an EVAP Service Port; you will need to access the EVAP system by disconnecting the EVAP line from the EVAP Purge Valve leading to the charcoal canister.

8. Set tester's selector switch to TEST. (Figure 6)

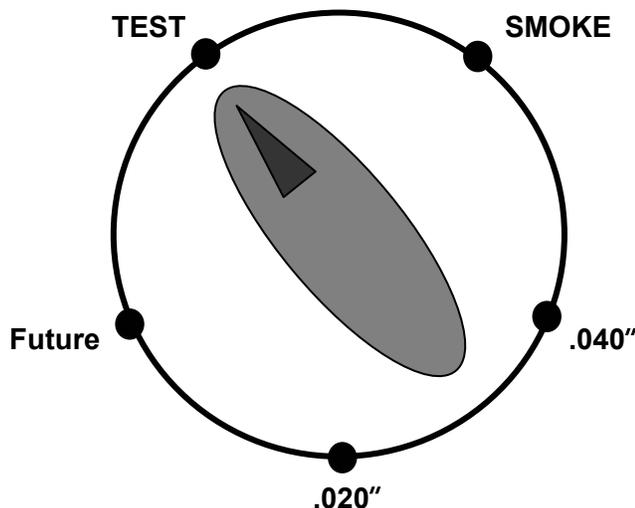


Figure 6

9. Press the ON button to activate the MotorVac EVAP-II. The testers ON light will turn on. Notice that at the beginning of the test procedure, the flow meter's indicator-ball goes to the top of the flow meter scale. This indicates that the EVAP System is being filled and there is NO restriction in the EVAP system at this time. If the ball never goes to the top of the flow meter, this indicates a restriction in the EVAP system. (Did you remember to remove the Schrader valve from the EVAP service port?)
10. "Close" the vehicle's EVAP System by activating the vehicle's Vent Solenoid.
11. Usually in less than 60 seconds -- depending on capacity and fuel system level -- the flow meter's indicator-ball will fall within the meter's visible scale. **Continue to fill the system until the ball stops descending.** This could take an additional two minutes.
12. Once the meter's indicator-ball has stopped descending, observe if the indicator-ball is above or below the flow meter's red pointer-flag. (Figure 7)

- **A measurement ABOVE the pointer-flag indicates an unacceptable leak in the EVAP System (FAIL). Proceed to Phase Two testing.**
- **A measurement BELOW the pointer-flag indicates an acceptable leak (or no leak) in the EVAP System (PASS).**

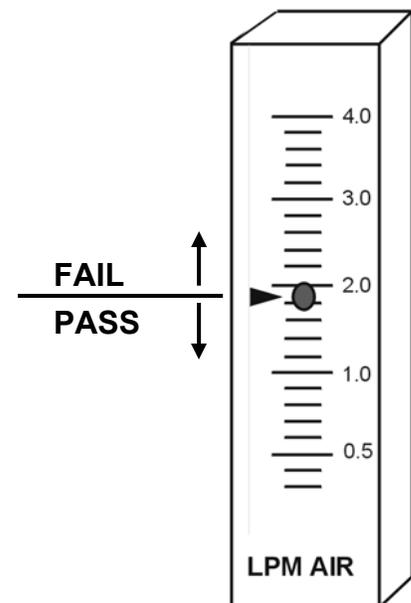


Figure 7

Helpful Tip: You will find that a common leak in the vehicle's EVAP System is due to an unsecured or faulty fuel cap. For this reason, we recommend you do not disturb the vehicle's fuel cap prior to completing the Phase One test. This way if an unacceptable leak has been determined after completing the Phase One test, you can reposition or test the fuel cap, then perform the Phase One test again. If you discover the leak was due to a fuel cap problem, you will have been able to identify with the symptom. Otherwise if you disturb the fuel cap prior to performing Phase One, and the vehicle passes the test, you will never know for sure if the leak was due to the fuel cap or if you are dealing with an intermittent condition.

For intermittent leaks; watch the ball in the flow meter while doing a wiggle test on the EVAP system components (hoses connections, etc.) If the ball in the flow meter goes up only when you wiggle a component, this indicates an intermittent leak. Continue to introduce smoke into the system and look for the leak. Repair the leak and retest.

Proceed to Phase Two of the test procedure if it has been determined that the vehicle you are testing has FAILED the Phase One EVAP system leak test.

Phase Two:

1. Verify the vehicle's fuel level is below the base of the tank neck.
2. Position the Selector Switch, on the MotorVac EVAP-II control panel, to 'SMOKE'.
(Figure 8)

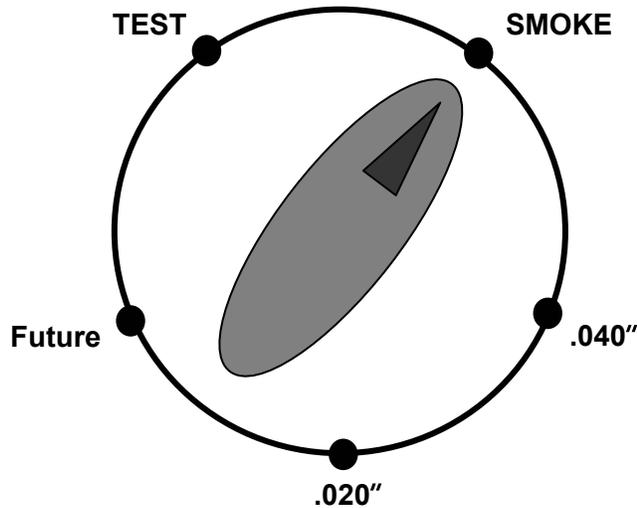


Figure 8

3. Remove the vehicle's fuel cap prior to introducing smoke into the EVAP system.
> *This assures proper purging of the EVAP system as well as saves time when filling the EVAP System with diagnostic smoke.*
4. Press the ON button to activate the MotorVac EVAP-II.
> *The 'ON' Indicator Light, on the control panel will light indicating that the tester is producing smoke.*
5. Replace the fuel cap once smoke is observed exiting the fuel tank's neck area (should take about one minute).
6. Continue to introduce smoke into the EVAP System until the flow meter's ball stops descending.
> *This assures the EVAP system is filled with smoke and is at proper test pressure.*
> *It is not necessary to wait until the flow meter's ball stops descending before you start to look for the smoke exiting the leak(s).*

You may use a halogen light (not provided) and follow the EVAP system's path to look for the smoke exiting the leak(s). While looking for the exiting smoke, continue to introduce smoke in approximately 30-second intervals, by turning the tester ON / OFF at 30-second intervals, until the leak is found.

> *This ON / OFF technique allows the EVAP system to achieve test pressure and then allows for the pressure to be relieved. Diagnostic Smoke is even more visible at lower test pressures. Use the halogen spotlight to follow the EVAP System's path and look for the smoke exiting at the source of the leak(s). See the smoke and you've found the leak!*

> You can also look for the UltraTraceUV that has been deposited at the exact location of the leak(s). This is especially helpful when the leak is in an area that is not readily visible, as on the top of the fuel tank or behind a panel. Once you gain access to the area of the leak, shine a UV light to identify the exact location of the leak.

> The longer the EVAP system is allowed to fill with diagnostic smoke, the more fluorescent material will be deposited at the exact location of a leak. Be sure to use a good quality ultraviolet lamp source (not supplied) with a UV scale that includes 412nm.

7. Repair the leak(s) and perform the Phase One test again to verify repair, as well as to make sure there are no additional leaks in the EVAP system.
8. Reinstall the vehicle's EVAP Service Port Schrader valve in a counter-clock rotation. (OBD vehicles only). Reinstall the EVAP service port green cap.

Helpful Tip: For an even quicker test procedure; you can combine the test features of Phase One and Phase Two since the design of this tester is such that the flow meter is operational in both Phases of testing.

If you already know the EVAP system has a leak, start with Phase Two testing. (The leak will still be quantified because the tester's flow meter is active with the tester's control switch set to SMOKE).

Then perform Phase One to verify the repair.

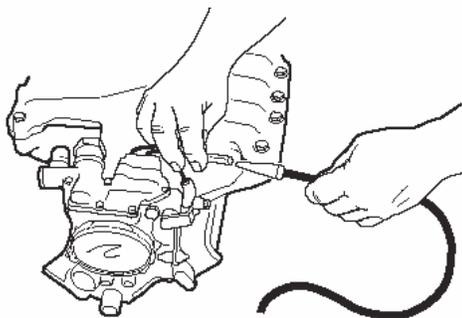
No Smoke during Purge Cycle:

> You may not see smoke come out of the fuel tank neck, during the Phase Two purge test, if (a) the fuel tank is too full or (b) if the vehicle you are testing has a fuel roll-over valve designed into the fuel tank.

Other Leak Detection Applications:

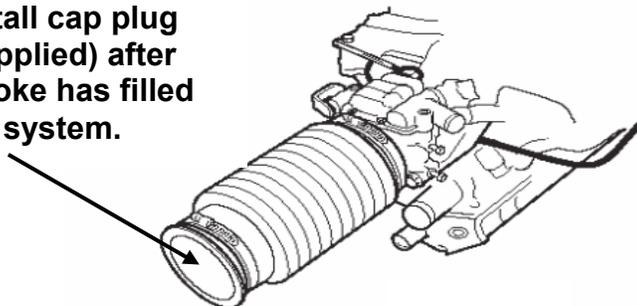
- Vacuum and induction leaks.
- Exhaust leaks.
- EGR valve leaks.
- Oil seals and gasket leaks.
- Idle motors and solenoid leaks.
- Brake booster leaks.
- Component testing (radiators, water pumps and valves).
- Under dash leaks.
- Intercooler and turbo charger leaks.
- Wind and water leaks (windows & sunroofs).

1. **Vacuum and Induction Leaks:** Set the selector switch to SMOKE. Select the correct size cap plug (supplied) to seal the system – but do not seal the system yet. (You should first purge all the non-smoke air out of the system being tester before you seal the system with the cap plug).
2. > *It is best to seal the engine's intake as close to the air inlet origin as possible to inspect the entire system. This is especially important on engines equipped with mass airflow sensors and related ducting connecting it to the intake system. If the system you are testing cannot be sealed with the kit we have provided, it will become necessary to seal the intake by other means. For example; wrap the vehicle's air filter with cellophane and reinstall into the air filter housing and secure. The cellophane will prevent most of the smoke from exiting the intake system, allowing you to create a satisfactory seal in the system you are testing for leaks. Or you may choose to use a latex rubber glove and a strong rubber band accomplish this task. Simply stretch the wrist of the glove around the air passage and secure with the rubber band. You may choose to plug the tail pipe of the vehicle with the exhaust cone that is provided -- be sure the exhaust cone's hose is also plugged. (It is possible that smoke pressure can be lost out the exhaust if both an intake and exhaust valve are open in the same cylinder at the same time).*
3. Select a vacuum line on the engine that is easily accessible and insert the tapered brass nozzle into this line.
> *The supply line to the brake booster is a good choice when introducing smoke into the intake manifold. It is important to make sure that you enter this line at a point where the check valve will not interfere with the smoke flow.*
4. Press the ON / OFF button once to turn the tester ON. Let the tester run until the system is filled with smoke. (30 seconds to 1 minute is usually sufficient time to fill the induction system).
5. Seal the system once smoke is observed exiting a leak.
6. Turn the tester ON and OFF in 30 second intervals until you pinpoint the leak.
7. Use the halogen light supplied to identify the origin of the smoke or use a UV light (not supplied) to look for residual traces of the fluorescent dye that was left behind by the smoke.

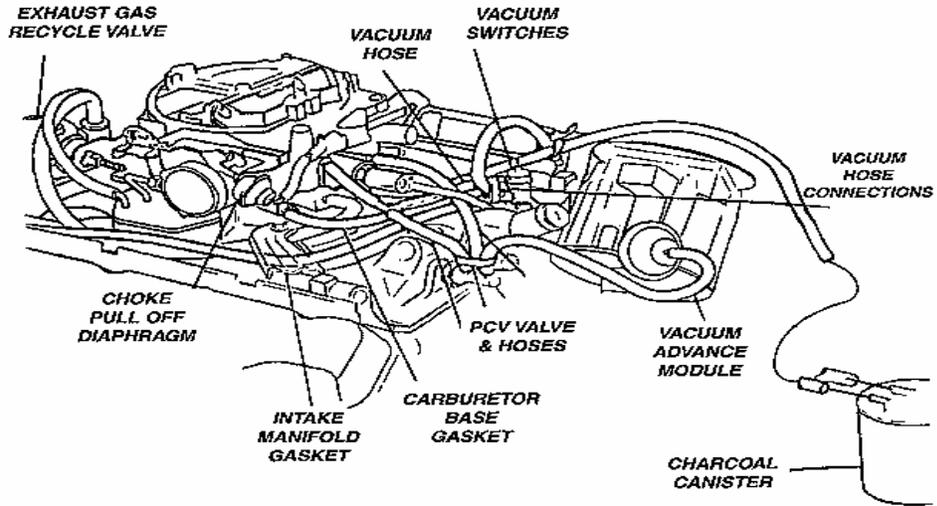


Introduce smoke through an easily accessible vacuum line. 11

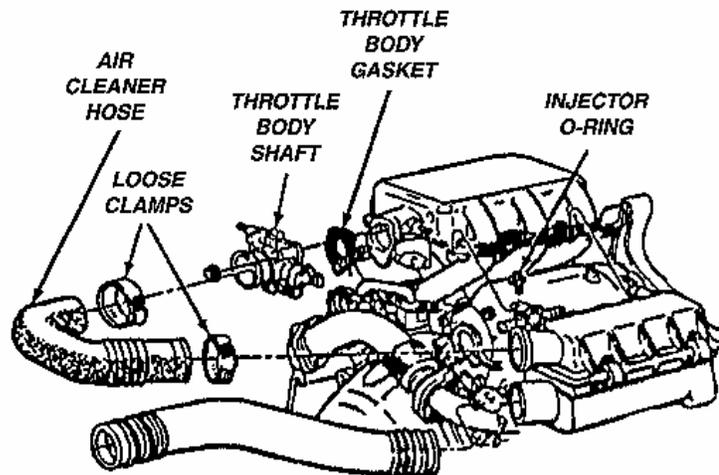
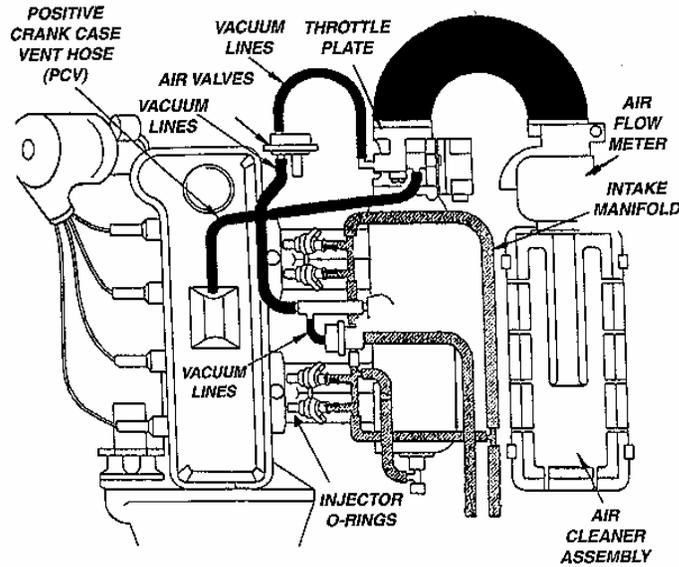
Install cap plug (supplied) after smoke has filled the system.



Carbureted Engines and Typical Leak Sources

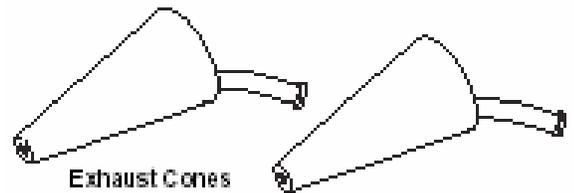


Fuel Injected Engines and Typical Leak Source



Exhaust Leaks: Escaping exhaust gases can be very dangerous to the occupants of a vehicle yet these repairs are neglected — but so easy to find with the MotorVac EVAP-II.

1. Set the selector switch to SMOKE.
2. Put the vehicle on a lift to expose the underside. With the engine off, simply insert the exhaust adapter cone into the tail pipe of the vehicle being tested (Figure 9). Insert the smoke supply line nozzle into the exhaust cone's hose opening and press the ON / OFF button.
 - > On dual exhaust systems, install a cone in each tail pipe. Be sure one cone is plugged.
 - > Most exhaust systems will fill in less than two minutes.



3. Look for the smoke exiting wherever there is a leak.
4. Even though exhaust leaks are very easy to find with MotorVac EVAP-II, here are two helpful tips to make finding exhaust leaks even easier:
 - (a) It is best to test a cold exhaust system rather than a hot one. A very hot catalytic converter may consume some of the smoke. But most importantly, many small exhaust leaks are only visible on a cold exhaust system due to 'thermal expansion'.
 - (b) Seal off the vehicle's intake system in order to achieve proper system pressure in the event both an intake and exhaust valve are open in the same cylinder at the same time.

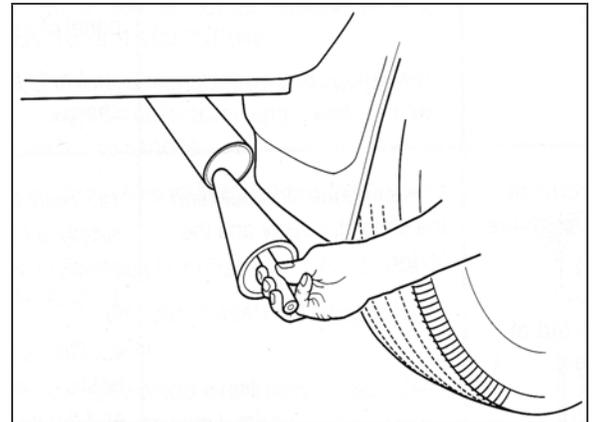


Figure 9

EGR Valve Leaks: The exhaust gas re-circulating (EGR) valve is at the heart of the emission control system. Since the EGR valve operates in such a hostile environment it is always susceptible to leakage. During a normal test for vacuum leaks, the EGR valve will be exposed to smoke and may show leaks at the seat, diaphragm, or even the base gasket.

If smoke is seen exiting the EGR valve, disconnect the vacuum supply line and introduce smoke directly into the valve. This will verify if the diaphragm is leaking, or if the valve is leaking at the seat.

Smoke may also be used to check the EGR ports for restriction. Open or remove the valve and introduce smoke through the tail pipe to verify that these ports are open.

Tech Tip - Testing the EGR Pintle Shaft: This will help you diagnose a good or bad EGR valve and other "metered" leaks.

1. Do not cap off any part of the engine – leave it in normal operating state (but NOT running). Insert the MotorVac EVAP-II supply hose into a direct vacuum manifold source, such as a brake booster hose or PCV. Turn the tester ON. Watch for smoke to escape from the EGR valve. If you see a lot of smoke, move on to the next step.
2. Cap off the intake using one of the cap plugs supplied with the MotorVac EVAP-II. Insert the exhaust cone into the tailpipe. (The hose on the exhaust cone should be plugged with the cap plug provided.) Now that the system is sealed, press the remote button and watch for smoke. A small amount of smoke indicates an acceptable EGR valve.

Oil Seals and Gasket Leaks: Many oil leaks can be located with the MotorVac EVAP-II. It is important to understand that the MotorVac EVAP-II will only find leaks that will allow air to flow through them. Example: A cam seal may allow air to pass through whereas a drain plug or pressure sensor will not. To locate oil leaks it is necessary to pressurize the crankcase with smoke.

1. Remove the dipstick and slip a hose over the dipstick tube, and insert the smoke supply nozzle into the hose.
2. Plug the PCV, air breather, and intake. Remove the oil filler cap.
3. Introduce smoke into the crankcase until smoke is seen exiting the oil filler port.
4. Install the oil filler cap and continue filling the system.
5. Use the spotlight to check for leaks, which could appear as seeping smoke, bubbling oil with little or no smoke, or dripping oil with no smoke at all.

Brake Booster Leaks: A leaking vacuum brake booster not only effects engine performance like other types of vacuum leaks, but more importantly, it can seriously affect the stopping power of the vehicle. The brake booster is a simple component to check for leaks.

1. Disconnect the vacuum supply line and the check valve from the brake booster.
2. Insert the smoke supply nozzle into the brake booster and begin introducing smoke.
3. Under the hood, look for smoke exiting around the crimped area of the booster canister. Also look inside the vehicle under the dash.

NOTE: Do not depress the brake pedal while performing this test.

Component Leak Testing (radiators, water pumps, valves, etc.): When installing new or rebuilt parts nothing is more frustrating than to discover on completion of the job that the component is faulty, or has a leak. It is far easier to inspect a radiator or water pump before it is installed than to find out after the job is completed and the antifreeze is installed, that there is a leak. Component leak testing has endless possibilities; anything from hoses to diaphragms can be tested. Supplied with every MotorVac EVAP-II is an exhaust cone adapter that can be used to access any opening from 1" to 3 ½". Simply introduce smoke into the system being tested, seal any inter-connecting ports or passages and look for the smoke or dye to exit a leak.

Under Dash Leaks: Under dashboard leaks can be very difficult to locate. The MotorVac EVAP-II can confirm or eliminate the possibility of an under dash leak in minutes. Most vehicles have a common vacuum supply line that originates at the engine intake. This vacuum source comes through the firewall to supply the climate control functions as well as other systems in the vehicle. Vacuum systems under the dashboard are intended to be closed systems; any flow through these systems would indicate that there is a leak present.

1. Set the selector switch on the tester to TEST.
2. Connect the supply nozzle to the main vacuum line (beyond the check valve) leading to the dashboard.
3. Introduce air into the system and watch the flow meter's indicator ball. If the ball drops to zero the system is leak-free.
4. Continue to introduce air into the system while testing each setting on the climate control. Watch the flow meter for any indication of flow, confirming a leak.

5. Set the selector switch on the tester to SMOKE and introduce smoke into the position determined to have a leak. Use the spotlight to look for the smoke exiting the leak, or use a UV lamp to look for the dye deposited.

Intercooler and Turbo Charger Leaks: Engine compartments with turbochargers tend to run hotter than normally aspirated engines causing hoses and seals to dry out and leak. For turbocharged systems to operate efficiently there can be no leaks in the intercooler, ducting, exhaust or the turbo itself. Intercoolers and turbochargers are tested with the engine off, as with all tests performed with the MotorVac EVAP-II.

1. Connect the smoke supply line to the intake system.
2. Introduce smoke into the “cold” side of the turbocharger.
3. While the intake is under smoke pressure, inspect the intercooler, the ducting, the waste gate, and the cold side of the turbo for leaks.
4. To inspect the “hot” side or exhaust side of the turbo for leaks, install the exhaust cone into the exhaust pipe. Introduce smoke and inspect the exhaust, the exhaust manifold, and the hot side of the turbocharger.

Wind and Water Leaks from sunroofs, windows and windshields: One of the toughest leaks to find on an automobile is wind / water leaks around the doors, windows, and sunroofs. It isn't safe or practical to search for these leaks while driving at 65 M.P.H. although that is when they are most noticeable. Old fashioned ways of locating where the wind and water is entering the vehicle may identify the leak, but this does not locate the *origin* of the leak, as you can with MotorVac EVAP-II.

1. Park the vehicle in an area that is shielded from the wind (preferably inside a closed facility).
2. Turn the vehicle's ignition to the ACCESSORIES position.
3. Turn the heater/AC blower to FRESH AIR and HIGH. (Verify the blower is NOT set to the recirculation mode.)
4. Close the vehicle's doors and windows. The cabin of the vehicle is now under a slight positive pressure.
5. Attach the OPTIONAL diffuser to the end of the tester's hose. See Figure 10
6. Turn the tester ON with the selector switch set to SMOKE.
7. From outside the vehicle, position the tip of the diffuser about 2 – 3 inches away from the vehicle, and follow a path along the areas you wish to test. The smoke will linger on the path you are following until a leak is present. The air exiting the vehicle will cause the smoke to be disrupted, identifying the source of the leak.

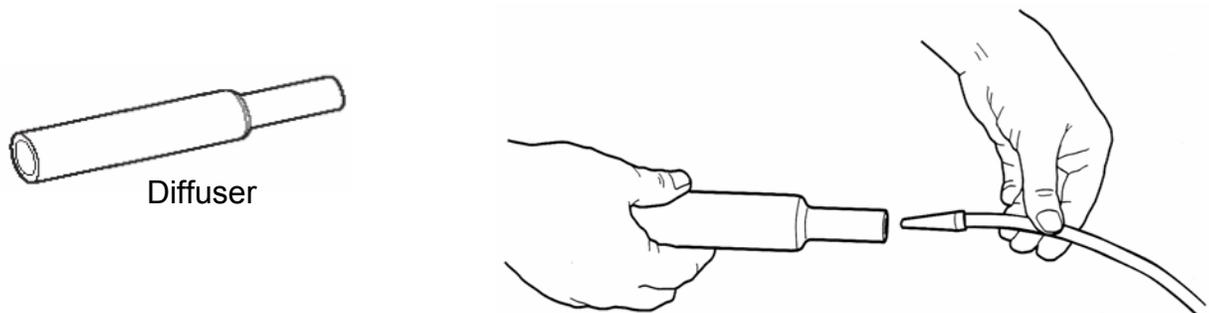


Figure 10

Tester Maintenance:

Regardless how often the tester is used, it is recommended to replace the MotorVac EVAP-II smoke solution at least once a year. Replacing the solution on a regular basis maintains the fluorescence in the solution active. It also helps keep the tester performing like-new since the solution also doubles as an internal lubricant for the tester.

Throughout the year it is important to keep the fluid level near the FULL mark, without overfilling it. Think of it like a car's engine; keep the oil in the proper level throughout the year, but at a given interval, you also drain the entire contents of the oil and replace it with new.

Smoke Solution Replacement Instructions: The entire procedure is performed from the dipstick tube on top of the tester. See figure 11.

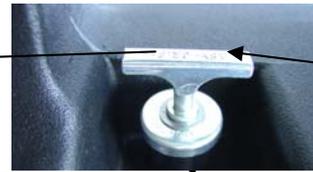
1. Remove the dipstick.
2. Tip the tester over onto its back, being careful not to damage the filter on the unit, and allow the residual solution in the tester to drain into a container that will allow for disposal of the waste oil.
Note: It is important the tester is tipped on its back because that is the position that will allow for proper drainage of the solution.
3. Stand the tester upright and on a flat and level surface.
4. Empty the entire 16 oz. contents of the new smoke solution Part No. 400-1035 container into the smoke canister through the dipstick tube opening.
5. Check the oil level with the dipstick and be sure it is not overfilled.
6. Record your name and the date of the smoke solution change on the maintenance record chart located on the Maintenance Record page of this manual.

Note: Dispose of the residual smoke oil solution according to local, state and federal regulations for waste oil.



CAUTION:

To prevent personal injury, possible vehicle and equipment damage,
Use ONLY manufacturer-approved smoke-producing solution
Part No. 400-1035 in the MotorVac EVAP-II™.



Dipstick

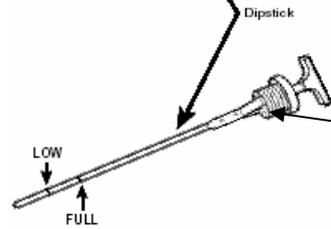


Figure 11

Troubleshooting Chart:

This product is controlled by a sophisticated Microprocessor Controller. Below is a chart describing some of the diagnostic light functions.

Symptom	Likely Cause	Solution
1. The green power indicator lamp on the tester does not come ON.	1a. Poor power-supply cable connection. 1b. Battery providing power is too weak.	1a. Secure the connection at the positive terminal and chassis ground. 1b. Verify the battery is in good condition and fully charged.
1. The red smoke indicator lamp on the tester does not come ON and the tester is NOT producing smoke.	1a. Battery providing power is too weak. 1b. The smoke-producing element in the smoke canister is not turning on.	1a. Verify the battery is in good condition and fully charged. 1b. Remove the tester's rear panel and inspect for loose connection at the smoke canister or circuit board.
1. The tester is not producing smoke -- even though the green and red lights are on.	1a. Battery providing power is too weak. 1b. The tester has depleted the smoke-producing solution.	1a. Verify the battery is in good condition and fully charged. 1b. Add smoke-producing solution. (Follow instructions in this manual). Note: Always keep solution level full.
1. Smoke will not come out of the fuel neck area when filling the vehicle's EVAP system with smoke during the Phase-two test.	1a. Fuel tank level is too high and is blocking the fuel neck passage. 1b. Vehicle has a roll-over valve preventing pressure relief through the tank neck.	1a. Reduce the fuel level in the vehicle's fuel tank so it is below the base of the fuel tank neck. 1b. Partially purge the system with smoke by allowing smoke introduction prior to closing vent solenoid.
1. I turn the tester on but there is no air or smoke coming out of either hose.	1a. Poor power-supply cable connection. 1b. Battery providing power is too weak. 1c. The machine is not connected to shop, not connected to nitrogen, or the nitrogen cylinder pressure is too low.	1a. Secure the connection at the positive terminal and chassis ground. 1b. Verify the battery is in good condition and fully charged. 1c. Be sure you gas sufficient air or gas connected to the tester.

Green	Red	Interval	Probable Cause
✓		Constant ON	Sufficient battery power
✓		Blinks every one (1) second	Insufficient battery power
✓	✓	Blink simultaneously every one (1) second	Power connection at battery is loose or there is short in heating circuit
✓	✓	Blink simultaneously @ 4 blinks per second	Open heating circuit
✓	✓	Blink alternately @ 1 blink per second	Temperature Control System*

* If Temperature Control code comes on; first try disconnecting power to the tester for 10 seconds; then reconnect power. If this failure code occurs a second time during operation, disconnect tester and contact manufacturer.

Maintenance Record:

Regardless of operating frequency change the Diagnostic Smoke-Producing Solution Part No. 400-1035 once a year and document it below. Top-off solution level regularly.

DATE	NAME	DATE	NAME

NOTES:

Accessories List:

Part No.	Description
400-1035 OPTIONAL	UltraTraceUV Smoke-Producing Solution (16 oz. in plastic bottle with easy fill spout) (MotorVac EVAP-II arrives full)
200-8687	Exhaust Cone Adapter (1" to 3 ½" Diameter)
200-3110	Assorted Cap-plug Set
060-0007 OPTIONAL	Diffuser Adapter (for wind and water leak testing)
060-0006	EVAP Service Port Adapter Fitting (small)
060-0005	EVAP Service Port Adapter Fitting (standard size – connects to most)
060-0004	Schrader Removal / Installation Tool
070-2005 OPTIONAL	¼ X 25' Coil-hose Nitrogen hose to Evap Tester with ¼ pipe-thread & automotive quick-disconnect fitting
050-1006	Water Trap with Filter
050-5233 OPTIONAL	Pressure regulator for Nitrogen Bottle
100-0222 OPTIONAL	Cart- (unassembled) for Evap-II and Nitrogen Tank

For Product Service and Information:

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In the unlikely event this product has a problem,
 We would like you to contact the Technical support Dept.
 directly, insuring a faster handling of your service needs.

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