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# LeakMaster™

## *Evaporative Emissions System Tester*

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*Operator's Manual*

*Part No. 6525*



**SPX** **OTC**

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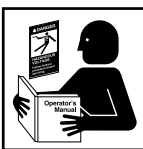
## SAFETY PRECAUTIONS



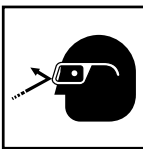
**WARNING:** To prevent personal injury and / or damage to equipment :

If the operator cannot read English, operating instructions and safety precautions must be read and discussed in the operator's native language.

- Si el operador no puede leer inglés, las instrucciones de operación y las precauciones de seguridad deberán leerse y comentarse en el idioma nativo del operador.
- Si l'utilisateur ne peut lire l'anglais, les instructions et les consignes de sécurité doivent lui être expliquées dans sa langue maternelle.



- Read, understand, and follow all safety precautions and operating procedures.
- Do not use this equipment in a manner not specified by the manufacturer.



- Wear eye protection that meets OSHA standards.
- Because of the volatile fumes that may be present in an evaporative emissions system, we recommend using an inert gas, such as nitrogen, for testing EVAP systems.



- Do not perform tests near a source of spark or ignition.
- Correctly connect the power supply to the battery and chassis ground.



- The spotlight is designed for intermittent use only, not constant use.
  - If the spotlight is hot, do not touch the top part of the lamp or lens, do not place it near flammable items, and do not put it away for storage until it cools.
  - Do not use the spotlight if it is damaged.
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# Background

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**The fuel vapor recovery system is the most neglected part of a 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 correct 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 the EVAP system wastes fuel and many times creates customer-complaints of "gasoline odors." **With the introduction of On-Board Diagnostics (OBD), the automotive industry is capable of determining if a vehicle's evaporative system has a leak.** Prior to the LeakMaster No. 6525, determining the **location** of an EVAP leak was a difficult and time-consuming challenge.

## **LeakMaster Operation**

The LeakMaster is a dual-phase tool. **Phase One** uses 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 using both visual vapor (smoke) and UltraTraceUV™ technology. UltraTraceUV is a unique chemical bonded to the smoke that deposits an ultraviolet fingerprint at the exact location of the leak.

This dual-phase operation is accomplished automatically. LeakMaster 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.

LeakMaster will not spill its solution regardless of the position it's placed 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.

LeakMaster needs no assembly, is self-calibrating, and requires no maintenance, other than a recommended annual smoke solution change.

**Read this manual in its entirety before performing any actual tests on a vehicle. The LeakMaster should be operated only by correctly trained and qualified technicians.**

### **Tech Tips**

- *When the vehicle's engine is turned off, the OBD-II EVAP system is generally venting in one form or another. Use a scanner to close the EVAP system in order to perform any leak tests. **Remember, ALL tests with the LeakMaster are performed with the engine OFF.***
- *It is best to perform all testing in calm air, so the smoke exiting the leak will not be blown away, impairing your view of the leak.*
- *Because of the EVAP system's volatile fumes, we always recommend you use an inert gas, such as nitrogen, when testing the evaporative system. However, LeakMaster is also designed to perform its functions with conventional shop air, if being used to test systems other than the EVAP system.*

# Introduction

## Congratulations!

*You are in possession of the most useful, yet simple to operate, Evaporative Emissions (EVAP) system diagnostic tester available today. The LeakMaster's versatile 12-volt design was specifically developed to diagnose vehicle EVAP systems for leaks.*

*In addition, the LeakMaster 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 compartment.*

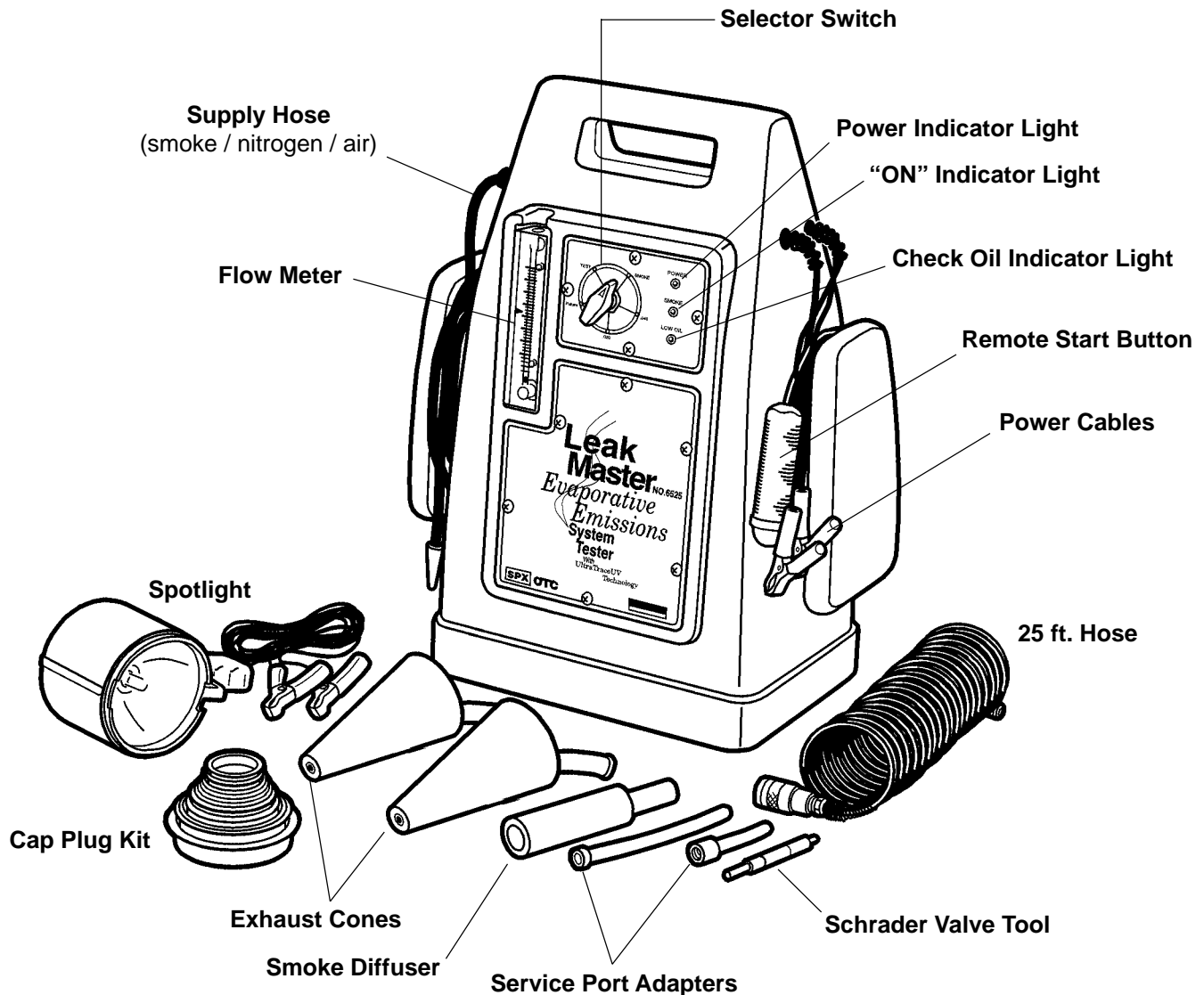
*The LeakMaster's unique design allows the operator to confirm the integrity of a system by utilizing a metered air system. If the tool has confirmed a leak in the system being tested, it then introduces a non-toxic, diagnostic, marked vapor (smoke) into the system. To locate the source of the leak, you simply look for the smoke exiting the leak, or use a conventional ultraviolet (UV) lamp to view the UV deposit left behind, which pinpoints the exact location of the leak.*

*The LeakMaster is shipped filled with a full charge of smoke-producing solution that will last approximately 500 tests.*

## Technical Specifications

Height	23 in. (58.4 cm)	Supply Pressure	13.0 in. H <sub>2</sub> O
Width	18 in. (45.7)	Supply Volume	15 liters per minute
Depth	9 in. (24.1 cm)	Operating Temperature Range	45°F to 140°F (7.2°C to 60°C)
Weight	17 lb. (7.6 kg)	Supply Line	12 feet (3.6 m)
Ship Weight	20 lb. (9.0 kg)	Power Supply Line	12 feet (3.6 m)
Power Supply	12V DC	Remote Starter Cable	12 feet (3.6 m)
Amperage Usage	15 amps		

# Tester Overview



## Component Description

**Supply Hose:** Use when confirming the integrity of an EVAP system, when verifying any system for leaks, or when introducing smoke into a system being tested for leaks.

**Selector Switch:** Use to select the functions of the tester as explained in this manual.

**Flow Meter:** Use its pointer-flag to establish a quick PASS / FAIL when determining if the vehicle being tested has a .040 or .020 leak.

**Water Separator / Filter** (on back of tester): Ensures a clean supply of nitrogen or air.

**Power Indicator Light:** Turns ON when connecting the power leads to a battery, indicating good contact.

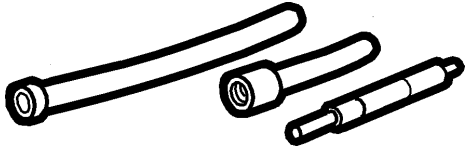
**“ON” Indicator Light:** Turns ON after pressing the remote starter button, indicating the tester is ON. (There is a five second self-diagnostic delay before the light comes on.)

**Remote Starter & Power Cables:** Use to operate the tester. The tester stays ON for five (5) minutes after the remote button is pressed; press the button again to turn the tester OFF.

**Drain / Fill Area** (located on the top-back of the tester): Much like a motor oil dipstick, there are low and high marks engraved on the tester’s dipstick. Remove the dipstick to maintain the smoke solution level at the FULL mark, and to drain and replace the smoke solution during yearly maintenance service.

# Tester Overview

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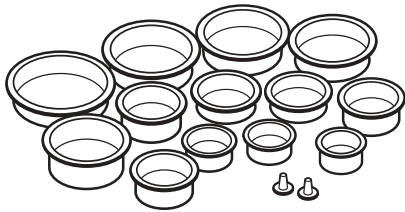


**No. CEA-04 – EVAP Service Port Adapter** is used when connecting to a vehicle's fuel vapor recovery system. Connects directly to the factory service access port on the vehicle.

**No. CEA-042 – Ford EVAP Service Port Adapter** connects to the factory service access port on some Ford vehicles.

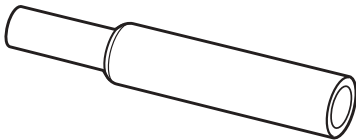
**No. CEA-049 – Schrader Valve Removal / Installation Tool** is designed to work on many different kinds of vehicles.

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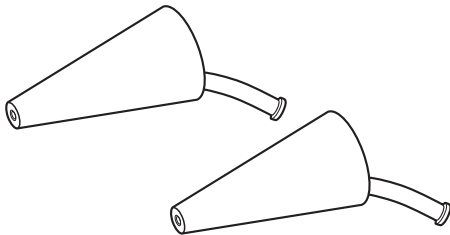
**No. CEA-02 – Cap Plug Kit** is used to seal the intake ducting of the engine being tested. The plugs range in size from 1-3/4" to 4-1/2", and may be used to seal either the inside diameter of an opening, or flip them over and seal the opening at the outside diameter.

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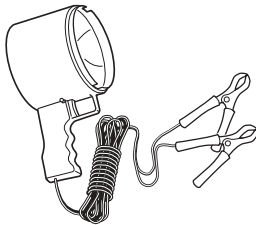
**No. CEA-03 – Smoke Diffuser** is designed to slow the velocity of the smoke exiting the supply hose. The diffuser allows the operator to lay down a thick bed of smoke along door, sunroof, windshield, and window seams so any air disturbance caused by unwanted airflow may be observed.

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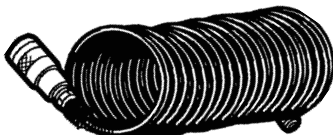
**No. CEA-01 – Exhaust Cones** taper in size from 1" to 3-1/2" with a 5/16" opening at the small end of the cone to which a short section of hose is connected. The supply nozzle is inserted into the end of the attached hose to introduce smoke into any system with an opening that fits these dimensions. May also be used as exhaust plugs when testing intake vacuum systems.

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**No. HS-400AC – Spotlight** helps locate the smoke when searching for leaks.

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**No. CEA-041 – 25 ft. Hose** is used to deliver nitrogen to the EVAP tester. Simply connect the 1/4" pipe thread to the nitrogen regulator and the quick-disconnect fitting to the EVAP tester.

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**No. P-0716-UV – Smoke-Producing Solution . . .** LeakMaster is shipped with a full charge of smoke-producing solution – enough to perform approximately 500 tests before needing a refill.

We recommend replacing the solution once a year (at the minimum) to help keep the LeakMaster operating in a like-new condition for many years to come.

# Setup

1. Connect the LeakMaster red power cable to a 12V DC power supply. If you are using a battery, verify that it is in good condition and fully charged. See Figure 1.
2. Connect the LeakMaster black ground cable to the vehicle's chassis ground.



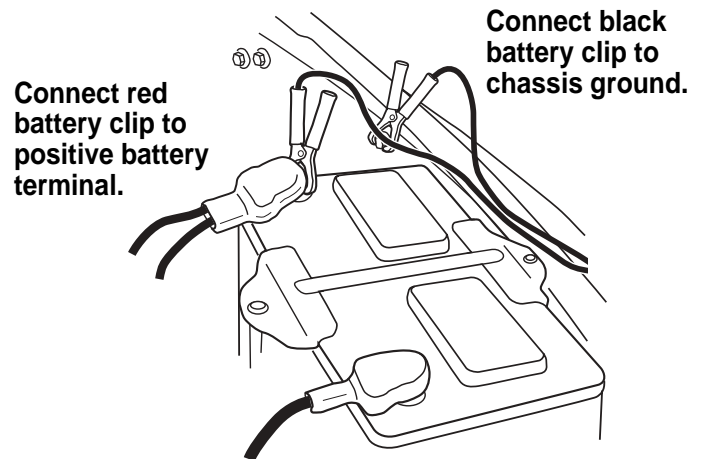
**CAUTION:** To prevent personal injury, do NOT connect LeakMaster's black cable to battery ground, because a spark in the vicinity of the battery can cause an explosion.

3. Depending on the tests you are performing, connect either a nitrogen or shop air supply line to the water separator located on the back of the tester. See Figure 2. Supply pressure must be between 50 psi and 125 psi.

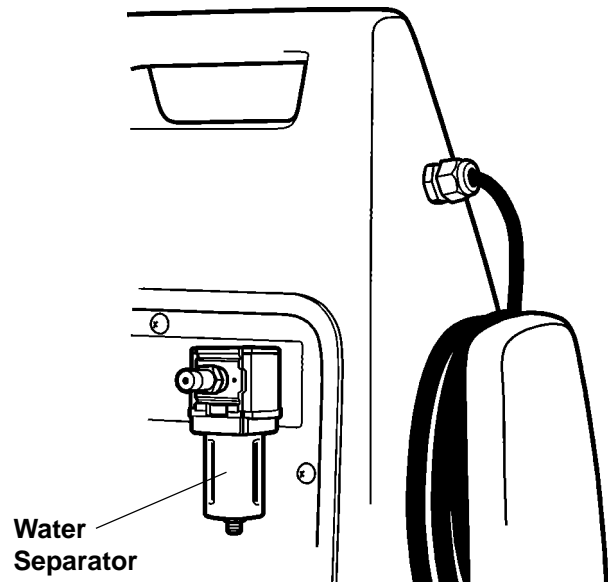
**When testing EVAP systems:** Connect the nitrogen line to the water separator.

**When testing systems other than EVAP:** Connect the air supply line to the water separator.

**Remember, all tests performed with the LeakMaster are performed with the vehicle engine OFF.**



**Figure 1**



**Figure 2**



# 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 is governed by a .040 or .020 acceptable leak standard.
3. Position the selector valve on the tester control panel to the correct standard. See Figure 3.

*The "future" setting on the control valve is reserved for a another standard, should requirements change.*

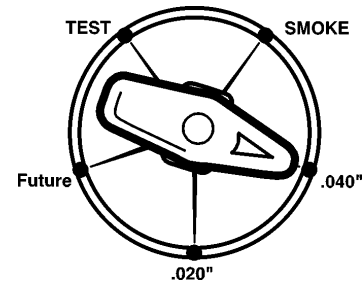
4. Turn the tester ON by pressing the remote starter button. Observe the flow meter's indicator ball. Position the flow meter's red flag so it aligns with the ball. See Figure 4.

**This measurement indicates the vehicle's Pass / Fail line.**

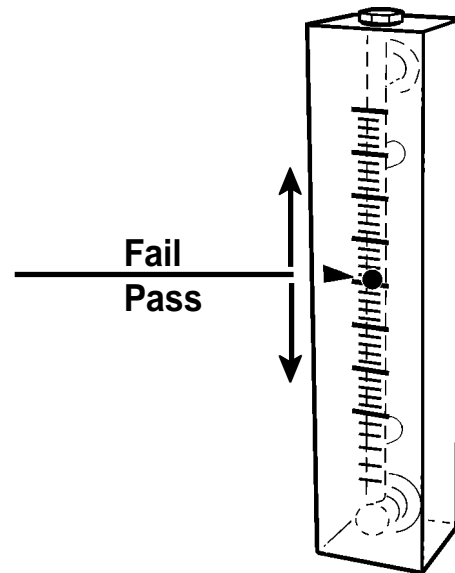
5. Press the remote starter button again to turn the tester OFF.
6. Locate the vehicle EVAP service port. Remove the green cap and the Schrader valve that is located inside the service port. See Figure 5.

**IMPORTANT: The Schrader valve is installed with a left-hand thread.**

7. Install the EVAP service port adapter (provided with the tester) into the EVAP service port.



**Figure 3**



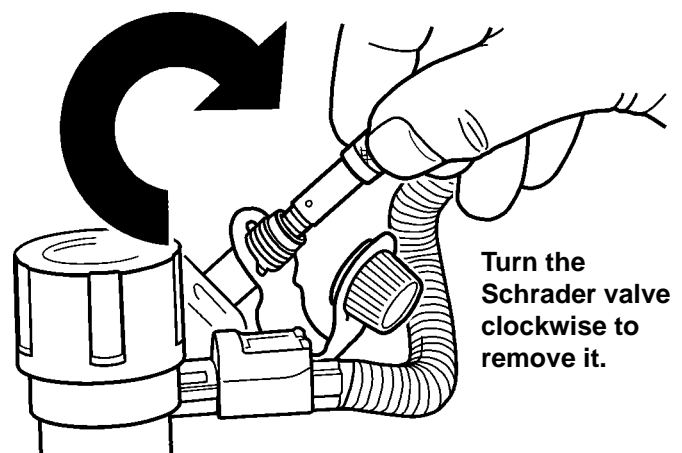
**Figure 4**

## Tech Tips

*The EVAP service port on OBD-II vehicles was designed with a Schrader valve before this smoke-producing test procedure was developed for diagnosing EVAP leaks.*

*Smoke, when passed through a Schrader valve, will partially condense. It will not be dense enough to be effective for EVAP leak diagnosis.*

*For this reason, when testing with smoke, **remove the Schrader valve before introducing smoke into the EVAP system. Remember to turn the Schrader valve in a clockwise rotation to remove it.***



**Figure 5**

# Phase One

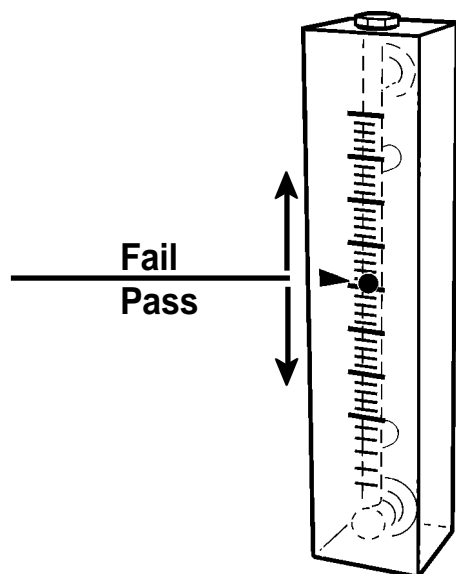
8. Insert the supply hose from the tester into the EVAP service port adapter. See Figure 6.
9. Close the vehicle's EVAP system vent solenoid.
10. Set the tester's control valve to TEST.
11. Press the remote start button to activate the tester.

At the beginning of the test procedure, the flow meter's indicator-ball is toward the top of the flow meter scale. This indicates the EVAP System is being filled. Usually in less than 60 seconds – depending on capacity and fuel system level – the 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.

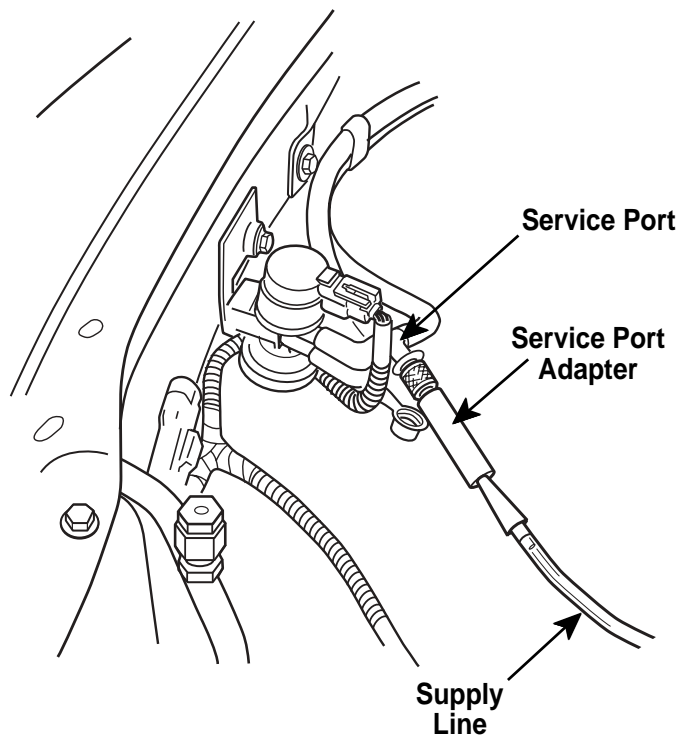
The timer will automatically turn OFF in five minutes. (The tester will turn OFF if the remote switch is pressed again before the 5 minutes has elapsed).

12. Once the flow meter's ball stops descending, observe if the ball is above or below the red flag. See Figure 7.

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



**Figure 7**



**Figure 6**

## Tech Tips

- When testing a pre-OBD vehicle, or when testing an OBD vehicle without an EVAP service port, access the EVAP system in one of two ways: disconnect the EVAP vent line leading back to the fuel tank; or go through the fuel tank neck using a fuel neck adapter (not supplied).
- A common leak in a vehicle's EVAP system is due to an unsecured or faulty fuel cap. We recommend **NOT** disturbing the fuel cap before completing Phase One.

If an unacceptable leak has been determined after completing Phase One, you can reposition or test the fuel cap, then perform Phase One again. You may discover the leak was due to a fuel cap problem.

If you disturb the fuel cap before 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.

# Phase Two

1. Verify the vehicle's fuel level is below the base of the fuel tank neck.

2. Position the selector valve on the tester to SMOKE. See Figure 8.

3. Remove the vehicle's fuel cap.

*This saves time when filling the EVAP system with smoke.*

4. Press the remote starter button to activate the tester.

*The "ON" indicator light will come ON after a 5-second self-diagnostic delay, indicating the tester is ON and producing smoke.*

5. Replace the fuel cap once smoke is seen exiting the fuel tank's neck.

*The timer will automatically turn OFF in five minutes. To shut the tester OFF before the five minutes are up, simply press the remote button.*

6. Continue to introduce smoke into the EVAP system for about 60 seconds, or until the flow meter's ball stops descending.

*It is not necessary to wait until the system is full (indicated by the descending flow meter ball) before looking for leaks.*

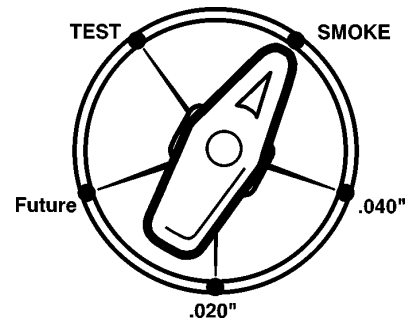
7. Use the spotlight provided to follow the EVAP path and look for smoke exiting a leak. Continue to introduce smoke in 30 second intervals until the leak is found.

*This ON/OFF technique allows the EVAP system to achieve test pressure, and then allows the pressure to be relieved. Diagnostic smoke is even more visible at lower test pressures.*

*You could also use a UV light (not provided) to search for the UltraTraceUV™ dye that would be deposited at the exact location of the leak(s). The longer the EVAP system is allowed to fill with diagnostic smoke, the more fluorescent material will be deposited.*

8. Repair the leak(s), and perform the Phase One test again to verify the repair and make certain there are no additional leaks in the EVAP system.

9. Reinstall the vehicle's Schrader valve using a counterclockwise thread rotation (OBD vehicles only). Reinstall the EVAP service port green cap.



**Figure 8**

## Tech Tips

- For an even quicker test procedure, it is possible to combine Phase One and Phase Two. The flow meter is operational in both phases.

*If you already know the EVAP system has a leak, start with Phase Two testing. (The leak will still be quantified because the flow meter is active.)*

*Then perform Phase One to verify the repair.*

- If you are testing a vehicle that has a fuel roll-over valve in the fuel tank, you may not see smoke exiting the fuel tank neck.

*You may need to introduce smoke through the fuel tank neck, and vent the non-smoke air out the vehicle's service port; or at least partially fill the system with smoke before closing the vent solenoid. Then, once smoke is seen exiting the vent area, close the vent solenoid.*

# Vacuum and Induction Leaks

1. Seal the system to be tested by selecting the correct size cap plug (supplied) and sealing the engine's air intake.

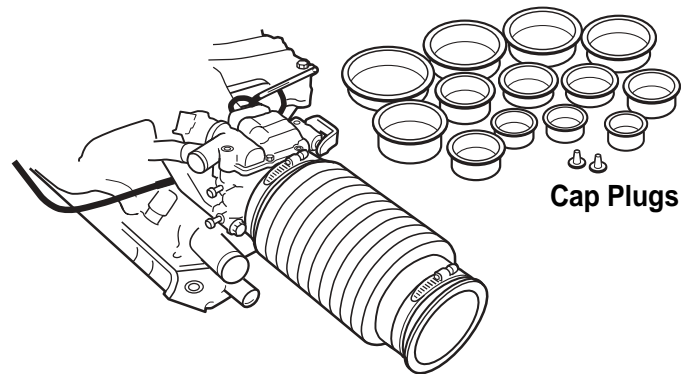
*To inspect the entire system, it is best to seal the engine's intake as close as possible to the air inlet origin. This is especially important on engines equipped with mass airflow sensors and related ducting connecting it to the intake system.*

2. Select a vacuum line on the engine that is easily accessible, and insert the tester's tapered smoke nozzle into a section of this line that goes to the engine.

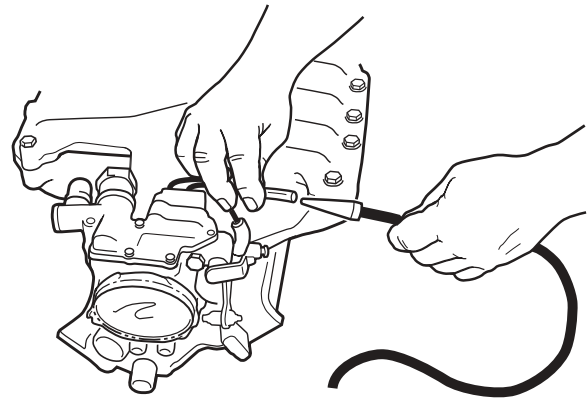
*The supply line to the brake booster is a good place to introduce smoke into the intake manifold. Enter this line at a point where the check valve will not interfere (or stop the flow of smoke).*

3. With the engine shut OFF, press the remote button once to turn the tester ON. Let the tester run until the system is filled – usually 30 seconds to 1 minute.
4. Once smoke is observed exiting a leak, push the remote button a second time to turn the tester OFF.
5. Turn the tester ON and OFF in 30 second intervals to pinpoint the source of the leak.
6. Use the spotlight to identify the origin of the smoke, or use a UV light (not supplied) to look for residual traces of the dye that was left behind by the smoke.

*The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.*



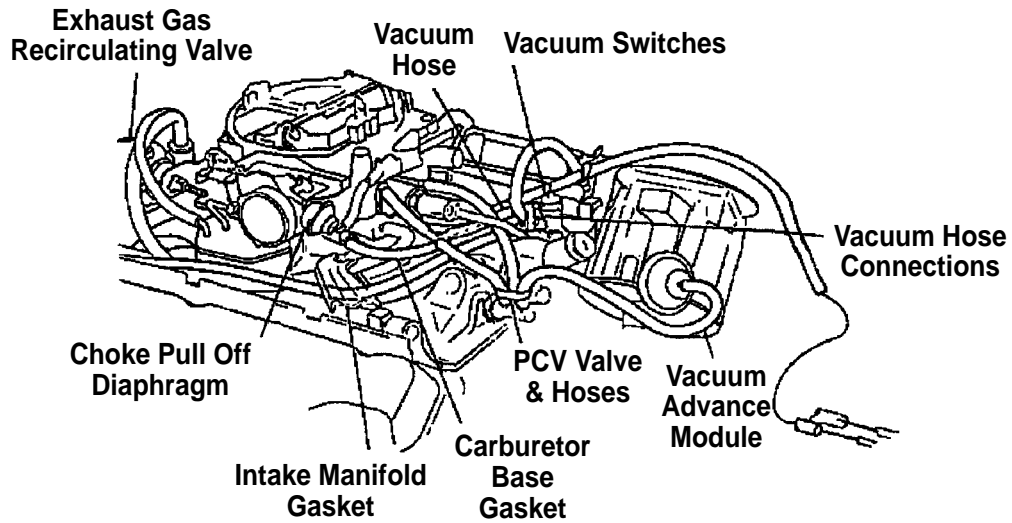
**One method to seal the system: Disconnect the rubber hose at the air cleaner, and plug the end of the hose.**



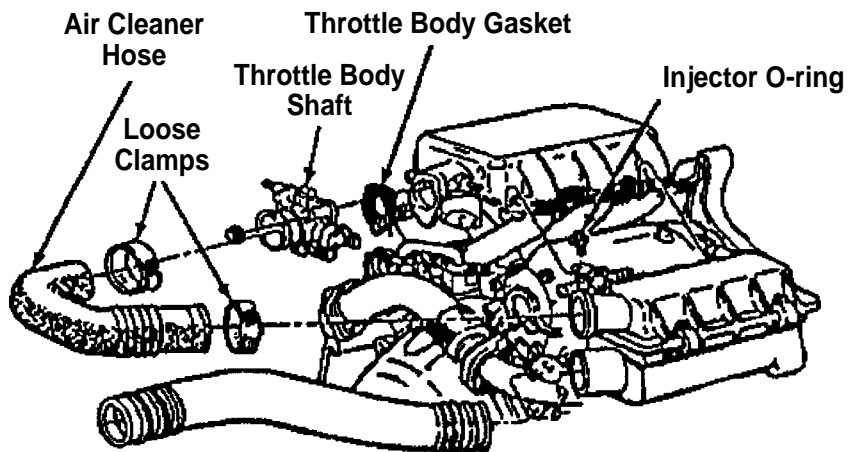
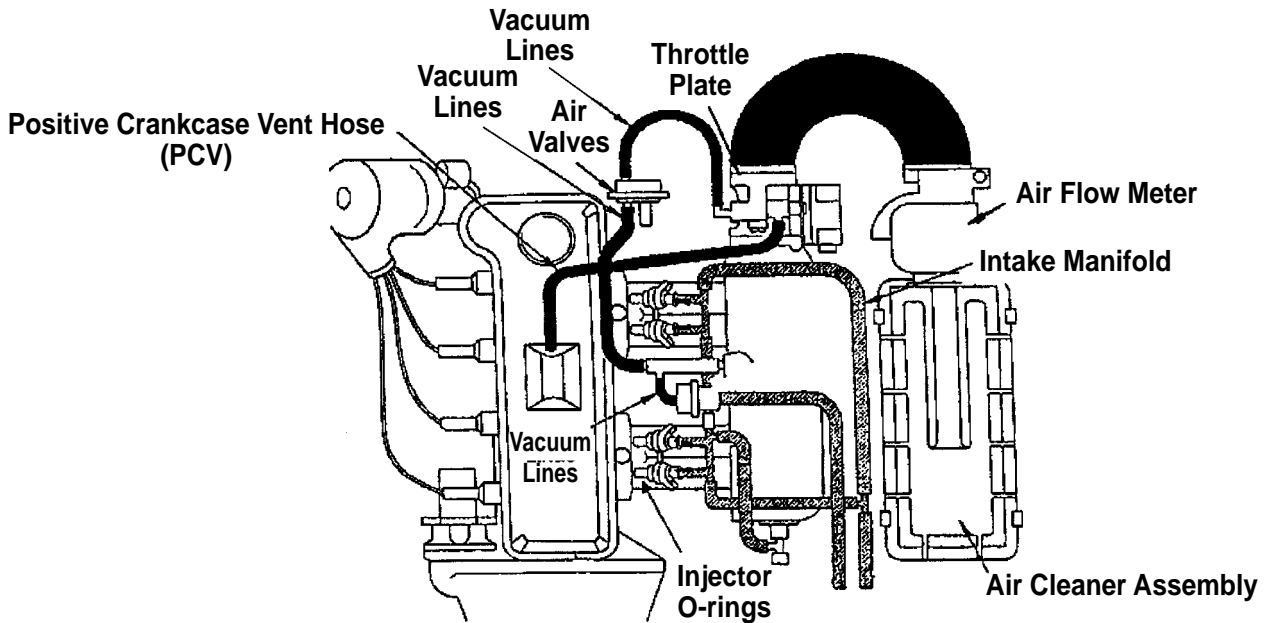
**Select a vacuum line that is easily accessible, and insert tester's tapered smoke nozzle.**

# Vacuum and Induction Leaks

## Typical Areas to Search on Carbureted Engines



## Typical Areas to Search on Fuel Injected Engines



# Vacuum and Induction Leaks

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## **EGR Valve Leaks**

The exhaust gas recirculating 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 EGR ports for restriction. Open or remove the valve, and introduce smoke through the tail pipe to verify these ports are open.

## **Idle Motors and Solenoid Leaks**

A small leak in an idle motor or solenoid component can make an engine idle rough or stall. Leaks in these components are usually found during a normal vacuum leak test. It is not unusual to find base gaskets and o-rings leaking in and around motors and solenoids.

## **Brake Booster Leaks**

A leaking vacuum brake booster not only affects engine performance like other types of vacuum leaks, but more importantly, it can seriously affect the stopping power of the vehicle.

**Pressing on the brake pedal during this test will falsify the test results.**

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 press the tester's remote button once to begin introducing smoke.
3. If the tester's flow meter indicates flow, the brake booster has a leak.
4. Under the hood, look for smoke exiting around the crimped area of the booster canister. Also look inside the vehicle under the dash.

## **Tech Tips**

*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 LeakMaster supply hose into a direct vacuum manifold source, such as a brake booster hose or PCV. Press the remote button on the LeakMaster. Watch for smoke to escape from the EGR valve. If you see a lot of smoke, the valve is bad; no smoke, move on to the next step.*
2. *Cap off the intake using one of the cap plugs supplied with the LeakMaster. 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.*

# Exhaust Leaks

The exhaust cones were developed for the identification of leaks in a vehicle's exhaust system. These leaks can be difficult to locate because they are often hidden by metal shields, or become silenced as the engine warms up.

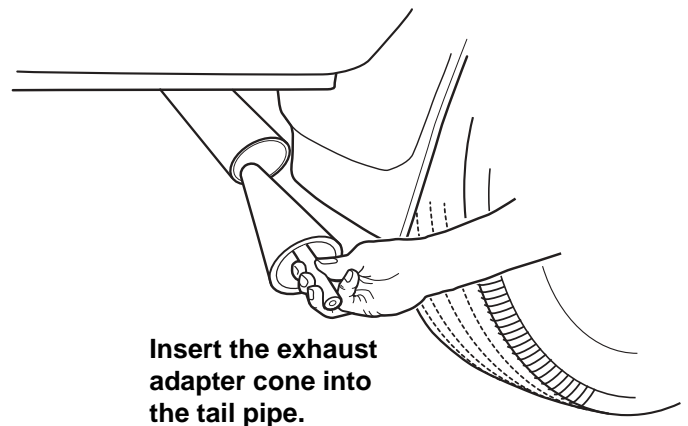
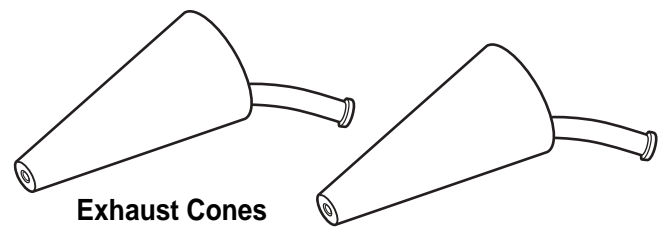
1. Put the vehicle on a lift to expose the underside.
2. With the engine OFF, insert the exhaust adapter cone into the tail pipe as shown.

*On dual exhaust systems, install a cone in each tail pipe.*

3. Attach the tester's SMOKE supply line to the hose on the exhaust cone.

*On dual exhaust systems, verify the other exhaust cone is plugged with the cap plug supplied with the cone.*

4. Press the remote button once to start the flow of smoke.
5. Using a spotlight, follow a path along the vehicle's exhaust system, and look for the source of the leak (exiting smoke).



**Insert the exhaust adapter cone into the tail pipe.**

## Tech Tips

- This test is more accurate when testing a cold exhaust system, because a very hot catalytic converter consumes some of the smoke. Also, many small exhaust leaks are only visible on a cold exhaust system, due to thermal expansion.
- Seal the vehicle's intake system with the cap plugs provided – this achieves correct system pressure in the event both an intake valve and an exhaust valve are open in the same cylinder at the same time.

# Miscellaneous Leaks

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## **Oil Seals and Gasket Leaks**

Many oil leaks can be located with the LeakMaster; however, it is important to understand that the LeakMaster will only find leaks that allow air to flow through them, causing the oil to bubble.

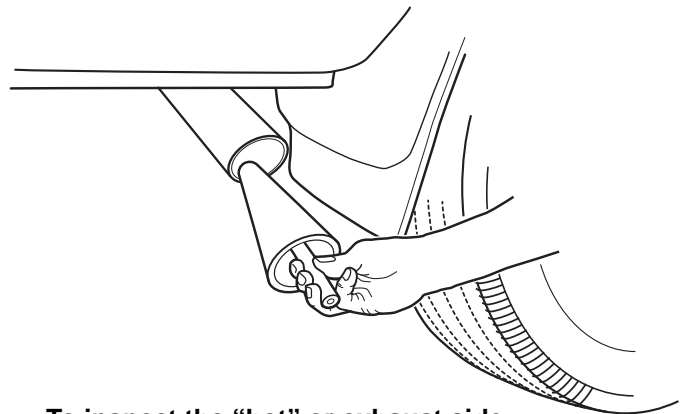
To find oil leaks, it is necessary to pressurize the crankcase with smoke:

1. Remove the vehicle's oil dipstick, slip a hose over the dipstick tube, and insert the smoke nozzle into the hose.
2. Block or 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.

## **Intercooler and Turbocharger 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.

1. Connect the smoke nozzle to the intake system.
2. Introduce smoke into this "cold" side of the turbocharger.
3. While the intake is under smoke pressure, inspect the intercooler, ducting, waste gate, and the cold side of the turbo for leaks.
4. To inspect the "hot" 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.



**To inspect the "hot" or exhaust side of the turbo, install the exhaust cone into the exhaust pipe.**



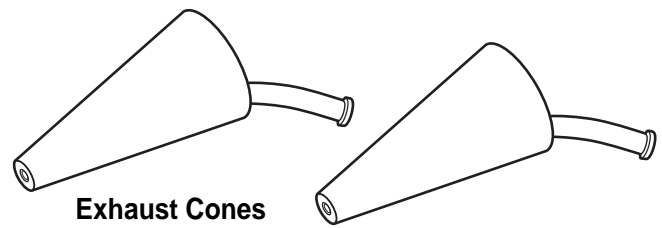
# Miscellaneous Leaks

## Component 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 later, after the antifreeze is added, that there is a leak.

Component testing has endless possibilities; anything from hoses to diaphragms can be tested. Supplied with every LeakMaster are two exhaust cone adapters that can be used to access any opening from 1" to 3-1/2". Simply introduce smoke into the system being tested, seal any interconnecting ports or passages, and look for smoke to exit a leak.



## Under-Dash Leaks

Under-dashboard leaks can be difficult to locate. The LeakMaster can confirm or eliminate the possibility of an under-dash leak in just 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 there is a leak present.

1. Set the control valve on the tester to TEST.
2. Install the supply nozzle into the main vacuum line (beyond the check valve) leading to the dashboard.
3. Introduce air into the system, and watch the flow meter 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 change of flow.

If the flow meter indicates flow in any of the positions on the climate control, you will know what portion of the system has a leak.

5. Set the control valve on the tester to SMOKE.
6. Introduce smoke into the system where a leak has been determined. Shine the spotlight under the dashboard, and look for smoke to pinpoint the leak.

### Tech Tips

*Don't forget that you may also identify leaks by using an ultraviolet light (not supplied) to look for traces of dye left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.*

# Miscellaneous Leaks

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## Wind and Water Leaks

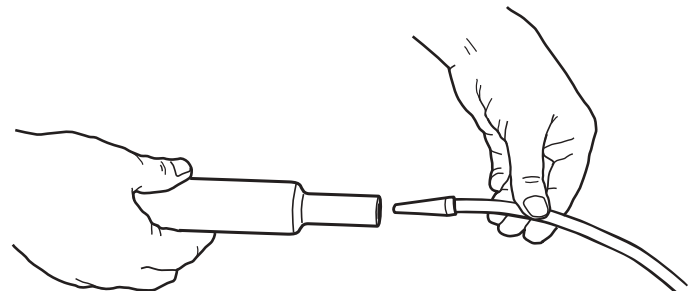
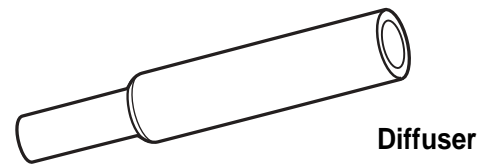
*(sunroofs, windows, etc.)*

The smoke diffuser was developed for quick identification of air and water leaks in a vehicle's passenger compartment. These leaks can be caused by faulty door and glass seals, windshield or sliding roof seals, or by misalignment of any of these components.

1. Park the vehicle to be tested indoors; avoid parking in a windy environment.
2. Turn the 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 smoke diffuser to the end of the tester's smoke nozzle.
6. Press the remote button.
7. From outside of the vehicle, position the tip of the diffuser about 2 – 3 inches away from the vehicle, and follow a path along the area 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.

8. Once you find a leak, mark its location with a wax pencil or removable marker. Look for the cause of the leak.
9. Turn the vehicle ignition OFF, and repair the leak.



**Attach the smoke diffuser to the end of the tester's smoke nozzle.**

# Maintenance

## Replacing the Smoke Solution

We recommend changing the smoke-producing solution in the tester at least once a year, regardless of how often the tester has been used.

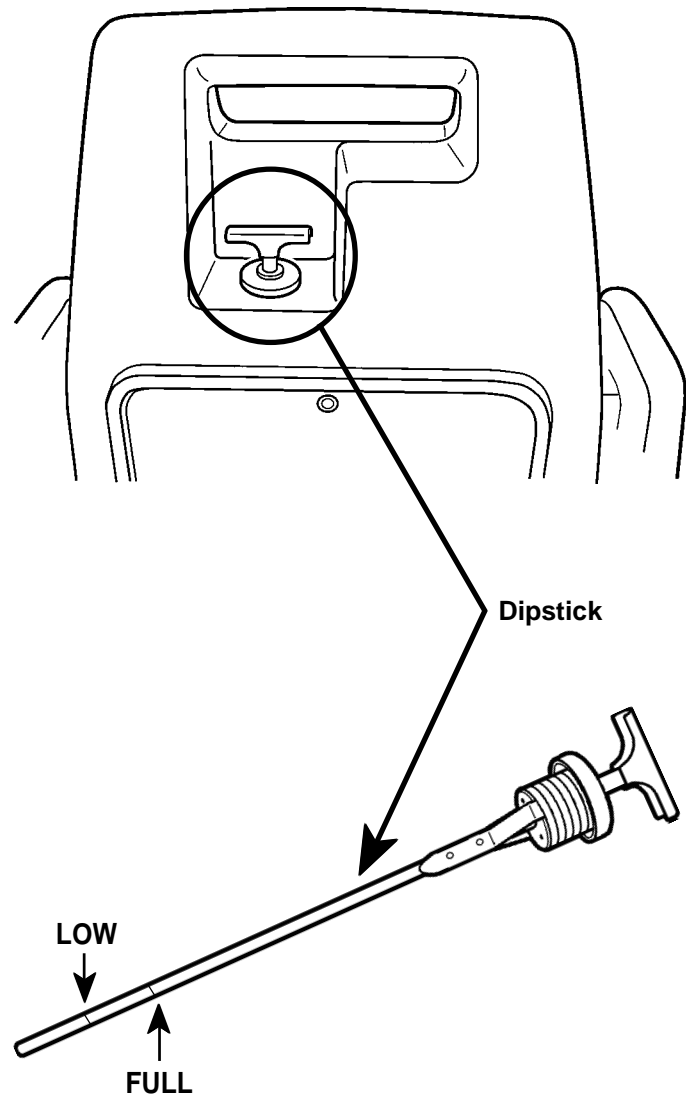
1. Remove the dipstick located on the back of the tester.
2. Tip the tester backward, allowing the solution to drain out of the dipstick tube into a catch basin.

**IMPORTANT: Do not damage the water separator on the back of the tester.**

3. Position the LeakMaster upright, and empty 16 ozs. of smoke producing solution (Part No. P-0716-UV) into the smoke chamber through the dipstick tube.

**CAUTION:** Use only the No. P-0716-UV solution (provided by the manufacturer) in the LeakMaster. Using solutions not recommended by the manufacturer can damage the unit and cause injury to the operator.

4. Install the dipstick, and then remove it again to verify the solution level, which should read at the FULL mark on the dipstick. Install the dipstick.
5. Record your name and the date in the *Fluid Change Record* in this manual.
6. Dispose of the waste smoke solution according to local, state, and federal (OSHA) regulations.



# Troubleshooting

## Diagnostic Lights

The LeakMaster has three diagnostic lights on the control panel that indicate if the tester is working correctly. The following table describes the tester's trouble codes.

Diagnostic Lights			Interval	Probable Cause
Green	Red	Yellow		
		√	Constant ON <i>(switch in SMOKE position; smoke venting into atmosphere; flow meter ball indicates flow)</i>	Low oil
		√	Constant ON <i>(switch in SMOKE position; system being tested; flow meter ball near zero)</i>	Normal temp. control function
		√	Occasionally blinks	Normal temp. control function
√			Constant ON	Sufficient power
√			Blinks every one (1) second	Insufficient power
√	√		Blink simultaneously every one (1) second	Power connection at battery is loose or short in heating circuit
√	√		Blink simultaneously @ four (4) blinks per second	Open heating circuit
√	√		Blink alternately @ one (1) blink per second	Thermal runaway *

\* If thermal runaway occurs, first try disconnecting power to the unit for 10 seconds; then reconnect power. If this failure code occurs a second time during operation, disconnect the tester and contact the manufacturer.

## Troubleshooting Guide

Problem	Cause	Solution
<b>Green power indicator lamp on the tester does not come ON.</b>	<ol style="list-style-type: none"> <li>1. Power cables are reversed.</li> <li>2. Poor power supply cable connection.</li> <li>3. Battery providing power is too weak.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correctly position the power cables.</li> <li>2. Secure the connection at positive terminal and chassis ground.</li> <li>3. Verify battery is in good condition and fully charged.</li> </ol>
<b>Smoke does NOT come out of the fuel neck area when filling the system with smoke during Phase Two.</b>	<ol style="list-style-type: none"> <li>1. Fuel tank level is too high and is blocking the fuel neck passage.</li> <li>2. Vehicle has a roll-over valve preventing pressure relief through the tank neck.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the fuel level in the tank so it is below the base of the fuel tank neck.</li> <li>2. Introduce smoke from the fuel tank; or if possible, disable the roll-over valve; or partially fill the system with smoke before closing the vent solenoid.</li> </ol>
<b>Tester is ON, but NO smoke or air coming out of hoses.</b>	<ol style="list-style-type: none"> <li>1. Poor power supply cable connection.</li> <li>2. Battery providing power is too weak.</li> <li>3. Tester's internal solenoid is stuck closed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Secure the connection at positive terminal and chassis ground.</li> <li>2. Verify battery is in good condition and fully charged.</li> <li>3. Disconnect the air or nitrogen quick-release at the tester's water separator, and then reconnect it.</li> </ol>

# Fluid Change Record

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Date	Name	Date	Name

## Notes

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# Quick Reference

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## **Tester Hookup**

1. Connect red power cable to 12V DC power.
2. Connect black ground cable to chassis ground.
3. Connect nitrogen to tester.

## **Phase One**

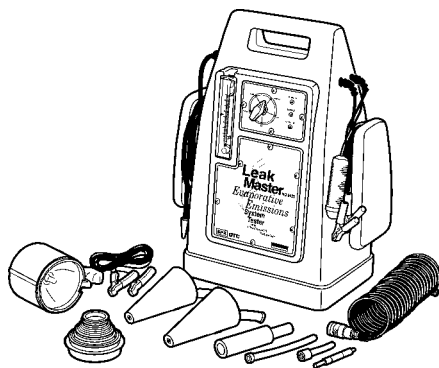
1. Set control valve to correct calibration.
2. Press remote button, and align flow meter's flag with ball.
3. Remove vehicle's Schrader valve.

**IMPORTANT: Remember that the Schrader valve is installed with a left-hand thread.**

4. Install service port adapter onto vehicle.
5. Connect tester's supply line to service port.
6. Close EVAP vent solenoid.
7. Set control valve to TEST.
8. Press remote button to fill system.
9. Compare flow meter ball to flag.
  - A. ABOVE flag means FAIL. Go to Phase Two.
  - B. BELOW flag means PASS.

## **Phase Two**

1. Remove vehicle's fuel cap.
2. Set control valve to SMOKE.
3. Press remote button to fill system.
4. Install fuel cap once smoke is seen exiting fuel tank neck.
5. Introduce smoke for 60 seconds more. Press remote button to turn tester OFF.
6. Look for leak. Continue introducing smoke in 30 second intervals.
7. Use light to follow EVAP system path.
8. Repair leak(s) and perform Phase One again to verify problem has been resolved.
9. Reinstall Schrader valve in vehicle.





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