



# SMT 300 Smoke Machine Tester Operator Manual

with UltraTraceUV® Dye Solution



**BOSCH**

Invented for life



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



- Use this equipment in the manner specified by the manufacturer.
- Understand operating procedures / follow all safety precautions.
- Correctly connect SMT 300 tester to battery and chassis ground.
- Use UltraTraceUV® Smoke Solution No. F00E900348 in this SMT 300 tester. Altering the solution, hoses, cables or any other replacement parts may cause damage to vehicles being tested and may cause personal injury.
- NEVER use with running vehicle engine.
- Never leave the SMT 300 tester's hoses or power cables connected to the vehicle for extended periods of time when tests are not being performed.
- Do not perform test near source of spark or ignition.
- It is essential that the 12V DC battery source you use to power the SMT 300 tester is in good condition and fully charged.
- Wear eye protection that meets OSHA standards.
- Follow safety precautions when using ultraviolet light source.
- Air pressure or nitrogen source to tester can be between 50-175 PSI (3.4 to 12 bar).
- Store and operate the SMT 300 tester in upright position.
- Use with a non-combustible gas, such as nitrogen, argon or CO<sub>2</sub>, when testing a vehicle's fuel vapor recovery (EVAP) system.



- Smoke exiting a very small leak is sometimes even easier to see if after filling the system with smoke you reduce the smoke flow by turning the flow control knob clockwise, which slows the exiting smoke velocity and helps you see very small leak(s).
- Use the white light provided to highlight the smoke exiting a leak.
- Use the Ultraviolet (UV) light and yellow glasses provided to look for the fluorescent deposit at the exact location of a leak. When using alternate source of UV light, be sure it is one that covers the 400 nanometer (nm) UV light range.
- When operating the SMT 300 tester in near freezing temperatures, cycle the operation of the SMT 300 tester 15 seconds ON and 15 seconds OFF for approximately the first minute or two of operation. This will allow the SMT 300 tester to reach its optimum operating temperature.
- 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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### NOTICE

Please note that the instructions in this Operator Manual are intended to only provide general and basic information to the user. This manual is not intended to be an exhaustive discussion and it is not intended as professional advice on the matters or procedures in question. While recommendations and safety precautions/warnings are provided for in this manual, it is not intended to be a substitute for your common sense.

## Thank You and Congratulations!

You are in possession of the most useful, yet simple to operate, leak tester available today. The patented technologies in this model SMT 300 tester were developed in collaboration with major automakers to specified standards and designed to be safe to use in any vehicle. It is the only smoke technology approved by any automaker in the world and is the only one that meets SAE International Papers' recommendations for safer fuel evaporative (EVAP) testing [2007-01-1235 & 2008-01-0554].

This SMT 300 tester produces a special smoke vapor known as Diagnostic Smoke®. It is designed to find leaks in any low pressure closed system, as well as pinpoint wind and water leaks entering the vehicle's passenger or trunk compartment. The UltraTraceUV® dye solution the tester uses is the only automaker (OEM) approved solution. To locate a leak; you simply introduce the smoke vapor into the system to be tested and shine the white light supplied to look for the smoke exiting the leak. Or use the ultraviolet (UV) light supplied to view the fluorescent dye deposited at the exact location of a leak. If you see the smoke or the dye, you've found the leak.

### UltraTraceUV®; the proper solution to use in your SMT 300 Smoke Machine Tester.

**A common question asked is if one can use a basic generic mineral oil, such as 'baby oil', in the tester to create the smoke.**

You can if you want to, but we don't recommend it. The patented UltraTraceUV® smoke solution supplied with this tester; will perform hundreds of tests that only cost pennies per test; is the only solution in the world approved by the auto manufacturers; and will not void any vehicle factory warranties. Plus, you have the added benefit of the trace dye that marks the exact location of a leak, increasing diagnostic accuracy unlike any other. This special solution is not a "generic" mineral oil. In fact, generic mineral oils are not intended for this type industrial use. The generic mineral oils break down, as evidenced by a foul odor and could damage vehicle components.



### SMT 300 Technical Specifications:

Height	13 in. (33.0 cm)
Length	13 in. (33.0 cm)
Width	12 in. (30.5 cm)
Weight	19 lb. (8.6 kg)
Shipping weight	24.5 lb. (9.5 kg)
Power supply	12 volts DC
Power consumption	15 amps.
Solution Max. Volume	12 oz. (355 ml)
Supply pressure	13.0 in. H <sub>2</sub> O (0.032 bar)
Supply volume	12 liters per minute
Smoke supply line	10 feet (3m)
Power supply line	10 feet (3m)
Operating temp. range	45°F to 140°F (7.2°C to 60°C)
Altitude	Up to 6,561 Ft (2,000 M)
Maximum Relative Humidity	80% for Temperatures up to 140°F (60°C)
Conditions of Use	Indoor/Outdoor (if not wet)
Pollution Degree	2

## Items Included with the SMT 300 Smoke Machine Tester



**UltraTraceUV® (F00E900348)** This patented solution is the only automaker-approved smoke-producing solution. The solution's chemistry contains a special dye that deposits at the exact location of a leak. Each bottle will perform approximately 300 full cycle tests. (12 oz. / 355 ml). SMT 300 is shipped with two (2) bottles. Replenishment part# F00E900348 is one (1) bottle.



**Cap Plugs Kit (F00E900349)** Useful when sealing an intake manifold system in order to contain the smoke in the system for proper leak testing such as; mass airflow sensor ducting, etc.



**Adapter Cone (F00E900350)** For introducing smoke into the exhaust system or into any orifice that accommodates the cone's size, such as the induction system.



**Smoke Diffuser (F00E900351)** Designed to locate leaks around doors, windows sunroofs and trunk compartment.



**Combination Light (F00E900352)** Turn it on and it delivers a white light, for easier smoke location. Click it again and it delivers an ultraviolet (UV) light that highlights the fluorescent dye deposited at the exact location of a leak. Click it a third time to activate the laser pointer. Kit includes light, amber glasses and batteries.



**Standard Size EVAP Service Port Fitting (F00E900353)**



**Schrader Removal / Installation Tool (F00E900354)**

**NOTE:** These items are provided within a separate accessory storage case and are available as replacement items as well. Please order the noted F00E900XXX part number. The accessory case replacement is F00E900364.

## Optional SMT 300 Accessories



**Inert Gas Pack (F00E900355)** 20oz. liquid CO<sub>2</sub> bottle and regulator to use in lieu of shop air. Provides the safest way to test EVAP system leakage. Fully filled bottle provides capacity for 25 full cycle tests. Refer to the Operator Manual for full details. (CO<sub>2</sub> bottle arrives empty).



**100psi pre-set Nitrogen Regulator (F00E900365)** For use with larger nitrogen bottles in the shop. Connects to the large bottle standard outlet fitting. Use with cylinder hose P/N F00E900366.



**Nitrogen Regulator/Cylinder Hose (F00E900366)**  
Connects the SMT 300 inlet to the optional 100psi Nitrogen Regulator P/N F00E900365.



**SMT 300 Replacement Filter Kit (F00E900361)**  
Replacement element for the SMT 300 internal filter system. Protects the SMT 300 from workshop air contaminants. Yearly replacement is recommended.



**SMT 300 Universal Filler Neck Adapter (F00E900362)**  
Allows direct connect of the SMT 300 smoke output hose to most fuel tank filler necks. Fuel tank and peripheral component testing is thus made easier.



**SMT 300 BMW-Mini Fuel Filler Neck Adapter (F00E900363)** Allows direct & specific connection of the SMT 300 smoke output hose to BMW and Mini fuel tank filler necks. Fuel tank and peripheral component testing is thus made easier.



**Air Fitting** Two are supplied. The automotive style fitting is already installed on the SMT 300. The spare fitting is an industrial style fitting but also a popular one in auto facilities.

## Initial Setup/Prior to Turning the SMT 300 Smoke Machine Tester 'ON'

### 1. Fill with Solution



Prior to using the SMT 300 tester for the first time; pour the entire contents of one 12 oz. (355 ml) smoke solution bottle supplied into the machine.



Always maintain solution level at or near FULL mark.



We do not recommend introducing a solution into the SMT 300 tester that is not recommended by the manufacturer because it may damage the vehicles being tested and may affect their factory warranty. It could also cause harm to the operator!

### 2. Proper Air Fitting

Two commonly used male air fittings are supplied with the SMT 300 tester. Be sure one of these fittings is the correct fitting for your female hose connector. Otherwise install correct fitting onto the SMT 300 tester. Use Teflon® thread sealer. Do not over-tighten.

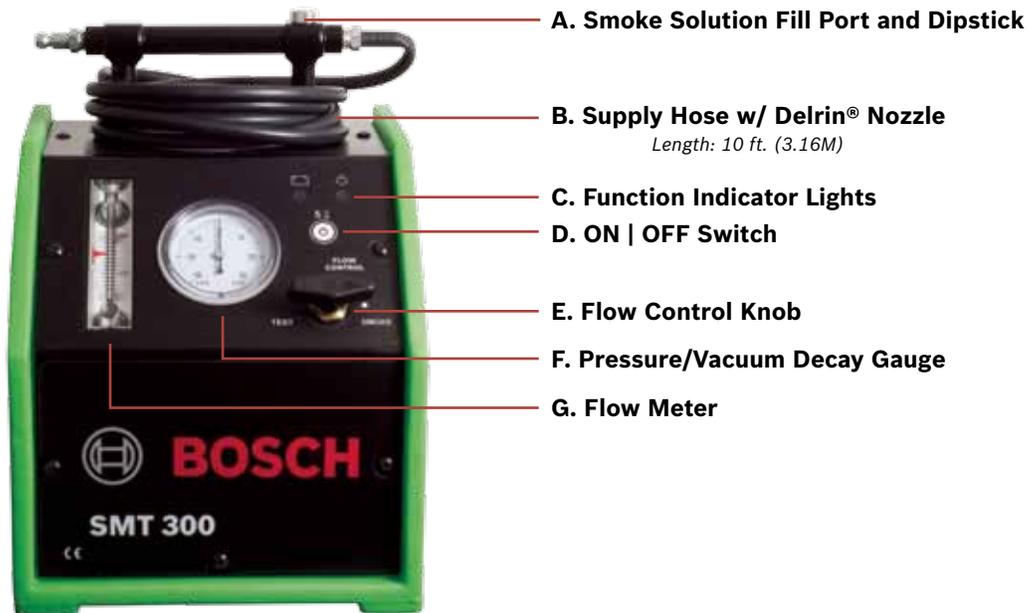
- ▶ Air inlet pressure supplied to the SMT 300 tester can be between 50 and 175 PSI (3.4 to 12 bar).

[Note: optimum inlet pressure is 90 PSI / 6.2 bar]

Air Fitting



## SMT 300 Smoke Machine Tester Front View



**A Smoke Solution Dipstick** used to fill and maintain proper smoke solution level.

**B Smoke Supply Hose**

**C Function Indicator Lights** green battery light turns ON when connected to 12-Volt DC power.

▶ Blinks 1-per second if power source is insufficient.

▶ Red ON / OFF light turns ON when you press the <ON> button, indicating smoke production.

**D ON | OFF Switch** Push to turn <ON> smoke production for 5 minutes.

**E Flow Control Knob** TEST delivers 'non-smoke' air. SMOKE (full open) delivers full volume of smoke. A position between SMOKE and FLOW CONTROL delivers varying degrees of smoke volume.

**F Pressure/Vacuum Decay Gauge** used to verify if there is a leak in the system. To test using Pressure-Decay; fill the system being tested, with the SMT 300 in either TEST or SMOKE setting. Once full, turn SMT 300 OFF. Observe the pressure gauge for decay, which would indicate a leak. To test using Vacuum-Decay; be sure the SMT 300 is turned OFF. Place a Tee fitting between the SMT 300 supply line nozzle and the system being leak tested. Attach a hand vacuum pump to the Tee and draw vacuum. Observe the SMT 300 vacuum gauge to be sure you do not draw more vacuum than the gauge allows, or it will damage the gauge. Stop drawing vacuum once proper vacuum is achieved. Observe the gauge for decay, which would indicate a leak.

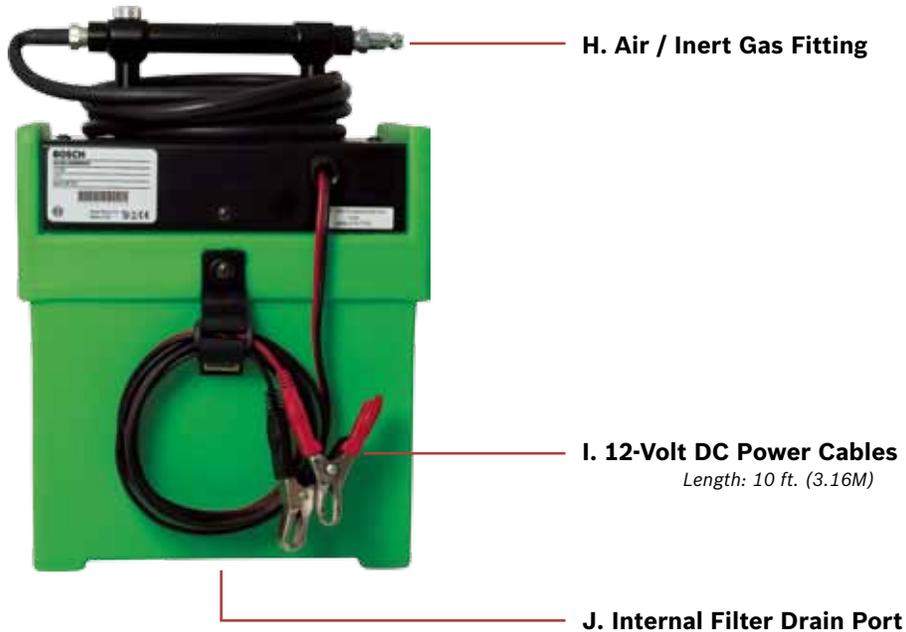
**NOTE:** The pressure/vacuum decay tests cannot determine the size of the leak(s). Leak size can be determined using the flow meter test, described on page 8.

**G Flow Meter** indicating flow could indicate a leak in the system being tested. If the meter indicates no flow, then you know there is nothing flowing through the system being tested (or indicates no leak).



Do **not** run the vehicle engine with the supply hose (item B) connected to the vehicle. Normal engine vacuum will damage the pressure/vacuum gauge.

## SMT 300 Smoke Machine Tester Rear View



- H Workshop Air Fitting / Inert Gas Fitting** connect to shop air for general purpose leak testing or to an inert gas, such as nitrogen or CO<sub>2</sub>, when testing a fuel evaporative system.
- I. 12-Volt DC Power Cables** connect to positive battery terminal and chassis ground.
- J. Internal Filter Drain Port** this tester is equipped with an internal filter system that protects the tester and vehicle from workshop air contaminants.



Occasional fluid drainage, from Port 'J', is normal. Excessive drainage indicates your workshop compressor requires draining and/or a filter system of its own. Failure to keep workshop compressor dry can result in contamination of the SMT 300 tester and vehicle being tested.



SAE INTERNATIONAL published papers strongly recommend you connect the smoke machine to an inert gas, such as nitrogen or CO<sub>2</sub>, when testing a vehicle's fuel vapor (EVAP) system due to its potentially explosive fumes.

## Basic Testing Procedure

1. Connect the SMT 300 tester to workshop air.
2. Connect the SMT 300 tester's red power cable to vehicle's 12 Volt DC battery positive terminal.
  - ▶ Battery must be in good condition and fully charged!
3. Connect the SMT 300 tester's black cable to the vehicle's chassis ground. Do NOT connect the black cable to battery ground because a spark in the vicinity of the battery can cause an explosion! **(Figure 1)**
4. Observe that the green power indicator lamp on the SMT 300 tester is 'ON' confirming that you are properly connected.
  - ▶ A blinking green power lamp indicates insufficient battery power to the tester.
5. Connect smoke supply hose to system being tested.
  - ▶ Flow Control Valve must be in full Open (+) position. **(Figure 2)**
6. Press <ON> button and fill system with smoke.
  - ▶ Smoke production is on 5-minute timer.
7. Use white light supplied and look for exiting smoke or use ultraviolet light supplied to look for fluorescent dye deposit at exact location of a leak.
  - ▶ The longer smoke is allowed to exit a leak, the more fluorescent dye will be deposited at leak locations.
  - ▶ Whenever possible it is best to 'purge' the 'non-smoke' air out of the system being tested in order to quickly fill the system with smoke.

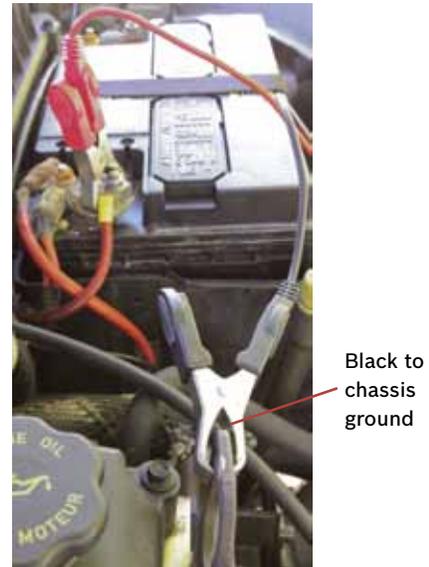


Figure 1



Figure 2

## Optional Gas Source

**Shown here using the optional portable Inert Gas Pack.**  
(Part No. F00E900355)

This gas pack makes the SMT 300 tester very portable and is also perfect for safer EVAP testing, since the gas supplied is inert. One 20 oz. cylinder will perform about 25 full cycle tests and is inexpensive to refill. Please Note: This Inert Gas Pack is shipped with an empty gas cylinder (for safety reasons). Prior to using for the first time, the cylinder must be filled with liquid CO<sub>2</sub>. Contact a local refilling station for liquid CO<sub>2</sub>. Suggestion: For CO<sub>2</sub>, contact a local air tool or sporting goods refilling location (i.e. hardware store, sporting goods store, or paintball supply house)



## Flow Meter Overview

### Flow

A flow meter ball indicating flow means there is flow going into (or through) the system being leak-tested. This is normal while the system being leak tested is being filled.

- ▶ An EVAP system will usually take about two minutes to fill.
- ▶ An indication of the system being full is when the flow meter ball stops descending during the leak test (or when the pressure gauge stops increasing in pressure).

If the flow meter ball descends to the bottom of the flow meter; that indicates there is no flow through the system being tested, or that there is no leak in the system being leak tested.

If the flow meter continues to indicate flow after the system is filled, this indicates a leak. The higher the ball is in the flow meter, the larger the leak size.

### EVAP Leak Size Reference Points

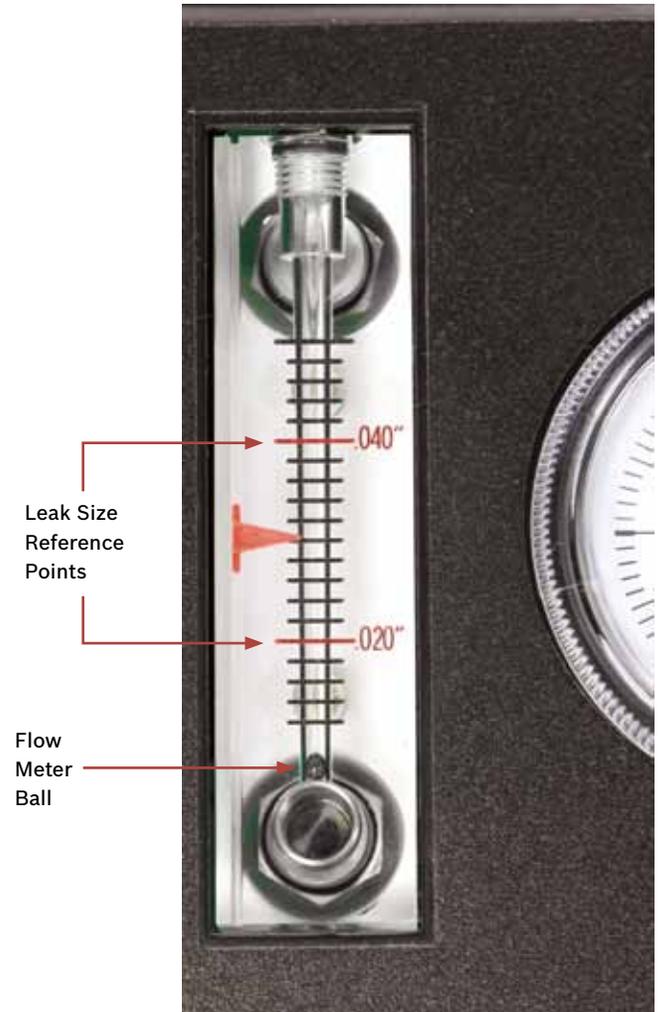
The flow meter has two leak size reference points which help quantify the leak size in the system being leak tested. The .020" (0.5 mm) and .040" (1.0 mm) reference points are equivalent to leaks of those sizes in the EVAP system being tested.

Once the system is filled (either in TEST or SMOKE setting) and the flow meter ball stops descending; position the flow meter's red flag so that it aligns with the level of the flow meter ball. Compare the level of the ball with the reference points in order to determine a PASS / FAIL.

A ball reading above the reference point indicates a FAIL.

A ball reading below the reference point indicates a PASS.

**NOTE:** The flow meter is most accurate when the SMT 300 control valve is in TEST (non-smoke) setting.



Remember: All tests with this tester are performed with the vehicle's engine turned off!

## EVAP Tech Tip

**NOTE:** The flow meter is active in all settings of the Flow Control Valve. However, for the most precise quantifying of a leak size use the TEST setting in either of these two methods:

A. Fill system in TEST (no smoke) setting until flow meter ball stops descending. Position the flow meter's red flag so that it aligns with the flow meter ball position (as described on previous page). Compare flow meter ball position with flow meter's Leak Size Reference Points. If the leak size is unacceptable (above reference point) and leak testing is required; set control valve to SMOKE setting, introduce smoke and look for smoke or dye to find the leak(s).

**Or**

B. To save time; fill system in SMOKE setting (full open). Be sure Tester is still <ON> and when the flow meter ball stops descending, immediately position the control valve to TEST and allow the ball to settle (TEST setting will give you a more accurate flow meter reading). Compare flow meter ball position with flow meter's Leak Size Reference Points.

- ▶ Above reference point = FAIL.
- ▶ Below reference point = PASS.

If the leak size is unacceptable and leak testing is required, then time will have been saved because the system is already filled with smoke. Now position the control valve again to SMOKE and continue to introduce smoke while looking for smoke or dye at leak exit points.

**NOTE:** When smoke testing a closed system, such as the EVAP system; it is best to purge the 'non-smoke' air out of the system by leaving an opening in the system being filled with smoke (e.g. EVAP vent). Close the system once smoke exits and continue to fill with smoke. This quickly fills the system with smoke.

## Control Valve Overview

**TEST** (non-smoke) setting delivers non-smoke air and the most accurate flow meter reading. This is the perfect setting when you want the most accurate leak size reading when testing the EVAP system.

This setting can also be used when testing many systems, such as a solenoid function, when smoke is not needed. Test the solenoid while activating it open and closed. Closing the solenoid should make the flow meter ball drop to the bottom. A flow meter indicating flow, while the solenoid is closed, confirms a leak in the solenoid.



**SMOKE** (full open) setting delivers maximum smoke volume to the system being leak tested.



**FLOW CONTROL** controls smoke volume. Locating the leak source is sometimes even easier with less smoke volume exiting a leak. After filling a system with smoke in the SMOKE (full open) setting, use the smoke volume control knob to tune in the desired volume of smoke exiting a leak.

**NOTE:** Flow Control does not affect delivery pressure; it only affects smoke flow volume.



## Sample Leak Detection Applications

This leak detector can be used in virtually any vehicle low pressure system suspected of having a leak, such as; EVAP system, intake / induction system, intercooler and turbocharger system, vacuum system, exhaust system, wind/water leaks and can also be used to verify air solenoid functions and test components prior to assembly. For details on EVAP testing, please refer to the Bosch training materials (not included with this manual).

### Intake/Induction Leaks

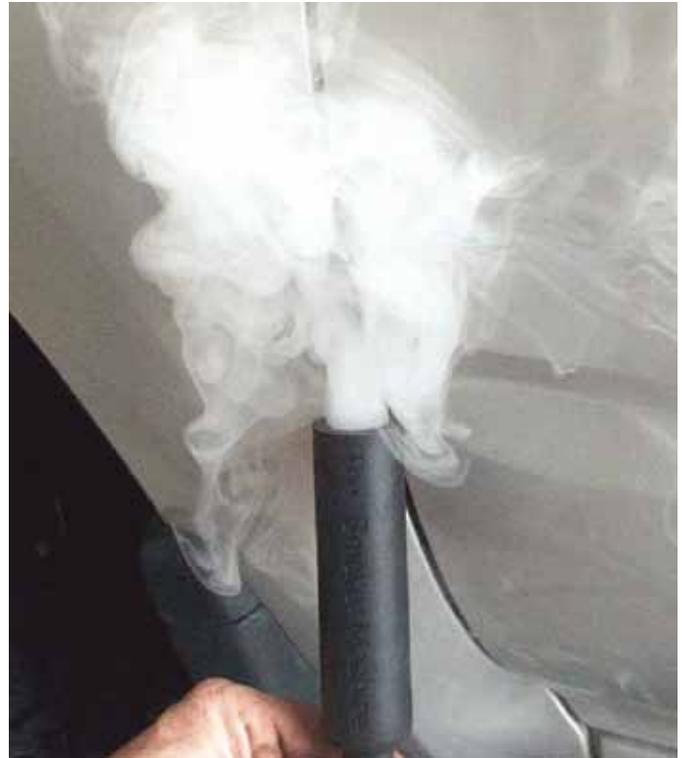


### Exhaust Leaks



## Wind and Water leaks

1. Set vehicle's climate control to 'fresh air' and set blower on full speed.
  - ▶ This creates positive cabin pressure.
2. Connect the SMT 300 tester's supply hose nozzle to Smoke Diffuser.
3. Lay smoke path along seals.
4. Look for smoke disturbance indicating a leak.
  - ▶ No air disturbance means 'No Leak'.

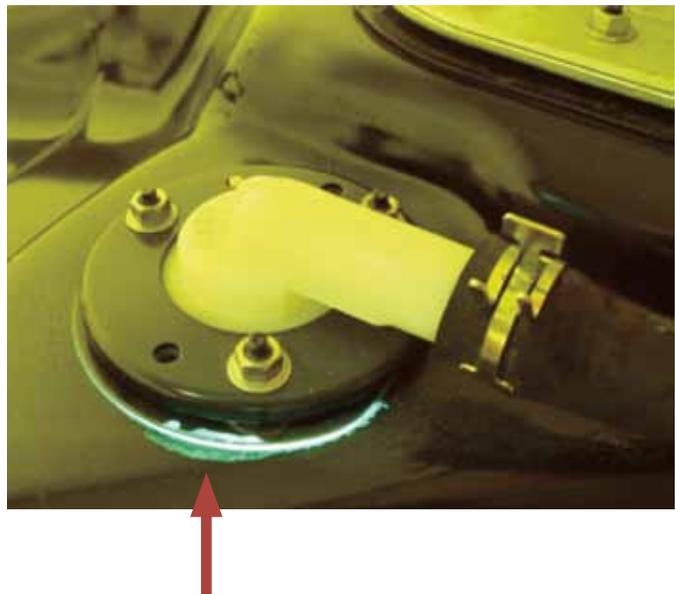
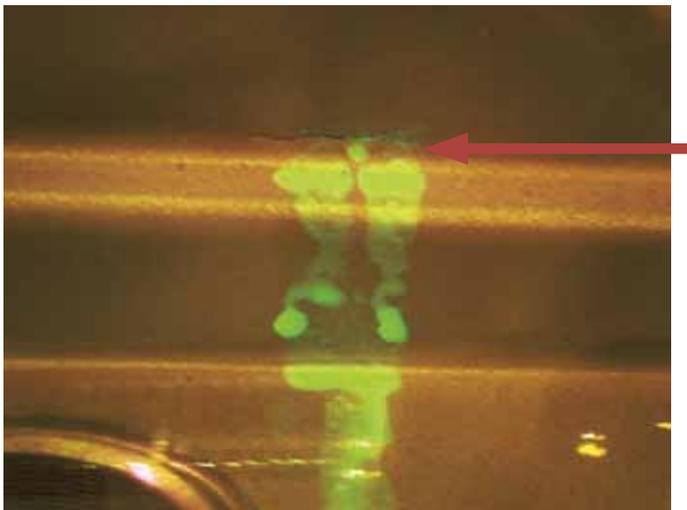


Air disturbance pinpoints the leak.

## Sample UV deposits

The patented smoke vapor contains a special ultraviolet-activated fluorescent dye that gets deposited at the exact location of a leak. Use the UV light provided to highlight the dye.

- ▶ This technology is designed so that the dye will only deposit if there is pressure-differential. So for instance, the dye will deposit when exiting a leak but will not deposit during the wind and water test.
- ▶ The longer the smoke is allowed to exit a leak, the more dye will be deposited.



## Troubleshooting Guide

Green	Red	Interval	Cause
✓		Constant ON	Good battery power.
✓		Blinks: 1-per second	Insufficient battery power.
✓	✓	Blinks simultaneously: 1-per second	Bad ground at smoke canister or circuit board; or power connection at battery is loose; or short in heating circuit.
✓	✓	Blinks simultaneously: 4-per second	Bad ground at smoke canister or circuit board; or open heating circuit.
✓	✓	Blinks alternately: 1-per second (System will shut down. Power must be disconnected/connected.)	Bad ground at smoke canister or circuit board; or circuit board failure.*

\* If circuit board failure occurs, first try disconnecting power to the SMT 300 tester for 10 seconds and reconnect. If failure code occurs a second time, disconnect the SMT300 tester and contact the manufacturer.

Symptom	Likely Cause	Solution
1. The green power indicator lamp on the SMT 300 tester does not turn ON.	<ol style="list-style-type: none"> <li>1. The 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 the positive terminal and chassis ground.</li> <li>3. Verify the battery is in good condition and fully charged.</li> </ol>
2. I turn the SMT 300 tester ON but there is no air or smoke coming out of the supply hose.	<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. Air supply to tester is insufficient.</li> </ol>	<ol style="list-style-type: none"> <li>1. Secure the connection at the positive terminal and chassis ground.</li> <li>2. Verify the battery is in good condition and fully charged.</li> <li>3. Be sure air/nitrogen supply is sufficient.</li> </ol>
2. Very little smoke coming out of the smoke hose or there is oil dripping from the smoke hose.	<ol style="list-style-type: none"> <li>1. There is too much smoke condensation inside the smoke supply hose. <ul style="list-style-type: none"> <li>▶ The smoke vapor from the SMT 300 is very dense and it is normal if at times it condenses inside the hose. This usually does not indicate a problem.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Position the hose lower than the Tester. Set control valve to TEST and turn Tester &lt;ON&gt; for one cycle, or until oil has drained from hose.</li> </ol>

### SMT 300 Technical Service Line

(866) 670-7734

Monday thru Friday

8:00am to 4:00pm PST (Pacific Time)

## SMT 300 Warranty

### LIMITED ONE (1) YEAR WARRANTY

Original Purchaser Warranty: under normal use, care and service, the SMT 300 (except as otherwise provided herein) shall be free from defects in material and workmanship for ONE (1) YEAR from the date of original invoice.

Seller's obligations under this warranty are limited solely to the repair or, at Seller's option, replacement of or refund of the original purchase price for, SMT 300 or parts which to Seller's satisfaction are determined to be defective and which are necessary, in Seller's judgment, to return the equipment to good operating condition.

Repairs or replacements qualifying under this Warranty will be performed or made on regular business days during Seller's normal working hours within a reasonable time following Buyer's request. All requests for warranty service must be made during the stated warranty period.





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