

INSTRUCTION & OPERATION MANUAL



Leakfinder®

Model No. GE-41413-B

General Motors Evaporative Emissions System Tester (EEST) & Smoke Machine

Diagnostic Smoke® Vapor

with non-contaminating UltraTraceUV® Trace Dye Solution



USA | Canada Patents • 6,392,227 • 6,439,031 • 6,526,808 | 2,279,147 • 2,394,911 | Int'l Patents & Pending

Caution and Usage Tips



- ALWAYS USE SMOKE TESTER WITH VEHICLE ENGINE TURNED <OFF>.
- DISCONNECT the smoke tester from the vehicle prior to starting the engine or prior to running any on-board monitor, including the DMTL or LDP. Damage caused by not following proper operating procedures will not be covered by the vehicle warranty or the smoke tester warranty.



- Use this equipment in the manner specified by the manufacturer.
- Follow common sense safety precautions.
- Use UltraTraceUV® Smoke Solution part number GE-41413-150 in Tester. Using a non-approved solution; may cause damage to vehicles being tested; may cause personal injury and may void vehicle and equipment warranties.



- Do not leave Tester's hose connected to the vehicle's EVAP system if tests are not being performed. Natural vacuum or pressure created by the fuel in the fuel tank can damage the pressure gauge if it exceeds the pressure limitations of the gauge.
- Do not perform test near source of spark or ignition.
- Wear appropriate eye protection.
- Wear yellow glasses supplied when using ultraviolet light.
- Gas pressure supplied to Tester can be between 3.4 to 17 bar (50 ~ 250 PSIG).
Note: Preferred inlet set pressure supplied to the tester is 100 PSIG (6.9 bar).



- **Connect Tester to nitrogen when testing fuel vapor (EVAP) system or a Rechargeable Energy Storage System. Note: DO NOT use workshop air for HEV battery leak testing or EVAP testing. Adding oxygen to the fuel vapor space can create a flammable mixture in the vehicle's fuel tank. You can connect Tester to workshop compressed air for non-EVAP testing.**



- When using alternate source of UV light, use light that includes 405 nanometer (nm) UV light range and wear yellow glasses.
- When testing an engine's intake or exhaust system for leaks, it is best if the engine is cold. Small leaks may be sealed due to thermal expansion.
- Be sure supply hose is completely unwound when using tester or an excessive amount of smoke vapor will accumulate inside the hose.
- **AVOID Tipping!!!**
Allowing the machine to tip over can cause injury, or damage to the equipment.

Contents

Accessories - Included and Optional	1-2
Initial Setup	3
Tester Calibration Procedure	4
Control Valve Overview	5
EVAP Test	6
Vacuum / Pressure Gauge Overview	7
Basic Testing Procedures	8
Other Leak Examples	9
Wind & Water Leaks	10
Technical Specifications	11
Troubleshooting Guide	11
Warranty	12

Thank You and Congratulations! Your Leakfinder® GE-41413-B Evaporative Emissions System Tester (EEST) & Smoke Machine is approved for Evaporative Emissions System (EVAP) leak-testing for both gasoline and ethanol vehicles.

Your tester incorporates STAR Diagnostic Smoke® Technology, *inside*. It is the simplest and quickest way to find many vehicle system leaks. Smoke vapor-generating leak detectors containing STAR Technology *inside* are the only leak detectors in the world approved by automakers (OEMs) for EVAP and other system testing.

The patented technology *inside* your Leakfinder® GE-41413-B, including the vapor-producing solution (UltraTraceUV®), was designed in collaboration with major OEMs, in order to establish a standard for leak detection. It is designed to be safe for vehicle systems and will not void factory warranties.

It is also the only smoke technology in the world that meets SAE INTERNATIONAL Published Papers' safety standards recommendation to use a smoke tester designed to function with an inert gas (such as Nitrogen, Argon or CO₂) when testing a vehicle's fuel evaporative (EVAP) system [SAE: 2007-01-1235 & 2008-01-0554].

Included with GE-41413-B

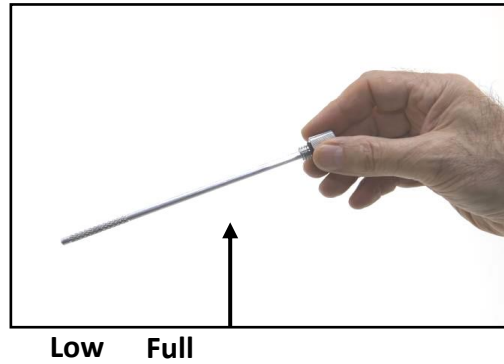
UltraTraceUV®: (GE-41413-150) this patented solution is the only GM-approved smoke-producing solution in the world. The solution's chemistry is designed to not damage vehicle components and contains a special non-contaminating dye that deposits at the exact location of a leak. Each bottle will perform approximately 300 test cycles. (12 oz. / 355 ml). (Part No. is for one bottle. Two bottles included with GE-41413-B).	
Combination Light: (GE-41413-151) white light, for easier smoke location and ultraviolet (UV) light, to highlight the fluorescent dye deposited at the exact location of a leak. Note: For eye safety & UV enhancement; always use yellow glasses when using UV light.	
Schrader Removal / Installation Tool: (GE-41413-152) fits both sizes of Schrader valves in vehicles with factory OBD-II service port fittings.	
Threaded Nozzle: (GE-41413-153) nozzle connects to tester's supply hose for vacuum leak testing or connecting to Optional Accessories.	
Mounting Platform: (GE-41413-165) Accommodates a 20 cubic foot. nitrogen gas cylinder. Cylinder not included. Obtain from local compressed gas supplier.	
Nitrogen Cylinder Pressure Regulator: (GE-41413-161) preset to 100 PSIG (6.9 bar) regulator connects directly onto nitrogen cylinder.	
Flex Hose: (GE-41413-162) connects Pressure Regulator (GE-41413-161) to nitrogen cylinder.	

Optional Accessories for GE-41413-B

Adapter Cone (standard): (GE-41413-157) for introducing smoke into the exhaust system or the induction system. Cone is 1" x 3.5" and 6" long (25.4 mm x 89 mm x 152 mm).	
Adapter Cone (large): (GE-41413-158) 3.5" x 6" and 4.5" long (89 mm x 152 mm x 144 mm).	
Smoke Diffuser: (GE-41413-159) locates leaks around doors, windows, sunroofs and trunk compartment seals.	
Long Flex Hose: (GE-41413-166) for use with a large tank of nitrogen if a 20 cubic foot cylinder is not used.	

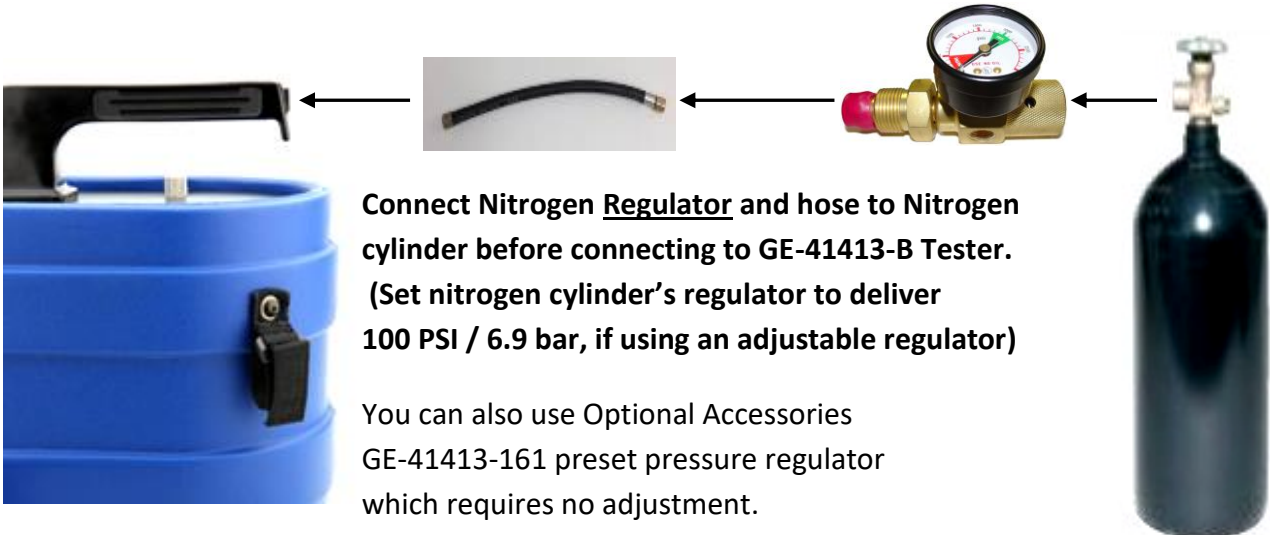
Initial Setup

1.



> Pour entire contents of one 12 oz. UltraTraceUV® solution bottle into the smoke chamber.
NOTE: Use second bottle supplied to regularly maintain at or near FULL mark.

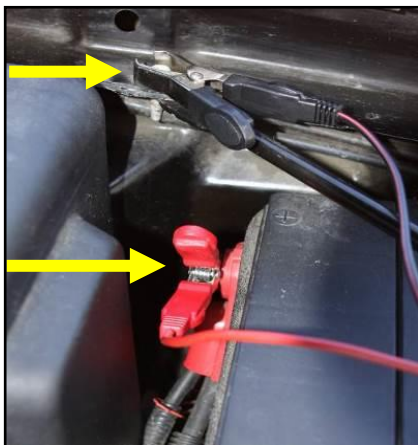
2.



Connect Nitrogen Regulator and hose to Nitrogen cylinder before connecting to GE-41413-B Tester.
(Set nitrogen cylinder's regulator to deliver 100 PSI / 6.9 bar, if using an adjustable regulator)

You can also use Optional Accessories
GE-41413-161 preset pressure regulator
which requires no adjustment.

3.



> Connect red clip to 12V-DC power.
> Connect black clip to chassis ground.

Tester Calibration Procedure

Verify GE-41413-B Output Supply Pressure

This tester has been calibrated at the factory and preset to deliver 13" H₂O pressure (32 mbar | 3.2 kPa), in TEST mode. It is normal for the tester to deliver a lower pressure in SMOKE mode.

However, based on your location and nitrogen inlet pressure supplied, it may be necessary to make a slight adjustment to the tester's output supply pressure before you use it for the first time. Once you make this adjustment, you should not have to adjust the tester's pressure regulator again, unless you change the nitrogen tank's regulated output pressure. Follow these simple steps to determine if your tester's pressure regulator requires calibration:

- A. Perform steps 1-5 in **Initial Setup**, on previous pages.
- B. Position tester's **Control Valve** on **TEST** mode. (Figure 1)
- C. Connect supply hose to Test Port. (Figure 2)
(This is a zero-leak self-test port)
- D. Open nitrogen cylinder's shutoff valve.
- E. Press and release the start button on tester's control panel.

NOTE: Allow about 30 seconds for pressure on tester's gauge to stabilize.

- F. Verify pressure is at 13" H₂O on tester's pressure gauge.

- If pressure is at 13" H₂O and ball in flow meter is at zero, then the Initial Setup of this tester is complete.
- If pressure is not at 13" H₂O, or if ball in flow meter is not at zero, then immediately proceed to step G below.

- G. Remove plastic cap, exposing pressure regulator adjustment. (Figure 3)

- H. Turn tester <ON>.

- I. Using a flat blade screwdriver turn adjustment screw clockwise to increase pressure and counter-clockwise to reduce pressure.

Note: Do not turn adjustment screw more than ½ turn at a time.

Note: If reducing pressure; you must remove the supply hose from the Test Port in order to relieve pressure build-up, then reconnect and verify pressure reading on tester's gauge.

VERY IMPORTANT: If at any time during this calibration process the ball in the flow meter does not settle at zero mark, that can only indicate one of two issues.

1. The tester could be producing too much pressure, causing the tester's internal EVAP over-pressure relief valve to open, indicated by the flow meter measuring the flow rate of the over-pressure relief valve's leak. Proceed to step 'J' below to resolve this issue.
2. The tester itself could have a leak. Note: step 1 above must be resolved before an internal leak of the tester can be determined.

- J. Be sure steps A-E on this page have been met. Use a screwdriver to reduce tester's pressure by very slowly turning screwdriver counter-clockwise until the safety pressure-relief valve closes, indicated by the flow meter ball settling at zero mark. Remove and reinstall supply hose from Test Port and verify test pressure is at 13" H₂O.

NOTE: Your GE-41413-B Tester is now ready for operation. Read entire operator manual before using Tester.

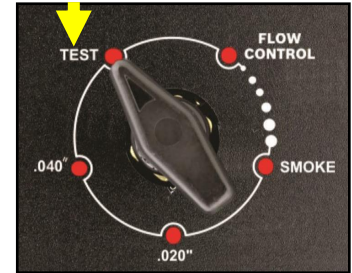


Figure 1

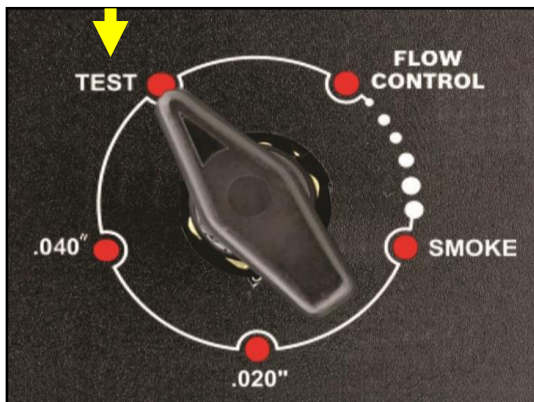


Figure 2

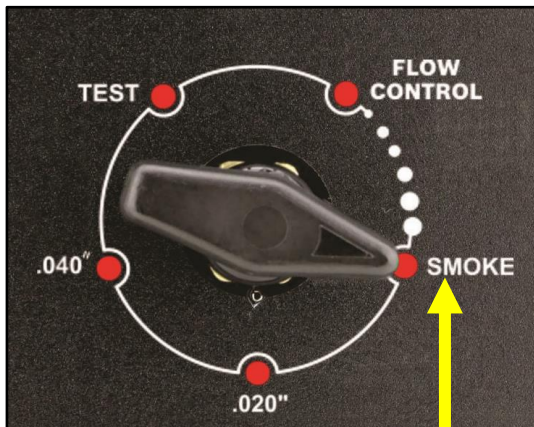


Figure 3

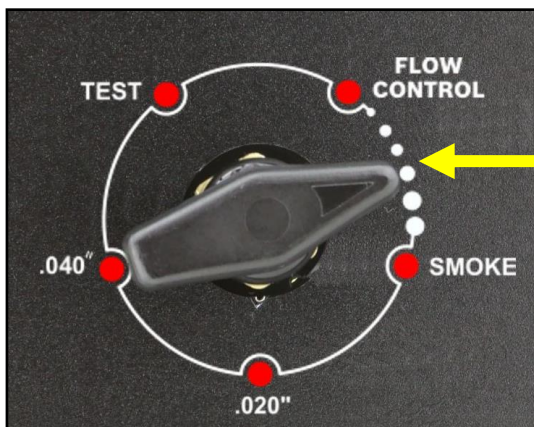
Control Valve Overview



TEST: Delivers non-smoke gas and a very accurate flow meter reading. This setting is for determining if a leak exists and how large it is.

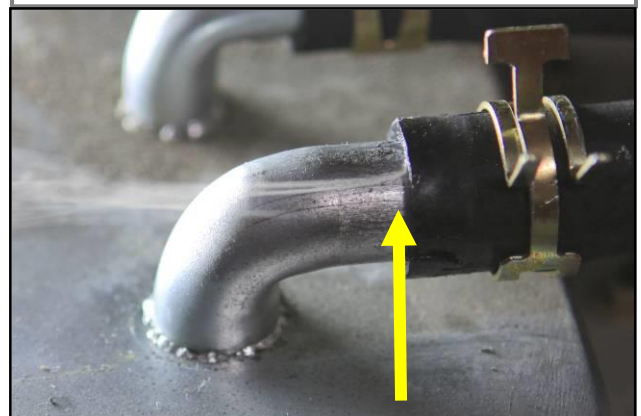


SMOKE: Delivers maximum smoke volume.



FLOW CONTROL: Controls smoke volume.

> Locating the leak source is sometimes easier with less smoke volume. First, fill system with smoke then reduce volume.



Note: Flow Control does not affect delivery pressure; it only affects flow volume.

EVAP Test

- A flow meter float indicating flow = flow going into (or through) the system being leak-tested. This is normal while the system is being pressurized.
- A flow meter float indicating flow *after* the system is filled = a leak in the system being tested. The higher the float is in the flow meter, the larger the leak size.
- No flow in flow meter = no flow through the system, or no leak.

Control Valve Leak Size Reference Points

The tester's control valve has calibrated leak size orifices built into the control valve. These .020" (0.5 mm) and .040" (1.0 mm) reference points calibrate the flow meter in order to quantify the leak size in the system being leak tested.

Calibrate the Flow Meter

Prior to calibrating the flow meter or running any tests, remove output hose from the tester and use shop air to purge any condensed UV Trace fluid. **FAILURE TO DO THIS WILL IMPACT FLOW METER PERFORMANCE AND TEST RESULTS.**

1. Position the Control Valve on a leak size. (See Figure 4 following OE manufacturer recommendations)
2. Press START button and observe the measurement of the flow meter's indicator float.
3. Position the flow meter's red pointer flag so that it aligns with the measurement observed in step 2 (See Figure 5).

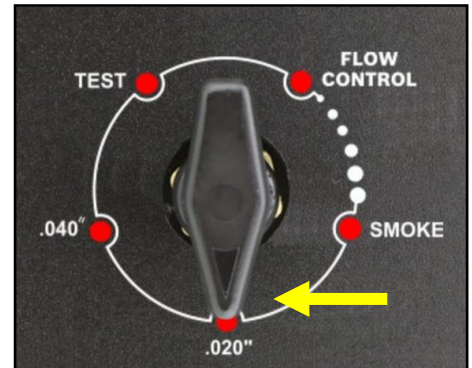


Figure 4

NOTE: This flow meter measurement indicates the EVAP Pass or Fail line for that leak standard.

Testing the EVAP System

1. Position the Control Valve to TEST (non-smoke gas).
2. Press START button and fill the system until the flow meter ball stops descending. Observe position of ball as compared to red flag.

> Above red flag = FAIL.

> Below red flag = PASS.

NOTE: If system failed and if previous test was performed in TEST mode (without smoke), then you must alleviate all pressure from EVAP system so that smoke can be introduced. Then set control valve to SMOKE (full flow) setting, introduce smoke and look for smoke or dye to find the leak(s).

NOTE: The flow meter measurements are most accurate when the tester's Control Valve is in TEST setting.

NOTE: When 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 (e.g. EVAP vent). Close the system once smoke exits that opening and continue to fill with smoke. This quickly fills the system with smoke (Note: depending on size of the tank and amount of fuel in it).



Figure 5

Pressure Gauge Overview

The pressure gauge serves two basic functions:

1. Monitoring system pressure while performing a pressure leak test in the TEST mode.
2. Measuring system pressure-decay (pressure loss) once system undergoing a pressure leak test has been filled in TEST mode.

NOTE: the pressure decay test is best performed immediately after the system undergoing a leak test has been filled with nitrogen in TEST setting, since the system has already built up pressure.

NOTE: if performing a pressure decay test when smoke is not needed, then the test will be even more accurate if performed using the control valve setting of TEST.

Test Procedure:

1. Be sure the GE-41413-B has completed filling the system being leak tested, with Control Valve in either TEST setting or SMOKE (full flow) setting. Depending on system being tested, follow GM OE Service Information procedures on Evaporative Emission System Diagnosis or Rechargeable Energy Storage System Smoke Testing.
 - > A filled system is confirmed when the flow meter float stops descending and the pressure gauge stops increasing in pressure.
2. If the GE-41413-B is still running; turn it off (by pressing the button on the tester's control panel) and immediately observe the pressure gauge for any decay, indicating a leak in the system being leak tested.
 - > Use whatever standard leak rate you are guided by to determine if the leak rate is above an acceptable level.



Do **NOT** run the vehicle engine with the GE-4143-B supply hose connected to the vehicle. Normal engine vacuum will damage the pressure gauge!

Disconnect the GE-41413-B supply hose from the vehicle after performing an EVAP test. Natural vacuum or pressure created by the fuel in the fuel tank can damage the pressure gauge if it exceeds the pressure limitations of the gauge.

Basic Test Procedures

(Testing for Vacuum Leaks)

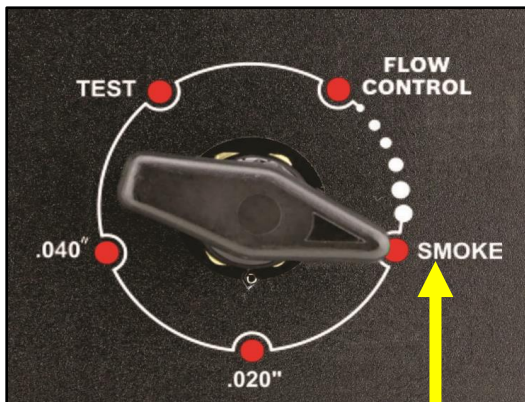
1.



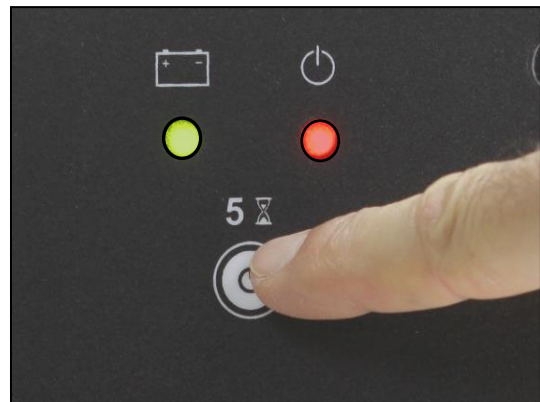
> Use adapter cone supplied to access intake/ induction system and connect smoke supply hose to adapter cone. Be sure brass cone supplied (GE-41413-153) is connected to supply hose.

Note: Completely unwind the nitrogen/smoke hose to optimize the tester's performance.

2.



> Position to SMOKE (full flow).



> Press START button.

> Green and red lights turn <ON>.

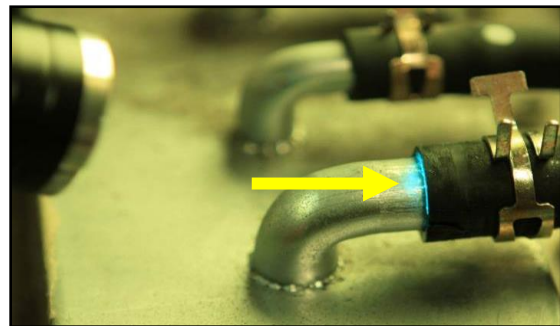
> A *blinking green light* indicates a weak battery.

> System is on a 5-minute timer.

3.



> Use white light supplied to find the smoke.



> Use UV light and yellow glasses supplied to find the dye.

Other Leak Samples

GE-41413-B can be used in virtually any vehicle low pressure system suspected of having a leak, such as; intake / induction, intercooler and turbocharger, vacuum, exhaust, EVAP and even wind/water leaks. Can also be used to verify air solenoid functions and test components prior to assembly.

Exhaust

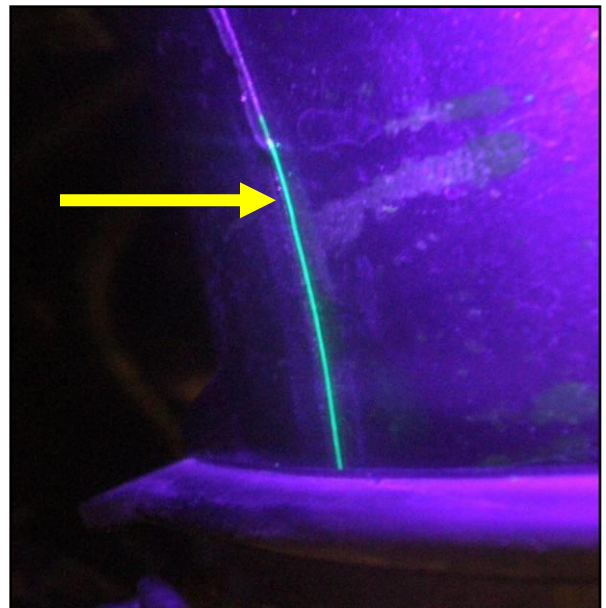


Fluorescent Dye Deposit

The UltraTraceUV® smoke solution contains a special ultraviolet-activated fluorescent dye that deposits at the exact location of a leak. Use the UV light provided to highlight the dye.

> *The longer the smoke is allowed to exit a leak, the more dye will be deposited.*

> *This technology has been designed so that the dye deposits only if there is pressure-differential. So for instance; the dye will deposit when exiting a leak but will not deposit during a wind and water leak test.*



Wind and Water Leaks

1. Set vehicle's climate control to 'Fresh Air' (not to re-circulate). Set blower on full speed.

> *This creates positive cabin pressure.*

2. Connect supply hose nozzle to Smoke Diffuser (Optional Accessory GE-41413-159)

3. Lay smoke path along seals.

4. Look for smoke disturbance indicating a leak.

No smoke disturbance means 'No Leak' >



< Smoke disturbance pinpoints the leak

Technical Specifications

Height	13.5 in. (34 cm)	Solution Max. Volume	12 oz. (355 ml)
Length	13 in. (33 cm)	Supply pressure	13.0 in. H ₂ O (32 mbar 3.2 kPa)
Width	9 in. (23 cm)	Supply volume	8 liters per minute
Weight	13.5 lb. (6.1 kg)	Smoke supply line	20 feet (6m)
Shipping weight	20 lb. (9.0 kg)	Power supply line	15 feet (4.6m)
Power supply	12 volts DC	Power consumption	15 amps.

NOTE: A common question asked is if one can use a very basic generic mineral oil, such as ‘baby oil’, in the GE-41413-B to create the smoke vapor.

Your GE-41413-B will create smoke vapor with baby oil, but we do not recommend it. The patented UltraTraceUV® smoke solution supplied with your GE-41413-B; will perform hundreds of tests (is very economical to use); is the only solution in the world approved by the OEMs; 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. UltraTraceUV® 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, evidenced by its foul odor and they could damage vehicle components or systems, such as EVAP system’s activated charcoal, and void factory warranty.

Troubleshooting Guide

Two lights on the control panel double as diagnostic lights.

Green	Red	Interval	Cause
✓		Blinks: 1 per second	Indicates weak battery power.
✓	✓	Blink simultaneously: 1 per second	Bad ground or power connection at smoke canister or short in circuit
✓	✓	Blink simultaneously: 4 times per second	Bad ground at smoke canister or open heating circuit
✓	✓	Blink alternately: 1 per second (System shuts down)	Bad ground or circuit board failure *

* If circuit board failure occurs, first disconnect power to your Tester for 10 seconds and reconnect. If failure code occurs a second time, disconnect Tester and contact Authorized Dealer.

Symptom	Likely Cause	Solution
The green power indicator lamp on the Tester does not turn ON	1. Poor power-supply cable connection.	1. <i>Secure power connection at the machine and wall outlet.</i>
There is no air or smoke coming out of the supply hose.	1. Flow Control valve is closed, either on Control Valve, or at base of supply hose. 2. Air/gas supply to tester is insufficient. 3. Bad power-supply cable connection, or power converter is set too low.	1. <i>Open flow control valves.</i> 2. <i>Check for sufficient air/gas supply.</i> 3. <i>Secure power converter connections and/or increase power converter setting.</i>
Very little smoke coming out of the smoke hose or oil dripping from the smoke hose.	1. There is too much smoke condensation inside the smoke supply hose. > This usually does <u>not</u> indicate a failure.	1. <i>Position the hose lower than the Tester. Set control valve to TEST and turn Tester <ON> for one cycle, or until oil has drained from hose.</i> Note: Remove the hose from the tester and use shop air to purge any condensed UV Trace fluid. Then reinstall the hose to the tester. Also when running any tests, completely unwind the nitrogen/smoke hose to reduce condensation and optimize the tester performance.

Warranty | Technical Support
Bosch Automotive Service Solutions
and



LIMITED TWO (2) YEAR WARRANTY

GE-41413-B Evaporative Emissions System Tester (EEST) & Smoke Machine

Bosch Automotive Service Solutions and Worldwide Vapor, Inc. warrant to the original purchaser; under normal use, care and service, tester shall be free from defects in material and workmanship for two years 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, Equipment 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.

For Technical Support:

1-800-GM TOOLS Monday-Friday 8:00am to 8:00pm EST



BOSCH



This product contains
STAR licensed technology, *inside*.

www.StarEnviroTech.com