OPERATOR MANUAL

Vehicle Evaporative Emissions Leak Detection System

Diagnostic Smoke® Vapor Machine

with Nitrogen Generator and UltraTraceUV® *Solution*

Approved for Flex-Fuel Vehicle Testing

Rotunda Part No. 218-00016
Manufacturer Part No. 522B-J/LR

ROTUNDA
GENERAL SERVICE EQUIPMENT
JAGUAR
LAND ROVER

Cautions & Usage Tips:

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

- This Tester automatically produces nitrogen, when connected to shop air, in order to insure safer testing of the vehicle's fuel vapor (EVAP) recovery system. You should never introduce air, containing oxygen, into a vehicle's EVAP system!
- Be sure air source to Tester is clean and dry by using appropriate filter on <u>your</u> air line prior to the Tester. Dirty, oily, or wet air can damage the Tester's built-in nitrogen generator and void the warranty.
- Check / replace Tester's filters regularly.

- Use only UltraTraceUV® Smoke Solution Part No. 218-00011. Altering the solution, hoses, cables or any other replacement part will void the warranty; may cause Tester malfunction; may cause damage to vehicle, property, or may cause personal injury.
- Do not use with running vehicle engine.
- Do not perform test near source of spark or ignition.

- Wear eye protection that meets OSHA standards.
- Follow safety precautions when using ultraviolet light source.
- Air pressure source to Tester must be between 90-150 PSI (6.2 to 10.3 bar).

- Use the halogen spotlight supplied to highlight the smoke exiting leaks.
- Use UV lamp supplied to look for the fluorescent deposit at the exact location of the leak(s). If using alternate UV light, be sure it is in the nanometer (nm) range of 410 ± 50 nm.
- Smoke exiting a very small leak is even easier to see if <u>after</u> filling the system with smoke you cycle the remote starter button on/off at about 30-second intervals. This will introduce the smoke and allow the system pressure to decrease making the leak even more visible.
- When operating the Tester in near freezing temperatures, cycle the operation of the Tester 15 seconds ON and 15 seconds OFF for approximately the first minute or two of operation. This will allow the 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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Specifications:

Vacutec® 522B-J/LR -- Technical Specifications			
Height	39 in. (99 cm)	Inlet pressure required	75--150 PSI (5.2—10.3 bar)
Depth	27 in. (68.6 cm)	Supply pressure output	13.0 in. H_2O (0.032 bar)
Width	20 in. (50.8. cm)	Supply volume	12 liters per minute
Weight	100 lb. (45.4 kg)	Smoke supply line	12 feet (3.6 m)
Shipping wt	105 lb. (47.6 kg)	Power supply line	10 feet (3 m)
Power supply	120 volts AC 60 Hz	Remote starter cable	10 feet (3 m)
Consumption	15 amps.	Operating temp. range	45°F to 140°F (7.2°C to 60°C)
		Altitude	Up to 2,000 M (6,561 Ft)
Maximum Relative humidity……>		80% for Temperatures up to 140°F (60°C)	
Conditions of se..……>		Indoor / Outdoor (if not wet)	
Pollution Degree: 2		Required gas source: compressed air will generate N_2	

Notes:

Vacutec® Smoke Machine EVAP Emissions System Tester with built-in Nitrogen Generator:

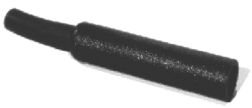
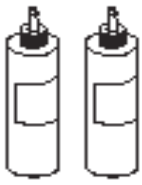
The Vacutec® 522B-J/LR Smoke Machine is approved for Evaporative Emissions System (EVAP) leak-testing, as well as other systems, on all Jaguar and Land Rover vehicles.

Utilizing the most advanced patented technology, the VACUTEC® 522B-J/LR is the most comprehensive, yet simple to operate (EVAP) tester available today. Simply connect the VACUTEC® 522B-J/LR to compressed air (shop air) and the machine automatically converts the air to high-purity nitrogen using Pressure Swing Absorption (PSA) nitrogen technology.

This Tester performs functions that both ***quantifies*** (Phase-one) the leaks and ***identifies*** (Phase-two) the leaks. It *quantifies* the leaks by using a pass/fail flow-test that verifies 0.040" (1 mm) and 0.020" (0.5 mm) size EVAP leaks (capable of verifying leaks much smaller and is updatable should future leak standards change). The 522B-J/LR also verifies a leak is present by using vacuum-decay and pressure-decay tests. *Identifying* the leaks is simple. Introduce the special non-toxic Diagnostic Smoke® vapor into the system to be tested and then simply look for the exiting smoke or the fluorescent dye deposited at the exact location of the leak(s). Also finds leaks in induction systems, under-dash vacuum systems, exhaust and EGR systems, throttle bodies, unfiltered and unmetered air systems, wind and water leaks and much more. All tests are performed with the engine OFF (not running).

<u>Please note</u>: It is essential that you maintain a proper filtration system for the compressed air being supplied to the 522B-J/LR Tester. Excessive moisture or oil in the air supplied to the Tester can contaminate its PSA nitrogen generators, damaging the Tester and voiding the warranty. Proper filtration will insure many years of trouble-free operation.

Accessories Included with Tester:

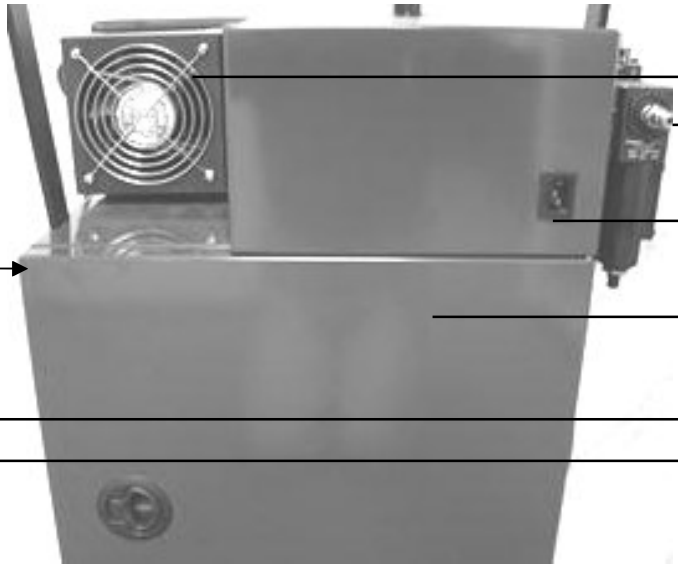
	**No. 218-00012 – EVAP Service Port Adapter** (Small size) connects to factory service port on some Jaguar cars. **No. 218-00007 – Service Port Adapter** (Standard Size) connects to factory EVAP service port. **No. 218-00014 – Schrader Removal / Installation Tool** fits both sizes of Schrader valves in vehicles with factory EVAP service port.
	**No. 218-00013 – Fuel Neck Adapter w/ fitting** ***Fits Jaguar X202 2003 MY S Type & X350 2004 MY Sedan cars.*** This adapter secures to the vehicle's fuel tank neck and is used to introduce smoke into the EVAP system on the vehicles mentioned above. These vehicles have a check valve (&/or roll-over device) inside the fuel tank, preventing smoke from exiting the fuel neck if smoke is introduced from the vehicle's EVAP Service Port -- thus preventing a full system purge during Phase-two testing. ***Note:*** *When using this adapter, vehicle's fuel level must be at ¼ or less. You must also purge the EVAP system during smoke introduction by either using the Service Port Adapter provided to open the EVAP service port Schrader valve or by opening a line toward the other end of the EVAP system.*
	**No. 218-00003 – Two Exhaust Cones** used to either introduce smoke into the exhaust system; into any system that fits the cone's tapered size; used as an exhaust plug when testing a dual exhaust system; or exhaust plug when testing the intake vacuum system.
	**No. 218-00004 – 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.
	**No. 218-00005 – 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.
	**No. 218-00008 – Halogen Spotlight** highlights the smoke when searching for leaks.
	**No. WVA16345 –** Twelve LED hi-intensity true UV light. Includes battery charger and UV enhancing glasses.
	**No. 218-00034 – UltraTraceUV® Smoke Solution** Tester arrives with a full charge of solution, enough to perform approximately 500 tests – plus one additional spare bottle. Use tester's dipstick and top off smoke solution regularly.

Tester Overview:

1. Dipstick
(Top-off fluid regularly)
2. Filters
3. Flow meter w/ pointer flag
4. Nitrogen / Smoke supply hose
5. Control Panel
6. Storage Compartment
7. Instructions panel
8. Vacuum / pressure gauge
9. Upper control panel lights
10. Function control buttons
11. Nitrogen Generator diagnostic lights
12. Vacuum-decay function button and regulator.
13. Remote Smoke Button
(Not sown. Its function is same as SMOKE button on control panel)

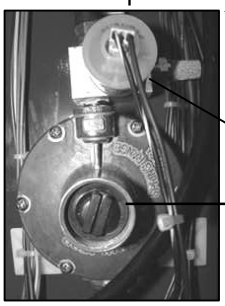
< Front view

< Rear view



14. Vacuum-decay device fan
15. Shop air fitting
16. Power Cord Plug
17. Service Panel Door
18. Oxygen sensor
19. Pressure regulator / calibration adjuster

Located inside service panel



Tester Overview – Feature Description:

1. **Dipstick:** Similar to maintaining proper oil level in a vehicle's engine, you should maintain the Tester's smoke solution level at the FULL mark.
2. **Filters:** This Tester has four filters; three outside of the cabinet and one accessed through the cabinet's rear door. Replace the three outside filter elements yearly or sooner if indicates.
3. **Flow meter w/ pointer flag:** Use to establish a quick Pass / Fail mark when determining if the EVAP system in the vehicle being tested has a .020'' (0.5 mm) or .040'' (1.0 mm) leak. You can also use the meter to verify flow in a system that has solenoids or a venting device that opens and closes, or simply to verify the integrity of any low pressure system for leaks.
   > This flow meter is capable of detecting leaks as small as .005'' (0.127 mm).
4. **Nitrogen / Smoke supply hose:** Use to deliver nitrogen, nitrogen with smoke vapor or to perform decay tests.
5. **Control Panel:** Houses all the Tester's controls.
6. **Storage Compartment:** Use to store accessories supplied with Tester.
7. **Instructions panel:** Use as quick reference of Tester's operations.
8. **Vacuum / Pressure gauge:** Serves three functions 1) monitoring system test pressure while in TEST mode 2) measures system Pressure-Decay once TEST or SMOKE mode completes its cycle 3) measures system Vacuum-Decay when using Vacuum-Decay function.
9. **Upper control panel lights:**
   Green**:** READY > Turns ON indicating Tester is ready for operation (this occurs after Tester's self-calibration).

   Red**:** SMOKE > Turns ON when SMOKE button is depressed, as long as the self- calibration process is complete.

   Yellow**:** CHECK OIL > Emergency Low Oil light turns ON if smoke solution is depleted. *Check oil level regularly. Do NOT allow Check Oil light to turn ON*.

10. **Function control buttons:** These buttons, along with the vacuum-decay (#12) function button, are the Tester's main system controls. (Figure 1)

    > .040" / .020" (1.0 mm / 0.5 mm): Simulates these leak sizes on the flow meter, calibrating the flow meter and setting the pass / fail level for EVAP system leaks - on a 10-second timer.
    > FUTURE: Updatable should future leak standards change.
    > TEST: Introduces nitrogen – on a 5-minute timer.
    > SMOKE: Introduces smoke (with nitrogen) – on a 15-minute timer. Pressing button prior to 15 minutes turns Tester OFF.

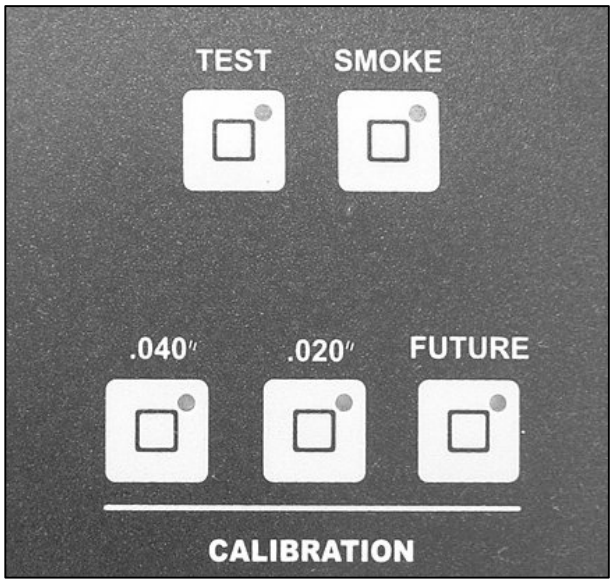


Figure 1

Tester Overview – Feature Description (continued):

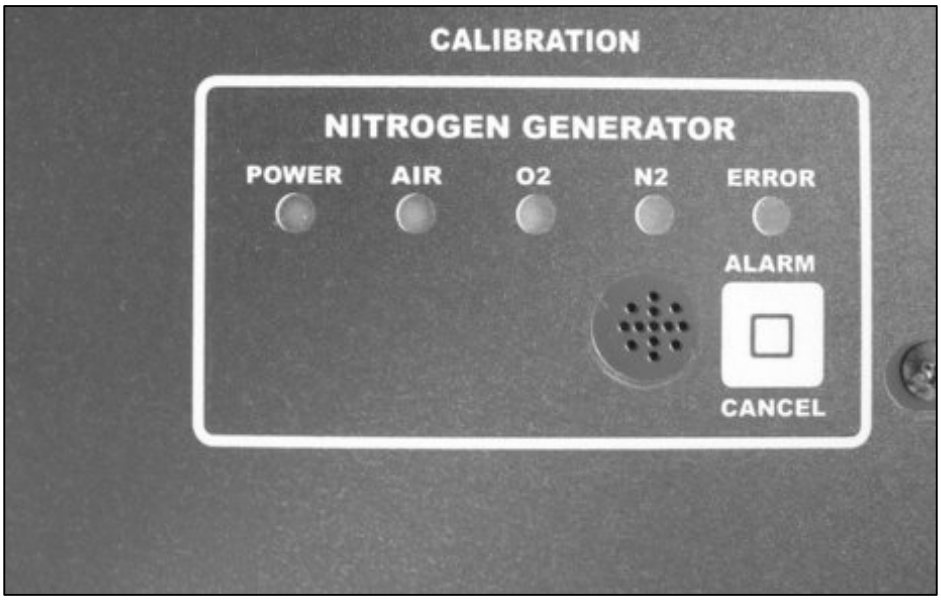


Figure 2

11. **Nitrogen Generator Diagnostic Lights:** These lights inform the operator of the status of the self-calibration process as well as Tester readiness. (Figure 2)

GREEN**:** POWER > When connected to 120V AC power; all lights initially blink and an audible sound is heard indicating a system self-test has begun.
> Turns ON solid indicating good power status and initial self-test is complete.

YELLOW**:** AIR > When connected to power only; light blinks indicating Tester needs to be connected to shop air or indicates there is insufficient air pressure.
> Turns ON solid when Tester is connected to power and shop air.

YELLOW**:** O_2 > Blinks during oxygen sensor self-calibration (approx. 30 seconds).
> Turns ON solid once oxygen sensor calibration is complete.

GREEN**:** N_2 > Blinks during nitrogen-purity calibration (approx. 50 seconds).
> Turns ON solid once nitrogen-purity is achieved – Tester is now ready for operation.

RED**:** ERROR > Turns ON solid if nitrogen purity is not achieved after calibration process.
> Turns ON solid and sounds audible alarm if nitrogen purity drops below acceptable levels during Tester operation. Disconnect power to Tester for 10 seconds and reconnect to initiate calibration process again.

ALARM / CANCEL > If fault occurs and audible alarm sounds, this button turns off audible alarm but will keep red error light on. Disconnect power to Tester for 10 seconds and reconnect to initiate calibration process again.

Tester Overview – Feature Description (continued):

12. **Vacuum-decay function button and vacuum regulator:** Button turns ON vacuum test and knob calibrates vacuum level (on 30 second timer).
13. **Remote Smoke Button:** (Not shown) Function is the same as SMOKE button on control panel.
14. **Vacuum-decay device fan:** Operates only during vacuum-decay test function to dilutes / disburses fumes during vacuum test (do not restrict flow).
15. **Shop air fitting:** Connects to shop air hose. Tester's inlet pressure must be between 75 and 150 PSI (5.2 to 10.3 bar).
16. **Power Cord Plug:** Connects to extension cord and 120-Volt AC 60 Hz wall outlet.
17. **Service Panel Door**: This is an access panel only and NOT for storage!
18. **Oxygen sensor:** Monitors the presence of oxygen in order to insure nitrogen purity.
19. **Pressure regulator / calibration adjuster:** Allows you to adjust system test pressure for calibration purposes.

Tips Prior to Performing EVAP Tests:

- **ALL tests with this Tester are performed with the engine OFF!**
- When the vehicle's engine is turned off, the OBD-II EVAP System's Vent Valve is generally venting (open). Use a scan tool and 'close' the Vent Valve in order to perform any leak tests.
- Because of the Vehicle Fuel Evaporative System's volatile fumes, you must never introduce air (containing oxygen) into a vehicle's EVAP system. This Tester will automatically produce a high-purity nitrogen when simply connected to shop air.
- Regardless of the system you are testing it is best to perform all tests in calm air so that the smoke exiting the leak(s) will not be blown away impairing your view of the leak(s).
- Most low-pressure closed systems can be tested for leaks with this Tester. You must **a)** introduce smoke into the system being tested and allow the smoke to exit out an open port (in order to make sure system is properly purged / filled) and then **b)** seal the system to be tested, in order to contain the smoke in the system being tested.
- Always completely unwind the Tester's supply hose before using it, otherwise condensed smoke vapor, in the form of liquid, will accumulate in the hose windings restricting the flow of smoke.

Tester Setup / Preparing the Tester for Operation:

1. The Tester arrives with a commonly used male quick-disconnect fitting. Be sure this fitting is the correct fitting for your female hose connector. (Figure 3)
   > *If you need to replace the fitting, use Teflon® tape to seal the threads, being careful not to place the tape too close to the edge where the air will travel -- that could cause a piece of the tape to break off and plug the filter.*
2. Connect a filtered / clean shop air supply consisting of a pressure between 75-150 PSI (5.2 to 10.3 bar).
3. Connect the Tester's power cord to 120-volt AC.
4. Observe that the Tester's control panel lights functions have been met, as described in earlier sections, and that the Green / Ready lamp on the Tester is 'ON', confirming that the Tester is ready for operation.

   Note: Any time the Tester is connected to power, it is normal to hear a gas pressure-relieve type noise about every 60 seconds, indicating a "pressure balance" during nitrogen-generation.

5. **NOTE: Prior to using the Tester for the first time; perform a quick pressure and vacuum calibration check by following the simple instructions in Tester Pressure Calibration and Tester Vacuum Calibration sections in the following two pages of this manual. Perform these steps to make sure the Tester is properly calibrated for your location.**

Figure 3

Tester-Pressure Calibration:

Based on your location and local climate, it may be necessary to make a slight adjustment to the Tester's output supply pressure before you use it for the first time. You should also verify proper calibration periodically as part of a routine maintenance program.

Determining if the Tester requires pressure calibration:

1. Connect Tester to shop air pressure (between 75-150 psi).
2. Connect Tester to 120-Volt AC power.
3. Allow tester to complete self-test and Green Ready light to turn ON.
4. Push and release the Tester's TEST button.
5. Restrict Tester's Supply Hose flow by placing your finger over the end of the Supply Hose Nozzle Tip or install a leak-free plug at the end of the Tester's Supply Hose Nozzle Tip.
6. The Tester's pressure gauge should read between 13'' and 14'' of water column (w.c.). (Figure 4)
   Note: *Proceed to Step 7 below if the Tester's pressure is not between 13'' and 14'' w.c.*

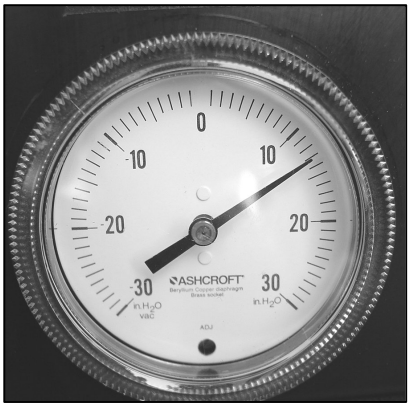


Figure 4

Adjusting System Pressure:

7. Be sure the Tester's System Pressure Gauge is indicating system pressure after having performed steps 1-6 above. (Figure 4)
8. Be sure Tester's TEST function is still ON. Use a flat-blade screwdriver to adjust the system pressure until pressure reads 14'' w.c. (see figure 5)

System pressure adjustment
(located inside rear panel)
Clockwise *increases* pressure
Counter-clock *decreases* pressure

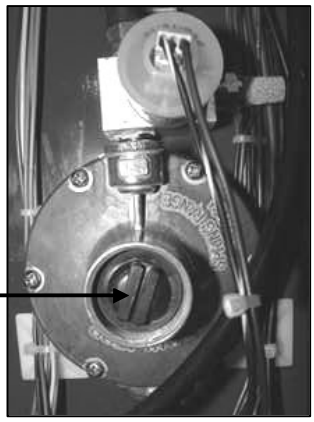


Figure 5

CAUTION: Carefully adjust the system pressure regulator by turning the adjuster in only 1/4 turns at a time. Turning the regulator plunger too far clockwise will cause the plunger to lock up; turning the regulator plunger too far counterclockwise will cause the plunger and spring to fall out of the regulator.

9. Remove the restriction from the supply hose tip for one or two seconds then once again restrict the supply hose flow. Verify that system pressure is somewhere between 13''-14'' w.c.; if not, repeat steps 7 and 8 above.

Phase-One – (quantifying the leak):

1. Connect Tester supply hose to vehicle EVAP system.
   > Refer to appropriate vehicle application.
   Note: For best Tester performance on a vehicle with an EVAP service port; do not connect to EVAP system via EVAP service port before removing the Schrader valve (left-hand thread). Otherwise, access EVAP system at other connection.

2. Determine if the vehicle's EVAP system you are testing is governed by a .020'' (0.5 mm) or .040'' (1 mm) acceptable leak standard. Press the appropriate calibration standard on the Tester's control panel (Figure 6) and observe the position of the flow meter ball. (Figure 7)
   > This function automatically turns off in 10 seconds.

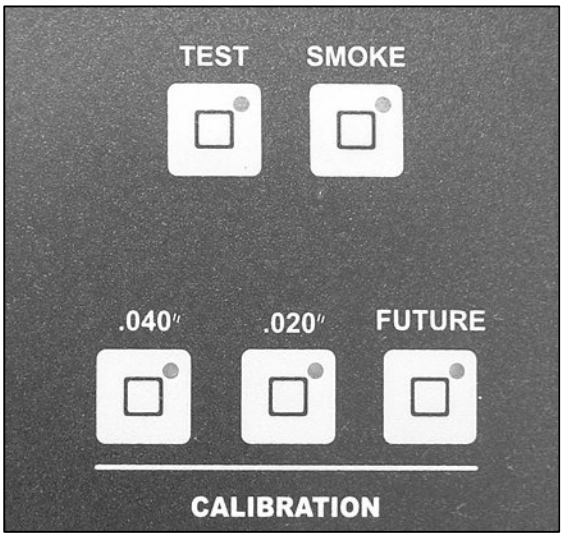


Figure 6

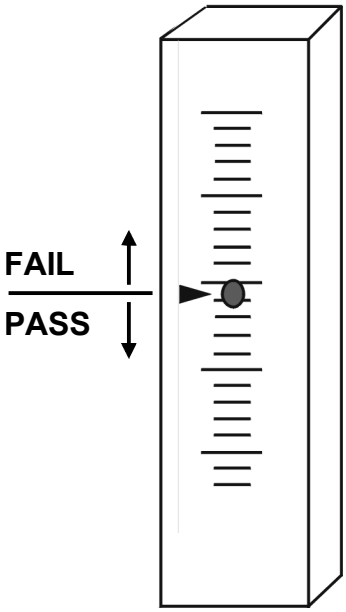


Figure 7

3. Position the flow meter's pointer flag so that it aligns with the measurement observed in step 2 above. (Figure 7)
   > This sets PASS / FAIL mark.

4. Close vehicle's EVAP Vent Solenoid.
   > Refer to appropriate vehicle application.
5. Press TEST on control panel and fill EVAP system. (Figure 6)
   > *This introduces 5-minutes of nitrogen gas.*
6. Look for flow meter ball to stop descending indicating that the vehicle system is full.
   > *Fill time 1-4 minutes depending on system volume.*
7. Compare flow meter ball reading to pointer flag. (Figure 7)
   > ABOVE flag = FAIL *(go to Phase-Two).*
   > BELOW flag = PASS *(test complete).*

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.

Testing With Pressure and Vacuum Decay:

In addition to quantifying the leak with the Phase-One flow test, the Tester allows you the flexibility of testing the vehicle's EVAP system by using either Pressure Decay or Vacuum Decay methods. Below are instructions for performing both decay tests.

Pressure-Decay Test:

Note: The Pressure Decay test is best performed immediately after the Phase-one flow test, since the system has already built up pressure.

At the completion of the Phase-one flow test, the EVAP system is fully pressurized, since the Phase-one test uses pressure to perform its flow test. Testing Pressure Decay with the Vacutec® 522B-J/LR is very simple. All you need to do is the following:

1. Be sure the Tester has completed the Phase-one flow test by referring back to Phase-one instructions in this manual. Remember that the Phase-one test is completed when the flow meter's ball stops descending. At that time the pressure gauge will indicate full system pressure. (Figure 8)
2. If Tester is still running, turn off the Tester by pressing the TEST button and observe the pressure gauge for any decay (loss of pressure) indicating a leak in the EVAP system.
3. Use whatever standard leak rate you are guided by to determine if the leak rate is above an acceptable level.

Pressure Decay Test Limitations:

- Understand that the pressure decay test will only give you a leak or no leak result and that *quantifying* the leak with this test is not possible.

Note: Disconnect the Tester from the vehicle after testing or the increasing fuel pressure in the vehicle's fuel tank (due to fuel volatility) could cause the Tester's pressure gauge to exceed its maximum pressure reading.

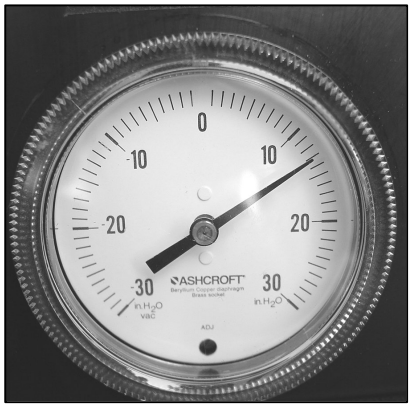


Figure 8

Vacuum Calibration:

Checking Vacuum Level Prior to Performing Vacuum Decay Test:

1. Allow tester to complete self-test and green READY light to turn ON.
2. Push and release the VACUUM button on Tester's control panel. (Figure 10)
   > *Vacuum button is on a 30-second timer.*
3. Restrict Tester's supply hose flow by placing your finger over the supply hose nozzle tip or install a leak-free plug at the end of the Tester's supply hose nozzle tip.
   Note: *The Tester's factory preset calibration is approximately -12'' w.c. (Figure 11)*
   Proceed to Step 4 below if you require a different vacuum setting.

Adjusting Vacuum Level Prior to Performing Vacuum Decay Test:

4. Be sure the Tester's System Vacuum Gauge is indicating system vacuum after having performed steps 1-3 above. (Figure 12). Press VACUUM button again if required to turn vacuum ON.
5. Locate Tester's vacuum calibration adjuster. (Figure 10)
6. Unlock the adjuster by loosening the knurled lock nut on the regulator's shaft. (Figure 10)
7. Slowly turn the knob clockwise to increase vacuum or counterclockwise to decrease vacuum until you reach the desired w.c. vacuum setting.
8. Temporarily relieve vacuum pressure in the line by removing the restriction at the supply hose nozzle. Test vacuum by once again restricting the supply hose nozzle.
9. Lock the adjuster by tightening the knurled nut.

Figure 9

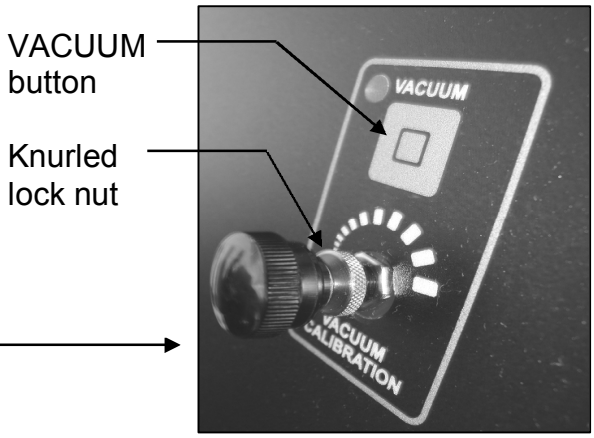


Figure 10

Vacuum-Decay Test:

1. Allow tester to complete self-test and green READY light to turn ON.
2. Connect Tester supply hose to vehicle EVAP system.
   > Refer to appropriate vehicle application.
3. Close vehicle's EVAP Vent solenoid
   > Refer to appropriate vehicle application.
4. Press VACUUM switch on Tester's control panel. (Figure 10)

   Note: The vacuum switch is on a 30-second timer, which should be sufficient time to draw the appropriate vacuum from the EVAP system. Press VACUUM switch again if additional time is required.

5. After vacuum timer turns off, observe the vacuum gauge for any decay (loss of vacuum) indicating a leak in the EVAP system. (Figure 11)
   > Use whatever standard leak rate you are guided by to determine if the leak rate is above an acceptable level.

Note: Disconnect the Tester from the vehicle after the Vacuum Decay Test. The fuel pressure in the vehicle's fuel tank is constantly changing due to the vehicle's fuel volatility and that could cause the Tester's pressure gauge to exceed its maximum reading limits.

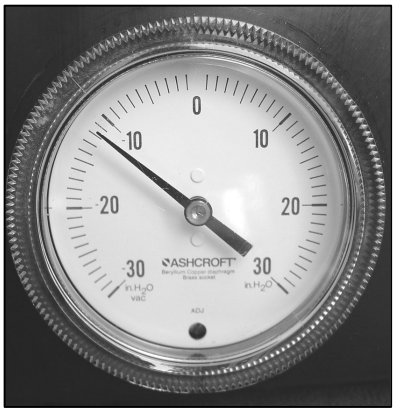


Figure 11

Phase-Two – (identifying the leak):

1. Allow tester to complete self-test and green READY light to turn ON.
2. Connect Tester supply hose to vehicle EVAP system.
   > Refer to appropriate vehicle application.
   > For best Tester performance; completely unwind Tester's supply hose.

Note: For best Tester performance on a vehicle with an EVAP service port; do not connect to EVAP system via EVAP service port before removing the Schrader valve (left-hand thread). Otherwise, access EVAP system at other connection. The Schrader valve will cause the smoke vapor to be drastically reduced and diminish its performance.

3. Close vehicle's EVAP Vent Solenoid.
   > Refer to appropriate vehicle application.
4. Remove the vehicle's fuel cap prior to introducing smoke into the EVAP system
5. Press SMOKE on control panel to fill EVAP system with smoke vapor.
   > *The control panel SMOKE light will light indicating smoke production.*
   > *The SMOKE setting is on a 15 minute timer. Pressing the SMOKE button again turns Tester off.*
   > It is normal for the flow meter ball, while in the SMOKE mode, not to be as steady as when it is in the TEST mode.

Note: The pressure gauge is active only after SMOKE cycle is complete.

6. Secure the fuel cap AFTER smoke is observed exiting the fuel tank's neck area.
   > *The removal of the fuel cap prior to introducing smoke insures faster filling of the EVAP system.*
7. Continue introducing smoke into the EVAP System until the flow meter's ball stops descending. This assures the system test pressure is met.
8. Follow the EVAP system path with the halogen light provided and look for the smoke exiting the leak(s) or use the UV light provided and look for the dye deposited at the exact location of the leak(s).
9. Repair the leak(s) and perform the Phase-One flow test again (or either decay test) to verify repair, as well as to make sure there are no additional leaks in the EVAP system.

> *The UltraTraceUV® smoke solution's dye feature 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, wear the yellow UV glasses and shine the UV light provided to identify the exact location of the leak(s).*

> *Smoke exiting a very small leak is even easier to see with lower pressure. If you encounter smoke leaking out of an area but find it difficult to pinpoint exactly where the source of the leak is; try reducing the pressure in the system being tested by turning the Tester OFF and allow the pressure to dissipate.*

> *The longer a particular leak is allowed to leak, the more fluorescent dye material will be deposited at that leak.*

Maintaining Proper Oil Level:

Similar to checking and topping off the oil in a vehicle's engine, you should maintain the Tester's solution level at the FULL mark. (Figure 12)

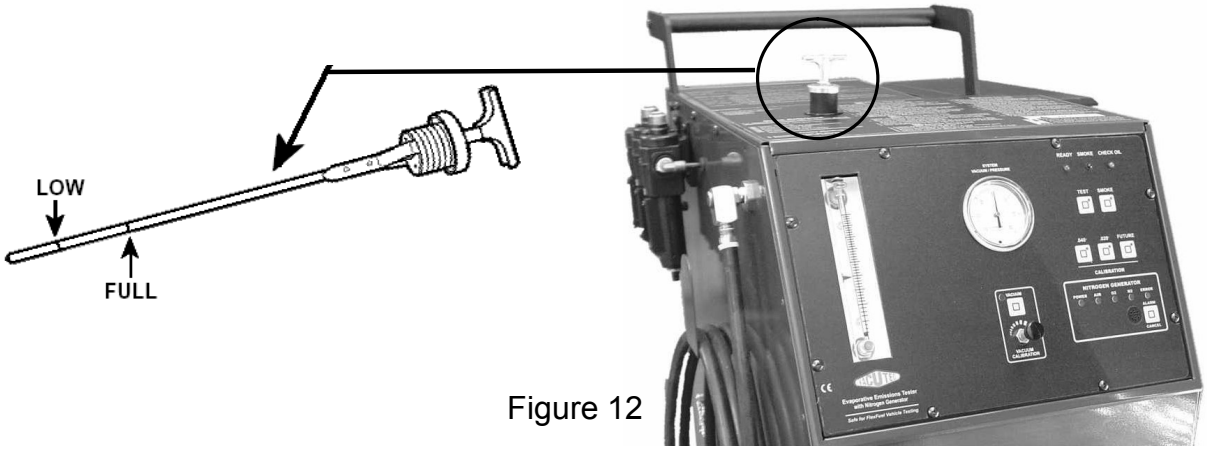


Figure 12

Do not attempt to introduce a solution into the Tester that is not recommended by the manufacturer because it could damage the vehicle! It will also void the Tester's warranty; could cause harm to the operator and may damage the Tester! Always use solution part number 218-00034 from Rotunda.

Yearly Maintenance – Replace Filters and Oxygen Sensor:

It is very important to keep the Tester's nitrogen generator assemblies free of oil, water and other contaminants, in order to maintain a high nitrogen purity and long service life. In order to do that, you need to be sure and maintain a clean filter system on <u>your</u> air supply into the Tester.

You must replace the filter elements inside filter assemblies #1, #2 and #3 once a year, or sooner if moisture or restriction is present, indicated by a red band seen in top view window of filter #2. Use only approved filter elements noted in Replacement Parts list in this manual. Turn filter bowl ¼ turn in counter-clock direction to gain access to the filter element. (Figure 13)

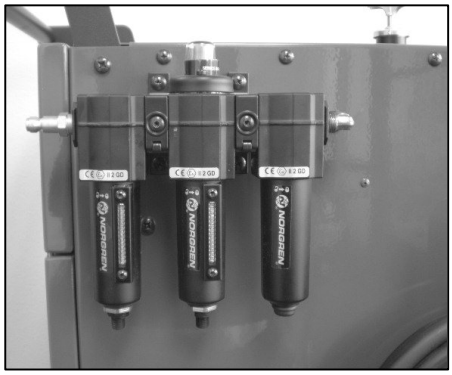


Figure 13

Replace oxygen sensor once a year:

1. Unplug Tester from wall outlet.
2. Remove oxygen sensor's electric plug.
   > *Grab the plug not the wires!*
3. Unscrew oxygen sensor (counter-clock).
4. Screw in new oxygen sensor.
5. Replace electric plug.

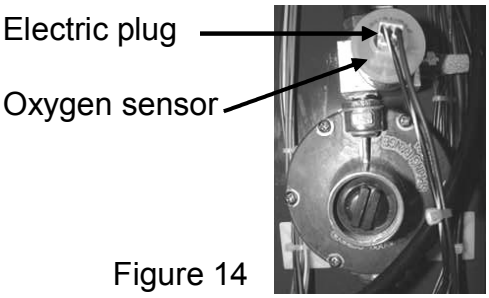
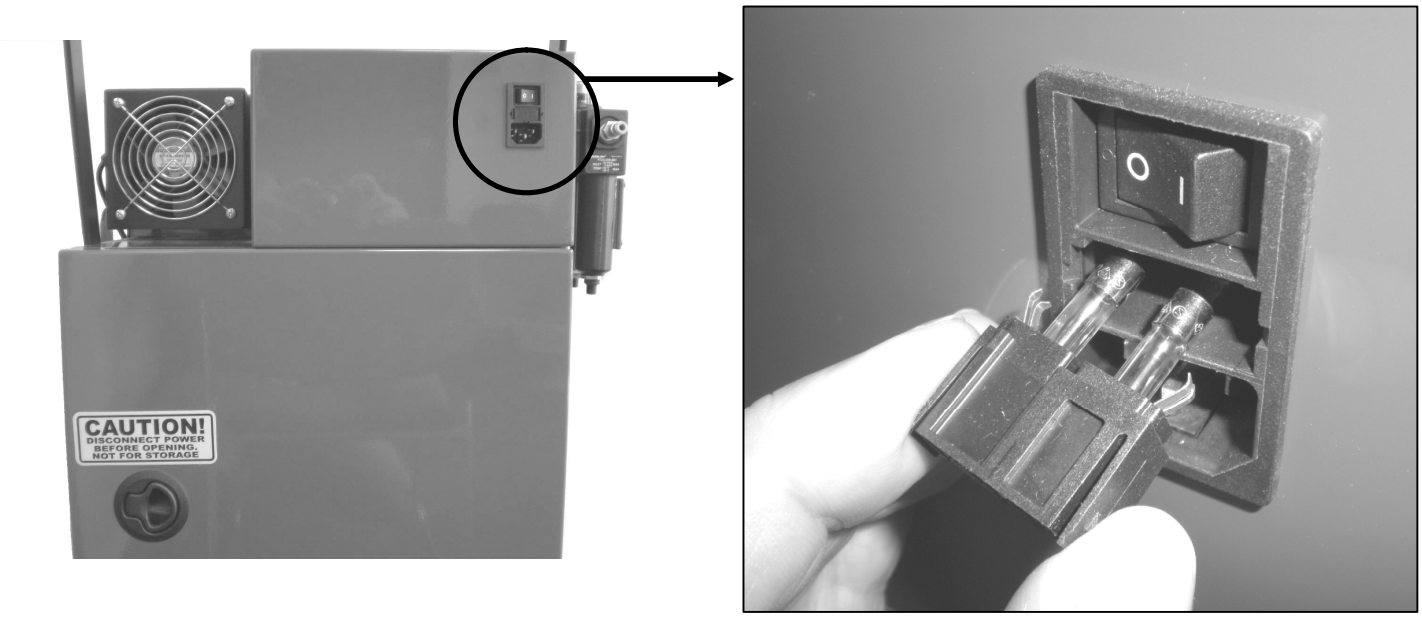


Figure 14

Fuse Replacement:

1. Unplug power cord from wall outlet.
2. Unplug power cord from Tester.
3. Remove fuse box by pinching outer sides of box.
4. Replace with 250V-IEC 5A fuse, obtained at most electronics stores, or from us with Part No. 030-F2395-ND. (Two fuses required).



Troubleshooting Guide *For Tech Support: 1.888.822.8832 (Opt.2)*

The Vacutec® 522B-J/LR has three diagnostic lights on the upper-right section of the control panel which indicate basic functions. The following tables describe the Tester's trouble codes.

Upper Panel Lights:

Green	Red	Yellow	Interval	Causes
		✓	Constant ON	Low on Smoke Solution
✓			Constant ON	No problems – system ready
✓			Blink: 1 per second	Insufficient power
✓	✓		Blink simultaneously: 1 per second	Bad ground at canister or at circuit board. Power connection loose or short in heating circuit
✓	✓		Blink simultaneously: 4 per second	Bad ground at canister or at circuit board. Open heating circuit
✓	✓		Blink alternately: 1 per second (System will automatically shut down.)	Bad ground at canister or at circuit board. Vapor control circuit*

* If this fault occurs, first try disconnecting power to the Tester for 10 seconds and reconnect. Allow system to self-calibrate and green READY light to turn ON. If failure code occurs a second time, disconnect Tester and contact manufacturer.

Vacuum test Button Light:

A blinking light indicates a faulty vacuum fan function.

Nitrogen Generator Diagnostic Lights:

These five diagnostic lights indicate the proper functionality of the nitrogen generator and are best described on page 5 of this manual.

NOTE: If Tester's O_2 Sensor fails to properly calibrate after approximately one minute (indicated by a continually blinking O_2 Sensor light), that indicates the O_2 Sensor requires recalibration. Replace the O_2 Sensor only if the recalibration fails to calibrate the Sensor. Follow recalibration instructions on next page.

Oxygen (O2) Sensor Calibration

NOTE: If O_2 light on your Tester's control panel continues to blink, indicating a faulty O_2 sensor, follow instructions below to:
I) Recalibrate the O_2 sensor in your Tester
II) Determine if the O_2 sensor is faulty
III) Replace the O_2 sensor and calibrate new sensor

I) Prior to installing a new O_2 Sensor; follow these steps to determine if your Tester's O_2 can be recalibrated.

Helpful Tip > Familiarize yourself with steps 5-7 in this section before performing step 1.

1. Turn Tester's power 'OFF'.
2. Push and hold alarm button (figure A).
3. Turn Tester's power 'ON'.
4. Once Power light stops flashing, and turns 'ON' solid, release alarm button (figure A).

The next 3 steps must be completed within 15 seconds after the power light turns 'ON' solid.

5. Open the rear cabinet door (figure B).
6. Locate circuit board (figure B).
7. Press calibration button on the circuit board until buzzer sounds (figure C).
8. **Calibration of O_2 is now complete!** This triggers the calibration of the N_2. After 50 seconds, the N_2 light will go solid and Tester is once again ready for operation.

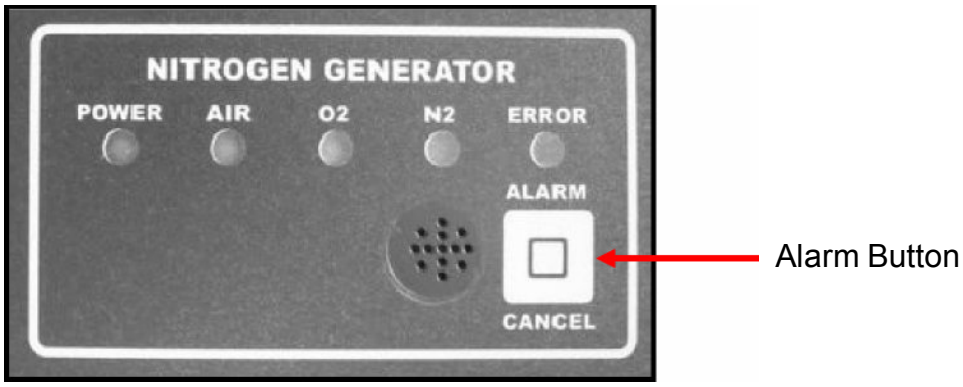


Figure A

NOTE: If step '**I**' above failed to recalibrate the O_2 Sensor, proceed to step '**II**'.

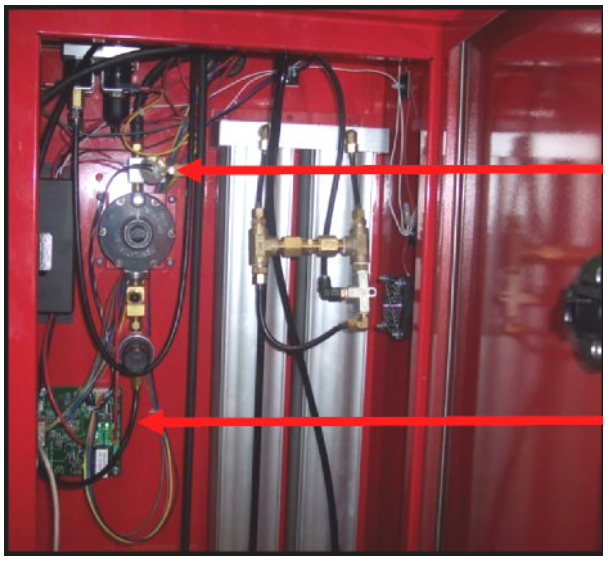


Figure B

Figure C

II) Determining if your O_2 sensor is faulty (was not able to recalibrate).

1. Turn Tester's power 'OFF'.
2. Remove O_2 sensor's electric plug (figure D). Note: Grab the plug, not the wires!
3. Set Voltmeter to 200mv scale and probe the two outer terminals (figure E).
   > This procedure can also be performed with the O_2 sensor removed from the Tester.
4. If voltage is below 6mv, the O_2 sensor has failed and needs to be replaced.

Figure D

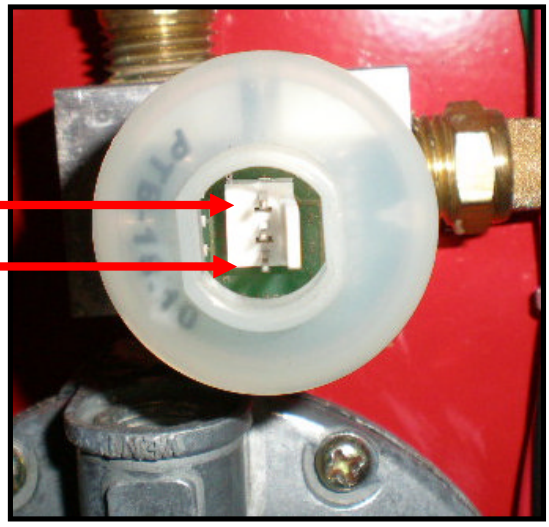


Figure E

III) Replace O2 sensor. Be very careful not to cross-thread during installation. Calibrate the new sensor by following steps 1-8 in section '**I**'.

Evaporative System Test & Diagnosis: Quick Reference

EVAP Test Overview

A: Tester Hookup.
B: Phase-One; quantifying the leak(s).
C: Pressure Decay Test.
D: Vacuum Decay Test.
E: Phase-Two; identifying the leak(s).

A: Tester Hookup

1. Connect power cord to 120-Volt AC power.
2. Connect a clean dry source of shop air to Tester.
3. Allow Tester to self-calibrate and green READY light to turn ON.

B: Phase-One Test

1. Follow Tester Hookup procedure.
2. Completely unwind Tester's supply hose.
3. Connect Tester's supply line to EVAP system.
4. Press appropriate calibration (.020'' / .040'') on control panel.
5. Align flow meter's pointer flag with ball.
   > *This sets PASS / FAIL mark.*
6. Close vehicle's EVAP vent solenoid.
7. Press TEST on control panel and fill vehicle system.
   > *This introduces 5-minutes of nitrogen.*
   > *Pressing TEST again turns Tester off.*
   > *Do NOT disturb vehicle's fuel cap.*
8. Observe flow meter's ball until it stops descending, indicating system is full.
   > *Fill time 1-4 minutes depending on system volume.*
9. Compare flow meter ball reading to pointer flag position.
   > *ABOVE flag = FAIL (go to Phase-Two).*
   > *BELOW flag = PASS (test complete).*

C: Pressure Decay Test

NOTE: Pressure Decay Test is best performed immediately after the Phase-One flow test, since system is already pressurized.

1. Be sure Tester has completed the Phase-One Test.
   > *Phase-One Test has completed when flow meter ball has stopped descending.*
2. If Tester is running, turn Tester off by pressing the TEST button.
3. Observe pressure gauge for decay, indicating a leak.
4. Use predetermined decay rate to determine if acceptable.

D: Vacuum Decay Test

1. Follow Tester Hookup procedure.
2. Connect Tester to vehicle's EVAP system.
3. Press VACUUM button on Tester.
   > *Vacuum functions on 30-second timer.*
4. When vacuum timer turns off; observe vacuum gauge for decay, indicating a leak.

E: Phase-Two Test

1. Follow Tester Hookup procedure.
2. Completely unwind Tester's supply hose.
3. Connect Tester's supply line to EVAP system.
   > *If connecting to a vehicle with EVAP service port, avoid introducing the smoke vapor through service port's Schrader valve.*
4. Close vehicle's EVAP vent solenoid.
5. Remove the vehicle's fuel cap.
6. Press SMOKE on control panel.
   > *This introduces 15-minutes of smoke vapor.*
   > *Pressing SMOKE again turns tester OFF.*
7. Install fuel cap *after* smoke is seen exiting the fuel tank neck, assuring the EVAP system has filled with smoke.
8. Continue introducing smoke until leak is found.
   > *Use halogen light supplied and follow EVAP system path to look for exiting smoke identifying the leak(s).*
   > *Use ultraviolet (UV) light supplied and wear yellow glasses to see fluorescent dye deposited at exact location of leak(s).*
   Note: The longer the smoke test is allowed to run, the more fluorescent dye will be deposited at the leak(s).
9. Repair leak(s) and perform Phase-One test again to verify problem has been resolved.

Accessories and Replacement Parts List

Accessories included with the Vacutec® 522B-J/LR	
Part No.	**Description**
218-00034	UltraTraceUV® Smoke Solution (16oz) Tester arrives full, plus one additional bottle.
218-00003	(2 included w/ Tester) Exhaust Cone Adapter (1" to 3 ½") Diameter)
218-00004	Assorted Cap-plug Set
218-00005	Smoke Diffuser (for finding wind/water leaks)
218-00007	EVAP Service Port Adapter Fitting (Standard size)
218-00012	EVAP Service Port Adapter Fitting (Small size)
218-00013	Fuel Neck Adapter
218-00014	Dual-Size Schrader Removal/Installation Tool
218-00008	400,000 CP Halogen Spot Lamp (20' power leads & clips)
218-00017	Twelve-LED hi-intensity true UV light. Includes battery charger and UV enhancing glasses.

Replacement Parts	
Part No.	**Description**
218-00018	Cable's on / off switch (does not include cable assembly)
218-00019	Tester's supply hose and nozzle - complete
218-00020	Tester's supply hose nozzle (no hose)
218-00021	Dipstick
218-00022	Flow meter's pointer flag
218-00023	Filter element #1 (5 micron)
218-00024	Filter element #2 (.01 micron)
218-00025	Filter element #3 (Charcoal filter) Alternate Part No. WVRP-5925-09C
218-00026	Dual O-ring kit for housing of filters #1, #2 or #3 (one O-ring kit required per filter)
030-F2395-ND	Fuse (two required). Also available at electronics supply with spec: 250V-IEC 5A
218-00027	Oxygen sensor

LIMITED ONE (1) YEAR WARRANTY

Manufacturer Part No. : Vacutec® 522B-J/LR

Vacutec® warrants only to the Original Purchaser that under normal use, care and service, the Equipment (except as otherwise provided herein) shall be free from defects in material and workmanship for ONE YEAR from the date of original invoice.

This Warranty does not cover (and separate charges for parts, labor and related expenses shall apply to) any damage to, malfunctioning, inoperability or improper operation of the Equipment caused by, resulting from or attributable to (A) abuse, misuse or tampering; (B) alteration, modification or adjustment (other than calibration) of the Equipment; (C) installation, repair or maintenance (other than specified operator maintenance) of the Equipment or related equipment, attachments, peripherals or optional features by other than Seller's authorized representatives; (D) improper or negligent use, application, operation, care, cleaning, storage or handling; (E) fire, water, wind, lightning or other natural causes; (F) adverse environmental conditions, including, without limitation, excessive heat, moisture, corrosive elements, or dust or other air contaminants; radio frequency interference; electric power failure; power line voltages beyond those specified for the Equipment; unusual physical, electrical or electro-magnetic stress; and/or any other condition outside of Seller's environmental specifications; (G) use of the Equipment in combination or connection with other equipment, attachments, supplies or consumables not manufactured or supplied by Seller.

NO OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED.

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.

STAR Technology Inside
OEM EVAP-Approved
Diagnostic Smoke
StarEnviroTech.com

This product contains STAR licensed technology

Rev. Oct., 2011