

The Deluxe

Refrigerant Identifier with Air-Radicator Technology

User's Instruction Manual
5-06-7000-37-0

Manufactured
by  **NEUTRONICS INC.**

April 8, 2004

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I. Cautions and Warnings

Read and understand the entire manual BEFORE attempting to operate the instrument.

Identifier Warnings

Air Detection Warm Up Warning: For best accuracy and results in *air detection only*, it is advised to allow the instrument an additional 5 minute warm up period after completion of the warm up and calibration modes. Allow the instrument to sit undisturbed for 5 minutes following the completion of the initial calibration mode.

Refrigerant Blend Warning: As of December 1996, there are nine (9) EPA SNAP “acceptable for use” refrigerants that are available and legal for use as R12 substitutes. The Neutronics Diagnostic Tool will not identify any of the substitutes as pure R12 or pure R134a. Each of the nine blends has been tested in the factory laboratory and it has been confirmed that the substitutes will not “fool” the instrument. Should one of the blends be encountered, the DIAGNOSTIC TOOL will fail the refrigerant and provide a readout of analysis in terms of percentage by weight concentrations of R12, R134a, R22 and hydrocarbons only. Due to cross sensitivity issues of the blends on the sensing device, the resultant reading will not be correct in the analyzed concentrations. However, the instrument will never identify any of the blends as pure R12 or pure R134a.

Flammability Warning: The instrument will provide an alarm indication (audible & visual) should the sample be determined to be potentially flammable.

Sample Filter Warning: Replace the sample filter of the instrument AS SOON AS RED SPOTS OR DISCOLORATION BEGIN TO APPEAR ON THE OUTSIDE DIAMETER OF THE WHITE ELEMENT. Failure to properly maintain and replace the sample filter will result in severe damage.

Sample Input Warning: The instrument requires connection of the supplied sample hose to the LOW SIDE OR VAPOR port of refrigerant storage cylinders or vehicle air conditioning systems. DO NOT attempt to introduce liquid or samples heavily laden with oil into the instrument. DO NOT connect the sample hose to the HIGH SIDE or LIQUID port! Liquid or oil laden samples will cause severe damage to the instrument that will not be covered under warranty repairs.

Air-Radicator Warning

Air Purge Warning: DO NOT attempt to purge the detected air from refrigerant sources that are vapor only. In order to properly purge air from refrigerant stores there MUST be some quantity of liquid refrigerant present to replace the volume of the air. Attempts to purge the air from vapor only sources will result in the loss of the entire refrigerant charge.

General Cautions

Always inspect the sample hose before each use. Replace the hose if it appears cracked, frayed, obstructed or fouled with oil.

ALWAYS turn the compressor or automobile engine off before connecting the instrument to an air conditioning system.

Always wear eye and skin protection when working with refrigerants. Escaping refrigerant vapors will present a freezing danger.

To reduce the risk of electrical shock, do not remove the top panel of the instrument, do not utilize the instrument in wet or damp areas, minimize the length and use of extension cords.

DO NOT direct refrigerant vapors venting from hoses towards the skin.

DO NOT remove the top panel of the instrument. There are no serviceable components internal to the instrument and removal of the top panel will void the warranty.

ALWAYS place the Identifier on a flat and sturdy surface.

DO NOT utilize any other hose other than those supplied with the instrument. The use of other hose types will introduce errors into the refrigerant analysis and instrument calibration.

ALWAYS verify that the refrigerant to be tested does not contain or will not emit heavy loads of oil or liquid.

NEVER admit any sample into the instrument at pressures in excess of 300 psig.

DO NOT utilize the coupler supplied on the service end of the R134a Sample Hose for any application other than with the instrument. The coupler supplied is a modified version that does not contain a check valve and is not suitable for any other refrigerant application.

NEVER obstruct the air intake, sample exhaust or case vent ports of the instrument during use.

II. Functional Description

Contamination of refrigerants either in storage cylinders or vehicle air conditioning systems can lead to component corrosion elevated head pressures and system failures when utilized by unsuspecting technicians. The ability of the technician to determine refrigerant type and purity is severely hampered by the presence of air when attempting to utilize temperature-pressure relations. The development of various substitute refrigerants further complicates the ability of a technician to determine refrigerant purity based upon temperature-pressure relationships. The substitute refrigerant blends can also introduce a flammability hazard to the refrigerant technician and the ultimate end user of the vehicle air conditioning system.

Non-condensable gasses (NCG), which are mainly comprised of ambient air, commonly contaminate refrigerant stores or systems. Contamination can be introduced into refrigerant from sources such as leaking joints on vehicle air conditioning systems, improper handling of transfer hoses, improper use of refrigerant recovery and recycling equipment or failure of such equipment. Ambient air contamination will lead to a number of refrigerant system problems including corrosion induced by moisture content of the ambient air, increased compressor heat and wear due to increased head pressures, added stress on system components due to increased head pressures and reduction of system efficiency due to displacement of refrigerant by the ambient air or NCG.

The Neutronics Deluxe Refrigerant Diagnostic Tool will provide a fast, easy and accurate means to determine refrigerant purity in refrigerant storage cylinders or directly in vehicle air conditioning systems, as well as, determine the need and control the purging of ambient air based NCG from refrigerant storage vessels or vehicle air conditioning systems. The instrument utilizes non-dispersive infrared (NDIR) technology to determine the weight concentrations of refrigerant types R12, R134a, R22, as well as, hydrocarbons and air. Refrigerant purity is automatically determined for refrigerants R12 and R134a by the instrument to eliminate human error. Pure refrigerant is defined as a refrigerant mixture that contains 98%, by weight, or greater of either R12 or R134a. The instrument provides the option to purge samples

refrigerant sources of air contamination down to levels set by the user. Air purging is completely automatic and requires no intervention by the user other than telling the instrument to begin the purging operation.

The instrument is supplied complete with R12 and R134a sample hoses, a R134a adapter fitting to permit sampling of ACME ported cylinders, a purge vent hose, a connected power cord and all required plumbing housed within a rugged portable case.

Refrigerant Identification:

Sample gas is admitted into the instrument through the supplied sample hose and presented to the sensing device. The instrument provides the user with direct percent by weight concentrations of R12, R134a, R22 and hydrocarbons. If the sample is determined to be pure R12 or pure R134a, the instrument will also provide a direct readout of the weight percentage of air within the sample. Note that the instrument does not consider air to be a contaminate since it can be removed by some refrigerant recycling equipment or by the purging feature of the instrument itself. Since air is not considered a contaminate, it is possible to read 100% R12 plus 5% air. The instrument only considers the weights of refrigerant contaminants in the total mixture.

The instrument interfaces with the user through the use of a 2-line 16-character alphanumeric display, status indicator lamps, push button communication switches and an alarm horn. Alarm indications are provided to alert the user of instrument fault conditions, potentially flammable refrigerant presence and contaminated refrigerant presence. Direct percent by weight concentrations of sample refrigerant is provided on the display as well as user directions and prompts. A printer port is supplied with the instrument that will interface with most parallel port printers.

Air-Radicator Purging Feature:

When a refrigerant source has been determined to be pure (at least 98% by weight of either R12 or R134a), the instrument will automatically offer the air purging feature to the user should there be any air contamination. Continuous monitoring of the venting gas stream to determine exact air concentrations controls the purging feature. Purging limits can be set by the user between 2-9% by weight to tailor the purge to specific needs. The instrument controls all functions of the purging feature with no intervention by the user required to complete the procedure. The user can halt or cancel the procedure at any time desired.

Control of the purge operation is achieved through direct measurements of refrigerant concentrations and is not dependent upon temperature or pressure measurements. Existing technology in the vehicle air conditioning market will typically utilize both pressure and temperature measurements to determine air content and to control the purging procedure. Pressure-temperature technology is susceptible to errors induced by refrigerant contamination and difficulties in obtaining precise temperature and pressure measurements. This is due to the inability to account for rapid temperature and pressure drops of the refrigerant during the purge procedure by temperature-pressure-based equipment or procedures. Temperature-pressure based technology will commonly require the refrigerant source to come to a temperature and pressure equilibrium before the purging can begin. This can take as long as eight to 24 hours.

With direct measurement of refrigerant concentrations, there is no need to wait for a refrigerant source to reach a temperature and pressure equilibrium. Also, rapid temperature and pressure changes during purging operations will not effect the measurements.

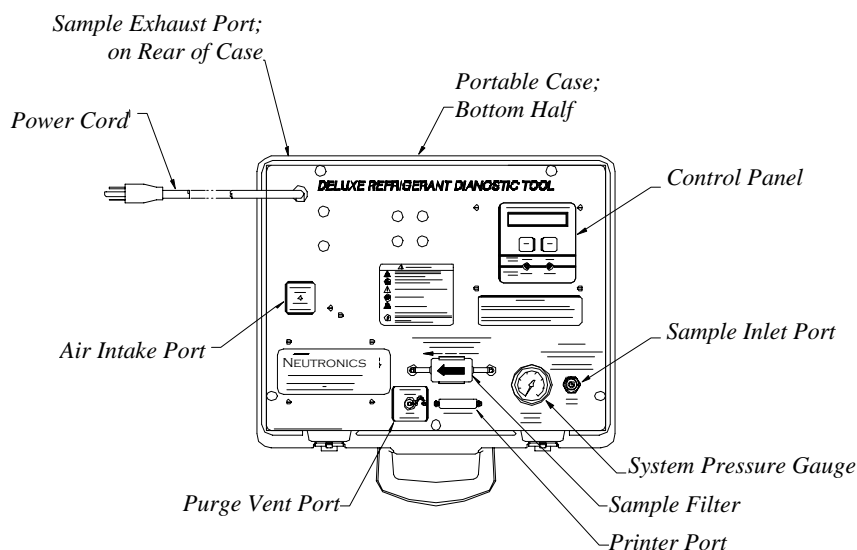
Overview:

The Neutronics Deluxe Refrigerant Diagnostic Tool will provide the user with a complete tool to identify refrigerant mixtures and rid the mixtures of air contamination all housed in a portable, rugged carrying case.

III. Hardware Description

A. Portable Case

The instrument is housed in a rugged portable high-density polyethylene case. The case will store the instrument itself as well as required hose assemblies, power cord and adapter fitting.



B. Power Cord

A nine-foot (2.75 meter), molded, 3-prong, grounded NEMA power supply cord is attached directly to the instrument. Different power cords may be supplied if the instrument is to be utilized in areas outside North America.

C. Sample Filter

The Sample Filter will provide retention of particulate and oil mist entrained within the sample vapor. The filter is supplied with a red maintenance indicating dye. As soon as red spots or discoloration begin to appear anywhere on the white outside diameter of the filter element, **THE FILTER MUST BE REPLACED**. Failure to replace the filter when indicated may lead to severe instrument damage that will not be covered under warranty repairs!

D. Air Intake Port

The Air Intake Port, located on the instrument top panel, is the entry port for ambient air during instrument calibration procedures. The port should never be obstructed any time during use.

E. Sample Exhaust Port

The Sample Exhaust Port, located on the rear of the carrying case, will emit sample gasses ejected from the sensing device. This port should always remain clear and unobstructed.

F. Sample Inlet Port

The Sample Inlet Port will admit the refrigerant vapor into the instrument through the connection of the mating end of the sample hose.

G. System Pressure Gauge

The System Pressure Gauge is intended to indicate to the user the presence of a refrigerant sample flow into the instrument. The gauge should read between 9-15 psig during normal operation. **THE GAUGE DOES NOT INDICATE THE STATUS OF THE REFRIGERANT SOURCE PRESSURE.**

H. Purge Vent Port

The Purge Vent Port will emit a mixture of refrigerant vapor and air during purging procedures. The port is supplied with a protective cap that must be replaced with the purge vent hose during purging operations. **The cap must remain installed on the port during refrigerant identification procedures to avoid excessive losses of refrigerant.**

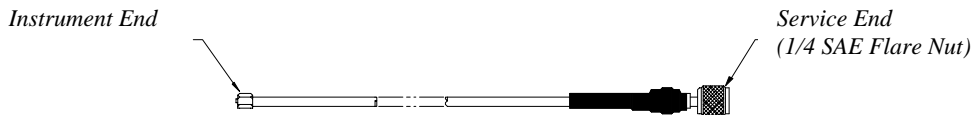
Warning: Failure to properly install the cap onto the purge vent port will result in excessive loss of refrigerant during the refrigerant identification procedure. The instrument will ALWAYS perform a refrigerant identification before permitting an air purge procedure.

I. Printer Port

The Printer Port is a 25-pin connector utilized to download the results of sample analysis to a user-supplied printer through a user-supplied cable. The port will support most parallel port printers.

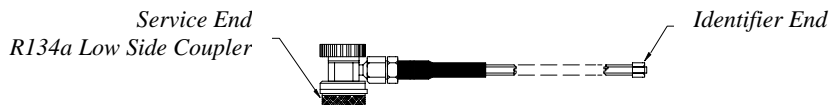
J. R12 Sample Hose

The 6-foot (1.8 meter) R12 Sample Hose is constructed of a nylon inner tube and a polyurethane outer tube. The inner tube will handle all of the refrigerant transfer and will provide containment up to 300 psig. The outer tube will provide protection of the inner tube from abrasion, nicking, cutting, etc. The hose is provided with an instrument inlet port mating connector on one end and a 1/4" SAE female flare coupling nut on the service end.



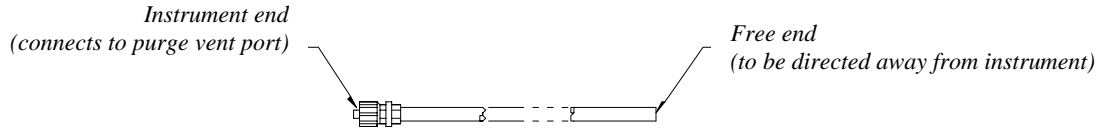
K. R134a Sample Hose

The 6-foot R134a Sample Hose is constructed of a nylon inner tube and a polyurethane outer tube. The inner tube will handle all of the refrigerant transfer and will provide containment up to 300 psig. The outer tube will provide protection of the inner tube from abrasion, nicking, cutting, etc. The hose is provided with an instrument inlet port mating connector on one end and a R134a Low Side Coupler on the service end.



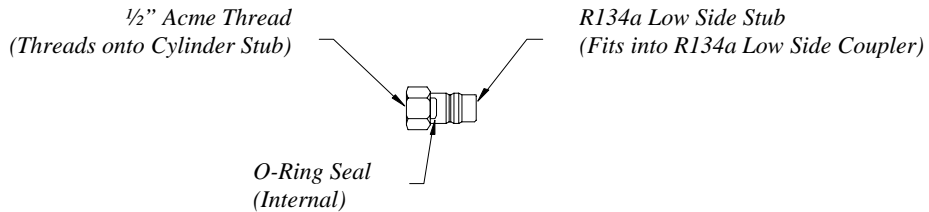
L. Purge Vent Hose

The Purge Vent Hose is a 6-foot length of neoprene tubing with a connector on one end to mate with the purge vent port. The hose will be utilized to direct venting refrigerant vapor and air contamination away from the instrument and the ambient air inlet port. This assures that no calibration errors or faults will occur during purging procedures.



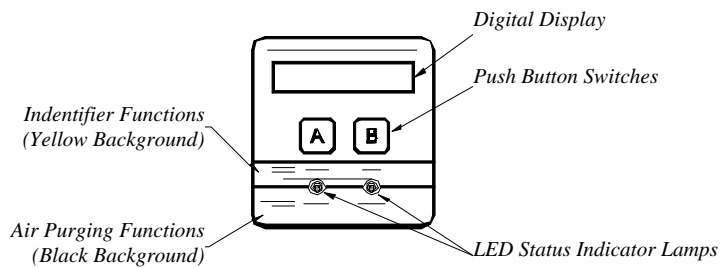
M. R134a Tank Adapter Fitting

The R134a Tank Adapter Fitting will provide the user with an adapter to allow connection of the R134a sample hose service end to a R134a cylinder ACME port.



N. Control Panel

The Control Panel contains all of the user interface devices to permit operation of the instrument as follows:



1. Digital Display

A 2-line, 16-character, alpha-numeric display is provided to inform the user of system status, required actions and prompt the user for specific inputs.

2. Push Button Switches

Two switches, labeled “A” and “B”, are provided for various functions. All inputs from the user to the instrument are made using these switches. The use of the switches is detailed by the instrument display during use.

3. LED Status Indicator Lamps

A red and green LED is provided to inform the user of system status at a glance or to alert the user of required actions or conditions. Note that the LEDs serve dual functions depending upon instrument function. During refrigerant identification functions, as indicated by the nomenclature on the **YELLOW** background, the green LED will indicate refrigerant purity and the red LED will indicate refrigerant contamination or system faults. During air purging functions, as indicated by the nomenclature on the black background, the green LED will indicate purge completion and the red LED will indicate system fault.

IV. Operation Procedures

A. Pre-Operational Procedure

1. Open the case and inspect the sample filter for signs of red spots or discoloration anywhere on the white outside diameter of the filter element. If any red spots or discoloration are noticed, **REPLACE THE FILTER BEFORE USING THE INSTRUMENT!**

Warning: When red spots or discoloration begin to appear on the white outside diameter of the filter element, THE FILTER MUST BE REPLACED. Failure to properly maintain the sample filter may result in severe instrument damage that will not be covered under warranty repairs.

2. Select the R12 or R134a sample hose for use in the specific application. Inspect the hose for signs of wear such as cracking, fraying or kinks. Verify that the hose is not obstructed and that no oil is present internal to the hose. If the hose shows signs of wear, obstruction or oil **IT MUST BE REPLACED** (or cleaned) **BEFORE USING THE INSTRUMENT!**
3. Install the selected sample hose onto the inlet port of the instrument. The hose connector needs only to be finger tightened to achieve a gas-tight seal.
4. Inspect the air intake port, the sample exhaust port and the case vent ports of the instrument to verify they are clear and unobstructed.
5. Verify that the purge vent port cap is securely installed onto the port.

Warning: Failure to properly install the cap onto the purge vent port will result in excessive loss of refrigerant during the refrigerant identification procedure. The instrument will ALWAYS perform a refrigerant identification before permitting an air purge procedure.

5. Inspect the sample port of the refrigerant storage cylinder or vehicle air conditioning system to be tested. Verify that the port is the **LOW SIDE** or **VAPOR** port.

B. Refrigerant Identification Operational Procedure

1. Plug the power cord of the instrument into a suitable receptacle. The instrument will display various parameters of the instrument and begin the warm up period.
2. The warm up period will last for approximately 90 seconds. The display will read “SYSTEM WARMING-CHECK FILTER”. This is a reminder to inspect the sample filter of the instrument.
3. It is possible to print the results of the last refrigerant identification run made prior to power up of the

instrument during the warm up period. To print the prior results connect a user-supplied cable and printer to the instrument printer port and press the “A” button of the instrument. The prior results will be downloaded to the printer.

4. During the warm up period the user has the option to enter the local elevation above sea level into the instrument memory. The instrument is sensitive to elevation changes of 500 feet (152 meters) and the local elevation must be entered into the instrument memory upon initial use. Normal barometric variations will not effect the performance of the instrument. After the local elevation has been entered into the instrument memory there is no need to enter it again unless the instrument is moved to a new elevation. To enter the elevation into the instrument memory, follow the procedure presented by the instrument display as stated below:
 - a. During the warm up period depress and hold the “A” and “B” buttons simultaneously until the display reads “USAGE ELEVATION, 400 FEET”. This is the factory setting of 400 feet (122-meters) elevation.
 - b. Use the “A” and “B” buttons to adjust the elevation to the nearest 100-foot (30-meter) increment. Pushing the “A” button will increase the elevation setting by 100-foot (30-meter) increments. Pressing the “B” button will decrease the elevation setting by 100-foot (30-meter) increments. The setting is adjustable from 0-9000 feet (0-2743 meters) and is displayed while adjusting.
 - c. When the correct setting of local elevation has been achieved, allow the instrument to sit for approximately 20 seconds while not pushing either of the buttons. The instrument will automatically return to the warm up period and the elevation setting will be stored in the memory.
5. After completion of the warm up period the instrument will self-calibrate. Ambient air will be drawn in through the air intake port and be presented to the sensing device for calibration. The calibration period will run approximately 20 seconds.
6. When the calibration period has completed, the instrument will display “READY: CON. HOSE, PRESS A TO START” and the green LED will be flashing. At this time the user should connect the service end of the sample hose to the low side or vapor port of the refrigerant storage vessel or vehicle air conditioning system to be sampled. When the hose is secured into position press the “A” button of the instrument to start processing.

Note: For proper operation, the instrument pressure gauge should read at least 10 psig.

Operational Tip: To achieve the best air detection accuracy, allow the instrument to warm-up an additional 5 minutes before pressing the “A” button as stated in step 5. This allows additional warming and stabilization of the sensing device before sampling. During the additional warm-up period, the instrument will “time out” and display “RECAL” required. Disconnect the sample hose from the refrigerant source and press the “A” button to re-calibrate. **Once the re-calibration has been completed it will not be necessary to repeat other additional warm up periods as long as the instrument has not been powered down between sample runs.**

7. The instrument will read “SAMPLING IN PROGRESS” while a small refrigerant sample is analyzed to determine the concentrations of R12, R134a, R22, hydrocarbons and air. Once the analysis is complete, the percentage concentrations of R12, R134a, R22 and hydrocarbons will be displayed. The user can press “A” to print the results or press “B” to exit (if there is no air) or press “B” to continue to the purge function if air is present.

8. The instrument will present the results of the analysis as outlined below:
 - a. **PASS R134a:** If the instrument has detected 98% by weight or greater concentration of R134a, the green PASS LED will illuminate and the weight concentrations of R12, R134a, R22, hydrocarbons and air will be displayed. The display will then prompt the user to press “A” to print (see step 8) or press “B” to continue (see step 9).
 - b. **PASS R12:** If the instrument has detected 98% by weight or greater concentration of R12, the green PASS LED will illuminate and the weight concentrations of R12, R134a, R22, hydrocarbons and air will be displayed. The display will then prompt the user to press “A” to print (see step 8) or press “B” to continue (see step 9).
 - c. **Refrigerant FAIL:** If the weight concentrations of either R12 or R134a are not at least 98%, the instrument will sound the alarm horn 5 times, the red FAIL LED will light and the weight percentages of R12, R134a, R22 and hydrocarbons will be displayed. Note that the instrument will not permit purging procedures on contaminated mixtures. The display will then prompt the user to press “A” to print (see step 8) or press “B” to exit (see step 9).

<p>Operational Tip: It is suggested to retest a refrigerant source whenever a refrigerant “fail” occurs to provide verification of initial results.</p>
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- d. **Hydrocarbon Alarm:** If hydrocarbon concentrations are sensed to be 2% by weight or greater, the instrument will sound the alarm horn 30 times, illuminate the red FAIL LED, display “Hydrocarbon High” and display the weight concentrations of R12, R134a, R22 and hydrocarbons. The display will then prompt the user to press “A” to print (see step 8) or press “B” to exit (see step 9).

Warning: The occurrence of the Hydrocarbon Alarm alerts the user to the presence of potentially flammable refrigerant mixtures. THE USER BEARS FULL RESPONSIBILITY for the removal of the potentially hazardous mixture from the instrument and any other attached equipment.

9. The user can now print the results of the analysis. Connect a user-supplied cable and parallel printer to the printer port of the instrument. Turn on the printer and press the “A” button of the instrument. The results of the last analysis will be downloaded to the printer and will appear as depicted below. Note that should a printer not be readily available, the instrument will store the LAST result only for printout during the next warm up period, as described in step 2.

Instrument Printout Example:

REFRIGERANT IDENTIFIER
Refrigerant Analysis

Refrigerant R134a	=	100%
Refrigerant R12	=	0%
Refrigerant R22	=	0%
Hydrocarbons	=	0%

Conclusion: >>PASS<<

Air = 3%

Date: _____

Technician: _____

Car Model: _____

VIN: _____

10. If no printout is desired, the user shall press button "B". In the case of pure refrigerants, the instrument will revert to the purge procedure should there be greater than 2% by weight air concentrations. The instrument will prompt the user if an air purge is desired as described in the Air Purge Operation Procedure. The instrument will return to a calibration mode when the "B" button is pressed for refrigerants that have been detected to be pure and have 2% or less air contamination or refrigerants that have been detected to be contaminated.

C. Air Purging Operation Procedure

Warning: Because small leaks in the sample hose connections or the refrigerant source can develop, it is **NOT RECOMMENDED** to allow the purging feature to operate for extended periods, such as overnight, without periodic inspection of the sample hose connections for leaks.

1. Whenever the instrument has determined that a refrigerant source is pure (98% by weight or greater R12 or R134a) and the air concentration levels exceed 2% the user will be prompted if an air purge is desired. Press the "A" button to initiate the purge procedure or press the "B" button to cancel the purge procedure.
2. After the instrument has been instructed to purge, the user has the option to adjust the purge limit setting by pressing the "B" button. The purge limit setting is the level to which the air will be reduced by the instrument. The limit is adjustable in 0.1% increments from 2-9%. To set the limit press the "A" button to raise the limit or the "B" button to lower the limit. When the desired setting has been reached, as displayed on the instrument, allow the instrument to sit for 15-seconds without pressing any of the buttons. The instrument will automatically store the setting and continue with the procedure.
3. The instrument will read "REMOVE PURGE CAP, CON. HOSE, PRS A". This is to instruct the user to remove the cap installed on the purge vent port and replace it with the purge vent hose. Direct the free end of the hose away from the instrument so that escaping gasses will not be directed back towards the instrument. When the hose is securely connected press the "A" button to continue.
4. The instrument will now read "NOW AIR IS XX.X%, PURGING TO XX%". This indicates to the user that the purging procedure has begun and also communicates the purge limit setting. Purging will continue as outlined below.

Note: The purging procedure may be halted or cancelled at any time by the user by pressing and holding either the “A” or “B” button during the procedure. When either of the buttons has been pressed and held, the instrument will display “PURGE STOPPED, PRESS A TO CONT. B TO EXIT”. If it is desired to end the purge procedure press the “B” button. If it is desired to continue with the purge procedure press the “A” button. In either case the instrument will perform a self-calibration and then either continue with the purge procedure or prompt the user for another run. ***If the purge process has been stopped and “B” was selected (exit purge process), the user must replace the cap on the purge port and disconnect the service end of the sample hose.***

- a. **Not Pure Alarm:** If the instrument detects that the levels of R12 or R134a are not at least 98% by weight, an alarm will sound and the purging procedure will be halted. If the alarm occurs, press “B” to continue. The purge procedure will be cancelled and the instrument will revert to self-calibration to ready for a new procedure.
 - b. **Excessive Air Alarm:** If air contamination is detected to be 25% by weight or greater, an alarm will sound and the user will be asked if the purge procedure should continue. Press the “A” button to re-calibration and continue the purge procedure or press the “B” button to revert to calibration and a new procedure. The excessive air alarm is included as a safety measure to prevent high losses of refrigerant. The purging of air from such high levels down to 2% will require high losses of refrigerant vapor.
 - c. **Time Out:** To conserve refrigerant during a potentially long purging procedure, the instrument will automatically halt the operation after a time out of 1-1/2 hours. The user will be asked if the procedure is to continue. To restart the procedure, press the “A” button or press the “B” button to end the session and return to calibration. Note that purge duration in excess of 1-1/2 hours are unusual (assuming a 50 lb. cylinder or smaller is being purged) and can be caused by high levels of air contamination, refrigerant contamination other than R12, R134a, R22 or hydrocarbons, or by the absence of liquid refrigerant in the refrigerant source.
 - d. **Calibration:** To keep the instrument at peak accuracy, an occasional self-calibration will be performed. The purge procedure will be momentarily halted until the completion of the 20-second self-calibration operation. The self-calibration will automatically occur after the first 5 minutes of the purging procedure and then after every successive 10-minute interval thereafter. The calibration operation is fully automatic and requires no intervention by the user.
 - e. **Normal Purging Procedure:** During the purging process the instrument will display “NOW AIR IS XX.X%, PURGING TO X.X%”. Purge times will vary with application and are dependent upon headspace size in the source, amount of initial air contamination and the purge limit setting. Typically, it will require 3 minutes to purge an automotive air conditioning system from 8% to 2% contamination levels. A typical 50 lb. storage cylinder that is at least 50% liquid will require 1 hour to reduce contamination levels from 8-2%. Observation of the instrument display will reveal that the air contamination level may rise and fall during the purging procedure. This is normal and is the result of air coming out of liquid solution and repeated refrigerant displacements of the air.
5. When the purging procedure has completed, the instrument display will read “DONE, AIR IS X.X%, PRESS B TO EXIT” and the green LED will flash. Press the “B” button to exit the purge operation and return to the calibration operation to ready for another refrigerant identification procedure. ***The user must replace the cap on the purge port and disconnect the service end of the sample hose BEFORE calibration occurs.*** If it is not desired to utilize the instrument again, unplug the power cord to power down the instrument.

D. Post-Operational Procedure:

1. Unplug and store the instrument power cord into the clips located on the internal lid of the case.
2. Disconnect the sample hose from the inlet port of the instrument. Inspect the hose for signs of wear such as cracking, fraying or kinks. Verify that the hose is not obstructed and that no oil is present internal to the hose. If the hose shows signs of wear, obstruction or oil **IT MUST BE REPLACED BEFORE USING THE INSTRUMENT!** Store the inspected hose in the case lid pocket.
3. Disconnect the purge vent hose, if it is connected, clean and stow in the case lid pocket. Replace the cap onto the purge vent.

Warning: ALWAYS replace the cap onto the purge vent port. Failure to replace the cap will result in excessive refrigerant loss during the next use of the instrument.

4. Inspect the sample filter for signs of red spots or discoloration anywhere on the white outside diameter of the filter element. If any red spots or discoloration are noticed, **REPLACE THE FILTER BEFORE USING THE INSTRUMENT!**

Warning: When red spots or discoloration begin to appear on the white outside diameter of the filter element, THE FILTER MUST BE REPLACED. Failure to properly maintain the sample filter may result in severe instrument damage that will not be covered under warranty repairs.

5. Clean the instrument of accumulated dirt, oil, grime, etc. with a moist cloth. Close the enclosure lid and latch. **DO NOT USE ANY SOLVENTS OR LIQUIDS TO CLEAN THE INSTRUMENT.**

V. Maintenance Procedures

WARNING: DO NOT remove the top panel of the instrument. There are no serviceable parts internal to the instrument and removal of the top panel will void warranty.

A. Service Contact

In the unlikely event that the instrument requires factory service assistance, the user can contact the Neutronics Incorporated Service Department at (610) 524-8800 Monday through Friday, 9AM to 4PM EST. Please have warranty information, user instruction manual, serial number and a description of the problem ready when calling.

Should the instrument require factory service, contact the Neutronics Incorporated Service Department to request a Return Material Authorization Number. This number will aid in expediting the repair and return of the instrument. Have the instrument model number, serial number, the specific problem and the date of purchase ready when calling the Service Department. When shipping the instrument back to the factory, record Customer Name, Customer Address and the Return Material Authorization Number on the outside of the shipping carton. Include a description of the problem and a copy of proof of purchase (for warranty repairs) in the package. Ship the instrument to the address stated below:

**Neutronics Incorporated
456 Creamery Way
Exton, PA 19341 U.S.A.**

B. Error Codes and Corrective Actions

The instrument is supplied with self –diagnostic software to provide the user with guidance should problems occur in the field. The software supplies three codes that will direct the user towards corrective measures. Should the corrective measures not clear the problem, the user is advised to contact the Neutronics Incorporated Service Department for assistance. Error codes are presented below with corrective action steps.

ERR.1: Signifies unstable readings due to inconsistent sample supply or interference from strong electrical fields.
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Corrective Action:

1. If the error code occurs during a sampling mode, verify that the sample hose is receiving a sample of at least 9 psig. Also verify that the sample exhaust and air intake ports are clear and not obstructed in any manner.
2. If the error occurs during a calibration mode, verify that the purge vent hose is not directed towards the instrument and that the air intake and sample exhaust ports are clear and not obstructed.
3. The unit should be kept away from sources of strong electrical fields (such as large compressors) Move the instrument 3-5 feet (1-1.5 meters) away from such sources and try again.
4. If the instrument is being utilized in an environment outside of the operating temperature range of 45-100°F (7-38°C), allow the instrument an additional warm up period of 15 minutes after power up before use.
5. To clear the error code, unplug the instrument. The error code will be cleared at the next power up.

ERR.2: Signifies internal sensor failure due to temperature extremes.
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Corrective Action:

1. Allow the unit to stabilize at room temperature for at least 30 minutes before attempting use.
2. To clear the error code, unplug the instrument. The error code will be cleared at the next power up.

ERR.3: Signifies a calibration fault.

Corrective Action:

1. Verify that the purge vent hose is not directed towards the instrument and that the air intake port and the sample exhaust ports are not obstructed.
2. If the instrument is being utilized in small closed area, refrigerant vapors will build up in the surrounding atmosphere. These vapors will be drawn into the air intake port during calibration and will cause a fault. Move the instrument to a location with fresh ambient air free of refrigerant vapors. Use the instrument in locations that provide adequate ventilation to prevent the accumulation of refrigerant vapors.
3. To clear the error code, unplug the instrument. The error code will be cleared at the next power up.

C. Maintenance Procedures

1. Sample Filter Replacement

Inspection Frequency: Inspect the sample before and after each use of the instrument.

What to Look for: When inspecting the sample filter, look completely around the entire outside diameter of the white filter element located inside of the plastic housing. Look for red spots or the beginnings of discoloration on the white outside diameter of the element. Do not look into the round ends of the white element for red spots or discoloration. The round ends of the filter may always appear red. If red spots or discoloration are discovered, the sample filter requires replacement to prevent the influx of particulate and oil mists into the instrument.

Sample Filter Replacement Procedure:

- a. Obtain a replacement filter, part number, 6-02-6000-08-0.
- b. Remove the existing filter from the retaining clip of the instrument by pulling straight up and out.
- c. CAREFULLY remove the flexible, black rubber tubing connections from both ends of the existing filter. **DO NOT allow the tubes to slip back into the internal portion of the case.**
- d. Discard the existing filter in an environmentally friendly manner.
- e. Install the tube ends onto the barbs of the replacement filter, taking note to align the flow arrow of the filter with the flow arrow of the instrument top panel.
- f. CAREFULLY slide the tubing back into the internal portion of the instrument and seat the new filter into the retaining clip.
- g. Inspect the sample hoses for signs of oil entrapment. Replacement of the sample filter usually requires cleaning or replacement of the sample hoses.

2. Sample Hose Inspection and Cleaning

Inspection Frequency: Inspect the sample hoses before and after each use of the instrument and after every replacement of the sample filter.

What to Look for: Inspect the inside diameter of the inner tube for signs of oil build up, dirt, obstructions, kinks, cuts, fraying, or any other signs of wear. Oil contamination can be cleaned out of sample hoses as directed below. Hoses that show signs of wear should be replaced immediately to avoid dangers of rupture or bursting.

Sample Hose Cleaning Procedure:

- a. Remove the hose from the instrument and flush with isopropyl alcohol or methanol until the oil is thoroughly cleansed from the inner tube.

Warning: Flush hoses away from sparks, open flames or other ignition sources and in an area that is well ventilated.

- b. Dry the hose by blowing clean, dry nitrogen or shop air through the inner hose or by allowing the hose to air-dry for several hours. Take care to not dry the hose with shop air that is lubricated.
- c. When the hose is completely dry, re-inspect the hose for signs of wear, as described above, and replace if wear is evident.

D. Spare Parts Listing

Spare parts are available from the local Neutronics representative or directly from the factory. To order spare parts directly from the factory, contact the Neutronics Incorporated Sales Office at (610) 524-8800 or FAX to (610) 524-8807. Have a shipping name address and purchase order ready as well as the model and serial number of the instrument.

User Instruction Manual:	5-06-7000-37-0
R12 Sample Hose Assembly:	6-02-6000-02-0
R134a Sample Hose Assembly:	6-02-6000-09-0
R134a ACME Tank Adapter Fitting:	4-03-5004-07-0
Replacement Sample Filter:	6-02-6000-08-0
*R134a Low Side Coupler:	4-04-5500-00-0
Deluxe Refrigerant Diagnostic Tool, Complete Instrument:	7-08-3000-03-0

* Note that the Low Side Coupler is a modified version of a standard coupler. This version does not contain a check valve and is not suitable for use applications other than for the Neutronics Refrigerant Identifier or the Neutronics Deluxe Refrigerant Diagnostic Tool.

VI. Specification Listing

Sample Parameters: Vapor only, oil-free, 300 psig (2 MPa) Maximum

Detected Compounds: R12, R134a, R22, Hydrocarbons, Air

Sensor Technology: Non-Dispersive Infrared (NDIR)

Refrigerant Sample Size: 0.3 ounces (8.5 grams) per sample

Refrigerant Loss During Purge Operation:

Typically 0.4 ounces (11 grams) per minute of purge time. Note that refrigerant loss is dependent upon many factors such as refrigerant source size, refrigerant source head space, initial refrigerant contamination and final purge limit setting.

Power: Universal 110/220 VAC, 50/60 Hz, 0.2 Amps Maximum

Operational Temperature: 45-100°F (7-37°C)

SAE J1771: If the refrigerant being tested is identified as contaminated, any visual percentages displayed of CFC-12 (R-12) or HFC-134a (R-134a) outside the design certified value is informational and may not be accurate.

SAE J1771 Certification Note: This equipment has not been designed certified for contaminate detection of R-124 or R-142B.

VII. Warranty

NEUTRONICS warrants, subject to the terms listed below, that the goods will be free from defects in design, materials, and workmanship for a period of (1) one year from the date that the goods are shipped to the buyer.

THE SOLE LIABILITY OF NEUTRONICS FOR ALL PURPOSES SHALL BE TO REPAIR OR REPLACE, AT THE SOLE OPTION OF NEUTRONICS, DEFECTS APPEARING WITHIN THE (1) ONE YEAR PERIOD. NEUTRONICS SHALL HAVE NO OBLIGATION FOR REPAIR OR REPLACEMENT UNLESS NEUTRONICS HAS RECEIVED WRITTEN NOTICE OF THE ALLEGED DEFECT WITHIN THE (1) ONE YEAR PERIOD AND THE DEFECTIVE GOODS ARE PROMPTLY RETURNED BY THE BUYER, AT THEIR EXPENSE, TO NEUTRONICS AT: 456 CREAMERY WAY EXTON, PA 19341 USA, AND THE DEFECT OCCURS UNDER THE CIRCUMSTANCES OF PROPER USE IN ACCORDANCE WITH ALL INSTRUCTIONS AND MANUALS PROVIDED TO THE BUYER. NEUTRONICS WILL DELIVER THE REPAIRED OR NEW GOODS TO THE BUYER AT NEUTRONICS EXPENSE. IN NO EVENT WILL NEUTRONICS BE LIABLE FOR ANY LOSS OR DAMAGE DIRECTLY OR INDIRECTLY ARISING FROM THE DEFECTS OR FROM THE USE OF THE GOODS OR FROM CONSEQUENTIAL OR INCIDENTAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE, FOR PERSONAL INJURY OR PROPERTY DAMAGE OR ANY FINANCIAL LOSS.

Buyer shall be responsible for insuring that the goods are functioning properly at all times and shall not use any goods which are not functioning properly. Buyer, therefore, agrees to indemnify NEUTRONICS from and against all losses and claims to or by any person or property caused in any manner by the goods or the use of the goods, including any expenses and attorney's fees in connection with all claims, demands, proceedings, or other expenses.

Any description of the goods contained in any documents to which these warranty provisions relate, including any quotations or purchase orders relating to the goods being delivered to the buyer, are for the sole purpose of identifying the goods, and any such description, as well as any sample or model which may have been displayed to or seen by the buyer at any time, have not been made part of the basis of the bargain and have not created or amounted to any express warranty that the goods would conform to any such description or any such sample or model.

NEUTRONICS DOES NOT WARRANT THAT THE GOODS ARE FREE OF THE RIGHTFUL CLAIM OF ANY THIRD PERSON BY WAY OF INFRINGEMENT OF PATENT OR OTHER PROPRIETARY INFORMATION AND DISCLAIMS ANY WARRANTY AGAINST SUCH INFRINGEMENT.

It shall be the responsibility of the buyer to read carefully and abide by all instructions provided to the buyer in the instruction manual or elsewhere. If the buyer, or the employees of the buyer, did not abide by such instructions, then the alleged defect shall not be deemed to have arisen under circumstances of proper use.

The terms of these warranty provisions shall apply to all products sold by Neutronics, except filters which are considered "consumable items," and as such are not covered by the terms of these warranties. No waiver, alteration or modification of the terms of these provisions shall be valid unless in writing and signed by an executive officer of NEUTRONICS.

EXCEPT AS SPECIFICALLY SET FORTH AND LIMITED IN THIS PARAGRAPH, NEUTRONICS, INC. MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES AS TO MERCHANTABILITY, OR AS TO THE FITNESS OF THE GOODS FOR ANY PARTICULAR USE OR PURPOSE, AND ANY WARRANTIES SET FORTH IN THIS

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4/8/2004
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