

# GA500<sup>PLUS</sup>

## Refrigerant Gas Analyzer

Instruction 3015-0849

Rev. 0 – August 2002



# Functional Overview

The Bacharach GA500<sup>PLUS</sup> Refrigerant Gas Analyzer is a simple to use diagnostic instrument designed to evaluate refrigerant gas samples taken directly from air conditioning systems. The analyzer identifies and measures the purity of R134a, R12, and R22 refrigerants and indicates the percentage of air in the system. A flashing LED and an audible alarm also alert the user to the presence of any flammable hydrocarbons in the test sample. Additional LED indicators are provided to indicate recoverable concentrations of R134a and R12 refrigerants, and a separate LED indicates one or more of the following conditions of a contaminated system:

- Less than 98% purity of R12 or R134a
- Presence of one or more refrigerants other than R12 or R134a
- Possible use of “Blends”
- 5% or more air in the sample

A complete sample analysis is displayed in an LCD window and hard copy test results can be produced by connecting the analyzer to a compatible printer.

## CAUTIONS

- Please read and understand this entire manual before attempting to operate or perform preventive maintenance.
- Observe common sense safety precautions and use eye protection when working with compressed gasses.
- This instrument requires connection to the low side (vapor port) of an automotive air conditioning system. Under any circumstances DO NOT connect to the high side (liquid port) or contamination and damage to the analyzer may occur.
- The analyzer has been calibrated for use with the supplied sample hose. Do not substitute another hose for the one supplied with the unit. Substituting the hose could result in inaccurate test results and may cause damage to the analyzer.
- Use only power cables supplied with the analyzer.
- Do not obstruct the air intake port or sample exhaust port.
- Inspect the sample hose before each use to insure it is clean, clear of obstructions, and free of defects.
- Turn off the automobile engine before connecting the sample hose to the analyzer.
- When disconnecting the sample hose a small amount of pressurized gas will be vented. Avoid personal injury by pointing away from face and exposed skin.
- Do not expose refrigerant samples to sparks, flames, or other ignition sources.

## Quick Operating Instructions

1. Select the power source and connect appropriate power cable.
2. Connect sample hose to analyzer and low side (vapor port) of air conditioning system.
3. Fully depress pump button 4 times to start test cycle.
4. Evaluate sample using LED indicators and LCD display.
5. Connect analyzer to printer and press pump once to print test results if desired.
6. To repeat test, disconnect printer from unit and pump 4 times to initiate test cycle.

**NOTE:** While a printer is connected to the analyzer the pump button acts as the print command; therefore, a measurement cannot be started until the printer is disconnected.

## Altitude Compensation

The GA500<sup>PLUS</sup> automatically compensates for significant changes in altitude, (1000 feet or more) between the range of sea level and 12,000 feet to maintain accurate refrigerant and air measurements.

# Connecting the Analyzer

## Connecting Power Cable

The analyzer operates on 12 volt DC current utilizing the power adapter cable (P/N 3015-1078), or an optional AC adapter (see replacement parts listing).

When power is first connected the analyzer will turn on automatically, run through a brief self test procedure, and automatically zero the unique infrared sensor for accurate readings. The unit will first prompt the user to connect the sample hose. After a brief delay the unit will then display the prompt “READY TO TEST – PUMP 4 TIMES TO START MEASUREMENT”.

## Connecting Gas Sample Hose

The analyzer is supplied with two sample hoses designed for direct connection to R12 and R134a systems.

To connect the sample hose to R12 systems, select the R12 hose and push the small quick connect fitting onto the nipple protruding from the bottom of the analyzer. Then screw the fitting on the opposite end of the hose to the low side (vapor port) of the air conditioning system or storage tank.

To connect the sample hose to R134a systems, select the R134a hose and push the small quick connect fitting onto the nipple protruding from the bottom of the analyzer. Turn the fitting knob to the left to retract the valve activating pin. Attach the fitting to the low side (vapor port) of the air conditioning unit or refrigerant cylinder and turn the knob to the full right position to open the port valve. Before disconnecting, return knob to the full left position to close the port valve.

## CAUTION

Inspect the sample hose before each use to insure it is clean, clear of obstructions, and free of defects. If the hose is contaminated, clean following the instructions outlined in the maintenance section of this manual. ***The analyzer has been calibrated for use with the supplied sample hose. Substituting the hose will result in inaccurate test results and may cause damage to the analyzer.*** If the hose must be replaced, use only Bacharach replacement hoses (P/N 3012-1105 (R12) or 3015-1108 (R134a)).

# Testing Procedure

## Sample Testing Procedure

To begin the test procedure, fully depress the test button 4 times. It is important to depress the button fully because doing so mechanically draws fresh air into the analyzer, purges any residual gasses, and automatically calibrates the unit for accurate readings.

A series of prompts will then appear in the display window indicating the test status. After approximately 35 seconds the analyzer will beep signaling the completion of the test. At this point the appropriate LEDs will illuminate and the actual test data will be displayed in the LCD window. See the following page for typical examples.

If the sample hose has not been properly connected the user will be prompted “HOSE NOT CONNECTED - PRESS PUMP TO CONTINUE TEST”. If the unit displays the prompt connect the sample hose as described in the previous section. Once the hose has been connected the unit will proceed with the test.

## Insufficient Pressure Alert

The analyzer is designed to operate with a system pressure of at least 10 psi. If the analyzer detects insufficient system pressure, the unit will beep and display the prompt “HOSE NOT CONNECTED - PRESS PUMP TO CONTINUE MEASUREMENT”.

If you receive this prompt, check the hose connections. After a brief pause the analyzer will reset and again display the prompt “READY TO TEST - PUMP 4 TIMES TO START MEASUREMENT”. Pump 4 times to start the test. If the unit displays the prompt “HOSE NOT CONNECTED - PRESS PUMP TO CONTINUE TEST” a second time, the system may be out of refrigerant or restricted in some manner. Disconnect unit and check system pressure with pressure gauge set.

## Repeating Test Procedure

The test procedure can be repeated easily without disconnecting the sample hose. Simply depress the test button 4 times again if you wish to repeat the test. Reminder: Printer must be unplugged from unit to repeat test.

# Typical Test Results

## Effects of Air on Test Readings

The analyzer measures and displays the percent purity of the refrigerant being tested, as well as the percent of air in the sample being tested. Because air is a noncondensable, the GA500<sup>PLUS</sup> ignores its presence in calculating gas concentrations. Consequently, the total of all the displays may be greater than 100%. For example, the analyzer may display 98% refrigerant purity and 10% air. This means that there is 10% air in the system being tested. When processing the refrigerant in SAE certified recycling equipment, the air should be removed.

### Example 1 – Recoverable

#### Concentrations of R12 or R134a

If the percentage purity of R12 or R134a is 98% or greater, the corresponding LED will illuminate and the LCD display will indicate the sample percentages.

RECOVERABLE	
R134a = 100.0%	HC = 0.0%
R12 = 0.0%	R22 = 0.0%
	AIR = 1.0%

### Example 2 – Recoverable

#### Concentrations with Excessive Air

If the percentage purity of R12 or R134a is 98% or greater, but the percentage of air in the system exceeds 5%, the corresponding LED will blink and the LCD display will indicate the presence of excessive air.

RECOVERABLE	
R134a = 0.0%	HC = 0.0%
R12 = 100.0%	R22 = 0.0%
	AIR = 5.0%

### Example 3 – Contaminated Samples

If the analyzer detects concentrations of R12 or R134a below the 98%, the “Contaminated” LED will illuminate and the LCD display will display the sample percentages.

CONTAMINATED	
R134a = 90.8%	HC = 0.0%
R12 = 9.2%	R22 = 0.0%
	AIR = 2.0%

### Example 4 – Flammable Hydrocarbons

If the analyzer detects hydrocarbon concentrations greater than 2%, the “HC Hazard” LED will illuminate and the analyzer will alert the user with an intermittent beep. To turn off the alarm, press the Print/Mute button.

CONTAMINATED	
R134a = 95.2%	HC = 4.8%
R12 = 0.0%	R22 = 0.0%
FLAMMABLE	AIR = 2.0%

## Response to Blends

When testing a system containing blends the unit will always indicate “contaminated” by illuminating the yellow contaminated LED. Constituents of blends other than R12, R134a, R22 or Hydrocarbons will cause incorrect purity readings on the display. These incorrect readings tend to repeat each time a specific blend is tested. This is called “fingerprinting” and may or may not truly reflect a given blend. Bacharach does not recommend this product for the correct identification of refrigerant blends. There are many variables that can affect the reading of the “fingerprinting” concept. In all cases systems containing blends will be measured as “contaminated”.

# Printing and Shutdown Instructions

## Printing Hard Copy Test Results

If hard copy test results are required, the current test data can be printed using computer compatible parallel printers. When a printer is connected to the GA500<sup>PLUS</sup>, the pump button automatically changes function from starting a measurement to controlling the printer, consequently you cannot start a measurement while a printer is connected to the unit.

There are two ways to print test results with the GA500<sup>PLUS</sup>

1. If your printer is close by, your measurement is complete, and the results are on the LCD display; simply connect the printer and press the pump button once and the report will be printed.
2. If you must remove power from the GA500<sup>PLUS</sup> and bring it to the printer the last measurement may be recalled and printed in the following manner: Connect the printer to the GA500<sup>PLUS</sup> then connect the power cable and wait for the warm-up to finish. When the unit displays "READY TO TEST"... Press the pump once to recall the last measurement and a second time to print it.

The following is a sample printout:

```
Bacharach GA500
Refrigerant Analysis

R134a                98.4%
R12                  1.6%
R22                   0.0%
Hydrocarbons         0.0%
Air                   5.0%
Conclusion:
    RECOVERABLE
Date:  ___/___/___
Technician: _____
Car Year/Model: _____
VIN: _____
Comments:  _____
```

## Shutdown Procedure

To shut down the analyzer first disconnect the power cable from the power source. Next, disconnect the sample hose from the vapor port of the air conditioning system or refrigerant cylinder. Fully depress the pump button to purge any residual gas. Disconnect the power cable and sample hose from the analyzer. Coil the sample hose neatly and store all components in the carrying case or in a clean, dry location.

## **CAUTION**

When disconnecting the sample hose, a small amount of pressurized gas will be vented. Avoid personal injury by pointing away from the face and any exposed skin.

## **Maintenance and Troubleshooting**

### **Inspecting and Replacing the Disposable Filter Element**

The analyzer incorporates a replaceable coalescing type filter with a red dye indicator for the presence of oil. It is located in a mounting clip on the front panel. To protect the Infrared Sensor, the filter should be replaced when it turns red or when any liquid or contamination visible. The analyzer will also prompt the user to check the filter after every 25 test cycles.

To replace the filter carefully pull the filter out of its mounting clip. The attached hoses will slide out of the unit to allow the filter to clear the mounting clip for replacement. Note the direction of the arrow on the filter. Slide the hoses off of the filter and replace with a new one making sure the arrow is facing in the same direction. Carefully push the filter back into its mounting clip sliding the extended hoses back into the unit.

## **CAUTION**

Use only Bacharach replacement filters (P/N 3011-2500). Please dispose of used filters appropriately.

### **Sample Hose Cleaning and Inspection**

The sample hoses should be inspected before each use to insure they are clean, clear of obstructions, and free of defects. The hoses should be replaced whenever any cracks, cuts, kinks, or permanent blockages are apparent. Use only Bacharach replacement sample hoses (P/N 3012-1105 (R12) and 3015-1108 (R134a)).

If oil is detected and/or the filter turns red, disconnect the hose assembly from the analyzer and unscrew the check valve/quick disconnect fitting from the instrument end of the hose. Flush the hose clean using isopropyl alcohol or methanol. Follow up with clean, low pressure compressed air, or nitrogen. Screw the check valve/quick disconnect fitting back onto the sample hose and allow to dry completely before use. If oil is detected be sure to also check the filter for contamination.

## CAUTION

Clean hoses in a well ventilated area away from sparks, flames or other ignition sources.

## Technical Specifications

### GENERAL DESCRIPTION:

Refrigerant Identifier/Analyzer

Infrared sensor based, 4-channel, universal design for R12 and R134a systems. Meets SAE Standard J1771.

### POWER:

Power Requirements, %

11.5 to 16 VDC – 1.5 Amp current

Power Consumption

20 watts

### ENVIRONMENTAL:

Operating Temperature

10° to 49°C (50° to 120°F)

Storage Temperature

-20° to 70°C (-40° to 158°F)

### PHYSICAL:

Dimensions

7.5"w x 11"h x 3"d (19 x 28 x 8 cm)

Weight

4lb. 6.5oz. (2 kg )

Contaminate Filter

Replaceable color-indicating filter

Connectors

12 VDC power jack, quick-connect hose port, 25 pin printer port (Centronics type)

### COMPOUNDS MEASURED:

R12, R134a, R22, HC (hydrocarbons)

### PERFORMANCE:

Purity Accuracy of R12, R134a, R22 and hydrocarbons

±1% from 90 to 100% by weight over the operating temperature range

Purity Accuracy with Presence of R124 or R142a found in some “Blends”

±98% for R12 and R134a, with system presence of R124 or 142b commonly found in refrigerant blends Frigc FR-12, Freezone, Freez-12, GHG-12, GHG-X4, GHG-HP, and ICOR Hot Shot, etc.

Resolution

±0.1% by weight

Repeatability

±0.25% by weight

Measurement Time

Complete test cycle: <60 seconds

DATA DISPLAY:

LCD display shows simultaneously % purity of R134a, R12, R22, Hydrocarbons and % of air by weight

R12 green LED lights if purity is 98% or greater

R134a green LED lights if purity is 98% or greater

Contaminated yellow LED lights if:

- Purity of R12 or R134a is <98%
- System contains >2% R22
- System contains >2% hydrocarbons
- System contains >2% SNAP approved blends or refrigerants other than R12, R134a, R22, and hydrocarbons

Flammable red LED flashes if system contains >2% of hydrocarbons (in addition, horn alarms)

# Product and Replacement Parts

**NOTE:** Product is shipped in a carrying case along with a quick connect to the unit, R12 hose assembly, R134a hose assembly with a quick connect adapter, battery clamp adapter for 12VDC operation, replacement in-line filter, and instruction manual. An optional AC power adapter is available.

## Product Models

<u>Model #</u>	<u>Description</u>
GA500 PL	GA500 <sup>PLUS</sup> Gas Analyzer
-A	Standard Automotive Product
-0	No AC Adapter
-1	110VAC adapter
-2	120VAC adapter
-3	220/230VAC adapter
-4	240VAC adapter
-E	English Instruction Manual

Example of complete part #: GA500PL-A-0-E

## Replacement Parts

3015-1108	Replacement hose set for R134a
3012-1105	Replacement hose set for R12
3011-2500	In-line filter
3015-1078	Long cord battery clamp adapter
3015-1117	Carry/Storage case
3015-0849	Operator's manual

## Optional Adapters

3015-0131	A/C adapter 120VAC, 50/60Hz (Std. North America)
3015-0207	A/C adapter 220/230VAC, 50/60Hz (Europe)
3015-0811	A/C adapter 240VAC, 50/60Hz (UK)
3015-4104	A/C adapter 240VAC, 50/60Hz (Australia)
3015-0826	A/C adapter 110VAC, 50/60Hz (Japan)

## **Limited Warranty**

Bacharach warrants to the purchaser that this GA500<sup>PLUS</sup> Gas Analyzer will be free of defects in material and workmanship for a period of one (1) year from the date of purchase. This warranty does not cover the in-line filter, hose assemblies, or any damage caused by the user. If during the warranty period, any covered defects are discovered, Bacharach will repair or replace the GA500<sup>PLUS</sup> at its discretion.

## **Service**

If repairs are ever required (in or out of warranty), contact Bacharach Customer Service at 724-334-5000.

## **Companion Products**

For unmatched performance in locating refrigerant leaks, Bacharach offers a line of leak detectors featuring the field-proven heated diode sensor technology.

For more information on these products, call Bacharach Headquarters at 724-334-5000, or visit our website at [www.bacharach-inc.com](http://www.bacharach-inc.com).



World Headquarters

621 Hunt Valley Circle, New Kensington, PA 15068

Ph: 724-334-5000 • Fax: 724-334-5001 • Toll Free: 800-736-4666

Website: [www.bacharach-inc.com](http://www.bacharach-inc.com) • E-mail: [help@bacharach-inc.com](mailto:help@bacharach-inc.com)