

MODIS™

**Flexible Gas Analyzer
User Manual**

February 2011

ZEEMS306A Rev. F

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1-800-424-7226

Safety Information

For your own safety and the safety of others, and to prevent damage to the equipment and vehicles upon which it is used, it is important that the accompanying *Important Safety Instructions* be read and understood by all persons operating, or coming into contact with, the equipment. We suggest you store a copy the book near the unit in sight of the operator

This product is intended for use by properly trained and skilled professional automotive technicians. The safety messages presented throughout this manual are reminders to the operator to exercise extreme care when using this test instrument.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the vast number of test applications and variations in the products that can be tested with this instrument, we cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician's responsibility to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures. It is important to perform tests in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area, the equipment being used, or the vehicle being tested.

It is assumed that the operator has a thorough understanding of vehicle systems before using this product. Understanding of these system principles and operating theories is necessary for competent, safe and accurate use of this instrument.

Before using the equipment, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested. Use the equipment only as described in this manual.

Read, understand and follow all safety messages and instructions in this manual, the accompanying safety manual, and on the test equipment.

Safety Message Conventions

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word indicating the hazard level.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or to bystanders.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to the operator or to bystanders.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or to bystanders.

Safety messages contain three different type styles.

- Normal type states the hazard.
- Bold type states how to avoid the hazard.
- Italic type states the possible consequences of not avoiding the hazard.

An icon, when present, gives a graphical description of the potential hazard.

Example:

 **WARNING**



Risk of unexpected vehicle movement.

- **Block drive wheels before performing a test with engine running.**

A moving vehicle can cause injury.

Important Safety Instructions

For a complete list of safety messages, refer to the accompanying safety manual.

SAVE THESE INSTRUCTIONS

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This manual contains tool usage instructions.

Some of the illustrations shown in this manual may contain modules and optional equipment that are not included on your system. Contact a sales representative for availability of other modules and optional equipment.

1.1 Conventions

1.1.1 Bold Text

Bold emphasis is used in procedures to highlight selectable items such as buttons and menu options.

Example:

- Press the **Y/a** button.

1.1.2 Symbols

The following types of arrows are used.

The “greater than” arrow (>) indicates an abbreviated set of selection instructions.

Example:

- Select **Utilities > Tool Setup > Date**.

The above statement abbreviates the following procedure:

1. Navigate to the **Utilities** button.
2. Use the Thumb Pad to navigate to and highlight the **Tool Setup** submenu.
3. Use the Thumb Pad to navigate to and highlight the **Date** option from the submenu.
4. Press **Y/a** to confirm the selection.

The solid arrows (e, c, d, b) are navigational instructions referring to the four directions of the Thumb Pad.

Example:

- Press the down d arrow.

1.1.3 Terminology

The term “select” means highlighting a button or menu item using the Thumb Pad and pressing the **Y/a** button to confirm the selection.

Example:

- Select **Reset**.

The above statement abbreviates the following procedure:

1. Navigate to and highlight the **Reset** button.
2. Press the **Y/a** button.

1.1.4 Note and Important Messages

The following messages are used.

Note

A NOTE provides helpful information such as additional explanations, tips, and comments.

Example:

**NOTE:**

For additional information refer to...

Important

IMPORTANT indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

Example:

IMPORTANT:

Do not force the CompactFlash[®] card into the slot.

1.1.5 Procedures

An arrow icon indicates a procedure.

Example:

**To change screen views:**

1. Select **View**.
The drop-down menu displays.
2. Select an option from the menu.
The screen layout changes to the format you selected.

1.2 Additional Manuals

Tools that work in conjunction with various hardware and software modules have separate manuals available for each of the modules.

1.3 Tool Help

Your unit has Tool Help containing reference and procedural information found in this and other tool related user's manuals. From the main menu, access Tool Help on the Utilities menu.

The Snap-on Flexible Gas Analyzer (FGA) (Figure 2-1) is a self-contained, battery operated unit that connects to the MODIS™ unit and uses the MODIS™ Gases software mode for emissions testing and data storage.



Figure 2-1 Flexible Gas Analyzer (FGA) unit

2.1 Power Sources

The FGA unit uses a long-life, internal, rechargeable battery and supports the three external power sources illustrated below (Figure 2-2).

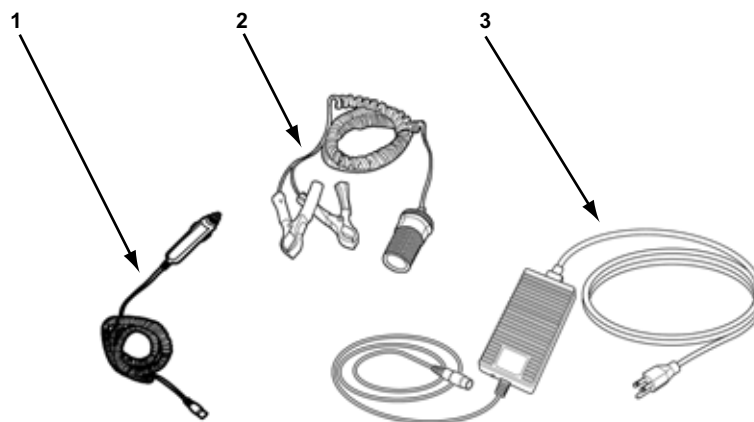


Figure 2-2 Three of the four FGA unit power sources

- 1— 12VDC source with cigarette lighter adapter**
- 2— 12VDC direct from vehicle battery**
- 3— External 13.2VDC high output power supply**
Also charges the internal battery

2.2 Internal Cooling Fan

The FGA unit's internal cooling fan is automatically controlled by a microprocessor inside the unit. The fan runs when the internal unit temperature reaches 100 degrees Fahrenheit, and turns off when the internal unit temperature falls below 90 degrees Fahrenheit. No user action is required to operate the fan.

IMPORTANT:

Do not block the cooling fan vent (Figure 2-3). The internal cooling fan needs a free-flowing air supply to operate properly.

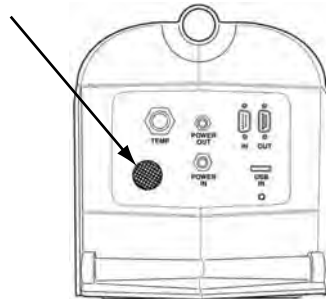


Figure 2-3 Cooling Fan Vent on side of FGA unit

A foam cooling fan filter (Figure 2-4) is covered by a plastic grill and is located behind the water trap/filter bowl. Periodic maintenance is required.

For cleaning procedures, refer to “Cleaning the Cooling Fan Filter” on page 39.

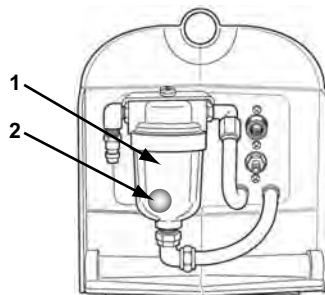


Figure 2-4 Side of FGA unit

- 1— Water Trap/Filter Bowl
- 2— Cooling Fan Filter

2.3 The FGA Pump

An internal pump is used to clear water and residual gases from the water trap/filter bowl.

For a more detailed discussion of the FGA pump, refer to “Toggle Pump” on page 21.

2.4 Unit Software

The FGA unit software is included in the MODIS™ 3.2 (and newer) system software.



NOTE:

If the Gases button displays on the MODIS™ main menu, the FGA software is installed on your MODIS™ unit.



To verify that the FGA software is installed:

1. Select **Utilities** > **System Info**.

The System Info screen displays (Figure 2-5).

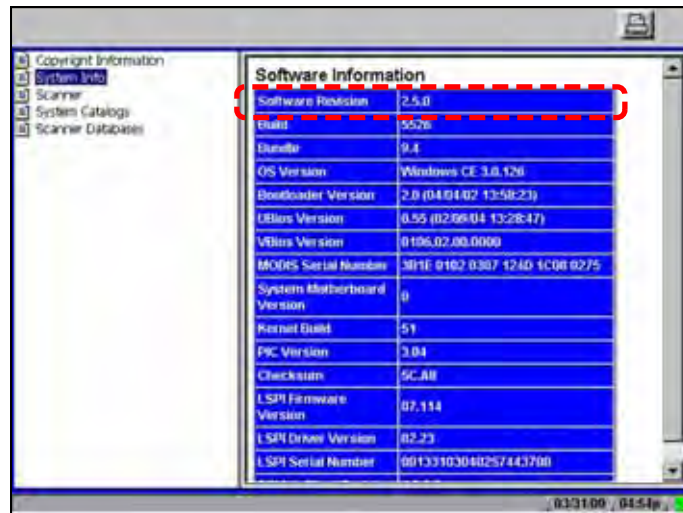


Figure 2-5 Sample System Info screen

2. Make sure you are running Software Revision: 1.2.0 build 266 or newer.
3. Press **N/X** to return to the main menu.

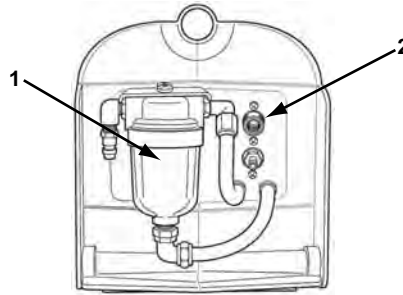
2.5 Assembling the FGA Unit

Required Tools:

- 1/2" open end wrench
- 9/16" open end wrench

**To assemble the FGA unit:**

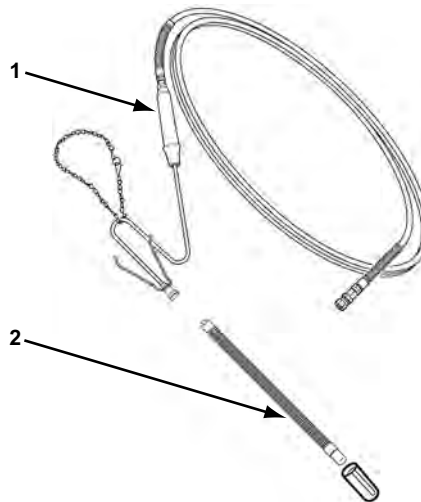
1. Connect the short clear hose (included with the FGA unit, but not pictured) to the Exhaust quick coupler outlet on the water trap/filter bowl end of the analyzer (Figure 2-6).

**Figure 2-6** Side of FGA unit**1— Water Trap/Filter Bowl****2— Exhaust Outlet****NOTE:**

If the Exhaust hose is not connected, the analyzer will automatically shut down.

Refer to the “Equipment Overview” section in the *Flexible Gas Analyzer (FGA) Operating Instructions Manual* for more detailed information about the hoses.

2. Install the Exhaust Sample Flex Probe (Figure 2-7) into the Exhaust Sample Hose Handle using 1/2” and 9/16” open end wrenches.

**Figure 2-7** Exhaust Sample Flex Probe assembly**1— Exhaust Sample Hose Handle****2— Exhaust Sample Probe**

Make sure the probe is tightened securely.

3. Remove the Leak Check Probe Adapter Cap (Figure 2-8) and store it in a safe place.

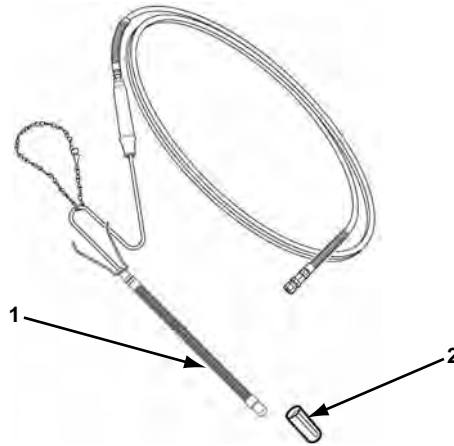


Figure 2-8 Assembled Exhaust Sample Probe

1— Exhaust Sample Probe

2— Leak Check Adapter cap

4. Connect the black sample hose to the quick coupler next to the sample filter bowl.
5. Connect the long yellow 13.2V power cord (Figure 2-9) to the POWER IN connection on the cable connection panel (Figure 2-10).



Figure 2-9 13.2V Power Cord and DC Power Supply

1— Yellow 13.2V Power Cord

2— 13.2V DC Power Supply

The 13.2V power cable has a large black female connector on one end, and a small silver male connector on the other end. The silver male connector end must be threaded onto the Power In connector to secure it to the panel.

The cable connection panel is on the opposite end of the analyzer from the filter bowl (Figure 2-10).

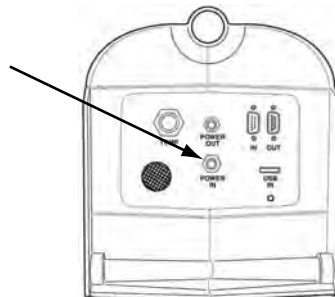


Figure 2-10 Power In connector on side of FGA unit

- Connect the other end of the Power In cable to the black male connector on the 13.2V DC power supply.

**NOTE:**

The DC power supply has an On/Off switch and a green LED to indicate when charging is active.

- Attach the AC power cord to the other end of the power supply (Figure 2-11).



Figure 2-11 13.2V Power Cord and DC Power Supply

- 1— 13.2V DC Power Supply
2— AC Power Cord Plugs to Wall Socket

2.6 Charging the FGA Unit Battery

Before using the Flexible Gas Analyzer for the first time, or when the analyzer has not been used for several weeks, allow the internal battery to charge for at least twenty-four hours.

Be aware of the following:

- The internal battery will not charge if the ambient temperature inside the FGA unit is above 145 ° F (65 ° C).
- The FGA unit internal battery will not over-charge.
The FGA unit uses an automatic rate controlled battery charger which allows the unit to remain connected to the charger indefinitely without causing damage to the unit or battery.
- The internal battery remain charged for about 2–4 months without use.

**To charge the internal battery:**

- Plug one end of the battery power adapter (Figure 2-10) into an 115V AC outlet, and the other end into the Power In socket on the FGA unit connection panel (Figure 2-12).

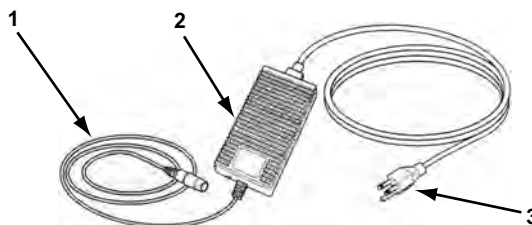


Figure 2-12 Battery Power Adapter

- 1— 13.2V Power Cord plugs to unit
2— 13.2V DC Power Supply
3— AC Power Cord plugs to wall socket

2. Turn on the charger using the switch on the DC power supply.
A green LED lights to indicate charging is active.
3. Let the battery charge for twenty-four hours before using the FGA unit.

2.7 Connecting the FGA Unit to the MODIS™ Unit

The following section covers the steps for connecting the FGA unit to the MODIS™ unit.



To connect the units:

1. Connect the long serial communications cable (provided with your FGA unit) to the connector labeled RS232 IN on the connection panel (Figure 2-13).

IMPORTANT:

DO NOT install this cable into the **RS232 OUT**.

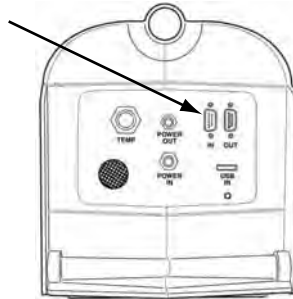


Figure 2-13 RS232 IN serial port

2. Secure the cable with the thumbscrews.

IMPORTANT:

DO NOT overtighten the thumbscrews.

3. Connect the other end of the long serial communications cable to your MODIS™ serial communications port located in the center of the top of the MODIS™ unit (Figure 2-14).

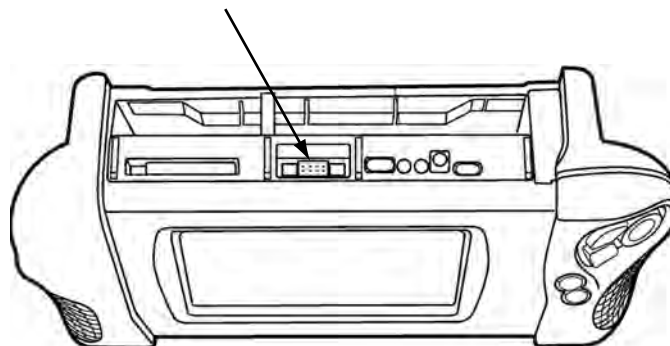


Figure 2-14 MODIS™ Serial communications port

This section provides navigation information for details about the MODIS™ Gases software. For more detailed information on how to navigate through the MODIS™ unit, refer to the *MODIS™ Display User Manual*.

3.1 Screen Layout

MODIS™ Gases test screen has four sections (Figure 3-1).

- Upper Toolbar
- Trace Status Area
- Main Body
- Lower Toolbar



Figure 3-1 Sample Gases test screen

- 1— Upper Toolbar
- 2— Trace Status Area
- 3— Main Body
- 4— Lower Toolbar

3.1.1 Upper Toolbar

The upper toolbar (Figure 3-2 and Figure 3-3) may contain the controls described in Table 3-1. Available buttons and controls vary depending on the active mode and stage of operation.



Figure 3-2 Sample "Live" Upper toolbar

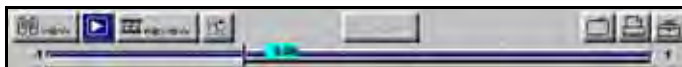











Figure 3-3 Sample "Paused" Upper toolbar

Table 3-1 Upper toolbar controls

Name	Button	Description
View		Changes the way data displays
Pause		Stops the collection of data to allow for reviewing buffered data
Play		Resumes collection of data following a pause
Review		Adjusts how the paused data scrolls on-screen for reviewing
Cursors		Makes digital amplitude, frequency, and time measurements
Reset		Clears the minimum and maximum data for all digital gauges
Save		Stores data and settings in memory
Print		Prints the displayed screen
Tools		Changes the way information appears on-screen

Data Buffer

Located just below the upper toolbar buttons, this indicator shows data collection activity when the screen is live and frame position and numbering information when the screen is paused (Figure 3-4). The Data Buffer cannot be highlighted or selected.



Figure 3-4 Sample Data Buffer

- 1— Pause button
- 2— Data Buffer

When the screen is paused, the Position Indicator displays the current frame number and the amount of data on the screen relative to the total data capture. The number of the first frame collected is displayed to the left of the Position Indicator. The number of the last frame is displayed to the right of the Position Indicator (Figure 3-5).



Figure 3-5 Sample Scroll Control with Position Indicator

- 1— Run button
2— Position Indicator

Review Button

The Review button is used in conjunction with the arrow buttons to review data when the screen is paused.

- Use the right **c** and left **e** arrows to review data one frame at a time.
- Use the up **b** and down **d** arrows to review data a fraction of a frame at a time when possible.



To manually review data:

1. Select the **Pause** button.
2. Select the **Review** button.
3. Press the arrow buttons as appropriate to manually review paused data.

The Review button menu lets you change data scrolling of the paused screen from manual scroll to automatic scroll.



To automatically scroll paused data:

1. With the **Review** button selected, press **Ya** again to display the menu of scroll options.
2. Select an option from the **Review** menu.
 - **Manual Scroll** is the default mode that lets you scroll the paused data on-screen using the arrow buttons.
 - **Auto Scroll Fast** automatically scrolls the paused data on-screen at full-speed.
 - **Auto Scroll Slow** automatically scrolls the paused data on-screen at half-speed.

3.1.2 Main Body

The main body of the MODIS™ Gases test screens (Figure 3-6) may contain the following:

- Trace status information
- Digital or graphical test results
- Saved data
- Cursors
- Confirmation messages



Figure 3-6 Sample Main Body screen

- 1— Trace Status Area
- 2— Main Body

Trace Status Area

Trace status information displays along the top of the test screen to indicate scales, units, gas selection, and whether each available trace is on or off (Figure 3-7).



Figure 3-7 Sample Trace status information

3.1.3 Lower Toolbar

The lower toolbar (Figure 3-8) may contain the controls described in Table 3-2. Available buttons and controls vary depending on the active mode and stage of operation.

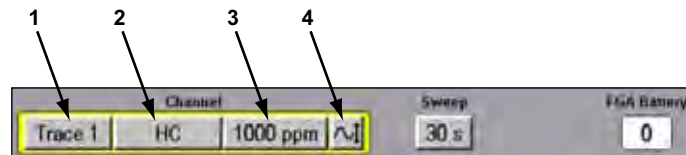







Figure 3-8 Sample lower toolbar

- 1— Trace number
- 2— Test
- 3— Scale
- 4— Signal Zero Offset

Table 3-2 Lower toolbar controls

Name	Button	Description
Trace number		Selects which trace to adjust
Test		Displays the current test chosen for the selected channel
Scale		Displays the current scale and units for the selected channel
Signal Zero Offset		Moves the zero (0) position up or down within the test display area for the selected channel
Sweep		Sets the amount of time data takes to move across the screen from left to right



To move between the upper and lower toolbars:

- Press the down **d** arrow to move to the lower toolbar.
- Press the up **b** arrow to move to the upper toolbar.
- When Easy Scroll is active, press the **N/X** button to move to the upper toolbar. Refer to the *MODIS™ Display User Manual* for more Easy Scroll information.

3.2 Selections

Refer to your *MODIS™ Display User Manual* for information and procedures.

The following sections describe how to operate the MODIS™ Gases software.

4.1 Starting MODIS™ GASES

The FGA unit does not have an On/Off switch. The FGA unit is activated through communication with the Gases software installed on your MODIS™ display unit.



NOTE:

If the FGA unit is not properly connected to your MODIS™ unit, the Gases mode will not function.

The MODIS™ Gases menu lets you select display, calibration, and preset options.



To start the Gases software:

1. Connect the FGA unit to your MODIS™ unit using the serial communications cable. See “Connecting the FGA Unit to the MODIS™ Unit” on page 10 for details.
2. Select **Gases > Graph/Digital** (Figure 4-1).

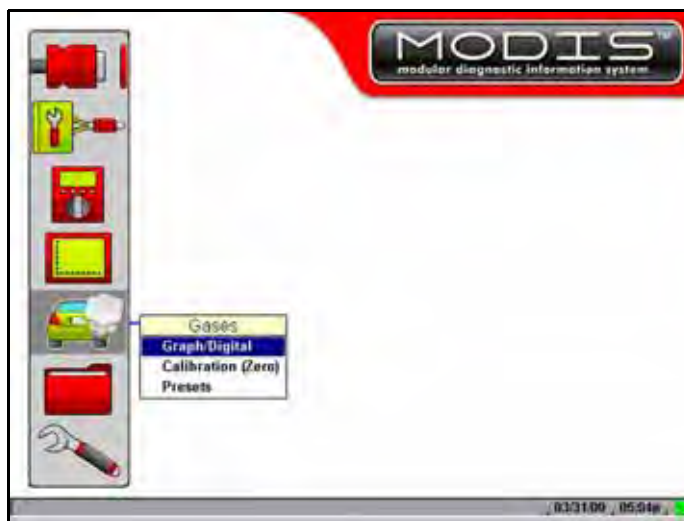


Figure 4-1 Sample GASES button and menu

The analyzer automatically powers on and warms up. Before the FGA unit begins to operate, the pump starts and performs a purge, followed by an automatic zero calibration.

3. Follow the on-screen instruction to continue (Figure 4-2).

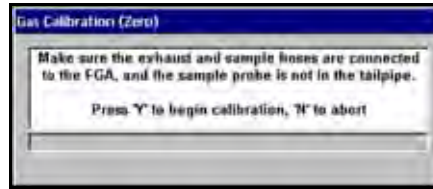


Figure 4-2 Sample startup calibration instruction

The Gases test screen displays at the end of the zero calibration process (Figure 4-4).



Figure 4-3 Sample Gases test screen

4.2 Changing the Data Display

The View menu lets you change the format of the data displays on the MODIS™ screen. Five View options are available:

- RPM
- Graph
- Digital
- Digital and Graph
- Digital and Bars



To change screen views:

1. Select **View**.

The drop-down menu displays (Figure 4-4).



Figure 4-4 Sample View menu option

2. Select a View option from the menu.
The screen changes based on your selection.

4.2.1 RPM

Selecting the RPM option displays the RPM field above the trace status area (Figure 4-5).

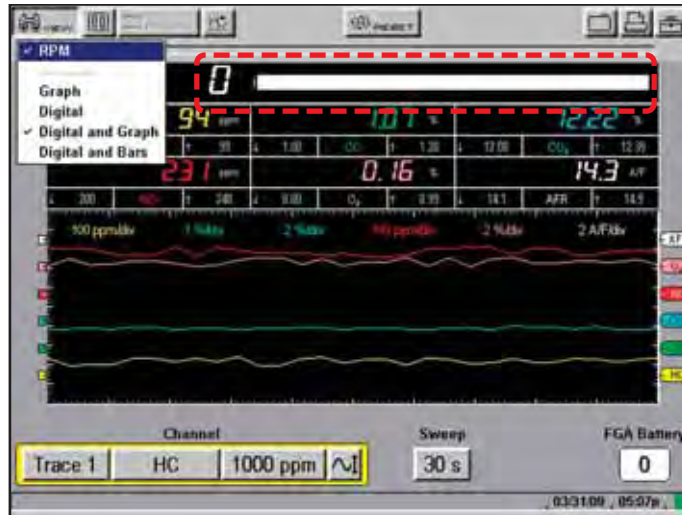


Figure 4-5 Sample RPM field

4.2.2 Graph

The Graph option displays a line graph with a gas test marker displayed to the right of the corresponding trace line (Figure 4-6). The marker indicates the zero position of the trace.

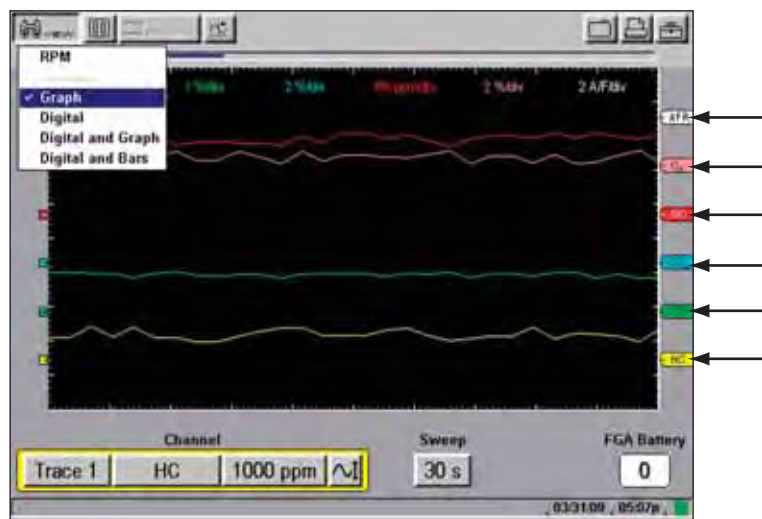


Figure 4-6 Sample Gas Test Markers

4.2.3 Digital

The Digital option displays a screen divided into six sections (Figure 4-7). Each section serves as a gauge for one of the six available traces. If a Trace number is set to not display, the designated section will appear empty. Refer to “Trace Number” on page 28 for more information about Trace number settings.

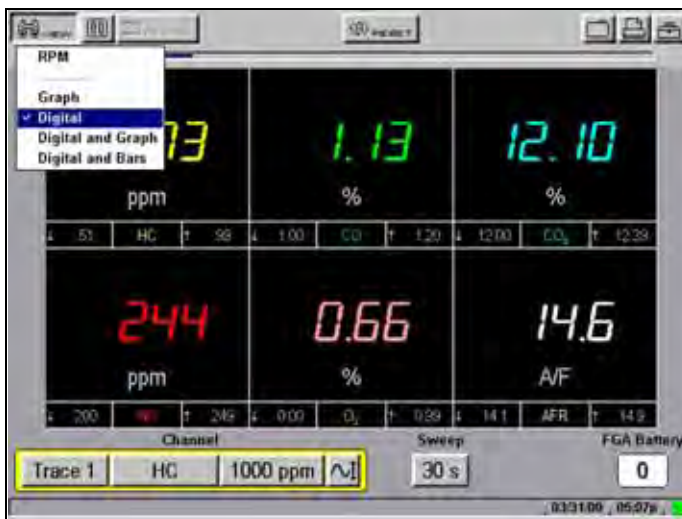


Figure 4-7 Sample Digital screen

4.2.4 Digital and Graph

The Digital and Graph option displays digital test data at the top of the screen and line graph data below it (Figure 4-8).



Figure 4-8 Sample Digital and Graph screen

- 1— Digital Data
- 2— Line Graph Data

4.2.5 Digital and Bars

The Digital and Bars option displays digital test data at the top of the screen and bar graph data below it (Figure 4-9).

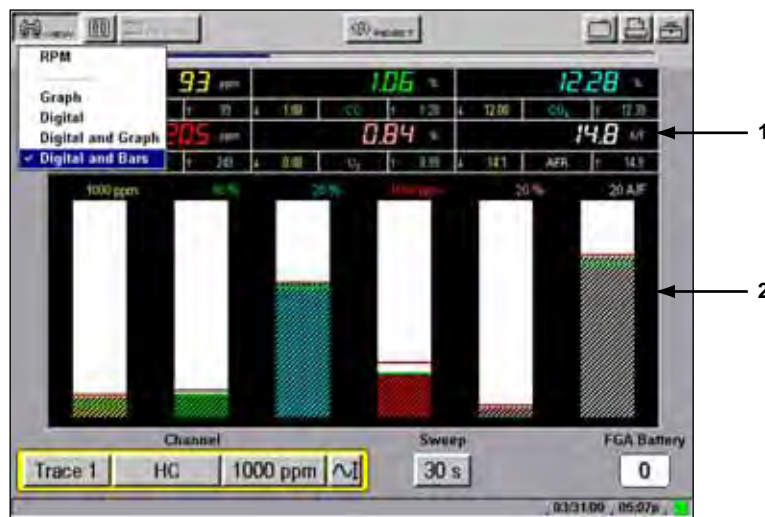


Figure 4-9 Sample Digital and Bars screen

- 1— Digital Data
- 2— Bar Graph Data

4.3 Changing the Setup

The Tools button menu typically lets you change the way information appears on-screen. For FGA, however, there are additional functions that manually control some analyzer setup procedures. The following are Tools button functions unique to MODIS™ Gases mode:

- Toggle Pump
- Zero Calibration
- Leak Check
- Gas Bottle Calibration

These are discussed below, the remaining menu options are covered in the *Lab Scope Plug-in*.

Select **Tools** and a dropdown menu displays, select an option from the menu (Figure 4-10).



Figure 4-10 Sample Tools dropdown menu

4.3.1 Toggle Pump

The Toggle Pump option lets you turn the analyzer sample pump off and on manually. The FGA pump continues to run while the FGA is active. You can turn the pump off manually, or the pump turns itself off automatically after thirty seconds of inactivity. To prolong the life of the battery when finished testing, we recommend that you turn the pump off manually before exiting Gases mode.

The Toggle Pump option is also available from the Gas Bench Setup menu under Utilities.



To turn the pump off manually:

From the Tools button menu, select **Toggle Pump**.(Figure 4-11)



Figure 4-11 Sample Toggle Pump option

You should hear the pump inside the FGA unit turn off.

4.3.2 Zero Calibration

The Zero Calibration option lets you manually zero your FGA unit.

This task can also be performed by selecting the Calibration (Zero) option, located on the Gases main menu (Figure 4-12).



Figure 4-12 Sample Calibration (Zero) Main menu selection



To re-zero the gas analyzer:

1. From the Tools button menu, select **Zero Calibration**. (Figure 4-13)



Figure 4-13 Sample Zero Calibration selection

A message box informs you that you are about to reset your analyzer unit and lose all existing data (Figure 4-14).

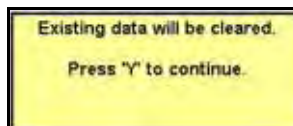


Figure 4-14 Sample Confirmation message



NOTE:

To ensure the integrity of the collected data, all data is cleared from your MODIS™ unit before each calibration and maintenance procedure.

2. Follow the on-screen instructions to continue.

The Gas Calibration (Zero) dialog box displays instructions for proper unit calibration (Figure 4-15).

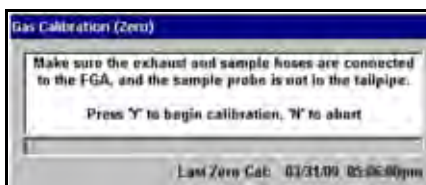


Figure 4-15 Sample Gas Calibration (Zero) dialog box

3. Follow the on-screen instructions.

The re-zero process begins. The progress displays in the Gas Calibration (Zero) dialog box (Figure 4-16).

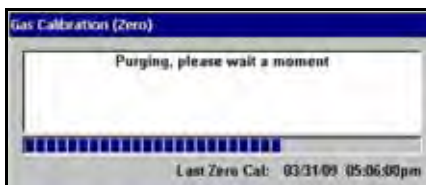


Figure 4-16 Sample Gas Calibration (Zero) progress

4. Continue using your FGA unit when the Gas Calibration (Zero) dialog box disappears.

4.3.3 Leak Check

The Leak Check option lets you check the gas sampling system for leaks.

The Leak Check option is also available from the Gas Bench Setup menu under Utilities.



NOTE:

Sample system leaks can cause inaccurate readings. We recommend that you perform a Leak Check once a week as part of a routine maintenance schedule.



To perform a Leak Check:

1. From the Tools button menu, select **Leak Check** (Figure 4-17).



Figure 4-17 Sample Leak Check selection

A message box informs you that you are about to reset your analyzer unit and lose all existing data (Figure 4-18).

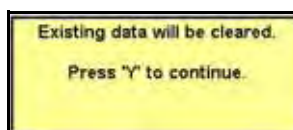


Figure 4-18 Sample Confirmation message

2. Press **Y** to continue.
The Leak Check dialog box (Figure 4-19) displays with instructions for proper testing.

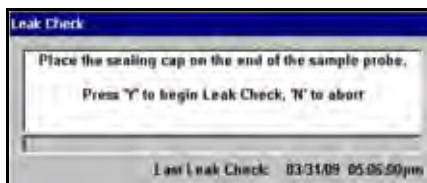


Figure 4-19 Sample Leak Check dialog box

3. Put the Leak Check Adapter Cap on the end of the Sample Probe to seal it, and press **Y**. The Leak Check process begins. The progress displays in the Leak Check dialog box. A test results message displays when the Leak Check process is complete (Figure 4-20).

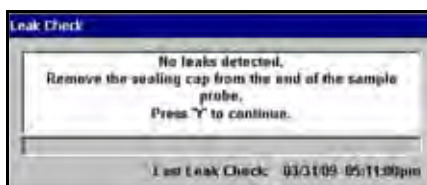


Figure 4-20 Sample Leak Check dialog box

4. Follow the on-screen instructions to continue (Figure 4-20).

Failed Leak Check

The following procedure explains what to do if your Leak Check fails.

**To fix a failed Leak Check:**

1. Inspect the exhaust hose, exhaust probe, fittings, and the water tap/filter bowl connection.
2. Remove the hose from the sample port on the filter, seal the inlet, and repeat the Leak Check. If the Leak Check passes, the vehicle sample hose or probe has a leak. If the Leak Check fails again, go to Step 3.
3. Remove the hose from the top fitting on the right of the sample filter bowl and seal it, then repeat the Leak Check. If the Leak Check passes, the sample filter bowl is leaking and needs repair. The most likely problem is a split O-ring seal.

**NOTE:**

After a successful Leak Check, it may be necessary to remove the hose from the top fitting on the right of the sample filter bowl to relieve the system vacuum and allow the pump to run (Figure 4-21).

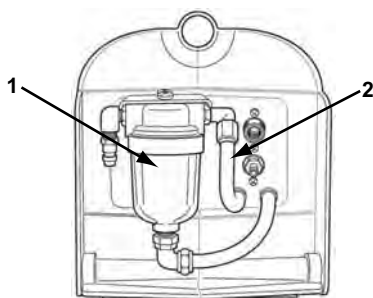


Figure 4-21 *Side of unit*

1— Water Trap/Filter Bowl

2— Remove this hose

4.3.4 Gas Bottle Calibration

Gas Bottle Calibration lets you perform a periodic gas calibration against known standards.

During normal operation, the gas analyzer should be calibrated periodically to ensure accurate gas measurement. The gas analyzer is calibrated using a special composition of gases that have been certified for concentration. Calibration intervals may vary depending on the application and use, but once every four months as part of routine maintenance is recommended, more frequently with heavy use.

The Gas Bottle Calibration procedure can also be accessed from the Utilities > Gas Bench Setup > Bottle Calibration submenu selection.



To perform the Gas Bottle Calibration:

1. From the Tools button menu, select **Gas Bottle Calibration** (Figure 4-22).



Figure 4-22 Sample Gas Bottle Calibration selection

A message box informs you that you are about to reset your analyzer unit and lose all existing data (Figure 4-23).

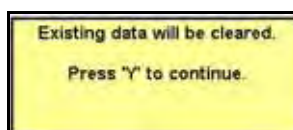


Figure 4-23 Sample Confirmation message

2. Verify that the gas analyzer Sample System Exhaust Hose is connected to the port labeled Exhaust.
3. Disconnect the Vehicle Exhaust Sample Hose from the Filter bowl Quick Coupler, and verify that the gas analyzer is sampling fresh air.
4. Press **Y**a to continue.

The Gas Calibration (Bottle) dialog box displays with instructions for proper calibration (Figure 4-24).

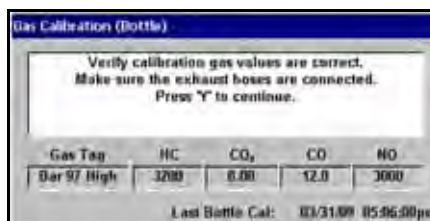


Figure 4-24 Sample Gas Calibration (Bottle) concentration confirmation dialog box

5. Verify that the displayed values, like those shown in Figure 4-24, match the values for each gas on your Gas Calibration Bottle within +/- 5%. The concentrations selected must match your bottle before continuing with a calibration.
 - If gas values match, continue to Step 6.
 - If gas values do not match, press **N/X** to exit the current Gas Bottle Calibration session, and change the Gas Values setting before continuing with the calibration. The Gas Value setting function is accessible from **Utilities > Gas Bench Setup > Gas Values**. Refer to "Gas Values" on page 34 for more details and procedures.
6. Press **Y**a to continue.

The Gas Calibration process begins. The progress displays in the Gas Calibration (Bottle) dialog box.

The Gas Calibration process begins with a purge of the sample system (Figure 4-25). The purge ensures that the sample system is clear of residual gases.

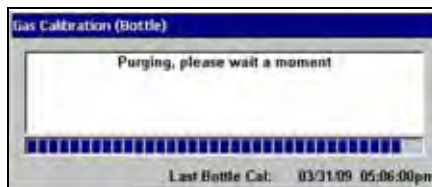


Figure 4-25 Sample Gas Calibration (Bottle) purge

The purge is followed by a Zero Calibration.

7. After the Zero Calibration finishes, follow the on-screen instructions (Figure 4-26), and press **Y** to begin the calibration.

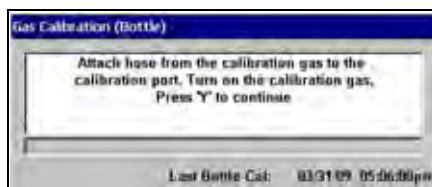


Figure 4-26 Sample Gas Calibration (Bottle)

NOTE:



Make sure the pressure gauge on the Gas Regulator reads at least 30 psi. If the pressure gauge does not read at least 30 psi, replace the Gas Bottle with a fresh bottle.

The Gas Calibration process begins and a progress bar displays at the bottom of the dialog box (Figure 4-27).

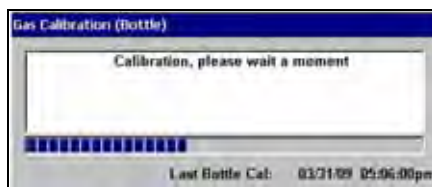


Figure 4-27 Sample Gas Calibration progress display

Verification of your selected Gas Values is the first process. Your selected Gas Values are compared to the Gas Values read by the gas analyzer.

- If the Gas Values appear incorrect, a message box displays instructing you to check the values on the bottle and make sure the bottle valve is open.
- If the Gas Values appear correct, the Gas Bottle Calibration begins automatically.

NOTE:



Calibration gas flows approximately three minutes.

A test results message displays when the Gas Calibration process is complete (Figure 4-28).

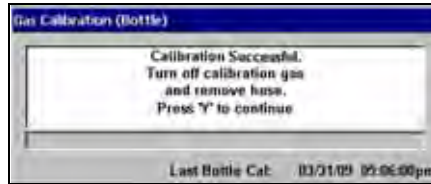


Figure 4-28 Sample Gas Calibration (Bottle) results display

- Follow the on-screen instructions to continue (Figure 4-28).

Failed Gas Bottle Calibration

The following troubleshooting procedure explains what to do if your Gas Bottle Calibration fails.



To fix a failed Gas Bottle Calibration:

- Verify that the gas bottle valve is open and gas flows.
- Verify that gas flows freely out of the calibration gas hose outlet.
- Verify that the pressure gauge on the calibration gas bottle reads at least 30 psi.
- Verify that the gas bottle was connected to the correct port on the FGA unit.
- Verify that the gas bottle values are correct.
- Rerun the Gas Calibration procedure.

Restore the Factory Calibration Setting

Use the following procedure if the previous procedure to fix the Gas Bottle Calibration fails.



To restore the factory calibration setting:

- Select **Utilities > Gas Bench Setup > Diagnostics**.
- Select **Reset > Restore Factory Setting**.
- Rerun the Gas Calibration procedure.

4.4 Changing Channel Control Bar Settings

The Channel control bar lets you change whether the selected trace displays or not (Figure 4-29).

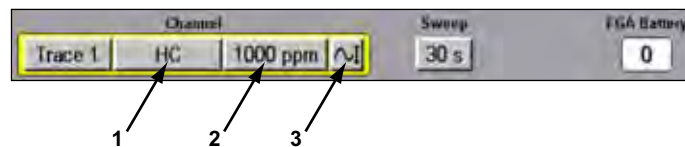


Figure 4-29 Sample Channel control bar (Lower toolbar)

- 1— Test button
- 2— Scale button
- 3— Signal Zero Offset Control

4.4.1 Trace Number

Trace number lets you select the gas trace to display. There are six gas traces available for use in the Gases software (Figure 4-30).

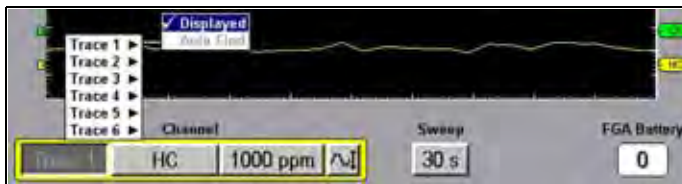


Figure 4-30 sample Trace 1 setup menu

The procedures for using the trace number menu are the same as the Channel Number procedures used in the Lab Scope modes.



To select a trace number:

1. Select the **Trace Number** button from the Channel control bar.
The trace setup menu displays (Figure 4-30).
2. Use the up **b** and down **d** arrows to select the trace you want to change (**Trace 1** through **Trace 6**).

You can select whether a trace displays or not.



To change the trace display:

1. From the Trace number menu (Figure 4-30), select the trace you want to change (**Trace 1** through **Trace 6**).
2. Press the right **c** arrow to move into the submenu, and select the **Displayed** option.
A check mark indicates that the option is turned on.
3. Repeat Steps 1–2 as needed.
If a trace is turned on, Steps 1–2 turns the display off and removes the check mark.
4. Press **N/X** to close the menu when you are finished.

4.4.2 Test

The Test menu displays the current gas test assignment for the selected trace (Figure 4-31).



Figure 4-31 Sample Test menu

The procedures for using the Test menu are the same as the Probe procedures used in the Lab Scope modes.

The Test selections are visible on the screen whenever a Digital View option is selected (Figure 4-32).



Figure 4-32 Sample Test selection display

4.5 Using Presets

Use the Presets option from the Gases menu to manage your preset files. Included are factory-installed presets for many commonly-used components.



NOTE:

Factory-installed presets, which are identified by a lock icon in the type field, cannot be edited, deleted, copied or moved.

The Presets option functions much like Data Management in Saved Data (refer to your *MODIS™ Display User Manual*). Factory-installed presets are identified by a lock icon, and cannot be edited, deleted, copied or moved.

From the Preset Management screen, you can perform various file management tasks using the following upper toolbar buttons:

- **Load**—opens an active test screen with settings from a configuration file.
- **Edit**—lets you change the file name of a stored configuration file and add text to the note field.
- **Delete**—removes the saved file from storage memory.
- **Copy**—lets you move a duplicate of the selected file to either the internal or CF storage memory location.
- **Move**—lets you move the selected file to a new location, either the internal or CF storage memory, and deleted from the previous storage location.
- **Select All**—allows you to highlight and delete, copy, or move all of the files at once.
- **Setup**—provides a shortcut to the Save Data utility that lets you set the global location for where presets save and load (either Internal storage memory, or Top CF).

4.5.1 Loading Saved Files

The Load button opens an active test screen with settings from a configuration file.



To load a preset:

1. From the main menu, select **Gases > Presets** (Figure 4-33).

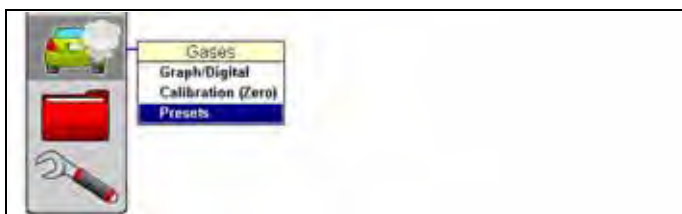


Figure 4-33 Sample Presets menu

The Preset Management screen displays with the highlight on the top saved file.

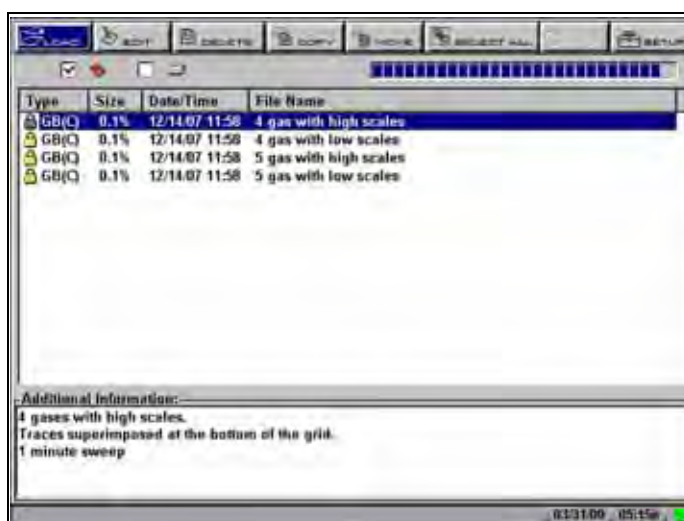


Figure 4-34 Sample preset load selection

2. Use the up **b** and down **d** arrows to highlight a preset from the list on-screen.
3. Use right **c** and left **e** arrows to select the **Load** button from the upper toolbar.

The Gases screen displays with your selected preset configuration.

4.5.2 Editing Presets

The Edit button lets you add notes to and change the name of the preset file.



NOTE:

A USB keyboard (not supplied) is required for this function.



To edit a preset:

1. From the main menu, select **Gases > Presets**.
The Preset Management screen displays.
2. Connect a USB keyboard to the port on top of the MODIS unit.
3. Use the up **b** and down **d** arrows to highlight a preset from the list on-screen.
4. Use the right **c** and left **e** arrows to highlight and **Y/a** to select **Edit** from the upper toolbar.
The Edit Preset Name And Note dialog box displays (Figure 4-35).



Figure 4-35 Sample Edit Preset Name And Note dialog box



NOTE:

The **Notes** and **Name** icons are not active if a keyboard is not plugged in.

5. Connect a USB keyboard to the port on top of the MODIS unit.
6. Use the right **c** and left **e** arrows to highlight and **Y/a** to select **Note**.
The Additional Information section is now active (Figure 4-36).

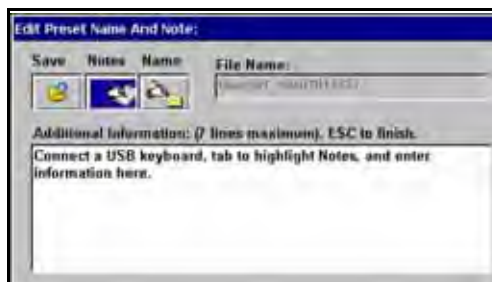


Figure 4-36 Sample Note selection

7. Using the keyboard, type a text note (7 lines maximum), then press **Esc** to exit the Additional Information section.
8. Use the right **c** and left **e** arrows to highlight and **Y/a** to select to **Name**.
The **File Name** field is now active (Figure 4-37).

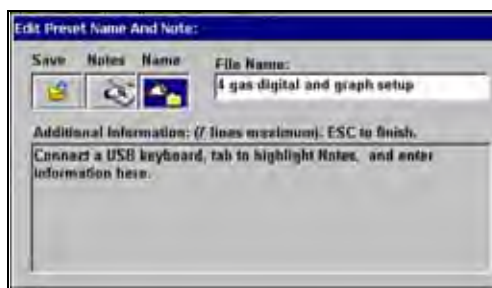


Figure 4-37 Sample Name selection

- Using your keyboard, type a name, and press **Esc** to exit the **File Name** field.



NOTE:

If you do not provide a file name, a name is automatically created for you (like User00x).

- Select **Save**.

After processing your edit request, you are returned to the Preset Management screen.

4.5.3 Deleting Presets

The Delete function lets you remove custom preset files from your system memory.

To delete files:

- From the main menu, select **Gases > Preset**.
The Preset Management screen displays.
- Use the up **b** and down **d** arrows to highlight a preset from the list.
- Use right **c** and left **e** arrows to select **Delete** from the upper toolbar.
A confirmation message displays (Figure 4-38).

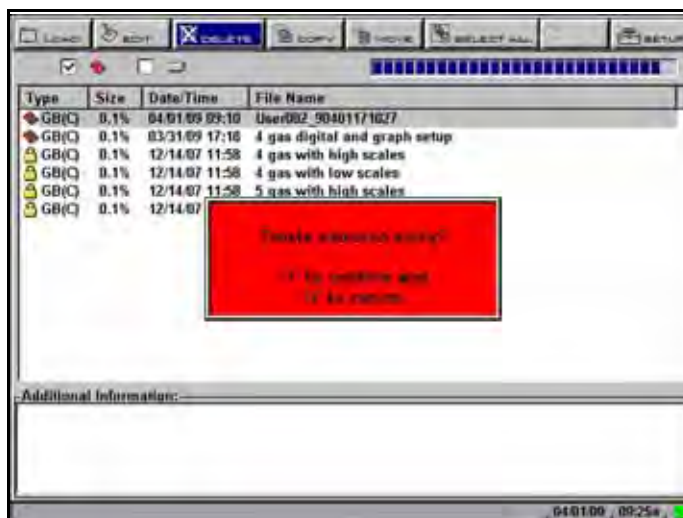


Figure 4-38 Sample Delete file confirmation message

- To permanently remove the data from memory, press **Y**, or press **N/X** to keep the data and close the dialog box.

After processing your delete request, you are returned to the Preset Management screen.

4.5.4 Copying and Moving Presets

The Copy and Move functions let you change the location of your preset files as needed.



To copy or move data:

1. From the main menu, select **Gases > Preset**.
The Preset Management screen displays.
2. Use the up **b** and down **d** arrows to highlight a file from the list on-screen.
3. Use right **c** and left **e** arrows to select **Copy** or **Move** from the upper toolbar.
A confirmation message displays.
4. Press **Ya** to acknowledge the message and close the dialog box, and return to the Preset Management screen.

4.5.5 Selecting Multiple Files

Use Select All to highlight all the files on-screen so you can Delete, Copy, or Move all the files as needed.



To exit the Preset Management screen:

- Press **N/X** to return to the main menu.

4.6 FGA Utilities

The following Gas Bench Setup utilities options may be available from the Utilities menu (Figure 4-39):

- Toggle Pump
- Leak Check
- Bottle Calibration
- Gas Values
- Install NO Cell
- Diagnostics

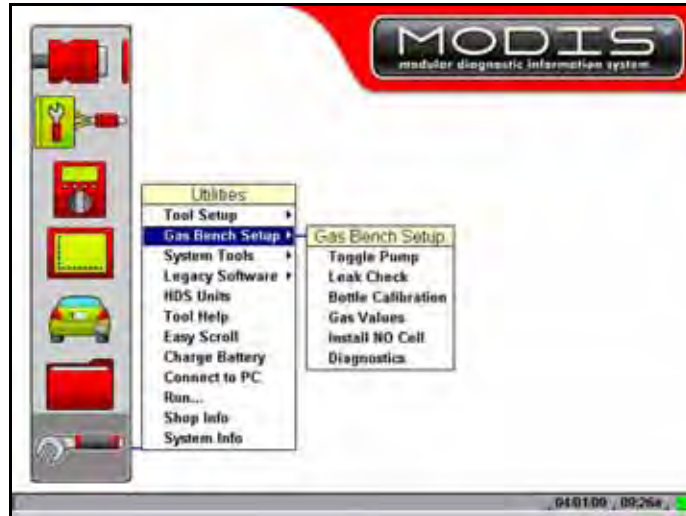


Figure 4-39 Sample Gas Bench Setup utilities submenu



NOTE:

The first three options are also accessible directly from within the Gases module through the Tools button on the upper toolbar (refer to “Toggle Pump” on page 21, “Leak Check” on page 22, and “Gas Bottle Calibration” on page 24 of this manual).

4.6.1 Gas Values

Before a gas calibration can be performed, a gas blend must be selected. Use the Gas Values utility to select the gas blend for use.

Table 4-1 lists the gas blends for calibration use.

Table 4-1 Calibration Gas Blends

Gas Tag	HC	CO	CO ₂	NO
Bar 97 High	3200	8.0	12.0	3000
Bar 97 Low	200	0.5	6.0	300
Mid-1	965	2.4	3.6	900
Mid-2	1920	4.8	7.2	1800
Customer	variable	variable	variable	variable



To set fixed Gas Values:

1. Select **Utilities > Gas Bench Setup > Gas Values**.
The Gas Bottle Values dialog box displays (Figure 4-40).

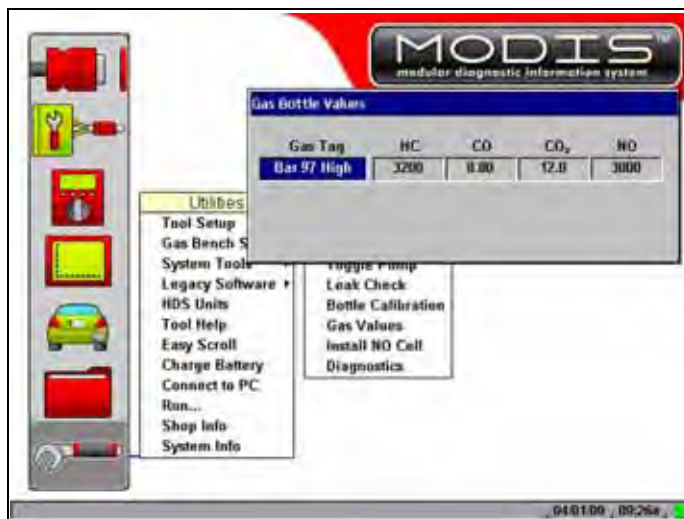


Figure 4-40 Sample Gas Bottle Values dialog box

- Press **Ya** to display the Gas Tag menu (Figure 4-41).

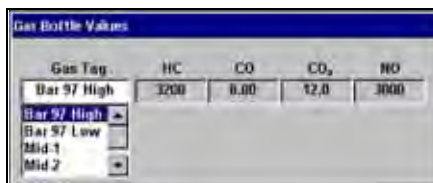


Figure 4-41 Sample Gas Tag menu

- Select a fixed gas blend option.



NOTE:

The Bar 97 High or Mid-2 gas blends are recommended for most routine maintenance gas calibrations.

The Gas Tag menu automatically closes.

- Press **N/X** to close the dialog box.



To set customer Gas Values:

- Select **Utilities > Gas Bench Setup > Gas Values**.
The Gas Bottle Values dialog box displays.
- Press **Ya** to display the Gas Tag menu.
- Select **Customer**.
The Gas Tag menu automatically closes.
- Use right **c** and left **e** arrows to select a gas field to customize (HC, CO, CO₂, NO).
The field turns white when active.
- Use right **c** and left **e** arrows to highlight a number and then use the up **b** and down **d** arrows to change the number.
- Use right **c** and left **e** arrows to move to the next gas field.
- Press **N/X** to close the dialog box.

4.6.2 Install NO Cell

The Install NO Cell utility is used after installing a new Nitrogen Oxides (NO) cell. This function is a specialized gas calibration that will initialize a new NO cell and can also be used to perform a standard gas calibration.



NOTE:

Replacement of the NO Cell should be done by EquiServ. Call 1-800-225-5786 for assistance.

4.6.3 Diagnostics

The Diagnostics utility displays a screen of gas bench data (Figure 4-42). This data can be used in diagnosing gas bench faults.

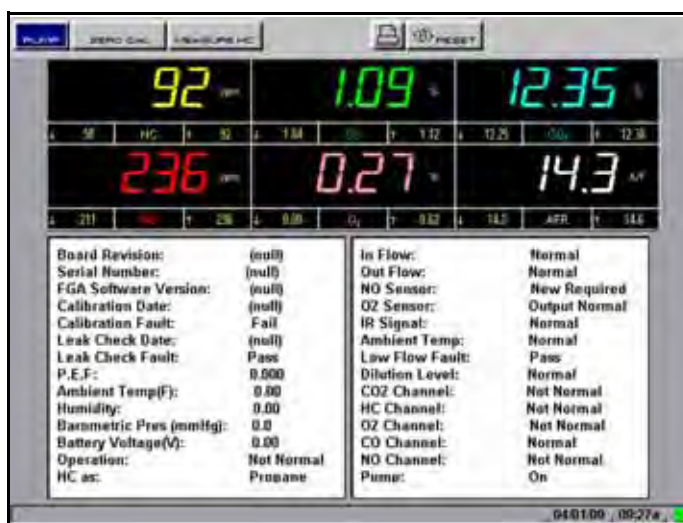


Figure 4-42 Sample Diagnostics utility screen



NOTE:

This function is used in conjunction with a call to EquiServ Technical Assistance 1-800-225-5786.

The upper toolbar allows you to select functions designed to exercise different parts of the gas bench. You can also restore the last completed calibration values or restore all factory settings from this screen.

In addition to assisting the identification of possible analyzer faults, the Diagnostic page contains useful reference information. The following describes some of the Diagnostic screen functions and displayed data.

- **Pump** lets you turn the sample pump on/off.
- **Measure HC** lets the HC value (shown on the Diagnostics screen only) be displayed as N-Hexane or Propane.
 - **N-Hexane** is used to measure vehicle exhaust gas.
 - **Propane** is used to measure calibration gas.
- **Reset** displays a menu of Reset options.

- **Reset Bench** reboots the FGA internal software.
- **Restore Factory Settings** resets the FGA gas calibration values to the original factory values.
- **Reset MinMax** resets the Min/Max limits on the digital gases display to zero.
- **Calibration Date** shows the last date the analyzer was gas calibrated.
- **Ambient Temp(F)** shows the internal temperature of the FGA unit.
 - Temperatures above 130 degrees Fahrenheit will slow the internal battery charging rate.
 - Temperatures above 145 degrees Fahrenheit will stop the internal battery charging.
- **Humidity** shows the humidity as measured inside the FGA at the gas analyzer bench.
- **Battery Voltage(V)** shows the voltage of the internal FGA battery.
 - If the voltage drops below 10V, the analyzer will turn off and must be charged.
- **HC as** changes from Hexane to Propane depending on how the Measure HC is set.

This section describes maintenance for the following MODIS parts and accessories:

- Water Trap/Filter Bowl
- Cooling Fan Filter

5.1 Water Trap/Filter Bowl

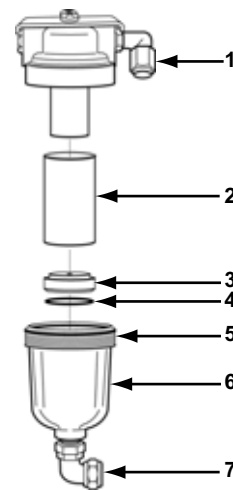


Figure 5-1 *Water trap/filter bowl assembly*

- 1— Gas sample hose connector
- 2— Filter
- 3— Seal
- 4— O-ring
- 5— Attached O-ring
- 6— Filter bowl
- 7— Water drain hose connector

The filter located inside the water trap/filter bowl assembly should be checked and replaced:

- Approximately every two weeks,
- If low flow condition persists, or
- If excessively high HC readings persist after running the pump for several minutes



NOTE:

Some water in the filter bowl is normal and does not affect operation. Under normal conditions, the filter bowl is approximately half full of water.

After a filter change, or when the filter is completely dry, the water fills the water trap. Once the filter absorbs the moisture, the water will drop to its normal level. If excess water ever accumulates, the float in the water trap/filter assembly automatically shuts down the gas analyzer pump to protect the FGA system.

It may be necessary to completely empty the water from the filter bowl to correct low flow caused by excessive water.



To completely empty the filter bowl of water:

- Disconnect the gas sample hose with the pump running.

The water empties automatically.



NOTE:

We recommend performing a Leak Check after water trap/filter maintenance service is performed. Refer to “Leak Check” on page 22 for details.



To replace the water trap filter:

IMPORTANT:

Do not use solvents to clean parts.

1. Remove the water drain hose from the connector at the bottom of the filter bowl.
Push the gray sleeve inward and pull the hose straight out of the connector.
2. Unscrew the filter bowl.
3. Remove the filter, seal) and O-ring.
4. Wash the bowl with soap and water.
5. Inspect the attached O-ring to make sure it is not split.
6. Reinstall the O-ring and seal back into the bottom of the filter bowl.
Make sure the O-ring is resting in the filter bowl and seated in the groove on the seal.
7. Insert a new filter in the filter bowl on top of the seal.
8. Line-up the filter bowl with the top threads of the housing and, using your fingers, tighten four full turns until snug.

5.2 Cleaning the Cooling Fan Filter

The cooling fan filter is located directly behind the water trap/filter bowl (Figure 5-2). Clean or replace this filter when you are replacing the water trap filter. Refer to “Internal Cooling Fan” on page 5 for fan details.

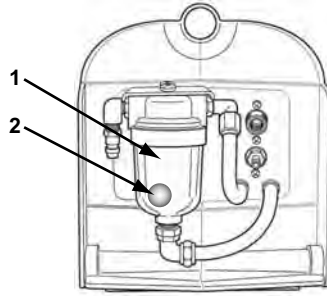


Figure 5-2 *Side of unit*

- 1— Water Trap/Filter Bowl**
2— Cooling Fan Filter location



To clean the cooling fan filter:

1. Pop the filter element retainer grid off the filter bracket.
2. Lift out the filter.
3. Rinse the filter under running water, or gently brush clean.
4. Replace the filter over the opening.
5. With flat side toward the filter, snap the filter retainer back in place.

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