RKI
INSTRUMENTS

Operator's Manual
SM-2009U Single Module
Calibration Station

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Warranty

RKI Instruments, Inc. warrants gas alarm equipment sold by us to be free from defects in materials and workmanship, and performance for a period of one year from date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis. Examples of such items are:

Absorbent cartridges	Batteries
Pump diaphragms and valves	Filter elements
Fuses	

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repairs procedures not in accordance with the instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC. INCLUDING BUT NOT LIMITED TO THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC. BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users only by authorized distributors, dealers, and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to replacement of parts or our complete goods.

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CAUTION: *Read and understand this manual before using the SM-2009U. Also read and understand the GX-2009 operator's manual.*

Chapter 1: Introduction

Overview

This chapter briefly describes the SM-2009U Single Module Calibration Station and the Single Module Data View Software. This chapter also describes the *SM-2009U Single Module Calibration Station Operator's Manual* (this document). Table 1 at the end of this chapter lists the SM-2009U's specifications.

About the SM-2009U

The SM-2009U Single Module Calibration Station is an advanced, reliable system that provides charging, calibration, bump testing, and calibration and bump test records for the GX-2009 gas detector. It is designed to save the records to a USB flash drive. The Single Module Data Viewer Software can then be used with a Windows-based personal computer to retrieve calibration and bump test data files from the USB flash drive or from the computer's hard drive if the files have been transferred to the hard drive from the flash drive.

The purpose of this manual is to explain how to set up and use the SM-2009U and the Single Module Data Viewer Software. You will learn how to:

- install and launch the software

- prepare the SM-2009U for use

- perform a bump test

- perform a calibration

- save calibration and bump test records to a USB flash drive

- view, print, and export calibration and bump test records

- use the SM-2009U to charge a GX-2009

CAUTION: *The GX-2009 detects oxygen deficiency and elevated levels of oxygen, combustible gases, carbon monoxide, and hydrogen sulfide, all of which can be dangerous or life threatening. When using the GX-2009, you must follow the instructions and warnings in the GX-2009 Operator's Manual to assure proper and safe operation of the unit and to minimize the risk of personal injury.*

CAUTION: *The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.*

System Requirements

To use the Single Module Data Viewer Software, your personal computer must meet the following requirements:

- **Operating Systems:** Windows$^{®}$ 2000, Windows$^{®}$ XP, Windows$^{®}$ Vista.

- **Processor:** IBM$^{®}$ compatible PC running Pentium$^{®}$ 2 processor or equivalent minimum

- **Memory:** 32 MB RAM minimum

- **Hard Disk Space:** 32 MB minimum

- **CD-ROM Drive**

- **Available USB port**

Specifications

Table 1: SM-2009U Specifications

Input Power	12 VDC NOTE: AC Adapter with 100 - 240 VAC, 50/60 Hz, 0.6A input and 12 VDC, 1.2A output provided as standard.
Environmental Conditions	• For Indoor Use Only • -10° C to 40° C, below 80% Relative Humidity, Non-Condensing
Applicable Instrument	GX-2009
Memory Capacity	64 KB
Maximum Record Size	256 bytes
Maximum Number of Records Saved	200
Number of Calibration Gas Cylinders	One calibration gas cylinder per bump test or calibration
Standard Accessories	• AC Adapter • USB Flash Drive • Single Module Data Viewer Software • Inlet Air Filter • Instruction Manual

About this Manual

The *SM-2009U Single Module Calibration Stations Operator's Manual* uses the following conventions for notes, cautions, and warnings.

NOTE: Describes additional or critical information.

CAUTION: Describes potential damage to equipment.

WARNING: **Describes potential danger that can result in injury or death.**

Cautions & Safety Information

- Use only polyurethane sample tubing with the SM-2009U. Consult RKI Instruments, Inc. for other materials.

- Do not subject the SM-2009U to infrared or intense light. This may cause communication errors.

- Do not expose the SM-2009U to water.

- Do not subject the SM-2009U to any hard impact.

Chapter 2: Description

Overview

This section describes the SM-2009U single module calibration station. It is designed to be used on a table top and consists of the AC adaptor, air filter and sample tubing, instrument cradle, back panel, control panel, status LEDs, and USB port.

AC Adapter

The AC adapter is a wall plug style adapter with a 5 foot cable. The end of the cable has a plug that connects to the power jack on the SM-2009U's back panel. The AC adapter is rated 100 - 240 VAC input, 12 VDC 1.2 A output.
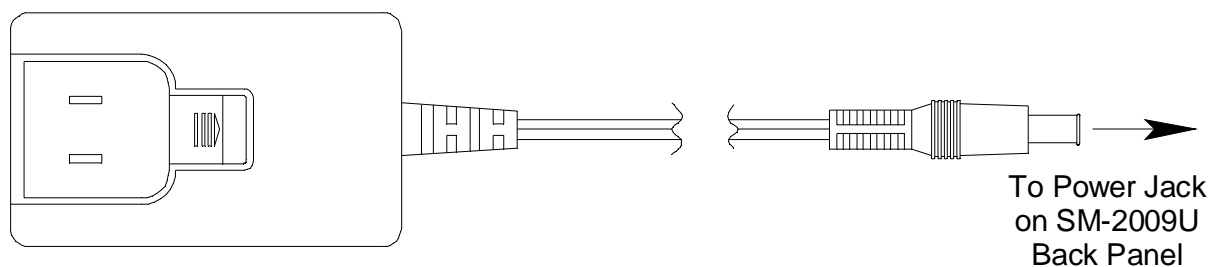

To Power Jack
on SM-2009U
Back Panel

Figure 1: AC Adapter

Air Filter & Sample Tubing

A cylindrical particle filter with a short length of tubing is supplied with the SM-2009U for installation to the AIR fitting on the back panel. The filter keeps particulate contamination out of the calibration station.

Two sample tubes are included with the calibration station. A 3 foot length of 3/16" ID polyurethane tubing is provided to connect the regulator on a calibration cylinder to the CAL. GAS fitting on the back panel. A 10 foot length of 5/16" ID polyurethane tubing is provided for connection to the exhaust fitting on the back panel to allow routing of the exhaust to a location such as open window where the exhaust can disperse.

Calibration Gas Sample Tubing, 3 feet

Exhaust Tubing, 10 feet
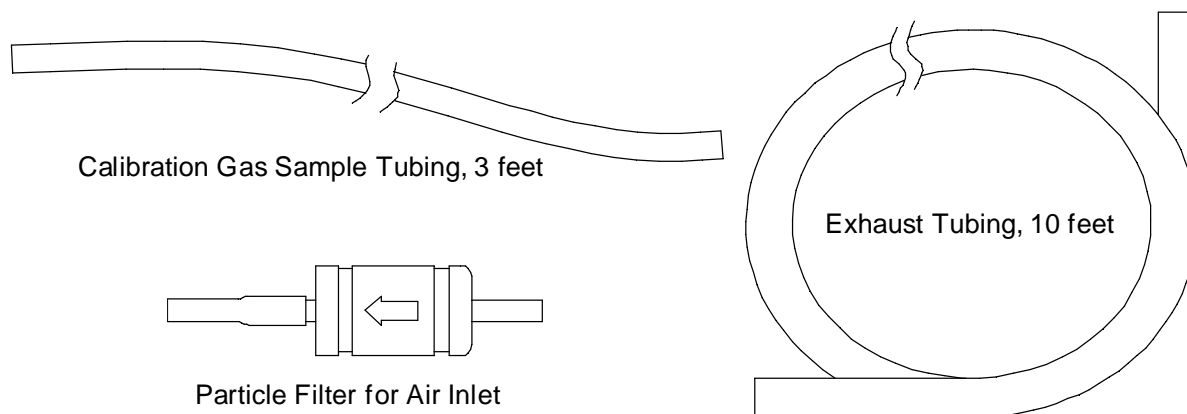
Particle Filter for Air Inlet

Figure 2: Air Filter & Sample Tubing

WARNING: *Do not use an exhaust tube that is longer than 10 feet. Using an exhaust tube longer than 10 feet will cause inaccurate gas response by the GX-2009 during a bump test or calibration.*

Instrument Cradle

The instrument cradle is a recessed area on the top of the SM-2009 that is designed to accept the GX-2009. Insert the GX-2009 in the instrument cradle when you perform a bump test or calibration. The cradle has charging contacts on the bottom that mate with the contacts on the back of the GX-2009. There are sample ports in the front of the cradle that match up with the GX-2009's sensors and route air and calibration gas to the sensors during a bump test or calibration. An infrared (IR) port at the back of the cradle lines up with the GX-2009's IR port when it is inserted in the cradle and is used to communicate with the GX-2009. A retaining tab that holds the GX-2009 in the cradle is located to the right of the IR port.
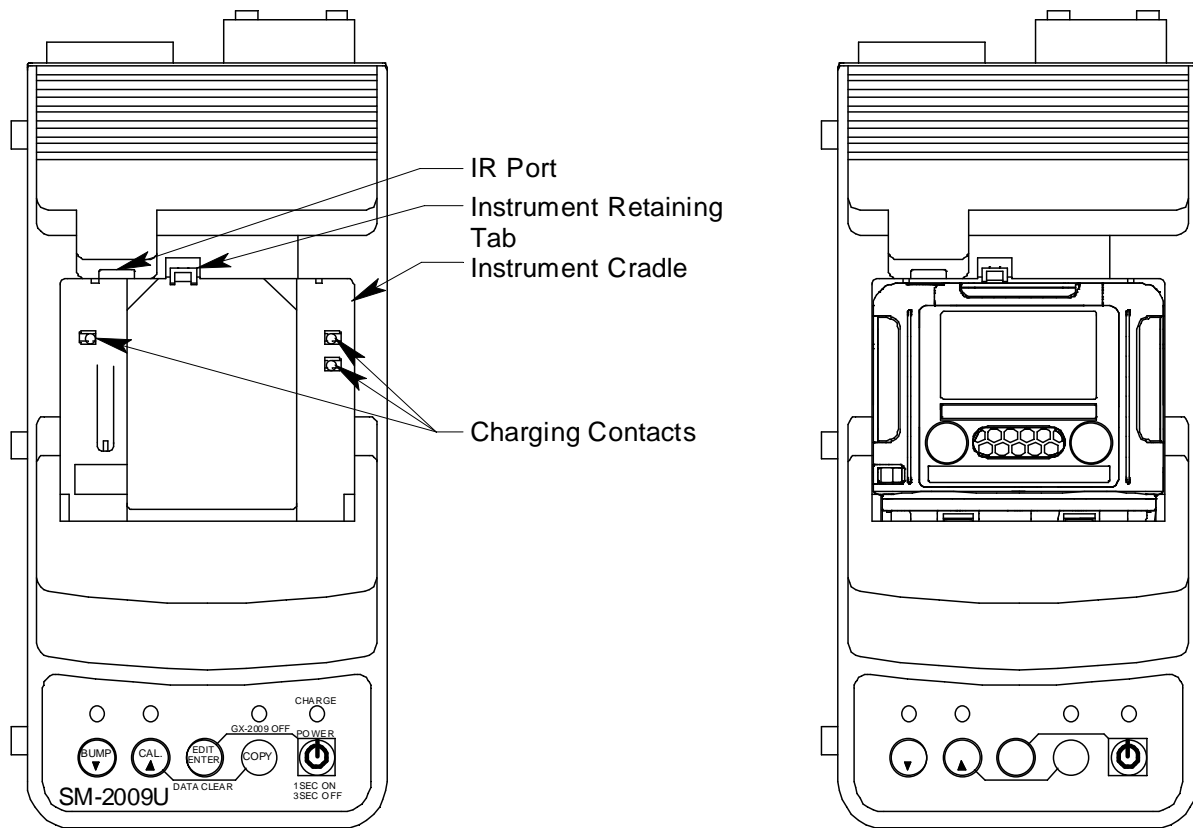
SM-2009U Without GX-2009   SM-2009U With GX-2009

Figure 3: Instrument Cradle

Back Panel

The back panel includes the power jack and sample fittings.
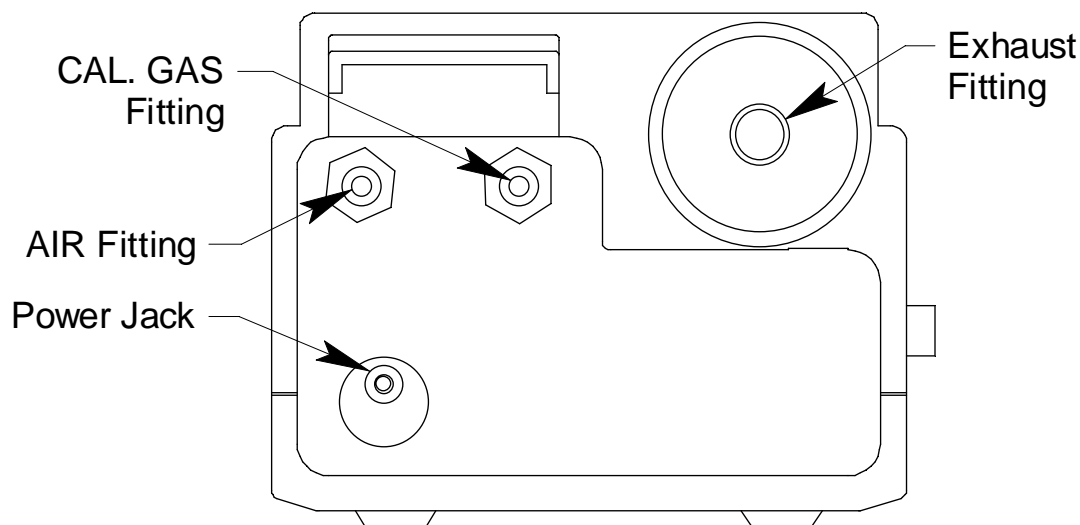

Figure 4: Back panel

Power Jack

The power jack is located in the lower left corner of the back panel. The plug on the end of the AC adapter cable mates to it.

Sample Fittings

Three sample fittings are located on the back of the SM-2009U. The AIR fitting is in the upper left corner and draws air into the SM-2009U. The CAL. GAS fitting is next to the AIR fitting and is used to connect the SM-2009U to a calibration gas cylinder. Both the AIR and CAL. GAS fittings accept 3/16" ID tubing.

An exhaust fitting is located in the upper right corner of the back panel. It allows routing of the exhausted calibration gas to a convenient location. This fitting accepts 5/16" ID tubing. Even though the exhaust gas can be routed to an area to be safely dispersed, the docking station should still be installed in a well ventilated area.

Control Panel

The control panel is used to setup and operate the calibration station. It is located at the front of the calibration station. It includes the control buttons, the control button LEDs, and the CHARGE status LED.

Figure 5: Control Panel

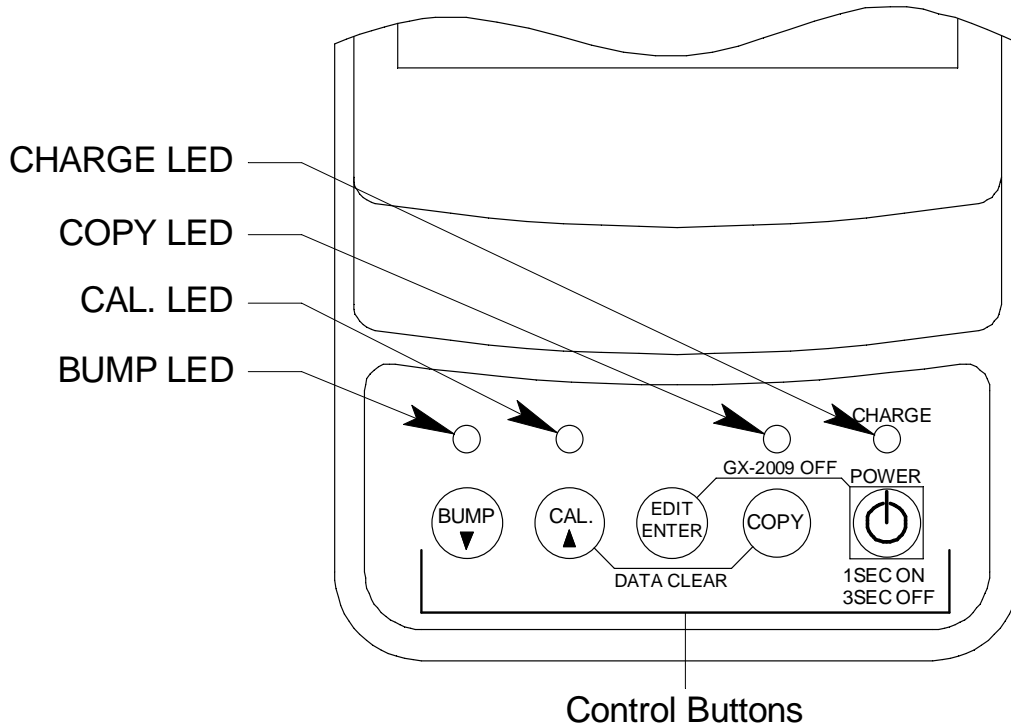Five control buttons are located on the control panel. From left to right they are BUMP ▼, CAL. ▲, EDIT ENTER, COPY, and POWER. The BUMP ▼, CAL. ▲, and COPY control buttons each have an LED above them that indicates the status of the function controlled by that button. The CHARGE LED is located above the POWER button and functions as a pilot LED, a system failure LED, and a charge indication LED.

Table 2: Control Button Functions

Control Button	Control Button Function(s)	Control Button LED Function(s)
BUMP ▼	• Initiates a bump test • Cancels a bump test • Moves down a list of parameters • Decreases an adjustable parameter	Indicates status of a bump test in progress
CAL. ▲	• Initiates a calibration • Cancels a calibration • Clears data from station memory (when used with COPY button) • Moves up a list of parameters • Increases an adjustable parameter	Indicates status of a calibration in progress
EDIT ENTER	• Puts station into various edit modes • Makes a displayed parameter editable • Escapes or cancels an operation • Turns off connected GX-2009 (when used with POWER button)	n/a
COPY	• Copies data to USB flash drive. • Clears data from station memory (when used with CAL. button)	• Indicates amount of calibration station memory used • Indicates status of copying function • Indicates the result of a copy operation

Table 2: Control Button Functions

Control Button	Control Button Function(s)	Control Button LED Function(s)
POWER	• Turns on the station • Turns off the station • Turns off connected GX-2009 (when used with EDIT ENTER button)	n/a

USB Port

A USB port is located on the right front of the calibration station below the COPY and POWER buttons. The port can be used to save calibration and bump test data to a USB flash drive.
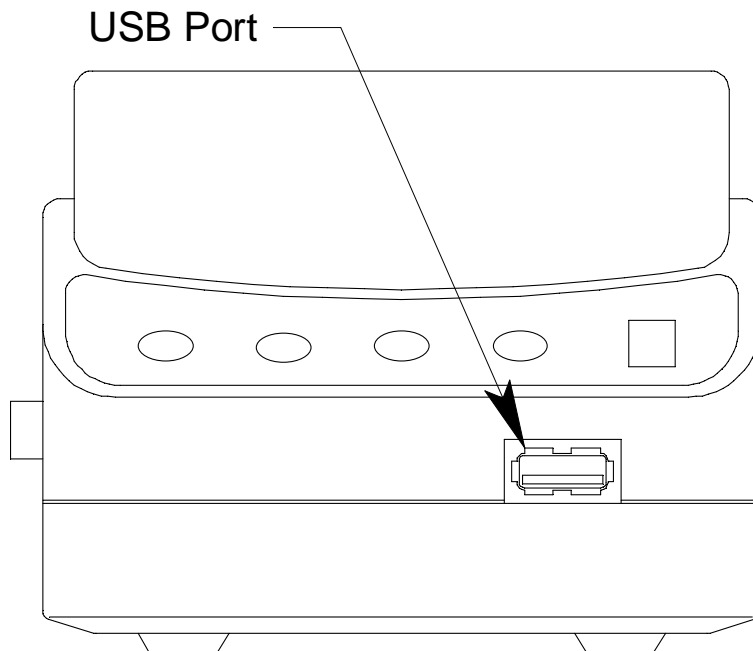
USB Port

Figure 6: Control Panel

NOTE: The SM-2009U does not support connection of a computer to the USB port, only a USB flash drive.

Chapter 3: Preparing to Use the SM-2009U

Overview

There are four tasks that must be completed before you can begin to use the SM-2009U: hardware assembly, setting the bump test and calibration parameters, connecting calibration gas, and installing the Single Module Data View Software on your computer. This chapter describes how to assemble the parts that are shipped with the SM-2009U and set the bump test and calibration parameters. It also describes how to install the Single Module Data Viewer Software on a Windows based personal computer.

Hardware Assembly

The hardware assembly consists of connecting the AC adapter, installing the air filter, connecting the sample tubing, and setting the SM-20090U's bump test and calibration parameters. Perform the following to complete the hardware assembly

1. Place the SM-2009U on a convenient table top near an AC wall socket in a well ventilated area. A location near a window that can be opened is best so that the exhaust can be routed to the window.

2. Insert the round plug on the end of the AC adapter's cable into the power jack on the back of the SM-2009U.

3. Connect the AC adapter's wall plug into a wall AC socket.

4. Install the air filter so that the arrow on the filter that indicates direction of flow is pointing towards the AIR fitting. Push the open end of the flexible tube that is on one end the filter onto the AIR fitting on the back of the SM-2009U.

5. Install the 10 foot long 5/16" ID flexible tube that is included with the SM-2009U on the exhaust fitting. Route the tube to an area where the exhaust can be safely dispersed, such as an open window.

CAUTION: *The maximum recommended length for the exhaust tube is 10 feet. Do not use more than 10 feet of tubing or tubing with an ID of less than 5/16" for the exhaust tube or the bump test and calibration accuracy will be adversely affected. The tube that is shipped with the SM-2009U has an ID of 5/16" and is 10 feet long.*

6. Install the 3 foot long 3/16" ID tube that is included with the SM-2009U on the CAL. GAS fitting.

Setting the Bump Test and Calibration Parameters

The bump test parameters define how long fresh air and calibration gas are applied to an instrument during a bump test. They also define the tolerance used in determining whether a unit fails or passes a bump test and whether or not a calibration automatically takes place if a bump test fails. The calibration parameters define how long fresh air and calibration gas are applied to an instrument during a calibration.

The bump test and calibration parameters are saved in the SM-2009U's memory. If a parameter is changed with one particular GX-2009 installed in the SM-2009U, the change will be in effect for the bump test or calibration of any subsequent GX-2009 until the parameter is changed again.

Bump Test & Calibration Parameters

There are four bump test parameters and two calibration parameters. The two calibration parameters, air sample time and calibration gas sample time, are also bump test parameters. The parameters are described below. Table 3 below shows the factory settings for the bump test and calibration parameters. If you wish to use the factory settings, then you do not need to make any parameter adjustments. If you wish to confirm or change the parameter settings, follow the instructions below beginning with "Turning On the SM-2009U with a GX-2009" on page 15.

Table 3: Bump Test & Calibration Parameter

Parameter	Display Tag	Available Choices	Bump Factory Setting	Cal Factory Setting
Air Sample Time	Air	• 30 seconds • 45 seconds • 60 seconds • 90 seconds	30 seconds	45 seconds
Calibration Gas Sample Time	GAS	• 30 seconds • 45 seconds • 60 seconds • 90 seconds • 120 seconds	30 seconds	90 seconds
Bump Test Check Tolerance	cHE	• ± 10% • ± 20% • ± 30% • ± 40% • ± 50%	50%	n/a
Automatic Calibration	cAL	• On • Off	Off	n/a

Air Sample Time (Air)

The air sample time can be set separately for bump testing and calibration. It is the length of time that a SM-2009U will draw air through the AIR fitting on the back of the station. Air is drawn during a bump test before an air adjust operation and to purge calibration gas from the system after calibration gas has been drawn through the CAL. GAS fitting on the back of the station.

Calibration Gas Sample Time (GAS)

The calibration gas sample time can be set separately for bump testing and calibration. It is the length of time that a SM-2009U will draw

calibration gas through the CAL. GAS fitting on the back of the station during a bump test.

Bump Test Check Tolerance (cHE)

The bump test check tolerance only applies to bump testing. It determines how close the GX-2009 gas reading must be to the calibration gas concentration for each channel during a bump test in order to pass the bump test. It is defined as a percentage of the calibration gas concentration.The amount that the GX-2009 gas reading differs from the calibration gas concentration must be equal to or less than this percentage of the calibration gas concentration. For example, if the tolerance is set to 50%, and the %LEL calibration gas concentration is 50% LEL, then the bump test gas reading for the LEL channel on the GX-2009 must be 50 %LEL ± 25 %LEL.

Automatic Calibration (cAL)

Automatic calibration only applies to bump testing. It is set to on or off. If it is set to on, then the calibration station will automatically perform a calibration if a bump test fails.

Turning On the SM-2009U with a GX-2009

Do the following to turn on the SM-2009U and establish a connection with a GX-2009:

1. Confirm that the AC Adapter is connected to the SM-2009U and to an AC wall socket.

2. Press and hold the SM-2009U's POWER button. The LEDs will turn amber the internal pump will turn on momentarily.

3. When the pump stops and the BUMP and CAL. LEDs turn off, release the POWER button.

4. The COPY LED will be off or on steadily and the CHARGE LED will be blinking green if the SM-2009U is operating properly or solid red if there is a system failure. The amount of free memory in the SM-2009U will dictate the condition of the COPY LED (see "Available Memory in the SM-2009U" on page 37).

5. Install a GX-2009 in the instrument cradle. The CHARGE LED will begin to blink yellow. See "Charging an Instrument in a Calibration Station" on page 35 for a complete description of charging the GX-2009.

6. Press and hold the POWER MODE button on the GX-2009 until you hear a beep, then release it. The GX-2009 will begin it's power up sequence (see exceptions below in step 7). If a successful connection between the GX-2009 and the SM-2009U occurs, the TRANSMIT screen will appear on the GX-2009 display.

<div align="center">

CH4 %LEL OXY vol%
50 **12.0**
CO ppm H2S ppm
50 **25.0**
▮▮ *TRANSMIT*

</div>

NOTE: The screen shown above applies to a 4-channel GX-2009. If your GX-2009 has less than 4 channels, the inactive channels will not appear in the above screen and in any screens where channels are displayed. All screens in this manual assume a 4-channel GX-2009.

---

7. There are two exceptions to the sequence described in step 6 above. See the GX-2009 User Setup Program Operator's Manual for a description of the **Cal Limit Display** and **Cal Limit Check** instrument parameters.

    •   When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is set to *Can't Use*, if the GX-2009 is due for calibration the instrument will show a calibration expired failure screen and the buzzer and LED arrays will pulse for a few seconds before connecting to the SM-2009U.

<div align="center">

FAIL

▮▮*C-LIMIT*

</div>

    The failure screen will remain on the display while the unit is connected to the SM-2009U and it is not possible to view or set the bump test or calibration parameters.

NOTE: You can still use the SM-2009 with an instrument for bump testing and calibration if this failure indication occurs, but you will not be able to perform any operations that require the display until a calibration is performed, the unit is turned off, and then the unit is re-connected to the SM-2009U. If you perform a bump test or calibration in this case, the only indication of pass or fail will be the BUMP or CAL. LED.

- When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is set to *Confirm to use*, if the GX-2009 is due for calibration the unit will show the following screen and beep and flash the LED arrays for a few seconds indicating that calibration is due.

> *CAL*
>
> �*C--LIMIT*

When the beeping and flashing stops, press and release the POWER MODE button on the GX-2009 to continue. The unit will now connect to the SM-2009U, the TRANSMIT screen shown in step 6 above will be displayed, and the CHARGE LED will begin to blink green.

Setting the Bump Test Parameters

Do the following to set the bump test parameters after establishing a connection between a GX-2009 and the SM-2009U.

1. Turn on the SM-2009U with a GX-2009 and establish a connection between them as described above in "Turning On the SM-2009U with a GX-2009". The GX-2009 will display the TRANSMIT screen.

> CH4 %LEL   OXY vol%
> *50*   *12.0*
> CO ppm   H2S ppm
> *50*   *25.0*
> ▧ *TRANSMIT*

2. Press and release the EDIT ENTER button. The GX-2009 will display the following screen.

```
┌────────────────────────┐
│                        │
│                        │
│                        │
│  🔋 BUMP/CAL           │
└────────────────────────┘
```
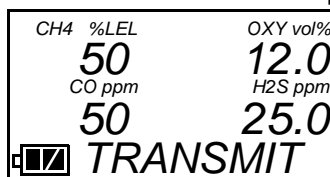
3. Press and release the BUMP ▼ button. The GX-2009 will display the following screens alternating between the four bump test parameters and their settings.

```
┌────────────────┐          ┌────────────────┐
│ A ir    G A S  │          │  3 0      6 0  │
│ c H E   c A L  │ ◄──────► │  5 0    o F F  │
│ 🔋   BUMP      │          │ 🔋     BUMP    │
└────────────────┘          └────────────────┘
```
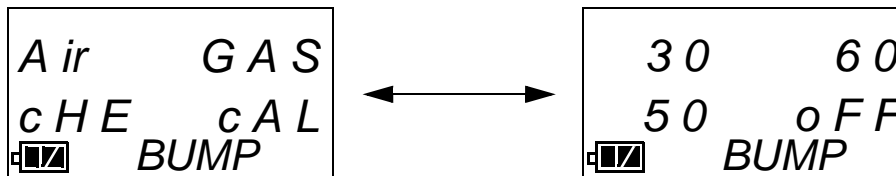
4. If you wish to cancel setting the bump test parameters or were just viewing the parameters to confirm their values, press and release the BUMP ▼ button to return to the TRANSMIT screen.

To continue and change parameters, press and release the EDIT ENTER button. The first bump test parameter, air sample time, will be shown on the GX-2009 display.
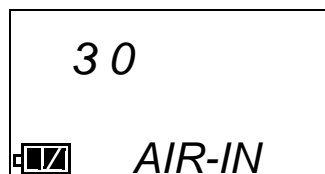
```
┌────────────────────────┐
│    3 0                  │
│                        │
│  🔋    AIR-IN          │
└────────────────────────┘
```

5. Use the BUMP ▼ and CAL. ▲ buttons to scroll through the parameters until the desired parameter is displayed. The scrolling sequence is shown below. Do not scroll past AUTO-C until you have finished making any desired changes.
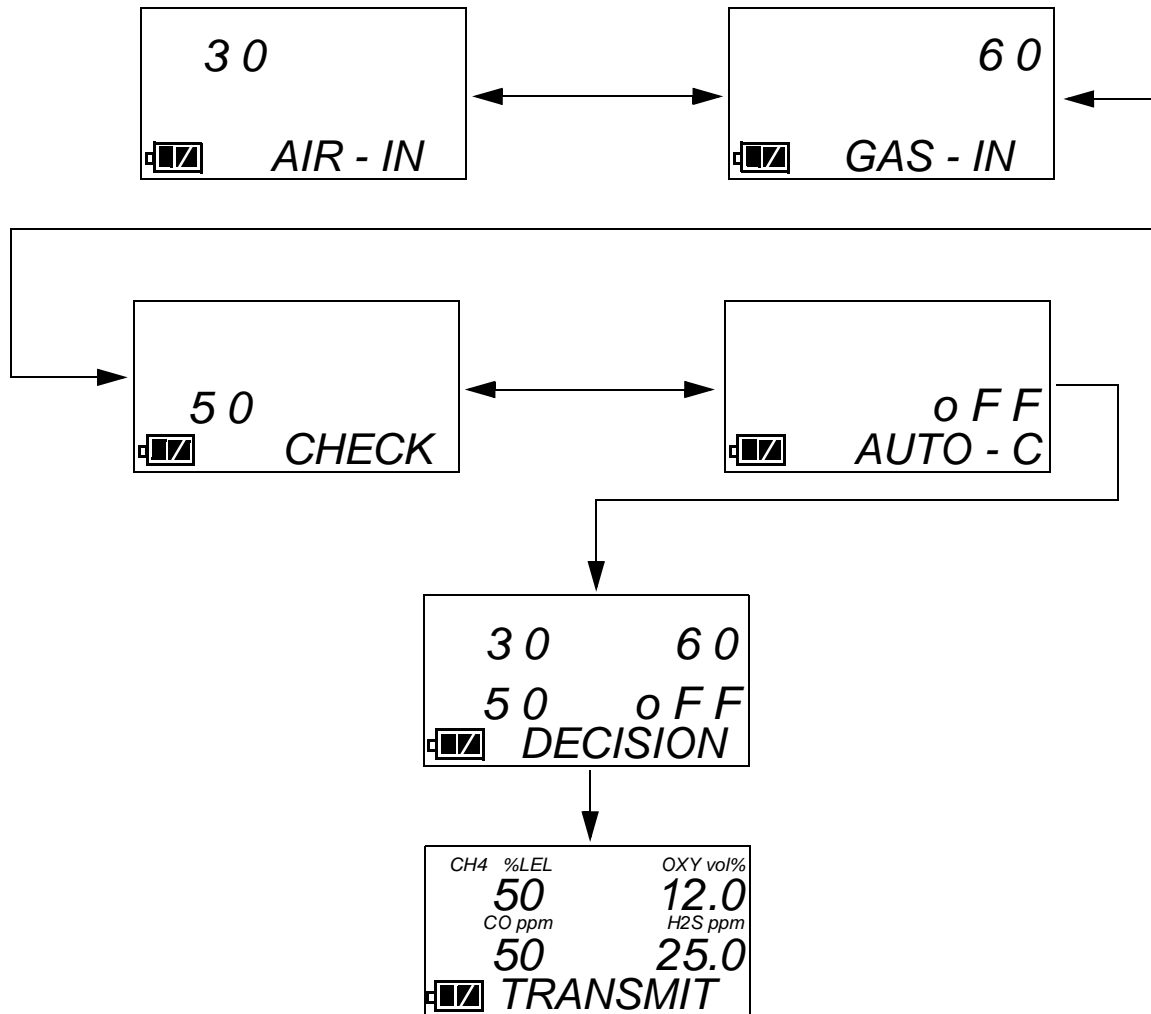
```
┌──────────────────┐              ┌──────────────────┐
│ 3 0              │              │              6 0 │
│                  │ ◄──────────► │                  │
│ ▣   AIR - IN     │              │ ▣   GAS - IN     │
└──────────────────┘              └──────────────────┘
```

```
┌──────────────────┐              ┌──────────────────┐
│ 5 0              │              │            o F F │
│ ▣   CHECK        │ ◄──────────► │ ▣   AUTO - C     │
└──────────────────┘              └──────────────────┘
```

```
     ┌──────────────────┐
     │  3 0      6 0    │
     │  5 0      o F F  │
     │ ▣  DECISION      │
     └──────────────────┘
```
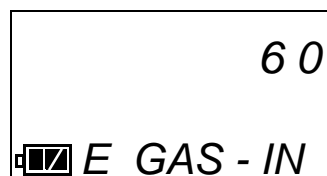
```
     ┌──────────────────┐
     │ CH4  %LEL   OXY vol% │
     │  50       12.0   │
     │ CO ppm     H2S ppm │
     │  50       25.0   │
     │ ▣ TRANSMIT       │
     └──────────────────┘
```

6. With the desired parameter displayed, press and release the EDIT ENTER button. An "E" will appear on the GX-2009 display to the right of the battery icon indicating that the parameter value can be changed. In the example below, the GAS-IN parameter has been selected for updating.
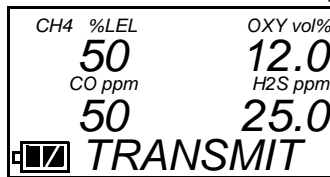
```
     ┌──────────────────┐
     │              6 0 │
     │                  │
     │ ▣ E  GAS - IN    │
     └──────────────────┘
```

7. Use the BUMP ▼ and CAL. ▲ buttons to set the parameter to the desired value, then press and release the EDIT ENTER button. The "E" next to the battery icon will disappear.

8. Repeat step 5 - step 7 to set any other parameters.

9. When you are done setting the parameters, use the BUMP ▼ button to scroll past AUTO-C. The DECISION screen will appear momentarily to indicate that the parameter changes have been saved and then the GX-2009 will return to the TRANSMIT screen.

Setting the Calibration Parameters

Do the following to set the calibration parameters after establishing a connection between a GX-2009 and the SM-2009U.

1. Turn on the SM-2009U with a GX-2009 and establish a connection between them as described above in "Turning On the SM-2009U with a GX-2009". The GX-2009 will display the TRANSMIT screen.

```
 CH4  %LEL          OXY vol%
      50              12.0
 CO ppm             H2S ppm
      50              25.0
 ▗▮▰ TRANSMIT
```

2. Press and release the EDIT ENTER button. The GX-2009 will display the following screen.

```



 ▗▮▰ BUMP/CAL
```

3. Press and release the CAL. ▲ button. The GX-2009 will display the following screens alternating between the two calibration parameters and their settings.

```
 A ir      G A S            3 0       6 0


 ▗▮▰  CAL             ▗▮▰    CAL
```
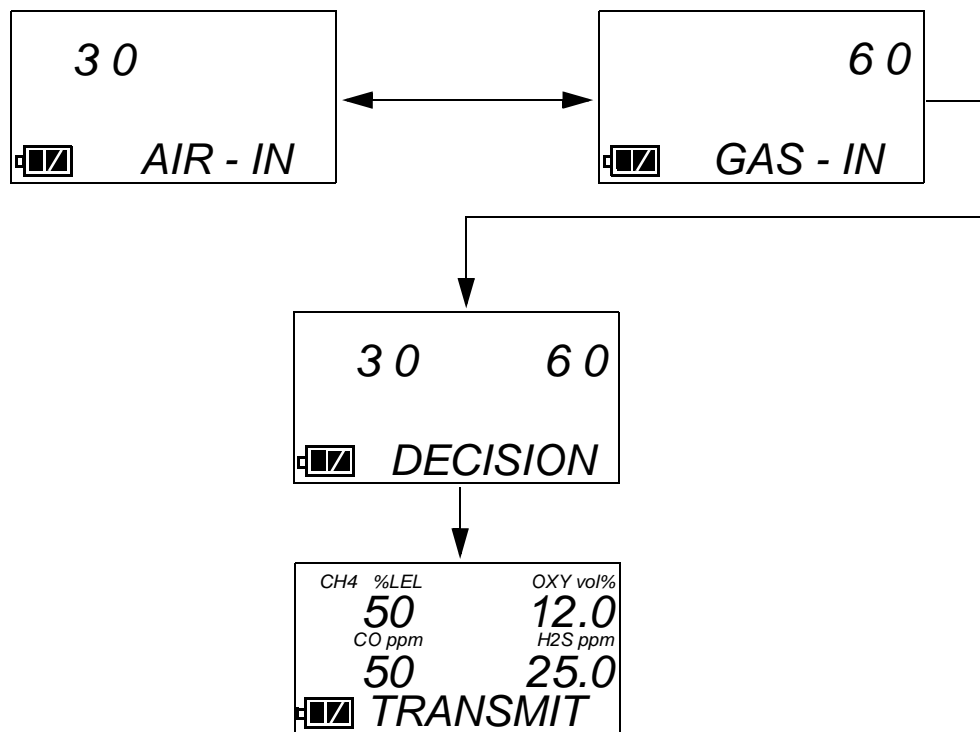←——————→
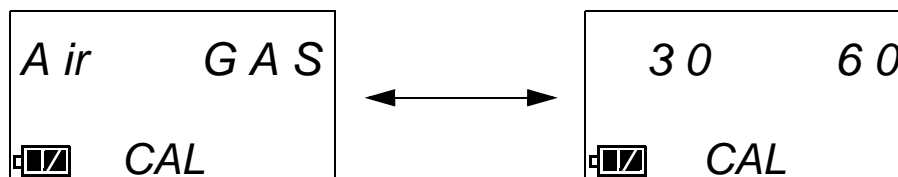
4. If you wish to cancel setting the calibration parameters or were just viewing the parameters to confirm their values, press and release the CAL. ▲ button to return to the TRANSMIT screen.
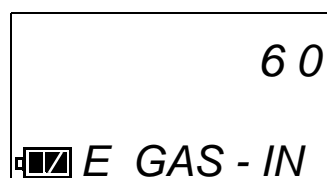
To continue, press and release the EDIT ENTER button. The first parameter, air sample time, will be shown on the GX-2009 display.
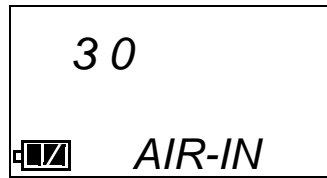
```
┌─────────────────────────┐
│  3 0                    │
│                         │
│                         │
│  ▭▨     AIR-IN          │
└─────────────────────────┘
```

5. Use the BUMP ▼ and CAL. ▲ buttons to scroll through the parameters until the desired parameter is displayed. The scrolling sequence is shown below. Do not scroll past GAS-IN until you have finished making any desired changes.

```
┌──────────────────────┐              ┌──────────────────────┐
│  3 0                 │              │                 6 0  │
│                      │ ◄───────►    │                      │
│                      │              │                      │
│  ▭▨    AIR - IN      │              │  ▭▨    GAS - IN      │
└──────────────────────┘              └──────────────────────┘
```

```
┌──────────────────────┐
│  3 0       6 0       │
│                      │
│  ▭▨    DECISION      │
└──────────────────────┘
```

```
┌──────────────────────────┐
│ CH4  %LEL      OXY vol%   │
│   50          12.0        │
│ CO ppm        H2S ppm     │
│   50          25.0        │
│ ▭▨  TRANSMIT              │
└──────────────────────────┘
```

6. With the desired parameter displayed, press and release the EDIT ENTER button. An "E" will appear on the GX-2009 display to the right of the battery icon indicating that the parameter value can be changed. In the example below, the GAS-IN parameter has been selected for updating.

```
┌─────────────────────────┐
│                 6 0     │
│                         │
│  ▭▨ E  GAS - IN         │
└─────────────────────────┘
```

7. Use the BUMP ▼ and CAL. ▲ buttons to set the parameter to the desired value, then press and release the EDIT ENTER button. The "E" next to the battery icon will disappear.

8. Repeat step 5 - step 7 to set any other parameters.

9. When you are done setting the parameters, use the BUMP ▼ button to scroll past GAS-IN. The DECISION screen will appear momentarily to indicate that the parameter changes have been saved and then the GX-2009 will return to the TRANSMIT screen.

Connecting Calibration Gas

The CAL. GAS fitting on the back of the calibration station is designed to be used with a calibration gas cylinder that is fitted with a demand flow regulator. The AIR fitting may be used with a demand flow regulator and a cylinder of zero emissions air, but this is not normally necessary since the calibration station will generally be in a fresh air area.

The type of calibration gas cylinder used depends on the gas sensors installed in the GX-2009 being used with the calibration station. A 4-gas mix, LEL/Oxygen/CO/H2S, is used if the instrument being used with the calibration station is a 4-gas unit. If the instrument does not have an H2S channel, then a 3-gas mix, LEL/Oxygen/CO, is used. Although a 4-gas cylinder will work for an instrument of any gas combination, if you have multiple instruments with various gas combinations, you may want to keep a 4-gas cylinder and a 3-gas cylinder to help preserve the charcoal filter on the CO sensor in instruments without an H2S channel. Use Table 4 below as a guide in determining which calibration gas cylinder is appropriate for your system. See "Spare Parts List" on page 50 for a list of available cylinder part numbers.

Table 4: Recommended Gas Cylinders

Typical Instrument Types	Recommended Calibration Gas Cylinder
LEL/Oxy/H2S/CO	4-gas mix with LEL/Oxy/H2S/CO
LEL/Oxy/CO	3-gas mix with LEL/Oxy/CO
LEL/Oxy/H2S	4-gas mix with LEL/Oxy/H2S/CO
LEL/Oxy	3-gas mix with LEL/Oxy/CO

Table 4: Recommended Gas Cylinders

Typical Instrument Types	Recommended Calibration Gas Cylinder
Oxy/CO	3-gas mix with LEL/Oxy/CO
Oxy/H2S	4-gas mix with LEL/Oxy/H2S/CO

To connect calibration gas to the SM-2009U do the following:

1. If the area around the calibration station is not considered a fresh air area (an area free of combustible and toxic gases and of normal oxygen content, 20.9%) install a tube not longer than 10 feet on the filter attached to the AIR fitting on the back of the docking station and route it to a fresh air area or connect a cylinder of zero air with a demand flow regulator to the fitting.

2. Install the demand flow regulator on the calibration gas cylinder.

3. Connect the demand flow regulator to the CAL. GAS port using the 3 foot length of 3/16" ID sample tubing provided with the station.

Installing the Single Module Data Viewer Software

1. Launch Windows®.

2. Exit from all applications and open windows.

3. Insert the Single Module Data Viewer Software Installation CD into your computer's CD-ROM drive.

4. The Single Module Data Viewer InstallShield Wizard comes up to guide you through installation. Click **Next** to proceed to the License Agreement window.

5. Read the license agreement and click the agreement acceptance selection box, then click **Next** to proceed to the Customer Information window.

6. Enter a user name and organization and select if you want to install the program for all users on the computer or just for your user account, then click **Next** to proceed to the Destination Folder window.

7. The default installation folder (C:\Program Files\Single Module Data Viewer\) is displayed. If you want to install the software in the default folder continue with step 8. If you want to install the software in a different location, click **Change** and choose a new installation folder now and then continue with step 8.

8. Click **Next** to proceed to the Ready to Install the Program window.

9. Review the installation settings. If they are Ok, click **Install** and the installation process will begin. If you want to change installation settings, click **Back** and change them to the desired settings.

10. During software installation, the installation program may find newer versions of Windows files on your computer than those in the Installation CD. If this happens, the installation software will ask you if you want to keep these newer files. Click **Yes** to do so.

11. Follow the on-screen instructions to complete software installation.

Chapter 4: Using the SM-2009U

Overview

When you have completed the tasks in "Chapter 3: Preparing to Use the SM-2009U", you are ready to use the SM-2009U calibration station. The SM-2009U is capable of performing bump tests and calibrations on the GX-2009. It can also charge the rechargeable batteries in the GX-2009. This chapter describes procedures for using the calibration station to bump test, calibrate, and recharge GX-2009s. It also describes the information that is saved in a calibration station's memory and how to save that information to a USB flash drive.

Bump Testing Instruments

When a bump test is performed, the SM-2009U performs a fresh air adjustment on a GX-2009 and then applies calibration gas to the instrument. The station then analyzes the response results based on criteria defined by the bump test check tolerance parameter and determines if the instrument passed the bump test. The bump test check tolerance is defined in "Bump Test Check Tolerance (cHE)" on page 15. If the automatic calibration parameter is set to on, then the SM-2009U will automatically perform a calibration if the bump test fails.
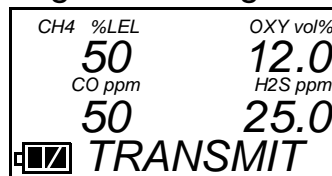
Do the following to perform a bump test

1. Confirm that the AC Adapter is connected to the SM-2009U and to an AC wall socket.

2. Press and hold the SM-2009U's POWER button. The LEDs will turn amber the internal pump will turn on momentarily.

3. When the pump stops and the BUMP and CAL. LEDs turn off, release the POWER button.

4. The COPY LED will be off or on steadily and the CHARGE LED will be blinking green if the SM-2009U is operating properly or solid red if these is a system failure. The amount of free memory in the SM-2009U will dictate the condition of the COPY LED (see "Available Memory in the SM-2009U" on page 37).

5. Install a GX-2009 in the instrument cradle. The CHARGE LED will

begin to blink yellow. If the batteries are fully charged, the CHARGE LED will become solid green after about 5 minutes. Typically a bump test or calibration will be initiated before this happens. See "Charging an Instrument in a Calibration Station" on page 35 for a complete description of charging the GX-2009.

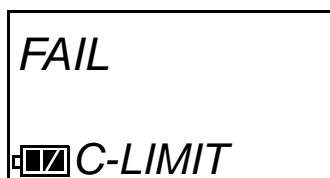| **NOTE:**	If the GX-2009 is left in the SM-2009U after calibration or bump testing, the pump will run for 12 seconds every 2 minutes in order to keep hydrogen generated from charging of the NiMH batteries from affecting the CO sensor.

6. Press and hold the POWER MODE button on the GX-2009 until you hear a beep, then release it. The GX-2009 will begin it's power up sequence (see exceptions below in step 7). If a successful connection between the GX-2009 and the SM-2009U occurs, the TRANSMIT screen will appear on the GX-2009 display and the CHARGE LED will begin to blink green.

```
CH4  %LEL           OXY vol%
   50                12.0
CO ppm              H2S ppm
   50                25.0
▯▮◢ TRANSMIT
```

NOTE:	The screen shown above applies to a 4-channel GX-2009. If your GX-2009 has less than 4 channels, the inactive channels will not appear in the above screen and in any screens where channels are displayed. All screens in this manual assume a 4-channel GX-2009.

7. There are two exceptions to the sequence described in step 6 above. See the GX-2009 User Setup Program Operator's Manual for a description of the **Cal Limit Display** and **Cal Limit Check** instrument parameters.

   • When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is set to *Can't Use*, if the GX-2009 is due for calibration the instrument will show a calibration expired failure screen and the buzzer and LED arrays will pulse for a few seconds before

connecting to the SM-2009U.

```
FAIL


▮C-LIMIT
```

The failure screen will remain on the display while the unit is
connected to the SM-2009U.

NOTE: You can still use the SM-2009 with an instrument for bump
testing and calibration if this failure indication occurs, but you
will not be able to perform any operations that require the
display until a calibration is performed, the unit is turned off,
and then the unit is re-connected to the SM-2009U. If you
perform a bump test or calibration in this case, the only
indication of pass or fail will be the BUMP or CAL. LED.

- When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is
  set to *Confirm to use*, if the GX-2009 is due for calibration the
  unit will show the following screen and beep and flash the LED
  arrays for a few seconds indicating that calibration is due.

```
CAL


▮C--LIMIT
```

When the beeping and flashing stops, press and release the
POWER MODE button on the GX-2009 to continue. The unit will
now connect to the program, the TRANSMIT screen shown in
step 6 above will be displayed, and the CHARGE LED will begin
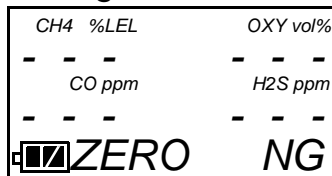to blink green.

8. If necessary, confirm that the bump test check tolerance is set to
the desired value. See "Setting the Bump Test Parameters" on
page 17

9. Verify that the appropriate calibration gas cylinder is connected to
the CAL. GAS fitting on the back of the SM-2009U. See
"Connecting Calibration Gas" on page 22 for calibration gas
cylinder options and calibration gas connection procedures.

10. Press and hold the BUMP ▼ button for at least one second, then release it. The bump test begins. During the bump test, the BUMP LED will flash yellow indicating that a bump test is in progress and the GX-2009 display will show the current gas readings.

```
CH4   %LEL              OXY vol%
      0                 20.9
    CO ppm               H2S ppm
      0                      0
 ▉▉▉      BUMP
```

11. The SM-2009U will apply fresh air to the instrument for the time defined by the air sample time parameter.

12. The SM-2009U will perform a fresh air adjustment on the instrument.

13. If the air adjustment is successful, the SM-2009U will continue as described in step 14 below.

    If one or more of the sensors fails the fresh air adjustment, then the SM-2009U will abort the bump test and will not apply calibration gas. If this happens, the BUMP LED will turn steadily red indicating a failure and the following screen will appear.

```
CH4   %LEL              OXY vol%
- - -                   - - -
    CO ppm               H2S ppm
- - -                   - - -
 ▉▉▉ZERO        NG
```

    In this case, you may attempt another bump test, press and release the EDIT ENTER button to return to the TRANSMIT screen, or turn off the GX-2009 using the EDIT ENTER and POWER buttons.

14. The SM-2009U will apply calibration gas to the instrument for the time defined by the calibration gas sample time parameter. At the end of the calibration gas application, the SM-2009U will determine if the bump test passed, but will not yet show the results.

15. If the automatic calibration bump test parameter is set to off or if it set to on and the bump test passes, the SM-2009U will purge the system with fresh air for the time defined by the air sample time parameter.

    If the automatic calibration parameter is set to on and the instrument failed the bump test, the SM-2009U will continue to

apply gas and perform a calibration.

16. The BUMP LED will stop blinking and be on steadily green if the bump test passed or steadily red if the bump test failed.

17. If the automatic calibration parameter is set to on and the instrument failed the bump test prompting an automatic calibration, the CAL. LED will be on steadily green if the calibration passed or steadily red if the calibration failed.

18. In addition to the indication by the BUMP LED and, if an automatic calibration took place, the CAL. LED, the GX-2009 display will indicate the bump test result or bump test/calibration result for each channel by alternating between two screens. One screen indicates whether each channel passed or failed and one screen indicates the bump test gas reading for each channel if only a bump test was performed or the calibration settings if a bump test and calibration were performed. A "P" indicates a pass and a "F" indicates a fail. Two examples of possible outcomes are shown below for both a bump test only and for a bump test with a calibration.
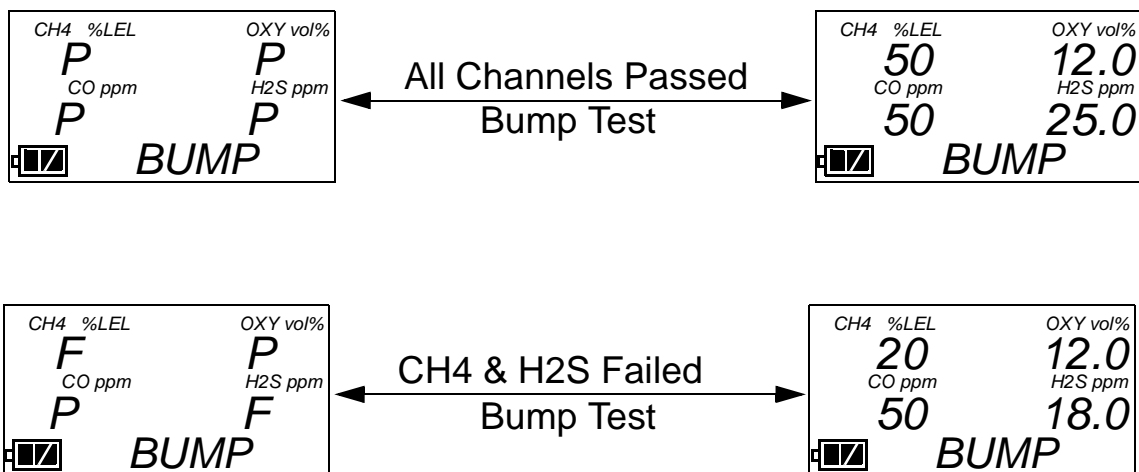

Figure 7: Screen Indications for Bump Test Only

If a successful bump test is performed, the GX-2009 will automatically be shut off in 15 seconds. The bump test due date will also be reset in the GX-2009.
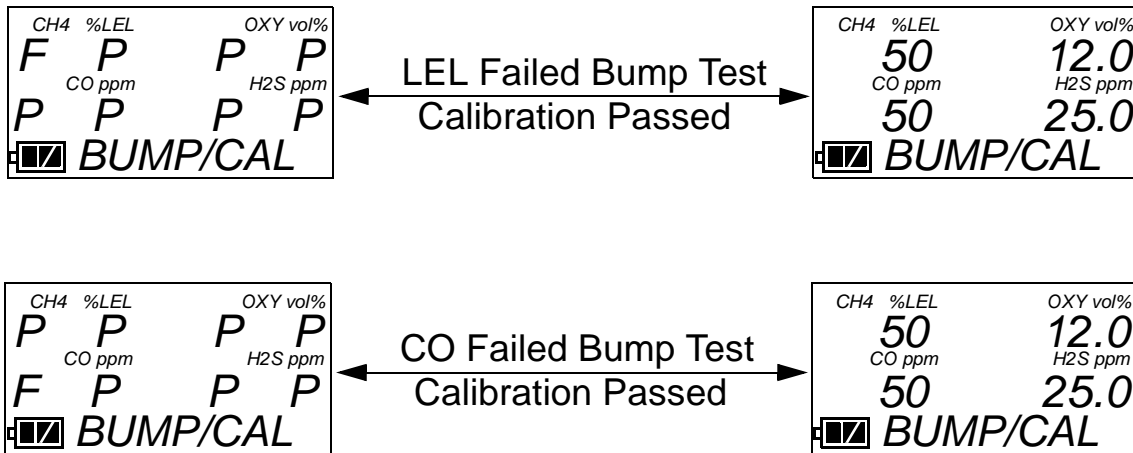
```
CH4  %LEL        OXY vol%          CH4  %LEL        OXY vol%
 F    P      P    P                  50           12.0
    CO ppm        H2S ppm          CO ppm         H2S ppm
 P    P      P    P                  50           25.0
 ▮▨ BUMP/CAL                        ▮▨ BUMP/CAL
```
LEL Failed Bump Test
Calibration Passed

```
CH4  %LEL        OXY vol%          CH4  %LEL        OXY vol%
 P    P      P    P                  50           12.0
    CO ppm        H2S ppm          CO ppm         H2S ppm
 F    P      P    P                  50           25.0
 ▮▨ BUMP/CAL                        ▮▨ BUMP/CAL
```
CO Failed Bump Test
Calibration Passed

Figure 8: Screen Indications for Bump Test & Automatic Calibration

19. The results of the bump test or bump test and calibration will be stored in the SM-2009U's memory and will be available to copy to a USB flash drive. See "Copying Calibration and Bump Test Records to a USB Flash Drive" on page 37 for instructions to copy the saved bump test and calibration records to a USB flash drive.

20. If you wish to return to the Transmit screen, press and release the EDIT ENTER button. If not, continue with step 21.

21. Turn off the instrument by pressing and holding the EDIT ENTER and POWER buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the SM-2009U will automatically turn off the instrument.

CAUTION: *When using the GX-2009 with the SM-2009U, do not turn off the instrument using the instrument power switch. Use the EDIT ENTER and POWER buttons on the SM-2009U to turn off the instrument.*

---

22. Remove the GX-2009 from the SM-2009U.

23. If you wish to bump test additional instruments, repeat step 5 - step step 22 above for each additional instrument.

Calibrating Instruments

When a calibration is performed, the calibration station performs a fresh air adjustment on an instrument and then applies calibration gas to the instrument. The calibration station analyzes the calibration results and determines if the instrument passed the calibration.
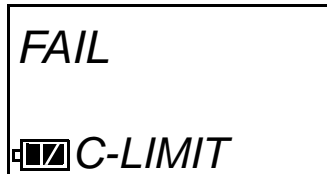
To perform a calibration on an instrument:

1. Confirm that the AC Adapter is connected to the SM-2009U and to an AC wall socket.

2. Press and hold the SM-2009U's POWER button. The LEDs will turn amber the internal pump will turn on momentarily.

3. When the pump stops and the BUMP and CAL. LEDs turn off, release the POWER button.

4. The COPY LED will be off or on steadily and the CHARGE LED will be blinking green if the SM-2009U is operating properly or solid red if there is a system failure. The amount of free memory in the SM-2009U will dictate the condition of the COPY LED (see "Available Memory in the SM-2009U" on page 37).

5. Install a GX-2009 in the instrument cradle. The CHARGE LED will begin to blink yellow. If the batteries are fully charged, the CHARGE LED will become solid green after about 5 minutes. Typically a bump test or calibration will be initiated before this happens. See "Charging an Instrument in a Calibration Station" on page 35 for a complete description of charging the GX-2009.

6. Press and hold the POWER MODE button on the GX-2009 until you hear a beep, then release it. The GX-2009 will begin it's power up sequence (see exceptions below in step 7). If a successful connection between the GX-2009 and the SM-2009U occurs, the TRANSMIT screen will appear on the GX-2009 display and the CHARGE LED will begin to blink green.

CH4 %LEL	OXY vol%
50	12.0
CO ppm	H2S ppm
50	25.0
▮▮ TRANSMIT	

NOTE: The screen shown above applies to a 4-channel GX-2009. If your GX-2009 has less than 4 channels, the inactive channels will not appear in the above screen and in any screens where channels are displayed. All screens in this manual assume a 4-channel GX-2009.

7. There are two exceptions to the sequence described in step 6 above. See the GX-2009 User Setup Program Operator's Manual for a description of the **Cal Limit Display** and **Cal Limit Check** instrument parameters.

    •   When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is set to *Can't Use*, if the GX-2009 is due for calibration the instrument will show a calibration expired failure screen and the buzzer and LED arrays will pulse for a few seconds before connecting to the SM-2009U.

    ```
    FAIL

    ▮▮ C-LIMIT
    ```

    The failure screen will remain on the display while the unit is connected to the SM-2009U.

NOTE: You can still use the SM-2009 with an instrument for bump testing and calibration if this failure indication occurs, but you will not be able to perform any operations that require the display until a calibration is performed, the unit is turned off, and then the unit is re-connected to the SM-2009U. If you perform a bump test or calibration in this case, the only indication of pass or fail will be the BUMP or CAL. LED.

- When **Cal Limit Display** is set to *On* and **Cal. Limit Check** is set to *Confirm to use*, if the GX-2009 is due for calibration the unit will show the following screen and beep and flash the LED arrays for a few seconds indicating that calibration is due.

```
CAL


█�█C--LIMIT
```

  When the beeping and flashing stops, press and release the POWER MODE button on the GX-2009 to continue. The unit will now connect to the program, the TRANSMIT screen shown in step 6 above will be displayed, and the CHARGE LED will begin to blink green.
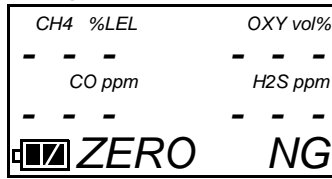
8. Verify that the appropriate calibration gas cylinder is connected to the CAL. GAS fitting on the back of the SM-2009U. See "Connecting Calibration Gas" on page 22 for calibration gas cylinder options and calibration gas connection procedures.

9. Press and hold the CAL. ▲ button for at least one second, then release it. The calibration begins. During the calibration, the CAL. LED will flash yellow indicating that a calibration is in progress and the GX-2009 display will show the current gas readings.

```
CH4  %LEL          OXY vol%
       0              20.9
   CO ppm           H2S ppm
       0                  0
█▐█       CAL
```
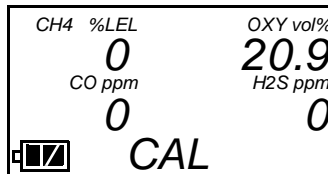
10. The SM-2009U will apply fresh air to the instrument for the time defined by the air sample time parameter.

11. The SM-2009U will perform a fresh air adjustment on the instrument.

12. If the air adjustment is successful, the SM-2009U will continue as described in step 13 below.

    If one or more of the sensors fails the fresh air adjustment, then the SM-2009U will abort the calibration and will not apply calibration gas. If this happens, the CAL. LED will turn steadily red indicating a

failure and the following screen will appear.

CH4 %LEL	OXY vol%
- - -	- - -
CO ppm	H2S ppm
- - -	- - -
ZERO	NG

In this case you may attempt another bump test, press and release the EDIT ENTER button to return to the TRANSMIT screen, or turn off the GX-2009 using the EDIT ENTER and POWER buttons.

13. The SM-2009U will apply calibration gas to the instrument for the time defined by the calibration gas sample time parameter.

14. The SM-2009U will purge the system with fresh air for the time defined by the air sample time parameter.

15. The CAL. LED will stop blinking and be on steadily green if the calibration passed or steadily red if the calibration failed.

16. In addition to the indication by the CAL. LED, the GX-2009 display will indicate the calibration result for each channel by alternating between two screens. One screen indicates whether each channel passed or failed and one screen indicates the calibration setting for each channel. A "P" indicates a pass and a "F" indicates a fail. Two examples of possible outcomes are shown below.

CH4 %LEL	OXY vol%
P	P
CO ppm	H2S ppm
P	P
CAL	

All Channels Passed
Calibration

CH4 %LEL	OXY vol%
50	12.0
CO ppm	H2S ppm
50	25.0
CAL	

CH4 %LEL	OXY vol%
F	P
CO ppm	H2S ppm
P	F
CAL	

CH4 & H2S Failed
Calibration

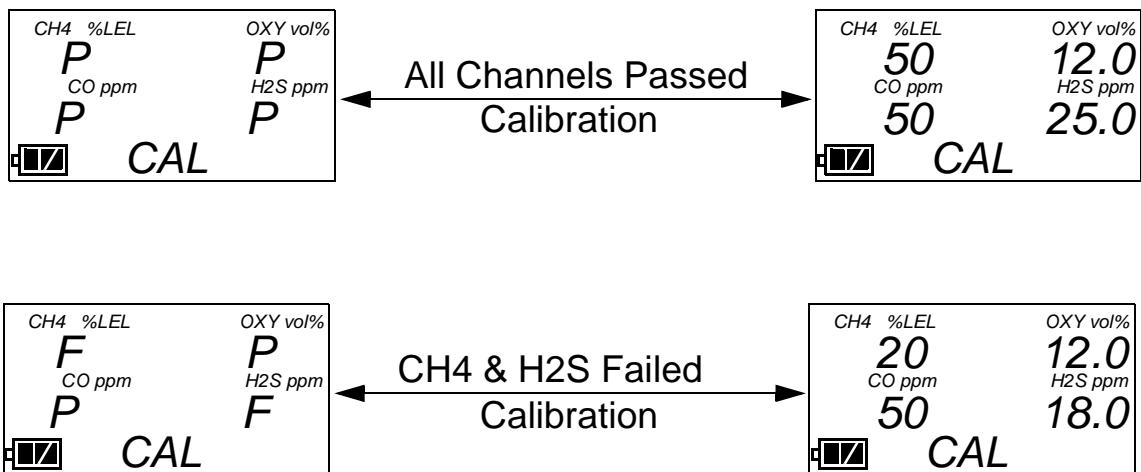| CH4 %LEL	OXY vol%
20	12.0
CO ppm	H2S ppm
50	18.0
CAL	

Figure 9: Screen Indications for Calibration

If a successful calibration is performed, the GX-2009 will automatically be shut off in 15 seconds. The calibration due date will also be reset in the GX-2009.

17. The results of the calibration will be stored in the SM-2009U's memory and will be available to copy to a USB flash drive. See "Copying Calibration and Bump Test Records to a USB Flash Drive" on page 37 for instructions to copy the saved bump test and calibration records to a USB flash drive.

18. If you wish to return to the Transmit screen, press and release the EDIT ENTER button. If not, continue with step 19.

19. Turn off the instrument by pressing and holding the EDIT ENTER and POWER buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the SM-2009U will automatically turn off the instrument.

CAUTION: *When using the GX-2009 with the SM-2009U, do not turn off the instrument using the instrument power switch. Use the EDIT ENTER and POWER buttons on the SM-2009U to turn off the instrument.*

20. Remove the GX-2009 from the SM-2009U.

21. If you wish to calibrate additional instruments, repeat step 5 - step step 21 above for each additional instrument.

Charging an Instrument in a Calibration Station

The SM-2009U can be used to charge the rechargeable batteries in a GX-2009. To maximize the GX-2009's run time and the battery life, make sure the batteries' charge is as low as possible before recharging it. You can use the GX-2009's REFRESH function to discharge the batteries. See the GX-2009 Operator's Manual for a complete description of the REFRESH function.

To recharge the battery pack in an instrument after performing a bump test or calibration:

1. Perform a bump test or calibration on an instrument as described in "Bump Testing Instruments" on page 25 or "Calibrating Instruments" on page 31.

2. After the bump test or calibration has been completed, turn off the

instrument by pressing and holding the EDIT ENTER and POWER buttons simultaneously for at least one second and then releasing them. If no buttons are pressed for 10 minutes, the calibration station will automatically turn off the instrument.

3. After a few seconds, the CHARGE LED will start blinking yellow. The BUMP and/or CAL. LED will continue to be either green or red depending on the result of the bump test or calibration.

4. If the battery pack is fully charged, then the CHARGE status LED will turn solid green in a few minutes.

   If the battery pack is drained enough for the calibration station to charge it, the CHARGE LED will continue to blink yellow while charging is taking place. The SM-2009U will take approximately 3 hours to charge a fully discharged GX-2009.

NOTE: If the GX-2009 is left in the SM-2009U after calibration or bump testing, the pump will run for 12 seconds every 2 minutes in order to keep hydrogen generated from charging of the NiMH batteries from affecting the CO sensor.

---

5. When the charge is complete, the CHARGE status LED will turn solid green.

To recharge the batteries in an instrument without performing any other operations:

1. Confirm that the AC Adapter is connected to the SM-2009U and to an AC wall socket.

2. Press and hold the SM-2009U's POWER button. The LEDs will turn amber and the internal pump will turn on momentarily.

3. When the pump stops and the BUMP and CAL. LEDs turn off, release the POWER button.

4. The CHARGE LED will begin to blink green for a few seconds, then blink yellow.

5. If the battery pack is fully charged, then the blinking yellow LED will turn solid green in a few minutes.

   If the battery pack is drained enough for the SM-20090U to charge

it, the CHARGE LED will continue to blink yellow while charging is taking place. The SM-2009U will take approximately 3 hours to charge a fully discharged GX-2009.

6. When the charge is complete, the CHARGE status LED will turn solid green.

Calibration and Bump Test Records

The SM-2009U saves a record of each bump test and calibration performed. It is capable of saving up to 200 such records. When an SM-2009U's memory becomes full, the oldest record is overwritten when a new record is saved. The records saved in the SM-2009U's memory can be saved to a USB flash drive using the USB port on the front.

Available Memory in the SM-2009U

The COPY LED indicates how much of the SM-2009's memory has been used. The table below describes the various indications.

Table 5: COPY LED Indications

COPY LED Indication	Memory Used
Off	None. No records are saved
Solid Green	Less than 80% of the SM-2009U's memory has been used.
Solid Yellow	More than 80% of the SM-2009U's memory has been used.
Solid Red	The calibration station's memory is full. A newly saved record will over-write the oldest one.

Copying Calibration and Bump Test Records to a USB Flash Drive

The SM-2009U will only perform a copy operation if there is at least one record saved in it's memory. If there are no records saved in the station's memory, the COPY LED will be off and the COPY button will not function. Do the following to save calibration and bump test records in the SM-2009U's memory to a USB flash drive.

NOTE: The USB port on the front of the calibration station cannot be used to connect the SM-2009U to a computer, only to save calibration and bump test records to a USB flash drive.

1. Confirm that the AC Adapter is connected to the SM-2009U and to an AC wall socket.

2. Press and hold the SM-2009U's POWER button. The LEDs will turn amber and the internal pump will turn on momentarily.

3. When the pump stops and the BUMP and CAL. LEDs turn off, release the POWER button.

4. The COPY LED will be off or on steadily and the CHARGE LED will be blinking green.The amount of free memory in the SM-2009U will dictate the condition of the COPY LED (see "Available Memory in the SM-2009U" on page 37).

5. Install a USB flash drive into the USB port on the front of the SM-2009U. The SM-2009U will take a few seconds to determine how much memory is available in the flash drive.

   - If the flash drive's available memory it is not enough for the contents of the SM-2009U's memory, the COPY LED will alternate between green and red. Enough memory will have to be cleared in the flash drive to make room for the records in the SM-2009U's memory.

   - If there is enough available memory in the flash drive for the contents of the SM-2009U's memory, the COPY LED will begin flashing in the same color that it was before installing the flash drive.

6. Press and release the COPY button. The COPY LED will become solid red while the records in the calibration station's memory are copied to the flash drive. In addition, the flash drive's LED will begin to blink.

7. When the COPY LED returns to its original color and begins blinking again and the flash drive's LED stops blinking, the copy operation is complete. Remove the flash drive from the USB port.

8. If the flash drive has not already been used with a calibration station, a folder named **DAT** will be created on the flash drive and a file with all the saved calibration and bump test records will be saved to this folder.

    If the flash drive has been used before with a calibration station, the file will be saved to the existing **DAT** folder.

9. The files on the flash drive can now be either transferred to a computer or kept on the flash drive for use with the Single Module Data Viewer Software. See the next section, "Bump Test and Calibration Record Files", for a discussion of these files and how to use them.

Clearing the SM-2009U's Memory

Make sure that you save the bump test and calibration records in the SM-2009U's memory to a flash drive before clearing its memory. The calibration station's memory can be cleared by simultaneously pressing and holding the CAL. ▲ and COPY buttons for five seconds.

Bump Test and Calibration Record Files

Each time a copy function is performed, a file is saved to the flash drive in the **DAT** folder. The file name will begin with "SM-2009" and the remainder of the file name will depend on the serial number of the SM-2009U used and the date of the most recent bump test or calibration performed on the SM-2009U. So it is possible to have multiple files in the DAT folder from the SM-2009U.

The files that an SM-2009U saves to a USB flash drive are structured so that they can be imported into a database controlled by the Single Module Data Viewer Software. See "Importing Files Into the Database" on page 43 for instructions to add files to the database.

Bump Testing or Calibrating and Saving Files To a Flash Drive Multiple Times In One Day

The SM-2009U assigns file names to calibration and bump test record files based on the day of the most recent calibration or bump test record saved in the calibration station's memory. If a copy operation is performed, additional bump tests or calibrations are performed, and another copy operation is performed with the same flash drive all on the same day, the existing file on the flash drive from the first copy operation will be overwritten by the file from the second copy operation because it's name will be the same as the new file. In this case, no information is lost since the second file saved to the flash drive includes all the records that were in the first file.

However, if a copy operation is performed, **the SM-2009U's memory is cleared**, additional bump tests or calibrations are performed, and another copy operation is performed with the same flash drive all on the same day, this will result in the information in the file from the first copy operation being lost. This is because the file saved to the flash drive in the second copy operation only includes records since the memory was cleared and when it overwrites the file from the first copy operation, all the information in the first file is lost.

CAUTION: *If copying an SM-2009U's memory to a flash drive multiple times during the same day and the SM-2009U's memory is cleared, transfer the calibration/bump test record files from the flash drive to a computer hard drive or some other memory device before performing another copy operation to avoid loss of information.*

Chapter 5: Single Module Data Viewer Program

Overview

The Single Module Data Viewer Program is used to view, organize, and print bump test and calibration records that were created by the SM-2009U. It can also be used to export these records from it's database for use in other programs. This chapter describes how to use the Single Module Data Viewer Program.

Launching the Single Module Data Viewer Software

1. Click **Start** on the Windows® Icon Tray, then select **Programs/Single Module Data Viewer**.

   NOTE: If you are starting the software for the first time, a message window appears informing you that a database has been created. If this occurs, click **OK**.

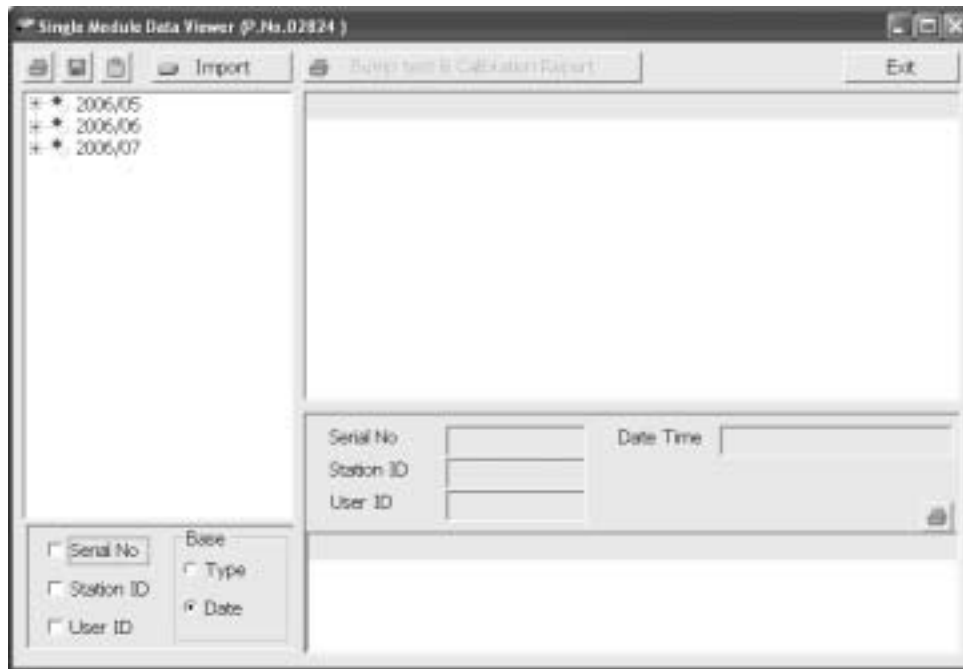2. The Single Module Data Viewer program is launched and the data viewing window appears.

Figure 10: Single Module Data Viewer Window

NOTE:	When you start the Single Module Data Viewer Program for the first time, there will be no data in the left part of the data viewing window since no data has been imported into the database yet.

Using the Single Module Data Viewer Software
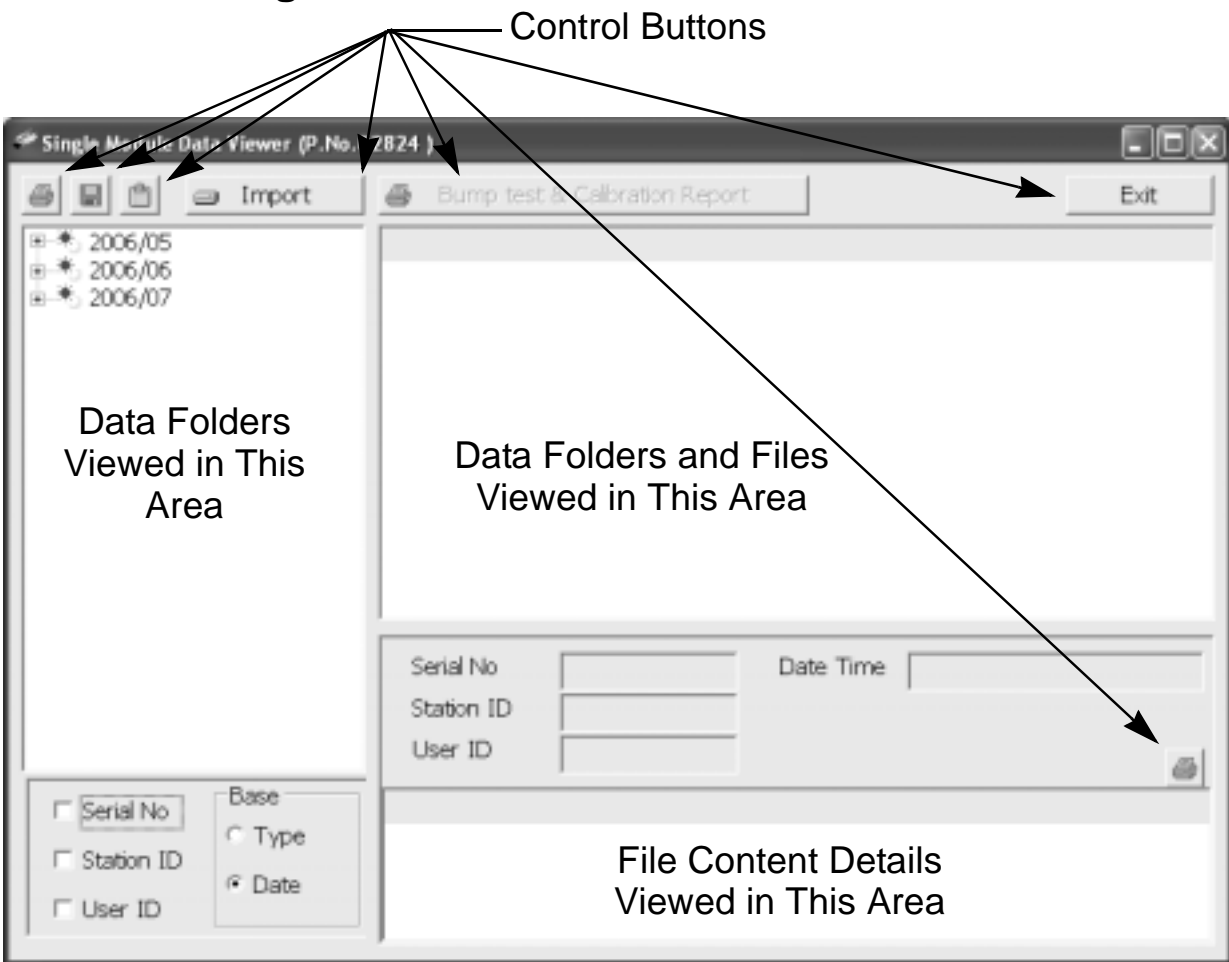
Data Viewing Window

Figure 11: Data Viewing Window

All of the operations that can be performed in the Single Module Data Viewer Program can be executed from the data viewing window. There are function buttons along the top of the window and one in the lower right that initiate the various operations. The upper left side of the window displays the contents of the database. The lower left corner of the window has selection boxes that allow you to organize the data. The

upper right side of the window shows the contents of the item selected in the upper left side, and the lower right side indicates the contents of the item selected in the area above it. In the example above, the data is organized by date.

You can do the following in the data viewing window:

- Import files into the database that were created by an SM-2009U

- View the bump test and calibration data saved in the database.

- Delete data.

- Print bump test or calibration results (pass or fail indication only).

- Copy bump test or calibration records to the clipboard or to a particular location on your computer or network.

- Print a bump test or calibration report that includes the results and all gas readings.

Importing Files Into the Database

The files generated by the SM-2009U are structured to be imported into the Single Module Data Viewer Program database. To import data files into the database, do the following:

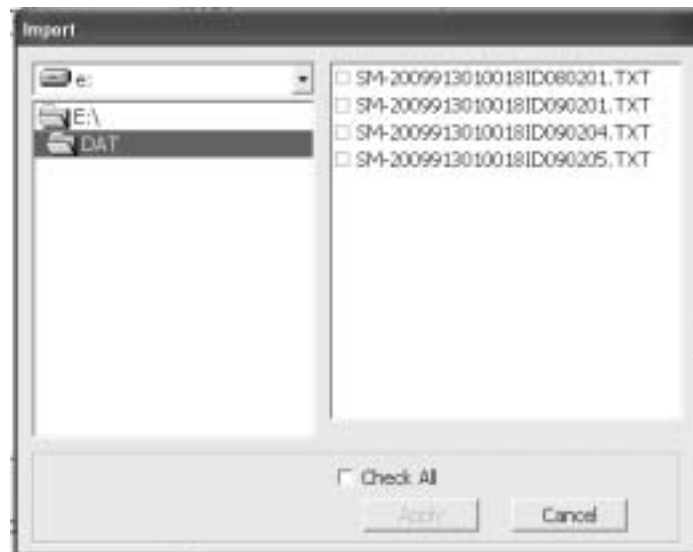1. While in the Data Viewing Window, click the **Import** button. The Import Window will appear.

Figure 12: Import Window

2. Navigate to the location of the files that you want to import into the database.

3.   Select the files that you want to import.

4. Click the **Apply** button. A window will appear for a few seconds indicating that the file or files are being imported.

5. The files are now added to the database.

Organizing the Data

When viewing the data, it can be organized in two ways:

1.   Base View Format

In base view format, neither of the Serial No, Station ID, or User ID selection boxes in the lower left of the window are selected and the Base box appears next to these selection boxes. The data can be organized by either the data type (bump test and calibration data) or by the month and year. The example below shows the data organized by type.
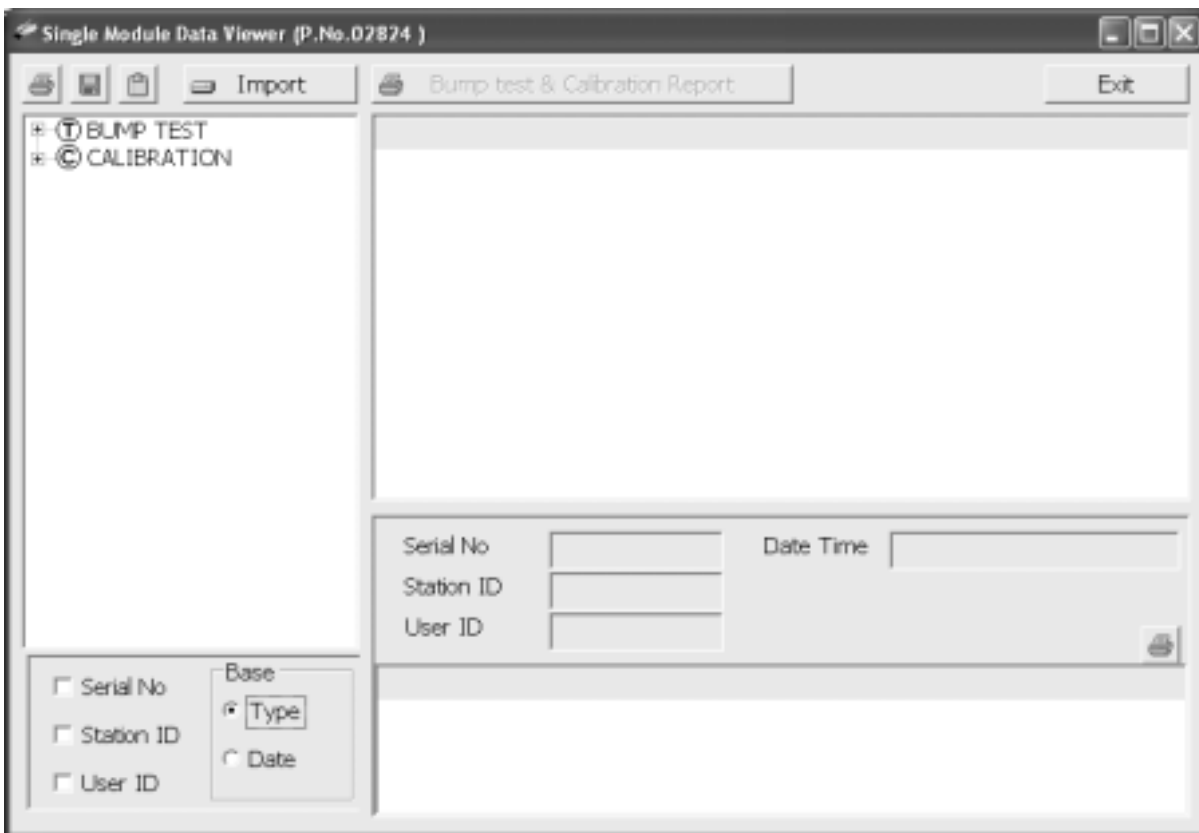

Figure 13: Data in Base Viewing Format

2. ID View Format

    In ID view format, the data can be organized by one or more of the following items depending on which selection box or boxes in the lower left corner of the data viewing window are selected:

    *   Serial Number

    *   Station ID

    *   User ID

    If any of these boxes is selected, the Base box disappears. The example below shows the data organized by serial number.
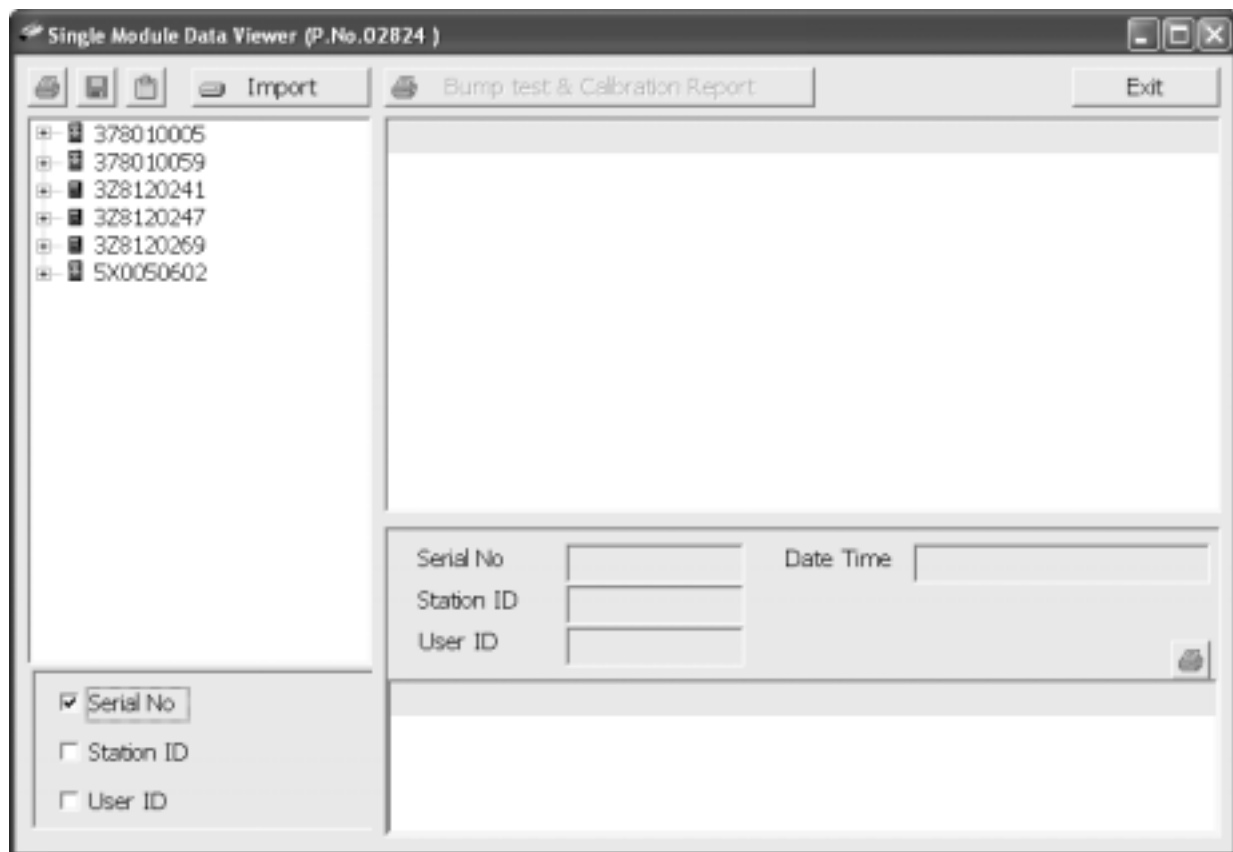

Figure 14: Data in ID Viewing Format

Viewing the Data

Once you have selected how you want to organize the data:

1. Click the expanded view symbol (+) next to an item, folder or icon, in the left side of the data viewing window or double click the item to

view the contents below it. Single click on an item to view the contents in the right side of the window. If an item is expanded and you want to close it, click the (-) symbol next to the item or double click it.

2. When an item no longer has a (+) or (-) symbol next to it, single click it and the contents of the item will be shown on the right side of the window.

3. If you are viewing data in base view format with the data organized by type, expand the item you wish to view, bump test or calibration data. Icons organized by year/month will appear below the bump test or calibration icon. Click on the item whose contents you wish to see. The bump test or calibration files will be shown in the upper right side of the data view window.
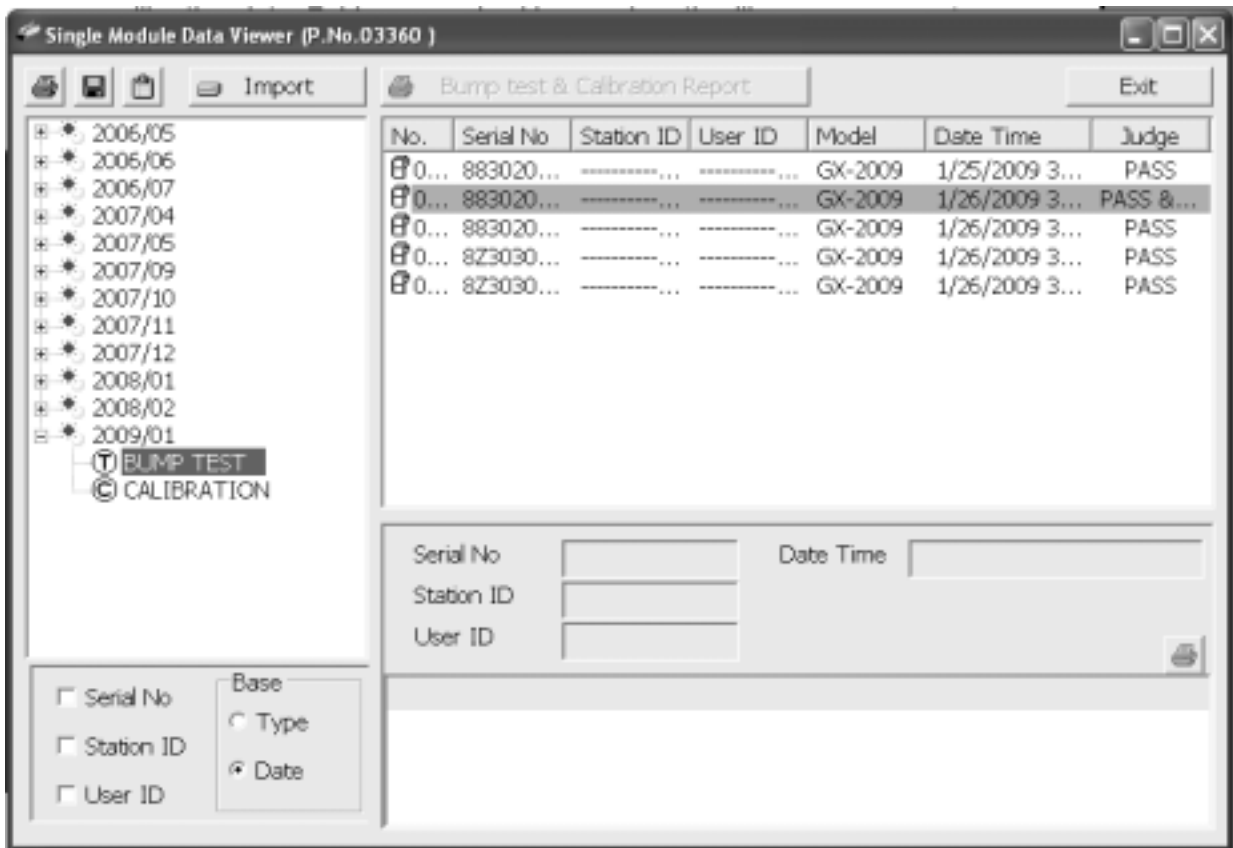

Figure 15: Calibration/Bump Test Files in Base View Format

If you organize the data by date, then folders organized by year/ month appear in the left side of the window. Expand the folder you want to see and click on the calibration or bump test folder. The

calibration or bump test files will appear in the upper right side of the window.

If you are viewing data in ID view format, expand the folders in the left side of the window until the bump test or calibration folder you wish to view is visible. Expand the folder. Folders organized by year/month will be listed below the calibration or bump test folder. Click the folder whose contents you want to view and the calibration or bump test files in it will be shown in the upper right side of the data view window. The example below is organized by serial number.
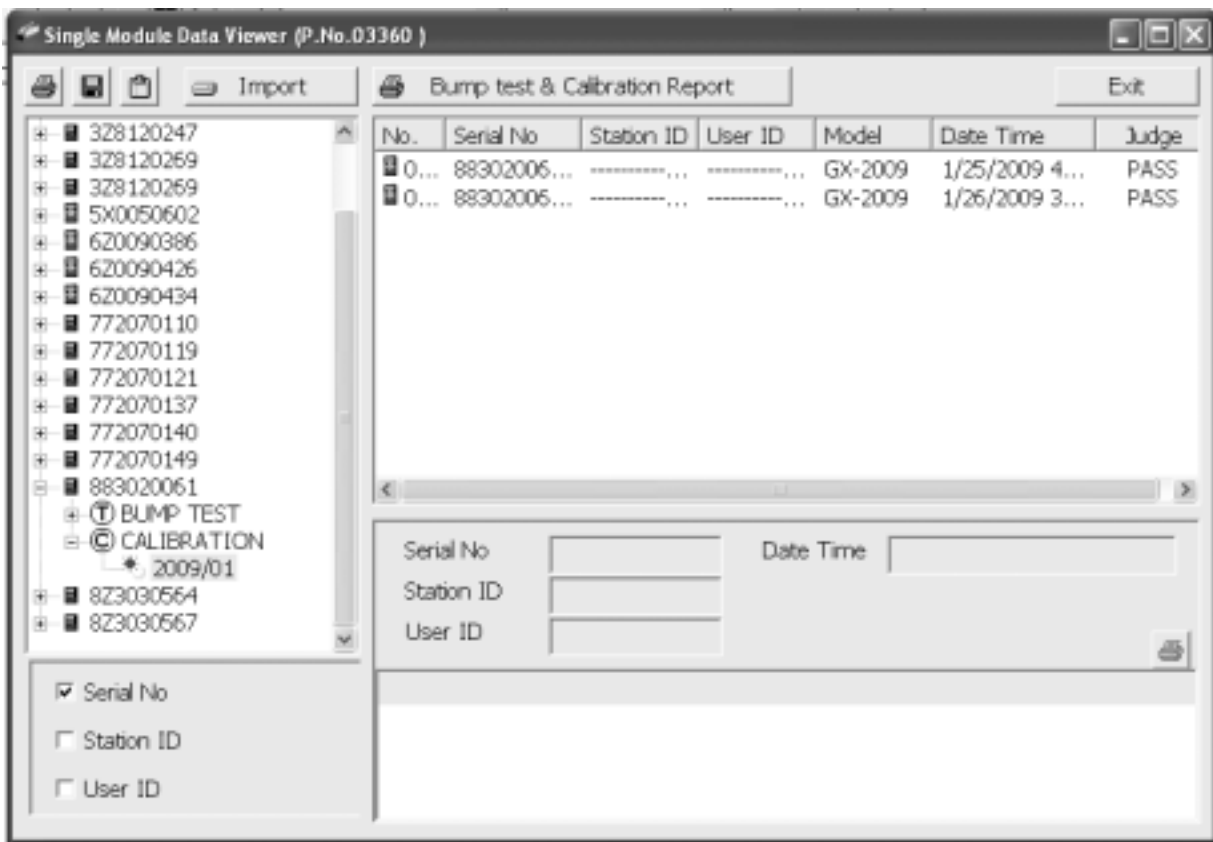

Figure 16: Calibration/Bump Test Files in ID View Format

4. Files that record a failed calibration or bump test on all channels are highlighted in red. Files that record a calibration or bump test where not all channels passed are highlighted in orange.

5. To view the file contents, click on the file in the upper right part of the data view window that you wish to view. The contents in the file will appear in the lower right part of the window. The contents

include the instrument's serial number, station ID, user ID, bump test or calibration time, test gas, and gas readings during the operation.

6. To print the files as they appear in the upper right part of the data view window, click the print button in the upper left corner of the window. A dialog box will appear confirming if you want to print. Click **OK**.

7. To print only the pass or fail result of all files in the upper right window, click the **Bump test & Calibration Report** button above the files. A dialog box will appear showing the selected printer and confirming if you want to print. Verify that the selected printer is correct and click **OK**.

8. To print the complete results, pass/fail and gas readings, of one of the files in the upper right part of the data view window, click on one of the files to select it and then click the print button that appears above the file details in the lower right. A dialog box will appear showing the selected printer and confirming if you want to print. Verify that the selected printer is correct and click **OK**.

9. To save files as they appear in the upper right part of the data view window, click the **Save To File** button to the right of the print button in the upper left corner of the window. The **Save To File** button has a floppy disk icon in it. A "Save As" dialog box will appear for you to specify the filename, file location, and file type. Select the **Text files (*.csv)** choice to save the information as a comma separated value file that may be opened with a spreadsheet program such as Microsoft Excel.

10. To save files to the clipboard as they appear in the upper right part of the data view window, click the **Copy To Clipboard** button. The **Copy To Clipboard** button has a clipboard icon in it. The file will be saved to the clipboard. It can then be pasted into a document by using the Paste command in an application.

Deleting Data

You can delete an instrument, bump test data, or calibration data in the data view window. The delete function is password protected to avoid accidental deletion of instruments or data. To delete an instrument or data, perform the following:

1. Find the item you wish to delete and right click it. A window will appear that says "Delete(D) Change Password(C)".

2. Click on "Delete(D)". A password entry window will appear.

3. Enter the password and click **OK**. The default password is "ABCDE" and is case sensitive. A confirmation window will appear.

4. Click **OK** to complete the deletion of the selected item.

Changing the Password

The default password is "ABCDE" and is case sensitive. You can change the password in the data view window. To change the password perform the following:

1. Right click in the upper right or upper left part of the data view window. A window will appear that says "Delete(D) Change Password(C)".

2. Click on "Change Password(C)". A window will appear prompting you for the current password.

3. Enter the current password and click the **Current Password** button. A window will appear prompting you for the new password.

4. Enter the new password and click the **New Password** button. A confirmation window will appear prompting you for the new password again.

5. Enter the new password again and click the **Confirm New Password** button. A window will appear indicating that the password has been changed.

6. Click **OK** to complete the password update.

Exiting the Program

To exit the Single Module Data View Program, do the following:

1. Click the **Exit** button in the upper right corner of the data view window. A confirmation window will appear.

2. Click the **OK** button to exit the program or the **Cancel** button to return to the program.

Spare Parts List

Table 6: Spare Parts List

Part Number	Description
06-1248RK	Polyurethane tubing, 5/16-inch OD x 3/16-inch ID, for connecting calibration cylinder to calibration station
06-1254RK	Polyurethane tubing, 7/16-inch OD x 5/16-inch ID, for exhaust tube, 10 feet maximum
33-0167RK	Particle air filter replacement, CF-8369
49-0115RK	AC adapter
71-0164RK	Operator's Manual SM-2009U Single Module Calibration Station (this document)
81-0076RK	Zero air cylinder,17 liter steel
81-0076RK-01	Zero air cylinder, 34 liter steel
81-0076RK-03	Zero air cylinder,103 liter steel
81-0090RK-01	Three-gas calibration cylinder, 50% LEL CH_4/12% O_2/ 50 ppm CO, 34 liter steel
81-0090RK-03	Three-gas calibration cylinder, 50% LEL CH_4/12% O_2/ 50 ppm CO, 103 liter steel
81-0154RK-02	Four-gas calibration cylinder, 50% LEL CH_4/12% O_2/50 ppm CO/25 ppm H_2S, 58 liter aluminum
81-0154RK-04	Four-gas calibration cylinder, 50% LEL CH_4/12% O_2/50 ppm CO/25 ppm H_2S, 34 liter aluminum

Table 6: Spare Parts List

Part Number	Description
81-0158RK-02	Four-gas calibration cylinder, 50% LEL Isobutane/12% O_2/50 ppm CO/25 ppm H_2S, 58 liter aluminum
81-0158RK-04	Four-gas calibration cylinder, 50% LEL Isobutane/12% O_2/50 ppm CO/25 ppm H_2S, 34 liter aluminum
81-1054RK	Demand flow regulator, 58/103 liter cylinders
81-1055RK	Demand flow regulator, for 17/34 liter steel cylinders
81-SM2009U	Single Module Calibration Station for GX-2009
83-0009RK	Single Mode Data Viewer software