

# AutoRAE

Automated Bump Test And Calibration System



**USER MANUAL**

048-4002-000, Revision A, June 2005

# **Warnings**

**For safety reasons, this equipment must be operated and serviced by qualified personnel only. Read and understand this manual and the manuals accompanying any monitor(s) used with this unit completely before operating or servicing.**

## **Operating Environment**

This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%. Substitution of components may impair intrinsic safety. Recharge batteries only in non-hazardous atmospheres.

## **Computer Interface**

Do not transfer data by means of the computer interface cable in hazardous atmospheres.

## **Static Hazard**

Clean only with a damp cloth.

## **Monitor Calibration**

Any newly purchased RAE Systems instrument should be fully calibrated by exposing it to known concentration calibration gases before the instrument is put into service for the first time. For safety, check the accuracy of the monitor by exposing the sensors to calibration gas(es) before each day's use.

# Contents

Introduction.....	2
AutoRAE Basic Setup Requirements .....	2
Setting Up The AutoRAE System .....	3
Using The AutoRAE System.....	5
Charging Monitor Batteries.....	5
Performing A Functional Bump Test .....	5
Calibrating A Monitor .....	6
Calibrating And Bump Testing Multiple Monitors .....	7
Disconnecting The AutoRAE System .....	7
Upgrading The AutoRAE Controller Firmware.....	8

**SPECIAL NOTE:** If the AutoRAE or a monitor needs to be serviced, contact either:

The **RAE Systems distributor** where the EntryRAE or monitor was purchased; they will return it on your behalf,

or

The **RAE Systems Technical Service department**. Before returning the unit for service or repair, obtain a Returned Material Authorization (RMA) number for proper tracking of your equipment. This number needs to be on all documentation and posted on the outside of the box in which the unit is returned for service or upgrade. ***Packages without RMA Numbers will be refused at the factory.***

# Introduction

AutoRAE is an easy-to-use automatic bump test and calibration system for RAE Systems' gas detection and monitoring instruments. The AutoRAE can perform the following functions:

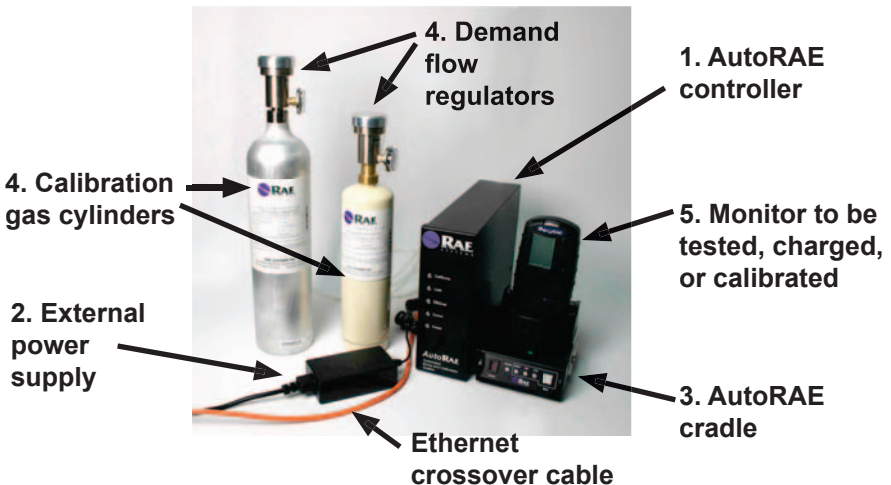
- Charging monitors' batteries.
- Simple bump test.<sup>1</sup>
- Full calibration of a five-sensor (O<sub>2</sub>, H<sub>2</sub>S, CO, LEL, PID) monitor.<sup>2</sup>

1. The bump test only verifies that sensors respond to gases. It is not designed to fully validate all sensors in the monitor.

2. The O<sub>2</sub> sensor is only calibrated with fresh air.

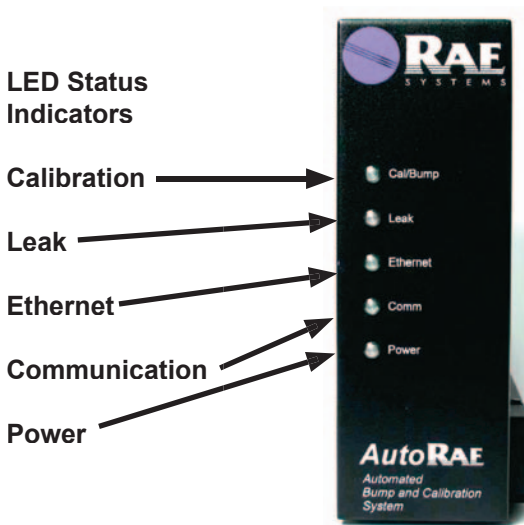
## AutoRAE Basic Setup requirements

1. One AutoRAE controller.
2. One external power supply/cord.
3. At least one AutoRAE cradle.
4. Calibration gases with demand flow gas regulators (for example, 4-gas mix and Isobutylene for EntryRAE).
5. Monitor to be tested, charged, or calibrated.
6. Proper air ventilation setup/gas hood (not shown).

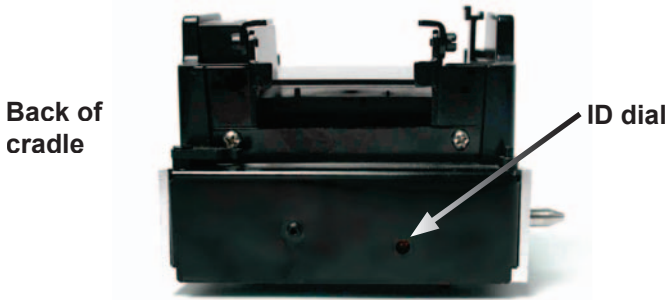


## Setting Up the AutoRAE System

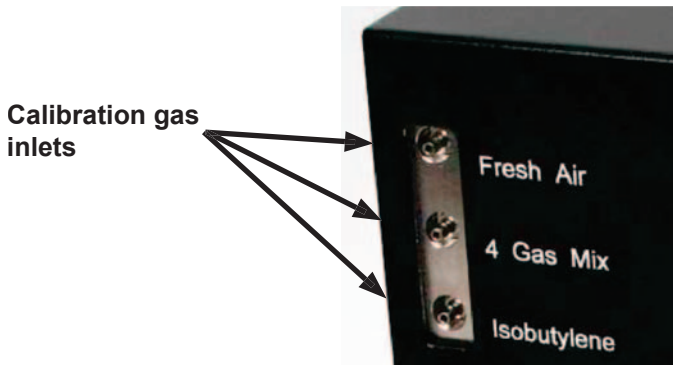
1. Connect the power cord to the AutoRAE controller and plug it into an external power supply.
2. Connect the AutoRAE cradles to the controller one at a time. Make sure all connections are firm. It is not recommended that cradles be connected to or disconnected from the AutoRAE controller while the system is powered on. Note that poor connections between the controller and cradle or between cradles can cause gas leaks. This condition is indicated by the red “Leak” LED on the AutoRAE controller.



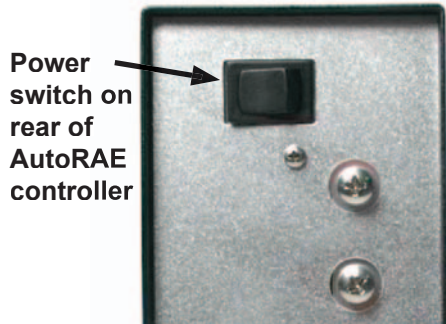
**Note:** If more than one cradle is to be connected to the AutoRAE controller, each cradle must be set with a different cradle unit ID ranging from 0 to 9 (for a maximum of 10 cradles per AutoRAE controller). This can be set with a screwdriver. Rotate the cradle until the ID dial on the back is visible and turn the dial with the screwdriver. The order of connection to the AutoRAE controller does not need to be sequential by cradle unit ID.



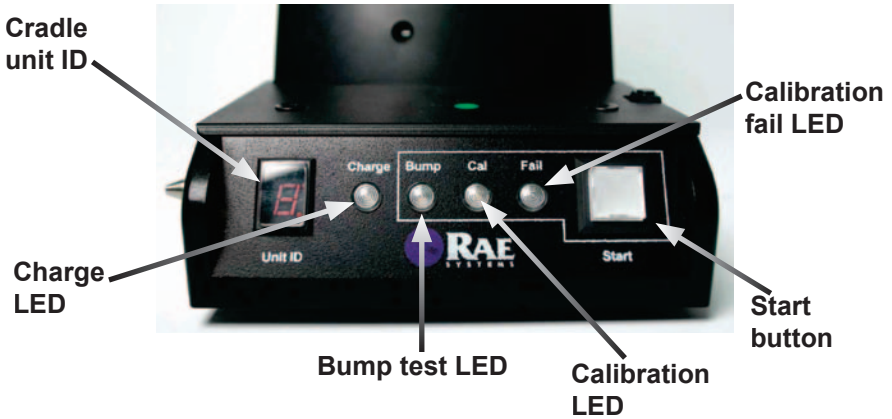
3. Connect the proper calibration gases to the AutoRAE controller gas inlets. Note that each canister of gas should have a demand flow gas regulator. The fresh air inlet should be left unconnected.



4. Turn the AutoRAE controller on using the power switch on the back of the controller. Check the status LEDs. The red “Power” LED on the controller will be lit, and the green “Comm” (communication) LED will flash periodically.



On the cradles, the “Start” button will flash for several seconds, and all other cradle status LEDs will blink once. The cradle unit IDs will light and remain lit as long as the system is powered on.



Front of AutoRAE cradle.

Your AutoRAE system is now ready to use.

## Using the AutoRAE System

The AutoRAE can be used to charge monitors' batteries, perform functional bump tests, and calibrate monitors.

### Charging Monitor Batteries

1. Turn on the AutoRAE system.
2. Place the monitor to be charged into an AutoRAE cradle and check the states of the cradle's status LEDs. The green “Charge” LED will begin flashing, and will continue to flash until the battery is fully charged. Once the battery is fully charged, the LED will stop flashing and stay lit. If the battery is fully charged when the monitor is placed into the cradle, the “Charge” LED will still flash for several minutes.

### Performing a Functional Bump Test

1. Turn the AutoRAE system on.
2. Place the monitor to be bump tested into an AutoRAE cradle. The green “Charge” LED will begin flashing and the battery will begin to charge.
3. Press the white “Start” button on the front of the cradle. The “Start”

button and green “Bump” LED will both begin to flash. You can toggle between the “Bump” and “Cal” LEDs and no selection/cancel while the “Start” button is flashing. The selected function’s LED (no LED in the case of no selection/cancel) will flash at this time.

4. Select the bump test function (“Bump”). The “Start” button will stop flashing after 10 seconds, and the current selection will be locked in. The AutoRAE will then proceed to bump test the monitor. During this time, the green “Cal/Bump” LED on the AutoRAE controller will be lit, and the green “Bump” LED on the cradle will continue to flash until the bump test is done (about 3 minutes). Upon completion of the bump test, the “Bump” LED on the cradle will stop flashing and remain lit if the monitor passed the test. The “Cal/Bump” LED on the controller will also go out. If the monitor failed the bump test, the AutoRAE will automatically start to calibrate the monitor (see *Calibrating a Monitor*). After all functions have been performed, the battery will resume charging.

## **Calibrating a Monitor**

1. Turn on the AutoRAE system.
2. Place the monitor to be calibrated into an AutoRAE cradle. The green “Charge” LED will begin flashing, and the battery will begin to charge.
3. Press the white “Start” button on the front of the cradle. The “Start” button and green “Bump” LED will both begin to flash. You can toggle between the “Bump” and “Cal” LEDs and no selection/cancel while the “Start” button is flashing. The selected function’s LED will flash at this time. Note: The LED does not flash in the case of no selection/cancel).
4. Select the calibration function (“Cal”). The “Start” button will stop flashing after 10 seconds, and the current selection will be locked in. The AutoRAE will then proceed to calibrate the monitor. During this time, the green “Cal/Bump” LED on the AutoRAE controller will be lit, and the green “Cal” LED on the cradle will continue to flash until the calibration is done (about 5 minutes). Upon completion of a successful calibration, the “Cal” LED on the cradle will stop flashing and remain lit. The “Cal/Bump” LED on the controller will also go



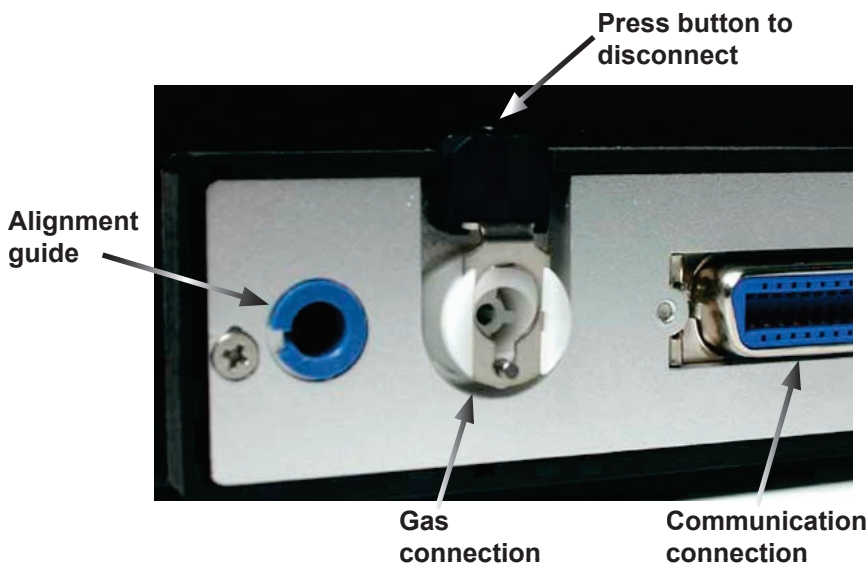
out. If the calibration failed, the red “Fail” LED on the cradle will be lit. After all functions have been performed, the battery will resume charging.

### **Calibrating and Bump Testing Multiple Monitors**

The AutoRAE system will only bump test/calibrate one monitor at a time. When multiple monitors are in AutoRAE cradles connected to the AutoRAE controller, the AutoRAE will bump test/calibrate the monitors in the order that they were selected. While the second through last monitors are waiting to be tested/calibrated, the LED of the selected function will flash and continue to flash until the bump test/calibration is completed.

### **Disconnecting the AutoRAE System**

You may disconnect cradles from the AutoRAE controller and from each other by pressing the small rectangular button with a circle on top, located on the top right of the cradle, and pulling the cradle away. It is recommended that you connect and disconnect cradles only when the AutoRAE controller is powered off.



Side of AutoRAE cradle/controller.

## Upgrading the AutoRAE Controller Firmware

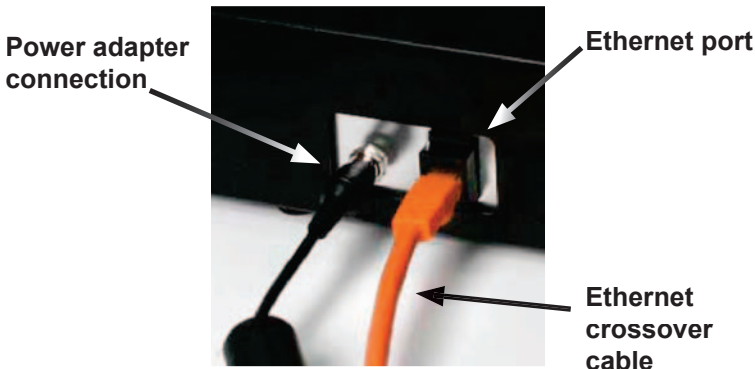
The firmware for the AutoRAE controller may be upgraded. To upgrade the AutoRAE controller firmware, you will need:

1. Automatic firmware upgrade utility software (provided on the AutoRAE Resource CD).
2. Ethernet crossover cable (provided in the AutoRAE package) .
3. Firmware file

Once you have collected these items, you may upgrade the AutoRAE controller firmware by following these steps:

1. Connect the AutoRAE controller to your computer using the provided Ethernet crossover cable. Insert one end of the cable into the communication port on the side of the AutoRAE controller (shown below). Insert the other end of the cable into the Ethernet port of your computer.

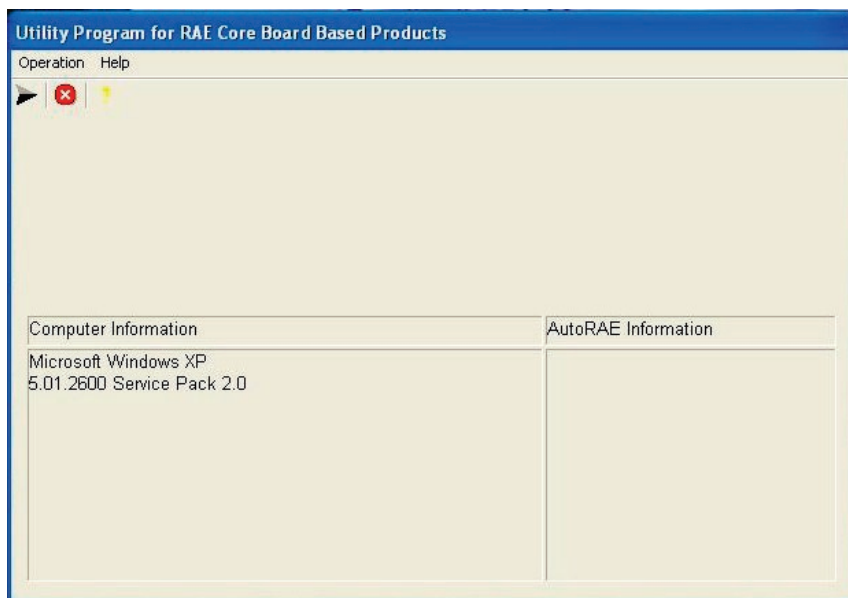
**Note:** All other Ethernet connections (wired and wireless) on your computer must be disconnected or disabled to use the automatic upgrade utility.




**Side of AutoRAE controller.**

2. Remove any instruments that may be in the AutoRAE cradles.
3. Turn on the AutoRAE controller.

4. Start the automatic firmware upgrade utility. The following window will appear:



Information about your computer's operating system is shown in the lower left pane under **Computer Information**.

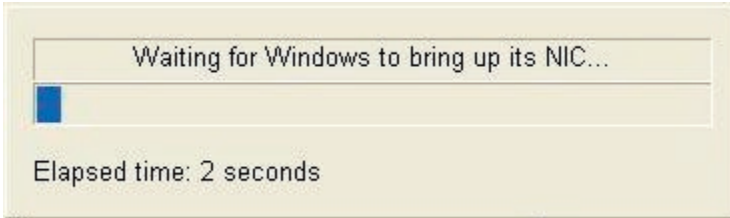
5. Start the upgrade process by selecting **Operation > Upgrade Firmware** from the menu bar, or by pressing  (the upgrade button). The following message will appear:



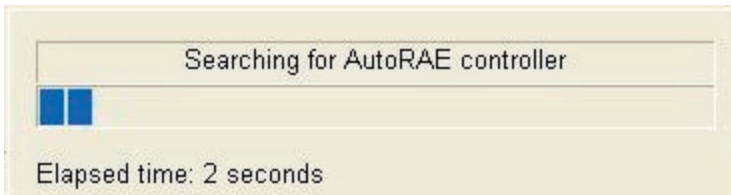
6. Click the **Yes** button to continue. Click the **No** button to cancel.

- The utility will proceed to set up the connection between the computer and the AutoRAE controller. During this time, the green **Ethernet** LED on the AutoRAE controller will be lit and the following message will appear:

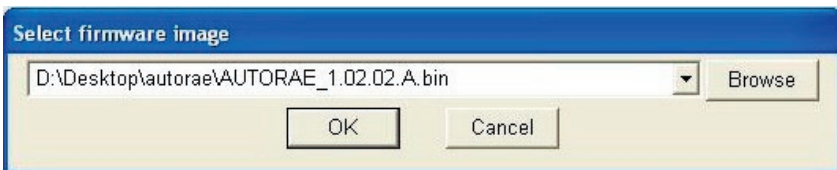
If no connection is found within two minutes (120 seconds), the utility will time out and return to the main window.



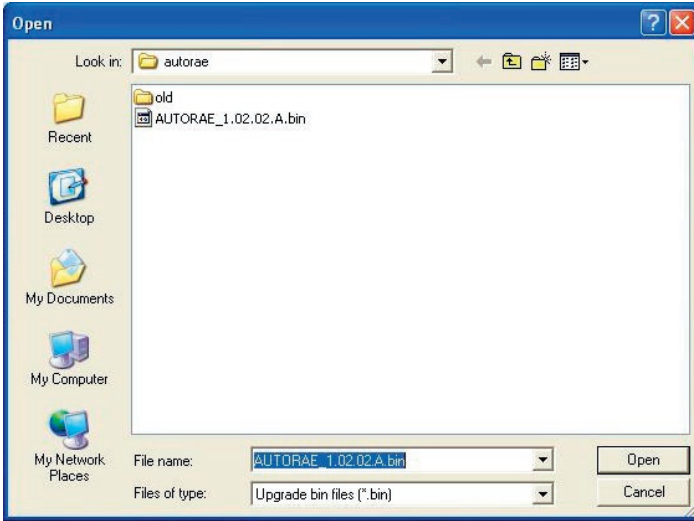
After the utility finishes setting up the connection, it will search for the AutoRAE controller. During this time, the following screen will appear:



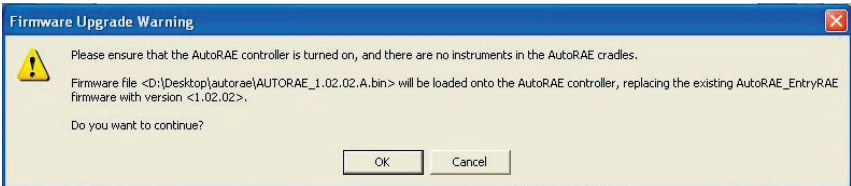
- Once the utility has found the AutoRAE controller, information about the AutoRAE, such as firmware version, serial number, and the IP address of the connection with the computer, will appear in the lower right pane of the main utility window under **AutoRAE Information**. A pop up window allowing you to select the AutoRAE firmware file to upgrade to will also appear:



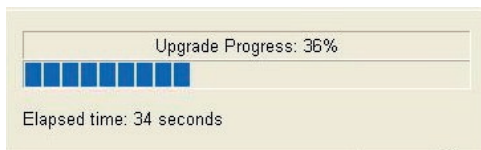
The utility will automatically select a firmware file. Ensure that this is the correct firmware file. If it is not, click on the **Browse** button and navigate to the appropriate file and click on the **Open** button:



9. Once the proper firmware file has been selected, press the **OK** button on the **Select Firmware Image** window. If you do not want to upgrade the firmware, press the **Cancel** button and the utility will return to the main screen. The following warning will appear:



10. Click on the **OK** button to continue, or the **Cancel** button to abort. The utility will prepare the connection between the computer and the AutoRAE controller, and will then upgrade the firmware. During this time, the green Ethernet LED on the front panel of the AUtoRAE controller will light. A status bar will appear during the upgrade:

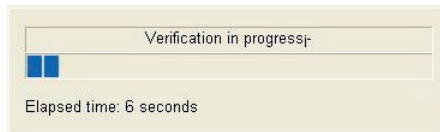


11. Once the firmware has been successfully upgraded, the following message will appear:



Click on the **OK** button.

12. The utility will verify that the firmware was properly installed. The verification progress window will appear:




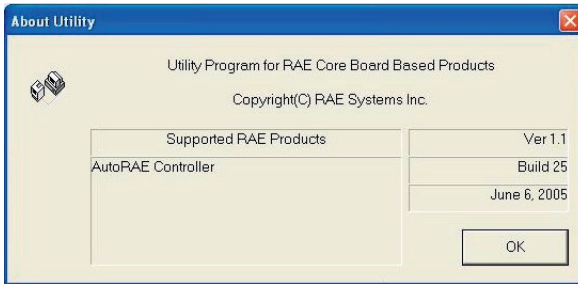
13. Once the verification is complete, the following message will appear:



Press **OK**, and the utility will return to the main window.

14. To exit the utility, select **Operations>Exit** from the menu bar or click on the  (exit button).

15. To view information about the automatic upgrade utility program, select **Help>About** from the menu bar or click on  (help button).



**Note:** The **Help>Power User Mode** option in the menu bar is for factory use only.



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



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Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.