# MONITOR REMOTE CONTROL FUNCTIONS

This technical note explains how raw data and remote control functions can be transferred in real time between a RAE Systems monitor and a personal computer via a hard wire hyperterminal emulation (P2P).

This P2P protocol is different from the wireless protocol used in the ProRAE Remote wireless network. MultiRAE Plus, ppbRAE, ppbRAE Plus, and MiniRAE2000 may be shipped with the wireless protocol enabled. To use a hardwired connection, the P2P feature must be restored.

A new software utility – WirelessP2.exe – available on the RAE Systems website at www.raesystems.com/downloads, makes it easy to set a monitor to either the wireless or P2P protocol:
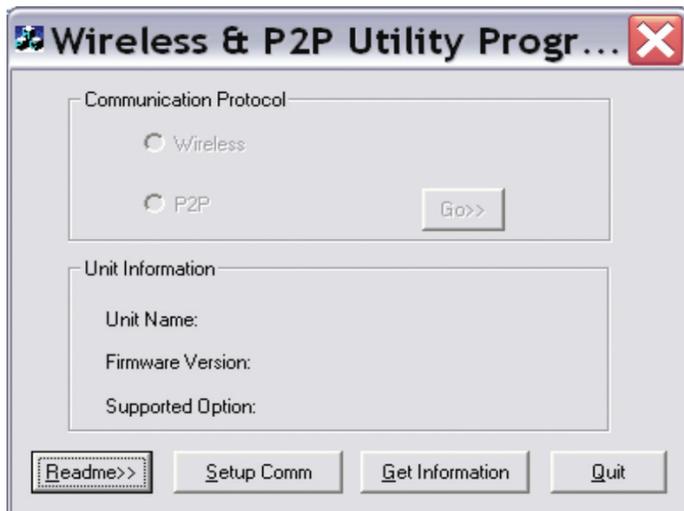
This utility can also be used to determine the set up of a given monitor. The communication setup status is also displayed as part of the instrument startup display string for MultiRAE Plus firmware V3.12D or higher, ppbRAE/ppbRAE Plus firmware V2.01B or higher, and MiniRAE 2000 firmware V1.25A or higher. The suffix "-D" is appended to the firmware version indication for instruments with P2P enabled. The suffix "-W" is appended to the firmware version indication for instruments that are wireless-enabled.

SETTING UP THE HYPERTERMINAL IN WINDOWS

This allows a direct connection via your serial port. If you are using Windows 7 or higher, you will need to get and install a HyperTerminal program (many are free or inexpensive) on the Internet. (Prior to Windows 7, HyperTerminal was included with the operating system.)

Start the HyperTerminal program and enter a title for the connection (for example "MultiRAE"). In the "connect using" dialog box, choose "Direct to com1" (this assumes that the serial cable is connected to the com1), and then click "OK." In "port setting", use the following settings: bits per second (or baud) = 9600, 8 bit, no parity bit, 1 stop bit, flow control = none. Then click "OK."

Connect the instrument to:

1. the 12V AC/DC adapter.

2. the Com1 port of the computer with the serial cable

Operation Via the HyperTerminal Window

The keyboard shortcuts in Table 1 display the unit's remote control readout in the HyperTerminal window. A MiniRAE 2000 or ppbRAE must be in hygiene mode to start remotely. For the latter monitors the codes are the same as in Table 1 but the read back shows fewer values because there is only one sensor.

Sensor Error / Alarm Limit Bits

A byte, comprised of eight bits, is used to record the alarm limits and errors of each sensor. All the sensors in the unit are checked remotely and then the results are displayed when the user hits the shortcut "E". If everything is operating correctly, "0 0 0 0 0" will appear for MultiRAE Plus and "0 0" for MiniRAE 2000 or ppbRAE. If anything is wrong, a number, created from the binary string, will appear in one of the two or five positions. The binary Alarm and Error codes are defined in Table 2 for the MultiRAE and Tables 3 & 4 for MiniRAE 2000 or ppbRAE.

Table 1. Hyperterminal Query Functions (All Models)

KEY	FUNCTION	DISPLAYED RESULTS (MultiRAE)				
C		TOX1	peak	low	STEL	TWA
		VOC	peak	low	STEL	TWA
		TOX2	**peak**	**low**	**STEL**	**TWA**
		LEL	**peak**	**low**		
		O2	**peak**	**low**		
E	Sensor Error	"**0 0 0 0 0**" - sensors are error-free				
F	Firmware	"**213**" - Version 2.13				
L	Alarm Limits	TOX1	peak	low	STEL	TWA
		VOC	peak	low	STEL	TWA
		TOX2	**peak**	**low**	**STEL**	**TWA**
		LEL	**peak**	**low**		
		O2	**peak**	**low**		
M	Model Number	**PGM50-4**				
		PGM50-5P				
N	Sensor Name	**"CO VOC H$_2$S LEL OXY"**				
S	Serial Number	"**090********" - 4-gas diffusion				
		"**095********" - 5-gas pumped				
P	Power (On/Off)	**"Multi-Gas Turning On" / "Off"**				
R	Read Instant Gas Level	**"00004 00006 00000 00000 00214"**				
		See note below				

* The last digit of each set is a decimal. This is more accurate than the LCD reading for all but the O$_2$ reading.

MultiRAE Alarm and Error Codes

Table 2. MultiRAE Alarm and Error Codes

ERROR	CODE	EXPLANATION
Calibration	**1**	A calibration error has occurred
Alarm	**2**	One of the alarm limits has been reached and the alarm is latched
Fail	**4**	A failure has occurred
High	**8**	High alarm limit has been reached
Low	**16**	Low alarm limit has been reached
STEL	**32**	STEL has been reached
TWA	**64**	TWA has been reached
Drift	**128**	A negative drift has occurred

The sensor that is in alarm or error is identified by the location of the number:

TOX1   VOC   TOX 2   LEL   OXY

The number that appears identifies the alarm(s) or error(s)

Examples of MultiRAE Alarm/Error Codes

If the High alarm has been exceeded on sensor number four (LEL), the reply to an "E" query is:

0   0   0   8   0

If a calibration error has occurred in the VOC sensor:

0   1   0   0   0

If a negative drift occurs and the low alarm limit is reached for sensor number three (TOX2):

0   0   144   0   0

(128 + 16 = 144)

If all three events occurred simultaneously, the reply is:

0   1   144   8   0

The quickest way to identify the nature of the alarm or error is to subtract the largest numbers first. 144 - 128 = 16

MiniRAE &ppbRAE Alarm and Error Codes

The MiniRAE 2000 and ppbRAE return two number codes in response to an "E" query. The alarm or error condition is identified by the location of the number:

ALARM ERROR

The codes are listed in Tables 3 and 4 for MiniRAE firmware versions up to 1.10A and ppbRAE versions up to 1.22. In later versions of both in struments the codes in Table 4 will revert to those in Table 2 andbe identical to those for the MultiRAE.

Table 3. MiniRAE & ppbRAE Alarm/Error Codes (1st Code)

CODE	EXPLANATION
1	Battery low, Datalog full, TWA alarm limit reached or STEL alarm limit reached
2	Low alarm limit reached
4	High alarm limit reached, lamp failure, or pump stall alarm

Table 4. MiniRAE & ppbRAE Alarm and Error Codes (2nd Code)

ERROR	CODE	EXPLANATION
Calibration	1	A calibration error has occurred
TWA	2	TWA alarm has been reached
STEL	4	STEL alarm had been reached
Low	8	Low alarm limit has been reached
High	16	High alarm limit has been reached
Max	32	Sensor raw counts hit maximum
OVR	64	ppm/ppb reading is over range

Examples of MiniRAE/ppbRAE Alarm/Error Codes

If the High alarm has been exceeded on the PID, the reply to an "E" query is:

4   16

If the battery is low and the PID ppm reading is over range:

1   64

If both the STEL and High alarm are reached:

5   20

$$(1 + 4 = 5)$$

$$(16 + 4 = 20)$$