

Communication Reliability Test Software (CRTS)

User's Guide

The Communication Reliability Test Software (CRTS) is a diagnostic and verification tool designed to interface with all of Pacific Scientific Instrument's sampling products that communicate by means of serial communications, both RS-232 and RS-485.

The CRTS software when used with the NetWork Wiring Tester provides a complete and effective field test tool for checking wiring and communications of RS-485 networks. The software provides a summary report form that becomes a useful format for discussion with the factory should any problems be encountered. Tests are conducted at the computer. This may be the computer intended for the system or any other computer with Windows 3.X, Windows95, or WindowsNT operating systems and at least one available serial (COM) port.

The software will verify the following:

- | connections from the computer to each RS-232/RS-485 converter (RS-485 networks only)
- | all counters are active and there are no duplicate addresses
- | wiring integrity throughout the system
- | no significant interference from outside sources disrupting consistent communications
- | sensors with different protocols are not being mixed on the same RS-485 network

This manual is organized with the following sections:

- | Program Start-up — connecting hardware; verifying hardware compatibility
- | Installation Diagram — gives a typical system diagram
- | Software Start-up — installing the software
- | Troubleshooting Tests — uses the software to perform tests when a problem is suspected
- | Diagnostics — detailed analysis of difficult problems

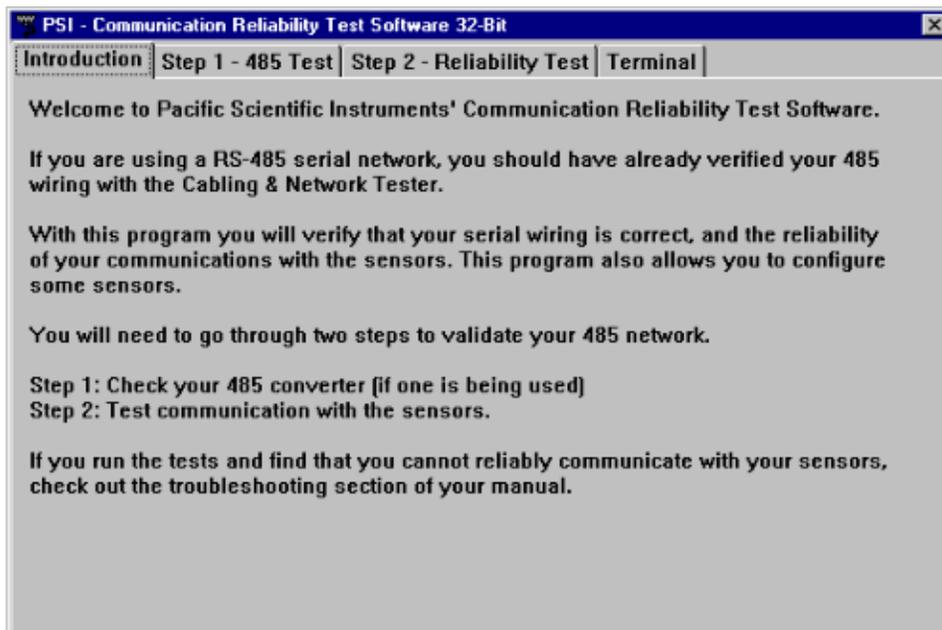
RS-485 Hardware Setup

If you are using the software for the first time, the following procedures will provide step-by-step instructions for preparing to use the RS-485 tests.

1. Verify all wiring hardware tests provided in the "NetWork Wiring Tester" Operating Guide have been made and have passed.
2. Verify all counters are connected to wall plates and are in an operating state (turned on). Refer to typical wiring diagram next page.
3. Connect RS-485 cable connector to the RS232-to-RS485 adapter; connect adapter to computer's COM port (see diagram next page).

Software Start-up

1. Turn on the computer. If CRTS is not installed on your computer's hard drive, after the WINDOWS operating system loads, install the CRTS diskette in the 3.5" drive.
2. Using the appropriate command, run the CRTS.exe (Windows3.X) or CRTS32.exe program (Windows95/WindowsNT). If you have a CRTS diskette, launch CRTS directly from the diskette. The program will ask for the user's company name. This will be used to label the printed report for documentation of this test.
3. (optional) Select "Introduction" tab for a brief discussion of what can be accomplished with the software and for several preliminary steps:

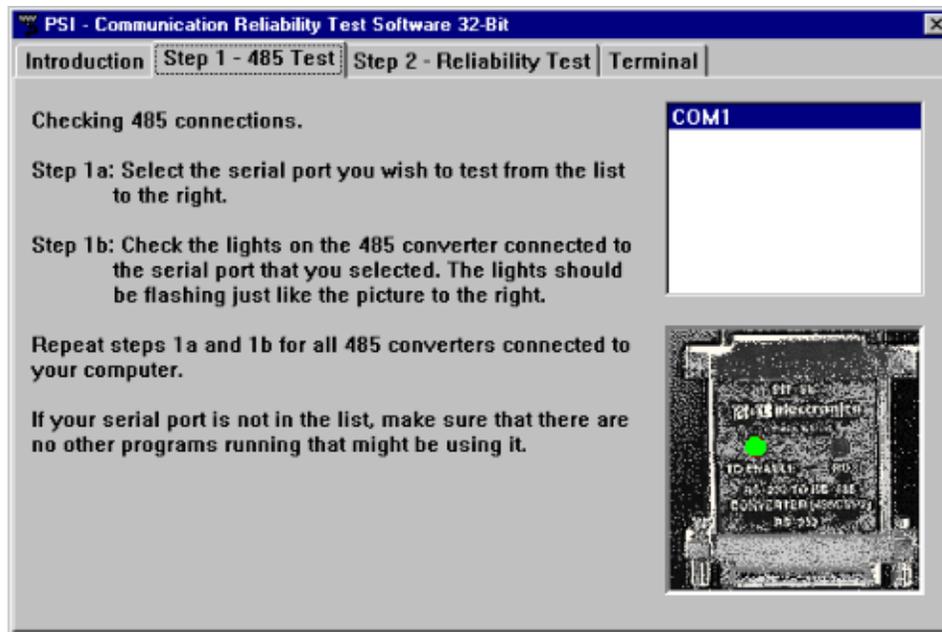


Troubleshooting Tests

Three basic tests are available for troubleshooting serial communications problems. RS-485 Test checks for proper communication links between a computer-specific serial port and your RS-485 converter (if one is used). Communication Reliability Tests (two tests) verify addresses assigned to each sensor (5 Minute test), and test for long-term stress problems (8 or 24 hour test).

RS-485 Test

1. Select "STEP #1: RS-485 Test" tab on the computer monitor. The screen on the next page will appear.
2. In turn, highlight each COM port listed in right column that has an RS-232/RS-485 converter. Verify that the light pattern indicated on the computer screen matches RS-232/RS-485 converter attached to the selected COM port.



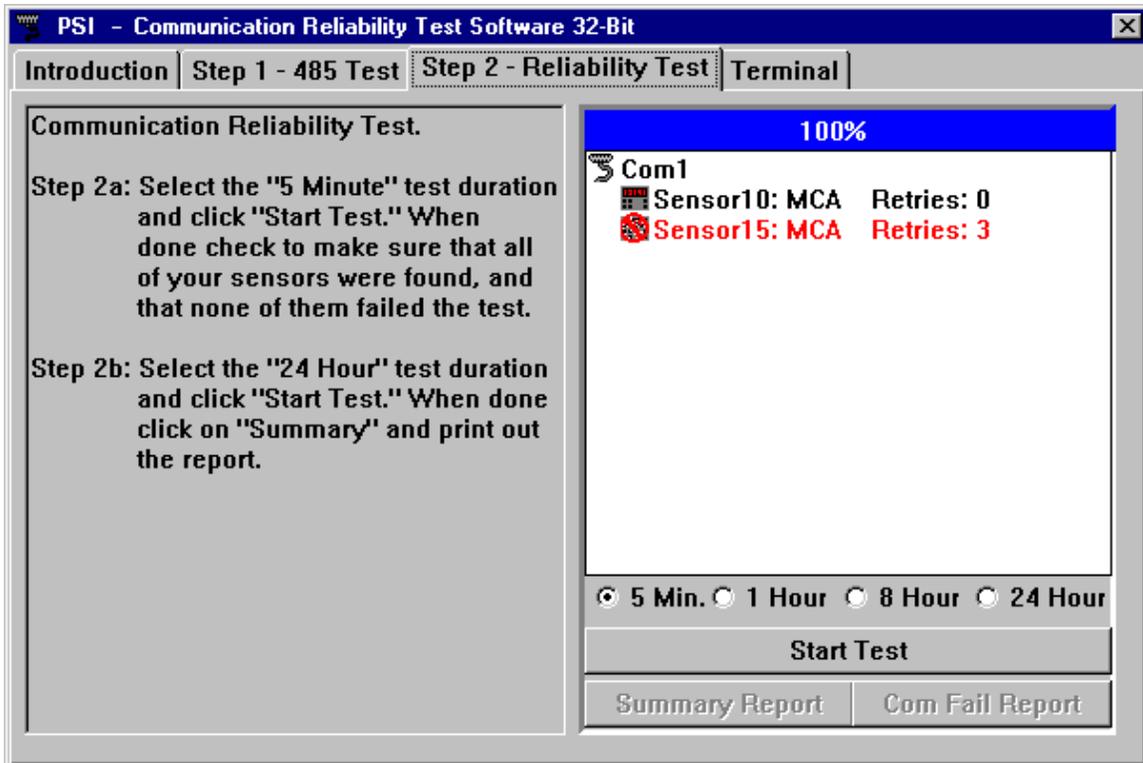
3. If one of the counters is using "00" as an address, verify that both lights on the converter are flashing (if device "00" is not used on your system, only one light will be flashing). If a problem communicating with device "00" exists, verify the counter is physically located at location "00" and is powered ON using the correct AC or DC power level.

Reliability Test

Two basic reliability tests exist as part of the software package. The short "5 Minute" test is for running a quick system test on all open COM ports and for locating immediate serial communication problems. This test interrogates each serial port to determine how many devices are present and what addresses are being used for each device. The second reliability test (24 Hour, 1 Hour or 8 Hour) re-verifies communications with all counters throughout the serial network on a repeated basis. This tests for interference from nearby equipment and validates wiring integrity.

"5 Minute" Test:

1. Select "STEP #2: Reliability Test" tab on the computer monitor. The screen on next page will appear.
2. Choose "5 Min" test, then follow instructions on the screen; verify that the correct number of counters are shown for each serial port and that the addresses are as expected (each device must have a unique address). Press "Start Test" button to begin the test.
3. At the end of five minutes, the system will indicate a pass or fail of the tests (see example below). Duplicate addresses, disconnected counters or wiring problems will show up at the beginning of the test. The test can be aborted by selecting CANCEL TEST on the screen. Tests can be repeated, if desired.



Note

When three consecutive retries have occurred, a COM fail symbol will be displayed (see example to left). Also, the line of text will turn "purple" after 1% of the communication is from retries, then turn "red" after 3% from retries.

- Print out the results of the "5 Min" test. If a "Good" is achieved, press Summary Report button to print a report for your records. See sample of Summary Report below.

**Communication Reliability Test
Summary Report**

Met One

1998/03/01 13:12 To 1998/03/01 13:14

Number of Commands: 196

Number of Retries: 7

Comm. Port	Sensor #: Protocol	No. of Commands	No. of Retries	Status	Comm. Fail at
6	2:FIX	42	0	Good	
6	3:FIX	36	3	BAD!	1998/03/01 13:14
6	4:FIX	36	3	BAD!	1998/03/01 13:14
6	5:FIX	42	0	Good	
6	8:FIX	40	1	Marginal	

Notes: a) "FIX" in the Summary Report above stands for type of protocol, NOT that something needs to be repaired.

b) The ratio of "No. of Retries" to "No. of Commands" determines the "Status"; e.g., ratio of sensor #3 above is 3/36 which is greater than 3%, therefore a BAD! status is reported. A Marginal status occurs at 1% to 3% ratio.

c) A "Com Fail Report" provides the command that failed, date, and time of the failure.

24 Hour" (or 1 Hour or 8 Hour) Test:

1. After a PASS is achieved for the "5 Min" test, select and start the "24 Hour" test (you may instead select the 1 Hour or 8 Hour test). This test again repeatedly and rapidly communicates with all counters on each RS-485 network. Again, any interference generated by nearby equipment and transferred through adjacent wiring in cable trays will be detected due to "communication retries". A "communication retry" will occur during a power down or power supply failure, counter disconnect, intermittent DC or communications wiring or electronic noise interference.
2. If a problem appears on the screen or in the Com Fail Report, troubleshoot the device to reestablish communications. The "Terminal" tab may be used for further diagnostics of difficult problems.
3. After a successful "24 Hour" test is completed, press Summary Report button to print a report for your records.

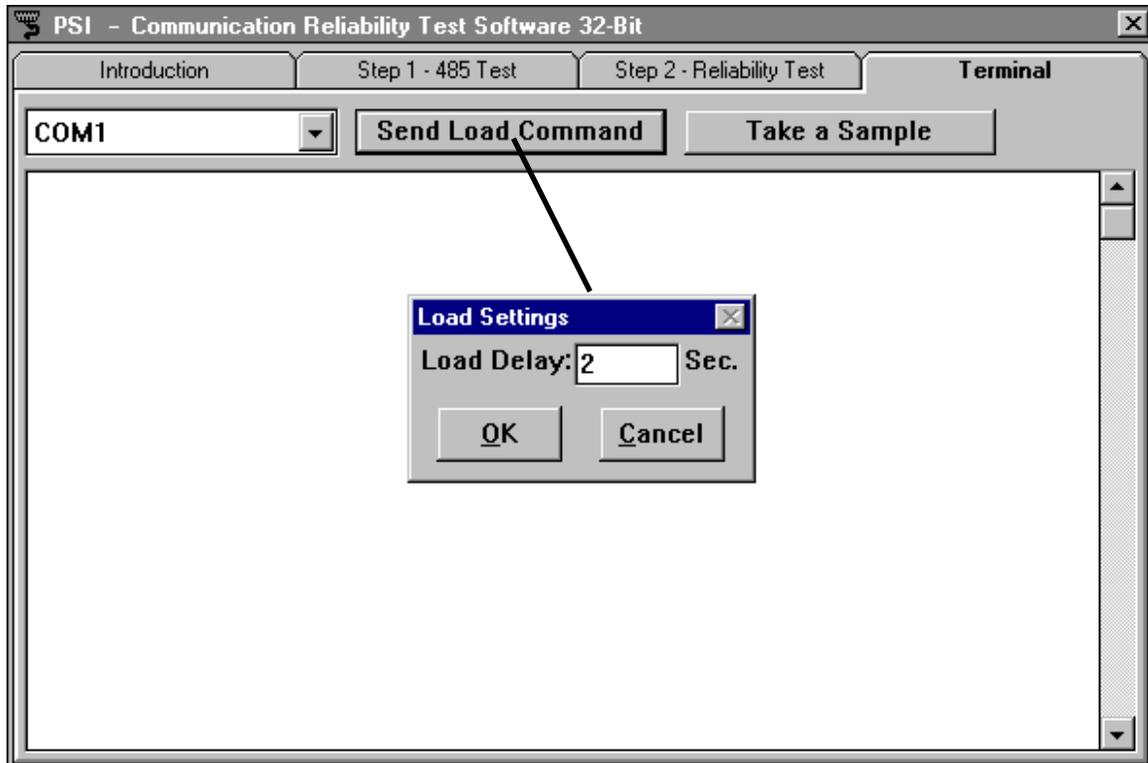
Diagnos tics

Additional troubleshooting can be performed when the "Terminal" tab is selected. From this screen, you can select "Send Load Command" to verify the sensor's operating configuration or you can "Take a Sample" to look at raw counts if you suspect a counter is not seeing all the particles or if you think there may be a software problem.

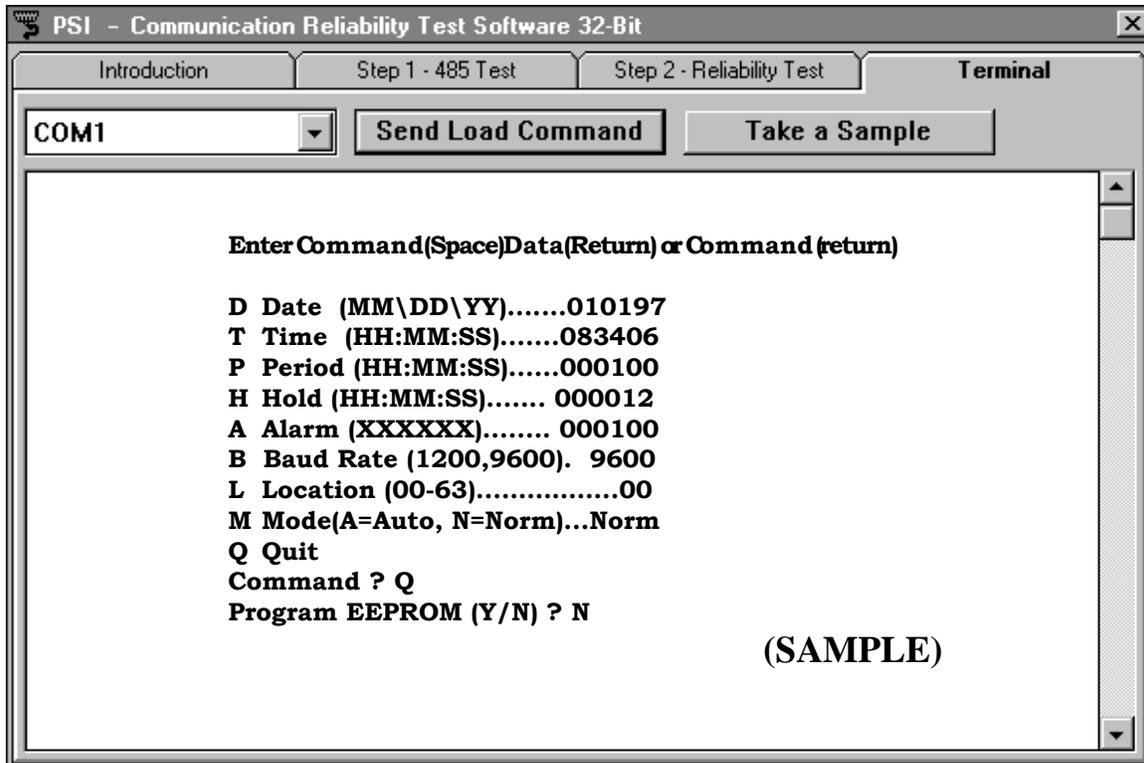
"Send Load Command" Button

By pressing this button, the firmware of the particle counters can be accessed to allow parameters to be checked and changed, if necessary.

1. With the system connected as described in the Installation section, remove power from all particle counters in the system.
2. From the Terminal screen, press "Send Load Command" button. A "Load Settings" submenu allows for setting the length of time you have to send the load command after power is applied to the particle counter (refer to figure below). The load command is only effective during 30 seconds after power is applied to the counter.
3. If you cannot return to this screen to press OK within 30 seconds after power is applied to the counter, use the "Load Delay" feature by entering number of seconds of desired delay (up to 10,000) before power must be applied.



- 4a. If using Load Delay, enter desired time, Click OK, then apply power to counter within 10 seconds before delay has elapsed.
- 4b. If not using Load Delay, apply power then click OK within 30 seconds after applying power.
5. The load command information from the counter will be returned and displayed similar to the screen shown below (load command settings vary with different types of instrument).



Note

The operating configuration displayed above is an example only. Each particle counter has its own specific load command. Refer to the counter's Operating Guide for more information.

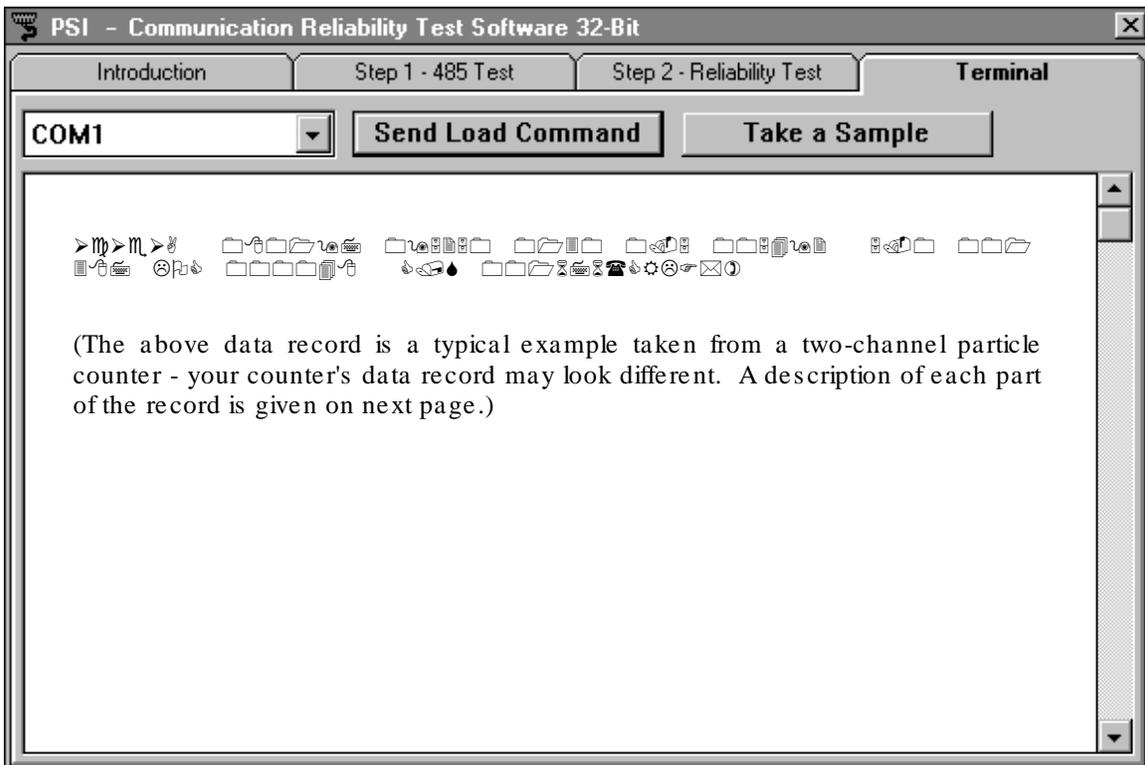
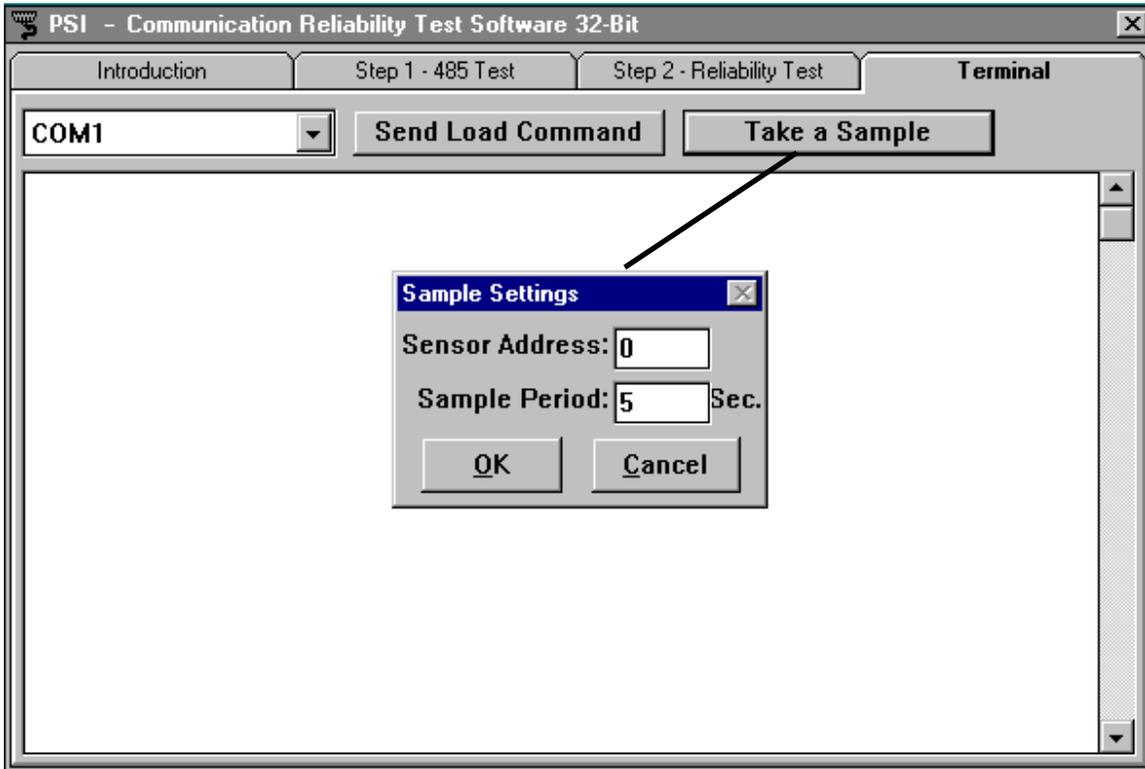
6. Changing the operating configuration varies from instrument to instrument. Refer to the Operating Guide for your instrument for exact instructions for changing the operating configuration.
7. When completed, end the sequence by typing "Q", and answer "Y" (some counters) when asked "Program EEPROM (Y/N)?". All of the configuration information will be saved in the EEPROM. Two beeps will be heard when EEPROM has finished reprogramming.

"Take a Sample" Button

By pressing this button, a sample run can be generated on any connected particle counter. Verify the counter is connected to the communications system and power is applied.

1. Press "Take a Sample"; the "Sample Settings" menu appears. See example top of next page.
2. Enter the Sensor (counter) Address and desired length of test (Sample Period).
3. Press OK to take a sample. At the end of the test, a data record (in serial communications format) will be returned from the counter (see second example on next page; see, also, brief description of record below the screen). This record

supplies all the data information generated by the counter. Refer to your particle counter's Operating Guide for additional information on command and data syntax.



Status

/	Date	Time	Period	Chan 1	Chan 2	Location	Checksum	End Msg.
\$	080197	095250	0130	0.5 005492	5.0 001387	LOC 000048	C/S 001676	(CRLF*)
				Size Count	Size Count	Tag Value	Tag Value	