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I-24 COMMUNICATIONS INTERFACE

The setup and operation of the Sentinel I24 communication options are explained in detail in the I-24 operation manual. The Sentinel I24 communicates via RS232 and TCP/IP and provides information storage on USB flash drive. This application bulletin will explain some of the communication considerations for these different methods.

There are two RS232 terminations, one (9 pin connector) on the operator panel on the front of the instrument and the second one (five pin terminal) inside on the top of the communication board between TCP/IP and USB terminals. The USB port is located on the front of the instrument. See Figure 172. The TCP/IP jack is located on the top of the communication board next to the RS232 terminals. See Figure 169 below for the location of the internal terminals.

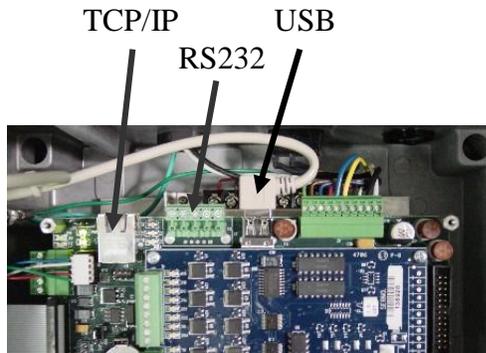


Figure 169 TCP/IP, RS232, and USB terminals

The standard RS232 interface cable for a portable printer is a nine-pin female to nine pin male serial null (leads for transmit and receive are crossed between pin connections) cable. The RS232 interface cable for a computer is a nine-pin female to nine pin female serial null cable. If a 25 pin serial cable is required for another printer, the diagram for the internal RS232 connection is detailed in Figure 170 below.

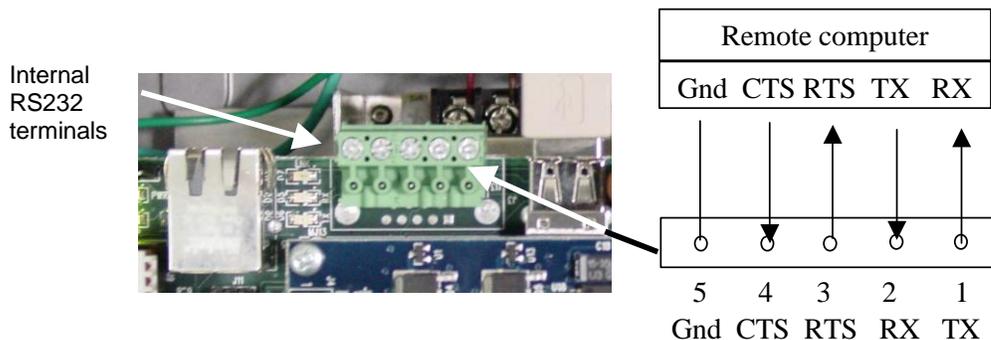


Figure 170 Internal RS232 terminals (Port 2)



COMMUNICATION WITH OTHER SERIAL DEVICES

The Sentinel I24 instruments have the ability to communicate with other printers or compatible devices (such as computers or PLCs). Communication either can be with the instrument sending information on command using the menus under the instrument's INSTR CONFIG key or with an external device programmed to request specific information.

COMMUNICATION SETUP AND EXECUTION

The Sentinel I24 instrument communicates via TCP/IP (Ethernet) and RS232. This communication is two-way with each method. The USB flash drive can backup or restore the Instrument information. There are common interface commands established to communicate with the instrument via the three methods. These commands can remotely request selected data, send new setup parameters for storage, and change some instrument functions. Instrument setup parameters, station setup parameters, part program parameters, calibration data, counter data, test result data, and security setup are all available for communication.



Figure 171 RS-232 connector



Figure 172 USB connection

The setup and operation commands for communications to and from the Sentinel I24 are accessed via the INSTR CONFIG key. For serial communication, the operator must select RS232 1 or RS232 2. For communication via TCP/IP, the operator or computer must select from one of four TCP/IP connections available through the one port.

All of the communication channels can operate simultaneously. The TCP/IP port is internal to the instrument on the top of the controller board or external on top of the enclosure when the Industrial Cabling Option is specified. See Figure 173 below for the external port.

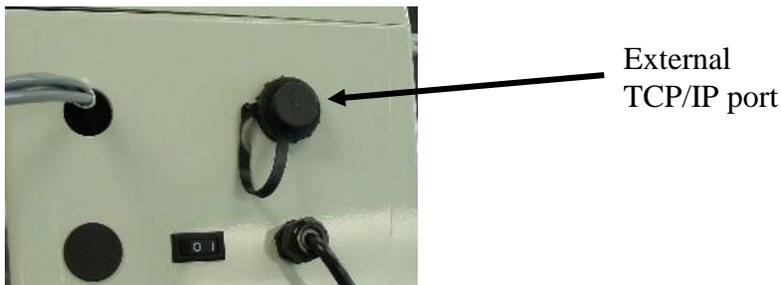


Figure 173 External TCP/IP Port supplied with Industrial Cable Package



For TCP/IP communication, the instrument must have an IP address. Enter the information regarding the Mail server, Gateway/Router, and instrument IP address within INSTR CONFIG, TCP/IP communications. **The instrument power must be cycled if an IP address is changed.**



Figure 174 Front panel Display keys

There are several communication and terminal parameters that must be setup within your computer to enable communication with the Sentinel I24 instrument. Computers with Microsoft Windows 98, XP, etc. have standard communication software called Hyper-Terminal found under START/ Accessories/ Communications.

The Sentinel I24 communicates in two ways. It can output a number of standard reports via the RS232 or TCP/IP. See Figure 175 below for a list of available. Review Chapter 4 on how to select these reports.

Report Selection	Description
Instrument Config	Setup Information for Hardware, Communication, Firmware, Instrument name, Time, Date, and Security
Station Config	Information about the manifold, transducer, and regulator
Part Config	Part setup parameters for all part programs,
Autosetup info	Initial parameters provided in the AutoSetup routine
All part results*	All the test results for the active part program in the instrument memory
All results*	All the test results in the instrument memory
Last 1000*	1000 most recent test results,
Last 100*	100 most recent test results,
Last 20*	20 most recent test results,
Station Counters	Counters information,

Figure 175 Communication Reports or Functions

The test report output format for Last 20, 100, 1000, All Part Results, and All Results are set for either Space delimited or Fixed Width output.

* For part programs with dual tests the Sentinel I24 stores two test results for each part tested. Therefore, when 1000 parts are tested, 2000 test results are stored for output. If “LAST 1000” is selected, it will output the dual test results for the last 1000 parts. “EACH TEST” will output the two test results for each part after it is tested.



Setup for “HyperTerminal” within Microsoft Windows 98 or higher

Transferring data from the Sentinel I24 instrument to a computer with Windows 98 or higher

1. Connect **null-modem** cable to the com port of the computer from external RS232 connection or connect an ethernet cable via a hub
2. Start Windows 98 or higher.
3. Choose START, PROGRAMS, Accessories, Communication, and HyperTerminal.
4. Choose HyperTerminal icon
5. Enter a connection name such as "I24 – RS232" or “I24 Ethernet” and choose desired icon, OK.
6. Within “Connect to” window, set "Connect using" to the com port for your computer, like "com 3" or select “TCP/IP” for Ethernet connection. For TCP/IP connections enter instrument’s IP address and Port Number 23.
7. When communicating with the instrument via RS 232, HyperTerminal can be configured to work with the following options. After setting the instrument configuration, set up HyperTerminal to communicate with the same parameters found under “Configure” below the “Connect using” window on the screen similar to Figure 178 when “Com 2” or “Com 3” is selected.

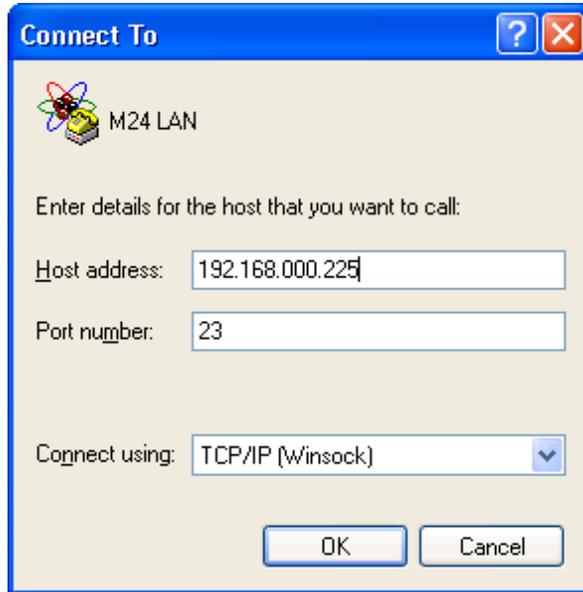


Figure 176 “Connect to” screen

Data input field	RS232
Connect Using	COM3 (or other COM)
Bits per second	9600 or 115200 baud
Parity	No parity
Data bits	8 bits
Stop bits	1 stop bit
Flow control	none

Figure 177 RS232 Configuration settings

Configuration settings for serial communication (example of Windows XP). These settings should match the Configuration setting within INST CONFIG for the serial device (RS232).

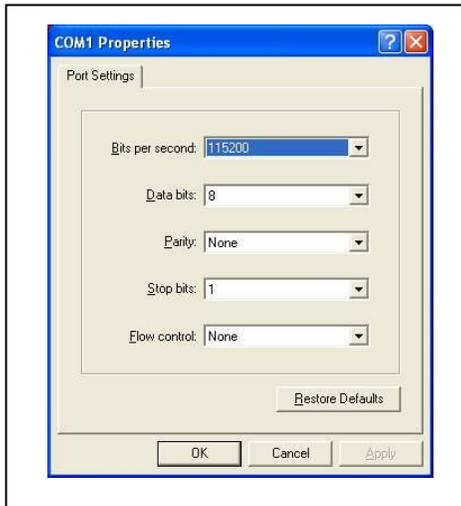


Figure 178 Com Port Serial Communication Properties

8. For RS-232 or TCP/IP, choose File, Properties, Settings

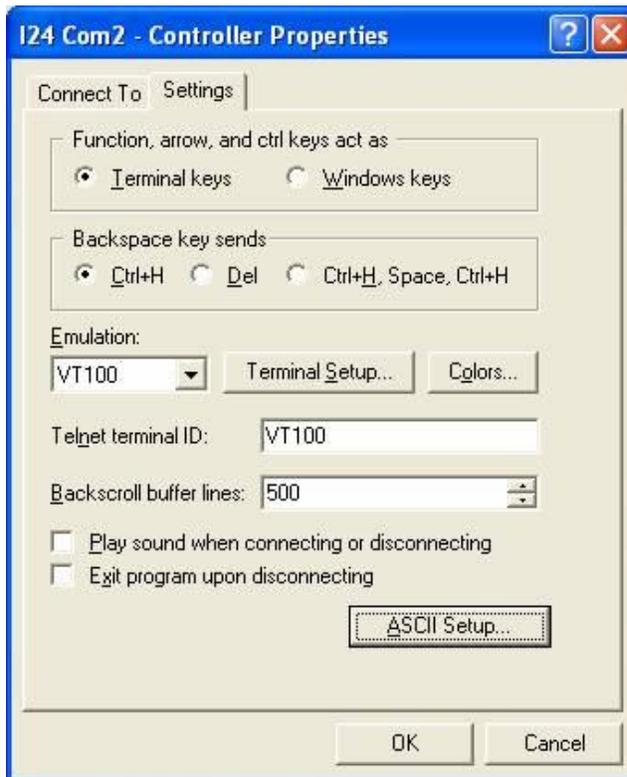


Figure 179 HyperTerminal Controller Properties screen

9. Click on the button "ASCII Setup"

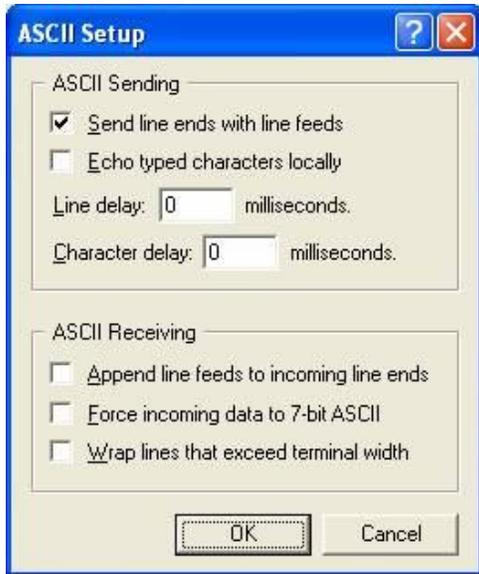


Figure 180 ASCII Settings Screen

When using HyperTerminal as an ASCII terminal, the following settings need to be set in HyperTerminal or the communication software as "properties" to receive and display data

10. Choose File, Save As, Save.

11. The HyperTerminal is ready to receive data from the Sentinel I24 instrument now and in the future.

12. For future data transfers, the computer will have a dedicated icon on HyperTerminal setup to receive data.

13. On the Sentinel I24, press INSTR CONFIG, select "RS232" or "TCP/IP 1" as the port option, and select the desired output by adjusting the settings for Interface, Function and Output for either RS232 or one of the TCP/IP outputs. Press ENTER. Make sure that the Sentinel I24 and receiving device are set the same. The data transfer is initiated when ENTER is pressed.

14. The data can be transferred directly to a file that can be opened in a spreadsheet program like EXCEL. Click on "Transfer" in the upper tool bar of HyperTerminal. Chose "Capture Text" and define a file name where the data should be sent. Click on "Start" in the transfer window.

15. When the data transfer is complete, click on "Transfer" and "Stop".

16. Open the spreadsheet program. Open the txt.file where the data was stored and saved using spreadsheet software like Excel.

16. While opening the "txt" file into Excel, check "Delimited". Check "Space","comma" and "tab" and then Next and Finish..

17. Most data can also be copied from HyperTerminal and pasted into Excel. After pasting into Excel, highlight the data and select Data, Text to Columns, Delimited, Space, comma, NEXT, and FINISH. There is a limitation on width of the data line in HyperTerminal that may cause the data to wrap to another line and get sorted to the wrong columns.

18. Remember the test result files have the most recent results at the top or first.

:



SENDING INFORMATION ONE-WAY VIA COMMANDS THROUGH SENTINEL I-24

Communication screens within INSTR CONFIG functions.

When the instrument is setup to communicate with RS232 or TCP/IP, the operator can command the instrument to send out any desired information via the INSTR CONFIG key. The operator chooses the desired report from the communication options defined by the combined settings of Interface, Function, and Output within the “RS232” or “TCP/IP”. After entering the desired choice, the information is sent to the computer that is connected for the transfer. Full details about requesting the reports through the keypad for these communication options are described in pages 4-7 through 4-18.

REQUESTING INFORMATION TO BE SENT USING TWO-WAY COMMUNICATION

via remote commands using one of the communication options.

A remote computer can request information from the Sentinel I24 via the two-way communication capabilities. Sending the desired alpha-numeric character string outlined below will either:

- Request test results, part or instrument setup information, or counter information.
- Download changes to stored part or instrument setup information. .

Enter HyperTerminal and connect with the Sentinel I24 instrument. If communicating via TCP/IP, select one of the four Interface Connections. The display will indicate that a connection is made.

Type “help” (return) and the following will display on the computer screen when the proper connection is made with the Sentinel I24 instrument.

```
help
*****
* TREE ROOT                CONTROLLER                *
*****
* <I>: Instrument config          *
* <P#>: Part config menu (please select a part number) *
* <T#>: Test data (please select a part number)      *
* <S#>: Self test (please select a part number)      *
* <A#>: Autosetup                                *
* <M>: Module menu                                *
* <U>: Update Firmware                            *
* VER: Display Version Number                    *
* Dir: Display Current Branch                    *
* Help: Help                                     *
```

Figure 181 TREE ROOT menu for the Sentinel I24



To address a particular menu, type the letter within <>, and Return or Enter. The submenu for that letter will be sent.

For instance, to find out about the Part Configuration for part 01, type “p01”, Enter.

```
p01
*****
* Part Configuration
*****
* <X>: Tst type, Test description for this part.          *
* <R>: Timers, Test timer settings for this part.        *
* <P>: Pressure, Pressure settings for this part         *
* <S1>: tst                                             *
* <C1>: cal                                             *
* <M>: misc                                             *
* <U>: units                                             *
* <I>: inputs                                           *
* <O>: outputs                                           *
* <T>: tooling                                           *
* VER: Display Version Number                          *
* Dir: Display Current Branch                          *
* Help: Help                                           *
*****
```

Figure 182 Part Configuration menu output.

To find out the settings for the Timers, type “R”, Enter.

```
r
*****
* Timers, Test timer settings for this part.            *
*****
* <1B0>: Prefill          0.15 sec          *
* <230>: Fill             0.60 sec          *
* <320>: Stabilize       6.55 sec          *
* <420>: Test            1.45 sec          *
* <5F0>: Exhaust         0.15 sec          *
* <8D0>: Relax           11.85 sec         *
* VER: Display Version Number                    *
* Dir: Display Current Branch                    *
* Help: Help                                     *
*****
```

Figure 183 Part configuration, Timers menu output



If you have entered into the Part Configure menu via the commands just discussed, you can change a timer by using the following command. The command involves entering the variable character found within < > and the new value for the variable. For instance:

1B0 = 0.5 would change the pre-fill timer to 0.5 seconds

The direct way to change that one variable while in the original screen after entering the connection would be:

P01R1B0=0.5

This directs the change to Part Program 01 (P01), Timer value (R), Pre-fill timer (1B0).

To determine the correct variable code, you should enter into HyperTerminal and determine the correct codes for the variables desired.

The main TREE ROOT codes are:

	<i>TREE ROOT</i>
TREE ROOT Code	Description
I	Instrument Configuration
P#	Part Configuration menu (specify with part number)
T#	Test data (specify with part number)
S#	Self Test (specify with part number)
A#	Auto Setup (specify with part number)
	Module menu
	Update Firmware
VER	Display Version Number
Dir	Display Current Branch
Help	Help

Figure 184 TREE ROOT code identification

See the list of configuration and menu codes for Instrument Configuration below.

			<i>Instrument Configuration</i>
TREE ROOT	Config Code	Menu Code	Description
I			Instrument Configuration
	H		Hardware, Instrument Hardware Settings
		530	Manifold Type
		7B0	Number of Parts
		541	Transducer Type 1
		542	Transducer Type 2
		671	Regulator type 1
		672	Regulator Type 2
	S		RS232 Port 1 Front door



	I	RS232 Port 1 Interface
	C	RS232 Port 1 Configuration
	F	RS232 Port 1 Function
	S	RS232 Port 1 Output
R		RS232 Port 2 On board
	I	RS232 Port 2 Interface
	C	RS232 Port 2 Configuration
	F	RS232 Port 2 Function
	S	RS232 Port 2 Output
T		Instrument Networking Settings
	IP	Instrument IP address
	M	Mail Server IP address
	G	Gateway IP address
	S	Subnet Mask
	C	MAC address
1,2,3,4		TCP/IP 1
	I	TCP/IP 1 (2,3,4) Interface
	F	TCP/IP 1 (2,3,4) Function
	S	TCP/IP 1 (2,3,4) Output
U		USB Universal Serial Bus Settings
	P	Update firmware
	F	Generate Report
	US	Result Sync
	BR	Backup/Restore
	M	Drive control
E		Email, Instrument email settings
	I	User id
	P	Email Password
	R	From Address
	E1	Email Alert 1
	A1	Email Alert 1 address
	E2	Email Alert 2
	A2	Email Alert 2 address
	F	Email Function
	AF	Email Function address
M		Misc, General instrument settings
	IN	Instrument name
	S	Serial number
	C	Edit/View security
	T	Time
	D	Date
	R	Screen Saver

Figure 185 Instrument Configuration menu codes



To request a download of test data independent of what is requested through the keypad of the instrument, enter codes as though you were going through the keypad to request the output. For instance to output the last 1000 test results via TCP/IP 1, you would enter a string of characters going from the TREE ROOT through the menu code.

Type "I", Enter for Instrument Configure

Type "1", Enter for TCP/IP 1

Type "F>" Enter to determine the code for "Sta Last 100"

The instrument will feed back all the codes for Function (F). From this list it will be determined that the code for "Sta Last 1000" is 3.

Type F=3, Enter

The instrument will output 1000 test results via TCP/IP 1.

The configuration codes for Part Configuration are listed below.

TREE ROOT	Conf Code	Menu Code	Part Configuration
P#			Part Configuration information for part number #
	X		Test type
	R		Timers
	P		Pressures
	S1		Test Parameters, 1 st test
	C1		Calibration Parameters, 1 st test
	M		Miscellaneous
	U		Units of measurement
	I		Inputs
	O		Outputs
	T		Tooling configuration

Figure 186 Part Configuration codes

The menu codes vary by test type within Part Configuration. If you want to change or define the part configuration values via an RS232 or TCP/IP, input P# and enter and the Configuration code and enter. The menu codes within the Configuration code will output with their identification. Use these menu codes to enter new values using the format described above.

To back out from a menu, Type "exit" to escape back to the TREE ROOT menu.

To determine the available choices within a Menu, type the menu code and >. For instance to determine the available choices for Manifold type within Hardware:

Exit, return

I, return

H, return

530>, return

Or type IH530>, return

and the list of manifold options will appear.



To request reports from the Sentinel I24 via RS232 or a TCP/IP connection using Hyper-Terminal, the path to the reports is similar to using the keypad to find the menu where the desired output is selected. So to output the Last 20 test results (Function selection) in Fixed Width format (Interface selection) with All the Test Results (Output selection), you need to find the INSTR CONFIG functions on TCP/IP x or RS232 communication.

So from the TREE ROOT menu, type “I”, return.

```

*****
* Instrument Configuration *
*****
* <H>: Hardware, Instrument hardware settings. *
* <S>: Rs232 1, Front door comm port interface. *
* <R>: Rs232 2, On board comm interface. *
* <T>: TCP/IP, Instrument networking settings *
* <1>: TCP/IP 1, User defined TCP/IP interface. *
* <2>: TCP/IP 2, User defined TCP/IP interface. *
* <3>: TCP/IP 3, User defined TCP/IP interface. *
* <4>: TCP/IP 4, User defined TCP/IP interface. *
* <U>: USB, Universal Serial Bus settings. *
* <E>: Email, Instrument email settings. *
* <M>: Misc, General instrument settings. *
* <V>: Version, Detailed instrument version settings. *
* VER: Display Version Number *
* Dir: Display Current Branch *
* Help: Help *
*****

```

Figure 187 Instrument Configuration menu on HyperTerminal

To communicate with TCP/IP 1, type “1”, return.

```

*****
* TCP/IP 1, User defined TCP/IP interface. *
*****
* <I>: TCP/IP 1 Interface Fixed width out *
* <F>: TCP/IP 1 Function Sta Last 20 *
* <P>: Fixed width out Part result only *
* VER: Display Version Number *
* Dir: Display Current Branch *
* Help: Help *
*****

```

Figure 188 TCP/IP 1 menu displayed on Hyper-Terminal



To get the right format output make sure that “INTERFACE” is set for “Fixed width out”, “Function” is set for “Sta Last 20”, and “Fixed Width out” is set for “All result information”. The above display showing the current settings for our desired output is not quite right. We need to change the “Fixed width out”. If we do not know the code for the desired output, we can enter an inquiry command to list the available code and outputs.

Type the letter code in the <> follow by an “>”. Therefore to find the options for the “Fixed Width out” output options,

type **P>** and Enter

```
L01: 1,3 A> All result information :01:AD
L01: 2,3 2> First 2 test results :02:82
L01: 3,3 P> Part result only :03:06
L01: 4,4 C> Custom :08:1F
```

Figure 189 Output options for Fixed Width Interface

To change the Output option to “All result information” which is selection A for the options above.

Type **P=A**

```
V01: IIP=All result information :04:7C
```

Figure 190 Response to Output change

Now test results will be sent after each test by the instrument in the “All result Information” format. To download the last 20 results, find the code for “sta Last 20”.

Type **F>**, enter

```
L01: 1,10 C> Station Cntrs :07:AD
L01: 2,10 1> Sta Last 20 :08:9C
L01: 3,10 2> Sta Last 100 :09:69
L01: 4,10 3> Sta Last 1000 :0A:22
L01: 5,10 4> All results :0B:A4
L01: 6,10 5> All part res :0C:A0
L01: 7,10 I> Instr Config :0D:25
L01: 8,10 S> Station Config :0E:2E
L01: 9,10 P> Part Config :0F:00
L01: 10,10 A> Autsetup info :10:93
```

Figure 191 Response to request for Function selections.



To request the “Sta Last 20” results.of All result information,

Type F=1, enter.

```
S01 P01 R-- 01/10/08 04:23:59.020 0000387755 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132648 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136364 psig
S01 P01 R-- 01/10/08 04:23:58.230 0000387754 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132481 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136434 psig
S01 P01 R-- 01/10/08 04:23:57.440 0000387753 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132606 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136485 psig
S01 P01 R-- 01/10/08 04:23:56.650 0000387752 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132839 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136443 psig
S01 P01 R-- 01/10/08 04:23:55.880 0000387751 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132779 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136397 psig
S01 P01 R-- 01/10/08 04:23:55.090 0000387750 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132788 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136318 psig
S01 P01 R-- 01/10/08 04:23:54.290 0000387749 A -           No barcode
PLR P LR 0.000000 sccm  PL 0.000000 dpsig  PT 0.132541 psig  EDC 0.
000000 sccm  PQ 0.000000 sccm  QL 0.000000 dpsig  QP 0.136229 psig
```

Figure 192 Portion of the “Sta Last 20” Test Result All Result Information output on Hyper-terminal.