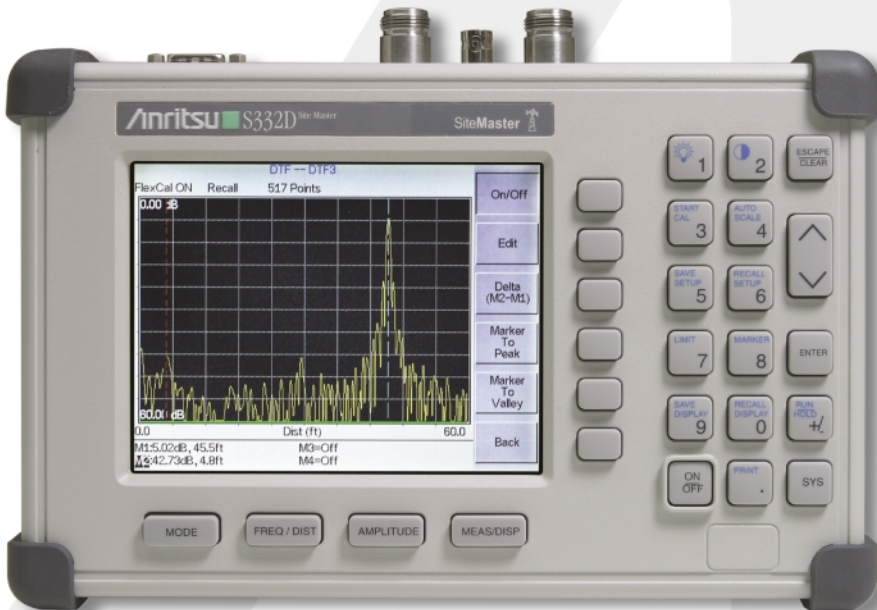


Site Master™

S331D/S332D

Cable and Antenna Analyzer

Site Master is the preferred cable and antenna analyzer of wireless providers, contractors and installers.



Color display option shown

Programming Manual



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UPDATES

Updates to this manual, if any, may be downloaded from the Anritsu internet site at: <http://www.us.anritsu.com>.

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Programming Overview

NOTE: This programming manual is written exclusively for Anritsu Site Master Models S331D and S332D. For information on firmware upgrades, contact your local Anritsu Service Center. Commands listed in this manual are not all backward-compatible with earlier Anritsu models.

General Description

The Site Master must first be set into “remote” mode for communication with a computer. Remote mode differs from normal repetitive sweep and single-sweep modes. During remote mode, the Site Master suspends normal operations and attends to the serial port. The front panel display indicates when the Site Master is in remote mode.

Once in remote mode, a series of control bytes and associated data are sent to the Site Master to perform various functions and activities. The serial port supports virtually all features accessible from the keypad with the exception of the printer. The printer requires connection to the same 9-pin connector on the Site Master rear panel used for remote communication.

To complete the communication session, send the control byte to exit remote mode and the Site Master will resume normal operations. You may also exit the remote mode by pressing the **ESCAPE/CLEAR** key on the Site Master front panel.

Interface Cable Installation

The Site Master is a DTE-type serial device. Communication between the Site Master and a PC is accomplished over a null modem serial cable provided with the Site Master (Anritsu part number 800-441). Connect the cable to the Serial Interface connector on the Site Master test connector panel and to the appropriate COM port connector on the PC.

Serial Communication Parameters

The Site Master begins communication at 9600 bps when first powered on. It uses no parity bits, 8 data bits, and 1 stop bit (N-8-1). No hardware handshaking is used. The Set Baud Rate Control Byte #197 (C5h) serial command can be used to change the baud rate to 19,200, 38,400, 56,000 or 115,200. An invalid setting returns the rate to 9600.

Communications Error Checking

Since there is no hardware handshaking, byte level error handling must be done by the controlling program. Use the expected number of response bytes (listed in the control byte description section of this manual) when waiting for feedback from the Site Master. For data streams going to the Site Master, the “watch dog timer” protects against interrupted transmissions by aborting a control byte sequence if the inter-byte time limit is exceeded.

Parameter Validation

The Site Master validates input parameters for each control byte sequence. If the input parameters are out of range or invalid, the Site Master notifies the computer by sending Parameter Error Byte #224 (E0h). The Site Master discards the received data and waits for the next control byte.

Entering Remote Mode

Send the Enter Remote Mode Byte #69 (45h) to the Site Master to enter remote mode at the end of the current sweep. Send the Enter Remote Mode Immediately byte #70 (46h) to enter remote mode in the middle of a sweep.

The Site Master serial port buffer is one byte wide. No internal buffer exists, so waiting for the response from the unit is essential. If the Site Master is not in remote mode, sending a second byte overwrites the original byte commanding it to enter remote mode. If control byte #69 is sent, the Site Master will enter remote mode at the end of the current sweep. If control byte #70 is sent, the unit will enter remote mode as soon as it receives the byte. This means that data stored for the current sweep may be incomplete. Once a response string is received from the Site Master, the unit is ready to accept additional control bytes.

Exiting Remote Mode

To exit remote mode, send the Exit Remote Control byte #255 (FFh) to the Site Master. The Site Master sends a response byte of 255 (FFh) then exits remote mode. Remote mode can also be exited by pressing the **ESCAPE/CLEAR** front panel key.

Remote Mode Changes to Site Master Operating Parameters

System parameters changed during remote mode remain changed for normal operation after the unit exits remote mode. However, the changes are not automatically written to the non-volatile EEPROM. Turning off the Site Master power erases the changed settings.

To retain the changes, the setup must be saved to one of the setup memory locations. Use either the run-time setup location 0, (which holds the power-on defaults) or one of the nine other setup locations. Control byte #64 (40h) sets the auto-save flag which commands the Site Master to automatically save the changes to the run-time setup location upon exiting remote mode. See the Site Master User's Guide or information in this manual on control byte #18 (12h) for further details.

Write Cycle Limitation of EEPROM

The EEPROM, used to store calibrations, setups and traces has a guaranteed lifetime of at least 100,000 write cycles and an unlimited number of read cycles. The write cycle limitation is for a specific location. For example, setup #1 can be stored 100,000 times and setup #2 can be stored 100,000 times, etc. Because of this, the Site Master does not automatically store the changed system parameters to the EEPROM. Be aware of the EEPROM write cycle limitation when programming the Site Master and keep the number of write cycles to a minimum.

Documentation Conventions

Throughout this manual, the following conventions will be observed:

Numeric Representation

Hexadecimal numbers are represented with the suffix h. For example, the decimal number 255 is represented in hexadecimal as FFh.

Binary numbers are represented with the suffix b. For example, the decimal number 2 is represented in binary as 10b.

Decimal numbers are represented with the prefix # when referring to a control byte (command byte) and without a prefix or suffix in all other cases.

Bit Positions

When enumerating bits in a byte, bit 0 will always be the least significant bit (LSB).

Mode References

The term "VNA" in reference to a command denotes Return Loss, SWR, Cable Loss and DTF modes. The term "SPA" in reference to a command denotes Spectrum Analyzer mode. All other modes are referenced individually.

Control Byte Summary

Control Byte #	Name	Description	Watchdog Timer
1 (01h)	Setup System	Sets system status flags and switches	Yes
2 (02h)	Set VNA Frequency	Sets Site Master VNA frequency range	Yes
3 (03h)	Select Measurement Mode	Sets current Site Master measurement mode	Yes
4 (04h)	Set VNA Scale	Sets Site Master VNA scale values	Yes
5 (05h)	Set VNA Marker	Sets position and on/off status of Site Master markers in VNA modes	Yes
6 (06h)	Set VNA Single Limit	Sets position and on/off status of the Site Master single limit in VNA modes	Yes
7 (07h)	Set DTF Parameters	Sets Distance to Fault parameters	Yes
8 (08h)	Set Time/Date	Sets time and date of the Site Master	Yes
9 (09h)	Set Reference Number	Sets reference number (trace name) for a sweep trace	Yes
10 (0Ah)	Serial Port Echo On/Off	Allows synchronization of Site Master and request from computer for sweep trace	Yes
11 (0Bh)	VNA Single Sweep On/Off	Enables or disables single sweep operation in VNA modes	Yes
12 (0Ch)	Watch-dog Timer On/Off	Enables or disables the watch-dog timer	---
13 (0Dh)	Sequence SM Calibration	Triggers a calibration step	Yes
14 (0Eh)	Set Site Master Data Points	Sets number of measurement data points for Site Master VNA modes	Yes
15 (0Fh)	Set SM Calibration Mode	Sets the Site Master calibration mode to OSL Cal (standard) or FlexCal	Yes
16 (10h)	Store Sweep Trace	Saves current trace data to EEPROM	---
17 (11h)	Recall Sweep Trace	Site Master sends the sweep data associated with a trace (obsolete)	Yes
18 (12h)	Save System Setup	Saves system setup parameters to EEPROM	Yes
19 (13h)	Recall System Setup	Recalls system setup parameters from EEPROM	Yes
20 (14h)	Query System Status	Gets the current system settings (obsolete)	---
21 (15h)	Trigger Self-Test	Triggers a self test	---
22 (16h)	Read Fail Counters	Returns the values of the lock-fail and integrator counters	---
24 (18h)	Query Trace Names	Returns list of all saved traces	---
25 (19h)	Delete Sweep Trace	Deletes single or all stored sweep traces	Yes
26 (1Ah)	Upload SPA Sweep Trace	Uploads a spectrum analyzer sweep trace to Site Master (obsolete)	Yes
27 (1Bh)	Query Sweep Memory	Queries Site Master for percentage of memory that is available for trace storage	---
28 (1Ch)	Upload VNA Sweep Trace	Uploads a Site Master VNA mode sweep trace to the Site Master (obsolete)	Yes
29 (1Dh)	Query System Status	Queries the Site Master for current system settings	Yes
30 (1Eh)	Select Printer Type	Selects printer type	Yes
31 (1Fh)	Select DTF Windowing	Selects DTF Windowing Methods	Yes
32 (20h)	Set VNA Trace Math	Selects Trace Math operation for VNA modes	Yes
33 (21h)	Recall Sweep Trace	Queries the Site Master for sweep trace data	Yes
34 (22h)	Set VNA Trace Overlay	Sets trace overlay operation and trace for VNA modes	Yes
35 (23h)	Set SPA A/B Trace	Defines traces "A" and "B" for SPA mode	Yes
36 (24h)	Upload Sweep Trace	Uploads a sweep trace to the Site Master	Yes
37 (25h)	Get Options	Returns an ASCII string listing installed options	---
39 (27h)	Query Power Level	Returns power level at RF In in Power Meter mode	---
40 (28h)	Set Power Meter Units	Sets Power Meter displaying unit	Yes
41 (29h)	Power Meter Relative Mode	Enables or disables Power Meter Relative Mode	Yes

Control Byte #	Name	Description	Watchdog Timer
42 (2Ah)	Power Meter Offset Mode	Enables or disables Power Meter offset	Yes
43 (2Bh)	Power Meter Zero Mode	Enables or disables Power Meter zeroing mode	Yes
44 (2Ch)	Power Meter RMS Averaging On/Off	Sets Power Meter RMS Averaging.	Yes
45 (2Dh)	Power Meter Center Frequency and Span	Sets the center frequency and span frequency for the Power Meter mode	Yes
48 (30h)	Trigger Sweep	Starts the next sweep	---
50 (32h)	Check Battery Status	Returns smart battery status	---
53 (35h)	Set SPA Minimum Sweep Time	Sets the min sweep time for the SPA when the span is 0	Yes
54 (36h)	Set Trigger Position	Sets the trigger position for the SPA when the span is 0	Yes
55 (37h)	Set Video Trigger Level	Sets the trigger level for the SPA in video trigger mode	Yes
64 (40h)	Auto Save Runtime Setup	Automatically save the runtime setup when exiting remote mode	Yes
69 (45h)	Enter Remote Mode	Enters remote mode at the end of the sweep and returns model number and firmware version	---
70 (46h)	Enter Remote Mode Immediately	Enters remote mode immediately and returns model number and firmware version	---
80 (50h)	Write Custom Cable	Writes Custom Cable data to Site Master	Yes
81 (51h)	Recall Custom Cable	Recalls Custom Cable data from Site Master	Yes
82 (52h)	Write Antenna	Writes custom antenna data to the Site Master via the serial port	Yes
83 (53h)	Recall Antenna	Recalls custom antenna data from the Site Master via the serial port	Yes
84 (54h)	Set Field Strength Measurement	Sets the field strength measurement state and the antenna index	Yes
85 (55h)	Set Channel Power	Sets the Channel Power measurement state and the setup parameters	Yes
86 (56h)	Read Channel Power	Reads the current channel power or the channel power of a stored trace	Yes
87 (57h)	Set ACPR	Sets the ACPR measurement state and parameters	Yes
88 (58h)	Read ACPR	Reads the current adjacent channel power or the adjacent channel power of a stored trace	Yes
89 (59h)	Read Signal Standard Name	Returns the signal standard name in English	Yes
96 (60h)	Measure OCC BW % of Power	Measures OCC BW with % of Power method	Yes
97 (61h)	Measure OCC BW dB Down	Measures OCC BW with dB down method	Yes
98 (62h)	Set Bias Tee Function	Set the Bias Tee function On/Off (Option 10 only)	Yes
99 (63h)	Set Spectrum Analyzer Start/Stop Frequency	Sets the Spectrum Analyzer Start and Stop frequencies	Yes
100 (64h)	Set Spectrum Analyzer Center Freq./Span	Sets the Spectrum Analyzer center frequency and frequency span	Yes
101 (65h)	Set Spectrum Analyzer Scale	Sets the Spectrum Analyzer reference level and scale value	Yes
102 (66h)	Set Spectrum Analyzer Marker	Sets position and on/off status of a Spectrum Analyzer marker	Yes
103 (67h)	Set Spectrum Analyzer Single Limit	Sets position and on/off status of Spectrum Analyzer single limit line	Yes
105 (69h)	Set Spectrum Analyzer Max Hold	Enables or disables the Spectrum Analyzer Max Hold feature	Yes

Control Byte #	Name	Description	Watchdog Timer
106 (6Ah)	Set Spectrum Analyzer Resolution Bandwidth Freq	Sets the Spectrum Analyzer resolution BW frequency (obsolete)	Yes
107 (6Bh)	Set Spectrum Analyzer Video Bandwidth Freq	Sets the Spectrum Analyzer video BW frequency (obsolete)	Yes
108 (6Ch)	Set Spectrum Analyzer Sweep Mode	Sets the Spectrum Analyzer sweep mode	Yes
109 (6Dh)	Set Spectrum Analyzer Marker to Peak	Sets specified marker to peak value of the sweep	Yes
110 (6Eh)	Set Spectrum Analyzer Marker to Center	Sets the center frequency equal to the frequency of the specified marker	Yes
111 (6Fh)	Set Spectrum Analyzer Attenuation	Sets the attenuation for the Site Master Spectrum Analyzer mode (obsolete)	Yes
112 (70h)	Set VNA Segmented Limit Lines	Sets the position and On/Off status of the segmented limit lines for the VNA modes	Yes
113 (71h)	Set Spectrum Analyzer Multiple Limit	Sets the position and On/Off Status of a limit segment for the SPA mode	Yes
114 (72h)	Set Return Spectrum Analyzer Sweep Time	If this is enabled, the duration of the current sweep (in milliseconds) will be returned as 4 bytes via the serial port at the end of the sweep	Yes
115 (73h)	Set Reference Level Offset	Sets the value of the reference level offset	Yes
117 (0x75)	Read Marker Value	Returns the frequency location of the specified marker, and the value at that location	Yes
118 (76h)	Set Sweep Averaging	Sets the number of sweeps to average	Yes
120 (78h)	Field InstaCal	Initiates an InstaCal calibration	---
124 (7Ch)	Read InstaCal Module ASCII Serial Number	Returns the InstaCal Module serial number in ASCII	Yes
129 (81h)	Set Site Master Marker (Peak/Valley)	Sets an individual marker in current measurement mode to either peak (maximum) signal or valley (minimum) signal	Yes
133 (85h)	Set/Reset SPA External Reference	Sets the external reference frequency for the spectrum analyzer	Yes
134 (86h)	Check External SPA Reference	Returns the state of the SPA external reference	---
136 (88h)	Set SPA Preamp State	Sets the state of the SPA preamp	Yes
140 (8Ch)	Set SPA Units	Sets the scale type (logarithmic or linear) and the units	Yes
141 (8Dh)	Set SPA Resolution Bandwidth	Sets the resolution BW frequency for the Spectrum Analyzer	Yes
142 (8Eh)	Set SPA Video Bandwidth	Sets the video BW frequency for the Spectrum Analyzer	Yes
143 (8Fh)	Set SPA Attenuation	Sets the attenuation for the Spectrum Analyzer	Yes
145 (91h)	Set AM/FM Demod	Sets the AM/FM/SSB Demodulation state	Yes
197 (C5h)	Set Baud Rate	Sets the serial communication baud rate for this session	Yes
198 (C6h)	Set Language	Sets the Site Master display language	Yes
208 (D0h)	Query Time	Queries the Site Master for the current time in ASCII format	---
221 (DDh)	Read Main Serial Number	Returns the Main (External) Serial Number as four bytes	Yes
255 (FFh)	Exit Remote Mode	Ends serial communications	---
A001h	Set T1 Transmission Level	Sets the transmission level of T1 measurement mode	Yes
A002h	Set T1/E1 Clock Source	Sets the Clock Source of T1/E1 measurement mode	Yes
A003h	Set T1/E1 Pattern	Sets the data pattern of T1/E1 measurement mode	Yes

Control Byte #	Name	Description	Watchdog Timer
A004h	Set T1/E1 Error Insert Type/Value	Sets the Insertion Error type and the number of errors	Yes
A005h	Set T1/E1 Framing Mode	Sets the Framing Mode of T1/E1 measurement	Yes
A006h	Start and Stop T1/E1 Measurement	Toggles state of T1 and E1 measurements	---
A007h	Insert Error for T1/E1 Measurement	Inserts the error defined into the data flow	---
A008h	Get T1/E1 Pattern	Returns the current pattern for T1 and E1 modes	---
A009h	Get T1/E1 Frame Sync Status	Returns the current frame sync status for T1 and E1 modes	---
A00Ah	Get T1/E1 Pattern Sync Status	Returns the current pattern sync status for T1 and E1 modes	---
A00Bh	Get T1/E1 Carrier Status	Returns the carrier status for T1 and E1 modes	---
A00Ch	Get T1/E1 Error Type and Number	Returns the error type and numbers for T1 and E1 modes	---
A00Dh	Set T1/E1 Line Coding Options	Sets line coding options for T1 and E1 modes	Yes
A00Eh	Set E1 Impedance Options	Sets the impedance for the E1 mode	Yes
A00Fh	Read T1 Volts Peak-to-Peak	Returns the Vpp measurement result	---
A013h	Set T1/E1 Receive Input Configuration Options	Sets the Rx input configuration for T1 and E1 modes	Yes
A014h	Set T1/E1 Measurement Duration	Sets T1 and E1 measurement duration	Yes
A015h	Set T1/E1 Data Logging	Enables/disables data logging in T1/E1 modes	Yes
A016h	Read T1/E1 dBdsx	Initiates a voltage measurement and returns the result in dBdsx	---
A017h	Read T1/E1 Frequency	Returns the last T1/E1 frequency measurement result in Hz if available	---
A018h	Read T1/E1 Freq Cal	Returns the current T1/E1 frequency calibration setting	---
A019h	Set T1/E1 Frequency Cal	Sets the T1/E1 frequency calibration value	Yes
A103h	Select SPA/Power Meter Signal Standard	Selects a Signal Standard	Yes
A201h	Read External Module Name	Returns the name of the attached external block converter module (Option 6 only)	---
A202h	Read External Module Serial Number	Returns the serial number of the attached external block converter module (Option 6 only)	---
A203h	Read External Module Frequency Range	Returns the frequency range of the attached external block converter module (Option 6 only)	---
A204h	Read Module Fail Counter	Returns the value of the module lock fail counter (Option 6 only)	---
A205h	Clear Module Fail Counter	Sets the module lock fail counter to 0 (Option 6 only)	---
A104h	Select SPA/Power Meter Channel	Selects a channel within the range of the currently selected signal standard	Yes
AA30h	Trigger Sweep	Causes the Site Master to perform a sweep if it is in single sweep mode	---
AA15h	Remote Self Test	Trigger the equivalent of a "key press" selftest.	---

NOTES: T1/E1 commands are available with Option 50 only. Power Meter commands are available with Option 29 only.

Control Byte Descriptions

Setup System – Control Byte #1 (01h)

Description: Sets system status flags and switches. The current value of the flags can be obtained by executing command #29, Query System Setup, and parsing the values from the appropriate bytes. The Site Master acts on the entire byte. So, the state of each of the bits must be defined every time the command is issued. See control byte #29 (1Dh) response byte 170 (VNA mode) or response bytes 275 and 276 (SPA mode) for current Site Master configuration.

Bytes to Follow: 2 bytes

1) Status Byte 1

- bit 0: Fixed CW Mode On/Off (1b = On, 0b = Off)
- bit 1: Not Used
- bit 2: LCD Back Light On/Off (1b = On, 0b = Off)
- bit 3: Measurement Unit Metric/English (0b = English, 1b = Metric)¹
- bits 4-7: Not Used

2) Status Byte 2

- bit 0: RBW Coupling (to span) (1b = Auto 0b = Manual)
- bit 1: VBW Coupling (to RBW) (1b = Auto 0b = Manual)
- bit 2: Not Used
- bits 3-4: Amplitude Units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
- bits 5-6: Detection Algorithm (00b = Positive Peak 01b = RMS Average 10b = Negative Peak 11b = Sampling Mode)
- bit 7: Attenuation Coupling (to ref level) (1b = Auto 0b = Manual)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 238 (EEh) Time-out Error

Set Site Master VNA Frequency – Control Byte #2 (02h)

Description: Sets the Site Master frequency range. Start and stop frequencies are given in terms of 1 Hz steps. (e.g. 1000.3 MHz would be sent as 1000300000 = 1,000,300,000 Hz.)

Valid range is 25 MHz – 4000 MHz.

See control byte #29 (1Dh) response bytes 28 to 35 for current Site Master start and stop frequencies.

Bytes to Follow: 8 bytes

- 1) Start Frequency (highest byte)
- 2) Start Frequency
- 3) Start Frequency
- 4) Start Frequency (lowest byte)
- 5) Stop Frequency (highest byte)
- 6) Stop Frequency
- 7) Stop Frequency
- 8) Stop Frequency (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error : Invalid frequency range
- 238 (EEh) Time-out Error

¹ Set the Metric/English flag to the proper value before sending distance information.

Select Measurement Mode – Control Byte #3 (03h)

Description: Sets the measurement mode of the Site Master. The response byte will not be sent until the mode change is complete.

See control byte #29 (1Dh) response byte 3 for the current Site Master measurement mode.

Bytes to Follow: 1 byte

- 1) Measurement Mode
 - 00h: RL Frequency
 - 01h: SWR Frequency
 - 02h: Cable Loss Frequency
 - 10h: RL Distance
 - 11h: SWR Distance
 - 30h: Spectrum Analyzer Mode
 - 31h: Transmission Mode (Option 21 only)
 - 40h: Power Meter Mode (Option 29 only)
 - 60h: T1 Tester Mode (Option 50 only)
 - 70h: E1 Tester Mode (Option 50 only)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error : Invalid measurement mode
- 238 (EEh) Time-out Error

Set Site Master VNA Scale – Control Byte #4 (04h)

Description: Sets the top and bottom value of the current measurement mode.

Return Loss & Cable Loss:

Unit is dB/1000.
Maximum value sent is 60000 which represents 60.00 dB,
Minimum value sent is 0 which represent 0.00 dB,
Start value < Stop value

SWR:

Unit is 1/1000 (of ratio)
Maximum value sent is 65535 which represents 65.53
Minimum value sent is 1000 which represents 1.00
Start value < Stop value

See control byte #29 (1Dh) response bytes 36 to 43 for current Site Master scaling.

Bytes to Follow: 8 bytes

- 1) Scale Start (highest byte)
- 2) Scale Start
- 3) Scale Start
- 4) Scale Start (lowest byte)
- 5) Scale Stop (highest byte)
- 6) Scale Stop
- 7) Scale Stop
- 8) Scale Stop (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error : Invalid scale range
- 238 (EEh) Time-out Error

Set Site Master VNA Marker – Control Byte #5 (05h)

Description: Sets an individual marker position and status in the current VNA measurement mode. See Control Byte #102 to set markers in Spectrum Analyzer mode.

The Site Master sets the position of a marker by its relative position on the graph. The lowest position is 0 at the start frequency (or distance). The highest position is the data point number at the stop frequency (or distance). For example, for a resolution of 130, the first frequency is at position 0. The last frequency is at 129.

To calculate the data point from a frequency (or distance):

$$\text{point} = (\text{resolution} - 1) * (\text{marker freq} - \text{start freq}) / (\text{stop freq} - \text{start freq})$$

See control byte #29 (1Dh) response bytes 44 to 55 for current frequency markers.

See control byte #29 (1Dh) response bytes 138 to 149 for current distance markers.

See control byte #29 (1Dh) response byte 162 for current marker on/off status.

Bytes to Follow: 5 bytes

- 1) Marker Number (01h = marker 1, 02h = marker 2, 03h = marker 3, 04h = marker 4, 05h = marker 5, 06h = marker 6)
- 2) Marker Line On/Off (01h = On, 00h = Off)
- 3) Marker Delta On/Off (01h = On, 00h = Off) ²
- 4) Marker Value (higher byte)
- 5) Marker Value (lower byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid marker, marker status, or marker position
238 (EEh) Time-out Error

Set Site Master VNA Single Limit – Control Byte #6 (06h)

Description: Sets the position and On/Off status of the Single Limit Line for the VNA modes. See control byte #103 to set the single limit for spectrum analyzer mode.

The single limit is a single, horizontal line. It can be set to On/Off in any Site Master mode. If Limit Beep is set to ON, the Site Master will give an error beep when sweep data appears above the limit line in SWR or Return Loss mode, or when sweep data appears below the limit line in Cable Loss mode.

The single limit and multiple limit types are mutually exclusive. That is, setting the single limit ON automatically turns multiple limit lines OFF. See control byte #112 (70h) for information about multiple limits. See control byte #29 (1Dh) response bytes 56-59, and byte 164 for current Site Master configuration.

Bytes to Follow: 6 bytes

- 1) Limit Line On/Off (01h = On, 00h = Off)
- 2) Beep at Limit On/Off (01h = On, 00h = Off)
- 3) Limit Value (highest byte)
- 4) Limit Value
- 5) Limit Value
- 6) Limit Value (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid limit status, limit beep status, or limit value
238 (EEh) Time-out Error

2 This byte is not applicable for markers 5 and 6. It will be ignored by the Site Master.

Notes:

Return Loss & Cable Loss:

Limit should be sent as (dB * 1000)

Maximum value sent is 60000 which represents 60.00 dB

Minimum value sent is 0 which represents 0.0 dB

SWR:

Limit is in thousandths (of ratio), so it should be sent as (ratio * 1000)

Maximum value sent is 65530 which represents 65.53

Minimum value sent is 1000 which represents 1.00

Set DTF Parameter – Control Byte #7 (07h)

Description: Sets Distance to Fault parameters.

Be aware using this control byte. The distance to fault parameters are all inter-related. Consequently, the control byte must change all of those parameters at the same time to properly set them.

Enter Start and Stop distances in hundred-thousandths of a meter or foot (12.34m would be sent as 1234000).

Relative Propagation Velocity is in hundred-thousandths (a Relative Propagation Velocity of 0.850 will be sent as 85000).

Cable Loss is in hundred-thousandths of dB/m or dB/ft (–0.345 dB/m would be sent as 34500).

See control byte #29 (1Dh) response bytes 130-137 (Distance), 150-157 (Propagation Velocity & Cable Loss) for current Site Master configuration.

Bytes to Follow: 16 bytes

- 1) Start Distance (highest byte)
- 2) Start Distance
- 3) Start Distance
- 4) Start Distance (lowest byte)
- 5) Stop Distance (highest byte)
- 6) Stop Distance
- 7) Stop Distance
- 8) Stop Distance (lowest byte)
- 9) Relative Propagation Velocity (highest byte)
- 10) Relative Propagation Velocity
- 11) Relative Propagation Velocity
- 12) Relative Propagation Velocity (lowest byte)
- 13) Cable Loss (highest byte)
- 14) Cable Loss
- 15) Cable Loss
- 16) Cable Loss (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Parameter(s) out of range
238 (EEh) Time-out Error

Set Time/Date – Control Byte #8 (08h)

Description: Sets the current time and date.

This Time/Date is stamped into all stored sweeps (for users' reference).

The Site Master stores bytes as ASCII text. Recommended time form is "hh:mm:ss" (hour:minute:sec). Recommended date format is "mm/dd/yyyy" (month/day/year).

The current time setting can be found by using control byte #33 to recall trace 0 and examining response bytes 31-38.

The current date setting can be found by using control byte #33 to recall trace 0 and examining response bytes 21-30.

Bytes to Follow: 7 bytes

- 1) Hour
- 2) Minute
- 3) Month
- 4) Day
- 5) Year (Higher byte)
- 6) Year (Lower byte)
- 7) Daylight Saving (01h=ON, 00h=OFF)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

Set Reference Number – Control Byte #9 (09h)

Description: Stores a Reference Number with the sweep trace.

The reference number is also known as the trace name. It is any combination of 16 letters, numbers and the characters "-", ",", ".", and "+". This command stores a trace name with the sweep trace.

The current reference number is found by recalling trace 0 and examining response bytes 39 to 54.

Bytes to Follow: 16 bytes (ASCII text string)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

Serial Port Echo On/Off – Control Byte #10 (0Ah)

Description: Sets the serial port echo mode On/Off.

Serial Port Echo Mode uses the single sweep mode (see control byte #11 (0Bh)). At the end of each sweep cycle, the Site Master sends a Sweep Complete Byte #192 (C0h) to the serial port.

This mode activates once the Site Master exits from the remote mode. Serial Port Echo status can't be saved to or recalled from saved setups. Cycling power resets the Serial port echo status to Off.

The Serial Port Echo Mode allows run-time handshaking between the Site Master and computer by doing the following:

- 1) Enter remote mode. Set Serial Port Echo Mode On. Exit remote mode.
- 2) The Site Master sweeps once and then sends the Sweep Complete Byte.
- 3) After you receive it. Enter remote mode. Recall sweep 0 (last sweep trace in RAM).
- 4) Exit remote mode. Send Sweep Triggering Byte #48 (30h) and wait for the next sweep cycle.
- 5) Repeat steps 2-4

Bytes to Follow: 1 byte

- 1) Serial Port Echo Status
00h = Off
01h = On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid serial port echo status
238 (EEh) Time-out Error

Site Master VNA Single Sweep Mode On/Off – Control Byte #11 (0Bh)

Description: Enables or disables the Single Sweep Mode during Site Master VNA modes of operation. For Single Sweep Mode during Spectrum Analyzer mode of operation, see control byte #108 (6Ch). Single Sweep Mode activates once the Site Master exits from the remote mode.

When the Site Master returns to local mode, the Site Master stops sweeping, waits for either the Run/Hold Key of the Site Master keypad or triggering byte #48 (30h).

Site Master also checks for the Enter Remote byte #69 (45h) at the end of each sweep. If present in the buffer, Site Master returns to remote mode.

Bytes to Follow: 1 byte

- 1) Single Sweep Mode Status
00h = Off
01h = On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid single sweep mode status
238 (EEh) Time-out Error

Watch-Dog Timer On/Off – Control Byte #12 (0Ch)

Description: Enables or disables the Watch-dog timer. Default is Disabled.

The Site Master incorporates a watch-dog timer for higher reliability in serial communication. In selected control bytes (see Control Byte Summary), the Site Master checks for the time interval between each byte received from the computer. If the time interval exceeds the set time limit (0.5 sec), the Site Master notifies the computer by sending Time-out Byte #238 (EEh). The Site Master discards the data it just received and then waits for the next control byte sequence.

Bytes to Follow: 1 byte

- 1) Watch-dog timer On/Off
00h = Off
01h = On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid watch-dog timer status

Sequence Site Master Calibration – Control Byte #13 (0Dh)

Description: Initiates a calibration step. The Site Master must be calibrated to give accurate measurements.

The command sequence must be sent in correct order. i.e. Open -> Short -> Load. You can also abort the calibration by command – “Abort” before the command - “Load” is sent. Once command - “Load” is sent, calibration is completed, and the old calibration data is lost.

The unit under test returns #255(FFh) upon receiving the command, and return #240 (F0h) when the calibration of the connected component is completed, then waits for further commands to complete the whole calibration process.

This command is designed to be executed step by step: open, short, load. Issuing any other command during this command sequence will cause undesired results.

Bytes to Follow: 1 byte

- 1) Calibration Step to trigger
 - 01h = Open
 - 02h = Short
 - 03h = Load
 - 04h = Not Used
 - 05h = Abort

Site Master Returns: 2 bytes

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Error : Invalid Cal Operation or Cal Incomplete
238 (EEh) Time-out Error
- 2) 240 (F0h) Calibration step is completed

Set Site Master Data Points – Control Byte #14 (0Eh)

Description: Set number of measurement data points for Site Master VNA modes.

Bytes to Follow: 1 byte

- 1) Number of Data Points
 - 00h = 130 Points
 - 01h = 259 Points
 - 02h = 517 Points

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid number of data points
238 (EEh) Time-out Error

Set Site Master Calibration Mode – Control Byte #15 (0Fh)

Description: Set the Site Master calibration mode to OSL Cal (standard) or FlexCal.

Bytes to Follow: 1 byte

- 1) Calibration Mode
 - 00h = OSL Calibration (standard)
 - 01h = FlexCal Calibration

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid calibration mode
238 (EEh) Time-out Error

Store Sweep Trace – Control Byte #16 (10h)

Description: Saves current trace to the next available memory location. Trace name can be set using control byte #9, “Set Reference Number” before executing this command.

Bytes to Follow: 0 bytes

Site Master Returns: 5 bytes

- 1-4) Time/Date Stamp (In long integer format)
- 5) Operation result:
 - 255 (FFh) Operation Complete Byte
 - 224 (E0h) Out of memory (Memory full)
 - 238 (EEh) Time-out Error

Recall Sweep Trace – Control Byte #17 (11h)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features, use Control Byte #33 (21h). This command cannot be used with a frequency converter module attached (Option 6 required).

Description: Queries the Site Master for sweep trace data.

Note: Before you can recall a sweep stored in non-volatile memory (trace numbers 1-200) you must build a trace table in the Site Master’s RAM. Use Control Byte #24 to build the trace table. Since the trace table exists in RAM, Control Byte #24 must be executed every time the Site Master’s power is cycled.

Bytes to Follow: 1 byte

- 0 = Last sweep trace before entering remote mode (sweep trace in RAM)
- 1- 200 = Specific saved sweep number (stored sweeps in Flash memory)

Site Master Returns:

- 1-2) # of following bytes (total length - 2)
- 3-4) Not Used
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes ASCII)
- 16) Measurement Mode³
- 17-20) Time/Date (in Long Integer⁴)
- 21-30) Date in String Format (mm/dd/yyyy)
- 31-38) Time in String Format (hh:mm:ss)
- 39-54) Reference number stamp (16 bytes in ASCII)
- 55-56) # data points (130, 259, 517 or 400)

For all Site Master Modes:

- 57) Start Frequency⁵ (highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (lowest byte)
- 61) Stop Frequency (highest byte)
- 62) Stop Frequency

3 Refer to Control Byte #3 “Select Measurement Mode” for detailed value.

4 Time/Date long integer representation is in seconds since January 1, 1970

5 Frequency units are Hz

- 63) Stop Frequency
- 64) Stop Frequency (lowest byte)
- 65) Minimum Frequency Step Size (highest byte)
- 66) Minimum Frequency Step Size
- 67) Minimum Frequency Step Size
- 68) Minimum Frequency Step Size (lowest byte)
- 69) Scale Top⁶ (highest byte)
- 70) Scale Top
- 71) Scale Top
- 72) Scale Top (lowest byte)
- 73) Scale Bottom (highest byte)
- 74) Scale Bottom
- 75) Scale Bottom
- 76) Scale Bottom (lowest byte)
- 77) Frequency Marker 1⁷ (highest byte)
- 78) Frequency Marker 1 (lowest byte)
- 79) Frequency Marker 2 (highest byte)
- 80) Frequency Marker 2 (lowest byte)
- 81) Frequency Marker 3 (highest byte)
- 82) Frequency Marker 3 (lowest byte)
- 83) Frequency Marker 4 (highest byte)
- 84) Frequency Marker 4 (lowest byte)
- 85) Frequency Marker 5 (highest byte)
- 86) Frequency Marker 5 (lowest byte)
- 87) Frequency Marker 6 (highest byte)
- 88) Frequency Marker 6 (lowest byte)
- 89) Single Limit⁸ (highest byte)
- 90) Single Limit
- 91) Single Limit
- 92) Single Limit (lowest byte)
- 93) Multiple Limit Segment # (1)
- 94) Multiple Limit Segment Status
- 95) Multiple Limit Start X⁹ (highest byte)
- 96) Multiple Limit Start X
- 97) Multiple Limit Start X
- 98) Multiple Limit Start X (lowest byte)
- 99) Multiple Limit Start Y (highest byte)
- 100) Multiple Limit Start Y (lowest byte)
- 101) Multiple Limit End X (highest byte)
- 102) Multiple Limit End X
- 103) Multiple Limit End X
- 104) Multiple Limit End X (lowest byte)
- 105) Multiple Limit End Y (highest byte)
- 106) Multiple Limit End Y (lowest byte)
- 107–162) Repeat bytes 93-106 for segments 2-5
- 163) Start Distance¹⁰ (highest byte)

6 See Control Byte #4 "Set Site Master Scale" for data format

7 $\text{marker point} = (\# \text{ of data points} - 1) * (\text{marker freq} - \text{start freq}) / (\text{stop freq} - \text{start freq})$ where # of data points can be found in bytes 55-56, start freq is in bytes 57-60, and stop freq is in bytes 61-64.

8 See Control Byte #6 "Set Site Master Single Limit" for data format.

9 See Control Byte #112 "Set Site Master Segmented Limit Lines" for data format.

10 Distance data uses units 1/100,000m (or feet)

- 164) Start Distance
- 165) Start Distance
- 166) Start Distance (lowest byte)
- 167) Stop Distance (highest byte)
- 168) Stop Distance
- 169) Stop Distance
- 170) Stop Distance (lowest byte)
- 171) Distance Marker 1¹¹ (highest byte)
- 172) Distance Marker 1 (lowest byte)
- 173) Distance Marker 2 (highest byte)
- 174) Distance Marker 2 (lowest byte)
- 175) Distance Marker 3 (highest byte)
- 176) Distance Marker 3 (lowest byte)
- 177) Distance Marker 4 (highest byte)
- 178) Distance Marker 4 (lowest byte)
- 179) Distance Marker 5 (highest byte)
- 180) Distance Marker 5 (lowest byte)
- 181) Distance Marker 6 (highest byte)
- 182) Distance Marker 6 (lowest byte)
- 183) Relative Propagation Velocity¹² (highest byte)
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (lowest byte)
- 187) Cable Loss¹³ (highest byte)
- 188) Cable Loss
- 189) Cable Loss
- 190) Cable Loss (lowest byte)
- 191) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7 : Not Used
- 192) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bits 4-7 : Not Used
- 193) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0 : Single Limit On/Off
 - bit 1: CW On/Off
 - bit 2-3 : Not Used
 - bit 4 : InstaCal On/Off¹⁴
 - bit 5 : Cal On/Off
 - bit 6 : Limit Type (0b = Single; 1b = Multiple)

11 Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

12 Relative Propagation Velocity uses units 1/100,000

13 Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

14 Bits (4,5) are as follows: (0,0) = Cal Off, (0,1) = OSL Cal (1,1) = InstaCal On, (1,0) = Impossible.

bit 7 : Unit of Measurement (1b = Metric, 0b = English)

194) Status Byte 4:

(LSB) bit 0 - 1 : DTF Windowing Mode
bit: 1 0
| |
0 0 - Rectangular (No Windowing)
0 1 - Nominal Side Lobe
1 0 - Low Side Lobe
1 1 - Minimum Side Lobe
bits 2 - 7 : Not Used

195-228) Not Used

229-1268) Sweep Data (130 points * 8 bytes/point = 1040 bytes)

229-2300) Sweep Data (259 points * 8 bytes/point = 2072 bytes)

229-4364) Sweep Data (517 points * 8 bytes/point = 4136 bytes)

8 bytes for each data point

1. gamma¹⁵ MSB
2. gamma
3. gamma
4. gamma LSB
5. phase¹⁶ MSB
6. phase
7. phase
8. phase LSB

Note: return loss = $-20 * (\log(\text{gamma}) / \log(10))$
VSWR = $(1+\text{gamma})/(1-\text{gamma})$
phase compares the reflected to the incident (reference)

For Spectrum Analyzer Mode:

- 57) Start Frequency¹⁷ (highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (lowest byte)
- 61) Stop Frequency (highest byte)
- 62) Stop Frequency
- 63) Stop Frequency
- 64) Stop Frequency (lowest byte)
- 65) Center Frequency (highest byte)
- 66) Center Frequency
- 67) Center Frequency
- 68) Center Frequency (lowest byte)
- 69) Frequency Span (highest byte)
- 70) Frequency Span
- 71) Frequency Span
- 72) Frequency Span (lowest byte)
- 73) Minimum Frequency Step Size (highest byte)
- 74) Minimum Frequency Step Size
- 75) Minimum Frequency Step Size
- 76) Minimum Frequency Step Size (lowest byte)

15 Gamma data uses 1/1000 units.

16 Phase data uses 1/10 degree unit.

17 Frequency in Hz

- 77) Ref Level¹⁸ (highest byte)
- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (lowest byte)
- 81) Scale per div¹⁹ (highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (lowest byte)
- 85) Frequency Marker 1²⁰ (highest byte)
- 86) Frequency Marker 1 (lowest byte)
- 87) Frequency Marker 2 (highest byte)
- 88) Frequency Marker 2 (lowest byte)
- 89) Frequency Marker 3 (highest byte)
- 90) Frequency Marker 3 (lowest byte)
- 91) Frequency Marker 4 (highest byte)
- 92) Frequency Marker 4 (lowest byte)
- 93) Frequency Marker 5 (highest byte)
- 94) Frequency Marker 5 (lowest byte)
- 95) Frequency Marker 6 (highest byte)
- 96) Frequency Marker 6 (lowest byte)
- 97) Single Limit²¹ (highest byte)
- 98) Single Limit
- 99) Single Limit
- 100) Single Limit (lowest byte)
- 101) Multiple Upper Limit 1 Start X (Frequency in Hz) (highest byte)
- 102) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 103) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 104) Multiple Upper Limit 1 Start X (Frequency in Hz) (lowest byte)
- 105) Multiple Upper Limit 1 Start Y (Power Level²²) (highest byte)
- 106) Multiple Upper Limit 1 Start Y (Power Level)
- 107) Multiple Upper Limit 1 Start Y (Power Level)
- 108) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 109) Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
- 110) Multiple Upper Limit 1 End X (Frequency in Hz)
- 111) Multiple Upper Limit 1 End X (Frequency in Hz)
- 112) Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
- 113) Multiple Upper Limit 1 End Y (Power Level) (highest byte)
- 114) Multiple Upper Limit 1 End Y (Power Level)
- 115) Multiple Upper Limit 1 End Y (Power Level)
- 116) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 117-260) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 101-116 for format)
- 261) RBW Setting (Frequency in Hz) (highest byte)
- 262) RBW Setting (Frequency in Hz)
- 263) RBW Setting (Frequency in Hz)
- 264) RBW Setting (Frequency in Hz) (lowest byte)
- 265) VBW Setting (Frequency in Hz) (highest byte)

18 Value sent as (Value in dBm * 1000) + 270,000

19 Value sent as (Value * 1000)

20 Value sent as data point on display. Freq = (Point * Span / (Total Data Points – 1)) + Start Freq

21 Value sent as (value in dBm * 1000) + 270,000

22 Value sent as (value in dBm * 1000) + 270,000

- 266) VBW Setting (Frequency in Hz)
- 267) VBW Setting (Frequency in Hz)
- 268) VBW Setting (Frequency in Hz) (lowest byte)
- 269) OCC BW Method (0b if % of power, 1b = dB down)
- 270) OCC BW % Value²³ (highest byte)
- 271) OCC BW % Value
- 272) OCC BW % Value
- 273) OCC BW % Value (lowest byte)
- 274) OCC BW dBc²⁴(highest byte)
- 275) OCC BW dBc
- 276) OCC BW dBc
- 277) OCC BW dBc (lowest byte)
- 278) Attenuation²⁵ (highest byte)
- 279) Attenuation
- 280) Attenuation
- 281) Attenuation (lowest byte)
- 282-297)Antenna Name(16 bytes in ASCII)
- 298) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7 : Not Used
- 299) Status Byte 2: (0b = Off , 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bits 4-7: Not Used
- 298) Status Byte 3: (0b = Off, 1b = On)
 - (LSB) bit 0 : Antenna Factor Correction On/Off
 - bits 1-2 : Detection Alg (00b = pos. peak 01b = average 10b = neg. peak)
 - bits 3-4 : Amplitude Units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
 - bit 5 : Channel Power On/Off
 - bit 6 : Adjacent Channel Power On/Off
 - bit 7 : Not Used
- 299) Status Byte 4²⁶
 - (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Limit Type (0b = Single, 1b = Multiple)
 - bit 1 : Not Used
 - bit 2 : Single Limit On/Off
 - bit 3 : Single Limit Beep Level ABOVE/BELOW
 - bit 4 : Multiple Limit Upper Segment 1 Status On/Off
 - bit 5 : Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW²⁷
 - bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 - bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW

23 % value is 0-99

24 dBc value 0 – 120 dBc

25 Value sent as (value in dB * 1000)

26 For bits 2 and 0, 00=no limit, 10=single limit, 01=multiple limit, 11=multiple limit.

27 Upper limits always trigger an error beep if data is ABOVE the limit segment, for example, this bit is always 1b.

- 300) Status Byte 5
 (0b = Off/Beep if data is below line, 1b = On/Beep if data is above line)
 (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 bit 1 : Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
 bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 bit 3 : Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
 bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 bit 5 : Multiple Limit Upper Segment 5 Beep Level ABOVE/BELOW
 bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 bit 7 : Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW²⁸
- 303) Status Byte 6
 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 (LSB) bit 0 : Multiple Limit Lower Segment 2 Status On/Off
 bit 1 : Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
 bit 2 : Multiple Limit Lower Segment 3 Status On/Off
 bit 3 : Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
 bit 4 : Multiple Limit Lower Segment 4 Status On/Off
 bit 5 : Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW
 bit 6 : Multiple Limit Lower Segment 5 Status On/Off
 bit 7 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 304) Status Byte 7
 bits 0-6: Number of sweeps to average (1-25, 1 implies no averaging)
 bit 7: Not Used
- 305) Reference Level Offset²⁹(highest byte)
 306) Reference Level Offset
 307) Reference Level Offset
 308) Reference Level Offset (lowest byte)
 309-338) Not Used
 339-1938) Sweep Data
 (400 points * 4 bytes/point= 1600 bytes)
 4 bytes for each data point
 1. dBm³⁰ MSB
 2. dBm
 3. dBm
 4. dBm LSB

Site Master Returns (For invalid sweeps/empty stored sweep locations): 11 bytes
 1-2) Number of following bytes (9 bytes for invalid sweep recall)
 3-4) Model # (unsigned integer, 14h for Site Master S33xD)
 5-11) Extended Model # (7 bytes in ASCII)

Site Master Returns (Invalid sweep location): 1 byte
 1) 224 (E0) Parameter Error: Invalid sweep location

Save System Setup – Control Byte #18 (12h)

Description: Saves current system setup parameters to a specific setup store location.

The Site Master saves all parameters described in Query System Status - control byte #29 (1Dh), (except Serial Port Echo Status) to the specified store location. Store location 0 is the run-time setup of the Site Master. It holds the power-on defaults of the Site Master.

28 LOWER limits always trigger an error beep if data is BELOW the limit segment, for example, this bit is always 0b.

29 Value sent as (value in dBm * 1000) + 270,000

30 Value sent as (value in dBm * 1000) + 270,000

Bytes to Follow: 1 byte

- 1) Location to save system setup parameters:
0 – 10 for SWR Mode, Return Loss Mode, Cable Loss Mode and DTF Mode
0 – 5 for Spectrum Analyzer Mode, Transmission Mode (Option 21) and Power Meter Mode (Option 29)
0 – 5 for T1/E1 Modes (Option 50)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid store location
238 (EEh) Time-out Error

Recall System Setup – Control Byte #19 (13h)

Description: Recalls system setup parameters from a specific store location. Storage locations depend on the measurement mode of the current setup. When the current mode is Spectrum Analyzer, Spectrum Analyzer setups (1-5) can be recalled. When the current mode is one of the Site Master VNA modes (SWR, RL, CL, DTF), one of the 10 VNA mode setups can be recalled. When the current mode is T1/E1, one of the T1/E1 setups can be recalled (1-5).

The Site Master recalls all parameters described in Query System Status - control byte #29 (1Dh), (except Serial Port Echo Status) from the specified store location. The recalled setup does not automatically become the power-on runtime setup when exiting remote.

You may want to save the recalled setup as the run-time setup by saving it to setup location 0 (which holds the power-on runtime setup). See control byte #18 (12h) for details.

Bytes to Follow: 1 byte

- 1) Location from which to recall system setup parameters:
0 = Run time setup for all measurement modes
1 – 10 = Saved setups for Site Master VNA modes SWR, RL, CL, DTF
1 – 5 = Saved setups for SPA Mode, Transmission Mode (Option 21) and Power Meter Mode (Option 29)
1 – 5 = Saved setups for T1/E1 modes (Option 50)
255 = Default setup

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid store location or no saved setup
238 (EEh) Time-out Error

Query System Status – Control Byte #20 (14h)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features, use Control Byte #33 (21h). This command cannot be used with a frequency converter module attached (Option 6 required).

Description: Queries the Site Master for current system settings.

The current state of the Site Master represents the state after the last successful remote control operation. For example, change the start frequency to another valid frequency while in remote mode, then execute control byte #20. The new start frequency will be returned in bytes 4-7, even though no sweep has been performed with that frequency.

Bytes to Follow: 0 bytes

Site Master Returns: 434 bytes

- 1) Measurement Mode³¹
- 2) Site Master Mode Data Points (higher byte)

³¹ Refer to Control Byte #3 "Select Measurement Mode" for valid measurement modes.

- 3) Site Master Mode Data Points (lower byte)
- 4) Start Frequency (Frequency in Hz) (highest byte)
- 5) Start Frequency
- 6) Start Frequency
- 7) Start Frequency (lowest byte)
- 8) Stop Frequency (Frequency in Hz) (highest byte)
- 9) Stop Frequency
- 10) Stop Frequency
- 11) Stop Frequency (lowest byte)
- 12) Scale Start (highest byte)³²
- 13) Scale Start
- 14) Scale Start
- 15) Scale Start (lowest byte)
- 16) Scale Stop (highest byte)
- 17) Scale Stop
- 18) Scale Stop
- 19) Scale Stop (lowest byte)
- 20) Frequency Marker 1 (higher byte)³³
- 21) Frequency Marker 1 (lower byte)
- 22) Frequency Marker 2 (higher byte)
- 23) Frequency Marker 2 (lower byte)
- 24) Frequency Marker 3 (higher byte)
- 25) Frequency Marker 3 (lower byte)
- 26) Frequency Marker 4 (higher byte)
- 27) Frequency Marker 4 (lower byte)
- 28) Frequency Marker 5 (higher byte)
- 29) Frequency Marker 5 (lower byte)
- 30) Frequency Marker 6 (higher byte)
- 31) Frequency Marker 6 (lower byte)
- 32) Site Master Single Limit (highest byte)³⁴
- 33) Site Master Single Limit
- 34) Site Master Single Limit
- 35) Site Master Single Limit (lowest byte)
- 36) Multiple Limit Segment # (1)
- 37) Multiple Limit Segment Status (0h = Off, 01h = On)
- 38) Multiple Limit Segment Start X (highest byte)³⁵
- 39) Multiple Limit Segment Start X
- 40) Multiple Limit Segment Start X
- 41) Multiple Limit Segment Start X (lowest byte)
- 42) Multiple Limit Segment Start Y (higher byte)
- 43) Multiple Limit Segment Start Y (lower byte)
- 44) Multiple Limit Segment End X (highest byte)
- 45) Multiple Limit Segment End X
- 46) Multiple Limit Segment End X
- 47) Multiple Limit Segment End X (lowest byte)
- 48) Multiple Limit Segment End Y (higher byte)
- 49) Multiple Limit Segment End Y (lower byte)
- 50-105) Repeat bytes 36 – 49 for segments 2 - 5

32 See "Set Site Master Scale" Control Byte #4 for data format.

33 $\text{Marker Point} = (\# \text{ data points} - 1) * (\text{marker freq} - \text{start freq}) / (\text{stop freq} - \text{start freq})$

34 See Control Byte #6, "Set Site Master Single Limit" for data format.

35 See Control Byte #112, "Set Site Master Segmented Limit Lines" for data format.

- 106) Start Distance (highest byte)³⁶
- 107) Start Distance
- 108) Start Distance
- 109) Start Distance (lowest byte)
- 110) Stop Distance (highest byte)
- 111) Stop Distance
- 112) Stop Distance
- 113) Stop Distance (lowest byte)
- 114) Distance Marker 1 (higher byte)³⁷
- 115) Distance Marker 1 (lower byte)
- 116) Distance Marker 2 (higher byte)
- 117) Distance Marker 2 (lower byte)
- 118) Distance Marker 3 (higher byte)
- 119) Distance Marker 3 (lower byte)
- 120) Distance Marker 4 (higher byte)
- 121) Distance Marker 4 (lower byte)
- 122) Distance Marker 5 (higher byte)
- 123) Distance Marker 5 (lower byte)
- 124) Distance Marker 6 (higher byte)
- 125) Distance Marker 6 (lower byte)
- 126) Relative Propagation Velocity (highest byte)³⁸
- 127) Relative Propagation Velocity
- 128) Relative Propagation Velocity
- 129) Relative Propagation Velocity (lowest byte)
- 130) Cable Loss (highest byte)³⁹
- 131) Cable Loss
- 132) Cable Loss
- 133) Cable Loss (lowest byte)
- 134) Spectrum Analyzer Mode Data Points (higher byte)
- 135) Spectrum Analyzer Mode Data Points (lower byte)
- 136) Spectrum Analyzer Start Frequency⁴⁰ (highest byte)
- 137) Spectrum Analyzer Start Frequency
- 138) Spectrum Analyzer Start Frequency
- 139) Spectrum Analyzer Start Frequency (lowest byte)
- 140) Spectrum Analyzer Stop Frequency (highest byte)
- 141) Spectrum Analyzer Stop Frequency
- 142) Spectrum Analyzer Stop Frequency
- 143) Spectrum Analyzer Stop Frequency (lowest byte)
- 144) Spectrum Analyzer Center Frequency (highest byte)
- 145) Spectrum Analyzer Center Frequency
- 146) Spectrum Analyzer Center Frequency
- 147) Spectrum Analyzer Center Frequency (lowest byte)
- 148) Spectrum Analyzer Frequency Span (highest byte)
- 149) Spectrum Analyzer Frequency Span
- 150) Spectrum Analyzer Frequency Span
- 151) Spectrum Analyzer Frequency Span (lowest byte)

36 Distance data uses units 1/100,000 m or 1/100,000 ft

37 Marker Point = (# data points - 1) * (marker dist - start dist) / (stop dist - start dist)

38 Relative Propagation Velocity uses units 1/100,000.

39 Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

40 Frequency unit is Hz.

- 152) Spectrum Analyzer Minimum Frequency Step Size (highest byte)
- 153) Spectrum Analyzer Minimum Frequency Step Size
- 154) Spectrum Analyzer Minimum Frequency Step Size
- 155) Spectrum Analyzer Minimum Frequency Step Size (lowest byte)
- 156) Ref Level (highest byte)⁴¹
- 157) Ref Level
- 158) Ref Level
- 159) Ref Level (lowest byte)
- 160) Scale per div (highest byte)⁴²
- 161) Scale per div
- 162) Scale per div
- 163) Scale per div (lowest byte)
- 164) Spectrum Analyzer Frequency Marker 1 (higher byte)⁴³
- 165) Spectrum Analyzer Frequency Marker 1 (lower byte)
- 166) Spectrum Analyzer Frequency Marker 2 (higher byte)
- 167) Spectrum Analyzer Frequency Marker 2 (lower byte)
- 168) Spectrum Analyzer Frequency Marker 3 (higher byte)
- 169) Spectrum Analyzer Frequency Marker 3 (lower byte)
- 170) Spectrum Analyzer Frequency Marker 4 (higher byte)
- 171) Spectrum Analyzer Frequency Marker 4 (lower byte)
- 172) Spectrum Analyzer Frequency Marker 5 (higher byte)
- 173) Spectrum Analyzer Frequency Marker 5 (lower byte)
- 174) Spectrum Analyzer Frequency Marker 6 (higher byte)
- 175) Spectrum Analyzer Frequency Marker 6 (lower byte)
- 176) Spectrum Analyzer Single Limit (highest byte)⁴⁴
- 177) Spectrum Analyzer Single Limit
- 178) Spectrum Analyzer Single Limit
- 179) Spectrum Analyzer Single Limit (lowest byte)
- 180) Multiple Upper Limit 1 Start X (Frequency in Hz) (highest byte)
- 181) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 182) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 183) Multiple Upper Limit 1 Start X (Frequency in Hz) (lowest byte)
- 184) Multiple Upper Limit 1 Start Y (Power Level) (highest byte)⁴⁵
- 185) Multiple Upper Limit 1 Start Y (Power Level)
- 186) Multiple Upper Limit 1 Start Y (Power Level)
- 187) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 188) Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
- 189) Multiple Upper Limit 1 End X (Frequency in Hz)
- 190) Multiple Upper Limit 1 End X (Frequency in Hz)
- 191) Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
- 192) Multiple Upper Limit 1 End Y (Power Level) (highest byte)⁴⁶
- 193) Multiple Upper Limit 1 End Y (Power Level)
- 194) Multiple Upper Limit 1 End Y (Power Level)
- 195) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 196-339) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 180-195 for format)

41 Value sent as (value in dBm * 1000) + 270,000)

42 Value sent as (value * 1000)

43 Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

44 Value sent as (value in dBm * 1000) + 270000

45 Value sent as (value in dBm * 1000) + 270000

46 Value sent as (value in dBm * 1000) + 270000

- 340) RBW Setting (highest byte)⁴⁷
- 341) RBW Setting
- 342) RBW Setting
- 343) RBW Setting (lowest byte)
- 344) VBW Setting (highest byte)⁴⁸
- 345) VBW Setting
- 346) VBW Setting
- 347) VBW Setting (lowest byte)
- 348) OCC BW Method⁴⁹
- 349) OCC BW % Value (highest byte)⁵⁰
- 350) OCC BW % Value
- 351) OCC BW % Value
- 352) OCC BW % Value (lowest byte)
- 353) OCC BW dBc (highest byte)⁵¹
- 354) OCC BW dBc
- 355) OCC BW dBc
- 356) OCC BW dBc (lowest byte)
- 357) Attenuation (highest byte)⁵²
- 358) Attenuation
- 359) Attenuation
- 360) Attenuation (lowest byte)
- 361) Antenna Index (0-14)
- 362-377) Antenna Name (16 bytes in ASCII)
- 246) Status Byte 1: (0b = Off, 1b = On)
 - (LSB) bit 0 : Site Master Marker 1 On/Off
 - bit 1 : Site Master Marker 2 On/Off
 - bit 2 : Site Master Marker 3 On/Off
 - bit 3 : Site Master Marker 4 On/Off
 - bit 4 : Site Master Marker 5 On/Off
 - bit 5 : Site Master Marker 6 On/Off
 - bits 6- 7 : Not Used
- 247) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Site Master Marker 2 Delta On/Off
 - bit 2 : Site Master Marker 3 Delta On/Off
 - bit 3 : Site Master Marker 4 Delta On/Off
 - bits 4-7: Not Used
- 248) Status Byte 3: (0b = Off, 1b = On)
 - (LSB) bit 0 : Spectrum Analyzer Mode Marker 1 On/Off
 - bit 1 : Spectrum Analyzer Mode Marker 2 On/Off
 - bit 2 : Spectrum Analyzer Mode Marker 3 On/Off
 - bit 3 : Spectrum Analyzer Mode Marker 4 On/Off
 - bit 4 : Spectrum Analyzer Mode Marker 5 On/Off
 - bit 5 : Spectrum Analyzer Mode Marker 6 On/Off

47 0000h = 10 kHz, 0001h = 30 kHz, 0002h = 100 kHz, 0003h = 1 MHz

48 0000h = 100 Hz, 0001h = 300 Hz, 0002h = 1 kHz, 0003h = 3 kHz, 0004h = 10 kHz, 0005h = 30 kHz, 0006h = 100 kHz, 0007h = 300 kHz

49 00h = % of power, 01h = dB down

50 0 – 99%

51 0 – 120 dBc

52 00h = 0 dB, 01h = 10 dB, 02h = 20 dB, 03h = 30 dB, 04h = 40 dB, 05h = 50dB

- bits 6 - 7 : Not Used
- 249) Status Byte 4: (0b = Off, 1b = On)
 (LSB) bit 0 : Not Used
 bit 1 : Spectrum Analyzer Mode Marker 2 Delta On/Off
 bit 2 : Spectrum Analyzer Mode Marker 3 Delta On/Off
 bit 3 : Spectrum Analyzer Mode Marker 4 Delta On/Off
 bits 4-7: Not Used
- 250) Status Byte 5: (0b = Off , 1b = On)
 (LSB) bit 0 : Site Master Limit Type (0b = Single, 1b = Multiple)
 bit 1 : Site Master Limit Beep ON/OFF
 bit 2 : FREQ-SWR Multiple Limit Segment 1 Status On/Off
 bit 3 : FREQ-SWR Multiple Limit Segment 2 Status On/Off
 bit 4 : FREQ-SWR Multiple Limit Segment 3 Status On/Off
 bit 5 : FREQ-SWR Multiple Limit Segment 4 Status On/Off
 bit 6 : FREQ-SWR Multiple Limit Segment 5 Status On/Off
 bit 7 : Not Used
- 251) Status Byte 6: (0b = Off, 1b = On)
 (LSB) bits 0-1: Not Used
 bit 2 : FREQ-RL Multiple Limit Segment 1 Status On/Off
 bit 3 : FREQ-RL Multiple Limit Segment 2 Status On/Off
 bit 4 : FREQ-RL Multiple Limit Segment 3 Status On/Off
 bit 5 : FREQ-RL Multiple Limit Segment 4 Status On/Off
 bit 6 : FREQ-RL Multiple Limit Segment 5 Status On/Off
 bit 7 : Not Used
- 252) Status Byte 7: (0b = Off, 1b = On)
 (LSB) bits 0-1: Not Used
 bit 2 : FREQ-CL Multiple Limit Segment 1 Status On/Off
 bit 3 : FREQ-CL Multiple Limit Segment 2 Status On/Off
 bit 4 : FREQ-CL Multiple Limit Segment 3 Status On/Off
 bit 5 : FREQ-CL Multiple Limit Segment 4 Status On/Off
 bit 6 : FREQ-CL Multiple Limit Segment 5 Status On/Off
 bit 7 : Not Used
- 253) Status Byte 8: (0b = Off, 1b = On)
 (LSB) bits 0-1: Not Used
 bit 2 : DIST-SWR Multiple Limit Segment 1 Status On/Off
 bit 3 : DIST-SWR Multiple Limit Segment 2 Status On/Off
 bit 4 : DIST-SWR Multiple Limit Segment 3 Status On/Off
 bit 5 : DIST-SWR Multiple Limit Segment 4 Status On/Off
 bit 6 : DIST-SWR Multiple Limit Segment 5 Status On/Off
 bit 7 : Not Used
- 254) Status Byte 9: (Ob = Off, 1b = On)
 (LSB) bits 0-1: Not Used
 bit 2 : DIST-RL Multiple Limit Segment 1 Status On/Off
 bit 3 : DIST-RL Multiple Limit Segment 2 Status On/Off
 bit 4 : DIST-RL Multiple Limit Segment 3 Status On/Off
 bit 5 : DIST-RL Multiple Limit Segment 4 Status On/Off
 bit 6 : DIST-RL Multiple Limit Segment 5 Status On/Off
 bit 7 : Not Used
- 255) Status Byte 10: (0b = Off/Beep if data is BELOW line , 1b = On/Beep if data is ABOVE line)
 (LSB) bit 0 : SPA Limit Type (0b = Single, 1b = Multiple)
 bit 1 : SPA Single Limit Beep On/Off
 bit 2 : SPA Single Limit Status On/Off
 bit 3 : SPA Single Limit Beep Level ABOVE/BELOW
 bit 4 : SPA Multiple Limit Upper Segment 1 Status On/Off

- bit 5 : SPA Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW⁵³
bit 6 : SPA Multiple Limit Upper Segment 2 Status On/Off
bit 7 : SPA Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 256) Status Byte 11 : (0b = Off/Beep if data is BELOW line , 1b = On/Beep if data is ABOVE line)
(LSB) bit 0 : SPA Multiple Limit Upper Segment 3 Status On/Off
bit 1 : SPA Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
bit 2 : SPA Multiple Limit Upper Segment 4 Status On/Off
bit 3 : SPA Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
bit 4 : SPA Multiple Limit Upper Segment 5 Status On/Off
bit 5 : SPA Multiple Limit Upper Segment 5 Beep Level ABOVE/BELOW
bit 6 : SPA Multiple Limit Lower Segment 1 Status On/Off
bit 7 : SPA Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW⁵⁴
- 257) Status Byte 12 : (0b = Off/Beep if data is BELOW line , 1b = On/Beep if data is ABOVE line)
(LSB) bit 0 : SPA Multiple Limit Lower Segment 2 Status On/Off
bit 1 : SPA Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
bit 2 : SPA Multiple Limit Lower Segment 3 Status On/Off
bit 3 : SPA Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
bit 4 : SPA Multiple Limit Lower Segment 4 Status On/Off
bit 5 : SPA Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW
bit 6 : SPA Multiple Limit Lower Segment 5 Status On/Off
bit 7 : SPA Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 394) Status Byte 13:
(LSB) bits 0 - 1 : DTF Windowing Mode
bit: 1 0
| |
0 0 - Rectangular (No Windowing)
0 1 - Nominal Side Lobe
1 0 - Low Side Lobe
1 1 - Minimum Side Lobe
bits 2 - 7 : Not Used
- 395) Status Byte 14: (0b = Off, 1b = On)
(LSB) bit 0 : Fixed CW Mode On/Off
bit 1 : Site Master Cal On/Off
bit 2 : LCD Back Light On/Off
bit 3 : Measurement Unit Metric/English (0b = English, 1b = Metric)
bit 4 : InstaCal On/Off
bits 5 -7 : Not Used
- 396) Status Byte 15: (0b = Off, 1b = On)
(LSB) bit 0 : Antenna Factors Correction On/Off
bit 1 : Not Used
bit 2 : SPA Cal Status On/Off
bits 3-4 : Amplitude Units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
bits 5-6 : Detection alg (00b = pos. peak 01b = average 10b = neg. peak, 11b= sampling mode)
bit 7 : Not Used
- 397) Status Byte 16: (0b = Off, 1b = On)
(LSB) bit 0: Serial Port Echo Status On/Off
bit 1: Return Sweep Time On/Off
bit 2: RBW Coupling (1b = auto, 0b = manual)
bit 3: VBW Coupling (1b = auto, 0b = manual)
bit 4: Attenuation Coupling (1b = auto, 0b = manual)

53 Beep level is always 1b for upper segmented limit line

54 Beep level is always 0b for lower segmented limit line

- bit 5: Channel Power On/Off
- bit 6: Adjacent Channel Power On/Off
- bit 7: Not Used
- 398) Printer Type⁵⁵
- 399) Current Language
(0 = English, 1 = French, 2 = German, 3 = Spanish, 4 = Chinese, 5 = Japanese)
- 400) LCD Contrast Value (0-255)
- 401) RTC battery ⁵⁶(higher byte)
- 402) RTC battery (lower byte)
- 403) PC board revision ⁵⁷(higher byte)
- 404) PC board revision (lower byte)
- 405) Reference Level Offset⁵⁸ (highest byte)
- 406) Reference Level Offset
- 407) Reference Level Offset
- 408) Reference Level Offset (lowest byte)
- 409-434) Not Used

Trigger Self-Test – Control Byte #21 (15h)

Description: Triggers a self test on the Site Master.

Bytes to Follow: 0 bytes

Site Master Returns: 12 bytes

- 1) Self-test report: (0b = Fail, 1b = Pass)
 - (LSB) bit 0 : Phase Lock Loop
 - bit 1 : Integrator
 - bit 2 : Battery
 - bit 3 : Temperature
 - bit 4 : EEPROM read/write
 - bit 5 : RTC Battery
 - bits 6- 7 : Not Used
- 2) Self-test report: (0b = Fail, 1b = Pass)
 - (LSB) bit 0 : Spectrum Analyzer Lock
 - bits 1–7 : Not Used
- 3) Battery Voltage (higher byte)
- 4) Battery Voltage (lower byte)
- 5) Temperature (higher byte)
- 6) Temperature (lower byte)
- 7) Lock Fail Counter (higher byte)
- 8) Lock Fail Counter (lower byte)
- 9) Integrator Fail Counter (higher byte)
- 10) Integrator Fail Counter (lower byte)
- 11) Spectrum Analyzer Lock Fail Counter (higher byte)
- 12) Spectrum Analyzer Lock Fail Counter (lower byte)

55 See Control Byte #30 for supported printers.

56 Value sent as Volts * 10. For example, 2.7V = 27.

57 This value is for internal use only.

58 Value sent as (value in dBm * 1000) + 270,000

Notes:

Battery Voltage in 1/10th of a Volt (e.g. 124 = 12.4 Volts)

Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2°C) or degree Fahrenheit (e.g., 934 = 93.4°F), depending on the current measurement unit (Metric or English) selected

Read Fail Counter – Control Byte #22 (16h)

Description: Reads the Fail Counter. Values are integer numbers of failures.

Bytes to Follow: 0 bytes

Site Master Returns: 8 bytes

- 1) Value of SM Lock Fail Counter (higher byte)
- 2) Value of SM Lock Fail Counter (lower byte)
- 3) Value of Integration Fail Counter (higher byte)
- 4) Value of Integration Fail Counter (lower byte)
- 5) Value of SA Lock Fail Counter (higher byte)
- 6) Value of SA Lock Fail Counter (lower byte)
- 7) Value of SA Fatal Error Counter (higher byte)
- 8) Value of SA Fatal Error Counter (lower byte)

Query Trace Names – Control Byte #24 (18h)

Description: Returns a list of all saved traces.

Bytes to Follow: 0 bytes

Site Master Returns: 3 + (41 x number of saved traces) bytes

1-2) # of saved traces

For each trace:

1-2) Trace Index

3) Measurement Mode (refer to Control Byte #3)

4-21) Date/Time in string format (“MM/DD/YYYYHH:MM:SS”)

22-25) Date/Time as Unsigned Long Integer (Seconds Since January 1, 1970)

26-41) Trace Name (16 bytes)

255 (FFh) Operation Complete Byte

Delete Sweep Trace – Control Byte #25 (19h)

Description: Delete single trace or all stored sweep traces in Site Master.

Bytes to Follow: 1 byte

- 1) 0 - Delete all traces
X - Delete single trace #X

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte

Upload SPA Sweep Trace – Control Byte #26 (1Ah)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features, use Control Byte #33 (21h). This command cannot be used with a frequency converter module attached (Option 6 required).

Description: Uploads a spectrum analyzer sweep trace to Site Master.

For data formats, refer to the footnotes listed beside the return bytes.

Bytes to Follow: 1921 bytes

- 1-2) # of following bytes (1919)
- 3) Measurement Mode⁵⁹
- 4-7) Time/Date (long integer format⁶⁰)
- 8-17) Date in String Format (mm/dd/yyyy)
- 18-25) Time in String Format (hh:mm:ss)
- 26-41) Reference Number/Trace Name (16 bytes in ASCII)
- 42-43) # data points (400)
- 44) Start Frequency (in Hz) (highest byte)
- 45) Start Frequency (in Hz)
- 46) Start Frequency (in Hz)
- 47) Start Frequency (in Hz) (lowest byte)
- 48) Stop Frequency (in Hz) (highest byte)
- 49) Stop Frequency (in Hz)
- 50) Stop Frequency (in Hz)
- 51) Stop Frequency (in Hz) (lowest byte)
- 52) Center Frequency (in Hz) (highest byte)
- 53) Center Frequency (in Hz)
- 54) Center Frequency (in Hz)
- 55) Center Frequency (in Hz) (lowest byte)
- 56) Frequency Span (in Hz) (highest byte)
- 57) Frequency Span (in Hz)
- 58) Frequency Span (in Hz)
- 59) Frequency Span (in Hz) (lowest byte)
- 60) Ref Level⁶¹ (highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (lowest byte)
- 64) Scale per div⁶² (highest byte)
- 65) Scale per div
- 66) Scale per div
- 67) Scale per div (lowest byte)
- 68) Marker 1⁶³ (higher byte)
- 69) Marker 1 (lower byte)
- 70) Marker 2 (higher byte)

59 See Control Byte #3 "Select Measurement Mode" for measurement modes.

60 Time/Date long integer representation is in seconds since January 1, 1997.

61 Value sent as (value in dBm * 1000) + 270,000

62 Value sent as (value * 1000)

63 Marker values are sent as # of data point on display.

- 71) Marker 2 (lower byte)
- 72) Marker 3 (higher byte)
- 73) Marker 3 (lower byte)
- 74) Marker 4 (higher byte)
- 75) Marker 4 (lower byte)
- 76) Marker 5 (higher byte)
- 77) Marker 5 (lower byte)
- 78) Marker 6 (higher byte)
- 79) Marker 6 (lower byte)
- 80) Single Limit⁶⁴ (highest byte)
- 81) Single Limit
- 82) Single Limit
- 83) Single Limit (lowest byte)
- 84) Multiple Upper Limit 1 Start X (Frequency in Hz) (highest byte)
- 85) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 86) Multiple Upper Limit 1 Start X (Frequency in Hz)
- 87) Multiple Upper Limit 1 Start X (Frequency in Hz) (lowest byte)
- 88) Multiple Upper Limit 1 Start Y (Power Level) (highest byte)
- 89) Multiple Upper Limit 1 Start Y (Power Level)
- 90) Multiple Upper Limit 1 Start Y (Power Level)
- 91) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 92) Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
- 93) Multiple Upper Limit 1 End X (Frequency in Hz)
- 94) Multiple Upper Limit 1 End X (Frequency in Hz)
- 95) Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
- 96) Multiple Upper Limit 1 End Y (Power Level) (highest byte)
- 97) Multiple Upper Limit 1 End Y (Power Level)
- 98) Multiple Upper Limit 1 End Y (Power Level)
- 99) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 100-243) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 84-99 for format)
- 244) RBW Setting⁶⁵ (highest byte)
- 245) RBW Setting
- 246) RBW Setting
- 247) RBW Setting (lowest byte)
- 248) VBW Setting⁶⁶ (highest byte)
- 249) VBW Setting
- 250) VBW Setting
- 251) VBW Setting (lowest byte)
- 252) OCC BW Method (00h = % of power, 01h = dB down)
- 253) OCC BW % Value (0-99) (highest byte)
- 254) OCC BW % Value (0-99)
- 255) OCC BW % Value (0-99)
- 256) OCC BW % Value (0-99) (lowest byte)
- 257) OCC BW dBc (0-120) (highest byte)
- 258) OCC BW dBc (0-120)
- 259) OCC BW dBc (0-120)
- 260) OCC BW dBc (0-120) (lowest byte)
- 261) Attenuation⁶⁷ (highest byte)

64 All amplitude values are sent as (value in dBm * 1000) + 270,000

65 Valid frequencies (in Hz) are 10,000 30,000 100,000 1,000,000

66 Valid frequencies (in Hz) are 100, 300, 1,000 3,000 10,000 30,000 100,000 300,000

67 Value sent as (value * 1000)

- 262) Attenuation
- 263) Attenuation
- 264) Attenuation (lowest byte)
- 265-280) Antenna Name (16 bytes in ASCII)
- 281) Status Byte 1: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7: Not Used
- 282) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bits 4-7: Not Used
- 283) Status Byte 3: (0b = Off, 1b = On)
 - (LSB) bit 0 : Antenna Factor Correction On/Off
 - bits 1-2 : Detection alg (00b = pos. peak 01b = average 10b = neg. peak)
 - bits 3-4 : Amplitude Units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
 - bit 5: Channel Power On/Off
 - bit 6: Adjacent Channel Power Ratio On/Off
 - bit 7: Not Used
- 284) Status Byte 4
 - (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Limit Type (0b = Single, 1b = Multiple)
 - bit 1 : Single Limit On/Off
 - bit 2 : Single Limit Beep Level (0b = beep when data is below line 1b = above)
 - bit 3 : Not Used
 - bit 4 : Multiple Limit Upper Segment 1 Status On/Off
 - bit 5 : Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW
 - bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 - bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 285) Status Byte 5
 - (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 - bit 1 : Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
 - bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 - bit 3 : Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
 - bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 - bit 5 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
 - bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 - bit 7 : Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW
- 286) Status Byte 6
 - (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Multiple Limit Lower Segment 2 Status On/Off
 - bit 1 : Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
 - bit 2 : Multiple Limit Lower Segment 3 Status On/Off
 - bit 3 : Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
 - bit 4 : Multiple Limit Lower Segment 4 Status On/Off
 - bit 5 : Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW
 - bit 6 : Multiple Limit Lower Segment 5 Status On/Off
 - bit 7 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 287) Status Byte 7
 - (LSB) bits 0-6: Number of Sweeps to Average (1-25, 1 implies no averaging)
 - bit 7 : Not Used

- 288) Reference Level Offset⁶⁸ (highest byte)
- 289) Reference Level Offset
- 290) Reference Level Offset
- 291) Reference Level Offset (lowest byte)
- 292-321) Not Used
- 322-1921) Sweep Data
 - (400 points * 4 bytes/point = 1600 bytes)
 - 4 bytes for each data point
 - 1. dBm⁶⁹ (highest byte)
 - 2. dBm
 - 3. dBm
 - 4. dBm (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Not enough bytes transferred
- 225 (E1h) Memory Error: Not enough memory to store data
- 238 (EEh) Time-out Error

Query Sweep Memory – Control Byte #27 (1Bh)

Description: Queries Site Master for percentage of memory that is available for trace storage.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) % of memory currently available (0 to 100)

Upload Site Master VNA Sweep Trace – Control Byte #28 (1Ch)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features use Control Byte #36 (24h).

Description: Uploads a Site Master VNA Mode (SWR, return loss, cable loss, DTF) sweep trace to the Site Master.

Bytes to Follow: 1255, 2287, or 4351 bytes (depending on resolution)

- 1-2) # of following bytes
- 3) Measurement Mode⁷⁰
- 4-7) Time/Date (in Long Integer)
- 8-17) Date in String Format (mm/dd/yyyy)
- 18-25) Time in String Format (hh:mm:ss)
- 26-41) Reference number stamp (16 ASCII bytes)
- 42-43) # of data points
- 44) Start Frequency (highest byte)⁷¹
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (lowest byte)

68 Value sent as (Value in dBm * 1000) + 270,000

69 Value sent as (Value in dBm * 1000) + 270,000

70 See Control Byte #3 "Set Measurement Mode" for available measurement modes.

71 Frequency in Hz

- 48) Stop Frequency (highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (lowest byte)
- 52) Minimum Frequency Step Size (highest byte)
- 53) Minimum Frequency Step Size
- 54) Minimum Frequency Step Size
- 55) Minimum Frequency Step Size (lowest byte)
- 56) Scale Top (highest byte)⁷²
- 57) Scale Top
- 58) Scale Top
- 59) Scale Top (lowest byte)
- 60) Scale Bottom (highest byte)
- 61) Scale Bottom
- 62) Scale Bottom
- 63) Scale Bottom (lowest byte)
- 64) Frequency Marker 1 (higher byte)⁷³
- 65) Frequency Marker 1 (lower byte)
- 66) Frequency Marker 2 (higher byte)
- 67) Frequency Marker 2 (lower byte)
- 68) Frequency Marker 3 (higher byte)
- 69) Frequency Marker 3 (lower byte)
- 70) Frequency Marker 4 (higher byte)
- 71) Frequency Marker 4 (lower byte)
- 72) Frequency Marker 5 (higher byte)
- 73) Frequency Marker 5 (lower byte)
- 74) Frequency Marker 6 (higher byte)
- 75) Frequency Marker 6 (lower byte)
- 76) Single Limit Line Value (highest byte)⁷⁴
- 77) Single Limit Line Value
- 78) Single Limit Line Value
- 79) Single Limit Line Value (lowest byte)
- 80) Multiple Limit Segment # (1)
- 81) Multiple Limit Segment Status (00h = Off, 01h = On)
- 82) Multiple Limit Start X (highest byte)⁷⁵
- 83) Multiple Limit Start X
- 84) Multiple Limit Start X
- 85) Multiple Limit Start X (lowest byte)
- 86) Multiple Limit Start Y (higher byte)
- 87) Multiple Limit Start Y (lower byte)
- 88) Multiple Limit End X (highest byte)
- 89) Multiple Limit End X
- 90) Multiple Limit End X
- 91) Multiple Limit End X (lowest byte)
- 92) Multiple Limit End Y (higher byte)
- 93) Multiple Limit End Y (lower byte)
- 94-149) Repeat bytes 80-93 for segments 2-5

72 See Control Byte #4, "Set Site Master Scale" for data format.

73 Marker point = (Number of data points – 1) * (marker freq – start freq) / (stop freq – start freq)

74 See Control Byte #6, "Set Site Master Single Limit" for data format

75 See Control Byte #112, "Set Site Master Segmented Limit Lines" for data format.

- 150) Start Distance (highest byte)⁷⁶
- 151) Start Distance
- 152) Start Distance
- 153) Start Distance (lowest byte)
- 154) Stop Distance (highest byte)
- 155) Stop Distance
- 156) Stop Distance
- 157) Stop Distance (lowest byte)
- 158) Distance Marker 1 (higher byte)⁷⁷
- 159) Distance Marker 1 (lower byte)
- 160) Distance Marker 2 (higher byte)
- 161) Distance Marker 2 (lower byte)
- 162) Distance Marker 3 (higher byte)
- 163) Distance Marker 3 (lower byte)
- 164) Distance Marker 4 (higher byte)
- 165) Distance Marker 4 (lower byte)
- 166) Distance Marker 5 (higher byte)
- 167) Distance Marker 5 (lower byte)
- 168) Distance Marker 6 (higher byte)
- 169) Distance Marker 6 (lower byte)
- 170) Relative Propagation Velocity (highest byte)⁷⁸
- 171) Relative Propagation Velocity
- 172) Relative Propagation Velocity
- 173) Relative Propagation Velocity (lowest byte)
- 174) Cable Loss (highest byte)⁷⁹
- 175) Cable Loss
- 176) Cable Loss
- 177) Cable Loss (lowest byte)
- 178) Status Byte 1: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7 : Not Used
- 179) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 2 Delta On/Off
 - bit 1 : Marker 3 Delta On/Off
 - bit 2 : Marker 4 Delta On/Off
 - bits 3-7: Not Used
- 180) Status Byte 3: (0b = Off, 1b = On)⁸⁰
 - (LSB) bit 0 : Single Limit On/Off
 - bit 1: CW On/Off
 - bits 2-3: Not Used
 - bit 4 : InstaCal On/Off

76 Distance data uses units 1/100,000m or 1/100,000 ft

77 Marker point = (# of data points – 1) * (marker dist – start dist) / (stop dist – start dist)

78 Relative Propagation Velocity uses units 1/100,000

79 Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft

80 Bits (4,5) are as follows: (0,0)=Cal Off, (0,1)=OSL Cal, (1,0) = Impossible, (1,1) = InstaCal

bit 5 : Cal On/Off
bit 6 : Limit Type (0b = Single; 1b = Multiple)
bit 7 : Unit of measurement (1b = Metric, 0b = English)

181) Status Byte 4:

(LSB) bit 0 - 1 : DTF Windowing Mode
bit: 1 0
| |
0 0 - Rectangular (No Windowing)
0 1 - Nominal Side Lobe
1 0 - Low Side Lobe
1 1 - Minimum Side Lobe
bits 2 - 7 : Not Used

182-215) Not Used

216-1255) Sweep Data (130 points * 8 bytes/point= 1040 bytes)

216-2287) (259 points * 8 bytes/point= 2072 bytes)

216-4351) (517 points * 8 bytes/point= 4136 bytes)

8 bytes for each data point

1. Gamma⁸¹ MSB
2. Gamma
3. Gamma
4. Gamma LSB
5. Phase⁸² MSB
6. Phase
7. Phase
8. Phase LSB

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Not enough bytes transferred
- 225 (E1h) Memory Error: Not enough memory to store data
- 238 (EEh) Time-out Error

Notes:

return loss = - 20* (log(Gamma) / log(10))

VSWR = (1+Gamma)/(1-Gamma)

Phase compares the reflected to the incident (reference)

Query System Status – Control Byte #29 (1Dh)

NOTE: This command is new to the S33xD. Use it instead of Control Byte #20 to access new features.

Description: Queries the Site Master for current system settings. Unlike Control Byte #20, this command returns only data that is valid for the active mode, plus system settings, such as the defined printer.

The current state of the Site Master represents the state after the last successful remote control operation. For example, change the start frequency to another valid frequency while in remote mode, then execute control byte #29. The new start frequency will be returned in the defined bytes, even though no sweep has been performed with that frequency.

Bytes to Follow: 0 bytes

Site Master Returns:

For All Modes:

81 Gamma data uses 1/1000 units.

82 Phase data uses 1/10 degree unit.

- 1) Number of Following Bytes (higher byte)
- 2) Number of Following Bytes (lower byte)
- 3) Measurement Mode⁸³
- 4) Printer Type⁸⁴
- 5) Current Language
(00h = English, 01h = French, 02h = German, 03h = Spanish, 04h = Chinese, 05h = Japanese)
- 6) LCD Contrast Value (0-255)
- 7) Date Format
(00h = MM/DD/YYYY, 01h = DD/MM/YYYY, 02h = YYYY/MM/DD)
- 8) RTC battery⁸⁵ (higher byte)
- 9) RTC battery (lower byte)
- 10) PC Board Revision⁸⁶ (higher byte)
- 11) PC Board Revision (lower byte)
- 12-25) Not Used

For Site Master VNA Modes:

- 26) Site Master VNA Mode Data Points (higher byte)
- 27) Site Master VNA Mode Data Points (lower byte)
- 28) VNA Start Frequency (Frequency in Hz) (highest byte)
- 29) VNA Start Frequency
- 30) VNA Start Frequency
- 31) VNA Start Frequency (lowest byte)
- 32) VNA Stop Frequency (Frequency in Hz) (highest byte)
- 33) VNA Stop Frequency
- 34) VNA Stop Frequency
- 35) VNA Stop Frequency (lowest byte)
- 36) VNA Scale Start (highest byte)⁸⁷
- 37) VNA Scale Start
- 38) VNA Scale Start
- 39) VNA Scale Start (lowest byte)
- 40) VNA Scale Stop (highest byte)
- 41) VNA Scale Stop
- 42) VNA Scale Stop
- 43) VNA Scale Stop (lowest byte)
- 44) VNA Frequency Marker 1 (higher byte)⁸⁸
- 45) VNA Frequency Marker 1 (lower byte)
- 46) VNA Frequency Marker 2 (higher byte)
- 47) VNA Frequency Marker 2 (lower byte)
- 48) VNA Frequency Marker 3 (higher byte)
- 49) VNA Frequency Marker 3 (lower byte)
- 50) VNA Frequency Marker 4 (higher byte)
- 51) VNA Frequency Marker 4 (lower byte)
- 52) VNA Frequency Marker 5 (higher byte)
- 53) VNA Frequency Marker 5 (lower byte)
- 54) VNA Frequency Marker 6 (higher byte)
- 55) VNA Frequency Marker 6 (lower byte)

83 Refer to Control Byte #3 "Select Measurement Mode" for valid measurement modes.

84 See Control Byte #30 for supported printers.

85 Value sent as Volts * 10. For example, 2.7 V = 27.

86 This value is for internal use only.

87 See "Set Site Master VNA Scale" Control Byte #4 for data format.

88 Marker Point = (# data points - 1) * (marker freq - start freq) / (stop freq - start freq)

- 56) Site Master VNA Single Limit (highest byte)⁸⁹
- 57) Site Master VNA Single Limit
- 58) Site Master VNA Single Limit
- 59) Site Master VNA Single Limit (lowest byte)
- 60) VNA Multiple Limit Segment # (1)
- 61) VNA Multiple Limit Segment Status (0h = Off, 01h = On)
- 62) VNA Multiple Limit Segment Start X (highest byte)⁹⁰
- 63) VNA Multiple Limit Segment Start X
- 64) VNA Multiple Limit Segment Start X
- 65) VNA Multiple Limit Segment Start X (lowest byte)
- 66) VNA Multiple Limit Segment Start Y (higher byte)
- 67) VNA Multiple Limit Segment Start Y (lower byte)
- 68) VNA Multiple Limit Segment End X (highest byte)
- 69) VNA Multiple Limit Segment End X
- 70) VNA Multiple Limit Segment End X
- 71) VNA Multiple Limit Segment End X (lowest byte)
- 72) VNA Multiple Limit Segment End Y (higher byte)
- 73) VNA Multiple Limit Segment End Y (lower byte)
- 74-129) Repeat bytes 60 – 73 for segments 2 - 5
- 130) Start Distance (highest byte)⁹¹
- 131) Start Distance
- 132) Start Distance
- 133) Start Distance (lowest byte)
- 134) Stop Distance (highest byte)
- 135) Stop Distance
- 136) Stop Distance
- 137) Stop Distance (lowest byte)
- 138) Distance Marker 1 (higher byte)⁹²
- 139) Distance Marker 1 (lower byte)
- 140) Distance Marker 2 (higher byte)
- 141) Distance Marker 2 (lower byte)
- 142) Distance Marker 3 (higher byte)
- 143) Distance Marker 3 (lower byte)
- 144) Distance Marker 4 (higher byte)
- 145) Distance Marker 4 (lower byte)
- 146) Distance Marker 5 (higher byte)
- 147) Distance Marker 5 (lower byte)
- 148) Distance Marker 6 (higher byte)
- 149) Distance Marker 6 (lower byte)
- 150) Relative Propagation Velocity (highest byte)⁹³
- 151) Relative Propagation Velocity
- 152) Relative Propagation Velocity
- 153) Relative Propagation Velocity (lowest byte)
- 154) Cable Loss (highest byte)⁹⁴
- 155) Cable Loss

89 See Control Byte #6, "Set Site Master VNA Single Limit" for data format.

90 See Control Byte #112, "Set Site Master VNA Segmented Limit Lines" for data format.

91 Distance data uses units 1/100,000m or 1/100,000 ft

92 Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

93 Relative Propagation Velocity uses units 1/100,000.

94 Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

- 156) Cable Loss
- 157) Cable Loss (lowest byte)
- 158) Average Cable Loss⁹⁵ (highest byte)
- 159) Average Cable Loss
- 160) Average Cable Loss
- 161) Average Cable Loss (lowest byte)
- 162) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Site Master Marker 1 On/Off
 - bit 1 : Site Master Marker 2 On/Off
 - bit 2 : Site Master Marker 3 On/Off
 - bit 3 : Site Master Marker 4 On/Off
 - bit 4 : Site Master Marker 5 On/Off
 - bit 5 : Site Master Marker 6 On/Off
 - bits 6- 7 : Not Used
- 163) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Site Master Marker 2 Delta On/Off
 - bit 2 : Site Master Marker 3 Delta On/Off
 - bit 3 : Site Master Marker 4 Delta On/Off
 - bits 4-7: Not Used
- 164) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0 : Site Master Limit Type (0b = Single, 1b = Multiple)
 - bit 1 : Site Master Limit Beep On/Off
 - bit 2 : FREQ-SWR Multiple Limit Segment 1 Status On/Off
 - bit 3 : FREQ-SWR Multiple Limit Segment 2 Status On/Off
 - bit 4 : FREQ-SWR Multiple Limit Segment 3 Status On/Off
 - bit 5 : FREQ-SWR Multiple Limit Segment 4 Status On/Off
 - bit 6 : FREQ-SWR Multiple Limit Segment 5 Status On/Off
 - bit 7 : Site Master Single Limit Status On/Off
- 165) Status Byte 4: (0b = Off, 1b = On)
 - (LSB) bits 0-1: Not Used
 - bit 2: FREQ-RL Multiple Limit Segment 1 Status On/Off
 - bit 3: FREQ-RL Multiple Limit Segment 2 Status On/Off
 - bit 4: FREQ-RL Multiple Limit Segment 3 Status On/Off
 - bit 5: FREQ-RL Multiple Limit Segment 4 Status On/Off
 - bit 6: FREQ-RL Multiple Limit Segment 5 Status On/Off
 - bit 7: Not Used
- 166) Status Byte 5: (0b = Off, 1b = On)
 - (LSB) bits 0-1: Not Used
 - bit 2: FREQ-CL Multiple Limit Segment 1 Status On/Off
 - bit 3: FREQ-CL Multiple Limit Segment 2 Status On/Off
 - bit 4: FREQ-CL Multiple Limit Segment 3 Status On/Off
 - bit 5: FREQ-CL Multiple Limit Segment 4 Status On/Off
 - bit 6: FREQ-CL Multiple Limit Segment 5 Status On/Off
 - bit 7: Not Used
- 167) Status Byte 6: (0b = Off, 1b = On)
 - (LSB) bits 0-1: Not Used
 - bit 2 : DIST-SWR Multiple Limit Segment 1 Status On/Off
 - bit 3 : DIST-SWR Multiple Limit Segment 2 Status On/Off
 - bit 4 : DIST-SWR Multiple Limit Segment 3 Status On/Off
 - bit 5 : DIST-SWR Multiple Limit Segment 4 Status On/Off
 - bit 6 : DIST-SWR Multiple Limit Segment 5 Status On/Off

95 Average Cable Loss is dB * 1000.

- bit 7 : Not Used
- 168) Status Byte 7: (0b = Off, 1b = On)
 - (LSB) bits 0-1: Not Used
 - bit 2: DIST-RL Multiple Limit Segment 1 Status On/Off
 - bit 3: DIST-RL Multiple Limit Segment 2 Status On/Off
 - bit 4: DIST-RL Multiple Limit Segment 3 Status On/Off
 - bit 5: DIST-RL Multiple Limit Segment 4 Status On/Off
 - bit 6: DIST-RL Multiple Limit Segment 5 Status On/Off
 - bit 7: Not Used
- 169) Status Byte 8:
 - (LSB) bits 0 - 1 : DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bit 2 : Serial Port Echo Status On/Off
 - bits 3 - 7 : Not Used
- 170) Status Byte 9: (0b = Off, 1b = On)
 - (LSB) bit 0 : Fixed CW Mode On/Off
 - bit 1 : Site Master VNA Cal On/Off
 - bit 2 : LCD Back Light On/Off
 - bit 3 : Measurement Unit Metric/English (0b = English, 1b = Metric)
 - bit 4 : InstaCal On/Off
 - bits 5-6: Not Used
 - bit 7 : Cal Mode (0b = OSL Cal, 1b = FlexCal)
- 171) VNA Signal Standard⁹⁶ (higher byte)
- 172) VNA Signal Standard (lower byte)
- 173-300) Not Used

For Spectrum Analyzer and Transmission Measurement (Option 21) Modes:

- 26) Spectrum Analyzer Mode Data Points (higher byte)
- 27) Spectrum Analyzer Mode Data Points (lower byte)
- 28) Spectrum Analyzer Start Frequency⁹⁷ (highest byte)
- 29) Spectrum Analyzer Start Frequency
- 30) Spectrum Analyzer Start Frequency
- 31) Spectrum Analyzer Start Frequency (lowest byte)
- 32) Spectrum Analyzer Stop Frequency (highest byte)
- 33) Spectrum Analyzer Stop Frequency
- 34) Spectrum Analyzer Stop Frequency
- 35) Spectrum Analyzer Stop Frequency (lowest byte)
- 36) Spectrum Analyzer Center Frequency (highest byte)
- 37) Spectrum Analyzer Center Frequency
- 38) Spectrum Analyzer Center Frequency
- 39) Spectrum Analyzer Center Frequency (lowest byte)
- 40) Spectrum Analyzer Frequency Span (highest byte)
- 41) Spectrum Analyzer Frequency Span
- 42) Spectrum Analyzer Frequency Span
- 43) Spectrum Analyzer Frequency Span (lowest byte)
- 44) Spectrum Analyzer Minimum Frequency Step Size (highest byte)

96 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

97 Scaled by frequency scale factor (bytes 321-322)

- 45) Spectrum Analyzer Minimum Frequency Step Size
- 46) Spectrum Analyzer Minimum Frequency Step Size
- 47) Spectrum Analyzer Minimum Frequency Step Size (lowest byte)
- 48) Ref Level (highest byte)⁹⁸
- 49) Ref Level
- 50) Ref Level
- 51) Ref Level (lowest byte)
- 52) Scale per div (highest byte)⁹⁹
- 53) Scale per div
- 54) Scale per div
- 55) Scale per div (lowest byte)
- 56) Spectrum Analyzer Frequency Marker 1 (higher byte)¹⁰⁰
- 57) Spectrum Analyzer Frequency Marker 1 (lower byte)
- 58) Spectrum Analyzer Frequency Marker 2 (higher byte)
- 59) Spectrum Analyzer Frequency Marker 2 (lower byte)
- 60) Spectrum Analyzer Frequency Marker 3 (higher byte)
- 61) Spectrum Analyzer Frequency Marker 3 (lower byte)
- 62) Spectrum Analyzer Frequency Marker 4 (higher byte)
- 63) Spectrum Analyzer Frequency Marker 4 (lower byte)
- 64) Spectrum Analyzer Frequency Marker 5 (higher byte)
- 65) Spectrum Analyzer Frequency Marker 5 (lower byte)
- 66) Spectrum Analyzer Frequency Marker 6 (higher byte)
- 67) Spectrum Analyzer Frequency Marker 6 (lower byte)
- 68) Spectrum Analyzer Single Limit (highest byte)¹⁰¹
- 69) Spectrum Analyzer Single Limit
- 70) Spectrum Analyzer Single Limit
- 71) Spectrum Analyzer Single Limit (lowest byte)
- 72) SPA Multiple Upper Limit 1 Start X¹⁰² (highest byte)
- 73) SPA Multiple Upper Limit 1 Start X
- 74) SPA Multiple Upper Limit 1 Start X
- 75) SPA Multiple Upper Limit 1 Start X (lowest byte)
- 76) SPA Multiple Upper Limit 1 Start Y (Power Level) (highest byte)¹⁰³
- 77) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 78) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 79) SPA Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 80) SPA Multiple Upper Limit 1 End X¹⁰⁴ (highest byte)
- 81) SPA Multiple Upper Limit 1 End X
- 82) SPA Multiple Upper Limit 1 End X
- 83) SPA Multiple Upper Limit 1 End X (lowest byte)
- 84) SPA Multiple Upper Limit 1 End Y (Power Level) (highest byte)¹⁰⁵
- 85) SPA Multiple Upper Limit 1 End Y (Power Level)
- 86) SPA Multiple Upper Limit 1 End Y (Power Level)

98 Value sent as (value in dBm * 1000) + 270,000)

99 Value sent as (value * 1000)

100 Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

101 Value sent as (value in dBm * 1000) + 270000

102 Scaled by Frequency Scale Factor (bytes 321-322)

103 Value sent as (value in dBm * 1000) + 270000

104 Scaled by Frequency Scale Factor (bytes 321-322)

105 Value sent as (value in dBm * 1000) + 270000

- 87) SPA Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 88-231) SPA Multiple Upper Limits 2-5, SA Multiple Lower Limits 1-5 (see bytes 72-87 for format)
- 232) RBW Setting (highest byte)¹⁰⁶
- 233) RBW Setting
- 234) RBW Setting
- 235) RBW Setting (lowest byte)
- 236) VBW Setting (highest byte)¹⁰⁷
- 237) VBW Setting
- 238) VBW Setting
- 239) VBW Setting (lowest byte)
- 240) OCC BW Method¹⁰⁸
- 241) OCC BW % Value (highest byte)¹⁰⁹
- 242) OCC BW % Value
- 243) OCC BW % Value
- 244) OCC BW % Value (lowest byte)
- 245) OCC BW dBc (highest byte)¹¹⁰
- 246) OCC BW dBc
- 247) OCC BW dBc
- 248) OCC BW dBc (lowest byte)
- 249) Attenuation (highest byte)
- 250) Attenuation
- 251) Attenuation
- 252) Attenuation (lowest byte)
- 253) Antenna Index(0-14)
- 254-269) Antenna Name (16 bytes in ASCII)
- 270) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Spectrum Analyzer Mode Marker 1 On/Off
 - bit 1 : Spectrum Analyzer Mode Marker 2 On/Off
 - bit 2 : Spectrum Analyzer Mode Marker 3 On/Off
 - bit 3 : Spectrum Analyzer Mode Marker 4 On/Off
 - bit 4 : Spectrum Analyzer Mode Marker 5 On/Off
 - bit 5 : Spectrum Analyzer Mode Marker 6 On/Off
 - bits 6 - 7 : Not Used
- 271) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Transmission Mode Cal Status On/Off (Option 21)
 - bit 1 : Spectrum Analyzer Mode Marker 2 Delta On/Off
 - bit 2 : Spectrum Analyzer Mode Marker 3 Delta On/Off
 - bit 3 : Spectrum Analyzer Mode Marker 4 Delta On/Off
 - bit 4 : Pre Amp Mode (0b = Manual, 1b = Auto)
 - bit 5 : Pre Amp Status On/Off
 - bit 6 : Dynamic Attenuation On/Off
 - bit 7: Reserved
- 272) Status Byte 3: (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - LSB) bit 0 : SPA Limit Type (0b = Single, 1b = Multiple)
 - bit 1 : SPA Single Limit Beep On/Off
 - bit 2 : SPA Single Limit Status On/Off
 - bit 3 : SPA Single Limit Beep Level ABOVE/BELOW

106 RBW frequency sent in Hz.

107 VBW frequency sent in Hz.

108 00h = % of power, 01h = dB down

109 0 – 99%

110 0 – 120 dBc

- bit 4 : SPA Multiple Limit Upper Segment 1 Status On/Off
- bit 5 : SPA Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW¹¹¹
- bit 6 : SPA Multiple Limit Upper Segment 2 Status On/Off
- bit 7 : SPA Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 273) Status Byte 4 : (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
- (LSB) bit 0 : SPA Multiple Limit Upper Segment 3 Status On/Off
- bit 1 : SPA Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
- bit 2 : SPA Multiple Limit Upper Segment 4 Status On/Off
- bit 3 : SPA Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
- bit 4 : SPA Multiple Limit Upper Segment 5 Status On/Off
- bit 5 : SPA Multiple Limit Upper Segment 5 Beep Level ABOVE/BELOW
- bit 6 : SPA Multiple Limit Lower Segment 1 Status On/Off
- bit 7 : SPA Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW¹¹²
- 274) Status Byte 5 : (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
- (LSB) bit 0 : SPA Multiple Limit Lower Segment 2 Status On/Off
- bit 1 : SPA Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
- bit 2 : SPA Multiple Limit Lower Segment 3 Status On/Off
- bit 3 : SPA Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
- bit 4 : SPA Multiple Limit Lower Segment 4 Status On/Off
- bit 5 : SPA Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW
- bit 6 : SPA Multiple Limit Lower Segment 5 Status On/Off
- bit 7 : SPA Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 275) Status Byte 6: (0b = Off, 1b = On)
- (LSB) bit 0 : Antenna Factors Correction On/Off
- bit 1 : Bias Tee On/Off (Option 10)
- bit 2 : SPA Cal Status On/Off
- bits 3-4 : Amplitude Units (Log) - 00b = dBm 01b = dBV 10b = dBmV 11b = dBuV
(Linear) – 00b = Watts 01b = Volts
- bits 5-6 : Detection Alg (00b = pos. peak 01b = RMS Avg 10b = neg. peak 11b = Sampling Mode)
- bit 7: Units Type (0b = Log 1b = Linear)
- 276) Status Byte 7: (0b = Off, 1b = On)
- (LSB) bit 0: Serial Port Echo Status On/Off
- bit 1: Return Sweep Time On/Off
- bit 2: RBW Coupling (1b = Auto, 0b = Manual)
- bit 3: VBW Coupling (1b = Auto, 0b = Manual)
- bit 4: Attenuation Coupling (1b = Auto, 0b = Manual)
- bit 5: Channel Power On/Off
- bit 6: Adjacent Channel Power On/Off
- bit 7: Not Used
- 277) Reference Level Offset¹¹³ (highest byte)
- 278) Reference Level Offset
- 279) Reference Level Offset
- 280) Reference Level Offset (lowest byte)
- 281) External Reference Frequency ¹¹⁴
- 282) Signal Standard¹¹⁵ (higher byte)
- 283) Signal Standard (lower byte)
- 284) Channel Selection¹¹⁶ (highest byte)
- 285) Channel Selection (lowest byte)

111 Beep level is always 1b for upper segmented limit line

112 Beep level is always 0b for lower segmented limit line

113 Value sent as (value in dBm * 1000) + 270,000

114 1 byte in MHz (i.e. 20 = 20MHz)

115 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

116 "No Channel" is sent as FFFEh

- 286) Trigger Type¹¹⁷
- 287) Interference Analysis Frequency¹¹⁸ (highest byte)
- 288) Interference Analysis Frequency
- 289) Interference Analysis Frequency
- 290) Interference Analysis Frequency (lowest byte)
- 291) Trigger Position (0 – 100%)
- 292) Min Sweep Time (in μ s) (highest byte)
- 293) Min Sweep Time (in μ s)
- 294) Min Sweep Time (in μ s)
- 295) Min Sweep Time (in μ s) (lowest byte)
- 296) Video Trigger Level¹¹⁹ (highest byte)
- 297) Video Trigger Level
- 298) Video Trigger Level
- 299) Video Trigger Level (lowest byte)
- 300) Status Byte 8
 - (LSB) bit 0: Input Power Status (1b = Input Power Too High, 0b = Input Power Ok)
 - bits 1-7: Not Used
- 301) Status Byte 9
 - (LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF)
 - bit 7: Not Used
- 302) Status Byte 10: (0b = Off, 1b = On)
 - (LSB) bits 0-1: Trace Math Operation (00b = A only, 01b = A-B, 10b = A+B)
 - bit 2: Max Hold On/Off
 - bit 3: Min Hold On/Off
 - bits 4-7: Not Used
- 303) Impedance (00h = 50 Ω , 0Ah = 75 Ω Anritsu Adapter, 0Ch = 75 Ω Other Adapter)
- 304) Impedance Loss¹²⁰ (higher byte)
- 305) Impedance Loss (lower byte)
- 306) AM/FM Demod Type¹²¹
- 307) AM/FM Demod Status (01h = On, 00h = Off)
- 308) AM/FM Demod Volume (0 to 100)
- 309) AM/FM Demod Frequency (highest byte)¹²²
- 310) AM/FM Demod Frequency
- 311) AM/FM Demod Frequency
- 312) AM/FM Demod Frequency (lowest byte)
- 313) AM/FM Demod Time (in ms) (highest byte)
- 314) AM/FM Demod Time (in ms)
- 315) AM/FM Demod Time (in ms)
- 316) AM/FM Demod Time (in ms) (lowest byte)
- 317) SSB BFO Offset¹²³ (highest byte)
- 318) SSB BFO Offset
- 319) SSB BFO Offset
- 320) SSB BFO Offset (lowest byte)

117 Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

118 Scaled by Frequency Scale Factor (bytes 321-322)

119 Value sent as (value in dBm * 1000) + 270,000

120 Value sent as (value in dB * 1000), valid values are 0 to 20 dB

121 AM/FM Demod Type: 00h = FM-Wide Band, 01h = FM-Narrow Band, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

122 Scaled by Frequency Scale Factor (bytes 321-322)

123 Value sent as ((value in Hz) – 10,000)

- 321) Frequency Scale Factor¹²⁴ (higher byte)
- 322) Frequency Scale Factor (lower byte)
- 323) Frequency Range Minimum¹²⁵ (highest byte)
- 324) Frequency Range Minimum
- 325) Frequency Range Minimum
- 326) Frequency Range Minimum (lowest byte)
- 327) Frequency Range Maximum¹²⁶ (highest byte)
- 328) Frequency Range Maximum
- 329) Frequency Range Maximum
- 330) Frequency Range Maximum (lowest byte)
- 331) Marker Type¹²⁷
- 332-400) Not Used

For Power Meter Mode (Option 29):

- 26) Power Meter Start Freq¹²⁸ (highest byte)
- 27) Power Meter Start Freq
- 28) Power Meter Start Freq
- 29) Power Meter Start Freq (lowest byte)
- 30) Power Meter Stop Freq¹²⁹ (highest byte)
- 31) Power Meter Stop Freq
- 32) Power Meter Stop Freq
- 33) Power Meter Stop Freq (lowest byte)
- 34) Power Meter Center Freq¹³⁰ (highest byte)
- 35) Power Meter Center Freq
- 36) Power Meter Center Freq
- 37) Power Meter Center Freq (lowest byte)
- 38) Power Meter Span Freq¹³¹ (highest byte)
- 39) Power Meter Span Freq
- 40) Power Meter Span Freq
- 41) Power Meter Span Freq (lowest byte)
- 42) Signal Standard¹³² (higher byte)
- 43) Signal Standard (lower byte)
- 44) Channel Selection¹³³ (higher byte)
- 45) Channel Selection (lower byte)
- 46) Power Meter Offset (highest byte)
- 47) Power Meter Offset
- 48) Power Meter Offset
- 49) Power Meter Offset (lowest byte)
- 50) Power Meter Relative (highest byte)¹³⁴

124 In number of Hz

125 Scaled by Frequency Scale Factor (bytes 321-322)

126 Scaled by Frequency Scale Factor (bytes 321-322)

127 00h=Regular Marker, 01h=Noise Marker

128 Scaled by Frequency Scale Factor (bytes 59-60)

129 Scaled by Frequency Scale Factor (bytes 59-60)

130 Scaled by Frequency Scale Factor (bytes 59-60)

131 Scaled by Frequency Scale Factor (bytes 59-60)

132 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

133 "No Channel" is sent as FFFEh

134 Value as ((value in dBm * 1000) + 100)

- 51) Power Meter Relative
- 52) Power Meter Relative
- 53) Power Meter Relative (lowest byte)
- 54) Power Meter Status (00h = Off, 01h = On)
- 55) Power Meter Unit (00h = Watts, 01h = dBm)
- 56) Power Meter Relative Status (00h = Off, 01h = On)
- 57) Power Meter Offset Status (00h = Off, 01h = On)
- 58) Power Meter RMS Averaging Level (00h = Off, 01h = Low, 02h = Medium, 03h = High)
- 59) Frequency Scale Factor¹³⁵ (higher byte)
- 60) Frequency Scale Factor (lower byte)
- 61) Frequency Range Minimum¹³⁶ (highest byte)
- 62) Frequency Range Minimum
- 63) Frequency Range Minimum
- 64) Frequency Range Minimum (lowest byte)
- 65) Frequency Range Maximum¹³⁷ (highest byte)
- 66) Frequency Range Maximum
- 67) Frequency Range Maximum
- 68) Frequency Range Maximum (lowest byte)
- 69) Zero Status (00h = Off, 01h = On)
- 70) Zero Value¹³⁸ (highest byte)
- 71) Zero Value
- 72) Zero Value
- 73) Zero Value (lowest byte)
- 74-120) Not Used

For T1 Mode (Option 50):

- 26) T1 Receive Input (00h: Terminate, 01h: Bridged, 02h: Monitor)
- 27) T1 Framing Mode (01h: ESF, 02h: D4SF)
- 28) T1 Line Coding (01h: B8ZS, 02h: AMI)
- 29) T1 Clock Source (00h: External, 01h: Internal)
- 30) T1 Tx Level (01h: 0 dB, 02h: -7.5 dB, 03h: -15 dB)
- 31) T1 Error Insert Type (00h: Frame Error, 01h: BPV, 02h: Bit Errors, 04h: RAI, 05h: AIS)
- 32) T1 Loop Code (00h: CSU, 01h: NIU, 02h: User 1, 03h: User 2)
- 33) T1 CRC Method (00h: ANSI CRC, 01h: Japanese CRC)
- 34) T1 Loop Type (00h: In Band, 01h: Data Link)
- 35) T1 Pattern (higher byte)
- 36) T1 Pattern (lower byte) 01h: PRBS-9, 02h: PRBS-11, 03h: PRBS-15, 04h: PRBS-20(O.151), 05h: PRBS-20(O.153), 06h: PRBS-23, 07h: QRSS, 08h: 1 in 8, 09h: 2 in 8, 0Ah: 3 in 8, 0Bh: All Ones, 0Ch: All Zeros, 0Dh: T1-DALY, 0Eh: User Defined)
- 37) T1 Pattern Invert Status (00h: Non-Inverted, 01h: Inverted)
- 38) T1 Display Type (00h: Histogram, 01h: Raw Data)
- 39) T1 Impedance
- 40 - 55) First User Defined Loop Code Down (16 bytes)
- 56 - 71) Second User Defined Loop Code Down (16 bytes)
- 72 - 87) First User Defined Loop Code Up (16 bytes)
- 88 - 103) Second User Defined Loop Code Up (16 bytes)
- 104 - 135) User Defined Pattern (32 bytes)
- 136) T1 1st User Defined Loop Up (higher byte)

135 In number of Hz

136 Scaled by Frequency Scale Factor

137 Scaled by Frequency Scale Factor

138 Value sent as ((value in dBm * 1000) + 100)

- 137) T1 1st User Defined Loop Up (lower byte)
- 138) T1 2nd User Defined Loop Up (higher byte)
- 139) T1 2nd User Defined Loop Up (lower byte)
- 140) T1 1st User Defined Loop Down (higher byte)
- 141) T1 1st User Defined Loop Down (lower byte)
- 142) T1 2nd User Defined Loop Down (higher byte)
- 143) T1 2nd User Defined Loop Down (lower byte)
- 144) T1 User Defined Pattern (highest byte)
- 145) T1 User Defined Pattern
- 146) T1 User Defined Pattern
- 147) T1 User Defined Pattern (lowest Byte)
- 148) T1 Bit Error Insert Value (1-1000) (higher byte)
- 149) T1 Bit Error Insert Value (lower byte)
- 150) T1 Frame Error Insert Value (1-1000) (higher byte)
- 151) T1 Frame Error Insert Value (lower byte)
- 152) T1 BPV Error Insert Value (1-1000) (higher byte)
- 153) T1 BPV Error Insert Value (lower byte)
- 154) T1 Graph Resolution¹³⁹
- 155) T1 Measurement Duration¹⁴⁰
- 156) T1 Voltage Measurement Scale (00h = Vpp, 01h = dBdsx)
- 157) T1 Auto Framing (00h = Fixed Framing, 01h = Auto Framing)
- 158 – 240) Not Used

For E1 Mode (Option 50):

- 26) E1 Receive Input (00h: Terminate, 01h: Bridged, 02h: Monitor)
- 27) E1 Framing Mode (03h: PCM30, 04h: PCM30CRC, 05h: PCM31, 06h: PCM31CRC)
- 28) E1 Line Coding (02h: AML, 03h: HDB3)
- 29) E1 Clock Source (00h: External, 01h: Internal)
- 30) E1 Tx Level
- 31) E1 Error Insert Type (00h: Frame Error, 01h: BPV, 02h: Bit Errors, 04h: RAI, 05h: AIS)
- 32) E1 Loop Code
- 33) E1 CRC Method
- 34) E1 Loop Type
- 35) E1 Pattern (highest byte)
- 36) E1 Pattern (lowest byte) (01h: PRBS-9, 02h: PRBS-11, 03h: PRBS-15, 04h: PRBS-20(O.151), 05h: PRBS-20(O.153), 06h: PRBS-23, 07h: QRSS, 08h: 1 in 8, 09h: 2 in 8, 0Ah: 3 in 8, 0Bh: All Ones, 0Ch: All Zeros, 0Dh: T1-DALY, 0Eh: User Defined)
- 37) E1 Pattern Invert (00h: Non-Inverted, 01h: Inverted)
- 38) E1 Display Type (00h: Histogram, 01h: Raw Data)
- 39) E1 Impedance (01h: 75Ω, 02h: 120Ω)
- 40 - 55) First User Defined Loop Code Down (16 bytes)
- 56 - 71) Second User Defined Loop Code Down (16 bytes)
- 72 - 87) First User Defined Loop Code Up (16 bytes)
- 88 - 103) Second User Defined Loop Code Up (16 bytes)
- 104 - 135) User Defined Pattern (32 bytes)
- 136) E1 1st User Defined Loop Up (highest byte)
- 137) E1 1st User Defined Loop Up (lowest byte)
- 138) E1 2nd User Defined Loop Up (highest byte)
- 139) E1 2nd User Defined Loop Up (lowest byte)
- 140) E1 1st User Defined Loop Down (highest byte)

139 Graph Resolution: 00h: Auto, 01h: 1 sec, 02h: 15 sec, 03h: 30 sec, 04h 45 sec, 05h 1 min, 06h: 15 min, 07h: 30 min, 08h: 45 min, 09h: 60 min

140 Measurement Duration: 00h: Manual, 01h: 3 min, 02h: 15 min, 03h: 30 min, 04h: 1 hr, 05h: 3 hrs, 06h: 6 hrs, 07h: 12 hrs, 08h: 1 day, 09h: 2 days

- 141) E1 1st User Defined Loop Down (lowest byte)
- 142) E1 2nd User Defined Loop Down (highest byte)
- 143) E1 2nd User Defined Loop Down (lowest byte)
- 144) E1 User Defined Pattern (highest byte)
- 145) E1 User Defined Pattern
- 146) E1 User Defined Pattern
- 147) E1 User Defined Pattern (lowest byte)
- 148) E1 Bit Error Insert Value (1-1000) (higher byte)
- 149) E1 Bit Error Insert Value (lower byte)
- 150) E1 Frame Error Insert Value (1-1000) (higher byte)
- 151) E1 Frame Error Insert Value (lower byte)
- 152) E1 BPV Error Insert Value (1-1000) (higher byte)
- 153) E1 BPV Error Insert Value (lower byte)
- 154) E1 Graph Resolution¹⁴¹
- 155) E1 Measurement Duration¹⁴²
- 156) E1 Voltage Measurement Scale (00h = Vpp, 01h = dBdsx)
- 157-240) Not Used

Select Printer Type – Control Byte #30 (1Eh)

Description: Select Printer Type.

Bytes to Follow: 1 byte

- 1) Printer ID
 - 0 – Epson Stylus Models
 - 1 – Epson LQ Models
 - 2 – Citizen PN Models
 - 3 – NEC Superscript Models
 - 4 – NEC Silentwriter Models
 - 5 – Seiko DPU 411, 414 Models
 - 6 – Canon BJC 50
 - 7 – Canon BJC 80
 - 8 – Canon BJC 250
 - 9 – Canon BJC 4400
 - 10 – HP DJ 300 Series
 - 11 – HP DJ 400 Series
 - 12 – HP DJ 500 Series
 - 13 – HP DJ 600 Series
 - 14 – HP DJ 800 Series
 - 15 – HP DJ 1120
 - 16 – HP LJ 6L, 6P, 4000
 - 17 – Epson Esc/P Compatible
 - 18 – Epson Esc/P2 Compatible
 - 19 – Epson Esc/P Raster Compatible
 - 20 – HP PCL3 Compatible

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte

141 Graph Resolution: 00h: Auto, 01h: 1 sec, 02h: 15 sec, 03h: 30 sec, 04h 45 sec, 05h 1 min, 06h: 15 min, 07h: 30 min, 08h: 45 min, 09h: 60 min

142 Measurement Duration: 00h: Manual, 01h: 3 min, 02h: 15 min, 03h: 30 min, 04h: 1 hr, 05h: 3 hrs, 06h: 6 hrs, 07h: 12 hrs, 08h: 1 day, 09h: 2 days

Select DTF Windowing – Control Byte #31 (1Fh)

Description: Select DTF Windowing Methods.

DTF windowing allows you to make a trade off between side lobe height and resolution.

Bytes to Follow: 1 byte

- 1) Windowing Method
 - 00h = Rectangular (finest resolution, highest side lobes)
 - 01h = Nominal Side Lobe (balance between resolution and side lobes)
 - 02h = Low Side Lobe
 - 03h = Minimum Side Lobe

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid DTF Windowing Method
238 (EEh) Time-out Error

Set Site Master VNA Trace Math – Control Byte #32 (20h)

Description: Setup trace math operation and trace for VNA modes.

Bytes to Follow: 2 bytes

- 1) Trace Math Operation
 - 00h = Off
 - 01h = Addition
 - 02h = Subtraction
- 2) Trace on which to Perform Math Operation (1 to 200)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Trace Math Operation
238 (EEh) Time-out Error

Recall Sweep Trace – Control Byte #33 (21h)

NOTE: This command is new to the S33xD. Use it instead of Control Byte #17 to access new features.

Description: Queries the Site Master for sweep trace data.

NOTE: Before you can recall a sweep stored in non-volatile memory (trace numbers 1-200) you must build a trace table in the Site Master's RAM. Use Control Byte #24 to build the trace table. Since the trace table exists in RAM, Control Byte #24 must be executed every time the Site Master's power is cycled.

Bytes to Follow: 1 byte

- 0 = Last sweep trace before entering remote mode (sweep trace in RAM)
- 1- 200 = Specific saved sweep number (stored sweeps in Flash memory)

Site Master Returns:

- 1-2) # of following bytes (total length - 2)

- 3) Current Instrument Date Format¹⁴³
- 4) Not Used
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes ASCII)
- 16) Measurement Mode¹⁴⁴
- 17-20) Time/Date (in Long Integer¹⁴⁵)
- 21-30) Date in String Format (mm/dd/yyyy)
- 31-38) Time in String Format (hh:mm:ss)
- 39-54) Reference number stamp (16 bytes in ASCII)
- 55-56) # data points (130, 259 or 517 or 401 or 100)

For all Site Master VNA Modes :

- 57) Start Frequency¹⁴⁶ (highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (lowest byte)
- 61) Stop Frequency (highest byte)
- 62) Stop Frequency
- 63) Stop Frequency
- 64) Stop Frequency (lowest byte)
- 65) Minimum Frequency Step Size (highest byte)
- 66) Minimum Frequency Step Size
- 67) Minimum Frequency Step Size
- 68) Minimum Frequency Step Size (lowest byte)
- 69) Scale Top¹⁴⁷ (highest byte)
- 70) Scale Top
- 71) Scale Top
- 72) Scale Top (lowest byte)
- 73) Scale Bottom (highest byte)
- 74) Scale Bottom
- 75) Scale Bottom
- 76) Scale Bottom (lowest byte)
- 77) Frequency Marker 1¹⁴⁸ (higher byte)
- 78) Frequency Marker 1 (lower byte)
- 79) Frequency Marker 2 (higher byte)
- 80) Frequency Marker 2 (lower byte)
- 81) Frequency Marker 3 (higher byte)
- 82) Frequency Marker 3 (lower byte)
- 83) Frequency Marker 4 (higher byte)
- 84) Frequency Marker 4 (lower byte)
- 85) Frequency Marker 5 (higher byte)
- 86) Frequency Marker 5 (lower byte)
- 87) Frequency Marker 6 (higher byte)
- 88) Frequency Marker 6 (lower byte)

143 00h = MM/DD/YYYY, 01h = DD/MM/YYYY, 02h = YYYY/MM/DD

144 Refer to Control Byte #3 "Select Measurement Mode" for detailed value.

145 Time/Date long integer representation is in seconds since January 1, 1970

146 Frequency units are Hz

147 See Control Byte #4 "Set Site Master Scale" for data format

148 marker point = (# of data points – 1) * (marker freq – start freq) / (stop freq – start freq) where # of data points can be found in bytes 55-56, start freq is in bytes 57-60, and stop freq is in bytes 61-64.

- 89) Single Limit¹⁴⁹ (highest byte)
- 90) Single Limit
- 91) Single Limit
- 92) Single Limit (lowest byte)
- 93) Multiple Limit Segment # (1)
- 94) Multiple Limit Segment Status
- 95) Multiple Limit Start X¹⁵⁰ (highest byte)
- 96) Multiple Limit Start X
- 97) Multiple Limit Start X
- 98) Multiple Limit Start X (lowest byte)
- 99) Multiple Limit Start Y (higher byte)
- 100) Multiple Limit Start Y (lower byte)
- 101) Multiple Limit End X (highest byte)
- 102) Multiple Limit End X
- 103) Multiple Limit End X
- 104) Multiple Limit End X (lowest byte)
- 105) Multiple Limit End Y (higher byte)
- 106) Multiple Limit End Y (lower byte)
- 107–162) Repeat bytes 93-106 for segments 2-5
- 163) Start Distance¹⁵¹ (highest byte)
- 164) Start Distance
- 165) Start Distance
- 166) Start Distance (lowest byte)
- 167) Stop Distance (highest byte)
- 168) Stop Distance
- 169) Stop Distance
- 170) Stop Distance (lowest byte)
- 171) Distance Marker 1¹⁵² (higher byte)
- 172) Distance Marker 1 (lower byte)
- 173) Distance Marker 2 (higher byte)
- 174) Distance Marker 2 (lower byte)
- 175) Distance Marker 3 (higher byte)
- 176) Distance Marker 3 (lower byte)
- 177) Distance Marker 4 (higher byte)
- 178) Distance Marker 4 (lower byte)
- 179) Distance Marker 5 (higher byte)
- 180) Distance Marker 5 (lower byte)
- 181) Distance Marker 6 (higher byte)
- 182) Distance Marker 6 (lower byte)
- 183) Relative Propagation Velocity¹⁵³ (highest byte)
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (lowest byte)
- 187) Cable Loss¹⁵⁴ (highest byte)
- 188) Cable Loss

149 See Control Byte #6 "Set Site Master VNA Single Limit" for data format.

150 See Control Byte #112 "Set Site Master VNA Segmented Limit Lines" for data format.

151 Distance data uses units 1/100,000m (or feet)

152 Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

153 Relative Propagation Velocity uses units 1/100,000

154 Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

- 189) Cable Loss
- 190) Cable Loss (lowest byte)
- 191) Average Cable Loss¹⁵⁵ (highest byte)
- 192) Average Cable Loss
- 193) Average Cable Loss
- 194) Average Cable Loss (lowest byte)
- 195) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7 : Not Used
- 196) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 2 Delta On/Off
 - bit 1 : Marker 3 Delta On/Off
 - bit 2 : Marker 4 Delta On/Off
 - bits 3-7 : Not Used
- 197) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0 : Single Limit On/Off
 - bit 1: CW On/Off
 - bit 2: Trace Math On/Off
 - bits 3-5 : Not Used
 - bit 6 : Limit Type (0b = Single; 1b = Multiple)
 - bit 7 : Unit of Measurement (1b = Metric, 0b = English)
- 198) Status Byte 4:
 - (LSB) bit 0 - 1 : DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bits 2 – 7 : Not Used
- 199) Status Byte 5 (Cal Status):
 - 00h : Calibration Off
 - 01h : Standard Calibration On
 - 02h : InstaCal Calibration On
 - 03h : Standard FlexCal On
 - 04h : InstaCal FlexCal On
- 200) VNA Signal Standard¹⁵⁶ (higher byte)
- 201) VNA Signal Standard (lower byte)
- 202-324) Not Used
- 325-1364) Sweep Data (130 points * 8 bytes/point = 1040 bytes)
- 325-2396) Sweep Data (259 points * 8 bytes/point = 2072 bytes)
- 325-4460) Sweep Data (517 points * 8 bytes/point = 4136 bytes)
 - 8 bytes for each data point
 - 1. gamma¹⁵⁷ (highest byte)

155 Average Cable Loss is dB * 1000.

156 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

157 Gamma data uses 1/10,000 units.

2. gamma
3. gamma
4. gamma (lowest byte)
5. phase¹⁵⁸ (highest byte)
6. phase
7. phase
8. phase (lowest byte)

Notes:

return loss = $-20 * (\log(\text{gamma}) / \log(10))$

VSWR = $(1 + \text{gamma}) / (1 - \text{gamma})$

phase compares the reflected to the incident (reference)

For Spectrum Analyzer and Transmission Measurement (Option 21) Modes:

- 57) Start Frequency¹⁵⁹ (highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (lowest byte)
- 61) Stop Frequency (highest byte)
- 62) Stop Frequency
- 63) Stop Frequency
- 64) Stop Frequency (lowest byte)
- 65) Center Frequency (highest byte)
- 66) Center Frequency
- 67) Center Frequency
- 68) Center Frequency (lowest byte)
- 69) Frequency Span (highest byte)
- 70) Frequency Span
- 71) Frequency Span
- 72) Frequency Span (lowest byte)
- 73) Minimum Frequency Step Size (highest byte)
- 74) Minimum Frequency Step Size
- 75) Minimum Frequency Step Size
- 76) Minimum Frequency Step Size (lowest byte)
- 77) Ref Level¹⁶⁰ (highest byte)
- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (lowest byte)
- 81) Scale per div¹⁶¹ (highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (lowest byte)
- 85) Frequency Marker 1¹⁶² (higher byte)
- 86) Frequency Marker 1 (lower byte)
- 87) Frequency Marker 2 (higher byte)
- 88) Frequency Marker 2 (lower byte)
- 89) Frequency Marker 3 (higher byte)

158 Phase data uses 1/10 degree unit.

159 Scaled by Frequency Scale Factor (bytes 335-336)

160 Value sent as (Value in dBm * 1000) + 270,000

161 Value sent as (Value * 1000)

162 Value sent as data point on display. $\text{Freq} = (\text{Point} * \text{Span} / (\text{Total Data Points} - 1)) + \text{Start Freq}$

- 90) Frequency Marker 3 (lower byte)
- 91) Frequency Marker 4 (higher byte)
- 92) Frequency Marker 4 (lower byte)
- 93) Frequency Marker 5 (higher byte)
- 94) Frequency Marker 5 (lower byte)
- 95) Frequency Marker 6 (higher byte)
- 96) Frequency Marker 6 (lower byte)
- 97) Single Limit¹⁶³ (highest byte)
- 98) Single Limit
- 99) Single Limit
- 100) Single Limit (lowest byte)
- 101) Multiple Upper Limit 1 Start X¹⁶⁴ (highest byte)
- 102) Multiple Upper Limit 1 Start X
- 103) Multiple Upper Limit 1 Start X
- 104) Multiple Upper Limit 1 Start X (lowest byte)
- 105) Multiple Upper Limit 1 Start Y (Power Level¹⁶⁵) (highest byte)
- 106) Multiple Upper Limit 1 Start Y (Power Level)
- 107) Multiple Upper Limit 1 Start Y (Power Level)
- 108) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 109) Multiple Upper Limit 1 End X¹⁶⁶ (highest byte)
- 110) Multiple Upper Limit 1 End X
- 111) Multiple Upper Limit 1 End X
- 112) Multiple Upper Limit 1 End X (lowest byte)
- 113) Multiple Upper Limit 1 End Y (Power Level) (highest byte)
- 114) Multiple Upper Limit 1 End Y (Power Level)
- 115) Multiple Upper Limit 1 End Y (Power Level)
- 116) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 117-260) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 101-116 for format)
- 261) RBW Setting (Frequency in Hz) (highest byte)
- 262) RBW Setting (Frequency in Hz)
- 263) RBW Setting (Frequency in Hz)
- 264) RBW Setting (Frequency in Hz) (lowest byte)
- 265) VBW Setting (Frequency in Hz) (highest byte)
- 266) VBW Setting (Frequency in Hz)
- 267) VBW Setting (Frequency in Hz)
- 268) VBW Setting (Frequency in Hz) (lowest byte)
- 269) OCC BW Method (0b = % of power, 1b = dB down)
- 270) OCC BW % Value¹⁶⁷
- 271) OCC BW dBc¹⁶⁸
- 272) Attenuation¹⁶⁹ (highest byte)
- 273) Attenuation
- 274) Attenuation
- 275) Attenuation (lowest byte)
- 276-291) Antenna Name (16 bytes in ASCII)

163 Value sent as (Value in dBm * 1000) + 270,000

164 Scaled by Frequency Scale Factor (bytes 335-336)

165 Value sent as (value in dBm * 1000) + 270,000

166 Scaled by Frequency Scale Factor (bytes 335-336)

167 % value is 0-99

168 dBc value 0 – 120 dBc

169 Value sent as (value in dB * 1000)

- 292) Status Byte 1: (0b = Off, 1b = On)
 (LSB) bit 0 : Marker 1 On/Off
 bit 1 : Marker 2 On/Off
 bit 2 : Marker 3 On/Off
 bit 3 : Marker 4 On/Off
 bit 4 : Marker 5 On/Off
 bit 5 : Marker 6 On/Off
 bits 6-7: Not Used
- 293) Status Byte 2: (0b = Off, 1b = On)
 (LSB) bit 0 : Not Used
 bit 1 : Marker 2 Delta On/Off
 bit 2 : Marker 3 Delta On/Off
 bit 3 : Marker 4 Delta On/Off
 bit 4 : Pre Amp Mode (0b = Manual, 1b = Auto)
 bit 5 : Pre Amp Status On/Off
 bit 6 : Dynamic Attenuation On/Off
 bit 7: Reserved
- 294) Status Byte 3: (0b = Off, 1b = On)
 (LSB) bit 0 : Antenna Factor Correction On/Off
 bits 1-2 : Detection alg (00b = pos. peak 01b = RMS avg 10b = neg. peak 11b = sampling mode)
 bits 3-4 : Amplitude Units (Log) - (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
 (Linear) – 00b = Watts 01b = Volts
 bit 5 : Channel Power On/Off
 bit 6 : Adjacent Channel Power On/Off
 bit 7 : Units Type (0b = Log 1b = Linear)
- 295) Status Byte 4¹⁷⁰
 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 (LSB) bit 0 : Limit Type (0b = Single, 1b = Multiple)
 bit 1 : Not Used
 bit 2 : Single Limit On/Off
 bit 3 : Single Limit Beep Level ABOVE/BELOW
 bit 4 : Multiple Limit Upper Segment 1 Status On/Off
 bit 5 : Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW¹⁷¹
 bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 296) Status Byte 5
 (0b = Off/Beep if data is below line, 1b = On/Beep if data is above line)
 (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 bit 1 : Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
 bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 bit 3 : Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
 bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 bit 5 : Multiple Limit Upper Segment 5 Beep Level ABOVE/BELOW
 bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 bit 7 : Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW¹⁷²
- 297) Status Byte 6
 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 (LSB) bit 0 : Multiple Limit Lower Segment 2 Status On/Off
 bit 1 : Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
 bit 2 : Multiple Limit Lower Segment 3 Status On/Off
 bit 3 : Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
 bit 4 : Multiple Limit Lower Segment 4 Status On/Off
 bit 5 : Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW
 bit 6 : Multiple Limit Lower Segment 5 Status On/Off
 bit 7 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 298) Status Byte 7
 (LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF)

170 For bits 2, 1 and 0 ("X" is "don't care"): 0X0=no limit, 1X0=single limit, 0X1=multiple limit, 1X1=multiple limit.

171 Upper limits always trigger an error beep if data is ABOVE the limit segment, for example, this bit is always 1b.

172 LOWER limits always trigger an error beep if data is BELOW the limit segment, for example, this bit is always 0b.

- bit 7: Not Used
- 299) Reference Level Offset ¹⁷³(highest byte)
 - 300) Reference Level Offset
 - 301) Reference Level Offset
 - 302) Reference Level Offset (lowest byte)
 - 303) External Reference Frequency ¹⁷⁴
 - 304) Signal Standard¹⁷⁵ (highest byte)
 - 305) Signal Standard (lowest byte)
 - 306) Channel Selection¹⁷⁶ (highest byte)
 - 307) Channel Selection (lowest byte)
 - 308) Interference Analysis Cellular Standard¹⁷⁷
 - 309) Interference Analysis Estimated Bandwidth (highest byte)
 - 310) Interference Analysis Estimated Bandwidth
 - 311) Interference Analysis Estimated Bandwidth
 - 312) Interference Analysis Estimated Bandwidth (lowest byte)
 - 313) Interference Analysis Frequency¹⁷⁸ (highest byte)
 - 314) Interference Analysis Frequency
 - 315) Interference Analysis Frequency
 - 316) Interference Analysis Frequency (lowest byte)
 - 317-320) Reserved
 - 321) Trigger Type¹⁷⁹
 - 322) Trigger Position (0 – 100%)
 - 323) Min Sweep Time (in μ s) (highest byte)
 - 324) Min Sweep Time (in μ s)
 - 325) Min Sweep Time (in μ s)
 - 326) Min Sweep Time (in μ s) (lowest byte)
 - 327) Video Trigger Level¹⁸⁰ (highest byte)
 - 328) Video Trigger Level
 - 329) Video Trigger Level
 - 330) Video Trigger Level (lowest byte)
 - 331) Status Byte 8 (0b = Off, 1b = On)
 - (LSB) bits 0-1: Trace Math Operation (00b = A only, 01b = A-B, 10b = A+B)
 - bit 2: Max Hold On/Off
 - bit 3: Min Hold On/Off
 - bit 4: Transmission Calibration On/Off (Option 21 only)
 - bit 5: Bias Tee On/Off (Option 10 only)
 - bit 6: Occupied BW Measurement On/Off
 - bit7: Not Used
 - 332) Impedance (00h = 50 Ω , 0Ah = 75 Ω Anritsu Adapter, 0Ch = 75 Ω Other Adapter)
 - 333) Impedance Loss¹⁸¹ (higher byte)
 - 334) Impedance Loss (lower byte)

173 Value sent as (value in dBm * 1000) + 270,000

174 1 byte in MHz (i.e. 20 = 20MHz)

175 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

176 "No Channel" is sent as FFFEh

177 4 Standards – 00h = 1250KHZ CDMA, 01h = GSM, 02h = TDMA, 03h = AMPS, 04h = Unknown FFh = Interference Analysis Measurement OFF

178 Scaled by Frequency Scale Factor (bytes 335-336)

179 Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

180 Value sent as (value in dBm * 1000) + 270,000

181 Value sent as (value in dB * 1000), valid values are 0 to 20 dB

- 335) Frequency Scale Factor¹⁸² (higher byte)
- 336) Frequency Scale Factor (lower byte)
- 337) Frequency Range Minimum¹⁸³ (highest byte)
- 338) Frequency Range Minimum
- 339) Frequency Range Minimum
- 340) Frequency Range Minimum (lowest byte)
- 341) Frequency Range Maximum¹⁸⁴ (highest byte)
- 342) Frequency Range Maximum
- 343) Frequency Range Maximum
- 344) Frequency Range Maximum (lowest byte)
- 345) Linked Trace Number (1-200)
- 346) Status Byte 9 (0b=Off, 1b=On)
 - (LSB) bit 0 : C/I Measurement On/Off
 - bits 1-3 : C/I Carrier Trace/Signal Type¹⁸⁵
 - bits 4-7 : Not Used
- 347) C/I Calculated Power¹⁸⁶ (Carrier or Interference - NB FHSS¹⁸⁷) (highest byte)
- 348) C/I Calculated Power (Carrier or Interference - NB FHSS) (lowest byte)
- 349) C/I Calculated Power (Carrier or Interference - NB FHSS) (highest byte)
- 350) C/I Calculated Power (Carrier or Interference - NB FHSS) (lowest byte)
- 351) C/I Calculated Power¹⁸⁸ (Interference - WB FHSS¹⁸⁹) (highest byte)
- 352) C/I Calculated Power (Interference - WB FHSS) (lowest byte)
- 353) C/I Calculated Power (Interference - WB FHSS) (highest byte)
- 354) C/I Calculated Power (Interference - WB FHSS) (lowest byte)
- 355) C/I Calculated Power¹⁹⁰ (Interference - Broadband¹⁹¹) (highest byte)
- 356) C/I Calculated Power (Interference - Broadband) (lowest byte)
- 357) C/I Calculated Power (Interference - Broadband) (highest byte)
- 358) C/I Calculated Power (Interference - Broadband) (lowest byte)
- 359) Occupied BW Power¹⁹² (highest byte)
- 360) Occupied BW Power
- 361) Occupied BW Power
- 362) Occupied BW Power (lowest byte)
- 363) Marker Type¹⁹³
- 364-431) Not Used
- 432-2035) Sweep Data (401 points * 4 bytes/point= 1604 bytes)
 - 4 bytes for each data point

182 In number of Hz

183 Scaled by Frequency Scale Factor (bytes 335-336)

184 Scaled by Frequency Scale Factor (bytes 335-336)

185 000b = NB FHSS, 001b = Carrier - WB FHSS, 010b = Carrier - Broadband, 111b = Interference

186 Value sent as (value in dBm * 1000) + 270,000

187 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a NB FHSS signal. Otherwise, these bytes represent the calculated carrier power.

188 Value sent as (value in dBm * 1000) + 270,000

189 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a WB FHSS signal. Otherwise, these bytes should be ignored.

190 Value sent as (value in dBm * 1000) + 270,000

191 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a Broadband signal. Otherwise, these bytes should be ignored.

192 If Method is % of power, then the value is dB Down * 1000. If the Method is db Down, then the value is %.

193 00h = Regular Marker, 01h = Noise Marker

1. dBm¹⁹⁴ (highest byte)
2. dBm
3. dBm
4. dBm (lowest byte)

For Power Meter Mode (Option 29):

- 57) Power Meter Mode (00h = Off, 01h = On)
- 58) Power Meter Unit (00h = dBm, 01h = Watts)
- 59) Start Frequency¹⁹⁵ (highest byte)
- 60) Start Frequency
- 61) Start Frequency
- 62) Start Frequency (lowest byte)
- 63) Stop Frequency (highest byte)
- 64) Stop Frequency
- 65) Stop Frequency
- 66) Stop Frequency (lowest byte)
- 67) Center Frequency (highest byte)
- 68) Center Frequency
- 69) Center Frequency
- 70) Center Frequency (lowest byte)
- 71) Frequency Span (highest byte)
- 72) Frequency Span
- 73) Frequency Span
- 74) Frequency Span (lowest byte)
- 75) Power Offset Status (00h = Off, 01h = On)
- 76) Power Offset¹⁹⁶ (highest byte)
- 77) Power Offset
- 78) Power Offset
- 79) Power Offset (lowest byte)
- 80) Power Relative Status (00h = Off, 01h = On)
- 81) Power Relative Value¹⁹⁷ (highest byte)
- 82) Power Relative Value
- 83) Power Relative Value
- 84) Power Relative Value (lowest byte)
- 85) RMS Averaging Level (00h = Off, 01h = Low, 02h = Medium, 03h = High)
- 86) Power Zero Status (00h = Off, 01h = On)
- 87) External Reference Status (00h = Off, 01h = On)
- 88) External Reference Frequency¹⁹⁸ (highest byte)
- 89) External Reference Frequency
- 90) External Reference Frequency
- 91) External Reference Frequency (lowest byte)
- 92) Signal Standard¹⁹⁹ (higher byte)
- 93) Signal Standard (lower byte)
- 94) Channel Selection²⁰⁰ (higher byte)

194 Value sent as (value in dBm * 1000) + 270,000

195 Scaled by Frequency Scale Factor (bytes 96-97)

196 Value sent as (value in dB * 1000), valid values are 0 to 60 dB

197 Value sent as (value in dBm * 1000)

198 Scaled by Frequency Scale Factor (bytes 96-97)

199 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

200 "No Channel" is sent as FFFEh

- 95) Channel Selection (lower byte)
- 96) Frequency Scale Factor²⁰¹ (higher byte)
- 97) Frequency Scale Factor (lower byte)
- 98) Frequency Range Minimum²⁰² (highest byte)
- 99) Frequency Range Minimum
- 100) Frequency Range Minimum
- 101) Frequency Range Minimum (lowest byte)
- 102) Frequency Range Maximum²⁰³ (highest byte)
- 103) Frequency Range Maximum
- 104) Frequency Range Maximum
- 105) Frequency Range Maximum (lowest byte)
- 106 – 150) Not Used
- 151) Power Meter Reading²⁰⁴ (highest byte)
- 152) Power Meter Reading
- 153) Power Meter Reading
- 154) Power Meter Reading (lowest byte)

For T1 Tester / E1 Tester Mode (Option 50):

- 57) Receive Input (00h: Terminate, 01h: Bridged, 02h: Monitor)
- 58) Framing Mode²⁰⁵
- 59) Line Coding (01h: B8ZS, 02h: AMI, 03h: HDB3)
- 60) Tx Level (Valid for T1 Only) (01h: 0 dB, 02h: -7.5 dB, 03h: -15 dB)
- 61) Clock Source (00h: External, 01h: Internal)
- 62) Error Insert Type (00h: Frame Error, 01h: BPV, 02h: Bit Errors, 04h: RAI, 05h: AIS)
- 63) Loop Code (Valid for T1 Only) (00h: CSU, 01h: NIU, 02h: User 1, 03h: User 2)
- 64) Loop Type (Valid for T1 Only) (00h: In Band, 01h: Data Link)
- 65) CRC Method (Valid for T1 Only) (00h: ANSI CRC, 01h: Japanese CRC)
- 66) Display Type (00h: Histogram, 01h: Raw Data)
- 67) Impedance (Valid for E1 Only) (01h: 75Ω, 02h: 120Ω)
- 68) Pattern²⁰⁶
- 69) Pattern Invert Status (00h: Non-Inverted, 01h: Inverted)
- 70) Insert Bit Error Value (1-1000) (higher byte)
- 71) Insert Bit Error Value (lower byte)
- 72) Insert BPV Error Value (1-1000) (higher byte)
- 73) Insert BPV Error Value (lower byte)
- 74) Insert Frame Error Value (1-1000) (higher byte)
- 75) Insert Frame Error Value (lower byte)
- 76) Measurement Duration²⁰⁷
- 77) Histogram Resolution²⁰⁸
- 78) Frame Sync Status (00h: In Sync, 01h: Out-of-Sync)

201 In number of Hz

202 Scaled by Frequency Scale Factor (bytes 96-97)

203 Scaled by Frequency Scale Factor (bytes 96-97)

204 Power sent as (power in dBm * 1000). Use two's-complement method to decode negative power levels.

205 T1 Mode: 01h: ESF, 02h: D4SF
E1 Mode: 03h: PCM30, 04h: PCM30CRC, 05h: PCM31, 06h: PCM31CRC

206 Pattern: 01h: PRBS-9, 02h: PRBS-11, 03h: PRBS-15, 04h: PRBS-20(O.151), 05h: PRBS-20(O.153), 06h: PRBS-23, 07h: QRSS, 08h: 1 in 8, 09h: 2 in 8, 0Ah: 3 in 8, 0Bh: All Ones, 0Ch: All Zeros, 0Dh: T1-DALY, 0Eh: User Defined

207 Measurement Duration: 00h: Manual, 01h: 3 min, 02h: 15 min, 03h: 30 min, 04h: 1 hr, 05h: 3 hrs, 06h: 6 hrs, 07h: 12 hrs, 08h: 1 day, 09h: 2 days

208 Histogram Resolution: 00h: Auto, 01h: 1 sec, 02h: 15 sec, 03h: 30 sec, 04h: 45 sec, 05h: 1 min, 06h: 15 min, 07h: 30 min, 08h: 45 min, 09h: 60 min

- 79) Pattern Sync Status (00h: In Sync, 01h: Out-of-Sync)
- 80) Carrier Status (00h: In Sync, 01h: Out-of-Sync)
- 81) Rx Alarms (bit 0: Receiving AIS, bit 1: Receiving RAI, bit 2: Receiving E1 MMF error)
- 82) BPV Error Count (highest byte)
- 83) BPV Error Count
- 84) BPV Error Count
- 85) BPV Error Count (lowest byte)
- 86) CRC Error Count (highest byte)
- 87) CRC Error Count
- 88) CRC Error Count
- 89) CRC Error Count (lowest byte)
- 90) Frame Error Count (highest byte)
- 91) Frame Error Count
- 92) Frame Error Count
- 93) Frame Error Count (lowest byte)
- 94) LOF Error Count (highest byte)
- 95) LOF Error Count
- 96) LOF Error Count
- 97) LOF Error Count (lowest byte)
- 98) E Bit Error Count (E1 Only) (highest byte)
- 99) E Bit Error Count (E1 Only)
- 100) E Bit Error Count (E1 Only)
- 101) E Bit Error Count (E1 Only) (lowest byte)
- 102) Errored Seconds (highest byte)
- 103) Errored Seconds
- 104) Errored Seconds
- 105) Errored Seconds (lowest byte)
- 106) Bit Count (highest byte)
- 107) Bit Count
- 108) Bit Count
- 109) Bit Count (lowest byte)
- 110) Bit Errors (highest byte)
- 111) Bit Errors
- 112) Bit Errors
- 113) Bit Errors (lowest byte)
- 114) User Defined Pattern (convert to binary for pattern) (highest byte)
- 115) User Defined Pattern
- 116) User Defined Pattern
- 117) User Defined Pattern (lowest byte)
- 118 – 125) Measurement Start Time String (ASCII string: “HH:MM:SS”)
- 126 – 136) Measurement Stop Time String (ASCII string: “DD:HH:MM:SS”)
- 137 – 147) Elapsed Time String (ASCII string: “DD:HH:MM:SS”)
- 148 – 155) Bit Error Rate String (ASCII string in engineering format: x.xxE-xx)
- 156 – 655) 100 data points with 5 bytes for each data point.

1st byte has information about Carrier Loss, Frame Loss, BPV and CRC

Following 4 bytes corresponds to the Bit Error Count

Break down of the 1st byte:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not Used	Not Used	Not Used	Carrier Loss	Frame Loss	BPV Error	CRC/E-bit Error	Any Error

- 656) Vpp or dBdsx²⁰⁹ (higher byte)
- 657) Vpp or dBdsx (lower byte)
- 658) T1 or E1 Receive Frequency (in Hz)²¹⁰ (highest byte)
- 659) T1 or E1 Receive Frequency (in Hz)
- 660) T1 or E1 Receive Frequency (in Hz)
- 661) T1 or E1 Receive Frequency (in Hz) (lowest byte)
- 662 – 750) Not Used

Site Master Returns (For invalid sweeps/empty stored sweep locations): 11 bytes

- 1-2) Number of following bytes (9 bytes for invalid sweep recall)
- 3) Current Instrument Date Format²¹¹
- 4) Model # (unsigned integer, 14h for Site Master model S331D, 15h for Site Master model S332D)
- 5-11) Extended Model # (7 bytes in ASCII)

Site Master Returns (Invalid sweep location): 1 byte

- 1) 224 (E0) Parameter Error: Invalid sweep location

Set Site Master VNA Trace Overlay – Control Byte #34 (22h)

Description: Setup trace overlay operation and trace for VNA modes.

Bytes to Follow: 2 bytes

- 1) Trace Overlay Operation
 - 00h = Off
 - 01h = On
- 2) Trace on which to Perform Overlay Operation (1 to 200)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid Trace Overlay Operation
- 238 (EEh) Time-out Error

Set SPA A/B Trace – Control Byte #35 (23h)

Description: Defines traces “A” and “B” for SPA mode.

Trace A is always the currently measured data (with or without trace math). It is always visible.

Trace B is always stored data and may come from a saved sweep or a previous “A” trace. There is no default for trace B. Trace B can be ON (visible) or OFF.

Bytes to Follow: 3 bytes

- 1) “A” trace display (00h = A only, 01h = A-B, 02h = A+B)
- 2) “B” trace status (00h = Off, 01h = On)
- 3) “B” trace number
 - 0 = save current “A” data into “B” buffer, use that as “B”
 - 1-200 = trace number
 - 255 = no “B” trace defined

Site Master Returns: 1 byte

209 Only in Vpp mode. See the T1/E1 Read Vpp command for data format.

210 Only in BER mode

211 00h = MM/DD/YYYY, 01h = DD/MM/YYYY, 02h = YYYY/MM/DD

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Not enough bytes transferred, "B" trace requested to be used in calculations or displayed, but no trace or invalid trace specified
- 238 (EEh) Time-out Error

Upload Sweep Trace – Control Byte #36 (24h)

This command is new to the S33xD. Use it, instead of Control Bytes #26 and #28, to access the new features.

Description: Uploads a sweep trace to the Site Master.

Bytes to Follow:

For All Modes:

- 1-2) # of following bytes
- 3) Measurement Mode²¹²
- 4-7) Time/Date (in Long Integer)
- 8-17) Date in String Format (MM/DD/YYYY)
- 18-25) Time in String Format (HH:MM:SS)
- 26-41) Reference number stamp (16 ASCII bytes)
- 42-43) # of data points (130, 259, 517 or 401 or 100)

For VNA Modes:

- 44) Start Frequency (highest byte)²¹³
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (lowest byte)
- 48) Stop Frequency (highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (lowest byte)
- 52) Minimum Frequency Step Size (highest byte)
- 53) Minimum Frequency Step Size
- 54) Minimum Frequency Step Size
- 55) Minimum Frequency Step Size (lowest byte)
- 56) Scale Top (highest byte)²¹⁴
- 57) Scale Top
- 58) Scale Top
- 59) Scale Top (lowest byte)
- 60) Scale Bottom (highest byte)
- 61) Scale Bottom
- 62) Scale Bottom
- 63) Scale Bottom (lowest byte)
- 64) Frequency Marker 1 (higher byte)²¹⁵
- 65) Frequency Marker 1 (lower byte)
- 66) Frequency Marker 2 (higher byte)

212 See Control Byte #3 "Set Measurement Mode" for available measurement modes.

213 Frequency in Hz

214 See Control Byte #4, "Set Site Master VNA Scale" for data format.

215 Marker point = (Number of data points – 1) * (marker freq – start freq) / (stop freq – start freq)

- 67) Frequency Marker 2 (lower byte)
- 68) Frequency Marker 3 (higher byte)
- 69) Frequency Marker 3 (lower byte)
- 70) Frequency Marker 4 (higher byte)
- 71) Frequency Marker 4 (lower byte)
- 72) Frequency Marker 5 (higher byte)
- 73) Frequency Marker 5 (lower byte)
- 74) Frequency Marker 6 (higher byte)
- 75) Frequency Marker 6 (lower byte)
- 76) Single Limit Line Value (highest byte)²¹⁶
- 77) Single Limit Line Value
- 78) Single Limit Line Value
- 79) Single Limit Line Value (lowest byte)
- 80) Multiple Limit Segment # (1)
- 81) Multiple Limit Segment Status (00h = Off, 01h = On)
- 82) Multiple Limit Start X (highest byte)²¹⁷
- 83) Multiple Limit Start X
- 84) Multiple Limit Start X
- 85) Multiple Limit Start X (lower byte)
- 86) Multiple Limit Start Y (higher byte)
- 87) Multiple Limit Start Y (lower byte)
- 88) Multiple Limit End X (higher byte)
- 89) Multiple Limit End X
- 90) Multiple Limit End X
- 91) Multiple Limit End X (lower byte)
- 92) Multiple Limit End Y (higher byte)
- 93) Multiple Limit End Y (lower byte)
- 94-149) Repeat bytes 80-93 for segments 2-5
- 150) Start Distance (highest byte)²¹⁸
- 151) Start Distance
- 152) Start Distance
- 153) Start Distance (lowest byte)
- 154) Stop Distance (highest byte)
- 155) Stop Distance
- 156) Stop Distance
- 157) Stop Distance (lowest byte)
- 158) Distance Marker 1 (higher byte)²¹⁹
- 159) Distance Marker 1 (lower byte)
- 160) Distance Marker 2 (higher byte)
- 161) Distance Marker 2 (lower byte)
- 162) Distance Marker 3 (higher byte)
- 163) Distance Marker 3 (lower byte)
- 164) Distance Marker 4 (higher byte)
- 165) Distance Marker 4 (lower byte)
- 166) Distance Marker 5 (higher byte)
- 167) Distance Marker 5 (lower byte)
- 168) Distance Marker 6 (higher byte)
- 169) Distance Marker 6 (lower byte)

216 See Control Byte #6, "Set Site Master VNA Single Limit" for data format

217 See Control Byte #112, "Set Site Master VNA Segmented Limit Lines" for data format.

218 Distance data uses units 1/100,000m or 1/100,000 ft

219 Marker point = (# of data points - 1) * (marker dist - start dist) / (stop dist - start dist)

- 170) Relative Propagation Velocity (highest byte)²²⁰
- 171) Relative Propagation Velocity
- 172) Relative Propagation Velocity
- 173) Relative Propagation Velocity (lowest byte)
- 174) Cable Loss (highest byte)²²¹
- 175) Cable Loss
- 176) Cable Loss
- 177) Cable Loss (lowest byte)
- 178) Average Cable Loss²²² (highest byte)
- 179) Average Cable Loss
- 180) Average Cable Loss
- 181) Average Cable Loss (lowest byte)
- 182) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7 : Not Used
- 183) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 2 Delta On/Off
 - bit 1 : Marker 3 Delta On/Off
 - bit 2 : Marker 4 Delta On/Off
 - bits 3-7: Not Used
- 184) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0 : Single Limit On/Off
 - bit 1: CW On/Off
 - bit 2: Trace Math On/Off
 - bits 3-5: Not Used
 - bit 6 : Limit Type (0b = Single; 1b = Multiple)
 - bit 7 : Unit of measurement (1b = Metric, 0b = English)
- 185) Status Byte 4:
 - (LSB) bit 0 - 1 : DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bits 2 – 7 : Not Used
- 186) Status Byte 5 (Cal Status) :
 - 00h : Calibration Off
 - 01h : Standard Calibration On
 - 02h : InstaCal Calibration On
 - 03h : Standard FlexCal On
 - 04h : InstaCal FlexCal On
- 187) VNA Signal Standard²²³ (higher byte)

220 Relative Propagation Velocity uses units 1/100,000

221 Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft

222 Average Cable Loss is dB * 1000.

223 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

- 188) VNA Signal Standard (lower byte)
- 189-314) Not Used
- 315-1354) Sweep Data (130 points * 8 bytes/point= 1040 bytes)
- 315-2386) (259 points * 8 bytes/point= 2072 bytes)
- 315-4450) (517 points * 8 bytes/point= 4136 bytes)
- 8 bytes for each data point
 1. Gamma²²⁴ (highest byte)
 2. Gamma
 3. Gamma
 4. Gamma (lowest byte)
 5. Phase²²⁵ (highest byte)
 6. Phase
 7. Phase
 8. Phase (lowest byte)

Notes:

return loss = $-20 * (\log(\text{Gamma}) / \log(10))$

VSWR = $(1 + \text{Gamma}) / (1 - \text{Gamma})$

Phase compares the reflected to the incident (reference)

For Spectrum Analyzer and Transmission Measurement (Option 21) Modes:

- 44) Start Frequency²²⁶ (highest byte)
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (lowest byte)
- 48) Stop Frequency²²⁷ (highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (lowest byte)
- 52) Center Frequency²²⁸ (highest byte)
- 53) Center Frequency
- 54) Center Frequency
- 55) Center Frequency (lowest byte)
- 56) Frequency Span²²⁹ (highest byte)
- 57) Frequency Span
- 58) Frequency Span
- 59) Frequency Span (lowest byte)
- 60) Ref Level²³⁰ (highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (lowest byte)
- 64) Scale per div²³¹ (highest byte)
- 65) Scale per div

224 Gamma uses units scaled to 1/10,000

225 Phase is transmitted in 1/10ths of a degree

226 Scaled by Frequency Scale Factor (bytes 318-319)

227 Scaled by Frequency Scale Factor (bytes 318-319)

228 Scaled by Frequency Scale Factor (bytes 318-319)

229 Scaled by Frequency Scale Factor (bytes 318-319)

230 Value sent as (value in dBm * 1000) + 270,000

231 Value sent as (value * 1000)

- 66) Scale per div
- 67) Scale per div (lowest byte)
- 68) Marker 1²³² (higher byte)
- 69) Marker 1 (lower byte)
- 70) Marker 2 (higher byte)
- 71) Marker 2 (lower byte)
- 72) Marker 3 (higher byte)
- 73) Marker 3 (lower byte)
- 74) Marker 4 (higher byte)
- 75) Marker 4 (lower byte)
- 76) Marker 5 (higher byte)
- 77) Marker 5 (lower byte)
- 78) Marker 6 (higher byte)
- 79) Marker 6 (lower byte)
- 80) Single Limit²³³ (highest byte)
- 81) Single Limit
- 82) Single Limit
- 83) Single Limit (lowest byte)
- 84) Multiple Upper Limit 1 Start X²³⁴ (highest byte)
- 85) Multiple Upper Limit 1 Start X
- 86) Multiple Upper Limit 1 Start X
- 87) Multiple Upper Limit 1 Start X (lowest byte)
- 88) Multiple Upper Limit 1 Start Y (Power Level) (highest byte)
- 89) Multiple Upper Limit 1 Start Y (Power Level)
- 90) Multiple Upper Limit 1 Start Y (Power Level)
- 91) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 92) Multiple Upper Limit 1 End X²³⁵ (highest byte)
- 93) Multiple Upper Limit 1 End X
- 94) Multiple Upper Limit 1 End X
- 95) Multiple Upper Limit 1 End X (lowest byte)
- 96) Multiple Upper Limit 1 End Y (Power Level) (highest byte)
- 97) Multiple Upper Limit 1 End Y (Power Level)
- 98) Multiple Upper Limit 1 End Y (Power Level)
- 99) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 100-243) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 84-99 for format)
- 244) RBW Setting²³⁶ (highest byte)
- 245) RBW Setting
- 246) RBW Setting
- 247) RBW Setting (lowest byte)
- 248) VBW Setting²³⁷ (highest byte)
- 249) VBW Setting
- 250) VBW Setting
- 251) VBW Setting (lowest byte)
- 252) OCC BW Method (00h = % of power, 01h = dB down)
- 253) OCC BW % Value (0-99)

232 Marker values are sent as # of data point on display.

233 All amplitude values are sent as (value in dBm * 1000) + 270,000

234 Scaled by Frequency Scale Factor (bytes 318-319)

235 Scaled by Frequency Scale Factor (bytes 318-319)

236 Valid frequencies (in Hz) are 100, 300, 1,000, 3,000, 10,000, 30,000, 100,000, 300,000, 1,000,000

237 Valid frequencies (in Hz) are 100, 300, 1,000, 3,000, 10,000, 30,000, 100,000, 300,000

- 254) OCC BW dBc (0-120)
- 255) Attenuation²³⁸ (highest byte)
- 256) Attenuation
- 257) Attenuation
- 258) Attenuation (lowest byte)
- 259-274) Antenna Name (16 bytes in ASCII)
- 275) Status Byte 1: (0b = Off, 1b = On)
 - (LSB) bit 0 : Marker 1 On/Off
 - bit 1 : Marker 2 On/Off
 - bit 2 : Marker 3 On/Off
 - bit 3 : Marker 4 On/Off
 - bit 4 : Marker 5 On/Off
 - bit 5 : Marker 6 On/Off
 - bits 6-7: Not Used
- 276) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bit 4 : Pre Amp Mode (0b = Manual, 1b = Auto)
 - bit 5 : Pre Amp Status On/Off
 - bit 6 : Dynamic Attenuation On/Off
 - bit 7 : Reserved
- 277) Status Byte 3: (0b = Off, 1b = On)
 - (LSB) bit 0 : Antenna Factor Correction On/Off
 - bits 1-2 : Detection alg (00b = pos. peak 01b = RMS Avg 10b = neg. peak, 11 = Sampling Mode)
 - bits 3-4 : Amplitude Units (log) (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
 - (Linear) – (00b = Watts 01b = Volts)
 - bit 5 : Channel Power On/Off
 - bit 6 : Adjacent Channel Power Ratio On/Off
 - bit 7 : Units Type (0b = Log 1b = Linear)
- 278) Status Byte 4 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Limit Type (0b = Single, 1b = Multiple)
 - bit 1 : Single Limit On/Off
 - bit 2 : Single Limit Beep Level (0b = beep when data is below line 1b = above)
 - bit 3 : Not Used
 - bit 4 : Multiple Limit Upper Segment 1 Status On/Off
 - bit 5 : Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW
 - bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 - bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 279) Status Byte 5 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 - bit 1 : Multiple Limit Upper Segment 3 Beep Level ABOVE/BELOW
 - bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 - bit 3 : Multiple Limit Upper Segment 4 Beep Level ABOVE/BELOW
 - bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 - bit 5 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
 - bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 - bit 7 : Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW
- 280) Status Byte 6 (0b = Off/Beep if data is BELOW line, 1b = On/Beep if data is ABOVE line)
 - (LSB) bit 0 : Multiple Limit Lower Segment 2 Status On/Off
 - bit 1 : Multiple Limit Lower Segment 2 Beep Level ABOVE/BELOW
 - bit 2 : Multiple Limit Lower Segment 3 Status On/Off
 - bit 3 : Multiple Limit Lower Segment 3 Beep Level ABOVE/BELOW
 - bit 4 : Multiple Limit Lower Segment 4 Status On/Off
 - bit 5 : Multiple Limit Lower Segment 4 Beep Level ABOVE/BELOW

238 Value sent as (value * 1000)

- bit 6 : Multiple Limit Lower Segment 5 Status On/Off
- bit 7 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
- 281) Status Byte 7
 - (LSB) bits 0-6: Number of Sweeps to Average (1-25, 1 implies averaging OFF)
 - bit 7 : Not Used
- 282) Reference Level Offset²³⁹ (highest byte)
- 283) Reference Level Offset
- 284) Reference Level Offset
- 285) Reference Level Offset (lowest byte)
- 286) External Reference Frequency²⁴⁰
- 287) Signal Standard²⁴¹ (higher byte)
- 288) Signal Standard (lower byte)
- 289) Channel Selection²⁴² (higher byte)
- 290) Channel Selection (lower byte)
- 291) Interference Analysis Cellular Standard²⁴³
- 292) Interference Analysis Estimated Bandwidth (highest byte)
- 293) Interference Analysis Estimated Bandwidth
- 294) Interference Analysis Estimated Bandwidth
- 295) Interference Analysis Estimated Bandwidth (lowest byte)
- 296) Interference Analysis Frequency²⁴⁴ (highest byte)
- 297) Interference Analysis Frequency
- 298) Interference Analysis Frequency
- 299) Interference Analysis Frequency (lowest byte)
- 300-303) Reserved
- 304) Trigger Type²⁴⁵
- 305) Trigger Position (0 – 100%)
- 306) Min Sweep Time (in μ s) (highest byte)
- 307) Min Sweep Time (in μ s)
- 308) Min Sweep Time (in μ s)
- 309) Min Sweep Time (in μ s) (lowest byte)
- 310) Video Trigger Level²⁴⁶ (highest byte)
- 311) Video Trigger Level
- 312) Video Trigger Level
- 313) Video Trigger Level (lowest byte)
- 314) Status Byte 8 (0b = Off, 1b = On)
 - (LSB) bits 0-1: Trace Math Operation (00b = A only, 01b = A-B, 10b = A+B)
 - bit 2: Max Hold On/Off
 - bit 3: Min Hold On/Off
 - bit 4: Transmission Calibration Status (Option 21 only)
 - bit 5: Bias Tee On/Off (Option 10 only)
 - bit 6: Occupied BW Measurement On/Off
 - bit 7: Not Used
- 315) Impedance (00h = 50 Ω , 0Ah = 75 Ω Anritsu Adapter, 0Ch = 75 Ω Other Adapter)

239 Value sent as (Value in dBm * 1000) + 270,000

240 byte in MHz (i.e. 20 = 20MHz)

241 Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh.

242 "No Channel" is sent as FFFEh.

243 4 Standards – 00h = 1250KHZ CDMA, 01h = GSM, 02h = TDMA, 03h = AMPS, 04h = Unknown FFh = Interference Analysis Measurement OFF

244 Scaled by Frequency Scale Factor (bytes 318-319)

245 Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

246 Value sent as (Value in dBm * 1000) + 270,000

- 316) Impedance Loss²⁴⁷ (higher byte)
- 317) Impedance Loss (lower byte)
- 318) Frequency Scale Factor²⁴⁸ (higher byte)
- 319) Frequency Scale Factor (lower byte)
- 320) Frequency Range Minimum²⁴⁹ (highest byte)
- 321) Frequency Range Minimum
- 322) Frequency Range Minimum
- 323) Frequency Range Minimum (lowest byte)
- 324) Frequency Range Maximum²⁵⁰ (highest byte)
- 325) Frequency Range Maximum
- 326) Frequency Range Maximum
- 327) Frequency Range Maximum (lowest byte)
- 328) Linked Trace Number (1-200)
- 329) Status Byte 9 (0b=Off, 1b=On)
 - (LSB) bit 0 : C/I Measurement On/Off
 - bits 1-3 : C/I Carrier Trace/Signal Type²⁵¹
 - bits 4-7 : Not Used
- 330) C/I Calculated Power²⁵² (Carrier or Interference - NB FHSS²⁵³) (highest byte)
- 331) C/I Calculated Power (Carrier or Interference - NB FHSS) (lowest byte)
- 332) C/I Calculated Power (Carrier or Interference - NB FHSS) (highest byte)
- 333) C/I Calculated Power (Carrier or Interference - NB FHSS) (lowest byte)
- 334) C/I Calculated Power²⁵⁴ (Interference - WB FHSS²⁵⁵) (highest byte)
- 335) C/I Calculated Power (Interference - WB FHSS) (lowest byte)
- 336) C/I Calculated Power (Interference - WB FHSS) (highest byte)
- 337) C/I Calculated Power (Interference - WB FHSS) (lowest byte)
- 338) C/I Calculated Power²⁵⁶ (Interference - Broadband²⁵⁷) (highest byte)
- 339) C/I Calculated Power (Interference - Broadband) (lowest byte)
- 340) C/I Calculated Power (Interference - Broadband) (highest byte)
- 341) C/I Calculated Power (Interference - Broadband) (lowest byte)
- 342-400) Not Used
- 401-2004) Sweep Data
 - (401 points * 4 bytes/point = 1604 bytes)
 - 4 bytes for each data point
 - 1. dBm²⁵⁸ (highest byte)
 - 2. dBm

247 Value sent as (value in dB * 1000), valid values are 0 to 20 dB

248 In number of Hz

249 Scaled by Frequency Scale Factor (bytes 318-319)

250 Scaled by Frequency Scale Factor (bytes 318-319)

251 000b = NB FHSS, 001b = Carrier - WB FHSS, 010b = Carrier - Broadband, 111b = Interference

252 Value sent as (value in dBm * 1000) + 270,000

253 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a NB FHSS signal. Otherwise, these bytes represent the calculated carrier power.

254 Value sent as (value in dBm * 1000) + 270,000

255 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a WB FHSS signal. Otherwise, these bytes should be ignored.

256 Value sent as (value in dBm * 1000) + 270,000

257 If Status Byte 9, bits 1-3 equal 111b, then value will be calculated power for the interference trace as a Broadband signal. Otherwise, these bytes should be ignored.

258 Value sent as (Value in dBm * 1000) + 270,000

- 3. dBm
- 4. dBm (lowest byte)

For T1/E1 Modes (Option 50):

- 44) Receive Input (00h: Terminate, 01h: Bridged, 02h: Monitor)
- 45) Framing Mode²⁵⁹
- 46) Line Coding (01h: B8ZS, 02h: AMI, 03h: HDB3)
- 47) Tx Level (Valid for T1 Only) (01h: 0 dB, 02h: -7.5 dB, 03h: -15 dB)
- 48) Clock Source (00h: External, 01h: Internal)
- 49) Error Insert Type (00h: Frame Error, 01h: BPV, 02h: Bit Errors, 04h: RAI, 05h: AIS)
- 50) Loop Code (Valid for T1 Only) (00h: CSU, 01h: NIU, 02h: User 1, 03h: User 2)
- 51) Loop Type (Valid for T1 Only) (00h: In Band, 01h: Data Link)
- 52) CRC Method (Valid for T1 Only) (00h: ANSI CRC, 01h: Japanese CRC)
- 53) Display Type (00h: Histogram, 01h: Raw Data)
- 54) Impedance (Valid for E1 Only) (01h: 75 Ω, 02h: 120 Ω)
- 55) Pattern²⁶⁰
- 56) Pattern Invert Status (00h: Non-Inverted, 01h: Inverted)
- 57) Insert Bit Error Value (1-1000) (higher byte)
- 58) Insert Bit Error Value (lower byte)
- 59) Insert BPV Error Value (1-1000) (higher byte)
- 60) Insert BPV Error Value (lower byte)
- 61) Insert Frame Error Value (1-1000) (higher byte)
- 62) Insert Frame Error Value (lower byte)
- 63) Measurement Duration²⁶¹
- 64) Histogram Resolution²⁶²
- 65) Frame Sync Status (00h: In Sync, 01h: Out-of-Sync)
- 66) Pattern Sync Status (00h: In Sync, 01h: Out-of-Sync)
- 67) Carrier Status (00h: In Sync, 01h: Out-of-Sync)
- 68) Rx Alarms (bit 0: Receiving AIS, bit 1: Receiving RAI, bit 2: Receiving E1 MMF error)
- 69) BPV Error Count (highest byte)
- 70) BPV Error Count
- 71) BPV Error Count
- 72) BPV Error Count (lowest byte)
- 73) CRC Error Count (highest byte)
- 74) CRC Error Count
- 75) CRC Error Count
- 76) CRC Error Count (lowest byte)
- 77) Frame Error Count (highest byte)
- 78) Frame Error Count
- 79) Frame Error Count
- 80) Frame Error Count (lowest byte)
- 81) LOF Error Count (highest byte)
- 82) LOF Error Count
- 83) LOF Error Count
- 84) LOF Error Count (lowest byte)
- 85) E Bit Error Count (E1 Only) (highest byte)

259 T1 Mode: 01h: ESF, 02h: D4SF
E1 Mode: 03h: PCM30, 04h: PCM30CRC, 05h: PCM31, 06h: PCM31CRC

260 Pattern: 01h: PRBS-9, 02h: PRBS-11, 03h: PRBS-15, 04h: PRBS-20(O.151), 05h: PRBS-20(O.153), 06h: PRBS-23, 07h: QRSS, 08h: 1 in 8, 09h: 2 in 8, 0Ah: 3 in 8, 0Bh: All Ones, 0Ch: All Zeros, 0Dh: T1-DALY, 0Eh: User Defined

261 Measurement Duration: 00h: Manual, 01h: 3 min, 02h: 15 min, 03h: 30 min, 04h: 1 hr, 05h: 3 hrs, 06h: 6 hrs, 07h: 12 hrs, 08h: 1 day, 09h: 2 days

262 Histogram Resolution: 00h: Auto, 01h: 1 sec, 02h: 15 sec, 03h: 30 sec, 04h: 45 sec, 05h: 1 min, 06h: 15 min, 07h: 30 min, 08h: 45 min, 09h: 60 min

- 86) E Bit Error Count (E1 Only)
- 87) E Bit Error Count (E1 Only)
- 88) E Bit Error Count (E1 Only) (lowest byte)
- 89) Errored Seconds (highest byte)
- 90) Errored Seconds
- 91) Errored Seconds
- 92) Errored Seconds (lowest byte)
- 93) Bit Count (highest byte)
- 94) Bit Count
- 95) Bit Count
- 96) Bit Count (lowest byte)
- 97) Bit Errors (highest byte)
- 98) Bit Errors
- 99) Bit Errors
- 100) Bit Errors (lowest byte)
- 101) User Defined Pattern (convert to binary for pattern) (highest byte)
- 102) User Defined Pattern
- 103) User Defined Pattern
- 104) User Defined Pattern (lowest byte)
- 105 – 112) Measurement Start Time String (ASCII string: “HH:MM:SS”)
- 113 – 123) Measurement Stop Time String (ASCII string: “DD:HH:MM:SS”)
- 124 – 134) Elapsed Time String (ASCII string: “DD:HH:MM:SS”)
- 135 – 142) Bit Error Rate String (ASCII string in engineering format: x.xxE-xx)
- 143 – 642) 100 data points with 5 bytes for each data point.

1st byte has information about Carrier Loss, Frame Loss, BPV and CRC
 Following 4 bytes corresponds to the Bit Error Count

Break down of the 1st byte:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not Used	Not Used	Not Used	Carrier Loss	Frame Loss	BPV Error	CRC/E-bit Error	Any Error

- 643) Vpp or dBdsx (higher byte)
- 644) Vpp or dBdsx (lower byte)
- 645) T1 or E1 Receive Frequency in Hz (highest byte)
- 646) T1 or E1 Receive Frequency in Hz
- 647) T1 or E1 Receive Frequency in Hz
- 648) T1 or E1 Receive Frequency in Hz (lowest byte)
- 649 – 750) Not Used

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Not enough bytes transferred
- 225 (E1h) Memory Error: Not enough memory to store data
- 238 (EEh) Time-out Error

Get Options – Control Byte #37 (25h)

Description: Queries the option(s) installed on the Site Master, returns a list as an ASCII string.

Bytes to Follow: 0 bytes

Site Master Returns: Number of bytes depends on the option(s) installed:

Option 3: “3”

Option 6: "6"
Option 10: "10"
Option 21: "21"
Option 29: "29"
Option 50: "50"
If no options are installed: "None"

Query Power Level – Control Byte #39 (27h)

(Option 29 only)

Description: Return Power Level at the RF In port. Also returns power meter settings.

Bytes to Follow: 0 bytes

Site Master Returns: 30 bytes

- 1) Status Byte # 1 (0b = Off, 1b = On)
(LSB) bit 0 : Unit (0b - Watt/%, 1b - dBm/dB)
bit 2 : Relative Mode On/Off
bit 3: Offset Mode On/Off
bit 4: Zero Mode On/Off
bits 5-7: Not Used
- 2) RMS Averaging Status²⁶³
- 3 - 6) Relative Mode Reference Power Level in dBm
- 7 - 10) Offset Mode Power Level
- 11 - 14) Zero Mode Power Level
- 15 - 18) Absolute Power Level
- 19 - 22) Power
- 23 - 26) Center Frequency
- 27 - 30) Span Frequency

Notes:

Power is returned as (dBm * 1000)
Relative power is returned as (dB * 1000)
Offset is returned as (dB * 1000)
Frequencies are scaled by the scale factor

Set Power Meter Units – Control Byte #40 (28h)

(Option 29 only)

Description: Set Power Meter units to Watts or dBm.

Bytes to Follow: 1 byte

- 1) Units
00h = Watt (% if in relative mode)
01h = dBm (dB if in relative mode)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Units
238 (EEh) Time-out Error

263 RMS Averaging: 00h = Off, 01h = Low, 02h = Medium, 03h = High

Power Meter Relative Mode On/Off – Control Byte #41 (29h)**(Option 29 only)**

Description: Enable or disable Power Meter Relative Mode.

Bytes to Follow: 1 byte

- 1) Relative Mode State
00h = Off
01h = On w/ trigger (use the current power level as a reference power level)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid parameter
238 (EEh) Time-out Error

Power Meter Offset Mode On/Off – Control Byte #42 (2Ah)**(Option 29 only)**

Description: Enable or disable Power Meter Offset Mode.

Bytes to Follow: 5 bytes

- 1) On/Off (01h = On, 00h = Off)
- 2 - 5) Offset Power level in dB (Multiplied by 1000)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid parameter
238 (EEh) Time-out Error

Note: If you turn the Offset mode off, you must still send the other bytes. Bytes 2 - 5 will be ignored.

Power Meter Zero Mode On/Off – Control Byte #43 (2Bh)**(Option 29 only)**

Description: Enable or disable Power Meter Zeroing Mode.

Bytes to Follow: 1 byte

- 1) Zero Mode Status
00h = Off
01h = On with trigger (current power level is referenced as -80 dBm)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid status
238 (EEh) Time-out Error

Power Meter RMS Averaging On/Off – Control Byte #44 (2Ch)**(Option 29 only)**

Description: Set Power Meter RMS Averaging. Enabling to one of three different levels, or off.

Bytes to Follow: 1 byte

- 1) RMS Averaging State
00h = Off
01h = On (Low) with trigger (current power level is referenced as -80 dBm)
02h = On (Medium)
03h = On (High)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid state
- 238 (EEh) Time-out Error

Power Meter Center Freq and Span Setup – Control Byte #45 (2Dh) (Option 29 only)

Description: Sets the center frequency and span frequency for the Power Meter mode. If Option 6 is installed and the frequency converter module is attached, the center frequency should be scaled by the scale factor of the module. If the module is not attached, the center frequency is sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 8 bytes

- 1) Center Frequency (highest byte)
- 2) Center Frequency
- 3) Center Frequency
- 4) Center Frequency (lowest byte)
- 5) Span Frequency (highest byte)
- 6) Span Frequency
- 7) Span Frequency
- 8) Span Frequency (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid frequency range
- 238 (EEh) Time-out Error

Trigger Sweep – Control Byte #48 (30h)

Description: Causes the Site Master to perform a sweep if it is in single sweep mode.

This command works only when the Site Master is NOT in remote mode. Send this command, receive the “Operation Complete Byte” and then wait for the “Sweep Complete Byte” to signify the end of the sweep.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 192 (C0h) Sweep Complete Byte (at the end of the sweep)

Trigger Sweep – Control Word (AA30h)

Description: Causes the Site Master to perform a sweep if it is in single sweep mode.

This command works only when the Site Master is NOT in remote mode. Send this command, receive the “Operation Complete Byte” and then wait for the “Sweep Complete Byte” to signify the end of the sweep.

Bytes to Follow: 0 bytes

Site Master Returns: 2 bytes

- 1) 255 (FFh) Operation Complete Byte (when the command is received)
- 2) 192 (C0h) Sweep Complete Byte (at the end of the sweep)

Check Battery Status – Control Byte #50 (32h)

Description: Return Smart Battery status.

Bytes to Follow: 0 bytes

Site Master Returns: 17 bytes

- 1-2) Battery Status flags (Refer to Smart Battery Data Spec 5.1.2.1)
- 3-4) State of Charge (unsigned integer 0 to 100(%)Full)
- 5-6) Battery Voltage (unsigned integer 0 to 65535 in mV)
- 7-8) Battery Current (signed integer -32,768 to +32,7687 mA, positive = Charging)
- 9-10) Battery Average current (signed integer -32,768 to +32,7687 mA, positive = Charging)
- 11-12) Average time to empty (unsigned integer 0 to 65535 minute)
- 13-14) Battery Charge Cycle Count (unsigned integer 0 to 65535 cycles)
- 15-16) Battery Capacity at Full Charge in mA Hours (unsigned integer 0 to 65535 cycles)
- 17) Unit under battery power (1 = YES; 0 = NO)

Set SPA Minimum Sweep Time - Control Byte #53 (35h)

Description: Sets the minimum sweep time (in μs) for the spectrum analyzer when the span is 0.

Valid range is 50 to 200,000,000.

Bytes to Follow: 4 bytes

- 1) Minimum Sweep Time (in μs) (highest byte)
- 2) Minimum Sweep Time (in μs)
- 3) Minimum Sweep Time (in μs)
- 4) Minimum Sweep Time (in μs) (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid sweep time
238 (EEh) Time-out Error

Set Trigger Position - Control Byte #54 (36h)

Description: Sets the trigger position (in percent) for the spectrum analyzer when the span is 0.

Bytes to Follow: 1 byte

- 1) Trigger Position (0 - 100%)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid trigger position
238 (EEh) Time-out Error

Set Video Trigger Level - Control Byte #55 (37h)

Description: Sets the trigger level (-120 - +20 dBm) for the spectrum analyzer when the span is 0 and trigger mode is video.

The trigger level should be sent as (value in dBm * 1000) + 120,000.

Bytes to Follow: 4 bytes

- 1) Trigger Level (highest byte)
- 2) Trigger Level
- 3) Trigger Level
- 4) Trigger Level (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte

224 (E0h) Parameter Error: Invalid trigger level
238 (EEh) Time-out Error

Automatically Save Runtime Setup – Control Byte #64 (40h)

Description: Automatically save the runtime setup when exiting remote mode.

This flag must be set once per power cycle of the Site Master. It returns to its default value when the unit is turned off. The default value is (0), DO NOT automatically save the runtime setup.

Bytes to Follow: 1 byte

- 1) Save runtime setup On/Off
00h = Off (default)
01h = On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
238 (EEh) Time Out Error

Enter Remote Mode – Control Byte #69 (45h)

Description: Enter remote mode at the end of a sweep then send model number and firmware version to the computer.

The computer sends Enter Remote mode byte #69 (45h) to the Site Master and waits for response.

Since the Site Master polls its serial port buffer at the end of each sweep, the computer must wait until the Site Master sends the return bytes before sending a new control byte. Otherwise, the new control byte overwrites the old one (saying enter remote) and the Site Master does not respond as expected.

Once in remote mode, the Site Master stops sweeping. A Remote Mode Indicator appears on the LCD.

The Site Master sends its model and software version numbers to the computer. The Site Master is now able to take multiple control bytes. It waits for the next control byte.

Bytes to Follow: 0 bytes

Site Master Returns: 13 bytes

- 1-2) Model # (unsigned integer, 14h for Site Master S331D, 15h for Site Master S332D)
- 3-9) Extended Model # (7 bytes in ASCII)
- 10-13) Software Version - 4 bytes (ASCII)

Enter Remote Mode Immediately – Control Byte #70 (46h)

Description: Enter remote mode in the middle of a sweep, then send the model number and firmware version to the computer.

The computer sends Enter Remote Mode Immediately byte #70 (46h) to the Site Master and waits for a response. This control byte causes the unit to enter remote mode immediately. Note that this could result in incomplete sweep data. Use control byte #69 if complete data is required.

Once in remote mode, the Site Master stops sweeping. A Remote Mode Indicator appears on the LCD.

The Site Master sends its model and software version numbers to the computer. The Site Master is now able to take multiple control bytes. It waits for the next control byte.

Bytes to Follow: 0 bytes

Site Master Returns: 13 bytes

- 1-2) Model # (unsigned integer, 14h for Site Master S331D, 15h for Site Master S332D)
- 3-9) Extended Model # (7 bytes in ASCII)
- 10-13) Software Version (4 bytes in ASCII)

Write Custom Cable – Control Byte #80 (50h)

Description: Write a cable parameter in the custom cable list.

Bytes to Follow: 25 bytes

- 1) Not Used
- 2) Cable List index (0 - 49)
- 3 – 17) Cable Description (string)
- 18) Propagation Velocity (highest byte)²⁶⁴
- 19) Propagation Velocity
- 20) Propagation Velocity
- 21) Propagation Velocity (lowest byte)
- 22) Insertion Loss (highest byte)²⁶⁵
- 23) Insertion Loss
- 24) Insertion Loss
- 25) Insertion Loss (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error
- 238 (EEh) Time Out Error

Recall Custom Cable – Control Byte #81 (51h)

Description: Query a cable in the custom cable list.

Bytes to Follow: 2 bytes

- 1) Not Used
- 2) Cable list index (0-49)

Site Master Returns: 24 bytes

- 1) Upper bound of Custom Cable Index
- 2 – 16) Cable Description (string)
- 17) Propagation Velocity (highest byte)²⁶⁶
- 18) Propagation Velocity
- 19) Propagation Velocity
- 20) Propagation Velocity (lowest byte)
- 21) Insertion Loss (highest byte)²⁶⁷
- 22) Insertion Loss
- 23) Insertion Loss
- 24) Insertion Loss (lowest byte)

264 Cable loss uses units 1/100,000 dBm or 1/100,000 dB/ft.

265 Relative Propagation Velocity uses units 1/100,000.

266 Relative Propagation Velocity uses units 1/100,000.

267 Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Write Antenna – Control Byte #82 (52h)

Description: Receives an antenna to the Site Master via the serial port.

An antenna is described with an index into the list (1-10) and an ASCII name that appears in the list on the Site Master. Each antenna can have up to 60 antenna factors. Each antenna factor has an associated frequency and value. These are specified one at a time.

Frequencies are sent in Hz, scaled by the scale factor.

The value of the antenna factor should be sent as (value * 100).

Bytes to Follow: 26 – 380, depending on the number of antenna factors

- 1) Antenna List Index (1-10)
 - 2-17) Antenna Name (in ASCII)
 - 18) Number of Antenna Factors (max = 60)
 - 19-20) Frequency Scale Factor (in Hz)
- For each antenna factor:
- 1) Frequency (highest byte)
 - 2) Frequency
 - 3) Frequency
 - 4) Frequency (lowest byte)
 - 5) Antenna Factor (higher byte)
 - 6) Antenna Factor (lower byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Recall Antenna – Control Byte #83 (53h)

Description: Sends an antenna from the Site Master via the serial port.

An antenna is described with an index into the list (1-10) and an ASCII name that appears in the list on the Site Master. Each antenna can have up to 60 antenna factors. The number of antenna factors will be sent before the actual values are sent. Each antenna factor has an associated frequency and value. These are specified one at a time.

Frequencies are sent in Hz, scaled by the scale factor.

The value of the antenna factor should be sent as (value * 100).

Bytes to Follow: 1 byte

- 1) Antenna List index (1-10)

Site Master Returns: (28-382 bytes, depending on the number of antenna factors)

- 1) Maximum Antenna Number (10)
 - 2-17) Antenna Name (in ASCII)
 - 18) Number of Antenna Factors (max = 60)
 - 19-20) Frequency Scale Factor (in Hz)
 - 21-22) Number of Following Bytes
- For each antenna factor:
- 1) Frequency (highest byte)
 - 2) Frequency
 - 3) Frequency
 - 4) Frequency (lowest byte)

- 5) Antenna Factor (higher byte)
- 6) Antenna Factor (lower byte)

Set Field Strength Measurement – Control Byte #84 (54h)

Description: Sets the state of the measurement (ON or OFF) and the antenna index for the field strength measurement. Antennas 1-10 are custom antennas. Antennas 11-15 are standard antennas. The standard antennas are:

11. Anritsu # 2000-1030 (MAXRAD MPA1750 - 1710-1880 MHz)
12. Anritsu # 2000-1031 (MAXRAD MPA1850 - 1850-1990 MHz)
13. Anritsu # 2000-1032 (MAXRAD MPA2450 - 2400-2483.5 MHz)
14. Anritsu # 2000-1200 (Centurion EXC SM806 - 806-899 MHz)
15. Anritsu # 2000-1035 (Centurion EXE-902-SM - 896-941 MHz)

If the FCN4760 frequency converter module is attached, the standard antenna is:

11. Anritsu # 2000-1361 (5725-5825 MHz)

Note that if the field strength measurement is turned ON, all other measurements (channel power, adjacent channel power) are turned OFF.

Bytes to Follow: 2 bytes

- 1) Field Strength Measurement State (On/Off)
- 2) Antenna List index (1-15)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid state or index
238 (EEh) Time Out Error

Set Channel Power – Control Byte #85 (55h)

Description: Sets the state of the measurement (ON or OFF), and the setup parameters to perform the channel power measurement.

Send a 0 (zero) following the command to set the channel power measurement in the current setup.

Send a 1 (one) to set the channel power associated with the trace that was most recently uploaded by command #36, Upload Sweep Trace.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Note that if the channel power measurement is turned ON, all other measurements (field strength, adjacent channel power) are turned OFF.

Bytes to Follow: 14 bytes

- 1) Channel Power Location (0 = current setup, 1 = last uploaded trace)
- 2) Channel Power Measurement State (On/Off)
- 3-6) Center Frequency
- 7-10) Integration Bandwidth
- 11-14) Span Frequency

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Read Channel Power – Control Byte #86 (56h)

Description: Read the current channel power or the channel power of a stored trace.

Send a 0 (zero) following the command to read the current channel power measurement (i.e. the one that is updated as the unit is sweeping).

Send 1-200 to read the channel power associated with a stored trace (use Query Trace Names, #24, to obtain trace numbers).

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 1 byte

- 1) Channel Power Location (0 = current measured value, 1-200 = value in stored trace)

Site Master Returns: 21 bytes

- 1) Channel Power On/Off
- 2-5) Channel Center Frequency
- 6-9) Integration Bandwidth
- 10-13) Channel Span Frequency
- 14-17) Channel Power (= (power in dBm * 1000) + 270000)
- 18-21) Channel Power Density (= (density in dBm/Hz * 1000) + 270000)

Set Adjacent Channel Power Ratio (ACPR) – Control Byte #87 (57h)

Description: Sets the state of the measurement (ON or OFF), the center frequency, the main channel bandwidth, the adjacent channel bandwidth and the channel spacing.

Send a 0 (zero) following the command to set the channel power measurement in the current setup.

Send a 1 (one) to set the adjacent channel power associated with the trace that was most recently uploaded by command #36, Upload Sweep Trace.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Note that if the ACPR measurement is turned ON, all other measurements (field strength, channel power) are turned OFF.

Bytes to Follow: 18 bytes

- 1) Adjacent Channel Power Location (0 = current setup, 1 = last uploaded trace)
- 2) Adjacent Channel Power Measurement State (On/Off)
- 3-6) Center Frequency
- 7-10) Main Channel Bandwidth
- 11-14) Adjacent Channel Bandwidth
- 15-18) Channel Spacing

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Read Adjacent Channel Power Ratio (ACPR) – Control Byte #88 (58h)

Description: Read the current adjacent channel power or the adjacent channel power of a stored trace.

Send a 0 (zero) following the command to read the current adjacent channel power measurement (i.e. the one that is updated as the unit is sweeping).

Send 1-200 to read the channel power associated with a stored trace (use Query Trace Names, #24, to obtain trace numbers).

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 1 byte

- 1) Adjacent Channel Power Ratio Location (0 = current measured value, 1-200 = value in stored trace)

Site Master Returns: 29 bytes

- 1) ACPR On/Off
- 2-5) Main Channel Center Frequency
- 6-9) Main Channel Bandwidth
- 10-13) Adjacent Channel Bandwidth
- 14-17) Channel Spacing
- 18-21) Main Channel Power (= (power in dBm * 1000) + 270000)
- 22-25) Lower Adjacent Channel Power (= (power in dBm * 1000) + 270000)
- 26-29) Upper Adjacent Channel Power (= (power in dBm * 1000) + 270000)

Read Signal Standard Name – Control Byte #89 (59h)

Description: Returns the name corresponding to the desired signal standard index as an ASCII string in English.

Bytes to Follow: 3 bytes

- 1) Mode (00h = VNA, 01h = SPA/Transmission Mode (Option 21))
- 2) Signal Standard Index (higher byte)
- 3) Signal Standard Index (lower byte)

Site Master Returns: 2 bytes + number of bytes in string (or 1 byte on error)

- 1) String length (in number of bytes - referred to as "X" on the next line)
 - 2-(X+1)) Standard Name in ASCII
 - X+2) 255 (FFh) Operation Complete Byte
- or
- 1) 224 (E0h) Parameter Error
 - 238 (EEh) Time Out Error

Measure OCC BW % of Power – Control Byte #96 (60h)

Description: Measure OCC BW with % of Power method.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 4 bytes

- 1) % of Power (highest byte)
- 2) % of Power
- 3) % of Power
- 4) % of Power (lowest byte) (in 100th of %, 9123 = 91.23%)

Site Master Returns: 16 bytes

- 1-4) Occupied Bandwidth (in Hz)
- 5-8) Measure dB down (dB * 100,000)

- 9-12) Low Frequency OCC BW
- 13-16) High Frequency OCC BW

Measure OCC BW dB Down – Control Byte #97 (61h)

Description: Measure OCC BW with dB down method.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 4 bytes

1-4) dB down (in 100th of dB, 1234 = 12.34dB)

Site Master Returns: 16 bytes

- 1-4) OCC BW (frequency in Hz)
- 5-8) Measure % of Power (% of power * 100)
- 9-12) Low Frequency OCC BW
- 13-16) High Frequency OCC BW

Set Bias Tee Function - Control Byte #98 (62h)

(Option 10 only)

Description: Set the Bias Tee function On/Off. If the Bias Tee is turned on, the Site Master returns the results of Bias Tee.

Bytes to Follow: 1 byte

- 00h - Turns the Bias Tee Off
- 01h - Turns the Bias Tee On

Site Master Returns:

If bias tee is turned Off (1 byte)

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid state
- 238 (EEh) Time-out Error

If bias tee is turned On (10 bytes)

- 1) Bias Tee Board Indicator (00h = No Hardware Installed, 01h = Hardware Installed)
- 2) Bias Tee Current (highest byte)
- 3) Bias Tee Current
- 4) Bias Tee Current
- 5) Bias Tee Current (lowest byte)
- 6) 10 * Bias Tee Voltage (highest byte) : voltage value is in volt/10
- 7) 10 * Bias Tee Voltage
- 8) 10 * Bias Tee Voltage
- 9) 10 * Bias Tee Voltage (lowest byte)
- 10) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error
- 238 (EEh) Time-out Error

NOTE: Due to the hardware delay, the Site Master does not return the results of the Bias Tee until approximately three seconds after the Bias Tee is turned on.

Set Spectrum Analyzer Start/Stop Frequency – Control Byte #99 (63h)

Description: Sets the spectrum analyzer start and stop frequencies.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, the frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 8 bytes

- 1) Start Frequency (highest byte)
- 2) Start Frequency
- 3) Start Frequency
- 4) Start Frequency (lowest byte)
- 5) Stop Frequency (highest byte)
- 6) Stop Frequency
- 7) Stop Frequency
- 8) Stop Frequency (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid frequency range
238 (EEh) Time Out Error

Set Spectrum Analyzer Center Freq./Span – Control Byte #100 (64h)

Description: Sets the spectrum analyzer center frequency and span.

If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, the frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 8 bytes

- 1) Center Frequency (highest byte)
- 2) Center Frequency
- 3) Center Frequency
- 4) Center Frequency (lowest byte)
- 5) Frequency Span (highest byte)
- 6) Frequency Span
- 7) Frequency Span
- 8) Frequency Span (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid frequency range
238 (EEh) Time Out Error

Set Spectrum Analyzer Scale – Control Byte #101 (65h)

Description: Sets the reference level and the number of dB represented by each graph division.

Ref Level will be the “top” scale of the graph, and there are total of 10 divisions, so bottom scale can be determined by : Ref level + 10 x dB/div.

Bytes to Follow: 8 bytes

- 1) Ref Level (highest byte)
- 2) Ref Level

- 3) Ref Level
- 4) Ref Level (lowest byte)
- 5) dB/div (highest byte)
- 6) dB/div
- 7) dB/div
- 8) dB/div (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid scale
238 (EEh) Time Out Error

Notes:

Ref Level is sent as the (Ref Level * 1000) + 270,000 (0 dBm = 270,000, 20 dBm = 290000, -120 dBm = 150,000)
Scale should be sent as (dBm * 1000) (e.g., -12.34 dBm = -12340)

Set Spectrum Analyzer Marker – Control Byte #102 (66h)

Description: Sets an individual Spectrum Analyzer marker.

Bytes to Follow: 5 bytes

- 1) Marker Number (01h = marker 1, 02h = marker 2, 03h = marker 3, 04h = marker 4, 05h = marker 5, 06h = marker 6)
- 2) Marker Line On/Off (01h = On, 00h = Off)
- 3) Marker Delta Status On/Off (01h = On, 00h = Off)
- 4) Marker Value (higher byte)
- 5) Marker Value (lower byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid marker number, status or position
238 (EEh) Time Out Error

Note: Marker Value is between 0 and 400, inclusive: Point = (400 * (marker freq - start freq)) / span

Set Spectrum Analyzer Single Limit – Control Byte #103 (67h)

Description: Sets the position and On/Off Status of the Limit Line.

Bytes to Follow: 6 bytes

- 1) Limit Number (1 for Site Master)
- 2) Limit Line On/Off (01h = On, 00h = Off)
- 3) Beep at Limit On/Off (01h = On, 00h = Off)
- 4) Limit Value (highest byte)
- 5) Limit Value
- 6) Limit Value
- 7) Limit Value (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid limit number, status or value
238 (EEh) Time Out Error

Note: Limit Value is sent as the (Limit Value * 1000) + 270,000 (0 dBm=270,000, 20 dBm=290000, -120 dBm=150,000)

Set Spectrum Analyzer Peak Hold – Control Byte #105 (69h)

Description: Sets the max hold and min hold settings on the Spectrum Analyzer.

Bytes to Follow: 1 byte

- 1) Peak Hold State
 - 00h – Peak Hold Off
 - 01h – Max Hold On
 - 02h – Min Hold On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid state
238 (EEh) Time Out Error

Set Spectrum Analyzer Resolution Bandwidth – Control Byte #106 (6Ah)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features use Control Byte #141 (8Dh).

Description: Sets the resolution BW frequency for the Spectrum Analyzer.

Bytes to Follow: 1 byte

- 1) Resolution Bandwidth Index
 - 00h – 10 kHz BW
 - 01h – 30 kHz BW
 - 02h – 100 kHz BW
 - 03h – 1 MHz BW

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid RBW Index
238 (EEh) Time Out Error

Set Spectrum Analyzer Video Bandwidth – Control Byte #107 (6Bh)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features use Control Byte #142 (8Eh).

Description: Sets the video BW frequency for the Spectrum Analyzer.

Bytes to Follow: 1 byte

- 1) Video Bandwidth Index
 - 00h – 100 Hz BW
 - 01h – 300 Hz BW
 - 02h – 1 kHz BW
 - 03h – 3 kHz BW
 - 04h – 10 kHz BW
 - 05h – 30 kHz BW
 - 06h – 100 kHz BW
 - 07h – 300 kHz BW

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid VBW Index
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Sweep Mode – Control Byte #108 (6Ch)

Description: Enables or disables the Single Sweep Mode during Spectrum Analyzer mode of operation.

Single Sweep Mode activates once the Site Master exits from the remote mode.

For Single Sweep Mode during Site Master VNA modes of operation see control byte #11 (0Bh).

Bytes to Follow: 1 byte

- 1) Sweep Mode
 - 00h – Single Sweep
 - 01h – Continuous Sweep
 - 02h – Video Trigger (Span must be 0)
 - 03h – External Trigger (Span must be 0)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid Mode
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Marker to Peak – Control Byte #109 (6Dh)

Description: Sets the specified marker to the peak value of the sweep.

Bytes to Follow: 1 byte

- 1) Marker Number (1-6)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid Marker Number
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Marker to Center – Control Byte #110 (6Eh)

Description: Sets the center frequency equal to the frequency of the specified marker.

Bytes to Follow: 1 byte

- 1) Marker Number (1-4)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid Marker Number
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Attenuation – Control Byte #111 (6Fh)

NOTE: This command exists for backward compatibility with the S33xC models. Features new to the S33xD models are not available here. To access the new features use Control Byte #143 (8Fh).

Description: Sets the attenuation for the Site Master Spectrum Analyzer mode. Send a value of 255 (FFh) to enable dynamic attenuation.

Automatic control couples the attenuation to the reference level. Note that setting the attenuation using this command automatically sets the attenuation coupling to “MANUAL”, thereby allowing it to be defined independently of the reference level.

Bytes to Follow: 1 byte

- 1) Attenuation Index
 - 00h – 0 dB
 - 01h – 10 dB
 - 02h – 20 dB
 - 03h – 30 dB
 - 04h – 40 dB
 - 05h – 50 dB

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Attenuation Value
238 (EEh) Time Out Error

Set Site Master VNA Segmented Limit Lines – Control Byte #112 (70h)

Description: Sets the position and On/Off status of the segmented limit lines for the VNA modes.

Site Master VNA modes support 5 limit segments. Each segment may have any finite slope and can be enabled and disabled independently of every other segment. The limit beep is enabled for all segments or no segments.

Limit segments are specified by their end points (starting and ending “x” and “y” values).

See control byte #29 (1Dh) response byte 60 to 129 for the current Site Master configuration.

Bytes to Follow: 14 bytes

- 1) Limit Number
- 2) Limit Line On/Off (01h = On, 00h = Off)
- 3) Starting X (highest byte)²⁶⁸
- 4) Starting X
- 5) Starting X
- 6) Starting X (lowest byte)
- 7) Starting Y (higher byte)
- 8) Starting Y (lower byte)
- 9) Ending X (highest byte)²⁶⁹
- 10) Ending X
- 11) Ending X
- 12) Ending X (lowest byte)
- 13) Ending Y (higher byte)
- 14) Ending Y (lower byte)

²⁶⁸ Frequency in Hz or distance in 1/100,000 ft (or meters)

²⁶⁹ Frequency in Hz or distance in 1/100,000 ft (or meters)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid limit segment, status or value
- 238 (EEh) Time Out Error

Notes: Limit Value depends on the current display mode selected.

Return Loss &: Limit should be sent as (dB * 1000)
Cable Loss Maximum value sent is 60000 which represents 60.00 dB
 Minimum value sent is 0 which represents 0.0 dB
SWR: Limit is in thousandths (of ratio), so it should be sent as (ratio * 1000)
 Maximum value sent is 65530 which represents 65.53
 Minimum value sent is 1000 which represents 1.00

Set Spectrum Analyzer Multiple Limit – Control Byte #113 (71h)

Description: Sets the position and ON/OFF Status of a limit segment.

Multiple limits are defined by multiple limit segments, each with a different finite slope. The single limit is a single, horizontal line that can be defined to act as an upper limit or as a lower limit. See control byte #103 for information about the single limit.

The limit types are mutually exclusive. That is, you cannot have both single and multiple limits at the same time. Note that setting a limit segment ON automatically makes the limit type “MULTIPLE”.

One segment is defined each time this command is sent to the Site Master. The first two bytes of the command specify which segment is being defined. There are 5 upper limits and 5 lower limits available in Spectrum Analyzer mode. Byte 1 selects the segment number. Byte 2 specifies whether it is an upper limit or a lower limit. Byte 3 turns the segment ON or OFF. Byte 4 specifies whether the error beep sounds when the bound set by the segment is exceeded by the measured data.

The segment location is defined by its endpoints. The “Start” endpoint must appear to the left of the “End” endpoint on the graph. That is, Start X < End X. If Start X = End X then Start Y must equal End Y. Vertical segments are not allowed.

Bytes to Follow: 20 bytes

- 1) Segment number (1-5)
- 2) Segment type (00h = LOWER limit, 01h = UPPER limit)
- 3) Limit Line ON/OFF (01h = On, 00h = Off)
- 4) Limit Beep ON/OFF (01h = On, 00h = Off)
- 5) Limit Value Start X ²⁷⁰(highest byte)
- 6) Limit Value Start X
- 7) Limit Value Start X
- 8) Limit Value Start X (lowest byte)
- 9) Limit Value Start Y ²⁷¹(highest byte)
- 10) Limit Value Start Y
- 11) Limit Value Start Y
- 12) Limit Value Start Y (lowest byte)
- 13) Limit Value End X ²⁷²(highest byte)
- 14) Limit Value End X
- 15) Limit Value End X

270 If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, the frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

271 (Value in dBm * 1000) + 270,000

272 If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, the frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

- 16) Limit Value End X (lowest byte)
- 17) Limit Value End Y ²⁷³ (highest byte)
- 18) Limit Value End Y
- 19) Limit Value End Y
- 20) Limit Value End Y (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid limit segment, status or value
- 238 (EEh) Time Out Error

Set Return Spectrum Analyzer Sweep Time – Control Byte #114 (72h)

Description: If this is enabled, the duration of the current sweep (in milliseconds) will be returned as 4 bytes via the serial port at the end of the sweep. If Serial Echo Status is enabled, the 4 bytes will be returned AFTER the sweep complete byte.

Bytes to Follow: 1 byte

- 1) Return SPA Sweep Time flag state
 - 00h = Don't Return Sweep Time
 - 01h = Return Sweep Time

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid state
- 238 (EEh) Time Out Error

Set Reference Level Offset – Control Byte #115 (73h)

Description: Set the value of the reference level offset.

The reference level offset allows the user to view the result of trace math (A+B, A-B) even if it is greater than +20 dBm or less than -120 dBm. The offset is a constant that is subtracted from the reference level.

Note that the valid range is -100 to +100 dB.

Send the value as (value in dB * 1000) + 270,000.

For example, to compensate for a 30 dB attenuator, the reference level offset should be -30 dB. That value would be sent over the serial port as $(-30 * 1000) + 270,000 = 240,000$.

Bytes to Follow: 4 bytes

- 1) Reference Level Offset (highest byte)
- 2) Reference Level Offset
- 3) Reference Level Offset
- 4) Reference Level Offset (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error
- 238 (EEh) Time Out Error

273 (Value in dBm * 1000) + 270,000

Read Marker Value – Control Byte #117 (75h)

Description: Returns the frequency location of the specified marker, and the value at that location.

If Option 6 is installed and the frequency converter module is attached, the frequency will be scaled by the scale factor of the module. If the module is not attached, the frequency is sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

Bytes to Follow: 1 byte

- 1) Marker number (1-6)

Site Master Returns: 8 bytes (1 byte if an error occurs)

- 1) Frequency (highest byte)
- 2) Frequency
- 3) Frequency
- 4) Frequency (lowest byte)
- 5) Value at Marker (highest byte)
- 6) Value at Marker
- 7) Value at Marker
- 8) Value at Marker (lowest byte)

or

- 1) 224 (E0h) Parameter Error: Invalid marker number
238 (EEh) Time-out Error

Note: Marker value sent as (value in dBm * 1,000) +270,000.

Set Sweep Averaging – Control Byte #118 (76h)

Description: Sets the number of sweeps to average. The maximum number is 25. Sending a 1 turns averaging off.

Bytes to Follow: 1 byte

- 1) Number of sweeps to average (1-25)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Field InstaCal – Control Byte #120 (78h)

Description: This command is used by the customer in the field to start an InstaCal sequence.

Prior to sending this command to the Site Master, the InstaCal module should be connected to the R/F Out port. To execute this command, exit remote mode after sending this command.

Byte to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Communication Error : Site Master was unable to communicate with InstaCal module
238 (EEh) Time Out Error : Field InstaCal sequence was unable to complete

Read InstaCal Module ASCII Serial Number – Control Byte #124 (7Ch)

Description: Returns the InstaCal Module serial number in ASCII.

Bytes to Follow: 1 byte

- 1) Serial number storage location (01h=main serial, 02h=secondary)

Site Master Returns: 8 bytes

- 1-8) Serial Number, in ASCII
-

Set Site Master Marker (Peak/Valley) – Control Byte #129 (81h)

Description: Sets an individual marker in current measurement mode to either peak (maximum) signal or valley (minimum) signal.

Bytes to Follow: 2 bytes

- 1) Marker Number (01h = marker 1, 02h = marker 2, 03h = marker 3, 04h = marker 4, 05h = marker 5, 06h = marker 6)
- 2) Marker Line Search Status (01h = Peak, 00h = Valley)

Site Master Returns: 3 bytes (1 byte if an error occurs)

- 1) Marker Position (higher byte)²⁷⁴
 - 2) Marker Position (lower byte)
 - 3) 255 (FFh) Operation Complete Byte
- or
- 1) 224 (E0h) Parameter Error : Invalid marker or marker search status
238 (EEh) Time Out Error
-

Set / Reset Spectrum Analyzer External Reference – Control Byte #133 (85h)

Description: Sets the external reference frequency for the spectrum analyzer in increments of 1 MHz from 2 – 20 MHz. The frequencies are sent in Hz.

Bytes to Follow: 1 byte if turning the reference OFF, 5 bytes if turning the reference ON

Turn OFF the external reference:

- 1) 00h - Turn OFF the frequency reference

or

Turn ON the external reference (the reference frequency is also sent):

- 1) 01h - Turn ON the frequency reference
- 2) External Reference Frequency (in Hz) (highest byte)
- 3) External Reference Frequency (in Hz)
- 4) External Reference Frequency (in Hz)
- 5) External Reference Frequency (in Hz) (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

²⁷⁴ The marker position is sent as a data point on the display. Equivalent Frequency = (position * span / (# data points - 1)) + start frequency

Check Spectrum Analyzer External Reference – Control Byte #134 (86h)

Description: Checks to see if Spectrum Analyzer external reference is present. If it is, it then checks to see if it is at the correct frequency for PLL locking.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

On Success:

- 1) 00h – Reference present and at the correct frequency (PLL functioning)
- 01h – Reference is not present
- 02h – Reference is present, but internal PLL and external frequency do not match up.

or

On Error:

- 1) 224 (E0h) Parameter Error – Not in External reference mode
- 238 (EEh) Time-out Error.

Set SPA Preamp State (On/Off/Auto) – Control Byte #136 (88h)

Description: Sets the state of Spectrum Analyzer preamplifier.

Setting the preamp state to ON or OFF sets the preamp coupling to manual. That is, the preamplifier state is controlled independently of all other parameters.

Setting the preamp state to AUTO couples the preamp state to the reference level and the attenuation. If the attenuation is automatically coupled to the reference level, the preamp will turn on when the reference level is set less than -26 dBm. If the attenuation is manually coupled to the reference level, the preamp will turn on when the value of (attenuation – reference level) ≥ 51 .

Bytes to Follow: 1 byte

- 1) Mode (00h = Off, 01h = On, 02h = Auto)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid state
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Units – Control Byte #140 (8Ch)

Description: Sets the scale type (logarithmic or linear) and the units.

Linear units can be:

- 01h = Volts
- 02h = Watts

Logarithmic units can be:

- 03h = dBm
- 04h = dBV
- 05h = dBmV
- 06h = dB μ V

Bytes to Follow: 2 bytes

- 1) Scale Type (00h = Linear, 01h = Logarithmic)
- 2) Units

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error
- 238 (EEh) Time-out Error

Set Spectrum Analyzer Resolution Bandwidth – Control Byte #141 (8Dh)

NOTE: This command is new to the Site Master S33xD models. Use it instead of Control Byte #106 to access the RBW.

Description: Sets the resolution BW frequency for the Spectrum Analyzer.

Bytes to Follow: 4 bytes

- 1) Resolution Bandwidth (frequency in Hz) (highest byte)
- 2) Resolution Bandwidth (frequency in Hz)
- 3) Resolution Bandwidth (frequency in Hz)
- 4) Resolution Bandwidth (frequency in Hz) (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid RBW
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Video Bandwidth – Control Byte #142 (8Eh)

NOTE: This command is new to the Site Master S33xD models. Use it instead of Control Byte #107 to access the VBW.

Description: Sets the video BW frequency for the Spectrum Analyzer.

Bytes to Follow: 4 bytes

- 1) Video Bandwidth (frequency in Hz) (highest byte)
- 2) Video Bandwidth (frequency in Hz)
- 3) Video Bandwidth (frequency in Hz)
- 4) Video Bandwidth (frequency in Hz) (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid VBW
- 238 (EEh) Time Out Error

Set Spectrum Analyzer Attenuation – Control Byte #143 (8Fh)

NOTE: This command is new to the Site Master S33xD models. Use it instead of Control Byte #111 to access the Attenuation.

Description: Sets the attenuation of the Spectrum Analyzer. Send a value of 255 (FFh) to enable dynamic attenuation.

Automatic control couples the attenuation to the reference level. Note that setting the attenuation using this command automatically sets the attenuation coupling to "MANUAL", thereby allowing it to be defined independently of the reference level.

Bytes to Follow: 1 byte

- 1) Attenuation (0 – 51)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid attenuation
238 (EEh) Time Out Error

Set AM/FM Demodulation – Control Byte #145 (91h)

Description: Sets the AM/FM/SSB Demodulation state. This command is also used to set the type of Modulation, volume, Demodulation Frequency, BFO Adjust (SSB only) and the Demodulation time. On turning demodulation ON, after exiting remote, at the end of every sweep, demodulation is performed at the Demodulation frequency for a period of time specified in the Demod Time.

Bytes to Follow: 16 bytes

- 1) Set AM/FM/SSB Demod On/Off²⁷⁵
- 2) Demodulation Type²⁷⁶
- 3) Speaker Volume (higher byte)²⁷⁷
- 4) Speaker Volume (lower byte)
- 5) Demodulation Time²⁷⁸ (highest byte)
- 6) Demodulation Time
- 7) Demodulation Time
- 8) Demodulation Time (lowest byte)
- 9) Demodulation Frequency²⁷⁹ (highest byte)
- 10) Demodulation Frequency
- 11) Demodulation Frequency
- 12) Demodulation Frequency (lowest byte)
- 13) SSB BFO Adjust²⁸⁰ (highest byte)
- 14) SSB BFO Adjust
- 15) SSB BFO Adjust
- 16) SSB BFO Adjust (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time Out Error

275 00h = Off, 01h = On

276 00h = FM Wideband, 01h = FM Narrowband, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

277 Speaker Volume is from 0 to 100 in steps of 10

278 Demodulation time in milliseconds from 100 millisecond to 500 seconds

279 If Option 6 is installed and the frequency converter module is attached, the frequencies should be scaled by the scale factor of the module. If the module is not attached, the frequencies are sent in Hz. Use Control Word A203 to determine whether a module is attached and the appropriate scale factor.

280 BFO Valid Values are -10 kHz to +10 kHz. Send value as BFO (in Hz) + 10,000. For Example -10 kHz would be sent as 0, 0 would be sent as 10000 and +10 kHz would be 20000

Set Baud Rate – Control Byte #197 (C5h)

Description: Set baud rate for this session. An invalid setting returns the baud rate to 9600.

Bytes to Follow: 1 byte

- 1) Baud Rate Index
 - 00h = 9600 baud
 - 01h = 19200 baud
 - 02h = 38400 baud
 - 03h = 56000 baud
 - 04h = 115200 baud

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid baud rate index
238 (EEh) Time Out Error

Set Language – Control Byte #198 (C6h)

Description: Set the Site Master display language.

Bytes to Follow: 1 byte

- 1) Language Index
 - 00h = English
 - 01h = French
 - 02h = German
 - 03h = Spanish
 - 04h = Chinese
 - 05h = Japanese

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid language index
238 (EEh) Time Out Error

Query Time – Control Byte #208 (D0h)

Description: Queries the Site Master for the current time in ASCII format.

Bytes to Follow: 0 bytes

Site Master Returns: 8 bytes (HH:MM:SS)

- 1) Hour (higher byte)
- 2) Hour (lower byte)
- 3) :
- 4) Minute (higher byte)
- 5) Minute (lower byte)
- 6) :
- 7) Second (higher byte)
- 8) Second (lower byte)

Read ASCII Serial Number – Control Byte #225 (E1h)

Description: Reads and returns the Site Master serial number as 8 ASCII bytes.

Bytes to Follow: 1 byte

- 1) Serial number storage location
 - 01h = Main (External) Serial Number,
 - 02h = Secondary (Motherboard) Serial Number
 - 03h = T1/E1 Serial Number

Site Master Returns: 8 bytes

- 1-8) Serial Number (in ASCII)

Exit Remote Mode – Control Byte #255 (FFh)

Description: Site Master exits remote mode.

The computer sends the Exit Remote command #255 (FFh) to the Site Master. Site Master returns a confirm flag (FFh). The Site Master resumes sweeping, either continuously or singly.

You may also press the “ESCAPE” key on the Site Master key pad to exit from remote mode (given that the serial communication is still in sync). In this case, the Site Master does not return a confirm byte to the serial port.

When exiting remote mode, system parameters changed during remote mode are used immediately.

System parameters changed during remote mode are not written to the non-volatile EEPROM.

You may want to save the changes to the run-time setup (saved setup location 0, which holds the power-on setup) or one of the saved setups for the current measurement mode. See control byte #18 (12h) for details.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete

Set T1 Transmission Level – Control Word (A001h)

(Option 50 only)

Description: Sets the transmission level of T1 measurement mode.

Bytes to Follow: 1 byte

- 1) Transmission Level
 - 00h: 0 dB
 - 01h: -7.5 dB
 - 02h: -15 dB
 - 03h: -22 dB

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid transmission level
- 238 (EEh) Time Out Error

Set T1/E1 Clock Source – Control Word (A002h)

(Option 50 only)

Description: Sets the Clock Source of T1/E1 measurement mode.

Bytes to Follow: 1 byte

- 1) Clock Source
 - 00h: Internal
 - 01h: External

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid clock source
- 238 (EEh) Time Out Error

Set T1/E1 Pattern – Control Word (A003h)

(Option 50 only)

Description: Sets the data pattern of T1/E1 measurement mode.

Bytes to Follow: 2 bytes

- 1) Data Pattern
 - 00h: AUTO_DETECT
 - 01h: PRBS_9
 - 02h: PRBS_11
 - 03h: PRBS_15
 - 04h: PRBS_20 (O.151)
 - 05h: PRBS_20 (O.153)
 - 06h: PRBS_23
 - 07h: QRSS
 - 08h: ONE_IN_8
 - 09h: TWO_IN_8
 - 0Ah THREE_IN_24
 - 0Bh: ALL_ONES
 - 0Ch: ALL_ZEROS
 - 0Dh: T1_DALY
 - 0Eh: BLUE_ALARM
 - 0Fh: YELLOW_ALARM
 - 10h: USER_DEFINED
- 2) Inverted Pattern Option (01h: Inverted; 00h: Non-inverted)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid pattern index
- 238 (EEh) Time Out Error

Set T1/E1 Error Insert Type/Value – Control Word (A004h)

(Option 50 only)

Description: Sets the Insertion Error type and the number of errors.

Bytes to Follow: 5 bytes

- 1) Error Type
 - 00h: Bit
 - 01h: Bert
 - 02h: BPV
 - 03h: Framing
- 2) Number of Errors (highest byte)
- 3) Number of Errors
- 4) Number of Errors
- 5) Number of Errors (lowest byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid error type or value
- 238 (EEh) Time Out Error

Set T1/E1 Framing Mode – Control Word (A005h)

(Option 50 only)

Description: Sets the Framing Mode of T1/E1 measurement.

Bytes to Follow: 1 byte

- 1) Framing Mode
 - 00h: Auto
- T1 Tester Only
 - 01h: D4 SF
 - 02h: ESF
- E1 Tester Only
 - 03h: PCM30
 - 04h: PCM30 CRC
 - 05h: PCM31
 - 06h: PCM31 CRC

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Invalid framing mode
- 238 (EEh) Time Out Error

Start and Stop T1/E1 Measurement – Control Word (A006h)

(Option 50 only)

Description: This command toggles the Run/Stop state of the T1/E1 measurement. That is, if the command is sent while the measurement is running, the command stops the measurement. If the command is sent when the measurement is stopped, the command starts the measurement.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 238 (EEh) Time Out Error

Insert Error for T1/E1 Measurement – Control Word (A007h)

(Option 50 only)

Description: This command inserts the error defined into the data flow.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 238 (EEh) Time Out Error

Get T1/E1 Pattern – Control Word (A008h)

(Option 50 only)

Description: Get the current T1/E1 pattern.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) T1 Pattern

or

- 1) 238 (EEh) Time Out Error

Get T1/E1 Frame Sync Status – Control Word (A009h)

(Option 50 only)

Description: Get the frame sync status of T1 /E1.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) Frame Sync Status (00h: Framed; 01h: Unframed)

or

- 1) 238 (EEh) Time Out Error

Get T1/E1 Pattern Sync Status – Control Word (A00Ah)

(Option 50 only)

Description: Get the pattern sync status of T1/ E1.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) Pattern Sync Status (00h: In-sync; 01h: Out-of-sync)

or

- 1) 238 (EEh) Time Out Error

Get T1/E1 Carrier Status – Control Word (A00Bh)

(Option 50 only)

Description: Get the carrier status of T1/E1.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) Carrier Status (00h: Carrier present; 01h: No carrier)

or

- 1) 238 (EEh) Time Out Error

Get T1/E1 Error Type and Number – Control Word (A00Ch)

(Option 50 only)

Description: Get the error type and number of T1/E1.

Bytes to Follow: 0 bytes

Site Master Returns: 16 bytes in T1 mode, 18 bytes in E1 mode, 1 byte on error

- 1) Frame Loss (higher byte)
- 2) Frame Loss (lower byte)
- 3) Bit Errors (highest byte)
- 4) Bit Errors
- 5) Bit Errors
- 6) Bit Errors (lowest byte)
- 7) BER (higher byte)
- 8) BER (lower byte)
- 9) BPV (higher byte)
- 10) BPV (lower byte)
- 11) CRC (higher byte)

12) CRC (lower byte)

T1:

13) Errored Seconds (highest byte)

14) Errored Seconds

15) Errored Seconds

16) Errored Seconds (lowest byte)

E1:

13) E Bits (higher byte)

14) E Bits (lower byte)

15) Errored Seconds (highest byte)

16) Errored Seconds

17) Errored Seconds

18) Errored Seconds (lowest byte)

or

1) 238 (EEh) Time Out Error

Set T1/E1 Line Coding Options – Control Word (A00Dh)

(Option 50 only)

Description: Sets the line coding options of T1/E1 measurement mode.

Bytes to Follow: 1 byte

- 1) Line Coding
 - 00h: B8ZS (for T1 only)
 - 01h: AMI
 - 02h: HDB3 (for E1 only)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid line coding option
238 (EEh) Time Out Error

Set E1 Impedance Options – Control Word (A00Eh)

(Option 50 only)

Description: Sets the impedance for the E1 mode. Note that impedance is set separately for BERT and Vpp measurements.

Bytes to Follow: 2 bytes

- 1) E1 Measurement (00h: BERT, 01h: Vpp)
- 2) Impedance
 - 00h: 75Ω
 - 01h: 120Ω

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid impedance setting
238 (EEh) Time Out Error

Read T1/E1 Volts Peak-to-Peak – Control Word (A00Fh)

(Option 50 only)

Description: Initiates the Vpp measurement on the T1 board and returns the result.

Vpp value is sent as (Vpp * 10).

Bytes to Follow: 0 bytes

Site Master Returns: 3 bytes

- 1) Volts peak-to-peak (higher byte)
- 2) Volts peak-to-peak (lower byte)
- 3) 255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

Set T1/E1 Receive Input Configuration Options - Control Word (A013h) (Option 50 only)

Description: Sets the Rx Input Configuration for the T1/E1 modes.

Bytes to Follow: 2 bytes

- 1) T1/E1 Measurement (00h: BERT, 01h: Vpp)
- 2) Rx Input Config
 - 00h: Terminate
 - 01h: Bridged
 - 02h: Monitor +20 dB (BERT only)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid measurement or configuration
238 (EEh) Time Out Error

Set T1/E1 Measurement Duration - Control Word (A014h) (Option 50 only)

Description: Sets the measurement duration for the current mode (T1 or E1).

Bytes to Follow: 1 byte

- 1) Measurement Duration Index
 - 00h: Manual
 - 01h: 3 minutes
 - 02h: 15 minutes
 - 03h: 30 minutes
 - 04h: 1 hour
 - 05h: 3 hours
 - 06h: 6 hours
 - 07h: 12 hours
 - 08h: 1 day
 - 09h: 2 days

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid duration or not in T1 or E1 mode
238 (EEh) Time Out Error

Set T1/E1 Data Logging - Control Word (A015h) (Option 50 only)

Description: Enables and disables data logging for T1/E1 modes. The ability to log data depends on the amount of available memory.

Bytes to Follow: 1 byte

- 1) Data Logging Status

00h: Off

01h: On

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid status or not enough memory
238 (EEh) Time Out Error

Read T1/E1 dBdsx - Control Word (A016h)

(Option 50 only)

Description: Initiates a voltage measurement on the T1 board and returns the result in dBdsx. The resolution is 0.1 dB and is offset by 350 so that only positive values are returned. For example, -5.0 dB will be reported as 300. Results less than -20 dB are not accurate to 0.1 dB and should be divided by 10.

Bytes to Follow: 2 bytes

- 1) dBdsx (higher byte)
- 2) dBdsx (lower byte)

Site Master Returns: 1 byte

- 1) Status Byte
255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

Read T1/E1 Frequency - Control Word (A017h)

(Option 50 only)

Description: Reports the last T1/E1 frequency measurement result in Hz if available. The DSP CPLD U80 must be version 7 or higher and the T1/E1 board version number must be 1 or higher for this measurement. The Site Master must be configured for a BER measurement and a BER measurement must be running before this command is executed. The firmware must version V1.88 or higher.

Bytes to Follow: 0 bytes

Site Master Returns: 4 bytes

- 1) Frequency (highest byte)
- 2) Frequency
- 3) Frequency
- 4) Frequency (lowest byte)

Read T1/E1 Frequency Cal - Control Word (A018h)

(Option 50 only)

Description: Reports the current T1/E1 frequency calibration setting. The value is in Hz offset from 0 by 100, with a range of 0 to 200 Hz (equivalent to ± 100 Hz).

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) Frequency calibration setting in Hz.

Set T1/E1 Frequency Cal - Control Word (A019h)

(Option 50 only)

Description: Sets the T1/E1 frequency calibration value. The value is in Hz offset from 0 by 100, with a range of 0 to 200 Hz (equivalent to ± 100 Hz).

Bytes to Follow: 1 byte

- 1) Frequency Calibration Setting in Hz

Site Master Returns: 1 byte

- 1) Status Byte
255 (FFh) Operation Complete Byte

Select SPA/Power Meter Signal Standard - Control Word (A103h)

Description: Selects a Signal Standard. Use this command for both Spectrum Analyzer and Power Meter modes. See the “Signal Standards” section for a list of standards and their indices.

Bytes to Follow: 1 byte

- 1) Signal Standard - See the “Signal Standards” section for a list of standards and their indices.

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid signal standard
238 (EEh) Time Out Error

Select SPA/Power Meter Channel - Control Word (A104h)

Description: Selects a channel within the range of the currently selected signal standard. Use this command for both Spectrum Analyzer and Power Meter modes. See the “Signal Standards” section for a list of valid channels for the selected channel.

Bytes to Follow: 2 bytes

- 1) Channel (higher byte)
- 2) Channel (lower byte)

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid channel
238 (EEh) Time Out Error

Read External Module Name – Control Word (A201h)

(Option 6 only)

Description: Returns the name of the attached external converter module (Option 6).

For example, module name “FCN4760” will be received as: c,46,43,4e,34,37,36,30,0,0,0,0,ff

Bytes to Follow: 0 bytes

Site Master Returns: 14 bytes (success) OR 1 byte (failure)

- 1) Length of Name (12)
- 2-13) Module Name
- 14) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

or

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

Read External Module Serial Number – Control Word (A202h)

(Option 6 only)

Description: Sets the serial number of the attached external converter module (Option 6).

For example, serial number 12345678 will be received as: 8,1,2,3,4,5,6,7,8,ff

Bytes to Follow: 0 bytes

Site Master Returns: 10 bytes

- 1) Length of Serial Number (8)
- 2-9) Serial Number
- 10) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

or

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

Read External Module Frequency Range – Control Word (A203h)

(Option 6 only)

Description: Sets the frequency range of the attached external converter module (Option 6). Frequency values are scaled by the scale factor value.

For example, the frequency range of the FCN4760 is as follows:

Scale factor: 10

Input Start Frequency: 4700 MHz (scaled, this number is 470 MHz)

Input End Frequency: 6000 MHz (scaled, this number is 600 MHz)

Output Start Frequency: 450 MHz (scaled, this number is 45 MHz)

Output End Frequency: 1750 MHz (scaled, this number is 600 MHz)

So the response will look like: 12,0,a,1c,3,a1,80,23,c3,46,0,2,ae,a5,40,a,6e,49,c0,ff

Bytes to Follow: 0 bytes

Site Master Returns: 20 bytes (success) *or* 1 byte (failure)

- 1) Length of Frequency Data (18)
- 2-3) Scale Factor (in Hz)
- 4-7) Input Start Frequency (scaled by Scale Factor)
- 8-11) Input End Frequency (scaled by Scale Factor)
- 12-15) Output Start Frequency (scaled by Scale Factor)
- 16-19) Output End Frequency (scaled by Scale Factor)
- 20) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

or

- 1) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

Read Module Fail Counter – Control Word (A204h)

(Option 6 only)

Description: Returns the value of the module lock fail counter.

Bytes to Follow: 0 bytes

Site Master Returns: 2 bytes (success) *or* 1 byte (failure)

- 1) Fail Counter (higher byte)
 - 2) Fail Counter (lower byte)
 - 3) 255 (FFh) Operation Complete Byte
- or
- 1) 255 (FFh) Operation Complete Byte
 - 224 (E0h) Parameter Error: Module not attached
 - 238 (EEh) Time Out Error

Clear Module Fail Counter – Control Word (A205h)

(Option 6 only)

Description: Sets the module lock fail counter to 0.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Module not attached
- 238 (EEh) Time Out Error

Remote Self Test - Control Word (AA15h)

Description: Trigger the equivalent of a "key press" selftest.

NOTE: The response bytes will not all be returned immediately. The first 12 will be returned, then there will be a slight delay before the next 14 are returned, then a final delay while the T1/E1 selftest is performed and the final 12 bytes are returned.

Bytes to Follow: 0 bytes

Site Master Returns:

S331D (No Options/Option 3): 25 bytes

- 1) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (higher byte)
- 2) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (lower byte)
- 3) Memory Check (01h: Pass, 00h: Fail)
- 4) RTC Voltage Check (01h: Pass, 00h: Fail)
- 5) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (higher byte)
- 6) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (lower byte)
- 7) VNA Lock Failure Counter (higher byte)
- 8) VNA Lock Failure Counter (lower byte)
- 9) VNA Integrator Failure Counter (higher byte)
- 10) VNA Integrator Failure Counter (lower byte)
- 11) SPA LO Failure Counter (higher byte)
- 12) SPA LO Failure Counter (lower byte)
- 13) H/W Config - Mother Board ID
- 14) H/W Config - SPA Board ID
- 15) H/W Config - T1E1 Board ID
- 16) H/W Config - PLD1 ID
- 17) H/W Config - PLD2 ID
- 18) H/W Config - T1E1 COLD ID
- 19) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 20) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 21) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 22) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 23) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)

- 24) VNA Integration Test - Reserved
- 25) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 26) SPA LO Test - Failed data point #
- 27) SPA LO Test - Failed LO #
- 28) End of Data (FFh)

S331D + Option 29 or S332D (w/o Option 6): 28 bytes

- 1) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (higher byte)
- 2) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (lower byte)
- 3) Memory Check (01h: Pass, 00h: Fail)
- 4) RTC Voltage Check (01h: Pass, 00h: Fail)
- 5) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (higher byte)
- 6) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (lower byte)
- 7) VNA Lock Failure Counter (higher byte)
- 8) VNA Lock Failure Counter (lower byte)
- 9) VNA Integrator Failure Counter (higher byte)
- 10) VNA Integrator Failure Counter (lower byte)
- 11) SPA LO Failure Counter (higher byte)
- 12) SPA LO Failure Counter (lower byte)
- 13) H/W Config - Mother Board ID
- 14) H/W Config - SPA Board ID
- 15) H/W Config - T1E1 Board ID
- 16) H/W Config - PLD1 ID
- 17) H/W Config - PLD2 ID
- 18) H/W Config - T1E1 COLD ID
- 19) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 20) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 21) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 22) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 23) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 24) VNA Integration Test - Reserved
- 25) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 26) SPA LO Test - Failed data point #
- 27) SPA LO Test - Failed LO #
- 28) End of Data (FFh)

S332D + Option 6: 33 bytes

- 1) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (higher byte)
- 2) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (lower byte)
- 3) Memory Check (01h: Pass, 00h: Fail)
- 4) RTC Voltage Check (01h: Pass, 00h: Fail)
- 5) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (higher byte)
- 6) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (lower byte)
- 7) VNA Lock Failure Counter (higher byte)
- 8) VNA Lock Failure Counter (lower byte)
- 9) VNA Integrator Failure Counter (higher byte)
- 10) VNA Integrator Failure Counter (lower byte)
- 11) SPA LO Failure Counter (higher byte)
- 12) SPA LO Failure Counter (lower byte)
- 13) H/W Config - Mother Board ID
- 14) H/W Config - SPA Board ID
- 15) H/W Config - T1E1 Board ID
- 16) H/W Config - PLD1 ID
- 17) H/W Config - PLD2 ID

- 18) H/W Config - T1E1 COLD ID
- 19) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 20) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 21) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 22) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 23) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 24) VNA Integration Test - Reserved
- 25) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 26) SPA LO Test - Failed data point #
- 27) SPA LO Test - Failed LO #
- 28) Module PLD Version
- 29) Module Attached
- 30) Module Lock (01h = Locked, 00h = Not Locked)
- 31) Module Lock Fail Counter (higher byte)
- 32) Module Lock Fail Counter (lower byte)
- 33) End of Data (FFh)

S331D + Option 50: 36 bytes

- 1) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (higher byte)
- 2) Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2° C) (lower byte)
- 3) Memory Check (01h: Pass, 00h: Fail)
- 4) RTC Voltage Check (01h: Pass, 00h: Fail)
- 5) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (higher byte)
- 6) Power Voltage in 1/10ths of a Volt (e.g., 124 = 12.4 Volts) (lower byte)
- 7) VNA Lock Failure Counter (higher byte)
- 8) VNA Lock Failure Counter (lower byte)
- 9) VNA Integrator Failure Counter (higher byte)
- 10) VNA Integrator Failure Counter (lower byte)
- 11) SPA LO Failure Counter (higher byte)
- 12) SPA LO Failure Counter (lower byte)
- 13) H/W Config - Mother Board ID
- 14) H/W Config - SPA Board ID
- 15) H/W Config - T1E1 Board ID
- 16) H/W Config - PLD1 ID
- 17) H/W Config - PLD2 ID
- 18) H/W Config - T1E1 COLD ID
- 19) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 20) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 21) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 22) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 23) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 24) VNA Integration Test - Reserved
- 25) Status (01h: Pass, 00h: Fail, FFh: T1/E1 board not installed)
- 26) Carrier Status (01h: carrier present, 00h: No carrier)
- 27) Frame Sync Status (01h: in frame sync, 00h: Not in frame sync)
- 28) QRSS pattern sync status (01h: Pattern sync, 00h: Not in sync)
- 29) QRSS bit error count (01h: Bit error found, 00h: No bit error)
- 30) T1 - Daly pattern sync status (01h: Pattern sync, 00h: Not in pattern sync)
- 31) 0 dB CSU Tx Level Check (00h: Pass (> - 2.5 dB), XXh: Value reported by DS2155)
- 32) -7.5 dB CSU Tx Level Check (00h: Pass (-5.0 to -12.5 dB), XXh: Value reported by DS2155)
- 33) -15 dB CSU Tx Level Check (00h: Pass (-12.5 to -20.0 dB), XXh: Value reported by DS2155)
- 34) -22.5 dB CSU Tx Level Check (00h: Pass (-20.0 to -30.0 dB), XXh: Value reported by DS2155)
- 35) Vpp measurement of 0 dB signal in 1/10ths of a Volt (e.g., 124 = 12.4 Volts)
- 36) End of Data (FFh)

Programming Examples

This section contains several sample functions written in C, (and one in Visual Basic) that can be used as references when programming Anritsu Handheld Products. These include functions to set up the comm port, enter and exit remote mode, and set the reference level of the spectrum analyzer.

Examples in C

```
/*
*****
/*  unsigned char EnterRemote(BYTE *ResponseBytes)          */
/*  Description: This function implements control byte #69, Enter */
/*               Remote Mode.  If successful, the unit will be in */
/*               remote mode, waiting to accept additional serial */
/*               commands.                                         */
/*  Inputs :   ResponseBytes = pointer to an array of bytes at */
/*             least 13 elements long (13 bytes are expected in */
/*             response to the Enter Remote command).           */
/*  Returns:   SUCCESS if the unit is in remote mode            */
/*            FAILURE if the command fails                      */
/*            Response bytes are returned in the variable      */
/*            ResponseBytes.                                    */
*****
unsigned char EnterRemote(BYTE *ResponseBytes)
{
    BYTE *SendEnterRemoteCharPointer; // Data to send
    BYTE SerialCommand;

    SendEnterRemoteCharPointer = &SerialCommand;
    SerialCommand = 69; // 69 is the Enter Remote Mode serial command

    // Write 1 byte of data from SendEnterRemoteCharPointer to the // COM Port
    WriteToPort (SendEnterRemoteCharPointer, 1);

    // Read the data returned by the SiteMaster - expecting 13 bytes,
    // give the unit 30 seconds to respond before timing out.
    if(!ReadFromPort(13, ResponseBytes, 30))
    {
        return FAILURE;
    }
    else
    {
        return SUCCESS;
    }
} /* EnterRemote */
```

```

/*****/
/*  unsigned char SetSPAScale(unsigned long ReferenceLevel,      */
/*                               unsigned long dBScale, BYTE *ResponseBytes) */
/*  Description: This function implements control byte #101, Set  */
/*              Spectrum Analyzer Scale. It sets the spectrum  */
/*              analyzer reference level and scale (dB/div).    */
/*  Inputs :    RefLevel = reference level value                */
/*              dBScale = scale value                           */
/*              NOTE: This function assumes the values have     */
/*              already been checked to fall in the valid range */
/*              and scaled according to the formulas in the     */
/*              Programming Manual.                              */
/*              ResponseBytes = pointer to an array of bytes at */
/*              least 1 element long (1 byte is expected in    */
/*              response to the Set Spectrum Analyzer Scale     */
/*              command).                                       */
/*  Returns:    SUCCESS if the values are set                   */
/*              FAILURE if the command fails                    */
/*              Response bytes are returned in the variable    */
/*              ResponseBytes.                                  */
/*****/
unsigned char SetSPAScale(unsigned long RefLevel,
                          unsigned long dBScale, BYTE *ResponseBytes)
{
    BYTE *SendScalePointer;    // Data to send
    BYTE  SendBytes[9];
    BYTE  SerialCommand;

    // Serial Command to Set Scale on the SPA.
    SerialCommand = 101;

    // Data pointer.
    SendScalePointer = &SendByte[0];
    // First byte to send is the serial command, #101.
    SendBytes[0] = SerialCommand;

    // Convert the reference level and scale into 8 bytes
    // (4 bytes each) for the SPA. Put the bytes in the
    // SendBytes variable, starting with byte 1 (leave byte 0
    // as the command byte).
    Get8Bytes(RefLevel, Scale, &SendBytes[1]);
    // Write 9 bytes of data in SendScalePointer to the port.

```

```

WriteToPort (SendScalePointer, 9);

// Expecting 1 byte back (give the unit 5 seconds to respond):
// 0xFF = success
// 0xE0 = parameter failure (invalid value)
// 0xEE = time-out (insufficient # of bytes received by SPA)
if(!ReadFromPort(1, ResponseBytes, 5))
    {
        return FAILURE;
    }
else
    {
        if ( *ResponseBytes != 0xFF )
            {
                return FAILURE;
            }
        else
            {
                return SUCCESS;
            }
    }
} /* SetSPAScale */

```

```

/*****
/*   unsigned char ExitRemote(BYTE *ResponseBytes)           */
/*   Description: This function implements control byte #255, Exit */
/*               Remote Mode.  If successful, the unit will leave */
/*               remote mode and resume sweeping.                */
/*   Inputs :   ResponseBytes = pointer to an array of bytes at */
/*               least 1 element long (1 byte is expected in    */
/*               response to the Exit Remote command).          */
/*   Returns:   SUCCESS if the unit exits remote mode           */
/*               FAILURE if the command fails                    */
/*               Response bytes are returned in the variable    */
/*               ResponseBytes.                                  */
*****/
unsigned char ExitRemote(BYTE *ResponseBytes)
{
    BYTE *SendExitRemoteCharPointer;    // Data to send
    BYTE SerialCommand;

    SendExitRemoteCharPointer = &SerialCommand;
    SerialCommand = 255; // 255 is the Exit Remote Serial Command

    // Write 1 byte of data from SendExitRemoteCharPointer to the // COM Port
    WriteToPort (SendExitRemoteCharPointer, 1);

    // Expecting 1 byte back (give the unit 5 seconds to respond):
    // 0xFF = success
    if(!ReadFromPort(1, ResponseBytes, 1))
    {
        return FAILURE;
    }
    else
    {
        if ( *ResponseBytes != 0xFF )
        {
            return FAILURE;
        }
        else
        {
            return SUCCESS;
        }
    }
} /* ExitRemote */

```

```

/*****
/* void Get8Bytes(unsigned long parm1, unsigned long parm2,      */
/*                BYTE* ByteData )                               */
/* Description: This function converts the 2 four byte values to */
/* 8 bytes for transmission to the SiteMaster. parm1 occupies   */
/* the first four bytes, parm2 occupies the second 4 bytes.     */
/* Inputs:    parm1 - 4 byte unsigned long integer              */
/*            parm2 - 4 byte unsigned long integer              */
/* Returns:   SUCCESS if the unit is in remote mode            */
/*            FAILURE if the command fails                      */
/*            The resulting bytes are returned in the           */
/*            memory location pointed to by ByteData. This     */
/*            location must have at least 8 empty bytes.        */
*****/
void Get8Bytes(unsigned long parm1, unsigned long parm2,
               BYTE* ByteData)
{
    // MSB of 1st parameter
    *ByteData = (BYTE)((parm1 & 0xFF000000)>24);
    *(ByteData+1) = (BYTE)((parm1 & 0x00FF0000)>16);
    *(ByteData+2) = (BYTE)((parm1 & 0x0000FF00)>8);
    // LSB of 1st parameter
    *(ByteData+3) = (BYTE)(parm1 & 0x000000FF);

    // MSB of 2nd parameter
    *(ByteData+4) = (BYTE)((parm2 & 0xFF000000)>24);
    *(ByteData+5) = (BYTE)((parm2 & 0x00FF0000)>16);
    *(ByteData+6) = (BYTE)((parm2 & 0x0000FF00)>8);
    // LSB of 2nd parameter
    *(ByteData+7) = (BYTE)(parm2 & 0x000000FF);
} /* Get8Bytes */

```

```

/*****
/*   BOOL OpenCommunications(int ComPort, int ComBaud)           */
/*   Description : This function is to Open the communication port */
/*   and set the port settings                                   */
/*   Inputs :    int - ComPort entered as a command line argument */
/*               int - ComBaud The Baud rate for Communication     */
/*   Returns:    SUCCESS - If the Communication link was established*/
/*               FAIL - IF there was an error opening the COM Port */
*****/
BOOL OpenCommunications(int ComPort, int ComBaud)
{
    DCB      CommSettings; // Structure with COM Port settings
    LPCTSTR ComPortNumber; // Pointer to the COM port number
    BOOL PortReady;       // Return val after setting the COM Port
    COMMTIMEOUTS timeout; // Structure with Time out values

    switch (ComPort)
    {
    case '1':
        ComPortNumber = "COM1";
        break;
    case '2':
        ComPortNumber = "COM2";
        break;
    case '3':
        ComPortNumber = "COM3";
        break;
    case '4':
        ComPortNumber = "COM4";
        break;
    default:
        CloseHandle(ComHandle);
        fclose(fp);
        exit(0);
        break;
    }

    /* Creating a File to Open a COM Port*/
    ComHandle = CreateFile( ComPortNumber,
                           GENERIC_READ | GENERIC_WRITE,
                           0, // exclusive access
                           NULL, // no security

```

```

OPEN_EXISTING,
0, // no overlapped I/O
NULL); // null template

/* Set up the COM Ports Input and Output Buffer
Syntax -
BOOL SetupComm(
HANDLE hFile, // handle to communications device
DWORD dwInQueue, // size of input buffer
DWORD dwOutQueue // size of output buffer
);
*/
PortReady = SetupComm(ComHandle, 5000, 5000);

/* Open the existing COM Settings
Syntax -
BOOL GetCommState(
HANDLE hFile, // handle to communications device
LPDCB lpDCB // pointer to device-control block
// structure
);
*/
PortReady = GetCommState(ComHandle, &CommSettings);

/*Check to see if it was successful*/
if(!PortReady)
{
CloseHandle(ComHandle);
fclose(fp);
exit(0);
}

/* This is USed to Update the CommSettings Structure Variables*/
// Setting the Baud Rate
switch (ComBaud)
{
case '1':
CommSettings.BaudRate = CBR_9600; // rate - 9600
break;
case '2':
CommSettings.BaudRate = CBR_19200; // rate - 19200
break;
}

```



```

    case '3':
        CommSettings.BaudRate = CBR_38400; // rate - 38400
        break;
    case '4':
        CommSettings.BaudRate = CBR_56000; // rate - 56000
        break;
    case '5':
        CommSettings.BaudRate = CBR_115200; // rate - 115200
        break;
    default:
        CommSettings.BaudRate = CBR_9600; //Default - 9600
        break;
}

// disable null stripping
CommSettings.fNull = FALSE;
// RTS flow control
CommSettings.fRtsControl = RTS_CONTROL_ENABLE;
// XON/XOFF in flow control
CommSettings.fInX = FALSE;
// XON/XOFF out flow control
CommSettings.fOutX = FALSE;
// DTR flow control type
CommSettings.fDtrControl = DTR_CONTROL_ENABLE;
// number of bits/byte, 4-8
CommSettings.ByteSize = 8;
// 0-4=no,odd,even,mark,space
CommSettings.Parity = NOPARITY;
// 0,1,2 = 1, 1.5, 2
CommSettings.StopBits = ONESTOPBIT;

/* Setting the COM State with the changed parameters
Syntax -
    BOOL SetCommState(
        HANDLE hFile, // handle to communications device
        LPDCB lpDCB // pointer to device-control block structure
    );
*/

PortReady = SetCommState (ComHandle, &CommSettings);

/* Setting the parameters for the timeouts.

```

NOTE: Without Timeout Settings, Reading the COM Port will not work properly*/

```
// This gives the Timeout value for each bytes received
```

```
timeout.ReadIntervalTimeout = MAXDWORD;
```

```
timeout.ReadTotalTimeoutConstant = 0;
```

```
timeout.ReadTotalTimeoutMultiplier = 0;
```

```
/* Sets the communication timeouts
```

```
Syntax -
```

```
    BOOL SetCommTimeouts(
```

```
        HANDLE hFile,                // handle to comm device
```

```
        LPCOMMTIMEOUTS lpCommTimeouts /* pointer to comm time-out structure */
```

```
    );
```

```
*/
```

```
SetCommTimeouts(ComHandle, &timeout);
```

```
if(PortReady)
```

```
{
```

```
    return SUCCESS;
```

```
}
```

```
else
```

```
{
```

```
    CloseHandle(ComHandle);
```

```
    fclose(fp);
```

```
    return FAIL;
```

```
    exit(0);
```

```
}
```

```
}
```

Example in Visual Basic

```
Private Sub cmdSetBaudRateSM_Click()
    Dim ChangeBaudSerialCmd As Integer
    Dim BaudRate As Integer
    Dim strInputBuf As Variant
    Dim PreviousSettings As String

    PreviousSettings = commCtrl.Settings

    'Check that we're in remote and have selected a baud rate
    If CheckInitialConditions(True, False, True) = False Then
        GoTo SetSMBaud_err_handler
    End If

    ChangeBaudSerialCmd = 197      'Setting Baud rate Serial Command
    BaudRate = GetBaudSerialCmd    'Get the Serial cmd for the specific baud rate
    commCtrl.Output = Chr$(ChangeBaudSerialCmd) + Chr$(BaudRate)    'Sending the data

    Delay (300)

    'Change the Baud setting for the application also
    If BaudRate = 0 Then
        commCtrl.Settings = "9600,n,8,1"
    ElseIf BaudRate = 1 Then
        commCtrl.Settings = "19200,n,8,1"
    ElseIf BaudRate = 2 Then
        commCtrl.Settings = "38400,n,8,1"
    ElseIf BaudRate = 3 Then
        commCtrl.Settings = "56000,n,8,1"
    ElseIf BaudRate = 4 Then
        commCtrl.Settings = "115200,n,8,1"
    Else
        'Box will fail, set back to 9600.
        commCtrl.Settings = "9600,n,8,1"
    End If

    Delay (1000)
    strInputBuf = CStr(commCtrl.Input)
    strInputBuf = Mid(strInputBuf, 1, 1)
    If strInputBuf = "" Then
        MsgBox "Invalid Baud Rate - NO STRING"
```

```

        GoTo SetSMBaud_err_handler
End If

If Asc(strInputBuf) = 255 Then
    MsgBox "Set Baud Rate Succesfully"
ElseIf Asc(strInputBuf) = 238 Then
    MsgBox "SiteMaster Timed out"
    GoTo SetSMBaud_err_handler
ElseIf Asc(strInputBuf) = 224 Then
    MsgBox "Invalid Baud Rate - ERR 224"
    GoTo SetSMBaud_err_handler
Else
    MsgBox "Invalid Baud Rate - ERR " + CStr(Asc(strInputBuf))
    GoTo SetSMBaud_err_handler
End If

Exit Sub
SetSMBaud_err_handler:
    commCtrl.Settings = PreviousSettings
End Sub

```

Parameter Definitions

Parameter	# of bytes	Step	Example / Description
Frequency	4 bytes unsigned	1 Hz	1000.3 MHz = 1000300000
Scale (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
Limit (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
Markers (frequency and distance marker)	2 bytes unsigned	1 sweep point	Marker values are given in relative position of the graph. The lowest value is 0, the highest is (# of data points -1).
Distance	4 bytes unsigned	1/100,000 m/ft	12.34 m = 1234000
Relative Propagation Velocity	4 bytes unsigned	1 / 100,000	0.837 = 83700
Cable Loss	4 bytes unsigned	1 / 100,000 dB	-0.345 dB/m = 34500
Gamma	4 bytes signed	1 / 10,000 (ratio)	Gamma value is the ratio of magnitude of the reflected signal over the magnitude of the incident signal.
Phase	4 bytes signed	1 / 10 degree	Phase value is the difference in phase between the incident and reflected signals.
Power: dBm/dB	4 bytes signed	1 / 1000 dBm 1 / 1000 dB	51.3 dBm = 51300 10.4 dB = 10400
Lock Fail Counter	2 bytes unsigned	1 error count	234 fails = 234
Integrator Fail Counter	2 bytes unsigned	1 error count	123 fails = 123

Spectrum Analyzer Signal Standards

Index	Standard	Center	Span	Valid Channels
00h	AMPS / EIA 553 - Uplink	859000000	70000000	1-799, 990-1023
01h	AMPS / EIA 553 - Downlink	859000000	70000000	1-799, 990-1023
02h	C-450 (P) - Uplink	463500000	21000000	1-800
03h	C-450 (P) - Downlink	463500000	21000000	1-800
04h	C-450 (SA) - Uplink	462500000	15000000	1-247
05h	C-450 (SA) - Downlink	462500000	15000000	1-247
06h	CDMA US Cellular - Uplink	859000000	70000000	1-799, 990-1023
07h	CDMA US Cellular - Downlink	859000000	70000000	1-799, 990-1023
08h	CDMA US PCS - Uplink	1920000000	140000000	1-1199
09h	CDMA US PCS - Downlink	1920000000	140000000	1-1199
0Ah	CDMA Korea PCS - Uplink	1810000000	120000000	1-599
0Bh	CDMA Korea PCS - Downlink	1810000000	120000000	1-599
0Ch	CDMA Japan / ARIB - Uplink	878500000	93000000	1-799, 801-1039, 1041-1199
0Dh	CDMA Japan / ARIB - Downlink	878500000	93000000	1-799, 801-1039, 1041-1199
0Eh	CDMA China - 1 - Uplink	916000000	88000000	0-1000, 1329-2047
0Fh	CDMA China - 1 - Downlink	916000000	88000000	0-1000, 1329-2047
10h	CDMA China - 2 - Uplink	910000000	76000000	0-1000
11h	CDMA China - 2 - Downlink	910000000	76000000	0-1000
12h	CDMA2000 Class 0, Korea Cellular - Uplink	859000000	70000000	1-799, 990-1023
13h	CDMA2000 Class 0, Korea Cellular - Downlink	859000000	70000000	1-799, 990-1023
14h	CDMA2000 Class 0, N.A. Cellular - Uplink	859000000	70000000	1-799, 990-1023
15h	CDMA2000 Class 0, N.A. Cellular - Downlink	859000000	70000000	1-799, 990-1023
16h	CDMA2000 Class 1, N.A. PCS - Uplink	1920000000	140000000	0-1199
17h	CDMA2000 Class 1, N.A. PCS - Downlink	1920000000	140000000	0-1199
18h	CDMA2000 Class 2, (TACS Band) - Uplink	916000000	88000000	0-1100, 1329-2047
19h	CDMA2000 Class 2, (TACS Band) - Downlink	916000000	88000000	0-1100, 1329-2047
1Ah	CDMA2000 Class 3, (JTACS Band) - Uplink	878500000	93000000	1-799, 801-1039, 1041-1199
1Bh	CDMA2000 Class 3, (JTACS Band) - Downlink	878500000	93000000	1-799, 801-1039, 1041-1199
1Ch	CDMA2000 Class 4, Korea PCS - Uplink	1810000000	120000000	0-599
1Dh	CDMA2000 Class 4, Korea PCS - Downlink	1810000000	120000000	0-599
1Eh	CDMA2000 Class 5, (NMT-450-20 kHz) - Uplink	472500000	43000000	1039-1473, 1792-2016
1Fh	CDMA2000 Class 5, (NMT-450-20 kHz) - Downlink	472500000	43000000	1039-1473, 1792-2016
20h	CDMA2000 Class 5, (NMT-450-25 kHz) - Uplink	439500000	57000000	1-300, 539-871
21h	CDMA2000 Class 5, (NMT-450-25 kHz) - Downlink	439500000	57000000	1-300, 539-871
22h	CDMA2000 Class 6, IMT-2000 - Uplink	2045000000	250000000	0-1199
23h	CDMA2000 Class 6, IMT-2000 - Downlink	2045000000	250000000	0-1199
24h	CDMA2000 Class 7, N.A. 700 MHz Cellular - Uplink	770000000	48000000	0-359
25h	CDMA2000 Class 7, N.A. 700 MHz Cellular - Downlink	770000000	48000000	0-359
26h	Digital Multitmedia Broadcasting (DMB)	2642500000	50000000	0

Index	Standard	Center	Span	Valid Channels
27h	ETACS - Uplink	916000000	88000000	0-1000, 1329-2047
28h	ETACS - Downlink	916000000	88000000	0-1000, 1329-2047
29h	GSM 900 - Uplink	897400000	40000000	1-124, 975-1023
2Ah	GSM 900 - Downlink	942400000	40000000	1-124, 975-1023
2Bh	GSM 1800 - Uplink	1747400000	80000000	512-885
2Ch	GSM 1800 - Downlink	1842400000	80000000	512-885
2Dh	GSM 1900 - Uplink	1879800000	80000000	512-810
2Eh	GSM 1900 - Downlink	1959800000	80000000	512-810
2Fh	JTACS - Uplink	878500000	93000000	0-1198 (even numbers only)
30h	JTACS - Downlink	878500000	93000000	0-1198 (even numbers only)
31h	MATS-E - Uplink	925000000	70000000	1-1000
32h	MATS-E - Downlink	925000000	70000000	1-1000
33h	N-AMPS / IS-88L - Uplink	859000000	70000000	1-799, 990-1023
34h	N-AMPS / IS-88L - Downlink	859000000	70000000	1-799, 990-1023
35h	N-AMPS / IS-88M - Uplink	859000000	70000000	1-799, 990-1023
36h	N-AMPS / IS-88M - Downlink	859000000	70000000	1-799, 990-1023
37h	N-AMPS / IS-88U - Uplink	897500000	147000000	1-799, 990-1023
38h	N-AMPS / IS-88U - Downlink	897500000	147000000	1-799, 990-1023
39h	NADC IS136 Cellular - Uplink	859000000	70000000	1-799, 990-1023
3Ah	NADC IS136 Cellular - Downlink	859000000	70000000	1-799, 990-1023
3Bh	NADC IS136 PCS - Uplink	1920000000	140000000	1-1199
3Ch	NADC IS136 PCS - Downlink	1920000000	140000000	1-1199
3Dh	NMT-411-25 kHz - Uplink	420500000	19000000	539-871
3Eh	NMT-411-25 kHz - Downlink	420500000	19000000	539-871
3Fh	NMT-450-20 kHz - Uplink	460500000	19000000	1039-1473
40h	NMT-450-20 kHz - Downlink	460500000	19000000	1039-1473
41h	NMT-450-25 kHz - Uplink	459000000	18000000	1-300
42h	NMT-450-25 kHz - Downlink	459000000	18000000	1-300
43h	NMT-470-20 kHz - Uplink	486500000	15000000	1972-2016
44h	NMT-470-20 kHz - Downlink	486500000	15000000	1972-2016
45h	NMT-900 - Uplink	925000000	70000000	1-1000
46h	NMT-900 - Downlink	925000000	70000000	1-1000
47h	NMT-900 (Offset) - Uplink	925000000	70000000	1025-2023
48h	NMT-900 (Offset) - Downlink	925000000	70000000	1025-2023
49h	NTACS - Uplink	878500000	93000000	1-1199
4Ah	NTACS - Downlink	878500000	93000000	1-1199
4Bh	PDC 800 Analog - Uplink	891500000	97000000	0-1680
4Ch	PDC 800 Analog - Downlink	891500000	97000000	0-1680
4Dh	PDC 1500 (JDC) - Uplink	1513000000	72000000	0-960
4Eh	PDC 1500 (JDC) - Downlink	1513000000	72000000	0-960
4Fh	PHS - Uplink	1906500000	23000000	1-77

Index	Standard	Center	Span	Valid Channels
50h	PHS - Downlink	1906500000	23000000	1-77
51h	SMR 800 - 12.5 kHz - Uplink	836000000	60000000	1-1199
52h	SMR 800 - 12.5 kHz - Downlink	836000000	60000000	1-1199
53h	SMR 800 - 25 kHz - Uplink	836000000	60000000	1-600
54h	SMR 800 - 25 kHz - Downlink	836000000	60000000	1-600
55h	SMR 1500 - Uplink	1483000000	60000000	1-479
56h	SMR 1500 - Downlink	1483000000	60000000	1-479
57h	TACS - Uplink	925000000	70000000	1-1000
58h	TACS - Downlink	925000000	70000000	1-1000
59h	UMTS/WCDMA - Uplink	1920000000	70000000	9600-9900
5Ah	UMTS/WCDMA - Downlink	2110000000	70000000	10550-10850
5Bh	UMTS/Region 2 - Uplink	1850000000	70000000	9250-9550
5Ch	UMTS/Region 2 - Downlink	1930000000	70000000	9650-9950
5Dh	802.11a	5170000000	84000000	34-161 (not all valid)
5Eh	802.11b	2442000000	84000000	1-14
5Fh	802.11 DS	2448000000	72000000	1-14
60h	802.11 FH	2448500000	93000000	2-95
61h	802.11g	2442000000	84000000	1-14

VNA Signal Standards

Index	Standard	Start Freq	Stop Freq
00h	Bluetooth US & Europe Uplink	2400000000	2484000000
01h	Bluetooth US & Europe Downlink	2400000000	2484000000
02h	Bluetooth US & Europe Fullband	2400000000	2484000000
03h	Bluetooth Japan Uplink	2472000000	2497000000
04h	Bluetooth Japan Downlink	2472000000	2497000000
05h	Bluetooth Japan Fullband	2472000000	2497000000
06h	C 450 P Uplink	4530000000	4640000000
07h	C 450 P Downlink	4630000000	4740000000
08h	C 450 P Fullband	4530000000	4740000000
09h	C 450 SA Uplink	4650000000	4700000000
0Ah	C 450 SA Downlink	4550000000	4600000000
0Bh	C 450 SA Fullband	4550000000	4700000000
0Ch	CDMA China 1 2 Uplink	8720000000	9150000000
0Dh	CDMA China 1 2 Downlink	9170000000	9600000000
0Eh	CDMA China 1 2 Fullband	8720000000	9600000000
0Fh	Cellular Uplink	8240000000	8490000000
10h	Cellular Downlink	8690000000	8940000000
11h	Cellular Fullband	8240000000	8940000000
12h	Cellular 700 MHZ Uplink	7760000000	7940000000
13h	Cellular 700 MHZ Downlink	7460000000	7640000000
14h	Cellular 700 MHZ Fullband	7460000000	7940000000
15h	DCS GSM 1800 Uplink	1710000000	1785000000
16h	DCS GSM 1800 Downlink	1805000000	1880000000
17h	DCS GSM 1800 Fullband	1710000000	1880000000
18h	GSM 900 Uplink	8800000000	9150000000
19h	GSM 900 Downlink	9250000000	9600000000
1Ah	GSM 900 Fullband	8800000000	9600000000
1Bh	IEEE 802 11 FH Uplink	2402000000	2495000000
1Ch	IEEE 802 11 FH Downlink	2402000000	2495000000
1Dh	IEEE 802 11 FH Fullband	2402000000	2495000000
1Eh	IEEE 802 11 DS Uplink	2412000000	2484000000
1Fh	IEEE 802 11 DS Downlink	2412000000	2484000000
20h	IEEE 802 11 DS Fullband	2412000000	2484000000
21h	IEEE 802 11 B G Uplink	2400000000	2484000000
22h	IEEE 802 11 B G Downlink	2400000000	2484000000
23h	IEEE 802 11 B G Fullband	2400000000	2484000000
24h	IMT 2000 UMTS WCDMA Uplink	1920000000	1980000000
25h	IMT 2000 UMTS WCDMA Downlink	2110000000	2170000000
26h	IMT 2000 UMTS WCDMA Fullband	1920000000	2170000000

Index	Standard	Start Freq	Stop Freq
27h	ISM 2 4 GHZ Uplink	2400000000	2484000000
28h	ISM 2 4 GHZ Downlink	2400000000	2484000000
29h	ISM 2 4 GHZ Fullband	2400000000	2484000000
2Ah	JTACS/NTAC Japan ARIB Uplink	887000000	925000000
2Bh	JTACS/NTAC Japan ARIB Downlink	832000000	870000000
2Ch	JTACS/NTAC Japan ARIB Fullband	832000000	925000000
2Dh	NMT 411 Uplink	411000000	420000000
2Eh	NMT 411 Downlink	421000000	430000000
2Fh	NMT 411 Fullband	411000000	430000000
30h	NMT 450 Uplink	450000000	460000000
31h	NMT 450 Downlink	460000000	470000000
32h	NMT 450 Fullband	450000000	470000000
33h	NMT 450 20 kHz CDMA2000 Uplink	451000000	484000000
34h	NMT 450 20 kHz CDMA2000 Downlink	461000000	494000000
35h	NMT 450 20 kHz CDMA2000 Fullband	451000000	494000000
36h	NMT 450 25 kHz CDMA2000 Uplink	411000000	458000000
37h	NMT 450 25 kHz CDMA2000 Downlink	421000000	468000000
38h	NMT 450 25 kHz CDMA2000 Fullband	411000000	468000000
39h	NMT 900 MATS E Uplink	890000000	915000000
3Ah	NMT 900 MATS E Downlink	935000000	960000000
3Bh	NMT 900 MATS E Fullband	890000000	960000000
3Ch	PCS GSM 1900 Uplink	1850000000	1910000000
3Dh	PCS GSM 1900 Downlink	1930000000	1990000000
3Eh	PCS GSM 1900 Fullband	1850000000	1990000000
3Fh	PCS Korea Uplink	1750000000	1780000000
40h	PCS Korea Downlink	1840000000	1870000000
41h	PCS Korea Fullband	1750000000	1870000000
42h	PDC 800 Uplink	898000000	940000000
43h	PDC 800 Downlink	843000000	885000000
44h	PDC 800 Fullband	843000000	940000000
45h	PDC 1500 Uplink	1525000000	1549000000
46h	PDC 1500 Downlink	1477000000	1501000000
47h	PDC 1500 Fullband	1477000000	1549000000
48h	PHS Uplink	1895000000	1918000000
49h	PHS Downlink	1895000000	1918000000
4Ah	PHS Fullband	1895000000	1918000000
4Bh	SMR 800 Uplink	806000000	821000000
4Ch	SMR 800 Downlink	851000000	866000000
4Dh	SMR 800 Fullband	806000000	866000000
4Eh	SMR 1500 Uplink	1453000000	1465000000
4Fh	SMR 1500 Downlink	1501000000	1513000000

Index	Standard	Start Freq	Stop Freq
50h	SMR 1500 Fullband	1453000000	1513000000
51h	TACS/ETACS Uplink+C22	872000000	915000000
52h	TACS ETACS Downlink	917000000	960000000
53h	TACS ETACS Fullband	872000000	960000000
54h	Tetra Uplink	380000000	430000000
55h	Tetra Downlink	380000000	430000000



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