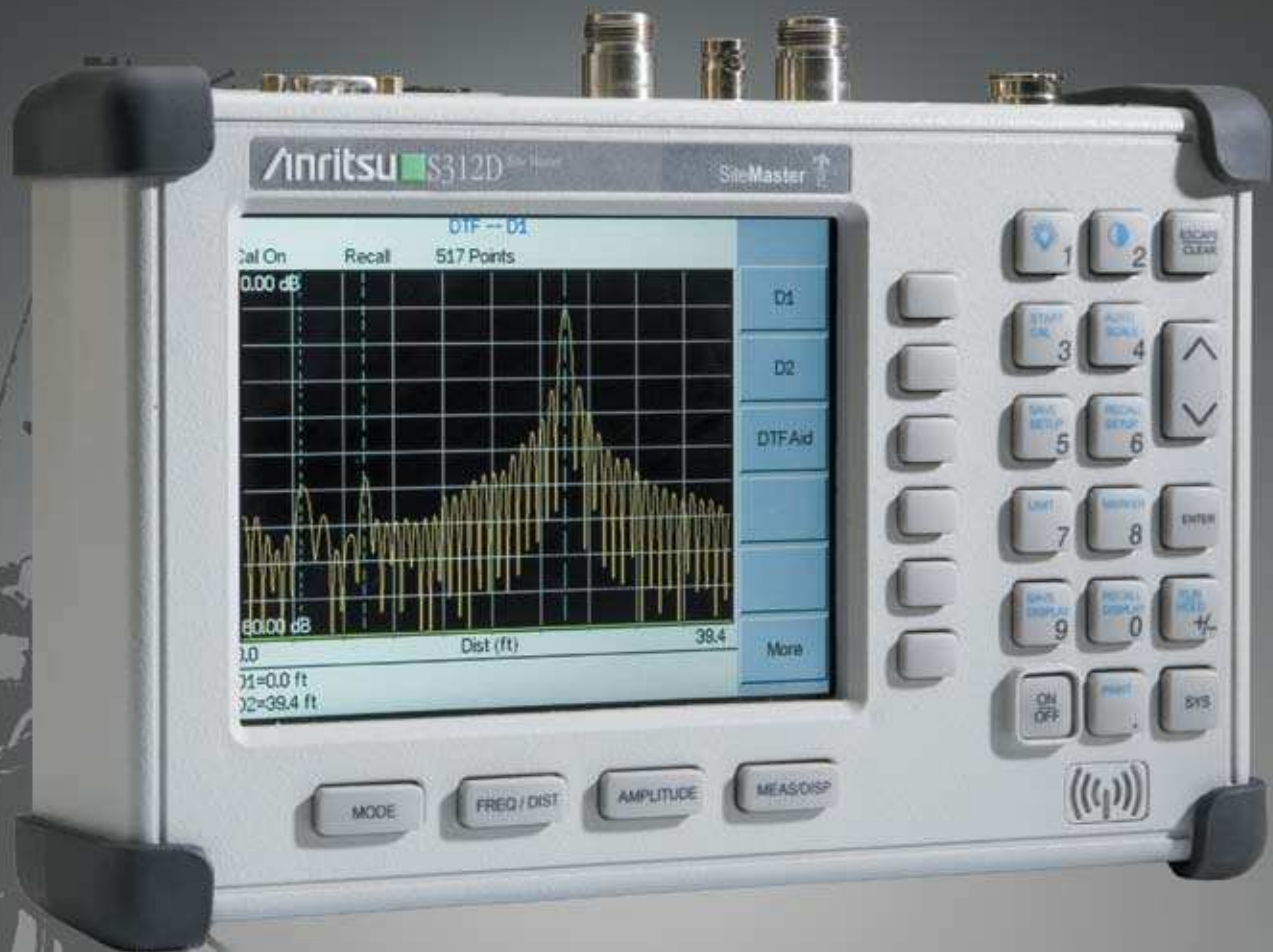


Site Master S311D / S312D

Cable and Antenna Analyzer, 2 MHz to 1600 MHz
Spectrum Analyzer, 100 kHz to 1600 MHz





S31xD Programming Manual

Remote Mode Command Specification

10580-00186 Revision A

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Programming Overview

WARNING: The Anritsu Site Master serial port commands are not backward compatible with earlier Site Master models.

This programming menu is written exclusively for Anritsu Site Master model S311D, and S312D. It is intended for firmware 5.00 and above. For information on firmware upgrade, please contact your local Anritsu service center.

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.

After the Site Master is in remote mode, you send a series of control bytes and associated data to the Site Master. These control byte sequences command the Site Master to perform various functions and activities. The serial port supports virtually all features that are accessible from the keypad. The only exception to this is the printer, which requires connection to the same 9 pin connector on the Site Master rear panel.

To complete the communication session, send the control byte to exit remote mode. Site Master resumes normal operations. You may also exit the remote mode by using the ESCAPE/CLEAR key.

Cabling

Serial communications take place via the 9 pin connector on the back of the Site Master. The Site Master is a DTE-type serial device and therefore requires a “null modem” cable for communication with a computer, which is also a DTE device. A suitable cable is provided with your Site Master (Anritsu part number 800-441).

Serial Communication Parameters

When turned on, the Site Master communicates at default baud rate of 9600. It uses no parity bits, 8 data bits, and 1 stop bit (N-8-1). No hardware handshaking is used. The Set Baud Rate serial command Control Byte #197 (C5h) can be used to change the baud rate to other common baud rates. It can be reset by turning the Cell Master off.

Communications Error Checking

Because no hardware handshaking occurs, byte level error handling must be done by the controlling program. The expected number of response bytes for each control byte (listed in the control byte description section of this manual) works well for responses coming 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, then 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 a 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 unit's response is essential. If the Site Master is not in remote, sending a second byte overwrites the original byte commanding it to go into remote. If you send control byte #69, you must wait until the end of the sweep. If you send control byte #70, the unit will enter remote mode as soon as it receives the byte. Note that this means that data stored for the current sweep may be incomplete.

After you receive the response string from Site Master, the Site Master is in remote mode.

Exiting Remote Mode

Send the Exit Remote control byte #255 (FFh) to the Site Master. Site Master sends a response byte of 255 (FFh) then exits remote mode. Remote mode can also be exited by pressing the ESCAPE/CLEAR key.

Lifetime of Changes to Site Master Operating Parameters

System parameters that are changed during remote mode remain changed for normal operation. They are not automatically written to the non-volatile EEPROM. Turning off power erases the changed settings.

If you want the changes saved, you must save the change to one of the setup memories. Use either the run-time setup (location 0, which holds the power-on defaults) or one of the nine saved setups. See control byte #18 (12h) for 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, you can store setup #1 100,000 times and setup #2 100,000 times, and so forth.

For this reason (write limitation), the changed system parameters are not automatically stored to EEPROM. Instead, a means is provided for changing the operating parameters that is independent of this limitation.

Be aware of the EEPROM write cycle limitation when programming the Site Master. Keep the number of write cycles to a minimum.

Documentation Conventions

Through 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).

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 bytes 170 (VNA modes) and 275 and 276 (Spectrum Analyzer 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: Logarithmic 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 – 1600 MHz.

Low end is extended to 2 MHz with option 2.

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

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

224 (E0h) Parameter Error : Invalid frequency range
238 (EEh) Time-out Error

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
 - 39h: Channel Scanner Mode
 - 3Bh: Interference Analyzer Mode
 - 3Ch: CW Signal Generator Mode
 - 40h: Power Monitor Mode (Option 29 Only)
 - 41h: Power Monitor Mode (Option 5)
 - 42h: High Accuracy Power Meter Mode

Site Master Returns: 1 byte

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

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

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

Return 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,

SWR:

Unit is 1/1000 (of ratio)
Maximum value sent is 65530 which represents 65.50
Minimum value sent is 1000 which represents 1.00

Cable Loss:

Unit is dB/1000.
Maximum value sent is 30000 which represents 30.00 dB,
Minimum value sent is 0 which represent 0.00 dB

See control byte #29 (1Dh) response bytes 36 to 43 for current Cell 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)

Cell Master Returns: 1 byte

- 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 measurement 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) do the following:

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

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 the 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

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

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

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.

Please refer to the Site Master User's Guide for a detailed explanation of the factors influencing proper selection of DTF parameters.

Give Start & Stop Distances in hundred-thousandths of meter or foot (12.34 m 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
- 254 (FEh): Internal 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 (Highest byte)
- 6) Year (Lowest 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 Trace Name (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 the 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
 - 224 (E0h) Incompatible Measurement Mode (i.e. Spectrum Analyzer)
 - 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.

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: 1 byte

- 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 Complete Byte³
-

Set Site Master VNA 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

³ This byte is returned only after the instrument is finished with its sweep. Not right away.

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 Trace Name (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
-

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD models are not available here. To access the new features use Control Byte #33 (21h).

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 Mode⁴
- 17-20) Time/Date (in Long Integer⁵)
- 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 Frequency⁶ (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 Top⁷ (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 1⁸ (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 Limit⁹ (Highest byte)
- 90) Single Limit
- 91) Single Limit
- 92) Single Limit (Lowest byte)
- 93) Multiple Limit Segment # (1)
- 94) Multiple Limit Segment Status

⁴ Refer to Control Byte #3 “Select Measurement Mode” for detailed value.

⁵ Time/Date long integer representation is in seconds since January 1, 1970

⁶ Frequency units are Hz

⁷ See Control Byte #4 “Set Site Master Scale” for data format

⁸ 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.

⁹ See Control Byte #6 “Set Site Master Single Limit” for data format.

- 95) Multiple Limit Start X¹⁰ (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 Distance¹¹ (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 1¹² (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 Velocity¹³ (Highest byte)
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (Lowest byte)
- 187) Cable Loss¹⁴ (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

¹⁰ See Control Byte #112 “Set Site Master Segmented Limit Lines” for data format.

¹¹ Distance data uses units 1/100,000m (or feet)

¹² Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 55-56, start dist is in bytes 163-166, and stop dist is in bytes 167-170.

¹³ Relative Propagation Velocity uses units 1/100,000

¹⁴ Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

- 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/Off¹⁵
 bit 5 : Cal On/Off
 bit 6 : Limit Type (0b = Single; 1b = Multiple)
 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. gamma¹⁶ MSB
 2. gamma
 3. gamma
 4. gamma LSB
 5. phase¹⁷ MSB
 6. phase
 7. phase
 8. phase LSB

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

For Spectrum Analyzer Mode:

- 57) Start Frequency¹⁸ (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)

¹⁵ Bits (4,5) are as follows: (0,0) = Cal Off, (0,1) = OSL Cal (1,1) = InstaCal On, (1,0) = Impossible.

¹⁶ Gamma data uses 1/1000 units.

¹⁷ Phase data uses 1/10 degree unit.

¹⁸ Frequency in Hz

- 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 Level¹⁹ (Highest byte)
- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (Lowest byte)
- 81) Scale per div²⁰ (Highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (Lowest byte)
- 85) Frequency Marker 1²¹ (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 Limit²² (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 Level²³) (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)

¹⁹ Value sent as (Value in dBm * 1000) + 270,000

²⁰ Value sent as (Value * 1000)

²¹ Value sent as data point on display. Freq = (Point * Span / (Total Data Points – 1)) + Start Freq

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

²³ Value sent as (value in dBm * 1000) + 270,000

- 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 if % of power, 1b = dB down)
- 270) OCC BW % Value²⁴ (Highest byte)
- 271) OCC BW % Value
- 272) OCC BW % Value
- 273) OCC BW % Value (Lowest byte)
- 274) OCC BW dBc²⁵ (Highest byte)
- 275) OCC BW dBc
- 276) OCC BW dBc
- 277) OCC BW dBc (Lowest byte)
- 278) Attenuation²⁶ (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 4²⁷
 - (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

²⁴ % value is 0-99

²⁵ dBc value 0 – 120 dBc

²⁶ Value sent as (value in dB * 1000)

²⁷ For bits 2 and 0, 00=no limit, 10=single limit, 01=multiple limit, 11=multiple limit.

- bit 4 : Multiple Limit Upper Segment 1 Status On/Off
bit 5 : Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW²⁸
bit 6 : Multiple Limit Upper Segment 2 Status On/Off
bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 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/BELOW²⁹
- 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 Offset³⁰(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. dBm³¹ MSB
2. dBm
3. dBm
4. dBm LSB

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

690 – 800) 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)

3-4) Model # (unsigned integer, 14h for Site Master S31xD)

5-11) Extended Model # (7 bytes in ASCII)

²⁸ Upper limits always trigger an error beep if data is ABOVE the limit segment, for example, this bit is always 1b.

²⁹ LOWER limits always trigger an error beep if data is BELOW the limit segment, for example, this bit is always 0b.

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

³¹ Value sent as (value in dBm * 1000) + 270,000

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.

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 (S312D only)
 - 0 – 5 for Power Meter Mode (with Option 29 only)

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.

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. Therefore, a call to #29 will not display the parameters in that setup.

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 Spectrum Analyzer mode (S312D only)
 - 1 – 5 = Saved setups for Power Meter mode (with Option 29 only)
 - 254 = Default setup, current mode
 - 255 = Default setup, all modes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error : Invalid store location or no saved setup
- 227 (E3h) Frequency Mismatch Error
- 238 (EEh) Time-out Error

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD models

are not available here. To access the new features use Control Byte #29 (1Dh).

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 Mode³²
- 2) Site Master Mode Data Points (Higher byte)
- 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)³⁴ (Highest byte)
- 9) Stop Frequency
- 10) Stop Frequency
- 11) Stop Frequency (Lowest byte)
- 12) Scale Start (Highest byte)³³
- 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)³⁴
- 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)³⁵
- 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)³⁶

³² Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

³³ See “Set Site Master Scale” Control Byte #4 for data format.

³⁴ Marker Point = (# data points – 1) * (marker freq – start freq) / (stop freq – start freq)

Where # of data points can be found in bytes 2-3, start freq is in bytes 4-7, and stop freq is in bytes 8-11.

³⁵ See Control Byte #6, “Set Site Master Single Limit” for data format.

³⁶ See Control Byte #112, “Set Site Master Segmented Limit Lines” for data format.

- 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
- 106) Start Distance (Highest byte)³⁷
- 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)³⁸
- 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)³⁹
- 127) Relative Propagation Velocity
- 128) Relative Propagation Velocity
- 129) Relative Propagation Velocity (Lowest byte)
- 130) Cable Loss (Highest byte)⁴⁰
- 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 Frequency⁴¹ (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

³⁷ Distance data uses units 1/100,000 m or 1/100,000 ft

³⁸ Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 2-3, start dist is in bytes 106-109, and stop dist is in bytes 110-113.

³⁹ Relative Propagation Velocity uses units 1/100,000.

⁴⁰ Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

⁴¹ Frequency unit is Hz.

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)
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) ⁴²
157)	Ref Level
158)	Ref Level
159)	Ref Level (Lowest byte)
160)	Scale per div (Highest byte) ⁴³
161)	Scale per div
162)	Scale per div
163)	Scale per div (Lowest byte)
164)	Spectrum Analyzer Frequency Marker 1 (Higher byte) ⁴⁴
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) ⁴⁵
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) ⁴⁶
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)

⁴² Value sent as (value in dBm * 1000) + 270,000)

⁴³ Value sent as (value * 1000)

⁴⁴ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

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

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

- 192) Multiple Upper Limit 1 End Y (Power Level) (Highest byte) ⁴⁷
 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)
 340) RBW Setting (Highest byte) ⁴⁸
 341) RBW Setting
 342) RBW Setting
 343) RBW Setting (Lowest byte)
 344) VBW Setting (Highest byte) ⁴⁹
 345) VBW Setting
 346) VBW Setting
 347) VBW Setting (Lowest byte)
 348) OCC BW Method ⁵⁰
 349) OCC BW % Value (Highest byte) ⁵¹
 350) OCC BW % Value
 351) OCC BW % Value
 352) OCC BW % Value (Lowest byte)
 353) OCC BW dBc (Highest byte) ⁵²
 354) OCC BW dBc
 355) OCC BW dBc
 356) OCC BW dBc (Lowest byte)
 357) Attenuation (Highest byte) ⁵³
 358) Attenuation
 359) Attenuation
 360) Attenuation (Lowest byte)
 361) Antenna Index (0-14)
 362-377) Antenna Name (16 bytes in ASCII)
 378) 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
 379) 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
 380) 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

⁴⁷ Value sent as (value in dBm * 1000) + 270000

⁴⁸ 0000h = 10kHz, 0001h = 30kHz, 0002h = 100kHz, 0003h = 1MHz

⁴⁹ 0000h = 100Hz, 0001h = 300Hz, 0002h = 1kHz, 0003h = 3kHz,
 0004h = 10kHz, 0005h = 30kHz, 0006h = 100kHz, 0007h = 300kHz

⁵⁰ 00h = % of power, 01h = dB down

⁵¹ 0 – 99%

⁵² 0 – 120 dBc

⁵³ 00h = 0dB, 01h = 10dB, 02h = 20dB, 03h = 30dB, 04h = 40dB, 05h = 50dB

- bit 4 : Spectrum Analyzer Mode Marker 5 On/Off
 - bit 5 : Spectrum Analyzer Mode Marker 6 On/Off
 - bits 6 - 7 : Not Used
- 381) 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
- 382) 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
- 383) 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
- 384) 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
- 385) 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
- 386) 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
- 387) 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/BELOW⁵⁴
bit 6 : SPA Multiple Limit Upper Segment 2 Status On/Off
bit 7 : SPA Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 388) 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/BELOW⁵⁵
- 389) 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
- 390) 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
- 391) 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
- 392) 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
- 393) 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)

⁵⁴ Beep level is always 1b for upper segmented limit line

⁵⁵ Beep level is always 0b for lower segmented limit line

- 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
- 394) Printer Type⁵⁶
- 395) Current Language
(0 = English, 1 = French, 2 = German, 3 = Spanish, 4 = Chinese, 5 = Japanese)
- 396) LCD Contrast Value (0-255)
- 397) RTC battery ⁵⁷(Higher byte)
- 398) RTC battery (Lower byte)
- 399) PC board revision ⁵⁸(Higher byte)
- 400) PC board revision (Lower byte)
- 401) Reference Level Offset⁵⁹ (Highest byte)
- 402) Reference: Level Offset
- 403) Reference Level Offset
- 404) Reference Level Offset (Lowest byte)
- 405-434) 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)

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

⁵⁶ See Control Byte #30 for supported printers.

⁵⁷ Value sent as Volts * 10. For example, 2.7V = 27.

⁵⁸ This value is for internal use only.

⁵⁹ Value sent as (value in dBm * 1000) + 270,000

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)
-

Clear Fail Counters – Control Byte #23 (17h)

Description: Resets the Lock Fail Counters, Integrator Fail Counter and spectrum analyzer Fatal Error Counter.

Bytes to Follow: 0 bytes

Site Master Returns: 1 byte

- 1) 255 (FFh) Operation Complete 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 save 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
-

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD models are not available here. To access the new features use Control Byte #36 (24h).

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 Mode⁶⁰
- 4-7) Time/Date (long integer format⁶¹)
- 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 Level⁶² (Highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (Lowest byte)
- 64) Scale per div⁶³ (Highest byte)
- 65) Scale per div
- 66) Scale per div
- 67) Scale per div (Lowest byte)
- 68) Marker 1⁶⁴ (Higher byte)
- 69) Marker 1 (Lower byte)
- 70) Marker 2 (Higher byte)
- 71) Marker 2 (Lower byte)
- 72) Marker 3 (Higher byte)

⁶⁰ See Control Byte #3 “Select Measurement Mode” for measurement modes.

⁶¹ Time/Date long integer representation is in seconds since January 1, 1997.

⁶² Value sent as (value in dBm * 1000) + 270,000

⁶³ Value sent as (value * 1000)

⁶⁴ Marker values are sent as # of data point on display.

See Control Byte #102, “Set Spectrum Analyzer Marker” for calculation of data point.

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 Limit⁶⁵ (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 Setting⁶⁶ (Highest byte)
 245) RBW Setting
 246) RBW Setting
 247) RBW Setting (Lowest byte)
 248) VBW Setting⁶⁷ (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) Attenuation⁶⁸ (Highest byte)
 262) Attenuation
 263) Attenuation
 264) Attenuation (Lowest byte)
 265-280) Antenna Name (16 bytes in ASCII)
 281) Status Byte 1: (0b = Off, 1b = On)

⁶⁵ All amplitude values are sent as (value in dBm * 1000) + 270,000

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

⁶⁷ Valid frequencies (in Hz) are 100, 300, 1,000 3,000 10,000 30,000 100,000 300,000

⁶⁸ Value sent as (value * 1000)

- (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 Offset⁶⁹ (Highest byte)

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

- 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. dBm⁷⁰ (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)

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD models are not available here. To access the new features use Control Byte #36 (24h).

Description: Uploads a Site Master Mode sweep trace to the Site Master.

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

- 1-2) # of following bytes
- 3) Measurement Mode⁷¹
- 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)
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (Lowest byte)
- 48) Stop Frequency (Highest byte)⁷⁴
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (Lowest byte)
- 52) Minimum Frequency Step Size (Highest byte)
- 53) Minimum Frequency Step Size

⁷⁰ Value sent as (Value in dBm * 1000) + 270,000

⁷¹ See Control Byte #3 “Set Measurement Mode” for available measurement modes.

- 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
- 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

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.

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

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 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)

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

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

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

Phase compares the reflected to the incident (reference)

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

This command is new to the S31xD. Use it instead of Control Byte #20 to access the 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:

- 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)

⁸¹ Gamma data uses 1/1000 units.

⁸² Phase data uses 1/10 degree unit.

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.

- 10) PC Board Revision ⁸⁶ (Higher byte)
- 11) PC Board Revision (Lower byte)
- 12-13) Digital Mother Board ID. Beginning with motherboard 64968, the hardware includes a 9-bit digital ID port. The digital ID will be used together with the PC Board Revision (mother board ID voltage) to identify the board and “dash” number. For boards prior to 64968, bytes 12 and 13 will be 0
- 14-25) 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 ⁸⁷ (Highest byte)
- 29) VNA Start Frequency
- 30) VNA Start Frequency
- 31) VNA Start Frequency (Lowest byte)
- 32) VNA Stop Frequency ⁸⁸ (Highest byte)
- 33) VNA Stop Frequency
- 34) VNA Stop Frequency
- 35) VNA Stop Frequency (Lowest byte)
- 36) VNA Scale Start (Highest byte) ⁸⁹
- 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) ⁹⁰
- 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)
- 56) Site Master VNA Single Limit (Highest byte) ⁹¹
- 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) ⁹²
- 63) VNA Multiple Limit Segment Start X

⁸⁶ This value is for internal use only.

⁸⁷ Frequency is scaled by the frequency scale factor specified in bytes 218-219.

⁸⁸ Frequency is scaled by the frequency scale factor specified in bytes 218-219.

⁸⁹ See “Set Site Master VNA Scale” Control Byte #4 for data format.

⁹⁰ Marker Point = (# data points – 1) * (marker freq – start freq) / (stop freq – start freq)

Where # of data points can be found in bytes 2-3, start freq is in bytes 4-7, and stop freq is in bytes 8-11.

⁹¹ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁹² See Control Byte #112, “Set Site Master VNA Segmented Limit Lines” for data format. Frequency is scaled by the frequency scale factor specified in bytes 218-219.

- 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 (Lowest byte)
- 68) VNA Multiple Limit Segment End X (Highest byte)⁹³
- 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 (Lowest byte)
- 74-129) Repeat bytes 60 – 73 for segments 2 - 5
- 130.Start Distance (Highest byte)⁹⁴
- 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)⁹⁵
- 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)⁹⁶
- 151.Relative Propagation Velocity
- 152.Relative Propagation Velocity
- 153.Relative Propagation Velocity (Lowest byte)
- 154.Cable Loss (Highest byte)⁹⁷
- 155.Cable Loss
- 156.Cable Loss
- 157.Cable Loss (Lowest byte)
- 158.Average Cable Loss⁹⁸ (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

⁹³ Frequency is scaled by the frequency scale factor specified in bytes 218-219.

⁹⁴ Distance data uses units 1/100,000m or 1/100,000 ft

⁹⁵ Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 2-3, start dist is in bytes 106-109, and stop dist is in bytes 110-113.

⁹⁶ Relative Propagation Velocity uses units 1/100,000.

⁹⁷ Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

⁹⁸ Average Cable Loss is dB * 1000.

- 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
 - 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 Standard⁹⁹ (Higher byte)
- 172. VNA Signal Standard (Lower byte)
- 173-196. VNA Signal Standard Name, 24 bytes of ASCII
- 197-217. VNA Cable Name, 21 bytes of ASCII
- 218. Frequency Scale Factor¹⁰⁰ (Higher byte)
- 219. Frequency Scale Factor (Lower byte)
- 220-300) Not Used

For Spectrum Analyzer Mode/Transmission Mode (Option 21):

- 26) Spectrum Analyzer Mode Data Points (Higher byte)
- 27) Spectrum Analyzer Mode Data Points (Lower byte)
- 28) Spectrum Analyzer Start Frequency¹⁰¹ (Highest byte)
- 29) Spectrum Analyzer Start Frequency
- 30) Spectrum Analyzer Start Frequency
- 31) Spectrum Analyzer Start Frequency (Lowest byte)
- 32) Spectrum Analyzer Stop Frequency¹⁰² (Highest byte)
- 33) Spectrum Analyzer Stop Frequency
- 34) Spectrum Analyzer Stop Frequency
- 35) Spectrum Analyzer Stop Frequency (Lowest byte)
- 36) Spectrum Analyzer Center Frequency¹⁰³ (Highest byte)
- 37) Spectrum Analyzer Center Frequency
- 38) Spectrum Analyzer Center Frequency
- 39) Spectrum Analyzer Center Frequency (Lowest byte)
- 40) Spectrum Analyzer Frequency Span¹⁰⁴ (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)
- 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)¹⁰⁵
- 49) Ref Level
- 50) Ref Level
- 51) Ref Level (Lowest byte)
- 52) Scale per div (Highest byte)¹⁰⁶

⁹⁹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

¹⁰⁰ Frequency Scale Factor is in number of Hz.

¹⁰¹ Scaled by Frequency Scale Factor (bytes 321-322)

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

¹⁰³ Scaled by Frequency Scale Factor (bytes 321-322)

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

¹⁰⁵ Value sent as (value in dBm * 1000) + 270,000)

- 53) Scale per div
- 54) Scale per div
- 55) Scale per div (Lowest byte)
- 56) Spectrum Analyzer Frequency Marker 1 (Higher byte)¹⁰⁷
- 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)¹⁰⁸
- 69) Spectrum Analyzer Single Limit
- 70) Spectrum Analyzer Single Limit
- 71) Spectrum Analyzer Single Limit (Lowest byte)
- 72) SPA Multiple Upper Limit 1 Start X¹⁰⁹ (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)¹¹⁰
- 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 X¹¹¹ (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)¹¹²
- 85) SPA Multiple Upper Limit 1 End Y (Power Level)
- 86) SPA Multiple Upper Limit 1 End Y (Power Level)
- 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)¹¹³
- 233) RBW Setting
- 234) RBW Setting
- 235) RBW Setting (Lowest byte)
- 236) VBW Setting (Highest byte)¹¹⁴
- 237) VBW Setting
- 238) VBW Setting
- 239) VBW Setting (Lowest byte)
- 240) OCC BW Method¹¹⁵

¹⁰⁶ Value sent as (value * 1000)

¹⁰⁷ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

¹⁰⁸ Value sent as (value in dBm * 1000) + 270000

¹⁰⁹ Scaled by Frequency Scale Factor (bytes 321-322)

¹¹⁰ Value sent as (value in dBm * 1000) + 270000

¹¹¹ Scaled by Frequency Scale Factor (bytes 321-322)

¹¹² Value sent as (value in dBm * 1000) + 270000

¹¹³ RBW frequency sent in Hz.

¹¹⁴ VBW frequency sent in Hz.

- 241) OCC BW % Value (Highest byte)¹¹⁶
 242) OCC BW % Value
 243) OCC BW % Value
 244) OCC BW % Value (Lowest byte)
 245) OCC BW dBc (Highest byte)¹¹⁷
 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 : Normalization On/Off
 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
 bit 4 : SPA Multiple Limit Upper Segment 1 Status On/Off
 bit 5 : SPA Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW¹¹⁸
 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

¹¹⁵ 00h = % of power, 01h = dB down

¹¹⁶ 0 – 99%

¹¹⁷ 0 – 120 dBc

¹¹⁸ Beep level is always 1b for upper segmented limit line

- bit 7 : SPA Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW¹¹⁹
- 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 Averaging 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: Occupied BW Measurement On/Off
- 277) Reference Level Offset¹²⁰ (Highest byte)
278) Reference Level Offset
279) Reference Level Offset
280) Reference Level Offset (Lowest byte)
281) External Reference Frequency¹²¹
282) Signal Standard¹²² (Higher byte)
283) Signal Standard (Lower byte)
284) Channel Selection¹²³ (Higher byte)
285) Channel Selection (Lower byte)
286) Trigger Type¹²⁴
287) Interference Analysis Frequency¹²⁵ (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)

¹¹⁹ Beep level is always 0b for lower segmented limit line

¹²⁰ Value sent as (value in dBm * 1000) + 270,000

¹²¹ 1 byte in MHz (i.e. 20 = 20MHz)

¹²² Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

¹²³ “No Channel” is sent as FFFEh

¹²⁴ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

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

- 296) Video Trigger Level¹²⁶ (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)
 - bit 1: Reserved
 - bits 2-7: 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 = 50Ω, 0Ah = 75Ω Anritsu Adapter, 0Ch = 75Ω Other Adapter)
- 304) Impedance Loss¹²⁷ (Higher byte)
- 305) Impedance Loss (Lower byte)
- 306) AM/FM Demod Type¹²⁸
- 307) AM/FM Demod Status (01h = On, 00h = Off)
- 308) AM/FM Demod Volume (0 to 100)
- 309) AM/FM Demod Frequency¹²⁹ (Highest byte)
- 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 Offset¹³⁰ (Highest byte)
- 318) SSB BFO Offset
- 319) SSB BFO Offset
- 320) SSB BFO Offset (Lowest byte)
- 321) Frequency Scale Factor¹³¹ (Higher byte)
- 322) Frequency Scale Factor (Lower byte)
- 323) Frequency Range Minimum¹³² (Highest byte)
- 324) Frequency Range Minimum
- 325) Frequency Range Minimum
- 326) Frequency Range Minimum (Lowest byte)
- 327) Frequency Range Maximum¹³³ (Highest byte)
- 328) Frequency Range Maximum
- 329) Frequency Range Maximum
- 330) Frequency Range Maximum (Lowest byte)
- 331) Marker Type¹³⁴

¹²⁶ Value sent as (value in dBm * 1000) + 270,000

¹²⁷ Value sent as (value in dB * 1000), valid values are 0 to 20 dB

¹²⁸ AM/FM Demod Type: 00h = FM-Wide Band, 01h = FM-Narrow Band, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

¹²⁹ Scaled by Frequency Scale Factor (bytes 321-322)

¹³⁰ Value sent as ((value in Hz) – 10,000)

¹³¹ In number of Hz

¹³² Scaled by Frequency Scale Factor (bytes 321-322)

¹³³ Scaled by Frequency Scale Factor (bytes 321-322)

¹³⁴ 00h = Regular Marker, 01h = Noise Marker

332-355) Signal Standard Name, 24bytes of ASCII
356-400) Not Used

For Power Meter Mode (Both option 5 and narrow band):

- 26) Power Meter Start Freq¹³⁵ (Highest byte)
- 27) Power Meter Start Freq
- 28) Power Meter Start Freq
- 29) Power Meter Start Freq (Lowest byte)
- 30) Power Meter Stop Freq¹³⁶ (Highest byte)
- 31) Power Meter Stop Freq
- 32) Power Meter Stop Freq
- 33) Power Meter Stop Freq (Lowest byte)
- 34) Power Meter Center Freq¹³⁷ (Highest byte)
- 35) Power Meter Center Freq
- 36) Power Meter Center Freq
- 37) Power Meter Center Freq (Lowest byte)
- 38) Power Meter Span¹³⁸ (Highest byte)
- 39) Power Meter Span
- 40) Power Meter Span
- 41) Power Meter Span (Lowest byte)
- 42) Signal Standard¹³⁹ (Higher byte)
- 43) Signal Standard (Lower byte)
- 44) Channel Selection¹⁴⁰ (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)¹⁴¹
- 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 Factor¹⁴² (Higher byte)
- 60) Frequency Scale Factor (Lower byte)
- 61) Frequency Range Minimum¹⁴³ (Highest byte)
- 62) Frequency Range Minimum
- 63) Frequency Range Minimum
- 64) Frequency Range Minimum (Lowest byte)
- 65) Frequency Range Maximum¹⁴⁴ (Highest byte)
- 66) Frequency Range Maximum

¹³⁵ Scaled by Frequency Scale Factor (bytes 59-60)

¹³⁶ Scaled by Frequency Scale Factor (bytes 59-60)

¹³⁷ Scaled by Frequency Scale Factor (bytes 59-60)

¹³⁸ Scaled by Frequency Scale Factor (bytes 59-60)

¹³⁹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

¹⁴⁰ "No Channel" is sent as FFFEh

¹⁴¹ Value as ((value in dBm * 1000) + 100)

¹⁴² In number of Hz

¹⁴³ Scaled by Frequency Scale Factor

¹⁴⁴ Scaled by Frequency Scale Factor

- 67) Frequency Range Maximum
- 68) Frequency Range Maximum (Lowest byte)
- 69) Zero Status (00h = Off, 01h = On)
- 70) Zero Value¹⁴⁵ (Highest byte)
- 71) Zero Value
- 72) Zero Value
- 73) Zero Value (Lowest byte)
- 74-97) Signal Standard Name, 24 bytes of ASCII
- 98-120) 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

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

¹⁴⁵ Value sent as ((value in dBm * 1000) + 100)

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)

This command is new to the S31xD. Use it, instead of Control Byte #17, to access the 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 Format¹⁴⁶
- 4) Not Used
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes ASCII)
- 16) Measurement Mode¹⁴⁷
- 17-20) Time/Date (in Long Integer¹⁴⁸)
- 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)

¹⁴⁶ 00h = MM/DD/YYYY, 01h = DD/MM/YYYY, 02h = YYYY/MM/DD

¹⁴⁷ Refer to Control Byte #3 "Select Measurement Mode" for detailed value.

¹⁴⁸ Time/Date long integer representation is in seconds since January 1, 1970

For all “Site Master VNA Modes” :

- 57) Start Frequency¹⁴⁹ (Highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (Lowest byte)
- 61) Stop Frequency¹⁵⁰ (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 Top¹⁵¹ (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 1¹⁵² (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)
- 89) Single Limit¹⁵³ (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 X¹⁵⁴ (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 X¹⁵⁵ (Highest byte)

¹⁴⁹ Frequency is scaled by the frequency scale factor specified in bytes 268-269.

¹⁵⁰ Frequency is scaled by the frequency scale factor specified in bytes 268-269.

¹⁵¹ See Control Byte #4 “Set Site Master Scale” for data format

¹⁵² 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.

¹⁵³ See Control Byte #6 “Set Site Master VNA Single Limit” for data format.

¹⁵⁴ See Control Byte #112 “Set Site Master VNA Segmented Limit Lines” for data format. Frequency is scaled by the frequency scale factor specified in bytes 268-269.

- 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 Distance¹⁵⁶ (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 1¹⁵⁷ (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 Velocity¹⁵⁸ (Highest byte)
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (Lowest byte)
- 187) Cable Loss¹⁵⁹ (Highest byte)
- 188) Cable Loss
- 189) Cable Loss
- 190) Cable Loss (Lowest byte)
- 191) Average Cable Loss¹⁶⁰ (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

¹⁵⁵ Frequency is scaled by the frequency scale factor specified in bytes 268-269.

¹⁵⁶ Distance data uses units 1/100,000m (or feet)

¹⁵⁷ Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 55-56, start dist is in bytes 163-166, and stop dist is in bytes 167-170.

¹⁵⁸ Relative Propagation Velocity uses units 1/100,000

¹⁵⁹ Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

¹⁶⁰ Average Cable Loss is dB * 1000.

- 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 Standard¹⁶¹ (Higher byte)
- 201) VNA Signal Standard (Lower byte)
- 202-205) GPS Position – Latitude (long integer)¹⁶²
- 206-209) GPS Position – Longitude (long integer)
- 210-211) GPS Position – Altitude (short integer)
- 212) Signal Standard Link Type¹⁶³
- 213-236) Signal Standard Name, 24 bytes in ASCII
- 237-257) Cable Name, 21 bytes in ASCII
- 258-267) UTC Time, 10 bytes in ASCII
- 268) Frequency Scale Factor¹⁶⁴ (Higher Byte)
- 269) Frequency Scale Factor (Lower Byte)
- 270-324) 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. gamma¹⁶⁵ (Highest byte)
 2. gamma
 3. gamma
 4. gamma (Lowest byte)
 5. phase¹⁶⁶ (Highest byte)
 6. phase

¹⁶¹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

¹⁶² Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = $\text{int}(\text{abs}(\text{value})/1,000,000)$; Minute = $(\text{float})(\text{abs}(\text{value})\%1,000,000)/10,000$

¹⁶³ 1 – Uplink, 2 – Downlink, 3 – Both, 0 – Invalid Link

¹⁶⁴ Frequency Scale Factor is in number of Hz.

¹⁶⁵ Gamma data uses 1/10,000 units.

¹⁶⁶ Phase data uses 1/10 degree unit.

- 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 Mode/Transmission Mode (Option 21 Only):

- 57) Start Frequency¹⁶⁷ (Highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (Lowest byte)
- 61) Stop Frequency¹⁶⁸ (Highest byte)
- 62) Stop Frequency
- 63) Stop Frequency
- 64) Stop Frequency (Lowest byte)
- 65) Center Frequency¹⁶⁹ (Highest byte)
- 66) Center Frequency
- 67) Center Frequency
- 68) Center Frequency (Lowest byte)
- 69) Frequency Span¹⁷⁰ (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 Level¹⁷¹ (Highest byte)
- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (Lowest byte)
- 81) Scale per div¹⁷² (Highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (Lowest byte)
- 85) Frequency Marker 1¹⁷³ (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)
- 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)

¹⁶⁷ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁶⁸ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁶⁹ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁷⁰ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁷¹ Value sent as (Value in dBm * 1000) + 270,000

¹⁷² Value sent as (Value * 1000)

¹⁷³ Value sent as data point on display. Freq = (Point * Span / (Total Data Points – 1)) + Start Freq

- 96) Frequency Marker 6 (Lower byte)
- 97) Single Limit¹⁷⁴ (Highest byte)
- 98) Single Limit
- 99) Single Limit
- 100) Single Limit (Lowest byte)
- 101) Multiple Upper Limit 1 Start X¹⁷⁵ (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 Level¹⁷⁶) (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 X¹⁷⁷ (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 % Value¹⁷⁸
- 271) OCC BW dBc¹⁷⁹
- 272) Attenuation¹⁸⁰ (Highest byte)
- 273) Attenuation
- 274) Attenuation
- 275) Attenuation (Lowest byte)
- 276-291) Antenna Name(16 bytes in ASCII)
- 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

¹⁷⁴ Value sent as (Value in dBm * 1000) + 270,000

¹⁷⁵ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁷⁶ Value sent as (value in dBm * 1000) + 270,000

¹⁷⁷ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁷⁸ % value is 0-99

¹⁷⁹ dBc value 0 – 120 dBc

¹⁸⁰ Value sent as (value in dB * 1000)

- 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 : Normalization On/Off
- 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 average 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 4¹⁸¹
 - (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/BELOW¹⁸²
 - 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/BELOW¹⁸³
- 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)
 - bit 7: Not Used
- 299) Reference Level Offset¹⁸⁴ (Highest byte)
- 300) Reference Level Offset

¹⁸¹ For bits 2, 1 and 0 ("X" is "don't care"): 0X0=no limit, 1X0=single limit, 0X1=multiple limit, 1X1=multiple limit.

¹⁸² Upper limits always trigger an error beep if data is ABOVE the limit segment, for example, this bit is always 1b.

¹⁸³ Lower limits always trigger an error beep if data is BELOW the limit segment, for example, this bit is always 0b.

¹⁸⁴ Value sent as (value in dBm * 1000) + 270,000

- 301) Reference Level Offset
- 302) Reference Level Offset (Lowest byte)
- 303) External Reference Frequency¹⁸⁵
- 304) Signal Standard¹⁸⁶ (Higher byte)
- 305) Signal Standard (Lower byte)
- 306) Channel Selection¹⁸⁷ (Higher byte)
- 307) Channel Selection (Lower byte)
- 308) Interference Analysis Cellular Standard¹⁸⁸
- 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 Frequency¹⁸⁹ (Highest byte)
- 314) Interference Analysis Frequency
- 315) Interference Analysis Frequency
- 316) Interference Analysis Frequency (Lowest byte)
- 317-320) Reserved
- 321) Trigger Type¹⁹⁰
- 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 Level¹⁹¹ (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
 - bit 7: Not Used
- 332) Impedance (00h = 50 Ω , 0Ah = 75 Ω Anritsu Adapter, 0Ch = 75 Ω Other Adapter)
- 333) Impedance Loss¹⁹² (Higher byte)
- 334) Impedance Loss (Lower byte)
- 335) Frequency Scale Factor¹⁹³ (Higher byte)
- 336) Frequency Scale Factor (Lower byte)
- 337) Frequency Range Minimum¹⁹⁴ (Highest byte)
- 338) Frequency Range Minimum
- 339) Frequency Range Minimum
- 340) Frequency Range Minimum (Lowest byte)

¹⁸⁵ 1 byte in MHz (i.e. 20 = 20MHz)

¹⁸⁶ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

¹⁸⁷ “No Channel” is sent as FFFEh

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

¹⁸⁹ Scaled by Frequency Scale Factor (bytes 335-336)

¹⁹⁰ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

¹⁹¹ Value sent as (value in dBm * 1000) + 270,000

¹⁹² Value sent as (value in dB * 1000), valid values are 0 to 20 dB

¹⁹³ In number of Hz

¹⁹⁴ Scaled by Frequency Scale Factor

341) Frequency Range Maximum¹⁹⁵ (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 Type¹⁹⁶
 bits 4-7: Not Used
 347) C/I Calculated Power¹⁹⁷ (Carrier or Interference – NB FHSS¹⁹⁸) (Highest byte)
 348) C/I Calculated Power (Carrier or Interference – NB FHSS)
 349) C/I Calculated Power (Carrier or Interference – NB FHSS)
 350) C/I Calculated Power (Carrier or Interference – NB FHSS) (Lowest byte)
 351) C/I Calculated Power¹⁹⁹ (Interference – WB FHSS²⁰⁰) (Highest byte)
 352) C/I Calculated Power (Interference – WB FHSS)
 353) C/I Calculated Power (Interference – WB FHSS)
 354) C/I Calculated Power (Interference – WB FHSS) (Lowest byte)
 355) C/I Calculated Power²⁰¹ (Interference – Broadband²⁰²) (Highest byte)
 356) C/I Calculated Power (Interference – Broadband)
 357) C/I Calculated Power (Interference – Broadband)
 358) C/I Calculated Power (Interference – Broadband) (Lowest byte)
 359) Occupied Bandwidth Power (Highest byte)²⁰³
 360) Occupied Bandwidth Power
 361) Occupied Bandwidth Power
 362) Occupied Bandwidth Power (Lowest byte)
 363) Marker Type²⁰⁴
 364-367) GPS Position – Latitude (long integer)²⁰⁵
 368-371) GPS Position – Longitude (long integer)
 372-373) GPS Position – Altitude (short integer)
 374) Signal Standard Link Type²⁰⁶
 375-398) Signal Standard Name, 24 bytes in ASCII
 399) Measure Offset Status (0h = Off, 1h = On)
 400-431) Not Used
 432-2035) Sweep Data (401 points * 4 bytes/point= 1604 bytes)
 4 bytes for each data point
 1. dBm²⁰⁷ (Highest byte)
 2. dBm

¹⁹⁵ Scaled by Frequency Scale Factor

¹⁹⁶ 000b = Carrier – NB FHSS, 001b = Carrier – WB FHSS, 010b = Carrier – Broadband, 111b = Interference

¹⁹⁷ Value sent as (value in dBm * 1000) + 270,000

¹⁹⁸ If Status Byte 9, bytes 1-3 equal 111b, then signal will be calculated power for the Interference – NB FHSS trace. Otherwise, these bytes represent the calculated Carrier power.

¹⁹⁹ Value sent as (value in dBm * 1000) + 270,000

²⁰⁰ If Status Byte 9, bytes 1-3 equal 111b, then signal will be calculated power for the Interference – WB FHSS trace. Otherwise, these bytes should be ignored.

²⁰¹ Value sent as (value in dBm * 1000) + 270,000

²⁰² If Status Byte 9, bytes 1-3 equal 111b, then signal will be calculated power for the Interference – Broadband trace. Otherwise, these bytes should be ignored.

²⁰³ If Method is % of power then the value is db Down * 1000. If the method is db down, then the value is %

²⁰⁴ 00h = Regular Marker, 01h = Noise Marker

²⁰⁵ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

²⁰⁶ 1 – Uplink, 2 – Downlink, 3 – Both, 0 – Invalid Link

²⁰⁷ Value sent as (value in dBm * 1000) + 270,000

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

For Power Meter Mode (both option 5 and narrow band):

- 57) Power Monitor Mode (00h = Off, 01h = On)
- 58) Power Meter Unit (00h = dBm, 01h = Watts)
- 59) Start Frequency²⁰⁸ (Highest byte)
- 60) Start Frequency
- 61) Start Frequency
- 62) Start Frequency (Lowest byte)
- 63) Stop Frequency²⁰⁹ (Highest byte)
- 64) Stop Frequency
- 65) Stop Frequency
- 66) Stop Frequency (Lowest byte)
- 67) Center Frequency²¹⁰ (Highest byte)
- 68) Center Frequency
- 69) Center Frequency
- 70) Center Frequency (Lowest byte)
- 71) Frequency Span²¹¹ (Highest byte)
- 72) Frequency Span
- 73) Frequency Span
- 74) Frequency Span (Lowest byte)
- 75) Power Offset Status (00h = Off, 01h = On)
- 76) Power Offset²¹² (Highest byte)
- 77) Power Offset
- 78) Power Offset
- 79) Power Offset (Lowest byte)
- 80) Power Relative Status (00h = Off, 01h = On)
- 81) Power Relative Value²¹³ (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 Frequency (in Hz) (Highest byte)
- 89) External Reference Frequency (in Hz)
- 90) External Reference Frequency (in Hz)
- 91) External Reference Frequency (in Hz) (Lowest byte)
- 92) Signal Standard²¹⁴ (Highest byte)
- 93) Signal Standard (Lowest byte)
- 94) Channel Selection²¹⁵ (Highest byte)
- 95) Channel Selection (Lowest byte)
- 96) Frequency Scale Factor²¹⁶ (Higher byte)
- 97) Frequency Scale Factor (Lower byte)
- 98) Frequency Range Minimum²¹⁷ (Highest byte)

²⁰⁸ Scaled by Frequency Scale Factor (bytes 96-97)

²⁰⁹ Scaled by Frequency Scale Factor (bytes 96-97)

²¹⁰ Scaled by Frequency Scale Factor (bytes 96-97)

²¹¹ Scaled by Frequency Scale Factor (bytes 96-97)

²¹² Value sent as (value in dB * 1000), valid values are 0 to 60 dB

²¹³ Value sent as (value in dBm * 1000)

²¹⁴ Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

²¹⁵ "No Channel" is sent as FFFEh

²¹⁶ In number of Hz

- 99) Frequency Range Minimum
- 100) Frequency Range Minimum
- 101) Frequency Range Minimum (Lowest byte)
- 102) Frequency Range Maximum²¹⁸ (Highest byte)
- 103) Frequency Range Maximum
- 104) Frequency Range Maximum
- 105) Frequency Range Maximum (Lowest byte)
- 106 – 150) Not Used
- 151) Power Meter Reading²¹⁹ (Highest byte)
- 152) Power Meter Reading
- 153) Power Meter Reading
- 154) Power Meter Reading (Lowest byte)
- 155) Measure Offset Status (0h = Off, 1h = On)

For Channel Scanner Mode:

- 57) Reference Level (Highest Byte)
- 58) Reference Level
- 59) Reference Level
- 60) Reference Level (Lowest Byte)
- 61) Scale Division (Highest Byte)
- 62) Scale Division
- 63) Scale Division
- 64) Scale Division (Lowest Byte)
- 65) Start Frequency (Highest Byte)
- 66) Start Frequency
- 67) Start Frequency
- 68) Start Frequency (Lowest Byte)
- 69) Span Frequency (Highest Byte)
- 70) Span Frequency
- 71) Span Frequency
- 72) Span Frequency (Lowest Byte)
- 73) Channel Step (Highest Byte)
- 74) Channel Step (Lowest Byte)
- 75) Channel Frequency Step (Highest Byte)
- 76) Channel Frequency Step
- 77) Channel Frequency Step
- 78) Channel Frequency Step (Lowest Byte)
- 79) Number of Channels Displayed
- 80) External Reference Frequency²²⁰
- 81) Display Type Channels or Frequencies²²¹
- 82) Display Type Graph or Text²²²
- 83) Signal Standard (Highest Byte)
- 84) Signal Standard
- 85) Signal Standard
- 86) Signal Standard (Lowest Byte)
- 87-90) GPS Position – Latitude (long integer)²²³

²¹⁷ Scaled by Frequency Scale Factor

²¹⁸ Scaled by Frequency Scale Factor

²¹⁹ Power sent as (power in dBm * 1000). Use two's-complement method to decode negative power levels.

²²⁰ Frequency in MHz, OFF if 0

²²¹ 0 – Channel, 1 - Frequency

²²² 0 – Graph, 1 - Text

²²³ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

91-94)	GPS Position – Longitude (long integer)
95-96)	GPS Position – Altitude (short integer)
97)	Start Channel (Highest Byte)
98)	Start Channel
99)	Start Channel
100)	Start Channel (Lowest Byte)
101 – 124)	Signal Standard Name, 24 bytes in ASCII
125 – 152)	Reserved
153 – 272)	Channel Scanner Data ²²⁴

For Interference Analyzer RSSI Mode

57)	Center Frequency (Highest Byte)
58)	Center Frequency
59)	Center Frequency
60)	Center Frequency (Lowest Byte)
61)	Reference Level (Highest Byte)
62)	Reference Level
63)	Reference Level
64)	Reference Level (Lowest Byte)
65)	Scale (Highest Byte)
66)	Scale
67)	Scale
68)	Scale (Lowest Byte)
69)	RBW (Highest Byte)
70)	RBW
71)	RBW
72)	RBW (Lowest Byte)
73)	VBW (Highest Byte)
74)	VBW
75)	VBW
76)	VBW (Lowest Byte)
77)	Status Byte 1 - Bit 0 - Detection Algorithm (Lowest Bit)²²⁵ - Bit 1 - Detection Algorithm - Bit 2 - Detection Algorithm (Highest Bit) - Bit 3 - Not Used - Bit 4 - Not Used - Bit 5 - Not Used - Bit 6 - Not Used
78)	Reference Level Offset (Highest Byte)
79)	Reference Level Offset
80)	Reference Level Offset
81)	Reference Level Offset (Lowest Byte)
82)	External Reference Frequency ²²⁶
83)	Signal Standard (Highest Byte)
84)	Signal Standard (Lowest Byte)
85)	Channel (Highest Byte) ²²⁷
86)	Channel (Lowest Byte)
87)	Min RSSI Measured (Highest Byte)
88)	Min RSSI Measured

²²⁴ 20 points, 6 bytes per point. First 2 bytes are channel numbers(Invalid channels sent as 0xFFFF) and 4 bytes are values. Value sent as (value in dBm) * 1000 + 270,000

²²⁵ 000 - Positive Peak, 010 – RMS Averaging, 100 – Negative Peak, 110 – Sampling Mode

²²⁶ Frequency in MHz, OFF if 0

²²⁷ Invalid channels are sent as 0xFFFF

89)	Min RSSI Measured
90)	Min RSSI Measured (Lowest Byte)
91)	Max RSSI Measured (Highest Byte)
92)	Max RSSI Measured
93)	Max RSSI Measured
94)	Max RSSI Measured (Lowest Byte)
95)	Measure Duration (Highest Byte) ²²⁸
96)	Measure Duration
97)	Measure Duration
98)	Measure Duration (Lowest Byte)
99)	Sweep Point Interval(Highest Byte) ²²⁹
100)	Sweep Point Interval
101)	Sweep Point Interval
102)	Sweep Point Interval (Lowest Byte)
103 – 106)	GPS Position – Latitude (long integer) ²³⁰
107 – 110)	GPS Position – Longitude (long integer)
111 – 112)	GPS Position – Altitude (short integer)
113)	Signal Standard
114 – 117)	Start GPS Position – Latitude (long integer) ²³¹
118 – 121)	Start GPS Position – Longitude (long integer)
122 – 123)	Start GPS Position – Altitude (short integer)
124)	Attenuation (Highest Byte) ²³²
125)	Attenuation
126)	Attenuation
127)	Attenuation (Lowest Byte)
128 – 151)	Signal Standard Name, 24 bytes in ASCII
152)	Measure Offset Status (0h = Off, 1h = On)
153 – 207)	Reserved
208 – 3415)	RSSI Sweep data ²³³

For High Accuracy Power Meter Mode

57)	Center Frequency(Highest Byte) ²³⁴
58)	Center Frequency
59)	Center Frequency
60)	Center Frequency(Lowest Byte)
61)	Power Reading(Highest Byte) ²³⁵
62)	Power Reading(Lowest Byte)
63)	Max Hold Status (0h = Off, 1h = On)
64)	Offset Status (0h = Off, 1h = On)
65)	Offset Value(Highest Byte) ²³⁶

²²⁸ Measure Duration time in minutes

²²⁹ Sweep Point Interval time in milliseconds

²³⁰ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = $\text{int}(\text{abs}(\text{value})/1,000,000)$; Minute = $(\text{float})(\text{abs}(\text{value})\%1,000,000)/10,000$

²³¹ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = $\text{int}(\text{abs}(\text{value})/1,000,000)$; Minute = $(\text{float})(\text{abs}(\text{value})\%1,000,000)/10,000$

²³² Attenuation is sent as (Att in dB * 1000)

²³³ Sweep Data contains 401 display points, 8 bytes per display point. The first 4 bytes are the amplitude, the next 2 bytes are the latitude increments from the start GPS position and the following 2 bytes are the longitude increments from the Start GPS position.

²³⁴ in kHz

²³⁵ in 2-complement and in dBm

²³⁶ in 2-complement and in dB

66)	Offset Value(Lowest Byte)
67)	Measure Offset Status (0h = Off, 1h = On)
68)	Measure Offset Value(Highest Byte) ²³⁷
69)	Measure Offset Value(Lowest Byte)
70)	Relative Value(Highest Byte) ²³⁸
71)	Relative Value(Lowest Byte)
72)	Relative Status (0h = Off, 1h = On)
73)	Running Averages Number(Highest Byte)
74)	Running Averages Number(Lowest Byte)
75 – 76)	Signal Standard ID
77 – 100)	Signal Standard Name
101)	Zero Status (0h = Off, 1h = On)
102)	Limit Status (0h = Off, 1h = On)
103)	Upper Limit dBm(Highest Byte) ²³⁹
104)	Upper Limit dBm(Lowest Byte)
105)	Lower Limit dBm(Highest Byte) ²⁴⁰
106)	Lower Limit dBm(Lowest Byte)
107)	Limit Unit Display
108)	Error Message Status ²⁴¹
109 – 112)	GPS Position – Latitude (long integer) ²⁴²
113 – 116)	GPS Position – Longitude (long integer)
117 – 118)	GPS Position – Altitude (short integer)
119 – 128)	UTC Time, 10 bytes in ASCII
129 – 256)	Reserved Byte

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 Format²⁴³

4) Model # (unsigned integer, 19h for Site Master model S311D, 1Ah for Site Master model S312D)

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 (0 or 1)

00h = Off

01h = On

2) Trace on which to Perform Overlay Operation (1 to 200)

²³⁷ in 2-complement and in dB

²³⁸ in 2-complement and in dBm

²³⁹ in 2-complement

²⁴⁰ in 2-complement

²⁴¹ Bit 0: set to 1 if there is power supply error in the power sensor module. Bit 1: set to 1 if there is too much RF power going into the sensor module. Bit 2: set to 1 if zeroing is done incorrectly. Bit 3: set to 1 if power sensor's operating temperature range is exceeded. Bit 4: set to 1 if temperature has drifted by more than specified degree since the last zeroing.

²⁴² Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

²⁴³ 00h = MM/DD/YYYY, 01h = DD/MM/YYYY, 02h = YYYY/MM/DD

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 Spectrum Analyzer 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

- 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 S31xD. 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 Mode²⁴⁴
- 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 Frequency²⁴⁵ (Highest byte)
- 45) Start Frequency
- 46) Start Frequency

²⁴⁴ See Control Byte #3 “Set Measurement Mode” for available measurement modes.

²⁴⁵ Frequency is scaled by the frequency scale factor specified in byte 245-246.

- 47) Start Frequency (Lowest byte)
- 48) Stop Frequency²⁴⁶ (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)²⁴⁷
- 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)²⁴⁸
- 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)²⁴⁹
- 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)²⁵⁰
- 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)²⁵¹
- 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

²⁴⁶ Frequency is scaled by the frequency scale factor specified in byte 245-246.

²⁴⁷ See Control Byte #4, “Set Site Master VNA Scale” for data format.

²⁴⁸ Marker point = (Number of data points – 1) * (marker freq – start freq) / (stop freq – start freq)

²⁴⁹ See Control Byte #6, “Set Site Master VNA Single Limit” for data format

²⁵⁰ See Control Byte #112, “Set Site Master VNA Segmented Limit Lines” for data format. Frequency is scaled by the frequency scale factor specified in bytes 245-246.

²⁵¹ Frequency is scaled by the frequency scale factor specified in bytes 245-246.

- 150) Start Distance (Highest byte)²⁵²
- 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)²⁵³
- 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)²⁵⁴
- 171) Relative Propagation Velocity
- 172) Relative Propagation Velocity
- 173) Relative Propagation Velocity (Lowest byte)
- 174) Cable Loss (Highest byte)²⁵⁵
- 175) Cable Loss
- 176) Cable Loss
- 177) Cable Loss (Lowest byte)
- 178) Average Cable Loss²⁵⁶ (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

²⁵² Distance data uses units 1/100,000m or 1/100,000 ft

²⁵³ Marker point = (# of data points – 1) * (marker dist – start dist) / (stop dist – start dist)

²⁵⁴ Relative Propagation Velocity uses units 1/100,000

²⁵⁵ Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft

²⁵⁶ Average Cable Loss is dB * 1000.

- 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 Standard²⁵⁷ (Higher byte)
188) VNA Signal Standard (Lower byte)
- 189-192) GPS Position – Latitude (long integer)²⁵⁸
193-196) GPS Position – Longitude (long integer)
197-198) GPS Position – Altitude (short integer)
199) Reserved
200-223) Signal Standard Name, 24 bytes in ASCII
224-244) Cable Name, 21 bytes in ASCII
245) Frequency Scale Factor²⁵⁹ (Higher byte)
246) Frequency Scale Factor (Lower byte)
248-314) 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. Gamma²⁶⁰ (Highest byte)
2. Gamma
3. Gamma
4. Gamma (Lowest byte)
5. Phase²⁶¹ (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 Mode:

44) Start Frequency²⁶² (Highest byte)

²⁵⁷ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFh

²⁵⁸ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = $\text{int}(\text{abs}(\text{value})/1,000,000)$; Minute = $(\text{float})(\text{abs}(\text{value})\%1,000,000)/10,000$

²⁵⁹ Frequency Scale Factor is in number of Hz.

²⁶⁰ Gamma uses units scaled to 1/10,000

²⁶¹ Phase is transmitted in 1/10ths of a degree

- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (Lowest byte)
- 48) Stop Frequency²⁶³ (Highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (Lowest byte)
- 52) Center Frequency²⁶⁴ (Highest byte)
- 53) Center Frequency
- 54) Center Frequency
- 55) Center Frequency (Lowest byte)
- 56) Frequency Span²⁶⁵ (Highest byte)
- 57) Frequency Span
- 58) Frequency Span
- 59) Frequency Span (Lowest byte)
- 60) Ref Level²⁶⁶ (Highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (Lowest byte)
- 64) Scale per div²⁶⁷ (Highest byte)
- 65) Scale per div
- 66) Scale per div
- 67) Scale per div (Lowest byte)
- 68) Marker 1²⁶⁸ (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 Limit²⁶⁹ (Highest byte)
- 81) Single Limit
- 82) Single Limit
- 83) Single Limit (Lowest byte)
- 84) Multiple Upper Limit 1 Start X²⁷⁰ (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)

²⁶² Scaled by Frequency Scale Factor (bytes 318-319)

²⁶³ Scaled by Frequency Scale Factor (bytes 318-319)

²⁶⁴ Scaled by Frequency Scale Factor (bytes 318-319)

²⁶⁵ Scaled by Frequency Scale Factor (bytes 318-319)

²⁶⁶ Value sent as (value in dBm * 1000) + 270,000

²⁶⁷ Value sent as (value * 1000)

²⁶⁸ Marker values are sent as # of data point on display.

See Control Byte #102, "Set Spectrum Analyzer Marker" for calculation of data point.

²⁶⁹ All amplitude values are sent as (value in dBm * 1000) + 270,000

²⁷⁰ Scaled by Frequency Scale Factor (bytes 318-319)

- 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 X²⁷¹ (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 Setting²⁷² (Highest byte)
- 245) RBW Setting
- 246) RBW Setting
- 247) RBW Setting (Lowest byte)
- 248) VBW Setting²⁷³ (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)
- 254) OCC BW dBc (0-120)
- 255) Attenuation²⁷⁴ (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 : Normalization On/Off
- 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 Averaging 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

²⁷¹ Scaled by Frequency Scale Factor (bytes 318-319)

²⁷² Valid frequencies (in Hz) are 100, 300, 1,000, 3,000, 10,000, 30,000, 100,000, 300,000, 1,000,000

²⁷³ Valid frequencies (in Hz) are 100, 300, 1,000, 3,000, 10,000, 30,000, 100,000, 300,000

²⁷⁴ Value sent as (value * 1000)

- 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
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 Offset²⁷⁵ (Highest byte)
283) Reference Level Offset
284) Reference Level Offset
285) Reference Level Offset (Lowest byte)
286) External Reference Frequency²⁷⁶
287) Signal Standard²⁷⁷ (Higher byte)
288) Signal Standard (Lower byte)
289) Channel Selection²⁷⁸ (Higher byte)
290) Channel Selection (Lower byte)
291) Interference Analysis Cellular Standard²⁷⁹
292) Interference Analysis Estimated Bandwidth (Highest byte)
293) Interference Analysis Estimated Bandwidth
294) Interference Analysis Estimated Bandwidth
295) Interference Analysis Estimated Bandwidth (Lowest byte)

²⁷⁵ Value sent as (Value in dBm * 1000) + 270,000

²⁷⁶ byte in MHz (i.e. 20 = 20MHz)

²⁷⁷ Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh.

²⁷⁸ "No Channel" is sent as FFFEh.

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

- 296) Interference Analysis Frequency²⁸⁰ (Highest byte)
 297) Interference Analysis Frequency
 298) Interference Analysis Frequency
 299) Interference Analysis Frequency (Lowest byte)
 300-303) Reserved
 304) Trigger Type²⁸¹
 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 Level²⁸² (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)
 316) Impedance Loss²⁸³ (Higher byte)
 317) Impedance Loss (Lower byte)
 318) Frequency Scale Factor²⁸⁴ (Higher byte)
 319) Frequency Scale Factor (Lower byte)
 320) Frequency Range Minimum²⁸⁵ (Highest byte)
 321) Frequency Range Minimum
 322) Frequency Range Minimum
 323) Frequency Range Minimum (Lowest byte)
 324) Frequency Range Maximum²⁸⁶ (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 Type²⁸⁷
 bits 4-7: Not Used
 330) C/I Calculated Power²⁸⁸ (Carrier or Interference – NB FHSS²⁸⁹) (Highest byte)
 331) C/I Calculated Power (Carrier or Interference – NB FHSS)
 332) C/I Calculated Power (Carrier or Interference – NB FHSS)

²⁸⁰ Scaled by Frequency Scale Factor (bytes 318-319)

²⁸¹ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

²⁸² Value sent as (Value in dBm * 1000) + 270,000

²⁸³ Value sent as (value in dB * 1000), valid values are 0 to 20 dB

²⁸⁴ In number of Hz

²⁸⁵ Scaled by Frequency Scale Factor

²⁸⁶ Scaled by Frequency Scale Factor

²⁸⁷ 000b = Carrier – NB FHSS, 001b = Carrier – WB FHSS, 010b = Carrier – Broadband, 111b = Interference

²⁸⁸ Value sent as (value in dBm * 1000) + 270,000

²⁸⁹ If Status Byte 9, bytes 1-3 equal 111b, then value will be calculated power for the Interference – NB FHSS trace. Otherwise, these bytes represent the calculated Carrier power.

- 333) C/I Calculated Power (Carrier or Interference – NB FHSS) (Lowest byte)
- 334) C/I Calculated Power²⁹⁰ (Interference – WB FHSS²⁹¹) (Highest byte)
- 335) C/I Calculated Power (Interference – WB FHSS)
- 336) C/I Calculated Power (Interference – WB FHSS)
- 337) C/I Calculated Power (Interference – WB FHSS) (Lowest byte)
- 338) C/I Calculated Power²⁹² (Interference – Broadband²⁹³) (Highest byte)
- 339) C/I Calculated Power (Interference – Broadband)
- 340) C/I Calculated Power (Interference – Broadband)
- 341) C/I Calculated Power (Interference – Broadband) (Lowest byte)
- 342) Marker Type²⁹⁴
- 343-400) Not Used
- 401-2004) Sweep Data (401 points * 4 bytes/point = 1604 bytes)
- 4 bytes for each data point
- 1. dBm²⁹⁵ (Highest byte)
- 2. dBm
- 3. dBm
- 4. dBm (Lowest byte)

For Power Meter:

- 44) Power Monitor Mode (00h = Off, 01h = On)
- 45) Power Meter Unit (00h = dBm, 01h = Watts)
- 46) Start Frequency²⁹⁶ (Highest byte)
- 47) Start Frequency
- 48) Start Frequency
- 49) Start Frequency (Lowest byte)
- 50) Stop Frequency²⁹⁷ (Highest byte)
- 51) Stop Frequency
- 52) Stop Frequency
- 53) Stop Frequency (Lowest byte)
- 54) Center Frequency²⁹⁸ (Highest byte)
- 55) Center Frequency
- 56) Center Frequency
- 57) Center Frequency (Lowest byte)
- 58) Frequency Span²⁹⁹ (Highest byte)
- 59) Frequency Span
- 60) Frequency Span
- 61) Frequency Span (Lowest byte)
- 62) Power Offset Status (00h = Off, 01h = On)
- 63) Power Offset³⁰⁰ (Highest byte)
- 64) Power Offset
- 65) Power Offset
- 66) Power Offset (Lowest byte)

²⁹⁰ Value sent as (value in dBm * 1000) + 270,000

²⁹¹ If Status Byte 9, bytes 1-3 equal 111b, then value will be calculated power for the Interference – WB FHSS trace. Otherwise, these bytes should be ignored.

²⁹² Value sent as (value in dBm * 1000) + 270,000

²⁹³ If Status Byte 9, bytes 1-3 equal 111b, then value will be calculated power for the Interference – Broadband trace. Otherwise, these bytes should be ignored.

²⁹⁴ 00h = Regular Marker, 01h = Noise Marker

²⁹⁵ Value sent as (Value in dBm * 1000) + 270,000

²⁹⁶ Scaled by Frequency Scale Factor (bytes 96-97)

²⁹⁷ Scaled by Frequency Scale Factor (bytes 96-97)

²⁹⁸ Scaled by Frequency Scale Factor (bytes 96-97)

²⁹⁹ Scaled by Frequency Scale Factor (bytes 96-97)

³⁰⁰ Value sent as (value in dB * 1000), valid values are 0 to 60 dB

67)	Power Relative Status (00h = Off, 01h = On)
68)	Power Relative Value ³⁰¹ (Highest byte)
69)	Power Relative Value
70)	Power Relative Value
71)	Power Relative Value (Lowest byte)
72)	RMS Averaging Level (00h = Off, 01h = Low, 02h = Medium, 03h = High)
73)	Power Zero Status (00h = Off, 01h = On)
74)	External Reference Status (00h = Off, 01h = On)
75)	External Reference Frequency (in Hz) (Highest byte)
76)	External Reference Frequency (in Hz)
77)	External Reference Frequency (in Hz)
78)	External Reference Frequency (in Hz) (Lowest byte)
79)	Signal Standard ³⁰² (higher byte)
80)	Signal Standard (lower byte)
81)	Channel Selection ³⁰³ (higher byte)
82)	Channel Selection (lower byte)
83)	Frequency Scale Factor ³⁰⁴ (higher byte)
84)	Frequency Scale Factor (lower byte)
85)	Frequency Range Minimum ³⁰⁵ (Highest byte)
86)	Frequency Range Minimum
87)	Frequency Range Minimum
88)	Frequency Range Minimum (Lowest byte)
89)	Frequency Range Maximum ³⁰⁶ (Highest byte)
90)	Frequency Range Maximum
91)	Frequency Range Maximum
92)	Frequency Range Maximum (Lowest byte)
93-96)	GPS Position – Latitude (long integer) ³⁰⁷
97-100)	GPS Position – Longitude (long integer)
101-102)	GPS Position – Altitude (short integer)
103)	Reserved
104 – 127)	Signal Standard Name, 24 bytes in ASCII
128 – 150)	Not Used
151)	Power Meter Reading ³⁰⁸ (Highest byte)
152)	Power Meter Reading
153)	Power Meter Reading
154)	Power Meter Reading (Lowest byte)
155)	Measure Offset Status (00h = Off, 01h = On)

For Channel Scanner Mode:

44)	Reference Level (Highest Byte)
45)	Reference Level
46)	Reference Level
47)	Reference Level (Lowest Byte)
48)	Scale Division (Highest Byte)
49)	Scale Division

³⁰¹ Value sent as (value in dBm * 1000)

³⁰² Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

³⁰³ “No Channel” is sent as FFFEh

³⁰⁴ In number of Hz

³⁰⁵ Scaled by Frequency Scale Factor

³⁰⁶ Scaled by Frequency Scale Factor

³⁰⁷ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

³⁰⁸ Power sent as (power in dBm * 1000). Use two’s-complement method to decode negative power levels.

50)	Scale Division
51)	Scale Division (Lowest Byte)
52)	Start Frequency (Highest Byte)
53)	Start Frequency
54)	Start Frequency
55)	Start Frequency (Lowest Byte)
56)	Span Frequency (Highest Byte)
57)	Span Frequency
58)	Span Frequency
59)	Span Frequency (Lowest Byte)
60)	Channel Step (Highest Byte)
61)	Channel Step (Lowest Byte)
62)	Channel Frequency Step (Highest Byte)
63)	Channel Frequency Step
64)	Channel Frequency Step
65)	Channel Frequency Step (Lowest Byte)
66)	Number of Channels Displayed
67)	External Reference Frequency ³⁰⁹
68)	Display Type Channels or Frequencies ³¹⁰
69)	Display Type Graph or Text ³¹¹
70)	Signal Standard (Highest Byte)
71)	Signal Standard (Lowest Byte)
72-75)	GPS Position – Latitude (long integer) ³¹²
76-79)	GPS Position – Longitude (long integer)
80-81)	GPS Position – Altitude (short integer)
82)	Start Channel (Highest Byte)
83)	Start Channel
84)	Start Channel
85)	Start Channel (Lowest Byte)
86 – 109)	Signal Standard Name, 24bytes in ASCII
110 – 137)	Reserved
138 – 257)	Channel Scanner Data ³¹³

For Interference Analyzer RSSI Mode

44)	Center Frequency (Highest Byte)
45)	Center Frequency
46)	Center Frequency
47)	Center Frequency (Lowest Byte)
48)	Reference Level (Highest Byte)
49)	Reference Level
50)	Reference Level
51)	Reference Level (Lowest Byte)
52)	Scale (Highest Byte)
53)	Scale
54)	Scale
55)	Scale (Lowest Byte)
56)	RBW (Highest Byte)

³⁰⁹ Frequency in MHz, OFF if 0

³¹⁰ 0 – Channel, 1 - Frequency

³¹¹ 0 – Graph, 1 - Text

³¹² Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = $\text{int}(\text{abs}(\text{value})/1,000,000)$; Minute = $(\text{float})(\text{abs}(\text{value})\%1,000,000)/10,000$

³¹³ 20 points, 6 bytes per point. First 2 bytes are channel numbers(Invalid channels sent as 0xFFFF) and 4 bytes are values. Value sent as $(\text{value in dBm}) * 1000 + 270,000$

57)	RBW
58)	RBW
59)	RBW (Lowest Byte)
60)	VBW (Highest Byte)
61)	VBW
62)	VBW
63)	VBW (Lowest Byte)
64)	Status Byte 1
	Bit 0 - Detection Algorithm (Lowest Bit) ³¹⁴
	Bit 1 - Detection Algorithm
	Bit 2 - Detection Algorithm (Highest Bit)
	Bit 3 - Not Used
	Bit 4 - Not Used
	Bit 5 - Not Used
	Bit 6 - Not Used
65)	Reference Level Offset (Highest Byte)
66)	Reference Level Offset
67)	Reference Level Offset
68)	Reference Level Offset (Lowest Byte)
69)	External Reference Frequency ³¹⁵
70)	Signal Standard (Highest Byte)
71)	Signal Standard (Lowest Byte)
72)	Channel (Highest Byte) ³¹⁶
73)	Channel (Lowest Byte)
74)	Min RSSI Measured (Highest Byte)
75)	Min RSSI Measured
76)	Min RSSI Measured
77)	Min RSSI Measured (Lowest Byte)
78)	Max RSSI Measured (Highest Byte)
79)	Max RSSI Measured
80)	Max RSSI Measured
81)	Max RSSI Measured (Lowest Byte)
82)	Measure Duration (Highest Byte) ³¹⁷
83)	Measure Duration
84)	Measure Duration
85)	Measure Duration (Lowest Byte)
86)	Sweep Point Interval(Highest Byte) ³¹⁸
87)	Sweep Point Interval
88)	Sweep Point Interval
89)	Sweep Point Interval (Lowest Byte)
90 - 93)	GPS Position – Latitude (long integer) ³¹⁹
94 - 97)	GPS Position – Longitude (long integer)
98 - 99)	GPS Position – Altitude (short integer)
100)	Signal Standard
101-104)	Start GPS Position – Latitude (long integer) ³²⁰

³¹⁴ 000 - Positive Peak, 010 – RMS Averaging, 100 – Negative Peak, 110 – Sampling Mode

³¹⁵ Frequency in MHz, OFF if 0

³¹⁶ Invalid channels are sent as 0xFFFF

³¹⁷ Measure Duration time in minutes

³¹⁸ Sweep Point Interval time in milliseconds

³¹⁹ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

105-108)	Start GPS Position – Longitude (long integer)
109-110)	Start GPS Position – Altitude (short integer)
111)	Attenuation (Highest Byte) ³²¹
112)	Attenuation
113)	Attenuation
114)	Attenuation (Lowest Byte)
115– 138)	Signal Standard Name, 24bytes in ASCII
139)	Measure Offset Status (0h = Off, 1h = On)
140– 194)	Reserved
195 – 3402)	RSSI Sweep data ³²²

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 2:	"2/"
Option 3:	"3/"
Option 5:	"5/"
Option 6:	"6/"
Option 10:	"10/"
Option 19:	"19/"
Option 21:	"21/"
Option 25:	"25/"
Option 27:	"27/"
Option 29:	"29/"
Option 50:	"50/"
If NO options are installed:	"None"

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

This command is available with Option 29 and/or Option 5.

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

Bytes to Follow: 0 bytes

³²⁰ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

³²¹ Attenuation is sent as (Att in dB * 1000)

³²² Sweep Data contains 401 display points, 8 bytes per display point. The first 4 bytes are the amplitude, the next 2 bytes are the latitude increments from the start GPS position and the following 2 bytes are the longitude increments from the Start GPS position.

Site Master Returns: 30 bytes

- 1) Status Byte # 1 (0b = Off, 1b = On)
(LSB) bit 0 : Unit (0b - Watt/%, 1b - dBm/dBr)
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 Status³²³
- 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 frequency scale factor.

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

This command is available with Option 29 and/or Option 5.

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

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

This command is available with Option 29 and/or Option 5.

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

³²³ RMS Averaging – 00h = Off, 01h = Low, 02h = Medium, 03h = High

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

This command is available with Option 29 and/or Option 5.

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)

This command is available with Option 29 and/or Option 5.

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)

This command is available with Option 29 only.

Description: Disable/enable Power Meter RMS Averaging. Enabling can be set to 3 different levels.

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 Frequency and Span Setup – Control Byte #45 (2Dh)

This command is available with 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 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) Span (Highest byte)
- 6) Span
- 7) Span
- 8) 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
-

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, then wait for the "Sweep Complete Byte" to signify the end of the sweep.

Note: The "Sweep Complete Byte" is not returned unless serial echo status is turned on using command #10.

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.

Note: The "Sweep Complete Byte" is not returned unless serial echo status is turned on using command #10.

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)
-

Sweep Data Echo On/Off – Control Byte #49 (31h)

Description: Sets the sweep data echo mode On/Off.

Sweep Data Echo Mode behaves much like the Serial Port Echo Mode (see Control Byte #10). It automatically puts the unit into single sweep mode. At the end of each sweep cycle, the Site Master sends a Sweep Complete Byte #192 (C0h) to the serial port. At this time, sweep data can be queried (see Control Byte #33) without having to enter remote mode first or exit remote mode when done. Depending on the value of the second following byte, the next sweep can be automatically triggered after the sweep data has been sent.

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

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

- 1) Enter remote mode. Set Sweep Data Echo Mode On. Exit remote mode.
- 2) The Site Master sweeps once and then sends the Sweep Complete Byte.
- 3) After you receive it: Recall sweep 0 (last sweep trace in RAM).
- 4) If using auto triggering, repeat steps 2-3. If using manual triggering, go to step 5.
- 5) Send Sweep Triggering Byte #48 (30h) and wait for the next sweep cycle.
- 6) Repeat steps 2-5.

Note: To execute commands other than #33, you must use the traditional Enter Remote, Send Commands, Exit Remote communication sequence.

Bytes to Follow: 2 bytes

- 1) Sweep Data Echo Status
00h : Off
01h : On
- 2) Next Sweep Trigger
00h : Manual
01h : Automatic

Site Master Returns: 1 byte

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

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)

Note:

The Smart Battery Data Spec can be found at <http://www.sbs-forum.org/specs/index.html>

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 $(\text{value in dBm} * 1000) + 120,000$.

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
-

Download Saved Setup – Control Byte #65 (41h)

Description: Returns parameters associated with the specified setup number. Since different modes have different numbers of setup locations available, the command requires the mode be specified as well as the setup number.

Bytes to Follow: 2 bytes

- 1) Measurement Mode³²⁴
- 2) Setup Number
 - 0 = Run time setup
 - 1 – 10 = Saved setups for Spectrum Analyzer/Transmission Measurement modes
 - 1 – 5 = Saved setups for Power Meter mode (Option 29 Only)
 - 255 = Default setup

Site Master Returns:

For All Modes:

- 1) Number of Following Bytes (Higher byte)
- 2) Number of Following Bytes (Lower byte)
- 3) Measurement Mode³²⁵
- 5-20) Not Used

For Site Master VNA Modes:

- 21) Number of Data Points (Higher byte)
- 22) Number of Data Points (Lower byte)
- 23) VNA Start Frequency³²⁶ (Highest byte)
- 24) VNA Start Frequency
- 25) VNA Start Frequency
- 26) VNA Start Frequency (Lowest byte)
- 27) VNA Stop Frequency³²⁷ (Highest byte)
- 28) VNA Stop Frequency
- 29) VNA Stop Frequency
- 30) VNA Stop Frequency (Lowest byte)
- 31) Return Loss Scale Start (Higher byte)³²⁸
- 32) Return Loss Scale Start (Lower byte)
- 33) Return Loss Scale Stop (Higher byte)
- 34) Return Loss Scale Stop (Lower byte)
- 35) SWR Scale Start (Higher byte)³²⁹
- 36) SWR Scale Start (Lower byte)
- 37) SWR Scale Stop (Higher byte)

³²⁴ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

³²⁵ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

³²⁶ Frequency is scaled by the frequency scale factor specified in bytes 465-466.

³²⁷ Frequency is scaled by the frequency scale factor specified in bytes 465-466.

³²⁸ See “Set Site Master VNA Scale” Control Byte #4 for data format.

³²⁹ See “Set Site Master VNA Scale” Control Byte #4 for data format.

- 38) SWR Scale Stop (Lower byte)
- 39) Cable Loss Scale Start (Higher byte)³³⁰
- 40) Cable Loss Scale Start (Lower byte)
- 41) Cable Loss Scale Stop (Higher byte)
- 42) Cable Loss Scale Stop (Lower byte)
- 43) DTF-RL Scale Start (Higher byte)³³¹
- 44) DTF-RL Scale Start (Lower byte)
- 45) DTF-RL Scale Stop (Higher byte)
- 46) DTF-RL Scale Stop (Lower byte)
- 47) DTF-SWR Scale Start (Higher byte)³³²
- 48) DTF-SWR Scale Start (Lower byte)
- 49) DTF-SWR Scale Stop (Higher byte)
- 50) DTF-SWR Scale Stop (Lower byte)
- 51) VNA Frequency Marker 1 (Higher byte)³³³
- 52) VNA Frequency Marker 1 (Lower byte)
- 53) VNA Frequency Marker 2 (Higher byte)
- 54) VNA Frequency Marker 2 (Lower byte)
- 55) VNA Frequency Marker 3 (Higher byte)
- 56) VNA Frequency Marker 3 (Lower byte)
- 57) VNA Frequency Marker 4 (Higher byte)
- 58) VNA Frequency Marker 4 (Lower byte)
- 59) VNA Frequency Marker 5 (Higher byte)
- 60) VNA Frequency Marker 5 (Lower byte)
- 61) VNA Frequency Marker 6 (Higher byte)
- 62) VNA Frequency Marker 6 (Lower byte)
- 63) Return Loss Single Limit (Higher byte)³³⁴
- 64) Return Loss Single Limit (Lower byte)
- 65) SWR Single Limit (Higher byte)³³⁵
- 66) SWR Single Limit (Lower byte)
- 67) Cable Loss Single Limit (Higher byte)³³⁶
- 68) Cable Loss Single Limit (Lower byte)
- 69) DTF-RL Single Limit (Higher byte)³³⁷
- 70) DTF-RL Single Limit (Lower byte)
- 71) DTF-SWR Single Limit (Higher byte)³³⁸
- 72) DTF-SWR Single Limit (Lower byte)
- 73) Return Loss Multiple Limit Segment # (1)
- 74) Return Loss Multiple Limit Segment Status (00h = Off, 01h = On)
- 75) Return Loss Multiple Limit Segment Start X (Highest byte)³³⁹
- 76) Return Loss Multiple Limit Segment Start X
- 77) Return Loss Multiple Limit Segment Start X
- 78) Return Loss Multiple Limit Segment Start X (Lowest byte)
- 79) Return Loss Multiple Limit Segment Start Y (Higher byte)
- 80) Return Loss Multiple Limit Segment Start Y (Lowest byte)

³³⁰ See “Set Site Master VNA Scale” Control Byte #4 for data format.

³³¹ See “Set Site Master VNA Scale” Control Byte #4 for data format.

³³² See “Set Site Master VNA Scale” Control Byte #4 for data format.

³³³ Marker Point = (# data points – 1) * (marker freq – start freq) / (stop freq – start freq)

Where # of data points can be found in bytes 2-3, start freq is in bytes 4-7, and stop freq is in bytes 8-11.

³³⁴ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

³³⁵ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

³³⁶ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

³³⁷ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

³³⁸ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

³³⁹ See Control Byte #112, “Set Site Master VNA Segmented Limit Lines” for data format. Frequency is scaled by the frequency scale factor specified in bytes 465-466.

- 81) Return Loss Multiple Limit Segment End X (Highest byte)³⁴⁰
- 82) Return Loss Multiple Limit Segment End X
- 83) Return Loss Multiple Limit Segment End X
- 84) Return Loss Multiple Limit Segment End X (Lowest byte)
- 85) Return Loss Multiple Limit Segment End Y (Higher byte)
- 86) Return Loss Multiple Limit Segment End Y (Lowest byte)
- 87-142) Repeat bytes 63 – 76 for segments 2 – 5
- 143-212) Repeat bytes 63 – 132 for SWR Multiple Limit
- 213-282) Repeat bytes 63 – 132 for Cable Loss Multiple Limit
- 283-352) Repeat bytes 63 – 132 for DTF-RL Multiple Limit
- 353-422) Repeat bytes 63 – 132 for DTF-SWR Multiple Limit
- 423) Start Distance (Highest byte)³⁴¹
- 424) Start Distance
- 425) Start Distance
- 426) Start Distance (Lowest byte)
- 427) Stop Distance (Highest byte)
- 428) Stop Distance
- 429) Stop Distance
- 430) Stop Distance (Lowest byte)
- 431) Distance Marker 1 (Higher byte)³⁴²
- 432) Distance Marker 1 (Lower byte)
- 433) Distance Marker 2 (Higher byte)
- 434) Distance Marker 2 (Lower byte)
- 435) Distance Marker 3 (Higher byte)
- 436) Distance Marker 3 (Lower byte)
- 437) Distance Marker 4 (Higher byte)
- 438) Distance Marker 4 (Lower byte)
- 439) Distance Marker 5 (Higher byte)
- 440) Distance Marker 5 (Lower byte)
- 441) Distance Marker 6 (Higher byte)
- 442) Distance Marker 6 (Lower byte)
- 443) Relative Propagation Velocity (Highest byte)³⁴³
- 444) Relative Propagation Velocity
- 445) Relative Propagation Velocity
- 446) Relative Propagation Velocity (Lowest byte)
- 447) Cable Loss (Highest byte)³⁴⁴
- 448) Cable Loss
- 449) Cable Loss
- 450) Cable Loss (Lowest byte)
- 451) Average Cable Loss³⁴⁵ (Highest byte)
- 452) Average Cable Loss
- 453) Average Cable Loss
- 454) Average Cable Loss (Lowest byte)
- 455) 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

³⁴⁰ Frequency is scaled by the frequency scale factor specified in bytes 465-466.

³⁴¹ Distance data uses units 1/100,000m or 1/100,000 ft

³⁴² Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 2-3, start dist is in bytes 106-109, and stop dist is in bytes 110-113.

³⁴³ Relative Propagation Velocity uses units 1/100,000.

³⁴⁴ Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

³⁴⁵ Average Cable Loss is dB * 1000.

- bit 4 : Site Master Marker 5 On/Off
 - bit 5 : Site Master Marker 6 On/Off
 - bits 6- 7 : Not Used
- 456) 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
- 457) 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
 - bits 2-6 : Not Used
 - bit 7 : Site Master Single Limit Status On/Off
- 458) Status Byte 4:
 - (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
- 459) Status Byte 5: (0b = Off, 1b = On)
 - (LSB) bit 0 : Fixed CW Mode On/Off
 - bit 1 : Single Sweep On/Off
 - bit 2 : Trace Overlay On/Off
 - bit 3 : Measurement Unit Metric/English (0b = English, 1b = Metric)
 - bits 4-6: Not Used
 - bit 7 : Cal Mode (0b = OSL Cal, 1b = FlexCal)
- 460) VNA Signal Standard³⁴⁶ (Higher byte)
- 461) VNA Signal Standard (Lower byte)
- 462) Cable Index
- 463) Cable Folder³⁴⁷
- 464) Trace Overlay Index (1-200)
- 465) Frequency Scale Factor³⁴⁸ (Higher byte)
- 466) Frequency Scale Factor (Lower byte)
- 467-550) Not Used

For Spectrum Analyzer Mode:

- 21) Spectrum Analyzer Start Frequency³⁴⁹ (Highest byte)
- 22) Spectrum Analyzer Start Frequency
- 23) Spectrum Analyzer Start Frequency
- 24) Spectrum Analyzer Start Frequency (Lowest byte)
- 25) Spectrum Analyzer Stop Frequency³⁵⁰ (Highest byte)
- 26) Spectrum Analyzer Stop Frequency
- 27) Spectrum Analyzer Stop Frequency
- 28) Spectrum Analyzer Stop Frequency (Lowest byte)
- 29) Spectrum Analyzer Center Frequency³⁵¹ (Highest byte)

³⁴⁶ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFh

³⁴⁷ 00h=Standard at 1000 MHz, 01h=Standard at 2000 MHz, 02h=Standard at 2500 MHz, 03h=Custom

³⁴⁸ Frequency Scale Factor is in number of Hz.

³⁴⁹ Scaled by Frequency Scale Factor (bytes 301-302)

³⁵⁰ Scaled by Frequency Scale Factor (bytes 301-302)

³⁵¹ Scaled by Frequency Scale Factor (bytes 301-302)

- 30) Spectrum Analyzer Center Frequency
- 31) Spectrum Analyzer Center Frequency
- 32) Spectrum Analyzer Center Frequency (Lowest byte)
- 33) Spectrum Analyzer Frequency Span³⁵² (Highest byte)
- 34) Spectrum Analyzer Frequency Span
- 35) Spectrum Analyzer Frequency Span
- 36) Spectrum Analyzer Frequency Span (Lowest byte)
- 37) Ref Level (Highest byte)³⁵³
- 38) Ref Level
- 39) Ref Level
- 40) Ref Level (Lowest byte)
- 41) Scale per div (Highest byte)³⁵⁴
- 42) Scale per div
- 43) Scale per div
- 44) Scale per div (Lowest byte)
- 45) Spectrum Analyzer Frequency Marker 1 (Higher byte)³⁵⁵
- 46) Spectrum Analyzer Frequency Marker 1 (Lower byte)
- 47) Spectrum Analyzer Frequency Marker 2 (Higher byte)
- 48) Spectrum Analyzer Frequency Marker 2 (Lower byte)
- 49) Spectrum Analyzer Frequency Marker 3 (Higher byte)
- 50) Spectrum Analyzer Frequency Marker 3 (Lower byte)
- 51) Spectrum Analyzer Frequency Marker 4 (Higher byte)
- 52) Spectrum Analyzer Frequency Marker 4 (Lower byte)
- 53) Spectrum Analyzer Frequency Marker 5 (Higher byte)
- 54) Spectrum Analyzer Frequency Marker 5 (Lower byte)
- 55) Spectrum Analyzer Frequency Marker 6 (Higher byte)
- 56) Spectrum Analyzer Frequency Marker 6 (Lower byte)
- 57) Spectrum Analyzer Single Limit (Highest byte)³⁵⁶
- 58) Spectrum Analyzer Single Limit
- 59) Spectrum Analyzer Single Limit
- 60) Spectrum Analyzer Single Limit (Lowest byte)
- 61) SPA Multiple Upper Limit 1 Start X³⁵⁷ (Highest byte)
- 62) SPA Multiple Upper Limit 1 Start X
- 63) SPA Multiple Upper Limit 1 Start X
- 64) SPA Multiple Upper Limit 1 Start X (Lowest byte)
- 65) SPA Multiple Upper Limit 1 Start Y (Power Level) (Highest byte)³⁵⁸
- 66) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 67) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 68) SPA Multiple Upper Limit 1 Start Y (Power Level) (Lowest byte)
- 69) SPA Multiple Upper Limit 1 End X³⁵⁹ (Highest byte)
- 70) SPA Multiple Upper Limit 1 End X
- 71) SPA Multiple Upper Limit 1 End X
- 72) SPA Multiple Upper Limit 1 End X (Lowest byte)
- 73) SPA Multiple Upper Limit 1 End Y (Power Level) (Highest byte)³⁶⁰
- 74) SPA Multiple Upper Limit 1 End Y (Power Level)

³⁵² Scaled by Frequency Scale Factor (bytes 301-302)

³⁵³ Value sent as (value in dBm * 1000) + 270,000)

³⁵⁴ Value sent as (value * 1000)

³⁵⁵ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

³⁵⁶ Value sent as (value in dBm * 1000) + 270000

³⁵⁷ Scaled by Frequency Scale Factor (bytes 301-302)

³⁵⁸ Value sent as (value in dBm * 1000) + 270000

³⁵⁹ Scaled by Frequency Scale Factor (bytes 301-302)

³⁶⁰ Value sent as (value in dBm * 1000) + 270000

- 75) SPA Multiple Upper Limit 1 End Y (Power Level)
76) SPA Multiple Upper Limit 1 End Y (Power Level) (Lowest byte)
77-220) SPA Multiple Upper Limits 2-5, SA Multiple Lower Limits 1-5 (see bytes 61-76 for format)
221) RBW Setting (Highest byte)³⁶¹
222) RBW Setting
223) RBW Setting
224) RBW Setting (Lowest byte)
225) VBW Setting (Highest byte)³⁶²
226) VBW Setting
227) VBW Setting
228) VBW Setting (Lowest byte)
229) OCC BW Method³⁶³
230) OCC BW % Value³⁶⁴
231) OCC BW dBc³⁶⁵
232) Attenuation
233) Antenna Index (0-14)
234-249) Antenna Name (16 bytes in ASCII)
250) 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
251) Status Byte 2: (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
bit 4 : Pre Amp Mode (0b = Manual, 1b = Auto)
bit 5 : Pre Amp Status On/Off
bit 6 : Dynamic Attenuation On/Off
bit 7 : Normalization On/Off
252) 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
bit 4 : SPA Multiple Limit Upper Segment 1 Status On/Off
bit 5 : SPA Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW³⁶⁶
bit 6 : SPA Multiple Limit Upper Segment 2 Status On/Off
bit 7 : SPA Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
253) 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

³⁶¹ RBW frequency sent in Hz.

³⁶² VBW frequency sent in Hz.

³⁶³ 00h = % of power, 01h = dB down

³⁶⁴ 0 – 99%

³⁶⁵ 0 – 120 dBc

³⁶⁶ Beep level is always 1b for upper segmented limit line

- 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/BELOW ³⁶⁷
- 254) 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
- 255) 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 : Amplitude Units (Linear) – 00b = Watts 01b = Volts
- bits 3-4 : Amplitude Units (Log) - 00b = dBm 01b = dBV 10b = dBmV 11b = dBuV
- bits 5-6 : Detection Alg (00b = pos. peak 01b = RMS Averaging 10b = neg. peak 11b = Sampling Mode)
- bit 7 : Units Type (0b = Log 1b = Linear)
- 256) Status Byte 7: (0b = Off, 1b = On)
- (LSB) bit 0: Interference Analysis On/Off
- bit 1: C/I Measurement 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: Occupied BW Measurement On/Off
- 257) Reference Level Offset³⁶⁸ (Highest byte)
- 258) Reference Level Offset
- 259) Reference Level Offset
- 260) Reference Level Offset (Lowest byte)
- 261) External Reference Frequency ³⁶⁹
- 262) Signal Standard³⁷⁰ (Higher byte)
- 263) Signal Standard (Lower byte)
- 264) Channel Selection³⁷¹ (Higher byte)
- 265) Channel Selection (Lower byte)
- 266) Trigger Type³⁷²
- 267) Interference Analysis Frequency³⁷³ (Highest byte)
- 268) Interference Analysis Frequency
- 269) Interference Analysis Frequency
- 270) Interference Analysis Frequency (Lowest byte)
- 271) Trigger Position (0 – 100%)
- 272) Min Sweep Time (in μ s) (Highest byte)

³⁶⁷ Beep level is always 0b for lower segmented limit line

³⁶⁸ Value sent as (value in dBm * 1000) + 270,000

³⁶⁹ 1 byte in MHz (i.e. 20 = 20MHz)

³⁷⁰ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

³⁷¹ “No Channel” is sent as FFFEh

³⁷² Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

³⁷³ Scaled by Frequency Scale Factor (bytes 301-302)

- 273) Min Sweep Time (in μ s)
- 274) Min Sweep Time (in μ s)
- 275) Min Sweep Time (in μ s) (Lowest byte)
- 276) Video Trigger Level³⁷⁴ (Highest byte)
- 277) Video Trigger Level
- 278) Video Trigger Level
- 279) Video Trigger Level (Lowest byte)
- 280) Status Byte 8
(LSB) bit 0: Reserved
bits 1-7: Not Used
- 281) Status Byte 9
(LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF)
bit 7: Not Used
- 282) 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
bit 4: View B On/Off
bit 5: External Reference Frequency On/Off
bits 6-7: Not Used
- 283) Impedance (00h = 50 Ω , 10h = 75 Ω Anritsu Adapter, 12h = 75 Ω Other Adapter)
- 284) Impedance Loss³⁷⁵ (Higher byte)
- 285) Impedance Loss (Lower byte)
- 286) AM/FM Demod Type³⁷⁶
- 287) AM/FM Demod Status (01h = On, 00h = Off)
- 288) AM/FM Demod Volume (0 to 100)
- 289) AM/FM Demod Frequency³⁷⁷ (Highest byte)
- 290) AM/FM Demod Frequency
- 291) AM/FM Demod Frequency
- 292) AM/FM Demod Frequency (Lowest byte)
- 293) AM/FM Demod Time (in ms) (Highest byte)
- 294) AM/FM Demod Time (in ms)
- 295) AM/FM Demod Time (in ms)
- 296) AM/FM Demod Time (in ms) (Lowest byte)
- 297) SSB BFO Offset³⁷⁸ (Highest byte)
- 298) SSB BFO Offset
- 299) SSB BFO Offset
- 300) SSB BFO Offset (Lowest byte)
- 301) Frequency Scale Factor³⁷⁹ (Higher byte)
- 302) Frequency Scale Factor (Lower byte)
- 303) Frequency Range Minimum³⁸⁰ (Highest byte)
- 304) Frequency Range Minimum
- 305) Frequency Range Minimum
- 306) Frequency Range Minimum (Lowest byte)
- 307) Frequency Range Maximum³⁸¹ (Highest byte)
- 308) Frequency Range Maximum

³⁷⁴ Value sent as (value in dBm * 1000) + 270,000

³⁷⁵ Value sent as (value in dB * 1000), valid values are 0 to 20 dB

³⁷⁶ AM/FM Demod Type: 00h = FM-Wide Band, 01h = FM-Narrow Band, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

³⁷⁷ Scaled by Frequency Scale Factor (bytes 301-302)

³⁷⁸ Value sent as ((value in Hz) – 10,000)

³⁷⁹ In number of Hz

³⁸⁰ Scaled by Frequency Scale Factor (bytes 301-302)

³⁸¹ Scaled by Frequency Scale Factor (bytes 301-302)

- 309) Frequency Range Maximum
- 310) Frequency Range Maximum (Lowest byte)
- 311) Marker Type³⁸²
- 312) Channel Power Int BW³⁸³ (Highest byte)
- 313) Channel Power Int BW
- 314) Channel Power Int BW
- 315) Channel Power Int BW (Lowest byte)
- 316) ACPR Main Channel BW³⁸⁴ (Highest byte)
- 317) ACPR Main Channel BW
- 318) ACPR Main Channel BW
- 319) ACPR Main Channel BW (Lowest byte)
- 320) ACPR Adjacent Channel BW³⁸⁵ (Highest byte)
- 321) ACPR Adjacent Channel BW
- 322) ACPR Adjacent Channel BW
- 323) ACPR Adjacent Channel BW (Lowest byte)
- 324) ACPR Channel Spacing³⁸⁶ (Highest byte)
- 325) ACPR Channel Spacing
- 326) ACPR Channel Spacing
- 327) ACPR Channel Spacing (Lowest byte)
- 328) Interference Analysis Cell Std³⁸⁷
- 329) Interference Analysis Est. BW³⁸⁸ (Highest byte)
- 330) Interference Analysis Est. BW
- 331) Interference Analysis Est. BW
- 332) Interference Analysis Est. BW (Lowest byte)
- 333) Trace B Trace Id³⁸⁹
- 334-500) Not Used

For Transmission Mode (Option 21):

- 21) Start Frequency³⁹⁰ (Highest byte)
- 22) Start Frequency
- 23) Start Frequency
- 24) Start Frequency (Lowest byte)
- 25) Stop Frequency³⁹¹ (Highest byte)
- 26) Stop Frequency
- 27) Stop Frequency
- 28) Stop Frequency (Lowest byte)
- 29) Center Frequency³⁹² (Highest byte)
- 30) Center Frequency
- 31) Center Frequency
- 32) Center Frequency (Lowest byte)
- 33) Frequency Span³⁹³ (Highest byte)
- 34) Frequency Span

³⁸² 00h = Regular Marker, 01h = Noise Marker

³⁸³ Scaled by Frequency Scale Factor (bytes 301-302)

³⁸⁴ Scaled by Frequency Scale Factor (bytes 301-302)

³⁸⁵ Scaled by Frequency Scale Factor (bytes 301-302)

³⁸⁶ Scaled by Frequency Scale Factor (bytes 301-302)

³⁸⁷ 4 Standards – 00h = 1250 kHz CDMA, 01h = GSM, 02h = TDMA, 03h = AMPS, 04h = Unknown, FFh =

Interference Analysis Measurement OFF

³⁸⁸ Frequency in Hz

³⁸⁹ FFh indicates no trace selected

³⁹⁰ Scaled by Frequency Scale Factor (bytes 244-245)

³⁹¹ Scaled by Frequency Scale Factor (bytes 244-245)

³⁹² Scaled by Frequency Scale Factor (bytes 244-245)

³⁹³ Scaled by Frequency Scale Factor (bytes 244-245)

- 35) Frequency Span
- 36) Frequency Span (Lowest byte)
- 37) Ref Level (Highest byte)³⁹⁴
- 38) Ref Level
- 39) Ref Level
- 40) Ref Level (Lowest byte)
- 41) Scale per div (Highest byte)³⁹⁵
- 42) Scale per div
- 43) Scale per div
- 44) Scale per div (Lowest byte)
- 45) Frequency Marker 1 (Higher byte)³⁹⁶
- 46) Frequency Marker 1 (Lower byte)
- 47) Frequency Marker 2 (Higher byte)
- 48) Frequency Marker 2 (Lower byte)
- 49) Frequency Marker 3 (Higher byte)
- 50) Frequency Marker 3 (Lower byte)
- 51) Frequency Marker 4 (Higher byte)
- 52) Frequency Marker 4 (Lower byte)
- 53) Frequency Marker 5 (Higher byte)
- 54) Frequency Marker 5 (Lower byte)
- 55) Frequency Marker 6 (Higher byte)
- 56) Frequency Marker 6 (Lower byte)
- 57) Single Limit (Highest byte)³⁹⁷
- 58) Single Limit
- 59) Single Limit
- 60) Single Limit (Lowest byte)
- 61) Multiple Upper Limit 1 Start X³⁹⁸ (Highest byte)
- 62) Multiple Upper Limit 1 Start X
- 63) Multiple Upper Limit 1 Start X
- 64) Multiple Upper Limit 1 Start X (Lowest byte)
- 65) Multiple Upper Limit 1 Start Y (Power Level) (Highest byte)³⁹⁹
- 66) Multiple Upper Limit 1 Start Y (Power Level)
- 67) Multiple Upper Limit 1 Start Y (Power Level)
- 68) Multiple Upper Limit 1 Start Y (Power Level) (Lowest byte)
- 69) Multiple Upper Limit 1 End X⁴⁰⁰ (Highest byte)
- 70) Multiple Upper Limit 1 End X
- 71) Multiple Upper Limit 1 End X
- 72) Multiple Upper Limit 1 End X (Lowest byte)
- 73) Multiple Upper Limit 1 End Y (Power Level) (Highest byte)⁴⁰¹
- 74) Multiple Upper Limit 1 End Y (Power Level)
- 75) Multiple Upper Limit 1 End Y (Power Level)
- 76) Multiple Upper Limit 1 End Y (Power Level) (Lowest byte)
- 77-220) Multiple Upper Limits 2-5, SA Multiple Lower Limits 1-5 (see bytes 61-76 for format)
- 221) RBW Setting (Highest byte)⁴⁰²
- 222) RBW Setting

³⁹⁴ Value sent as (value in dBm * 1000) + 270,000)

³⁹⁵ Value sent as (value * 1000)

³⁹⁶ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

³⁹⁷ Value sent as (value in dBm * 1000) + 270000

³⁹⁸ Scaled by Frequency Scale Factor (bytes 244-245)

³⁹⁹ Value sent as (value in dBm * 1000) + 270000

⁴⁰⁰ Scaled by Frequency Scale Factor (bytes 244-245)

⁴⁰¹ Value sent as (value in dBm * 1000) + 270000

⁴⁰² RBW frequency sent in Hz.

- 223) RBW Setting
- 224) RBW Setting (Lowest byte)
- 225) VBW Setting (Highest byte)⁴⁰³
- 226) VBW Setting
- 227) VBW Setting
- 228) VBW Setting (Lowest byte)
- 229) Attenuation
- 230) 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
- 231) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0 : S21 Spa Cal Status (0 – Cal OFF, 1 – Cal ON)
 - 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 : Not Used
- 232) Status Byte 3: (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 Beep On/Off
 - bit 2 : Single Limit Status 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/BELOW⁴⁰⁴
 - bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 - bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 233) Status Byte 4: (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/BELOW⁴⁰⁵
- 234) Status Byte 5: (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

⁴⁰³ VBW frequency sent in Hz.

⁴⁰⁴ Beep level is always 1b for upper segmented limit line

⁴⁰⁵ Beep level is always 0b for lower segmented limit line

- bit 6 : Multiple Limit Lower Segment 5 Status On/Off
 bit 7 : Multiple Limit Lower Segment 5 Beep Level ABOVE/BELOW
 235) Status Byte 6: (0b = Off, 1b = On)
 (LSB) bit 0 : Not Used
 bit 1 : Bias Tee On/Off (Option 10)
 bit 2 : External Reference Freq 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 Averaging 10b = neg. peak 11b = Sampling Mode)
 bit 7 : Units Type (0b = Log 1b = Linear)
 236) External Reference Frequency⁴⁰⁶
 237) Signal Standard⁴⁰⁷ (Higher byte)
 238) Signal Standard (Lower byte)
 239) Channel Selection⁴⁰⁸ (Higher byte)
 240) Channel Selection (Lower byte)
 241) Trigger Type⁴⁰⁹
 242) Status Byte 7
 (LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF)
 bit 7: Not Used
 243) 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: RBW Coupling (1b = Auto, 0b = Manual)
 bit 5: VBW Coupling (1b = Auto, 0b = Manual)
 bit 6: Attenuation Coupling (1b = Auto, 0b = Manual)
 bit 7: View B On/Off
 244) Frequency Scale Factor⁴¹⁰ (Higher byte)
 245) Frequency Scale Factor (Lower byte)
 246) Frequency Range Minimum⁴¹¹ (Highest byte)
 247) Frequency Range Minimum
 248) Frequency Range Minimum
 249) Frequency Range Minimum (Lowest byte)
 250) Frequency Range Maximum⁴¹² (Highest byte)
 251) Frequency Range Maximum
 252) Frequency Range Maximum
 253) Frequency Range Maximum (Lowest byte)
 254) Marker Type⁴¹³
 255) Trace B Trace Id⁴¹⁴
 256) Status Byte 9
 (LSB) bit 0: Reserved
 bits 1-7: Not Used
 257-400) Not Used

For Power Meter Mode (Option 29 Only):

⁴⁰⁶ 1 byte in MHz (i.e. 20 = 20MHz)

⁴⁰⁷ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

⁴⁰⁸ “No Channel” is sent as FFFEh

⁴⁰⁹ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

⁴¹⁰ In number of Hz

⁴¹¹ Scaled by Frequency Scale Factor (bytes 244-245)

⁴¹² Scaled by Frequency Scale Factor (bytes 244-245)

⁴¹³ 00h = Regular Marker, 01h = Noise Marker

⁴¹⁴ FFh indicates no trace selected

- 21) Power Meter Start Freq⁴¹⁵ (Highest byte)
- 22) Power Meter Start Freq
- 23) Power Meter Start Freq
- 24) Power Meter Start Freq⁴¹⁶ (Lowest byte)
- 25) Power Meter Stop Freq (Highest byte)
- 26) Power Meter Stop Freq
- 27) Power Meter Stop Freq
- 28) Power Meter Stop Freq (Lowest byte)
- 29) Power Meter Center Freq⁴¹⁷ (Highest byte)
- 30) Power Meter Center Freq
- 31) Power Meter Center Freq
- 32) Power Meter Center Freq (Lowest byte)
- 33) Power Meter Span⁴¹⁸ (Highest byte)
- 34) Power Meter Span
- 35) Power Meter Span
- 36) Power Meter Span (Lowest byte)
- 37) Signal Standard⁴¹⁹ (Higher byte)
- 38) Signal Standard (Lower byte)
- 39) Channel Selection⁴²⁰ (Higher byte)
- 40) Channel Selection (Lower byte)
- 41) Power Meter Offset⁴²¹ (Highest byte)
- 42) Power Meter Offset
- 43) Power Meter Offset
- 44) Power Meter Offset (Lowest byte)
- 45) Power Meter Relative (Highest byte)⁴²²
- 46) Power Meter Relative
- 47) Power Meter Relative
- 48) Power Meter Relative (Lowest byte)
- 49) Not Used
- 50) Power Meter Unit (00h = Watts, 01h = dBm)
- 51) Power Meter Relative Status (00h = Off, 01h = On)
- 52) Power Meter Offset Status (00h = Off, 01h = On)
- 53) Power Meter RMS Averaging Level (00h = Off, 01h = Low, 02h = Medium, 03h = High)
- 54) Frequency Scale Factor⁴²³ (Higher byte)
- 55) Frequency Scale Factor (Lower byte)
- 56) Frequency Range Minimum⁴²⁴ (Highest byte)
- 57) Frequency Range Minimum
- 58) Frequency Range Minimum
- 59) Frequency Range Minimum (Lowest byte)
- 60) Frequency Range Maximum⁴²⁵ (Highest byte)
- 61) Frequency Range Maximum
- 62) Frequency Range Maximum
- 63) Frequency Range Maximum (Lowest byte)
- 64) Zero Status (00h = Off, 01h = On)

⁴¹⁵ Scaled by Frequency Scale Factor (bytes 54-55)

⁴¹⁶ Scaled by Frequency Scale Factor (bytes 54-55)

⁴¹⁷ Scaled by Frequency Scale Factor (bytes 54-55)

⁴¹⁸ Scaled by Frequency Scale Factor (bytes 54-55)

⁴¹⁹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

⁴²⁰ “No Channel” is sent as FFFEh

⁴²¹ Value sent as (value in dB * 1000)

⁴²² Value sent as ((value in dBm * 1000) + 100)

⁴²³ In number of Hz

⁴²⁴ Scaled by Frequency Scale Factor

⁴²⁵ Scaled by Frequency Scale Factor

- 65) Zero Value⁴²⁶ (Highest byte)
- 66) Zero Value
- 67) Zero Value
- 68) Zero Value (Lowest byte)
- 69-120) Not Used

Upload Setup – Control Byte #66 (42h)

Description: Receives parameters defining a setup and saves them in the memory location associated with the specified setup number. Since different modes have different numbers of setup locations available, the command requires the mode be specified as well as the setup number.

Setup numbers as follows:

- 0 = Run time setup
- 1 – 10 = Saved setups for Spectrum Analyzer/Transmission Measurement modes
- 1 – 5 = Saved setups for Power Meter mode (Option 29 Only)

Bytes to Follow: 2 bytes

For All Modes:

- 1) Number of Following Bytes (Higher byte)
- 2) Number of Following Bytes (Lower byte)
- 3) Measurement Mode⁴²⁷
- 4) Setup Number in which to store setup
- 5-20) Not Used

For Site Master VNA Modes:

- 21) Number of Data Points (Higher byte)
- 22) Number of Data Points (Lower byte)
- 23) VNA Start Frequency⁴²⁸ (Highest byte)
- 24) VNA Start Frequency
- 25) VNA Start Frequency
- 26) VNA Start Frequency (Lowest byte)
- 27) VNA Stop Frequency⁴²⁹ (Highest byte)
- 28) VNA Stop Frequency
- 29) VNA Stop Frequency
- 30) VNA Stop Frequency (Lowest byte)
- 31) Return Loss Scale Start (Higher byte)⁴³⁰
- 32) Return Loss Scale Start (Lower byte)
- 33) Return Loss Scale Stop (Higher byte)
- 34) Return Loss Scale Stop (Lower byte)
- 35) SWR Scale Start (Higher byte)⁴³¹
- 36) SWR Scale Start (Lower byte)
- 37) SWR Scale Stop (Higher byte)
- 38) SWR Scale Stop (Lower byte)
- 39) Cable Loss Scale Start (Higher byte)⁴³²
- 40) Cable Loss Scale Start (Lower byte)
- 41) Cable Loss Scale Stop (Higher byte)

⁴²⁶ Value sent as ((value in dBm * 1000) + 100)

⁴²⁷ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁴²⁸ Frequency is scaled by the frequency scale factor specified in bytes 465-466.

⁴²⁹ Frequency is scaled by the frequency scale factor specified in bytes 465-466.

⁴³⁰ See “Set Site Master VNA Scale” Control Byte #4 for data format.

⁴³¹ See “Set Site Master VNA Scale” Control Byte #4 for data format.

⁴³² See “Set Site Master VNA Scale” Control Byte #4 for data format.

- 42) Cable Loss Scale Stop (Lower byte)
- 43) DTF-RL Scale Start (Higher byte)⁴³³
- 44) DTF-RL Scale Start (Lower byte)
- 45) DTF-RL Scale Stop (Higher byte)
- 46) DTF-RL Scale Stop (Lower byte)
- 47) DTF-SWR Scale Start (Higher byte)⁴³⁴
- 48) DTF-SWR Scale Start (Lower byte)
- 49) DTF-SWR Scale Stop (Higher byte)
- 50) DTF-SWR Scale Stop (Lower byte)
- 51) VNA Frequency Marker 1 (Higher byte)⁴³⁵
- 52) VNA Frequency Marker 1 (Lower byte)
- 53) VNA Frequency Marker 2 (Higher byte)
- 54) VNA Frequency Marker 2 (Lower byte)
- 55) VNA Frequency Marker 3 (Higher byte)
- 56) VNA Frequency Marker 3 (Lower byte)
- 57) VNA Frequency Marker 4 (Higher byte)
- 58) VNA Frequency Marker 4 (Lower byte)
- 59) VNA Frequency Marker 5 (Higher byte)
- 60) VNA Frequency Marker 5 (Lower byte)
- 61) VNA Frequency Marker 6 (Higher byte)
- 62) VNA Frequency Marker 6 (Lower byte)
- 63) Return Loss Single Limit (Higher byte)⁴³⁶
- 64) Return Loss Single Limit (Lower byte)
- 65) SWR Single Limit (Higher byte)⁴³⁷
- 66) SWR Single Limit (Lower byte)
- 67) Cable Loss Single Limit (Higher byte)⁴³⁸
- 68) Cable Loss Single Limit (Lower byte)
- 69) DTF-RL Single Limit (Higher byte)⁴³⁹
- 70) DTF-RL Single Limit (Lower byte)
- 71) DTF-SWR Single Limit (Higher byte)⁴⁴⁰
- 72) DTF-SWR Single Limit (Lower byte)
- 73) Return Loss Multiple Limit Segment # (1)
- 74) Return Loss Multiple Limit Segment Status (00h = Off, 01h = On)
- 75) Return Loss Multiple Limit Segment Start X (Highest byte)⁴⁴¹
- 76) Return Loss Multiple Limit Segment Start X
- 77) Return Loss Multiple Limit Segment Start X
- 78) Return Loss Multiple Limit Segment Start X (Lowest byte)
- 79) Return Loss Multiple Limit Segment Start Y (Higher byte)
- 80) Return Loss Multiple Limit Segment Start Y (Lowest byte)
- 81) Return Loss Multiple Limit Segment End X (Highest byte)⁴⁴²
- 82) Return Loss Multiple Limit Segment End X
- 83) Return Loss Multiple Limit Segment End X
- 84) Return Loss Multiple Limit Segment End X (Lowest byte)

⁴³³ See “Set Site Master VNA Scale” Control Byte #4 for data format.

⁴³⁴ See “Set Site Master VNA Scale” Control Byte #4 for data format.

⁴³⁵ Marker Point = (# data points – 1) * (marker freq – start freq) / (stop freq – start freq)

Where # of data points can be found in bytes 2-3, start freq is in bytes 4-7, and stop freq is in bytes 8-11.

⁴³⁶ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁴³⁷ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁴³⁸ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁴³⁹ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁴⁴⁰ See Control Byte #6, “Set Site Master VNA Single Limit” for data format.

⁴⁴¹ See Control Byte #112, “Set Site Master VNA Segmented Limit Lines” for data format. Frequency is scaled by the frequency scale factor specified in bytes 465-466.

⁴⁴² Frequency is scaled by the frequency scale factor specified in bytes 465-466.

- 85) Return Loss Multiple Limit Segment End Y (Higher byte)
- 86) Return Loss Multiple Limit Segment End Y (Lowest byte)
- 87-142) Repeat bytes 63 – 76 for segments 2 – 5
- 143-212) Repeat bytes 63 – 132 for SWR Multiple Limit
- 213-282) Repeat bytes 63 – 132 for Cable Loss Multiple Limit
- 283-352) Repeat bytes 63 – 132 for DTF-RL Multiple Limit
- 353-422) Repeat bytes 63 – 132 for DTF-SWR Multiple Limit
- 423) Start Distance (Highest byte)⁴⁴³
- 424) Start Distance
- 425) Start Distance
- 426) Start Distance (Lowest byte)
- 427) Stop Distance (Highest byte)
- 428) Stop Distance
- 429) Stop Distance
- 430) Stop Distance (Lowest byte)
- 431) Distance Marker 1 (Higher byte)⁴⁴⁴
- 432) Distance Marker 1 (Lower byte)
- 433) Distance Marker 2 (Higher byte)
- 434) Distance Marker 2 (Lower byte)
- 435) Distance Marker 3 (Higher byte)
- 436) Distance Marker 3 (Lower byte)
- 437) Distance Marker 4 (Higher byte)
- 438) Distance Marker 4 (Lower byte)
- 439) Distance Marker 5 (Higher byte)
- 440) Distance Marker 5 (Lower byte)
- 441) Distance Marker 6 (Higher byte)
- 442) Distance Marker 6 (Lower byte)
- 443) Relative Propagation Velocity (Highest byte)⁴⁴⁵
- 444) Relative Propagation Velocity
- 445) Relative Propagation Velocity
- 446) Relative Propagation Velocity (Lowest byte)
- 447) Cable Loss (Highest byte)⁴⁴⁶
- 448) Cable Loss
- 449) Cable Loss
- 450) Cable Loss (Lowest byte)
- 451) Average Cable Loss⁴⁴⁷ (Highest byte)
- 452) Average Cable Loss
- 453) Average Cable Loss
- 454) Average Cable Loss (Lowest byte)
- 455) 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
- 456) Status Byte 2: (0b = Off, 1b = On)
 (LSB) bit 0 : Not Used

⁴⁴³ Distance data uses units 1/100,000m or 1/100,000 ft

⁴⁴⁴ Marker Point = (# data points – 1) * (marker dist – start dist) / (stop dist – start dist)

Where # of data points can be found in bytes 2-3, start dist is in bytes 106-109, and stop dist is in bytes 110-113.

⁴⁴⁵ Relative Propagation Velocity uses units 1/100,000.

⁴⁴⁶ Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

⁴⁴⁷ Average Cable Loss is dB * 1000.

- 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
- 457) 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
- bits 2-6 : Not Used
- bit 7 : Site Master Single Limit Status On/Off
- 458) Status Byte 4:
- (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
- 459) Status Byte 5: (0b = Off, 1b = On)
- (LSB) bit 0 : Fixed CW Mode On/Off
- bit 1 : Single Sweep On/Off
- bit 2 : Trace Overlay On/Off
- bit 3 : Measurement Unit Metric/English (0b = English, 1b = Metric)
- bits 4-6: Not Used
- bit 7 : Cal Mode (0b = OSL Cal, 1b = FlexCal)
- 460) VNA Signal Standard⁴⁴⁸ (Higher byte)
- 461) VNA Signal Standard (Lower byte)
- 462) Cable Index
- 463) Cable Folder⁴⁴⁹
- 464) Trace Overlay Index (1-200)
- 465) Frequency Scale Factor (Higher byte)⁴⁵⁰
- 466) Frequency Scale Factor (Lower byte)
- 467-550) Not Used

For Spectrum Analyzer Mode:

- 21) Spectrum Analyzer Start Frequency⁴⁵¹ (Highest byte)
- 22) Spectrum Analyzer Start Frequency
- 23) Spectrum Analyzer Start Frequency
- 24) Spectrum Analyzer Start Frequency (Lowest byte)
- 25) Spectrum Analyzer Stop Frequency⁴⁵² (Highest byte)
- 26) Spectrum Analyzer Stop Frequency
- 27) Spectrum Analyzer Stop Frequency
- 28) Spectrum Analyzer Stop Frequency (Lowest byte)
- 29) Spectrum Analyzer Center Frequency⁴⁵³ (Highest byte)
- 30) Spectrum Analyzer Center Frequency
- 31) Spectrum Analyzer Center Frequency
- 32) Spectrum Analyzer Center Frequency (Lowest byte)
- 33) Spectrum Analyzer Frequency Span⁴⁵⁴ (Highest byte)

⁴⁴⁸ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

⁴⁴⁹ 00h=Standard at 1000 MHz, 01h=Standard at 2000 MHz, 02h=Standard at 2500 MHz, 03h=Custom

⁴⁵⁰ Frequency Scale Factor is in number of Hz.

⁴⁵¹ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁵² Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁵³ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁵⁴ Scaled by Frequency Scale Factor (bytes 301-302)

- 34) Spectrum Analyzer Frequency Span
- 35) Spectrum Analyzer Frequency Span
- 36) Spectrum Analyzer Frequency Span (Lowest byte)
- 37) Ref Level (Highest byte)⁴⁵⁵
- 38) Ref Level
- 39) Ref Level
- 40) Ref Level (Lowest byte)
- 41) Scale per div (Highest byte)⁴⁵⁶
- 42) Scale per div
- 43) Scale per div
- 44) Scale per div (Lowest byte)
- 45) Spectrum Analyzer Frequency Marker 1 (Higher byte)⁴⁵⁷
- 46) Spectrum Analyzer Frequency Marker 1 (Lower byte)
- 47) Spectrum Analyzer Frequency Marker 2 (Higher byte)
- 48) Spectrum Analyzer Frequency Marker 2 (Lower byte)
- 49) Spectrum Analyzer Frequency Marker 3 (Higher byte)
- 50) Spectrum Analyzer Frequency Marker 3 (Lower byte)
- 51) Spectrum Analyzer Frequency Marker 4 (Higher byte)
- 52) Spectrum Analyzer Frequency Marker 4 (Lower byte)
- 53) Spectrum Analyzer Frequency Marker 5 (Higher byte)
- 54) Spectrum Analyzer Frequency Marker 5 (Lower byte)
- 55) Spectrum Analyzer Frequency Marker 6 (Higher byte)
- 56) Spectrum Analyzer Frequency Marker 6 (Lower byte)
- 57) Spectrum Analyzer Single Limit (Highest byte)⁴⁵⁸
- 58) Spectrum Analyzer Single Limit
- 59) Spectrum Analyzer Single Limit
- 60) Spectrum Analyzer Single Limit (Lowest byte)
- 61) SPA Multiple Upper Limit 1 Start X⁴⁵⁹ (Highest byte)
- 62) SPA Multiple Upper Limit 1 Start X
- 63) SPA Multiple Upper Limit 1 Start X
- 64) SPA Multiple Upper Limit 1 Start X (Lowest byte)
- 65) SPA Multiple Upper Limit 1 Start Y (Power Level) (Highest byte)⁴⁶⁰
- 66) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 67) SPA Multiple Upper Limit 1 Start Y (Power Level)
- 68) SPA Multiple Upper Limit 1 Start Y (Power Level) (Lowest byte)
- 69) SPA Multiple Upper Limit 1 End X⁴⁶¹ (Highest byte)
- 70) SPA Multiple Upper Limit 1 End X
- 71) SPA Multiple Upper Limit 1 End X
- 72) SPA Multiple Upper Limit 1 End X (Lowest byte)
- 73) SPA Multiple Upper Limit 1 End Y (Power Level) (Highest byte)⁴⁶²
- 74) SPA Multiple Upper Limit 1 End Y (Power Level)
- 75) SPA Multiple Upper Limit 1 End Y (Power Level)
- 76) SPA Multiple Upper Limit 1 End Y (Power Level) (Lowest byte)
- 77-220) SPA Multiple Upper Limits 2-5, SA Multiple Lower Limits 1-5 (see bytes 61-76 for format)
- 221) RBW Setting (Highest byte)⁴⁶³

⁴⁵⁵ Value sent as (value in dBm * 1000) + 270,000)

⁴⁵⁶ Value sent as (value * 1000)

⁴⁵⁷ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁴⁵⁸ Value sent as (value in dBm * 1000) + 270000

⁴⁵⁹ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁶⁰ Value sent as (value in dBm * 1000) + 270000

⁴⁶¹ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁶² Value sent as (value in dBm * 1000) + 270000

⁴⁶³ RBW frequency sent in Hz.

- 222) RBW Setting
- 223) RBW Setting
- 224) RBW Setting (Lowest byte)
- 225) VBW Setting (Highest byte)⁴⁶⁴
- 226) VBW Setting
- 227) VBW Setting
- 228) VBW Setting (Lowest byte)
- 229) OCC BW Method⁴⁶⁵
- 230) OCC BW % Value⁴⁶⁶
- 231) OCC BW dBc⁴⁶⁷
- 232) Attenuation
- 233) Antenna Index (0-14)
- 234-249) Antenna Name (16 bytes in ASCII)
- 250) 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
- 251) Status Byte 2: (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
 - bit 4 : Pre Amp Mode (0b = Manual, 1b = Auto)
 - bit 5 : Pre Amp Status On/Off
 - bit 6 : Dynamic Attenuation On/Off
 - bit 7 : Normalization On/Off
- 252) 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
 - bit 4 : SPA Multiple Limit Upper Segment 1 Status On/Off
 - bit 5 : SPA Multiple Limit Upper Segment 1 Beep Level ABOVE/BELOW⁴⁶⁸
 - bit 6 : SPA Multiple Limit Upper Segment 2 Status On/Off
 - bit 7 : SPA Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 253) 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

⁴⁶⁴ VBW frequency sent in Hz.

⁴⁶⁵ 00h = % of power, 01h = dB down

⁴⁶⁶ 0 – 99%

⁴⁶⁷ 0 – 120 dBc

⁴⁶⁸ Beep level is always 1b for upper segmented limit line

- bit 7 : SPA Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW ⁴⁶⁹
- 254) 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
- 255) 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 : Amplitude Units (Linear) – 00b = Watts 01b = Volts
bits 3-4 : Amplitude Units (Log) - 00b = dBm 01b = dBV 10b = dBmV 11b = dBuV
bits 5-6 : Detection Alg (00b = pos. peak 01b = RMS Averaging 10b = neg. peak 11b = Sampling Mode)
bit 7 : Units Type (0b = Log 1b = Linear)
- 256) Status Byte 7: (0b = Off, 1b = On)
- (LSB) bit 0: Interference Analysis On/Off
bit 1: C/I Measurement 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: Occupied BW Measurement On/Off
- 257) Reference Level Offset⁴⁷⁰ (Highest byte)
- 258) Reference Level Offset
- 259) Reference Level Offset
- 260) Reference Level Offset (Lowest byte)
- 261) External Reference Frequency ⁴⁷¹
- 262) Signal Standard⁴⁷² (Higher byte)
- 263) Signal Standard (Lower byte)
- 264) Channel Selection⁴⁷³ (Higher byte)
- 265) Channel Selection (Lower byte)
- 266) Trigger Type⁴⁷⁴
- 267) Interference Analysis Frequency⁴⁷⁵ (Highest byte)
- 268) Interference Analysis Frequency
- 269) Interference Analysis Frequency
- 270) Interference Analysis Frequency (Lowest byte)
- 271) Trigger Position (0 – 100%)
- 272) Min Sweep Time (in μ s) (Highest byte)
- 273) Min Sweep Time (in μ s)
- 274) Min Sweep Time (in μ s)
- 275) Min Sweep Time (in μ s) (Lowest byte)
- 276) Video Trigger Level⁴⁷⁶ (Highest byte)

⁴⁶⁹ Beep level is always 0b for lower segmented limit line

⁴⁷⁰ Value sent as (value in dBm * 1000) + 270,000

⁴⁷¹ 1 byte in MHz (i.e. 20 = 20MHz)

⁴⁷² Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

⁴⁷³ “No Channel” is sent as FFFEh

⁴⁷⁴ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

⁴⁷⁵ Scaled by Frequency Scale Factor (bytes 301-302)

277)	Video Trigger Level
278)	Video Trigger Level
279)	Video Trigger Level (Lowest byte)
280)	Status Byte 8 (LSB) bit 0: Reserved bits 1-7: Not Used
281)	Status Byte 9 (LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF) bit 7: Not Used
282)	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 bit 4: View B On/Off bit 5: External Reference Frequency On/Off bits 6-7: Not Used
283)	Impedance (00h = 50Ω, 10h = 75Ω Anritsu Adapter, 12h = 75Ω Other Adapter)
284)	Impedance Loss ⁴⁷⁷ (Higher byte)
285)	Impedance Loss (Lower byte)
286)	AM/FM Demod Type ⁴⁷⁸
287)	AM/FM Demod Status (01h = On, 00h = Off)
288)	AM/FM Demod Volume (0 to 100)
289)	AM/FM Demod Frequency ⁴⁷⁹ (Highest byte)
290)	AM/FM Demod Frequency
291)	AM/FM Demod Frequency
292)	AM/FM Demod Frequency (Lowest byte)
293)	AM/FM Demod Time (in ms) (Highest byte)
294)	AM/FM Demod Time (in ms)
295)	AM/FM Demod Time (in ms)
296)	AM/FM Demod Time (in ms) (Lowest byte)
297)	SSB BFO Offset ⁴⁸⁰ (Highest byte)
298)	SSB BFO Offset
299)	SSB BFO Offset
300)	SSB BFO Offset (Lowest byte)
301)	Frequency Scale Factor ⁴⁸¹ (Higher byte)
302)	Frequency Scale Factor (Lower byte)
303)	Frequency Range Minimum ⁴⁸² (Highest byte)
304)	Frequency Range Minimum
305)	Frequency Range Minimum
306)	Frequency Range Minimum (Lowest byte)
307)	Frequency Range Maximum ⁴⁸³ (Highest byte)
308)	Frequency Range Maximum
309)	Frequency Range Maximum
310)	Frequency Range Maximum (Lowest byte)
311)	Marker Type ⁴⁸⁴

⁴⁷⁶ Value sent as (value in dBm * 1000) + 270,000

⁴⁷⁷ Value sent as (value in dB * 1000), valid values are 0 to 20 dB

⁴⁷⁸ AM/FM Demod Type: 00h = FM-Wide Band, 01h = FM-Narrow Band, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

⁴⁷⁹ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸⁰ Value sent as ((value in Hz) – 10,000)

⁴⁸¹ In number of Hz

⁴⁸² Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸³ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸⁴ 00h = Regular Marker, 01h = Noise Marker

- 312) Channel Power Int BW⁴⁸⁵ (Highest byte)
- 313) Channel Power Int BW
- 314) Channel Power Int BW
- 315) Channel Power Int BW (Lowest byte)
- 316) ACPR Main Channel BW⁴⁸⁶ (Highest byte)
- 317) ACPR Main Channel BW
- 318) ACPR Main Channel BW
- 319) ACPR Main Channel BW (Lowest byte)
- 320) ACPR Adjacent Channel BW⁴⁸⁷ (Highest byte)
- 321) ACPR Adjacent Channel BW
- 322) ACPR Adjacent Channel BW
- 323) ACPR Adjacent Channel BW (Lowest byte)
- 324) ACPR Channel Spacing⁴⁸⁸ (Highest byte)
- 325) ACPR Channel Spacing
- 326) ACPR Channel Spacing
- 327) ACPR Channel Spacing (Lowest byte)
- 328) Interference Analysis Cell Std⁴⁸⁹
- 329) Interference Analysis Est. BW⁴⁹⁰ (Highest byte)
- 330) Interference Analysis Est. BW
- 331) Interference Analysis Est. BW
- 332) Interference Analysis Est. BW (Lowest byte)
- 333) Trace B Trace Id⁴⁹¹
- 334-500) Not Used

For Transmission Mode (Option 21 Only):

- 21) Start Frequency⁴⁹² (Highest byte)
- 22) Start Frequency
- 23) Start Frequency
- 24) Start Frequency (Lowest byte)
- 25) Stop Frequency⁴⁹³ (Highest byte)
- 26) Stop Frequency
- 27) Stop Frequency
- 28) Stop Frequency (Lowest byte)
- 29) Center Frequency⁴⁹⁴ (Highest byte)
- 30) Center Frequency
- 31) Center Frequency
- 32) Center Frequency (Lowest byte)
- 33) Frequency Span⁴⁹⁵ (Highest byte)
- 34) Frequency Span
- 35) Frequency Span
- 36) Frequency Span (Lowest byte)
- 37) Ref Level (Highest byte)⁴⁹⁶

⁴⁸⁵ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸⁶ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸⁷ Scaled by Frequency Scale Factor (bytes 301-302)

⁴⁸⁸ Scaled by Frequency Scale Factor (bytes 301-302)

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

⁴⁹⁰ Frequency in Hz

⁴⁹¹ FFh indicates to trace selected

⁴⁹² Scaled by Frequency Scale Factor (bytes 244-245)

⁴⁹³ Scaled by Frequency Scale Factor (bytes 244-245)

⁴⁹⁴ Scaled by Frequency Scale Factor (bytes 244-245)

⁴⁹⁵ Scaled by Frequency Scale Factor (bytes 244-245)

⁴⁹⁶ Value sent as (value in dBm * 1000) + 270,000)

- 38) Ref Level
- 39) Ref Level
- 40) Ref Level (Lowest byte)
- 41) Scale per div (Highest byte)⁴⁹⁷
- 42) Scale per div
- 43) Scale per div
- 44) Scale per div (Lowest byte)
- 45) Frequency Marker 1 (Higher byte)⁴⁹⁸
- 46) Frequency Marker 1 (Lower byte)
- 47) Frequency Marker 2 (Higher byte)
- 48) Frequency Marker 2 (Lower byte)
- 49) Frequency Marker 3 (Higher byte)
- 50) Frequency Marker 3 (Lower byte)
- 51) Frequency Marker 4 (Higher byte)
- 52) Frequency Marker 4 (Lower byte)
- 53) Frequency Marker 5 (Higher byte)
- 54) Frequency Marker 5 (Lower byte)
- 55) Frequency Marker 6 (Higher byte)
- 56) Frequency Marker 6 (Lower byte)
- 57) Single Limit (Highest byte)⁴⁹⁹
- 58) Single Limit
- 59) Single Limit
- 60) Single Limit (Lowest byte)
- 61) Multiple Upper Limit 1 Start X⁵⁰⁰ (Highest byte)
- 62) Multiple Upper Limit 1 Start X
- 63) Multiple Upper Limit 1 Start X
- 64) Multiple Upper Limit 1 Start X (Lowest byte)
- 65) Multiple Upper Limit 1 Start Y (Power Level) (Highest byte)⁵⁰¹
- 66) Multiple Upper Limit 1 Start Y (Power Level)
- 67) Multiple Upper Limit 1 Start Y (Power Level)
- 68) Multiple Upper Limit 1 Start Y (Power Level) (Lowest byte)
- 69) Multiple Upper Limit 1 End X⁵⁰² (Highest byte)
- 70) Multiple Upper Limit 1 End X
- 71) Multiple Upper Limit 1 End X
- 72) Multiple Upper Limit 1 End X (Lowest byte)
- 73) Multiple Upper Limit 1 End Y (Power Level) (Highest byte)⁵⁰³
- 74) Multiple Upper Limit 1 End Y (Power Level)
- 75) Multiple Upper Limit 1 End Y (Power Level)
- 76) Multiple Upper Limit 1 End Y (Power Level) (Lowest byte)
- 77-220) Multiple Upper Limits 2-5, SA Multiple Lower Limits 1-5 (see bytes 67-82 for format)
- 221) RBW Setting (Highest byte)⁵⁰⁴
- 222) RBW Setting
- 223) RBW Setting
- 224) RBW Setting (Lowest byte)
- 225) VBW Setting (Highest byte)⁵⁰⁵

⁴⁹⁷ Value sent as (value * 1000)

⁴⁹⁸ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁴⁹⁹ Value sent as (value in dBm * 1000) + 270000

⁵⁰⁰ Scaled by Frequency Scale Factor (bytes 244-245)

⁵⁰¹ Value sent as (value in dBm * 1000) + 270000

⁵⁰² Scaled by Frequency Scale Factor (bytes 244-245)

⁵⁰³ Value sent as (value in dBm * 1000) + 270000

⁵⁰⁴ RBW frequency sent in Hz.

⁵⁰⁵ VBW frequency sent in Hz.

- 226) VBW Setting
 227) VBW Setting
 228) VBW Setting (Lowest byte)
 229) Attenuation
 230) 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
 231) Status Byte 2: (0b = Off, 1b = On)
 (LSB) bit 0 : S21 Spa Cal Status (0 – Cal OFF, 1 – Cal ON)
 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 : Not Used
 232) Status Byte 3: (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 Beep On/Off
 bit 2 : Single Limit Status 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/BELOW⁵⁰⁶
 bit 6 : Multiple Limit Upper Segment 2 Status On/Off
 bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
 233) Status Byte 4: (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/BELOW⁵⁰⁷
 234) Status Byte 5: (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
 235) Status Byte 6: (0b = Off, 1b = On)
 (LSB) bit 0 : External Reference Frequency On/Off

⁵⁰⁶ Beep level is always 1b for upper segmented limit line

⁵⁰⁷ Beep level is always 0b for lower segmented limit line

- bit 1 : Bias Tee On/Off (Option 10)
- bit 2 : Amplitude Units (Linear) – 00b = Watts 01b = Volts
- bits 3-4 : Amplitude Units (Log) - 00b = dBm 01b = dBV 10b = dBmV 11b = dBuV
- bits 5-6 : Detection Alg (00b = pos. peak 01b = RMS Averaging 10b = neg. peak 11b = Sampling Mode)
- bit 7 : Units Type (0b = Log 1b = Linear)
- 236) External Reference Frequency⁵⁰⁸
- 237) Signal Standard⁵⁰⁹ (Higher byte)
- 238) Signal Standard (Lower byte)
- 239) Channel Selection⁵¹⁰ (Higher byte)
- 240) Channel Selection (Lower byte)
- 241) Trigger Type⁵¹¹
- 242) Status Byte 7
 - (LSB) bits 0-6: Number of sweeps to average (1-25, 1 implies averaging OFF)
 - bit 7: Not Used
- 243) 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: RBW Coupling (1b = Auto, 0b = Manual)
 - bit 5: VBW Coupling (1b = Auto, 0b = Manual)
 - bit 6: Attenuation Coupling (1b = Auto, 0b = Manual)
 - bit 7: View B On/Off
- 244) Frequency Scale Factor⁵¹² (Higher byte)
- 245) Frequency Scale Factor (Lower byte)
- 246) Frequency Range Minimum⁵¹³ (Highest byte)
- 247) Frequency Range Minimum
- 248) Frequency Range Minimum
- 249) Frequency Range Minimum (Lowest byte)
- 250) Frequency Range Maximum⁵¹⁴ (Highest byte)
- 251) Frequency Range Maximum
- 252) Frequency Range Maximum
- 253) Frequency Range Maximum (Lowest byte)
- 254) Marker Type⁵¹⁵
- 255) Trace B Trace Id⁵¹⁶
- 256) Status Byte 9
 - (LSB) bit 0: Reserved
 - bits 1-7: Not Used
- 257-400) Not Used

For Power Meter Mode (Option 29 Only):

- 21) Power Meter Start Freq⁵¹⁷ (Highest byte)
- 22) Power Meter Start Freq
- 23) Power Meter Start Freq
- 24) Power Meter Start Freq⁵¹⁸ (Lowest byte)

⁵⁰⁸ 1 byte in MHz (i.e. 20 = 20MHz)

⁵⁰⁹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). “No Standard” sent as FFFEh

⁵¹⁰ “No Channel” is sent as FFFEh

⁵¹¹ Trigger Type – 00h = Single, 01h = Free Run, 02h = Video, 03h = External

⁵¹² In number of Hz

⁵¹³ Scaled by Frequency Scale Factor (bytes 244-245)

⁵¹⁴ Scaled by Frequency Scale Factor (bytes 244-245)

⁵¹⁵ 00h = Regular Marker, 01h = Noise Marker

⁵¹⁶ FFh indicates no trace selected

⁵¹⁷ Scaled by Frequency Scale Factor (bytes 54-55)

- 25) Power Meter Stop Freq (Highest byte)
- 26) Power Meter Stop Freq
- 27) Power Meter Stop Freq
- 28) Power Meter Stop Freq (Lowest byte)
- 29) Power Meter Center Freq⁵¹⁹ (Highest byte)
- 30) Power Meter Center Freq
- 31) Power Meter Center Freq
- 32) Power Meter Center Freq (Lowest byte)
- 33) Power Meter Span⁵²⁰ (Highest byte)
- 34) Power Meter Span
- 35) Power Meter Span
- 36) Power Meter Span (Lowest byte)
- 37) Signal Standard⁵²¹ (Higher byte)
- 38) Signal Standard (Lower byte)
- 39) Channel Selection⁵²² (Higher byte)
- 40) Channel Selection (Lower byte)
- 41) Power Meter Offset⁵²³ (Highest byte)
- 42) Power Meter Offset
- 43) Power Meter Offset
- 44) Power Meter Offset (Lowest byte)
- 45) Power Meter Relative (Highest byte)⁵²⁴
- 46) Power Meter Relative
- 47) Power Meter Relative
- 48) Power Meter Relative (Lowest byte)
- 49) Not Used
- 50) Power Meter Unit (00h = Watts, 01h = dBm)
- 51) Power Meter Relative Status (00h = Off, 01h = On)
- 52) Power Meter Offset Status (00h = Off, 01h = On)
- 53) Power Meter RMS Averaging Level (00h = Off, 01h = Low, 02h = Medium, 03h = High)
- 54) Frequency Scale Factor⁵²⁵ (Higher byte)
- 55) Frequency Scale Factor (Lower byte)
- 56) Frequency Range Minimum⁵²⁶ (Highest byte)
- 57) Frequency Range Minimum
- 58) Frequency Range Minimum
- 59) Frequency Range Minimum (Lowest byte)
- 60) Frequency Range Maximum⁵²⁷ (Highest byte)
- 61) Frequency Range Maximum
- 62) Frequency Range Maximum
- 63) Frequency Range Maximum (Lowest byte)
- 64) Zero Status (00h = Off, 01h = On)
- 65) Zero Value⁵²⁸ (Highest byte)
- 66) Zero Value
- 67) Zero Value
- 68) Zero Value (Lowest byte)

⁵¹⁸ Scaled by Frequency Scale Factor (bytes 54-55)

⁵¹⁹ Scaled by Frequency Scale Factor (bytes 54-55)

⁵²⁰ Scaled by Frequency Scale Factor (bytes 54-55)

⁵²¹ Index into Standard List (use control byte #89 to retrieve the ASCII string name). "No Standard" sent as FFFEh

⁵²² "No Channel" is sent as FFFEh

⁵²³ Value sent as (value in dB * 1000)

⁵²⁴ Value sent as ((value in dBm * 1000) + 100)

⁵²⁵ In number of Hz

⁵²⁶ Scaled by Frequency Scale Factor

⁵²⁷ Scaled by Frequency Scale Factor

⁵²⁸ Value sent as ((value in dBm * 1000) + 100)

69-120) Not Used

Site Master Returns: 1 byte

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

Read Parameter Limits – Control Byte #67 (43h)

Description: Returns limits (minimum and maximum values) associated with each parameter defined for the specified measurement mode.

“Frequency Parameters (for SPA, TM and PM)” are start, stop, and center frequencies, multiple limit “x” parameters and AM/FM demod frequency parameters.

“Frequency Parameters (for VNA modes)” are start and stop frequencies and multiple limit “x” parameters.

“Distance Parameters” are start and stop distances, multiple limit “x” parameters and cable loss.

Bytes to Follow: 2 bytes

- 1) Measurement Mode⁵²⁹
- 2) Limits to Read (00h = Frequency Parameter Limits (Spectrum Analyzer, Transmission Mode, Power Meter), 01h = Available RBWs, 02h = Available VBWs, 03h = Distance Parameter Limits (Metric Units, VNA DTF Modes) 04h = Distance Parameter Limits (English Units, VNA DTF Modes), FFh = All Other Parameter Limits)

Site Master Returns:

For All Modes:

- 1) Number of Following Bytes (Higher byte)
- 2) Number of Following Bytes (Lower byte)
- 3) Measurement Mode⁵³⁰
- 5-20) Not Used

For Spectrum Analyzer, Transmission (Option 21) and Power Meter (Option 29) Modes, Frequency Parameter Limits:

- 21) Number of Valid Frequency Ranges

For each range:

- 1) Range Scale Factor⁵³¹ (Higher byte)
- 2) Range Scale Factor (Lower byte)
- 3) Range Start Frequency⁵³² (Highest byte)
- 4) Range Start Frequency
- 5) Range Start Frequency
- 6) Range Start Frequency (Lowest byte)
- 7) Range Stop Frequency⁵³³ (Highest byte)
- 8) Range Stop Frequency
- 9) Range Stop Frequency
- 10) Range Stop Frequency (Lowest byte)

For Spectrum Analyzer, Transmission (Option 21) Modes, Available RBWS:

⁵²⁹ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁵³⁰ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁵³¹ Scale Factor in number of Hz

⁵³² Scaled by Span Scale Factor

⁵³³ Scaled by Span Scale Factor

21) Number of Valid RBWs

For each RBW:

- 1) RBW Frequency (in Hz) (Highest byte)
- 2) RBW Frequency (in Hz)
- 3) RBW Frequency (in Hz)
- 4) RBW Frequency (in Hz) (Lowest byte)

For Spectrum Analyzer, Transmission (Option 21) Modes, Available VBWS:

21) Number of Valid VBWs

For each VBW:

- 1) VBW Frequency (in Hz) (Highest byte)
- 2) VBW Frequency (in Hz)
- 3) VBW Frequency (in Hz)
- 4) VBW Frequency (in Hz) (Lowest byte)

For VNA Modes, Distance Parameter Limits, in Metric Units:

- 21) Distance Minimum⁵³⁴ (Highest byte)
- 22) Distance Minimum
- 23) Distance Minimum
- 24) Distance Minimum (Lowest byte)
- 25) Distance Maximum⁵³⁵ (Highest byte)
- 26) Distance Maximum
- 27) Distance Maximum
- 28) Distance Maximum (Lowest byte)
- 29) Cable Loss Minimum⁵³⁶ (Highest byte)
- 30) Cable Loss Minimum
- 31) Cable Loss Minimum
- 32) Cable Loss Minimum (Lowest byte)
- 33) Cable Loss Maximum⁵³⁷ (Highest byte)
- 34) Cable Loss Maximum
- 35) Cable Loss Maximum
- 36) Cable Loss Maximum (Lowest byte)

For VNA Modes, Distance Parameter Limits, in English Units:

- 21) Distance Minimum⁵³⁸ (Highest byte)
- 22) Distance Minimum
- 23) Distance Minimum
- 24) Distance Minimum (Lowest byte)
- 25) Distance Maximum⁵³⁹ (Highest byte)
- 26) Distance Maximum
- 27) Distance Maximum
- 28) Distance Maximum (Lowest byte)
- 29) Cable Loss Minimum⁵⁴⁰ (Highest byte)
- 30) Cable Loss Minimum
- 31) Cable Loss Minimum
- 32) Cable Loss Minimum (Lowest byte)

⁵³⁴ Distance sent as (distance in meters * 100,000)

⁵³⁵ Distance sent as (distance in meters * 100,000)

⁵³⁶ Cable loss sent as (loss in dB/m * 100,000)

⁵³⁷ Cable loss sent as (loss in dB/m * 100,000)

⁵³⁸ Distance sent as (distance in feet * 100,000)

⁵³⁹ Distance sent as (distance in feet * 100,000)

⁵⁴⁰ Cable loss sent as (loss in dB/ft * 100,000)

- 33) Cable Loss Maximum⁵⁴¹ (Highest byte)
- 34) Cable Loss Maximum
- 35) Cable Loss Maximum
- 36) Cable Loss Maximum (Lowest byte)

For VNA Modes, All Other Parameter Limits:

- 21) Frequency Minimum⁵⁴² (Highest byte)
- 22) Frequency Minimum
- 23) Frequency Minimum
- 24) Frequency Minimum (Lowest byte)
- 25) Frequency Maximum⁵⁴³ (Highest byte)
- 26) Frequency Maximum
- 27) Frequency Maximum
- 28) Frequency Maximum (Lowest byte)
- 29) Return Loss Scale/Limit Y Minimum⁵⁴⁴ (Highest byte)
- 30) Return Loss Scale/Limit Y Minimum
- 31) Return Loss Scale/Limit Y Minimum
- 32) Return Loss Scale/Limit Y Minimum (Lowest byte)
- 33) Return Loss Scale/Limit Y Maximum⁵⁴⁵ (Highest byte)
- 34) Return Loss Scale/Limit Y Maximum
- 35) Return Loss Scale/Limit Y Maximum
- 36) Return Loss Scale/Limit Y Maximum (Lowest byte)
- 37) Cable Loss Scale/Limit Y Minimum⁵⁴⁶ (Highest byte)
- 38) Cable Loss Scale/Limit Y Minimum
- 39) Cable Loss Scale/Limit Y Minimum
- 40) Cable Loss Scale/Limit Y Minimum (Lowest byte)
- 41) Cable Loss Scale/Limit Y Maximum⁵⁴⁷ (Highest byte)
- 42) Cable Loss Scale/Limit Y Maximum
- 43) Cable Loss Scale/Limit Y Maximum
- 44) Cable Loss Scale/Limit Y Maximum (Lowest byte)
- 45) SWR Scale/Limit Y Minimum⁵⁴⁸ (Highest byte)
- 46) SWR Scale/Limit Y Minimum
- 47) SWR Scale/Limit Y Minimum
- 48) SWR Scale/Limit Y Minimum (Lowest byte)
- 49) SWR Scale/Limit Y Maximum⁵⁴⁹ (Highest byte)
- 50) SWR Scale/Limit Y Maximum
- 51) SWR Scale/Limit Y Maximum
- 52) SWR Scale/Limit Y Maximum (Lowest byte)
- 53) Marker Minimum⁵⁵⁰ (Higher byte)
- 54) Marker Minimum (Lower byte)
- 55) Marker Maximum⁵⁵¹ (Higher byte)
- 56) Marker Minimum (Lower byte)

⁵⁴¹ Cable loss sent as (loss in dB/ft * 100,000)

⁵⁴² Frequency is scaled by the frequency scale factor specified in bytes 69-70.

⁵⁴³ Frequency is scaled by the frequency scale factor specified in bytes 69-70.

⁵⁴⁴ Scale sent in (dB * 1000)

⁵⁴⁵ Scale sent in (dB * 1000)

⁵⁴⁶ Scale sent in (dB * 1000)

⁵⁴⁷ Scale sent in (dB * 1000)

⁵⁴⁸ Scale sent in (ratio * 1000)

⁵⁴⁹ Scale sent in (ratio * 1000)

⁵⁵⁰ Value sent as data point on the display. Equivalent frequency (or distance) = (# data points – 1) * (marker X – start X) / (stop X – start X)

⁵⁵¹ Value sent as data point on the display. Equivalent frequency (or distance) = (# data points – 1) * (marker X – start X) / (stop X – start X)

- 57) Propagation Velocity Minimum (Highest byte)
- 58) Propagation Velocity Minimum
- 59) Propagation Velocity Minimum
- 60) Propagation Velocity Minimum (Lowest byte)
- 61) Propagation Velocity Maximum⁵⁵² (Highest byte)
- 62) Propagation Velocity Maximum
- 63) Propagation Velocity Maximum
- 64) Propagation Velocity Maximum (Lowest byte)
- 65) Cable Folder Minimum
- 66) Cable Folder Maximum
- 67) Trace Overlay Index Minimum
- 68) Trace Overlay Index Maximum
- 69) Frequency Scale Factor⁵⁵³ (Higher byte)
- 70) Frequency Scale Factor (Lower byte)
- 71-200) Not Used

For Spectrum Analyzer Mode, All Other Parameter Limits:

- 21) Frequency Scale Factor Minimum⁵⁵⁴ (Higher byte)
- 22) Frequency Scale Factor Minimum (Lower byte)
- 23) Frequency Scale Factor Maximum⁵⁵⁵ (Higher byte)
- 24) Frequency Scale Factor Maximum (Lower byte)
- 25) Span Minimum⁵⁵⁶ (Highest byte)
- 26) Span Minimum
- 27) Span Minimum
- 28) Span Minimum (Lowest byte)
- 29) Span Maximum⁵⁵⁷ (Highest byte)
- 30) Span Maximum
- 31) Span Maximum
- 32) Span Maximum (Lowest byte)
- 33) Reference Level Minimum⁵⁵⁸ (Highest byte)
- 34) Reference Level Minimum
- 35) Reference Level Minimum
- 36) Reference Level Minimum (Lowest byte)
- 37) Reference Level Maximum⁵⁵⁹ (Highest byte)
- 38) Reference Level Maximum
- 39) Reference Level Maximum
- 40) Reference Level Maximum (Lowest byte)
- 41) Scale Minimum⁵⁶⁰ (Highest byte)
- 42) Scale Minimum
- 43) Scale Minimum
- 44) Scale Minimum (Lowest byte)
- 45) Scale Maximum⁵⁶¹ (Highest byte)
- 46) Scale Maximum
- 47) Scale Maximum
- 48) Scale Maximum (Lowest byte)

⁵⁵² Propagation velocity sent as (velocity * 100,000)

⁵⁵³ Frequency Scale Factor is in number of Hz.

⁵⁵⁴ Scale Factor in number of Hz

⁵⁵⁵ Scale Factor in number of Hz

⁵⁵⁶ Scaled by Span Scale Factor

⁵⁵⁷ Scaled by Span Scale Factor

⁵⁵⁸ Value sent as (value * 1000) + 270,000

⁵⁵⁹ Value sent as (value * 1000) + 270,000

⁵⁶⁰ Value sent as (value * 1000)

⁵⁶¹ Value sent as (value * 1000)

- 49) Marker Minimum⁵⁶² (Higher byte)
- 50) Marker Minimum (Lower byte)
- 51) Marker Maximum⁵⁶³ (Higher byte)
- 52) Marker Maximum (Lower byte)
- 53) Limit Y Minimum⁵⁶⁴ (Highest byte)
- 54) Limit Y Minimum
- 55) Limit Y Minimum
- 56) Limit Y Minimum (Lowest byte)
- 57) Limit Y Maximum⁵⁶⁵ (Highest byte)
- 58) Limit Y Maximum
- 59) Limit Y Maximum
- 60) Limit Y Maximum (Lowest byte)
- 61) OBW Method Minimum
- 62) OBW Method Maximum
- 63) OBW % of Power Minimum
- 64) OBW % of Power Maximum
- 65) OBW dBc Minimum
- 66) OBW dBc Maximum
- 67) Attenuation Minimum
- 68) Attenuation Maximum
- 69) Amplitude Units Minimum
- 70) Amplitude Units Maximum
- 71) Detection Algorithm Minimum
- 72) Detection Algorithm Maximum
- 73) RL Offset Minimum⁵⁶⁶ (Highest byte)
- 74) RL Offset Minimum
- 75) RL Offset Minimum
- 76) RL Offset Minimum (Lowest byte)
- 77) RL Offset Maximum⁵⁶⁷ (Highest byte)
- 78) RL Offset Maximum
- 79) RL Offset Maximum
- 80) RL Offset Maximum (Lowest byte)
- 81) External Reference Frequency Minimum⁵⁶⁸ (Highest byte)
- 82) External Reference Frequency Minimum
- 83) External Reference Frequency Minimum
- 84) External Reference Frequency Minimum (Lowest byte)
- 85) External Reference Frequency Maximum⁵⁶⁹ (Highest byte)
- 86) External Reference Frequency Maximum
- 87) External Reference Frequency Maximum
- 88) External Reference Frequency Maximum (Lowest byte)
- 89) Trigger Type Minimum
- 90) Trigger Type Maximum
- 91) Minimum Sweep Type (in μ s) Minimum (Highest byte)
- 92) Minimum Sweep Type (in μ s) Minimum
- 93) Minimum Sweep Type (in μ s) Minimum

⁵⁶² Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁵⁶³ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁵⁶⁴ Value sent as (value * 1000) + 270,000

⁵⁶⁵ Value sent as (value * 1000) + 270,000

⁵⁶⁶ Value sent as (value * 1000) + 270,000

⁵⁶⁷ Value sent as (value * 1000) + 270,000

⁵⁶⁸ Reference frequency in Hz

⁵⁶⁹ Reference frequency in Hz

- 94) Minimum Sweep Type (in μ s) Minimum (Lowest byte)
- 95) Minimum Sweep Type (in μ s) Maximum (Highest byte)
- 96) Minimum Sweep Type (in μ s) Maximum
- 97) Minimum Sweep Type (in μ s) Maximum
- 98) Minimum Sweep Type (in μ s) Maximum (Lowest byte)
- 99) Video Trigger Level Minimum⁵⁷⁰ (Highest byte)
- 100) Video Trigger Level Minimum
- 101) Video Trigger Level Minimum
- 102) Video Trigger Level Minimum (Lowest byte)
- 103) Video Trigger Level Maximum⁵⁷¹ (Highest byte)
- 104) Video Trigger Level Maximum
- 105) Video Trigger Level Maximum
- 106) Video Trigger Level Maximum (Lowest byte)
- 107) Sweep Average Minimum
- 108) Sweep Average Maximum
- 109) Trace Math Minimum
- 110) Trace Math Maximum
- 111) Impedance Loss Minimum⁵⁷² (Highest byte)
- 112) Impedance Loss Minimum
- 113) Impedance Loss Minimum
- 114) Impedance Loss Minimum (Lowest byte)
- 115) Impedance Loss Maximum⁵⁷³ (Highest byte)
- 116) Impedance Loss Maximum
- 117) Impedance Loss Maximum
- 118) Impedance Loss Maximum (Lowest byte)
- 119) Demod Type Minimum
- 120) Demod Type Maximum
- 121) Demod Volume Minimum
- 122) Demod Volume Maximum
- 123) Demod Time Minimum (in ms) (Highest byte)
- 124) Demod Time Minimum (in ms)
- 125) Demod Time Minimum (in ms)
- 126) Demod Time Minimum (in ms) (Lowest byte)
- 127) Demod Time Maximum (in ms) (Highest byte)
- 128) Demod Time Maximum (in ms)
- 129) Demod Time Maximum (in ms)
- 130) Demod Time Maximum (in ms) (Lowest byte)
- 131) SSB BFO Offset Minimum⁵⁷⁴ (Highest byte)
- 132) SSB BFO Offset Minimum
- 133) SSB BFO Offset Minimum
- 134) SSB BFO Offset Minimum (Lowest byte)
- 135) SSB BFO Offset Maximum⁵⁷⁵ (Highest byte)
- 136) SSB BFO Offset Maximum
- 137) SSB BFO Offset Maximum
- 138) SSB BFO Offset Maximum (Lowest byte)
- 139) ACPR Main Channel BW Minimum (in Hz) (Highest byte)
- 140) ACPR Main Channel BW Minimum (in Hz)
- 141) ACPR Main Channel BW Minimum (in Hz)
- 142) ACPR Main Channel BW Minimum (in Hz) (Lowest byte)

⁵⁷⁰ Value sent as (value * 1000) + 270,000

⁵⁷¹ Value sent as (value * 1000) + 270,000

⁵⁷² Value sent as (value in dB * 1000)

⁵⁷³ Value sent as (value in dB * 1000)

⁵⁷⁴ Value sent as ((value in Hz) – 10,000)

⁵⁷⁵ Value sent as ((value in Hz) – 10,000)

- 143) ACPR Main Channel BW Maximum (in Hz) (Highest byte)
- 144) ACPR Main Channel BW Maximum (in Hz)
- 145) ACPR Main Channel BW Maximum (in Hz)
- 146) ACPR Main Channel BW Maximum (in Hz) (Lowest byte)
- 147) ACPR Adjacent Channel BW Minimum (in Hz) (Highest byte)
- 148) ACPR Adjacent Channel BW Minimum (in Hz)
- 149) ACPR Adjacent Channel BW Minimum (in Hz)
- 150) ACPR Adjacent Channel BW Minimum (in Hz) (Lowest byte)
- 151) ACPR Adjacent Channel BW Maximum (in Hz) (Highest byte)
- 152) ACPR Adjacent Channel BW Maximum (in Hz)
- 153) ACPR Adjacent Channel BW Maximum (in Hz)
- 154) ACPR Adjacent Channel BW Maximum (in Hz) (Lowest byte)
- 155) ACPR Channel Spacing Minimum (in Hz) (Highest byte)
- 156) ACPR Channel Spacing Minimum (in Hz)
- 157) ACPR Channel Spacing Minimum (in Hz)
- 158) ACPR Channel Spacing Minimum (in Hz) (Lowest byte)
- 159) ACPR Channel Spacing Maximum (in Hz) (Highest byte)
- 160) ACPR Channel Spacing Maximum (in Hz)
- 161) ACPR Channel Spacing Maximum (in Hz)
- 162) ACPR Channel Spacing Maximum (in Hz) (Lowest byte)
- 163) Channel Power Integration BW Minimum (in Hz) (Highest byte)
- 164) Channel Power Integration BW Minimum (in Hz)
- 165) Channel Power Integration BW Minimum (in Hz)
- 166) Channel Power Integration BW Minimum (in Hz) (Lowest byte)
- 167) Channel Power Integration BW Maximum (in Hz) (Highest byte)
- 168) Channel Power Integration BW Maximum (in Hz)
- 169) Channel Power Integration BW Maximum (in Hz)
- 170) Channel Power Integration BW Maximum (in Hz) (Lowest byte)
- 171-300) Not Used

For Transmission Measurement Mode (Option 21 Only), All Other Parameter Limits:

- 21) Span Scale Factor Minimum⁵⁷⁶ (Higher byte)
- 22) Span Scale Factor Minimum (Lower byte)
- 23) Span Scale Factor Maximum⁵⁷⁷ (Higher byte)
- 24) Span Scale Factor Maximum (Lower byte)
- 25) Span Minimum⁵⁷⁸ (Highest byte)
- 26) Span Minimum
- 27) Span Minimum
- 28) Span Minimum (Lowest byte)
- 29) Span Maximum⁵⁷⁹ (Highest byte)
- 30) Span Maximum
- 31) Span Maximum
- 32) Span Maximum (Lowest byte)
- 33) Reference Level Minimum⁵⁸⁰ (Highest byte)
- 34) Reference Level Minimum
- 35) Reference Level Minimum
- 36) Reference Level Minimum (Lowest byte)
- 37) Reference Level Maximum⁵⁸¹ (Highest byte)
- 38) Reference Level Maximum

⁵⁷⁶ Scale Factor in number of Hz

⁵⁷⁷ Scale Factor in number of Hz

⁵⁷⁸ Scaled by Span Scale Factor

⁵⁷⁹ Scaled by Span Scale Factor

⁵⁸⁰ Value sent as (value * 1000) + 270,000

⁵⁸¹ Value sent as (value * 1000) + 270,000

- 39) Reference Level Maximum
- 40) Reference Level Maximum (Lowest byte)
- 41) Scale Minimum⁵⁸² (Highest byte)
- 42) Scale Minimum
- 43) Scale Minimum
- 44) Scale Minimum (Lowest byte)
- 45) Scale Maximum⁵⁸³ (Highest byte)
- 46) Scale Maximum
- 47) Scale Maximum
- 48) Scale Maximum (Lowest byte)
- 49) Marker Minimum⁵⁸⁴ (Higher byte)
- 50) Marker Minimum (Lower byte)
- 51) Marker Maximum⁵⁸⁵ (Higher byte)
- 52) Marker Maximum (Lower byte)
- 53) Limit Y Minimum⁵⁸⁶ (Highest byte)
- 54) Limit Y Minimum
- 55) Limit Y Minimum
- 56) Limit Y Minimum (Lowest byte)
- 57) Limit Y Maximum⁵⁸⁷ (Highest byte)
- 58) Limit Y Maximum
- 59) Limit Y Maximum
- 60) Limit Y Maximum (Lowest byte)
- 61) Attenuation Minimum
- 62) Attenuation Maximum
- 63) Amplitude Units Minimum
- 64) Amplitude Units Maximum
- 65) Detection Algorithm Minimum
- 66) Detection Algorithm Maximum
- 67) External Reference Frequency Minimum⁵⁸⁸ (Highest byte)
- 68) External Reference Frequency Minimum
- 69) External Reference Frequency Minimum
- 70) External Reference Frequency Minimum (Lowest byte)
- 71) External Reference Frequency Maximum⁵⁸⁹ (Highest byte)
- 72) External Reference Frequency Maximum
- 73) External Reference Frequency Maximum
- 74) External Reference Frequency Maximum (Lowest byte)
- 75) Trigger Type Minimum
- 76) Trigger Type Maximum
- 77) Sweep Average Minimum
- 78) Sweep Average Maximum
- 79) Trace Math Minimum
- 80) Trace Math Maximum
- 81-200) Not Used

For Power Meter Mode (Option 29 Only), All Other Parameter Limits:

⁵⁸² Value sent as (value * 1000)

⁵⁸³ Value sent as (value * 1000)

⁵⁸⁴ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁵⁸⁵ Value sent as data point on the display. Equivalent frequency = (point * span / (# data points – 1)) + start frequency.

⁵⁸⁶ Value sent as (value * 1000) + 270,000

⁵⁸⁷ Value sent as (value * 1000) + 270,000

⁵⁸⁸ Reference frequency in MHz

⁵⁸⁹ Reference frequency in MHz

- 21) Span Scale Factor Minimum⁵⁹⁰ (Higher byte)
 - 22) Span Scale Factor Minimum (Lower byte)
 - 23) Span Scale Factor Maximum⁵⁹¹ (Higher byte)
 - 24) Span Scale Factor Maximum (Lower byte)
 - 25) Span Minimum⁵⁹² (Highest byte)
 - 26) Span Minimum
 - 27) Span Minimum
 - 28) Span Minimum (Lowest byte)
 - 29) Span Maximum⁵⁹³ (Highest byte)
 - 30) Span Maximum
 - 31) Span Maximum
 - 32) Span Maximum (Lowest byte)
 - 33) Power Meter Offset Minimum (Highest byte)
 - 34) Power Meter Offset Minimum
 - 35) Power Meter Offset Minimum
 - 36) Power Meter Offset Minimum (Lowest byte)
 - 37) Power Meter Offset Maximum (Highest byte)
 - 38) Power Meter Offset Maximum
 - 39) Power Meter Offset Maximum
 - 40) Power Meter Offset Maximum (Lowest byte)
 - 41) Power Meter Relative Minimum⁵⁹⁴ (Highest byte)
 - 42) Power Meter Relative Minimum
 - 43) Power Meter Relative Minimum
 - 44) Power Meter Relative Minimum (Lowest byte)
 - 45) Power Meter Relative Maximum⁵⁹⁵ (Highest byte)
 - 46) Power Meter Relative Maximum
 - 47) Power Meter Relative Maximum
 - 48) Power Meter Relative Maximum (Lowest byte)
 - 49-150) Not Used
-

Query Saved Setups – Control Byte #68 (44h)

Description: Returns a list of setups saved for the specified measurement mode. Modes that are stored in the same table (i.e. Spectrum Analyzer and Transmission Measurement modes or RL, CL and SWR modes) will be returned by this command when any of the modes in that list are specified.

Bytes to Follow: 1 byte

- 1) Measurement Mode⁵⁹⁶

Site Master Returns:

For All Modes:

- 1) Number of Following Bytes (Higher byte)
- 2) Number of Following Bytes (Lower byte)
- 3) Number of Setups

For Each Setup, VNA Modes – Frequency Domain:

- 1) Setup Number

⁵⁹⁰ Scale Factor in number of Hz

⁵⁹¹ Scale Factor in number of Hz

⁵⁹² Scaled by Span Scale Factor

⁵⁹³ Scaled by Span Scale Factor

⁵⁹⁴ Value sent as ((value in dBm + 100) * 1000)

⁵⁹⁵ Value sent as ((value in dBm + 100) * 1000)

⁵⁹⁶ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

- 2) Attributes
bit 0: Read Only Status (00h = Write-able, 01h = Read Only)
bits 1-7: Not Used
- 3) Measurement Mode⁵⁹⁷
- 4) Cal Status⁵⁹⁸
- 5) Frequency Scale Factor⁵⁹⁹ (Higher byte)
- 6) Frequency Scale Factor (Lower byte)
- 7) Start Frequency⁶⁰⁰ (Highest byte)
- 8) Start Frequency
- 9) Start Frequency
- 10) Start Frequency (Lowest byte)
- 11) Stop Frequency⁶⁰¹ (Highest byte)
- 12) Stop Frequency
- 13) Stop Frequency
- 14) Stop Frequency (Lowest byte)
- 15-20) Not Used

For Each Setup, VNA Modes – Time Domain (i.e. DTF):

- 1) Setup Number
- 2) Attributes
bit 0: Read Only Status (00h = Write-able, 01h = Read Only)
bits 1-7: Not Used
- 3) Measurement Mode⁶⁰²
- 4) Cal Status⁶⁰³
- 5) Not Used
- 6) Measurement Units (00h = Feet, 01h = Meters)
- 7) Start Distance⁶⁰⁴ (Highest byte)
- 8) Start Distance
- 9) Start Distance
- 10) Start Distance (Lowest byte)
- 11) Stop Distance⁶⁰⁵ (Highest byte)
- 12) Stop Distance
- 13) Stop Distance
- 14) Stop Distance (Lowest byte)
- 15-20) Not Used

For Each Setup, Spectrum Analyzer, Transmission Mode, Power Meter Modes:

- 1) Setup Number
- 2) Attributes
bit 0: Read Only Status (00h = Write-able, 01h = Read Only)
bits 1-7: Not Used
- 3) Measurement Mode⁶⁰⁶
- 4) Cal Status (Transmission Mode Setup Only, 00h = Off, 01h = On)
- 5) Frequency Scale Factor⁶⁰⁷ (Higher byte)

⁵⁹⁷ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁵⁹⁸ 00h = Cal Off, 01h = OSL Cal On, 02h = OSL InstaCal On, 03h = FlexCal On, 04h = FlexCal InstaCal On

⁵⁹⁹ Frequency Scale Factor is in number of Hz

⁶⁰⁰ Frequency is scaled by the frequency scale factor specified in bytes 5-6.

⁶⁰¹ Frequency is scaled by the frequency scale factor specified in bytes 5-6.

⁶⁰² Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁶⁰³ 00h = Cal Off, 01h = OSL Cal On, 02h = OSL InstaCal On, 03h = FlexCal On, 04h = FlexCal InstaCal On

⁶⁰⁴ Distance sent as (distance * 100,000) where “distance” is in the units specified in byte 6.

⁶⁰⁵ Distance sent as (distance * 100,000) where “distance” is in the units specified in byte 6.

⁶⁰⁶ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁶⁰⁷ Frequency Scale Factor is in number of Hz

- 6) Frequency Scale Factor (Lower byte)
- 7) Start Frequency⁶⁰⁸ (Highest byte)
- 8) Start Frequency
- 9) Start Frequency
- 10) Start Frequency (Lowest byte)
- 11) Stop Frequency⁶⁰⁹ (Highest byte)
- 12) Stop Frequency
- 13) Stop Frequency
- 14) Stop Frequency (Lowest byte)
- 15-20) Not Used

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, 19h for Site Master S311D, 1Ah for S312D)
- 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, 19h for Site Master S311D, 1Ah for S312D)
- 3-9) Extended Model # (7 bytes in ASCII)
- 10-13) Software Version (4 bytes in ASCII)

⁶⁰⁸ Frequency is scaled by the frequency scale factor specified in bytes 5-6.

⁶⁰⁹ Frequency is scaled by the frequency scale factor specified in bytes 5-6.

Write Protect Setup – Control Byte #71 (47h)

Description: Makes a saved setup either read-only or write-able.

Setup numbers as follows:

- 255 = All Setups in the Specified Mode
- 1 – 10 = Saved setups for Spectrum Analyzer/Transmission Measurement modes
- 1 – 5 = Saved setups for Power Meter mode (Option 29 Only)

Bytes to Follow: 3 bytes

- 1) Measurement Mode⁶¹⁰
- 2) Setup Number
- 3) Write-Protect Status (00h = Allow Writes (default), 01h = Lock Setup (i.e. “read only”))

Spectrum Master Returns: 1 byte

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

Clear Setup Memory Location – Control Byte #72 (48h)

Description: Clears a setup memory location such that it appears as “<EMPTY>” in the Recall Setup list.

Setup numbers as follows:

- 255 = All Setups in the Specified Mode
- 1 – 10 = Saved setups for Spectrum Analyzer/Transmission Measurement modes
- 1 – 5 = Saved setups for Power Meter mode (Option 29 Only)

Bytes to Follow: 2 bytes

- 1) Measurement Mode⁶¹¹
- 2) Setup Number

Spectrum Master Returns: 1 byte

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

Write Signal Standards – Control Byte #78 (4Eh)

Description: Write user-defined signal standards to the unit.

Bytes to Follow: Variable bytes

- 1-2) Version # (integer, e.g. 100 for 1.00)
- 3-4) Total number of records in this package (Maximum 200)
- (1st record)
- 5) Type of record (bit7: selected in SPA mode; bit6: selected in VNA mode; bit1: CDMA std; bit2: GSM std; Others are reserved)
- 6) # of sub-band (When the standard includes multiple sub-bands)
- 7-30) Name of Standard (ASCII 24 bytes)
- 31-34) Uplink Frequency (integer)
- 35-38) Downlink Frequency (integer)
- 39-40) Start Ch# (integer)

⁶¹⁰ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

⁶¹¹ Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

41-42) Stop Ch# (integer)
 43-46) Channel occupied band width (integer)
 47-50) Channel spacing (integer)
 51-52) Channel step (integer)
 (2nd record)
 53-100) Repeat from 5 to 52

Cell Master Returns: 1 byte

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

Recall Signal Standards – Control Byte #79 (4Fh)

Description: Download signal standards to PC.

Bytes to Follow: 0 byte

Cell Master Returns:

Command received correctly : Variable bytes

1-2) Version # (integer, e.g. 100 for 1.00)
 3-4) Total number of records in this package (Maximum 200)
 (1st record)
 5-6) Type of record
 7-30) Name of Standard (ASCII 24 bytes)
 31-34) Start Frequency (integer)
 35-38) Stop Frequency (integer)
 39-40) Start Ch# (integer)
 41-42) Stop Ch# (integer)
 43-46) Channel occupied band width (integer)
 47-50) Channel spacing (integer)
 51-52) Channel step (integer)
 (2nd record)
 53-100) Repeat from 5 to 52

Last byte) FF (End of the return bytes)

Command error : 1 byte

224 (E0h) Parameter Error
 238 (EEh) Time Out Error

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)⁶¹²
 19) Propagation Velocity
 20) Propagation Velocity

⁶¹² Propagation Velocity in units 1/100,000

- 21) Propagation Velocity (Lowest byte)
- 22) Insertion Loss (Highest byte)⁶¹³
- 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)⁶¹⁴
- 18) Propagation Velocity
- 19) Propagation Velocity
- 20) Propagation Velocity (Lowest byte)
- 21) Insertion Loss (Highest byte)⁶¹⁵
- 22) Insertion Loss
- 23) Insertion Loss
- 24) Insertion Loss (Lowest byte)

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 (scaled by Scale Factor) (Highest byte)
 - 2) Frequency (scaled by Scale Factor)

⁶¹³ Insertion Loss in units 1/100,000 dB/m or 1/100,000 dB/ft

⁶¹⁴ Propagation Velocity in units 1/100,000

⁶¹⁵ Insertion Loss in units 1/100,000 dB/m or 1/100,000 dB/ft

- 3) Frequency (scaled by Scale Factor)
- 4) Frequency (scaled by Scale Factor) (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 (scaled by Scale Factor) (Highest byte)
- 2) Frequency (scaled by Scale Factor)
- 3) Frequency (scaled by Scale Factor)
- 4) Frequency (scaled by Scale Factor) (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 the standard antennas. The standard antennas are as follows:

14. Anritsu #2000-1200 (Centurion EXCSM806) – 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, the 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 will 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: 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* * 100) + 270000)
 - 18-21) Channel Power Density (= (density in *dBm/Hz* * 100) + 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 (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 extension module is attached, the frequencies will 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* * 100) + 270000)
- 22-25) Lower Adjacent Channel Power (= (power in *dBm* * 100) + 270000)
- 26-29) Upper Adjacent Channel Power (= (power in *dBm* * 100) + 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 = Spectrum Analyzer/Transmission)
- 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 extension module is attached, the OBW frequencies will be scaled by the scale factor of the module. If the module is not attached, the OBW 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 OBW frequencies will be scaled by the scale factor of the module. If the module is not attached, the OBW 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) Occupied Bandwidth (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)

This command is available only with Option 10.

Description: Set the Bias Tee function On/Off. If the Bias Tee is turned on, the Spectrum 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 Spectrum Master does not return the results of the Bias Tee until approximately 3 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)

Spectrum 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 division, 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 $(\text{Ref Level} * 1000) + 270,000$ (0 dBm = 270,000, 20 dBm = 290000, -120 dBm = 150,000)
Scale should be sent as $(\text{dBm} * 1000)$ (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: $\text{Point} = (400 * (\text{marker freq} - \text{start freq})) / \text{span}$

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 $(\text{Limit Value} * 1000) + 270,000$ (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

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD 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

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD 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
-

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

This command exists for backward compatibility with the S33xC models. Features new to the S31xD 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 Index
- 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 limit lines.

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 bytes 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)⁶¹⁶
- 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)⁶¹⁷
- 10) Ending X
- 11) Ending X
- 12) Ending X (Lowest byte)
- 13) Ending Y (Higher byte)
- 14) Ending Y (Lower 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

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,

⁶¹⁶ Frequency in Hz or Distance in 1/100,000 ft (or meters)

⁶¹⁷ Frequency in Hz or Distance in 1/100,000 ft (or meters)

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 Spectrum 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 ⁶¹⁸(Highest byte)
- 6) Limit Value Start X
- 7) Limit Value Start X
- 8) Limit Value Start X (Lowest byte)
- 9) Limit Value Start Y ⁶¹⁹(Highest byte)
- 10) Limit Value Start Y
- 11) Limit Value Start Y
- 12) Limit Value Start Y (Lowest byte)
- 13) Limit Value End X ⁶²⁰(Highest byte)
- 14) Limit Value End X
- 15) Limit Value End X
- 16) Limit Value End X (Lowest byte)
- 17) Limit Value End Y ⁶²¹(Highest byte)
- 18) Limit Value End Y
- 19) Limit Value End Y
- 20) Limit Value End Y (Lowest byte)

Spectrum 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

⁶¹⁸ 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.

⁶¹⁹ (Value in dBm * 1000) + 270,000

⁶²⁰ 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.

⁶²¹ (Value in dBm * 1000) + 270,000

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
-

Set Spectrum Analyzer Impedance – Control Byte #116 (74h)

Description: Set the impedance and the loss value due to an adapter.

The Site Master can automatically compensate for the effects of impedance adapters. The impedance of the Site Master is 50Ω, so there is no need for an adapter in this case. The loss for the Anritsu 75Ω adapter 12N50-75B is known by the Site Master.

This control byte also allows for the specification of the impedance and the loss due to an adapter the system does not know. In either case, 5 bytes must be sent to the unit. If the impedance is 50Ω or one of the known adapters is specified, bytes 2-5 are ignored. If an unknown adapter is specified, the unit uses bytes 2-5 to correct for the adapter.

Bytes to Follow: 5 bytes

- 1) Impedance Adapter⁶²²
- 2) Impedance Loss⁶²³ (Highest byte)
- 3) Impedance Loss
- 4) Impedance Loss

⁶²² Impedance Adapter: 00h = 50 Ω 0Ah = 75Ω, adapter 12N50-75B 0Ch = 75Ω, other adapter offset

⁶²³ Send the loss value as value in dB* 1,000

- 5) Impedance Loss (Lowest byte)

Site Master Returns: 1 byte

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

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)

Spectrum 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

If markers are set to be noise markers, convert the returned dBm value to dBm/Hz using this formula (only if detection method is RMS Average):

$$\text{marker (in dBm/Hz)} = \text{marker value (in dBm)} - 10 * \log_{10}(\text{RBW}) - 0.13$$

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.

Note: This only works in Spectrum Analyzer mode.

Bytes to Follow: 1 byte

- 1) Number of sweeps to average (1-25, 1 turns averaging OFF)

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: 2 bytes

- 1) 255 (FFh): Operation Complete Byte
- 2) 240 (F0h): Calibration completes
254 (FEh): Operation complete with some conditions⁶²⁴
224 (E0h): Communication Error : Cell Master was unable to communicate with InstaCal module
238 (EEh): 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)⁶²⁵
- 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.

⁶²⁴ Attached instacal module's serial number is different from the one whose characterization data is in the instrument's memory. It's recommended to issue instacal module characterization command byte #242 (F2h).

⁶²⁵ The marker position is sent as a data point on the display. Equivalent Frequency = (position * span / (# data points – 1)) + start frequency

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

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 SA 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 = dBμV

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)

This command is new to the S31xD. Use it instead of Control Byte #106 to access the new RBWs.

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)

This command is new to the S31xD. Use it instead of Control Byte #107 to access the new VBWs.

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)

This command is new to the S31xD. Use it instead of Control Byte #111 to access the new attenuations.

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

Automatic control couples the attenuation to the reference level. Dynamic control let the instrument sets appropriate attenuation on each sweep based on the total power coming into the RF-in port. 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)
- Or
- 255 (for dynamic attenuation)

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/Off⁶²⁶
- 2) Demodulation Type⁶²⁷
- 3) Speaker Volume (Higher byte)⁶²⁸
- 4) Speaker Volume (Lower byte)
- 5) Demodulation Time⁶²⁹ (Highest byte)
- 6) Demodulation Time
- 7) Demodulation Time
- 8) Demodulation Time (Lowest byte)
- 9) Demodulation Frequency⁶³⁰ (Highest byte)
- 10) Demodulation Frequency
- 11) Demodulation Frequency
- 12) Demodulation Frequency (Lowest byte)

⁶²⁶ 00h = Off, 01h = On

⁶²⁷ 00h = FM Wideband, 01h = FM Narrowband, 02h = AM, 03h = SSB Lower, 04h = SSB Upper

⁶²⁸ Speaker Volume is from 0 to 100 in steps of 10

⁶²⁹ Demodulation time in milliseconds from 100 millisecc to 500 seconds

⁶³⁰ 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.

- 13) SSB BFO Adjust⁶³¹ (Highest byte)
- 14) SSB BFO Adjust
- 15) SSB BFO Adjust
- 16) SSB BFO Adjust (Lowest byte)

Spectrum Master Returns: 1 byte

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

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

⁶³¹ 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

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 Main Serial Number – Control Byte #221 (DDh)

Description: Returns the Main (External) Serial Number as four bytes. This command remains for backward compatibility.

A better command to use would be “Read ASCII Serial Number” #225 (E1h) which returns the serial number in ASCII format.

Bytes to Follow: 0 bytes

Site Master Returns: 4 bytes

- 1) Main Serial Number (Highest byte)
- 2) Main Serial Number
- 3) Main Serial Number
- 4) Main Serial Number (Lowest 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

Site Master Returns: 8 bytes

1-8) Serial Number (in ASCII)

GPS Power – Control Byte #237 (EDh)

Description: Turn On/Off power of GPS module.

Bytes to Follow: 1 bytes

Power Switch (1=ON, others=OFF)

Cell Master Returns: 1 byte

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

Read GPS Position – Control Byte #238 (EEh)

Description: Read current GPS position data: Latitude, longitude, and Altitude.

Bytes to Follow: 0 byte

Cell Master Returns: 13 byte (if Ok)

- 1-2) Number of satellites in use (< 3 if not locked)
- 3-6) GPS Position – Latitude (long integer)⁶³² (= -1 if not valid)
- 7-10) GPS Position – Longitude (long integer) (= -1 if not valid)
- 11-12) GPS Position – Altitude (short integer) (= -30000 if not valid)
- 13) 255 (FFh) Operation Complete Byte

Error code : 1 byte

- 224 (E0h) Parameter Error
- 238 (EEh) Time Out Error

Automatic Cal Disable – Control Byte #241 (F1h)

Description: Disable automatic calibration.

Bytes to Follow: 1 byte

- 0: to disable automatic calibration
- 1: to enable automatic calibration

Cell Master Returns: 1 byte

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

Instacal Module Characterization – Control Byte #242 (F2h)

Description: This command can either be a query or a request depending on the argument (parameter). If the argument is 1 (01h), then this is a request to load the attached instacal module characterization. This needs to be done only once whenever there is a change in the module being used to calibrate. It makes future calibration using the same module a lot quicker. If the argument is 0 (00h), then this is a query asking if the attached InstaCal module's characterization had been recorded in the instrument's memory.

Bytes to Follow: 1 byte

- 0 (00h): To ask if the attached instacal module's characterization is in the instrument's memory
- 1 (01h): To record the attached instacal module's characterization into the instrument's memory

Cell Master Returns: 1 byte⁶³³

- 0 (00h): Attached instacal module's characterization is in the instrument's memory OR attempt to record the attached instacal's characterization into the instrument's memory succeeded.
- 1 (01h): Attached instacal module's characterization is not in the instrument's memory OR attempt to record the attached instacal's characterization into the instrument's memory failed.
- 224 (E0h): Parameter error - invalid parameter
- 238 (EEh): Time-out error
- 254 (FEh): Cannot detect an instacal module from the RF out port.

Recall Sweep Trace – Control Byte #243 (F3h)

Description: This command is similar to another recall sweep trace with control byte #33 (21h). The only different between this command and command #33 (21h) is that this command requires 2 bytes to follow whereas command

⁶³² Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

⁶³³ If there are 2 possible interpretations to the return byte, then the first interpretation is intended for the query type and the second one is intended for the request type.

#33 (21h) requires 1 byte. This makes it possible to recall traces whose indices are bigger than 255, which is not possible with command #33 (21h).

Bytes to Follow: 2 bytes

0 = Last sweep trace before entering remote mode (sweep trace in RAM)

1- 300 = Specific saved sweep number (stored sweeps in Flash memory)

1) Trace Index (Higher Byte)

2) Trace Index (Lower Byte)

Cell Master Returns:

Exactly like command #33 (21h), so please refer to that section.

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 change 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

Configure DS0/E0 Channel Tests – Control Word (A01Ah)

This control byte is available with Option 50 only.

Description: Configures DS0/E0 channel access

Bytes to Follow: 3 bytes

1) Channel insert ON/OFF. 1 for ON, 0 for OFF.

2) Channel number. 1 – 24 for DS1

3) Audio monitor volume in percent, 0 – 100%

Cell Master Returns: 1 byte

Status Byte

255 (FFh) Operation Complete Byte

238 (EEh) Time-out Error

Read DS0/E0 Level and Frequency – Control Word (A01Bh)

This control byte is available with Option 50 only.

Description: Reports the level and frequency of the received signal on the selected DS0/E0 channel. The range of the level measurement is –40.0 to +3.0 dBm. The result is reported with 0.1 dB resolution, offset by 401. A report of 401 corresponds to 0.0 dBm, a report of 0 is under range and a report of 432 is over range. The frequency is reported in Hz.

Bytes to Follow: 0 bytes

Cell Master Returns: 4 bytes

- 1) Level high byte
- 2) Level low byte
- 3) Frequency high byte
- 4) Frequency low byte

Set DS0/E0 Level and Frequency – Control Word (A01Ch)

This control byte is available with Option 50 only.

Description: Sets the level and frequency of the sinusoidal signal to transmit on the selected channel. The range of the level setting is 0 to –30 dBm. The level setting is offset by 30 where 30 corresponds to 0 dBm and 0 to –30 dBm. The frequency is in Hz with a range of 100 to 3000 Hz.

Bytes to Follow: 3 bytes

- 1) Level
- 2) Frequency high byte
- 3) Frequency low byte

Cell Master Returns: 1 byte

Status Byte

255 (FFh) Operation Complete Byte

238 (EEh) Time-out Error

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.

Bytes to Follow: 1 byte

- 1) Signal Standard – See the section “Signal Standards” 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 section “Signal Standards” 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)

This command is available only with option 6.

Description: Returns the name of the attached frequency 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)

This command is available only with option 6.

Description: Sets the serial number of the attached frequency 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

Perform Transmission Mode Calibration – Control Word (A301h)

This command is available only with option 21.

Description: Perform Transmission Mode Calibration.

Bytes to Follow: 0 bytes

Cell Master Returns: 1 byte

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

Turn OFF Transmission Mode Calibration – Control Word (A302h)

This command is available only with option 21.

Description: Turn OFF Transmission Mode Calibration

Bytes to Follow: 0 bytes

Cell Master Returns: 1 byte

Get Signal Standard Name – Control Word (A501h)

Description: Get the ASCII signal standard corresponding to a specified Index. This command can be used in any measurement mode.

Bytes to follow: 2

- 1) Index (Highest Byte)
- 2) Index (Lowest Byte)

Cell Master Returns: 20 bytes

1 – 20) Standard Name in ASCII

Set Signal Standard Link Direction – Control Word (A502h)

Description: Set the link direction of current selected signal standard. This command can be used in any measurement mode.

Bytes to follow: 1 byte

- 1) Type⁶³⁴

Cell Master Returns: 1 byte

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

Perform Noise Diode Cal – Control Word (A505h)

⁶³⁴ 1 = downlink, 2 = uplink, 3 = up and downlink

Description: Performs noise diode calibration on SPA board

Bytes to follow: 0

Cell Master Returns: 1 byte

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

Set Bias T Voltage – Control Word (A506h)

Description: Motherboards beginning with 64968 have a programmable Bias T. This command sets the Bias T voltage between 12 and 24 volts.

Bytes to follow: 1

1) Bias T Voltage

Cell Master Returns: 1 byte

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

Select Function in IA Measurement Mode – Control Word (A700h)

This command is available only with option 25.

Description: Selects measurement function in Interference Analysis mode.

Bytes to Follow: 1 bytes

1) Function ID (0: Spectrum; 1: Spectrogram; 2: Signal strength; 3: RSSI; 4: Signal ID)

Cell Master Returns: 1 byte

255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

Spectrogram: Set Sweep Interval – Control Word (A721h)

This command is available only with option 25.

Description: Sets the sweep interval in spectrogram mode.

Bytes to Follow: 2 bytes

- a. Sweep interval in seconds (Highest byte)
- b. Sweep interval in seconds (Lowest byte)

Cell Master Returns: 1 byte

255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Module not attached
238 (EEh) Time Out Error

Spectrogram: Set Time Span of Measurement – Control Word (A722h)

This command is available only with option 25.

Description: Sets the time span of spectrogram measurement. Maximum time span is 72 hours (4320 minutes) when "Auto Save" is turned on. Minimum time span is 0 which means the fastest sweep time of current setting is used.

Bytes to Follow: 2 bytes

- 1) Time span in minutes (MSB)
- 2) Time span in minutes (LSB)

Cell Master Returns: 1 byte

- 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Module not attached
- 238 (EEh) Time Out Error

Spectrogram: Turn On/Off Auto Save – Control Word (A723h)

This command is available only with option 25.

Description: Turns On or Off Auto Save switch of spectrogram mode. When Auto Save is turned on, the first 5 screens of records are saved automatically into 5 memory slots. Once all 5 memory slots have been occupied, Auto Save is going to be turned off.

Bytes to Follow: 1 bytes

On/Off Switch (0:Off, 1:On)

Cell Master Returns: 1 byte

- 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: Module not attached
- 238 (EEh) Time Out Error

Spectrogram: Get Trace Name – Control Word (A724h)

This command is available only with option 25.

Description: Get the Trace names saved in five spectrogram memory slots. The name is composed with Time & Date when the trace is saved. If the memory slot is empty, the date field is set with "--/--/----" and the time field is set with "--:--:--".

Bytes to Follow: 0 bytes

Cell Master Returns:

When control word is received correctly: 101 bytes

- 1-2) Index of trace (from 0 to 4)
- 3-12) Date of save in ASCII string, format: "--/--/----"
- 13-20) Time of save in ASCII string, format: "--:--:--"
- 21-100) Repeat the information of 1) to 20) four times
- 101) FFh

When error occurs: 1 byte

- 224 (E0h) Parameter Error: Module not attached
- 238 (EEh) Time Out Error

Spectrogram: Recall Trace – Control Word (A725h)

This command is available only with option 25.

Description: Recall a spectrogram trace by sending the trace index (0-4) of the memory slots.

Bytes to Follow: 1 bytes

- 1) Index of memory slots (0-4)

Cell Master Returns:

When control word is received correctly: 32448 bytes

- | | |
|-----------|---|
| 1-10) | Date of save (ASCII, format: "--/--/----") |
| 11-18) | Time of save (ASCII, format: "--:--:--") |
| 19-22) | Center Frequency (Integer – MSB to LSB) |
| 23-26) | Span (Integer – MSB to LSB) |
| 27-30) | RBW (Integer – MSB to LSB) |
| 31-34) | VBW (Integer – MSB to LSB) |
| 35-38) | Reference level (Integer – MSB to LSB) |
| 39-42) | Scale (Integer – MSB to LSB) |
| 43-46) | Time Span (Integer – MSB to LSB) |
| 47-48) | Sweep Interval (Integer – MSB to LSB) |
| 49-52) | GPS Position – Latitude (long integer) ⁶³⁵ |
| 53-56) | GPS Position – Longitude (long integer) |
| 57-58) | GPS Position – Altitude (short integer) |
| 59-32458) | 80 records of spectrogram data. Each record has the following format: |
| 1-401) | Color indices of 401 sweep data points, The formula of color index is as following:
Color Index = (Ref Level - SaMeasData) * 255 / (Division * 10) |
| 402-405) | Time Stamp of the record being generated. |
- Status byte: 1 byte
- | | |
|-----------|--------------------------------------|
| 255 (FFh) | Operation Complete Byte |
| 224 (E0h) | Parameter Error: Module not attached |
| 238 (EEh) | Time Out Error |

Remote Self Test – Control Word (AA15h)

This control byte is for **INTERNAL** use only and should not be distributed.

Description: Trigger the equivalent of a “key press” self test.

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.

Bytes to Follow: 0 bytes

Site Master Returns:

S311D (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)

⁶³⁵ Signed long integer is used to represent latitude and longitude. Positive latitude means North hemisphere, negative latitude means South hemisphere; Positive longitude means East hemisphere, negative longitude means West hemisphere. Degree = int(abs(value)/1,000,000); Minute = (float)(abs(value)%1,000,000)/10,000

- 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 - PLD1 ID
- 16) H/W Config - PLD2 ID
- 17) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 18) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 19) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 20) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 21) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 22) VNA Integration Test - Reserved
- 23) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 24) SPA LO Test - Failed data point #
- 25) SPA LO Test - Failed LO #
- 26) End of Data (FFh)

S311D + Option 29 or S312D: 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 - PLD1 ID
- 16) H/W Config - PLD2 ID
- 17) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 18) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 19) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 20) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 21) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 22) VNA Integration Test - Reserved
- 23) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 24) SPA LO Test - Failed data point #
- 25) SPA LO Test - Failed LO #
- 26) End of Data (FFh)

S312D + 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 - PLD1 ID
- 16) H/W Config - PLD2 ID
- 17) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 18) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 19) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 20) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 21) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 22) VNA Integration Test - Reserved
- 23) SPA LO Test - Status (01h: Pass, 00h: Fail, FFh: SPA board not installed)
- 24) SPA LO Test - Failed data point #
- 25) SPA LO Test - Failed LO #
- 26) Module PLD Version
- 27) Module Attached
- 28) Module Lock (01h = Locked, 00h = Not Locked)
- 29) Module Lock Fail Counter (Higher byte)
- 30) Module Lock Fail Counter (Lower byte)
- 31) End of Data (FFh)

S311D + 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 - PLD1 ID
- 16) H/W Config - PLD2 ID
- 17) VNA PLL Lock Failure Test - Status (01h: Pass, 00h: Fail)
- 18) VNA PLL Lock Failure Test - Failed data point # (Ignore this byte if the Lock Fail Test Status was Pass)
- 19) VNA PLL Lock Failure Test - Failed PLL # (Ignore this byte if the Lock Fail Test Status was Pass)
- 20) VNA Integration Test - Status (01h: Pass, 00h: Fail)
- 21) VNA Integration Test - Failed data point # (Ignore this byte if the Integration Test Status was Pass)
- 22) VNA Integration Test - Reserved
- 23) Status (01h: Pass, 00h: Fail)
- 24) Carrier Status (01h: carrier present, 00h: No carrier)

- 25) Frame Sync Status (01h: in frame sync, 00h: Not in frame sync)
- 26) QRSS pattern sync status (01h: Pattern sync, 00h: Not in sync)
- 27) QRSS bit error count (01h: Bit error found, 00h: No bit error)
- 28) 0 dB CSU Tx Level Check (00h: Pass (> -2.5 dB), XXh: Value reported by DS2155)
- 29) -7.5 dB CSU Tx Level Check (00h: Pass (-5.0 to -12.5 dB), XXh: Value reported by DS2155)
- 30) -15 dB CSU Tx Level Check (00h: Pass (-12.5 to -20.0 dB), XXh: Value reported by DS2155)
- 31) -22.5 dB CSU Tx Level Check (00h: Pass (-20.0 to -30.0 dB), XXh: Value reported by DS2155)
- 32) Vpp measurement of 0 dB signal in 1/10ths of a Volt (e.g. 124 = 12.4 Volts)
- 33) End of Data (FFh)

Parameter Definitions

Parameter	# of bytes	Step	Example / Description
Frequency	4 bytes unsigned	1 Hz	1000.3 MHz = 1000300000
Frequency	4 bytes unsigned	10-Hz	1000.3 MHz = 100030000
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 & distance marker)	2 bytes unsigned	1 sweep point	Marker Values are given in relative position of the graph. The lowest value is 0, while 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 reflected signal over the magnitude of incident signal.
Phase	4 bytes signed	1 / 10 degree	Phase value is the difference in phase between the incident and reflected signal.
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

Programming Examples

This section contains several sample functions written in C, (and one in Visual Basic) that can be used as references when programming the 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. These reference examples are not meant to be used verbatim, but are included to aid software developers in writing their own programming codes for the Site Master.

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 - ComPor- entered as a command line argument */
/*              int - ComBau- The Baud rate for Communication      */
/*  Returns:     SUCCESS - If the-Communication link was established*/
/*              FAIL - IF the-e 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 -
    BO-L 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 dev omm.
        LPCOMMTIMEOUTS lpCommTimeouts /* pointer to comm tim omm.t 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 22-"
```

```

        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

```

Revision History

Date	Revision Name	Change Description
4/7/2008	10580-00186 A	Initial Release.