

# Anritsu

## Site Master S113C, S114C, S331C, S332C, S113CQ, S114CQ, and S115BQ

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*Programming Manual*



**Hand-Held Tester for Transmission Lines  
and other RF Components**

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## **UPDATES**

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

## Programming Overview

*NOTE: This programming manual is written exclusively for the Anritsu Site Master Models S113C, S114C, S331C, S332C, S113CQ, S114CQ, and S115BQ. For information on firmware upgrades, contact your local Anritsu Service Center. Commands listed in this manual are not all backward-compatible with earlier Site Master Models.*

### General Description

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

Once in remote mode, 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 accessible from the keypad. The only exception 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.

### Interface Cable Installation

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

### Serial Communication Parameters

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

### Communications Error Checking

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

### Parameter Validation

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

### Entering Remote Mode

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

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

## Exiting Remote Mode

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

## Remote Mode Changes to Site Master Operating Parameters

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

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

## Write Cycle Limitation of EEPROM

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

## Documentation Conventions

Throughout this manual, the following conventions will be observed:

### Numeric Representation

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

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

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

### Bit Positions

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

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# 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 #20, 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 #20 (14h) response bytes 391, 392, and 393 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)<sup>1</sup>

bits 4-7: Not Used

2) Status Byte 2

bit 0: RBW Coupling (to span) (1b = auto 0b = manual)

bit 1: VBW Coupling (to RBW) (1b = auto 0b = manual)

bit 2: Not Used

bits 3-4: Amplitude units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)

bits 5-6: Detection algorithm (00b = positive peak 01b = average  
10b = negative peak)

bit 7: Attenuation Coupling (to ref level) (1b = auto 0b = manual)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
238 (EEh) Time-out Error

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

## Set Site Master 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.)

Frequency range for each model is as follows:

S33xC: 25MHz – 4000MHz

S11xC: 2MHz – 1600MHz

S11xCQ: 2MHz – 1600MHz

S115BQ: 2MHz – 1600MHz

See control byte #20 (14h) response bytes 4 to 11 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:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid frequency range  
238 (EEh) Time-out Error

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

**Description:** Sets the measurement mode of the Site Master. You must have a valid calibration at current frequencies before setting a mode in the distance domain.

See control byte #20 (14h) response byte 1 (01h) for the current Site Master measurement mode.

**Byte 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
  - 40h: Power Monitor Mode

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Measurement Mode  
238 (EEh) Time-out Error

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

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

Return Loss & Cable Loss:

Unit is dB/1000.

Maximum value sent is 54000 which represents 54.00 dB,

Minimum value sent is 0 which represent 0.00 dB,

Start value < Stop value

SWR:

Unit is 1/1000 (of ratio)

Maximum value sent is 65535 which represents 65.53

Minimum value sent is 1000 which represents 1.00

Start value < Stop value

See control byte #20 (14h) response bytes 12 to 19 (0Ch to 13h) for current Site Master scaling.

**Bytes to Follow:** 8 bytes

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

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

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## Set Site Master 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 #20 (14h) response bytes 20 to 31 for current frequency markers.

See control byte #20 (14h) response bytes 114 to 125 for current distance markers.

See control byte #20 (14h) response byte 378 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) <sup>2</sup>
- 4) Marker Value (highest byte)
- 5) Marker Value (lowest byte)

**Site Master Returns:**

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

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

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

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

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 limit value will follow the conventions below:

Return Loss & Cable Loss:

Limit is in **thousandths** of a dB

Maximum value sent is 54000 which represents 54.00 dB

Minimum value sent is 0 which represents 0.0 dB

SWR:

Limit is in **thousandths** (of ratio)

Maximum value sent is 65530 which represents 65.53

Minimum value sent is 1000 which represents 1.00

The single limit and multiple limit types are mutually exclusive. That is, setting the single limit ON automatically turns multiple limit lines OFF. Also see control byte #112 (70h) for information about multiple limits.

See control byte #20 (14h) response bytes 32-35, and byte 382 bits 0-1 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:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid limit status, limit beep status, or limit value  
238 (EEh) Time-out Error

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## 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 #20 (14h) response bytes 106-113 (Distance), 126-133 (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:**      255 (FFh) Operation Complete Byte  
                                 224 (E0h) Parameter Error : Parameter(s) out of range  
                                 238 (EEh) Time-out Error

---

## Set Time/Date - Control Byte #8 (08h)

**Description:** Sets the current time and date.

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

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

The current time setting can be found by using control byte #17 to recall trace 0 and examining response bytes 31-38.

The current date setting can be found by using control byte #17 to recall trace 0 and examining response bytes 21-30.

**Byte to Follow:** 7 bytes

- 1) Hour
- 2) Minute
- 3) Month
- 4) Day
- 5) Year (Highest byte)
- 6) Year (Lowest byte)
- 7) Daylight Saving (ON/~OFF)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
238 (EEh) Time-out Error

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

**Description:** Stores a Reference Number with the sweep trace.

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

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

**Byte to Follow:** 16 bytes (ASCII text string)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
238 (EEh) Time-out Error

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## 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)). Therefore, 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

**Byte to follow:** 1 byte

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

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

---

## Single Sweep Mode On/Off - Control Byte #11 (0Bh)

**Description:** Enables or disables the Single Sweep Mode during Site Master modes of operation.

For Single Sweep Mode during Spectrum Analyzer modes 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.

**Byte to Follow:** 1 byte

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

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

---

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

**Description:** Enables or disables the Watch-dog timer.

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.

**Byte to Follow:** 1 byte

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

**Site Master Returns:** 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. Calibration is based on frequency range. Once the frequency range is set, sequence the calibration process using this control byte. Measure each component (open, short, load) then trigger the calculate step. The calculate step uses the measurements obtained and generates the correction factors.

When this control byte is received, any old calibration data is lost. The Site Master does the calibration step specified by the second byte. After the measurements, the calculation step must be triggered to complete the calibration.

After receiving the calculate byte, the Site Master checks to see if all calibration steps are completed. The Site Master calculates the resulting correction factors and sends an Operation Complete Byte #255 (FFh) to the computer. If all steps are not complete, the Site Master Returns an Operation Incomplete Byte #224 (E0h) and no calculation is performed.

**Bytes to Follow :** 1 byte

- 1) Calibration Step to trigger  
01h = open  
02h = short  
03h = load  
04h = Calculate Calibration Data

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Error: Invalid Cal operation or Cal Incomplete  
238 (EEh) Time-out Error

---

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

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

**Byte to follow:** 1 byte

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

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Data Point Setting  
238 (EEh) Time-out Error

---

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

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

**Byte to follow:** 0 bytes

**Site Master Returns:** 5 bytes

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

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

**Description:** Queries the Site Master for sweep trace data.

**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 Mode<sup>3</sup>
- 17-20) Time/Date (in Long Integer<sup>4</sup>)
- 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)

For all "Site Master Modes" :

- 57) Start Frequency<sup>5</sup> (highest byte)
- 58) Start Frequency
- 59) Start Frequency

<sup>3</sup> Refer to Control Byte #3 "Select Measurement Mode" for detailed value.

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

<sup>5</sup> Frequency units is Hz



- 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 Top<sup>6</sup> (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 1<sup>7</sup> (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 Limit<sup>8</sup> (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 X<sup>9</sup> (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 Distance<sup>10</sup> (highest byte)

<sup>6</sup> See Control Byte #4 “Set Site Master Scale” for data format

<sup>7</sup> 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.

<sup>8</sup> See Control Byte #6 “Set Site Master Single Limit” for data format.

<sup>9</sup> See Control Byte #112 “Set Site Master Segmented Limit Lines” for data format.

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

- 164) Start Distance
- 165) Start Distance
- 166) Start Distance (lowest byte)
- 167) Stop Distance (highest byte)
- 168) Stop Distance
- 169) Stop Distance
- 170) Stop Distance (lowest byte)
- 171) Distance Marker 1<sup>11</sup> (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 Velocity<sup>12</sup> (highest byte)
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (lowest byte)
- 187) Cable Loss<sup>13</sup> (highest byte)
- 188) Cable Loss
- 189) Cable Loss
- 190) Cable Loss (lowest byte)
- 191) Status Byte 1: ( 0b = Off , 1b = On)
  - (LSB) bit 0 : Marker 1 On/Off
  - bit 1 : Marker 2 On/Off
  - bit 2 : Marker 3 On/Off
  - bit 3 : Marker 4 On/Off
  - bit 4 : Marker 5 On/Off
  - bit 5 : Marker 6 On/Off
  - bits 6-7 : Not Used
- 192) Status Byte 2: (0b = Off, 1b = On)
  - (LSB) bit 0 : Not Used
  - bit 1 : Marker 2 Delta On/Off
  - bit 2 : Marker 3 Delta On/Off
  - bit 3 : Marker 4 Delta On/Off
  - bits 4-7 : Not Used
- 193) Status Byte 3: ( 0b = Off , 1b = On)
  - (LSB) bit 0 : Single Limit On/Off
  - bit 1: CW On/Off
  - bit 2-3 : Not Used
  - bit 4 : InstaCal On/Off<sup>14</sup>
  - bit 5 : Cal On/Off
  - bit 6 : Limit Type ( 0b = Single; 1b = Multiple)

<sup>11</sup> 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.

<sup>12</sup> Relative Propagation Velocity uses units 1/100,000

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

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

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

194) Status Byte 4:

(LSB) bit 0 - 1 : DTF Windowing Mode  
bit: 1 0  
| |  
0 0 - Rectangular (No Windowing)  
0 1 - Nominal Side Lobe  
1 0 - Low Side Lobe  
1 1 - Minimum Side Lobe  
bits 2 - 7 : Not Used  
195-228) Not Used  
229-1268) Sweep Data (130 points \* 8 bytes/point = 1040 bytes)  
229-2300) Sweep Data (259 points \* 8 bytes/point = 2072 bytes)  
229-4364) Sweep Data (517 points \* 8 bytes/point = 4136 bytes)  
8 bytes for each data point  
1. gamma<sup>15</sup> MSB  
2. gamma  
3. gamma  
4. gamma LSB  
5. phase<sup>16</sup> MSB  
6. phase  
7. phase  
8. phase LSB

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

For Spectrum Analyzer Mode:

57) Start Frequency<sup>17</sup> (highest byte)  
58) Start Frequency  
59) Start Frequency  
60) Start Frequency (lowest byte)  
61) Stop Frequency (highest byte)  
62) Stop Frequency  
63) Stop Frequency  
64) Stop Frequency (lowest byte)  
65) Center Frequency (highest byte)  
66) Center Frequency  
67) Center Frequency  
68) Center Frequency (lowest byte)  
69) Frequency Span (highest byte)  
70) Frequency Span  
71) Frequency Span  
72) Frequency Span (lowest byte)  
73) Minimum Frequency Step Size (highest byte)  
74) Minimum Frequency Step Size  
75) Minimum Frequency Step Size  
76) Minimum Frequency Step Size (lowest byte)  
77) Ref Level<sup>18</sup> (highest byte)

<sup>15</sup> Gamma data uses 1/1000 units.

<sup>16</sup> Phase data uses 1/10 degree unit.

<sup>17</sup> Frequency in Hz

<sup>18</sup> Value sent as ( Value in dBm \* 1000 ) + 270,000

- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (lowest byte)
- 81) Scale per div<sup>19</sup> (highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (lowest byte)
- 85) Frequency Marker 1<sup>20</sup> (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 Limit<sup>21</sup> (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 Level<sup>22</sup>) (highest byte)
- 106) Multiple Upper Limit 1 Start Y (Power Level)
- 107) Multiple Upper Limit 1 Start Y (Power Level)
- 108) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 109) Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
- 110) Multiple Upper Limit 1 End X (Frequency in Hz)
- 111) Multiple Upper Limit 1 End X (Frequency in Hz)
- 112) Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
- 113) Multiple Upper Limit 1 End Y (Power Level) (highest byte)
- 114) Multiple Upper Limit 1 End Y (Power Level)
- 115) Multiple Upper Limit 1 End Y (Power Level)
- 116) Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
- 117-260) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 101-116 for format)
- 261) RBW Setting (Frequency in Hz) (highest byte)
- 262) RBW Setting (Frequency in Hz)
- 263) RBW Setting (Frequency in Hz)
- 264) RBW Setting (Frequency in Hz) (lowest byte)
- 265) VBW Setting (Frequency in Hz) (highest byte)
- 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 % Value<sup>23</sup> (highest byte)

<sup>19</sup> Value sent as ( Value \* 1000 )

<sup>20</sup> Value sent as data point on display.  $\text{Freq} = ( \text{Point} * \text{Span} / ( \text{Total Data Points} - 1 ) ) + \text{Start Freq}$

<sup>21</sup> Value sent as (value in dBm \* 1000) + 270,000

<sup>22</sup> Value sent as (value in dBm \* 1000) + 270,000

<sup>23</sup> % value is 0-99

- 271) OCC BW % Value
- 272) OCC BW % Value
- 273) OCC BW % Value (lowest byte)
- 274) OCC BW dBc <sup>24</sup>(highest byte)
- 275) OCC BW dBc
- 276) OCC BW dBc
- 277) OCC BW dBc (lowest byte)
- 278) Attenuation<sup>25</sup> (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
- 300) 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
- 301) Status Byte 4<sup>26</sup>
  - (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/BELOW<sup>27</sup>
  - bit 6 : Multiple Limit Upper Segment 2 Status ON/OFF
  - bit 7 : Multiple Limit Upper Segment 2 Beep Level ABOVE/BELOW
- 302) 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

<sup>24</sup> dBc value 0 – 120 dBc

<sup>25</sup> Value sent as ( value in dB \* 1000 )

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

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

- 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/BELOW<sup>28</sup>
- 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 Offset <sup>29</sup>(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. dBm<sup>30</sup> MSB
  2. dBm
  3. dBm
  4. dBm LSB

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

1-2) Number of following bytes (9 bytes for invalid sweep recall)

3-4) Model # (unsigned integer, 0Ch for Site Master)

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

**Site Master Returns (Invalid sweep location):** 1 byte

224 (E0) : Parameter error : Invalid sweep location

---

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

<sup>29</sup> Value sent as ( value in dBm \* 1000 ) + 270,000

<sup>30</sup> Value sent as ( value in dBm \* 1000 ) + 270,000

## 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 #20 (14h), (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

**Site Master Returns:** 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.

The Site Master recalls all parameters described in Query System Status - Control Byte #20 (14h), (except Serial Port Echo Status) from the specified store location. The recalled setup does **not** automatically become the default setup when exiting remote.

You may want to save the recalled setup as the run-time setup by saving it to setup location 0 (which holds the power-on defaults). 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  
1 – 10 = Saved setups  
255 = Default setup

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

---

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

**Description:** Queries the Site Master extra space for current system settings.

The current state of the Site Master represents the state after 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 Mode<sup>31</sup>
- 2) Site Master Mode Data Points (highest byte)
- 3) Site Master Mode Data Points (lowest byte)
- 4) Start Frequency (Frequency in Hz) (highest byte)

---

<sup>31</sup> Refer to Control Byte #3 “Select Measurement Mode” for valid measurement modes.

- 5) Start Frequency
- 6) Start Frequency
- 7) Start Frequency (lowest byte)
- 8) Stop Frequency (Frequency in Hz) (highest byte)
- 9) Stop Frequency
- 10) Stop Frequency
- 11) Stop Frequency (lowest byte)
- 12) Scale Start (highest byte)<sup>32</sup>
- 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 (highest byte)<sup>33</sup>
- 21) Frequency Marker 1 (lowest byte)
- 22) Frequency Marker 2 (highest byte)
- 23) Frequency Marker 2 (lowest byte)
- 24) Frequency Marker 3 (highest byte)
- 25) Frequency Marker 3 (lowest byte)
- 26) Frequency Marker 4 (highest byte)
- 27) Frequency Marker 4 (lowest byte)
- 28) Frequency Marker 5 (highest byte)
- 29) Frequency Marker 5 (lowest byte)
- 30) Frequency Marker 6 (highest byte)
- 31) Frequency Marker 6 (lowest byte)
- 32) Site Master Single Limit (highest byte)<sup>34</sup>
- 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)<sup>35</sup>
- 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 (highest byte)
- 43) Multiple Limit Segment Start Y (lowest 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 (highest byte)
- 49) Multiple Limit Segment End Y (lowest byte)
- 50-105) Repeat bytes 36 – 49 for segments 2 - 5
- 106) Start Distance (highest byte)<sup>36</sup>
- 107) Start Distance
- 108) Start Distance

<sup>32</sup> See “Set Site Master Scale” Control Byte #4 for data format.

<sup>33</sup> 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.

<sup>34</sup> See Control Byte #6, “Set Site Master Single Limit” for data format.

<sup>35</sup> See Control Byte #112, “Set Site Master Segmented Limit Lines” for data format.

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



- 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 (highest byte)<sup>37</sup>
- 115) Distance Marker 1 (lowest byte)
- 116) Distance Marker 2 (highest byte)
- 117) Distance Marker 2 (lowest byte)
- 118) Distance Marker 3 (highest byte)
- 119) Distance Marker 3 (lowest byte)
- 120) Distance Marker 4 (highest byte)
- 121) Distance Marker 4 (lowest byte)
- 122) Distance Marker 5 (highest byte)
- 123) Distance Marker 5 (lowest byte)
- 124) Distance Marker 6 (highest byte)
- 125) Distance Marker 6 (lowest byte)
- 126) Relative Propagation Velocity (highest byte)<sup>38</sup>
- 127) Relative Propagation Velocity
- 128) Relative Propagation Velocity
- 129) Relative Propagation Velocity (lowest byte)
- 130) Cable Loss (highest byte)<sup>39</sup>
- 131) Cable Loss
- 132) Cable Loss
- 133) Cable Loss (lowest byte)
- 134) Spectrum Analyzer Mode Data Points (highest byte)
- 135) Spectrum Analyzer Mode Data Points (lowest byte)
- 136) Spectrum Analyzer Start Frequency<sup>40</sup> (highest byte)
- 137) Spectrum Analyzer Start Frequency
- 138) Spectrum Analyzer Start Frequency
- 139) Spectrum Analyzer Start Frequency (lowest byte)
- 140) Spectrum Analyzer Stop Frequency (highest byte)
- 141) Spectrum Analyzer Stop Frequency
- 142) Spectrum Analyzer Stop Frequency
- 143) Spectrum Analyzer Stop Frequency (lowest byte)
- 144) Spectrum Analyzer Center Frequency (highest byte)
- 145) Spectrum Analyzer Center Frequency
- 146) Spectrum Analyzer Center Frequency
- 147) Spectrum Analyzer Center Frequency (lowest byte)
- 148) Spectrum Analyzer Frequency Span (highest byte)
- 149) Spectrum Analyzer Frequency Span
- 150) Spectrum Analyzer Frequency Span
- 151) Spectrum Analyzer Frequency Span (lowest byte)
- 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)<sup>41</sup>

<sup>37</sup> 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.

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

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

<sup>40</sup> Frequency unit is Hz.

<sup>41</sup> Value sent as (value in dBm \* 1000) + 270,000)

- 157) Ref Level
- 158) Ref Level
- 159) Ref Level (lowest byte)
- 160) Scale per div (highest byte)<sup>42</sup>
- 161) Scale per div
- 162) Scale per div
- 163) Scale per div (lowest byte)
- 164) Spectrum Analyzer Frequency Marker 1 (highest byte)<sup>43</sup>
- 165) Spectrum Analyzer Frequency Marker 1 (lowest byte)
- 166) Spectrum Analyzer Frequency Marker 2 (highest byte)
- 167) Spectrum Analyzer Frequency Marker 2 (lowest byte)
- 168) Spectrum Analyzer Frequency Marker 3 (highest byte)
- 169) Spectrum Analyzer Frequency Marker 3 (lowest byte)
- 170) Spectrum Analyzer Frequency Marker 4 (highest byte)
- 171) Spectrum Analyzer Frequency Marker 4 (lowest byte)
- 172) Spectrum Analyzer Frequency Marker 5 (highest byte)
- 173) Spectrum Analyzer Frequency Marker 5 (lowest byte)
- 174) Spectrum Analyzer Frequency Marker 6 (highest byte)
- 175) Spectrum Analyzer Frequency Marker 6 (lowest byte)
- 176) Spectrum Analyzer Single Limit (highest byte)<sup>44</sup>
- 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)<sup>45</sup>
- 185) Multiple Upper Limit 1 Start Y (Power Level)
- 186) Multiple Upper Limit 1 Start Y (Power Level)
- 187) Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
- 188) Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
- 189) Multiple Upper Limit 1 End X (Frequency in Hz)
- 190) Multiple Upper Limit 1 End X (Frequency in Hz)
- 191) Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
- 192) Multiple Upper Limit 1 End Y (Power Level) (highest byte)<sup>46</sup>
- 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)<sup>47</sup>
- 341) RBW Setting
- 342) RBW Setting
- 343) RBW Setting (lowest byte)
- 344) VBW Setting (highest byte)<sup>48</sup>
- 345) VBW Setting

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<sup>42</sup> Value sent as (value \* 1000)

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

<sup>44</sup> Value sent as ( value in dBm \* 1000 ) + 270000

<sup>45</sup> Value sent as ( value in dBm \* 1000 ) + 270000

<sup>46</sup> Value sent as ( value in dBm \* 1000 ) + 270000

<sup>47</sup> 0x0000 = 10KHz,      0x0001 = 30KHz,      0x0002 = 100KHz,      0x0003 = 1MHz

<sup>48</sup> 0x0000 = 100Hz,      0x0001 = 300Hz,      0x0002 = 1KHz,      0x0003 = 3KHz,  
0x0004 = 10KHz,      0x0005 = 30KHz,      0x0006 = 100KHz,      0x0007 = 300KHz

- 346) VBW Setting
- 347) VBW Setting (lowest byte)
- 348) OCC BW Method<sup>49</sup>
- 349) OCC BW % Value (highest byte)<sup>50</sup>
- 350) OCC BW % Value
- 351) OCC BW % Value
- 352) OCC BW % Value (lowest byte)
- 353) OCC BW dBc (highest byte)<sup>51</sup>
- 354) OCC BW dBc
- 355) OCC BW dBc
- 356) OCC BW dBc (lowest byte)
- 357) Attenuation (highest byte)<sup>52</sup>
- 358) Attenuation
- 359) Attenuation
- 360) Attenuation (lowest byte)
- 361) Antenna Index(0-9)
- 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
  - 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

<sup>49</sup> 00h = % of power, 01h = dB down

<sup>50</sup> 0 – 99%

<sup>51</sup> 0 – 120 dBc

<sup>52</sup> 0x00 = 0dB, 0x01 = 10dB, 0x02 = 20dB, 0x03 = 30dB, 0x04 = 40dB, 0x05 = 50dB

- 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: (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**
- 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/BELOW<sup>53</sup>**  
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**

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<sup>53</sup> Beep level is always 1b for upper segmented limit line

- bit 6 : SPA Multiple Limit Lower Segment 1 Status ON/OFF  
bit 7 : SPA Multiple Limit Lower Segment 1 Beep Level ABOVE/BELOW<sup>54</sup>
- 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)  
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)  
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 Type<sup>55</sup>  
395) Current Language  
(0 = English, 1 = French, 2 = German, 3 = Spanish, 4 = Chinese, 5 = Japanese)  
396) LCD Contrast Value (0-255)  
397) RTC battery<sup>56</sup>(Highest byte)  
398) RTC battery (Lowest byte)

<sup>54</sup> Beep level is always 0b for lower segmented limit line

<sup>55</sup> See Control Byte #30 for supported printers.

<sup>56</sup> Value sent as Volts \* 10. For example, 2.7V = 27.

- 399) PC board revision<sup>57</sup> (Highest byte)
  - 400) PC board revision (Lowest byte)
  - 401) Reference Level Offset<sup>58</sup> (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 (highest byte)
- 4) Battery Voltage (lowest byte)
- 5) Temperature (highest byte)
- 6) Temperature (lowest byte)
- 7) Lock Fail Counter (highest byte)
- 8) Lock Fail Counter (lowest byte)
- 9) Integrator Fail Counter (highest byte)
- 10) Integrator Fail Counter (lowest byte)
- 11) Spectrum Analyzer Lock Fail Counter (highest byte)
- 12) Spectrum Analyzer Lock Fail Counter (lowest 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 on the current measurement unit (Metric or English) selected.

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<sup>57</sup> This value is for internal use only.

<sup>58</sup> Value sent as (value in dBm \* 1000) + 270,000

### 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:** 6 bytes

- 1) Value of SM Lock Fail Counter (highest byte)
  - 2) Value of SM Lock Fail Counter (lowest byte)
  - 3) Value of Integration Fail Counter (highest byte)
  - 4) Value of Integration Fail Counter (lowest byte)
  - 5) Value of SA Lock Fail Counter (highest byte)
  - 6) Value of SA Lock Fail Counter (lowest byte)
- 

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

**Description:** Resets the Lock Fail Counter and Integrator Fail Counter.

**Bytes to Follow:** 0 bytes

**Site Master Returns:** Operation Complete Byte # 255 (FFh)

---

### 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

1-3) # 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)
- 

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

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

**Bytes to Follow:** 1 byte

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

**Site Master Returns:** Operation Complete Byte # 255 (FFh)

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

**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 Mode<sup>59</sup>
- 4-7) Time/Date (long integer format<sup>60</sup>)
- 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 Level<sup>61</sup> (highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (lowest byte)
- 64) Scale per div<sup>62</sup> (highest byte)
- 65) Scale per div
- 66) Scale per div
- 67) Scale per div (lowest byte)
- 68) Marker 1<sup>63</sup> (highest byte)
- 69) Marker 1 (lowest byte)
- 70) Marker 2 (highest byte)
- 71) Marker 2 (lowest byte)
- 72) Marker 3 (highest byte)
- 73) Marker 3 (lowest byte)
- 74) Marker 4 (highest byte)
- 75) Marker 4 (lowest byte)
- 76) Marker 5 (highest byte)
- 77) Marker 5 (lowest byte)
- 78) Marker 6 (highest byte)
- 79) Marker 6 (lowest byte)
- 80) Single Limit<sup>64</sup> (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)

<sup>59</sup> See Control Byte #3 “Select Measurement Mode” for measurement modes.

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

<sup>61</sup> Value sent as (value in dBm \* 1000) + 270,000

<sup>62</sup> Value sent as (value \* 1000)

<sup>63</sup> Marker values are sent as # of data point on display.

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

<sup>64</sup> All amplitude values are sent as (value in dBm \* 1000) + 270,000



- 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 Setting<sup>65</sup> (highest byte)
- 245) RBW Setting
- 246) RBW Setting
- 247) RBW Setting (lowest byte)
- 248) VBW Setting<sup>66</sup> (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) Attenuation<sup>67</sup> (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)
  - (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 : Marker 2 Delta ON/OFF
  - bit 1 : Marker 3 Delta ON/OFF
  - bit 2 : Marker 4 Delta ON/OFF
  - bits 3-7: Not Used

<sup>65</sup> Valid frequencies (in Hz) are 10,000 30,000 100,000 1,000,000

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

<sup>67</sup> Value sent as (value \* 1000)

- 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 Offset<sup>68</sup> (highest byte)  
 289) Reference Level Offset  
 290) Reference Level Offset  
 291) Reference Level Offset (lowest byte)  
 292-321) Not Used  
 322-1921) Sweep Data (400 points \* 4 bytes/point = 1600 bytes)  
 4 bytes for each data point  
 1. dBm<sup>69</sup> (highest byte)  
 2. dBm  
 3. dBm  
 4. dBm (lowest byte)

**Site Master Returns:** 1 byte

<sup>68</sup> Value sent as (Value in dBm \* 1000) + 270,000

<sup>69</sup> Value sent as (Value in dBm \* 1000) + 270,000

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 used (0 to 100)
- 

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

**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 Mode<sup>70</sup>
- 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)<sup>71</sup>
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (lowest byte)
- 48) Stop Frequency (highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (lowest byte)
- 52) Minimum Frequency Step Size (highest byte)
- 53) Minimum Frequency Step Size
- 54) Minimum Frequency Step Size
- 55) Minimum Frequency Step Size (lowest byte)
- 56) Scale Top (highest byte)<sup>72</sup>
- 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 (highest byte)<sup>73</sup>
- 65) Frequency Marker 1 (lowest byte)
- 66) Frequency Marker 2 (highest byte)

---

<sup>70</sup> See Control Byte #3 “Set Measurement Mode” for available measurement modes.

<sup>71</sup> Frequency in Hz

<sup>72</sup> See Control Byte #4, “Set Site Master Scale” for data format.

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

- 67) Frequency Marker 2 (lowest byte)
- 68) Frequency Marker 3 (highest byte)
- 69) Frequency Marker 3 (lowest byte)
- 70) Frequency Marker 4 (highest byte)
- 71) Frequency Marker 4 (lowest byte)
- 72) Frequency Marker 5 (highest byte)
- 73) Frequency Marker 5 (lowest byte)
- 74) Frequency Marker 6 (highest byte)
- 75) Frequency Marker 6 (lowest byte)
- 76) Single Limit Line Value (highest byte)<sup>74</sup>
- 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)<sup>75</sup>
- 83) Multiple Limit Start X
- 84) Multiple Limit Start X
- 85) Multiple Limit Start X (lowest byte)
- 86) Multiple Limit Start Y (highest byte)
- 87) Multiple Limit Start Y (lowest 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 (highest byte)
- 93) Multiple Limit End Y (lowest byte)
- 94-149) Repeat bytes 80-93 for segments 2-5
- 150) Start Distance (highest byte)<sup>76</sup>
- 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 (highest byte)<sup>77</sup>
- 159) Distance Marker 1 (lowest byte)
- 160) Distance Marker 2 (highest byte)
- 161) Distance Marker 2 (lowest byte)
- 162) Distance Marker 3 (highest byte)
- 163) Distance Marker 3 (lowest byte)
- 164) Distance Marker 4 (highest byte)
- 165) Distance Marker 4 (lowest byte)
- 166) Distance Marker 5 (highest byte)
- 167) Distance Marker 5 (lowest byte)
- 168) Distance Marker 6 (highest byte)
- 169) Distance Marker 6 (lowest byte)
- 170) Relative Propagation Velocity (highest byte)<sup>78</sup>
- 171) Relative Propagation Velocity

<sup>74</sup> See Control Byte #6, “Set Site Master Single Limit” for data format

<sup>75</sup> See Control Byte #112, “Set Site Master Segmented Limit Lines” for data format.

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

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

<sup>78</sup> Relative Propagation Velocity uses units 1/100,000

- 172)Relative Propagation Velocity  
 173)Relative Propagation Velocity (lowest byte)  
 174)Cable Loss (highest byte)<sup>79</sup>  
 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)<sup>80</sup>  
     (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)  
 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. Gamma MSB  
       2. Gamma  
       3. Gamma  
       4. Gamma LSB  
       5. Phase MSB  
       6. Phase  
       7. Phase  
       8. Phase LSB

**Site Master Returns:**     255 (FFh) Operation Complete Byte  
                               224 (E0h) Parameter Error: Not enough bytes transferred

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

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

225 (E1h) Memory Error: Not enough memory in SM to store  
238 (EEh) Time-out Error

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)

---

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

**Description:** Select Printer Type.

**Bytes to Follow:** 1 byte

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 340, 350
- 11 – HP DJ 500 Series
- 12 – HP DJ 600 Series
- 13 – HP DJ 800 Series
- 14 – HP DJ 1120
- 15 – HP LJ 6L, 6P, 4000
- 16 – Epson Esc/P Compatible
- 17 – Epson Esc/P2 Compatible
- 18 – Epson Esc/P Raster Compatible
- 19 – HP PCL3 Compatible

**Site Master Returns:** 1 byte

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

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

**Site Master Returns:**

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

---

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

**Description:** Setup trace math operation and trace.

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

---

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

**Description:** Setup trace overlay operation and trace.

**Bytes to Follow:** 2 bytes

1) Trace Overlay Operation (0 to 1)

00h = Off

01h = On

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

**Site Master Returns:** 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".

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:** 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

---

### Get Options - Control Byte #37 (25h)

**Description:** Queries the option(s) installed on the Site Master, returns a list as an ASCII string.  
5 = "Option 5" – Power Meter

**Bytes to Follow:** 0 bytes

**Site Master Returns:** : 1-4 bytes, depending on the option(s)

If "Option 5" – Power Meter is installed: "5"

If NO options are installed: "None"

---

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

**Description:** Return Power Level at detector Port

This control byte contains all the information you need to determine just about anything about a power monitor measurement.

**Bytes to Follow:** 0 bytes

**Site Master Returns:** 21 bytes

- 1) Status Byte (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 - 5) Relative Mode Reference Power Level in dBm
- 6 - 9) Offset Mode Power Level<sup>81</sup>
- 10 -13) Zero Mode Power Level<sup>82</sup>
- 14 -17) Absolute Power Level<sup>83</sup>
- 18 - 21) Power<sup>84</sup>

Notes: You can query power level without setting power monitor mode ON.

Absolute Power of -100 indicates a hardware failure(Power monitor mode unavailable or RF detector not connected)

Power is in 1000 of dBm.

Relative power is in 1000 of dBr

Offset is in 1000 of dB

---

<sup>81</sup> Offset in dB, value in dB \* 1000

<sup>82</sup> Value in dBm \* 1000

<sup>83</sup> Value in dBm \* 1000

<sup>84</sup> Value in dBm \* 1000 or dBr \* 1000



### Set Power Monitor Unit - Control Byte #40 (28h)

**Description:** Set Power Monitor unit to watts or dBm.

**Bytes to Follow:** 1 byte

00h = Watt (% if in relative mode)  
01h = dBm (dBr if in relative mode)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid power monitor unit  
238 (EEh) Time-out Error

---

### Relative Mode On/Off - Control Byte #41 (29h)

**Description:** Enable or disable Power Monitor Relative Mode.

**Bytes to Follow:** 1 byte

00h = Off  
01h = On w/ trigger (use the current power level as a reference power level)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid parameter  
238 (EEh) Time-out Error

---

### Offset Mode On/Off - Control Byte #42 (2Ah)

**Description:** Enable or disable Power Monitor Offset Mode.

**Bytes to Follow:** 5 byte

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

**Site Master Returns:** 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.

---

### Zero Mode On/Off - Control Byte #43 (2Bh)

**Description:** Enable or disable Power Monitor Zeroing Mode.

**Bytes to Follow:** 1 byte

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

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid parameter  
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 or serial port echo mode.

**Bytes to Follow:** 0 bytes

**Site Master Returns:** Sweep Complete Byte # 192 (C0h)

Note: If the Site Master is *not* in single sweep or serial port echo mode, sending this byte does nothing.

Note: This command is for local mode operation. If the Site Master is in remote mode, sending the byte does nothing.

---

### 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 is at <http://www.sbs-forum.org/specs/index.html>

---

### 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: :** 255 (FFh) Operation Complete  
238 (EEh) Time Out Error

---

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

**Description:** Enter remote mode then send model number and firmware version to the computer

**Bytes to Follow:** 0 bytes

**Site Master Returns:** : 13 bytes

1-2) Model # (unsigned integer, 0Ch for Site Master C Models)

3-9) Extended Model # (7 bytes in ASCII)

10-13) Software Version - 4 bytes (ASCII)

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.

---

### 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.

**Bytes to Follow:** 0 bytes

**Site Master Returns:** : 13 bytes

1-2) Model # (unsigned integer, 0Ch for Site Master C Models)

3-9) Extended Model # (7 bytes in ASCII)

10-13) Software Version (4 bytes in ASCII)

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.

---

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

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

**Bytes to Follow:** 25 bytes

- 0) Not Used
- 1) Cable List index (0 - 24)
- 2 – 16) Cable Description (string)
- 17) Propagation Velocity (highest byte)<sup>85</sup>
- 18) Propagation Velocity
- 19) Propagation Velocity
- 20) Propagation Velocity (lowest byte)
- 21) Insertion Loss (highest byte)<sup>86</sup>
- 22) Insertion Loss
- 23) Insertion Loss
- 24) Insertion Loss (lowest byte)

**Site Master Returns: :** 255 (FFh) Operation Complete  
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

- 0) Upper bound of Custom Cable Index
  - 1 – 15) Cable Description (string)
  - 16) Propagation Velocity (highest byte)<sup>87</sup>
  - 17) Propagation Velocity
  - 18) Propagation Velocity
  - 19) Propagation Velocity (lowest byte)
  - 20) Insertion Loss (highest byte)<sup>88</sup>
  - 21) Insertion Loss
  - 22) Insertion Loss
  - 23) Insertion Loss (lowest byte)
- 

<sup>85</sup> Propagation Velocity in units 1/100,000

<sup>86</sup> Insertion Loss in units 1/100,000 dB/m or 1/100,000 dB/ft

<sup>87</sup> Propagation Velocity in units 1/100,000

<sup>88</sup> Insertion Loss in units 1/100,000 dB/m or 1/100,000 dB/ft

## Write Antenna - Control Byte #82 (52h)

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

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

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

**Bytes to Follow:** 24 – 378, 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)

For each antenna factor:

- 1) Frequency (in Hz) (highest byte)
- 2) Frequency (in Hz)
- 3) Frequency (in Hz)
- 4) Frequency (in Hz) (lowest byte)
- 5) Antenna Factor (highest byte)
- 6) Antenna Factor (lowest byte)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error: Not enough bytes transferred  
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.

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:** (26-380 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) Number of Following Bytes

For each antenna factor:

- 1) Frequency (in Hz) (highest byte)
  - 2) Frequency (in Hz)
  - 3) Frequency (in Hz)
  - 4) Frequency (in Hz) (lowest byte)
  - 5) Antenna Factor (highest byte)
  - 6) Antenna Factor (lowest 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.

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

**Bytes to Follow:** 2 bytes

- 1) Field Strength Measurement State (On/Off)
- 2) Antenna List index (1-10)

**Site Master Returns:** 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 #26, Upload SPA Sweep Trace.

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 (in Hz)
- 7-10) Integration Bandwidth (in Hz)
- 11-14) Span Frequency (in Hz)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error: Invalid parameter value  
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).

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

## Set Adjacent Channel Power (ACP) - 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 (in Hz).

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 #26, Upload Sweep Trace.

Note that if the ACP 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 (in Hz)
- 7-10) Main Channel Bandwidth (in Hz)
- 11-14) Adjacent Channel Bandwidth (in Hz)
- 15-18) Channel Spacing (in Hz)

**Site Master Returns:**

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

---

## Read Adjacent Channel Power (ACP) - 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).

**Bytes to Follow:** 1 byte

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

**Site Master Returns:** 29 bytes

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

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

**Description:** Measure OCC BW with % of Power method.

**Bytes to Follow:** 4 Byte

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

**Site Master Returns:** 16 bytes

- 1-4) OCC BW (frequency in Hz)
  - 5-8) Measure dB down (dB \* 10,000)
  - 9-12) Low Frequency OCC BW (frequency in Hz)
  - 13-16) High Frequency OCC BW (frequency in Hz)
- 

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

**Description:** Measure OCC BW with dB down method.

**Bytes to Follow:** 4 Byte

- 1-4) dB down (In 100<sup>th</sup> of dB, 1234 = 12.34dB)

**Site Master Returns:** 16 bytes

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



## Set Spectrum Analyzer Frequency - Control Byte #99 (63h)

**Description:** Sets the Site Master frequency range by defining the center and span frequencies.

**Bytes to Follow:** 8 bytes

- 1) Start Frequency (highest byte)<sup>89</sup>
- 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:** 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 Site Master frequency range.

**Bytes to Follow:** 8 bytes

- 1) Center Frequency (highest byte)<sup>90</sup>
- 2) Center Frequency
- 3) Center Frequency
- 4) Center Frequency (lowest byte)
- 5) Frequency Span (highest byte)
- 6) Frequency Span
- 7) Frequency Span
- 8) Frequency Span (lowest byte)

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

---

<sup>89</sup> Frequency in Hz

<sup>90</sup> Frequency in Hz

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

Notes:

Parameters are sent as 1000<sup>th</sup> of a dB (-12.34dB = -12340)

Ref Level is sent as the (Ref Level \* 1000) + 270,000 (0dB = 270,000, 20dB = 290000,-120dB = 150,000)

---

## 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 (highest byte)
- 5) Marker Value (lowest byte)

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

Note:

Marker Value is between 0 and 399; Point = (399 \* (marker freq - start freq)) / span

---

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

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

**Bytes to Follow:** 6 bytes

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

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid limit, limit status, or limit value  
238 (EEh) Time-out Error

Note:

Parameters are sent as 1000<sup>th</sup> of a dB (-12.34dB = -12340)

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

---

## Set Spectrum Analyzer Max Hold - Control Byte #105 (69h)

**Description:** Sets the max hold settings on the Spectrum Analyzer.

**Bytes to Follow:** 1 byte

- 00h – Max Hold Off
- 01h – Max Hold On

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Setting  
238 (EEh) Time-out Error

---

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

**Description:** Sets the resolution BW freq for the Spectrum Analyzer.

**Bytes to Follow:** 1 byte

- 00h – 10 kHz resolution BW
- 01h – 30 kHz resolution BW
- 02h – 100 kHz resolution BW
- 03h – 1 MHz resolution BW

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid RBW  
238 (EEh) Time-out Error

---

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

**Description:** Sets the video BW freq for the Spectrum Analyzer.

**Bytes to Follow:** 1 byte

00h – 100 Hz video BW  
01h – 300 Hz video BW  
02h – 1 kHz video BW  
03h – 3 kHz video BW  
04h – 10 kHz video BW  
05h – 30 kHz video BW  
06h – 100 kHz video BW  
07h – 300 kHz video BW

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid VBW  
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. For Single Sweep Mode during Site Master modes of operation see control byte #11 (0Bh) Single Sweep Mode activates once the Site Master exits from the remote mode.

**Bytes to Follow:** 1 byte

00h – Single Sweep  
01h – Continuous Sweep

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Mode  
238 (EEh) Time-out Error

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### 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

Marker Number (1-6)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Marker Number  
238 (EEh) Time-out Error

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### 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

Marker Number (1-4)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Marker Number  
238 (EEh) Time-out Error

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

**Description:** Sets the attenuation for the Site Master Spectrum Analyzer mode.

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

**Site Master Returns:**

- 255 (FFh) Operation Complete Byte
- 224 (E0h) Parameter Error: invalid attenuation setting.
- 238 (EEh) Time-out Error

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## Set SM Segmented Limit Lines - Control Byte #112 (70h)

**Description:** Sets the position and On/Off status of the limit lines.

Site Master supports 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 #20 (14h) response byte 36 to 105 for 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)<sup>91</sup>
- 4) Starting X
- 5) Starting X
- 6) Starting X (lowest byte)
- 7) Starting Y (highest byte)
- 8) Starting Y (lowest byte)
- 9) Ending X (highest byte)<sup>92</sup>
- 10) Ending X
- 11) Ending X
- 12) Ending X (lowest byte)
- 13) Ending Y (highest byte)
- 14) Ending Y (lowest byte)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid limit segment, limit status, or limit value  
238 (EEh) Time-out Error

Notes:

**Limit Value** depend on the current display mode selected.

Return Loss &: Limit is in **thousandths** of a dB

Cable Loss Maximum value sent is 54000 which represents 54.00 dB  
Minimum value sent is 0 which represents 0.0 dB

SWR: Limit is in **thousandths** (of ratio)  
Maximum value sent is 65530 which represents 65.53  
Minimum value sent is 1000 which represents 1.00

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

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

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

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

One segment is defined each time this command is sent to the Site Master. The first two bytes of the command specify which segment is being defined. There are 5 upper limits and 5 lower limits available. Byte 1 selects the segment number. Byte 2 specifies whether it is an upper limit or a lower limit. Byte 3

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<sup>91</sup> Frequency in Hz

<sup>92</sup> Frequency in Hz

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 <sup>93</sup>(highest byte)
- 6) Limit Value Start X
- 7) Limit Value Start X
- 8) Limit Value Start X (lowest byte)
- 9) Limit Value Start Y <sup>94</sup>(highest byte)
- 10) Limit Value Start Y
- 11) Limit Value Start Y
- 12) Limit Value Start Y (lowest byte)
- 13) Limit Value End X <sup>95</sup>(highest byte)
- 14) Limit Value End X
- 15) Limit Value End X
- 16) Limit Value End X (lowest byte)
- 17) Limit Value End Y <sup>96</sup>(highest byte)
- 18) Limit Value End Y
- 19) Limit Value End Y
- 20) Limit Value End Y (lowest byte)

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid limit, limit status, or limit value  
238 (EEh) Time-out Error

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

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

**Bytes to Follow:** 1 byte

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

**Site Master Returns** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error: Invalid state  
238 (EEh) Time-out Error

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<sup>93</sup> Frequency in Hz

<sup>94</sup> ( Value in dBm \* 1000 ) + 270,000

<sup>95</sup> Frequency in Hz

<sup>96</sup> ( Value in dBm \* 1000 ) + 270,000





## 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

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## 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:**

OK: 3 bytes

- 1) Marker Position (Highest byte)<sup>97</sup>
- 2) Marker Position (Lowest byte)
- 3) 255 (FFh) Operation Complete Byte

Failure: 1 byte

224 (E0h) Parameter Error : Invalid marker, marker status, or marker position

238 (EEh) Time-out Error

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## 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

00h = 9600 baud

01h = 19200 baud

02h = 38400 baud

03h = 56000 baud

04h = 115200 baud

**Site Master Returns:** 255 (FFh) Operation Complete Byte

224 (E0h) Parameter Error : Invalid baud rate setting

238 (EEh) Time-out Error

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<sup>97</sup> The marker position is sent as a data point on the display. Equivalent Frequency = (position \* span / (# data points – 1) ) + start frequency

## Set Language – Control Byte #198 (C6h)

**Description:** Set the Site Master display language.

**Bytes to Follow:** 1 byte

- 00h = English
- 01h = French
- 02h = German
- 03h = Spanish
- 04h = Chinese
- 05h = Japanese

**Site Master Returns:** 255 (FFh) Operation Complete Byte  
224 (E0h) Parameter Error : Invalid Language  
238 (EEh) Time-out Error

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## Query Time - Control Byte #208 (D0h)

**Description:** Queries the Site Master for the current time in ASCII format.  
A better command to use would be “Read ASCII Serial Number” #225 (E1h).

**Bytes to Follow:** 0 bytes

**Site Master Returns:** 8 bytes HH:MM:SS

- 1) Hour
  - 2) Hour
  - 3) :
  - 4) Minute
  - 5) Minute
  - 6) :
  - 7) Second
  - 8) Second
- 

## Read Main Serial Number - Control Byte #221 (DDh)

**Description:** Returns the main serial number. This command remains for backward compatibility.  
A better command to use would be “Read ASCII Serial Number” #225 (E1h).

**Bytes to Follow:** 0 bytes

**Site Master Returns:** 4 bytes

- 9) Main Serial Number (highest byte)
  - 10) Main Serial Number
  - 11) Main Serial Number
  - 12) 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

Serial number storage location  
01h=main SM serial number,  
02h=secondary SM serial number,  
03h=main SPA serial number

**Site Master Returns:** : 8 bytes  
1-8) Serial Number (in ASCII)

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### Exit Remote Mode - Control Byte #255 (FFh)

**Description:** Site Master exits remote mode

**Bytes to Follow:** 0 bytes

**Site Master Returns:** : 255 (FFh) Operation Complete

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.

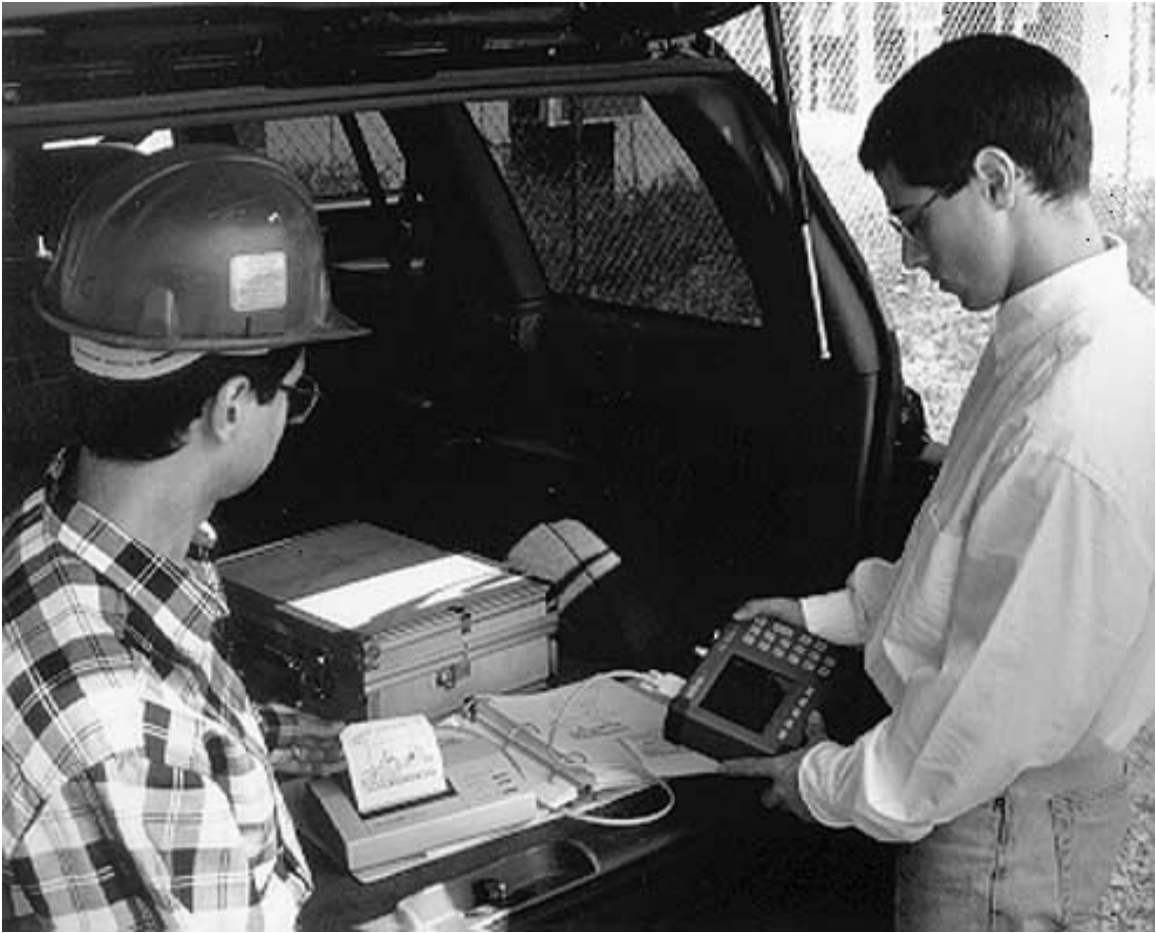
System parameters changed during remote mode are not written to the non-volatile EEPROM. You may want to save the change to the run-time setup (saved setup location 0, which holds the power-on defaults) or one of the nine saved setups(saved setup location 1-9). See control byte #18 (12h) for details.

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## Parameter Definitions

Parameter	# of bytes	Step	Example / Description
Frequency	4 bytes unsigned	1 Hz	1000.3 MHz = 1000300000
Scale (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
(G/IL)	2 bytes unsigned	1 / 100 dB	100 dB = 0 120 dB = 22000
Limit (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
(G/IL)	2 bytes unsigned	1 / 100 dB	100 dB = 0 120 dB = 22000
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 129 (130 data points in total)
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 / 1000 (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/dBr	4 bytes signed	1 / 1000 dBm 1 / 1000 dBr	51.3 dBm = 51300 10.4 dBr = 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





**Anritsu**