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The Anritsu product(s) listed on the title page is (are) warranted against defects in materials and workmanship for one year from the date of shipment.

Anritsu's obligation covers repairing or replacing products which prove to be defective during the warranty period. Buyers shall prepay transportation charges for equipment returned to Anritsu for warranty repairs. Obligation is limited to the original purchaser. Anritsu is not liable for consequential damages.

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TRADEMARK ACKNOWLEDGEMENTS

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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

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).

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)[1]
>> bits 4-7: Not Used
>
> 2) Status Byte 2
>> bit 0: RBW Coupling (to span) (1b = auto 0b = manual)
>> bit 1: VBW Coupling (to RBW) (1b = auto 0b = manual)
>> bit 2: Not Used
>> bits 3-4: Amplitude units (00b = dBm 01b = dBV 10b = dBmV 11b = dBuV)
>> bits 5-6: Detection algorithm (00b = positive peak 01b = 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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[1] 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

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

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

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:

point = (resolution – 1) * (marker freq – start freq) / (stop freq – 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) [2]
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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[2] 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

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

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

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[3]
         17-20)   Time/Date (in Long Integer[4])
         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[5] (highest byte)
         58)   Start Frequency
         59)   Start Frequency

---

[3] Refer to Control Byte #3 "Select Measurement Mode" for detailed value.
[4] Time/Date long integer representation is in seconds since January 1, 1970
[5] Frequency units 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[6] (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[7] (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[8] (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[9] (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[10] (highest byte)

---

[6] See Control Byte #4 "Set Site Master Scale" for data format
[7] 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.
[8] See Control Byte #6 "Set Site Master Single Limit" for data format.
[9] See Control Byte #112 "Set Site Master Segmented Limit Lines" for data format.
[10] Distance data uses units 1/100,000m (or feet)

164) Start Distance
165) Start Distance
166) Start Distance (lowest byte)
167) Stop Distance (highest byte)
168) Stop Distance
169) Stop Distance
170) Stop Distance (lowest byte)
171) Distance Marker 1[11] (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[12] (highest byte)
184) Relative Propagation Velocity
185) Relative Propagation Velocity
186) Relative Propagation Velocity (lowest byte)
187) Cable Loss[13] (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[14]
                bit 5 : Cal On/Off
                bit 6 : Limit Type (0b = Single; 1b = Multiple)

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[11] 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.
[12] Relative Propagation Velocity uses units 1/100,000
[13] Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.
[14] Bits (4,5) are as follows: (0,0) = Cal Off, (0,1) = OSL Cal (1,1) = InstaCal On, (1,0) = Impossible.

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

194) Status Byte 4:
    (LSB)   bit 0 - 1 : DTF Windowing Mode
            bit: 1 0
                        | |
                      0 0 - Rectangular (No Windowing)
                      0 1 - Nominal Side Lobe
                      1 0 - Low Side Lobe
                      1 1 - Minimum Side Lobe
            bits 2 – 7 : Not Used

195-228)   Not Used
229-1268)   Sweep Data   (130 points * 8 bytes/point = 1040 bytes)
229-2300)   Sweep Data   (259 points * 8 bytes/point = 2072 bytes)
229-4364)   Sweep Data   (517 points * 8 bytes/point = 4136 bytes)
            8 bytes for each data point
                1. gamma[15] MSB
                2. gamma
                3. gamma
                4. gamma LSB
                5. phase[16] MSB
                6. phase
                7. phase
                8. phase LSB

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

For Spectrum Analyzer Mode:
57)   Start Frequency[17] (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[18] (highest byte)

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[15] Gamma data uses 1/1000 units.
[16] Phase data uses 1/10 degree unit.
[17] Frequency in Hz
[18] Value sent as (Value in dBm * 1000) + 270,000

78)   Ref Level
79)   Ref Level
80)   Ref Level (lowest byte)
81)   Scale per div[19] (highest byte)
82)   Scale per div
83)   Scale per div
84)   Scale per div (lowest byte)
85)   Frequency Marker 1[20] (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[21] (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[22]) (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[23] (highest byte)

---

[19] Value sent as (Value * 1000)
[20] Value sent as data point on display. Freq = (Point * Span / (Total Data Points – 1)) + Start Freq
[21] Value sent as (value in dBm * 1000) + 270,000
[22] Value sent as (value in dBm * 1000) + 270,000
[23] % value is 0-99

271) OCC BW % Value
272) OCC BW % Value
273) OCC BW % Value (lowest byte)
274) OCC BW dBc [24](highest byte)
275) OCC BW dBc
276) OCC BW dBc
277) OCC BW dBc (lowest byte)
278) Attenuation[25] (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[26]
    (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[27]
                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

---

[24] dBc value 0 – 120 dBc

[25] Value sent as (value in dB * 1000)

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

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

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[28]

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 [29](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[30] 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

---

[28] LOWER limits always trigger an error beep if data is BELOW the limit segment, for example, this bit is always 0b.
[29] Value sent as (value in dBm * 1000) + 270,000
[30] Value sent as (value in dBm * 1000) + 270,000

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[31]
> 2)   Site Master Mode Data Points (highest byte)
> 3)   Site Master Mode Data Points (lowest byte)
> 4)   Start Frequency (Frequency in Hz) (highest byte)

---

[31] 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)[32]
13) Scale Start
14) Scale Start
15) Scale Start (lowest byte)
16) Scale Stop (highest byte)
17) Scale Stop
18) Scale Stop
19) Scale Stop (lowest byte)
20) Frequency Marker 1 (highest byte)[33]
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)[34]
33) Site Master Single Limit
34) Site Master Single Limit
35) Site Master Single Limit (lowest byte)
36) Multiple Limit Segment # (1)
37) Multiple Limit Segment Status (0h = Off, 01h = On)
38) Multiple Limit Segment Start X (highest byte)[35]
39) Multiple Limit Segment Start X
40) Multiple Limit Segment Start X
41) Multiple Limit Segment Start X (lowest byte)
42) Multiple Limit Segment Start Y (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)[36]
107) Start Distance
108) Start Distance

---

[32] See "Set Site Master Scale" Control Byte #4 for data format.
[33] 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.
[34] See Control Byte #6, "Set Site Master Single Limit" for data format.
[35] See Control Byte #112, "Set Site Master Segmented Limit Lines" for data format.
[36] 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)[37]
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)[38]
127)   Relative Propagation Velocity
128)   Relative Propagation Velocity
129)   Relative Propagation Velocity (lowest byte)
130)   Cable Loss (highest byte)[39]
131)   Cable Loss
132)   Cable Loss
133)   Cable Loss (lowest byte)
134)   Spectrum Analyzer Mode Data Points (highest byte)
135)   Spectrum Analyzer Mode Data Points (lowest byte)
136)   Spectrum Analyzer Start Frequency[40] (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)[41]

---

[37] 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.
[38] Relative Propagation Velocity uses units 1/100,000.
[39] Cable loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.
[40] Frequency unit is Hz.
[41] 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)[42]
161)   Scale per div
162)   Scale per div
163)   Scale per div (lowest byte)
164)   Spectrum Analyzer Frequency Marker 1 (highest byte)[43]
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)[44]
177)   Spectrum Analyzer Single Limit
178)   Spectrum Analyzer Single Limit
179)   Spectrum Analyzer Single Limit (lowest byte)
180)   Multiple Upper Limit 1 Start X (Frequency in Hz) (highest byte)
181)   Multiple Upper Limit 1 Start X (Frequency in Hz)
182)   Multiple Upper Limit 1 Start X (Frequency in Hz)
183)   Multiple Upper Limit 1 Start X (Frequency in Hz) (lowest byte)
184)   Multiple Upper Limit 1 Start Y (Power Level) (highest byte) [45]
185)   Multiple Upper Limit 1 Start Y (Power Level)
186)   Multiple Upper Limit 1 Start Y (Power Level)
187)   Multiple Upper Limit 1 Start Y (Power Level) (lowest byte)
188)   Multiple Upper Limit 1 End X (Frequency in Hz) (highest byte)
189)   Multiple Upper Limit 1 End X (Frequency in Hz)
190)   Multiple Upper Limit 1 End X (Frequency in Hz)
191)   Multiple Upper Limit 1 End X (Frequency in Hz) (lowest byte)
192)   Multiple Upper Limit 1 End Y (Power Level) (highest byte) [46]
193)   Multiple Upper Limit 1 End Y (Power Level)
194)   Multiple Upper Limit 1 End Y (Power Level)
195)   Multiple Upper Limit 1 End Y (Power Level) (lowest byte)
196-339) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5 (see bytes 180-195 for format)
340)   RBW Setting (highest byte)[47]
341)   RBW Setting
342)   RBW Setting
343)   RBW Setting (lowest byte)
344)   VBW Setting (highest byte)[48]
345)   VBW Setting

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[42] Value sent as (value * 1000)

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

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

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

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

[47] 0x0000 = 10KHz,   0x0001 = 30KHz,   0x0002 = 100KHz,   0x0003 = 1MHz

[48] 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[49]

349)   OCC BW % Value (highest byte)[50]

350)   OCC BW % Value

351)   OCC BW % Value

352)   OCC BW % Value (lowest byte)

353)   OCC BW dBc (highest byte)[51]

354)   OCC BW dBc

355)   OCC BW dBc

356)   OCC BW dBc (lowest byte)

357)   Attenuation (highest byte)[52]

358)   Attenuation

359)   Attenuation

360)   Attenuation (lowest byte)

361)   Antenna Index(0-9)

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

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

[50] 0 – 99%

[51] 0 – 120 dBc

[52] 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[53]
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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[53] 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 [54]

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[55]
395)   Current Language
      (0 = English, 1 = French, 2 = German, 3 = Spanish, 4 = Chinese, 5 = Japanese)
396)   LCD Contrast Value (0-255)
397)   RTC battery [56](Highest byte)
398)   RTC battery (Lowest byte)

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[54] Beep level is always 0b for lower segmented limit line
[55] See Control Byte #30 for supported printers.
[56] Value sent as Volts * 10. For example, 2.7V = 27.

399)   PC board revision [57](Highest byte)
400)   PC board revision (Lowest byte)
401)   Reference Level Offset[58] (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 ^{o}C) or degree Fahrenheit (e.g. 934 = 93.4 ^{o}F),
depending on the current measurement unit (Metric or English) selected.

---

[57] This value is for internal use only.
[58] 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)

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[59]
4-7)	Time/Date (long integer format[60])
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[61] (highest byte)
61)	Ref Level
62)	Ref Level
63)	Ref Level (lowest byte)
64)	Scale per div[62] (highest byte)
65)	Scale per div
66)	Scale per div
67)	Scale per div (lowest byte)
68)	Marker 1[63] (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[64] (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)

---

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

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

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

[62] Value sent as (value * 1000)

[63] Marker values are sent as # of data point on display.
See Control Byte #102, "Set Spectrum Analyzer Marker" for calculation of data point.

[64] 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[65] (highest byte)
245) RBW Setting
246) RBW Setting
247) RBW Setting (lowest byte)
248) VBW Setting[66] (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[67] (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

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[65] Valid frequencies (in Hz) are 10,000 30,000 100,000 1,000,000
[66] Valid frequencies (in Hz) are 100, 300, 1,000 3,000 10,000 30,000 100,000 300,000
[67] Value sent as (value * 1000)

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[68] (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[69] (highest byte)
                              2. dBm
                              3. dBm
                              4. dBm (lowest byte)

Site Master Returns: 1 byte

---

[68] Value sent as (Value in dBm * 1000) + 270,000
[69] 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[70]
      4-7)   Time/Date (in Long Integer)
      8-17)   Date in String Format (mm/dd/yyyy)
      18-25)   Time in String Format (hh:mm:ss)
      26-41)   Reference number stamp (16 ASCII bytes)
      42-43)   # of data points
      44) Start Frequency (highest byte)[71]
      45) Start Frequency
      46) Start Frequency
      47) Start Frequency (lowest byte)
      48) Stop Frequency (highest byte)
      49) Stop Frequency
      50) Stop Frequency
      51) Stop Frequency (lowest byte)
      52) Minimum Frequency Step Size (highest byte)
      53) Minimum Frequency Step Size
      54) Minimum Frequency Step Size
      55) Minimum Frequency Step Size (lowest byte)
      56) Scale Top (highest byte)[72]
      57) Scale Top
      58) Scale Top
      59) Scale Top (lowest byte)
      60) Scale Bottom (highest byte)
      61) Scale Bottom
      62) Scale Bottom
      63) Scale Bottom (lowest byte)
      64) Frequency Marker 1 (highest byte)[73]
      65) Frequency Marker 1 (lowest byte)
      66) Frequency Marker 2 (highest byte)

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[70] See Control Byte #3 "Set Measurement Mode" for available measurement modes.
[71] Frequency in Hz
[72] See Control Byte #4, "Set Site Master Scale" for data format.
[73] Marker point = (Number of data points – 1) * (marker freq – start freq) / (stop freq – start freq)

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)[74]
77) Single Limit Line Value
78) Single Limit Line Value
79) Single Limit Line Value (lowest byte)
80) Multiple Limit Segment # (1)
81) Multiple Limit Segment Status (00h = Off, 01h = On)
82) Multiple Limit Start X (highest byte)[75]
83) Multiple Limit Start X
84) Multiple Limit Start X
85) Multiple Limit Start X (lowest byte)
86) Multiple Limit Start Y (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)[76]
151) Start Distance
152) Start Distance
153) Start Distance (lowest byte)
154) Stop Distance (highest byte)
155) Stop Distance
156) Stop Distance
157) Stop Distance (lowest byte)
158) Distance Marker 1 (highest byte)[77]
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)[78]
171) Relative Propagation Velocity

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[74] See Control Byte #6, "Set Site Master Single Limit" for data format
[75] See Control Byte #112, "Set Site Master Segmented Limit Lines" for data format.
[76] Distance data uses units 1/100,000m or 1/100,000 ft
[77] Marker point = (# of data points – 1) * (marker dist – start dist) / (stop dist – start dist)
[78] Relative Propogation Velocity uses units 1/100,000

172) Relative Propagation Velocity
173) Relative Propagation Velocity (lowest byte)
174) Cable Loss (highest byte)[79]
175) Cable Loss
176) Cable Loss
177) Cable Loss (lowest byte)
178) Status Byte 1: (0b = Off , 1b = On)
      (LSB)   bit 0 : Marker 1 On/Off
                    bit 1 : Marker 2 On/Off
                    bit 2 : Marker 3 On/Off
                    bit 3 : Marker 4 On/Off
                    bit 4 : Marker 5 On/Off
                    bit 5 : Marker 6 On/Off
                    bits 6-7 : Not Used
179) Status Byte 2: (0b = Off, 1b = On)
      (LSB)   bit 0 : Marker 2 Delta On/Off
                    bit 1 : Marker 3 Delta On/Off
                    bit 2 : Marker 4 Delta On/Off
                    bits 3-7: Not Used
180) Status Byte 3: (0b = Off , 1b = On)[80]
      (LSB)   bit 0 : Single Limit On/Off
                    bit 1: CW On/Off
                    bits 2-3: Not Used
                    bit 4 : InstaCal On/Off
                    bit 5 : Cal On/Off
                    bit 6 : Limit Type (0b = Single; 1b = Multiple)
                    bit 7 : Unit of measurement (1b = Metric, 0b = English)
181) Status Byte 4:
          (LSB)   bit 0 - 1 : DTF Windowing Mode
                    bit: 1 0
                                    | |
                                0 0 - Rectangular (No Windowing)
                                0 1 - Nominal Side Lobe
                                1 0 - Low Side Lobe
                                1 1 - Minimum Side Lobe
              bits 2 – 7 : Not Used
182-215)   Not Used
216-1255)   Sweep Data   (130 points * 8 bytes/point= 1040 bytes)
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

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[79] Cable Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft
[80] Bits (4,5) are as follows: (0,0)=Cal Off, (0,1)=OSL Cal, (1,0) = Impossible, (1,1) = InstaCal

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

Note: return loss = - 20* (log(Gamma) / log(10))
         VSWR   = (1+Gamma)/(1-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 [81]

    10 -13) Zero Mode Power Level [82]

    14 -17) Absolute Power Level [83]

    18 - 21) Power[84]

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

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[81] Offset in dB, value in dB * 1000

[82] Value in dBm * 1000

[83] Value in dBm * 1000

[84] 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

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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)[85]
- 18) Propagation Velocity
- 19) Propagation Velocity
- 20) Propagation Velocity (lowest byte)
- 21) Insertion Loss (highest byte)[86]
- 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)[87]
- 17) Propagation Velocity
- 18) Propagation Velocity
- 19) Propagation Velocity (lowest byte)
- 20) Insertion Loss (highest byte)[88]
- 21) Insertion Loss
- 22) Insertion Loss
- 23) Insertion Loss (lowest byte)

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[85] Propagation Velocity in units 1/100,000
[86] Insertion Loss in units 1/100,000 dB/m or 1/100,000 dB/ft
[87] Propagation Velocity in units 1/100,000
[88] 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 100th 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 100th of dB, 1234 = 12.34dB)

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

Set Spectum 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)[89]
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 Spectum 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)[90]
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

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[89] Frequency in Hz
[90] 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 1000th 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 1000th 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

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

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

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

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)[91]
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)[92]
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

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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[91] Frequency in Hz
[92] 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 [93](highest byte)
6) Limit Value Start X
7) Limit Value Start X
8) Limit Value Start X (lowest byte)
9) Limit Value Start Y [94](highest byte)
10) Limit Value Start Y
11) Limit Value Start Y
12) Limit Value Start Y (lowest byte)
13) Limit Value End X [95](highest byte)
14) Limit Value End X
15) Limit Value End X
16) Limit Value End X (lowest byte)
17) Limit Value End Y [96](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

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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[93] Frequency in Hz
[94] (Value in dBm * 1000) + 270,000
[95] Frequency in Hz
[96] (Value in dBm * 1000) + 270,000

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

Description: Set the value of the reference level offset.

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

Note that the valid range is –100 to +100 dB.
Send the value as (value in dB * 1000) + 270,000.
For example, to compensate for a 30 dB attenuator, the reference level offset should be -30 dB. That value would be sent over the serial port as (-30 * 1000) + 270,000 = 240,000.

Bytes to Follow: 4 bytes
1) Reference Level Offset (highest byte)
2) Reference Level Offset
3) Reference Level Offset
4) Reference Level Offset (lowest byte)

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

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

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

Bytes to Follow: 1 byte

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

Site Master Returns: 255 (FFh) Operation Complete
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Field InstaCal - Control Byte #120 (78h)

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

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

Byte to Follow: 0 bytes

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

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

Description: Returns the InstaCal Module serial number in ASCII.

Bytes to Follow: 1 byte

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

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

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

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

Bytes to Follow: 2 bytes

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

Site Master Returns:
        OK: 3 bytes
     1)   Marker Position (Highest byte)[97]
     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

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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[97] 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

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)

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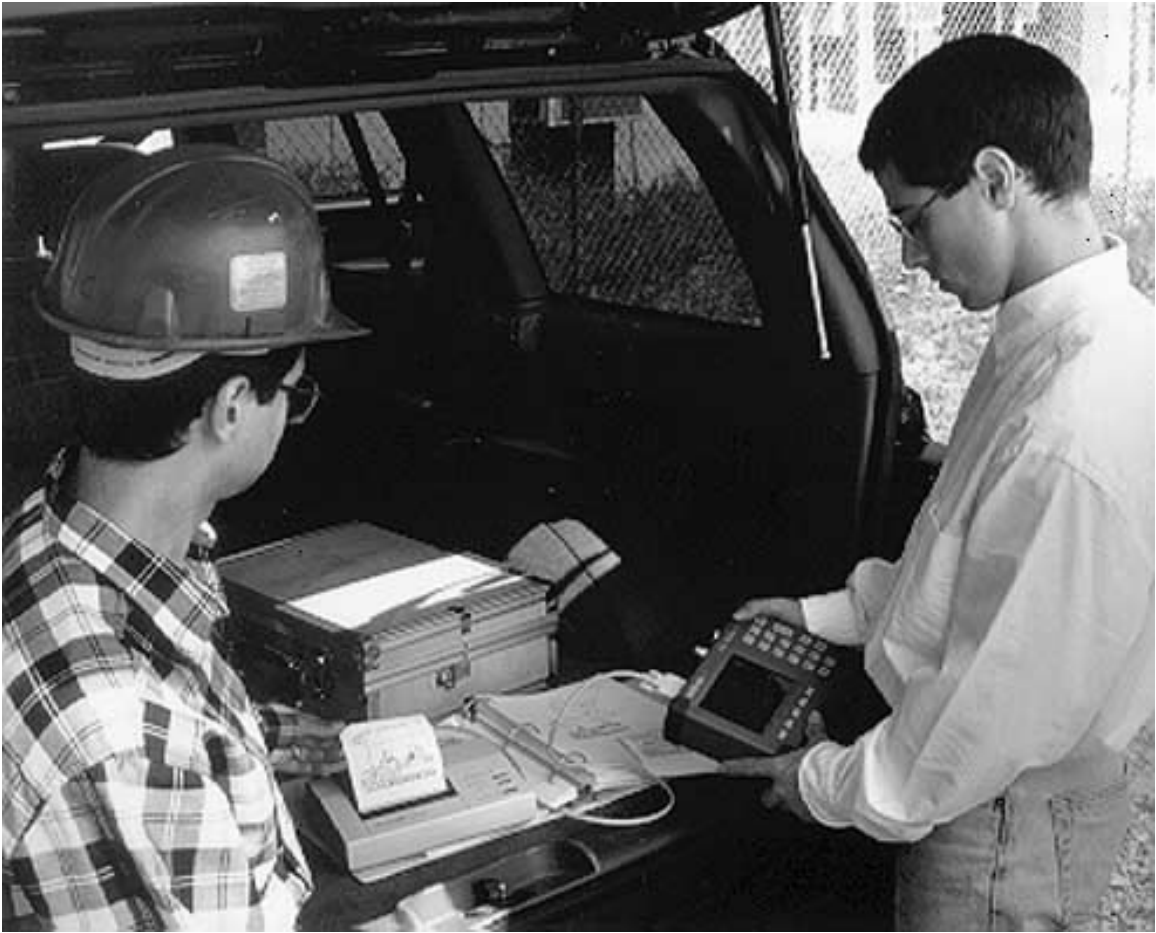
System parameters changed during remote mode are not written to the non-volatile EEPROM.
You may want to save the change to the run-time setup (saved setup location 0, which holds the power-on defaults) or one of the nine saved setups(saved setup location 1-9). See control byte #18 (12h) for details.

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

/Inritsu