

Anritsu

MS2711A
Hand-Held
Spectrum Analyzer

Programming Manual



**Hand-Held Spectrum Analyzer, for Measuring,
Monitoring and Analyzing Signal Environments**

WARRANTY

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.

LIMITATION OF WARRANTY

The foregoing warranty does not apply to Anritsu connectors that have failed due to normal wear. Also, the warranty does not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, or operation outside the environmental specifications of the product. No other warranty is expressed or implied, and the remedies provided herein are the Buyer's sole and exclusive remedies.

TRADEMARK ACKNOWLEDGEMENTS

MS-DOS, Windows, and Windows for Workgroups are registered trademarks of the Microsoft Corporation.

Site Master and **Cable Mate** are trademarks of Anritsu Company.

NOTICE

Anritsu Company has prepared this manual for use by Anritsu Company personnel and customers as a guide for the proper installation, operation, and maintenance of Anritsu Company equipment and computer programs. The drawings, specifications, and information contained herein are the property of Anritsu Company, and any unauthorized use or disclosure of these drawings, specifications, and information is prohibited; they shall not be reproduced, copied, or used in whole or in part as the basis for manufacture or sale of the equipment or software programs without the prior written consent of Anritsu Company.

Index

How To Use This Manual	1
-------------------------------------	---

Programming Manual Organization	1
--	---

Programming Overview

General Description	2
Cabling	2
Serial Communication Parameters	2
Communications Error Checking	2
Parameter Validation	2
Entering Remote Mode	3
Exiting Remote Mode	3
Lifetime of Changes to Spectrum Analyzer Operating Parameters	3
Write Cycle Limitation of EEPROM	3

Functional Description

Initialize

Enter remote mode	4
Enter remote mode immediately	4

Configure

System

LCD backlight	4
Watch dog timer	4
Serial port echo	4
Sweep mode select	4
Printer type	4
Automatically save runtime setup	4
Return sweep time	4
AM/FM demodulation	4
Set sweep averaging	4

Measurement

Measurement mode select	4
-------------------------------	---

Power Monitor

Get Power levels	5
Power Monitor Units of measure	5
Relative mode	5
Offset mode	5
Zero mode	5

Frequency

Start frequency	5
Stop frequency	5
Center frequency	5
Frequency span	5

Display	
Display mode	5
Ref level	5
dB/div	5
Markers	
On/Off	5
Delta Status On/Off	5
Value	5
Marker to Peak	5
Marker to Center	5
Single Limits	
On/Off	6
Beep	6
Value	6
Multiple Limits	
On/Off	6
Beep	6
Value	6
A/B Trace	
A/B trace select	6
<u>Utility</u>	
Time set	6
Date set	6
Reference number set	6
Read time	6
Read date	6
<u>Action</u>	
Trigger sweep	6
Save system setup	6
Recall system setup	6
Save sweep	7
Query trace names	7
Query trace memory	7
Download sweep trace	7
Delete sweep trace	7
Write Antenna	7
Recall Antenna	7
<u>Data</u>	
Recall sweep	7
<u>Measurement</u>	
Measure OCC BW % of Power	7
Measure OCC BW dB Down	7

Set Max Hold	7
Set Resolution BW Frequency	7
Set Video BW Frequency	7
Set Attenuation	7
Set field strength measurement	7
Set channel power	7
Read channel power.	7
Set adjacent channel power	7
Read adjacent channel power	7

Status

Query system status	8
Self-test Trigger	8
Battery status	8

Close

Exit remote mode	8
----------------------------	---

Control Byte Descriptions

Control byte summary	9
Control byte 1 Setup system	11
Control byte 3 Select measurement mode	11
Control byte 7 Read time/date	12
Control byte 8 Set time/date	12
Control byte 9 Set reference number	12
Control byte 10 Serial port echo on/off	13
Control byte 12 Watch dog timer on/off	13
Control byte 16 Store sweep trace	14
Control byte 17 Recall sweep trace.	14
Control byte 18 Save system setup.	17
Control byte 19 Recall system setup	17
Control byte 20 Query system status	18
Control byte 21 Trigger self-test	21
Control byte 24 Query trace names.	21
Control byte 25 Delete sweep trace	22
Control byte 26 Download sweep trace	22
Control byte 27 Query sweep memory.	25
Control byte 30 Select printer type	25
Control byte 34 Set A/B trace	25
Control byte 39 Query power level	26
Control byte 40 Set power monitor unit	26
Control byte 41 Relative mode on/off.	27
Control byte 42 Offset mode on/off	27
Control byte 43 Zero mode on/off	27
Control byte 48 Trigger sweep	28
Control byte 50 Check battery status	28
Control byte 64 Automatically save runtime setup	28
Control byte 69 Enter remote mode	29

Control byte 70	Enter remote mode immediately	29
Control byte 82	Write antenna	30
Control byte 83	Recall antenna	30
Control byte 84	Set Field Strength Measurement	31
Control byte 85	Set Channel Power	31
Control byte 86	Read Channel Power	31
Control byte 87	Set Adjacent Channel Power	32
Control byte 88	Read Adjacent Channel Power	32
Control byte 96	Measure OCC BW % of Power	33
Control byte 97	Measure OCC BW dB Down	33
Control byte 99	Set Frequency	34
Control byte 100	Set Center Freq/Span	34
Control byte 101	Set Scale	35
Control byte 102	Set Marker	35
Control byte 103	Set Single Limit	36
Control byte 105	Set Max Hold	36
Control byte 106	Set Resolution Bandwidth	36
Control byte 107	Set Video Bandwidth	37
Control byte 108	Set Sweep Mode	37
Control byte 109	Set Marker to Peak	38
Control byte 110	Set Marker to Center	38
Control byte 111	Set Attenuation	38
Control byte 112	Set AM/FM Demodulation	39
Control byte 113	Set Multiple Limit	39
Control byte 114	Set Return Sweep Time	40
Control byte 118	Set Sweep Averaging	40
Control byte 255	Exit remote mode	40
Parameter definitions	41

How to Use this Manual

If you want to find out
general concepts for programming the Spectrum Analyzer,
go to the Programming Overview.

If you want to find out
how to **perform a task**,
go to the Functional Description.

If you want to find out
what the **syntax of a control byte** is,
go to the Control Byte Description.

Programming Manual Organization

Programming Overview

This section contains general information about programming the Spectrum Analyzer. It is an introduction and helps you get started.

Functional Descriptions

This section includes a complete list of tasks you can control via the serial port. These are high level descriptions. Each task refers you to the appropriate individual control byte for details.

Control Byte Descriptions

This section contains detailed explanations for each of the control bytes.

Programming Overview

This programming manual is written exclusively for the Anritsu Hand-Held Spectrum Analyzer Model MS2711A with firmware Version 1.30 and above. For information on firmware upgrade, please contact your local Anritsu service center.

General Description

The MS2711A must first be set into “remote” mode for communication with a computer. Remote mode differs from normal continuous sweep and single-sweep modes. During remote mode, the Spectrum Analyzer suspends normal operations and attends to the serial port. The front panel display indicates when the Spectrum Analyzer is in remote mode.

Once in remote mode, you send a series of control bytes and associated data to the Spectrum Analyzer. These control byte sequences command the unit 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 MS2711A rear panel.

To complete the communication session, send the control byte to exit remote mode. Spectrum Analyzer resumes normal operations. You may also exit the remote mode by using the <ESCAPE> key.

Cabling

Serial communications take place via the 9 pin connector on the back of the MS2711A. The Spectrum Analyzer is a DTE-type serial device and therefore requires a “null modem” cable for communication with a computer, which is also a DTE device. A serial “null modem” interface cable is provided with your MS2711A.

Serial Communication Parameters

The Spectrum Analyzer communicates at a baud rate of 9600. It uses no parity bits, 8 data bits, and 1 stop bit (N-8-1). No hardware handshaking is used.

Communications Error Checking

Since there is no hardware handshaking, byte level error handling must be done by the controlling program. The expected number of response bytes for each control byte (listed in the control byte description section of this manual) works well for responses coming from the Spectrum Analyzer. For data streams going to the MS2711A, 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 MS2711A validates input parameters for each control byte sequence. If the input parameters are out of range or invalid, the Spectrum Analyzer notifies the computer by sending Parameter Error Byte #224 (E0h). The Spectrum Analyzer discards the received data and waits for the next control byte.

Entering Remote Mode

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

The MS2711A's serial port buffer is one byte wide. No internal buffer exists, so waiting is essential. If the Spectrum Analyzer is not in remote, sending a second byte overwrites the original byte commanding it to go into remote. If you send control byte #69, you must wait until the end of the sweep. If you send control byte #70, the unit will enter remote mode as it receives the byte. Note that this means the data stored for the current sweep may be incomplete.

Once you receive the response string from Spectrum Analyzer, you're in remote mode.

Exiting Remote Mode

Send the Exit Remote control byte #255 (FFh) to the MS2711A. The Spectrum Analyzer sends a response byte of 255 (FFh) then exits remote mode.

Lifetime of Changes to Spectrum Analyzer Operating Parameters

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

If you want the changes saved, you must save the change to one of the setup memories. Use either the run-time setup (location 0, which holds the power-on defaults) or one of the ten saved setups. See control byte #18 (12h) for details. You can also use control byte #64 to specify that the runtime setup be automatically saved to setup location 0 when exiting remote mode.

Write Cycle Limitation of EEPROM

The EEPROM, used to store setups, has a guaranteed lifetime of at least 100,000 write cycles and an unlimited number of read cycles. The write cycle limitation is for a specific location. For example, you can store setup #1 100,000 times and setup #2 100,000 times, etc.

It is for this reason we do not automatically store the changed system parameters to EEPROM. Instead, we provide a means of changing the operating parameters independent of this limitation.

Be aware of the EEPROM write cycle limitation when programming the MS2711A. Keep the number of write cycles to a minimum.

Functional Description

INITIALIZE

Enter remote mode - see control byte #69 (45h)

The Spectrum Analyzer must be in remote mode for further control byte command sequences to be accepted. Remember to wait until the Spectrum Analyzer responds before issuing further control byte sequences.

Enter remote mode immediately - see control byte #70 (46h)

CONFIGURE SYSTEM

LCD backlight -see control byte #1 (01h)

LCD backlight helps in adverse lighting conditions.

Watch dog timer - see control byte #12 (0Ch)

Used to guard against interrupted data transfers to the Spectrum Analyzer.

Serial port echo - see control byte #10 (0Ah)

Use this to synchronize the Spectrum Analyzer sweep and computer requests for current trace data.

The Spectrum Analyzer goes into single sweep mode. It sends the sweep complete byte #192 (C0h) after the completion of each sweep. You must send the sweep trigger byte #48(30h) for the Spectrum Analyzer to perform another sweep. Retrieve the trace data using control byte #17 (11h).

Sweep mode select - see control byte #108 (6Ch)

Sweep mode is selectable as single sweep or continuous sweep mode.

Printer type - see control byte #30 (1Eh)

Printer type is selectable.

Automatically save runtime setup - see control byte #64 (40h)

Return sweep time -see control byte #114 (72h)

AM/FM demodulation - see control byte #112 (70h)

Set Sweep Averaging - see control byte #118 (76h)

CONFIGURE MEASUREMENT

Measurement mode select - see control byte #3 (03h)

Measurement mode is selectable as tracking generator mode, spectrum analyzer mode, or power monitor mode.

CONFIGURE POWER MONITOR

The power monitor is available as an option.

Get Power levels - see control byte #39 (27h)

Querying the Spectrum Analyzer gives the raw and corrected power levels plus information about the configuration.

Power Monitor Units of measure - see control byte #40 (28h)

Relative Mode - see control byte #41 (29h)

Offset Mode - see control byte #42 (2Ah)

Zero Mode - see control byte #43 (2Bh)

CONFIGURE FREQUENCY

Start frequency - see control byte 99 (63h)

Stop frequency - see control byte #99 (63h)

Center frequency - see control byte #100 (64h)

Frequency span - see control byte #100 (64h)

CONFIGURE DISPLAY

Display mode - see control byte #3 (03h)

Selectable as spectrum analyzer or power monitor.

Ref level - see control byte #101 (65h)

dB/div - see control byte #101 (65h)

CONFIGURE MARKERS

Marker (on/off) - see control byte #102 (66h)

Marker Delta Status (on/off) - see control byte #102 (66h)

Marker value - see control byte #102 (66h)

Marker to Peak - see control byte #109 (6Dh)

Marker to Center - see control byte #110 (6Eh)

CONFIGURE SINGLE LIMITS

Limit (on/off) - see control byte #103 (67h)

Limit beep (on/off) - see control byte #103 (67h)

Limit beep (if data above/below limit line) - see control byte #103 (67h)

Limit value - see control byte #103 (67h)

CONFIGURE MULTIPLE LIMITS

Limit (on/off) - see control byte #113 (71h)

Limit beep (on/off) - see control byte #113 (71h)

Limit value - see control byte #113 (71h)

CONFIGURE A/B TRACE

A/B trace select - see control byte #34 (22h)

Set up A and B trace definitions.

UTILITY

ASCII text strings, which are stored with each sweep, help identify the stored traces. Use these control bytes to modify the strings before storing the trace.

Time set - see control byte #8 (08h)

Date set - see control byte #8 (08h)

Reference number set - see control byte #9 (09h)

Read Time - see control byte #7 (07h)

Read Date - see control byte #7 (07h)

ACTION

Trigger sweep - see control byte #48 (30h)

Both serial port echo and single sweep modes use this byte to trigger a Spectrum Analyzer sweep. If the Spectrum Analyzer is not in one of those modes, this byte is ignored.

Save system setup - see control byte #18 (12h)

Recall system setup - see control byte #19 (13h)

Save sweep - see control byte #16 (10h)

Query trace names - see control byte #24 (18h)

Query trace memory - see control byte #27 (1Bh)

Download sweep trace - see control byte #26 (1Ah)

Delete sweep trace - see control byte #25 (19h)

Write Antenna - see control byte #82 (52h)

Recall Antenna - see control byte #83 (53h)

DATA

Recall sweep - see control byte #17 (11h)

Use this control byte to obtain stored traces or the current measurement data from the Spectrum Analyzer. All traces and modes use the same trace data format.

MEASUREMENT

Measure OCC BW % of Power - see control byte #96 (60h)

Measure OCC BW dB Down - see control byte #99 (63h)

Set Max Hold - see control byte #105 (69h)

Set Resolution BW Frequency - see control byte #106 (6Ah)

Set Video BW Frequency - see control byte #107 (6Bh)

Set Attenuation - see control byte #111 (6Fh)

Set field strength measurement - see control byte #84 (54h)

Set channel power - see control byte #85 (55h)

Read channel power - see control byte #86 (56h)

Set adjacent channel power - see control byte #87 (57h)

Read adjacent channel power - control byte #88 (58h)

STATUS

Query system status - see control byte #20 (14h)

The system status contains virtually all information about the current Spectrum Analyzer system state. It is a powerful and complete “snapshot” of the system.

Some control bytes affect multiple system parameters. Use the response from this control byte for preserving any of the system parameters you wish to remain unchanged.

Self-test Trigger - see control byte #21 (15h)

Upon receiving this control byte the Spectrum Analyzer runs self-test. After completion of the self-test, the Spectrum Analyzer sends the results via the serial port.

Battery status - see control byte #50 (32h)

Returns the smart battery status.

CLOSE

Exit remote mode - see control byte #255 (FFh)

Ends communication with the Spectrum Analyzer. “Exiting remote mode” returns the Spectrum Analyzer to normal operation.

Control Byte Summary

Control Byte Summary (1 of 2)

Control Byte #	Name	Description	WD Timer?
1 (01h)	Setup system	Sets system status flags and switches	Yes
3 (03h)	Select measurement mode	Sets measurement mode	Yes
7(07h)	Read time/date	Reads time and date from the real time clock	—
8 (08h)	Set time/date	Sets the real time clock time and date	Yes
9 (09h)	Set reference number	Sets reference number for a sweep trace	Yes
10 (0Ah)	Serial port echo On/Off	Allows synchronization of the Spectrum Analyzer and request from computer for sweep trace	Yes
12 (0Ch)	Watch-dog timer On/Off	Enable or disable the watch-dog timer	—
16 (10h)	Store sweep trace	Save current trace data to EEPROM	Yes
17 (11h)	Recall sweep trace	Queries the MS2711A for sweep trace data	Yes
18 (12h)	Save system setup	Save current system setup parameters to EEPROM	Yes
19 (13h)	Recall system setup	Recall system setup parameters from EEPROM	Yes
20 (14h)	Query system status	Queries the MS2711A for current system settings	—
21 (15h)	Trigger self-test	Triggers a self-test	—
24 (18h)	Query trace names	Returns list of all saved traces	—
25 (19h)	Delete sweep trace	Delete single or all stored sweep traces	Yes
26(1Ah)	Download sweep trace	Downloads a sweep trace to the MS2711A	Yes
27(1Bh)	Query sweep memory	Queries percentage of memory available for trace storage	—
30 (1Eh)	Select printer type	Select printer type	Yes
34(22h)	Set A/B trace	Set up A and B trace definitions	Yes
39 (27h)	Query Power Level	Return Power Level at Detector Port	—
40 (28h)	Set Power Monitor Unit	Set Power Monitor displaying unit	Yes
41 (29h)	Set Relative Mode	Enable or disable Power Monitor Relative Mode	Yes
42 (2Ah)	Set Offset Mode	Enable or disable Power Monitor Offset Mode	Yes
43 (2Bh)	Set Zero Mode	Enable or disable Power Monitor Zeroing Mode	Yes
48 (30h)	Trigger sweep	Starts the next sweep	—
50 (32h)	Check Battery Status	Return smart battery status	—
64 (40h)	Auto Save Runtime Setup	Automatically save the runtime setup when exiting remote mode	—
69 (45h)	Enter remote mode	Enters remote mode at the end of the sweep and returns model number and firmware version	—

Control Byte Summary (2 of 2)

Control Byte #	Name	Description	WD Timer?
70 (46h)	Enter remote mode immediately	Enters remote mode immediately and returns the model number and firmware version	—
82 (52h)	Write Antenna	Receives an Antenna via the serial port	Yes
83 (53h)	Recall Antenna	Sends an Antenna via the serial port	Yes
84 (54h)	Set Field Strength Measurement	Enables/disables and defines the field strength measurement	Yes
85 (55h)	Set Channel Power	Enables/disables and defines the channel power measurement	Yes
86 (56h)	Read Channel Power	Returns the result of the channel power measurement	Yes
87 (57h)	Set Adjacent Channel Power	Enables/disables and defines the adjacent channel power measurement	Yes
88 (58h)	Read Adjacent Channel Power	Returns the result of the adjacent channel power measurement	Yes
96 (60h)	Measure OCC BW % of Power	Measure OCC BW with % of Power method	Yes
97 (61h)	Measure OCC BW dB Down	Measure OCC BW with dB down method	Yes
99 (63h)	Set Frequency	Sets the frequency range	Yes
100 (64h)	Set Center Freq./Span	Sets the center frequency and frequency span	Yes
101 (65h)	Set Scale	Sets the graph boundaries	Yes
102 (66h)	Set Marker	Sets an individual marker	Yes
103 (67h)	Set Single Limit	Set position and on/off status of the single limit line	Yes
105 (69h)	Set Max Hold	Enable or disable Max Hold	Yes
106 (6Ah)	Set Resolution Bandwidth	Sets the resolution bandwidth	Yes
107 (6Bh)	Set Video Bandwidth	Sets the video bandwidth	Yes
108 (6Ch)	Set Sweep Mode	Sets the sweep mode	Yes
109 (6Dh)	Set Marker to Peak	Sets specified marker to peak measurement	Yes
110 (6Eh)	Set Marker to Center	Sets the specified marker to the center frequency	Yes
111 (6Fh)	Set Attenuation	Sets the attenuation for the Spectrum Analyzer	Yes
112 (70h)	Set AM/FM Demodulation	Sets the AM/FM demodulation state, type, and volume	Yes
113 (71h)	Set Multiple Limit	Sets the position and status of a limit segment	Yes
114 (72h)	Set Return Sweep Time	Enables/disables returning the current sweep time	Yes
118 (76h)	Set Sweep Averaging	Sets the number of sweeps to average	Yes
255 (FFh)	Exit remote mode	End serial communications	—

Control Byte Descriptions

Setup system - Control byte #1 (01h)

Description: Sets system status flags and switches. The MS2711A acts on the entire byte. You must account for the state of each of the bits. For example, if you wanted to turn the LCD backlight on without disturbing the other switches you would query the Spectrum Analyzer with control byte #20. You would then mask in the LCD status with the data from response bytes #246 and #250 and send this to the Spectrum Analyzer after control byte #1.

If coupling is set to automatic, the following values are linked:

- RBW to span
- VBW to RBW
- Attenuation to reference level

See control byte #20 (14h) response bytes #246 and #250 for current MS2711A configuration.

Bytes to Follow: 1 byte

- 1) Status byte (bit data – LSB = 0)
 - bit 0 = RBW Coupling (to span) (1 = auto, 0 = manual)
 - bit 1 = VBW Coupling (to RBW) (1 = auto, 0 = manual)
 - bit 2 = LCD Back Light On/Off
 - bit 3-4 = Amplitude units (00 = dBm, 01 = dBV, 10 = dBmV, 11 = dB μ V)
 - bit 5-6 = Detection algorithm (00 = positive peak, 01 = average, 10 = negative peak)
 - bit 7 = Attenuation Coupling (to ref level) (1 = auto, 0 = manual)

Spectrum Analyzer Returns: 255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

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

Description: Sets measurement mode of the MS2711A.

See control byte #20 (14h) response byte 1 (01h) for current Spectrum Analyzer measurement mode.

Bytes to Follow: 1 byte

- 1) Measurement Mode
 - 20h = Tracking Generator Mode
 - 30h = Spectrum Analyzer Mode
 - 40h = Power Monitor Mode

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

Read time/date - Control Byte #7 (07h)

Description: Reads the time and date from the real time clock.

This Time/Date is stamped into all stored sweeps (for users' reference). The real time clock time and date can be set by using control byte #8 (08h).

Bytes to Follow: None

Spectrum Analyzer Returns: 7 bytes

- 1) Hour
- 2) Minute
- 3) Month
- 4) Day
- 5) Year (Higher Byte)
- 6) Year (Lower Byte)
- 7) Daylight Savings (ON/~OFF)

Set time/date - Control Byte #8 (08h)

Description: Sets the real-time clock.

The current Time/Date is stamped into all stored sweeps (for users' reference). Current time and date can be found by using control byte #7 (07h).

Bytes to Follow: 7 bytes

- 1) Hour
- 2) Minute
- 3) Month
- 4) Day
- 5) Year (Higher Byte)
- 6) Year (Lower Byte)
- 7) Daylight Savings (ON/~OFF)

Spectrum Analyzer 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. You determine the format.

Current reference number is found in trace 0 response bytes 39 to 54 (27h to 36h).

Bytes to Follow: 16 bytes (ASCII text string)

Spectrum Analyzer 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 #108 (6Ch)). Therefore, at the end of each sweep cycle, the Spectrum Analyzer sends a Sweep Complete Byte #192 (C0h) to the serial port.

This mode activates once the MS2711A 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 MS2711A and computer by doing the following ...

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

Bytes to Follow: 1 byte

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

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

Watch-dog timer On/Off - Control Byte #12 (0Ch)

Description: Enables or Disables the Watch-dog timer.

The MS2711A incorporates a Watch-dog Timer for higher reliability in serial communication. In selected control bytes (see control byte summary), the Spectrum Analyzer 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 Spectrum Analyzer notifies the computer by sending Time-out Byte #238 (EEh). The MS2711A discards the data it just received and then waits for the next control byte sequence.

Bytes to Follow: 1 byte

- 1) Watch-dog timer On/Off
0 = Off
1 = On

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

Store sweep trace - Control Byte #16 (10h)

Description: Saves current trace.

Bytes to Follow: 0 bytes

Spectrum Analyzer 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 MS2711A 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)

Spectrum Analyzer Returns:

- 1-2) # of following bytes (1908 for a valid sweep)
- 3-4) Reserved bytes
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes in ASCII)
- 16) Measurement Mode
- 17-20) Time/Date (in Long Integer)
- 21-30) Date in String Format (mm/dd/yyyy)
- 31-38) Time in String Format (hh:mm:ss)
- 39-54) Reference number stamp
- 55-56) # data points
- 57) Start Frequency (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 (highest byte)
- 78) Ref Level
- 79) Ref Level
- 80) Ref Level (lowest byte)
- 81) Scale per div (highest byte)
- 82) Scale per div
- 83) Scale per div
- 84) Scale per div (lowest byte)
- 85) Frequency Marker 1 (higher byte)
- 86) Frequency Marker 1 (lower byte)
- 87) Frequency Marker 2 (higher byte)
- 88) Frequency Marker 2 (lower byte)
- 89) Frequency Marker 3 (higher byte)
- 90) Frequency Marker 3 (lower byte)
- 91) Frequency Marker 4 (higher byte)
- 92) Frequency Marker 4 (lower byte)
- 93) Single Limit (highest byte)
- 94) Single Limit
- 95) Single Limit
- 96) Single Limit (lowest byte)
- 97) Multiple Upper Limit 1 Start X (higher byte)
- 98) Multiple Upper Limit 1 Start X
- 99) Multiple Upper Limit 1 Start X
- 100) Multiple Upper Limit 1 Start X (lower byte)
- 101) Multiple Upper Limit 1 Start Y (higher byte)
- 102) Multiple Upper Limit 1 Start Y
- 103) Multiple Upper Limit 1 Start Y
- 104) Multiple Upper Limit 1 Start Y (lower byte)
- 105) Multiple Upper Limit 1 End X (higher byte)
- 106) Multiple Upper Limit 1 End X
- 107) Multiple Upper Limit 1 End X
- 108) Multiple Upper Limit 1 End X (lower byte)
- 109) Multiple Upper Limit 1 End Y (higher byte)
- 110) Multiple Upper Limit 1 End Y
- 111) Multiple Upper Limit 1 End Y
- 112) Multiple Upper Limit 1 End Y (lower byte)
- 113 - 256) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5
- 257) RBW Setting (highest byte)
- 258) RBW Setting
- 259) RBW Setting
- 260) RBW Setting (lowest byte)
- 261) VBW Setting (highest byte)
- 262) VBW Setting
- 263) VBW Setting
- 264) VBW Setting (lowest byte)
- 265) OCC BW Method
- 266) OCC BW % Value (highest byte)
- 267) OCC BW % Value
- 268) OCC BW % Value
- 269) OCC BW % Value (lowest byte)
- 270) OCC BW dBc (highest byte)
- 271) OCC BW dBc

- 272) OCC BW dBc
- 273) OCC BW dBc (lowest byte)
- 274) Attenuation (highest byte)
- 275) Attenuation
- 276) Attenuation
- 277) Attenuation (Lowest byte)
- 278-293) Antenna Name (16 bytes in ASCII)
- 294) Status byte 1: (0 = Off, 1 = 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 4-7 : Not Used
- 295) Status byte 2 : (0 = Off, 1 = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bit 4-7 : Not Used
- 296) Status byte 3 : (0 = Off, 1 = On)
 - (LSB) bit 0 : Antenna Factor Correction On/Off
 - bits 1-2 : Detection alg. (00 = positive peak, 01 = average, 10 = negative peak)
 - bits 3-4 : Amplitude Units (00 = dBm, 01 = dBV, 10 = dbmV, 11 = dB μ V)
 - bits 5-7 : Not Used
- 297) Status byte 4 (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 - (LSB) bit 0 : Limit Type (0 = Single, 1 = Multiple)
 - bit 1 : Unused
 - bit 2 : Single Limit On/Off
 - bit 3 : Single Limit Beep Level (0 = beep when data is below line, 1 = above)
 - 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
- 298) Status byte 5 (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 - (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 - bit 1 : Multiple Limit Upper Segment 3 Beep Level Above/Below
 - bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 - bit 3 : Multiple Limit Upper Segment 4 Beep Level Above/Below
 - bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 - bit 5 : Multiple Limit Upper Segment 5 Beep Level Above/Below
 - bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 - bit 7 : Multiple Limit Lower Segment 1 Beep Level Above/Below
- 299) Status byte 6 (0 = Off/Beep if data is below line, 1 = 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

- 300) Status byte 7
(LSB) bits 0-6: Number of Sweeps to Average (1-25, 1 implies no averaging)
bit 7: Reserved
- 301-310) Reserved
- 311-1910) Sweep Data (400 points * 4 bytes/point = 1600 bytes)
4 bytes for each data point
 - 1. dBm MSB
 - 2. dBm
 - 3. dBm
 - 4. dBm LSB

For invalid sweeps(empty stored sweep locations): only 12 bytes will return:

- 1-2) Number of following bytes (10 bytes for invalid sweep recall)
- 3-4) Model # (unsigned integer, 0x0A for MS2711A)
- 5-12) Extended Model # (8 bytes in ASCII)

Invalid sweep location: 1 byte

224 (E0) : Parameter error : Invalid sweep location

Notes: Please refer to Control Bytes 64h through 67h for data formats.
Minimum Frequency Step Size is in Hz.

Save system setup - Control Byte #18 (12h)

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

The MS2711A saves all parameters described in System Status Query - Control Byte #20 (14h) to the specified store location. Store location 0 is the run-time setup of the MS2711A. It holds the power-on defaults of the MS2711A.

Bytes to Follow: 1 byte

- 1) Location to save system setup parameters, 0 - 10

Spectrum Analyzer 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 MS2711A recalls all parameters described in System Status Query (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 to recall system setup parameters from:
0 = Run-time setup

1 - 10 = Saved setups
255 = Default setup

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

Query system status - Control Byte #20 (14h)

Description: Queries the MS2711A for current system settings.

The current state of the Spectrum Analyzer represents the state after last successful remote control operation.

Note: Please refer to Control Bytes 64h through 67h for data formats.

Bytes to Follow: 0 bytes

Spectrum Analyzer Returns: 260 bytes

- 1) Measurement Mode
- 2) Data Points (higher byte)
- 3) Data Points (lower byte)
- 4) Start Frequency (highest byte)
- 5) Start Frequency
- 6) Start Frequency
- 7) Start Frequency (lowest byte)
- 8) Stop Frequency (highest byte)
- 9) Stop Frequency
- 10) Stop Frequency
- 11) Stop Frequency (lowest byte)
- 12) Center Frequency (highest byte)
- 13) Center Frequency
- 14) Center Frequency
- 15) Center Frequency (lowest byte)
- 16) Frequency Span (highest byte)
- 17) Frequency Span
- 18) Frequency Span
- 19) Frequency Span (lowest byte)
- 20) Minimum Frequency Step Size (highest byte)
- 21) Minimum Frequency Step Size
- 22) Minimum Frequency Step Size
- 23) Minimum Frequency Step Size (lowest byte)
- 24) Ref Level (highest byte)
- 25) Ref Level
- 26) Ref Level
- 27) Ref Level (lowest byte)
- 28) Scale per div (highest byte)
- 29) Scale per div
- 30) Scale per div
- 31) Scale per div (lowest byte)
- 32) Frequency Marker 1 (higher byte)
- 33) Frequency Marker 1 (lower byte)

- 34) Frequency Marker 2 (higher byte)
- 35) Frequency Marker 2 (lower byte)
- 36) Frequency Marker 3 (higher byte)
- 37) Frequency Marker 3 (lower byte)
- 38) Frequency Marker 4 (higher byte)
- 39) Frequency Marker 4 (lower byte)
- 40) Single Limit (highest byte)
- 41) Single Limit
- 42) Single Limit
- 43) Single Limit (lowest byte)
- 44) Multiple Upper Limit 1 Start X (higher byte)
- 45) Multiple Upper Limit 1 Start X
- 46) Multiple Upper Limit 1 Start X
- 47) Multiple Upper Limit 1 Start X (lower byte)
- 48) Multiple Upper Limit 1 Start Y (higher byte)
- 49) Multiple Upper Limit 1 Start Y
- 50) Multiple Upper Limit 1 Start Y
- 51) Multiple Upper Limit 1 Start Y (lower byte)
- 52) Multiple Upper Limit 1 End X (higher byte)
- 53) Multiple Upper Limit 1 End X
- 54) Multiple Upper Limit 1 End X
- 55) Multiple Upper Limit 1 End X (lower byte)
- 56) Multiple Upper Limit 1 End Y (higher byte)
- 57) Multiple Upper Limit 1 End Y
- 58) Multiple Upper Limit 1 End Y
- 59) Multiple Upper Limit 1 End Y (lower byte)
- 60-203) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5
- 204) RBW Setting (highest byte)
- 205) RBW Setting
- 206) RBW Setting
- 207) RBW Setting (lowest byte)
- 208) VBW Setting (highest byte)
- 209) VBW Setting
- 210) VBW Setting
- 211) VBW Setting (lowest byte)
- 212) OCC BW Method
- 213) OCC BW % Value (highest byte)
- 214) OCC BW % Value
- 215) OCC BW % Value
- 216) OCC BW % Value (lowest byte)
- 217) OCC BW dBc (highest byte)
- 218) OCC BW dBc
- 219) OCC BW dBc
- 220) OCC BW dBc (lowest byte)
- 221) Attenuation (highest byte)
- 222) Attenuation
- 223) Attenuation
- 224) Attenuation (lowest byte)
- 225) Antenna Index
- 226-241) Antenna Name (16 bytes in ASCII)
- 242) AM/FM Demod Type (0 = FM-Wide Band, 1 = FM Narrow Band, 2 = AM)
- 243) AM/FM Demod Volume (0 = min, 255 = max)
- 244) Status byte 1 : (0 = Off, 1 = 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 4-7 : Not Used
- 245) Status byte 2 : (0 = Off, 1 = On)
 (LSB) bit 0 : Not Used
 bit 1 : Marker 2 Delta On/Off
 bit 2 : Marker 3 Delta On/Off
 bit 3 : Marker 4 Delta On/Off
 bit 4-7 : Not Used
- 246) Status byte 3 : (0 = Off, 1 = On)
 (LSB) bit 0 : Antenna Factors Correction On/Off
 bit 1 : AM/FM Demod Status On/Off
 bit 2 : Spectrum Analyzer Cal Status On/Off
 bit 3-4 : Amplitude Units (00 = dBm, 01 = dBV, 10 = dBmV, 11 = dB μ V)
 bit 5-6 : Detection Alg. (00 = positive peak, 01 = average, 10 = negative peak)
 bit 7 : LCD Back Light On/Off
- 247) Status byte 4 : (0 = Off, 1 = On)
 (LSB) bit 0 : Limit Type (0 = Single, 1 = Multiple)
 bit 1 : Limit Beep On/Off
 bit 2 : Single Limit Status On/Off
 bit 3 : Single Limit Beep Level (0 = beep when data below line, 1 = above)
 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
- 248) Status byte 5 : (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 (LSB) bit 0 : Multiple Limit Upper Segment 3 Status On/Off
 bit 1 : Multiple Limit Upper Segment 3 Beep Level Above/Below
 bit 2 : Multiple Limit Upper Segment 4 Status On/Off
 bit 3 : Multiple Limit Upper Segment 4 Beep Level Above/Below
 bit 4 : Multiple Limit Upper Segment 5 Status On/Off
 bit 5 : Multiple Limit Upper Segment 5 Beep Level Above/Below
 bit 6 : Multiple Limit Lower Segment 1 Status On/Off
 bit 7 : Multiple Limit Lower Segment 1 Beep Level Above/Below
- 249) Status byte 6 : (0 = Off/Beep if data is below line, 1 = 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
- 250) Status byte 7 : (0 = On, 1 = Off)
 (LSB) bit 0 : Serial Port Echo Status On/Off
 bit 1 : Return Sweep Time On/Off
 bit 2 : RBW Coupling (1 = auto, 0 = manual)
 bit 3 : VBW Coupling (1 = auto, 0 = manual)
 bit 4 : Attenuation Coupling (1 = auto, 0 = manual)
 bit 5-7 : Not Used
- 251) Printer Type
- 252) Trace A/B Status
 (LSB) bit 0-1 : Trace A (00 = A only, 01 = A - B, 10 = A + B)

- bit 2 : Trace B On/Off
- bit 3-7 : Not Used
- 253) Trace B Trace ID (0 = previous data, 1-200 = saved trace id, 255 = none)
- 254) Status Byte 8
 - (LSB) bits 0-6 : Number of Sweeps to Average (1-25, 1 implies no averaging)
 - bit 7 : Reserved
- 255-260) Currently Unused

Trigger self-test - Control Byte #21 (15h)

Description: Triggers a self test on the MS2711A.

Bytes to Follow: 0 Bytes

Spectrum Analyzer Returns: 8 bytes

- 1) Self-test report: (0 = Fail, 1 = Pass)
 - (LSB) bit 0 : Battery
 - bit 1 : Temperature
 - bit 2 : EEPROM read/write
 - bit 3-7 : Not currently used
- 2) Self-test report: (0 = Fail, 1 = Pass)
 - (LSB) bit 0 : Spectrum Analyzer Lock
 - bit 1- 7 : Unused
- 3) Battery Voltage(higher byte)
- 4) Battery Voltage(lower byte)
- 5) Temperature (higher byte)
- 6) Temperature (lower byte)
- 7) Spectrum Analyzer Lock Fail Counter (higher byte)
- 8) Spectrum Analyzer Lock Fail Counter (lower byte)

Notes: Battery Voltage in 1/10th of a Volt (e.g. 124 = 12.4 Volts)
 Temperature in 1/10th of degree Celsius (e.g. 362 = 36.2 °C)

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

Description: Returns a list of all saved traces.

Bytes to Follow: 0 bytes

Spectrum Analyzer Returns: 2 + 41× number of saved traces

- 1-2) # of saved traces
 - for each trace:
 - 1-2) Trace Index
 - 3) Measurement Mode (refer to Control Byte #3)
 - 4-21) Date/Time in string format ("MM/DD/YYYYHH:MM:SS")
 - 22-25) Date/Time as Unsigned Long Integer
 - 26-41) Trace Name (16 bytes)

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

Description: Delete single or all stored sweep traces in MS2711A.

Bytes to Follow: 1 byte

- 0 - Delete all Traces
- X - Delete Single Trace #X

Spectrum Analyzer Returns: 225 (FFh) Operation Complete Byte

Download Sweep Trace - Control Byte #26 (1Ah)

Description: Downloads a sweep trace to the MS2711A.

Bytes to Follow: 1890 bytes

- 1-2) # of following bytes
- 3) Measurement Mode
- 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
- 42-43) # of data points
- 44) Start Frequency (highest byte)
- 45) Start Frequency
- 46) Start Frequency
- 47) Start Frequency (lowest byte)
- 48) Stop Frequency (highest byte)
- 49) Stop Frequency
- 50) Stop Frequency
- 51) Stop Frequency (lowest byte)
- 52) Center Frequency (highest byte)
- 53) Center Frequency
- 54) Center Frequency
- 55) Center Frequency (lowest byte)
- 56) Frequency Span (highest byte)
- 57) Frequency Span
- 58) Frequency Span
- 59) Frequency Span (lowest byte)
- 60) Ref Level (highest byte)
- 61) Ref Level
- 62) Ref Level
- 63) Ref Level (lowest byte)
- 64) Scale per div (highest byte)
- 65) Scale per div
- 66) Scale per div
- 67) Scale per div (lowest byte)
- 68) Frequency Marker 1 (higher byte)
- 69) Frequency Marker 1 (lower byte)

- 70) Frequency Marker 2 (higher byte)
- 71) Frequency Marker 2 (lower byte)
- 72) Frequency Marker 3 (higher byte)
- 73) Frequency Marker 3 (lower byte)
- 74) Frequency Marker 4 (higher byte)
- 75) Frequency Marker 4 (lower byte)
- 76) Single Limit (highest byte)
- 77) Single Limit
- 78) Single Limit
- 79) Single Limit (lowest byte)
- 80) Multiple Upper Limit 1 Start X (higher byte)
- 81) Multiple Upper Limit 1 Start X
- 82) Multiple Upper Limit 1 Start X
- 83) Multiple Upper Limit 1 Start X (lower byte)
- 84) Multiple Upper Limit 1 Start Y (higher byte)
- 85) Multiple Upper Limit 1 Start Y
- 86) Multiple Upper Limit 1 Start Y
- 87) Multiple Upper Limit 1 Start Y (lower byte)
- 88) Multiple Upper Limit 1 End X (higher byte)
- 89) Multiple Upper Limit 1 End X
- 90) Multiple Upper Limit 1 End X
- 91) Multiple Upper Limit 1 End X (lower byte)
- 92) Multiple Upper Limit 1 End Y (higher byte)
- 93) Multiple Upper Limit 1 End Y
- 94) Multiple Upper Limit 1 End Y
- 95) Multiple Upper Limit 1 End Y (lower byte)
- 96-239) Multiple Upper Limits 2-5, Multiple Lower Limits 1-5
- 240) RBW Setting (highest byte)
- 241) RBW Setting
- 242) RBW Setting
- 243) RBW Setting (lowest byte)
- 244) VBW Setting (highest byte)
- 245) VBW Setting
- 246) VBW Setting
- 247) VBW Setting (lowest byte)
- 248) OCC BW Method
- 249) OCC BW % Value (highest byte)
- 250) OCC BW % Value
- 251) OCC BW % Value
- 252) OCC BW % Value (lowest byte)
- 253) OCC BW dBc (highest byte)
- 254) OCC BW dBc
- 255) OCC BW dBc
- 256) OCC BW dBc (lowest byte)
- 257) Attenuation (highest byte)
- 258) Attenuation
- 259) Attenuation
- 260) Attenuation (lowest byte)
- 261-276) Antenna Name (16 bytes in ASCII)
- 277) Status byte 1 : (0 = Off, 1 = 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 4-7 : Not Used
- 278) Status byte 2 : (0 = Off, 1 = On)
 - (LSB) bit 0 : Not Used
 - bit 1 : Marker 2 Delta On/Off
 - bit 2 : Marker 3 Delta On/Off
 - bit 3 : Marker 4 Delta On/Off
 - bit 4-7 : Not Used
- 279) Status byte 3 : (0 = Off, 1 = On)
 - (LSB) bit 0 : Antenna Factors Correction On/Off
 - bit 1-2 : Detection Alg. (00 = positive peak, 01 = average, 10 = negative peak)
 - bit 3-4 : Amplitude Units (00 = dBm, 01 = dBV, 10 = dBmV, 11 = dBμV)
 - bit 5-7 : Not Used
- 280) Status byte 4 : (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 - (LSB) bit 0 : Limit Type (0 = Single, 1 = Multiple)
 - bit 1 : Single Limit On/Off
 - bit 2 : Single Limit Beep Level (0 = beep when data below line, 1 = above)
 - bit 3 : Multiple Limit Upper Segment 1 Status On/Off
 - bit 4 : Multiple Limit Upper Segment 1 Beep Level Above/Below
 - bit 5 : Multiple Limit Upper Segment 2 Status On/Off
 - bit 6 : Multiple Limit Upper Segment 2 Beep Level Above/Below
 - bit 7 : Multiple Limit Upper Segment 3 Status On/Off
- 281) Status byte 5 : (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 - (LSB) bit 0 : Multiple Limit Upper Segment 3 Beep Level Above/Below
 - bit 1 : Multiple Limit Upper Segment 4 Status On/Off
 - bit 2 : Multiple Limit Upper Segment 4 Beep Level Above/Below
 - bit 3 : Multiple Limit Upper Segment 5 Status On/Off
 - bit 4 : Multiple Limit Upper Segment 5 Beep Level Above/Below
 - bit 5 : Multiple Limit Lower Segment 1 Status On/Off
 - bit 6 : Multiple Limit Lower Segment 1 Beep Level Above/Below
 - bit 7 : Multiple Limit Lower Segment 2 Status On/Off
- 282) Status byte 6 : (0 = Off/Beep if data is below line, 1 = On/Beep if data is above line)
 - (LSB) bit 0 : Multiple Limit Lower Segment 2 Beep Level Above/Below
 - bit 1 : Multiple Limit Lower Segment 3 Status On/Off
 - bit 2 : Multiple Limit Lower Segment 3 Beep Level Above/Below
 - bit 3 : Multiple Limit Lower Segment 4 Status On/Off
 - bit 4 : Multiple Limit Lower Segment 4 Beep Level Above/Below
 - bit 5 : Multiple Limit Lower Segment 5 Status On/Off
 - bit 6 : Multiple Limit Lower Segment 5 Beep Level Above/Below
 - bit 7 : Not Used
- 283) Status byte 7
 - (LSB) bits 0-6 : Number of Sweeps to Average (1-25, 1 implies no averaging)
 - bit 7 : Reserved
- 284-290) Reserved
- 291-1890) Sweep Data (400 points * 4 bytes/point = 1600 bytes)
 - 4 bytes for each data point
 - 1. dBm MSB
 - 2. dBm
 - 3. dBm
 - 4. dBm LSB

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

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

Description: Queries MS2711A for percentage of memory that is available for trace storage.

Bytes to Follow: 0 bytes

Spectrum Analyzer Returns: 1 byte - % of memory currently used (0 to 100)

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

Description: Select Printer Type

Bytes to Follow: 1 byte

- 0 - Epson Stylus Models
- 1 - Epson LQ Models
- 2 - Citizen PN Models
- 3 - NEC Superscript Models
- 4 - NEC Silent Writer Models
- 5 - Seiko DPU 411, 414
- 6 - Cannon BJC 50
- 7 - Cannon BJC 80
- 8 - Cannon BJC 250
- 9 - Cannon BJC 4400
- 10 - HP Deskjet 340
- 11 - HP Deskjet 500 Series
- 12 - HP Deskjet 600 Series
- 13 - HP Deskjet 800 Series
- 14 - HP Deskjet 1120C
- 15 - HP Laserjet 6L, 6P, 4000
- 16 - Epson ESC/P compatible
- 17 - Epson ESC/P2 compatible
- 18 - Epson ESC/P Raster compatible
- 19 - HP PCL3 compatible

Spectrum Analyzer Returns: 225 (FFh) Operation Complete Byte

Select A/B Trace - Control Byte #34 (22h)

Description: Set up A and B trace definitions.

Bytes to Follow: 3 bytes

- 1) "A" trace display (0 = A only, 1 = A - B, 2 = A + B)
- 2) "B" trace status (0 = OFF, 1 = 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

Spectrum Analyzer 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

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

Spectrum Analyzer Returns: 21 bytes

- 1) Status Byte
(LSB) bit 0 : Unit (0 - Watt/%, 1 - dBm/dBr)
bit 2 : Relative Mode On/~Off
bit 3 : Offset Mode On/~Off
bit 4 : Zero Mode On/~Off
bit 5-7: Not currently used.
- 2-5) Relative Mode Reference Power Level in dBm
- 6-9) Offset Mode Offset in dB
- 10-13) Zero Mode Power Level in dBm
- 14-17) Absolute Power Level in dBm
- 18-21) Power in dBm/dBr

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 **one-thousandth** of dBm
Relative power is in **one-thousandth** of dBr
Offset is in **one-thousandth** of dB

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)

Spectrum Analyzer 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.)

Spectrum Analyzer 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 bytes

1) On/~Off (01 = On, 00 = Off)

2-5) Offset Power Level in dB

Spectrum Analyzer 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 w/ trigger(current power level is referenced as -80 dBm.)

Spectrum Analyzer 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 MS2711A to perform a sweep if it is in single sweep or serial port echo mode.

Bytes to Follow: 0 bytes

Spectrum Analyzer Returns: Sweep Complete Byte # 192 (C0h)

Note: If the Spectrum Analyzer is *not* in single sweep or serial port echo mode, sending the byte does nothing. This command is for local mode operation. If the Spectrum Analyzer is in remote mode, sending the byte does nothing.

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

Description: Returns smart battery status.

Bytes to Follow: 0 bytes

Spectrum Analyzer 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)
-

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 Spectrum Analyzer. It returns to its default when the unit is turned off. The default is (0), Do Not automatically save the runtime setup.

Bytes to Follow: 1 byte

- 1) Save runtime setup On/Off
 - 0 = Off
 - 1 = On

Spectrum Analyzer Returns: 255 (FFh) Operation Complete Byte
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 byte

Spectrum Analyzer Returns: 13 bytes

- 1-2) Model # (unsigned integer, 0x0A for MS2711A)
- 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 MS2711A and waits for response.

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

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

The MS2711A sends its model and software version numbers to the computer. The Spectrum Analyzer 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 of the computer.

Bytes to Follow: 0 bytes

Spectrum Analyzer Returns: 13 bytes

- 1-2) Model # (unsigned integer, 0x0A for MS2711A)
- 3-9) Extended Model # (7 bytes in ASCII)
- 10-13) Software Version - 4 bytes (ASCII)

The computer sends Enter Remote Mode Immediately byte #70 (46h) to the MS2711A 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 Spectrum Analyzer stops sweeping. A Remote Mode Indicator appears on the LCD.

The MS2711A sends its model and software version numbers to the computer. The Spectrum Analyzer is now able to take multiple control bytes. It waits for the next control byte.

Write Antenna - Control Byte #82 (52h)

Description: Receives an Antenna to the MS2711A via the serial port.

Bytes to Follow: (24 - 378, depending on the number of antenna factors)

- 1) Antenna List index (1-10)
 - 2-17) Antenna Name (string)
 - 18) Number of Antenna Factors
 - 19-21) Frequency
 - 23-24) Antenna Factor (X multiplier = 100)
- Frequency and Antenna Factor are repeated for the number of antenna factors.

Spectrum Analyzer Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Not enough bytes transferred
238 (EEh) Time-out Error

Note: Frequency is specified in 1 Hz steps.
(e.g. 100.3 MHz would be sent as 100030000 = 1,000,300,000 Hz)

Recall Antenna - Control Byte #83 (53h)

Description: Sends an Antenna from the MS2711A via the serial port.

Bytes to Follow: 1 byte

- 1) Antenna List index (1-10)

Spectrum Analyzer Returns: (26-380 bytes, depending on the number of antenna factors)

- 1) Maximum Antenna Number
 - 2-17) Antenna Name (string)
 - 18) Number of Antenna Factors
 - 19-20) Number of Following Bytes
 - 21-24) Frequency
 - 25-26) Antenna Factor (X multiplier = 100)
- Frequency and Antenna Factor are repeated for the number of antenna factors.

Note: Frequency is specified in 1 Hz steps.
(e.g. 100.3 MHz would be sent as 100030000 = 1,000,300,000 Hz)

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.

Bytes to Follow: 2 bytes

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

Spectrum Analyzer 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), the center frequency and the span (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 channel power associated with the trace that was most recently uploaded by command #26, Upload Sweep Trace.

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

Spectrum Analyzer 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 the last recalled 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 a 1 (one) to read the channel power associated with the trace that was most recently recalled by command #17, Recall Sweep Trace.

Bytes to Follow: 1 byte

- 1) Channel Power Location (0 = current measured value, 1 = last recalled trace value)

Spectrum Analyzer 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, AM/FM demodulation) 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)

Spectrum Analyzer 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 the last recalled 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 a 1 (one) to read the adjacent channel power associated with the trace that was most recently recalled by command #17, Recall Sweep Trace.

Bytes to Follow: 1 byte

- 1) Adjacent Channel Power Location (0 = current measured value, 1 = last recalled trace value)

Spectrum Analyzer 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 bytes

- 1) % of Power (highest byte)
- 2) % of Power
- 3) % of Power
- 4) % of Power (lowest byte)

Spectrum Analyzer Returns: 16 bytes

- 1-4) OCC BW
- 5-8) Measure % of Power
- 9-12) Low Frequency OCC BW
- 13-16) High Frequency OCC BW

Note: In 100th of %, 9123 = 91.23%

Measure OCC BW dB Down - Control Byte #97 (63h)

Description: Measure OCC BW with dB down method.

Bytes to Follow: 4 bytes

- 1) dB down (highest byte)
- 2) dB down
- 3) dB down
- 4) dB down (lowest byte)

Spectrum Analyzer Returns: 16 bytes

- 1-4) OCC BW
- 5-8) Measure dB down
- 9-12) Low Frequency OCC BW
- 13-16) High Frequency OCC BW

Note: In 100th of dB, 1234 = 12.34 dB

Set Frequency - Control Byte #99 (63h)

Description: Sets the MS2711A frequency range.

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)

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

Notes: Start and stop frequencies are given in terms of 1 Hz steps.
(e.g. 100.3 MHz would be sent as 100030000 = 1,000,300,000 Hz)

Set Center Freq./Span - Control Byte #100 (64h)

Description: Sets the MS2711A center frequency and frequency span.

Bytes to Follow: 8 bytes

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

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

Notes: Center frequencies and frequency spans are given in terms of 1 Hz steps.
(e.g. 100.3 MHz would be sent as 100030000 = 1,000,300,000 Hz)

Set Scale - Control Byte #101 (65h)

Description: Sets the graph boundaries.

Ref Level will be the “top” scale of the graph, and there are a total of 10 divisions, so the bottom scale can be determined by: $\text{Ref Level} - 10 \times \text{dB/div}$.

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)

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

Notes: Parameters are sent in 1000th of a dB ($-12.34 \text{ dB} = -12340$)
Ref Level is sent as: $(\text{Ref Level}) \times 1000 + 270,000$ (0 dB = 270,000, 20 dB = 290,000,
-120 dB = 150,000)

Set Marker - Control Byte #102 (66h)

Description: Sets an individual MS2711A marker.

Bytes to Follow: 5 bytes:

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

Spectrum Analyzer 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.

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

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

Note that setting the limit ON automatically makes the limit type "SINGLE".

Bytes to Follow: 7 bytes:

- 1) Limit Line On/~Off (01h = On, 00h = Off)
- 2) Limit Beep On/~Off (01h = On, 00h = Off)
- 3) Beep if Data is Above/Below Limit (01h = Above, 00h = Below)
- 4) Limit Value (highest byte)
- 5) Limit Value
- 6) Limit Value
- 7) Limit Value (lowest byte)

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

Notes: Parameters are sent in 1000th of a dB (-12.34 dB = -12340)
Limit is sent as: (Limit) × 1000 + 270,000 (0 dB = 270,000, 20 dB = 290,000,
-120 dB = 150,000)

Set 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

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

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

Description: Set the resolution BW for the Spectrum Analyzer. Automatic control couples the resolution BW to the span.

Note the setting the RBW using this command automatically sets the RBW coupling to "MANUAL".

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

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

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

Description: Set the video BW for the Spectrum Analyzer. Automatic control couples the video BW to the resolution BW.

Note that setting the VBW using this command automatically sets the VBW coupling to "MANUAL".

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

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

Set Sweep Mode - Control Byte #108 (6Ch)

Description: Sets the sweep mode for the Spectrum Analyzer.

Bytes to Follow: 1 byte
00h = Single Sweep
01h = Continuous Sweep

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

Set Marker to Peak - Control Byte #109 (6Dh)

Description: Sets the specified marker to the peak measurement.

Bytes to Follow: 1 byte
Marker to set to peak (1 - 4)

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

Set Marker to Center - Control Byte #110 (6Eh)

Description: Sets the specified marker to the center frequency.

Bytes to Follow: 1 byte
Marker to set to center frequency (1 - 4)

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

Set Attenuation - Control Byte #111 (6Fh)

Description: Sets the attenuation of the Spectrum Analyzer. Automatic control couples the attenuation to the reference level.

Note that setting the attenuation using this command automatically sets the attenuation coupling to "MANUAL".

Bytes to Follow: 1 byte
00h = 0 dB attenuation
01h = 10 dB attenuation
02h = 20 dB attenuation
03h = 30 dB attenuation
04h = 40 dB attenuation
05h = 50 dB attenuation

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

Set AM/FM Demodulation - Control Byte #112 (70h)

Description: Sets the AM/FM demodulation status (ON/OFF), type, and volume.

Bytes to Follow: 3 bytes

- 1) Demod state (00h = OFF, 01h = ON)
- 2) Demod type (00h = FM-Wide band, 01h = FM-Narrow band, 02h = AM)
- 3) Volume (00h = lowest, 01h = highest)

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

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

Description: Sets the position and On/Off status of a limit segment.

Note that setting a limit segment ON automatically makes the limit type "MULTIPLE".

Bytes to Follow: 20 bytes

- 1) Segment number (1-5)
- 2) Segment type (00 = lower limit, 01 = 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 (highest byte)
- 6) Limit Value Start X
- 7) Limit Value Start X
- 8) Limit Value Start X (lowest byte)
- 9) Limit Value Start Y (highest byte)
- 10) Limit Value Start Y
- 11) Limit Value Start Y
- 12) Limit Value Start Y (lowest byte)
- 13) Limit Value End X (highest byte)
- 14) Limit Value End X
- 15) Limit Value End X
- 16) Limit Value End X (lowest byte)
- 17) Limit Value End Y (highest byte)
- 18) Limit Value End Y
- 19) Limit Value End Y
- 20) Limit Value End Y (lowest byte)

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

Notes: Limits (Y values) are sent as 1000th of a dB (-12.34 dB = -12340)
Limit Y is sent as: (Limit Y) × 1000 + 270,000 (0 dB = 270,000, 20 dB = 290,000,
-120 dB = 150,000)
Frequencies (X values) are given in terms of 1 Hz steps.

Set Return 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

00h = Don't Return Sweep Time

01h = Return Sweep Time

Spectrum Analyzer Returns: 225 (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

Number of sweeps to average (1-25)

Spectrum Analyzer Returns: 225 (FFh) Operation Complete Byte
224 (E0h) Parameter Error
238 (EEh) Time-out Error

Exit remote mode - Control Byte #255 (FFh)

Description: MS2711A exits remote mode.

Bytes to Follow: 0 byte

Spectrum Analyzer Returns: 1 byte
1) Confirm flag FFh

The computer sends a serial stop byte #255 (FFh) to the MS2711A. Spectrum Analyzer returns a confirm flag (FFh). The Spectrum Analyzer resumes sweeping, either continuously or singly.

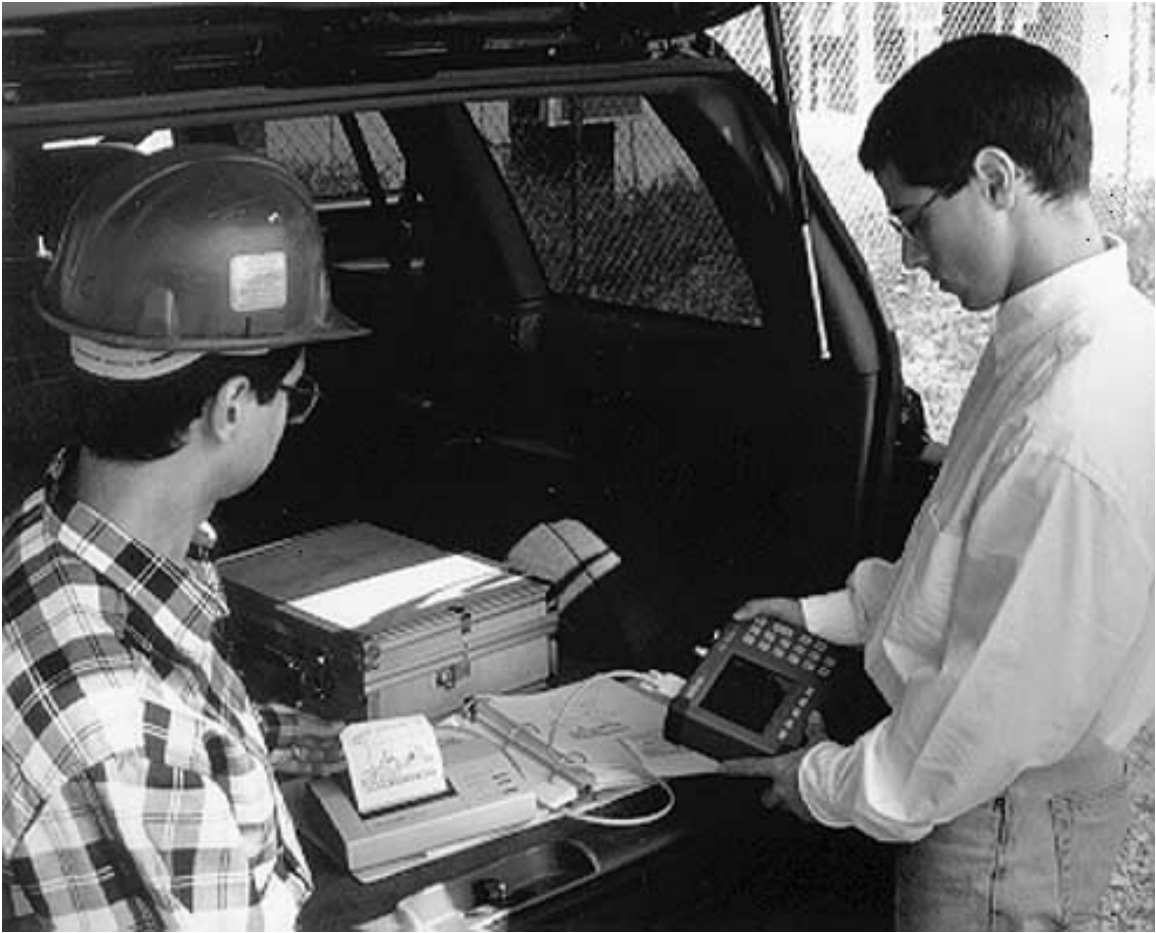
You may also press the "ESCAPE" key on the Spectrum Analyzer key pad to exit from remote mode (given that the serial communication is still in sync). In this case, the Spectrum Analyzer does not return a confirm byte to the serial port.

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. You can also use control byte #64 to specify that the runtime setup be automatically saved to setup location 0 when exiting remote mode.

Parameter Definitions

Parameter	# of Bytes	Step	Example / Description
Frequency	4 bytes unsigned	1 Hz	1000.3 MHz = 1000300000
Scale (dB/div)	4 bytes unsigned	1 / 1000 dB	8 dB = 8000
(Ref Level)	4 bytes unsigned	1 / 1000 dB + 270,000	20 dB = 20,000 + 270,000 = 290,000 -20 dB = -20,000 + 270,000 = 250,000
Limit	4 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
Markers	2 bytes unsigned	1 sweep point	Marker values are given in relative position on the graph. The lowest value is 0; the highest value is 399.
Power Monitor: 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



Anritsu