

Anritsu

SiteMaster™
S110, S111, S112, S113, S330,
S331, S330A, S331A, S400A
Personal SWR/RL and
Fault Location Tester

Programming Manual



**Hand-Held Tester For Antennas, Transmission
Lines And Other RF Components**

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 Site Master Operating Parameters	3
Write Cycle Limitation of EEPROM	3

Functional Description

Initialize

Enter remote mode	4
-------------------------	---

Configure

System

Fixed CW mode control	4
Keypad lock	4
LCD backlight	4
Printer type	4
Watch dog timer	4
Serial port echo	4
Single sweep	4

Measurement

Domain select	5
Measurement unit	5
Calibration on/off	5
Calibration to Use	5

Power Monitor

Power Monitor mode	5
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

Distance	
Start distance.....	5
Stop distance.....	5
Relative velocity.....	6
Cable loss.....	6
DTF Windowing.....	6
Display	
Display mode.....	6
Scale start.....	6
Scale stop.....	6
Markers	
on/off.....	6
Value.....	6
Limits	
on/off.....	6
Beep.....	6
Value.....	6
<u>Utility</u>	
Time set.....	6
Date set.....	6
Reference number set.....	6
<u>Action</u>	
Save system setup.....	7
Recall system setup.....	7
Save sweep.....	7
<u>Data</u>	
Recall sweep.....	7
<u>Calibration</u>	
Calibrate.....	7
Export calibration data.....	7
Import calibration data.....	7
<u>Status</u>	
Query system status.....	7
Self-test Trigger.....	7
Read failure counters.....	8
Clear failure counters.....	8
<u>Close</u>	
Exit remote mode.....	8

Control Byte Descriptions

Control byte summary	9
Control byte 1 Setup system	11
Control byte 2 Set frequency	11
Control byte 3 Select domain	12
Control byte 4 Set scale	12
Control byte 5 Set marker	13
Control byte 6 Set limit	14
Control byte 7 Set DTF parameters	14
Control byte 8 Set time/date	15
Control byte 9 Set reference number	16
Control byte 10 Serial port echo on/off	16
Control byte 11 Single sweep mode on/off	16
Control byte 12 Watch dog timer on/off	17
Control byte 13 Sequence calibration	17
Control byte 14 Export calibration data	18
Control byte 15 Import calibration data	18
Control byte 16 Store sweep trace	19
Control byte 17 Recall sweep trace	19
Control byte 18 Save system setup	21
Control byte 19 Recall system setup	22
Control byte 20 Query system status	22
Control byte 21 Trigger self-test	24
Control byte 22 Read fail counters	25
Control byte 23 Clear fail counters	25
Control byte 30 Select calibration	25
Control byte 33 Select DTF windowing	26
Control byte 38 Set power monitor mode	26
Control byte 39 Query power level	26
Control byte 40 Set power monitor unit	27
Control byte 41 Relative mode on/off	27
Control byte 42 Offset mode on/off	28
Control byte 43 Zero mode on/off	28
Control byte 49 Extra setup marker info	28
Control byte 50 Extra sweep marker info	29
Control byte 69 Enter remote mode	30
Control byte 255 Exit remote mode	30
Parameter definitions	31

Mini - Applications

Example 1 — Visual Basic	32
set frequencies and scale	
then retrieve a trace	
Example 2 — Visual Basic	34
sequence two calibrations	
then switch between them and graph a trace	

Example 3 — Labview 36
method of sending to and receiving from Site Master
then graph a trace

Example 4 — Visual Basic 38
query the Site Master for last trace
then retrieve the trace

Example 5 — Visual Basic 40
monitors input power
zero corrects measurements

How to Use this Manual

If you want to find out
general concepts for programming the Site Master,
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.

If you want to see
a summary of working programs,
go to the Mini-Application Reference.

Programming Manual Organization

Programming Overview

This section contains general information about programming the Site Master. 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.

Mini - Applications Reference

This section contains a short description of the mini - applications included on the Site Master Software Tools diskette.

Programming Overview

This programming manual is written exclusively for Anritsu Site Master series (Model S110, S111, S112, S113, S330, S331, S330A, S331A, and S400A) with firmware Version 3.00 or higher. For information on firmware upgrade, please contact your local Anritsu service center.

General Description

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

Once in remote mode, the Site Master accepts control bytes and associated data at the serial port. 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 key.

Cabling

Serial communications take place via the 9 pin connector on the back of the Site Master. The Site Master is a DTE-type serial device and therefore requires a "null modem" cable for communication with a computer, which is also a DTE device. We provide a suitable cable with your Site Master.

Serial Communication Parameters

The Site Master 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 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.

Since the Site Master only checks its serial port buffer after each sweep, you must wait until the Site Master reaches the end of the sweep to get a response. The Site Master's serial port buffer is one byte wide. No internal buffer exists, so waiting is essential. If the Site Master is not in remote, sending a second byte overwrites the original byte commanding it to go into remote.

Once you receive the response string from Site Master, you're in remote mode.

Exiting Remote Mode

Send the Exit Remote control byte #255 (FFh) to the Site Master. Site Master sends a response byte of 255 (FFh) then exits remote mode.

Lifetime of Changes to Site Master 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 nine saved setups. See control byte #18 (12h) for details.

Write Cycle Limitation of EEPROM

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

Functional Description

INITIALIZE

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

Site Master must be in remote mode for further control byte command sequences to be accepted. Remember to wait until Site Master responds before issuing further control byte sequences.

CONFIGURE SYSTEM

Fixed CW mode control - see control byte #1 (01h)

Site Master "dithers" the CW signal for improved immunity to interfering signals. Turning on the fixed CW signal bit "cleans up" the output spectrum by disabling the dithering. The drawback is decreased immunity to interfering signals.

Keypad lock - see control byte #1 (01h)

Disabling the keypad prevents accidental changes to system parameters.

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

LCD backlight helps in adverse lighting conditions.

Printer type - see control byte #1 (01h)

Printer type is selectable.

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

Used to guard against interrupted data transfers to the Site Master.

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

Use this to synchronize the Site Master sweep and computer requests for current trace data. This feature is especially useful for synchronizing distance to fault sweeps.

Site Master 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 Site Master to perform another sweep. Retrieve the trace data using control byte #17 (11h).

Single sweep - see control byte #11 (0Bh)

This puts the Site Master into single sweep mode. Normally the Site Master sweeps continually. Once in the single sweep mode, send the sweep trigger byte #48 (30h) to cause Site Master to perform another sweep.

CONFIGURE MEASUREMENT

Domain select - see control byte #3 (03h)

The Site Master is either in frequency or distance domain.

Measurement unit - see control byte #1 (01h)

The Site Master uses Metric or English units.

Calibration on/off - see control byte #1 (01h)

Calibration corrects for test port uniqueness. It should always be used to ensure accurate readings.

Calibration to Use - see control byte #30 (1Eh)

Allows the use of calibration A or B.

CONFIGURE POWER MONITOR

The power monitor is available as an option on Models S112, S113, S330A, S331A, and S400A.

Power Monitor mode - see control byte #38 (26h)

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

Querying the Site Master 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 #2 (02h)

Stop frequency - see control byte #2 (02h)

CONFIGURE DISTANCE

Start distance - see control byte #7 (07h)

Stop distance - see control byte #7 (07h)

Relative velocity - see control byte #7 (07h)

This affects the distance to fault calculations.

Cable loss - see control byte #7 (07h)

This affects the measurement magnitude.

DTF Windowing - see control byte #33 (21h)

Allows selection of a window to lessen the side lobes.

CONFIGURE DISPLAY

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

Selectable among SWR, return loss, and cable loss.

Scale start - see control byte #4 (04h)

Scale stop - see control byte #4 (04h)

CONFIGURE MARKERS

Marker (on/off) - see control byte #5 (05h)

Marker value - see control byte #5 (05h)

CONFIGURE LIMITS

Limit (on/off) - see control byte #6 (06h)

Limit beep (on/off) - see control byte #6 (06h)

Limit value (on/off) - see control byte #6 (06h)

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)

ACTION

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

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

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

DATA

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

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

CALIBRATION

Calibrate - see control byte #13 (0Dh)

Computer sequencing of the Open-Short-Load calibration is possible.

Export calibration data - see control byte #14 (0Eh)

Calibration data for the current sweep range is exportable. The exact format and byte ordering must be preserved for measurement integrity.

Import calibration data - see control byte #15 (0Fh)

Previously exported calibration data can be sent back to the Site Master. The Site Master takes each byte and writes it to the EEPROM. Consequently, a 5 ms delay between bytes is necessary to allow the write cycle to complete.

STATUS

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

The system status contains virtually all information about the current Site Master system state. It is a powerful and complete "snapshot" of the system.

Some control bytes affect multiple system parameters (such as distance to fault 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 Site Master runs self-test. After completion of the self-test, the Site Master sends the results via the serial port.

Read failure counters -see control byte #22 (16h)

In order to provide absolute confidence about the validity of a measurement, internal counters monitor the analog integrator and phase lock loops for error conditions. If an error occurs, it is logged. These counters perform the same function as the icons on the front panel.

Clear failure counters - see control byte #23 (17h)

Use this control byte to reset the failure counters.

CLOSE

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

Ends communication with the Site Master. "Exiting remote mode" returns the Site Master to normal operation.

Control Byte Summary

Control Byte Summary (1 of 2)

Control Byte #	Name	Description	Watch-dog Timer
1 (01h)	Setup system	System status flags and switches	Yes
2 (02h)	Set frequency	Frequency range	Yes
3 (03h)	Select domain	Measurement domain and measurement mode	Yes
4 (04h)	Set scale	Set scale values	Yes
5 (05h)	Set marker	Position and on/off status of a marker	Yes
6 (06h)	Set limit	Position and on/off status of a limit line	Yes
7 (07h)	Set DTF parameters	Distance to Fault parameters	Yes
8 (08h)	Set time/date	Time and date for a sweep trace	Yes
9 (09h)	Set reference number	Reference number for a sweep trace	Yes
10 (0Ah)	Serial port echo On/Off	Allows synchronization of the Site Master and request from computer for sweep trace	Yes
11 (0Bh)	Single sweep On/Off	Enable or disable the single sweep mode	Yes
12 (0Ch)	Watch-dog timer On/Off	Enable or disable the watch-dog timer	—
13 (0Dh)	Sequence calibration	Trigger a calibration step	Yes
14 (0Eh)	Export calibration data	Send calibration data to the computer	—
15 (0Fh)	Import calibration data	Send calibration data to the Site Master	Yes
16 (10h)	Store sweep trace	Save current trace data to EEPROM	Yes
17 (11h)	Recall sweep trace	Site Master sends sweep data	Yes
18 (12h)	Save system setup	Save system setup to EEPROM	Yes
19 (13h)	Recall system setup	Recall system setup from EEPROM	Yes
20 (14h)	Query system status	Get the current system settings	—
21 (15h)	Trigger self-test	Trigger a self test	—
22 (16h)	Read fail counters	Same as icons on front panel	—
23 (17h)	Clear fail counters	Reset the fail counters	—
30 (1Eh)	Select Calibration	Select between calibration A & B	Yes
33 (21h)	Select DTF Windowing	Select DTF Windowing Methods	Yes

Control Byte Summary (2 of 2)

Control Byte #	Name	Description	Watch-dog Timer
38 (26h)	Power Monitor On/Off	Turn Power Monitor Mode On/Off	Yes
39 (27h)	Query Power Level	Return Power Level at Detector Port	—
40 (28h)	Set Power 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	Set/Reset Power Level offset	Yes
43 (2Bh)	Set Zero Mode	Set/Reset Power Level zeroing mode	Yes
49 (31h)	Extra Setup Marker Info	Obtains Marker Setup Information	—
50 (32h)	Extra Sweep Marker Info	Obtains Marker Status information for a saved trace in EEPROM	—
69 (45h)	Enter remote mode	Returns model number and firmware version	—
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 Site Master 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 do the following: query the Site Master with control byte #20. You would mask in the LCD status with the data from response byte #41 and send this to the Site Master after control byte #1.

See control byte #20 (14h) response byte 41 (29h) for current Site Master configuration. It is important to set the Metric/English flag to the proper value before sending distance information.

Bytes to follow: 1 byte

1) Status byte (bit data)

(LSB) bit 0 = Fixed CW mode On/Off

bit 1 = Keyboard Lock On/Off

bit 2 = LCD Back Light On/Off

bit 3 = Measurement Unit Metric/English (0 = English, 1 = Metric)

bit 4 = Cal On/Off

bit 5-7 : Printer type select

bit: 7 6 5

1 1 1

0 0 0 - none, no printer selected (system default)

0 0 1 - Seiko DPU-411 thermal printer

0 1 0 - HP Deskjet 340 ink jet printer

0 1 1 - 1 1 1 reserved

Site Master Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Invalid Printer Selection or unsuccessful attempt to turn calibration on.
238 (EEh) Time-out Error

Notes: Cal can be turned on ONLY if a complete calibration has been performed at the current start and stop frequencies.

Bit Value: 0 = Off

1 = On

Set frequency - Control byte #2 (02h)

Description: Sets the Site Master frequency range.

See control byte #20 (14h) response bytes 2 to 9 (2h to 9h) for current Site Master configuration.

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

Notes: 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)

Select domain - Control Byte #3 (03h)

Description: Sets measurement domain and display graph type. You must have a valid calibration (current frequencies and calibration frequencies being the same) to switch to the Distance domain.

See control byte #20 (14h) response byte 1 (01h) for current Site Master domain. See control byte #20 (14h) response byte 40 (28h) bit 4 for current Site Master display type.

Bytes to follow: 2 bytes

- 1) Domain
 - 00h : Frequency Domain
 - 01h : Distance Domain
- 2) Graph type
 - 00h : SWR
 - 01h : RL
 - 02h : Cable Insertion Loss

Site Master Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error : Invalid domain or graph type or combination
 238 (EEh) Time-out Error

Note: Only models S111, S113, S331, S331A, and S400A support the distance domain.

Set scale - Control byte #4 (04h)

Description: Sets the graph boundaries. The scale settings require knowing the graph type for proper configuration. For example, the scale start in return loss and cable loss is the top of the graph while scale start is the bottom of the graph for SWR. Think of the scale start as being the smallest value on the graph.

See control byte #20 (14h) response bytes 20 to 27 (14h to 19h) for current Site Master scaling. Remember to check control byte #20 response byte 40 (28h) bit 4 for the current Site Master display type.

Bytes to follow: 4 bytes

- 1) Scale Start (higher byte)
- 2) Scale Start (lower byte)
- 3) Scale Stop (higher byte)
- 4) Scale Stop (lower byte)

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

Notes:

Return Loss & Cable Loss: Scaling is in **thousandths** of a dB
Maximum value sent is 54000 which represents 54.00 dB
Minimum value sent is 0 which represent 0.00 dB
Scale Start Value is the top of the graph
Scale Stop Value is the bottom of the graph

SWR: Scaling is in **thousandths** (of ratio)
Maximum value sent is 65535 which represents 65.53
Minimum value sent is 1000 which represents 1.00
Scale Start Value is the bottom of the graph
Scale Stop Value is the top of the graph

Set marker - Control byte #5 (05h)

Description: Sets an individual marker.

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 129 at the stop frequency (or distance). The On/Off Status of a Marker can be toggled using this control byte.

In order to set frequency markers, you must be in the frequency domain. Likewise, if you want to set distance markers, you must be in the distance domain. Marker position is independently remembered for distance and frequency domains.

See control byte #20 (14h) response bytes 14 to 18 (0Eh to 12h) for current frequency markers. See control byte #20 (14h) response bytes 28 to 31 (1Ch to 1F) for current distance markers. See control byte #20 (14h) response byte 40 (28h) for current marker on/off status.

Bytes to follow: 4 bytes:

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

Set limit - Control byte #6 (06h)

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

Currently, Site Master supports one limit line so the limit number is always 1. If the limit beep is turned on, the Site Master beeps any time the trace is above the limit line on the display. You can use return loss graphs to "catch" a bad match. SWR graph limit beeps only when the match gets good.

See control byte #20 (14h) response byte 40 (28h) for current Site Master configuration.

Bytes to follow: 5 bytes:

- 1) Limit Number (for units with multiple limits, 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 (higher byte)
- 5) Limit Value (lower 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

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

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

Set DTF parameters - 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 operations manual for a detailed explanation of the factors influencing proper selection of DTF parameters.

See control byte #20 (14h) response bytes 20 to 39 (14h to 27h) 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

Notes: Start & Stop Distances are 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)

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). Since the Site Master does not have a real-time clock, you must update the time/date stamp before storing a sweep.

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

Current time setting can be found in trace 0 response bytes 16 to 23 (10h to 17h). Current date setting can be found in trace 0 response bytes 24 to 31 (18h to 1Fh). See control byte #17 (11h).

Bytes to Follow: 16 bytes

- 1-8) Time
- 9-16) Date

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. You determine the format.

Current reference number is found in trace 0 response bytes 32 to 39 (20h to 27h). See control byte #17 (11h).

Bytes to Follow: 8 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.

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 remote control byte #69 (45h) at the end of each sweep. If present in the buffer, Site Master returns to remote mode(no sweeping, locked keypad).

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 bytes 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
0 = Off
1 = On

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

Sequence 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.

Upon receiving this control byte any old calibration data is lost. The Site Master does the calibration step specified by the second byte. You may perform the open, short, and load calibrations in any order. After the measurements, you must trigger the calculation step to complete the calibration.

After receiving the calculation byte, the Site Master checks to see if all three 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 three 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

Export calibration data - Control Byte #14 (0Eh)

Description: Sends calibration data from the Site Master to the computer.

One of the most powerful features of the Site Master programming ability is export of the Calibration Data to the computer. You can save it to a file, then re-introduce the calibration data at a later time. Multiple frequency ranges can be used without having to recalibrate each time.

Calibration data usually doesn't change much, so calibration can often be used throughout the same day. But be aware that changes in temperature affect the calibration data the most, so if the temperature changes much, re-calibrate. Refer to the operation manual for details on calibration.

Bytes to Follow: 0 byte

Site Master Returns: 2608 bytes

- 1) Calibration Start Frequency(highest byte)
- 2) Calibration Start Frequency
- 3) Calibration Start Frequency
- 4) Calibration Start Frequency(lowest byte)
- 5) Calibration Stop Frequency(highest byte)
- 6) Calibration Stop Frequency
- 7) Calibration Stop Frequency
- 8) Calibration Stop Frequency(lowest byte)
- 9 - 2608) Calibration data

Import calibration data - Control Byte #15 (0Fh)

Description: Transfers previously exported calibration data from the computer to the Site Master.

This is the other half of the operation described in control byte #14 (0Eh). Send the stored calibration data back to the Site Master in exactly the same order in which you received it. The Site Master does no error checking on the calibration data.

Warning: The Site Master takes each byte and stores it to EEPROM. You must wait a minimum of 5 milliseconds (this is the only control byte that requires a delay) between bytes to allow the Site Master time to complete this cycle. The EEPROM is guaranteed to allow 100,000 calibrations. Use this control byte with care.

Bytes to Follow: 2608 bytes

- 1) Calibration Start Frequency(highest byte)
- 2) Calibration Start Frequency
- 3) Calibration Start Frequency
- 4) Calibration Start Frequency(lowest byte)
- 5) Calibration Stop Frequency(highest byte)
- 6) Calibration Stop Frequency
- 7) Calibration Stop Frequency
- 8) Calibration Stop Frequency(lowest byte)
- 9 - 2608) Calibration data

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

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

Description: Saves current trace data (last complete trace data before entering remote) to a specific location.

Note: Any calibration steps performed in remote mode overwrite the trace data in the memory.

Bytes to follow: 1 byte

- 1) Store Location 1-40

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

Recall sweep trace - Control Byte #17 (11h)

Description: Queries the Site Master for sweep trace data.

Expected time for sending one sweep is about 0.6 seconds.

Bytes to Follow: 1 Byte

- 0 - Last sweep trace before entering remote mode (sweep trace in RAM)
- 1- 40 = Specific saved sweep number (stored sweeps in EEPROM)

Site Master Returns: Valid Sweep: 604 bytes

- 1-2) # of following bytes (602 for a valid sweep)
- 3-4) Reserved bytes
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes ASCII)
- 16-23) Time stamp
- 24-31) Date stamp
- 32-39) Reference number stamp
- 40) Domain (0: Frequency Domain, 1: Distance Domain)
- 41) Start Frequency (highest byte)

- 42) Start Frequency
- 43) Start Frequency
- 44) Start Frequency (lowest byte)
- 45) Stop Frequency (highest byte)
- 46) Stop Frequency
- 47) Stop Frequency
- 48) Stop Frequency (lowest byte)
- 49) Minimum Frequency Step Size (Highest byte)
- 50) Minimum Frequency Step Size
- 51) Minimum Frequency Step Size
- 52) Minimum Frequency Step Size (lowest byte)
- 53) Scale Start (higher byte)
- 54) Scale Start (lower byte)
- 55) Scale Stop (higher byte)
- 56) Scale Stop (lower byte)
- 57) Frequency Marker 1 (higher byte)
- 58) Frequency Marker 1 (lower byte)
- 59) Frequency Marker 2 (higher byte)
- 60) Frequency Marker 2 (lower byte)
- 61) Limit (higher byte)
- 62) Limit (lower byte)
- 63) Start Distance (highest byte)
- 64) Start Distance
- 65) Start Distance
- 66) Start Distance (lowest byte)
- 67) Stop Distance (highest byte)
- 68) Stop Distance
- 69) Stop Distance
- 70) Stop Distance (lowest byte)
- 71) Distance Marker 1 (higher byte)
- 72) Distance Marker 1 (lower byte)
- 73) Distance Marker 2 (higher byte)
- 74) Distance Marker 2 (lower byte)
- 75) Relative Propagation Velocity (highest byte)
- 76) Relative Propagation Velocity
- 77) Relative Propagation Velocity
- 78) Relative Propagation Velocity (lowest byte)
- 79) Cable Loss (highest byte)
- 80) Cable Loss
- 81) Cable Loss
- 82) Cable Loss (lowest byte)
- 83) Status byte 1: (0 = Off , 1 = On)
 - (LSB) bit 0 : Limit On/Off
 - bit 1 : Marker 1 On/Off
 - bit 2 : Marker 2 On/Off
 - bit 3 : Cal On/Off
 - bit 4 : RL/SWR (0 = SWR, 1 = RL)
 - bit 5 : Unit of measurement (0 = Metric, 1 = English)
 - bit 6 - 7 : Printer type (see control byte #1)

- 84) Status byte 2: (Extended Status Byte for Version 3.00 of Firmware)
 (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
 bit 2-3: Currently Unused
 bit 4-5: Measurement Mode (see Notes)
 bit: 5 4
 | |
 0 0 - SWR
 0 1 - RL
 1 0 - Cable Insertion Loss
 bit 6-7: Currently Unused
- 85-604) Sweep Data (130 points * 4 bytes/point= 520 bytes)
 4 bytes for each data point
 1. gamma MSB
 2. gamma LSB
 3. phase MSB
 4. phase LSB

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

For invalid sweeps(empty stored sweep locations) : only 11 bytes will return:
 1-2) Number of following bytes (9 bytes for invalid sweep recall)
 3-4) Model # (unsigned integer, 0x00 for Site Master)
 5-11) Extended Model # (7 bytes in ASCII)

Invalid sweep location : 1 byte
 224 (E0) : Parameter error : Invalid sweep location

Notes: Please refer to Control Bytes 02h through 0Ah for data formats.

Firmware Version 3.00 or above encodes measurement mode in byte 84 bits 4-5. Byte 83 bit 4 also provides measurement mode information to ensure compatibility with PC software that is written for earlier versions of firmware.

Minimum Frequency Step Size is in Hz
Gamma is in **thousandths** (of ratio)
Phase is in **tenths** of a degree

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 System Status Query - Control Byte #20 (14h) 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 - 9

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 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, currently 0 - 9

Site Master 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 Site Master for current system settings.

The current state of the Site Master represents the state after last successful remote control operation.

Please refer to Control bytes 01h through 0Ah for data formats.

Bytes to Follow: 0 bytes

Site Master Returns: 43 bytes

- 1) Domain (0 = Frequency Domain, 1 = Distance Domain)
- 2) Start Frequency (highest byte)
- 3) Start Frequency
- 4) Start Frequency
- 5) Start Frequency (lowest byte)
- 6) Stop Frequency (highest byte)
- 7) Stop Frequency
- 8) Stop Frequency
- 9) Stop Frequency (lowest byte)
- 10) Scale Start (higher byte)
- 11) Scale Start (lower byte)
- 12) Scale Stop (higher byte)
- 13) Scale Stop (lower byte)

- 14) Frequency Marker 1 (higher byte)
- 15) Frequency Marker 1(lower byte)
- 16) Frequency Marker 2 (higher byte)
- 17) Frequency Marker 2 (lower byte)
- 18) Limit (higher byte)
- 19) Limit (lower byte)
- 20) Start Distance (highest byte)
- 21) Start Distance
- 22) Start Distance
- 23) Start Distance (lowest byte)
- 24) Stop Distance (highest byte)
- 25) Stop Distance
- 26) Stop Distance
- 27) Stop Distance (lowest byte)
- 28) Distance Marker 1 (higher byte)
- 29) Distance Marker 1 (lower byte)
- 30) Distance Marker 2 (higher byte)
- 31) Distance Marker 2 (lower byte)
- 32) Relative Propagation Velocity (highest byte)
- 33) Relative Propagation Velocity
- 34) Relative Propagation Velocity
- 35) Relative Propagation Velocity (lowest byte)
- 36) Cable Loss (highest byte)
- 37) Cable Loss
- 38) Cable Loss
- 39) Cable Loss (lowest byte)
- 40) bit data 1

- (LSB) bit 0 = Limit On/Off
- bit 1 = Marker 1 On/Off
- bit 2 = Marker 2 On/Off
- bit 3 = Beep at Limit On/Off
- bit 4 = RL/SWR (1=RL, 0=SWR)
- bit 5 = Watch-dog Timer On/Off
- bit 6 = Single Sweep Mode On/Off
- bit 7 = reserved

41) bit data 2

- (LSB) bit 0 = Fixed CW On/Off
 - bit 1 = Keyboard Lock On/Off
 - bit 2 = LCD Back Light On/Off
 - bit 3 = Measurement Unit, Metric/English (0 = English, 1 = Metric)
 - bit 4 = Cal On/Off
 - bit 5-7 : Printer type select
- | | | | |
|------|--|---|---|
| bit: | 7 | 6 | 5 |
| | | | |
| | 0 | 0 | 0 |
| | - none, no printer selected (system default) | | |
| | 0 | 0 | 1 |
| | - Seiko DPU-411 thermal printer | | |
| | 0 | 1 | 0 |
| | - HP Deskjet 340 ink jet printer | | |
| | 0 | 1 | 1 |
| | - 1 1 1 reserved | | |

42) bit data 3: (Extended Status Byte for Version 3.00 of Firmware)

(LSB) bit 0-1: DTF Windowing Mode

bit: 1 0

1 1

0 0 - Rectangular (No Windowing)

0 1 - Nominal Side Lobe

1 0 - Low Side Lobe

1 1 - Minimum Side Lobe

bit 2-3: Currently Unused

bit 4-5: Measurement Mode (See Note)

bit: 5 4

1 1

0 0 - SWR

0 1 - RL

1 0 - Cable Insertion Loss

bit 6-7: Currently Unused

43) Serial Port Echo Status On/Off (1=On, 0=Off)

Notes: Firmware Version 3.00 or above encodes measurement mode in byte 40 bit 4-5. Byte 2 bit 4 also provides measurement mode information to ensure compatibility with PC software that is written for earlier versions of firmware.

Bit Value: 0 = Off
1 = On

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

Description: Triggers a self test on the Site Master.

Bytes to Follow: 0 Bytes

Site Master Returns: 9 bytes

1) Self-test report: (0 = Fail, 1 = Pass)

(LSB) bit 0 : Phase Lock Loop

bit 1 : Integrator

bit 2 : Battery

bit 3 : Temperature

bit 4 : EEPROM read/write

bit 5- 7 : Not currently used.

2) Battery Voltage(higher byte)

3) Battery Voltage(lower byte)

4) Temperature (higher byte)

5) Temperature (lower byte)

6) Lock Fail Counter (higher byte)

7) Lock Fail Counter (lower byte)

8) Integrator Fail Counter (higher byte)

9) Integrator Fail Counter (lower byte)

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

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

Read fail counters - Control Byte #22 (16h)

Description: Reads the value of the Lock Fail Counter and Analog Integrator Fail Counter.

This duplicates the functionality of the front panel icons. If the Analog Integrator takes too long to reach measurement level, due to low battery or an interfering signal, the count increments. If the phase lock circuitry fails, its count increments. You can check these counters at the end of the sweep to make sure everything went okay.

The Site Master preserves the value of each of these counters when power is turned off.

Bytes to Follow: 0 bytes

Site Master Returns: 4 bytes (unsigned integer)

- 1) Lock Fail counter (higher byte)
 - 2) Lock Fail counter (lower byte)
 - 3) Integrator Fail Counter (higher byte)
 - 4) Integrator Fail Counter (lower 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)

Select Calibration - Control Byte #30 (1Eh)

Description: Select Calibration A or B

The Site Master allows storage of two calibrations. Use this control byte to switch between the two.

Be sure to select a calibration before sequencing through the calibration steps, otherwise the currently selected calibration will be overwritten.

When switching between the calibrations, make sure the frequency range of the Site Master is set to the same frequency range as the calibration. If the frequency ranges are different, then the calibration will not be used.

Bytes to Follow: 1 byte

- 01h - Cal A
- 02h - Cal B

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

Select DTF Windowing - Control Byte #33 (21h)

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 Power Monitor Mode - Control Byte #38 (26h)

Description: Set Power Monitor Mode On/Off

Use this control byte to instruct the Site Master to remain in power monitor mode after exiting remote mode.

Bytes to Follow: 1 byte

- 00h - Off
- 01h - On

Site Master Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error : Option not available
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 byte

Site Master 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) Relative Mode reference Power (highest byte)
- 3) Relative Mode reference Power

- 4) Relative Mode reference Power
- 5) Relative Mode reference Power (lowest byte)
- 6) Offset (highest byte)
- 7) Offset
- 8) Offset
- 9) Offset (lowest byte)
- 10) Zero Reference Power (highest byte)
- 11) Zero Reference Power
- 12) Zero Reference Power
- 13) Zero Reference Power (lowest byte)
- 14) Absolute Power (highest byte)
- 15) Absolute Power
- 16) Absolute Power
- 17) Absolute Power (lowest byte)
- 18) Power (highest byte)
- 19) Power
- 20) Power
- 21) Power (lowest byte)

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

Absolute Power of -100 dBm 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

Zero Reference Power in 1000 of dBm

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(Site Master takes a power reading and uses it as the 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 bytes

- 1) On/Off (01 - On, 00 - 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 (Site Master samples the current power level and uses it as the zero adjust value.)

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

Extra Setup Marker Info - Control Byte #49 (31h)

Description: Obtains Marker Status Information.

Bytes to Follow: 0 byte

Site Master Returns: 25 bytes

- 1) Number of Markers for this Unit
- 2) Marker #1 On/Off Status
- 3) Reserved
- 4) Frequency Marker #1 Point (high byte)
- 5) Frequency Marker #2 Point (low byte)
- 6) Distance Marker #1 Point (high byte)
- 7) Distance Marker #2 Point (low byte)
- 8) Marker #2 On/Off Status
- 9) Marker #2 Delta Status
- 10) Frequency Marker #2 Point (high byte)

- 11) Frequency Marker #2 Point (low byte)
- 12) Distance Marker #2 Point (high byte)
- 13) Distance Marker #2 Point (low byte)
- 14) Marker #3 On/Off Status
- 15) Marker #3 Delta Status
- 16) Frequency Marker #3 Point (high byte)
- 17) Frequency Marker #3 Point (low byte)
- 18) Distance Marker #3 Point (high byte)
- 19) Distance Marker #3 Point (low byte)
- 20) Marker #4 On/Off Status
- 21) Marker #4 Delta Status
- 22) Frequency Marker #4 Point (high byte)
- 23) Frequency Marker #4 Point (low byte)
- 24) Distance Marker #4 Point (high byte)
- 25) Distance Marker #4 Point (low byte)

Extra Sweep Marker Info - Control Byte #50 (32h)

Description: Obtains Marker Status Information for a saved trace in EEPROM.

Bytes to Follow: 1 byte

- 0 - Last sweep trace before entering remote mode (sweep trace in RAM)
- 1-70 - Specific save sweep number (stored sweeps in EEPROM)

Site Master Returns: 25 bytes

- 1) Number of Markers for this Unit
- 2) Marker #1 On/Off Status
- 3) Reserved
- 4) Frequency Marker #1 Point (high byte)
- 5) Frequency Marker #2 Point (low byte)
- 6) Distance Marker #1 Point (high byte)
- 7) Distance Marker #2 Point (low byte)
- 8) Marker #2 On/Off Status
- 9) Marker #2 Delta Status
- 10) Frequency Marker #2 Point (high byte)
- 11) Frequency Marker #2 Point (low byte)
- 12) Distance Marker #2 Point (high byte)
- 13) Distance Marker #2 Point (low byte)
- 14) Marker #3 On/Off Status
- 15) Marker #3 Delta Status
- 16) Frequency Marker #3 Point (high byte)
- 17) Frequency Marker #3 Point (low byte)
- 18) Distance Marker #3 Point (high byte)
- 19) Distance Marker #3 Point (low byte)
- 20) Marker #4 On/Off Status
- 21) Marker #4 Delta Status
- 22) Frequency Marker #4 Point (high byte)
- 23) Frequency Marker #4 Point (low byte)
- 24) Distance Marker #4 Point (high byte)
- 25) Distance Marker #4 Point (low byte)

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

Site Master Returns: 13 bytes

- 1-2) Model # (unsigned integer, 0x00 for Site Master)
- 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.

Exit remote mode - Control Byte #255 (FFh)

Description: Site Master exits remote mode

Bytes to Follow: 0 byte

Site Master Returns: 1 byte

- 1) Confirm flag FFh

The computer sends a serial stop byte #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
Limit (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
Markers (Frequency & Distance Marker)	2 bytes unsigned	1 sweep point	Marker values are given in relative position on the graph. The lowest value is 0; the highest value 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/m/ft	-0.345 dB/m = 34500
Gamma	2 bytes signed	1 / 1000 (ratio)	Gamma value is the ratio of magnitude of reflected signal over the magnitude of incident signal.
Phase	2 bytes signed	1 / 10 degree	Phase value is the difference in phase between the incident and reflected signal.
Power: dBm/dBr	4 bytes unsigned	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

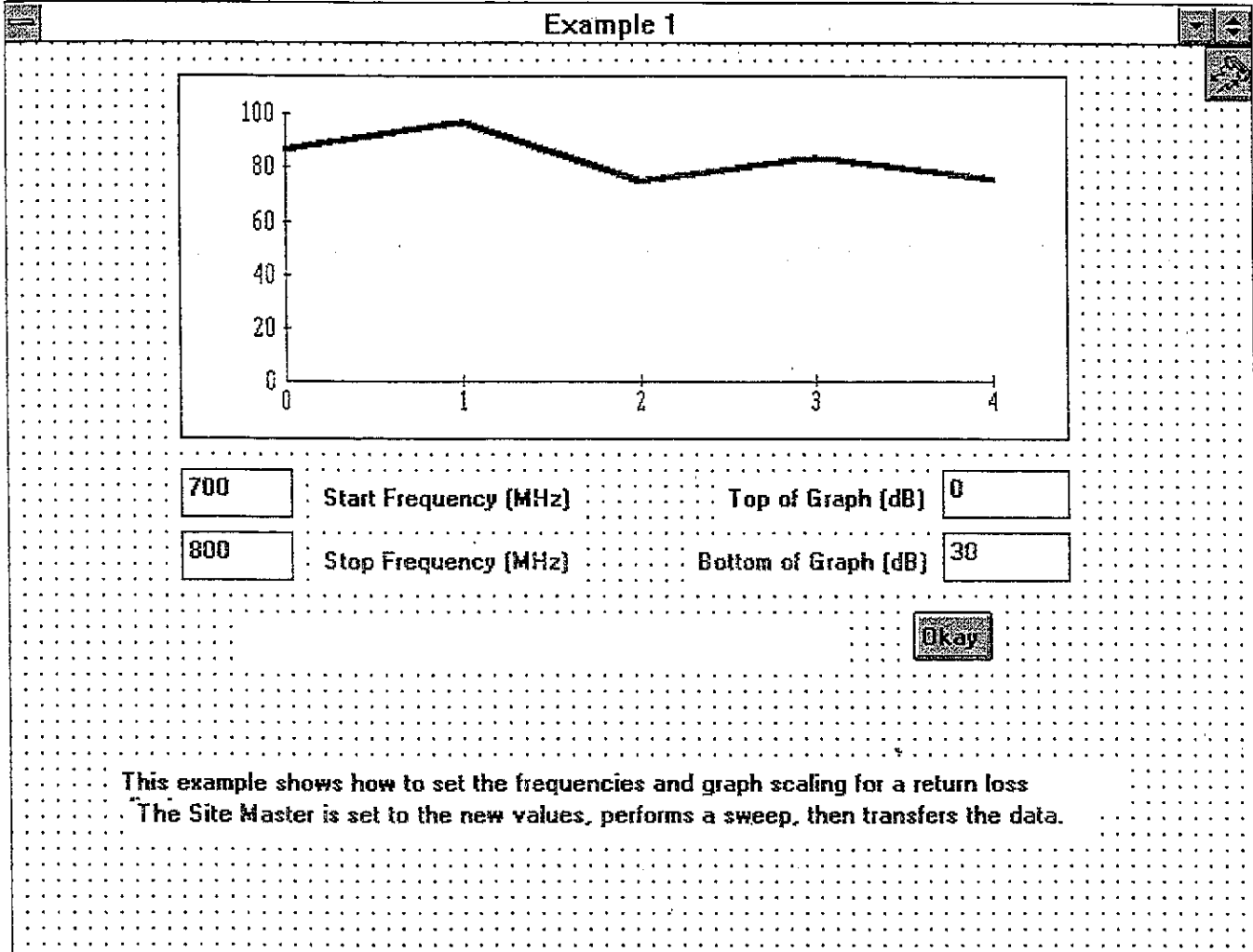
Mini-Applications

Anritsu provides you with four mini-applications written in Visual Basic 3.0 (Professional Edition) for Windows and one example written in LabView 3.1. Each application is self-contained and performs several simple, but important tasks. The source code, located on the Site Master software tools distribution diskette, is ready to run. Have fun!

Mini-App #1 - Reference

sm2_ex1.frm

This application sets the Site Master to the frequencies entered in the text boxes. It also changes the graph scaling to the user entered values. After controlling the Site Master the mini-app transfers a trace and displays the data on a graph.



description of functions

Sub cmdOkay_click () — sequences through the application, updates the message.

Function ConvertFourToSingle (FourBytes As String) As Single — takes a 4 byte string and converts it to a single precision number.

Sub ConvertSingleToFour (value As Single, ReturnBuffer As String) — takes a single precision number and converts it to a 4 byte string.

Sub ConvertSingleToTwo (value As Single, ReturnBuffer As String) — takes a single precision number and converts it to a 2 byte string.

Function ConvertTwoToSingle (TwoBytes As String) As Single — takes a 2 byte string and converts it to a single precision number.

Sub EnterRemote () — causes the Site Master to go into remote.

Sub ExitRemote () — causes the Site Master to return to local control.

Sub Form_Load () — initialization routines needed to communicate with the Site Master.

Sub GetTrace (TraceNum As Integer, TraceBuffer As String) — obtains the current trace.

Sub GraphTrace (TraceBuffer As String) — converts gamma to return loss and graphs it.

Function ReceiveFromSiteMaster (ExpectedBytes As Integer, TimeOutValue As Integer, ReceiveBuffer As String) As Integer — handles the serial communication and error checking for the receipt of bytes from the Site Master using the Comm Control.

Function SendToSiteMaster (SendString As String) As Integer — outputs to Site Master via the Comm Control.

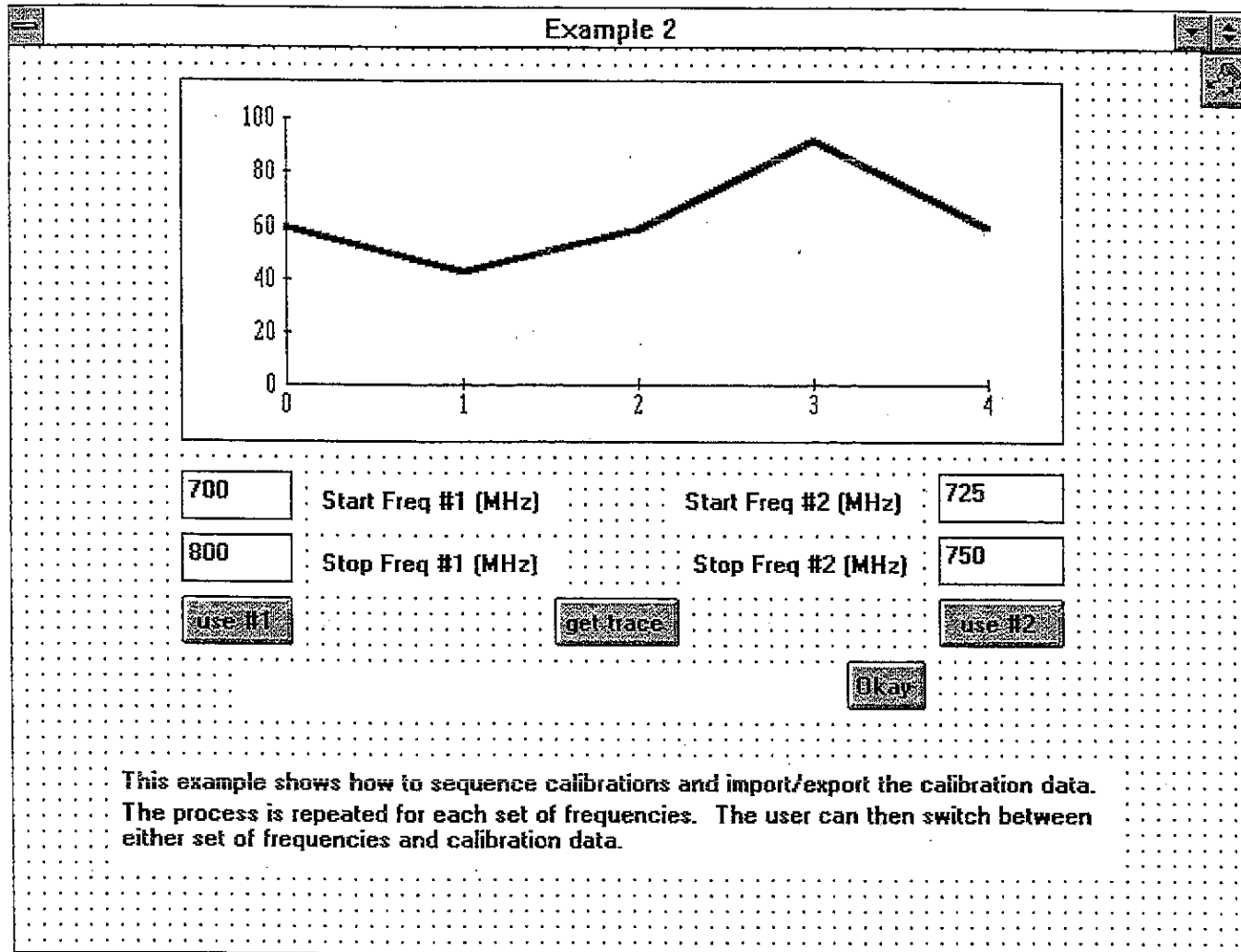
Sub SetFrequencies (StartFreq As Single, StopFreq As Single) — sends the desired frequencies to the Site Master.

Sub SetScale (Top As Single, Bottom As Single) — sets the desired scaling parameters, assumes return loss graph type.

Mini-App #2-Reference

sm2_ex2.frm

This mini-app sequences through two calibrations and then switches between the two frequency ranges, capturing a trace when requested.



description of functions

Sub cmdGetTrace_Click () — returns the current trace from Site Master.

Sub cmdOkay_click () — sequences through the program steps.

Sub SequenceCal () — sequences through the calibration steps.

Sub cmdUseFreq1_Click () — sets Site Master to frequency range #1.

Sub cmdUseFreq2_Click () — sets Site Master to frequency range #2.

Function ConvertFourToSingle (FourBytes As String) As Single — takes a 4 byte string and converts it to a single precision number.

Sub ConvertSingleToFour (value As Single, ReturnBuffer As String) — takes a single precision number and converts it to a 4 byte string.

Sub ConvertSingleToTwo (value As Single, ReturnBuffer As String) — takes a single precision number and converts it to a 2 byte string.

Function ConvertTwoToSingle (TwoBytes As String) As Single — takes a 2 byte string and converts it to a single precision number.

Sub delay (DelayTime As Integer) — sets millisecond delay for importing calibration data.

Sub EnterRemote () — causes the Site Master to go into remote.

Sub ExitRemote () — causes the Site Master to return to local control.

Sub Form_Load () — initialization routines needed to communicate with the Site Master.

Sub GetTrace (TraceNum As Integer, TraceBuffer As String) — obtains the current trace.

Sub GraphTrace (TraceBuffer As String) — converts gamma to return loss and graphs it.

Function ReceiveFromSiteMaster (ExpectedBytes As Integer, TimeOutValue As Integer, ReceiveBuffer As String) As Integer — handles the serial communication and error checking for the receipt of bytes from the Site Master using the Comm Control.

Function SendToSiteMaster (SendString As String) As Integer — outputs to Site Master via the Comm Control.

Sub SetFrequencies (StartFreq As Single, StopFreq As Single) — sends the desired frequencies to the Site Master.

Sub SetScale (Top As Single, Bottom As Single) — sets the desired scaling parameters, assumes return loss graph type.

Mini-App #3-Reference

sm_exmpl.vi

This Labview VI allows you to send a byte to the Site Master, receive bytes from Site Master and graph the data trace. The send and receive should not be on together, but graph and receive work fine together.

SM_EXMPL.VI

File Edit Operate Controls Windows Text Help

value of byte to send send

number of bytes to get receive graph

receive text

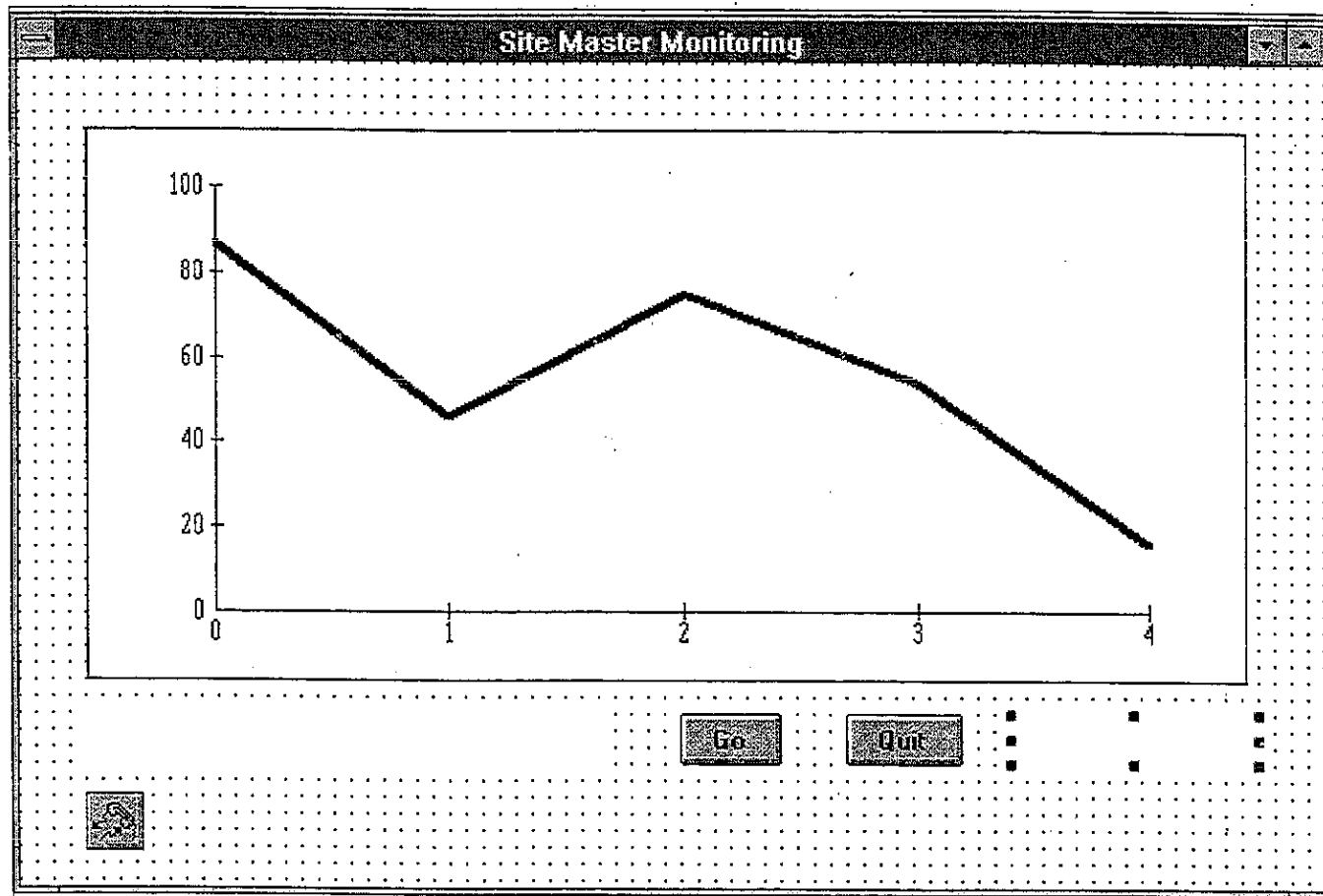
to "capture" a trace

- 1) to enter remote "send 69"
- 2) read 13 bytes (response)
- 3) to request trace "send 17"
- 4) current trace is "0"
- 5) toggle graph switch on
- 6) read in 604 bytes
- 7) to exit remote "send 255"
- 8) read in 1 byte

Mini-App #4 Reference

sm3_ex4.frm

This mini-app sends a remote mode request to query the Site Master for the last successful sweep trace, and then displays it on the screen.



description of functions

Sub cmdGo_Click () — sequences through the program steps

Sub cmdGo_Click () — stop taking measurements

Function ConvertFourToSingle (FourBytes As String) — takes a 4 byte string and converts it to a single precision number

Sub EnterRemote () — causes the Site Master to go to remote

Sub ExitRemote () — causes the Site Master to return to local control

Sub Form_Load () — initialization routines needed to communicate with the Site Master

Sub monitor () — program main loop

Function RecallTrace (TraceNum As Integer, TraceBuffer As String) — obtains the current trace.

Function RecallTrace (TraceNum As Integer, TraceBuffer As String) — converts gamma as return loss.

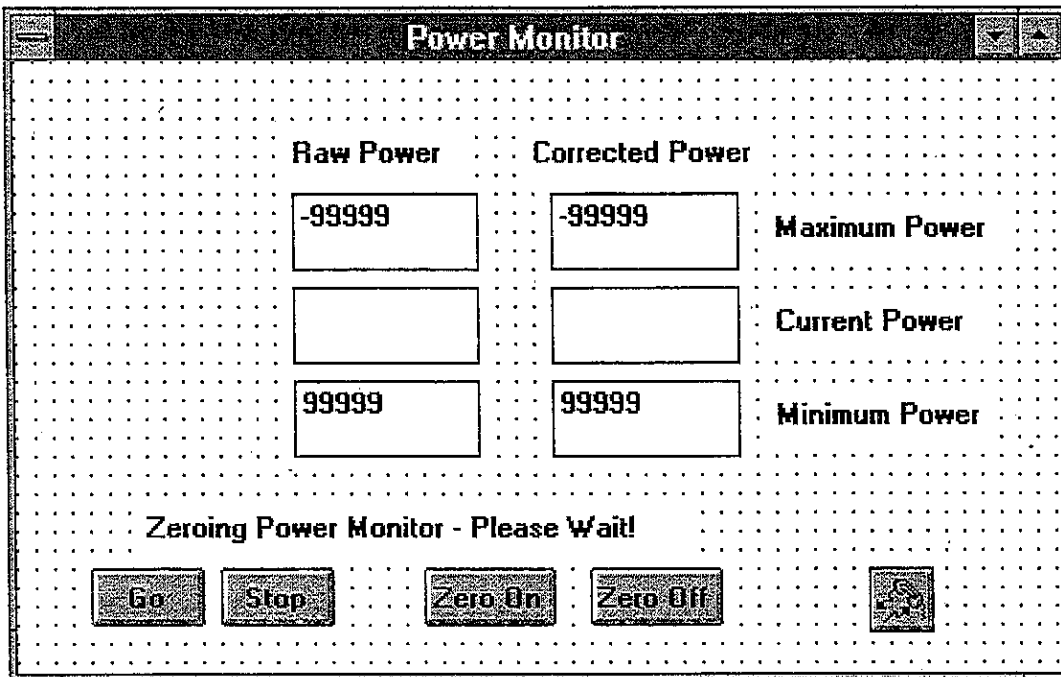
FunctionReceiveFromSiteMaster (ExpectedBytes As Integer, TimeOutValue As Integer, ReceiveBuffer As String) As Integer — handles the serial communication and error checking for the receipt of bytes from the Site Master using the Comm Control.

Function SendToSiteMaster (SendString As String) As Integer — outputs to Site Master via the Comm Control.

Mini-App #5 Reference

sm3_ex5.frm

This mini-app monitors the input power at the detector port. Zeroing option allows noise correction of the measurements.



description of functions

Sub cmdGo_Click () — sequences through the program steps.

Sub cmdGo_Click () — stop taking measurement.

Sub cmdZeroOn_Click () — send command to Site Master to perform a zeroing operation.

Function ConvertFourToSingle (FourBytes As String) As Single — takes a 4 byte string and converts it to a single precision number.

Sub delay (DelayTime As Integer) — sets millisecond delay for importing calibration data.

Sub EnterRemote () — causes the Site Master to go into remote.

Sub ExitRemote () — causes the Site Master to return to local control.

Function ReceiveFromSiteMaster (ExpectedBytes As Integer, TimeOutValue As Integer, ReceiveBuffer As String) As Integer — handles the serial communication and error checking for the receipt of bytes from the Site Master using the Comm Control.

Function SendToSiteMaster (SendString As String) As Integer — outputs to Site Master via the Comm Control.