

# Spectrum Master

MS2712E and MS2713E  
Spectrum Analyzer





## User Guide

# Spectrum Master Handheld Spectrum Analyzer

**MS2712E, 100 kHz to 4 GHz**

**MS2713E, 100 kHz to 6 GHz**

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Appendix A provides a list of supplemental documentation for the Spectrum Master features and options. The documentation set is available as PDF files on the documentation disc and the Anritsu web site.

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# DECLARATION OF CONFORMITY

**Manufacturer's Name:** ANRITSU COMPANY

**Manufacturer's Address:** Microwave Measurements Division  
490 Jarvis Drive  
Morgan Hill, CA 95037-2809  
USA

declares that the product specified below:

**Product Name:** Spectrum Master

**Model Number:** MS2712E, MS2713E

conforms to the requirement of:

EMC Directive: 2004/108/EC  
Low Voltage Directive: 2006/95/EC

## **Electromagnetic Compatibility: EN61326:2006**

Emissions: EN55011: 2007 Group I Class A

Immunity:	EN 61000-4-2:1995 +A1:1998 +A2:2001	4kV CD, 8kV AD
	EN 61000-4-3:2006 +A1:2008	3V/m
	EN 61000-4-4:2004	0.5kV SL, 1kV PL
	EN 61000-4-5:2006	0.5kV L-L, 1kV L-E
	EN 61000-4-6: 2007	3V
	EN 61000-4-11: 2004	100% @ 20msec

## **Electrical Safety Requirement:**

Product Safety: EN 61010-1:2001

Morgan Hill, CA

  
Eric McLean, Corporate Quality Director

21 July 2007  
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only YLYB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他(电缆、风扇、 连接器等) (Appended goods)	×	○	×	×	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。  
 ×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

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Equipment marked with the Crossed-out Wheellie Bin symbol complies with the European Parliament and Council Directive 2002/96/EC (the "WEEE Directive") in the European Union.



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This product and its manuals may require an Export License or approval by the government of the product country of origin for re-export from your country.

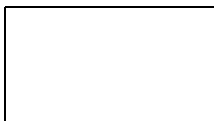
Before you export this product or any of its manuals, please contact Anritsu Company to confirm whether or not these items are export-controlled.

When disposing of export-controlled items, the products and manuals need to be broken or shredded to such a degree that they cannot be unlawfully used for military purposes.

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This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance ([www.eiae.org](http://www.eiae.org)) for disposal or recycling information.

VxWorks Runtime  
License 2000-1189



WindML Target License  
2000-1372



NI Device License  
3-2000-1486



WindRiver USB Runtime License  
2000-1421







## Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

### Symbols Used in Manuals

#### Danger



This indicates a very dangerous procedure that could result in serious injury or death, or loss related to equipment malfunction, if not performed properly.

#### Warning



This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

#### Caution



This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

### Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

## For Safety

### Warning



Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced. Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

### Warning



or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

### Warning



This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

### Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

# Table of Contents

---

## Chapter 1—General Information

1-1	Introduction . . . . .	1-1
1-2	Chapter Overview . . . . .	1-1
1-3	Available Models . . . . .	1-1
1-4	Available Options . . . . .	1-2
1-5	Standard Accessories . . . . .	1-4
1-6	Optional Accessories . . . . .	1-4
1-7	Additional Documents . . . . .	1-4
1-8	General Description . . . . .	1-5
1-9	Spectrum Master Specifications . . . . .	1-5
1-10	Preventive Maintenance . . . . .	1-5
1-11	Calibration and Verification . . . . .	1-6
1-12	ESD Caution . . . . .	1-6
1-13	Battery Replacement . . . . .	1-6
1-14	Soft Carrying Case . . . . .	1-8
1-15	Tilt Bail Stand . . . . .	1-9
1-16	Secure Environment Workplace . . . . .	1-10
	Spectrum Master Memory Types . . . . .	1-10
	Erase All User Files in Internal Memory . . . . .	1-10
	Recommended Usage in a Secure Environment . . . . .	1-11

## Chapter 2—Instrument Overview

2-1	Introduction . . . . .	2-1
2-2	Chapter Overview . . . . .	2-1
2-3	Turning On the Spectrum Master . . . . .	2-1
2-4	Front Panel Overview . . . . .	2-2
	Front Panel Keys . . . . .	2-3
	Touch Screen Keys . . . . .	2-5
	Keypad Menu Keys (1 to 9) . . . . .	2-5
	LED Indicators . . . . .	2-6
2-5	Display Overview . . . . .	2-6
2-6	Test Panel Connector Overview . . . . .	2-8
2-7	Symbols and Indicators . . . . .	2-10
	Battery Symbols . . . . .	2-10
	Additional Symbols . . . . .	2-11

## Table of Contents (Continued)

---

2-8	Data Entry . . . . .	2-12
	Numeric Values . . . . .	2-12
	Parameter Setting . . . . .	2-12
	Text Entry . . . . .	2-12
2-9	Mode Selector Menu . . . . .	2-13

### Chapter 3—Quick Start Guide

3-1	Introduction . . . . .	3-1
3-2	Measurement Mode Selection . . . . .	3-1
3-3	Spectrum Analyzer . . . . .	3-2
	Set Start and Stop Frequencies. . . . .	3-2
	Enter the Center Frequency . . . . .	3-2
	Select a Signal Standard . . . . .	3-2
	Set the Measurement Frequency Bandwidth. . . . .	3-2
	Set the Amplitude . . . . .	3-3
	Power Offset Set Up for Compensating External Loss . . . . .	3-3
	Set the Span . . . . .	3-3
	Single Limit Line . . . . .	3-4
	Create a Limit Envelope . . . . .	3-4
	Setting Up Markers . . . . .	3-5
	Select a Smart Measurement Type . . . . .	3-6

### Chapter 4—File Management

4-1	Introduction . . . . .	4-1
4-2	Managing Files . . . . .	4-1
	Save Files . . . . .	4-1
	Save Dialog Box . . . . .	4-2
	Quick Name Keys . . . . .	4-2
	Recall Files . . . . .	4-3
	Recall Dialog Box . . . . .	4-3
	Copying Files . . . . .	4-4
	Deleting Files . . . . .	4-5
	Delete Dialog Box . . . . .	4-5
4-3	File Menu Overview . . . . .	4-6
4-4	File Menu . . . . .	4-7
	Save Menu . . . . .	4-8
	Save Location Menu . . . . .	4-9
	Save On Event Menu . . . . .	4-10
	Recall Menu . . . . .	4-11
	Copy Menu . . . . .	4-12
	Delete Menu . . . . .	4-13

# Table of Contents (Continued)

---

## Chapter 5—System Operations

5-1	Introduction . . . . .	5-1
5-2	System Menu Overview . . . . .	5-2
5-3	System Menu . . . . .	5-3
	System Options Menu . . . . .	5-4
	Display Settings Menu . . . . .	5-5
	Reset Menu . . . . .	5-6
5-4	Preset Menu . . . . .	5-7
5-5	Self Test . . . . .	5-7
5-6	Updating the Spectrum Master Firmware . . . . .	5-8
5-7	Spectrum Master Firmware Emergency Repair . . . . .	5-9

## Chapter 6—GPS (Option 31)

6-1	Introduction . . . . .	6-1
6-2	Chapter Overview . . . . .	6-1
6-3	Activating the GPS Feature . . . . .	6-1
6-4	Saving and Recalling Traces with GPS Information . . . . .	6-3
	Saving Traces with GPS Information . . . . .	6-3
	Recalling GPS Information . . . . .	6-3
6-5	GPS Menu . . . . .	6-4

## Chapter 7—Ethernet Connectivity (Option 411)

7-1	Introduction . . . . .	7-1
7-2	Ethernet Connection . . . . .	7-1
	Network Connection . . . . .	7-1
	Ethernet Direct Connection . . . . .	7-1
7-3	Ethernet Configuration on the Spectrum Master . . . . .	7-3
	LAN Connection . . . . .	7-3
	Ethernet Config . . . . .	7-5
	Ethernet Menu . . . . .	7-6
7-4	DHCP . . . . .	7-7
	Example 1 . . . . .	7-8
	Example 2 . . . . .	7-8
7-5	ipconfig Tool . . . . .	7-8
7-6	Ping Tool . . . . .	7-9

## Chapter 8—Bias Tee (Option 10)

8-1	Overview . . . . .	8-1
-----	--------------------	-----

# Table of Contents (Continued)

---

## Chapter 9—Anritsu Tool Box and Line Sweep Tools

9-1	Introduction . . . . .	9-1
9-2	Anritsu Tool Box with Line Sweep Tools. . . . .	9-1
9-3	Install the Software . . . . .	9-2
9-4	Other Software . . . . .	9-2
9-5	Why use Line Sweep Tools? . . . . .	9-3
	Line Sweep Tools Features. . . . .	9-3
9-6	Using Line Sweep Tools . . . . .	9-4
	Markers and Limit Lines. . . . .	9-4
	Marker Presets . . . . .	9-5
	Renaming Grid. . . . .	9-5
	Report Generator. . . . .	9-6

## Chapter 10—Master Software Tools

10-1	Introduction . . . . .	10-1
10-2	MST Overview . . . . .	10-1
10-3	Feature Overview . . . . .	10-1
10-4	Installing MST. . . . .	10-2
10-5	Connecting to the Instrument . . . . .	10-2
10-6	Updating Spectrum Master Firmware . . . . .	10-2

## Appendix A—Measurement Guides

A-1	Introduction . . . . .	A-1
-----	------------------------	-----

## Index

# Chapter 1 — General Information

## 1-1 Introduction

This chapter provides information about frequency range, available options, additional documents, general overview, preventive maintenance, and annual verification requirements for the Anritsu Handheld MS2712E and MS2713E Spectrum Master models. Throughout this manual, the term Spectrum Master will refer to both models.

## 1-2 Chapter Overview

- [“Available Models” on page 1-1](#)
- [“Available Options” on page 1-2](#)
- [“Standard Accessories” on page 1-4](#)
- [“Optional Accessories” on page 1-4](#)
- [“Additional Documents” on page 1-4](#)
- [“General Description” on page 1-5](#)
- [“Spectrum Master Specifications” on page 1-5](#)
- [“Preventive Maintenance” on page 1-5](#)
- [“Calibration and Verification” on page 1-6](#)
- [“Calibration and Verification” on page 1-6](#)
- [“ESD Caution” on page 1-6](#)
- [“Battery Replacement” on page 1-6](#)
- [“Soft Carrying Case” on page 1-8](#)
- [“Tilt Bail Stand” on page 1-9](#)
- [“Secure Environment Workplace” on page 1-10](#)

## 1-3 Available Models

[Table 1-1](#) lists the Spectrum Master models and frequency ranges described in this User Guide.

**Table 1-1.** Spectrum Master Models

Model	Frequency Range
MS2712E	Spectrum Analyzer, 100 kHz to 4 GHz
MS2713E	Spectrum Analyzer, 100 kHz to 6 GHz

## 1-4 Available Options

Available options for the Spectrum Master models are shown in [Table 1-2](#).

**Table 1-2.** Available Options (Sheet 1 of 2)

MS2712E	MS2713E	Description
MS2712E-0419	MS2713E-0419	PIM Analyzer
MS2712E-0021	MS2713E-0021	2-Port Transmission Measurement
MS2712E-0010	MS2713E-0010	Bias-Tee
MS2712E-0031	MS2713E-0031	GPS Receiver (Requires Antenna P/N 2000-1528-R)
MS2712E-0019	MS2713E-0019	High-Accuracy Power Meter (Requires External Power Sensor)
MS2712E-0029	MS2713E-0029	Power Meter
MS2712E-0025	MS2713E-0025	Interference Analyzer <sup>(1)</sup>
MS2712E-0027	MS2713E-0027	Channel Scanner
MS2712E-0431	MS2713E-0431	Coverage Mapping <sup>(1)</sup>
MS2712E-0090	MS2713E-0090	Gated Sweep
MS2712E-0028	MS2713E-0028	C/W Signal Generator (Requires Option 0021) (Requires CW Signal Generator Kit, P/N 69793)
MS2712E-0009	MS2713E-0009	10 MHz BW Demod
MS2712E-0040	MS2713E-0040	GSM/GPRS/EDGE RF Signal Analyzer <sup>(2)</sup>
MS2712E-0041	MS2713E-0041	GSM/GPRS/EDGE Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0044	MS2713E-0044	W-CDMA/HSDPA RF Signal Analyzer <sup>(2)</sup>
MS2712E-0045	MS2713E-0045	W-CDMA Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0065	MS2713E-0065	W-CDMA/HSDPA Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0035	MS2713E-0035	W-CDMA/HSDPA Over-the-Air Signal Analyzer <sup>(3)</sup>
MS2712E-0520	MS2713E-0520	P25 Analyzer <sup>(2)</sup>
MS2712E-0522	MS2713E-0522	P25 Coverage <sup>(3)</sup>
MS2712E-0530	MS2713E-0530	NXDN Analyzer <sup>(2)</sup>
MS2712E-0532	MS2713E-0532	NXDN Coverage <sup>(3)</sup>
MS2712E-0541	MS2713E-0541	LTE RF Measurements <sup>(2)</sup>
MS2712E-0542	MS2713E-0542	LTE Modulation Measurement <sup>(3)</sup>
MS2712E-0546	MS2713E-0546	LTE Over-the-Air Measurements <sup>(3)</sup>



**Table 1-2.** Available Options (Sheet 2 of 2)

MS2712E	MS2713E	Description
MS2712E-0060	MS2713E-0060	TD-SCDMA/HSDPA RF Signal Analyzer <sup>(2)</sup>
MS2712E-0061	MS2713E-0061	TD-SCDMA/HSDPA Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0038	MS2713E-0038	TD-SCDMA/HSDPA Over-the-Air Signal Analyzer <sup>(2)</sup>
MS2712E-0042	MS2713E-0042	cdmaOne/CDMA2000 1X RF Signal Analyzer <sup>(2)</sup>
MS2712E-0043	MS2713E-0043	cdmaOne/CDMA2000 1X Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0033	MS2713E-0033	cdmaOne/CDMA2000 1X Over-the-Air Signal Analyzer <sup>(3)</sup>
MS2712E-0062	MS2713E-0062	CDMA2000 1xEV-DO RF Signal Analyzer <sup>(2)</sup>
MS2712E-0063	MS2713E-0063	CDMA2000 1xEV-DO Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0034	MS2713E-0034	CDMA2000 1xEV-DO Over-the-Air Signal Analyzer <sup>(3)</sup>
MS2712E-0046	MS2713E-0046	IEEE 802.16 Fixed WiMAX RF Signal Analyzer <sup>(2)</sup>
MS2712E-0047	MS2713E-0047	IEEE 802.16 Fixed WiMAX Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0066	MS2713E-0066	IEEE 802.16 Mobile WiMAX RF Signal Analyzer <sup>(2)</sup>
MS2712E-0067	MS2713E-0067	IEEE 802.16 Mobile WiMAX Demodulated Signal Analyzer <sup>(2)</sup>
MS2712E-0037	MS2713E-0037	IEEE 802.16 Mobile WiMAX Over-the-Air Signal Analyzer
MS2712E-0509	MS2713E-0509	AM/FM/PM Analyzer
MS2712E-0030	MS2713E-0030	ISDB-T Measurements <sup>(2)</sup>
MS2712E-0032	MS2713E-0032	ISDB-T SFN Field Measurements <sup>(2)</sup>
MS2712E-0411	MS2713E-0411	Ethernet Connectivity
MS2712E-0098	MS2713E-0098	Standard Calibration (ANSI 2540-1-1994)
MS2712E-0099	MS2713E-0099	Premium Calibration to Z540 plus test data

1. Requires Option 0031.
2. Requires Option 0009.
3. Requires Option 0009 and Option 0031.

## 1-5 Standard Accessories

The Anritsu Spectrum Master includes a one year warranty which includes: battery, firmware, software, and Certificate of Calibration and Conformance. The following items are supplied with the product.

**Table 1-3.** Standard Accessories for Spectrum Master Models

Part Number	Description
10580-00251	Spectrum Master User Guide
3-68736	Soft Carrying Case
2300-498	MST CD: Master Software Tools
2300-530	Anritsu Tool Box with Line Sweep Tools DVD
10920-00060	Handheld Instruments Documentation Disc
633-44	Rechargeable Li-Ion Battery
40-168-R	AC-DC Adapter
806-141-R	Automotive Cigarette Lighter Adapter
3-2000-1498	USB A/5-pin mini-B Cable, 10 feet/305 cm
11410-00511	Spectrum Master MS2712E, MS2713E Technical Data Sheet

### Caution

When using the Automotive Cigarette Lighter Adapter, Anritsu Part Number 806-141-R, always verify that the supply is rated for a minimum of 60 Watts at 12 VDC, and that the socket is clear of any dirt or debris. If the adapter plug becomes hot to the touch during operation, then discontinue use immediately.

## 1-6 Optional Accessories

The Spectrum Master Technical Data Sheet (P/N: 11410-00511) contains a list and description of available optional accessories. In addition, the Spectrum Master can be equipped with a GSM/EDGE Analyzer, W-CDMA/HSDPA Analyzer, TD-SCDMA Analyzer, CDMA Analyzer, EVDO Analyzer, Fixed and Mobile WiMAX Analyzer, LTE Analyzer, ISDB-T Analyzer, PIM Analyzer and P25/NXDN Analyzer.

The data sheet is provided with the instrument and also available on the Anritsu website: <http://us.anritsu.com>.

## 1-7 Additional Documents

This user guide is specific to the Spectrum Master and includes a general description about the instrument. For information about Spectrum Analysis, Interference Analysis, 2-port Transmission Measurements, Power Meter, PIM Analysis, P25/NXDN, and Master Software Tools, refer to the individual Measurement Guides listed in [Appendix A, “Measurement Guides”](#).

## 1-8 General Description

The Spectrum Master MS2712E and MS2713E are integrated multi-functional test instruments that eliminate the need to carry and learn multiple test sets. The Spectrum Master can be configured to include: 2-port transmission measurements, spectrum analyzer, interference analyzer with interference mapping capabilities, coverage mapping, channel scanner, gated sweep, CW signal generator, power meter, high accuracy power meter, and AM/FM/PM analyzer. In addition, the spectrum master can be configured to include 3GPP, 3GPP2, IEEE 802.16, ISDB-T, PIM analyzer and P25/NXDN signal analyzers. A GPS receiver can be added to both the MS2712E and MS2713E Spectrum Master models.

The bright 8.4" TFT color display provides easy viewing in a variety of lighting conditions. All Spectrum Master models are equipped with a Li-Ion battery delivering more than three hours of battery life.

The combination of a touch screen and keypad enables users to navigate menus with the touch screen and enter numbers with the keypad.

The internal memory is large enough to store approximately 2,000 traces or setups. Measurements and setups can also be stored in a USB flash drive or transferred to a PC using the included USB cable. Ethernet connectivity is available using Option 0411.

**Note**

For USB storage, Anritsu recommends P/N 2000-1520-R USB Flash Drive. Not all after-market USB drives are compatible with the instrument. Many drives come with a second partition that contains proprietary firmware. This partition must be removed. Only one partition is allowed. Refer to the individual manufacturer for instructions on how to remove it. Some drives can be made to work by reformatting them using the FAT32 format.

Master Software Tools (MST), a PC based software program, can be used to create reports, view and organize data, analyze historical data, add markers and limit lines, rename traces and trace analysis. Please see [Chapter 10](#) for a brief overview of Master Software Tools and the Master Software Tools Users Guide for additional information. A .pdf file of the User Guide is available on the MST CD-ROM provided with the Spectrum Master.

## 1-9 Spectrum Master Specifications

Refer to the Spectrum Master Technical Data Sheet (P/N 11410-00511) for general specifications, detailed measurement specifications for all available measurement modes, ordering information, power sensors, and available accessories. The data sheet is included with the instrument and also available on the Anritsu website: <http://us.anritsu.com>.

## 1-10 Preventive Maintenance

Spectrum Master preventive maintenance consists of cleaning the unit and inspecting and cleaning the RF connectors on the instrument and all accessories. Clean the Spectrum Master with a soft, lint-free cloth dampened with water or water and a mild cleaning solution.

**Caution** To avoid damaging the display or case, do not use solvents or abrasive cleaners.

Clean the RF connectors and center pins with a cotton swab dampened with denatured alcohol. Visually inspect the connectors. The fingers of the N(f) connectors and the pins of the N(m) connectors should be unbroken and uniform in appearance. If you are unsure whether the connectors are undamaged, gauge the connectors to confirm that the dimensions are correct.

Visually inspect the test port cable(s). The test port cable should be uniform in appearance, and not stretched, kinked, dented, or broken.

## 1-11 Calibration and Verification

Anritsu recommends an annual calibration and performance verification of the Spectrum Master by local Anritsu service centers. The Spectrum Master is self-calibrating and there are no field-adjustable components. Contact information for Anritsu Service Centers is available at: <http://www.anritsu.com/Contact.asp>

## 1-12 ESD Caution

The Spectrum Master, like other high performance instruments, is susceptible to electrostatic discharge (ESD) damage. Coaxial cables and antennas often build up a static charge, which (if allowed to discharge by connecting directly to the Spectrum Master without discharging the static charge) may damage the Spectrum Master input circuitry. Spectrum Master operators must be aware of the potential for ESD damage and take all necessary precautions.

Operators should exercise practices outlined within industry standards such as JEDEC-625 (EIA-625), MIL-HDBK-263, and MIL-STD-1686, which pertain to ESD and ESDS devices, equipment, and practices. Because these apply to the Spectrum Master, it is recommended that any static charges that may be present be dissipated before connecting coaxial cables or antennas to the Spectrum Master. This may be as simple as temporarily attaching a short or load device to the cable or antenna prior to attaching to the Spectrum Master. It is important to remember that the operator may also carry a static charge that can cause damage. Following the practices outlined in the above standards will ensure a safe environment for both personnel and equipment.

## 1-13 Battery Replacement

The battery can be replaced without the use of tools. The battery compartment is located on the lower left side of the instrument (when you are facing the measurement display). To remove the battery:

1. Slide the catch toward the bottom of the instrument
2. Pull the top of the door away from the unit
3. Lift out the battery door.
4. Remove the battery pack from the instrument by grabbing the battery lanyard and pulling out.

Replacement is the opposite of removal. The battery key side (slot below the contacts) should be facing the front on the unit and slide in first.

<b>Note</b>	When inserting the battery the battery label should face the back of the instrument and the guide slot on the battery should be below the contacts. If the battery door does not latch closed, the battery may be inserted incorrectly.
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**Figure 1-1.** Battery Compartment Door

The battery that is supplied with the Spectrum Master may need charging before use. The battery can be charged while it is installed in the Spectrum Master by using either the AC-DC Adapter (40-168-R) or the DC adapter (806-141-R), or outside the Spectrum Master with the optional Dual Battery Charger (2000-1374). Refer to [“Battery Symbols” on page 2-10](#) for a description of battery symbols.

**Note** Use only Anritsu Company approved batteries, adapters, and chargers with this instrument.

**Caution** When using the Automotive Cigarette Lighter Adapter, Anritsu Part Number 806-141-R, always verify that the supply is rated for a minimum of 60 Watts @ 12 VDC, and that the socket is clear of any dirt or debris. If the adapter plug becomes hot to the touch during operation, then discontinue use immediately.

**Note** Anritsu Company recommends removing the battery for long-term storage of the instrument.

## 1-14 Soft Carrying Case

The Spectrum Master can be operated while in the soft carrying case. On the back of the case is a large storage pouch for accessories and supplies.

To install the instrument into the soft carrying case:

1. The front panel of the case is secured with hook-and-loop fasteners. Fully close the front panel of the case. When closed, the front panel supports the shape of the case while you are inserting the Spectrum Master.
2. Place the soft carrying case face down on a stable surface, with the front panel fully closed and laying flat.

**Note**

The soft case has two zippers near the back. The zipper closer to the front of the case opens to install and remove the instrument. The zipper closer to the back of the case opens an adjustable support panel that can be used to provide support for improved stability and air flow while the instrument is in the case. This support panel also contains the storage pouch.

3. Open the zippered back of the case.
4. Insert the instrument face down into the case, take care that the connectors are properly situated in the case top opening. You may find it easier to insert the connectors first, then pull the corners over the bottom of the Spectrum Master.



**Figure 1-2.** Instrument Inserted into the Soft Carrying Case

5. Close the back panel and secure with the zipper to secure the Spectrum Master.

The soft carrying case includes a detachable shoulder strap, which can be connected to the D-rings of the case.

**Caution** The soft case has panel openings for the fan inlet and exhaust ports. Do not block the air flow through the panels when the unit is operating.

## 1-15 Tilt Bail Stand

A Tilt Bail is attached to the back of the Spectrum Master for desktop operation. The tilt bail provides two settings of backward tilt for improved stability. To deploy the tilt bail, pull the bottom of the tilt bail away from the back of the instrument. To store the tilt bail, push the bottom of the bail towards the back of the instrument until it attaches to the Spectrum Master.

**Note** Do not use the tilt bail while the instrument is in the soft case. The soft case has an adjustable support panel in the back zipper.



**Figure 1-3.** Tilt Bail Extended

## 1-16 Secure Environment Workplace

This section details the types of memory in the Spectrum Master, how to delete stored user files in internal memory, and recommended usage in a secure environment workplace.

### Spectrum Master Memory Types

The instrument contains non-volatile disk-on-a-chip memory, EEPROM, and volatile DRAM memory. The instrument is also supplied with an external USB flash drive. The instrument does not have a hard disk drive or any other type of volatile or non-volatile memory.

#### Disk-On-A-Chip (DOC)

DOC is used for storage of instrument firmware, factory calibration information, user measurements, setups, and .jpg screen images. User information stored on the DOC is erased by the master reset process described below.

#### EEPROM

This memory stores the model number, serial number, and calibration data for the instrument. Also stored here are the user-set operating parameters such as frequency range. During the master reset process all operating parameter stored in the EEPROM are set to standard factory default values.

#### RAM Memory

This is volatile memory used to store parameters needed for the normal operation of the instrument along with current measurements. This memory is reset whenever the instrument is restarted.

#### External USB Flash Drive (not included with the instrument)

This memory may be selected as the destination for saved measurements and setups for the instrument. The user can also copy the contents of the internal disk-on-chip memory to the external flash memory for storage or data transfer. The external Flash USB can be reformatted or sanitized using software on a PC.

Refer to the [Chapter 4, “File Management”](#) for additional information on saving and copying files to the USB flash drive.

### Erase All User Files in Internal Memory

Perform a Master Reset:

1. Turn the instrument on.
2. Press the **Shift** button then the **System** (8) button.
3. Press the System Options submenu key.
4. Press the Reset key, then the Master Reset key.
5. A dialog box will be displayed on the screen warning that all settings will be returned to factory default values and all user files will be deleted. This deletion is a standard file delete and does not involve overwriting exiting information.
6. Press the **ENTER** button to complete the master reset.
7. The instrument will reboot and the reset is complete.



## Recommended Usage in a Secure Environment

Set the Spectrum Master to save files to the external USB Flash drive:

1. Attach the external Flash drive and turn the instrument on.
2. Press the **Shift** button then the **File** (7) button.
3. Press the **Save** submenu key.
4. Press the **Change Save Location** submenu key, then select the USB drive with the rotary knob, **Up/Down** arrow keys, or the touchscreen.
5. Press the **Set Location** submenu key.

The external USB drive is now the default location for saving files.

**Note**

For USB storage, Anritsu recommends P/N 2000-1520-R USB Flash Drive. Not all after-market USB drives are compatible with the instrument. Many drives come with a second partition that contains proprietary firmware. This partition must be removed. Only one partition is allowed. Refer to the individual manufacturer for instructions on how to remove it. Some drives can be made to work by reformatting them using the FAT32 format.



# Chapter 2 — Instrument Overview

## 2-1 Introduction

This chapter provides a brief overview of the Anritsu Spectrum Master. The intent of this chapter is to acquaint the user with the instrument. For detailed measurement information, refer to a specific measurement guide listed in [Appendix A, “Measurement Guides”](#).

## 2-2 Chapter Overview

- [“Turning On the Spectrum Master” on page 2-1](#)
- [“Front Panel Overview ” on page 2-2](#)
- [“Display Overview ” on page 2-6](#)
- [“Test Panel Connector Overview” on page 2-8](#)
- [“Symbols and Indicators” on page 2-10](#)
- [“Data Entry” on page 2-12](#)
- [“Mode Selector Menu” on page 2-13](#)

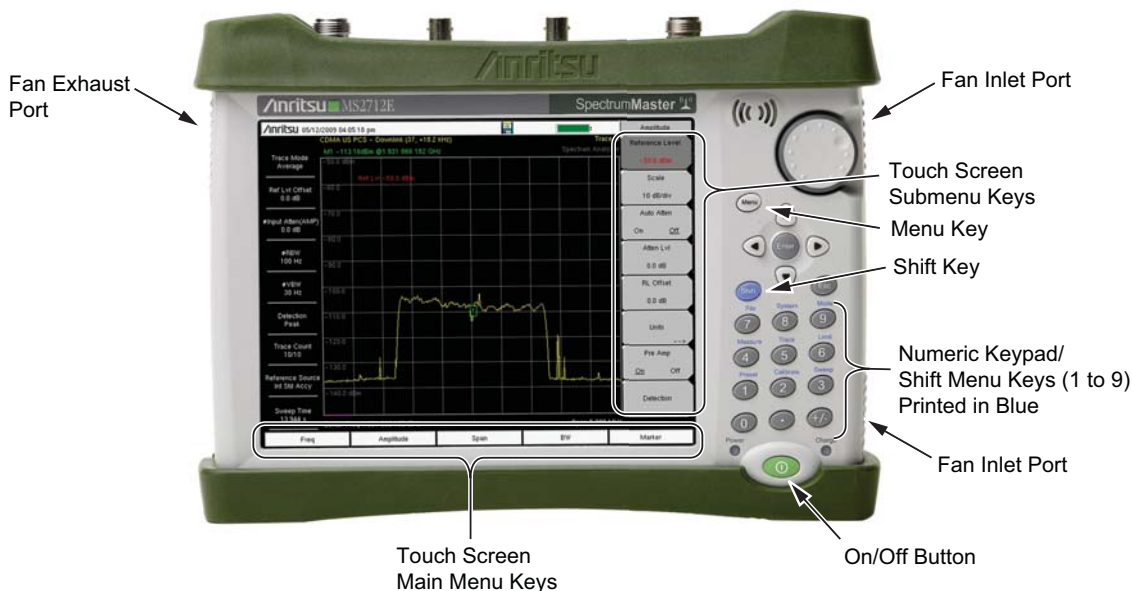
## 2-3 Turning On the Spectrum Master

The Anritsu Spectrum Master is capable of approximately three hours of continuous operation from a fully charged, field-replaceable battery (see [Section 1-13 “Battery Replacement” on page 1-6](#)). The Spectrum Master can also be operated from a 12 Vdc source (which will also simultaneously charge the battery). This can be achieved with either the Anritsu AC-DC Adapter (Anritsu part number 40-168-R) or the Automotive Cigarette Lighter Adapter (Anritsu part number 806-141-R). Both items are included with the Spectrum Master ([Table 1-3](#)).

**Caution**

When using the Automotive Cigarette Lighter Adapter, Anritsu Part Number 806-141-R, always verify that the supply is rated for a minimum of 60 Watts @ 12 VDC, and that the socket is clear of any dirt or debris. If the adapter plug becomes hot to the touch during operation, discontinue use immediately.

To turn on the Spectrum Master, press the green **On/Off** button on the front panel (Figure 2-1)



**Figure 2-1.** Spectrum Master Overview

The Spectrum Master takes approximately sixty seconds to complete power warm-up and to load the application software. At the completion of this process, the instrument is ready for use.

## 2-4 Front Panel Overview

The Spectrum Master menu-driven interface is easy to use and requires little training. The Spectrum Master uses a touch screen and keypad for data input. The five bottom menu keys and eight submenu keys on the right side are touch screen keys. The menu and submenu keys will vary depending upon the selected mode of operation, see “[Mode Selector Menu](#)” on page 2-13.

Numeric keys 1 through 9 are dual purpose, depending upon the current mode of operation. The dual-purpose keys are labeled with a number on the key itself and the alternate function is printed in blue above each of the keys. Use the blue **Shift** key to access the functions printed on the panel. The **Escape** key, used for aborting data entry, is the oval button located above numeric key 9. The rotary knob, the four arrow keys, and the keypad can be used to change the value of an active parameter.

The **Menu** key provides graphical icons of all the installed measurement modes and user defined short-cuts (see “[Menu Key](#)” on page 2-3). The locations of the keys are shown in [Figure 2-1](#).

### Note

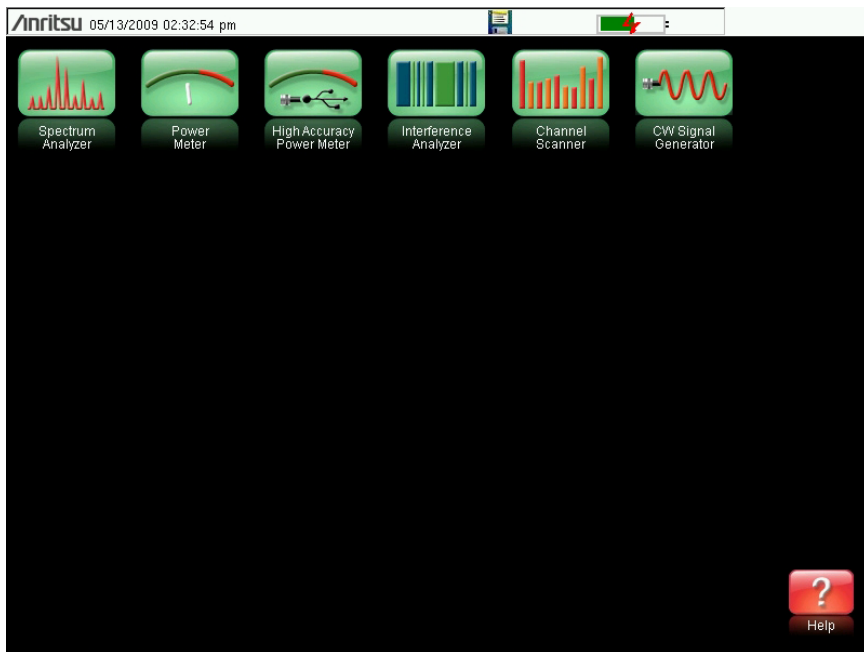
Keep the fan inlet and exhaust ports clear of obstructions at all times for proper ventilation and cooling of the instrument.

## Front Panel Keys

### Menu Key

Press the **Menu** key to display a grid of shortcut icons for installed measurement modes and user selected menus and setup files.

[Figure 2-2](#) shows the **Menu** key screen with shortcut icons for the installed measurement modes. Touch one of the icons in the top two rows to change modes. These icons are preinstalled and can not be moved or deleted.



**Figure 2-2.** Menu Key Screen, Icons for Installed Measurements

**Note**

The display of the Menu screen will vary depending on Spectrum Master model and installed options.

Figure 2-3 shows the **Menu** key screen with shortcut icons for the installed measurement modes and four rows of user-defined shortcuts to menus and setup files.

Press and hold down any key for a few seconds to add a shortcut to this screen. To shortcut setup files (.stp), open the recall menu and hold down on the file name for several seconds. Then select the location for the shortcut.

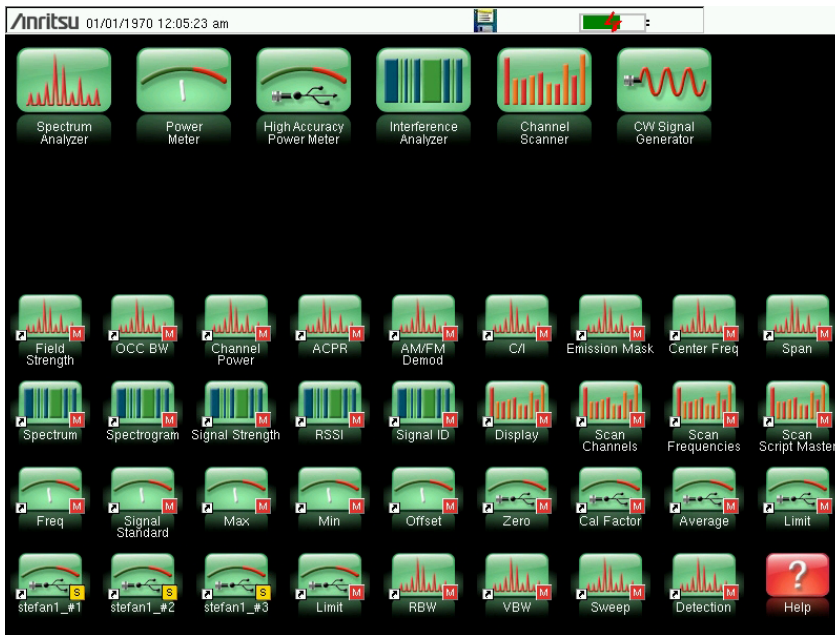


Figure 2-3. Menu Key Screen

User-defined shortcuts will stay in memory until deleted. To delete or move a shortcut button, press the **Menu** key then press and hold the shortcut for approximately 3 seconds. The Customize Button dialog box will open to allow a button to be deleted or moved. Press **Esc** to exit the Menu shortcut display.

**Note**

The Factory Default reset will delete all user created shortcut icons from the Menu screen. Refer to the [“Reset Menu”](#) on page 5-6 for additional information.

Help for the Menu shortcut screen is available by pressing the icon in the lower-right corner of the display.

**Esc Key**

Press this key to cancel any setting that is currently being made.

**Enter Key**

Press this key to finalize data input or select a highlighted item from a list.

**Arrow Keys**

The four arrow keys (around the **Enter** key) are used to scroll up, down, left, or right. The arrow keys can often be used to change a value or to change a selection from a list. This function is similar to the function of the rotary knob. The arrow keys are also used to move markers.

## Shift Key

Pressing the **Shift** key and then a number key executes the function that is indicated in blue text above the number key. When the **Shift** key is active, its icon is displayed at the top-right of the measurement display area by the battery charge indicator.



**Figure 2-4.** Shift Key Icon

## Number Keypad

The Number keypad has two functions: The primary function is number entry. The secondary function of the number keypad is to list various menus. See [“Keypad Menu Keys \(1 to 9\)” on page 2-5](#).

## Rotary Knob

Turning the rotary knob changes numerical values, scrolls through selectable items from a list, and moves markers. Values or items may be within a dialog box or an edit window.

## Touch Screen Keys

### Main Menu Touch Screen Keys

These five main menu keys are horizontally arranged along the lower edge of the touch screen. The main menu key functions change to match specific instrument Mode settings. The main menu keys generate function-specific submenus. The various measurement modes are selected by pressing the **Shift** key and then the **Mode** (9) key. Descriptions of the various measurement modes can be found in the applicable Measurement Guides listed in [Appendix A, “Measurement Guides”](#).

**Note** Available measurement modes are based on model and options purchased. Refer to [Table 1-1](#) and [Table 1-2](#) for additional information.

### Submenu Touch Screen Keys

These submenu keys are arranged along the right-hand edge of the touch screen. The submenu labels change as instrument measurement settings change. The current submenu title is shown at the top of the submenu key block.

## Keypad Menu Keys (1 to 9)

Pressing the **Shift** key and then a number key selects the menu function that is printed in blue characters above the number key. See [Figure 2-1 on page 2-2](#).

Not all Secondary Function Menus are active in various measurement modes. If any one of these menus is available in a specific instrument mode of operation, then it can be called from the number keypad. It may also be available from a main menu key or a submenu key.

The Preset Menu (1) and System Menu (8) are described in [Chapter 5, “System Operations”](#). The Sweep Menu (3), Measure Menu (4), Trace Menu (5), and Limit Menu (6) vary depending on measurement mode, see the Measurement Guides listed in [Appendix A](#) for information. The File Menu (7) is described in [Chapter 4, “File Management”](#). The Mode Menu (9) is described in [“Mode Selector Menu” on page 2-13](#).

## LED Indicators

### Power LED

The Power LED is located to the left of the **On/Off** key. The LED is solid green when the unit is on and slowly blinks when the unit is off but has external power.

### Charge LED

The Charge LED is located to the right of the **On/Off** key. The LED slowly blinks when the battery is charging and is solid green when the battery is fully charged.

## 2-5 Display Overview

Figure 2-5 illustrates some of the key information areas of the Spectrum Master in Spectrum Analyzer mode. For detailed information, refer to the Measurement Guides listed in Appendix A, "Measurement Guides".

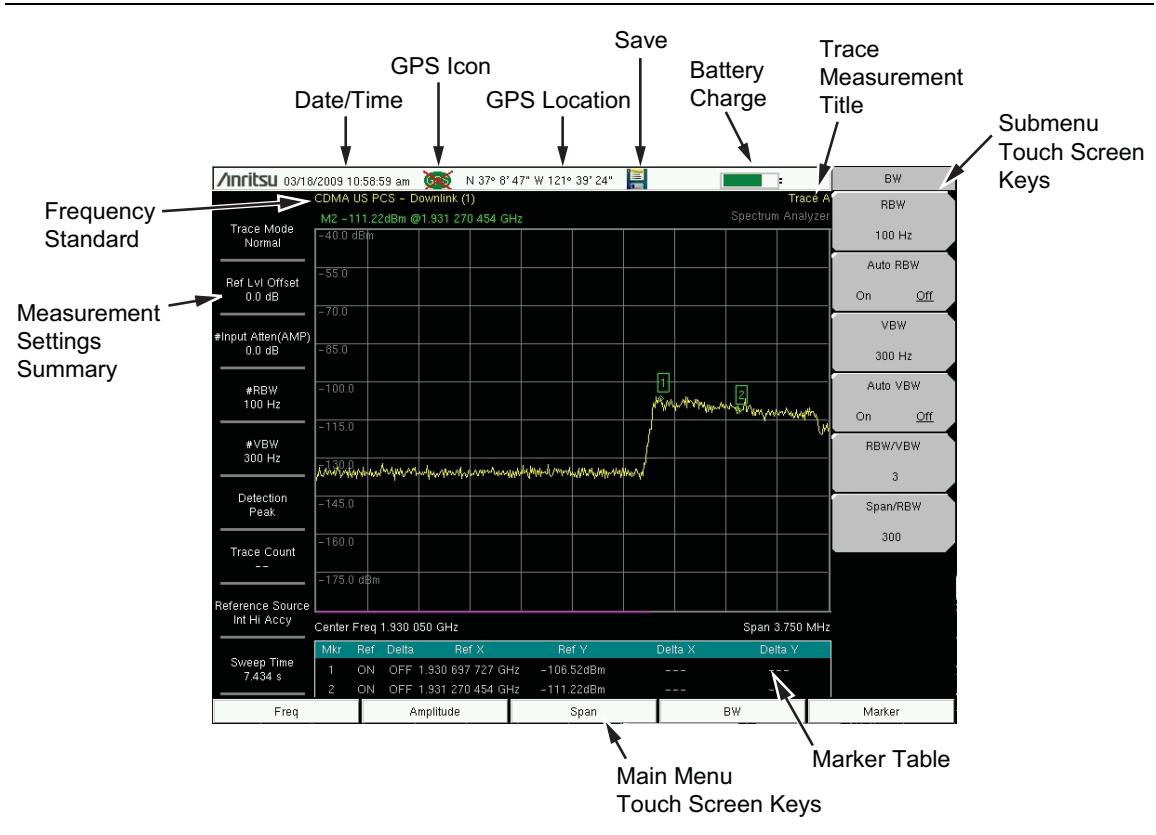


Figure 2-5. Spectrum Analyzer Display

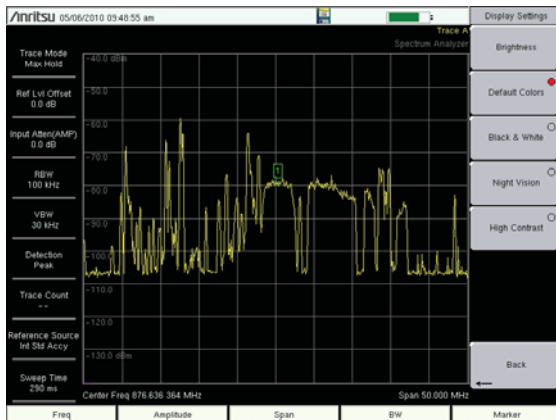


In addition to the default color display, Spectrum Master offers the following display settings for the Spectrum Analyzer, Transmission Measurement, Interference Analyzer, Channel Scanner, CW Generator, AM/FM/PM Analyzer, Power Meter, and High Accuracy Power Meter modes:

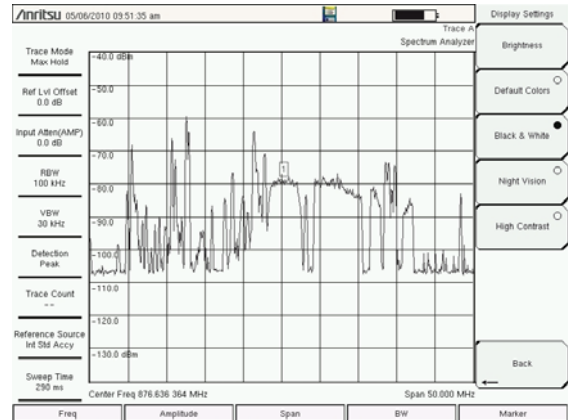
**Black & White** for printing and viewing in broad daylight conditions

**Night Vision** optimized for night-time viewing

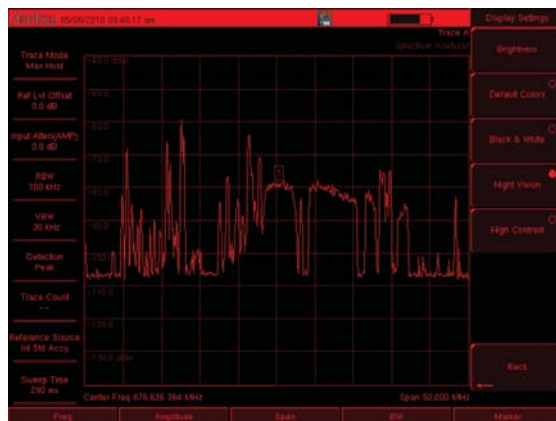
**High Contrast** for other challenging viewing conditions



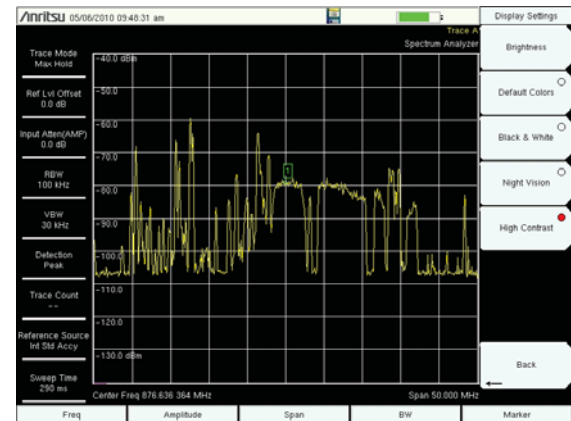
Default Colors



Black & White



Night Vision

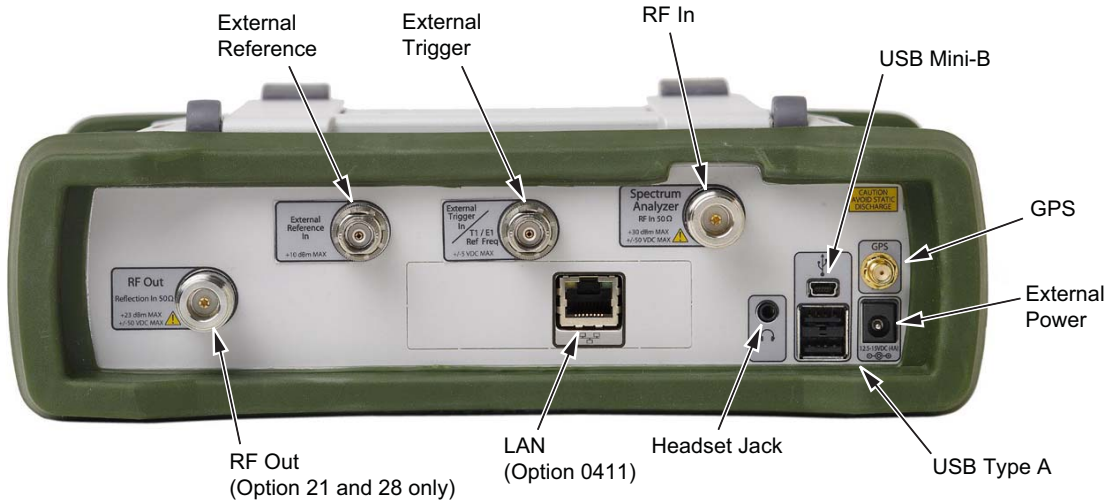


High Contrast

Figure 2-6. Spectrum Master Display Settings

## 2-6 Test Panel Connector Overview

Test panel connector for the Spectrum Master is shown in [Figure 2-7](#).



**Figure 2-7.** Spectrum Master Test Panel Connector

### External Power

The external power connector is used to power the unit and for battery charging. Input is 12 VDC to 15 VDC at up to 5.0 A. The green flashing Power LED near the power switch indicates that the instrument has external power.

#### Warning

When using the AC-DC Adapter, always use a three-wire power cable that is connected to a three-wire power line outlet. If power is supplied without grounding the equipment in this manner, then the user is at risk of receiving a severe or fatal electric shock.

### LAN Connection (Option 0411)

The RJ-45 connector is used to connect the Spectrum Master to a local area network or directly to a PC with an ethernet crossover cable. Integrated into this connector are two LEDs. The amber LED shows the presence of a 10 Mbit/s LAN connection when on, and a 100 Mbit/s LAN connection when off. The green LED flashes to show that LAN traffic is present. For additional information about the LAN connection, Ethernet connection, and DHCP, refer to [Chapter 7, “Ethernet Connectivity \(Option 411\)”](#).

### USB Interface – Type A

The Spectrum Master has two Type A USB connectors that accept USB Flash Memory devices for storing measurements, setups data, and screen images.

### USB Interface – Mini-B

The USB 2.0 Mini-B connector can be used to connect the Spectrum Master directly to a PC. The first time the Spectrum Master is connected to a PC, the normal USB device detection by the computer operating system will take place. The CD-ROM that is shipped with the instrument contains a driver for Windows XP that is installed when Master Software Tools is installed. Drivers are not available for earlier versions of the Windows operating system. During the driver installation process, place the CD-ROM in the computer drive and specify that the installation wizard should search the CD-ROM for the driver.

<b>Note</b>	For proper detection, Master Software Tools should be installed on the PC prior to connecting the Spectrum Master to the USB port.
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### Headset Jack

The headset jack provides audio output from the built-in AM/FM/SSB demodulator for testing and troubleshooting wireless communication systems. The jack accepts a 2.5 mm 3-wire miniature phone plug such as those commonly used with cellular telephones.

### Ext Trigger In

A TTL signal that is applied to the External Trigger female BNC input connector causes a single sweep to occur. In the Spectrum Analyzer mode, it is used in zero span, and triggering occurs on the rising edge of the signal. After the sweep is complete, the resultant trace is displayed until the next trigger signal arrives.

### RF In

50  $\Omega$  Type-N female connector. Maximum input is +26 dBm at 50 VDC.

### RF Out/Reflection In

RF output, 50 impedance, for transmission measurements (Options 21 and 28 only). Maximum input is +23 dBm at  $\pm 50$  VDC.

### GPS Antenna Connector (Option 0031)

The GPS antenna connection on the Spectrum Master is type SMA-female. GPS function is described in [Chapter 6, “GPS \(Option 31\)”](#).

## 2-7 Symbols and Indicators

The following symbols and indicators indicate the instrument status or condition on the display.

### Battery Symbols

The battery symbol above the display indicates the charge remaining in the battery. The colored section inside the symbol changes size and color with the charge level.



**Figure 2-8.** Battery Status

**Green:** Battery is 30% to 100% charged

**Yellow:** Battery is 10% to 30% charged

**Red:** Battery 0% to 10% charged

**Lightning Bolt:** Battery is being charged (any color symbol)

Detailed battery information is also available in the Status dialog box (**System > Status**).

When either the AC-DC Adapter (40-168-R) or the Automotive Cigarette Lighter Adapter (806-141-R) is connected, the battery automatically receives a charge, and the battery symbol with the lightning bolt is displayed (Figure 2-9).



**Figure 2-9.** Battery Charging Icon

The green Charge LED flashes when the battery is charging, and remains on steady when the battery is fully charged.

**Caution** Use only Anritsu-approved batteries, adapters, and chargers with this instrument.

When operating from external power without a battery installed, the battery symbol is replaced by a red plug body (Figure 2-10).



**Figure 2-10.** Battery Not Installed

## Additional Symbols

### Single Sweep

Single Sweep is selected. Press Continuous in the **Sweep** menu to resume continuous sweeping.

### Floppy Icon

Shortcut to the **Save** submenu. Touch the icon to open the touch screen keyboard for saving measurements, setups, or screen displays.

## 2-8 Data Entry

### Numeric Values

Numeric values are changed using the rotary knob, arrow keys, or the keypad. Pressing one of the main menu keys will display a list of submenus on the right side of the touch screen. When the value on a submenu key is displayed in red, it is ready for changing. When using the rotary knob or arrow keys the changing value is shown on the submenu and in red on the graticule. When using the keypad, the new value is shown in red on the graticule and the submenu changes to Units. Selecting a unit for the new value completes the entry.

### Parameter Setting

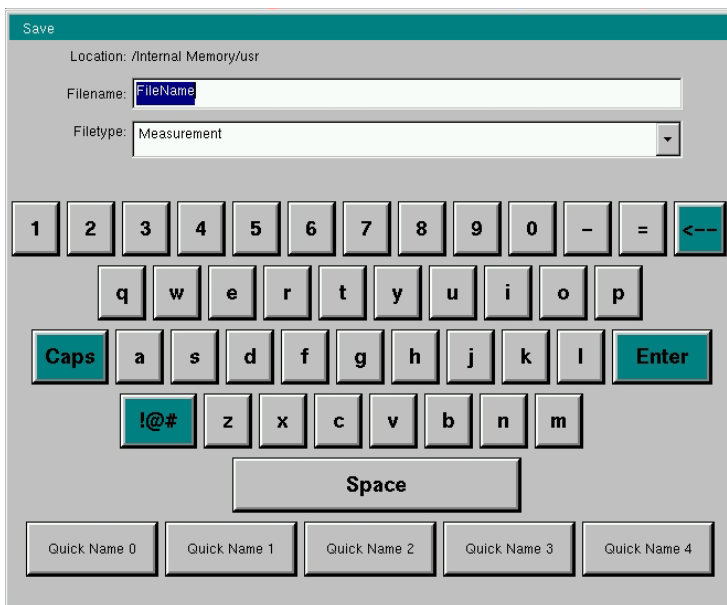
Pop-up list boxes or edit boxes are used to provide selection lists and selection editors. Scroll through a list of items or parameters with the arrow keys, the rotary knob, or the touch screen. These list boxes and edit boxes frequently display a range of possible values or limits for possible values.

Finalize the input by pressing the **Enter** key. At any time before finalizing the input, press the escape (**Esc**) key to abort the change and retain the previously existing setting.

Some parameters (such as for antennas or couplers) can be added to list boxes by creating them and importing them using Master Software Tools.

### Text Entry

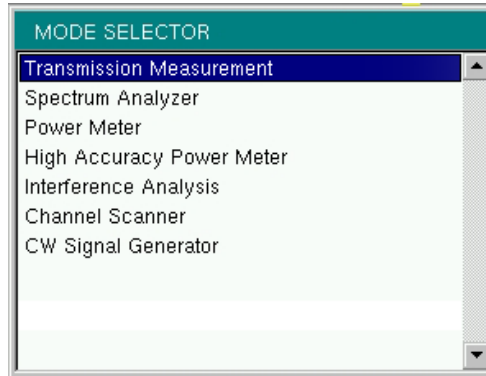
When entering text, as when saving a measurement, the touch screen keyboard is displayed ([Figure 2-11](#)). Characters are entered directly with the touch screen keyboard. The keypad can be used for numeric entry. The left and right arrow keys will scroll the cursor through the filename. See [“Save Menu” on page 4-8](#) for additional information.



**Figure 2-11.** Touch Screen Keyboard

## 2-9 Mode Selector Menu

To access the functions under the Mode menu, select the **Shift** key, then the **Mode** (9) key. Use the directional arrow keys, the rotary knob, or the touch screen to highlight the selection, and press the **Enter** key to select. The list of modes that appear in this menu will vary depending upon the options that are installed and activated in the instrument. [Figure 2-12](#) is an example of the Mode menu. Your instrument may not show the same list. The current mode is displayed below the battery symbol.



**Figure 2-12.** Mode Selector Menu

**Note** The display of the Mode Selector will vary depending on the installed options.

The **Menu** key is another option to quickly change measurement modes. Press the **Menu** key then select one of the Measurement icons in the top two rows ([Figure 2-2 on page 2-3](#)).





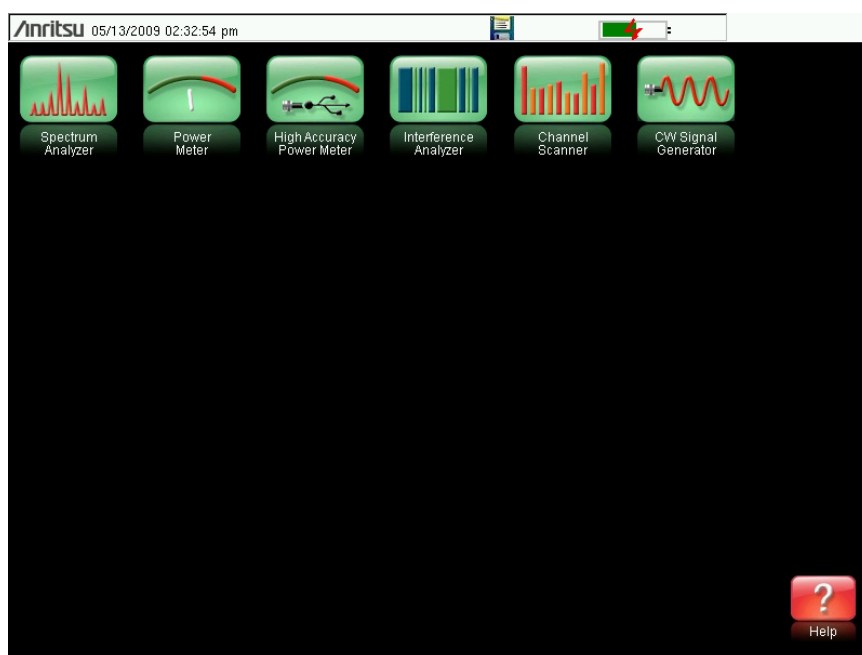
# Chapter 3 — Quick Start Guide

## 3-1 Introduction

This chapter provides a brief overview of basic measurement setups. For detailed measurement information, refer to a specific measurement guide listed in [Appendix A, “Measurement Guides”](#). This chapter provides quick start measurement information for the Spectrum Analyzer mode:

## 3-2 Measurement Mode Selection

Press the **Menu** key and use the touch screen to select the appropriate measurement icon. .



**Figure 3-1.** Menu Screen with Icons for Installed Measurement Modes

**Note** The display of the Menu screen will vary depending on installed options.

## 3-3 Spectrum Analyzer

Set the instrument to Spectrum Analyzer mode as described in [Section 3-2 “Measurement Mode Selection”](#) on page 3-1.

### Set Start and Stop Frequencies

1. Press the **Freq** main menu key.
2. Press the **Start Freq** submenu key.
3. Enter the desired start frequency using the keypad, the arrow keys, or the rotary knob. When entering a frequency using the keypad, the submenu key labels change to GHz, MHz, kHz, and Hz. Press the appropriate unit key. Pressing the **Enter** key has the same affect as pressing the MHz submenu key.
4. Press the **Stop Freq** submenu key.
5. Enter the desired stop frequency.

### Enter the Center Frequency

1. Press the **Freq** main menu key.
2. Press the **Center Freq** submenu key.
3. Enter the desired center frequency using the keypad, the arrow keys, or the rotary knob. When entering a frequency using the keypad, the submenu key labels change to GHz, MHz, kHz, and Hz. Press the appropriate unit key. Pressing the **Enter** key has the same affect as pressing the MHz submenu key.

The center frequency and span is shown at the bottom of the screen.

### Select a Signal Standard

1. Press the **Freq** main menu key.
2. Press the **Signal Standard** submenu key. The Signal Standards dialog box opens.
3. Highlight a signal standard and press **Enter** to select.
4. Press the **Channel** submenu key to change the channel value in the Channel Editor.

The signal standard is shown in yellow at the top of the screen.

### Set the Measurement Frequency Bandwidth

1. Press the **BW** main menu key to display the BW menu.
  - Press the **RBW** and/or the **VBW** submenu key to manually change the values.
  - Set RBW and VBW automatically by pressing the **Auto RBW** submenu key or the **Auto VBW** submenu key.
2. Press the **RBW/VBW** submenu key to change the resolution bandwidth and video bandwidth ratio.
3. Press the **Span/RBW** submenu key to change the span width to resolution bandwidth ratio.

## Set the Amplitude

Press the **Amplitude** main menu key to display the Amplitude menu.

### Set Amplitude Reference Level and Scale

1. Press the Reference Level submenu key and use the arrow keys, rotary knob, or the keypad to change the reference level. Press **Enter** to set the reference level value.
2. Press the Scale submenu key and use the arrow keys, rotary knob, or the keypad to enter the desired scale. Press **Enter** to set the scale value.

### Set Amplitude Range and Scale

1. Press the Auto Atten submenu key to set an optimal reference level based on the measured signal.
2. Press the Scale submenu key.
3. Enter the desired scale units by using the keypad, the arrow keys, or the rotary knob. Press **Enter** to set. The y-axis scale is automatically renumbered.

## Power Offset Set Up for Compensating External Loss

To obtain accurate results, compensate for any external attenuation by using power offset. The power offset compensation factor is in dB (external attenuation can be created by using an external cable or an external high power attenuator).

From the **Amplitude** menu, press the RL Offset submenu key and use the keypad, the arrow keys, or the rotary knob to enter the desired offset value. When using the rotary knob, the value changes in increments of 0.1 dB. Using the **Left/Right** arrow keys changes the value in 10% increments of the value shown on the Scale submenu key. When using the **Up/Down** arrow keys, the value changes in the increment shown on the Scale submenu key. When using the keypad, enter the new value then press **Enter** or the dB submenu key to set the value. The power offset is displayed in the instrument settings summary column on the left side of the measurement display.

## Set the Span

1. Press the **Span** main menu key or the **Freq** main menu key followed by the Span submenu key.
2. To select full span, press the Full Span submenu key. Selecting full span overrides any previously set Start and Stop frequencies.
3. For a single frequency measurement, press the Zero Span submenu key.

<b>Note</b>	To quickly move the span value up or down, press the Span Up 1-2-5 or Span Down 1-2-5 submenu keys. These keys facilitate a zoom-in, zoom-out feature in a 1-2-5 sequence.
-------------	--

## Single Limit Line

Press the **Limit** menu key to display the Limit menu.

1. Press the Limit (Upper / Lower) submenu key to select the desired limit line, Upper or Lower.
2. Activate the selected limit line by pressing the On Off submenu key so that On is underlined.
3. Press the Limit Move submenu key to display the Limit Move menu. Press the first Move Limit submenu key and use the arrows keys, rotary knob, or keypad to change the dBm level of the limit line.
4. Press the Back submenu key to return to the Limit menu.
5. If necessary, press the Set Default Limit submenu key to redraw the limit line in view.

## Create a Limit Envelope

1. Press **Shift** then **Limit** (6) to open the Limit menu.
2. Select Limit Envelope.
3. Press the Create Envelope key.

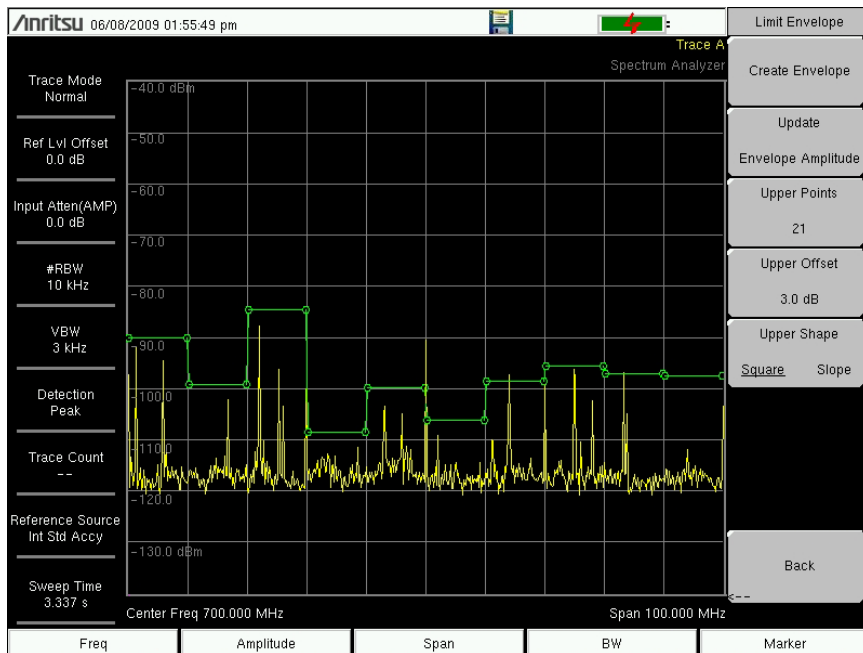


Figure 3-2. Limit Envelope

## Setting Up Markers

Press the **Marker** main menu key to display the Marker menu.

### Selecting, Activating, and Placing a Marker

1. Press the Marker 1 2 3 4 5 6 submenu key and then select the desired marker using the touch screen marker buttons. The selected marker is underlined on the Marker submenu key.
2. Press the On Off submenu key so that On is underlined. The selected marker is displayed in red and ready to be moved.
3. Use the rotary knob to place the marker on the desired frequency.
4. Repeat steps 1 through 3 to activate and move additional markers.

### Selecting, Activating, and Placing a Delta Marker:

1. Press the Marker 1 2 3 4 5 6 submenu key and select the desired delta marker. The selected marker is underlined.
2. Press the Delta On Off submenu key so that On is underlined. The selected marker is displayed in red and ready to be moved.
3. Use the rotary knob to place the delta marker on the desired frequency.
4. Repeat steps 1 through 3 to activate and move additional markers.

### Viewing Marker Data in a Table Format

1. Press the More submenu key.
2. Press the Marker Table On Off submenu key so that On is underlined. All marker and delta marker data are displayed in a table under the measurement graph.

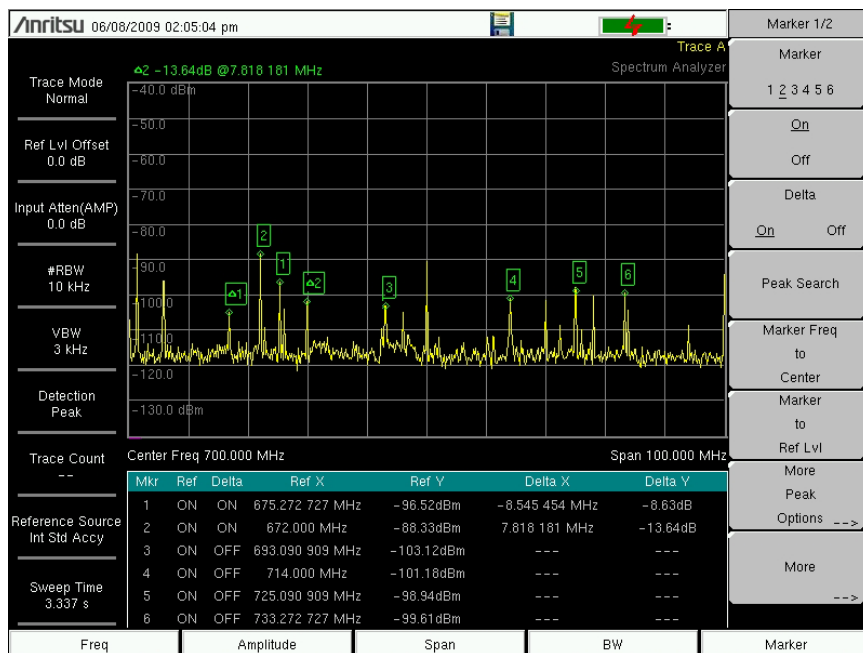


Figure 3-3. Marker Table

### Select a Smart Measurement Type

In Spectrum Analyzer mode, press **Shift** then **Measure** (4) and select a smart measurement using the submenu keys.

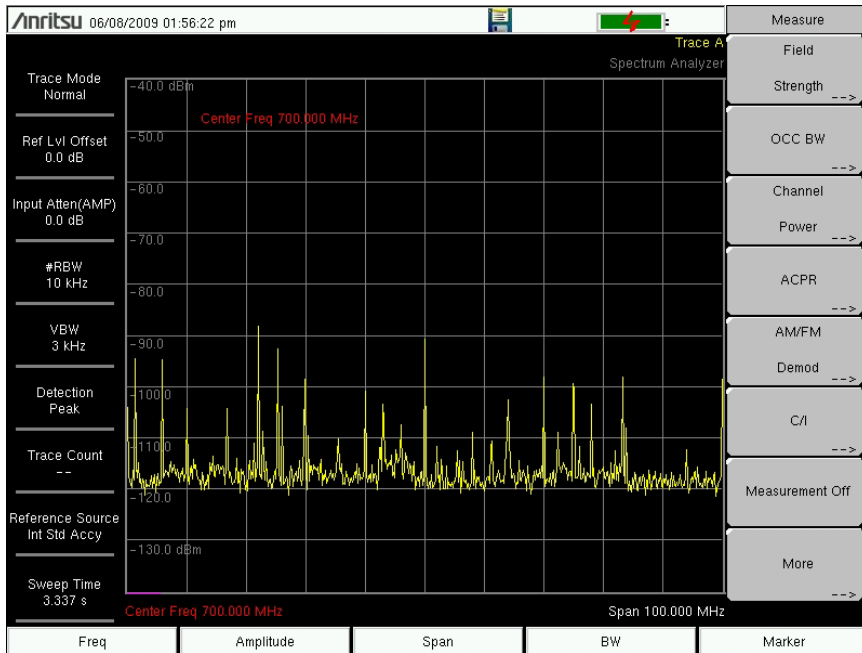


Figure 3-4. Spectrum Analyzer Measure Menu

# Chapter 4 — File Management

## 4-1 Introduction

This chapter will review the file management features of the Spectrum Master and detail the **File** menu. The submenus under this menu allow the user to save, recall, copy, and delete files in internal memory or an external USB flash drive.

## 4-2 Managing Files

Press the **Shift** key then the **File** (7) key on the numeric keypad to list the **File** menu. Follow the additional steps below.

**Note**

When navigating through the **File** menu, pressing the **Esc** key will return to the previous menu.

### Save Files

#### Set the Save Location

Press the **Save** submenu key then the **Change Save Location** and select the location to save files. You can save files to the internal memory or to an external USB flash drive. You can also create new folders. If an external USB flash drive is connected or disconnected, press **Refresh Directories** to update the location tree. Press the **Set Location** key to store the save location.

#### Save Measurement As

The **Save Measurement As** key is used to quickly save measurements with a specific file name. The Spectrum Master saves the measurement with the latest file name that was used to save a measurement and with a number that is automatically incremented and appended to the end of the file name. For instance, if the last measurement was saved with the name **ACPR**, **Save Measurement As** saves the next measurement as **ACPR\_#1**, **ACPR\_#2**, etc. The file name used can be changed using the **Save** dialog box ([Figure 4-1](#)).

#### Save a Measurement

Press the **Save Measurement** key and enter the name for the measurement file. The file type will default to measurement and the appropriate extension will be added based on the current measurement mode.

#### Save a Setup

Press the **Save** submenu key, type a name for the setup file, confirm that the file type is **Setup** using the **Change Type** key or the touchscreen and press **Enter** to save.

#### Create a Menu Shortcut for a Setup file

Press the **Recall** submenu key to display saved setup files. Locate the setup file to shortcut and then press and hold on the file name for a few seconds. Select a location in the shortcut grid to save the setup file.

### Save a Measurement Screen as JPEG

Press the **Save** submenu key, type a name for the JPEG file, confirm that the file type is Jpeg, and press **Enter** to save.

### Save Dialog Box

The save dialog box (Figure 4-1) is used to store files on the internal memory or an external flash drive. The file type, file name, and save location are set at this display. See “[Save Menu](#)” on page 4-8 and “[Save Location Menu](#)” on page 4-9 for details.

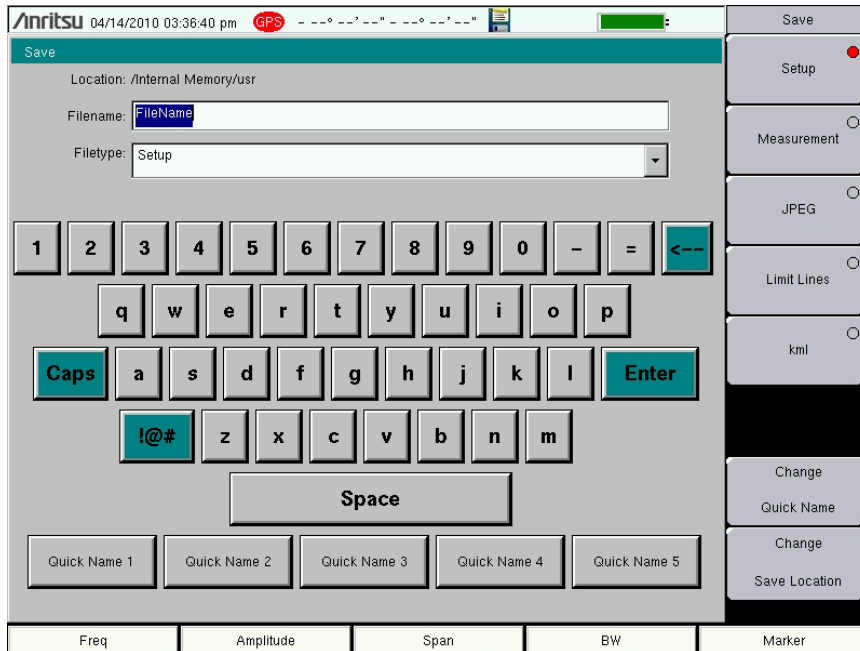


Figure 4-1. Save Dialog Box

### Quick Name Keys

Quick Name keys below the keyboard in Figure 4-1 allow users to enter quick names for frequently used file measurement names. To edit the keys, press the **Shift** key, then the **File** (7) key. Press **Save** then the **Change Quick Name** key, select one of the **Quick Names** for editing, press **Enter** and enter the new name for the key. Press **Enter** again and the new name will be displayed on the key.



## Recall Files

The recall menu enables you to view all the Measurement and Setup files in the internal memory and external USB flash drive.

You can sort the recall menu by name, date, or type. You can also select to view only measurement files or setup files by pressing **File Type** on the Recall dialog box and selecting the file type you want to view.

### Recall a Measurement

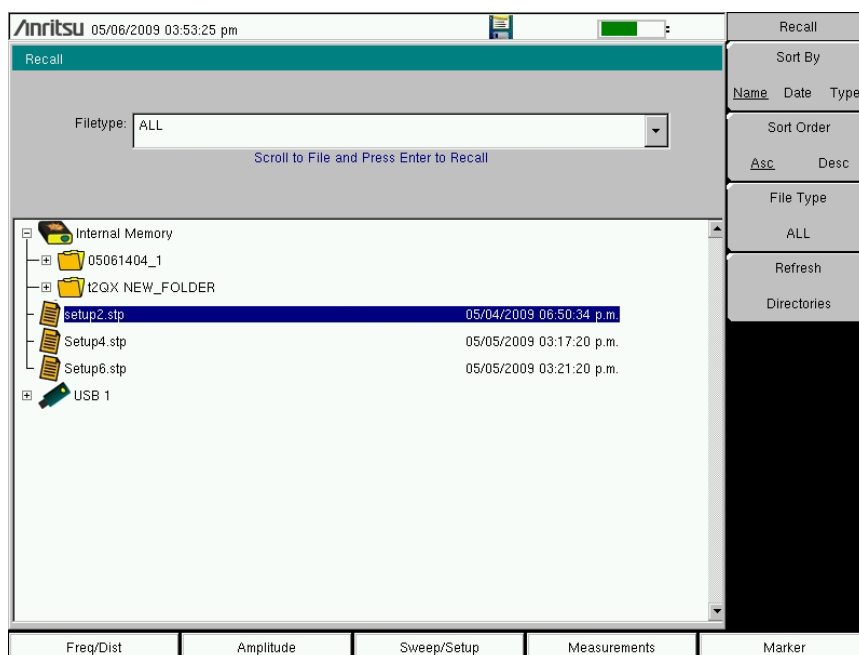
From the **File** menu, press the **Recall Measurement** submenu key, select the measurement with the touchscreen, rotary knob or the **Up/Down** arrow keys and press **Enter**.

### Recall a Setup

Press the **Recall** submenu key. Confirm that the file type is **Setup** or **All**. Select the setup file (.stp) with the touchscreen, rotary knob or the **Up/Down** arrow keys and press **Enter**.

## Recall Dialog Box

The Recall dialog box ([Figure 4-2](#)) will open previously saved measurements and setups. See the [“Recall Menu”](#) on [page 4-11](#) for additional information.



**Figure 4-2.** Recall Dialog Box

## Copying Files

The steps below detail copying a file from internal memory to an external flash drive. Select the files to copy in the top window and the location for the files to be copied to in the bottom window (Figure 4-3). Refer to the “Copy Menu” on page 4-12 for additional information.

1. Insert a USB drive into either USB Type A port of the Spectrum Master.
2. From the **File** main menu, press the Copy submenu key. The Copy submenu and Copy dialog box are displayed.
3. Select the file(s) to copy. To select multiple files, highlight the first then press the **Select** or **De-Select** key to keep the file selected. The file will be outlined in blue. Repeat with all the files to copy. To display files in a folder, select the folder and press the **Enter** key.
4. Press the **Scroll** submenu key and highlight the USB drive in the lower window using the touch screen or the **Up/Down** arrow keys. The **Scroll** submenu key toggles between **Src** (top window) and **Dst** (bottom window).
5. Press the **Copy** key to copy the files to the flash drive.

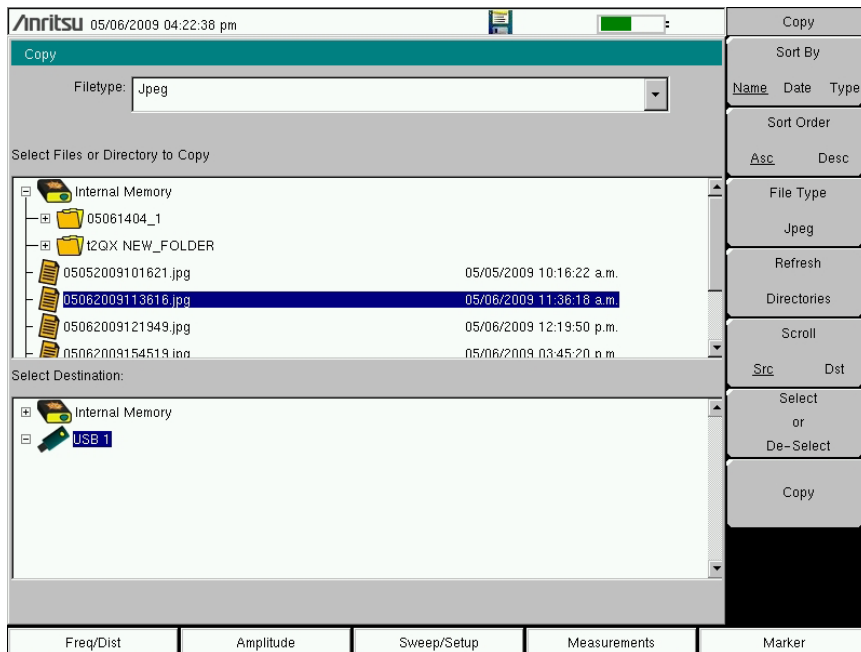


Figure 4-3. Copy Dialog Box

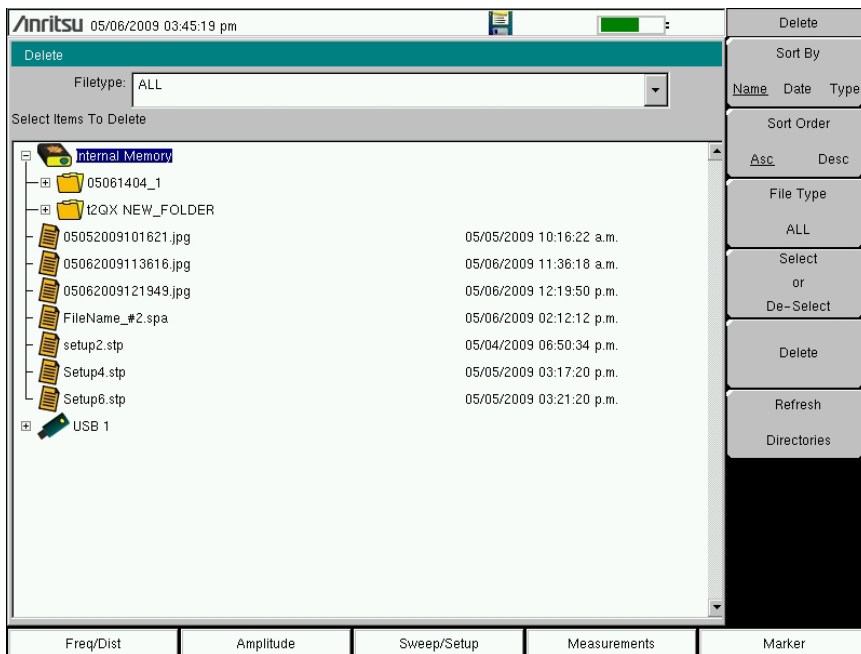
## Deleting Files

### Delete a Selected File or Files

Press the Delete submenu key. Highlight the file to be deleted with the touchscreen or the **Up/Down** arrow keys. Press the Select or De-Select key. The file will be outlined in blue when selected. Press the Delete key and **Enter** to delete the selected file.

### Delete Dialog Box

Press the Delete submenu key to open the Delete dialog box (Figure 4-4). The submenus allow sorting by file type, name and saved date. See the “Delete Menu” on page 4-13 for additional information.



**Figure 4-4.** Delete Dialog Box

### 4-3 File Menu Overview

Open this menu by pressing the **Shift** key, then the **File** (7) key.

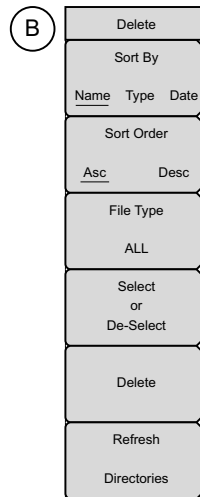
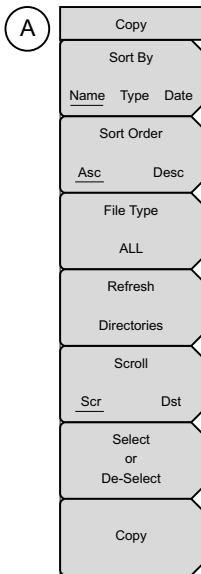
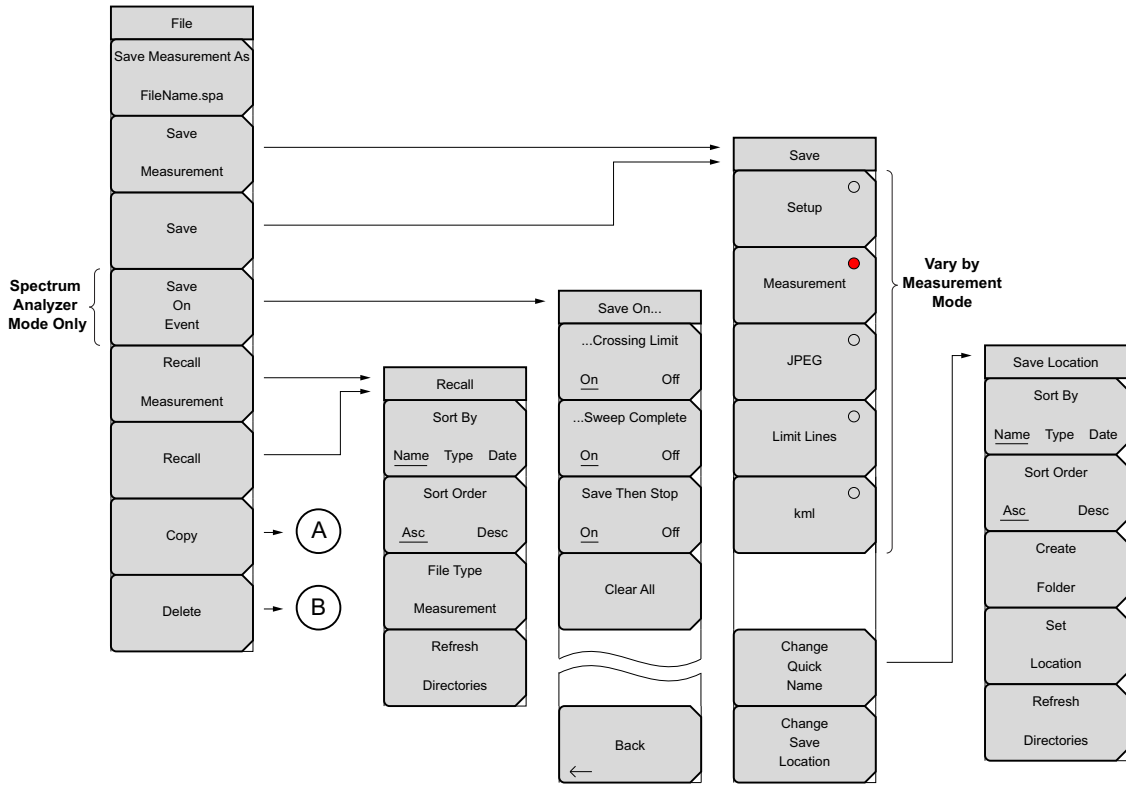


Figure 4-5. File Menu

## 4-4 File Menu

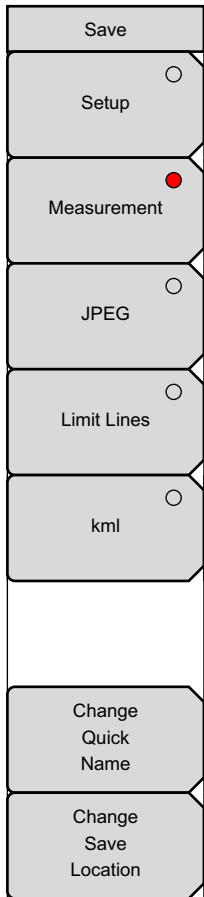
Key Sequence: **File**

File	<b>Save Measurement As:</b> This key will save the current setup with a user defined file name. The default file name is changed using the Save submenu. To change the default file name, type in a new file with the touch screen keyboard and press <b>Enter</b> . After a few seconds the screen with return to File menu. Press the Save Measurement As key again and the new file name will be used. Measurement files names have a .spa extension.
Save Measurement As FileName.spa	
Save Measurement	<b>Save Measurement:</b> Press this submenu key to display the <a href="#">“Save Menu” on page 4-8</a> and the touch screen keyboard. Measurements can be saved to internal memory or to a USB flash drive. The saved measurement can be named by using touch screen keyboard. By default, measurements are saved in a directory named /user to internal memory. The save destination is set with the <a href="#">“Save Location Menu” on page 4-9</a> .
Save	
Save On Event	<b>Save:</b> Press this submenu key to display the <a href="#">“Save Menu” on page 4-8</a> and the touch screen keyboard. Measurements can be saved to internal memory or to a USB flash drive. The saved setup, measurement or JPEG file can be named by using touch screen keyboard. By default, measurements are saved in a directory named /user to internal memory. The save destination is set with the <a href="#">“Save Location Menu” on page 4-9</a> .
Recall Measurement	<b>Save on Event (Spectrum Analyzer mode only):</b> Press this submenu key to display the <a href="#">“Save On Event Menu” on page 4-10</a> .
Recall	<b>Recall Measurement:</b> Press this submenu key to display the <a href="#">“Recall Menu” on page 4-11</a> . This menu is for recalling measurements from internal memory or a USB flash drive.
Copy	<b>Recall:</b> Press this submenu key to display the <a href="#">“Recall Menu” on page 4-11</a> . This menu is for recalling measurement or setup data from internal memory or a USB flash drive.
Delete	<b>Copy:</b> Press this submenu key to display the <a href="#">“Copy Menu” on page 4-12</a> . This submenu is for copying files or folders from internal memory or a USB flash drive.
	<b>Delete:</b> Press this submenu key to display the <a href="#">“Delete Menu” on page 4-13</a> and a selection box that shows the setup and measurement names, the type and the date and time that the information was saved. Use the rotary knob or the <b>Up/Down</b> arrow keys to highlight the file that is to be deleted and press the Delete submenu key, then <b>Enter</b> . Press the <b>Esc</b> key to cancel the operation. Note that deleted files can not be recovered.

**Figure 4-6.** File Menu

## Save Menu

Key Sequence: **File** > Save



The top keys in the Save menu will display the available save options based on the current measurement mode. Options include:

**Setup:** Setup files contain basic instrument information, measurement mode setup details, measurement marker data, and limit data. File extension: .stp

**Measurement:** Contains the measurement data and opens up with Master Software Tools. File extension: Varies based on measurement.

**Jpeg:** Jpeg files contain a screen capture of the display. File extension: .jpg

**Limit Lines:** Contains limit line data details. File extension: .lim

**kml:** Saves measurement and location data that can be viewed in Google Earth. File extension: .kml

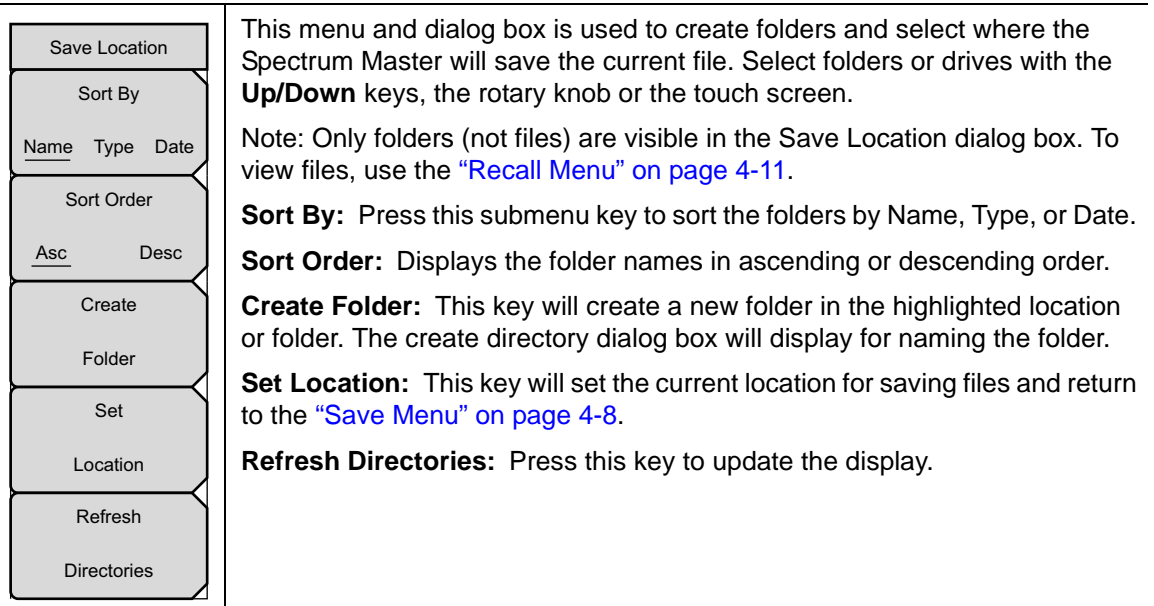
**Change Quick Name:** Press this submenu key to change the Quick Names at the bottom of the touch screen keyboard ([Figure 4-1](#)). Select the Quick Name to edit and press **Enter**. Type the new Quick Name and press **Enter** again. The new Quick Name will display on the button below the keyboard.

**Change Save Location:** Press this submenu key to open the [“Save Location Menu”](#).

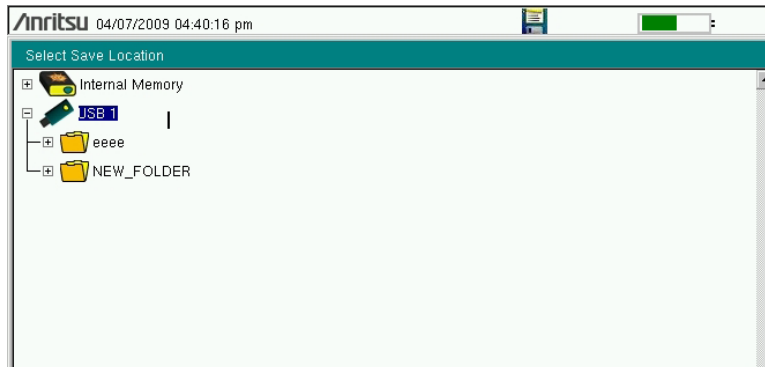
**Figure 4-7.** Save Menu

## Save Location Menu

Key Sequence: **File** > Save > Change Save Location



**Figure 4-8.** Save Location Menu



**Figure 4-9.** Select Save Location Dialog Box

## Save On Event Menu

Key Sequence: **File** > Save On Event

Save On...	In Spectrum Analyzer mode, this menu is used to auto save measurements to internal memory after:
...Crossing Limit <input checked="" type="checkbox"/> On <input type="checkbox"/> Off	<b>...Crossing Limit:</b> Toggling this submenu key to On will save the measurement to internal memory when the measurement has crossed a defined limit line created with the <b>Limit</b> menu.
...Sweep Complete <input checked="" type="checkbox"/> On <input type="checkbox"/> Off	<b>...Sweep Complete:</b> Toggling this submenu key to On will save the measurement to internal memory after the current sweep is complete. If Save Then Stop is toggled Off, a measurement will be saved after every sweep.
Save Then Stop <input checked="" type="checkbox"/> On <input type="checkbox"/> Off	<b>Save Then Stop:</b> Set this key to On to stop the sweep after a measurement is saved. With this key Off and Sweep Complete On a measurement is saved after every sweep.
Clear All	<b>Clear All:</b> Pressing this key will turn Off the three save on event keys:
	Crossing Limit
	Sweep Complete
	Save Then Stop
Back ←	

**Figure 4-10.** Save On Menu



## Recall Menu

Key Sequence: **File** > Recall

Recall	<p>This menu and dialog box is used to navigate folders and select files to recall to the Spectrum Master. Select folders or files with the <b>Up/Down</b> keys, the rotary knob, or the touch screen.</p> <p><b>Sort By:</b> Press this submenu key to sort file and folders by the file name, by the type of file, or by the date that the file or folder was saved.</p> <p><b>Sort Order:</b> Displays the folder or file in ascending or descending order based on the selection in the Sort By key.</p> <p><b>File Type:</b> Press this submenu key to select what type of file is viewed. The options are the ALL, Measurement, or Setup. The file type can be changed with the <b>Up/Down</b> keys, the rotary knob, or the touch screen. Press <b>Enter</b> to make the selection.</p> <p><b>Setup:</b> Setup files contain basic instrument information, measurement mode setup details, measurement marker data, and limit data.</p> <p><b>Measurement:</b> Measurement files contain all of the information in the setup files and the measurement data.</p> <p><b>Limit Lines (.lim):</b> The Limit line file contains limit line data details.</p> <p><b>ALL:</b> Displays all file types.</p> <p><b>Refresh Directories:</b> Press this key to update the display.</p>
Sort By	
Name    Type    Date	
Sort Order	
Asc            Desc	
File Type	
ALL	
Refresh	
Directories	

**Figure 4-11.** Recall Menu

## Copy Menu

Key Sequence: **File** > Copy

Copy	<p>This menu and dialog box is used to copy folders and files. Select folders or files with the <b>Up/Down</b> keys, the rotary knob or the touch screen. <a href="#">Figure 4-3 on page 4-4</a> shows the Copy dialog box with two JPG images and one folder (including the folder's contents) selected and ready to be copied to the USB flash drive. Highlight a folder and press <b>Enter</b> to view the contents.</p> <p><b>Sort By:</b> Press this submenu key to sort file and folder lists by name, by type of file, or by the date that the file was saved.</p> <p><b>Sort Order:</b> Displays the folder or file in ascending or descending order based on the selection in the Sort By key.</p> <p><b>File Type:</b> Press this submenu key to select what type of file to view for copying. The options are: ALL, Measurement, Setup, or JPG. The file type can be changed with the <b>Up/Down</b> keys, the rotary knob, or the touch screen. Press <b>Enter</b> to make the selection.</p> <p><b>Refresh Directories:</b> Press this key to update the display.</p> <p><b>Scroll Scr Dst:</b> Press this submenu key to use the scroll function in the Source Folder (Scr - top panel) or Destination Folder (Dst - bottom panel). See <a href="#">Figure 4-3</a>.</p> <p><b>Select or De-Select:</b> Use this key to select or deselect the file(s) or folder(s) to be copied. When selected, a file or folder will be outlined in blue, see <a href="#">Figure 4-3</a>.</p> <p><b>Copy:</b> Copies the files or folders selected in the top window to the destination selected in the bottom window. A dialog box will display showing when the copying is complete. If a file with the same name exists in the destination folder a warning box will display to allow file overwrite or to cancel.</p>
Sort By	
Name    Type    Date	
Sort Order	
Asc            Desc	
File Type	
ALL	
Refresh	
Directories	
Scroll	
Scr            Dst	
Select or De-Select	
Copy	

**Figure 4-12.** Copy Menu

## Delete Menu

Key Sequence: **File** > Delete

Delete	<p>This menu and dialog box is used to delete folders and files. Select folders or files with the <b>Up/Down</b> keys, the rotary knob or the touch screen.</p> <p><b>Sort By:</b> Press this submenu key to sort files and folders by name, by the type of file, or by the date that the file or folder was saved.</p> <p><b>Sort Order:</b> Displays the folder or file in ascending or descending order based on the selection in the Sort By key.</p> <p><b>File Type:</b> Press this submenu key to select what type of file view for deleting. The options are the ALL, Measurement, Setup, Limit Lines, or JPG. The file type can be changed with the <b>Up/Down</b> keys, the rotary knob, or the touch screen. Press <b>Enter</b> to make the selection.</p> <p><b>Select or De-Select:</b> Use this key to select or deselect the file(s) or folder(s) to be deleted. When selected, a file or folder will be outlined in blue.</p> <p><b>Delete:</b> Press this key to open the Delete dialog box. Press <b>Enter</b> to delete the selected item or <b>Esc</b> to Cancel.</p> <p><b>Refresh Directories:</b> Press this key to update the display.</p>
Sort By	
Name    Type    Date	
Sort Order	
Asc            Desc	
File Type	
ALL	
Select or De-Select	
Delete	
Refresh	
Directories	

**Figure 4-13.** Delete Menu



# Chapter 5 — System Operations

## 5-1 Introduction

This chapter will review the Spectrum Master system operations.

- [“System Menu Overview” on page 5-2](#)
- [“System Menu” on page 5-3](#)
- [“Preset Menu” on page 5-7](#)
- [“Self Test” on page 5-7](#)
- [“Updating the Spectrum Master Firmware” on page 5-8](#)
- [“Spectrum Master Firmware Emergency Repair” on page 5-9](#)

The other menus (Sweep Measure Trace and Limit) are detailed in the Measurement Guides listed in [Appendix A](#).

## 5-2 System Menu Overview

To access the functions under the System menu, select the **Shift** key, then the **System** (8) key.

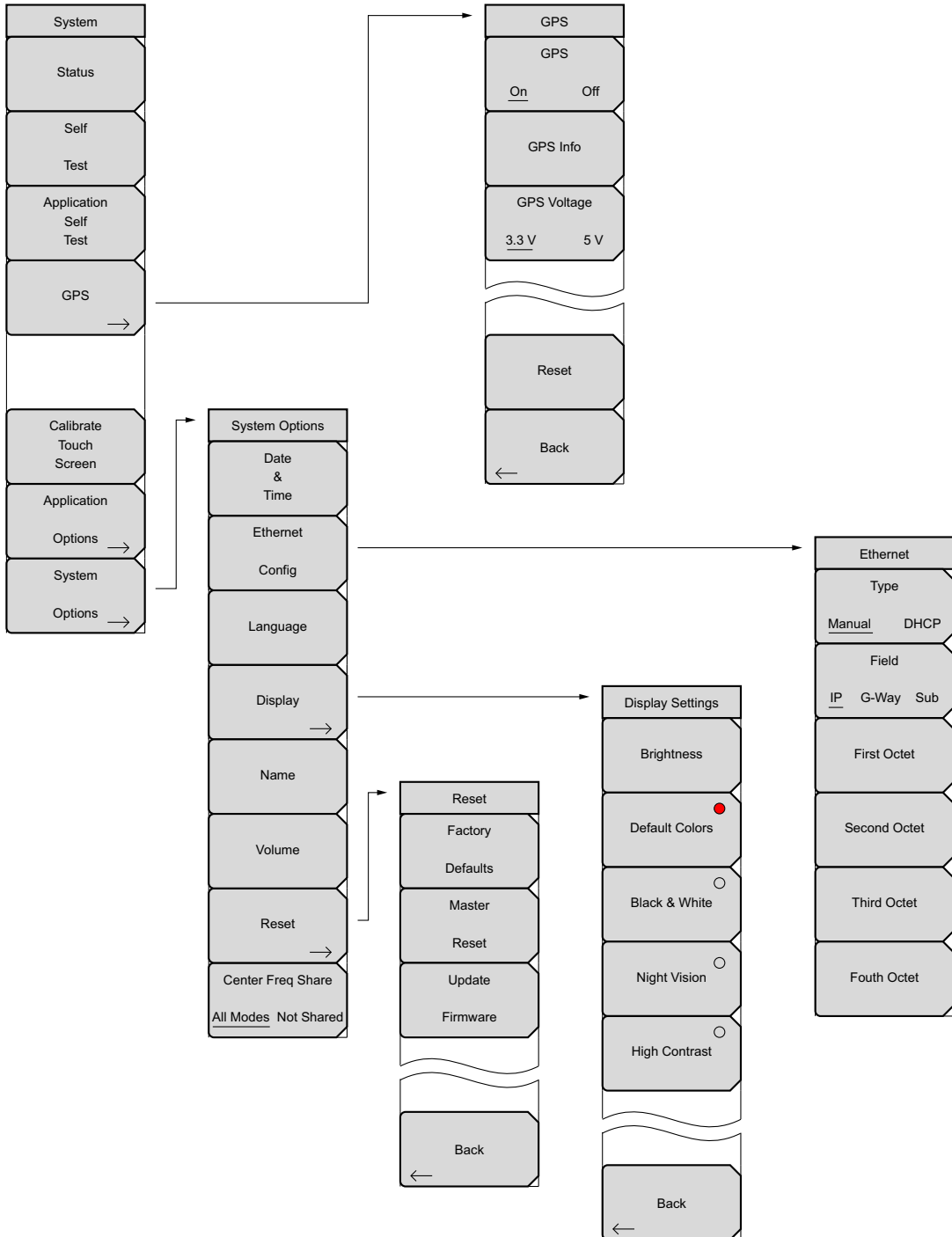


Figure 5-1. System Menu

## 5-3 System Menu

Key Sequence: **Shift, System** (8)

System	<b>Status:</b> Pressing this submenu key displays the current system status, including the operating system and firmware versions, temperatures and other details such as current battery information. Press <b>Esc</b> or <b>Enter</b> to return to normal operation.
Status	
Self Test	<b>Self Test:</b> This key initiates a series of diagnostic tests that check the components of the instrument. A display will list the individual tests with a pass or fail indication. Press <b>Esc</b> or <b>Enter</b> to return to normal operation.
Application Self Test	<b>Application Self Test:</b> This key initiates a series of diagnostic tests related to the performance of the instrument for specific applications. A display will list the individual tests with a pass or fail indication. Press <b>Esc</b> or <b>Enter</b> to return to normal operation.
GPS →	<b>GPS :</b> Opens the <a href="#">“GPS Menu” on page 6-4.</a>
	<b>Calibrate Touch Screen:</b> Start the touch screen calibration. Run the calibration procedure when instrument is not responding to your screen taps as expected.
Calibrate Touch Screen	<b>Application Options:</b> This submenu key presents a menu to select application options. This will vary depending upon the measurement mode.
Application Options →	<b>System Options:</b> This key opens the <a href="#">“System Options Menu” on page 5-4.</a>
System Options →	

**Figure 5-2.** System Menu

### Calibrate Touch Screen Shortcut

**Note** Press **Shift** then **0** to open the Calibrate Touch Screen display. Press **Enter** to start the calibration or **Esc** to cancel.

## System Options Menu

Key Sequence: **Shift, System** (8) > System Options

System Options	
Date & Time	<b>Date and Time:</b> This key brings up a dialog box for setting the current date and time. Use the submenu keys or the <b>Left/Right</b> arrow keys to select the field to be modified. Use the keypad, the <b>Up/Down</b> arrow keys or the rotary knob to select the date and time. Press <b>Enter</b> to accept the changes, or press the <b>Esc</b> key to return to normal operation without changing anything.
Ethernet Config	<b>Ethernet Config:</b> Press this submenu key to display the Ethernet submenu and to open the Ethernet Editor dialog box to set the IP address of the instrument. For details refer to <a href="#">Chapter 7, "Ethernet Connectivity (Option 411)"</a> .
Language	<b>Language:</b> This submenu key brings up a selection box allowing selection from a list of built-in languages for the Spectrum Master displays. The languages currently available are English, French, German, Spanish, Japanese, Chinese, Korean, and Italian. In addition, up to two custom languages may be loaded into the instrument if they have been defined using the Master Software Tools. If a mode does not have language translations available, English is the default language. Press <b>Enter</b> to accept the change, or press the <b>Esc</b> key to return to normal operation without changing the setting.
Display →	<b>Display:</b> The Display submenu key opens the <a href="#">"Display Settings Menu" on page 5-5</a> allowing brightness control and the selection of the default color display, black & white display, night vision display, or a high contrast display.
Name	<b>Name:</b> Opens a dialog box to name the instrument. The unit can be named using the keypad to select numbers and the touch screen keys to select letter groups. Use the <b>Shift</b> key to select an upper case letter. Use the <b>Left/Right</b> directional arrows to move the cursor position. The Back Space key will remove the last character entered. Press <b>Enter</b> to save the name.
Volume	<b>Volume:</b> The current volume setting is displayed on the screen. Use the keypad, the <b>Up/Down</b> arrow keys or the rotary knob to change the volume and press the <b>Enter</b> key to accept the change.
Reset →	<b>Reset:</b> Press this submenu key to open the <a href="#">"Reset Menu" on page 5-6</a> .
Center Freq Share	<b>Center Freq Share:</b> Select All Modes to have the current center frequency setting carried over when changing measurement modes. Not applicable to measurements which do not have a center frequency setting or measurements where the current center frequency setting is outside the range of the new measurement.
All Modes Not Shared	

**Figure 5-3.** System Options Menu



## Display Settings Menu

Key Sequence: **Shift, System** (8) > System Options > Display

Display Settings	<p><b>Brightness:</b> The brightness of the display can be adjusted to optimize viewing under a wide variety of lighting conditions. Use the keypad, the <b>Up/Down</b> arrow keys or the rotary knob to select a brightness level from 1 to 9, with 9 being the brightest. Press <b>Enter</b> to accept the change.</p>
Brightness	<p><b>Default Colors:</b> Sets the display colors to their factory default condition. Used for normal viewing.</p>
Default Colors <input type="radio"/>	<p><b>Black &amp; White:</b> Sets the display colors to black and white. Used for printing and viewing in broad daylight conditions.</p>
Black & White <input type="radio"/>	<p><b>Night Vision:</b> Sets the display to a red-tinted color. Optimized for night-time viewing.</p>
Night Vision <input type="radio"/>	<p><b>High Contrast:</b> Increases the contrast of the default display colors. Used for other challenging viewing conditions.</p>
High Contrast <input type="radio"/>	<p><b>Back:</b> Press this submenu key to return to the <a href="#">“System Options Menu”</a> on page 5-4.</p>
Back	
Back ←	

**Figure 5-4.** Display Settings Menu

## Reset Menu

Key Sequence: **Shift, System (8)** > System Options > Reset

Reset	<b>Factory Defaults:</b> Restores the instrument to the factory default values, including Ethernet (Option 411), language, volume, brightness setting, and user created shortcut icons on the Menu screen. Press the <b>Enter</b> key to initiate the reset, and power-cycle the instrument.
Factory Defaults	<b>Master Reset:</b> In addition to the functions described in Factory Defaults above, all user files in the internal memory are deleted, and the original language and antenna files are restored. Press the <b>Enter</b> key to initiate the Master Reset and power-cycle the instrument. Press <b>Esc</b> to return to normal operation without resetting.
Master Reset	<b>Update Firmware:</b> Press this submenu key to update the instrument operating system with a USB memory device. Press <b>Enter</b> and follow the onscreen instructions to update the firmware or press <b>Esc</b> to return to normal operation without updating. Refer to <a href="#">“Updating the Spectrum Master Firmware” on page 5-8</a> for additional information on both firmware update options.
Update Firmware	<b>Back:</b> Press this submenu key to return to the <a href="#">“System Options Menu” on page 5-4</a> .
Back	

**Figure 5-5.** Reset Menu

## 5-4 Preset Menu

Key Sequence: **Shift, Preset** (1)

Preset	<p><b>Preset:</b> This key resets the instrument to the default starting conditions.</p> <p><b>Save Setup:</b> Opens the Save dialog box (Figure 4-1) to name and save the current operating settings, allowing them to be recalled later to return the instrument to the state it was in at the time the setup was saved.</p> <p>The saved setup can be named using the touch screen keyboard. Use the Caps key to select an upper case letter. Use the <b>Left/Right</b> directional arrows to move the cursor position. Press <b>Enter</b> to save the setup.</p> <p>Note: Set the File type as Setup. See “<a href="#">Save Menu</a>” on page 4-8 for details.</p> <p><b>Recall Setup:</b> This key allows the selection and recall of a previously stored instrument setup using the “<a href="#">Recall Menu</a>” on page 4-11. Use the rotary knob, the <b>Up/Down</b> arrow keys, or the touchscreen to highlight the saved setup, and press <b>Enter</b>. All current instrument settings are replaced by the stored setup information.</p>
Preset	
Save Setup	
Recall Setup	

Figure 5-6. Preset Menu

## 5-5 Self Test

At power on, the Spectrum Master runs through a series of quick checks to ensure that the system is functioning properly. The System self test runs a series of tests that are related to the instrument. The Application Self Test runs a series of tests that are related to the current operating mode of the instrument.

If the Spectrum Master is within the specified operating range with a charged battery, and the self test fails, then contact your Anritsu Service Center (<http://www.anritsu.com/Contact.asp>).

To start a self test when the system is already powered up:

1. Press the **Shift** key and then the **System** (8) key.
2. Press the Self Test submenu key. The Self Test results are displayed.
3. Press **Esc** to continue.

## 5-6 Updating the Spectrum Master Firmware

Please review the MST User Guide section on copying firmware to a USB memory device.

1. Run Master Software Tools and load the firmware update onto the USB memory device. Review the section (in MST Help) that discusses this process.
2. After the firmware is loaded, insert the USB memory device into the USB port of the instrument.
3. Press the following key sequence: **Shift > System (8) > System Options > Reset > Update Firmware**. The Load Firmware main menu key is displayed.
4. Press the **Load Firmware** main menu key to list the Firmware Update menu and Update Application Firmware submenu key.
5. Press the Update Application Firmware submenu key and the Firmware Update dialog opens.
6. Highlight each of the save choices: **Save None**, **Save User Data**, and **Save & Restore User Data**. Read through each choice carefully and then select the desired save mode.
  - **Save None:** No attempt will be made to save any user data.
  - **Save User Data:** User data will be save to the selected external media device.

**Warning**

If there is not enough available memory space for all user data, then some data may be lost during this process.

- **Save & Restore:** User data will be saved to the selected external media device. The instrument will also attempt to restore the files to the instrument after the update.

**Warning**

If there is not enough available memory space for all user data, then some data may be lost during this process.

7. Press **Enter** to begin the firmware update process. To abort the process, press **Esc** then choose another analyzer mode or power down.
8. The Firmware Update dialog will query you to confirm the process by pressing **Enter** to continue or **Esc** to abort.
9. Select **Enter** and the firmware update process begins and the Firmware Update dialog displays the following message  
Updating firmware. Please Wait.
10. When complete, the instrument will reboot.

## 5-7 Spectrum Master Firmware Emergency Repair

If you have problems with booting up or updating firmware on the instrument, use the following steps to resolve the problem.

1. Press and hold the **Shift**, **4** (Measure), **0**, and **On/Off** keys simultaneously until a green bar displays at the top of the screen. The Bootstrap window opens.
2. Place the USB memory device with update firmware into the USB connector on the instrument. Please review the MST User Guide section on copying firmware to a USB memory device.
3. Touch the Load All command line on the screen.
4. A successful emergency repair returns:
  - Loading applications passed.
  - Loading DSP FPGA passed.
  - Loading SPA FPGA passed.
  - Loading OS passed.
5. Power down and power up the instrument.



# Chapter 6 — GPS (Option 31)

## 6-1 Introduction

The Spectrum Master is available with a built-in GPS receiver feature (Option 31) that can provide latitude, longitude, altitude, and UTC timing information. This option also enhances frequency reference oscillator accuracy in the spectrum analyzer mode. Within three minutes of satellite acquisition, the reference oscillator will have an accuracy of better than 50 ppb (parts per billion).

In order to acquire data from the GPS satellites, the user must have line-of-sight to the satellites or the antenna must be placed outside without any obstructions. Anritsu GPS antenna 2000-1528-R is required.

<b>Note</b>	The Spectrum Master Technical Data Sheet provides a list of the options and measurements that require GPS (Option 31).
-------------	--

## 6-2 Chapter Overview

- [Section 6-3 “Activating the GPS Feature” on page 6-1](#)
- [Section 6-4 “Saving and Recalling Traces with GPS Information” on page 6-3](#)
- [Section 6-5 “GPS Menu” on page 6-4](#)

## 6-3 Activating the GPS Feature

Install the Anritsu GPS antenna onto the GPS Antenna connector on the Spectrum Master.

1. Press the **Shift** key, then the **System** (8) key.
2. Press the GPS submenu key.
3. Press the GPS On/Off submenu key to toggle the GPS feature on or off. When GPS is first turned on, a RED GPS icon will be appear at the top of the display.



---

**Figure 6-1.** GPS Icon, Red

4. When the GPS receiver has tracked at least three satellites, the GPS icon will change to GREEN. Latitude and Longitude information is displayed in the white bar on top of the display. Acquiring satellites may take as long as three minutes.



**Figure 6-2.** GPS Icon, Green

5. Press the GPS Info submenu key to view information about:

- Tracked Satellites
- Latitude and Longitude
- Altitude
- UTC
- Fix Available
- Almanac Complete
- Antenna and Receiver Status
- GPS Voltage and Current

See [Section 6-5 “GPS Menu” on page 6-4](#) for details about the GPS Info dialog box.

6. Press the Reset submenu key to reset the GPS.

7. The GREEN GPS icon with a RED CROSS through it, as shown below, appears when GPS satellite tracking is lost (after actively tracking 3 or more satellites). The GPS longitude and latitude are saved in the instrument memory until the Spectrum Master is turned off or until GPS is turned off by using the GPS On/Off key.



**Figure 6-3.** GPS Icon, Tracking Lost



## 6-4 Saving and Recalling Traces with GPS Information

### Saving Traces with GPS Information

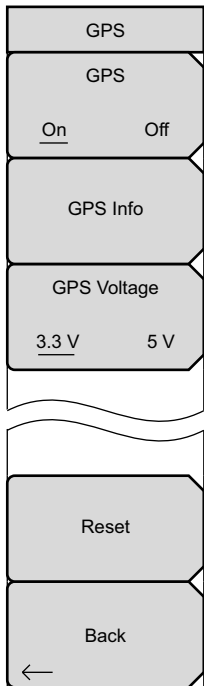
The GPS coordinates of a location can be saved along with a measurement trace. Refer to the [“Save Menu” on page 4-8](#) for more information. The current GPS coordinates will be saved with the measurement traces whenever GPS is on and actively tracking satellites.

### Recalling GPS Information

If the GPS coordinates were saved with a measurement, then when the measurement is recalled, the coordinates that were saved are recalled as well. Refer to the [“Recall Menu” on page 4-11](#) for more information about recalling a saved trace.

## 6-5 GPS Menu

Key Sequence: **Shift, System (8) > GPS**



**GPS:** Press this submenu key to turn GPS on or off.

**GPS Info:** Press this submenu key to display the current GPS information.

**Tracked Satellites:** Shows the number of tracked satellites (three are required to retrieve latitude and longitude, four are required to resolve altitude). Generally, the larger number of satellites tracked, the more accurate the information.

**Latitude and Longitude:** Shows location in degrees, minutes, and seconds.

**Altitude:** Shows altitude information in meters.

**UTC:** Universal Coordinated Time.

**Fix Available:** The cold start search sets are established to ensure that at least three satellites are acquired within the first couple of minutes. When three satellites are found, the receiver will compute an initial fix (typically in less than two minutes). **Fix Not Available** means that the initial position has not been established.

**Almanac Complete:** The system Almanac contains information about the satellites in the constellation, ionospheric data, and special system messages. In a cold start, the GPS receiver does not have any navigation data so the receiver does not have a current almanac. A complete system almanac is not required to achieve a first position fix. The availability of the almanac, however, can significantly reduce the time to first fix.

**Antenna Status:**

OK: Antenna is connected properly and antenna is working properly

Short/Open: A short or open exists between the antenna and the connection. If this message is displayed, then remove and replace the GPS antenna. If the message persists, then try another Anritsu GPS antenna (part number 2000–1528-R). If the message persists, then contact your nearest Anritsu Service Center.

**Receiver Status:** Current status of the receiver.

**GPS Antenna Voltage and Current:** Shows voltage and current.

**GPS Voltage:** Press this submenu key to set the source voltage to be either 3.3 V or 5 V depending on the GPS receiver being used. GPS antenna voltage is set to 3.3 V by default in order to prevent accidental damage to lower-voltage GPS antennas.

**Reset:** The Reset key sets the tracked number of satellites to 0 and erases any almanac data, along with saved coordinates. The process of searching for and reacquiring satellites will begin again.

**Back:** Press this submenu key to return to the [“System Menu” on page 5-3](#).

**Figure 6-4.** GPS Menu

# Chapter 7 — Ethernet Connectivity (Option 411)

## 7-1 Introduction

This chapter describes how to connect to a network or directly to a PC using Option 411 Ethernet Connectivity. It also describes the RJ-45 connector, DHCP, and connection tests for the MS2712E and MS2713E Spectrum Master.

## 7-2 Ethernet Connection

### Network Connection

<b>Note</b>	DHCP is the default Ethernet type. If the Anritsu handheld has been set to Manual, change to DHCP from the <b>System</b> main menu ( <b>Shift+8</b> ) > System Options > Ethernet.
-------------	--

Use the following procedure if you can connect to a network that offers DHCP.

1. Connect the handheld instrument and the computer running MST to the Ethernet network.
2. Turn on the Anritsu handheld and confirm the network connection from the **System** main menu (Shift+8) > **Status** submenu key. The IP address on the handheld is displayed in the STATUS window.
3. In Master Software Tools, press the **Network** tab then the **Query Network for Instruments** button. Double-click on the handheld instrument to complete the connection. The instrument model and IP address along with a green connection icon will be displayed at the top of the MST window.

### Ethernet Direct Connection

Use the following procedure if you can not connect to a network running DHCP.

1. Connect the handheld instrument and the computer running MST with an Ethernet crossover cable or a standard Ethernet cable with a crossover adapter.
2. Turn on the Anritsu handheld and set the Ethernet connection to **Manual**.  
**System** main menu > System Options > Ethernet.
3. Use the **Field** and **Octet** submenu keys to setup the following:

IP: 10.0.0.2  
Gateway: 10.0.0.2  
Subnet: 255.255.255.0

Press **Enter** to save the changes.

**Note** The following steps may disable network and/or internet access.

4. Configure the computer for direct Ethernet connection:
  - a. On the computer running MST, double-click on the local area connection associated with Ethernet crossover cable connection (Start menu > Settings > Network Connections > Local Area Connection x).
  - b. Click on the Properties button, then double-click on Internet Protocol (TCP/IP).
  - c. Select Use the following IP address (or Alternate Configuration) and enter the following information:
    - IP: 10.0.0.1
    - Gateway: 10.0.0.1
    - Subnet: 255.255.255.0
  - d. Close all the open windows and restart the computer and the Anritsu handheld.
5. Open Master Software Tools, press the Network tab then the Query Network for Instruments button. Double-click on the instrument to complete the connection. The instrument model and IP address (10.0.0.2) along with a green connection icon will be displayed at the top of the MST window.

## 7-3 Ethernet Configuration on the Spectrum Master

### LAN Connection

The RJ-45 connector is used to connect the Spectrum Master to a local area network. Integrated into this connector are two LEDs. The amber LED shows the status of the Ethernet Link: Link Up (On) or Link Down (Off). The green LED flashes to show that LAN traffic is present. The instrument IP address is set by pressing the **Shift** key, then the **System** (8) key followed by the System Options soft key and the Ethernet Config soft key. The instrument Ethernet address can be set automatically using DHCP, or manually by entering the desired IP address, gateway address, and subnet mask.

**Note**

An active Ethernet cable must be connected to the instrument before it is turned ON in order to enable the Ethernet port for DHCP or for a static IP address.

Depending upon local conditions, the port may remain enabled when changing from DHCP to static IP address, when changing from static IP address to DHCP, or when temporarily disconnecting the Ethernet cable.

If the port becomes disabled, ensure that an active Ethernet cable is attached to the instrument before cycling the power OFF and back ON.

Dynamic Host Configuration Protocol (DHCP) is an Internet protocol that automates the process of setting IP addresses for devices that use TCP/IP, and is the most common method of configuring a device for network use. To determine if a network is set up for DHCP, connect the MS2712E and MS2713E to the network and select DHCP protocol in the Ethernet Config menu.

Turn the Spectrum Master off, and then on. If the network is set up for DHCP, the assigned IP address should be displayed briefly after the power up sequence.

To display the IP address with the instrument on, press the **Shift** key, then the **System** (8) key, then the System Options soft key and the Ethernet Config soft key. The IP address will be displayed as shown in [Figure 7-1](#). The image on the display panel of your Spectrum Master may differ from the image shown here.

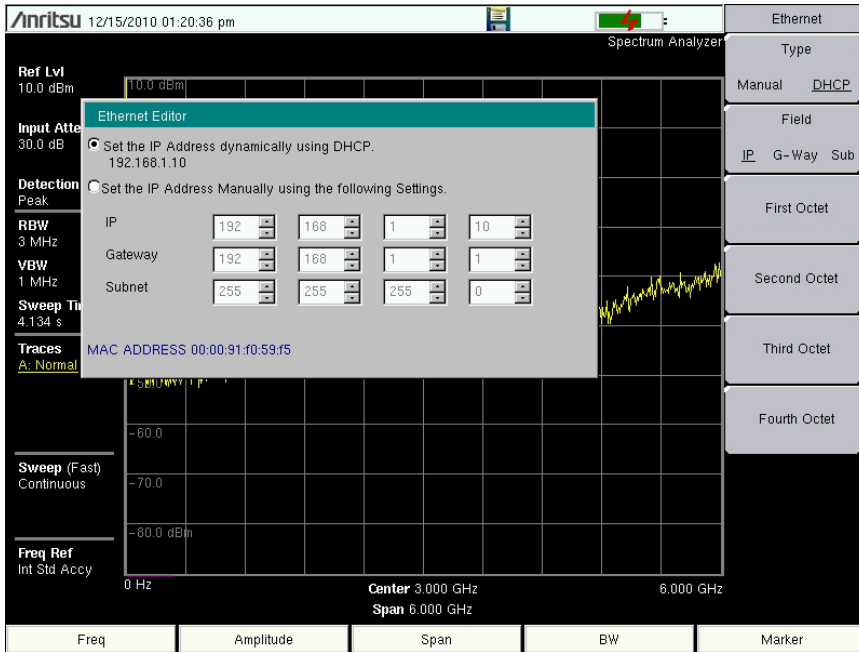


Figure 7-1. IP Address Assigned Using DHCP

## Ethernet Config

Press this submenu key to display the Ethernet submenu and to open the Ethernet Editor dialog box in order to set the IP address of the instrument.

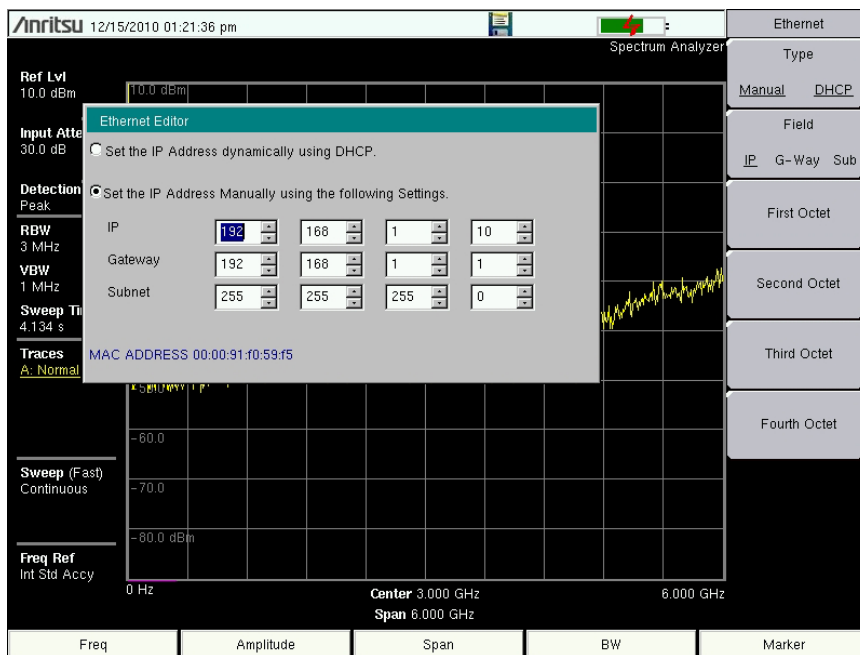


Figure 7-2. Setting IP Address Manually

## Ethernet Menu

Key Sequence: **Shift, System (8)** > System Options > Ethernet Config

Ethernet	<p><b>Type</b>  <b>Manual DHCP:</b> Press this submenu key to select whether the address will be entered manually, or will be supplied automatically by a network DHCP server. If Manual is selected, then use the submenu keys or the <b>Left/Right</b> arrow keys to select the field that is to be modified. Use the keypad, the <b>Up/Down</b> arrow keys, or the rotary knob to enter the input. Press <b>Enter</b> to accept the changes, or press the <b>Esc</b> key to return to normal operation without changing anything.</p>
Type Manual DHCP	
Field	
IP G-Way Sub	
First Octet	<p><b>Field</b>  <b>IP G-Way Sub:</b> Press this submenu key to select the desired Internet Protocol Property to be edited.</p>
Second Octet	<p><b>First Octet:</b> Moves the cursor to the left most column of the selected IP properties field.</p>
Third Octet	<p><b>Second Octet:</b> Moves the cursor to the second column from the left of the selected IP properties field.</p>
Fourth Octet	<p><b>Third Octet:</b> Moves the cursor to the third column from the left of the selected IP properties field.</p>
	<p><b>Fourth Octet:</b> Moves the cursor to the forth column from the left of the selected IP properties field.</p>

Figure 7-3. Ethernet Menu



## 7-4 DHCP

DHCP stands for Dynamic Host Configuration Protocol. It is a protocol that allows a server to dynamically assign IP addresses to devices that are connected to the network. Most networks include a DHCP server to manage IP addresses. When a DHCP server is available on the network, DHCP is the preferred IP address assignment mode.

When using DHCP, no setup is required to lease and use a dynamic IP address. In a dynamic IP operation, the IP address in use may change from use to use. The DHCP server hands out IP addresses on a first come, first served basis. As soon as the device is disconnected from the network, the IP address that it was using becomes available to lease to the next unit that requests an IP address. Normally, some amount of lag time is present on the DHCP server end, so if the device is connected again reasonably soon, then it may end up with the same address.

<b>Note</b>	The instrument must be connected to the network before it is turned on in order for DHCP to function. Key elements of the DHCP lease are performed only during the instrument startup operations, or when switching from manual to DHCP
-------------	---

When a DHCP server is not available, a Static IP address can be used. A Static IP address is a fixed address. After being set, it will always remain the same, and care must be taken to not conflict with other equipment on the network.

When using a static IP address on an established network, always request the Static IP address from the network administrator. Randomly choosing a Static IP address on an established network may result in duplicate IP addresses or other conflicts.

Three parameters must be set prior to using a Static IP address:

### IP Address

This is the Static IP address on the network.

### Default Gateway

Often when a static IP address is assigned, a default gateway is also identified. If the default gateway is unknown, then type in the Static IP address so that the Static IP address and Default Gateway are the same number.

### Subnet Mask

This parameter is usually extracted from the Static IP address based on the class of the address and determines the destination of any broadcast messages that might be sent from the instrument. It can be customized if necessary. The subnet mask may also be provided with the Static IP address.

### Example 1

In this example, a Static IP address has been chosen because no network DHCP service is available. The instrument is connected to the network port on the PC with a crossover Ethernet cable (not included). This is also referred to as Direct Connect:

```
IP Address: 10.0.0.2
Default Gateway: 10.0.0.1
Subnet Mask: 255.255.0.0
```

### Example 2

In this example, the Static IP address has been assigned with an associated gateway and subnet mask:

```
IP Address: 153.56.100.42
Default Gateway: 153.56.100.1
Subnet Mask: 255.255.252.0
```

## 7-5 ipconfig Tool

A few tools that are built into the Microsoft Windows operating system can assist in making some determinations about the network to which the PC is connected. Typing `ipconfig` at a command prompt produces a display of information about the in-use parameters of the PC and its network connection. Following is an example of the typical results expected:

<b>Note</b>	The <code>ipconfig</code> display does not report whether the information is from a DHCP server or from a Static IP setup.
-------------	--

```
Y:\>ipconfig

Windows 2000 IP Configuration

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix. : us.anritsu.com
IP Address. . . . . : 172.26.202.172
Subnet Mask . . . . . : 255.255.252.0
Default Gateway . . . . . : 172.26.200.1
```

## 7-6 Ping Tool

Another tool that can find out if a selected IP address is already on the network is ping. Ping is a harmless way to determine if an address is found on the network, and (if it is found) to receive a reply. Basically, the ping function sends out a request to a specific address to determine if a computing device is connected to the network at that address. If a valid connection is found, then a copy of the signal (that was sent) is returned. If a connection is not found, then the response is “request timed out”, which means that no reply was received from that IP address.

```
Y:\>ping 172.26.202.172
Pinging 172.26.202.172 with 32 bytes of data:
Reply from 172.26.202.172: bytes=32 time<10ms TTL=128
Reply from 172.26.202.172: bytes=32 time<10ms TTL=128
Reply from 172.26.202.172: bytes=32 time<10ms TTL=128
Reply from 172.26.202.172: bytes=32 time<10ms TTL=128
Ping statistics for 172.26.202.172:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milliseconds:
    Minimum = 0 ms, Maximum = 0 ms, Average = 0 ms
```



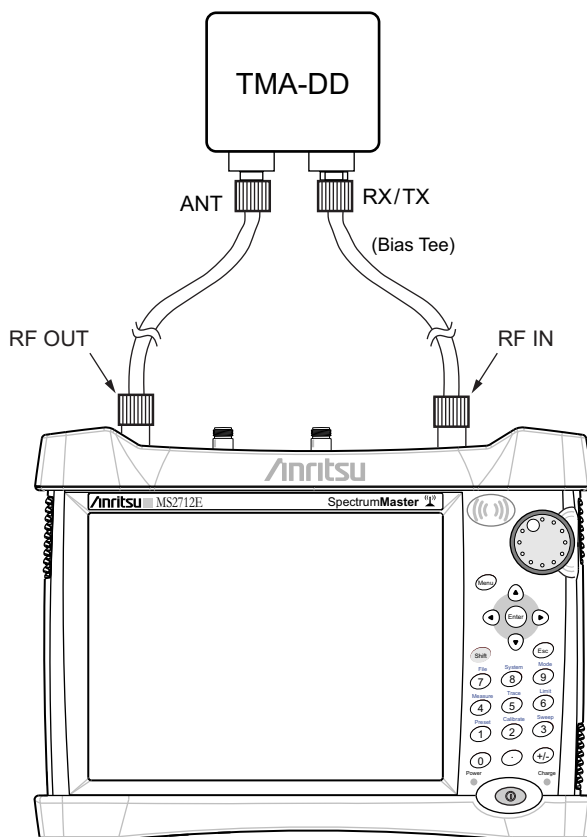
# Chapter 8 — Bias Tee (Option 10)

## 8-1 Overview

Option 10 provides a bias tee that is installed inside the instrument. The bias arm is connected to a 12 VDC to 32 VDC power source that can be turned on as needed to place the voltage on the center conductor of the instrument's RF In port. This supply of bias implies it is mostly useful when conducting two-port transmission measurements. This voltage can be used to provide power to block down converters in satellite receivers and can also be used to power some tower mounted amplifiers.

The bias can be turned on only when the instrument is in transmission measurement, channel scanner, interference analyzer, or spectrum analyzer mode. When bias is turned on, the bias voltage and current are displayed in the lower left corner of the display. The 12 VDC to 32 VDC power supply is designed to continuously deliver a maximum of 6 watts.

The bias tee menu can be accessed from the applications options menu and in transmission measurement, it can also be accessed from the **Measure** main menu.



**Figure 8-1.** Variable Bias Tee



# Chapter 9 — Anritsu Tool Box and Line Sweep Tools

## 9-1 Introduction

This chapter provides a brief overview of the Anritsu Tool Box and the Line Sweep Tools program. For detailed information about Line Sweep Tools, refer to the program Help.

## 9-2 Anritsu Tool Box with Line Sweep Tools

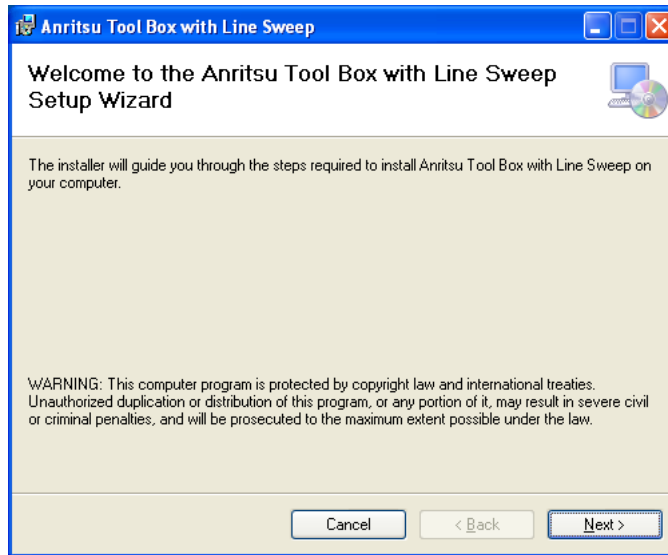
The Anritsu Tool Box is a central location to open an Anritsu measurement, visit the Anritsu web site, or launch an Anritsu application (Figure 9-1). To open the Anritsu Tool Box, either click on the shortcut icon on the desktop or click Start and navigate through the Programs folder to the Anritsu folder. Then click on the Anritsu Tool Box shortcut to open the Anritsu Tool Box. Once the Tool Box is open, move the mouse pointer over any of the application icons to view a short description of the application.



Figure 9-1. Anritsu Tool Box

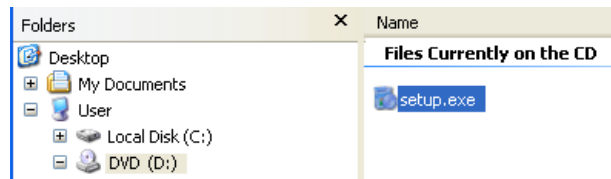
## 9-3 Install the Software

Place the Installation DVD in your computer and follow the on-screen instructions (Figure 9-2).



**Figure 9-2.** Installing Anritsu Tool Box with Line Sweep Tools

If the installer does not autostart, navigate to the DVD and run setup.exe (Figure 9-3).



**Figure 9-3.** setup.exe on the Anritsu Tool Box DVD

The installation will start. Follow the on-screen instructions. The software is also available free of charge from the Anritsu web site (<http://www.anritsu.com>).

## 9-4 Other Software

The Anritsu Tool Box may also link to the Anritsu Master Software Tools software and the Anritsu Map Master software. If this software had already been installed on your computer, the Tool Box will link to it. If not, clicking on the icons will bring you to the Anritsu web site, where you will be able to download the software free of charge.



## 9-5 Why use Line Sweep Tools?

Line Sweep Tools is a program designed to increase productivity for people who work with dozens of Cable traces, Antenna traces, and Passive Intermodulation (PIM) traces every day. Line Sweep Tools will:

- Collect sweeps from Anritsu PIM and Line Sweep gear.
- Help verify that those sweeps are done properly and that the Cable, Antenna and PIM sweeps meet specifications.
- Help create reports of the findings quickly and to a professional standard.

### Line Sweep Tools Features

The Line Sweep Tools user interface is familiar to users of Hand Held Software Tools, the current industry standard line sweep post-capture trace processing software. This leads to a short learning curve and easy trace collection, validation, and reporting.

Anritsu's Line Sweep Tools program includes:

- Presets for markers and limit lines take hours off the report preparation time for a user with dozens of traces to verify.
- The Report Generator which makes generating PDF reports for multiple traces, with logos, quick and easy.
- Dual Trace viewing mode ensures compatibility with the E series line sweep instruments.
- A naming grid makes renaming files, titles, and subtitles much quicker and error free.
- Line Sweep Tools can open DAT or VNA files from a wide range of current and supported Anritsu hand-held instruments.
- Line Sweep Tools can open the PIM files generated by Passive Inter-Modulation measurements.

## 9-6 Using Line Sweep Tools

Like its predecessor, Hand Held Software Tools (HHST), Line Sweep Tools is intuitive for most users. However, unlike HHST, Line Sweep Tools has the capability to work rapidly with a large number of traces.



**Figure 9-4.** Line Sweep Tools Window

Line Sweep Tools can open DAT files from HHST; or VNA/DAT files from Anritsu's E-series instruments. It also can open PIM files. Either way, the file once opened, can be inspected and modified in many different ways. Line Sweep Tools saves files as a new type of DAT file, and can export traces as VNA, text, JPG, BMP, or PNG. Line Sweep Tools does not produce files that can be opened by HHST.

### Markers and Limit Lines

The easiest way to manage markers is to turn one on and use the mouse to drag it to the desired position. The marker tool bar is shown in [Figure 9-5](#). Marker number 1 is On in the figure below. Markers can be set to an exact value by pressing the “e” button, which displays detailed marker controls, numeric value entry, peak find, and valley find.



**Figure 9-5.** Limit Toolbar and Marker Toolbar

The dark button on the left turns on the limit line. Once on, it can be dragged to the desired place, or put on an exact y-axis value by entering a number.

## Marker Presets

The fastest way to manage markers on multiple traces is to use the preset function. The marker and limit line preset toolbar allows users to quickly set all markers and the limit line to pre-defined values on similar traces (Figure 9-6).



**Figure 9-6.** Preset Toolbar

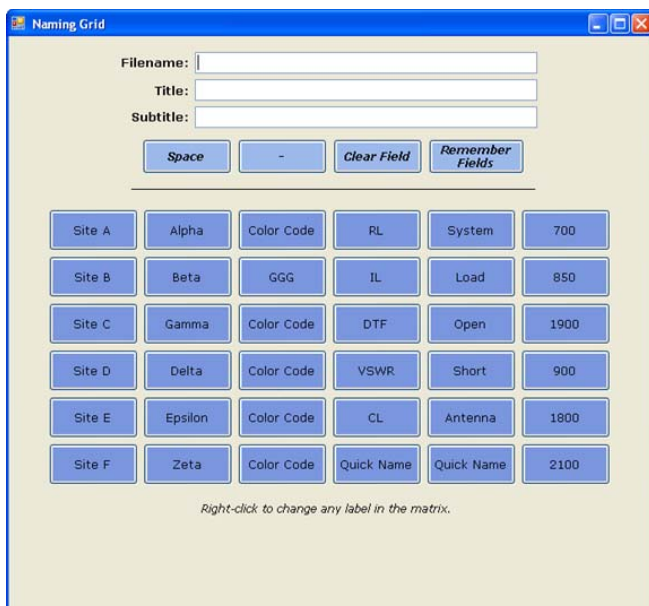
First set the markers and limit lines on a typical trace to the desired values. Then, press the red “e” or edit button on the Preset toolbar. This puts the preset buttons into “learn” mode. Now, press a preset button (1 to 7). This programs the preset button where to put the markers and limit lines. Finally, press the red “e” button again to exit the learn mode.

The programmed button is now enabled. Line Sweep Tools can program up to 7 buttons with preset markers and limit line.

To use the preset, just press it and the markers and limit line will display at the programmed locations even when switching to a new trace. The two arrow keys make going to the next, or previous, trace simple. Using presets, a dozen similar traces can be reliably validated in seconds.

## Renaming Grid

The renaming grid, much like the naming grid in the E series instruments, allows users to quickly and consistently rename filenames, trace titles, and trace subtitles. The grid can be set up with custom phrases to make the renaming process simpler.



**Figure 9-7.** Renaming Grid and Renaming Toolbar

To use the renaming grid:

1. Click on the left icon of the Renaming toolbar.
2. Select the filename, title, or subtitle box. Right-clicking on a box will allow you to change the text on the button.
3. Press buttons and type until the desired name is shown.
4. Press Remember Fields to copy the new name for later use.
5. On the toolbar, press the button that corresponds to the field to be renamed.
6. If desired, use the arrow keys on the Marker toolbar to go to the next trace.

## Report Generator

To use the report generator in Line Sweep Tools, go to File menu and select Report Setup to tell Line Sweep Tools how you want the report to appear. In this case, the report will have the name of the contractor that did the work (Company field), the contractor logo, and will be generated in PDF format (Figure 9-8).

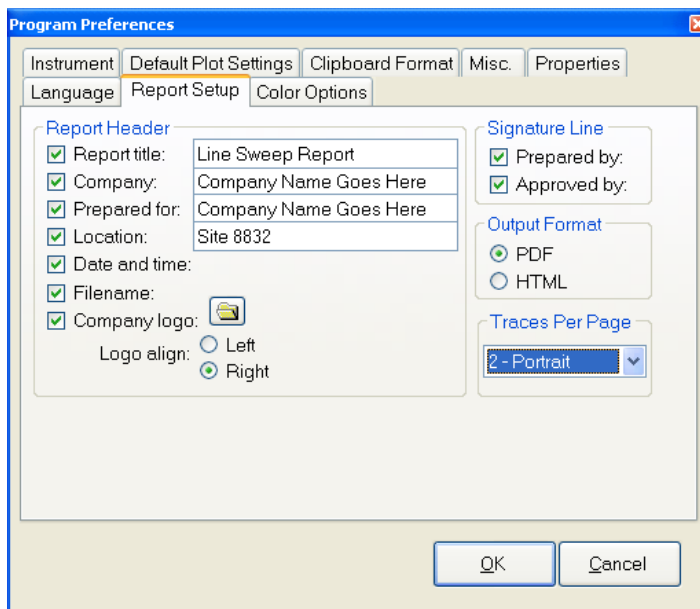


Figure 9-8. Report Setup Tab

Once the report generator is setup, File > Generate Report, will create the PDF. The report will include all traces that were open at the time the report was made (Figure 9-9).

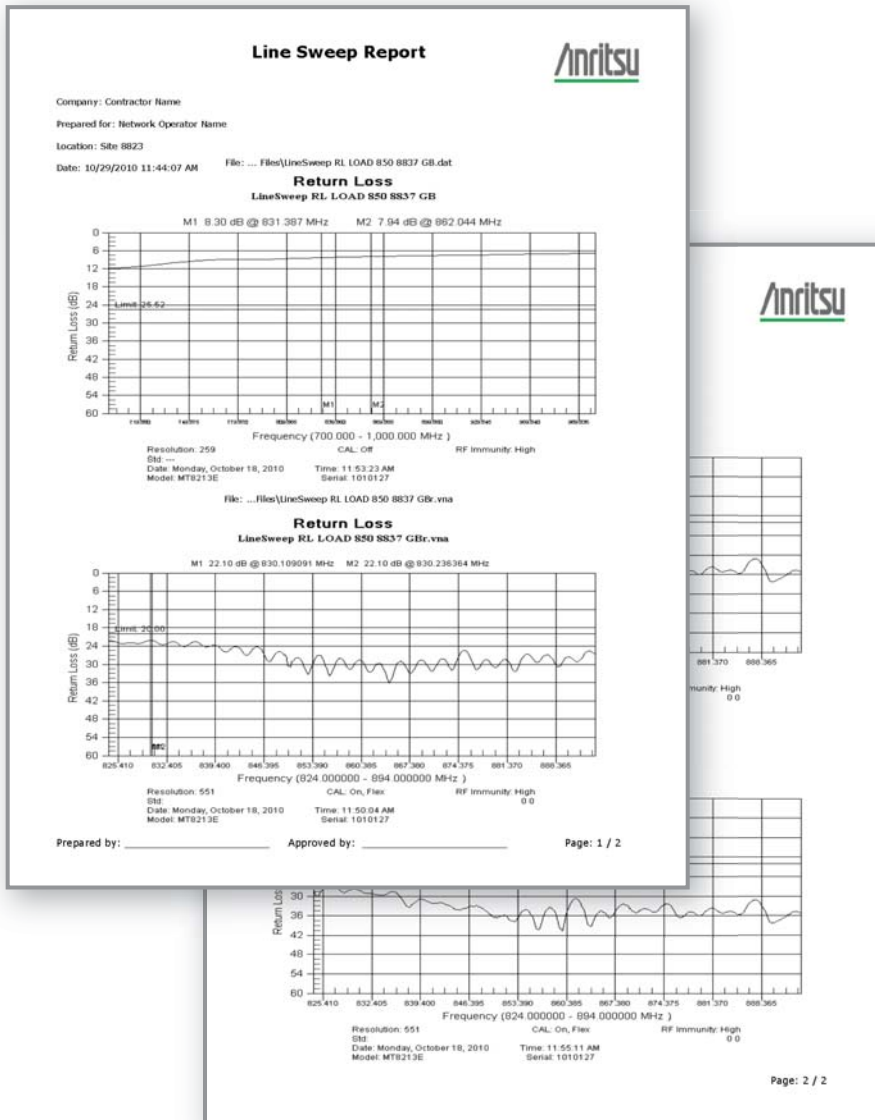


Figure 9-9. Generated Report



# Chapter 10 — Master Software Tools

## 10-1 Introduction

This chapter provides a brief overview of Master Software Tools (MST). For detailed information, refer to the MST Manual.

## 10-2 MST Overview

Anritsu Master Software Tools is a Windows 2000 and later compatible program for transferring and editing saved measurements, markers, and limit lines to a PC. Master Software Tools will not function on earlier versions of the Microsoft Windows operating system.

## 10-3 Feature Overview

### Capturing or Retrieving Traces

MST includes a feature to capture the current screen and associated data from the test instrument to the Master Software Tools Graphic Display Editor window. Saved files on the test instrument can also be retrieved and displayed or edited with Master Software Tools.

### Editing Graphs

MST can be used to change the scale, limit lines, and markers in a measurement through the Edit Graph button in the workspace toolbar, or through the Context Menus.

### Context Menus

Context Menus are accessed by right-clicking the mouse on an active measurement screen in the Graphic Display Editor Window. Context Menu functions may include commands that are also available on the pull down menus and toolbar buttons, or functions, commands, and options specific to the active measurement window.

### Overlaying Traces

Trace Math and Overlays allow for comparing multiple traces.

### Folder Spectrogram

Folder Spectrogram provides a simulated three dimensional view of a large amount of data in one set of graphs.

## 10-4 Installing MST

MST is provided on the CD-ROM included with the instrument. Insert the CD-ROM into a PC to run the installer. Follow the onscreen instruction.

## 10-5 Connecting to the Instrument

Use the USB cable supplied with the test instrument to make the connection.

1. Connect the USB cable to the USB-A port on the computer and to the USB-min B port on the test instrument.
2. Turn on the test instrument. Run the Master Software Tools program.
3. Pull down the **Connection** menu and click on Connect – USB. This establishes communication to the test instrument.

For Ethernet connection refer to [Chapter 7, “Ethernet Connectivity \(Option 411\)”](#).

## 10-6 Updating Spectrum Master Firmware

Refer to [“Updating the Spectrum Master Firmware”](#) on page 5-8.



# Appendix A — Measurement Guides

## A-1 Introduction

This appendix provides a list of supplemental documentation for Spectrum Master features and options. These measurement guides are available as PDF files on the documentation disc and the Anritsu website.

**Table A-1.** Analyzers and Analyzer Options (Sheet 1 of 2)

Spectrum Master Feature (Required Option)	Related Document (Part Number)
Spectrum Analyzer Interference Analyzer (0025) Channel Scanner (0027) C/W Signal Generator (0028) Gated Sweep (0090) Coverage Mapping (0431) AM/FM/PM Analyzer (0509)	Spectrum Analyzer Measurement Guide (10580-00231) for <i>Firmware V1.11 and BEFORE</i>  Spectrum Analyzer Measurement Guide (10580-00244) for <i>Firmware AFTER V1.11</i>
Bias-Tee (0010) 2-Port Transmission Measurement (0021)	2-Port Transmission Measurement Guide (10580-00242)
W-CDMA/HSDPA Over-the-Air Signal Analyzer (0035) TD-SCDMA/HSDPA Over-the-Air Signal Analyzer (0038) GSM/GPRS/EDGE RF Signal Analyzer (0040) GSM/GPRS/EDGE Demodulated Signal Analyzer (0041) W-CDMA/HSDPA RF Signal Analyzer (0044) W-CDMA Demodulated Signal Analyzer (0045) TD-SCDMA/HSDPA RF Signal Analyzer (0060) TD-SCDMA/HSDPA Demodulated Signal Analyzer (0061) W-CDMA/HSDPA Demodulated Signal Analyzer (0065) LTE RF Measurements (0541) LTE Modulation Measurement (0542) LTE Over-the-Air Measurements (0546)	3GPP Signal Analyzer Measurement Guide (10580-00234)
cdmaOne/CDMA2000 1X Over-the-Air Signal Analyzer (0033) CDMA2000 1xEV-DO Over-the-Air Signal Analyzer (0034) cdmaOne/CDMA2000 1X RF Signal Analyzer (0042) cdmaOne/CDMA2000 1X Demodulated Signal Analyzer (0043) CDMA2000 1xEV-DO RF Signal Analyzer (0062) CDMA2000 1xEV-DO Demodulated Signal Analyzer (0063)	3GPP2 Signal Analyzer Measurement Guide (10580-00235)

**Table A-1.** Analyzers and Analyzer Options (Sheet 2 of 2)

<b>Spectrum Master Feature (Required Option)</b>	<b>Related Document (Part Number)</b>
ISDB-T Measurements (0030) ISDB-T SFN Field Measurements (0032)	Digital Video Broadcast Signal Analyzer Measurement Guide (10580-00237)
High-Accuracy Power Meter (0019) Power Meter (0029)	Power Meter Measurement Guide (10580-00240)
IEEE 802.16 Mobile WiMAX Over-the-Air Signal Analyzer (0037) IEEE 802.16 Fixed WiMAX RF Signal Analyzer (0046) IEEE 802.16 Fixed WiMAX Demodulated Signal Analyzer (0047) IEEE 802.16 Mobile WiMAX RF Signal Analyzer (0066) IEEE 802.16 Mobile WiMAX Demodulated Signal Analyzer (0067)	WiMAX Signal Analyzer Measurement Guide (10580-00236)
P25 Analyzer (0520) P25 Coverage (0522) NXDN Analyzer (0530) NXDN Coverage (0532)	P25/NXDN Analyzer and Coverage Measurement Guide (10580-00243)
PIM Analyzer (0419)	PIM Master User Guide (10580-00280)
Performance Specifications	Spectrum Master Technical Data Sheet (11410-00511)
SCPI Programming Instruction	Spectrum Master Programming Manual (10580-00256)
Maintenance Manual	Spectrum Master Maintenance Manual (10580-00254)
Documentation	Handheld Instruments Documentation Disc (10920-00060)
Computer Software Applications	Master Software Tools CD-ROM (2300-498) or Download Anritsu Tool Box with Line Sweep Tools DVD (2300-530) or Download

# Index

- A**
- additional documents ..... A-1
  - address
    - Ethernet IP address ..... 7-3
  - annual verification ..... 1-6
  - application
    - self test ..... 5-7
- B**
- batteries and chargers ..... 2-10
  - battery replacement ..... 1-6
  - battery symbols ..... 2-10
  - bias tee ..... 8-1
  - black and white ..... 5-5
  - brightness ..... 5-5
- C**
- calibrate touch screen ..... 5-3
  - carrying case ..... 1-8
  - center frequency share ..... 5-4
  - change directory ..... 4-8
  - charging battery ..... 1-7
  - connecting to a PC ..... 10-2
  - connector panel ..... 2-8
  - copy menu ..... 4-12
  - create folder ..... 4-9
- D**
- date and time ..... 5-4
  - default colors ..... 5-5
  - default gateway, for IP address ..... 7-7
  - DHCP
    - LAN connection ..... 7-3
    - more information ..... 7-7
  - display ..... 5-4
  - Dynamic Host Configuration Protocol
    - see DHCP
- E**
- electrostatic discharge ..... 1-6
  - emergency repair ..... 5-9
  - entering data ..... 2-12
  - Ethernet
    - configuration ..... 7-5
    - IP address ..... 7-3
    - menu ..... 7-6
  - external power ..... 2-8
- F**
- factory defaults ..... 5-6
  - file management ..... 4-1
  - file menu ..... 4-7
  - file name ..... 4-2
  - file types ..... 4-8
  - firmware
    - updating ..... 5-6, 5-8, 10-2
  - floppy icon ..... 2-11
  - frequency range ..... 1-1
- G**
- gateway
    - default, for IP address ..... 7-7
    - part of IP address ..... 7-3
  - GPS ..... 6-1
  - GPS menu ..... 6-4
- H**
- high contrast ..... 5-5
- I**
- internal memory ..... 1-5
  - IP address ..... 7-3
    - default gateway ..... 7-7
    - ping tool ..... 7-9
    - static ..... 7-7
    - subnet mask ..... 7-7
  - ipconfig tool ..... 7-8
- L**
- LAN and DHCP information ..... 7-1
  - LAN connection ..... 2-8, 7-3
  - language, display ..... 5-4
- M**
- maintenance ..... 1-5
  - mask, subnet, for IP address ..... 7-7
  - master reset ..... 5-6
  - Master Software Tools ..... 2-9, 10-1
  - measurement guides ..... A-1

menu	
copy	4-12
delete	4-13
Ethernet	7-6
file	4-7
GPS	6-4
mode selector	2-13
preset	5-7
recall	4-11
reset	5-6
save	4-8
save location	4-9
save on event	4-10
system	5-3
system options	5-4, 5-5
mode selector	2-13

**N**

night vision	5-5
--------------	-----

**P**

packaged items	1-4
ping tool	7-9
power supply	2-1
preset menu	5-7

**Q**

quick name	4-2
------------	-----

**R**

recall menu	4-10, 4-11
-------------	------------

refresh directories	4-9
reset settings	5-6

**S**

safety symbols	
for safety	Safety-2
in manuals	Safety-1
on equipment	Safety-1
save menu	4-8
select files and folders	4-12
self test	5-3, 5-7
single sweep	2-11
standard accessories	1-4
static IP address	7-7
subnet	7-3
subnet mask, for IP address	7-7
system menu	5-2
system self test	5-7

**T**

tilt bail	1-9
touch screen keyboard	2-12
touch screen keys	2-5

**U**

USB connectors	2-9
----------------	-----

**V**

volume	5-4
--------	-----



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