User Guide

Spectrum Master
Handheld Spectrum Analyzer

MS2711E, 9 kHz to 3 GHz

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 website.

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Chapter 1—General Information

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Chapter 1 — General Information

1-1 Introduction

The Spectrum Master MS2711E User Guide is part of a set of manuals that cover all of the instrument functions and their use. This manual covers the instrument overview, system functions, and other common features, along with a brief guide to basic measurement concepts and setups. Most instrument operations and modes are covered in specific measurement guides as listed below.

Additional Documentation

Document Part Number	Description (Required Option)
10100-00065	Important Product Information, Compliance and Safety Notices
10580-00244	Spectrum Analyzer Measurement Guide Spectrum Analyzer Preamplifier (Option 8) Interference Analyzer (Option 25) Channel Scanner (Option 27) EMF Measurements (Option 444) AM/FM/PM Analyzer (Option 509)
10580-00240	Power Meter Measurement Guide High-Accuracy Power Meter (Option 19) Power Meter (Option 29)
11410-00597	Spectrum Master Technical Data Sheet Performance Specifications
10580-00339	E-Series Tracking Generator Measurement Guide Tracking Generator (Option 20)
10580-00256	Spectrum Master Programming Manual SCPI Programming Instruction
10580-00254	Spectrum Master Maintenance Manual Maintenance Manual

Read the Handheld Instruments Product Information, Compliance, and Safety Guide (PN: 10100-00065) for important safety, legal, and regulatory notices *before* operating the equipment. For additional information and literature covering your product, visit the product page of your instrument and select the Library tab:

- http://www.anritsu.com/en-US/test-measurement/products/ms2711e

Contacting Anritsu for Sales and Service

To contact Anritsu, please visit the following URL and select the services in your region: http://www.anritsu.com/contact-us.

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1-2   Instrument Description

The Spectrum Master MS2711E is an integrated multi-functional test instrument that eliminates the need to carry and learn multiple test sets. The Spectrum Master can be configured to include: spectrum analyzer, interference analyzer with interference mapping capabilities, tracking generator, channel scanner, power meter, high accuracy power meter, and an AM/FM/PM analyzer. A GPS receiver can be added to the MS2711E Spectrum Master model.

The bright 8.4 inch TFT color display provides easy viewing in a variety of lighting conditions. The MS2711E model is 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.

Note	Not all 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.

Available Options

Available options for the Spectrum Master MS2711E model is shown in Table 1-1.

Table 1-1.   Available Options

Option Number	Description
MS2711E-0031	GPS Receiver (Requires GPS Antenna)
MS2711E-0019	High-Accuracy Power Meter (Requires External Power Sensor)
MS2711E-0029	Power Meter
MS2711E-0020	Tracking Generator
MS2711E-0008	Preamplifier
MS2711E-0025	Interference Analyzer[1]
MS2711E-0027	Channel Scanner
MS2711E-0509	AM/FM/PM Analyzer
MS2711E-0098	Standard Calibration (ANSI 2540-1-1994)
MS2711E-0099	Premium Calibration to Z540 plus test data
MS2711E-0444	EMF Measurement (Requires Anritsu Isotropic Antenna)

1. Requires Option 31.

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1-3   Instrument Care and Preventive Maintenance

Site Master care and preventive maintenance consists of cleaning the unit and inspecting and cleaning the RF connectors on the instrument and all accessories. Clean the Site 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.

Connector Care

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.

To prevent damage to your instrument, do not use pliers or a plain wrench to tighten the Type-N connectors. The recommended torque is 12 lbf ·in to 15 lbf ·in (1.36 N ·m to 1.70 N ·m). Inadequate torque settings can affect measurement accuracy. Over-tightening connectors can damage the cable, the connector, the instrument, or all of these items.

Visually inspect connectors for general wear, cleanliness, and for damage such as bent pins or connector rings. Repair or replace damaged connectors immediately. Dirty connectors can limit the accuracy of your measurements. Damaged connectors can harm the instrument. Connection of cables carrying an electrostatic potential, excess power, or excess voltage can damage the connector, the instrument, or both.

Connecting Procedure

1. Carefully align the connectors. The male connector center pin must slip concentrically into the contact fingers of the female connector.
2. Push connectors straight together. Do not twist or screw them together. A slight resistance can usually be felt as the center conductors mate.
3. To tighten, turn the connector nut, not the connector body. Major damage can occur to the center conductor and to the outer conductor if the connector body is twisted.
4. If you use a torque wrench, initially tighten by hand so that approximately 1/8 turn or 45 degrees of rotation remains for the final tightening with the torque wrench.

   Relieve any side pressure on the connection (such as from long or heavy cables) in order to assure consistent torque. Use an open-end wrench to keep the connector body from turning while tightening with the torque wrench.

   Do not over-torque the connector.

Disconnecting Procedure

1. If a wrench is needed, use an open-end wrench to keep the connector body from turning while loosening with a second wrench.
2. Complete the disconnection by hand, turning only the connector nut.
3. Pull the connectors straight apart without twisting or bending.

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.

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 of the unit and slide in first.

Note	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.

Figure 1-1.   Battery Compartment Door

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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 or the DC adapter, or outside the Spectrum Master with the optional Dual Battery Charger. Refer to "Battery Symbols" on page 2-9 for a description of battery symbols.

Note	Use only Anritsu Company approved batteries, adapters, and chargers with this instrument. Anritsu Company recommends removing the battery for long-term storage of the instrument.

Caution	When using the Automotive Cigarette Lighter Adapter, 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.

1-4   Calibration and Verification

Anritsu recommends an annual calibration and performance verification of the Spectrum Master by a local Anritsu service center. 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-us.

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1-5   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.

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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	Not all 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 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 "Battery Replacement" on page 1-5). 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 or the Automotive Cigarette Lighter Adapter. Both items are included with the Spectrum Master.

Caution	When using the Automotive Cigarette Lighter Adapter, 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)
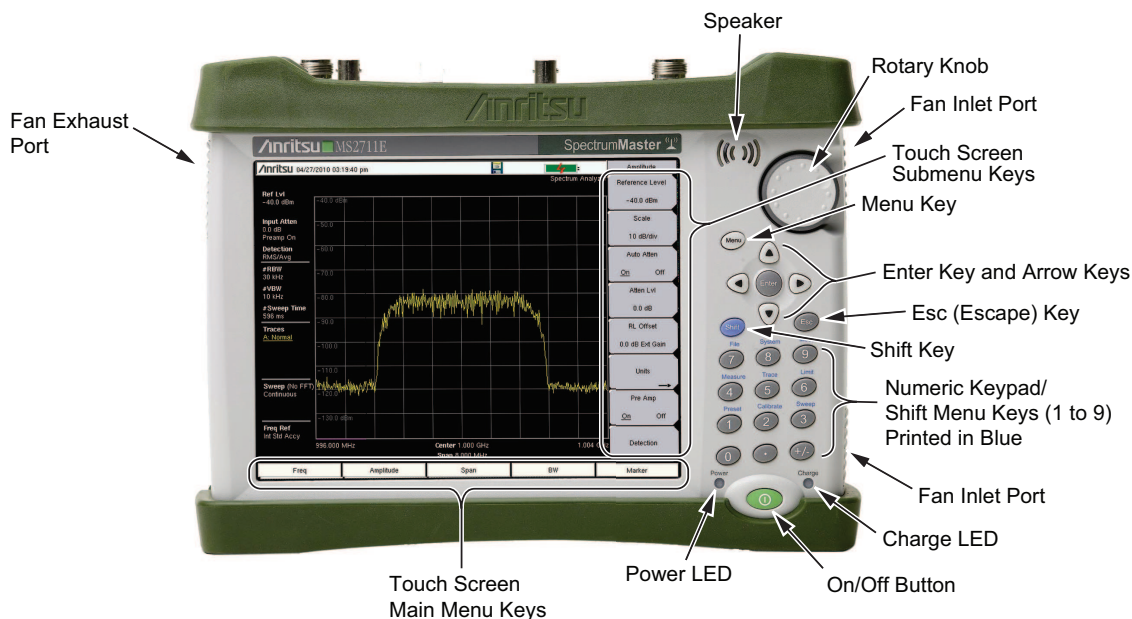
Figure 2-1. Spectrum Master Overview

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

2-3   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 2-12.

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.

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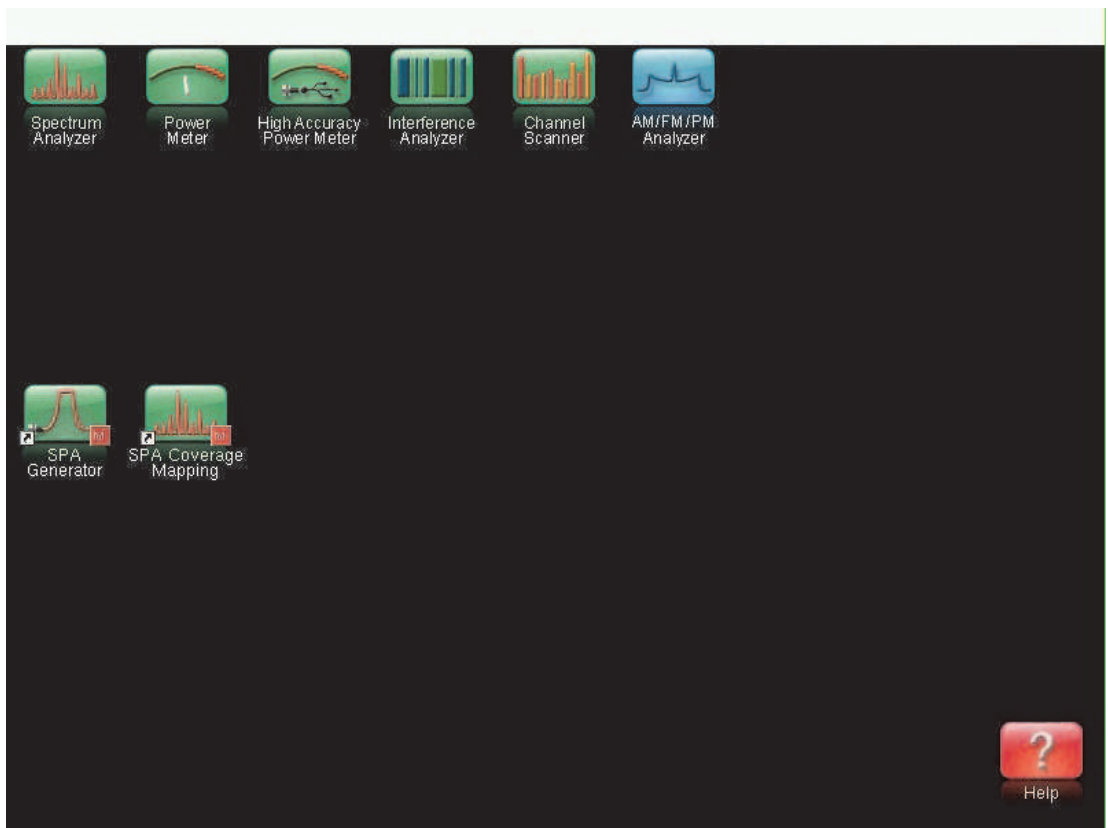
Figure 2-2.   Menu Key Screen, Icons for Installed Measurements and Shortcuts

Note	The display of the Menu screen will vary depending on Spectrum Master model, firmware version, 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.

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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.
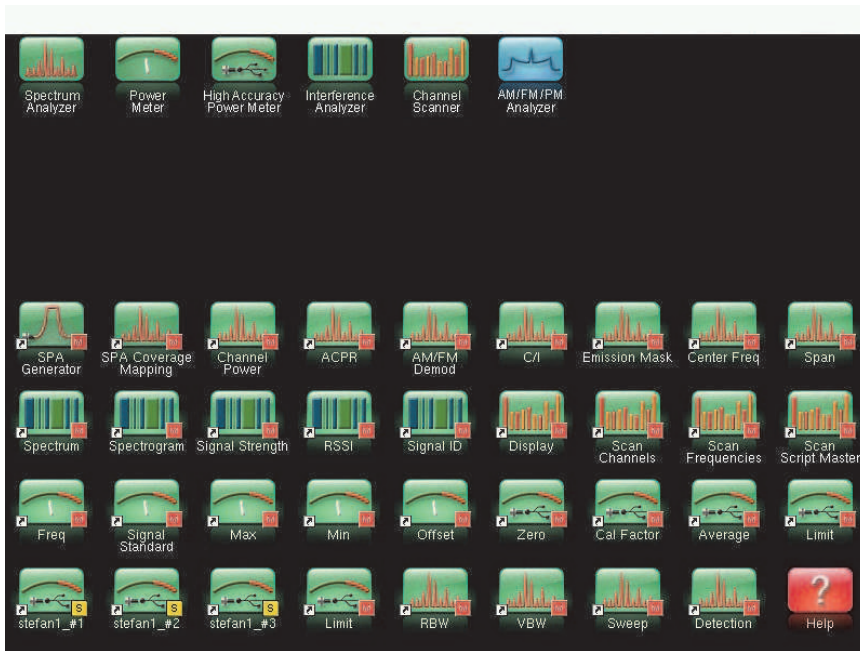
Figure 2-3. Menu Key Screen

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 5-7 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.

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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.

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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 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 2-1.

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 2-12.

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.

2-4   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".
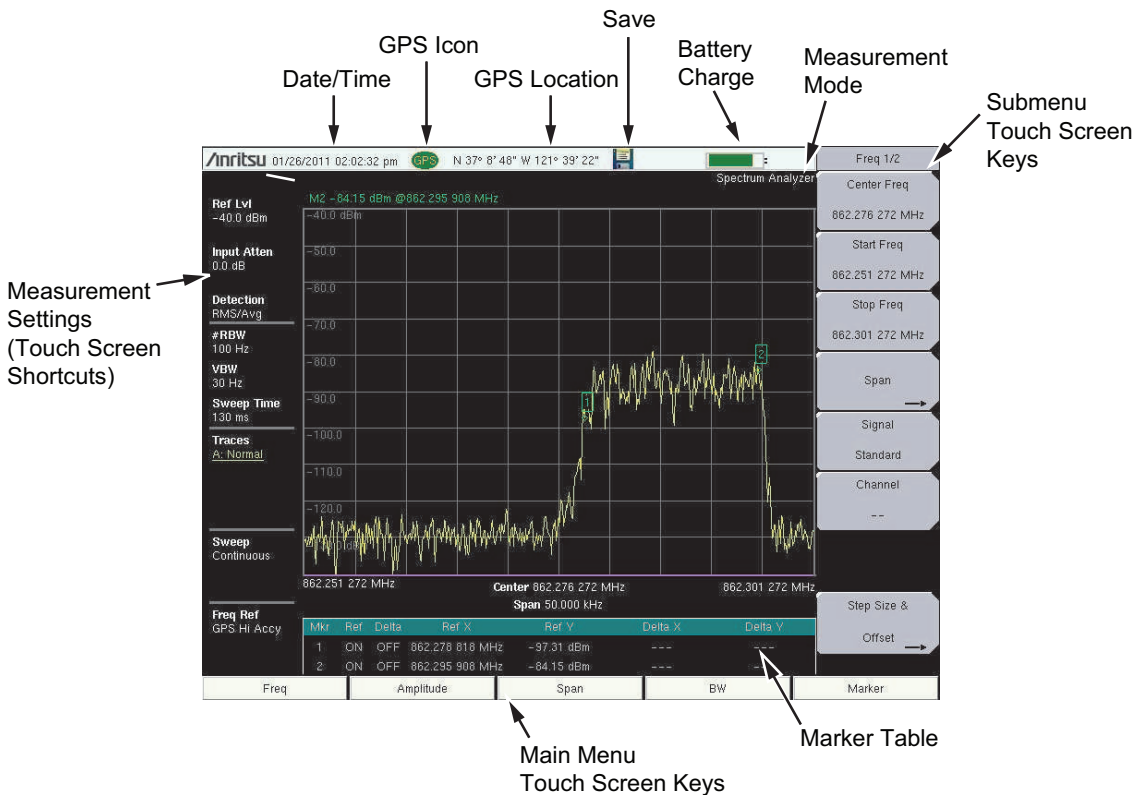
Figure 2-5.   Spectrum Analyzer Display

Note	Many of measurement settings are used as touch screen shortcuts. Use the touch screen to select a measurement setting to edit.

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In addition to the default color display, Spectrum Master offers the following display settings for the Spectrum Analyzer, Interference Analyzer, Channel Scanner, 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
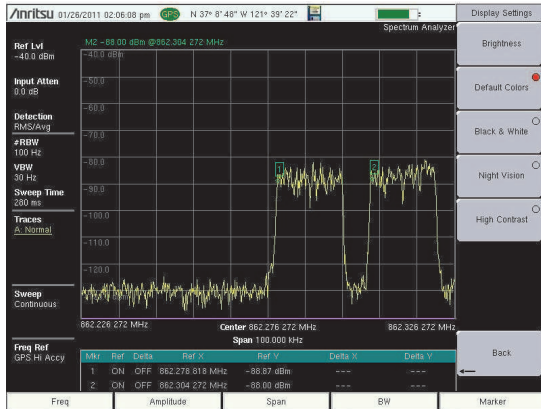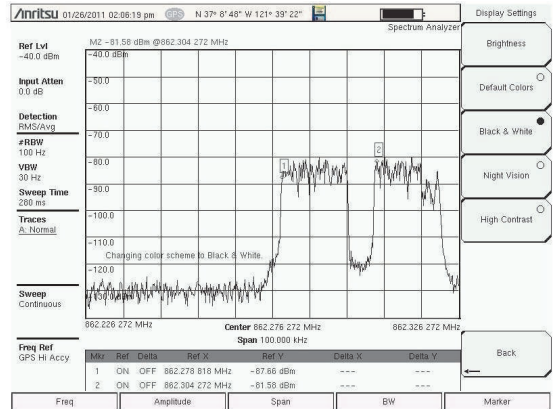
Default Colors   Black & White
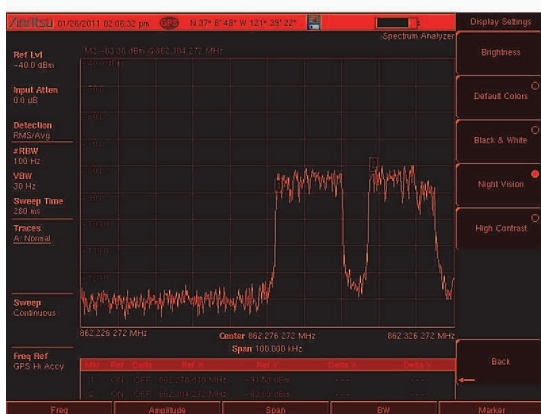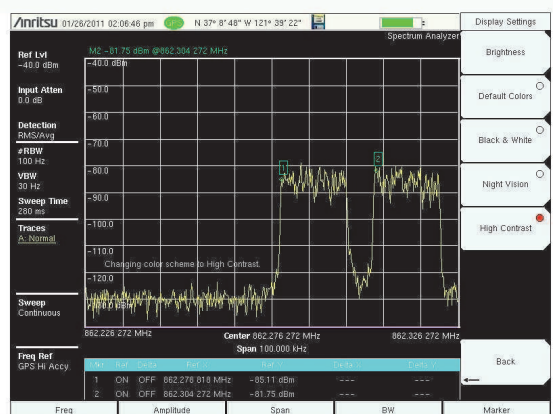
Night Vision   High Contrast

Figure 2-6.   Spectrum Master Display Settings

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2-5   Test Panel Connector Overview

Test panel connector for the Spectrum Master is shown in Figure 2-7.
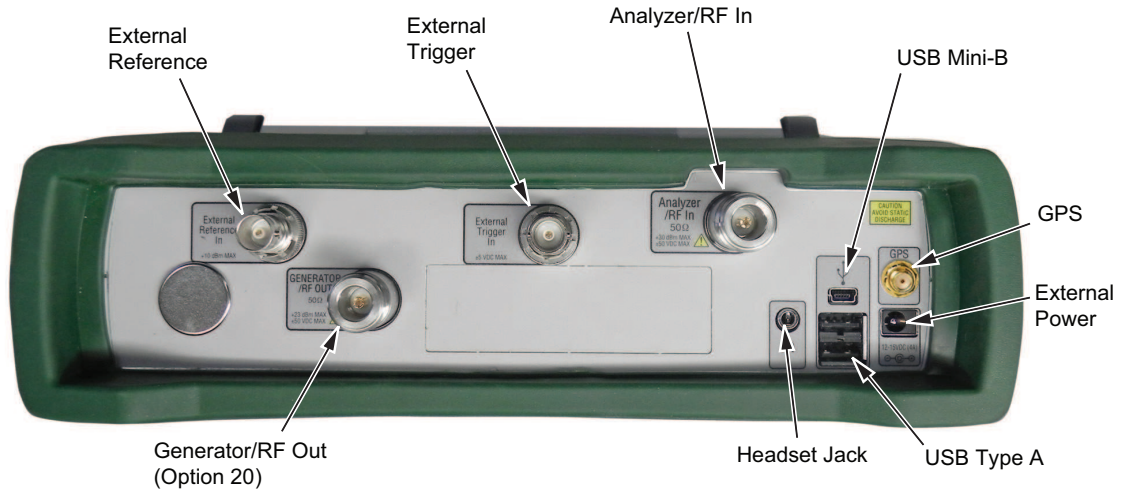
Figure 2-7.   Spectrum Master Test Panel Connector

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.

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.

Note	For proper detection, the applicable Anritsu Software Tool 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.

External 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.

Analyzer/RF In

50 Ω Type-N female connector. Maximum input is +30 dBm at 50 VDC.

Generator/RF Out (Option 0020)

RF output, 50 Ω impedance, for tracking generator (Option 20). Maximum input is +23 dBm at ±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)".

2-6   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 with Black Plug body: Battery is fully charged and external power is applied

    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 or the Automotive Cigarette Lighter Adapter 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.

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2-7   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.
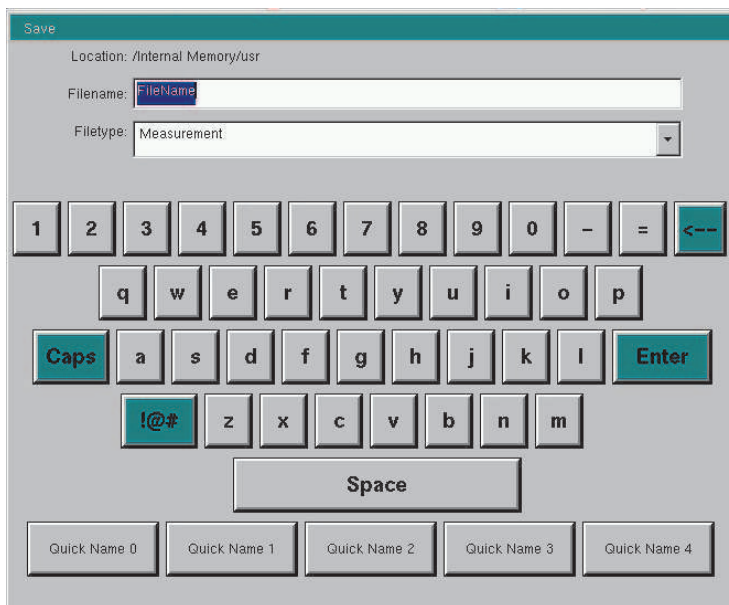

Figure 2-11. Touch Screen Keyboard

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2-8   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.
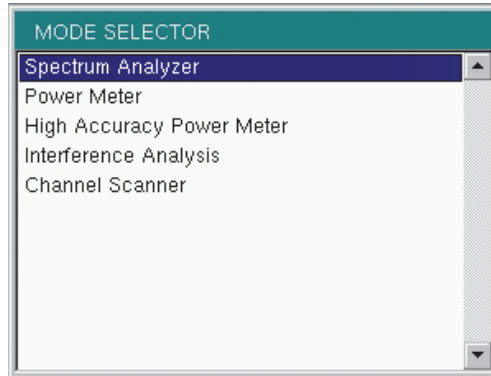
Figure 2-12. Mode Selector Menu

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).

2-9   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.

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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 2-13. 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.

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2-10   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 2-14. Tilt Bail Extended

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

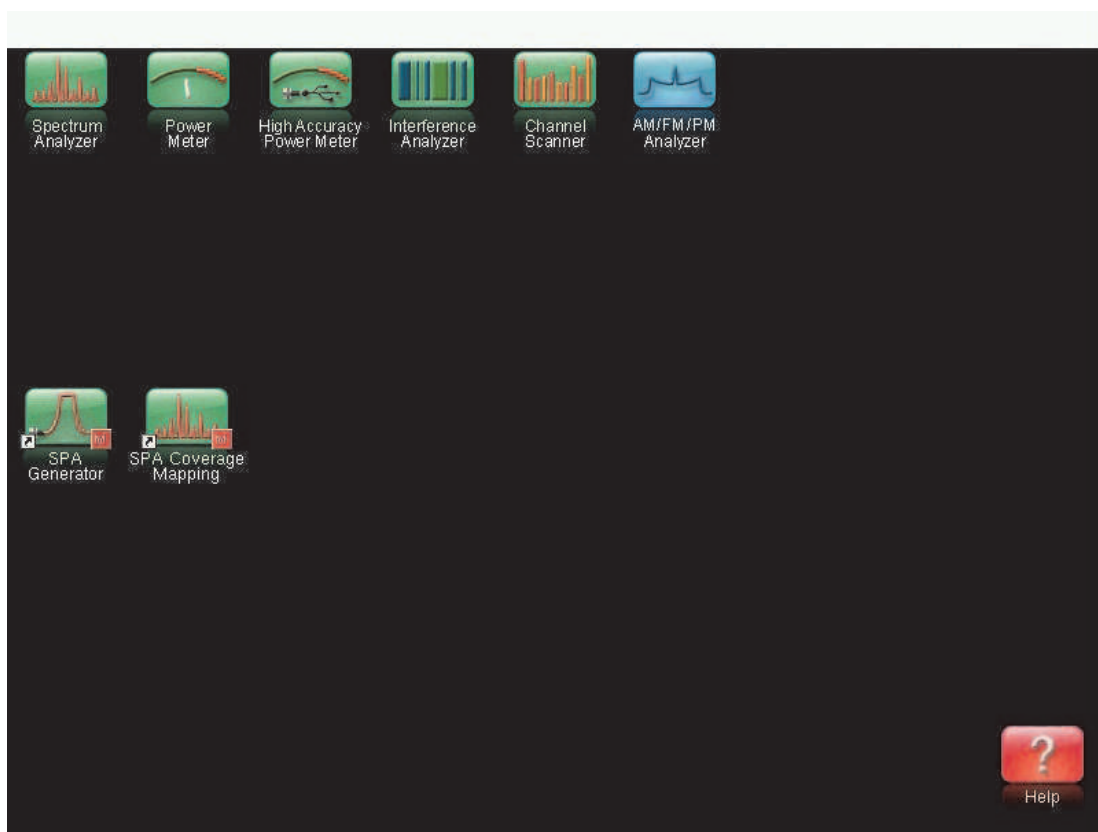Press the **Menu** key and use the touch screen to select the appropriate measurement icon.

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

Note	The display of the instrument will vary based on installed options and firmware.

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3-3   Spectrum Analyzer

Set the instrument to Spectrum Analyzer mode as described in .

Set the Frequency

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.

Set 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 Frequency Offset

1. Press the **Freq** main menu key.

2. Press the Step Size & Other submenu key.

3. Press the Freq Offset submenu key and enter the desired frequency offset 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. Offset will be displayed at the bottom of the screen. The Center Freq, Start Freq, and Stop Freq keys will also indicate that a frequency offset has been turned on.

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5. Set the Freq Offset to 0 Hz to remove the frequency offset.

Note	The Freq Offset will affect the displayed values of frequencies, Markers and Limits. The currently frequency offset value is displayed on the Freq Offset submenu key, located under the **Freq** main menu > Step Size & Offset submenu.

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.

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Reference Level Offset for External Loss or External Gain

To obtain accurate measurements, compensate for any external attenuation or gain by using the RL Offset submenu. The compensation factor is in dB. External attenuation can be created by using an external cable or an external high power attenuator, external gain is typically from an amplifier.

To adjust the reference level for either gain or loss, press the RL Offset submenu key and enter a positive dB value and then press the appropriate submenu key (dB External Gain or dB External Loss). The new RL Offset value will be displayed on the instrument and reference level is adjusted.

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.

Note	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.
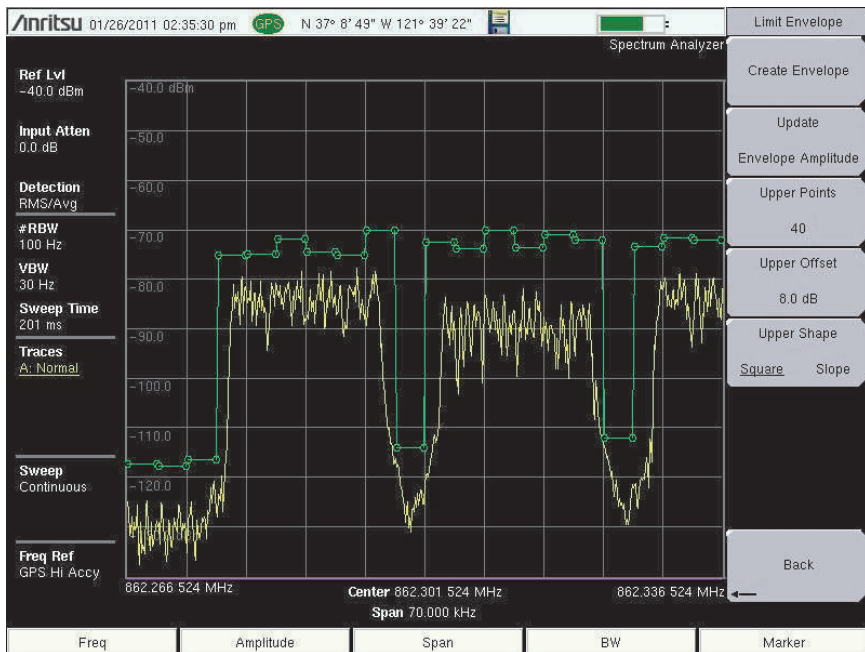
Figure 3-2.   Limit Envelope

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 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

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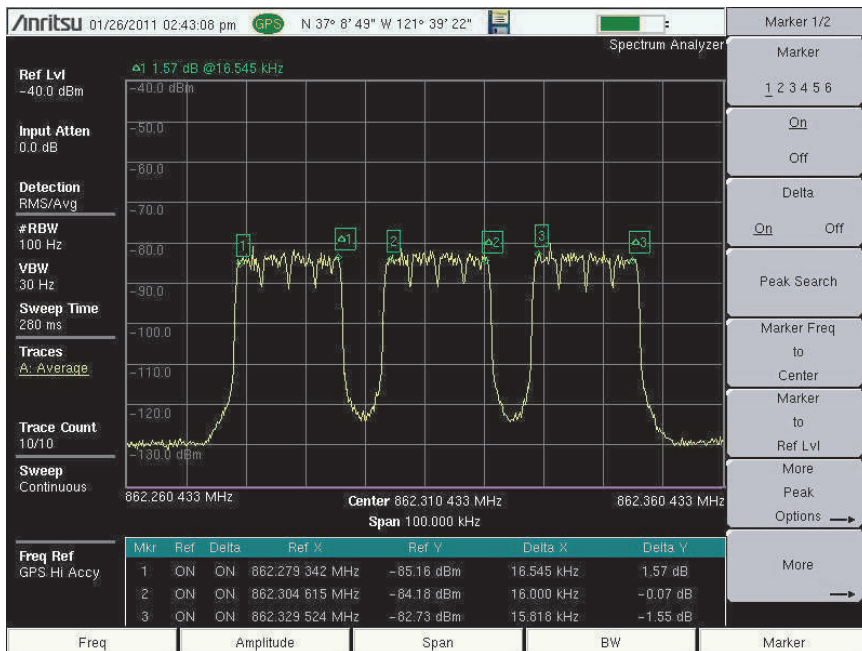
In Spectrum Analyzer mode, press **Shift** then **Measure** (4) and select a measurement using the submenu keys.

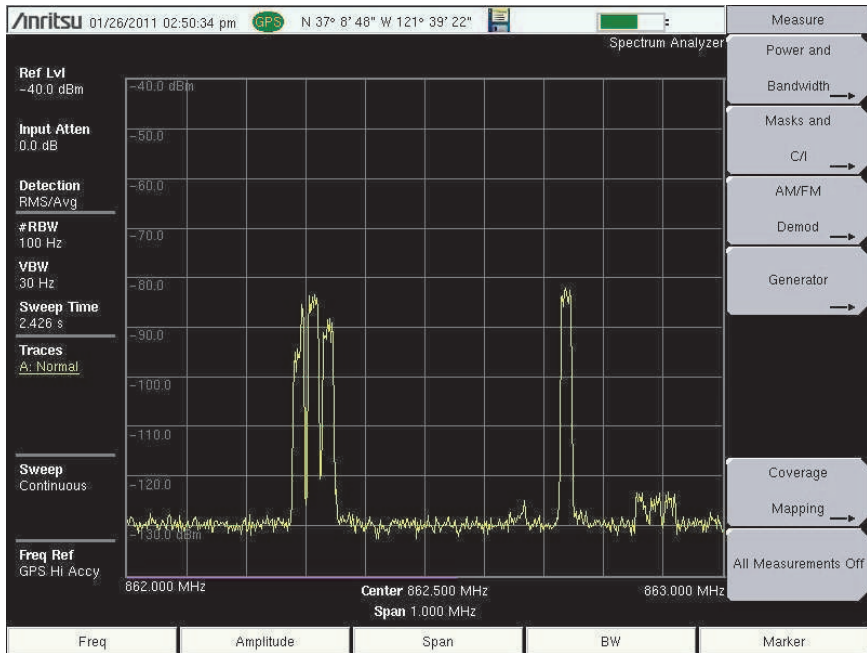**Figure 3-4.**   Spectrum Analyzer Measure Menu

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.

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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.
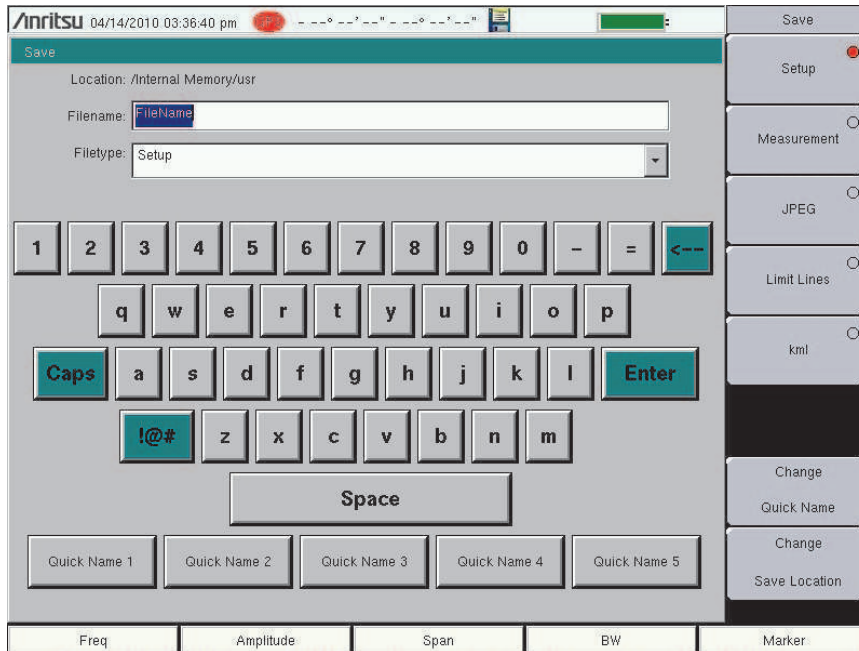
Figure 4-1.   Save Dialog Box

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.
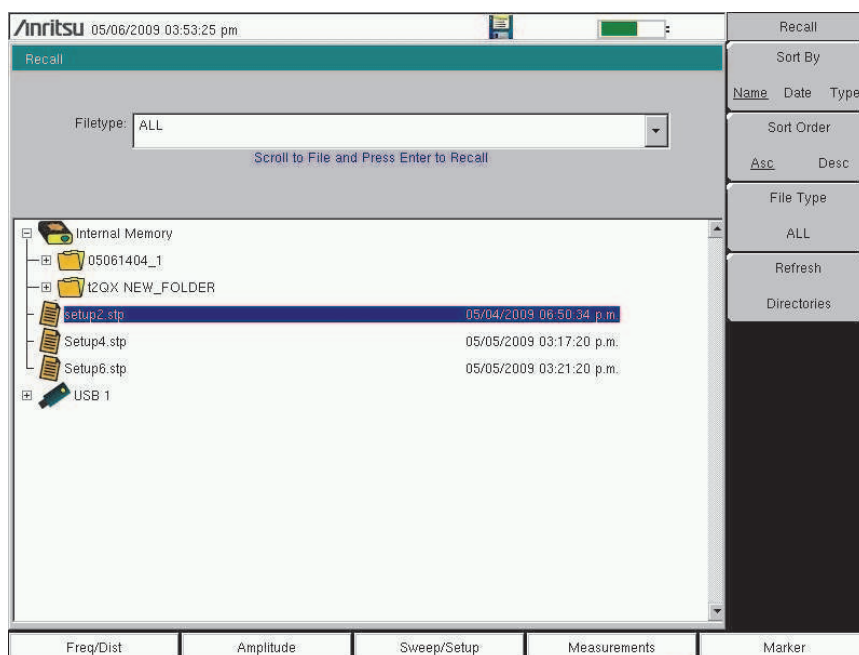
Figure 4-2.   Recall Dialog Box

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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.
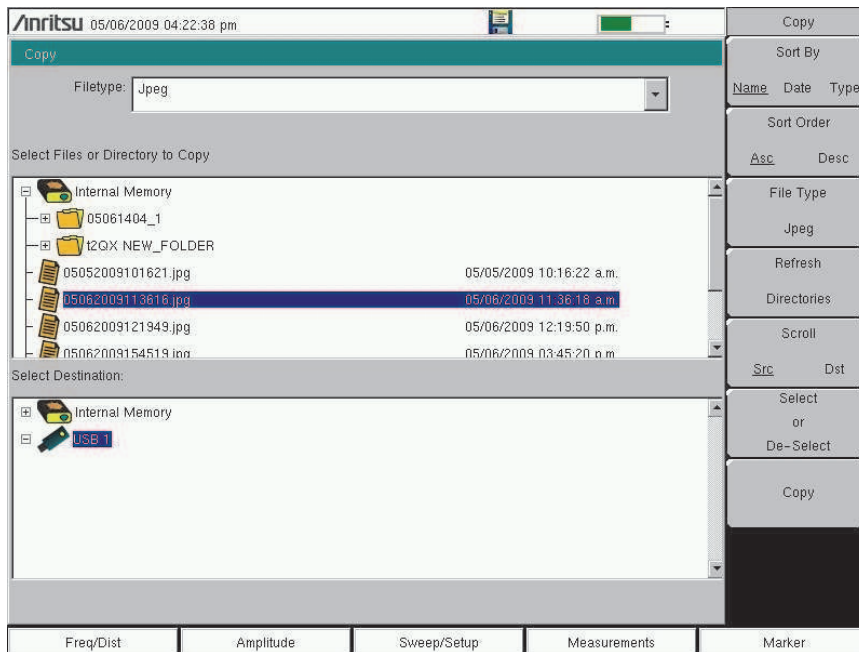
Figure 4-3.   Copy Dialog Box

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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**

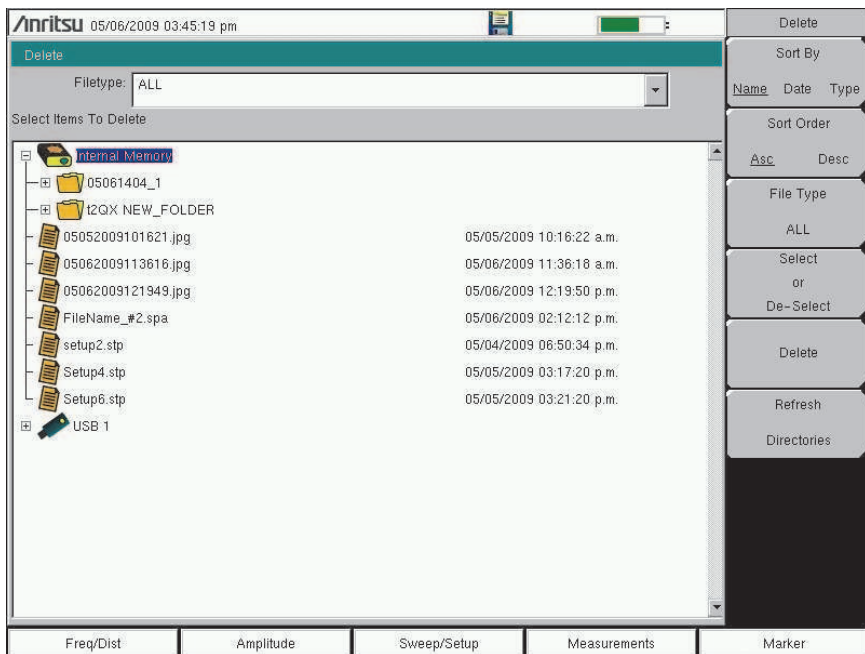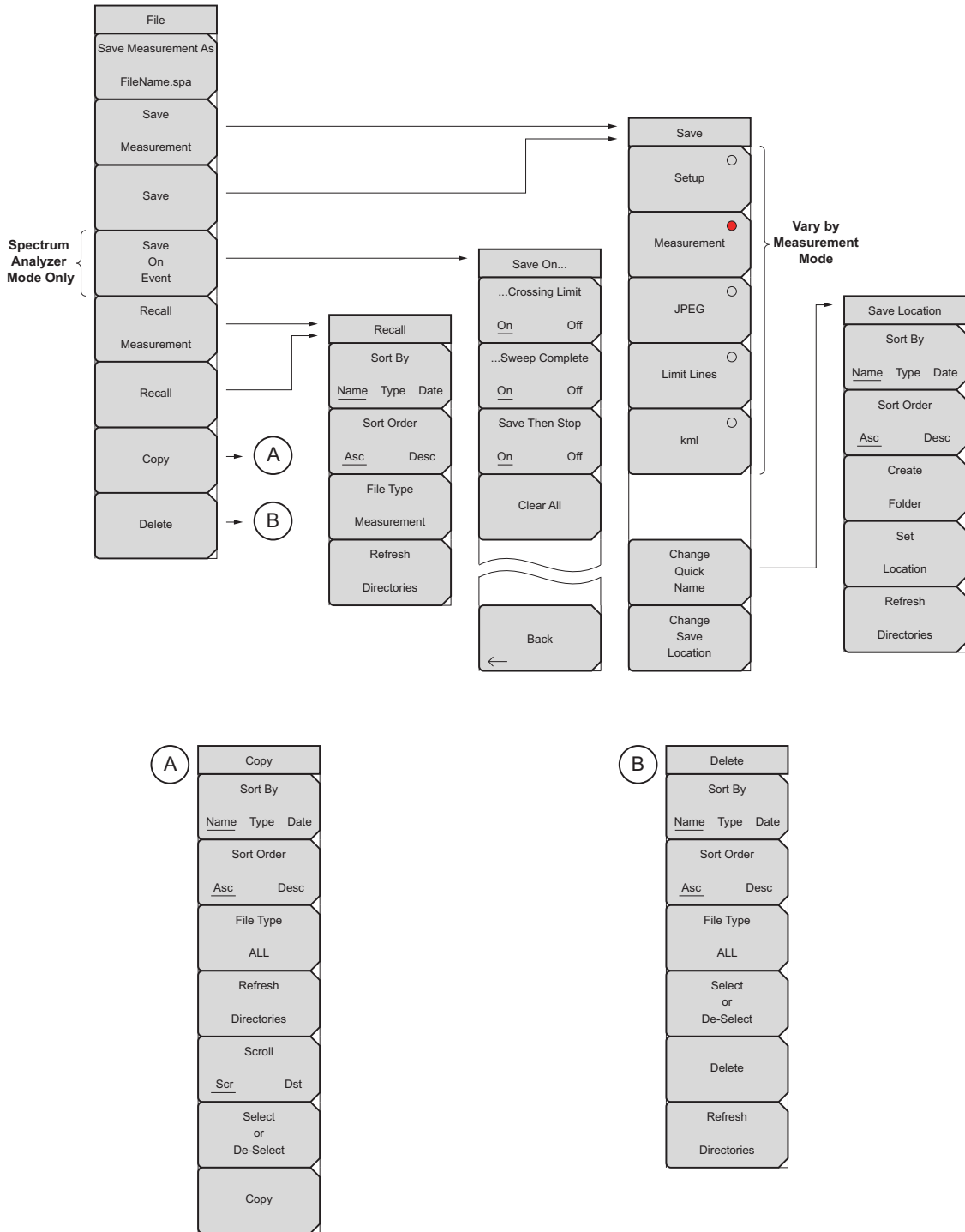|	
File Save Measurement As FileName.spa Save Measurement Save Save On Event Recall Measurement Recall Copy Delete	**Save Measurement As:** This key will save the current setup with a user defined file name. The default file name is changed using the Save submenu. To change the default file name, type in a new file with the touch screen keyboard and press **Enter**. 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:** Press this submenu key to display the "Save Menu" on page 4-8 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 "Save Location Menu" on page 4-9. **Save:** Press this submenu key to display the "Save Menu" on page 4-8 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 "Save Location Menu" on page 4-9. **Save on Event** (Spectrum Analyzer mode only)**:** Press this submenu key to display the "Save On Event Menu" on page 4-10. **Recall Measurement:** Press this submenu key to display the "Recall Menu" on page 4-11. This menu is for recalling measurements from internal memory or a USB flash drive. **Recall:** Press this submenu key to display the "Recall Menu" on page 4-11. This menu is for recalling measurement or setup data from internal memory or a USB flash drive. **Copy:** Press this submenu key to display the "Copy Menu" on page 4-12. This submenu is for copying files or folders from internal memory or a USB flash drive. **Delete:** Press this submenu key to display the "Delete Menu" on page 4-13 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 **Up/Down** arrow keys to highlight the file that is to be deleted and press the Delete submenu key, then **Enter**. Press the **Esc** key to cancel the operation. Note that deleted files can not be recovered.

Figure 4-6.   File Menu

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Save Menu

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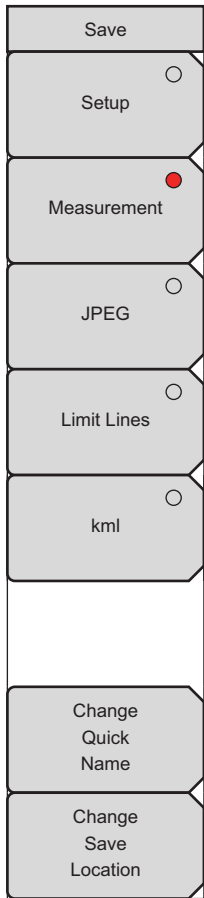
The top keys in the Save menu will display the available save options based on the current measurement mode. Options include:

> **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".

The menu keys shown:

- Save
- Setup ○
- Measurement ●
- JPEG ○
- Limit Lines ○
- kml ○
- Change Quick Name
- Change Save Location

Figure 4-7.   Save Menu

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Save Location Menu

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

Save Location	This menu and dialog box is used to create folders and select where the Spectrum Master will save the current file. Select folders or drives with the **Up/Down** keys, the rotary knob or the touch screen.
Sort By	
Name Type Date	Note: Only folders (not files) are visible in the Save Location dialog box. To view files, use the "Recall Menu" on page 4-11.
Sort Order	**Sort By:** Press this submenu key to sort the folders by Name, Type, or Date.
Asc Desc	**Sort Order:** Displays the folder names in ascending or descending order.
Create Folder	**Create Folder:** This key will create a new folder in the highlighted location or folder. The create directory dialog box will display for naming the folder.
Set Location	**Set Location:** This key will set the current location for saving files and return to the "Save Menu" on page 4-8.
Refresh Directories	**Refresh Directories:** Press this key to update the display.

Figure 4-8. Save Location Menu
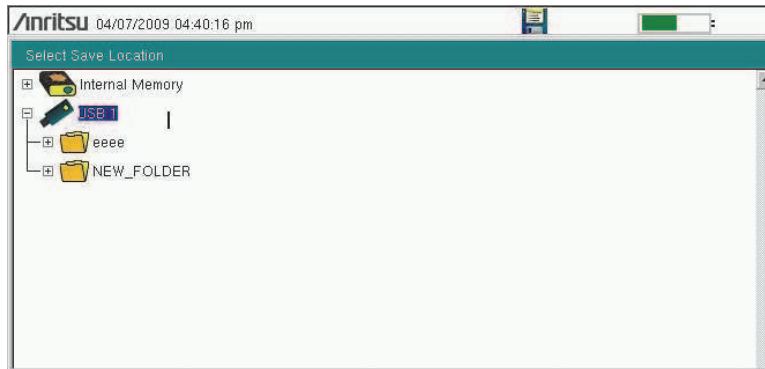
Figure 4-9. Select Save Location Dialog Box

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Save On Event Menu

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

Save On... **...Crossing Limit** On Off **...Sweep Complete** On Off **Save Then Stop** On Off **Clear All** **Back** ←	In Spectrum Analyzer mode, this menu is used to auto save measurements to internal memory after: **...Crossing Limit:** 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 **Limit** menu. **...Sweep Complete:** 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:** 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:** Pressing this key will turn Off the three save on event keys: Crossing Limit Sweep Complete Save Then Stop

Figure 4-10. Save On Menu

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Recall Menu

Key Sequence: **File** > Recall

Recall Sort By Name Type Date Sort Order Asc Desc File Type ALL Refresh Directories	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 **Up/Down** keys, the rotary knob, or the touch screen. **Sort By:** 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. **Sort Order:** Displays the folder or file in ascending or descending order based on the selection in the Sort By key. **File Type:** 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 **Up/Down** keys, the rotary knob, or the touch screen. Press **Enter** to make the selection. **Setup:** Setup files contain basic instrument information, measurement mode setup details, measurement marker data, and limit data. **Measurement:** Measurement files contain all of the information in the setup files and the measurement data. **Limit Lines (.lim):** The Limit line file contains limit line data details. **ALL:** Displays all file types. **Refresh Directories:** Press this key to update the display.

Figure 4-11. Recall Menu

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Copy Menu

Key Sequence: **File** > Copy

Copy
Sort By
Name   Type   Date
Sort Order
Asc   Desc
File Type
ALL
Refresh
Directories
Scroll
Scr   Dst
Select or De-Select
Copy
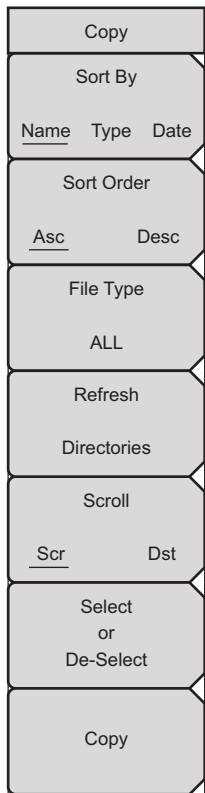
This menu and dialog box is used to copy folders and files. Select folders or files with the **Up/Down** keys, the rotary knob or the touch screen. Figure 4-3 on page 4-4 shows the Copy dialog box with two JPG images and one folder (including the folder's contents) selected and ready to be copied to the USB flash drive. Highlight a folder and press **Enter** to view the contents.

Sort By: 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.

Sort Order: Displays the folder or file in ascending or descending order based on the selection in the Sort By key.

File Type: 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 **Up/Down** keys, the rotary knob, or the touch screen. Press **Enter** to make the selection.

Refresh Directories: Press this key to update the display.

Scroll Scr Dst: Press this submenu key to use the scroll function in the Source Folder (Scr - top panel) or Destination Folder (Dst - bottom panel). See Figure 4-3.

Select or De-Select: 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 Figure 4-3.

Copy: 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.

Figure 4-12. Copy Menu

Delete Menu

Key Sequence: **File** > Delete

	This menu and dialog box is used to delete folders and files. Select folders or files with the **Up/Down** keys, the rotary knob or the touch screen.

Delete

Sort By

Name   Type   Date

Sort Order

Asc   Desc

File Type

ALL

Select
or
De-Select

Delete

Refresh

Directories

This menu and dialog box is used to delete folders and files. Select folders or files with the **Up/Down** keys, the rotary knob or the touch screen.

Sort By: 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.

Sort Order: Displays the folder or file in ascending or descending order based on the selection in the Sort By key.

File Type: 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 **Up/Down** keys, the rotary knob, or the touch screen. Press **Enter** to make the selection.

Select or De-Select: 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.

Delete: Press this key to open the Delete dialog box. Press **Enter** to delete the selected item or **Esc** to Cancel.

Refresh Directories: Press this key to update the display.

Figure 4-13. Delete Menu

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Chapter 5 — System Operations

5-1 Introduction

This chapter reviews the Spectrum Master system operations and related menus. The other menus (Sweep, Measure, Trace, and Limit) are described in the Measurement Guides that are listed in Appendix A.

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5-2   System Menu Overview

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

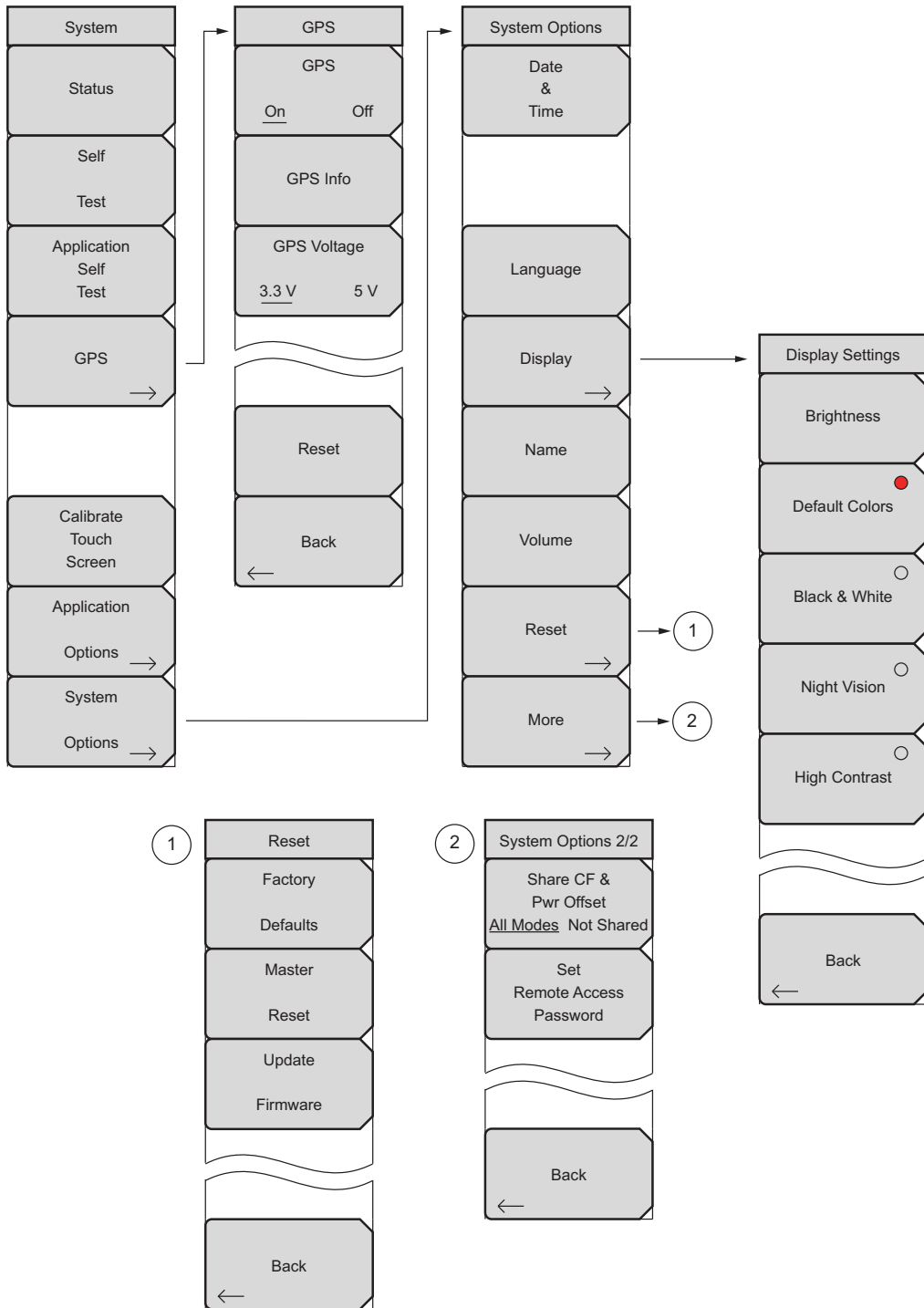**Figure 5-1.**   System Menu

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5-3　System Menu

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

System
Status
Self Test
Application Self Test
GPS →
Calibrate Touch Screen
Application Options →
System Options →

Status: 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 **Esc** or **Enter** to return to normal operation.

Self Test: 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 **Esc** or **Enter** to return to normal operation.

Application Self Test: 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 **Esc** or **Enter** to return to normal operation.

GPS: Opens the "GPS Menu" on page 6-4.

Calibrate Touch Screen: Start the touch screen calibration. Run the calibration procedure when instrument is not responding to your screen taps as expected.

Application Options: This submenu key presents a menu to select application options. This will vary depending upon the measurement mode.

System Options: This key opens the "System Options Menu" on page 5-4.

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 Language Display → Name Volume Reset → More →	**Date and Time:** This key brings up a dialog box for setting the current date and time. Use the submenu keys or the **Left/Right** arrow keys to select the field to be modified. Use the keypad, the **Up/Down** arrow keys or the rotary knob to select the date and time. Press **Enter** to accept the changes, or press the **Esc** key to return to normal operation without changing anything. **Language:** 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 **Enter** to accept the change, or press the **Esc** key to return to normal operation without changing the setting. **Display:** The Display submenu key opens the "Display Settings Menu" on page 5-6 allowing brightness control and the selection of the default color display, black & white display, night vision display, or a high contrast display. **Name:** 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 **Shift** key to select an upper case letter. Use the **Left/Right** directional arrows to move the cursor position. The Back Space key will remove the last character entered. Press **Enter** to save the name. **Volume:** The current volume setting is displayed on the screen. Use the keypad, the **Up/Down** arrow keys or the rotary knob to change the volume and press the **Enter** key to accept the change. **Reset:** Press this submenu key to open the "Reset Menu" on page 5-7. **More:** Press this submenu key to open the "System Options 2/2 Menu" on page 5-5.

Figure 5-3.   System Options Menu

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System Options 2/2 Menu

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

System Options 2/2 Share CF & Pwr Offset <u>All Modes</u> Not Shared Set Remote Access Password Back ←	**Center Freq Share:** Select All Modes to have the current center frequency setting carried over when changing measurement modes. This feature is not applicable to measurements which do not have a center frequency setting or to measurements in which the current center frequency setting is outside the range of the new measurement. **Set Remote Access Password:** Press this submenu key to open the Password text box (Figure 5-5) and Text Entry menu. Type in the desired password. Upper case and lower case letters and the symbols - _ + . are the allowed password characters. Press **Enter** to save or **Esc** to cancel. **Back:** Press this submenu key to return to the "System Options Menu" on page 5-4.

Figure 5-4.   System Options Menu

Remote Access Password

Warning	Do not use SCPI commands with this feature.

This function is valid only with Master Software Tools (MST) v2.21.1 or later. After setting the password, reboot the instrument (normal power **OFF** then **ON**) to provide remote access security. Only one user then has access at any one time.

The password is first set into the instrument, then used in MST. When prompted in MST, enter the password into the password text box. The password text box shown in Figure 5-5 may differ from the text box that is displayed on your instrument.
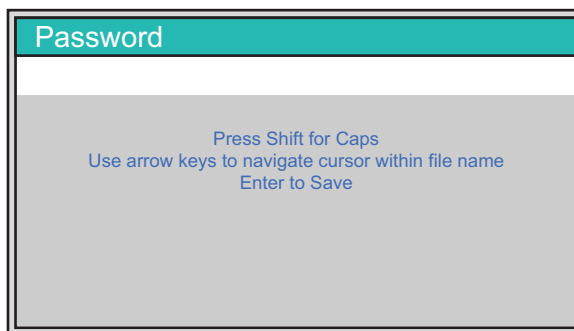
<div style="border:1px solid #000; padding:1em;">

Password

Press Shift for Caps
Use arrow keys to navigate cursor within file name
Enter to Save

</div>

Figure 5-5.   Remote Access Password Text Box

The password can be removed or reset by a Master Reset, by a Factory Default reset, or by a firmware update (which includes a restart).

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Display Settings Menu

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

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

Figure 5-6.   Display Settings Menu

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Reset Menu

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

Reset Factory Defaults Master Reset Update Firmware Back ←	**Factory Defaults:** 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 **Enter** key to initiate the reset, and power-cycle the instrument. **Master Reset:** 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 **Enter** key to initiate the Master Reset and power-cycle the instrument. Press **Esc** to return to normal operation without resetting. **Update Firmware:** Press this submenu key to update the instrument operating system with a USB memory device. Press **Enter** and follow the onscreen instructions to update the firmware or press **Esc** to return to normal operation without updating. Refer to "Updating the Spectrum Master Firmware" on page 5-9 for additional information on both firmware update options. **Back:** Press this submenu key to return to the "System Options Menu" on page 5-4.

Figure 5-7.   Reset Menu

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5-4   Preset Menu

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

Preset Preset Save Setup Recall Setup	**Preset:** This key resets the instrument to the default starting conditions. **Save Setup:** 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. The saved setup can be named using the touch screen keyboard. Use the Caps key to select an upper case letter. Use the **Left/Right** directional arrows to move the cursor position. Press **Enter** to save the setup. Note: Set the File type as Setup. See "Save Menu" on page 4-8 for details. **Recall Setup:** This key allows the selection and recall of a previously stored instrument setup using the "Recall Menu" on page 4-11. Use the rotary knob, the **Up/Down** arrow keys, or the touchscreen to highlight the saved setup, and press **Enter**. All current instrument settings are replaced by the stored setup information.

Figure 5-8.   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, contact your Anritsu Service Center at http://www.anritsu.com/contact-us.

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.

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5-6   Updating the Spectrum Master Firmware

The Spectrum Master is updated using a USB memory stick. Updated product information can be found on the Anritsu website:

http://www.anritsu.com/

Search for the product model number. The firmware updates are on the product page under the Library tab in the "Drivers, Software Downloads" section.

Note	The "Release History" link provides a summary of the firmware changes.

1. Click on the "Firmware Update for the Spectrum Master MS2711E" link.

2. Click the "Download" button and then "Run". After the download is complete, press "Run" again and follow the onscreen instructions. Press "Help (?)" for additional information.

3. After the firmware update is saved on the USB memory stick, eject the memory stick from the computer.

4. Turn the Spectrum Master off and insert the USB memory stick into the Spectrum Master.

5. Connect the AC adapter and turn the Spectrum Master On.

6. The instrument should update automatically. Follow the instrument prompts.

7. If the automatic update did not start, complete the following steps:

   a. On the instrument, press the **Shift** key and then the **System** (8) key.

   b. Press the following key sequence: System Options > Reset > Update Firmware. The Load Firmware menu opens.

   c. Press the **Load Firmware** main menu key (located at the bottom-left corner of the instrument screen).

   d. Press the Update Application Firmware submenu key.

   e. From the choices presented, select the desired "Save" mode.

   f. Press the **Enter** key to begin the firmware update.

   g. Press the **Enter** key one more time to confirm that you want to upgrade the instrument firmware.

8. After the update is compete, the Spectrum Master will restart.

Note	Do not turn off the instrument during the firmware update to avoid potential permanent damage to the instrument.

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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 25 ppb (parts per billion). No accuracy specifications apply if no GPS satellites are acquired.

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. An Anritsu GPS antenna is required.

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

6-2 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

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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 6-4 "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

6-3   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.

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6-4   GPS Menu

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

GPS menu
GPS
GPS
On   Off
GPS Info
GPS Voltage
3.3 V   5 V
Reset
Back ←

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. If the message persists, 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

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Chapter 7 — Anritsu Tool Box

7-1 Introduction

The Anritsu Tool Box is a suite of applications that provide an interface between Anritsu handheld RF instruments and a PC. The instrument connects to the computer via a USB, Ethernet, or serial port. Depending on the application selected, available functions include the capture, transfer, and reporting of measurement data for trace analysis and RF interference analysis.

The Tool Box may be installed from the Anritsu software DVD or you can download individual applications from the Anritsu website at www.anritsu.com/en-US/Services-Support/Handheld-Tools-Tool-Box.aspx

This chapter gives an overview of the software installation DVD and the main features of each application in the Anritsu Tool Box.

7-2 Software Installation DVD

Place the software disc in the DVD drive on your PC and follow the on-screen instructions. The Setup Wizard welcome screen illustrated in Figure 7-1 may change with the software version.

You will be asked to select which applications you wish to install. Not all instrument models are supported by every software tool. Visit the web page referenced in the *Introduction* section above and follow the links for more information on a specific tool.

Figure 7-1. Anritsu Tool Box Setup Wizard

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If the installer does not autostart, open the DVD in Windows Explorer and double-click the executable setup file. See Figure 7-2.
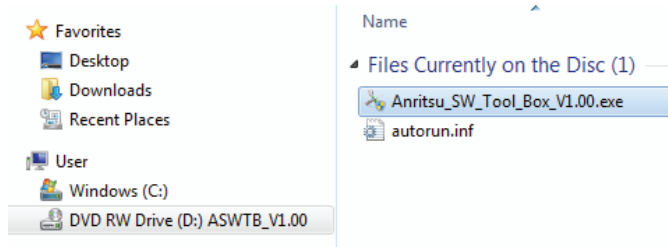
Figure 7-2.   Tool Box Installer on the Anritsu Software DVD

7-3   Anritsu Software Tool Box

The Anritsu Tool Box serves as a central location from which you can open a previously saved measurement, visit the Anritsu website, or launch an application. To open the Tool Box, either double-click the desktop shortcut or select the Tool Box from the Windows Start menu, under All Programs and the Anritsu folder. On the Tool Box screen, hover the mouse pointer over any of the application icons to view a short description of the application. See Figure 7-3.

Figure 7-3.   Anritsu Tool Box Screen

7-4   Software Tools

The Anritsu Tool Box provides links to the software tools installed on your PC. Alternatively, you can launch an application using its desktop shortcut or through the Windows Start menu.

The following sections list the top features and functions of the tools contained in the Anritsu Tool Box that are compatible with the Spectrum Master MS2711E. For a detailed description of these features and how to perform specific tasks, refer to each application's Help system. The program Help also lists the instrument models, measurement modes, trace types, and file types that are compatible with that application.

Line Sweep Tools (LST)

Line Sweep Tools is post-capture trace processing software designed for users who need to analyze and generate reports on large numbers of cable, antenna, and PIM traces. Software features include:

- Measurement plot data capture and transfer from the instrument to a PC
- Marker and limit line presets
- Return Loss, Distance-to-Fault, PIM analysis
- LMR Master and VNA Master Field Mode compatibility
- Plot overlay for comparison of up to ten traces of the same measurement type
- Plot area zooming
- A naming grid for renaming files, titles, and subtitles
- Automated report generation
- Output to printer or to PDF or HTML format
- Export of plot data to text, image, or VNA files

Master Software Tools (MST)

Master Software Tools is designed for users of Anritsu handheld spectrum analyzers, interference analysis tools, transmission testers, and backhaul testers. Supported functions include the following:

- Transfer of captured measurement data to and from a PC for storage and analysis
- RF Spectrum Analyzer traces
- RF Interference analysis
- Spectrum monitoring
- Transmitter signal quality tests
- T1, T3, and E1 backhaul tests
- Trace overlay features for comparing multiple Spectrum Analyzer measurements
- Limit lines and markers
- Script Master for the creation of automated test procedures
- Export of measurement data as text, graphic, or Comma Separated Value format (CSV) files
- Reports created in HTML format for use in other applications

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

Spectrum Master Feature (Required Option)	Related Document (Part Number)
All Spectrum Master Instruments	Important Product Information, Compliance and Safety Notices (10100-00065)
Spectrum Analyzer Preamplifier (Option 8) Interference Analyzer (Option 25) Channel Scanner (Option 27) EMF Measurements (Option 444) AM/FM/PM Analyzer (Option 509)	Spectrum Analyzer Measurement Guide (10580-00244)
High-Accuracy Power Meter (0019) Power Meter (Option 29)	Power Meter Measurement Guide (10580-00240)
Performance Specifications	Spectrum Master Technical Data Sheet (11410-00597)
Tracking Generator (Option 20)	E-Series Tracking Generator Measurement Guide (10580-00339)
SCPI Programming Instruction	Spectrum Master Programming Manual (10580-00256)
Maintenance Manual	Spectrum Master Maintenance Manual (10580-00254)
Documentation	Handheld Instruments Documentation Disc (10920-00060)

A complete suite of computer software applications are available for download:

http://www.anritsu.com/en-US/Services-Support/Handheld-Tools-Tool-Box.aspx

PN: 10580-00328 Rev. H

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