User Guide

**Anritsu**

# BTS Master

MT8222A

The High Performance Handheld Base Station Analyzer

**User Guide**

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# MT8222A

**The High Performance Handheld Base Station Analyzer**

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

**/Anritsu**

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

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

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# UPDATES

Updates, if any, can be downloaded from the Documents area of the Anritsu web site at:
http://www.us.anritsu.com

# 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:** BTS Master

**Model Number:** MT8222A

conforms to the requirement of:

EMC Directive 89/336/EEC as amended by Council Directive 92/31/EEC & 93/68/EEC
Low Voltage Directive 73/23/EEC as amended by Council directive 93/68/EEC

## Electromagnetic Interference: EN61326-1:1997 A1:1998 A2:2001 A3:2003

Emissions:                EN55011:1998 A1:1999 A2:2002 Group 1 Class A

Immunity:                 EN 61000-4-2:1995 A1:1998 A2:2001 - 4kV CD, 8kV AD
                          EN 61000-4-3:2002 A1:2002 - 3V/m
                          EN 61000-4-4:2004 - 0.5kV SL, 1kV PL
                          EN 61000-4-5:1995 A1:2001 - 1kV L-L, 2kV L-E
                          EN 61000-4-6:1996 A1:2001 - 3V
                          EN 61000-4-11:1994 A1:2001 - 1 cycle @ 100%

## Electrical Safety Requirement:

Product Safety:           The Product Complies when used with Company supplied Power Supply
                          (tested to IEC 60950-1:2001)

_____
Eric McLean, Corporate Quality Director

Morgan Hill, CA                          _17 APRIL 2006_
                                                Date

产品中有毒有害物质或元素的名称及含量

| 部件名称 | 有毒有害物质或元素 | | | | | |
|---|---|---|---|---|---|---|
| | 铅<br>(Pb) | 汞<br>(Hg) | 镉<br>(Cd) | 六价铬<br>[Cr(VI)] | 多溴联苯<br>(PBB) | 多溴二苯醚<br>(PBDE) |
| 印刷线路板<br>(PCA) | ✕ | ○ | ✕ | ✕ | ○ | ○ |
| 机壳、支架<br>(Chassis) | ✕ | ○ | ✕ | ✕ | ○ | ○ |
| LCD | ✕ | ✕ | ✕ | ✕ | ○ | ○ |
| 其他（电缆、风扇、<br>连接器等）<br>(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<br>定的限量要求以下。<br>✕：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<br>标准规定的限量要求。 | | | | | | |

## 环保使用期限

**40**　这个标记是根据 2006/2/28 公布的「电子信息产品污染控制管理办法」以及 SJ/T 11364-2006「电子信息产品污染控制标识要求」的规定，适用于在中国销售的电子信息产品的环保使用期限。仅限于在遵守该产品的安全规范及使用注意事项的基础上，从生产日起算的该年限内，不会因产品所含有害物质的泄漏或突发性变异，而对环境污染，人身及财产产生深刻地影响。

注）电池的环保使用期限是 5 年。生产日期标于产品序号的前四码
　　（如 S/N 0728XXXX 为07 年第28 周生产）。

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

For Products placed on the EU market after August 13, 2005, please contact your local Anritsu representative at the end of the product's useful life to arrange disposal in accordance with your initial contract and the local law.

## CE Conformity Marking

Anritsu affixes the CE Conformity marking onto its conforming products in accordance with Council Directives of The Council Of The European Communities in order to indicate that these products conform to the EMC and LVD directive of the European Union (EU).

$$C \epsilon$$

## C-tick Conformity Marking

Anritsu affixes the C-tick marking onto its conforming products in accordance with the electromagnetic compliance regulations of Australia and New Zealand in order to indicate that these products conform to the EMC regulations of Australia and New Zealand.

**CN274**

## Notes On Export Management

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.

## Mercury Notification

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) for disposal or recycling information.

VxWorks Runtime
License 2000-1189

WindML Target License
2000-1372
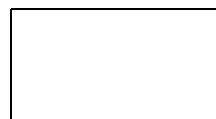
NI Device License
2000-1486

WindRiver USB Runtime License
2000-1421

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.

# TSymbols 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**

**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.

| **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** **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

# Table of Contents (Continued)

# Table of Contents (Continued)

# Table of Contents (Continued)

## Index

# Chapter 1 — General Information

## 1-1 Introduction

This chapter provides a description of the BTS Master model MT8222A. It also reviews preventive maintenance, calibration requirements, ESD cautions, and additional documents. General and performance specifications, instrument options, standard accessories, and optional accessories are in the BTS Master MT8222A Technical Data Sheet (PN: 11410-00433). Refer to  Appendix A, "Measurement Guides", for additional information. Throughout this manual, this instrument may be referred to as the BTS Master or the MT8222A.

## 1-2 Additional Documents

This user guide is specific to the BTS Master MT8222A. Additional instrument functions and descriptions of optional measurement capabilities are described in measurement guides. Refer to Appendix A, "Measurement Guides" for a list of these guides and their Anritsu part numbers.

## 1-3 Description

The MT8222A BTS Master is an integrated multi-functional base station test tool that eliminates the need to carry and to learn to use multiple test sets. The MT8222A measurement capabilities include: spectrum analyzer smart measurements, precision return loss, VSWR, cable loss, distance-to-fault, two port gain/loss, one-port and two-port magnitude and phase, interference analysis, spectrogram, and power meter.

RF, advanced demodulation, and over-the-air (OTA) measurements can be applied to WCDMA/HSDPA, GSM/GPRS/EDGE, Fixed WiMAX, Mobile WiMAX, CDMA and EVDO, DVB-T/H, TD-SCDMA, and LTE.

Additional capabilities include a Vector Signal Generator (VSG), GPS location information, enhanced frequency reference oscillator accuracy, T1 measurements (including Vpp), E1 - 2 Mb/s measurements, T3 measurements, and listening to DS0/VF channels.

The BTS Master base model has cable and antenna analysis, spectrum analysis from 100 kHz to 7.1 GHz, and an internal power meter. The cable and antenna analysis is performed by a Vector Network Analyzer that is designed to make accurate vector-corrected 1-port and 1-path, 2-port magnitude and phase measurements from 10 MHz to 4 GHz, and 6 GHz is optional.

The MT8222A BTS Master is also a synthesizer-based spectrum analyzer that provides quick and accurate measurement results. Measurements can be easily made by using the main instrument functions:  frequency, span, amplitude, and bandwidth. Dedicated keys for one-button measurements of field strength, channel power, occupied bandwidth, Adjacent Channel Power Ratio (ACPR), and Carrier to Interference Ratio (C/I) make the handheld MT8222A the ideal choice for the field. A familiar calculator-type keypad allows for fast data entry.

In transmitter analyzer mode, the MT8222A BTS Master displays 6 markers and the marker table in Code Domain Power and Codogram displays. In Spectrum Analyzer mode, a full range of marker capabilities (such as peak, center, and delta functions) are provided for faster, more comprehensive analysis of displayed signals. Upper and lower multi-segmented limit lines are available to create quick, simple pass/fail measurements. A menu option provides for an audible alert when a limit value is exceeded. A vertical line marker is available with the histogram displays of BERT measurements in the T1/T3 Analyzer. Markers are not available in GSM mode.

Time and date stamping of measurement data is automatic. The internal memory provides for storage and recall of traces and measurement setups. The bright daylight-viewable, high-resolution, color liquid crystal display (LCD) provides easy viewing in a variety of lighting conditions. The BTS Master is capable of approximately 3 hours of continuous operation from a fully charged battery and can be operated from a 12 VDC source, which also simultaneously charges the battery.

Anritsu Master Software Tools (MST), a PC-based software program, provides a convenient means for storing measurement data. Master Software Tools can also convert measurements from the BTS Master display into several graphic formats. Master Software Tools supports all of the options that are provided with the BTS Master.

Measurements may be stored in internal memory, in a CompactFlash module, or in a USB Flash drive. Stored measurements can be downloaded to a PC by using the included USB and Ethernet cables. After being stored, a graphic trace can then be displayed, scaled, or enhanced in Master Software Tools with markers and limit lines. Historical graphs can be overlaid with current data by using the PC mouse in a drag-and-drop fashion. The underlying data can be extracted and used in spreadsheets or for other analytical tasks.

| 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. |
|---|---|

# 1-4 Preventive Maintenance

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

| Caution | To avoid damage to 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 N(f) connectors and the pins of N(m) connectors should be unbroken and uniform in appearance. If you are unsure whether the connectors are good, gauge the connectors to confirm that their dimensions are correct.

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

# 1-5    Calibration Requirements

The BTS Master loads factory calibration data during start-up, eliminating the need for daily calibration checks. In WCDMA modes, an additional automatic calibration is performed as the internal temperature of the BTS Master changes (to insure the best possible measurement results).

Although the BTS Master does not require daily field calibration, Anritsu Company recommends annual calibration and performance verification by local Anritsu service centers. The Cable and Antenna Analyzer requires calibration standards for OPEN, SHORT, and LOAD, which are sold separately. The Cable and Antenna Analyzer Measurement Guide is available on the documentation disc and the Anritsu web site. Refer to Appendix A, "Measurement Guides",  for a list of measurement guides and their Anritsu part numbers.

| | |
|---|---|
| **Note** | Anritsu recommends allowing the instrument to warm up to typical operation temperature (~15 minutes) before calibrating. |

# 1-6    ESD Cautions

The MT8222A, like other high performance instruments, is susceptible to ESD (electrostatic discharge) damage. Coaxial cables and antennas often build up a static charge, which (if allowed to discharge by connecting directly to the MT8222A without discharging the static charge) may damage the MT8222A input circuitry. MT8222A 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 MT8222A, Anritsu Company recommends that any static charges that may be present be dissipated before connecting coaxial cables or antennas to the MT8222A. This may be as simple as temporarily attaching a short or load device to the cable or antenna prior to attaching to the MT8222A. Remember that the operator may also carry a static charge that can cause damage. Following the practices outlined in the above standards ensures a safe environment for both personnel and equipment.

# 1-7    Anritsu Reference Documents

The following URL is an Internet link to the BTS Master product page.

BTS Master product page link: http://www.us.anritsu.com/BTSMaster

A table at the bottom of the web page presents Internet links to related literature and software. Examples include the following types of documents:

- Application Notes
- Brochures
- Data Sheets
- Instruction Sheets
- Technical Notes
- White Papers
- Master Software Tools

# 1-8    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). Slide the battery door down, towards the bottom of the instrument, to remove it. Remove the battery pack from the instrument by pulling straight out on the battery lanyard. Replacement is the opposite of removal.



Battery Compartment Door

**Figure 1-1.**    Battery Compartment Door

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

The battery that is supplied with the BTS Master may need charging before use. The battery can be charged while it is installed in the BTS Master by using either the AC-DC Adapter (40-168-R) or the 12-Volt DC adapter (806-141-R), or separately in the optional Dual Battery Charger (2000-1374). Refer to section for a description of battery symbols.

| **Caution** | When using the Automotive Cigarette Lighter 12 VDC 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. |
|---|---|

# 1-9   Soft Carrying Case

The instrument 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 BTS Master.

**2.** Place the soft carrying case face down on a stable surface, with the front panel fully closed and laying flat.

**3.** Fully open the zippered back of the case.

| **Note** | Two zippers provide access around the back of the case. The zipper closer to the front of the case opens the case back, and allows access to install and remove the unit. The zipper closer to the back of the case opens a 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. |
|---|---|

**4.** Insert the instrument face down into the case, taking 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 BTS Master.



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

**5.** Close the back panel and secure with the zipper.

The soft carrying case includes a detachable shoulder strap, which can be connected to the D-rings on the upper corners of the case as required for comfort or convenience.

## 1-10 Tilt Bail Stand

The attached Tilt Bail can be used for desktop operation. The tilt bail provides a backward tilt for improved stability and air flow. 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 and snap the bail into the clip on the back of the instrument.



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



**Figure 1-4.** Tilt Bail Extended

# 1-11   Secure Environment Workplace

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

## BTS 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.

### CompactFlash Card

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 CompactFlash memory for storage or data transfer. The external Flash USB can be reformatted using the BTS Master or sanitized using software on a PC.

Refer to the Chapter 4, "File Management" for additional information on saving and copying files to the CompactFlash memory.

### External USB Flash Drive

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

The BTS Master does not currently provide a secure erase feature. In environments where data security is an issue, it is recommended that users store their BTS Master created files on the CompactFlash memory or an external USB Flash drive that is then securely retained, sanitized, or destroyed after use.

To set the BTS Master to save files to the CompactFlash memory:

**1.** Insert the CompactFlash cart and turn the instrument on.

**2.** Press the **Shift** button then the **File** (7) button.

**3.** Press the Directory Management submenu key.

**4.** Confirm that CF is underlined in the Current Location key.

The CompactFlash card is now the default location for saving files.

To set the BTS Master to save files to an 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 Directory Management submenu key.

**4.** Confirm that USB is underlined in the Current Location 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 MT8222A BTS Master. The intent of this chapter is to acquaint you with the instrument. To begin using the instrument immediately, go to Chapter 3, "Basic Measurement Setups", to find directions for power on, editing, frequency, bandwidth, amplitude, limit line, marker, file management procedures, and firmware update. For more detailed information on measurement setups, refer to the specific measurement guides, which are based on the options that can be purchased for this instrument. The measurement guides and a copy of this user guide are available as PDF files on the documentation disc. Refer to Appendix A, "Measurement Guides".

## 2-2    Hardware Overview

### Turning On the MT8222A for the First Time

The Anritsu MT8222A BTS Master is capable of approximately 3 hours of continuous operation from a fully charged, field-replaceable battery (refer to Section "Battery Replacement" on page 1-4 of Chapter 1). The MT8222A 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 12 VDC Automotive Cigarette Lighter Adapter (Anritsu part number 806-141-R). Both items are included as standard accessories.

| **Caution** | When using the Automotive Cigarette Lighter 12 VDC 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. |
| --- | --- |

To turn on the MT8222A, press the **On/Off** button on the front panel (Figure 2-1).
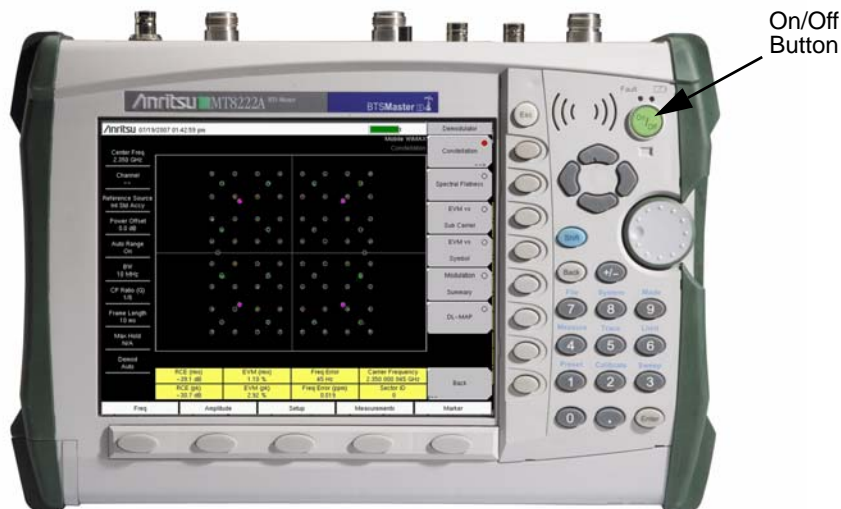


**Figure 2-1.**    MT8222A On/Off Button

The MT8222A BTS Master takes approximately sixty seconds to complete power-up and to load the application software. At the completion of this process, the instrument is ready to be used.

# 2-3   Front Panel Overview

The BTS Master menu-driven interface is easy to use and requires little training. Hard keys on the front panel are used to initiate function-specific menus. Five main menu keys are located below the display. These keys vary in function depending upon the selected mode of instrument operation.

A rotary knob and 21 hard keys are located to the right of the measurement display. Nine of the hard keys are dual purpose, depending upon the current mode of operation. The dual-purpose keys are labeled with a number on the key itself. The alternate function is printed on the panel above each of these nine keys. Use the shift key to access the functions that are printed on the panel. The **Escape** key (which is used for aborting data entry) is the round button located above the submenu keys. The rotary knob, the four arrow keys, and the keypad can be used to change the value of an active parameter. The rotary knob can also be pressed to duplicate the action of the **Enter** key.

Arranged in a vertical column on the instrument case and along the right edge of the measurement display are 8 submenu keys. They change function depending upon the current menu selection. The current submenu key function is indicated in the active function block (submenu key labels) on the right edge and within the measurement display. An example of the keys is shown in Figure 2-2.
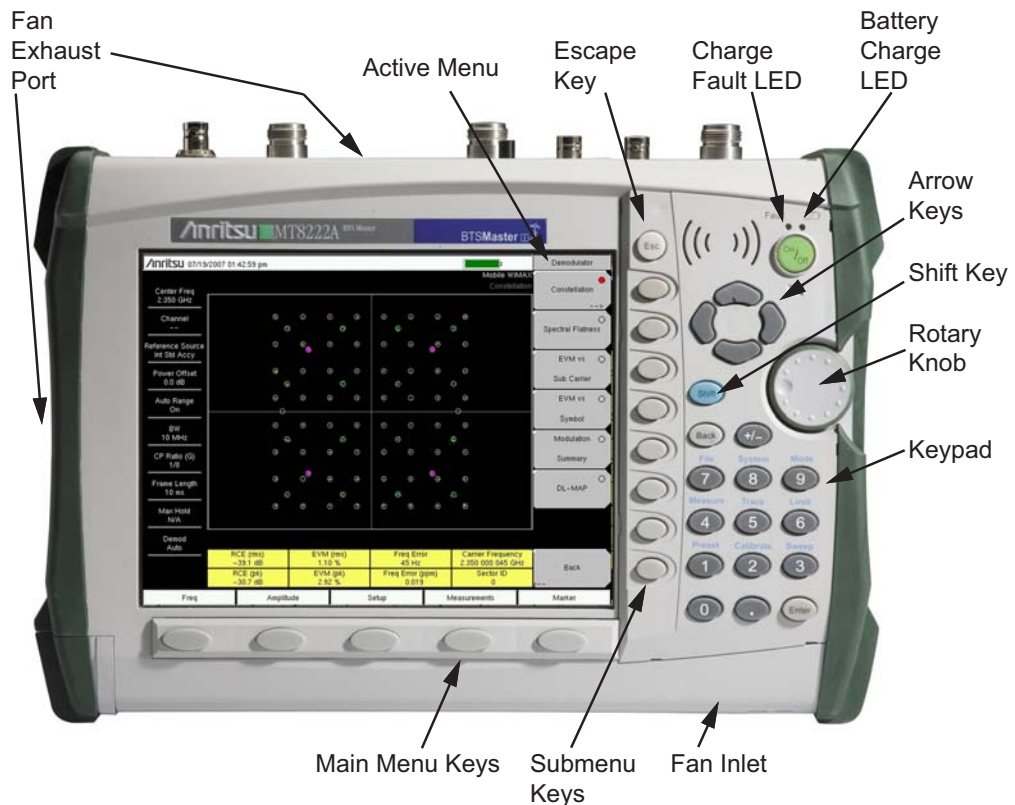


**Figure 2-2.**   Front Panel Overview

Other features on the front panel include:

### Battery Charge LED (Green)

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

### Charge Fault LED (Red)

The Charge Fault LED remains on steady under a battery charger fault condition. Fault conditions include a battery cell voltage that is too low to charge or a battery temperature that is outside the temperature range (−5 °C to +50 °C) for charging.

### Fan Inlet and Exhaust Ports

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

## 2-4    Front Panel Keys

The term hard key refers to all of the buttons on the instrument face except for the vertical row of 8 gray buttons adjacent to the right edge of the measurement display screen (the 8 submenu keys) and the horizontal row of 5 gray buttons below the measurement display screen (the 5 main menu keys).

The hard keys perform as follows:

### Esc Key

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

### Enter Key

Press this key to finalize data input. Pressing the rotary knob performs this same function.

### Arrow Keys

The four arrow keys (between the rotary knob and the **Esc** key) are used to scroll up, down, left, or right. The arrow keys can often be used (depending upon measurement selection) to change a value or to change a selection from a list. This function is similar to the function of the rotary knob. In some measurements, the **Left/Right** arrow keys change values by different increments than the **Up/Down** arrow keys or the rotary knob. The arrow keys are also used to move markers.

### Shift Key

Press the **Shift** key and then press a number key to open the menu 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 between the battery charge indicator and the submenu label.
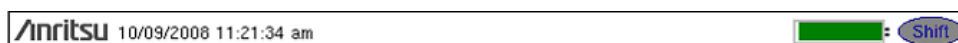


**Figure 2-3.**   Shift Key Icon

The **Shift** key is also used for UPPERCASE letters when entering text (refer to "Text Entry" on page 2-11.

**Back Key**

Press this key to delete only one character, one number, or the range that is specified by the cursor.

**+/– Key**

Press this key to change the sign of numbers that are entered with the number keys.

**Number Keypad**

Press these keys to directly input numbers. Number keys 1 through 9 are also used to open menus. Refer to the functions of the "Shift Key".

**Rotary Knob**

Turn the rotary knob to change numerical values, to scroll through selectable items within a list, and to move markers. Values or items may be within a dialog box or an edit window.

Press the rotary knob to finalize the input function in the same manner as pressing the **Enter** key.

## Main Menu Keys

The 5 main menu keys are horizontally arranged adjacent to the measurement display screen and along its lower edge. These keys (buttons) have no printed labels. They are positioned to accompany virtual key labels that are displayed in the measurement display area. These main menu key labels change to match specific instrument Mode settings. Each Mode has a specific set of main menu keys. For details about the main menu keys, refer to the section "Firmware Overview" on page 2-18. For details about the Mode settings, refer to section "Mode Selector Menu" on page 2-6.

## Submenu Keys

These 8 gray keys (buttons) have no printed labels. They are arranged adjacent to the measurement display screen along the right-hand edge. They are positioned to accompany virtual submenu key labels that are displayed to match instrument modes and measurement functions. The virtual key labels change as instrument measurement settings change.

## 2-5      Mode Selector Menu

To access the functions under the Mode menu, press the **Shift** key, then the **Mode** (9) key. Use the directional arrow keys or the rotary knob to highlight the selection, and press the **Enter** key to select. The list of modes that appears in this menu will vary depending upon the options that are installed and activated in your instrument. Figure 2-4 is an example of the Mode menu. Your instrument may not show the same list.
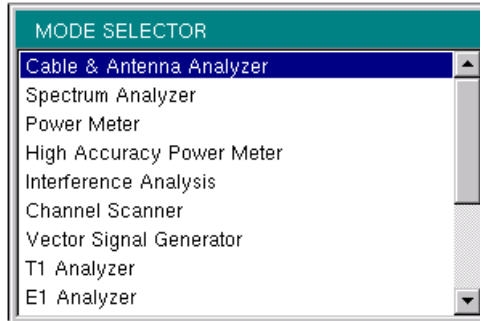


**Figure 2-4.**    Mode Selector Menu

# 2-6    Secondary Function Menus

Pressing the **Shift** key and then a number key selects the menu function that is printed in blue characters above the number key.
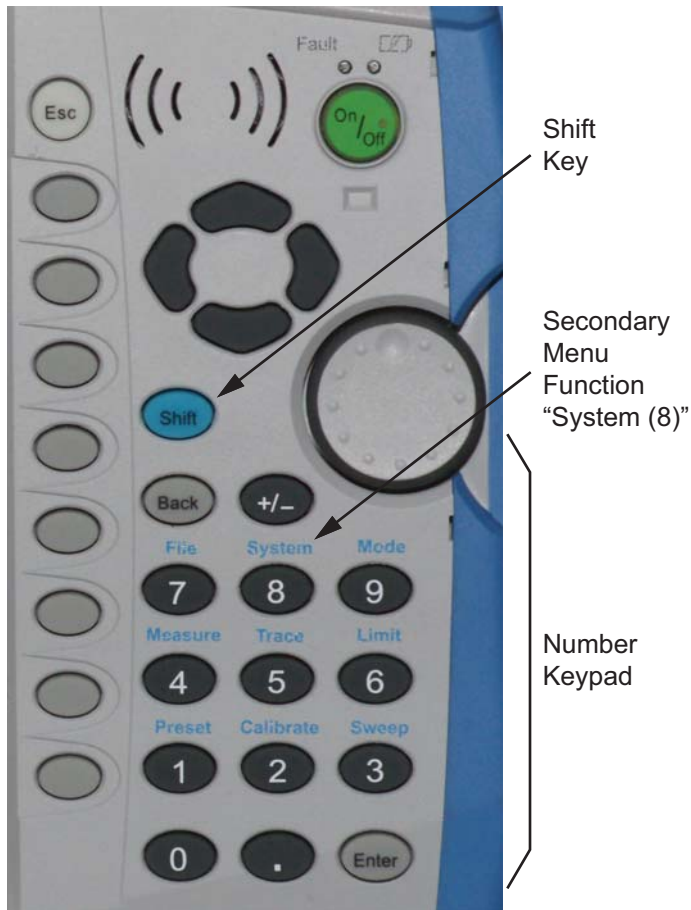


**Figure 2-5.**    Keypad and Secondary Function Menus

Not all Secondary Function Menus are active in various operation Modes. If any one of these 9 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 Secondary Function Menus are:  Preset (1), Calibrate (2), Sweep (3), Measure (4), Trace (5), Limit (6), File (7), System (8), and Mode (9).

# 2-7    Display Overview

Typical measurement displays are shown for the basic operating modes of the MT8222A, including Cable and Antenna Analyzer mode, Spectrum Analyzer mode, and one of the many measurement options (WCDMA/HSDPA analyzer display shown in Figure 2-8). Note that the images shown in this manual may be different from any images that are displayed on your BTS Master.

## Cable and Antenna Analyzer Mode

Figure 2-6 illustrates some of the key information areas of the MT8222A display in Cable and Antenna Analyzer mode. For more detailed key descriptions of the Cable and Antenna Analyzer mode, refer to the Cable and Antenna Analyzer Measurement Guide (Anritsu part number 10580-00230, available on the documentation disc). Also refer to Appendix A, "Measurement Guides", for a complete list of measurement guides.
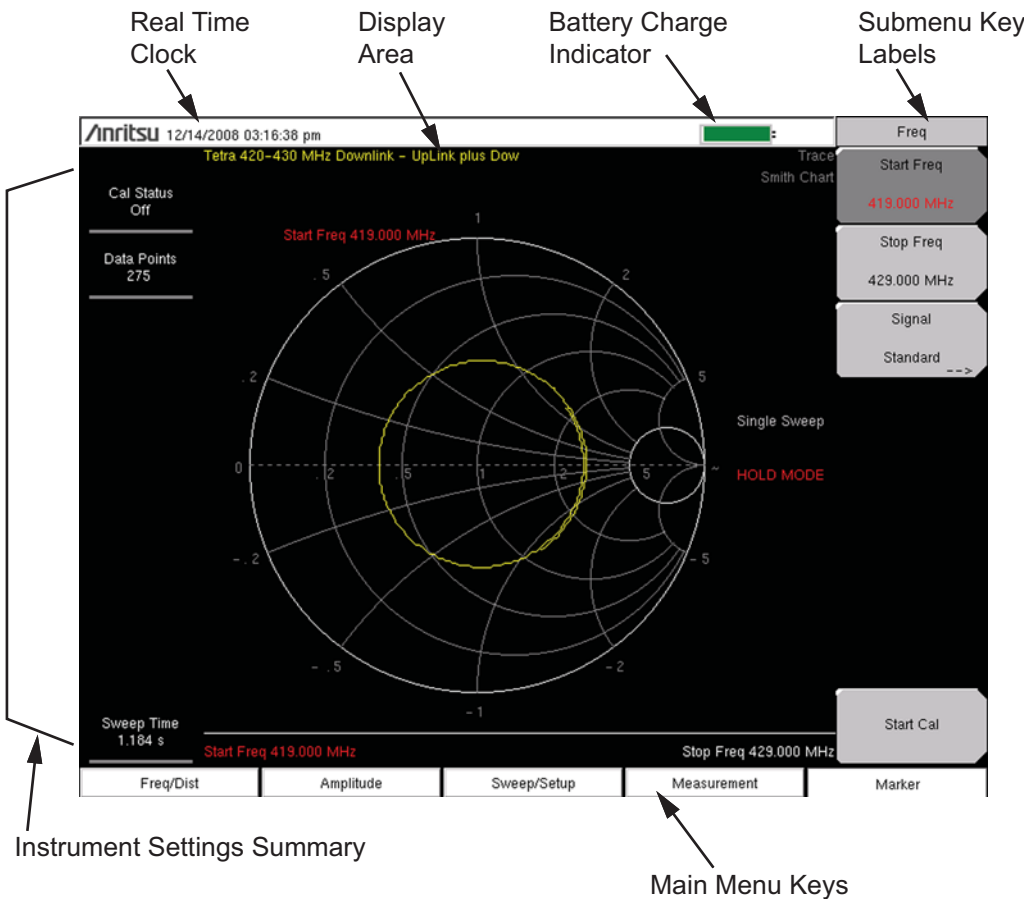


**Figure 2-6.**    Cable and Antenna Analyzer Smith Chart Display

Figure 2-7 illustrates some of the key information areas of the MT8222A display in Spectrum Analyzer mode. For more detailed key descriptions of the Spectrum Analyzer mode, refer to the Spectrum Analyzer Measurement Guide, available on the documentation disc). Also refer to Appendix A, "Measurement Guides", for a complete list of measurement guides.
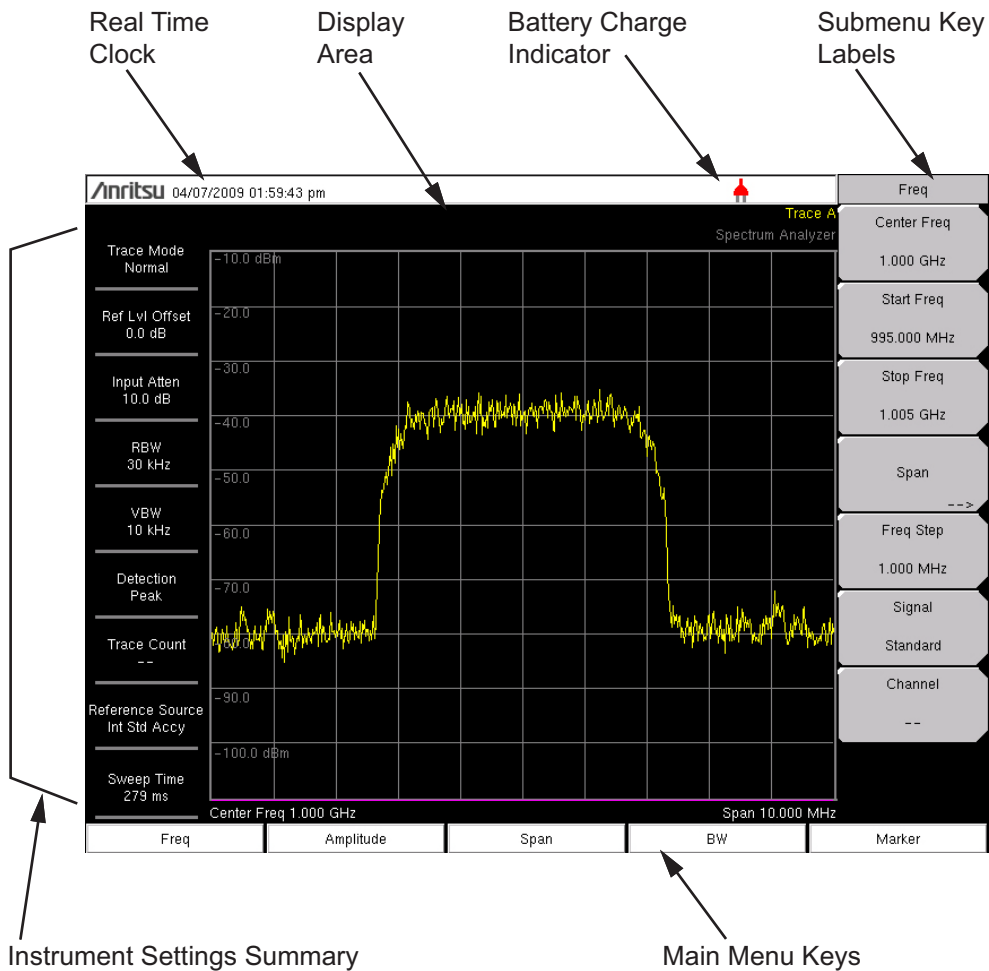


**Figure 2-7.** Spectrum Analyzer Display

Figure 2-8 illustrates some of the information areas that are unique to the MT8222A WCMDA/HSDPA Signal Analyzer CDP display. For detailed WCDMA/HSDPA information, refer to the 3GPP Measurement Guide (Anritsu part number 10580-00234, available on the documentation disc and the Anritsu web site. Also refer to Appendix A, "Measurement Guides", for a complete list of measurement guides.
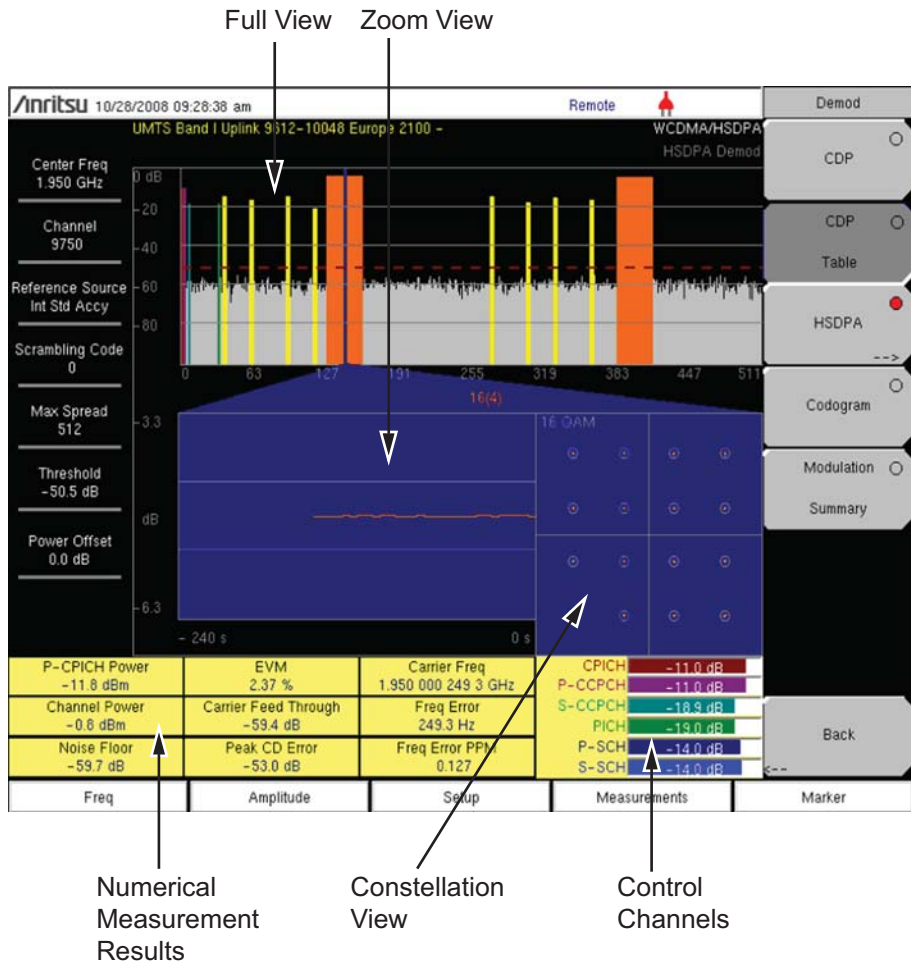


**Figure 2-8.**    WCDMA/HSDPA Signal Analyzer CDP Display Overview

# 2-8 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 or the rotary knob. Select numerical values by scrolling with the arrow keys or rotary knob or by entering the digits directly from the number keypad. These list boxes and edit boxes frequently display a range of possible values or limits for possible values.

Finalize the input by pressing the rotary knob or 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 through the use of Master Software Tools.

# 2-9 Text Entry

When entering text (as when saving a measurement) the submenu key for Text Entry displays the characters (alphabet, hyphen, and underscore) in 6 letters per key (Refer to Figure 2-11). Characters can be entered by using the rotary knob or by using the submenu keys. Refer to Figure 2-9, Figure 2-10 and Figure 2-11.

The rotary knob scrolls through the characters in a pop-up window and is pressed to select each character in sequence.

Alternatively, press the a b c / d e f submenu key (for example) to open another submenu with a separate key for each of these letters. The menu returns to the complete character set after each individual letter is entered.

Use the arrow keys to navigate within a name or character string. Use the **Shift** key for capital letters. Press the **Enter** key or the rotary knob to finalize a text entry.

Lowercase Text Entry
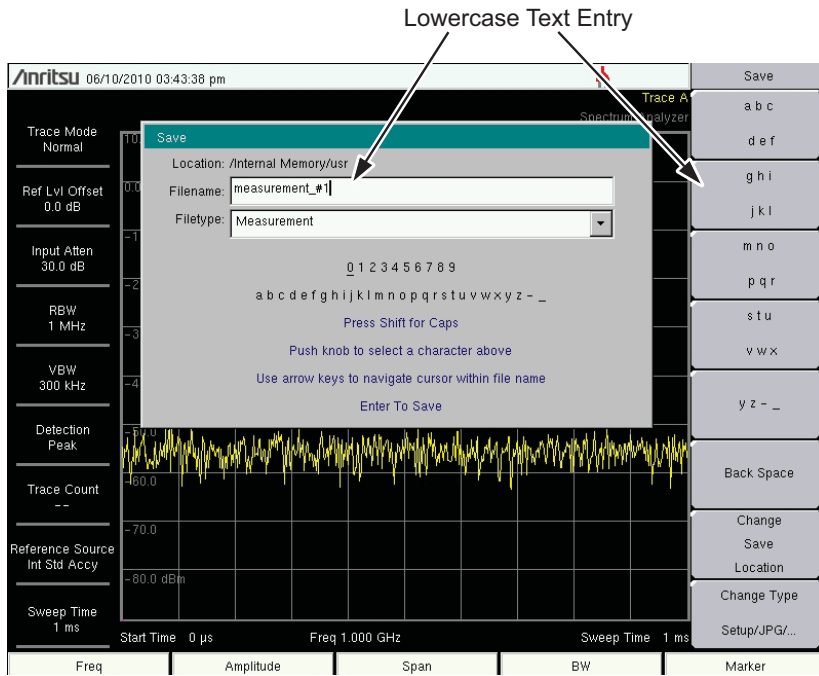


**Figure 2-9.**    Text Entry Menu – Lower Case

Uppercase Text Entry



**Figure 2-10.**  Text Entry Menu – Upper Case

**Figure 2-11.** Text Entry Menu – Selecting Characters

## 2-10   Test Panel Connectors

The test panel connectors are shown in Figure 2-12 and Figure 2-13 and are described in the following text.
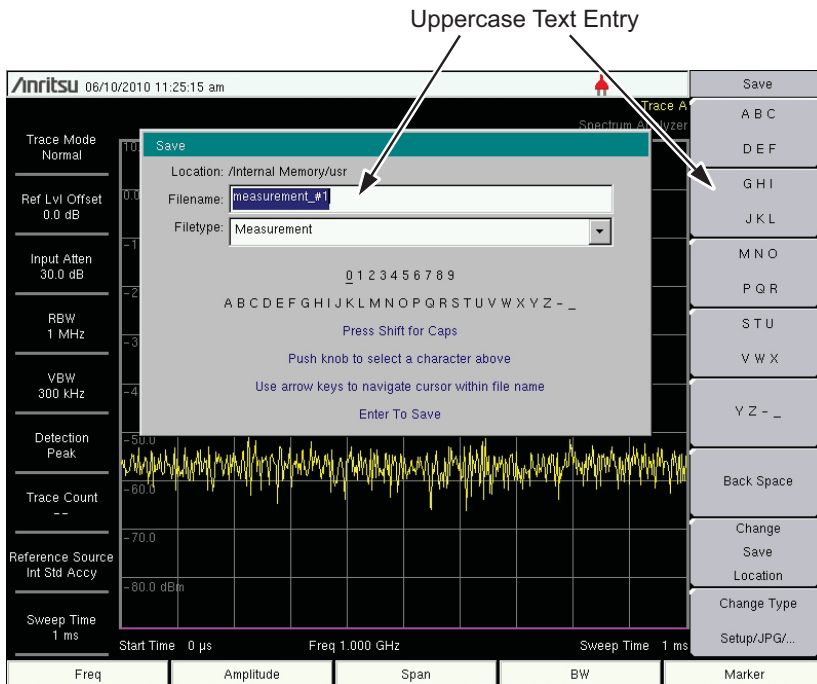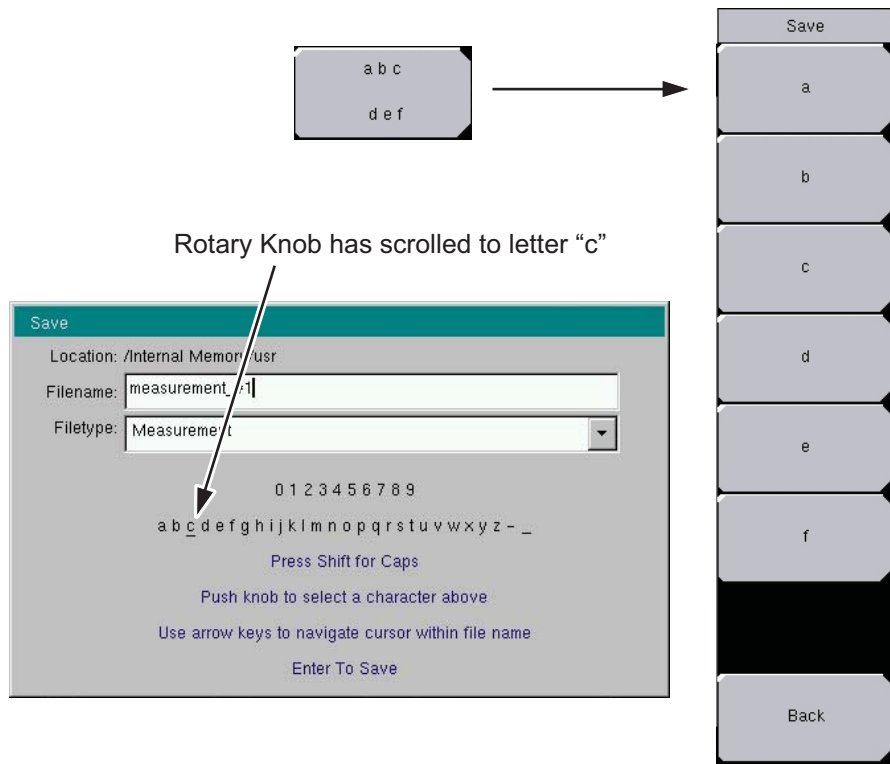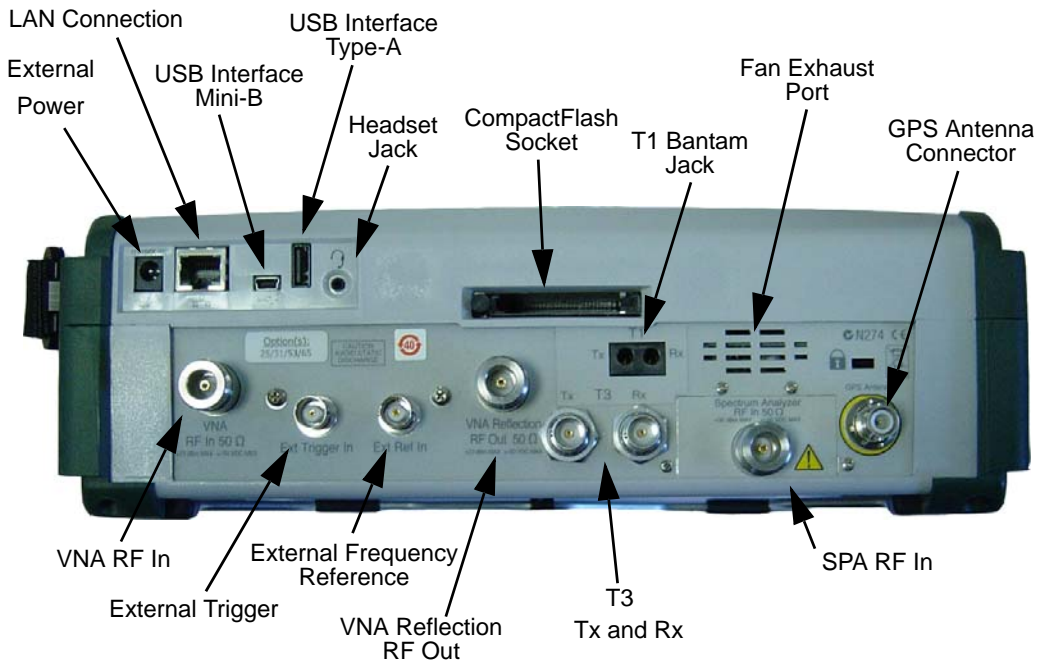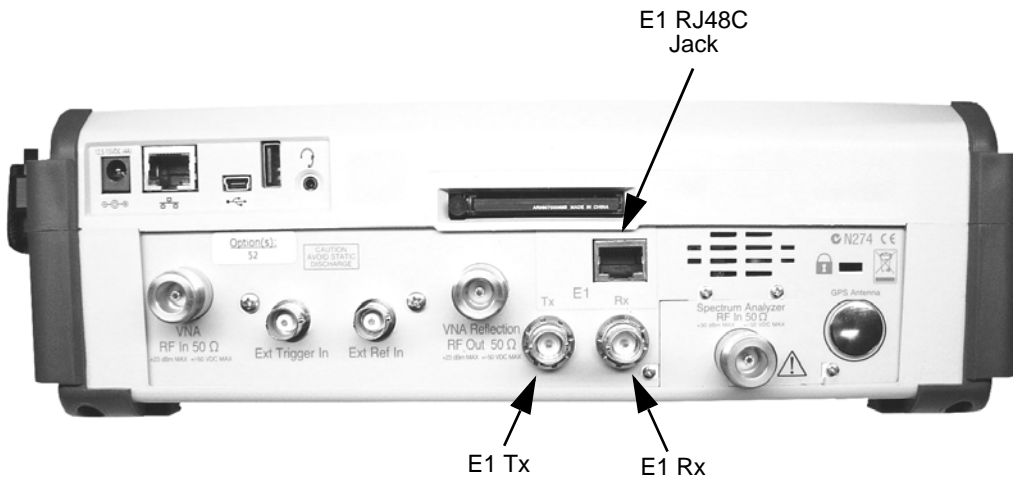


**Figure 2-12.**   Test Panel Connectors, including T1 and T3



**Figure 2-13.**   Test Panel Connectors, Including E1

### 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. A green flashing indicator light near the power switch shows that the instrument battery is being charged by the external charging unit. The indicator is steadily illuminated when the battery is fully charged.

| | |
|---|---|
| **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

The RJ-45 connector is used to connect the BTS Master to a local area network. 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 Appendix C, "LAN and DHCP".

### USB Interface – Type Mini-B

The USB 2.0 interface can be used to connect the MT8222A BTS Master directly to a PC. The first time the MT8222A is connected to a PC, the normal USB device detection by the computer operating system will take place. The CD-ROM that 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.

| | |
|---|---|
| **Note** | For proper detection, Master Software Tools should be installed on the PC prior to connecting the BTS Master to the USB port. |

### USB Interface – Type A

The MT8222A BTS Master can also be a USB Host and allow various USB Flash Memory devices to be connected to the instrument for storing measurements, setups, and files.

### 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. This port is also used for External Clock Recovery in T1/T3/E1 operations (described in the Backhaul Measurement Guide). Refer to Appendix A, "Measurement Guides" for reference to the Backhaul Measurement Guide, which can be found on the documentation disc and the Anritsu web site.

### Ext Freq Ref

BNC female connector for connection of an external frequency reference or external trigger.

### RF Detector

RF detector connector for Power Monitor measurements (Option 5). Refer to the Technical Data Sheet for available RF Detectors.

### Spectrum Analyzer RF In

50 Ω Type-N female connector.

### VNA Reflection/RF Out

RF output, 50 Ω impedance, for reflection measurements. Maximum input is +23 dBm at ±50 Vdc.

### VNA RF In

50 Ω Type-N female connector.

### T1, T3 Bantam Jacks

BERT tester (Option 51 and Option 53) Bantam jacks for transmit and receive.

### GPS Antenna Connector

GPS antenna connection.

| | |
|---|---|
| **Note** | The GPS antenna connection on the BTS Master is fitted with a reverse BNC connector to help prevent damage to the GPS circuitry. There is a DC voltage present on this connector. Do not connect anything other than the Anritsu GPS antenna (part number 2000-1410) to this port. |

### CompactFlash Card

Accepts a 256 MB CompactFlash Memory Module, Anritsu Part Number 3-2000-1500 or other commercially available equivalent. The contents of the internal memory can be copied to and from a removable CompactFlash card. The flash card can be up to 512 MB.

# 2-11 Symbols and Indicators

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

**Cal Status On:**

The BTS Master has been calibrated with discrete Open, Short, and Load components.

**Cal Status Off:**

The BTS Master has not been calibrated.

**Battery Symbol:**

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 2-14.** 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)

When the battery is charging, either from the AC-DC Adapter (40-168-R) or the 12 Volt DC adapter (806-141-R), the symbol changes to that shown in Figure 2-15:



**Figure 2-15.** Battery Charging Status

The Battery Charge LED (refer to Figure 2-2 on page 2-3) 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.

The battery symbol is replaced by a red plug body to indicate that the instrument is running from external power and is not charging the battery (or to indicate that the battery is not present). When the external AC adaptor is connected, the battery automatically receives a charge, and the battery symbol with the lightning bolt is displayed (Figure 2-15). When the battery is not installed, the red plug body is displayed, as shown in Figure 2-16.



**Figure 2-16.** Battery Not Installed

**Hold**

The BTS Master is on hold. To resume sweeping, toggle from Hold to Run in the Sweep menu.

**Single Sweep**

Single Sweep is selected. Press Continuous sweep to resume sweeping.

# 2-12 Firmware Overview

## Main Menu Keys

The BTS Master menu-driven interface is easy to use and requires little training. The 5 Main Menu keys are located below the measurement display. These 5 keys are used to list function-specific menus in the active menu (submenu labels). These Main Menu keys vary in function based on the selected mode of operation (**Shift, Mode** (9)). Refer to "Mode Selector Menu" on page 2-6 for more information on changing the instrument mode. Table 2-1 lists the Main Menu Key labels for each mode of instrument operation.

**Table 2-1.** Mode-Dependent Main Menu Keys Located Below Measurement display

| Mode | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |
|------|-------|-------|-------|-------|-------|
| Cable & Antenna | Freq/Dist | Amplitude | Sweep/Setup | Measurements | Marker |
| Spectrum Analyzer | Freq | Amplitude | Span | BW | Marker |
| Interference Analysis | Freq | Amplitude | BW | Measurements | Marker |
| Channel Scanner | Scanner | Amplitude | Custom Scan | Measurements | |
| Vector Signal Generator | Freq | Amplitude | Setup | Modulation | RF On/Off |
| Power Meter | Freq | Amplitude | Average | | Limits |
| High Accuracy Power Meter | | Amplitude | Average | Zero/Cal | Limit |
| GSM/GPRS/EDGE | Freq | Amplitude | Setup | Measurements | Marker |
| WCDMA/HSDPA | Freq | Amplitude | Setup | Measurements | Marker |
| TD-SCDMA/HSDPA | Freq | Amplitude | Setup | Measurements | |
| LTE Analyzer | Freq | Amplitude | Setup | Measurements | Marker |
| CDMA | Freq | Amplitude | Setup | Measurements | Marker |
| EVDO | Freq | Amplitude | Setup | Measurements | Marker |
| Fixed WiMAX | Freq | Amplitude | Setup | Measurements | |
| Mobile WiMAX | Freq | Amplitude | Setup | Measurements | Marker |
| DVB-T/H, DVB-T/H SFN | Frequency | Amplitude | Setup | Measurements | Marker |
| T1/FT1, E1, T3/T1/FT1 | Configuration | Pattern/Loop | Error/Alarm | Measurements | Start/Stop |

## Submenu Keys

The 8 submenu keys are located to the right of the measurement display. They change function depending upon the current mode and current menu selection. The current submenu title is shown at the top of submenu key labels. Refer to Figure 2-2 on page 2-3.

# Chapter 3 — Basic Measurement Setups

## 3-1 Introduction

This chapter provides a brief overview of the Anritsu MT8222A BTS Master. The intent of this chapter is to provide a starting point for making basic measurement setups. This chapter describes setup, configure frequency, bandwidth, and amplitude before configuring your measurement setups. After measurements are taken, refer to section "Managing Files" on page 4-1 for a description of saving, recalling, and deleting measurement files. For more detailed information about specific measurements, refer to the measurement descriptions in the measurement guides for the specific instrument mode and analyzer technology (such as WiMAX or 3GPP). Refer to Appendix A, "Measurement Guides", for a list of these guides and their Anritsu part numbers.

## 3-2 Measurement Setup

### Connect the Input Source

Connect the input signal or antenna to the appropriate test connector on the top of the instrument. For connector descriptions, refer to Figure 2-12 on page 2-14.

### Editing and Entering Values

- Parameter values that are ready for editing are displayed in red on the submenu key. After changing the value, press **Enter** to set the new value.

- Some submenu keys have toggled parameter values (On / Off, Low / High). On these submenu keys the current value is underlined. Press the submenu key to toggle the value.

- Use the arrow keys, numeric keypad, or rotary knob to change submenu key values, to select list box options, or to enter filenames.

### Selecting the Analyzer Mode

1. Press the **Shift** key followed by pressing the **Mode** (9) key on the numeric keypad to open the Mode Selector list box.

2. Use the directional arrow keys or the rotary knob to highlight the desired mode, and press the **Enter** key or the rotary knob to select.

# 3-3    Set the Measurement Frequency

## Using Start and Stop Frequencies

1. Press the **Freq** main menu key. In Cable & Antenna Analyzer mode, press the **Freq/Dist** main menu key.

2. Press the Start Freq submenu key.

3. Enter the desired start frequency. 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.

## Entering Center Frequency

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

2. Press the Center Freq submenu key.

3. Enter the desired center frequency by 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 current setting is shown at the top of the instrument settings summary column on the left side of the measurement display.

## Selecting Signal Standard

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

2. Press the Signal Standard submenu key. The Signal Standards dialog opens.

3. Highlight a signal standard and press **Enter** or the rotary knob to select.

4. Press the Channel submenu key to change the channel value in the Channel Editor.

| **Note** | The signal standards list on your BTS Master can be updated via Master Software Tools. |
|---|---|

## Setting Measurement Frequency Bandwidth

### Spectrum Analyzer and Interference Analysis Mode

1. Press the **BW** main menu key to display the BW menu.

   - Press the RBW or the VBW submenu key (or both) to manually change 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.

# 3-4    Set the Amplitude

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

## Setting Amplitude Reference Level and Scale

### Spectrum Analyzer and Interference Analysis Modes

| **Note** | To change the current measurement units, press the Units submenu key and select the required units from the submenu keys that are presented. Press the Back submenu key to return to the Amplitude menu. |
|---|---|

   **1.** Press the Reference Level submenu key and use the **Up/Down** arrow keys 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 **Up/Down** arrow keys or the keypad to enter the desired scale. Press **Enter** to set the scale value.

| **Note** | The Scale parameter cannot be changed when linear units are selected (Watts or Volts). Press the Amplitude submenu key and select Auto Atten coupling of the attenuator setting and the reference level to help ensure that harmonics and spurs are not introduced into the measurements. Attenuator Functions are described in the Spectrum Analyzer Measurement Guide. |
|---|---|

## Setting Amplitude Range and Scale

| **Note** | This setting applies to most demodulator modes of instrument operation. The Spectrum Analyzer and Cable and Antenna Analyzer modes have no equivalent to Auto Range. For other analyzer modes, consult the individual measurement guides. Refer to Appendix A, "Measurement Guides". |
|---|---|

   **1.** Press the Adjust Range submenu key to set an optimal reference level based on the measured signal.

| **Note** | To have the instrument continually set the optimal reference level, press the Auto Range submenu key so that On is selected. |
|---|---|

   **2.** Press the Scale submenu key.

   **3.** Enter the desired scale units by using the keypad, the arrow keys, or the rotary knob. Press the **Enter** key 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. In power offset mode, the compensation factor is in dB. (External attenuation can be created by using an external cable or an external high power attenuator.)

Press the **Power 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 increments of 1.0 dB. When using the **Up/Down** arrow keys, the value changes in increments of 10.0 dB. 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.

# 3-5   Set the Span

### Spectrum Analyzer, Interference Analysis, and Power Meter Modes

**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. |

# 3-6    Setting Up Limit Lines

Press the **Shift** key then the **Limit** (6) key on the numeric keypad to display the Limit menu.

## Single Limit Line

### Spectrum Analyzer and Interference Analysis Modes

   **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 Move Limit
   submenu key 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.

### Cable and Antenna Mode

   **1.** Press the **Shift** key followed by the **Limit** main menu key to list the Limit menu.

   **2.** Activate the limit line by pressing the Limit On Off submenu key so On is underlined.
   The limit line is displayed on the graph.

   **3.** Press the Single Limit submenu key to change the location of the limit line on the y-axis.

   **4.** If necessary, press the Set Default Limit submenu key to display the limit line.

## Segmented Limit Lines

### Spectrum Analyzer and Interference Analysis Modes

The following procedure creates limit lines for a Return Loss Measurement. Limits are set to
12 dB between 1000 MHz and 1400 MHz and to 15 dB between 1600 MHz and 2000 MHz.

### Initial Setup:

   **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.

### Creating a Sample Segmented Limit Line:

   **4.** Press the Move Limit submenu key and use the number keys to enter a limit value of
   12 dB. The limit value can also be moved by using the arrow keys or the rotary knob.
   Press the Back submenu key to return to the Limit menu.

   **5.** Press the Limit Edit submenu key to display the Edit menu.

   **6.** Press the Add Point submenu key.

   **7.** Press the Frequency submenu key and enter 1400 MHz.

   **8.** Press the Add Point submenu key

   **9.** Press the Frequency submenu key and enter 1600 MHz.

**10.** Press the Amplitude submenu key and enter 15 dB.

**11.** Press the Add Point submenu key.

**12.** Press the Frequency submenu key and enter 2000 MHz.

**13.** Press the Amplitude submenu key and enter 15 dB.

**Cable and Antenna Mode**

**1.** Press the **Shift** key followed by the **Limit** main menu key to list the Limit menu.

**2.** Activate the limit line by pressing the Limit On Off submenu key so that On is underlined. The limit line is displayed on the graph.

**3.** Press the Multi-Segment Edit submenu key to create a multi-segmented limit line.

**4.** Highlight the left point on the limit line before adding the first point using the Next Point Left submenu key.

**5.** Press the Add Point submenu key to place a new point on the limit line. Use the Point Freq and Point  Value submenu keys to set the frequency and dB level of the point.

**6.** Repeat step 5 until the desired number of points have been added.

**7.** If necessary, press the Set Default Limit submenu key to display the limit line.

## Limit Line Envelope

**Spectrum Analyzer and Interference Analysis Modes**

**1.** Complete step 1 through step 4 in the procedure for Setting Up Non-Segmented Limit Lines.

**2.** Press the Limit (Upper / Lower) submenu key to select the desired limit line for use in creating an envelope.

**3.** Press the Limit Envelope submenu key to display the Limit Envelope menu.

**4.** Press the Create Envelope submenu key to create an envelope around the measurement.

**5.** Press Upper Points or Lower Points submenu key to change the number of segments in the envelope.

# 3-7 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 so that the desired marker number is underlined. Each press of the Marker key selects the next higher number (cycling from 6 back to 1 again). Press **Shift**, then the Marker key to backward through the marker list.

**2.** Press the On Off submenu key so that On is underlined. The selected marker is displayed in red, ready to be moved.

**3.** Use the rotary knob to place the marker on the desired frequency.

**4.** Repeat Step 1 and Step 2 to activate and move multiple markers.

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

**1.** Press the Marker 1 2 3 4 5 6 submenu key so that the desired delta marker number is underlined.

**2.** Press the Delta On Off submenu key so that On is underlined. The selected marker is displayed in red, ready to be moved.

**3.** Use the rotary knob to place the delta marker on the desired frequency.

**4.** Repeat Step 1 and Step 2 to activate and move multiple 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 markers and delta marker data are displayed in a table under the measurement graph.

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# Chapter 4 — File Management

## 4-1    Introduction

This chapter will review the file management features of the BTS 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 Save then the Change Save Location submenu keys 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 BTS 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 Site 1 Trace, Save Measurement As saves the next measurement as Site 1 Trace_#1, Site 1 Trace_#2, etc. The file name used can be changed using the "Save Menu" on page 4-7.

#### 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 and press **Enter** to save.

#### 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 using the  Change Type key and press **Enter** to save.

## 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 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 using the File Type key. Select the setup file (.stp) with the rotary knob or the **Up/Down** arrow keys and press **Enter**.

## Recall Dialog Box

The Recall dialog box (Figure 4-1) will open previously saved measurements and setups. See the "Recall Menu" on page 4-10 for additional information.
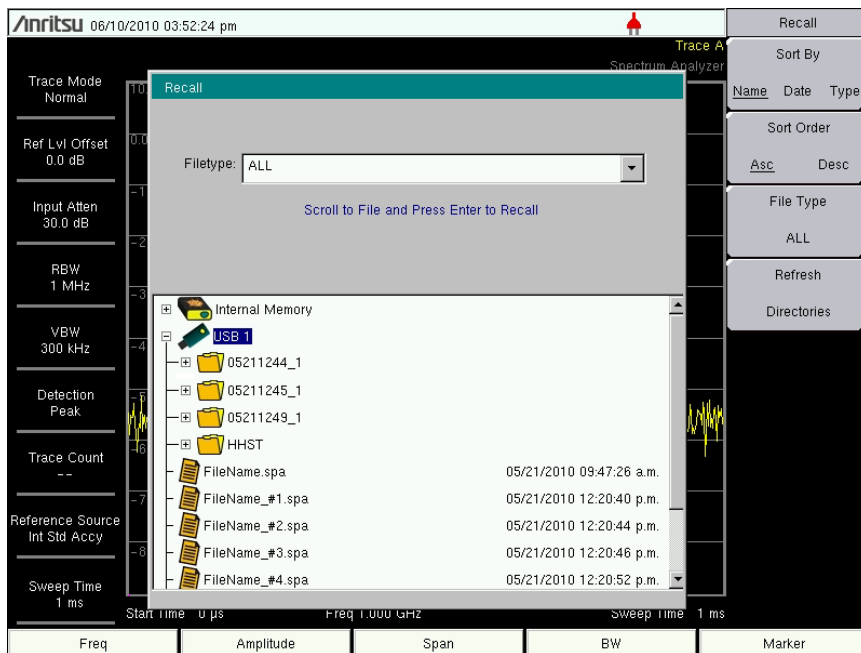


**Figure 4-1.**   Recall Dialog Box

## 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 4-2). Refer to the "Copy Menu" on page 4-11 for additional information.

1. Insert a USB drive into either USB Type A port of the BTS 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 key and highlight the USB drive in the lower window using 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.
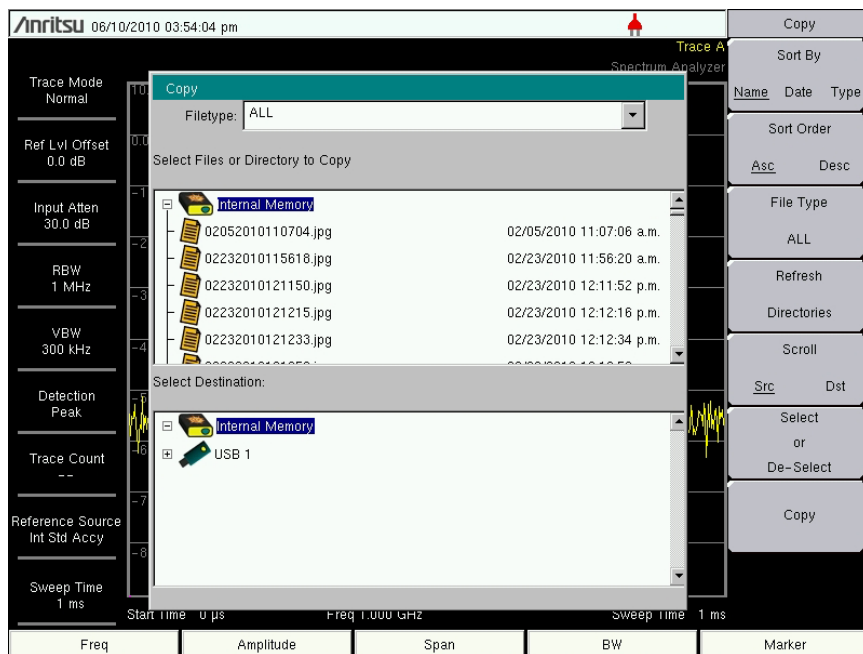


**Figure 4-2.** Copy Dialog Box

## Deleting Files

### Delete a Selected File or Files

Press the Delete submenu key. Highlight the file to be deleted with the **Up/Down** arrow keys. Press the Select or De-Select key. The file will be highlighted 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 4-3). The submenus allow sorting by file type, name and saved date. See the "Delete Menu" on page 4-12 for additional information.
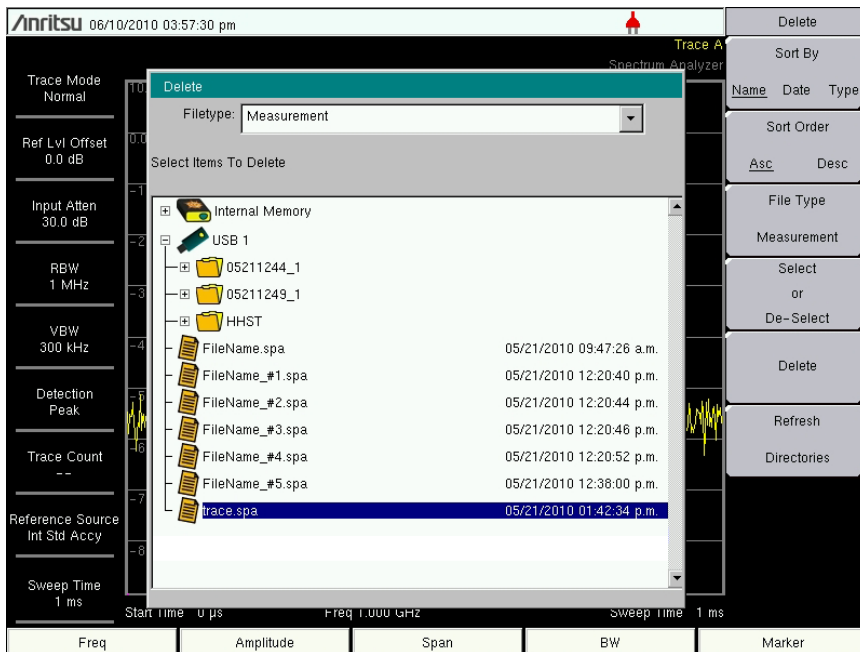


**Figure 4-3.**   Delete Dialog Box

## 4-3    File Menu Overview

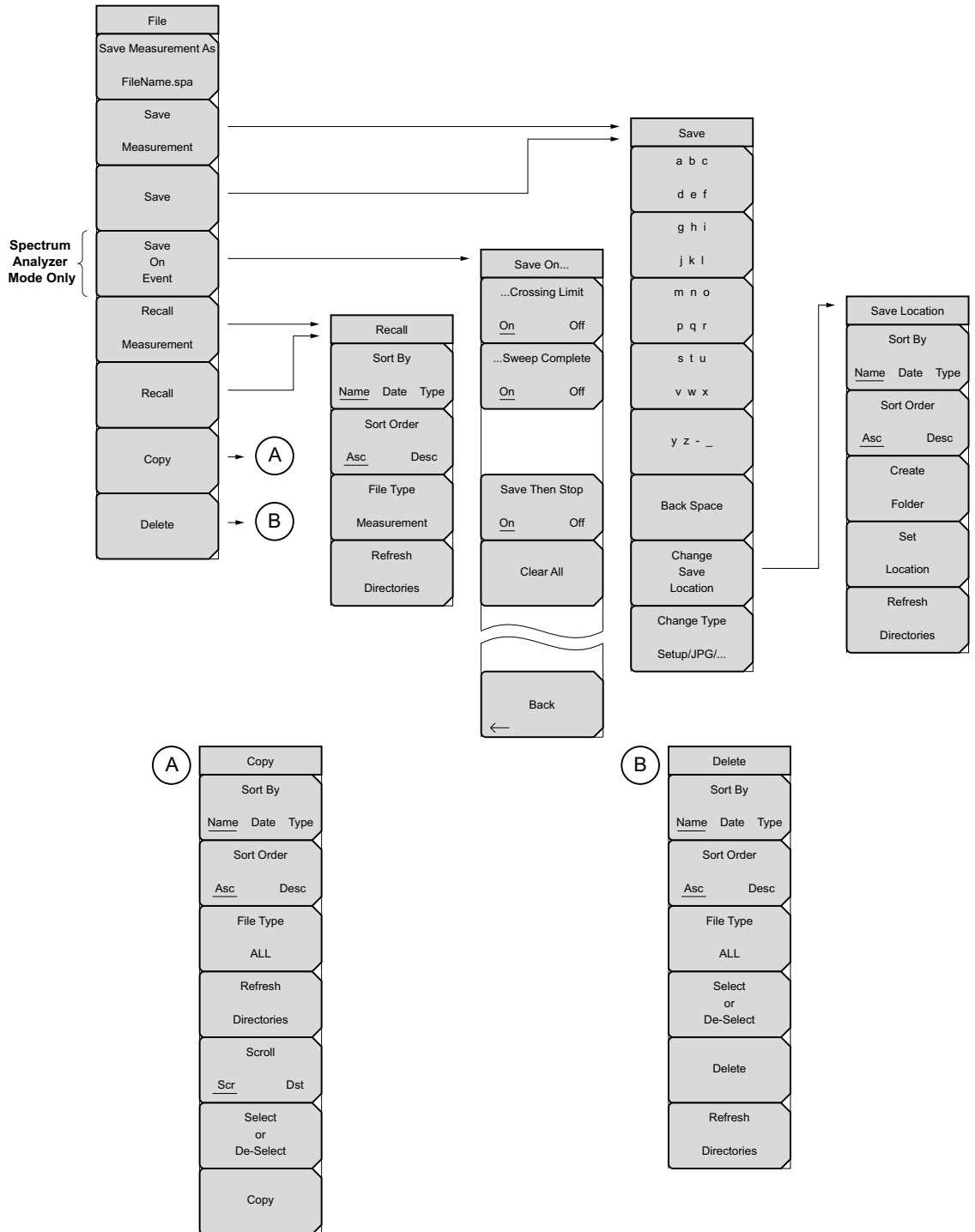Open this menu by pressing the **Shift** key, then the **File** (7) key.



**Figure 4-4.**   File Menu

---

# 4-4   File Menu

Key Sequence: **File**

| | |
|---|---|
| **File**<br>Save Measurement As<br>FileName.spa<br>Save<br>Measurement<br>Save<br>Save<br>On<br>Event<br>Recall<br>Measurement<br>Recall<br>Copy<br>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, press the Save Measurement submenu key to open the Save dialog box. Enter the new measurement filename with the letter keys. Refer to "Save Menu" on page 4-7. Press **Enter** to save the name and return to the File menu. The Save Measurement As submenu key displays the new entered name appended with _#1.spa. 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.<br><br>**Save Measurement:** Press this submenu key to display the "Save Menu" on page 4-7 and Save dialog box. Measurements can be saved to internal memory or to a USB flash drive. The saved measurement can be named using the text entry keys. 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 4-8.<br><br>**Save:** Press this submenu key to display the "Save Menu" on page 4-7. Measurements can be saved to internal memory or to a USB flash drive. The BTS Master is shipped with an Anritsu-approved USB flash drive for external data storage. (Refer to the BTS Master Technical Data Sheet listed in Appendix A for the Anritsu Part Number of the USB flash drive). The saved setup, measurement or JPEG file can be named by using the text entry keys. 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 4-8.<br><br>**Save on Event** (Spectrum Analyzer mode only)**:** Press this submenu key to display the "Save On Event Menu" on page 4-9.<br><br>**Recall Measurement:** Press this submenu key to display the "Recall Menu" on page 4-10. This menu is for recalling measurements from internal memory or a USB flash drive.<br><br>**Recall:** Press this submenu key to display the "Recall Menu" on page 4-10. This menu is for recalling measurement or setup data from internal memory or a USB flash drive.<br><br>**Copy:** Press this submenu key to display the "Copy Menu" on page 4-11. This submenu is for copying files or folders from internal memory or a USB flash drive.<br><br>**Delete:** Press this submenu key to display the "Delete Menu" on page 4-12 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 4-5.**   File Menu

## Save Menu

Key Sequence: **File** > Save

| Save | **Text Entry Keys:** The top 5 keys are for text entry. The submenu keys for Text Entry displays the characters (alphabet, hyphen, and underscore). Press the a b c / d e f submenu key (for example) to open another submenu with a separate key for each of these letters. Characters can be entered by using the rotary knob or by using the submenu keys. |
|---|---|

a b c

d e f

g h i

j k l

m n o

p q r

s t u

v w x

y z - _

Back Space

Change
Save
Location

Change Type

Setup/JPG/...

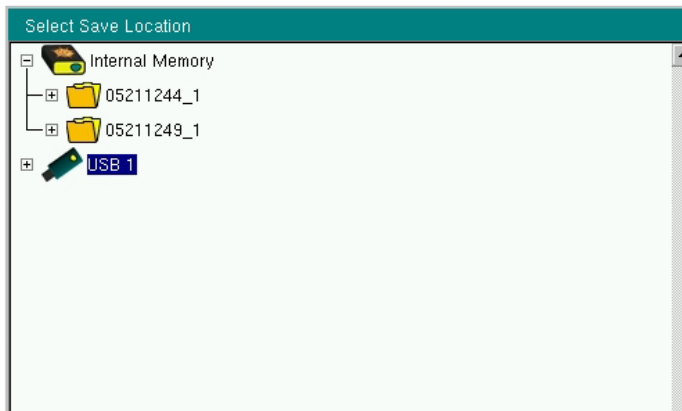**Text Entry Keys:** The top 5 keys are for text entry. The submenu keys for Text Entry displays the characters (alphabet, hyphen, and underscore). Press the a b c / d e f submenu key (for example) to open another submenu with a separate key for each of these letters. Characters can be entered by using the rotary knob or by using the submenu keys.

The rotary knob scrolls through the characters in a pop-up window and pressing the rotary knob enters a character. The menu returns to the complete character set after each individual letter is entered.

Use the arrow keys to navigate within a name or character string. Use the **Shift** key for capital letters. Press the **Enter** key or the rotary knob to finalize a text entry.

**Back Space:**  Use this key to delete a file name highlighted in blue or delete individual characters.

**Change Save Location:**  Press this submenu key to open the "Save Location Menu".

**Change Type:**   Press this submenu key to select what type of file is saved. The options are the Measurement, Setup, or Jpeg. The file type can be changed with the **Up/Down** keys or the rotary knob.

> **Setup (.stp):** Setup files contain basic instrument information, measurement mode setup details, measurement marker data, and limit data.

> **Measurement (.spa):** Contains the measurement data and opens with Master Software Tools.

> **Jpeg (.jpg):** Jpeg files contain a screen capture of the display.

> **Limit Lines (.lim):** The Limit line file contains limit line data details.

**Figure 4-6.**   Save Menu

## Save Location Menu

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

| | |
|---|---|
| Save Location<br><br>Sort By<br><br>Name  Date  Type<br><br>Sort Order<br><br>Asc       Desc<br><br>Create<br><br>Folder<br><br>Set<br><br>Location<br><br>Refresh<br><br>Directories | This menu and dialog box is used to create folders and select where the BTS Master will save the current file. Select folders or drives with the **Up/Down** keys or the rotary knob.<br><br>Note: Only folders (not files) are visible in the Save Location dialog box. To view files, use the "Recall Menu" on page 4-10.<br><br>**Sort By:**  Press this submenu key to sort the folders by Name, Type, or Date.<br><br>**Sort Order:**  Displays the folder names in ascending or descending order .<br><br>**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.<br><br>**Set Location:**  This key will set the current location for saving files and return to the "Save Menu" on page 4-7.<br><br>**Refresh Directories:**  Press this key to update the display. |

**Figure 4-7.**   Save Location Menu



**Figure 4-8.**   Select Save Location Dialog Box

## Save On Event Menu

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

| | |
|---|---|
| Save On... <br><br> ...Crossing Limit <br><br> On      Off <br><br> ...Sweep Complete <br><br> On      Off <br><br><br><br><br> Save Then Stop <br><br> On      Off <br><br> Clear All <br><br><br><br><br> Back <br> ← | This menu is used to auto save measurements to internal memory after: <br><br> **...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. <br><br> **...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. <br><br> **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. <br><br> **Clear All:** Pressing this key will turn Off the three save on event keys: <br><br> Crossing Limit <br> Sweep Complete <br> Save Then Stop |

**Figure 4-9.**  Save On Menu

## Recall Menu

Key Sequence: **File** > Recall
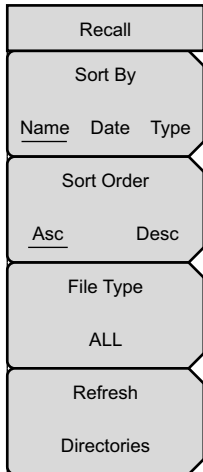
| | |
|---|---|
| Recall<br><br>Sort By<br><br>Name  Date  Type<br><br>Sort Order<br><br>Asc       Desc<br><br>File Type<br><br>ALL<br><br>Refresh<br><br>Directories | This menu and dialog box is used to create folders and select where the BTS Master will save the current file. Select folders or drives with the **Up/Down** keys or the rotary knob.<br><br>**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.<br><br>**Sort Order:** Displays the folder or file in ascending or descending order based on the selection in the Sort By key.<br><br>**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 or the rotary knob. Press **Enter** to make the selection.<br><br>     **Setup:** Setup files contain basic instrument information, measurement mode setup details, measurement marker data, and limit data.<br><br>     **Measurement:** Measurement files contain all of the information in the setup files and the measurement data.<br><br>     **Limit Lines (.lim):** The Limit line file contains limit line data details.<br><br>     **ALL:** Displays all file types.<br><br>**Refresh Directories:** Press this key to update the display. |

**Figure 4-10.**  Recall Menu

## Copy Menu

Key Sequence: **File** > Copy

| Copy |
| --- |
| Sort By |
| <u>Name</u> Date Type |
| Sort Order |
| <u>Asc</u> Desc |
| File Type |
| ALL |
| Refresh |
| Directories |
| Scroll |
| <u>Scr</u> 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 or the rotary knob. Figure 4-2 on page 4-3 shows the Copy dialog box with two Jpeg 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 Jpeg. The file type can be changed with the **Up/Down** keys or the rotary knob. Press **Enter** to make the selection.

**Refresh Directories:** Press this key to update the display.

**Scroll:** Press this submenu key to use the scroll function in the Source Folder (Scr - top panel) or Destination Folder (Dst - bottom panel). See Figure 4-2.

Note: Previously saved files are not visible in this window.

**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 4-2.

**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 4-11.** Copy Menu

## Delete Menu

Key Sequence: **File** > Delete

| | |
|---|---|
| **Delete** | This menu and dialog box is used to delete folders and files. Select folders or files with the **Up/Down** keys or the rotary knob. |
| **Sort By** Name  Date  Type | **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** Asc          Desc | **Sort Order:** Displays the folder or file in ascending or descending order based on the selection in the Sort By key. |
| **File Type** ALL | **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 Jpeg. The file type can be changed with the **Up/Down** keys or the rotary knob. Press **Enter** to make the selection. |
| **Select** or **De-Select** | **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** | **Delete:** Press this key to open the Delete dialog box. Press **Enter** to delete the selected item or **Esc** to Cancel. |
| **Refresh** **Directories** | **Refresh Directories:** Press this key to update the display. |

**Figure 4-12.**  Delete Menu

# Chapter 5 — System Operation

## 5-1    Introduction

This chapter will review the BTS Master system operations.

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

# 5-2   System Menu Overview

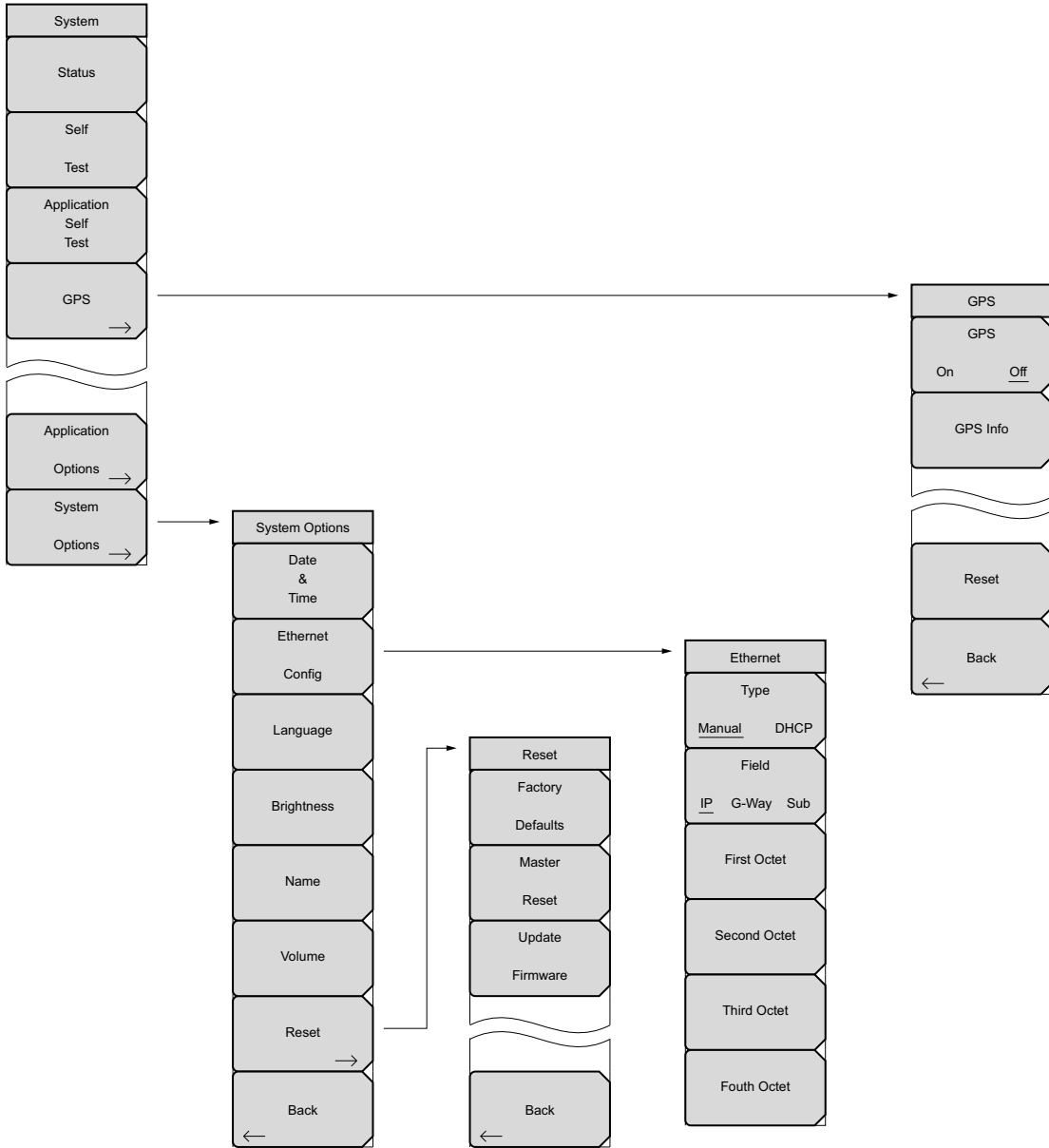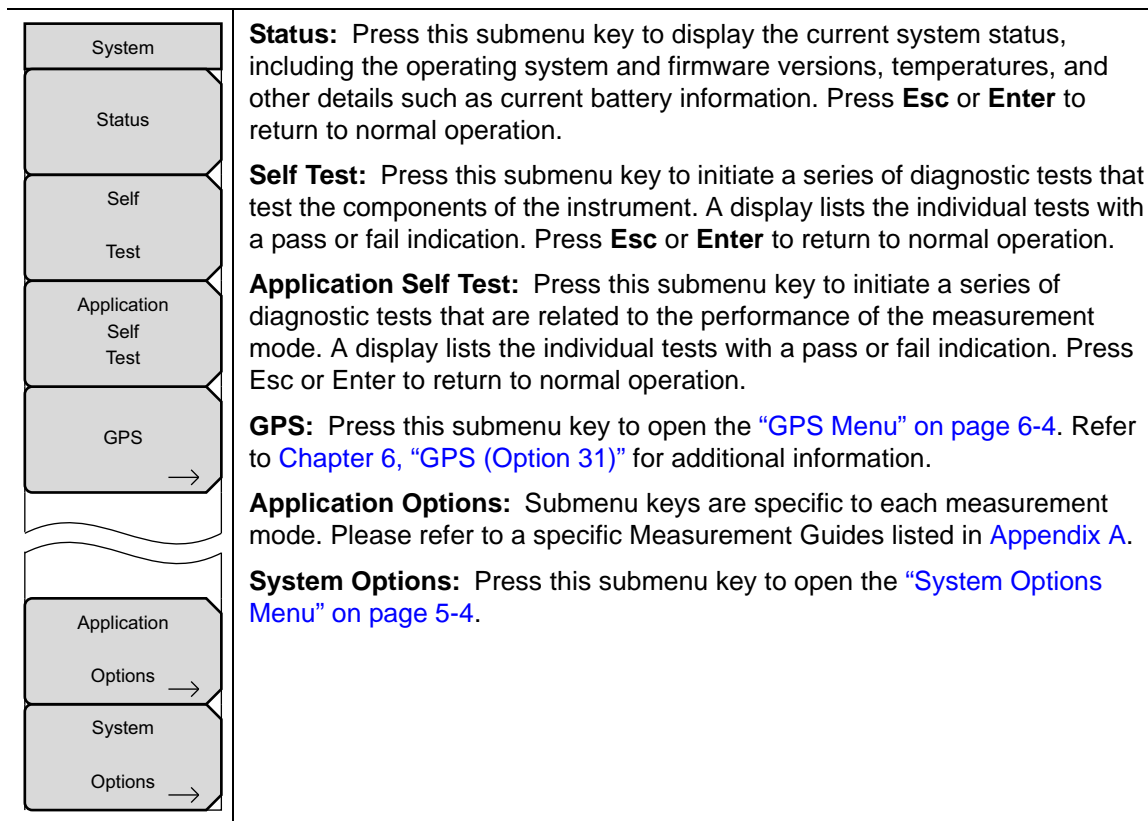To access the functions under the System menu, select the **Shift** key, then the **System** (8) key.



**Figure 5-1.**   System Menu

# 5-3 System Menu

Key Sequence: **Shift** > **System** (8) key

| | |
|---|---|
| **System** **Status** **Self** **Test** **Application** **Self** **Test** **GPS** $\rightarrow$ **Application** **Options** $\rightarrow$ **System** **Options** $\rightarrow$ | **Status:** Press this submenu key to display 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:** Press this submenu key to initiate a series of diagnostic tests that test the components of the instrument. A display lists the individual tests with a pass or fail indication. Press **Esc** or **Enter** to return to normal operation. **Application Self Test:** Press this submenu key to initiate a series of diagnostic tests that are related to the performance of the measurement mode. A display lists the individual tests with a pass or fail indication. Press Esc or Enter to return to normal operation. **GPS:** Press this submenu key to open the "GPS Menu" on page 6-4. Refer to Chapter 6, "GPS (Option 31)" for additional information. **Application Options:** Submenu keys are specific to each measurement mode. Please refer to a specific Measurement Guides listed in Appendix A. **System Options:** Press this submenu key to open the "System Options Menu" on page 5-4. |

**Figure 5-2.** System Menu

## System Options Menu

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

| | |
|---|---|
| System Options | **Date & Time:**  Press this submenu key to display 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. |
| Date & Time | |
| Ethernet Config | **Ethernet Config:**  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 section "Ethernet Configuration" on page C-1 in Appendix C, "LAN and DHCP". |
| Language | **Language:**  Press this submenu key to open a list box and select a built-in language for the BTS Master displays. The languages that are currently available are:  English, French, German, Spanish, Japanese, Chinese, Korean, and Italian. In addition, a custom language may be selected if it has been defined by using Master Software Tools and loaded into the MT8222A. Two custom languages may be loaded into the instrument via 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 changes. |
| Brightness | |
| Name | In addition, any existing language (except English) may be edited for a better local translation. |
| Volume | Note: A **SYSTEM+ON** Factory Default reset will overwrite any custom settings within the BTS Master and will require that you reload the custom language files via Master Software Tools. |
| Reset → | **Brightness:**  Press this submenu key to adjust the brightness of the display. This adjustment allows you 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, where 9 is the brightest. Press **Enter** to accept the change. |
| Back ← | **Name:**  Press this submenu key to open a dialog box to name the instrument. The MT8222A can be named by using the text entry controls as described in section "Text Entry" on page 2-11. Press **Enter** to save the name. |
| | **Volume:**  Press this submenu key to set the speaker 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 5-5. |
| | **Back:**  Press this submenu key to return to the "System Menu" on page 5-3. |

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

## Reset Menu

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

| | |
|---|---|
| **Reset**<br><br>Factory<br>Defaults<br><br>Master<br>Reset<br><br>Update<br>Firmware<br><br><br><br>Back<br>← | **Factory Defaults:** Press this submenu key to restore the BTS Master to its factory default parameter values and Mode settings, including Ethernet, language, and brightness settings. Press the **Enter** key to initiate the reset. The BTS Master is automatically rebooted as part of this operation. To return to normal operation without resetting, press **Esc** rather than pressing **Enter**.<br><br>Note: This same reset sequence can be initiated when turning the BTS Master On by pressing and holding the **Esc+On** keys until the Anritsu splash screen is displayed.<br><br>**Master Reset:** Press this submenu key to restore the factory setting to all system parameters, including Ethernet, language, and brightness settings. Also, 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 reset. The BTS Master is automatically rebooted as part of this operation. To return to normal operation without resetting, press **Esc** rather than pressing **Enter**.<br><br>Note: This same reset sequence can be initiated when turning the BTS Master On by pressing and holding the **System** (8)**+On** keys until the Anritsu splash screen is displayed.<br><br>**Update Firmware:** Press this submenu key to update the instrument operating system using an external USB drive. Press **Enter** to begin the update, or press **Esc** to return to normal operation without updating. Refer to "Update Firmware" on page 5-7 for additional information.<br><br>**Back:** Press this submenu key to return to the "System Options Menu" on page 5-4. |

**Figure 5-4.**   Reset Menu

# 5-4    Preset Menu

Key Sequence:  **Shift** > **Preset** (1) key

| | |
|---|---|
| Preset | **Preset:**  This key resets the instrument to the default starting conditions. |
| Preset | **Save Setup:**  Opens the Save dialog box 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. |
| Save Setup | **Recall Setup:**  This key allows the selection and recall of a previously stored instrument setup. All current instrument settings are replaced by the stored setup information. |
| Recall Setup | |

**Figure 5-5.**    Preset Menu

# 5-5    Self Test

At power on, the BTS 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 BTS Master is within the specified operating range with a charged battery, and the self test fails, then contact your Anritsu Service Center.

To initiate 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.

Press the **Esc** key to continue.

# 5-6   Update Firmware

## Using a USB Memory Device or a CompactFlash card

The BTS Master contains a feature that allows you to update its firmware by using a USB memory device. First, you must load the CompactFlash card or USB memory device with the firmware using Master Software Tools (MST). Review the section (in MST Help) that discusses this process. After the firmware is loaded onto the CompactFlash card or USB memory device, follow the instructions below to update the firmware on your BTS Master.

1. Insert the USB memory stick into the USB port.

2. Press the follow key sequence: **Shift** > **System** (8) > System Options > Reset > Update Firmware. The Load Firmware main menu key is displayed (Figure 5-6).
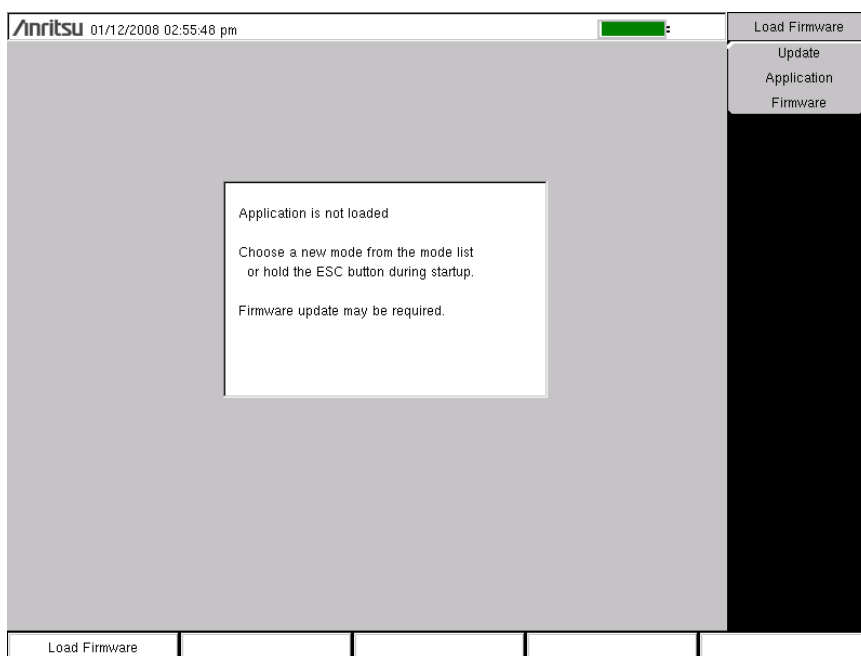


**Figure 5-6.**   Firmware Main Menu

3. Press the **Load Firmware** main menu key to list the Firmware Update menu and Update Application Firmware submenu key.

4. Press the Update Application Firmware submenu key and the Firmware Update dialog opens (Figure 5-7).

5. Select either Update From USB Memory or Updated From CompactFlash.
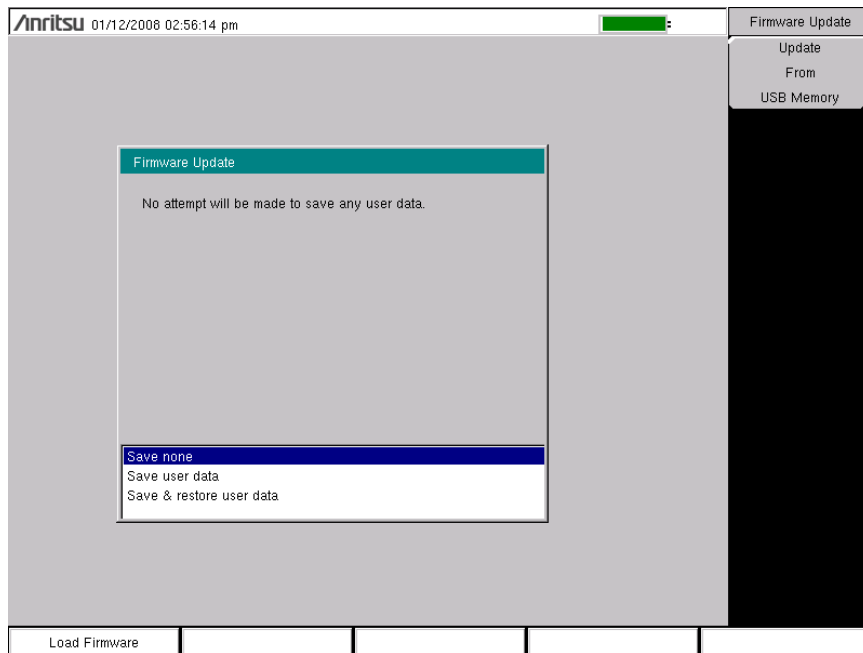
**Figure 5-7.** Firmware Update Menu

**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 (Figure 5-8).
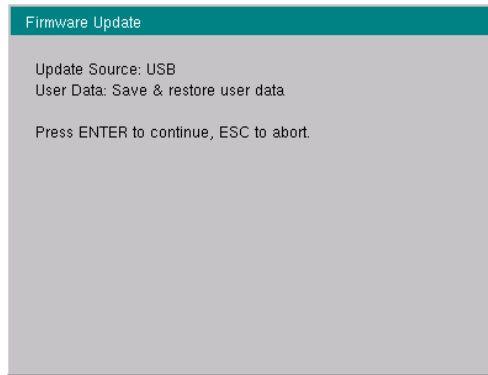


**Figure 5-8.** Firmware Update Menu

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.

## Update Firmware Using Master Software Tools

Refer to "Updating Instrument Firmware" on page 8-2 in Chapter 8, "Master Software Tools".

# Chapter 6 — GPS (Option 31)

## 6-1    Introduction

This chapter provides a brief overview of the Anritsu MT8222A BTS Master. The intent of this chapter is to acquaint you with the instrument. To begin using the instrument immediately, go to Chapter 3, "Basic Measurement Setups" to find directions for power on, editing, frequency, bandwidth, amplitude, limit line, marker, file management procedures, and firmware update. For more detailed information on measurement setups, refer to the specific measurement guides, which are based on the options that can be purchased for this instrument. The measurement guides and a copy of this user guide are available as PDF files on the documentation disc. Refer to Appendix A, "Measurement Guides".

# 6-2    Setting Up GPS (Option 31)

The MT8222A BTS Master is available with a built-in GPS receiver (Option 31) that can provide latitude, longitude, altitude, and UTC timing information. This option also enhances frequency reference oscillator accuracy.

## Activating the GPS feature:

**1.** Attach the GPS antenna to the GPS Antenna connector on the top of the instrument.

| Note | The GPS antenna connection on the BTS Master is fitted with a reverse BNC connector to help prevent damage to the GPS circuitry. There is a DC voltage present on this connector. Do not connect anything other than the Anritsu GPS antenna (part number 2000-1410) to this port. |
|------|-----|

| Caution | Check the voltage setting before connecting your antenna. |
|---------|-----|

**2.** Press the **Shift** key then the **System** (8) key on the numeric keypad to display the System menu.

**3.** Press the GPS submenu key to display the GPS menu (refer to "GPS Menu" on page 6-4).

**4.** Activate GPS by pressing the GPS, On/Off submenu key so that On is underlined. When GPS is first turned On, the GPS icon is displayed in red.



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

**5.** Press the GPS Info submenu key to open the GPS Info window, which displays:

    **a.** Tracked Satellites

    **b.** Latitude

    **c.** Longitude

    **d.** Altitude

    **e.** UTC Timing Information

    **f.** Fix Available

    **g.** Almanac Complete

    **h.** Antenna Status

    **i.** Receiver Status

When the GPS receiver is tracking at least 3 satellites, the GPS icon changes to green.



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

| | |
|---|---|
| **Note** | As long as 3 minutes may be required for the Ref Freq status to change to GPS High Accuracy in the Status menu, which is displayed on the left side of the measurement display. |
| | To reset the GPS, press the Reset submenu key. The green GPS icon with a red cross appears when GPS satellite tracking is lost (refer to Figure 6-3). This occurs after being active (tracking three or more satellites). |



**Figure 6-3.**   GPS Icon, Green with Red Cross

After GPS location Fix is attained, the internal reference oscillator begins to correct its frequency to match the GPS standard. After the internal frequency is adjusted to match the GPS standard, the status is indicated by "GPS High Accuracy" showing in the Status menu, which is displayed on the left side of the measurement display. When the GPS feature is not enabled, the reference source displays either "Internal Standard Accuracy" or a user-selected external reference frequency in the Status menu.

Within three minutes of satellite acquisition, the reference oscillator will have an accuracy of better than 25 ppb (parts per billion). The OCXO internal standard accuracy is ±0.3 PPM. The correction factor applied to the internal OCXO allows the instrument to maintain GPS frequency accuracy for three days at better than 50 ppb, even when the instrument is obstructed from receiving signals from the GPS satellites.

In order to acquire data from the GPS satellites, you must have line-of-sight to the satellites, or the antenna must be placed outside with no obstructions.

The 2000-1410 GPS Antenna with 5 meter cable is a required accessory (unless you already have a GPS antenna with a reverse BNC connector).

# 6-3    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.

**Reset:** Press this submenu key to reset the GPS for a new location.

**Back:** Press this submenu key to return to the "System Menu" on page 5-3.
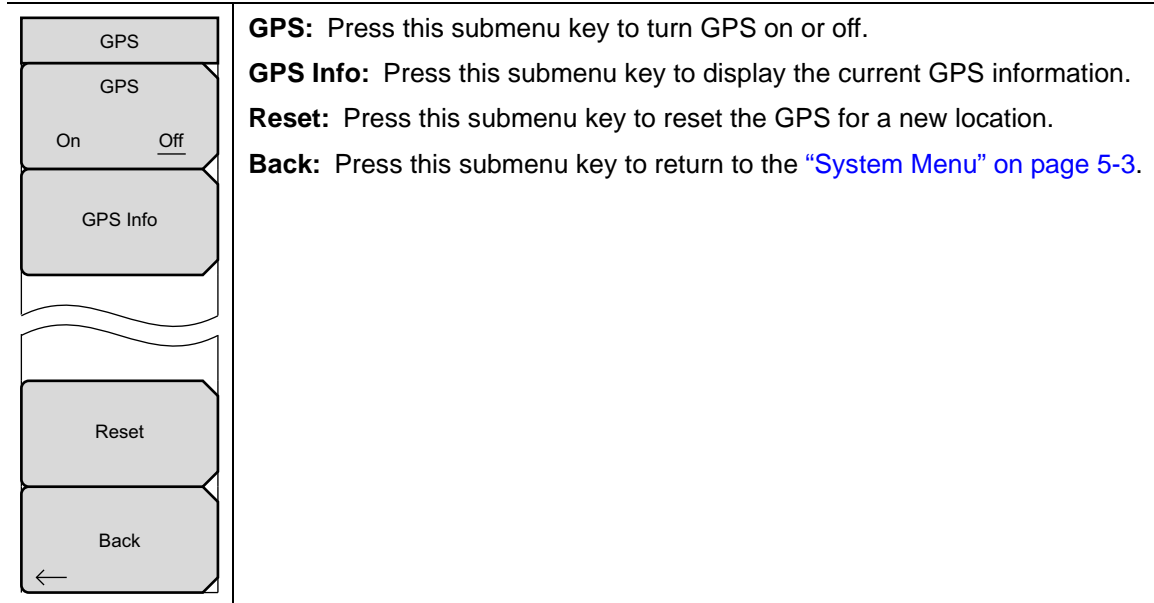
**Figure 6-4.**   GPS Menu

# Chapter 7 — Anritsu Tool Box and Line Sweep Tools

## 7-1 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.

## 7-2 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 7-1). 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 7-1.** Anritsu Tool Box

## 7-3    Install the Software

Place the Installation DVD in your computer and follow the on-screen instructions
(Figure 7-2).
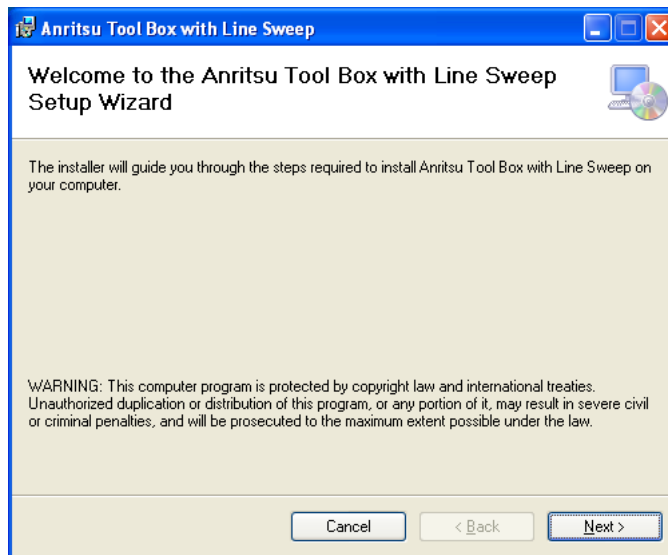


**Figure 7-2.**    Installing Anritsu Tool Box with Line Sweep Tools

If the installer does not autostart, navigate to the DVD and run setup.exe (Figure 7-3).
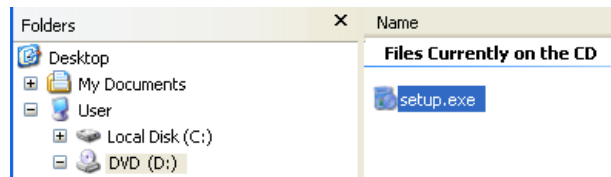


**Figure 7-3.**    setup.exe on the Anritsu Tool Box DVD

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).

## 7-4    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.

# 7-5    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.

# 7-6    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 7-4.**    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 7-5. 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 7-5.**    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 7-6).



**Figure 7-6.**    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.
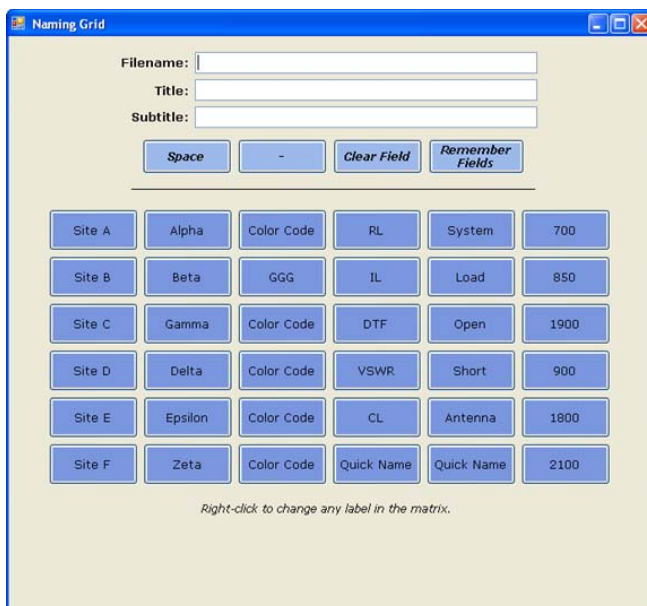


**Figure 7-7.**    Renaming Grid and Renaming Toolbar

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 7-8).
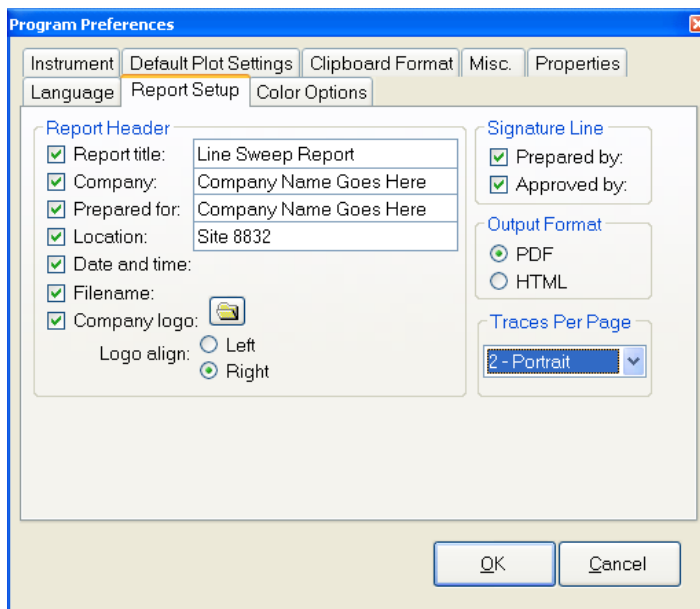


**Figure 7-8.**    Report Setup Tab

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 7-9).
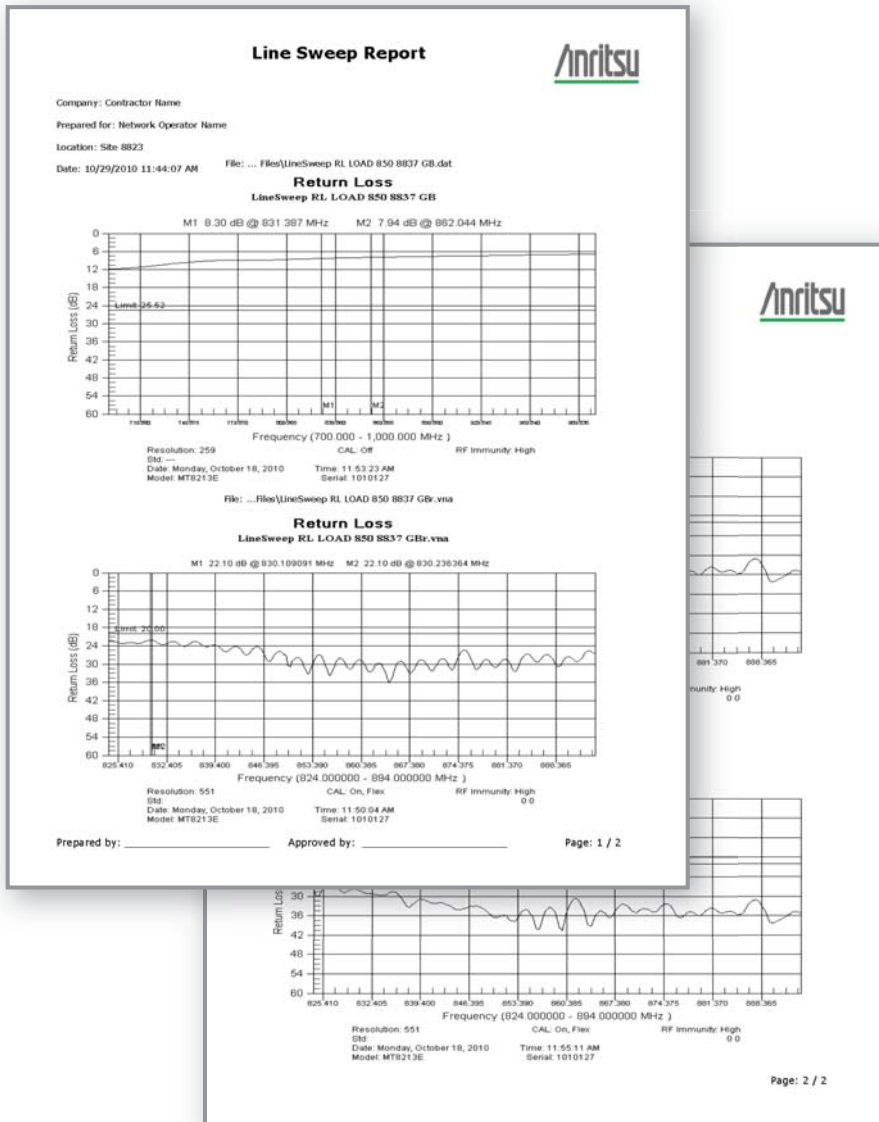


**Figure 7-9.**   Generated Report

# Chapter 8 — Master Software Tools

## 8-1    Introduction

This chapter provides a brief overview of Master Software Tools (MST), firmware update, and emergency repair procedures. For detailed information about Master Software Tools, refer to the MST Manual on the CD-ROM that was included with the BTS Master. The major sections of this chapter include:

## 8-2    Master Software Tools Overview

Anritsu Master Software Tools is a Microsoft Windows 2000 and Windows XP 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.

## 8-3    MST 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.

### Script Master

Script Master is an editor to create files that set up measurement parameters and create automated test procedures that aid field techs or FAEs with measurement testing.

---

# 8-4    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.

# 8-5    Updating Instrument Firmware

1. Connect the BTS Master to a PC by using USB or Ethernet. Refer to the Master Software Tools (MST) User Guide (on the CD-ROM) for information regarding connecting your BTS Master to a PC.

2. Run Master Software Tools

3. From the Connection menu:

   - for a USB Connection, Select Connect – USB.

   - for an Ethernet Connection:

       a. Enter the IP Address of your BTS Master by first clicking Enter IP Address…

       b. Then click Connect – Ethernet: xxx.xxx.xxx.xxx

   - In either type of connection, the connection type is displayed in the toolbar.
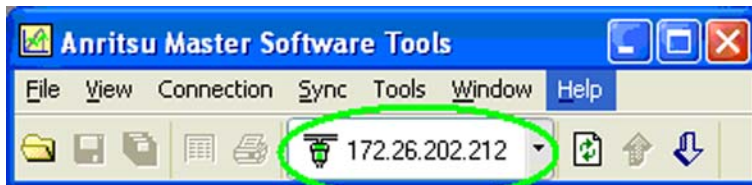


**Figure 8-1.**    IP Address in Connection Button

4. From the Tools menu, click Product Updates.

   The Product Updates window opens.
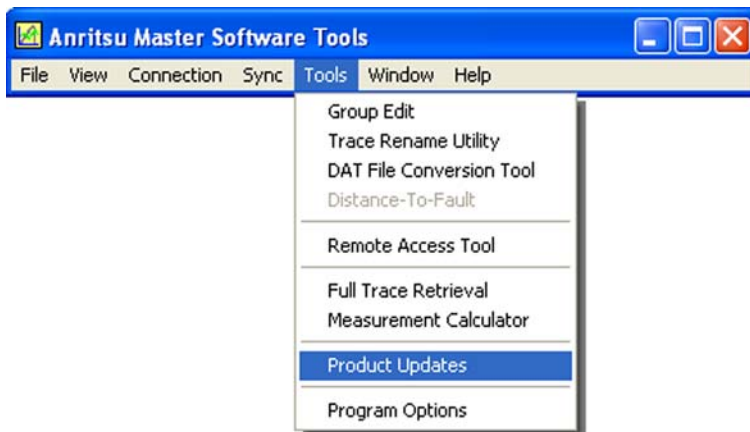


**Figure 8-2.**    Tool Menu: Product Updates Command

**5.** Notice the differences in the two Product Update windows in Figure 8-3 and Figure 8-4.

- File Status Ready

  In Figure 8-3, the status of the highlighted file is Ready, and the Install to Unit button is active. You can immediately click Install to Unit to update your BTS Master with the new firmware.

- File Status Available

  In Figure 8-4, the status of the highlighted file is Available, and the Install to Unit button is gray and inactive. This means that the updated file is on the Anritsu Product Support Web site and needs to be downloaded to your PC. After the file has been downloaded and placed on your PC, its status changes to Ready, and the Install to Unit button becomes active.
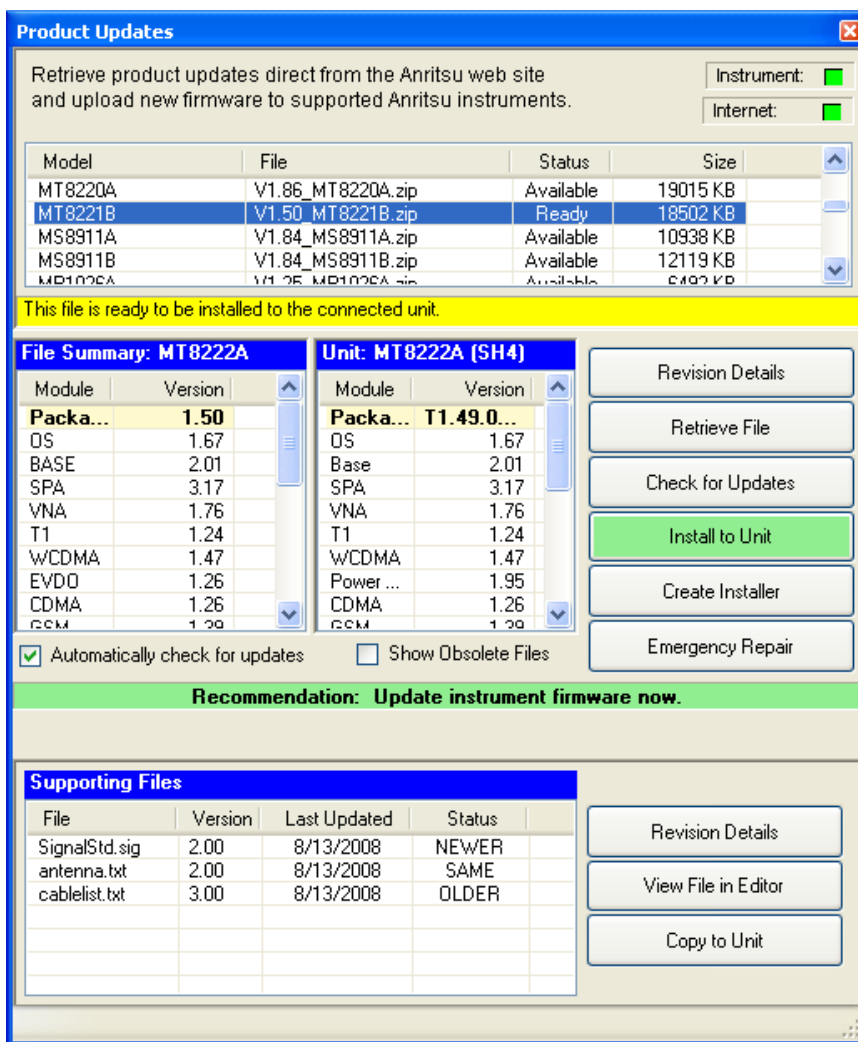


**Figure 8-3.**    Product Updates Window: Status Ready
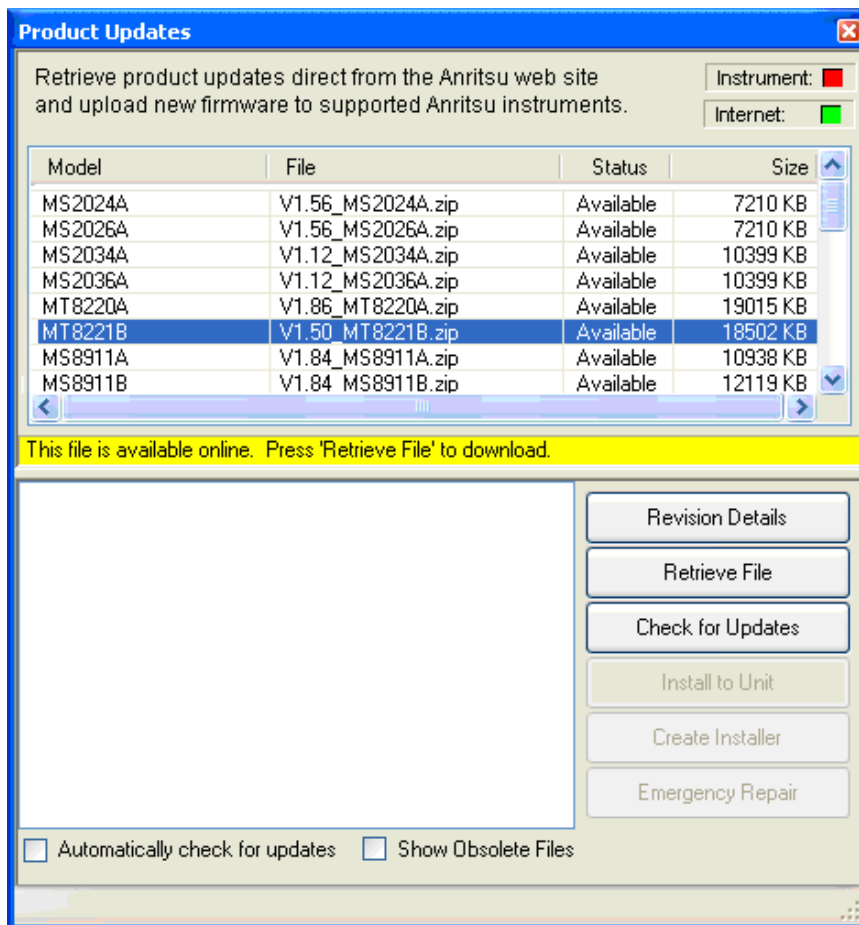
**Figure 8-4.**   Product Updates Window:  Status Available

**File Status Ready:**

   **1.** Check that the file status is Ready and that the Install to Unit button is active.

   **2.** Click the Install to Unit button. Your BTS Master is updated with the new firmware.

**File Status Available:**

   **1.** Check that the file status is Available.

   **2.** Click Retrieve File to download the file from the Web site to your PC.

   **3.** Check that the file status changes to Ready.

   **4.** Click the Install to Unit button. Your BTS Master is updated with the new firmware.

**File Not Listed:**

You might open the Products Update window and not find the file that you are looking for. In that case:

**1.** Click the Check for Updates button. Master Software Tools checks for the latest updates at the Anritsu Product Support Web Site. New updates that are found are listed in the file menu.

**2.** Click the Retrieve File button. The file is transferred from the Web site to your PC.

**3.** After the status changes to Ready, click the now-active Install to Unit button. Your BTS Master is updated with the new firmware.

### Update Problems

If you do not find the latest update, or if you encounter a problem with updating the firmware, then contact Anritsu. Internet links to worldwide Anritsu locations can be found at the following URL:

http://www.anritsu.com/Contact.asp

## Update Firmware Using a CompactFlash Card or a USB Device

Refer to .

# 8-6    Emergency Repair Procedure

If you have problems booting up your BTS Master after updating then firmware on your BTS Master, use the following steps to resolve the problem. Refer to Figure 8-5.

1. Close the Master Software Tools application and then restart it.

2. Turn off the BTS Master. Connect the BTS Master via Ethernet to your local network or directly to your PC using the Ethernet cross-over cable.

3. Turn on the BTS Master in bootstrap mode as follows:

   a. With the BTS Master off, hold the first, third, and fifth submenu keys (located at the right edge of the measurement display screen).

   b. While holding all 3 submenu keys, press the **On/Off** button.

   c. Continue holding all 3 submenu keys until the Anritsu logo appears on the measurement display screen, then release them.



**Figure 8-5.**    BTS Master Bootstrap Screen

4. Press the Ethernet Configuration submenu key (the first submenu key, as shown in Figure 8-5).

**5.** Wait until the Ethernet menu is displayed, as shown in Figure 8-6.
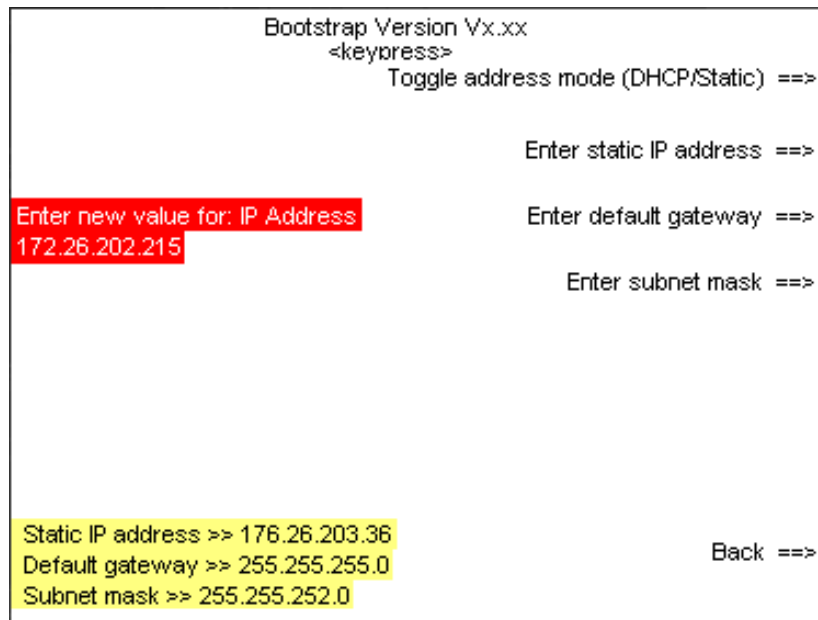


**Figure 8-6.**   Ethernet Menu

Additional explanations of the Ethernet menu submenu keys can be found in
Appendix C "Ethernet Menu" on page C-4.

- If your BTS Master is configured for DHCP, then it immediately attempts to obtain (lease) an IP address from the network DCHP server, and then displays the IP address at the lower-left corner of the measurement display screen. If an IP address is successfully acquired, then note and write down the IP address. Press the Back key, skip Step 6 and Step 7, and go next to Step 8.

- If the BTS Master cannot obtain an IP address from the DHCP server, then it will time out after approximately 3 minutes. The statement "DHCP Lease Failed" will be displayed at the lower-left corner of the measurement display screen. Go to Step 6, "DHCP Mode Second Attempt".

- If your BTS Master is configured for STATIC IP, then it opens to the Static IP configuration window and displays the current Static IP address at the lower-left corner of the measurement display screen. To reconfigure the Static IP address, go to Step 7, "Static Address Mode".

**6.** DHCP Mode Second Attempt

   **a.** Confirm that the connections, the Ethernet line, and communication on the LAN to the test instrument are all functioning correctly.

   **b.** Re-attempt to obtain an IP address through DHCP configuration. Press the first submenu key, Press the Type submenu key to toggle the address mode (Manual or DHCP) to switch to DHCP configuration and automatically obtain an IP address. Note and write down the IP address that is assigned to the BTS Master.

   **c.** Press the Back submenu key. Return to the main bootstrap screen and go to Step 8.

**7.** Static Address Mode

  **a.** Press the second submenu key. Enter the IP address.

  **b.** Press the third submenu key. Enter the gateway address.

  **c.** Press the fourth submenu key. Enter the subnet mask.

  **d.** Attach the Ethernet network cable between the test instrument and your PC.

  **e.** Press the Back submenu key, to return to the main bootstrap screen.

**8.** Press the Update OS (Ethernet) submenu key (the second submenu key in the bootstrap menu, as shown in Figure 8-5).

The BTS Master should give you a "Waiting for OS download connection" message.

**9.** In Master Software Tools, go to the Tools menu and click Product Updates.
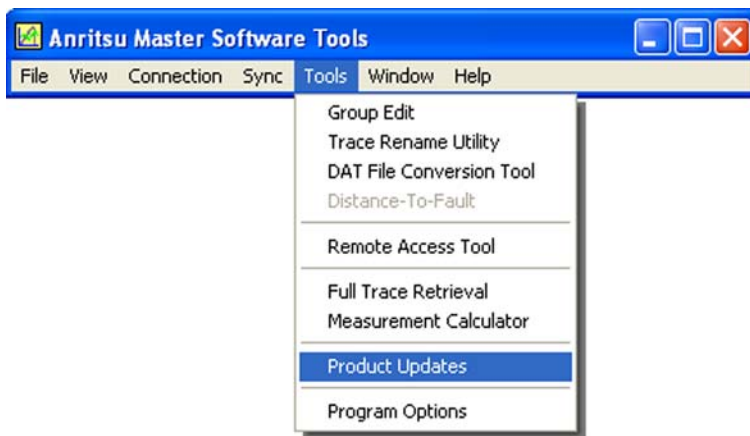


**Figure 8-7.**   Tool Menu: Product Updates Command

**10.** The Product Updates window opens. At this point, Master Software Tools is not yet connected to your BTS Master.
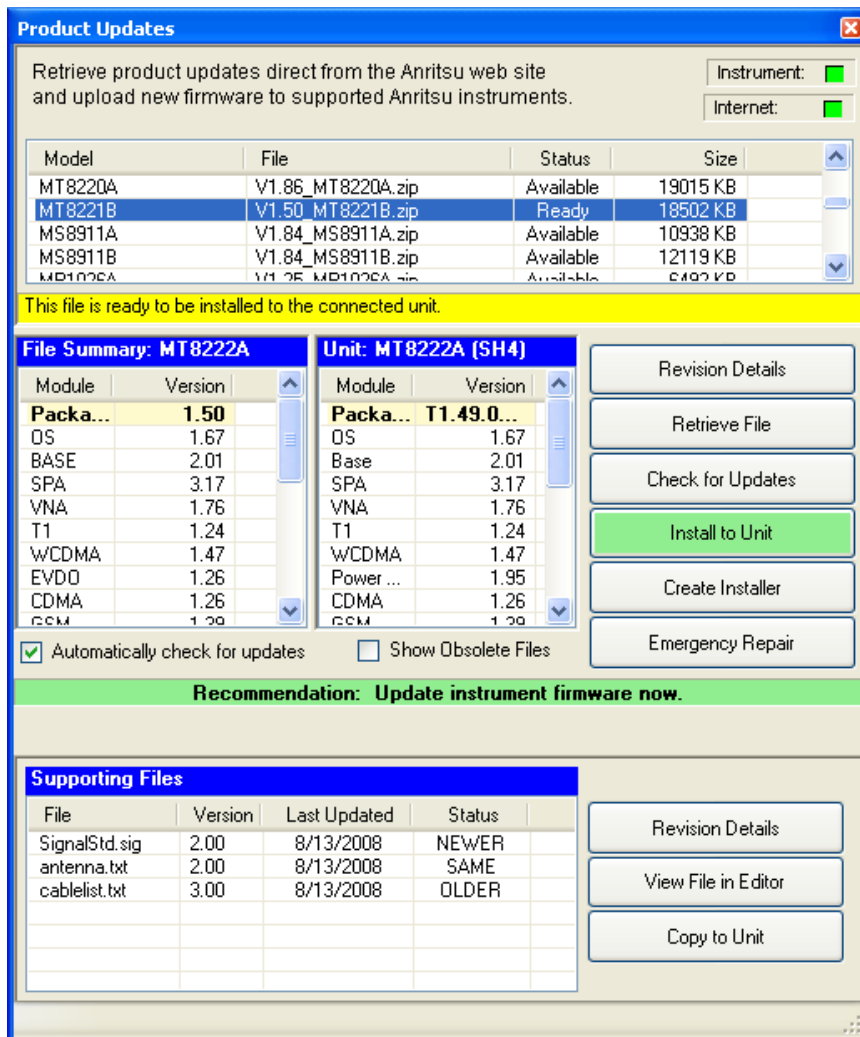


**Figure 8-8.**   Product Updates Window:  Status Ready

**11.** Highlight the firmware that you wish to load into your BTS Master. If its status is "Ready", then the file is located on the PC, and the Emergency Repair button is active. If the file status is listed as "Available", then click on the Retrieve File button to download the file from the Anritsu web site to your PC. After the file has been downloaded, its status changes to Ready. Highlight that file.

| | **For Files Not Listed** |
|---|---|
| **Note** | If the file that you are looking for is not on the list, then:<br><br>Click the "Check for Updates" button to obtain the latest list from the Anritsu Web site.  This updates the Products Updates screen.<br><br>If a zip (compressed) file was sent to you from Anritsu Company, then:<br><br>Copy the zip file to the MST folder. The default location is C:\Program Files\Anritsu\Anritsu Master Software Tools\Archives<br><br>Select the box next to "Show Obsolete Files" at the bottom of the Product Updates screen. This updates the list. |

**12.** Click the Emergency Repair button in the Product Updates window. The OS Recovery window opens.
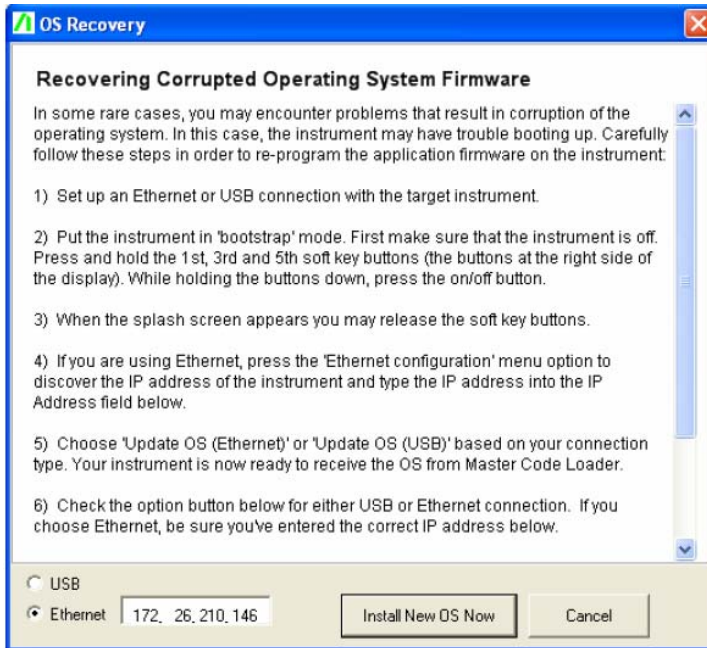


**Figure 8-9.**   OS Recovery Window

**13.** In the OS Recovery window, click the Ethernet option button (at the bottom of the window, under the USB option button).

    **a.** Enter the IP address of your BTS Master.

    **b.** Click the "Install New OS Now" button. Master Software Tools connects to your BTS Master and begins to install the firmware. Progress messages appear above the buttons. Be patient, the installation can take several minutes.

**14.** When your BTS Master is done loading the new OS firmware, it should automatically reboot. If it does not reboot, turn off the BTS Master, then turn it on. The BTS Master should start up normally.

# Appendix A — Measurement Guides

## A-1    Introduction

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

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

| BTS Master Feature (Required Option) | Related Document (Part Number) |
|---|---|
| Cable and Antenna Analyzer<br><br>High Voltage Bias Tee (0010) | Cable and Antenna Analyzer Measurement Guide (10580-00230) |
| Spectrum Analyzer<br><br>Interference Analyzer (0025)<br><br>Channel Scanner (0027)<br><br>CW Signal Generator (0028)<br><br>Gated Sweep (0090) | Spectrum Analyzer Measurement Guide (10580-00231) for *Firmware V1.69 and BEFORE*<br><br>Spectrum Analyzer Measurement Guide (10580-00244) for *Firmware AFTER V1.69* |
| High-Accuracy Power Meter (0019) | Power Meter Measurement Guide (10580-00240) |
| GSM/GPRS/EDGE RF Signal Analyzer (0040)<br>GSM/GPRS/EDGE Demodulated Signal Analyzer (0041)<br>W-CDMA/HSDPA RF Signal Analyzer (0044)<br>W-CDMA Demodulated Signal Analyzer (0045)<br>W-CDMA/HSDPA Demodulated Signal Analyzer (0065)<br>W-CDMA/HSDPA Over-the-Air Signal Analyzer (0035)<br>TD-SCDMA/HSDPA RF Signal Analyzer (0060)<br>TD-SCDMA/HSDPA Demodulated Signal Analyzer (0061)<br>TD-SCDMA/HSDPA Over-the-Air Signal Analyzer (0038)<br>LTE RF Measurements (0541)<br>LTE Modulation Measurement (0542)<br>LTE Over-the-Air Measurements (0546) | 3GPP Signal Analyzer Measurement Guide (10580-00234) |

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

| BTS Master Feature (Required Option) | Related Document (Part Number) |
|---|---|
| cdmaOne/CDMA2000 1X RF Signal Analyzer (0042)<br>cdmaOne/CDMA2000 1X Demodulated Signal Analyzer (0043)<br>cdmaOne/CDMA2000 1X Over-the-Air Signal Analyzer (0033)<br>CDMA2000 1xEV-DO RF Signal Analyzer (0062)<br>CDMA2000 1xEV-DO Demodulated Signal Analyzer (0063)<br>CDMA2000 1xEV-DO Over-the-Air Signal Analyzer (0034) | 3GPP2 Signal Analyzer Measurement Guide (10580-00235) |
| IEEE 802.16 Fixed WiMAX RF Signal Analyzer (0046)<br>IEEE 802.16 Fixed WiMAX Demodulated Signal Analyzer (0047)<br>IEEE 802.16 Mobile WiMAX RF Signal Analyzer (0066)<br>IEEE 802.16 Mobile WiMAX Demodulated Signal Analyzer (0067)<br>IEEE 802.16 Mobile WiMAX Over-the-Air Signal Analyzer (0037) | WiMAX Signal Analyzer Measurement Guide (10580-00236) |
| DVB-T/H Measurements (0064) | Digital Video Broadcast Signal Analyzer Measurement Guide (10580-00237) |
| T1 Analyzer (0051)<br>E1 Analyzer (0052)<br>T3/T1 Analyzer (0053) | Backhaul Analyzer Measurement Guide (10580-00238) |
| PIM Analyzer (0419) | PIM Master User Guide (10580-00280) |
| Performance Specifications | BTS Master Technical Data Sheet (11410-00433) |
| Programming Manual | BTS Master Programming Manual (10580-00208) |
| Maintenance Manual | BTS Master Maintenance Manual (10580-00158) |
| Documentation | Handheld Instruments Documentation Disc (10920-00060) |
| Computer Software Applications | Master Software Tools CD-ROM (2300-498) or Download<br><br>Anritsu Tool Box with Line Sweep Tools DVD (2300-530) or Download |

# Appendix B — Error Messages

## B-1    Introduction

This chapter provides a list of information and error messages that could be displayed on the MT8222A BTS Master. If any error condition persists, contact your local Anritsu Service Center (http://www.anritsu.com/Contact.asp).

## B-2    Self Test or Application Self Test Error Messages

### Overall Status FAILED

One or more elements of the System or Application Self Test has failed. Refer to the other pass fail tests listed below to determine which specific test failed.

### ADC Self Test FAILED

The Analog to Digital converter failed to return an answer. Insure that the battery level is adequate for operation or that the temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

### DDC FAILED

The Digital Down Converter failed to return a value. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

### Lock Test FAILED

One or more Phase Lock Loops Failed to properly achieve Lock Status. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

### Over Power FAILED

RF Power applied to the input connector is too high. Remove or reduce the input power or add additional attenuation. Sometimes out of band frequencies may be present that can cause an Over Power Error. In highly rich RF environments it may be necessary to add an external band pass filter to reduce unwanted interference. See the accessories section for a list of available band pass filters from Anritsu. Out of band frequencies can often be detected by increasing the Span to maximum in the peak detect mode of operation. Another resolution may be to reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Over Power Start FAILED

RF Power applied to the input connector is too high at turn on. See Over Power FAILED error above.

Mixer Saturation:  Increase Attenuation

or

Mixer Overdrive FAILED

Too much power applied with too little Attenuation. Increase attenuation. Sometimes even out of band frequencies may be present that would cause a Mixer Overdrive Error. In highly rich RF environments it may be necessary to add an external band pass filter to reduce unwanted interference. See the accessories section for a list available band pass filters from Anritsu. Out of band frequencies can often be detected by increasing the SPAN to maximum in peak detect mode of operation. Another resolution may be to Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

# B-3   Operation Error Messages

ADC Over range:  Increase Reference Level

Input signal is too large for the Analog to Digital converter to process. Increase the internal or external attenuation or, if using Auto attenuation, increasing the Reference Level should resolve the error. See also the Mixer Overdrive error above for information on Out of band RF power.

Calibrator Reading Error

Calibration reference source is not providing quality signal. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Fatal Error

Usually caused by a failure to communicate with one section or another. Sometimes resolved by restarting the unit or by Factory Defaults, ESC+ON, resetting of the unit. Under extreme cases the use of MASTER RESET, System+ON, may resolve the issue. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Trace not saved. Please wait for complete sweep and try again.

Attempted to save a measurement trace before the sweep had completed at least once. Wait for at least one complete sweep and try to save again.

Measurement not valid in Zero Span

Attempt was made to make an automated measurement that requires more than ZERO SPAN to accomplish. An example would be Occupied Bandwidth measurement.

The Freq range of the Antenna is invalid for this setup. Please select another Antenna

Choose a start and stop frequency that is within the defined frequency range for the selected antenna compensation table. See also Master Software Tools for creation and Upload of Antenna correction files.

Minimum permitted Sweep time is 50 μs

An attempt was made to set the minimum Sweep time to less than 50 μs.

Invalid Attenuation for Preamp

The only valid attenuation settings while the Preamp is operational are 0 dB and 10 dB. All other settings attempted by the user will result in this message. Select 0 dB or 10 dB or select AUTO Attenuation to let the system determine the correct setting based on the reference level selected.

Valid Attenuations with Preamp on are 0 dB and 10 dB

Same as above

Unable to add additional limit points. %d is the maximum.

Attempted to add an additional limit line point beyond the maximum number of allowed points.

Use Demod type USB or LSB to use Beat Frequency Osc

An attempt to use the Beat Frequency Oscillator while not in Upper or Lower Sideband Demodulation mode.

Trace A/B/C has no data to view

Attempt to turn on or VIEW a trace that has never had data recalled into this trace location. Refer to Recall Trace section for instructions on how to recall stored measurement traces into either Trace A, B or C.

Locking to Internal Ref failed

Switching from an external frequency reference to the internal reference has failed. Some additional warm up time may be needed if the unit has been on external reference for a long time or the unit is not warmed up enough.

Locking to External Ref failed; Lock attempt Failed

Switching from an internal frequency reference to the external reference has failed. Verify that the correct external reference frequency value has been selected from the list of valid external reference frequencies. Verify that the level of the external reference frequency is at least 1vp-p.

Fatal error, EEPROM failed

Hardware communications between modules has failed. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Fatal error, no SPA board connected

Hardware communications between modules has failed. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Operation not Permitted in Recall Mode

Attempted to perform an operation on a recalled trace. Many operations are valid only on a live or active trace.

Cannot change scale in Linear mode

Linear display mode of operation does not support a scaling change in the same manner as the Log display mode.

Cannot turn on delta marker because Ref Marker is invalid

Delta markers cannot be enabled unless the primary marker is within the displayed span.

Cannot turn on delta marker because Ref Marker is a counter Marker

Delta markers cannot be enabled unless the primary marker is NOT a counter Marker. Turn off the Counter Marker mode of marker operation to use Delta Marker.

Current Marker is not ON

Attempted to use a marker mode or feature for a marker that is not enabled. Turn on the appropriate marker to use this function or switch to a marker that is already enabled.

Marker must be ON to Use the feature

Attempted to use a marker mode or feature for a marker that is not enabled. Turn on the appropriate marker to use this function or switch to a marker that is already enabled.

Triggering valid only in Zero Span

External triggering can only be used while the SPAN is set to 0 (zero)

Cannot change Modes for Recalled/Inactive Traces

Detection modes or other elements such as RBW/VBW, averaging, and so forth, cannot be altered on a recalled trace. The trace is displayed with the same parameters in which it was saved.

Cannot change average for Recalled/Inactive Traces

Cannot set Delta Detection modes or other elements such as RBW/VBW, averaging, and so forth, cannot be altered on a recalled trace. The trace is displayed with the same parameters in which it was saved.

Pretune Calibration Table fault

Ensure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Lock failed during initialization

One or more of the Phase Lock Loops failed to achieve lock status during startup. Insure that the battery level is adequate for operation or that temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Reference LVL Cal is OFF

Factory Calibration is OFF. Insure that the battery level is adequate for operation or that the temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

IF Cal is OFF

Factory Calibration is OFF. Insure that the battery level is adequate for operation or that the temperature is within acceptable limits. Reset to factory defaults with either Factory Defaults, ESC+ON, or MASTER RESET, System+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Cannot set Delta Mkr Freq to Demod Freq

Marker to Demod frequency is only available with a primary marker as the selected marker.

Fan Failure

The system has determined that the fan should be running due to the internal temperature of the unit, but cannot detect that the fan is actually running.

It is important to keep the fan inlet and exhaust ports clear of obstructions. The cooling fan will vary the speed in relation to the internal temperature of the instrument. The fan will turn on at low speed when the internal temperature of the instrument reaches 44ºC, and will increase the fan speed to maximum at 54ºC. As the internal temperature of the instrument decreases, the fan will reduce speed until the temperature reaches 39ºC, at which point the fan will turn off.
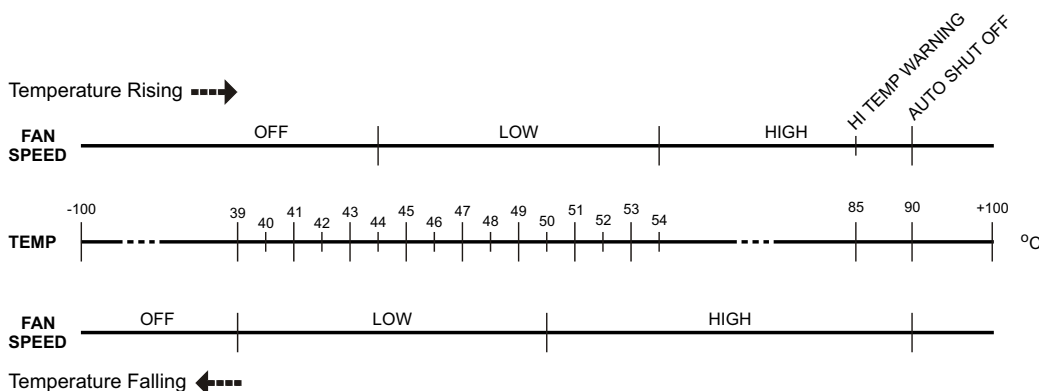


**Figure B-1.**    Fan Speed versus Temperature

High Temp Warning

The internal temperature has reached an excessive level, 85ºC. Verify that the ventilation openings are unobstructed and that the fan is running. Internal temperatures may be manually verified by using the SELF TEST function. Turn off the unit and allow the temperature to cool down. If the fault is not resolved and the internal temperature reaches 90ºC, a countdown of 10 seconds will begin to give the user a chance to save the current setup before it will turn itself off before internal temperatures can cause any damage. If the error persists after removing any obstructions and allowing the unit to cool, reset to the factory defaults with either Factory Defaults, ESC+ON. Caution: Use of MASTER RESET, System+ON, will erase all user saved setups and measurement traces and return the unit to a fully Factory Default condition. If the error persists, contact your Anritsu Service Center.

Copy failed. Please check External USB Memory

Attempt to copy user saved data to the external USB Flash drive has failed. Do not attempt to remove or power down the unit before the copy has completed. Be sure that the USB memory device is not already full and that it is fully inserted into the USB connector .

PLL Lock Fail

Phase Lock Loop failed to lock.

Trace not saved. Please wait for complete sweep and try again.

Attempted to save a measurement trace before the sweep had completed at least once. Wait for at least one complete sweep and try to save again.

# Appendix C — LAN and DHCP

## C-1    Introduction

This appendix describes network connections for the MT8222A BTS Master.

## C-2    Ethernet Configuration

### LAN Connection

The RJ-45 connector is used to connect the BTS Master to a local area network. 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. The instrument IP address is set by pressing the **Shift** key, then the **System** (8) key followed by the System Options submenu key and the Ethernet Config submenu key. The instrument Ethernet address can be set automatically using DHCP, or manually by entering the desired IP address, gateway address, and subnet mask.

| | |
|---|---|
| | 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. |
| **Note** | 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 MT8222A to the network and select DHCP protocol in the Ethernet Config menu.

Turn the BTS 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 submenu key and the Ethernet Config submenu key. The IP address will be displayed as shown in Figure C-1. The image on the display panel of your BTS Master may differ from the image shown here.
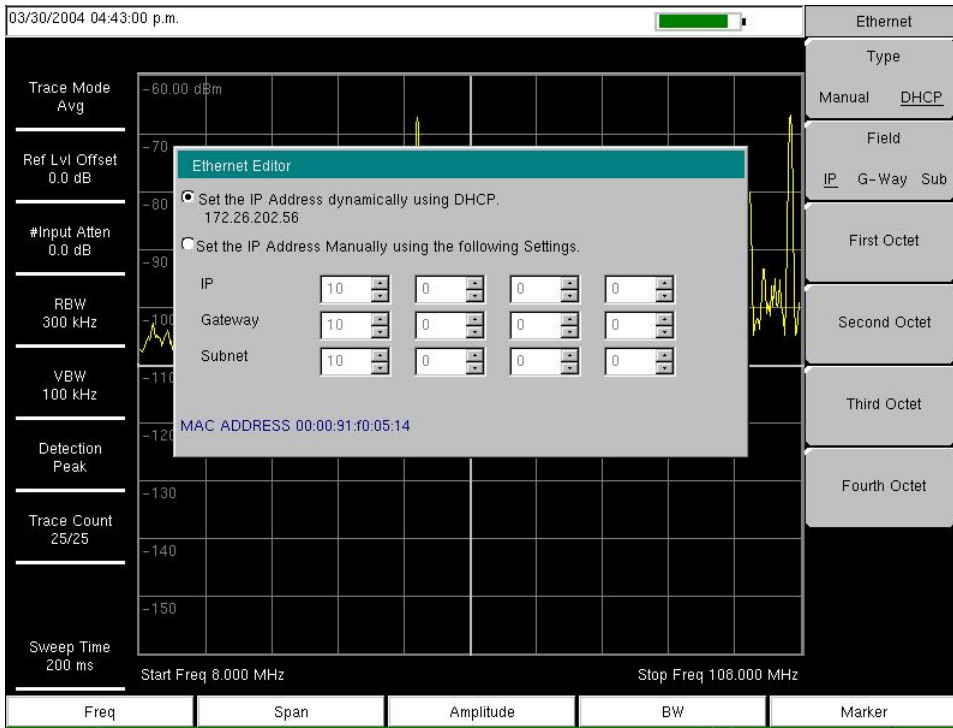


**Figure C-1.**   IP Address Assigned Using DHCP

## 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.
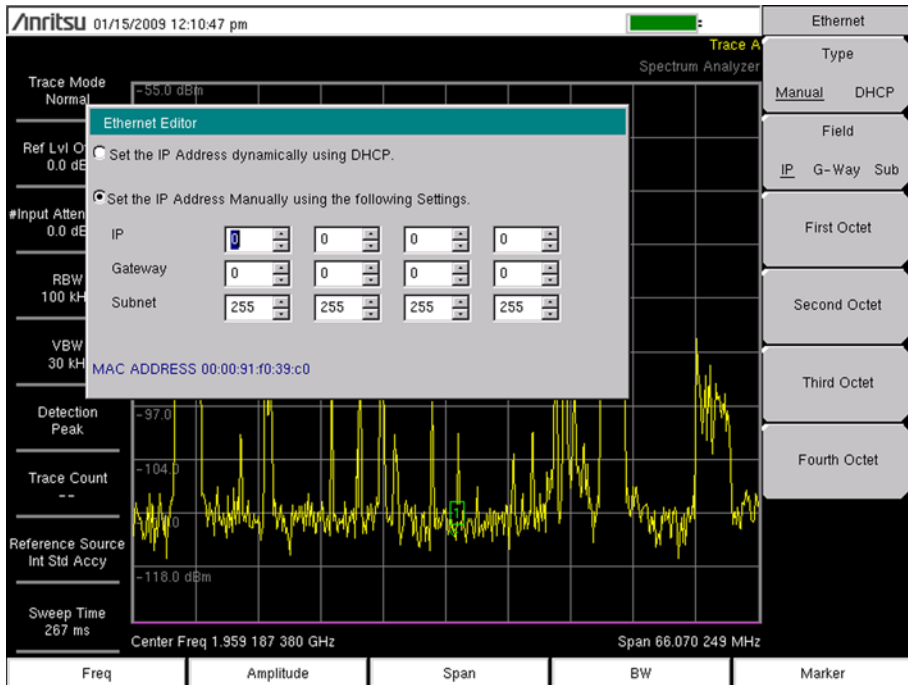


**Figure C-2.**   Setting IP Address Manually

## Ethernet Menu

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

| Ethernet |
|---|

**Type**
**Manual   DHCP:** 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 **Left/Right** arrow keys to select the field that is to be modified. Use the keypad, the **Up/Down** arrow keys, or the rotary knob to enter the input. Press **Enter** to accept the changes, or press the **Esc** key to return to normal operation without changing anything.

**Field**
**IP   G-Way   Sub:** Press this submenu key to select the desired Internet Protocol Property to be edited.

**First Octet:** Moves the cursor to the left most column of the selected IP properties field.

**Second Octet:** Moves the cursor to the second column from the left of the selected IP properties field.

**Third Octet:** Moves the cursor to the third column from the left of the selected IP properties field.

**Fourth Octet:** Moves the cursor to the forth column from the left of the selected IP properties field.

Menu items (left column):
- Type — Manual / DHCP
- Field — IP / G-Way / Sub
- First Octet
- Second Octet
- Third Octet
- Fouth Octet

**Figure C-3.**   Ethernet Menu

# C-3    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.

| Note | The MT8222A 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: 10.0.0.2

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
```

# C-4   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:

| Note | The ipconfig 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
```

# C-5   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
```

# Index

PN: 10580-00156  Rev. T

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