860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

OPERATION MANUAL

Table of Contents

Section I: The Basics

Section II: Installer Functions

Section III: Service Functions

Section IV: Setup Functions

Section V: Utility Functions

Section VI: Appendix

TRILITHIC

Trilithic Company Profile

Trilithic is a privately held manufacturer founded in 1986 as an engineering and assembly company that built and designed customer-directed products for telecommunications, military and industrial customers. From its modest beginnings as a two-man engineering team, Trilithic grew over the years and broadened its offerings of RF and microwave components by adding broadband solutions to its product line. This was accomplished with the acquisition of components manufacturer Cir-Q-Tel and instruments manufacturer Texscan.

Today, Trilithic is an industry leader providing telecommunications solutions for major broadband, RF and microwave markets around the world. As an ISO 9000:2001 certified company with over 40 years of collective expertise in engineering and custom assembly, Trilithic is dedicated to providing quality products, services, and communications solutions that exceed customer expectations.

Trilithic is comprised of five major divisions:

- **Broadband Instruments and Systems**
  Offers test, analysis, and quality management solutions for the major cable television systems worldwide.

- **RF Microwave Components**
  Provides components and custom subsystems for companies specializing in cellular, military, and other wireless applications.

- **Emergency Alert Systems**
  Leading supplier of government-mandated emergency alert systems used by broadcast TV, cable TV, IPTV, DBS, and radio stations.

- **XFTP**
  Offers a specialty line of field technical products for cable operators and technicians, as well as a line of products for installing electronics in the home of the future.

- **Network Services**
  Provides network data management and support services to safeguard and protect your network and data by employing certified, experienced, and dedicated network engineers.

Table of Contents

860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section I: The Basics

TRILITHIC

Helpful Website

The following website contains general information which may be of interest to you:

http://www.trilithic.com

Trilithic's website contains product specifications and information, tips, release information, marketing information, Frequently Asked Questions (FAQs), bulletins and other technical information. You can also check this website for product updates.

The following website contains information about the 860 DSP and 860 DSPi which may be of interest to you:

http://www.860DSP.com

Where to Get Technical Support

Trilithic technical support is available Monday through Friday from 8:00AM to 5:00PM EST. Callers in North America can dial 1-317-895-3600 or 1-800-344-2412 (toll free). International callers should dial 1-317-895-3600 or fax questions to 1-317-895-3613. You can also email technical support at *techsupport@trilithic.com*.

For quicker support response when calling or sending email, please provide the following information:

- Your name and your company name

- The technical point of contact (name, phone number, email)

- The 860 DSPi serial number, firmware and hardware version numbers

- A detailed description of the problem you are having, including any error or information messages

How this Manual is Organized

Thank you for choosing the 860 DSP or 860 DSPi. This manual is provided with the 860 DSP and 860 DSPi to help the user become better acquainted with the device and to become productive faster. This manual is divided into the following sections:

- **Section I: The Basics** - provides Trilithic contact information, describes how this operation manual is structured, and gives an overview of the instrument and its basic features. Before using the instrument, it is recommended that the user read this section for an overview of features, setup, basic commands and other important details. There is also a section on how to store measurement data.

- **Section II: Installer Functions** - is full of instructions on how to use the features shown in the **Installer** Menu of the instrument. This section is written as though the user is familiar with the basic operation of the instrument and is broken into chapters for each function.

- **Section III: Service Functions** - is full of instructions on how to use the features shown in the **Service** Menu of the instrument. This section is written as though the user is familiar with the basic operation of the instrument and is broken into chapters for each function.

- **Section IV: Setup Functions** - is full of instructions on how to use the features shown in the **Setup** Menu of the instrument. This section is written as though the user is familiar with the basic operation of the instrument and is broken into chapters for each function.

- **Section V: Utility Functions** - is full of instructions on how to use the features shown in the **Utility** Menu of the instrument. This section is written as though the user is familiar with the basic operation of the instrument and is broken into chapters for each function.

- **Section VI: Appendix** - provides instrument specifications and warranty information.

Conventions Used in this Manual

This manual has several standard conventions for presenting information.

- Connections, Menus, menu options, and user entered text and commands appear in **bold**.
- Section names, Web and email addresses appear in *italics*.

> **Note:** A note is information that will be of assistance to you related to the current step or procedure.

> **CAUTION:** A caution alerts you to any condition that could cause a mechanical failure or potential loss of data.

> **WARNING:** A warning alerts you to any condition that could cause personal injury.

Precautions

> **WARNING:** The battery **MUST** be charged with the Trilithic charge cube (15 V at 2 A) provided with the instrument. Using any other charge cube may damage the battery.

> **WARNING:** The maximum "RF" input voltage to the meter is 90 V (AC or DC). A larger voltage will damage the meter.

> **CAUTION:** The accuracy of the meter may be affected when in a strong electromagnetic field.

> **CAUTION:** Do not use the instrument in any manner not recommended by the manufacturer.

Recommended Software and Hardware

The following software is recommended for advanced configuration and data management of the 860 DSP or 860 DSPi:

- **WorkBench** is a Windows-based web-linked software application that supports and augments the many functions and features of the instrument, making it easier to update/ upgrade your instrument, using an intuitive PC graphic user interface. WorkBench is especially helpful for keeping track of a fleet of devices, to make sure all technicians are working with the same features, channel plans and test processes. With WorkBench, you can quickly and easily install and configure additional optional performance features by purchasing them, downloading them from the Trilithic website, and installing them at your convenience.

    - Simplifies device inventory management.

    - Stores measurement results.

    - Makes firmware updates easier, resulting in improved accuracy and productivity.

    - Enables configuration of devices including channel plans and automated tests ensuring consistency in measurement procedures.

    - Optional TDM component in WorkBench provides communication link with instruments in the field.

- **Test Data Management Integrated Server Package** is a pre-configured server, integrating powerful software applications and hardware to provide a tailored, comprehensive solution for managing test data and field analyzer inventory. It comes equipped with TDM (Trilithic Data Manager) server software and one onboard WorkBench application. The Trilithic TDM is a server application that enables remote configuration of the 860 DSP or 860 DSPi, collection of measurement records, and instrument update and feature addition via Internet.

    - Enables in-field device configuration updates.

    - Upload or download measurement data for records.

    - "One-click" send and receive data.

    - Interfaces with records, work order management, and third party diagnostic information; facilitates inventory, work order completion tracking, etc.

    - Messaging interface for broadcast or individual technician communication.

    - All server software is pre-installed on a high performance server, ensuring reliability and minimizing system activation time.

- The **Trilithic Data Manager (TDM)** makes keeping field meter firmware up to date simple by notifying the technician that an update is available when he/she enters the **Browser** mode. Automated tests can be programmed and deployed to meters in the same way, to ensure consistent testing and comparable results. The Trilithic TDM interfaces with Trilithic's WorkBench application, which keeps measurement data for historical records, accessible from the NOC, and tied to a work order. It also interfaces with third-party work order management applications.

Introduction 2

Overview

Congratulations! You're the owner of Trilithic's 860 DSP or 860 DSPi, a multifunction, interactive cable analyzer. Specifically designed for the digital age, the instrument performs a wide range of network and analog / digital signal quality tests and can also serve as a data terminal for work orders and other documentation.

Two versions of the instrument are offered, the 860 DSPi, modem-equipped and configured for digital installations; and the 860 DSP itself, without a modem and offering the feature set and performance needed for distribution and headend maintenance.

Easily tailored to meet changing needs and applications, the instrument can be re-configured through options as an advanced analog signal analyzer, a QAM / QPSK digital signal analyzer, high-resolution spectrum analyzer, modem tester or data terminal communicating by DOCSIS and other interface protocols.

With return path options the instrument can perform all of the functions of Trilithic's RSVP and 9580 SSR return test field units and is fully compatible with Trilithic's Guardian Reverse Path Maintenance System. Options also allow the instrument to be converted into a modem-equipped 860 DSP with all of the features of both instruments.

860 DSP and 860 DSPi Base Models

Trilithic offers the following base 860 DSP and DSPi configurations:

- 860 DSP (P/N 201097001F)
- 860 DSPi with US DOCSIS 2.0 Modem (P/N 201097100U)
- 860 DSPi with Euro DOCSIS 2.0 Modem (P/N 201097110U)
- 860 DSPi with US DOCSIS 3.0 Modem (P/N 2011097200U)
- 860 DSPi with Euro DOCSIS 3.0 Modem (P/N 201097210U)

Features

Adaptability

DSP-based, the instrument can easily be enhanced by downloading software options and features from the Trilithic website, *www.trilithic.com*. Many of the firmware updates are free, and most do not require hardware changes.

Durability and Convenience

The instrument is housed in a durable shock-resistant plastic housing, which is further protected by an integral rubber boot and enclosed in a padded bag. A hand strap and a rubber nonslip grip allow the operator to hold the instrument securely with one hand in all weather conditions. A shoulder strap allows you to carry the instrument hands-free.

> ⚠️ **WARNING:** Never use a shoulder strap while climbing or working where the strap could catch on something in a fall.

User Friendly

The operator interface of the instrument is based on familiar PC-like conventions, with displays and controls presented as desktops, icons, drop down menus and soft keys. Often-used test sequences can be assembled into "Macros", sequences of several different tests that can then be executed at the push of a button or at specified times or intervals.

> **Note:** See **Section II: Installer Functions**, Chapter 13: Auto Test Mode to learn how to setup an Auto Test Macro.

Standard Functions

Your instrument is equipped with a number of standard functions and may also be equipped with one or more optional functions. All 860 DSPi's tune to the 4 - 65 MHz reverse frequency spectrum. Other advanced features include measurement of hum, carrier/noise ratios on active channels and CSO/CTB. All 860 DSPi's are equipped to store measurement data records which can be accessed at a later time.

WorkBench Software

WorkBench is the Windows-based companion software for your instrument. This software manages all the support aspects of your instrument including configuration, data transfer, and installation of updates and options.

Configuration

WorkBench allows you to choose and edit channel plans and configuration packages, set signal and noise measurement bandwidths, select measurement units, define various parameters and set performance limits for auto test functions. This software also allows you to customize your instrument to meet your specific needs and preferences.

Data File Transfer

Your instrument can capture and store various data including performance to user set limits, which can later be transferred to a PC running WorkBench. Types of data stored include analog signal amplitudes, digital signal powers, carrier/noise ratios, BER and other measures of digital performance, and key return path measurements. In addition to simple records, the instrument can assemble and store comprehensive reports of signal quality which can later be transferred to WorkBench for review. The results of running Auto Test macros are automatically stored.

Updates and Adding Options

WorkBench software gives you a powerful tool for keeping your instruments up to date. New capabilities and options can be added to your instrument in the field by simply downloading firmware. WorkBench manages this process, by acquiring new firmware from disk or directly from the Trilithic website, evaluating your instrument and advising you if updates are absent.

Getting to Know Your 860 DSPi ◆ 3

Overview

Before using your instrument take a few minutes to familiarize yourself with the instrument, its basic conventions and its navigational tools. This section provides a brief overview of the instrument's features, buttons, and controls.

Front Panel:

1. Outer Case

2. Display Screen

3. Textured Hand Grip and Strap

4. Yellow Softkeys

5. Alphanumeric Keypad

6. Arrow Buttons

7. Audio Speaker

8. Red Operation Buttons

9. Power Button

Top:

10. Connector for Future Expansion

11. SLM/Forward RF Connector

12. Reverse/Both RF Connector

Right Side:

13. Charge Jack

14. PC Cable Connector

15. Battery Access

16. USB Port (Not functional, but does supply voltage to power an accessory)

17. Ethernet Connection (Optional)

TRILITHIC

Battery Charging

Before you can use your instrument, you will need charge its battery. Your instrument's battery pack provides approximately 4 hours of power during continuous operation. (The 860 DSPi is also equipped with an extra battery used with the internal cable modem, typically extending the battery life to six hours of continuous operation.)
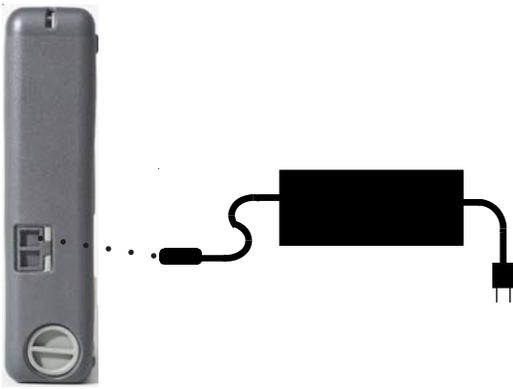
The instrument comes with a charge cube which can be used to charge the battery in approximately 4 hours or to trickle charge the battery while the instrument is in use.

Plug the charge cube into the instrument's charge jack on the right side of the instrument. The charge jack and the PC cable connector are located under a dual rubber flap. Pull the flap back. The charge jack is the top hole.

Your instrument is equipped with a "smart" battery charging circuit so that the charging method (*fast or trickle*) is an auto function. *Fast Charge* is used to charge the battery quickly when the unit is off. *Trickle Charge* is used when the instrument is turned on.

Every time your instrument is plugged into the charging cube, it starts charging automatically via the *Trickle Charge* method. If the unit determines *Fast Charge* is necessary, it defaults to the *Fast Charge* method when the instrument is off.

Replacing the Battery

The battery in your instrument has been installed at the factory. Should you need to replace it, rotate the **Battery Access Latch** *(located below the PC cable connector)* counter clockwise to open it.

The 860 DSPi is also equipped with an internal battery used with the internal cable modem. For instructions on replacing this battery or for replacement batteries call Trilithic.

Charge Jack

PC Cable Connector

Battery Access Latch (turn COUNTER clockwise to open)
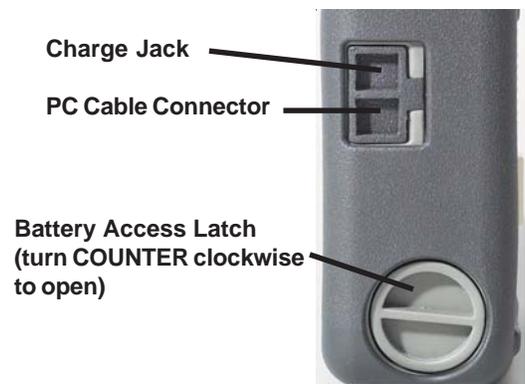
> ⚠ **CAUTION:** Be sure your instrument is turned OFF before removing the battery access latch.

The Display Screen

The instrument has been designed with simple, intuitive navigational tools. For your convenience, the display has a large, easy to read, menu style navigation. In some menus you will also notice on-screen cursors which enhance functions.

Once the instrument's battery is charged, you may turn the instrument on by pressing the ⏻ button at the bottom left of the keypad.

The instrument will briefly display the introduction screen before displaying the **Installer** Menu.

> **Note:** The introduction screen may be customized to include the user name and company's name. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings* to learn how to customize your introduction screen.

The display screen contains several tools which you should become familiar with before using the instrument. Take a moment to locate the basic features of the display screen.
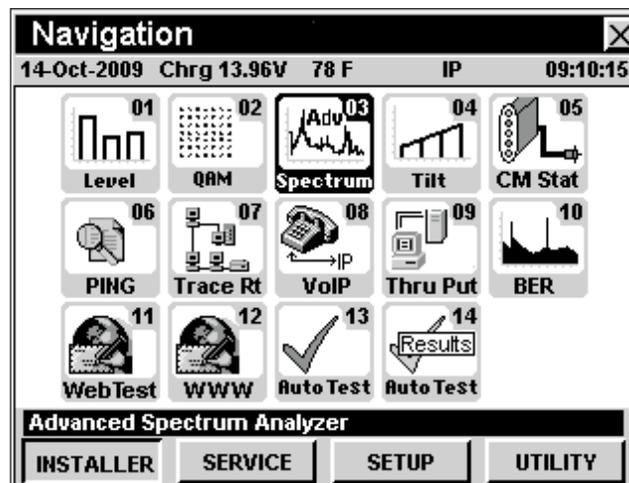
Title Bar

The title bar along the top of the screen indicates which screen is displayed, such as the **Navigation** Menu shown above.

Status Bar

Directly below the title bar is a gray status bar which displays the date, the battery voltage, the battery charging status, the temperature, the communications status and the time. Possible communications status indicators are IP, TCP, COM, RDY AND -----.

| 12-Oct-2009 | Chrg 14.20V | 89 F | | IP | 07:56:26 |

> **Note:** When the battery is fully charged, the status bar will display approximately 7.95 V. When the battery is low, the status bar will display approximately 6.50 V.

Main Display Area

The main display area, located below the status bar, displays text and graphic information such as selection icons, graphs, and interactive pop-up boxes which vary depending on which screen has been accessed.
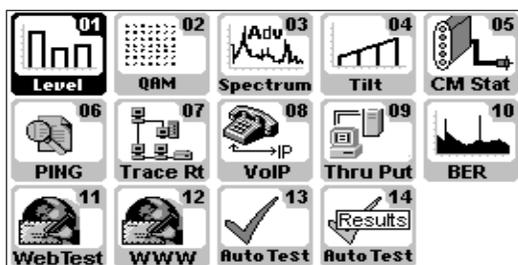
> **Note:** A navigation menu (as shown above) is always displayed when the instrument is first turned on. By default, the instrument displays the **Installer** Menu with the **Level** icon highlighted. The instrument will automatically display the navigation menu and icon that was last used prior to the instrument being turned off.

Message Bar

Below the main display area is a black message bar. Single line text entries are displayed to help you navigate the 860 DSPi menus and show information when the instrument is performing tests. In some cases, the message bar will be split to show the status of your instrument, such as DSP OK, LOW SIGNAL, WAITING and other status messages.

| Single Channel Mode |

Softkey Labels

Below the message bar, are four softkeys which correspond to and identify the actions assigned to the four yellow buttons on the keypad.

The softkeys are used to toggle between different menus as well as access various functions within a menu screen.

Most menu screens utilize from one to four of the softkeys which can be used for taking readings, adjusting parameters and other operations.

For example: **Installer, Service, Setup, Utility**, etc.
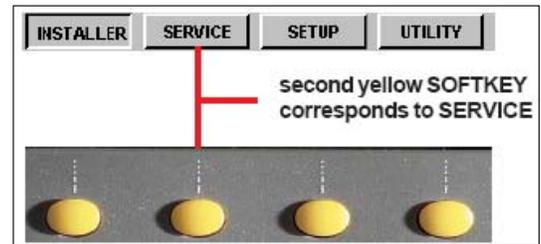
Input/Output Helper Icons

Several of the function screens on the 860 DSP or 860 DSPi include input helper icons. These icons are displayed to help you determine which RF port to connect the cable to use when using the instrument. The two RF ports are described as follows:

SLM/Forward Port

This port is used when the 860 DSP or 860 DSPi will receive data from the cable system.

Reverse/Both Port

This port is used to transmit data from the 860 DSP or 860 DSPi to the cable system.

> **Note:** When the active network port has been changed to Internal Modem, the 860 DSP or 860 DSPi will transmit and receive data through the SLM/Forward (input) port.

Basic Navigation 4

Introduction

The instrument is very flexible and easy to use. Using a combination of icons, menus and tabs you can navigate through a variety of modes and functions. It is important that you take a moment to become familiar with the basic navigational style and conventions of the instrument, so you can be more efficient using your new instrument.

This section will provide you with a brief overview of the simple navigational style and some of the common operating conventions of the instrument using:

- Alphanumeric Keypad

- Menu Icons

- Navigation Screens

- Arrow Buttons

- Red Operation Buttons

- Yellow Softkeys

> **Note:** For more detailed and specific instructions on setup or specific operating modes, refer to Sections II, III, IV, and V of this manual.

Let's Get Started!

Turn the instrument power on by pressing the ⏻ button at the bottom left of the keypad.

If your instrument is not charged you can connect it to AC power via its charge cube.

The instrument will briefly display the introduction screen before displaying the **Installer** Menu.
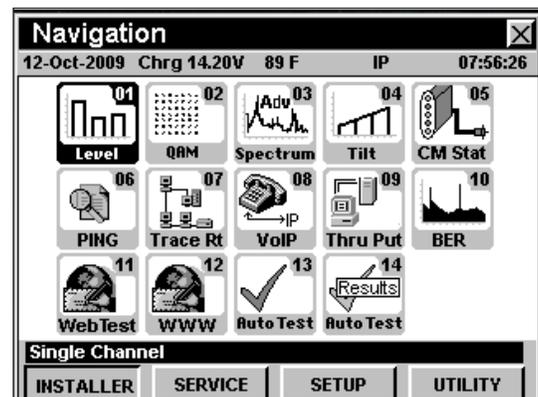
> **Note:** The introduction screen may be customized to include the user name and company's name. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings* to learn how to customize your introduction screen.

Selecting Menu Icons

The first time you power on your instrument, it will default to the **Installer** Menu. This first screen, displays a variety of icons which are labeled with a corresponding number and the operation they perform. This is your home page or "desktop" for the instrument and will be your starting point. Notice that the currently selected icon is highlighted black and the other icons remain gray.
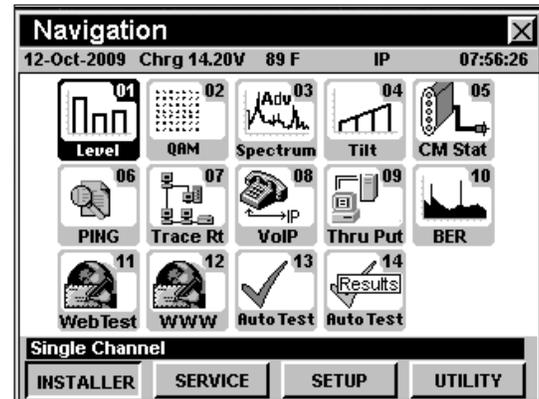
Note: The labels and the arrangement of the icons in these examples are the default settings of the instrument. The display's appearance may be customized and therefore may differ from your instrument's display. This can be done using your WorkBench software. See the WorkBench operation manual for more details.

Note: Icons are added to the instrument using WorkBench or during the installation of some new firmware packages.

There are two ways to select an operation from the menu; by using arrow buttons or by entering the corresponding two digit number using the alphanumeric keypad.

Arrow Buttons

To select an icon simply press the ⬆ ⬇ ◄ ► button(s) in the direction toward the icon you wish to select. With the desired icon highlighted in black, press the (Ent) button.

Alphanumeric Keyboard

To select an icon using the corresponding number, simply press the two digit numbers on the alphanumeric keyboard, (0), (1) for example for the **Level** icon. Icons 1 through 9 may also be selected by pressing one number button and the (Ent) button.

Using Softkeys

Most of the screens in the instrument utilize softkeys to access various modes, menus and functions. These softkeys are accessed simply using the corresponding yellow buttons located on the keypad directly below the display.

The **Navigation** Menus for example, utilize all four softkeys.

Each softkey supports a different **Navigation** Menu:

- **Installer**
- **Service**
- **Setup**
- **Utility**
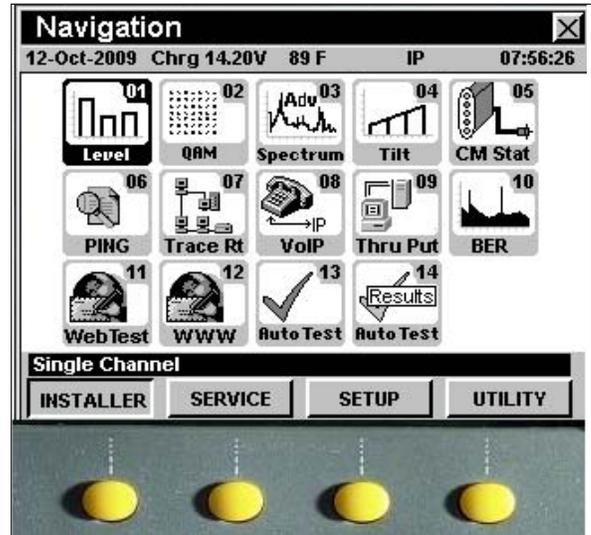
> **Note:** The functions on these softkey labels may vary depending on the instrument's current operating mode.

The **Installer** Menu displays the installer functions available with the instrument. All of the installer functions in this folder can be accessed using your arrow keys or by pressing the corresponding two digit number as you learned previously.

As well, if you select the **Service, Setup,** or **Utility** Menus using the corresponding softkey, the menu of choice will display the various functions available on your unit.

On some screens the softkeys are also used to access additional menus, additional information (such as channel plans) or quick access to other functions (using the Goto softkey).

> **Note:** The labels and the arrangement of the softkeys in these examples are the default settings of the instrument. The display's appearance may be customized and therefore may differ from your instrument's display. This can be done using your WorkBench software. See the WorkBench operation manual for more details.

Using Red Operation Buttons

The instrument has three red operation buttons on its keypad, which are used for navigation through various screens and functions. Those three buttons are the (Bk), (Fn), and (Ent) buttons.

Enter Button

The (Ent) button is used for a few different things. It is used to confirm selection of a highlighted item, such as an option or icon in a menu; when on an operation screen it can be used to open a pop-up entry window for a specific parameter; and it is used to accept entered information and to close an entry window.

Back Button

The (Bk) button is used to take you back to a previous screen or to close a menu. It can also be used to exit a pop-up entry window without accepting entry information.

> **Note:** If you hold down the (Bk) button, it will cause the instrument to go back multiple screens.

Function Button

The (Fn) button can be selected at any time to display a pop-up menu with additional functions. These functions vary from capturing screens for future reference to saving configuration files. The **Function** Menu also contains an item called "Context Help", which will display a brief explanation of the current screen.

> **Note:** If the instrument "locks up" or does not respond to user commands, reset the instrument by pressing and holding the (Fn) and (⏻) buttons for five seconds.

Using the Alphanumeric Keypad

The instrument makes use of an alphanumeric keypad similar to that of a telephone for entering both numbers and letters.

You can enter a name using the alphanumeric buttons on the keypad by pressing a button several times to cycle through its associated number and letters.

For instance, the ① button supports the number 1 and the letters A, B, and C. The ② button supports the number 2 and the letters D, E and F.

Two buttons are used for additional items. The ⓪ button which supports the number 0, is also used to put a "space" between other letters or numbers and the Ⓕⓝ button can be used as a period or decimal.

In some instances you will also need to utilize the ▶ button to advance the cursor to the next space.

> **Note:** The easiest way to learn how the alphanumeric buttons work is to use them. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings* to learn how to enter your operator name and company name using the alphanumeric buttons.

Once you have become familiar with the basic operation of the instrument, you are ready to begin using your instrument. Although the instrument is delivered from the factory ready-to-use, you will want to setup a few preliminary parameters to get started using the instrument effectively.

For this reason it is recommended that you setup your instrument's channel plan, including any digital channels you may have on your cable system. And if you have an 860 DSPi, you will want to setup your internal cable modem and network connection. Refer to the following areas of this Operation Manual for more information on how to:

- Learn a Channel Plan - **Section IV: Setup Functions,** Chapter 2: Instrument Setup Mode, *Edit Channel Plan Settings*

- Edit a Channel Plan - **Section IV: Setup Functions,** Chapter 2: Instrument Setup Mode, *Edit Channel Plan Settings*

- Configure a Cable Modem and Network Connection - **Section IV: Setup Functions,** Chapter 2: Instrument Setup Mode, *COM/NET Settings*

- Configure a Wi-Fi Connection - **Section IV: Setup Functions,** Chapter 2: Instrument Setup Mode, *Wi-Fi Settings*

Note: See the 860 DSP and 860 DSPi quick start guide that was delivered with the instrument for more information about how to perform the preliminary setup of the instrument.

Basic Function Menu Options   6

Introduction

The **Function** Menu can be accessed by pressing the (Fn) button while in any of the **Navigation** Menus or from within many of the instrument's modes.

This chapter will provide you with an understanding of the most common **Function** Menu options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log
- Switch to Modem, RJ45 Port, or Wi-Fi

Contrast / Freeze

This option is used to adjust the contrast level of the display screen or to freeze the display so you can study the display in detail before resuming the measurement.

> **Note:** This option cannot be accessed from within the **Auto Test Results**, **Calendar**, **Calculator**, and **CM Thru** Modes.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Contrast / Freeze**, and then press the (Ent) button. You may also select **Contrast / Freeze** by pressing the corresponding alphanumeric button.

- The **Function** Menu will close, the title bar will indicate **System Paused**, and the display will freeze.

- To adjust the contrast level of the display screen, press the (▲) (▼) buttons.

- To resume measurement, press any button on the instrument.
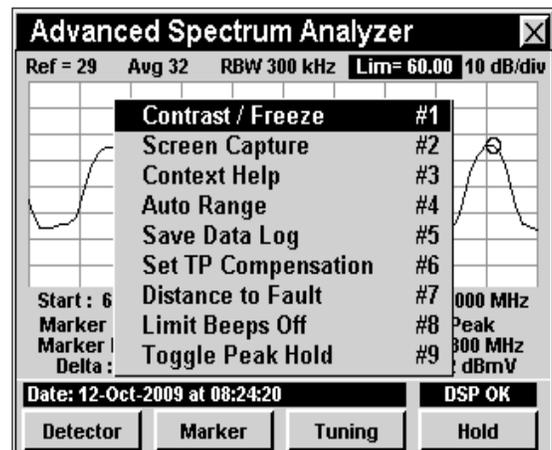
> **Note:** Upon start-up, the display screen may be very dark or light based on extreme environmental temperatures. Use this function to adjust the contrast level in order to correct the problem.

Screen Capture

This option is used to save an exact image of your measurements including all of the optional settings such as markers. This option will save the current screen as a compressed bitmap image file.

Screen captures can be downloaded from the 860 DSPi to WorkBench for later review. WorkBench also allows you to output a screen capture as a .bmp file for inserting it into a word processing document or slide presentation. For more information on downloading files to WorkBench, see the WorkBench operation manual.

> **Note:** This option cannot be accessed from within the **Auto Test Results**, **Calendar**, **Calculator**, and **CM Thru** Modes.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Screen Capture**, and then press the (Ent) button. You may also select **Screen Capture** by pressing the corresponding alphanumeric button.

- The **Function** Menu will close, the **Capture Screen Image** Window will open.

- Enter the file name of the screen capture using the alphanumeric keypad.

- Once the file name has been entered, press the (Ent) button. The file is now saved for retrieval using WorkBench.
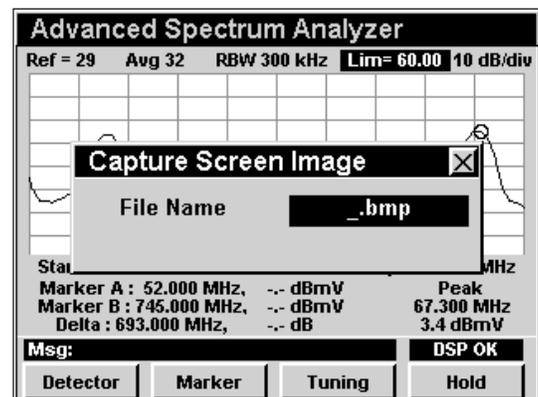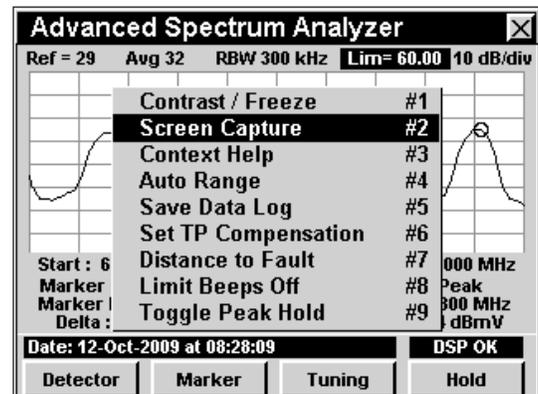
> **Note:** Files may be stored in .bmp, .lcd, or .bmpz format. The .bmpz format is the most memory efficient format. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* for more information about how to change the file format.

Context Help

This option is used to provide mode specific help and advice.

> **Note:** This option cannot be accessed from within the **Auto Test Results**, **Calendar**, **Calculator**, and **CM Thru** Modes.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Context Help**, and then press the (Ent) button. You may also select **Context Help** by pressing the corresponding alphanumeric button.

- The **Function** Menu will close and the **Help** Window will open.

- When done reading the help file, press the (Ent) button to return to the previous screen.
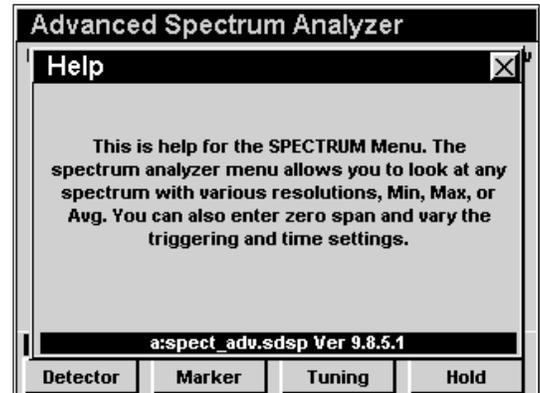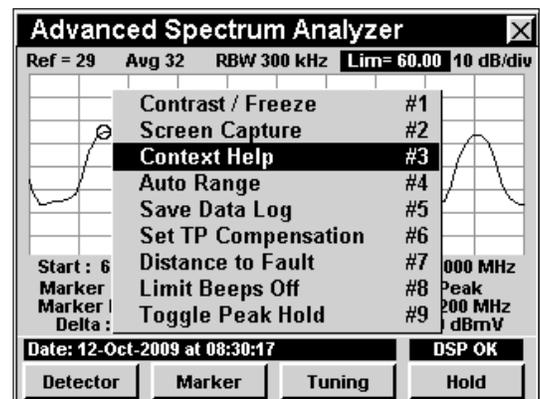
Save Data Log

This option is used to store measurement data so that you can download it later using WorkBench.

You can download a data log to WorkBench where you have several options for viewing and comparing data. WorkBench also lets you output a data log in text delimited format for importing into a spreadsheet. For more information on downloading files to WorkBench, see the WorkBench operation manual.

> **Note:** This option cannot be accessed from within the **Auto Test Results**, **Calendar**, **Calculator**, and **CM Thru** Modes.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Save Data Log**, and then press the (Ent) button. You may also select **Save Data Log** by pressing the corresponding alphanumeric button. The **Function** Menu will close and the **Save Data Log** Window will open.
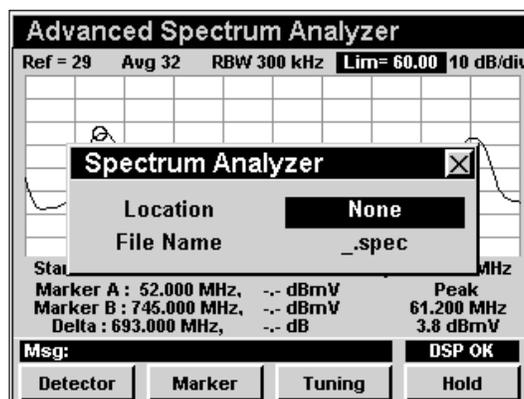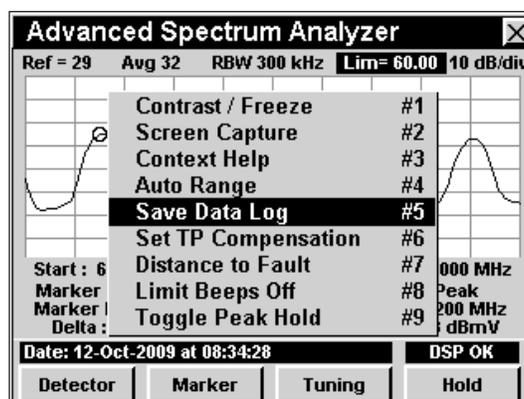
> **Note:** The **Location** and **Task Files** fields will not appear if they have not been enabled. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* for more information about how to enable these fields.

Location

To enter the location, use the ◀ ▶ buttons to highlight **Location** field, then use the ▲ ▼ buttons to change between **None** and **Custom**, and then press the (Ent) button. With **Custom** selected, press the (Ent) button and the **Edit Location** Window will open. Use the ◀ ▶ ▲ ▼ buttons and the alphanumeric keypad to enter your location information, and then press the (Ent) button. The **Edit Location** Window will close.
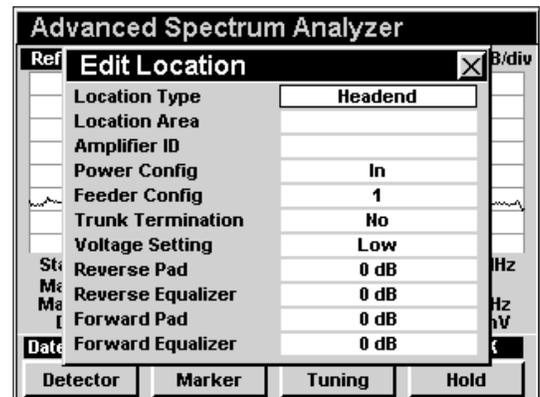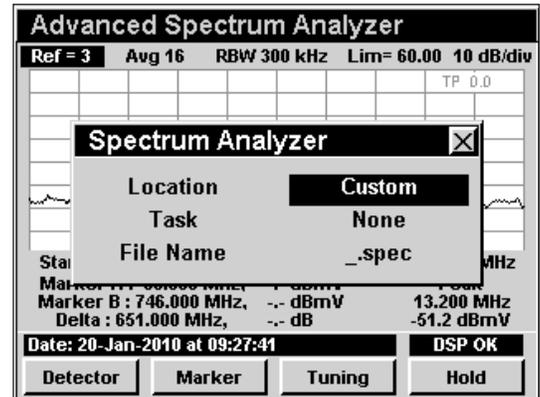
Task

To associate the data log with a work order, use the ◀ ▶ buttons to highlight the **Task** field, and use the ▲ ▼ buttons to select the name of the task file.
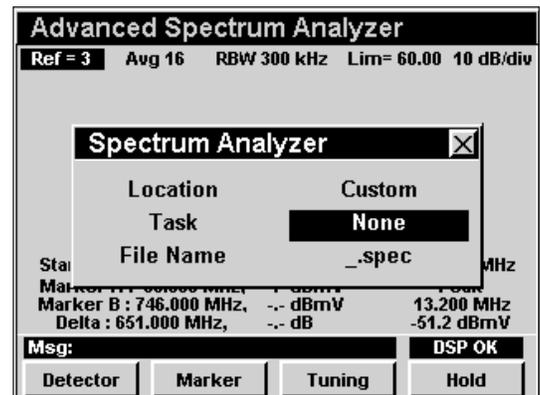
File Name

To select a file name, use the ◀ ▶ buttons to highlight **File Name** field. Either use the name that is automatically created when you have associated a task file or enter the file name of the data log using the alphanumeric keypad.

Once the file name has been entered, press the (Ent) button. The file is now saved for retrieval using WorkBench.
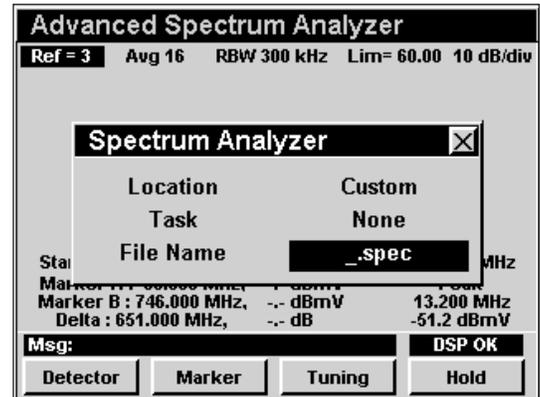
Select Network Port

This option allows you to quickly toggle the method of external communication.

Note: This option can only be accessed from within the **Installer**, **Service**, **Setup**, and **Utility** Menus.

To use this option, press the (Fn) button, use the ▲ ▼ buttons to highlight **Change Network Port**, and then press the (Ent) button. You may also select **Change Network Port** by pressing the corresponding alphanumeric button. The **Change Network Port** window will open.
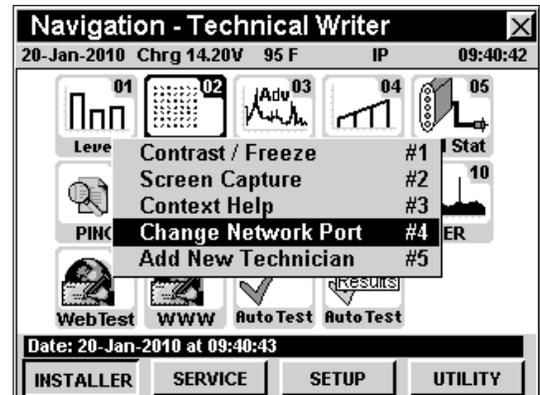
Use the ◀ ▶ buttons to highlight the **External RJ45**, **Internal Modem**, or **Wi-Fi** network port, and then press the **Ent** button.
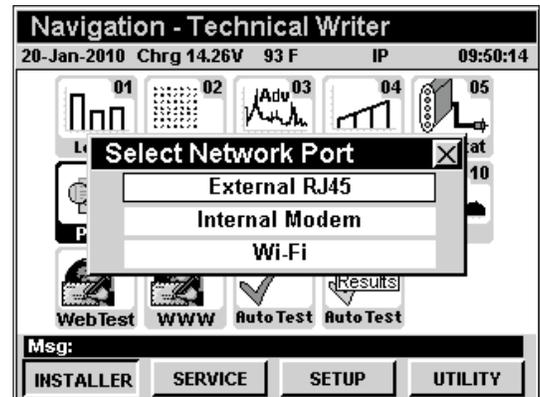
Remote Control Mode 7

Introduction

In **Remote Control** Mode the instrument has the ability to be controlled remotely over an internet connection. This is extremely useful for remotely controlling an instrument in the field from the office. In order to use the **Remote Control** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5). **Remote Control** Mode is standard on the 860 DSPi.

This section will provide you with a basic understanding of how to use **Remote Control** Mode including:

- Required Setup

- Logging on to the Network

- Remote Control Mode Operation

> **Note:** If your instrument does not include all of the features shown in this chapter, be sure to go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to upgrade your instrument to use all of the newest free features that are included in this mode.

Required Setup

To use **Remote Control** Mode, you will need to set up some basic parameters, be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Remote Control** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

Logging on to the Network

Verify in the status bar, that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to a network.

Before logging on to the network, the 860 DSPi's communication port must be selected. From the **Installer**, **Service**, **Setup**, or **Utility** menus, press the (Fn) button to display the **Function Menu**. Use the (▲) (▼) buttons to highlight **Change Network Port**, and then press the (Ent) button. The **Change Network Port** window will open. Use the (▲) (▼) buttons to highlight the desired communication port, then press the (Ent) button.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your instrument.

> **Note:** The internal cable modem uses the measurement "F" connector. So, only network type tests (i.e. **Ping**, **Thru Put**, **VoIP**, **Web Browser**, etc.) are available. If regular measurement modes are required, use the external RJ45 as your remote control network port.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward input, then select the [icon] icon from the **Installer** Menu. The **Logging On To Network** Window will show the progress of the logon process.

When logon is complete, the **Ping** Mode will be displayed. Take note of the **Our IP = ###.###.###.###** Field that is listed in the title bar. This represents the IP address that you will connect to using a PC's web browser.

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect it may take several minutes for the modem to find the downstream data carrier.

External RJ45 Port

Connect the external network connection to the instrument's Ethernet port, then select the icon from the **Installer** Menu.

The **Logging On To Network** Window will show the progress of the logon process.

When logon is complete, the **Ping** Mode will be displayed. Take note of the **Our IP = ###.###.###.###** Field that is listed in the title bar. This represents the IP address that you will connect to using a PC's web browser.

Wi-Fi

Select the icon from the **Installer** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **Ping** Mode will be displayed. Take note of the **Our IP = ###.###.###.###** Field that is listed in the title bar. This represents the IP address that you will connect to using a PC's web browser.
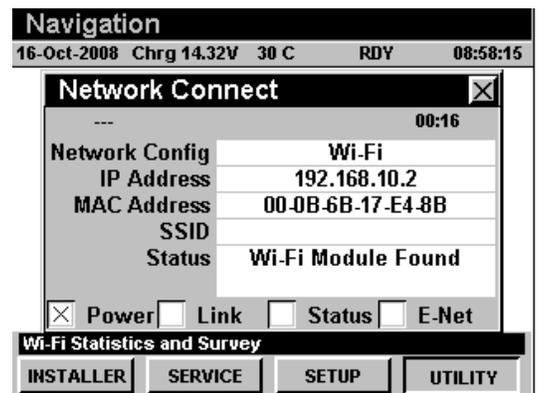
Remote Control Mode Operation

To remotely control the 860 DSP or 860 DSPi from a PC, open the PC's web browser and enter the IP address that was assigned to your instrument when you logged on to the network.

The image to the right will be displayed in the web browser. Use any of the buttons on the image (except the ⏻ button) to control the instrument as you normally would.

If you need to refresh the web browser image of the instrument without pressing a key, click directly on the image in the instrument's display screen.
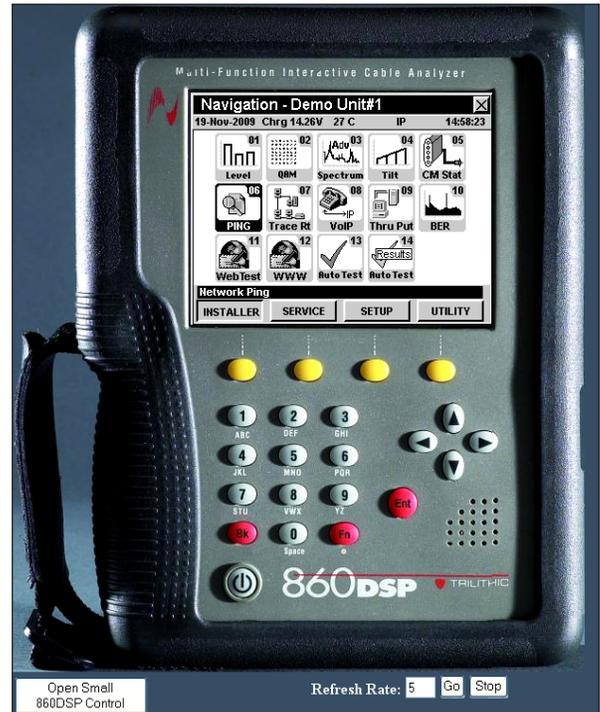
Note: We recommend that your instrument is connected to AC power when in **Remote Control** Mode.

A smaller control is provided as an alternative to the default display of the full instrument. Select the **Open Small 860 DSP Control** button. This will open a new window as displayed to the right. Use this control just as you would the larger control.

When you have finished using the small control, simply close the window.
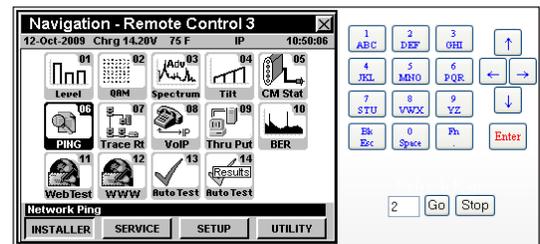
Note: The **Remote Control** Mode has been tested to work with the latest versions of the Internet Explorer and Firefox web browsers. This feature may not work with some other web browsers.

860 DSPi RTP Reflector Option 8

Overview

In addition to the standard VoIP RTP test functionality of the 860 DSPi, Trilithic offers exclusive compatibility with the Tektronix® DirectQuality™ system. A hand-held probe (PP-30) us used in installation testing to relay call quality information back to a DirectQuality server for display on the installer's 860 DSPi browser.

Additionally, an RTP reflector option configures the 860 DSPi to reflect an RTP stream generated by a Tektronix probe, enabling analysis of upstream and downstream call characteristics.

The 860 DSPi RTP Reflector Option extends the measurement and troubleshooting range of field technicians by offering a simple round-trip VoIP quality test from any RF test point. The option works through communication with the Tektronix DirectQuality active monitoring system, enabling tests to verify RTP communication from the test point to probes placed strategically throughout the cable network.

Real-Time Transport Protocol (RTP) is used to transmit IPTV, Video-on-Demand (VoD), VoIP and other real-time media over IP networks. Tektronix' RTP Loopback test agent accurately simulates these media streams by supporting over 50 different audio and video codecs, including the latest wideband VoIP, HDTV and IPTV standards.

The RTP Reflector Option enables round-trip stream analysis for packet loss, jitter, delay and other IP impairments. R-factor, MOS and other industry-standard service quality metrics are included based on a Tektronix E-model implementation.

The Tektronix DirectQuality server provides a PocketDQ 2.0 application that enables browser based activation of a wide range of tests to verify IP communication characteristics.

PP-30 Test Probe

The PP-30 is a small test probe that attaches to a telephone outlet for call and connection quality testing within the Tektronix system. The 860 DSPi can be configured to communicate with the system to initiate tests and display results.

860 DSPi Web Browser Configuration

The links on the 860 DSPi browser home page can be configured using WorkBench.

The following procedure shows how to configure a link for "PocketDQ" or "RTP Reflector" on the 860 DSPi. The graphic shown to the right is the 860 DSPi **Configuration** Window within WorkBench that is used to set web browser parameters.
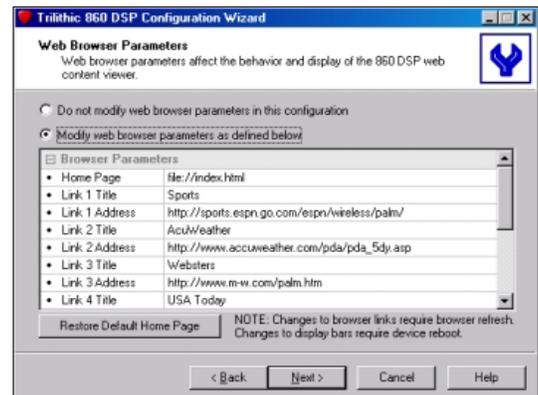
To configure a link for "RTP Reflector", perform the following steps:

1. Select the "Modify web browser parameters as defined below" radio button.

2. Choose the link title number that you wish to change, for example, "Link 3 Title" and enter "RTP Reflector".

3. Choose the "Link 3 Address," and change the URL to: http://[IP_address]/tektronix/cgi-bin/pocketdq.exe.

> **Note:** For [IP_address] enter either the IP address of the DQ server, or the name of the server, e.g. dq.trilithic.com, etc.

Accessing the PocketDQ Application

After you have configured the 860 DSPi web browser using WorkBench, enter the 860 DSPi **Web Browser** Mode and select the RTP Reflector link. The PocketDQ login screen will be displayed.

Upon successful login, the following screen is displayed. This screen enables you to run a test, view previous test results, or retrieve support information.

Test Procedure

When the user selects Test from the PocketDQ screen, the test will start with an Initiation screen.

First the user selects test objective, test origin (call from), and service area. Next the user enters IP address or host name for termination device. The IP address is set automatically when using a Trilithic 860 DSPi. The test duration can be set within a range of 1 to 10 minutes. The codec used is configured in the DirectQuality server default settings.
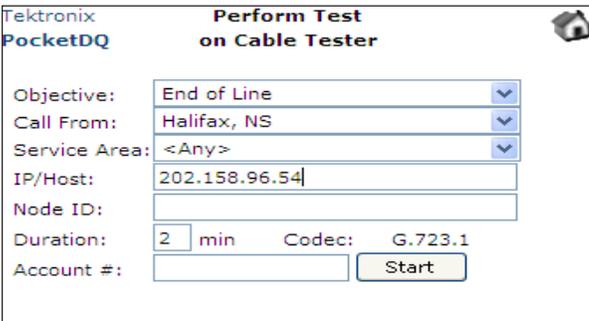
Searching for Previously Run Tests

Tests that have been run previously can be found by "searching" and users can use any combination of parameters to search for test results. The search mode entry display example is shown below.

Search results are grouped by date, as seen in the above results display. The "State" column provides overall Pass or Fail information. The "Phone/IP" column displays the phone number or IP address of termination.

The RTP Reflector top-level results display shows two results families: Speech Quality and RTP Statistics. Drilling down by selecting the pass/fail parameter provides the following information.

The Speech Quality results include CQ (conversational quality) and LQ (listening quality) MOS and R-factor.

The RTP Statistics results include 5 additional results families, each with pass/fail limits. Each of these categories provides additional information accessible by selecting the pass/fail parameter link.

Packet Information

Each of the Packets results provides further detail when the user selects a particular pass/fail parameter link, as follows:

Burst Information

Each of the Burst results provides further detail when the user selects a particular pass/fail parameter link, as follows:

TRILITHIC

RTP Statistics Information

More detail for Jitter is provided when the user selects that pass/fail parameter link, as follows:

More detail for the Jitter Buffer is provided when the user selects that pass/fail parameter link, as follows:

More detail for the Delay is provided when the user selects that pass/fail parameter link, as follows:

Test Data Management

The RTP Reflector measurement information can be saved to a task (work order) folder for inclusion in installation quality assurance test data. This is done by selecting the "save data" button on the initial results display.

Secure860Link 9

Introduction

The 860 DSPi has two standard features which enhance communication security, the Secure860Link (S8L), and the Instrument Fingerprint. The S8L enhances privacy for communications between the meter and the Trilithic Data Manager (TDM) system. The Instrument Fingerprint system will be discussed in the next chapter.

SSL Certificate

The S8L feature in the 860 DSP and 860 DSPi uses a unique 1024 bit RSA certificate on every 860 in the cable system and utilizes Secure Sockets Layer (SSL) encryption.

> **Note:** The TDM must also have this feature installed for the Secure860Link to work.

Upon initial activation of the **S8L** Mode, the meter will (on the next reboot) create a self signed SSL certificate identifying the meter by its MAC address. This may take up to 5 minutes to create but must be done only once. After this certificate is created and its private key stored in the hidden flash memory, the certificate will be loaded into the run-time memory for use by the meter's internal web server and internal web browser.

The meter operator (using the **Web Browser** Menu) logs into the TDM using the secure web port 443 (https:// link) and causes the TDM to establish a data connection back to the meter over port 443. The TDM then requests the meter's SSL certificate and compares it against authorized meters within its database. If the meter is authorized, communication continues over port 443 until the transactions are completed. If the meter is not approved in the database, then communication is halted by the TDM.

> **Note:** The TDM maintains a list of the connection attempts made by unauthorized 860 meters. The TDM administrator may authorize or de-authorize a meter at any time.

Using Secure860Link

The 860 DSPi can utilize S8L using a combination of its web browser over SSL as well as its web server over SSL. Both (browse and serve) directions use secure TCP port 443 as a communication path. The only unsecure connections allowed within the meter are a few identification commands. No unsecure data can be read or written to any of the flash devices in the meter while in **S8L** Mode. Additionally, the **Remote Control** Mode will not allow anyone to view the LCD remotely, thus prohibiting the ability to issue commands remotely. A sample image is shown here of what the viewer sees in Remote Control view while in **S8L** Mode.
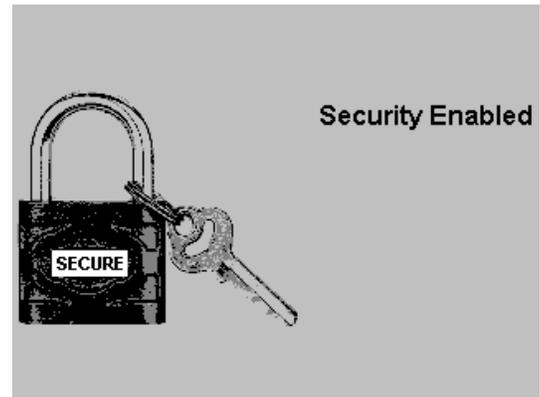
Secure860Link Support

Perform the following steps to confirm the availability of S8L on the instrument:

1. Select the ⌷Setup⌷ softkey.

2. Select the [Info] icon.

3. Highlight the **Version Info** Menu selection.

4. Check the characters at the end of the entry next to the text *Package*.

Firmware ending in ".2" indicates that SSL is supported and if your firmware is at least version 8.4.1.2 or higher, your meter supports S8L.
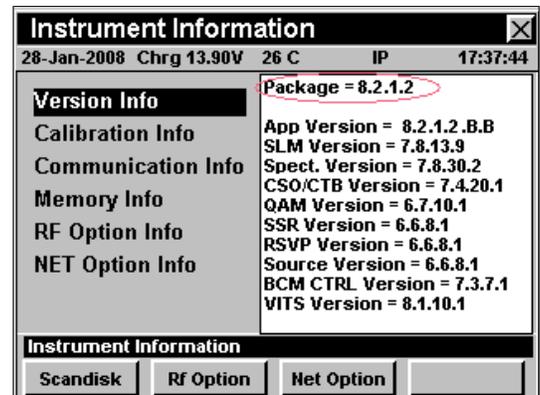
Enable/Disable S8L

S8L can be enabled or disabled via WorkBench or the **Setup/Global** Menu in the meter.

Introduction

The 860 DSPi Instrument Fingerprint feature, in addition to keeping the serial number in a secure internal code, also enables the owner to "imprint" the meter with an "asset id" that identifies the original owner in the event that the analyzer is lost or stolen. A six digit serial number is entered at the factory, and in addition to being unchangeable, is displayed when the instrument is powered on.

Instrument Fingerprint Serial Number

Perform the following steps to view the instrument serial number:

1. Select the **Setup** softkey.

2. Select the **Info** icon.

3. Select the **Unit ID** button.

The serial number will be displayed. You may also press the (4) alphanumeric keypad digit to display the instrument serial number.

4. Press the **Ent** button or the **Fn** button to exit the **Serial Number** screen.

When the instrument is restarted, the splash screen will show the serial number in the upper left corner.
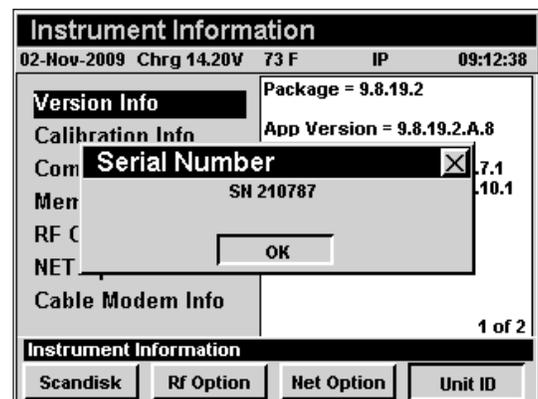
Entering the Instrument Fingerprint Serial Number

The user will be required to manually enter the serial number if the 860 DSP or 860 DSPi instrument is updated from an old firmware version.

> **Note:** The **serial number can only be entered ONCE.** Take caution to make sure it is correctly entered before final confirmation is performed.

Perform the following steps to enter the instrument serial number:

1. Select the ▭ Setup softkey.

2. Select the (i) Info icon.

3. Select the ▭ Unit ID button. You may also press the (4) alphanumeric keypad digit to display the instrument serial number.

The **Enter Serial Number** screen will be displayed.

4. Locate the serial number tag on the back of the instrument and use the alphanumeric keypad to enter the unit serial number.

5. Press the (Ent) button or the (Fn) button to exit the **Enter Serial Number** screen.

When the instrument is restarted, the splash screen will show the serial number in the upper left hand corner.
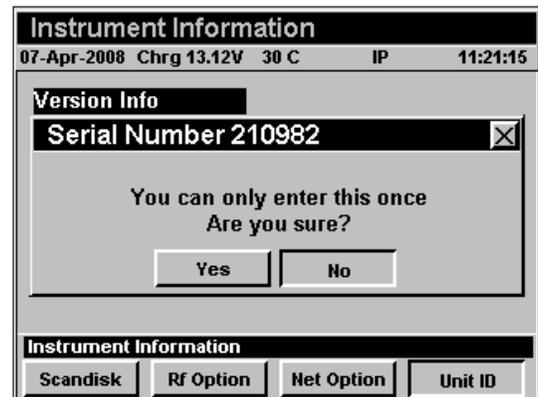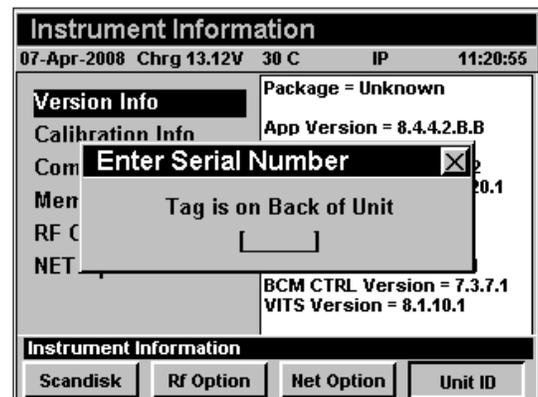
Asset ID

The 860 DSPi can be identified with a unique asset ID tag. This is especially useful in electronically labeling the 860 DSPi as the property of an individual or a company. When the instrument is restarted, the splash screen will show the asset ID in the lower left corner.

Entering the Asset ID

The user will be required to manually enter the asset ID. Trilithic's WorkBench software must be used to assign the asset ID to the 860 DSPi.

Perform the following steps to enter the asset ID:

1. Start the WorkBench software and connect to the 860 DSPi via a network connection.

2. On the **Global** tab, click **Application Options** to expand the menu tree, then select **General**.

3. The asset ID tag is a global setting, and will be applied to all 860 DSPi's which are configured by that copy of WorkBench.

4. Enter the asset ID password to prevent a user with a different copy of WorkBench from changing the asset ID tag.

When the instrument is restarted, the splash screen will show the asset ID in the lower left corner.
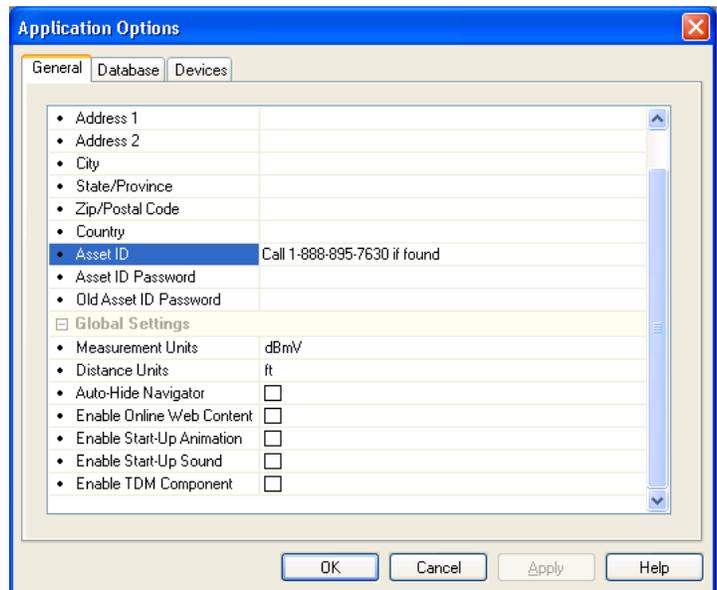
> **Note:** For additional configuration information, refer to the WorkBench software manual.

Firmware Upgrade Instructions 11

Overview

This chapter discusses how to upgrade the firmware of the 860 DSPi. There are four ways to upgrade the 860 DSPi:

- Serial connection - Use a serial cable to directly connect a PC to the 860 DSPi.

- Ethernet connection - Use a router that is configured as a DHCP server. You must first be sure that the router you are using is setup to assign IP addresses using DHCP (Dynamic Host Configuration Protocol).

- Crossover cable connection - Use a crossover cable to directly connect a PC and the 860 DSPi that are both assigned a static IP address within the same range.

- TDM connection via internal cable modem (refer to the TDM operation manual).

Serial Connection

Prerequisites

The following tasks must be completed before performing the firmware upgrade:

- Connect the 860 DSPi to the PC using the 860 DSPi serial cable.

- Connect the 860 DSPi to the charge cube and plug the charge cube into AC power.

- You must have WorkBench software.

Upgrade Firmware

Perform the following steps using WorkBench:

1. Under the **Online** tab select the "Updates and Upgrades" link, and then select the "Click here to download 860 DSP or 860 DSPi firmware" link. This will download the firmware upgrade (.860) file.

2. Under the **Devices** tab, right-click **860 DSP**, and then select "New 860 DSP Connection…".

3. Select the "Connect to a device on a local serial port" radio button and select the serial port that the 860 DSPi is connected to.
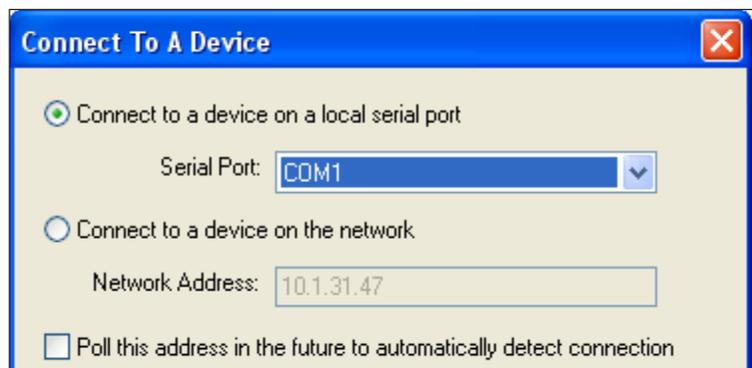
TRILITHIC

4. Select the **Connect…** button.

5. Right-click on the device, then hover over the "Configure" menu, and then select "Apply Firmware Upgrade…".

6. Select the firmware upgrade (.860) file that was saved in Step 1, and then select the **Open** button.
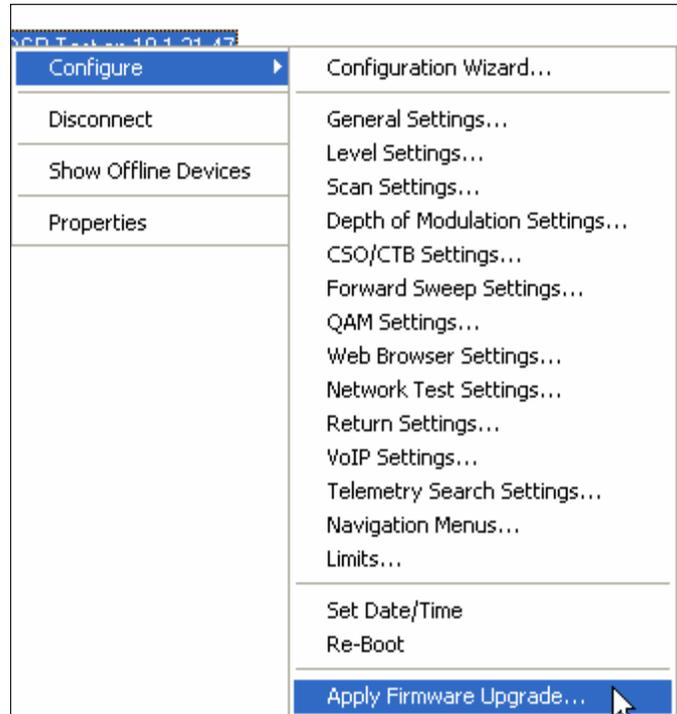
Ethernet Connection

Using a Router

Prerequisites

The following tasks must be completed before performing the firmware upgrade:

- Connect the 860 DSPi to the router using a Cat5e Ethernet cable.

- Connect the 860 DSPi to the charge cube and plug the charge cube into AC power.

- Connect a PC to the router.

Configure the PC to Obtain an IP Address Automatically

1. Select the **Start** button, then right-click **My Network Places** and then select "Properties".

2. Right-click **Local Area Connection** and then select "Properties".

3. Select "Internet Protocol (TCP/IP)", and then select the **Properties** button.
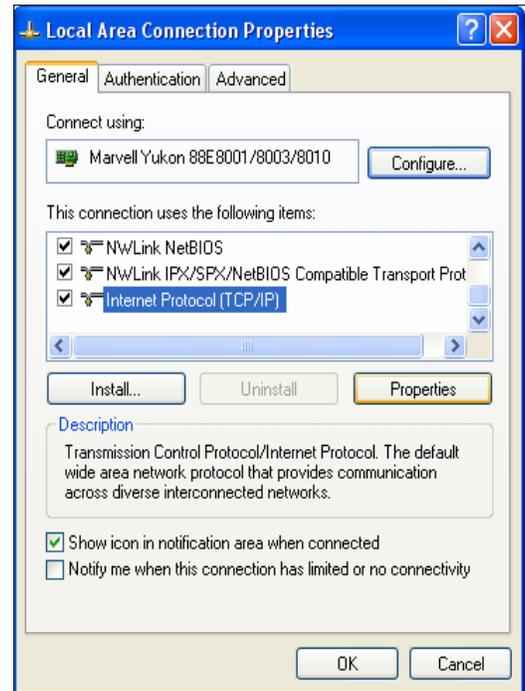
4. Select the "Obtain an IP address automatically" radio button.

5. Select the **OK** button to save the configuration changes.
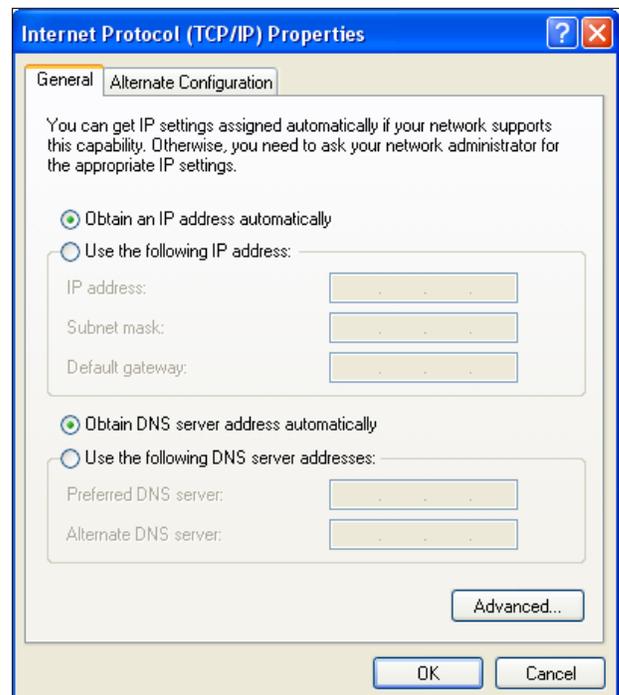
Configure the 860 DSPi for DHCP Using the External RJ45 Port

1. Select the ⌐ Setup ¬ softkey.

2. Select the [Setup icon] icon.

3. Select the "COM/NET" option.

Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Communication Settings
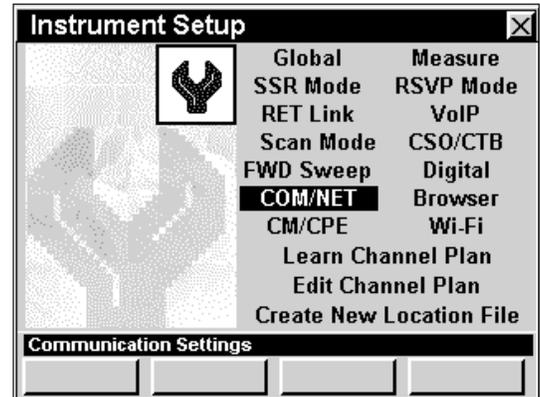
4. Use the ◄ ► buttons to highlight the **Network Port** field**.**

5. Use the ▲ ▼ buttons to select "External RJ45".

6. Use the ◄ ► buttons to highlight the **My IP Address** field**.**

The **My IP Address** field will default to "DHCP (Dynamic)".

COMMUNICATION SETTINGS

Network Port	**External RJ45**	10 Mbps
My IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	On Startup	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

7. If "DHCP (Dynamic)" is not selected, use the alphanumeric keypad to enter "0.0.0.0" in the **My IP Address** field, then select the (Ent) button.
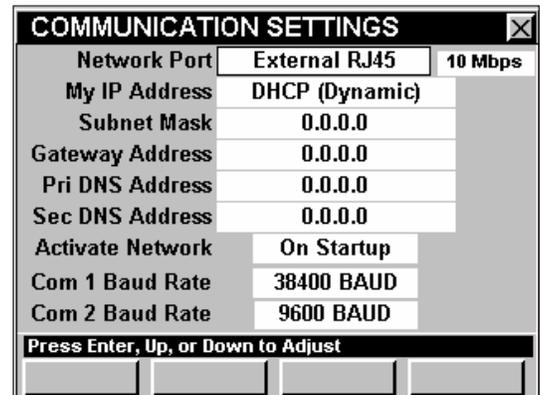
8. Select the INSTALLER softkey.

9. Select the [PING] icon to activate the RJ45 port and obtain an IP address from the router.

The IP address is displayed in the upper left corner of the top banner.
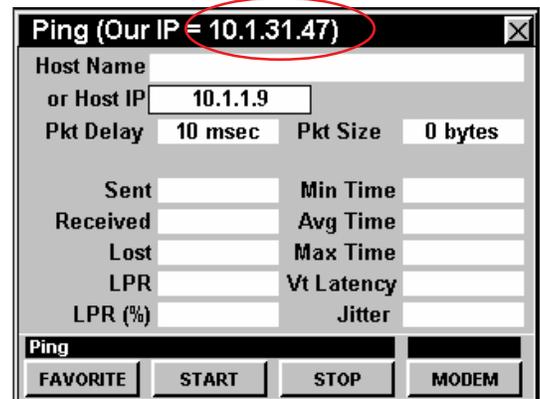
Upgrade Firmware

Not Using Workbench

1. Download the 860 DSPi firmware upgrade zip file from the Trilithic website.

2. Unzip the file and double-click the executable (.exe) firmware upgrade file.

3. When prompted, enter the IP address of the 860 DSPi and press the **Enter** button.

Using Workbench

1. Under the **Online** tab select the "Updates and Upgrades" link, and then select the "Click here to download 860 DSP or 860 DSPi firmware" link. This will download the firmware upgrade (.860) file.

2. Under the **Devices** tab, right-click **860 DSP**, and then select "New 860 DSP Connection…".

3. Select the "Connect to a device on the network" radio button and enter the IP address of the 860 DSPi.

4. Select the **Connect…** button.

5. Right-click on the device, then hover over the "Configure" menu, and then select "Apply Firmware Upgrade…".

6. Select the firmware upgrade (.860) file that was saved in step 1, and then select the **Open** button.

TRILITHIC

Cross-Over Cable Connection

To use a crossover cable you will need to assign a static IP address within the same range to both the PC and the 860 DSPi. For the purpose of this instruction we will be using the IP address 10.10.10.1 and Subnet Mask 255.255.255.0.

Prerequisites

The following tasks must be completed before performing the firmware upgrade:

- Connect the 860 DSPi to the PC using a Cat5e crossover cable.

- Connect the 860 DSPi to the charge cube and plug the charge cube into AC power.

Configure the PC to Use a Static IP Address

1. Select the "Start" button, then right-click "My Network Places" and then select "Properties".

2. Right-click "Local Area Connection" and then select "Properties".

3. Select "Internet Protocol (TCP/IP)", and then select the **Properties** button.
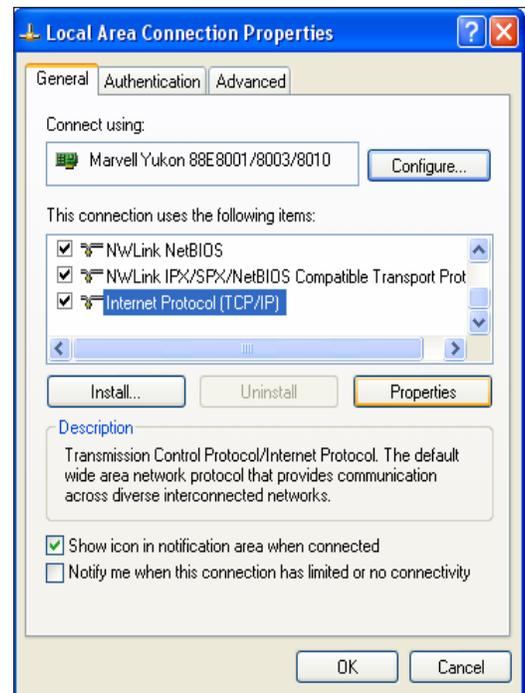
4. Select the "Use the following IP address:" radio button and enter the IP address of 10.10.10.1 and the Subnet Mask of 255.255.255.0.

5. Select the **OK** button to save the configuration changes.
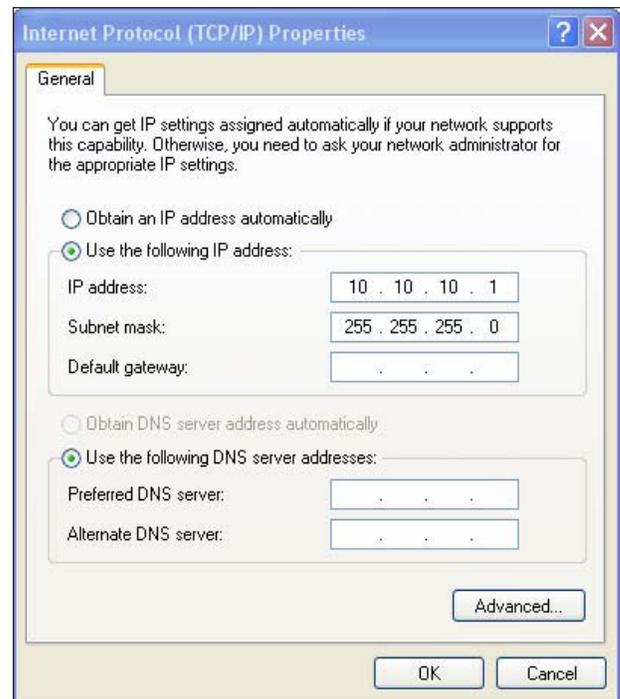
Configure the 860 DSPi for a Static IP Address Using the External RJ45 Port

1. Select the ⬚Setup⬚ softkey.

2. Select the ⬚ icon.

3. Select the "COM/NET" option.

4. Use the ◄ ► buttons to highlight the **Network Port** field**.**

5. Use the ▲ ▼ buttons to select "External RJ45".

6. Use the ①...⓪ alphanumeric keypad to enter the IP Address of 10.10.10.2 in the **My IP Address** field.

7. Enter the Subnet Mask of 255.255.255.0 in the Subnet Mask field.

8. Select the ⬚INSTALLER⬚ softkey.

9. Select the 🖼 icon to activate the RJ45 port and obtain an IP address from the router.

The IP address is displayed in the upper left corner of the top banner.

Network Ping (IP 10.10.10.2)			
Host Name			
Host IP	10.1.1.1		
Pkt Delay	10 msec	Pkt Size	0 bytes
Sent		Min Time	
Received		Avg Time	
Lost		Max Time	
LPR		Latency	
LPR (%)		Jitter	
Network Ping			
Favorites	Start	Stop	Modem

Upgrade Firmware

Not Using WorkBench

If you are not using WorkBench, perform the following steps:

1. Download the 860 DSPi firmware upgrade zip file from the Trilithic website.

2. Unzip the file and double-click the executable (.exe) firmware upgrade file.

3. When prompted, enter the IP address of the 860 DSPi and press the **Enter** button.

Using WorkBench

If you are using WorkBench, perform the following steps:

1. Under the **Online** tab select the "Updates and Upgrades" link, and then select the "Click here to download 860 DSP or 860 DSPi firmware" link. This will download the firmware upgrade (.860) file.

2. Under the **Devices** tab, right-click **860 DSP**, and then select "New 860 DSP Connection…".

3. Select the "Connect to a device on the network" radio button and enter the IP address of the 860 DSPi.

4. Select the **Connect…** button.

5. Right-click on the device, then hover over the "Configure" menu, and then select "Apply Firmware Upgrade…".

6. Select the firmware upgrade (.860) file that was saved in Step 1, and then select the **Open** button.
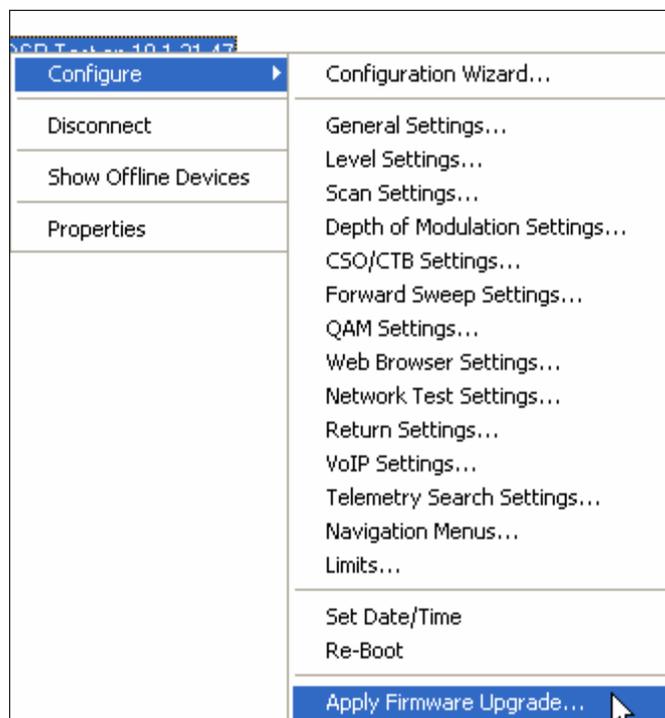
Optional Software Features

The following table describes the optional software features that are available for the 860 DSP and 860 DSPi.

To determine which software options are installed on your 860 DSP or 860 DSPi do as follows:

1. Access the **Setup** Menu by pressing the [Setup] softkey.

2. Select the [ⓘ Info] icon.

3. Once in the **Instrument Information** Mode, follow the instructions shown below for each option.

Option Code	Name	Description
PP-1	Power Pack Option (P/N 0930081003)	This option is installed in all 860 DSPs as a standard feature. When this option is installed in the 860 DSPi it provides the extended spectrum analyzer frequency range of 4 MHz to 1.0 GHz as well as providing several additional modes that are not included with the standard 860 DSPi. Use the ◀ ▶ buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *Power Pack : YES.*

Option Code	Name	Description
RTB	Return Transmitter Board (P/N 071271001K)	When installed in an 860 DSP or 860 DSPi this option enables return signal generation. This hardware option is required when selecting the Return Sweep Receiver Option (SR-1), Return Tester RSVP Option (VP-1), or Frequency Domain Reflectometer Option (FDR). Use the ◀ ▶ buttons to highlight the **Communication Info** Field. If you have this hardware option installed it will be indicated by the text *Transmitter (65 MHz)* followed by the calibration information for the return transmitter board. **Instrument Information** 13-Feb-2009 Chrg 14.14V 91 F 10.1.33.132 10:54:38 Version Info Calibration Info Communication Info Memory Info RF Option Info NET Option Info Cable Modem Info Receiver (4MHz to 1003MHz) 1GHz (V2) Cal: 02-Jan-2008 10:24:12 Transmitter (65 MHz) Cal: 02-Jan-2008 11:01:05 Digital Video Ver 00B2 Instrument Information Scandisk Rf Option Net Option Unit ID
SR-1	Return Sweep Receiver Option (P/N 0930082003)	When installed in an 860 DSP or 860 DSPi this option provides the functionality of the 9580 SSR Field Unit. This option is compatible with the Guardian System and Guardian System II. It also includes the RSA Mode for return band sweeping. **REQUIRES RETURN TRANSMITTER BOARD & POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◀ ▶ buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *Return Test (SSR) : YES.* **Instrument Information** 13-Feb-2009 Chrg 14.14V 89 F IP 10:07:44 Version Info Calibration Info Communication Info Memory Info RF Option Info NET Option Info Cable Modem Info Power Pack : YES QAM (4..256), QAM EVS : YES 8VSB (ATSC) : YES Advanced Spectrum : YES Return Test (SSR) : YES Return Install (RSVP) : YES CW Source + Loopback : YES Enhanced Dig Vid : YES SpeedSweep : YES VITS : YES TraffiControl : YES FDR : YES QAM Source : YES Instrument Information Scandisk Rf Option Net Option Unit ID
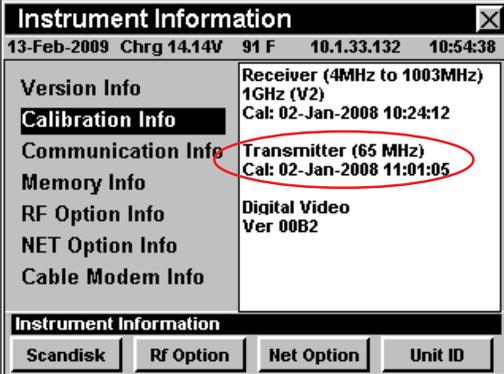
Option Code	Name	Description
VP-1	Return Tester Option (P/N 0930082004)	When installed in an 860 DSP or 860 DSPi this option provides the functionality of the RSVP and RSVP[2] Installer's Return Tester. This option is compatible with the Guardian System and Guardian System II. **REQUIRES RETURN TRANSMITTER BOARD & POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *Return Install (RSVP) : YES.*
SA-1	Spectrum Analyzer Option (P/N 0930082005)	When installed in an 860 DSPi this option upgrades Spectrum Analyzer Mode to Advanced Spectrum Analyzer Mode to provide zero span measurement capabilities as well as adjustable Resolution Bandwidth (RBW). **REQUIRES POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *Advanced Spectrum : YES.*
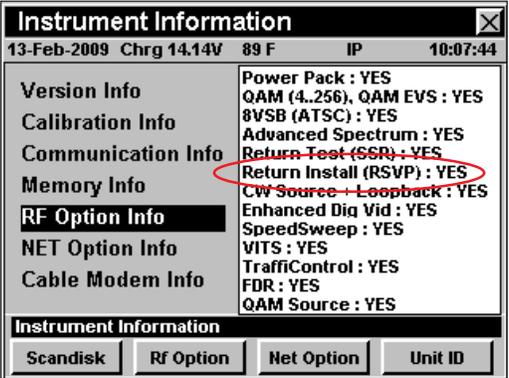
Option Code	Name	Description
QA-1	QAM Option (P/N 0930082008)	When installed in an 860 DSP this option provides all the features that are included in QAM Lite Mode as well as the following display options; constellation, equalizer tap diagram, and BER graph. This option also provides QAM EVS support. Use the ◀ ▶ buttons to highlight the **RF Option Info** field. If you have this hardware option installed it will be indicated by the text *QAM (4..256), QAM EVS : YES.* Note: Units with **QAM Lite** Mode installed will be indicated by the text *QAM Lite.*
QA-2	QAM Option (P/N 0930081004)	When installed in an 860 DSP this option upgrades QAM Lite Mode to QAM Mode to provide the following display options; constellation, equalizer tap diagram, and BER graph. This option also provides QAM EVS support. **REQUIRES POWER PACK OPTION (PP-1)** Use the ◀ ▶ buttons to highlight the **RF Option Info** field. If you have this hardware option installed it will be indicated by the text *QAM (4..256), QAM EVS : YES.* Note: Units with **QAM Lite** Mode installed will be indicated by the text *QAM Lite.*
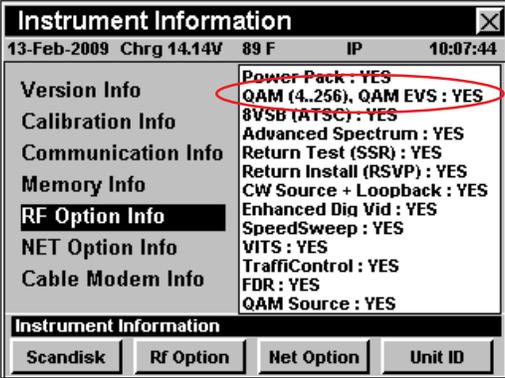
TRILITHIC

ption Code	Name	Description
VSB	Vestigial Sideband Modulation (VSB) Option (P/N 0930081012)	When installed in an 860 DSP or 860 DSPi, this option measures and displays the signal qualities of Vestigial Sideband Modulation (VSB) digital television signals displayed using constellation, equalizer tap diagram, and BER graph. This feature also displays the signal level and numeric values for MER and pre/post FEC BER. **NOT AVAILABLE FOR 860 DSPi WITH EURO DOCSIS MODEM** **REQUIRES POWER PACK OPTION (PP-1)** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *8VSB (ATSC) : YES.*
FS-1	Forward SpeedSweep Option (P/N 0930081008)	When installed in an 860 DSP or 860 DSPi, this option provides compatibility with the 8300 FST for forward sweep and balancing. **REQUIRES POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *SpeedSweep : YES.*
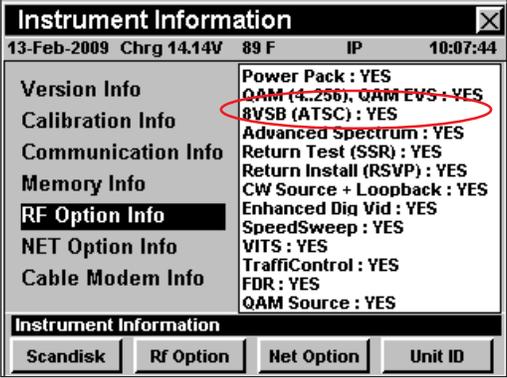
Option Code	Name	Description
VITS	Vertical Interval Test Signal Option (P/N 0930081013)	When installed in an 860 DSP or 860 DSPi, this option analyzes the signal qualities of Vertical Test Signals (VITS) to measure in-channel response, differential phase, differential gain, and chroma delay. This feature also displays the test signal itself. **NOT AVAILABLE FOR 860 DSPi WITH EURO DOCSIS MODEM** **REQUIRES POWER PACK OPTION (PP-1)** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *VITS : YES.*
TC-1	TraffiControl Option (P/N 0930081014)	When installed in an 860 DSP or 860 DSPi, this option provides a way to troubleshoot upstream ingress and noise problems within active channel bands by seeing the ingress that is present "underneath" an upstream cable modem channel, or any bursty signal. **REQUIRES POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◄ ► buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *TraffiControl : YES.*
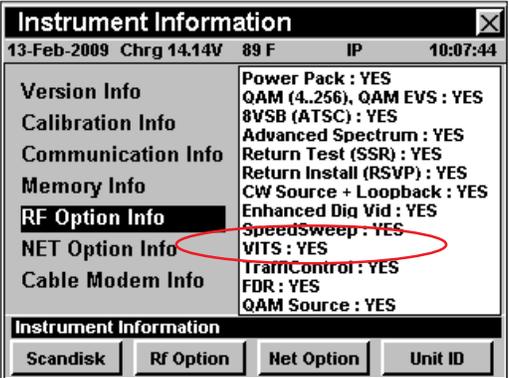
Option Code	Name	Description
RTP-1	Real-Time Transport Protocol Reflector Option (P/N 0930081015)	When installed in an 860 DSP or 860 DSPi, this option extends the measurement and troubleshooting range of field technicians by offering a simple round-trip VoIP quality test from any RF test point. The option works through communication with the Tektronix DirectQuality active monitoring system, enabling tests to verify RTP communication from the test point to probes placed strategically throughout the cable network. Real-Time Transport Protocol (RTP) is used to transmit IPTV, Video-on-Demand (VoD), VoIP and other real-time media over IP networks. Tektronix' RTP Loopback test agent accurately simulates these media streams by supporting over 50 different audio and video codecs, including the latest wideband VoIP, HDTV & IPTV standards. The RTP Reflector Option enables round-trip stream analysis for packet loss, jitter, delay and other IP impairments. R-factor, MOS and other industry-standard service quality metrics are included based on a Tektronix E-model implementation. **THIS OPTION ONLY WORKS WITH FULLY IMPLEMENTED Tektronix DirectQuality SYSTEMS** **REQUIRES FIRMWARE VERSION v8.1.11.1 OR HIGHER AND POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◄ ► buttons to highlight the **NET Option Info** Field. If you have this hardware option installed it will be indicated by the text *Tek RTP Reflector : YES.*

Option Code	Name	Description
FDR	Frequency Domain Reflectometer Option (P/N 0930081016)	When installed in an 860 DSP or 860 DSPi, the Frequency Domain Reflectometer Option (FDR) provides a simple, convenient and accurate tool for determining the distance to cable faults. The option works by sending a sweep into the cable and analyzing the complex reflected wave to determine the distance to various sources of reflection (opens, shorts, splitters, etc.). **REQUIRES RETURN TRANSMITTER BOARD & POWER PACK OPTION (PP-1) ON THE 860 DSPi** Use the ◀ ▶ buttons to highlight the **RF Option Info** Field. If you have this hardware option installed it will be indicated by the text *FDR : YES.*

Option Code	Name	Description
WIFI	WI-FI (P/N 2072045001K)	When installed in an 860 DSPi, the Wi-Fi Option can be used to survey available access points, or to access a network to perform tests such as ping, trace route, throughput, VoIP, and verification of browser functionality. This is a hardware and software option that includes a built-in Wi-Fi Adapter, Ethernet Communications Option (CI-5), and necessary software access codes. It can also be used when connected to a Wi-Fi access point to communicate data to TDM. **REQUIRES POWER PACK OPTION (PP-1)** Use the ◄ ► buttons to highlight the **NET Option Info** Field. If you have this hardware option installed it will be indicated by the text *Wi-Fi: YES.* Use the ◄ ► buttons to highlight the **Communication Info** Field. If you have this hardware option installed it will be indicated by the text *Wi-Fi:* followed by the individual MAC address of the Wi-Fi Receiver Board.
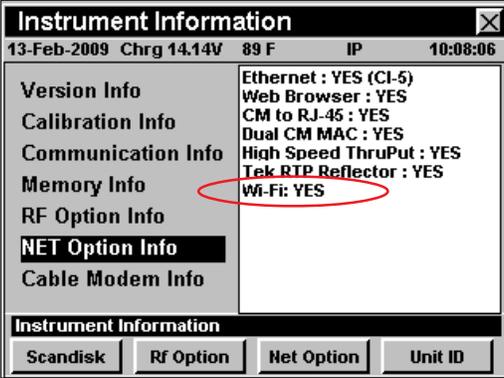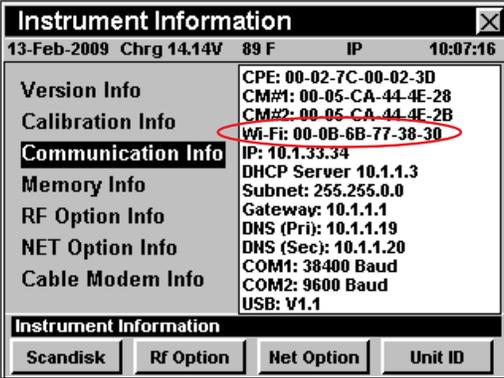
Upgrade Options For Existing Equipment

Trilithic offers the following upgrade kits to equip older equipment with all of the testing capability of a new 860 DSP or 860 DSPi.

860 DSP to 860 DSPi Upgrade (P/N 2071511000)
When installed in an 860 DSP, this hardware provides a DOCSIS 2.0 Cable Modem to upgrade the 860 DSP to an 860 DSPi.

To determine if an internal modem is installed in your device you must:

1. Access the **Setup** Menu from any **Navigation** Menu by pressing the Setup softkey.

2. Select the 🛈 icon from the **Setup** Menu.

Once in the **Instrument Information** Mode, follow the instructions shown to the right.

Use the ◀ ▶ buttons to highlight the **Communications Info** field. If you have this hardware option installed it will be indicated by the text *CM#1:* followed by the individual MAC address of the cable modem.

Instrument Information
13-Feb-2009 Chrg 14.14V   89 F   IP   10:07:16

Version Info
Calibration Info
Communication Info
Memory Info
RF Option Info
NET Option Info
Cable Modem Info

CPE: 00-02-7C-00-02-3D
CM#1: 00-05-CA-44-4E-28
CM#2: 00-05-CA-44-4E-2B
Wi-Fi: 00-0B-6B-77-38-30
IP: 10.1.33.34
DHCP Server 10.1.1.3
Subnet: 255.255.0.0
Gateway: 10.1.1.1
DNS (Pri): 10.1.1.19
DNS (Sec): 10.1.1.20
COM1: 38400 Baud
COM2: 9600 Baud
USB: V1.1

Instrument Information

Scandisk | Rf Option | Net Option | Unit ID

1 GHz Upgrade for the 860 DSP & DSPi
(P/N 2071798000K)

When installed in an 860 DSP or 860 DSPi, this hardware provides a new or referbished RF PCB board with an extended frequency range up to 1 GHz.

To determine if an internal modem is installed in your device you must:

1. Access the **Setup** Menu from any **Navigation** Menu by pressing the `Setup` softkey.

2. Select the [i] icon from the **Setup** Menu.

Once in the **Instrument Information** Mode, follow the instructions shown to the right.

Use the ◄ ► buttons to highlight the **Calibration Info** field. If you have this hardware option installed it will be indicated by the text *RF: 1GHz (####)*, where #### indicates the version of the installed hardware.

Instrument Information
13-Feb-2009 Chrg 14.14V   91 F   10.1.33.132   10:54:38

Version Info
Calibration Info
Communication Info
Memory Info
RF Option Info
NET Option Info
Cable Modem Info

Receiver (4MHz to 1003MHz)
1GHz (V2)
Cal: 02-Jan-2008 10:24:12

Transmitter (65 MHz)
Cal: 02-Jan-2008 11:01:05

Digital Video
Ver 00B2

Instrument Information
Scandisk   Rf Option   Net Option   Unit ID
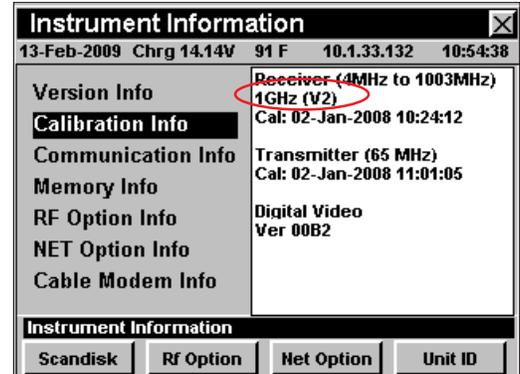
Ethernet Communication Upgrades for the 860 DSP & 860 DSPi

To determine if an internal modem is installed in your device you must:

1. Access the **Setup** Menu from any **Navigation** Menu by pressing the [Setup] softkey.

2. Select the (i) **Info** icon from the **Setup** Menu.

Once in the **Instrument Information** Mode, follow the instructions shown to the right.

Use the ◀ ▶ buttons to highlight the **Net Option Info** Field. If you have this hardware option installed it will be indicated by the text *Ethernet : YES (CI-#)*, where # indicates which option (CI-1, CI-2, CI-3, CI-4, or CI-5) you have. The CI-1, CI-2, and CI-3 options are no longer available.

```
Instrument Information                    ☒
13-Feb-2009  Chrg 14.14V   89 F      IP        10:08:06

Version Info            Ethernet : YES (CI-5)
                        Web Browser : YES
Calibration Info        CM to RJ-45 : YES
Communication Info      Dual CM MAC : YES
                        High Speed ThruPut : YES
Memory Info             Tek RTP Reflector : YES
RF Option Info          Wi-Fi: YES
NET Option Info
Cable Modem Info

Instrument Information
 Scandisk   Rf Option   Net Option   Unit ID
```
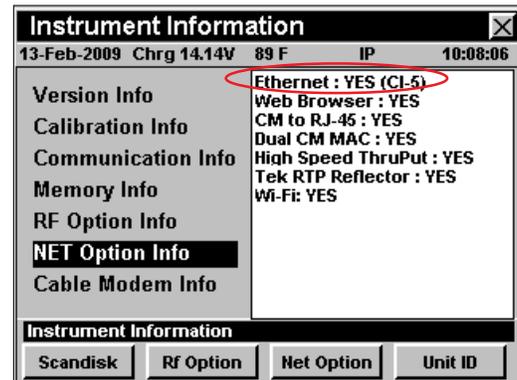
Note: Options CI-1, CI-2, and CI-3 are no longer available.
Option CI-1 includes a 10 Base-T NIC.
Option CI-2 includes a 10 Base-T NIC and USB 1.1.
Option CI-3 includes a 10 Base-T NIC, USB 1.1, and CM Through Mode.

Ethernet Communications Option (CI-4)
(P/N 2071667100K)

When installed in an 860 DSP, this option provides Ethernet connectivity to the internet through an external cable modem. Ethernet Communications Option (CI-4) is currently available for the 860 DSP and non Wi-Fi equipped 860 DSPis.

This is a hardware kit that includes an Ethernet Communications Board (CI-4).
Option CI-4 includes a 10/100 Base-T NIC, USB 1.1, and CM Through Mode.

Ethernet Communications Option (CI-5)

When installed in an 860 DSP, this option provides Ethernet connectivity to the internet through an external cable modem. Ethernet Communications Option (CI-5) is currently only available with Wi-Fi equipped 860 DSPis and cannot be purchased separately.

This is a hardware kit that includes an Ethernet Communications Board (CI-5).
Option CI-5 includes a 10/100 Base-T NIC, USB 1.1, CM Through Mode, and Wi-Fi.

Enhanced Digital Retrofit (IL-2) for the 860 DSP & 860 DSPi
(P/N 2071569000K)

When installed in an 860 DSP or 860 DSPi, this option provides deep interleave support to BER Mode and extended measurements of errored seconds and code word errors in the QA-1 Option for the 860 DSP and the QA-2 Option for the 860 DSPi.

Enhanced Digital Video Retrofit (IL-2) is currently available, but the IL-1 Option is no longer available. This is a hardware and software kit that includes an Enhanced Digital Video (IL-2) board and necessary software access codes.

To determine if an internal modem is installed in your device you must: 1. Access the **Setup** Menu from any **Navigation** Menu by pressing the `Setup` softkey. 2. Select the 🛈 **Info** icon from the **Setup** Menu. Once in the **Instrument Information** Mode, follow the instructions shown to the right.	Since this software option is bundled with the IL-1 or IL-2 hardware option, there are three different messages that can be displayed based on your software and hardware configuration. Use the ◀ ▶ buttons to highlight the **RF Option Info** Field.

- If the IL-1 or IL-2 hardware option is installed and you have this software option installed, it will be indicated by the text *Enhanced Dig Vid : YES*.

- If the IL-1 or IL-2 hardware option is installed and you do not have this software option installed, it will be indicated by the text *Enhanced Dig Vid : Ready*.

- If the IL-1 or IL-2 hardware option is not installed and you have this software option installed, it will be indicated by the text *Enhanced Dig Vid : NO*.
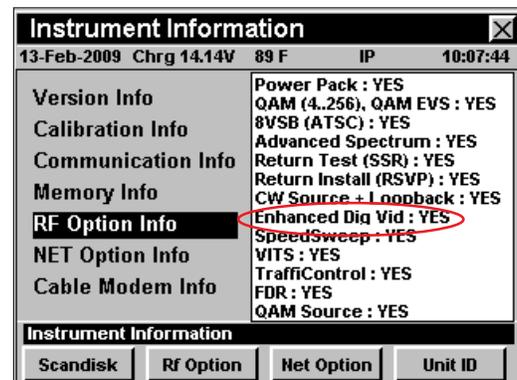
Enhanced Digital Retrofit (IL-2) for the 860 DSP & 860 DSPi (continued) (P/N 2071569000K)	
	Use the ◀ ▶ buttons to highlight the **Calibration Info** Field. If you have this hardware option installed it will be indicated by the text *Digital Video Ver ####*, where *####* indicates the version of the installed hardware.

Instrument Information ☒

13-Feb-2009 Chrg 14.14V   91 F   10.1.33.132   10:54:38

Version Info

Calibration Info

Communication Info

Memory Info

RF Option Info

NET Option Info

Cable Modem Info

Receiver (4MHz to 1003MHz) 1GHz (V2)
Cal: 02-Jan-2008 10:24:12

Transmitter (65 MHz)
Cal: 02-Jan-2008 11:01:05

Digital Video
Ver 00B2

Instrument Information

| Scandisk | Rf Option | Net Option | Unit ID |
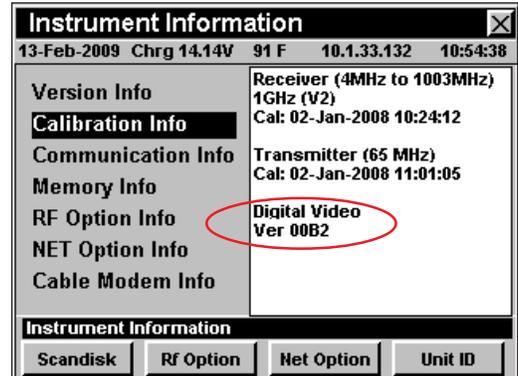
Modem Upgrades for the 860 DSPi

To determine if an internal modem is installed in your device you must:

1. Access the **Setup** Menu from any **Navigation** Menu by pressing the Setup softkey.

2. Select the ⓘ Info icon from the **Setup** Menu.

Once in the **Instrument Information** Mode, follow the instructions shown to the right.

Use the ◀ ▶ buttons to highlight the **Cable Modem Info** Field.

- The type of modem you have installed will be indicated by the text *Modem Type ##1#, ##2#, or ##3#,* where

  #### indicates the version of the installed modem and the third digit represents the DOCSIS type of 1, 2, or 3.

- If UGS is enabled on the installed modem, it will be indicated by the text *UGS Ready*.

About the 860 DSP ☒
26-Apr-2007 Charge 14.44V   30 C   COM   09:57:24

Version Info
Calibration Info
Communication Info
Memory Info
RF Option Info
NET Option Info
Cable Modem Info

Powering Up Modem
Initializing Modem
Checking Version
2.00.03T2.1.1A
Modem Type
US2A
MAC#1: 00-05-CA-40-D3-2C
MAC#2: 00-05-CA-40-D3-2F
UGS Ready
Docsis20Capability: Yes
Powering Down Modem

Instrument Information Mode
SCANDISK | Rf OPTION | Net OPTION |
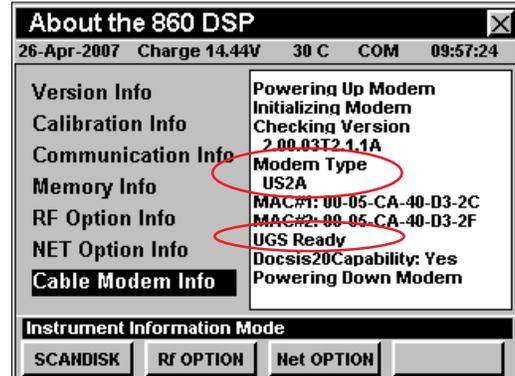
Use the ◀ ▶ buttons to highlight the **NET Option Info** Field. If you have the Dual Cable Modem software option installed it will be indicated by the text *Dual CM MAC : YES*.

Instrument Information ☒
13-Feb-2009 Chrg 14.14V   89 F   IP   10:08:06

Version Info
Calibration Info
Communication Info
Memory Info
RF Option Info
NET Option Info
Cable Modem Info

Ethernet : YES (CI-5)
Web Browser : YES
CM to RJ-45 : YES
Dual CM MAC : YES
High Speed ThruPut : YES
Tek RTP Reflector : YES
Wi-Fi: YES

Instrument Information
Scandisk | Rf Option | Net Option | Unit ID
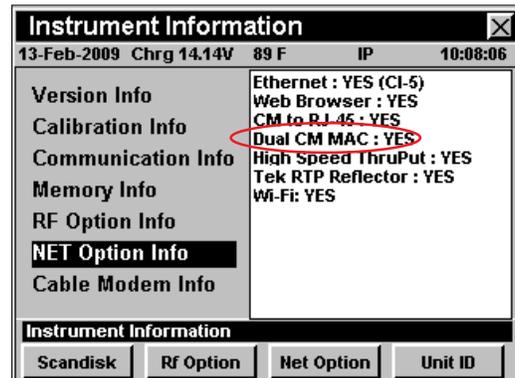
Modem Upgrades for the 860 DSPi (continued)

	Use the ◀ ▶ buttons to highlight the **Communication Info** Field. If you have the Dual Cable Modem hardware option installed it will be indicated by the text *CM#1: and CM#2:* followed by the individual MAC address of each cable modem. **Instrument Information** ⊠ 13-Feb-2009 Chrg 14.14V 89 F IP 10:07:16 Version Info — CPE: 00-02-7C-00-02-3D Calibration Info — CM#1: 00-05-CA-44-4E-28 **Communication Info** — CM#2: 00-05-CA-44-4E-2B Wi-Fi: 00-0B-6B-77-38-30 Memory Info — IP: 10.1.33.34 RF Option Info — DHCP Server 10.1.1.3 NET Option Info — Subnet: 255.255.0.0 Cable Modem Info — Gateway: 10.1.1.1 DNS (Pri): 10.1.1.19 DNS (Sec): 10.1.1.20 COM1: 38400 Baud COM2: 9600 Baud USB: V1.1 Instrument Information Scandisk Rf Option Net Option Unit ID

TRILITHIC

Modem Upgrades for the 860 DSPi (continued)

DOCSIS 1.X to DOCSIS 2.0 Modem Upgrade with   **Unsolicited Grant Service**   (P/N 2071506001K)

This upgrade is for any 860 DSPi that includes a DOCSIS 1.X cable modem.

This is a hardware and software upgrade that includes;

- New DOCSIS 2.0 cable modem with a firmware revision US2A or higher.

- Activation of Unsolicited Grant Service (UGS) which enables testing with QoS enabled.

DOCSIS 1.X to DOCSIS 2.0 Modem Upgrade with   **Dual MAC Addresses & Unsolicited Grant Service**   (P/N 2071506000)

This upgrade is for any 860 DSPi that includes a DOCSIS 1.X cable modem.

This is a hardware and software upgrade that includes;

- New DOCSIS 2.0 cable modem with a firmware revision US2A or higher.

- Activation of Unsolicited Grant Service (UGS) which enables testing with QoS enabled.

- The necessary software access codes to enable the cable modem to be configured with two separate MAC addresses, which in turn enables provisioning an 860 DSPi simultaneously on two separate CMTS's that are served by the same DHCP server.

DOCSIS 2.0 Modem Upgrade to US2A Firmware with   **Unsolicited Grant Service**   (P/N 0930130000)

This upgrade is for any 860 DSPi that includes a DOCSIS 2.0 cable modem with a firmware revision prior to US2A.

This is a hardware and software upgrade that includes;

- Firmware update to Revision US2A or higher.

- Activation of Unsolicited Grant Service (UGS) which enables testing with QoS enabled.

Modem Upgrades for the 860 DSPi (continued)

DOCSIS 2.0 Modem Software Upgrade with
Dual MAC Addresses & Unsolicited Grant Service
(P/N 0930081007)

This upgrade is for any 860 DSPi that includes a DOCSIS 2.0 cable modem with a firmware revision of US2A or higher.

- The software upgrade that includes the necessary software access codes to enable the cable modem to be configured with two separate MAC addresses, which in turn enables provisioning an 860 DSPi simultaneously on two separate CMTS's that are served by the same DHCP server.

DOCSIS 1.X or DOCSIS 2.0 to DOCSIS 3.0 Modem Upgrade
(P/N 2072070001K)

This upgrade is for any 860 DSPi that includes a DOCSIS 1.X or DOCSIS 2.0 cable modem.

- This hardware and software upgrade includes a new DOCSIS 3.0 cable modem.

Wi-Fi Communications Upgrade for the 860 DSPi
(P/N 2072045001K)

When installed in an 860 DSPi, the Wi-Fi Option can be used to survey available access points, or to access a network to perform tests such as ping, trace route, throughput, VoIP, and verification of browser functionality. This is a hardware and software upgrade that includes a built-in Wi-Fi Adapter, Ethernet Communications Option (CI-5), and necessary software access codes. It can also be used when connected to a Wi-Fi access point to communicate data to TDM.

REQUIRES POWER PACK OPTION (PP-1)

To determine if an internal modem is installed in your device you must:

1. Access the **Setup** Menu from any **Navigation** Menu by pressing the ⬚Setup⬚ softkey.

2. Select the 🛈 icon from the **Setup** Menu.

Once in the **Instrument Information** Mode, follow the instructions shown to the right.

Use the ◀ ▶ buttons to highlight the **NET Option Info** Field. If you have this hardware option installed it will be indicated by the text *Wi-Fi: YES*.

Use the ◀ ▶ buttons to highlight the **Communication Info** Field. If you have this hardware option installed it will be indicated by the text *Wi-Fi:* followed by the individual MAC address of the Wi-Fi Receiver Board.
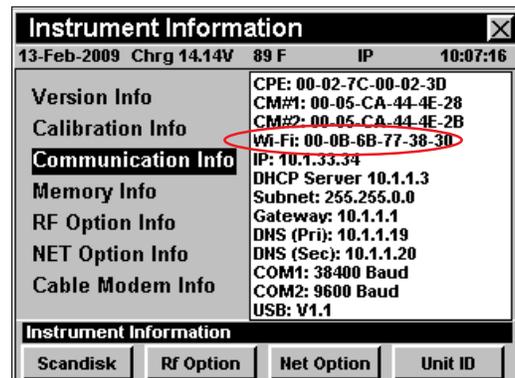
860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section II: Installer Functions

TRILITHIC

Installer Functions Overview

Introduction

The instrument enables you to select from numerous testing and measurement procedures. The instruments features several Installer Functions which come with the instrument, and it may have one or more optional functions.

This section will provide you with instructions on how to utilize the functions available in the **Installer** Menu of the instrument:

> **Note:** The labels and the arrangement of the icons in this section are the default settings of the instrument. The user's display appearance may be customized and therefore may differ from the **Installer** Menu shown in this section. WorkBench software is required for customizing. See the WorkBench operation manual for more details.

Mode	Description	860 DSP Option	860 DSPi Option
Level Level	Displays the amplitude of the carriers included in a single channel, or the amplitude of a signal at a selected frequency.	Standard	Standard
QAM Lite QAM Lite	Analyzes and displays the signal qualities of digitally modulated signals displayed using a bar graph of signal level and numeric values for MER and pre/post FEC BER. **YOU MAY NOT HAVE THIS ICON, SEE NOTE 1**	N/A	Standard

Mode	Description	860 DSP Option	860 DSPi Option
QAM	Performs all of the QAM Lite features plus it will also display constellation, equalizer tap diagram, and BER graph. **YOU MAY NOT HAVE THIS ICON, SEE NOTE 1**	QA-1	PP-1 and QA-2
	The addition of the Enhanced Digital Video Retrofit Option (IL-1 or IL-2) provides extended measurements of errored seconds and code word errors in the QA-1 Option for the 860 DSP and the QA-2 Option for the 860 DSPi.	IL-1 or IL-2	IL-1 or IL-2
Spectrum Analyzer	Displays the amplitude of all carrier, beats, and other RF sources in the user-selectable spectrum from 4.0 MHz to 1.0 GHz with a resolution bandwidth of 300 kHz. **YOU MAY NOT HAVE THIS ICON, SEE NOTE 2**	Standard	PP-1
Return Spectrum Analyzer	Displays the amplitude of all carrier, beats, and other RF sources in the user-selectable spectrum from 4.0 MHz to 65.0 MHz with a resolution bandwidth of 300 kHz. **YOU MAY NOT HAVE THIS ICON, SEE NOTE 2**	N/A	Standard
Advanced Spectrum Analyzer	Displays the amplitude of all carrier, beats, and other RF sources in the user-selectable spectrum from 4.0 MHz to 1.0 GHz with a user-selectable resolution bandwidth from 10.0 KHz to 3.0 MHz, and includes a Zero Span Function. **YOU MAY NOT HAVE THIS ICON, SEE NOTE 2**	SA-1	PP-1 and SA-1
Tilt	Measures the amplitudes of a pre-selected group of carriers, and also computes the difference in amplitude between two selectable channels in the group.	Standard	Standard

Mode	Description	860 DSP Option	860 DSPi Option
DOCSIS 2.0 CM Statistics	Used to perform a quick view of the DOCSIS 1.X and DOCSIS 2.0 cable modem information. **NOT AVAILABLE FOR 860 DSP, SEE NOTE 3**	N/A	Standard on DOCSIS 1.X and 2.0 Equipped Devices
DOCSIS 3.0 CM Statistics	Used to perform a quick view of the DOCSIS 3.0 cable modem information. **NOT AVAILABLE FOR 860 DSP, SEE NOTE 3**	N/A	Standard on DOCSIS 3.0 Equipped Devices
VoIP	Used to measure various parameters that impact call quality, and provides results to reveal proximity to potential failure. (Works with ACTS Advanced Communication Test Server located in the cable network.)	CI-1, CI-2, CI-3, or CI-4	Standard
Thru Put	Tests the effective data rate of both the upstream and downstream channels of a cable modem connection.	CI-1, CI-2, CI-3, or CI-4	Standard
Digital BER	Used to test the ratio of corrupted bits versus total bits of data for a selected channel.	QA-1	Standard
	The addition of the Enhanced Digital Retrofit Option (IL-1 or IL-2) provides deep interleave support to BER Mode.	IL-1 or IL-2	Standard
Web Connectivity Test	Used to perform a quick Web Browser connectivity test without entering the Web Browser menu.	CI-1, CI-2, CI-3, or CI-4	PP-1

TRILITHIC

Mode	Description	860 DSP Option	860 DSPi Option
Web Browser	Used to access information from the internet.	CI-1, CI-2, CI-3, or CI-4	PP-1
Automatic Test	Performs a sequence of operations specified by a user-defined "macro".	Standard	Standard
Automatic Test Shortcut	Used as a shortcut to a user-defined "macro" that is saved on the 860 DSP or 860 DSPi using the WorkBench software, and displays an icon title that is the name of the user-defined "macro" that is referenced.	Requires WorkBench Software	Requires WorkBench Software
Automatic Test Results	Used to recall stored results of an AutoTest.	Standard	Standard
PING	Provides the ability to PING the network connection to check network connectivity between network devices.	CI-1, CI-2, CI-3, or CI-4	Standard
Trace Rt	This is a network utility which plots a route from source to destination displaying all routers along the way in addition to the round trip time from the source to the router. It also attempts to do a reverse domain name look up to display the registered name of each router.	CI-1, CI-2, CI-3, or CI-4	Standard

Note 1: The QAM Lite icon will appear on the 860 DSPi as a default setting. The QAM Lite icon will be replaced with the QAM icon when the QAM Option (QA-1 or QA-2) is installed.

Note 2: The Return Spectrum Analyzer icon will appear on the 860 DSPi as a default setting and will not appear on the 860 DSP in any configuration. The Return Spectrum Analyzer icon will be replaced on the 860 DSPi with the Spectrum Analyzer icon when the Power Pack Option (PP-1) is installed. The Spectrum Analyzer icon will appear on the 860 DSP as a default setting. The Spectrum Analyzer icon will be replaced on the 860 DSP and 860 DSPi with the Advanced Spectrum Analyzer icon when the Spectrum Analyzer Option (SA-1) is installed.

Note 3: Although this icon will appear on the 860 DSP, this mode is not available for the 860 DSP. The 860 DSP must be upgraded to an 860 DSPi by installing the DOCSIS 2.0 modem to access this mode.

Each mode of the instrument can be accessed by selecting the corresponding icon as shown in the previous table. Some modes may be inaccessible based on the options that have been installed on the instrument. Optional modes for the 860 DSP and 860 DSPi are indicated by an option code that is described in detail in **Section I: The Basics**, Chapter 7: Optional Software and Hardware.

This section assumes you are at least familiar with the basic operation of the navigational tools used in the instrument, so be sure to review **Section I: The Basics**, Chapter 4: Basic Navigation before proceeding through this section.

To use some installer functions, you may have to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this section.

To use some installer functions, you will need to connect your instrument to your cable system.

Level Mode 2

Introduction

In **Level** Mode the instrument displays the amplitude of the carriers included in a single channel, or the amplitude of a signal at a selected frequency. The basic 860 DSP and 860 DSPi come equipped with the **Level** Mode as a standard feature.

This section will provide you with the basic understanding of how to use **Level** Mode including:

- Required Setup

- Setting Reference Level

- Setting Vertical Resolution

- Adjusting Channels and Frequencies

- Setting Channel Plan

- Setting Frequency Step

- Using the Goto Function
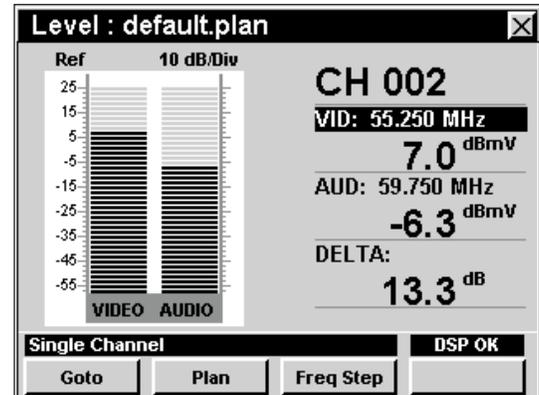
- Function Menu Options

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Level** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Level** Mode, you will need to set up **Level** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**; see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Level

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◄ ► buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing (4).

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing (4).

Adjusting Channels and Frequencies

To change the channel or frequency, use the ◄ ► buttons to highlight the channel number or frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number or frequency using the alphanumeric keypad, and then press the (Ent) button.

Level

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

You must have a system channel plan that is up to date in order to view the channels in your system.

Changing Frequency Step Size

To change the frequency step size, press the [Freq Step] softkey, use the ▲ ▼ buttons to select the frequency step size you want from the list of frequency steps, and then press the (Ent) button. You may also select the desired frequency step size by pressing the corresponding alphanumeric button.

The first frequency step, in this case 100.000 MHz, is the channel spacing that is configured in **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Level Mode Settings*.

The frequency step, in this case 100.000 MHz, that is marked with and asterisk (*) is the currently selected frequency step.
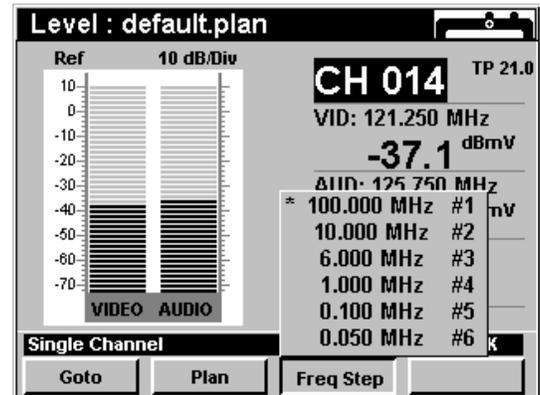
TRILITHIC

Level

Using the Goto Function

The ⬚ Goto ⬚ softkey gives you rapid access to related measurement functions.

Goto Spectrum

From **Level** Mode you can jump to **Spectrum** Mode with the spectrum analyzer settings automatically set to display the current channel or frequency.

To change to **Spectrum** Mode, press the ⬚ Goto ⬚ softkey, use the ▲ ▼ buttons to select **Spectrum**, and then press the (Ent) button. You may also select **Spectrum** by pressing ①.

Once in **Spectrum** Mode, you may change any of the analyzer settings as described in Chapter 4: Spectrum Mode of this section of the manual.

Pressing the (Bk) button will return you to **Level** Mode at the originally selected channel.
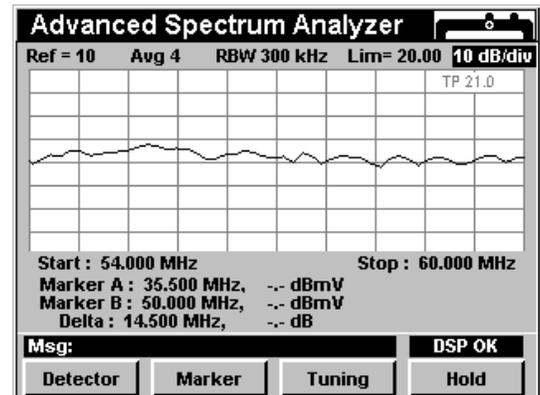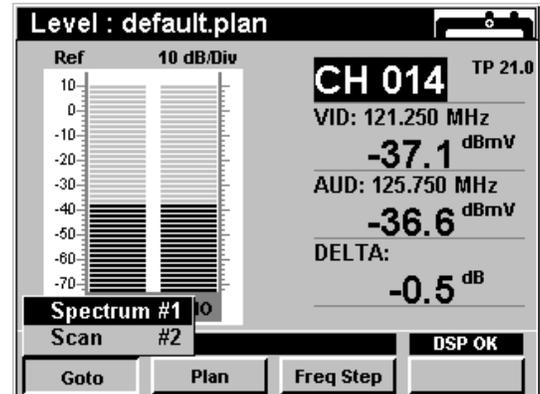
Goto Scan

If you are tuned to a channel, you can also jump to **Scan** Mode with the marker automatically set to the currently selected channel.

To change to **Scan** Mode, press the ⬚ Goto softkey, use the ▲ ▼ buttons to select **Scan**, and then press the (Ent) button. You may also select **Scan** by pressing (2).

While in **Scan** Mode you can move the marker to another channel of interest and then press (Bk) to return to **Level** Mode tuned to the new channel.
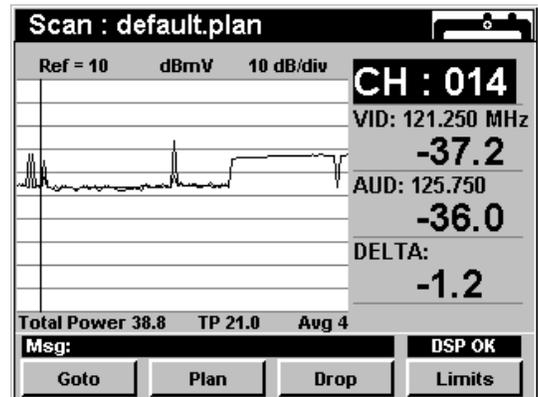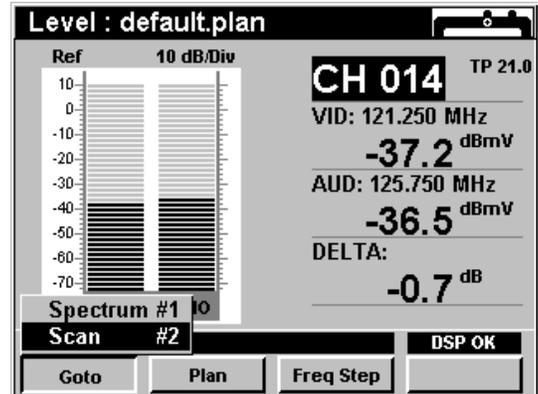
Level

Goto QAM

When tuned to a digital channel in **Level** Mode you can ~~~~
settings automatically set to display the current channel ~~~~

To change to **QAM** Mode, press the [Goto] softkey, use ~~~~
then press the (Ent) button. You may also select **QAM** by p~~~~

You may change the channel in **QAM** Mode, however wh~~~~
you will return to the originally selected channel.
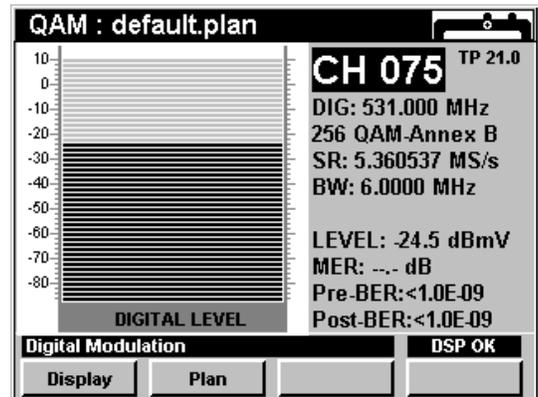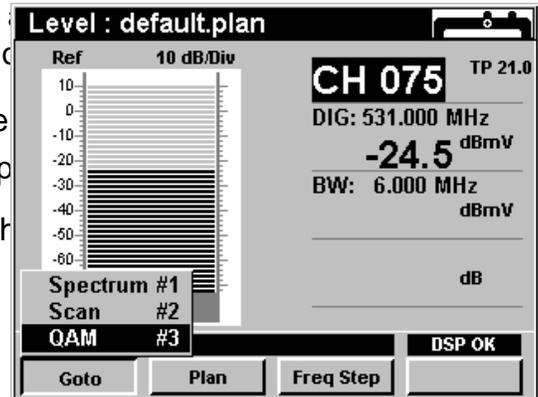
Note: QAM Lite Mode is a standard function of the 860 DSPi and **QAM** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **QAM Lite** or **QAM** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

![Level icon]

Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Level** Mode.

The following **Function** Menu options can be accessed while in **Level** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Auto Range
- Save Data Log
- Set Test Point Compensation

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals on screen by automatically adjusting the reference level and vertical resolution.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Auto Range**, and then press the (Ent) button. You may also select **Auto Range** by pressing (4).
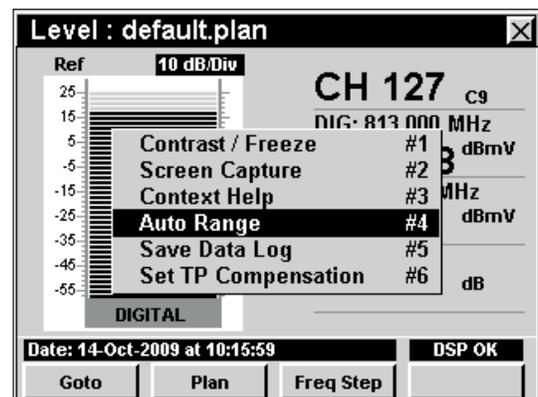
Set Test Point Compensation Feature

This feature allows the user to enter an offset that will be added to all measurements made in **Level** Mode.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (6).

- The **Function** Menu will close and the **Forward Compensation** window will open.

    - To enter an offset value for the test point or probe, use the (◄)(►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

    - To enable test point compensation, use the (◄)(►) buttons to highlight **TP Mode**, and then use the (▲)(▼) buttons to change between **Enabled** and **Disabled**.

    - To resume measurement, press the (Bk) button.

- The **Forward Compensation** window will close and the **Level** Mode will display the combined (**Test Point** and **Probe**) test point compensation value next to the channel number.
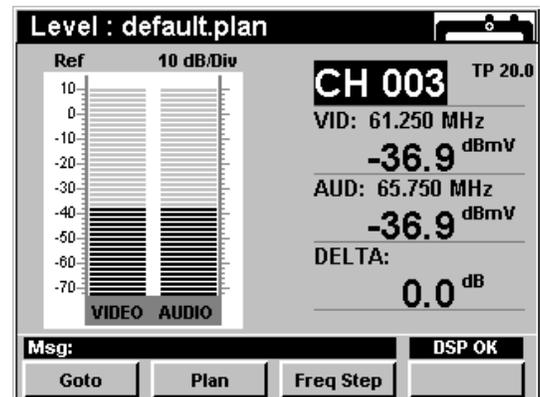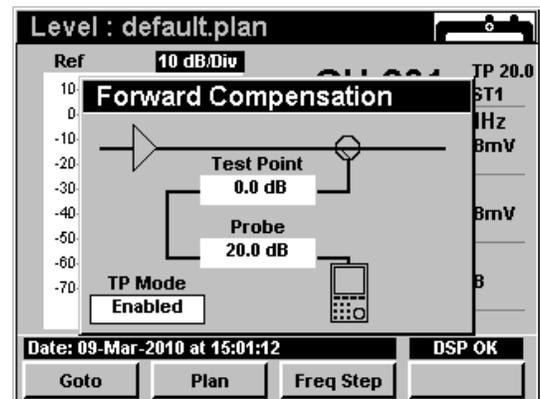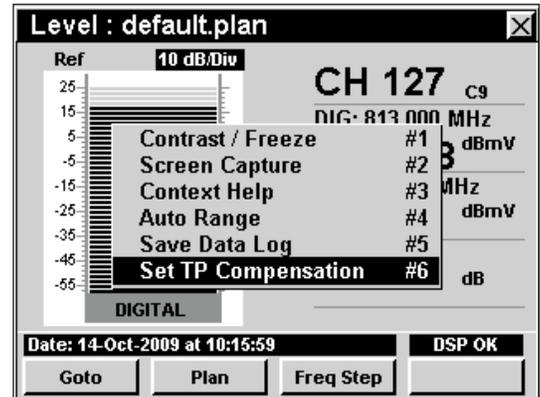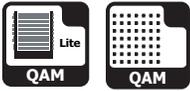
Introduction

QAM Mode analyzes and displays the signal qualities of digitally modulated signals. The 860 DSP and 860 DSPi come equipped with two different versions of the QAM analyzer as follows:

- **QAM Lite** Mode - The basic 860 DSPi comes equipped with this mode as the standard QAM analyzer. This mode displays a bar graph of the signal level and numeric values for MER and pre and post FEC BER. This mode is not available for the 860 DSP in any configuration.

- **QAM** Mode - The 860 DSP and 860 DSPi can be upgraded to this mode by purchasing the QAM Option (QA-1 or QA-2) respectively. This mode includes all of the features of **QAM Lite** Mode plus digital constellation, equalizer tap diagram, and BER graph.

> **Note:** Before the 860 DSPi can be upgraded to the **QAM** Mode by purchasing the QAM Option (QA-2), you must first purchase the Power Pack Option (PP-1).

- You can also upgrade the **QAM** Mode with the addition of the Enhanced Digital Video Retrofit Option (IL-2). This option will provide support for decoding interleaved QAM channels in the QA-1 Option for the 860 DSP and the QA-2 Option for the 860 DSPi. This retrofit option is for instruments that were built before March 2005. Any instruments built since this date are equipped with the IL-1 or IL-2 Retrofit Option as a standard feature.

This section will provide you with the basic understanding of how to use **QAM** Mode including:

- Required Setup
- Setting Channel Plan
- Adjusting Channels and Frequencies
- Changing Digital Modulation Settings
- Setting the Display Mode
- Function Menu Options

Note: QAM Lite Mode is a standard function of the 860 DSPi and **QAM** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **QAM Lite** or **QAM** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **QAM** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **QAM** Mode, you will need to set up some **QAM** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Digital Settings* before proceeding through this chapter.

To use the distance to fault function of the equalizer tap diagram in **QAM** Mode, you will need to set up the cable velocity factor. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Fwd Sweep Settings* before proceeding through this chapter.
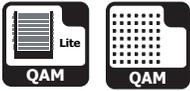
Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the `Plan` softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

The instrument will tune to and measure QAM parameters for channels defined as digital in your channel plan.

You must have a system channel plan that is up to date in order to view the channels in your system.
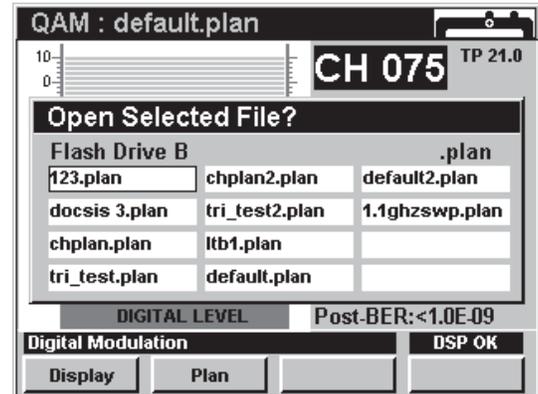
Adjusting Channels and Frequencies

To change the channel or frequency, use the ◀ ▶ buttons to highlight the channel number or frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number or frequency using the alphanumeric keypad, and then press the (Ent) button.

You may enter any channel number in your plan. If the channel is not designated as digital in your plan, the message **Not A Digital Channel** will be displayed in the message bar at the bottom of the screen and the instrument will beep.

The instrument will default to 64 QAM when tuning by frequency. To temporarily change the modulation type you must first enter a new frequency.
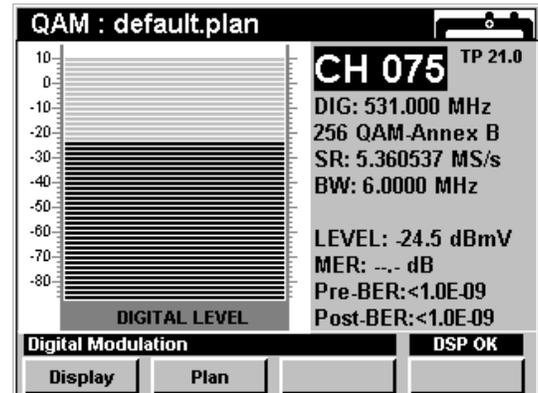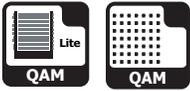
Changing Digital Modulation Settings

To change the digital modulation settings, tune to a channel by frequency, use the ◄ ► buttons to highlight the desired setting and then use the ▲ ▼ buttons to increment the value up and down or enter the desired value using the alphanumeric keypad and then press the (Ent) button.

Select from the following modulation types:

- **QPSK, 16, 32, 64, 128, and 256 QAM-Annex A:** Euro modulation

- **64 and 256 QAM-Annex B:** US DOCSIS modulation
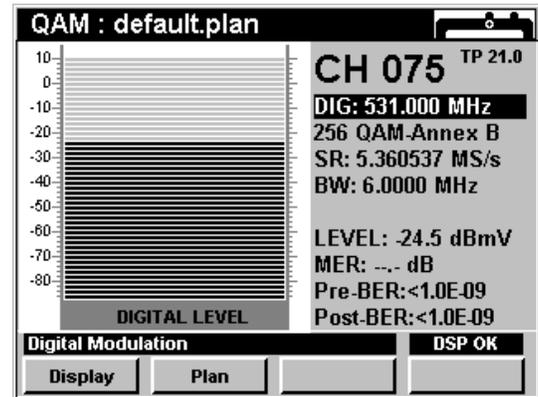
Setting the Display Mode

QAM Mode has four display options; bar graph, digital constellation, equalizer tap diagram, and BER graph. To change display modes use the Display softkey to toggle between the displays.

Using the Bar Graph Display

The bar graph display is useful for quickly determining the level and quality of a digital signal. The level is displayed as a bar graph with an associated numerical value. Verifying that a digital channel's level MER and BER are within acceptable limits is usually all that is necessary to insure that a digital channel will operate properly.
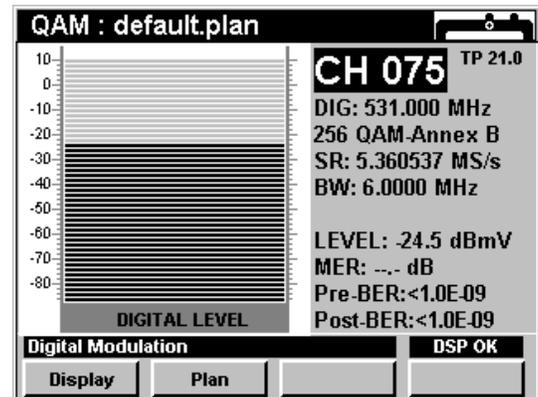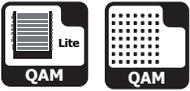
Using the Constellation Display

The constellation display graphs symbol values on an I and Q grid. The constellation display is useful for observing impairments in the digital signal.

An optimum constellation has symbol clusters that are compact dots in the center of each symbol box. By observing the shape of the symbol clusters and their location relative to their optimum location in the constellation, it is possible to draw some conclusions about the nature of an impairment.

For example, broadband noise causes symbol clusters to enlarge. Symbol clusters with a hole in the center indicate coherent interference like CSO/CTB, spurs or ingress. Phase noise in headend converters causes the symbol clusters to appear as arcs particularly those near the edges of the constellation. A constellation with the corner symbol clusters drawn inward indicates gain compression.

Using the Zoom Feature

The instrument allows you to easily zoom in or out on a constellation display**.**

To zoom in on a constellation display, press the Zoom In softkey. A selection window will appear in the display.

Use the ◄ ► ▲ ▼ buttons to place the selection window on the desired location then press the Zoom In softkey. If the selection window still appears, you can continue to zoom in by positioning the window and pressing the Zoom In softkey.

To zoom out from a constellation display press the Zoom Out softkey. Press the Zoom Out softkey repeatedly to zoom out further.

TRILITHIC

Using the Equalizer Tap Diagram

The equalizer tap diagram shows the relative amplitude of the equalizer taps needed to correct phase and amplitude distortions in the QAM signal.

The equalizer tap diagram is useful in determining presence of reflections. You can get an approximate distance to fault indication by using the `Eq Left` or `Eq Right` softkeys to place the indicator on the tap of interest.

Using the BER Graph

The BER graph shows the ratio of corrupted bits to total bits in the QAM signal. The analyzer dwells on the selected channel, counting good bits and watching for individual corrupted bits. The BER graph shows errored bits as vertical lines that expand horizontally across the display with advancing time.

- **Gray:** These lines indicate repaired bits

- **Black:** These lines represent unrepairable bits
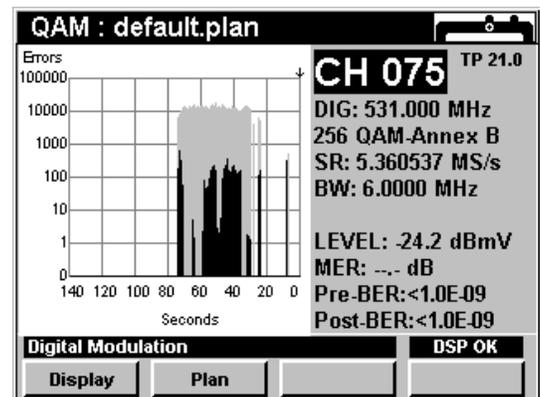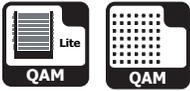
Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **QAM** Mode.

The following **Function** Menu options can be accessed
while in **QAM** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Auto Range

- Save Data Log

- Set Test Point Compensation

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals
on screen.

To use this option, press the (Fn) button, use the
(▲) (▼) buttons to highlight **Auto Range**, and then
press the (Ent) button. You may also select **Auto
Range** by pressing (4).

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all level measurements.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (6).

- The **Function** Menu will close and the **Forward Compensation** window will open.

  - To enter an offset value for the test point or probe, use the (◄) (►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

  - To enable test point compensation, use the (◄) (►) buttons to highlight **TP Mode**, and then use the (▲) (▼) buttons to change between **Enabled** and **Disabled**.

  - To resume measurement, press the (Bk) button.

- The **Forward Compensation** window will close and the **QAM** Mode will display the combined (**Test Point** and **Probe**) test point compensation value next to the channel number.
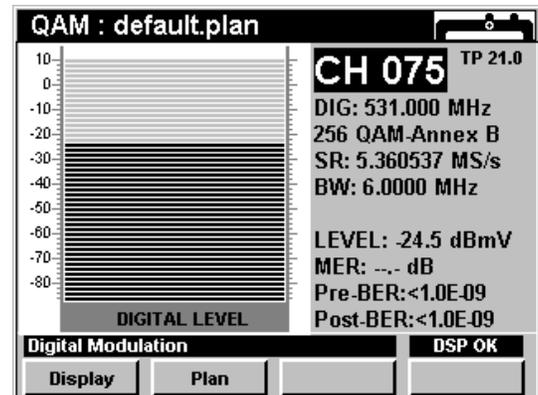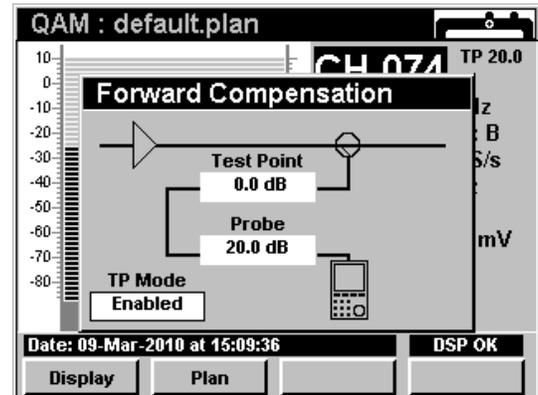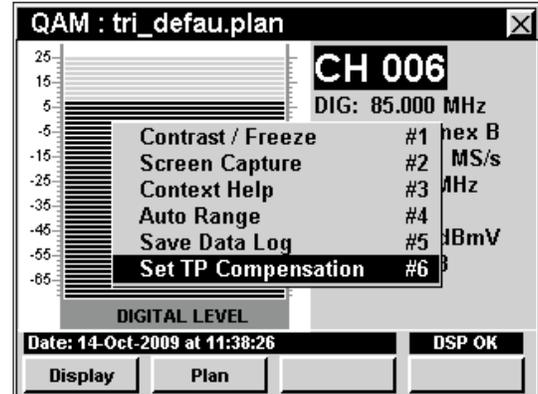
Introduction

The **Spectrum** Mode displays the amplitude of all carriers, beats and other RF sources in a user-selectable spectrum. In this mode the instrument displays RF amplitude as a power-vs-frequency line graph. Also displayed are the frequencies selected for the two markers, the RF amplitude of any signals at those frequencies and the difference between the amplitudes. An automatic marker identifies the highest amplitude signal in the displayed spectrum.

The **Spectrum** Mode draws a graph of all of the RF sources present in a selected span of frequencies. **Spectrum** Mode differs from **Scan** Mode in that the sources do not have to be included in a pre-selected channel plan.

The 860 DSP and 860 DSPi come equipped with three different versions of the spectrum analyzer as follows:

- **Spectrum** Mode - The basic 860 DSP comes equipped with this mode as the standard spectrum analyzer. This mode includes a frequency range of 4 MHz to 1.0 GHz and is limited to a fixed bandwidth set at 300 kHz. The 860 DSPi can be upgraded to this mode by purchasing the Power Pack Option (PP-1).

- **Return Spectrum** Mode - The basic 860 DSPi comes equipped with this mode as the standard spectrum analyzer. This mode includes a frequency range of 4 MHz to 65 MHz and is limited to a fixed bandwidth set at 300 kHz. This mode is not available for the 860 DSP in any configuration.

- **Advanced Spectrum** Mode - The 860 DSP and 860 DSPi can be upgraded to this mode by purchasing the Spectrum Analyzer Option (SA-1). This mode includes an adjustable bandwidth that can be set as narrow as 10 kHz to as wide as 3 MHz, zero span capabilities, and a frequency range of 4 MHz to 1.0 GHz.

> **Note:** To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Spectrum** Mode or **Advanced Spectrum** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order these options and start using them today.

This section will provide you with the basic understanding of how to use **Spectrum** Mode including:

- Required Setup
- Setting Reference Level
- Setting Resolution Bandwidth
- Setting Amplitude Limits
- Setting Vertical Resolution
- Detector Settings
- Marker Settings
- Setting Frequency Parameters
- Zero Span Measurements
- Hold Settings
- Function Menu Options
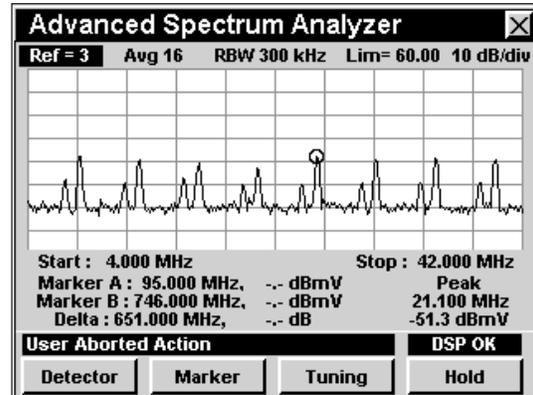
Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Spectrum** Mode, you are not required to perform any setup procedures.

Setting Reference Level

On the spectrum graph, vertical displacement represents signal strength. The horizontal axis represents a range of frequencies, with the lowest represented frequency on the left edge of the graph, the highest on the right edge.

The amplitude represented by the top horizontal line on the graph is the reference level. In this mode the reference level also controls gain in the RF front end. It is possible to overload the RF front end if the reference level is too low.

To change the reference level, use the ◀ ▶ buttons to highlight **Ref**, and then adjust the current value using the ▲ ▼ buttons.
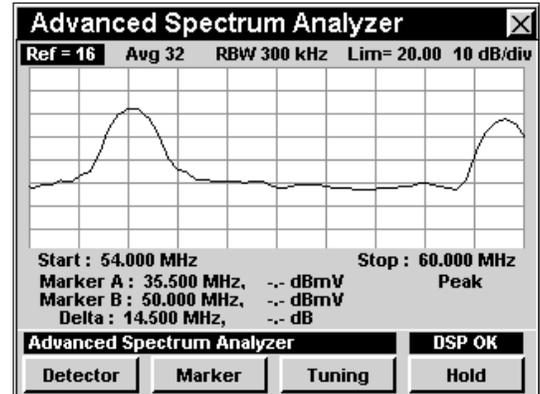
Note: If **Overload** appears in the bottom right message bar it is because the input signals are overloading the instrument. Increase the reference level until the message disappears or use the Auto Range Function by pressing the Fn button and then selecting 4.

Setting Resolution Bandwidth

The resolution bandwidth setting determines how close together in frequency two signals can be and still be represented individually on the spectrum display.

Instruments with **Spectrum** Mode and **Return Spectrum** Mode have a resolution that is fixed at 300 kHz, a useful bandwidth for most wide-span spectrum scans.

Instruments with **Advanced Spectrum** Mode can be set to resolutions of 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, or 3 MHz.

The **RBW XXX kHz** and **RBW XXX MHz** sets the resolution bandwidth for the graph. To change the resolution bandwidth, first use the ◀ ▶ buttons to highlight **RBW XXX kHz** or **RBW XXX MHz**, then use the ▲ ▼ buttons to set the resolution bandwidth as desired.

Narrow resolution bandwidth settings are most useful for tests run at narrow frequency spans, such as hunting for spurious or reverse ingress, especially at frequencies near RF carriers.

Broad resolution bandwidth settings are most useful for measuring the true power of some digital modulation formats.
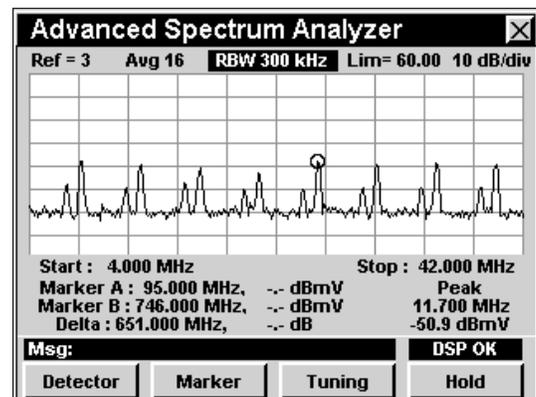
Setting Amplitude Limits

The **Lim = XX** sets an amplitude limit threshold for testing of ingress problems on the return band. When the amplitude of a displayed signal exceeds the limit threshold, the instrument will beep.

To use this option, use the ◄ ► buttons to highlight **Lim = XX**, and then press the ▲ ▼ buttons to increase or decrease the amplitude limit threshold.

- A dark horizontal line will appear on the screen when the amplitude limit threshold is lower than the reference level.

- To enable the use of limit beeps, press the (Fn) button, use the ▲ ▼ buttons to highlight **Limit Beeps On**, and then press the (Ent) button. You may also select **Limit Beeps On** by pressing (8).

- To disable the use of limit beeps, press the (Fn) button, use the ▲ ▼ buttons to highlight **Limit Beeps Off**, and then press the (Ent) button. You may also select **Limit Beeps Off** by pressing (8).
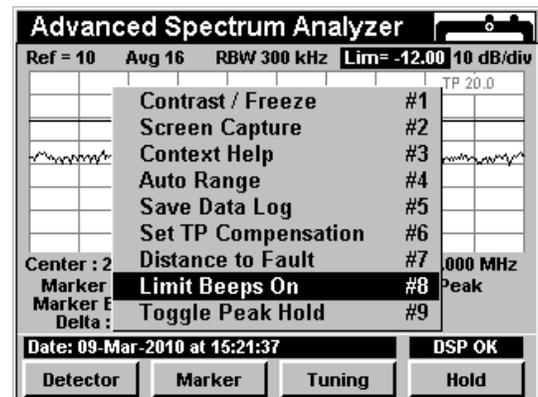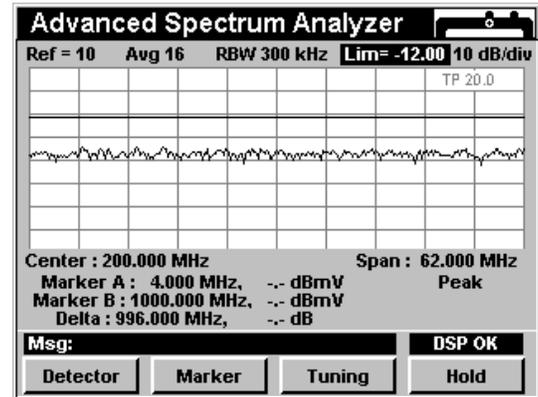
Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div**, and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.
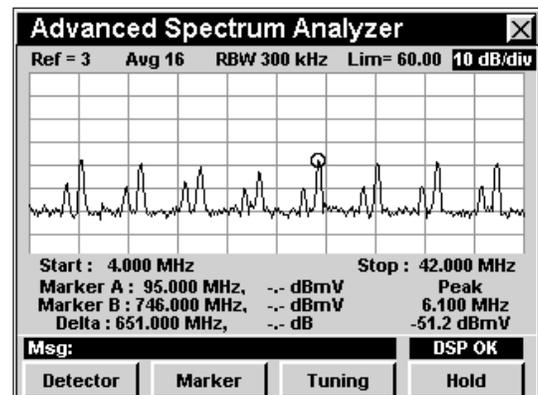
Detector Settings

The number of scans that are averaged is settable in the instrument using the **Detector** settings. The **Detector** settings allows you to smooth out noise "jitter" on the spectrum display by averaging a succession of spectrum scans. Its effect is similar to that of a video filter in a bench-top spectrum analyzer. Reducing display jitter is most useful when you are looking for small signals, such as spurious or common path distortions in the presence of noise.

To use this option, press the `Detector` softkey, use the ▲ ▼ buttons to highlight the desired detector setting of **Averaging**, **Dwell Wide**, or **Dwell Narrow** and then press the **Ent** button. You may also select the desired detector setting by pressing the corresponding alphanumeric button.

- Use the **Averaging** setting to perform measurements of the power of digital signals and to display the noise floor of signals.

- Use the **Dwell Narrow** and **Dwell Wide** settings to catch fast upstream modem bursts and fast noise bursts.

  - **Dwell Narrow** - This setting is slower than **Dwell Wide**, but displays the measurement more like an analog spectrum analyzer display.

  - **Dwell Wide** - This setting is faster than **Dwell Narrow**, but displays the measurement less like an analog spectrum analyzer display.

To change the number of times that the detector dwells on a frequency, use the ◄ ► buttons to highlight the detector settings status area shown in the figure, then use the ▲ ▼ buttons to set the value as follows:

- **Averaging** - Norm, Avg 8, Avg 16, Avg 32, Avg 64, Avg 128, and Avg 256

- **Dwell Wide** - Norm, Dwl W 8, Dwl W 16, Dwl W 32, Dwl W 64, Dwl W 128, and Dwl W 256

- **Dwell Narrow** - Norm, Dwl N 8, Dwl N 16, Dwl N 32, Dwl N 64, Dwl N 128, and Dwl N 256

Selecting a low value will decrease the chance of detecting data bursts and provide a faster less accurate result and selecting a high value will increase the chance of detecting data bursts and provide a slower more accurate result.
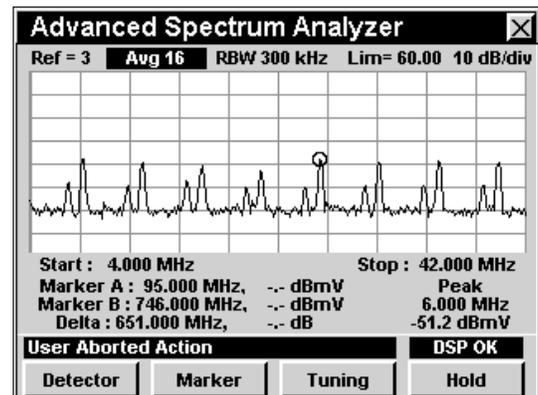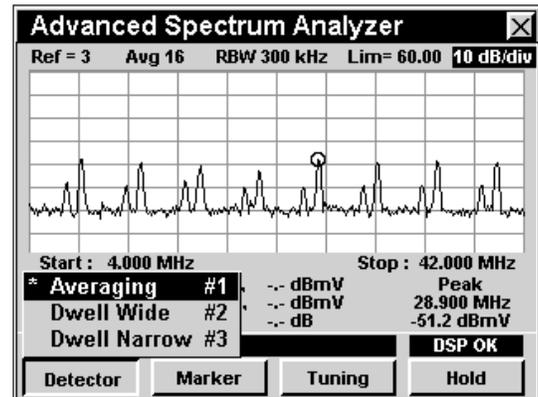
Marker Settings

The instrument displays two frequency-settable markers as dark vertical lines on the scale. These markers can be used to make amplitude measurements of carriers at user-selected frequencies, or to determine the difference (**Delta**) in amplitude between two selected carriers.

To set a marker to a frequency, use the ◀ ▶ buttons to highlight **Marker A** or **Marker B**, then increment the

marker to higher or lower frequencies using the ▲ ▼ buttons. You can also enter a frequency directly using the alphanumeric keypad and pressing the (Ent) button.

The ⬛Marker softkey allows you to set a carrier of interest in the center of the display then conveniently "zoom" in on it by reducing the **Span** setting.

To use this option, press the ⬛Marker softkey, use the

▲ ▼ buttons to highlight the desired marker setting of **Center => Marker 1**, **Center => Marker 2**, or **Start=M1/**

Stop=M2 and then press the (Ent) button. You may also select the desired marker setting by pressing the corresponding alphanumeric button. The ⬛Marker softkey accesses the following functions:

- **Center => Marker 1 -** sets the displayed spectrum's center frequency to the current setting of **Marker A**.

- **Center => Marker 2** - sets the displayed spectrum's center frequency to the current setting of **Marker B**.

- **Start=M1/Stop=M2 -** sets the far left edge of the displayed spectrum to the current frequency of **Marker A**, and the far right edge to the frequency of **Marker B**. This allows you to select a "slice" of the spectrum then expand it to the full width of the display.
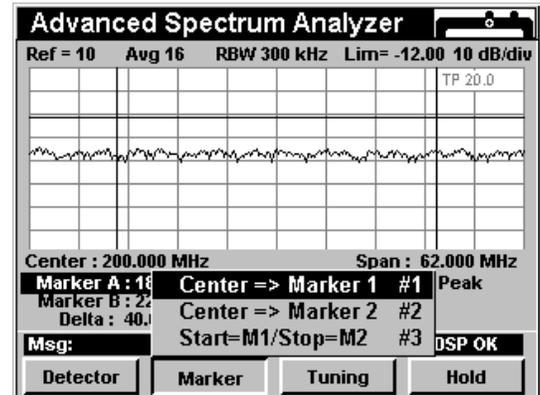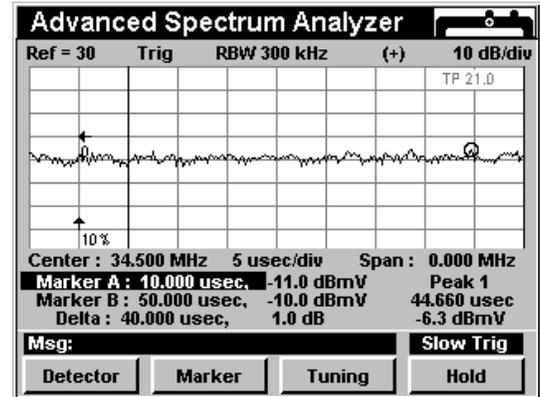
Setting Frequency Parameters

The actual frequency range represented by the horizontal axis of the graph can be set in one of three ways as follows:

Center/Span

This option allows you to enter the frequency represented by the center vertical grid line (**Center**) and the total frequency width of the display (**Span**).

To use this option, press the ⌷ Tuning ⌷ softkey, use the ⒜ ⒱ buttons to highlight **Center/Span**, and then press the (Ent) button. You may also select **Center/Span** by pressing ①.

- Use the ◀ ▶ buttons to highlight **Center**, and then use the alphanumeric keypad to enter the center frequency, and then press the (Ent) button.

- Use the ◀ ▶ buttons to highlight **Span**, and then use the alphanumeric keypad to enter the span frequency, and then press the (Ent) button.
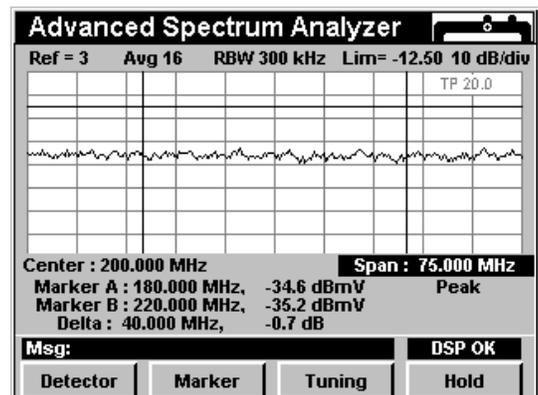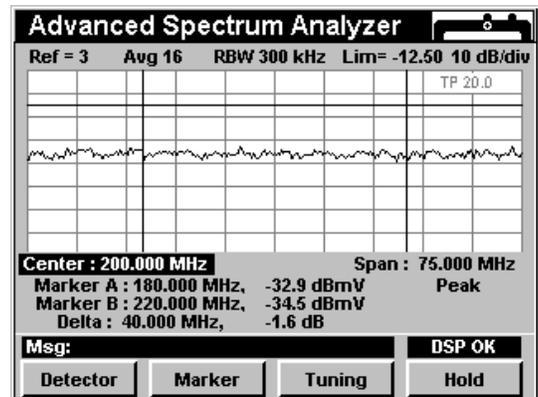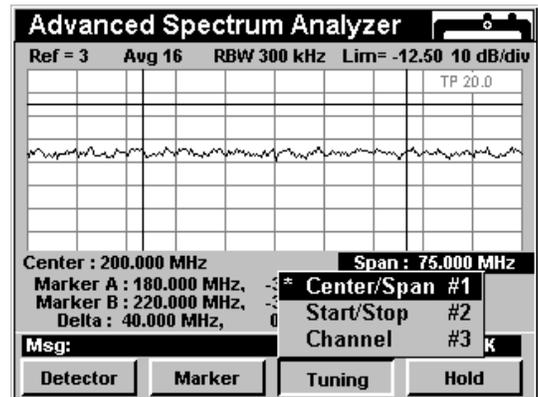
Start/Stop

This option allows you to enter the frequency represented by the farthest left vertical grid line (**Start**) and the farthest right vertical grid line (**Stop**).

To use this option, press the `Tuning` softkey, use the ⏶ ⏷ buttons to highlight **Start/Stop**, and then press the (Ent) button. You may also select **Start/Stop** by pressing ②.

- Use the ◀ ▶ buttons to highlight **Start**, and then use the alphanumeric keypad to enter the start frequency, and then press the (Ent) button.

- Use the ◀ ▶ buttons to highlight **Stop**, and then use the alphanumeric keypad to enter the stop frequency, and then press the (Ent) button.
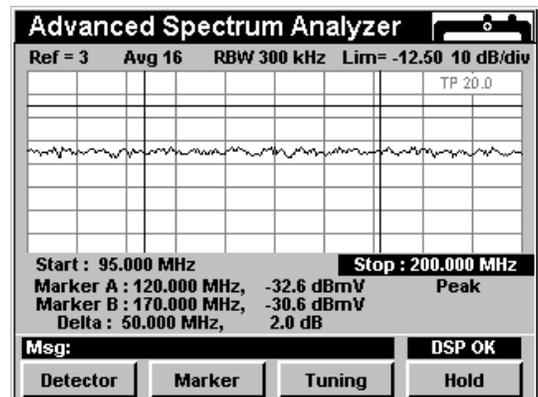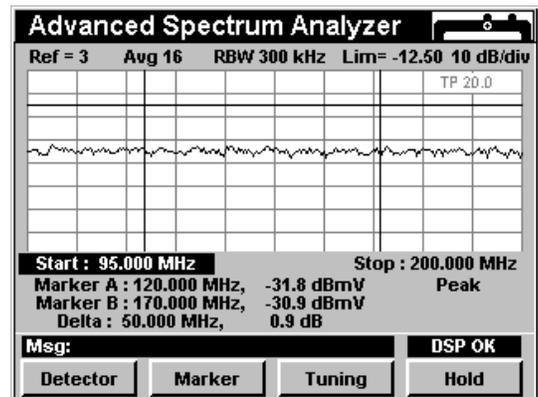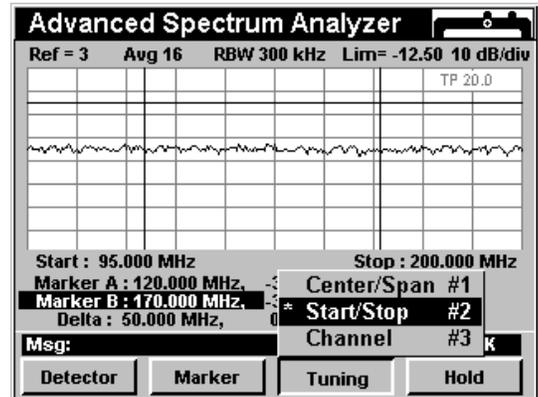
Channel

This option allows you to enter the frequency represented by the farthest left vertical grid line (**Start**) and the farthest right vertical grid line (**Stop**) as well as being able to increment the **Start** or **Stop** frequencies by the selected channel spacing.

To use this option, press the Tuning softkey, use the ▲ ▼ buttons to highlight **Channel**, and then press the (Ent) button. You may also select **Channel** by pressing ③.

- Use the ◀ ▶ buttons to highlight **Start**, and then use the alphanumeric keypad to enter the center frequency, and then press the (Ent) button.

- Use the ◀ ▶ buttons to highlight **Stop**, and then use the alphanumeric keypad to enter the span frequency, and then press the (Ent) button.

- When **Start** or **Stop** are highlighted, use the ▲ ▼ buttons to increment the frequency up or down by the selected channel spacing. To set the frequency spacing between channels, you will need to set the **Channel Spacing**, see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Level Mode Settings*.
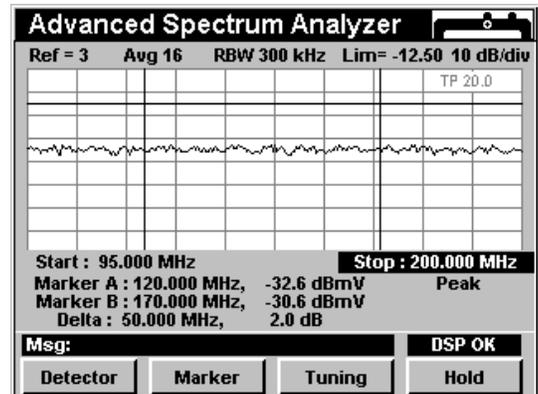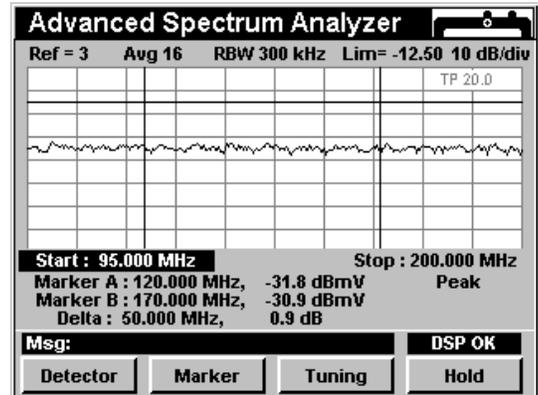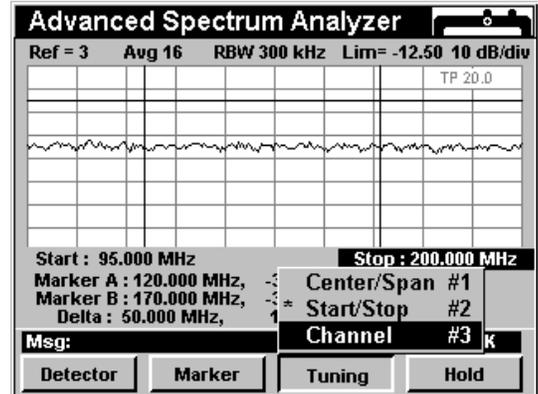
Zero Span Measurements

With the **Center/Span** setting selected and with **Span** set to 0 MHz, the zero span measurement mode is enabled. This allows "time domain" measurements to be performed on signals.

In the zero span measurement mode, you can measure timing relationships or measure the amplitude of a waveform at a settable time interval after a user-set amplitude trigger.

In effect, this mode converts the instrument into a tunable receiver connected to a digital oscilloscope, but displaying power in dBmV rather than +/- volts.

The zero span measurement mode is useful for detecting transient noise and bursts of data transmissions. It may also be used to compare the amplitudes of TDMA sources sharing the same frequency.

To use the zero span measurement mode, press the [Tuning] softkey, use the ▲ ▼ buttons to highlight

Center/Span, and then press the (Ent) button. You may also select **Center/Span** by pressing ①.

- Use the ◄ ► buttons to highlight **Span**, press the ⓪ button, and then press the (Ent) button.

- The detector settings status area in the upper left of the display window will change to **Trig**.

- Two small horizontal and vertical arrows will appear on the display to indicate the voltage and time triggers.

- The horizontal resolution settings will appear on the display between the **Center** and **Span**.

- The frequency settings of the variable markers will change to time settings. The units of the variable markers will match the units of the horizontal resolution settings.
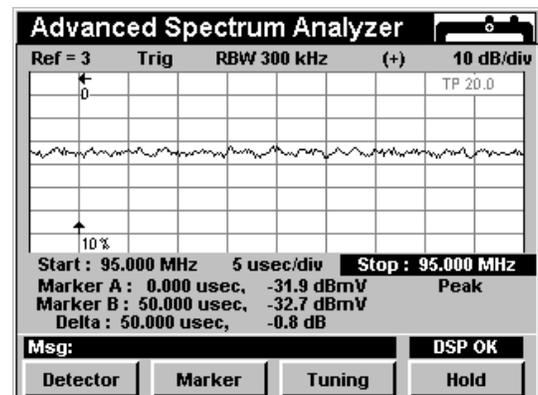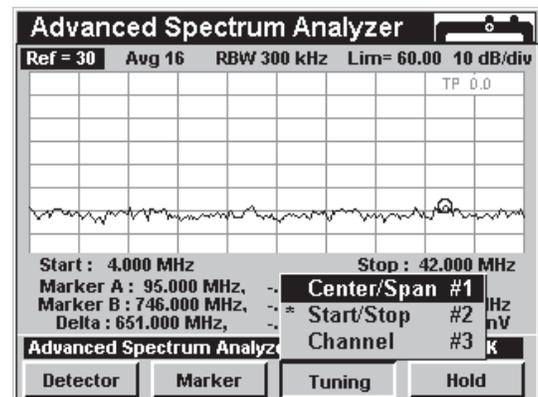
Setting Triggers

When the instrument is in zero span measurement mode, the small horizontal and vertical arrows that appear on the display are voltage and time triggers.

These control which point in a displayed waveform will be used as a reference for time interval measurements, and where that point will appear in the display window.

To set the voltage trigger, use the ◄ ► buttons to highlight **Trig**. Press ▲ ▼ buttons to set the voltage trigger to the point on the waveform that you wish measurements to be referenced from.
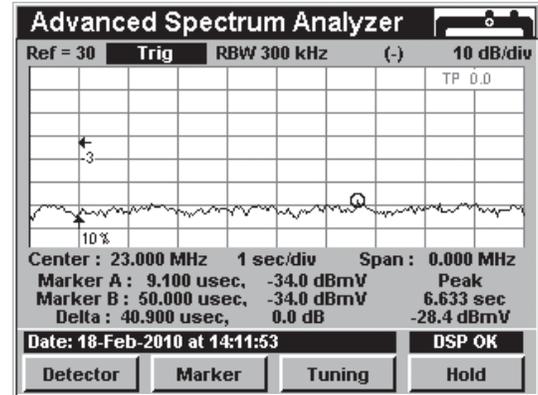
Trigger Modes

You can set the trigger point on the rising side of the waveform or the trailing side.

To set the trigger mode, use the ◄ ► buttons to highlight the second heading from the right, above the display window. (It may indicate **(+)**, **(-)**, or **Auto**, depending on how it was last set.)

- Press the ▲ ▼ buttons to select a rising trigger **(+)** or a falling trigger **(-)**. Being able to set this parameter enables you to for example, trigger on the lead or trailing side of a pulse, or to capture a trace when a burst of data starts, or when it ends.

- You can also select **Auto**, which automatically manages the trigger settings for you. This is a useful feature when you are setting up the instrument to display a waveform because **Auto** always provides a view of the waveform, even if some measurement parameters are not yet set.

TRILITHIC
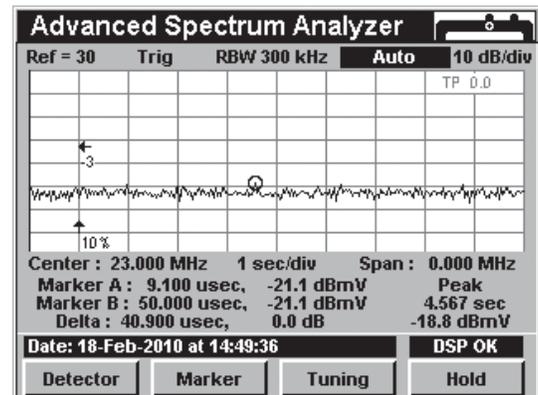
Setting Markers

While operating in zero span measurement mode, markers denote time intervals, rather than frequencies.

You can set one marker to measure the waveform amplitude at a settable delay after the trigger or you can set both markers and measure the amplitude difference between two points in the waveform.

To set a marker, use the ◀ ▶ buttons to highlight **Marker A** or **Marker B**, enter the desired interval before or after the time trigger at which you want the marker to appear by using the alphanumeric keypad, and then press the (Ent) button. Also, you can increment the marker value by pressing the ▲ ▼ buttons. The display will now show the setting of each marker, the amplitudes of the displayed waveform at those points, and the time and amplitude differences between them.
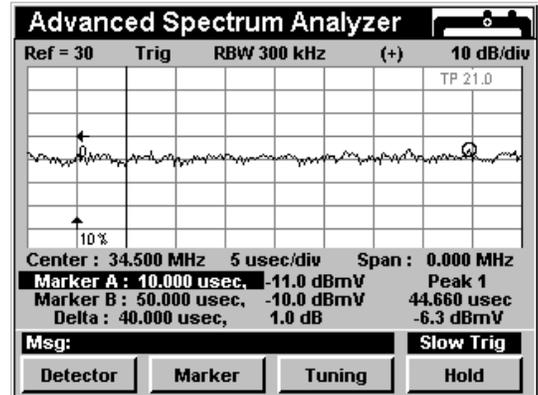
Hold Settings

The ⎡ Hold ⎤ softkey will allow the user to hold the minimum or maximum value of the spectrum being displayed on the instrument screen.

The user may choose, **None**, **Max**, or **Min** as the Hold setting value.

None

The **None** selection disables the Hold setting.

To use the **None** selection of the Hold setting, press the ⎡ Hold ⎤ softkey, use the ▲ ▼ buttons to highlight **None**, and then press the (Ent) button. You may also select **None** by pressing ①.
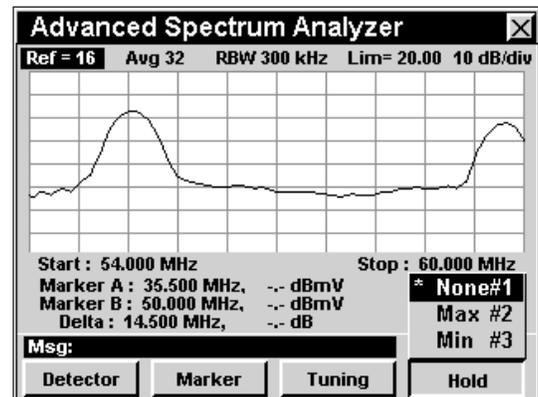
Max

The **Max** selection will hold the maximum value of the spectrum being displayed.

To use the **Max** selection of the Hold setting, press the ⎡ Hold ⎤ softkey, use the ▲ ▼ buttons to highlight **Max**, and then press the (Ent) button. You may also select **Max** by pressing ②.
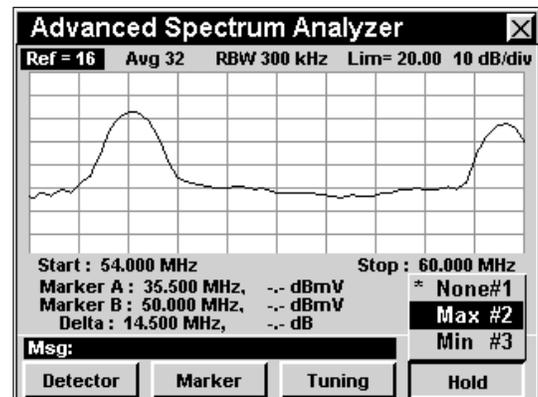
Min

The **Min** selection will hold the minimum value of the spectrum being displayed.

To use the **Min** selection of the Hold setting, press the ⎡ Hold ⎤ softkey, use the ▲ ▼ buttons to highlight **Min**, and then press the (Ent) button. You may also select **Min** by pressing ③.
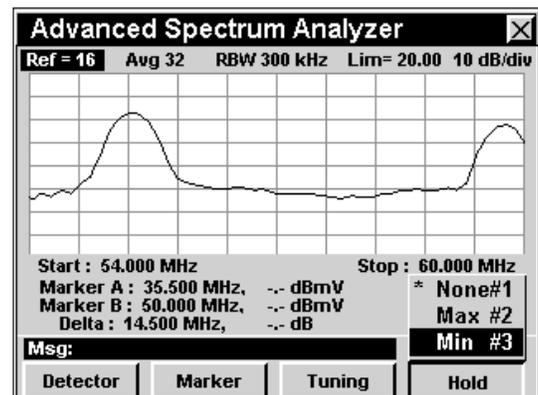
Function Menu Options

The **Function** Menu can be accessed by pressing the Fn button while in the **Spectrum** Mode.

The following **Function** Menu options can be accessed while in **Spectrum** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Auto Range
- Save Data Log
- Set Test Point Compensation
- Limit Beeps On/Off
- Toggle Peak Hold
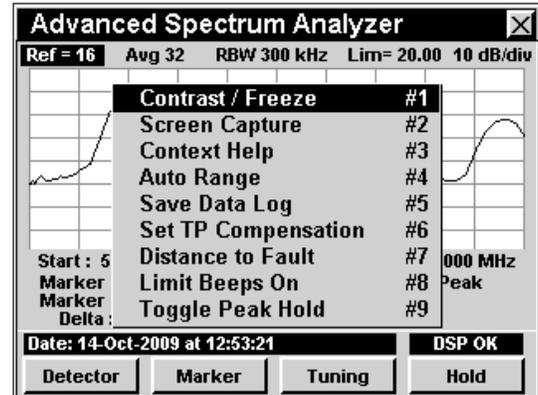
> **Note:** For more information on Limit Beeps On/Off, see *Setting Amplitude Limits* in this chapter.

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals on screen.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Auto Range**, and then press the (Ent) button. You may also select **Auto Range** by pressing (4).

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all measurements made in **Spectrum** Mode.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (6).

- The **Function** Menu will close and the **Forward Compensation** window will open.

  - To enter an offset value for the test point or probe, use the (◄) (►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

  - To enable test point compensation, use the (◄) (►) buttons to highlight **TP Mode**, and then use the (▲) (▼) buttons to change between **Enabled** and **Disabled**.

  - To resume measurement, press the (Bk) button.

TRILITHIC

- The **Forward Compensation** window will close and the **Spectrum** Mode will display the combined (**Test Point** and **Probe**) test point compensation value in the upper right portion of the spectrum analyzer display.
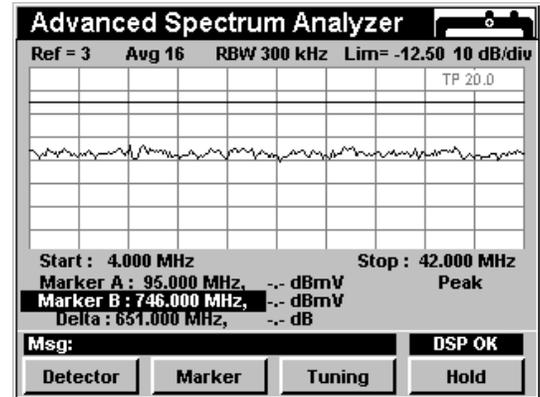
Toggle Peak Hold

This option is used to hold the maximum signal level at each frequency, scanned over time.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Toggle Peak Hold**, and then press the (Ent) button. You may also select **Toggle Peak Hold** by pressing (9).
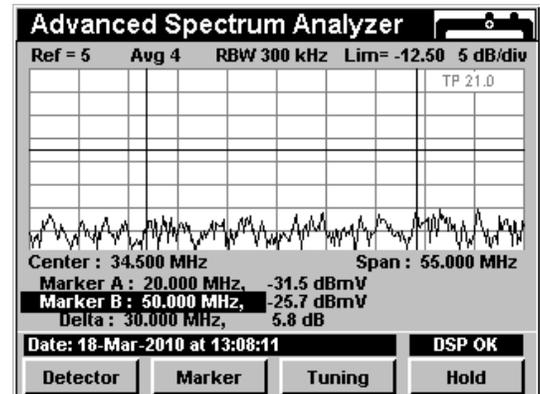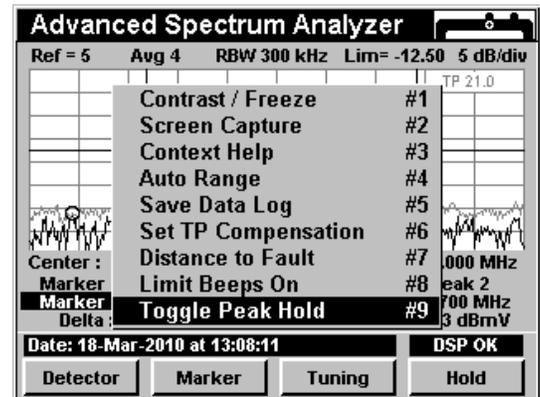
Introduction

In **Tilt** Mode the instrument measures the amplitudes of a pre-selected group of carriers, and also computes the difference in amplitude between two selectable channels in the group. This function may be used to quickly measure several especially important channels or to calculate distribution system unflatness.

In **Tilt** Mode the instrument displays the amplitudes of up to 10 pre-selected carriers in a bar graph.

> **Note:** Do not select more than 10 channels from your channel plan to be included in the Tilt measurement. When performing the Tilt measurement, the instrument will only use the first 10 channels from the active channel plan that are selected for Tilt measurement.

The amplitudes of the highest and lowest carriers, and their difference, are displayed numerically. You may also display the amplitudes of all **Tilt** plan carriers numerically.

The basic 860 DSP and 860 DSPi come equipped with the **Tilt** Mode as a standard feature.

This section will provide you with the basic understanding of how to use **Tilt** Mode including:

- Required Setup
- Setting Reference Level
- Setting Vertical Resolution
- Setting Channel Plan
- Setting Low and High Tilt Channels
- Changing Display Mode
- Function Menu Options
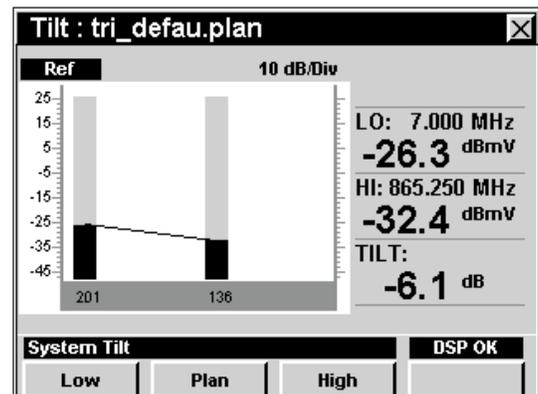
> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Tilt** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◀ ▶ buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing ④.

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◀ ▶ buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing ④.

Tilt

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

You must have a system channel plan that is up to date in order to view the channels in your system.

Setting the Low and High Tilt Channels

The **Low** and **High** channels used for computing tilt can be changed by pressing either the [Low] or [High] softkey. The **Low** and **High** channels selected will appear as solid bars in the graph.
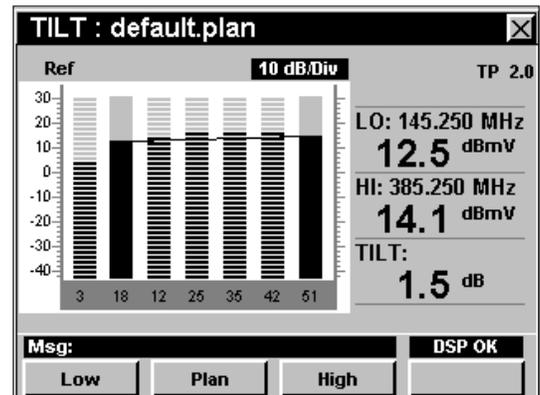
Changing Display Mode

You can toggle the display between a bar graph and a numeric display.

To use this feature, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change Display Mode**, and then press the (Ent) button. You may also select **Change Display Mode** by pressing (6).

In the numeric display the instrument lists the levels for all **Tilt** channels.
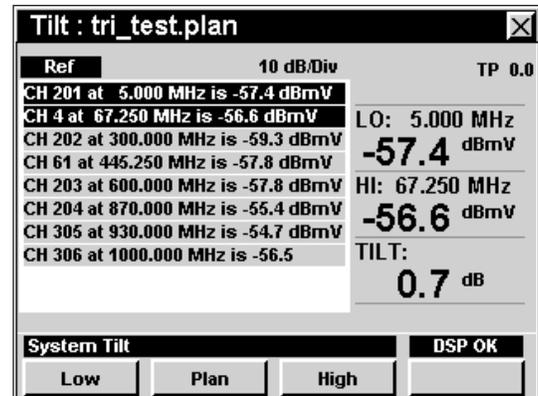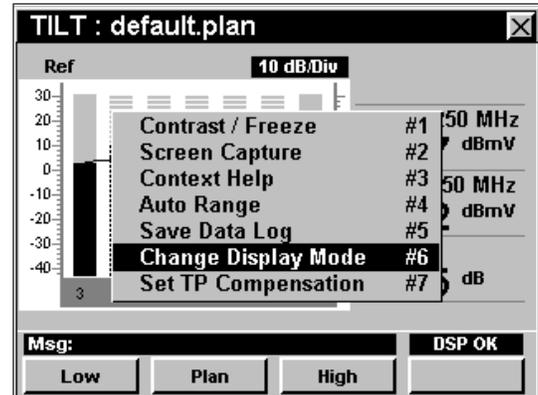
Function Menu Options

The **Function** Menu can be accessed by pressing the Fn button while in the **Tilt** Mode.

The following **Function** Menu options can be accessed while in **Tilt** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Auto Range
- Save Data Log
- Change Display Mode
- Set Test Point Compensation

> **Note:** For more information on **Change Display Mode**, see *Changing Display Mode* in this chapter.

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals on screen, by automatically adjusting the reference level and vertical resolution.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Auto Range**, and then press the (Ent) button. You may also select **Auto Range** by pressing (4).

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all measurements made in **Tilt** Mode.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (7).

- The **Function** Menu will close and the **Forward Compensation** window will open.

  - To enter an offset value for the test point or probe, use the (◄)(►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

  - To enable test point compensation, use the (◄)(►) buttons to highlight **TP Mode**, and then use the (▲)(▼) buttons to change between **Enabled** and **Disabled**.

  - To resume measurement, press the (Bk) button.

- The **Forward Compensation** window will close and the **Tilt** Mode will display the combined (**Test Point** and **Probe**) test point compensation value in the upper right portion of the screen.

CM Stat Mode (DOCSIS 2.0) 6

Introduction

In **CM Stat** Mode the instrument displays a quick view of the internal cable modem information. The basic 860 DSPi comes equipped with the **CM Stat** Mode as a standard feature. This mode is not available for the 860 DSP in any configuration.

This section will provide you with the basic understanding of how to use **CM Stat** Mode including:

- Required Setup

- Logging on to the Network

- Measurement Data

- Using the Goto Function

- Function Menu Options

Cable Modem Statistics

08-Mar-2010 Chrg 13.60V 34 C   IP   13:40:38

Downstream

Frequency	Rx Level	MER	preBER	postBER
819.00 MHz (256 QAM)	3.57 dBmv	38.98 dB	1.00E-09	1.00E-09
807.00 MHz (256 QAM)	4.23 dBmv	38.60 dB	1.00E-09	1.00E-09
813.00 MHz (256 QAM)	4.35 dBmv	38.60 dB	1.00E-09	1.00E-09
801.00 MHz (256 QAM)	5.10 dBmv	38.98 dB	1.00E-09	1.00E-09

Upstream

Frequency	Tx Level
24.00 MHz (64 QAM -2)	25.75 dBmv
16.90 MHz (64 QAM -1)	25.68 dBmv
31.10 MHz (64 QAM -3)	25.18 dBmv
38.20 MHz (64 QAM -4)	25.18 dBmv

Msg: DOCSIS 2.0

Goto	IP Info	Config File	Change ID

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **CM Stat** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **CM Stat** Mode, you will need to set up the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

Logging on to the Network

Verify in the status bar that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward input, then select the [PING] icon from

the **Installer** menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **PING** function will be displayed.

```
NAVIGATION
19-Mar-2007  Charge 14.32V   29 C   COM   00:43:04
┌─ LOGGING ON TO NETWORK ──────── ⊠ ─┐
│ Enabled                          00:50 │
│ Network Config   Internal Cable Modem │
│    IP Address       Requesting IP     │
│   MAC Address     00:05:CA:28:E7:A6   │
│   Search Freq        SEARCH ALL       │
│      Status         Traffic Enable    │
│                                        │
│ ⊠ Power ⊠ Cable ⊠ Status ⊠ E-Net     │
Cable Modem Statistics
 INSTALLER    SERVICE    SETUP    UTILITY
```

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect, it may take several minutes for the modem to find the downstream data carrier.

Measurement Data

The **CM Stat** Mode displays connections statistics for the internal cable modem. The instrument will display the downstream and upstream frequency, transfer rate, and power level as well as the downstream modulation type, signal-to-noise ratio, corrected bits, and uncorrected bits.

CM Stat

Using the Goto Function

The [Goto] softkey gives you rapid access to related measurement functions.

Goto Throughput

From **CM Stat** Mode you can jump to **Throughput** Mode.

To change to **Throughput** Mode, press the [Goto] softkey, use the (▲) (▼) buttons to select **Throughput**, and then press the (Ent) button. You may also select **Throughput** by pressing (1).

Once in **Throughput** Mode, you may test the internal cable modem as described in Chapter 11: Throughput Mode of this section of the manual. Pressing the (Bk) button will return you to **CM Stat** Mode.

TRILITHIC

Goto PING / LPR

From **CM Stat** Mode you can jump to **PING** Mode.

To change to **PING** Mode, press the [Goto] softkey, use the ▲ ▼ buttons to select **PING / LPR**, and then press the (Ent) button. You may also select **PING / LPR** by pressing (2).

Once in **PING** Mode, you may test the internal cable modem as described in <u>Chapter 8: PING Mode</u> of this section of the manual. Pressing the (Bk) button will return you to **CM Stat** Mode.

CM Stat

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **CM Stat** Mode.

The following **Function** Menu options can be accessed while in **CM Stat** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Upstream Correction

- Downstream Correction

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

TRILITHIC

Introduction

In **CM Stat** Mode the instrument displays a quick view of the internal cable modem information. The basic 860 DSPi comes equipped with the **CM Stat** Mode as a standard feature. This mode is not available for the 860 DSP in any configuration.

This section will provide you with the basic understanding of how to use **CM Stat** Mode including:

- Required Setup

- Logging on to the Network

- Measurement Data

- Using the Goto Function

- Function Menu Options

Cable Modem Statistics

| 08-Mar-2010 Chrg 13.60V 34 C | IP | 13:40:38 |

Downstream

Frequency	Rx Level	MER	preBER	postBER
819.00 MHz (256 QAM)	3.57 dBmv	38.98 dB	1.00E-09	1.00E-09
807.00 MHz (256 QAM)	4.23 dBmv	38.60 dB	1.00E-09	1.00E-09
813.00 MHz (256 QAM)	4.35 dBmv	38.60 dB	1.00E-09	1.00E-09
801.00 MHz (256 QAM)	5.10 dBmv	38.98 dB	1.00E-09	1.00E-09

Upstream

Frequency	Tx Level
24.00 MHz (64 QAM -2)	25.75 dBmv
16.90 MHz (64 QAM -1)	25.68 dBmv
31.10 MHz (64 QAM -3)	25.18 dBmv
38.20 MHz (64 QAM -4)	25.18 dBmv

Msg:			DOCSIS 3.0
Goto	IP Info	Config File	Change ID

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **CM Stat** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **CM Stat** Mode, you will need to set up the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

Logging on to the Network

Verify in the status bar that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward input, then select the icon from

the **Installer** Menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **PING** function will be displayed.

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect, it may take several minutes for the modem to find the downstream data carrier.

Measurement Data

The **CM STAT** Mode displays connections statistics for the internal cable modem. The instrument will display the downstream and upstream frequency, transfer rate, and power level as well as the downstream modulation type, signal-to-noise ratio, corrected bits, and uncorrected bits.

Using the Goto Function

The ▭ Goto ▭ softkey gives you rapid access to related measurement functions.

Goto Throughput

From **CM Stat** Mode you can jump to **Throughput** Mode.

To change to **Throughput** Mode, press the ▭ Goto ▭ softkey, use the ▲ ▼ buttons to select **Throughput**, and then press the (Ent) button. You may also select **Throughput** by pressing ①.

Once in **Throughput** Mode, you may test the internal cable modem as described in Chapter 11: Throughput Mode of this section of the manual. Pressing the (Bk) button will return you to **CM Stat** Mode.

TRILITHIC

Goto PING/ LPR

From **CM Stat** Mode you can jump to **PING** Mode.

To change to **PING** Mode, press the ⬜ Goto ⬜ softkey, use the ⬆ ⬇ buttons to select **PING / LPR**, and then press the (Ent) button. You may also select **PING / LPR** by pressing ②.

Once in **PING** Mode, you may test the internal cable modem as described in <u>Chapter 8: PING Mode</u> of this section of the manual. Pressing the (Bk) button will return you to **CM Stat** Mode.
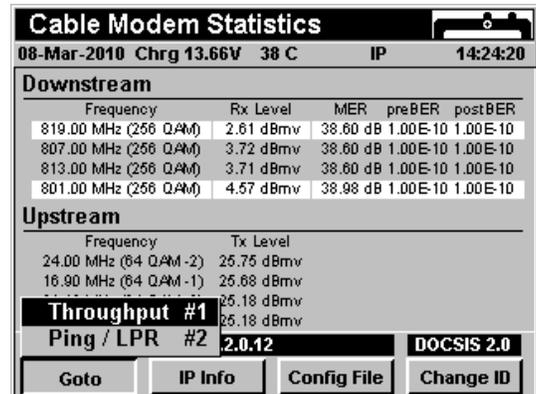
Cable Modem Statistics

08-Mar-2010 Chrg 13.66V   38 C   IP   14:24:20

Downstream

Frequency	Rx Level	MER	preBER	postBER
819.00 MHz (256 QAM)	2.61 dBmv	38.60 dB	1.00E-10	1.00E-10
807.00 MHz (256 QAM)	3.72 dBmv	38.60 dB	1.00E-10	1.00E-10
813.00 MHz (256 QAM)	3.71 dBmv	38.60 dB	1.00E-10	1.00E-10
801.00 MHz (256 QAM)	4.57 dBmv	38.98 dB	1.00E-10	1.00E-10

Upstream

Frequency	Tx Level
24.00 MHz (64 QAM -2)	25.75 dBmv
16.90 MHz (64 QAM -1)	25.68 dBmv
Throughput #1	25.18 dBmv
Ping / LPR #2	25.18 dBmv

2.0.12   DOCSIS 2.0

Goto	IP Info	Config File	Change ID

Network Ping (IP 10.2.8.124)   ✕

Host Name	Throughput Server	
Host IP	207.250.51.174	
Pkt Delay	100 msec	Pkt Size	256 bytes

Sent	9	Min Time	41 msec
Received	9	Avg Time	55 msec
Lost	0	Max Time	109 msec
LPR	0.00e+00	Latency	88 msec
LPR (%)	0.0 %	Jitter	31 msec

Msg:

Favorites	Start	Stop	Modem

Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **CM Stat** Mode.

The following **Function** Menu options can be accessed
while in **CM Stat** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Upstream Correction

- Downstream Correction

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Introduction

In **PING** Mode the instrument has the ability to ping a host on the network connection. This is extremely useful for checking network connectivity between network devices. The basic 860 DSPi comes equipped with the **PING** Mode as a standard feature. In order to use the **PING** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

This section will provide you with a basic understanding of how to use **PING** Mode including:

- Required Setup

- Logging on to the Network

- Entering a Host Name or IP

- Editing Packet Delay

- Editing Packet Size

- Pinging the Network

- Viewing Modem Information

- Function Menu Options

Note: PING Mode is standard on the 860 DSPi, but is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **PING** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **PING** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **PING** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode with an internal Wi-Fi adapter, you will need to setup the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

Logging on to the Network

Verify in the status bar that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward Input, then select the [icon] icon from the **Installer** Menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **PING** Mode will be displayed.

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect, it may take several minutes for the modem to find the downstream data carrier.

External RJ45 Port

Connect the external network connection to the instrument's Ethernet Port, then select the icon from the **Installer** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **PING** Mode will be displayed.

Wi-Fi

Select the icon from the **Utility** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **PING** Mode will be displayed.

Entering a Host Name or IP

You will need to enter an address to ping. You can enter either the **Host Name** (i.e. *www.860dsp.com*) or the **Host IP** (i.e. 207.67.51.2).

- To enter the **Host Name**, use the ◀ ▶ buttons to highlight **Host Name**, press the **Ent** button, enter the name you want to ping using the alphanumeric keypad, and then press the **Ent** button.

- To enter the **Host IP**, use the ◀ ▶ buttons to highlight **Host IP**, enter the address you want to ping using the alphanumeric keypad, and then press the **Ent** button.

- To select from the pre-stored favorite web addresses, press the ⬛ Favorite softkey, use the ▲ ▼ buttons to highlight desired web address, and then press the **Ent** button. You may also select the desired web address by pressing the corresponding alphanumeric button.

Ping (Our IP = 10.1.31.38)

Host Name	WWW.860DSP.COM		
or Host IP	207.67.51.2		
Pkt Delay	10 msec	Pkt Size	0 bytes
Sent	26677	Min Time	2 msec
Received	26677	Avg Time	3 msec
Lost	0	Max Time	115 msec
LPR	0.00e+00	Vt Latency	62 msec
LPR (%)	0.0 %	Jitter	56 msec

Msg:

FAVORITE | START | STOP | MODEM

Ping (Our IP = 10.1.31.38)

Host Name	WWW.860DSP.COM		
or Host IP	207.67.51.2		
Pkt Delay	10 msec	Pkt Size	0 bytes
Sent	882	Min Time	3 msec
Received	882	Avg Time	3 msec
Lost	0	Max Time	18 msec
LPR	0.00e+00	Vt Latency	62 msec
LPR (%)	0.0 %	Jitter	7 msec

Msg:

FAVORITE | START | STOP | MODEM

Note: Notice the IP address of your instrument is displayed in the title bar at the top of the screen.

Note: The first four web addresses entered in the Host Name or Host IP fields will be stored as favorites. To clear the list and save a new series of favorites, refer to the section *Function Menu Options, Clear Favorites* in this chapter.

Editing Packet Delay

The packet delay determines how often packets are transmitted. To change the packet delay use the ◄ ► buttons to highlight **Pkt Delay** and use the ▲ ▼ buttons to change the packet delay. The packet delay can be set between 10 msec and 1000 msec in 10 msec increments.

Network Ping (IP 10.2.8.124)			☒
Host Name		www.my860.com	
Host IP	207.250.51.130		
Pkt Delay	100 msec	Pkt Size	256 bytes
Sent	1024	Min Time	40 msec
Received	1003	Avg Time	74 msec
Lost	20	Max Time	247 msec
LPR	1.95e-02	Latency	98 msec
LPR (%)	2.0 %	Jitter	57 msec
Msg:			
Favorites	Start	Stop	Modem

Editing Packet Size

The packet size determines the size of the transmitted packet payload. To change the packet size use the ◄ ► buttons to highlight **Pkt Size** and use the ▲ ▼ buttons to change the packet size. The packet size can be set to 0, 32, 64, 256, 512, 768, or 1024 bytes.

Network Ping (IP 10.2.8.124)			☒
Host Name		www.my860.com	
Host IP	207.250.51.130		
Pkt Delay	100 msec	Pkt Size	256 bytes
Sent	1177	Min Time	40 msec
Received	1151	Avg Time	73 msec
Lost	26	Max Time	247 msec
LPR	2.21e-02	Latency	97 msec
LPR (%)	2.2 %	Jitter	86 msec
Msg:			
Favorites	Start	Stop	Modem

Pinging the Network Host

To ping the host, press the [Start] softkey.

The instrument will continue to ping the host and update the status of the test on the screen until you press the [Stop] softkey.

A successful ping will display zero **Lost** packets as the number of packets **Sent** and **Received** increases.

An unsuccessful ping will display an increasing **LPR** (Lost Packet Rate) as the number of packets **Sent** and **Received** increases.

Network Ping (IP 10.2.8.124)	☒
Host Name	www.my860.com
Host IP	207.250.51.130
Pkt Delay 100 msec	**Pkt Size** 256 bytes

Sent	1177	**Min Time**	40 msec
Received	1151	**Avg Time**	73 msec
Lost	26	**Max Time**	247 msec
LPR	2.21e-02	**Latency**	97 msec
LPR (%)	2.2 %	**Jitter**	86 msec

Msg:

Favorites	Start	Stop	Modem

Viewing Modem Information

To view internal modem information, press the [Modem] softkey. Pressing the (Bk) button will return you to **PING** Mode.

Ping (Our IP = 192.168.5.89)	☒
Host Name	
or Host IP	**Downstream**
Pkt Delay 1(	Frequency : 819.000 MHz
	Data Rate : 5.360484 MSPS
Sent	Power : 2.61 dBmV
Received	Modulation : 256 QAM
Lost	Signal to Noise : 37.00 dB
LPR 1.(	**Upstream**
LPR (%) 1(	Frequency : 19.000 MHz
	Data Rate : 2560.000 KSPS
Ping	Power : 57.72 dBmV

FAVORITE	START	STOP	MODEM

Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **PING** Mode.

The following **Function** Menu options can be accessed
while in **PING** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Clear Favorites

- Display CPE IP or Display IP
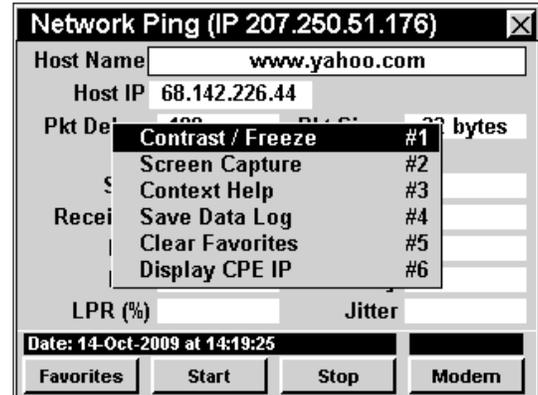
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Clear Favorites

This option is used to clear the list of pre-stored
favorites that are shown when the ⎡Favorite⎤ softkey is
selected.

To use this option, press the (Fn) button, use the (▲) (▼)
buttons to highlight **Clear Favorites**, and then press
the (Ent) button. You may also select **Clear Favorites**
by pressing (5).

After you clear the favorites, the instrument will
remember the next four addresses that are entered.

TRILITHIC
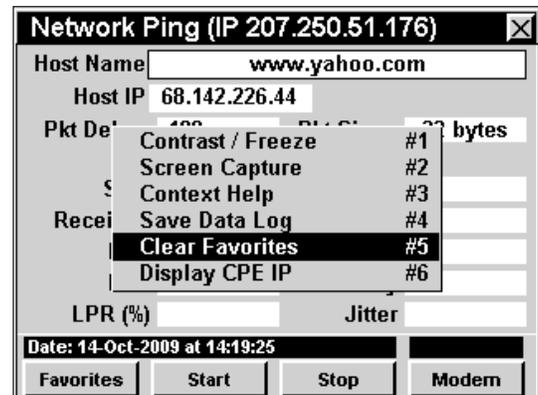
Display CPE IP

To use this feature, press the (Fn) button, use the (▲) (▼) buttons to highlight **Display CPE IP**, and then press the (Ent) button. You may also select **Display CPE IP** by pressing (6).

- The **Function** Menu will close and the **Display CPE IP** window will open.

- To exit the **Display CPE IP** window, press the (Ent) button.
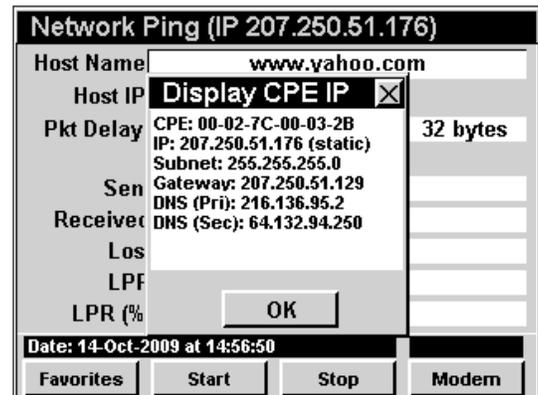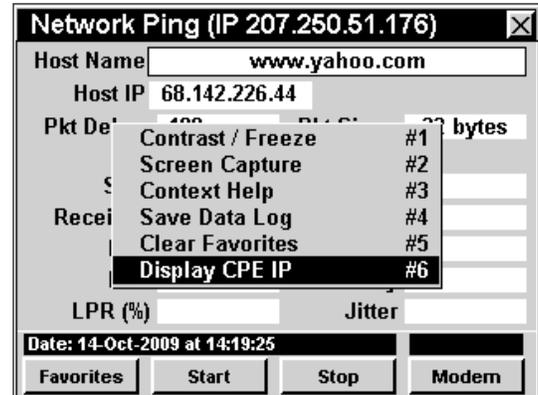
Note: Display CPE IP is only shown when using an internal cable modem connection.

Note: When connected to a cable modem in the field, the 860 DSP or 860 DSPi is considered as Customer Premise Equipment (CPE). The Display CEP IP function displays the IP address and connection settings for the 860 DSP or 860 DSPi when installed as CPE.

Trace Rt

Introduction

The **Trace Route** Mode is a network utility which plots a route from the source to the destination while displaying all the routers along the way. It also displays the round trip route time from the source to the router.

It also attempts to do a reverse domain name look up to display the registered name of each router.

This section will provide you with a basic understanding of how to use **Trace Route** Mode including:

- Required Setup

- Trace Route Mode Support

- Entering a Host Name or IP

- Function Menu Options
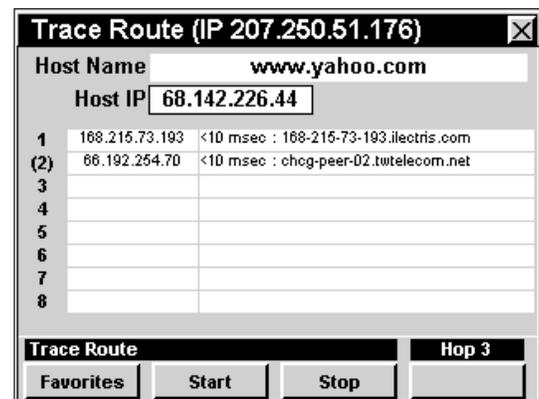
Required Setup

To use **Trace Route** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Trace Setup** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

Trace Rt

> **Note: Trace Route** Mode is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Trace Route** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to _www.trilithic.com_ to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Trace Route Mode Support

To determine if your instrument supports **Trace Route** Mode, perform the following:

- Select the ▭ Setup ▭ softkey.

- Select the ⓘ Info icon.

- Examine the version. If the firmware version is 8.1.1.1 or higher, your instrument supports **Trace Route** Mode.
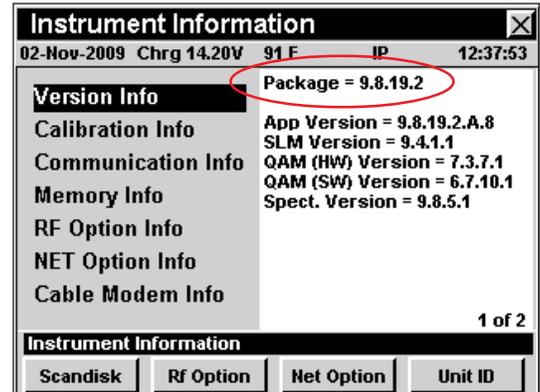
Entering a Host Name or IP

You will need to enter an address to ping. You can enter either the **Host Name** (i.e. *www.860dsp.com*) or the **Host IP** (i.e. 207.250.51.130).

To enter the **Host Name:**

- Use the ◄ ► buttons to highlight **Host Name**, and then press the **Ent** button.

- Use the alphanumeric keypad and enter the **Host Name** you want to trace, and then press the **Ent** button.

To enter the **Host IP** address:

- Use the ◄ ► buttons to highlight **Host IP,** and then press the **Ent** button.

- Use the alphanumeric keypad and enter the **Host IP** address you want to trace, and then press the **Ent** button.

- To select from a list of pre-stored favorite web addresses, press the **Favorite** softkey, use the ▲ ▼ buttons to highlight desired web address, and then press the **Ent** button. You may also select the desired web address by pressing the corresponding alphanumeric button.

- Select the **Start** softkey to begin the trace.

- Select the **Stop** softkey to stop the trace.

TRILITHIC

Trace Rt

The display screen continuously displays the trace route in a loop. This allows the user to see if a particular router is intermittently passing ping packets and if different routes are being taken.

This feature can be disabled by removing the Continuous Run option, which is accessed by pressing the (Fn) key.

Note: There is no guarantee that every ping packet will follow the same route.

Function Menu Options

Standard Functions

- Contrast Freeze
- Screen Capture
- Context Help
- Save Data Log

Optional Functions

- Clear Favorites
- Display IP or Display CPE IP
- Run Test Continuous

Basic Function Menu Options

- Clear Favorites
- Display CPE IP
- Display IP
- Run Test Continuous

Introduction

In **VoIP** Mode the instrument can test a variety of call and connection quality parameters using either a built in modem or an external modem. The basic 860 DSPi comes equipped with the **VoIP** Mode as a standard feature. In order to use the **VoIP** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

The instrument tests the various measurable parameters that impact call quality, and provides measurement results to test proximity to potential failure. This test utilizes a network protocol called RTP (Real Time Protocol). The instrument will establish a connection to the indicated server on port 24007. The instrument and the server negotiate the test parameters from the **Instrument Setup** Mode as well as synchronize their clocks. The server and the meter then communicate using RTP over UDP protocol on port 24007. Once all of the packets are transmitted and received by both the server and the meter, the results are calculated and compared to user-defined limits. An ACTS (Advanced Communication Test System) server is also required, and ideally will be installed in the cable network near the gateway.

This section will provide you with a basic understanding of how to use **VoIP** Mode including:

- Required Setup
- Logging on to the Network
- Entering the Server IP
- Running a VoIP Test
- Viewing VoIP Test Details
- Function Menu Options
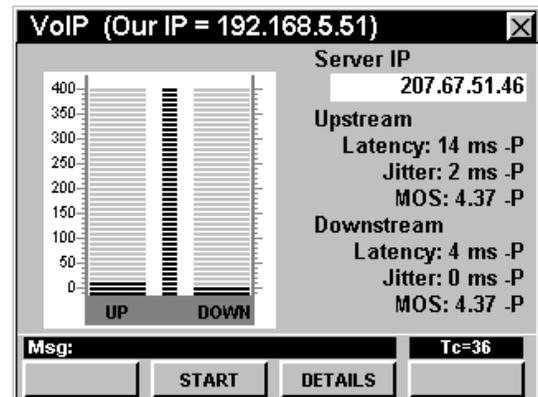
Note: VoIP Mode is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **VoIP** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter. Be sure to go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **VoIP** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **VoIP** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

To use **VoIP** Mode, you will need to setup **VoIP** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *VoIP Settings* before proceeding through this chapter.

In order for your instrument to test the upstream and downstream data rate it must send and receive a file from a server. This server will need to be setup by your IT department prior to using **VoIP** Mode. It is preferable to use a server located within your local system to prevent skewing of the throughput results due to extensive routing or Internet traffic. The server application must be either the Trilithic VoIP RTP test server or the Trilithic Advanced Communication Test Server.

Logging on to the Network

Verify in the status bar that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward input, then select the [icon] icon from the **Installer** menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **VoIP** Mode will be displayed.

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect, it may take several minutes for the modem to find the downstream data carrier.

External RJ45 Port

Connect the external network connection to the

instrument's Ethernet port, then select the [icon] icon from the **Installer** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **VoIP** Mode will be displayed.

Wi-Fi

Select the icon from the **Installer** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **VoIP** Mode will be displayed.

Entering the Server IP

You will need to enter the address of the server to connect to.

To enter the **Server IP**, use the ◀ ▶ buttons to highlight **Server IP**, press the (Ent) button, enter the address of the server you want to connect to using the alphanumeric keypad, and then press the (Ent) button.
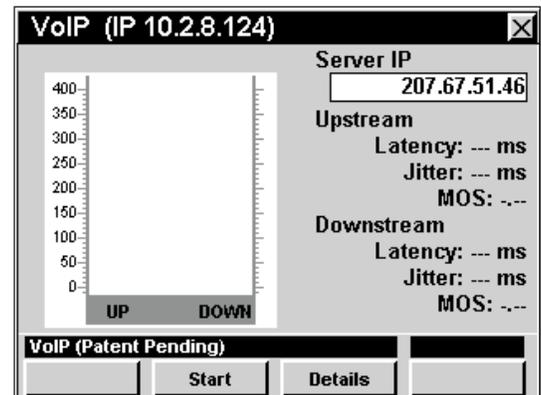
Running a VoIP Test

To run the **VoIP** Test, press the [Start] softkey.

The instrument will display the progress of the **VoIP** Test on the bar graph.

When the test is complete, the instrument will display upstream and downstream results for **Latency**, **Jitter**, and **MOS**. The "P" or "F" next to the upstream and downstream results indicates the pass or fail status of the test.

TRILITHIC
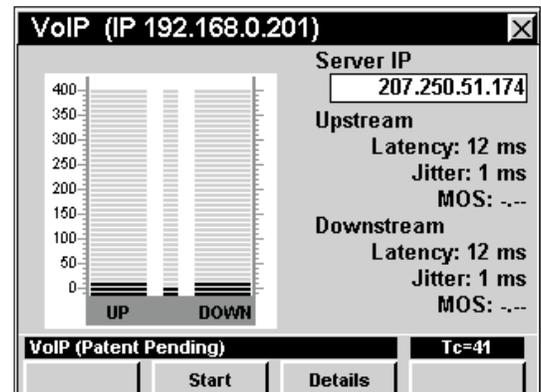
Viewing VoIP Test Details

To view detailed results of the **VoIP** Test, press the
Details softkey.

The **Results** window will open. If the results occupy more
than one screen, use the (Ent) button to scroll through the
results.

Press the (Bk) button to return to the **VoIP** Mode.
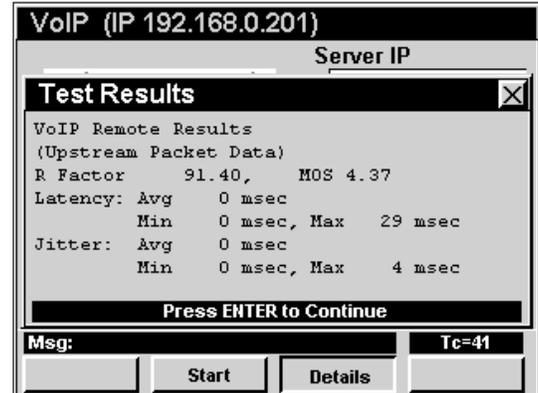
Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **VoIP** Mode.

The following **Function** Menu options can be accessed
while in **VoIP** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Display CPE IP

- High Priority Ping
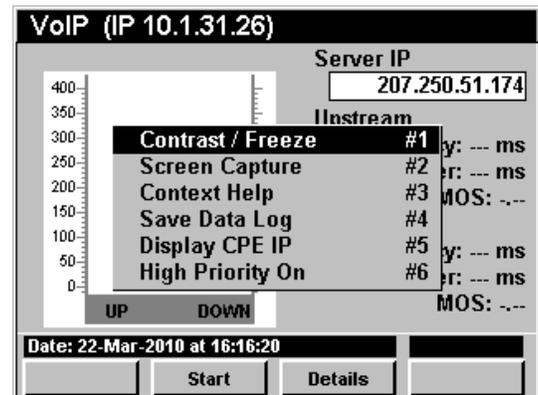
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Display CPE IP

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Display CPE IP**, and then press the (Ent) button. You may also select **Display CPE IP** by pressing (5).

- The **Function** Menu will close and the **Display CPE IP** window will open.

- To exit the **Display CPE IP** window press the (Ent) button.
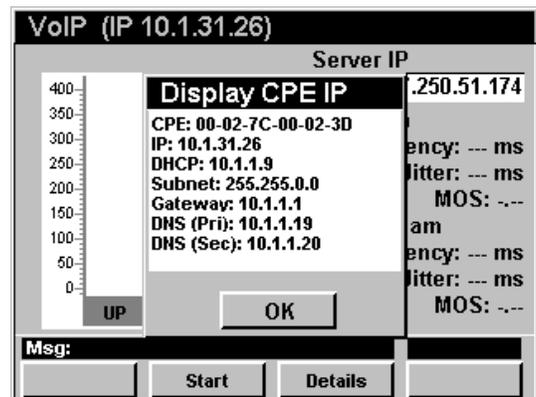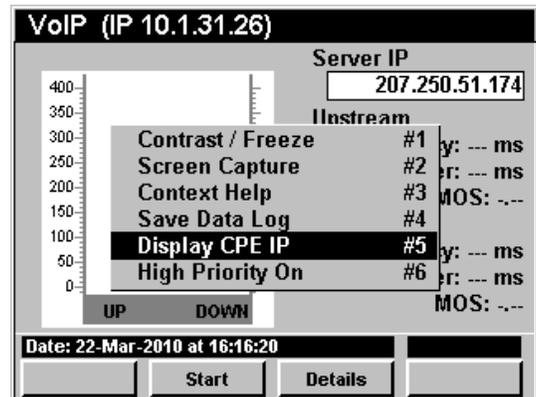
High Priority On/Off

The High Priority function allows the 860 DSP or 860 DSPi to instruct the CMTS to hold open time slots for the 860 DSP or 860 DSPi's cable modem to communicate over. To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **High Priority On**, and then press the (Ent) button. You may also select **Display CPE IP** by pressing (6).

- The **Function** Menu will close and the screen will return to the **VoIP** window will open.

- To turn off **High Priority**, press the (Fn) button, use the (▲) (▼) buttons to highlight **High Priority Off**, and then press the (Ent) button. You may also select **High Priority Off** by pressing (6).
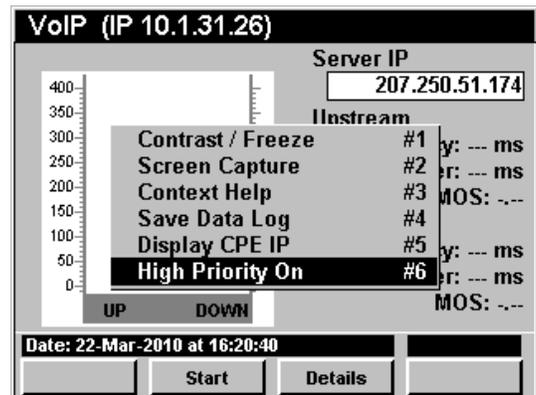
Introduction

In **Thru Put** Mode the instrument can test the effective data rate of both the upstream and downstream channels of a cable modem connection using either a built in modem or an external modem. The basic 860 DSPi comes equipped with the **Thru Put** Mode as a standard feature. In order to use the **Thru Put** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

The instrument tests the data rate by sending and receiving a file from a Trilithic test server on the network. The instrument comes with a 1 MB upstream test file keyed to your instrument's MAC address.

This section will provide you with a basic understanding of how to use **Thru Put** Mode including:

- Required Setup
- Logging on to the Network
- Setting the Server IP
- Setting the Downstream file
- Running an Upstream Test
- Running a Downstream Test
- Using the Goto Function
- Viewing Modem Information
- Function Menu Options
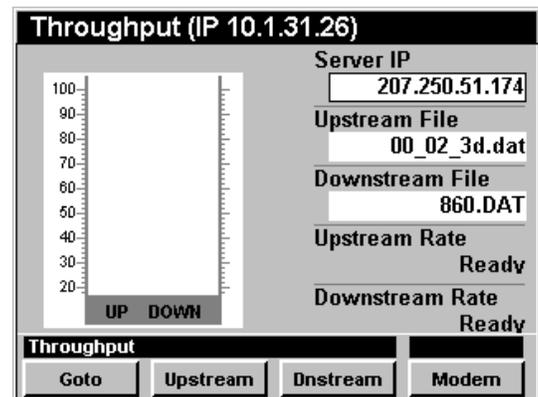
Note: Thru Put Mode is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Thru Put** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Thru Put** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Thru Put** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

In order for your instrument to test the upstream and downstream data rate it must send and receive a file from a Trilithic ACTS server. This server will need to be setup by your IT department prior to using **Thru Put** Mode. It is preferable to use a server located within your local system to prevent skewing of the throughput results due to extensive routing or Internet traffic. The server must support the file transfer protocols used by the instrument.

Trilithic recommends using the Trilithic Advanced Communication Server application.

To see the file types supported by your instrument, follow the instructions for logging on to the network and then press the Upstream and Dnstream softkeys.

Thru Put

Logging on to the Network

Verify in the status bar, that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds (30 seconds if SSL is installed) after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward Input, then select the icon from the **Installer** menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **Thru Put** Mode will be displayed.

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect, it may take several minutes for the modem to find the downstream data carrier.

External RJ45 Port

Connect the external network connection to the

instrument's Ethernet Port, then select the icon from the **Installer** Menu.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **Thru Put** Mode will be displayed.

TRILITHIC

Thru Put

Wi-Fi

Connect the external network connection to the instrument's Ethernet Port, then select the icon from the **Installer** Menu. The Select Wi-Fi Zone window will appear. Select from the detected Wi-Fi connections.

The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **Thru Put** Mode will be displayed.
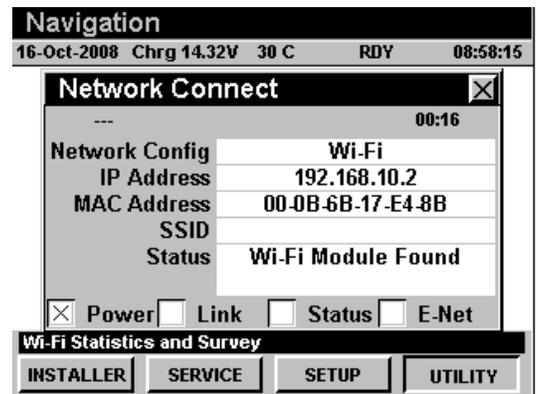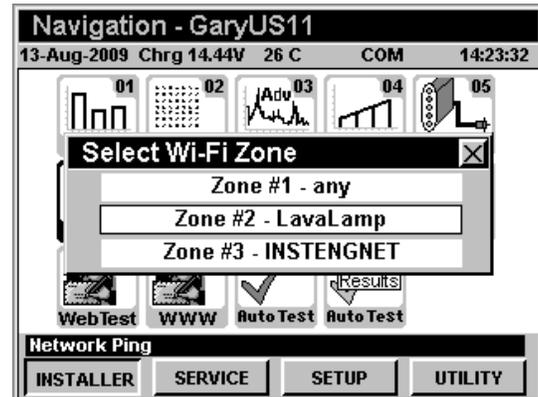
Setting the Server IP

To set the **Server IP** use the ◄ ► buttons to highlight **Server IP**, then enter the **Server IP** using the alphanumeric keypad, and then press the (Ent) button. Once set, the instrument will remember the IP.
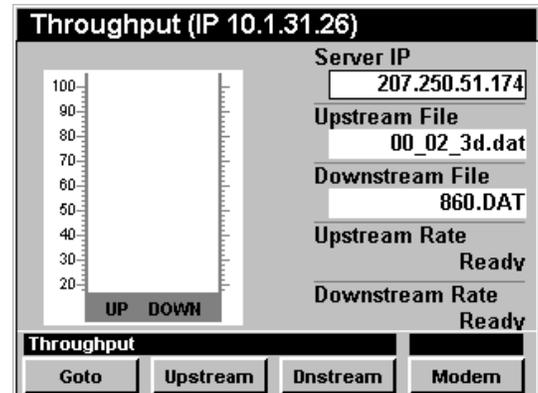
Setting the Downstream File

When performing a downstream throughput test, the instrument will download a file from the server. The downstream file size should be approximately 1 MB.

To set the **Downstream File** use the ◄ ► buttons to highlight **Downstream File**, then enter the file name using the alphanumeric keypad, and then press the (Ent) button.
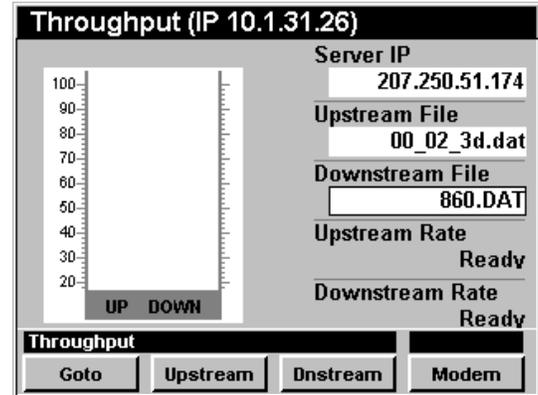
Running an Upstream Test

To run an upstream throughput test, press the Upstream softkey, use the ▲ ▼ buttons to highlight the desired test protocol, and then press the (Ent) button. You may also select the desired test protocol by pressing the corresponding alphanumeric button.

The instrument will display the progress of the upstream file transfer on the bar graph.

When the test is complete, the instrument will display the effective upstream data rate.

TRILITHIC

![Thru Put]
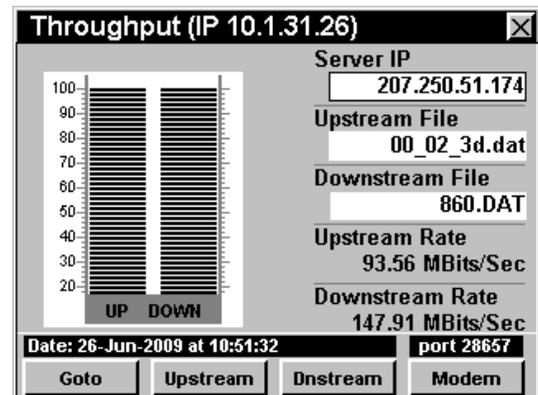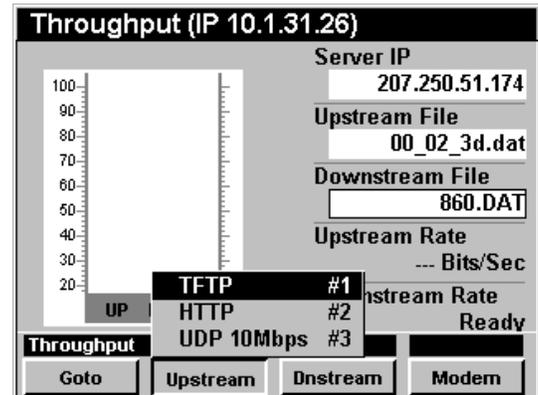
Running a Downstream Test

To run a downstream throughput test, press the **Dnstream** softkey, use the ▲ ▼ buttons to highlight the desired test protocol, and then press the **Ent** button. You may also select the desired test protocol by pressing the corresponding alphanumeric button.

The instrument will display the progress of the downstream file transfer on the bar graph.

When the test is complete, the instrument will display the effective downstream data rate.
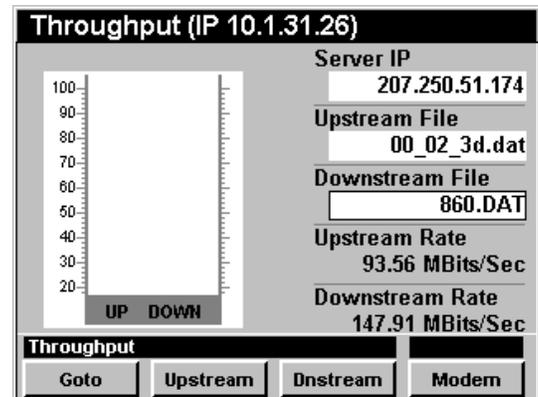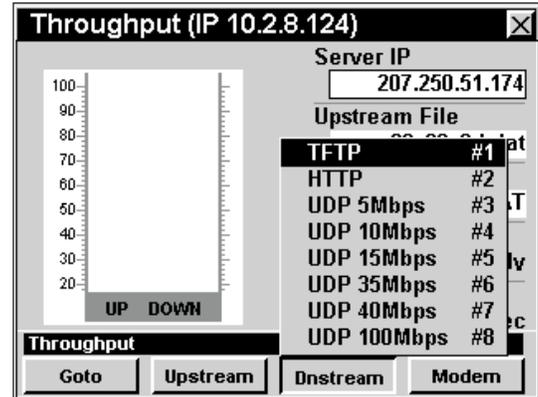
Note: The test protocols UDP 15 through UDP 100 Mbps are only available for DOCSIS 3.0 instruments that have the Ethernet Option (CI-4 or CI-5) installed. This option provides a 100 Mbps network connection. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have Ethernet Option (CI-4 or CI-5) mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Thru Put

Using the Goto Function

The ⬚ Goto ⬚ softkey gives you rapid access to related measurement functions.

Goto Ping / LPR

From **Thru Put** Mode you can jump to **Ping** Mode.

To change to **Ping** Mode, press the ⬚ Goto ⬚ softkey, use the ⬆ ⬇ buttons to select **Ping / LPR**, and then press the (Ent) button. You may also select **Ping / LPR** by pressing ①.

Once in **Ping** Mode, you may test the internal cable modem as described in Chapter 7: Ping Mode of this section of the manual. Pressing the (Bk) button will return you to **Thru Put** Mode.
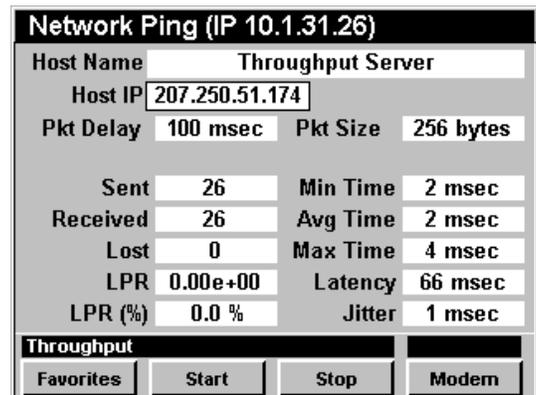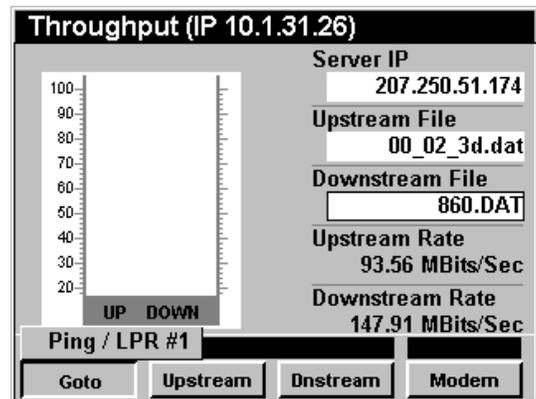
Viewing Modem Information

To view internal modem information, press the ⬚ Modem ⬚ softkey. Pressing the (Bk) button will return you to **Thru Put** Mode.
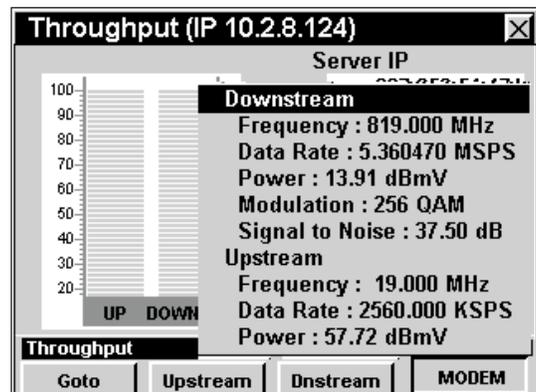
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Thru Put** Mode.

The following **Function** Menu options can be accessed while in **Thru Put** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log
- Change HTTP Port
- Change TFTP Port
- Change UDP Port
- Display CPE IP
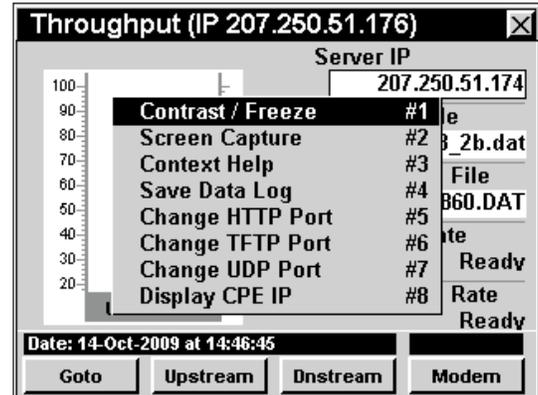
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Change HTTP Port

This option is used to set the HTTP port that the instrument uses to connect to the 860 DSPi High Speed Throughput Test Suite.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change HTTP Port**, and then press the (Ent) button. You may also select **Change HTTP Port** by pressing (5).

- The **Function** Menu will close and the **Change HTTP Port** window will open.

- Enter the port number using the alphanumeric keypad, and then press the (Ent) button.

Throughput (IP 10.2.8.124)

Server IP
207.250.51.174
Upstream File
d.dat
Change HTTP Port ✕
Current=80 (Default=80)
[ ]
.DAT
Test
Downstream Rate
Ready
UP DOWN
Msg: port 80
Goto | Upstream | Dnstream | Modem

Throughput (IP 10.2.8.124)

Server IP
207.250.51.174
Upstream File
d.dat
Change HTTP Port ✕
Current=80 (Default=80)
[ ]
.DAT
Test
Downstream Rate
Ready
UP DOWN
Msg: port 80
Goto | Upstream | Dnstream | Modem
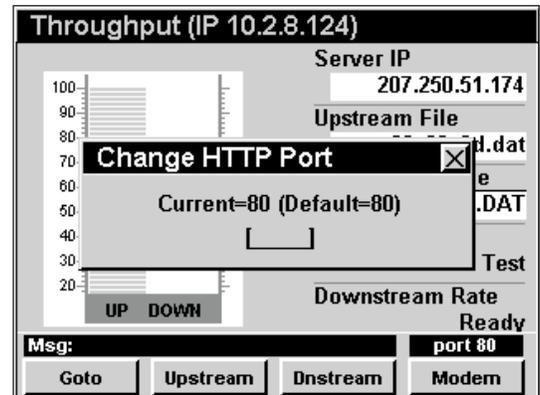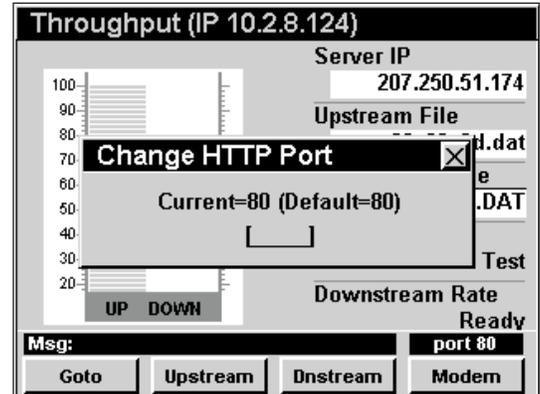
Note: If changing from the default port setting, a corresponding port setting change must be made to the ACTS server.

Change TFTP Port

This option is used to set the TFTP port that the instrument uses to connect to the 860 DSPi High Speed Throughput Test Suite.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change TFTP Port**, and then press the (Ent) button. You may also select **Change TFTP Port** by pressing (6).

- • The **Function** Menu will close and the **Change TFTP Port** window will open.

- • Enter the port number using the alphanumeric keypad, and then press the (Ent) button.

Note: If changing from the default port setting, a corresponding port setting change must be made to the ACTS server.

TRILITHIC

Change UDP Port

This option is used to set the UDP port that the instrument uses to connect to the 860 DSPi High Speed Throughput Test Suite.

To use this option, press the **Fn** button, use the ▲ ▼ buttons to highlight **Change UDP Port**, and then press the **Ent** button. You may also select **Change UDP Port** by pressing ⑦.

- The **Function** Menu will close and the **Change UDP Port** window will open.

- Enter the port number using the alphanumeric keypad, and then press the **Ent** button.
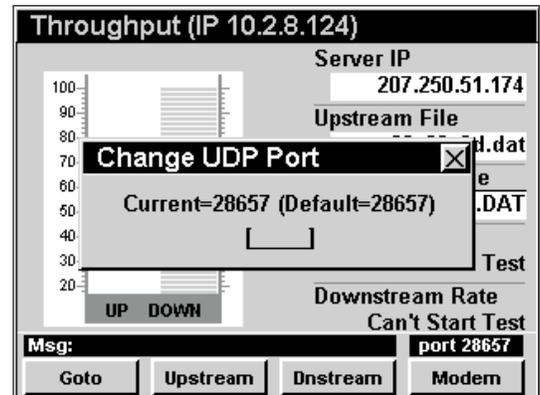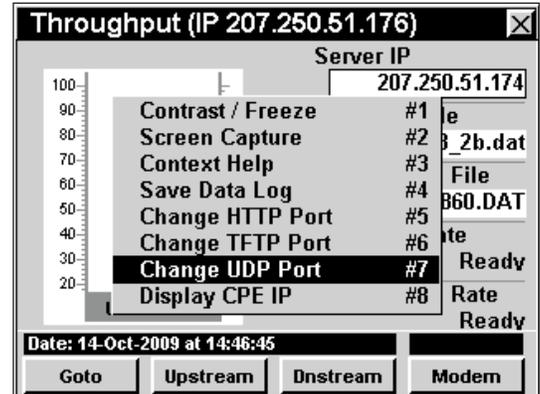
Note: If changing from the default port setting, a corresponding port setting change must be made to the ACTS server.

Display CPE IP

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Display CPE IP**, and then press the (Ent) button. You may also select **Display CPE IP** by pressing (8).

- The **Function** Menu will close and the **Display CPE IP** window will open.

- To exit the **Display CPE IP** window press the (Ent) button.

Thru Put
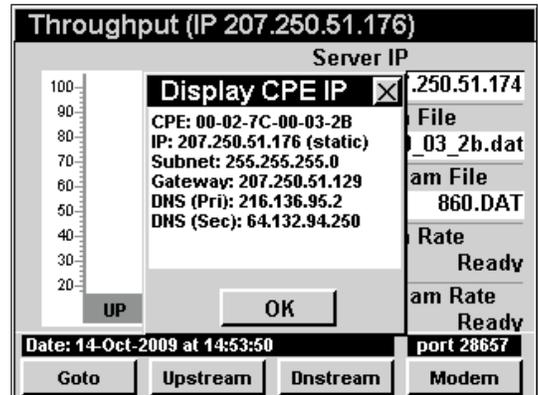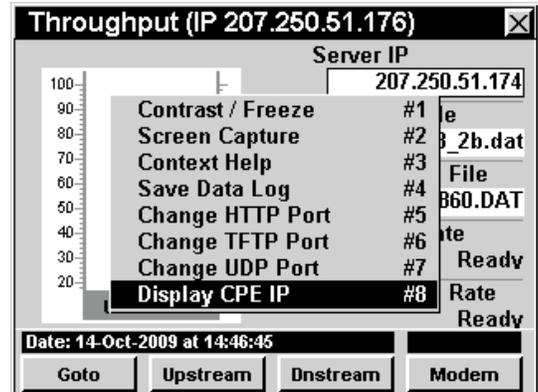
Display IP

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Display IP**, and then press the (Ent) button. You may also select **Display IP** by pressing (7).

- The **Function** Menu will close and the **Display IP** window will open.

- To exit the **Display IP** window, press the (Ent) button.
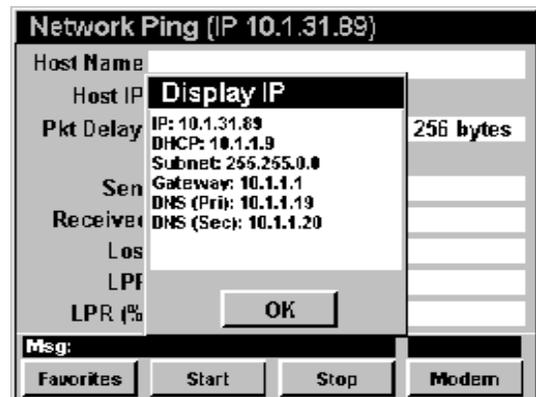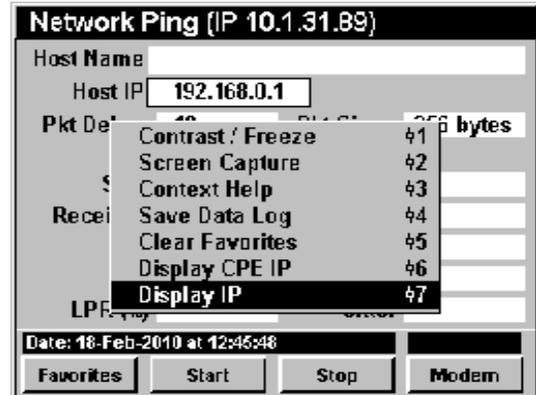
Note: Display IP is only shown when using an internal cable modem connection.

Introduction

In **BER** Mode the instrument can test the ratio of corrupted bits versus the total bits of data for a selected channel. The basic 860 DSPi comes equipped with the **BER** Mode as a standard feature. In order to use the **BER** Mode on your 860 DSP, the instrument must be equipped with QAM Option (QA-1).

You can also upgrade the **BER** Mode with the addition of the Enhanced Digital Video Retrofit Option (IL-1 or IL-2). This option will provide deep interleave support for **BER** Mode on both the 860 DSP and 860 DSPi. This retrofit option is for instruments that were built before March 2005. Any instruments built since this date are equipped with the IL-1 or IL-2 Retrofit Option as a standard feature.

In **BER** Mode the instrument dwells on a particular channel, counting good bits and watching for individual corrupted bits. The ratio of corrupted bits/total bits is the impulse BER.

This section will provide you with a basic understanding of how to use **BER** Mode including:

- Required Setup

- Adjusting Channels

- Adjusting Time Scale

- Setting Channel Plan

- Resetting BER Test

- Viewing Test Results

- Function Menu Options
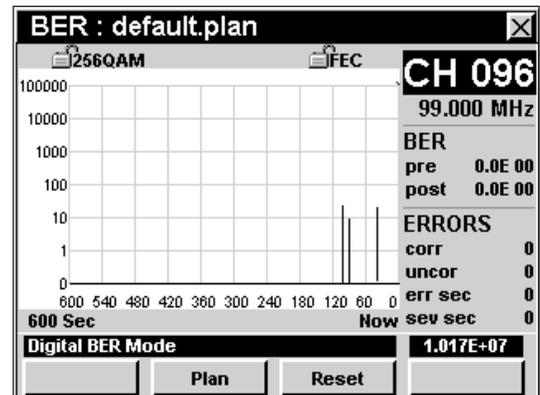
Note: BER Mode is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **BER** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode. The QA-1 option is a paid upgrade to the 860 DSPi.

Required Setup

To use **BER** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number or frequency using the alphanumeric keypad, and then press the **Ent** button.
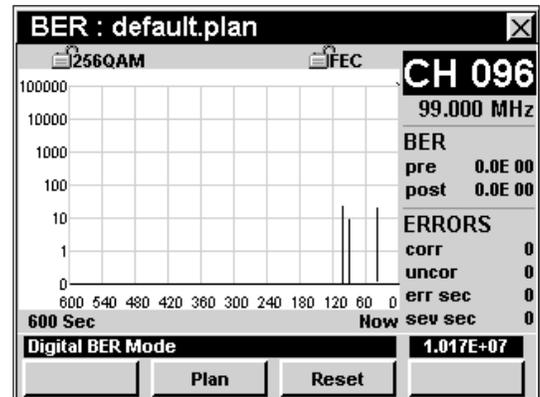
Adjusting Time Scale

To change the time scale of the time graph, use the ◄ ► buttons to highlight the time scale, use the ▲ ▼ buttons to increment the value up and down.
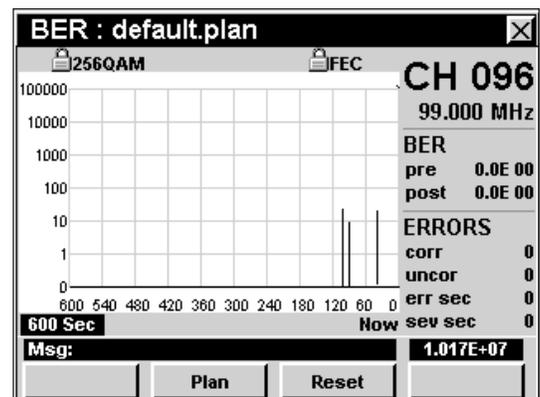
Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the Title Bar. To change the channel plan press the Plan softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the Ent button. You may also select the desired channel plan by pressing the corresponding alphanumeric button.

You must have a system channel plan that is up to date in order to view the channels in your system.
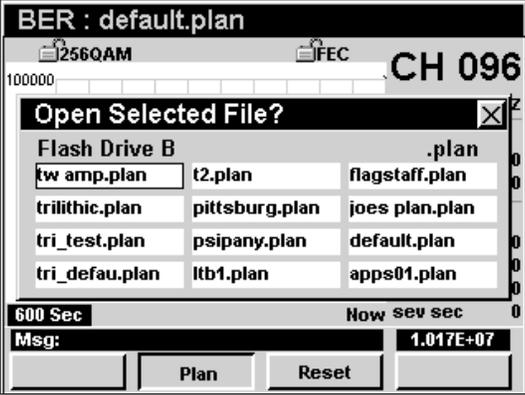
Resetting BER Test

To reset the **BER** Test press the Reset softkey. The **BER** Test will reset the time measurement to zero seconds and restart the **BER** Test.
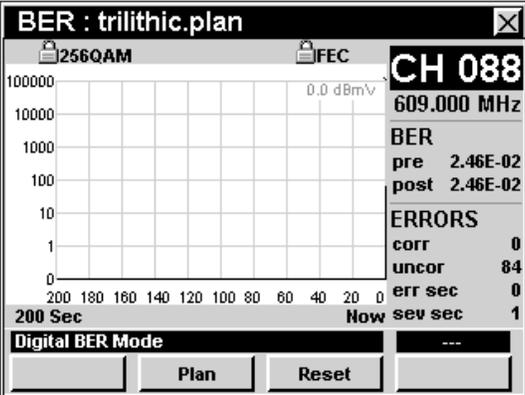
Viewing Test Results

The **BER** Mode presents bit error statistics as follows:

- The BER is expressed as the ratio of errored bits to total bits. This ratio is presented as a single number in the form "3E-7" or "7E-6". At the beginning of the test the BER is shown as 0E-0 then changes to show the BER as errored bits are accumulated in the course of the test.

    - Test results are given both as **pre-FEC** (before forward error correction) and **post-FEC** (after forward error correction) values.

- Total errored and corrected, and errored and uncorrectable code words, expressed as running totals.

    - The running total of code words that were corrected using the FEC are displayed as **corr**.

    - The number of code words that were not capable of being corrected by the FEC are displayed as **uncor**.

- Errored seconds and severely errored seconds, expressed as running totals.

    - In this convention, BER is expressed as the number of seconds of data that contained one or more bits that needed FEC correction.

    - The successfully-repaired seconds are displayed as **err sec**.

    - The seconds in which a bit was too damaged to repair are displayed as **sev sec**.

- Time graph

    - Errored code words are displayed as marks on a horizontal line that expands across the display, representing advancing time. The most recent events are shown on the right side of the graph, the earliest events are on the left. The advantage of this convention is that the displayed information is always meaningful regardless of the duration of the test and the graphical display makes patterns of reoccurrence easy to detect. Corrected code words per unit time are shown as light gray lines and uncorrectable code words per unit time are shown as black lines.

    - The X scale represents the number of seconds in the test.

    - The Y scale represents the number of errors in each interval of the time represented by the full X scale.

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **BER** Mode.

The following **Function** Menu options can be accessed while in **BER** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log
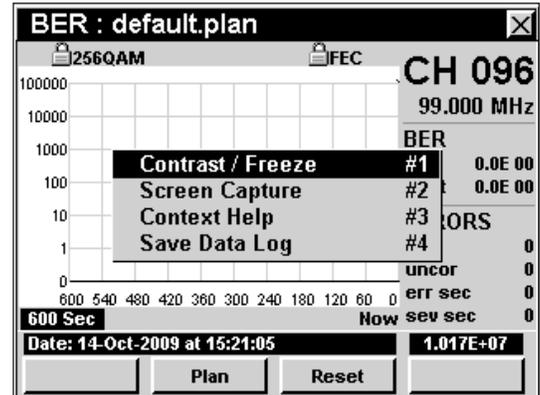
Introduction

The **Web Test** Mode is used to test whether the instrument has an active internet connection. In order to use the **Web Test** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1). In order to use the **Web Test** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

This section will provide you with a basic understanding of how to use **Web Test** Mode including:

- Required Setup

- Performing Web Test

- Function Menu Options

Note: Web Test Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Web Test** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Web Test** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Web Test** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

For more information on how to use the **Web Browser** Mode, see Chapter 14: Web Browser Mode in this section of the manual.

Performing Web Test

When the **Web Test** Mode is activated, the instrument will try to connect to the web page *http://my860dsp.com/confirm*.

When the **Web Test** Mode successfully connects to this web page, the web page will display **Web Connectivity...Pass**.

When the **Web Test** Mode cannot successfully connect to this web page, the web page will display a web page error. If this occurs, check your connections settings and try again.

Web Test

Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **Web Test** Mode.

The following **Function** Menu options can be accessed
while in **Web Test** Mode:

- Contrast / Freeze
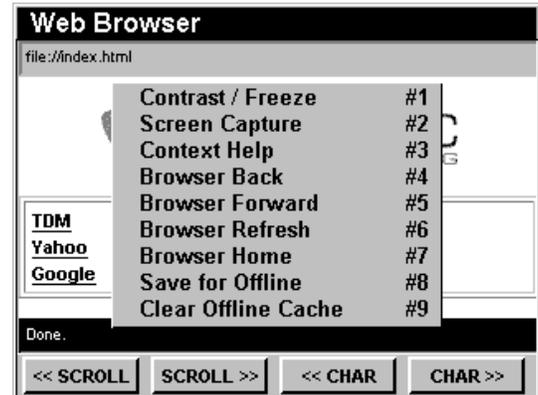
- Screen Capture

- Context Help

- Browser Refresh

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

Browser Refresh

This option is used to refresh the current web page.

To use this option, press the (Fn) button, use the (▲) (▼)
buttons to highlight **Browser Refresh**, and then
press the (Ent) button. You may also select **Browser
Refresh** by pressing (6).

TRILITHIC
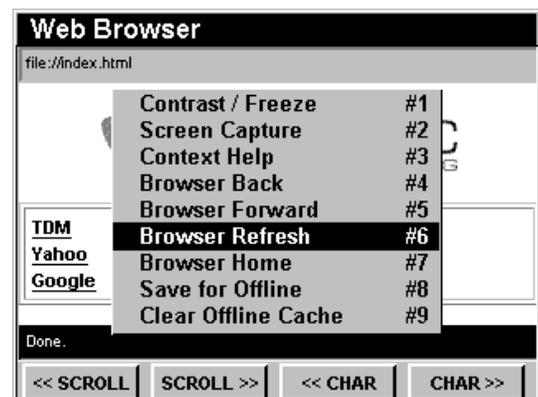
Web Browser Mode 14

Introduction

In **Web Browser** Mode the instrument can access information from the Internet and connect with web based applications such as work force management and status monitoring or to retrieve information from technical databases. The **Web Browser** Mode can be used with a built in modem or via an ethernet connection to an external modem or network.

In order to use the **Web Browser** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1). In order to use the **Web Browser** Mode on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

This section will provide you with a basic understanding of using the **Web Browser** Mode including:

- Required Setup
- Browser Overview
- Browser Navigation
- Function Menu Options

Note: Web Browser Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Web Browser** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Note: Since the web browser can be configured to point to any website, in any country, it is possible to seize (lockup) the **Web Browser** Mode. Trilithic has taken every precaution to prevent browser problems, but there are still many features that a desktop web browser can perform that an embedded browser will have difficulties attempting to display. Please report any issues to Trilithic Technical Support.

CAUTION: Should you have any difficulties or get locked-up while in **Web Browser** Mode, hold down the ⏻ and Fn buttons at the same time, for five seconds to force a reboot of your instrument.

Required Setup

To use **Web Browser** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Web Browser** Mode with an internal cable modem, you will need to setup the internal cable modem. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode with the internal Wi-Fi adapter, you will need to set up the internal Wi-Fi adapter. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings* before proceeding through this chapter.

To change the appearance of your browser screen by hiding or displaying status bars, you will need to set up the browser settings; see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Browser Settings*.

The 860 DSP web browser is limited to accessing the web pages listed on its internal home page (index.html) located on drive B.

You will need to use the WorkBench software to edit the index.html file. This will allow you to add or change the web pages accessible from the home page. See your WorkBench operation manual for further instructions.

Browser Overview

The web browser screen contains several tools which you should become familiar with before using the web browser. Take a moment to locate the basic features of the web browser screen.
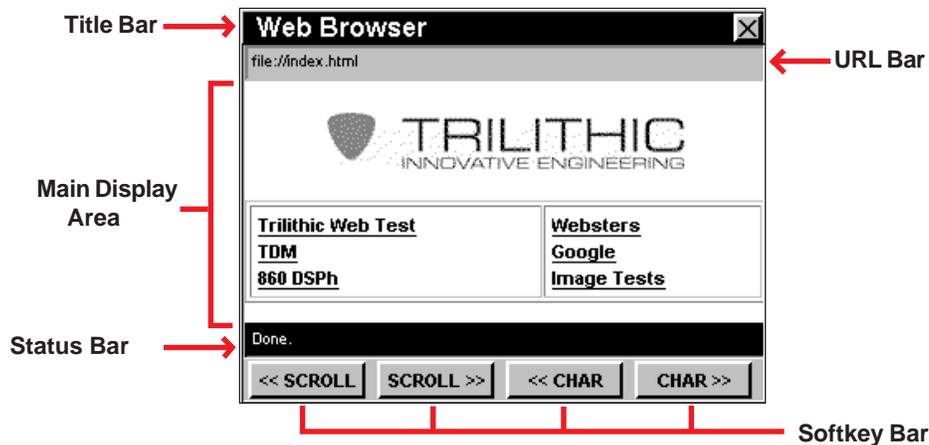
Title Bar

The title bar along the top of the screen indicates which screen is displayed, such as **Web Browser** shown above.

URL Bar

The URL bar shows the URL of the current web page.

Main Display Area

The main display area, located below the URL bar, displays the web page being accessed.

Status Bar

Below the main display area is a black status bar. Single line text entries are displayed to inform the user about the status of a web page.

Softkey Bar

Below the status bar, are four softkeys which correspond and identify the actions assigned to the four yellow buttons on the keypad.

The softkeys are used to access various web browsing functions.

Browser Navigation

Selecting Links

Use the ◄ ► buttons to move between selectable fields on a web page.

Pressing the (Ent) button will select a highlighted field.

Scrolling Web Pages

Use the [<<Scroll] and [Scroll>>] softkeys to scroll left and right on the web page.

Use the ▲ ▼ buttons to scroll up and down on the web page.

Entering Data

To enter numbers and text use the alphanumeric keypad.

Use the [<<Char] and [Char>>] softkeys to move the cursor left and right when entering or editing text.

Use the (Ent) button when finished entering text or the ◄ ► buttons to move to a new field.

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Web Browser** Mode.

The following **Function** Menu options can be accessed while in **Web Browser** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Browser Back
- Browser Forward
- Browser Refresh
- Browser Home
- Offline Browsing
- Clear Offline Cache
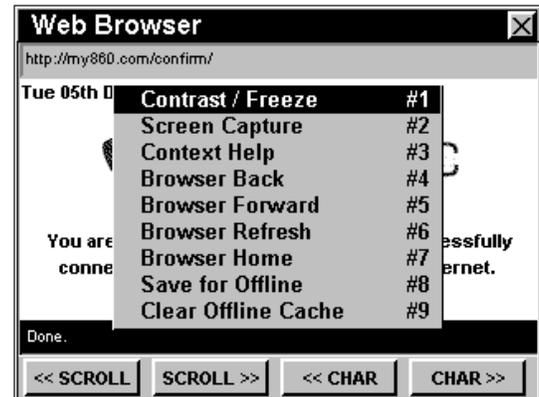
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help

Browser Back

This option is used to move back one web page.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Browser Back**, and then press the (Ent) button. You may also select **Browser Back** by pressing (4).
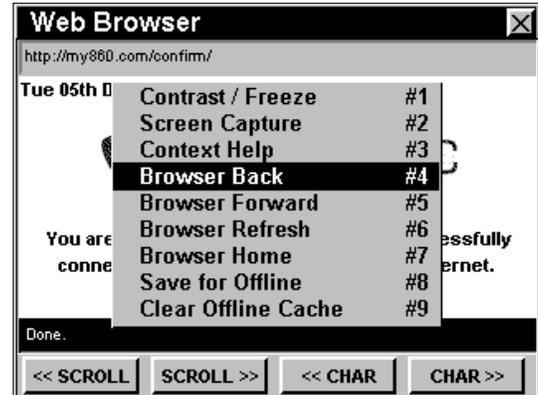
Browser Forward

This option is used to move forward one web page.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Browser Forward**, and then press the (Ent) button. You may also select **Browser Forward** by pressing (5).
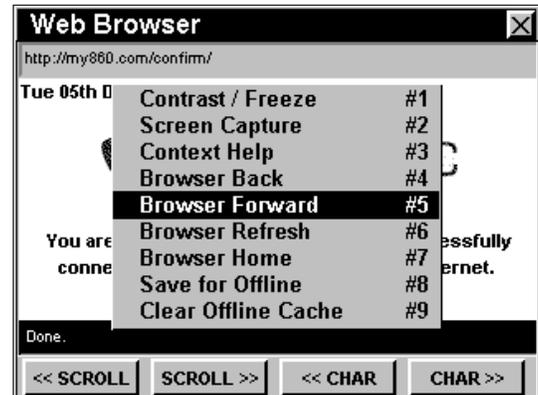
Browser Refresh

This option is used to refresh the current web page.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Browser Refresh**, and then press the (Ent) button. You may also select **Browser Refresh** by pressing (6).
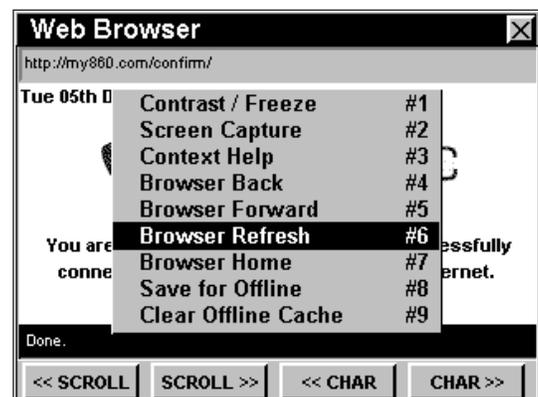
Browser Home

This option is used to go to the home web page.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Browser Home**, and then press the (Ent) button. You may also select **Browser Home** by pressing (7).
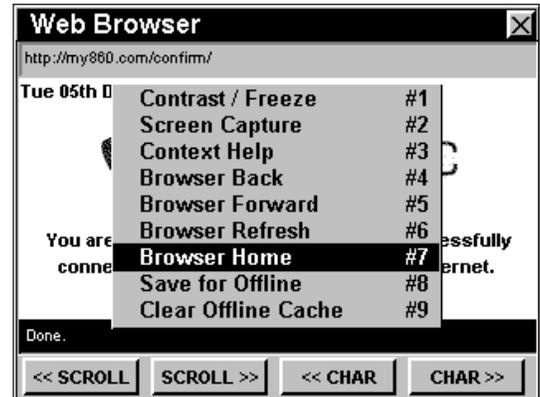
Offline Browsing

You can save web pages for off-line browsing when an internet connection is not available.

To use this option to save a web page for offline browsing, press the (Fn) button, use the (▲) (▼) buttons to highlight **Save for Offline**, and then press the (Ent) button. You may also select **Save for Offline** by pressing (8). The instrument will store the web page and associated graphics on flash drive B.
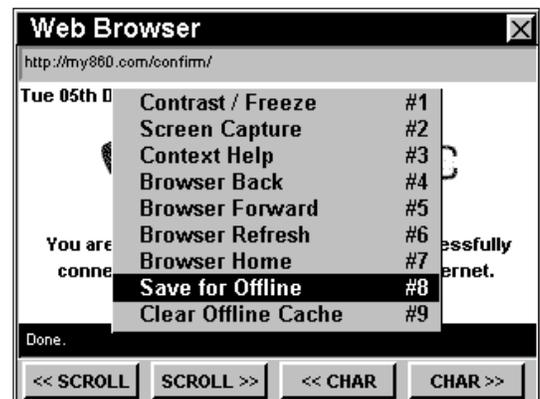
To use this option to recall pages or graphics when off-line, press the (Fn) button, use the (▲) (▼) buttons to highlight **Recall Offline**, and then press the (Ent) button. You may also select **Recall Offline** by pressing (8).

- The instrument will display a list of the cached web pages.

- Use the (◄) (►) buttons to highlight a website in the cache.

- To view a highlighted selection, press the (Ent) button.

Note: In order for links from one web page to another to work offline, you must store the linked pages for offline browsing. If you try to navigate to an uncached page, the instrument will display an error message. Use the **Browser Back** function to return to the previous page.

Clear Offline Cache

This option is used to the clear the offline cache of web pages.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Clear Offline Cache**, and then press the (Ent) button. You may also select **Clear Offline Cache** by pressing (9).
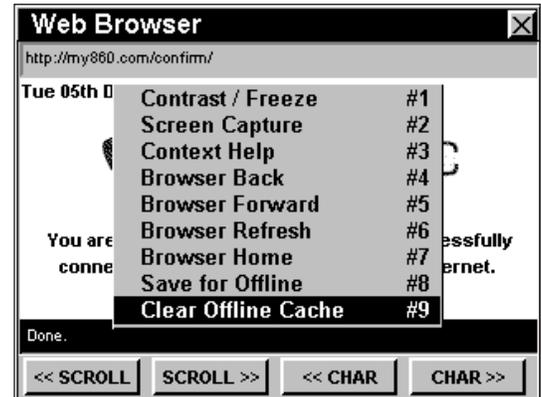
Introduction

The **Auto Test** Mode performs a sequence of operations specified by a "macro". You can assemble **Auto Test** macros either manually or load them into the instrument using WorkBench software. Each macro is a "script" that the instrument can follow. It may contain most of the functions that the instrument is capable of performing, including channel selection, level setting, measurements, comparisons to limits and data recording. A list of macros can be stored in your instrument and you can select a macro for performing tests and generating reports at any time.

The basic 860 DSP and 860 DSPi come equipped with the **Auto Test** Mode as a standard feature.

In **Auto Test** Mode, the instrument displays the results of a test sequence which you can store in the unit's memory. Stored reports may be recalled using the **Automatic Test Results** Mode.

This section will provide you with the basic understanding of how to use **Auto Test** Mode including:

- Required Setup
- Creating Auto Test Macros
- Running Auto Test Macros
- Function Menu Options

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Auto Test** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Creating Auto Test Macros

Auto Test macros can include up to 16 automated tests which the instrument can perform immediately, at specific dates and times, or periodically starting at a specified date and time.

Create New Macro

To create a new **Auto Test** macro, press the `New` softkey.

- The **Create a New Macro** window will open.

- Enter the name of the new macro using the alphanumeric keypad, and then press the `Ent` button.

- The **Edit Macro** window will appear with **Step #1 of 16** selected. If **Step #1 of 16** is not selected, use the `Prev` or `Next` softkeys to select **Step #1 of 16**.

Automatic Test
20-Nov-2009 Chrg 14.20V   93 F   IP   11:58:51

File Name	LOG SIZE	Schedule
860serv1.mac	3088 bytes	Specified Times
at tap.mac	11068 bytes	Immediate
cpe.mac	10268 bytes	Immediate
eol.mac	13220 bytes	Immediate
grnd blk.mac	12424 bytes	Immediate
set top.mac	11448 bytes	Immediate
tap.mac	11708 bytes	Immediate
---	---	---
---	---	---

Automatic Test

| New | Edit | Start | Delete |

Automatic Test
20-Nov-2009 Chrg 14.20V   93 F   IP   12:00:36

File Name	LOG SIZE	Schedule
860serv1.mac	3088 bytes	Specified Times

Create a New Macro

Enter a Macro Name

_.mac

Automatic Test

| New | Edit | Start | Delete |

Edit Macro
20-Nov-2009 Chrg 14.20V   93 F   IP   12:01:33

Step #1 of 16   Unused Step

Information

Schedule   Immediate

Automatic Test

| Prev | Params | Limits | Next |

Auto Test

Selecting Type of Test

The default type of test **Unused Step** is displayed when creating a new macro.

To select the type of test desired, use the ◄ ► buttons to highlight the **Step #X** of **16** Field, use the ▲ ▼ buttons to select the type of test desired as follows;

Test Type	Mode	Channel Plan	IP Address	Schedule Type	Test Parameters	Test Limits
Unused Step	N/A					
Check All Levels	SCAN	X		X		X
Check Tilt (dB)	TILT	X		X		X
Check HUM (%)	HUM	X		X	X	X
Check C/N (dB)	C/N	X		X		X
Check Depth of Mod (%)	MOD	X		X		X
Check QAM w/o Constellation	QAM	X		X		X
Check QAM plus Constellation	QAM	X		X		X
Check Ping	PING		X	X	X	X
Check Throughput	THRU PUT		X	X	X	X
Check Spectrum	SPECTRUM			X	X	X
Check VoIP RTP	VoIP		X	X	X	X
Check Cable Modem	CM STAT			X	X	X
Check Leakage	N/A					X

If you wish to add another macro step, use the ⬚ Next ⬚ softkey to advance to the next step in the auto test sequence. You can then define the step as described above. You may define up to 16 steps in this manner.

> **Note:** Macro test steps must be continuous. The instrument ends execution of a macro on the first unused step.

> **Note:** Leakage measurement requires the use of an external leakage meter such as the Seeker Lite² or Seeker.

Selecting a Channel Plan

To select the channel plan, use the ◄ ► buttons to highlight the **Channel Plan** field, and then use the ▲ ▼ buttons to cycle through the channel plans available on your instrument.

A brief summary of the selected **Channel Plan** will be displayed in the **Information** field.

Edit Macro	✕
20-Nov-2009 Chrg 14.20V 91 F IP 12:08:32	
Step #1 of 16	Check All Levels
Channel Plan	Prompt User
Information	9 Channels in Plan 3 Analog Channels to Test 6 Digital Channels to Test
Schedule	Immediate
Msg:	
Prev	Params	Limits	Next
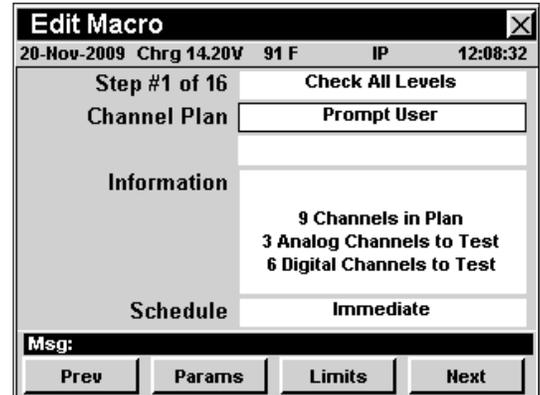
Note: Be sure to check that the channel plan you select has channels designated for the type of test you are defining for this step. For example, if you are defining a step as a **Hum** test, there must be at least one channel designated for **Hum**.

Select an IP Address

To enter an IP address, use the ◄ ► buttons to highlight the **IP Address** field, and then use the alphanumeric keypad to enter the IP address, and press the (Ent) button.

Edit Macro	✕
20-Nov-2009 Chrg 14.20V 91 F IP 12:21:26	
Step #1 of 16	Check Ping
IP Address	10.1.33.23
Information	
Schedule	Specified Times
Msg:	
Prev	Params	Limits	Next
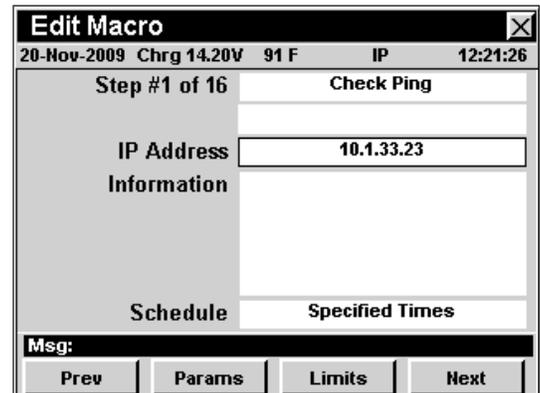
Selecting a Schedule Type

The schedule type is used to control how and when the instrument runs the macro. To select the schedule type, use the ◄ ► buttons to highlight the **Schedule** field, and then use the ▲ ▼ buttons to cycle through the schedule types available.

- **Immediate** - Run the macro immediately.

- **Interval / Count** - Run the macro at a selected date and time and repeating the macro at regular time intervals.

- **Specified Times** - Run the macro at up to four selected dates and times.
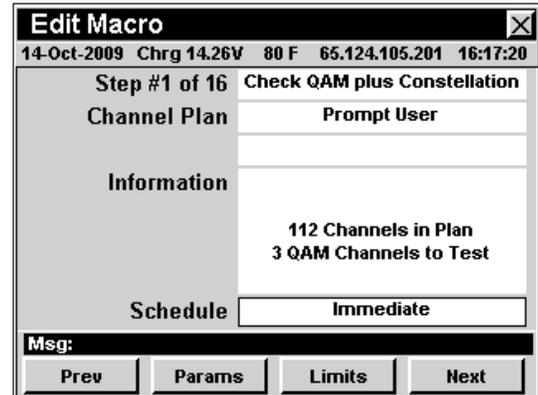
> **Note:** You can change the schedule type at run time; however, setting the default to the method you most commonly use will save time when running the macro.

Setting Test Parameters

To set test parameters, use the ☐ Prv ☐ or ☐ Next ☐ softkey to highlight the desired test step and then press the ☐ Params ☐ softkey.

After setting the test parameters, press the **Bk** button to save the new parameters and return to the **Edit Macro** window.

Check Hum (%) Test Parameters

When the test type is set to **Check Hum (%)**, use the ◄ ► buttons to highlight the following test parameters, and then use the ▲ ▼ buttons to cycle through the available options:

Hum Type - This sets the AC power frequency used to measure power line related HUM. You can select from **60 kHz**, **120 kHz**, or **< 1 kHz Value**.

TRILITHIC

Auto Test
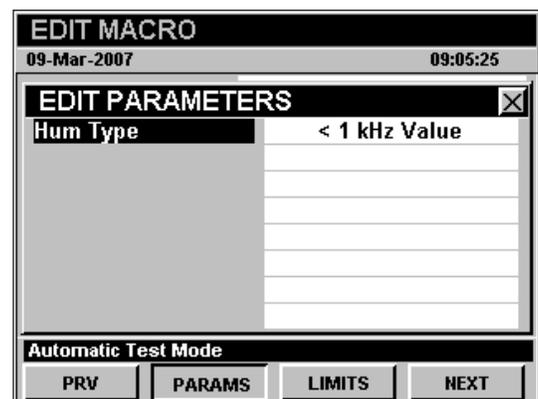
Check PING Test Parameters

When the test type is set to **Check PING**, use the ◀ ▶ buttons to highlight the following test parameters, and then use the ▲ ▼ buttons to cycle through the available options:

Packet Rate- This sets the time delay for the signal to be converted into an IP packet. You can select from **10 msec** to **1000 msec**, in 10 msec increments.

Packet Size - This sets the size of the packet to send for the test. You can select from **0**, **32**, **64**, **256**, **512**, **768**, or **1024 Bytes**.

Packets to Send - This sets the number of packets to send for the test. You can select from **100 Pkts** to **100000 Pkts**, in 100 Pkt increments.

Codec Delay - This sets the time delay for the codec compression. You can select from **0 msec** to **300 msec**, in 1 msec increments.

Jitter Buffer Delay - This sets the time delay for buffering packets. You can select from **0 msec** to **300 msec**, in 1 msec increments.
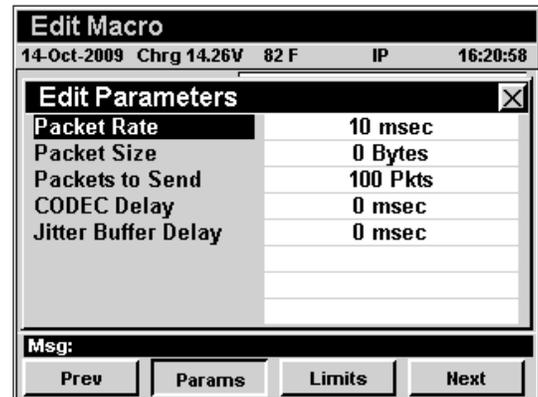
Check Throughput Test Parameters

When the test type is set to **Check Throughput**, use the ◀ ▶ buttons to highlight the following test parameters, and then use the ▲ ▼ buttons to cycle through the available options:

File Transfer - This sets the throughput file transfer protocol. You can select from **UDP**, **TFTP**, and **HTTP Upstream Test** and **UDP**, **TFTP**, and **HTTP Downstream Test**.

Transfer Rate - This sets the data transfer rate for the **UDP Downstream Test**. You can select from **100 kBit/Sec** to **40 MBit/Sec**, in 100 kBit/Sec increments.
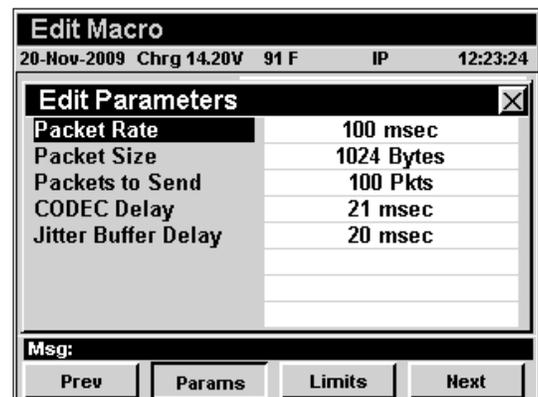
Check Spectrum Test Parameters

When the test type is set to **Check Spectrum**, use the ◄ ► buttons to highlight the following test parameters, and then use the ▲ ▼ buttons to cycle through the available options:

Start Frequency - This sets the start frequency for the spectrum scan. This value cannot be higher than the **Stop Frequency**.

Stop Frequency - This sets the stop frequency for the spectrum scan. This value cannot be lower than the **Start Frequency**.

Resolution Bandwidth - This sets the resolution bandwidth for the spectrum scan.

Detector Mode - This sets the type of detector mode to use. You can select from **Avg Detector**, **Dwell Wide Detector**, or **Dwell Narrow Detector**.

Sampling Level - This sets the number of samples to use for the detector mode averaging. You can select from **Single Sample**, **2** , **4**, **8**, **16**, **32**, **64**, **128**, or **256 Samples**.

Reference Level - This sets the reference level of the spectrum scan.

Hold Setting - This sets the time delay for buffering packets. You can select from **None**, **Max**, or **Min**.
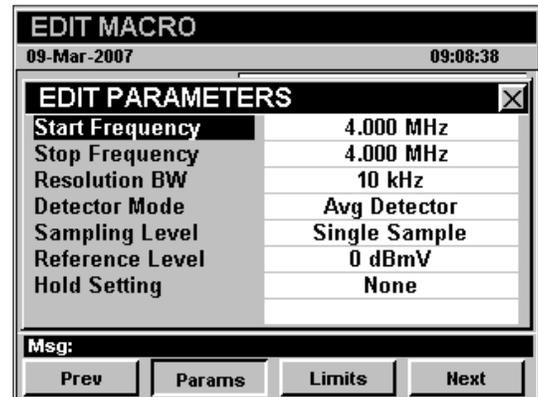
Check VoIP RTP Test Parameters

When the test type is set to **Check VoIP RTP**, use the ◀ ▶ buttons to highlight the following test parameters, and then use the ▲ ▼ buttons to cycle through the available options:

CODEC Type - This sets the type of CODEC. This is set to **G.711 64000 bps** and cannot be changed manually.

CODEC Delay - This sets CODEC delay. This is tied to the **CODEC Type** and cannot be changed manually.

Packet Rate - This sets the rate that packets are sent. You can choose from **20 msec** to **250 msec**, in 10 msec increments.

Packet Size - This sets set the size of packet. You can choose from **20 Bytes** to **1000 Bytes**.

Jitter Buffer Delay - This sets the jitter buffer to be used by voice receivers. You can choose from **20 msec** to **300 msec**, in 10 msec increments.

Call Length - This sets the length of the call. The values to choose from are variable based on the **Packet Rate** and **Packet Size**.
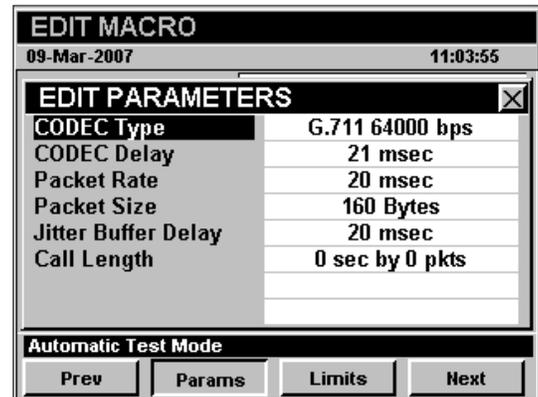
CAUTION: The instrument is set to perform the VoIP RTP test using the G.711 64000 bps CODEC. The default values provided, should be sufficient to perform any VoIP RTP test. If you choose to change the default values, it may adversely affect your test results. When your selected test settings do not conform to the CODEC, an asterisk will appear in the **CODEC Type** field. Change VoIP RTP test settings at your own risk.

Auto Test

Setting Test Limits

Setting test limits allows you to define the testing criteria that your system must satisfy. When the instrument performs an **Auto Test** macro it will compare the measurement data to the test limits that you have set.

> **Note:** To meet a minimum limit the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

To set test parameters, use the [Prv] or [Next] softkey to highlight the desired test step and then press the [Limits] softkey.

After setting the test limits, press the (Bk) button to save the new limits and return to the **Edit Macro** window.

Check All Levels Test Limits

When the test type is set to **Check All Levels**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Video - Sets the minimum limit for analog video channel levels.

Max Video - Sets the maximum limit for analog video channel levels.

Min V/A Delta - Sets the minimum allowable video to audio level difference.

EDIT MACRO
13-Mar-2007   16:16:27

EDIT LIMITS   ☒
Min Video	60 dBmV
Max Video	0 dBmV
Min V/A Delta	0 dB
Max V/A Delta	0 dB
Min Digital Level	10 dBmV
Max Digital Level	0 dBmV
Max Delta Video	0 dB
Max Delta Adj Video	0 dB

Automatic Test Mode
| Prev | Params | Limits | Next |

Max V/A Delta - Sets the maximum allowable video to audio level difference.

Min Digital Level - Sets the minimum limit for digital channel levels.

Max Digital Level - Sets the maximum limit for digital channel levels.

Max Delta Video - Sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.

Max Delta Adj Video - Sets the maximum level variation between any two adjacent video carriers.

Auto Test

Check Tilt (dB) Test Limits

When the test type is set to **Check Tilt (dB)**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Tilt - Sets minimum amplitude versus frequency tilt your system must meet.

Max Tilt - Sets maximum amplitude versus frequency tilt your system must not exceed.

```
Edit Macro
24-Mar-2010  Batt 7.19V    24 C        IP         09:07:25
 Edit Limits
 Tilt Min Limit                      -5 dB
 Tilt Max Limit                       5 dB


 Automatic Test
   Prev        Params        Limits        Next
```
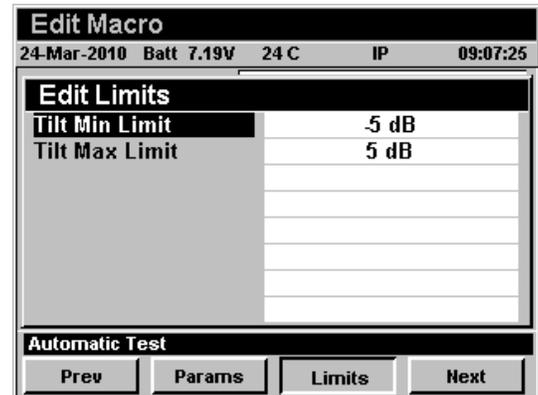
Check Hum (%) Test Limits

When the test type is set to **Check Hum (%)**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Max Hum Percent - Sets the maximum hum level your system must not exceed.

```
EDIT MACRO
20-Nov-2006                                       10:23:50
 EDIT LIMITS                                    ✕
 Max Hum Percent                      3 %



 Msg:
   PRV         PARAMS        LIMITS        NEXT
```
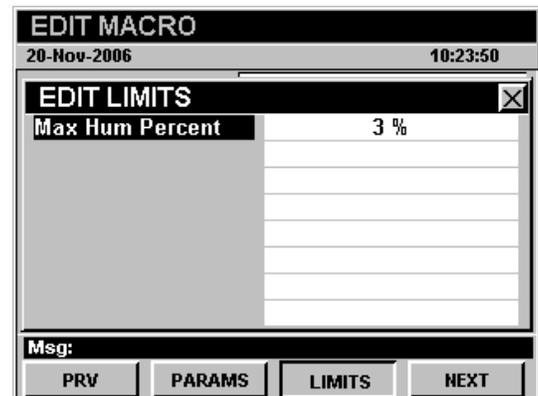
Check CN (dB) Test Limits

When the test type is set to **Check CN (dB)**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Carrier to Noise - Sets minimum carrier to noise level your system must meet.

```
EDIT MACRO
14-Mar-2007                                       07:52:25
 EDIT LIMITS                                    ✕
 Min Carrier to Noise                43 dB



 Automatic Test Mode
   PRV         PARAMS        LIMITS        NEXT
```
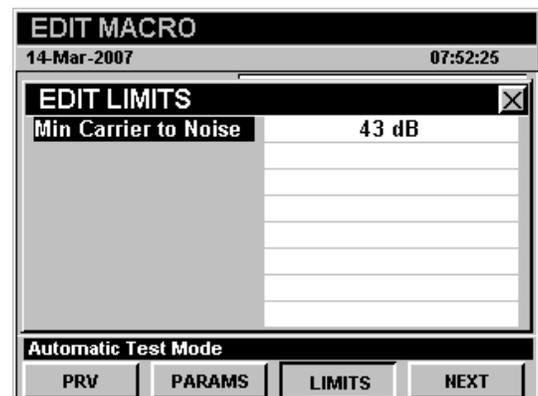
Check Depth of Mod (%) Test Limits

When the test type is set to **Check Depth of Mod (%)**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Percent Mod - Sets minimum depth of modulation percentage your system must meet.

Max Percent Mod - Sets maximum depth of modulation percentage your system must not exceed.

```
EDIT MACRO
14-Mar-2007                              07:58:34

  EDIT LIMITS                               ☒
  Min Percent Mod              83%
  Max Percent Mod              92%



  Automatic Test Mode
    PRV      PARAMS      LIMITS      NEXT
```
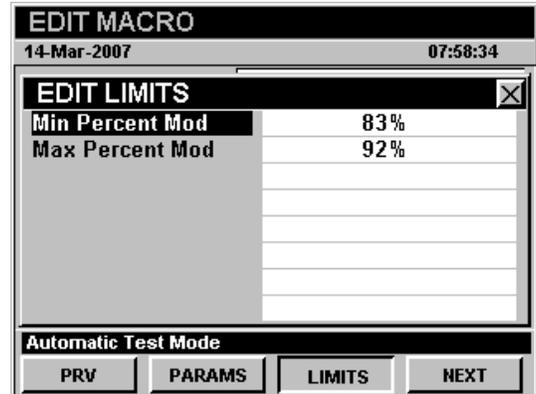
Check QAM w/o Constellation Test Limits

When the test type is set to **Check QAM w/o Constellation**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Digital Level - Sets the minimum limit for digital channel levels.

Max Digital Level - Sets the maximum limit for digital channel levels.

Min Digital MER - Sets the minimum digital MER your system must meet.

```
EDIT MACRO
14-Mar-2007                              08:00:58

  EDIT LIMITS                               ☒
  Min Digital Level          10 dBmV
  Max Digital Level           0 dBmV
  Min Digital MER         Don't Test MER
  Max Digital EVM         Don't Test EVM
  Max Digital Pre BER     Don't Test Pre BER
  Max Digital Post BER    Don't Test Post BER


  Automatic Test Mode
    PRV      PARAMS      LIMITS      NEXT
```

Max Digital EVM - Sets the maximum digital EVM your system must not exceed.

Max Digital Pre BER - Sets the maximum digital pre BER your system must meet.

Max Digital Post BER - Sets the maximum digital post BER your system must not exceed.
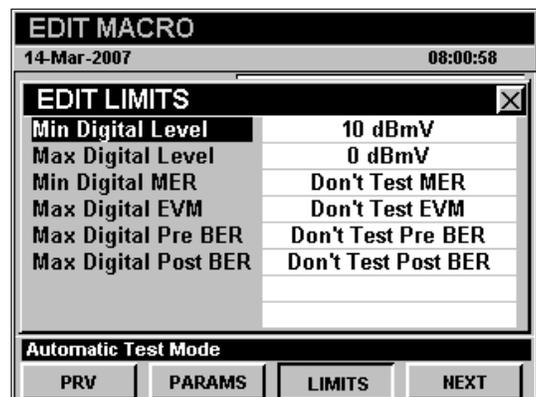
> **Note:** Setting **Min Digital MER**, **Max Digital EVM**, **Max Digital Pre BER**, or **Max Digital Post BER** to zero disables the limit test.

> **Note:** The higher that you set the MER / BER limits, the more time the MER / BER test will take.

Auto Test

Check QAM plus Constellation Test Limits

When the test type is set to **Check QAM plus Constellation**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Digital Level - Sets the minimum limit for digital channel levels.

Max Digital Level - Sets the maximum limit for digital channel levels.

Min Digital MER - Sets the minimum digital MER your system must meet.

```
EDIT MACRO
14-Mar-2007                          08:19:45

  EDIT LIMITS                              ☒
 Min Digital Level          10 dBmV
 Max Digital Level           0 dBmV
 Min Digital MER         Don't Test MER
 Max Digital EVM         Don't Test EVM
 Max Digital Pre BER     Don't Test Pre BER
 Max Digital Post BER    Don't Test Post BER


 Automatic Test Mode
   PRV      PARAMS      LIMITS      NEXT
```

Max Digital EVM - Sets the maximum digital EVM your system must not exceed.

Max Digital Pre BER - Sets the maximum digital pre BER your system must meet.

Max Digital Post BER - Sets the maximum digital post BER your system must not exceed.
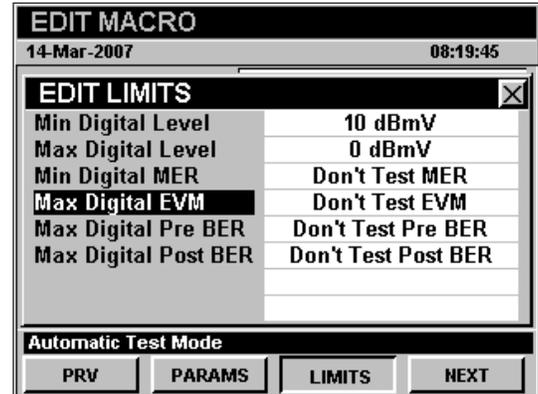
Check PING Test Limits

When the test type is set to **Check PING**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Launch Level - Sets the minimum launch level that your cable modem must meet.

Max Launch Level - Sets the maximum launch level that your cable modem must not exceed.

Max Lost Packets - Sets the maximum number of lost packets that your system must not exceed.

```
EDIT MACRO
14-Mar-2007                          08:21:39

  EDIT LIMITS                              ☒
 Min Launch Level           10 dBmV
 Max Launch Level            0 dBmV
 Max Lost Packets            0 Pkts
 Max Percent Lost            0 %
 Max Transit Time           10 msec
 Max Latency                 0 msec
 Max Jitter                  0 msec


 Automatic Test Mode
   PRV      PARAMS      LIMITS      NEXT
```

Max Percent Lost - Sets the maximum percent of lost packets your system must not exceed.

Max Transit Time - Sets the maximum transit time your system must not exceed.

Max Latency - Sets the maximum latency your system must not exceed.

Max Jitter - Sets the maximum jitter your system must not exceed.
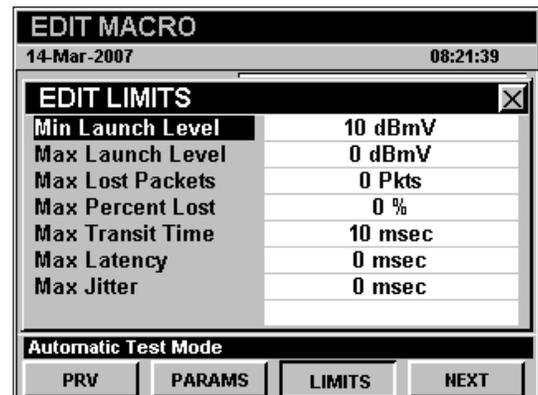
Check Throughput Test Limits

When the test type is set to **Check Throughput**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Transfer Rate - Sets the minimum throughput transfer rate that your system must meet.

```
EDIT MACRO
14-Mar-2007                          08:33:01
  EDIT LIMITS                              ☒
  Min Transfer Rate          100.00 kBit/Sec



  Automatic Test Mode
  PRV      PARAMS     LIMITS     NEXT
```
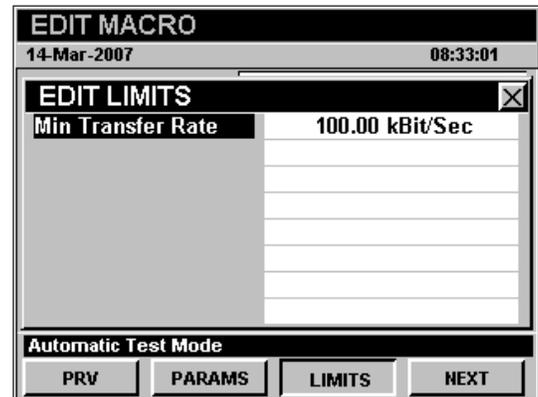
Check Spectrum Test Limits

When the test type is set to **Check Spectrum**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Level - Sets the minimum level that your system must meet. This measurement is useful for checking for a dead laser.

Max Level - Sets the maximum level that your system must not exceed.

```
EDIT MACRO
09-Apr-2007                          18:39:05
  EDIT LIMITS                              ☒
  Min Level                        -70 dBmV
  Max Level                        -50 dBmV



  Automatic Test Mode
  PRV      PARAMS     LIMITS     NEXT
```
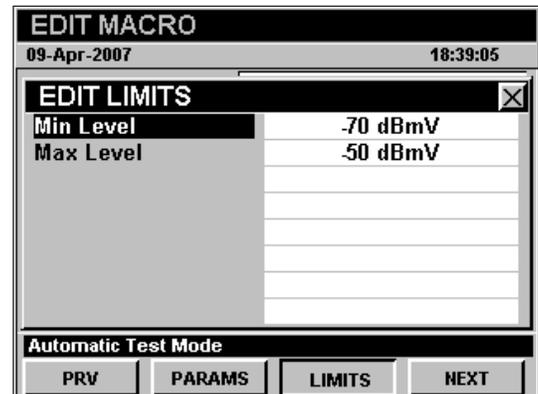
Check VoIP RTP Test Limits

When the test type is set to **Check VoIP RTP**, use the ◀ ▶ buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Maximum Latency - Sets the maximum latency that your system must not exceed.

Maximum Jitter - Sets the maximum jitter that your system must not exceed.

Minimum MOS - Sets the minimum MOS that your system must meet.

```
EDIT MACRO
14-Mar-2007                          08:37:36
  EDIT LIMITS                              ☒
  Maximum Latency            200 msec
  Maximum Jitter              50 msec
  Minimum MOS                   3.6



  Automatic Test Mode
  PRV      PARAMS     LIMITS     NEXT
```
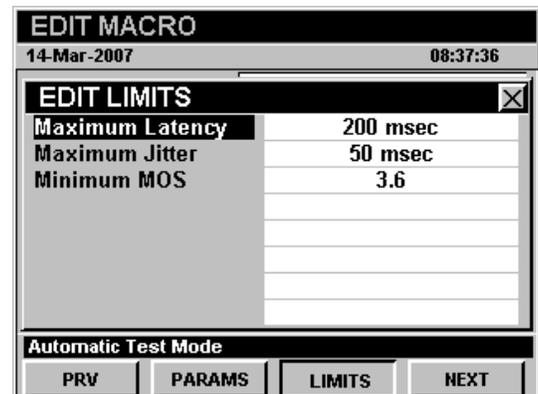
Check Cable Modem Test Limits

When the test type is set to **Check Cable Modem**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Min Launch Level - Sets the minimum launch level that your cable modem must meet.

Max Launch Level - Sets the maximum launch level that your cable modem must not exceed.

Min Receive Level - Sets the minimum receive level that your cable modem must meet.

EDIT MACRO

14-Mar-2007   08:40:46

EDIT LIMITS   ✕

Min Launch Level	60 dBmV
Max Launch Level	0 dBmV
Min Receive Level	20 dBmV
Max Receive Level	0 dBmV

Automatic Test Mode

| PRV | PARAMS | LIMITS | NEXT |

Max Receive Level - Sets the maximum receive level that your cable modem must not exceed.
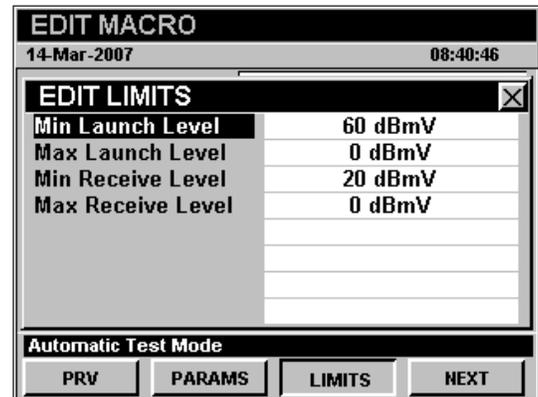
Check Leakage Test Limits

When the test type is set to **Check Leakage**, use the ◄ ► buttons to highlight the following test settings, and then use the ▲ ▼ buttons to change the value of the test settings:

Max Level - Sets the maximum leakage level that your system must not exceed.

EDIT MACRO

14-Mar-2007   08:52:31

EDIT LIMITS   ✕

Max Level	0 uV/meter

Automatic Test Mode

| PRV | PARAMS | LIMITS | NEXT |
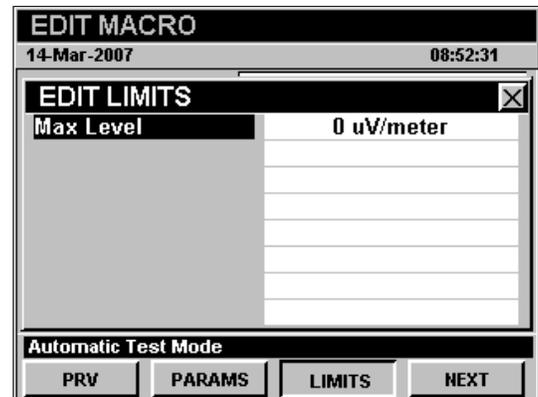
Auto Test

Saving Macros

After completing the setup of an **Auto Test** macro, press the (Bk) button, use the ◄ ► buttons to select **Yes** to save the macro or **No** to exit without saving, and select the (Ent) button. The instrument will return to the **Auto Test Macros** window.
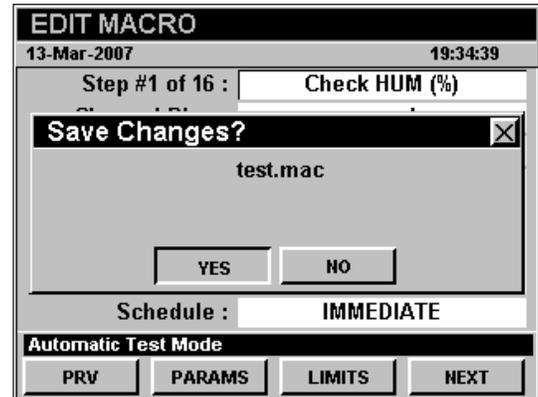
Copying Macros

To copy or create a macro similar to an existing macro, use the ◄ ► buttons to highlight the macro that you wish to copy, and select the Copy softkey. The **Copy a Macro** window will appear; enter a new file name using the alphanumeric keypad, and select the (Ent) button.
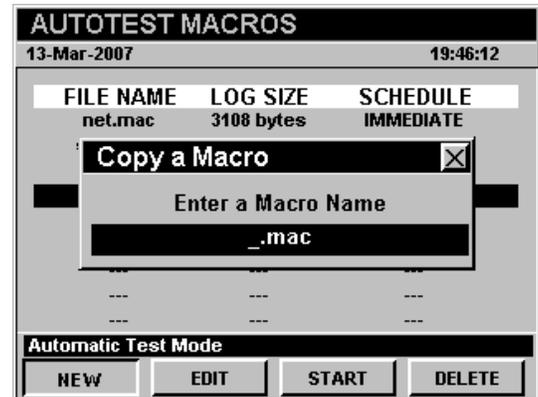
Deleting Macros

To delete an existing macro, use the ◄ ► buttons to highlight the macro that you wish to delete, and select the Delete softkey. The **Delete Selected File?** window will appear; use the ◄ ► buttons to select **Yes** to delete the macro or **No** to exit without deleting, and select the (Ent) button.
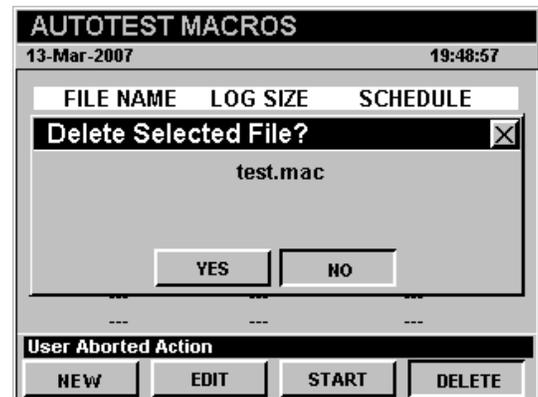
Running Auto Test Macros

To run an **Auto Test** macro, highlight the macro name on the **Auto Test Macros** window, and then start the selected macro by pressing the [Start] softkey.

Immediate Execution

If the **Schedule** field is set to **Immediate** the macro will execute immediately.

The instrument will display the progress of the macro along with the **Pass** or **Fail** status for each step.

```
AUTOTEST RESULTS                      ☒
13-Mar-2007                     22:46:53
Step #1          Step #9
Step #2          Step #10
Step #3          Step #11
Step #4          Step #12
Step #5          Step #13
Step #6          Step #14
Step #7          Step #15
Step #8          Step #16
Automatic Test Results
           LOAD
```
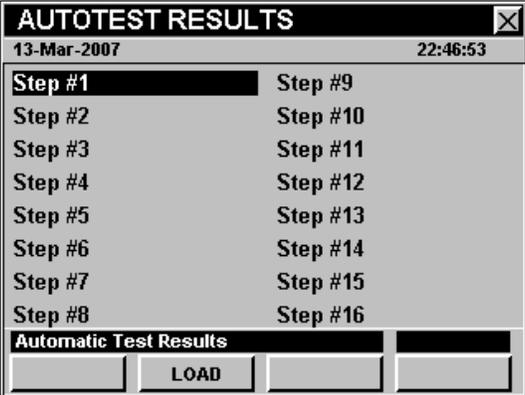
> **Note:** You can abort a macro in progress by pressing the (Bk) button when the **Auto Test Results** window is shown.

When the macro finishes execution, the **Save Data As** window will appear; use the alphanumeric keypad to enter the file name, and then press the (Ent) button.

```
AUTOTEST RESULTS
13-Mar-2007                     20:13:35
Step #1 : SCAN,FAIL      Step #9 : -------,---
Step #2 : -------,---     Step #10 : -------,---
Step   FAIL - Save Data As          ☒
Step
Step      File Name        _.log
Step
Step #7 : -------,---     Step #15 : -------,---
Step #8 : -------,---     Step #16 : -------,---
Executing Test Step                  DSP OK
           LOAD
```
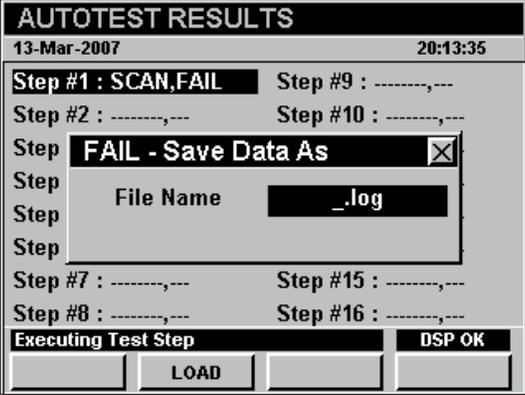
> **Note:** When the macro is complete, the instrument will save a data log that includes all of the data collected during the test.

Auto Test

Interval / Count Execution

If the **Schedule** Field is set to **Interval / Count** the **Save Macro Data** window will appear; use the alphanumeric keypad to enter the file name, and then press the (Ent) button.

The **Timing/Schedule** window will appear.
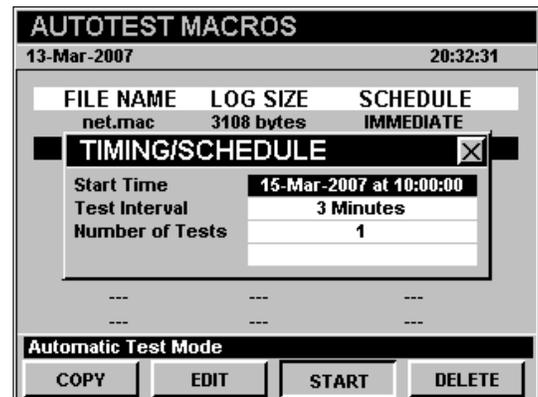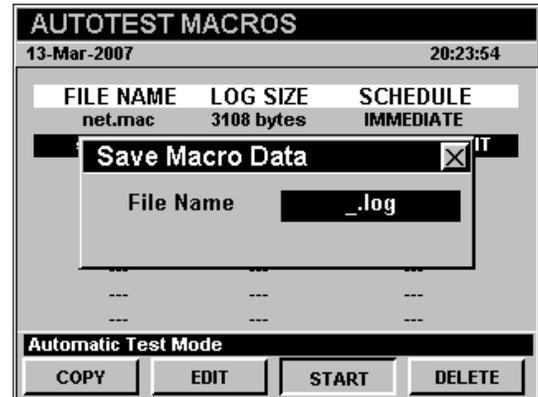
Start Date and Time

To set the macro start date and time from the
Timing/Schedule window, use the
◄ ► buttons to highlight the **Start Time** Field,
and press the **Ent** button.

- The **Enter Current Date** window will
  appear. Use the alphanumeric keypad to
  enter the current date, and press the **Ent**
  button.

- The **Enter Start Time** window will appear.
  Use the alphanumeric keypad to enter the
  current date, and press the **Ent** button.

Note: The clock display on the instrument stops when the **Enter Current Date** and **Enter Start Time** windows are open.

Auto Test
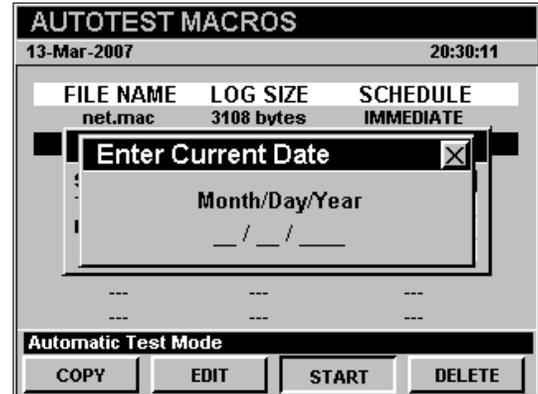
Test Interval

To set the macro test interval, use the ◄ ► buttons to highlight the **Test Interval** Field, and use the ▲ ▼ buttons to change the test interval value.
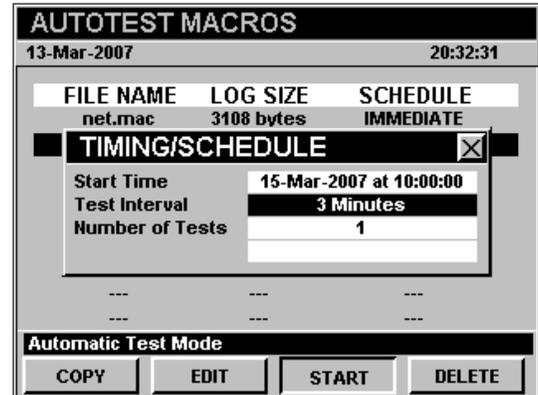
Number of Tests

To set the number of test, use the ◄ ► buttons to highlight the **Number of Tests** Field, and use the ▲ ▼ buttons to change the number of tests.

Test Execution

When you have completed setting up the macro schedule, press the (Bk) button. The instrument will begin running the macro. The instrument will display the **Auto Test Results** window briefly, and then the instrument will go into low power mode.

Forty-five seconds before a timed event is scheduled to occur, the instrument will exit low power mode and the instrument will display the **Auto Test Results** window.

AUTOTEST RESULTS	✕
13-Mar-2007	22:46:53

Step #1	Step #9
Step #2	Step #10
Step #3	Step #11
Step #4	Step #12
Step #5	Step #13
Step #6	Step #14
Step #7	Step #15
Step #8	Step #16

Automatic Test Results

| | LOAD | | |

The instrument will display the progress of the macro along with the **Pass** or **Fail** status for each step.

> **Note:** You can abort a macro in progress by pressing the (Bk) button when the **Auto Test Results** window is shown.

You can power up the instrument while it is in low power mode by pressing the ⏻ button. The instrument will display **Auto Test In Progress** in the title bar.

The instrument will display the next macro start time in the message bar at the bottom of the screen.

> **CAUTION:** You may leave the instrument on or turn it off and the **Auto Test Macro** will continue. Pressing any other key will abort the macro in progress.

> **Note:** When the macro is complete, the instrument will save a data log that includes all of the data collected during the test.

Specified Times Execution

If the **Schedule** Field is set to **Specified Times** the **Save Macro Data** window will appear; use the alphanumeric keypad to enter the file name, and then press the (Ent) button.

The **Table Schedule** window will appear.

Auto Test
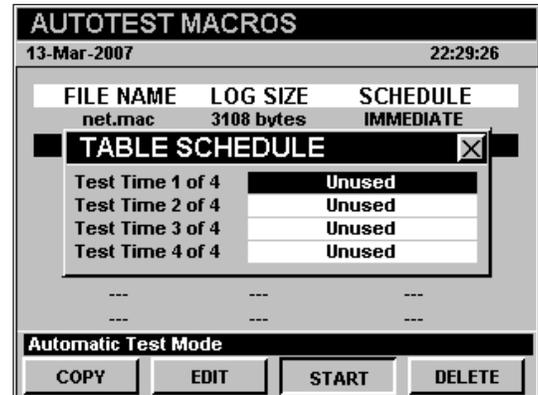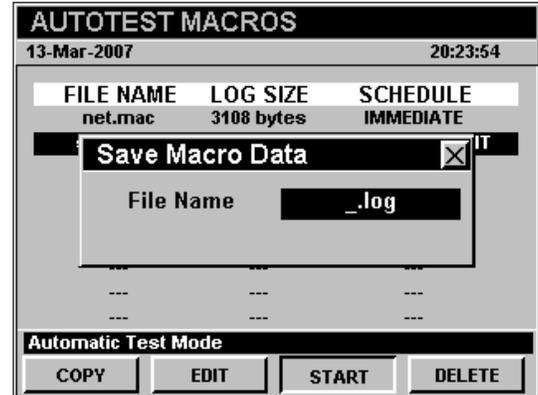
Start Date and Time

To set the macro start date and time from the **Table Schedule** window, use the ◄ ► buttons to highlight the unused test time, and press the (Ent) button.

- The **Enter Current Date** window will appear. Use the alphanumeric keypad to enter the current date, and press the (Ent) button.

- The **Enter Start Time** window will appear. Use the alphanumeric keypad to enter the start time, and press the (Ent) button.
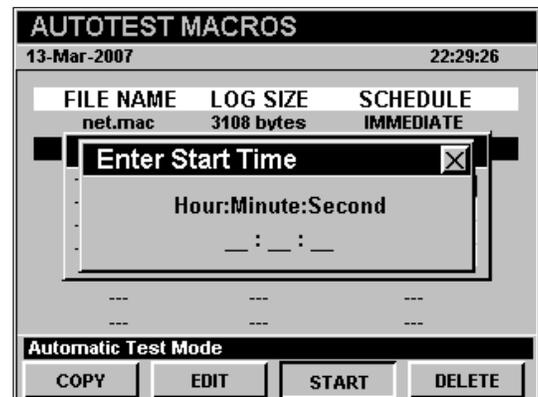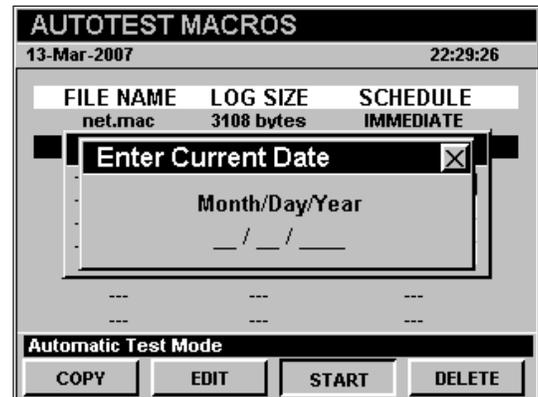
Note: The clock display on the instrument stops when the **Enter Current Date** and **Enter Start Time** windows are open.

Test Execution

When you have completed setting up the macro schedule, press the (Bk) button. The instrument will begin running the macro. The instrument will display the **Auto Test Results** window briefly, and then the instrument will go into low power mode.

Forty-five seconds before a timed event is scheduled to occur, the instrument will exit low power mode and the instrument will display the **Auto Test Results** window.

Automatic Test Results			
18-Mar-2010 Chrg 14.14V 35 C IP 17:00:44			
Step #1		Step #9	
Step #2		Step #10	
Step #3		Step #11	
Step #4		Step #12	
Step #5		Step #13	
Step #6		Step #14	
Step #7		Step #15	
Step #8		Step #16	
Automatic Test Results			
	Load	Stop	

The instrument will display the progress of the macro along with the **Pass** or **Fail** status for each step.

> **Note:** You can abort a macro in progress by pressing the (Bk) button when the **Auto Test Results** window is shown.

You can power up the instrument while it is in low power mode by pressing the (⏻) button. The instrument will display **Auto Test In Progress** in the title bar.

The instrument will display the next macro start time in the message bar at the bottom of the screen.

> **CAUTION:** You may leave the instrument on or turn it off and the **Auto Test Macro** will continue. Pressing any other key will abort the macro in progress.

> **Note:** When the macro is complete, the instrument will save a data log that includes all of the data collected during the test.

Auto Test

Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **Auto Test** Mode.

The following **Function** Menu options can be accessed
while in **Auto Test** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

Introduction

The instrument can store the results of an **Auto Test** macro in its memory. Stored reports may be recalled using the **Auto Test Results** Mode. If you have just completed an **Immediate Auto Test** macro, the **Auto Test Results** Mode will appear and the test results will be displayed.

The basic 860 DSP and 860 DSPi come equipped with the **Auto Test Results** Mode as a standard feature.

This section will provide you with the basic understanding of how to use **Auto Test** Mode including:

- Required Setup

- Viewing Auto Test Results

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Auto Test Results** Mode, you are not required to perform any setup procedures.

Viewing Auto Test Results

To review the results of an **Interval / Count** or **Specified Times Auto Test** macro press the ⬚ Load ⬚ softkey. The **Open File** window will appear.

Use the ◀ ▶ ▲ ▼ buttons to highlight the desired file and press the (Ent) button.

AUTOTEST RESULTS
09-Apr-2007   18:54:58
Step #1   Step #9
Open File   ☒
DRIVE B   .log
tilt.log   rf.log
leak.log   test00.log
scan.log
net.log
Step #8   Step #16
Msg: DSP OK
        LOAD

The instrument will display a list of each **Auto Test** macro step plus the results of the corresponding step.

To view the details of an **Auto Test** macro step, use the ▲ ▼ buttons to highlight the desired test step and press (Ent) button.
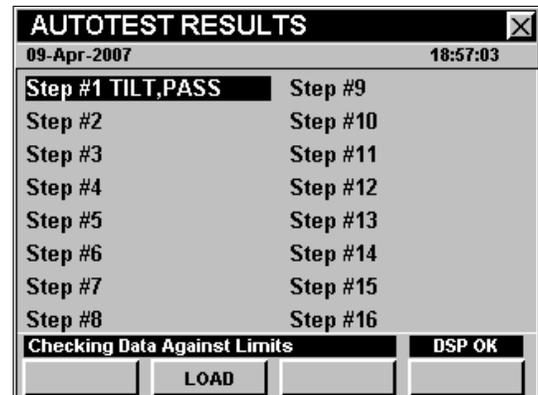
AUTOTEST RESULTS   ☒
09-Apr-2007   18:57:03
Step #1 TILT,PASS   Step #9
Step #2   Step #10
Step #3   Step #11
Step #4   Step #12
Step #5   Step #13
Step #6   Step #14
Step #7   Step #15
Step #8   Step #16
Checking Data Against Limits   DSP OK
        LOAD

If the results occupy more than one screen, use the (Ent) button to scroll through the results.

Press the (Bk) button to return to the **Auto Test Results** window.

AUTOTEST RESULTS
09-Apr-2007   18:55:13
RESULTS   ☒
TILT - PASS
High Channel 51 -45.10 dBmV
Low Channel   3 -42.81 dBmV
Tilt Measurement -2.29 dB
     Min Limit   -10.00 dB
     Max Limit   -2.00 dB

        Press ENTER to Continue
Checking Data Against Limits   DSP OK
        LOAD
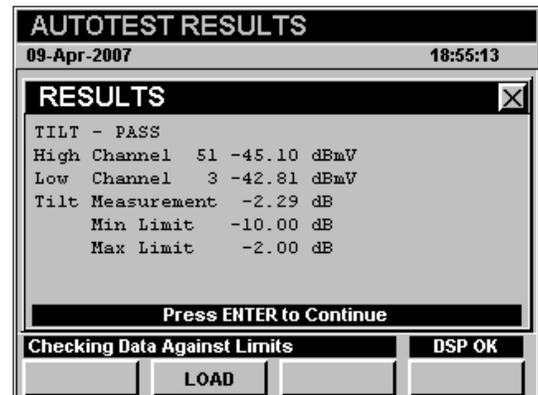
860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section III: Service Functions

TRILITHIC

Service Functions Overview ⬤ 1

Introduction

The instrument enables you to select from numerous testing and measurement procedures. The instruments features several service functions which come with the instruments and may have one or more optional functions.

This section will provide you with instructions on how to utilize the functions available in the **Service** Menu of the instrument:

Note: The labels and the arrangement of the icons in this section are the default settings of the instrument. The user's display appearance may be customized and therefore may differ from the **Service** Menu shown in this section. WorkBench software is required for customizing. See the WorkBench operation manual for more details.

Mode	Description	860 DSP Option	860 DSPi Option
Hum	Displays the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency interference present on the video carrier of a single selected channel.	Standard	PP-1
Carrier-to-Noise Ratio	Displays the ratio of the amplitudes of the visual carrier and the noise within a single selected channel.	Standard	PP-1

Mode	Description	860 DSP Option	860 DSPi Option
Depth of Modulation	Displays the percentage of video modulation for the visual carrier of a single, selected channel.	Standard	PP-1
CSO / CTB	Measures the amplitude of two common intermodulation products, Composite Second Order and Composite Triple Beat present within a selected analog video channel. This feature also allows a user to measure CSO/CTB on an Analog (NTSC) Cable TV Channel without removing the carrier and disrupting service.	Standard	PP-1
Channel Plan Scan	Displays the amplitudes of all visual and aural carriers in the selected channel plan as two simultaneous line graphs or as a bar graph; also displays total power measurement.	Standard	PP-1
FM Deviation	Displays the current and maximum FM deviation on the audio carrier of a single, selected channel.	Standard	PP-1
Sweepless Sweep® / Forward SpeedSweep	Used to test and set the tilt and gain of distribution amplifiers and detect faults in the system that affect these parameters. Note: The 8300 FST is no longer supported.	Standard	PP-1
Forward SpeedSweep	Performs all of the Sweepless Sweep features plus it provides compatibility with the 8300 FST. This will allow the Forward SpeedSweep Mode to test the tilt and gain of un-used frequency bands that are not in the users channel lineup.	FS-1	FS-1

Mode	Description	860 DSP Option	860 DSPi Option
Return Test (SSR)	This test allows you to maintain your reverse spectrum by performing reverse band frequency flatness sweeps and return band ingress analysis.	SR-1	PP-1 and SR-1
Return Sweep (RSA)	This test allows you to test your return path for micro-reflections and suck-outs.	SR-1	PP-1 and SR-1
Return Installation (RSVP)	This test allows you to test your return band for cable modem launch levels and return band carrier-to-ingress measurements.	VP-1	PP-1 and VP-1
VSB (VSB)	Analyzes and displays the signal qualities of Vestigial Sideband Modulation (VSB) signals displayed using constellation, equalizer tap diagram, and BER graph. This feature also displays the signal level and numeric values for MER and pre/post FEC BER.	VSB and IL-1 or IL-2	VSB and IL-1 or IL-2
VITS (VITS)	Analyzes the signal qualities of Vertical Interval Test Signals (VITS) to measure in-channel response, differential phase, differential gain, and chroma delay. This feature also displays the test signal itself.	VITS	VITS
QAM EVS (QAM EVS)	Allows the operator to tune the meter to a downstream QAM channel and display its Error Vector Spectrum (EVS), to reveal noise and ingress that may be present under the QAM channel.	QA-1	PP-1 and QA-2
TraffiControl (Traffic)	Provides a way to troubleshoot ingress and noise problems within active channel bands by seeing the ingress that is present "underneath" an upstream cable modem channel, or any bursty signal.	TC-1	PP-1 and TC-1

Each mode of the instrument can be accessed by selecting the corresponding icon as shown in the previous table. Some modes may be inaccessible based on the options that have been installed on the instrument. Optional modes for the 860 DSP and 860 DSPi are indicated by an option code that is described in detail in **Section I: The Basics**, Chapter 7: Optional Software and Hardware.

This section assumes you are at least familiar with the basic operation of the navigational tools used in the instrument, so be sure to review **Section I: The Basics**, Chapter 4: Basic Navigation before proceeding through this section.

To use some Installer Functions, you may have to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this section.

To use some Service Functions you will need to connect your instrument to your cable system.

Introduction

In **Hum** Mode the instrument displays the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency (<1KHz) interference present on the video carrier of a single selected channel. In **Hum** Mode the instrument displays the selected channel number and the amplitudes of hum and low frequency interference as individual percentages. **Hum** Mode requires a minimum signal level of -20 dBmV. The basic 860 DSP comes equipped with the **Hum** Mode as a standard feature. In order to use the **Hum** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **Hum** Mode including:

- Required Setup
- Adjusting Channels
- Setting Channel Plan
- Using the Goto Function
- Function Menu Options
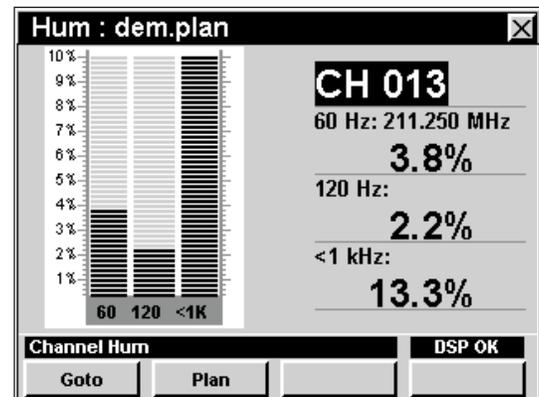
> **Note: Hum** Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Hum** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to _www.trilithic.com_ to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Hum** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Hum** Mode, you will need to setup the line frequency **Hum Type (50/60 Hz)**. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Level Mode Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **Hum Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the Plan softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

The instrument will tune to the channels defined as analog in your channel plan.

You must have a system channel plan that is up to date in order to view the channels in your system.

Using the Goto Function

The ⎡ Goto ⎤ softkey gives you rapid access to related measurement functions.

Goto Spectrum

From **Hum** Mode you can jump to **Spectrum** Mode with the spectrum analyzer settings automatically set to display the current channel.

To change to **Spectrum** Mode, press the ⎡ Goto ⎤ softkey, use the (▲) (▼) buttons to select **Spectrum**, and then press the (Ent) button. You may also select **Spectrum** by pressing (1).

Once in **Spectrum** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode. Pressing the (Bk) button will return you to **Hum** Mode at the originally selected channel.
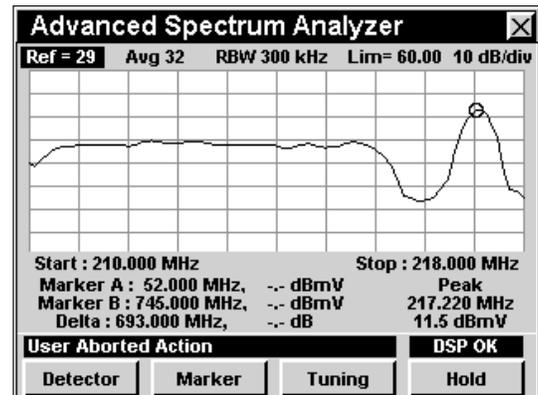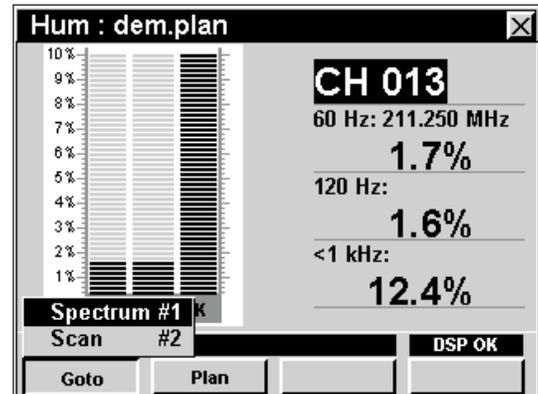
Hum : dem.plan

CH 013
60 Hz: 211.250 MHz
1.7%
120 Hz:
1.6%
<1 kHz:
12.4%

Spectrum #1
Scan   #2
DSP OK
Goto   Plan

Advanced Spectrum Analyzer
Ref = 29   Avg 32   RBW 300 kHz   Lim= 60.00 10 dB/div

Start : 210.000 MHz   Stop : 218.000 MHz
Marker A : 52.000 MHz,   -.- dBmV   Peak
Marker B : 745.000 MHz, -.- dBmV   217.220 MHz
Delta : 693.000 MHz,   -.- dB   11.5 dBmV
User Aborted Action   DSP OK
Detector   Marker   Tuning   Hold

Goto Scan

If you are tuned to a channel, you can also jump to **Scan** Mode with the marker automatically set to the currently selected channel.

To change to **Scan** Mode, press the [Goto] softkey, use the ▲ ▼ buttons to select **Scan** , and then press the (Ent) button. You may also select **Scan** by pressing ②.

While in **Scan** Mode you can move the marker to another channel of interest and then press (Bk) to return to **Hum** Mode tuned to the new channel.
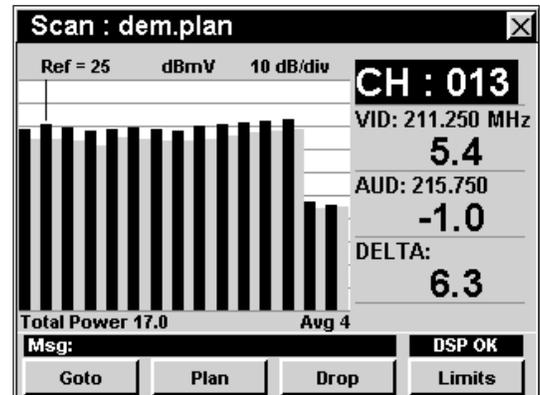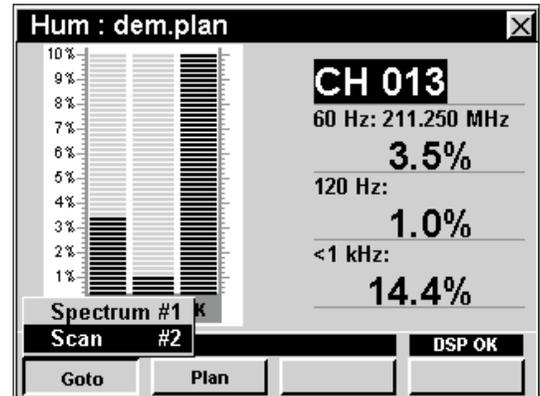
Function Menu Options

The Function Menu can be accessed by pressing the (Fn) button while in the **Hum** Mode.

The following Function Menu options can be accessed while in **Hum** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log
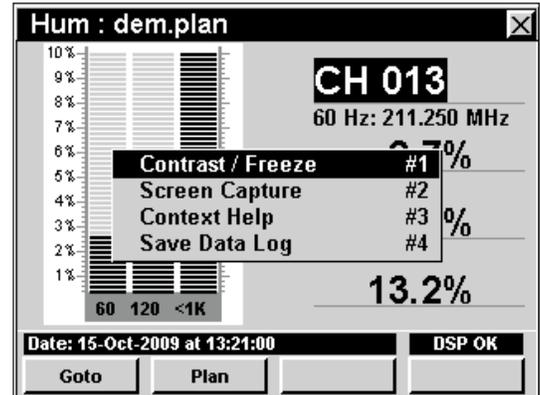
Introduction

In **C/N** Mode the instrument displays the ratio of the amplitudes of the visual carrier and the noise within a single, selected channel. In **C/N** Mode the instrument displays the selected channel number, frequency, and the amplitudes of the visual carrier, the bandwidth-corrected noise and the ratio of the two measurements. **C/N** Mode requires a minimum signal level greater than 5 dBmV. The basic 860 DSP comes equipped with the **C/N** Mode as a standard feature. In order to use the **C/N** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **C/N** Mode including:

- Required Setup

- Setting Reference Level

- Setting Vertical Resolution

- Adjusting Channels

- Setting Channel Plan

- Using the Goto Function

- Function Menu Options
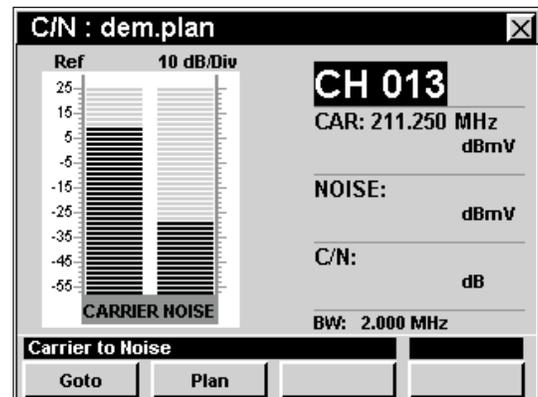
Note: C/N Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **C/N** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **C/N** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **C/N** Mode, you will need to set the **Analog Noise BW** used when computing the C/N for analog TV channels. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◄ ► buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

To quickly bring off scale signals on screen, press the **Fn** button, and then select **Auto Range** by pressing ④.

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

To quickly bring off scale signals on screen, press the **Fn** button, and then select **Auto Range** by pressing ④.

Adjusting Channels

To change the channel, use the ◀ ▶ buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the Ent button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **C/N Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the `Plan` softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the Ent button.

You must have a system channel plan that is up to date in order to view the channels in your system.

TRILITHIC

Using the Goto Function

The **Goto** softkey gives you rapid access to related measurement functions.

Goto Spectrum

From **C/N** Mode you can jump to **Spectrum** Mode with the spectrum analyzer settings automatically set to display the current channel.

To change to **Spectrum** Mode, press the **Goto** softkey, use the ▲ ▼ buttons to select **Spectrum**, and then press the **Ent** button. You may also select **Spectrum** by pressing ①.

Once in **Spectrum** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode. Pressing the **Bk** button will return you to **C/N** Mode at the originally selected channel.
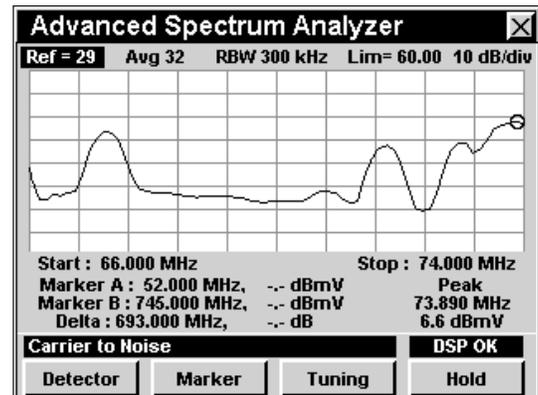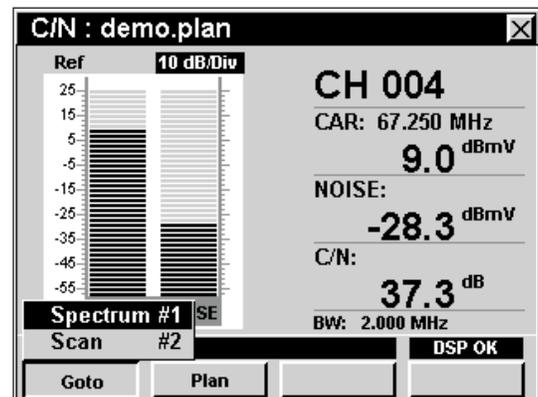
Goto Scan

If you are tuned to a channel, you can also jump to **Scan** Mode with the marker automatically set to the currently selected channel.

To change to **Scan** Mode, press the ⬜ Goto ⬜ softkey, use the ⬆ ⬇ buttons to select **Scan**, and then press the (Ent) button. You may also select **Scan** by pressing (2).

While in **Scan** Mode you can move the marker to another channel of interest and then press (Bk) to return to **C/N** Mode tuned to the new channel.
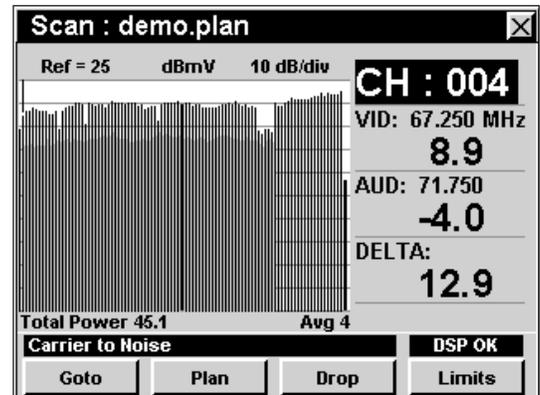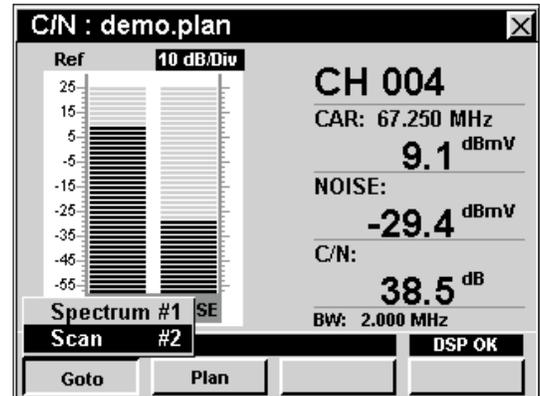
Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **C/N** Mode.

The following **Function** Menu options can be accessed
while in **C/N** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Auto Range

- Save Data Log

- Set Test Point Compensation

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals
on screen, by automatically adjusting the reference
level and vertical resolution.

To use this option, press the (Fn) button, use the
(▲)(▼) buttons to highlight **Auto Range**, and then
press the (Ent) button. You may also select **Auto
Range** by pressing (4).

TRILITHIC

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all measurements made in **C/N** Mode.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (6).

- The **Function** Menu will close and the **Forward Compensation** window will open.

  - To enter an offset value for the test point or probe, use the (◀) (▶) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

  - To enable test point compensation, use the (◀) (▶) buttons to highlight **TP Mode**, and then use the (▲) (▼) buttons to change between **Enabled** and **Disabled**.

  - To resume measurement, press the (Bk) button.

- The **Forward Compensation** window will close and the **C/N** Mode will display the combined (**Test Point** and **Probe**) test point compensation value next to the channel number.
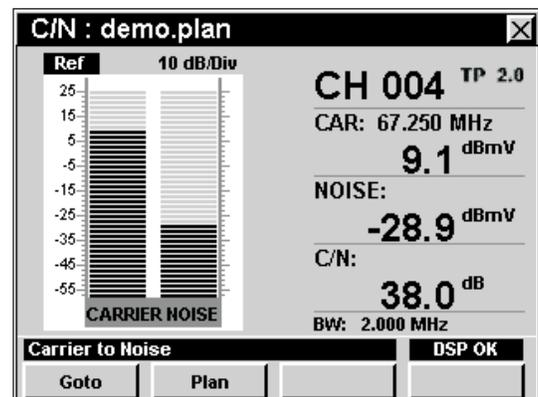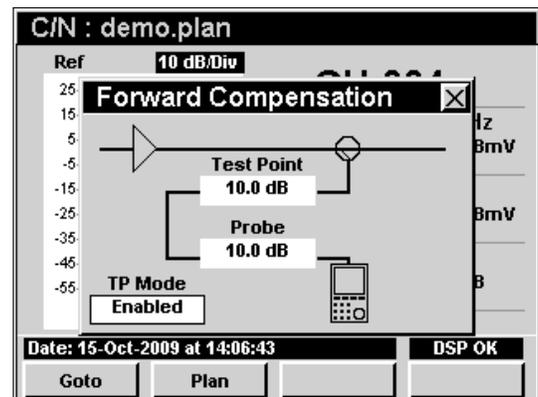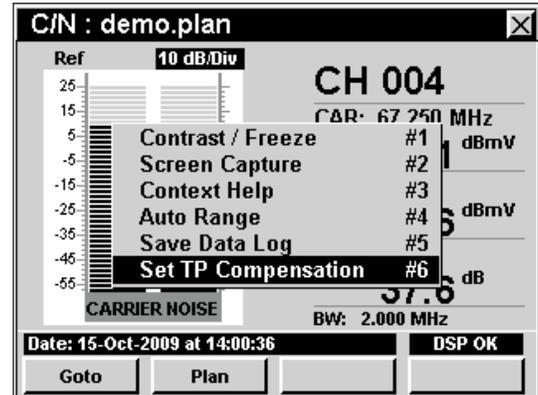
Introduction

In **Mod** Mode the instrument displays the percentage of video modulation for the visual carrier of a single, user-selected channel. In **Mod** Mode the instrument displays the selected channel number, frequency, and the video modulation depth as a percentage, both numerically and as a bar graph. This mode can also be toggled to a mode that allows the user to hear the demodulated aural content through the instrument's built-in speaker. The basic 860 DSP comes equipped with the **Mod** Mode as a standard feature. In order to use the **Mod** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **Mod** Mode including:

- Required Setup

- Adjusting Channels

- Setting Channel Plan

- Using the Audio Function

- Function Menu Options
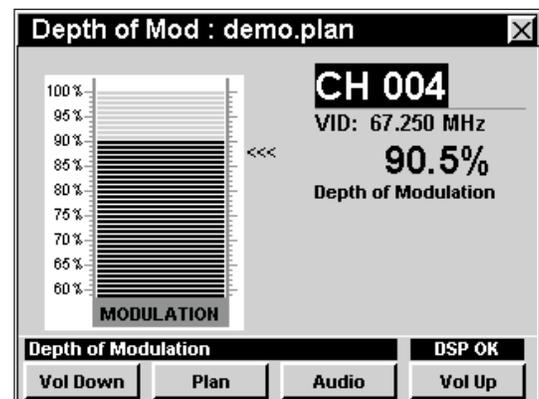
Note: Mod Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Mod** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Mod** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **Depth of Modulation Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

You must have a system channel plan that is up to date in order to view the channels in your system.
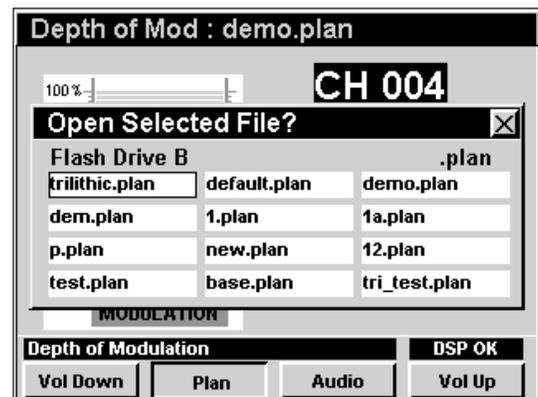
Using the Audio Function

The [Audio] softkey allows you hear the audio (AM or FM) on analog video channels. You can toggle the audio feature on and off by pressing the [Audio] softkey. When the audio feature is on, the **AUDIO ON** icon will be displayed in the lower right portion of the screen and the % depth of modulation measurement will be paused.

To adjust the volume use the [Vol Up] or [Vol Down] softkey. The current volume will be displayed in the status bar at the bottom of the screen.
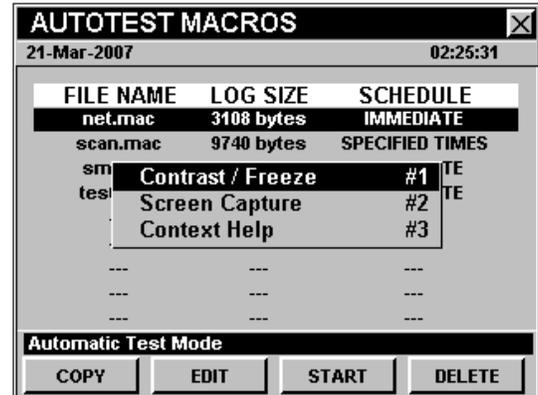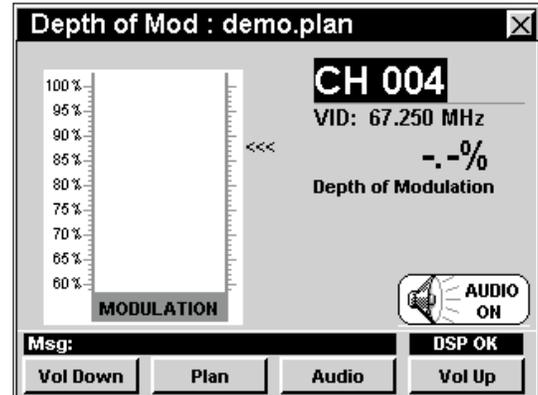
Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Mod** Mode.

The following **Function** Menu options can be accessed while in **Mod** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log
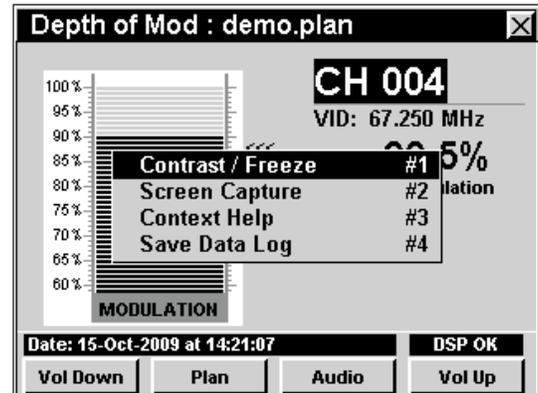
Introduction

In **CSO/CTB** Mode the instrument measures the amplitude of two common intermodulation products, composite second order and composite triple beat present within a selected analog video channel. This mode requires two measurements; the in-channel energy while the video carrier is present and the residual energy when the carrier is switched off. To ensure full measurement range, the CSO/CTB measurement should be performed with a carrier level greater than 0 dBmV. The basic 860 DSP comes equipped with the **CSO/CTB** Mode as a standard feature. In order to use the **CSO/CTB** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **CSO/CTB** Mode including:

- Required Setup

- Adjusting Channels

- Setting Channel Plan

- Measuring CSO/CTB

- Function Menu Options
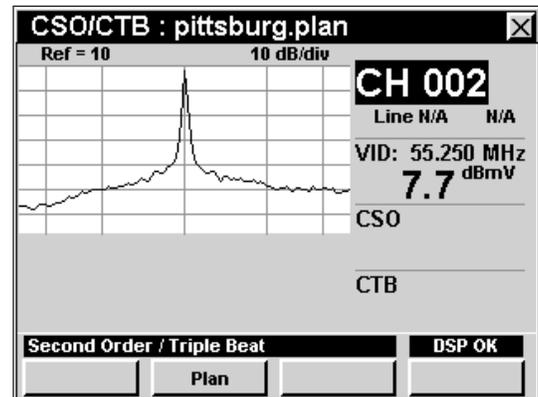
Note: CSO/CTB Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **CSO/CTB** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.
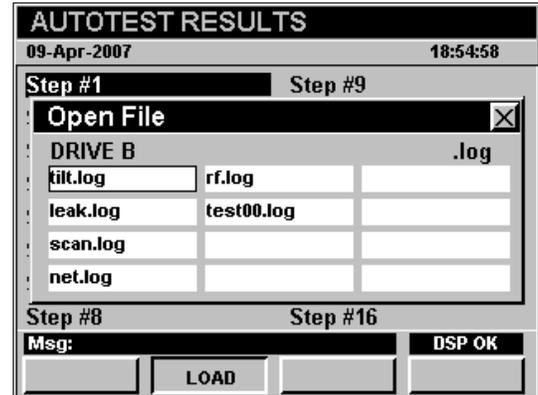
Required Setup

To use **CSO/CTB** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **CSO/CTB** Mode, you will need to set up the **CSO/CTB** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CSO/CTB Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

>
>
> **Note:** In order to properly measure CSO/CTB you will need signal levels of at least 0 dBmV. For best results you may need to add a channel filter in line with the instrument. When using a filter make certain the filter has sufficient bandwidth to include the carrier and CSO/CTB.

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **CSO/CTB Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.

![CSO/CTB icon]

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the ▭Plan▭ softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

The instrument will tune to the channels defined as analog in your channel plan.

You must have a system channel plan that is up to date in order to view the channels in your system.
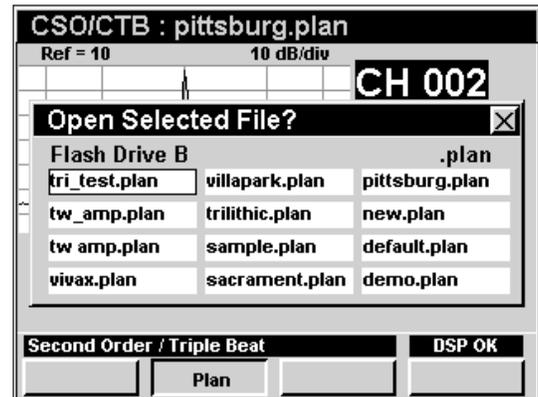
Measuring CSO/CTB

The instrument can perform CSO/CTB calculations using one of the following two methods:

- **Method #1** - This method involves taking a reference trace, removing the channel, and looking at the spectrum beneath the channel.

- **Method #2** - This method involves using a line blanker and looking at the spectrum beneath the channel during the blanked line.

> **Note:** In general, worst-case CSO products appear at the lowest and highest frequency channels while worst-case CTB products tend to appear at the mid-frequency channels.

Method #1

Once you have selected the desired channel, the instrument will display the peak video carrier level.

To measure CSO/CTB you must remove the selected channel for a short period of time in order to see what signal lies underneath the chosen frequencies. This should be done under strict conditions as to not affect the cable subscribers.

When the carrier has been removed, it will measure and display CSO and CTB. The CSO/CTB values for the five selected frequencies from setup are displayed below the channel.

A detailed list of CSO/CTB components is displayed in tabular form at the lower left of the screen. The instrument will hold the CSO/CTB readings after you turn the carrier back on.
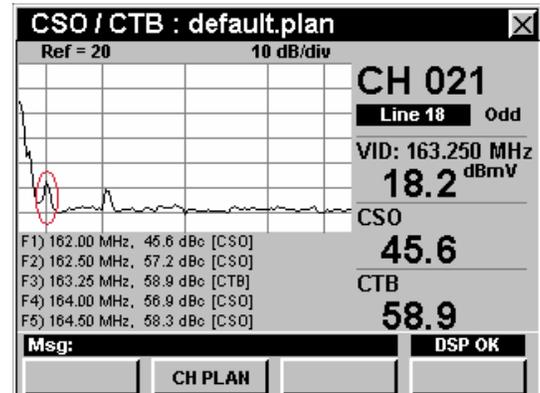
Note: If your meter is equipped with the Advanced CSO/CTB option, you must set the Line number to zero (**Line N/A** will be displayed) in order to use **Method #1**.

Note: For additional information about this measurement, refer to the **860 DSPi CSO/CTB** application note, available on Trilithic's website at *www.trilithic.com*, in the Broadband Instruments, Downloads, Application Notes section.

Method #2

Once you have selected the desired channel, the instrument will display the peak video carrier level.

To measure CSO/CTB this method requires the use of a line blanker. Once you have installed your line blanker and chosen a line number to blank perform the following steps;

- Use the ◄ ► buttons to highlight **Line**, and then use the ▲ ▼ buttons to choose your line number or use the alphanumeric keypad to enter the desired line number and then press the **Ent** button.

- Use the ◄ ► buttons to highlight **Even/Odd**, and then use the ▲ ▼ buttons to select either **Even** or **Odd**.

- The meter will automatically look at the selected channel during the blanked line for CSO and CTB carriers.
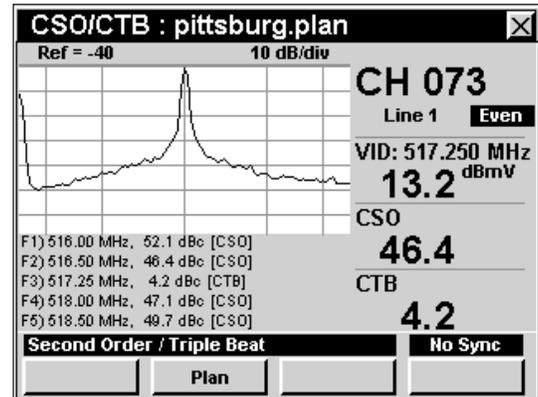
The CSO/CTB values for the five selected frequencies from setup are displayed below the channel.

A detailed list of CSO/CTB components is displayed in tabular form at the lower left of the screen. The instrument will hold the CSO/CTB readings after you turn the carrier back on.

Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **CSO/CTB** Mode.

The following **Function** Menu options can be accessed
while in **CSO/CTB** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Set Test Point Compensation
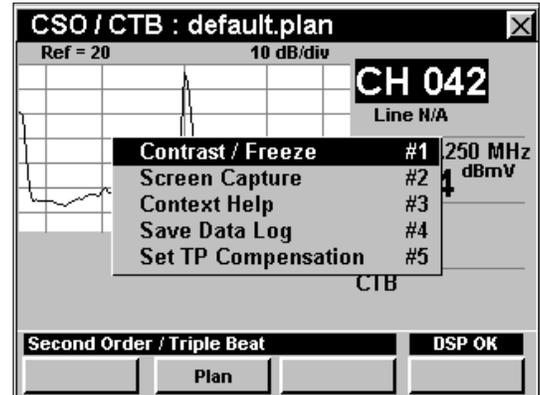
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all measurements made in **CSO/CTB** Mode.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (5).

- • The **Function** Menu will close and the **Forward Compensation** window will open.

  - • To enter an offset value for the test point or probe, use the (◄) (►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

  - • To enable test point compensation, use the (◄) (►) buttons to highlight **TP Mode**, and then use the (▲) (▼) buttons to change between **Enabled** and **Disabled**.

  - • To resume measurement, press the (Bk) button.

- • The **Forward Compensation** window will close and the **CSO/CTB** Mode will display the combined (**Test Point** and **Probe**) test point compensation value below the graph.
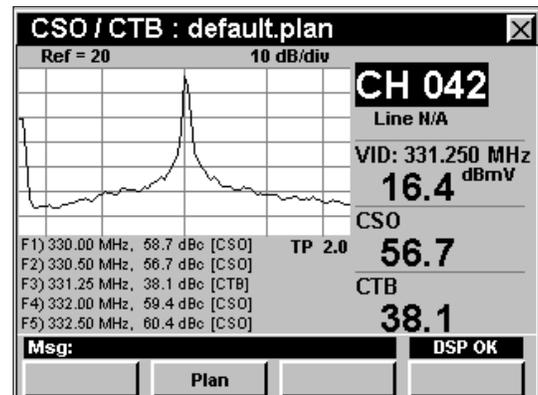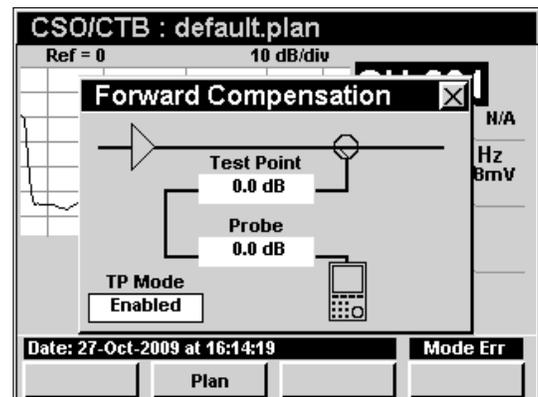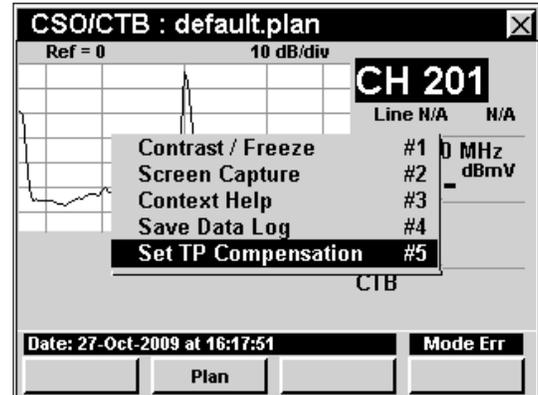
Introduction

In **Scan** Mode the instrument displays the amplitudes of all visual and aural carriers in the selected channel plan as two simultaneous line graphs or as a bar graph. The amplitudes of the visual and aural carriers, and their difference, are displayed for the channel currently selected by the variable marker. The basic 860 DSP comes equipped with the **Scan** Mode as a standard feature. In order to use the **Scan** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **Scan** Mode including:

- Required Setup

- Setting Reference Level

- Setting Vertical Resolution

- Adjusting Channels

- Setting Channel Plan

- Setting Scan Limit Set and Viewing Limits

- Using the Goto Function

- Changing Display Mode
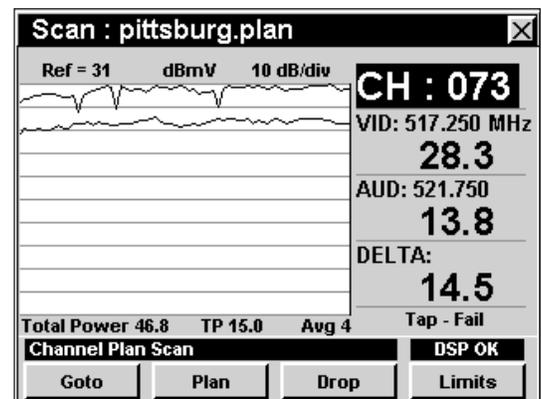
- Function Menu Options

> **Note: Scan** Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Scan** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Scan** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.
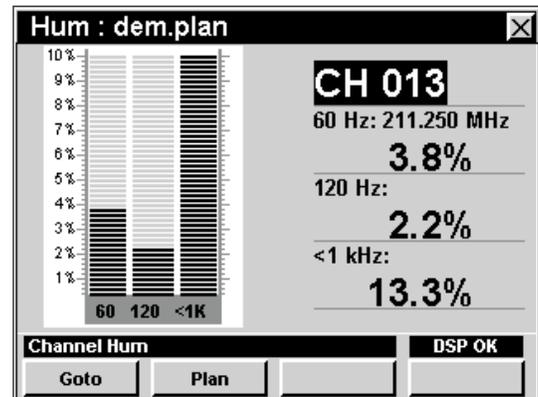
To use **Scan** Mode, you will need to set up the **Scan** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Scan Mode Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Setting Reference Level

On the graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◀ ▶ buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing (4).

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◀ ▶ buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

To quickly bring off scale signals on screen, press the (Fn) button, and then select **Auto Range** by pressing (4).

Scan

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

Scan : pittsburg.plan ⊠
Ref = 31   dBmV   10 dB/div   CH : 073
VID: 517.250 MHz
28.3
AUD: 521.750
13.8
DELTA:
14.5
Total Power 46.8   TP 15.0   Avg 4   Tap - Fail
Channel Plan Scan   DSP OK
Goto   Plan   Drop   Limits

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

You must have a system channel plan that is up to date in order to view the channels in your system.

Scan : pittsburg.plan
Ref = 31   dBmV   10 dB/div   CH : 073
Open Selected File? ⊠
Flash Drive B   .plan
tri_test.plan   villapark.plan   pittsburg.plan
tw_amp.plan   trilithic.plan   new.plan
tw amp.plan   sample.plan   default.plan
vivax.plan   sacrament.plan   demo.plan
Total Power 46.8   TP 15.0   Avg 4   Tap - Fail
Channel Plan Scan   DSP OK
Goto   Plan   Drop   Limits

TRILITHIC

Setting Scan Limit Set and Viewing Limits

The instrument can analyze a channel scan according to one of four scan limit sets named **Tap**, **Block**, **Set**, and **User**. By selecting the appropriate scan limit set, the instrument will instantly inform you of out of tolerance readings.

To select the scan limit set, press the `Drop` softkey, use the ▲ ▼ buttons to select the scan limit set from the list of scan limit set options, and then press the (Ent) button. You may also select the desired scan limit set option by pressing the corresponding alphanumeric button.

To view the details of a current scan limit set, press the `Limits` softkey. To view details of a specific limit, use the ▲ ▼ buttons to highlight the desired limit, and then press the (Ent) button. The **Scan Information** window will appear. Pressing the (Ent) or (Bk) button will return you to **Scan** Mode. An asterisk (*) next to the limit indicates that the limit has failed.

To see a list of channels not meeting limits, press the `Limits` softkey, use the ▲ ▼ buttons to highlight **Scan Information**, and press the (Ent) button. To page through the scan results, press the (Ent) button. The **Scan Information** window will appear. Pressing the (Ent) or (Bk) button will return you to **Scan** Mode.
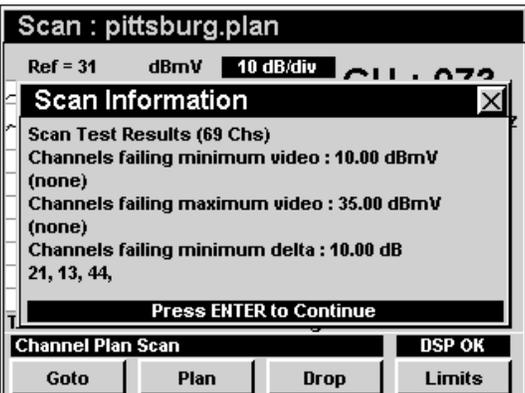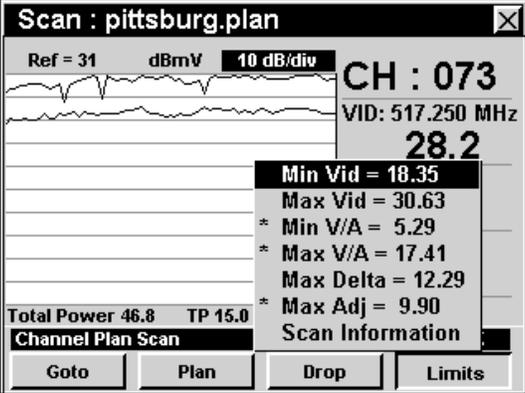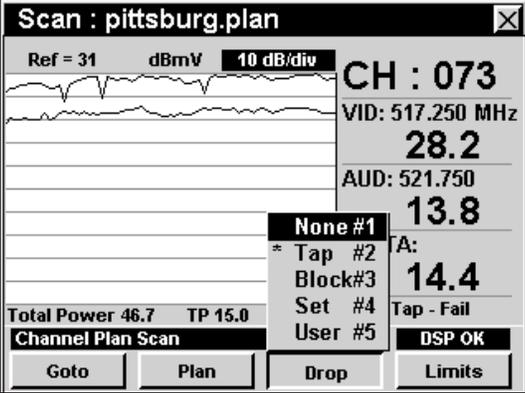
Note: To set the test limits of a scan limit set, see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Scan Mode Settings*.

Using the Goto Function

The [Goto] softkey gives you rapid access to related measurement functions.

Goto Level

From **Scan** Mode you can jump to **Level** Mode with the channel automatically set to display the current channel.

To change to **Level** Mode, press the [Goto] softkey, use the (▲) (▼) buttons to select **Level**, and then press the (Ent) button. You may also select **Level** by pressing (1).

Pressing the (Bk) button will return you to **Scan** Mode at the originally selected channel.
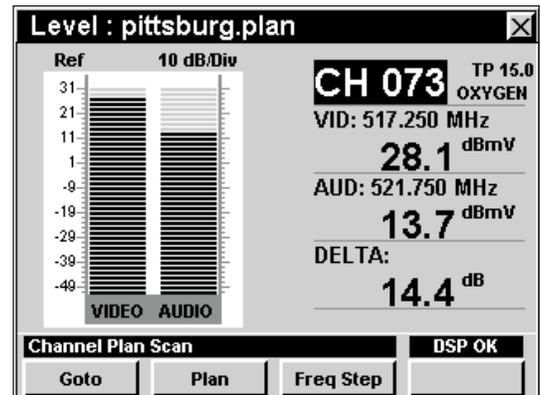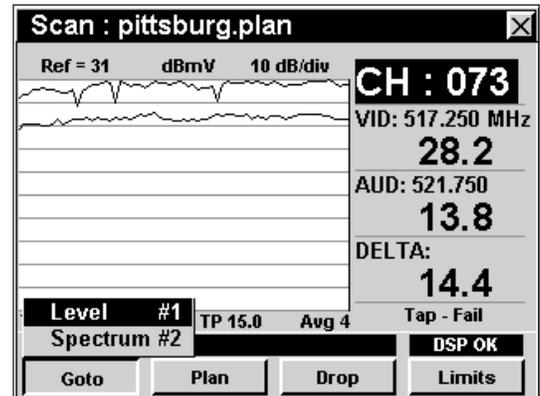
Goto Spectrum

From **Scan** Mode you can jump to **Spectrum** Mode with the spectrum analyzer settings automatically set to display the current channel or frequency.

To change to **Spectrum** Mode, press the `Goto` softkey, use the ▲ ▼ buttons to select **Spectrum**, and then press the Ent button. You may also select **Spectrum** by pressing ②.

Once in **Spectrum** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the Bk button will return you to **Scan** Mode at the originally selected channel.

Scan
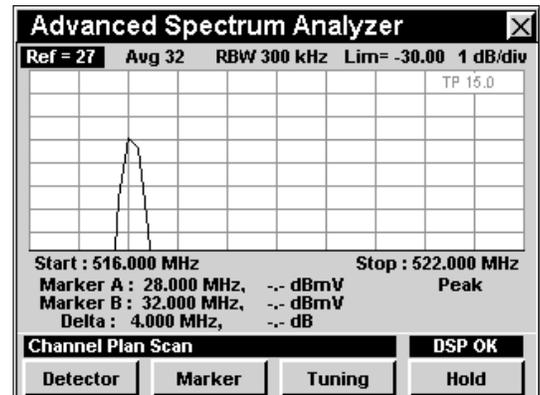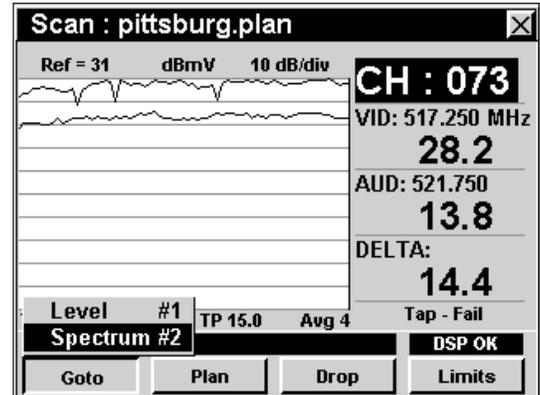
Changing Display Mode

You can toggle the display between a line graph and a bar graph.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Change Display Mode**, and then press the (Ent) button. You may also select **Change Display Mode** by pressing (6).

In the bar graph display the instrument lists the levels for all **Scan** channels.
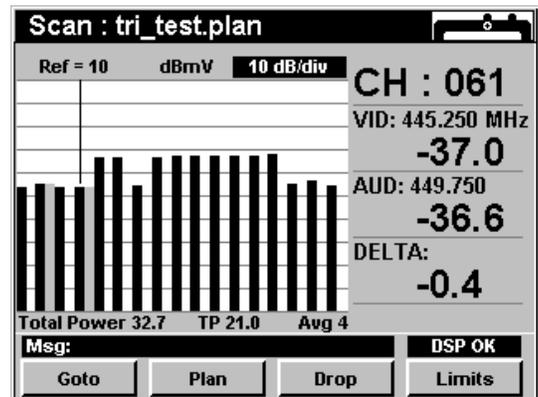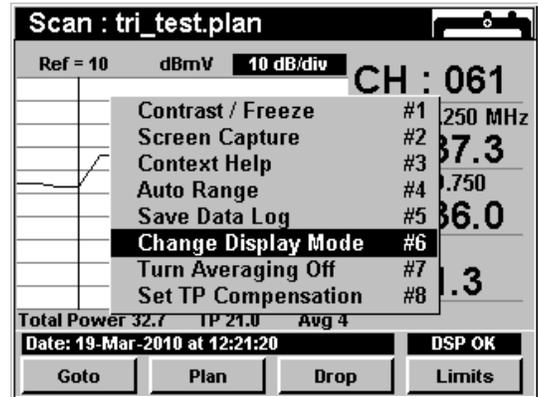
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Scan** Mode.

The following **Function** Menu options can be accessed while in **Scan** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Auto Range

- Save Data Log

- Change Display Mode

- Turn Averaging On/Off

- Set Test Point Compensation
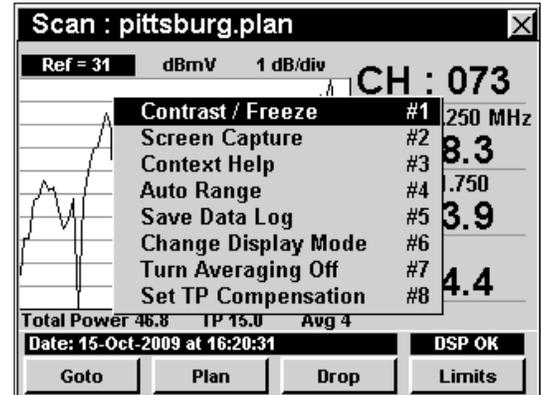
> **Note:** For more information on **Change Display Mode**, see *Changing Display Mode* in this chapter.

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Auto Range Option

This option is used to quickly bring off scale signals on screen, by automatically adjusting the reference level and vertical resolution.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Auto Range**, and then press the (Ent) button. You may also select **Auto Range** by pressing (4).

Turn Averaging On/Off

This option is used to enable and disable the sweep averaging function. When active, this function averages the values of several consecutive sweeps to reduce display jitter.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Turn Averaging On/Off**, and then press the (Ent) button. You may also select **Turn Averaging On/Off** by pressing (7).

To adjust the number of scans in an average, see **Section IV: Setup Functions**, Chapter 2: INSTRUMENT SETUP Mode, *Forward Sweep Settings*.
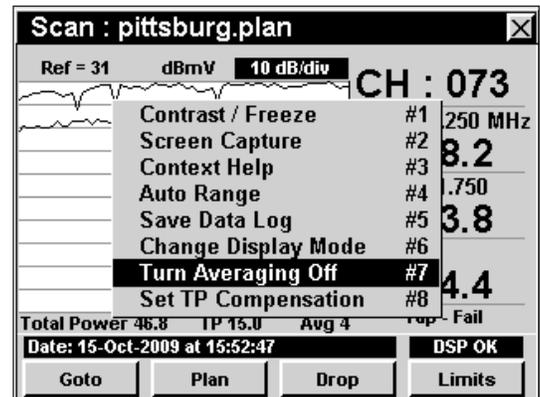
TRILITHIC

Scan

Set Test Point Compensation Option

This option is used to enter an offset that will be added to all measurements made in **Scan** Mode.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (8).

- The **Function** Menu will close and the **Forward Compensation** window will open.

    - To enter an offset value for the test point or probe, use the (◄) (►) buttons to highlight **Test Point** or **Probe**, enter the value using the alphanumeric keypad, and then press the (Ent) button.

    - To enable test point compensation, use the (◄) (►) buttons to highlight **TP Mode**, and then use the (▲) (▼) buttons to change between **Enabled** and **Disabled**.

    - To resume measurement, press the (Bk) button.

- The **Forward Compensation** window will close and the **Scan** Mode will display the combined (**Test Point** and **Probe**) test point compensation value below the graph.
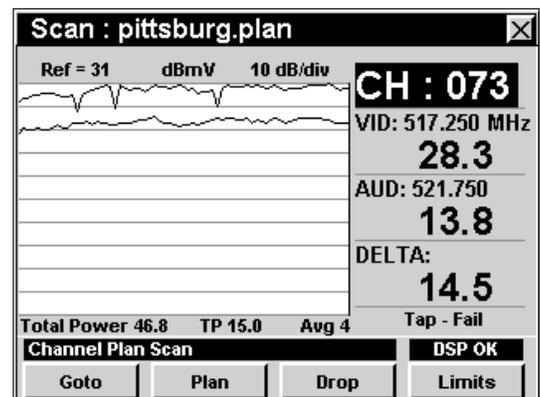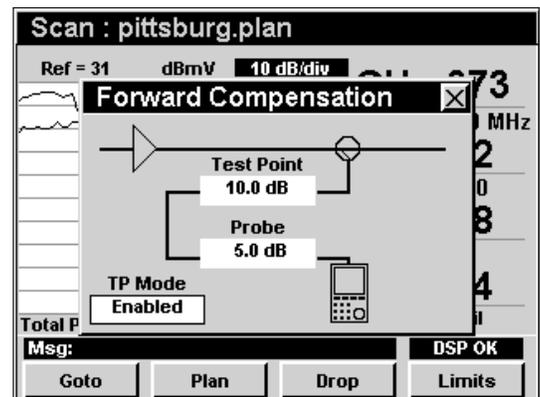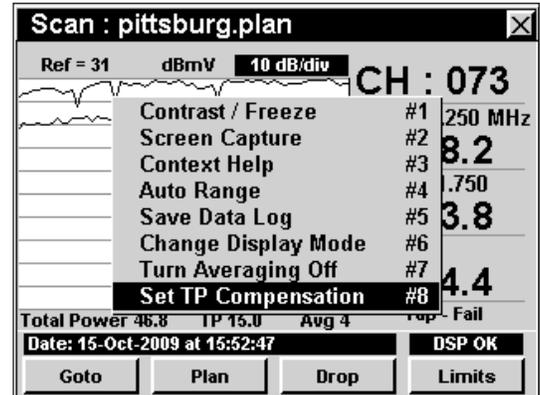
Introduction

In **FM Dev** Mode the instrument displays the current and maximum FM deviation on the audio carrier of a single user-selected channel. In **FM Dev** Mode the instrument displays the selected channel number, the current FM deviation, and the maximum detected FM deviation, both numerically and as a bar graph. The basic 860 DSP comes equipped with the **FM Dev** Mode as a standard feature. In order to use the **FM Dev** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **FM Dev** Mode including:

- Required Setup

- Adjusting Channels

- Setting Channel Plan

- Using the Audio Function

- Function Menu Options
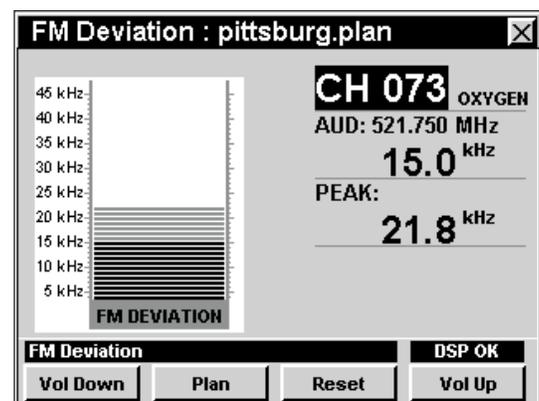
> **Note: FM Dev** Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **FM Dev** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **FM Dev** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **FM Deviation Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.
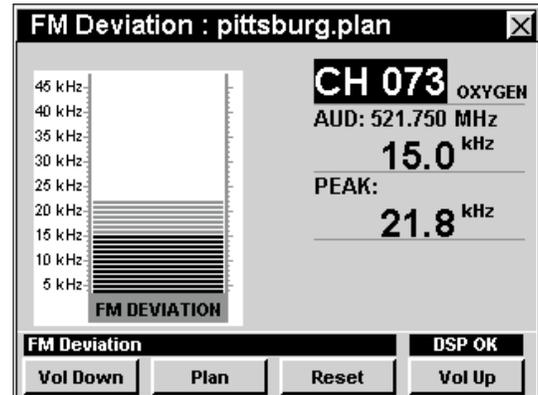
Note: Press the [Reset] softkey to reset the displayed **peak/max hold**.

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

You must have a system channel plan that is up to date in order to view the channels in your system.
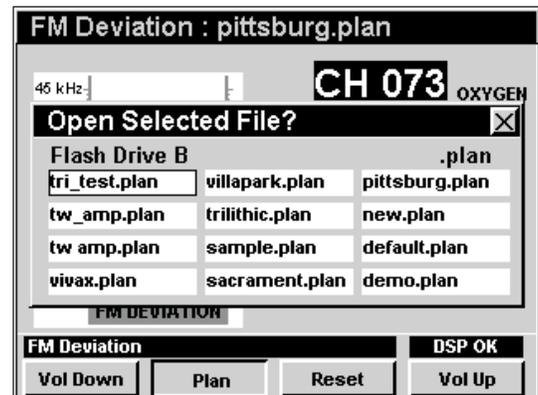
Setting Volume Level

To adjust the volume use the [Vol Up] or [Vol Down] softkey. The current volume will be displayed in the status bar at the bottom of the screen.

Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **FM Dev** Mode.

The following **Function** Menu options can be accessed while in **FM Dev** Mode, and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- • Contrast / Freeze
- • Screen Capture
- • Context Help
- • Save Data Log
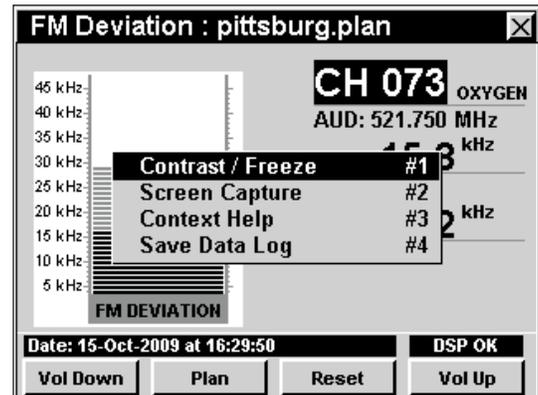
Introduction

The **Sweep** Mode is used to test and set the tilt and gain of distribution amplifiers and detect faults in the system that affect these parameters.

The instrument uses the carriers already being carried by the HFC distribution system or a dedicated sweep transmitter in the head end. The instrument compensates for differences in the amplitudes of the carriers by comparing two sweeps, a reference and a test. You perform the reference sweep at some starting point in the coaxial plant, usually the node for the service area to be swept, and save the scan in the instrument.

The sweep process is based on the unity gain principle that applies to the coaxial design of the HFC network. This means that each amplifier output test point will ideally have the same output level characteristics. The sweep uses comparison to a stored reference (typically the node or first active component of the network). If the successive amplifiers are operating according to the designed unity gain principle, the response will be very close to that of the stored reference. When ther is damage, loose connections, or adjustment is required, the display response will deviate from the ideal "flat" response.

The 860 DSP and 860 DSPi come equipped with two different versions of the **Sweep** Mode as follows:

- **Carrier-Referenced Sweep** Mode - The basic 860 DSP comes equipped with this mode as the standard **Sweep** Mode. This mode is use to test and set the tilt and gain of distribution amplifiers and detect faults in the system that affect these parameters. The 860 DSPi can be upgraded to this mode by purchasing the Power Pack Option (PP-1).

- **Forward SpeedSweep** Mode - The 860 DSP and 860 DSPi can be upgraded to this mode by purchasing the Forward SpeedSweep Option (FS-1). This mode includes all of the **Carrier-Referenced Sweep** Mode features plus it provides compatibility with the 8300 FST, however the **Forward SpeedSweep** Mode does not require the 8300 FST. This will allow the **Forward SpeedSweep** Mode to test the tilt and gain including unused frequency bands that are not in the users channel lineup.

> **Note:** To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Sweepless Sweep** Mode or **Forward SpeedSweep** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order these options and start using them today.

![Sweep icon]

This section will provide you with the basic understanding of how to use **Sweep** Mode including:

Sweep : tri_test.plan screen display

- Required Setup

- Setting Reference Level

- Setting Averaging Type

- Setting Vertical Resolution

- Setting Channel Plan

- Setting Test Point Profile

- Setting TAP Offset Value

- Marker Settings

- Capturing a Reference Scan

- Sweeping an Amplifier

- Changing Display Mode

- Function Menu Options
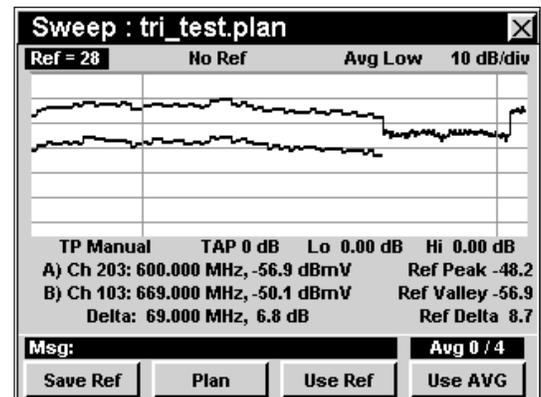
Required Setup

To use **Sweep** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Sweep** Mode, you will need to set up the **Sweep** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Fwd Sweep Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◄ ► buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

Sweep : tri_test.plan

Ref = 28   No Ref   Avg Low   10 dB/div

TP Manual   TAP 0 dB   Lo 0.00 dB   Hi 0.00 dB
A) Ch 203: 600.000 MHz, -57.4 dBmV   Ref Peak -48.2
B) Ch 103: 669.000 MHz, -49.8 dBmV   Ref Valley -57.4
      Delta: 69.000 MHz, 7.6 dB   Ref Delta 9.2

Msg: Avg 0 / 4
Save Ref   Plan   Use Ref   Use AVG

Setting Averaging Type

To set the averaging type, use the ◄ ► buttons to highlight **Avg** and then use the ▲ ▼ buttons to set the averaging type to Avg Off, Avg Low, Avg Med, and Avg High as desired.

Sweep : tri_test.plan

Ref = 28   No Ref   Avg Low   10 dB/div

TP Manual   TAP 0 dB   Lo 0.00 dB   Hi 0.00 dB
A) Ch 203: 600.000 MHz, -58.8 dBmV   Ref Peak -48.4
B) Ch 103: 669.000 MHz, -49.8 dBmV   Ref Valley -58.8
      Delta: 69.000 MHz, 9.0 dB   Ref Delta 10.4

Msg: Avg 0 / 4
Save Ref   Plan   Use Ref   Use AVG
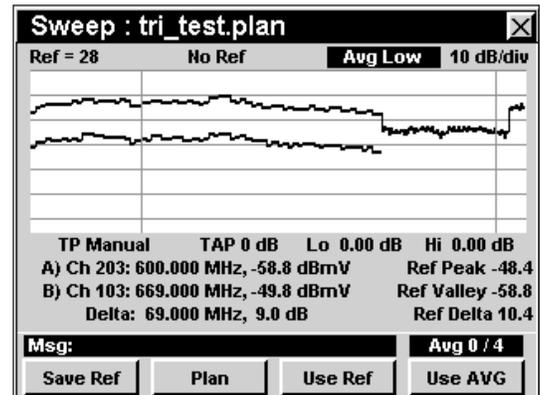
Note: Higher averaging is recommended when setting a reference to ensure optimal performance when sweeping.

Sweep

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the Plan softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the Ent button.

You must have a system channel plan that is up to date in order to view the channels in your system.

TRILITHIC
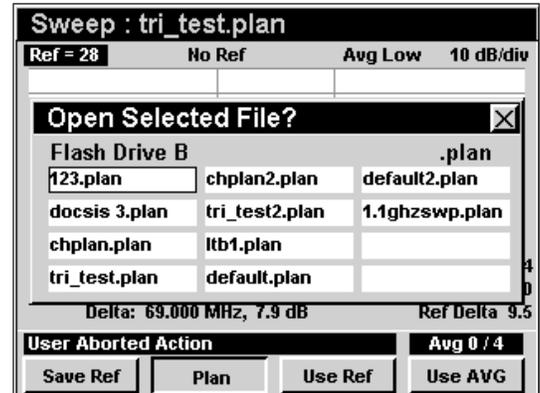
Setting Test Point Profile

The **TP** sets the name of the test point profile which is used for comparison of sweep signals. To change the test point profile, use the ◄ ► buttons to highlight **TP** and then use the ▲ ▼ buttons to set the test point profile to **Manual** or **Test Point 1** through **Test Point 9** as desired.

To use a Test Point Profile, the profile parameters will have to be entered as described in **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *FWD Sweep Settings*.
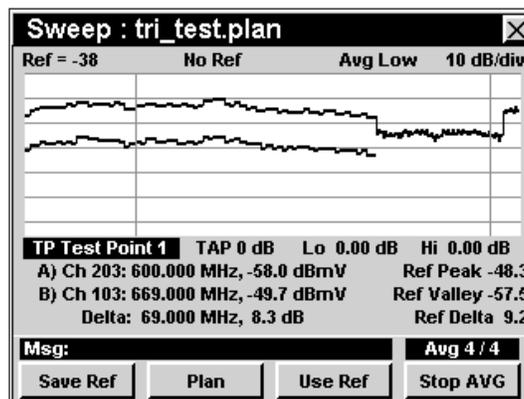
Setting TAP Offset Value

The **TAP** sets the offset value of the TAP. To change the offset, use the ◄ ► buttons to highlight **TAP** and then use the ▲ ▼ buttons to set the TAP value to the desired value.
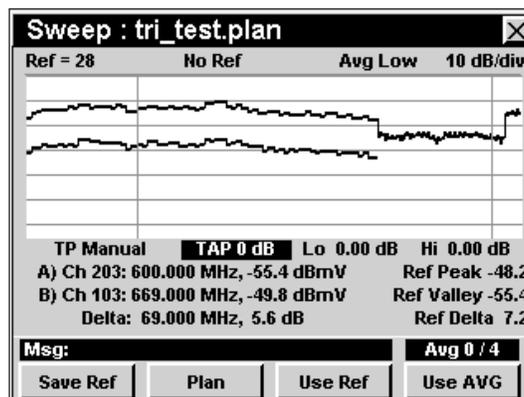
Setting Low Gain

The **Lo** sets the lower gain limit. To change the low gain, use the ◄ ► buttons to highlight **Lo** and then use the ▲ ▼ buttons to set the low gain to the desired value.

TRILITHIC
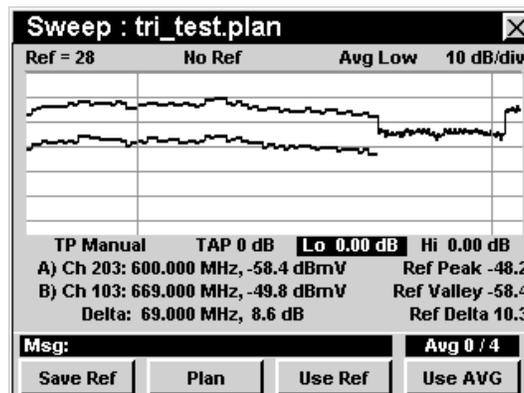
Setting High Gain

The **Hi** sets the upper gain limit. To change the high gain, use the ◀ ▶ buttons to highlight **Hi** and then use the ▲ ▼ buttons to set the high gain to the desired value.

```
Sweep : tri_test.plan                              ✕
Ref = 28          No Ref          Avg Low    10 dB/div




    TP Manual      TAP 0 dB    Lo 0.00 dB   Hi 0.00 dB
A) Ch 203: 600.000 MHz, -57.1 dBmV          Ref Peak -48.5
B) Ch 103: 669.000 MHz, -49.9 dBmV          Ref Valley -57.1
    Delta: 69.000 MHz, 7.3 dB               Ref Delta  8.7
Msg:                                          Avg 0 / 4
  Save Ref       Plan        Use Ref       Use AVG
```

Marker Settings

The instrument displays two frequency-settable markers as dark vertical lines on the scale. These markers can be used to make amplitude measurements of carriers at user-selected frequencies, or to determine the difference (**Delta**) in amplitude between two selected carriers.

To set a marker to a frequency, use the ◀ ▶ buttons to highlight **Marker A** or **Marker B**, then increment the marker to higher or lower frequencies using the ▲ ▼ buttons. You can also enter a frequency directly using the alphanumeric keypad and pressing the (Ent) button.

```
Sweep : tri_test.plan                              ✕
Ref = 28          No Ref          Avg Low    10 dB/div




    TP Manual      TAP 0 dB    Lo 0.00 dB   Hi 0.00 dB
A) Ch 203: 600.000 MHz, -57.1 dBmV          Ref Peak -48.2
B) Ch 103: 669.000 MHz, -50.7 dBmV          Ref Valley -57.1
    Delta: 69.000 MHz, 6.4 dB               Ref Delta  8.8
Msg:                                          Avg 0 / 4
  Save Ref       Plan        Use Ref       Use AVG
```

Sweep

Capturing a Reference Scan

The reference scan will be used to remove measurement errors caused by variations in carrier amplitudes. In most cases, the reference scan will be taken at the node for the service area you will be sweeping. For convenience, the instrument can store up to 12 independent sweep references.

To capture a reference scan, connect the instrument to the node output test point, use the ◀ ▶ buttons to highlight **TP** and then use the ▲ ▼ buttons to set the test point profile.

You should now see a scan of the carriers present at the test point, with a shaded line across the screen representing the desired carrier amplitudes.

> **Note:** If you do not see this display, adjust the reference level to bring the scan on-screen.

Use the markers to adjust the amplifier gain and tilt pads to bring the node to nominal performance.

To save the displayed scan as a reference scan, press the `Save Ref` softkey and use the alphanumeric keypad to enter the desired reference name, and press the (Ent) button. The current scan has now been saved with the selected reference scan name for use as a reference when sweeping amplifiers.

![Sweep icon]
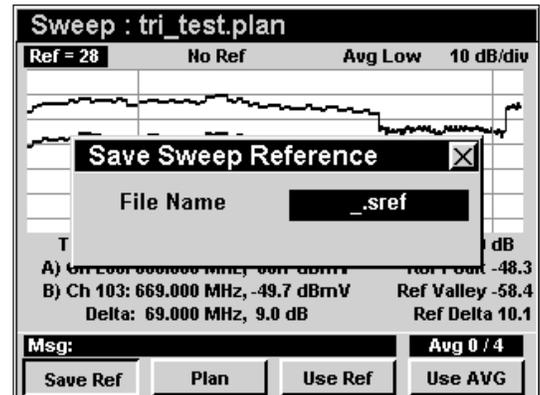
Sweeping an Amplifier

The process for sweeping an amplifier is very similar to that used to create a reference scan.

To sweep an amplifier, connect the instrument to the node output test point, use the ◄ ► buttons to highlight **TP Manual** and then use the ▲ ▼ buttons to set the **TP Test Point (1 thru 9)** profile for this type of amplifier installation.
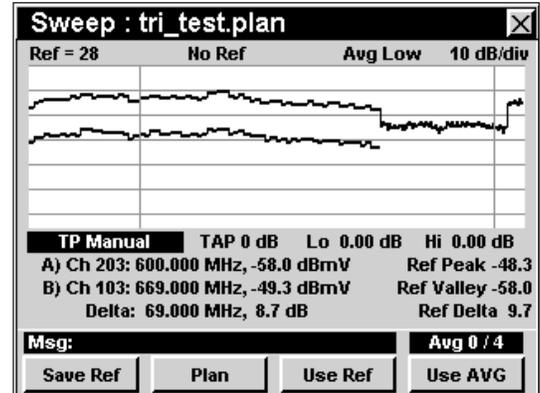
Note: If you do not see this display, adjust the reference level to bring the scan on-screen.

Press the ⌐Use Ref⌐ softkey, use the ▲ ▼ buttons to highlight the reference file for the node that serves this area, and press the (Ent) button.

The instrument now displays a line graph representing the gain and tilt performance of the amplifier. When the amplifier is properly aligned, the trace will coincide with the center (fourth from the bottom) horizontal line of the graph's grid.

While using a reference, the **Ref** and **TAP** settings are automatically adjusted to position the trace at the appropriate point in the graph, and are not manually adjustable.

To stop using the reference function, press the ⌐Use Ref⌐ softkey, use the ▲ ▼ buttons to highlight **No Ref**, and press the (Ent) button.

![Sweep icon]

Changing Display Mode

You can toggle the display between a line graph and a bar graph.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change Display Mode**, and then press the (Ent) button. You may also select **Change Display Mode** by pressing (7).

When Taking Reference

When taking a reference sweep, the instrument highlights the difference between the active video and audio signals.
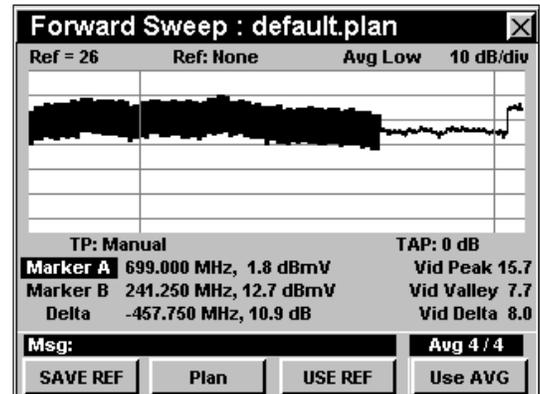
When Using Reference

When using a reference sweep, the instrument displays the sweep response with the area below the trace "filled-in."
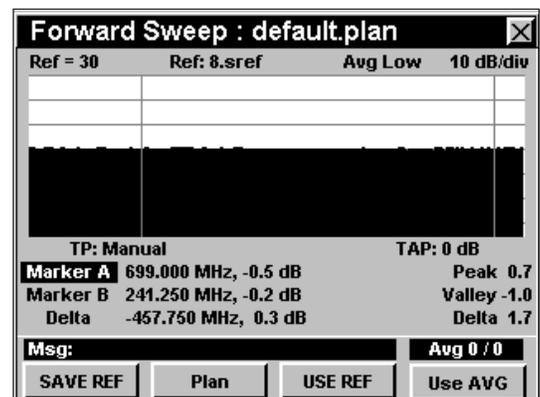
Sweep

Function Menu Options

The **Function** Menu can be accessed by pressing the Fn button while in the **Sweep** Mode.

The following **Function** Menu options can be accessed while in **Sweep** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Auto Range

- Save Data Log

- Distance to Fault

- Change Display Mode

- 8300 FST Channel On/Off

> **Note:** For more information on **Change Display Mode**, see _Changing Display Mode_ in this chapter.

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

![Sweep icon]

Auto Range Option

This option is used to quickly bring off scale signals on screen, by automatically adjusting the reference level and vertical resolution.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Auto Range**, and then press the (Ent) button. You may also select **Auto Range** by pressing (4).
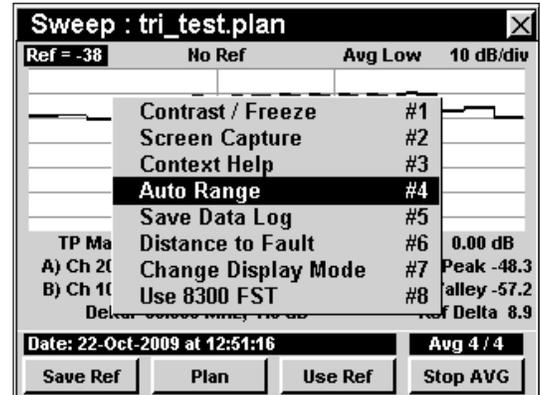
Distance to Fault Option

This option is used to calculate the distance to a fault.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Distance to Fault**, and then press the (Ent) button. You may also select **Distance to Fault** by pressing (6). The distance to fault value will be displayed in the status bar.

To accurately use the Distance to Fault Option, you will need to setup the cable velocity factor in **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Forward Sweep Settings*.

TRILITHIC
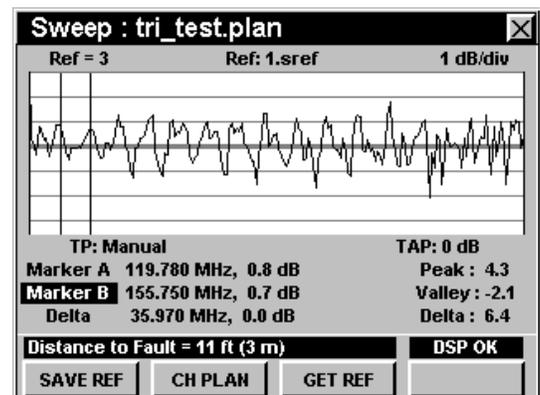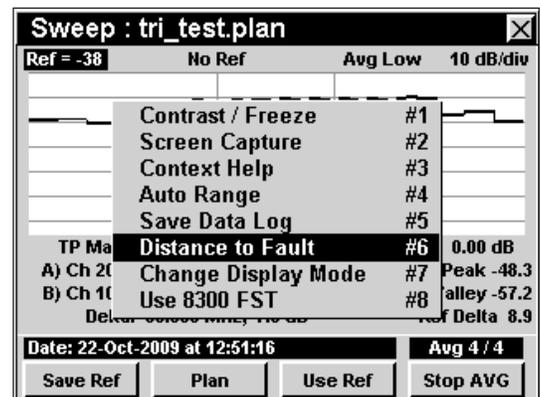
Use 8300 FST

This option is used to enable and disable the use of 8300 FST channels.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Use 8300 FST**, and then press the (Ent) button. You may also select **Use 8300 FST** by pressing (8).
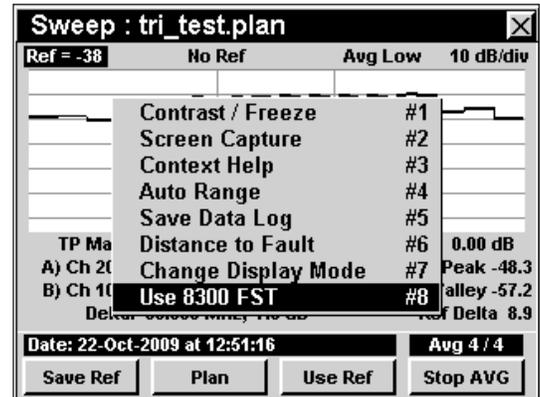
Introduction

SSR Mode equips the instrument with the return maintenance functions of a Trilithic Guardian SSR reverse field unit including:

- Reverse path sweep graphing the response of 8 individually-settable reverse test carriers, as measured in the hub and transmitted to the 860 DSP or 860 DSPi.

- Reverse gain and tilt, calculated from the reverse test carriers used in the sweep display.

- Reverse spectrum view, showing a spectrum plot of the reverse band as scanned in the hub and transmitted to the 860 DSP or 860 DSPi.

SSR Mode also equips your instrument with some additional features not available in the Trilithic Guardian SSR field unit including:

- Simultaneous display of both the sweep trace and the reverse spectrum, as scanned in the hub.

- Variable markers that simplify the direct measurement of ingress and traffic amplitudes.

- A compare function that simultaneously displays the reverse spectrum as measured at the hub by the SST and the reverse spectrum measured locally by the 860 DSP or 860 DSPi. This function is especially useful for determining if the disrupting ingress detected by the SST is coming from the leg of the system to which the 860 DSP or 860 DSPi is currently connected.

In order to use the **SSR** Mode on your 860 DSP, the instrument must be equipped with Return Sweep Receiver Option (SR-1). In order to use the **SSR** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1) and Return Sweep Receiver Option (SR-1).

> **Note: SSR** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **SSR** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

This section will provide you with the basic understanding of how to use **SSR** Mode including:

- Required Setup
- Using the SSR Mode
- Adjusting Node
- Adjusting Tx Level
- Using Variable Markers
- Using the Compare Function
- Saving a Reference Scan
- Using a Reference Scan
- Using the Goto Function
- Viewing the Tx Frequencies
- Adjusting Rx Link Level
- Function Menu Options
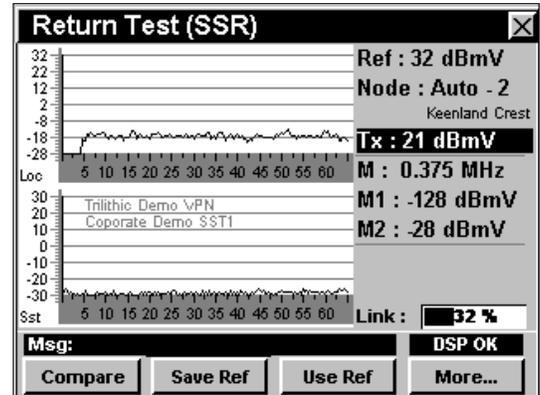
Required Setup

To use **SSR** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **SSR** Mode, you will need to set up the **SSR** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *SSR Mode Settings* before proceeding through this chapter.

To use **SSR** Mode with Auto Link with a 9581 SST R4 in **Normal** Mode, you will need to set up the return link parameters. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Ret Link Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

> **Note:** To use **SSR** Mode, the 860 DSP or 860 DSPi must be in communication with a Trilithic Guardian 9580 SST (0.3 Mhz – 42 MHz) or 9581 SST (0.3 – 65 MHz) reverse analyzer located in the hub. SSTs are digitizers which analyze test signals from the 860 DSP or 860 DSPi and scan the reverse spectrum, measuring traffic and ingress. Data collected by the SST is transmitted on a downstream data carrier to instruments in the field for use in reverse path quality calculations.

Using the SSR Mode

The **SSR** Mode transmits a set of up to eight reverse test carriers to the SST in the hub for analysis. The frequencies for the carriers are set at the hub, but if you know that one of these carriers will interfere with return services in a particular part of your system you may selectively turn that carrier off.

Reverse sweeping is used to adjust the gain and tilt of reverse distribution amplifiers. When adjusted, test signals injected into any amplifier's reverse test point at a particular level will arrive in the hub at a desired level. To perform the adjustments you must know the injection level specified for the reverse amplifier modules and the insertion loss of the test point you will be connecting to.

Note: For more information on SST/SSR setup and sweeping see the 9580 SST or 9581 SST operation manual.

Note: The Guardian SST in the hub that will be receiving and evaluating the upstream test signals must also be set to the appropriate reference level before you begin your RSVP tests. If the SST is set to the wrong reference level inaccurate test results may occur.

Adjusting Node

If the **Node** setting is **Auto**, the 860 DSP or 860 DSPi will display the return spectrum, as scanned by the SST, for the node the 860 DSP or 860 DSPi is currently connected to.

If you move to another node's service area, the 860 DSP or 860 DSPi will automatically begin showing you the spectrum for the new node.

You can also manually select a different **Node :** for display, as long as the node is served by the same SST as the **Node** you are connected to.
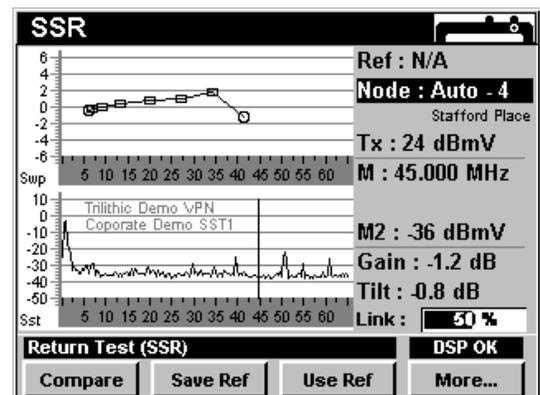
To change the node, use the ◀ ▶ buttons to highlight **Node** and use the ▲ ▼ buttons to increment the value up and down.

  TRILITHIC

Adjusting Tx Level

The output transmit level (**Tx**) of the 860 DSP or 860 DSPi needs to be set to the sum of the specified input level of the return module, plus the test point coupler insertion loss, plus the losses of any other devices that may be connected between the test point and the 860 DSP or 860 DSPi.

Once you have calculated this value, you can adjust the output transmit level while in **SSR** Mode**.**

To change the output transmit level, use the ◄ ► buttons to highlight **Tx :** and use the ▲ ▼ buttons to increment the value up and down.
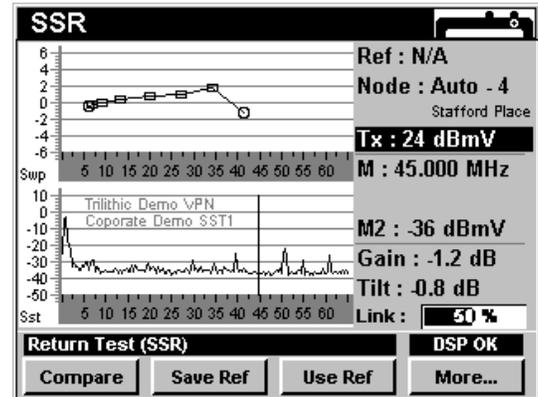
Using Variable Markers

The spectrum functions of the 860 DSP or 860 DSPi are equipped with variable markers, one for the graph transmitted by the SST, one for the spectrum scanned locally by the 860 DSP or 860 DSPi.

To set the frequency of the marker, use the ◄ ► buttons to highlight **M**, and then use the ▲ ▼ buttons to increase and decrease the marker frequency level.

- **M1** shows the amplitude of any signals at the marker frequency on the upper graph (local).

- **M2** shows the amplitude of any signals at the marker frequency on the lower graph (SST).

- The frequency setting of **M2** automatically matches that of **M1**.

SSR
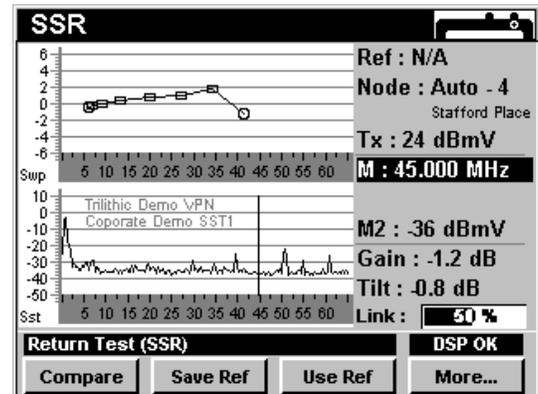
Using the Compare Function

Both the spectrum scanned by the SST in the hub and the spectrum of the field test point are presented simultaneously. This makes it easy for you to compare spectrum signatures to determine whether an ingress outbreak detected in the hub is caused by an ingress source on this branch of your system.

The **SSR** Mode displays the reverse spectrum graphs as follows:

- The upper part of the display can represent the reverse sweep graph or a graph of the reverse spectrum that is scanned locally by the 860 DSP or 860 DSPi. The graph that is displayed in the upper part of the display can be changed by using the Compare function.

- The lower part of the display always represents the reverse spectrum graph as scanned by the SST in the hub. The reverse spectrum graph information is transmitted to the field units through the SST's forward data carrier. A 9580 SST has eight reverse inputs; a 9581 SST has 16. In the most common installation configuration, Guardian SSTs are connected to scan the spectrum of each connected node separately.

Sweep Graph

The Sweep graph is arranged to display +/- 6 dB variation around a horizontal ("zero") line representing the correct settings for a return amplifier.

This value is set automatically by the data transmission from the SST in the hub.

To sweep a return path, begin at the node and work down to the last active location in each branch, selecting gain and tilt pad values that bring the sweep as close as possible to the "zero" line.

To change to the Sweep graph, press the Compare softkey, use the ▲ ▼ buttons to select **Sweep**, and then press the (Ent) button. You may also select **Sweep** by pressing ①.

TRILITHIC
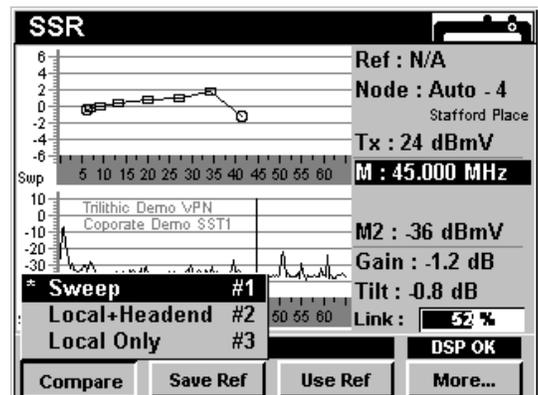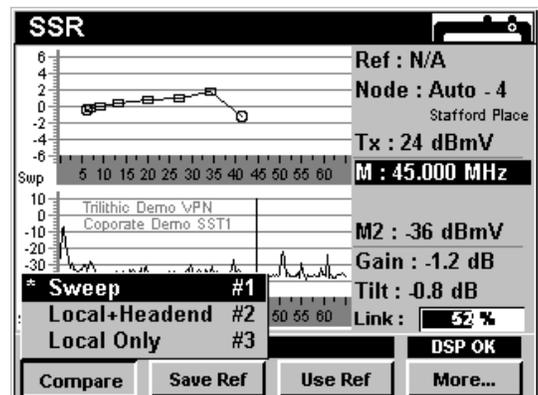
Local + Headend Graph

The **Local + Headend** graph is arranged to display a continuously updated view of the reverse spectrum taken locally.

This graph will allow you to compare the spectrum at your location against what is being seen at the headend.

To change to the **Local + Headend** graph, press the Compare softkey, use the ▲ ▼ buttons to select **Local + Headend**, and then press the Ent button. You may also select **Local + Headend** by pressing ②.
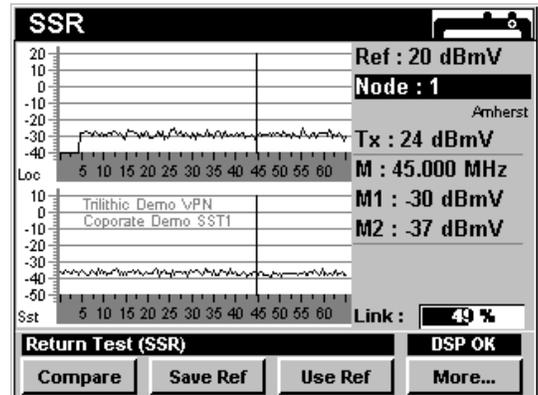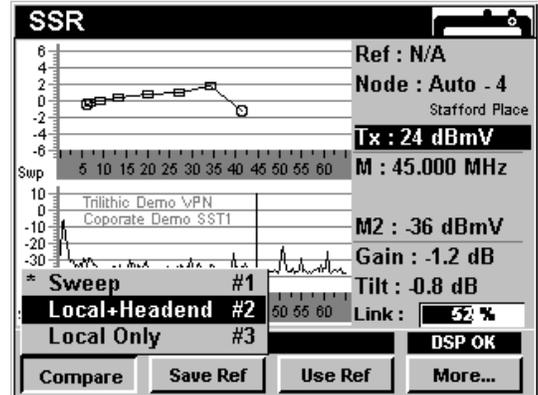
Local Only Graph

The **Local Only** graph is arranged to display a snapshot view of the reverse spectrum taken locally.

To change to the **Local Only** graph, press the `Compare` softkey, use the ▲ ▼ buttons to select **Local Only**, and then press the (Ent) button. You may also select **Local Only** by pressing ③.

In the **Local Only** Mode, only the top (local) spectrum will be updated.
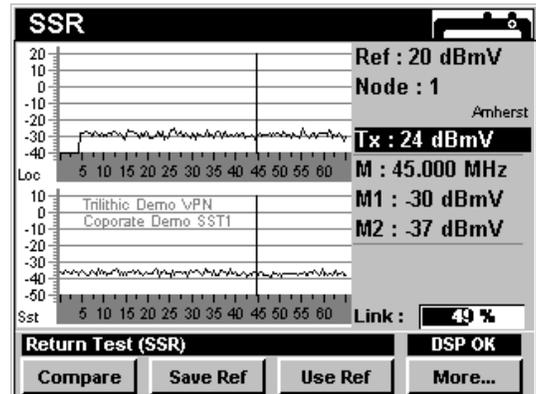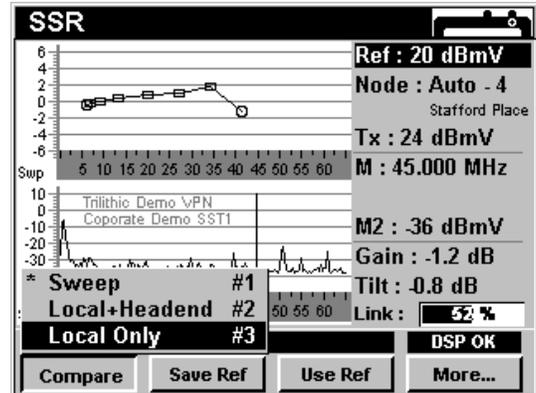
Saving a Reference Scan

To save the displayed scan as a reference scan, press the `Save Ref` softkey. The Save Sweep Reference file will appear. Use the alphanumeric keypad to enter a file name then press the (Ent) button.

TRILITHIC
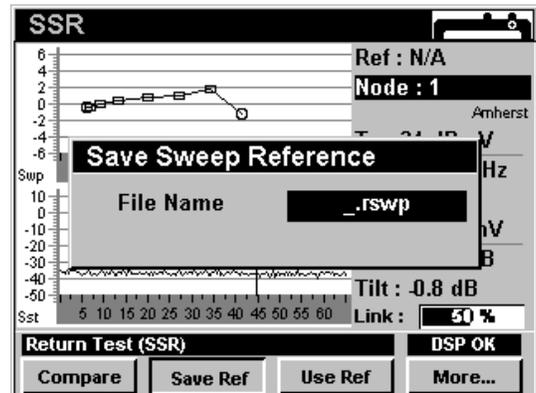
Using a Reference Scan

To use the displayed scan as a reference scan, press the
`Use Ref` softkey, use the ▲ ▼ buttons to highlight the
desired reference name, and press the (Ent) button. The
selected reference scan can be used to reference when
sweeping amplifiers.
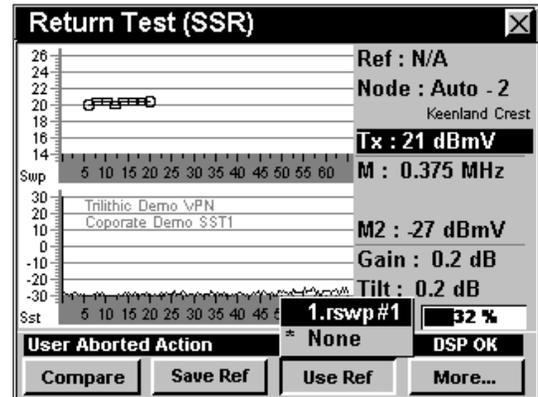
Using the Goto Function

The `Goto` softkey gives you rapid access to several spectrum displays.

Goto Spectrum 42

From **SSR** Mode you can jump to **Spectrum 42**
Mode which displays the reverse spectrum frequency
range of 4 Mhz to 42 MHz.

To change to **Spectrum 42** Mode, press the `Goto`
softkey, use the ▲ ▼ buttons to select **Spectrum 42**,
and then press the (Ent) button. You may also select
Spectrum 42 by pressing ①.

Once in **Spectrum 42** Mode, you may change any of
the analyzer settings as described in **Section II:
Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the (Bk) button will return you to **SSR** Mode.
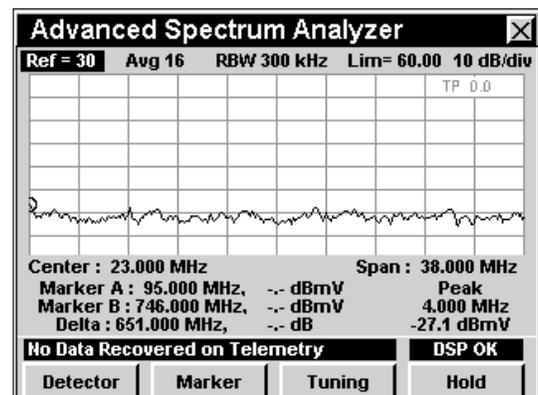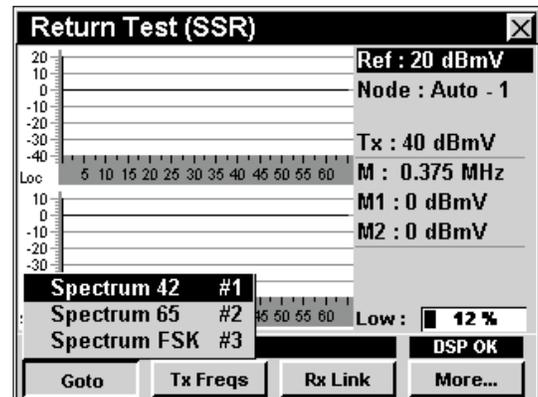
Goto Spectrum 65

From **SSR** Mode you can jump to **Spectrum 65** Mode which displays the reverse spectrum frequency range of 4 Mhz to 65 MHz.

To change to **Spectrum 65** Mode, press the `Goto` softkey, use the ⬆ ⬇ buttons to select **Spectrum 65**, and then press the (Ent) button. You may also select **Spectrum 65** by pressing ②.

Once in **Spectrum 65** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the (Bk) button will return you to **SSR** Mode.
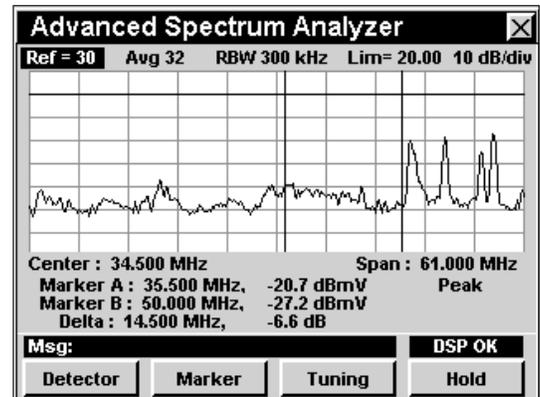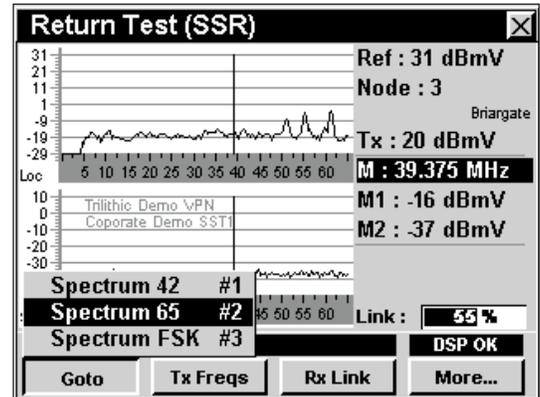
Goto Spectrum FSK

From **SSR** Mode you can jump to **Spectrum FSK** Mode which displays the link frequency.

This should allow you to view the telemetry carrier of the 9581 SST.

To change to **Spectrum FSK** Mode, press the `Goto` softkey, use the ▲ ▼ buttons to select **Spectrum FSK**, and then press the (Ent) button. You may also select **Spectrum FSK** by pressing ③.

Once in **Spectrum FSK** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the (Bk) button will return you to **SSR** Mode.

TRILITHIC
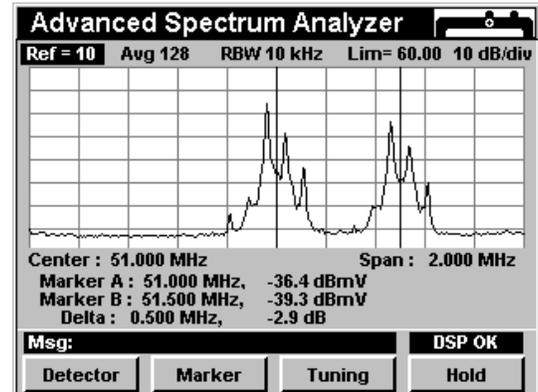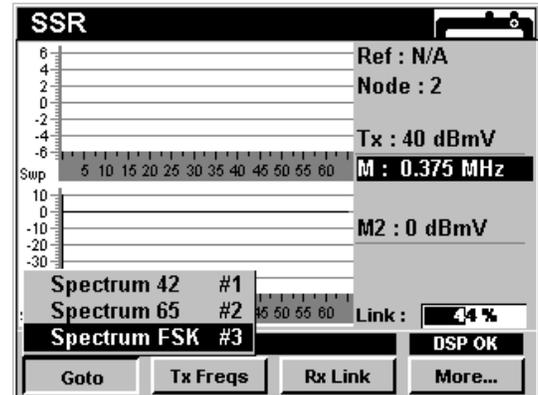
Viewing the Tx Frequencies

Pressing the `Tx Freqs` softkey will display a list of the test frequencies that your instrument is using to test the return path.

These frequencies are set by the headend SST base frequency plus an offset frequency determined by your **SSR ID** (A through F).

Active test frequencies will show a number in MHz. Inactive test frequencies will be blank. The two frequencies marked with (*) indicate they will be used for Gain/Tilt calculations.
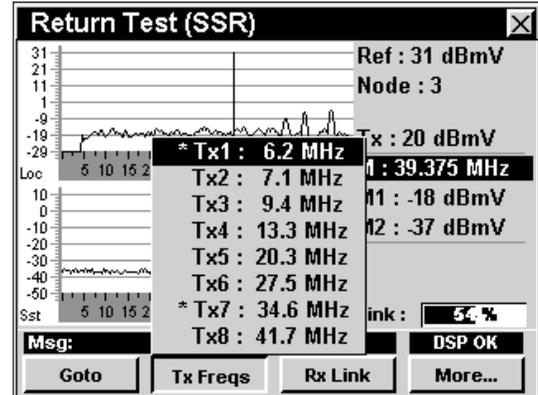
> **Note:** Your instrument must be communicating with an SST to display this frequency list.

Adjusting Rx Link Frequency

To change the actual link frequency, press the `Rx Link` softkey. The **SSR Link Frequency** window will appear. Use the alphanumeric keypad to enter a frequency value, and then press the `Ent` button.

> **Note:** The Guardian SST in the hub that will be receiving and evaluating the upstream sweep signals must be set to the appropriate receive level before you begin your sweep. If the SST is set to the wrong level amplifier gains may be mis-adjusted.

Function Menu Options
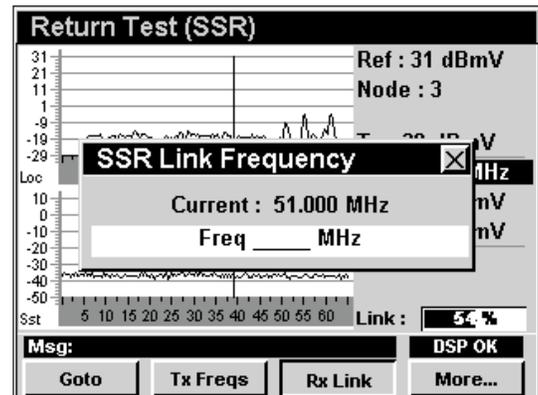
The **Function** Menu can be accessed by pressing the Fn button while in the **SSR** Mode.

The following **Function** Menu options can be accessed while in **SSR** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Toggle Peak Hold
- Save Data Log
- Set Test Point Compensation
- Change Display Mode
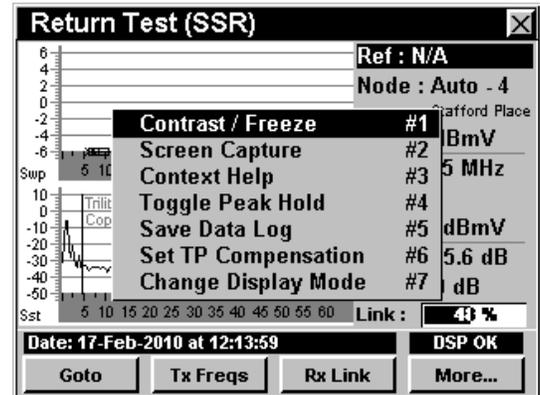
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Toggle Peak Hold

This option is used to hold the maximum signal level at each frequency, scanned over time. The two sweep displays will show a dark trace for the peak hold and a lighter trace for the live sweep.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Toggle Peak Hold**, and then press the (Ent) button. You may also select **Toggle Peak Hold** by pressing (4).
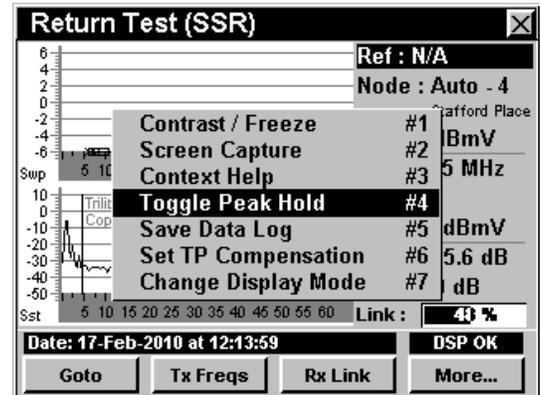
Changing Display Mode

You can toggle the display between a line graph and a bar graph.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change Display Mode**, and then press the (Ent) button. You may also select **Change Display Mode** by pressing (7).
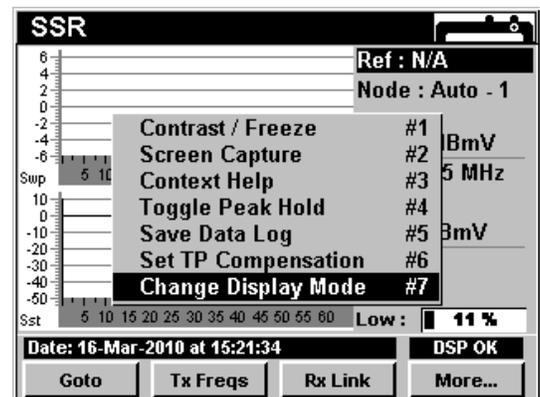
Introduction

RSA Mode configures the 860 DSP or 860 DSPi to function as an upstream sweep transmitter for troubleshooting micro-reflections and instances of narrow suck-outs between the test point and the headend. The upstream sweep is transmitted to the 8310 Return SpeedSweep Analyzer (RSA), installed in the headend. The 8310 RSA sends response information to the 860 DSP or 860 DSPi via a telemetry signal.

RSA Mode equips the instrument with return maintenance functions including:

- Reverse path sweep graphing the response at over 600 individually-settable reverse test frequencies, as measured in the hub and transmitted to the 860 DSP or 860 DSPi.

- Reverse gain and tilt, calculated from the reverse sweep display.

- Reverse spectrum view, showing a spectrum plot of the reverse band as scanned in the headend and transmitted to the 860 DSP or 860 DSPi.

- Simultaneous display of both the sweep trace and the reverse spectrum, as scanned in the headend.

- Variable markers that simplify the direct measurement of ingress and traffic amplitudes.

In order to use the **RSA** Mode on your 860 DSP, the instrument must be equipped with Return Sweep Option (SR-1). To use the **RSA** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1) and Return Sweep Receiver Option (SR-1).

> **Note: RSA** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **RSA** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

This section will provide you with the basic understanding of how to use **RSA** Mode including:

- Required Setup
- Using RSA Mode
- Setting Reference Level
- Changing Display Resolution
- Setting Spectrum Limit Frequencies
- Instrument Unit Designation
- Setting Test Point Level
- Marker Settings
- Capturing a Reference Scan
- Sweeping an Amplifier
- Adjusting Rx Link Frequency
- Function Menu Options
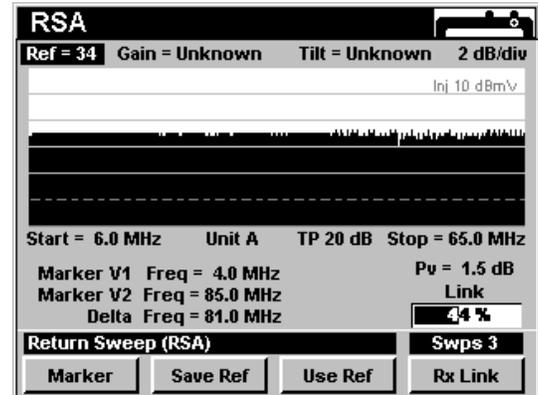
Required Setup

To use **RSA** Mode, you will need to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **RSA** Mode, you will need to set up the **RSA** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *SSR Mode Settings* before proceeding through this chapter (**RSA** Mode Settings are contained within the **SSR** Mode Settings section).

To use **RSA** Mode, you will need to setup the 8310 RSA in the headend to communicate with the 860 DSP or 860 DSPi. Refer to the 8310 Reverse SpeedSweep Analyzer operation manual for setup instructions before proceeding through this chapter.

> **Note:** To use **RSA** Mode, the 860 DSP or 860 DSPi must be in communication with a Trilithic 8310 Return SpeedSweep Analyzer, located in the headend. The RSA analyzes sweep test signals from the 860 DSP or 860 DSPi and scan the reverse spectrum. Data collected by the RSA is transmitted on a frequency-agile downstream data carrier to the 860 DSP or 860 DSPi in the field for use in reverse path quality calculations.

Using RSA Mode

The **RSA** Mode transmits a sweep to the 8310 RSA in the headend for analysis. The sweep frequencies are set on the 8310 RSA in the headend, and the 860 DSP or 860 DSPi tracks the sweeping signal. The sweep steps around active channels to avoid interference with active channels.

Reverse sweeping is used to adjust the gain and tilt of reverse distribution amplifiers. When adjusted, test signals injected into any amplifier's reverse test point at a particular level will arrive in the headend at the desired level. To perform the adjustments you must know the injection level specified for the reverse amplifier modules and the insertion loss of the test point you will be connecting to.

> **Note:** For more information on 8310 Reverse SpeedSweep Analyzer setup and sweeping, refer to the 8310 RSA's operation manual.

> **Note:** The 8310 RSA in the headend that will receive and evaluate the upstream test signals must be set to the appropriate frequency before beginning reverse sweep tests. If the 8310 RSA and 860 DSP or 860 DSPi are not set to the same reference level, inaccurate test results may occur.

Setting Reference Level

On the graph, vertical displacement represents signal strength. The amplitude represented by the peak column on the graph is the reference level.

To change the reference level, use the ◀ ▶ buttons to highlight **Ref** and then adjust the current value using the ▲ ▼ buttons.

![RSA](RSA logo)

Changing Display Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division, as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

Setting Spectrum Limit Frequencies

The **Start** and **Stop** spectrum limit frequencies are used to set the lower and upper spectrum display limits on the 860 DSP or 860 DSPi.

To change the **Start** (lower limit) and **Stop** (upper limit) frequencies, use the ◄ ► buttons to highlight the **Start** or **Stop** and use the ▲ ▼ buttons to increment each value up or down.

Instrument Unit Designation

The 8310 RSA installed in the headend can communicate with as many as (10) 860 DSP or 860 DSPi field analyzers. If multiple instruments are in communication with the 8310 RSA, each instrument must be configured with a different unit designation.

To assign a unique unit designation, use the ◀ ▶ buttons to highlight **Unit** and use the ▲ ▼ buttons to increment the value up or down.
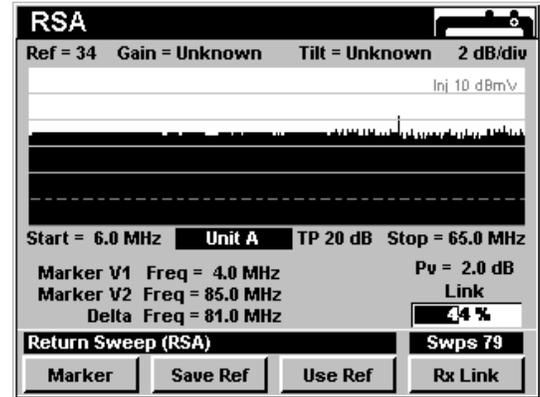
Setting Test Point Level

The test point level (**TP**) of the 860 DSP or 860 DSPi needs to be set to the sum of the specified input level of the return module, plus the test point coupler insertion loss, plus the losses of any other devices that may be connected between the test point and the 860 DSP or 860 DSPi.

Once you have calculated this value, you can adjust the output transmit level while in **RSA** Mode**.**

To change the test point level, use the ◀ ▶ buttons to highlight **TP** and use the ▲ ▼ buttons to increment the value up and down.

TRILITHIC
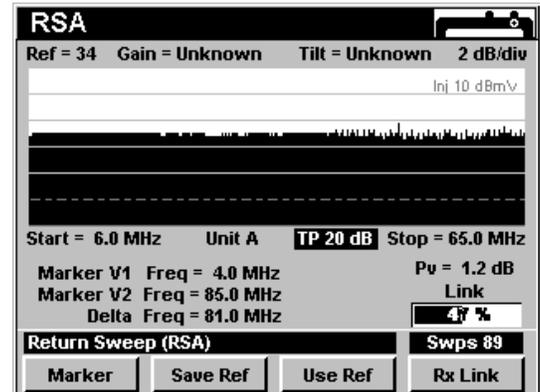
Marker Settings

The spectrum functions of the 860 DSP or 860 DSPi are equipped with variable markers. These markers can be used to make amplitude measurements of the sweep at user-selected frequencies, or to determine the difference (Delta) in level or frequency between two selected sweep points.

Press the **Marker** softkey to toggle the display between vertical markers (frequency) and horizontal markers (level).

To set the level of the vertical marker, use the ◄ ► buttons to highlight **Freq** as it corresponds to **Marker V1** or **Marker V2**, and then use the ▲ ▼ buttons to increment the marker to higher or lower frequencies. You can also enter a frequency directly using the alphanumeric keypad and pressing the **Ent** button.

- **Marker V1** shows the frequency of the sweep at the marker frequency.

- **Marker V2** shows the frequency of the sweep at the marker frequency.

To set the level of the horizontal marker, use the ◄ ► buttons to highlight the amplitude level as it corresponds to **Marker H1** or **Marker H2**, and then use the ▲ ▼ buttons to increment the marker to higher or lower amplitude levels. You can also enter an amplitude level directly using the alphanumeric keypad and pressing the **Ent** button.

- **Marker H1** shows the amplitude level of the sweep at the marker level.

- **Marker H2** shows the amplitude level of the sweep at the marker level.
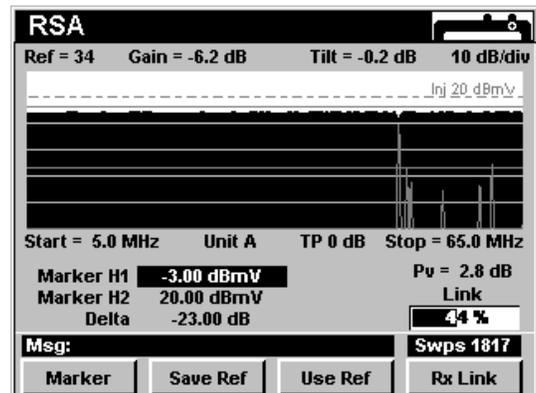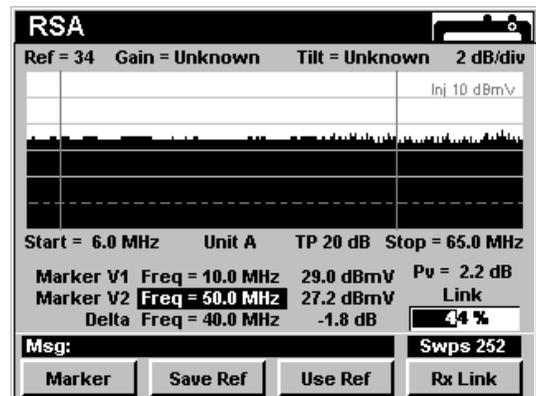
Capturing a Reference Scan

The reference scan will be used to remove measurement errors caused by variations in carrier amplitudes. In most cases, the reference scan will be taken at the node for the service area you will be sweeping.

To save the displayed scan as a reference scan, press the [Save Ref] softkey, use the alphanumeric keypad to enter the desired reference name, and press the (Ent) button. The current scan has now been saved with the selected reference scan name for use as a reference when sweeping amplifiers.
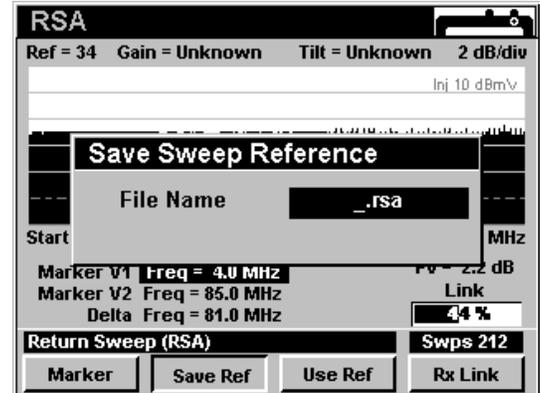
Note: If you do not see this display, adjust the reference level to bring the scan on-screen.

Sweeping an Amplifier

The process for sweeping an amplifier is very similar to that used to capture a reference scan.

Press the [Use Ref] softkey, use the (▲) (▼) buttons to highlight the reference file for the node that serves this area, and press the (Ent) button.
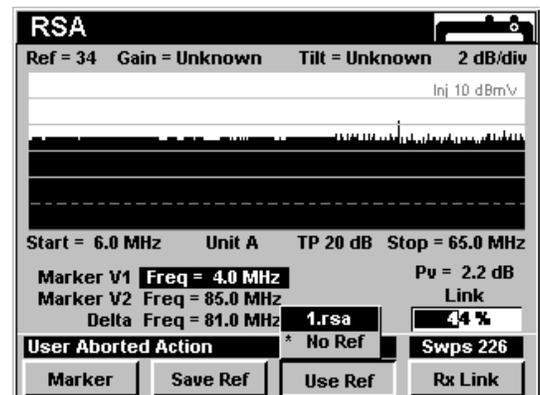
The instrument now displays a graph representing the gain and tilt performance of the amplifier. When the amplifier is properly aligned, the trace will coincide with the center (fourth from the bottom) horizontal line of the graph's grid.

While using a reference, the **Ref** and **TAP** settings are automatically adjusted to position the trace at the appropriate point in the graph, and are not manually adjustable.

To stop using the reference function, press the Use Ref softkey, use the ▲ ▼ buttons to highlight **No Ref**, and press the (Ent) button.

RSA : 1.rsa			
Ref = 6	Gain = -21.0 dB	Tilt = 3.2 dB	2 dB/div

Inj 10 dBmᵥ

Start = 6.0 MHz	Unit A	TP 20 dB	Stop = 65.0 MHz
Marker V1 Freq = 10.0 MHz		-0.2 dB	Pᵥ = 3.5 dB
Marker V2 Freq = 50.0 MHz		3.0 dB	Link
Delta Freq = 40.0 MHz		3.2 dB	44 %
Msg:			Swps 416
Marker	Save Ref	Use Ref	Rx Link

Adjusting Rx Link Frequency

To change the actual link frequency, press the Rx Link softkey. The **RSA Link Frequency** window will appear. Use the alphanumeric keypad to enter a frequency value, and then press the (Ent) button.

RSA			
Ref = 34	Gain = Unknown	Tilt = Unknown	2 dB/div

Inj 10 dBmᵥ

RSA Link Frequency

Current : 50.000 MHz

Freq _____ MHz

Start =			0 MHz
Marker V1 Freq = 4.0 MHz			8 dB
Marker V2 Freq = 85.0 MHz			Link
Delta Freq = 81.0 MHz			44 %
Msg:			Swps 1567
Marker	Save Ref	Use Ref	Rx Link
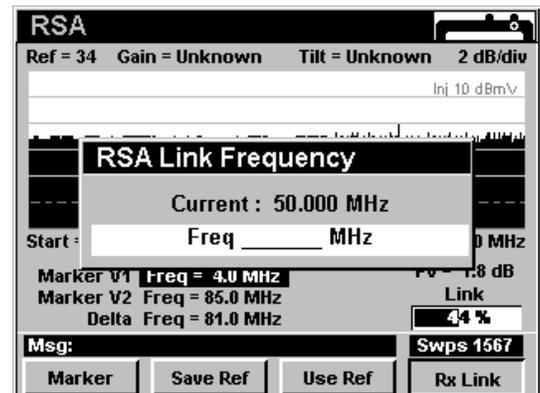
> **Note:** The 8310 RSA in the hub that will be receiving and evaluating the upstream sweep signals must be set to the appropriate receive level before you begin your sweep. If the 8310 RSA is set to the wrong level, amplifier gains may be mis-adjusted.
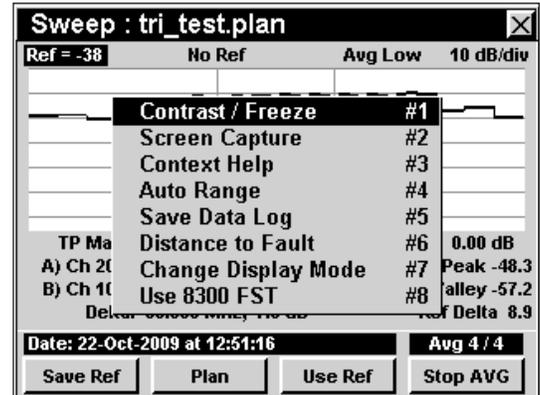
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **RSA** Mode.

The following **Function** Menu options can be accessed while in **RSA** Mode:

- Changing Display Mode
- Setting TP Compensation
- Toggling the Ingress View
- Toggling Peak Hold

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

Changing Display Mode

You can toggle the display between a line graph and a bar graph.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Change Display Mode**, and then press the (Ent) button. You may also select **Change Display Mode** by pressing (4).
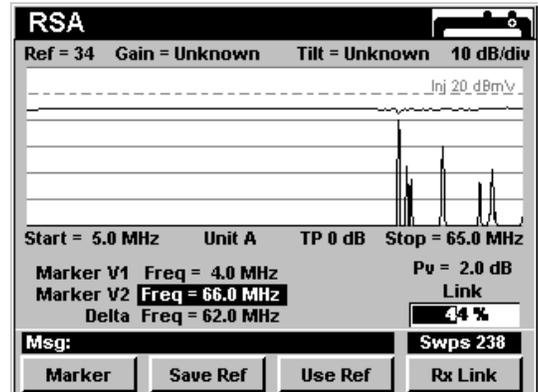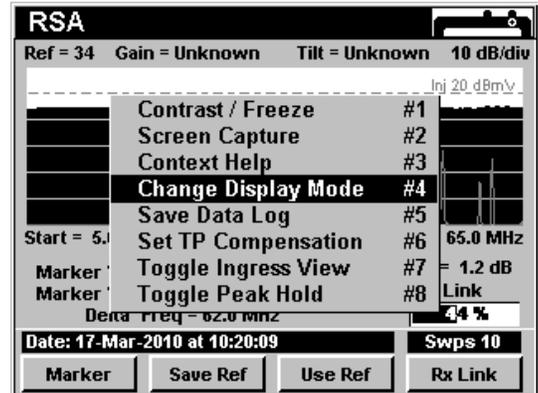
Setting TP Compensation

This option is used to enter an offset that will be added to all measurements made in **RSA** Mode.

To use this option, press the (Fn) button, use the
(▲) (▼) buttons to highlight **Set TP Compensation**,
and then press the (Ent) button. You may also select
Set TP Compensation by pressing (6).

- The **Function** Menu will close and the **Return Compensation** window will open.

    - To enter an offset value for the test point or probe, use the (◄) (►) buttons to highlight **Injection Level**, **Test Point**, or **Tx Level** and enter the value using the alphanumeric keypad, and then press the (Ent) button.

    - To resume measurement, press the (Bk) button or allow approximately five seconds for the **Return Compensation** window to close.

- The **Return Compensation** window will close and the **RSA** Mode will display the combined (**Injection Level**, **Test Point**, and **Probe**) test point compensation value below the graph.

TRILITHIC
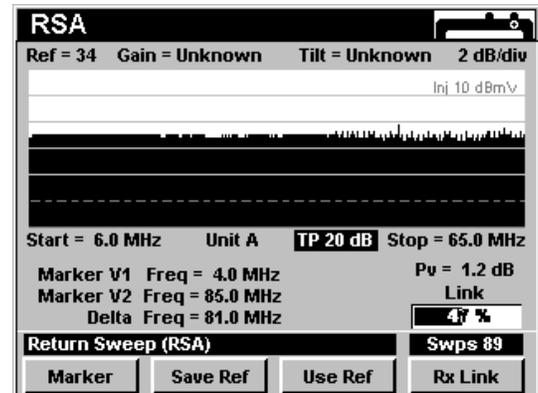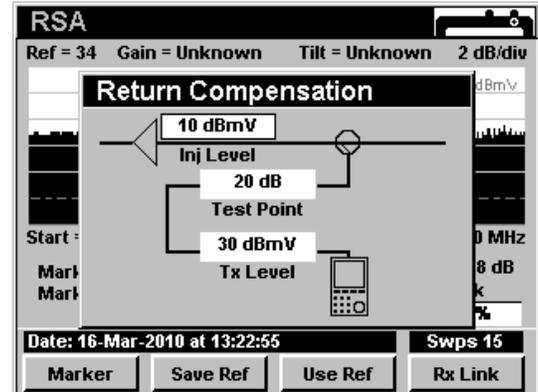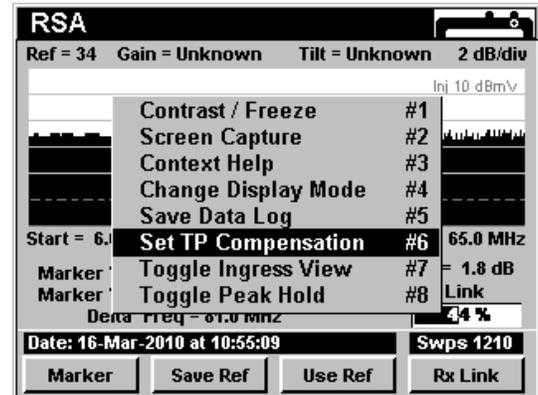
Toggle Ingress View

You can toggle a graphic overlay of system ingress on or off, which will affect the balancing of amplifiers over the spectrum graph.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Toggle Ingress View**, and then press the (Ent) button. You may also select **Toggle Ingress View** by pressing (7).
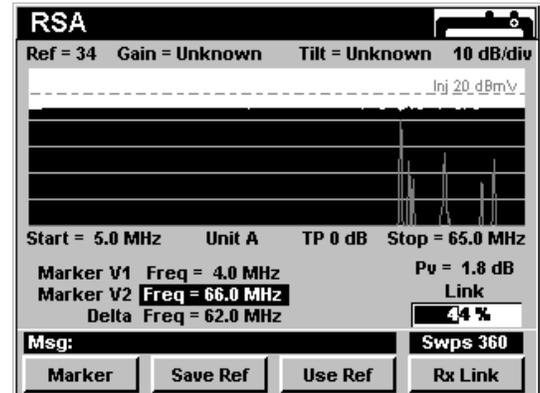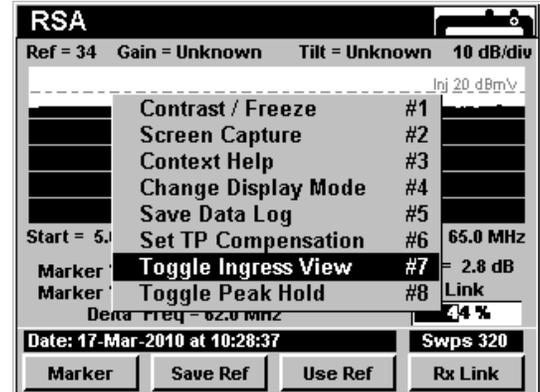
Toggle Peak Hold

You can toggle a hold function that will display the maximum recorded ingress over the spectrum graph.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Toggle Peak Hold**, and then press the (Ent) button. You may also select **Toggle Peak Hold** by pressing (8).

Hold will appear in the upper-left corner of the spectrum display to indicate that Toggle Peak Hold has been selected.
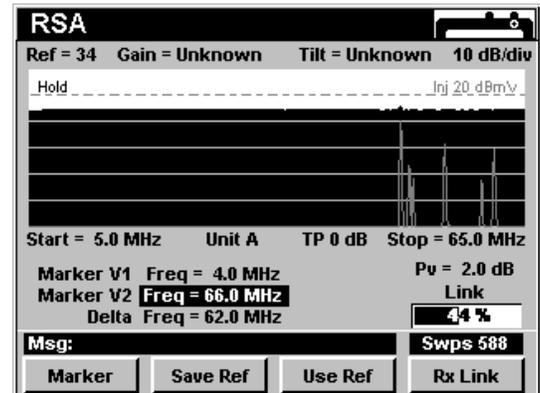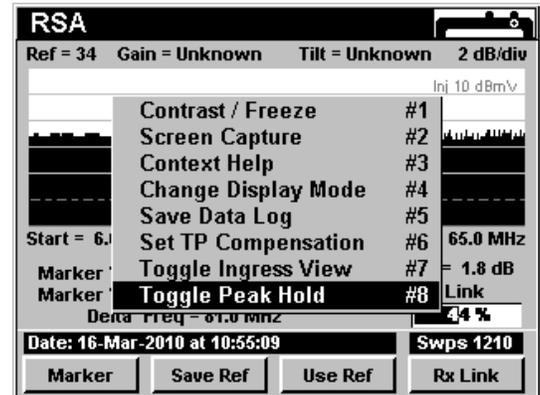
Introduction

RSVP Mode equips the instrument with the return path testing functions of a Trilithic Guardian RSVP installer's reverse tester. This mode enables the 860 DSP or 860 DSPi to perform several key reverse path quality tests to insure trouble-free installations including:

- Determining the reverse signal "launch level" needed for a signal from the subscriber's terminal to arrive in the hub at the appropriate amplitude.

- Determining the bandwidth-corrected carrier / (noise + ingress) ratio for the path from the subscriber's terminal to the hub.

- Automatically comparing both measurements to user-set limits and displaying PASS or FAIL indications.

RSVP Mode also equips your instrument with some additional features not available in the Trilithic Guardian RSVP reverse tester including:

- Simultaneous testing of launch level and C/(N+I) on up to eight frequencies.

- Simultaneous display of markers for each test frequency, the reverse spectrum, and test results with PASS or FAIL messages, for all active test frequencies.

In order to use the **RSVP** Mode on your 860 DSP, the instrument must be equipped with Return Tester Option (VP-1). In order to use the **RSVP** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1) and Return Tester Option (VP-1).

> **Note: RSVP** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **RSVP** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

This section will provide you with the basic understanding of how to use **RSVP** Mode including:

- Required Setup

- Using RSVP Mode

- Setting Vertical Resolution

- Using the Goto Function

- Viewing the Tx Frequencies

- Adjusting Rx Link Level

- Function Menu Options
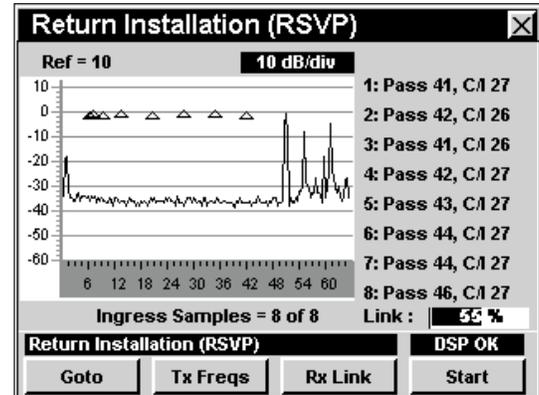
Required Setup

To use **RSVP** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **RSVP** Mode, you will need to set up the **RSVP** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *RSVP Mode Settings* before proceeding through this chapter.

To use **RSVP** Mode with a 9581 SST R4 in Normal Mode, you will need to set up the return link parameters. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Ret Link Settings* before proceeding through this chapter.

For SECAM L channels, you will need to set the **Optimal Modulation**. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings*.

Note: To use **RSVP** Mode, the 860 DSP or 860 DSPi must be in communication with a Trilithic Guardian 9580 SST (0.3 Mhz – 42 MHz) or 9581 SST (0.3 – 65 MHz) Reverse Analyzer located in the hub. SSTs are digitizers which analyze test signals from the 860 DSP or 860 DSPi and scan the reverse spectrum, measuring traffic and ingress. Data collected by the SST is transmitted on a downstream data carrier to instruments in the field for use in reverse path quality calculations.

Using RSVP Mode

The instrument displays several types of data at once in **RSVP** Mode:

- The reverse spectrum for the path you are connected to, showing noise, ingress and services traffic.

- Triangular markers showing the test frequencies that are active and the progress of the "launch level" test.

- A list showing PASS or FAIL for each active test carrier frequency, with the measured launch level and C/I ratio for each carrier.

When the **RSVP** Mode is started, the RSVP test sequence begins running.

When the test has finished, the results are displayed and the **RSVP** Mode is idle.

To begin another test sequence press the [Start] softkey.

The instrument then automatically runs the RSVP test sequence, evaluates the data and displays the results, then stops until you press the [Start] softkey again.

During the test sequence the marker triangles rise on the display as the instrument adjusts its launch levels. At the completion of the launch test the markers for all frequencies that passed the test are displayed stationary at the reference level of the SST in the hub.

During the tests, the reverse spectrum display is updated every 0.8 seconds until the selected number of samples is attained.

> **Note:** The Guardian SST in the hub that will be receiving and evaluating the upstream test signals must be set to the appropriate reference level before you begin your RSVP tests. If the SST is set to the wrong reference level inaccurate test results may occur.

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

Using the Goto Function

The [Goto] softkey gives you rapid access to several spectrum displays.

Goto Spectrum 42

From **RSVP** Mode you can jump to **Spectrum 42** Mode which displays the reverse spectrum frequency range of 4 Mhz to 42 MHz.

To change to **Spectrum 42** Mode, press the [Goto] softkey, use the ▲ ▼ buttons to select **Spectrum 42**, and then press the (Ent) button. You may also select **Spectrum 42** by pressing ①.

Once in **Spectrum 42** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the (Bk) button will return you to **RSVP** Mode.
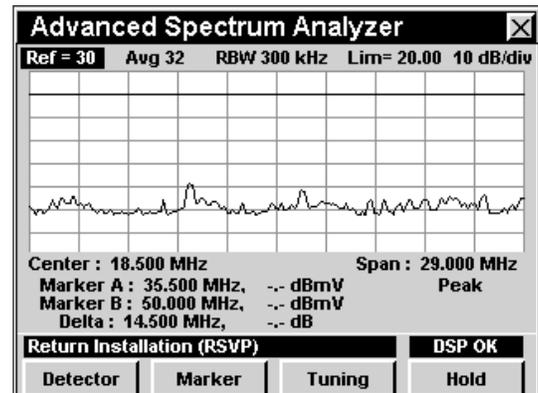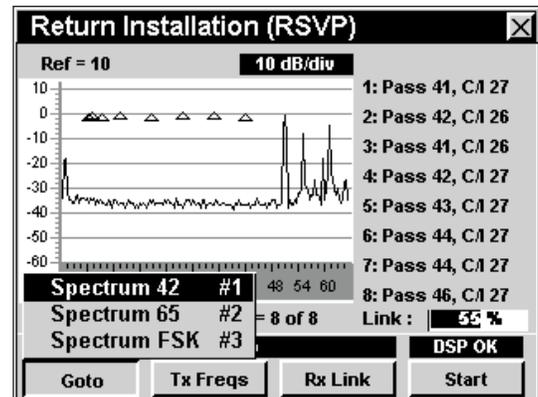
Goto Spectrum 65

From **RSVP** Mode you can jump to **Spectrum 65** Mode which displays the reverse spectrum frequency range of 4 Mhz to 65 MHz.

To change to **Spectrum 65** Mode, press the [Goto] softkey, use the ▲ ▼ buttons to select **Spectrum 65**, and then press the (Ent) button. You may also select **Spectrum 65** by pressing ② .

Once in **Spectrum 65** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the (Bk) button will return you to **RSVP** Mode.
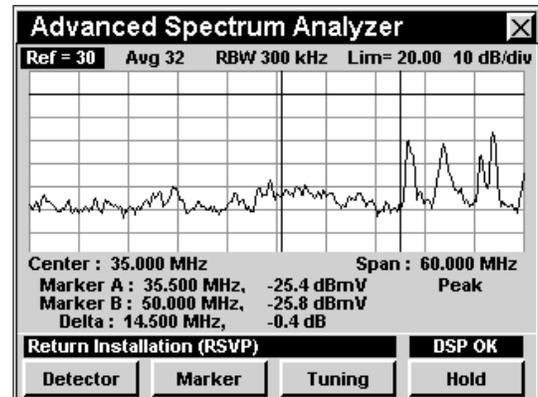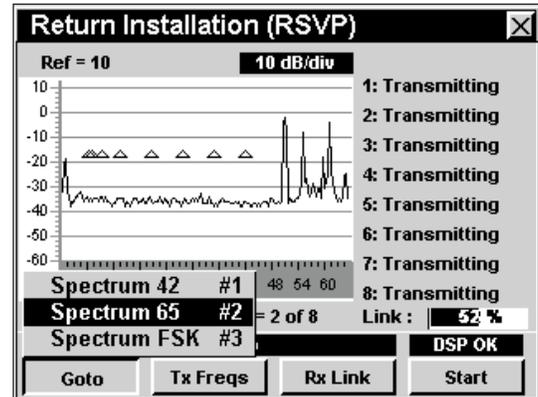
Goto Spectrum FSK

From **RSVP** Mode you can jump to **Spectrum FSK** Mode which displays the link frequency.

To change to **Spectrum FSK** Mode, press the `Goto` softkey, use the ▲ ▼ buttons to select **Spectrum FSK**, and then press the **Ent** button. You may also select **Spectrum FSK** by pressing ③.

Once in **Spectrum FSK** Mode, you may change any of the analyzer settings as described in **Section II: Installer Functions**, Chapter 4: Spectrum Mode.

Pressing the **Bk** button will return you to **RSVP** Mode.
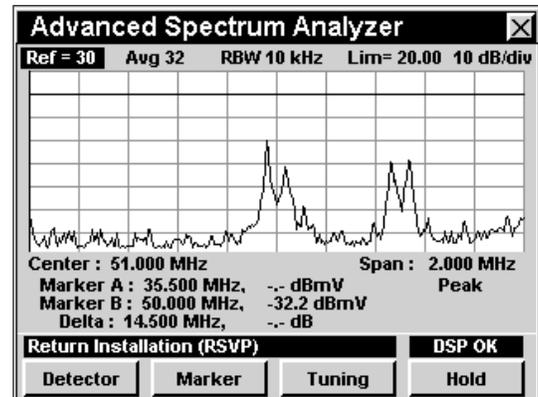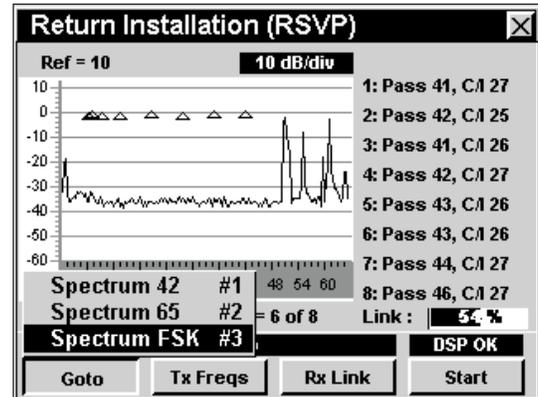
Viewing the Tx Frequencies

Pressing the [Tx Freqs] softkey will display a list of the test frequencies that your instrument is using to test the return path.

These frequencies are set by the headend SST base frequency plus an offset frequency determined by your **RSVP ID** (A through F).
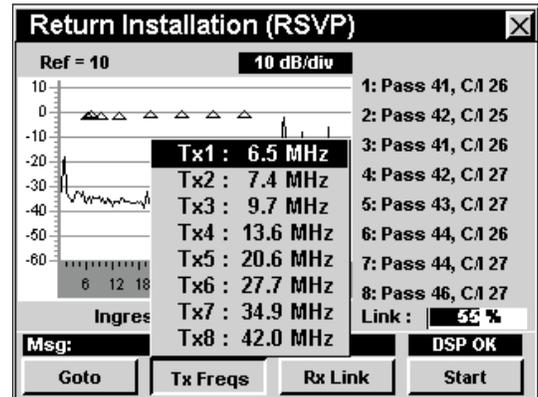
Return Installation (RSVP)
Ref = 10   10 dB/div
1: Pass 41, C/I 26
2: Pass 42, C/I 25
3: Pass 41, C/I 26
4: Pass 42, C/I 27
5: Pass 43, C/I 27
6: Pass 44, C/I 26
7: Pass 44, C/I 27
8: Pass 46, C/I 27
Tx1 : 6.5 MHz
Tx2 : 7.4 MHz
Tx3 : 9.7 MHz
Tx4 : 13.6 MHz
Tx5 : 20.6 MHz
Tx6 : 27.7 MHz
Tx7 : 34.9 MHz
Tx8 : 42.0 MHz
Link : 55 %
Msg: DSP OK
Goto   Tx Freqs   Rx Link   Start

Note: Your instrument must be communicating with an SST to display this frequency list.

Adjusting Rx Link Frequency

To change the actual link frequency, press the [Rx Link] softkey. The **RSVP Link Frequency** window will appear. Use the alphanumeric keypad to enter a frequency value, and then press the (Ent) button.

Return Installation (RSVP)
Ref = 10   10 dB/div
1: Pass 41, C/I 26
2: Pass 42, C/I 25
RSVP Link Frequency
Current : 51.000 MHz
Freq _____ MHz
6 12 18 24 30 36 42 48 54 60
8: Pass 46, C/I 27
Ingress Samples = 8 of 8   Link : 55 %
Msg: DSP OK
Goto   Tx Freqs   Rx Link   Start

Note: The Guardian SST in the hub that will be receiving and evaluating the upstream sweep signals must be set to the appropriate receive level before you begin your sweep. If the SST is set to the wrong level amplifier gains may be mis-adjusted.

![RSVP icon]

Function Menu Options
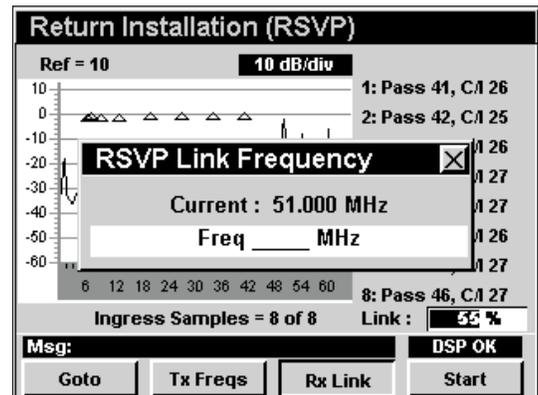
The **Function** Menu can be accessed by pressing the (Fn) button while in the **RSVP** Mode.

The following **Function** Menu options can be accessed while in **RSVP** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log
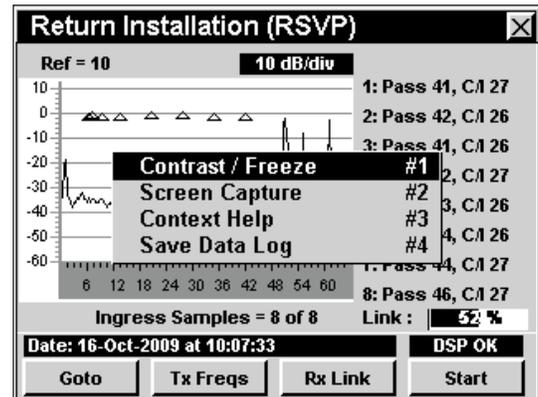
Introduction

In **VSB** Mode the instrument operates similar to the **QAM** Mode without channel plan support. In order to use the **VSB** Mode on your 860 DSP or 860 DSPi, the instrument must be equipped with Vestigial Sideband Modulation Option (VSB).

This section will provide you with the basic understanding of how to use **VSB** Mode including:

- Required Setup

- Setting Frequency

- Selecting Modulation Type

- Changing Symbol Rate

- Changing Bandwidth

- Setting the Display Mode

- Function Menu Options
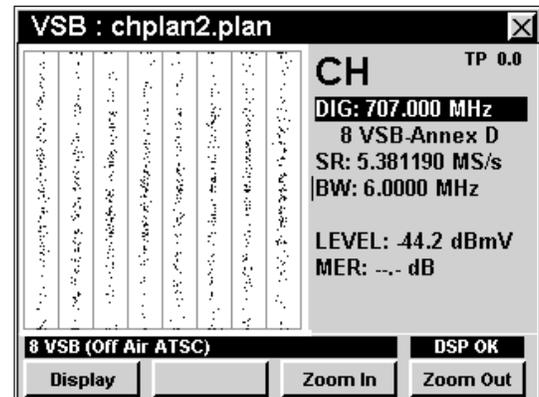
> **Note: VSB** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **VSB** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to _www.trilithic.com_ to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **VSB** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Setting Frequency

To change the frequency, use the ◄ ► buttons to highlight the frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency using the alphanumeric keypad, and then press the (Ent) button.
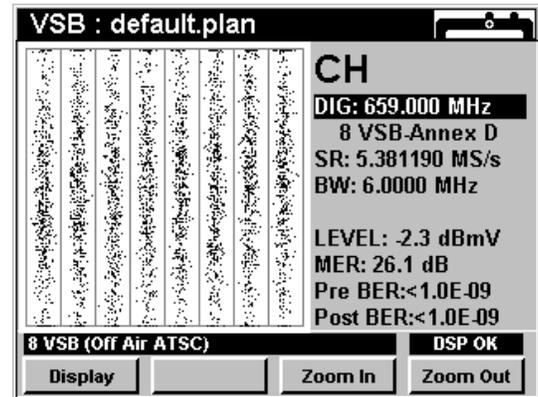
Note: This mode does not make use of the current channel plan; you must manually select your channel frequency.

Selecting Modulation Type

To change the modulation type, use the ◄ ► buttons to highlight the modulation type, use the ▲ ▼ buttons to increment the value up and down, and then press the (Ent) button.

You can select from the modulation types as follows:

- **8 VSB:** This represents eight amplitude levels that support up to 19.28 Mbps of data in a single 6 MHz channel.

- **16 VSB:** This represents eight amplitude levels that support up to 38.57 Mbps of data in a single 6 MHz channel.
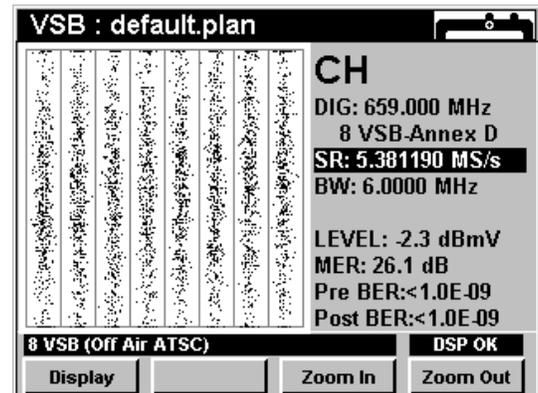
Changing Symbol Rate

To change the symbol rate, use the ◀ ▶ buttons to highlight the symbol rate, use the ▲ ▼ buttons to increment the value up and down or enter the desired symbol rate using the alphanumeric keypad, and then press the (Ent) button.

```
VSB : chplan2.plan                    ⊠
                            CH      TP 0.0
                            DIG:  55.250 MHz
                               8 VSB-Annex D
                            SR: 5.381190 MS/s
                            BW: 6.0000 MHz

                            LEVEL: -46.2 dBmV
                            MER: --.- dB

8 VSB (Off Air ATSC)                DSP OK
 Display             Zoom In  Zoom Out
```
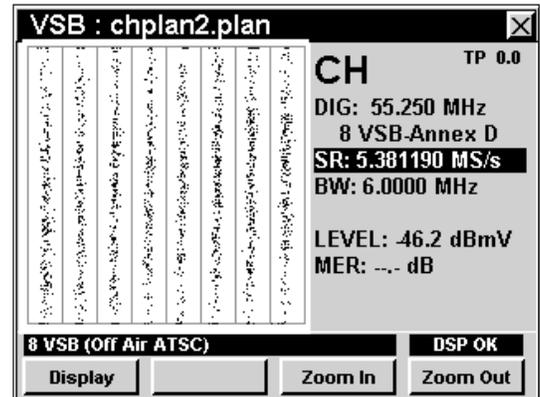
Changing Bandwidth

To change the bandwidth, use the ◀ ▶ buttons to highlight the bandwidth, use the ▲ ▼ buttons to increment the value up and down or enter the desired bandwidth using the alphanumeric keypad, and then press the (Ent) button.

```
VSB : chplan2.plan                    ⊠
                            CH      TP 0.0
                            DIG:  55.250 MHz
                               8 VSB-Annex D
                            SR: 5.381190 MS/s
                            BW: 6.0000 MHz

                            LEVEL: -45.9 dBmV
                            MER: --.- dB

8 VSB (Off Air ATSC)                DSP OK
 Display             Zoom In  Zoom Out
```

TRILITHIC
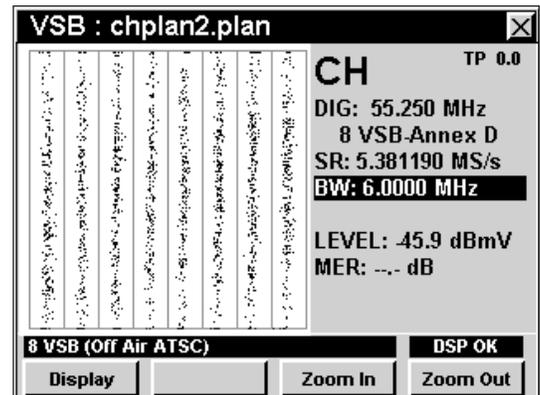
Setting the Display Mode

VSB Mode has three display options; digital constellation, equalizer tap diagram, and BER graph. To change display modes use the `Display` softkey to toggle between the displays.

Using the Constellation Display

The constellation display graphs symbol values on an I and Q grid. The constellation display is useful for observing impairments in the digital signal.

In 8 VSB, the digital information is transmitted exclusively in the amplitude of the RF envelope and not in the phase. This is unlike other digital modulation formats, such as QAM, where each point in the signal constellation is a certain vector combination of carrier amplitude and phase. A QAM-like arrangement is not possible in 8 VSB since the carrier phase is no longer an independent variable under our control, but is rather "consumed" in suppressing the lower sideband.
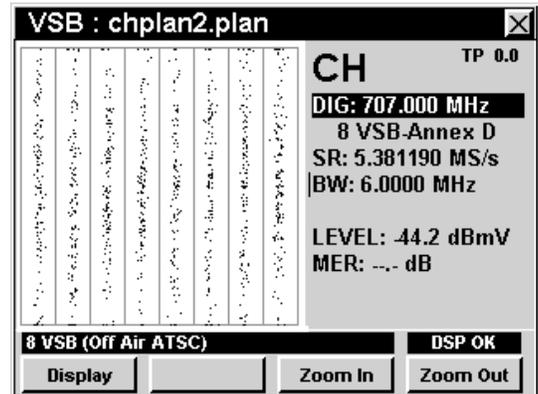
The eight levels are recovered by sampling an in-phase (I channel) synchronous detector. Nothing would be gained by sampling a quadrature (Q) channel detector since no useful information is contained in this channel. The signal constellation diagram is therefore a series eight vertical lines that correspond to the eight transmitted amplitude levels.

When the 8 VSB signal is corrupted, the eight vertical lines become blurred and errors are received.

Using the Zoom Feature

The instrument allows you to easily zoom in or out on a constellation display.

To zoom in on a constellation display, press the `Zoom In` softkey. A selection window will appear in the display.

Use the ◀ ▶ ▲ ▼ buttons to place the selection window on the desired location then press the `Zoom In` softkey. If the selection window still appears, you can continue to zoom in by positioning the window and pressing the `Zoom In` softkey.

To zoom out from a constellation display press the `Zoom Out` softkey. Press the `Zoom Out` softkey repeatedly to zoom out further.

Using the Equalizer Tap Diagram

The equalizer tap diagram shows the relative amplitude of the equalizer taps needed to correct phase and amplitude distortions in the VSB signal.

The equalizer tap diagram is useful in determining presence of reflections. You can get an approximate distance to fault indication by using the [Eq Left] or [Eq Right] softkeys to place the indicator on the tap of interest.
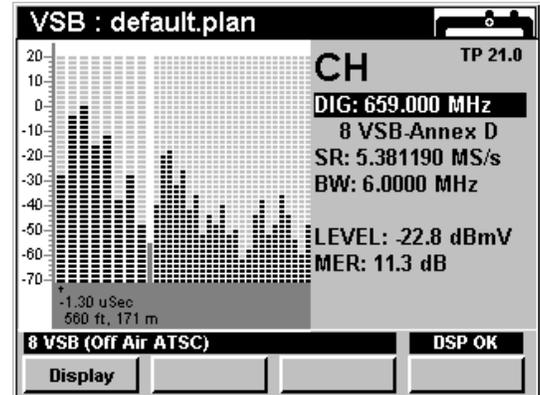
Using the BER Graph

The BER graph shows the ratio of corrupted bits to total bits in the VSB signal. The analyzer dwells on the selected channel, counting good bits and watching for individual corrupted bits. The BER graph shows errored bits as vertical lines that expand horizontally across the display with advancing time.
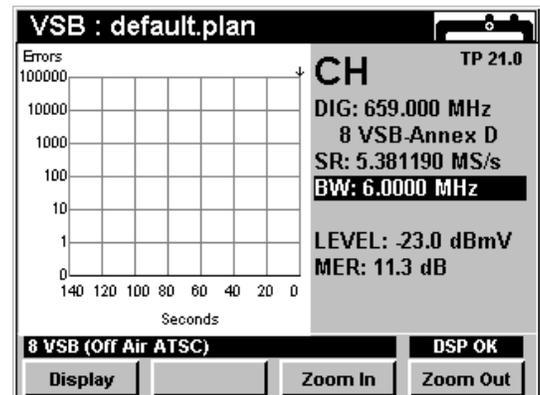
Function Menu Options

The **Function** Menu can be accessed by pressing the
(Fn) button while in the **VSB** Mode.

The following **Function** Menu options can be accessed
while in **VSB** Mode:

- Contrast / Freeze
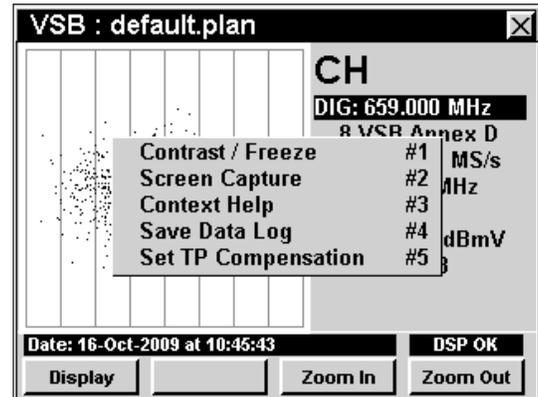
- Screen Capture

- Context Help

- Save Data Log

- Set TP Compensation

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Set TP Compensation

To use this option, press the (Fn) button, use the
(▲) (▼) buttons to highlight **Set TP Compensation**,
and then press the (Ent) button. You may also select
Set TP Compensation by pressing (5).
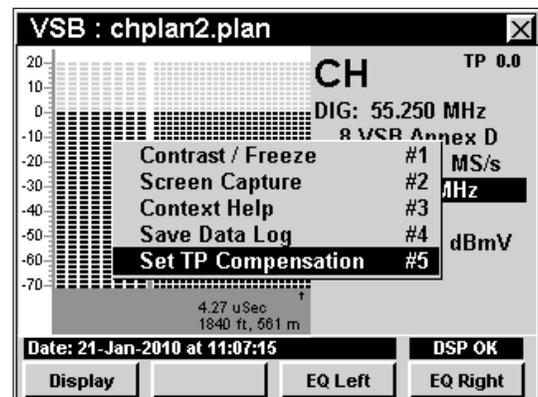
Introduction

In **VITS** Mode the instrument analyzes the signal characteristics of VITS (Vertical Interval Test Signals) signals to measure in-channel response, differential phase, differential gain, and chroma-delay. This mode also displays the test signal itself. In order to use the **VITS** Mode on your 860 DSP or 860 DSPi, the instrument must be equipped with the VITS Option (VITS).

This section will provide you with the basic understanding of how to use **VITS** Mode including:

- Required Setup

- Setting Averaging Type

- Adjusting Channels

- Setting Line Number

- Setting Even/Odd Fields

- Setting Test Type

- Setting Channel Plan

- Function Menu Options
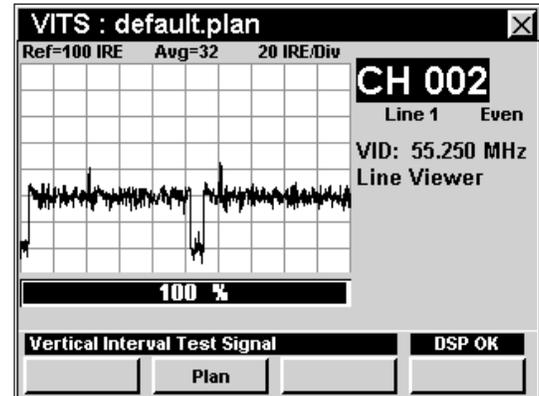
> **Note: VITS** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **VITS** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **VITS** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Setting Averaging Type

To set the averaging type, use the ◄ ► buttons to highlight **Avg=** and then use the ▲ ▼ buttons to set the averaging type to Avg 16, 32, 64, 128, or 256 as desired.

Increasing **Avg** will slow down test times but results in more accurate results. For improved results, set **Avg** to at least 64.
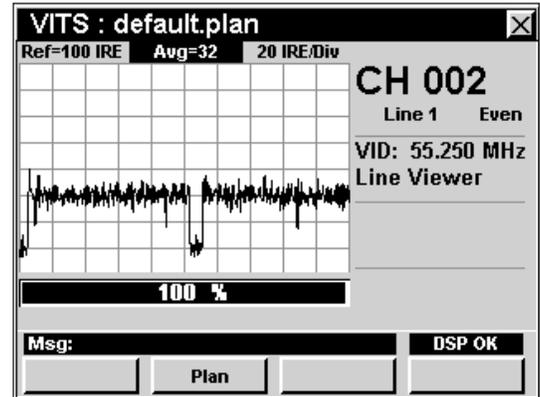
Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the Ent button.

You may enter any channel number in your plan. If the channel is not designated as analog in your plan or the channel is scrambled, the message **VITS Not Available** will be displayed in the status bar at the bottom of the screen and the instrument will beep.

Setting Line Number

To change the line number, use the ◄ ► buttons to highlight the line number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel line number using the alphanumeric keypad, and then press the Ent button.

TRILITHIC
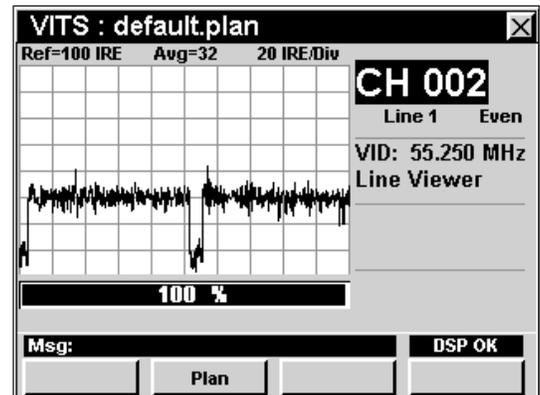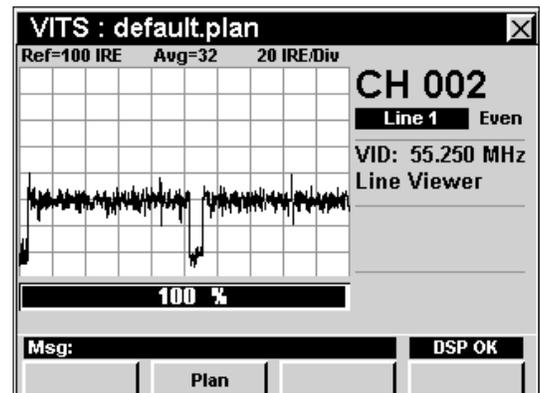
Setting Even/Odd Fields

To change between even and odd fields, use the
◄ ► buttons to highlight the **Even/Odd** field, use the ▲
▼ buttons to change the value between **Even** and **Odd**.

```
VITS : default.plan                    ☒
Ref=100 IRE      Avg=32      20 IRE/Div
                                CH 002
                                Line 1   Even

                                VID: 55.250 MHz
                                Line Viewer

              100 %

Msg:                              DSP OK
                     Plan
```
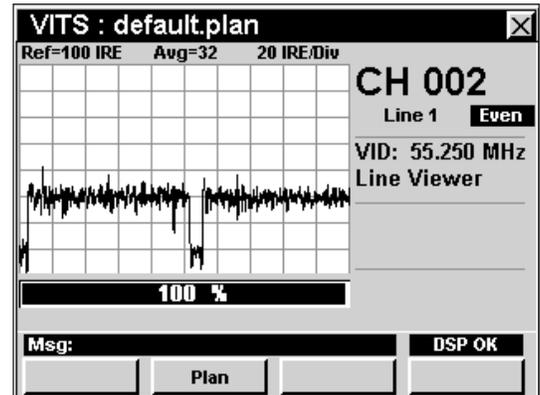
Setting Test Type

To set the type of test to perform, use the ◄ ► buttons to highlight the test type field, use the
▲ ▼ buttons to increment change the value between **Line Viewer**, **Diff Gain/Phase**, **Chroma Delay**, or **In Channel Response**.

Line Viewer

When the test type is set to **Line Viewer** the instrument simply displays the VITS signal using a line viewer. No measurements are made when this test type is selected and the progress bar will always show **0%**.

```
VITS : default.plan                    ☒
Ref=100 IRE      Avg=16      20 IRE/Div
                                CH 007
                                Line 17   Odd

                                VID: 175.250 MHz
                                Line Viewer

              0%

Msg:                              DSP OK
                   CH PLAN
```
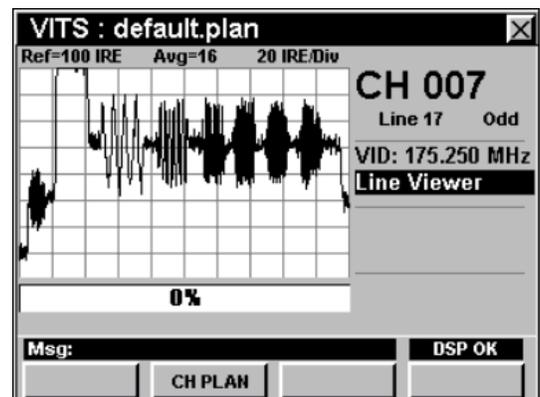
Differential Gain and Phase

When the test type is set to **Diff Gain/Phase** the instrument will measure and display the differential gain and phase.

- **Differential Gain** - This is the change in amplitude of the chrominance signal as a function of the amplitude of the associated luminance signal.

- **Differential Phase** - This is the change in phase of the chrominance signal as a function of the amplitude of the associated luminance signal.
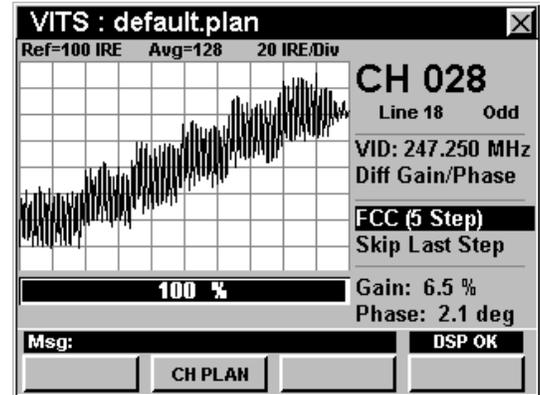
The progress bar will show the status of the test.

Note: The test will not start until the appropriate line, field, and signal type have been selected.

Changing Test Signal Type

To change the test signal type, use the ◄ ► buttons to highlight the test signal type field, use the ▲ ▼ buttons to change the value between **FCC (5 Step)**, **FCC (10 Step)**, **NTC7 (5 Step)**, or **NTC7 (10 Step)**.
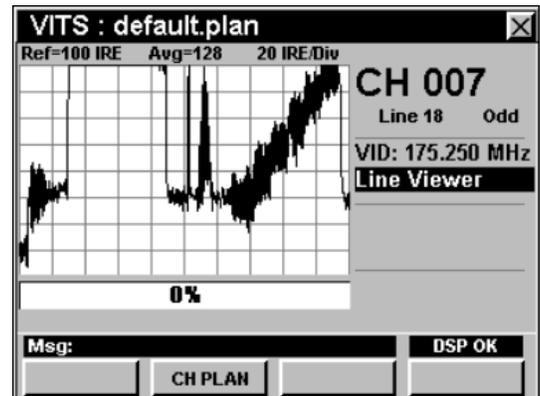
Including / Skipping Last Step

To include or skip the last step of the chrominance staircase when measuring the differential gain and phase, use the ◀ ▶ buttons to highlight the last step field, use the ▲ ▼ buttons to change the value between **Include Last** and **Skip Last Step**.

Typically the last step is skipped due to clipping circuitry contained in modulators.
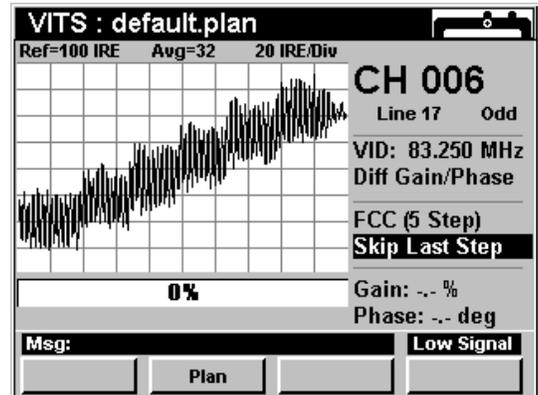
Chrominance-Luminance Delay

When the test type is set to **Chroma Delay** the instrument will measure and display the chrominance-luminance delay. This is the change in delay time of the chrominance component of the signal relative to the luminance component after passing through the system.

The progress bar will show the status of the test.
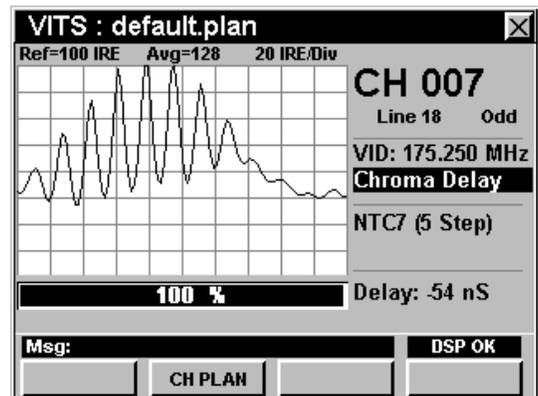
Note: The test will not start until the appropriate line, field, and signal type have been selected.

Changing Test Signal Type

To change the test signal type, use the ◀ ▶ buttons to highlight the test signal type field, use the ▲ ▼ buttons to change the value between **FCC (5 Step)**, **FCC (10 Step)**, **NTC7 (5 Step)**, or **NTC7 (10 Step)**.
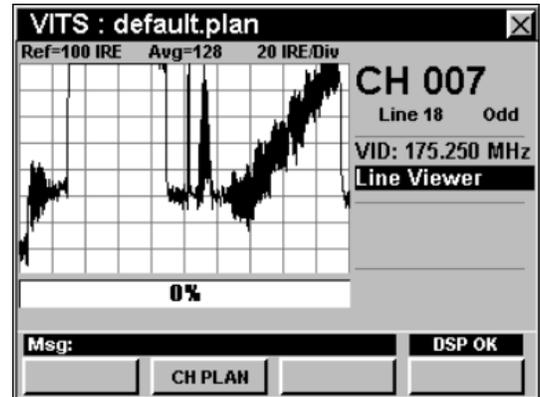
In-Channel Response

When the test type is set to **In Channel Resp** the instrument will measure and display the in-channel flatness of the TV passband frequency response.

The FCC requires that the in-channel response be within +/- 2 dB for a range of 0.75 MHz to 5 MHz above the lower boundary frequency of the channel (0.5 MHz to 3.58 MHz above the visual carrier may be used instead).

Typically a multiburst signal is used for this measurement. This signal usually includes six bursts of discrete frequencies that range from 0.5 MHz to 4.1 MHz.

By looking at the spectrum of the multiburst signal, it is possible to measure in-channel response by comparing the maximum variation in the magnitudes of each discrete burst frequency to the FCC limit.

The progress bar will show the status of the test.
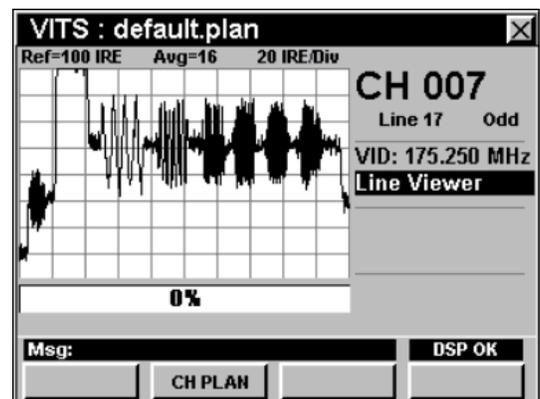
Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the `Plan` softkey. The **Open File** window will open. Use the ◀ ▶ ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the **Ent** button.

The instrument will tune to the channels defined as analog in your channel plan.

You must have a system channel plan that is up to date in order to view the channels in your system.
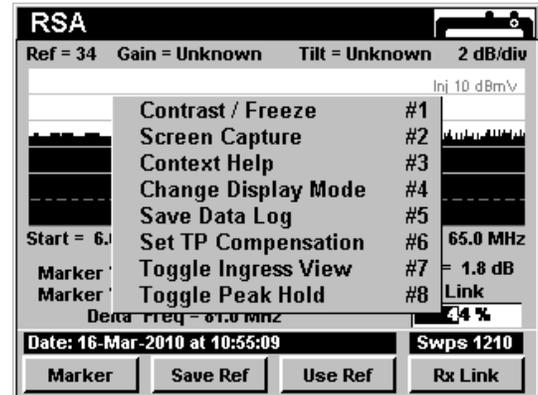
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **VITS** Mode.

The following **Function** Menu options can be accessed while in **VITS** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help
- Save Data Log

TRILITHIC
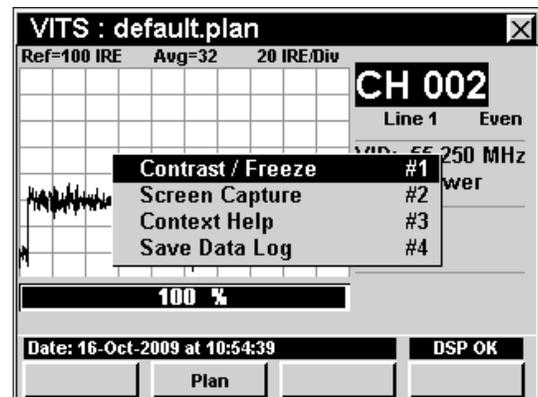
Introduction

The Error Vector Spectrum Menu (**QAM EVS**) allows the operator to tune the meter to a downstream QAM channel and display its error vector spectrum to reveal noise and ingress that may be present under the QAM channel. This feature is a component of the QA-1 option for the 860 DSP and QA-2 option for the 860 DSPi, and will present itself when the unit is updated with the January 2008 firmware. 860 DSPi owners may activate the QA-2 option and 860 DSP owners may activate the QA-1 option in the field by purchasing a key code.

This section will provide you with the basic understanding of how to use **QAM EVS** Mode including:

- Required Setup

- QAM EVS Support

- Using QAM EVS Mode

- Adjusting Marker

- Setting Vertical Resolution

- Setting Reference Level

- Adjusting Channels

- Adjusting Digital Frequencies

- Setting Channel Plan

- Function Menu Options
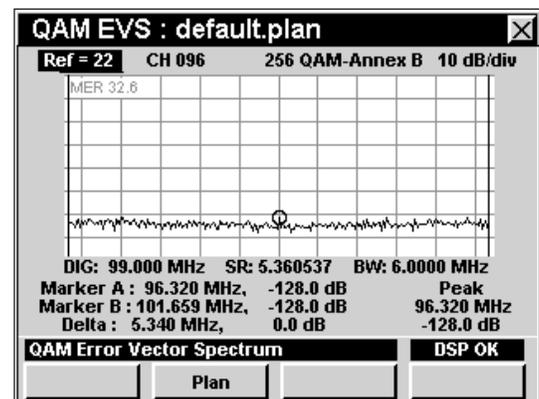
Required Setup

To use **QAM EVS** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **QAM EVS** Mode, you will need to set up the **QAM EVS** Mode. Be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Digital Settings* before proceeding through this chapter.

Using QAM EVS Mode

The QAM EVS test can be performed on a channel from a specified channel plan or custom user entered QAM channel. The mode of operation is a cross between the **QAM** Mode and the **Spectrum Analyzer** mode.

As soon as the operator enters the **QAM EVS** Mode, it is tuned to the last tuned channel in the **QAM** Mode. The operator can then adjust the reference (top line of spectrum display), the digital channel, the modulation, the frequency, the symbol rate, the bandwidth, and the dB per division.

The center frequency of the display is the center frequency of the channel. The span of the display is the channel's symbol rate.

When the unit locks onto the QAM signal, the error vector spectrum is plotted. The user can also see the current MER in the upper left of the graph. The markers and peak can be used to help determine the frequency of unwanted signals present in the QAM channel.

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◄ ► buttons to highlight **Ref=** and then adjust the current value using the ▲ ▼ buttons.

TRILITHIC

Adjusting Channels

To change the channel, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

QAM EVS : default.plan

Ref = 22   CH 097   256 QAM-Annex B   10 dB/div
MER 32.6

DIG: 105.000 MHz   SR: 5.360537   BW: 6.0000 MHz
Marker A : 102.320 MHz,   -128.0 dB   Peak
Marker B : 107.659 MHz,   -128.0 dB   102.320 MHz
  Delta :   5.340 MHz,   0.0 dB   -128.0 dB
Msg: DSP OK
                Plan

Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◄ ► buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.

QAM EVS : default.plan

Ref = 22   CH 097   256 QAM-Annex B   10 dB/div
MER 32.6

DIG: 105.000 MHz   SR: 5.360537   BW: 6.0000 MHz
Marker A : 102.320 MHz,   -128.0 dB   Peak
Marker B : 107.659 MHz,   -128.0 dB   102.320 MHz
  Delta :   5.340 MHz,   0.0 dB   -128.0 dB
Msg: DSP OK
                Plan

Adjusting Digital Frequency

To change the DIG frequency, use the ◄ ► buttons to highlight the channel number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number using the alphanumeric keypad, and then press the (Ent) button.

QAM EVS : pittsburg.plan

Ref = 22   CH 002   256 QAM-Annex B   10 dB/div
MER 32.6

DIG: 55.250 MHz   SR: 5.360537   BW: 6.0000 MHz
Marker A : 52.570 MHz,   -128.0 dB   Peak
Marker B : 57.909 MHz,   -128.0 dB   52.570 MHz
  Delta :   5.340 MHz,   0.0 dB   -128.0 dB
Msg: DSP OK
                Plan

Adjusting Marker

To change the marker, use the ◄ ► buttons to highlight the marker frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency number using the alphanumeric keypad, and then press the (Ent) button.
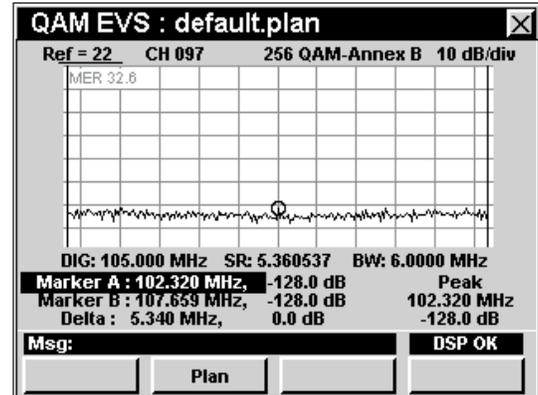
```
QAM EVS : default.plan                              ☒
Ref = 22    CH 097           256 QAM-Annex B  10 dB/div
MER 32.6


DIG: 105.000 MHz   SR: 5.360537   BW: 6.0000 MHz
Marker A : 102.320 MHz,   -128.0 dB          Peak
Marker B : 107.659 MHz,   -128.0 dB      102.320 MHz
Delta :   5.340 MHz,       0.0 dB        -128.0 dB
Msg:                                          DSP OK
                        Plan
```

Setting Channel Plan

The instrument tunes channels according to a predefined channel plan. The currently selected plan is displayed in the title bar. To change the channel plan press the [Plan] softkey. The **Open File** window will open. Use the ◄ ► ▲ ▼ buttons to select the channel plan you want from the list of channel plans available, and then press the (Ent) button.

The instrument will tune to the channels defined as analog in your channel plan.

You must have a system channel plan that is up to date in order to view the channels in your system.

```
QAM EVS : default.plan
Ref = 22    CH 096           256 QAM-Annex B  10 dB/div
MER 19.5
Open Selected File?                             ☒
Flash Drive B                               .plan
tw amp.plan      t2.plan          flagstaff.plan
trilithic.plan   pittsburg.plan   joes plan.plan
tri_test.plan    psipany.plan     default.plan
tri_defau.plan   ltb1.plan        apps01.plan

Delta :   5.340 MHz,       0.0 dB        -128.0 dB
QAM Error Vector Spectrum                      DSP OK
                        Plan
```

Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **QAM EVS** Mode.

The following **Function** Menu options can be accessed while in **QAM EVS** Mode:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

- Set TP Compensation

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Set TP Compensation
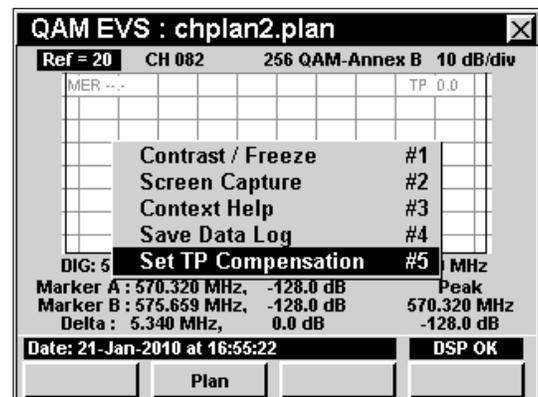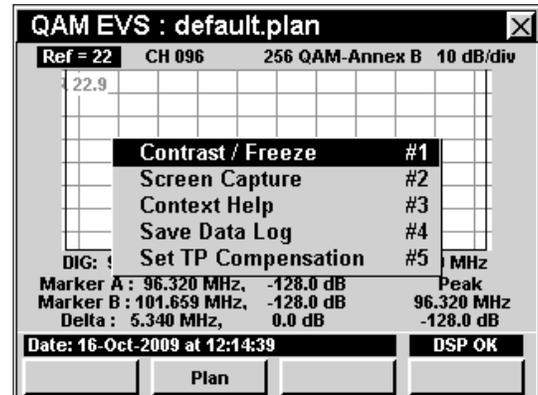
To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Set TP Compensation**, and then press the (Ent) button. You may also select **Set TP Compensation** by pressing (5).

Introduction

The 860 DSPi TraffiControl option can be used to display the ingress that is present "underneath" an upstream cable modem channel, or any bursty signal.

This section will provide you with the basic understanding of how to use **TraffiControl** Mode including:

- Required Setup
- Using TraffiControl Mode
- Setting Reference Level
- Setting Vertical Resolution
- Adjusting Digital Frequency
- Adjusting Bandwidth
- Adjusting Marker
- Adjusting Trigger
- Function Menu Options
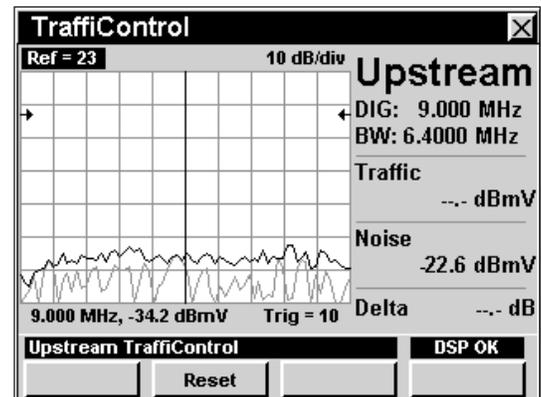
Required Setup

To use **TraffiControl** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Using TraffiControl Mode

The **TraffiControl** Mode provides a fixed frequency span of 8 MHz. The user enters the center frequency of the upstream cable modem signal (DIG:), and the bandwidth (BW:). (DOCSIS and Euro DOCSIS upstream bandwidths are 200 kHz, 400 kHz, 800 kHz, 1600 kHz, 3200 kHz, or 6400 kHz).

The TraffiControl display shows three traces: a Traffic trace, a Live Noise trace, and a Peak Noise trace. The Traffic trace (gray) shows the last captured signal containing traffic. The Live Noise trace (gray) shows the last captured signal without traffic. The Peak Noise trace (black) shows a persistent peak hold of the noise trace. This simple and comprehensive display enables a user to see what is currently happening, as well as capture peak interference levels of transient signals during the time that the measurement is being made.

Setting Reference Level

On the bar graph, vertical displacement represents signal strength. The amplitude represented by the top horizontal line on the graph is the reference level.

To change the reference level, use the ◄ ► buttons to highlight **Ref=** and then adjust the value using the ▲ ▼ buttons.
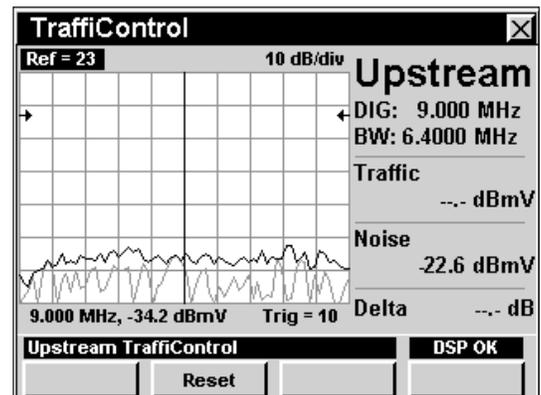
Setting Vertical Resolution

The **XX dB/Div** sets the vertical resolution for the graph. To change the vertical resolution, use the ◀ ▶ buttons to highlight **XX dB/Div** and then use the ▲ ▼ buttons to set the vertical resolution to 1 dB, 2 dB, 5 dB, or 10 dB per division as desired.

Selecting a low value will magnify the differences in the amplitudes of the displayed signals, but will limit the range of amplitudes that will fit on the graph.
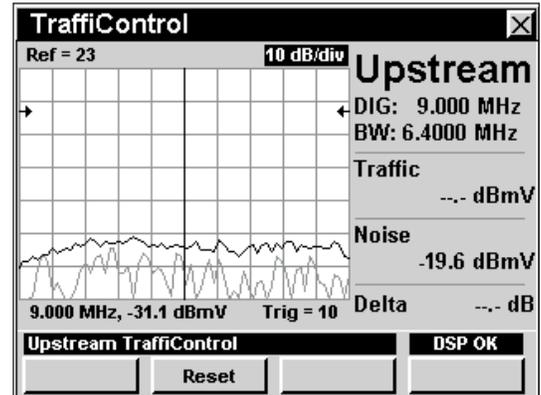
Adjusting Digital Frequency

The center frequency of the display can be changed by adjusting the digital frequency (**DIG**).

To change the **DIG** frequency, use the ◀ ▶ buttons to highlight **DIG:**, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency using the alphanumeric keypad, and then press the **Ent** button.
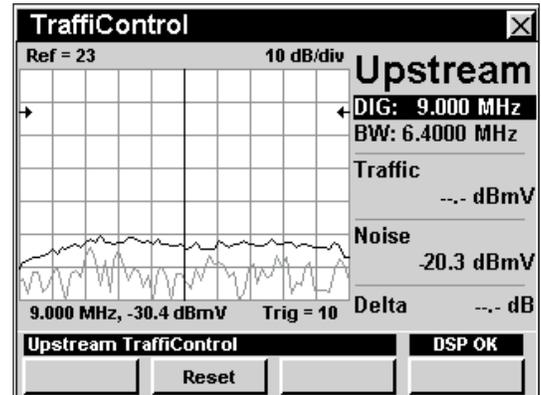
Adjusting Bandwidth Frequency

The bandwidth frequency of the display can be changed by adjusting the bandwidth frequency (**BW**).

To change the bandwidth frequency, use the ◀ ▶ buttons to highlight **BW:**, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency using the alphanumeric keypad, and then press the **Ent** button.
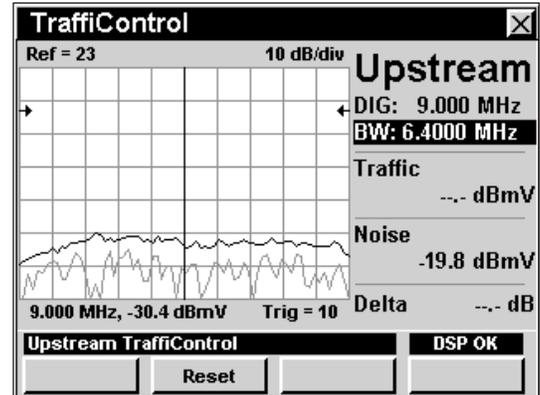
Adjusting Marker

To adjust the position of the marker on the display, use the ◀ ▶ buttons to highlight the marker and amplitude readout. Use the ▲ ▼ buttons to position the marker along the display.

The frequency and amplitude of the signal beneath the marker will be displayed in the readout.
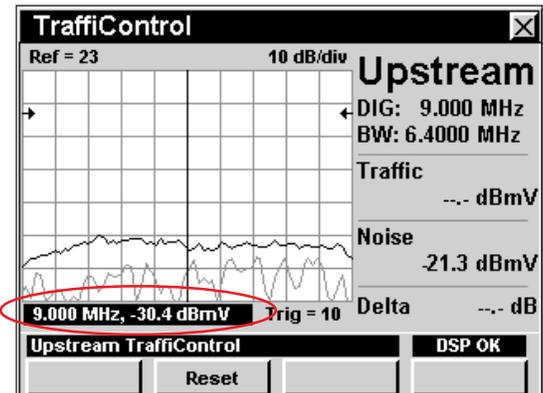
Adjusting Trigger

The trigger of the display can be changed by adjusting the trigger level (**Trig**). The recommended level is approximately 10 dB below the level of the traffic signal.

To change the trigger level, use the ◀ ▶ buttons to highlight **Trig =**. Use the ▲ ▼ buttons to increment the value up and down in one dB increments.

The Reset soft key will re-trigger the signal and refresh the screen with the data captured during the reset cycle.
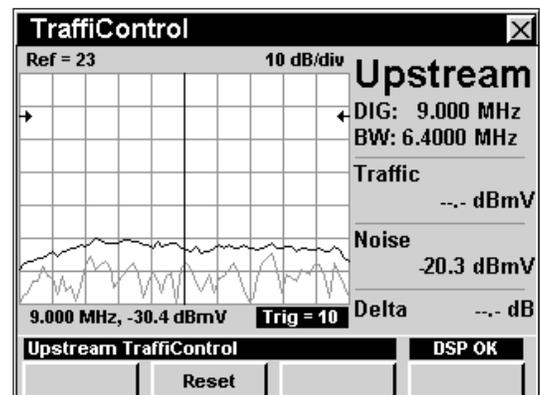
Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **TraffiControl** Mode.

The following **Function** Menu options can be accessed while in **TraffiControl** Mode, and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log
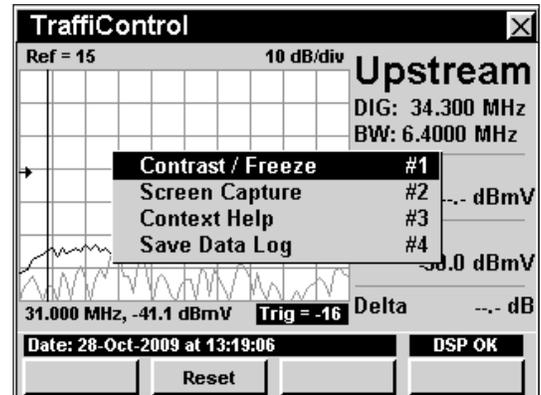
860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section IV: Setup Functions

TRILITHIC

Setup Function Overview

Introduction

The instrument enables you to select from numerous instrument setup and procedures. The instruments features several Setup Functions which come with the instruments and may have one or more optional functions.

This section will provide you with instructions on how to utilize the functions available in the **Setup** Menu of the instrument:

> **Note:** The labels and the arrangement of the icons in this section are the default settings of the instrument. The user's display appearance may be customized and therefore may differ from the **Setup** menu shown in this section. WorkBench software is required for customizing. See the WorkBench operation manual for more details.
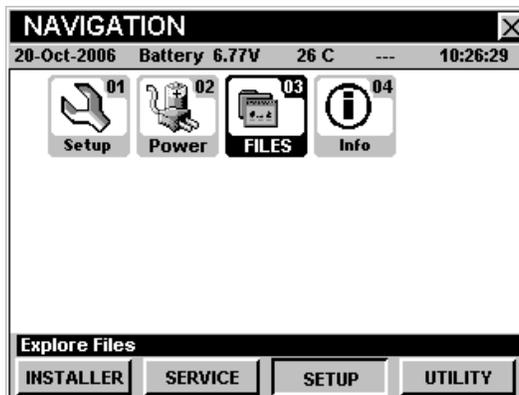
Mode	Description	860 DSP Option	860 DSPi Option
Instrument Setup	Allows you set the general preferences for data display and data functionality.	Standard	Standard
Power Management	Allows you to change power management settings for Power Scheme, Processor Speed, Backlight Level, Unit Off Timer and Backlight Timer.	Standard	Standard

Mode	Description	860 DSP Option	860 DSPi Option
File Explorer	Allows you to perform file maintenance functions such as previewing and deleting files.	Standard	Standard
Instrument Information	Provides information about the 860 DSPi system's operation capabilities.	Standard	Standard

Each mode of the instrument can be accessed by selecting the corresponding icon as shown in the previous table. Some modes may be inaccessible based on the options that have been installed on the instrument. Optional modes for the 860 DSP and 860 DSPi are indicated by an option code that is described in detail in **Section I: The Basics**, Chapter 7: Optional Software and Hardware.

This section assumes you are at least familiar with the basic operation of the navigational tools used in the instrument, so be sure to review **Section I: The Basics**, Chapter 4: Basic Navigation before proceeding through this section.

Introduction

There are several settings that can be accessed from the **Instrument Setup** Mode. The basic 860 DSP and 860 DSPi come equipped with the **Instrument Setup** Mode as a standard feature.

To select the parameter that you wish to setup, use the ◄ ► buttons to highlight the desired setting and then press the (Ent) button.

Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Global Settings
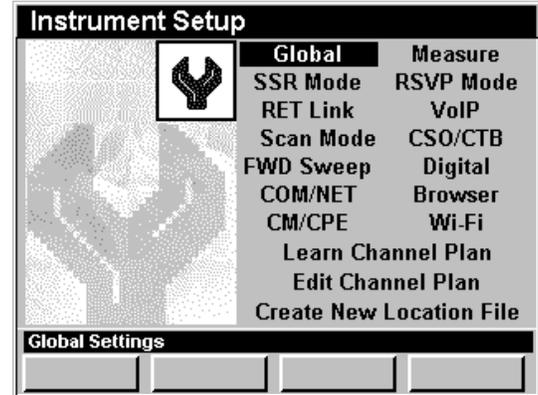
Note: Although the instrument will cycle through the settings in order and this chapter follows that order, you **DO NOT** have to setup the parameters in this order.

When a setup parameter is selected, the instrument will display a new window to enter data by using the alphanumeric keypad or the ◄ ► ▲ ▼ buttons.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Note: All changes that are made in the **Instrument Setup** Mode, will take affect immediately unless otherwise noted.

Note: Depending on options installed on you instrument, you may not need to setup all the parameters shown. Optional setup items will be "grayed out" if you do not have them installed on your instrument. To view the installed functions on your instrument, see Chapter 5: Instrument Information Mode.

Note: It is possible to lock users out of the **Instrument Setup** Mode by using the WorkBench Software.

Global Settings

This section will show you how to adjust your instrument's **Global Settings**. The **Global Settings** window allows you to assign various global characteristics to your instrument. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Global Settings** including:

- Operator Name
- Company Name
- Keyboard Beeps
- Current Language
- Current Date and Time
- Web Server Port
- Web Server Port Security
- Web Server Offset
- Notepad Utility
- Screen Capture

Instrument Setup

	Global	Measure
	SSR Mode	RSVP Mode
	RET Link	VoIP
	Scan Mode	CSO/CTB
	FWD Sweep	Digital
	COM/NET	Browser
	CM/CPE	Wi-Fi
	Learn Channel Plan	
	Edit Channel Plan	
	Create New Location File	

Global Settings

Global Settings ☒

Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	17-Oct-2009 01:36:32
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter to Adjust

TRILITHIC

Operator Name

The **Operator Name** setting allows you personalize your instrument with your name. It will be displayed on the introduction screen when your instrument is turned on. This information will also be added to every data log.

To change the operator name, use the ◄ ► buttons to highlight the **Operator Name** field, press the

(Ent) button, enter the operator name using the

alphanumeric keypad, and then press the (Ent) button. As many as 32 characters can be entered, however only 24 characters will be displayed.

```
Global Settings                               ×
        Operator Name     Remote Control 3
        Company Name            TRI
       Keyboard Beeps          Yes
            Language        english.lang
    Current Date/Time   17-Oct-2009      01:36:32
     Web Server Port        80         Unsecure
    Web Server Offset      -300 mins from GMT
      Notepad Utility      Browser Notepad
      Screen Capture       Standard BMP
 Press Enter to Adjust
```
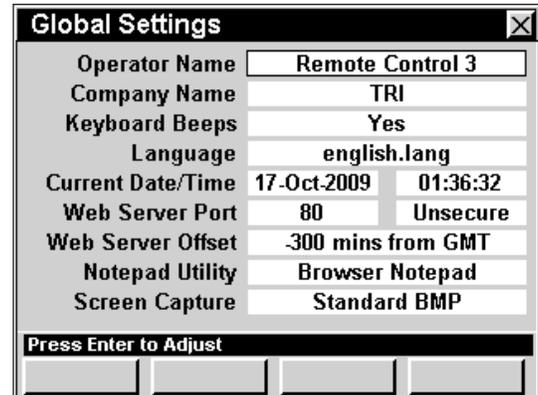
Company Name

The **Company Name** setting allows you to personalize your instrument with your company's name. It will be displayed on the introduction screen when your instrument is turned on. This information will also be added to every data log.

To change the company name, use the ◄ ► buttons to highlight the **Company Name** field, press the

(Ent) button, enter the company name using the

alphanumeric keypad, and then press the (Ent) button.

```
Global Settings                               ×
        Operator Name     Remote Control 3
        Company Name            TRI
       Keyboard Beeps          Yes
            Language        english.lang
    Current Date/Time   17-Oct-2009      01:36:32
     Web Server Port        80         Unsecure
    Web Server Offset      -300 mins from GMT
      Notepad Utility      Browser Notepad
      Screen Capture       Standard BMP
 Press Enter to Adjust
```
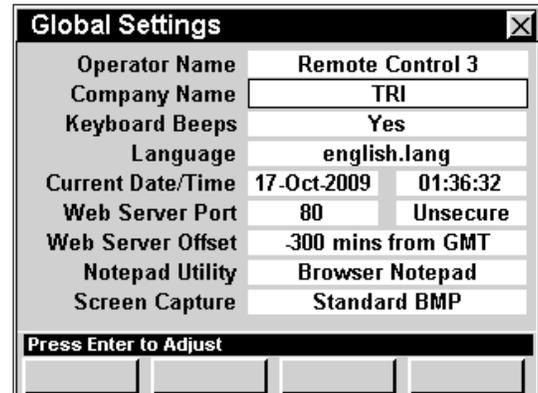
Keyboard Beeps

Your instrument is equipped with an audio speaker for you to hear various functions, including keyboard beeps whenever you push any button. The default for keyboard beeps is **YES**.

To change this setting, use the ◄ ► buttons to highlight the **Keyboard Beeps** field, and then use

the (Ent) button and/or ▲ ▼ buttons to select **Yes** or **No**.

- • Select **Yes** to hear the keyboard beeps.

- • Select **No** to mute the keyboard beeps.

```
Global Settings                               ×
        Operator Name     Remote Control 3
        Company Name            TRI
       Keyboard Beeps          Yes
            Language        english.lang
    Current Date/Time   17-Oct-2009      01:36:32
     Web Server Port        80         Unsecure
    Web Server Offset      -300 mins from GMT
      Notepad Utility      Browser Notepad
      Screen Capture       Standard BMP
 Press Enter to Adjust
```
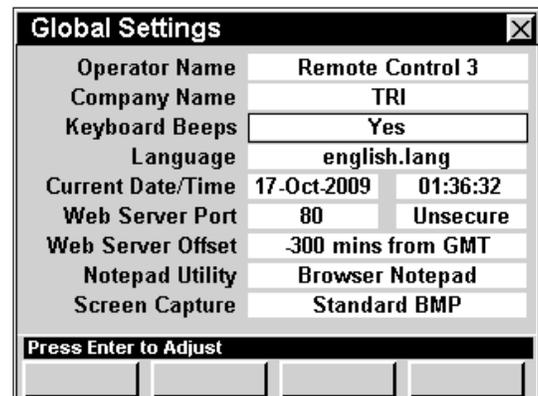
Language

Your instrument can be equipped to work in various languages. The default language is English. Contact the factory for other language options.

If you have other language options available on your instrument, you can change the default language.

Use the ◄ ► buttons to highlight the **Language** field, and then use the (Ent) button or ▲ ▼ buttons to select the default language.

Global Settings ☒

Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	17-Oct-2009 01:36:32
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter to Adjust

Note: You must restart your instrument for this change to take effect.

Current Date

You can program your instrument to display the current date in the status bar of your display screen.

To change the current date, use the ◄ ► buttons to highlight the left-most field next to **Current Date/ Time**, press the (Ent) button, enter the current date using the alphanumeric keypad, and then press the (Ent) button.

The date should be entered using the mm/dd/yyyy format.

Global Settings ☒

Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	17-Oct-2009 01:36:32
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter to Adjust

Note: The date will automatically save once all of the numbers in the mm/dd/yyyy format are entered. If you enter an invalid date, the current date will not change.

Current Time

You can program your instrument to display the current time in the status bar of your display screen.

To change the current time, use the ◀ ▶ buttons to highlight the right-most field next to **Current Date/ Time**, press the (Ent) button, enter the current time using the alphanumeric keypad, and then press the (Ent) button.

The time should be entered using the hh:mm:ss format. Note that the time is in 24-hour, or military format.

Global Settings	✕
Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	20-Oct-2009 10:55:29
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter or Numeric Keypad to Adjust
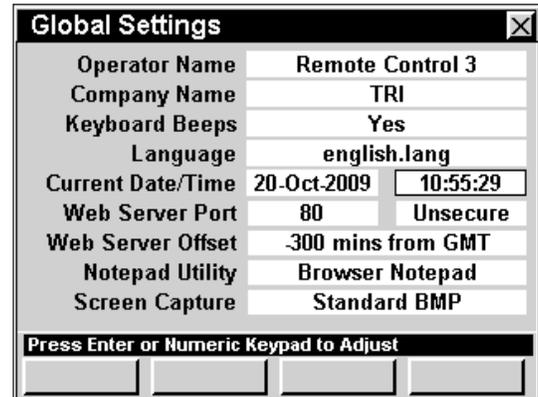
> **Note:** The time will automatically save once all of the numbers in the hh:mm:ss format are entered. If you enter an invalid time, the current time will not change.

Web Server Port

Your instrument may be equipped with **Remote Control** Mode.

The **Web Port** setting allows you to specify the port in which your instrument will be communicating with the network and if the port is Secure or Unsecure.

The web server default port is set to Port 80.

To change the web port, use the ◀ ▶ buttons to highlight the **Web Server Port** field, and use the ▲ ▼ buttons to increment the value by 1, or press the (Ent) button, enter the number of the desired web port using the alphanumeric keypad, and then press the (Ent) button.

Global Settings	✕
Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	17-Oct-2009 01:36:32
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter to Adjust

To change the web port security, use the ◀ ▶ buttons to highlight the **Web Server Port** (Secure/Unsecure) field, and use the ▲ ▼ and/or (Ent) buttons to change the security of the web port.
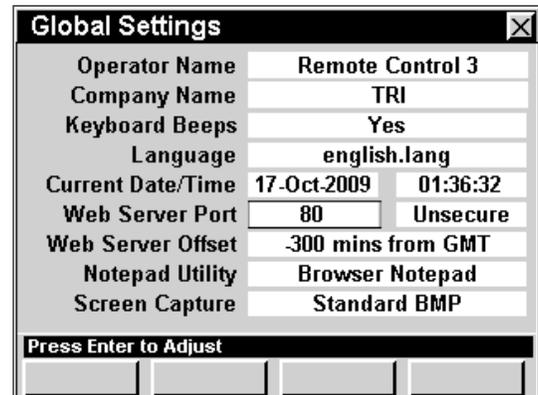
> **Note:** You must restart your instrument for this change to take effect.

Web Server Offset

Web browser's uses Greenwich Mean Time (GMT) for the universal time while browsing Internet pages. This effects both the internal **Web Browser** Mode and **Remote Control** Mode.

The **Web Server Offset** setting allows you specify the time difference between your current time and GMT. The default is set for -300 minutes (5 hours behind GMT).

To change the web server offset, use the ◄ ► buttons to highlight the **Web Server Offset** field, and use the (Ent) or ▲ button to decrease the time difference in 5 minute increments or use the ▼ button to increase the time difference in 5 minute increments.

Notepad Utility

Your instrument may be equipped with a legacy notepad and/or web browser notepad.

The **Notepad Utility** setting allows you specify the type of notepad to use. The default for the notepad is **Legacy Notepad**.

To change the type of notepad, use the ◄ ► buttons to highlight the **Notepad Utility** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Legacy Notepad** and **Browser Notepad**.

> **Note:** The **Legacy Notepad** can only open text files. Whereas, the **Browser Notepad** can open text files and HTML files.

Screen Capture

The **Screen Capture** setting sets the file type for capturing and saving screen shots while using various measurement functions.

The following three file types are available:

- **Standard BMP** - Large file size.

- **Direct LCD** - Medium file size, approximately 50% smaller than **Standard BMP**.

- **Compressed BMPZ** - Very small file size, approximately 90% smaller than **Standard BMP**.

   The default screen capture type is set to **Compressed BMPZ**.

To change the screen capture type, use the ◄ ► buttons to highlight the **Screen Capture** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Standard BMP**, **Direct LCD,** and **Compressed BMPZ**.
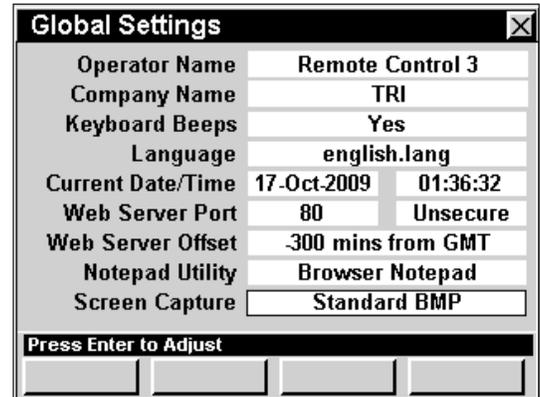
> **Note:** Choosing a smaller file size will allow you to save more screen captures on you instrument at any one time.

Global Settings	✕
Operator Name	Remote Control 3
Company Name	TRI
Keyboard Beeps	Yes
Language	english.lang
Current Date/Time	17-Oct-2009 01:36:32
Web Server Port	80 Unsecure
Web Server Offset	-300 mins from GMT
Notepad Utility	Browser Notepad
Screen Capture	Standard BMP

Press Enter to Adjust

Setup

Measurement Settings

This section will show you how to adjust your instrument's **Measurement Settings**. The **Measurement Settings** window allows you to assign various measurement characteristics to your instrument. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

This section will provide you with a basic understanding of how to modify the **Measurement Settings** including:

- Temperature Units
- Measurement Units
- Analog Noise BW
- Optimal Modulation
- Channel Spacing
- Hum Type (50/60 Hz)
- Screen Capture Type
- Test point
- Test point / Probe Value
- Data Log Attachments
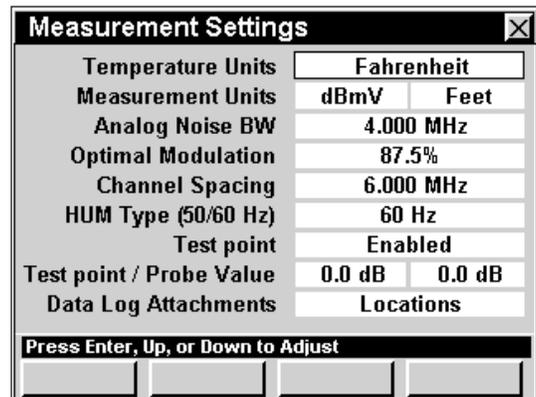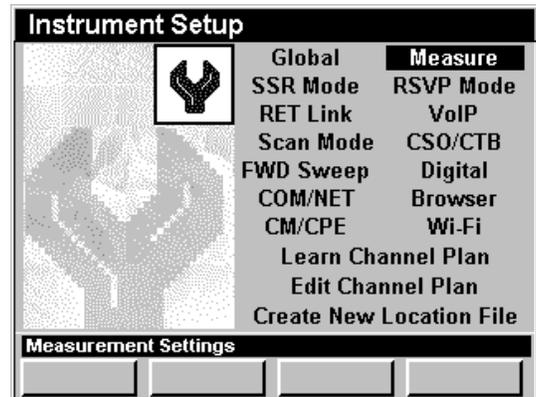
Temperature Units

Your instrument is equipped to display temperature readings in two temperature units; **Celsius** or **Fahrenheit**. The default unit for temperature is **Celsius**.

To change the temperature units, use the ◄ ► buttons to highlight the **Temperature Units** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Celsius** and **Fahrenheit**.

Measurement Settings	☒
Temperature Units	Fahrenheit
Measurement Units	dBmV Feet
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5%
Channel Spacing	6.000 MHz
HUM Type (50/60 Hz)	60 Hz
Test point	Enabled
Test point / Probe Value	0.0 dB 0.0 dB
Data Log Attachments	Locations

Press Enter, Up, or Down to Adjust

Measurement Units

Your instrument is equipped to display three different measurement units; **dBmV**, **dBµV,** and **dBm** in either **feet** or **meters**. The default unit for measurement is **dBmV**.

To change the **dBmV**, **dBµV,** and **dBm** measurement units, use the ◄ ► buttons to highlight the **Measurement Units** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **dBmV**, **dBµV**, and **dBm**.

Measurement Settings	☒
Temperature Units	Fahrenheit
Measurement Units	dBmV Feet
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5%
Channel Spacing	6.000 MHz
HUM Type (50/60 Hz)	60 Hz
Test point	Enabled
Test point / Probe Value	0.0 dB 0.0 dB
Data Log Attachments	Locations

Press Enter, Up, or Down to Adjust

To change the **feet** and **meter** measurement units, use the ◄ ► buttons to highlight the **Measurement Units** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **feet** and **meter**.

Measurement Settings	☒
Temperature Units	Fahrenheit
Measurement Units	dBmV Feet
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5%
Channel Spacing	6.000 MHz
HUM Type (50/60 Hz)	60 Hz
Test point	Enabled
Test point / Probe Value	0.0 dB 0.0 dB
Data Log Attachments	Locations

Press Enter, Up, or Down to Adjust

Analog Noise BW

The **Analog Noise BW** setting is the noise bandwidth used when computing C/N for analog TV channels. The default analog noise bandwidth is **4.000 MHz**.

To change the analog noise bandwidth, use the ◄ ► buttons to highlight the **Analog Noise BW** field, and use the ▲ ▼ buttons to change the bandwidth in 0.05 MHz increments, or press the (Ent) button, enter the bandwidth using the alphanumeric keypad, and then press the (Ent) button.

Measurement Settings	⊠	
Temperature Units	Fahrenheit	
Measurement Units	dBmV	Feet
Analog Noise BW	4.000 MHz	
Optimal Modulation	87.5%	
Channel Spacing	6.000 MHz	
HUM Type (50/60 Hz)	60 Hz	
Test point	Enabled	
Test point / Probe Value	0.0 dB	0.0 dB
Data Log Attachments	Locations	

Press Enter, Up, or Down to Adjust
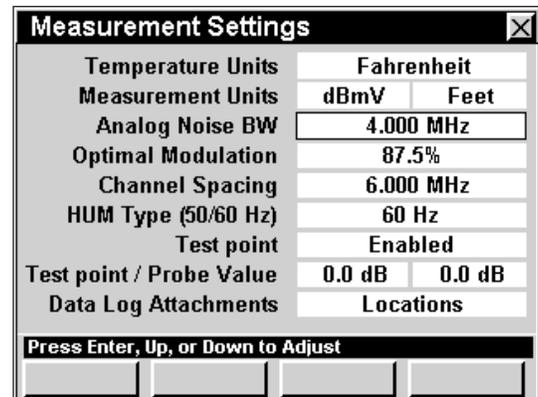
Optimal Modulation

The **Optimal Modulation** setting sets the marker on the % modulation bar graph. It is also used to compute signal level in SECAM L. The default percent modulation is set at **87.5%**.

To change the optimal modulation, use the ◄ ► buttons to highlight the **Optimal Modulation** field, and use the (Ent) or ▲ button to increase the percent modulation in 0.1% increments or use the ▼ button to decrease the percent modulation in 0.1% increments.

Measurement Settings	⊠	
Temperature Units	Fahrenheit	
Measurement Units	dBmV	Feet
Analog Noise BW	4.000 MHz	
Optimal Modulation	87.5%	
Channel Spacing	6.000 MHz	
HUM Type (50/60 Hz)	60 Hz	
Test point	Enabled	
Test point / Probe Value	0.0 dB	0.0 dB
Data Log Attachments	Locations	

Press Enter, Up, or Down to Adjust
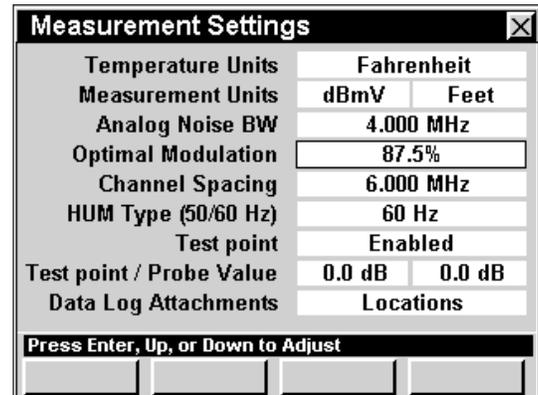
Channel Spacing

The **Channel Spacing** setting is used as one of the frequency step sizes you can select when tuning by frequency. The default channel spacing frequency is **6 MHz**.

To change the channel spacing, use the ◄ ► buttons to highlight the **Channel Spacing** field, and use the (Ent) or (▲) button to change the channel spacing in 0.025 MHz increments or press the (Ent) button, enter the channel spacing using the

alphanumeric keypad, and then press the (Ent) button again.

Hum Type (50/60 Hz)

This frequency is used when measuring power line related Hum. You can set the AC power frequency for either **50** or **60 Hz**. The default AC power frequency is **60 Hz**.

To change the number of AC power frequency, use the ◄ ► buttons to highlight the **Hum Type (50/60 Hz)** Field, and use the (Ent) or (▲) (▼) buttons to change between **50** and **60 Hz**.

Test point

The **Test point** setting allows you to enable and disable the constant offset that will be added to all measurements made in **Level**, **QAM**, **Tilt**, **Scan**, **Spectrum Analyzer**, **C/N**, and **CSO/CTB** Modes in order to have the unit automatically adjust the data to overcome test point losses. The default setting is **Disabled**.

To enable and disable test point compensation, use the ◄ ► buttons to highlight the **Test point** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Disabled** and **Enabled**.
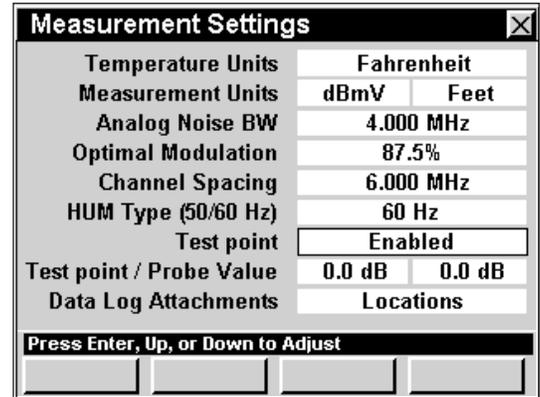
Test point / Probe Value

The **Test point / Probe Value** setting allows you to set the constant offset for the test point and/or probe that will be added to all measurements made in **Level**, **QAM**, **Tilt**, **Scan**, **Spectrum Analyzer**, **C/N**, and **CSO/CTB** Modes in order to have the unit automatically adjust the data to overcome test point losses. The default settings are **0.0 dB**.

To change the offset value for the test point, use the ◄ ► buttons to highlight the left-most field next to **Test point / Probe Value**, use the (Ent) or ▲ button to increase the offset value in 0.1 dB increments or use the ▼ button to decrease the offset value in 0.1 dB increments.
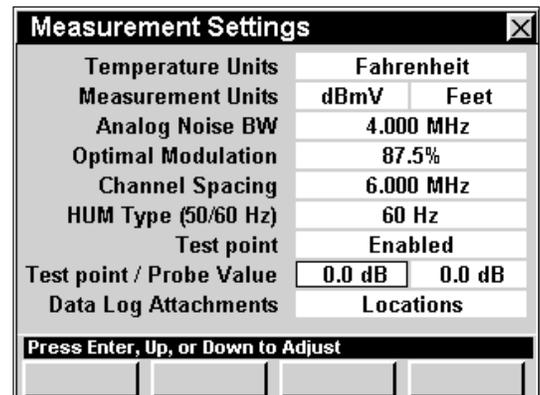
To change the offset value for the probe, use the ◄ ► buttons to highlight the right-most field next to **Test point / Probe Value**, use the (Ent) or ▲ button to increase the offset value in 0.1 dB increments or use the ▼ button to decrease the offset value in 0.1 dB increments.
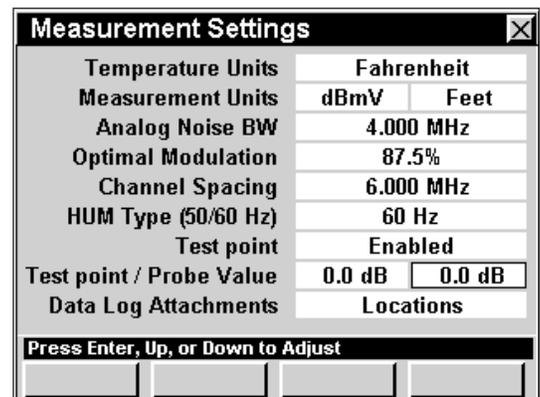
Data Log Attachments

The **Data Log Attachments** setting allows you to choose whether to assign a location and/or task to any data logs that you wish to save. The default setting is **None**.

To choose whether to assign a location and/or task to any data logs that you wish to save, use the ◀ ▶ buttons to highlight the **Data Log Attachments** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **None**, **Locations**, **Tasks**, and **Locations+Tasks**.

Measurement Settings	⊠	
Temperature Units	Fahrenheit	
Measurement Units	dBmV	Feet
Analog Noise BW	4.000 MHz	
Optimal Modulation	87.5%	
Channel Spacing	6.000 MHz	
HUM Type (50/60 Hz)	60 Hz	
Test point	Enabled	
Test point / Probe Value	0.0 dB	0.0 dB
Data Log Attachments	Locations	

Press Enter, Up, or Down to Adjust

> **Note:** For more information on saving data logs, see **Section I: The Basics**, Chapter 6: Basic Function Menu Options, *Save Data Log*.

SSR Mode Settings

This section will show you how to adjust your instrument's **SSR Mode Settings**. The **Return Sweep Settings** window allows you to assign return sweep settings to your instrument. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **SSR Mode Settings** including:

- SSR Tx Level
- SSR Link Frequency
- RSA Link Frequency
- SSR Sweep Carriers
- SSR Gain/Tilt Frequencies
- SSR Unit ID (A-F)
- RSA Unit ID (A-J)
- SSR Local Input
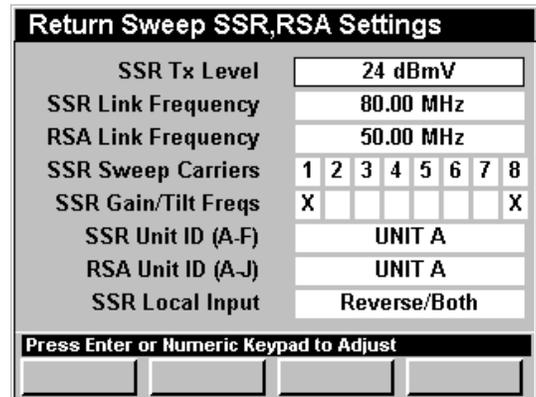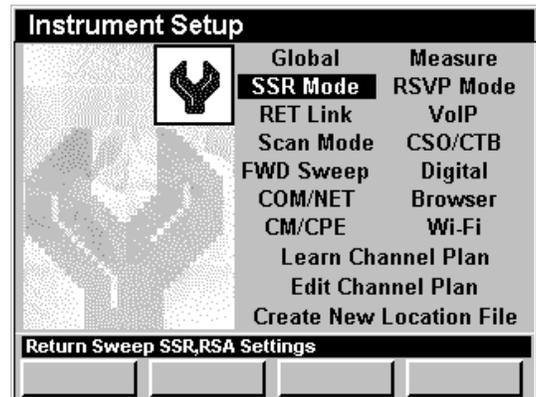
Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Return Sweep SSR,RSA Settings

Return Sweep SSR,RSA Settings

SSR Tx Level	24 dBmV
SSR Link Frequency	80.00 MHz
RSA Link Frequency	50.00 MHz
SSR Sweep Carriers	1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs	X X
SSR Unit ID (A-F)	UNIT A
RSA Unit ID (A-J)	UNIT A
SSR Local Input	Reverse/Both

Press Enter or Numeric Keypad to Adjust

> **Note: SSR** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **SSR** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

SSR Tx Level

The level of the sweep signals transmitted to a SST by the 860 DSP or 860 DSPi can be set between **20 dBmV** and **55 dBmV**. The default sweep signal level is **40 dBmV**.

To change the sweep signal level, use the ◄ ► buttons to highlight the **SSR Tx Level** field, and use the ▲ ▼ buttons to change the sweep signal level in 1 dBmV increments, or press the (Ent) button, enter the sweep signal level using the alphanumeric keypad, and then press the (Ent) button.

Return Sweep SSR,RSA Settings

SSR Tx Level	24 dBmV
SSR Link Frequency	80.00 MHz
RSA Link Frequency	50.00 MHz
SSR Sweep Carriers	1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs	X X
SSR Unit ID (A-F)	UNIT A
RSA Unit ID (A-J)	UNIT A
SSR Local Input	Reverse/Both

Press Enter or Numeric Keypad to Adjust

Note: If you use different Tx Levels in different parts of your system you can also set the Tx Level directly while using **SSR** Mode; see **Section III: Service Functions**, Chapter 9: SSR Mode, *Adjusting Tx Level*.

SSR Link Frequency

The SST in the hub communicates with field units via a downstream "link" carrier. The frequency of this carrier is set at the hub, and the **SSR Link** setting of the 860 DSP or 860 DSPi must match it. The default link frequency is **80.00 MHz**.

To set the 860 DSP or 860 DSPi to receive the "link" carrier, use the ◄ ► buttons to highlight the **SSR Link Frequency** field, and use the ▲ ▼ buttons to change the link frequency in 0.05 MHz increments, or press the (Ent) button, enter the link frequency using the alphanumeric keypad, and then press the (Ent) button.

Return Sweep SSR,RSA Settings

SSR Tx Level	24 dBmV
SSR Link Frequency	80.00 MHz
RSA Link Frequency	50.00 MHz
SSR Sweep Carriers	1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs	X X
SSR Unit ID (A-F)	UNIT A
RSA Unit ID (A-J)	UNIT A
SSR Local Input	Reverse/Both

Press Enter or Numeric Keypad to Adjust

Note: If you use different Link Frequencies in different parts of your system you can also set the Link Frequency directly while using **SSR** Mode; see **Section III: Service Functions**, Chapter 9: SSR Mode, *Adjusting Rx Link Level*.

RSA Link Frequency

The RSA in the hub communicates with field units via a downstream "link" carrier. The frequency of this carrier is set at the hub, and the **RSA Link** setting of the 860 DSP or 860 DSPi must match it. The default link frequency is **80.00 MHz**.

To set the 860 DSP or 860 DSPi to receive the "link" carrier, use the ◄ ► buttons to highlight the **RSA Link Frequency** field, and use the ▲ ▼ buttons to change the link frequency in 0.05 MHz increments, or press the (Ent) button, enter the link frequency using the alphanumeric keypad, and then press the (Ent) button.

Return Sweep SSR,RSA Settings								
SSR Tx Level	24 dBmV							
SSR Link Frequency	80.00 MHz							
RSA Link Frequency	50.00 MHz							
SSR Sweep Carriers	1	2	3	4	5	6	7	8
SSR Gain/Tilt Freqs	X							X
SSR Unit ID (A-F)	UNIT A							
RSA Unit ID (A-J)	UNIT A							
SSR Local Input	Reverse/Both							

Press Enter or Numeric Keypad to Adjust

SSR Sweep Carriers

The 860 DSP or 860 DSPi transmits up to eight sweep frequencies, which are set in the SST in the hub. The settings are transmitted to field units as part of the regular data transmissions at the "link" frequency. Normally, all of the frequencies would be active during a sweep, but it may be necessary to switch a carrier off in some parts of your system because services already occupy the frequency.

To set the sweep carriers, use the ◄ ► buttons to highlight the **SSR Sweep Carriers** field, and use the (Ent) button and/or the ▲ ▼ buttons to set the carrier to **ON** (number displayed) or **OFF** (blank, no number displayed).

```
Return Sweep SSR,RSA Settings
SSR Tx Level            24 dBmV
SSR Link Frequency      80.00 MHz
RSA Link Frequency      50.00 MHz
SSR Sweep Carriers   1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs  X               X
SSR Unit ID (A-F)       UNIT A
RSA Unit ID (A-J)       UNIT A
SSR Local Input       Reverse/Both
Press Enter, Up, or Down to Adjust
```

SSR Gain/Tilt Frequencies

Two of the eight sweep carriers that the 860 DSP or 860 DSPi transmits can be selected for automatic gain and tilt calculations. The computed values simplify gain/tilt pad selection when balancing return amplifiers.

To set the sweep carriers to use for automatic gain and tilt calculations, use the ◄ ► buttons to highlight the corresponding field next to the **SSR Gain/Tilt Freqs** field, and use the (Ent) button and/or the ▲ ▼ buttons to set the carrier (indicated with an X).

```
Return Sweep SSR,RSA Settings
SSR Tx Level            24 dBmV
SSR Link Frequency      80.00 MHz
RSA Link Frequency      50.00 MHz
SSR Sweep Carriers   1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs  X               X
SSR Unit ID (A-F)       UNIT A
RSA Unit ID (A-J)       UNIT A
SSR Local Input       Reverse/Both
Press Enter, Up, or Down to Adjust
```

Setup

SSR Unit ID (A-F)

Up to six field units may communicate with a
particular SST at one time. Each unit is identified by
a single character, "A" through "F". No two units
connected to the same SST can use the same ID
character.

To set the unit ID, use the ◄ ► buttons to highlight
the **SSR Unit ID (A-F)** field, and use the (Ent) button
and/or the ▲ ▼ buttons to cycle through the desired
unit ID.

Note: Trilithic RSVP Installer Reverse Testers, 860 DSPs, and
860 DSPi's running the **RSVP** Mode always have the Unit ID of **Unit F**.
If you have any of these devices running the **RSVP** Mode on your system,
DO NOT set the **SSR Unit ID** to **Unit F**.

RSA Unit ID (A-J)

Up to 10 field units may communicate with a
particular RSA at one time. Each unit is identified by
a single character, "A" through "J". No two units
connected to the same RSA can use the same ID
character.

To set the unit ID, use the ◄ ► buttons to highlight
the **RSA Unit ID (A-J)** field, and use the (Ent) button
and/or the ▲ ▼ buttons to cycle through the desired
unit ID.

TRILITHIC

SSR Local Input

When using the **Compare** Function in **SSR Mode** the 860 DSP or 860 DSPi needs access to both the upstream and downstream path.

The downstream connection allows the instrument to receive the link data carrier from the SST in the hub; the reverse connection is used to inject reverse sweep signals.

The SSR Local Input selects which connector the instrument will use to sample the Local Ingress in order to compare it against the SST Ingress Sample taken at the head end.

Return Sweep SSR,RSA Settings	
SSR Tx Level	24 dBmV
SSR Link Frequency	80.00 MHz
RSA Link Frequency	50.00 MHz
SSR Sweep Carriers	1 2 3 4 5 6 7 8
SSR Gain/Tilt Freqs	X ... X
SSR Unit ID (A-F)	UNIT A
RSA Unit ID (A-J)	UNIT A
SSR Local Input	Reverse/Both

Press Enter, Up, or Down to Adjust

The 860 DSP or 860 DSPi can accommodate either arrangement.

To set the local input, use the ◀ ▶ buttons to highlight the **SSR Local Input** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **SLM / Forward** or **Reverse / Both**.

RSVP Mode Settings

This section will show you how to adjust your instrument's **RSVP Mode Settings**. The **Return Test Settings** window allows you to assign return test settings to your instrument. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **RSVP Mode Settings** including:

- RSVP Max Tx Level
- RSVP Link Frequency
- RSVP Test Carriers
- RSVP C/I Threshold
- RSVP C/I Bandwidth
- RSVP C/I Samples
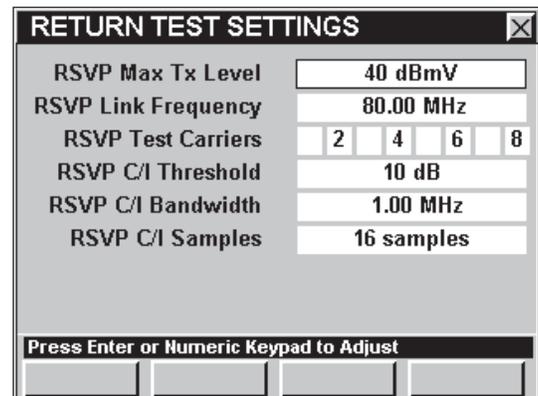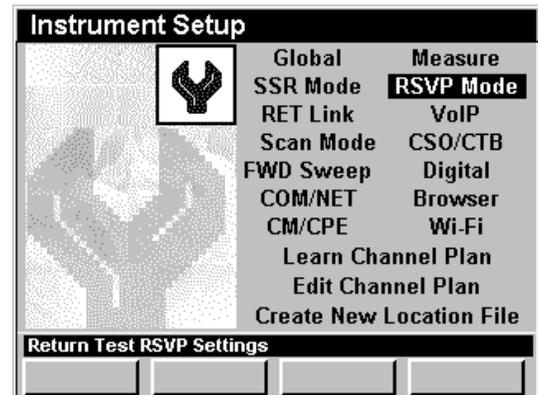
Note: RSVP Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **RSVP** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

RSVP Maximum Tx Level

The maximum acceptable level of the test signals transmitted to an SST by the 860 DSP or 860 DSPi can be set between **20 dBmV** and **55 dBmV**. During the RSVP test, the 860 DSP or 860 DSPi determines what level is needed to communicate with the SST in the hub. The default maximum transmit level is **40 dBmV**.

RETURN TEST SETTINGS	✕
RSVP Max Tx Level	40 dBmV
RSVP Link Frequency	80.00 MHz
RSVP Test Carriers	2 4 6 8
RSVP C/I Threshold	10 dB
RSVP C/I Bandwidth	1.00 MHz
RSVP C/I Samples	16 samples

Press Enter or Numeric Keypad to Adjust

Transmit levels that exceed the **RSVP Max Tx Level** setting are an indication of reverse path transmission problems, and will cause a **FAIL** message.

To change the maximum acceptable level of the test signals transmitted to an SST by the 860 DSP or 860 DSPi, use the ◀ ▶ buttons to highlight the **RSVP Max Tx Level** field, and use the ▲ ▼ buttons to change the value in 1 dBmV increments, or press the (Ent) button, enter the maximum signal level using the alphanumeric keypad, and then press the (Ent) button.

> **Note:** For tests using **RSVP** Mode to be accurate, it is necessary to set the reference level of the SST in the hub to the appropriate level. Consult your Guardian SST manual for more details.

RSVP Link Frequency

The SST in the hub communicates with field units via a downstream "link" carrier. The frequency of this carrier is set at the hub, and the **RSVP Link Frequency** setting in the 860 DSP or 860 DSPi must match it. The default link frequency is set to **80.00 MHz**.

To set the 860 DSP or 860 DSPi to receive the "link" carrier, use the ◄ ► buttons to highlight the **RSVP Link Frequency** field, and use the ▲ ▼ buttons to change the value in 0.05 MHz increments, or press the (Ent) button, enter the link frequency using the alphanumeric keypad, and then press the (Ent) button.

> **Note:** If the **SSR** Mode and **RSVP** Mode are installed on your instrument, the link frequency can be set to different frequencies, one for **SSR** Mode and one for **RSVP** Mode.

RSVP Test Carriers

The **RSVP** Mode transmits up to eight test signals at frequencies which are set in the SST in the hub. The settings are transmitted to field units as part of the regular data transmissions at the **RSVP Link Frequency**. All of the frequencies can be active during a test, but it is more usual for a smaller number to be active.

To set the test carriers, use the ◄ ► buttons to highlight the **SSR Test Carriers** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **ON** (number displayed) or **OFF** (blank, no number displayed).

RSVP C/I Threshold

The **RSVP C/I Threshold** sets the limit that **RSVP** Mode will use to determine if the Carrier/ (Noise + Ingress) ratio is acceptable (PASS) or inadequate (FAIL). You can select from **1** to **80 dB**. The default threshold value is set to **10 dB**.

To set the threshold, use the ◄ ► buttons to highlight the **RSVP C/I Threshold** field, and use the ▲ ▼ buttons to change the value in 1 dB increments, or press the Ent button, enter the threshold value using the alphanumeric keypad, and then press the Ent button.

RETURN TEST SETTINGS ✕

RSVP Max Tx Level	40 dBmV
RSVP Link Frequency	80.00 MHz
RSVP Test Carriers	2 4 6 8
RSVP C/I Threshold	10 dB
RSVP C/I Bandwidth	1.00 MHz
RSVP C/I Samples	16 samples

Press Enter, Up, or Down to Adjust

> **Note:** The **RSVP C/I Threshold** is typically set for the desired C/I for the set top or cable modems that you use.

RSVP C/I Bandwidth

Ingress measurements, like noise measurements, are typically referenced to a particular measurement bandwidth. Your instrument can be set to automatically perform this correction. You can select from **0.100** to **8.00 MHz**. The default bandwidth value is set to 1.00 MHz.

To set the bandwidth, use the ◄ ► buttons to highlight the **RSVP C/I Bandwidth** field, and use the ▲ ▼ buttons to change the value in 0.10 MHz increments, or press the Ent button, enter the bandwidth value using the alphanumeric keypad, and then press the Ent button.

RETURN TEST SETTINGS ✕

RSVP Max Tx Level	40 dBmV
RSVP Link Frequency	80.00 MHz
RSVP Test Carriers	2 4 6 8
RSVP C/I Threshold	10 dB
RSVP C/I Bandwidth	1.00 MHz
RSVP C/I Samples	16 samples

Press Enter, Up, or Down to Adjust

> **Note:** The **RSVP C/I Bandwidth** is typically set for the desired C/I for the set top or cable modems that you use.

RSVP C/I Samples

To improve the repeatability of measurements, the instrument repeats the C/I measurement from 8 to 16 times and averages the data before comparing it to the **RSVP C/I Threshold**. The default number of samples is **16 samples**.

The number of samples is settable. Lower numbers give test results the most quickly. Larger values offer more measurement stability at the cost of more measurement time.

To set the number of samples, use the ◄ ► buttons to highlight the **RSVP C/I Samples** field, and then use the (Ent) button and/or the ▲ ▼ buttons to change the value in 1 sample increments.

RETURN TEST SETTINGS ⊠

| RSVP Max Tx Level	40 dBmV			
RSVP Link Frequency	80.00 MHz			
RSVP Test Carriers	2	4	6	8
RSVP C/I Threshold	10 dB			
RSVP C/I Bandwidth	1.00 MHz			
RSVP C/I Samples	16 samples			

Press Enter, Up, or Down to Adjust

Setup

RET Link Settings

This section will show you how to adjust your instrument's **RET Link Settings**. The **Telemetry Search Settings** window allows you to assign up to 10 link frequencies. There are two common methods for setting up a system with many 9581 SSTs. The first method uses a single common link frequency and the second method uses different telemetry frequencies in different parts of your system. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **RET Link Settings** including:

- Method 1 - Manual Link Frequency

- Method 2 - Automatic Return Telemetry Frequency Search

- RSVP Search (reserved for future use)
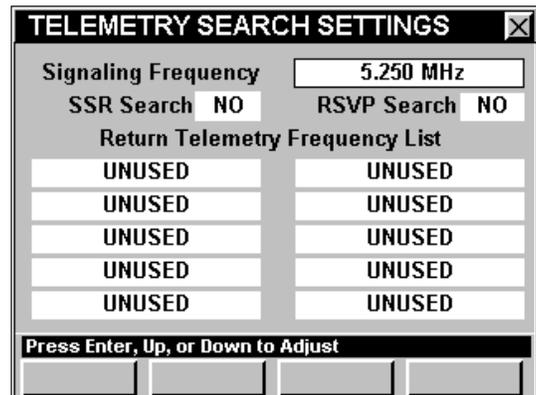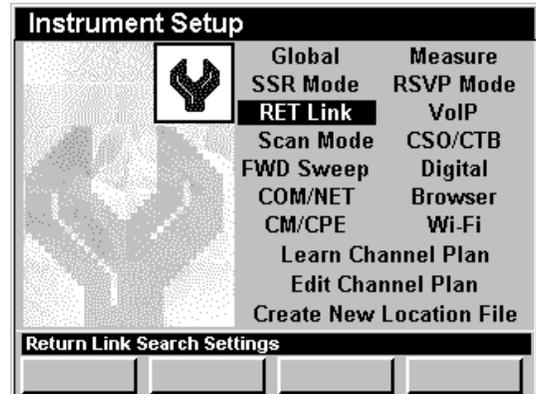
Note: SSR Mode and **RSVP** Mode are optional functions of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **SSR** Mode or **RSVP** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order these options and start using them today.

Method 1 - Manual Link Frequency

The first method uses the settings from the **SSR Mode** or **RSVP Mode** Settings and the Return Telemetry Frequencies should be set to **UNUSED**. This way all head end units transmit their telemetry data on a single frequency no matter what node you are on in your system. In this configuration, you can pre-configure the instrument with the single frequency and it will work anywhere in your system.

TELEMETRY SEARCH SETTINGS	☒

Signaling Frequency	5.250 MHz

SSR Search	NO	RSVP Search	NO

Return Telemetry Frequency List

UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED

Press Enter, Up, or Down to Adjust

Method 2 - Automatic Return Telemetry Frequency Search

The second method works by the instrument signaling the 9581 SST on the signaling telemetry frequency and looking at each data stream for this signal to appear. Once a signal is found, that telemetry frequency is made the current default frequency and the unit uses it.

To enable the automatic frequency search, you must first enter a return telemetry frequency.

To enter a return telemetry frequency, use the ◄ ► buttons to highlight any of the **Return Telemetry Frequency List** fields, use the ▲ ▼ buttons to change the value in 0.05 MHz increments, or press the **(Ent)** button, enter the value using the alphanumeric keypad, and then press the **(Ent)** button. You can choose from **50 MHz** to **92 MHz**.

To set the return telemetry frequency to **UNUSED**, press the **(Ent)** button, press the **(0)** button, and then press the **(Ent)** button.

Once you have entered at least one return telemetry frequency, use the ◄ ► buttons to highlight the **SSR Search** field, and then use the **(Ent)** button and/or the ▲ ▼ buttons to change between **Yes** and **No**.

TELEMETRY SEARCH SETTINGS ☒

Signaling Frequency	5.250 MHz
SSR Search NO	**RSVP Search** NO

Return Telemetry Frequency List

92.00 MHz	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED

Press Enter or Numeric Keypad to Adjust

TELEMETRY SEARCH SETTINGS ☒

Signaling Frequency	5.250 MHz
SSR Search YES	**RSVP Search** NO

Return Telemetry Frequency List

92.00 MHz	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED
UNUSED	UNUSED

SST-9581 R4 Normal Mode Only

Note: The SSR Search method only works in **SSR** Mode using the 9581 SST with R4 firmware.

Note: The RSVP Search method is not currently supported.

VoIP Settings

This section will show you how to adjust your instrument's **VoIP Settings**. The **Voice over IP (VoIP) Settings** window allows you to set the parameters required to test VoIP signals.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **VoIP Settings** including:

- Codec Type, Delay, and Bit Rate

- Packet Rate and Size

- Jitter Buffer Delay

- Call Length

- Maximum Latency

- Maximum Jitter

- Minimum MOS

Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

VOIP Settings

VOICE OVER IP (VOIP) SETTINGS ⊠

CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

Note: VoIP Mode is an optional function of the 860 DSP. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **VoIP** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Codec Type, Delay, and Bit Rate

The **CODEC Type**, **CODEC Delay**, and **CODEC Bit Rate** settings cannot be changed manually by the user.

These settings will automatically change based on changes to the **Packet Rate** and **Packet Size** settings.

The value of the **CODEC Bit Rate** will be followed by an asterisk (*) when the **Packet Rate** and **Packet Size** settings have been changed to a value that does not meet the **CODEC Type** specifications.

VOICE OVER IP (VOIP) SETTINGS	
CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

Packet Rate and Size

These settings allow you to change the data packet size and the rate at which data packets are sent and received. When changing the value of this setting be careful not to select values that do not meet the **CODEC Type** specifications.

You can choose a **Packet Rate** between 20 and 200 msec. The default **Packet Rate** is **20 msec**.

You can choose a **Packet Size** between 20 and 1000 Bytes. The default **Packet Size** is **160 Bytes**.

To change the number of packet rate or size, use the ◄ ► buttons to highlight the **Packet Rate** or **Packet Size** field, and then use the (Ent) or (▲) button to increase the value in 10 unit increments or use the (▼) button to decrease the value in 10 unit increments.

VOICE OVER IP (VOIP) SETTINGS	
CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

VOICE OVER IP (VOIP) SETTINGS	
CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

Note: Trilithic does not recommend changing these settings. These settings should be adequate for performing all VoIP testing.

Jitter Buffer Delay

This setting allows you to change the amount of time that the instrument temporarily stores arriving packets in order to minimize delay variations. If packets arrive too late then they are discarded.

To change the delay, use the ◄ ► buttons to highlight the **Jitter Buffer Delay** field, and use the (Ent) or ▲ button to increase the value in 5 msec increments or use the ▼ button to decrease the value in 5 msec increments.

Call Length

This setting allows you to change the length of the VoIP test call. You can choose a call length between 10 sec by 500 pkts and 40 sec by 2000 pkts. The default setting is **20 sec by 1000 pkts**.

To change the delay, use the ◄ ► buttons to highlight the **Call Length** field, and use the (Ent) or ▲ button to increase the value in 1 msec by 50 pkts increments or use the ▼ button to decrease the value in 1 msec by 50 pkts increments.

Maximum Latency

This setting allows you to change the maximum amount of time between the start of the VoIP test and when the first data packets are received. You can choose a latency between 0 and 400 msec. The default setting is **140 msec**.

To change the latency, use the ◄ ► buttons to highlight the **Max Latency** field, and use the (Ent) or ▲ button to increase the value in 5 msec increments or use the ▼ button to decrease the value in 5 msec increments.

Maximum Jitter

This setting allows you to change the maximum allowable jitter. You can choose a maximum jitter between 0 msec and 400 msec. The default setting is **40 msec**.

To change the value, use the ◄ ► buttons to highlight the **Max Jitter** field, and use the (Ent) or (▲) button to increase the value in 5 msec increments or use the (▼) button to decrease the value in 5 msec increments.

VOICE OVER IP (VOIP) SETTINGS	☒
CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

Minimum Mean Opinion Score (MOS)

This setting allows you to change the minimum desired quality of the voice signal. You can choose a desired signal quality level between 2.00 and 5.00. The default setting is **4.00**.

To change the value, use the ◄ ► buttons to highlight the **Min MOS** field, and use the (Ent) or (▲) button to increase the value in 0.10 increments or use the (▼) button to decrease the value in 0.10 increments.

VOICE OVER IP (VOIP) SETTINGS	☒
CODEC Type	G.711
CODEC Delay	21 msec
CODEC Bit Rate	64000 bps
Packet Rate	20 msec
Packet Size	160 Bytes
Jitter Buffer Delay	40 msec
Call Length	20 sec by 1000 pkts

Max Latency	Max Jitter	Min MOS
140 msec	40 msec	4.00

Press Enter, Up, or Down to Adjust

Scan Mode Settings

This section will show you how to adjust your instrument's **Scan Mode Settings**. The **Scan Mode/Limit Settings** window allows you to assign scan test limits to your instrument. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Scan Mode Settings** including:

- Scan Mode Averages

- Scan Limit Set and Setting Limits
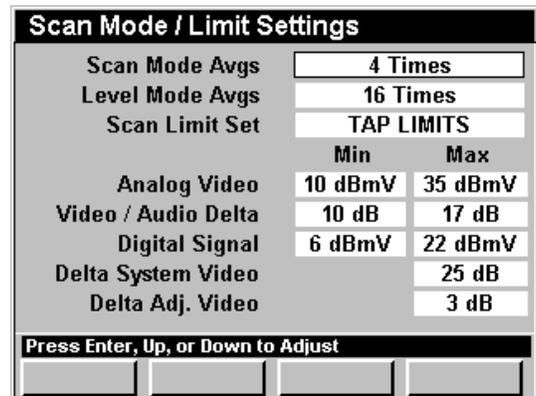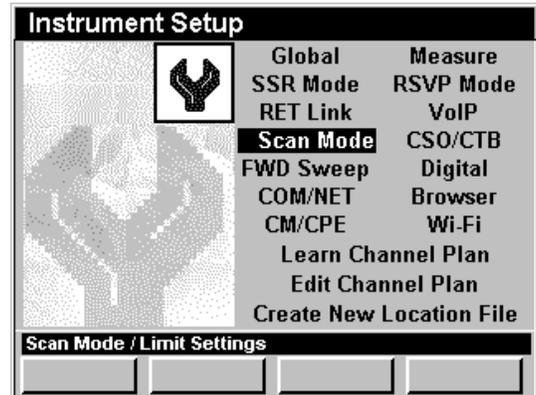
Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Scan Mode / Limit Settings

Scan Mode / Limit Settings

	Min	Max
Scan Mode Avgs	4 Times	
Level Mode Avgs	16 Times	
Scan Limit Set	TAP LIMITS	
Analog Video	10 dBmV	35 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	6 dBmV	22 dBmV
Delta System Video		25 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

Note: Scan Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Scan** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Multi Ch Averaging

You can set your rate of averaging for **Scan** Mode directly from this setup menu. You can select from **1, 2, 4, 8, 16, 32, 64, 128, 256, 512,** or **1024 Times.** The default to average is **4 Times**.

To change the number of averages, use the ◄ ► buttons to highlight the **Multi Ch Averaging** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible average rates.

Scan Mode / Limit Settings		
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	TAP LIMITS	
	Min	Max
Analog Video	8 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB
Press Enter, Up, or Down to Adjust		

Single Ch Averaging

You can set your rate of averaging for **Scan** Mode directly from this setup menu. You can select from **1, 2, 4, 8, 16, 32, 64, 128, 256, 512,** or **1024 Times.** The default to average is **4 Times**.

To change the number of averages, use the ◄ ► buttons to highlight the **Single Ch Averaging** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible average rates.

Scan Mode / Limit Settings		
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	TAP LIMITS	
	Min	Max
Analog Video	8 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB
Press Enter, Up, or Down to Adjust		

Scan Limit Set and Setting Limits

The **Scan Limit Set** setting allows you to toggle between the four different limit modes you can set. You can select from **TAP LIMITS**, **SET LIMITS**, **BLOCK LIMITS**, and **USER LIMITS**.

Each limit mode allows you to define amplitude standards your system must meet at the specified location. The corresponding limits are shown below the **Min** and **Max** column headings and will change to the current set limit as you toggle through the various limit modes.

To change the limit mode, use the ◀ ▶ buttons to highlight the **Scan Limit Set** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible limit modes.

Scan Mode / Limit Settings

	Min	Max
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	TAP LIMITS	
Analog Video	8 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

Tap Limits

The **TAP LIMITS** mode allows you to define amplitude standards your system must meet at the Tap.

When the instrument performs a channel scan to this limit it will tell you immediately if any channel fails the criteria you have set.

To meet a minimum limit the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

Scan Mode / Limit Settings

	Min	Max
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	TAP LIMITS	
Analog Video	8 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

- **Min** and **Max Analog Video -** sets the range for analog video channel levels.

- **Min** and **Max Video / Audio Delta -** sets the minimum and maximum allowable video to audio level difference.

- **Min** and **Max Digital Signal -** sets limits for digital channel levels.

- **Max Delta System Video** - sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.

- **Max Delta Adjacent Video** - sets the maximum level variation between any two adjacent video carriers.

To change the amplitude standards your system must meet at the Tap, change the **Scan Limit Set** field to **TAP LIMITS**.

To change a limit, use the ◀ ▶ buttons to highlight desired limit field, and use the (Ent) or ▲ button to increase the limit in one unit increments or use the ▼ button to decrease the limit in one unit increments.

Block Limits

The **BLOCK LIMITS** mode allows you define amplitude standards your system must meet at the ground block.

When the instrument performs a channel scan to this limit it will tell you immediately if any channel fails the criteria you have set.

To meet a minimum limit the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

Scan Mode / Limit Settings

	Min	Max
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	BLOCK LIMITS	
Analog Video	6 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

- **Min** and **Max Analog Video -** sets the range for analog video channel levels.

- **Min** and **Max Video / Audio Delta -** sets the minimum and maximum allowable video to audio level difference.

- **Min** and **Max Digital Signal -** sets limits for digital channel levels.

- **Max Delta System Video** - sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.

- **Max Delta Adjacent Video** - sets the maximum level variation between any two adjacent video carriers.

To change the amplitude standards your system must meet at the ground block, change the **Scan Limit Set** field to **BLOCK LIMITS**.

To change a limit, use the ◄ ► buttons to highlight desired limit field, and use the (Ent) or ▲ button to increase the limit in one unit increments or use the ▼ button to decrease the limit in one unit increments.

TRILITHIC

Set Limits

The **SET LIMITS** mode allows you define amplitude standards your system must meet at the TV set outlet.

When the instrument performs a channel scan to this limit it will tell you immediately if any channel fails the criteria you have set.

To meet a minimum limit the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

Scan Mode / Limit Settings

	Min	Max
Multi Ch Averaging	4 Times	
Single Ch Averaging	128 Times	
Scan Limit Set	SET LIMITS	
Analog Video	0 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

- **Min** and **Max Analog Video -** sets the range for analog video channel levels.

- **Min** and **Max Video / Audio Delta -** sets the minimum and maximum allowable video to audio level difference.

- **Min** and **Max Digital Signal -** sets limits for digital channel levels.

- **Max Delta System Video** - sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.

- **Max Delta Adjacent Video** - sets the maximum level variation between any two adjacent video carriers.

To change the amplitude standards your system must meet at the TV set outlet, change the **Scan Limit Set** field to **SET LIMITS**.

To change a limit, use the ◀ ▶ buttons to highlight desired limit field, and use the (Ent) or ▲ button to increase the limit in one unit increments or use the ▼ button to decrease the limit in one unit increments.

User Limits

The **USER LIMITS** mode allow you to define amplitude standards your system must meet at a user defined point in your system.

When the instrument performs a channel scan to this limit it will tell you immediately if any channel fails the criteria you have set.

To meet a minimum limit the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

Scan Mode / Limit Settings

	Min	Max
Multi Ch Averaging		4 Times
Single Ch Averaging		128 Times
Scan Limit Set		USER LIMITS
Analog Video	-10 dBmV	60 dBmV
Video / Audio Delta	10 dB	17 dB
Digital Signal	-20 dBmV	60 dBmV
Delta System Video		10 dB
Delta Adj. Video		3 dB

Press Enter, Up, or Down to Adjust

- **Min** and **Max Analog Video -** sets the range for analog video channel levels.

- **Min** and **Max Video / Audio Delta -** sets the minimum and maximum allowable video to audio level difference.

- **Min** and **Max Digital Signal -** sets limits for digital channel levels.

- **Max Delta System Video** - sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.

- **Max Delta Adjacent Video** - sets the maximum level variation between any two adjacent video carriers.

To change the amplitude standards your system must meet at a user defined point in your system, change the **Scan Limit Set** field to **USER LIMITS**.

To change a limit, use the ◄ ► buttons to highlight desired limit field, and use the (Ent) or ▲ button to increase the limit in one unit increments or use the ▼ button to decrease the limit in one unit increments.
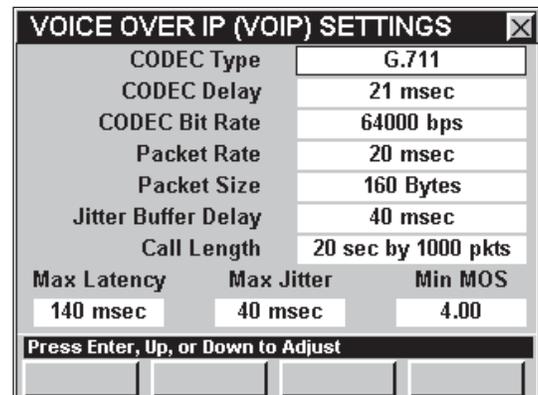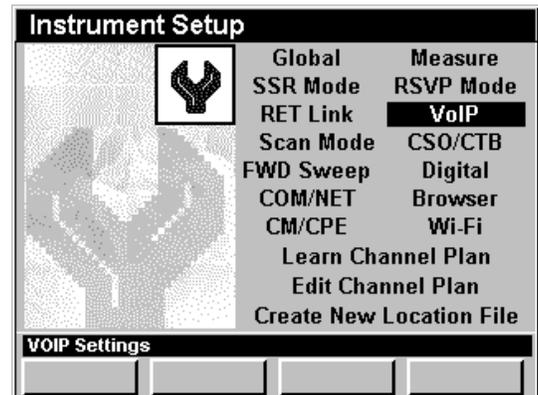
CSO / CTB Settings

This section will show you how to adjust your instrument's **CSO/CTB Settings**. The **CSO/CTB Settings** window allows you to define the offsets from the video carrier for measuring CSO and CTB. The offsets for CSO and CTB depend on your channel plan. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of h
including:

- CSO/CTB Span

- CSO/CTB Offset #1

- CSO/CTB Offset #2

- CSO/CTB Offset #3

- CSO/CTB Offset #4

- CSO/CTB Offset #5
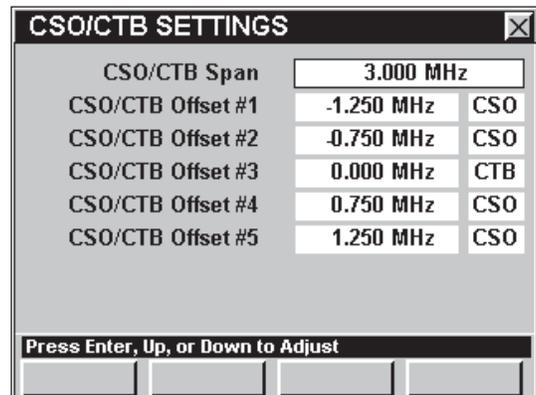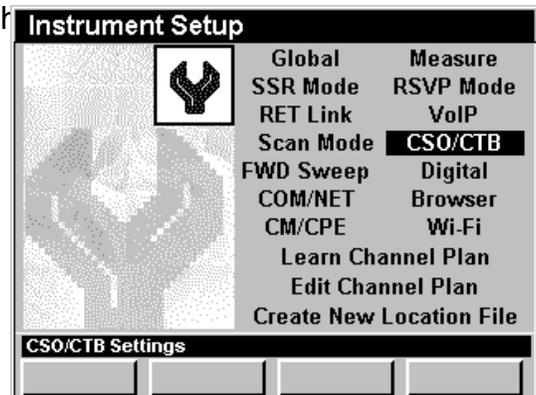
Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi
	Learn Channel Plan
	Edit Channel Plan
	Create New Location File

CSO/CTB Settings

CSO/CTB SETTINGS ☒

CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

Note: CSO/CTB Mode is an optional function of the 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Advanced CSO/CTB** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.
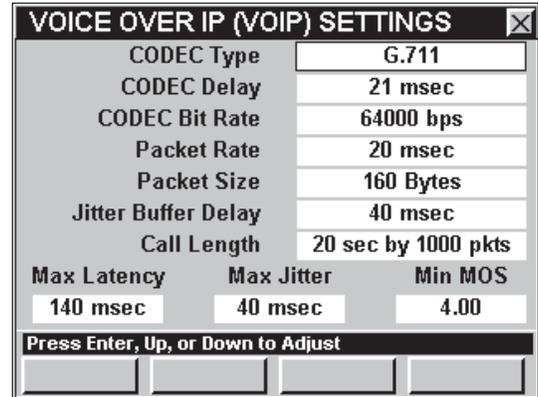
CSO/CTB Span

The **CSO/CTB Span** setting allows you to set the total frequency span included in a CSO/CTB measurement. Set this greater than 2 times the largest CSO/CTB offset. The default span is set at **3.000 MHz**.

To change the CSB/CTB Span, use the ◀ ▶ buttons to highlight the **CSO/CTB Span** field, and use the ▲ ▼ buttons to change the span in 0.050 MHz increments, or press the (Ent) button, enter the bandwidth using the alphanumeric keypad, and then press the (Ent) button.

CSO/CTB SETTINGS		✕
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

> **Note:** You should set your **CSO/CTB Span** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Edit Channel Plan Settings* for more information on the channel plan you are using.

CSO/CTB Offset #1

The **CSO/CTB Offset #1** settings allows you to set the #1 of 5 CSO/CTB offsets. The default offset is set at **-1.250 MHz** and is designated **CSO**.

To change the value of the CSB/CTB Offset, use the ◀ ▶ buttons to highlight left-most field next to **CSO/ CTB Offset #1**, use the ▲ ▼ buttons to change the offset in 0.050 MHz increments, or press the

Ent button, enter the offset using the alphanumeric keypad, and then press the **Ent** button.

To change the CSO/CTB designation, use the ◀ ▶ buttons to select the right-most field next to **CSO/ CTB Offset #1**, and then use the ▲ ▼ or **Ent** button to toggle between **CSO** and **CTB**.

CSO/CTB SETTINGS		⊠
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

CSO/CTB SETTINGS		⊠
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

Note: You should set your **CSO/CTB Offset #1** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Edit Channel Plan Settings* for more information on the channel plan you are using.

CSO/CTB Offset #2

The **CSO/CTB Offset #2** settings allows you to set the #2 of 5 CSO/CTB offsets. The default offset is set at **-0.750 MHz** and is designated **CSO**.

To change the value of the CSB/CTB Offset, use the ◄ ► buttons to highlight left-most field next to **CSO/ CTB Offset #2**, use the ▲ ▼ buttons to change the offset in 0.050 MHz increments, or press the (Ent) button, enter the offset using the alphanumeric keypad, and then press the (Ent) button.

To change the CSO/CTB designation, use the ◄ ► buttons to select the right-most field next to **CSO/ CTB Offset #2**, and then use the ▲ ▼ or (Ent) button to toggle between **CSO** and **CTB**.

CSO/CTB SETTINGS		✕
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

CSO/CTB SETTINGS		✕
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

Note: You should set your **CSO/CTB Offset #2** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Channel Plan Settings* for more information on the channel plan you are using.

CSO/CTB Offset #3

The **CSO/CTB Offset #3** settings allows you to set the #3 of 5 CSO/CTB offsets. The default offset is set at **0.000 MHz** and is designated **CTB**.

To change the value of the CSB/CTB Offset, use the ◄ ► buttons to highlight left-most field next to **CSO/CTB Offset #3**, use the ▲ ▼ buttons to change the offset in 0.050 MHz increments, or press the **Ent** button, enter the offset using the alphanumeric keypad, and then press the **Ent** button.

To change the CSO/CTB designation, use the ◄ ► buttons to select the right-most field next to **CSO/CTB Offset #3**, and then use the ▲ ▼ or **Ent** button to toggle between **CSO** and **CTB**.

Note: You should set your **CSO/CTB Offset #3** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Channel Plan Settings* for more information on the channel plan you are using.

CSO/CTB Offset #4

The **CSO/CTB Offset #4** settings allows you to set the #4 of 5 CSO/CTB offsets. The default offset is set at **0.750 MHz** and is designated **CSO**.

To change the value of the CSB/CTB Offset, use the ◄ ► buttons to highlight left-most field next to **CSO/CTB Offset #4**, use the ▲ ▼ buttons to change the offset in 0.050 MHz increments, or press the **Ent** button, enter the offset using the alphanumeric keypad, and then press the **Ent** button.

To change the CSO/CTB designation, use the ◄ ► buttons to select the right-most field next to **CSO/CTB Offset #4**, and then use the ▲ ▼ or **Ent** button to toggle between **CSO** and **CTB**.

CSO/CTB SETTINGS		☒
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

CSO/CTB SETTINGS		☒
CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

Note: You should set your **CSO/CTB Offset #4** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Channel Plan Settings* for more information on the channel plan you are using.

Setup

CSO/CTB Offset #5

The **CSO/CTB Offset #5** settings allows you to set the #5 of 5 CSO/CTB offsets. The default offset is set at **1.250 MHz** and is designated **CSO**.

To change the value of the CSB/CTB Offset, use the ◀ ▶ buttons to highlight left-most field next to **CSO/CTB Offset #5**, use the ▲ ▼ buttons to change the offset in 0.050 MHz increments, or press the

(Ent) button, enter the offset using the alphanumeric keypad, and then press the (Ent) button.

To change the CSO/CTB designation, use the ◀ ▶ buttons to select the right-most field next to **CSO/CTB Offset #5**, and then use the ▲ ▼ or (Ent) button to toggle between **CSO** and **CTB**.

CSO/CTB SETTINGS ☒

CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

CSO/CTB SETTINGS ☒

CSO/CTB Span	3.000 MHz	
CSO/CTB Offset #1	-1.250 MHz	CSO
CSO/CTB Offset #2	-0.750 MHz	CSO
CSO/CTB Offset #3	0.000 MHz	CTB
CSO/CTB Offset #4	0.750 MHz	CSO
CSO/CTB Offset #5	1.250 MHz	CSO

Press Enter, Up, or Down to Adjust

Note: You should set your **CSO/CTB Offset #5** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Channel Plan Settings* for more information on the channel plan you are using.

FWD Sweep Settings

This section will show you how to adjust your instrument's **FWD Sweep Settings**. The **Forward Sweep Settings** window allows you to assemble and name the various configurations of the test points you will encounter when performing a test in **Sweep** Mode. This allows you to call up standard configurations when sweeping, rather than having to reenter sweep settings each time you connect to a test point. These settings are unique to your instrument and will remain constant throughout every operation you perform.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

This section will provide you with a basic understanding of how to modify the **FWD Sweep Settings** including:

- Sweep Averages
- Cable Velocity Factor
- Test Point Number and Name
- High and Low Pilot Carrier Level
- TAP (Offset) Value

Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Forward Sweep Settings

Forward Sweep SETTINGS ☒

Sweep Averaging	MEDIUM
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dBmV
High Pilot Value	0.00 dBmV
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

> **Note:** To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Sweepless Sweep** Mode or **Forward SpeedSweep** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order these options and start using them today.

> **Note:** You should set your **FWD Sweep Settings** according to the channel plan you are using. See the Chapter 2: Instrument Setup Mode, *Channel Plan Settings* for more information on the channel plan you are using.

Sweep Averaging

This setting is used to average the values of several consecutive sweeps to reduce display jitter. You can select from **Disabled**, **Low**, **Medium**, and **High**. The default averaging is **Medium**.

To change the number of averages, use the ◀ ▶ buttons to highlight the **Sweep Averaging** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible averages.

Forward Sweep Settings

Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

> **Note:** You can also change the sweep averaging directly while using **Sweep** Mode; see **Section III: Service Functions**, Chapter 8: Sweep Mode, *Setting Averaging Type*.

Cable Velocity Factor

This setting is used to calculate the distance to fault measurement in **Sweep** Mode. This calculates the approximate distance to a serious line fault by analyzing VSWR patterns in the sweep response. The default cable velocity factor is **87.5%**.

To change the cable velocity factor, use the ◀ ▶ buttons to highlight the **Cable Velocity Factor** field, and use the (Ent) or ▲ button to increase the cable velocity factor in 0.1% increments or use the ▼ button to decrease the cable velocity factor in 0.1% increments.

Forward Sweep Settings

Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

Test Point Number and Name

You will need to enter "profiles" for each type of node and amplifier you will be servicing.

You can enter up to 9 test point configurations. If a profile has not been previously named, it will carry the label, **Test Point <#>**, where **<#>** can be 1 through 9.

Each name should be a designation for a type of node or amplifier you will be sweeping ("Acme 3", "Mega 5"). When sweeping, selecting the setup information stored under this name will set the instrument to the amplitude and coupler values that are appropriate for this device.

To change the test point number, use the ◄ ► buttons to highlight the **Test Point Number** field, and use the (Ent) or ▲ button to increase the test point number or use the ▼ button to decrease the test point number.

To change the test point name, use the ◄ ► buttons to highlight the **Test Point Name** field, press the (Ent) button, enter the operator name using the alphanumeric keypad, and then press the (Ent) button.

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter to Adjust

Setup

Low and High Pilot Value

The **Low Pilot Value** and **High Pilot Value Settings** allow the user to set the sensitivity and display parameters of the instrument so that when amplifiers are set to the proper gain and tilt, the sweep trace coincides with the middle horizontal line of the sweep graph.

Set the pilot amplitudes to those that you would expect when the named device is properly aligned.

These settings will be used to determine node and amplifier gain errors.

To change the low pilot value, use the ◀ ▶ buttons to highlight the **Low Pilot Value** field, and use the (Ent) or (▲) button to increase the low pilot value in 0.25 dBmV increments or use the (▼) button to decrease the low pilot value in 0.25 dBmV increments.

To change the low pilot value, use the ◀ ▶ buttons to highlight the **High Pilot Value** field, and use the (Ent) or (▲) button to increase the high pilot value in 0.25 dBmV increments or use the (▼) button to decrease the high pilot value in 0.25 dBmV increments.

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

Note: The low pilot is the first (lowest frequency) carrier marked as a Tilt channel in the channel plan you select when using the **Sweep** Mode. The high pilot is the last (highest frequency) Tilt carrier in the plan.

Note: The value you enter should be the value AHEAD of the test point coupler. The coupler loss will be accounted for in the **TAP (Offset) Value** section that follows.

TAP (Offset) Value

Test points connect through directional couplers within the node or amplifier. The Tap values are typically 20 dB or 30 dB, though additional losses may be included in your connections.

This setting is the total loss in the connection between the amplifier, or node, test point and the input to the 860 DSP or 860 DSPi, and must include the coupling loss of the test point, and any pads or other in-line hardware.

This setting is individually settable for each test point profile, and is included in the information the instrument uses to center the graph of an aligned amplifier to the center graticule of the sweep display.

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip
Press Enter or Numeric Keypad to Adjust	

You should repeat this process to define all of the amplifier and node test points you will be connecting to before sweeping your distribution system.

To change the offset value, use the ◀ ▶ buttons to highlight the **TAP (Offset) Value** field, and use the ▲ ▼ buttons to change the offset value in 1 dB increments, or press the (Ent) button, enter the offset value using the alphanumeric keypad, and then press the (Ent) button.

> **Note:** The **TAP (Offset) Value** is used in **Sweep** Mode only. All other modes use the Test Point Compensation **Function** Menu Option.

8300 FST Channels

This setting allows the user to enable and disable the 8300 FST channels when using **Sweep** Mode. While performing the sweep test with the 8300 FST channels disabled, the instrument will skip the 8300 FST channels that are defined in the channel plan. While performing the sweep test with the 8300 FST enabled, the instrument will use the 8300 FST channels that are defined in the channel plan.

To enable and disable the 8300 FST channels, use the ◀ ▶ buttons to highlight the **8300 FST Channels** field, and use the **Ent** button and/or the ▲ ▼ buttons to change between **Skip** and **Use**.

Forward Sweep Settings	
Sweep Averaging	Medium
Cable Velocity Factor	87.5 %
Test Point Number	1
Test Point Name	Test Point 1
Low Pilot Value	0.00 dB
High Pilot Value	0.00 dB
TAP (Offset) Value	0 dB
8300 FST Channels	Skip

Press Enter, Up, or Down to Adjust

Setup

Digital Settings

This section will show you how to adjust your instrument's **Digital Settings**. The **Digital (QAM) Settings** window allows you to set the parameters that affect the digital display when using **QAM Lite** Mode or **QAM** Mode.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

This section will provide you with a basic understanding of how to modify the **Digital Settings** including:

- Symbols to Display
- MER / EVM Display
- QAM Demodulation
- BER Demodulation
- VSB Demodulation
- Error Vector Spectrum
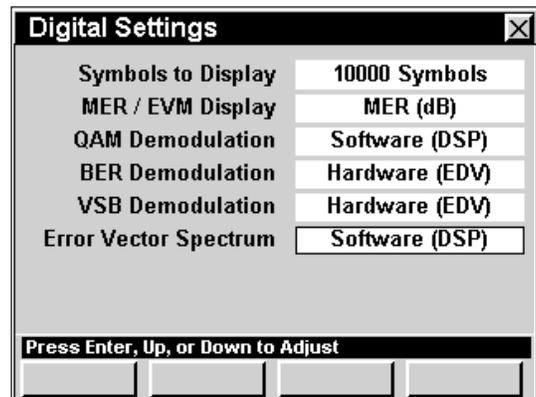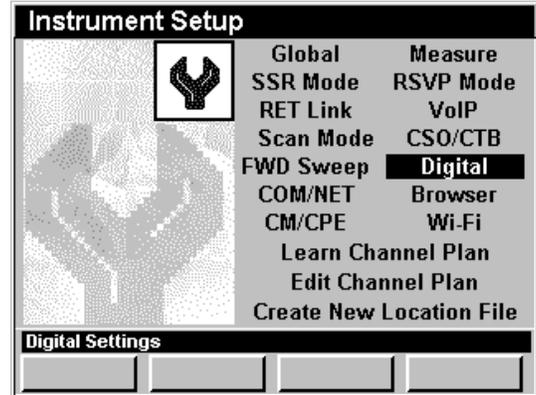
Note: QAM Lite Mode is a standard function of the 860 DSPi and **QAM** Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **QAM Lite** or **QAM** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: In order for **QAM** Mode to tune channels correctly, you must designate which channels are digital and the modulation used for each channel. See the Chapter 2: Instrument Setup Mode, *Edit Channel Plan Settings* for more information on the channel plan you are using.

Setup

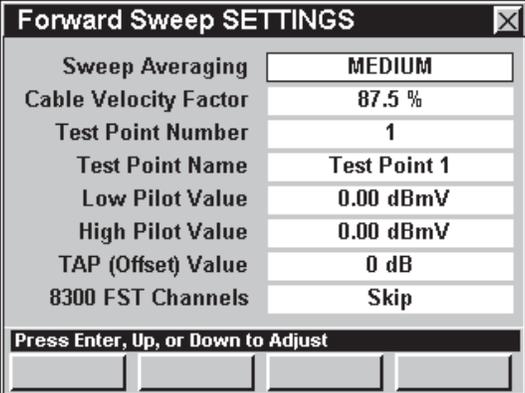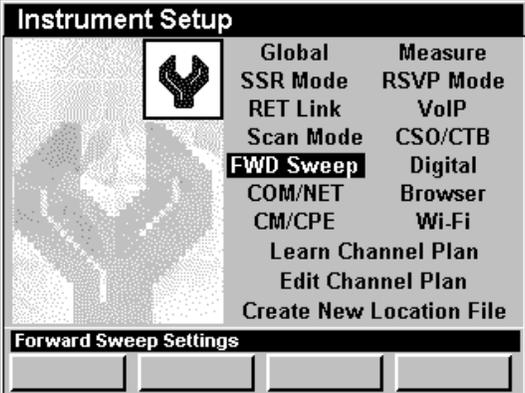## Symbols To Display

This setting allows you to set the number of symbols that are displayed on a constellation screen to make the constellation more or less dense. You can select from **1,000** to **30,000 Symbols**, or **DWELL** (infinite symbols).

To change the number of symbols, use the ◀ ▶ buttons to highlight the **Symbols to Display** field, and use the **Ent** or ▲ button to increase the time symbols in 1000 symbol increments or use the ▼ button to decrease the symbols in 1000 symbol increments.

Digital Settings	✕
Symbols to Display	10000 Symbols
MER / EVM Display	MER (dB)
QAM Demodulation	Software (DSP)
BER Demodulation	Hardware (EDV)
VSB Demodulation	Hardware (EDV)
Error Vector Spectrum	Software (DSP)

Press Enter, Up, or Down to Adjust

MER / EVM Display

This setting allows you to select whether the instrument displays **MER (dB)** or **EVM (%)**.

To change how the instrument displays digital measurements, use the ◀ ▶ buttons to highlight the **MER / EVM** field, and use the **Ent** button and/or the ▲ ▼ buttons to change between **MER (dB)** and **EVM (%)**.

Digital Settings	✕
Symbols to Display	10000 Symbols
MER / EVM Display	MER (dB)
QAM Demodulation	Software (DSP)
BER Demodulation	Hardware (EDV)
VSB Demodulation	Hardware (EDV)
Error Vector Spectrum	Software (DSP)

Press Enter, Up, or Down to Adjust
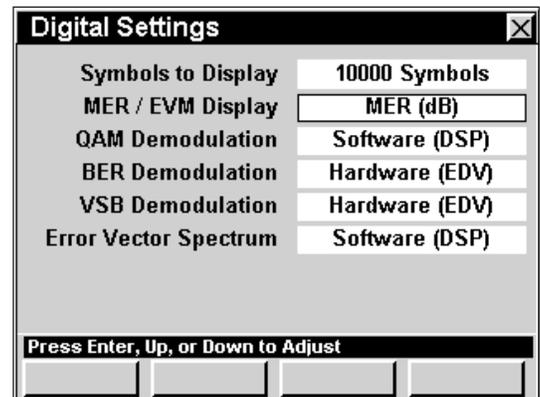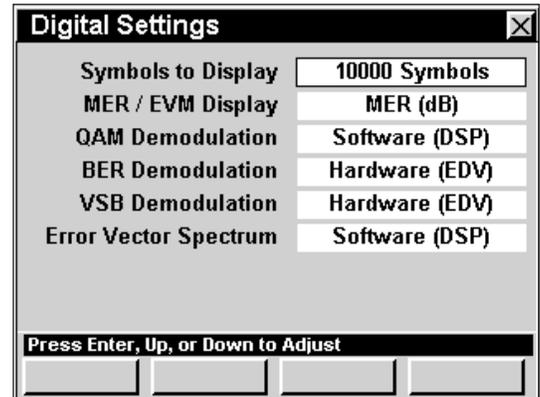
Note: The **QAM Demodulation** Setting must be set to **Software (DSP)** in order for the instrument to allow the selection of **EVM (%)** for the **MER / EVM Display** Setting**.**

QAM Demodulation

This setting allows you to select whether the instrument performs hardware or software QAM demodulation.

To change the QAM Demodulation, use the ◀ ▶ buttons to highlight the **QAM Demodulation** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Hardware (EDV)** and **Software (DSP)**.

```
┌─────────────────────────────────────┐
│ Digital Settings                  ⊠ │
│                                      │
│   Symbols to Display   10000 Symbols │
│    MER / EVM Display      MER (dB)   │
│   QAM Demodulation     Software (DSP)│
│    BER Demodulation    Hardware (EDV)│
│    VSB Demodulation    Hardware (EDV)│
│  Error Vector Spectrum Software (DSP)│
│                                      │
│                                      │
│ Press Enter, Up, or Down to Adjust   │
│  ┌────┐  ┌────┐  ┌────┐  ┌────┐      │
│  └────┘  └────┘  └────┘  └────┘      │
└─────────────────────────────────────┘
```

With **Hardware (EDV)** selected, the 860 DSP or 860 DSPi relies on an internal card to perform QAM demodulation calculations. With **Software (DSP)** selected, the 860 DSP or 860 DSPi performs QAM demodulation calculations using its internal software. **Hardware (EDV)** demodulation is more accurate, but slower than **Software (DSP)** demodulation.
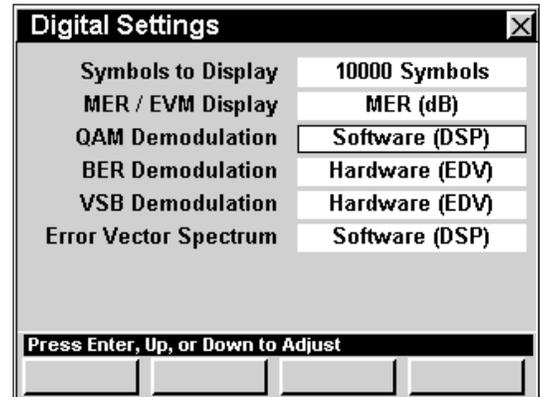
BER Demodulation

This setting allows you to select whether the instrument performs hardware or software BER demodulation.

To change the BER Demodulation, use the ◀ ▶ buttons to highlight the **BER Demodulation** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Hardware (EDV)** and **Internal Modem**.

```
┌─────────────────────────────────────┐
│ Digital Settings                  ⊠ │
│                                      │
│   Symbols to Display   10000 Symbols │
│    MER / EVM Display      MER (dB)   │
│   QAM Demodulation     Software (DSP)│
│    BER Demodulation    Hardware (EDV)│
│    VSB Demodulation    Hardware (EDV)│
│  Error Vector Spectrum Software (DSP)│
│                                      │
│                                      │
│ Press Enter, Up, or Down to Adjust   │
│  ┌────┐  ┌────┐  ┌────┐  ┌────┐      │
│  └────┘  └────┘  └────┘  └────┘      │
└─────────────────────────────────────┘
```
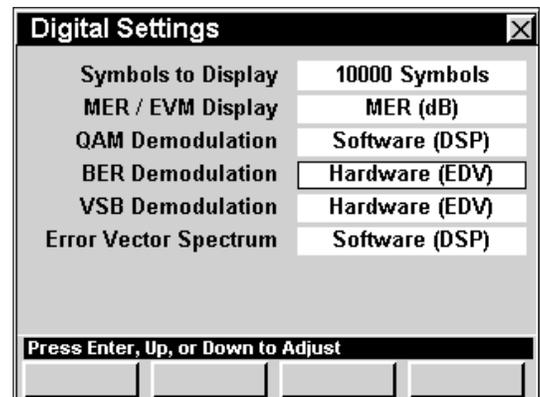
VSB Demodulation

This setting allows you to select whether the instrument performs hardware or software 8 VSB demodulation.

To change the 8 VSB Demodulation, use the ◀ ▶ buttons to highlight the **VSB Demodulation** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Hardware (EDV)** and **Software (DSP)**.

Digital Settings

Symbols to Display	10000 Symbols
MER / EVM Display	MER (dB)
QAM Demodulation	Software (DSP)
BER Demodulation	Hardware (EDV)
VSB Demodulation	Hardware (EDV)
Error Vector Spectrum	Software (DSP)

Press Enter, Up, or Down to Adjust
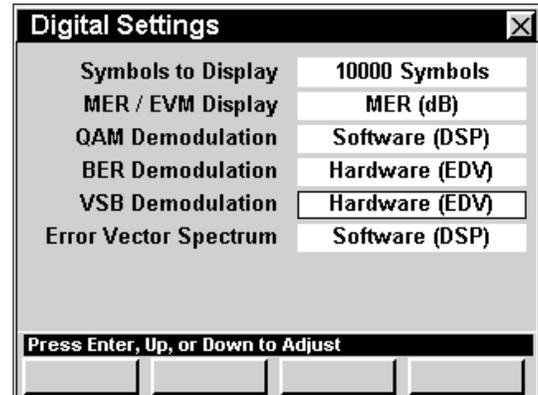
Note: Software demodulation for 8 VSB is not currently available.

Note: Hardware demodulation for EVS is not currently available.

Error Vector Spectrum

This setting allows you to select whether the instrument performs hardware or software Error Vector Spectrum (EVS) demodulation.

To change the Error Vector Spectrum, use the ◀ ▶ buttons to highlight the **Error Vector Spectrum** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Hardware (EDV)** and **Software (DSP)**.

Digital Settings

Symbols to Display	10000 Symbols
MER / EVM Display	MER (dB)
QAM Demodulation	Software (DSP)
BER Demodulation	Hardware (EDV)
VSB Demodulation	Hardware (EDV)
Error Vector Spectrum	Software (DSP)

Press Enter, Up, or Down to Adjust
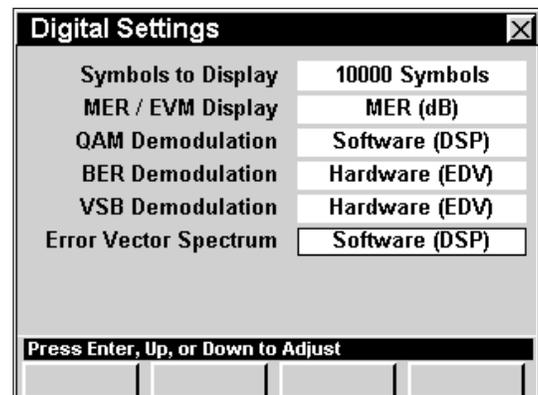
Note: Software demodulation for EVS is not currently available.

COM/NET Settings

This section will show you how to adjust your instrument's **COM/NET Settings**. The **Communications Settings** window allows you to set the communication parameters that affect connecting the instrument using your ethernet connection. The basic 860 DSPi comes equipped with the ethernet connection as a standard feature. In order to use the ethernet communications on your 860 DSP, the instrument must be equipped with Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5).

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

This section will provide you with a basic understanding of how to modify the **COM/NET Settings** including:

- Network Port
- Connection Speed
- My IP Address
- Subnet Mask
- Gateway Address
- Primary DNS Address
- Secondary DNS Address
- Activating Network
- Com 1 and Com 2 Baud Rate

Instrument Setup

Global	Measure
SSR Mode	RSVP Mode
RET Link	VoIP
Scan Mode	CSO/CTB
FWD Sweep	Digital
COM/NET	Browser
CM/CPE	Wi-Fi

Learn Channel Plan
Edit Channel Plan
Create New Location File

Communication Settings

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

Note: Contact your IT Department or Network Group to see if you should use a static IP (fixed) address or get a dynamic IP address from a network server. You will also need to know a valid gateway for your system if you plan to access devices outside your network.

Network Port

This setting allows you to select the method of external communication.

- **Internal Modem** - This option uses the cable modem built into the 860 DSPi to communicate through the RF input.

- **External RJ45** - This option uses the RJ45 connector with an ethernet cable to communicate with another device.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

To change the method of external communication, use the ◀ ▶ buttons to highlight the **Network Port** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Internal Modem** and **External RJ45**.

Connection Speed

This setting allows you to select the speed at which to communicate when using external communication. You can choose from **10 Mbps** or **100 Mbps** connections speeds. The default connection speed is **10 Mbps**.

To change the connection speed, use the ◀ ▶ buttons to highlight the field to the right of the **Network Port** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **10 Mbps** and **100 Mbps**.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

My IP Address

This setting is a unique number which identifies your instrument on an Ethernet, IP network. You may need to check with your network administrator to determine what IP address is needed. The default setting is **DHCP (Dynamic)**.

To change the IP address, use the ◄ ► buttons to highlight the **My IP Address** field, press the

(Ent) button, enter the IP address using the

alphanumeric keypad, and then press the (Ent) button. The format of the IP address is made up of four, 3-digit numbers separated by periods.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter or Numeric Keypad to Adjust

To set the IP address to **DHCP (Dynamic)**, enter **0.0.0.0**.

> **Note:** If you need to connect your instrument to a different subnetwork, your network administrator will need to supply a valid IP address.

> **CAUTION:** If you are using DHCP and **Activate Network** is set to **On Startup**, you will have up to two minutes after you turn on your instrument to connect it to the network. After this time, the instrument will give up looking for a DHCP server and will disable network functions.

Subnet Mask

This setting is a unique number which identifies the range of IP addresses that are on your subnetwork. You may need to check with your network administrator to determine what address is needed. The default setting is **0.0.0.0**.

To change the subnet mask, use the ◄ ► buttons to highlight the **Subnet Mask** field, press the (Ent) button, enter the address using the alphanumeric keypad,

and then press the (Ent) button. The format of the address is made up of four, 3-digit numbers separated by periods.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter or Numeric Keypad to Adjust

Gateway Address

This setting is a unique number which identifies the IP address of the network device on your subnet which allows you to communicate with devices outside of your network. The default setting is **0.0.0.0** which indicates that there is no gateway and the gateway will be discovered through DHCP.

To change the gateway address, use the ◄ ► buttons to highlight the **Gateway Address** field, press the (Ent) button, enter the address using the alphanumeric keypad, and then press the (Ent) button. The format of the address is made up of four, 3-digit numbers separated by periods.

Communication Settings		
Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	
Press Enter or Numeric Keypad to Adjust		

Note: If you need to connect your instrument to a different subnetwork, your network administrator will need to supply a valid gateway address.

Primary and Secondary DNS Addresses

The primary and secondary DNS addresses are unique numbers which identify the server address of the network device which resolves network names to IP Addresses. The default for these parameters is **0.0.0.0**.

To change the primary or secondary DNS address, use the ◄ ► buttons to highlight the **Pri DNS Address or Sec DNS Address** field, press the Ent button, enter the address name using the alphanumeric keypad, and then press the Ent button. The format of the DNS address is made up of four, 3-digit numbers separated by periods.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter or Numeric Keypad to Adjust

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter or Numeric Keypad to Adjust

Activating Network

This setting is used to set how the network connection is activated.

To change how the network is activated, use the ◄ ► buttons to highlight the **Activate Network** field, and use the Ent button and/or the ▲ ▼ buttons to change between **Prompt User** and **On Startup**.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

Com 1 and Com 2 Baud Rate

This setting is used to set the transfer rate for the external serial ports. You can choose from **9600**, **19200**, **38400**, **57600**, and **115200 BAUD**.

To change the transfer rate, use the ◄ ► buttons to highlight the **Com 1 Baud Rate** or **Com 2 Baud Rate** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible transfer rates.

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

Communication Settings

Network Port	External RJ45	10 Mbps
IP Address	DHCP (Dynamic)	
Subnet Mask	0.0.0.0	
Gateway Address	0.0.0.0	
Pri DNS Address	0.0.0.0	
Sec DNS Address	0.0.0.0	
Activate Network	Prompt User	
Com 1 Baud Rate	38400 BAUD	
Com 2 Baud Rate	9600 BAUD	

Press Enter, Up, or Down to Adjust

Browser Settings

This section will show you how to adjust your instrument's **Browser Settings**. The **Web Browser Settings** window allows you to set the display settings that are used in **Web Browser** Mode.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Browser Settings** including:

- • Home Page

- • Display Settings

- • Browser Cookies

```
Instrument Setup
                    Global        Measure
                    SSR Mode      RSVP Mode
                    RET Link      VoIP
                    Scan Mode     CSO/CTB
                    FWD Sweep     Digital
                    COM/NET       Browser
                    CM/CPE        Wi-Fi
                    Learn Channel Plan
                    Edit Channel Plan
                    Create New Location File
Web Browser Settings
```

```
Web Browser Settings
Home Page        file://index.html
        URL Bar         Displayed
     Status Bar         Displayed
    Softkey Bar         Displayed
      Title Bar         Displayed
Browser Cookies   Lost on Power Down


Home Page Changed only using WorkBench Software
```

Note: Web Browser Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Web Browser** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Home Page

The web browser is limited to accessing the web pages listed on its internal home page (index.html) located on drive B.

You will need to use the WorkBench software to edit the index.html file. This will allow you to add or change the web pages accessible from the home page. See your WorkBench operation manual for further instructions.

Web Browser Settings

Home Page	file://index.html
URL Bar	Displayed
Status Bar	Displayed
Softkey Bar	Displayed
Title Bar	Displayed
Browser Cookies	Lost on Power Down

Home Page Changed only using WorkBench Software
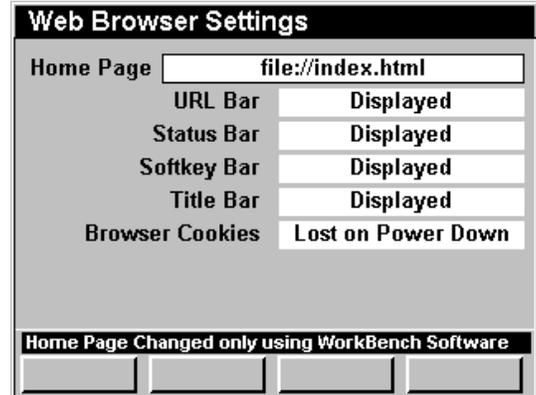
Display Settings

These settings allow you to change the appearance of your web browser screen by hiding or displaying the **URL Bar**, **Status Bar**, **Softkey Bar**, or **Title Bar**.

To change the appearance of your web browser screen, use the ◄ ► buttons to highlight the desired field, and use the Ent button and/or the ▲ ▼ buttons to change between **Displayed** and **Hidden**.

Web Browser Settings

Home Page	file://index.html
URL Bar	Displayed
Status Bar	Displayed
Softkey Bar	Displayed
Title Bar	Displayed
Browser Cookies	Lost on Power Down

Press Enter, Up, or Down to Adjust

Title Bar → **Web Browser** ⊠
URL Bar → file://index.html

TRILITHIC
INNOVATIVE ENGINEERING

Trilithic Web Test	Websters
TDM	Google
860 DSPh	Image Tests

Status Bar → Done.
Softkey Bar → | << SCROLL | SCROLL >> | << CHAR | CHAR >> |

Note: You will need to restart your instrument for these changes to take effect.

Browser Cookies

This setting allows you to choose whether to save or discard web browser cookies when the unit is turned off.

To change the action taken on shutdown of the instrument, use the ◀ ▶ buttons to highlight the **Browser Cookies** field, and use the (Ent) button and/ or the ▲ ▼ buttons to change between **Saved on Power Down** and **Lost on Power Down**.

Web Browser Settings

Home Page	file://index.html
URL Bar	Displayed
Status Bar	Displayed
Softkey Bar	Displayed
Title Bar	Displayed
Browser Cookies	Lost on Power Down

Press Enter, Up, or Down to Adjust

Setup

CM/CPE Settings

This section will show you how to adjust your instrument's **CM/CPE Settings**. The **CM and CPE Settings** window allows you to set the parameters required to use your cable system's DOCSIS network via the instrument's internal cable modem. The basic 860 DSPi comes equipped with an internal cable modem as a standard feature. The internal cable modem is not available for the 860 DSP in any configuration.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

This section will provide you with a basic understanding of how to modify the **CM/CPE Settings** including:

- 860 DSPi CPE MAC Address

- Internal Cable Modem CPE MAC Address

- Downstream MAC Frequency

- Show Modem Info
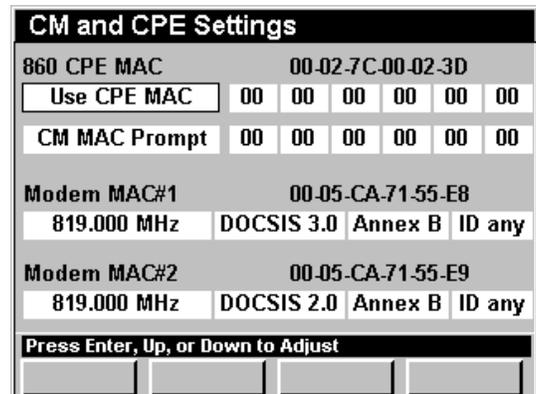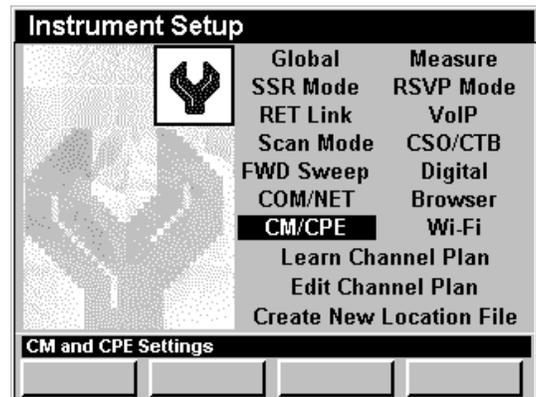
860 DSP CPE MAC Address

To have access to your cable system's DOCSIS network you may need to use the CPE MAC address of a device that has been provisioned correctly.

This can be done two ways, by provisioning the CPE MAC address of the 860 DSPi on the cable modem network or by spoofing an existing device's CPE MAC address using the 860 DSPi.

Provisioning an 860 DSPi or spoofing a device's CPE MAC address is essential to get the cable modem to work properly on DOCSIS networks that requires PCs to be authenticated.

The CPE MAC address is a unique number which identifies your 860 DSPi on a cable system's DOCSIS network. A CPE MAC address is of the form **12-34-56-78-9A-BC** and is unique for every device on the network.

Provisioning an 860 DSPi

To use the CPE MAC address of your 860 DSPi to connect to the cable system DOCSIS network, use the ◀ ▶ buttons to highlight the field below **860 CPE MAC**, and use the **Ent** button and/or the ▲ ▼ buttons to change the setting to **Use CPE MAC**.

Note: You may have your IT Department or System Administrator provision the CPE MAC address of the 860 DSPi on your cable system's DOCSIS network before this method will work.

Spoofing an External Device

The following two methods can be used to spoof the CPE MAC address of an external device that is provisioned correctly on the cable system's DOCSIS network;

- **Spoof CPE MAC** - Use this setting if you plan on spoofing the same external devices's CPE MAC address each time you logon to the network.

- **Spoof Prompt** - Use this setting if you plan on spoofing a different external devices's CPE MAC address each time you logon to the network.

CM and CPE Settings

860 CPE MAC		00-02-7C-00-02-3D				
Spoof CPE MAC	00	00	00	00	00	00
Spoof CM MAC#1	00	00	00	00	00	00

Modem MAC#1		00-05-CA-71-55-E8		
819.000 MHz	DOCSIS 3.0	Annex B	ID any

Modem MAC#2		00-05-CA-71-55-E9		
819.000 MHz	DOCSIS 2.0	Annex B	ID any

Press Enter, Up, or Down to Adjust

> **Note:** You can't permanently change the CPE MAC address of the 860 DSPi, but you can temporarily override the CPE MAC address of the 860 DSPi by spoofing an external device's MAC address.

Spoof CPE MAC

To spoof the same external device each time you logon to the network, use the ◄ ► buttons to highlight the field below **860 CPE MAC**, and use the (Ent) button and/or the ▲ ▼ buttons to change the setting to **Spoof CPE MAC**.

When you select **Spoof CPE MAC**, use the ◄ ► buttons to highlight the fields next to **Spoof CPE MAC**, use the ▲ ▼ buttons to increase or decrease the value, or press the (Ent) button, enter the value using the alphanumeric keypad, and

CM and CPE Settings

860 CPE MAC		00-02-7C-00-02-3D				
Spoof CPE MAC	00	00	00	00	00	00
Spoof CM MAC#1	00	00	00	00	00	00

Modem MAC#1		00-05-CA-71-55-E8		
819.000 MHz	DOCSIS 3.0	Annex B	ID any

Modem MAC#2		00-05-CA-71-55-E9		
819.000 MHz	DOCSIS 2.0	Annex B	ID any

Press Enter, Up, or Down to Adjust

then press the (Ent) button. Repeat this procedure for each field next to **Spoof CPE MAC**.

When **Spoof CPE MAC** is selected, the 860 DSPi will use the same external devices's CPE MAC address to logon to the network each time the 860 DSPi is asked to logon using the internal cable modem.

Spoof Prompt

To spoof a different external device each time you logon to the network, use the ◄ ► buttons to highlight the field below **860 CPE MAC**, and use the (Ent) button and/or the ▲ ▼ buttons to change the setting to **Spoof Prompt**.

If you select **Spoof Prompt**, the **Enter PC MAC to Spoof** window will appear when the 860 DSPi is asked to logon to the network using the internal cable modem.

To enter the external devices's CPE MAC address, use the ◄ ► buttons to highlight the address fields, and use the ▲ ▼ buttons to increase or decrease the value, or press the (Ent) button, enter the value using the alphanumeric keypad, and then press the (Ent) button again. Repeat this procedure for each address field.

Note: The 860 DSPi will automatically populate the **Enter PC MAC to Spoof** window with the last CPE MAC address that you used to logon to the network using the internal cable modem.

Internal Cable Modem MAC Address

To have access to your cable system's DOCSIS network you may need to use the MAC address of a modem that has been provisioned correctly.

This can be done two ways, by provisioning the MAC address of the 860 DSPi's internal cable modem on the cable modem network or by spoofing an existing cable modem's MAC address using the 860 DSPi.

Provisioning the internal cable modem of an 860 DSPi or spoofing a cable modem's MAC address is essential to get the cable modem to work properly on DOCSIS networks.

The MAC address is a unique number which identifies the internal cable modem of your 860 DSPi on a cable system's DOCSIS network. A MAC address is of the form **12-34-56-78-9A-BC** and is unique for every device on the network.

Provisioning the 860 DSPi's Internal Cable Modem

To use the MAC address of your 860 DSPi's internal cable modem to connect to the cable system DOCSIS network, use the ◀ ▶ buttons to highlight the field below **Modem MAC#1** and **Modem MAC#2**, and use the (Ent) button and/or the ▲ ▼ buttons to change the setting to **Use CM MAC#1**, **Use CM MAC#2**, or **CM MAC Prompt**.

Choosing **Use CM MAC#1** or **Use CM MAC#2** will allow you to use the MAC address of internal cable modem number 1 or 2 exclusively to connect to the network.

CM and CPE Settings						
860 CPE MAC		00-02-7C-00-02-3D				
Use CPE MAC	00	00	00	00	00	00
Spoof CM MAC#1	00	00	00	00	00	00
Modem MAC#1		00-05-CA-71-55-E8				
819.000 MHz	DOCSIS 3.0		Annex B		ID any	
Modem MAC#2		00-05-CA-71-55-E9				
819.000 MHz	DOCSIS 2.0		Annex B		ID any	
Press Enter, Up, or Down to Adjust						

Note: If your system is using BPI (Base Line Privacy), you must have your IT Department or System Administrator provision the MAC address of the 860 DSPi's internal cable modem on your cable system's DOCSIS network before this method will work.

Setup

If you select **CM MAC Prompt**, the **Select CM MAC to Use** window will appear when the 860 DSPi is asked to logon to the network using the internal cable modem.

To select which internal cable modem to use, use the ◀ ▶ buttons to select the **MAC#1** or **MAC#2** button, and then press the (Ent) button.
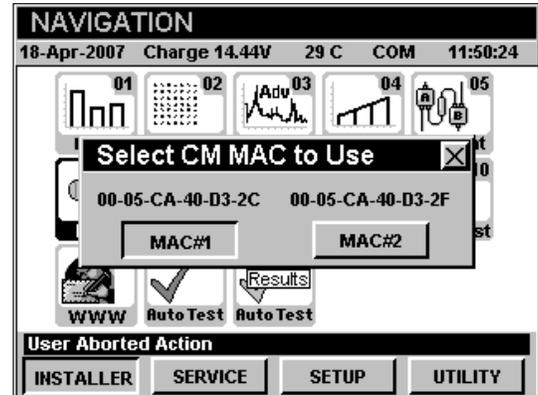
Spoofing an External Cable Modem

The following two methods can be used to spoof the MAC address of an external cable modem that is provisioned correctly on the cable system's DOCSIS network;

- **Spoof CM MAC#1** or **Spoof CM MAC#2** - Use these settings if you plan on spoofing the same external cable modem's MAC address each time you log on to the network. You can spoof a cable modem using either internal cable modem of the 860 DSPi.

- **Spoof Prompt** - Use this setting if you plan on spoofing a different external cable modem's MAC address each time you log on to the network.

Note: You can't permanently change the MAC addresses of the 860 DSPi's internal cable modems, but you can temporarily override the MAC addresses of the 860 DSPi's internal cable modems by spoofing an external cable modem's MAC address.

Spoof CM MAC#1 or Spoof CM MAC#2

To spoof the same external cable modem each time you logon to the network, use the ◀ ▶ buttons to highlight the field below **Modem MAC#1** and **Modem MAC#2**, and use the (Ent) button and/or the ▲ ▼ buttons to change the setting to **Spoof CM MAC#1** or **Spoof CM MAC#2**.

When you select **Spoof CM MAC#1** or **Spoof CM MAC#2**, use the ◀ ▶ buttons to highlight the fields next to **Spoof CM MAC#1** or **Spoof CM MAC#2**, use the ▲ ▼ buttons to increase or decrease the value, or press the (Ent) button, enter the value using the alphanumeric keypad, and then press the (Ent) button. Repeat this procedure for each field next to **Spoof CM MAC#1** or **Spoof CM MAC#2**.

When **Spoof CM MAC#1** or **Spoof CM MAC#2** is selected, the 860 DSPi will use the same cable modem's CPE MAC address to logon to the network each time the 860 DSPi is asked to logon using the internal cable modem.

CM and CPE Settings

860 CPE MAC			00-02-7C-00-02-3D			
Use CPE MAC	00	00	00	00	00	00
Spoof CM MAC#1	00	00	00	00	00	00

Modem MAC#1	00-05-CA-71-55-E8		
819.000 MHz	DOCSIS 3.0	Annex B	ID any

Modem MAC#2	00-05-CA-71-55-E9		
819.000 MHz	DOCSIS 2.0	Annex B	ID any

Press Enter, Up, or Down to Adjust

CM and CPE Settings

860 CPE MAC			00-02-7C-00-02-3D			
Use CPE MAC	00	00	00	00	00	00
Spoof CM MAC#2	00	00	00	00	00	00

Modem MAC#1	00-05-CA-71-55-E8		
819.000 MHz	DOCSIS 3.0	Annex B	ID any

Modem MAC#2	00-05-CA-71-55-E9		
819.000 MHz	DOCSIS 2.0	Annex B	ID any

Press Enter, Up, or Down to Adjust

Note: Spoofing is not allowed on systems where DOCSIS 1.1 has been implemented and BPI is activated due to security reasons.

Setup

Spoof Prompt

To spoof a different cable modem each time you logon to the network, use the ◀ ▶ buttons to highlight the field below **Modem MAC#1** and **Modem MAC#2**, and use the (Ent) button and/or the ▲ ▼ buttons to change the setting to **Spoof Prompt**.

If you select **Spoof Prompt**, the **Enter CM MAC to Spoof** window will appear when the 860 DSPi is asked to logon to the network using the internal cable modem.

To enter the cable modem's MAC address, use the ◀ ▶ buttons to highlight the address fields, use the ▲ ▼ buttons to increase or decrease the value, or press the (Ent) button, enter the value using the alphanumeric keypad, and then press the (Ent) button. Repeat this procedure for each address field.

Note: The 860 DSPi will automatically populate the **Enter CM MAC to Spoof** window with the last cable modem MAC address that you used to logon to the network using the internal cable modem.

Modem MAC Frequency

This settings allows you to accelerate the modem logon process by entering the center frequency of the downstream DOCSIS carrier. You can select from **91.000** to **1000.000 MHz**, or **Search** (search all frequencies).

To change the search frequency, use the ◄ ► buttons to highlight the **Modem MAC#1** or **Modem MAC#2** field, and use the ▲ ▼ buttons to change the downstream frequency in increments equal to your channel spacing, or press the **Ent** button, enter the downstream frequency using the alphanumeric keypad, and then press the **Ent** button.

To search all the downstream frequencies, set the **Modem MAC#1** or **Modem MAC#2** field to **Search** by entering **0**.

CM and CPE Settings						
860 CPE MAC			00-02-7C-00-02-3D			
Use CPE MAC	00	00	00	00	00	00
Use CM MAC#1	00	00	00	00	00	00
Modem MAC#1			00-05-CA-71-55-E8			
819.000 MHz	DOCSIS 3.0		Annex B		ID any	
Modem MAC#2			00-05-CA-71-55-E9			
Search	DOCSIS 2.0		Annex B		ID any	
Press Enter, Up, or Down to Adjust						

CM and CPE Settings						
860 CPE MAC			00-02-7C-00-02-3D			
Use CPE MAC	00	00	00	00	00	00
Use CM MAC#1	00	00	00	00	00	00
Modem MAC#1			00-05-CA-71-55-E8			
819.000 MHz	DOCSIS 3.0		Annex B		ID any	
Modem MAC#2			00-05-CA-71-55-E9			
Search	DOCSIS 2.0		Annex B		ID any	
Press Enter, Up, or Down to Adjust						

Setup

Wi-Fi Settings

The user can configure up to 3 default Wi-Fi configurations (called zones) using the **Setup** menu. The zone selected when the user leaves setup is the newly active zone that the meter will attempt to use the next time Wi-Fi is activated.

To configure the Wi-Fi zone, use the ◀ ▶ buttons to highlight Wi-Fi on the Instrument Information screen and press the (Ent) button. You may also select the desired modulation type by pressing the corresponding alphanumeric button.

Use the ◀ ▶ buttons to highlight the desired Wi-Fi zone parameter setting and press the (Ent) button to change the value.
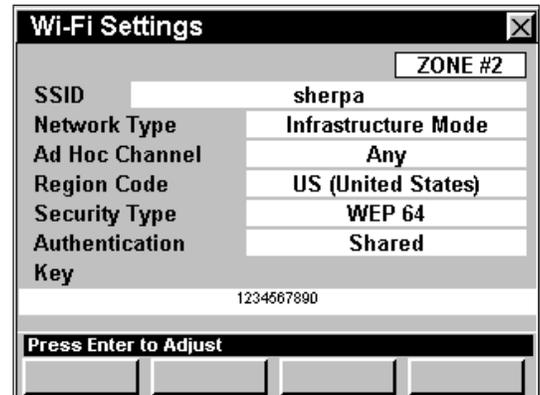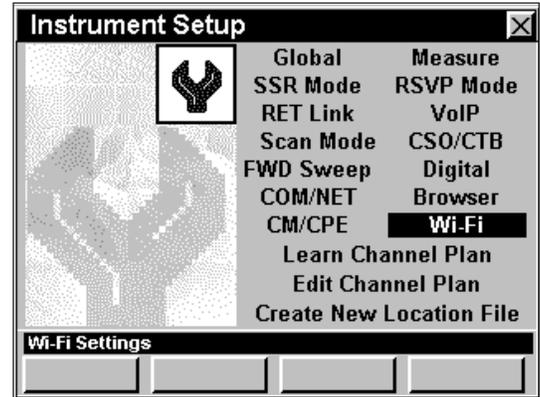
Learn Channel Plan Settings

Although the instrument comes ready-to-use from the factory, you will need to identify your channel plan on the instrument before you begin using it. This section will show you how to adjust your instrument's **Learn Channel Plan Settings**. The **Learn Channel Plan Menu** window allows you to set the parameters required to quickly identify and learn a channel plan configuration on a system.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Learn Channel Plan Settings** including:

- • Base Channel Plan
- • Low and High Level Limit
- • Start and Stop Frequency
- • Learned Plan Name
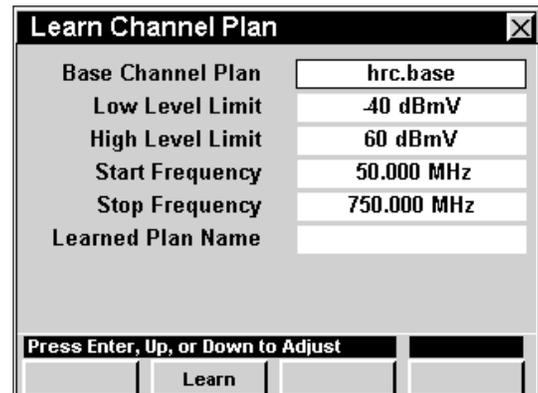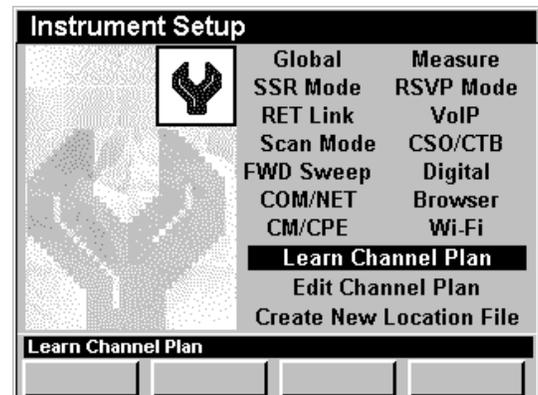
Note: Although you can build basic channel plans in the instrument, it is more convenient to use the WorkBench software to create complex channel plans. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

Base Channel Plan

To create a channel plan or to use an existing base channel plan without modifications, you will need to select the plan from the list of the unit's default plans.

Your instrument is equipped with several default base channel plans which may include NCTA, IRC, HRC, U2, U1, PAL_D, PAL_B, NCTA870, or NCTA1000. You may use either an existing base plan or create your own customized channel plan.

To set the base channel plan, use the ◄ ► buttons to highlight the **Base Channel Plan** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible base channel plans.

When the base channel plan that you want to model your learned channel plan from is displayed, use the ◄ ► buttons to highlight the **Learned Plan Name** field, press the (Ent) button, enter the channel plan name using the alphanumeric keypad, and then press the (Ent) button.

Learn Channel Plan	☒
Base Channel Plan	hrc.base
Low Level Limit	-40 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	

Press Enter, Up, or Down to Adjust

Learn

Learn Channel Plan	☒
Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust

Learn

Low and High Level Limits

The **Low Level Limit** setting is used to set the minimum level required to qualify as an active channel. Set this value from 5 to 10 dB below the levels on the system test point you will use to learn your channel plan.

The **High Level Limit** setting excludes signals higher than the set limit. Use this only if you have high level signals that you want to eliminate from your Learned Plan.

To change the limits, use the ◀ ▶ buttons to highlight the **Low Level Limit** or **High Level Limit** field, and use the (Ent) or ▲ button to increase the level in 1 dBmV increments or use the ▼ button to decrease the time difference in 1 dBmV increments.

Learn Channel Plan ☒

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust

Learn

Learn Channel Plan ☒

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust

Learn

Note: Digital signals will be measured using a 300 kHz bandwidth, causing them to measure about 10 dB low. You will need to set the **Low Level Limit** to accommodate this.

Note: Be sure the **High Level Limit** is set at least 5 to 10 dB above the highest signal level you expect to see.

Start and Stop Frequency

The **Start Frequency** parameter sets the lowest frequency to scan for the active channels and the **Stop Frequency** sets the highest frequency to scan. It is important to set the **Start Frequency**. You only need to set the **Stop Frequency** if you intentionally want to eliminate active channels at the high end of the frequency spectrum.

To change the frequency range, use the ◄ ► buttons to highlight the **Start Frequency** or **Stop Frequency** field, and use the ▲ ▼ buttons to change the frequency in 1.000 MHz increments, or press the (Ent) button, enter the frequency using the alphanumeric keypad, and then press the (Ent) button.

Learn Channel Plan   ✕

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust

Learn

Learn Channel Plan   ✕

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust

Learn

Note: Any channels lower than the set **Low Level Limit** or higher than the set **High Level Limit WILL NOT** be included when the instrument learns the channel plan. Accordingly, any channels below the **Start Frequency** or above the **Stop Frequency WILL NOT** be included when the instrument learns the channel plan.

Learn Channel Plan

Once you have completed making modifications to the new channel plan's parameters, press the **Learn** Softkey.

In the message bar at the bottom of the screen you will see the instrument download, scan and read your current channel plan.

When the tests are completed, your instrument will store the learned channel plan in its nonvolatile memory so you can access it from the operation menus.

Learn Channel Plan

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV
Start Frequency	50.000 MHz
Stop Frequency	750.000 MHz
Learned Plan Name	_.plan

Press Enter to Adjust
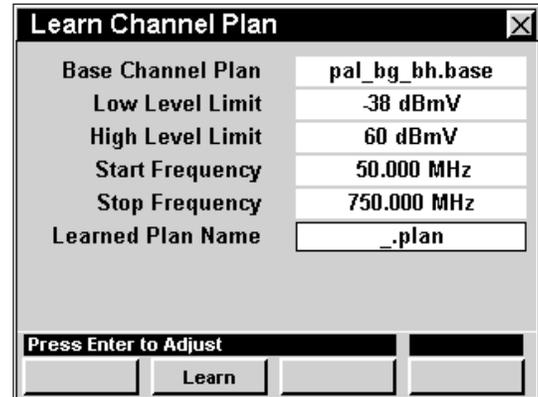
Learn

⚠️ **CAUTION:** Even if you make no modifications to a base channel plan, you still must select the base channel plan, assign a unique name to it and then have your instrument "learn" the plan in order for the unit to access the plan in the operation menus.

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Learn Channel Plan Menu** window.

The following **Function** Menu Options can be accessed while the **Learn Channel Plan Menu** window and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help

Learn Channel Plan

Base Channel Plan	pal_bg_bh.base
Low Level Limit	-38 dBmV
High Level Limit	60 dBmV

Contrast / Freeze	#1
Screen Capture	#2
Context Help	#3

Date: 16-Nov-2009 at 16:29:50

Learn
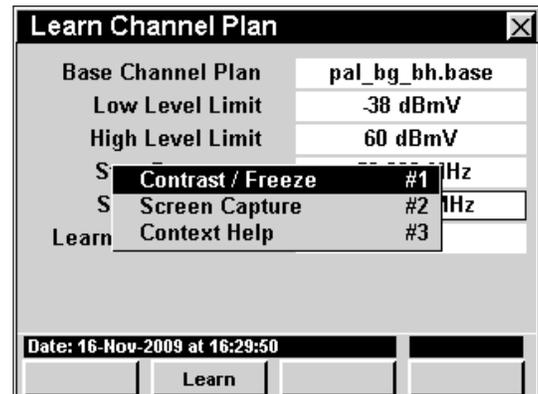
Edit Channel Plan Settings

Although the instrument comes ready-to-use from the factory, you may need to edit a channel plan. This section will show you how to adjust your instrument's **Edit Channel Plan Settings**. The **Edit Channel Plan Menu** window allows you to edit the channel plan parameters that are configured on your system.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Edit Channel Plan Settings** including:

- Loading a Channel Plan to Edit

- Saving Channel Plans

- Deleting Channel Plans

- Selecting a Channel Number and Channel Usage

- Changing Channel Name

- Channel Type

- Channel Details

- Video / Center

- Audio / Digital Bandwidth

- SAP Symbol Rate

- Tilt, C/N, HUM, and Percent Modulation Settings
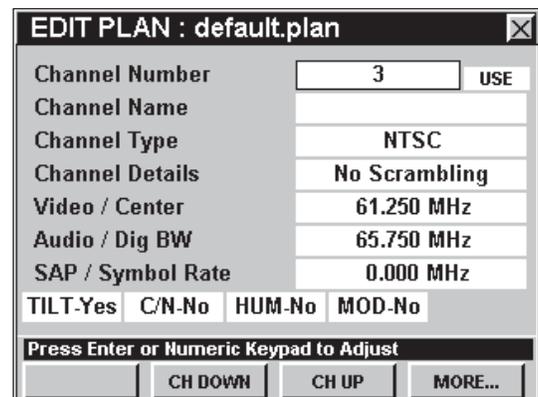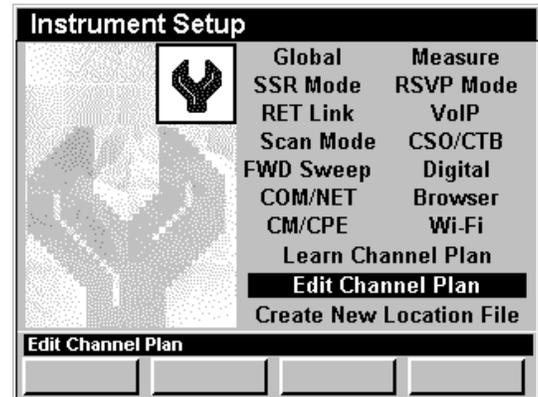
Note: If you want to edit a channel plan stored in your instrument, you should use **Edit Channel Plan Settings** to set up your digital channel specifications **AFTER** you have used **Learn Channel Plan Settings**.

Note: Although you can build basic channel plans in the instrument, it is more convenient to use the companion software WorkBench to create complex channel plans. For instructions regarding setup using WorkBench, please refer to the WorkBench operation manual.

Loading a Channel Plan to Edit

In order to edit a channel you will first need to select which channel plan you want to edit.

Press the ⬚Load⬚ softkey, use the ◀ ▶ ▲ ▼ buttons to highlight an available channel plan on your instrument, and then select the (Ent) button.

The basic parameters for the specified channel plan will be displayed in the edit fields.

EDIT PLAN : default.plan

| Channel Number | 3 | USE |

Open File ✕
DRIVE B .plan
tri_test.plan
2006.plan
show.plan
default.plan

Press Enter or Numeric Keypad to Adjust
LOAD SAVE MORE...
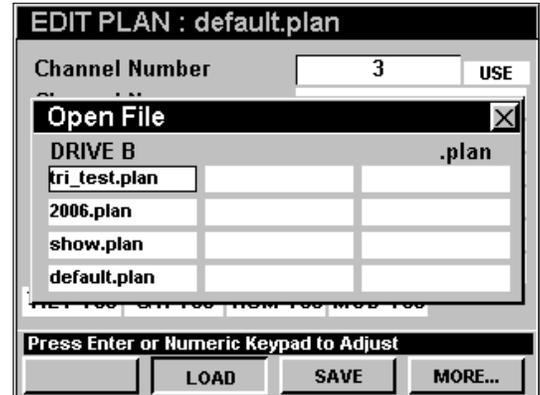
> **Note:** You may have to use the ⬚MORE...⬚ softkey to be able to see the ⬚Load⬚ softkey.

Saving Channel Plans

To save a channel plan with the same name after you have made any desired changes to a channel plan, press the ⬚Save⬚ softkey. "Channel Plan Saved" will be displayed in the message bar.

You may save changes at any time by pressing the ⬚Save⬚ softkey. However, it is only necessary to save changes before the instrument is turned off.

EDIT PLAN : default.plan ✕

Channel Number	3	USE
Channel Name		
Channel Type	NTSC	
Channel Details	No Scrambling	
Video / Center	61.250 MHz	
Audio / Dig BW	65.750 MHz	
SAP / Symbol Rate	0.000 MHz	

TILT-Yes | C/N-Yes | HUM-Yes | MOD-Yes

Channel Plan Saved
LOAD SAVE MORE...
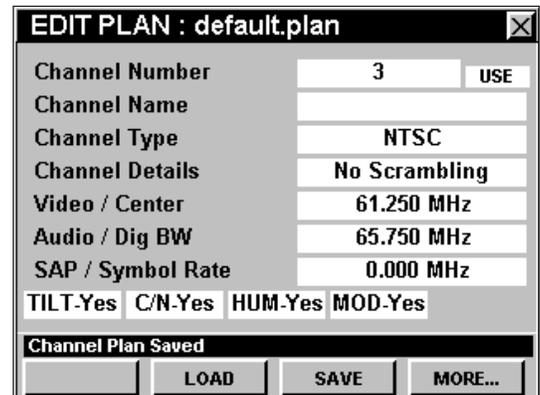
> **Note:** You may have to use the ⬚MORE...⬚ softkey to be able to see the ⬚Save⬚ softkey.

> **CAUTION:** Any changes made and not saved will be lost when the instrument is turned off.

To save a channel plan with a new file name after you have made any desired changes to a channel plan, press the `Save As` softkey, enter the file name using the alphanumeric keypad, and then press the (Ent) button.

EDIT PLAN : default.plan

Channel Number	201	USE
Channel Name		
Chan~~nel Type~~	~~Custom / CM~~	

Enter a File Name ☒

Save Channel Plan As

_.plan

TILT-No	C/N-No	HUM-No	MOD-No

Press Enter, Up, or Down to Adjust

| | DELETE | SAVE AS | MORE... |
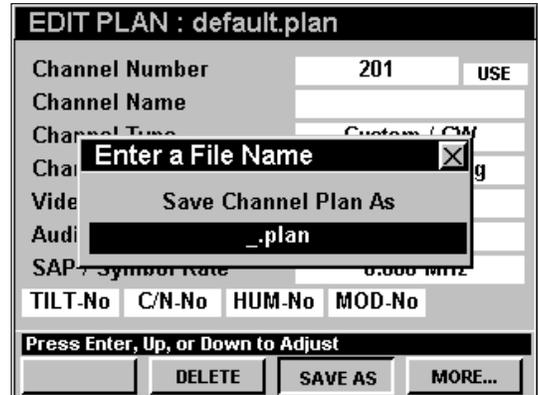
If you have made any changes to a channel plan and you press the (Bk) button while in the **Edit Plan** window, you will be prompted to save your channel plan. Use the ◄ ► buttons to select either **Yes** or **No**, and then press the (Ent) button.

EDIT PLAN : default.plan

Channel Number	3	USE
Channel Name		

Save Changes? ☒

default.plan

YES	NO

TILT-Yes	C/N-No	HUM-Yes	MOD-Yes

Press Enter, Up, or Down to Adjust

| | LOAD | SAVE | MORE... |
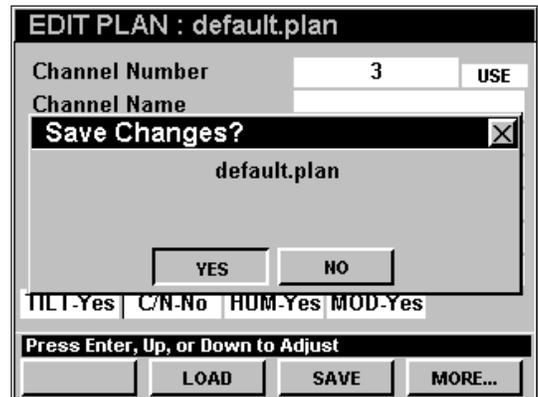
Deleting Channel Plans

To delete a channel plan, press the `Delete` softkey, use the ◄ ► ▲ ▼ buttons to highlight an available channel plan on your instrument, and then select the (Ent) button.

EDIT PLAN : default.plan

Channel Number	201	USE

Delete File ☒

DRIVE B .plan

default.plan		
tri_test.plan		
2006.plan		
show.plan		

Press Enter, Up, or Down to Adjust

| | DELETE | SAVE AS | MORE... |
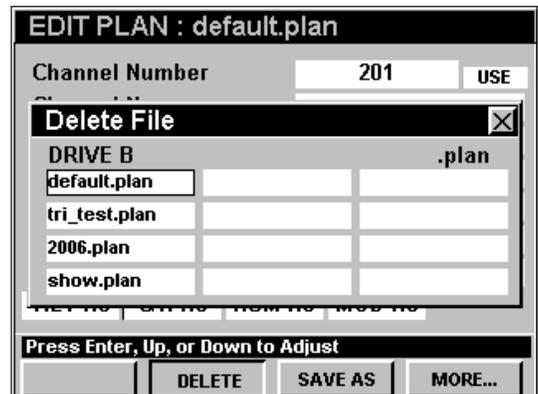
Note: You may have to use the `MORE...` softkey to be able to see the `Delete` softkey.

Selecting a Channel Number and Channel Usage

To select a channel for editing, use the ◄ ► buttons to highlight left-most field next to **Channel Number**, use the ▲ ▼ buttons to change the channel number in one channel increments, or press the (Ent) button.

To enable and disable channel numbers, use the ◄ ► buttons to highlight right-most field next to **Channel Number**, use the ▲ ▼ buttons to change between **USE** and **SKIP**.

```
EDIT PLAN : default.plan                    ⊠
Channel Number            3      USE
Channel Name
Channel Type              NTSC
Channel Details           No Scrambling
Video / Center            61.250 MHz
Audio / Dig BW            65.750 MHz
SAP / Symbol Rate         0.000 MHz
TILT-Yes  C/N-No  HUM-No  MOD-No
Press Enter or Numeric Keypad to Adjust
          CH DOWN    CH UP    MORE...
```

Note: When editing any parameter, you can use the [Ch Up] or [Ch Down] softkeys to change the channel number within a selected channel plan.

Channel Name

You may label each channel for easier identification (such as HBO, DISN, USA, TBS, etc.). To edit the channel name, use the ◄ ► buttons to select the **Channel Name** field, press the (Ent) button, enter the channel name using the alphanumeric keypad, and then press the (Ent) button.

```
EDIT PLAN : default.plan                    ⊠
Channel Number            3      USE
Channel Name            *******
                          _
Channel Type              NTSC
Channel Details           No Scrambling
Video / Center            61.250 MHz
Audio / Dig BW            65.750 MHz
SAP / Symbol Rate         0.000 MHz
TILT-Yes  C/N-No  HUM-No  MOD-No
Enter Text String (    )
          CH DOWN    CH UP    MORE...
```

Note: The channel name supports only eight characters so make sure you use letters which will accurately identify the channel for you.
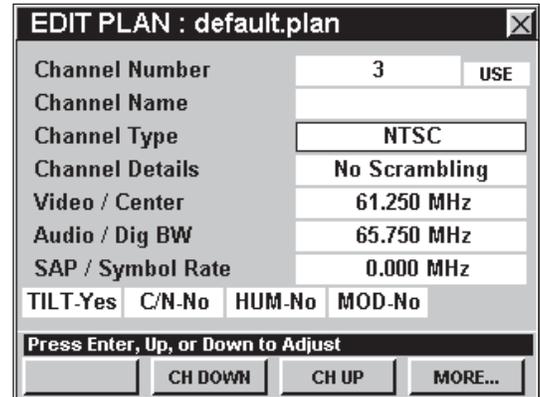
Note: When editing any parameter, you can use the [Ch Up] or [Ch Down] softkeys to change the channel number within a selected channel plan.

Channel Type

The following channel types are available for your instrument; **Custom / CW**, **Digital**, **NTSC**, **PAL B**, **D**, **G**, **H**, **I**, **K**, **N**, and **M**, **SECAM B**, **D**, **G**, **H**, **I**, **K**, and **L**.

To change the channel type, use the ◄ ► buttons to highlight the **Channel Type** field, and use the (Ent) button and/or the ▲ ▼ buttons to increment through the possible channel types.

EDIT PLAN : default.plan

Channel Number	3	USE
Channel Name		
Channel Type	NTSC	
Channel Details	No Scrambling	
Video / Center	61.250 MHz	
Audio / Dig BW	65.750 MHz	
SAP / Symbol Rate	0.000 MHz	

TILT-Yes | C/N-No | HUM-No | MOD-No

Press Enter, Up, or Down to Adjust

| | CH DOWN | CH UP | MORE... |

Note: When editing any parameter, you can use the ⟨ Ch Up ⟩ or ⟨ Ch Down ⟩ softkeys to change the channel number within a selected channel plan.

Channel Details

The following channel details are available for your instrument when the **Channel Type** field is set to anything but **Digital**; **No Scrambling**, **Sync Suppressed**, **Sync Sup. w/o field**, **Sync Sup. w/o Vert.**, and **Split Sync w/o Sup**.

The following channel details are available for your instrument when the **Channel Type** field is set to **Digital**; **QPSK-Annex A**, **16**, **32**, **64**, **128**, and **256 QAM-Annex A**, **64** and **256 QAM-Annex B**.

To change the channel details, use the ◄ ► buttons to highlight the **Channel Details** field, and use the

EDIT PLAN : default.plan

Channel Number	3	USE
Channel Name		
Channel Type	NTSC	
Channel Details	No Scrambling	
Video / Center	61.250 MHz	
Audio / Dig BW	65.750 MHz	
SAP / Symbol Rate	0.000 MHz	

TILT-Yes | C/N-No | HUM-No | MOD-No

Press Enter, Up, or Down to Adjust

| | CH DOWN | CH UP | MORE... |

(Ent) button and/or the ▲ ▼ buttons to increment through the possible channel details types.
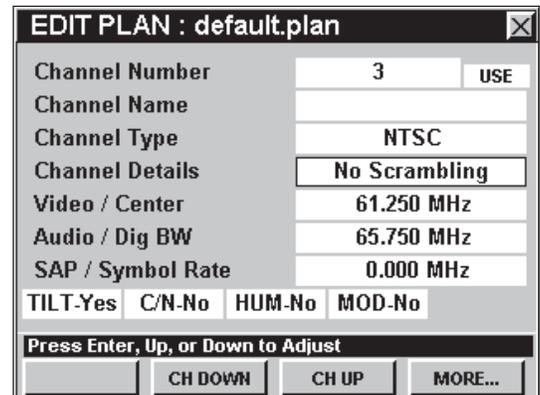
Note: When editing any parameter, you can use the ⟨ Ch Up ⟩ or ⟨ Ch Down ⟩ softkeys to change the channel number within a selected channel plan.

Video / Center

To edit the video carrier frequency for analog channels or channel center frequency for digital channels, use the ◀ ▶ buttons to highlight the **Video / Center** field, press the (Ent) button, enter the frequency using the alphanumeric keypad, and then press the (Ent) button.

```
EDIT PLAN : default.plan                 ✕
Channel Number              3      USE
Channel Name
Channel Type              NTSC
Channel Details        No Scrambling
Video / Center          61.250 MHz
Audio / Dig BW          65.750 MHz
SAP / Symbol Rate        0.000 MHz
TILT-Yes  C/N-No  HUM-No  MOD-No
Press Enter or Numeric Keypad to Adjust
          CH DOWN   CH UP   MORE...
```

Note: When editing any parameter, you can use the [Ch Up] or [Ch Down] softkeys to change the channel number within a selected channel plan.

Audio / Dig BW

To edit the audio frequency for analog channels or the digital bandwidth for digital channels, use the ◀ ▶ buttons to highlight the **Audio / Dig BW** field, press the (Ent) button, enter the frequency using the alphanumeric keypad, and then press the (Ent) button.

```
EDIT PLAN : default.plan                 ✕
Channel Number              3      USE
Channel Name
Channel Type              NTSC
Channel Details        No Scrambling
Video / Center          61.250 MHz
Audio / Dig BW          65.750 MHz
SAP / Symbol Rate        0.000 MHz
TILT-Yes  C/N-No  HUM-No  MOD-No
Press Enter or Numeric Keypad to Adjust
          CH DOWN   CH UP   MORE...
```

Note: When editing any parameter, you can use the [Ch Up] or [Ch Down] softkeys to change the channel number within a selected channel plan.

SAP / Symbol Rate

To edit the secondary audio programming carrier frequency or symbol rate of digital modulation, use the ◀ ▶ buttons to highlight the **SAP / Symbol Rate** field, press the (Ent) button, enter the frequency using the alphanumeric keypad, and then press the (Ent) button.

EDIT PLAN : default.plan ☒

Channel Number	3 USE
Channel Name	
Channel Type	NTSC
Channel Details	No Scrambling
Video / Center	61.250 MHz
Audio / Dig BW	65.750 MHz
SAP / Symbol Rate	0.000 MHz

TILT-Yes | C/N-No | HUM-No | MOD-No

Press Enter or Numeric Keypad to Adjust

| | CH DOWN | CH UP | MORE... |

Note: When editing any parameter, you can use the `Ch Up` or `Ch Down` softkeys to change the channel number within a selected channel plan.

Tilt, C/N, HUM, and Percent Modulation Settings

The Tilt, C/N, Hum, Percent Modulation settings are all enabled and disabled in the same way.

To change the desired setting, use the ◀ ▶ buttons to highlight the **Tilt, C/N, Hum,** or **MOD** field, and use the (Ent) button and/or the ▲ ▼ buttons to change between **Yes** and **No**.

EDIT PLAN : default.plan ☒

Channel Number	3 USE
Channel Name	
Channel Type	NTSC
Channel Details	No Scrambling
Video / Center	61.250 MHz
Audio / Dig BW	65.750 MHz
SAP / Symbol Rate	0.000 MHz

TILT-Yes | C/N-No | HUM-No | MOD-No

Press Enter, Up, or Down to Adjust

| | CH DOWN | CH UP | MORE... |

Note: C/N, HUM, and Modulation are used for analog video only.

Note: When editing any parameter, you can use the `Ch Up` or `Ch Down` softkeys to change the channel number within a selected channel plan.

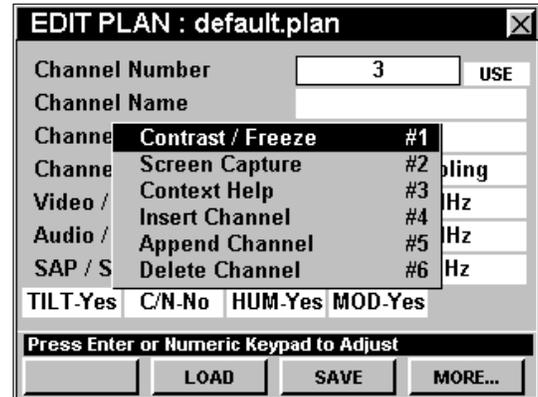**Note:** These tests are used in conjunction with **Auto Test** Macros.

Setup

Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Edit Plan Menu** window.

The following **Function** Menu options can be accessed while the **Edit Plan Menu** window:

- Contrast / Freeze
- Screen Capture
- Context Help
- Insert Channel
- Append Channel
- Delete Channel

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:
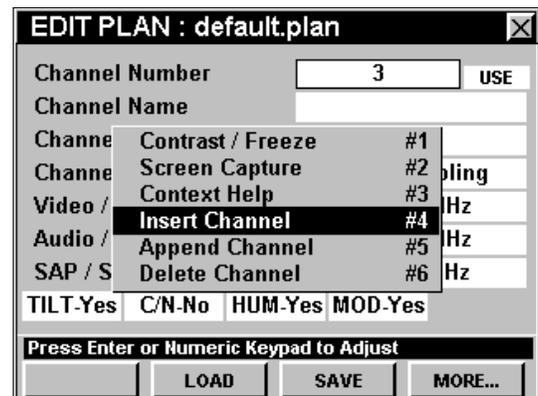
- Contrast / Freeze
- Screen Capture
- Context Help

Insert Channel

If needed you can insert a new channel into your channel plan.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Insert Channel**, and then press the (Ent) button. You may also select **Insert Channel** by pressing (4).

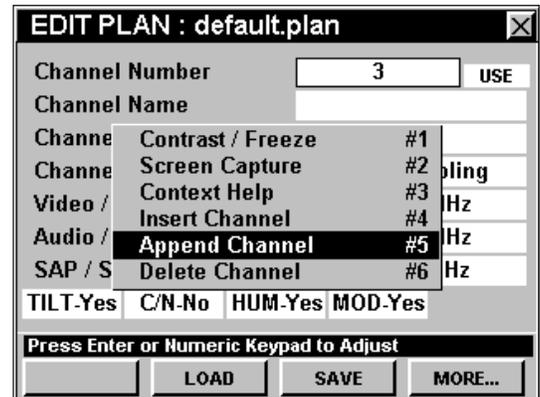The new channel will be inserted in the first available channel location below the currently selected channel number.

Append Channel

If needed you can append a new channel to the end of your channel plan.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Append Channel**, and then press the (Ent) button. You may also select **Append Channel** by pressing (5).

The new channel will be appended to the end of the selected channel plan.

EDIT PLAN : default.plan ⊠

| Channel Number | 3 | USE |
| Channel Name | | |

Channe	Contrast / Freeze	#1
Channe	Screen Capture	#2	bling
Video /	Context Help	#3	Hz
Audio /	Insert Channel	#4	
	Append Channel	#5	Hz
SAP / S	Delete Channel	#6	Hz

| TILT-Yes | C/N-No | HUM-Yes | MOD-Yes |

Press Enter or Numeric Keypad to Adjust
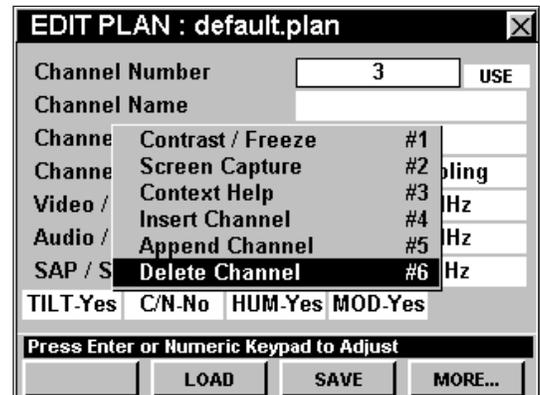
| | LOAD | SAVE | MORE... |

Delete Channel

If needed you can delete an existing channel from your channel plan.

To use this option to delete the currently selected channel, press the (Fn) button, use the (▲) (▼) buttons to highlight **Delete Channel**, and then press the (Ent) button. You may also select **Delete Channel** by pressing (6).

The new channel will be appended to the end of the selected channel plan.

EDIT PLAN : default.plan ⊠

| Channel Number | 3 | USE |
| Channel Name | | |

Channe	Contrast / Freeze	#1
Channe	Screen Capture	#2	bling
Video /	Context Help	#3	Hz
Audio /	Insert Channel	#4	
SAP / S	Append Channel	#5	Hz
	Delete Channel	#6	Hz

| TILT-Yes | C/N-No | HUM-Yes | MOD-Yes |

Press Enter or Numeric Keypad to Adjust

| | LOAD | SAVE | MORE... |

Setup

Create Location Settings

Although the instrument comes ready-to-use from the factory, you may need to store unique specifications for certain locations in your system. This section will show you how to adjust your instrument's **Create Location Settings**. The **Edit Location** window provides a method to tag data loss with information about the location at which the data is taken. These are helpful settings, but are not required.

These parameters can be set directly from your instrument or using WorkBench. For instructions regarding setup using WorkBench, please refer to the WorkBench Operation Manual.

This section will provide you with a basic understanding of how to modify the **Create Location Settings** including:

- Selecting a Location Type

- Location Area and Amplifier ID

- Power Configuration

- Feeder Configuration

- Trunk Termination

- Voltage Setting

- Reverse Pad

- Reverse Equalizer

- Forward Pad

- Forward Equalizer

- Saving Location Settings
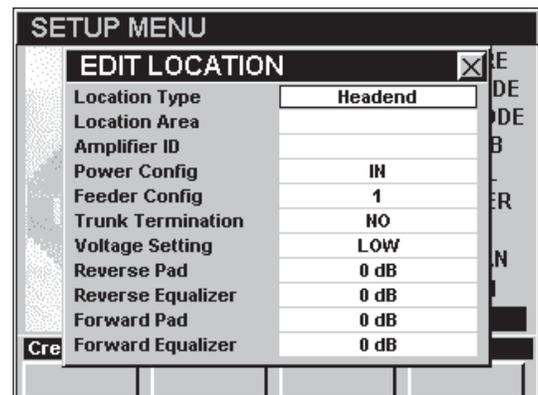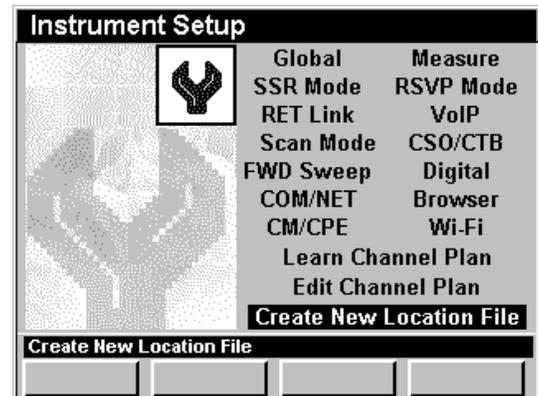
Location Type

You can identify a particular location in your cable system for future reference. The location type may include: **Headend**, **Trunk Amp**, **Line Extender**, **Fiber Node**, or **Field Test**. Use the **Field Test** for any location that does not fall into a specific type.
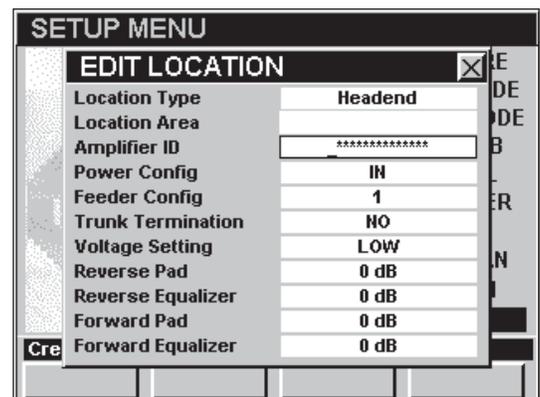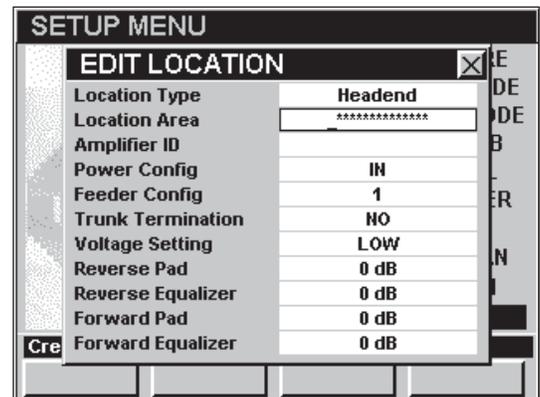
To change the location type, use the ◄ ► buttons to highlight the **Location Type** field, and use the ▲ ▼ buttons to increment through the possible location types.
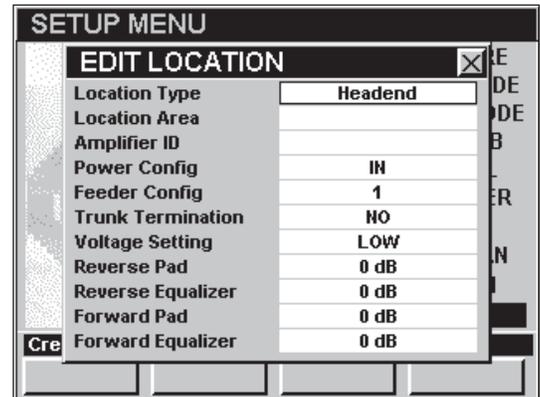
Location Area and Amplifier ID

You may also want to create a unique name for the location area and the amplifier ID.

To change the location area or amplifier ID, use the ◄ ► buttons to highlight the **Location Area** or **Amplifier ID** field, press the (Ent) button, enter the name using the alphanumeric keypad, and then press the (Ent) button.
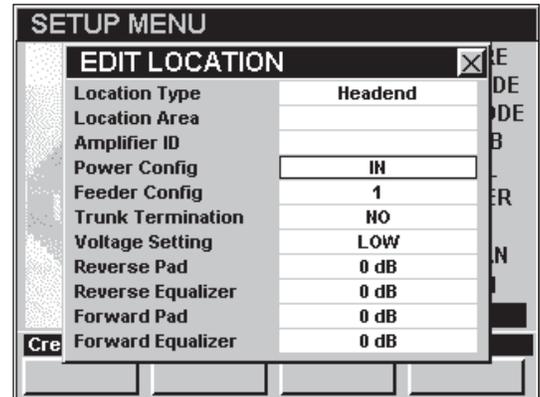
Power Configuration

You can specify the power configuration for this location. The following power configurations are available for your instrument; **In**, **Out** or **Through**.
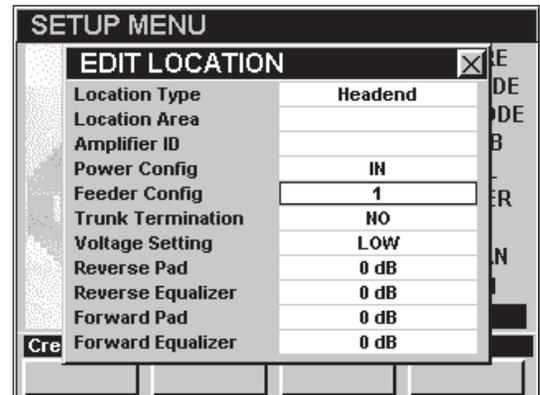
To change the power configuration, use the ◄ ► buttons to highlight the **Power Config** field, and use the ▲ ▼ buttons to increment through the possible power configurations.

```
SETUP MENU
  EDIT LOCATION                    ☒
  Location Type          Headend
  Location Area
  Amplifier ID
  Power Config              IN
  Feeder Config              1
  Trunk Termination         NO
  Voltage Setting           LOW
  Reverse Pad              0 dB
  Reverse Equalizer        0 dB
  Forward Pad              0 dB
Cre Forward Equalizer      0 dB
```

Feeder Configuration

You can specify the feeder configuration for this location. The feeder configuration can be specified as any number between **1** and **9**.
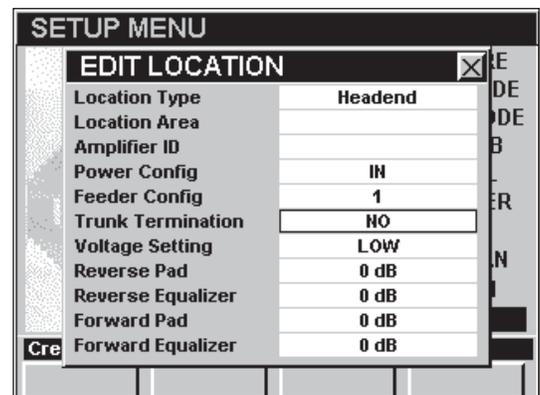
To change the feeder configuration, use the ◄ ► buttons to highlight the **Feeder Config** field, and use the ▲ ▼ buttons to increment through the possible feeder configurations.

```
SETUP MENU
  EDIT LOCATION                    ☒
  Location Type          Headend
  Location Area
  Amplifier ID
  Power Config              IN
  Feeder Config              1
  Trunk Termination         NO
  Voltage Setting           LOW
  Reverse Pad              0 dB
  Reverse Equalizer        0 dB
  Forward Pad              0 dB
Cre Forward Equalizer      0 dB
```

Trunk Termination

You can specify if this location has a trunk termination.

To specify whether this location has a trunk termination, use the ◄ ► buttons to highlight the **Trunk Termination** field, and use the ▲ ▼ buttons to change between **Yes** and **No**.

```
SETUP MENU
  EDIT LOCATION                    ☒
  Location Type          Headend
  Location Area
  Amplifier ID
  Power Config              IN
  Feeder Config              1
  Trunk Termination         NO
  Voltage Setting           LOW
  Reverse Pad              0 dB
  Reverse Equalizer        0 dB
  Forward Pad              0 dB
Cre Forward Equalizer      0 dB
```

Voltage Setting

You can specify the voltage setting for this location. The following voltage settings are available for your instrument; **Low**, **Medium, or High**.
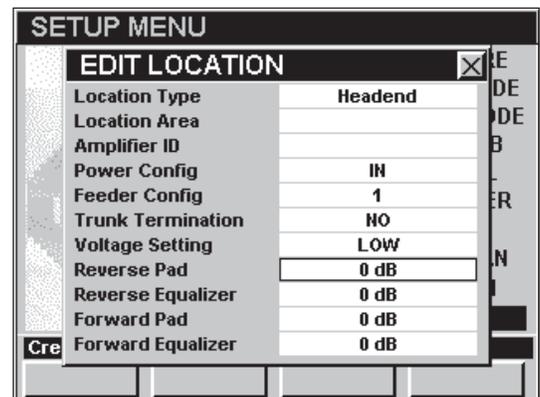
To change the voltage setting, use the ◀ ▶ buttons to highlight the **Voltage Setting** field, and use the ▲ ▼ buttons to increment through the possible voltage settings.
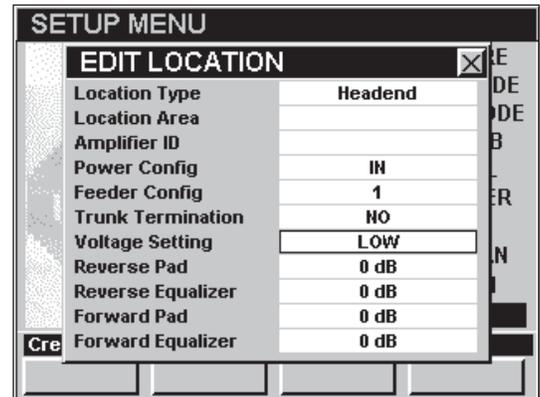
Reverse Pad

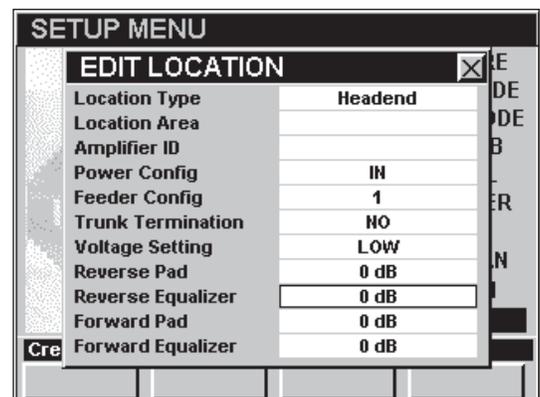You can specify the reverse pad setting for this location.

To change the reverse pad settings, use the ◀ ▶ buttons to highlight the **Reverse Pad** field, and use the ▲ ▼ buttons to change the setting in 1 dB increments.

Reverse Equalizer

You can specify the reverse equalizer setting for this location.

To change the reverse equalizer settings, use the ◀ ▶ buttons to highlight the **Reverse Equalizer** field, and use the ▲ ▼ buttons to change the setting in 1 dB increments.
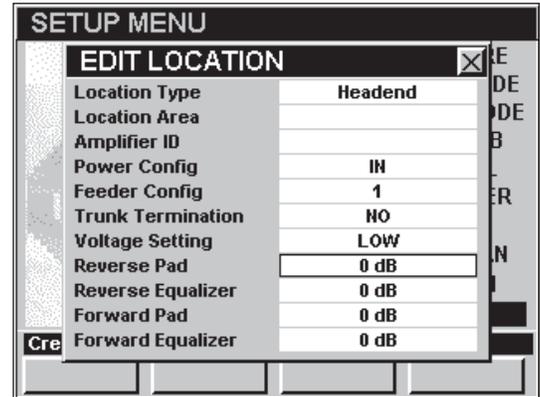
Forward Pad

You can specify the forward pad setting for this location.

To change the forward pad settings, use the ◀ ▶ buttons to highlight the **Forward Pad** field, and use the ▲ ▼ buttons to change the setting in 1 dB increments.

Forward Equalizer

You can specify the forward equalizer setting for this location.

To change the forward equalizer settings, use the ◀ ▶ buttons to highlight the **Forward Equalizer** field, and use the ▲ ▼ buttons to change the setting in 1 dB increments.
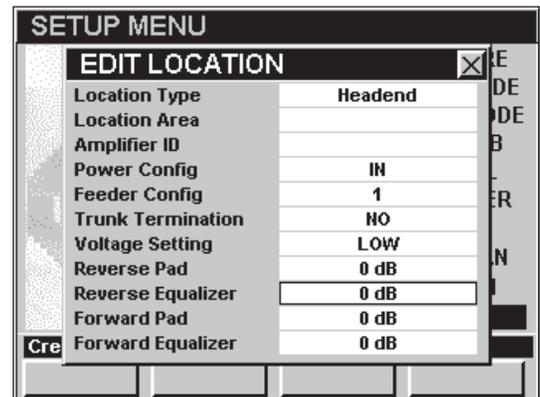
Saving Location Settings

When you are done changing all of the location settings, press the **Bk** button. The Save Location File window will appear, use the alphanumeric keypad to enter the file name of the location file, and then press the **Ent** button.
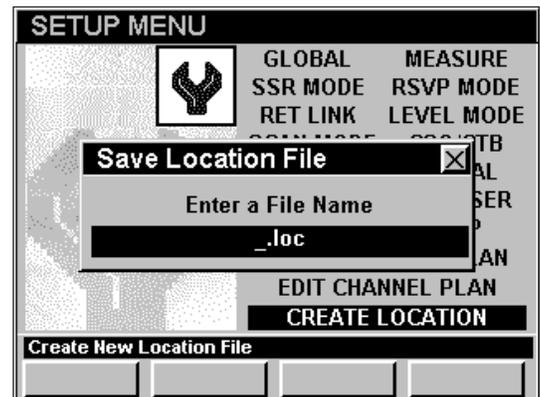
Setup
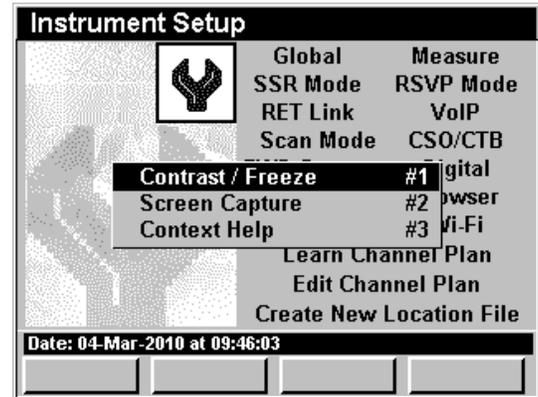
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Instrument Setup** Mode.

The following **Function** Menu Options can be accessed while in **Instrument Setup** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

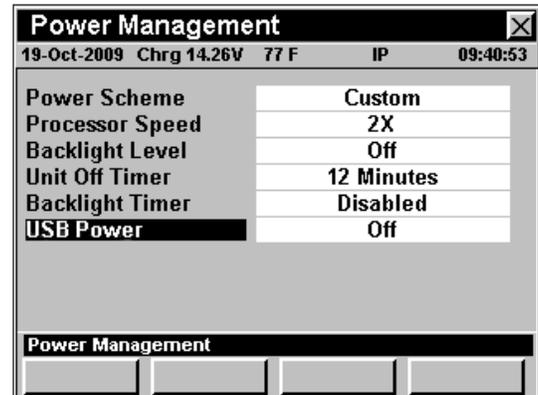- Contrast / Freeze

- Screen Capture

- Context Help

Introduction

Your instrument is equipped with both a battery and an AC power adaptor. The battery life is approximately four hours for continuous operation and can be extended when used intermittently.

The **Power Management** Mode allows you to better manage the power consumption of you instrument to prolong the time needed between charging. The basic 860 DSP and 860 DSPi come equipped with the **Power Management** Mode as a standard feature.

This section will provide you with the basic understanding of how to use **Power Management** Mode including:

- Choosing Power Scheme

- Processor Speed

- Backlight Level

- Unit Off Timer

- Backlight Timer

- USB Power

- Function Menu Options

Power Management

19-Oct-2009 Chrg 14.26V	77 F	IP	09:40:53
Power Scheme		Custom	
Processor Speed		2X	
Backlight Level		Off	
Unit Off Timer		12 Minutes	
Backlight Timer		Disabled	
USB Power		Off	

Power Management

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Choosing a Power Scheme

This setting allows you to choose from pre-configured power schemes in order to conserve battery usage.

To change the power scheme, use the ◀ ▶ buttons to highlight the **Power Scheme** field, and use the ▲ ▼ buttons to increment through the possible power schemes. You can select from **High (Fastest)**, **Normal**, **Low (Efficient)**, and **Custom**.

- **High (Fastest)** - This setting allows the instrument to operate using all options at their highest capacity and fastest speed. This is ideal when the AC power adaptor is plugged into AC power. The default settings of this power scheme are; **Processor Speed** = **2X** and **Backlight Level** = **16**.

- **Normal** - This setting is the typical power scheme. The default settings of this power scheme are; **Processor Speed** = **1X** and **Backlight Level** = **10**.

- **Low (Efficient)** - This setting is your most efficient option. If you need to use the instrument for an extended period of time before recharging, this option will extend your battery life. The default settings of this power scheme are; **Processor Speed** = **1X** and **Backlight Level** = **OFF**.

- **Custom** - This setting allows you to **customize your power management settings** by manually setting the **Processor Speed** and **Backlight Level** yourself.
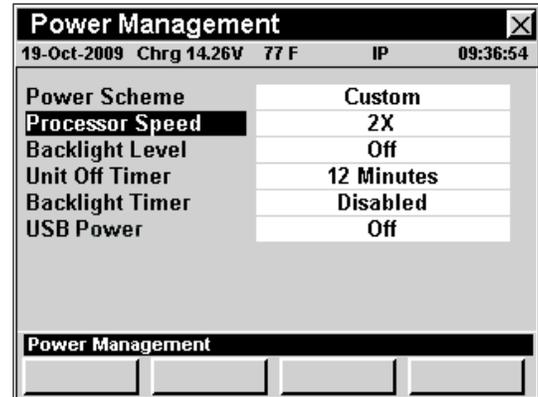
TRILITHIC
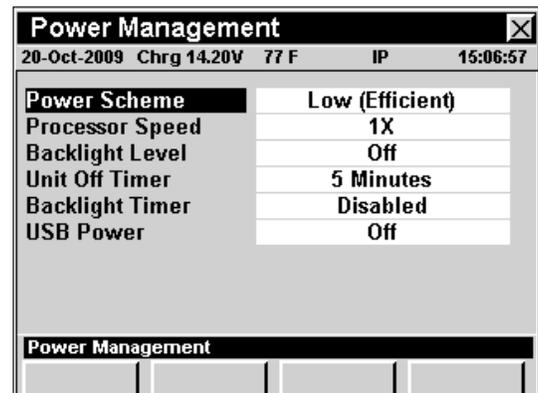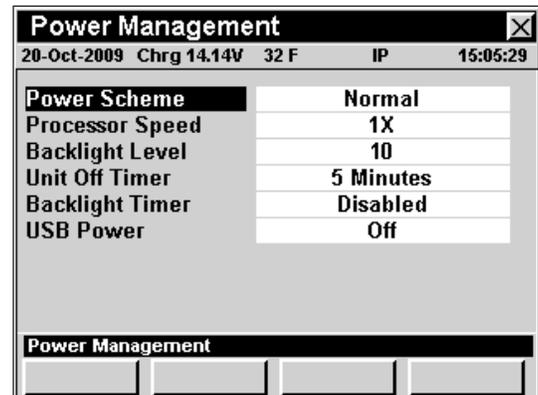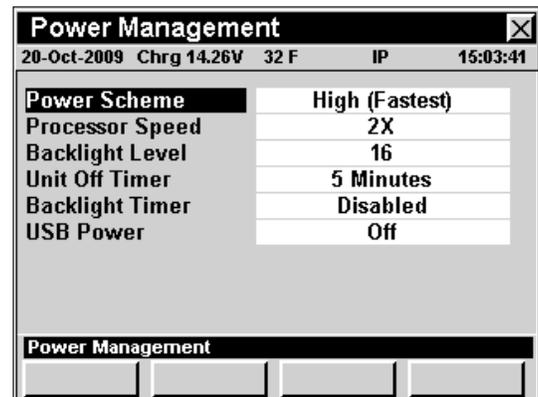
Setting Processor Speed

The processor speed is the level at which your instrument should process data. The processor speed can only be changed when the **Power Scheme** is set to **Custom**.

To change the processor speed, use the ◀ ▶ buttons to highlight the **Processor Speed** field, and use the ▲ ▼ buttons to change between **1X** and **2X**.

- **1X** - This setting is used to conserve battery power.

- **2X** - This is the default setting.

```
Power Management                          ☒
19-Oct-2009  Chrg 14.26V   77 F      IP        09:36:54

Power Scheme              Custom
Processor Speed           2X
Backlight Level           Off
Unit Off Timer            12 Minutes
Backlight Timer           Disabled
USB Power                 Off


Power Management
```

Setting Backlight Level

This setting is the level of brightness of your instrument's display. The backlight level can only be changed when the **Power Scheme** is set to **Custom**. On older instruments, you can choose a backlight level between **Off** and **28**. On newer instruments, you can choose a backlight level of **On** or **Off**.

To change the backlight level, use the ◀ ▶ buttons to highlight the **Backlight Level** field, and use the ▲ ▼ buttons to increment through the possible backlight levels.

```
Power Management                          ☒
19-Oct-2009  Chrg 14.20V   77 F      IP        09:38:34

Power Scheme              Custom
Processor Speed           2X
Backlight Level           Off
Unit Off Timer            12 Minutes
Backlight Timer           Disabled
USB Power                 Off


Power Management
```

- If you are working outdoors in direct light choose a lower number.

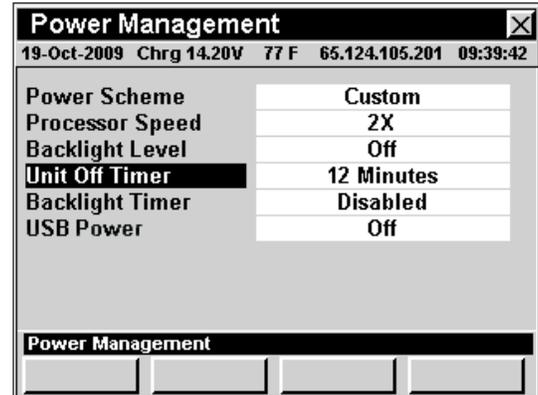- If you are working inside or in dark environments choose a larger number.
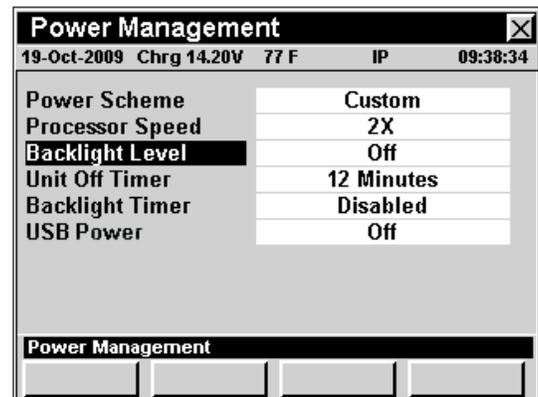
Unit Off Timer

This setting is used to turn off your instrument after it has been idle for a specified period of time.

In order to conserve battery power, it is recommended to change this setting to automatically turn off the instrument within a particular amount of idle time. You can choose from **Disabled** to **240 minutes**.

To change the unit off timer, use the ◀ ▶ buttons to highlight the **Unit Off Timer** field, and use the ▲ ▼ buttons to change the time in 1 minute increments.

> **Note:** Although this option will turn off your instrument after a specified period of time, when you power it on again, for your convenience it will bring you to the exact same screen it was on when it powered off.
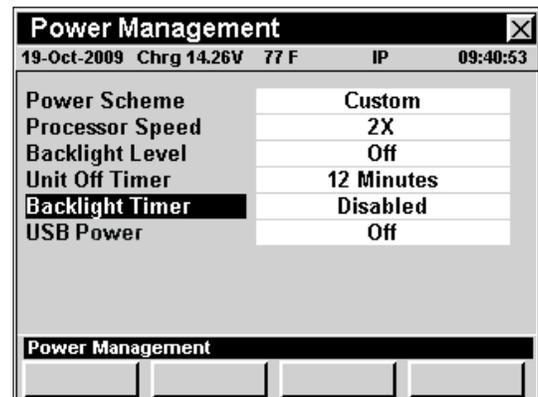
> **Note:** This timer setting does not apply when the instrument is being powered through the charge cube.

Backlight Timer

This setting is used to turn off the display screen's backlight after your instrument has been idle for a specified period of time.

In order to conserve battery power, it is recommended to change this setting to automatically turn off the display screen's backlight within a particular amount of idle time. You can choose from **Disabled** to **240 minutes.**

To change the backlight timer, use the ◀ ▶ buttons to highlight the **Backlight Timer** field, and use the ▲ ▼ buttons to change the time in 1 minute increments.
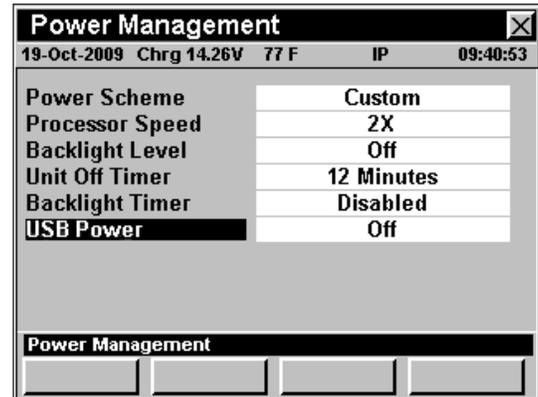
> **Note:** This timer setting does not apply when the instrument is being powered through the charge cube.

Power

USB Power

This setting is used to turn the USB power on and off.

To toggle the instrument USB power between on and off, use the ◀ ▶ buttons to highlight the **USB Power** field, and use the ▲ ▼ buttons to toggle between on and off.
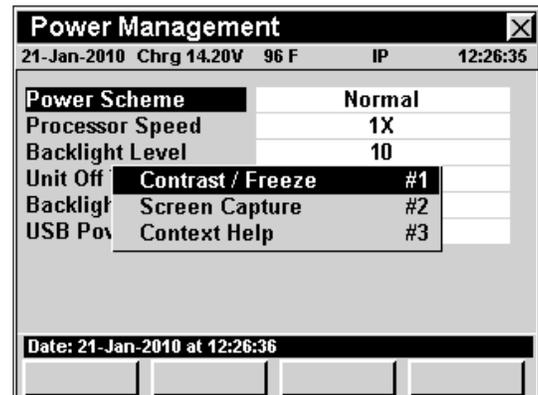

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Power Management** Mode.

The following **Function** Menu options can be accessed while in **Power Management** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
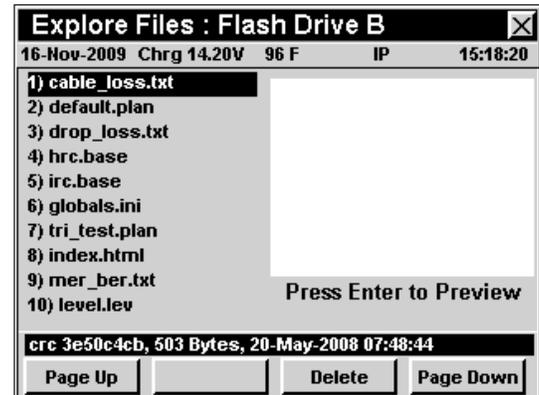- Screen Capture
- Context Help

Introduction

The **Explore Files** Mode allows you to view the data log files and unit configurations that are saved on **Flash Drive B**. These files include; learned channel plans, screen saves, data logs and text files. The basic 860 DSP and 860 DSPi come equipped with the **Power Management** Mode as a standard feature.

> **Note:** Your instrument has two drives, **Flash Drive B** is accessible, **Flash Drive A** is reserved for the instrument's firmware and calibration files and is not accessible.

This section will provide you with the basic understanding of how to use **Explore Files** Mode including:

- Previewing Files

- Deleting Files

- Supported File Types

- Function Menu Options

Explore Files : Flash Drive B ✕
16-Nov-2009 Chrg 14.20V 96 F IP 15:18:20
1) cable_loss.txt
2) default.plan
3) drop_loss.txt
4) hrc.base
5) irc.base
6) globals.ini
7) tri_test.plan
8) index.html
9) mer_ber.txt **Press Enter to Preview**
10) level.lev
crc 3e50c4cb, 503 Bytes, 20-May-2008 07:48:44
Page Up | | Delete | Page Down

> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

FILES

Previewing Files

The **Explore Files** Mode displays a list of files stored on **Flash Drive B**.

Use the ▲ ▼ buttons to navigate through the list.

The instrument will display 10 files in the list on a screen at one time. You can page back a forth through the list using the `Page Up` or `Page Down` softkeys.

To preview a file, highlight the desired file name then press the (Ent) button.

A thumbnail preview will appear giving you information about the files contents.

The file parameters are displayed in the message bar at the bottom of the screen.
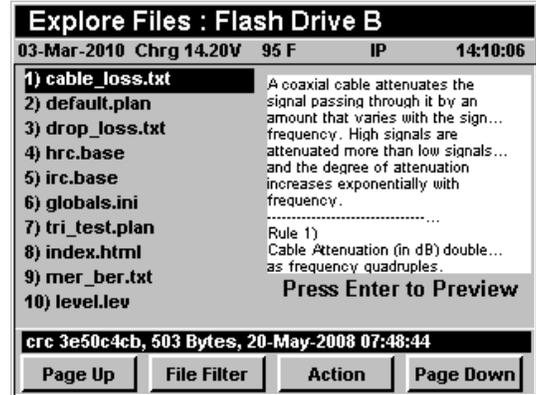
> **Note:** Some file types cannot be previewed, including log files.

Deleting Files

To delete a file, use the ▲ ▼ buttons to highlight the desired file name then press the `Action` softkey.

- The Preview/Delete function menu will open.

- Use the ◄ ► buttons to select **Preview**, and then press the (Ent) button.
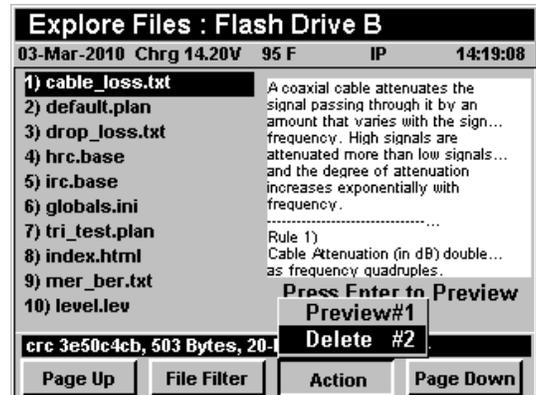
> **Note:** Before deleting a file be sure to preview the file and consult the file types list to be sure that you have the selected the correct file.

Supported File Types

The following is a list of extensions the 860 DSP uses for saving information:

Extension	File Type
.base	Base Channel plan (contains all channels for a given plan used for learning a channel plan)
.ber	BER Data Log
.bmpz	Compressed Bitmap Screen Save
.c2n	C/N Data Log
.cso	CSO/CTB Data Log
.dat	Temporary Cache files used by the web browser
.dom	% MOD Data Log
.fdr	FDR Data Log
.fm	FM Deviation Data Log
.fswp	Sweep Data Log
.gif	Web graphic file
.html	Web browser Source File
.hum	hum Data Log
.ini	User settings (deleting this file returns the 860 to factory default)
.lcd	Screen save
.jpg	Web graphic file
.leak	Leakage Data Log
.lev	Level Data Log
.log	Macro results
.mac	Autotest macro (deleting this file will remove the macro)
.ping	PING Data Log
.plan	Learned or user edited channel plan

Extension	File Type
.png	Web graphic file
.qam	QAM Data Log
.qaml	QAM Light Data Log
.qevs	QAM EVS Data Log
.rout	Trace Route Data Log
.rsa	RSA Sweep Data Log
.rswp	SSR Data Log
.rtst	RSVP Data Log
.scan	Scan Data Log
.spec	Spectrum Data Log
.sref	Sweep Reference
.stat	CM Stat Data Log
.thru	Thru Put Data Log
.tilt	TILT Data Log
.traf	TraffiControl Data Log
.txt	Text
.vits	VITS Data Log
.vrtp	VoIP Data Log
.wifi	Wi-Fi Survey Data Log
.wlog	Web Browser Data Log

Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **File Explorer** Mode.

The following **Function** Menu Options can be accessed
while in **File Explorer** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Restore Defaults
- Restore Icons
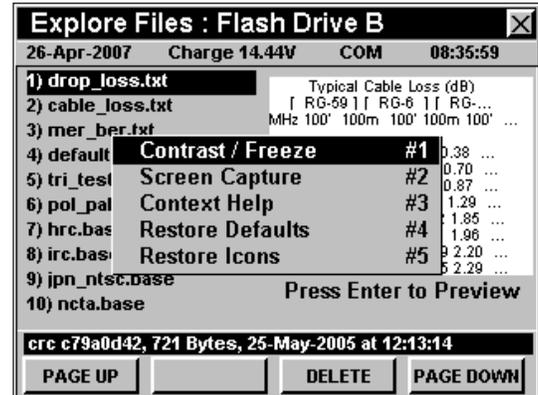
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function
Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help

FILES

Restore Factory Default Settings

If needed you can reset your instrument to the original factory default settings.

To use this option, press the (Fn) button, use the (▲) (▼) buttons to highlight **Restore Defaults**, and then press the (Ent) button. You may also select **Restore Defaults** by pressing (4).

- The **Function** Menu will close and the **Restore Defaults** window will open.

- Use the (◄) (►) buttons to select **Yes** or **No**, and then press the (Ent) button.
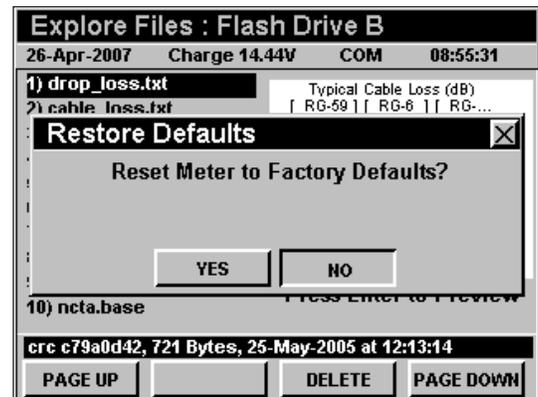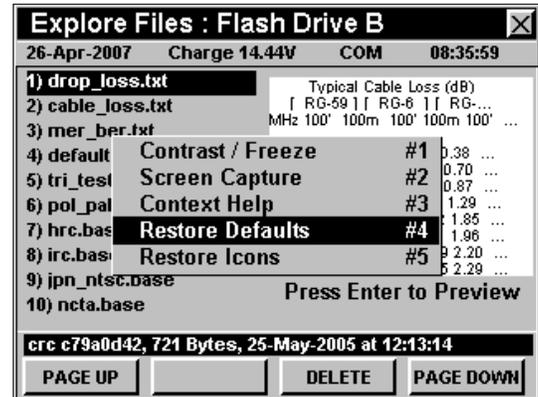
⚠ **CAUTION:** Setting to factory defaults will delete most user settings such as active channel plan, limits, display units etc.

FILES

Restore Icons

If needed you can reset your icons to the original factory default icons.

To use this option, press the (Fn) button, use the (▲)(▼) buttons to highlight **Restore Icons**, and then press the (Ent) button. You may also select **Restore Icons** by pressing (5).

- The **Function** Menu will close and the **Restore Icons** window will open.

- Use the (◄) (►) buttons to select **Yes** or **No**, and then press the (Ent) button.
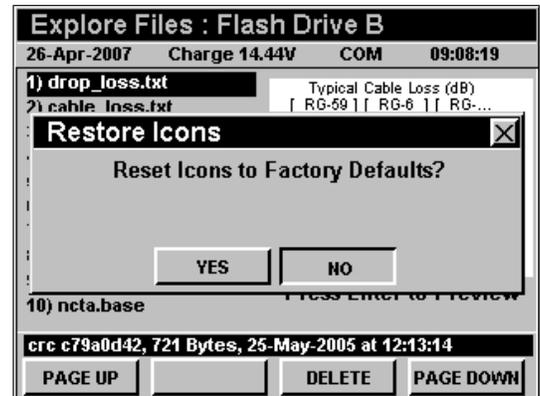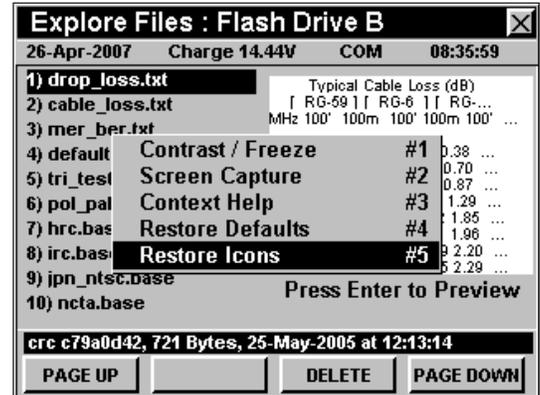
Note: Icons can be customized using the WorkBench companion software. For instructions, see your WorkBench Operation Manual.

Note: After a firmware upgrade, you may need to restore icons to see any new icons.

CAUTION: Restoring icons will delete any user set icons. **YOU WILL NOT BE ABLE TO RETRIEVE ANY CUSTOMIZED ICONS AFTER REVERTING TO FACTORY DEFAULT SETTINGS**.

Introduction

The **Instrument Information** Mode allows you to view information specific to your instrument such as firmware revision version, calibration date and options installed in your instrument. This is a useful resource when upgrading your instrument or just referencing communications specifications. The basic 860 DSP and 860 DSPi come equipped with the **Instrument Information** Mode as a standard feature.

This section will provide you with the basic understanding of how to use **Instrument Information** Mode including:

- Version Info

- Calibration Info

- Communications Info

- Memory Info

- RF Option Info

- NET Option Info

- Cable Modem Info

- Performing a ScanDisk

- Activating Rf Options

- Activating Net Options
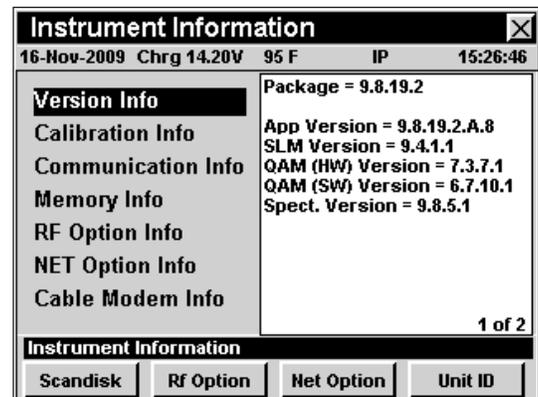
Note: All information displayed in the **Instrument Information** Mode is static and is to be used as a reference only. To edit any settings you will need to use the **Instrument Setup** Mode.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Version Info

The **Version Info** field provides details on the version of firmware installed in your instrument. This information will be helpful if you are updating your firmware or upgrading your instrument's option package.

To view the version info of your instrument, use the ◄ ► buttons to highlight the **Version Info** field.
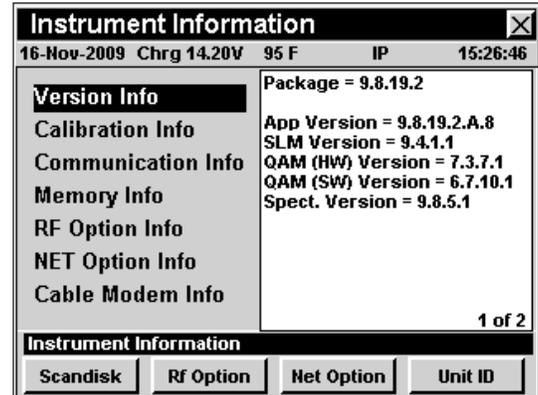

Note: When you download firmware updates from the web site or using WorkBench software, this information will be automatically updated.

Calibration Info

The **Calibration Info** field provides recorded details of the last time your instrument was calibrated. This information will be helpful if you are sending your instrument in to the factory for periodic maintenance.

To view the calibration info of your instrument, use the ◄ ► buttons to highlight the **Calibration Info** field.
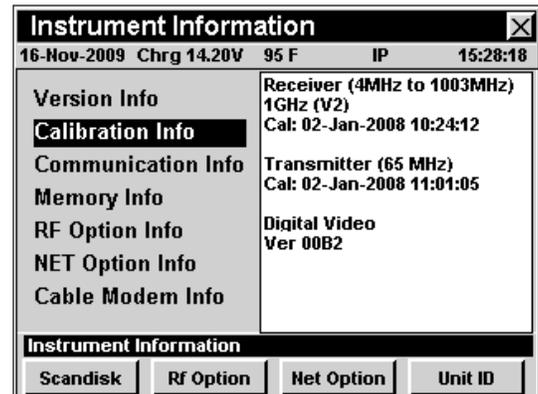
Note: When your instrument is sent in for calibration, this information will be automatically updated. You should schedule your instrument for calibration every two years.

Communication Info

The **Communication Info** field displays details on the MAC address and various IP and server setup information on your instrument. This information is helpful for quick reference of your current communications settings.

To view the communication info of your instrument, use the ◄ ► buttons to highlight the **Communication Info** field.

Note: This information can be edited from the **Instrument Setup** Mode and will be automatically updated.

Memory Info

The **Memory Info** field displays details of the memory available and used on your instrument. This information displays the amount of hard disk space available on your instrument.

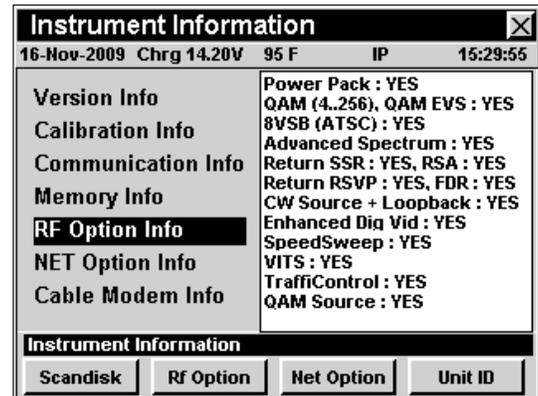To view the memory info of your instrument, use the ◄ ► buttons to highlight the **Memory Info** field.

Note: This information is automatically updated as files are saved and stored in the instrument.

RF Option Info

RF Option Info displays details of the current RF options available on your instrument. This information provides a reference of the types of RF options available to use and the types of RF options you can install on your instrument.

To view the RF option info of your instrument, use the ◀ ▶ buttons to highlight the **RF Option Info** field.

```
Instrument Information                    ⊠
16-Nov-2009  Chrg 14.20V   95 F      IP        15:29:55
                        Power Pack : YES
Version Info            QAM (4..256), QAM EVS : YES
                        8VSB (ATSC) : YES
Calibration Info        Advanced Spectrum : YES
Communication Info      Return SSR : YES, RSA : YES
                        Return RSVP : YES, FDR : YES
Memory Info             CW Source + Loopback : YES
RF Option Info          Enhanced Dig Vid : YES
                        SpeedSweep : YES
NET Option Info         VITS : YES
Cable Modem Info        TraffiControl : YES
                        QAM Source : YES
Instrument Information
  Scandisk  │  Rf Option  │  Net Option  │  Unit ID
```

> **Note:** Options can be added after the initial purchase. For more information, call your sales representative or Trilithic at 800-344-2412.
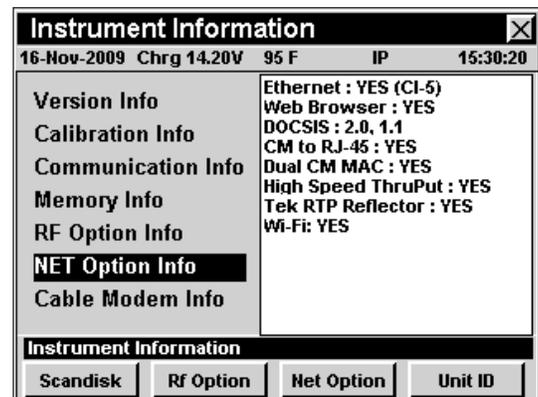
> **Note:** This information is automatically updated as options are added to your instrument.

NET Option Info

NET Option Info displays details of the current NET options available on your instrument. This information provides a reference of the types of NET options available to use and the types of NET options you can install on your instrument.

To view the NET option info of your instrument, use the ◀ ▶ buttons to highlight the **NET Option Info** field.

```
Instrument Information                    ⊠
16-Nov-2009  Chrg 14.20V   95 F      IP        15:30:20
                        Ethernet : YES (CI-5)
Version Info            Web Browser : YES
                        DOCSIS : 2.0, 1.1
Calibration Info        CM to RJ-45 : YES
Communication Info      Dual CM MAC : YES
                        High Speed ThruPut : YES
Memory Info             Tek RTP Reflector : YES
RF Option Info          Wi-Fi: YES

NET Option Info
Cable Modem Info

Instrument Information
  Scandisk  │  Rf Option  │  Net Option  │  Unit ID
```

> **Note:** Options can be added after the initial purchase. For more information, call your sales representative or Trilithic at 800-344-2412.

> **Note:** This information is automatically updated as options are added to your instrument.

Cable Modem Info

If you have the internal cable modem installed in your instrument, and the internal cable modem is selected as the communication device, the **Cable Modem Info** field will display details on your internal cable modem settings. This information is helpful for quick reference of your current modem settings.

To view the cable modem info of your instrument, use the ◀ ▶ buttons to highlight the **Cable Modem Info** field.
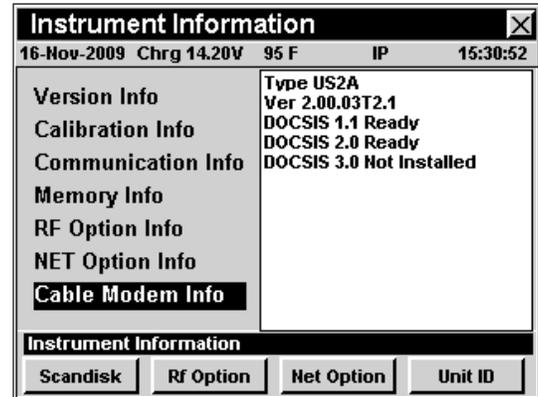
Performing a ScanDisk

To scan your **Flash Drive A** or **Flash Drive B** for errors, press the Scandisk softkey, use the ▲ ▼ buttons to highlight **Drive A Only** or **Drive B Only**, and then press the (Ent) button. You may also select **Drive A Only** or **Drive B Only** by pressing ① or ②.

The following messages may appear in the message bar at the bottom of the screen;

- **ScanDisk Complete with No errors** - This will be displayed if there are no errors on the selected drive.

- **ScanDisk Completed, Requires Firmware Upgrade** - This will be displayed if there are errors on the **Flash Drive A**. Some configuration files may be corrupted, it is recommended that you upgrade your firmware. In some instances the instrument's calibration files may be corrupted. If this occurs, you will need to return your instrument to the factory for re-calibration.

- **ScanDisk Completed, Requires Reconfiguration** - This will be displayed if there are errors on **Flash Drive B**. Normally, no user intervention is needed. In some instances a customized setting or channel plan may be corrupted. If this occurs, you will need to reconfigure that feature.
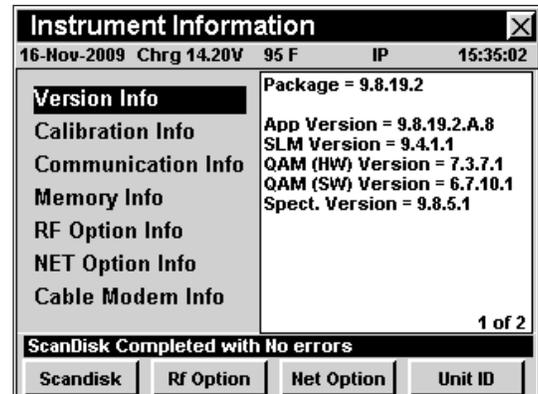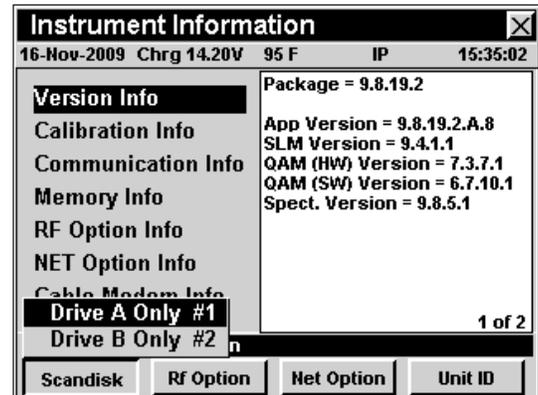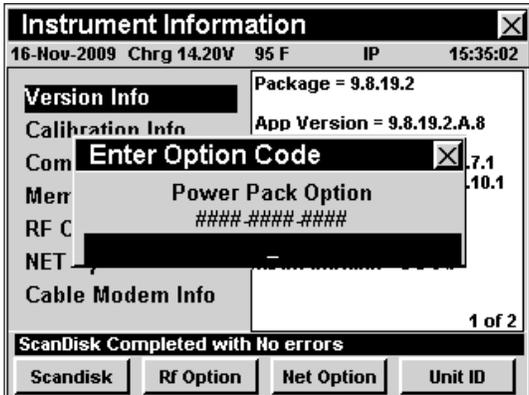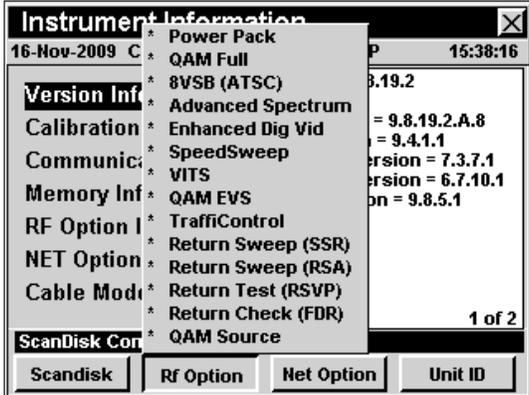
Activating Rf Options

If you purchased an option after your instrument was initially shipped, you will need to activate the option on your instrument.

Press the [Rf Option] softkey to display a list of all the Rf options available on your instrument. Active Rf options are indicated by an asterisk (*) next to the option name.

Use the ▲ ▼ buttons to highlight the name of the option to be activated and press the (Ent) button. The **Enter Option Code** window will appear. Enter the option code using the alphanumeric keypad, and then press the (Ent) button. The **Enter Option Code** window will only appear when the highlighted option has not yet been installed.

Note: Options may also require additional hardware be installed. Check with your sales representative or call Trilithic at 800-344-2412 for more information.

Note: The option code is a unique activation number that is specifically generated for your instrument. You should have received this code with your order for new options. If you are missing this code, contact Trilithic at 800-344-2412.
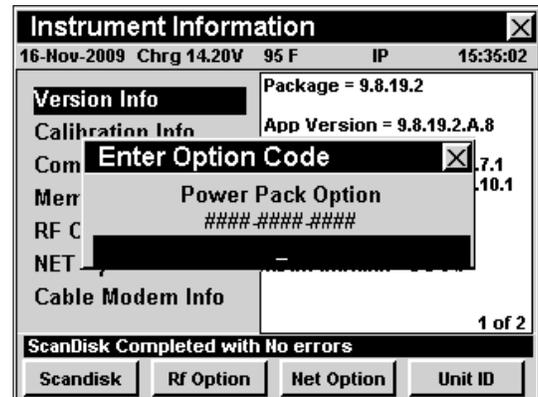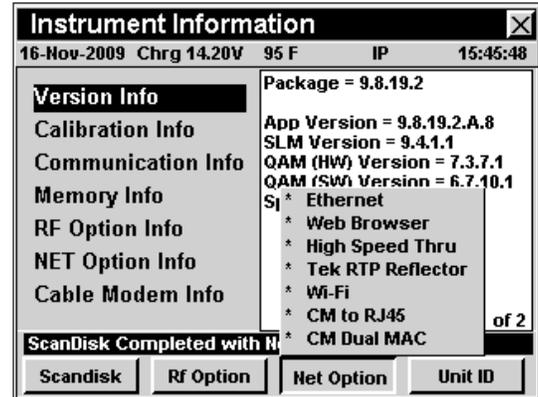
TRILITHIC

Activating Net Options

If you purchased an option after your instrument was initially shipped, you will need to activate the option on your instrument.

Press the Net Option softkey to display a list of all the Net options available on your instrument. Active Net options are indicated by an asterisk (*) next to the option name.

Use the ▲ ▼ buttons to highlight the name of the option to be activated and press the Ent button. The **Enter Option Code** window will appear. Enter the option code using the alphanumeric keypad, and then press the Ent button. The **Enter Option Code** window will only appear when the highlighted option has not yet been installed.

Instrument Information
16-Nov-2009 Chrg 14.20V   95 F   IP   15:45:48

Version Info   Package = 9.8.19.2
Calibration Info   App Version = 9.8.19.2.A.8
Communication Info   SLM Version = 9.4.1.1
                      QAM (HW) Version = 7.3.7.1
Memory Info   QAM (SW) Version = 6.7.10.1
RF Option Info   Sp * Ethernet
NET Option Info   * Web Browser
Cable Modem Info   * High Speed Thru
                         * Tek RTP Reflector
                         * Wi-Fi
                         * CM to RJ45   of 2
ScanDisk Completed with N * CM Dual MAC

Scandisk | Rf Option | Net Option | Unit ID

Instrument Information
16-Nov-2009 Chrg 14.20V   95 F   IP   15:35:02

Version Info   Package = 9.8.19.2
Calibration Info   App Version = 9.8.19.2.A.8
Com **Enter Option Code** .7.1
Men   **Power Pack Option** .10.1
RF C   ####-####-####
NET
Cable Modem Info
                                      1 of 2
ScanDisk Completed with No errors

Scandisk | Rf Option | Net Option | Unit ID

> **Note:** Options may also require additional hardware be installed. Check with your sales representative or call Trilithic at 800-344-2412 for more information.

> **Note:** The option code is a unique activation number that is specifically generated for your instrument. You should have received this code with your order for new options. If you are missing this code, contact Trilithic at 800-344-2412.

Unit ID

The Unit ID option allows you to see the instrument serial number.

To use this option, press the **Unit ID** softkey. The unit serial number will be displayed. To exit the window press the **Ent** button.
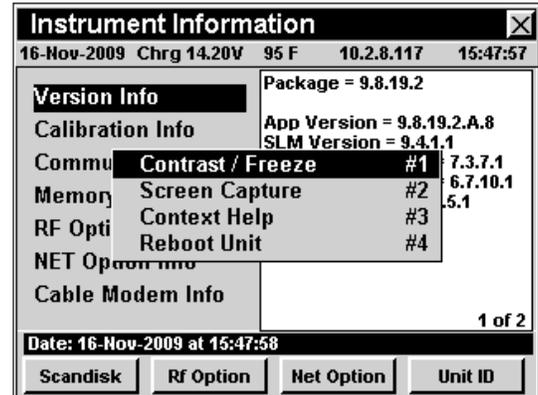
Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **Instrument Information** Mode.

The following **Function** Menu options can be accessed while in **Instrument Information** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Reboot Unit

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help

Reboot Unit

If needed you can reboot your instrument.

To use this option, press the **Fn** button, use the ▲ ▼ buttons to highlight **Reboot Unit**, and then press the **Ent** button. You may also select **Reboot Unit** by pressing ④.
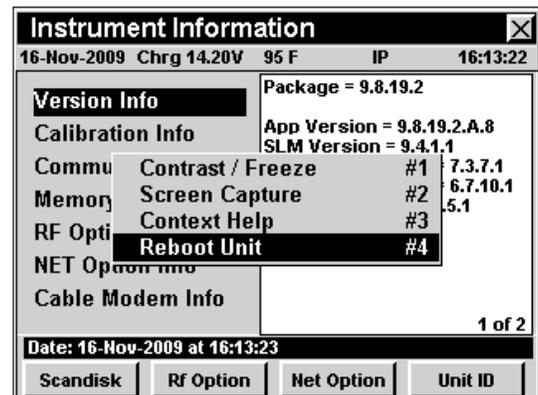
860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section V: Utility Functions

TRILITHIC

Introduction

The instrument enables you to select from several Utility Functions. The instruments features several Utility Functions which come with the instruments and may have one or more optional functions.

This section will provide you with instructions on how to utilize the functions available in the **Utility** menu of the instrument.

> **Note:** The labels and the arrangement of the icons in this section are the default settings of the instrument. The user's display appearance may be customized and therefore may differ from the **Utility** menu shown in this section. WorkBench software is required for customizing. See the WorkBench Operation Manual for more details.

Mode	Description	860 DSP Option	860 DSPi Option
Calendar	Displays the month and day of the current year.	Standard	Standard
Notepad	Enables the user to reference technical notes or text documents that have been created on a PC using the WorkBench Software or a text editor application, and loaded from a PC using the WorkBench Software.	Standard	Standard

Mode	Description	860 DSP Option	860 DSPi Option
Calculator	Provides basic math functions.	Standard	Standard
Tasks	Allows the user to display open and closed work order tasks. These work orders can be created using Trilithic Data Manager (TDM), CSG Workforce Express, or other third party workforce management systems.	Standard	Standard
Line Viewer	Allows the user to look at any line on an Analog (NTSC) Cable TV Channel. This is useful for checking your line blanker or test signal line inserter device for proper operation.	Standard	PP-1
Cable Modem Thru	Provides a method of using the internal cable modem as a desktop modem by allowing a customers PC to connect to the external RJ-45 port and gain Internet access through the internal cable modem. **NOT AVAILABLE FOR 860 DSP, SEE NOTE 1**	N/A	Standard
FDR	Provides a simple, convenient and accurate tool for determining the distance to cable faults. The option works by sending a sweep into the cable and analyzing the complex reflected wave to determine the distance to various sources of reflection (opens, shorts, splitters, etc.).	FDR and Return Transmitter Board	PP-1, FDR and Return Transmitter Board
Source Generator	An operating function that is bundled with the SSR Mode and RSVP Mode that configures the 860 DSPi to function as a return frequency signal source with settable signal frequency, amplitude, and modulation.	SR-1 or VP-1 or FDR/RSA	PP-1 and SR-1 or VP-1 or FDR/RSA

Mode	Description	860 DSP Option	860 DSPi Option
Upstream QAM Source	Generates a QPSK signal or a 16 or 64 QAM signal (5 to 42 MHz) at a test point that can be analyzed in the headend displayed using a bar graph. **NOT AVAILABLE FOR 860 DSP, SEE NOTE 1**	N/A	Standard
Wi-Fi	Provides the ability to survey available access points, or to access a network to perform tests such as ping, trace route, throughput, VoIP, and verification of browser functionality. **NOT AVAILABLE FOR 860 DSP, SEE NOTE 1**	N/A	PP-1 and Wi-Fi

Note 1: Although this icon will appear on the 860 DSP, this mode is not available for the 860 DSP. The 860 DSP must be upgraded to an 860 DSPi by installing an internal DOCSIS 2.0 or DOCSIS 3.0 modem to access this mode.

Each mode of the instrument can be accessed by selecting the corresponding icon as shown in the previous table. Some modes may be inaccessible based on the options that have been installed on the instrument. Optional modes for the 860 DSP and 860 DSPi are indicated by an option code that is described in detail in **Section I: The Basics**, Chapter 7: Optional Software and Hardware.

This section assumes you are at least familiar with the basic operation of the navigational tools used in the 860 DSPi, so be sure to review **Section I: The Basics,** Chapter 4: Basic Navigation before proceeding through this section.

To use some Utility Functions, you may have to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this section.

To use some Utility Functions you will need to connect your instrument to your cable system.

TRILITHIC

Introduction

The **Calendar** Mode displays the current month and day (indicated with parentheses) by default.

The basic 860 DSP and 860 DSPi come equipped with the **Calendar** Mode as a standard feature.

This section will provide you with a basic understanding of how to use **Calendar** Mode including:

- Required Setup
- Changing Months

Calendar : October-2006						☒
SUN	MON	TUE	WED	THUR	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	(24)	25	26	27	28
29	30	31				

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.
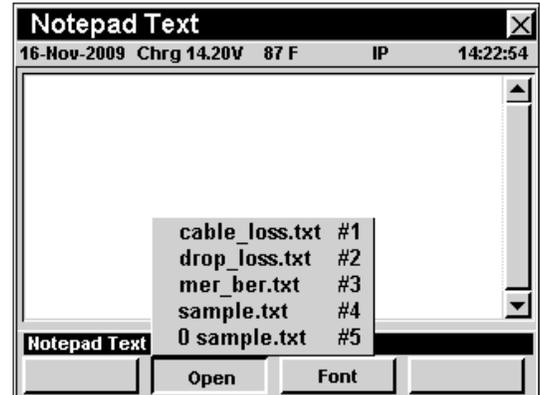
Required Setup

To use **Calendar** Mode, you will need to set the current date, see **Section IV: Setup Functions, Chapter 2: Instrument Setup Mode**, *Global Settings*.

Changing Months

To change the month that is displayed, press the ▲ ▼ buttons to cycle through the months in the current year.

Notepad Mode

Introduction

The **Notepad** Mode enables you to reference technical notes or text messages which have been created on a PC using the WorkBench software or a text editor application, and loaded from a PC using the WorkBench software.

The basic 860 DSP and 860 DSPi come equipped with the **Notepad** Mode as a standard feature. The **Notepad** Mode can be configured to run as a legacy version of the application, or can be configured to run through the instrument's web browser. The legacy **Notepad** Mode is discussed in the following sections; the web browser **Notepad** Mode is discussed in the final section of this chapter.

This section will provide you with a basic understanding of how to use **Notepad** Mode including:

- Required Setup
- Opening Text Files
- Changing Display Font Sizes
- Function Menu Options
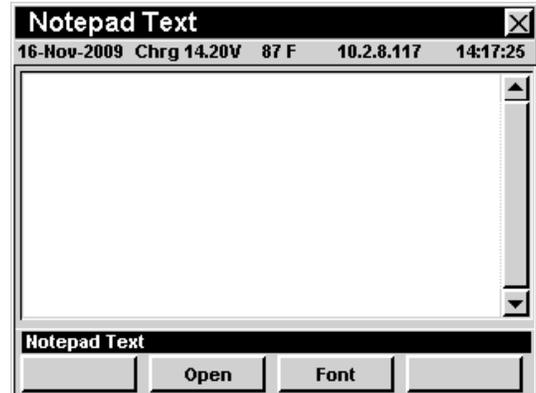
> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Notepad** Mode, you are not required to perform any setup procedures.

Opening Text Files

To open a text file you have downloaded from a PC, press the [Open] softkey, use the ▲ ▼ buttons to highlight the file you want to view, and then press the (Ent) button to open the highlighted text file.

Use the ▲ ▼ buttons to scroll through the text file.

Notepad Text
16-Nov-2009 Chrg 14.20V   87 F   IP   14:22:54

cable_loss.txt #1
drop_loss.txt   #2
mer_ber.txt   #3
sample.txt   #4
0 sample.txt   #5

Notepad Text

Open   Font

Note: You will need the companion software, WorkBench to download any text files into your instrument. For instructions using WorkBench software, please see the WorkBench operation manual.

Changing Display Font Size

To change the size of the font that is displayed on your instrument in the Notepad Mode, press the [Font] softkey, use the ▲ ▼ buttons to highlight the desired font size and then press the (Ent) button.
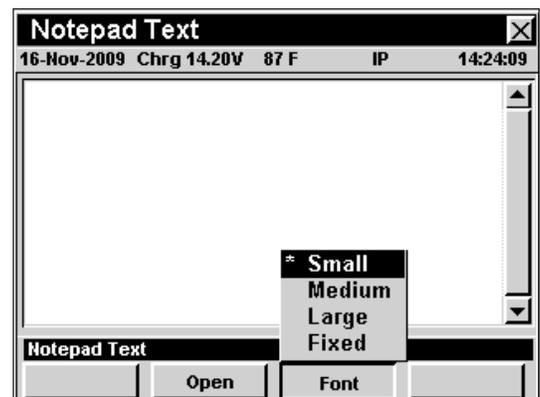
Notepad Text
16-Nov-2009 Chrg 14.20V   87 F   IP   14:24:09

⁂ Small
Medium
Large
Fixed

Notepad Text

Open   Font

Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Notepad** Mode.

The following **Function** Menu options can be accessed while in **Notepad** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help
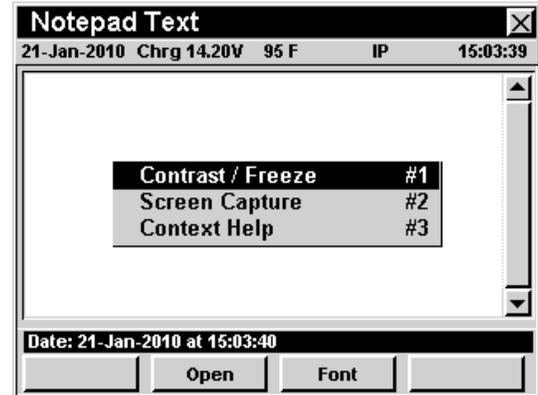
Web Browser Notepad

The **Legacy Notepad** Mode can only open text files, whereas the **Web Browser Notepad** can open text files, HTML files, and image files. To change configuration settings, refer to the **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings, Notepad Utility* section of this manual.

The **Legacy Notepad** Mode functions the same as the instrument's web browser, which is detailed in **Section II: Installer Functions**, Chapter 14: Web Browser Mode.
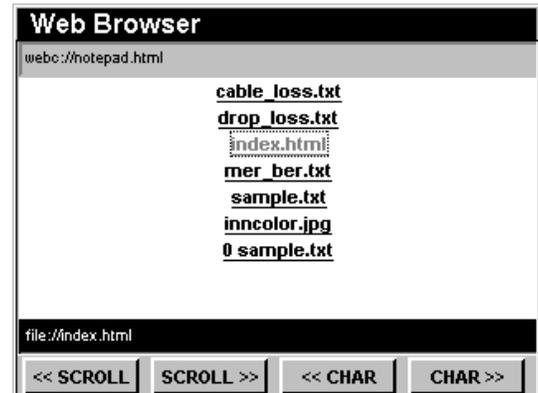
Overview

To use the calculator. Enter the desired number and mathematical function using the alphanumeric keypad, and then press the (Ent) button to compute the solution.

The basic 860 DSP and 860 DSPi come equipped with the **Calculator** Mode as a standard feature.

This section will provide you with a basic understanding of how to use **Calculator** Mode including:

- Required Setup

- Performing Calculations
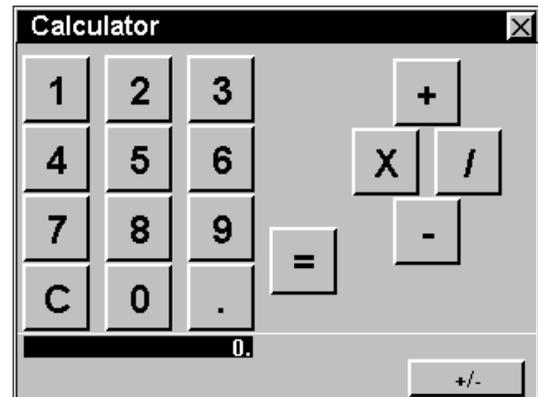
> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Calculator** Mode, you are not required to perform any setup procedures.

CALC

Performing Calculations

The following buttons represent the functions shown on the calculator screen.

- The (0)...(9) number buttons correspond to the alphanumeric buttons.

- The (Bk) button is used to clear computations.

- The (Fn) button is used as the decimal point.

Calculator

1	2	3		+
4	5	6	X	/
7	8	9		-
C	0	.	=	

0.

+/-
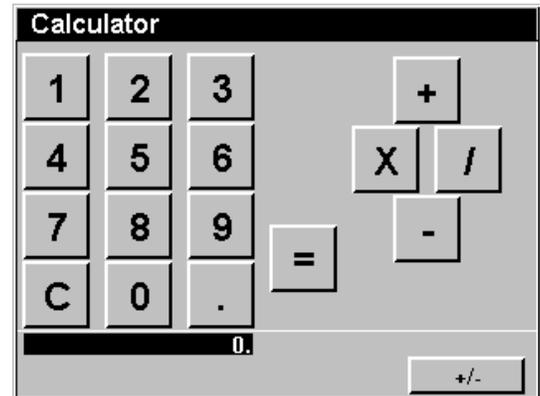
> **Note:** To enter decimals such as .5, .25, .73, etc., you will need to press the (0) button before you enter the decimal.

- The (Ent) button is used to equal (=) computations.

- The ◄ ► ▲ ▼ arrow buttons correspond to the calculator symbols for multiplication (x), and division (/), addition (+), subtraction (-).

- The +/- softkey is used to change a calculated number to a negative or positive.

Introduction

The **Tasks** Mode allows the user to display open and closed work order tasks. These work orders can be created using Trilithic Data Manager (TDM), CSG Workforce Express, or other third party workforce management systems.

The basic 860 DSP and 860 DSPi come equipped with the **Tasks** Mode as a standard feature.

This section will provide you with a basic understanding of how to use **Tasks** Mode including:

- Required Setup

- View Task Details

- New Task

- Close Task

- ReOpen Task

- Delete Task

- Function Menu Options
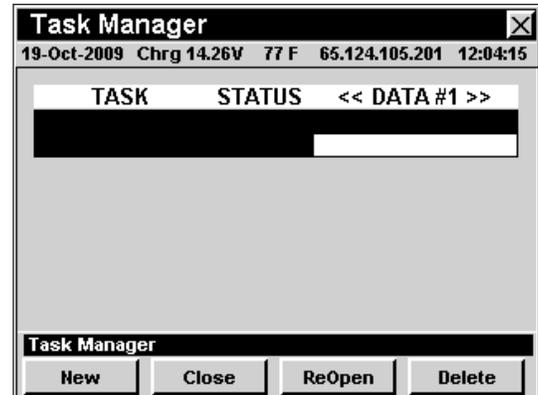
> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Tasks** Mode, you will need to set the current date, see **Section IV: Setup Functions, Chapter 2: Instrument Setup Mode**, *Global Settings*. You will also need to enable **Tasks** Mode in the instrument setup; see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings, Data Log Attachments*. The value must be set to **Tasks** or **Locations + Tasks**.

In order to use the **Tasks** Mode, you will need to install Trilithic Data Manager (TDM), SG Workforce Express, or some other third party workforce management system.

Viewing Task Details

To view details of a specific task, use the (▲) (▼) buttons to highlight the task you want to view, and then press the (Ent) button. The **Task** window will open. When done viewing test details, press the (Ent) button.
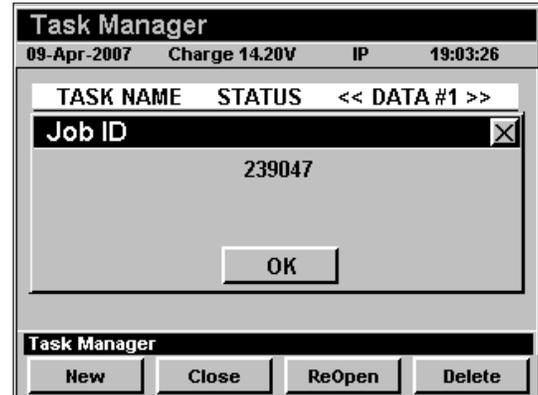
Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Tasks** Mode.

The following **Function** Menu options can be accessed while in **Tasks** Mode;

- Contrast / Freeze

- Screen Capture

- Context Help

- Close Task File

- ReOpen Task File

- Delete Task File

- Task ID Length
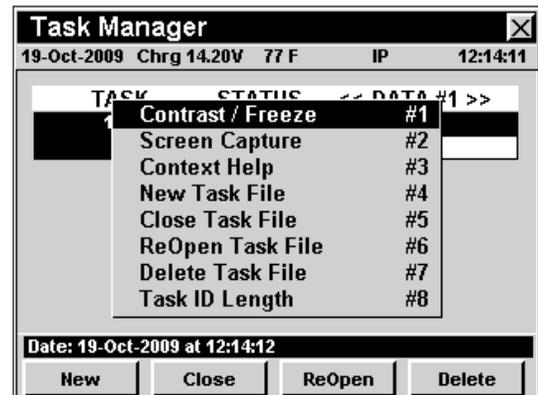
Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options;

- Contrast / Freeze

- Screen Capture

- Context Help

TASKS

New Task File

This option is used to create a new task.

To use this option highlight the **New Task File** option, press the (Fn) button.

The **Function** Menu will close and the **Create New Task** window will open. Use the (1)...(0) buttons to enter a task ID number, and select the (Ent) button. The instrument will return to the **Task Manager** window.
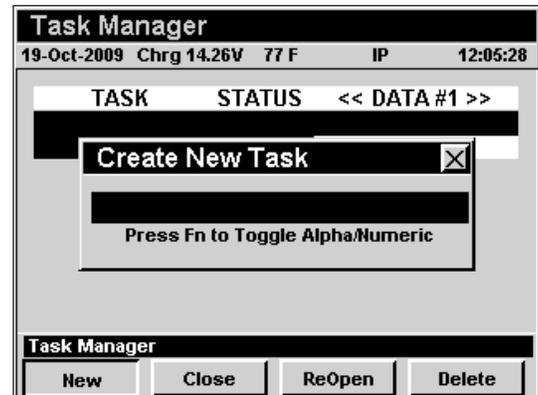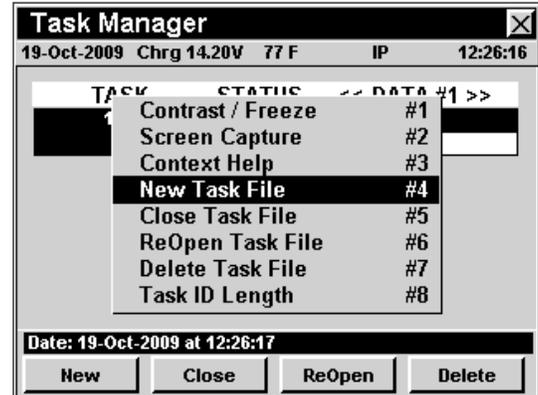
Close Task File

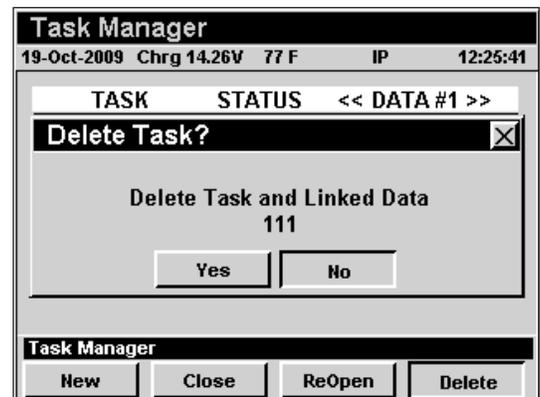This option is used to close an open task.

To use this option, use the ⓐ ⓥ buttons to highlight the open task you want to close, press the ⒻⓃ button, use the ⓐ ⓥ buttons to highlight **Close Task File**, and then press the ⒺⓃⓉ button. You may also select **Close Task File** by pressing ⑤.

The **Function** Menu will close and the **Close Task?** window will open. Use the ◀ ▶ buttons to select **Yes** to close the task or **No** to exit without closing the task, and select the ⒺⓃⓉ button. The instrument will return to the **Task Manager** window.
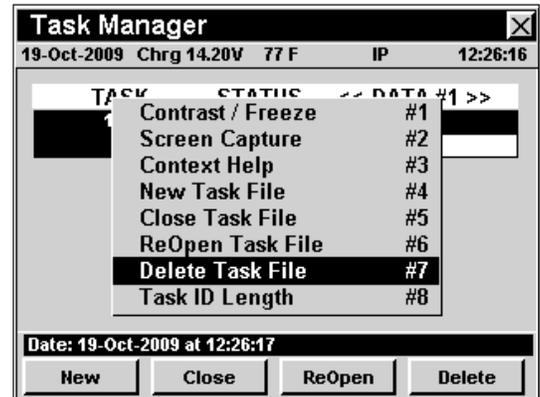
TASKS
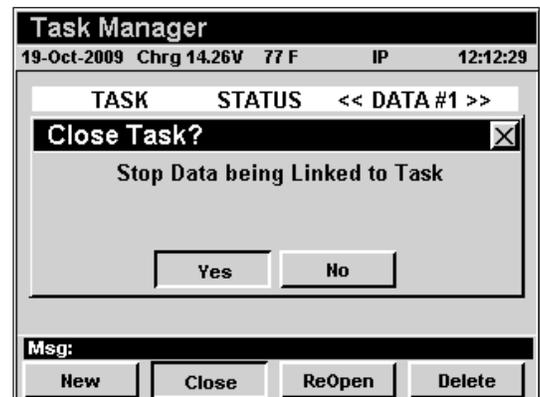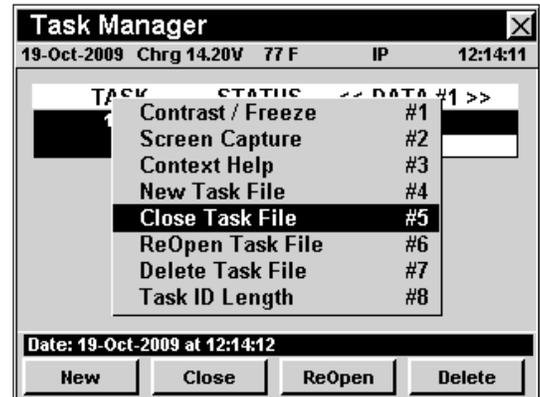
ReOpen Task File

This option is used to reopen a closed task.

To use this option, use the ▲ ▼ buttons to highlight the closed task you want to reopen, press the **Fn** button, use the ▲ ▼ buttons to highlight **ReOpen Task File**, and then press the **Ent** button. You may also select **ReOpen Task File** by pressing **6**.

The **Function** Menu will close and the **ReOpen TASK?** window will open. Use the ◀ ▶ buttons to select **Yes** to open the closed task or **No** to exit without reopening the task, and select the **Ent** button. The instrument will return to the **Task Manager** window.

Delete Task File

This option is used to delete a task.

To use this option, use the ⒜ ⒱ buttons to highlight the task you want to delete, press the (Fn) button, use the ⒜ ⒱ buttons to highlight **Delete Task File**, and then press the (Ent) button. You may also select **Delete Task File** by pressing ⑦.

The Function Menu will close and the **Delete Task?** window will open. Use the ⒜ ⒱ buttons to select **Yes** to delete the task or **No** to exit without deleting the task, and select the (Ent) button. The instrument will return to the **Task Manager** window.

Task Manager ✕
19-Oct-2009 Chrg 14.20V   77 F   IP   12:26:16

TASK	STATUS	<< DATA #1 >>
Contrast / Freeze		#1
Screen Capture		#2
Context Help		#3
New Task File		#4
Close Task File		#5
ReOpen Task File		#6
Delete Task File		**#7**
Task ID Length		#8

Date: 19-Oct-2009 at 12:26:17

| New | Close | ReOpen | Delete |

Task Manager
19-Oct-2009 Chrg 14.26V   77 F   IP   12:25:41

| TASK | STATUS | << DATA #1 >> |

Delete Task? ✕

Delete Task and Linked Data
111

| Yes | No |

Task Manager

| New | Close | ReOpen | Delete |

Task ID Length

This option is used to set the length of characters that may be used to identify a task.

To use this option, use the (▲) (▼) buttons to highlight the task you want to delete, press the (Fn) button, use the (▲) (▼) buttons to highlight **Task ID Length**, and then press the (Ent) button. You may also select **Task ID Length** by pressing (8).

The **Function** Menu will close and the **Enter Task ID Length?** window will open. Use the (1)...(0) buttons to enter the number of digits (16 max) allowed for the Task ID. If the number of digits is less than 10, press the (Ent) button and the instrument will return to the **Task Manager** window.. If the number of digits is greater than 9, the instrument will return to the **Task Manager** window.
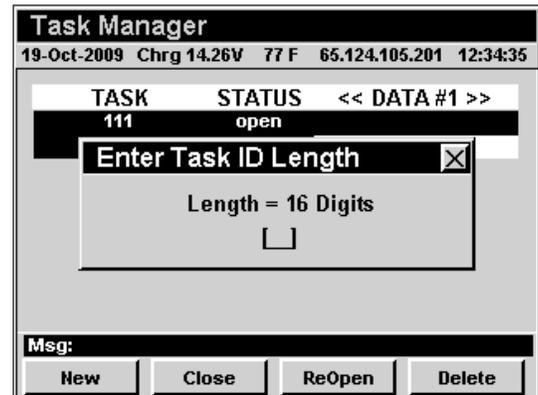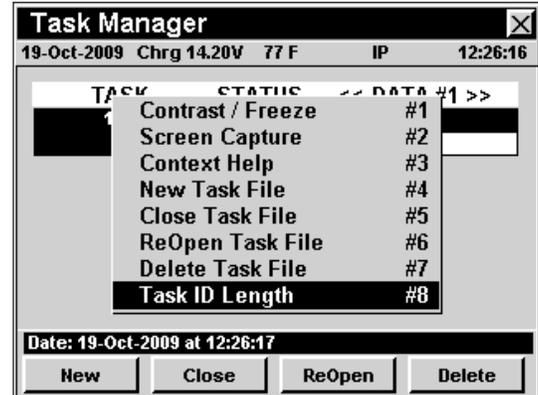
> **Note:** The **Task ID Length** must be set to the same value as the corresponding value that was set in Trilithic Data Manager.

Introduction

The **Line** Mode allows the user to look at any line on an analog (NTSC) cable TV channel. This is useful for checking your line blanker or test signal line inserter device for proper operation.

The basic 860 DSP comes equipped with the **Line** Mode as a standard feature. In order to use the **Line** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1).

This section will provide you with a basic understanding of how to use **Line** Mode including:

- Required Setup

- Adjusting Channels and Frequencies

- Setting Line Number

- Setting Even/Odd Lines

- Setting Channel Plan

- Viewing Blank Lines

- Function Menu Options
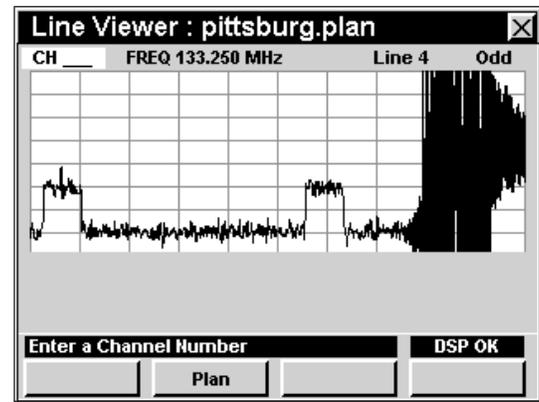
> **Note:** If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **Line** Mode, you are not required to perform any setup procedures.

Adjusting Channels and Frequencies

To change the channel or frequency, use the ◄ ► buttons to highlight the channel number or frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel number or frequency using the alphanumeric keypad, and then press the (Ent) button.

Line Viewer : pittsburg.plan
CH 016   FREQ 133.250 MHz   Line 4   Odd
Msg: DSP OK
Plan

Setting Line Number

To change the line number, use the ◄ ► buttons to highlight the line number, use the ▲ ▼ buttons to increment the value up and down or enter the desired channel line number using the alphanumeric keypad, and then press the (Ent) button.
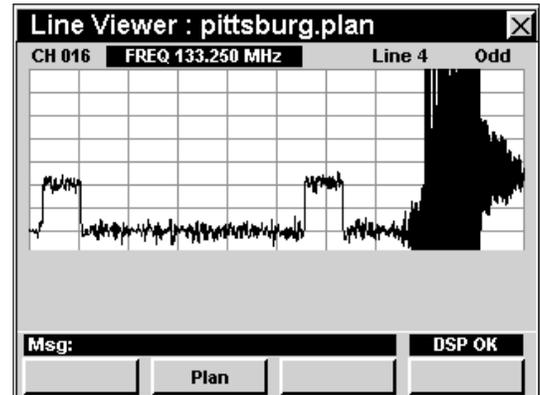
Line Viewer : pittsburg.plan
CH 016   FREQ 133.250 MHz   Line 4   Odd
Msg: DSP OK
Plan
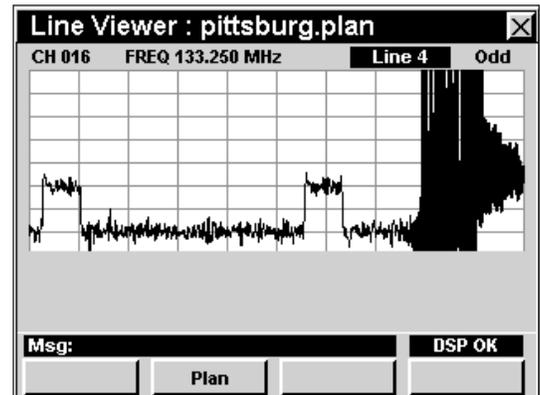
Setting Even/Odd Fields

To change the between even and odd fields, use the
◄ ► buttons to highlight the **Even/Odd**, use the ▲ ▼
buttons to increment change the value between **Even**
and **Odd**.
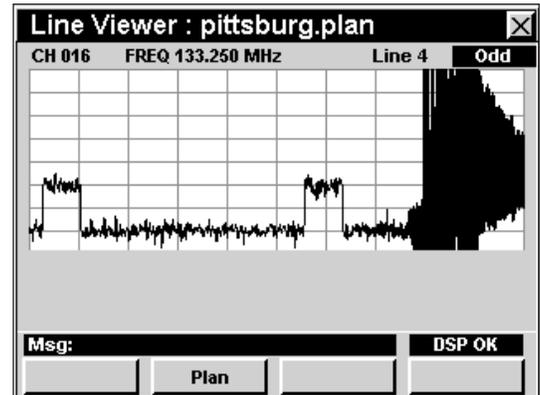
Setting Channel Plan

The instrument tunes channels according to a predefined
channel plan. The currently selected plan is displayed in
the Title Bar. To change the channel plan press the
[Plan] softkey, the **Open File** window will open. Use the
◄ ► ▲ ▼ buttons to select the channel plan you want
from the list of channel plans available, and then press
the (Ent) button.

You must have a system channel plan that is up to date in
order to view the channels in your system.
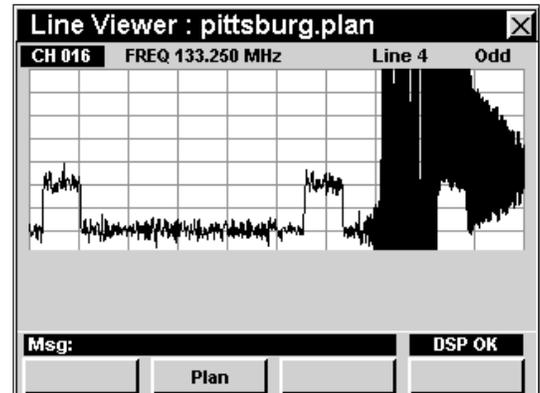
Viewing Blank Lines

The accompanying graphics demonstrate the typical types of signal lines.
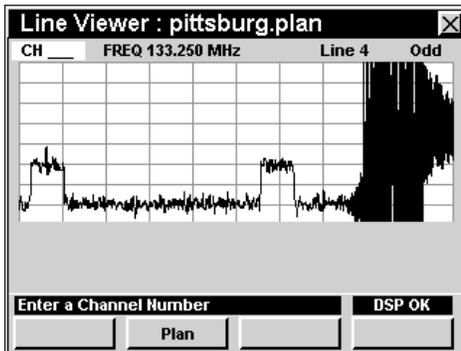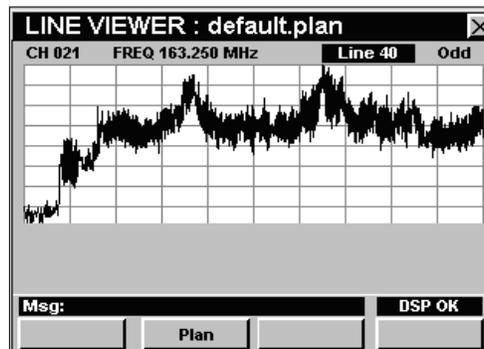

NTC Composite Signal
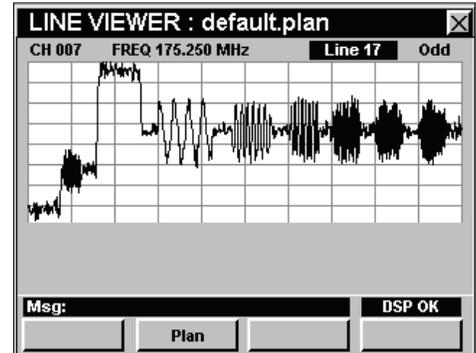
Multiburst Signal
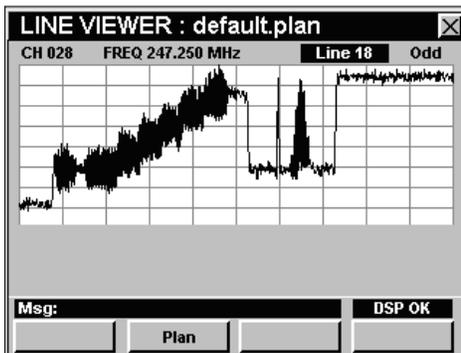
FCC Composite Signal
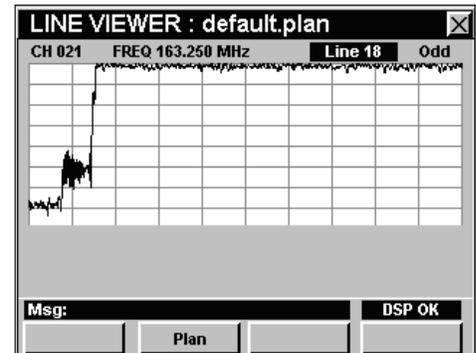
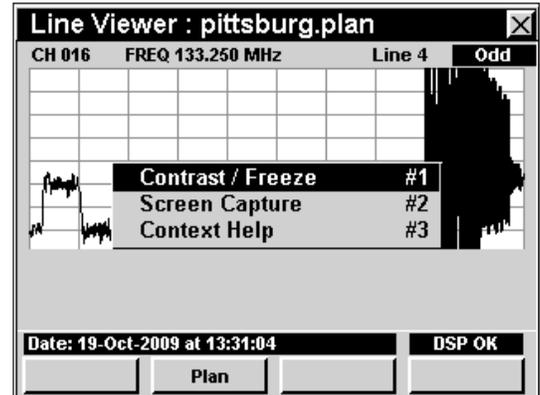Blank Line Signal

Regular NTSC Video Signal

Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **Line** Mode.

The following **Function** Menu options can be accessed
while in **Line** Mode and are described in **Section I: The
Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

Introduction

The **CM Thru** Mode provides a method of using the internal cable modem as a desktop modem by allowing a customers PC to connect to the external RJ45 port and gain Internet access through the internal cable modem.

The basic 860 DSPi comes equipped with the **CM Thru** Mode as a standard feature. This mode is not available for the 860 DSP in any configuration.

This section will provide you with a basic understanding of how to use **CM Thru** Mode including:

- Required Setup

- Logging on to the Network

- Measurement Data

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Required Setup

To use **CM Thru** Mode, you will need to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

If your instrument is equipped with an internal modem, you will need to setup the internal cable modem; see **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings*.

Logging on to The Network

Verify in the status bar, that the field to the left of the time says **RDY**. This indicates that the instrument is ready to connect to the cable modem network.

> **Note:** If the instrument does not indicate **RDY** within 10 seconds after the instrument is turned on, power the unit off and back on. If the **RDY** message never shows up, you may not have Ethernet Option (CI-1, CI-2, CI-3, CI-4, or CI-5) installed on your 860 DSP.

Internal Cable Modem

Connect the cable drop to the instrument's

SLM/Forward input, then select the [icon] icon from the **Utility** menu. The **Logging On To Network** window will show the progress of the logon process.

When logon is complete, the **CM Thru** Mode will be displayed.
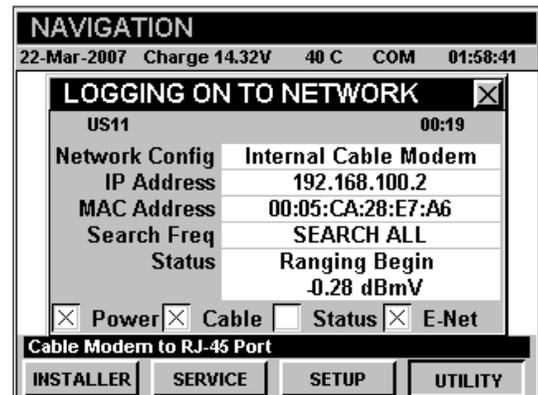
> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect in may take several minutes for the modem to find the downstream data carrier.

Measurement Data

The **CM Thru** Mode displays connections statistics for the internal cable modem. The instrument will display the downstream and upstream frequency, transfer rate, and power level as well as the downstream modulation type, signal-to-noise ratio, corrected bits, and uncorrected bits.

Introduction

The **Frequency Domain Reflectometer (FDR)** Mode provides a tool for determining the distance to fault (DTF) of cable systems. The mode works by sending a sweep into the cable and analyzing the complex reflected wave to determine the distance to various sources of reflection (opens, shorts, splitters, etc.). The reflecting events are indicated on an amplitude versus distance display, and markers are used to identify the distance to the source of the reflection, and the return loss at that point.

This section will provide you with a basic understanding of how to use **FDR** Mode including:

- Required Setup

- Determine if **FDR** Mode is Available

- Using the **FDR** Mode

- Function Menu Options
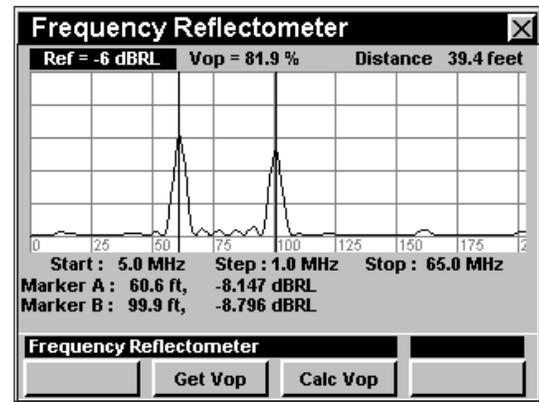
Required Setup

To use **FDR** Mode, you will need to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.
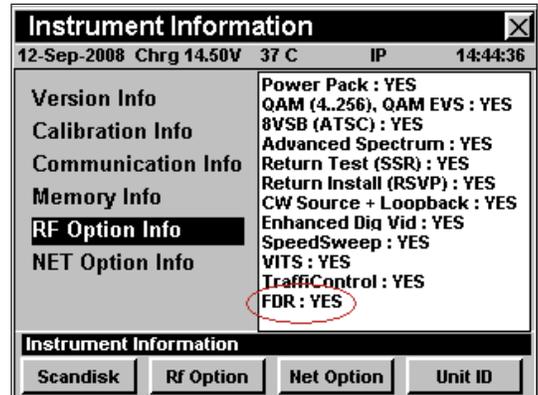
Determine if FDR Mode is Available

To determine if the **FDR** Mode option is available on this instrument, press the [Setup] softkey, use the ◀ ▶ buttons to select the ⓘ Info icon and press the (Ent) button.
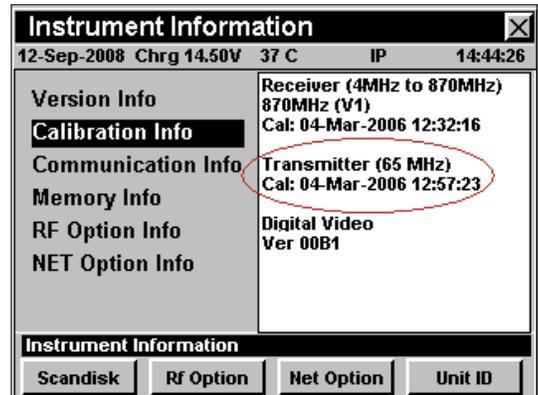
You may also press the ④ to display the Instrument Information screen.

```
Navigation - Technical Writer                    ✕
21-Oct-2009  Chrg 14.26V    96 F        IP      15:59:56

      01          02          03          04
   Setup        Power       FILES        Info

Instrument Information
  INSTALLER    SERVICE      SETUP      UTILITY
```

Use the ▲ ▼ buttons to select the **RF Option Info** field. If the FDR Option is installed, the widow will display the text *FDR : YES*.

```
Instrument Information                            ✕
12-Sep-2008  Chrg 14.50V   37 C        IP      14:44:36

Version Info              Power Pack : YES
                          QAM (4..256), QAM EVS : YES
Calibration Info          8VSB (ATSC) : YES
                          Advanced Spectrum : YES
Communication Info        Return Test (SSR) : YES
                          Return Install (RSVP) : YES
Memory Info               CW Source + Loopback : YES
                          Enhanced Dig Vid : YES
RF Option Info            SpeedSweep : YES
                          VITS : YES
NET Option Info           TraffiControl : YES
                          FDR : YES

Instrument Information
  Scandisk    Rf Option    Net Option    Unit ID
```

The **Calibration Info** field will display the date the **FDR** Mode was last calibrated.

```
Instrument Information                            ✕
12-Sep-2008  Chrg 14.50V   37 C        IP      14:44:26

Version Info              Receiver (4MHz to 870MHz)
                          870MHz (V1)
Calibration Info          Cal: 04-Mar-2006 12:32:16

Communication Info        Transmitter (65 MHz)
                          Cal: 04-Mar-2006 12:57:23
Memory Info
                          Digital Video
RF Option Info            Ver 00B1
NET Option Info

Instrument Information
  Scandisk    Rf Option    Net Option    Unit ID
```
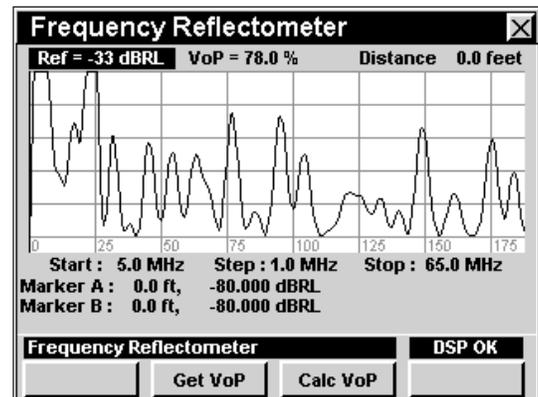
Using the FDR Mode

The **FDR** Mode allows the user to find reflection points in a cable network. The following procedures detail the use of the **FDR** Mode.
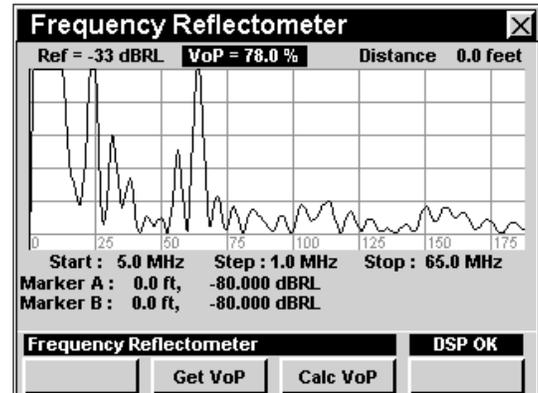
Reference Level

The reference level may be adjusted in 3 dB increments.

To change the reference level, use the ◀ ▶ buttons to highlight the **Ref** control and use the ▲ ▼ buttons to change the reference level.
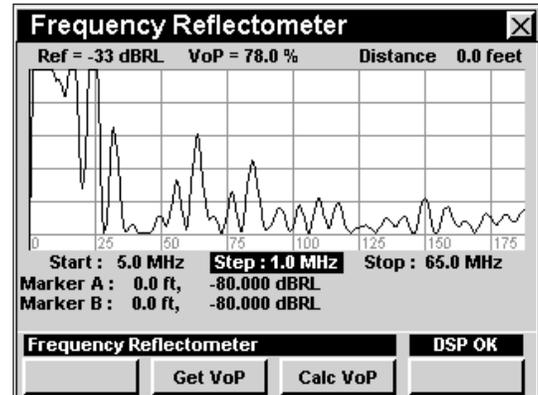

Velocity of Propagation (VoP)

To adjust the VoP use the ◀ ▶ buttons to highlight the **VoP** control and use the ▲ ▼ buttons to change the VoP percentage value.

Step Size

To change the frequency of the step size press the
◄ ► buttons to highlight the **Step** control, press the
▲ ▼ buttons to select **0.5 MHz** or **1.0 MHz** step
size.

Marker Settings

The instrument displays two frequency-settable
markers as dark vertical lines on the scale. These
markers can be used to make amplitude
measurements of carriers at user-selected
frequencies, or to determine the difference (**Delta**) in
amplitude between two selected carriers.
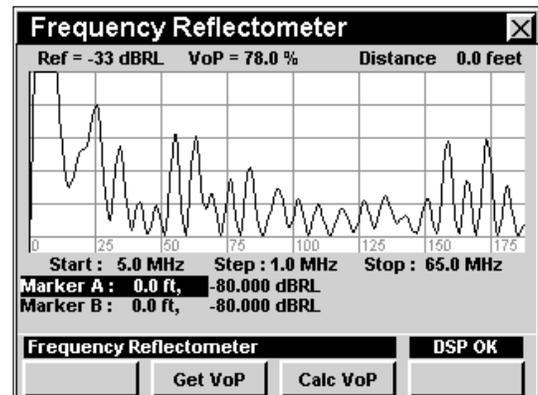
To set a marker to a frequency, use the ◄ ► buttons
to highlight **Marker A** or **Marker B**, then increment the
marker to higher or lower frequencies using the ▲ ▼
buttons. You can also enter a frequency directly using
the alphanumeric keypad and pressing the (Ent) button.
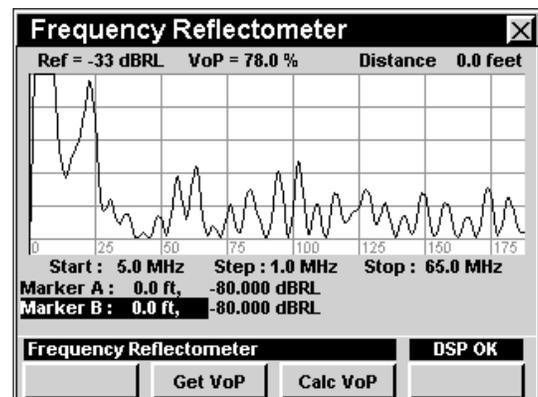
Calc VoP

To calculate distance, press the `Calc VoP` softkey, use the ▲ ▼ buttons to highlight **Marker A** or **Marker B**, and press the (Ent) button. The distance relative to the specific marker is displayed next to the **Distance** readout in the upper right corner of the **FDR** Mode window.
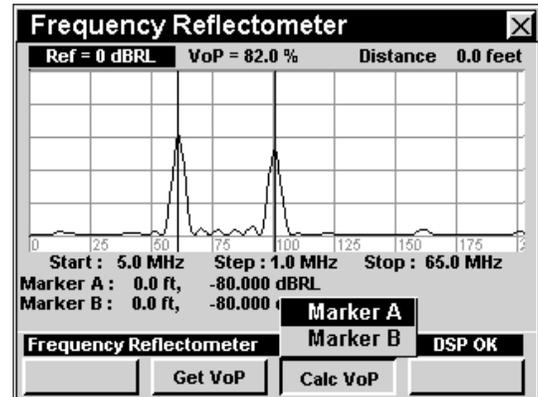
Get VoP

The user may select **RG-59, RG-6, RG-11, Simi-Rigid**, or **Hardline** cable type by pressing the `Get VoP` softkey, use the ▲ ▼ buttons to highlight the cable type desired and press the (Ent) button or you may also select the numeric key that matches the desired cable type.
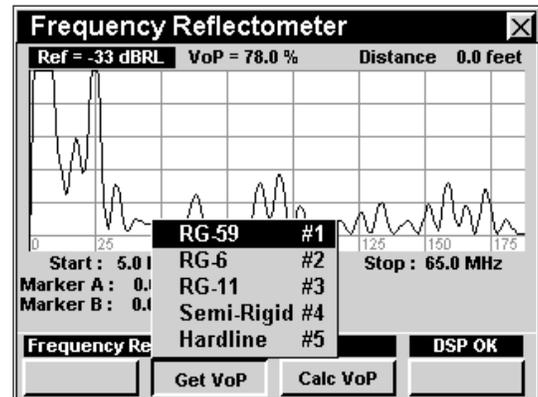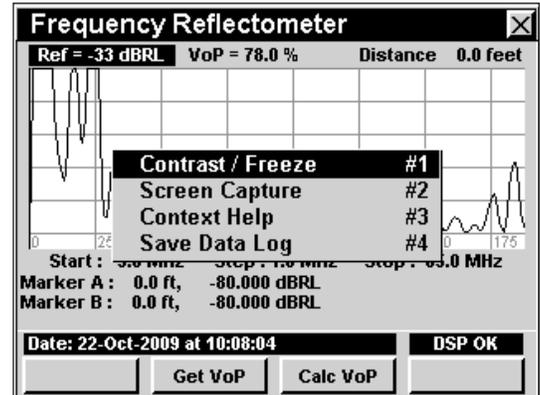
Function Menu Options

The **Function** Menu can be accessed by pressing the
Fn button while in the **FDR** Mode.

The following **Function** Menu Options can be accessed
while in **FDR** Mode and are described in **Section I: The
Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

- Save Data Log

Introduction

The **Source** Mode configures the 860 DSP or 860 DSPi to function as a return frequency signal source with settable signal frequency, amplitude and modulation.

You can use **Source** Mode to "ring out" home and MDU (Multiple Dwelling Unit) cabling, using a signal level meter or Legacy Guardian Isometer Reverse Leakage Detector to trace cabling. You can also inject the test signal into the house wiring and use the Isometer to find breaks and loose connections that would admit ingress.

In order to use the **Source** Mode on your 860 DSP, the instrument must be equipped with Return Sweep Receiver Option (SR-1) or Return Tester Option (VP-1). In order to use the **Source** Mode on your 860 DSPi, the instrument must be equipped with Power Pack Option (PP-1) and Return Sweep Receiver Option (SR-1) or Return Tester Option (VP-1).

This section will provide you with the basic understanding of how to use **Source** Mode including:

- Required Setup
- Using Source Mode
- Setting Frequency
- Adjusting Tx Level
- Selecting Modulation Type
- Changing Frequency Step Size
- Function Menu Options
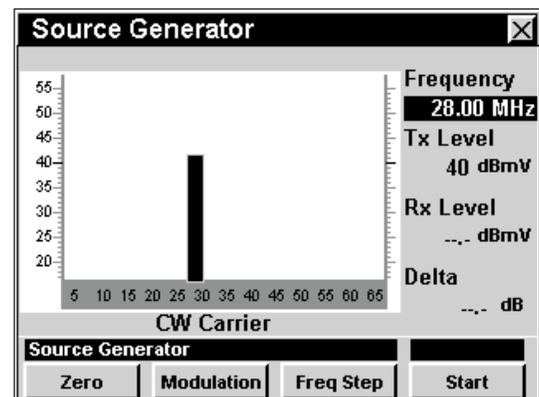
Note: Source Mode is an optional function of the 860 DSP and 860 DSPi. To view the installed functions on your instrument, see **Section IV: Setup Functions**, Chapter 5: Instrument Information Mode. If you do not have **Source** Mode installed in your instrument, you may call Trilithic at (800) 344-2412 to order this option and start using it today.

Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.
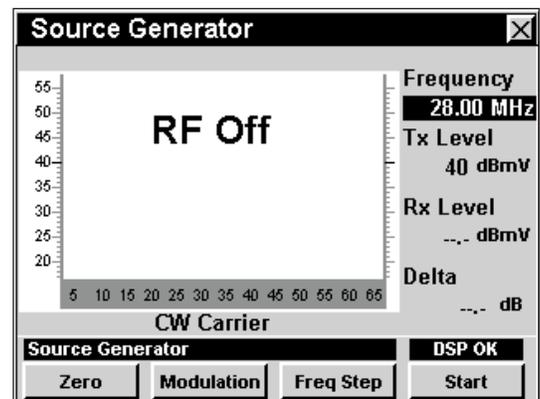
Required Setup

To use **Source** Mode, you will need to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

Using Source Mode

To start using the **Source** Mode, select the [Start] softkey. The graph will no longer display the text **RF Off** and the source signal will be displayed.


To stop using the **Source** Mode, select the [Stop] softkey. The graph will no longer display the source signal and the text **RF Off** will be displayed.
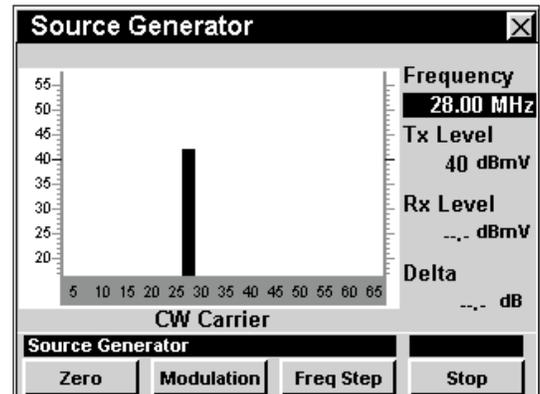
Setting Frequency

To change the frequency, use the ◄ ► buttons to highlight the frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency using the alphanumeric keypad, and then press the **Ent** button.
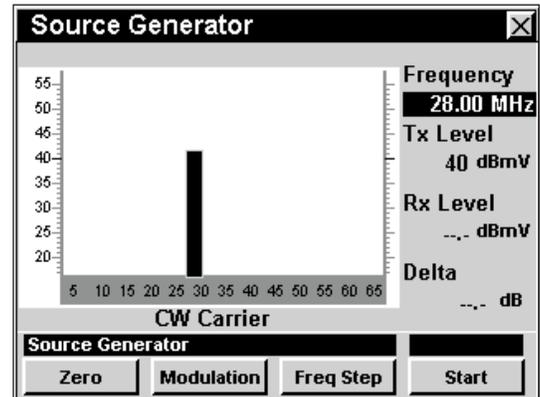
Adjusting Tx Level

To change the output transmit level, use the ◄ ► buttons to highlight **Tx** and use the ▲ ▼ buttons to increment the value up and down.
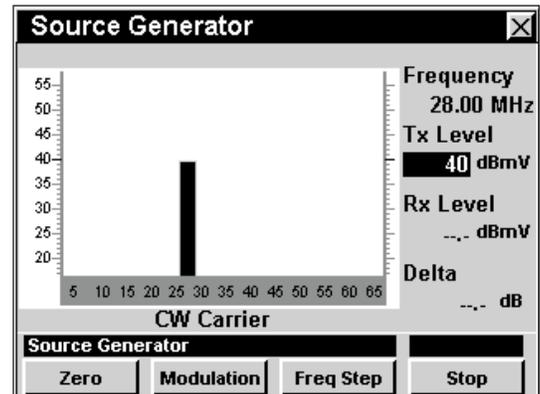
Selecting Modulation Type

To change the modulation type, press the `Modulation` softkey, use the ▲ ▼ buttons to highlight the desired modulation type, and press the (Ent) button. You may also select the desired modulation type by pressing the corresponding alphanumeric button.

The signal generated by the **Source** Mode can have several different modulation types as follows:

CW: No modulation.

Pulse: 100% AM square-wave modulation at a 1 kHz rate. The modulation produces an audible tone in the speaker of a signal level meter. This can simplify identification of cables in MDUs.

**Tag:** The signal is Channel Tagged at a 20 Hz rate to be compatible with the Legacy Guardian Isometer.

Sweep 42: The signal is swept across the reverse spectrum range of 5 MHz to 42 MHz.

Seeep 65: The signal is swept across the reverse spectrum range of 5 MHz to 65 MHz.

Single: The signal is a single chirp used to simulate fast ingress signals.

Repeat: The signal is a repeating chirp used to simulate fast ingress signals.

Loop Back: This signal is transmitted from the **Reverse/Both** connection and is read using the **SLM/Forward** connection. This signal is used to test the properties of cables, pads, and transmitters. To "zero out" the **Loop Back** modulation, press the `Zero` softkey.
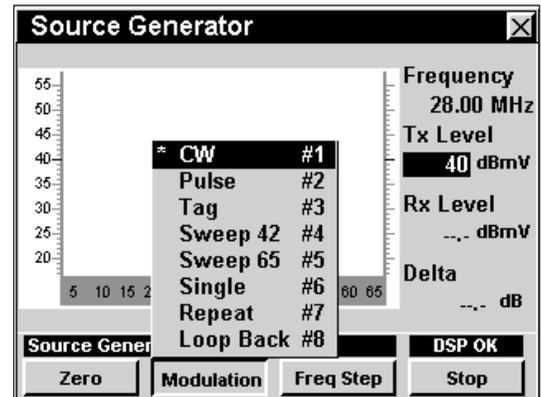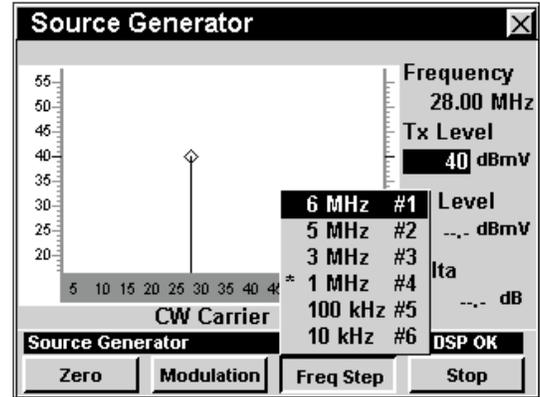
Changing Frequency Step Size

To change the frequency step size, press the `Freq Step` softkey, use the ▲ ▼ buttons to highlight the desired frequency step, and then press the (Ent) button. You may also select the desired frequency step by pressing the corresponding alphanumeric button.

The third frequency step, in this case 1 MHz, is the channel spacing that is configured in **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Level Mode Settings*.
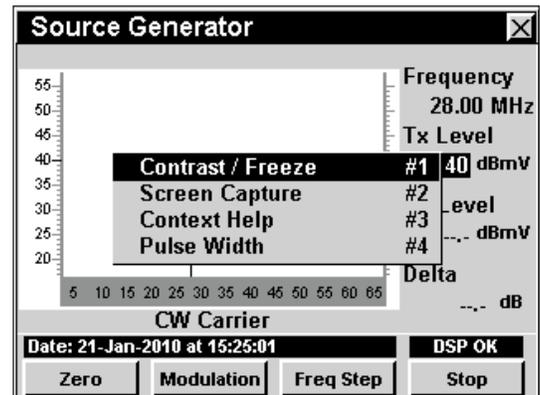
Function Menu Options

The **Function** Menu can be accessed by pressing the (Fn) button while in the **Source** Mode.

The following **Function** Menu options can be accessed while in **Source** Mode:

- Contrast / Freeze
- Screen Capture
- Context Help
- Pulse Width

Basic Function Menu Options

The following functions are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze
- Screen Capture
- Context Help

Pulse Width

This option is used to enter the pulse width in milliseconds.

The pulse width is used for the **Single** and **Repeat** modulation types.

To use this option, press the (Fn) button, use the ▲ ▼ buttons to highlight **Pulse Width**, and then press the (Ent) button. You may also select **Pulse Width** by pressing (4).

- The **Function** Menu will close and the **Enter Pulse Width in msec** window will open.

- Enter the pulse width value using the alphanumeric keypad, and then press the Required Setup
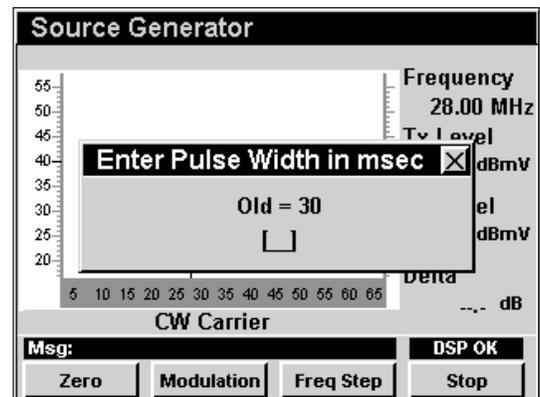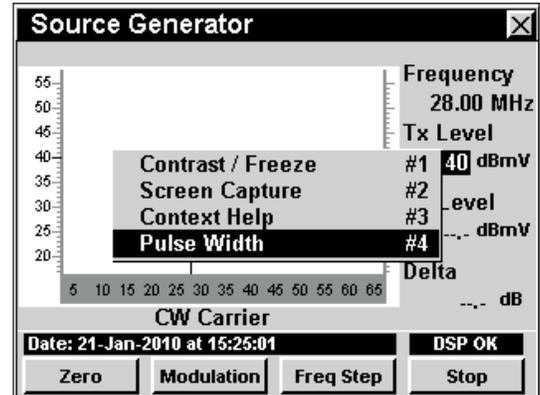
QAM Source Mode 10

Introduction

QAM Source Mode configures the instrument to function as a QAM signal source with settable signal modulation and symbol rate. The basic 860 DSPi comes equipped with the **QAM Source** Mode as a standard feature. This mode is not available for the 860 DSP in any configuration.

This section will provide you with the basic understanding of how to use **QAM Source** Mode including:

- Required Setup
- Using QAM Source Mode
- Setting Frequency
- Adjusting Tx Level
- Selecting Modulation Type
- Changing Symbol Rate
- Changing Frequency Step Size
- Function Menu Options
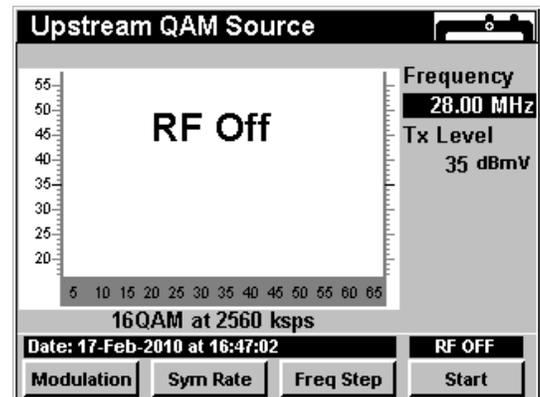
Note: If your instrument does not include all of the features shown in this chapter, go on-line to *www.trilithic.com* to update your firmware for free. This will allow you to use all of the newest features that are included in this mode.

Note: If your instrument is not equipped with the latest internal cable modem, contact Trilithic for details on how to upgrade your instrument.

Required Setup

To use **QAM Source** Mode, you will need to set up some basic parameters, be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **QAM Source** Mode, you will need to setup the internal cable modem, be sure you have completed **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *CM/CPE Settings* before proceeding through this chapter.
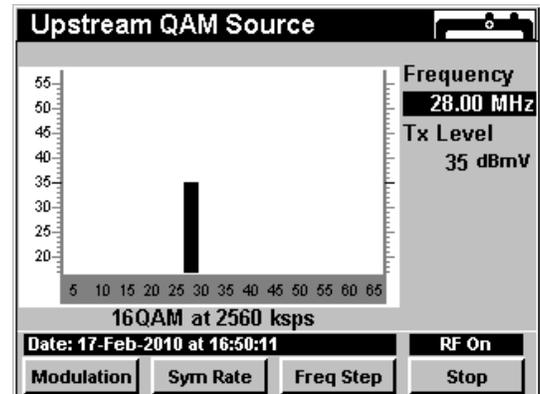
QAM Src

Using QAM Source Mode

To start using the **QAM Source** Mode, select the ▭Start▭ softkey. The graph will no longer display the text **RF OFF** and the source signal will be displayed.
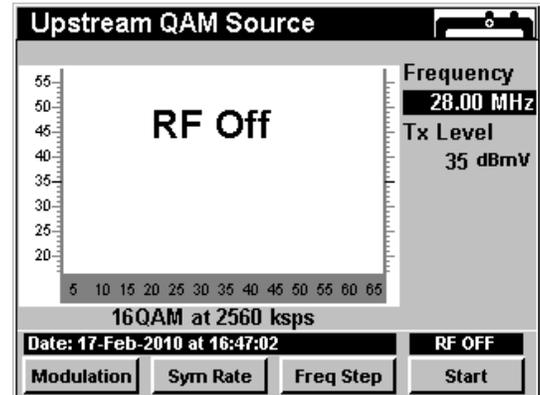

To stop using the **QAM Source** Mode, select the ▭Stop▭ softkey. The graph will no longer display the source signal and the text **RF Off** will be displayed.

TRILITHIC

QAM Src

Setting Frequency

To change the frequency, use the ◀ ▶ buttons to highlight the frequency, use the ▲ ▼ buttons to increment the value up and down or enter the desired frequency using the alphanumeric keypad, and then press the (Ent) button.
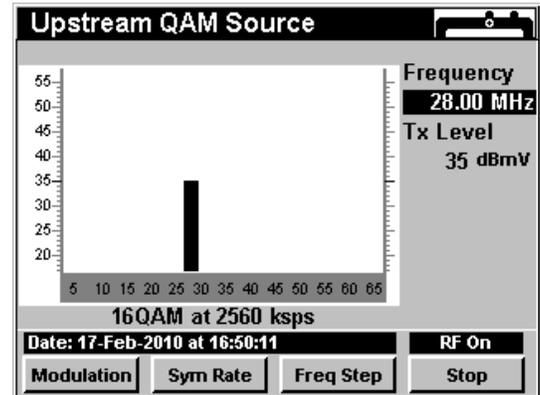
Adjusting Tx Level

To change the Output Transmit Level (**Tx**), use the ◀ ▶ buttons to highlight the Tx level, use the ▲ ▼ buttons to increment the value up and down or enter the desired level using the alphanumeric keypad, and then press the (Ent) button.
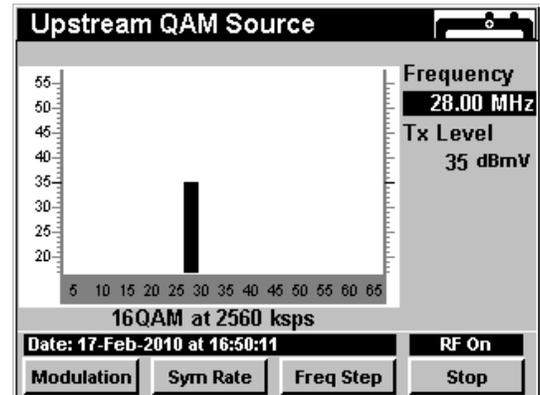
Selecting Modulation Type

To change the modulation type, press the **Modulation** softkey, use the ▲ ▼ buttons to highlight the desired modulation type, and press the **Ent** button. You may also select the desired modulation type by pressing the corresponding alphanumeric button.

The signal generated by the **QAM Source** Mode can have several different modulation types as follows:

> **QPSK:** This represents four points on the constellation diagram, equispaced around a circle. With four phases, QPSK can encode two bits per symbol.

> **16 QAM:** This represents 4 different phases and 4 different amplitudes that are used for a total of 16 different symbols.

> **64 QAM:** This represents 8 different phases and 8 different amplitudes that are used for a total of 64 different symbols.

The modulation type, in this case 64 QAM, that is marked with and asterisk (*) is the currently selected modulation type.

Changing Symbol Rate

To change the symbol rate, press the `Freq Step` softkey, use the ⏶ ⏷ buttons to highlight the desired symbol rate, and then press the (Ent) button. You may also select the desired symbol rate by pressing the corresponding alphanumeric button.
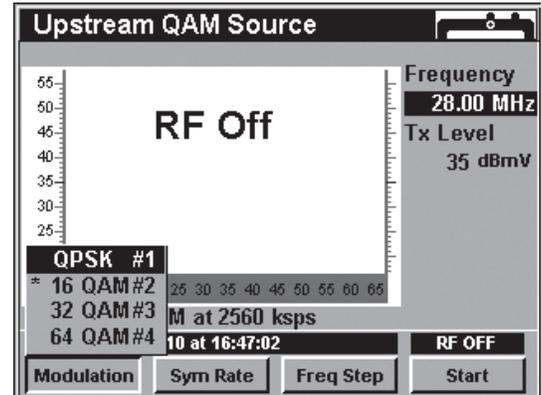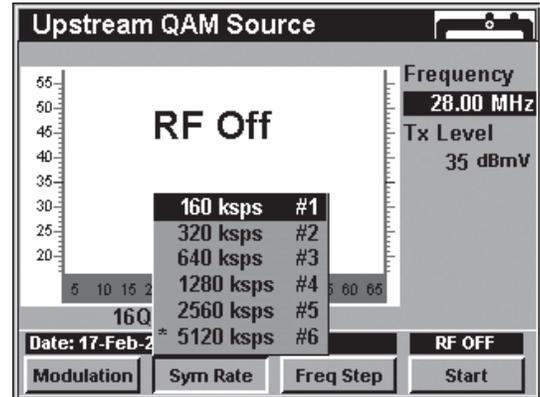
The symbol rate, in this case 5120 ksps, that is marked with and asterisk (*) is the currently selected symbol rate.

CAUTION: Changing the symbol rate will change the bandwidth of your signal. The screen shows an approximation of this effect but the actual response may be slightly wider than shown. Be careful when changing the symbol rate if you have placed your QAM source signal close to active return band traffic.

Changing Frequency Step Size

To change the frequency step size, press the `Freq Step` softkey, use the ⏶ ⏷ buttons to highlight the desired frequency step, and then press the (Ent) button. You may also select the desired frequency step by pressing the corresponding alphanumeric button.

The third frequency step, in this case 1 MHz, is the channel spacing that is configured in **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Level Mode Settings*.

Function Menu Options

The **Function** Menu can be accessed by pressing the **Fn** button while in the **QAM Source** Mode.

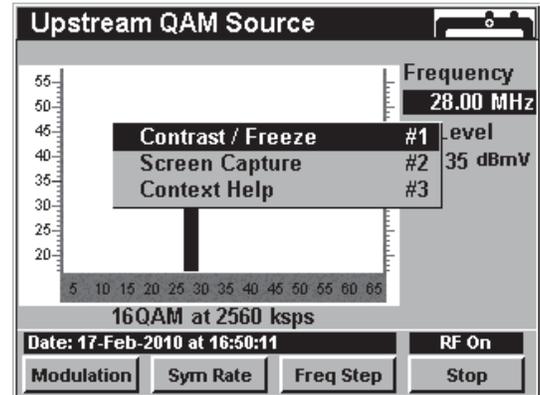The following **Function** Menu options can be accessed while in **QAM Source** Mode and are described in **Section I: The Basics**, Chapter 6: Basic Function Menu Options:

- Contrast / Freeze

- Screen Capture

- Context Help

Wi-Fi (802.11 b/g) in the 860 DSPi

The **Wi-Fi** Mode provided a means for cable technical personnel to verify a company's Wi-Fi access points are properly broadcasting adequate field strength and security protocol.

The **Wi-Fi Survey** Mode can be used on data service installations to verify wireless accessibility throughout a customer's home, and to verify that the configured channel is not conflicting with a neighbor's access point without actually logging on to the company's network.

The Wi-Fi adaptor for the 860 DSPi provides a communications path for measurement data, unit configurations and internet sites, and may also be used to perform common Wi-Fi network verification tests such as:

- Detects in-range wireless IEEE 802.11 b/g access points and lists SSID's and channels.

- Displays the up to 10 access points, with the one currently connected highlighted.

- List includes received signal strength in dBm for each access point, and indicates security enabled/disabled.

- Indicates the type of access point (infrastructure or ad hoc).

This section will provide you with the basic understanding of how to use **Wi-Fi** Mode including:

- Required Setup

- Selecting the Wi-Fi Option

- Using the Wi-Fi Survey Mode

- Checking the 860 DSPi for Wi-Fi Compatibility

- Zone Configuration

- Using the Wi-Fi Mode

- Workbench Support

Required Setup

To use **Wi-Fi** Mode, you will need to set up some basic parameters. Be sure you have completed **Section I: The Basics**, Chapter 5: Initial Setup before proceeding through this chapter.

To use **Wi-Fi** Mode, you will need to set up your Wi-Fi adapter. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Wi-Fi Settings*.

Using the Wi-Fi Survey Mode

This mode allows the user to verify a company's wireless access and parameters. The following screens display the Wi-Fi parameter for the survey mode of operation.

When the user enters the mode, you can select from a list of configured Wi-Fi zones. Once you have chosen a Wi-Fi zone, the instrument will connect to the associated Wi-Fi access point and a list of access points within range is displayed.

The Wi-Fi access point that the meter is currently connected to will appear highlighted by a black bar.

The list is auto-sorted with the access point with the highest level at the top and a descending order of received power level.

Up to 10 access points are shown along with their SSID and power level.

If the SSID is unknown, the word unknown is displayed. An asterisk appearing next to an SSID indicates that security is enabled. Also, the default assumes the access point is part of an infrastructure mode network.

If an SSID is setup for an ad hoc wireless network, the words "ad hoc" appear next to the SSID.
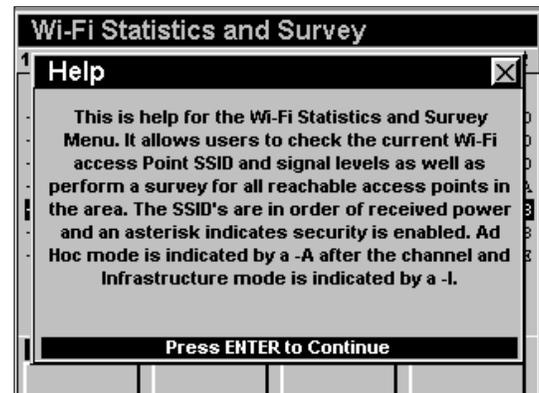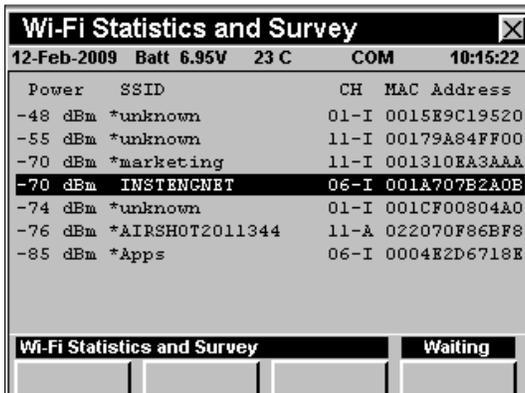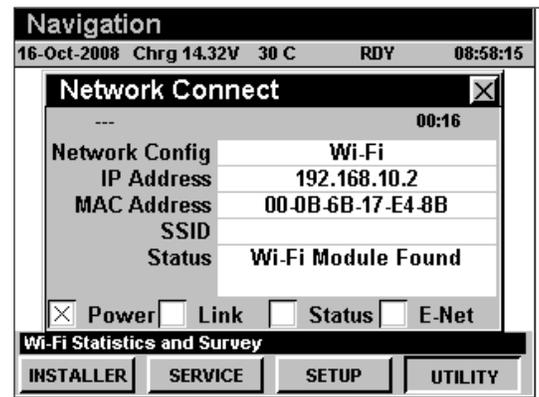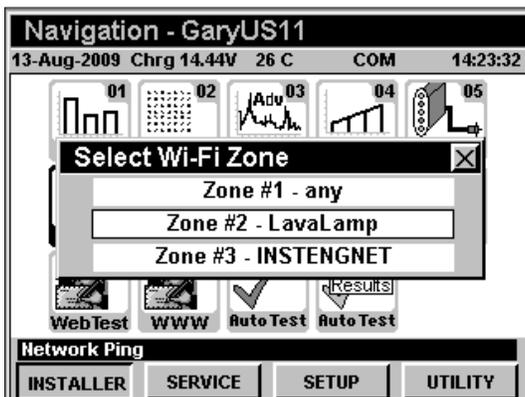
Using the Wi-Fi Mode

Perform the following steps to use the **Wi-Fi** Mode;

Select Wi-Fi as the network login default (similar to ping or cable modem) in the Setup, COM/NET settings.

When the user activates the network by entering Ping, Trace Route, Browser, etc.; the meter logs into the Wi-Fi network and functions the same as when connected using the internal cable modem, or the RJ45 (network adapter) and all network functions should be available.

Alternatively, the user can enter the Wi-Fi survey mode without acquiring an IP address, and the meter will not attempt to login to the Wi-Fi network. In this mode of operation the survey is available, but other network related test modes are not. When you exit the survey mode, the meter automatically powers down the Wi-Fi module.

> **Note:** The meter must either be able to acquire an IP address from the network, or have been setup with a static IP address if using an ad hoc network. The Wi-Fi survey mode is also available at this time.

860 DSP & 860 DSPi Multifunction Interactive Cable Analyzer

Section VI: Appendix

TRILITHIC

Specifications

Frequency Range:	5 MHz to 1 GHz
Level Measurement	
Range:	-40 to +50 dBmV
Resolution:	0.1 dB
Accuracy:	± 0.75 dB @ 25º C ± 2.00 dB (Analog), ± 2.50 dB (Digital) @ -18º C to 50º C Over Temperature
Carrier-to-Noise *(In-service, non-scrambled standard channels only)*	
Minimum Input Level for Full Range:	+ 10 dBmV
Dynamic Range:	50 dB
Resolution:	< 0.5 dB
Hum *(In-service, non-scrambled standard channels only)*	
Minimum Input Level:	0 dBmV
Range:	0% to 5%
Resolution:	0.1%
Accuracy:	± 0.5%
Depth of Modulation *(In-service, non-scrambled standard channels only)*	
Range:	50% to 100%
Resolution:	0.5%
Audio Demodulation:	FM Carriers

Tilt	
Maximum Number of Carriers:	10
Hi / Lo Delta Resolution:	0.1 dB
Scan:	Video, Audio, Pilot, and Digital Carriers; Includes Total Power Measurement

Forward (Sweepless) Sweep Mode	
Frequency Range:	54 MHz to 1 GHz
Display Span:	User-Definable
Display Scale:	1, 2, 5, or 10 dB/division
Display Range:	6 Vertical Divisions
Sweep Rate (78 Channels):	~ 500 ms

Spectrum Mode	
Frequency Range:	4 MHz to 1 GHz
Resolution Bandwidth:	10, 30, 100, and 300 kHz; 1, 3 MHz
Spans:	User-Selectable in 10 kHz Steps
Display Scale:	1, 2, 5, or 10 dB/division
Range:	8 Vertical Lines
Detection and Dwell:	Selectable Detector Modes (Narrow or Wide) and Dwell Time
Spurious Free Dynamic Range:	60 dB @ 25º C (+50 dBmV)
Sensitivity:	-40 dBmV

Zero Span Mode	
Video Bandwidth:	Digital Averaging
Resolution Bandwidth:	10, 30, 100, and 300 kHz; 1, 3 MHz
Pulse Measurement Accuracy:	Nominal Level in < 7 ms, ± 2.0 dB from Nominal in 4 ms (300 kHz RBW)
Sweep Times:	50 ms to 20 sec in 1, 2, 5 Settings

Intermodulation Distortion (CSO/CTB)	
Range:	Greater Than or Equal to 61.0 dB
Resolution:	0.1 dB

QAM Measurements	
Modulation Types:	ITU J.83 Annex A, B, C QPSK, 16, 32, 64, 128, & 256 QAM (at symbol rates from 2 MSPS to 6.9 MSPS)
Measureable Input (Lock) Range:	**64 QAM:** -20 to +50 dBmV (typical) **256 QAM:** -15 to +50 dBmV (typical)
Frequency Tuning:	5 MHz to 1 GHz
BER (64 & 256 QAM, Pre & Post FEC):	1×10^{-4} to 1×10^{-9}

MER:	**64 & 256 QAM, 6 MHz Channel Bandwidth:**
	  Range: 21 to 38 dB, Accuracy (typical): ± 1.5 dB
	64 & 256 QAM, 8 MHz Channel Bandwidth:
	  Range: 21 to 35 dB, Accuracy (typical): ± 2.5 dB

EVM:
(Software QAM Only)
	64 QAM, 6 or 8 MHz Channel:
	  Range: 1.1% to 8.1%
	  Accuracy: ± 0.5% (1.1% to 2.0%), ± 1.0% (2.1% to 4.2%), ± 1.6% (4.3% to 8.1%)
	256 QAM, 6 or 8 MHz Channel:
	  Range: 1.1% to 5.3%
	  Accuracy: ± 0.5% (1.1% to 2.0%), ± 0.8% (2.1% to 4.2%)

QAM Level Measurement	
Signal Types:	QPSK; QAM (16, 32, 64, 128, & 256)
Range:	-40 to +50 dBmV
Accuracy:	± 1.25 dB @ 25º C
QAM Signal Generator	
Signal Types:	QPSK; QAM (16, 32, & 64)
Symbol Rates:	160, 320, 640, 1280, 2560, & 5120 kSym/Sec
Range:	+20 to +58 dBmV
MER:	> 38 dB
Frequency Range:	5 MHz to 42 MHz
VP-1 or SR-1 Option	
TX Frequency Range:	5 MHz to 65 MHz
RX Link Frequency Range:	50 MHz to 92 MHz
TX Level Range:	20 dBmV to 55 dBmV
TC Level Accuracy:	± 0.35 dB @ 25º C
RX Link Range:	-20 dBmV to +20 dBmV
Power Source	
Charging Time:	4 Hours
Operating Time:	~ 4 Hours (860 DSP In Level Mode) ~ 6 Hours (860 DSPi in Level Mode)
Physical	
Weight:	4.75 lbs
Operating Temperature Range:	-18º C to +50º C (0º F to 122º F)

TRILITHIC

Warranty Information

Trilithic, Inc. warrants that each part of this product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of two (2) years from date of delivery. Trilithic, Inc.'s obligation under this Warranty shall be limited, at Trilithic, Inc.'s sole option, to replacing the product, or to replacing or repairing any defective part, F.O.B. Indianapolis, Indiana; provided that the Buyer shall give Trilithic, Inc. written notice.

Batteries are not included or covered by this Warranty.

The remedy set forth herein shall be the only remedy available to the Buyer under this Warranty and in no event shall Trilithic, Inc. be liable for incidental or consequential damages for any alleged breach of this Warranty. This Warranty shall not apply to any part of the product which, without fault of Trilithic, Inc., has been subject to alteration, failure caused by a part not supplied by Trilithic, Inc., accident, fire or other casualty, negligence or misuse, or to any cause whatsoever other than as a result of a defect.

Except for the warranty and exclusions set forth above, and the warranties, if any, available to the Buyer from those who supply Trilithic, Inc., there are no warranties, expressed or implied (including without limitation, any implied warranties of merchantability of fitness), with respect to the condition of the product or its suitability for any use intended for it by the Buyer or by the purchaser from the Buyer.

TRILITHIC

9710 Park Davis Drive
Indianapolis, IN 46235
(317) 895-3600
www.trilithic.com