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)

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.)
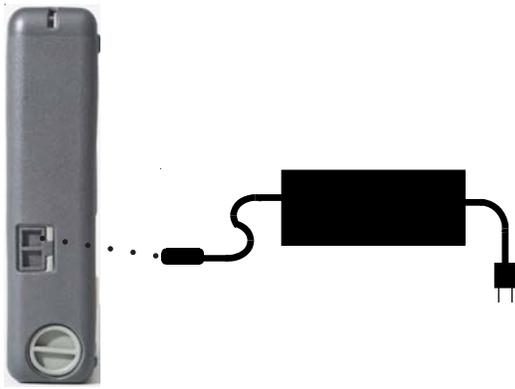
The instrument comes with a charge cube which can be used to charge the battery in approximately 4 hours or to trickle charge the battery while the instrument is in use.

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)
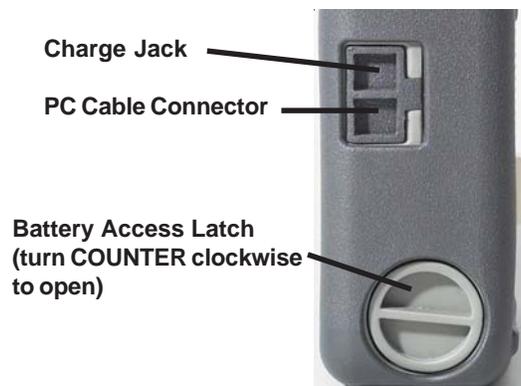
⚠️ **CAUTION:** Be sure your instrument is turned OFF before removing the battery access latch.

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.
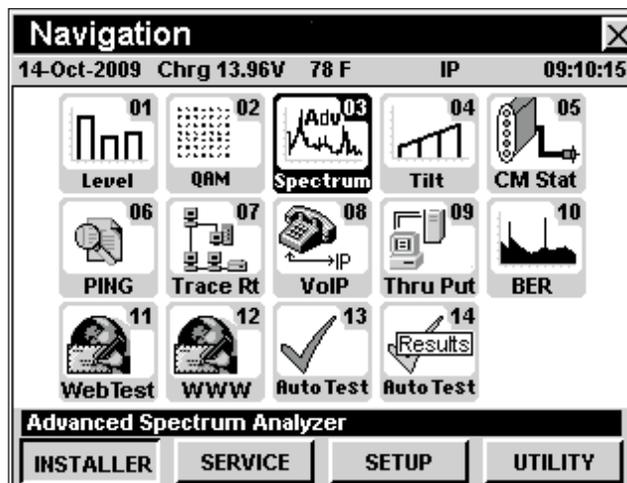
Title Bar

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.
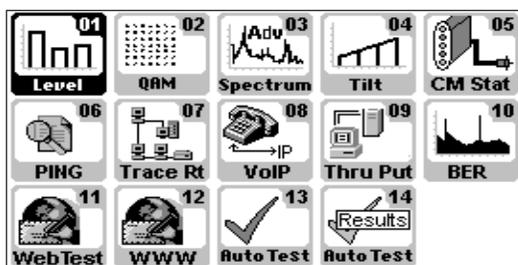
> **Note:** A navigation menu (as shown above) is always displayed when the instrument is first turned on. By default, the instrument displays the **Installer** Menu with the **Level** icon highlighted. The instrument will automatically display the navigation menu and icon that was last used prior to 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.
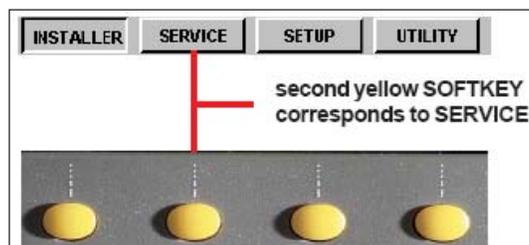
Input/Output Helper Icons

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.

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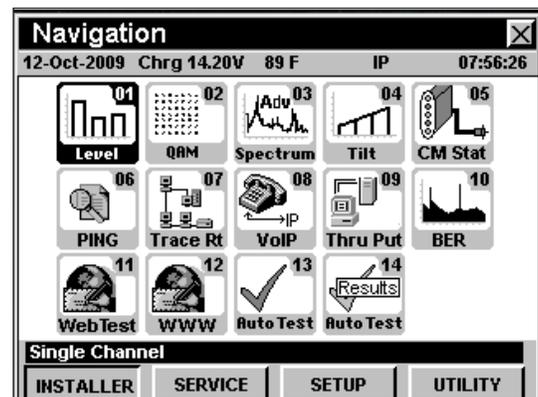
> **Note:** The introduction screen may be customized to include the user name and company's name. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings* to learn how to customize your introduction screen.

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.
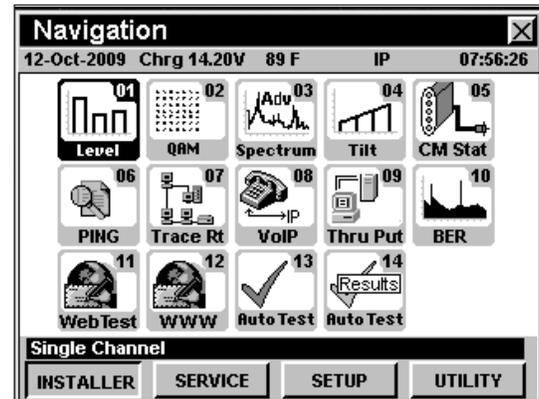
Note: The labels and the arrangement of the icons in these examples are the default settings of the instrument. The display's appearance may be customized and therefore may differ from your instrument's display. This can be done using your WorkBench software. See the WorkBench operation manual for more 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**
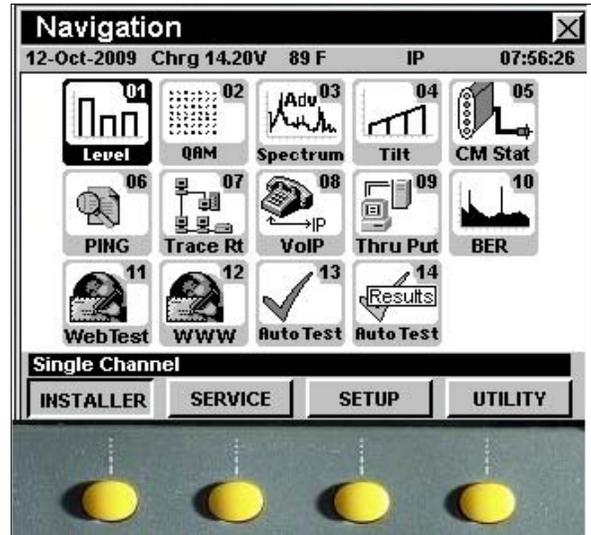
> **Note:** The functions on these softkey labels may vary depending on the instrument's current operating mode.

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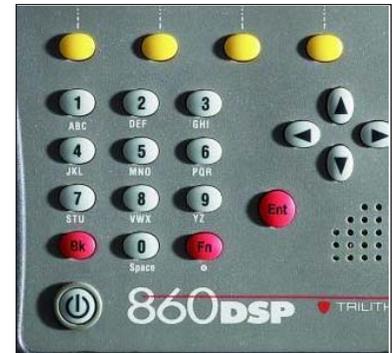
> **Note:** The easiest way to learn how the alphanumeric buttons work is to use them. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Global Settings* to learn how to enter your operator name and company name using the alphanumeric buttons.

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.

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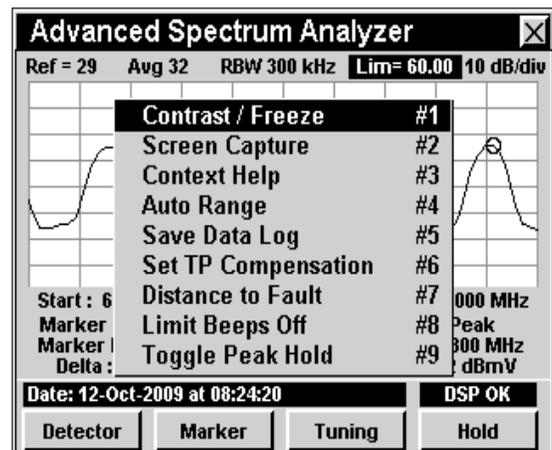
> **Note:** Upon start-up, the display screen may be very dark or light based on extreme environmental temperatures. Use this function to adjust the contrast level in order to correct the problem.

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.
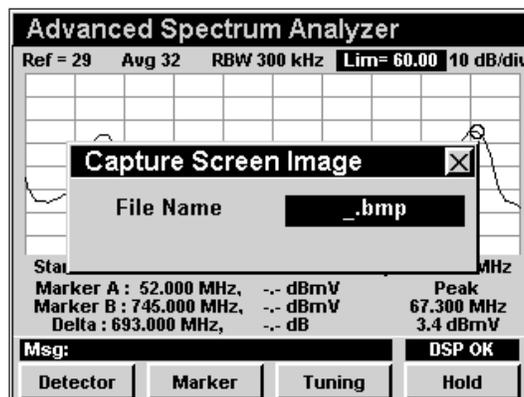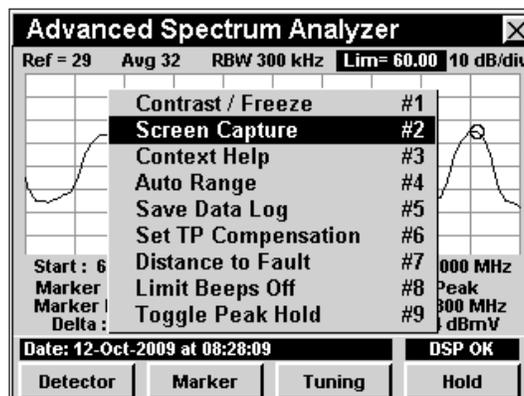
> **Note:** Files may be stored in .bmp, .lcd, or .bmpz format. The .bmpz format is the most memory efficient format. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* for more information about how to change the file format.
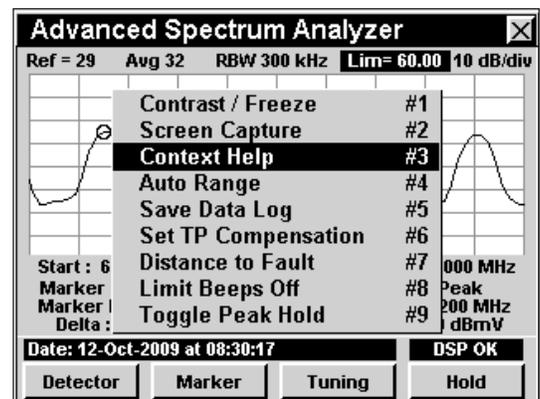
Context Help

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.
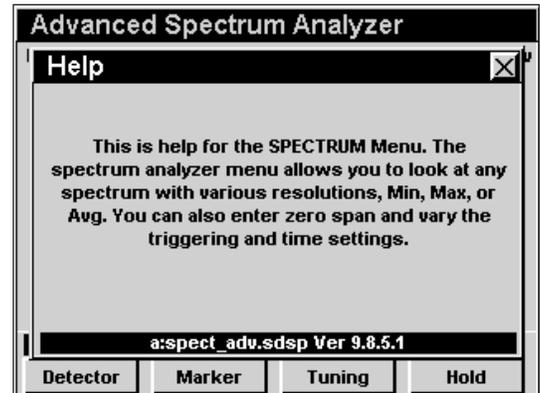
Save Data Log

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.
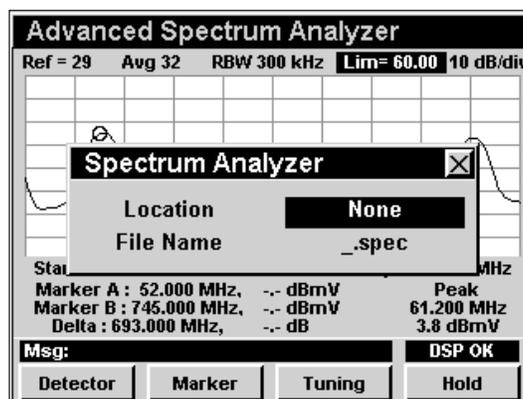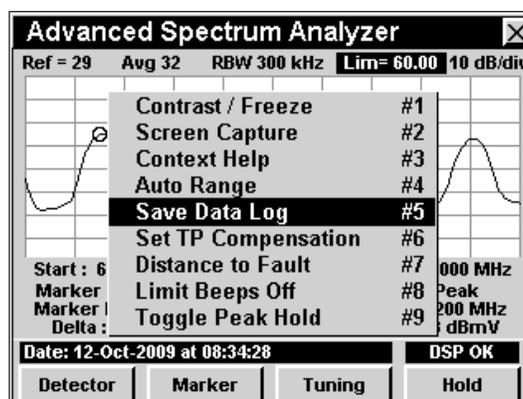
> **Note:** The **Location** and **Task Files** fields will not appear if they have not been enabled. See **Section IV: Setup Functions**, Chapter 2: Instrument Setup Mode, *Measurement Settings* for more information about how to enable these fields.

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.
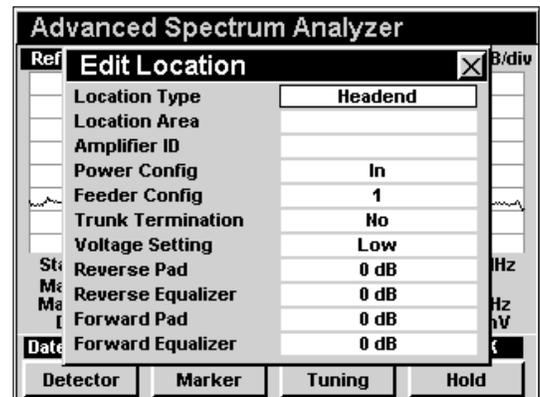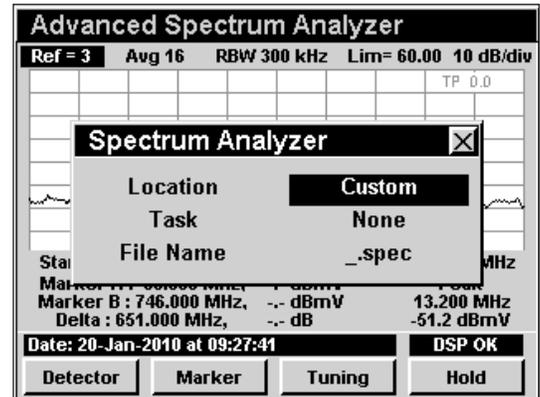
Task

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.

 TRILITHIC
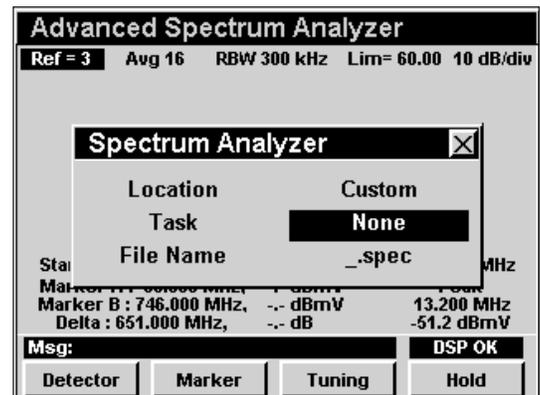
File Name

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.
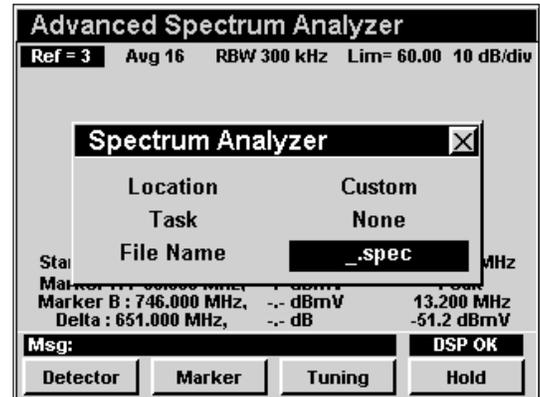
Select Network Port

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.
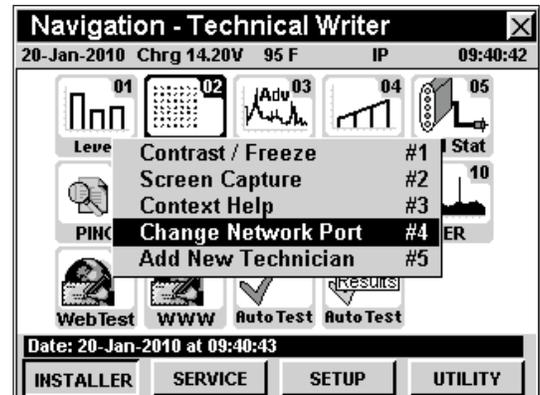
Use the ◄ ► buttons to highlight the **External RJ45**, **Internal Modem**, or **Wi-Fi** network port, and then press the (Ent) button.
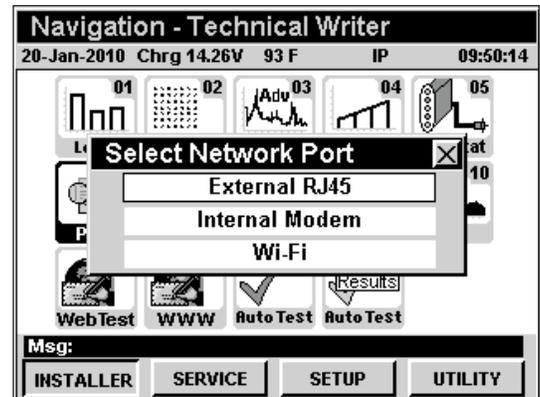
Remote Control Mode 7

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 [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** 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.
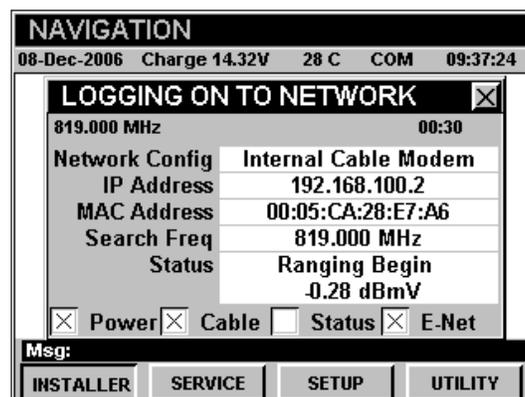

> **Note:** If you have not set the default downstream data carrier frequency or it is incorrect it may take several minutes for the modem to find the downstream data carrier.

External RJ45 Port

Connect the external network connection to the instrument's Ethernet port, then select the [icon] 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.
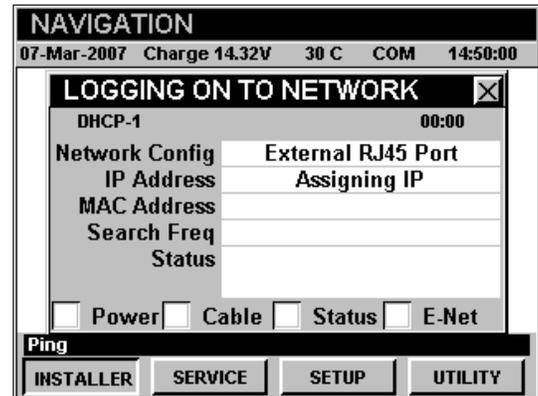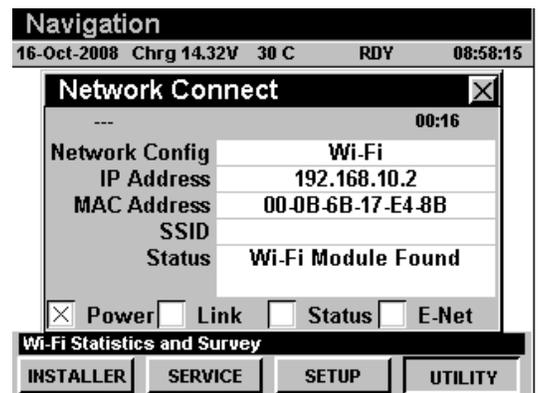
Wi-Fi

Select the [icon] 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.
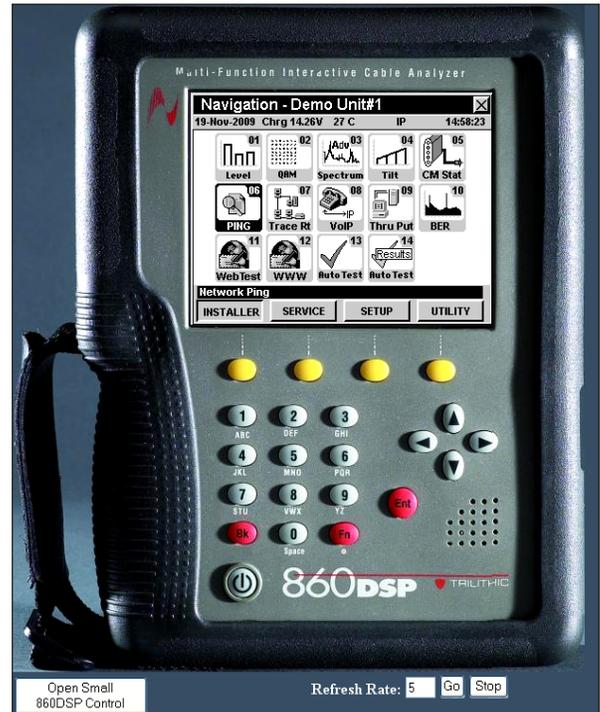
Remote Control Mode Operation

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.
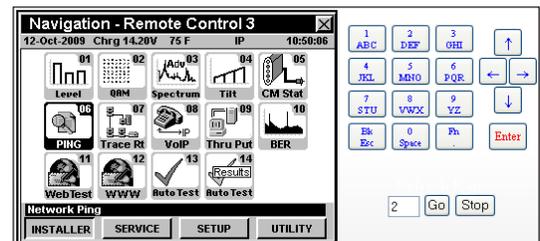
Note: The **Remote Control** Mode has been tested to work with the latest versions of the Internet Explorer and Firefox web browsers. This feature may not work with some other web browsers.

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.
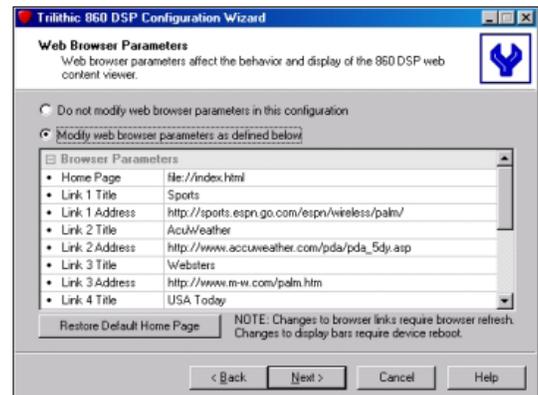
To configure a link for "RTP Reflector", perform the following steps:

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.
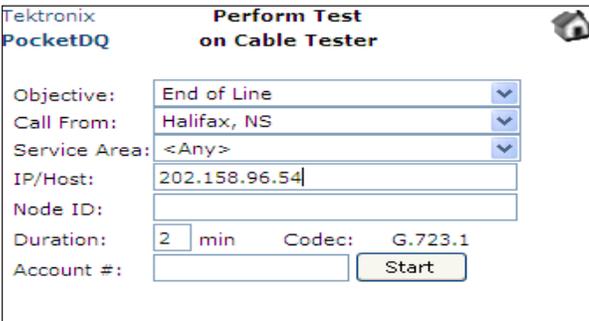
Searching for Previously Run Tests

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:

RTP Statistics Information

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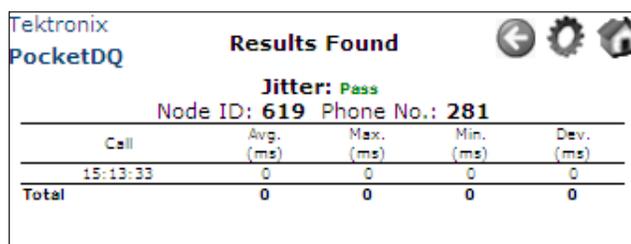
More detail for the Jitter Buffer is provided when the user selects that pass/fail parameter link, as follows:
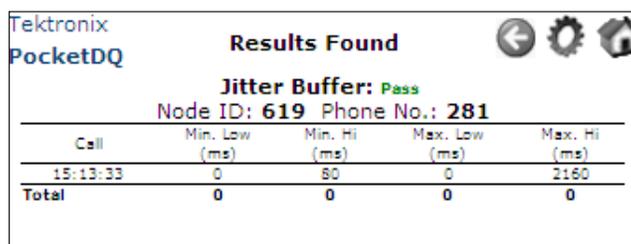
More detail for the Delay is provided when the user selects that pass/fail parameter link, as follows:
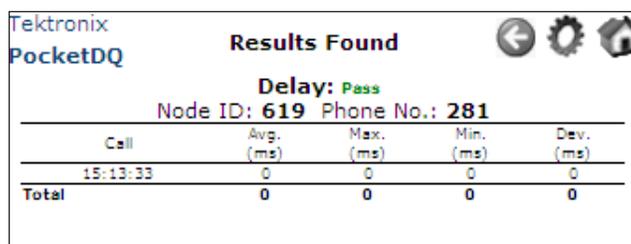
Test Data Management

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.
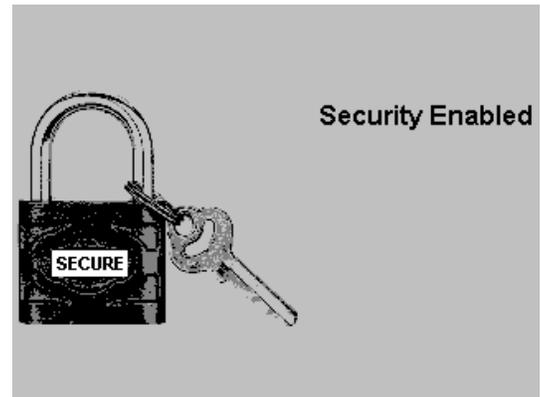
Secure860Link Support

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.
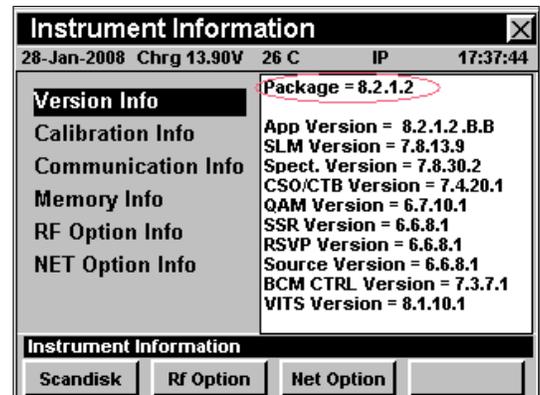
Enable/Disable S8L

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.
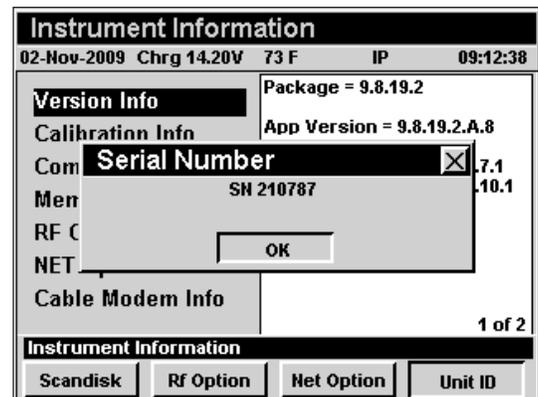
Entering the Instrument Fingerprint Serial Number

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 ⓘ **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.

TRILITHIC
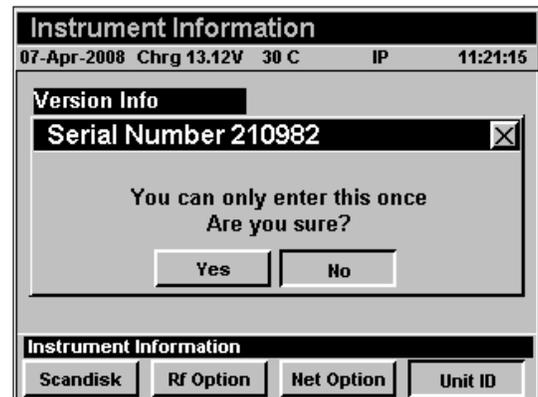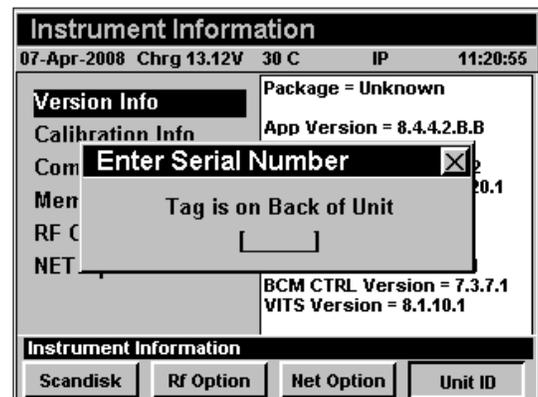
Asset ID

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.
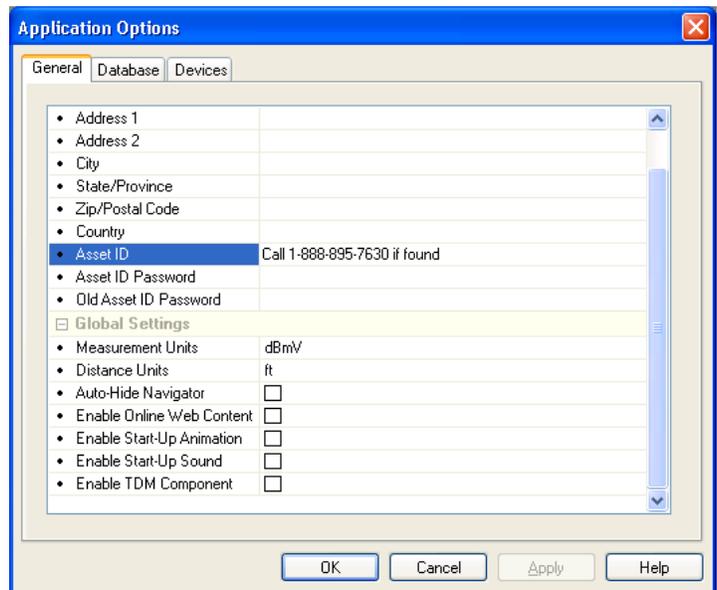
Note: For additional configuration information, refer to the WorkBench software manual.

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.
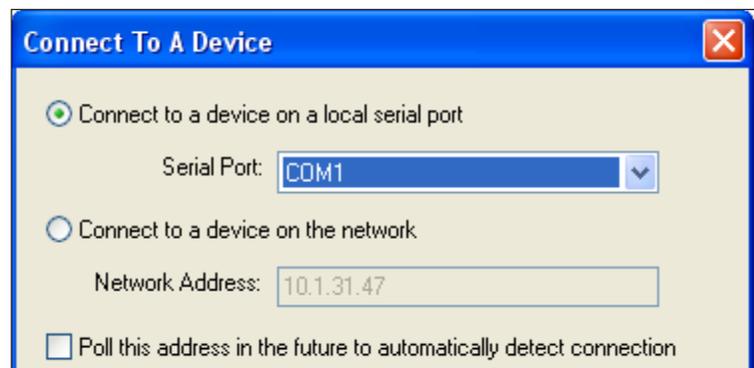
TRILITHIC

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.

DSP Test xx 10.1.31.47	
Configure ►	Configuration Wizard…
Disconnect	General Settings…
Show Offline Devices	Level Settings…
Properties	Scan Settings…
	Depth of Modulation Settings…
	CSO/CTB Settings…
	Forward Sweep Settings…
	QAM Settings…
	Web Browser Settings…
	Network Test Settings…
	Return Settings…
	VoIP Settings…
	Telemetry Search Settings…
	Navigation Menus…
	Limits…
	Set Date/Time
	Re-Boot
	Apply Firmware Upgrade…
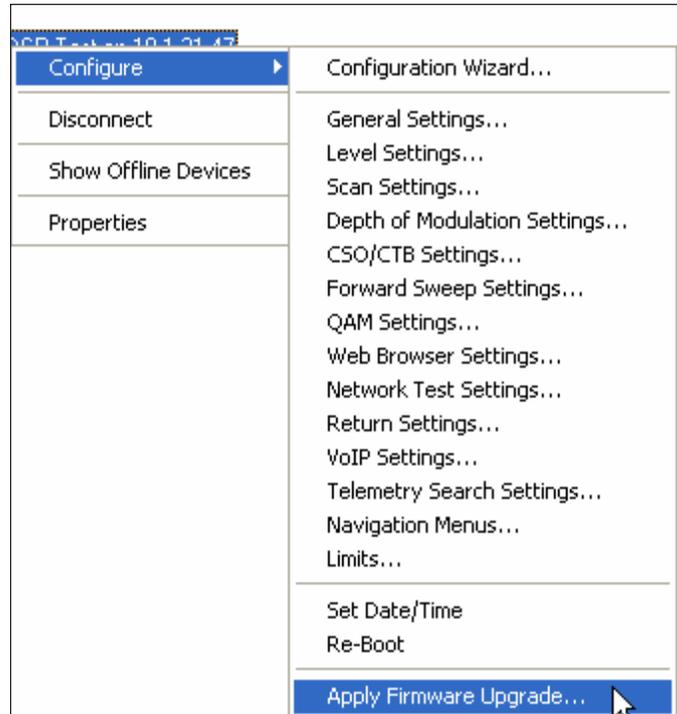
Ethernet Connection

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.
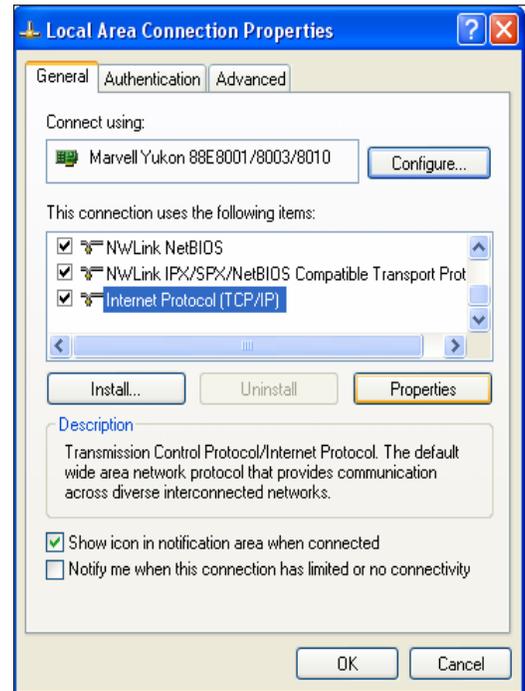
4. Select the "Obtain an IP address automatically" radio button.

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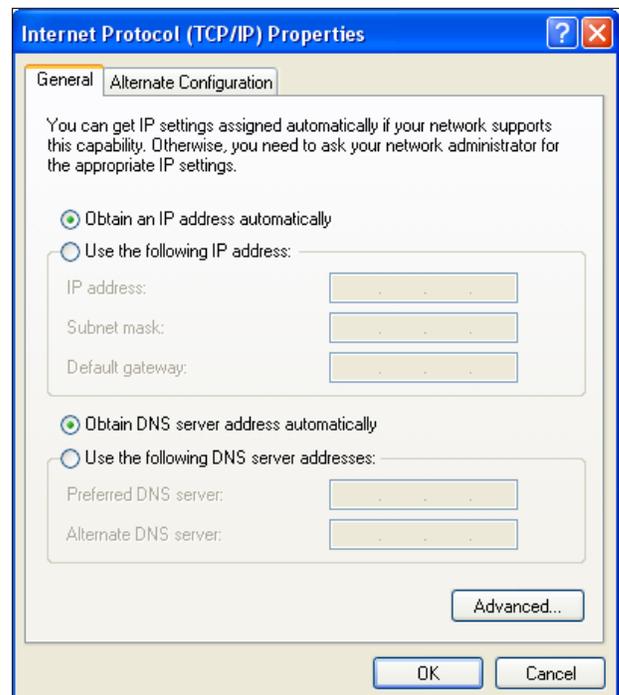
Configure the 860 DSPi for DHCP Using the External RJ45 Port

1. Select the ▭ Setup ▭ softkey.

2. Select the [wrench] 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.
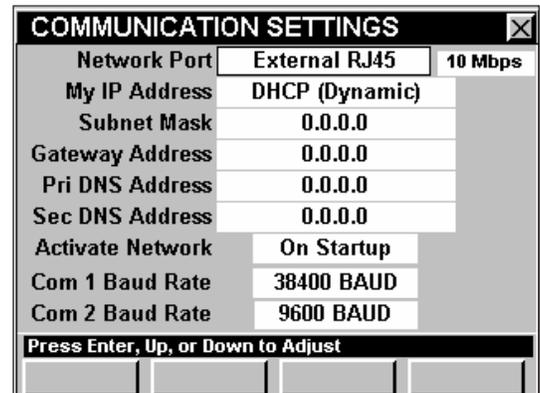
8. Select the INSTALLER softkey.

9. Select the [PING icon] 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.

Ping (Our IP = 10.1.31.47)	☒

Host Name			
or Host IP	10.1.1.9		
Pkt Delay	10 msec	Pkt Size	0 bytes
Sent		Min Time	
Received		Avg Time	
Lost		Max Time	
LPR		Vt Latency	
LPR (%)		Jitter	

Ping

FAVORITE	START	STOP	MODEM
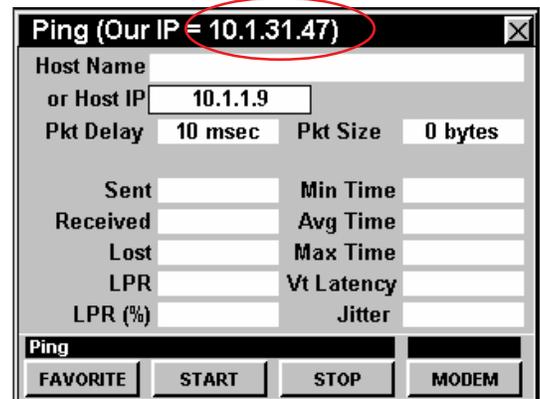
Upgrade Firmware

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".

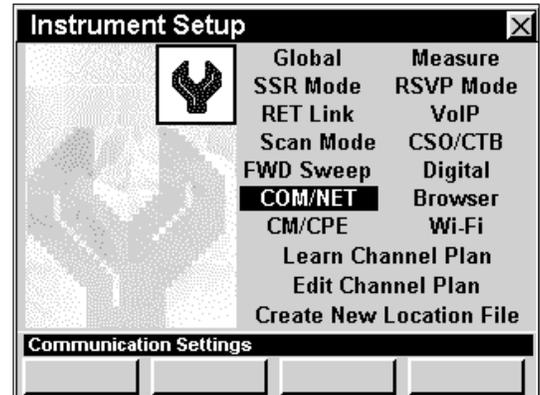3. Select "Internet Protocol (TCP/IP)", and then select the **Properties** button.
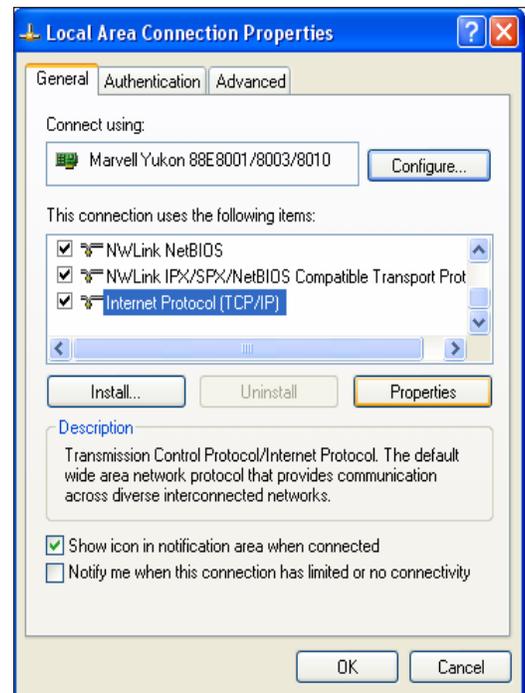
4. Select the "Use the following IP address:" radio button and enter the IP address of 10.10.10.1 and the Subnet Mask of 255.255.255.0.

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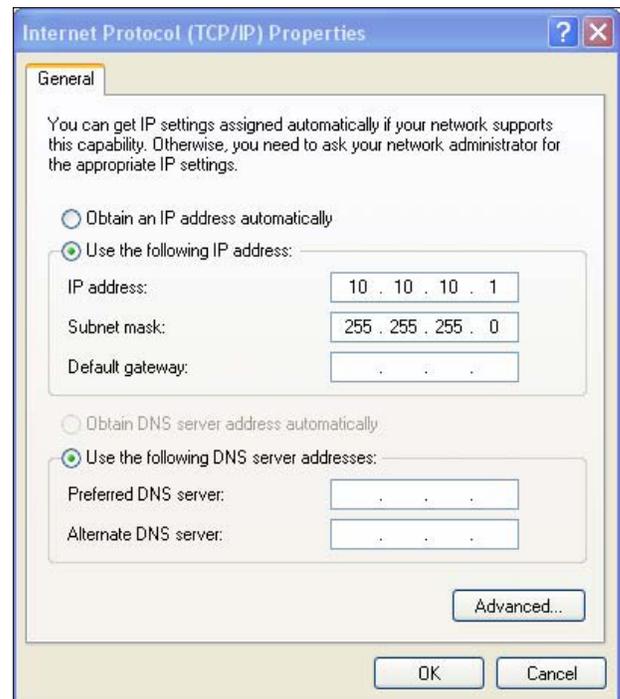
Configure the 860 DSPi for a Static IP Address Using the External RJ45 Port

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] icon to activate the RJ45 port and obtain an IP address from the router.

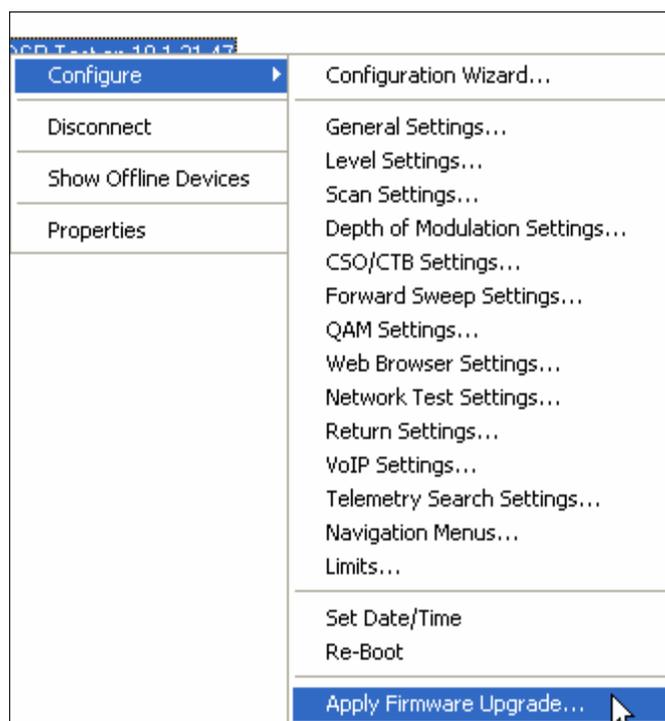The IP address is displayed in the upper left corner of the top banner.

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 |

TRILITHIC

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.
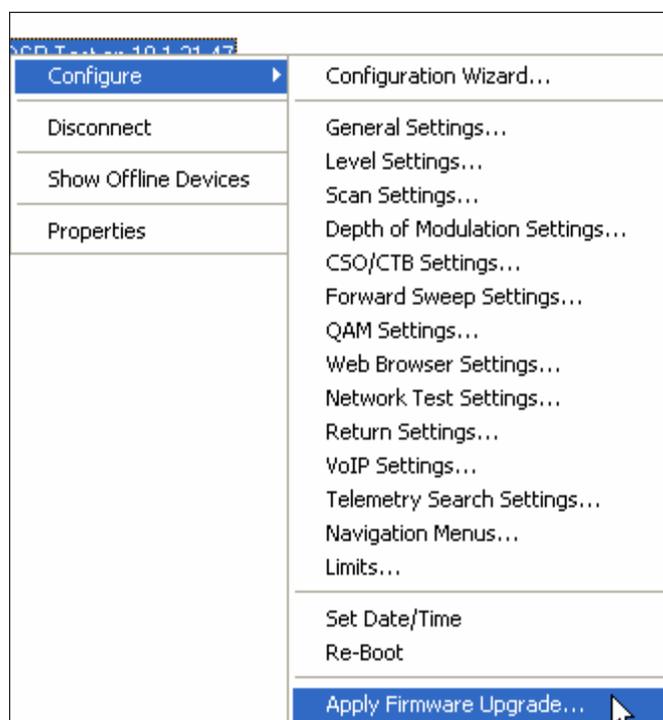
Optional Software and Hardware 12

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.
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.*
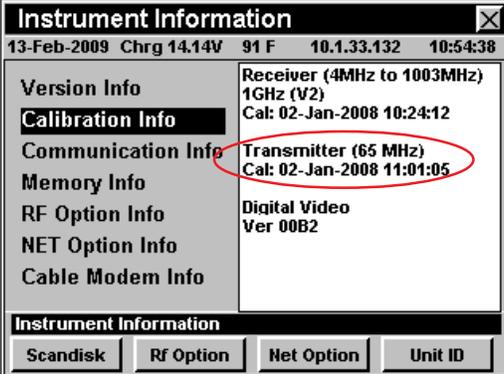
Option Code	Name	Description
VP-1	Return Tester Option (P/N 0930082004)	When installed in an 860 DSP or 860 DSPi this option provides the functionality of the RSVP and RSVP[2] Installer's Return Tester. This option is compatible with the Guardian System and Guardian System II. **REQUIRES RETURN TRANSMITTER 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.*
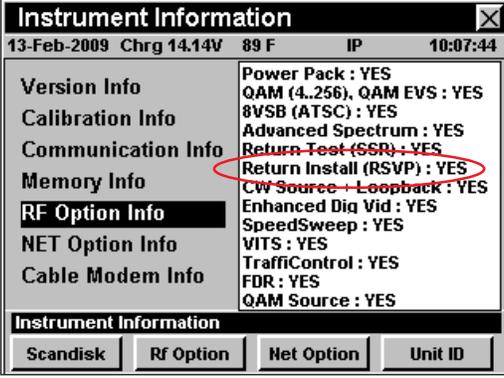
Option Code	Name	Description
QA-1	QAM Option (P/N 0930082008)	When installed in an 860 DSP this option provides all the features that are included in QAM Lite Mode as well as the following display options; constellation, equalizer tap diagram, and BER graph. This option also provides QAM EVS support. 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.*
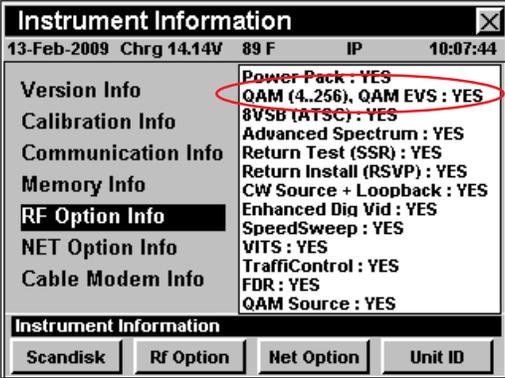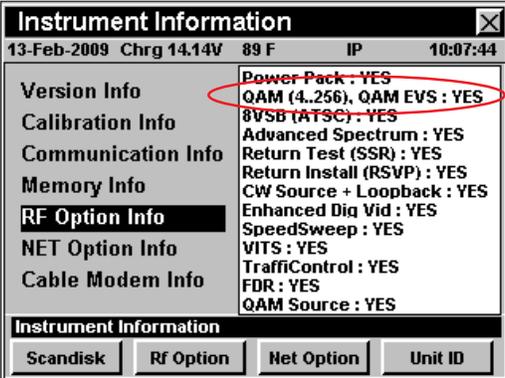
ption Code	Name	Description
VSB	Vestigial Sideband Modulation (VSB) Option (P/N 0930081012)	When installed in an 860 DSP or 860 DSPi, this option measures and displays the signal qualities of Vestigial Sideband Modulation (VSB) digital television signals displayed using constellation, equalizer tap diagram, 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.*
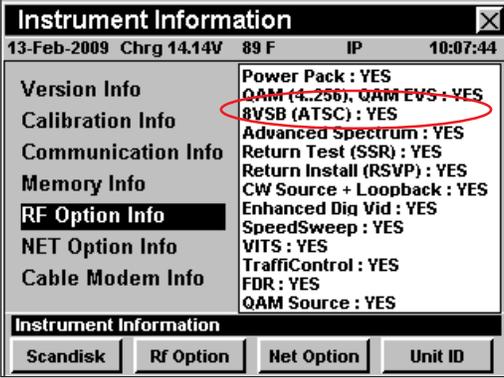
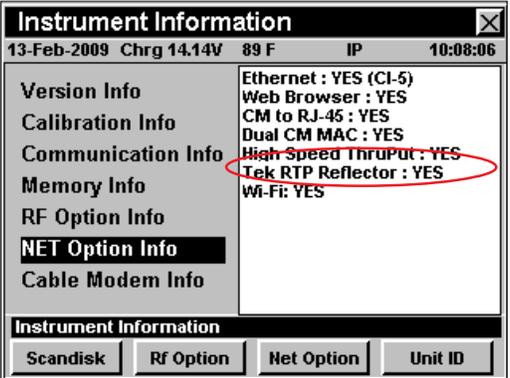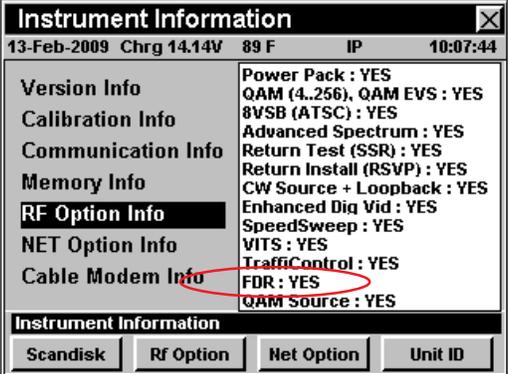| Option Code	Name	Description
VITS	Vertical Interval Test Signal Option (P/N 0930081013)	When installed in an 860 DSP or 860 DSPi, this option analyzes the signal qualities of Vertical Test Signals (VITS) to measure in-channel response, differential phase, differential gain, and chroma delay. This feature 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.*
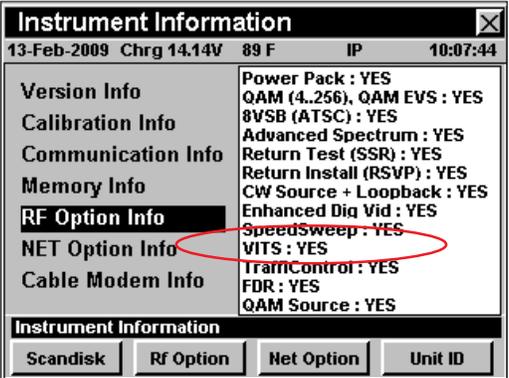
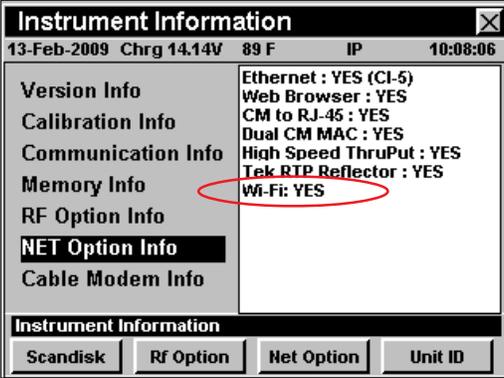| Option Code	Name	Description
RTP-1	Real-Time Transport Protocol Reflector Option (P/N 0930081015)	When installed in an 860 DSP or 860 DSPi, this option extends the measurement and troubleshooting range of field technicians by offering a simple round-trip VoIP quality test from any RF test point. The 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.*

TRILITHIC

| 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.
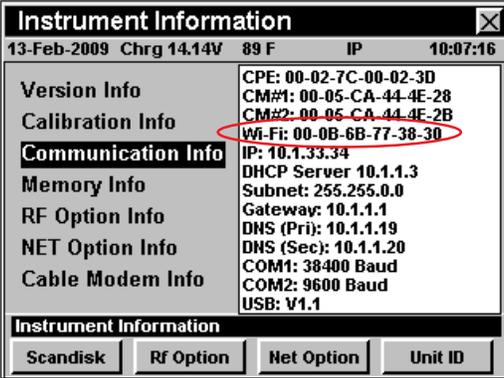
Upgrade Options For Existing Equipment

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

CPF: 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 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 **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
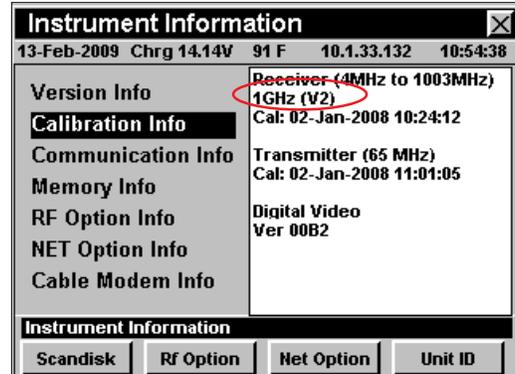
Ethernet Communication Upgrades for the 860 DSP & 860 DSPi

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
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 |

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.

Instrument Information

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 |

- 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*.

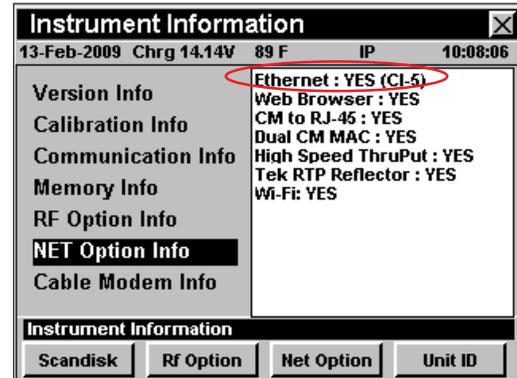| Enhanced Digital Retrofit (IL-2) for the 860 DSP & 860 DSPi (continued) (P/N 2071569000K)	
	Use the ◄ ► buttons to highlight the **Calibration Info** Field. If you have this hardware option installed it will be indicated by the text *Digital Video Ver ####*, where *####* indicates the version of the installed hardware.
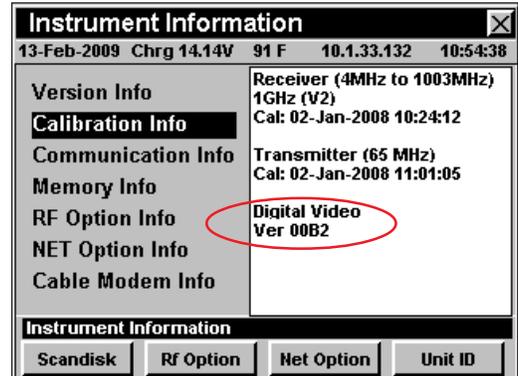
Modem Upgrades for the 860 DSPi

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

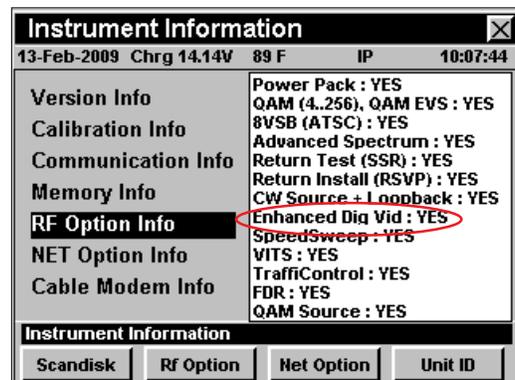1. Access the **Setup** Menu from any **Navigation** Menu by pressing the Setup softkey.

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            Powering Up Modem
Calibration Info        Initializing Modem
                        Checking Version
Communication Info      2.00.03T2.1.1A
Memory Info             Modem Type
                         US2A
RF Option Info          MAC#1: 00-05-CA-40-D3-2C
NET Option Info         MAC#2: 00-05-CA-40-D3-2F
                        UGS Ready
Cable Modem Info        Docsis20Capability: Yes
                        Powering Down Modem

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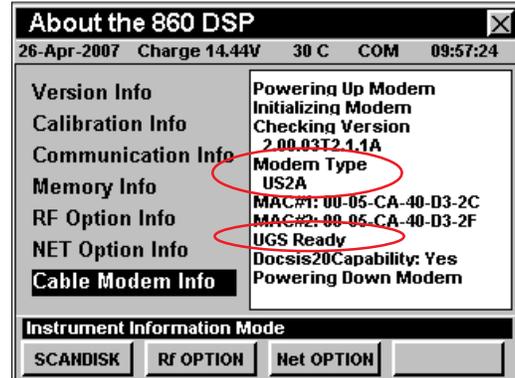
Use the ◀ ▶ buttons to highlight the **NET Option Info** Field. If you have the Dual Cable Modem software option installed it will be indicated by the text *Dual CM MAC : YES*.

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

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

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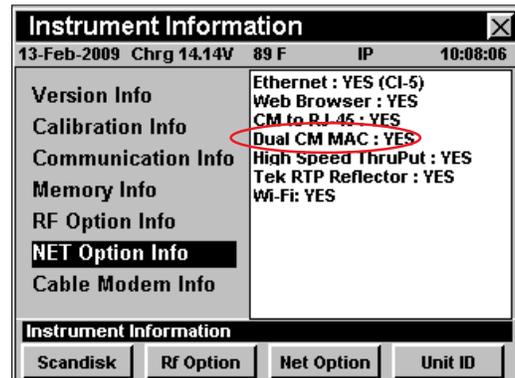
Modem Upgrades for the 860 DSPi (continued)

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
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

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.
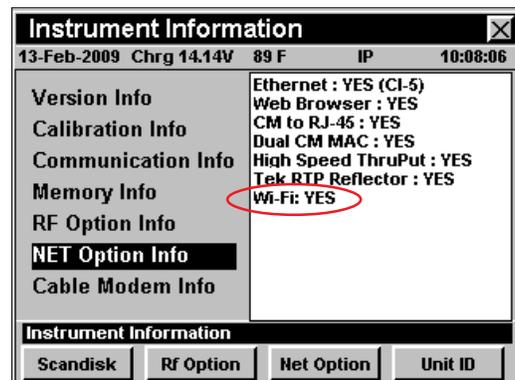
REQUIRES POWER PACK OPTION (PP-1)

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 ⓘ **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 *Wi-Fi: 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

	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.	**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-77-38-3D 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

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