

720 DSP Business Certification Meter

Operation Manual



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. See Page iv for complete details.



Industry
Canada

Industrie
Canada

This Class B digital apparatus complies with Canadian ICES-003. See Page v for complete details.

The CM Sweep feature is patent pending.

innovative technology to keep you a *step ahead*

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Putting Innovation Within Reach

Product innovation at Trilithic has always been characterized by one thing: it's practical. It makes life easier for customers. It's the natural result of listening to them. That philosophy has been the driving force behind the company's growth from its beginnings as a two-man engineering team in 1986 to its current position as a global manufacturer with more than 130 employees.

A privately held company, Trilithic broadened its original RF and microwave component product line by acquiring Filters manufacturer Cir-Q-Tel and instruments manufacturer Texscan, adding broadband solutions to the product line. The company also expanded operations to Thailand in 2001, to meet increasing demand for its products in the growing markets of Asia.

As new communications applications continue to emerge, part of Trilithic's business has evolved into managing change—helping customers respond quickly to market opportunities with innovative technology and individualized solutions. But the core value of Trilithic's business approach—listening to customers—hasn't changed. Keeping that focus intact will help provide better products in the long run and ensure continued growth for decades to come.

Trilithic is comprised of two major divisions:

Broadband Instruments

The company is best known for innovations in signal level measurement, leakage detection and reverse path maintenance—like the use of Digital Signal Processing (DSP) technology, which lets field technicians upgrade their signal analyzers by simply downloading firmware.

Emergency Alert Systems

Trilithic's EAS division is a leading supplier of homeland security government-mandated emergency alert systems for broadband and other communication system providers. As the communications industry continues its rapid evolution, Trilithic has begun offering comprehensive systems and services to address a wide variety of emergency alert system needs, including the design and architectural layout of complex analog and digital EAS networks.

FCC Part 15 Compliance



Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Pursuant to FCC 15.21 of the FCC rules, changes not expressly approved by Trilithic, Inc. might cause harmful interference and void the FCC authorization to operate this product.

The internal antenna used for this instrument is installed at the Trilithic factory or by Trilithic approved repair facilities. During operation of the device, a distance of 20 cm or more should be maintained between the antenna in this device and any persons and must not be co-located or operating in conjunction with any other antenna or transmitter. To ensure compliance, do not operate at closer distances than this. The antenna on the 720 DSP is located inside the device at the top of the unit attached to the back plastic case. Do not use any antenna other than the installed antenna.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the device and receiver
- Connect the device into an output on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Industry Canada Compliance



Industry Canada

This device complies with Industry Canada license-exempt RSS standard(s). Operation of this device is subject to the following two conditions; 1) This device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus complies with Canadian ICES-003.

Industrie Canada Conformité



Industrie Canada

Cet appareil est conforme au Cahier des charges sur les normes radioélectriques d'Industrie Canada concernant les appareils radio exempts de licence. Le fonctionnement de cet appareil est soumis aux deux conditions suivantes : 1) cet appareil ne doit pas produire de brouillage et 2) cet appareil doit accepter tout brouillage, y compris celui pouvant causer un mauvais fonctionnement de l'appareil.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

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720 DSP

Business Certification Meter

Section I: The Basics



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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.

Trilithic technical support is available Monday through Friday from 8:00 AM to 5:00 PM 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 e-mail technical support at support@trilithic.com.

For quicker support response when calling or sending e-mail, please provide the following information:

- Your name and your company name
- The technical point of contact (name, phone number, e-mail)
- A detailed description of the problem you are having, including any error or information messages
- The serial number of the 720 DSP that you are having problems with

How this Manual is Organized

Thank you for choosing the 720 DSP. This manual is provided with the 720 DSP to help the user become better acquainted with the device and to become productive faster. Each section is written as though the user is familiar with the basic operation of the instrument and is broken into chapters for each function.

This manual is divided into the following sections:

- Section I: The Basics – This section 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, basic commands and other important details.
- Section II: Setup Menu – This section includes instructions on how to use the features shown in the Setup Menu of the instrument.
- Section III: Autotest Menu – This section includes instructions on how to use the features shown in the Autotest Menu of the instrument.
- Section IV: Troubleshoot Menu – This section includes instructions on how to use the features shown in the Troubleshoot Menu of the instrument.
- Section V: Utility Menu – This section includes instructions on how to use the features shown in the Utility Menu of the instrument.
- Section VI: Appendix – The section provides instrument specifications and warranty information.

Conventions Used in this Manual

This manual has several standardized conventions for presenting information:

- Connections, menus, menu options, and user-entered text and commands appear in **bold**.
- Section names, web, and e-mail addresses appear in *italics*.



A **NOTE** is information that will be of assistance to you related to the current step or procedure.



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



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

Precautions



The maximum “RF” input voltage to the meter is 90 Volts (AC or DC). A larger voltage will damage the meter.



Pursuant to FCC 15.21 of the FCC rules, changes not expressly approved by Trilithic might cause harmful interference and void the FCC authorization to operate this product.



The antenna used for this instrument is installed at the Trilithic factory or by Trilithic approved repair facilities. During operation of the device, a distance of 20 cm or more should be maintained between the antenna in this device and person. To ensure compliance, do not operate at closer distances than this. The antenna on the 720 DSP is located inside the device at the top of the unit attached to the back plastic case. Do not use any antenna other than the installed antenna.



Do not use the instrument in any manner not recommended by the manufacturer.



A strong electromagnetic field may affect the measurement accuracy of the 720 DSP.



Use only the battery charger supplied with the 720 DSP. Use of any other charger may damage the battery.



CAUTION

DO NOT install the SFP transceiver modules upside down, damage to the device may occur. Transceiver modules should always be inserted with the interface connection facing the rear of the device and the label facing the front of the device.



CAUTION

Damage caused by improper cleaning of the display screen will void the warranty of the 720 DSP.



CAUTION

Never use abrasive pads, paper towels, tissue paper, or clothing to wipe the screen. If you do, these non-ultrasoft materials can cause permanent damage by scratching the screen or stripping the anti-glare coating off the screen.



CAUTION

Never use any type of window cleaner, soap, scouring powder, or any cleanser with solvents such as alcohol, benzene, ammonia, or paint thinner. These chemicals can react with the materials used to construct the display which can lead to hazing, yellowing, brittleness, or other types of damage.



CAUTION

Never spray liquid directly on the display screen as it could run inside the unit and cause damage.

Recommended Software & Hardware

The following software is recommended for configuration and data management of the 720 DSP:

ViewPoint Express

ViewPoint Express is a Windows-based software application with a web browser interface that supports basic 720 DSP configuration as follows:

- Software registration and activation
- Meter connection and synchronization
- Create channel configuration presets and test locations
- Create and organize channel plans, limits sets, and autotests
- Create configuration packages with channel plans, limit sets, and autotests
- Define meter settings
- Query, display, and delete test data

ViewPoint Integrated Server Package with WFM Module

ViewPoint Integrated Server Package with WFM Module is a server-based software application with a web browser interface that supports advanced 720 DSP configuration and data management as follows:

- Includes all of the features included in ViewPoint Express
- Server initialization and configuration
- Manage users/device access licenses and user/group permissions
- Create organizational structure
- Meter-initiated connection and sync from meter browser
- Configure and perform import of job attributes
- Define job test requirements
- Detailed test reporting with advanced Business Certification reporting
- TDM & 860 DSP data Integration
- Customer specific database queries

What is the 720 DSP?

Overview

- Simplify Installation, Troubleshooting & Home Certification of Both Residential and Business Installations
- 1 GbE SFP Optical & Electrical Ethernet Throughput Testing
- 802.11a/b/g/n (2.4/5 GHz) Wireless Testing
- Intuitive Color Touch Screen with Simple Pass/Fail Indicators Reduce Installer Entry Errors and Improves Decision Making
- Next-Generation Autotest Apps Streamline Certification
- Convenient Multiple Standard Tests in a Single Autotest App Help to Standardize Tech Processes & Procedures



The Standardization Solution

Trilithic's 720 DSP™ conveniently combines CATV and Gigabit Ethernet testing in a single meter for troubleshooting and installation of both residential and business services.

Multi-service verification can now be achieved with one instrument containing everything needed for service, business, or residential installations. Eliminate the need for multiple instruments in most business services with Gigabit Ethernet Throughput testing and save capital expenditures at the same time.

Tailored for the challenges faced by installers, contractors and service techs, this meter comes equipped with all of the powerful troubleshooting tools for the experienced tech, yet helps simplify decision making and streamline standard processes and procedures for the more novice tech. This improves tech efficiencies, the overall health of the entire system, and allows techs to grow with the meter.

Gigabit Ethernet Testing

Used in combination with either the MetroNet 5001™ or TLB-GbE™, the 720 DSP can achieve throughput testing speeds of up to 1 GbE using a dedicated test port.

The 720 DSP can perform either roundtrip or one-way measurements of Key Parameter Index (KPI) for full Ethernet service testing. With constant payload testing for Layer 2 through Layer 4, the 720 DSP is built for verification of both Ethernet Service Level Agreement (SLA) and Quality of Service (QoS) metrics.

Next Generation Features

The 720 DSP features an intuitive color touch screen interface, simple pass/fail indicators, and powerful autotest apps to streamline certification and make the technician's job easier.

Everything about this next-gen meter was built with the technician in mind, from the long battery life and quick charge time to its unique built-in LED flashlight and glow in the dark keypad for those dark cramped spaces.

Including next-generation smart device technology, the 720 DSP is the easiest, most feature-rich, best-performing business services meter available today.

Simple Yet Powerful

Providing the widest range of standard functions for an installer available today, the 720 DSP includes virtually all the testing options an installer or service technician needs to verify service quality and easily identify and fix problems in the field.

- Multi-user support
- Multi-language support
- Create work orders right on the meter
- Built-in web browser, real-time data transmission
- Interactive autotesting apps

Autotest Apps

The 720 DSP features next generation autotest applications that practically walk the technician through a job. By performing standardized measurement tests at various required locations on the job site using custom test plans, channel plans and limit sets, the meter very clearly indicates (using color and symbols) what areas still need attention, before the technician leaves the job site.

Multi-user support allows technicians that work in various territories to easily switch channel plans and standardized autotest apps and test limits or login as a completely different user. The built-in web browser allows techs to upload job data in near real-time as well as transmit and receive channel plans, autotests, work orders and firmware.

Leaving less room for entry error, this new simple user interface can translate into less training and more efficient time in the field for techs. Although the 720 DSP comes equipped with all of the required troubleshooting tools for an advanced maintenance technician, it also offers a higher comfort factor for novice technicians, reducing decision making in the field, which can ultimately result in more productive work days and more satisfied customers.

Justify ROI

Field operations managers can now easily verify that all of their technicians are performing the proper tests and are doing so at the right place and time—in near-real time. The potential benefits include identifying techs who need additional training, improving team performance, reducing truck rolls and cutting operating costs could obviously be significant.

At a higher level ViewPoint can deliver simple, standardized, system-wide reports and dashboards that can help a director or VP of technical operations view the entire operation at a glance to gain information that can be used to reduce service and repeat trouble calls.

Essentially, this integrated system approach allows cable operators to see much more of their plant-wide operations and use the information in practical ways. The insights can enable them to identify both localized problems and high-level system issues to make decisions based on a clearer understanding of their overall operations and the associated ROI.

Combining 720 DSPs in the field with the new ViewPoint WFM Module in the back office, managers can view the health of their entire system—in near real-time, for total installation & service management.

Total System Management

Combining the 720 DSP meter in the field with the new ViewPoint Integrated Server in the back office, managers now have simplified access to intelligent management tools for monitoring, assessing and improving the efficiency of their total operation while making it even easier to obtain consistent, repeatable results that give supervisors that birds-eye view of the field for Total System Management.



By unifying an entire MSO's field operations in one convenient dashboard, managers can easily verify compliance and quality throughout the entire plant, either by home, system, region, division or any other attribute from a billing system.

This simple and completely customizable integrated system of field analysis and reporting tools allows managers to watch over their entire field operations in one convenient dashboard that compares each location in the system, analyzes the overall health of their entire organization and addresses concerns in near real-time.

Standard Interfaces

- RF Test Port (F-Type)
- DOCSIS 3.0 modem 8x4 (100/304 Mbps)
- RJ45 Management Port (10/100 Mbps)
- Cable Modem Thru RJ45
- RJ45 Electrical Ethernet & SFP Optical Ethernet Test Ports (10/100/1000 Mbps)
- 802.11 “b/g/n” 2.4/5 GHz Wi-Fi
- USB 2.0 Flash Drive Port

Standard Testing Features

- Return Spectrum Analysis (4 to 110 MHz)
- Level Measurement
- C/N Measurement
- QAM Measurement (MER/BER/Constellation/EQ)
- Complete Channel Plan Scan with Tilt Measurement
- Ping, Trace Route, VoIP & Throughput Measurements
- Cable Modem Statistics

Advanced Measurement Functions

The 720 DSP includes all of the following advanced measurement functions standard:

Frequency Domain Reflectometer

This feature enables the 720 DSP to provide a simple, convenient and accurate tool for determining the distance to cable faults by sending a sweep into the cable and analyzing the complex reflected wave to determine the distance to various sources of reflection (opens, shorts, splitters, etc.). The reflecting events are indicated on a distance versus amplitude display, and markers are used to identify the distance to the source of the reflection, and the return loss at that point.

Forward Spectrum Analysis

This feature enables the 720 DSP to view raw forward spectrum traces from 50 to 1000 MHz with DSP spectrum snapshots to give the user your downstream channels.

Upstream Linear Distortions Measurement

The UP-LD feature enables the 720 DSP to view the pre-equalization of the upstream channel, along with the in-channel frequency response and group delay to determine if equalization is hiding potential problems within the upstream.

Analog & Digital HUM Measurement

This feature enables the 720 DSP to measure the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency interference (HUM) present on the video/QAM carrier of a single selected analog or digital channel.

Optional Features

The following optional features are available for the 720 DSP.

Bluetooth Communications Adapter

This is a software and hardware option package that is used to connect the 720 DSP to an iPad via Bluetooth for remote control of the meter during operation. This package includes a software activation key for the BCA option on the 720 DSP and a Class II Mini Bluetooth Adapter (v2.1) with a 10 meter range for speeds up to 3 Mbps. This option is compatible with the iPad and iPhones that have device tethering enabled by the service provider.

QAM Error Vector Spectrum Analysis

When activated in a 720 DSP, this feature provides users not only the ability to tune the meter to a downstream QAM channel and display its Error Vector Spectrum (EVS), to reveal noise and ingress that may be present under the QAM channel but also provides a method for troubleshooting 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.

Source Generator

This feature enables the 720 DSP to generate either a continuous wave (CW) or 16/32/64/128/256 QAM signal with adjustable frequency, and modulation in the return path from 5 to 85 MHz.

Traffic Control Plus

This feature enables the 720 DSP to provide users with the ability to troubleshoot the upstream in a bonded channel environment. This feature can be used to see impairments with ease and sort traffic from ingress within a bursty upstream.

CM Sweep

When activated in a 720 DSP, the CM Sweep feature (patent pending) provides users with the ability perform in-band sweeps or upstream alignment without any headend sweep gear. This feature can be used to balance the upstream, see the percentage of pre-equalizer effort, and isolate problems between existing active components.

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.

Equipment Supplied with the 720 DSP

The 720 DSP comes with the following:

- 720 DSP Business Services Meter
- Two Built-In Li-Ion Batteries
- Protective Carrying Case with Shoulder Strap
- Touchscreen Stylus with Tether
- AC to DC Power Adapter & Battery Charger
- AC US Power Cable

Replacement Parts

The following replacement parts are available for the 720 DSP:

Part Number	Description
0090061000	Li-ION Replacement Battery (Replacement Requires 2 Batteries)
2131570000	720 DSP Protective Carrying Case
0320052000	Shoulder Strap
0750009000	Touchscreen Stylus
0610198000	AC to DC Power Adapter & Battery Charger
0190197000	AC US Power Cable

Field Accessories

The following accessories are available for the 720 DSP:

Part Number	Description
2071527048	Precision test cable (I/O-15)
2072097000A	Vehicle Power Adapter
2131221000	Large Utility Carrying Bag
0190322000	AC Euro Power Cable

Software

The following software is available for the 720 DSP:

Part Number	Description
0930208000	ViewPoint Express Configuration Software for the 720 DSP
2011657000	ViewPoint Integrated Server with WFM Module for the 720 DSP
0930144000	ACTS™ software for high speed network testing

Gigabit Ethernet Testing Accessories

The following Gigabit Ethernet testing accessories are available for the 720 DSP:

Part Number	Description
2011609000	TLB-GbE – This is an ethernet loop back device that operates as a companion to the 720 DSP, 720 DSP & MetroNet 5021 for remote loop back when running Gigabit Ethernet tests from either the RJ-45 Electrical or SFP Optical Gigabit Ethernet port.
2072185001	SFP 100 FX – 1310 nm SFP multi-mode transceiver 100 Mbps, LC connector and 2 km reach
2072185002	SFP 100 LX – 1310 nm SFP single-mode transceiver 100 Mbps, LC connector and 30 km reach
2072185003	SFP 1000 LX – 850 nm SFP multi-mode transceiver 1000 Mbps, LC connector and 550 meter reach
2072185004	SFP 1000 SX – 1310 nm SFP single-mode transceiver 1000 Mbps, LC connector and 10 km reach
2072185005	SFP 1000 ZX – 1550 nm SFP single-mode transceiver 1000 Mbps, LC connector and 80 km reach
2072191001	Six (6) foot multi-mode optical patch cable, full duplex with LC to LC connectors
2072191002	Six (6) foot single-mode optical patch cable, full duplex with LC to LC connectors
2072192001	Six (6) foot CAT5e ethernet patch cable, 100 Ohm impedance with RJ-45 Male to Male connectors
2072213010	Quad-Shielded Six (6) foot CAT5e ethernet patch cable, 100 Ohm impedance with RJ-45 Male to Male connectors

A Guided Tour of the 720 DSP

Front View



Rear View

RF Input Connector

**Internal Wi-Fi Antenna
(2 dB Gain)**

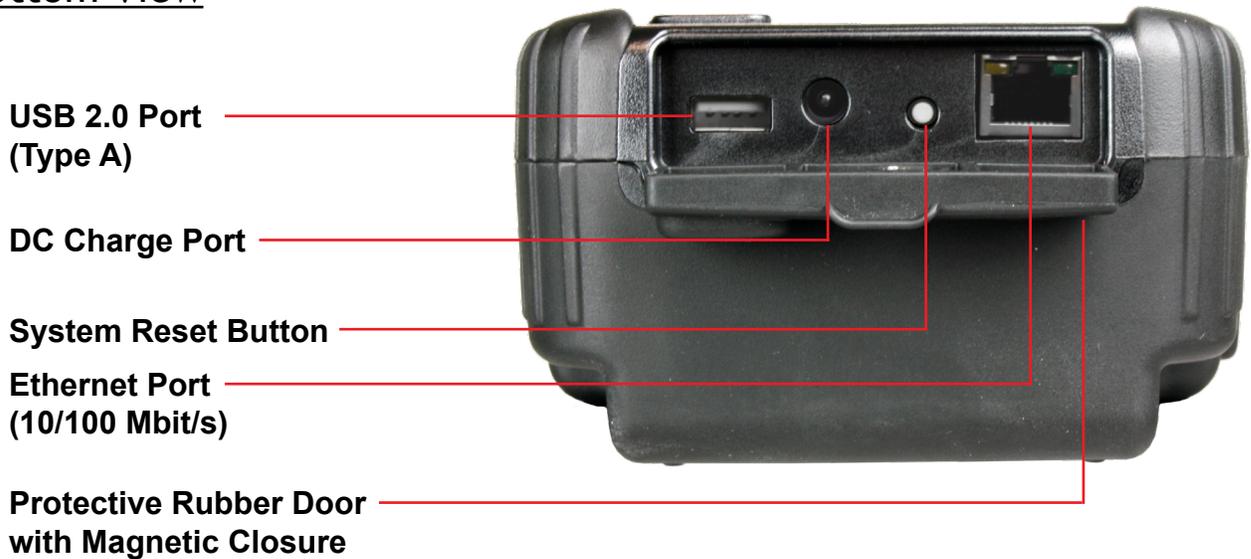
**Identification Label
(S/N, FCC ID & Notice)**



Top View



Bottom View



In the image above, the protective rubber door is in the open position for illustrative purposes. This door should remain closed when not using any of these ports.

Right Side View

RJ-45 Electrical Ethernet Port
(10/100/1000 Mbit/s)

SFP Optical Ethernet Port
(10/100/1000 Mbit/s)

Protective Rubber Door
with Magnetic Closure



NOTE

In the image above, the protective rubber door is in the open position for illustrative purposes. This door should remain closed when not using any of these ports.



NOTE

Only one of the Gigabit Ethernet interface can be selected for testing, both the Electrical and Optical port cannot be used simultaneously.

Protective Carrying Case

The 720 DSP includes a protective carrying case with the following features:

- Molded form-fit design that includes an impact resistant foam core with coated ballistic nylon finish to provide maximum protection
- High-strength zipper to ensure secure closure
- Stylus holder and adjustable Velcro hand strap
- Removable shoulder strap (not shown)
- Metal D-rings for shoulder strap or line hook with reinforced stitching throughout
- Front flap with magnetic closure provides full access to the touchscreen, keypad, and bottom ports when open
- When the front flap is closed, it provides protection to the touchscreen and keypad as well as the bottom ports
- Rear flap with Velcro closure that provides easy access to the information label on the back of the 720 DSP
- Front and rear flaps can be used together as a kick-stand for the unit during operation



Optical Transceiver Installation & Removal

Perform the following steps to properly insert and remove the optical transceiver module:

1. Remove the protective plugs from the SFP optical transceiver and the protective caps from the connectors on the fiber-optic cable, save them for future use.
2. Insert the optical transceiver into the GigE port on the right side of the 720 DSP. Be sure to insert the optical transceiver with the SFP label facing the back of the device.
3. Clean the fiber-optic connectors on the fiber-optic cables.
4. Plug the appropriate fiber-optic cable into the connector on the SFP module.
5. To remove the optical transceiver, first disconnect the fiber-optic cable and then use the bail to pull the optical transceiver out of the port on the 720 DSP.



DO NOT install the transceiver modules upside down, damage to the device may occur. Transceiver modules should always be inserted with the SFP label facing the back of the device.

Cleaning the Display Screen

The touchscreen LCD display of the 720 DSP requires special care when cleaning. This display is sensitive and can be easily scratched or damaged while cleaning. To clean the display screen of the 720 DSP, use an ultrasoft, clean, lint free, microfiber cloth.

To clean fingerprints and greasy smudges off the display screen, use a bottle of screen cleaning solution designed for LCD displays. Put a small amount of screen cleaning solution on a cleaning cloth and then wipe the screen gently.

For correct cleaning of the display, follow these four simple steps:

1. Turn off the 720 DSP before you begin. If the screen is dark, it will be easier to see any areas that aren't clean.
2. Very gently, wipe the display with an ultrasoft, clean, lint free, dry cloth. If this does not completely clean the display, DO NOT press harder on the screen in an attempt to clean the screen as this may cause permanent damage.
3. If Step 2 does not work, spray screen cleaning solution onto the cloth. Never spray the screen cleaning solution directly onto the display screen.
4. Let the screen dry completely before turning on the 720 DSP.



Damage caused by improper cleaning of the display screen will void the warranty of the 720 DSP.

Battery Charging

Before you can use your instrument, you will need charge its battery. Your instrument's battery pack provides approximately 8 to 10 hours of power during continuous operation.

The instrument comes with a AC to DC Power Adapter & Battery Charger which can be used to charge the battery in approximately 3 hours or to trickle charge the battery while the instrument is in use.

Plug the power adapter & battery charger into the DC charge port of the 720 DSP on the bottom of the instrument under a protective cover.

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. Trickle Charge is used to keep the battery fully charged.

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.

Charging Status

The Title Bar at the top of the 720 DSP screen displays the battery voltage and the following charging status icons:

- 
Charging – This icon is displayed when the 720 DSP battery is charging. When charging, the battery voltage will be shown between 12 and 14 VDC (dependent on charging source).
- 
100% Charge – This icon is displayed when the 720 DSP battery is charged from a minimum of 7.50 VDC or approximately 100% of battery capacity.
- 
75% Charge – This icon is displayed when the 720 DSP battery is charged from a minimum of 7.25 VDC or approximately 75% of battery capacity.
- 
50% Charge – This icon is displayed when the 720 DSP battery is charged from a minimum of 7.00 VDC or approximately 50% of battery capacity.
- 
25% Charge – This icon is displayed when the 720 DSP battery is charged from a minimum of 6.50 VDC or approximately 25% of battery capacity. When the battery charge drops to this level, it is recommended that the battery is charged soon.
- 
0% Charge – This icon is displayed when the 720 DSP battery is charged to less than 6.50 VDC or approximately 0% of battery capacity. When the battery charge drops to this level, it is recommended that the battery is charged immediately.

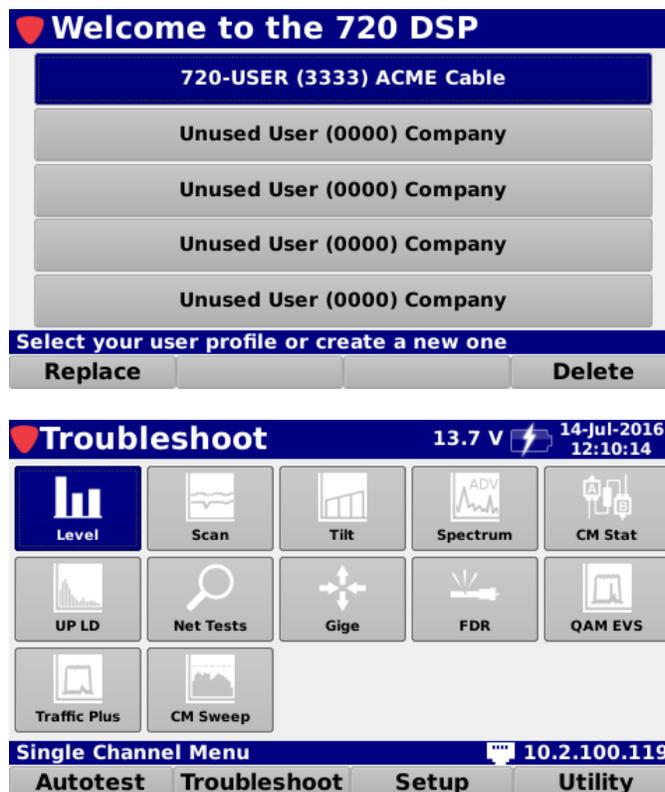
Basic Navigation & Control

Startup

Once the instrument's battery is charged, you may startup the 720 DSP by pressing the **Power** button at the bottom left of the keypad.

Upon startup one of the following will occur:

- If multiple user profiles are activated, the instrument will display the **Welcome to the 720 DSP** screen as shown in the image above. Use the touchscreen or keypad to select the user profile that you wish to use. The **Troubleshoot** menu will be displayed as shown in the image to the right.
- If multiple user profiles are deactivated, the 720 DSP will automatically display the **Troubleshoot** menu as shown in the image to the right.



 **NOTE** *For more information about configuring multiple user profiles, see Section II: Setup, Chapter 3: Meter Configuration, Global Settings.*

 **NOTE** *For more information on how to log off the current user or to switch to another user, see Chapter 4: Function Menu, Log Off User later in this section.*

Sleep Mode

The sleep mode is used to conserve power by putting the 720 DSP to sleep when not in use. This also allows the 720 DSP to be turned back on quickly when moving from one test location to another throughout the work day

Automatic Sleep Mode

The 720 DSP will automatically enable the sleep mode to conserve power after the 720 DSP has been idle for a specified period of time.

The default setting for the sleep mode delay is **5 Minutes**. The sleep mode delay can be set from a minimum of one (1) minute up to a maximum of 60 minutes.



NOTE

For more information about setting the Sleep Mode Delay, see Section II: Setup, Chapter 3: Meter Configuration, Interface Settings.



NOTE

Whenever the 720 DSP is being powered by the AC to DC power adapter & battery charger, the sleep mode delay will be deactivated automatically.

Manual Sleep Mode

To manually enter the sleep mode, quickly press the **Power** button.

Wake from Sleep Mode

Quickly Press the **Power** button to wake the 720 DSP from sleep mode. The sleep mode delay timer will automatically restart.

Shutdown

Shutdown allows the 720 DSP to be turned off at the end of the work day to conserve power.

Automatic Shutdown

The 720 DSP will automatically enable the automatic shutdown mode to conserve power after the 720 DSP has been idle for a specified period of time.

The default setting for the turn off delay is **1 Hour**. The turn off delay can be set from a minimum of one (1) hour up to a maximum of 24 hours.



NOTE

For more information about setting the Turn Off Delay, see Section II: Setup, Chapter 3: Meter Configuration, Interface Settings.



NOTE

Whenever the 720 DSP is being powered by the AC to DC power adapter & battery charger, the turn off delay will be deactivated automatically.

Manual Shutdown

Press and hold the **Power** button to shutdown the 720 DSP. A notification window will be displayed, select the **OK** button to shutdown or select the **Cancel** button to exit without shutting down the device.



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.

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 is located at the top of the display screen, an example is shown in the image below. The left side of the title bar displays the name of the currently selected screen, such as the **Autotest**, **Troubleshoot**, **Setup**, and **Utility** menus, the right side of the Title Bar displays the battery voltage, charging status, date, and time.



Message Bar

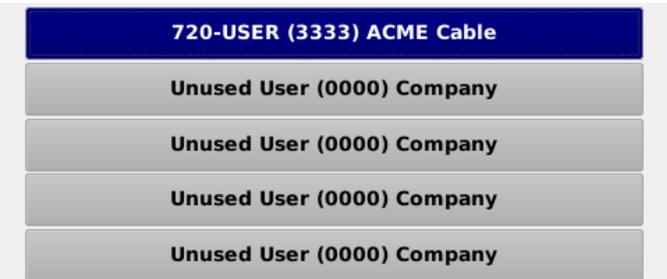
The message bar is located below the main display area, an example is shown in the image below. This area displays single line text entries to help you navigate the 720 DSP menus and show information when the instrument is performing tests. On the **Autotest**, **Troubleshoot**, **Setup**, and **Utility** menus, the right side of the message bar displays network connection icons to indicate which types of network connections are currently active.



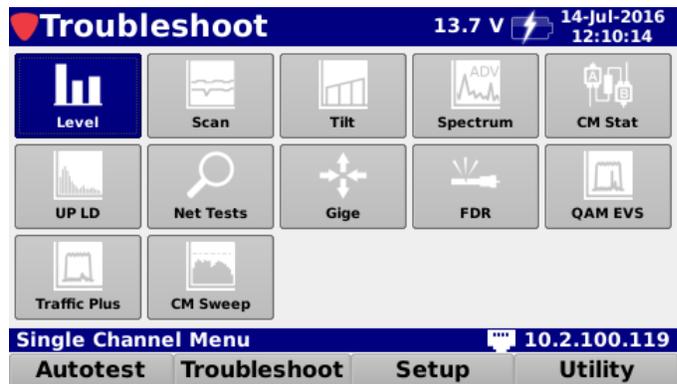
Main Display Area

The main display area, located below the Title Bar, displays text and graphic information such as function icons, measurement, graphs, and interactive pop-up boxes which vary depending on which screen has been accessed.

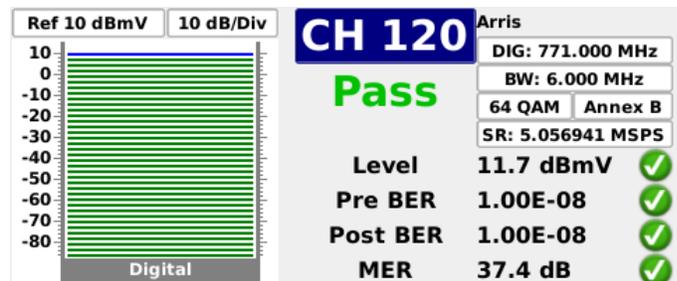
If multiple user profiles are enabled, the **Welcome to the 720 DSP** screen will always be displayed upon startup as shown in the image to the right.



After selecting a user profile, the **Troubleshoot** menu will automatically be displayed by default with the **Level** icon highlighted.



After selecting a function icon from any navigation menu, the measurements and data will be displayed in this area. For example, the image shown to the right represents the type of information that would be displayed in a measurement 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.

Most screens utilize from one to four of the softkeys which are used to toggle between different menus and access various measurement functions.

Navigation Menus

All navigation menus will show the same softkeys. For example, the following image shows a navigation menu with the **Autotest**, **Troubleshoot**, **Setup**, and **Utility** softkeys.



Other Screens

On measurement screens the softkeys are used to access additional measurement functions such as:

SETUP FUNCTIONS

- File Management – New, Open, Save and Save As commands for Channel Plan, Limit Set,
- Channel Plan Management – Add, Remove and Preset commands.
- Limit Set Management – Remove command.

MEASUREMENT & UTILITY FUNCTIONS

- Job Management – New, Open, Close and Delete commands.
- Level and Scan Measurements – Display, Channel Plan and Limit Set commands
- Return Spectrum Measurements – Peak Hold and Limit Set commands.
- File Explorer – Database Backup/Restore, File Delete/Export, Sort by Name/Type/Date-Time/Size and Save Logs commands.
- Web Browser – Back, Menu, Home and Refresh commands.

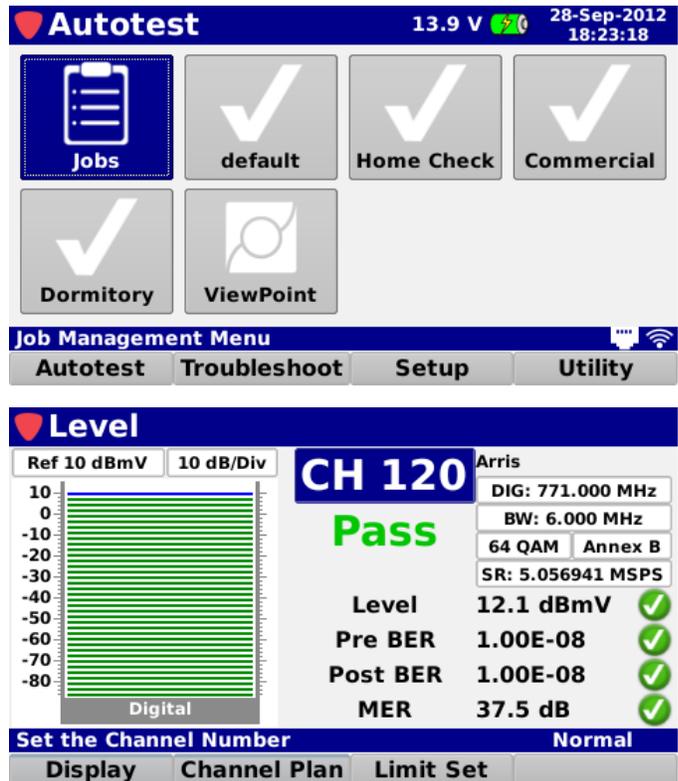
Selecting On-Screen Items

There are two ways to select items on the display screen:

- Use the touchscreen to directly select the item.
- Use the arrow buttons on the keyboard to highlight the desired item and then press the **Enter** button.

In the example images shown to the right, notice how the currently selected item is highlighted blue and the other items remain gray.

Once you select an item, you will either enter a new function or a window will appear.



NOTE

If the touchscreen doesn't recognize your touch, the location of the touch is inaccurate, or it does not otherwise appear to be operating correctly it may need to be calibrated. For more information on how to calibrate the touchscreen, see Section II: Setup, Chapter 5: Touchscreen Calibration.

Main Keypad

The main keypad is the set of buttons that are shown in the image to the right. These glow-in-the-dark buttons provide illumination in low light situations.



Enter Button

The **Enter** button is used to select the highlighted items in order to:

- Select icons from the navigation menus
- Select custom setting fields to open the **Virtual Keyboard** and enter custom values.
- Select functions from the **Function** menu
- Select menu options from pop-up menus
- Select channel plans and limit sets from file lists

Arrow Buttons

The arrow buttons are used to navigate, highlight items, scroll lists, or change values on the display screen.

Back Button

The **Back** 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. If you hold down the **Back** button, this will cause the instrument to go back multiple screens.

Function Button

The **Function** 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.

Using the Virtual Keyboard

The instrument makes use of a **Virtual Keyboard** similar to that of a smart device for entering both numbers and letters.

The following **Virtual Keyboards** can be accessed by selecting the corresponding softkey:

- Select the **abc** softkey to display a keyboard with lower case letters
- Select the **ABC** softkey to display a keyboard with upper case letters
- Select the **123** softkey to display a keyboard with numbers and symbols
- Select the **123+** softkey to display a keyboard with additional symbols



abc softkey selected



ABC softkey selected



123 softkey selected



123+ softkey selected

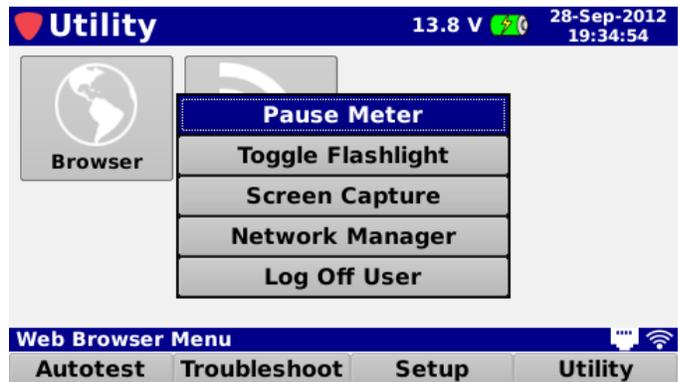
To delete existing text, use the **Back** softkey. Once you have finished making changes, select the **Done** softkey to save your changes and exit or select the **Back** button on the keyboard to exit without saving your changes.

Introduction

While in any of the navigation menus or from within many of the instrument functions, press the **Function** button to display the **Function** menu as shown in the image to the right.

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

- Pause Meter
- Toggle Flashlight
- Screen Capture
- Network Manager
- Log Off User

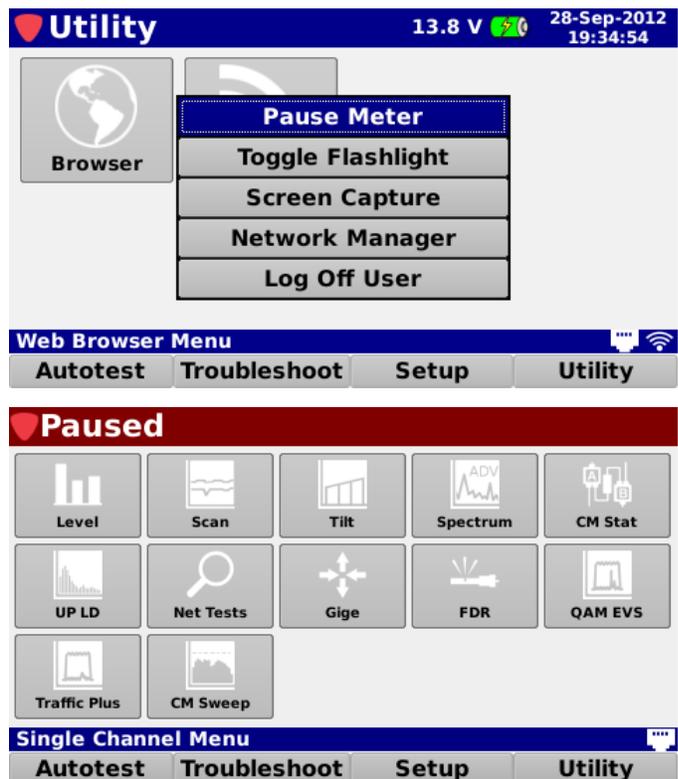


Pause Meter

This function is used to pause the meter during measurements. To pause meter measurements, select the **Pause Meter** function from the **Function** menu as shown in the image to the right.

The **Title Bar** will be highlighted in red and display **Paused** until the pause meter function is disabled.

To exit the pause meter function, press the **Back** button.

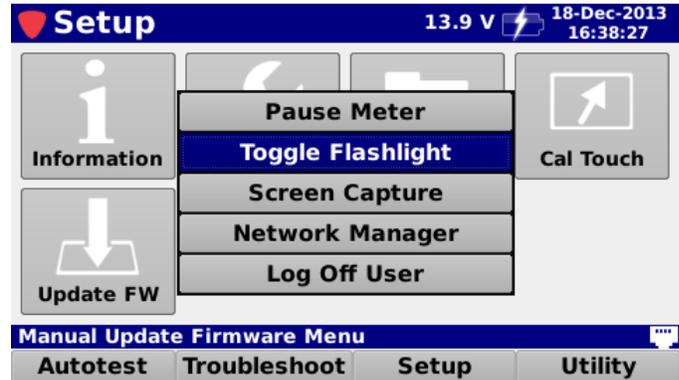


Toggle Flashlight

This function is used to toggle the flashlight on and off. To turn the LED flashlight on, select the **Toggle Flashlight** function from the **Function** menu as shown in the image to the right.

The LED flash light will illuminate until the flashlight delay has expired (between 30 and 180 seconds, user adjustable) or it has been manually toggled off.

To manually toggle the LED flash light off, press the **Function** button and then select the **Toggle Flashlight** function again.



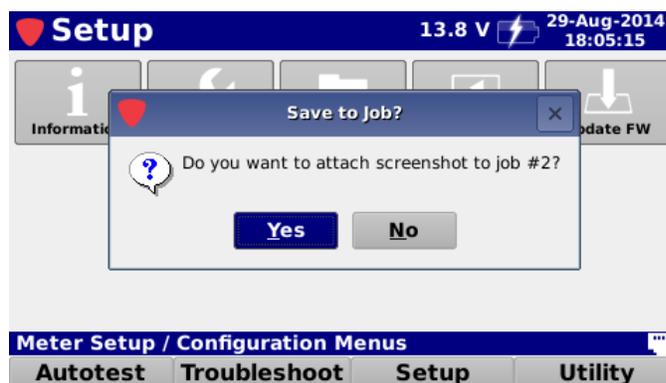
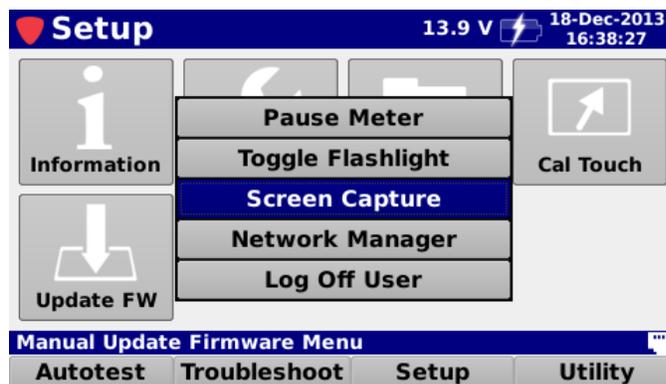
To adjust the Flashlight Delay, see Section II: Setup, Chapter 3: Meter Configuration, Interface Settings.

Screen Capture

This function is used to take a screen capture of the currently displayed screen. To take a screen capture, select the **Screen Capture** function from the **Function** menu as shown in the image to the right.

If you have an open job, you can also save the screen capture to the job by selecting **Yes** as shown in the image to the right.

If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



 **NOTE** *To view the files saved to the internal memory of the 720 DSP, see Section II: Setup, Chapter 4: File Management.*

Network Manager

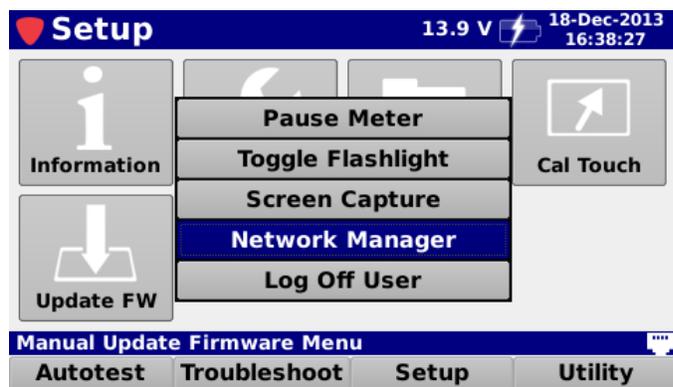

NOTE

Before proceeding through this section, you should first setup the default network configuration as shown in Section II: Setup, Chapter 3: Meter Configuration.

This function is used to enable or disable network connections. To open the network manager, select the **Network Manager** function from the **Function** menu as shown in the image to the right.

The **Network Manager** window provides controls for the following types of network connections:

- **DOCSIS** – This enables the built-in DOCSIS 3.0 (8x4) cable modem via the RF Input Connector.
- **Ethernet** – This enables the built-in 10/100 Mbit/s Ethernet port on the bottom of the unit.
- **Wi-Fi** – This enables Wi-Fi communications via an internal Wi-Fi antenna.
- **GigE** – This enables the built-in 10/100/1000 Mbit/s Ethernet Port on the right side of the unit.
- **Bluetooth** – This enables Bluetooth communications via an optional USB Bluetooth adapter.


NOTE

See the following sections for more information on how to enable each type of connection.

Connection Indicators

Once connected, the **Network Manager** window will automatically display the MAC, IP, Subnet, Gateway, and DNS of the active connection.

Within the **Network Manager** window, each connection button is labeled with the connection name and status as follows:



Active – This symbol indicates the connection is currently active.



Inactive – This symbol indicates the connection is currently inactive.

From any navigation menu, the active connections are shown in the right side of the Status Bar as follows:



DOCSIS – This symbol indicates the DOCSIS connection is currently active.



Ethernet – This symbol indicates the 10/100 Ethernet connection on the bottom side of the device is currently active.



Wi-Fi – This symbol indicates the Wi-Fi connection is currently active.



Bluetooth – This symbol indicates the Bluetooth connection is currently active.



GigE Electrical – This symbol indicates the 10/100/1000 GigE Electrical connection is currently active.

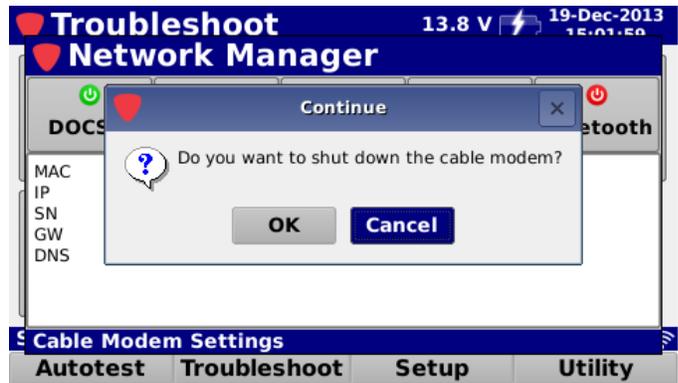


GigE Optical – This symbol indicates the 10/100/1000 GiGE Optical connection is currently active.

Disconnect a Network Connection

To disconnect an active network connection, select any connection button with an active status.

The **Continue** window will appear as shown in the image to the right. Select the **OK** button to disconnect or select the **Cancel** button to exit without disconnecting.



DOCSIS Cable Modem Connection



NOTE

Do not connect an RJ-45 cable to the Ethernet Port when the DOCSIS connection is enabled. Otherwise, the DOCSIS connection will not operate properly. To use both connections at the same time, follow the instructions later in this section about how to use the Cable Modem to Ethernet Mode.

Perform the following steps to connect using the DOCSIS cable modem:

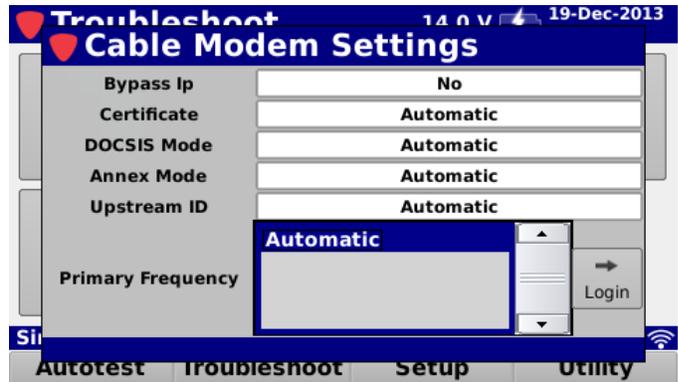
1. Connect the cable drop to the RF Input Connector of the 720 DSP.
2. Select the **DOCSIS** connection button from the **Network Manager** window as shown in the image to the right.



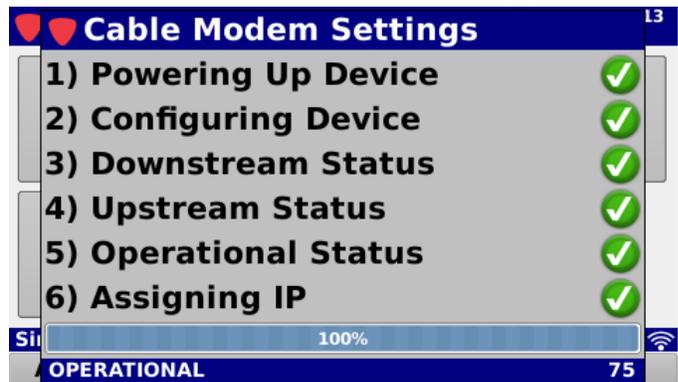
NOTE

If the Prompt User option is set to No from within the Cable Modem Settings option of the Setup Menu, the Cable Modem Settings window will not appear. If so, proceed to Step 4.

- If the **Prompt User** option is set to **Yes** from within the **Cable Modem Settings** option of the **Setup** menu, the **Cable Modem Settings** window will appear as shown in the image to the right. Adjust the cable modem settings as desired and then select the **Login** button.



- The **Cable Modem Settings** window will display the network connection progress as shown in the image to the right.
- The icon of the active connection will be displayed in the **Message Bar**.



- Return to the **Network Manager** window to view the MAC, IP, Subnet, Gateway, and DNS of the cable modem connection as shown in the image to the right.



A static IP of 192.168.100.2 will be assigned to the cable modem during the connection process if the Bypass IP option is set to Yes from within the Cable Modem Settings option of the Setup Menu.

Ethernet Connection (10/100 Mbps)



NOTE

Do not connect an RJ-45 cable to the Ethernet Port when the DOCSIS connection is enabled. Otherwise, the DOCSIS connection will not operate properly. To use both connections at the same time, follow the instructions later in this section about how to use the Cable Modem to Ethernet Mode.

Perform the following steps to connect using the Ethernet connection:

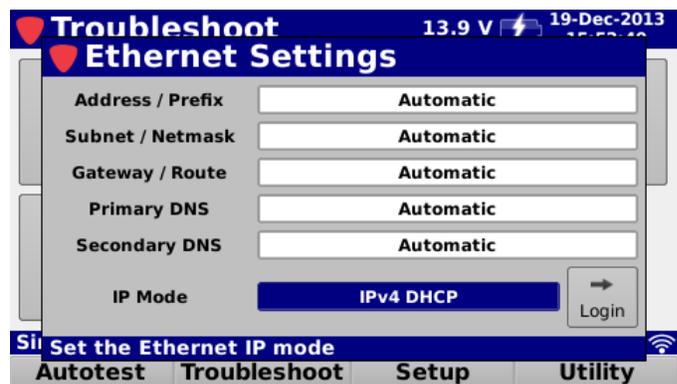
1. Connect an Ethernet cable to the Ethernet port of the 720 DSP.
2. Select the **Ethernet** connection button from the **Network Manager** window as shown in the image to the right.



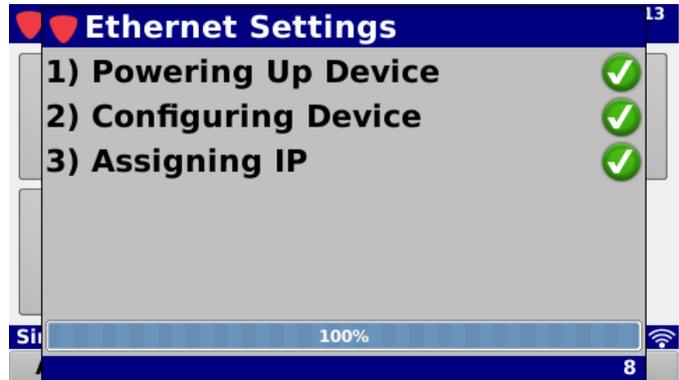
NOTE

If the Prompt User option is set to No from within the Ethernet Settings option of the Setup menu, the Ethernet Settings window will not appear. If so, proceed to Step 4.

3. If the **Prompt User** option is set to **Yes** from within the **Ethernet Settings** option of the **Setup** menu, the **Ethernet Settings** window will appear as shown in the image to the right. Adjust the Ethernet settings as desired and then select the **Login** button.



4. The **Ethernet Settings** window will display the network connection progress as shown in the image to the right.
5. The icon of the active connection will be displayed in the **Message Bar**.
6. Return to the **Network Manager** window to view the MAC, IP, Subnet, Gateway, and DNS of the Ethernet connection as shown in the image to the right.



Wi-Fi Connection

Perform the following steps to connect using the Wi-Fi connection:

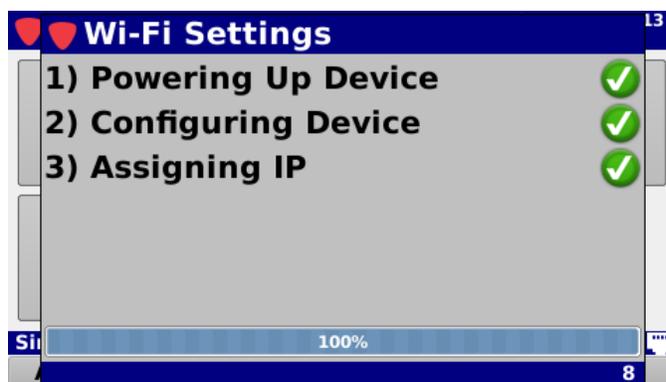
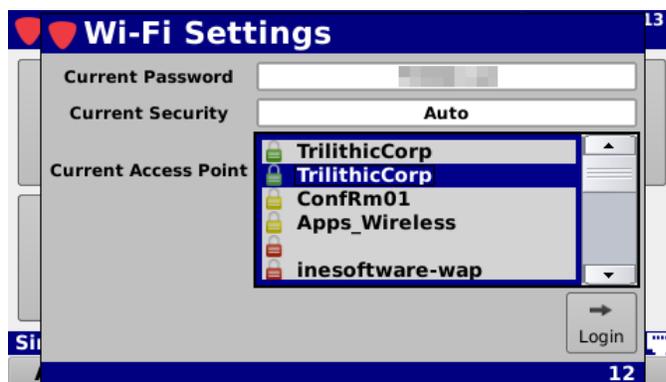
1. Select the **Wi-Fi** connection button from the **Network Manager** window as shown in the image to the right.



NOTE

If the Prompt User option is set to No from within the Wi-Fi Settings option of the Setup Menu, the Wi-Fi Settings window will not appear. If so, proceed to Step 3.

2. If the **Prompt User** option is set to **Yes** from within the **Wi-Fi Settings** option of the **Setup** menu, the **Wi-Fi Settings** window.
3. After approximately 15 seconds the Wi-Fi adapter will show a list of the available networks will appear as shown in the image to the right. Select the desired network from the list, adjust the Wi-Fi settings as needed and then select the **Login** button.
4. The **Wi-Fi Settings** window will display the network connection progress as shown in the image to the right.
5. The IP address and icon of the active connection will be displayed in the **Message Bar**.
6. Return to the **Network Manager** window to view the SSID, MAC, IP, Subnet, Gateway, and DNS of the Wi-Fi connection as shown in the image to the right.



Gigabit Ethernet Connection (10/100/1000 Mbps)

Perform the following steps to connect using the Gigabit Ethernet connection:

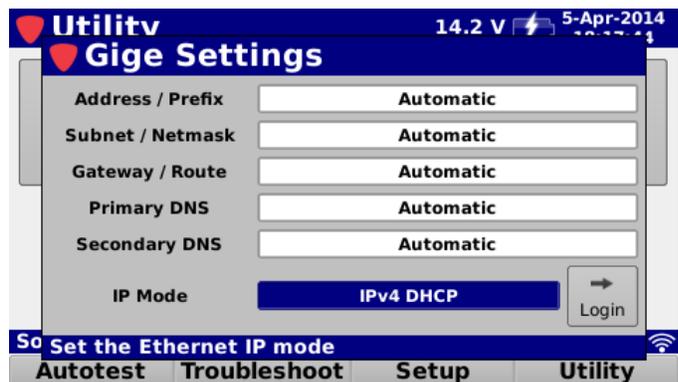
1. Connect an Ethernet cable to either the Electrical or Optical 10/100/1000 Ethernet port on the right side of the 720 DSP.
2. Select the **GigE** connection button from the **Network Manager** window as shown in the image to the right.



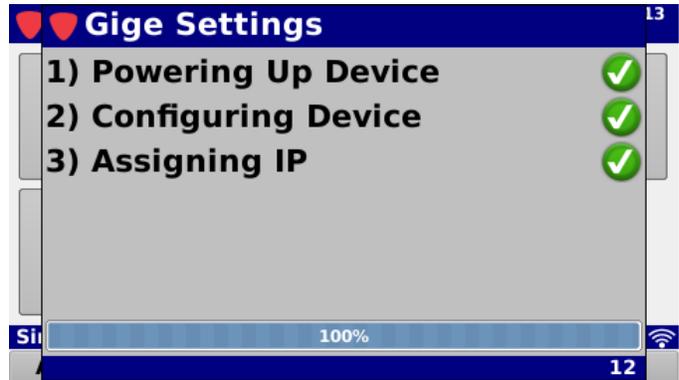
NOTE

If the Prompt User option is set to No from within the Bluetooth Settings option of the Setup Menu, the Bluetooth Settings window will not appear. If so, proceed to Step 4.

3. If the **Prompt User** option is set to **Yes** from within the **GigE Settings** option of the **Setup** menu, the **Ethernet Settings** window will appear as shown in the image to the right. Adjust the Ethernet settings as desired and then select the **Login** button.



4. The **Ethernet Settings** window will display the network connection progress as shown in the image to the right.
5. The icon of the active connection will be displayed in the **Message Bar**.
6. Return to the **Network Manager** window to view the MAC, IP, Subnet, Gateway, and DNS of the Ethernet connection as shown in the image to the right.



Bluetooth Connection (OPTIONAL)

Perform the following steps to connect to an iPad using the optional Bluetooth connection:

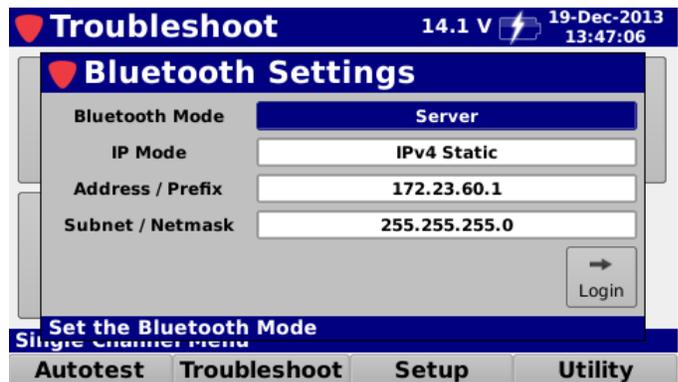
1. Make sure the iPad is turned on and the Bluetooth is enabled.
2. Insert the USB Bluetooth adapter into the USB port of the 720 DSP.
3. Select the **Bluetooth** connection button from the **Network Manager** window as shown in the image to the right.



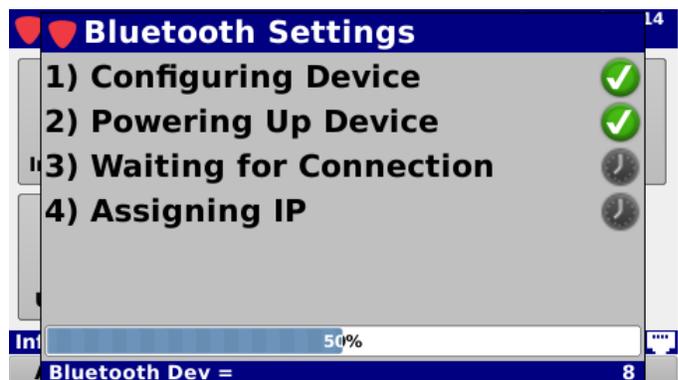
NOTE

If the Prompt User option is set to No from within the Bluetooth Settings option of the Setup Menu, the Bluetooth Settings window will not appear. If so, proceed to Step 4.

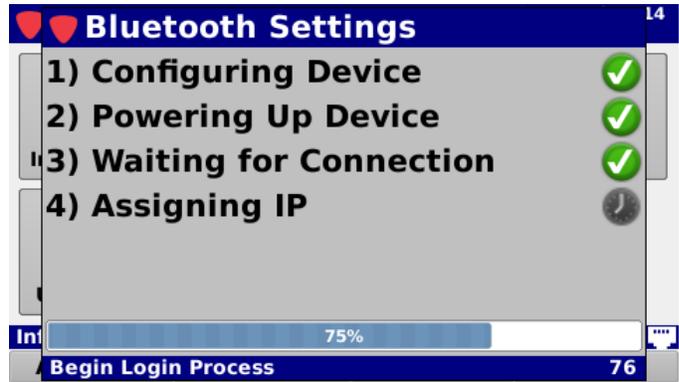
4. If the **Prompt User** option is set to **Yes** from within the **Bluetooth Settings** option of the **Setup** menu, the **Bluetooth Settings** window will appear as shown in the image to the right. Adjust the IP and Subnet Addresses as needed and then select the **Login** button.



5. The **Bluetooth Settings** window will display the network connection progress as shown in the image to the right.
6. On the iPad, select the name of the Trilithic Device from the list of discoverable Bluetooth devices. The name of the Trilithic Device will be in the format of "tri-#####-#".



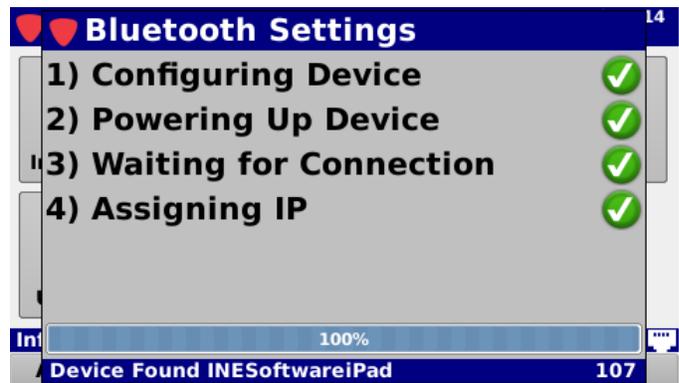
- Once the 720 DSP recognizes the iPad, the **Bluetooth Settings** window will display the network connection progress as shown in the image to the right.



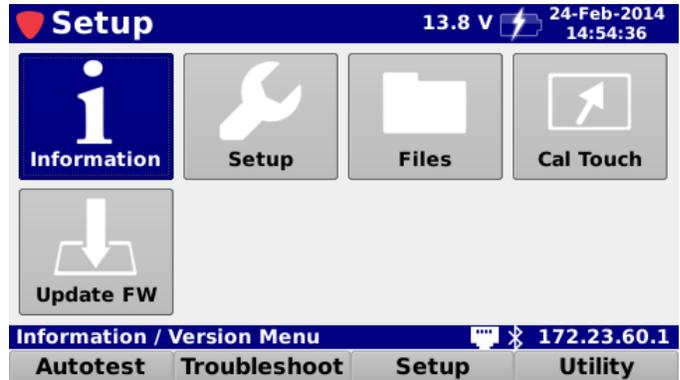
- If the iPad that you are connecting to has never been paired with the 720 DSP, a window will be displayed as shown in the image to the right.



- Once the 720 DSP connects to the iPad, the **Bluetooth Settings** window will display the network connection progress.



10. The icon of the active connection will be displayed in the **Message Bar**.



11. Return to the **Network Manager** window to view the MAC, IP, Subnet, Gateway, and DNS of the Bluetooth connection as shown in the image to the right.



DOCSIS Cable Modem to Ethernet Connection



NOTE

Do not connect an RJ-45 cable to the Ethernet Port until after the DOCSIS connection is enabled. Otherwise, the DOCSIS connection will not operate properly.

Perform the following steps to route the 720 DSP Ethernet connection through the internal cable modem for connection to a PC:

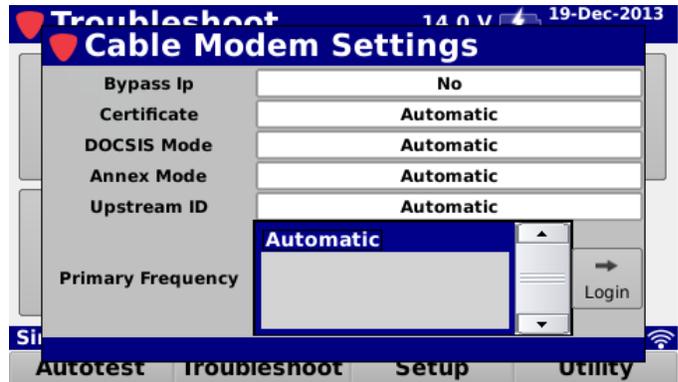
1. Connect the cable drop to the RF Input Connector of the 720 DSP.
2. Select the **DOCSIS** connection button from the **Network Manager** window as shown in the image to the right.



NOTE

If the Prompt User option is set to No from within the Cable Modem Settings option of the Setup Menu, the Cable Modem Settings window will not appear. If so, proceed to Step 4.

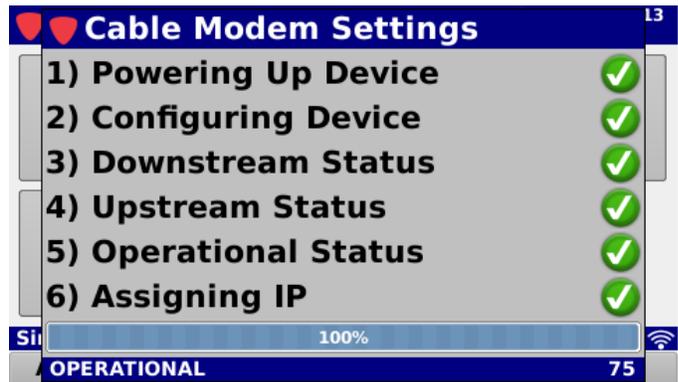
- If the **Prompt User** option is set to **Yes** from within the **Cable Modem Settings** option of the **Setup** menu, the **Cable Modem Settings** window will appear as shown in the image to the right. Adjust the cable modem settings as desired and then select the **Login** button.



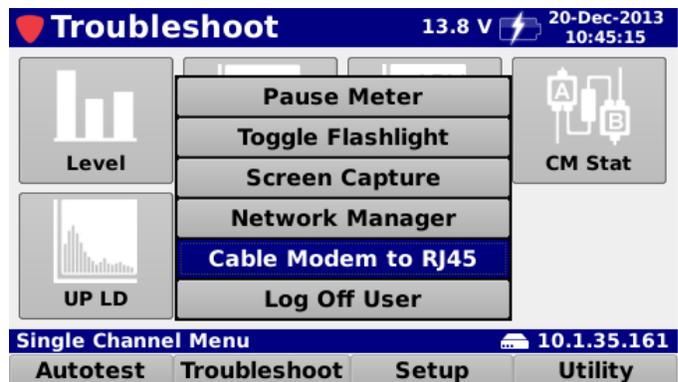
NOTE

If your cable modem system does not allow a cable modem to obtain more than one CPE IP Address, you must set the Bypass IP option to Yes.

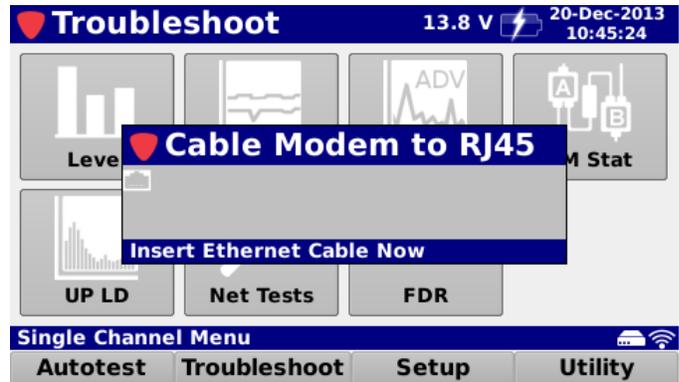
- The **Cable Modem Settings** window will display the network connection progress as shown in the image to the right.



- The icon of the active connection will be displayed in the **Message Bar**.
- Press the **Function** button and select the **Cable Modem to RJ45** function from the **Function** menu as shown in the image to the right.



7. The **Cable Modem to RJ45** window will be displayed while in this mode.
8. Connect one end of an Ethernet cable to the Ethernet Port of the 720 DSP.
9. Connect the other end of the Ethernet cable to the Ethernet Port of a PC.
10. The 720 DSP should now be routing the cable modem data through the Ethernet Port to the connected PC.



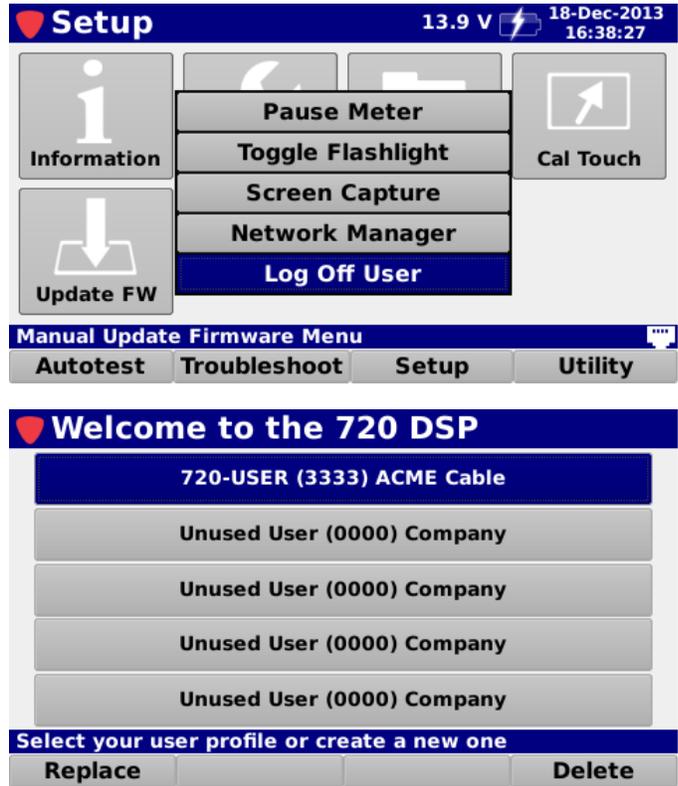
To exit this function, perform the following steps:

1. Disconnect the Ethernet cable from the Ethernet port of the 720 DSP.
2. Press the Back button to disable the cable modem to RJ45 mode.
3. The Ethernet connection will automatically be disabled. However, the DOCSIS Cable Modem connection will remain active.

Log Off User

This function is used to log off the current user. To log off, select the **Log Off User** function from the **Function** menu as shown in the image to the right.

The **Welcome to the 720 DSP** screen will be displayed, from this screen you can now log in as a different user.



 **NOTE** *If the Multiple Users option is set to No from within the Global Settings option of the Setup menu, the Log Off User function and welcome screen will not be displayed.*

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Accessing the 720 DSP Remotely

The 720 DSP enables you to remotely access the device using any active network connection.

After making a successful connection to a network, use the **Network Manager** window to determine the IP address of the 720 DSP as shown in the image to the right.

Once you have the IP address of the 720 DSP, enter this value into the address bar of a web browser.



The web browser will display a list of links to specific functions as shown in the image to the right. From this list, select the function that you would like to perform as follows:

- **Remote Control** – This is used to display a web page with a control layout similar to the 720 DSP. From this page you can control almost any function of the 720 DSP.
- **Log File** – This is used to display a web page that includes all of the information currently stored in the log file of the 720 DSP.
- **System Stats** – This is used to display a web page that includes graphs related to system processor and memory usage statistics over time.
- **Screen Shot** – This is used to display a web page that includes a screen shot of the current 720 DSP display screen.
- **Files** – This is used to display a web page that includes all of the files stored on the internal memory of the 720 DSP.

- [Remote Control](#)
- [Log File](#)
- [System Stats](#)
- [Screen Shot](#)
- [Files](#)

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720 DSP Business Certification Meter

Section II: Setup Menu



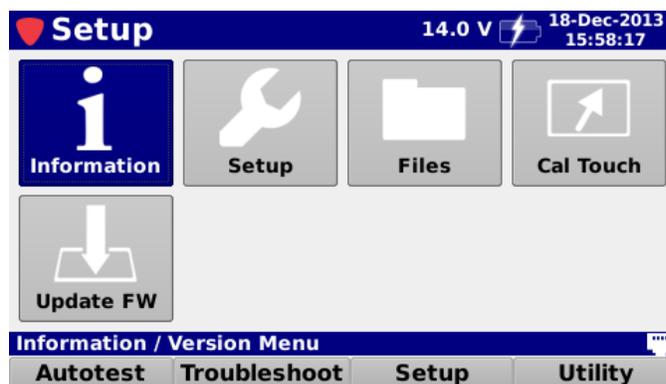
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Introduction

Select the **Setup** softkey to display the **Setup** menu as shown in the image to the right. The 720 DSP enables you to select from numerous instrument setup functions. These functions allows you to view, edit, and adjust information and setup parameters for the meter.

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

- Instrument information
- Meter configuration
- File management
- Touchscreen calibration
- Firmware updates

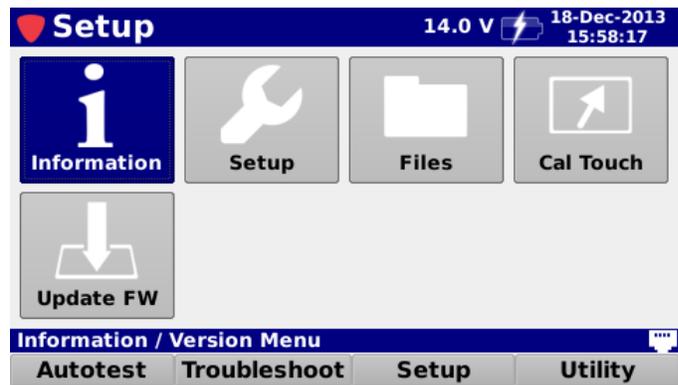


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Instrument Information

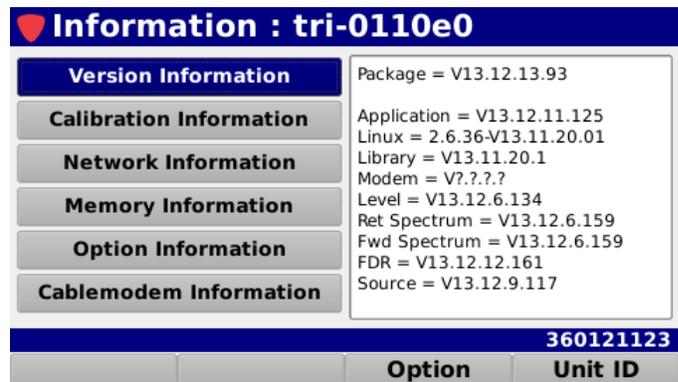
Overview

Select the **Information** icon as shown in the image to the right to view information about the 720 DSP.



The **Information** screen will be displayed as shown in the image to the right. This screen allows you to view the following types of instrument information:

- Serial Number
- Version
- Calibration
- Network
- Memory
- Options
- Cable Modem
- Activate Options
- View Unit ID



 ***All information displayed in the Instrument Information Mode is static and is to be used as a reference only. To edit any settings you will need to use the Instrument Setup Mode.***

NOTE

The unit serial number is located on the right side of the **Message Bar**. This information is set at the Trilithic factory and cannot be changed by the user. The serial number also appears on a label on the back side of the 720 DSP. Please provide this number when requesting an RMA for troubleshooting, service, calibration, or repair.

Version Information

Select the **Version Information** button to display details on the version of software/firmware installed in the 720 DSP. This information will be helpful if you are updating your firmware or upgrading your instrument's option package.

Information : tri-0110e0

Version Information	Package = V13.12.13.93
Calibration Information	Application = V13.12.11.125 Linux = 2.6.36-V13.11.20.01
Network Information	Library = V13.11.20.1 Modem = V?.?.?.?
Memory Information	Level = V13.12.6.134 Ret Spectrum = V13.12.6.159
Option Information	Fwd Spectrum = V13.12.6.159 FDR = V13.12.12.161
Cablemodem Information	Source = V13.12.9.117

360121123

Option	Unit ID



NOTE *When you download firmware updates from the Trilithic web site or using the ViewPoint WFM Module, this information will be automatically updated.*

Calibration Information

Select the **Calibration Information** button to display recorded details of the last time the 720 DSP was calibrated. This information will be helpful if you are sending your instrument in to the factory for periodic maintenance.

Information : tri-0110e0

Version Information	Cal Serial Num = 95203
Calibration Information	Version = V1 Tuner Type = 6 MHz Date/Time 11-Dec-2012 17:59:22
Network Information	
Memory Information	Forward (Rx) = 50MHz..1GHz Return (Rx) = 4MHz..110MHz Return (Tx) = 5MHz..85MHz
Option Information	
Cablemodem Information	

360121123

Option	Unit ID



NOTE *When the 720 DSP is sent in for calibration, this information will be automatically updated. You should schedule the 720 DSP for calibration every two years.*

Network Information

Select the **Network Information** button to displays network details such as MAC, IP, SN, GW, and DNS. This information is helpful for quick reference of your current network status.

Information : tri-0110e0

Version Information	Ethernet: MAC 00:02:7C:01:10:E0 IP 10.1.35.116 SN 255.255.0.0 GW 10.1.50.19 DNS trilithic.net, 10.1.1.17, 10.1.1.18
Calibration Information	
Network Information	
Memory Information	
Option Information	
Cablemodem Information	

360121123

	Option	Unit ID

Memory Information

Select the **Memory Information** button to display details of the memory available and used on the 720 DSP. This information is automatically updated as files are saved and stored in the 720 DSP.

Information : tri-0110e0

Version Information	RAM: Total = 255916 KBytes Used = 76108 KBytes Free = 179808 KBytes Root Drive: rootfsa Total = 94332 KBytes Used = 77236 KBytes Free = 17096 KBytes User Drive: user Total = 237372 KBytes Used = 132 KBytes Free = 237240 KBytes
Calibration Information	
Network Information	
Memory Information	
Option Information	
Cablemodem Information	

360121123

	Option	Unit ID

Option Information

Select the **Option Information** button to display which options that are available to use and those options that you can install on the 720 DSP.

Information : tri-0110e0

Version Information	Yes - 720 DSP Yes - Bluetooth Adapter Yes - Linear Distortions Yes - Source
Calibration Information	
Network Information	
Memory Information	
Option Information	
Cablemodem Information	

360121123

Option	Unit ID
--------	---------

 **NOTE** *This information is automatically updated as options are added to the 720 DSP. After initial sale, most options can be simply added with the purchase of an option activation code. For more information, call your sales representative or Trilithic at 800-344-2412.*

Cable Modem Information

Select the **Cable Modem Information** button to display what type of cable modem that is installed in the 720 DSP.

Information : tri-0110e0

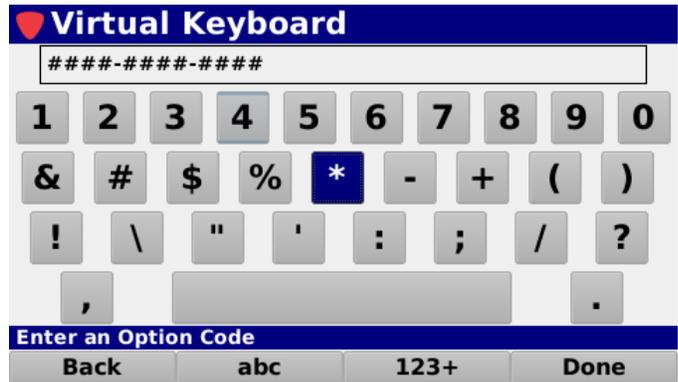
Version Information	Cable Modem (US3A) Version = Serial Num = MAC#1 = MAC#2 =
Calibration Information	
Network Information	
Memory Information	
Option Information	
Cablemodem Information	

360121123

Option	Unit ID
--------	---------

Option Activation

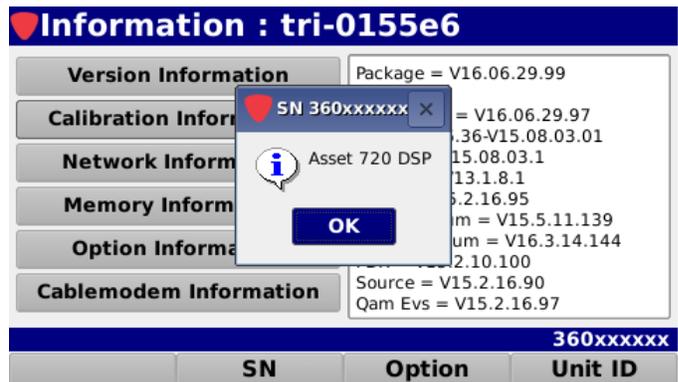
Select the **Option** softkey and then enter the option activation key that you purchased from Trilithic. The dash between each four digits of the code as shown in the image to the right is not required when entering the option activation key.



 **NOTE** *The option code is a unique activation number that is specifically generated for your instrument. You should have received this code with your order for new options. If you are missing this code, contact Trilithic at 800-344-2412.*

Unit ID

Select the **Unit ID** softkey to view the asset number that is associated with this 720 DSP serial number. The asset number is securely assigned using the ViewPoint WFM Module. Select the **OK** button to exit this window.

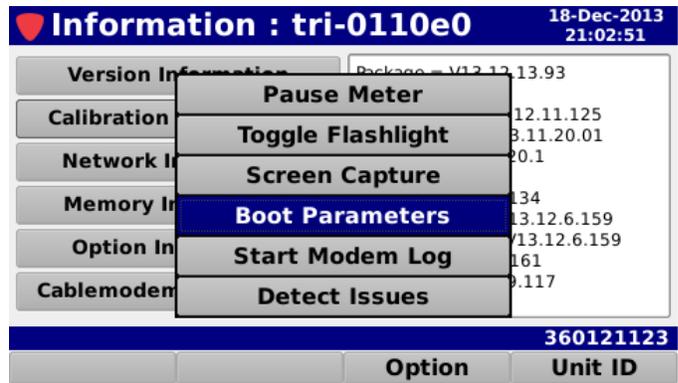


Function Menu Options

The Function menu can be accessed by pressing the **Function** button while in the Instrument Information Mode.

The following **Function** menu options can be accessed while in Instrument Information Mode:

- Pause Meter
- Toggle Flashlight
- Screen Capture
- Boot Parameters
- Start Modem Log



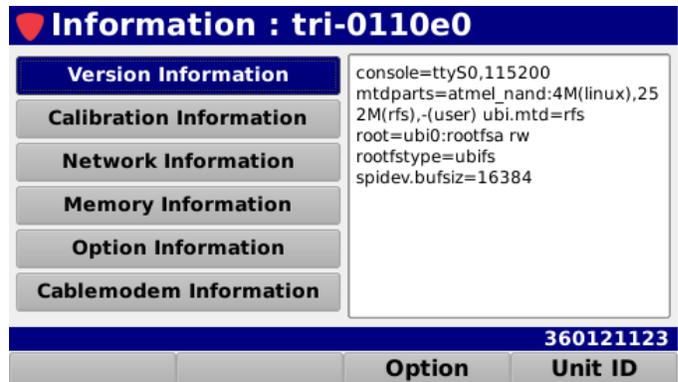
The following functions are described in Section I: The Basics, Chapter 4: Function Menu:

- Pause Meter
- Toggle Flashlight
- Screen Capture

Boot Parameters

Select the **Boot Parameters** button to view the more information about the boot parameters of the 720 DSP.

The boot parameters will be displayed in the right side of the Information screen. This information is used for advanced troubleshooting by Trilithic technical support.

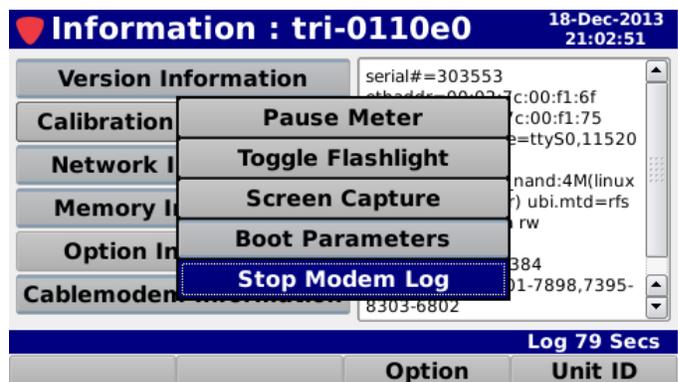
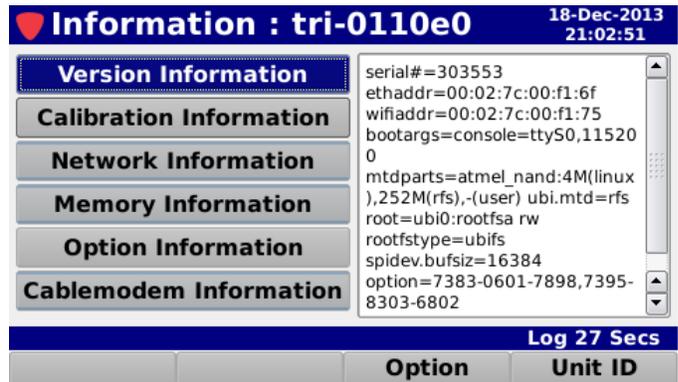
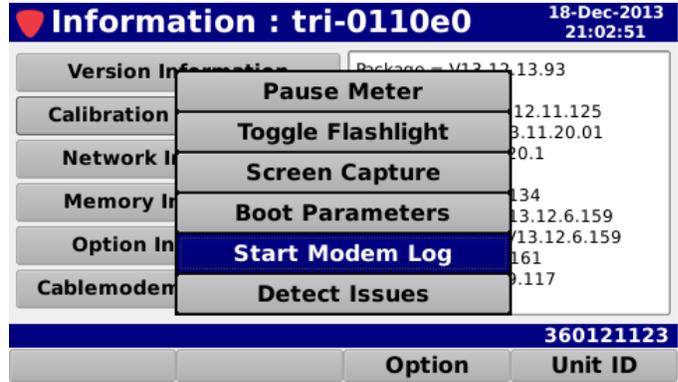


Modem Logging

Select the **Start Modem Log** button to log the activity of the internal modem. This information is used for advanced troubleshooting by Trilithic technical support.

The log timer will be displayed in the right side of the status bar.

Once you are ready to stop modem logging, Press the **Function** button again and then select the **Stop Modem Log** button.



Detect Issues

Select the **Detect Issues** button to detect any file system issues of the 720 DSP.

Any detected file system issues will be displayed in the right side of the Information screen. This information is used for advanced troubleshooting by Trilithic technical support.

Information : tri-0110e0 18-Dec-2013 21:02:51

Version Information	Package = V12.12.13.93
Calibration	12.11.125
Network Information	8.11.20.01
Memory Information	20.1
Option Information	134
Cablemodem	13.12.6.159
	713.12.6.159
	161
	9.117

360121123

Option	Unit ID
--------	---------

Information : tri-0110e0

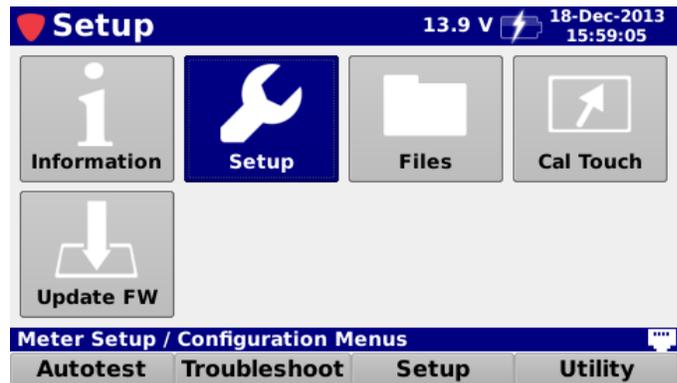
Version Information	Checking file read issue... [PASS]
Calibration Information	
Network Information	
Memory Information	
Option Information	
Cablemodem Information	

360121123

Option	Unit ID
--------	---------

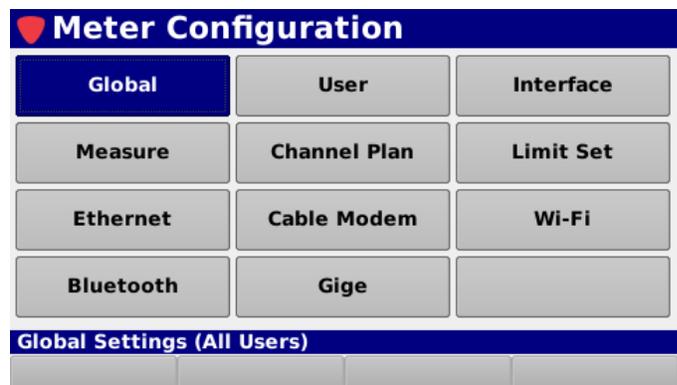
Overview

Select the **Setup** icon as shown in the image to the right to adjust the meter configuration of the 720 DSP.



The **Meter Configuration** screen will be displayed as shown in the image to the right. This screen allows you to modify the following types of settings:

- Global
- User
- Interface
- Measurement
- Channel Plan Management
- Limit Set Management
- Ethernet
- Cable Modem
- Wi-Fi
- Bluetooth (Optional)
- Gigabit Ethernet

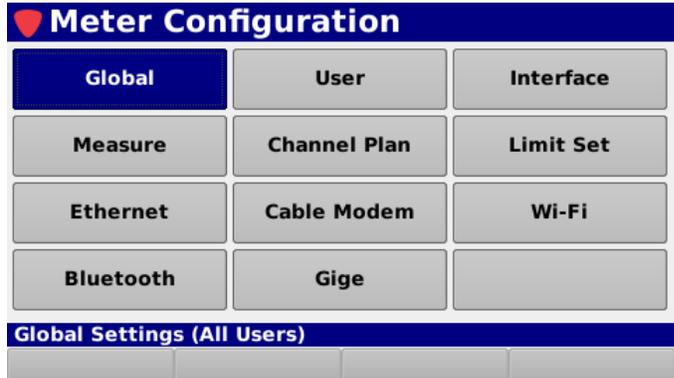


NOTE

All changes that are made in this mode are automatically saved and optional items will be grayed out and cannot be configured if they are not installed in the 720 DSP.

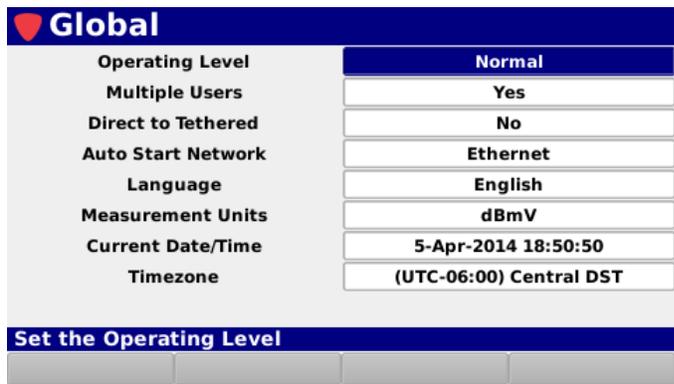
Global Settings

Select the **Global** button as shown in the image to the right to adjust the global settings for all users of the 720 DSP.



The **Global Settings** screen will be displayed as shown in the image to the right. This screen allows you to modify the global settings of the 720 DSP.

From within the **Global Settings** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, please refer to the ViewPoint Operation Manual.*

Operating Level

The **Operator Level** setting is used to control whether the 720 DSP is operating in its normal mode or in an advanced logging mode. The logging mode is used for advanced troubleshooting by Trilithic technical support.

The default setting for **Operator Level** is **Normal**, use the up/down arrow buttons to select from the following preset values:

- Select **Normal** for the normal mode of operation.
- Select **Logging** for troubleshooting with Trilithic technical support.
- Select **Calibrate** to enter the calibration mode.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:50:50
Timezone	(UTC-06:00) Central DST
Set the Operating Level	
<input type="button" value="Up"/> <input type="button" value="Down"/> <input type="button" value="Left"/> <input type="button" value="Right"/>	

Multiple User Control

The **Multiple Users** setting is used to control whether multiple user profiles are displayed when the 720 DSP is powered on.

The default setting for **Multiple Users** is **Yes**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** to allow multiple user profiles.
- Select **No** to use only one user profile.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:50:35
Timezone	(UTC-06:00) Central DST
Set Multi User Mode	
<input type="button" value="Up"/> <input type="button" value="Down"/> <input type="button" value="Left"/> <input type="button" value="Right"/>	

Tethering Control

The **Direct to Tethered** setting is used to control whether the 720 DSP automatically enters its tethered mode upon startup/login.

The default setting for **Direct to Tethered** is **No**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** to allow automatic tethering upon startup/login.
- Select **No** to disable automatic tethering upon startup/login.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:50:19
Timezone	(UTC-06:00) Central DST
Set Direct to Tethered Mode	
<input type="button" value="Up"/> <input type="button" value="Down"/>	

Auto-Start Network

The **Auto-Start Network** setting is used to control what network the 720 DSP automatically connects to when entering the tethered mode upon startup/login.

Use the up/down arrow buttons to select from **DOCSIS**, **Ethernet**, **Wi-Fi**, or **Bluetooth** to automatically enable the selected network upon startup/login.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:49:52
Timezone	(UTC-06:00) Central DST
Set Default Network Interface	
<input type="button" value="Up"/> <input type="button" value="Down"/>	

Language

The 720 DSP can be equipped to work in various languages.

The default language is **English**, use the up/down arrow buttons to select from the following languages.

- **English**
- **Spanish**
- **Portuguese**
- **Chinese**
- **Chinese (Simplified)**
- **Japanese**

If you have other language options available on your instrument, you can change the default language. You must restart the device before language changes take affect.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:49:05
Timezone	(UTC-06:00) Central DST
Set Language	

Measurement Units

The **Measurement Units** settings is used to choose the default measurement units.

The default unit of measurement is **dBmV**, use the up/down arrow buttons to select from the following preset values:

- **dBuV**
- **dBmV**
- **dBm**

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:48:42
Timezone	(UTC-06:00) Central DST
Set the Measurement Units	

Current Date/Time

The **Current Date/Time** setting is used to set the current date and time for the 720 DSP. This information is displayed in the Title Bar of any navigation screen and is added to every data log, measurement, job, and autotest.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right.

Use the **Virtual Keyboard** to enter the current date in the mm/dd/yyyy format.

Select the **Done** softkey and the **Virtual Keyboard** will be displayed as shown in the image to the right.

Use the **Virtual Keyboard** to enter the current time in the hh:mm:ss format.

Select the **Done** softkey again to save the current date and time or Press the **Back** button at any time to exit without saving the changes.

Global	
Operating Level	Normal
Multiple Users	Yes
Direct to Tethered	No
Auto Start Network	Ethernet
Language	English
Measurement Units	dBmV
Current Date/Time	5-Apr-2014 18:48:21
Timezone	(UTC-06:00) Central DST

Set Local Date/Time

Virtual Keyboard

mm/dd/yyyy

1	2	3
4	5	6
7	8	9
	0	

Set the date

Back Done

Virtual Keyboard

hh:mm:ss

1	2	3
4	5	6
7	8	9
	0	

Set the time

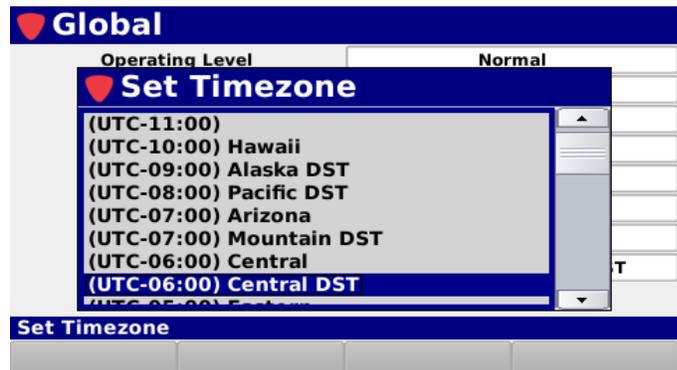
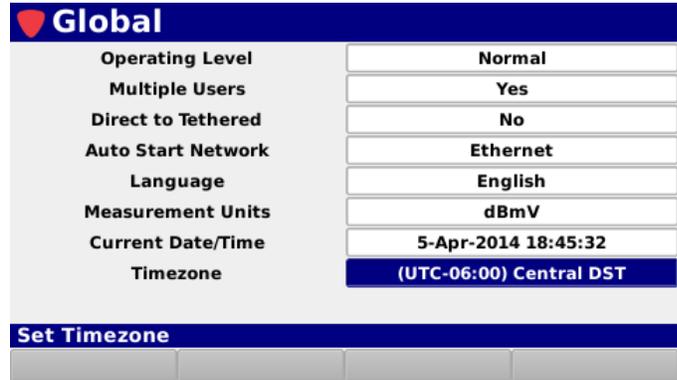
Back Done

Timezone

The **Timezone** setting allows you to set the time zone of the 720 DSP. This is useful when using the instrument in areas that automatically adjust their local time based on Daylight Savings Time (DST).

Press the **Enter** button and the **Set Timezone** window will be displayed as shown in the image to the right.

Use the up/down arrow buttons to choose the desired timezone and then press the **Enter** button to select the timezone.



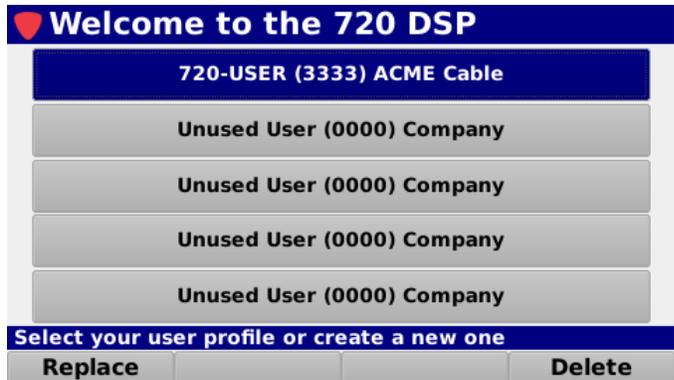
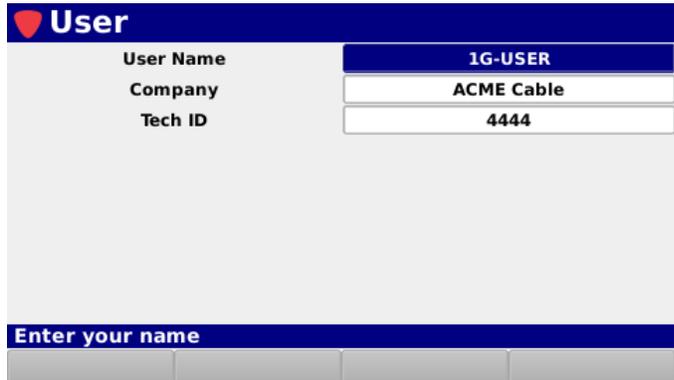
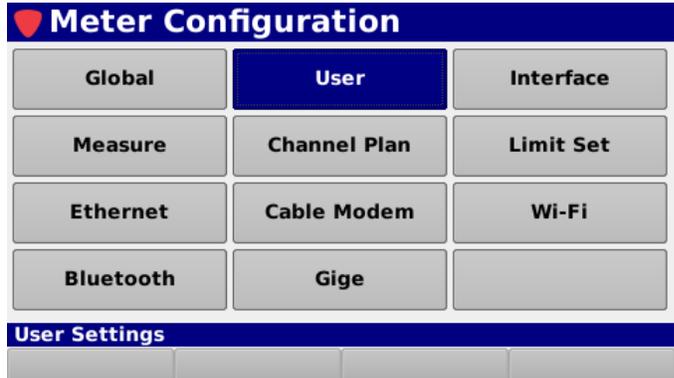
User Settings

Select the **User** button as shown in the image to the right to adjust the user information that is associated with the currently logged in user of the 720 DSP.

The **User** screen will be displayed as shown in the image to the right. This screen allows you to modify the user settings of the currently logged in user of the 720 DSP.

From within the **User** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

This information is added to every data log and is displayed on the welcome screen of the 720 DSP as shown in the image to the right.



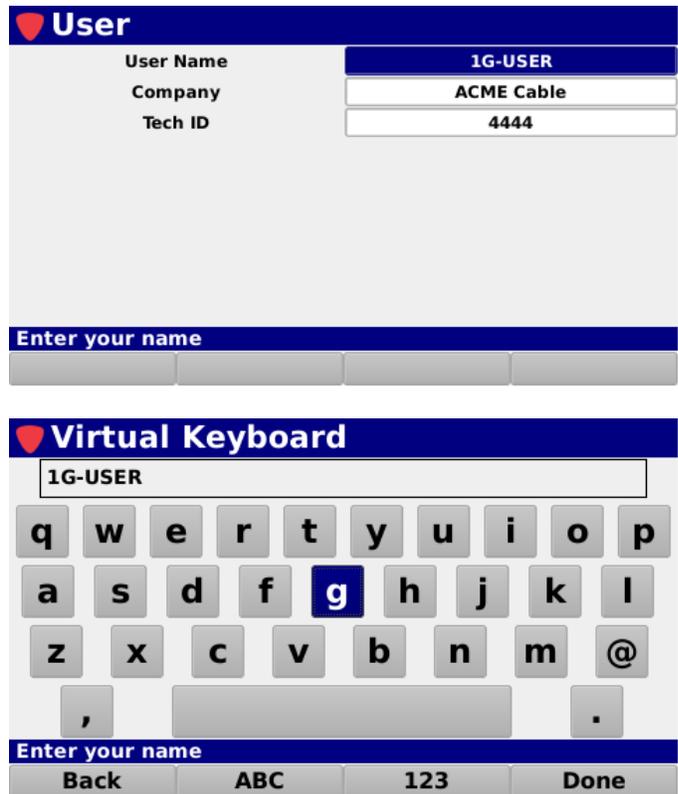
NOTE *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, please refer to the ViewPoint Operation Manual.*

User Name

The **User Name** setting is used to set the user name for the user profile that is currently logged into the 720 DSP. This information is displayed on the welcome screen and is added to every data log, measurement, job, and autotest.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right.

Use the **Virtual Keyboard** to enter the user name.

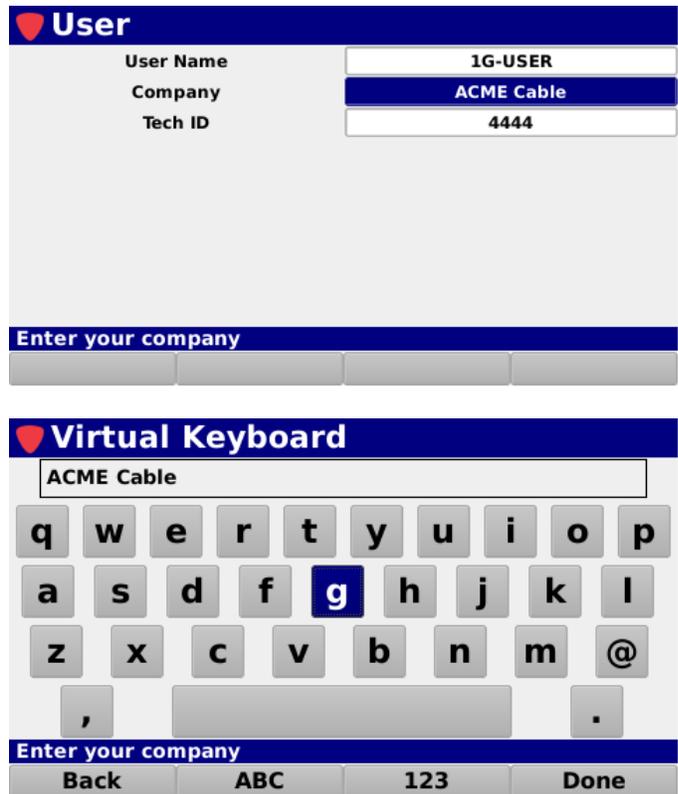


Company

The **Company** setting is used to set the company name for the user profile that is currently logged into the 720 DSP. This information is displayed on the welcome screen and is added to every data log, measurement, job, and autotest.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right.

Use the **Virtual Keyboard** to enter the company name.

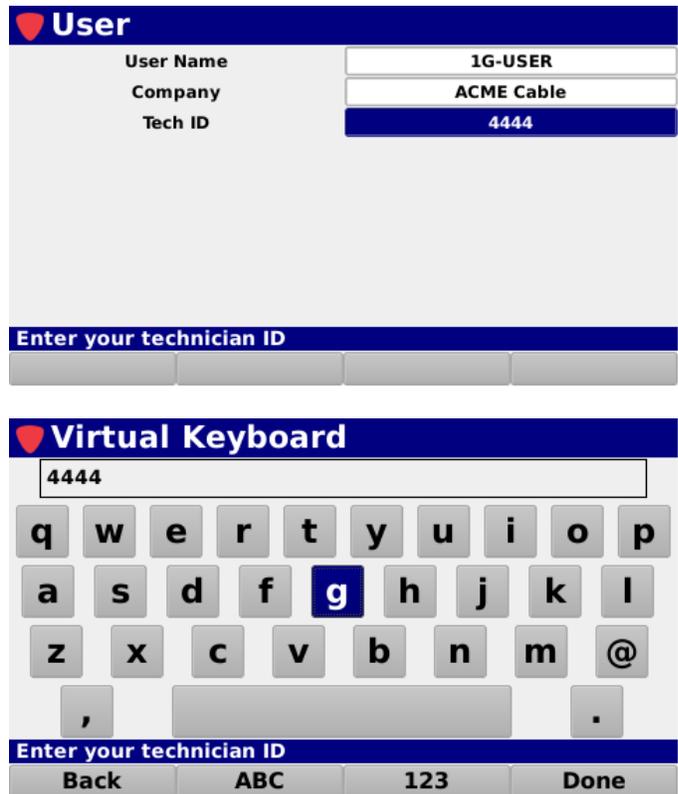


Tech ID

The **Tech ID** setting is used to set the technician ID for the user profile that is currently logged into the 720 DSP. This information is displayed on the welcome screen and is added to every data log, measurement, job, and autotest.

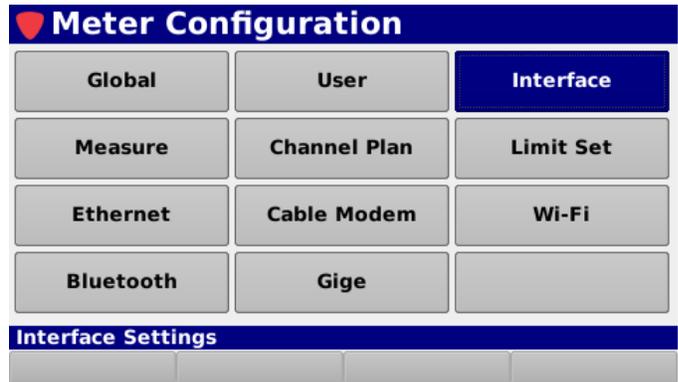
Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right.

Use the **Virtual Keyboard** to enter the technician ID.



Interface Settings

Select the **Interface** button as shown in the image to the right to adjust the interface settings for the currently logged in user of the 720 DSP.



The **Interface** screen will be displayed as shown in the image to the right. This screen allows you to modify the user interface settings.

From within the **Interface** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, please refer to the ViewPoint Operation Manual.*

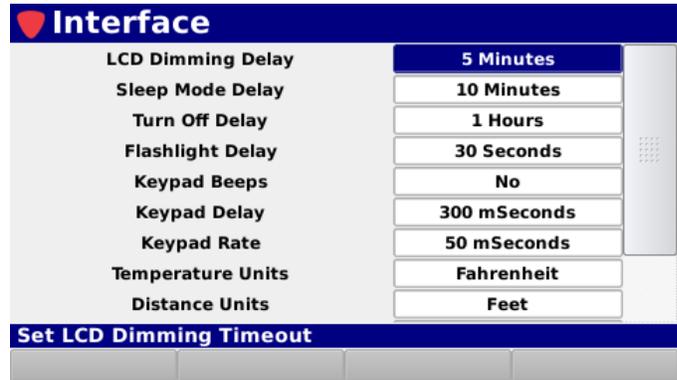
LCD Dimming Delay

The **LCD Dimming Delay** setting is used to conserve power by automatically dimming the display screen backlight after the 720 DSP has been idle for a specified period of time.

The default setting for the LCD dimming delay is **1 Minute**. The LCD dimming delay can be set from a minimum of one (1) minute up to a maximum of five (5) minutes.

Use either of the following methods to change the LCD dimming delay:

- Use the up/down arrow buttons to change the value in one (1) minute increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the LCD dimming delay as shown in the image to the right.



Upon any button press, the LCD will automatically brighten and the delay timer will restart.



NOTE

Whenever the 720 DSP is being powered by the AC to DC power adapter & battery charger, the LCD dimming delay will be deactivated automatically.

Sleep Mode Delay

The **Sleep Mode Delay** setting is used to conserve power by automatically enabling the sleep mode after the 720 DSP has been idle for a specified period of time.

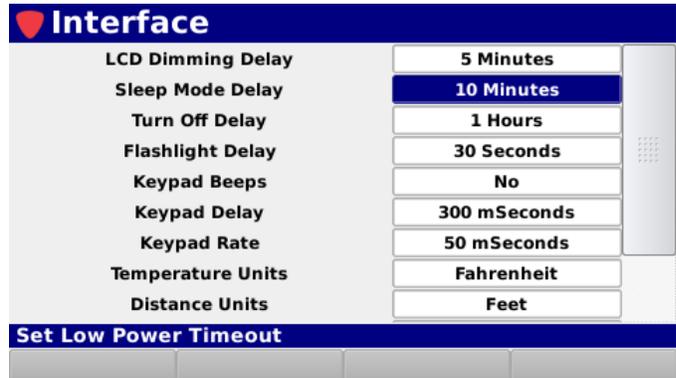
The default setting for the sleep mode delay is **5 Minutes**. The sleep mode delay can be set from a minimum of one (1) minute up to a maximum of 60 minutes.

Use either of the following methods to change the sleep mode delay:

- Use the up/down arrow buttons to change the value in one (1) minute increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the sleep mode delay as shown in the image to the right.

Quickly Press the **Power** button to awaken the 720 DSP from sleep mode.

The sleep mode delay timer will automatically restart.



NOTE

Whenever the 720 DSP is being powered by the AC to DC power adapter & battery charger, the sleep mode delay will be deactivated automatically.

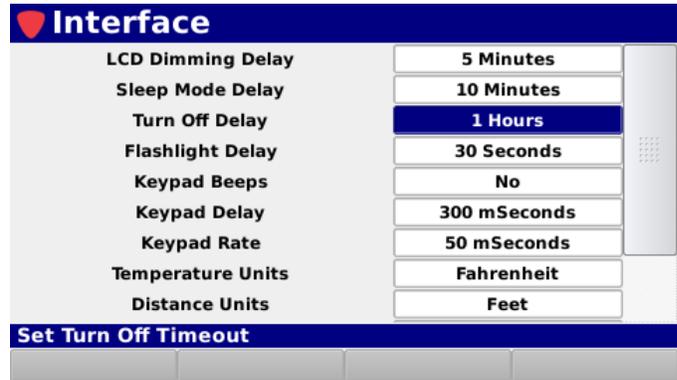
Turn Off Delay

The **Turn Off Delay** setting is used to conserve power by automatically turning off the device after the 720 DSP has been idle for a specified period of time.

The default setting for the turn off delay is **1 Hour**. The turn off delay can be set from a minimum of one (1) hour up to a maximum of 24 hours.

Use either of the following methods to change the turn off delay:

- Use the up/down arrow buttons to change the value in one (1) hour increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the turn off delay as shown in the image to the right.



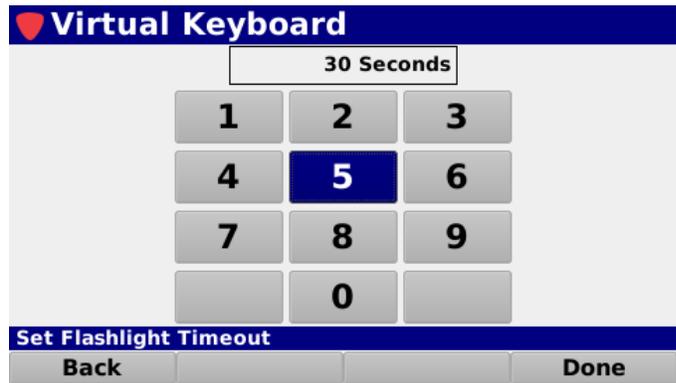
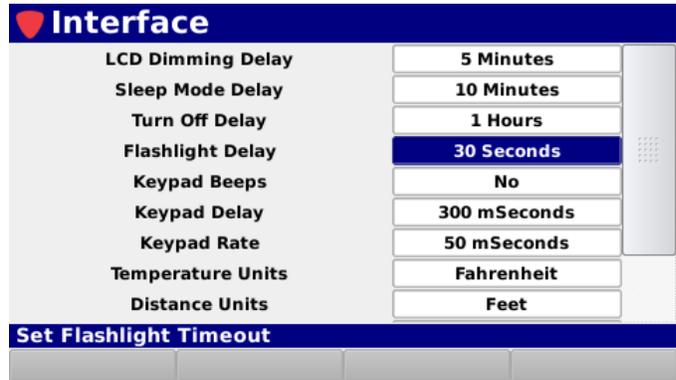
Flashlight Delay

The **Flashlight Delay** setting is used to conserve power by automatically turning off the LED flashlight after a specified period of time.

The default setting for the flashlight delay is **30 Seconds**. The flashlight delay can be set from a minimum of 30 seconds up to a maximum of 180 seconds.

Use either of the following methods to change the flashlight delay:

- Use the up/down arrow buttons to change the value in 30 second increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the flashlight delay as shown in the image to the right.

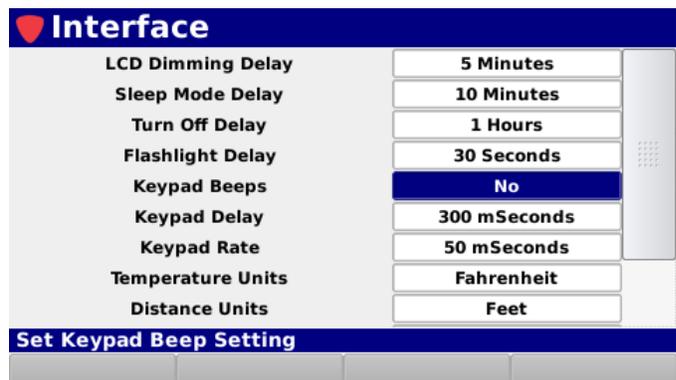


Keypad Beeps

The **Keypad Beeps** setting is used to enable or disable keypad beeps for the internal speaker.

The default setting for **Keypad Beeps** is **Yes**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** to hear the keypad beeps.
- Select **No** to mute the keypad beeps.



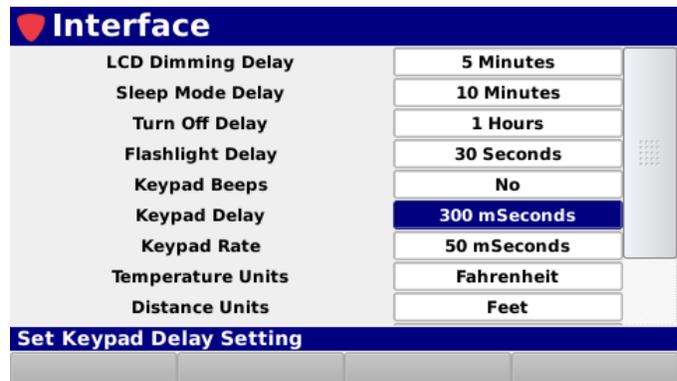
Keypad Delay

The **Keypad Delay** setting is used to adjust the keypad delay.

The default setting for the keypad delay is **300 mSeconds**. The keypad delay can be set from a minimum of 100 mSeconds up to a maximum of 1000 mSeconds.

Use either of the following methods to change the keypad delay:

- Use the up/down arrow buttons to change the value in 50 mSecond increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the keypad delay as shown in the image to the right.



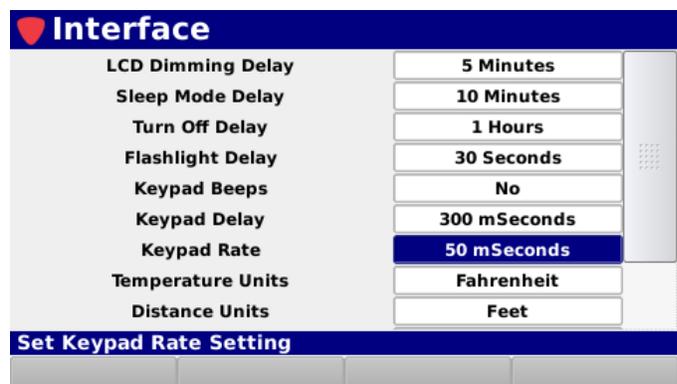
Keypad Rate

The **Keypad Rate** setting is used to adjust the keypad rate.

The default setting for the keypad rate is **50 mSeconds**. The keypad rate can be set from a minimum of 50 mSeconds up to a maximum of 1000 mSeconds.

Use either of the following methods to change the keypad rate:

- Use the up/down arrow buttons to change the value in 50 mSecond increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the keypad rate as shown in the image to the right.

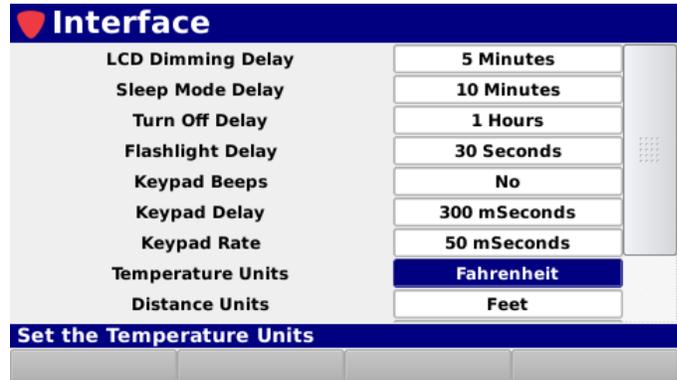


Temperature Units

The **Temperature Units** setting is used to set the default temperature units to display on the 720 DSP.

The default setting for **Temperature Units** is **Celsius**, use the up/down arrow buttons to select from the following preset values:

- **Fahrenheit** (°F)
- **Celsius** (°C)

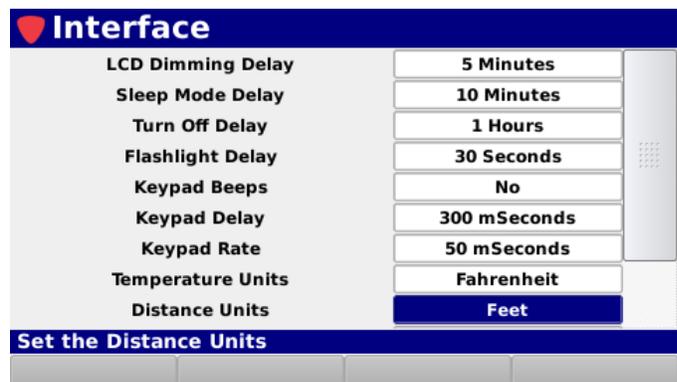


Distance Units

The **Distance Units** setting is used to set the default distance measurement units to display on the 720 DSP.

The default setting for **Distance Units** is **Meters**, use the up/down arrow buttons to select from the following preset values:

- **Feet**
- **Meters**



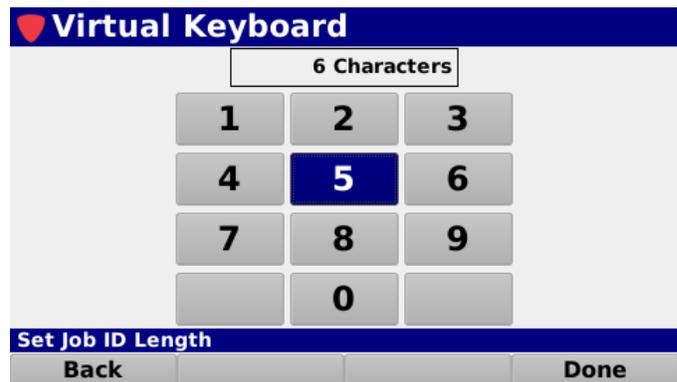
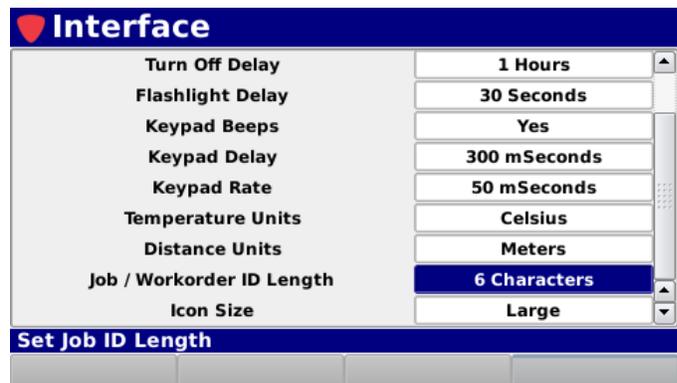
Job & Workorder ID Length

The **Job/Workorder ID Length** setting is used to set the maximum number of characters to display for jobs and workorders on the 720 DSP.

The default setting for the job and workorder ID length is **6 Characters**. The character length can be set from a minimum of 6 characters up to a maximum of 32 characters.

Use either of the following methods to change the maximum number of characters:

- Use the up/down arrow buttons to change the value in one (1) character increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the number of characters as shown in the image to the right.

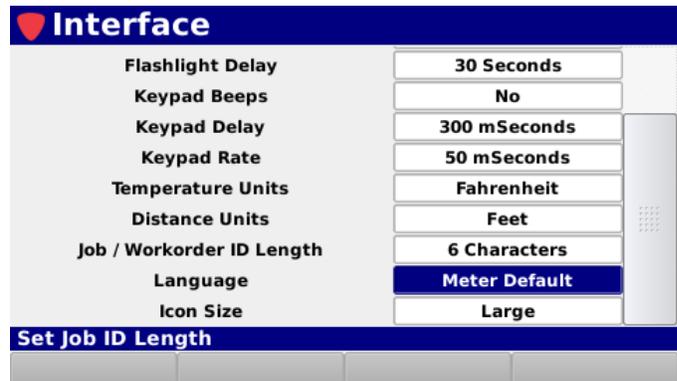


Language

The 720 DSP can be equipped to work in various languages.

The default language is defined by the **Global** menu and shows here as **Meter Default**, but can be adjusted per user. Use the up/down arrow buttons to select from the following languages.

- **Meter Default**
- **English**
- **Spanish**
- **Portuguese**
- **Chinese**
- **Chinese (Simplified)**
- **Japanese**



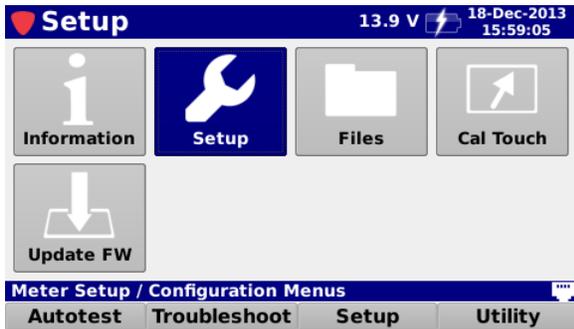
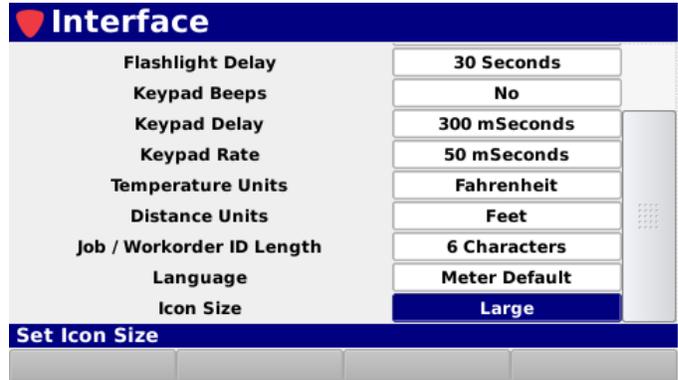
If you have other language options available on your instrument, you can change the default language. You must restart the device before language changes take affect.

Icon Size

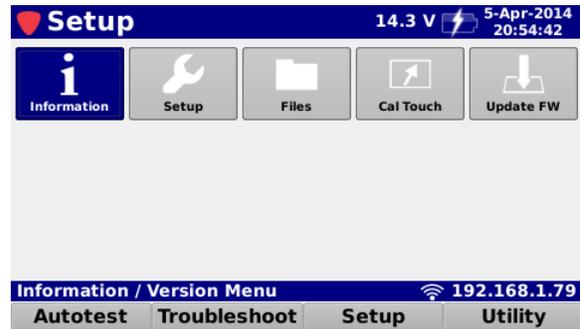
The **Icon Size** setting is used to set the default icon size to display on the 720 DSP.

The default setting for **Icon Size** is **Large**, use the up/down arrow buttons to select from the following preset values:

- **Large**
- **Small**



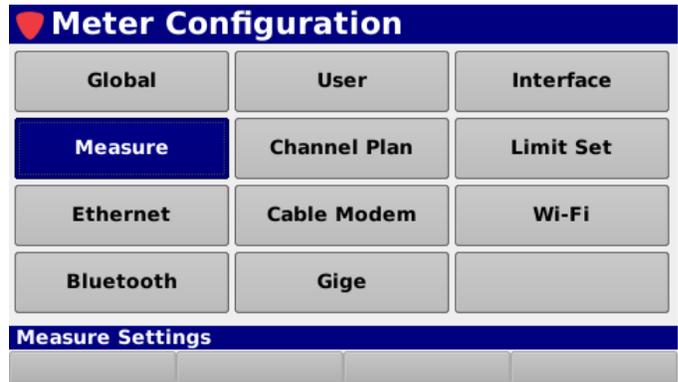
Large Icons



Small Icons

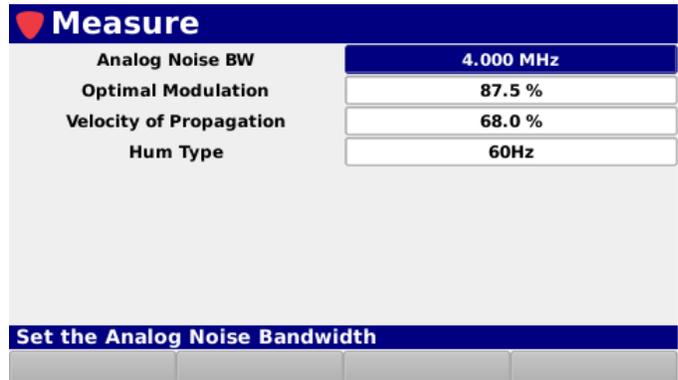
Measurement Settings

Select the **Measure** button as shown in the image to the right to adjust the measurement settings for the 720 DSP.



The **Measure** screen will be displayed as shown in the image to the right. This screen allows you to modify the measurement settings of the 720 DSP.

From within the **Measure** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, please refer to the ViewPoint Operation Manual.*

Analog Noise Bandwidth

The **Analog Noise BW** setting is used to set the noise bandwidth that is used when computing C/N for analog TV channels.

The default setting for the analog noise bandwidth is **4.000 MHz**. The analog noise bandwidth can be set from a minimum of 0.100 MHz up to a maximum of 9.000 MHz.

Use either of the following methods to change the analog noise bandwidth:

- Use the up/down arrow buttons to change the value in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the analog noise bandwidth as shown in the image to the right.

Measure	
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5 %
Velocity of Propagation	68.0 %
Hum Type	60Hz

Set the Analog Noise Bandwidth		

Virtual Keyboard		
4.000000 MHz		
1	2	3
4	5	6
7	8	9
	0	.

Set the Analog Noise Bandwidth		
Back		Done

Optimal Modulation

The **Optimal Modulation** setting is used to set the marker on the % modulation bar graph to compute signal level for analog channels with SECAM L modulation.

The default setting for the optimal modulation is **87.5%**. The optimal modulation can be set from a minimum of 70.0% up to a maximum of 99.0%.

Use either of the following methods to change the optimal modulation:

- Use the up/down arrow buttons to change the value in 0.1% increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the optimal modulation as shown in the image to the right.

Measure	
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5 %
Velocity of Propagation	68.0 %
Hum Type	60Hz

Set the Optimal Modulation

Virtual Keyboard			
			87.5 %
1	2	3	
4	5	6	
7	8	9	
	0	.	
Set the Optimal Modulation			
Back			Done

Velocity of Propagation

The **Velocity of Propagation** setting is used to set the propagation value for the cable under test.

The default setting for the velocity of propagation is **82.0%**. The velocity of propagation can be set from a minimum of 60.0% up to a maximum of 99.0%.

Use either of the following methods to change the velocity of propagation:

- Use the up/down arrow buttons to change the value in 0.1% increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the velocity of propagation as shown in the image to the right.

Measure	
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5 %
Velocity of Propagation	68.0 %
Hum Type	60Hz

Set the Velocity of Propagation		

Virtual Keyboard		
68.0 %		
1	2	3
4	5	6
7	8	9
	0	.
Set the Velocity of Propagation		
Back		Done

Hum Type

The **Hum Type** setting is used to set the default hum type for testing.

The default setting for **Hum Type** is **60 Hz**, use the up/down arrow buttons to select from the following preset values:

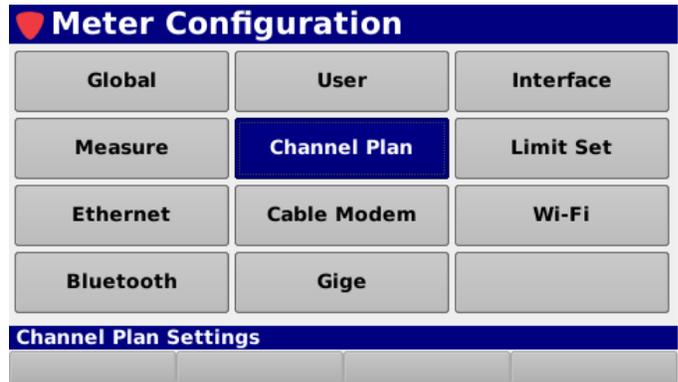
- **60 Hz**
- **50 Hz**

Measure	
Analog Noise BW	4.000 MHz
Optimal Modulation	87.5 %
Velocity of Propagation	68.0 %
Hum Type	60Hz

Set the Hum Type		

Channel Plan Management

Select the **Channel Plan** button as shown in the image to the right to manage channel plans on the 720 DSP.

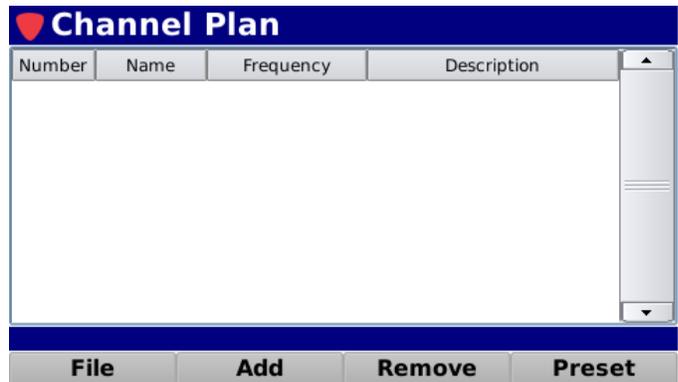


 **Channel Plans and Limit Sets created/modified on the 720 DSP can only be used in the Troubleshooting menu. Autotests require ViewPoint WFM Module Channel Plans and Limit Sets.**

NOTE

The **Channel Plan** screen will be displayed as shown in the image to the right. This screen allows you to:

- Open, create, save and delete channel plans
- Add and remove channels
- Edit channel details
- Save preset channel configurations



 **These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, see the ViewPoint Operation Manual.**

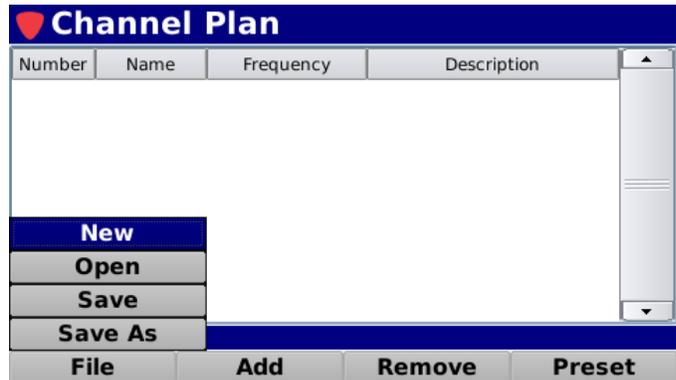
NOTE

From within the **Channel Plan** screen, use the arrow buttons on the keypad to navigate through the list of channels.

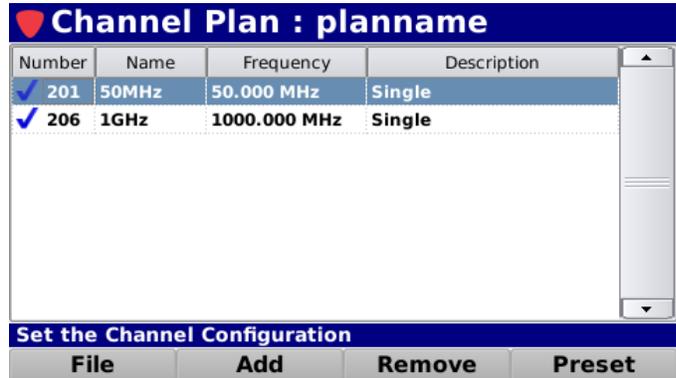
Create a New Channel Plan

Perform the following steps to create a new channel plan:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **New** button as shown in the image to the right.
3. The **Continue** window will be displayed as shown in the image to the right.
4. Select the **OK** button to continue or select the **Cancel** button to exit without creating a new channel plan.
5. Use the **Virtual Keyboard** to enter the name of the new channel plan as shown in the image to the right.



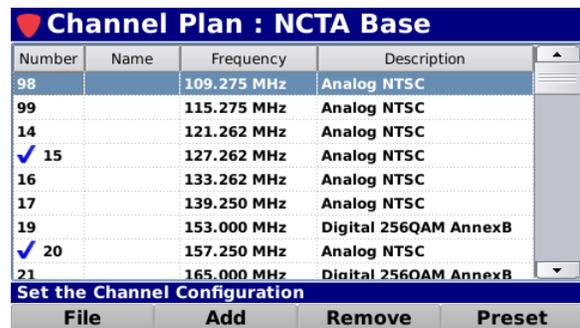
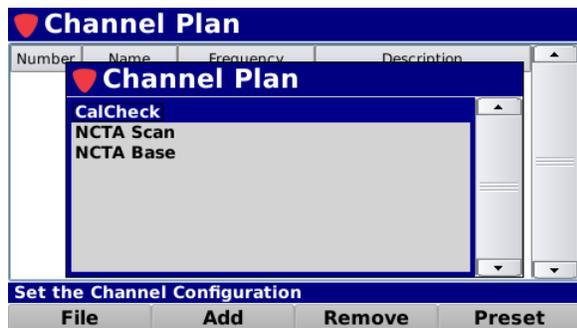
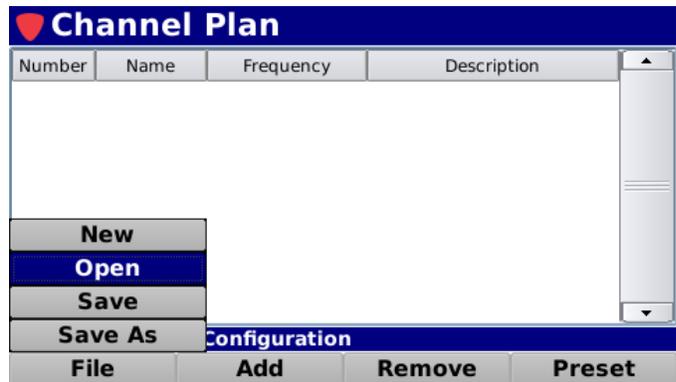
- The new channel plan will be displayed as shown in the image to the right. Use the up/down arrow buttons to highlight specific channels for editing or removal.



Open an Existing Channel Plan

Perform the following steps to open an existing channel plan:

- Select the **File** softkey.
- From the **File** pop-up menu, select the **Open** button as shown in the image to the right.
- The **Channel Plan** window will be displayed as shown below (left).
- Select the name of the channel plan that you would like to open.
- The selected channel plan and its channels are displayed as shown below (right). Use the up/down arrow buttons to highlight specific channels for editing or removal.



Adding Channels to a Channel Plan

The 720 DSP comes pre loaded with four different channel presets; **NTSC**, **PAL G**, **Dig Video**, and **DOCSIS**. Perform the following steps to add a channel to the channel plan:

1. Use the up/down arrow buttons to highlight the row above the location to add the new channel. Skip this step when adding the first channel to an empty channel plan.
2. Select the **Add** softkey.
3. From the **Add** pop-up menu, select from one of four preset channels as shown in the image to the right.
4. The new channel will be inserted below the previously highlighted row or as the first channel in the channel plan.

Channel Plan : NCTA Base

Number	Name	Frequency	Description
98		109.275 MHz	Analog NTSC
99		115.275 MHz	Analog NTSC
14		121.262 MHz	Analog NTSC
✓ 15		127.262 MHz	Analog NTSC
16		133.262 MHz	Analog NTSC
17			Analog NTSC
19			Digital 256QAM AnnexB
✓ 20			Analog NTSC
21			Digital 256QAM AnnexB

Add pop-up menu:

- Preset NTSC
- Preset PAL G
- Preset Dig Video
- Preset DOCSIS

Buttons: File, Add, Remove, Preset

Channel Plan : NCTA Base

Number	Name	Frequency	Description
98		109.275 MHz	Analog NTSC
99		115.275 MHz	Analog NTSC
14		121.262 MHz	Analog NTSC
✓ 15		127.262 MHz	Analog NTSC
16	NTSC	133.262 MHz	Scrambled NTSC
16		133.262 MHz	Analog NTSC
17		139.250 MHz	Analog NTSC
19		153.000 MHz	Digital 256QAM AnnexB
✓ 20		157.250 MHz	Analog NTSC

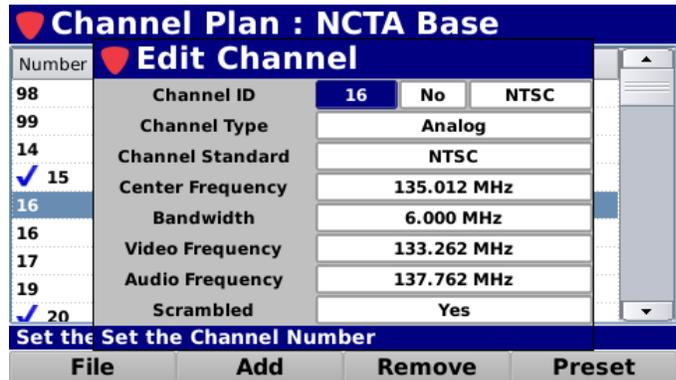
Buttons: File, Add, Remove, Preset

Removing Channels from a Channel Plan

To remove a channel from the channel plan, use the up/down arrow buttons to highlight the channel to be removed and select the **Remove** softkey.

Editing a Channel

To edit a channel from the channel plan, use the up/down arrow buttons to highlight the channel to be edited and then Press the **Enter** button. The **Edit Channel** screen will be displayed as shown to the right.

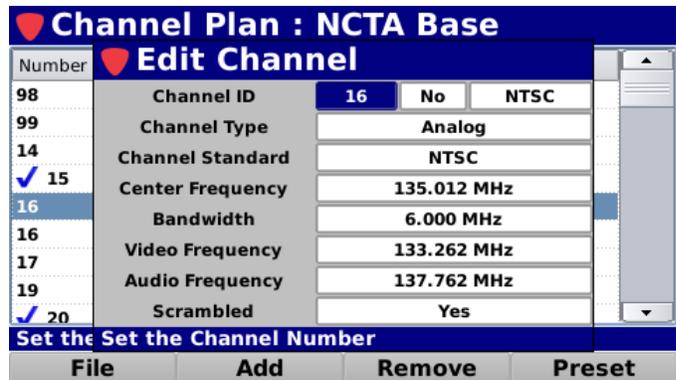


Basic Channel Settings

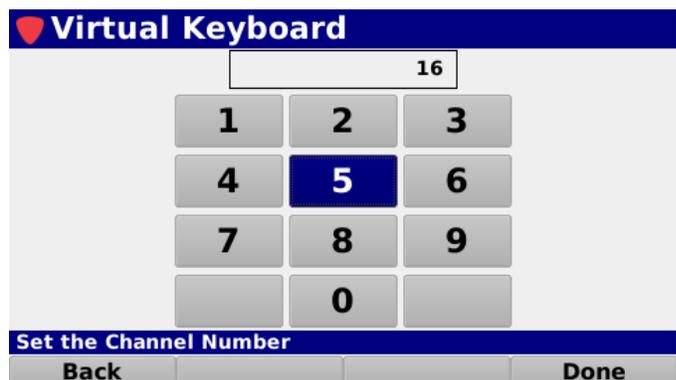
From within the **Edit Channel** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

Channel ID

The **Channel ID** setting is used to number the selected channel.



Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image to the right.

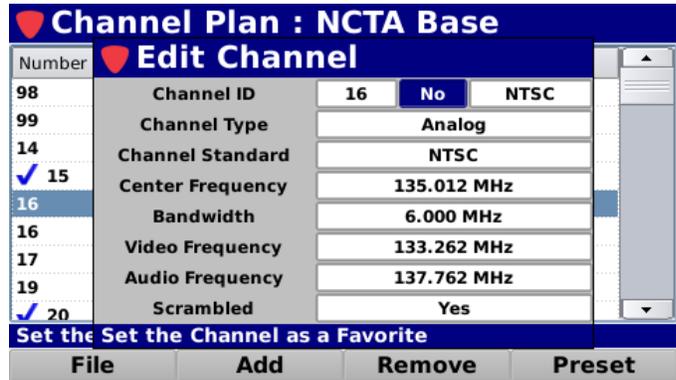


Favorites Selection

The **Favorites** setting is used to select favorite channels for quick access

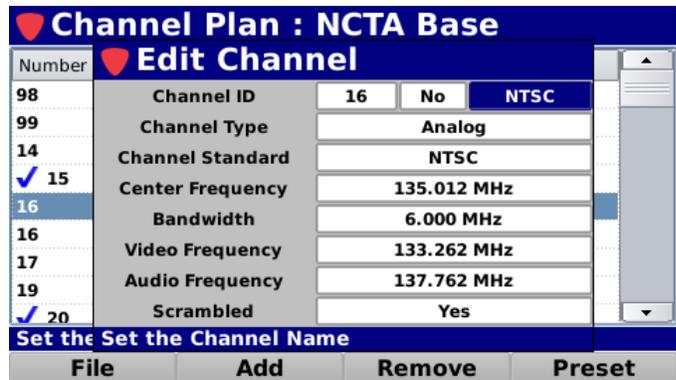
The default setting for **Favorites** is **No**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** to add the channel to the favorites list.
- Select **No** to remove the channel from the favorites list.



Channel Name

The **Channel Name** setting is used to name the selected channel.



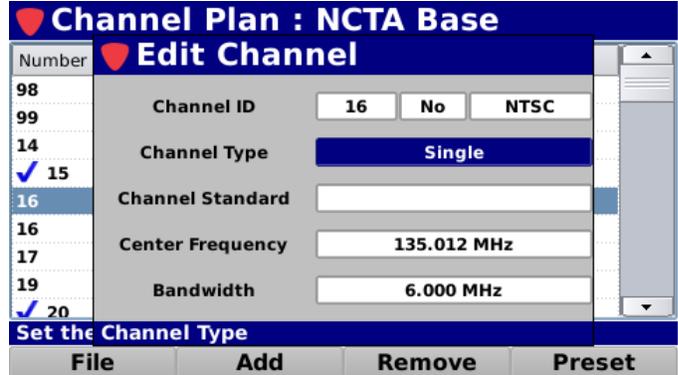
Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel name as shown in the image to the right.



Channel Type

The **Channel Type** setting is used to select the type of channel and available channel settings. Use the up/down arrow buttons to select from the following types of channels as shown in the images below:

- Single
- Analog
- Digital



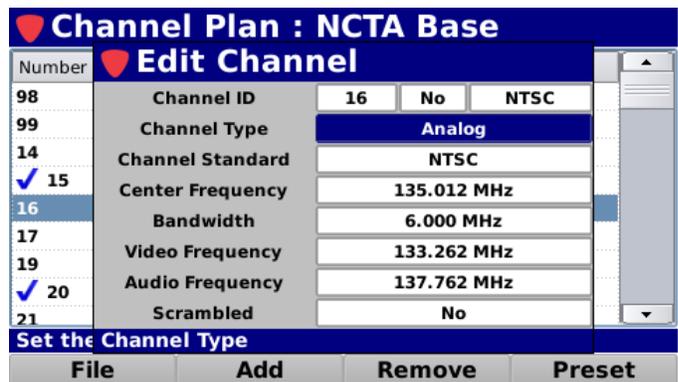
Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	16	No	NTSC
98	Channel Type	Single		
99	Channel Standard			
14	Center Frequency	135.012 MHz		
✓ 15	Bandwidth	6.000 MHz		
16				
16				
17				
19				
✓ 20				

Set the Channel Type

File Add Remove Preset



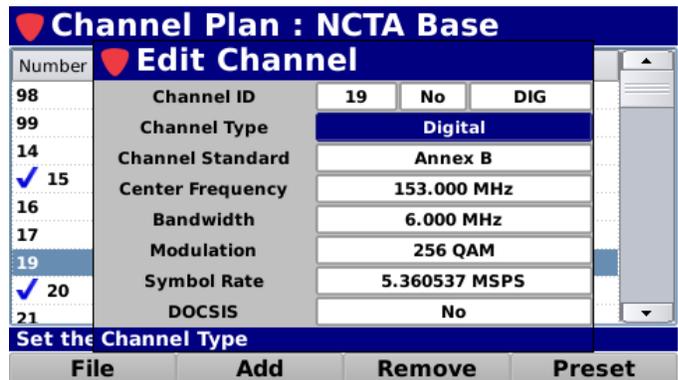
Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	16	No	NTSC
98	Channel Type	Analog		
99	Channel Standard	NTSC		
14	Center Frequency	135.012 MHz		
✓ 15	Bandwidth	6.000 MHz		
16	Video Frequency	133.262 MHz		
17	Audio Frequency	137.762 MHz		
19	Scrambled	No		
✓ 20				
21				

Set the Channel Type

File Add Remove Preset



Channel Plan : NCTA Base

Edit Channel

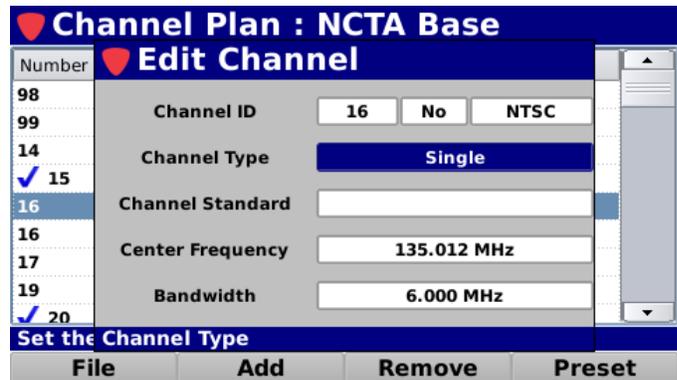
Number	Channel ID	19	No	DIG
98	Channel Type	Digital		
99	Channel Standard	Annex B		
14	Center Frequency	153.000 MHz		
✓ 15	Bandwidth	6.000 MHz		
16	Modulation	256 QAM		
17	Symbol Rate	5.360537 MSPS		
19	DOCSIS	No		
✓ 20				
21				

Set the Channel Type

File Add Remove Preset

Single Channel Properties

When the **Channel Type** is set to **Single**, the following settings are available. From within the **Edit Channel** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

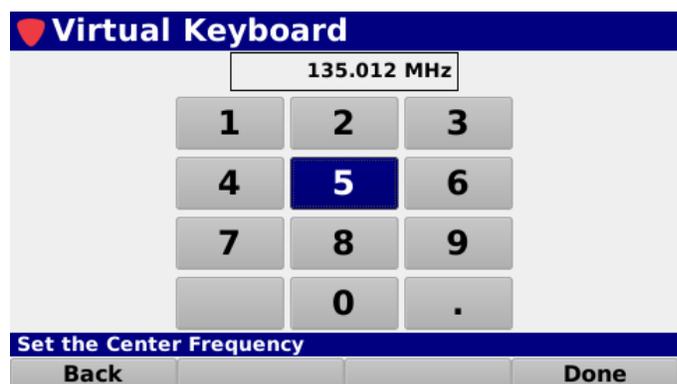
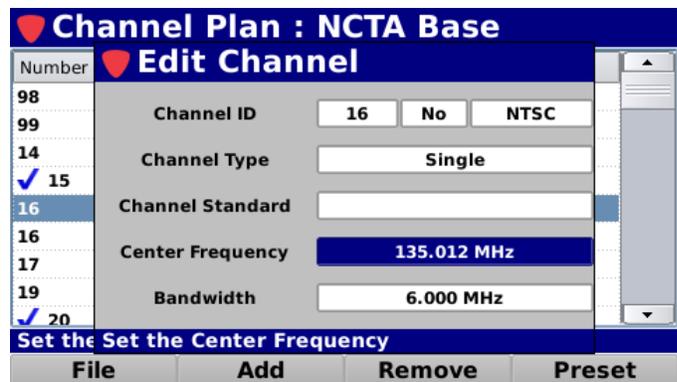


Center Frequency

The **Center Frequency** setting is used to adjust the center frequency of the channel. The center frequency can be set from a minimum of 50.000 MHz up to a maximum of 999.999 MHz.

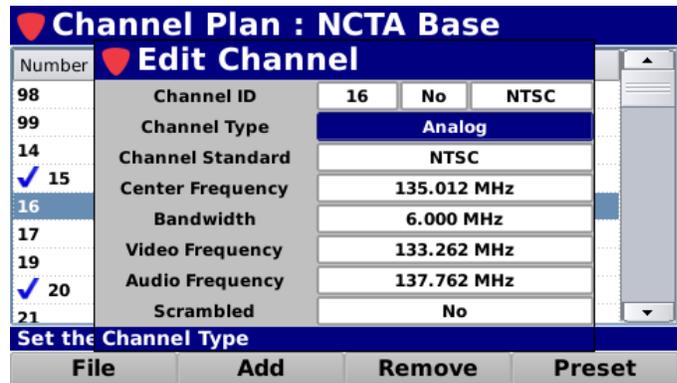
Use either of the following methods to change the center frequency of the channel:

- Use the up/down arrow buttons to change the value in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.



Analog Channel Properties

When the **Channel Type** is set to **Analog**, the following settings are available. From within the **Edit Channel** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

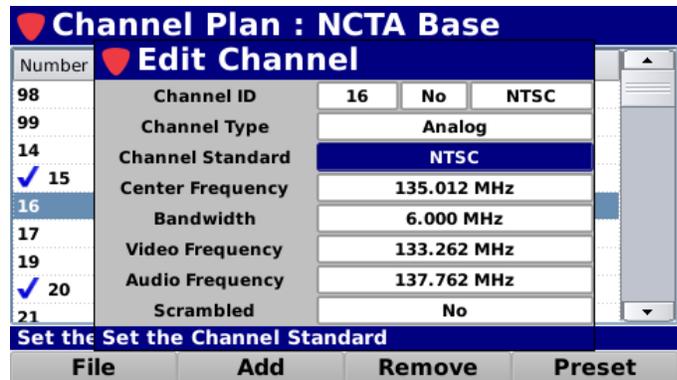


Channel Plan : NCTA Base			
Edit Channel			
Number	Channel ID	16	No NTSC
98	Channel Type	Analog	
99	Channel Standard	NTSC	
14	Center Frequency	135.012 MHz	
✓ 15	Bandwidth	6.000 MHz	
16	Video Frequency	133.262 MHz	
17	Audio Frequency	137.762 MHz	
19	Scrambled	No	
✓ 20			
21			
Set the Channel Type			
File		Add	Remove Preset

Channel Standard

The **Channel Standard** setting is used to select the analog encoding standard. Use the up/down arrow buttons to select from the following standards:

- **NTSC**
- **PAL B/I/D/N/M/G/H/K**
- **SECAM B/L/D/G/H/I/K**



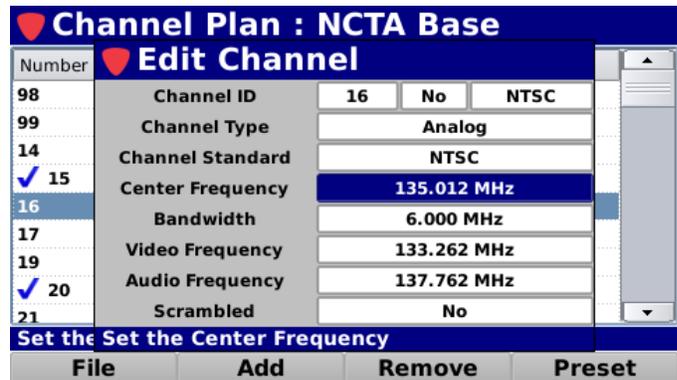
Channel Plan : NCTA Base			
Edit Channel			
Number	Channel ID	16	No NTSC
98	Channel Type	Analog	
99	Channel Standard	NTSC	
14	Center Frequency	135.012 MHz	
✓ 15	Bandwidth	6.000 MHz	
16	Video Frequency	133.262 MHz	
17	Audio Frequency	137.762 MHz	
19	Scrambled	No	
✓ 20			
21			
Set the Set the Channel Standard			
File		Add	Remove Preset

Center Frequency

The **Center Frequency** setting is used to adjust the center frequency of the channel. The center frequency can be set from a minimum of 50.000 MHz up to a maximum of 999.999 MHz.

Use either of the following methods to change the center frequency of the channel:

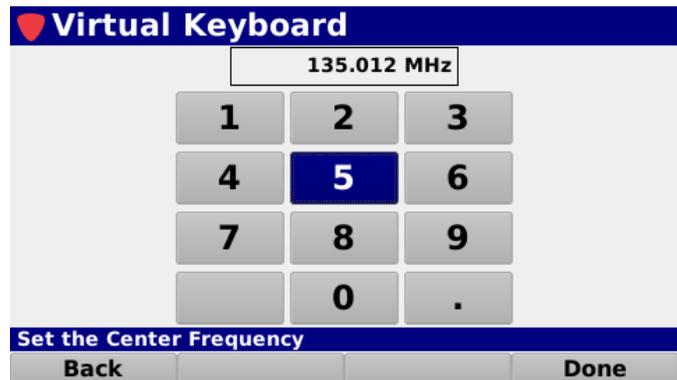
- Use the up/down arrow buttons to change the value in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.



Number	Channel ID	Channel Type	Channel Standard	Center Frequency	Bandwidth	Video Frequency	Audio Frequency	Scrambled
98	16	No	NTSC					
99		Analog						
14			NTSC					
✓ 15				135.012 MHz				
16					6.000 MHz			
17						133.262 MHz		
19							137.762 MHz	
✓ 20								No
21								

Set the Center Frequency

File Add Remove Preset



Virtual Keyboard

135.012 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Center Frequency

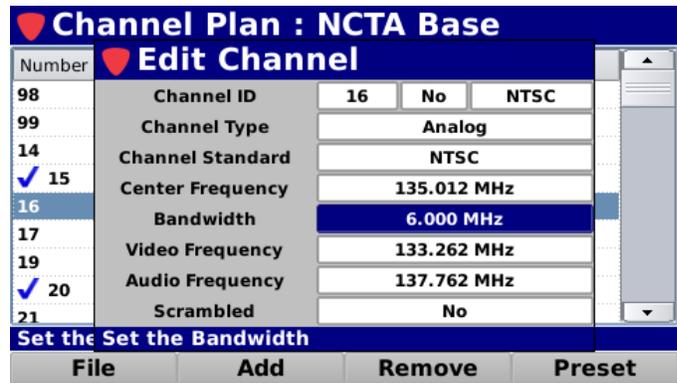
Back Done

Bandwidth

The **Bandwidth** setting is used to adjust the bandwidth of the channel. The bandwidth can be set from a minimum of 0.000 MHz up to a maximum of 8.000 MHz.

Use either of the following methods to change the bandwidth of the channel:

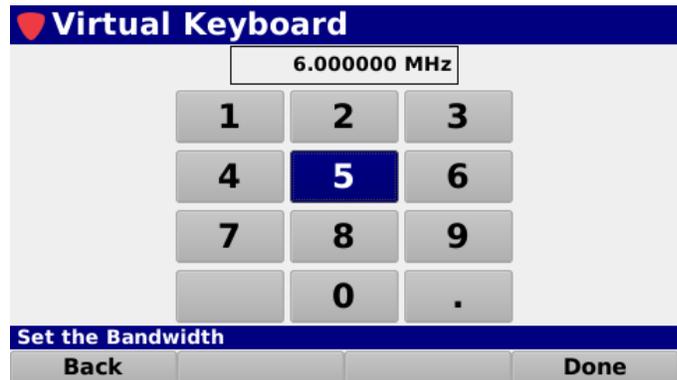
- Use the up/down arrow buttons to change the value in 0.100 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the bandwidth as shown in the image to the right.



Number	Channel ID	No	NTSC
98	16	No	NTSC
99			Analog
14			NTSC
✓ 15			135.012 MHz
16			6.000 MHz
17			133.262 MHz
19			137.762 MHz
✓ 20			No
21			

Set the Bandwidth

File Add Remove Preset



6.000000 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Bandwidth

Back Done

Video Frequency

The **Video Frequency** setting is used to adjust the video frequency of the channel. The video frequency can be set from a minimum of 50.000 MHz up to a maximum of 999.999 MHz.

Use either of the following methods to change the video frequency of the channel:

- Use the up/down arrow buttons to change the value in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.

Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	16	No	NTSC
98	Channel Type	Analog		
99	Channel Standard	NTSC		
14	Center Frequency	135.012 MHz		
✓ 15	Bandwidth	6.000 MHz		
16	Video Frequency	133.262 MHz		
17	Audio Frequency	137.762 MHz		
19	Scrambled	No		
✓ 20				
21				

Set the Set the Video Frequency

File Add Remove Preset

Virtual Keyboard

133.262 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Video Frequency

Back Done

Audio Frequency

The **Audio Frequency** setting is used to adjust the audio frequency of the channel. The audio frequency can be set from a minimum of 50.000 MHz up to a maximum of 999.999 MHz.

Use either of the following methods to change the audio frequency of the channel:

- Use the up/down arrow buttons to change the value in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the audio frequency as shown in the image to the right.

Number	Channel ID	Channel Type	Channel Standard	Center Frequency	Bandwidth	Video Frequency	Audio Frequency	Scrambled
98	16	No	NTSC					
99		Analog						
14			NTSC					
✓ 15				135.012 MHz				
16					6.000 MHz			
17						133.262 MHz		
19							137.762 MHz	
✓ 20								No
21								

Set the Set the Audio Frequency

File Add Remove Preset

137.762 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Audio Frequency

Back Done

Scrambled

The **Scrambled** setting is used to set whether the channel is scrambled.

The default setting for **Scrambled** is **No**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** if the channel is scrambled.
- Select **No** if the channel is not scrambled.

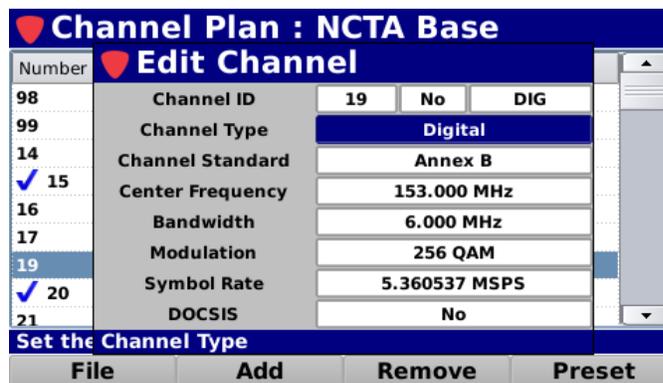
Number	Channel ID	Channel Type	Channel Standard	Center Frequency	Bandwidth	Video Frequency	Audio Frequency	Scrambled
98	16	No	NTSC					
99		Analog						
14			NTSC					
✓ 15				135.012 MHz				
16					6.000 MHz			
17						133.262 MHz		
19							137.762 MHz	
✓ 20								No
21								

Set the Set the Scrambled Flag

File Add Remove Preset

Digital Channel Properties

When the **Channel Type** is set to **Digital**, the following settings are available. From within the **Edit Channel** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	19	No	DIG
98	Channel Type	Digital		
99	Channel Standard	Annex B		
14	Center Frequency	153.000 MHz		
✓ 15	Bandwidth	6.000 MHz		
16	Modulation	256 QAM		
17	Symbol Rate	5.360537 MSPS		
19	DOCSIS	No		
✓ 20				
21				

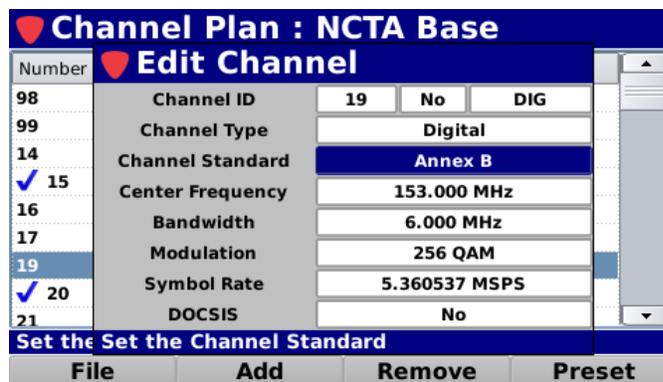
Set the Channel Type

File Add Remove Preset

Channel Standard

The **Channel Standard** setting is used to select the digital encoding standard. Use the up/down arrow buttons to select from the following standards:

- **Arbitrary**
- **Annex A/B/C**



Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	19	No	DIG
98	Channel Type	Digital		
99	Channel Standard	Annex B		
14	Center Frequency	153.000 MHz		
✓ 15	Bandwidth	6.000 MHz		
16	Modulation	256 QAM		
17	Symbol Rate	5.360537 MSPS		
19	DOCSIS	No		
✓ 20				
21				

Set the Set the Channel Standard

File Add Remove Preset

Center Frequency

The **Center Frequency** setting is used to adjust the center frequency of the channel. The center frequency can be set from a minimum of 50.000 MHz up to a maximum of 999.999 MHz.

Use either of the following methods to change the center frequency of the channel:

- Use the up/down arrow buttons to change the value in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.

Channel Plan : NCTA Base

Edit Channel

Number	Channel ID	19	No	DIG
98	Channel Type	Digital		
14	Channel Standard	Annex B		
✓ 15	Center Frequency	153.000 MHz		
16	Bandwidth	6.000 MHz		
17	Modulation	256 QAM		
19	Symbol Rate	5.360537 MSPS		
✓ 20	DOCSIS	No		
21				

Set the Center Frequency

File Add Remove Preset

Virtual Keyboard

153.000 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Center Frequency

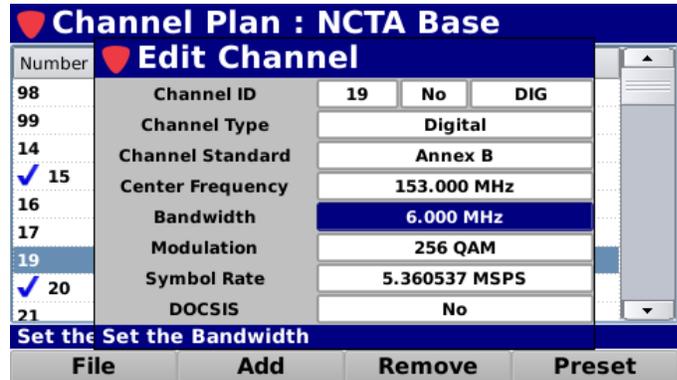
Back Done

Bandwidth

The **Bandwidth** setting is used to adjust the bandwidth of the channel. The bandwidth can be set from a minimum of 0.000 MHz up to a maximum of 8.000 MHz.

Use either of the following methods to change the bandwidth of the channel:

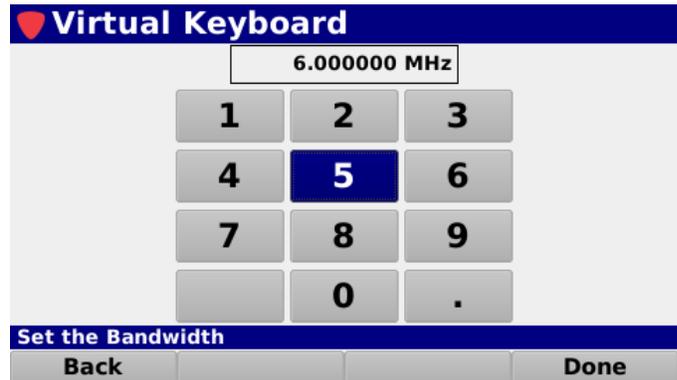
- Use the up/down arrow buttons to change the value in 0.100 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the bandwidth as shown in the image to the right.



Channel Plan : NCTA Base			
Edit Channel			
Number	Channel ID	19	No DIG
98	Channel Type	Digital	
99	Channel Standard	Annex B	
14	Center Frequency	153.000 MHz	
✓ 15	Bandwidth	6.000 MHz	
16	Modulation	256 QAM	
17	Symbol Rate	5.360537 MSPS	
19	DOCSIS	No	
✓ 20			
21			

Set the Bandwidth

File Add Remove Preset



Virtual Keyboard

6.000000 MHz

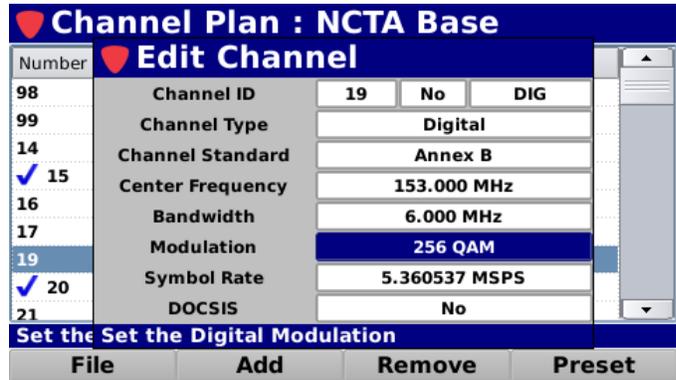
1	2	3
4	5	6
7	8	9
	0	.

Set the Bandwidth

Back Done

Modulation

The **Modulation** setting is used to adjust the modulation type of the channel. Use the up/down arrow buttons to select from **16/32/64/128/256 QAM**.

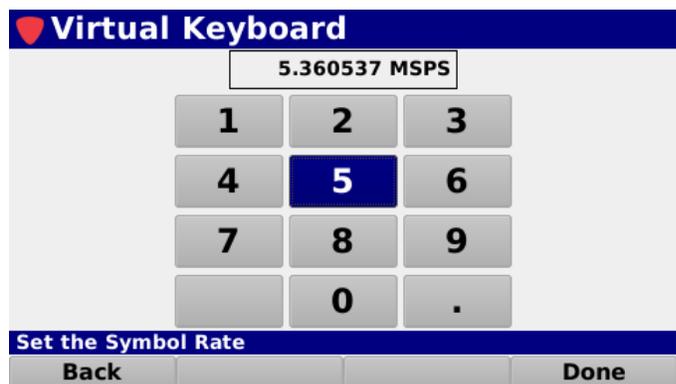
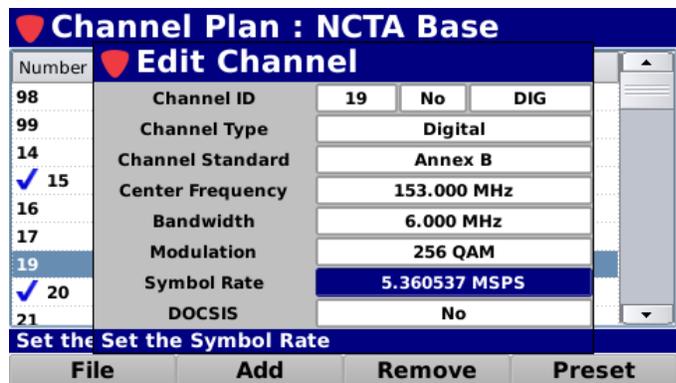


Symbol Rate

The **Symbol Rate** setting is used to adjust the symbol rate of the channel. The symbol rate can be set from a minimum of 0.000 MSPS up to a maximum of 6.952 MSPS.

Use either of the following methods to change the symbol rate of the channel:

- Use the up/down arrow buttons to change the value in 0.001 MSPS increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the symbol rate as shown in the image to the right.

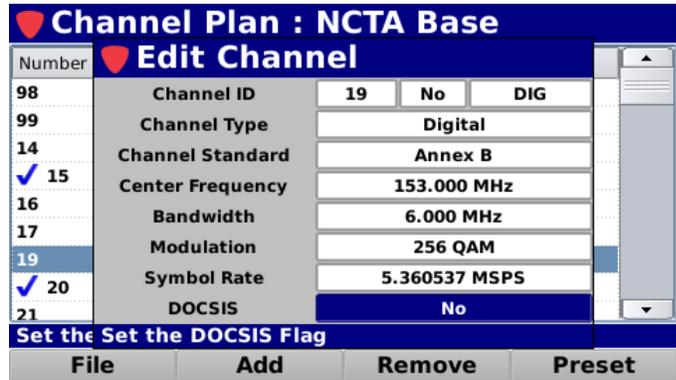


DOCSIS

The **DOCSIS** setting is used to set whether the selected channel is a DOCSIS cable modem communication channel.

The default setting for **DOCSIS** is **No**, use the up/down arrow buttons to select from the following preset values:

- Select **Yes** if the channel is a DOCSIS channel.
- Select **No** if the channel is not a DOCSIS channel.

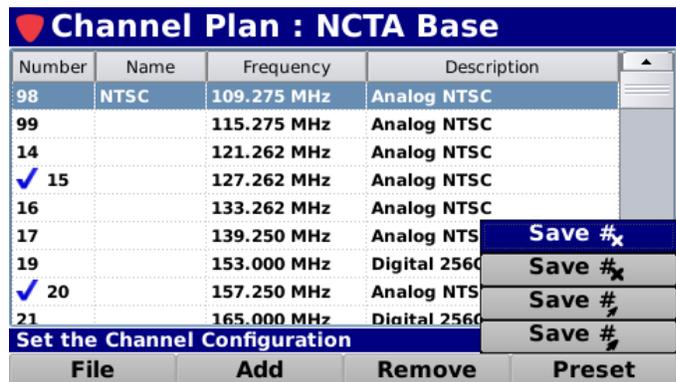
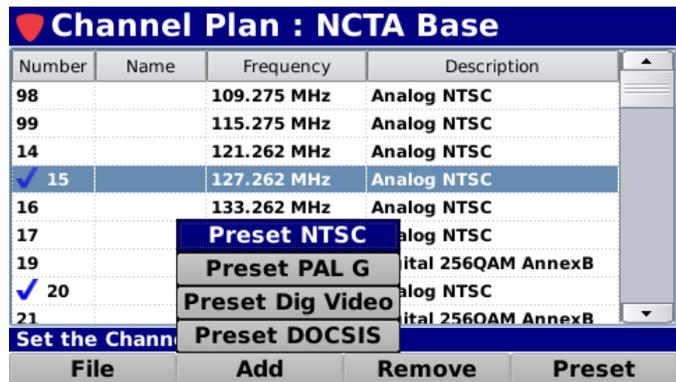


Channel Presets

The 720 DSP comes pre loaded with four different channel presets as shown in the image to the right. After editing custom channels you may find it useful to save your own preset channels.

Perform the following steps to save new channel presets:

1. Use the up/down arrow buttons to highlight the channel that you would like to save as a preset.
2. Select the **Preset** softkey.
3. From the **Preset** pop-up menu, select the desired save position by selecting the **Save #X** button as shown in the image to the right.
4. The **Add** pop-up menu will now include the selected channel as a preset channel type.

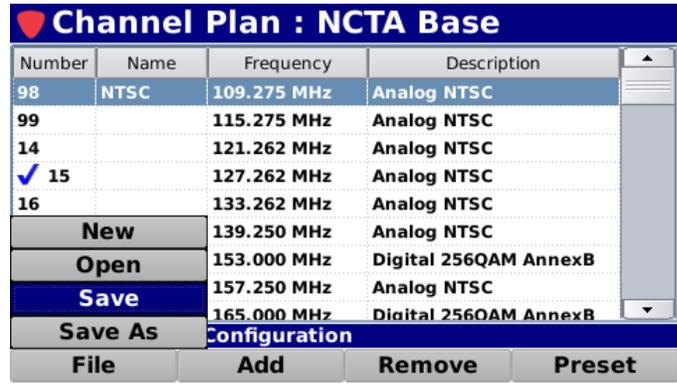


Save an Open Channel Plan

After editing an open channel plan, you must save your changes.

Perform the following steps to save the channel plan:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **Save** button as shown in the image to the right.
3. The channel plan will be saved to the internal memory of the 720 DSP.

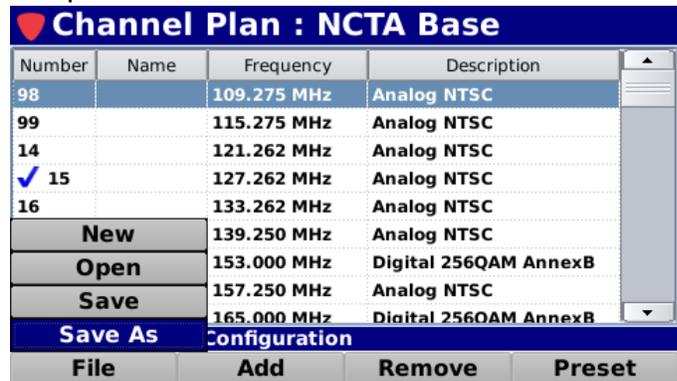


Save an Open Channel Plan with a New Name

After editing an open channel plan, you can save the channel plan with a new name. This function is useful for duplicating an existing channel plan

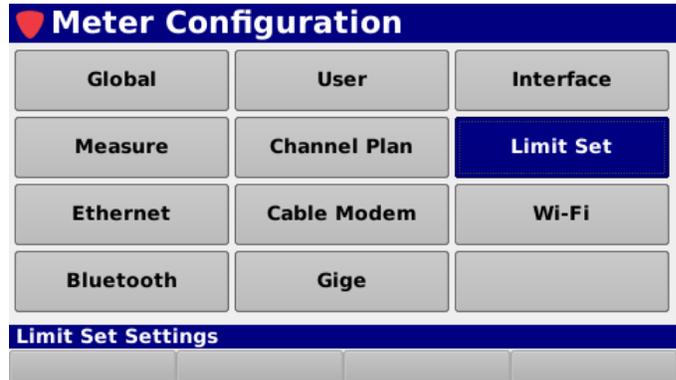
Perform the following steps to save the channel plan with a new name:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **Save As** button as shown in the image to the right.
3. Use the **Virtual Keyboard** to enter the new name for the channel plan as shown in the image to the right.
4. The new channel plan will be saved to the internal memory of the 720 DSP.



Limit Set Management

Select the **Limit Set** button as shown in the image to the right to manage limit sets on the 720 DSP.



 **NOTE** *Channel Plans and Limit Sets created/modified on the 720 DSP can only be used in the Troubleshooting menu. Autotests require ViewPoint WFM Module Channel Plans and Limit Sets.*

The **Limit Set** screen will be displayed as shown in the image to the right. This screen allows you to:

- Open, create, save and delete limit sets
- Edit measurement limits



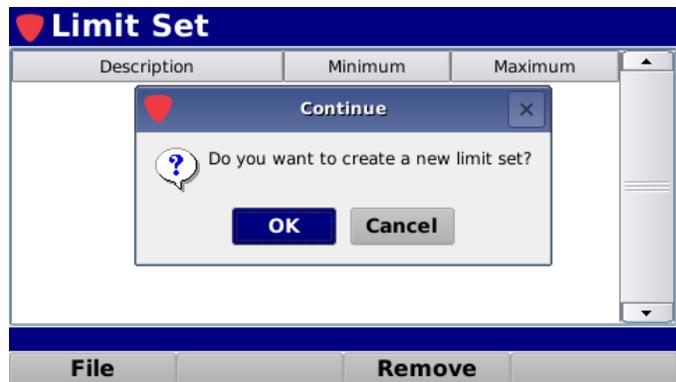
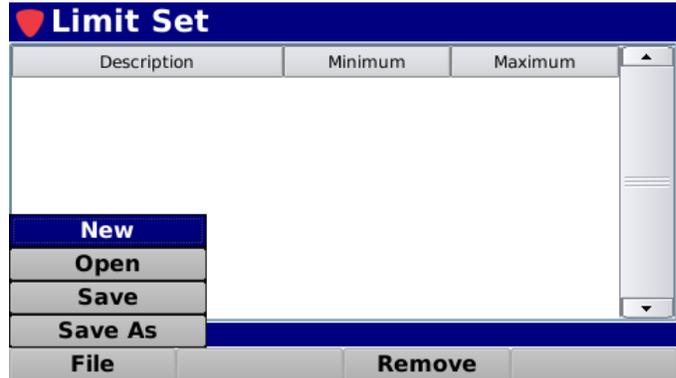
 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, see the ViewPoint Operation Manual.*

From within the **Limit Set** screen, use the arrow buttons on the keypad to navigate through the list of channels.

Create a New Limit Set

Perform the following steps to create a new limit set:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **New** button as shown in the image to the right.
3. The **Continue** window will be displayed as shown in the image to the right.
4. Select the **OK** button to continue or select the **Cancel** button to exit without creating a new limit set.
5. Use the **Virtual Keyboard** to enter the name of the new limit set as shown in the image to the right.



- The new limit set will be displayed as shown in the image to the right. Use the up/down arrow buttons to highlight specific limits for editing or removal.

Description	Minimum	Maximum
Video Level	-40.0 dBmV	60.0 dBmV
Video Audio Delta	-40.0 dB	60.0 dB
Video Delta		60.0 dB
Adjacent Level		60.0 dB
C/N Level	20.0 dB	
Digital Level	-40.0 dBmV	60.0 dBmV
Video Digital Delta		60.0 dB
16 QAM MER	20.0 dB	
32 QAM MER	20.0 dB	

Set Minimum/Maximum Video Level

File Remove

Open an Existing Limit Set

Perform the following steps to open an existing limit set:

- Select the **File** softkey.
- From the **File** pop-up menu, select the **Open** button as shown in the image to the right.
- The **Limit Set** window will be displayed as shown below (left).
- Select the name of the limit set that you would like to open.
- The selected limit set and its thresholds are displayed as shown below (right). Use the up/down arrow buttons to highlight specific thresholds for editing or removal.

Limit Set

Description	Minimum	Maximum
New		
Open		
Save		
Save As		
File		
Remove		

Limit Set

Description	Minimum	Maximum
GB - Ingress Check		
Tap		
CalCheck		
CPE		
Tap - West		
CPE - West		
Drop		

Set Minimum/Maximum Video Level

File Remove

Limit Set : CPE

Description	Minimum	Maximum
Video Level	-3.0 dBmV	15.0 dBmV
Video Audio Delta	10.0 dB	18.0 dB
Adjacent Level		3.0 dB
Digital Level	-8.0 dBmV	10.0 dBmV
256 QAM MER	20.0 dB	
64 QAM MER	33.0 dB	
Pre Bit Error		1.00E-09
Post Bit Error		1.00E-09
Video Delta		12.0 dB

Set Minimum/Maximum Video Level

File Remove

Removing Limits from a Limit Set

To remove a limit from the limit set, use the up/down arrow buttons to highlight the limit to be removed and select the **Remove** softkey.

Knowing Your Limits

When the 720 DSP performs testing versus a limit set it, immediately display the pass/fail status for each measurement criteria that you have set.

To meet a minimum limit, the measured values must be equal to or greater than the minimum limit. To meet a maximum limit the measured values must be less than or equal to the maximum limit.

- **Video Level** – This sets the minimum and maximum analog video channel levels.
- **Video Audio Delta** – This sets the minimum and maximum allowable video to audio level difference.
- **Video Delta** – This sets the maximum difference allowed between the lowest and highest levels measured for the analog video channels.
- **Adjacent Level** – This sets the maximum level variation between any two adjacent video carriers.
- **C/N Level** – This sets minimum carrier to noise ratio.
- **Digital Level** – This sets the minimum and maximum digital video channel levels.
- **Video Digital Delta** – This sets the maximum difference allowed between the lowest and highest levels measured for the digital video channels.
- **16 QAM MER** – This sets the minimum MER for digital video channels with 16 QAM Modulation.

Limit Set : limitname		
Description	Minimum	Maximum
Video Level	-40.0 dBmV	60.0 dBmV
Video Audio Delta	-40.0 dB	60.0 dB
Video Delta		60.0 dB
Adjacent Level		60.0 dB
C/N Level	20.0 dB	
Digital Level	-40.0 dBmV	60.0 dBmV
Video Digital Delta		60.0 dB
16 QAM MER	20.0 dB	
32 QAM MER	20.0 dB	
Set Minimum/Maximum Video Level		
File		Remove

- **32 QAM MER** – This sets the minimum MER for digital video channels with 32 QAM Modulation.
- **64 QAM MER** – This sets the minimum MER for digital video channels with 64 QAM Modulation.
- **128 QAM MER** – This sets the minimum MER for digital video channels with 128 QAM Modulation.
- **256 QAM MER** – This sets the minimum MER for digital video channels with 256 QAM Modulation.
- **Pre Bit Error** – This sets the maximum pre error correction bit errors.
- **Post Bit Error** – This sets the maximum post error correction bit errors.
- **Tilt Level** – This sets the minimum and maximum Tilt level.
- **Launch Level** – This sets the minimum and maximum cable modem launch levels.

Limit Set : limitname			
Description	Minimum	Maximum	
32 QAM MER	20.0 dB		
64 QAM MER	20.0 dB		
128 QAM MER	20.0 dB		
256 QAM MER	20.0 dB		
Pre Bit Error		1.00E-07	
Post Bit Error		1.00E-07	
Tilt Level	-40.0 dB	60.0 dB	
Launch Level	20.0 dBmV	55.0 dBmV	
Ingress Level		60.0 dBmV	
Set Minimum 32 QAM MER			
File		Remove	

- **Ingress Level** – This sets the maximum ingress level while performing a Return Spectrum measurement.
- **VoIP Latency** – This sets the maximum upstream & downstream latency while performing a VoIP measurement.
- **VoIP Jitter** – This sets the maximum upstream & downstream jitter while performing a VoIP measurement.
- **VoIP MOS** – This sets the minimum upstream & downstream MOS (Mean Opinion Score) while performing a VoIP measurement.
- **Upstream Rate** – This sets the minimum upstream rate while performing a throughput measurement.
- **Downstream Rate** – This sets the minimum downstream transmission rate while performing a throughput measurement.
- **Lost Packets** – This sets the maximum lost packet rate while performing a ping measurement.
- **Ping Time** – This sets the maximum ping time while performing a ping measurement.

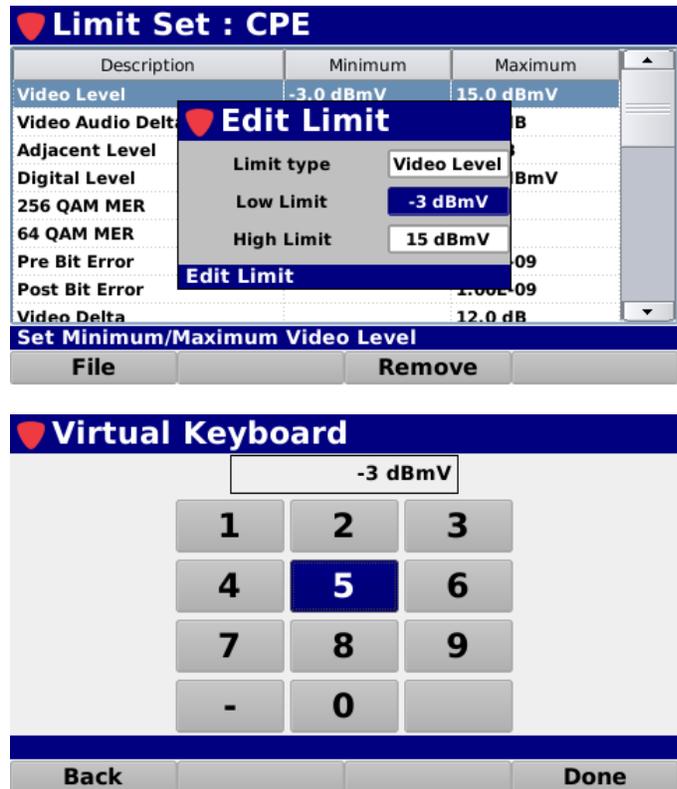
Limit Set : limitname			
Description	Minimum	Maximum	
Launch Level	20.0 dBmV	55.0 dBmV	
Ingress Level		60.0 dBmV	
VoIP Latency		500 msec	
VoIP Jitter		500 msec	
VoIP MOS	2.00		
Upstream Rate	1 Mbps		
Downstream Rate	1 Mbps		
Lost Packets		10.0 %	
Ping Time		500 msec	
Set Maximum Ingress Level			
File		Remove	

Editing Limit(s)

To edit limit(s) within the limit set, use the up/down arrow buttons to highlight the limit(s) to be edited and select the **Enter** button.

The **Edit Limit** screen will be displayed as shown to the right. Use the left/right arrow buttons to highlight the threshold that you would like to change.

Use the up/down arrow buttons or select the **Enter** button and use the **Virtual Keyboard** to enter the threshold.



Limit Set : CPE

Description	Minimum	Maximum
Video Level	-3.0 dBmV	15.0 dBmV
Video Audio Delta		B
Adjacent Level		BmV
Digital Level		BmV
256 QAM MER		
64 QAM MER		
Pre Bit Error		09
Post Bit Error		1.00E-09
Video Delta		12.0 dB

Edit Limit

Limit type: Video Level

Low Limit: -3 dBmV

High Limit: 15 dBmV

Set Minimum/Maximum Video Level

File Remove

Virtual Keyboard

-3 dBmV

1	2	3
4	5	6
7	8	9
-	0	

Back Done

Save an Open Limit Set

After editing an open limit set, you must save your changes.

Perform the following steps to save the limit set:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **Save** button as shown in the image to the right.
3. The limit set will be saved to the internal memory of the 720 DSP.

Limit Set : CPE		
Description	Minimum	Maximum
Video Level	-3.0 dBmV	15.0 dBmV
Video Audio Delta	10.0 dB	18.0 dB
Adjacent Level		3.0 dB
Digital Level	-8.0 dBmV	10.0 dBmV
256 QAM MER	20.0 dB	
New	33.0 dB	
Open		1.00E-09
Save		1.00E-09
Save As	Minimum Video Level	
File		Remove

Save an Open Limit Set with a New Name

After editing an open limit set, you can save the limit set with a new name. This function is useful for duplicating an existing limit set.

Perform the following steps to save the limit set with a new name:

1. Select the **File** softkey.
2. From the **File** pop-up menu, select the **Save As** button as shown in the image to the right.

Limit Set : CPE		
Description	Minimum	Maximum
Video Level	-3.0 dBmV	15.0 dBmV
Video Audio Delta	10.0 dB	18.0 dB
Adjacent Level		3.0 dB
Digital Level	-8.0 dBmV	10.0 dBmV
256 QAM MER	20.0 dB	
New	33.0 dB	
Open		1.00E-09
Save		1.00E-09
Save As	Minimum Video Level	
File		Remove

3. Use the **Virtual Keyboard** to enter the new name for the limit set as shown in the image to the right.
4. The new limit set will be saved to the internal memory of the 720 DSP.

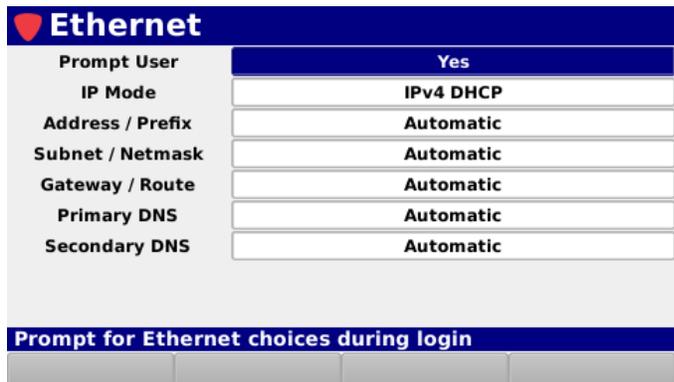
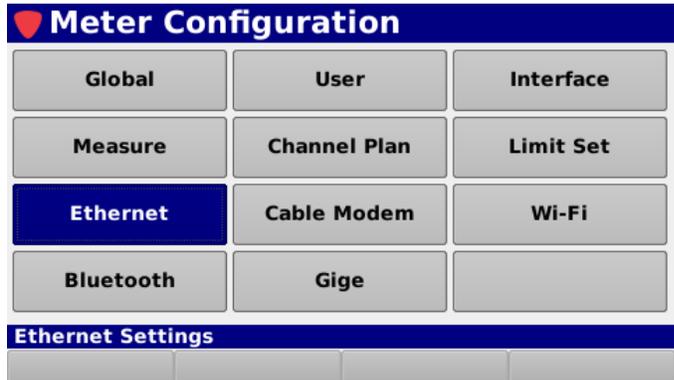
Virtual Keyboard			
[Input Field]			
q	w	e	r
t	y	u	i
o	p		
a	s	d	f
g	h	j	k
l			
z	x	c	v
b	n	m	@
,			.
Enter a Limit Set Name			
Back	ABC	123	Done

Ethernet Settings

Select the **Ethernet** button as shown in the image to the right to view/edit the Ethernet settings for the 720 DSP.

The **Ethernet** screen will be displayed as shown in the image to the right. This screen allows you to modify the Ethernet connection settings.

From within the **Ethernet** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, see the ViewPoint Operation Manual.*

Prompt User

The **Prompt User** setting is used to prompt a user with the **Network Settings** window before connecting to a network.

The default setting for **Prompt User** is **Yes**, use the left/right arrow buttons to select from the following preset values:

- Select **Yes** to prompt the user with the **Network Settings** window before connecting to a network.
- Select **No** to automatically connect using the default network settings.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 DHCP
Address / Prefix	Automatic
Subnet / Netmask	Automatic
Gateway / Route	Automatic
Primary DNS	Automatic
Secondary DNS	Automatic
Prompt for Ethernet choices during login	
<input type="button" value="Left"/> <input type="button" value="Right"/>	

IP Mode

The **IP Mode** setting is used to set which type of network connection to establish when logging into a network.

The default setting for **IP mode** is **IPv4 DHCP**, use the left/right arrow buttons to select from the following preset values:

- Select **IPv4 DHCP** to automatically obtain an IP address from a DHCP server. In this mode, the network settings cannot be adjusted and are populated with the text **Automatic**.
- Select **IPv4 Static** to manually enter the network settings. In this mode, all of the network settings must be manually adjusted as shown in the following sections.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 DHCP
Address / Prefix	Automatic
Subnet / Netmask	Automatic
Gateway / Route	Automatic
Primary DNS	Automatic
Secondary DNS	Automatic
Set the Ethernet IP mode	
<input type="button" value="Left"/> <input type="button" value="Right"/>	

Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	
Set the Ethernet IP mode	
<input type="button" value="Left"/> <input type="button" value="Right"/>	

Address / Prefix

When **IP Mode** is set to **IPv4 Static**, the **Address / Prefix** setting is used to set the IP address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the IP Address in the **###.###.###.###** format.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set the IPv4 address or Ipv6 prefix

Virtual Keyboard									
###.###.###.###									
1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	
Set the IPv4 address or Ipv6 prefix									
Back	abc	123+	Done						

Subnet / Netmask

When **IP Mode** is set to **IPv4 Static**, the **Subnet / Netmask** setting is used to set the subnet address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the subnet address in the `###.###.###.###` format.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set the IPv4 subnet or Ipv6 netmask

Virtual Keyboard									
###.###.###.###									
1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	
Set the IPv4 subnet or Ipv6 netmask									
Back	abc	123+	Done						

Gateway / Route

When **IP Mode** is set to **IPv4 Static**, the **Gateway / Route** setting is used to set the subnet address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the gateway address in the `###.###.###.###` format.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set the gateway or route

Virtual Keyboard									
###.###.###.###									
1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	
Set the gateway or route									
Back	abc	123+	Done						

Primary DNS

When **IP Mode** is set to **IPv4 Static**, the **Primary DNS** setting is used to set the primary domain name server address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the primary DNS address in the `###.###.###.###` format.

Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set an Ethernet Domain Name Server			

Virtual Keyboard												
###.###.###.###												
1	2	3	4	5	6	7	8	9	0			
&	#	\$	%	*	-	+	()				
!	\	"	'	:	;	/	?					
,									.			
Set an Ethernet Domain Name Server												
Back			abc			123+			Done			

Secondary DNS

When **IP Mode** is set to **IPv4 Static**, the **Secondary DNS** setting is used to set the secondary domain name server address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the secondary DNS address in the `###.###.###.###` format.

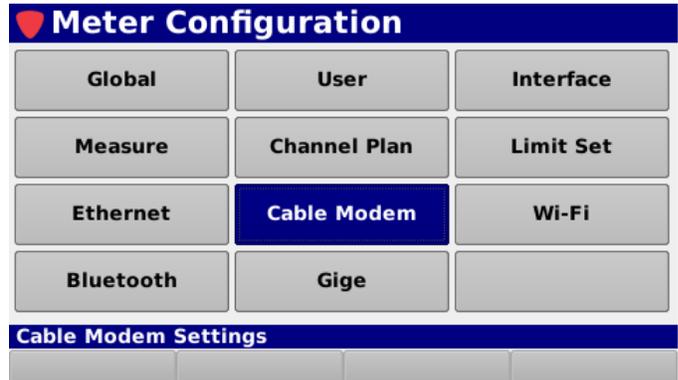
Ethernet	
Prompt User	Yes
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set an Ethernet Domain Name Server

Virtual Keyboard									
###.###.###.###									
1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	
Set an Ethernet Domain Name Server									
Back	abc	123+	Done						

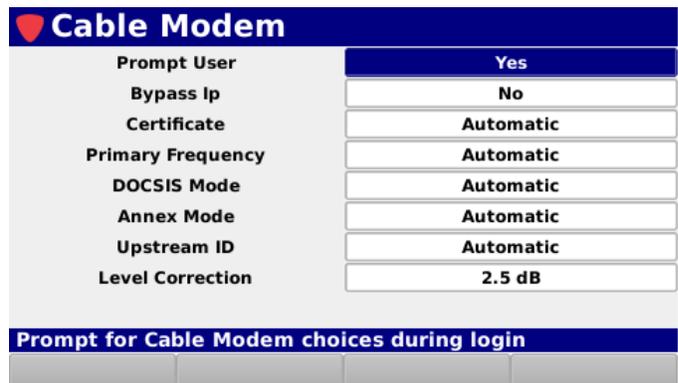
Cable Modem Settings

Select the **Cable Modem** button as shown in the image to the right to view/edit the cable modem settings for the 720 DSP.



The **Cable Modem** screen will be displayed as shown in the image to the right. This screen allows you to modify the cable modem connection settings.

From within the **Cable Modem** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



 **NOTE** *These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, see the ViewPoint Operation Manual.*

Prompt User

The **Prompt User** setting is used to prompt a user with the **Network Settings** window before connecting to a network.

The default setting for **Prompt User** is **Yes**, use the left/right arrow buttons to select from the following preset values:

- Select **Yes** to prompt the user with the **Network Settings** window before connecting to a network.
- Select **No** to automatically connect Use the default network settings.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB
Prompt for Cable Modem choices during login	

Bypass IP

The **Bypass IP** setting is used to set whether the 720 DSP obtains an IP address from the DHCP server when connecting.

The default setting for **Bypass IP** is **Yes**, select use the left/right arrow buttons to select from the following preset values:

- Select **Yes** to bypass IP address assignment by the DHCP server.
- Select **No** to obtain an IP address from the DHCP server.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB
Set the Request or Bypass DHCP Setting	



NOTE

A static IP of 192.168.100.2 will be assigned to the cable modem during the connection process if the Bypass IP option is set to Yes from within the Cable Modem Settings option of the Setup Menu.

Certificate

The **Certificate** setting is used to set which cable modem MAC address to use when connecting to the CMTS.

The default setting for **Certificate** is **Automatic**, use the left/right arrow buttons to select from the following preset values:

- Select **Automatic** to automatically connect using the MAC address that was last used to connect to the CMTS (MAC #1 by default).
- If the first MAC address is provisioned on the CMTS, select **MAC #1** to connect using the first MAC address.
- If the second MAC address is provisioned on the CMTS, select **MAC #2** to connect using the second MAC address.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB
Set the Certificate / MAC	

Primary Frequency

The **Primary Frequency** setting is used to set the primary cable modem frequency to use when connecting to the CMTS.

The primary frequency can be set from a minimum of 000.000 MHz (Automatic) up to a maximum of 999.999 MHz.

Use either of the following methods to change the primary frequency of the cable modem:

- Use the up/down arrow buttons to change the value in 1.000 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the primary frequency as shown in the image to the right.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB
Set the Downstream frequency	

Virtual Keyboard			
0.000 MHz			
1	2	3	
4	5	6	
7	8	9	
	0	.	
Set the Downstream frequency			
Back			Done

DOCSIS Mode

The **DOCSIS Mode** setting is used to set the DOCSIS mode of the CMTS that the cable modem will connect to.

The default setting for **DOCSIS Mode** is **Automatic**, use the left/right arrow buttons to select from the following preset values:

- **Automatic** – Automatically determine the DOCSIS mode of the CMTS during login.
- **DOCSIS 1.1** – Connect to a DOCSIS 1.1 CMTS.
- **DOCSIS 2.0** – Connect to a DOCSIS 2.0 CMTS.
- **DOCSIS 3.0** – Connect to a DOCSIS 3.0 CMTS.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB
Set the DOCSIS Mode	

Annex Mode

The **Annex Mode** setting is used to set the Annex mode of the CMTS that the cable modem will connect to.

The default setting for **Annex Mode** is **Automatic** and will be automatically determined during login.

Upstream ID

The **Upstream ID** setting is used to set the ID of the upstream channel of the CMTS that the cable modem will connect to.

The default setting for **Upstream ID** is **Automatic**. The upstream ID can be set from a minimum of 0 (Automatic) up to a maximum of 16.

Use either of the following methods to change the upstream ID of the cable modem:

- Use the up/down arrow buttons to change the value in 1 unit increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the upstream ID as shown in the image to the right.

Cable Modem	
Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB

Set the Upstream ID

--	--	--	--

Virtual Keyboard

0		
1	2	3
4	5	6
7	8	9
	0	

Set the Upstream ID

Back		Done
------	--	------

Level Correction

The **Level Correction** setting is used to set the downstream correction level. This is similar to a calibration factor to compensate for loss between the Input F Connector and the Internal Cable Modem.

The default setting for **Level Correction** is **Automatic**. The level correction can be set from a minimum of 0.0 dB up to a maximum of 4.0 dB.

Use either of the following methods to change the level correction of the cable modem:

- Use the up/down arrow buttons to change the value in 0.1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the level correction as shown in the image to the right.

Cable Modem

Prompt User	Yes
Bypass Ip	No
Certificate	Automatic
Primary Frequency	Automatic
DOCSIS Mode	Automatic
Annex Mode	Automatic
Upstream ID	Automatic
Level Correction	2.5 dB

Set the Downstream Correction

Virtual Keyboard

2.5 dB

1	2	3
4	5	6
7	8	9
-	0	.

Set the Downstream Correction

Back		Done
------	--	------

Wi-Fi Settings

Select the **Wi-Fi** button as shown in the image to the right to view/edit the Wi-Fi settings for the 720 DSP.

The **Wi-Fi** screen will be displayed as shown in the image to the right. This screen allows you to modify the Wi-Fi connection settings.

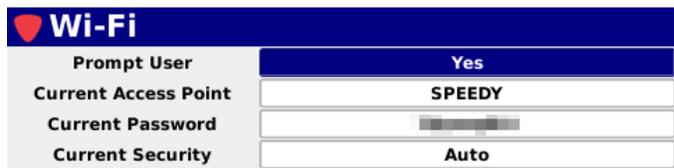
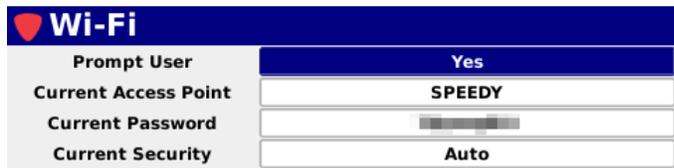
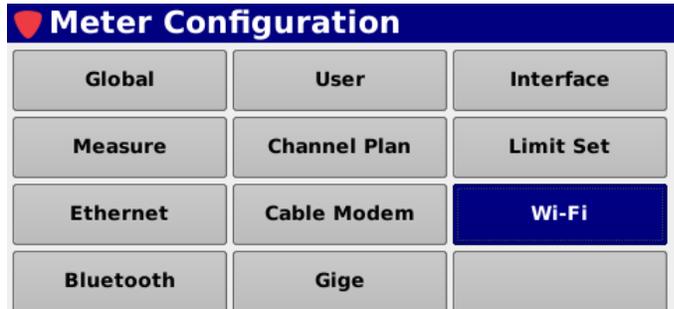
From within the **Wi-Fi** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

Prompt User

The **Prompt User** setting is used to prompt a user with the **Network Settings** window before logging into a network.

The default setting for **Prompt User** is **Yes**, use the left/right arrow buttons to select from the following preset values:

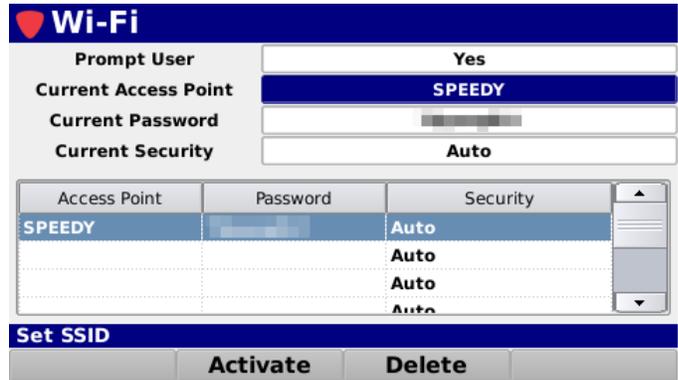
- Select **Yes** to prompt the user with the **Network Settings** window before connecting to a network.
- Select **No** to automatically connect using the default network settings.



Current SSID

The **Current SSID** setting is used to set the SSID of the default Wi-Fi network.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the SSID of the Wi-Fi network.



Wi-Fi

Prompt User: Yes

Current Access Point: **SPEEDY**

Current Password: [REDACTED]

Current Security: Auto

Access Point	Password	Security
SPEEDY	[REDACTED]	Auto
		Auto
		Auto
		Auto

Set SSID

Activate Delete



Virtual Keyboard

SPEEDY

q w e r t y u i o p

a s d f g h j k l

z x c v b n m @

, .

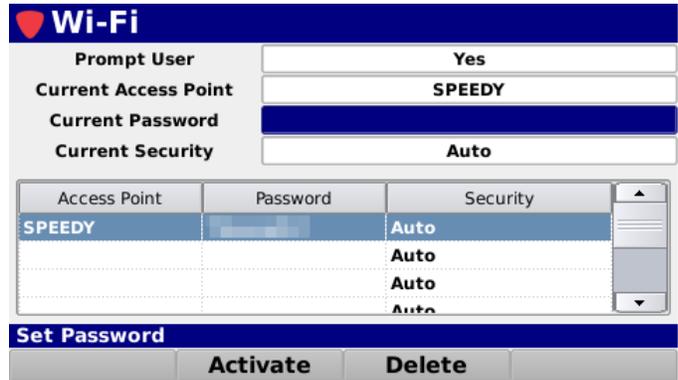
Set SSID

Back ABC 123 Done

Current Password

The **Current Password** setting is used to set the password of the default Wi-Fi network.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the password of the Wi-Fi network.

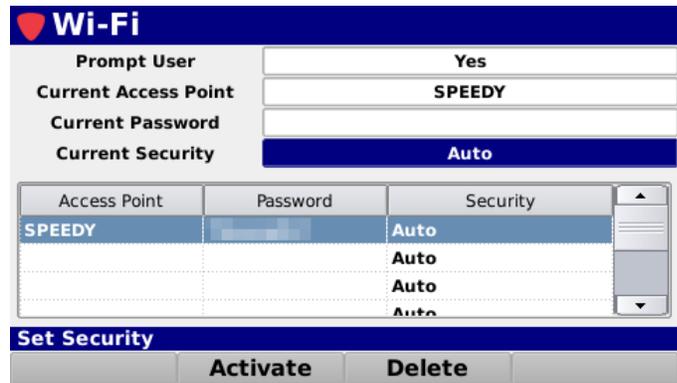


Current Security

The **Current Security** setting is used to set the security of the selected Wi-Fi network.

The default setting for **Current Security** is **Auto**, use the left/right arrow buttons to select from the following preset values:

- **Auto** – This will automatically set the security protocol of the Wi-Fi access point.
- **WEP 40/64** – This is the Wired Equivalency Privacy (WEP) security protocol with a 40 or 64 bit hexadecimal security key.
- **WEP 104/128** – This is the Wired Equivalency Privacy (WEP) security protocol with a 104 or 128 bit hexadecimal security key.
- **WPA/WPA2** – This is either the Wi-Fi Protected Access (WPA-PSK, TKIP) with a 256 bit key (64 hexadecimal digits) or Wi-Fi Protected Access II (WPA2-PSK) security protocol with a passphrase of 8 to 63 ACSII characters.



The screenshot shows the 'Wi-Fi' configuration page. At the top, there's a blue header with a red shield icon and the text 'Wi-Fi'. Below this, there are four rows of configuration options, each with a label on the left and a value in a white box with a grey border:

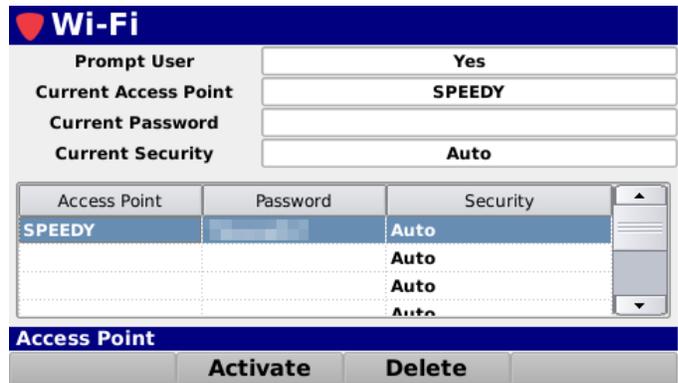
- Prompt User**: Yes
- Current Access Point**: SPEEDY
- Current Password**: (empty)
- Current Security**: Auto

Below these fields is a table with three columns: 'Access Point', 'Password', and 'Security'. The first row is highlighted in blue and contains 'SPEEDY', a masked password, and 'Auto'. Below this are three more rows, each with 'Auto' in the 'Security' column. To the right of the table is a vertical scrollbar. At the bottom of the interface, there is a blue bar with the text 'Set Security' and two buttons: 'Activate' and 'Delete'.

Select Default Access Point

Highlight the desired access point from the access points table and then select the **Activate** softkey.

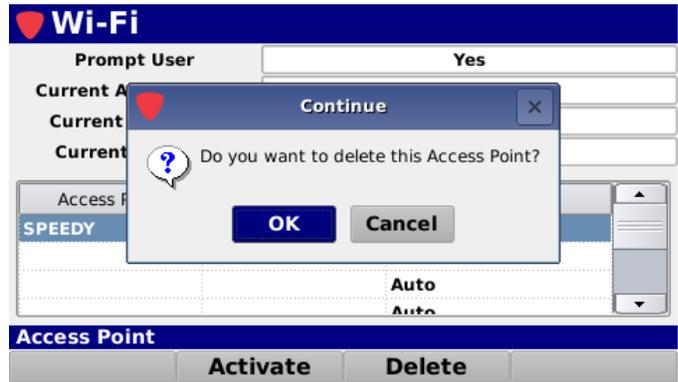
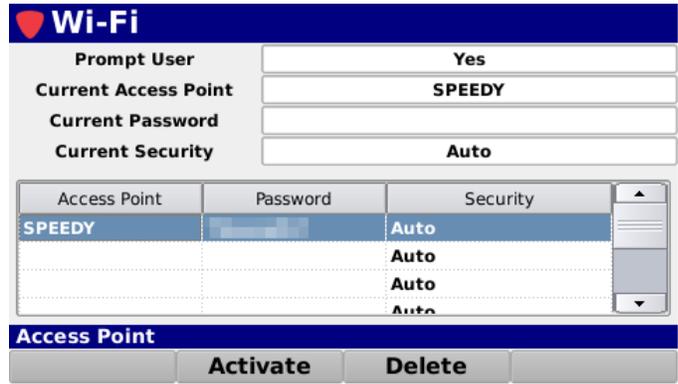
The **Continue** window will be displayed as shown in the image to the right. Select the **OK** button to continue or select the **Cancel** button to exit without setting the default access point.



Delete a Saved Access Point

Highlight the desired access point from the access points table and then select the **Delete** softkey.

The **Continue** window will be displayed as shown in the image to the right. Select the **OK** button to continue or select the **Cancel** button to exit without deleting the saved access point.



Bluetooth Settings (OPTIONAL)

Select the **Bluetooth** button as shown in the image to the right to view/edit the Bluetooth settings for the 720 DSP.

The **Bluetooth** screen will be displayed as shown in the image to the right. This screen allows you to modify the Bluetooth connection settings.

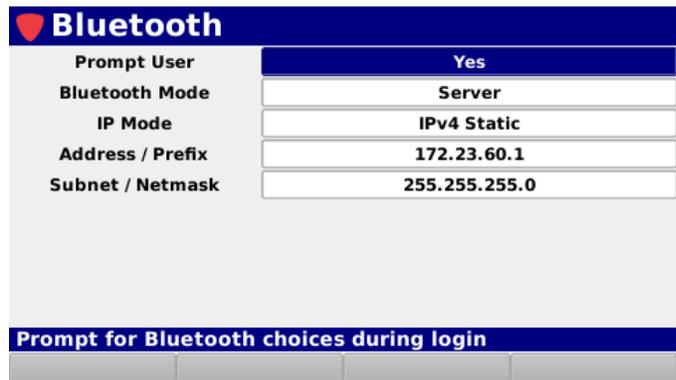
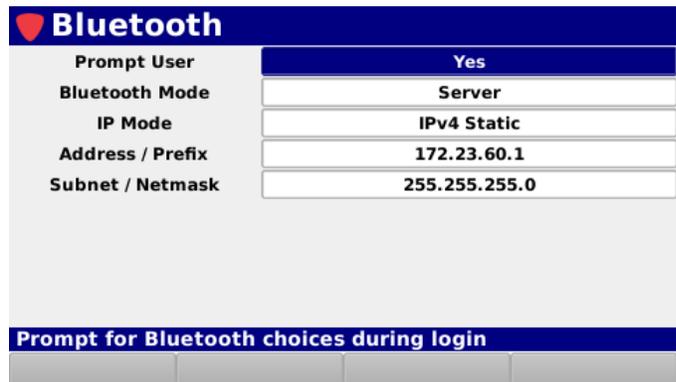
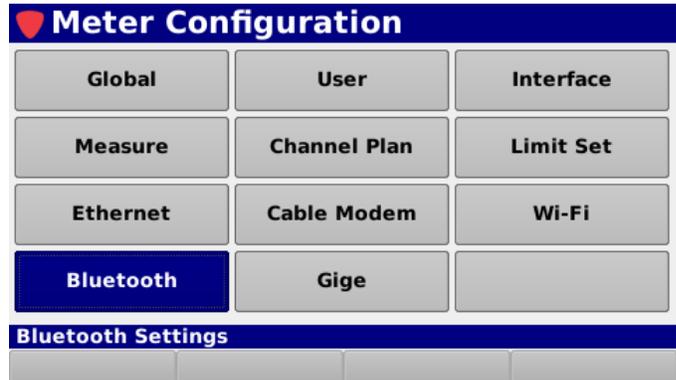
From within the **Bluetooth** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.

Prompt User

The **Prompt User** setting is used to prompt a user with the **Network Settings** window before logging into a network.

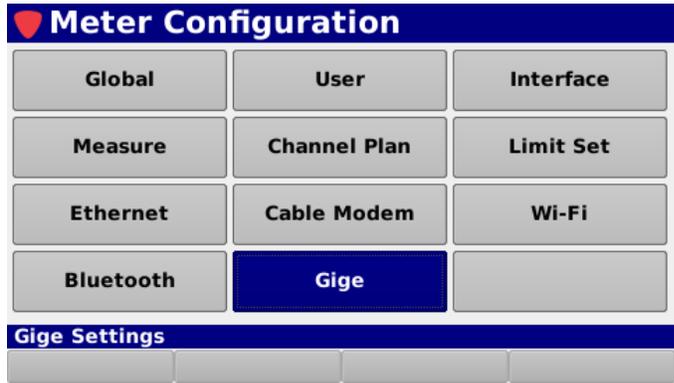
The default setting for **Prompt User** is **Yes**, use the left/right arrow buttons to select from the following preset values:

- Select **Yes** to prompt the user with the **Network Settings** window before connecting to a network.
- Select **No** to automatically connect using the default network settings.



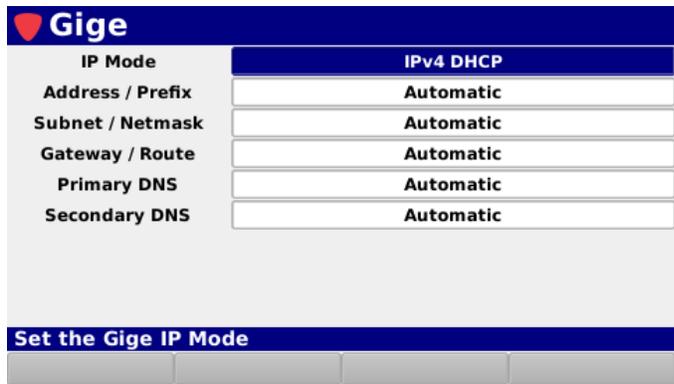
Gigabit Ethernet Settings

Select the **GigE** button as shown in the image to the right to view/edit the Gigabit Ethernet settings for the 720 DSP.



The **GigE** screen will be displayed as shown in the image to the right. This screen allows you to modify the Gigabit Ethernet connection settings.

From within the **GigE** screen, use the left/right arrow buttons on the keypad to navigate through the list of setup items.



These parameters can be set directly from your instrument or using the ViewPoint WFM Module. For instructions regarding setup using ViewPoint, see the ViewPoint Operation Manual.

IP Mode

The **IP Mode** setting is used to set which type of network connection to establish when logging into a network.

The default setting for **IP mode** is **IPv4 DHCP**, use the left/right arrow buttons to select from the following preset values:

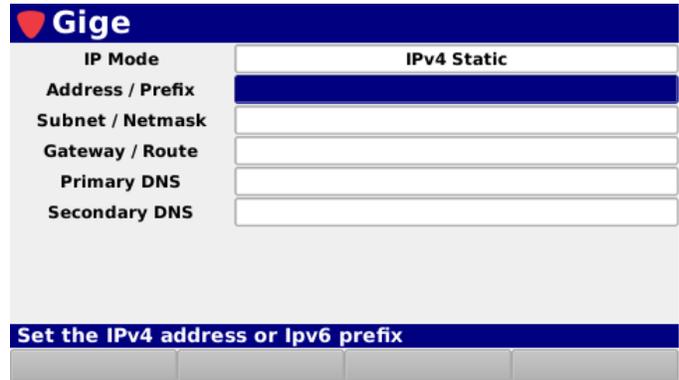
- Select **IPv4 DHCP** to automatically obtain an IP address from a DHCP server. In this mode, the network settings cannot be adjusted and are populated with the text **Automatic**.
- Select **IPv4 Static** to manually enter the network settings. In this mode, all of the network settings must be manually adjusted as shown in the following sections.

Gige	
IP Mode	IPv4 DHCP
Address / Prefix	Automatic
Subnet / Netmask	Automatic
Gateway / Route	Automatic
Primary DNS	Automatic
Secondary DNS	Automatic
Set the Gige IP Mode	
<input type="button" value="Left"/> <input type="button" value="Right"/>	

Gige	
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	
Set the Gige IP Mode	
<input type="button" value="Left"/> <input type="button" value="Right"/>	

Address / Prefix

When **IP Mode** is set to **IPv4 Static**, the **Address / Prefix** setting is used to set the IP address of the network connection.

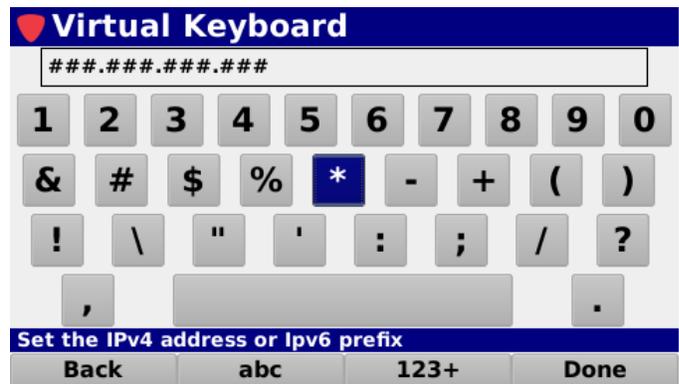


Gige

IP Mode	IPv4 Static
Address / Prefix	<input type="text"/>
Subnet / Netmask	<input type="text"/>
Gateway / Route	<input type="text"/>
Primary DNS	<input type="text"/>
Secondary DNS	<input type="text"/>

Set the IPv4 address or Ipv6 prefix

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the IP Address in the `###.###.###.###` format.



Virtual Keyboard

###.###.###.###

1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	

Set the IPv4 address or Ipv6 prefix

Back abc 123+ Done

Subnet / Netmask

When **IP Mode** is set to **IPv4 Static**, the **Subnet / Netmask** setting is used to set the subnet address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the subnet address in the `###.###.###.###` format.

Gige

IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set the IPv4 subnet or Ipv6 netmask

Virtual Keyboard

###.###.###.###

1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	

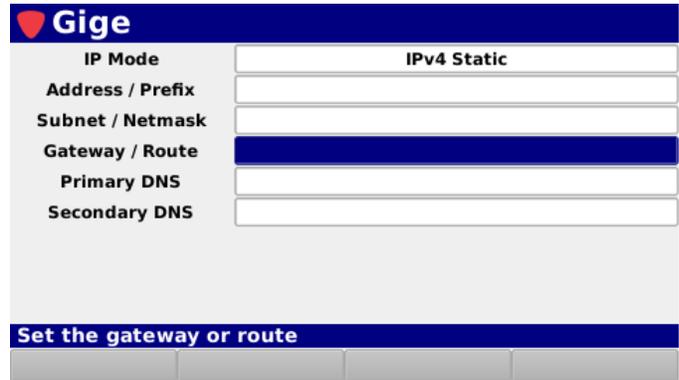
Set the IPv4 subnet or Ipv6 netmask

Back abc 123+ Done

Gateway / Route

When **IP Mode** is set to **IPv4 Static**, the **Gateway / Route** setting is used to set the subnet address of the network connection.

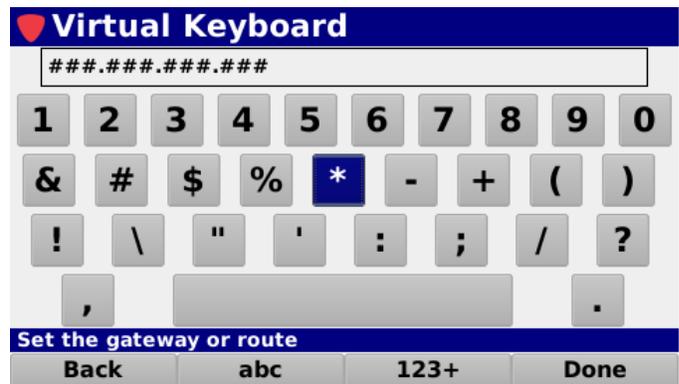
Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the gateway address in the `###.###.###.###` format.



Gige

IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set the gateway or route



Virtual Keyboard

###.###.###.###

1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	

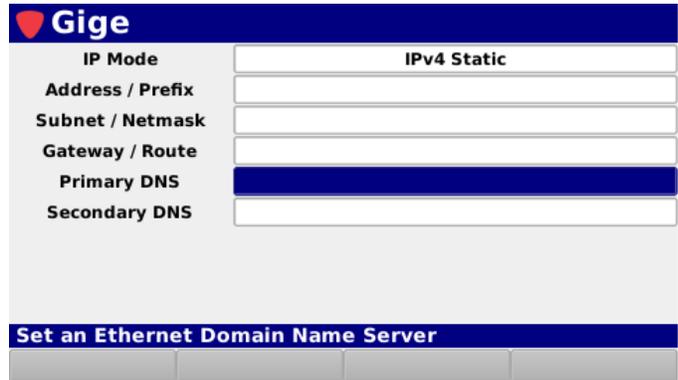
Set the gateway or route

Back abc 123+ Done

Primary DNS

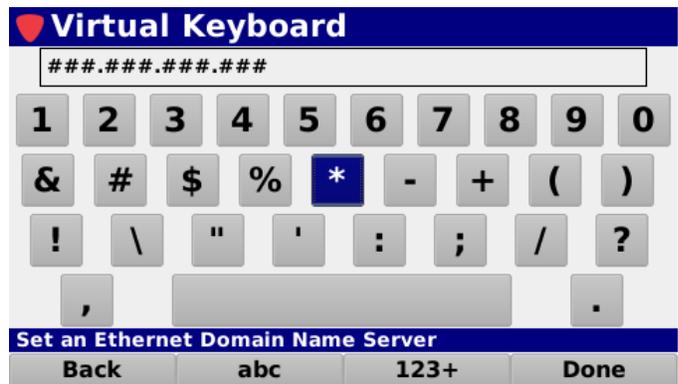
When **IP Mode** is set to **IPv4 Static**, the **Primary DNS** setting is used to set the primary domain name server address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the primary DNS address in the `###.###.###.###` format.



Gige	
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set an Ethernet Domain Name Server



###.###.###.###

1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	

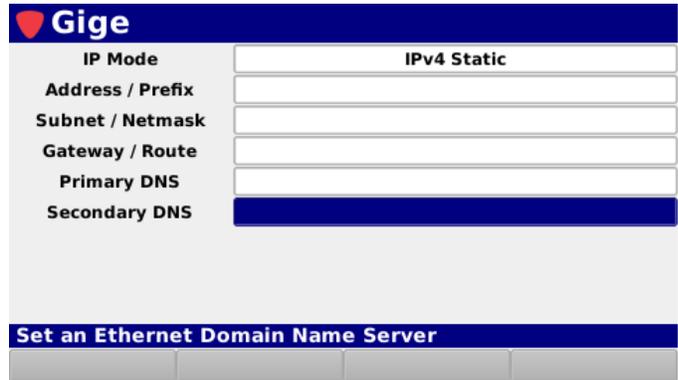
Set an Ethernet Domain Name Server

Back abc 123+ Done

Secondary DNS

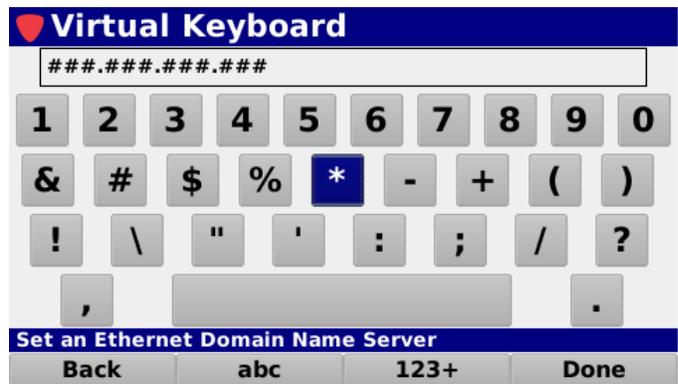
When **IP Mode** is set to **IPv4 Static**, the **Secondary DNS** setting is used to set the secondary domain name server address of the network connection.

Press the **Enter** button and the **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the secondary DNS address in the `###.###.###.###` format.



Gige	
IP Mode	IPv4 Static
Address / Prefix	
Subnet / Netmask	
Gateway / Route	
Primary DNS	
Secondary DNS	

Set an Ethernet Domain Name Server



###.###.###.###

1	2	3	4	5	6	7	8	9	0
&	#	\$	%	*	-	+	()	
!	\	"	'	:	;	/	?		
,								.	

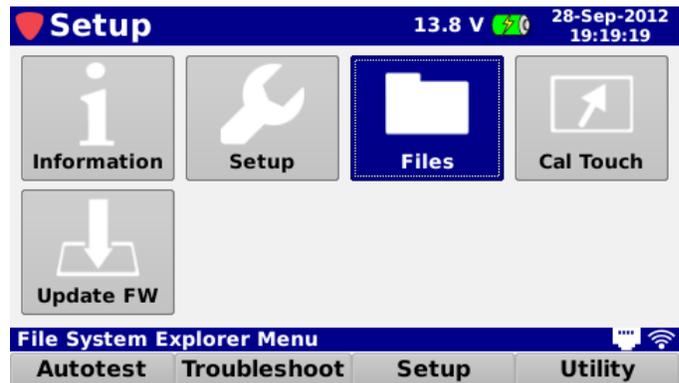
Set an Ethernet Domain Name Server

Back	abc	123+	Done
------	-----	------	------

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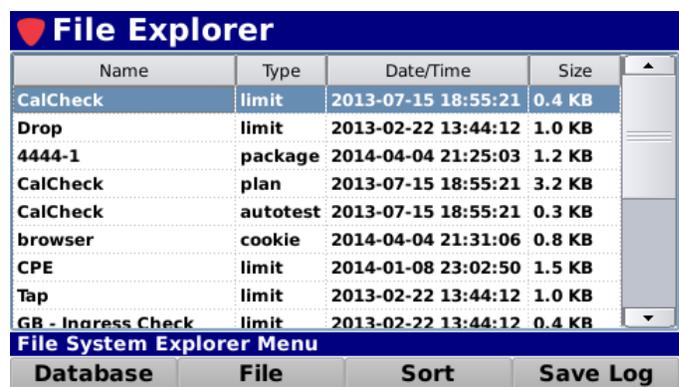
Overview

Select the **Files** icon as shown in the image to the right to view the files that are stored in the internal memory of the 720 DSP.



The **File Explorer** screen will be displayed as shown in the image to the right. This screen allows you to perform the following actions:

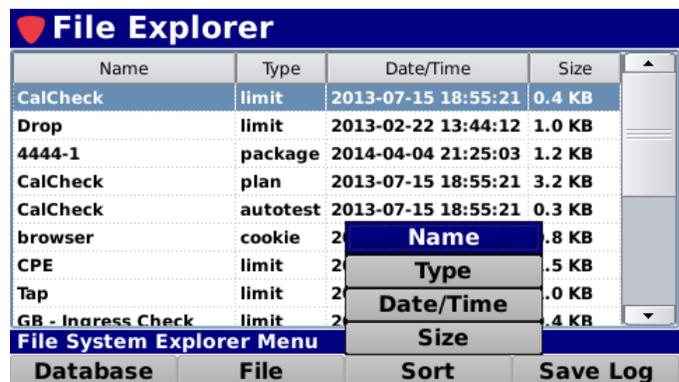
- View and sort files by; name, type, size and date/time saved
- Export files to USB
- Delete files
- Database backup & restore
- Save system logs



View & Sort

From within the **File Explorer** screen, use the arrow buttons on the keypad to navigate through the list of files.

Select the **Sort** softkey to sort the file list. Select from **Name**, **Type**, **Date/Time**, or **Size** sort types as shown in the image to the right.

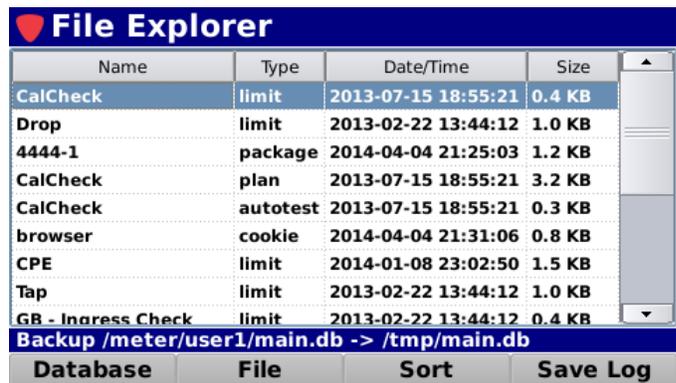
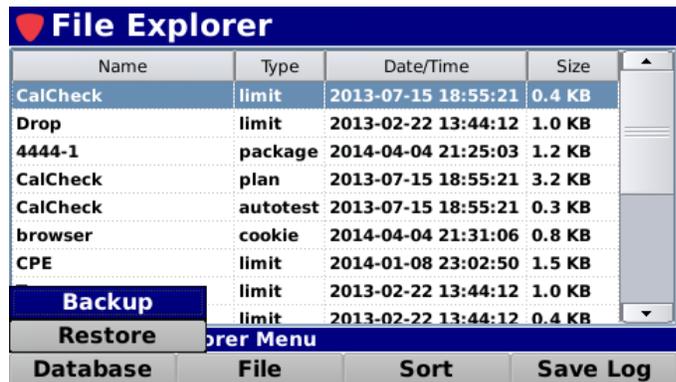


Database Backup

Backup to Internal Memory

Perform the following steps to backup the 720 DSP database file to the internal memory of the 720 DSP:

1. Select the **Database** softkey.
2. From the **Database** pop-up menu, select the **Backup** button as shown in the image to the right.
3. The Status Bar will indicate a successful backup to the internal memory by displaying the text “-> /tmp/main.db” as shown in the image below.



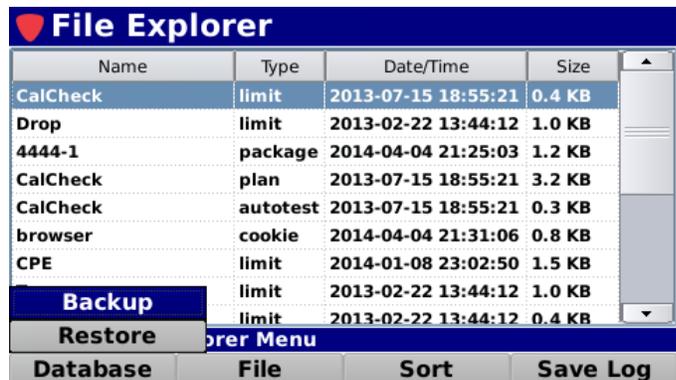
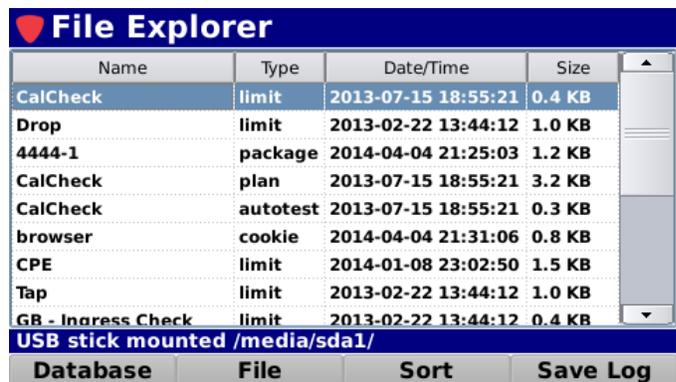
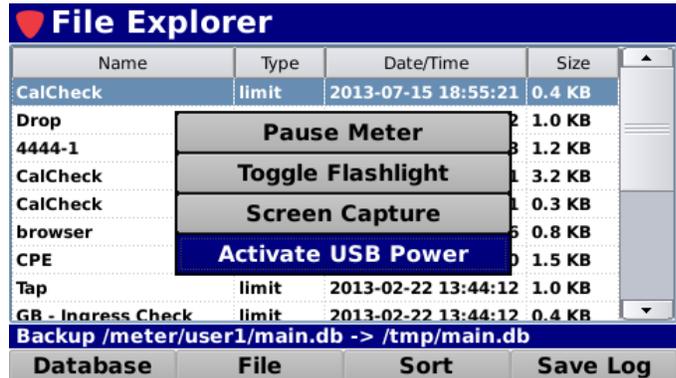
This internal memory is lost on power down and is only used to clone users on the meter by backing up the database of one user and restoring the database to another user.

This function is useful when cloning the device settings between users on the same meter. When importing the database file under another user, all device settings will be updated while retaining the existing user information.

Backup to USB Flash Drive

Perform the following steps to backup the 720 DSP database file to a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.
4. Select the **Database** softkey.
5. From the **Database** pop-up menu, select the **Backup** button as shown in the image to the right.



- The **Message Bar** will indicate a successful backup to the flash drive by displaying the text “-> /media/sda1/main.db” as shown in the image below.

Name	Type	Date/Time	Size
CalCheck	limit	2013-07-15 18:55:21	0.4 KB
Drop	limit	2013-02-22 13:44:12	1.0 KB
4444-1	package	2014-04-04 21:25:03	1.2 KB
CalCheck	plan	2013-07-15 18:55:21	3.2 KB
CalCheck	autotest	2013-07-15 18:55:21	0.3 KB
browser	cookie	2014-04-04 21:31:06	0.8 KB
CPE	limit	2014-01-08 23:02:50	1.5 KB
Tap	limit	2013-02-22 13:44:12	1.0 KB
GB - Ingress Check	limit	2013-02-22 13:44:12	0.4 KB

Backup /meter/user1/main.db -> /media/sda1/main.db

Database File Sort Save Log



This function is useful when cloning the device settings between different meters. When importing the database file on another meter, all device settings will be updated while retaining the existing user information.

Database Restore

Restore from Internal Memory

Perform the following steps to restore the 720 DSP database file from the internal memory of the 720 DSP:

- Select the **Database** softkey.
- From the **Database** pop-up menu, select the **Restore** button as shown in the image to the right.
- The entire database will be restored from the internal memory of the 720 DSP.

Name	Type	Date/Time	Size
CalCheck	limit	2013-07-15 18:55:21	0.4 KB
Drop	limit	2013-02-22 13:44:12	1.0 KB
4444-1	package	2014-04-04 21:25:03	1.2 KB
CalCheck	plan	2013-07-15 18:55:21	3.2 KB
CalCheck	autotest	2013-07-15 18:55:21	0.3 KB
browser	cookie	2014-04-04 21:31:06	0.8 KB
CPE	limit	2014-01-08 23:02:50	1.5 KB
	limit	2013-02-22 13:44:12	1.0 KB
	limit	2013-02-22 13:44:12	0.4 KB

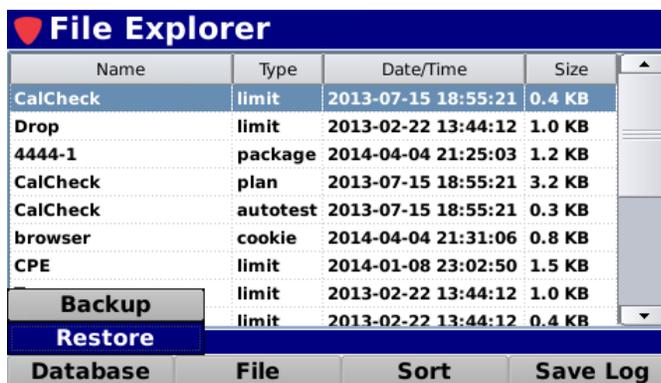
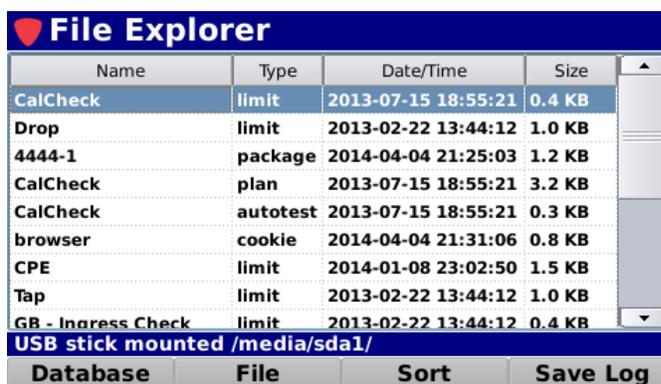
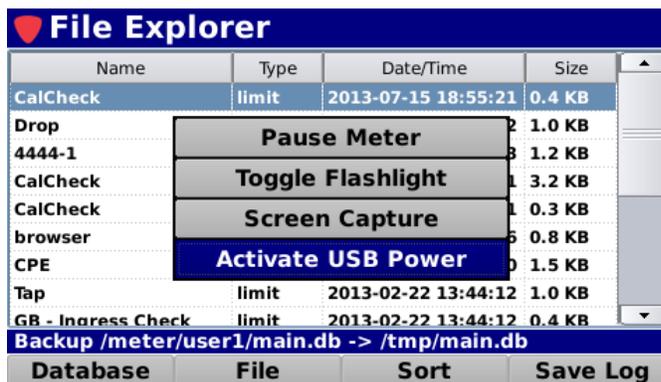
Backup Restore

Database File Sort Save Log

Restore from USB Flash Drive

Perform the following steps to restore the 720 DSP database file from a USB flash drive:

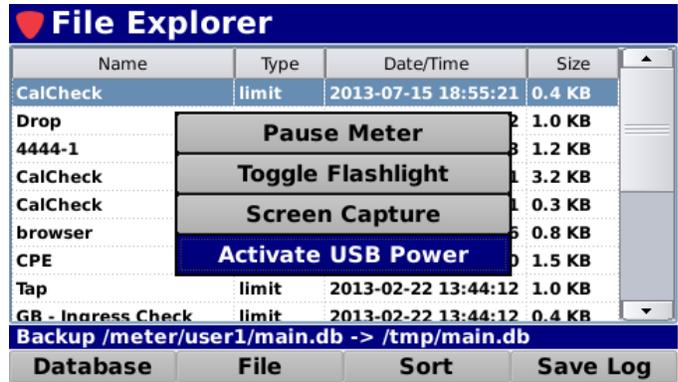
1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.
4. Select the **Database** softkey.
5. From the **Database** pop-up menu, select the **Restore** button as shown in the image to the right.
6. The entire database will be restored from the USB flash drive.



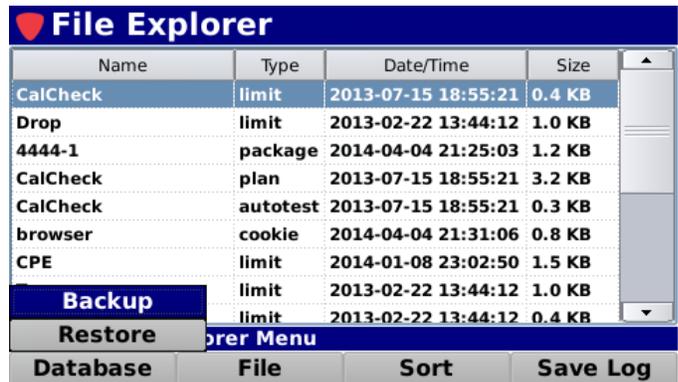
Cloning Meter Settings to a New Meter

Perform the following steps to clone all files from one 720 DSP to another:

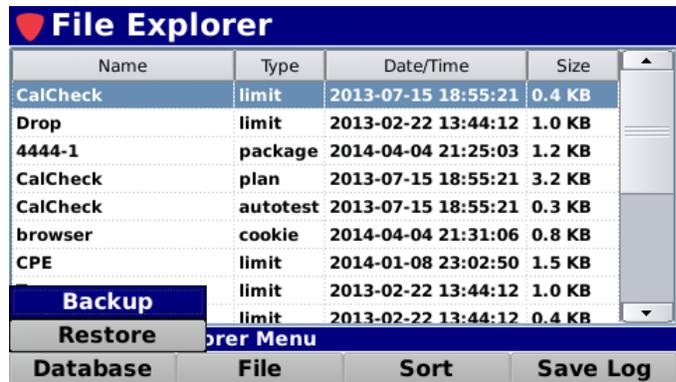
1. Insert a USB flash drive into the USB port of the meter to clone.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.



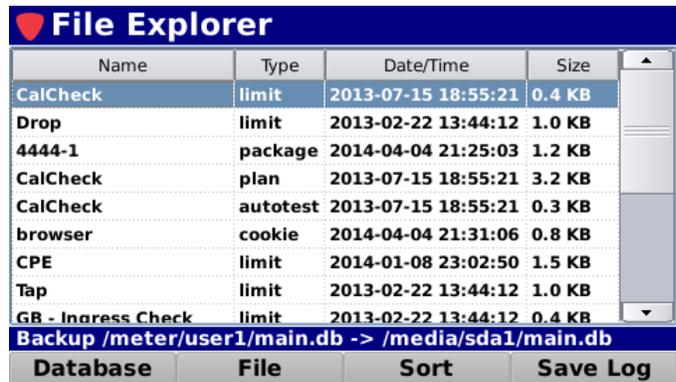
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.



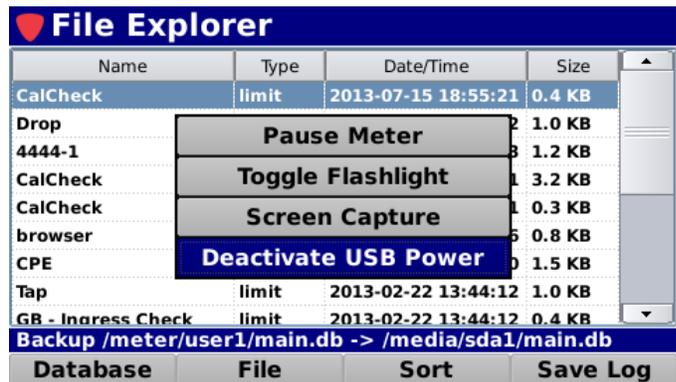
4. Select the **Database** softkey.
5. From the **Database** pop-up menu, select the **Backup** button as shown in the image to the right.



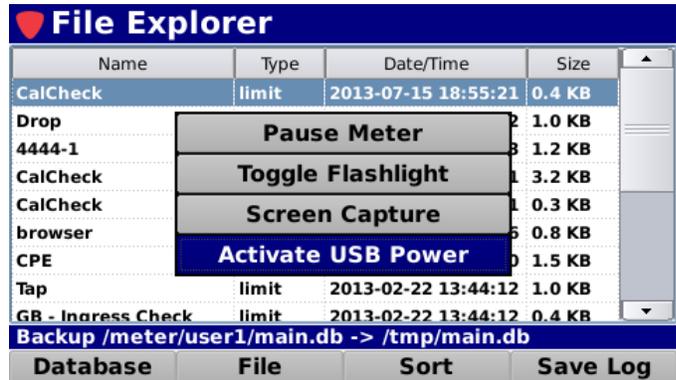
6. The **Message Bar** will indicate a successful backup to the flash drive by displaying the text “-> /media/sda1/main.db” as shown in the image to the right.



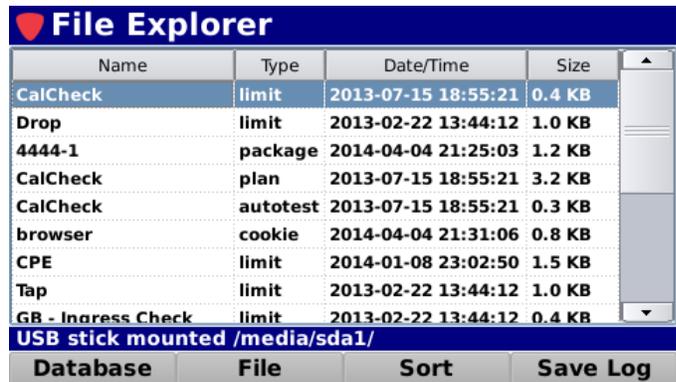
7. Press the **Function** button and select the **Deactivate USB Power** function as shown in the image to the right.
8. Remove the USB flash drive from the meter to clone.
9. Login to an existing user or create a new user on the new meter to clone to.
10. Insert a USB flash drive into the USB port of the new meter to clone to.



11. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.



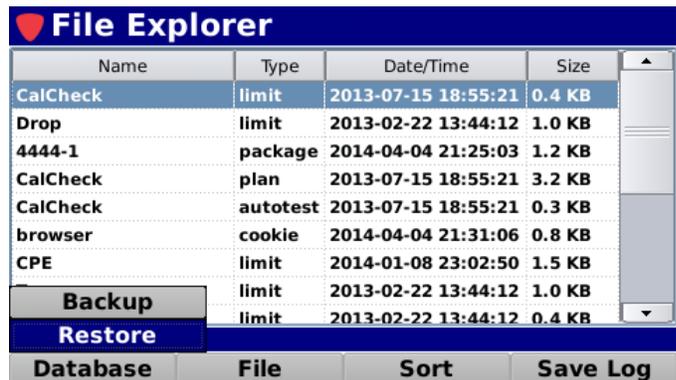
12. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.



13. Select the **Database** softkey.

14. From the **Database** pop-up menu, select the **Restore** button.

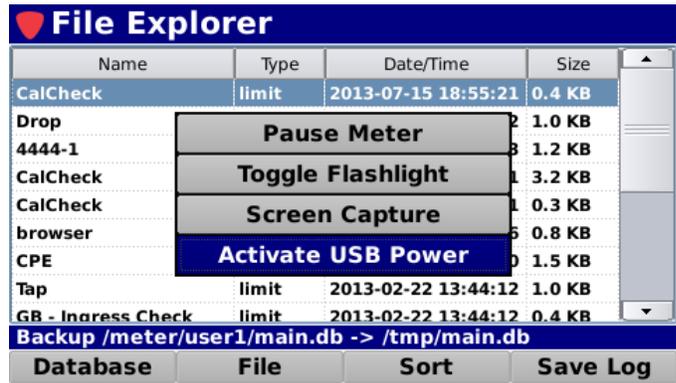
15. The clone process is now complete. To continue with additional meters return to step 7 as the database file on your memory stick may be used for all your meters. You will not have to export another database file unless there is additional files you want to move.



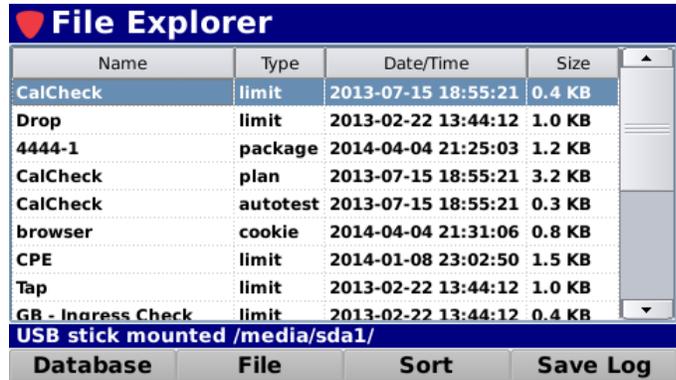
Import ViewPoint Files from a USB Flash Drive

Perform the following steps to import a ViewPoint package file from a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.



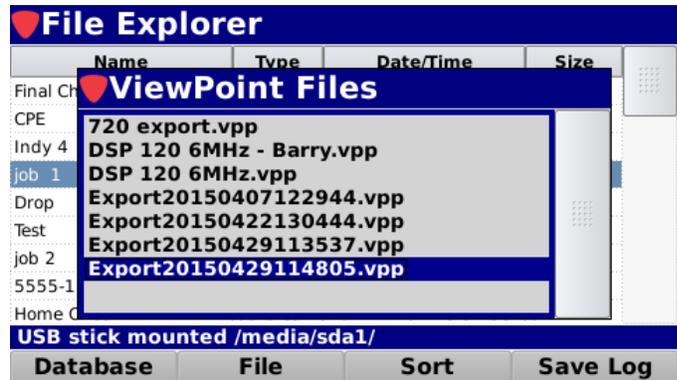
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.



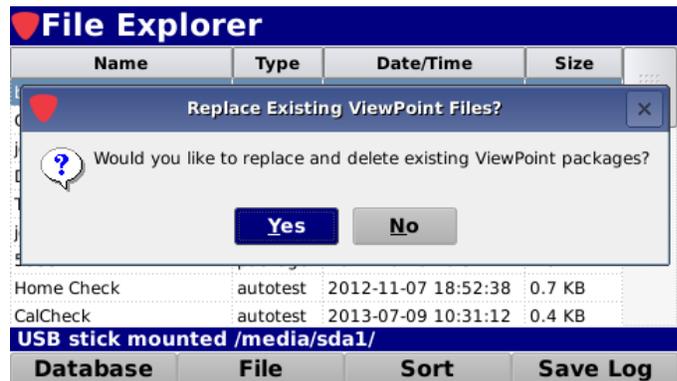
4. Select the **File** softkey.
5. From the **File** pop-up menu, select the **Import** button as shown in the image to the right.



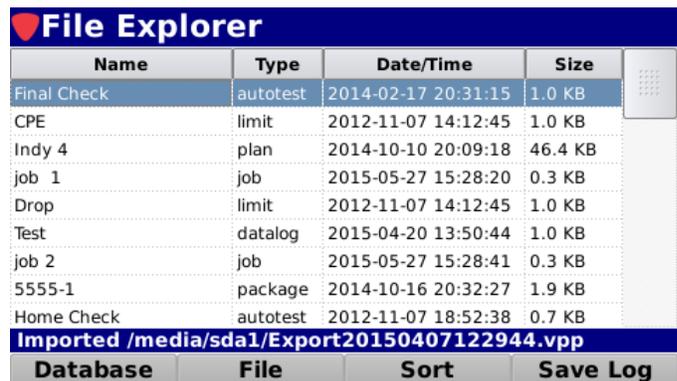
- From the **ViewPoint Files** window, use the arrow buttons to highlight the file you would like to import.



- A confirmation window will be displayed as shown in the image to the right. If you have existing ViewPoint files on the meter, it will ask if you want to replace them.
- Select the **Yes** button to import the file and replace existing files or select **No** to keep the existing package files and import the new package.



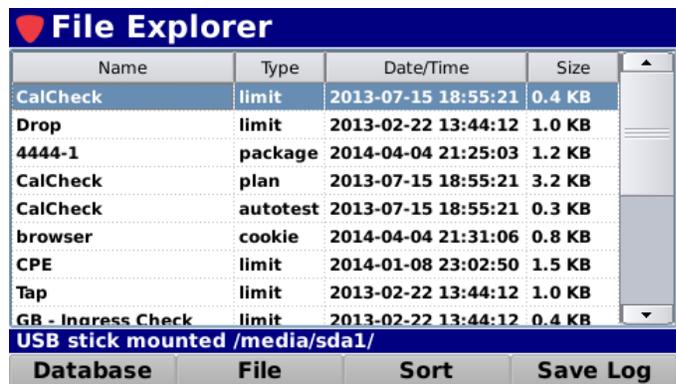
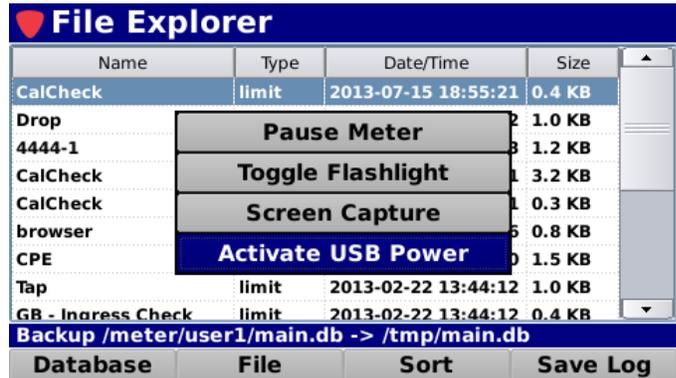
- The **Message Bar** will indicate a successful import from the flash drive by displaying the text "**Imported / media/sda1/<file_name>**" as shown in the image to the right.



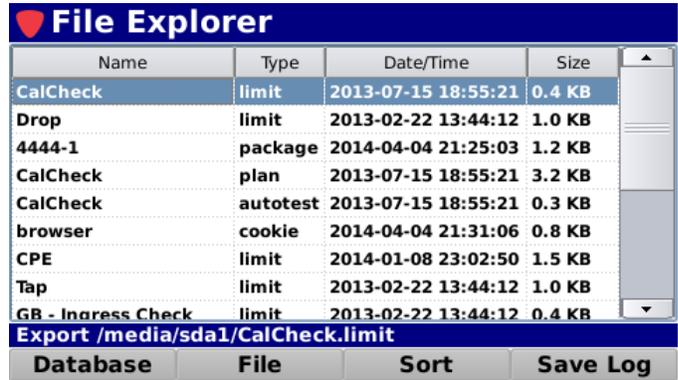
Export a File

Perform the following steps to export a single file to a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.
4. Use the arrow buttons to highlight the file that you would like to export.
5. Select the **File** softkey.
6. From the **File** pop-up menu, select the **Export** button as shown in the image to the right.



- The **Message Bar** will indicate a successful export to the flash drive by displaying the text **“Export /media/sda1/<file_name>”** as shown in the image to the right.

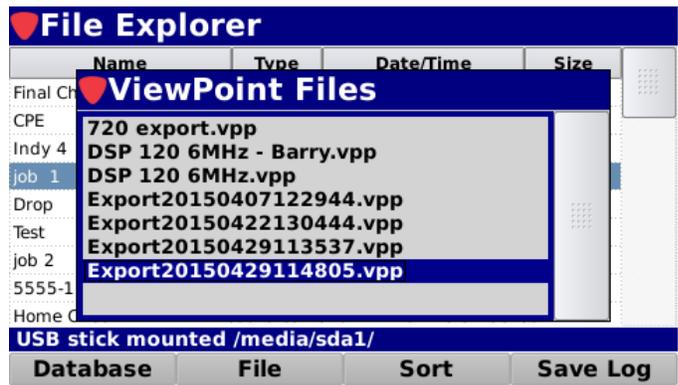


Name	Type	Date/Time	Size
CalCheck	limit	2013-07-15 18:55:21	0.4 KB
Drop	limit	2013-02-22 13:44:12	1.0 KB
4444-1	package	2014-04-04 21:25:03	1.2 KB
CalCheck	plan	2013-07-15 18:55:21	3.2 KB
CalCheck	autotest	2013-07-15 18:55:21	0.3 KB
browser	cookie	2014-04-04 21:31:06	0.8 KB
CPE	limit	2014-01-08 23:02:50	1.5 KB
Tap	limit	2013-02-22 13:44:12	1.0 KB
GB - Ingress Check	limit	2013-02-22 13:44:12	0.4 KB

Export /media/sda1/CalCheck.limit

Database File Sort Save Log

- Later when you are ready to import, you will see the file listed in the ViewPoint files on the USB flash drive, as shown here.



Name	Type	Date/Time	Size
Final Ch			
CPE			
Indy 4			
job 1			
Drop			
Test			
job 2			
5555-1			
Home C			

ViewPoint Files

- 720 export.vpp
- DSP 120 6MHz - Barry.vpp
- DSP 120 6MHz.vpp
- Export20150407122944.vpp
- Export20150422130444.vpp
- Export20150429113537.vpp
- Export20150429114805.vpp

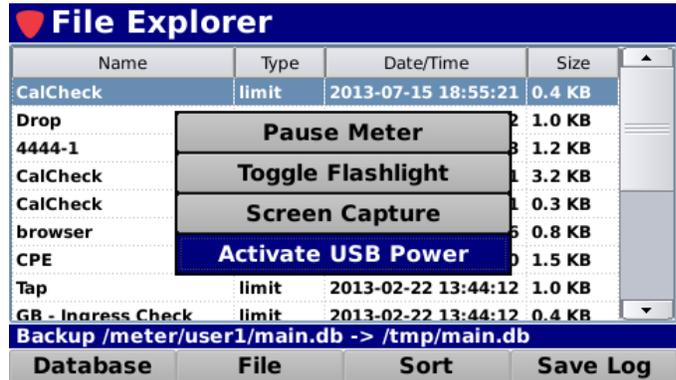
USB stick mounted /media/sda1/

Database File Sort Save Log

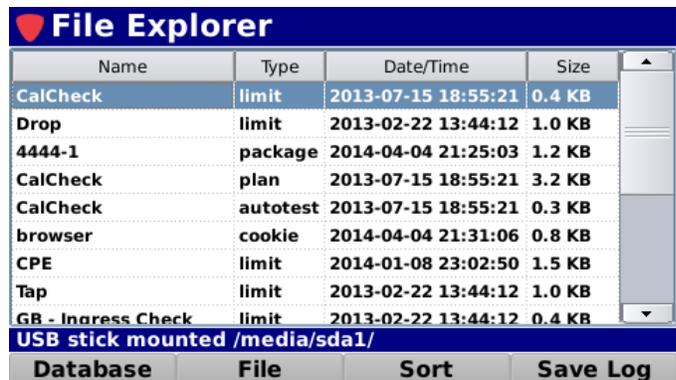
Export All Files

Perform the following steps to export all files to a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.



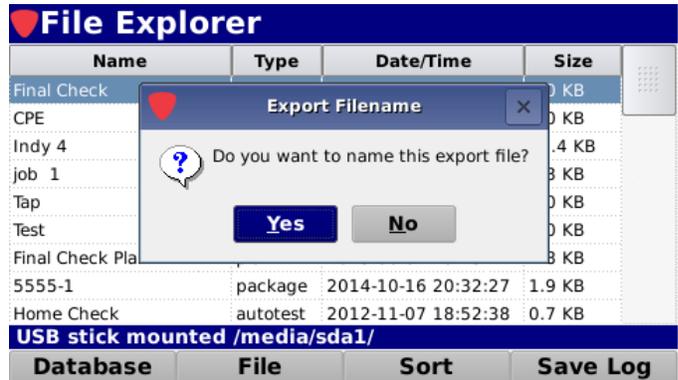
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.



4. Select the **File** softkey.
5. From the **File** pop-up menu, select the **Export All** button as shown in the image to the right.



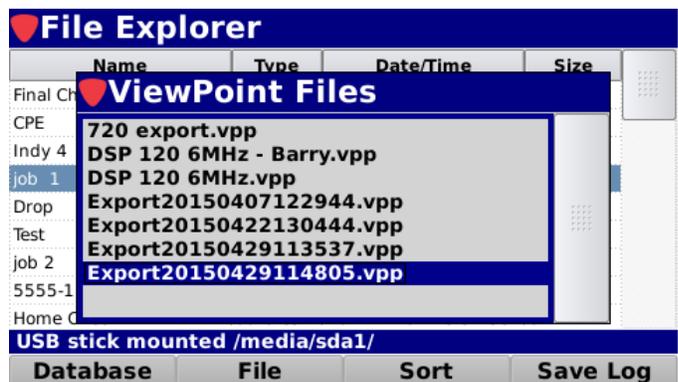
6. The **Export Filename** window will be displayed as shown in the image to the right.
7. Select the **Yes** button to name the export file or select **No** to use the date for the filename.



8. Use the **Virtual Keyboard** to enter the name of the new export file as shown in the image to the right.



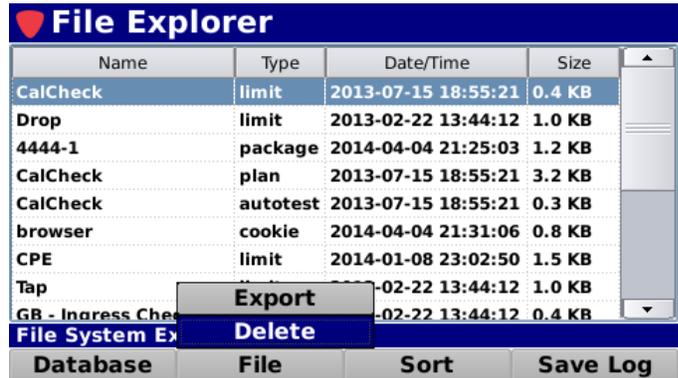
9. Later when you are ready to import, you will see the file listed in the ViewPoint files on the USB flash drive, as shown here.



Delete Files

Perform the following steps to delete files from the internal memory of the 720 DSP:

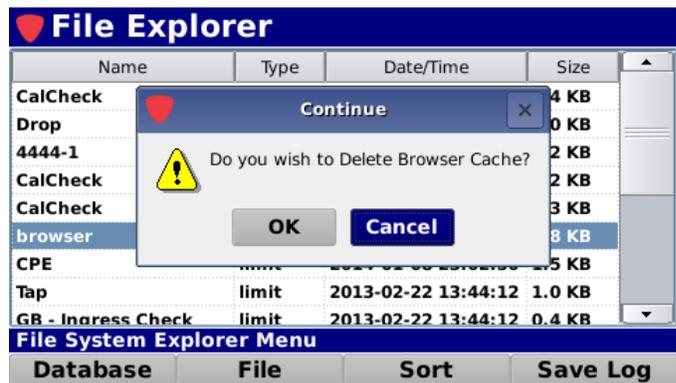
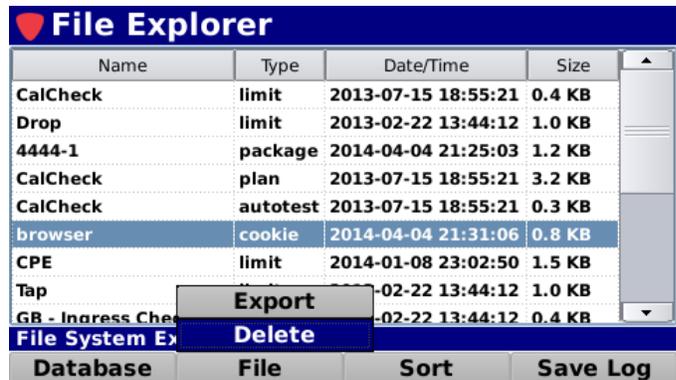
1. Use the arrow buttons to highlight the file that you want to delete.
2. Select the **File** softkey.
3. From the **File** pop-up menu, select the **Delete** button as shown in the image to the right.
4. The **Continue** window will be displayed as shown in the image to the right.
5. Select the **OK** button to delete the file or select the **Cancel** button to exit without deleting the file.



Delete Web Browser Cookies & Cache

Perform the following steps to delete the web browser cache file from the internal memory of the 720 DSP:

1. To select the browser cache file, use the arrow buttons to highlight the file named “**browser**” with the type of “**cookie**”.
2. Select the **File** softkey.
3. From the **File** pop-up menu, select the **Delete** button as shown in the image to the right.
4. The **Continue** window will be displayed as shown in the image to the right.
5. Select the **OK** button to delete the browser cache or select the **Cancel** button to exit without deleting the browser cache file.



Save Log File

This function is used when experiencing unexpected operation of the 720 DSP.

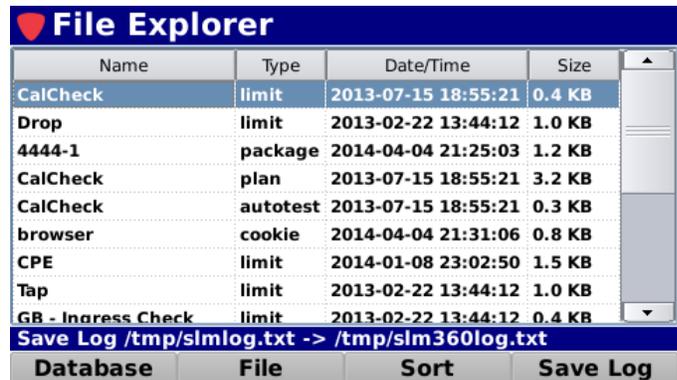


NOTE *To save a log file, the Operating Level setting must be set to Logging, see Section II: Setup, Chapter 3: Meter Configuration, Global Settings.*

Save to Internal Memory

This function is used primarily for hands-on factory and repair center troubleshooting. Perform the following steps to save the 720 DSP log file to the internal memory of the 720 DSP:

1. Select the **Save Log** softkey.
2. The **Message Bar** will indicate a successful save to the internal memory of the 720 DSP by displaying the text “-> /tmp/slm360log.txt” as shown in the image to the right.

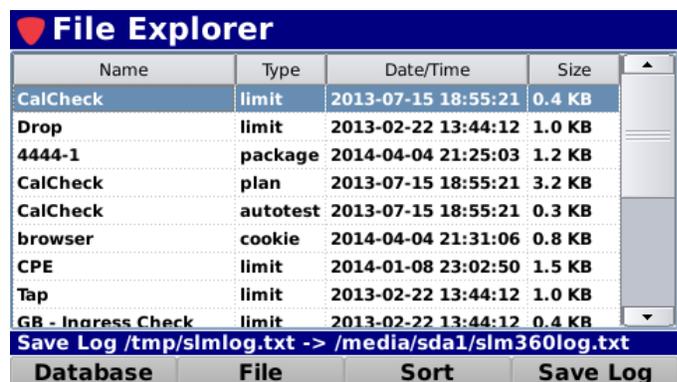
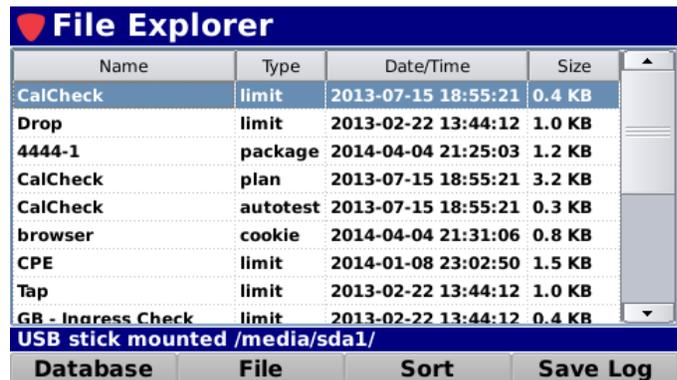
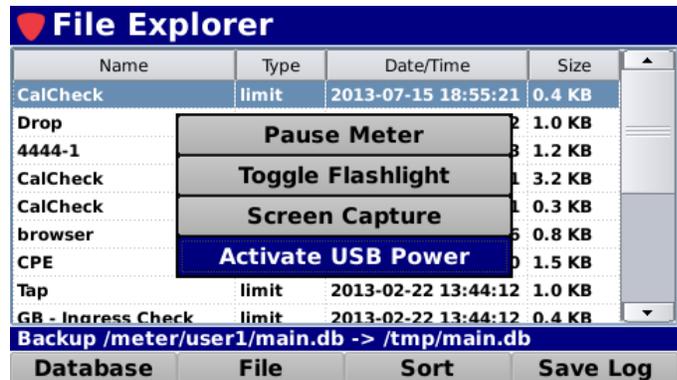


Save to USB Flash Drive

This function is used primarily for remote troubleshooting with the Trilithic Applications Support Department. This file can be emailed to Trilithic for advanced troubleshooting.

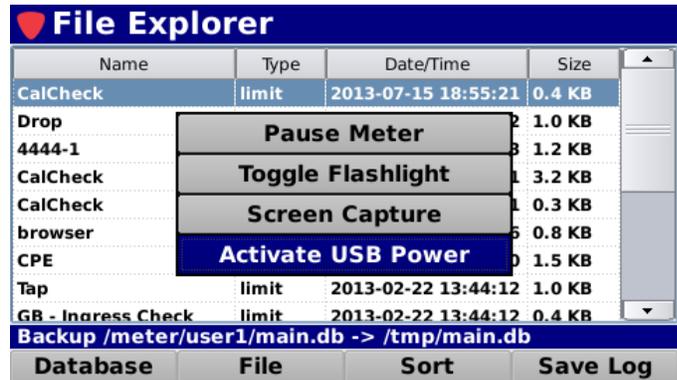
Perform the following steps to save the 720 DSP log file to a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Press the **Function** button and select the **Activate USB Power** function as shown in the image to the right.
3. The power to the USB flash drive is activated and the drive is now mounted to the file system as shown in the image to the right. The 720 DSP is now capable of transferring files to and from the USB flash drive.
4. Select the **Save Log** softkey.
5. The **Message Bar** will indicate a successful save to the flash drive by displaying the text “-> /media/sda1/slm360log.txt” as shown in the image to the right.



Function Menu Options

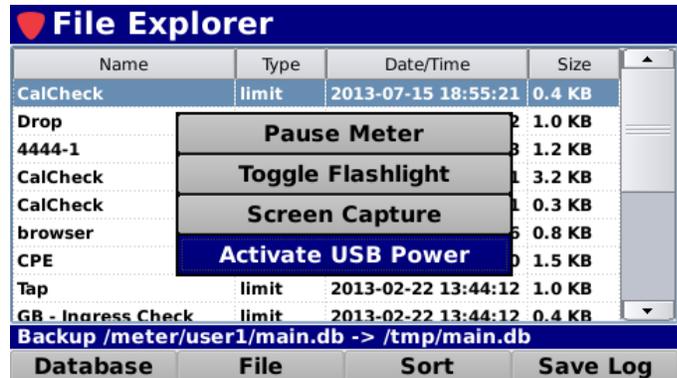
Additional functions can be accessed from within the **File Explorer** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **File Explorer** screen.



Activate USB Power

This function is used to activate power to the USB flash drive inserted into the USB port of the 720 DSP. The USB flash drive must be enabled before being able to be used.

Select the **Activate USB Power** button from the **Function** menu. The USB flash drive will be mounted to the file system and is now capable of transferring files to/from the 720 DSP.

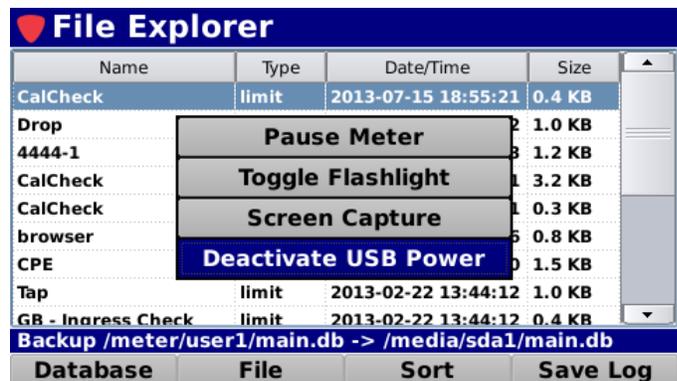


Deactivate USB Power

This function is used to deactivate power to the USB flash drive inserted into the USB port of the 720 DSP. The USB flash drive should be deactivated before removing.

Select the **Deactivate USB Power** button from the **Function** menu. The USB flash drive can now be removed.

The 720 DSP automatically deactivates the power to the USB flash drive when you exit the **File Explorer** screen.



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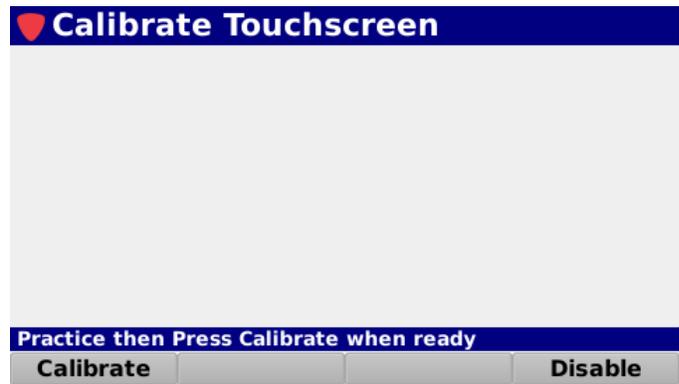
Touchscreen Calibration

Overview

Select the **Cal Touch** icon as shown in the image to the right to calibrate the touchscreen of the 720 DSP.



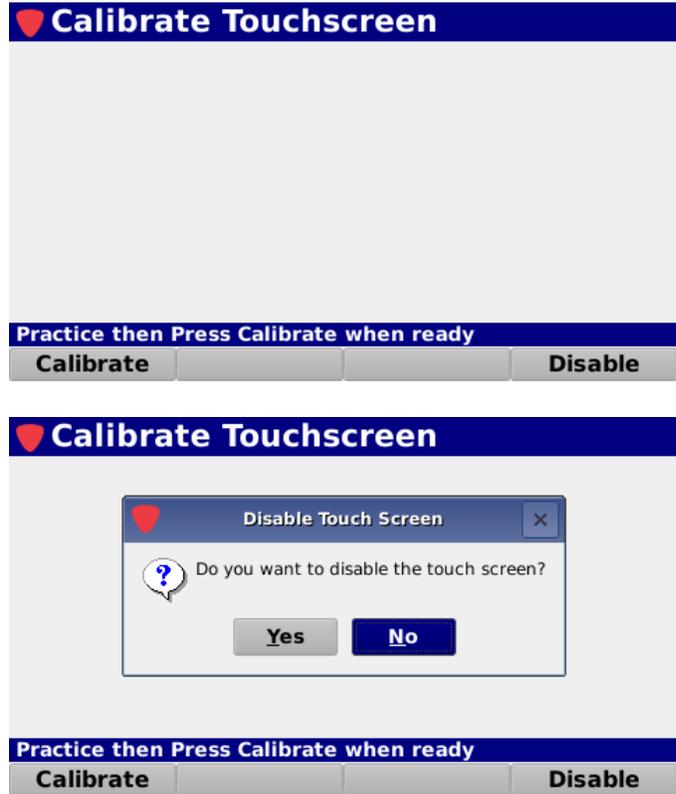
The **Calibrate Touchscreen** screen will be displayed as shown in the image to the right. This screen allows you to perform a touchscreen calibration or disable the touchscreen.



Disable Touchscreen

Perform the following steps to disable the 720 DSP touchscreen:

1. Select the **Disable** softkey.
2. The **Disable Touch Screen** window will be displayed as shown below.
3. Select the **Yes** button to disable the touchscreen or select the **No** button to exit without disabling the touchscreen.
4. To enable the touchscreen, perform the touchscreen calibration as described in the following section.



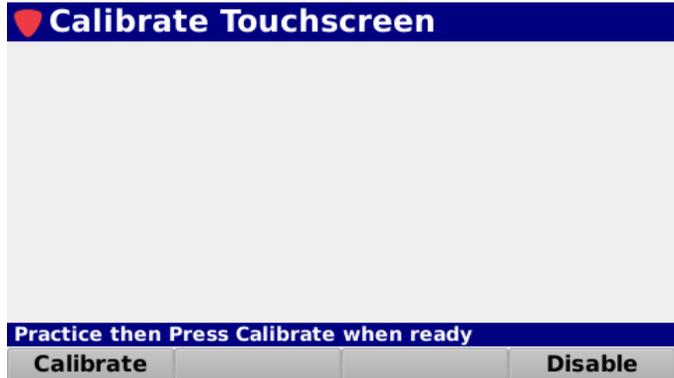
NOTE

This function can be used to disable a touchscreen that is operating improperly or has been damaged. This allows continued operation of the 720 DSP using the keypad.

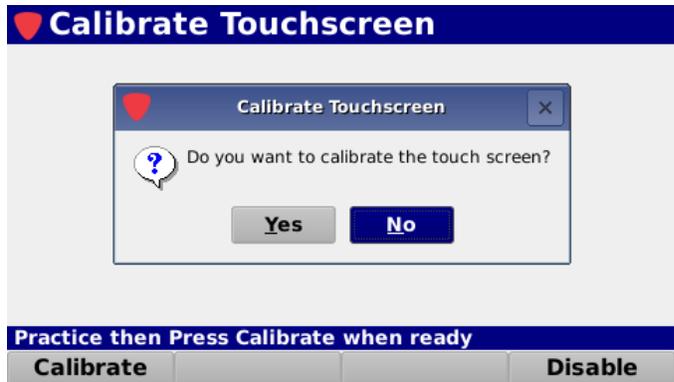
Calibrate Touchscreen

Perform the following steps to calibrate the 720 DSP touchscreen:

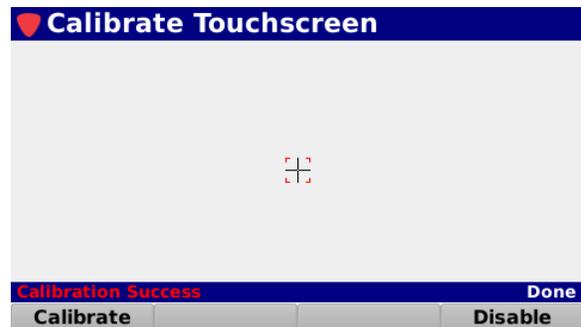
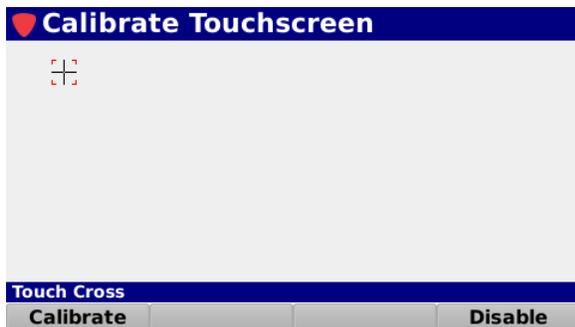
1. Select the **Calibrate** softkey.



2. The **Calibrate Touchscreen** window will be displayed as shown to the right.
3. Select the **Yes** button to calibrate the touchscreen or select the **No** button to exit without calibrating the touchscreen.



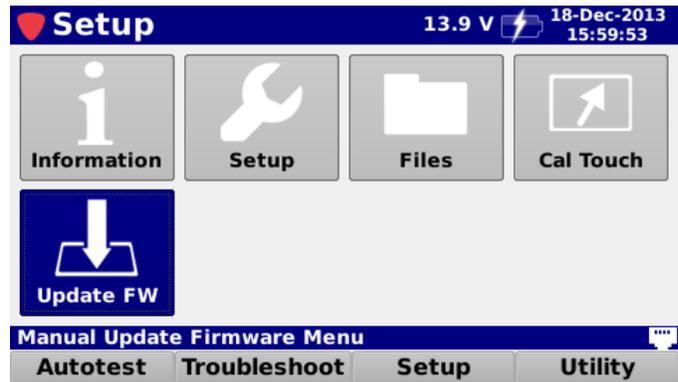
4. To calibrate the touchscreen, select the cross that appears on the screen with the included stylus. During the calibration, the **Message Bar** at the bottom of the screen will prompt you through selecting multiple points on the screen.
5. After you have selected the last cross the **Message** bar will display the text "**Calibration Success**" to indicate that the calibration has been completed successfully.



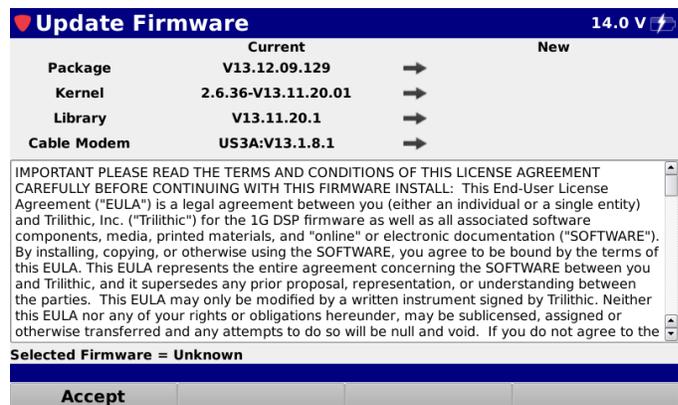
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Overview

Select the **Update FW** icon as shown in the image to the right to update the firmware of the 720 DSP.



The **Update Firmware** screen will be displayed as shown in the image to the right. This screen allows you to perform a firmware update. Before performing a firmware update, you must accept the End User License Agreement (EULA) by selecting the **Accept** softkey.



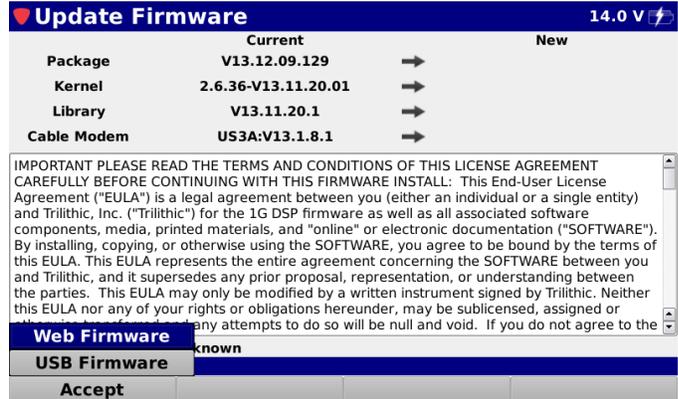


CAUTION *Before updating the firmware, make sure the battery is fully charged or the meter is powered via the AC to DC Power Adapter & Battery Charger.*

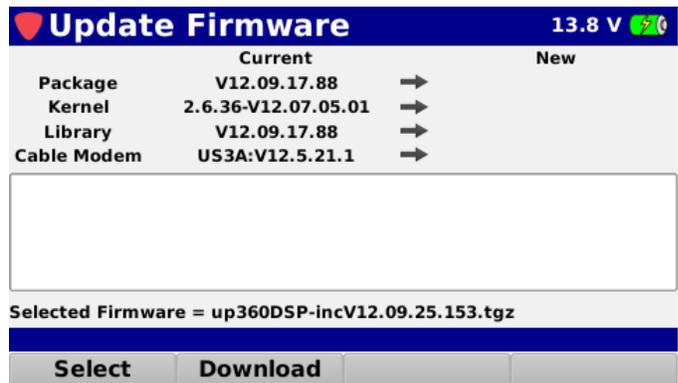
Update Firmware from Website

Perform the following steps to update the 720 DSP firmware from a website:

1. Make sure you are connected to the network via the Network Manager in the **Function** menu.
2. Select the **Accept** softkey.
3. From the **Accept** pop-up menu, select the **Web Firmware** button as shown in the image to the right.



4. Once the meter shows the current firmware version, select the **Download** softkey as shown in the image to the right to download the firmware file.



5. The download progress will be displayed in the activity area of the **Update Firmware** screen as shown in the image to the right.



6. Once the download has finished, the new firmware information will be displayed as shown in the image to the right. Select the **Install** softkey to install the firmware file.
7. Once the installation is finished, the 720 DSP will automatically restart with the new firmware.

Update Firmware from a USB Flash Drive



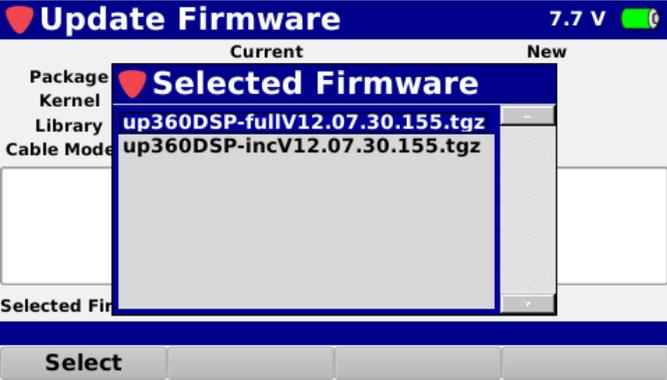
Please ensure you have a USB flash drive that is formatted using the FAT or FAT32 file system and contains no other data.

NOTE

For the latest firmware, contact Trilithic Applications Engineering at support@trilithic.com.

Perform the following steps to update the 720 DSP firmware from a USB flash drive:

1. Insert a USB flash drive into the USB port of the 720 DSP.
2. Select the **Accept** softkey.
3. From the **Accept** pop-up menu, select the **USB Firmware** button as shown in the image to the right.
4. The **Selected Firmware** window will be displayed as shown to the right. Press the **Enter** button to select the firmware file that you would like to use.



5. Once the file has been transferred from the USB flash drive, the new firmware information will be displayed as shown in the image to the right. Select the **Install** softkey to install the firmware file.
6. Once the installation is finished, the 720 DSP will automatically restart with the new firmware.



720 DSP Business Certification Meter

Section III: Autotest Menu



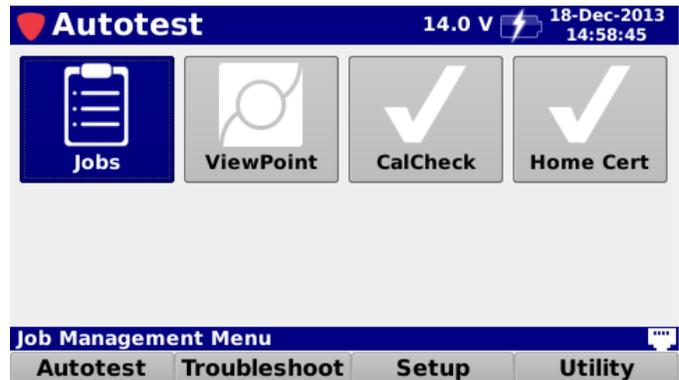
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Introduction

Select the **Autotest** softkey to display **Autotest** menu as shown in the image to the right. The 720 DSP enables you to view, create, and edit jobs as well as execute autotests on the meter.

This section will provide you with instructions on how to utilize the functions available in the **Autotest** menu of the instrument including:

- Synchronize with ViewPoint
- Manage Jobs
- Execute Autotests



NOTE

Autotests can only be created using the ViewPoint Express PC Configuration Software or ViewPoint Integrated Server Package with WFM Module.



NOTE

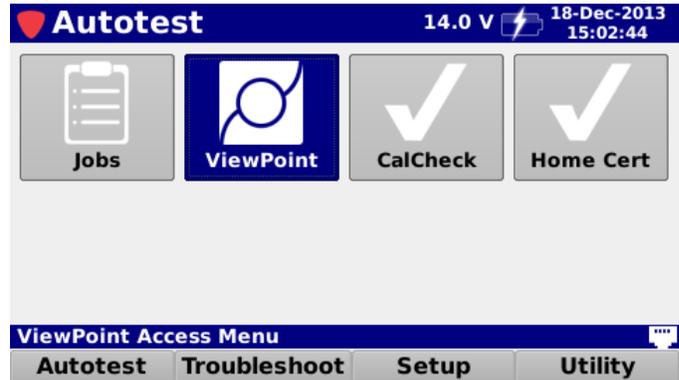
The CalCheck and Home Cert Autotests are included by default from the factory. When ViewPoint and the meter are synchronized all of the Autotests in ViewPoint for this meter will be displayed on this screen.

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ViewPoint Data Connection

Connecting to ViewPoint for the First Time

Select the **ViewPoint** icon as shown in the image to the right to connect to the ViewPoint WFM Module.



Upon first use of the **ViewPoint** icon, the **ViewPoint** re-direct portal will be displayed as shown in the image to the right. This screen allows you to enter a secure key that is provided to your company upon successful registration and setup of your ViewPoint WFM Module.



After you select the key entry field, use the **Virtual Keyboard** to enter the secure key as shown in the image to the right.



Once you have entered the secure key, select the **Go to ViewPoint** button as shown in the image to the right.



Enter the 6-digit demo key provided by your Trilithic representative.

Go to ViewPoint



ViewPoint Sync

Once you have successfully connected to ViewPoint the screen will display the status of the configuration and test data on your device for the current user.

Upon connecting, a comparison is made between the configuration files on the 720 DSP and what is currently available for the device in ViewPoint.

The results of this comparison will be shown in the **Configuration** column for the following types of files:

- Channel Plans
- Limit Sets
- Autotests
- Settings

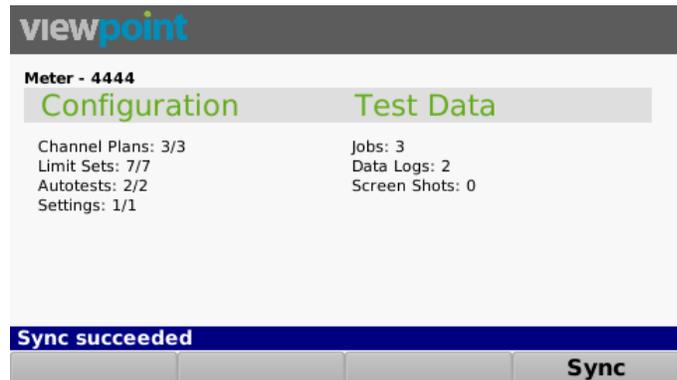
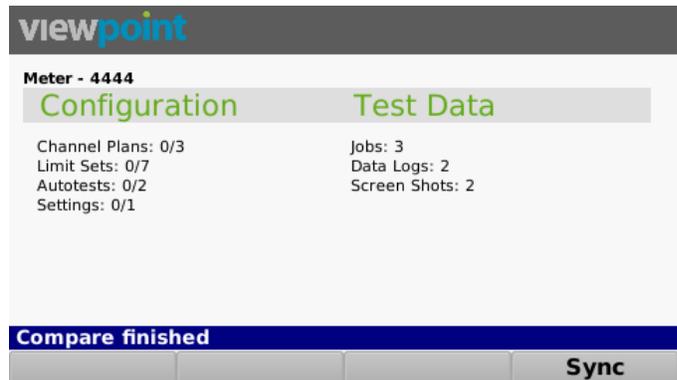
The **Test Data** column shows the number of test files on the 720 DSP including:

- Jobs
- Data Logs
- Screen Shots

Select the **Sync** softkey to perform the following functions:

- Download all of the new/updated configuration files to the 720 DSP
- Upload all of the test data files to the ViewPoint WFM Module

When the sync is finished, the text **Sync succeeded** will be displayed in the **Message Bar**.



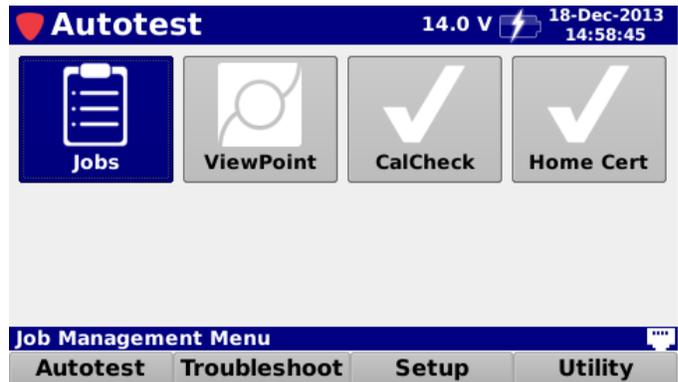
NOTE

Only Closed jobs and their associated data will be uploaded and deleted. Otherwise, the data is sent to the server but the job is still available for more testing.

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Overview

Select the **Jobs** icon as shown in the image to the right to manage jobs on the 720 DSP.



The **Job Management** screen will be displayed as shown in the image to the right. This screen allows you to perform the following actions:

- Create new jobs
- Open existing jobs
- Close existing jobs
- Delete existing jobs



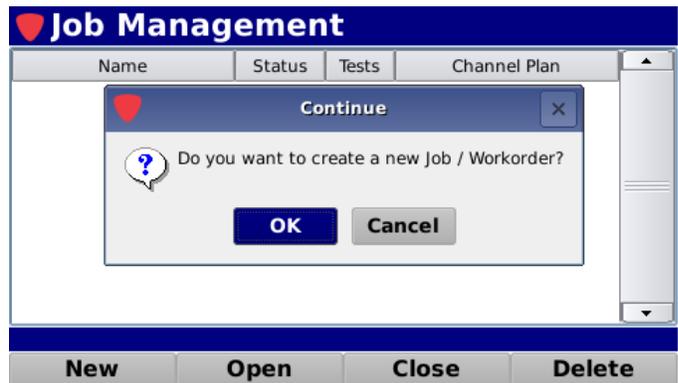
From within the **Job Management** screen, use the arrow buttons on the keypad to navigate through the list of jobs.

Create a New Job

From the **Job Management** screen, select the **New** softkey to create a new job.



The **Continue** window will be displayed as shown in the image to the right. Select the **OK** button to create a new job or select the **Cancel** button to exit without creating a new job.



The **Virtual Keyboard** will be displayed as shown in the image below (left). Use the **Virtual Keyboard** to enter the name of the new job. The new job will be displayed in the **Job Management** screen as shown in the image below (right). If you don't enter a name for the job, the default job name will follow the format "wYYYYMMDDHHMMSS".



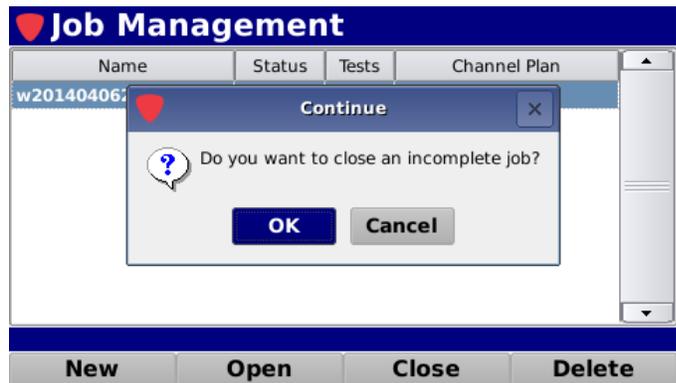
By default, the **Channel Plan** field will be populated with the last used channel plan provided that it still exists on the instrument.

Close an Open Job

From the **Job Management** screen, select the **Close** softkey to close the highlighted job.



If the job hasn't been completed, the **Continue** window will be displayed as shown in the image to the right. Select the **OK** button to close the job or select the **Cancel** button to exit without closing the job.



After selecting the **OK** button or if the job has already been completed, the **Virtual Keyboard** will be displayed as shown in the image below (left). If the job is incomplete, use the **Virtual Keyboard**, enter any comments for the job.

The **Job Management** screen will automatically refresh to display the closed status of the job as shown in the image below (right).



Open a Closed Job

From the **Job Management** screen, select the **Open** softkey to open the highlighted job.

Job Management

Name	Status	Tests	Channel Plan
w20140406204840	Closed	0	NCTA Base

New Open Close Delete

The **Job Management** screen will automatically refresh to display the open status of the job as shown in the image to the right.

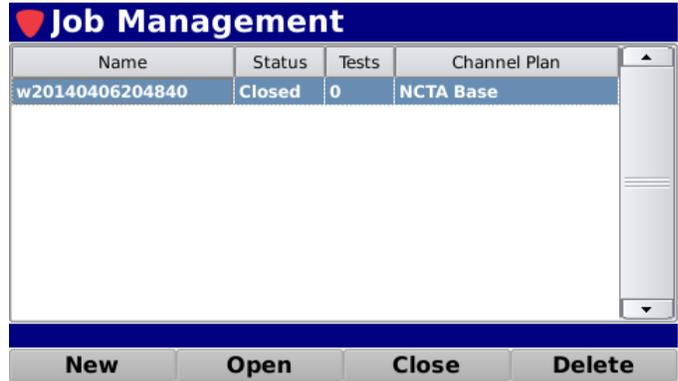
Job Management

Name	Status	Tests	Channel Plan
w20140406204840	Open	0	NCTA Base

New Open Close Delete

Delete an Existing Job

From the **Job Management** screen, select the **Delete** softkey to delete the highlighted job.



The **Continue** window will be displayed as shown in the image to the right. Select the **OK** button to delete the job or select the **Cancel** button to exit without deleting the job.



The **Job Management** screen will automatically refresh to remove the deleted job as shown in the image to the right.



Function Menu Options

Additional functions can be accessed from within the **Autotest** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Autotest** screen.



Changing Channel Plan of an Existing Job

This function is used to change the channel plan of the selected job. Highlight the name of the job that you would like to change the channel plan for as shown in the image to the right.



Press the **Function** button.

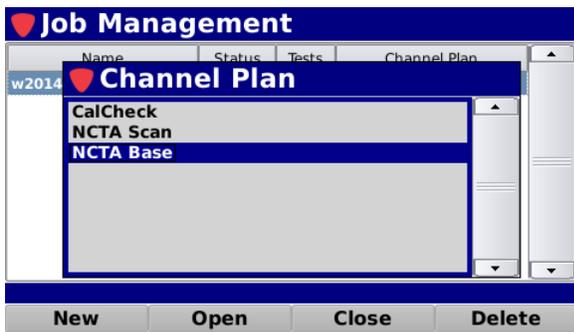
Select the **Change Channel Plan** button from the **Function** menu as shown in the image to the right.



If there is more than one channel plan on the 720 DSP, the **Channel Plan** window will be displayed as shown in the image below (left). Select the name of the channel plan that you would like to assign to the selected job.

If there is only one channel plan on the 720 DSP, the **Channel Plan** window will be skipped and that channel plan will automatically be assigned to the channel plan.

Once you have selected the channel plan, the **Job Management** screen will automatically refresh to display the new channel plan assignment as shown in the image below (right).



Changing Comments of an Existing Job

This function is used to change the comments of the selected job. Highlight the job that you would like to change the comments for as shown in the image to the right.



Press the **Function** button.

Select the **Change Comment** button from the **Function** menu as shown in the image to the right.



The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter the comments for the selected job.



Overview

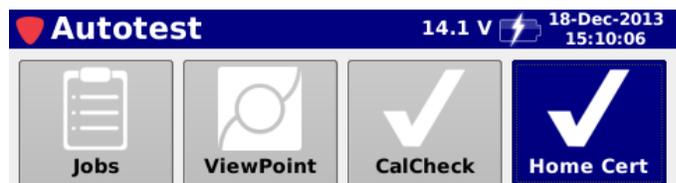
The **Autotest** menu can include any number of Autotest apps that are configured using the ViewPoint WFM Module. The image shown to the right displays four different Autotest apps **Default, Home Check, Commercial, and Dormitory** that were configured using the ViewPoint WFM Module.

Select any of the Autotest apps as shown in the image to the right to execute an Autotest on the 720 DSP.

If a job hasn't been opened, the **Job Management** window will be displayed. Choose the job that you would like to perform that Autotest on.

The **Autotest** screen will be displayed as shown in the image to the right. This screen allows you execute autotests at multiple locations for each job on the 720 DSP.

The **Autotest** screen displays the Autotest Name, Job, Channel Plan, and Tech ID above the test locations.



Job: w20140224152302
Channel Plan: NCTA Base
Tech ID: 1111



NOTE

See the ViewPoint WFM Module Operation Manual for more information on how to create Autotest Apps and configure Locations, Channel Plans, and Limit Sets for Autotesting.

Each test location will be tested against a channel plan and limit set that is configured using the ViewPoint WFM Module.

The following information will be displayed below each location;

- **Required Status** – Each location will display its status with either of the following:

- **Blank** – This is displayed when the location is not required and can be tested more than once.
- **Required** – This is displayed when the location is required and can only be tested once.
- **Required (+)** – This is displayed when the location is required and can be tested more than once.



- **Location Pass/Fail Indicators** – Each location will display a pass/fail indicator as shown in the following section:



NOTE

Channel Plans and Limit Sets created/modified on the 720 DSP can only be used in the Troubleshooting menu. Autotests require ViewPoint WFM Module Channel Plans and Limit Sets.



NOTE

You can retest any location that fails as many times as you like but once a required location passes and only one test is required, you are done with that location.

Location Pass/Fail Indicators

When an Autotest App is created in the ViewPoint WFM Module, channel plans and limit sets will be assigned to each location for testing. The following standard locations can be added to an Autotest App:

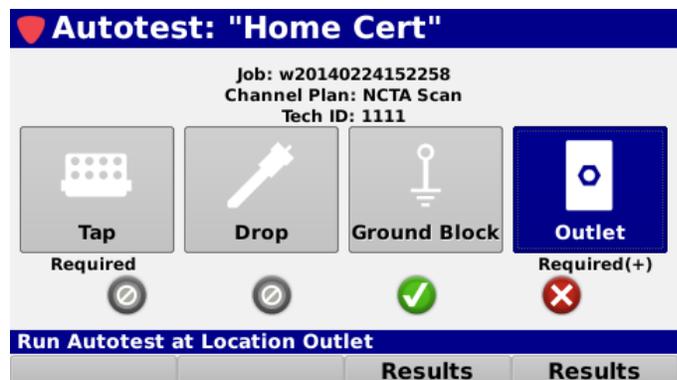
- Tap
- Drop
- Ground Block
- Outlet

Custom locations can also be created using the ViewPoint WFM Module. Any locations that aren't allowed for the selected autotest will not be displayed and cannot be executed.

A Pass/Fail status will be displayed below each test location. When any of the individual measurement parameters of an autotest location fail, the location as a whole will indicate a Fail status.

Each individual location will indicate its status using the following icons:

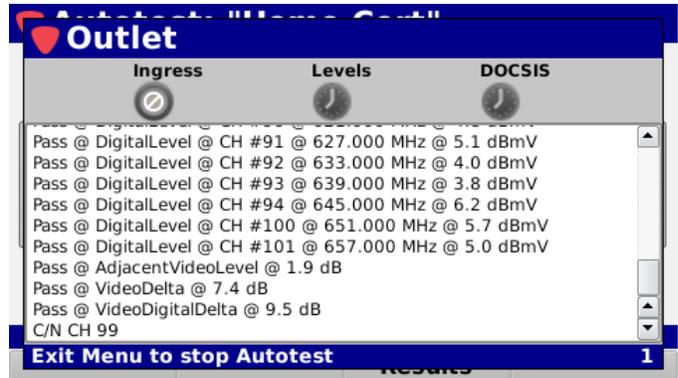
-  This icon indicates that this autotest has not been executed at this location.
-  This icon indicates that all of the measurements for this test location have passed the measurement thresholds.
-  This icon indicates that one or more of the measurements for this test location have failed the measurement thresholds.



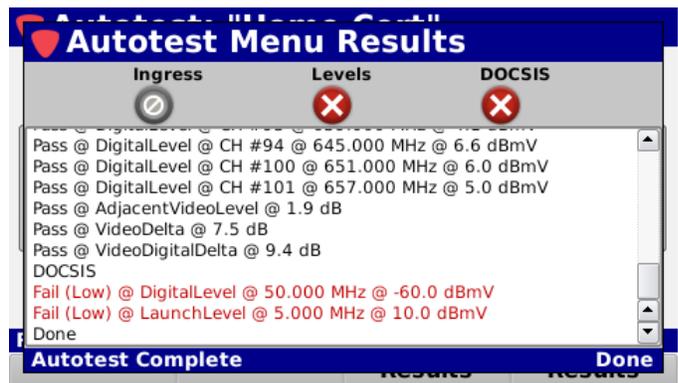
Executing an Autotest

To execute an Autotest, select the location for testing from the Autotest screen. The Autotest will automatically start testing according to the channel plan and limit set for each location as shown in the images below.

The names of the Job, Channel Plan, and Limit set will be displayed along with detailed measurement results for each test.



Any failed tests will be displayed with red text as shown in the image to the right.



When the Autotest is complete, press the Back button to exit. A notice screen will be displayed as shown in the image to the right. Select the **OK** button to save the test results or select the **Cancel** button to exit without saving the test results.

If you save the test passing results and the location is set to test only once, you will not be allowed to run this test again.

You can always re-run failed tests as the premises are repaired.



Pass/Fail Measurement Indicators

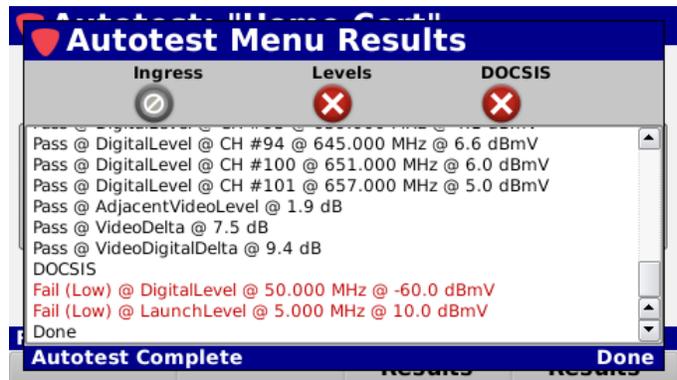
After completing an autotest, to view the measurement results from any location, select the corresponding **Results** softkey. The following tests can be executed at each location:

- **Channel Plan Scan** – This measurement scans each channel in the selected channel plan and compares the results to the selected limit set. This test includes: Level, Tilt, C/N, MER, and BER.
- **Modem Test** – This measurement performs a modem login and compares the results to the selected limit set. This test includes: Pre/Post Bit Error and Modem Launch Levels.
- **Spectrum Test** – This measurement performs a return spectrum test and compares the results to the selected limit set. This test includes: Maximum Ingress Level.

A Pass/Fail status will be displayed at the top of the results screen along with detailed test results for each test. When any of the individual measurement parameters of a test fail, the test as a whole will indicate a Fail status.

Each individual test will indicate its status using the following icons:

-  This icon indicates that this measurement was skipped. This only applies to measurements that are not enabled.
-  This icon indicates that all of the measurements for this test have passed the measurement thresholds.
-  This icon indicates that one or more of the measurements for this test have failed the measurement thresholds.



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720 DSP Business Certification Meter

Section IV: Troubleshoot Menu



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Introduction

Select the **Troubleshoot** softkey to display the **Troubleshoot** menu as shown in the image to the right. The 720 DSP enables you to troubleshoot installation issues using the functions within this menu.

This section will provide you with instructions on how to utilize the functions available in the **Troubleshoot** menu of the instrument including:

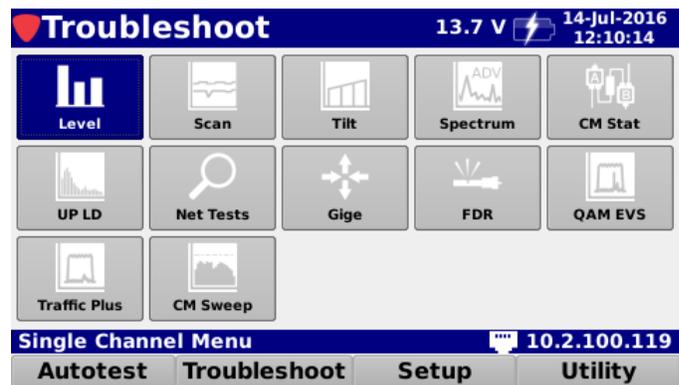
- Level Measurement
 - Analog & Digital Hum
- Channel Plan Scan
- Tilt Measurement
- Spectrum Analysis
 - Return Spectrum Analysis – 4 to 110 MHz
 - Forward Spectrum Analysis – 50 to 1000 MHz
- Cable Modem Statistics
- Upstream Linear Distortions Measurement (OPTIONAL)
- Network Testing Suite
- Gigabit Ethernet Testing
- Frequency Domain Reflectometer
- QAM Error Vector Spectrum Analysis (OPTIONAL)
- Cable Modem Sweep (OPTIONAL)
- Traffic Control Plus (OPTIONAL)



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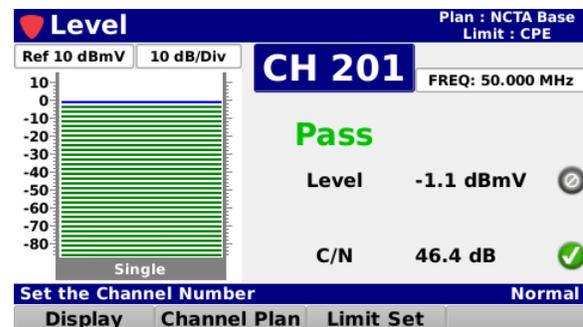
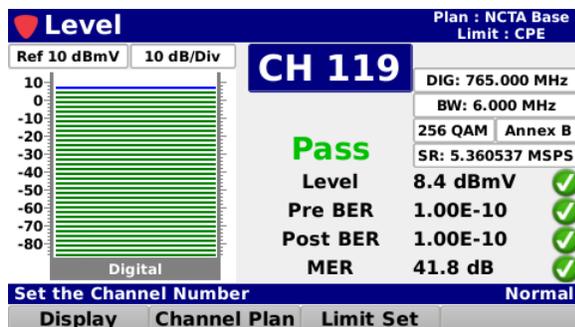
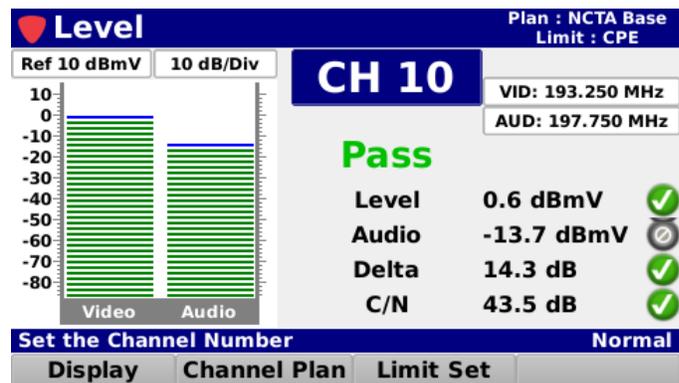
Overview

Select the **Level** icon as shown in the image to the right to perform channel measurements on the 720 DSP.



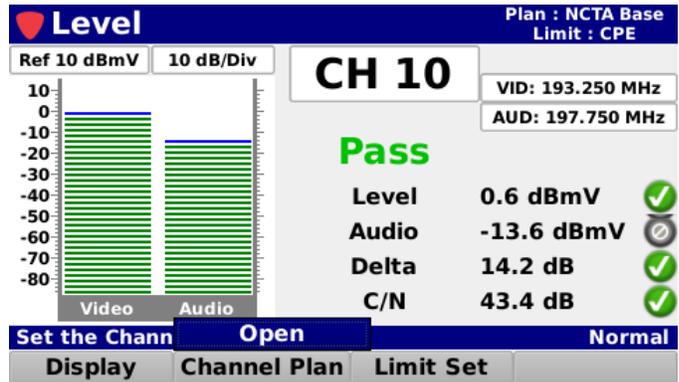
The **Level** screen will be displayed as shown in the image to the right. This screen allows you to perform measurements on the following types of channels:

- Analog (right)
 - NTSC
 - PAL B/I/D/N/M/G/H/K
 - SECAM B/L/D/G/H/I/K
- Digital (bottom left)
 - Annex A/B/C
 - 16/32/64/128/256 QAM
- Single Carrier (bottom right)

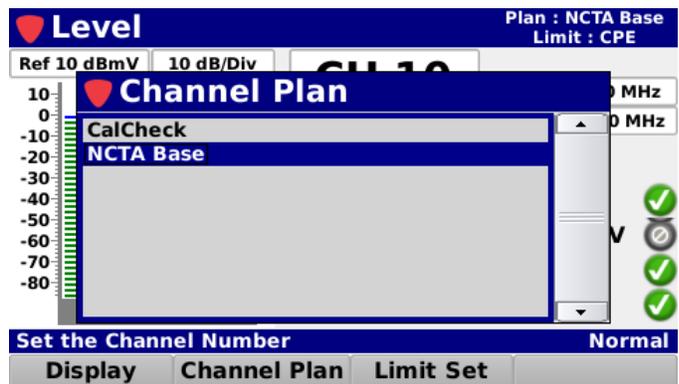


Opening a Channel Plan

Select the **Channel Plan** softkey as shown in the image to the right to select the channel plan to use for the level measurement.



Select the **Open** button from the **Channel Plan** pop-up menu and the **Channel Plan** window will be displayed as shown in the image to the right.



From the **Channel Plan** window, select the name of the channel plan to use for the level measurement.

After selecting the channel plan, the **Level** screen will be displayed again.

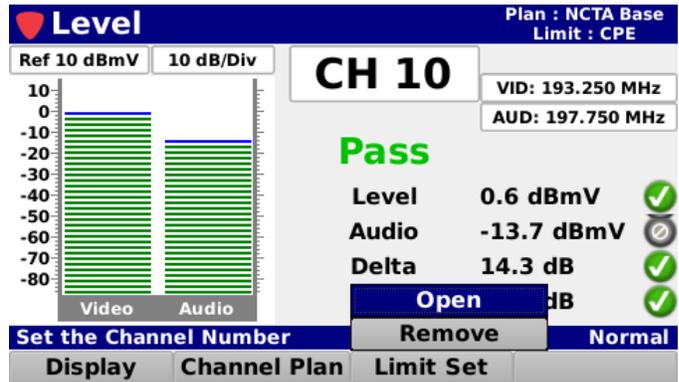


NOTE

The Channel Plan window will be bypassed if there is only one channel plan to choose from.

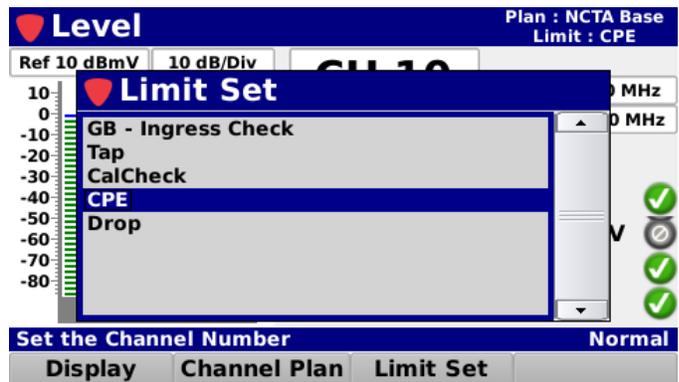
Opening a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the level measurement.



Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the level measurement.

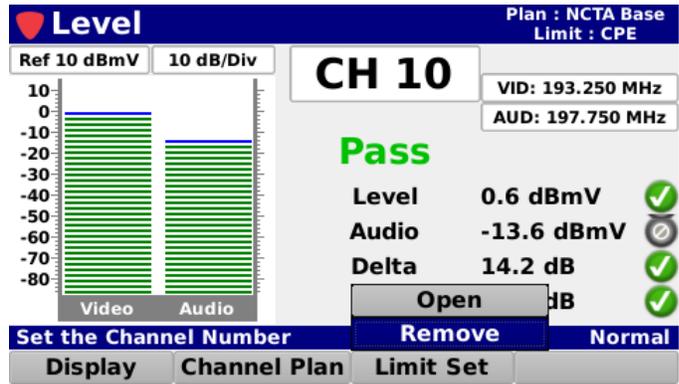


After selecting the limit set, the **Level** screen will be displayed again.

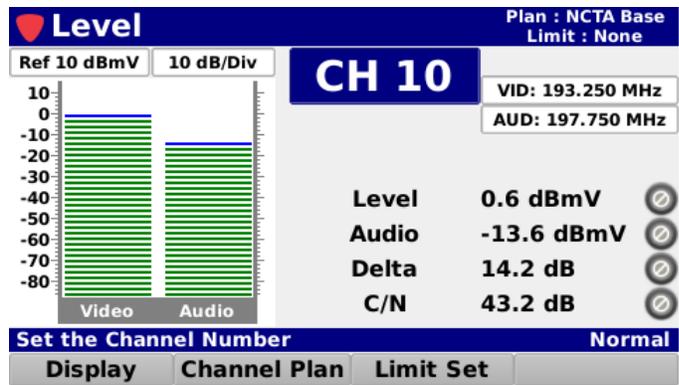
 **NOTE** *The Limit Set window will be bypassed if there is only one limit set to choose from.*

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove limits set for the level measurement.



Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.



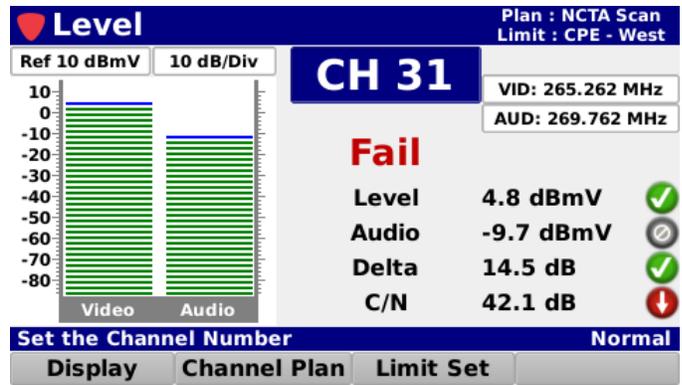
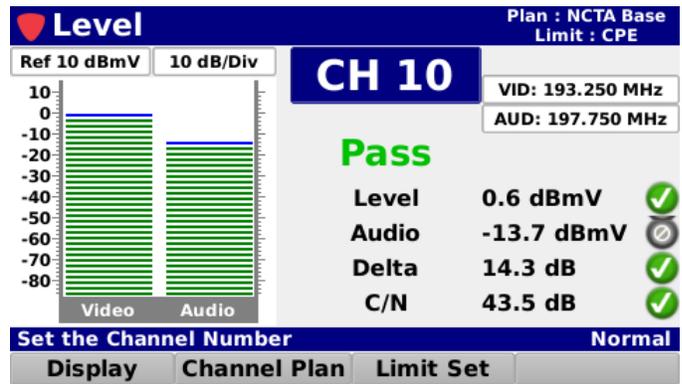
Pass/Fail Measurement Indicators

When a limit set has been opened, each channel that is included in the channel plan will be tested against the selected limit set thresholds.

A pass/fail status will be displayed below the channel number. When any of the individual measurement parameters of a channel fail, the channel as a whole will indicate a fail status.

Each individual measurement parameter will indicate its status using the following icons:

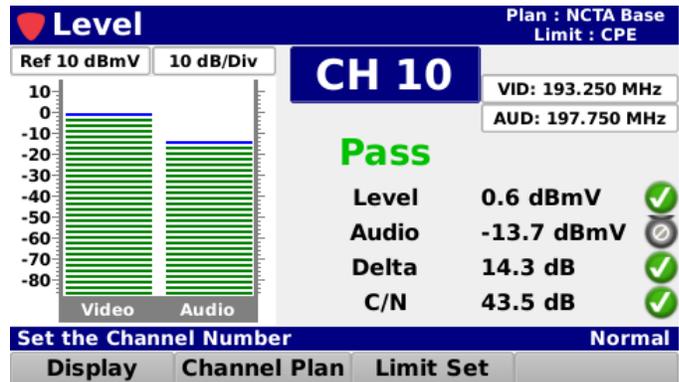
-  This icon indicates that this measurement is currently being performed and you must wait for it to be completed.
-  This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
-  This icon indicates that this measurement is within the measurement thresholds of the currently selected limit set.
-  This icon indicates that the measurement has failed the high limit measurement threshold.
-  This icon indicates that the measurement has failed the low limit measurement threshold.



Analog Channel Measurement

When an analog channel is selected, the **Level** screen will display the following information:

- Reference Level (adjustable)
- Vertical Scale (adjustable)
- Channel Number (adjustable)
- Channel Name
- Video Center Frequency (adjustable)
- Audio Center Frequency (adjustable)
- Display Type (adjustable)



Measurement Results

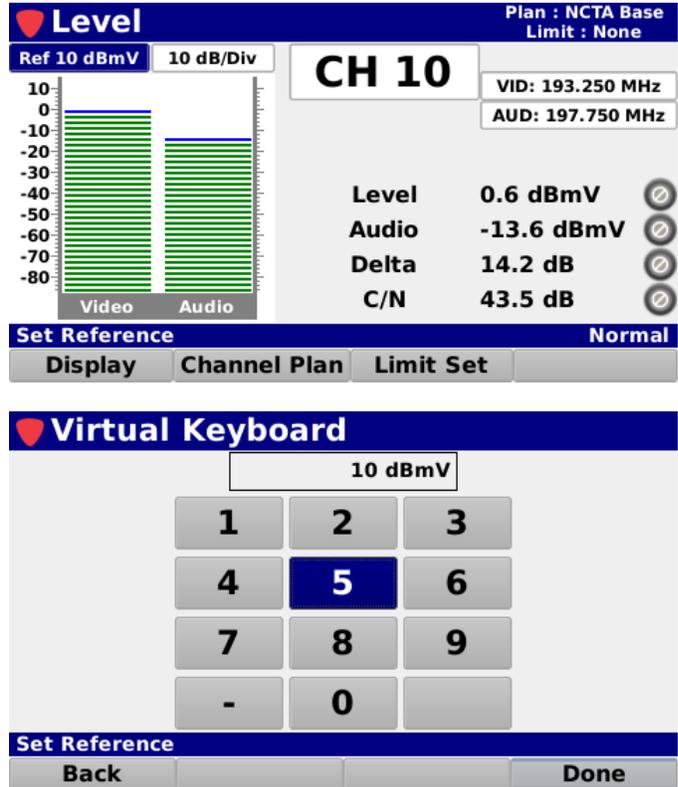
The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Video level value with bar graph
- Audio level value with bar graph
- Video/Audio delta value
- C/N value

Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the bar graph. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

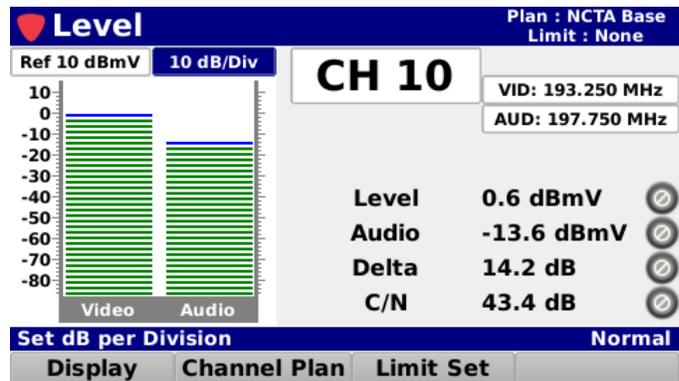
- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.



The image shows two screenshots from the 720 DSP interface. The top screenshot is the 'Level' screen for 'CH 10'. It features a bar graph on the left with a vertical scale from -80 to 10 dBmV. The 'Ref' field is set to 10 dBmV and the scale is 10 dB/Div. The graph shows two bars: 'Video' at approximately -10 dBmV and 'Audio' at approximately -13.6 dBmV. On the right, the 'Level' field is highlighted and set to 0.6 dBmV, with other fields for Audio (-13.6 dBmV), Delta (14.2 dB), and C/N (43.5 dB). The bottom screenshot is the 'Virtual Keyboard' screen, showing a numeric keypad with the number '5' highlighted. The input field above the keypad displays '10 dBmV'. The 'Set Reference' button is highlighted at the bottom.

Vertical Scale Adjustment

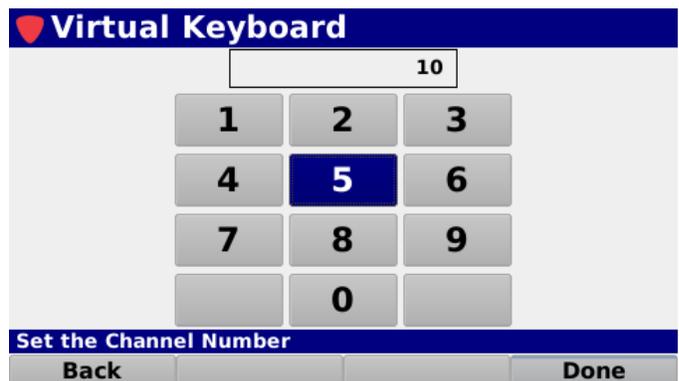
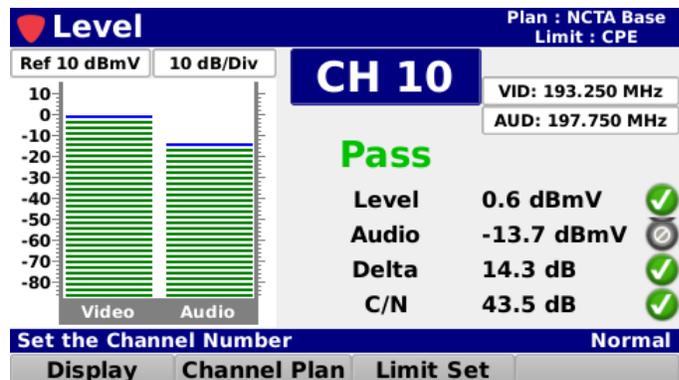
Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of **1**, **2**, **5** or **10** dB/div.



Channel Adjustment

Highlight the channel field as shown in the image to the right and then use either of the following methods to change the channel number:

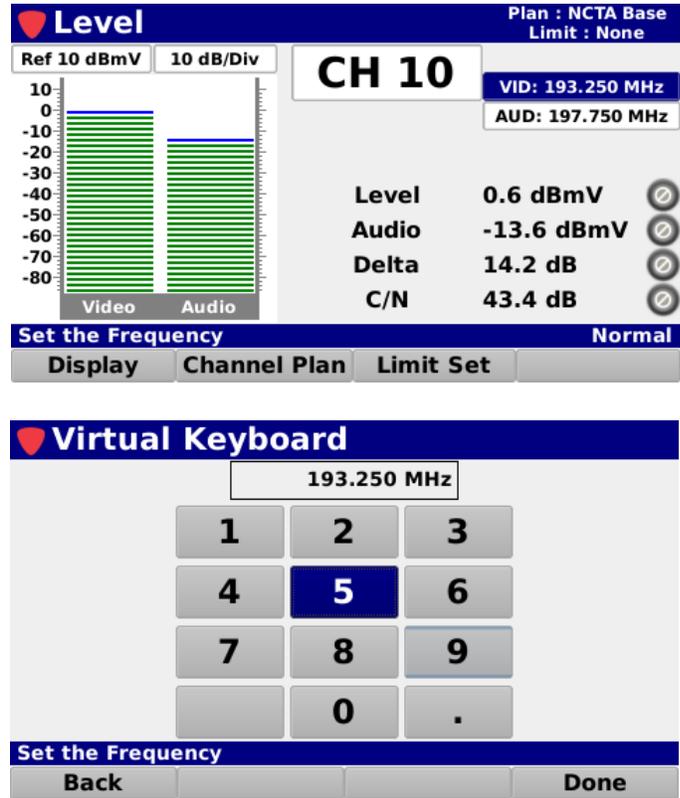
- Use the up/down arrow buttons to change the channel number in 1 channel increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image to the right.



Video Frequency Adjustment

Highlight the video frequency field as shown in the image to the right and then use either of the following methods to change the video frequency:

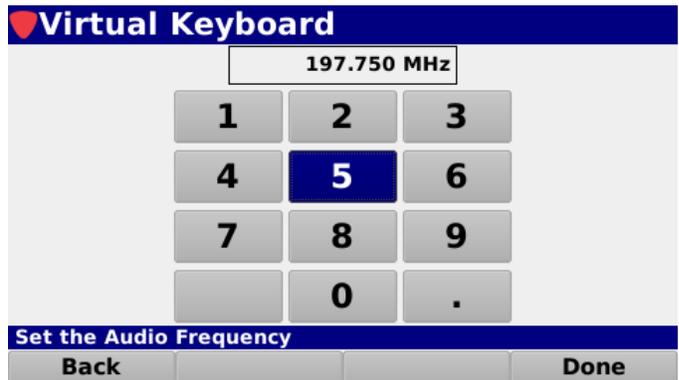
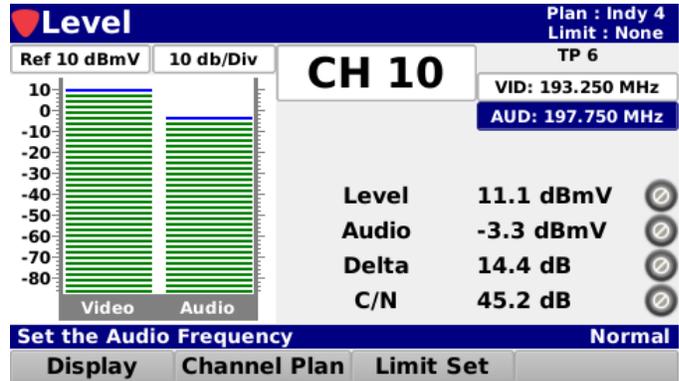
- Use the up/down arrow buttons to change the video frequency in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the video frequency as shown in the image to the right.



Audio Frequency Adjustment

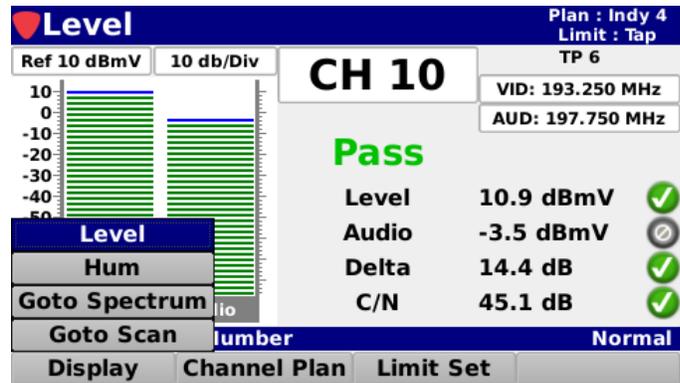
Highlight the audio frequency field as shown in the image to the right and then use either of the following methods to change the audio frequency:

- Use the up/down arrow buttons to change the audio frequency in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the audio frequency as shown in the image to the right.



Display Type Adjustment

Select the **Display** softkey to scroll through the following types measurement displays:

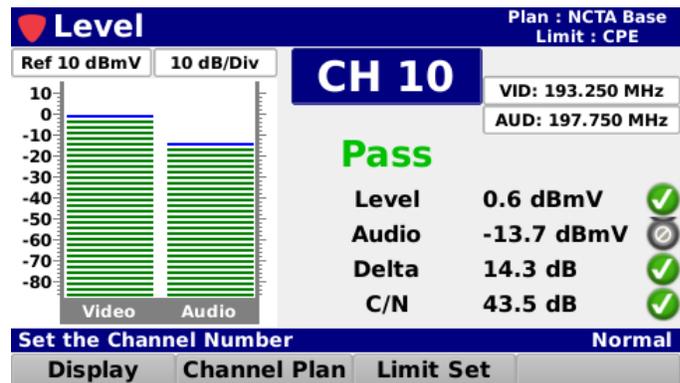


Bar Graph

Select the **Level** button from the **Display** pop-up menu to display a bar graph of the video and audio carrier levels of the analog video carrier.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Video level value with bar graph
- Audio level value with bar graph
- Video/Audio delta value
- C/N value



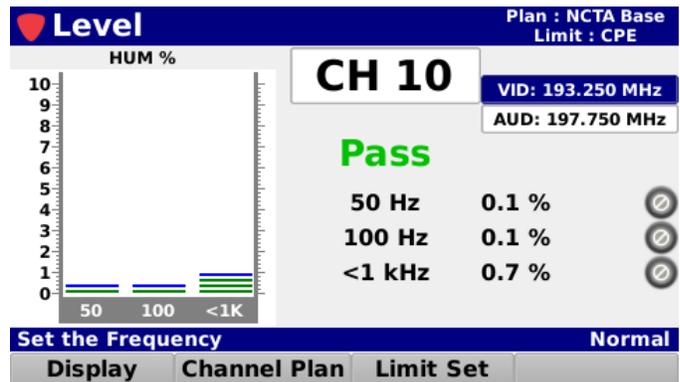
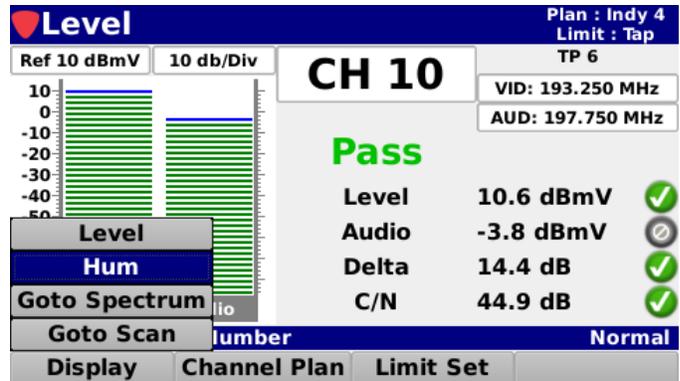
HUM

The HUM feature provides users with the ability to measure the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency interference present on the video carrier of a single selected analog channel.

Select the **Hum** button from the **Display** pop-up menu to display a bar graph of the HUM levels of the analog channel.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

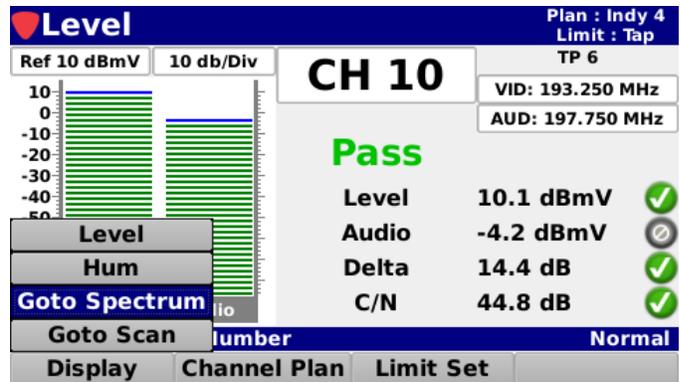
- 60 Hz level value with bar graph
- 120 Hz level value with bar graph
- < 1 kHz (low frequency) level value with bar graph



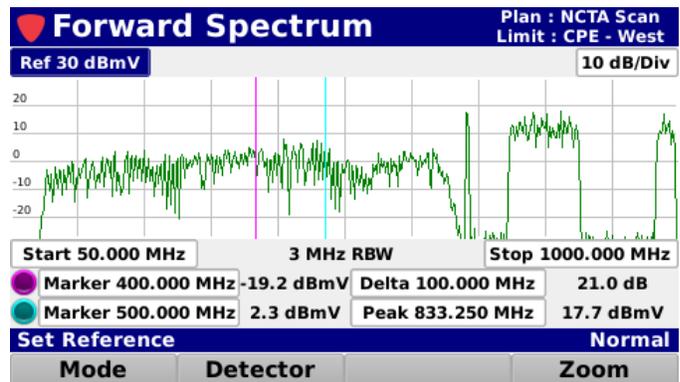
Go to Spectrum

The **Go to Spectrum** feature provides the ability to go to the Forward Spectrum display directly from the **Level** measurement screen.

Select the **Goto Spectrum** button from the **Display** pop-up menu to display the **Forward Spectrum** screen.



The **Forward Spectrum** screen provides the ability to view raw spectrum traces for the forward path from 50 to 1000 MHz with DSP spectrum snapshots to give a view of any downstream channels.

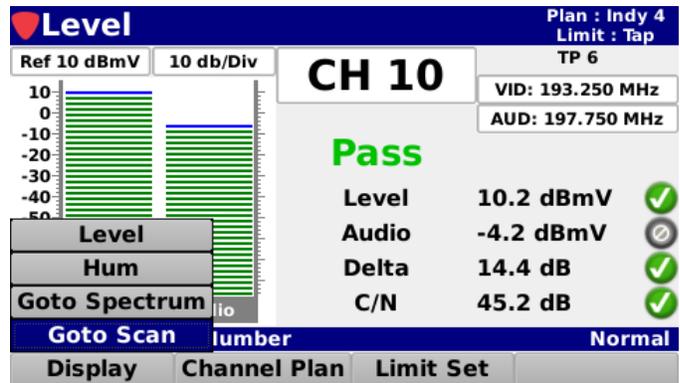


For more information on Forward Spectrum, see Chapter 4: Spectrum Analysis, later in this section.

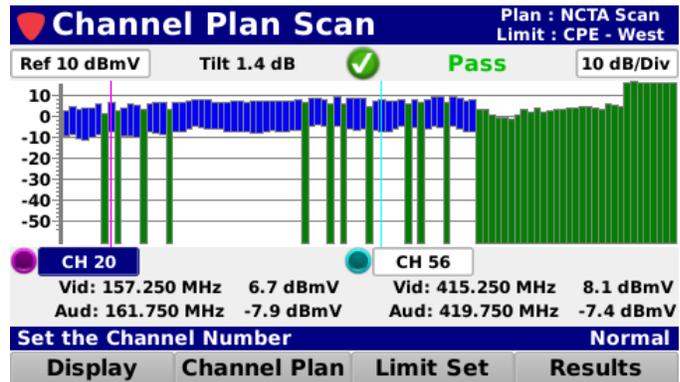
Go to Scan

The **Go to Scan** feature provides the ability to go to the Channel Plan Scan display directly from the **Level** measurement screen.

Select the **Goto Scan** button from the **Display** pop-up menu to display the **Channel Plan Scan** screen.



The **Channel Plan Scan** screen allows you to perform a scan of all of the channels in the current channel plan.

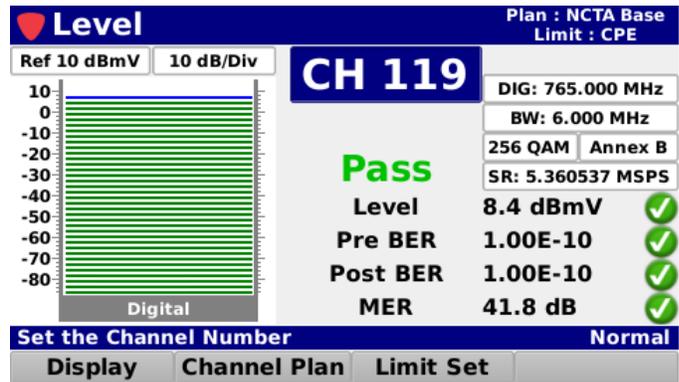


NOTE For more information on Channel Plan Scan, see Chapter 3: Channel Plan Scan, later in this section.

Digital Channel Measurement

When a digital channel is selected, the **Level** screen will display the following information based on the settings of the current channel plan:

- Reference Level (adjustable)
- Vertical Scale (adjustable)
- Channel Number (adjustable)
- Channel Name
- Digital Video Frequency (adjustable)
- Channel Bandwidth (adjustable)
- Modulation Type (adjustable)
- Channel Standard (adjustable)
- Symbol Rate (adjustable)
- Display Type (adjustable)



Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the bar graph. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.

Level Plan : NCTA Base
Limit : CPE

Ref 10 dBmV 10 dB/Div **CH 119**

DIG: 765.000 MHz
BW: 6.000 MHz
256 QAM Annex B
SR: 5.360537 MSPS

Pass

Level	8.6 dBmV	✓
Pre BER	1.00E-09	✓
Post BER	1.00E-09	✓
MER	41.8 dB	✓

Set Reference Normal

Display Channel Plan Limit Set

Virtual Keyboard

10 dBmV

1	2	3
4	5	6
7	8	9
-	0	

Set Reference

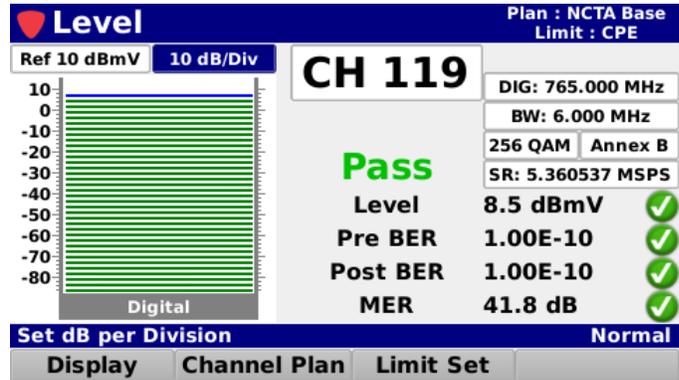
Back Done



The Reference Level adjustment is only available when the measurement display is set to the bar graph.

Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of 1, 2, 5 or 10 dB/div.

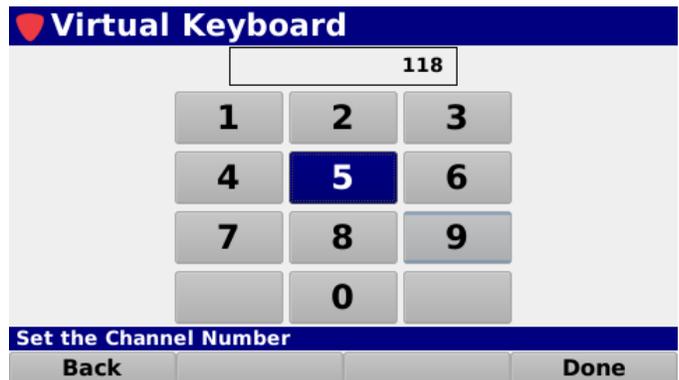
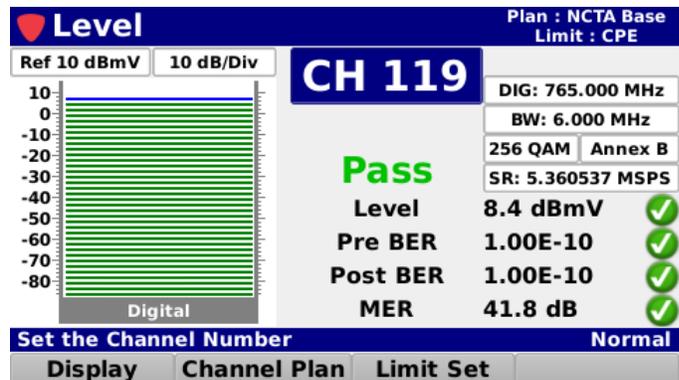


The Vertical Scale adjustment is only available when the measurement display is set to the bar graph.

Channel Adjustment

Highlight the channel field as shown in the image to the right and then use either of the following methods to change the channel number:

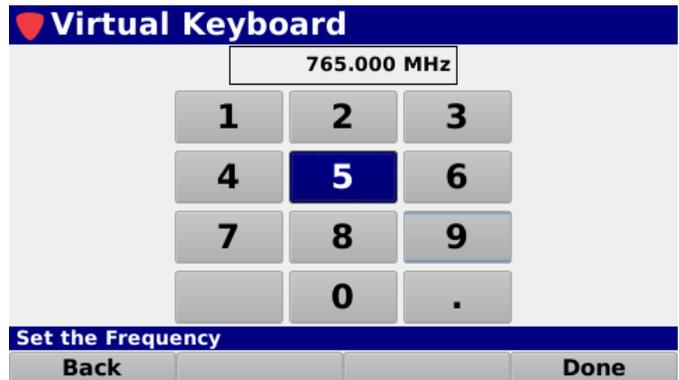
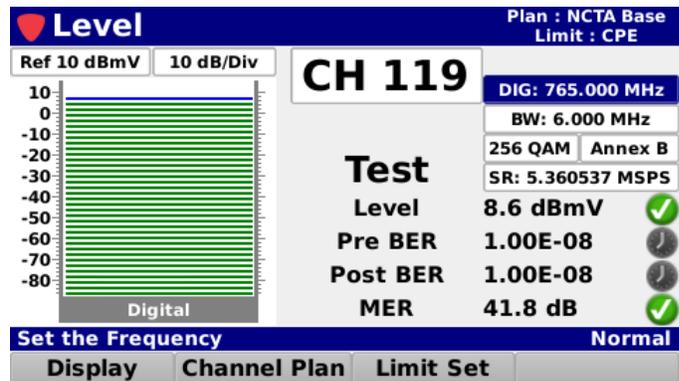
- Use the up/down arrow buttons to change the channel number in 1 channel increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image to the right.



Digital Video Frequency Adjustment

Highlight the digital video frequency field as shown in the image to the right and then use either of the following methods to change the video frequency:

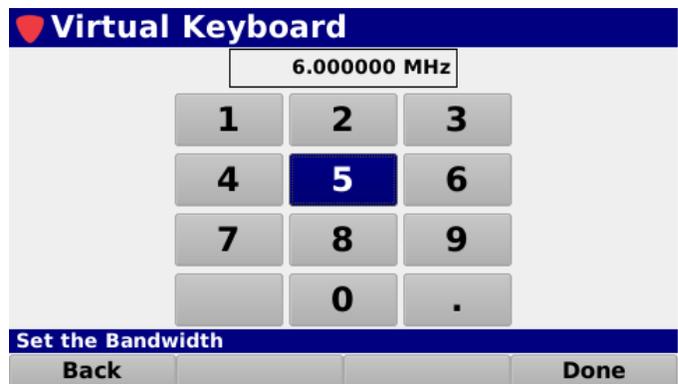
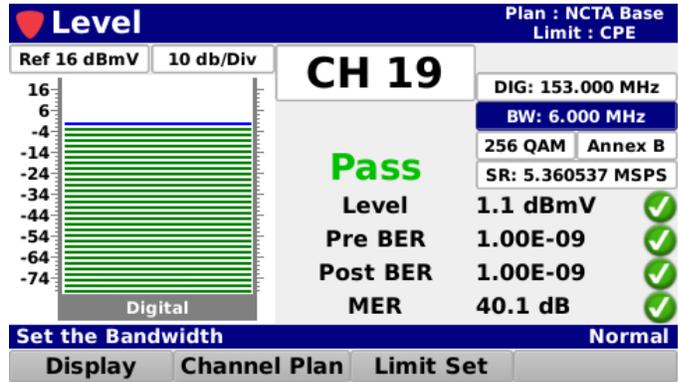
- Use the up/down arrow buttons to change the digital video frequency in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the digital video frequency as shown in the image to the right.



Channel Bandwidth Adjustment

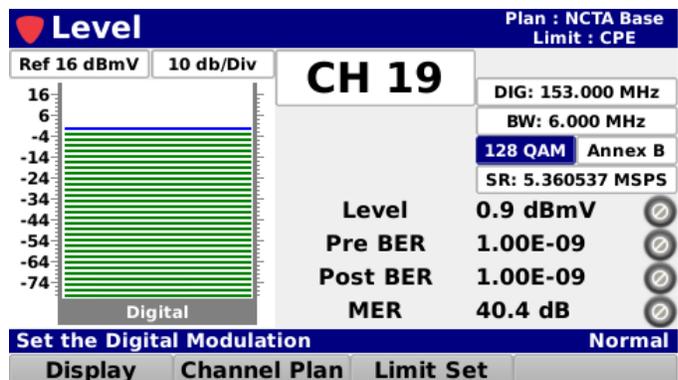
Highlight the channel bandwidth field as shown in the image to the right and then use either of the following methods to change the frequency:

- Use the up/down arrow buttons to change the bandwidth in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the bandwidth as shown in the image to the right.



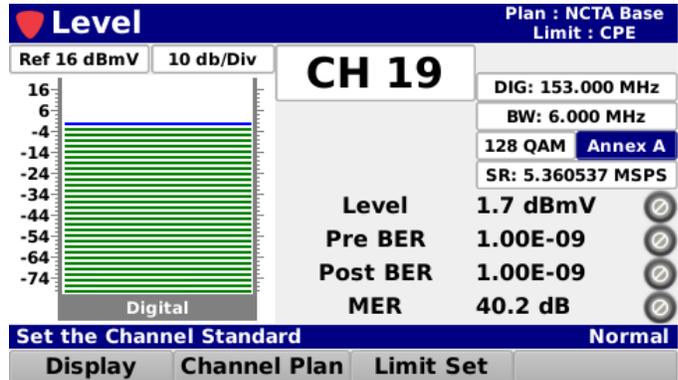
Modulation Type Adjustment

Highlight the modulation type field as shown in the image to the right. Then, use the up/down arrow buttons to select **QPSK**, **16 QAM**, **32 QAM**, **64 QAM**, **128 QAM**, or **256 QAM**.



Channel Standard Adjustment

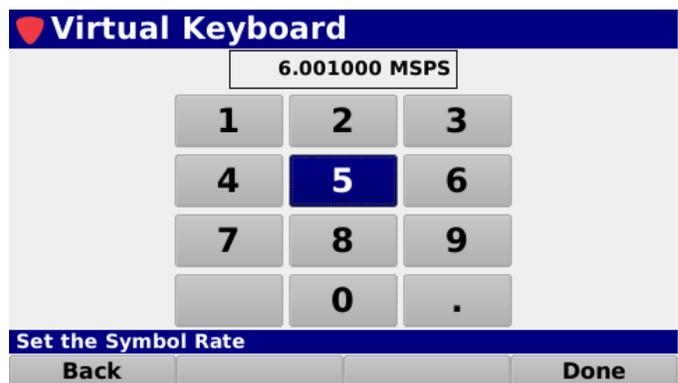
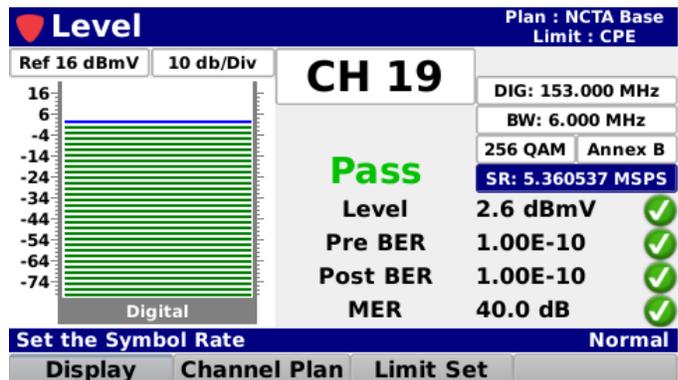
Highlight the channel standard field as shown in the image to the right. Then, use the up/down arrow buttons to select **Arbitrary**, **Annex A**, **Annex B**, or **Annex C**.



Symbol Rate Adjustment

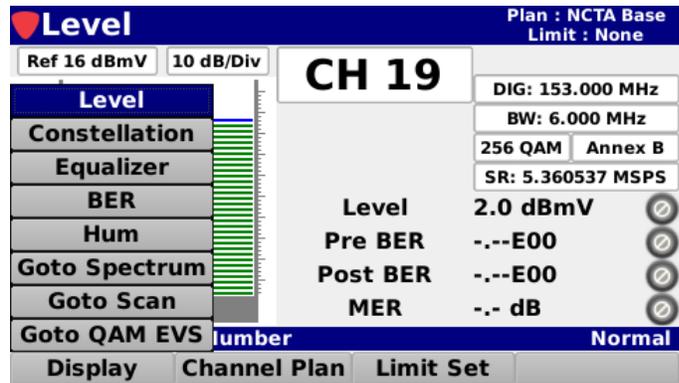
Highlight the symbol rate field as shown in the image to the right and then use either of the following methods to change the symbol rate:

- Use the up/down arrow buttons to change the rate in 0.001 MSPS increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the bandwidth as shown in the image to the right.



Display Type Adjustment

Select the **Display** softkey to scroll through the following types of measurement displays:

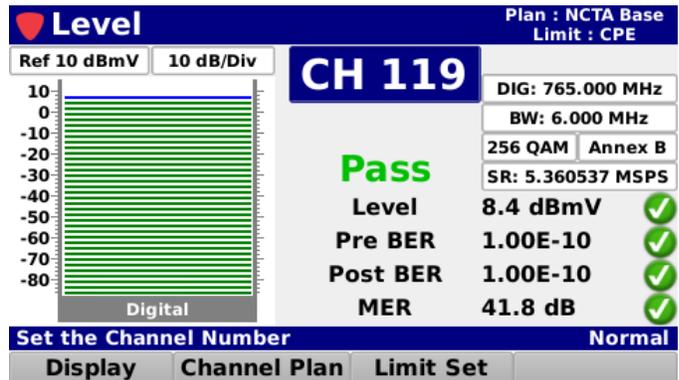


Bar Graph

Select the **Level** button from the **Display** pop-up menu to display a bar graph of the digital video carrier

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Digital channel level value with bar graph
- Pre BER
- Post BER
- MER



QAM Constellation

Select the **Constellation** button from the **Display** pop-up menu to display the constellation diagram of the specified QAM channel.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Digital channel level value with constellation diagram
- Pre BER
- Post BER
- MER

Zoom

Select the **Zoom** softkey in the QAM Constellation screen to bring up the **Zoom** pop-menu.

Select the **Zoom In** button and use the arrow buttons to choose the quadrant you want to zoom to, indicated by the red square, as shown in the image below. You can zoom in several levels.

To return to the top level, select the **Zoom Out** button.

Level Plan : NCTA Base Limit : CPE

CH 119

DIG: 765.000 MHz
BW: 6.000 MHz
256 QAM Annex B
SR: 5.360537 MSPS

Pass

Level	8.6 dBmV	✓
Pre BER	1.00E-09	✓
Post BER	1.00E-09	✓
MER	41.9 dB	✓

Set the Frequency Normal

Display Channel Plan Limit Set

Level Plan : NCTA Base Limit : CPE

CH 19

DIG: 153.000 MHz
BW: 6.000 MHz
256 QAM Annex B
SR: 5.360537 MSPS

Pass

Level	2.9 dBmV	✓
Pre BER	1.00E-09	✓
Post BER	1.00E-09	✓
MER		

Zoom In

Set the Channel Number Zoom Out

Display Channel Plan Limit Set Zoom

Level Plan : NCTA Base Limit : CPE

CH 19

DIG: 153.000 MHz
BW: 6.000 MHz
256 QAM Annex B
SR: 5.360537 MSPS

Test

Level	2.6 dBmV	✓
Pre BER	1.00E-09	✓
Post BER	1.00E-09	✓
MER	39.9 dB	✓

Set the Channel Number Normal

Display Channel Plan Limit Set Zoom

Level Plan : NCTA Base Limit : CPE

CH 19

DIG: 153.000 MHz
BW: 6.000 MHz
256 QAM Annex B
SR: 5.360537 MSPS

Pass

Level	2.5 dBmV	✓
Pre BER	1.00E-09	✓
Post BER	1.00E-09	✓
MER	39.9 dB	✓

Set the Channel Number Normal

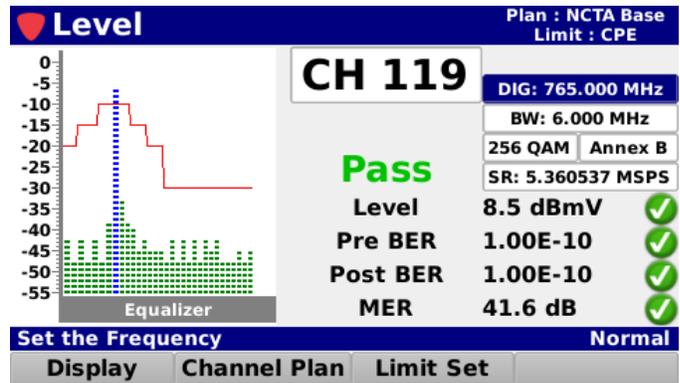
Display Channel Plan Limit Set Zoom

Equalizer Tap

Select the **Equalizer** button from the **Display** pop-up menu to display the equalizer stress and whether the DOCSIS specification is being broken.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Digital channel level value with bar graph
- Pre BER
- Post BER
- MER

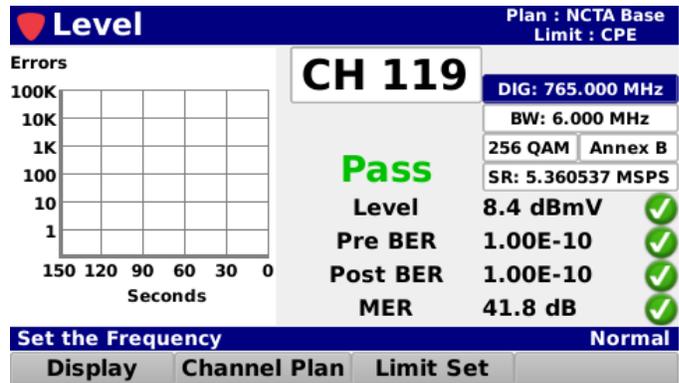


Bit-Error Rate

Select the **Equalizer** button from the **Display** pop-up menu to display the BER on a graph with a 150 second measurement period with solid green lines for Pre BER and solid red lines for Post BER.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

- Digital channel level value with bar graph
- Pre BER
- Post BER
- MER



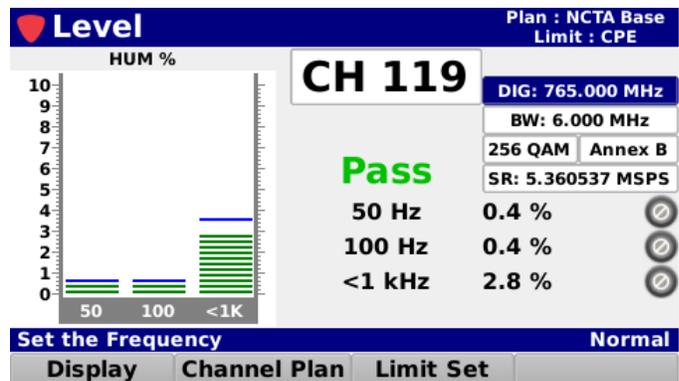
HUM

The HUM feature provides users with the ability to measure the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency interference present on the QAM carrier of a single selected digital channel.

Select the **Hum** button from the **Display** pop-up menu to display a bar graph of the HUM levels of the QAM channel.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

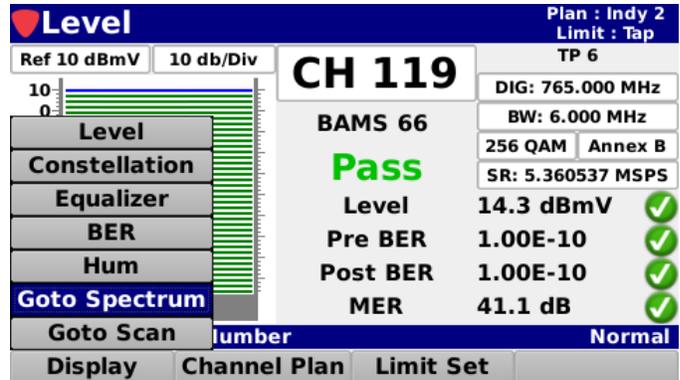
- 60 Hz level value with bar graph
- 120 Hz level value with bar graph
- < 1 kHz (low frequency) level value with bar graph



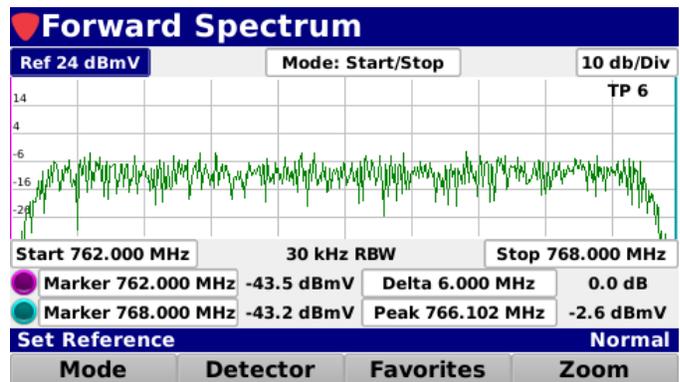
Go to Spectrum

The **Go to Spectrum** feature provides the ability to go to the Forward Spectrum display directly from the **Level** measurement screen.

Select the **Goto Spectrum** button from the **Display** pop-up menu to display the **Forward Spectrum** screen.



The **Forward Spectrum** screen provides the ability to view raw spectrum traces for the forward path from 50 to 1000 MHz with DSP spectrum snapshots to give a view of any downstream channels.

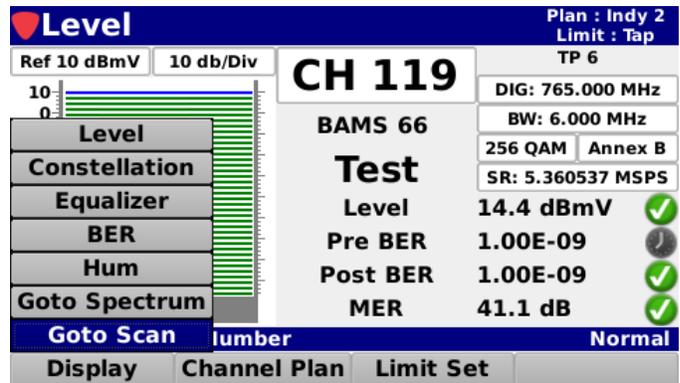


For more information on Forward Spectrum, see Chapter 4: Spectrum Analysis, later in this section.

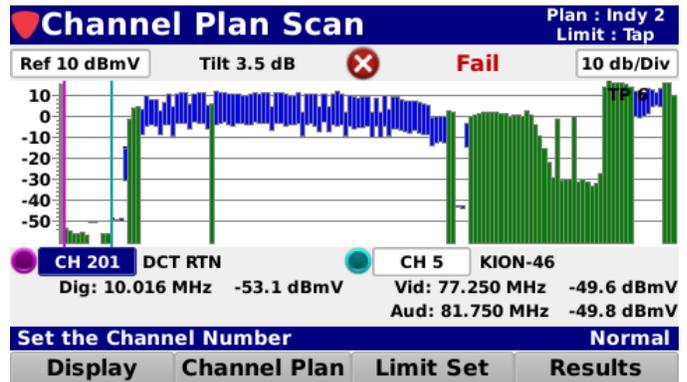
Go to Scan

The **Go to Scan** feature provides the ability to go to the Channel Plan Scan display directly from the **Level** measurement screen.

Select the **Goto Scan** button from the **Display** pop-up menu to display the **Channel Plan Scan** screen.



The **Channel Plan Scan** screen allows you to perform a scan of all of the channels in the current channel plan.



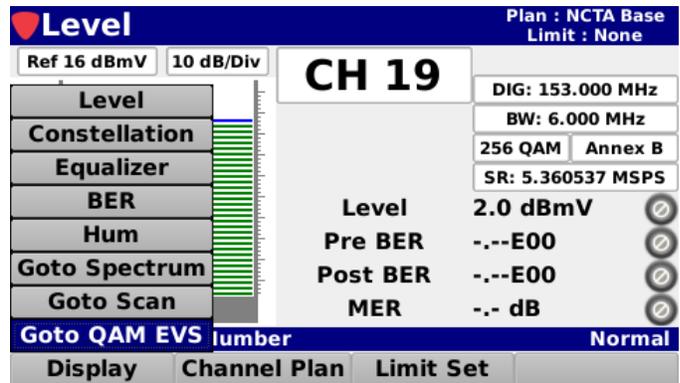
For more information on Channel Plan Scan, see Chapter 3: Channel Plan Scan, later in this section.

NOTE

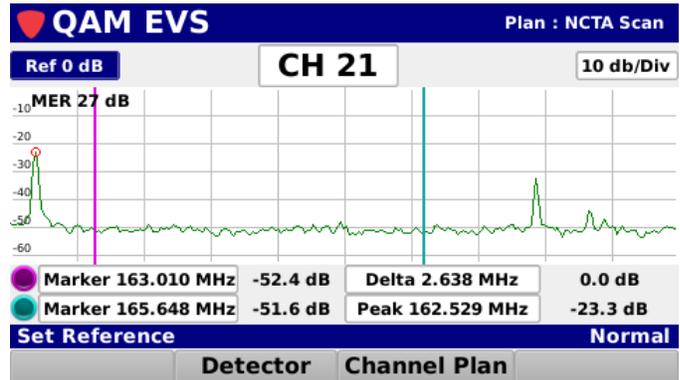
Go to QAM EVS (OPTIONAL)

The **Go to QAM EVS** feature provides the ability to go to the QAM EVS display directly from the **Level** measurement screen.

Select the **Goto QAM EVS** button from the **Display** pop-up menu to display the **QAM EVS** screen.



The **QAM EVS** screen provides users with the ability to tune the meter to a downstream QAM channel and display its error vector spectrum to reveal noise and ingress that may be present under the QAM channel.



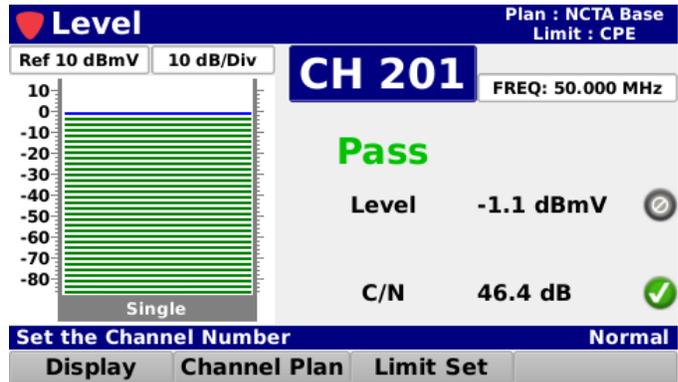
NOTE

For more information on QAM EVS, see Chapter 10: QAM Error Vector Spectrum Analysis, later in this section.

Single Carrier Channel Measurement

When a single carrier channel is selected, the **Level** screen will display the following information based on the settings of the current channel plan:

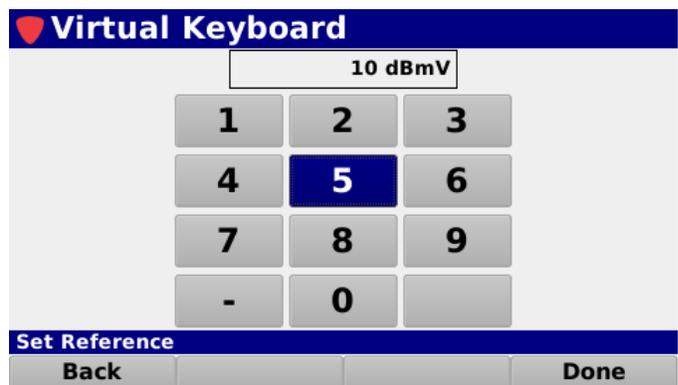
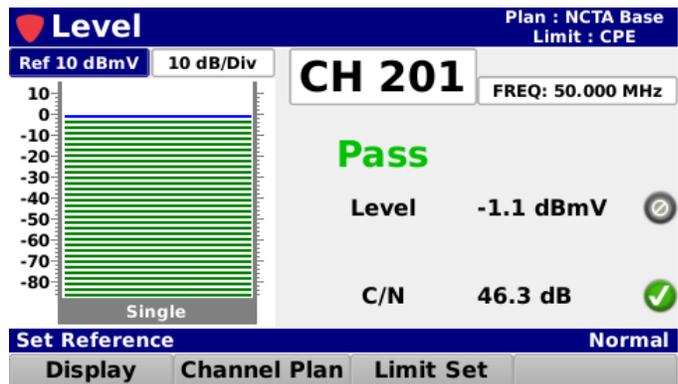
- Reference Level (adjustable)
- Vertical Scale (adjustable)
- Channel Number (adjustable)
- Channel Name
- Center Frequency (adjustable)



Reference Level Adjustment

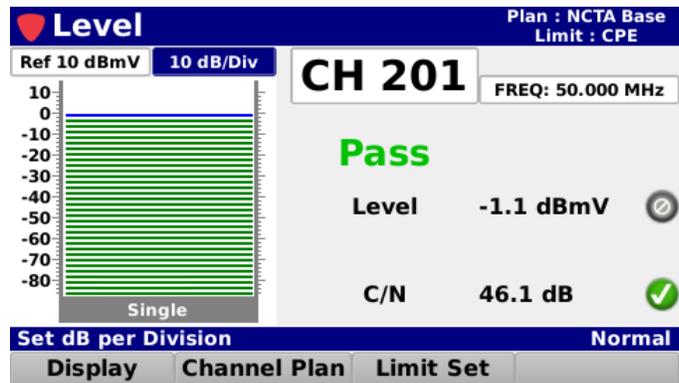
The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the bar graph. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.



Vertical Scale Adjustment

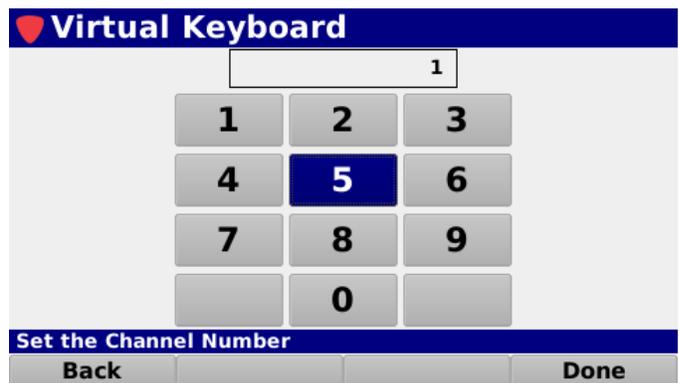
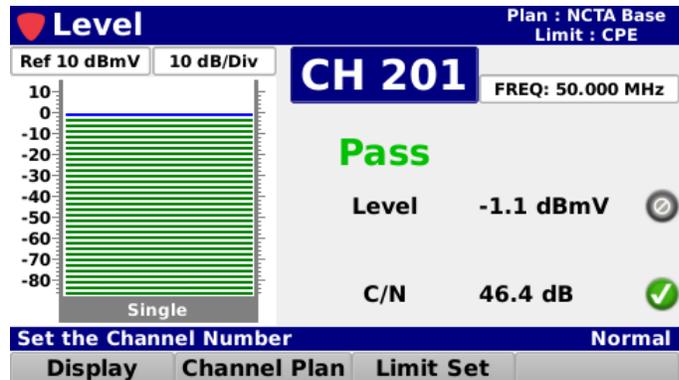
Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of **1**, **2**, **5** or **10** dB/div.



Channel Adjustment

Highlight the channel field as shown in the image to the right and then use either of the following methods to change the channel number:

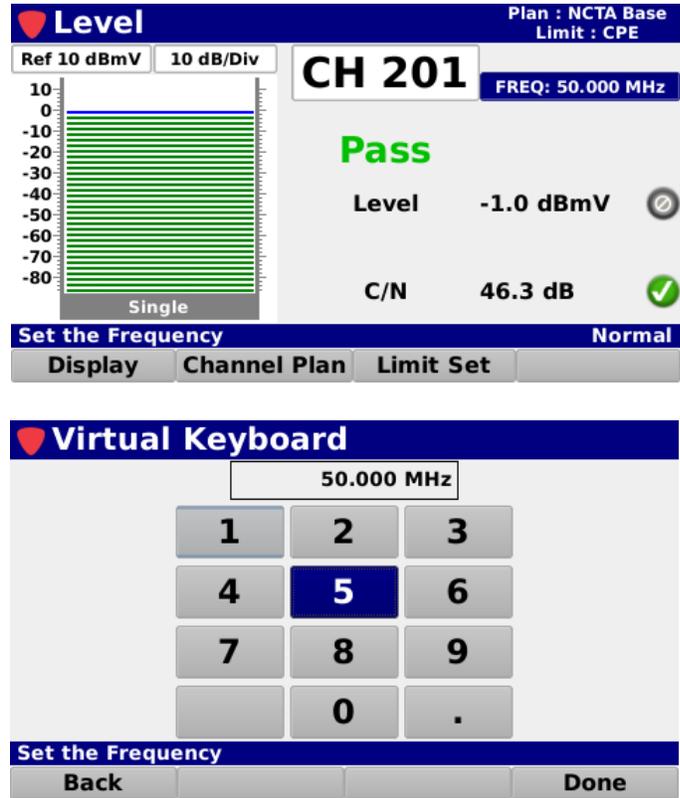
- Use the up/down arrow buttons to change the channel number in 1 channel increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image to the right.



Center Frequency Adjustment

Highlight the center frequency field as shown in the image to the right and then use either of the following methods to change the center frequency:

- Use the up/down arrow buttons to change the center frequency in 0.050 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.



Display Type Adjustment

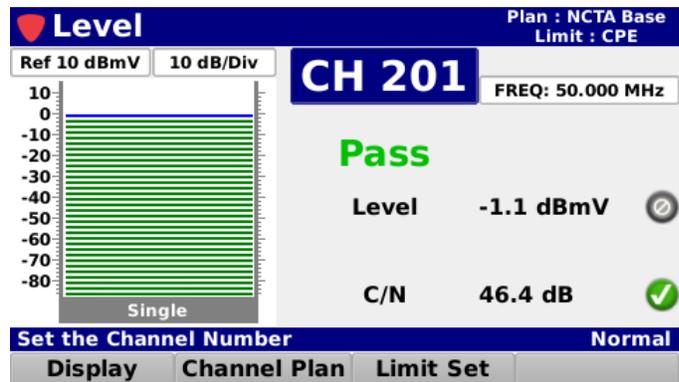
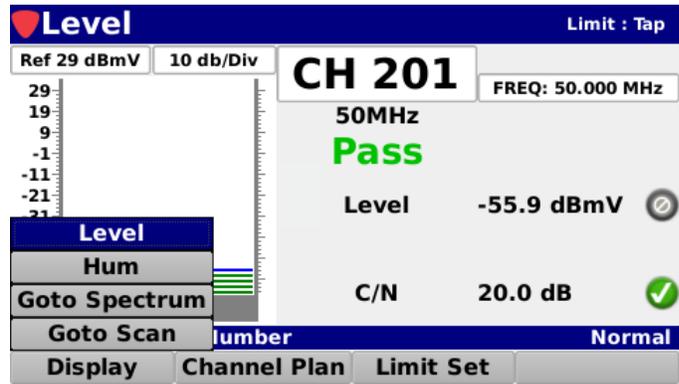
Select the **Display** softkey to scroll through the following types measurement displays:

Bar Graph

Select the **Level** button from the **Display** pop-up menu to display a bar graph of the video and audio carrier levels of the analog video carrier.

The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

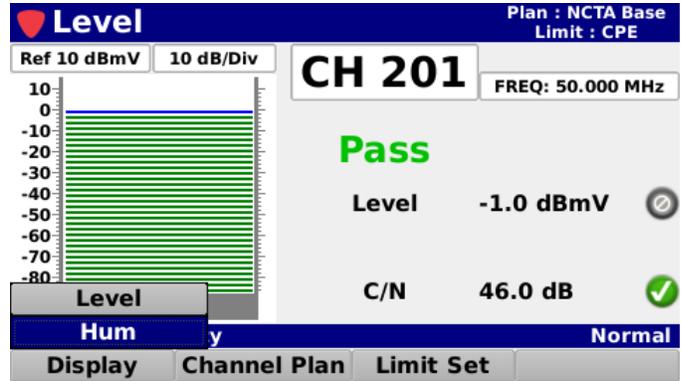
- Video level value with bar graph
- Audio level value with bar graph
- Video/Audio delta value
- C/N value



HUM

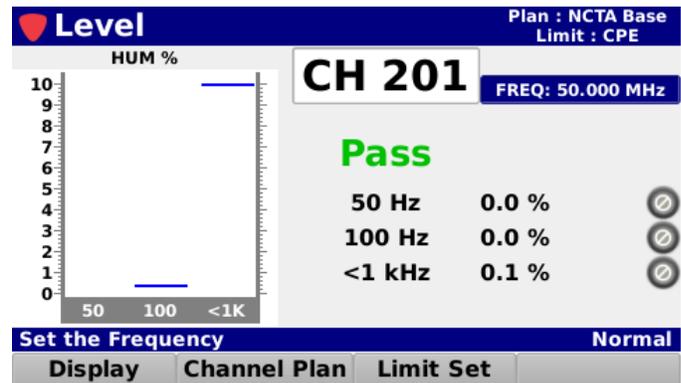
The HUM feature provides users with the ability to measure the amplitude of the 50/60 Hz, 100/120 Hz, and low frequency interference present on the video carrier of a single carrier channel.

Select the **Hum** button from the **Display** pop-up menu to display a bar graph of the HUM levels of the analog channel.



The following measurement results are displayed with a pass/fail status for each measurement that is included in the open limit set:

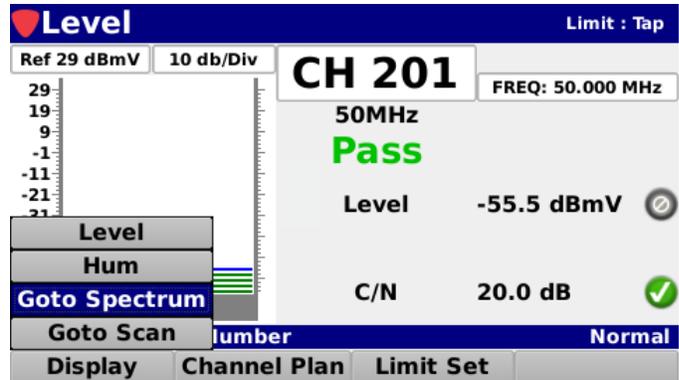
- 60 Hz level value with bar graph
- 120 Hz level value with bar graph
- < 1 kHz (low frequency) level value with bar graph



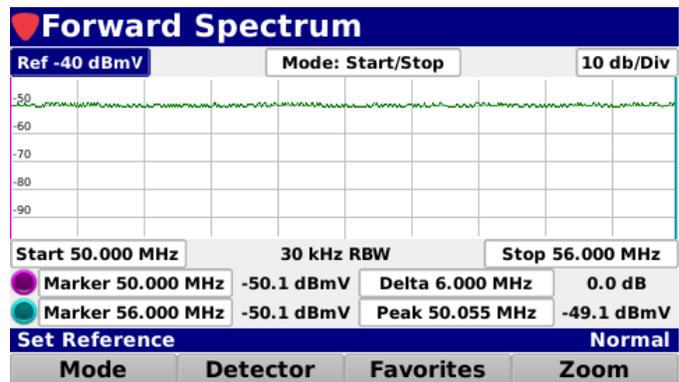
Go to Spectrum

The **Go to Spectrum** feature provides the ability to go to the Forward Spectrum display directly from the **Level** measurement screen.

Select the **Goto Spectrum** button from the **Display** pop-up menu to display the **Forward Spectrum** screen.



The **Forward Spectrum** screen provides the ability to view raw spectrum traces for the forward path from 50 to 1000 MHz with DSP spectrum snapshots to give a view of any downstream channels.



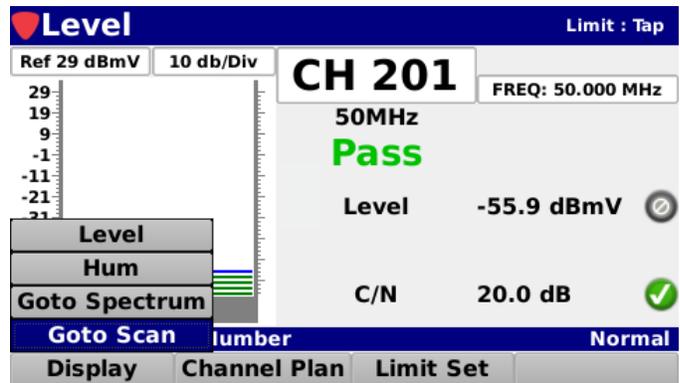
For more information on Forward Spectrum, see Chapter 4: Spectrum Analysis, later in this section.

NOTE

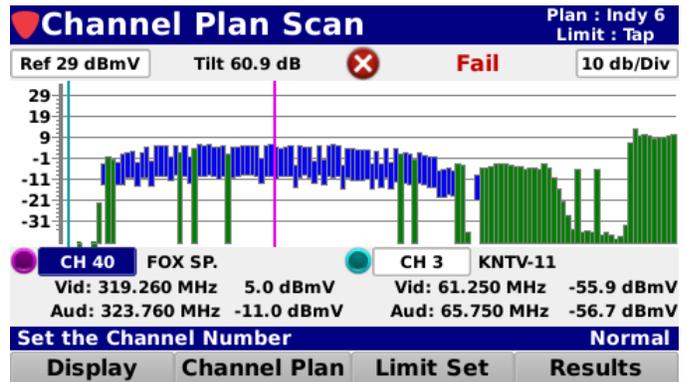
Go to Scan

The **Go to Scan** feature provides the ability to go to the Channel Plan Scan display directly from the **Level** measurement screen.

Select the **Goto Scan** button from the **Display** pop-up menu to display the **Channel Plan Scan** screen.



The **Channel Plan Scan** screen allows you to perform a scan of all of the channels in the current channel plan.

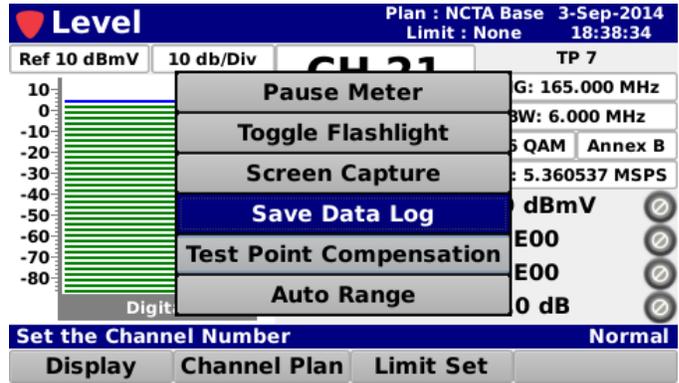


NOTE

For more information on Channel Plan Scan, see Chapter 3: Channel Plan Scan, later in this section.

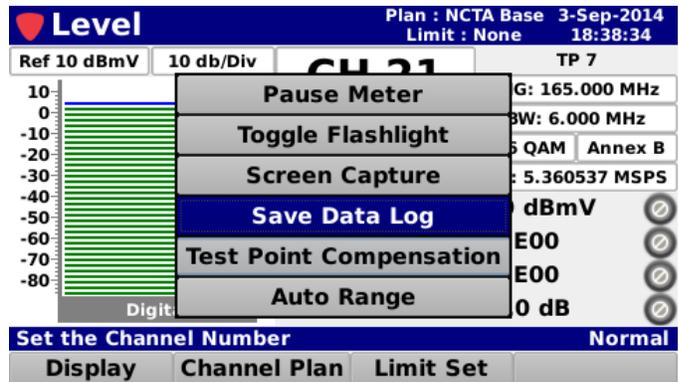
Function Menu Options

Additional functions can be accessed from within the **Level** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Level** screen.

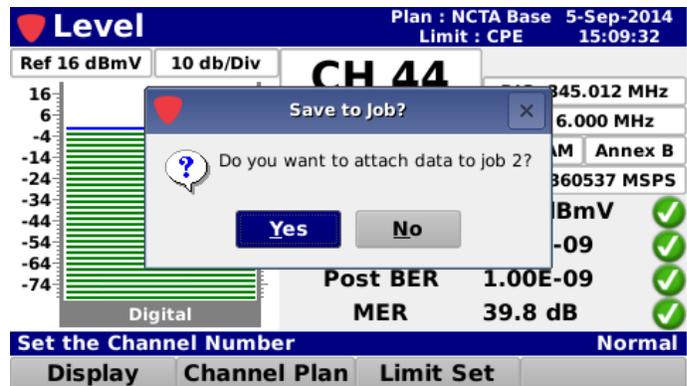


Save Data Log

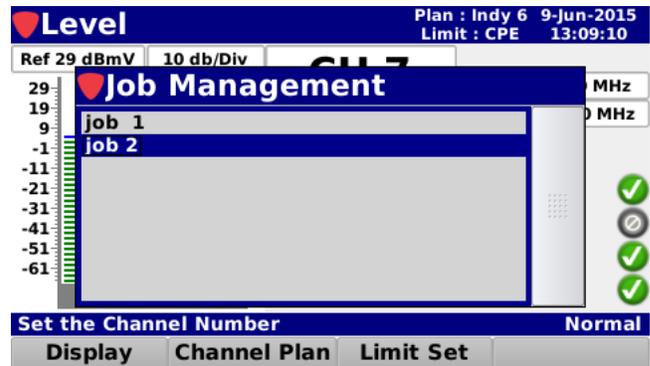
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes**.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.

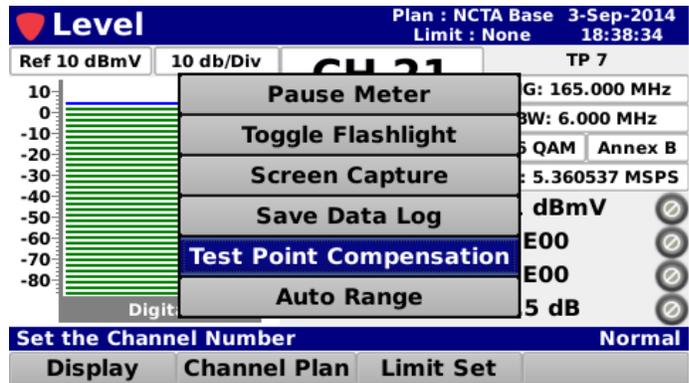


If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Test Point Compensation

Select the **Test Point Compensation** button from the **Function** menu to enter test point loss measurements for both test point and probe loss.

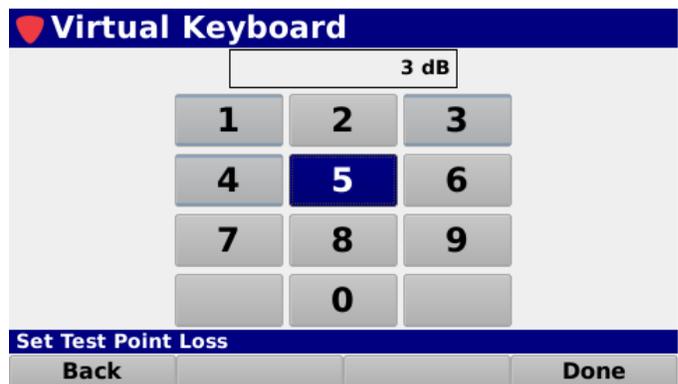
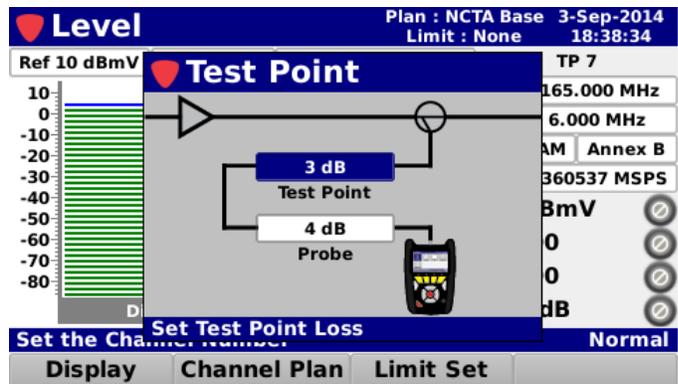


The **Test Point** screen will be displayed as shown in the image to the right.

Test Point Loss

Highlight the **Test Point** field and then use either of the following methods to change the loss value:

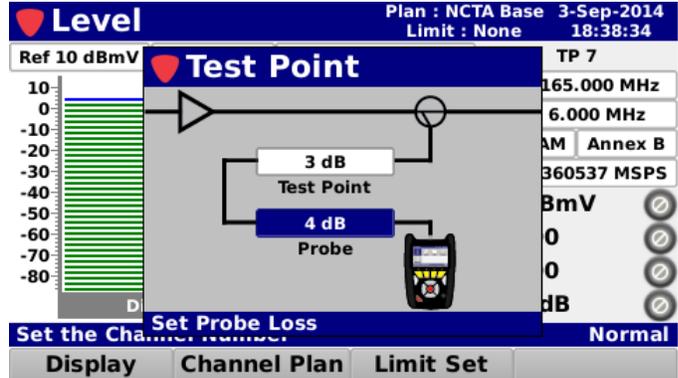
- Use the up/down arrow buttons to change the test point loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



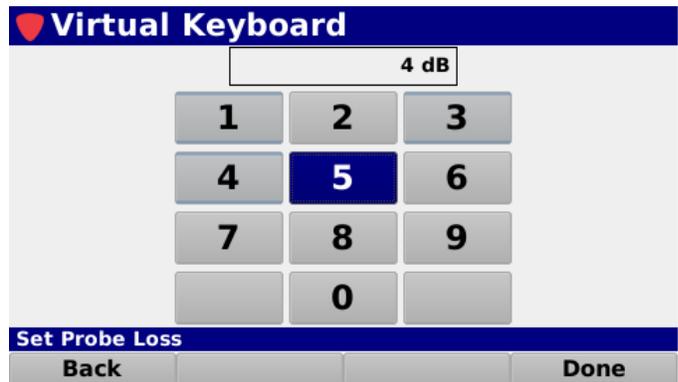
Probe Loss

Highlight the **Probe** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the probe loss level in 1 dB increments.

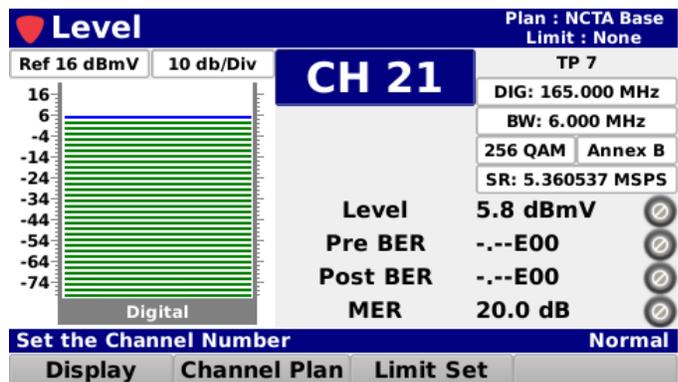


- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



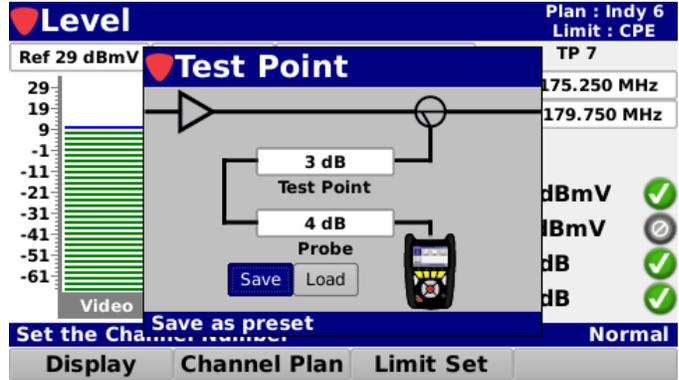
When finished entering the test point loss information, press the **Back** button to return to the **Level** screen.

The total test point compensation value will be displayed to the right of the channel number, as shown in the image to the right.



Save Preset

Select the **Save** button to save the test point values as a preset.

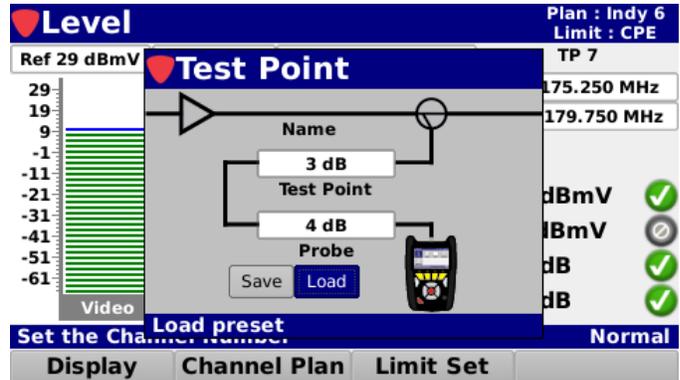


The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter a name for the preset.

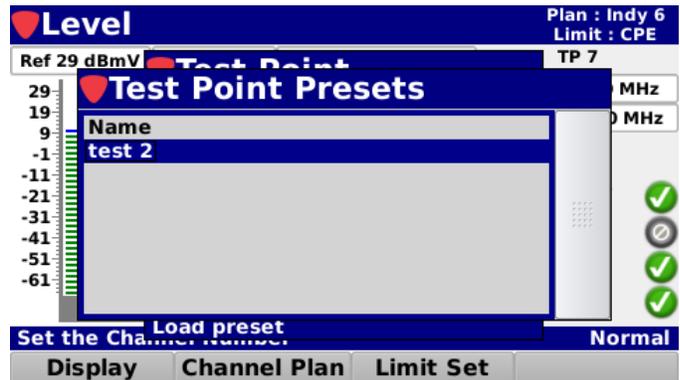


Load Preset

Select the **Load** button to load the test point values preset.

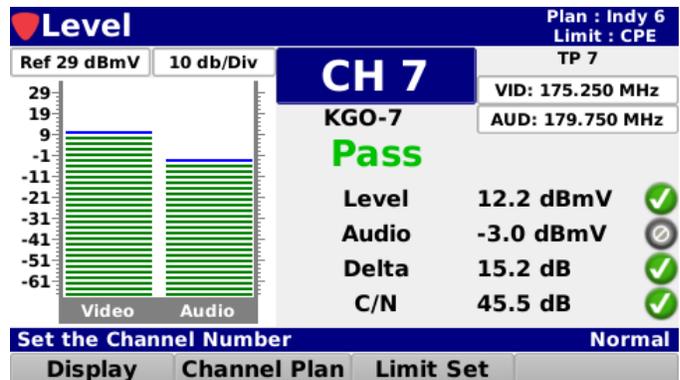


If you have multiple presets, the **Test Point Presets** window will be displayed. Choose the preset you would like to load.



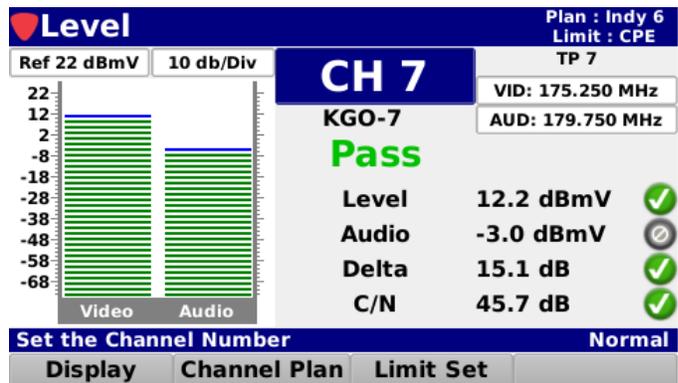
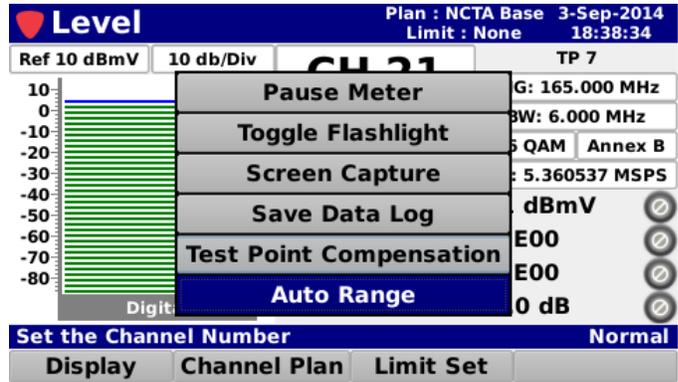
When finished entering the test point loss information, press the **Back** button to return to the **Level** screen.

The total test point compensation value will be displayed to the right of the channel number, as shown in the image to the right.



Auto Range

Select the **Auto Range** button from the **Function** menu to quickly bring off-scale signals onscreen by automatically adjusting the reference level and vertical resolution.

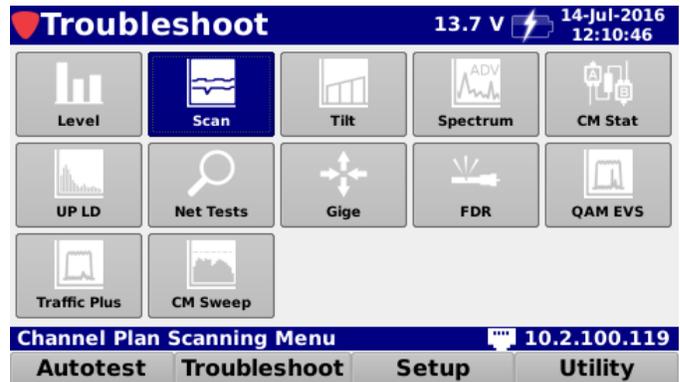


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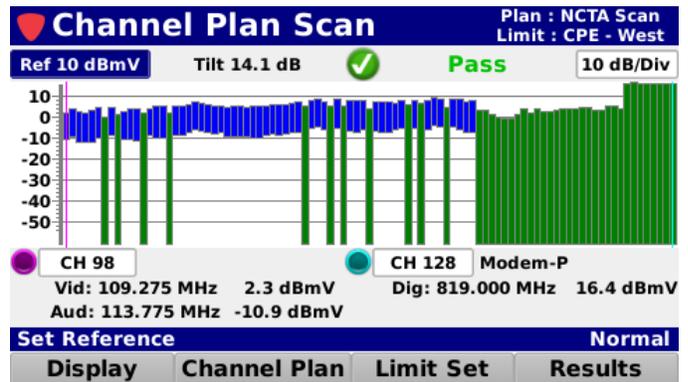
Channel Plan Scan

Overview

Select the **Scan** icon as shown in the image to the right to perform a channel plan scan on the 720 DSP.

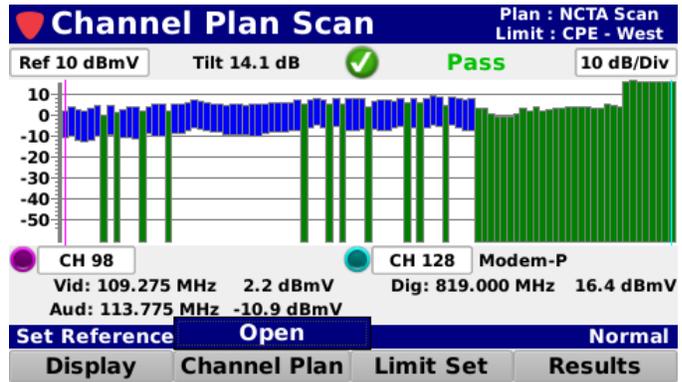


The **Channel Plan Scan** screen will be displayed as shown in the images to the right. This screen allows you to perform a scan of all of the channels in the current channel plan.



Opening a Channel Plan

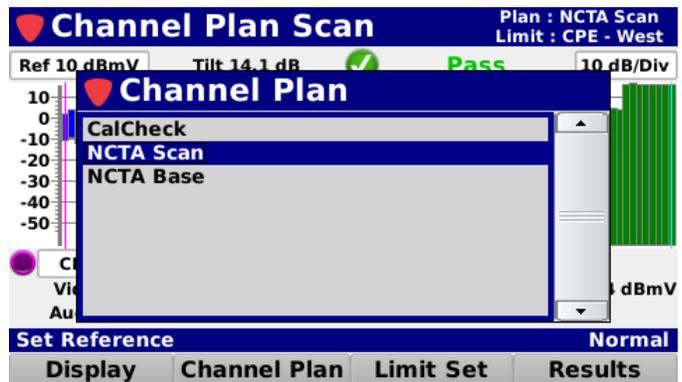
Select the **Channel Plan** softkey as shown in the image to the right to select the channel plan to use for the channel plan scan.



Select the **Open** button from the **Channel Plan** pop-up menu and the **Channel Plan** window will be displayed as shown in the image to the right.

From the **Channel Plan** window, select the name of the channel plan to use for the channel plan scan.

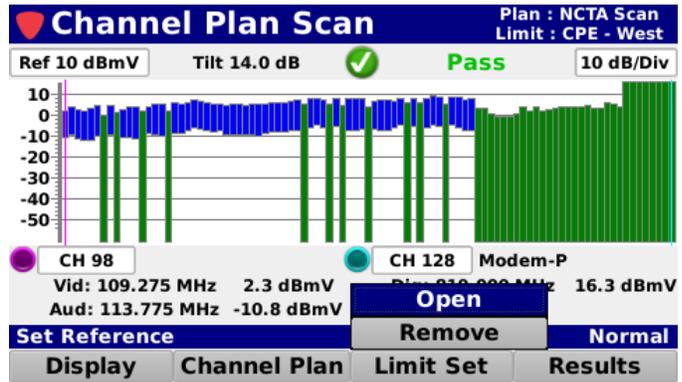
After selecting the channel plan, the **Channel Plan Scan** screen will be displayed again.



 **NOTE** *The Channel Plan window will be bypassed if there is only one channel plan to choose from.*

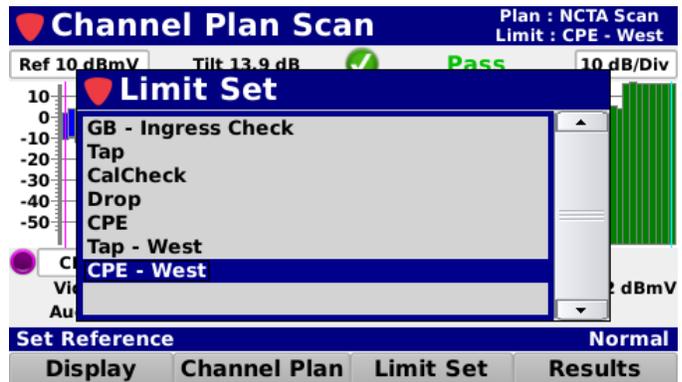
Opening a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the channel plan scan.



Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the channel plan scan.



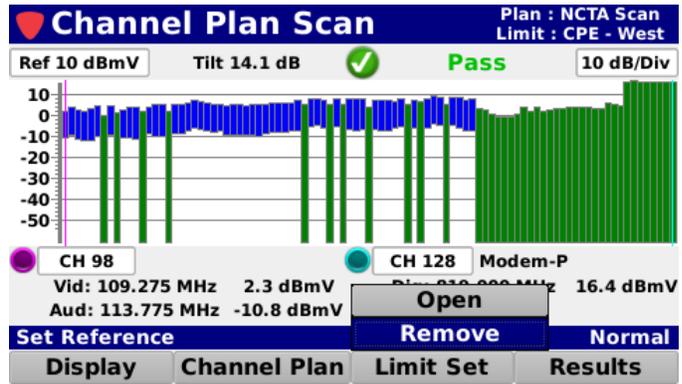
After selecting the limit set, the **Channel Plan Scan** screen will be displayed again.

 **The Limit Set window will be bypassed if there is only one limit set to choose from.**

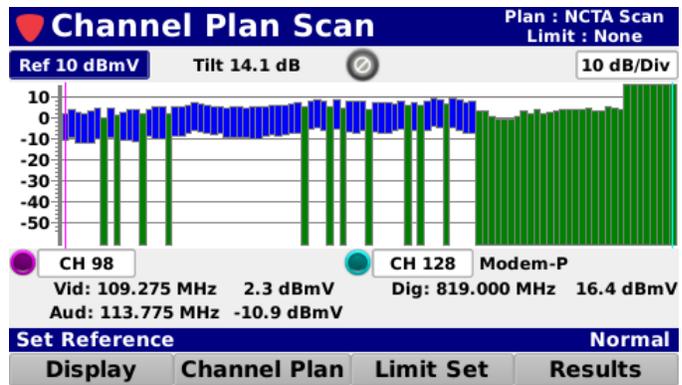
NOTE

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove the limits set for the channel plan scan.



Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.



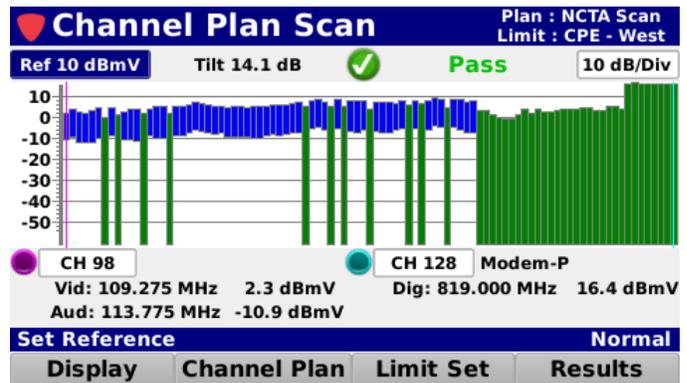
Pass/Fail Measurement Indicators

When a limit set has been opened, each channel that is included in the channel plan will be tested against the selected limit set thresholds.

The Tilt measurement between the two user adjustable markers will be displayed along with the Pass/Fail status of the channel plan scan. When any of the individual measurement parameters of a channel plan scan fail, the channel plan scan as a whole will indicate a Fail status.

When the **Results** softkey is selected the following results are displayed, each individual measurement parameter will indicate its status and uses the following icons:

-  This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
-  This icon indicates that this measurement is within the measurement thresholds of the currently selected limit set.
-  This icon indicates that the measurement limit set has failed.
-  This icon indicates that the measurement has failed the high limit measurement threshold.
-  This icon indicates that the measurement has failed the low limit measurement threshold.



Scan Results - 95 Channels

Limit	Status	Description
Min Dig	Pass	
Max Dig	8 Chs	121,122,123,124,125,126,127,...
Min Vid	Pass	
Max Vid	Pass	
Min Vid/Aud	Pass	
Max Vid/Aud	Pass	
Max Vid/Dig	Pass	
Max Vid Delta	Pass	
Max Vid Adj	Pass	
Min Tilt	Pass	
Max Tilt	Pass	

Display Type Adjustment

Select the **Display** softkey to scroll through the following types measurement displays:

Measurement Results

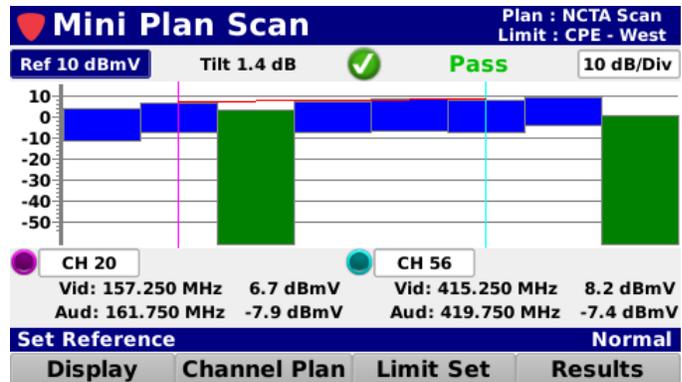
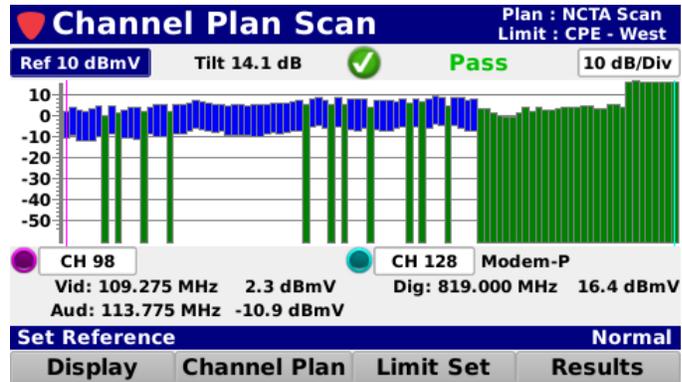
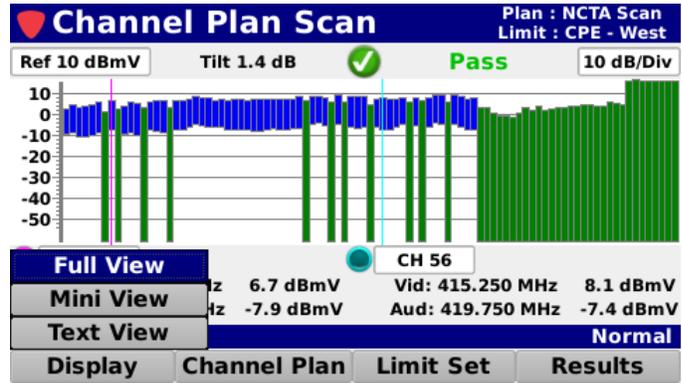
The Tilt measurement results are displayed with a pass/fail status when Tilt limits are included in the open limit set.

Full View

Select the **Full View** button from the **Display** pop-up menu to display the level of each channel in the channel plan scan. Analog channels are represented by a solid green bar, digital channels by a solid blue bar, and single carrier channel by a solid gray bar.

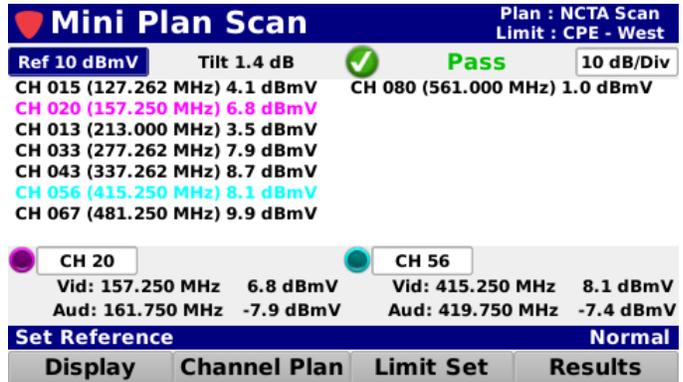
Mini View

Select the **Mini View** button from the **Display** pop-up menu to display the level of your favorites channels in the channel plan scan. Analog channels are represented by a solid blue bar, digital channels by a solid green bar, and single carrier channel by a solid gray bar.



Text View

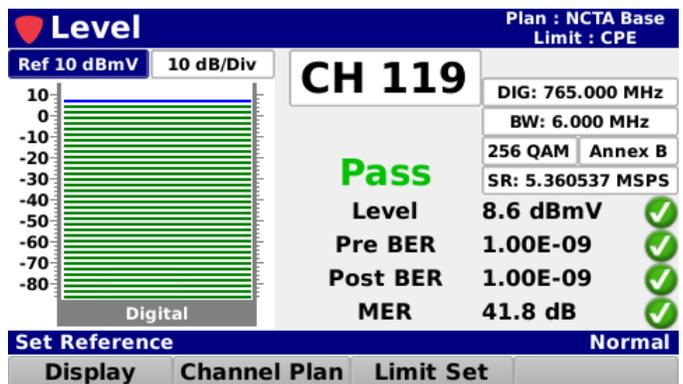
Select the **Text View** button from the **Display** pop-up menu to display a text list of your favorites channels in the channel plan scan.



Go to Level

The **Go to Level** feature provides the ability to go to the Level measurement display directly from the **Channel Plan Scan** screen.

Select the **Goto Level** button from the **Display** pop-up menu to display the **Level** screen. The **Level** screen allows you to perform various types of channel measurements.



For more information on Level measurement, see Chapter 2: Level Measurement, earlier in this section.

Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the bar graph. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.

Channel Plan Scan Plan : NCTA Scan
Limit : CPE - West

Ref 10 dBmV Tilt 14.1 dB Pass 10 dB/Div

10
0
-10
-20
-30
-40
-50

CH 98 CH 128 Modem-P
Vid: 109.275 MHz 2.3 dBmV Dig: 819.000 MHz 16.4 dBmV
Aud: 113.775 MHz -10.9 dBmV

Set Reference Normal

Display Channel Plan Limit Set Results

Virtual Keypad

10 dBmV

1	2	3
4	5	6
7	8	9
-	0	

Set Reference

Back Done

Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of 1, 2, 5 or 10 dB/div.

Channel Plan Scan Plan : NCTA Scan
Limit : CPE - West

Ref 10 dBmV Tilt 1.4 dB Pass 10 dB/Div

10
0
-10
-20
-30
-40
-50

CH 20 CH 56
Vid: 157.250 MHz 6.7 dBmV Vid: 415.250 MHz 8.1 dBmV
Aud: 161.750 MHz -8.0 dBmV Aud: 419.750 MHz -7.4 dBmV

Set dB per Division Normal

Display Channel Plan Limit Set Results

Tilt Measurement & Marker Adjustment

The **Channel Plan Scan** screen includes two on-screen markers that are used for measurement of Tilt in the channel plan. The Tilt between the two markers is displayed at the top middle of the screen as shown in the image to the right.

The markers are represented by the following color bullets, vertical lines, and text:

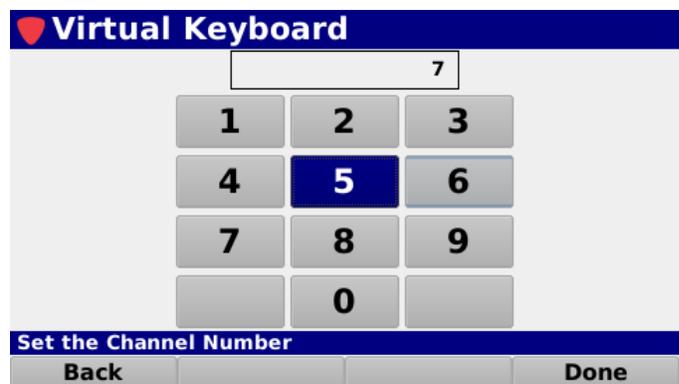
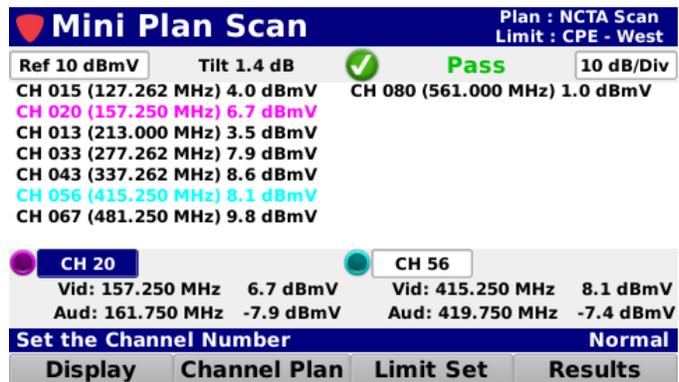
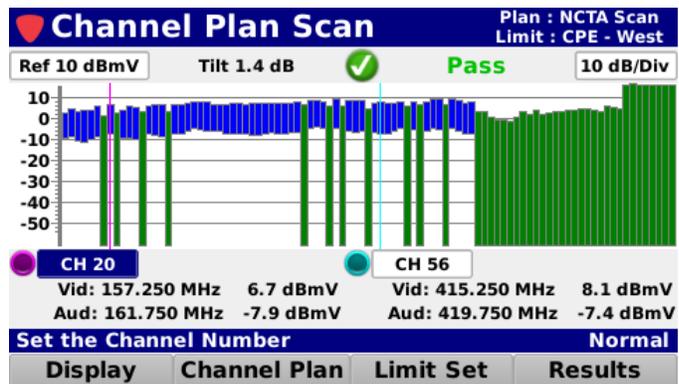
- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker in 1 channel increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image below.

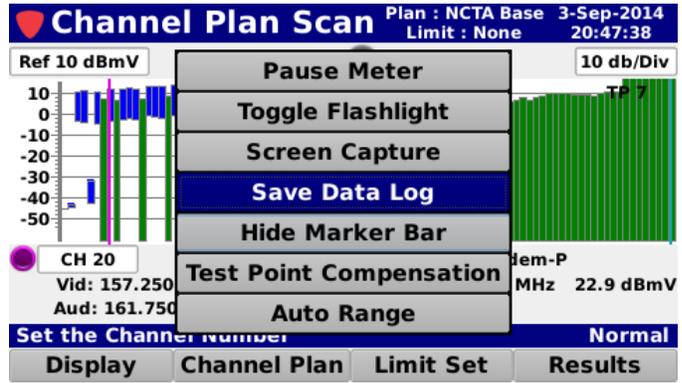
The following information is displayed for each channel type:

- **Analog** – Channel number/name, video/audio frequencies, and video/audio levels.
- **Digital** – Channel number/name, digital video frequency, and level.
- **Single Carrier** – Channel number/name, center frequency, and level.



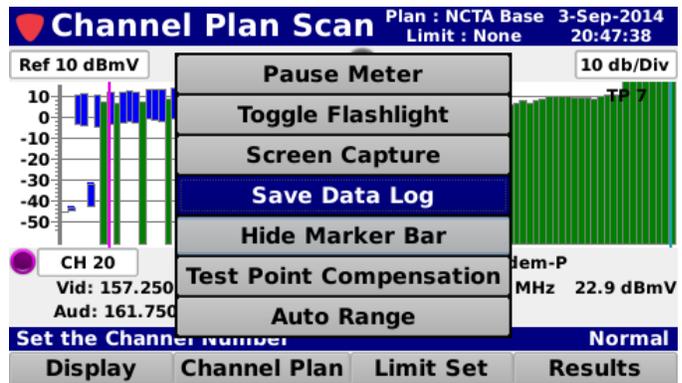
Function Menu Options

Additional functions can be accessed from within the **Channel Plan Scan** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Channel Plan Scan** screen.

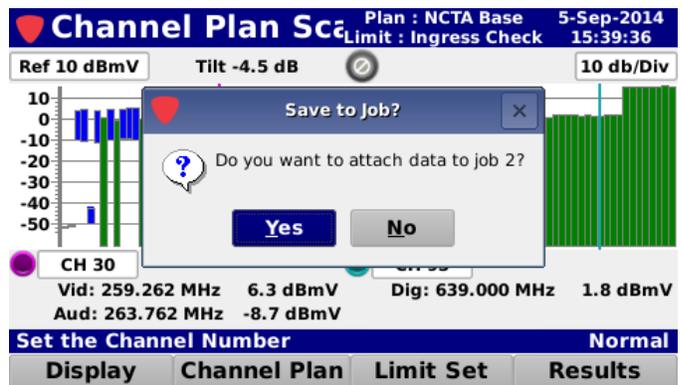


Save Data Log

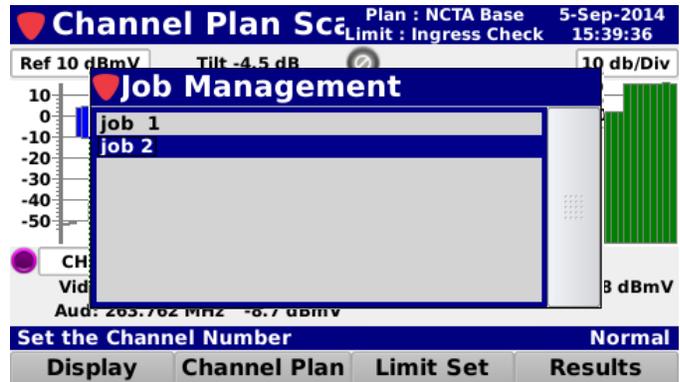
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes**.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.



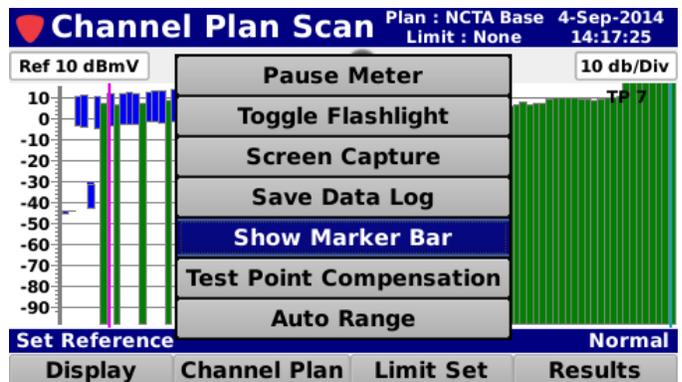
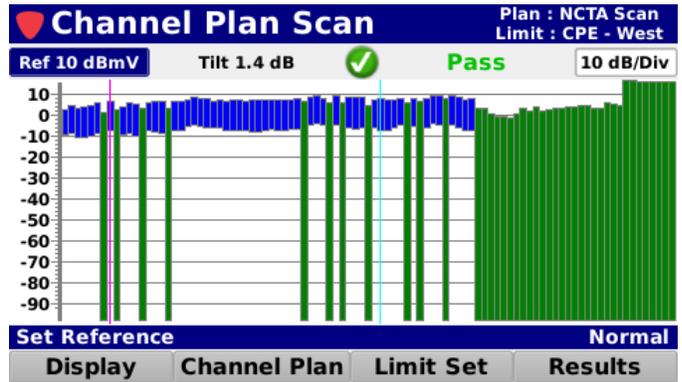
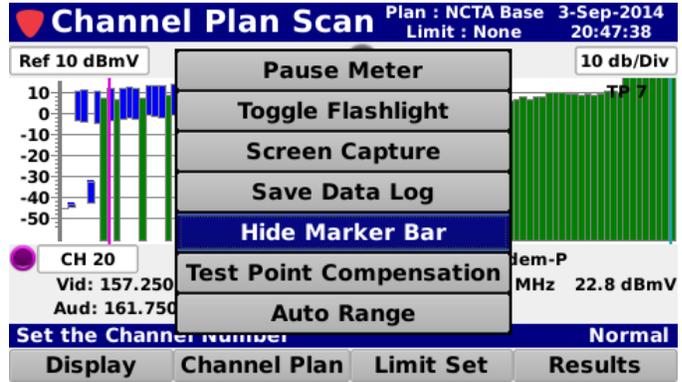
If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Hide Marker Bar

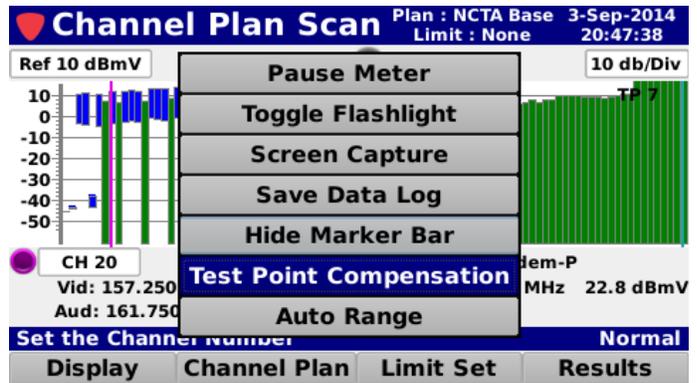
Select the **Hide Marker Bar** button from the **Function** menu to hide the marker bar at the bottom of the screen and expand the measurement viewing area.

When the marker bar is hidden, select the **Show Marker Bar** button from the **Function** menu to show the marker bar.



Test Point Compensation

Select the **Test Point Compensation** button from the **Function** menu to enter test point loss measurements for both test point and probe loss.

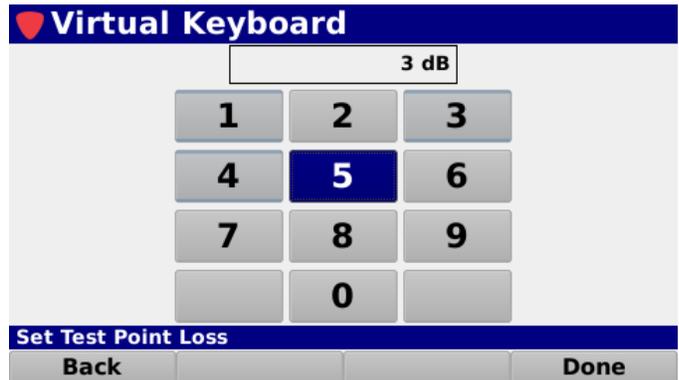
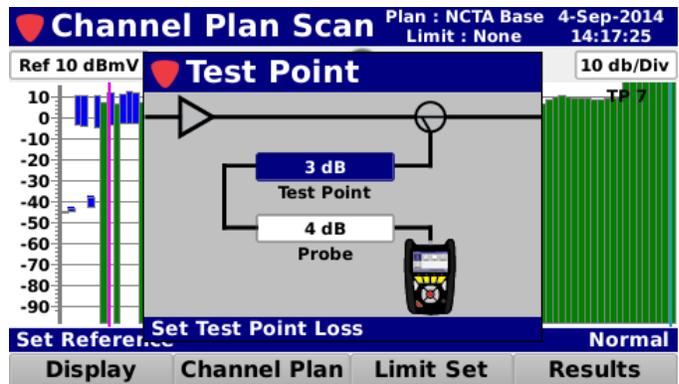


The **Test Point** screen will be displayed as shown in the image to the right.

Test Point Loss

Highlight the **Test Point** field and then use either of the following methods to change the loss value:

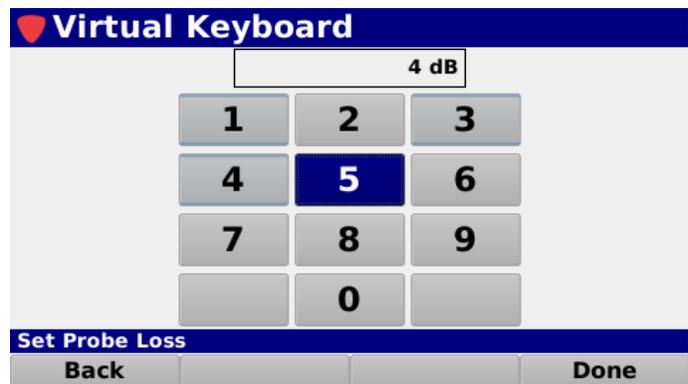
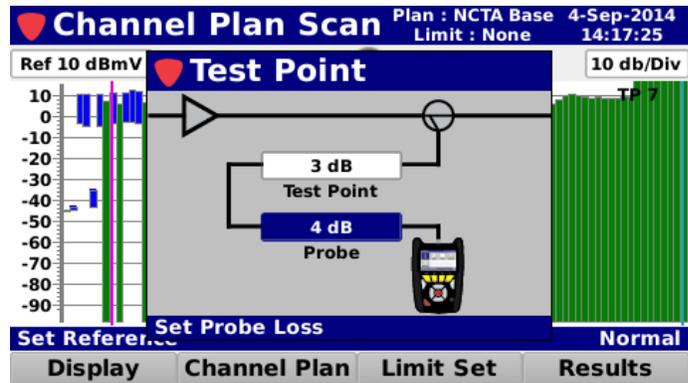
- Use the up/down arrow buttons to change the test point loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



Probe Loss

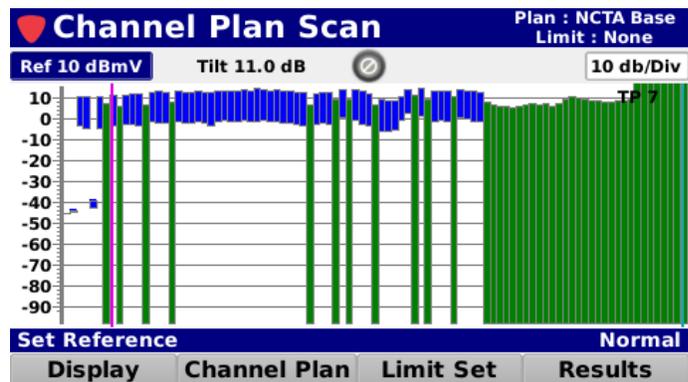
Highlight the **Probe** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the probe loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



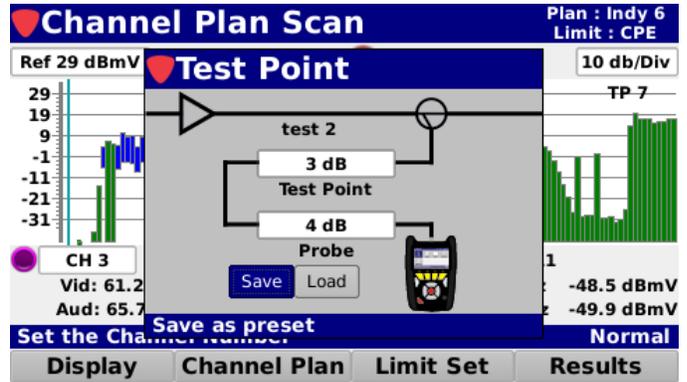
When finished entering the test point loss information, press the **Back** button to return to the **Channel Plan Scan** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Save Preset

Select the **Save** button to save the test point values as a preset.

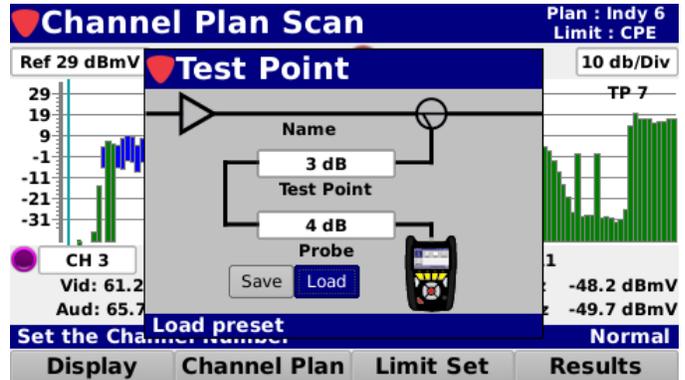


The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter a name for the preset.

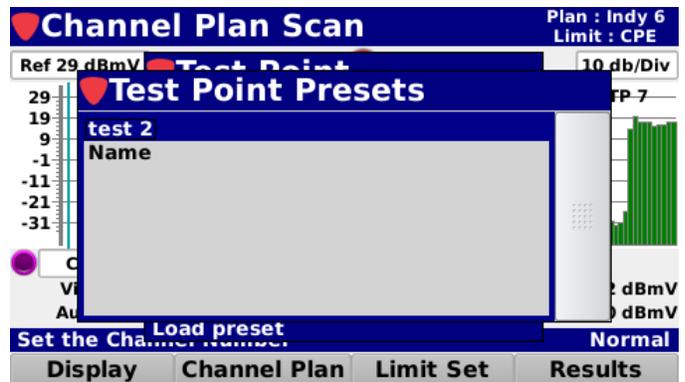


Load Preset

Select the **Load** button to load the test point values preset.

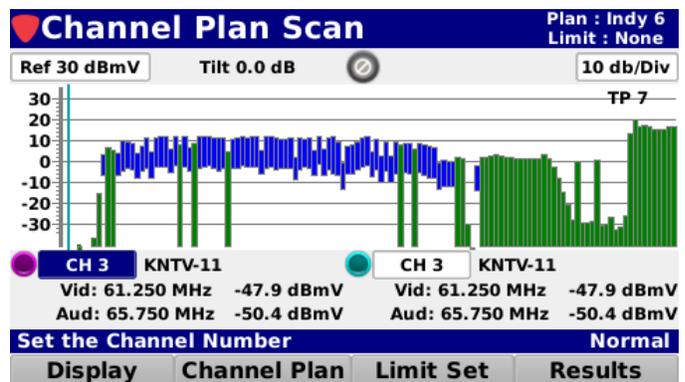


If you have multiple presets, the **Test Point Presets** window will be displayed. Choose the preset you would like to load.



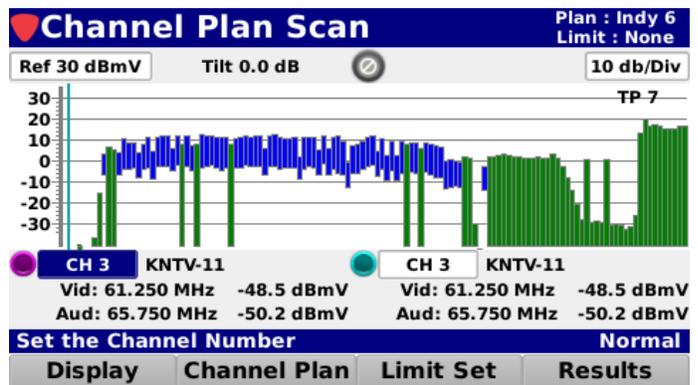
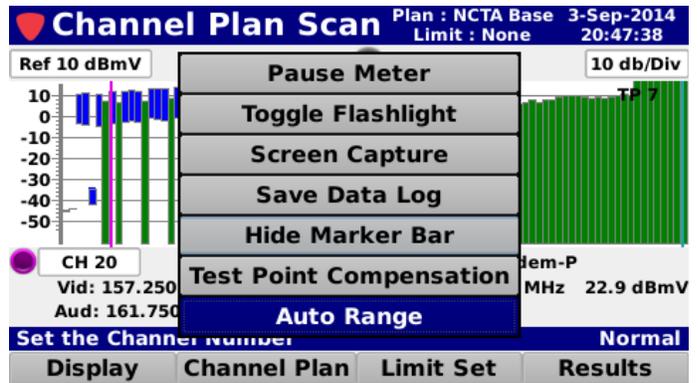
When finished entering the test point loss information, press the **Back** button to return to the **Level** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Auto Range

Select the **Auto Range** button from the **Function** menu to quickly bring off-scale signals onscreen by automatically adjusting the reference level and vertical resolution.

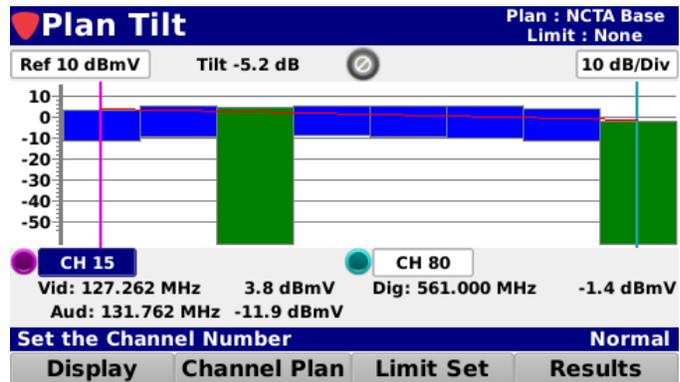


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Overview

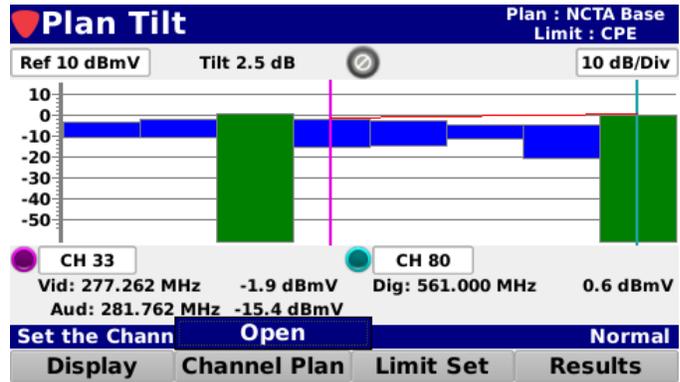
Select the **Tilt** icon as shown in the image to the right to perform a tilt measurement on the 360 DSP.

The **Plan Tilt** screen will be displayed as shown in the image to the right. This screen shows the level difference between two selectable channels, shown by the colored markers.



Opening a Channel Plan

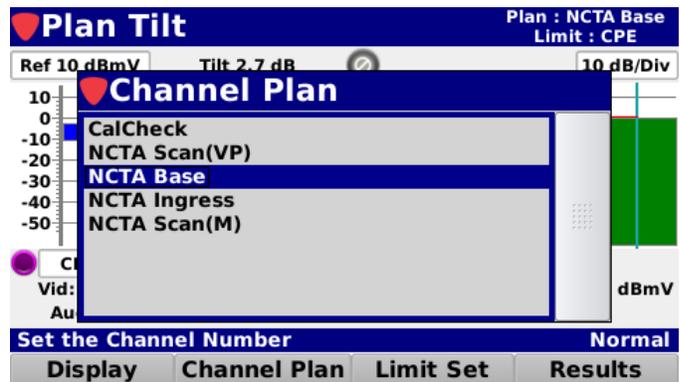
Select the **Channel Plan** softkey as shown in the image to the right to select the channel plan to use for the tilt measurement.



Select the **Open** button from the **Channel Plan** pop-up menu and the **Channel Plan** window will be displayed as shown in the image to the right.

From the **Channel Plan** window, select the name of the channel plan to use for the tilt measurement.

After selecting the channel plan, the **Plan Tilt Scan** screen will be displayed again.

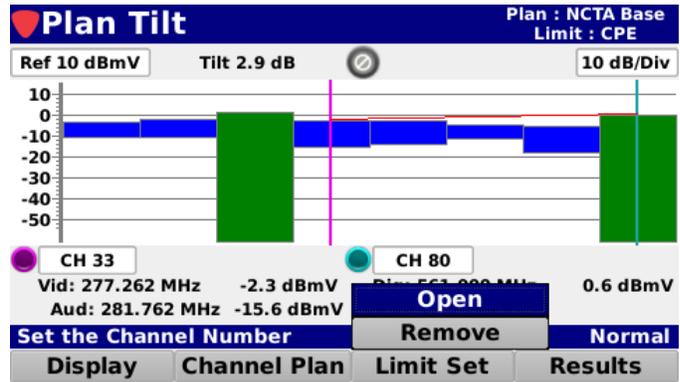


 **The Channel Plan window will be bypassed if there is only one channel plan to choose from.**

 **Tilt measurement only shows channels selected as favorites in the channel plan. You can select up to 14 channels as favorites.**

Opening a Limit Set

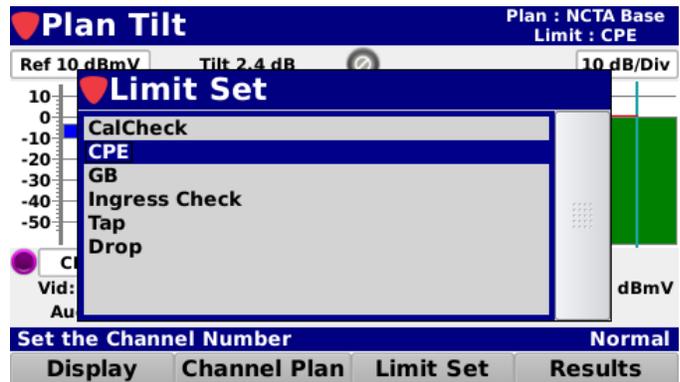
Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the tilt measurement.



Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the tilt measurement.

After selecting the limit set, the **Plan Tilt** screen will be displayed again.

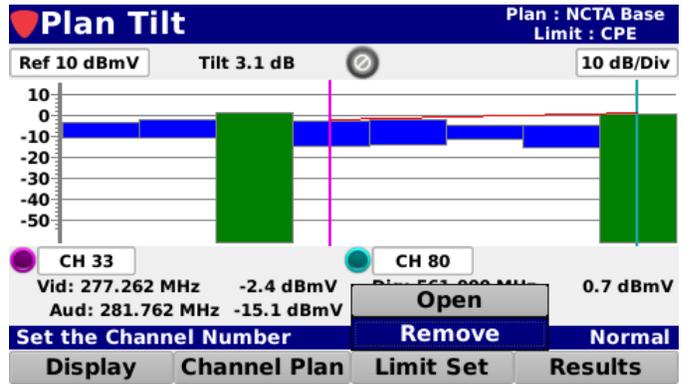


The Limit Set window will be bypassed if there is only one limit set to choose from.

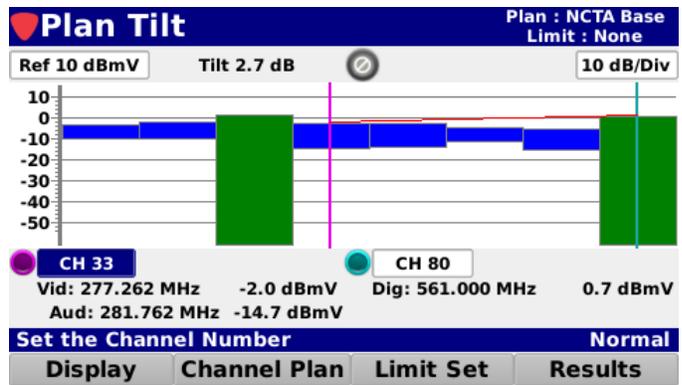
NOTE

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove the limits set for the tilt measurement.



Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.



Pass/Fail Measurement Indicators

When a limit set has been opened, each channel that is included in the channel plan will be tested against the selected limit set thresholds.

The Tilt measurement between the two user adjustable markers will be displayed along with the Pass/Fail status of the channel plan scan. When any of the individual measurement parameters of a channel plan scan fail, the channel plan scan as a whole will indicate a Fail status.

When the **Results** softkey is selected the following results are displayed, each individual measurement parameter will indicate its status and uses the following icons:

- 

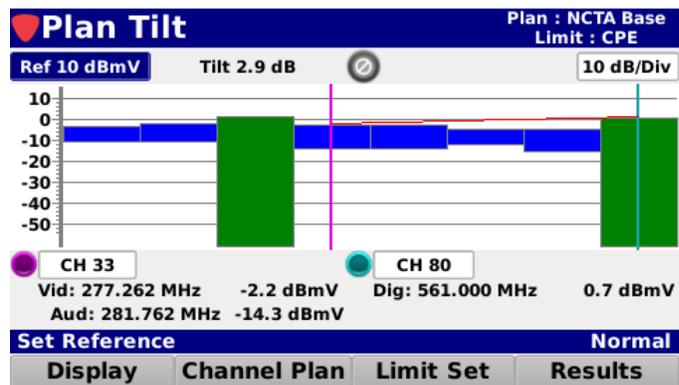
This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
- 

This icon indicates that this measurement is within the measurement thresholds of the currently selected limit set.
- 

This icon indicates that the measurement limit set has failed.
- 

This icon indicates that the measurement has failed the high limit measurement threshold.
- 

This icon indicates that the measurement has failed the low limit measurement threshold.



Limit	Status	Description
Min Dig	Pass	
Max Dig	Pass	
Min Vid	Pass	
Max Vid	Pass	
Min Vid/Aud	Pass	
Min Vid/Aud	Pass	
Max Vid/Dig	Pass	
Max Vid Delta	Pass	
Max Vid Adj	Pass	

Display Type Adjustment

Select the **Display** softkey to scroll through the following types measurement displays:

Measurement Results

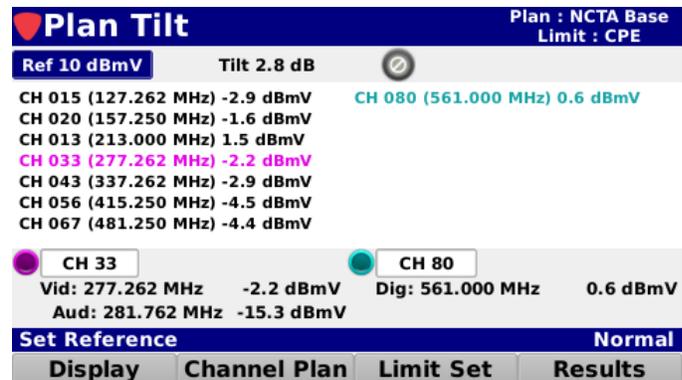
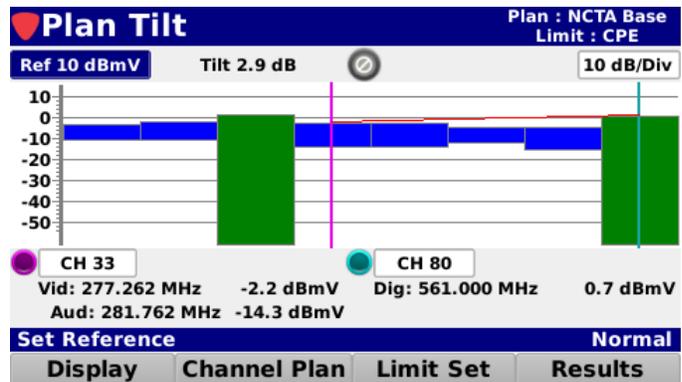
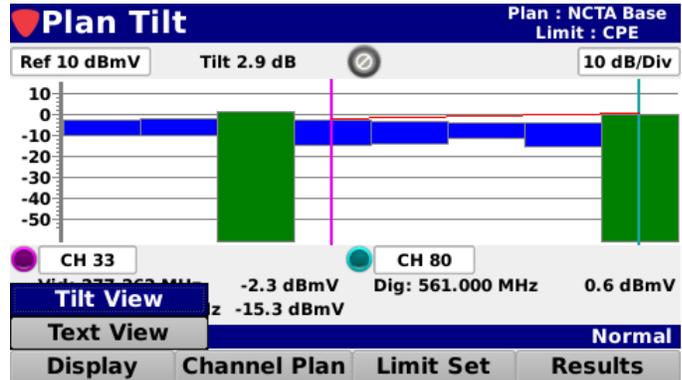
The Tilt measurement results are displayed with a pass/fail status when Tilt limits are included in the open limit set.

Full View

Select the **Full View** button from the **Display** pop-up menu to display the level of each channel in the channel plan scan. Analog channels are represented by a solid green bar, digital channels by a solid blue bar, and single carrier channel by a solid gray bar.

Text View

Select the **Text View** button from the **Display** pop-up menu to display a text list of your favorites channels in the tilt measurement.



Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the bar graph. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.

The screenshot shows the 'Plan Tilt' interface. At the top, it displays 'Plan : NCTA Base' and 'Limit : CPE'. Below this, there are fields for 'Ref 10 dBmV', 'Tilt 2.9 dB', and '10 dB/Div'. A bar graph shows signal levels for two channels: CH 33 (Vid: 277.262 MHz, -2.2 dBmV; Aud: 281.762 MHz, -14.3 dBmV) and CH 80 (Dig: 561.000 MHz, 0.7 dBmV). The reference level is highlighted in green. Below the graph is a 'Set Reference' menu with options: Display, Channel Plan, Limit Set, and Results. Below that is a 'Virtual Keypad' with a numeric keypad where '10 dBmV' is entered in the top field. The keypad has buttons for 1-9, 0, and a minus sign. At the bottom are 'Set Reference', 'Back', and 'Done' buttons.

Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of 1, 2, 5 or 10 dB/div.

This screenshot is similar to the one above but shows the 'Set dB per Division' menu. The 'Ref 10 dBmV' field is highlighted in green. The 'Virtual Keypad' is not visible. The 'Set dB per Division' menu has options: Display, Channel Plan, Limit Set, and Results. The '10 dB/Div' field is highlighted in blue. Below the graph, the signal levels for CH 33 and CH 80 are shown with updated values: CH 33 (Vid: 277.262 MHz, -2.2 dBmV; Aud: 281.762 MHz, -14.8 dBmV) and CH 80 (Dig: 561.000 MHz, 0.5 dBmV). At the bottom are 'Set dB per Division', 'Back', and 'Done' buttons.

Tilt Measurement & Marker Adjustment

The **Plan Tilt** screen includes two on-screen markers that are used for measurement of Tilt in the channel plan. The Tilt between the two markers is displayed at the top middle of the screen as shown in the image to the right.

The markers are represented by the following color bullets, vertical lines, and text:

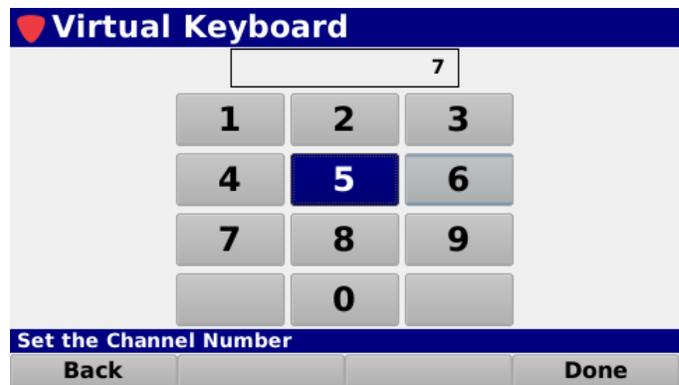
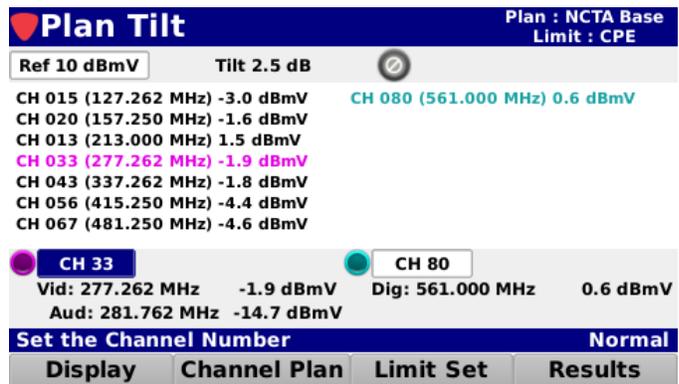
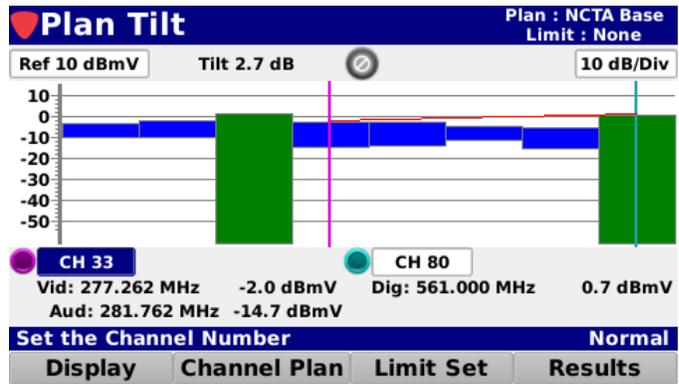
- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker for the selected favorite channel
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image below.

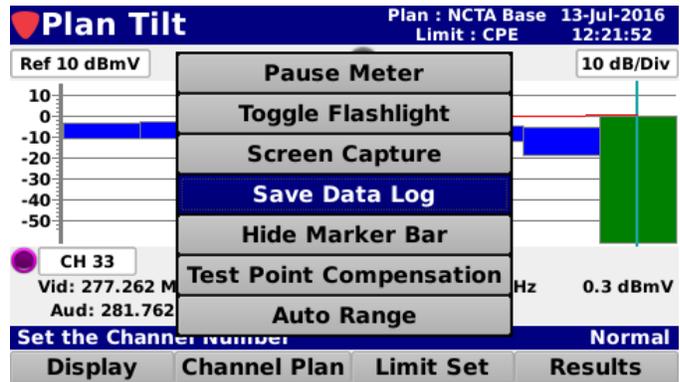
The following information is displayed for each channel type:

- **Analog** – Channel number/name, video/audio frequencies, and video/audio levels.
- **Digital** – Channel number/name, digital video frequency, and level.
- **Single Carrier** – Channel number/name, center frequency, and level.



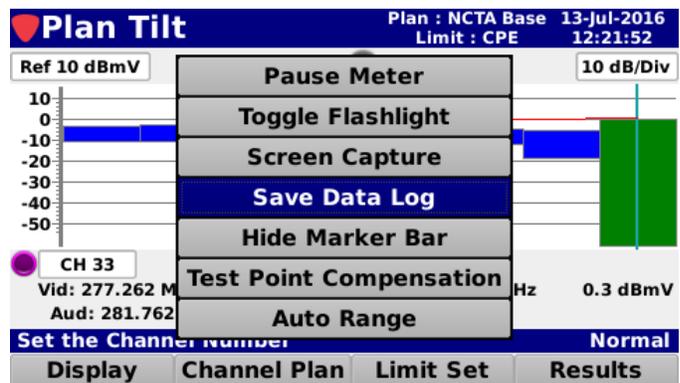
Function Menu Options

Additional functions can be accessed from within the **Plan Tilt** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Plan Tilt** screen.

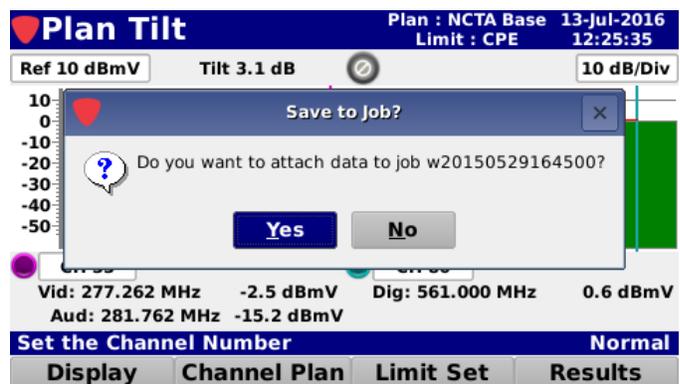


Save Data Log

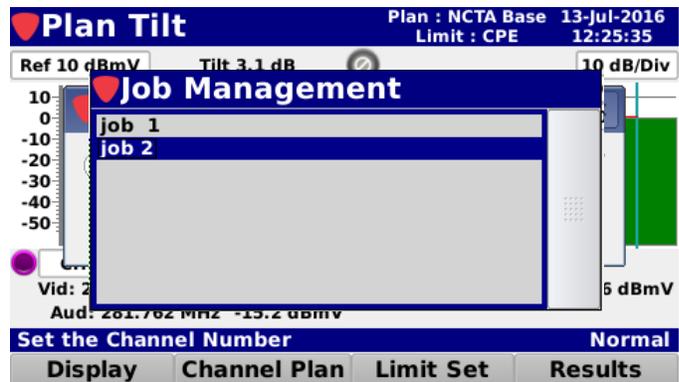
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes**.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.



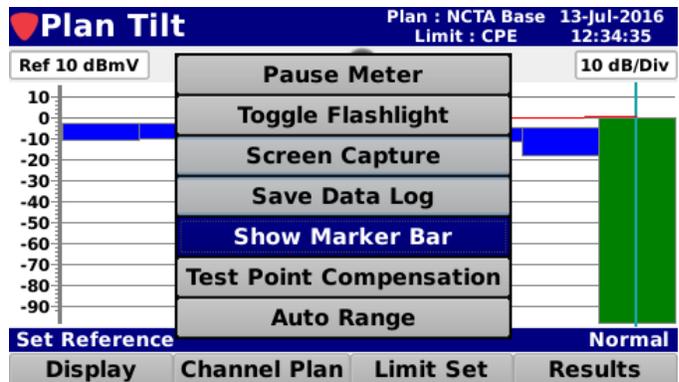
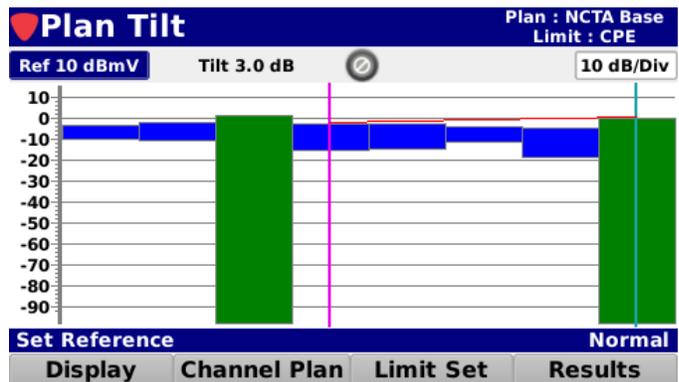
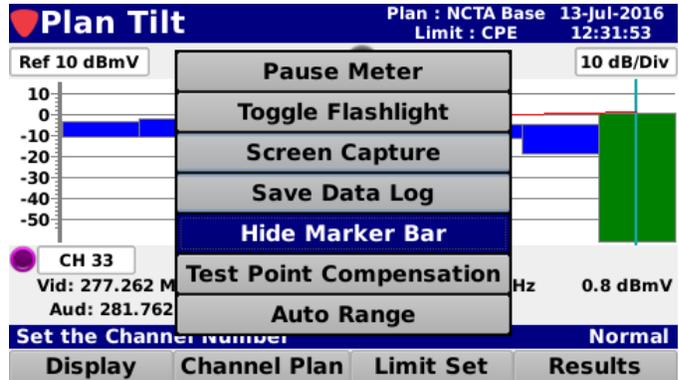
If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 360 DSP.



Hide Marker Bar

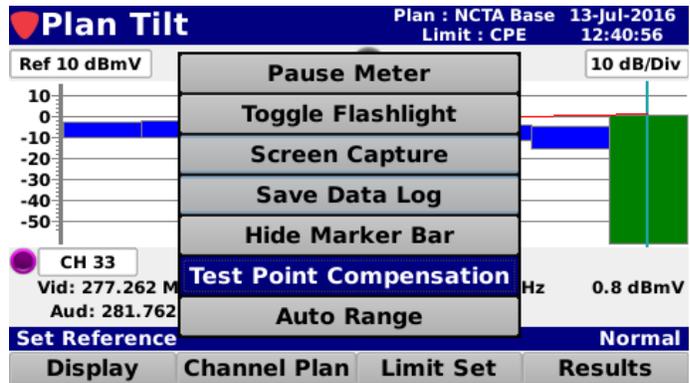
Select the **Hide Marker Bar** button from the **Function** menu to hide the marker bar at the bottom of the screen and expand the measurement viewing area.

When the marker bar is hidden, select the **Show Marker Bar** button from the **Function** menu to show the marker bar.



Test Point Compensation

Select the **Test Point Compensation** button from the **Function** menu to enter test point loss measurements for both test point and probe loss.

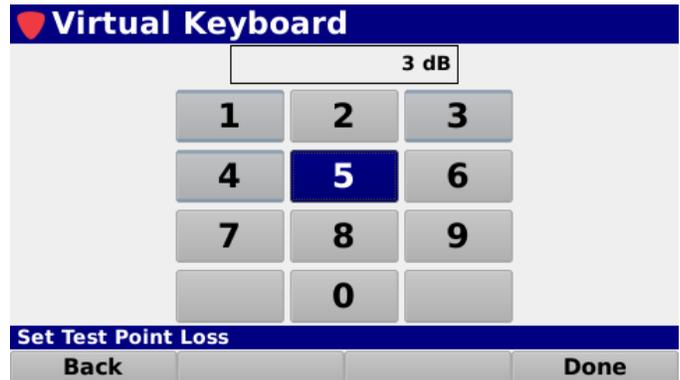
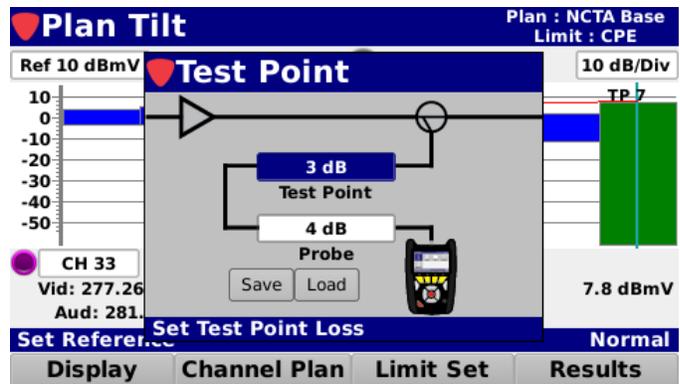


The **Test Point** screen will be displayed as shown in the image to the right.

Test Point Loss

Highlight the **Test Point** field and then use either of the following methods to change the loss value:

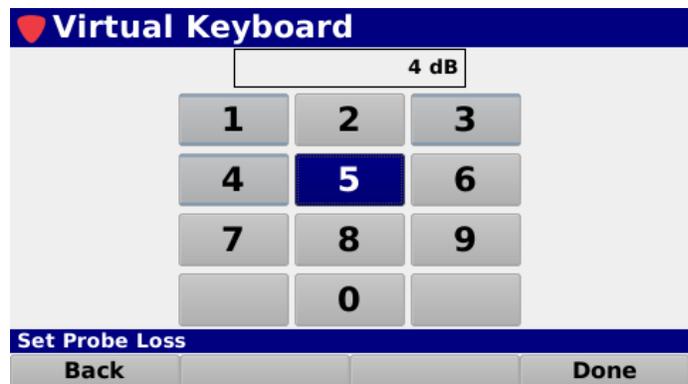
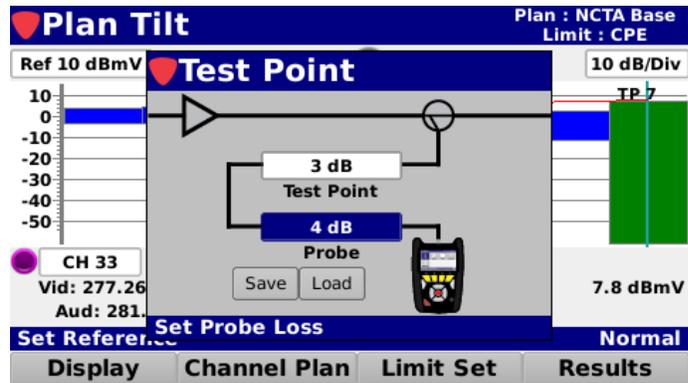
- Use the up/down arrow buttons to change the test point loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



Probe Loss

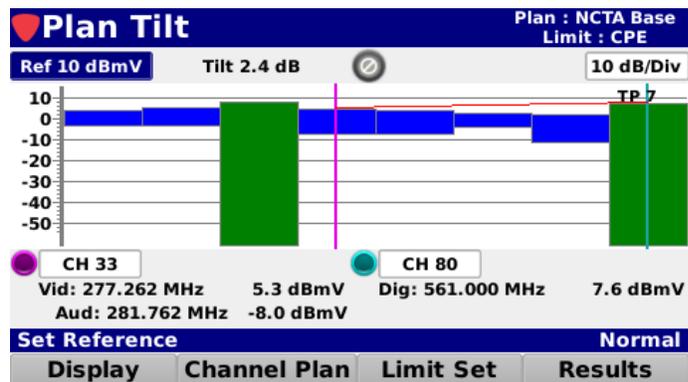
Highlight the **Probe** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the probe loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



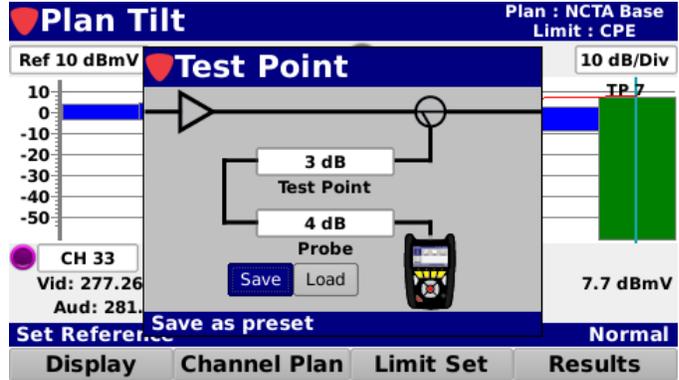
When finished entering the test point loss information, press the **Back** button to return to the **Channel Plan Scan** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Save Preset

Select the **Save** button to save the test point values as a preset.

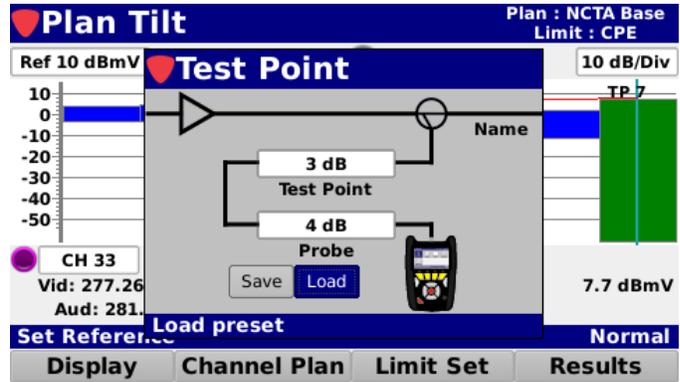


The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter a name for the preset.

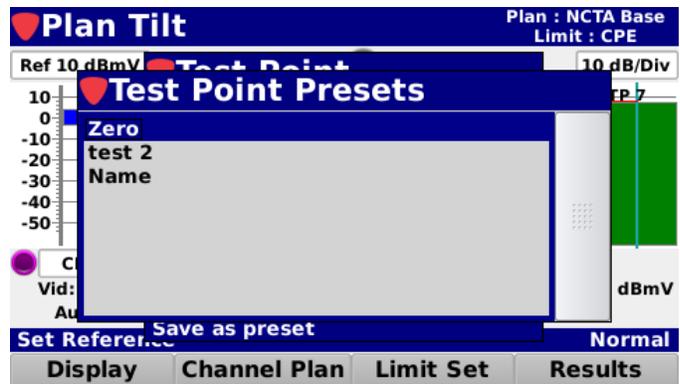


Load Preset

Select the **Load** button to load the test point values preset.

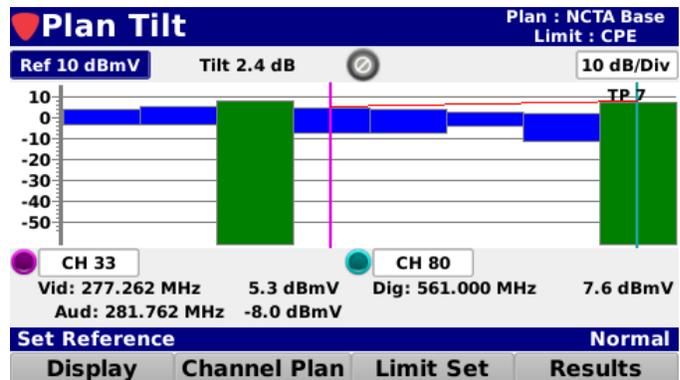


If you have multiple presets, the **Test Point Presets** window will be displayed. Choose the preset you would like to load.



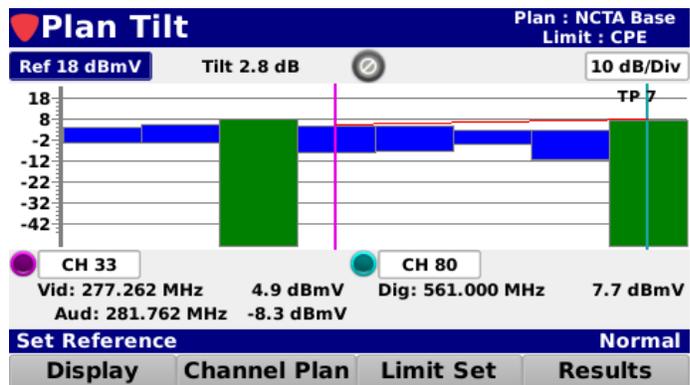
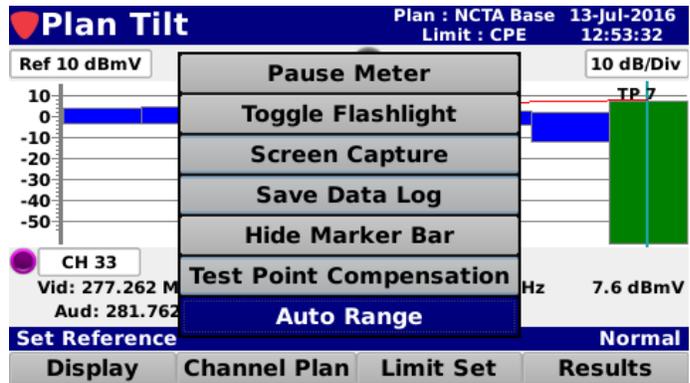
When finished entering the test point loss information, press the **Back** button to return to the **Level** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Auto Range

Select the **Auto Range** button from the **Function** menu to quickly bring off-scale signals onscreen by automatically adjusting the reference level and vertical resolution.



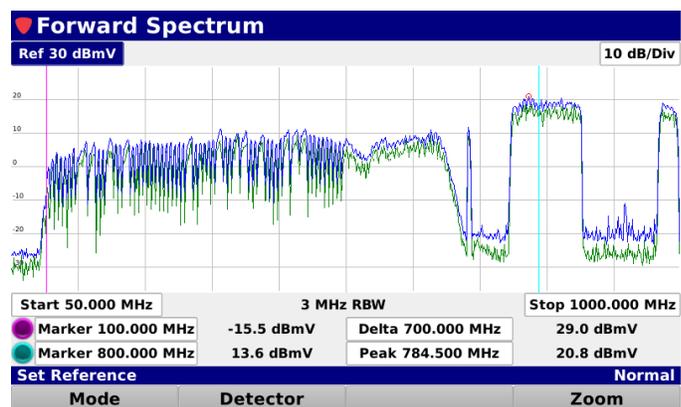
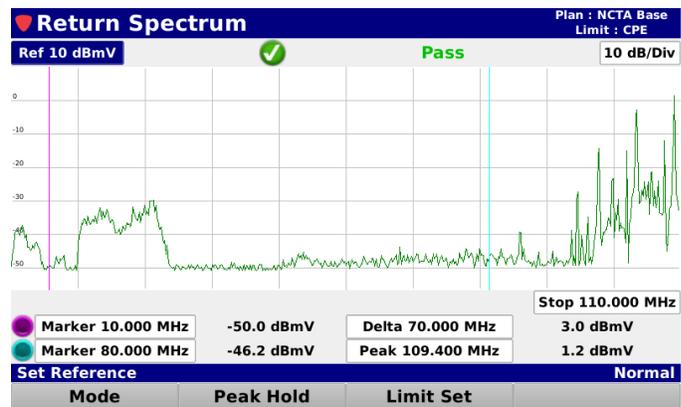
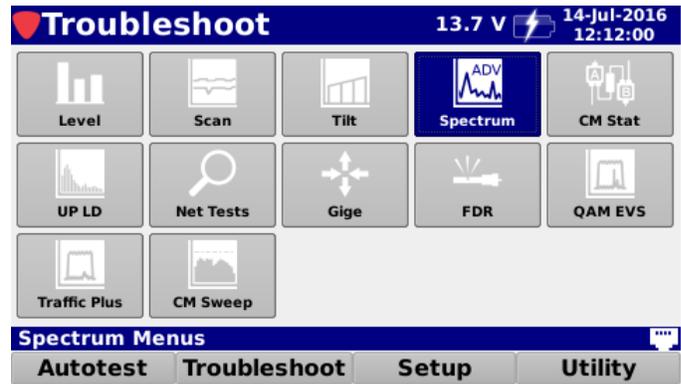
Overview

Select the **Advanced Spectrum** icon as shown in the image to the right to perform either return or forward spectrum measurements on the 720 DSP.

The **Return Spectrum** screen will be displayed as shown in the image to the right. This screen allows you to perform measurements of the return spectrum between 4 and 110 MHz.

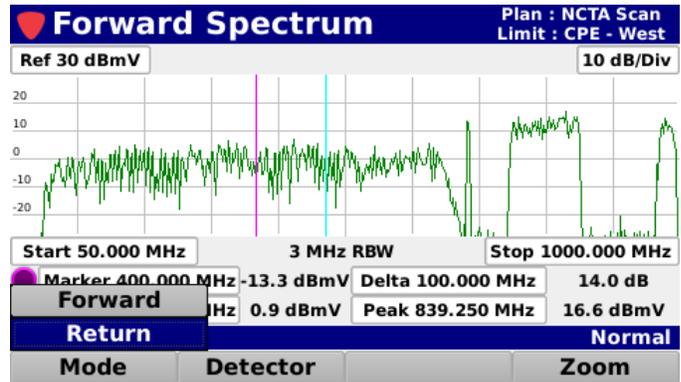
The 720 DSP provides users with the ability to view raw spectrum traces with DSP spectrum snapshots to give the user a view of any upstream or downstream channels:

- Return Spectrum – 4 to 110 MHz
- Forward Spectrum – 50 to 1000 MHz

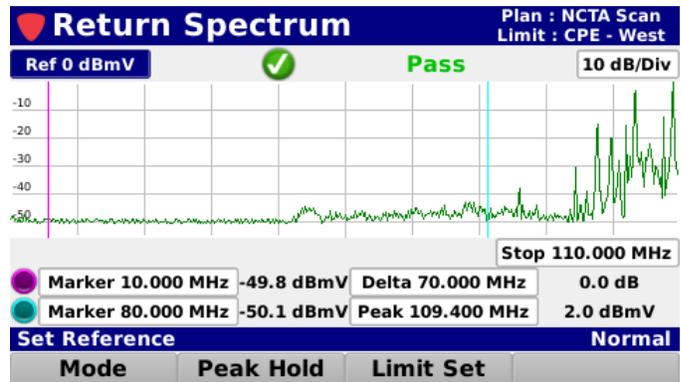


Return Spectrum Measurement

Select the **Mode** softkey and choose **Return** as shown in the image to the right.

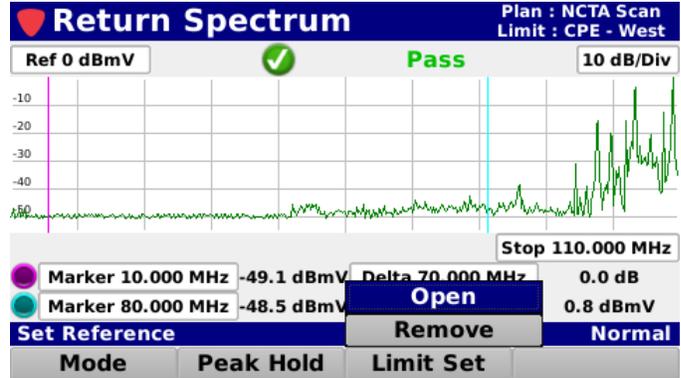


The **Return Spectrum** screen provide users with the ability to view raw spectrum traces for the forward path from 4 to 110 MHz with DSP spectrum snapshots to give the user a view of any upstream channels.



Opening a Limit Set

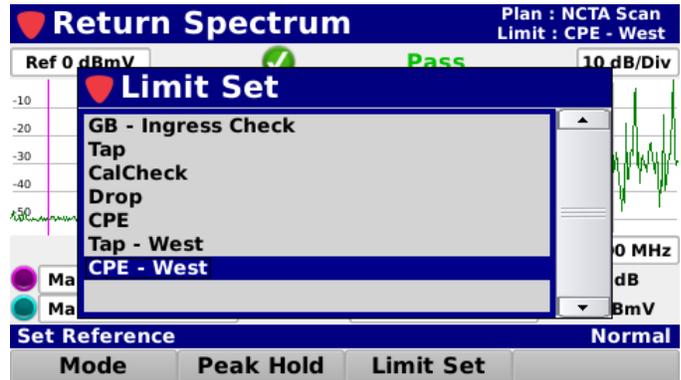
Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the return spectrum measurement.



Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the return spectrum measurement.

After selecting the limit set, the **Return Spectrum** screen will be displayed again.

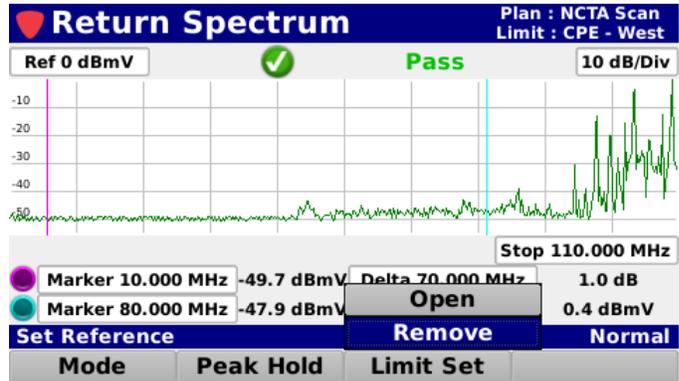


The Limit Set window will be bypassed if there is only one limit set to choose from.

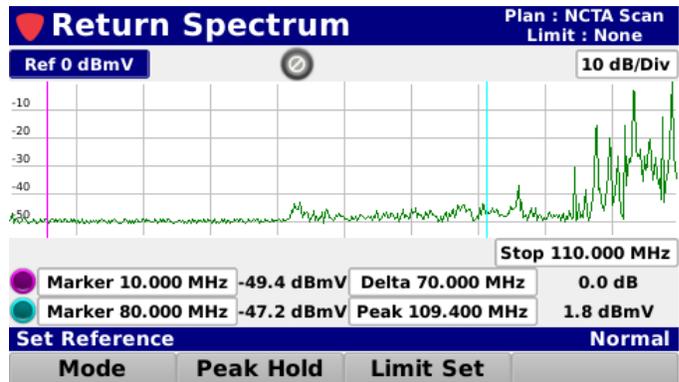
NOTE

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove limits sets for the return spectrum measurement.



Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.



Pass/Fail Measurement Indicators

When a limit set has been opened, the return spectrum will be tested against the high limit measurement threshold for the return spectrum ingress.

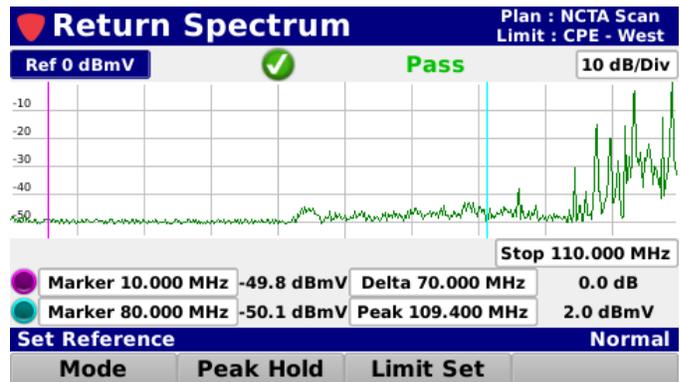
A Pass/Fail status will be displayed at the top of the screen. The pass/fail status of the return spectrum ingress will be indicated using the following icons:

- 

This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
- 

This icon indicates that this measurement is within the high limit measurement thresholds for the return spectrum **Ingress** measurement.
- 

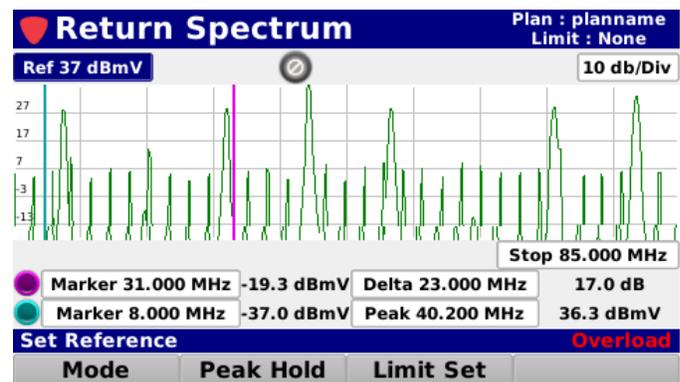
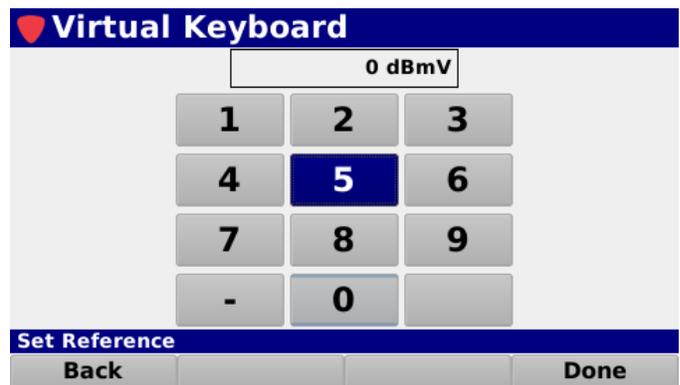
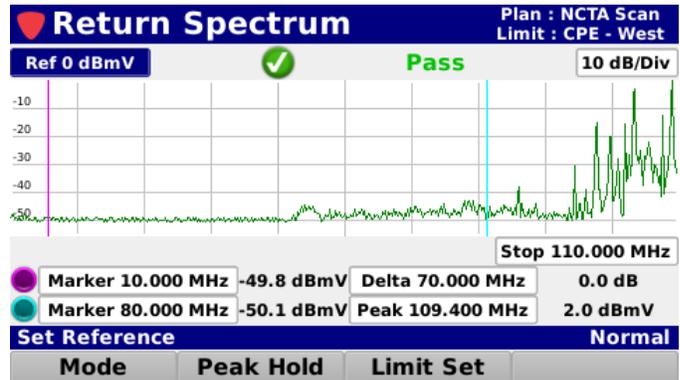
This icon indicates that the measurement has failed the high limit measurement threshold for the return spectrum **Ingress** measurement.



Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the spectrum display. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

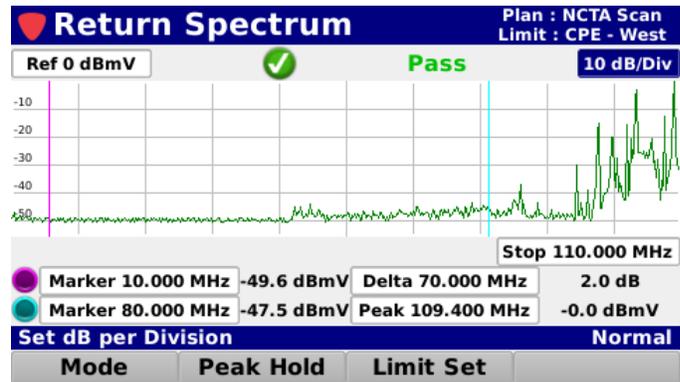
- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.



If the red “Overload” message appears as shown in the image above, set your reference level higher. It’s too low.

Vertical Scale Adjustment

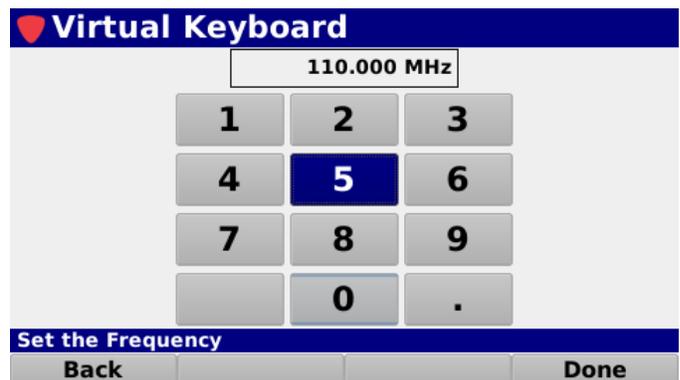
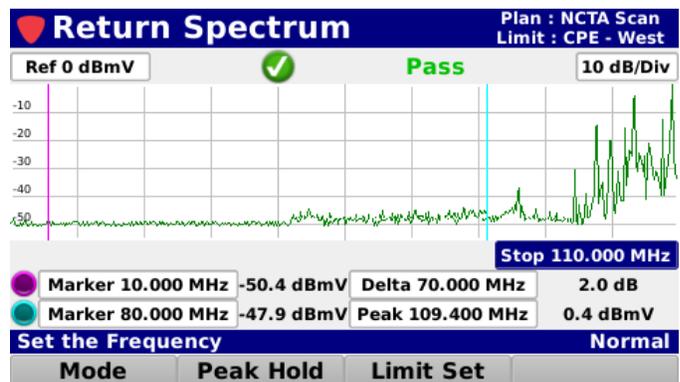
Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of **1, 2, 5** or **10 dB/div**.



Stop Frequency Adjustment

Highlight the stop frequency field as shown in the image to the right and then use either of the following methods to change the stop frequency:

- Use the up/down arrow buttons to select from a stop frequency of **42, 65, 85** or **110 MHz**.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the stop frequency as shown in the image to the right.



Marker Adjustment

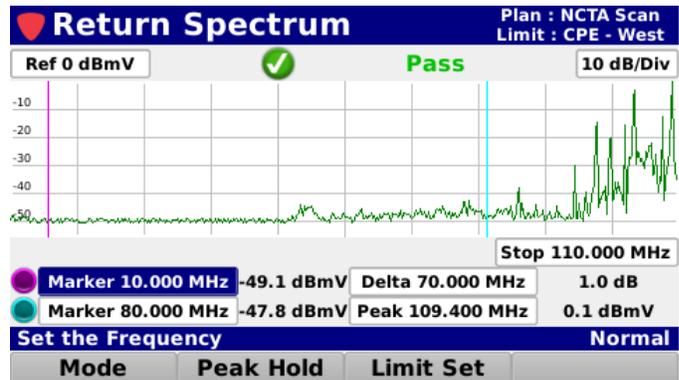
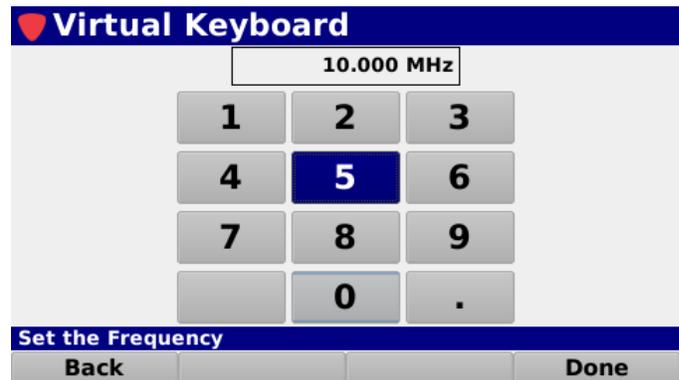
The Return Spectrum measurement includes two on-screen markers that are used for measurement of specific frequencies within the return spectrum.

The markers are represented by the following color bullets and vertical lines:

- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker in 0.200 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the frequency as shown in the image below.

Virtual Keyboard

10.000 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Frequency

Back Done

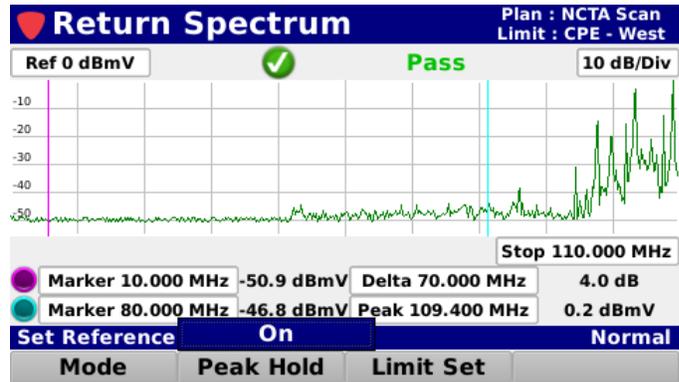
The following information is displayed for the markers:

- **Level** – Displays the signal level at the specified frequency for each marker.
- **Frequency Delta** – Displays the frequency delta between the two markers.
- **Frequency Peak** – Displays the frequency of the peak signal level in the return spectrum.
- **Level Peak** – Displays the peak signal level in the return spectrum.
- **Level Delta** – Displays the signal level difference between the minimum and maximum level values in the return spectrum.

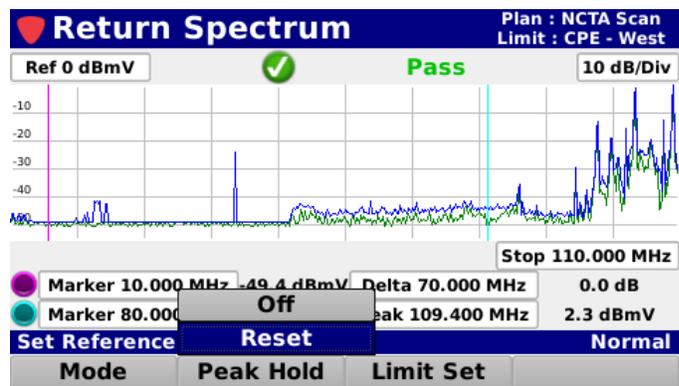
Peak Hold

Select the **Peak Hold** softkey as shown in the image to the right to enable peak hold for the return spectrum measurement.

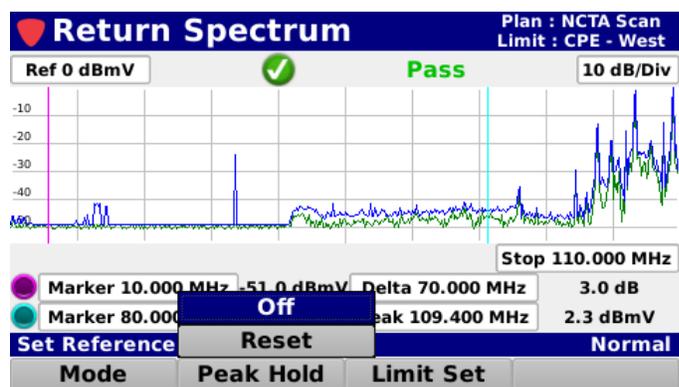
Select the **On** button from the **Peak Hold** pop-up menu and the blue peak hold trace will start to appear on the screen over the green live trace.



To reset the peak hold trace, select the **Peak Hold** softkey again and then select the **Reset** button from the **Peak Hold** pop-up menu. The blue peak hold trace will momentarily disappear and then start again.

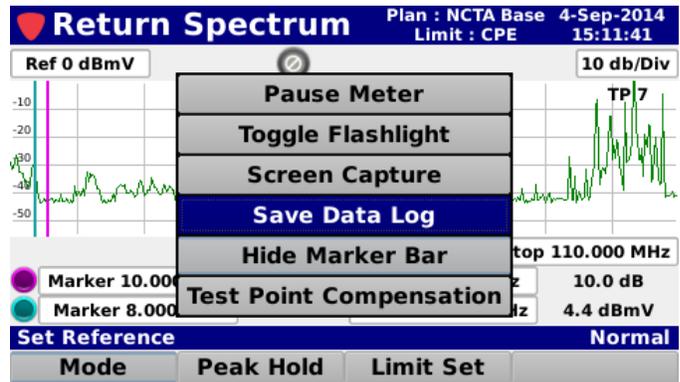


To turn of the peak hold trace, select the **Peak Hold** softkey again and then select the **Off** button from the **Peak Hold** pop-up menu. The blue peak hold trace will no longer be displayed.



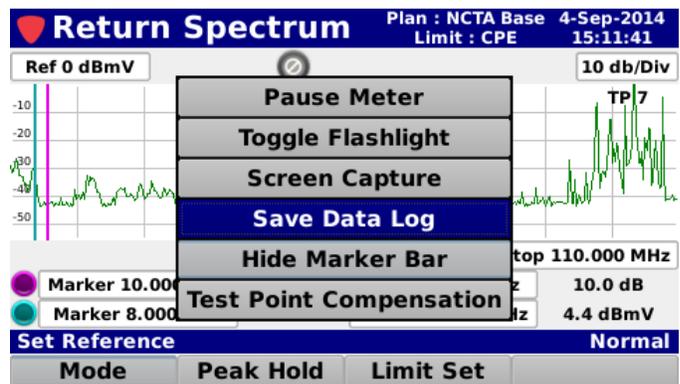
Function Menu Options

Additional functions can be accessed from within the **Return Spectrum** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Return Spectrum** screen.

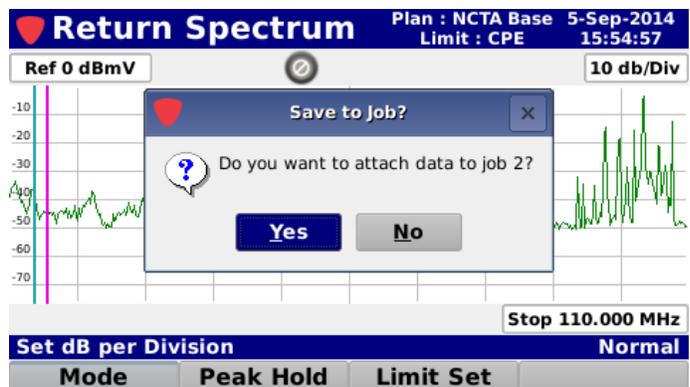


Save Data Log

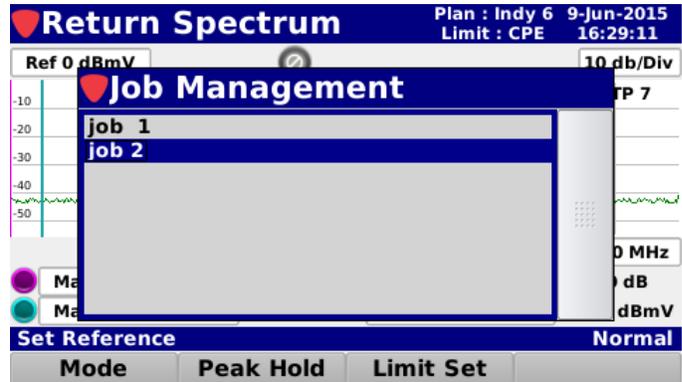
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes**.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.



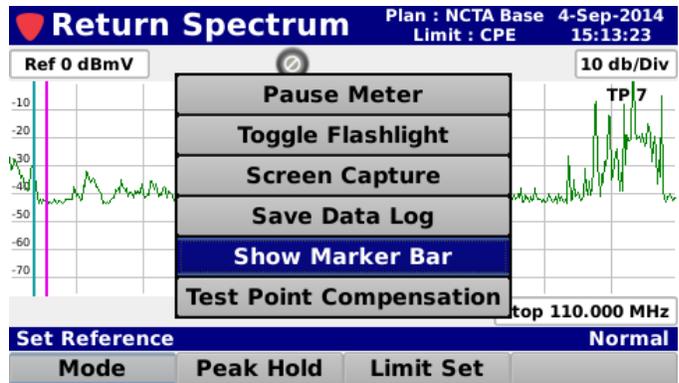
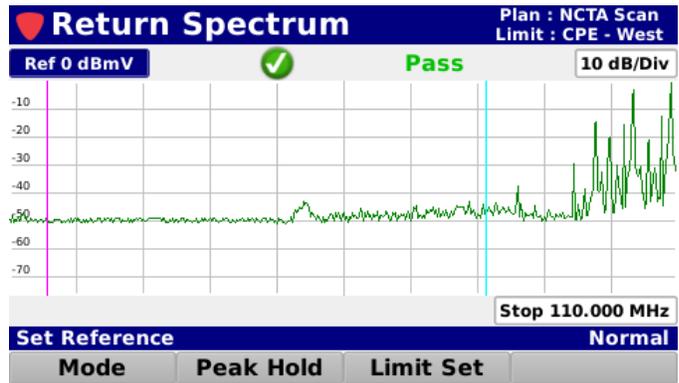
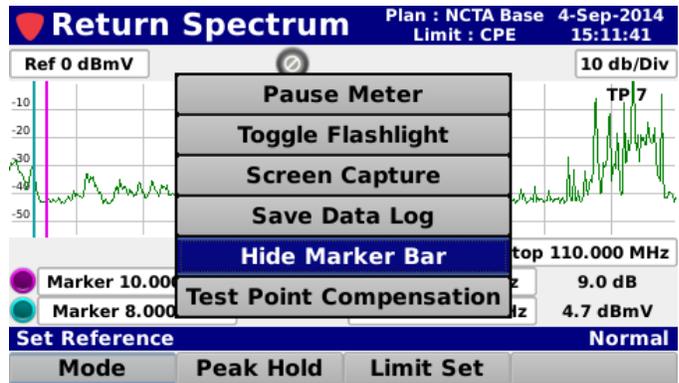
If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Hide Marker Bar

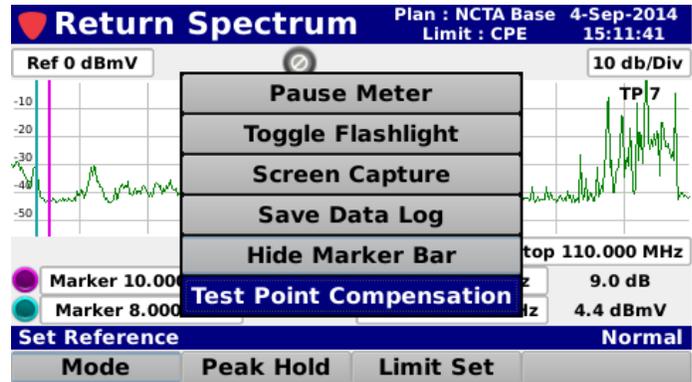
Select the **Hide Marker Bar** button from the **Function** menu to hide the marker bar at the bottom of the screen and expand the measurement viewing area.

When the marker bar is hidden, select the **Show Marker Bar** button from the **Function** menu to show the marker bar.



Test Point Compensation

Select the **Test Point Compensation** button from the **Function** menu to enter test point loss measurements for both test point and probe loss.

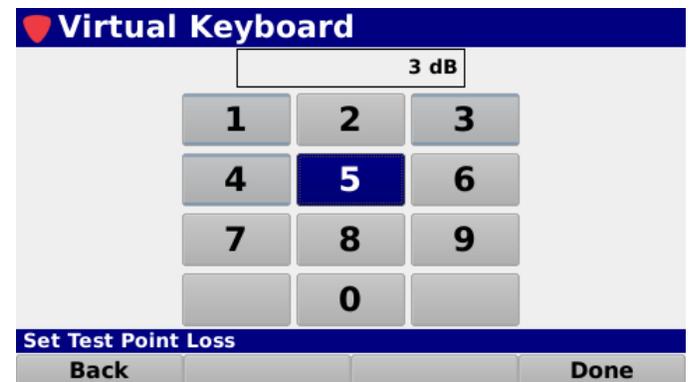
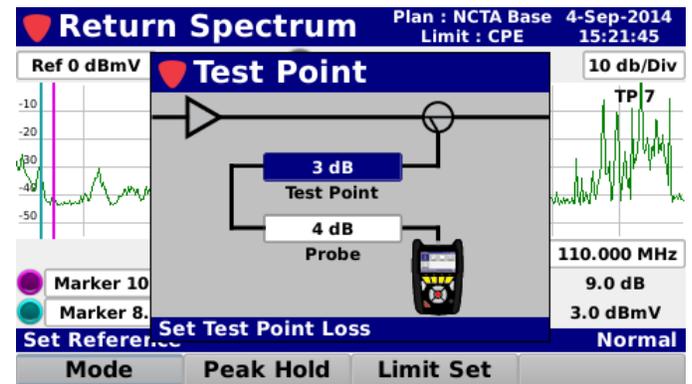


The **Test Point** screen will be displayed as shown in the image to the right.

Test Point Loss

Highlight the **Test Point** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the test point loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



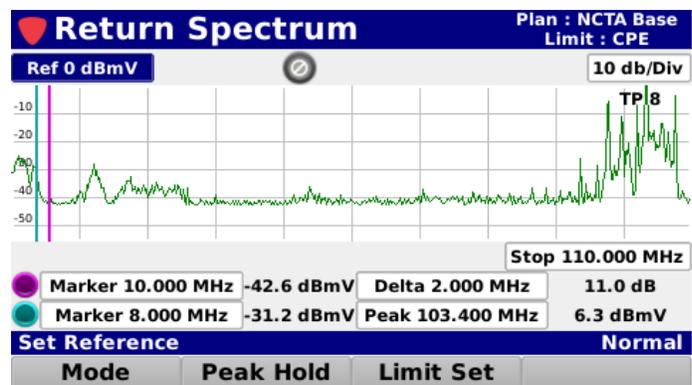
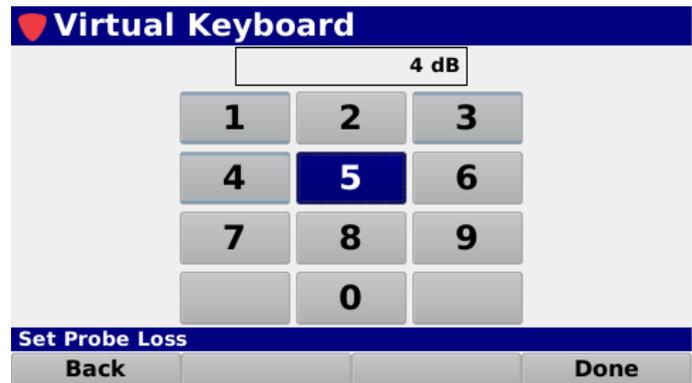
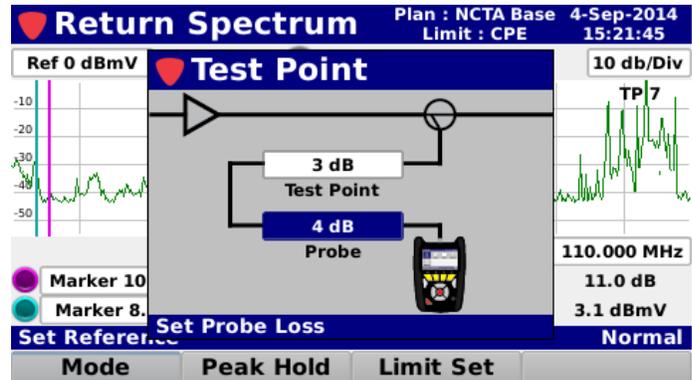
Probe Loss

Highlight the **Probe** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the probe loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.

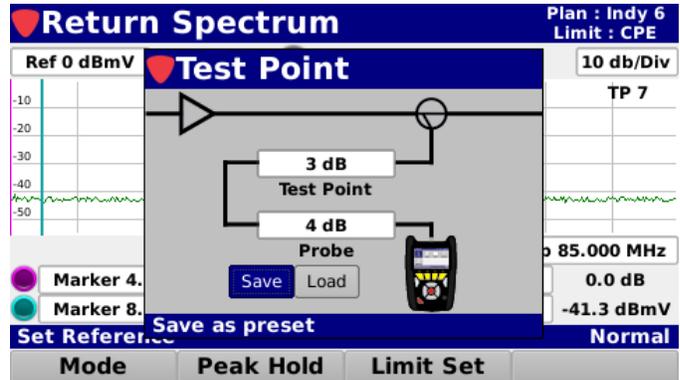
When finished entering the test point loss information, press the **Back** button to return to the **Return Spectrum** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Save Preset

Select the **Save** button to save the test point values as a preset.

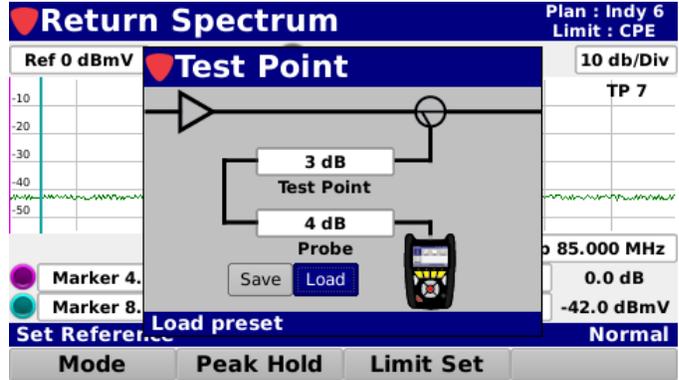


The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter a name for the preset.

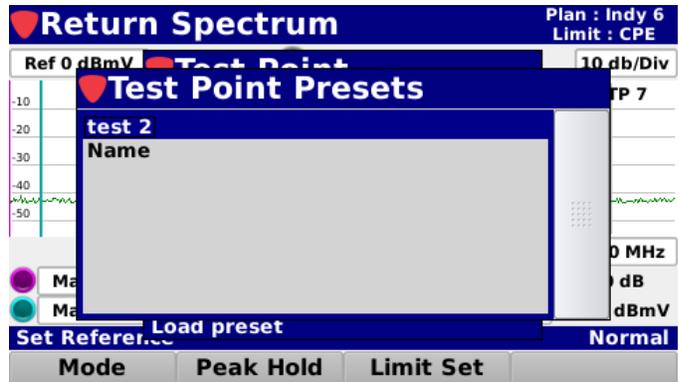


Load Preset

Select the **Load** button to load the test point values preset.

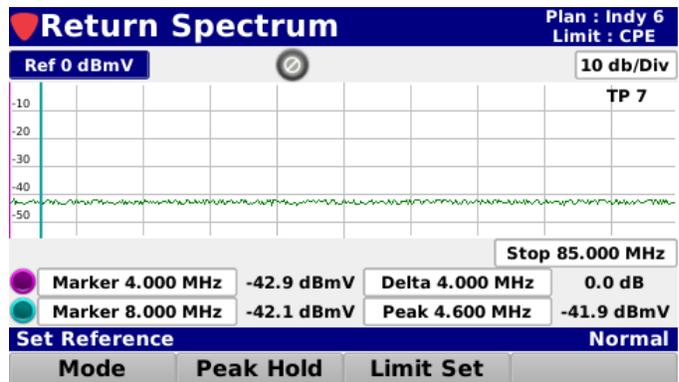


If you have multiple presets, the **Test Point Presets** window will be displayed. Choose the preset you would like to load.



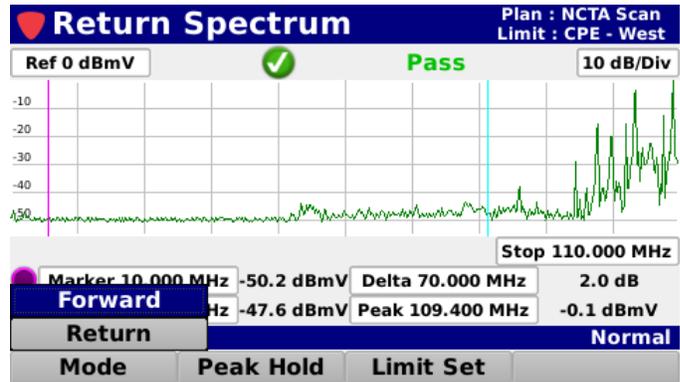
When finished entering the test point loss information, press the **Back** button to return to the **Return Spectrum** screen.

The total test point compensation value will be displayed, as shown in the image to the right.

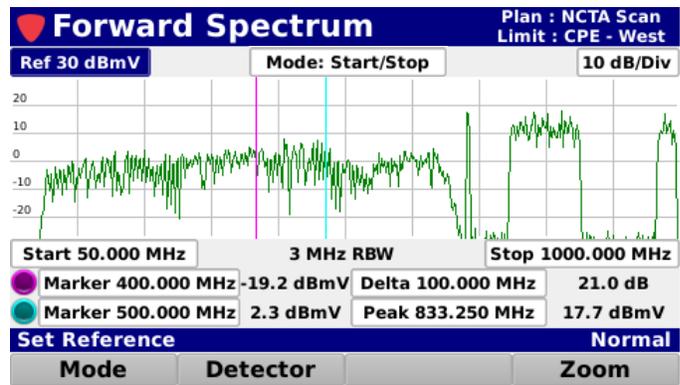


Forward Spectrum Measurement

Select the **Mode** softkey and choose **Forward** as shown in the image to the right.



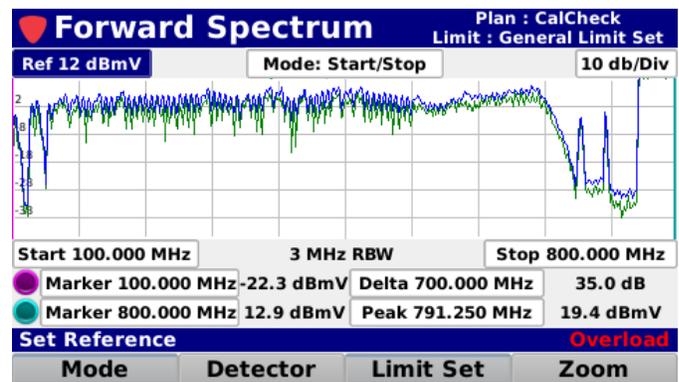
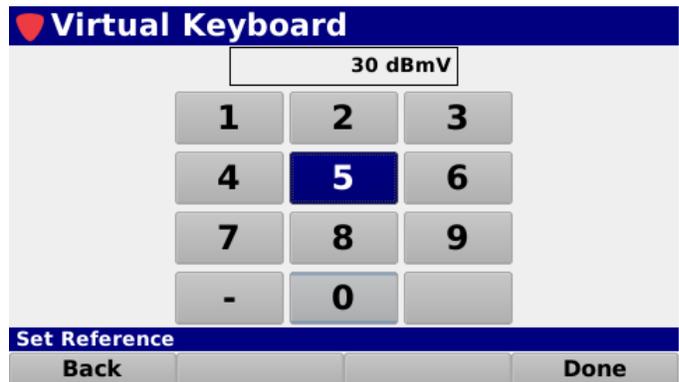
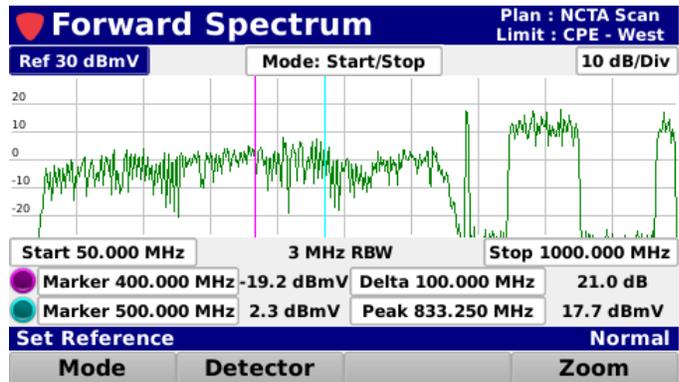
The **Forward Spectrum** screen provides users with the ability to view raw spectrum traces for the forward path from 50 to 1000 MHz with DSP spectrum snapshots to give the user a view of any downstream channels.



Reference Level Adjustment

The reference level can be adjusted from -40 to 60 dBmV and is the highest value displayed on the spectrum display. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

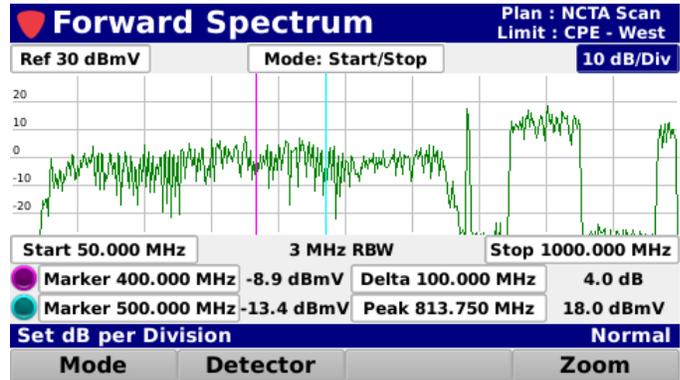
- Use the up/down arrow buttons to change the reference level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.



NOTE If the red “Overload” message appears as shown in the image above, set your reference level higher. It’s too low.

Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of **1, 2, 5** or **10 dB/div**.

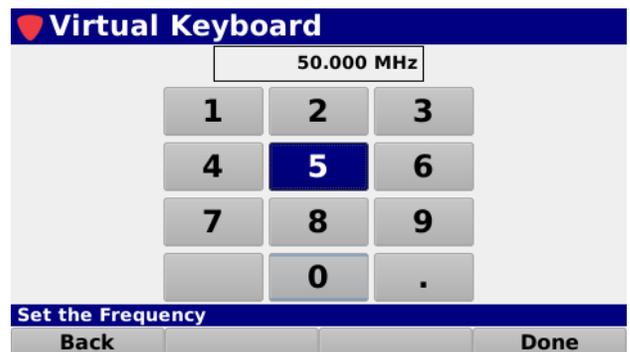
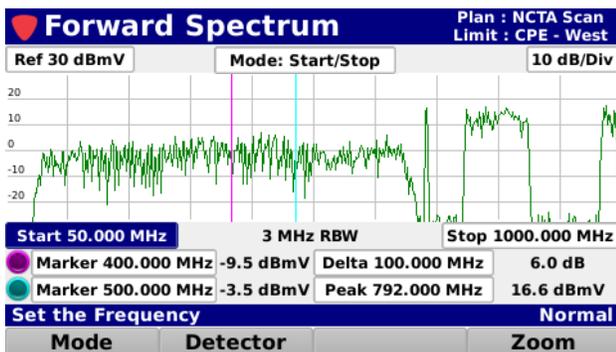
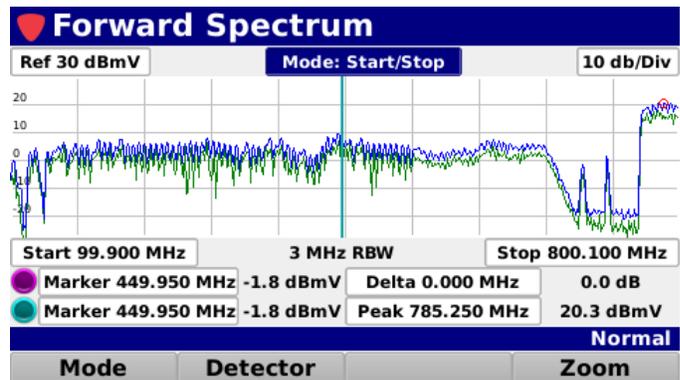


Start Frequency Adjustment

Highlight the **Mode: Start/Stop** field as shown in the image to the right. Use the up/down arrow buttons to set it to **Start/Stop**.

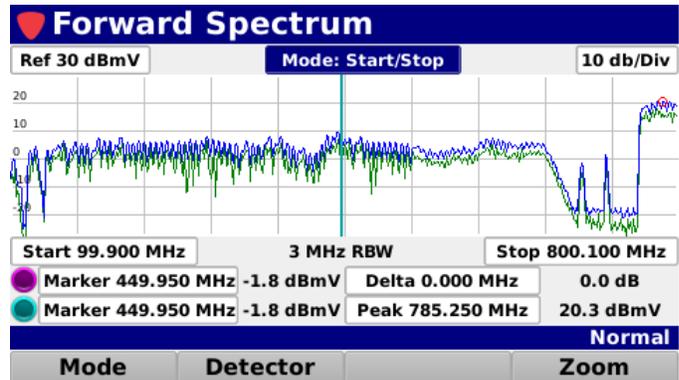
Highlight the **Start** frequency field as shown in the image below (left) and then use either of the following methods to change the start frequency:

- Use the up/down arrow buttons to adjust the frequency in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the start frequency as shown in the image below (right).



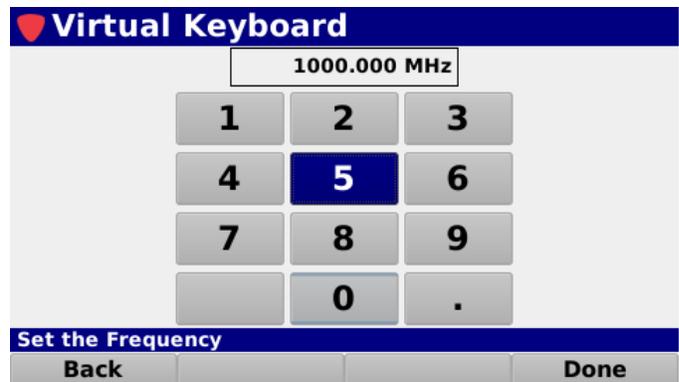
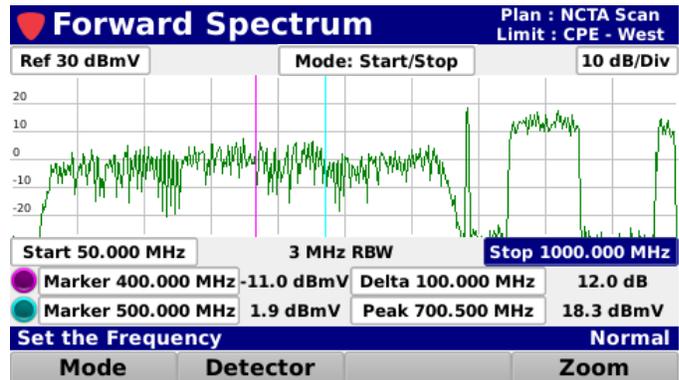
Stop Frequency Adjustment

Highlight the **Mode: Start/Stop** field as shown in the image to the right. Use the up/down arrow buttons to set it to **Start/Stop**.



Highlight the **Stop** frequency field as shown in the image to the right and then use either of the following methods to change the stop frequency:

- Use the up/down arrow buttons to adjust the frequency in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the stop frequency as shown in the image to the right.

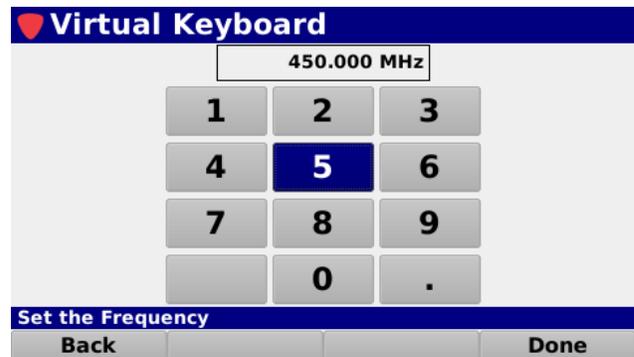
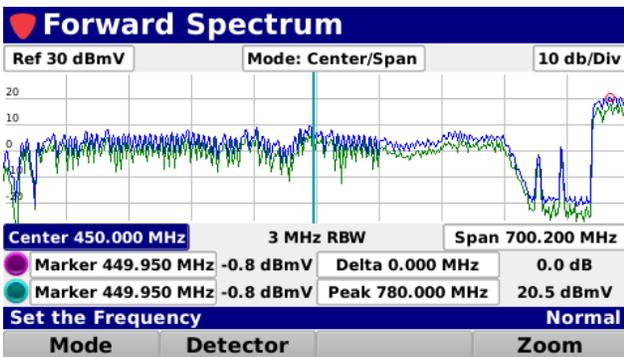
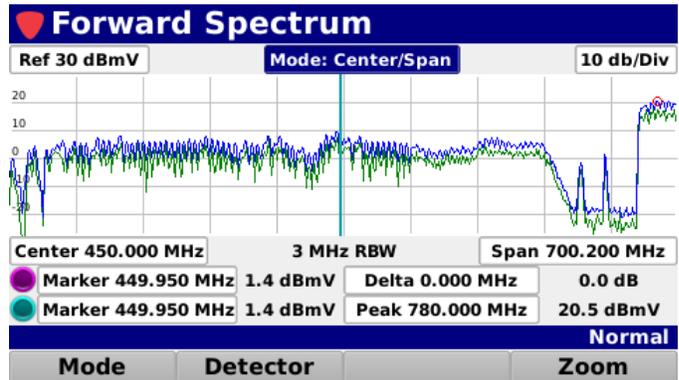
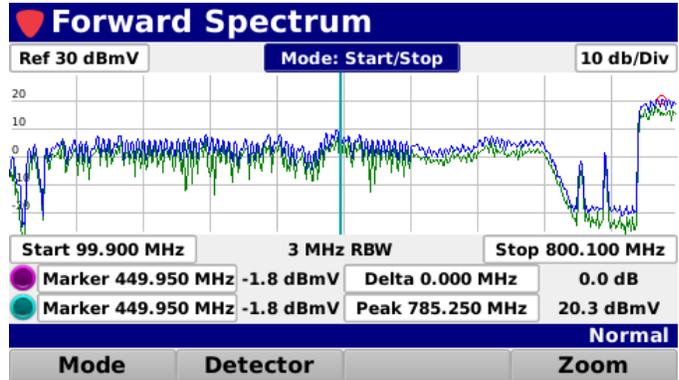


Center Frequency Adjustment

Highlight the **Mode: Start/Stop** field as shown in the image to the right. Use the up/down arrow buttons to set it to **Center/Span**.

Highlight the **Center** frequency field as shown in the image below (left) and then use either of the following methods to change the frequency:

- Use the up/down arrow buttons to adjust the frequency in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the frequency as shown in the image below (right).

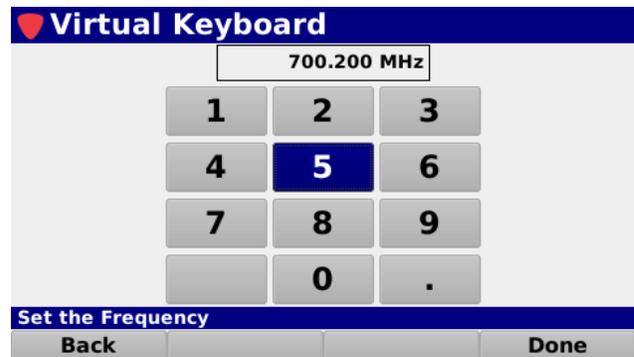
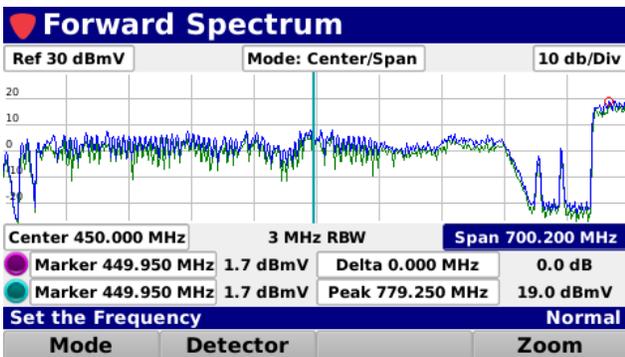
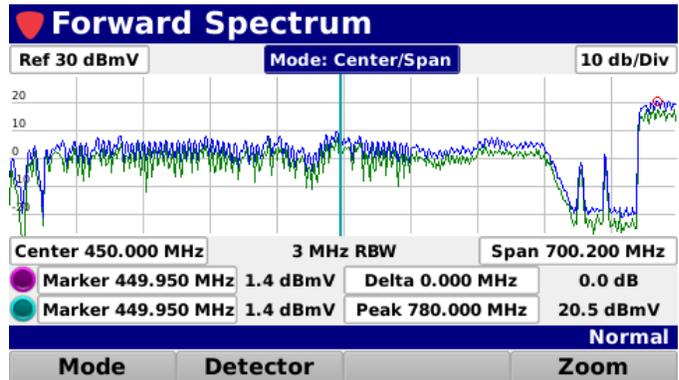
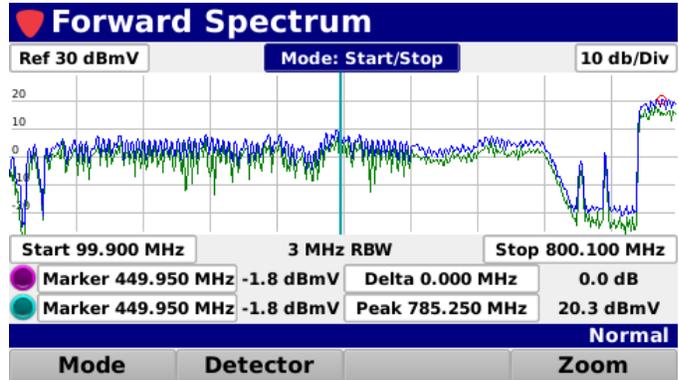


Span Frequency Adjustment

Highlight the **Mode: Start/Stop** field as shown in the image to the right. Use the up/down arrow buttons to set it to **Center/ Span**.

Highlight the **Center** frequency field as shown in the image below (left) and then use either of the following methods to change the frequency:

- Use the up/down arrow buttons to adjust the frequency in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the frequency as shown in the image below (right).



Marker Adjustment

The Forward Spectrum measurement includes two on-screen markers that are used for measurement of specific frequencies within the forward spectrum.

The markers are represented by the following color bullets and vertical lines:

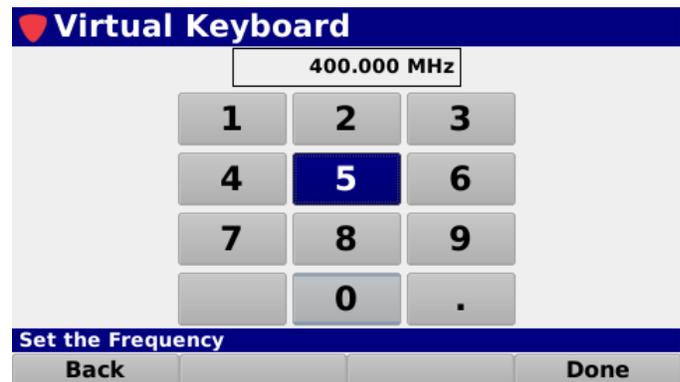
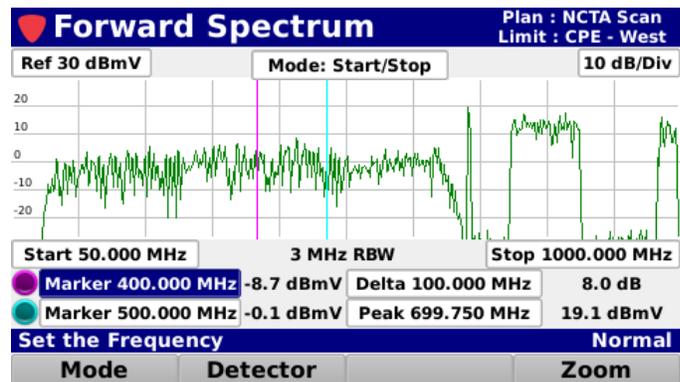
- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker in 0.200 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the frequency as shown in the image to the right.

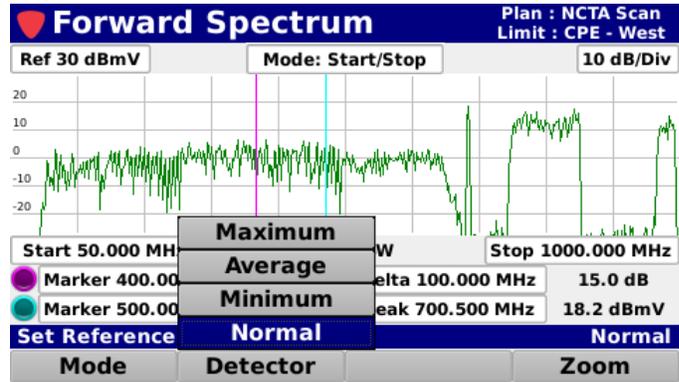
The following information is displayed for the markers:

- **Level** – Displays the signal level at the specified frequency for each marker.
- **Frequency Delta** – Displays the frequency delta between the two markers.
- **Frequency Peak** – Displays the frequency of the peak signal level in the return spectrum.
- **Level Peak** – Displays the peak signal level in the return spectrum.
- **Level Delta** – Displays the signal level difference between the minimum and maximum level values in the return spectrum.



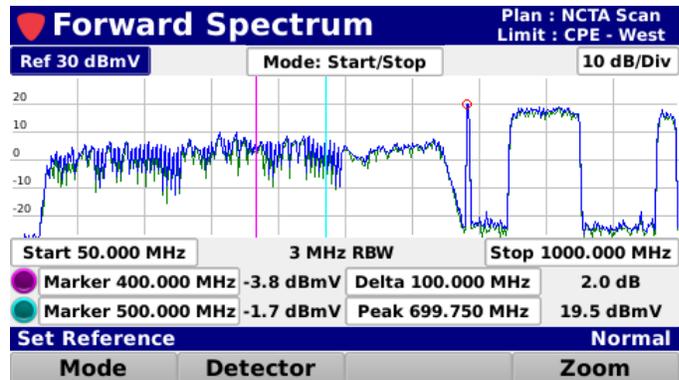
Detector Type

Select the **Detector** softkey to scroll through the following detector types for the forward spectrum measurement:



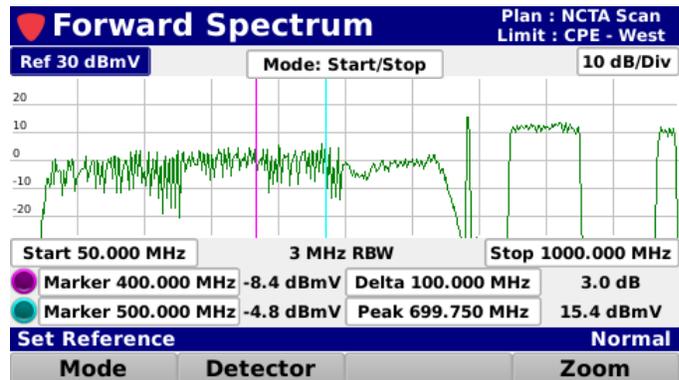
Maximum

Select the **Maximum** button from the **Detector** pop-up menu to display the maximum level of the forward spectrum as a blue trace that appears on the screen over the green live trace.



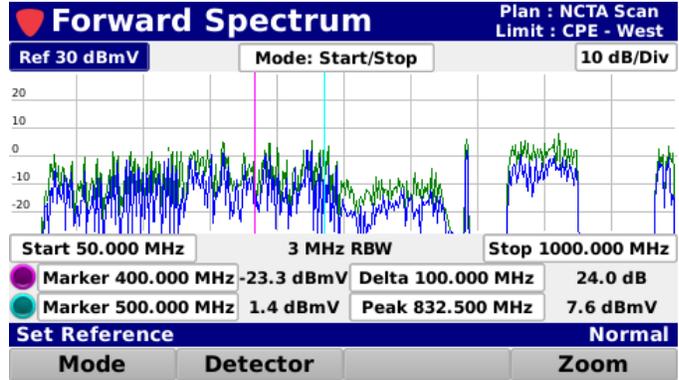
Average

Select the **Average** button from the **Detector** pop-up menu to display the average level of the forward spectrum as a green trace.



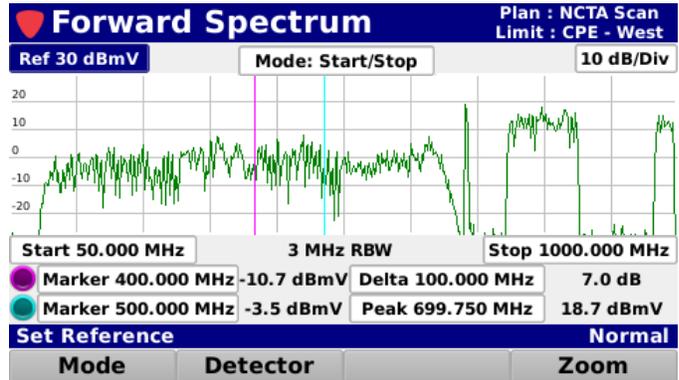
Minimum

Select the **Minimum** button from the **Detector** pop-up menu to display the minimum level of the forward spectrum as a blue trace that appears on the screen over the green live trace.



Normal

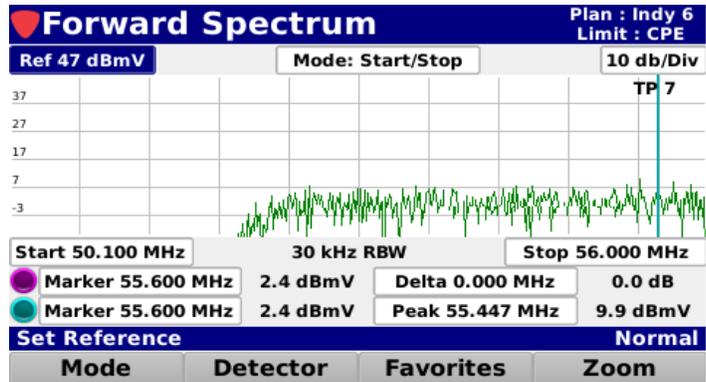
Select the **Normal** button from the **Detector** pop-up menu to display the normal live level of the forward spectrum as a green trace.



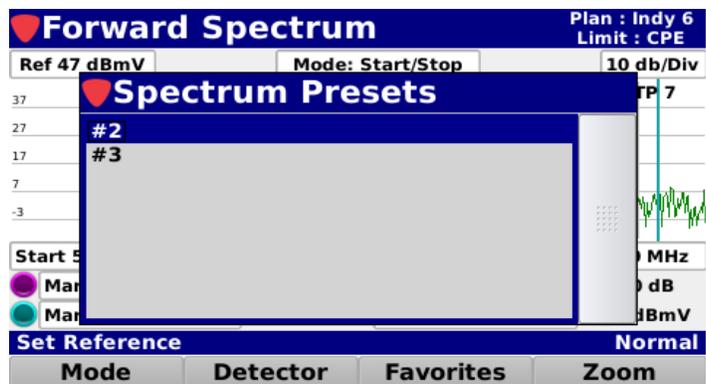
Load Favorite

Select the **Favorites** softkey to load a forward spectrum favorite.

This softkey may only appear after you save a favorite. See the **Save Favorite** section later in this chapter for more information.



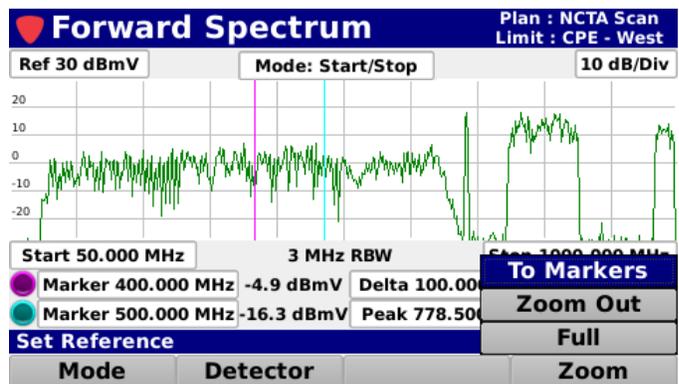
The **Spectrum Presets** window will be displayed as shown in the image to the right. Choose the preset you want to load.



Display Zoom

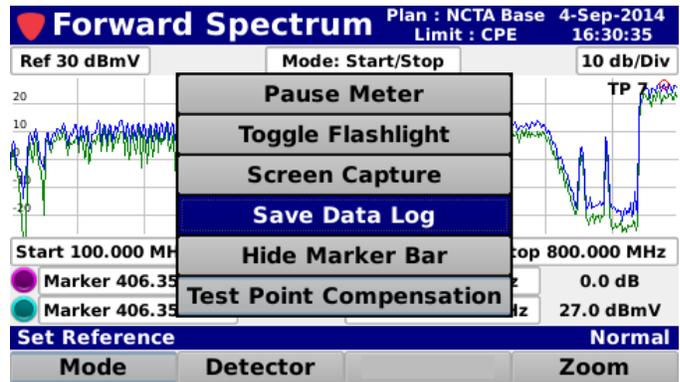
Select the **Zoom** softkey to choose from the following zoom options:

- **To Markers** – Changes the start and stop frequency values to match the currently displayed marker frequency values.
- **Zoom Out** – This is used after zooming to markers and returns the start and stop frequencies to their previously set values.
- **Full** – This is used to zoom out to the full forward spectrum view of 50 to 1000 MHz.



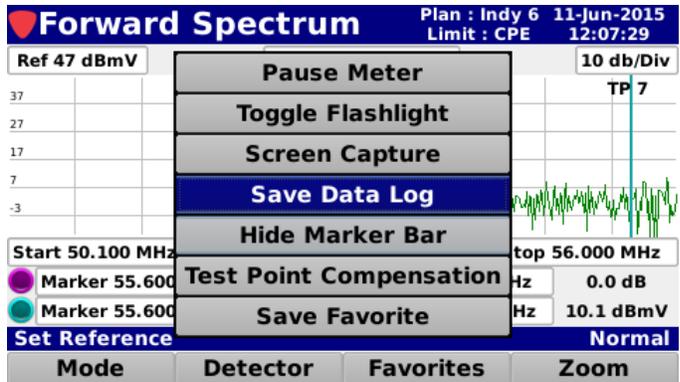
Function Menu Options

Additional functions can be accessed from within the **Forward Spectrum** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Forward Spectrum** screen.

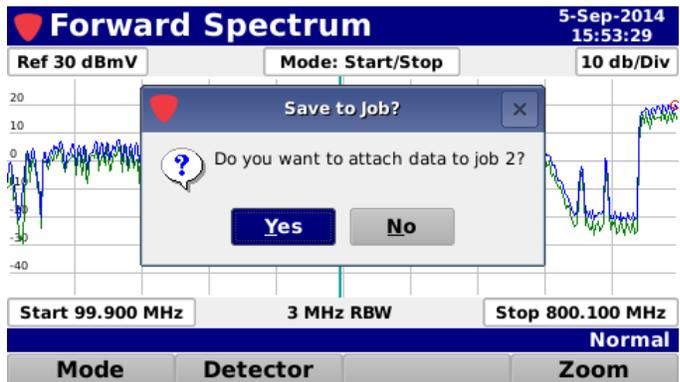


Save Data Log

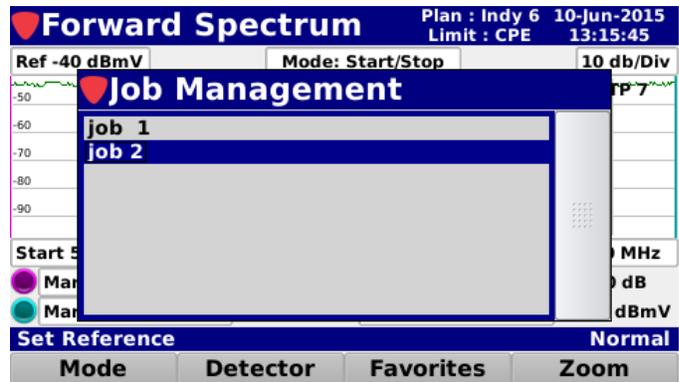
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes**.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.



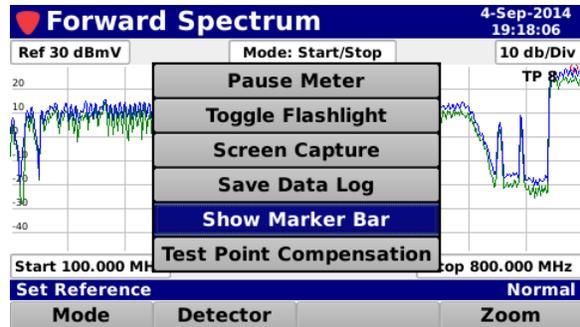
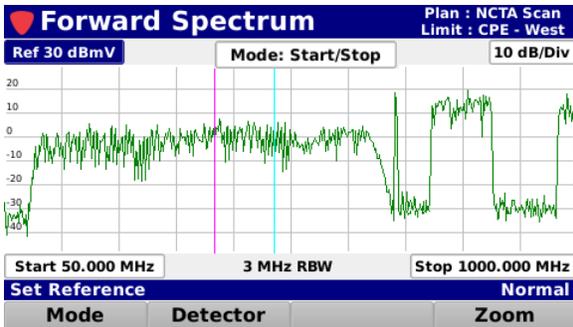
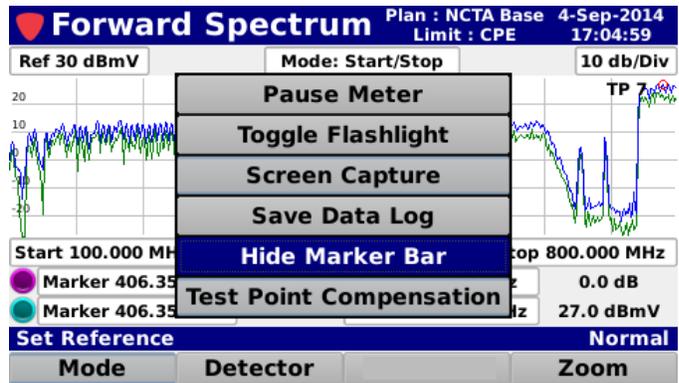
If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Hide Marker Bar

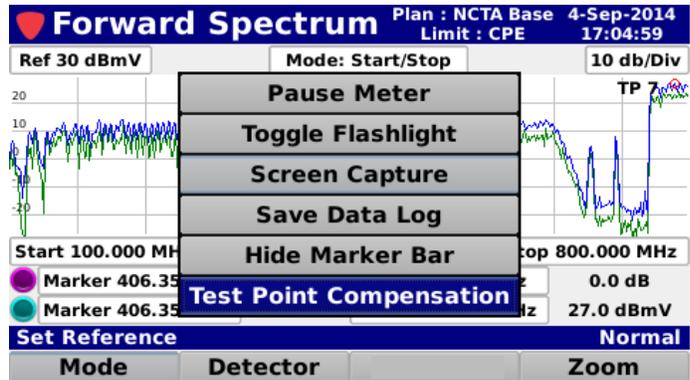
Select the **Hide Marker Bar** button from the **Function** menu to hide the marker bar at the bottom of the screen and expand the measurement viewing area.

When the marker bar is hidden, select the **Show Marker Bar** button from the **Function** menu to show the marker bar.



Test Point Compensation

Select the **Test Point Compensation** button from the **Function** menu to enter test point loss measurements for both test point and probe loss.

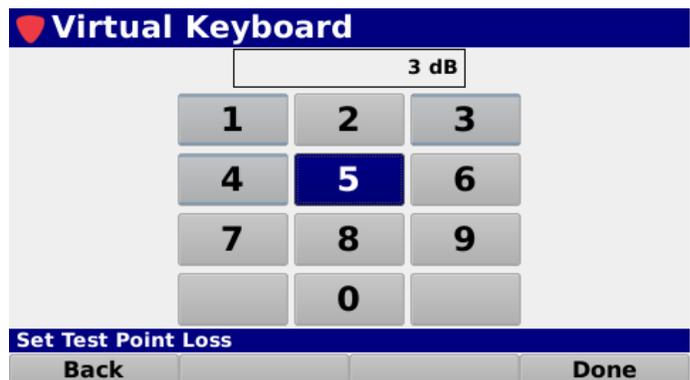
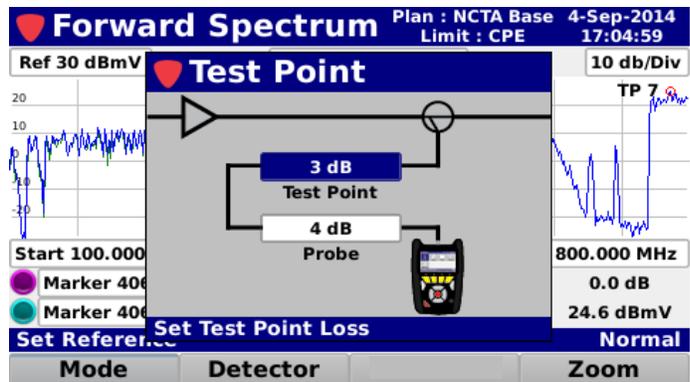


The **Test Point** screen will be displayed as shown in the image to the right.

Test Point Loss

Highlight the **Test Point** field and then use either of the following methods to change the loss value:

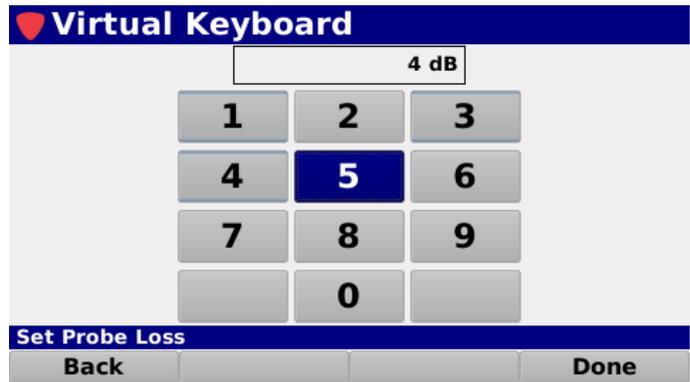
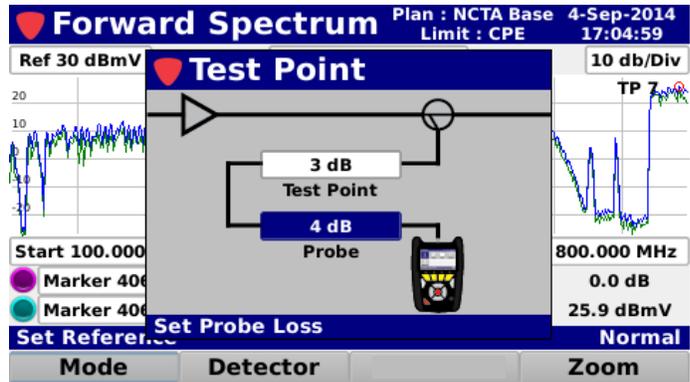
- Use the up/down arrow buttons to change the test point loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



Probe Loss

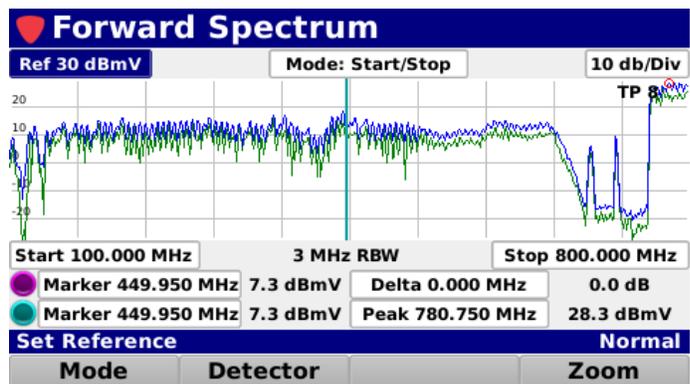
Highlight the **Probe** field and then use either of the following methods to change the loss value:

- Use the up/down arrow buttons to change the probe loss level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the loss value as shown in the image to the right.



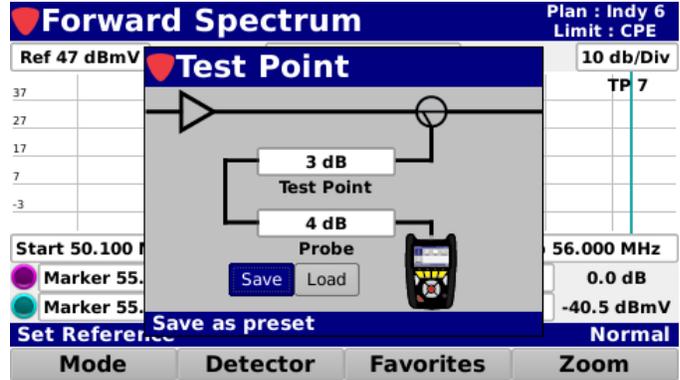
When finished entering the test point loss information, press the **Back** button to return to the **Forward Spectrum** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Save Preset

Select the **Save** button to save the test point values as a preset.

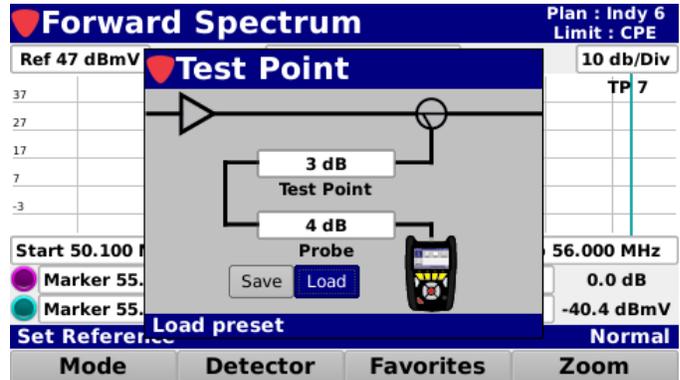


The **Virtual Keyboard** will be displayed as shown in the image to the right. Use the **Virtual Keyboard** to enter a name for the preset.

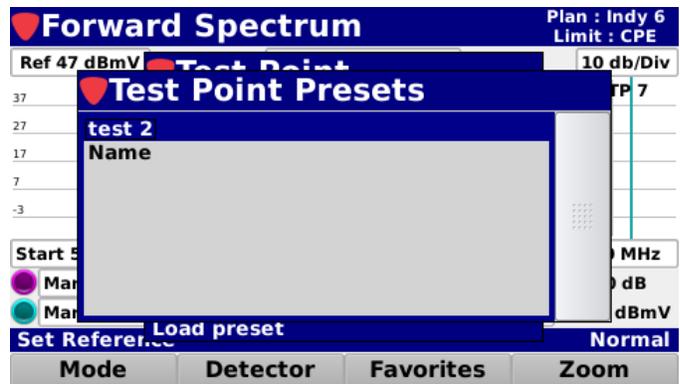


Load Preset

Select the **Load** button to load the test point values preset.

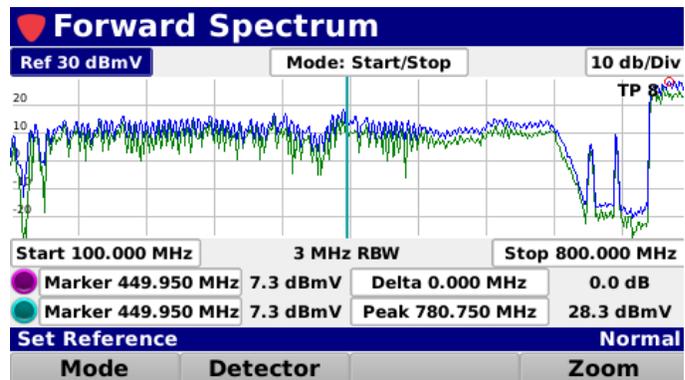


If you have multiple presets, the **Test Point Presets** window will be displayed. Choose the preset you would like to load.



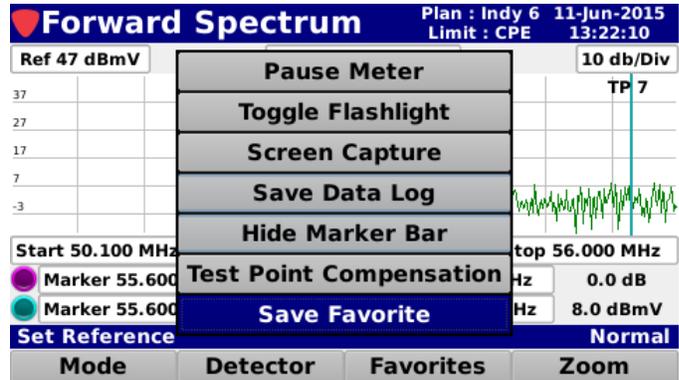
When finished entering the test point loss information, press the **Back** button to return to the **Forward Spectrum** screen.

The total test point compensation value will be displayed, as shown in the image to the right.



Save Favorite

Select the **Save Favorite** button from the **Function** menu to save a forward spectrum favorite.



The **Save New Favorite** window will be displayed as shown in the image to the right. Select the **OK** button to save the favorite or select the **Cancel** button to exit without saving.



The **Virtual Keyboard** will be displayed. Use the **Virtual Keyboard** to enter the name of the new favorite.



NOTE

To load a forward spectrum favorite, select the Favorites softkey, then select the favorite you want. For more information, see the Load Favorite section earlier in this chapter.

Cable Modem Statistics

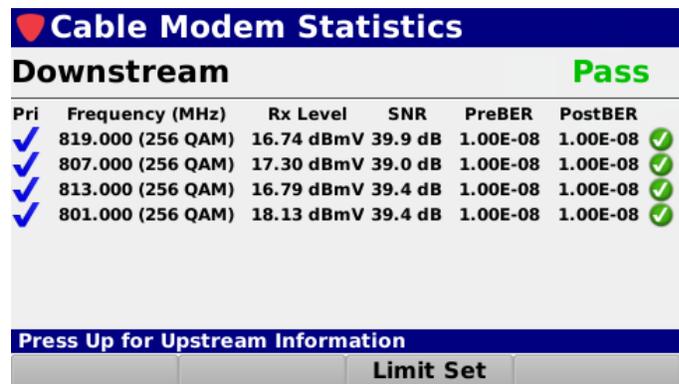
Overview

Select the **CM Stat** icon as shown in the image to the right to perform cable modem measurements using the 720 DSP.



The **Cable Modem Statistics** screen provides the ability to display up to eight (8) downstream or four (4) upstream DOCSIS cable modem channels.

Select the **Display** softkey as shown in the image to the right to alternate between the **Downstream** and **Upstream** cable modem statistics.



The following information is displayed for downstream channels as shown in the image to the right:

- Priority Status
- Frequency
- Receive Level
- Signal to Noise Ratio
- Pre BER
- Post BER

Cable Modem Statistics					
Downstream					Pass
Pri	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER
✓	819.000 (256 QAM)	16.74 dBmV	39.9 dB	1.00E-08	1.00E-08 ✓
✓	807.000 (256 QAM)	17.30 dBmV	39.0 dB	1.00E-08	1.00E-08 ✓
✓	813.000 (256 QAM)	16.79 dBmV	39.4 dB	1.00E-08	1.00E-08 ✓
✓	801.000 (256 QAM)	18.13 dBmV	39.4 dB	1.00E-08	1.00E-08 ✓

Press Up for Upstream Information

	Limit Set	
--	-----------	--

The following information is displayed for upstream channels as shown in the image to the right:

- ID
- Frequency
- Transmit Level

Cable Modem Statistics		
Upstream		Pass
ID	Frequency (MHz)	Tx Level
1	16.900 (4 QAM)	31.50 dBmV ✓
2	24.000 (4 QAM)	30.93 dBmV ✓
3	31.100 (4 QAM)	31.68 dBmV ✓
6	39.800 (64 QAM)	31.68 dBmV ✓

Press Down for Downstream Information

	Limit Set	
--	-----------	--

Opening a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the cable modem measurement.

Cable Modem Statistics
Downstream **Pass**

Pri	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER
✓	777.000 (256 QAM)	15.28 dBmV	39.0 dB	4.63E-08	1.00E-10
✓	783.000 (256 QAM)	15.56 dBmV	39.4 dB	4.55E-09	1.00E-10
✓	789.000 (256 QAM)	14.94 dBmV	39.4 dB	5.31E-09	1.00E-10
✓	795.000 (256 QAM)	15.00 dBmV	39.4 dB	6.82E-09	1.00E-10
✓	801.000 (256 QAM)	13.93 dBmV	39.0 dB	9.67E-08	1.00E-10
✓	807.000 (256 QAM)	13.75 dBmV	39.4 dB	2.65E-08	1.00E-10
✓	813.000 (256 QAM)	14.08 dBmV			1.62E-06
✓	819.000 (256 QAM)	14.28 dBmV			1.76E-06

Press Up for Upstream Inform

Open
Remove
Limit Set

Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the cable modem measurement.

Cable Modem Statistics
Downstream **Pass**

Pri	Frequ	PostBER
✓	777.00	.00E-10
✓	783.00	.00E-10
✓	789.00	.00E-10
✓	795.00	.00E-10
✓	801.00	.00E-10
✓	807.00	.00E-10
✓	813.00	.44E-06
✓	819.00	.56E-06

Press Up for Upstream Information

Limit Set

- Tap
- Ground Block
- Outlet
- Drop

Limit Set

After selecting the limit set, the **Cable Modem Statistics** screen will be displayed again.

NOTE *The Limit Set window will be bypassed if there is only one limit set to choose from.*

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove the limits set for the cable modem measurement.

Cable Modem Statistics					
Downstream					Pass
Pri	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER
✓	777.000 (256 QAM)	15.51 dBmV	39.4 dB	4.73E-08	1.00E-10 ✓
✓	783.000 (256 QAM)	15.80 dBmV	39.9 dB	3.36E-09	1.00E-10 ✓
✓	789.000 (256 QAM)	15.17 dBmV	39.9 dB	3.92E-09	1.00E-10 ✓
✓	795.000 (256 QAM)	15.25 dBmV	39.4 dB	5.04E-09	1.00E-10 ✓
✓	801.000 (256 QAM)	14.18 dBmV	39.4 dB	8.74E-08	1.00E-10 ✓
✓	807.000 (256 QAM)	13.92 dBmV	39.9 dB	2.88E-08	1.00E-10 ✓
✓	813.000 (256 QAM)	14.33 dBmV			1.19E-06 ✓
✓	819.000 (256 QAM)	14.53 dBmV			1.29E-06 ✓

Press Up for Upstream Information

Open
Remove
Limit Set

Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.

Cable Modem Statistics					
Downstream					
Pri	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER
✓	777.000 (256 QAM)	15.50 dBmV	39.4 dB	4.84E-08	1.00E-10 ⊗
✓	783.000 (256 QAM)	15.77 dBmV	39.9 dB	3.14E-09	1.00E-10 ⊗
✓	789.000 (256 QAM)	15.10 dBmV	39.9 dB	3.66E-09	1.00E-10 ⊗
✓	795.000 (256 QAM)	15.23 dBmV	39.4 dB	4.71E-09	1.00E-10 ⊗
✓	801.000 (256 QAM)	14.20 dBmV	39.4 dB	1.39E-06	1.28E-06 ⊗
✓	807.000 (256 QAM)	13.92 dBmV	39.9 dB	3.01E-08	1.00E-10 ⊗
✓	813.000 (256 QAM)	14.27 dBmV	39.9 dB	1.18E-06	1.11E-06 ⊗
✓	819.000 (256 QAM)	14.53 dBmV	39.4 dB	1.27E-06	1.21E-06 ⊗

Press Up for Upstream Information

Limit Set

Pass/Fail Measurement Indicators

When a limit set has been opened, the cable modem will be tested against the current limit set. The overall Pass/Fail status applies to the sum of all of the level measurements (Rx or Tx) that are displayed on the selected screen.

A Pass/Fail status will be displayed next to each channel (Rx or Tx). The pass/fail status of the cable modem level measurement will be indicated using the following icons:

-  This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
-  This icon indicates that this measurement is within the measurement thresholds of the currently selected limit set.
-  This icon indicates that the measurement limit set has failed.
-  This icon indicates that the measurement has failed the high limit measurement threshold.
-  This icon indicates that the measurement has failed the low limit measurement threshold.

Cable Modem Statistics						
Downstream						Pass
Pri	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER	
✓	819.000 (256 QAM)	16.74 dBmV	39.9 dB	1.00E-08	1.00E-08	✓
✓	807.000 (256 QAM)	17.30 dBmV	39.0 dB	1.00E-08	1.00E-08	✓
✓	813.000 (256 QAM)	16.79 dBmV	39.4 dB	1.00E-08	1.00E-08	✓
✓	801.000 (256 QAM)	18.13 dBmV	39.4 dB	1.00E-08	1.00E-08	✓

Press Up for Upstream Information

Limit Set

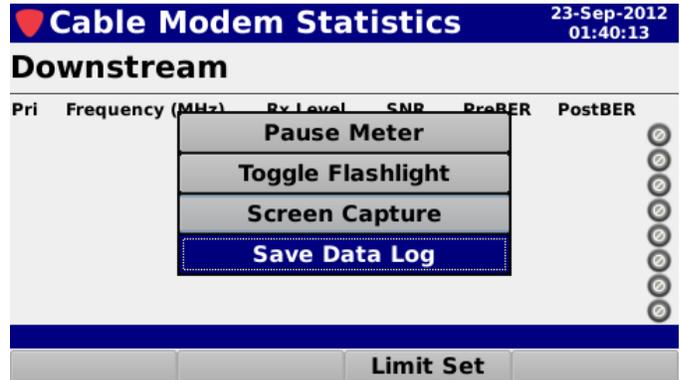
Cable Modem Statistics			
Upstream			Pass
ID	Frequency (MHz)	Tx Level	
1	16.900 (4 QAM)	31.50 dBmV	✓
2	24.000 (4 QAM)	30.93 dBmV	✓
3	31.100 (4 QAM)	31.68 dBmV	✓
6	39.800 (64 QAM)	31.68 dBmV	✓

Press Down for Downstream Information

Limit Set

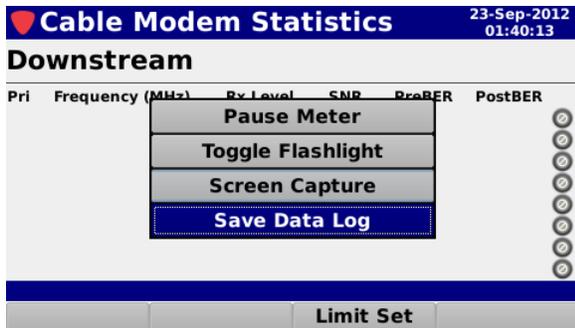
Function Menu Options

Additional functions can be accessed from within the **Cable Modem Statistics** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Cable Modem Statistics** screen.



Save Data Log

Select the **Save Data Log** function from the **Function** menu to save a copy of the measurement result data log. Use the **Virtual Keyboard** to enter the name of the data log to save to the internal memory of the 720 DSP.

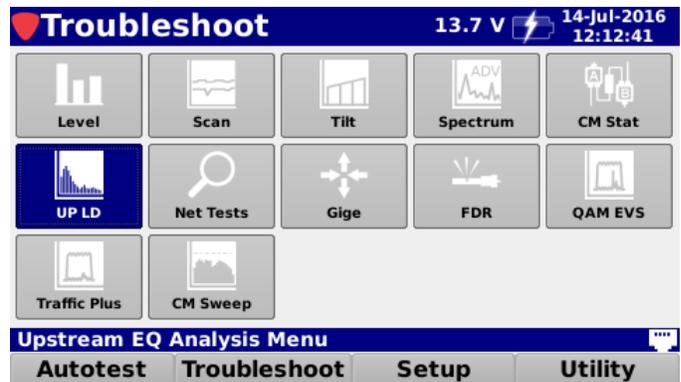


Upstream Linear Distortions

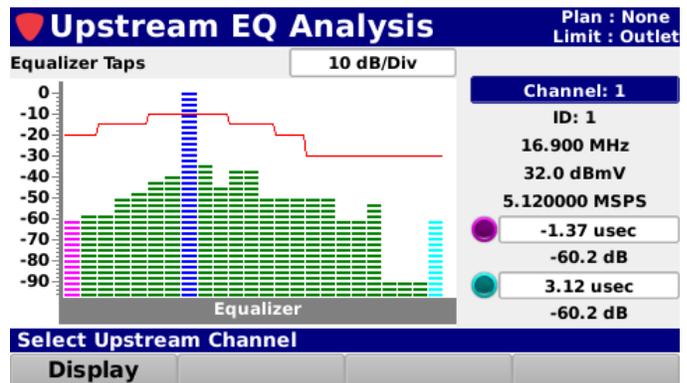
Overview

Upstream Linear Distortion analysis takes the EQ taps from the cable modem and displays their values. It also calculates and displays the in channel response and group delay graph.

Select the **UP LD** icon as shown in the image to the right to perform upstream linear distortion testing using the 720 DSP.



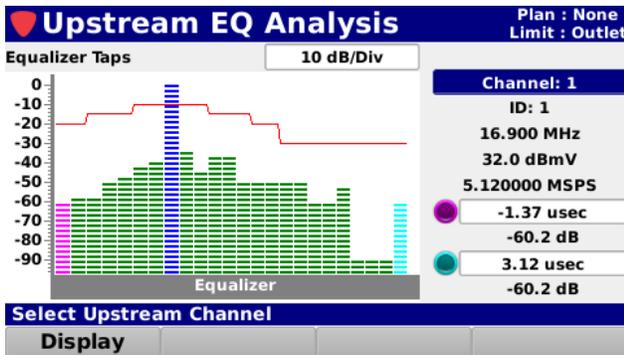
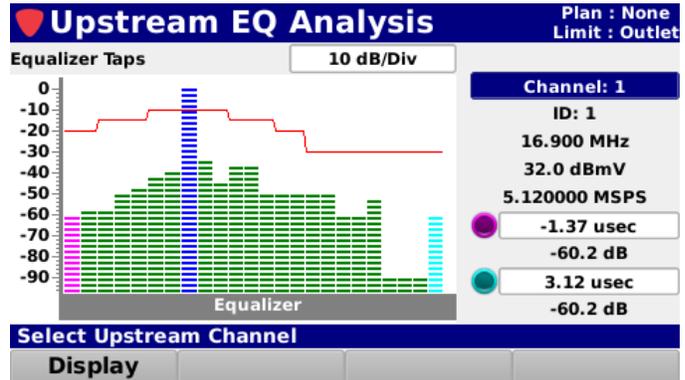
The **Upstream EQ Analysis** screen will be displayed as shown in the image to the right. This screen displays an equalizer tap bar graph along with measurement details for the selected upstream channel.



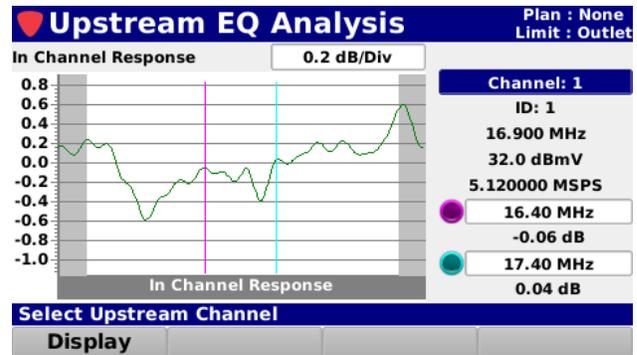
Selecting the Measurement Display

Select the **Display** softkey to cycle through the following measurement displays:

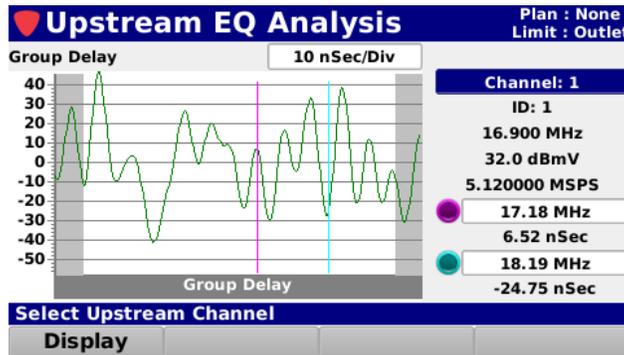
- Equalizer Taps (default)
- In Channel Response
- Group Delay



Equalizer Taps



In Channel Response

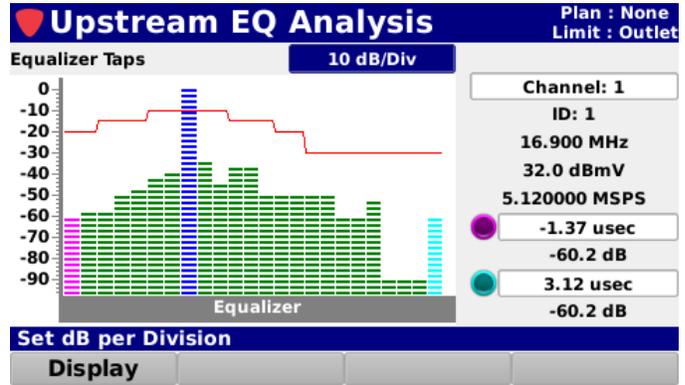


Group Delay

Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from the following vertical scales for each type of display:

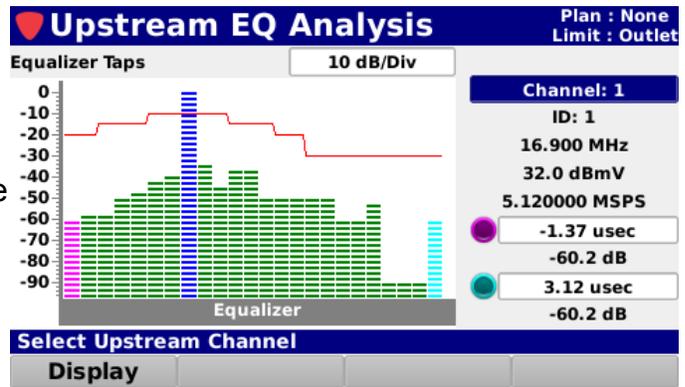
- **Equalizer Taps:** 1, 2, 5, or 10 dB/Div
- **In Channel Response:** 0.1, 0.2, 0.5 or 1.0 dB/Div
- **Group Delay:** 1, 10, 100 nSec/Div or 1usec/Div



Upstream Channel Adjustment

Highlight the channel adjustment field as shown in the image to the right. Then, use the up/down arrow buttons to select the desired upstream channel.

The ID, frequency, level, and symbol rate of the selected upstream channel will be displayed below the channel adjustment field.



Marker Adjustment

The Upstream Linear Distortion measurement includes markers for each of the three types of displays. The markers can be adjusted as shown in the following sections:

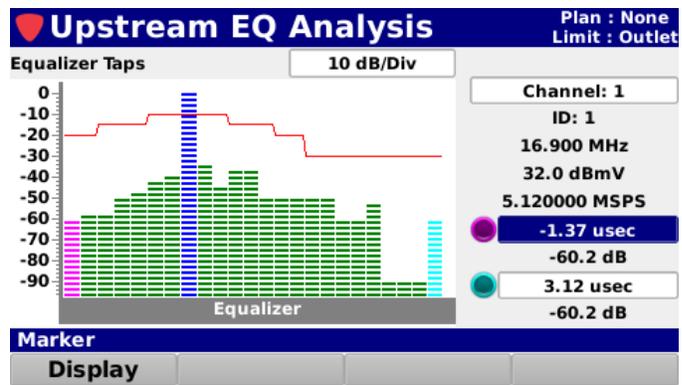
Tap Markers

In the **Equalizer Taps** display, there are two on-screen markers that can be moved independently of one another and are used to highlight a specific equalizer tap.

The markers are represented by the following color bullets and equalizer tap:

- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use the up/down arrow buttons to change the marker to a different equalizer tap. The level and distance (time) to the selected equalizer tap are displayed as shown in the image to the right.



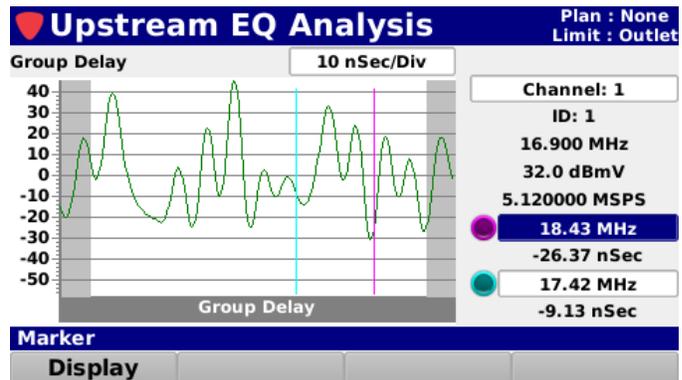
Spectrum Markers

In the **In Channel Response** and **Group Delay** displays that can be moved independently of one another and there are two on-screen markers that are used to highlight a specific 1 MHz frequency range.

The markers are represented by the following color bullets and vertical line:

- **Marker 1** – Purple
- **Marker 2** – Light Blue

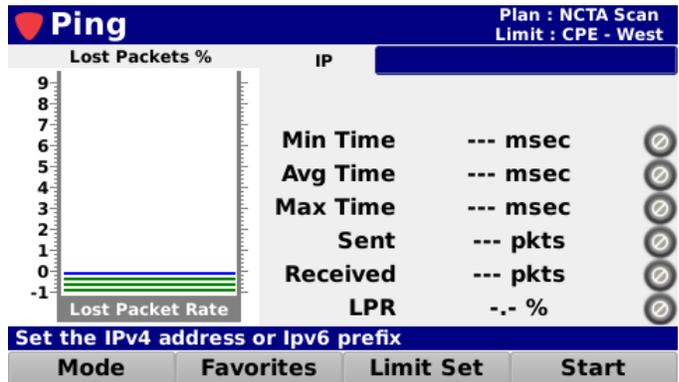
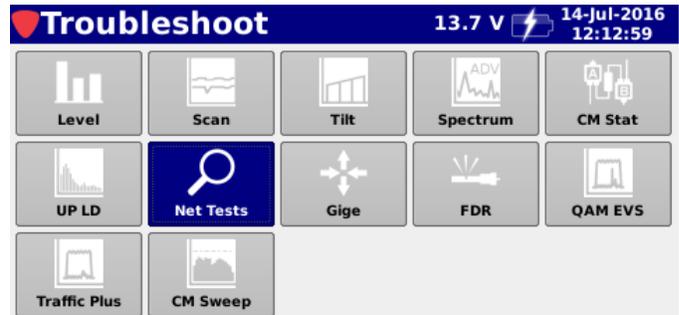
Highlight the desired marker and use the up/down arrow buttons to change the marker to a different frequency. The frequency and distance (time) to the markers are displayed as shown in the image to the right.



Overview

The Network Test Suite is a standard feature of the 720 DSP that is used to perform network tests and includes Ping, VoIP, and Thru-Put tests. Select the **Net Tests** icon as shown in the image to the right to perform network tests using the 720 DSP.

The **Network Tests** screen will be displayed as shown in the image to the right. This screen displays a measurement bar graph specific to the type of measurement along with relevant measurement values.



Selecting the Test Mode

Select the **Mode** softkey to choose from the following network tests:

- Ping
- VoIP
- Throughput
- Traceroute

Plan : NCTA Scan
Limit : CPE - West

Lost Packets % IP

Min Time --- msec
Avg Time --- msec
Max Time --- msec
Sent --- pkts
Received --- pkts
LPR -- %

Mode Favorites Limit Set Start

Plan : NCTA Scan
Limit : CPE - West

Lost Packets % IP

Min Time --- msec
Avg Time --- msec
Max Time --- msec
Sent --- pkts
Received --- pkts
LPR -- %

Set the IPv4 address or Ipv6 prefix

Mode Favorites Limit Set Start

Ping

Plan : NCTA Scan
Limit : CPE - West

VoIP Latency msec IP

Up Latency --- msec
Up Jitter --- msec
Up Pkt, MOS ---, ---
Down Latency --- msec
Down Jitter --- msec
Down Pkt, MOS ---, ---

Set the IPv4 address or Ipv6 prefix

Mode Favorites Limit Set Start

VoIP

Plan : NCTA Scan
Limit : CPE - West

Speed Mbps IP

Target Up Rate 100 Mbps
Target Down Rate 60 Mbps

Up Rate --- Mbps
Down Rate --- Mbps

Set the IPv4 address or Ipv6 prefix

Mode Favorites Limit Set Start

Throughput

Plan : NCTA Scan
Limit : CPE - West

IP

Hop	Address	Name	Time

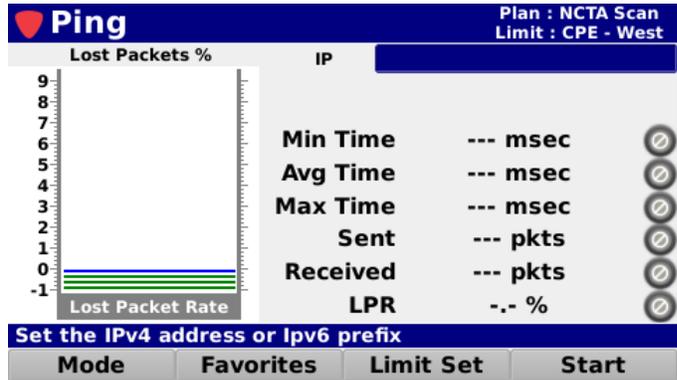
Set the IPv4 address or Ipv6 prefix

Mode Favorites Limit Set Start

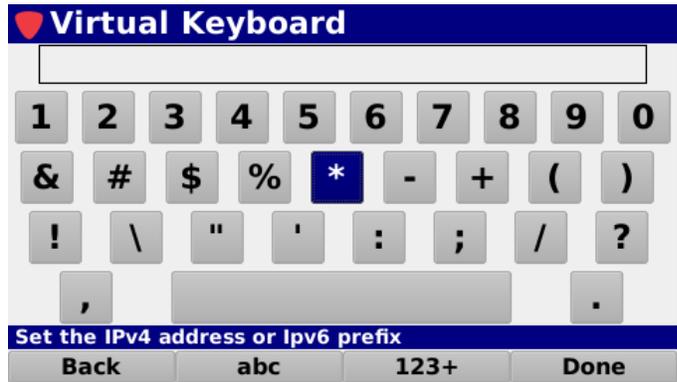
Traceroute

Setting the Destination IP Address

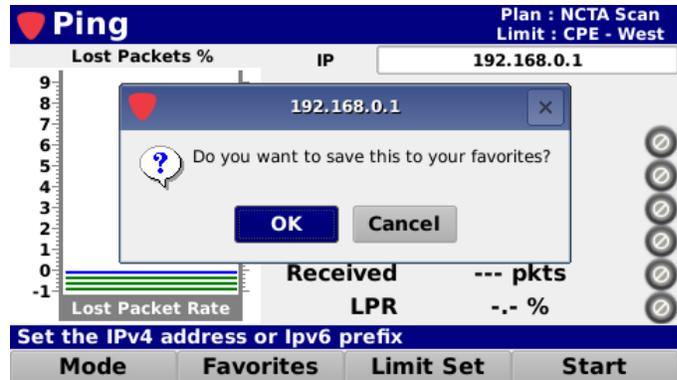
To manually enter the destination IP address for the network testing, highlight the **IP** field as shown in the image to the right.



Then, press the **Enter** button and use the **Virtual Keyboard** to directly enter the IP address as shown in the image to the right.



After selecting the **Done** softkey, a confirmation window will be displayed as shown in the image to the right. Select the **OK** button to save the location to your favorites or select the **Cancel** button to accept the changes without saving to your favorites.

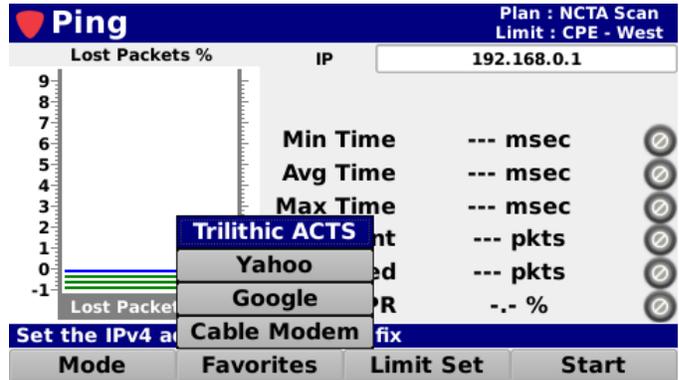


Selecting a Favorite

After entering a destination IP address as shown in the previous section, the 720 DSP allows you to save the entered IP address as a favorite location for quick and easy access.

Select the **Favorites** softkey to view a list of up to six (6) favorite destination IP addresses.

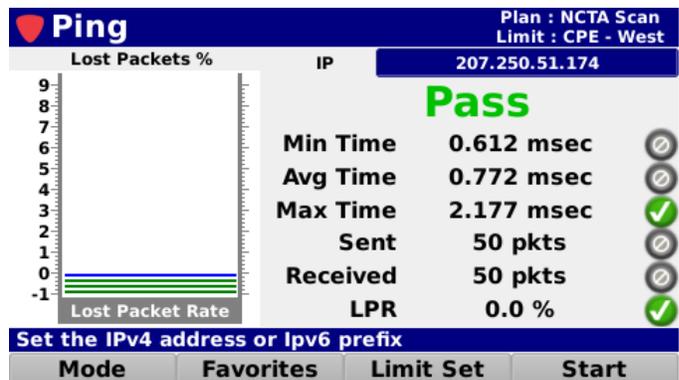
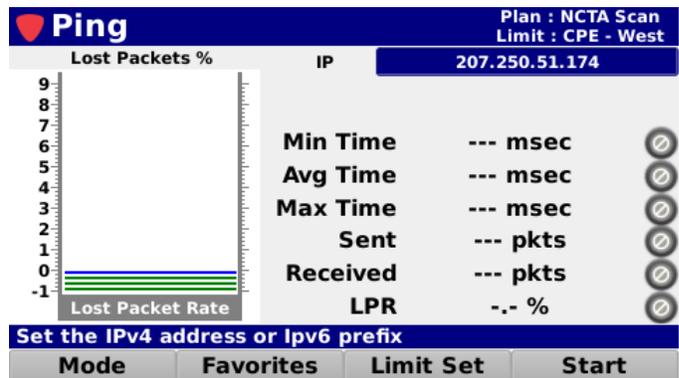
From the **Favorites** pop-up menu, select the name of the favorite to use for testing. The IP address or URL of the selected location will be entered automatically in the **IP** field.



Executing Network Tests

After entering a destination IP address or selecting a favorite, select the **Start** key to execute the selected test.

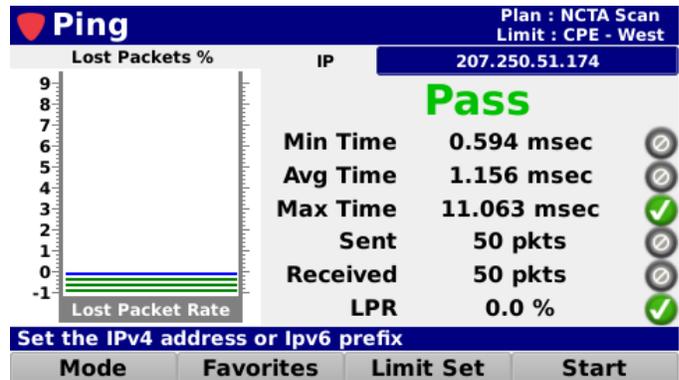
The 720 DSP will display the measurement results for each test mode as shown in the following sections.



Ping Mode

When the **Ping** mode is selected, the following measurement results are displayed as shown in the image to the right:

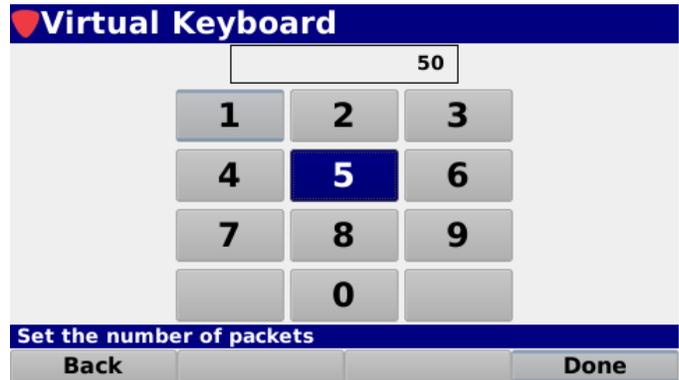
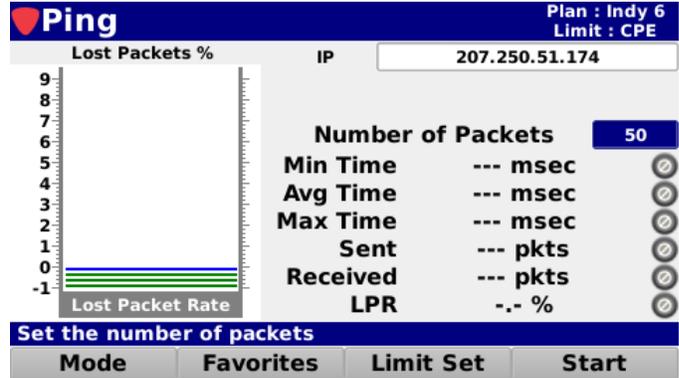
- **Minimum Time** – This is the minimum time required to send/receive a single test packet.
- **Average Time** – This is the average time required to send/receive all test packets.
- **Maximum Time** – This is the maximum time required to send/receive a single test packet.
- **Sent** – This is the number of packets sent by the 720 DSP to the destination IP address.
- **Received** – This is the number of packets received by the 720 DSP from the destination IP address.
- **LPR** – This is the lost packet ratio. This measurement is displayed in the bar graph and as a numeric value. The LPR is calculated as the percentage of packets received to those which were sent (LPR = {Received Packets / Sent Packets} * 100%), for example:
 - 50 sent packets
 - 25 received packets
 - $LPR = \{25 / 50\} * 100\%$
 $\{0.50\} * 100\%$
50%



Setting the Number of Packets

To manually enter the number of packets for the ping test, highlight the **Number of Packets** field as shown in the image to the right and then use either of the following methods to change the packet number:

- Use the up/down arrow buttons to adjust the number in 1 packet increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the number of packets as shown in the image to the right.



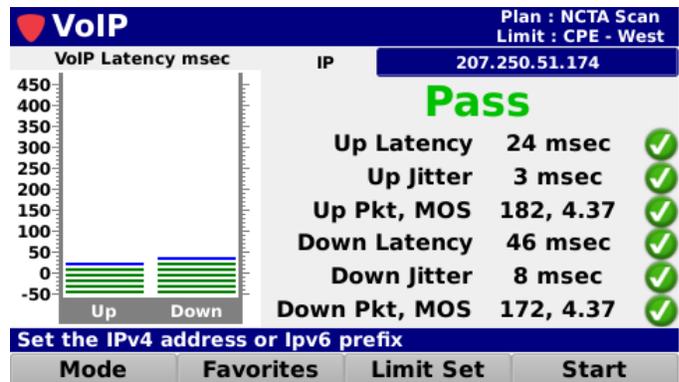
VoIP Mode



The Throughput mode is not available when connected to the Internet through the GigE port. This test cannot be used for testing the VoIP Gigabit Ethernet connections.

When the **VoIP** mode is selected, the following measurement results are displayed as shown in the image to the right:

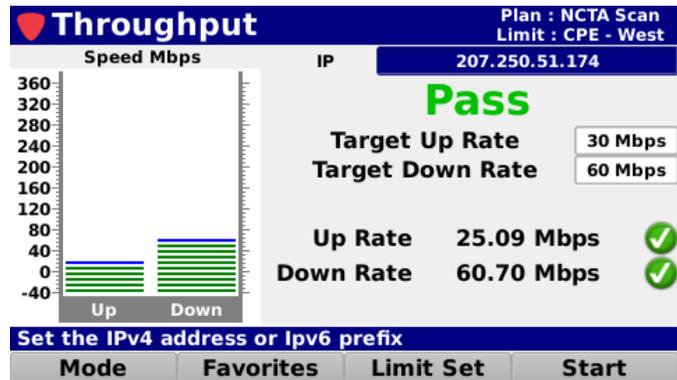
- **Up Latency** – This is the upstream latency. This measurement is displayed in the bar graph and as a numeric value.
- **Up Jitter** – This is the upstream jitter.
- **Up MOS** – This is the upstream mean opinion score.
- **Down Latency** – This is the downstream latency. This measurement is displayed in the bar graph and as a numeric value.
- **Down Jitter** – This is the downstream jitter.
- **Down MOS** – This is the downstream mean opinion score.



Throughput Mode

When the **Throughput** mode is selected, the following measurement results are displayed as shown in the image to the right:

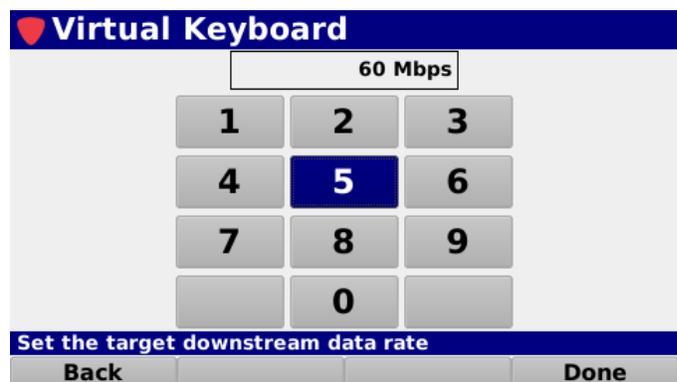
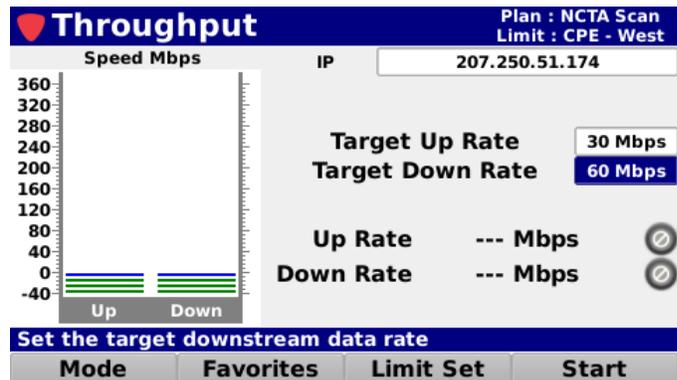
- **Up Rate** – This is the up stream data rate. This measurement is displayed in the bar graph and as a numeric value.
- **Down Rate** – This is the down stream data rate. This measurement is displayed in the bar graph and as a numeric value.



Setting the Target Downstream Rate

To manually enter the target downstream rate for the throughput test, highlight the **Target Down Rate** field as shown in the image to the right and then use either of the following methods to change the target downstream rate:

- Use the up/down arrow buttons to adjust the rate in 1 Mbps increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the target downstream rate as shown in the image to the right.



Traceroute

When the **Traceroute** mode is selected, the following measurement results are displayed as shown in the image to the right:

- **Hop** – This is the number of the intermediary point (hop) in the route between the meter and the destination address.
- **Address** – This is the IP address of the corresponding intermediary point (hop).
- **Name** – This is the name of the corresponding intermediary point (hop).
- **Time** – This is the time to each intermediary point (hop).

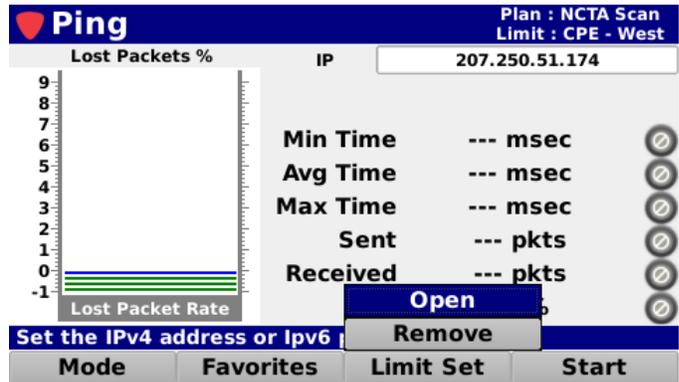
Traceroute				Plan : NCTA Scan
				Limit : CPE - West
IP		www.google.com		
Hop	Address	Name	Time	
2	168.215.73.193	168-215-73-193.ilectris.com	2 ms	
3	66.192.250.158	chi2-pr1-xe-1-2-0-0.us.twt...	11 ms	
4	72.14.212.199	72.14.212.199	7 ms	
5	209.85.254.122	209.85.254.122	7 ms	
6	72.14.237.133	72.14.237.133	7 ms	
7	72.14.239.137	72.14.239.137	30 ms	
8	216.239.46.39	216.239.46.39	28 ms	

Set the IPv4 address or Ipv6 prefix

Mode	Favorites	Limit Set	Start
------	-----------	-----------	-------

Opening a Limit Set

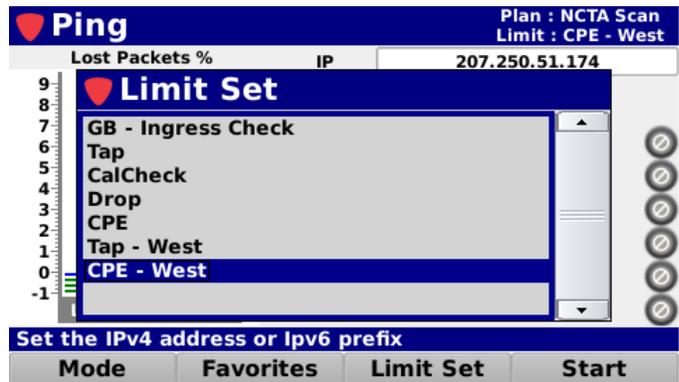
Select the **Limit Set** softkey as shown in the image to the right to select the limit set to use for the network testing.



Select the **Open** button from the **Limit Set** pop-up menu and the **Limit Set** window will be displayed as shown in the image to the right.

From the **Limit Set** window, select the name of the limit set to use for the network testing.

After selecting the limit set, the **Network Tests** screen will be displayed again.

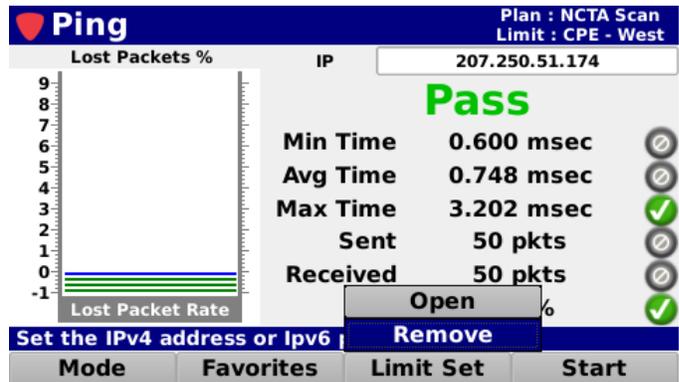


NOTE

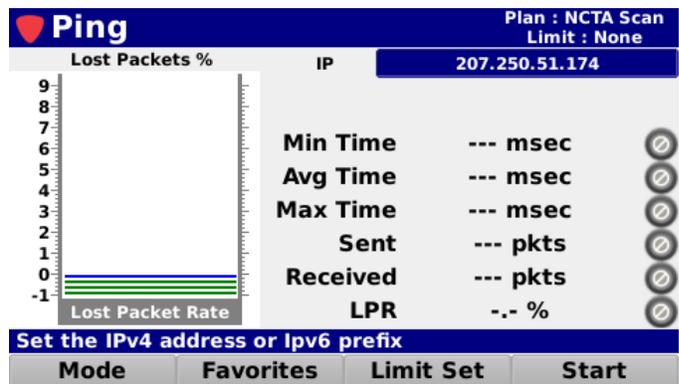
The Limit Set window will be bypassed if there is only one limit set to choose from.

Removing a Limit Set

Select the **Limit Set** softkey as shown in the image to the right to remove the limits set for the cable modem measurement.



Select the **Remove** button from the **Limit Set** pop-up menu and the pass/fail results will no longer be displayed as shown in the image to the right.

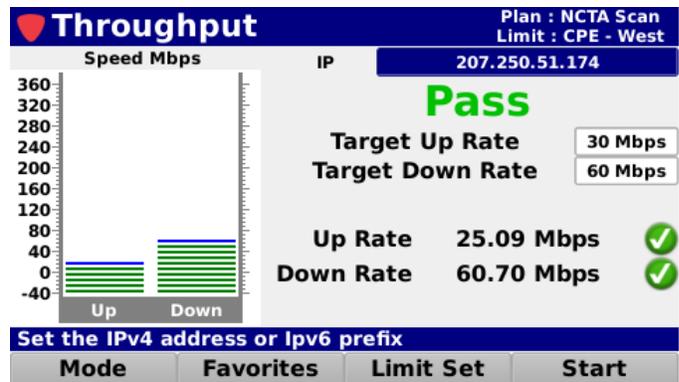
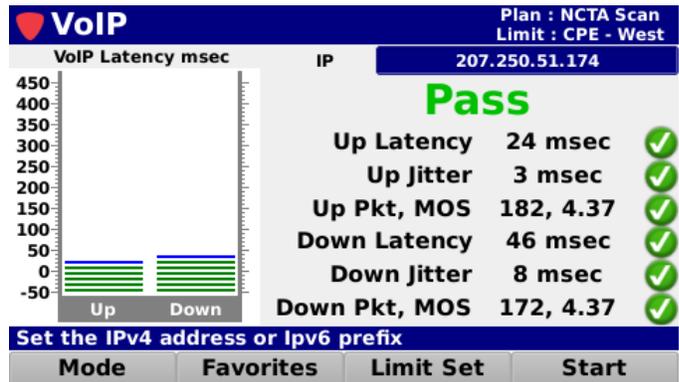


Pass/Fail Measurement Indicators

When a limit set has been opened, the network tests will be tested against the current limit set. When any of the individual measurement parameters of a network tests fail, the network tests as a whole will indicate a Fail status.

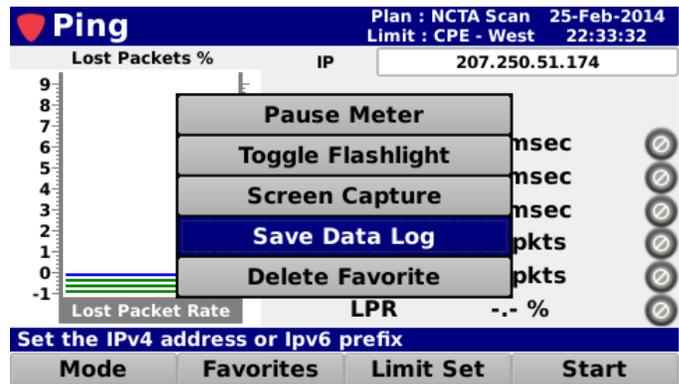
A Pass/Fail status will be displayed next to each measurement parameter. The pass/fail status of the network tests will be indicated using the following icons:

-  This icon indicates that this measurement was skipped. This only applies to measurements that have been removed from the currently selected limit set.
-  This icon indicates that this measurement is within the measurement thresholds of the currently selected limit set.
-  This icon indicates that the measurement limit set has failed.
-  This icon indicates that the measurement has failed the high limit measurement threshold.
-  This icon indicates that the measurement has failed the low limit measurement threshold.



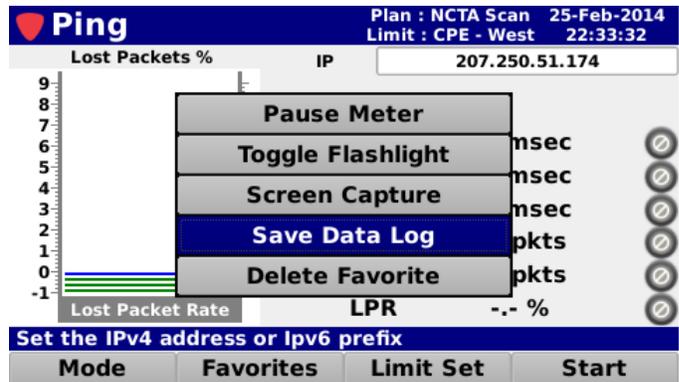
Function Menu Options

Additional functions can be accessed from within the **Network Tests** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Network Tests** screen.

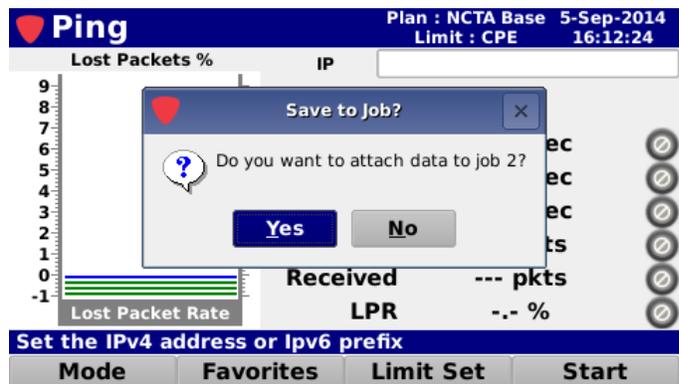


Save Data Log

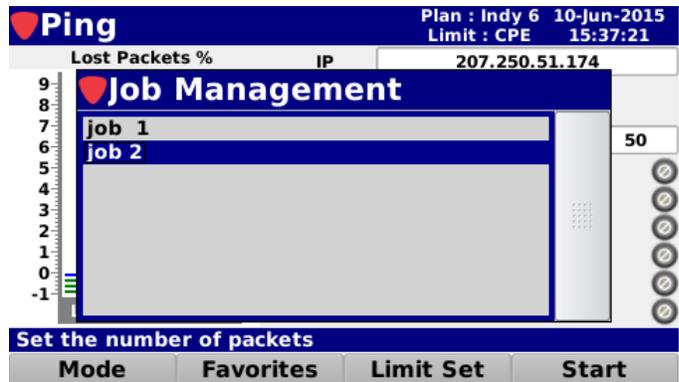
Select the **Save Data Log** button from the **Function** menu to save a copy of the measurement result data log.



If you have an open job, you can also save the test to the job by selecting **Yes** as shown in the image below.



If you have multiple open jobs, the **Job Management** window will be displayed. Choose the job you would like to save the log to.



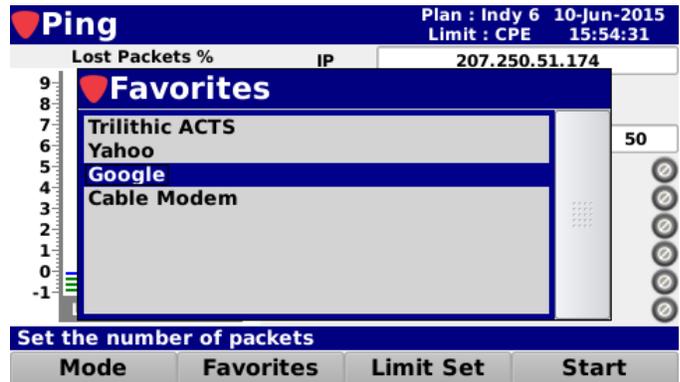
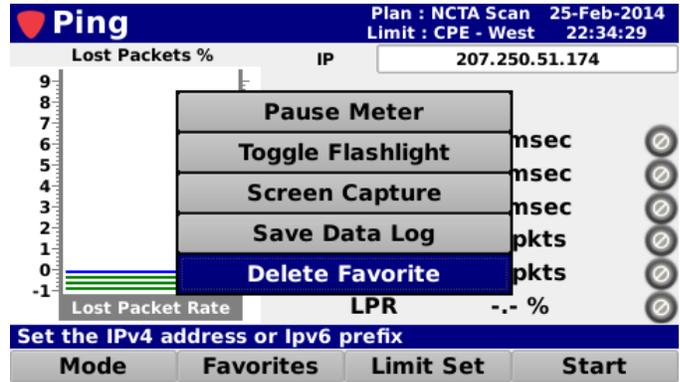
If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Delete Favorites

Select the **Delete Favorite** button from the **Function** menu to delete any one of the six available favorites.

The **Favorites** window will be displayed as shown in the image to the right. Select the name of the favorite you want to delete.



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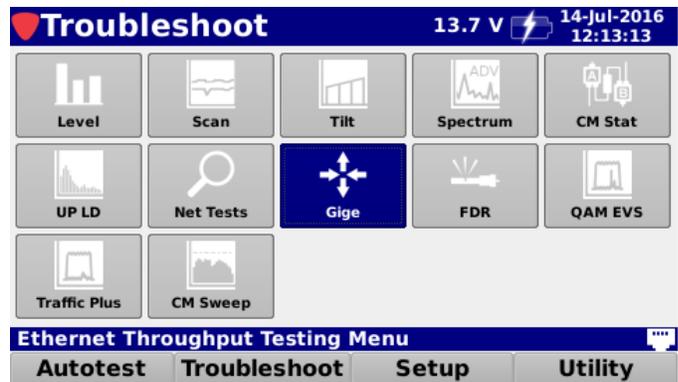
Gigabit Ethernet Testing

Overview

Used in combination with either the MetroNet 5001™ or TLB-GbE™, the 720 DSP can achieve throughput testing speeds of up to 1 GbE using a dedicated electrical/optical test port.

The 720 DSP can perform either roundtrip or one-way loopback measurements of Key Parameter Index (KPI) for full Ethernet service testing. With constant payload testing for Layer 2 through Layer 4, the 720 DSP is built for verification of both Ethernet Service Level Agreement (SLA) and Quality of Service (QoS) metrics.

To access the Gigabit Ethernet testing feature, select the **Gige** icon from the **Troubleshoot** menu as shown in the image to the right.



Testing Features

- Unlimited Target Devices
- Identify Target Devices by IPv4, Host Name or MAC Address Types
- Up to 8 Streams per Target Device Under Test
- IPTV, VoIP, Web Data, Layer 2, Layer 3 & Jumbo Frame Types
- Adjustable CIR, CBS, EIR & EBS for all Frame Types
- Virtual LAN (VLAN) Compatibility

Hardware Requirements

The Gigabit Ethernet testing feature works in combination with a loopback device to BERT loopback measurements of Key Parameter Index (KPI) for full Ethernet service testing.

The requirements for performing the BERT test using the 720 DSP are as follows:

- Loopback device must be installed in the headend or hub site.
- Loopback device must be on the same network as the field test point.

Initial Setup Requirements

Before using the Gige feature for the first time, the user must first perform the following setup steps:

1. Create a new test point for the BERT test.
2. Create a new target device for loopback.
3. Add target device(s) to the selected test point
4. Add stream(s) to the target device(s) in the selected test point

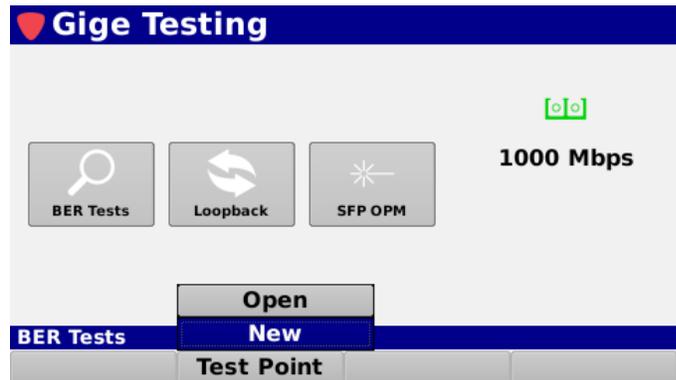
Creating a New Test Point

Follow the steps shown in the following sections to perform the initial setup of the 720 DSP for BERT testing via a loopback device.

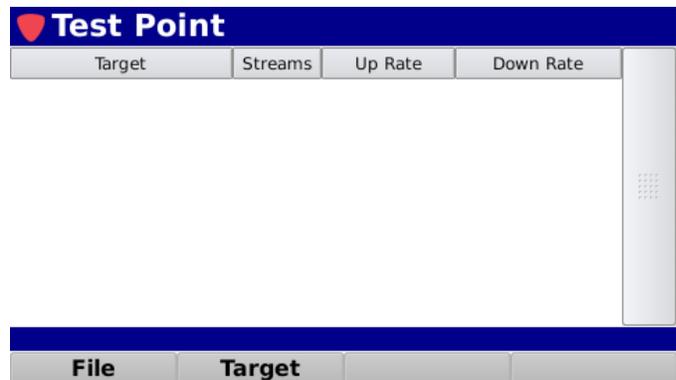
The first step in setting up the BERT testing from the 720 DSP involves creating a test point. The test point is the location in the network from where you will be performing the BERT test. The name of the test point should correspond to this location in the network. Multiple test points can be created to test from many different types of locations within the network.

Perform the following steps to create a new test point:

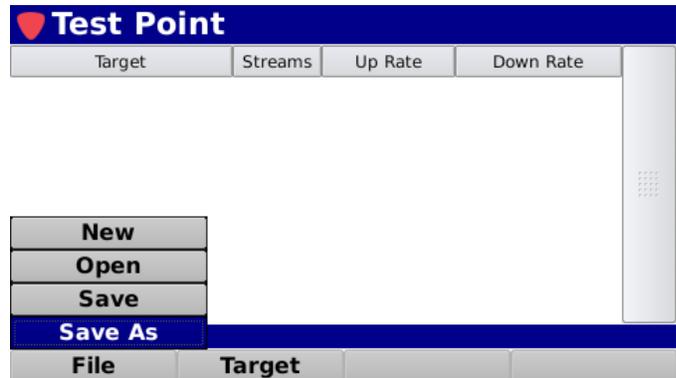
1. From the **Gige Testing** screen, select **New** from the **Test Point** softkey as shown in the image to the right.



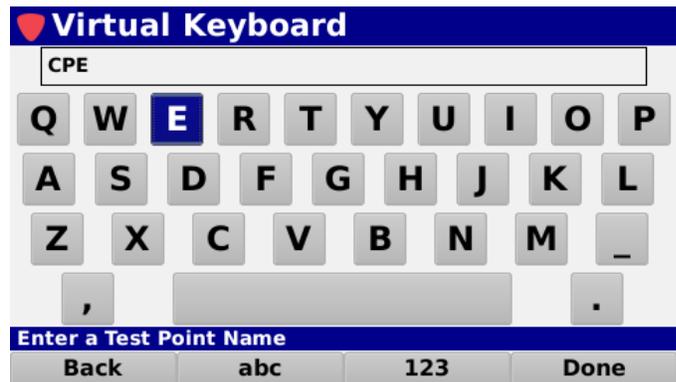
2. The **Test Point** screen will be displayed as shown in the image to the right.



- From the **Test Point** screen, select **Save As** from the **File** softkey as shown in the image to the right.



- Use the **Virtual Keyboard** to enter the name of your test point. Once you have entered a name, select the **Done** softkey as shown in the image to the right.
- In this example, the name of the test point simply corresponds to the customer premise equipment (CPE).



- The name of the test point will be displayed in the header bar as shown in the image to the right.
- Repeat the steps above to create additional test points. Once you have created all of the required test points for your system, proceed to the next section.

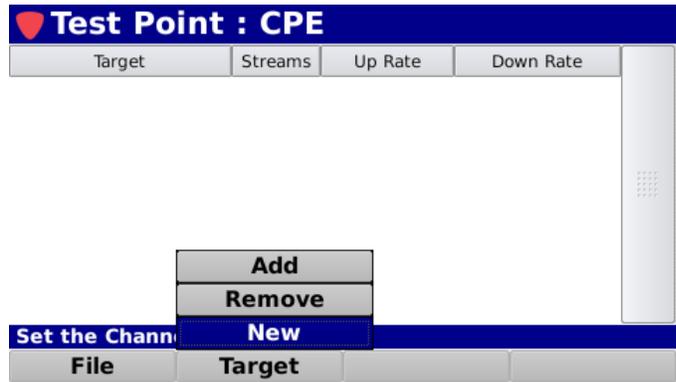


Creating a Loopback Target

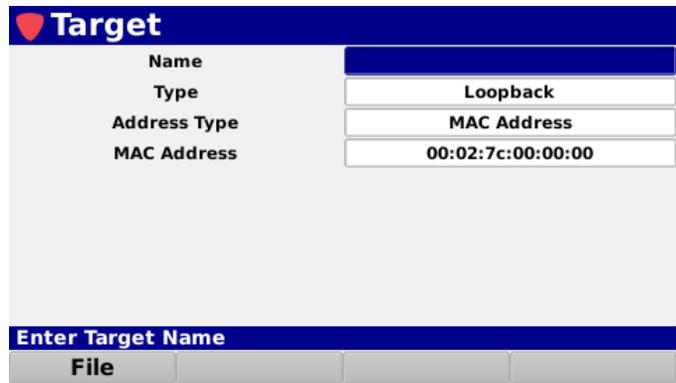
The second step in setting up the BERT testing from the 720 DSP involves creating a loopback target. Each loopback target corresponds to the available loopback devices installed in the network where you will be performing the BERT test. The name of the loopback target should correspond to the name of the loopback device or location within the network where the loopback device is installed. Multiple loopback targets can be created to perform BERT loopback tests to different locations within the network.

Perform the following steps to create a new loopback target:

1. From the **Test Point** screen, select **New** from the **Target** softkey as shown in the image to the right.



2. The **Target** screen will be displayed as shown in the image to the right.

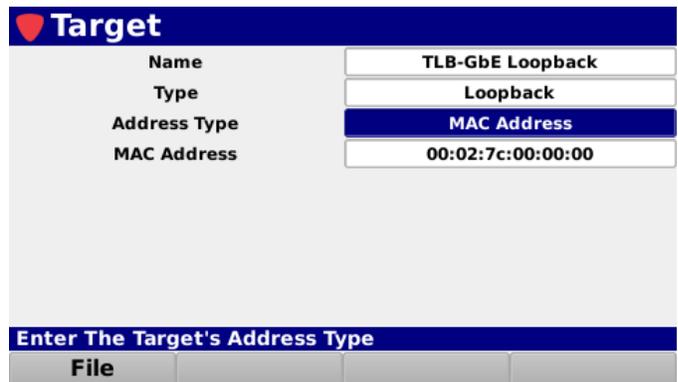


3. Select the **Name** field to enter the name of the target loopback device using the **Virtual Keyboard** as shown in the image to the right. Once you have entered the target name, select the **Done** softkey.
4. In this example, the name of the target loopback device simply corresponds to a TLB-GbE that is being used for loopback.



5. The **Address Type** field is used to set the type of address to use when finding the target loopback device on the network. Select the **Address Type** field and then use the up/down arrow buttons on the physical keypad to select from the following values:

- **MAC Address** – Select this value to find the target loopback device by its MAC Address as shown in the image to the right.



- **Host Name** – Select this value to find the target loopback device by its Host Name as shown in the image to the right.



- **IPv4 Address** – Select this value to find the target loopback device by its IPv4 Address as shown in the image to the right.

Name	TLB-GbE Loopback
Type	Loopback
Address Type	IPv4 Address
IPv4 Address	192.168.1.100

Enter The Target's Address Type

File

6. Once you have selected the **Address Type**, select the **MAC Address**, **Host Name** or **IPv4 Address** field and use the **Virtual Keyboard** to enter the address of the target loopback device as shown in the images below.

Name	TLB-GbE Loopback
Type	Loopback
Address Type	MAC Address
MAC Address	00:02:7c:00:00:00

Enter The Target's Mac Address

File

00:02:7c:00:00:00

Enter The Target's Mac Address

Back ABC 123 Done

Name	TLB-GbE Loopback
Type	Loopback
Address Type	Host Name
Host Name	00:02:7c:00:00:00

Enter The Target's Host Name

File

00:02:7c:00:00:00

Enter The Target's Host Name

Back ABC 123 Done

Name	TLB-GbE Loopback
Type	Loopback
Address Type	IPv4 Address
IPv4 Address	192.168.1.100

Enter The Target's IPv4 Address

File

192.168.1.100

Enter The Target's IPv4 Address

Back ABC 123 Done

- From the **Target** screen, select **Save** from the **File** softkey as shown in the image to the right. This will save the loopback target to the internal memory of the device using the target name. You can also select **Save As** from the **File** softkey to make a copy of the loopback target with a new target name.

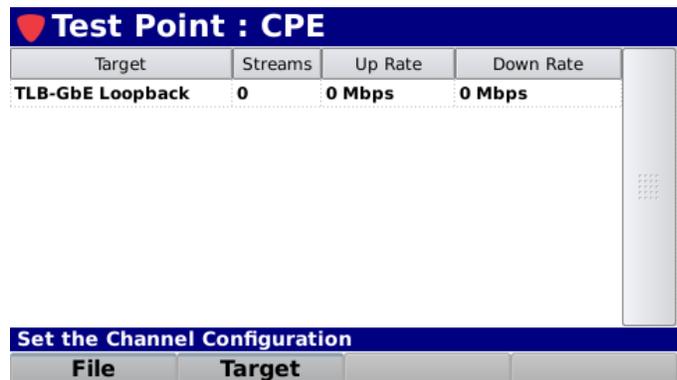
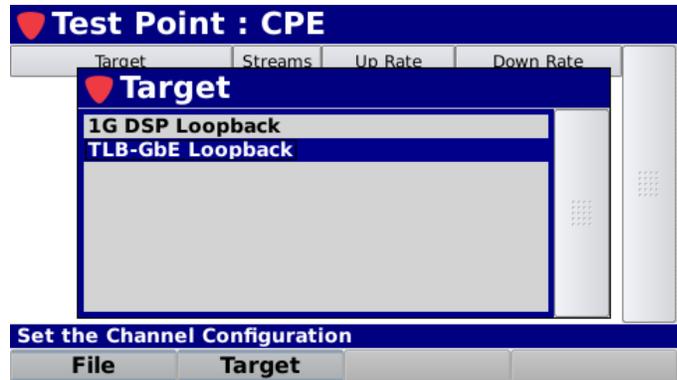
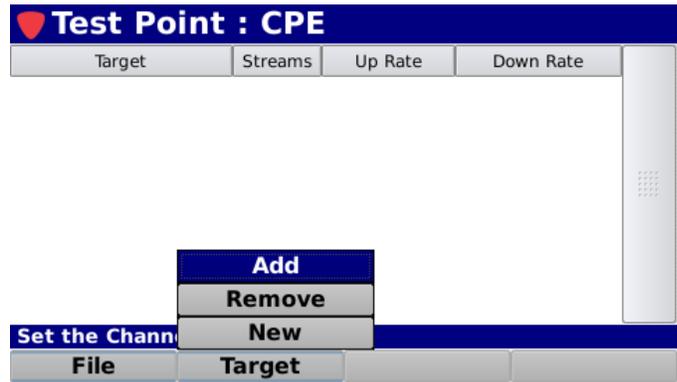
Target																					
Name	TLB-GbE Loopback																				
Type	Loopback																				
Address Type	IPv4 Address																				
IPv4 Address	192.168.1.100																				
<table border="1"> <tr> <td>New</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Save</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Save As</td> <td>s IPv4 Address</td> <td></td> <td></td> </tr> <tr> <td>File</td> <td></td> <td></td> <td></td> </tr> </table>		New				Open				Save				Save As	s IPv4 Address			File			
New																					
Open																					
Save																					
Save As	s IPv4 Address																				
File																					

Adding Loopback Targets to a Test Point

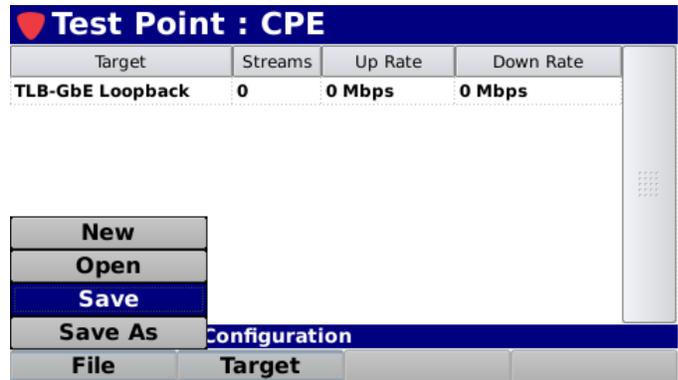
The third step in setting up the BERT testing from the 720 DSP involves adding the appropriate loopback targets to each test point. Multiple loopback targets can be added to a single test point in order to perform BERT loopback tests to different locations within the network.

Perform the following steps to add a loopback target to a test point:

1. From the **Test Point** screen, select **Add** from the **Target** softkey as shown in the image to the right.
2. In this example, we are using the CPE test point that was created earlier.
3. The **Target** selection window will be displayed as shown in the image to the right. Use the up/down arrow buttons on the physical keypad to highlight the desired target and then press the **Enter** button.
4. In this example, our target will be the TLB-GbE.
5. The **Test Point** screen will now display the name of the selected loopback target. Continue to add all of the loopback devices that are required for the selected test point.



- Once you have added all of the loopback targets, select **Save** from the **File** softkey as shown in the image to the right.



Adding Streams to a Loopback Target within a Test Point

The fourth step in setting up the BERT testing from the 720 DSP involves adding the appropriate streams to the loopback targets of each test point. Up to 8 streams can be added to a single loopback target in order to perform BERT loopback tests for different types of service from a single test point. The 720 DSP includes the following 8 pre-defined streams that are designed to test a number of typical traffic conditions within the network:

Stream			
Name	IPTV	Direction	2 Way
Frame	IPTV	Limits	None
CIR	100 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

IPTV Stream

Stream			
Name	Low Priority	Direction	2 Way
Frame	Layer 3	Limits	None
CIR	200 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	Use Vlan	Vlan Id	5
Priority Type	PCP	Color Mode	Color Blind
Green Code	1	Yellow Code	0
Enter stream name			

Low Priority Stream

Stream			
Name	IP Only	Direction	2 Way
Frame	Layer 3	Limits	None
CIR	300 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

IP Only Stream

Stream			
Name	Jumbo	Direction	2 Way
Frame	Jumbo	Limits	None
CIR	100 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

Jumbo Stream

Stream			
Name	100 Mb Web Data	Direction	2 Way
Frame	Web Data	Limits	None
CIR	100 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

100 Mb Web Data Stream

Stream			
Name	MAC Only	Direction	2 Way
Frame	Layer 2	Limits	None
CIR	100 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

MAC Only Stream

Stream			
Name	100 Line VOIP	Direction	2 Way
Frame	VOIP	Limits	None
CIR	50 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	No Vlan	Vlan Id	0
Priority Type	None	Color Mode	None
Green Code	0	Yellow Code	0
Enter stream name			

100 Line VOIP Stream

Stream			
Name	High Priority	Direction	2 Way
Frame	Layer 3	Limits	None
CIR	50 Mbps	CBS	0 Bytes
EIR	0 Mbps	EBS	0 Bytes
Vlan	Use Vlan	Vlan Id	5
Priority Type	PCP	Color Mode	Color Blind
Green Code	7	Yellow Code	0
Enter stream name			

High Priority Stream

Each of these pre-defined streams can be adjusted to match the typical traffic conditions within your network. The following stream settings cannot be adjusted and are currently used for informational purposes only:

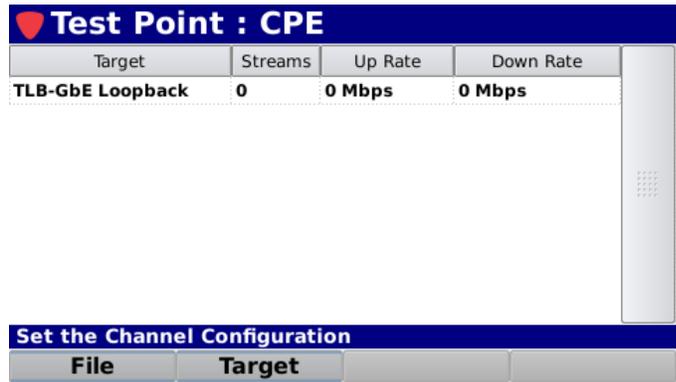
- **Stream Direction** – 2 Way
- **Stream Limits** – None

The following settings can be adjusted for each stream:

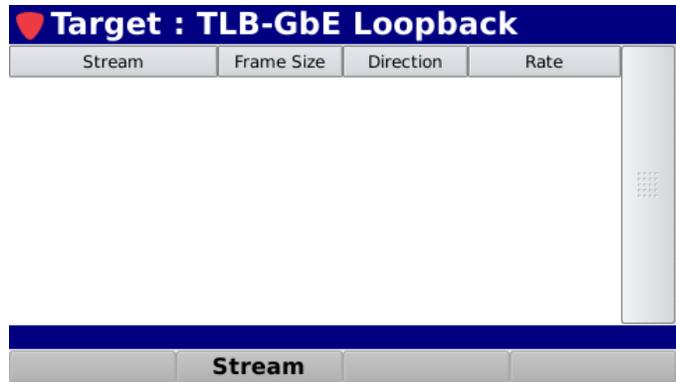
- **Stream Name** – Customizable Name
- **Stream Frame Type** – IPTV, VoIP, Web Data, Layer 2, Layer 3 or Jumbo
- **CIR** – Committed Information Rate (0 to 10,000 Mbps)
- **CBS** – Committed Burst Size (0 to 10,000,000 Bytes)
- **EIR** – Excess Information Rate (0 to 10,000 Mbps)
- **EBS** – Excess Bust Size (0 to 10,000,000 Bytes)
- **VLAN Mode** – No VLAN or Use VLAN
- **VLAN ID** – 0 to 4095 (available when VLAN Mode is set to “Use VLAN”)
- **Priority Type** – None, DiffServ, or PCP
- **Color Mode** – Color Blind or Color Aware
- **Green Code** – 0 to 7
- **Yellow Code** – 0 to 7 (available when Color Mode is set to “Color Aware”)

Perform the following steps to add streams to a loopback target:

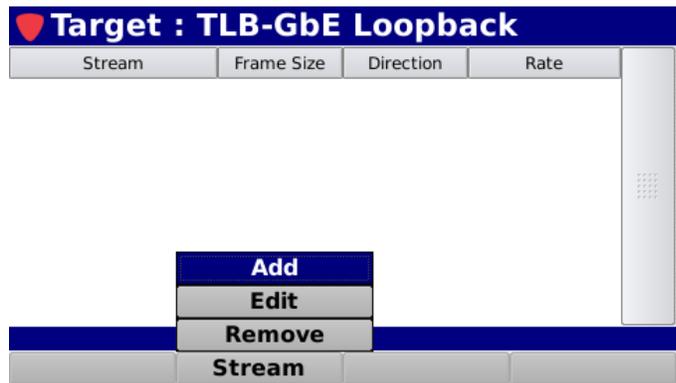
1. From the **Test Point** screen, use the up/down arrow buttons on the physical keypad to highlight the desired target and then press the **Enter** button.
2. In this example we are using the CPE test point with a TLB-GbE loopback device.
3. The stream table for the selected Target will be displayed as shown in the image to the right.



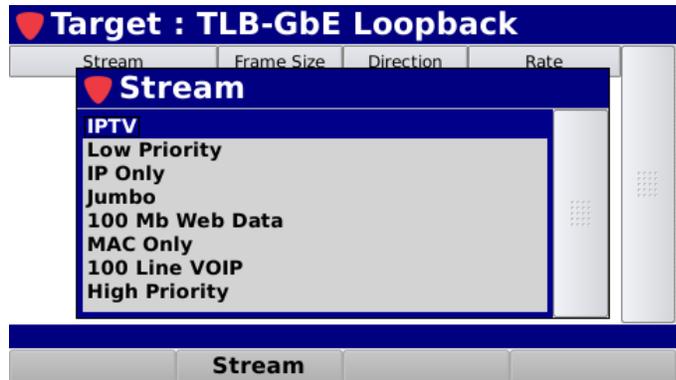
3. The stream table for the selected Target will be displayed as shown in the image to the right.



4. To add a stream to the selected loopback target, select **Add** from the **Stream** softkey as shown in the image to the right.



- The Stream selection window will appear as shown in the image to the right. Use the up/down arrow buttons on the physical keypad to highlight the desired stream and then press the **Enter** button.
- In this example, we will add each type of stream to the selected target.



- Once you have added the desired streams to the loopback target, the stream table will display each stream as shown in the image to the right. To edit any of the selected streams, use the up/down arrow buttons on the physical keypad to highlight the desired stream and then press the **Enter** button.

Stream	Frame Size	Direction	Rate
IPTV	1518	2 Way	100 Mbps
Low Priority	68	2 Way	200 Mbps
IP Only	68	2 Way	300 Mbps
Jumbo	11000	2 Way	100 Mbps
100 Mb Web Data	1518	2 Way	100 Mbps
MAC Only	64	2 Way	100 Mbps
100 Line VOIP	78	2 Way	50 Mbps
High Priority	68	2 Way	50 Mbps

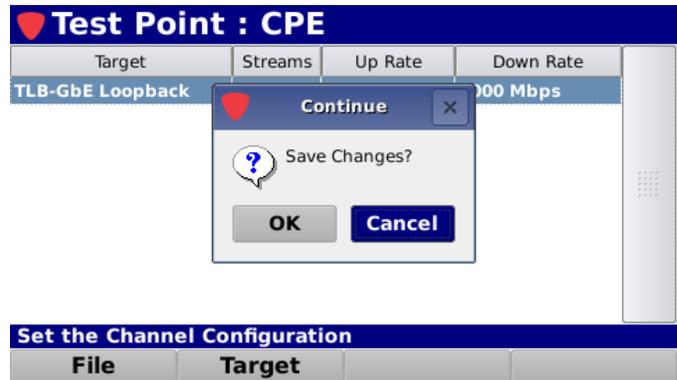
- Once you have added all of the necessary streams to the loopback target, press the **Back** button on the physical keypad to return to the **Test Point** screen as shown in the image to the right.

Target	Streams	Up Rate	Down Rate
TLB-GbE Loopback	8	1000 Mbps	1000 Mbps

Set the Channel Configuration

File Target

9. Once you have finished making all of the necessary changes to the test point, press the **Back** button on the physical keypad. A **Continue** window will appear asking you whether you would like to save your changes. Select **OK** to save your changes or select **Cancel** to discard any changes.

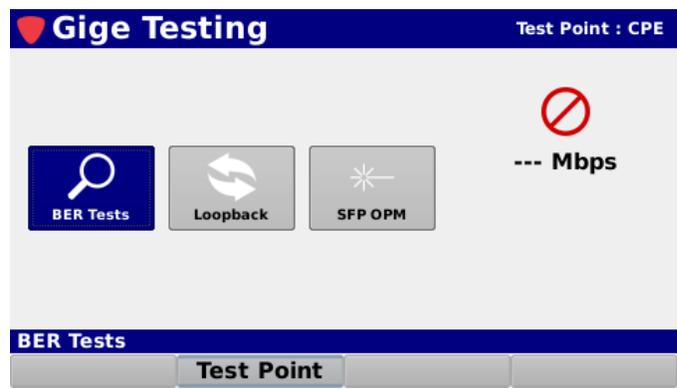


BERT Testing

Before starting the BERT testing from the field device, you must first set up a test point that includes a Target loopback device with at least one traffic stream as shown in the previous section.

If you are using the TLB-GbE as your loopback device, it will always be prepared for loopback after its initial setup.

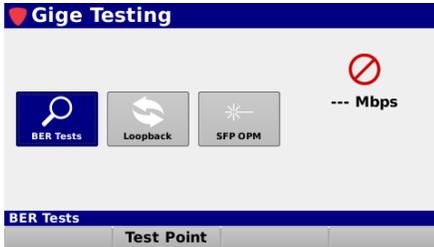
1. On the field device, select the **Gige** icon from the **Troubleshoot** menu to display the **Gige Testing** screen as shown in the image to the right. Notice that this screen shows that you do not have an active link yet since the field device has not been physically connected to the network.



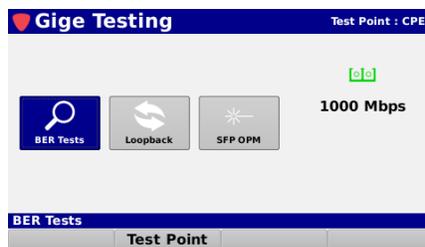
2. If using the optical Ethernet interface, you must first install a SFP transceiver into the port on the side of the device and then connect one end of the optical patch cable to the SFP transceiver as shown in the image to the right. The optical transceiver used with the field device must match the specifications of the SFP transceivers used with your other connected network devices and the loopback device. When using electrical Ethernet, simply insert the RJ-45 connector on one end of the electrical Ethernet cable into the port on the side of the device.



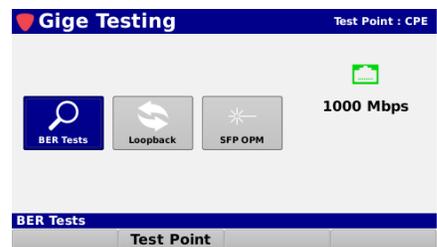
3. Connect the other end of the patch cable to the desired test point within the network (e.g. network switch or router). Once the patch cable has been attached to the network device, the **Gige Testing** screen will display the link status and speed as shown in the images below.



No Link

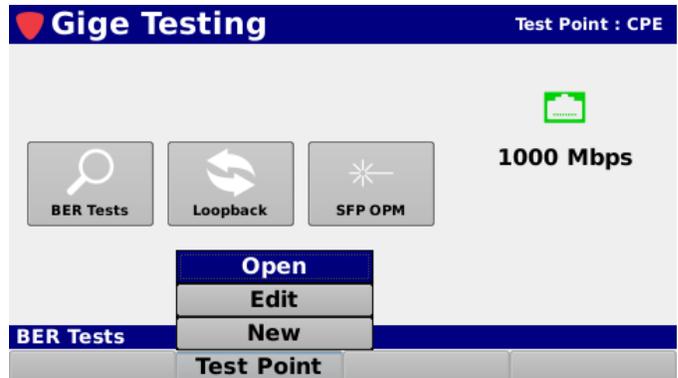


Optical Link

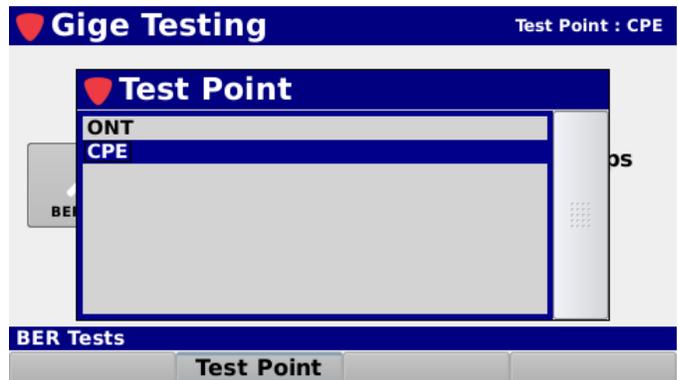


Electrical Link

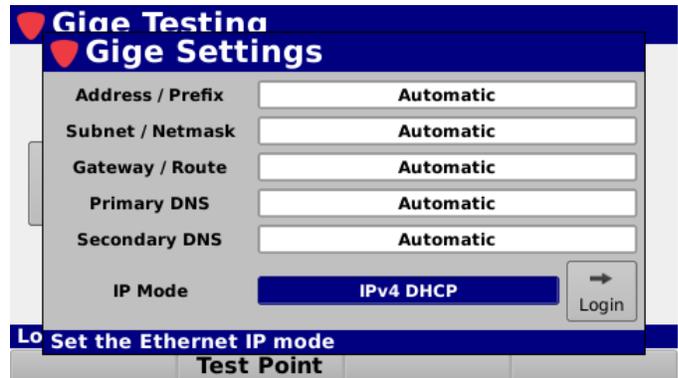
4. The previously opened Test Point will automatically be displayed in the upper right corner of the screen as shown in the images above. To open a different Test Point, select **Open** from the **Test Point** softkey as shown in the image to the right.



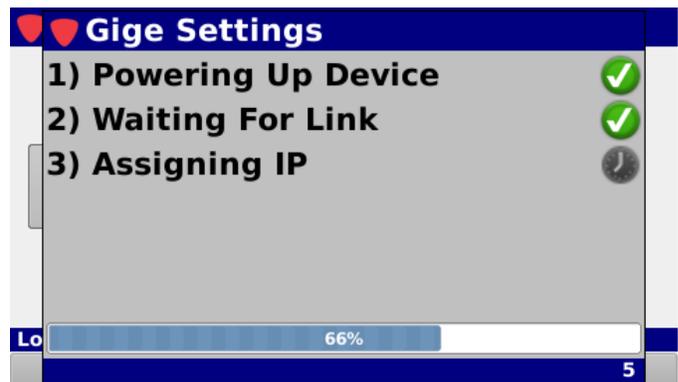
5. The **Test Point** selection window will be displayed as shown in the image to the right. Use the up/down arrow buttons on the physical keypad to highlight the desired test point and then press the **Enter** button.
6. In this example, our test point will be at the CPE.



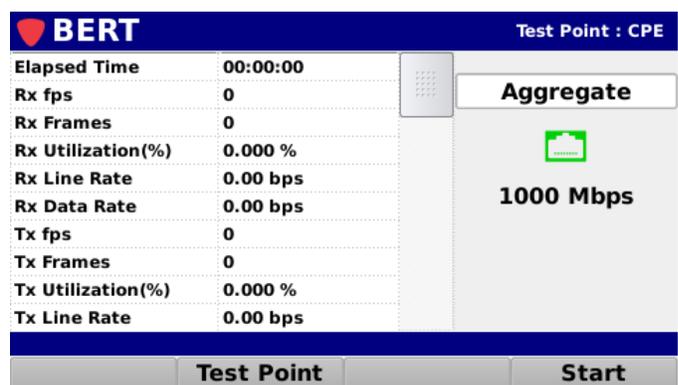
7. From the **Gige Testing** screen, select the **BER** icon. The **Gige Settings** window will appear as shown in the image to the right. When testing through network devices such as routers and switches on a network with DHCP addressing, you can simply select **IPv4 DHCP** from the **IP Mode** field to automatically request an IP address from the network.



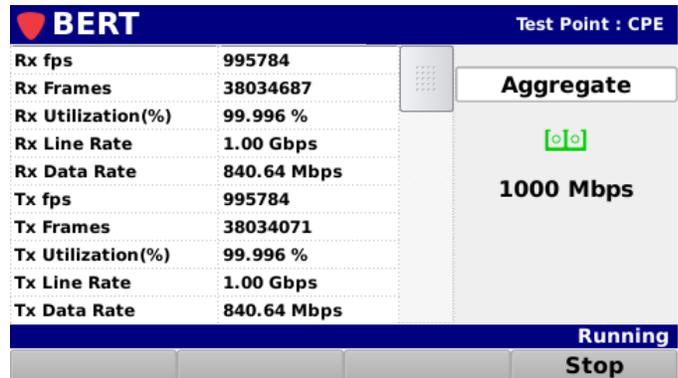
8. Once you select the **IP Mode**, select the **Login** button to connect to the network. The network connection status will be displayed as shown in the image to the right.



9. When the field device has successfully joined the network, the **BERT** screen will be displayed as shown in the image to the right.

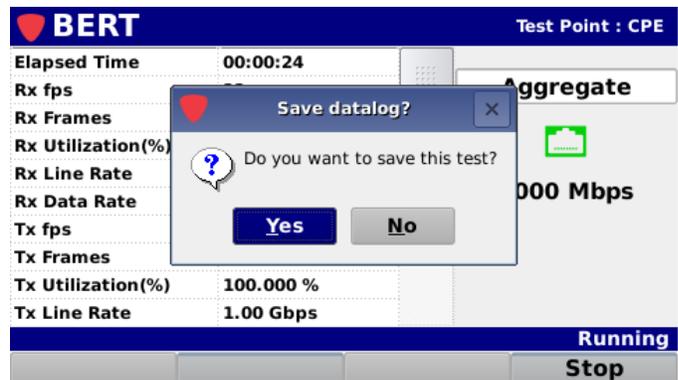


10. To start the BERT test, simply select the **Start** softkey from the **BERT** screen of the field device as shown in image to the right. The **BERT** screen will display the traffic rate that it is currently being sent to and received back from the loopback device.

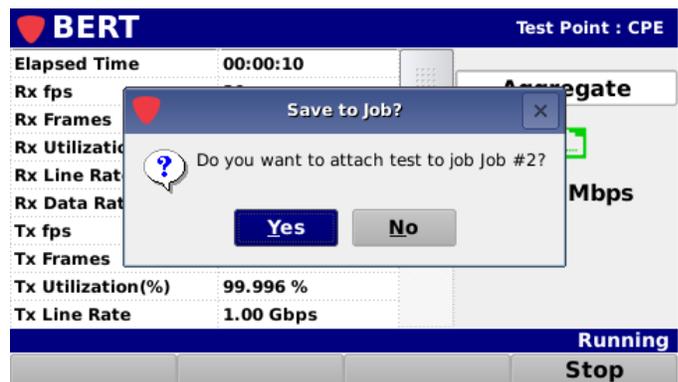


11. To stop the BERT test, press the **Stop** softkey.

A confirmation window will appear asking if you want to save this datalog. Select **Yes** to save or select **No** to cancel.



If you save the datalog, and have an open job, you can also save the test to the job by selecting **Yes** as shown in the image to the right.



If you don't want to save the test to the open job, select **No** and you will be prompted to enter a file name using the **Virtual Keyboard**. It will then be saved to the internal memory of the 720 DSP.



Analyzing the Results

Once you have started the BERT test on the field device, the following test results will be displayed as shown in the following images:

- **Rx fps** – The total amount of frames per second (fps) that the field device is receiving from the loopback device.
- **Rx Frames** – The total amount of frames that the field device is receiving from the loopback device.
- **Rx Utilization (%)** – The average bandwidth utilization that the field device is receiving from the loopback device.
- **Rx Line Rate** – The physical (sync) speed at which the field device is set to receive data from the loopback device.
- **Rx Data Rate** – The actual speed at which the field device is receiving data from the loopback device.
- **Tx fps** – The total amount of frames per second (fps) that the field device is sending to the loopback device.
- **Tx Frames** – The total amount of frames that the field device is sending to the loopback device.
- **Tx Utilization (%)** – The average bandwidth utilization that the field device is transmitting to the loopback device.
- **Tx Line Rate** – The physical (sync) speed at which the field device is set to transmit data to the loopback device.
- **Tx Data Rate** – The actual speed at which the field device is transmitting data to the loopback device.

BERT		Test Point : CPE
Rx fps	995784	Aggregate  1000 Mbps
Rx Frames	38034687	
Rx Utilization(%)	99.996 %	
Rx Line Rate	1.00 Gbps	
Rx Data Rate	840.64 Mbps	
Tx fps	995784	
Tx Frames	38034071	
Tx Utilization(%)	99.996 %	
Tx Line Rate	1.00 Gbps	
Tx Data Rate	840.64 Mbps	
		Running
		Stop

- **Rx TCP Frames** – The total amount of TCP frames that the field device is receiving from the loopback device.
- **Rx UDP Frames** – The total amount of UDP frames that the field device is receiving from the loopback device.
- **Tx TCP Frames** – The total amount of TCP frames that the field device is sending to the loopback device.
- **Tx UDP Frames** – The total amount of UDP frames that the field device is sending to the loopback device.
- **Broadcast** – The total amount of Broadcast frames that the field device is receiving from the loopback device.
- **Multicast** – The total amount of Multicast frames that the field device is receiving from the loopback device.
- **Unicast** – The total amount of Unicast frames that the field device is receiving from the loopback device.
- **ARP Frames** – The total amount of ARP frames that the field device is receiving from the loopback device.
- **Lost Frames** – The total amount of lost frames that the field device did not receiving from the loopback device.
- **Bit Error Count** – The total count of bit errors that the field device is receiving from the loopback device.
- **IP Checksum Error** – The total count of IP Checksum errors that the field device is receiving from the loopback device.
- **Dribble Error** – The total count of Dribble errors that the field device is receiving from the loopback device.

BERT		Test Point : CPE
Rx TCP Frames	874982	Aggregate  1000 Mbps
Rx UDP Frames	7704337	
Tx TCP Frames	875550	
Tx UDP Frames	7705578	
Broadcast	0	
Multicast	0	
Unicast	106743290	
ARP Frames	0	
Lost Frames	0	
Bit Error Count	0	
		Running Stop

BERT		Test Point : CPE
Bit Error Count	0	Aggregate  1000 Mbps
IP Checksum Error	0	
Dribble Error	0	
Alignment Error	0	
Collisions	0	
Tx Undersize	0	
Tx 64~127 Bytes	130296969	
Tx 128~255 Bytes	0	
Tx 256~511 Bytes	0	
Tx 512~1023 Bytes	0	
		Running Stop

- **Alignment Error** – The total count of Alignment errors that the field device is receiving from the loopback device.
- **Collisions** – The total count of Collision errors that the field device is receiving from the loopback device.
- **Tx Undersize** – The total count of Undersize packets that the field device is transmitting to the loopback device.
- **Tx 64~127 Bytes** – The total count of 64 to 127 byte packets that the field device is transmitting to the loopback device.
- **Tx 128~255 Bytes** – The total count of 128 to 255 byte packets that the field device is transmitting to the loopback device.
- **Tx 256~511 Bytes** – The total count of 256 to 511 byte packets that the field device is transmitting to the loopback device.
- **Tx 512~1023 Bytes** – The total count of 512 to 1023 byte packets that the field device is transmitting to the loopback device.
- **Tx 1024~1518 Bytes** – The total count of 1024 to 1518 byte packets that the field device is transmitting to the loopback device.
- **Tx Oversize** – The total count of Oversize packets that the field device is transmitting to the loopback device.
- **Rx Undersize** – The total count of Undersize packets that the field device is receiving from the loopback device.
- **Rx 64~127 Bytes** – The total count of 64 to 127 byte packets that the field device is receiving from the loopback device.

BERT		Test Point : CPE
Tx 512~1023 Bytes	0	Aggregate  1000 Mbps
Tx 1024~1518 Bytes	2535624	
Tx Oversize	176904	
Rx Undersize	0	
Rx 64~127 Bytes	152140396	
Rx 128~255 Bytes	0	
Rx 256~511 Bytes	0	
Rx 512~1023 Bytes	0	
Rx 1024~1518 Bytes	2535625	
Rx Oversize	176903	
		Running Stop

- **Rx 128~255 Bytes** – The total count of 128 to 255 byte packets that the field device is receiving from the loopback device.
- **Rx 256~511 Bytes** – The total count of 256 to 511 byte packets that the field device is receiving from the loopback device.
- **Rx 512~1023 Bytes** – The total count of 512 to 1023 byte packets that the field device is receiving from the loopback device.
- **Rx 1024~1518 Bytes** – The total count of 1024 to 1518 byte packets that the field device is receiving from the loopback device.
- **Rx Oversize** – The total count of Oversize packets that the field device is receiving from the loopback device.

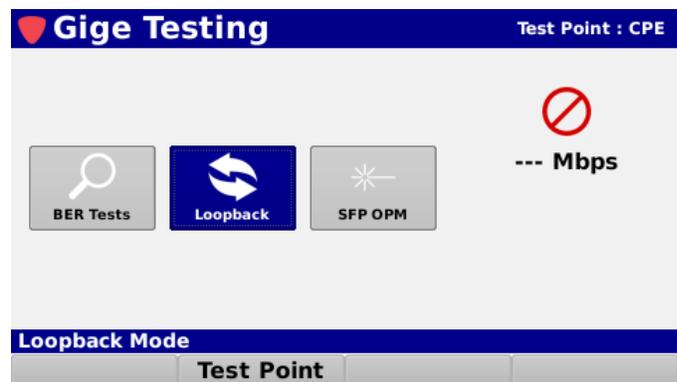
Loopback Mode

In the previous sections, we used a TLB-GbE loopback device for our BERT examples, but you can also use another 720 DSP or 1G DSP for loopback.

In order to perform loopback with field devices, you must first prepare the device for loopback testing within the **Gige Testing** screen.

Perform the following steps to prepare a 720 DSP or 1G DSP for loopback testing:

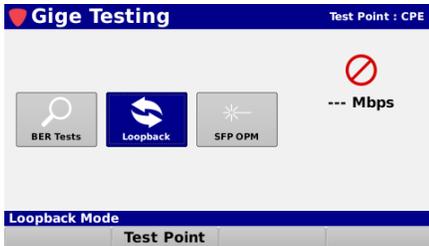
1. On the loopback device, select the **Gige** icon from the Troubleshoot menu to display the **Gige Testing** screen as shown in the image to the right. Notice that this screen shows that you do not have an active link yet since the loopback device has not been physically connected to the network.



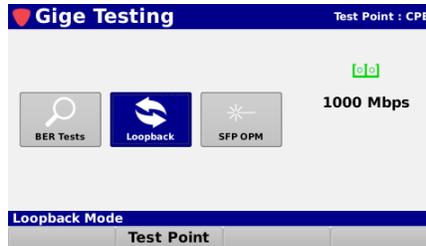
2. If using the optical Ethernet interface, you must first install a SFP transceiver into the port on the side of the device and then connect one end of the optical patch cable to the SFP transceiver as shown in the image to the right. The optical transceiver used with the loopback device must match the specifications of the SFP transceivers used with your other connected network devices and the field test unit. When using electrical Ethernet, simply insert the RJ-45 connector on one end of the electrical Ethernet cable into the port on the side of the device.



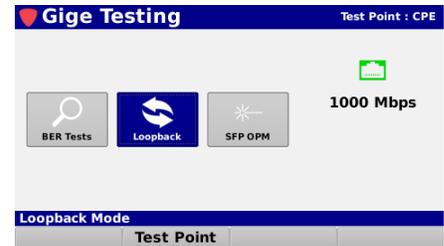
- Connect the other end of the patch cable to the desired test point within the network (e.g. network switch or router). Once the patch cable has been attached to the network device, the Gige Testing screen will display the link status and speed as shown in the images below.



No Link

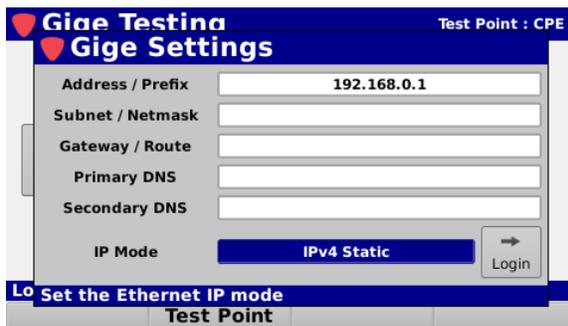


Optical Link

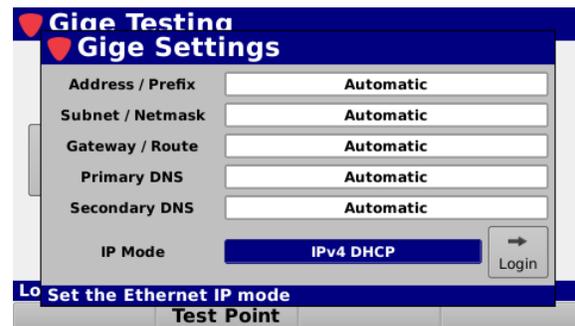


Electrical Link

- From the **Gige Testing** screen, select the **Loopback** icon as shown in the images above. The **Gige Settings** window will appear as shown in the images below. When testing through network devices such as routers and switches on a network with DHCP addressing, you can simply select **IPv4 DHCP** from the **IP Mode** field to automatically request an IP address from the network. When two devices are connected over a network without DHCP addressing, you should select **IPv4 Static** from the **IP Mode** field. When using static addressing, you must set the IP address of the loopback device to an address on the same network as the field device acting as the BERT source.

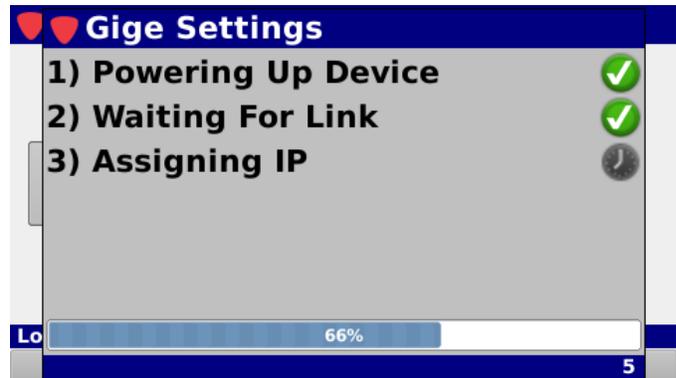


Static Addressing

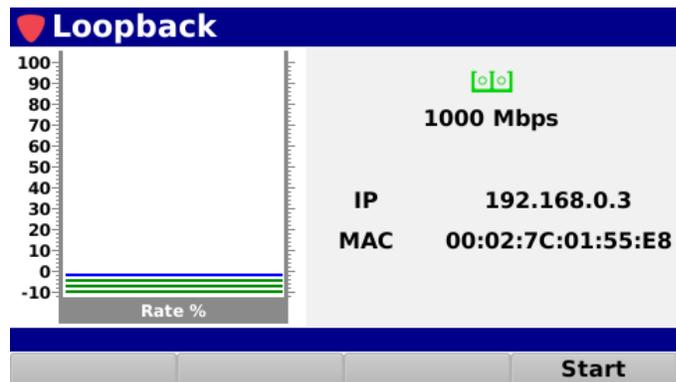


DHCP Addressing

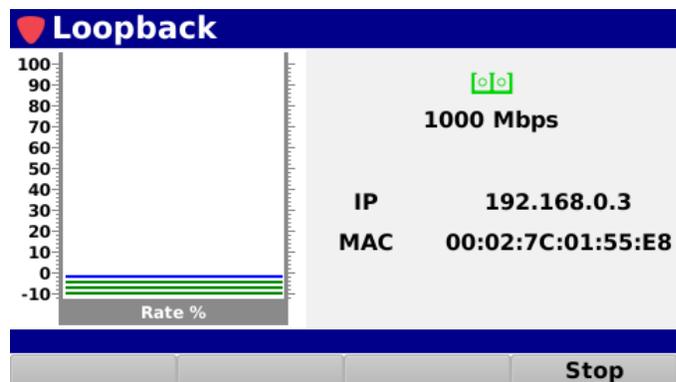
- Once you select the **IP Mode**, select the **Login** button to connect to the network. The network connection status will be displayed as shown in the image to the right.



- When the loopback device has successfully joined the network, the **Loopback** screen will be displayed as shown in the image to the right. In this example the IP address of the loopback device is set to "192.168.0.3". This address will correspond to the IP address settings of the target device in the field device test point.



- To start the loopback operation, simply select the **Start** softkey. The **Loopback** screen will display the traffic rate that it is currently looping back to the field device. In this example the Rate % is at zero since the field device is not transmitting any streams of data to the loopback device.



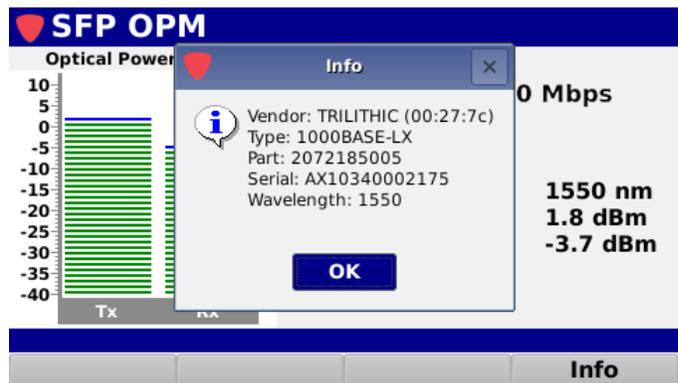
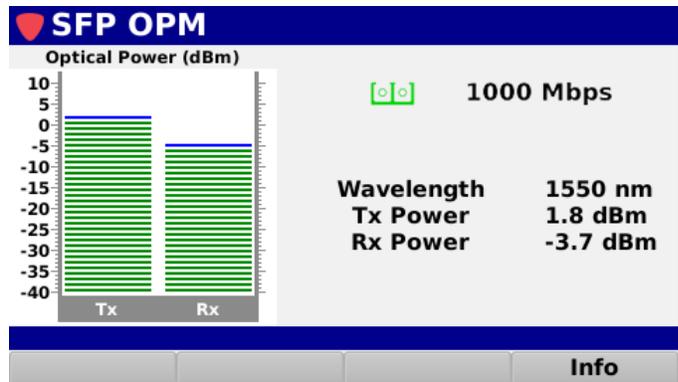
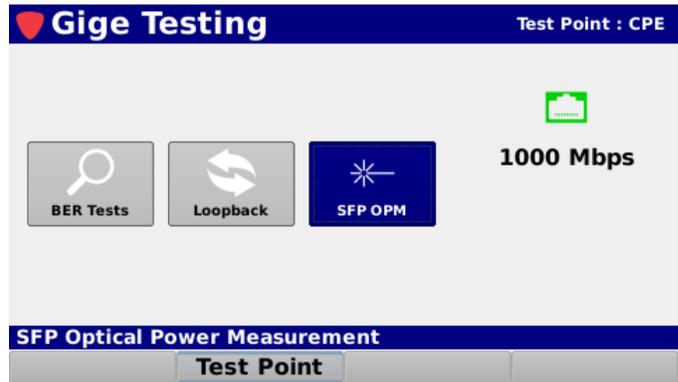
SFP Optical Power Meter

The SFP Optical Power Meter feature provides users with the ability to measure the optical power through the optical transceiver.

Select the **SFP OPM** icon as shown in the image to the right to use the SFP Optical Power Meter on the 720 DSP.

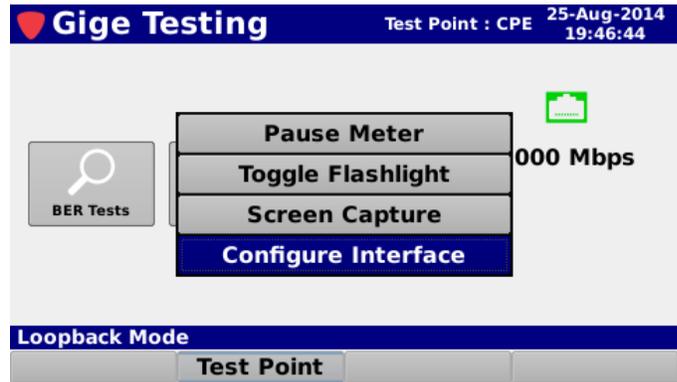
The **SFP OPM** menu will be displayed as shown in the image to the right.

- Make sure the current port selected is connected and linked with optical interface. The laser of the selected port must also be turned on.
- Both transmit and receive optical power are read from the optical transceiver and displayed in dBm. Select the **Info** button to view the Vendor, Type, Part Number, Serial Number and Wavelength of the connected SFP transceiver as shown in the image to the right.



Function Menu Options

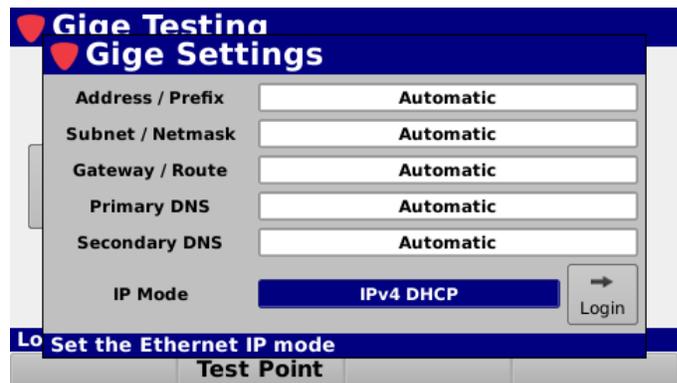
Additional functions can be accessed from within the **Gige Testing** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **Gige Testing** screen.



Configure Interface

Select the **Configure Interface** button from the **Function** menu to configure the IP addressing of the **Gige Testing** screen. Use the **Virtual Keyboard** to enter the necessary fields for connection to the router, switch, or loopback device.

You can also change the **IP Mode** using the up/down arrow buttons.



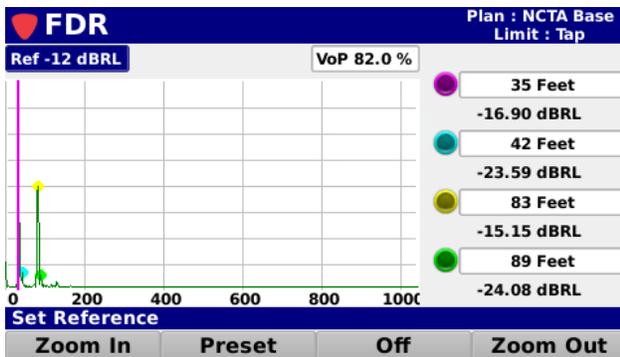
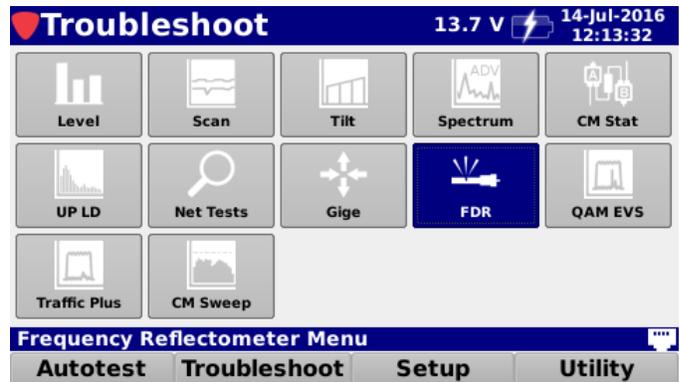
Overview

The FDR Measurement provides a simple, convenient and accurate tool for determining the distance to cable faults. This 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.). The reflecting events are indicated on an amplitude versus distance display, and markers are used to identify the distance to the source of the reflection, and the return loss at that point.

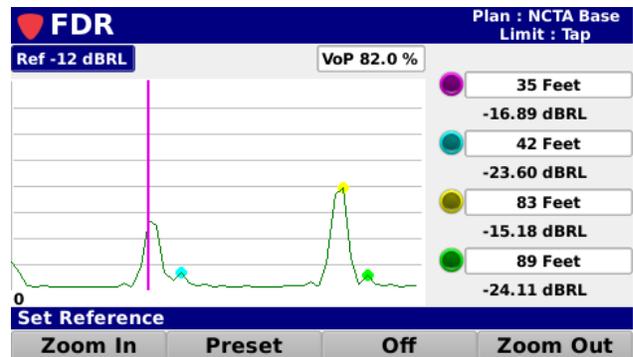
Select the **FDR** icon as shown in the image to the right to perform an FDR measurement using the 720 DSP.

The **Frequency Reflectometer** screen will be displayed as shown in the images below. This screen displays a measurement trace along with distances to faults and the level at each fault.

Use the **Zoom In** and **Zoom Out** softkeys to change the distance that is displayed on the measurement trace.



Full Span

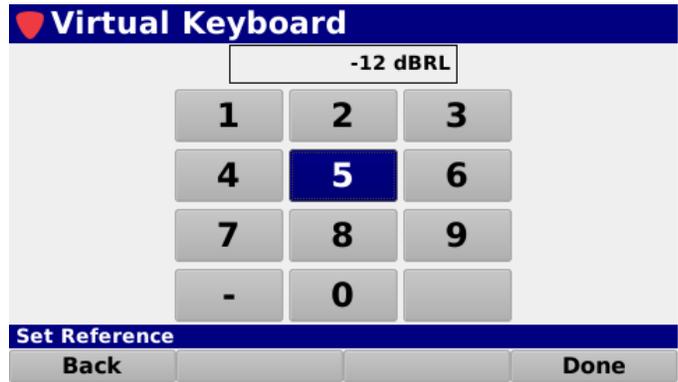
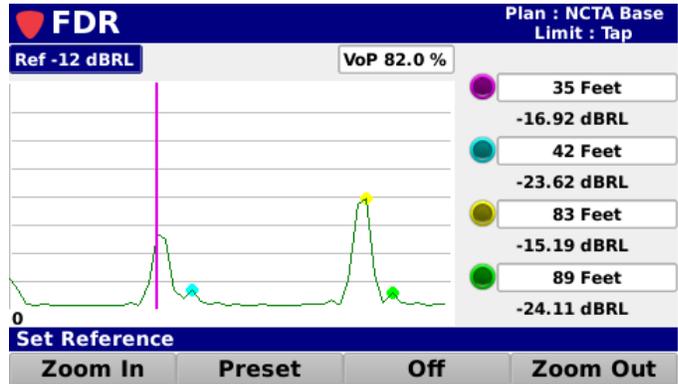


Zoomed to Fault

Reference Level Adjustment

The reference level can be adjusted from -80 to 0 dBRL and is the highest vertical value displayed on the spectrum display. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

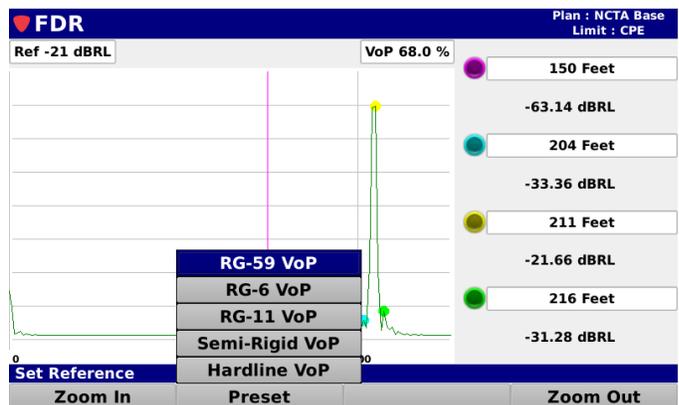
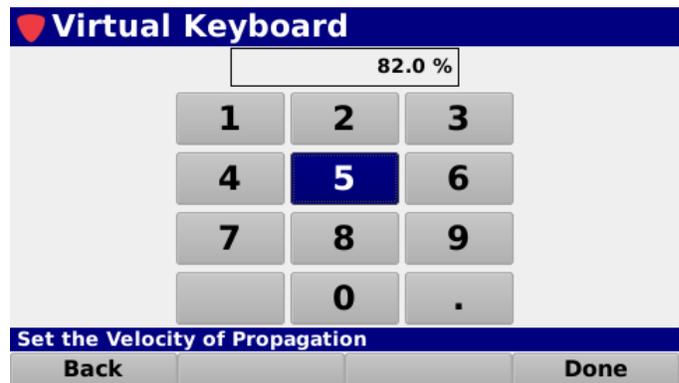
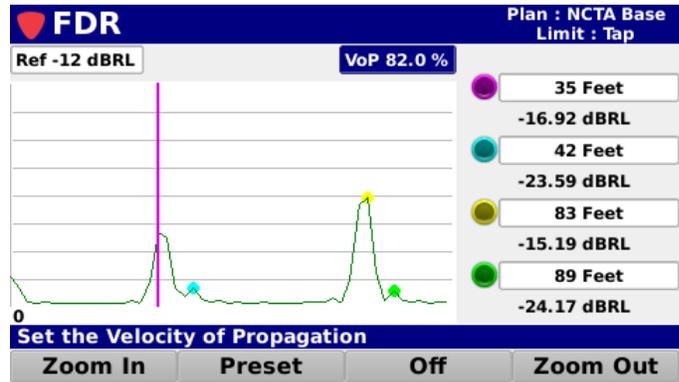
- Use the up/down arrow buttons to change the reference level in 3 dBRL increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.



Velocity of Propagation Adjustment

The velocity of propagation can be adjusted from 60.0 to 99.0%. Highlight the velocity of propagation field as shown in the image to the right and then use either of the following methods to change the value:

- Use the up/down arrow buttons to change the reference level in 0.1% increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the velocity of propagation as shown in the image to the right.
- Press the **Preset** softkey to select one of the following preset velocity of propagation settings:
 - **RG-59** – 79.0%
 - **RG-6** – 82.0%
 - **RG-11** – 88.0%
 - **Semi-Rigid** – 92.0%
 - **Hardline** – 93.0%



Marker Adjustment

The FDR measurement includes one on-screen marker that is used to mark a specific distance to fault.

The markers are represented by the following color bullets and vertical lines:

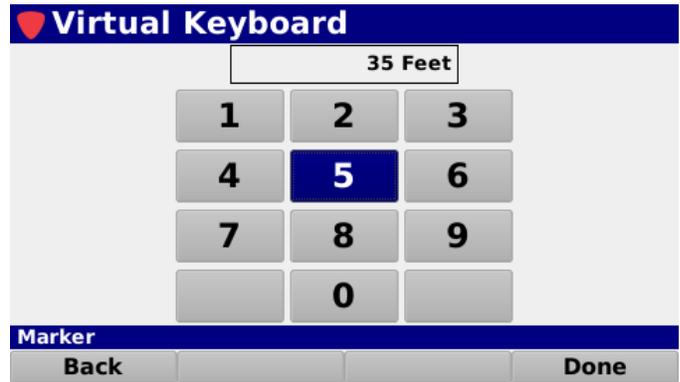
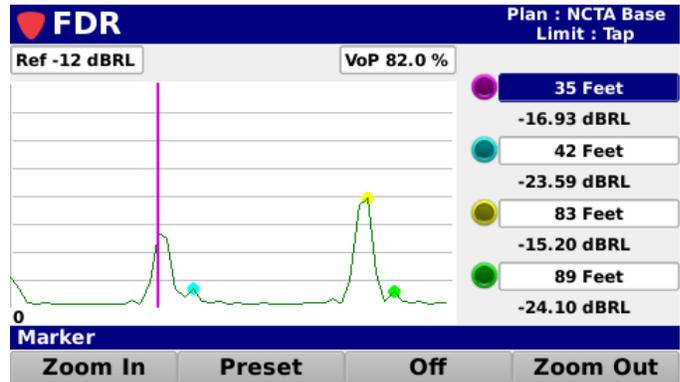
- **Marker 1** – Purple

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker in 1 Foot/Meter increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the distance as shown in the image below.

The following information is displayed for the markers:

- **Level** – Displays the signal level at the specified marker.
- **Distance** – Displays the distance to the marker.



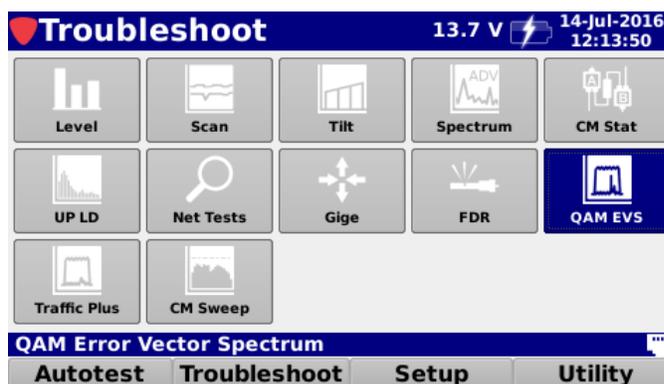
Overview

QAM Error Vector Spectrum Analysis (EVS) is an optional feature of the 720 DSP. If you do not have this option, call Trilithic at (800) 344-2412 in order to purchase an option activation code and start using this option today.

To view the installed functions on your instrument, see **Section II: Setup Menu, Chapter 2: Instrument Information**.

When activated in a 720 DSP, the QAM Error Vector Spectrum Analysis feature provides users with the ability to tune the meter to a downstream QAM channel and display its error vector spectrum to reveal noise and ingress that may be present under the QAM channel.

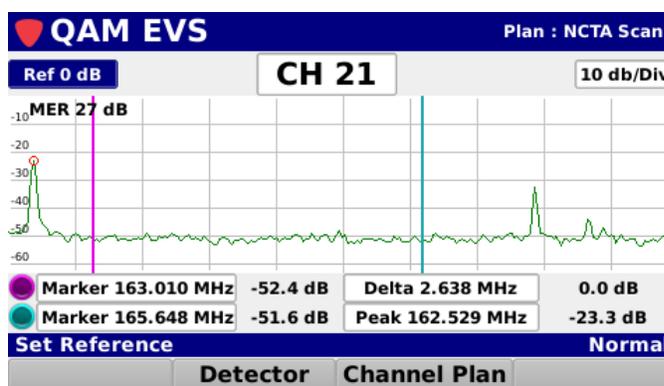
Select the QAM EVS icon as shown in the image to the right to perform a QAM Error Vector Spectrum Analysis.



The QAM EVS screen will be displayed as shown in the image to the right.

The QAM EVS test can be performed on a channel from a specified channel plan or custom user entered QAM channel. The mode of operation is a cross between the QAM Mode and the Spectrum Analyzer mode.

As soon as you enter the QAM EVS Mode, it is tuned to the last tuned channel in the Level Mode. You can then adjust the reference (top line of spectrum display), the digital channel, the modulation, the frequency, the symbol rate, the bandwidth, and the dB per division. The center frequency of the display is the center frequency of the channel. The span of the display is the channel's symbol rate.

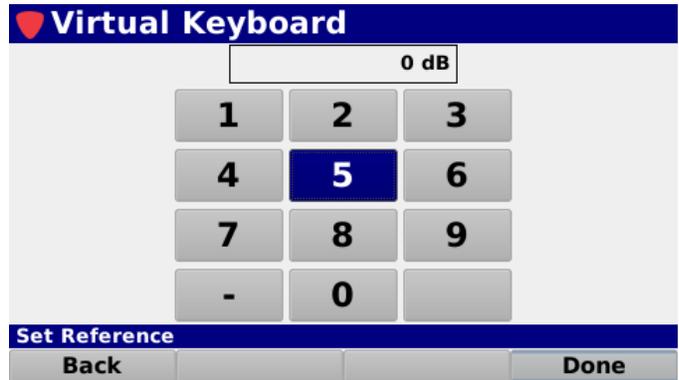
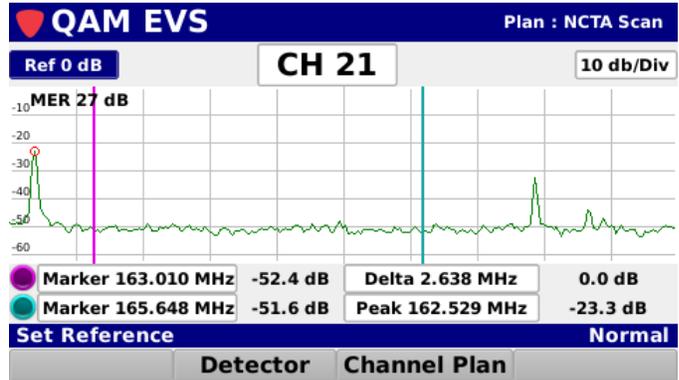


When the unit locks onto the QAM signal, the error vector spectrum is plotted. The current MER is shown in the upper left of the graph. The markers and peak can be used to help determine the frequency of unwanted signals present in the QAM channel.

Reference Level Adjustment

The reference level can be adjusted from -90 to 0 dB and is the highest vertical value displayed on the spectrum display. Highlight the reference level field as shown in the image to the right and then use either of the following methods to change the reference level:

- Use the up/down arrow buttons to change the reference level in 1 dB increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the reference level as shown in the image to the right.

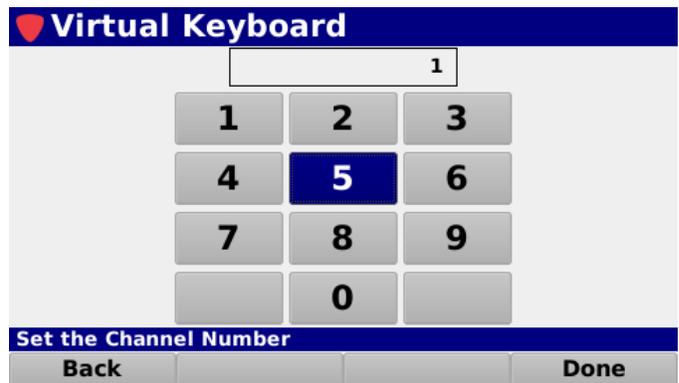
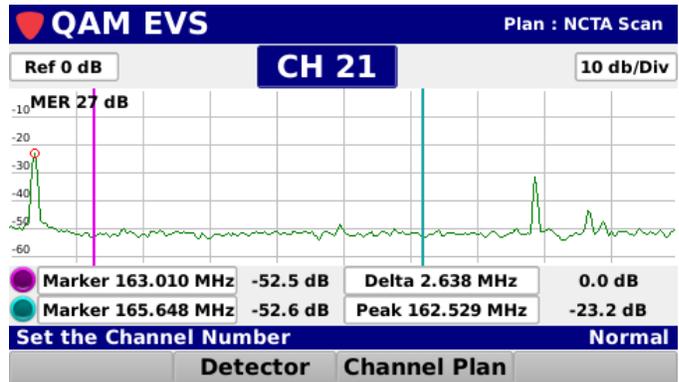


Channel Adjustment

Highlight the channel field as shown in the image to the right and then use either of the following methods to change the channel number:

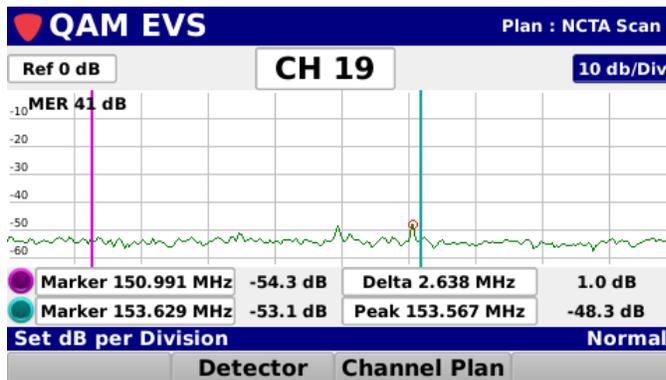
- Use the up/down arrow buttons to change the channel number in 1 channel increments.

- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the channel number as shown in the image to the right.



Vertical Scale Adjustment

Highlight the vertical scale field as shown in the image to the right. Then, use the up/down arrow buttons to select from a vertical scale of **1, 2, 5, or 10 dB/div**.



Marker Adjustment

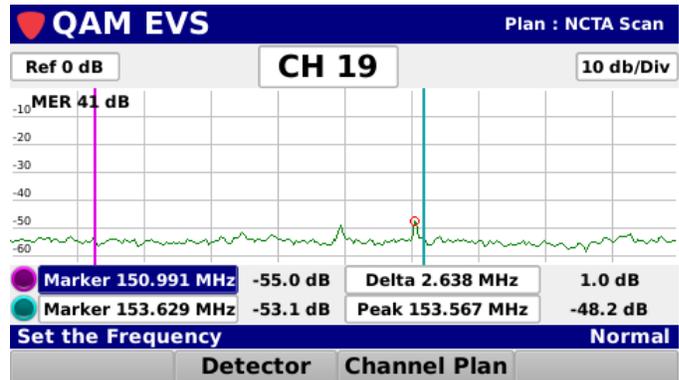
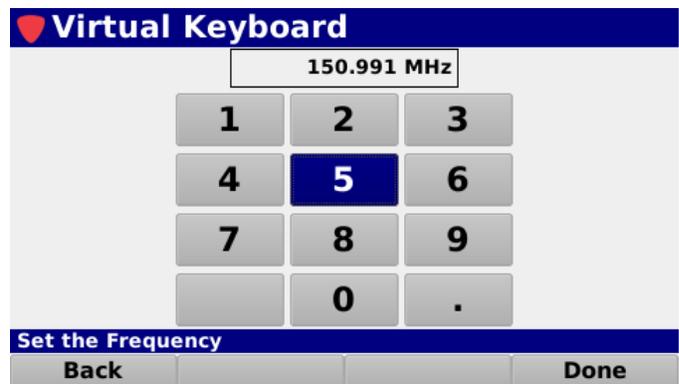
The QAM Error Vector Spectrum Analysis measurement includes two on-screen markers that are used for measurement of specific frequencies within the QAM error vector spectrum.

The markers are represented by the following color bullets and vertical lines:

- **Marker 1** – Purple
- **Marker 2** – Light Blue

Highlight the desired marker and use either of the following methods to change the marker location:

- Use the up/down arrow buttons to change the marker in 0.200 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the frequency as shown in the image to the right.

Virtual Keyboard

150.991 MHz

1	2	3
4	5	6
7	8	9
	0	.

Set the Frequency

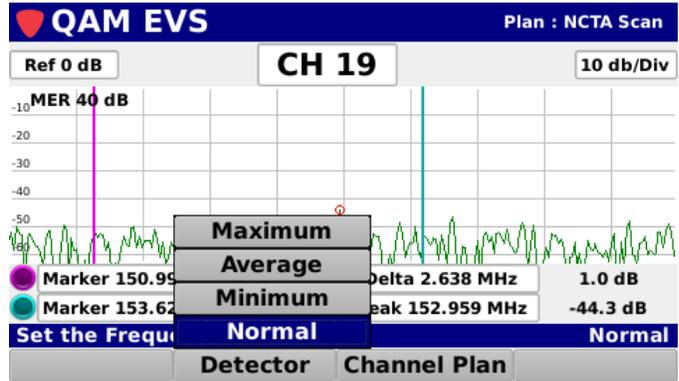
Back Done

The following information is displayed for the markers:

- **Level** – Displays the signal level at the specified frequency for each marker.
- **Frequency Delta** – Displays the frequency delta between the two markers.
- **Frequency Peak** – Displays the frequency of the peak signal level in the return spectrum.
- **Level Peak** – Displays the peak signal level in the return spectrum.
- **Level Delta** – Displays the signal level difference between the minimum and maximum level values in the return spectrum.

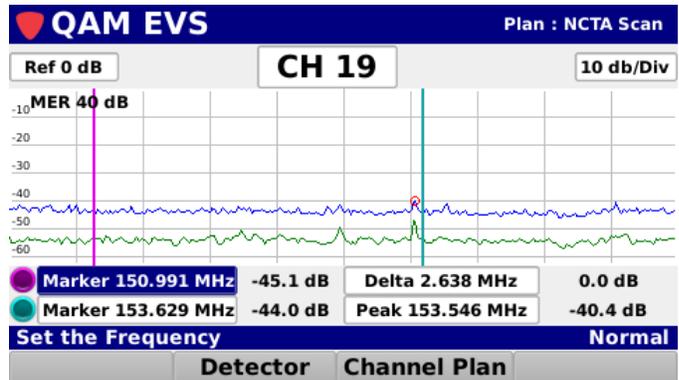
Detector Type

Select the **Detector** softkey to scroll through the following detector types for the QAM Error Vector Spectrum Analysis measurement:



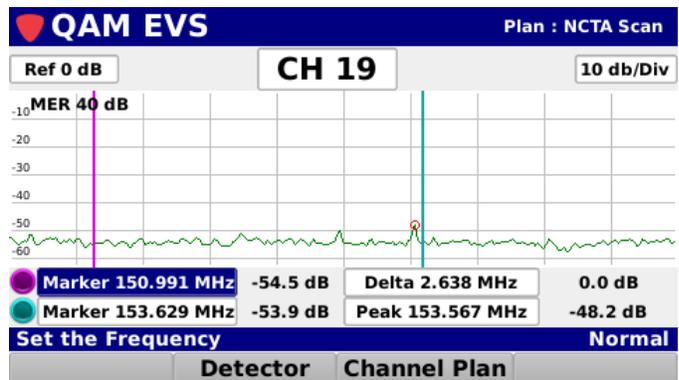
Maximum

Select the **Maximum** button from the **Detector** pop-up menu to display the maximum level of the QAM EVS as a blue trace that appears on the screen over the green live trace.



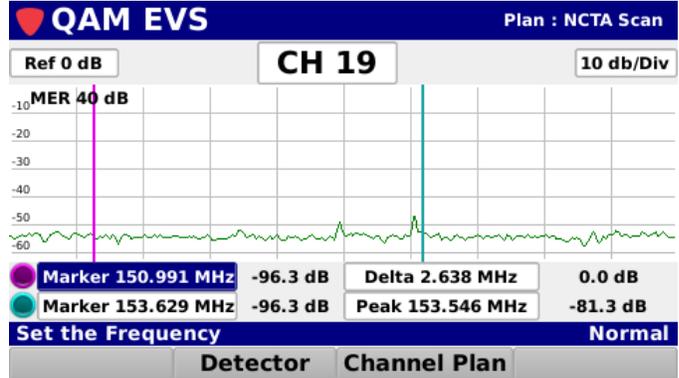
Average

Select the **Average** button from the **Detector** pop-up menu to display the average level of the QAM EVS as a green trace.



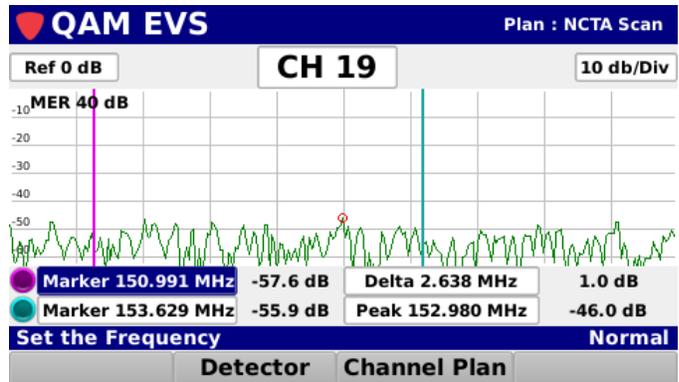
Minimum

Select the **Minimum** button from the **Detector** pop-up menu to display the minimum level of the QAM EVS as a blue trace that appears on the screen over the green live trace.



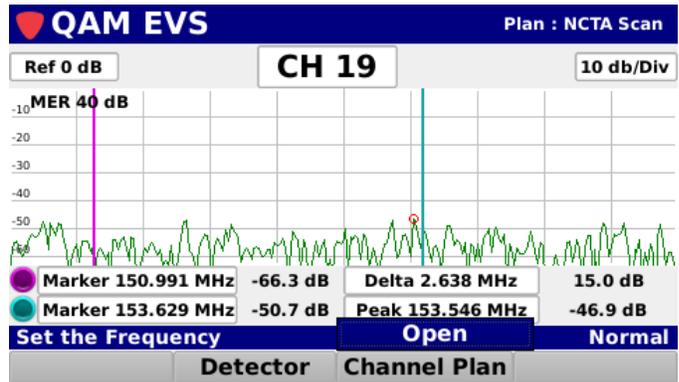
Normal

Select the **Normal** button from the **Detector** pop-up menu to display the normal live level of the QAM EVS as a green trace.



Opening a Channel Plan

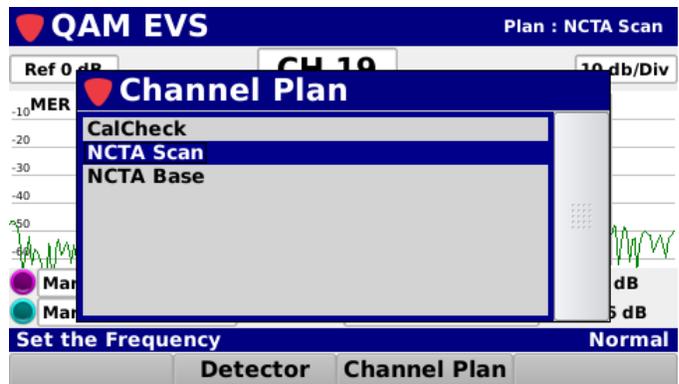
Select the **Channel Plan** softkey as shown in the image to the right to select the channel plan to use for the QAM Error Vector Spectrum Analysis.



Select the **Open** button from the **Channel Plan** pop-up menu and the **Channel Plan** window will be displayed as shown in the image to the right.

From the **Channel Plan** window, select the name of the channel plan to use for the QAM Error Vector Spectrum Analysis.

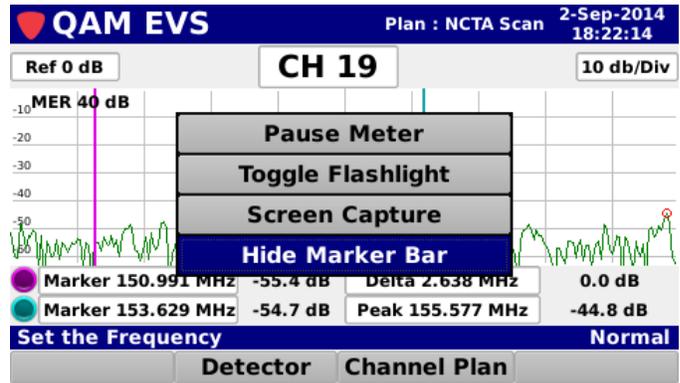
After selecting the channel plan, the **QAM EVS** screen will be displayed again.



 **NOTE** *The Channel Plan window will be bypassed if there is only one channel plan to choose from.*

Function Menu Options

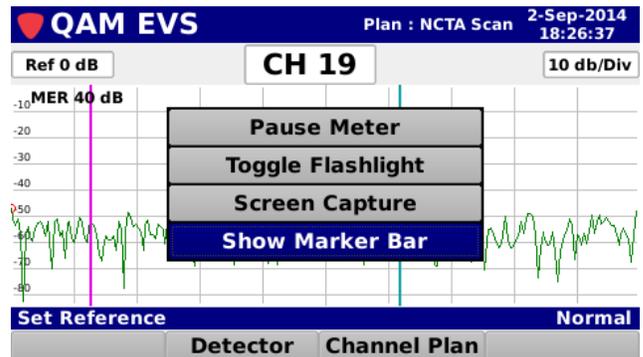
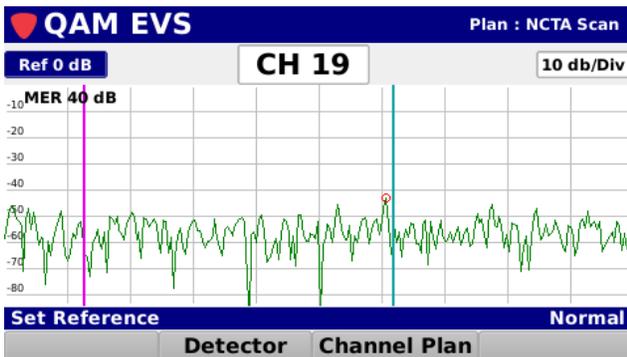
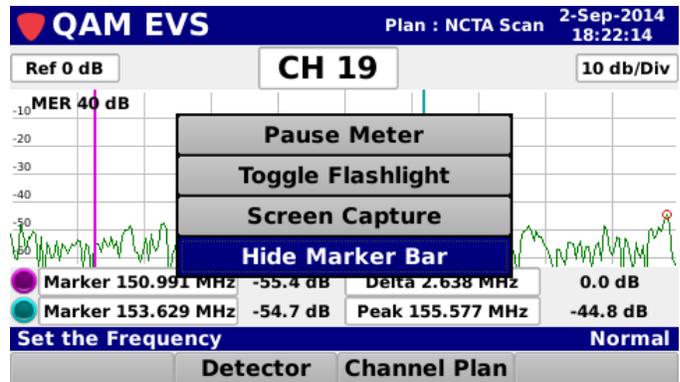
Additional functions can be accessed from within the **QAM EVS** screen by pressing the **Function** button. The **Function** menu will be displayed as shown in the image to the right and includes the following functions specifically for the **QAM EVS** screen.



Hide Marker Bar

Select the **Hide Marker Bar** button from the **Function** menu to hide the marker bar at the bottom of the screen and expand the measurement viewing area.

When the marker bar is hidden, select the **Show Marker Bar** button from the **Function** menu to show the marker bar.



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Overview

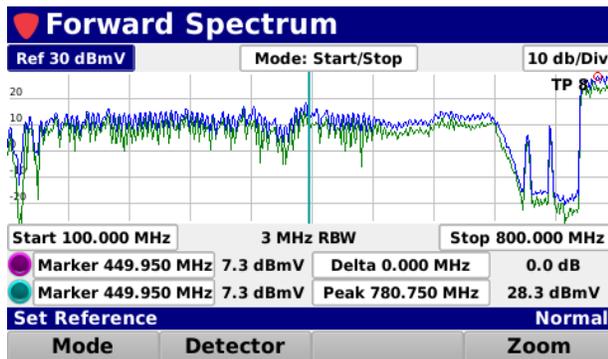
Traffic Control Plus is an optional feature of the 720 DSP. If you do not have this option, call Trilithic at (800) 344-2412 in order to purchase an option activation code and start using this option today.

To view the installed functions on your instrument, see **Section II: Setup Menu, Chapter 2: Instrument Information**.

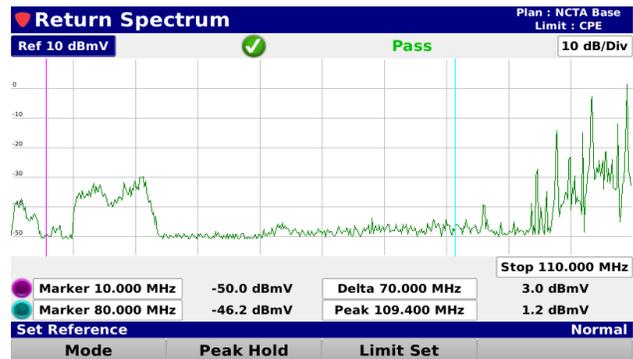
Select the **Traffic Plus** icon as shown in the image to the right to perform a Traffic Control Plus measurement using the 720 DSP.

The Traffic Control Plus spectrum menu provides a real time view of the return band. This menu has 100% coverage, so even the shortest cable modem burst can be seen. It will also show ingress even under a busy upstream.

In a typical HFC plant the RF spectrum is divided into two main bands, the forward band and the return band.

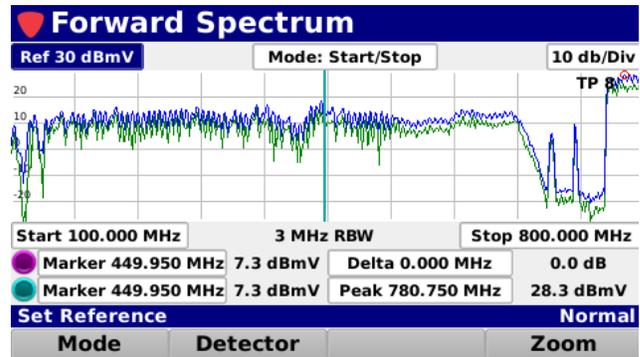


Forward Spectrum



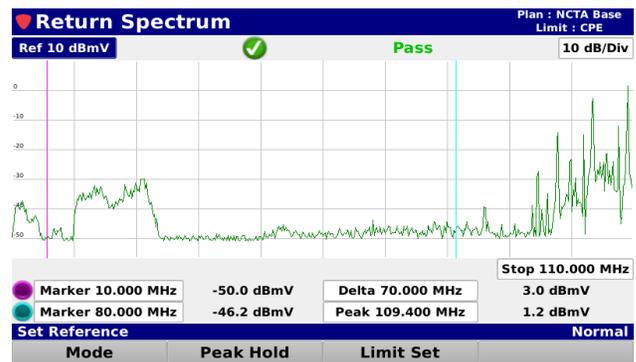
Return Spectrum

The forward band has a larger bandwidth, typically several hundred MHz. The forward band contains signals that are transmitted from the MSO to the customer, such as analog and digital TV channels and DOCSIS downstream.



Forward Spectrum

The return band is smaller than the forward and varies in size from about 40 to 100 MHz. The return band is for signals transmitted from the customer back to the MSO. This is mainly DOCSIS upstreams. While the signals in the forward band are constant and easy to detect, the signals in the return tend to be bursty. This can cause issues while attempting to measure signals in the return band.



Return Spectrum

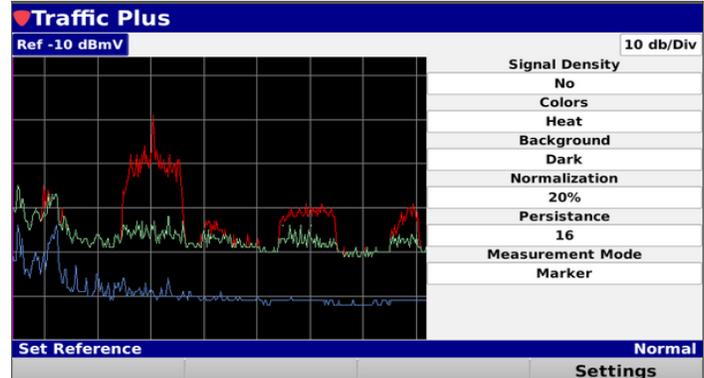
The Return Spectrum menu on the DSP line of meters is a powerful tool to troubleshoot and fix many issues in a typical cable TV system. It can be used to detect ingress and noise sources that can be disruptive to the return band of the system. These issues may lead to cable modem problems, causing a poor experience for the user. While the return spectrum is very good at detecting continuous signals, it does not always catch bursty signals such as a cable modem upstream channels. An upstream burst can be as short as 6.25 microseconds.

If there is enough upstream traffic, return spectrum may catch a full channel, or it may only catch a single slice of the channel. All these factors make it very difficult to differentiate traffic signal, noise, and ingress under the traffic.

Basic Settings

When using the Traffic Control Plus feature for the first time, select the **Settings** softkey and use the following configuration:

Signal Density: No
 Colors: (Any)
 Background: Dark
 Normalization: 20%
 Persistence: 16
 Measurement Mode: Marker



To adjust a setting, highlight the field, then use the up/down arrow buttons to change.

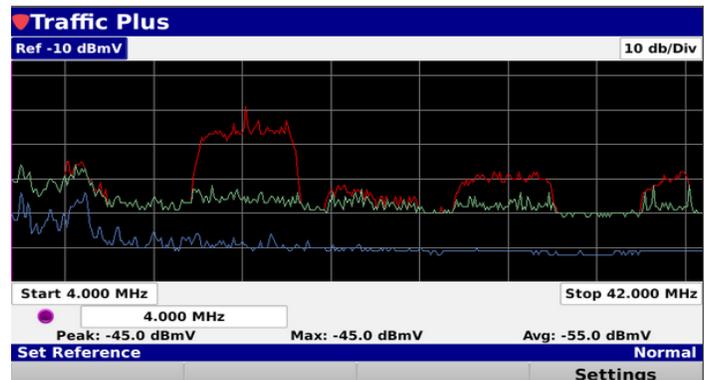
Once finished, select the **Back** button and the screen will be displayed as shown in the image to the right:

The following traces are always shown on the display.

Red Trace – Max peak signal. Typically shows an outline of the existing upstream modem carriers.

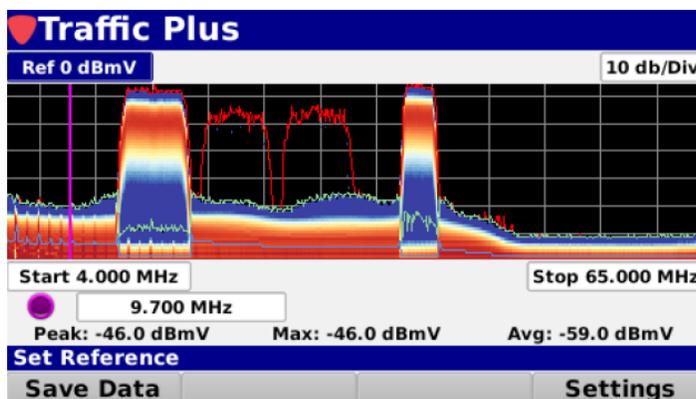
Green Trace – Max constant signal, which may be the noise floor for a bursty signal or some sort of continuous signal.

Blue Trace – Average constant signal. Like the green trace, shows the noise floor, ingress under the carrier, or other unwanted signals.



Signal Density

Along with the previously described traces, the Traffic Control Plus spectrum shows the distribution of spectral power using color to represent the prevalence of a signal. This gives the user a visual cue if the event is occurring frequently, infrequently, or somewhere in between. This can also help find a signal beneath the traffic. To use this function select the **Settings** softkey and set **Signal Density** to **Yes**. Select a Colors option. Set the Normalization setting to **10%**, this will be explained later in this section. Select the **Back** button and the display should look something like the following image.



In the above example, with the **Colors** set to **Blue Yellow Red**, the blue section represents the area of the spectrum where the signal was most prevalent, the red the least prevalent, and the yellow in between. As you can see, the red, green, and blue traces are still visible.

The determination of what is most prevalent, least prevalent, and in between is dependent on the **Normalization** setting. This value is adjustable from 0.01% to 100%. In the example above where we have the Normalization set to **10%**, the blue section, or most prevalent, shows signal power that was present at least 10% of the time. As you increase or decrease this value, you can see the effect on the display. Suggested settings for this value are 10 or 20%.

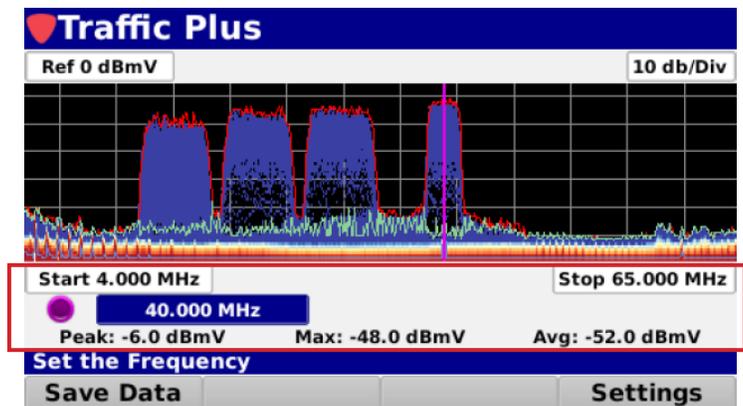
Other Settings

The **Background** setting of the display can be either **Dark** or **Light**. Adjust this for the best readability of the display.

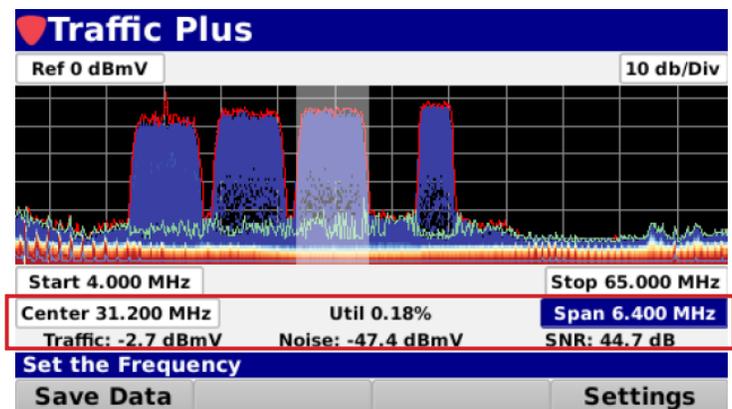
The **Persistence** setting can be a value from **1** to **32**, selectable in multiples of two (1,2,4,8,16,32). This value has a direct effect on the number of samples used to build the specific traces. The end effect of this setting is the higher the value, the longer the max trace stays visible. A suggested value for this field is 8 or 16.

Measurement Mode

The Traffic Control Plus spectrum has two measurement modes: **Marker mode** and **Region of Interest mode**. The marker mode allows the user to move a marker to any frequency and display the values of the three traces at that frequency, as shown in the image to the right.

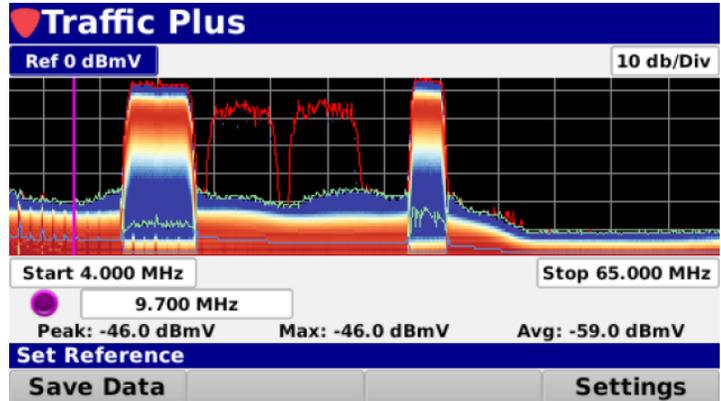


In the region of interest measurement mode, you can define a center frequency and a span, such as a cable modem channel. The traffic level, signal to noise ratio, and channel utilization will be calculated for that region. Please note that the region of interest measurements are only valid for bursty signals.

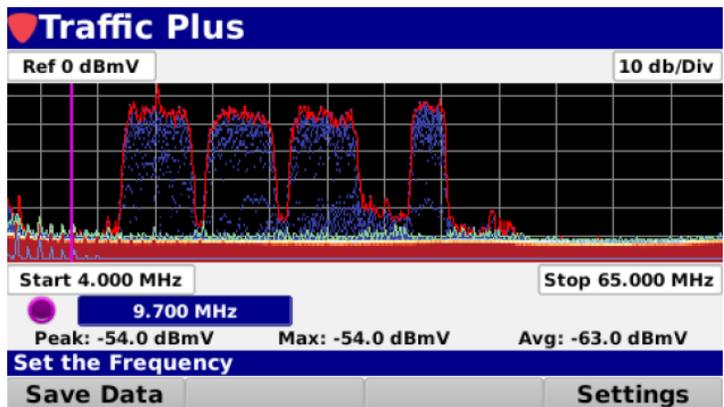


Additional Examples

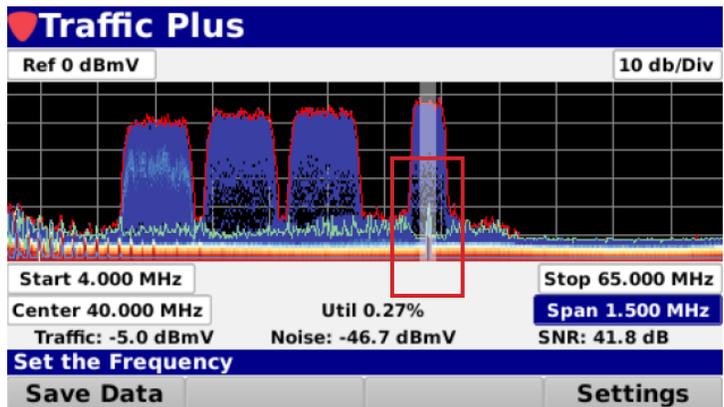
The image is an example of frequent modem traffic.



While this image shows infrequent modem traffic.



Finally, this image shows ingress under the carrier.



Cable Modem Sweep (OPTIONAL)

Overview

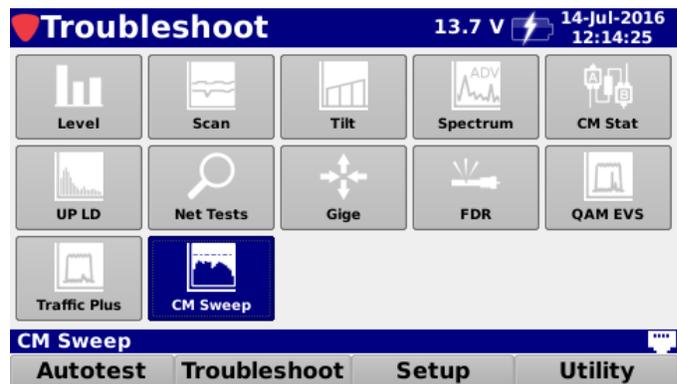
Cable Modem Sweep (patent pending) is an optional feature of the 720 DSP. If you do not have this option, call Trilithic at (800) 344-2412 in order to purchase an option activation code and start using this option today.

To view the installed functions on your instrument, see **Section II: Setup Menu, Chapter 2: Instrument Information**.

Select the **CM Sweep** icon as shown in the image to the right to perform a CM Sweep of the upstream using the 720 DSP.

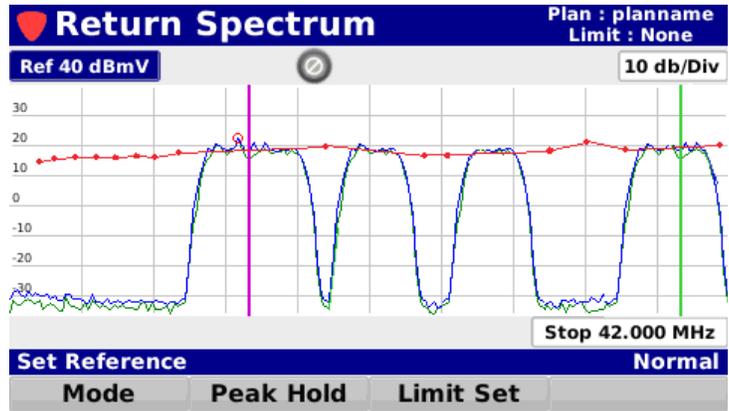
The traditional method used to balance the return path is to have a handheld device in the field send back fixed carriers to a headend device, and then have the headend device communicate back to the handheld unit the levels at which the carriers are received. This method works well, however, there are some drawbacks. First is the requirement and the added expense of the headend unit. Second is the fact that, as the return path gets crowded with upstream traffic, there is less and less room for injected sweep carriers. And finally, the traditional method does not allow for any in-band analysis because the active upstream signals are avoided.

The CM Sweep menu on the DSP line of meters uses the active upstream, specifically the modem carriers, to help balance the upstream. In addition, it will provide pre-equalization information to help troubleshoot impairments that may be present in the system. It must be noted, however, that the accuracy of this function will depend on the specific receive level tolerance configured in the CMTS. In other words, if the CMTS is expecting the modem to connect at 0 dBmV but will accept a range of -1 to +1 dBmV, this may explain some differences in launch levels noted in the field.

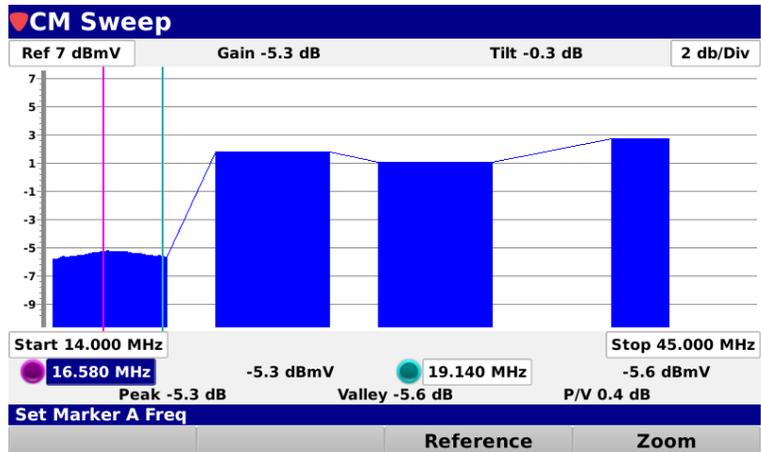


Using CM Sweep

The current method used to check for gain and flatness in the return CATV band is to insert test carriers (red dots) between live signals (blue/green traces), receive these signals at the headend sweep receiver, and basically connect the dots, producing a frequency flatness trace, as shown in the image to the right. The problem with this method is available bandwidth. As more channels are inserted into the upstream, the available bandwidth to insert test carriers is diminished.



An alternate method of testing the upstream is to process information between the CMTS and the meter's cable modem, in order to present a bar graph representation of the upstream carriers. This allows the technician the ability to analyze the upstream for tilt and gain without the added expense of a headend sweep receiver.



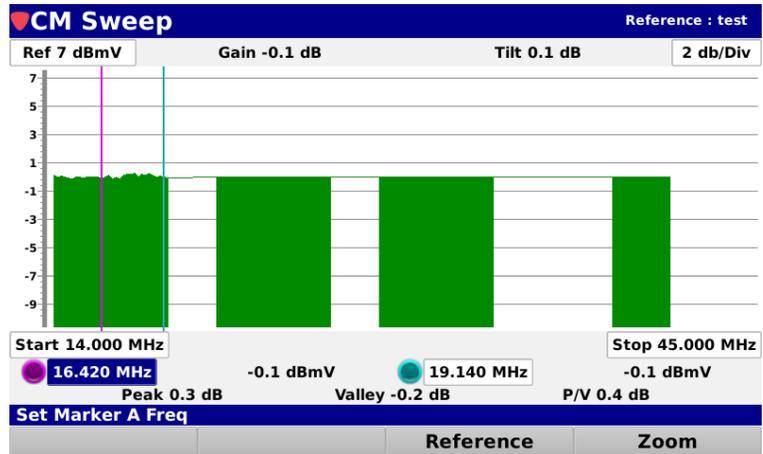
The image shown on the right is a return band (upstream) sweep using DOCSIS carriers.

Each bar represents the upstream channel compared to the nominal value expected at the CMTS. Assuming the CMTS is looking for zero, the first channel is indicating that it is about 5 dBmV lower than the CMTS is expecting and the fourth channel is about 3 dBmV higher than the CMTS nominal value.

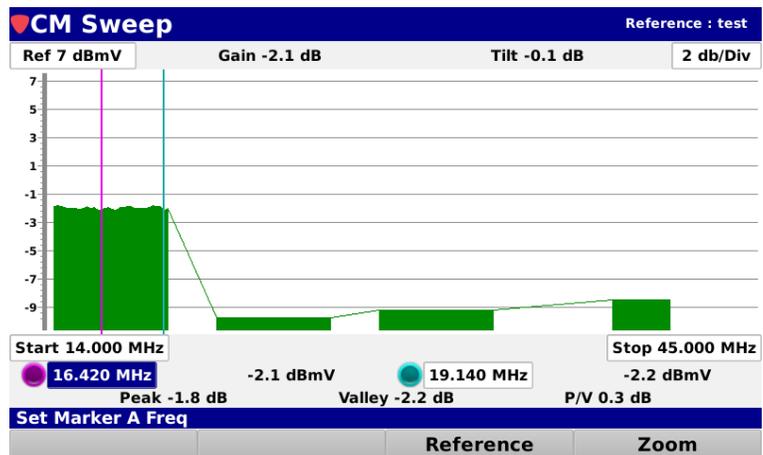
The bar graphs above also incorporate the pre-equalization information from the CMTS which gives the technician an indication of the in-channel response for each upstream channel. This can aid the technician in quickly evaluating the upstream channel response.

There are two agile markers that allow you to check for gain (tied to the first marker) and tilt (which is the difference between the two markers) both across the upstream band and in-channel. **Peak**, **Valley**, and **P/V** are referenced between the markers.

Once you have your levels at the node set up correctly, you can store a reference and use that reference at the next amplifier to adjust for gain and tilt. The image on the right shows the previous graph but with a reference stored.



Once you have stored a reference, you can go to the next amp in line and compare the referenced display from the node (image above) to the local display at the amp (image to the right), which will allow you to EQ and/or pad to get the upstream aligned.



NOTE

The Zoom button is currently still under development.

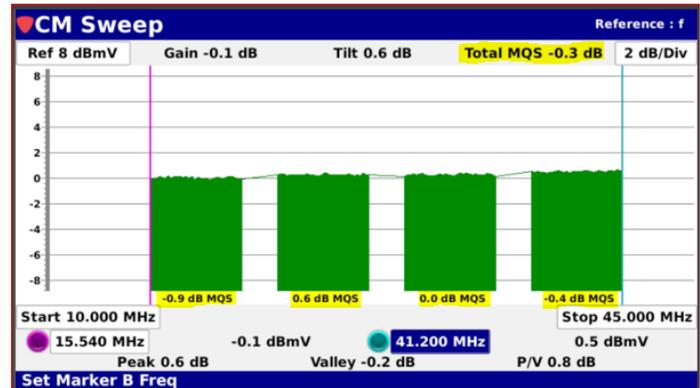
Modem Quality of Service

CM Sweep also looks at a new metric called, “MQS” or Modem Quality of Service, which allows the operator to see the “Quality” of each upstream as a total “MQS” in dB. The higher the “MQS” score means that the equalizer is working harder, so there are potentially more impairments in the path of the specific cable modem.

Under 1 dB “MQS” is considered an excellent value, while some impairments could give you a value as high as 6 dB showing certain impairments in the upstream.

As seen in the image to the right, the CM Sweep allows the end user to see gain and tilt based on the marker settings once a reference is applied. This also allows the user to see their “MQS” score, which is highlighted in yellow.

The final key to this is looking at the overall “MQS”, which is shown in the upper right of the screen. This “MQS” score is the summation of all the cable modem channels seen in the return path.



720 DSP Business Certification Meter

Section V: Utility Menu



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Introduction

Select the **Utility** softkey to display **Utility** menu as shown in the image to the right. The 720 DSP enables you to select from numerous utility functions.

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

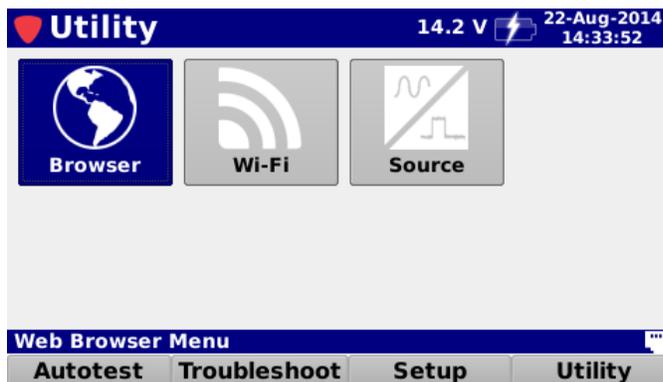
- Web Browser
- Wi-Fi Network Survey
- Source Generator (OPTIONAL)



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Using the Web Browser

Select the **Browser** icon as shown in the image to the right to open the built-in web browser of the 720 DSP. Before using the web browser, be sure to connect to a network.

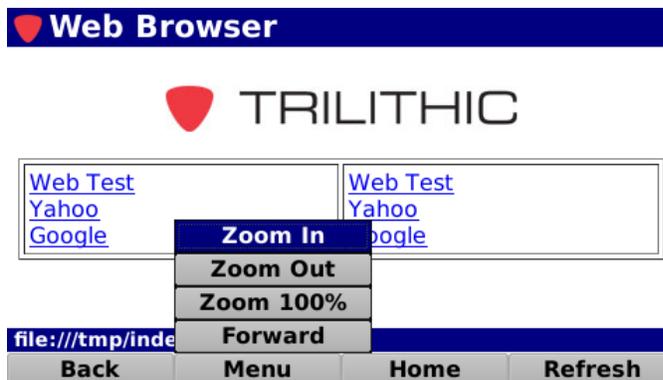


The **Web Browser** screen will be displayed as shown in the image to the right. This screen allows you to view web sites.

This screen displays the default home page of the 720 DSP and includes a list of six favorite web sites. The favorites can be set using the ViewPoint WFM Module software.

Use the softkeys at the bottom of the screen to perform the following actions:

- **Back** – Select this softkey to back up to the previously displayed web site.
- **Menu** – Select this softkey to display the menu pop-up menu to perform the following actions:
 - **Zoom In** – Select this option to zoom in.
 - **Zoom Out** – Select this option to zoom out.
 - **Zoom 100%** – Select this option to zoom the browser to 100%.
 - **Forward** – Select this option to go forward to a previously displayed web site.
- **Home** – Select this softkey to return to the 720 DSP home page.
- **Refresh** – Select this softkey to refresh the current web site.

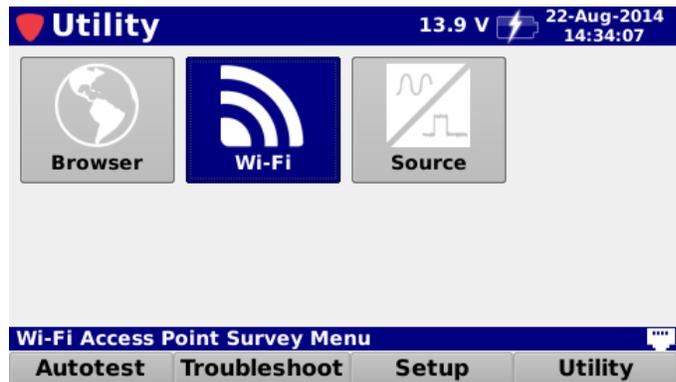


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Wi-Fi Access Point Survey

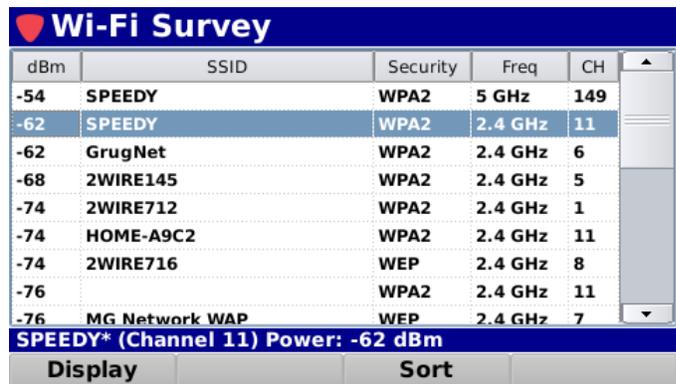
Performing a Wi-Fi Access Point Survey

Select the **Wi-Fi** icon as shown in the image to the right to open the Wi-Fi access point survey mode of the 720 DSP.



The **Wi-Fi Survey** screen will be displayed as shown in the image to the right. This screen allows you to perform a survey of Wi-Fi access points in your area that are currently broadcasting their SSID.

Use the left/right buttons scroll through all available Wi-Fi networks and displays the following information in the **Message Bar**:



- **SSID** – Broadcast name of the Wi-Fi network.
- **Channel** – Current broadcast channel of the selected Wi-Fi network.
- **Power** – Measured channel power level in dB of the selected Wi-Fi network.

 **NOTE** *If the 720 DSP is connected to a Wi-Fi access point through the Network Manager screen, the Wi-Fi Survey will only display the Wi-Fi frequencies that the 720 DSP is currently using.*

Choose Display Type

Use the **Display** softkey to choose between the **List** or **Graph** displays. The alternative **Graph** display is shown in the image to the right.

dBm	SSID	Security	Freq	CH
-50	SPEEDY	WPA2	2.4 GHz	11
-54	SPEEDY	WPA2	5 GHz	149
-62	GrugNet	WPA2	2.4 GHz	6
-64	MG Network WAP	WEP	2.4 GHz	7
-66	2WIRE145	WPA2	2.4 GHz	5
-66	HOME-A9C2	WPA2	2.4 GHz	11
-72	HOME-51A7	WPA2	2.4 GHz	1
		WPA2	2.4 GHz	1
		WEP	2.4 GHz	8

List | **Graph** | 11) Power: -50 dBm

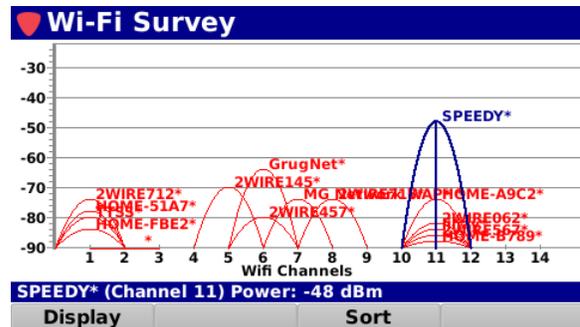
Display | Sort

dBm	SSID	Security	Freq	CH
-54	SPEEDY	WPA2	5 GHz	149
-62	SPEEDY	WPA2	2.4 GHz	11
-62	GrugNet	WPA2	2.4 GHz	6
-68	2WIRE145	WPA2	2.4 GHz	5
-74	2WIRE712	WPA2	2.4 GHz	1
-74	HOME-A9C2	WPA2	2.4 GHz	11
-74	2WIRE716	WEP	2.4 GHz	8
-76		WPA2	2.4 GHz	11
-76	MG Network WAP	WEP	2.4 GHz	7

SPEEDY* (Channel 11) Power: -62 dBm

Display | Sort

List Display



Graph Display

View & Sort

From within the **Wi-Fi Survey** screen, use the arrow buttons on the keypad to navigate through the list of access points.

Select the **Sort** softkey to sort the file list. Select from **Level**, **Security**, **Frequency**, or **Channel** sort types as shown in the image to the right.

dBm	SSID	Security	Freq	CH
-48	SPEEDY	WPA2	2.4 GHz	11
-54	SPEEDY	WPA2	5 GHz	149
-64	GrugNet	WPA2	2.4 GHz	6
-66	liljay	WEP	2.4 GHz	11
-70	2WIRE145	WPA2	2.4 GHz	5
-70	2WIRE958			3
-72	2WIRE712			1
-72	MG Network WAP			7
-74	HOME-51A7			1

SPEEDY* (Channel 11) Power:

Display | Sort

Level
Security
Frequency
Channel

Source Generator (OPTIONAL)

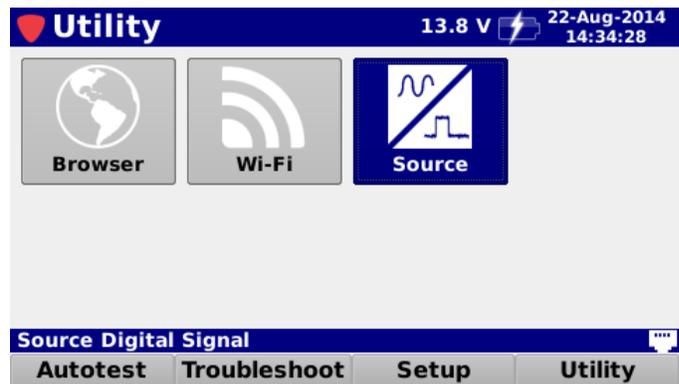
Overview

The Source Generator (SRC) is an optional feature of the 720 DSP. If you do not have this option, call Trilithic at (800) 344-2412 in order to purchase an option activation code and start using this option today.

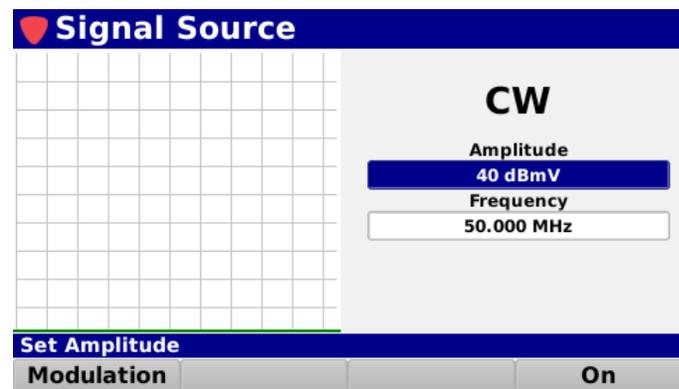
To view the installed functions on your instrument, see **Section II: Setup Menu, Chapter 2: Instrument Information**.

When activated in a 720 DSP, the Source Generator feature provides users with the ability to generate either a continuous wave (CW) or 16/32/64/128/256 QAM signal with adjustable frequency, and modulation in the return path from 5 to 85 MHz.

Select the **Source** icon as shown in the image to the right to use the Source Generator Option on the 720 DSP.



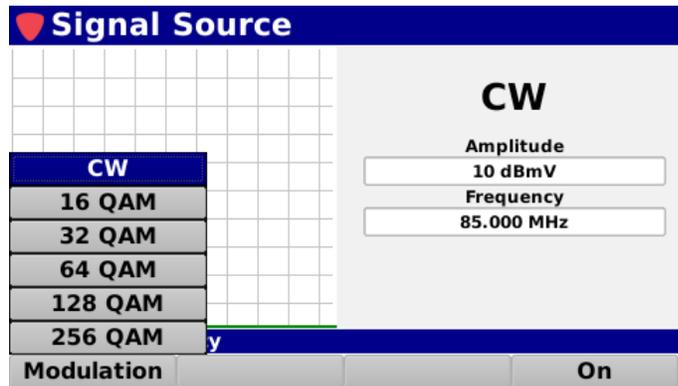
The **Signal Source** screen will be displayed as shown in the image to the right. This screen displays the type of signal source along with related signal settings.



Modulation Type Selection

Select the **Modulation** softkey as shown in the image to the right to choose from the following modulation types:

- CW - Continuous Wave
- 16 QAM
- 32 QAM
- 64 QAM
- 128 QAM
- 256 QAM



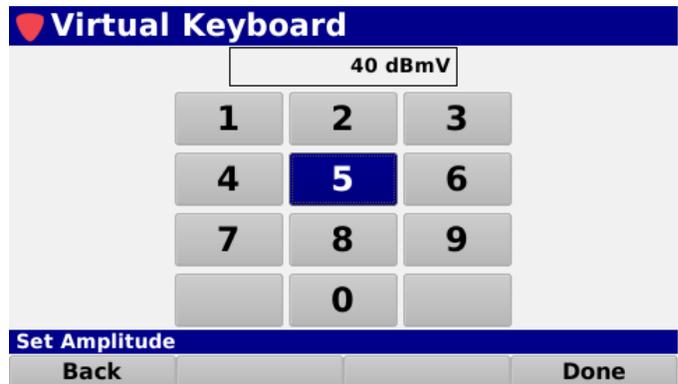
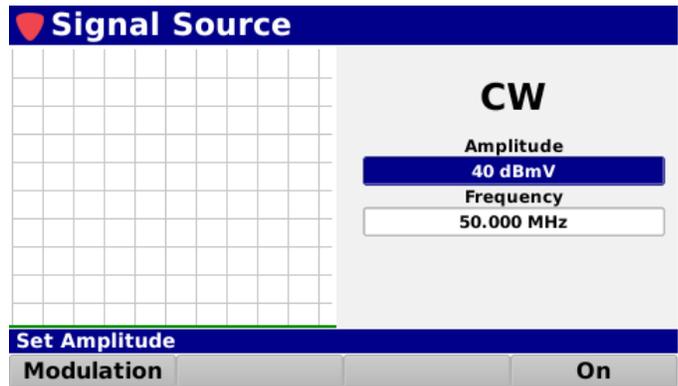
CW Signal Settings

The settings shown in the following sections can be adjusted when the **Modulation** is set to **CW**.

Amplitude Adjustment

The amplitude level can be adjusted from 10 to 40 dBmV. Highlight the **Amplitude** field as shown in the image to the right and then use either of the following methods to change the amplitude level:

- Use the up/down arrow buttons to change the amplitude level in 1 dBmV increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the amplitude level as shown in the image to the right.



QAM Signal Settings

The settings shown in the following sections can be adjusted when the **Modulation** is set to **16, 32, 64, 128 or 256 QAM**.



NOTE *When QAM Modulation is selected, the amplitude level of the source signal is fixed at 30 dBmV.*

Frequency Adjustment

The center frequency can be adjusted from 5 to 85 MHz. Highlight the **Frequency** field as shown in the image to the right and then use either of the following methods to change the center frequency:

- Use the up/down arrow buttons to change the center frequency in 0.1 MHz increments.
- Press the **Enter** button and use the **Virtual Keyboard** to directly enter the center frequency as shown in the image to the right.

Signal Source

	256 QAM
	Amplitude
	30 dBmV
	Frequency
	50.000 MHz
	Symbol Rate
	5.12 MSPS
	BER
	0

Set the Frequency

Modulation		On
------------	--	----

Virtual Keyboard

50.000 MHz

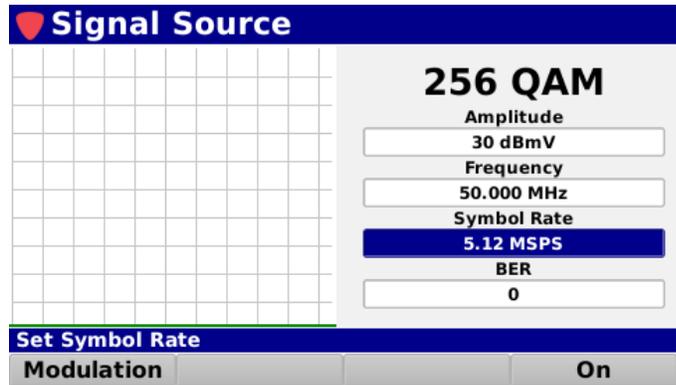
1	2	3
4	5	6
7	8	9
	0	.

Set the Frequency

Back		Done
------	--	------

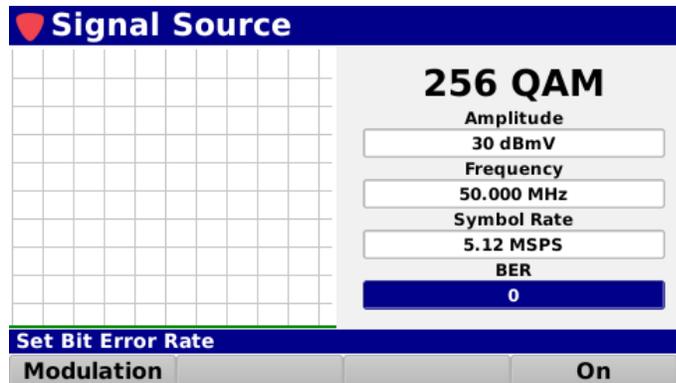
Symbol Rate Adjustment

The symbol rate can be adjusted from 0.64 to 5.12 MSPS. Highlight the **Symbol Rate** field as shown in the image to the right and then use the up/down arrow buttons to choose between symbol rates of 0.64, 1.28, 2.56 or 5.12 MSPS.



Bit Error Rate Adjustment

The bit error rate (BER) can be adjusted from 0 to 1.00E-2. Highlight the **Symbol Rate** field as shown in the image to the right and then use the up/down arrow buttons adjust the BER in 1.00E-1 increments.



Source Activation & Deactivation

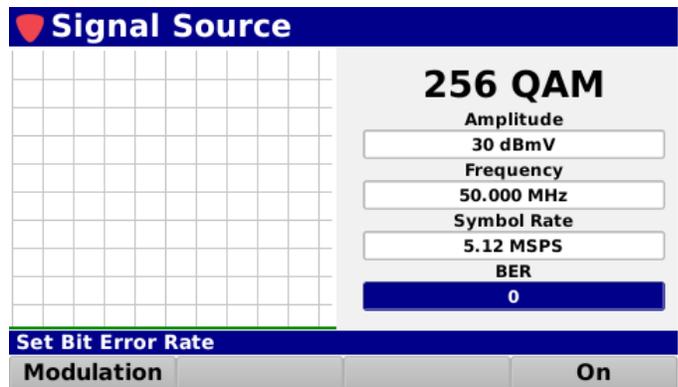


WARNING

Before activation of the source generator, ensure that the meter is not connected to an output of the active plant. Otherwise, the source signal could disrupt traffic in the upstream return band.

Once you selected the desired modulation type and have adjusted the source signal settings, the source can be activated by selecting the **On** softkey as shown in the image to the right.

When the source is On, select the **Off** softkey at any time to deactivate the source.



Signal Source

256 QAM

Amplitude: 30 dBmV

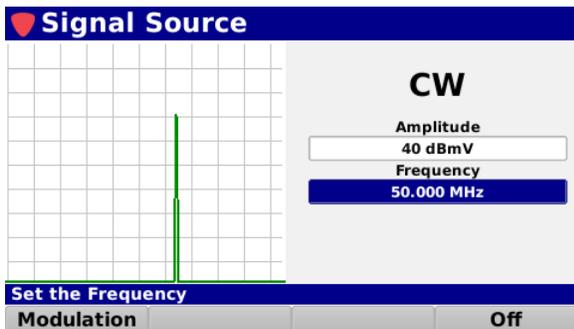
Frequency: 50.000 MHz

Symbol Rate: 5.12 MSPS

BER: 0

Set Bit Error Rate

Modulation: On



Signal Source

CW

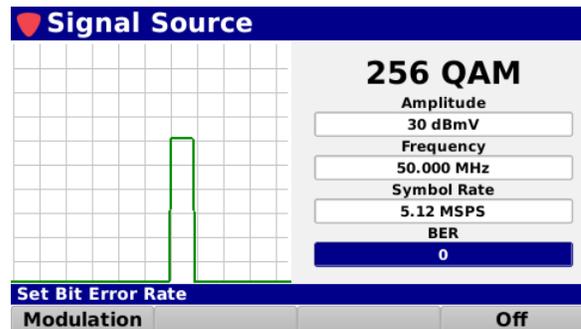
Amplitude: 40 dBmV

Frequency: 50.000 MHz

Set the Frequency

Modulation: Off

CW Source Signal On



Signal Source

256 QAM

Amplitude: 30 dBmV

Frequency: 50.000 MHz

Symbol Rate: 5.12 MSPS

BER: 0

Set Bit Error Rate

Modulation: Off

QAM Source Signal On

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720 DSP Business Certification Meter

Section VI: Appendix



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Level Measurement

Channel Bandwidth	Standard: 6 MHz Optional: 8 MHz
Amplitude Range	-40 dBmV to +50 dBmV
Modulation Types	Analog: NTSC, PAL B/D/G/H/I/K/N & SECAM B/D/G/H/I/K/L Digital: 16/32/64/128/256 QAM Annex A, 64/256 QAM Annex B, Annex C
Analog Measurement Accuracy	± 0.75 dB @ 77 °F (25 °C) ± 2.0 dB from 0 to 122 °F (-18 to 50 °C)
Digital Measurement Accuracy	± 0.75 dB @ 77 °F (25 °C) ± 2.5 dB from 0 to 122 °F (-18 to 50 °C)
Resolution	0.1 dB

Spectrum Measurement

Frequency Range	Return Path: 4 to 110 MHz Forward Path: 50 to 1000 MHz
Resolution Bandwidth	10, 30, 100, and 300 kHz 1 and 3 MHz
Display Spans	Return Path: 4 to 42, 4 to 65, 4 to 85 or 4 to 110 MHz Forward Path: User-selectable in 1 MHz steps
Display Scale	1, 2, 5, or 10 dB/division
Display Range	8 vertical divisions (when marker bar is hidden)
Spurious Free Dynamic Range	60 dB @ 25° C (77° F) (+50 dBmV)
Sensitivity	-40 dBmV (4 MHz to 1 GHz)
Forward Sweep Rate	~ 1 second for 78 channels

Digital Channel Measurement

Deep Interleave Compatibility	Yes
Downstream MER	40 ±2 dB @ +6 dBmV RF Input Level 34 ±2 dB @ -6 dBmV RF Input Level
Downstream BER	Method: True BER, derived from code words not from MER Standard: ITU J.83 annex A, B, C Range: 1 E-7 to 1 E-9 @ -6 dBmV RF Input Level
Symbol Rates	≥ 0.64 msps; ≤ 7.000 msps

Cable Modem Measurement

Protocol Support	DOCSIS 1.1 / 2.0 / 3.0 compliant (US & Euro DOCSIS 8x4) SNMP V1, V2c, V3 IEEE 802.3, 802.3u
Compliance Certificates	CE mark RoHS compliant CableLabs wave 80 (DOCSIS 8x4)
Receiver Demodulation	<p>Demodulation: 64 QAM, 256 QAM</p> <p>Data rate: Up to 304 Mbps with 8 downstream channel bonding (DOCSIS 8x4) Up to 400 Mbps with 8 downstream channel bonding (EuroDOCSIS 8x4)</p> <p>Channel bandwidth: 6 Mhz (DOCSIS, DOCSIS-J) 6/8 MHz (Dual mode 8x4)</p> <p>Maximum modem input signal level: 17 dBmV</p>
Transmitter Modulation	<p>Modulation: QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, and 128 QAM (SCDMA only)</p> <p>Data rate: Up to 108 Mbps with 4 upstream channels bonding</p> <p>Frequency (edge to edge): 5 to 42 MHz (DOCSIS) 5 to 65 MHz (EuroDOCSIS) 5 to 65 MHz (DOCSIS-J)</p> <p>Output level of CM can be controlled by CMTS though power ranging function</p> <p>Step: 1 dB</p>

Carrier-to-Noise Measurement

In-service, non-scrambled standard channels only

Minimum Input Level for Full Range	+10 dBmV
Dynamic Range	50 dB
Resolution	< 0.5 dB

Tilt Measurement

Max Number of Carriers	14 (dependent on favorite channel setup)
High/Low Delta Resolution	0.1 dB
Scan	Video, audio, pilot, and digital carriers

HUM Measurement

In-service, non-scrambled standard channels only

Minimum Input Level	0 dBmV
Range	0% to 5%
Resolution	0.1%
Accuracy	±0.5%

Source Generator (OPTIONAL)

QAM Source

Frequency Range	5 to 85 MHz
Signal Types	16/32/64/128/256 QAM
Symbol Rates	640, 1280, 2560 & 5120 ksym/sec
Amplitude	30 dBmV (fixed)
MER	> 38 dB

CW Source

Frequency Range	5 to 85 MHz
Amplitude Range	20 to 40 dBmV

Physical Specifications

Construction	Rubber overmolded plastic housing
Control	Glow in the dark keypad and LCD touch screen and/or via a wireless connection to a mobile device such as a laptop, tablet, iPad® or iPhone®, or Android® handset
Display	Color LCD touch screen 480 x 272 pixels (approx 4" x 2.25")
Annunciators	Audible annunciator for key strokes
Antenna	Internal Wi-Fi antenna, 2 dB gain
Flashlight	High Intensity LED (0.25 W)
Dimensions w/o Case (H x W x D)	8.0 x 5.5 x 2.75 in (20.32 x 13.97 x 6.99 cm)
Dimensions w/ Case (H x W x D)	9.0 x 6.5 x 3.75 in (22.86 x 16.51 x 9.53 cm)
Weight w/o Case	2.75 lbs (1.25 Kg)
Weight w/ Case	3.75 lbs (1.70 Kg)

Available Interface Types

RF Test Port	Replaceable F-Type connector DOCSIS 3.0 Modem (8x4)
Ethernet	RJ45 Management Port (10/100 Mbps) RJ45 Electrical Test Port (10/100/1000Base-T) SFP Optical Test Port (100/1000Base-X)
Wi-Fi	802.11 b/g/n 2.4/5 GHz Wi-Fi Adapter
USB	USB 2.0 Type-A Standard Port
Bluetooth (Optional)	Class II Mini Bluetooth USB Adapter (v2.1) with a 10 meter range for speeds up to 3 Mbps

Battery & Power Specifications

Operating Time	8 to 10 hours, dependent on use
Charge Time	4 hours
Battery	Two 2600 mAh @ 7.4V Li-Ion internal batteries, factory replaceable
Power Adapter	Input: 100 to 240 VAC ~ 47 to 63 Hz, 1.1A Max Output: 15 VDC, 3.3A

Environmental Specifications

Storage & Operating Temperature	-18° to +50° C (0° to 122° F)
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Trilithic Broadband Instruments 2-Year Limited Warranty

Trilithic, Inc. ("Trilithic") warrants to the buyer that the product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of two (2) years from date of delivery. Trilithic reserves the right, before having any obligation under this limited warranty, to inspect the damaged product, and all costs of shipping the product to Trilithic for inspection shall be borne solely by the buyer. Trilithic's obligation under this limited warranty shall be limited, at Trilithic's sole option, to replacing or repairing the product, or to replacing or repairing any defective part, F.O.B. Indianapolis, Indiana. If neither of the two options is reasonably available, then Trilithic, in its sole discretion, may provide a prorated refund to the buyer of the purchase price of the product, as evidenced by the proof of purchase, less any applicable service fees in accordance with the following schedule: months 0-3 = 100%; months 4-12 = 50%; and months 13-24 = 25%. Batteries and fans are not included or covered by this limited warranty. Any product or part that is repaired or replaced under this limited warranty shall be covered only for the remainder of the original warranty period which applied to the original product or part, or for ninety (90) days, whichever is longer. All products or parts that are exchanged for replacement shall become the property of Trilithic.

In order to recover under this limited warranty, buyer must make a written claim to Trilithic within sixty (60) days of the occurrence and must present acceptable proof of original ownership of the product (such as an original receipt, purchase order or similar documentation). In order for this limited warranty to be effective, the product must have been handled and used as set forth in the documentation accompanying the product and/or its packaging. This limited warranty shall not apply to any damage due to accident, misuse, abuse, neglect, fire or other casualty. Further, this limited warranty shall not apply to any product which has been altered or where the damage was caused by a part not supplied by Trilithic. Trilithic retains the final decision whether a product is within warranty conditions.

THE REMEDY SET FORTH HEREIN SHALL BE THE ONLY REMEDY AVAILABLE TO THE BUYER AND TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL TRILITHIC BE LIABLE FOR ANY SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOST REVENUES, LOST PROFITS, LOSS OF USE OF SOFTWARE, LOSS OR RECOVERY OF DATA, DOWNTIME, REPLACEMENT EQUIPMENT AND ANY THIRD PARTY CLAIMS ARISING OUT OF ANY THEORY OF RECOVERY INCLUDING WARRANTY, CONTRACT, STATUTORY OR TORT IN CONNECTION WITH THE PRODUCT, EVEN IF TRILITHIC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. NOTWITHSTANDING THE FOREGOING, IN THE EVENT THAT THIS LIMITED WARRANTY FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT SHALL TRILITHIC'S ENTIRE LIABILITY TO BUYER EXCEED THE PURCHASE PRICE OF THE DEFECTIVE PRODUCT.

EXCEPT FOR THE LIMITED WARRANTY PROVIDED HEREIN, TO THE FULLEST EXTENT PERMITTED BY LAW, TRILITHIC DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED (INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), WITH RESPECT TO THE PRODUCT OR ITS SUITABILITY FOR ANY USE INTENDED FOR IT BY THE BUYER. TO THE EXTENT ANY IMPLIED WARRANTIES MAY NONETHELESS EXIST BY OPERATION OF LAW, ANY SUCH WARRANTIES ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY.

This limited warranty is non-transferable. This limited warranty does not affect any other legal rights buyer may have by operation of law. No agent, reseller, distributor or business partner of Trilithic is authorized to modify the terms of this limited warranty on behalf of Trilithic.



TRILITHIC

9710 Park Davis Drive
Indianapolis, IN 46235
(317) 895-3600