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7200 Series

Digital Radio Test Set

Operation Manual



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Digital Radio Test Set

Operation Manual

PUBLISHED BY
VIAVI Solutions, Inc.

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10200 West York / Wichita, Kansas 67215 U.S.A. / (316) 522-4981 / FAX (316) 524-2623

Electromagnetic Compatibility

Double shielded and properly terminated external interface cables must be used with this equipment when interfacing with the RS-232 and IEEE-488.

For continued EMC compliance, all external cables must be shielded and 3 meters or less in length.

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Declaration of Conformity

The Declaration of Conformity Certificate included with the Unit should remain with the Unit.

VIAVI recommends the operator reproduce a copy of the Declaration of Conformity Certificate to be stored with the Operation Manual for future reference.

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Warranty Information

Warranty information for this product is available on the VIAVI website at https://www.viavisolutions.com/en-us/warranty-information.

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Scope of Manual

Type of Manual

Operation Manual. This manual applies to all products in the 7200 Digital Test Set Series.

Equipment Name and Model Number

7200 Configurable Automated Test Set (CATS)

Purpose of Equipment

General purpose Communications Service Monitor for testing radios and related equipment.

Optional Hardware/Software

Graphics contained in this manual may contain optional hardware and software functions.

Software Version

VIAVI updates Test Set software on a routine basis. As a result, examples may show images from earlier software versions. Images are updated when appropriate.

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SAFETY FIRST - TO ALL OPERATIONS PERSONNEL

General Conditions of Use

This product is designed and tested to comply with the requirements of IEC/EN61010-1 'Safety requirements for electrical equipment for measurement, control and laboratory use' for Class I portable equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from installation supply Category II.

Equipment should be protected from liquids such as spills, leaks, etc. and precipitation such as rain, snow, etc. When moving the equipment from a cold to hot environment, allow the temperature of the equipment to stabilize before it is connected to the supply to avoid condensation forming. The equipment must only be operated within the environmental conditions specified in the performance data.

This product is not approved for use in hazardous atmospheres or medical applications. If the equipment is to be used in a safety-related application, such as avionics or military applications, the suitability of the product must be assessed and approved for use by a competent person.

WARNING

PROTECTION PROVIDED BY EQUIPMENT MAY BE IMPAIRED IF THE TEST SET IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER.

Case, Cover or Panel Removal

Opening the Case Assembly exposes the operator to electrical hazards that may result in electrical shock or equipment damage. Do not operate this Test Set with the Case Assembly open.

Safety Identification in Technical Manual

This manual uses the following terms to draw attention to possible safety hazards that may exist when operating or servicing this equipment:

CAUTION

IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE, E.G., FIRE.

WARNING

IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

Safety Symbols in Manuals and on Units



CAUTION:
Refer to accompanying documents. (This symbol refers to specific CAUTIONS represented on the unit and clarified in the text.)



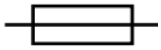
Indicates a Toxic hazard.



Indicates item is static sensitive.



AC TERMINAL: Terminal that may supply or be supplied with AC or alternating voltage.



Indicates a Fuse (AC or DC).

Equipment Grounding Protection

Improper grounding of equipment can result in electrical shock.

Use of Probes

Refer to Product Specifications for the maximum voltage, current and power ratings of any connector on the Test Set before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

DMM Measurement Category

The Digital Multimeter (DMM) is classified in Measurement Category II. Measurement Category II is designated for equipment which performs measurements on circuits directly connected to low voltage installation.

Power Cords

The AC Power Cord included with the unit, or an appropriate replacement, should be used to connect the Test Set to a grounded AC power supply. Failure to ground the Test Set may expose the operator to hazardous voltage levels.

To connect the Test Set to a Class II (ungrounded) 2-terminal socket outlet, fit the power cord with either a 3-pin Class I plug used in conjunction with an adapter incorporating a ground wire, or fit the power cord with a Class II plug containing an integral ground wire. The ground wire must be securely fastened to ground; grounding one terminal on a 2-terminal socket does not provide adequate protection.

Power cords must be in good operating condition. Power cords must not be frayed or broken, nor expose bare wiring. Using a damaged power cord may expose the operator to hazardous voltage levels.

International Power Requirements

The AC power cord must meet local regulations and power requirements. Check with local standards and regulations to ensure the power cord being used meets all local safety regulations.

NOTE

For use in Switzerland, Type 12 Plug should be used to connect Test Set to a grounded power supply.

Use Recommended Fuses Only

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings. Refer to Product Specifications for fuse requirements and specifications.

Internal Battery

This unit contains a Lithium Ion Battery, serviceable only by a qualified technician.

EMI (Electromagnetic Interference)

CAUTION

SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICE OUT TO A DISTANCE OF SEVERAL MILES. USER OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.

Electrical Hazards (AC supply voltage)

WARNING

THIS EQUIPMENT IS PROVIDED WITH A PROTECTIVE GROUNDING LEAD THAT CONFORMS WITH IEC SAFETY CLASS I. TO MAINTAIN THIS PROTECTION THE SUPPLY LEAD MUST ALWAYS BE CONNECTED TO THE SOURCE OF SUPPLY VIA A SOCKET WITH A GROUNDED CONTACT.

BE AWARE THAT THE SUPPLY FILTER CONTAINS CAPACITORS THAT MAY REMAIN CHARGED AFTER THE EQUIPMENT IS DISCONNECTED FROM THE SUPPLY. ALTHOUGH THE STORED ENERGY IS WITHIN THE APPROVED SAFETY REQUIREMENTS, A SLIGHT SHOCK MAY BE FELT IF THE PLUG PINS ARE TOUCHED IMMEDIATELY AFTER REMOVAL.

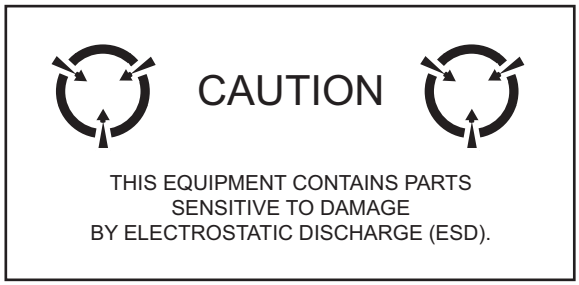
DO NOT REMOVE INSTRUMENT COVERS AS THIS MAY RESULT IN PERSONAL INJURY. THERE ARE NO USER-SERVICEABLE PARTS INSIDE.

Static Sensitive Devices

CAUTION

INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USE IN A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER EITHER BY THE USE OF VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- WHEN REMOVING DEVICES FROM THEIR CONTAINERS, GROUND THE HAND BEING USED WITH A CONDUCTIVE WRISTBAND.
- TIPS OF SOLDERING IRONS AND/OR ANY TOOLS USED MUST BE GROUNDED.
- DEVICES MUST NEVER BE INSERTED INTO NOR REMOVED FROM CIRCUITS WITH POWER ON.
- PC BOARDS, WHEN TAKEN OUT OF THE SET, MUST BE LAID ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.



Toxic Hazards

WARNING

SOME OF THE COMPONENTS USED IN THIS EQUIPMENT MAY INCLUDE RESINS AND OTHER MATERIALS WHICH GIVE OFF TOXIC FUMES IF INCINERATED. TAKE APPROPRIATE PRECAUTIONS, THEREFORE, IN THE DISPOSAL OF THESE ITEMS.

Beryllia



Beryllia (beryllium oxide) is used in the construction of some of the components in this equipment.

This material, when in the form of fine dust or vapor and inhaled into the lungs, can cause a respiratory disease. In its solid form, as used here, it can be handled safely, however, avoid handling conditions which promote dust formation by surface abrasion.

Use care when removing and disposing of these components. Do not put them in the general industrial or domestic waste or dispatch them by post. They should be separately and securely packed and clearly identified to show the nature of the hazard and then disposed of in a safe manner by an authorized toxic waste contractor.

Beryllium Copper



Some mechanical components within this instrument are manufactured from beryllium copper. This is an alloy with a beryllium content of approximately 5%. It represents no risk in normal use.

The material should not be machined, welded or subjected to any process where heat is involved.

It must be disposed of as “special waste.”

It must NOT be disposed of by incineration.

Lithium



A Lithium battery is used in this equipment.

Lithium is a toxic substance so the battery should in no circumstances be crushed, incinerated or disposed of in normal waste.

Do not attempt to recharge this type of battery. Do not short circuit or force discharge since this might cause the battery to vent, overheat or explode.

Input Overload

CAUTION

REFER TO PRODUCT SPECIFICATIONS FOR MAXIMUM INPUT RATING OF ANT AND T/R CONNECTORS TO AVOID INPUT OVERLOAD.

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Preface

Scope

This Manual contains instructions for operating the Test Set. It is strongly recommended that the Operator become thoroughly familiar with this manual before attempting to operate the equipment.

Organization

This manual is composed of the following chapters:

Chapter 1 - General Information

Provides an introduction and a brief overview of Test Set functions and features, including Principles of Operation and product specifications.

Chapter 2 - Test Set Operation

Identifies Test Set Controls, Connectors and Indicators.

Provides Power On and Power Off procedures.

Provides functional description of Graphic User Interface (GUI) components.

Provides instructions for defining Test Set parameters.

Chapter 3 - Test Set Functions

Provides functional description of Test Set functions.

Chapter 4 - System and Utility Functions

Provides functional description of Test Set system level and utility functions.

Chapter 5 - Scripting Tools

Describes the types of automated test scripts and script writing tools available for the Test Set.

Chapter 6 - Test Set Options

Identifies and describes hardware options available for the Test Set.

Chapter 7 - Maintenance

Identifies Operator Level Troubleshooting and Maintenance procedures.

Appendix A - Pin-Out Tables

Identifies connector pin locations.

Appendix B - Abbreviations

Lists terms and abbreviations used in this manual.

Appendix C - Product Specifications

Lists product's operational specifications.

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Chapter 1 - General Information

1.1 INTRODUCTION

The VIAVI 7200 Configurable Automated Test Set (CATS) integrates transmit and receive test functions into a flexible, user friendly instrument which supports touch-screen, mouse and remote operation.

1.1.1 Scope

Type of Manual	Operation Manual
Equipment Name and Model Number	7200 Configurable Automated Test Set (CATS)
Equipment Use	General purpose Communications Service Monitor for testing radios and related equipment.

1.1.2 Nomenclature Cross-Reference List

Common Name	7200, Test Set or Unit
Official Nomenclature	7200 Configurable Automated Test Set (CATS)

1.2 EQUIPMENT FEATURES AND CAPABILITIES

The 7200 CATS is designed to be used for communications testing in a bench or rack mount environment. The 7200 meets the needs for testing a variety of radio systems.

1.2.1 Features

- Touchscreen based User Interface (UI)
- Drag-and-drop User Interface for custom configuration
- Built-in signal switching
- Multiple signal and modulation generators
- Front and Rear Panel USB Connectors
- Optional Rack Mount Capability

1.2.2 Capabilities

The 7200 provides users with the following standard capabilities:

Generators

- AF Generators
- Modulation Generators
- RF Generator

Receive Measurement Meters

- RF Power Meter
- Receive Power (Peak and RMS)
- Distortion Meter
- SINAD Meter
- AF Level Meter
- RF Error Meter
- AF and RF Counter

Instruments

- Spectrum Analyzer
- Zero Span Analyzer

System Functions

- Option Management
- Software Management
- System Configuration

Utility Functions

- Touchscreen Calibration
- Internal Help System

Internal/External Frequency Reference

Remote Control Capabilities

1.3 STANDARD ACCESSORIES

The following items are standard with all Test Sets:

DESCRIPTION	PART NUMBER	QTY
Test Set	87277 / 91006	1
Standard Accessories		
BNC to T-Connector Adapter	20339	2
TNC to BNC Adapter	23758	2
BNC F/DBL Banana Plug Adapter/Connector	23764	1
10A Fast Blo 3AG Fuse	56067	2
AC Power Cord	62302	1
S M BNC/S M BNC Coaxial Cable	63339	4
Scope Probe Kit	67411	2
DMM Probe Set	88923	1
7200 Series Operation Manual (CD)	112801	1
7200 Series Getting Started Manual (Paper)	86987	1

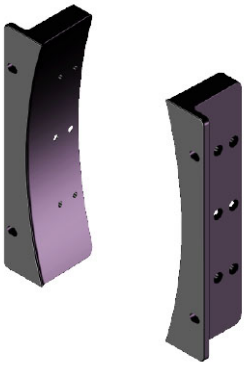
<table>
<tr><td colspan="2">Test Set</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>BNC to T-Connector Adapter</td><td>TNC to BNC Adapter</td></tr>
<tr><td>Part Number: 20339</td><td>Part Number: 23758</td></tr>
<tr><td></td><td></td></tr>
<tr><td>BNC F/DBL BN Plug Adapter/Connector</td><td>Fuse, 10AMP, Fast Blo 3AG</td></tr>
<tr><td>Part Number: 23764</td><td>Part Number: 56067</td></tr>
<tr><td></td><td></td></tr>
</table>

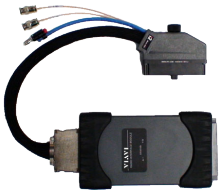
AC Power Cord	S M BNC/S M BNC Coaxial Cable
Part Number: 62302	Part Number: 63339
	
Scope Probe Kit	DMM Probe Set, 7000 Series
Part Number: 67411	Part Number: 88923
	
7200 Series Getting Started Manual	7200 Series Operation CD
Part Number: 86987	Part Number: 86985 or 112801
	

1.4 OPTIONAL ACCESSORIES

The following items are optional accessories available for the Test Set:

NOTE	Some of the optional accessories are standard with the accessory configuration options. Check packing list.

20AMP, Current Shunt 0.01 Ohm	**Transit Case, Test Set**
Part Number: 67478	**Part Number: 86170**
	
ZIF Mating Connector	**Adapter, USB 2.0, IEEE-488.2 GPIB**
Part Number: 86474	**Part Number: 87593**
	
Rack Mount Kit, 7000 Series	**Transit Case, Power Supply**
Part Number: 88574	**Part Number: 88770**
	

760W Programmable Power Supply	External Power Supply Cable Assy
Part Number: 88863	Part Number: 88991
	
Ethernet Cable, 5’	7200 Series Maintenance CD
Part Number: 89661	Part Number: 86986
	
Intelligent Cable Assembly	
Part Number: 92554	
	

1.5 PRINCIPLES OF OPERATION

Test Sets in the Common Platform Series contain the following assemblies and modules:

1.5.1 Front Panel Assembly

The Front Panel Assembly provides access to the Test Set's Input/Output connectors and User Interface panel.

1.5.2 Power Supply Assembly

The Power Supply is responsible for supplying power for module operation and providing +5 Volt bias for power applied status.

1.5.3 Generator Assembly

The Generator Assembly provides the Test Set's AF, RF and Modulated Output signals.

1.5.4 Receiver Assembly

The Receiver Assembly is responsible for processing RF Signals received from the RF Combiner.

1.5.5 RF Combiner Assembly

The RF Combiner Assembly provides the RF Input/Output for the GEN, ANT and T/R Ports. The RF Combiner also controls the RF Amplifier and Attenuator and provides a cross-feed path between the Generator and Receiver Assemblies.

1.5.6 RF Frequency Reference Assembly

The RF Frequency Reference Assembly provides a 10 MHz Internal/External frequency reference. The Assembly also provides internal timing for the A2D/D2A Converter.

1.5.7 µTCA and PXI Backplane Assemblies

The µTCA and PXI Backplane Assemblies route electrical signals between various system assemblies.

1.5.8 Audio I/O PCB Assembly

The Audio I/O PCB Assembly processes and routes all Test Set Audio Input/Output to and from the Front Panel Assembly.

1.5.9 A2D/D2A Converter Assembly

The Analog/Digital Converter Assembly is responsible for the Analog to Digital and Digital to Analog signal conversion of Input/Output signals.

1.5.10 Front Panel Switch Matrix Assembly

The Front Panel Switch Matrix Assembly is responsible for handling the UUT Interface (ZIF Connector).

1.5.11 Switch Fabric Assembly

The Switch Fabric Assembly provides system inter connectivity for the Network PCIe and SRIO interfaces.

1.5.12 Rear Panel Assembly

The Rear Panel Assembly provides access to the Test Set's Input/Output connectors and AC Power Supply connection.

1.5.13 SBC Carrier PCB Assembly

The Single Board Computer (SBC) Carrier is the Test Set's core processor.

1.5.14 DMM Assembly

The DMM Assembly is the Input/Output interface for performing AC, DC and Resistance measurements.

1.5.15 Scope Assembly

The Oscilloscope Assembly is the Input/Output interface for the Test Set's Scope function.

1.5.16 3010/3011 Synthesizer LO Assemblies

The Synthesizer LO Assemblies provide accurate Frequency Oscillators for the RF Assemblies.

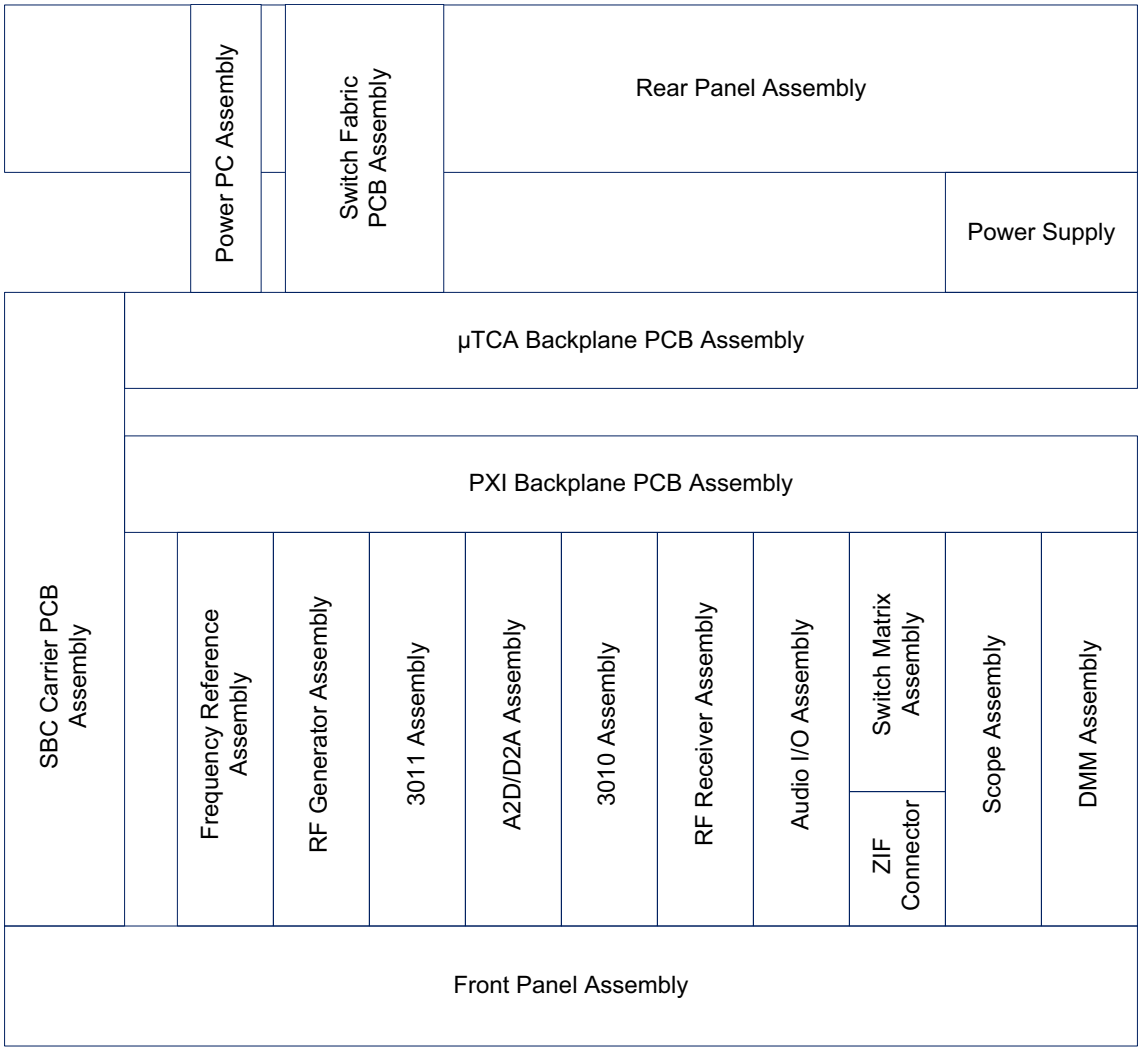


Fig. 1-1 System Block Diagram

1.5.17 Intelligent Cable Assembly

The Intelligent Cable Assembly is used to create a hardware and software interface between the 7200 and supported radio products. The Intelligent Cable wire harness connects to the 7200 Front Panel ZIF Connector and the Scope, Audio and DMM input connectors. The Intelligent Cable Assembly UUT Connector is connected to a radio under test using an adapter cable.

Chapter 2 - Test Set Operation

2.1 INTRODUCTION

Unless specifically mentioned, this chapter refers to local operation of a Test Set configured with factory default settings. New Test Sets are configured to start in the factory default state. Review Installation and Power Requirements before using the Test Set.

2.2 INSTALLATION REQUIREMENTS

2.2.1 Power Requirements

The Test Set is powered by an external AC power supply. The Test Set is a Safety Class 1 test instrument which must be grounded before use. The power cord supplied with the Test Set, or an appropriate replacement, should be used to connect the Test Set to a grounded AC power supply outlet.

- Ensure that the power cord is properly connected to the AC Power Connector on the rear panel of the Test Set prior to connecting unit to an AC power supply.
- Ensure Test Set is positioned so that the AC Power Connector is easily accessible.

CAUTION	FAILURE TO GROUND THE TEST SET OR USING A DAMAGED POWER CORD MAY EXPOSE THE OPERATOR TO HAZARDOUS VOLTAGE LEVELS. REPLACEMENT POWER CORDS ARE AVAILABLE FROM VIAVI.

2.2.2 Ventilation Requirements

The Test Set is force air-cooled by six fans that draw air through vents in the sides of the case. Do not obstruct the air vents while the instrument is in use. Avoid standing the instrument on or close to other equipment that is hot.

2.2.3 Bench Top Installation

The Test Set can be positioned in flat or tilted position when used in a bench top environment.



Fig. 2-1 Storage/Shipment (Flat) Position



Fig. 2-2 Tilted Position

2.2.4 Rack Mount Installation

The Test Set can be installed in a rack mount environment using the optional 7000 Series Rack Mount Kit, #88574. The Test Set is designed for a 19” Rack, 6U high rack environment.

2.3 CONTROLS AND CONNECTORS

2.3.1 Front Panel Controls and Connectors

Refer to Numerical Reference Charts for connector cross-reference.



Fig. 2-3 Front Panel Controls and Connectors

# REF	Connector	Description
1	**Audio I/O Connector**	Audio 1 and 2 Input/Output Connectors are the Test Set's primary AF signal measurement input connectors, AF generator output connectors, External Modulation input connectors and Digital Data Input/Output connectors.
2	**Digital Multimeter (DMM)**	The Digital Multimeter (DMM) is the connection interface for resistance measurements and AC/DC current and voltage measurements.
3	**Oscilloscope CH1/ CH2 Input Connectors**	The CH1 and CH2 Connectors are standard female BNC connectors used as the dedicated input channels for the Oscilloscope. Connectors are capable of digitizing data and trigger acquisitions.
4	**ZIF Connector**	The ZIF I/O Connector is an interface which provides cross-point switching and control signals. The ZIF I/O Connector can be used for Serial, USB, Ethernet and DC Power Supply connections.
5	**Trigger Input Connector**	The Trigger Input Connector is a standard female BNC connector used as the external trigger input for the Oscilloscope.
6	**Timing Input Connector**	Reserved for future development.
7	**Generator (GEN) Connector**	The RF Gen output provides the maximum RF output level from the RF Generator. The RF GEN Connector is reverse power protected to a level of +10 dBm.

# REF	Connector	Description
8	**T/R Connector**	The T/R Connector is a combined (Duplexed) connector that provides an RF Gen output connection and an RF Receiver input and broadband power meter connection. This connector should be used when performing high power measurements. Refer to product specifications for maximum rated input power level.
9	**Antenna (ANT) Connector**	The ANT Connector provides maximum sensitivity input to the Test Set RF Receiver. This connector should be used when measuring low level RF signals. Refer to product specifications for maximum rated input power level.
10	**Home Button**	Pressing the Home Button once displays the Home Menu which accesses miscellaneous Test Set functions. Pressing the Home Button twice minimizes all open Function Windows to the Launch Bar, placing them in a Hidden State. When in Hidden State, pressing the Home Button twice restores all active, minimized Function Windows to their previous UI state. Opening an inactive Function Window when the UI is in the Hidden State clears and resets the UI. The UI does not restore the Function Windows which were active when initiating the Hidden State.
11	**USB Connector**	The USB Connectors are standard USB connections that allow connection of USB 2.0 devices.
12	**LAN/1588 Indicators**	The LAN and 1588 Indicator are reserved for future development.
13	**Power Supply On/ Standby Button**	The Power Supply On/Standby Button is used to power the Test Set on and off. Pressing this button initiates a power-down sequence which saves current settings and test results. This button should be used for routinely powering down unit. When the button's LED is green it indicates the unit is powered on. When the AC Power Switch is in the ON position, the Power Supply On/Standby Button LED is orange to indicate the unit is in Standby Mode.

2.3.2 Rear Panel Controls and Connectors

Refer to Numerical Reference Charts for connector cross-reference.

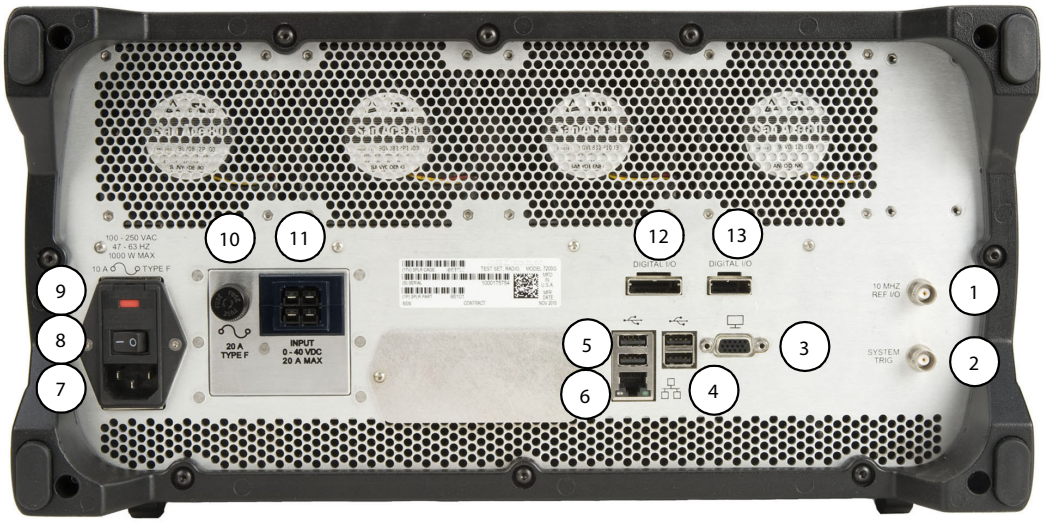


Fig. 2-4 Rear Panel Controls and Connectors

INDEX #	CONNECTOR	DESCRIPTION
1	**10 MHz Reference I/O Connector**	The 10 MHz External Reference I/O Connector is a BNC connection used to connect the Test Set to an external frequency standard, or to output the internal frequency standard from the Test Set to other equipment.
2	**System Trigger Connector**	The System Trigger Input Connector is the external trigger input for System functions.
3	**VGA Connector**	The VGA Output Connector is a standard VGA style, 15 way, D-type connection that allows a VGA monitor or video projector to duplicate the Test Set's screen display. To ensure proper operation, the VGA Monitor must be connected to the output connector before the Test Set is turned ON.
4	**USB Connectors**	The USB Connectors are USB standard connections that allows connection of USB 2.0 devices.
5	**USB Connectors**	The USB Connectors are USB standard connections that allows connection of USB 2.0 devices.
6	**Ethernet Connectors**	The Ethernet Connector is a standard Base T RJ45 connection which can be used for software updates, remote operation and for connecting external devices (i.e., External Power Supply).
7	**AC Power Connector**	The AC Power Connector accepts an IEC 320 connector. Refer to Product Specifications for required supply voltage, frequency and power consumption specifications.

INDEX #	CONNECTOR	DESCRIPTION
8	**AC Power Switch**	The AC Power Supply Switch isolates the Test Set from the AC power supply. The AC Power Supply should not be used to routinely power down the unit. The Power On/Standby Button should be used to routinely power down the unit
9	**AC Power Fuse**	The AC Fuses are accessed from the rear panel by removing the fuse cover located above the AC Power.
10	**External Power Supply Fuse**	The DC Power Fuse Holder houses the fuse for the External Power Supply Connector.
11	**External Power Supply Connector**	The External Power Supply Connector is the interface connector for the External Power Supply accessory.
12	**PCIe Connector**	The Peripheral Expansion Connector is used to connect add-in external devices.
13	**sRIO Connector**	The sRIO Connector is a high speed data communication connector used to transfer high speed data to external devices.

2.4 POWER TEST SET ON/OFF

2.4.1 User Interface Startup Screen

When a factory delivered Test Set is first powered on it displays the Factory Default Window shown in Fig. 2-6. The 7200 is designed to allow users to select a custom startup screen. For example, the screen can display a saved UI configuration or script file when the unit is powered on.

2.4.2 Power ON Test Set

After reviewing and completing 2.2, Installation Requirements, perform the following steps to Power On the Test Set:

STEP	PROCEDURE
1.	Place Rear Panel AC Power Switch to ON position. Verify Front Panel Power On/ Standby Button LED is illuminated.
2.	Press Front Panel Power On/Standby Button to power on Test Set.
3.	Wait while Test Set completes boot-up procedure. The User Interface (UI) displays a status bar at the bottom of the screen throughout the boot-up procedure.



Fig. 2-5 Startup Progress Indicator

The Factory Default Window is displayed when a new unit is first powered on or after factory default settings have been restored.

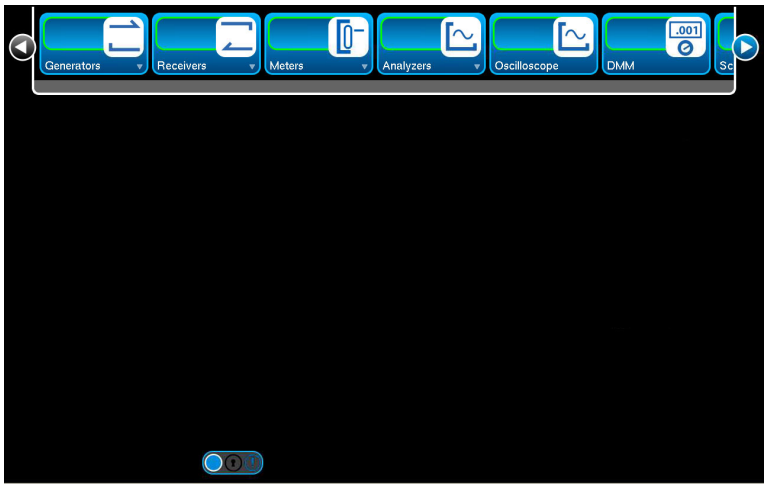


Fig. 2-6 Factory Default Window

2.4.3 Power OFF Test Set

During standard power-down sequence (documented below) the Test Set automatically stores Test Set settings and data that are active when the power-down sequence is initiated.

Perform the following steps to power down the Test Set:

STEP	PROCEDURE

1. Press the Front Panel Power On/Standby Button to initiate power-down sequence.
2. At prompt, press OK to confirm Test Set shutdown.

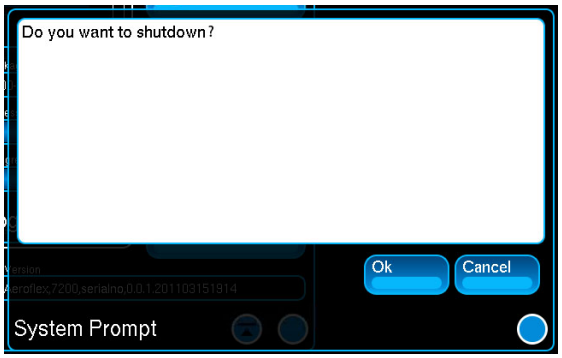


Fig. 2-7 Power OFF - User Prompt to Confirm

3. Wait while Test Set completes power down sequence.
4. Test Set is now in Standby Mode.
5. For long-term storage place the Rear Panel AC Power Switch to OFF position and disconnect from AC Power Supply.

NOTE	Power down the Test Set and place the AC Power Switch to OFF Position before disconnecting the unit from the AC Power Supply.

2.4.4 Standby Mode

When the Rear Panel AC Power Switch is placed in the ON position, the Test Set is in Standby Mode and the Front Panel Power On/Standby Button LED is illuminated. When in Standby Mode the Unit is powered on by pressing the Power On/Standby Button.

For long-term storage the Test Set should be isolated from the AC Power Supply by placing the AC Power Switch in the OFF position and disconnecting the AC Power Cord from the AC Power Supply.

2.4.5 Restore Defaults

Factory Default settings are restored by pressing the Home Button once and selecting System Reset from the Home Menu.

2.5 UI NAVIGATION

The Test Set User Interface is a capacitive touchscreen. The Touchscreen must be pressed firmly using a fingertip to activate screen functions. Touchscreen targeting can be calibrated using the User Touchscreen Calibration Tool.

The UI is navigated locally using the Front Panel Touchscreen or a USB mouse. Touchscreen functionality is still active when a mouse and/or keyboard is connected to the Test Set.

NOTE	The Test Set can be configured to emit a beep when the UI is touched. Refer to 4.12.2, Touchscreen Beep Function for information.

2.6 REMOTE OPERATION

The Test Set can be configured to be operated from a remote location such as a computer or a handheld device. When accessed remotely, the Test Set can be controlled via the UI, or by using remote programming language.

NOTE	The Test Set's TCP/IP Port is 5025.

2.6.1 Establish Network Access

Remote Operation is dependent on configuring the Test Set for network access. Network access is configured on the Network Tab of the System Configuration Window (refer to Section 4.5.4, Network Window).

2.6.2 Remote Operation Options

After network access is established, the Test Set can be controlled remotely by the following methods:

2.6.2.A VNC Connection (GUI Operation)

1. Configure the Test Set for network access as defined in section 2.6.1, Establish Network Access.
2. Open a VNC Client and enter the Test Set IP address (as configured on Network Window).

For more information, including download a VNC Client, refer to http://www.realvnc.com/ or http://www.tightvnc.com/.

2.6.2.B GPIB Connection (RCI Operation)

The Test Set can be configured to create an interface between the Test Set to UUT via a GPIB connection. Configure the Test Set for network access as defined in section 2.6.1, Establish Network Access, then refer to section 4.8.1, GPIB Window for further instructions.

2.6.2.C RS-232 Connection (RCI Operation)

The Test Set can be configured to control a UUT via an RS-232 connection. Configure the Test Set for network access as defined in section 2.6.1, Establish Network Access, then refer to section 4.10, Store Window for further instructions.

2.6.2.D Ethernet Connection (RCI Operation)

1. Configure the Test Set for network access as defined in section 2.6.1, Establish Network Access.
2. The Test Set can now be accessed using an external controller/application. For example, open a command window and enter telnet Test Set IP TCP/IP Port. Refer to the example below which shows an open command window connected to a Test Set IP Address 10.200.162.35 on port 5025.

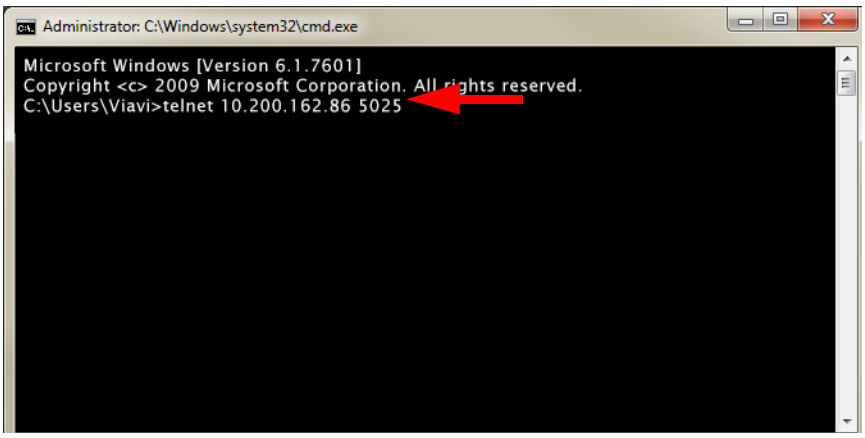


Fig. 2-8 Command Window Example

NOTE The Test Set's TCP/IP Port is 5025.

2.7 USER INTERFACE COMPONENTS

2.7.1 Launch Bar

The Launch Bar is a horizontal scrolling menu located at the top of the UI. The Launch Bar provides access to the Function Buttons as shown in Fig. 2-9.



Fig. 2-9 Launch Bar

The Launch Bar is opened and closed by touching or clicking anywhere on the Launch Bar. When the Launch Bar is opened, it appears in front of any Function Windows currently occupying that area of the display (refer to Fig. 2-10). The Launch Bar closes automatically when a Function Window is maximized.

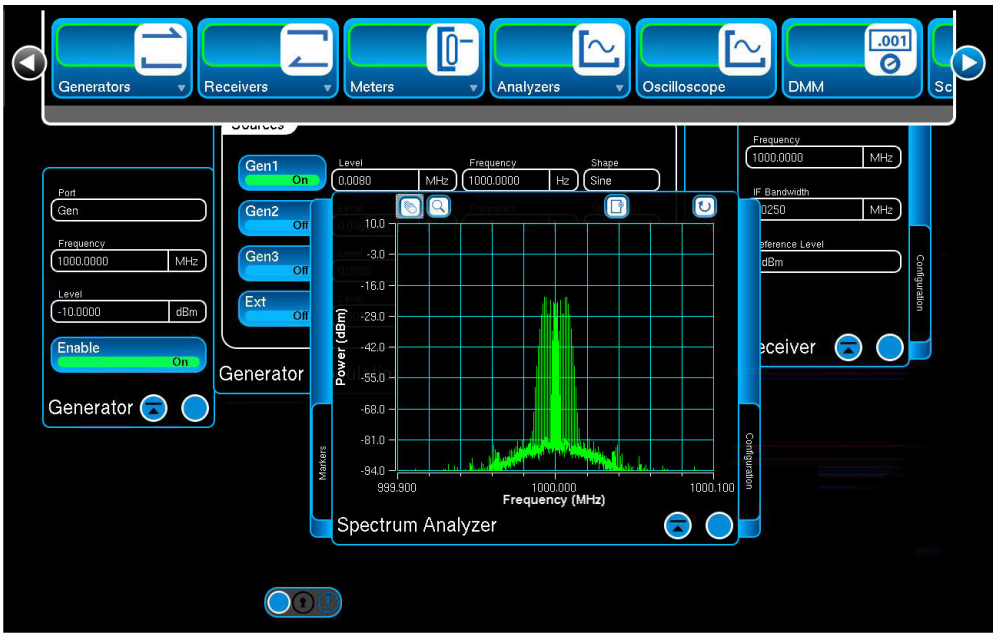


Fig. 2-10 Launch Bar - Overlay Function Windows

The Launch Bar is scrolled from left to right by pressing and dragging the bar in the desired direction or by pressing the left and right arrows. The corresponding directional arrow is greyed out and disabled when the scroll bar reaches the left or right end of the Launch Bar.

For example, when the Launch Bar has reached the left edge of the scrolling menu, the left arrow button is disabled as shown in Fig. 2-9. When the Launch Bar has reached the right edge of the scrolling menu the right arrow button is disabled as shown in Fig. 2-10.

2.7.2 Function Buttons

The Launch Bar consists of buttons that identify functions installed in the Test Set. The Function Buttons displayed depend on the options installed in the Test Set.

Pressing a Function Button on the Launch Bar opens that Function Window or in some cases a vertical drop-down menu which contains a list of grouped function buttons (refer to Fig. 2-11). Pressing a Function Button also brings an opened Function Window to the forefront of the UI.

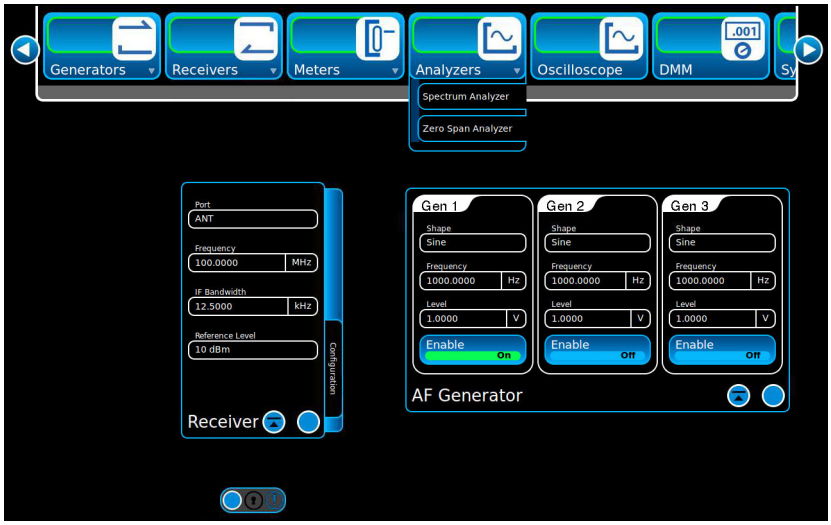


Fig. 2-11 Launch Bar - Vertical Drop-down Menu

2.7.3 Function Windows

Function Windows provide visual access to the Test Set's operating parameters and measurement data. Function Windows have been designed to be semi-transparent. The semi-transparency prevents windows from being hidden behind other windows.

2.7.3.A Open/Close Function Windows

Function Windows are opened by pressing the Function Button. Function Windows are closed by pressing the Minimize icon at the bottom of the Function Window.

2.7.3.B Function Window Icons

Function Windows contain some or all of the following icons:

Icon	Function	Description
	**Maximize**	The Maximized icon is displayed when a window is in Standard view. This icon changes the Function Window to Maximized View. Refer to Maximized View.
	**Restore**	The Restore Button is displayed when a window is in Maximized view. This icon changes the Function Window to Standard View. Refer to Standard View.
	**Minimize**	The Minimize icon is displayed in both Maximized and Standard view. This icon minimizes the Function Window to the Launch Bar. Refer to Minimized View.

2.7.3.C Function Window States

2.7.3.C.1 Standard View

By default, Function Windows initially open in Standard view. When in Standard view, a Function Window occupies a pre-defined portion of the display. When in Standard View windows can be moved anywhere on the display area.

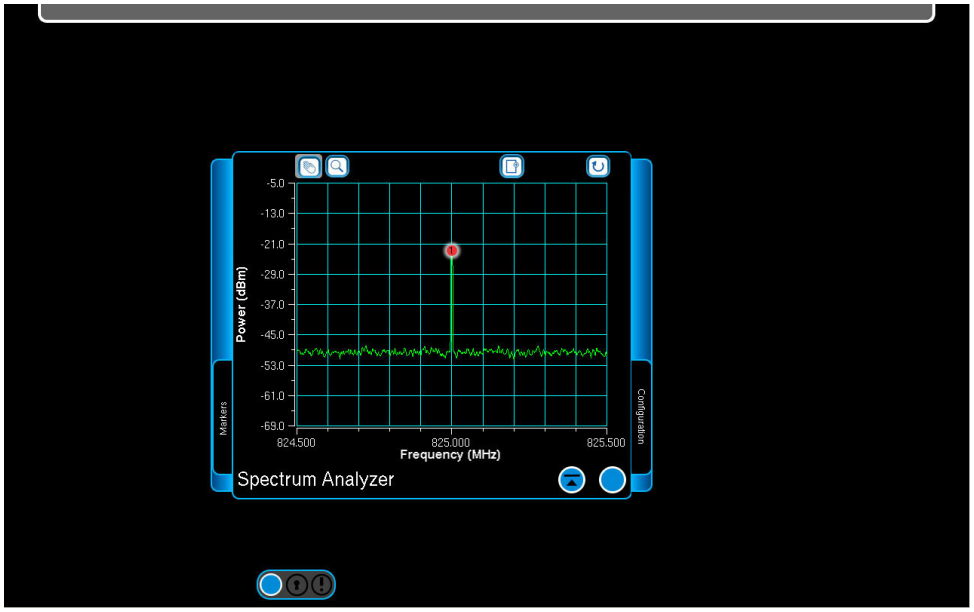


Fig. 2-12 Window in Standard View

2.7.3.C.2 Maximized View

When a Function Window is maximized, the window occupies the full display and provides access to function parameters which may not be visible when a window is in Standard view. When a Function Window is maximized the Launch Bar is automatically closed.

A Function Window is returned to Standard View by pressing the ReStore Button. When in maximized view, opened slider windows overlap the main window as shown in Fig. 2-13.

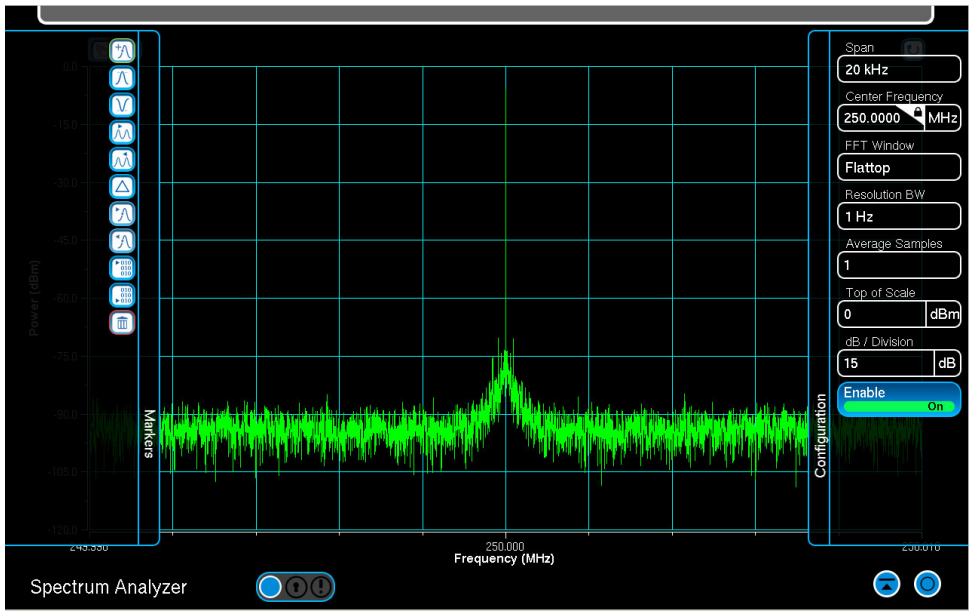


Fig. 2-13 Window in Maximized View

2.7.3.C.3 Minimized View

Function Windows can be minimized to the Launch Bar where they remain active but not visible on the UI. When an active Function Window is reopened, the Test Set restores it in the window's last active state and position on the UI.

> **NOTE** The term "minimized" is used because using the term "closed" implies that a function has been stopped.

2.7.3.D Positioning/Moving Function Windows

By default, when Function Windows are opened they are positioned from left to right in unoccupied space on the UI in the order in which they are opened. When space is filled on the UI, additional Function Windows that are opened are placed in the center of the UI on top of any open windows. When an active Function Window is closed and reopened, the Test Set restores the window to it's last active state and position on the UI.

Windows can be positioned to overlap other Function Windows as shown in Fig. 2-14. Select a partially hidden window or press the Function Button on the Launch Bar to bring a window to the forefront of the display.

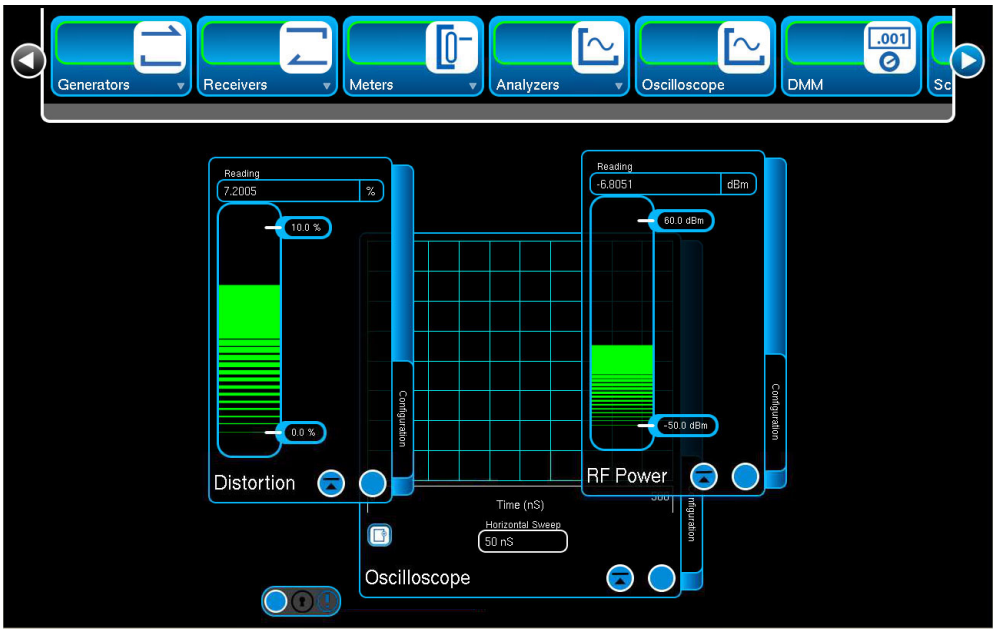


Fig. 2-14 Function Windows Overlapping - Oscilloscope in Back

For example, with the UI configuration as shown in Fig. 2-14, selecting the Oscilloscope Window or pressing the Oscilloscope Button on the Launch Bar brings the Oscilloscope Window to the forefront as shown in Fig. 2-15.

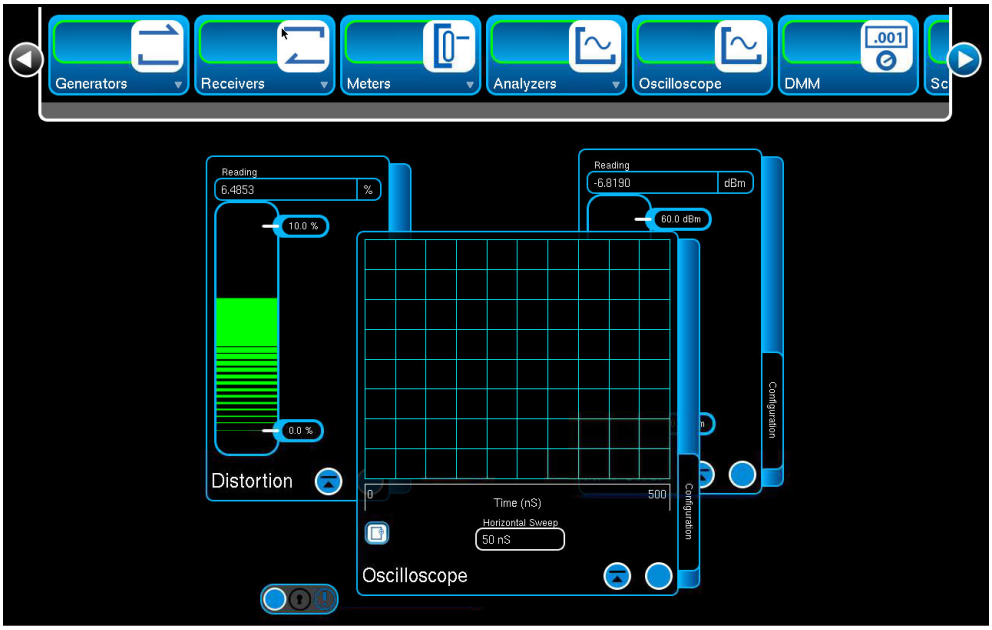


Fig. 2-15 Function Windows Overlapping - Oscilloscope in Forefront

When in Standard View, Function Windows can be moved anywhere on the display area. They can also be positioned so that portions of the window run off of the screen.

To move a window, select the window's title block or black background and drag the window to a new location on the display.

2.7.4 Slide Out Windows

Slide Out Windows are used to provide access to additional function parameters. Slide Out Windows are opened and closed by pressing on the blue tab on the side of the Slide Out Window.

Fig. 2-16 shows the SINAD Meter Window with the Slide Out Window in a closed and opened state.

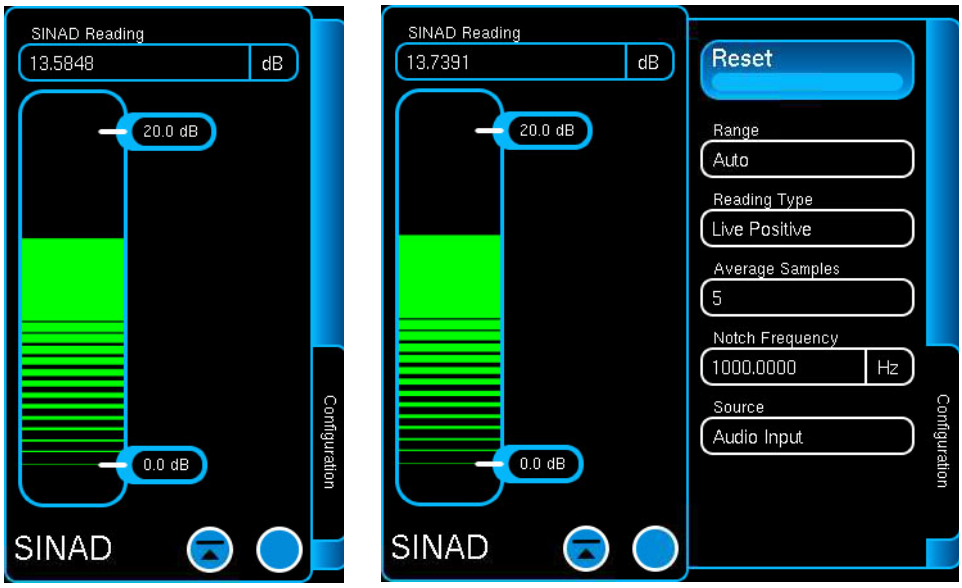


Fig. 2-16 SINAD Meter Slide Out Window Closed/Opened

When a window is near the edge of the display area, a Slide Out Window opens to overlap the main window as shown in Fig. 2-17.

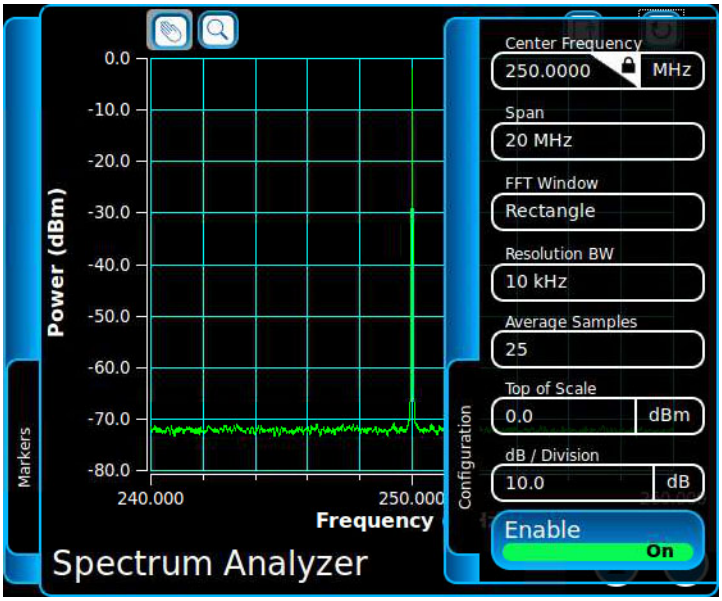


Fig. 2-17 Slide Out Window Overlapping Main Window

When in maximized view, opened Slide Out windows overlap the main window as shown in Fig. 2-13.

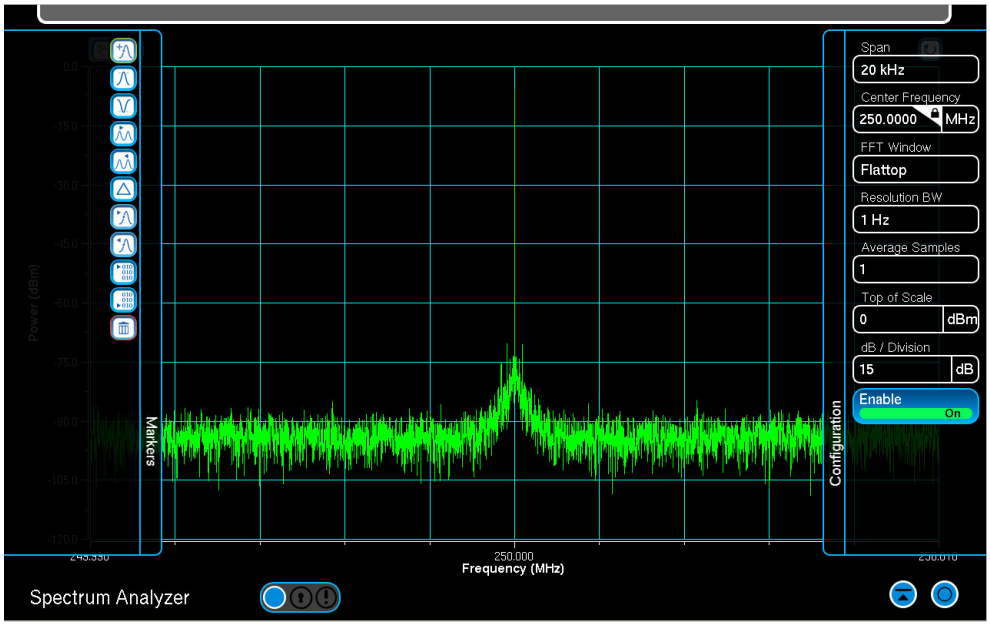


Fig. 2-18 Window in Maximized View

2.7.5 Status Bar

The Status Bar located at the bottom of the UI displays status messages and system errors. The Status Bar also contains the 4.2, Frequency Reference toggle button.

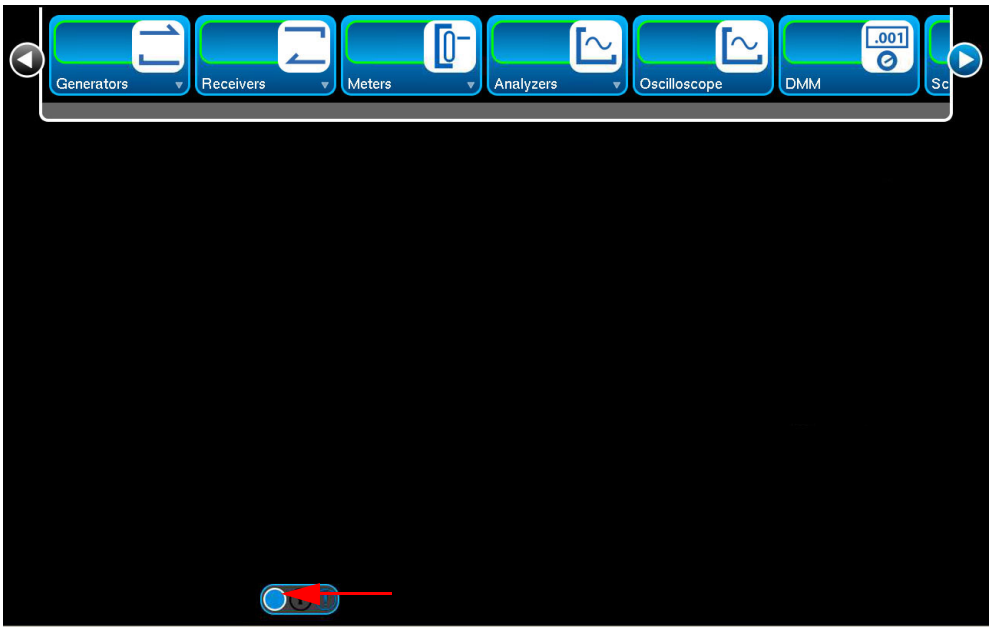


Fig. 2-19 Status Bar Location - Minimized

The Status Bar can be displayed in Minimized View, as shown in Fig. 2-19, Expanded View, as shown in Fig. 2-20, or with the Message Window open as shown in Fig. 2-21.



Fig. 2-20 Status Bar - Expanded View

Minimized View occupies the smallest amount of space on the UI, however status messages are not visible. Expanded View displays the last generated status or error message. The Status Bar Message Window displays a chronological list of status and error messages.

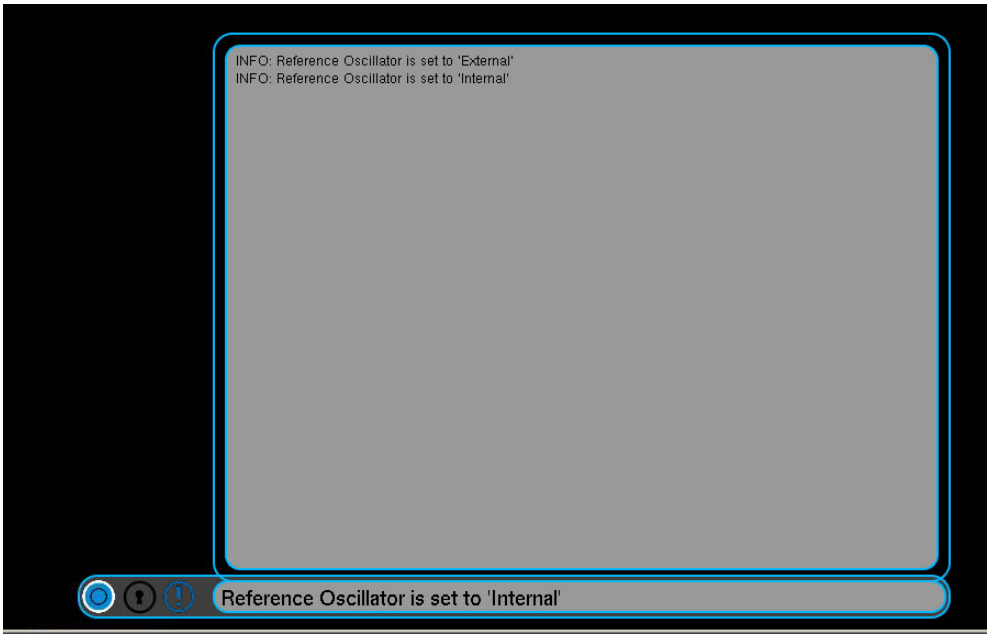


Fig. 2-21 Status Bar - Message Window

2.7.5.A Opening and Closing Status Bar

The Status Bar is opened by:

- Pressing the active Status Message Indicator (opens Message Window).
- Pressing the Minimize/Maximize View Icon (Expanded View).
- Pressing the Expanded Status Bar (opens Message Window).

2.7.5.B Status Bar Icons/Indicators

Icon	Description
	Reserved for future development.
	The Status Message Indicator changes from black to blue to when a non-critical error or status message is received. The Status Message Indicator returns to gray when the Status Bar view is changed to Expanded or Maximized.
	When a Critical Error occurs the Status Message Indicator turns red and the Status Bar is outlined in red until the Critical Error Message is acknowledged.

2.8 TEST SET PARAMETERS

2.8.1 Data Field Types

Function Windows contain Editable and Read Only Data Fields.

2.8.1.A Editable Data Fields

Editable fields have a white border. These fields are defined using numeric entry, text entry or by selecting predefined values from a drop-down menu. In Fig. 2-22 the Range, Reading Type and Average Samples fields are editable fields as indicated by the white border.

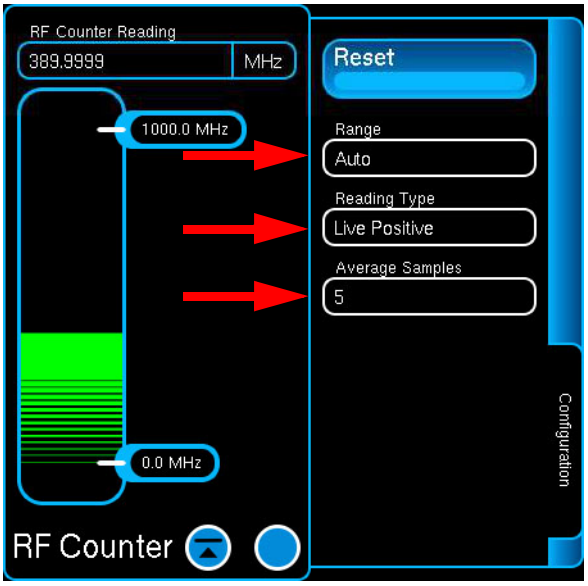


Fig. 2-22 Editable Data Fields

An editable field updates to the Locked state when the Test Set experiences a condition which makes the field un-editable.



Fig. 2-23 Locked State Indicator

A locked field cannot be edited until the lock-out condition is resolved. Refer to 2.9.3.A, Field Locked for additional information.

2.8.1.B Read Only Data Fields

Read only fields have a blue border. These fields display system generated data such as measurements or received signal information. In Fig. 2-24 the Reading field is a Read Only field as indicated by the blue border.

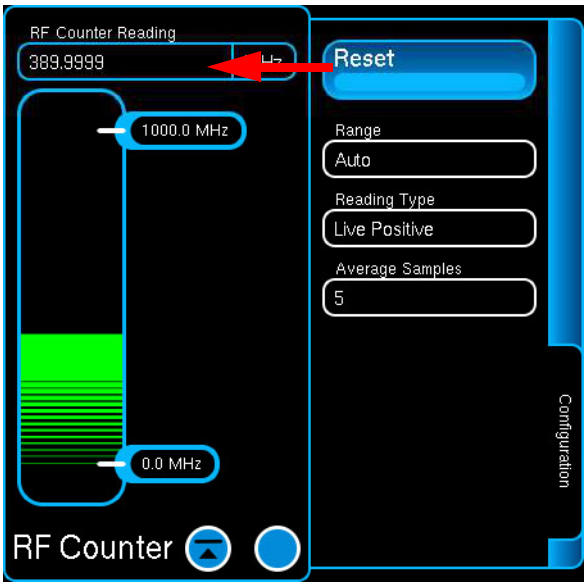


Fig. 2-24 Read Only Data Field

2.8.2 Defining Data Fields

Test Set parameters are defined using the following types of Editable Data Fields:

2.8.2.A Numeric Data Fields

Numeric Data Fields are used to define a variety of parameters such as frequency and level. When a Numeric Data Field is selected for editing the 2.8.3, Numeric Entry Window is enabled.

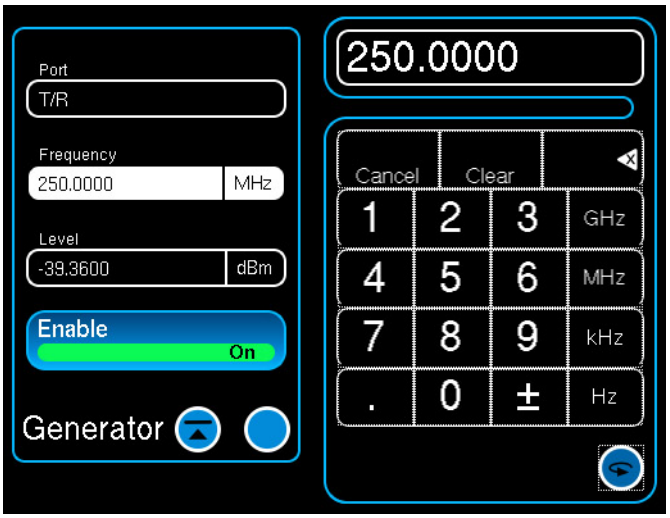


Fig. 2-25 Numeric Data Field - Selected for Editing

2.8.2.B Text Data Fields

Text Data Fields are defined by selecting pre-defined variables from a drop-down menu or by entering user defined text. Editable text fields are defined using the Test Set's Keyboard or an external keyboard. When a Text Data Field is selected for editing the 2.8.4, Keyboard is enabled.

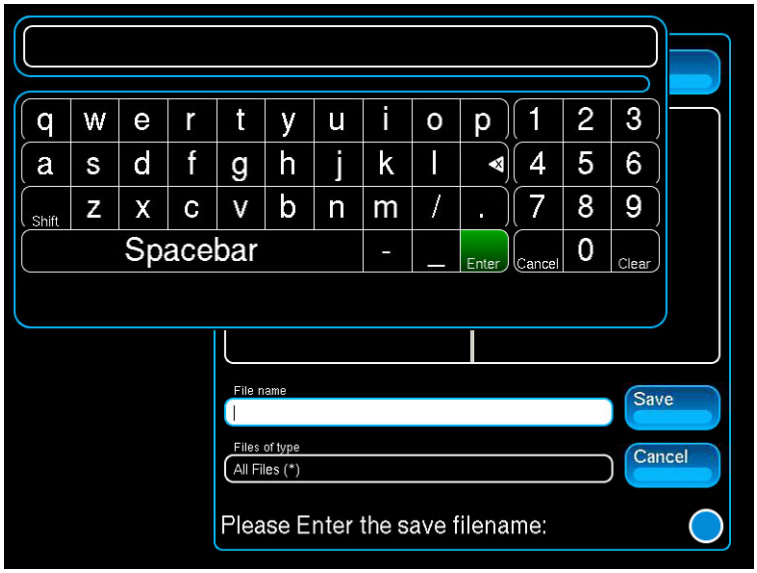


Fig. 2-26 Text Data Field - Selected for Editing

2.8.2.C Drop-down Menus

Drop-down menus are used to list pre-defined numeric and text variables. Selecting a Drop-down menu opens the list of variables available for that field.

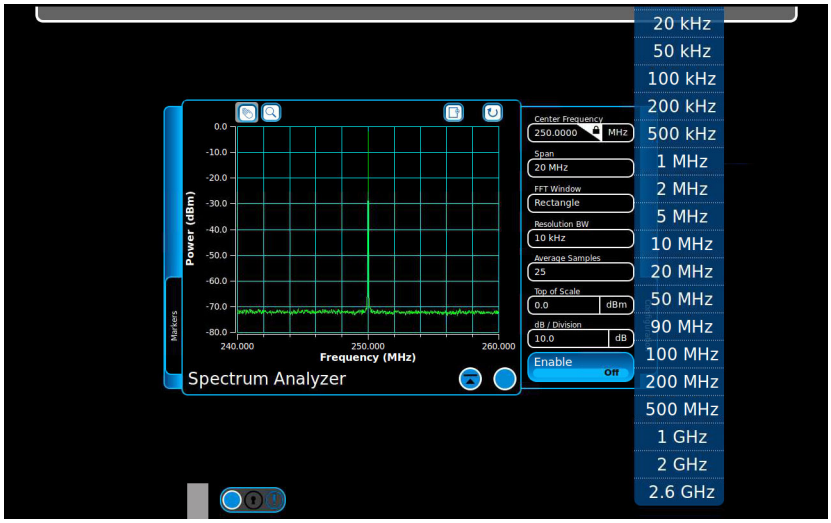


Fig. 2-27 Drop-down Menu

If an opened drop-down menu extends off of the UI it can be moved up or down on the UI to view contents.

2.8.3 Numeric Entry Window

The Numeric Entry Window is displayed when a numeric data field is selected for editing. The Numeric Entry Window contains a Numeric Keypad, a Slider Bar and a Spinner Knob. The type of numeric entry tool being displayed is changed by pressing the “flip” icon in the bottom right corner of the window. The window defaults to display the Numeric Keypad when it is opened.

2.8.3.A Numeric Keypad

The Numeric Keypad allows the user to enter a specific numeric value. A value is entered by pressing the numbers on the keypad. The value is then enabled by pressing the unit of measurement or the Enter Button on the Numeric Keypad Window.

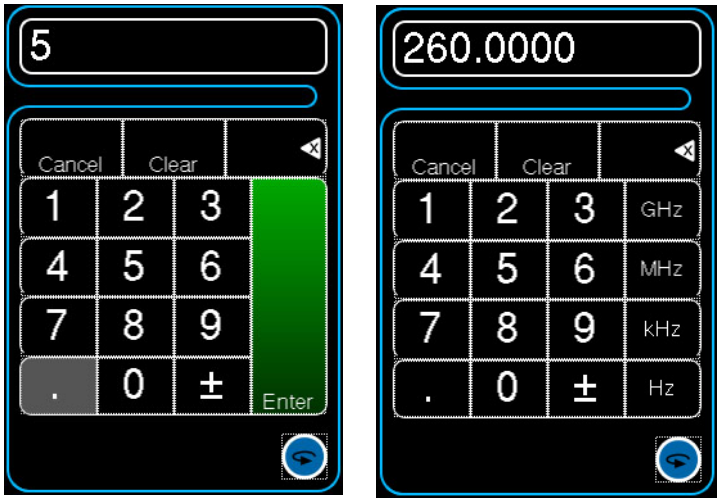


Fig. 2-28 Numeric Keypads

Pressing Cancel voids any un-entered changes and closes the Numeric Entry Window. Pressing Cancel does not restore a changed value that has already been enabled (entered).

Pressing Clear resets a numeric value to zero. To reset an un-entered value to the previously defined value press Cancel.

Pressing Backspace deletes the last number in the numeric value. For example, if a frequency is defined as 123.456789 MHz, pressing Backspace three times would result in a value of 123.456 MHz.

2.8.3.B Slider Bar

The Slider Bar allows the user to select and change a defined range of values. The values to be changed are indicated by a bounding box. Fig. 2-29 shows the bounding box around the numbers '600.' The position of the bounding box is controlled using the /10 and x10 keys to adjust the precision setting.

Once the digit range is selected the value is increased or decreased using the Slider Bar or the Up and Down arrows. The Up (increase) and Down (decrease) arrows are used to adjust the last value selected in the bounding box. Values are active at the time that they are being edited, meaning they are "live" edits.

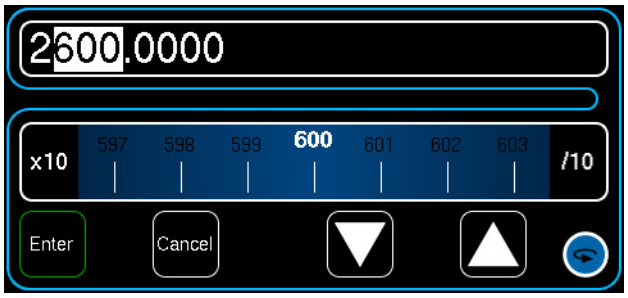


Fig. 2-29 Slider Bar

Pressing Cancel voids any un-entered changes and closes the Numeric Entry Window. Pressing Cancel does not restore a changed value that has already been enabled (entered).

The Slider Bar is closed by pressing the Enter or Cancel Button.

2.8.3.C Spinner Knob

The Spinner Knob allows the user to increase (clock-wise) or decrease (counter clock-wise) a numeric value. The values to be changed are indicated by a bounding box. Values are active at the time that they are being edited, meaning they are "live" edits.

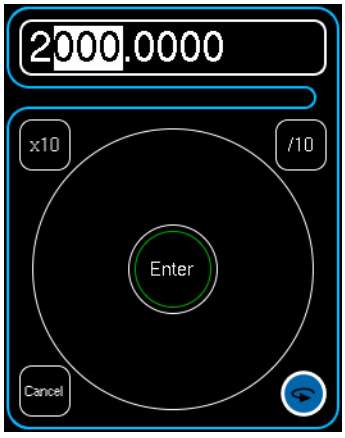


Fig. 2-30 Rotary Spinner Knob

The Spinner Knob is closed by pressing the Enter or Cancel Button.

2.8.3.D Defining Precision

The precision of the selected digit range selected on the Slider Bar and Spinner Knob is changed by pressing x10 or /10.

x10 moves the digit range one decimal point to the left each time it is pressed, resulting in a wider precision and larger value adjustments.

/10 moves the digit range one decimal point to the right each time it is pressed, creating a tighter precision and making smaller value adjustments.

2.8.4 Keyboard

The Keyboard is displayed when a Text Data Field is selected for editing. The Keyboard is an alpha/numeric keyboard which functions similarly to an external keyboard.

Software Version 1.3.6 added support for a multi-language keyboard. The Keyboard currently supports English and Korean.



Fig. 2-31 User Interface Keyboard

2.8.5 External Devices

The Test Set supports the use of various external devices.

2.8.5.A USB Mouse and Keyboard

An external USB keyboard and/or mouse can be used for UI navigation and control. Local Touchscreen control is still active when a keyboard and/or mouse are connected to the Unit.

2.8.5.B Handheld Devices

The Test Set can be accessed and controlled remotely using many of the hand held devices that are available in today's market (i.e., tablet).

The following must be configured to use hand held devices to access the Test Set:

- Wireless network access must be available;
- Test Set must be properly configured for network access (refer to 4.5.4, Network Window);
- Hand held device must have a vnc client installed.

2.9 MESSAGE WINDOWS

The Test Set uses the following to alert the user of various operational conditions.

- Pop-up Messages
- Message Windows
- Status Bar
- User Interface Indicators

2.9.1 Pop-up Messages

The Test Set uses pop-up messages to notify the user about system errors or operating conditions. Fig. 2-32 shows an example of a Pop-up Message generated when an incorrect directory is selected on the Script Loader Window.

Green Pop-up Messages indicate operational conditions; red Pop-up Messages indicate system errors.

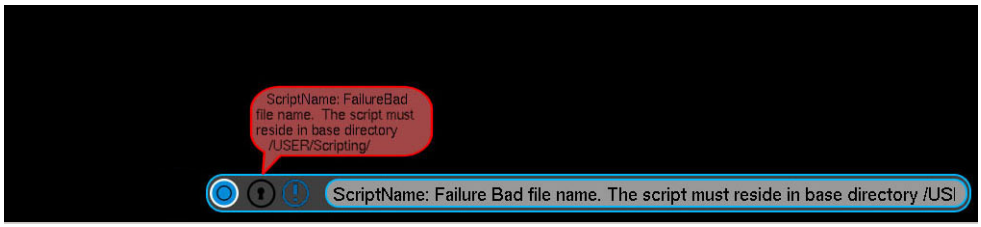


Fig. 2-32 Pop-up Message - Example

Pop-up Messages contain an abbreviated message of the error or condition. Additional information is displayed by opening the Status Bar at the bottom of the UI.

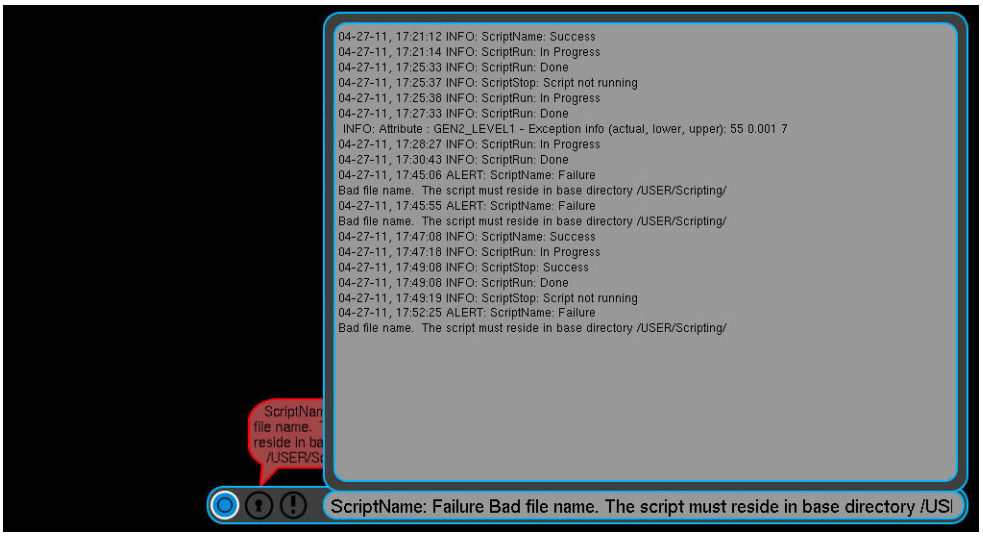


Fig. 2-33 Pop-up Message - Expanded Status Bar

2.9.2 Message Windows

The Test Set uses Message Windows to provide the user with information or to request user action.

For example, when powering down the Test Set, a User Prompt Window is displayed which requires the user to confirm or cancel the shut down procedure.

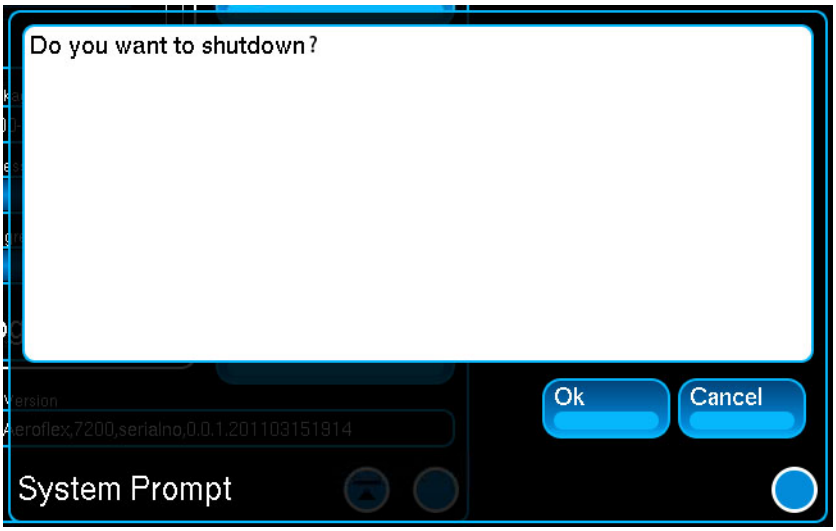


Fig. 2-34 User Prompt Message Window

A Critical Error Message Window is displayed when a condition occurs which makes the Test Set unable to perform a requested function.

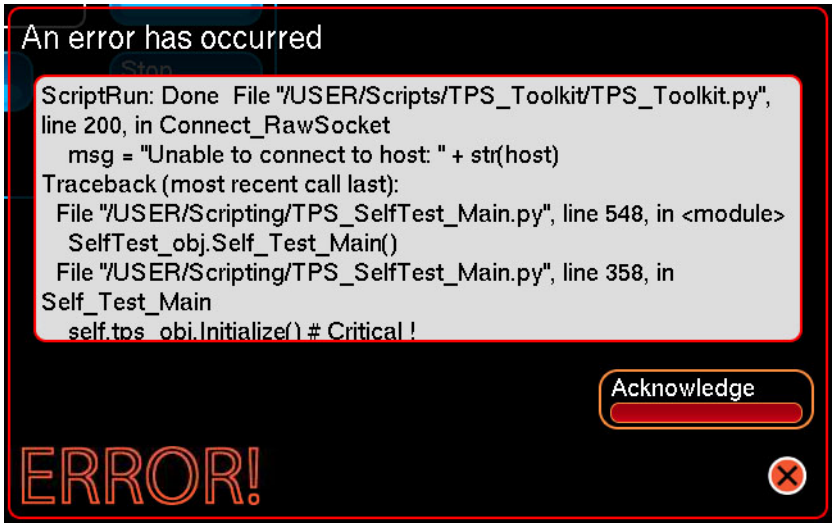


Fig. 2-35 Critical Error Message Window

Another example is a window which is displayed to notify the user when a procedure is complete, such as when performing Touchscreen Calibration.

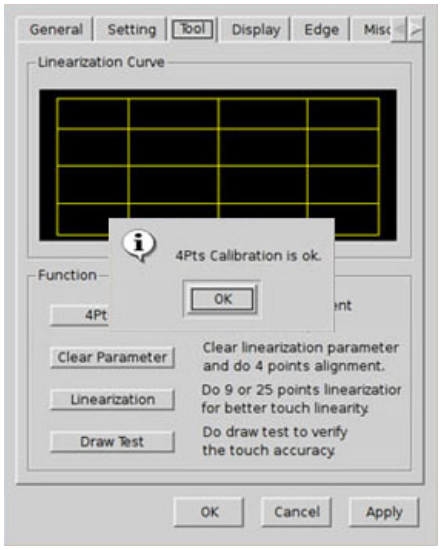


Fig. 2-36 Procedure Complete Message Window

2.9.3 User Interface Indicators

The UI uses the following to indicate operational states and conditions:

2.9.3.A Field Locked

An editable field updates to the Locked state when the Test Set experiences a condition which makes the field un-editable.

For example, when the Spectrum Analyzer Span is set higher than 100 MHz the Spectrum Analyzer Center Frequency is locked and controlled via the Receiver Frequency.

When the Spectrum Analyzer Span is set lower than 100 MHz the Receiver Frequency field is locked and is controlled by the Spectrum Analyzer Center Frequency.

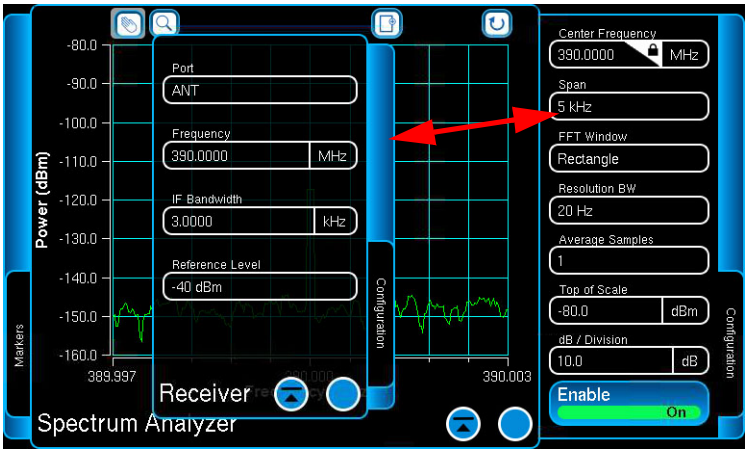


Fig. 2-37 Spectrum Analyzer - Locked Status Indicator

A locked field cannot be edited until the lock-out condition is resolved.

2.9.3.B Input Overload

The Input Overload is displayed as a Pop-up Message when the input at the ANT and T/R Connector exceeds the maximum rated input power for the connector.

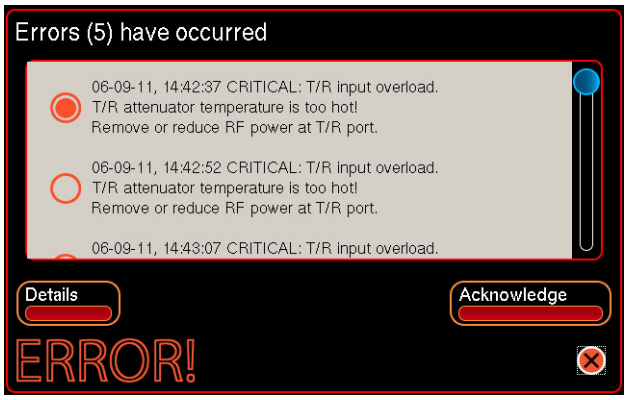


Fig. 2-38 Input Overload Error Message

When the Input Overload Indicator is tripped, Input Overload Status must be reset in order to continue with Test Set operation. Input Overload is reset by pressing the Pop-up Message bubble.

Refer to Appendix C - Product Specifications for connector maximum input ratings.

2.10 TEST CONFIGURATIONS AND SETUPS

The following sections explain how to configure test equipment for basic test scenarios.

2.10.1 Transmitter Testing

The transmitter test evaluates UUT transmit performance. The Test Set's AF Generator is configured to send an audio signal to the UUT. The UUT modulates the signal, then sends the signal back to the Test Set. The configuration shown below routes the modulated signal received from the UUT to the Test Set's measurement meters. The UUT is connected to the Test Set as shown in Fig. 2-39.

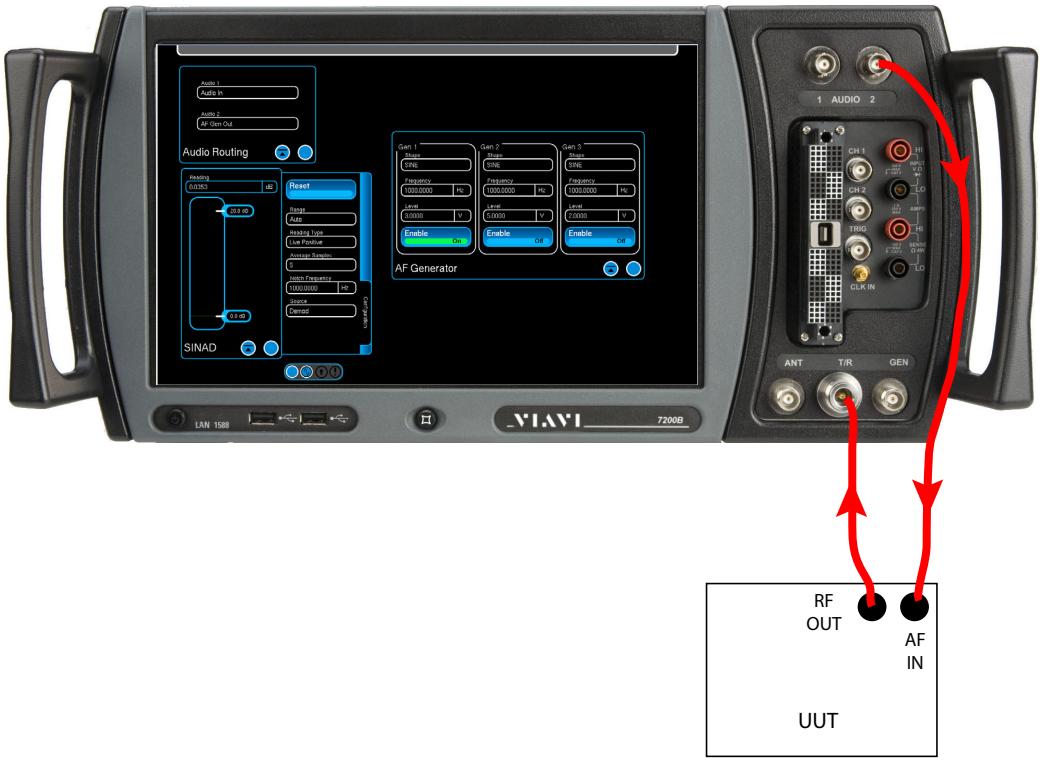


Fig. 2-39 Transmitter Testing Hardware Configuration

Configure Test Set parameters as follows to perform UUT Transmitter Testing:

Function	Parameter	Setting
Receiver	Frequency	Per UUT
Receiver	Port	T/R
Receiver	IF Bandwidth	Per UUT
Receiver	Modulation	Per UUT
Receiver	Reference Level	Per UUT
Audio Routing	Audio 2	AF Gen Out
Meters	Source	Demod
AF Generator	Shape	Per UUT (Sine is typical)
AF Generator	Frequency	Per UUT (1 kHz is typical)
AF Generator	Level	Per UUT
AF Generator	Enable	ON

2.10.2 Receiver Testing

Receiver Testing measures the receive sensitivity of the UUT. The Test Set's RF Generator sends an RF signal from the Test Set to the UUT. The UUT demodulates the received signal and sends the demodulated signal back to the Test Set. The configuration shown below routes the signal received from the UUT to the Test Set's Oscilloscope and measurement meters. The UUT is connected to the Test Set as shown in Fig. 2-40.

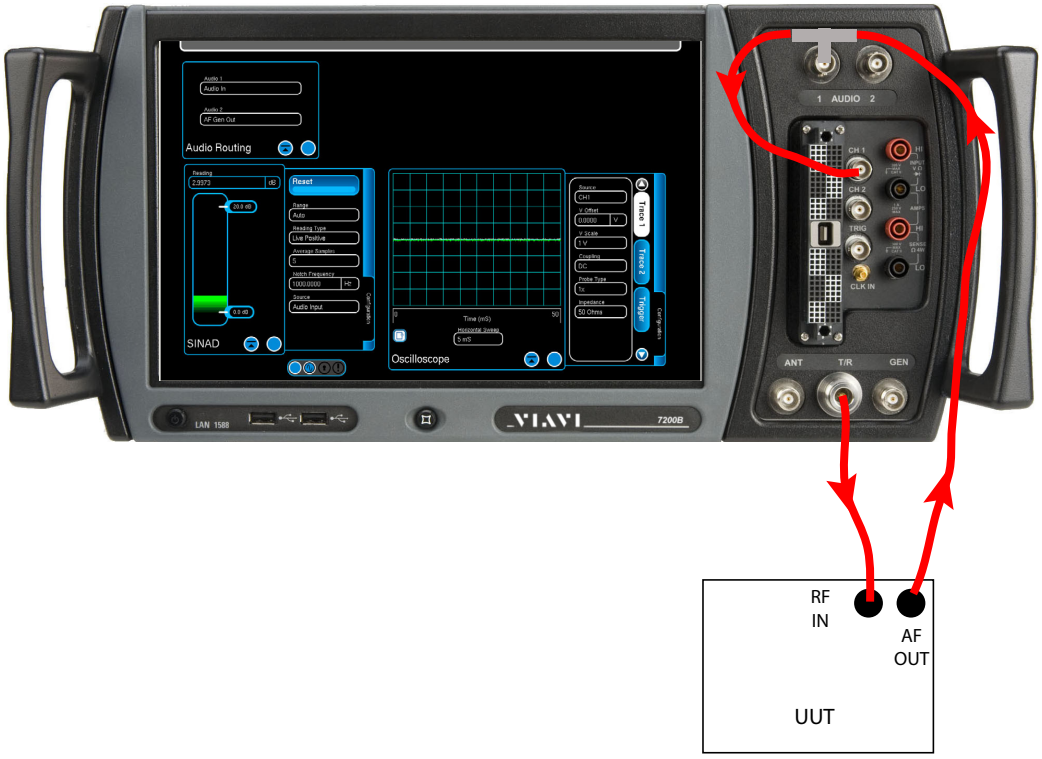


Fig. 2-40 Receiver Test Hardware Configuration

Configure Test Set parameters as follows to perform UUT Receiver Testing:

Function	Parameter	Setting
RF Generator	Frequency	Per UUT
RF Generator	Port	GEN
RF Generator	Level	Per UUT
RF Generator	Enable	ON
Audio Routing	Audio 1	Audio In
Meters	Source	Audio Input
Oscilloscope	Source	CH1

2.10.3 Duplex Testing

Duplex Testing performs both UUT Transmitter and Receiver Testing. The Test Set can be configured for One Port or Two Port Duplex testing.

2.10.3.A One Port Duplex Testing

The UUT is connected to the Test Set as shown in Fig. 2-41.

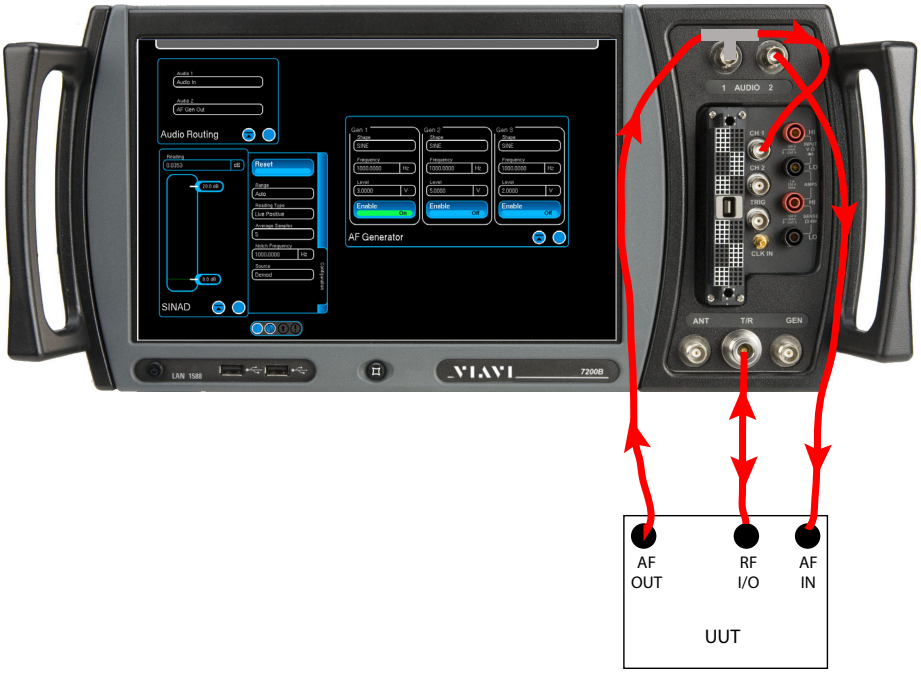


Fig. 2-41 One Port Duplex Test Hardware Configuration

Configure Test Set parameters as follows to perform One Port Duplex Testing:

Function	Parameter	Setting
RF Generator	Frequency	Per UUT
RF Generator	Port	T/R
RF Generator	Level	Per UUT
RF Generator	Enable	ON
Receiver	Frequency	Per UUT
Receiver	Port	T/R
Receiver	IF Bandwidth	Per UUT
Receiver	Modulation	Per UUT
Receiver	Reference Level	Per UUT
AF Generator	Shape	Per UUT (Sine is typical)
AF Generator	Frequency	Per UUT (1 kHz is typical)
AF Generator	Level	Per UUT
AF Generator	Enable	ON
Audio Routing	Audio 1	Audio In
Audio Routing	Audio 2	AF Gen Out
Meters	Source	Set to Audio Input to view demodulated UUT signal. Set to Demod to view UUT RF Signal.
Oscilloscope	Source	CH1 (view demodulated UUT signal)

2.10.3.B Two Port Duplex Testing

The UUT is connected to the Test Set as shown in Fig. 2-42.

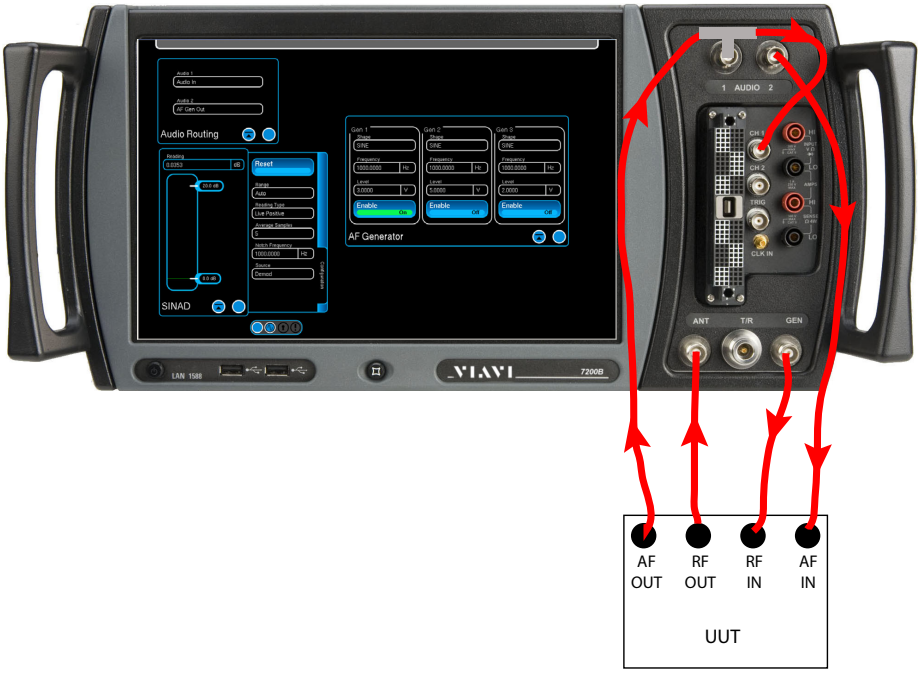


Fig. 2-42 Two Port Duplex Test Hardware Configuration

Configure Test Set parameters as follows to perform Two Port Duplex Testing:

Function	Parameter	Setting
RF Generator	Frequency	Per UUT
RF Generator	Port	GEN
RF Generator	Level	Per UUT
RF Generator	Enable	ON
Receiver	Frequency	Per UUT
Receiver	Port	ANT
Receiver	IF Bandwidth	Per UUT
Receiver	Modulation	Per UUT
Receiver	Reference Level	Per UUT
AF Generator	Shape	Per UUT (Sine is typical)
AF Generator	Frequency	Per UUT (1 kHz is typical)
AF Generator	Level	Per UUT
AF Generator	Enable	ON
Audio Routing	Audio 1	Audio In
Audio Routing	Audio 2	AF Gen Out
Meters	Source	Set to Audio Input to view demodulated UUT signal Set to Demod to view UUT RF Signal
Oscilloscope	Source	CH1 (view demodulated UUT signal)

Chapter 3 - Test Set Functions

3.1 INTRODUCTION

This chapter provides an operational description of Test Set Generate, Receiver Meter and Instrument functions.

3.2 GENERATORS

Test Set Generator Functions are accessed from the Generators Function Menu.

3.2.1 RF Generator Window

The RF Generator produces outgoing RF signals at either the T/R or GEN Connector. The RF Generator is also used in combination with the modulation generators to produce modulated signals.

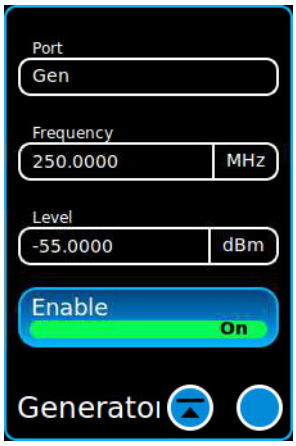


Fig. 3-1 RF Generator Window

Parameter	Description
Frequency	Sets the frequency generated by the RF Generator at the selected RF Output Connector.
Port	Selects the RF Output Connector to which the RF Generator Signal is routed. The GEN Connector is the dedicated RF output connector. The T/R Connector provides full duplex operation.
Level	Sets the Output Level of the RF Generator.
Enable	Turns the RF Generator On and Off.

3.2.2 Generator Modulation Window

The Generator Modulation Window is used to configure the Test Set's modulation generator functions. The fields displayed on the Generator Modulation Window depend on the parameter selected from the Modulation/Gen Mode menu.

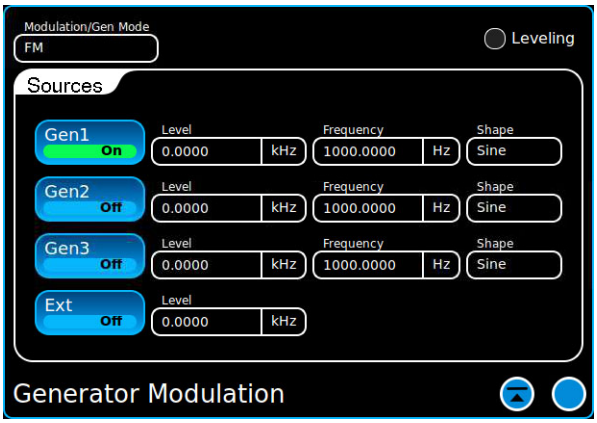


Fig. 3-2 Generator Modulation Window

3.2.2.A Modulated Signal Routing

The RF Modulation Generators apply modulation parameters to signals that are routed from the Test Set's internal Function Generator or from an external signal source. The modulated signals are then routed to the RF Generator which sends the signal to the selected output connector.

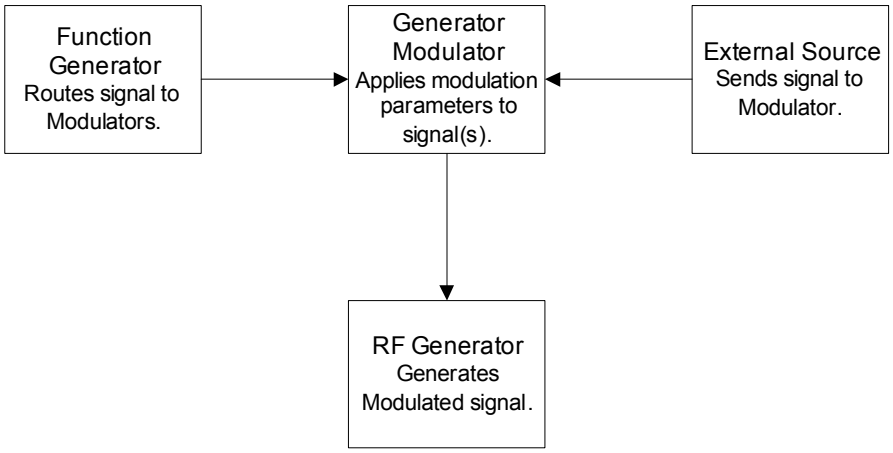


Fig. 3-3 Modulated Signal Routing Diagram

NOTE	In order for the Test Set to generate a modulated signal, both RF and Modulation parameters must be configured.

3.2.2.B Enabling Modulation

Modulation Generators are enabled by setting the Gen"X" Buttons to the ON state. External Modulation is enabled by setting the Ext Button to the ON state.

3.2.2.C Generator Modulation Parameters

The Modulation/Gen Mode and Leveling Status Indicator are always present on the Generator Modulation Window. Other parameters are enabled based on the Modulation/ Gen Mode setting: Modulation Type or Generator Mode.

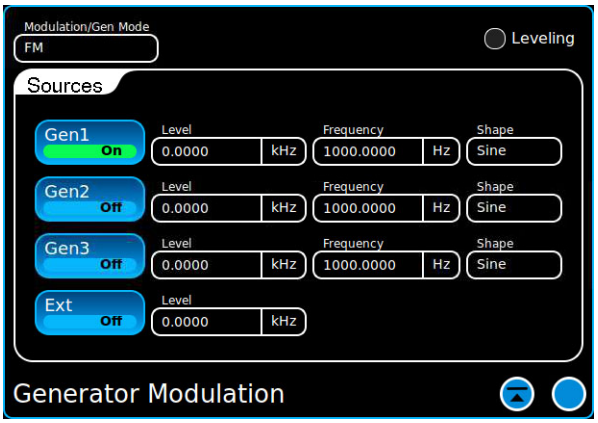


Fig. 3-4 Generator Modulation Window

Parameter	Description
Modulation/ Gen Mode	Selects the modulation function to be performed. • Modulation type: Defines the type of modulation to be applied to the outgoing RF Signal. Selecting a Modulation Type modulation parameters on the Generator Modulation Window. • Gen Modes: Selects additional Modulation Generator modes. Refer to section 3.2.2.F, Modulator Modes for information.
Leveling Indicator	The Test Set makes internal adjustments to ensure the accuracy of the power level of an outgoing modulated signal. The Leveling Status Indicator shows the status of the adjustment process (referred to as Leveling). • Leveling Active (refer to Fig. 3-17) indicates the Leveling process is being performed. The indicator background is Yellow/Orange in color. • Leveling Complete (refer to Fig. 3-5) indicates the Leveling process is complete. The indicator background is black.

3.2.2.D Modulated Signal Types

This section describes the types of modulated signals the Test Set is capable of generating. Refer to section 3.2.2.F, Modulator Modes for additional Generator Modulation functions.

3.2.2.D.1 No (None) Modulation

When Modulation Type is set to None all parameters are in the Locked State. Parameters are enabled when a modulation type is selected.

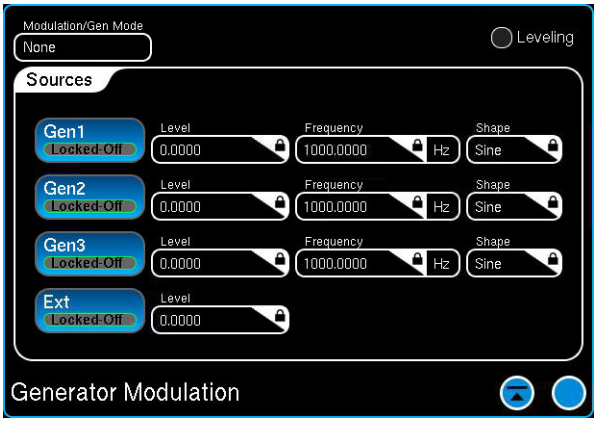


Fig. 3-5 Generator Modulation - No Modulation Selected

3.2.2.D.2 AM Parameters

When AM is selected the Generator Modulation Window displays the following fields:

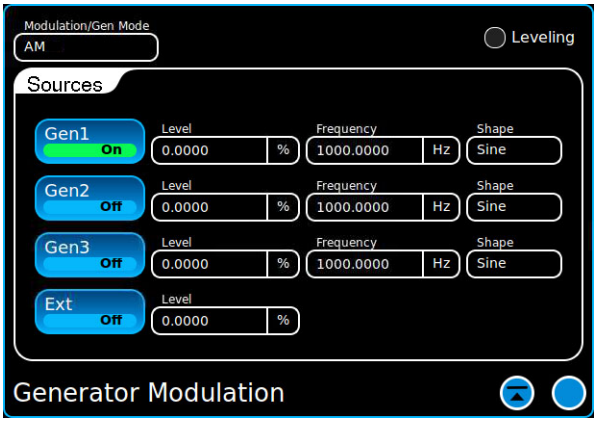


Fig. 3-6 AM Modulation Parameters

Parameter	Description
Level	Defines depth applied to modulated signal.
Frequency	Defines frequency of modulated signal.
Shape	Selects waveform shape of modulated signal.

3.2.2.D.3 FM Parameters

When FM is selected the Generator Modulation Window displays the following fields:

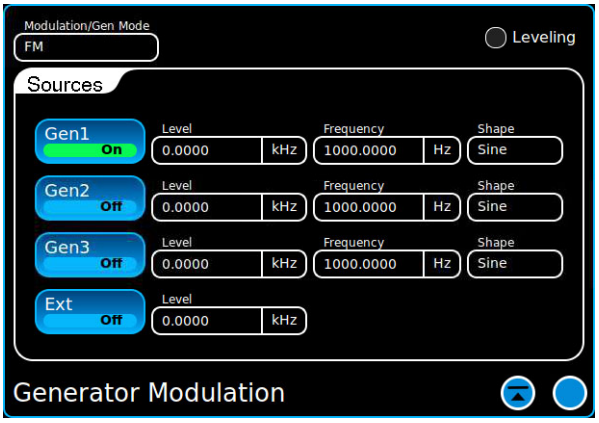


Fig. 3-7 FM Modulation Parameters

Parameter	Description
Level	Defines deviation applied to modulated signal.
Frequency	Defines frequency of modulated signal.
Shape	Selects waveform shape of modulated signal.

3.2.2.D.4 PM Parameters

When PM is selected the Generator Modulation Window displays the following fields:

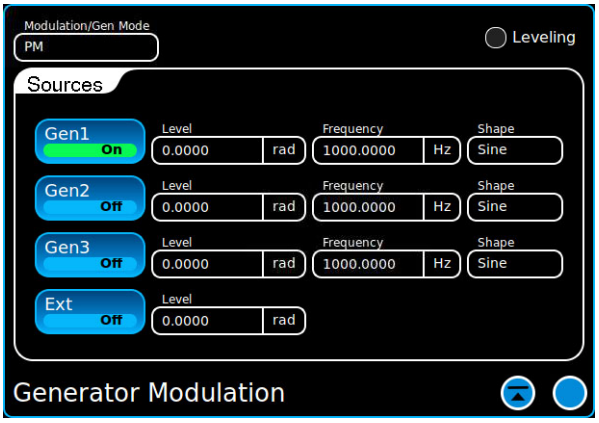


Fig. 3-8 PM Modulation Parameters

Parameter	Description
Level	Defines phase shift applied to modulated signal.
Frequency	Defines frequency of modulated signal.
Shape	Selects waveform shape of modulated signal.

3.2.2.D.5 Lower Sideband (LSB) Parameters

When LSB modulation is selected the Generator Modulation Window displays the following fields:

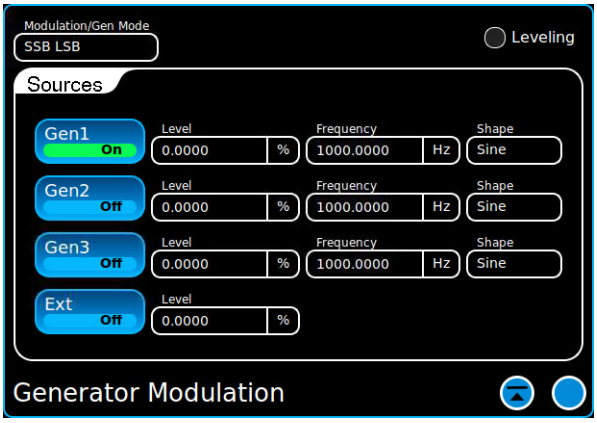


Fig. 3-9 LSB Modulation Parameters

Parameter	Description
Level	Defines depth applied to modulated signal.
Frequency	Defines frequency of modulated signal.
Shape	Selects waveform shape of modulated signal.

3.2.2.D.6 Upper Sideband (USB) Parameters

When USB modulation is selected the Generator Modulation Window displays the following fields:

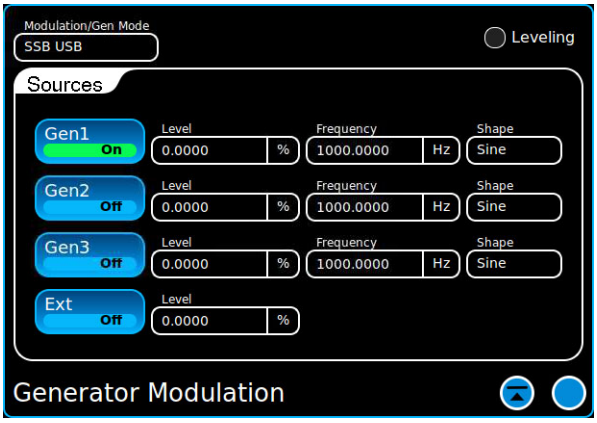


Fig. 3-10 USB Modulation Parameters

Parameter	Description
Level	Defines depth applied to modulated signal.
Frequency	Defines frequency of modulated signal.
Shape	Selects waveform shape of modulated signal.

3.2.2.D.7 NRZ Modulation Types

NRZ Modulation types are available when Option #139261 is enabled on the Test Set.

An NRZ Modulation type must be selected to use the Digital Data Generator to produce an outgoing modulated NRZ data signal.

Refer to 3.2.4.B, Configure Digital Data Generator Modulation Output Source for detailed information.

3.2.2.D.8 External Modulation

External Modulation is available for some modulation types (i.e., AM, FM or SSB LSB). A valid input audio signal must be connected to the Test Set to use external modulation. The Test Set's Audio Input Routing must also be properly configured.

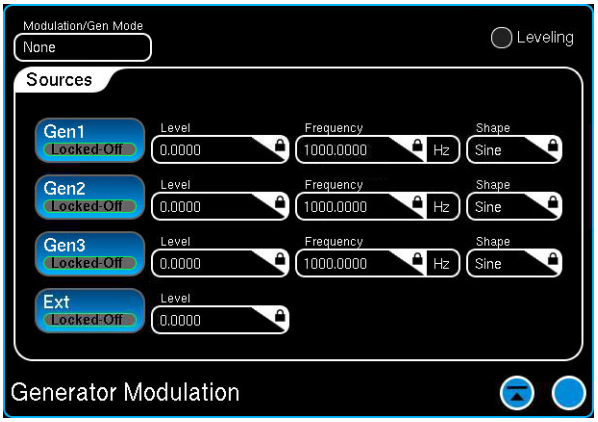


Fig. 3-11 External Modulation Unavailable

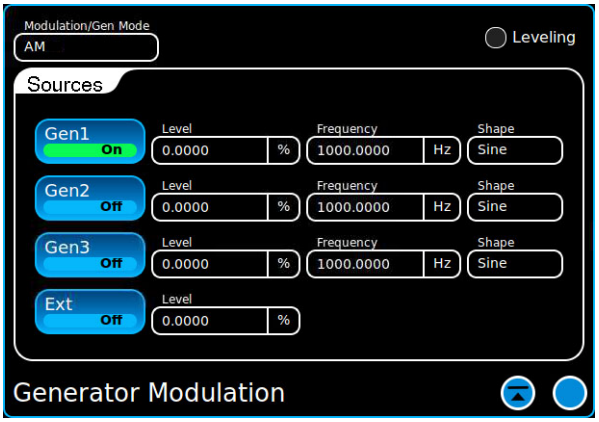


Fig. 3-12 External Modulation Available

3.2.2.E How to Configure a Modulated Signal

To configure the Test Set to generate a modulated signal:

STEP PROCEDURE

1. Select Modulation type from Modulation drop-down menu.

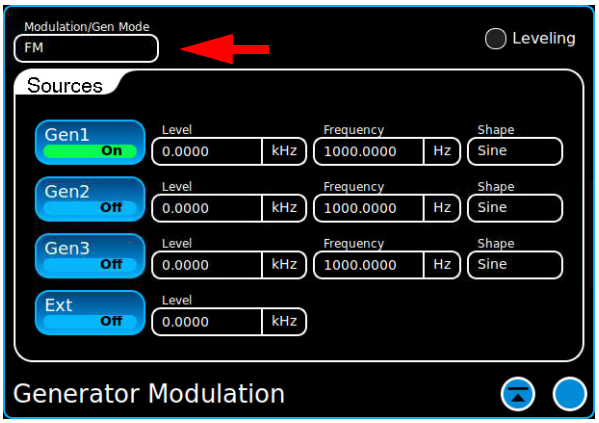


Fig. 3-13 Select Modulation Type

2. Configure Level, Frequency and Type parameters for internal modulation source (Gen1, Gen2 or Gen3).

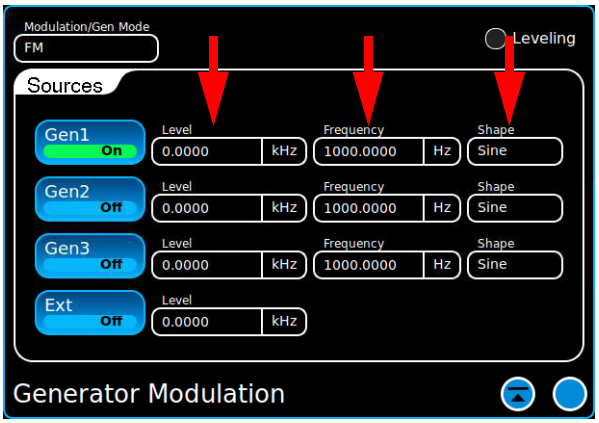


Fig. 3-14 Configure Modulation Parameters

3. Configure Level, Frequency and Port parameters for RF Generator. Enable the RF Generator.
4. Enable the Modulator (Gen1, Gen2 or Gen3).
5. Wait while the Leveling process is completed.

NOTE

Refer to section 3.2.2.F.2.a, How to Generate an IQ Modulated Signal for procedures to output IQ Waveforms.
Refer to section 3.2.4.B, Configure Digital Data Generator Modulation Output Source for procedures to output NRZ Modulation types.

3.2.2.F Modulator Modes

This section describes the additional modes of operation which are supported by the Test Set's modulation generators.

3.2.2.F.1 Record/Playback

The Generator Modulation Record/Playback and Receiver IQ Record Functions were merged into the IQ Record-Playback Window in software version 2.1.0.

Refer to section 3.3.6, IQ Record-Playback Window for information.

3.2.2.F.2 I/Q File

This function is available when Option #139270 is enabled on the Test Set.

Selecting IQ File Modulation allows the user to select an iq waveform file which has been imported to or saved in the Test Set. IQ Files which have been imported to the Test Set are selected by pressing the Browse Button.

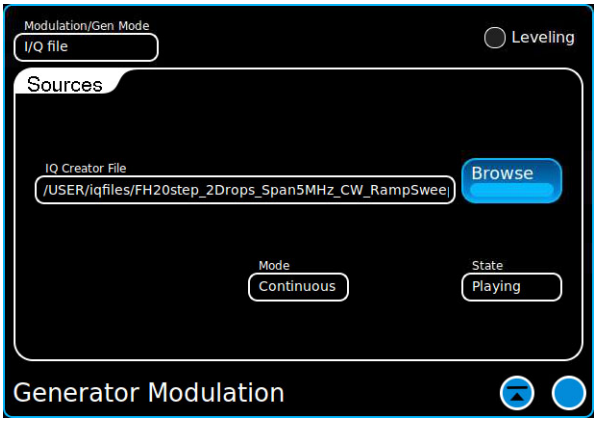


Fig. 3-15 IQ File Modulation Parameters

Parameter	Description
IQ File	Loads the IQ waveform File to be played.
Mode	Defines the output mode of the IQ Waveform. • Continuous: sends IQ Waveform in continuous loop. • Single SW: sends single sweep of the waveform. • Single HW: reserved for future development.
NOTE	IQ waveforms with a bandwidth <250 kHz can only be played in Continuous mode.
State	Returns play state of arbitrary waveform. • Loading: IQ Waveform file is being loaded. • Idle: Playback is disabled or complete. • Armed: Initiates single sweep of IQ waveform when in Single-SW mode. • Playing: Indicates IQ waveform is playing.

3.2.2.F.2.a How to Generate an IQ Modulated Signal

NOTE	The Arbitrary waveform file must be imported to the Test Set in order to generate the waveform.

To configure the Test Set to output an IQ File:

STEP	PROCEDURE

1. Enable the RF Generator.
2. Select IQ File from the Modulation type drop-down menu.
3. Select the desired Playback Mode (example shows Continuous).
4. Press the Browse Button to open the File Find Dialog Window.
5. Select the IQ File to be loaded. Verify the File Name field updates to display the selected file.

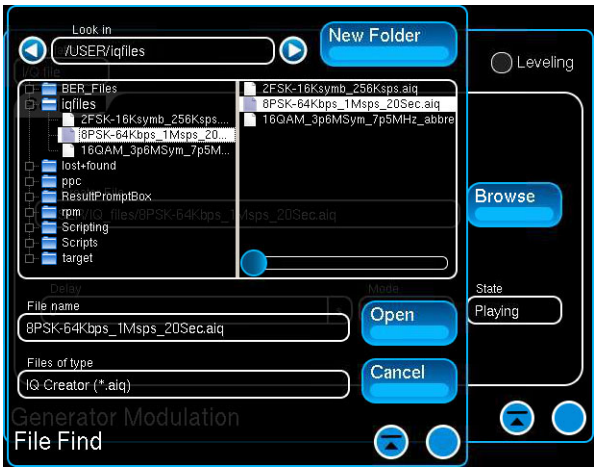


Fig. 3-16 Select IQ File to Load

6. Press the Open Button to load the selected file.
7. Wait while the Test Set loads the selected file. The Leveling Status indicator updates to show Leveling status at the end of the load process.

NOTE	Do not interrupt the file loading process. Interrupting the file loading process may place the Test Set in an inoperable state.

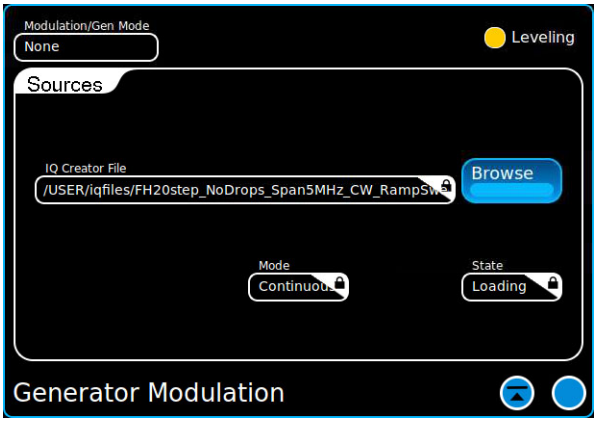


Fig. 3-17 IQ File Loading Status

8. When the Leveling Indicator changes back to Inactive State the IQ file is playing.

3.2.3 AF Generator

The Audio Function (AF) Generator provides the functionality necessary to evaluate frequency and audio response as well as to perform measurements such as gain and distortion.

The Test Set has three audio generators, Gen1, Gen2 and Gen3. Each generator can be configured independently to produce signals with different waveform type, frequency and level parameters.

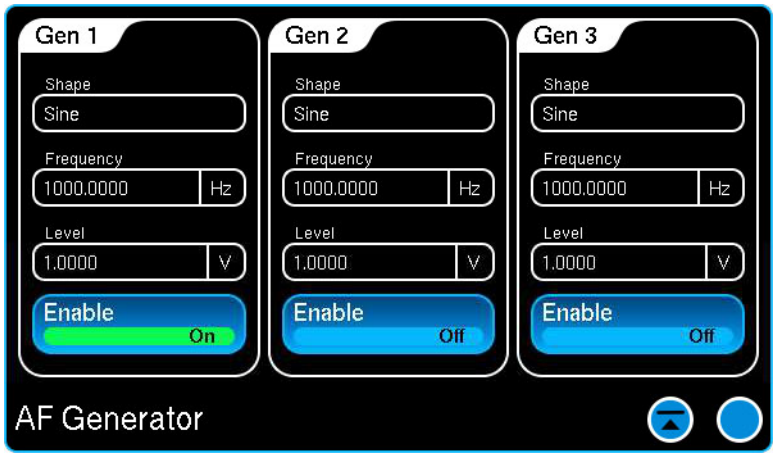


Fig. 3-18 AF Generator Window

Parameter	Description
Type	Selects waveform shape of generated signal.
Frequency	Defines the frequency of the signal.
Level	Defines level applied to the signal.
Enable	Enables/disables AF Generator.

3.2.3.A How to Configure an AF Generator Signal

To configure the Test Set to generate an AF signal:

STEP PROCEDURE

1. Configure the Audio Output Port on the Audio Routing Window.
2. Configure Type, Frequency and Level parameters for internal audio source (Gen1, Gen2 or Gen3).
3. Enable the AF Generator (Gen1, Gen2 or Gen3).

3.2.4 Digital Data Generator

This function is available when Option #139261 is enabled on the Test Set.

The Digital Data Generator outputs a non return to zero (NRZ) bit pattern which can be used in combination with the BER Meter to perform loop-back test scenarios. Digital Data Generator and BER Meter parameters must be configured to match when performing loop-back tests.

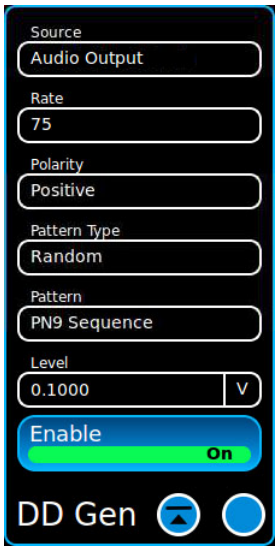


Fig. 3-19 Digital Data Generator (DD Gen)

The Digital Data Generator allows the user to define the following signal parameters:

Component	Description
Source	Selects the internal signal source for the Digital Data Generator. Audio Output routes a signal from the Digital Data Generator to the Test Set's Audio 1 Connector. • The Modulation Type on the Generator Modulation Window must be set to a non-NRZ modulation type to select Audio Output. • Audio 1 on Audio Routing Window must be set to DD Gen Out. Modulation Output routes a signal from the Test Set's Digital Data Generator to the Modulation Generator. • RF and Modulation Generators must be configured properly. • The Modulation Type on the Generator Modulation Window must be set to an NRZ modulation type.
Rate	Defines the Data Rate of the generated signal.
Polarity	Defines the Polarity of the outgoing signal in relation to the Pattern Definition. • Positive: Outgoing signal is not altered. • Negative: Outgoing signal is inverted in relation to the selected Pattern.

Component	Description
Pattern Type	Selects the type of pattern used by the Digital Data Generator. • Random: populates the Pattern drop-down menu with available PN sequence patterns. • Fixed: populates the Pattern drop-down menu with available standard patterns. • User Defined: populates the Pattern drop-down menu with customer generated pattern files which have been transferred to and stored on the Test Set.
Pattern	Selects the pattern generated by Digital Data Generator. Menu contents depend on the selected Pattern Type.
Level	Defines the amplitude of the generated signal.
Enable	The Enable button turns the Digital Data Generator ON and OFF. This button is placed in a Locked State when an NRZ Modulation Type is selected on the Generator Modulation Window.

3.2.4.A Configure Digital Data Generator Audio Output Source

When the Digital Data Generator Source is set to Audio Output, the Test Set routes a signal from the Digital Data Generator to the Test Set's Audio 1 Connector. The Audio 1 field on the Audio Routing Window must be set to DD Gen Out.

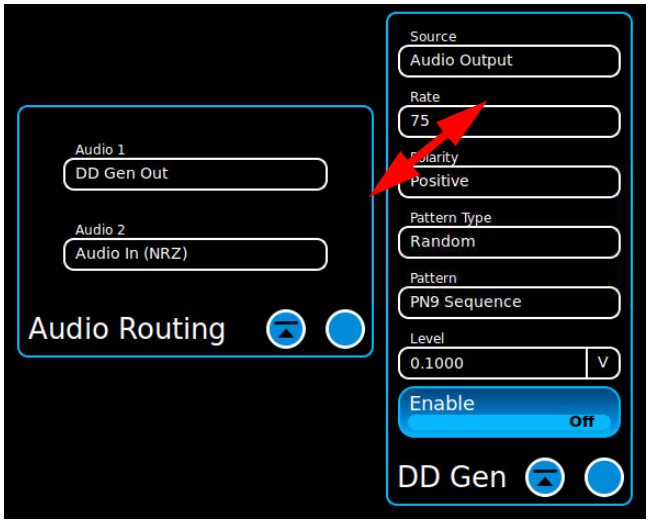


Fig. 3-20 Digital Data Generator Audio Output Configuration

The following procedure describes the basic steps necessary to configure the Digital Data Generator to use a signal routed to the Test Set's Audio 2 Connector:

STEP PROCEDURE

1. Set Digital Data Generator Source to Audio Output.
2. Select DD Gen Out on the Audio Routing Window.
3. Define Rate, Polarity, Pattern Type and Level according to UUT parameters as desired.
4. Select the Pattern for defined Pattern Type.
5. Enable the Digital Data Generator.
6. If performing BER Loop-back test, define BER Meter parameters to match Digital Data Generator parameters.

3.2.4.B Configure Digital Data Generator Modulation Output Source

Functionality of the Digital Data Generator Modulation Output Source is linked to the Test Set's RF and Modulation Generators. The Generator Modulation Type must be set to an NRZ Modulation (i.e., AM NRZ or FM NRZ) in order to create a modulated digital data signal. The RF Generator outputs the RF Signal to which the modulation parameters are applied.

The following procedure describes the basic steps necessary to configure the Digital Data Generator to use a signal routed from the Test Set's Modulation Generator:

STEP	PROCEDURE

1. Open the RF Generator, Generator Modulation and Digital Data Generator Windows.
2. Enable the RF Generator.
3. Configure RF Generator parameters according to outgoing signal requirements.
4. Select the Generator Modulation Window.
5. Set the Modulation Type to the desired NRZ modulation type.
6. The Digital Data Generator Source updates to Modulation Output and is placed in a Locked State.
7. The Digital Data Generator is enabled and is placed in a Locked State.

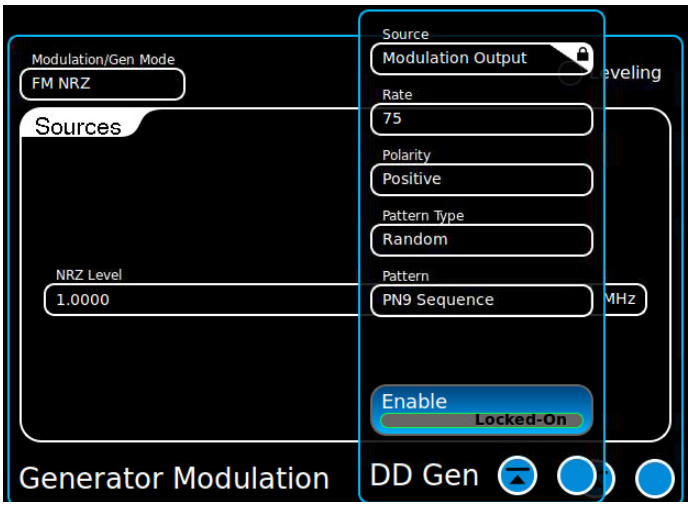


Fig. 3-21 Digital Data Generator Modulation Output

8. Define Digital Data Generator Rate, Polarity and Pattern Type according to UUT parameters as desired.
9. Select the Pattern for defined Pattern Type.
10. Configure the NRZ Level on the Generator Modulation Window.
11. When the Leveling process is complete the Test Set is outputting the configured modulated digital data signal.
12. If performing BER Loop-back test, define BER Meter parameters to match Digital Data Generator parameters.

3.3 RECEIVE FUNCTIONS

Test Set Receive Functions are accessed from the Receiver Function Menu.

3.3.1 Audio Filter Window

The Audio Filter Window provides the user with the ability to include a filter in the audio signal path. The audio filter isolates the selected portion of the incoming signal which allows the user to include or exclude specific aspects of the incoming signal. The type of filter selected should be appropriate for the type of signal being received.

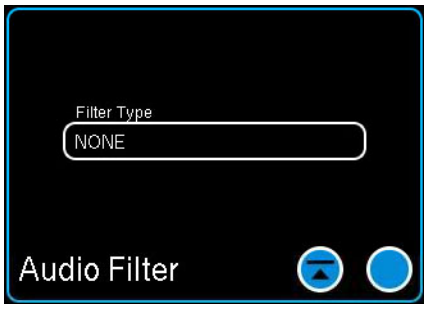


Fig. 3-22 Audio Filter Window

3.3.2 Demod Filter Window

The Demod Filter Window provides the user with the ability to include a filter in the RF signal path. The demod filter isolates the selected portion of the incoming signal which allows the user to include or exclude specific aspects of the incoming signal. The type of filter selected should be appropriate for the type of signal being received.

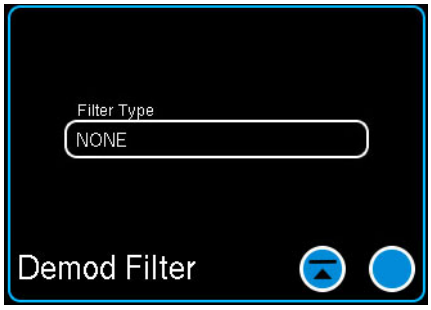


Fig. 3-23 Demod Filter Window

3.3.3 Receiver Window

The RF Receiver defines and displays parameters of the signal the Test Set receives from the Unit Under Test (UUT). Receiver parameters should be configured according to the operating specifications of the UUT and to the type of signal being received from the from the UUT.

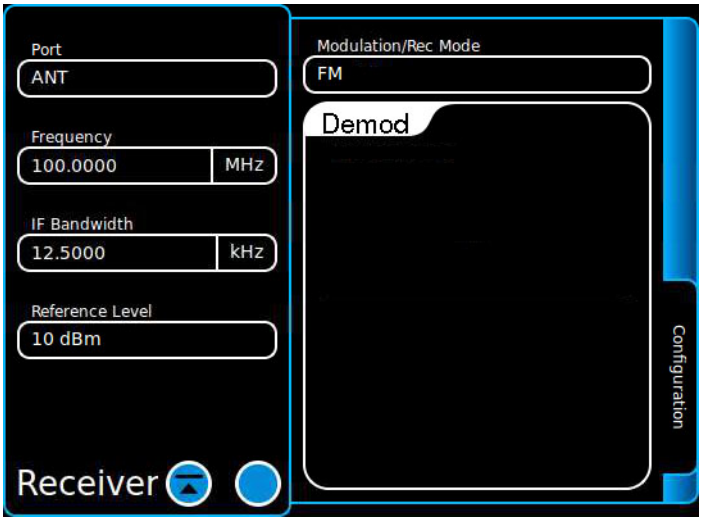


Fig. 3-24 Receiver Configuration Window

Parameter	Description
Port	Selects the connector at which the Test Set receives an Input signal.
Frequency	Sets the expected frequency of the received signal.
NOTE	When the Spectrum Analyzer Span is set to a value <100 MHz the Receiver Frequency defines the Spectrum Analyzer Center Frequency.
IF Bandwidth	Selects the expected bandwidth of the received signal. The bandwidths that are available change according to the Modulation type selected. The IF Bandwidth should be set to a value higher than the bandwidth of the incoming signal.
Reference Level	Defines the Receiver Reference Level.
Modulation	This menu selects the receive function to be performed. • Modulation type: Defines the type of signal being received and demodulated by the Receiver. The Modulation Type selected on the Receiver affects which meter readings are valid. • Rec Modes: Refer to section 3.3.4, Receiver Modes of Operation.
Demod Parameters	The Demod section of the Receiver Configuration Window updates according to the selected Modulation Type.

3.3.3.A Configuring Modulation Measurements

The following configuration procedure is used for performing modulation measurements.

STEP	PROCEDURE

1. Select the appropriate Input Connector.
   - ANT Connector should be selected for high sensitivity, low power measurements.
   - T/R Connector should be selected for high power measurements.
2. Receiver Frequency should be set to the UUT transmit frequency.
3. Select the IF Bandwidth and Modulation according to the expected receive signal.
4. Set the Reference Level according to the expected receive signal.
5. Configure Filter Type on the Audio Filter Window according to the expected receive signal.

Refer to the following sections for additional information:

- 3.3.6, IQ Record-Playback Window
- 3.3.4.A, Burst Power Measurements

3.3.4 Receiver Modes of Operation

3.3.4.A Burst Power Measurements

This function is available when Option #139260 is enabled on the Test Set.

The Receiver Modulation/Rec Mode must be set to Burst Power in order to obtain valid readings on the Burst Power Signal Meter.

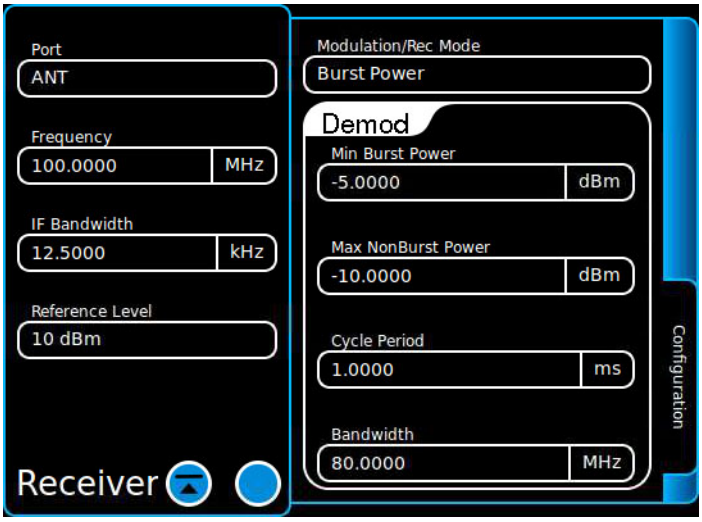


Fig. 3-25 Burst Power Measurement Parameters

Parameter	Description
Min Burst Power (Upper Threshold)	The Min Burst Power value defines the upper threshold of the power window (refer to Fig. 3-43).
Max Non-Burst Power (Lower Threshold)	The Max Non-Burst Power value defines the lower threshold of the power window (refer to Fig. 3-43).
NOTE	Thresholds should be reviewed and adjusted as necessary when a radio changes output power levels.
Cycle Period	Defines the total on/off time of a hopping signal.
Bandwidth	Defines the expected bandwidth of the received signal. Most hopping signals use a bandwidth that occupies several RF channels (refer to Fig. 3-43).

Refer to section 3.5.8, Burst Power Signal Meter for information about performing Burst Power Signal measurements.

3.3.5 IQ Record Function

The Receiver IQ Record and Generator Modulation Record/Playback Functions were merged into the IQ Record-Playback Window in software version 2.1.0.

Refer to section 3.3.6, IQ Record-Playback Window for information.

3.3.6 IQ Record-Playback Window

This function is available when Option #139272 is enabled on the Test Set.

The IQ Record-Playback Window is used to record an incoming signal in the form of an IQ waveform. The recorded IQ waveform can be used as follows:

- Immediately played back on the Test Set using the IQ Playback function (refer to 3.3.6.D, Recording and Playing IQ Signals).
- Saved and transferred to an external device using the Test Set's File Management Window.
- Saved to the Test Set's internal database and played back at a later date using the Generator Modulation IQ File Option #139270.

> **NOTE** The Receiver IQ Record and Generator Modulation Record/Playback Functions were merged into the IQ Record-Playback Window in software version 2.1.0.
> The IQ Record functionality described in this section applies to Test Sets running software version 2.1.0 or later.
> If the Test Set contains software prior to version 2.1.0, refer to the Receiver IQ Record Function.

3.3.6.A IQ Record/Playback Functionality Overview

IQ Record functionality is managed by the Test Set's Receiver; IQ Playback functionality is managed by the Test Set's RF and Modulation Generators. Incoming (Record) signal parameters are defined on the IQ Record Tab and outgoing (Playback) signal parameters are configured on the IQ Playback Tab.

The IQ Record-Playback function is designed to use the system's Receiver, RF Generator and Modulation Generator to perform selected record and playback functions. When IQ Record-Playback is enabled the Test Set's Receiver, RF Generator and Modulation Generator functions are locked as described in the following sections.

3.3.6.A.1 Record/Receiver Field Synchronization

When IQ Record-Playback functionality is enabled, the Port, Frequency and Reference Level fields on the Receiver Window are placed in a Locked State (Fig. 3-26). In this state the IQ Record Port, Frequency and Reference Level settings are linked with the RF Receiver settings. Changing any of the linked IQ Record parameters updates the corresponding RF Receiver parameter.

The RF Receiver's Port, Frequency and Reference Level fields remain in the Locked State until the IQ Record-Playback function is turned OFF (Fig. 3-27). When Record-Playback Functionality is turned OFF, the RF Receiver's Port, Frequency and Reference Level fields default to their previous settings.

3.3.6.A.2 Playback/Generator Field Synchronization

When IQ Record-Playback functionality is enabled, the Port, Frequency and Level fields on the Generator Window are placed in a Locked State (Fig. 3-26). When IQ record-Playback is enabled the fields on the Generator Modulation Window are also placed in a Locked State (Fig. 3-26). In this state the IQ Playback Port, Frequency and Level settings are linked with the RF Generator settings. Changing any of the linked IQ Playback parameters updates the corresponding RF Generator parameter.

The RF Generator's Port, Frequency and Level fields and Generator Modulation fields remain in the Locked State until the IQ Record-Playback function is turned OFF (Fig. 3-27). When Record-Playback Functionality is turned OFF, all RF and Modulation generator fields are unlocked and the RF Generator's Port, Frequency and Level fields default to their previous settings.

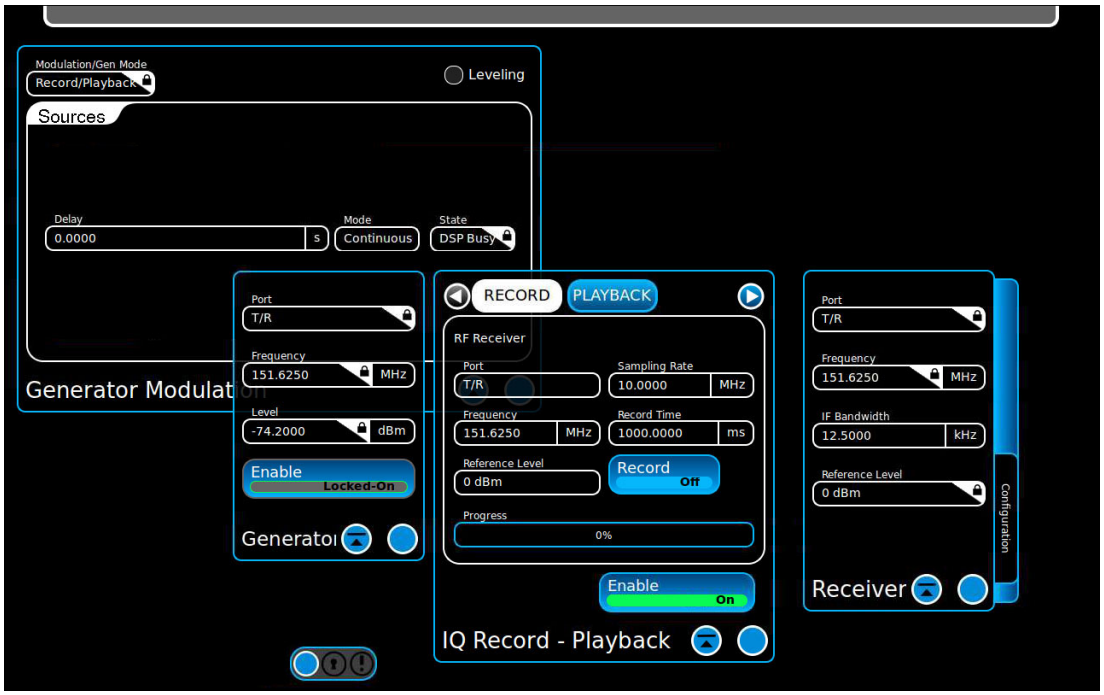


Fig. 3-26 IQ Record-Playback Function ON

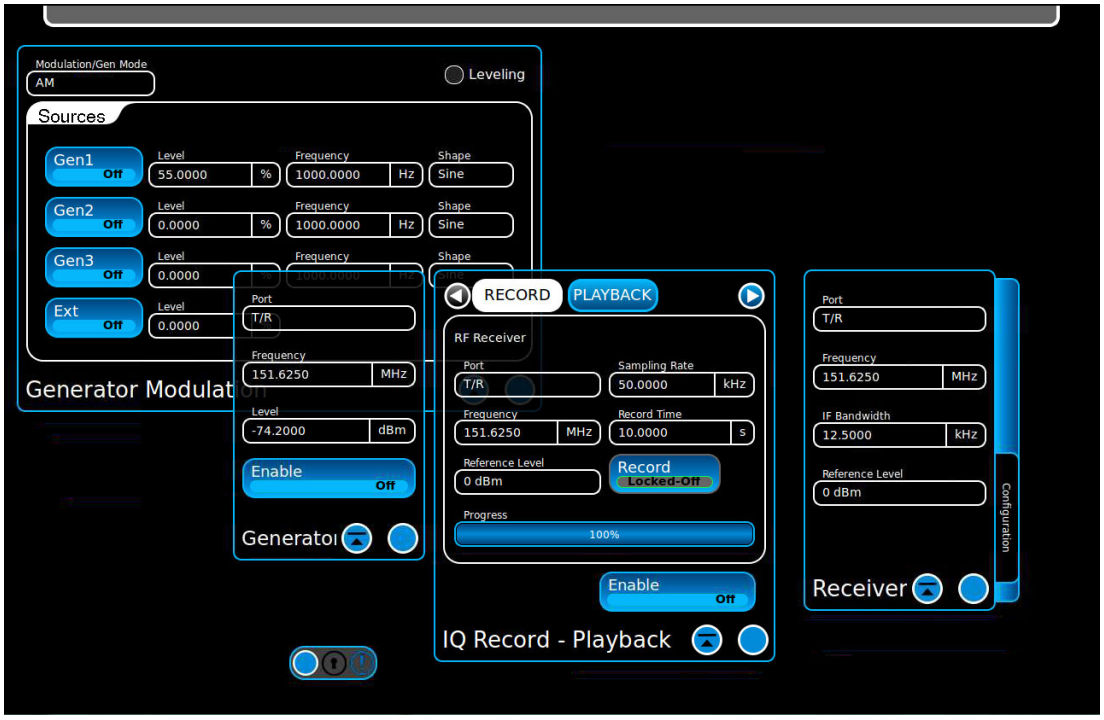
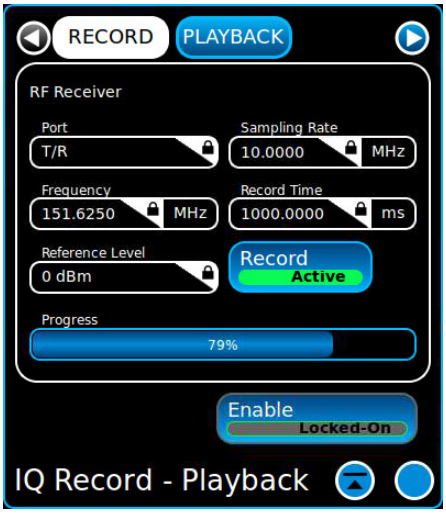


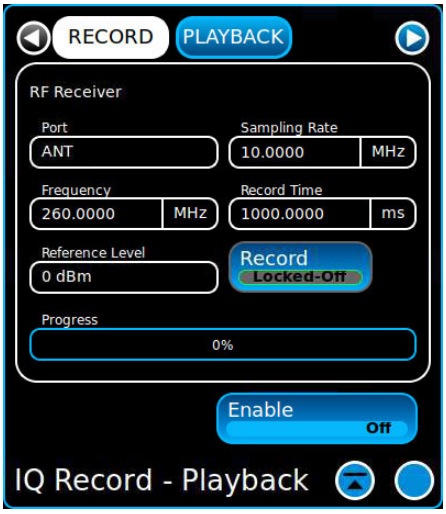
Fig. 3-27 IQ Record-Playback Function OFF

3.3.6.B IQ Record Mode Parameters

IQ Record parameters define how the Test Set's Receiver processes and records the incoming signal.



IQ Record In Progress



IQ Record Complete (Playing)

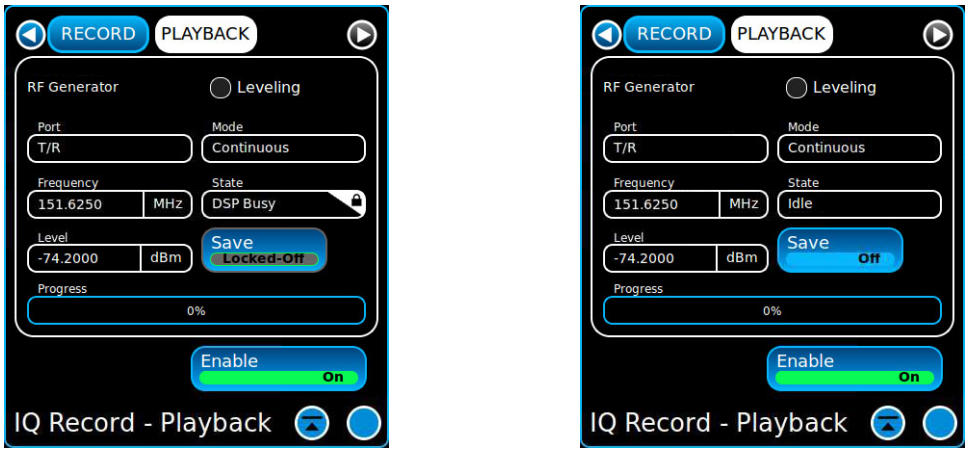
Fig. 3-28 IQ Record Function Parameters

Parameter	Description
Port	The Record Port field selects the RF Input connector where the incoming signal is being received. When Record/Playback functionality is enabled the Record Port is synchronized with the RF Receiver Port. The Record Port setting defaults to the selected RF Receiver Port setting and the RF Receiver Port is placed in a locked state.
Sampling Rate	This field defines the rate at which the input signal is sampled.
Frequency	The Record Frequency defines the Receive frequency of the signal to be recorded. Refer to section 3.3.6.A.1, Record/ Receiver Field Synchronization for additional information.
Record Time	This field defines the length of time the Test Set records the signal.
Reference Level	This field defines the Receiver Reference Level. Refer to section 3.3.6.A.1, Record/Receiver Field Synchronization for additional information.
Record Button	Pressing the Record Button initiates the record function. The button also indicates status of the record and playback functions during different system processes. • Locked-Active: Indicates Test Set is recording an incoming signal. • Off: Ready to Record Signal. • Locked-Off: Indicates Playback Mode is ON. Turn Playback Mode OFF to enable the Record button.
Progress Bar	The Progress Bar indicates the completion status of the recording process.

Parameter	Description
Enable Button	This button configures the Test Set's processors to perform record and playback functions. When enabled (ON), IQ Record parameters override and lock the corresponding Receiver and Generator parameters. Refer to section 3.3.6.A, IQ Record/ Playback Functionality Overview for more detailed information.

3.3.6.C IQ Playback Mode Parameters

IQ Playback parameters define how a recorded IQ signal is processed and generated by the Test Set's RF Generator.



IQ Playback In Progress IQ Playback Stopped

Fig. 3-29 IQ Playback Function Parameters

Parameter	Description
Port	Selects the Test Set Connector from which the IQ signal is generated. Refer to section 3.3.6.A.2, Playback/Generator Field Synchronization for more information.
Mode	Defines the playback mode of the waveform. • Continuous: plays waveform as a continuous loop. When Continuous Mode is selected the Test Set auto-plays the recorded signal at the completion of the recording process. • Single SW: plays single sweep of the waveform.
Level	Defines the level at which the Test Set generates the outgoing signal. Refer to section 3.3.6.A.2, Playback/Generator Field Synchronization for more information.
State	Field functions as a drop down menu and a status indicator. • Idle: Playback is disabled or complete. • Armed: Initiates playback of recorded IQ waveform. • Playing: Indicates IQ waveform is playing. • Busy: Indicates Test Set's processors are active.
Frequency	Defines the frequency of the outgoing signal. Refer to section 3.3.6.A.2, Playback/Generator Field Synchronization for more information.

Parameter	Description
Save	Opens the File Save Dialog Window which allows the user to save the recorded waveform as an .aiq file. The button also indicates status of IQ Record-Playback functions. • Locked-Off: Indicates Test Set is playing a recorded signal. Playback must be turned OFF (Idle) before waveform can be saved • On: Indicates Playback Mode is Off and the Save function is available.
NOTE	Saved IQ files can only be played back on the Test Set when the Generator Modulation IQ File Option #139270 is enabled on the Test Set.
Save Progress Bar	The Save Progress Bar indicates the completion status of the file save process. Refer to Fig. 3-31.
Enable Button	This button configures the Test Set's processors to perform record and playback functions. When enabled (ON), IQ Record parameters override and lock the corresponding Receiver and Generator parameters. Refer to section 3.3.6.A, IQ Record/ Playback Functionality Overview for more detailed information.

3.3.6.D Recording and Playing IQ Signals

IQ Record Mode records the incoming signal. When the recording process is complete the system automatically switches to IQ Playback Mode and begins playing the recorded waveform. IQ Playback Mode parameters determine how the recorded IQ waveform is played.

3.3.6.D.1 How to Record an Incoming Signal

STEP	PROCEDURE

1. Open IQ Record-Playback Window. Select the Record Tab.
2. Set Enable to ON.
3. Wait while the system performs a series of internal processes to prepare to record a signal.
4. Configure the IQ Record RF Receiver parameters according to the specifications of the incoming signal.
5. Press the Record Button.

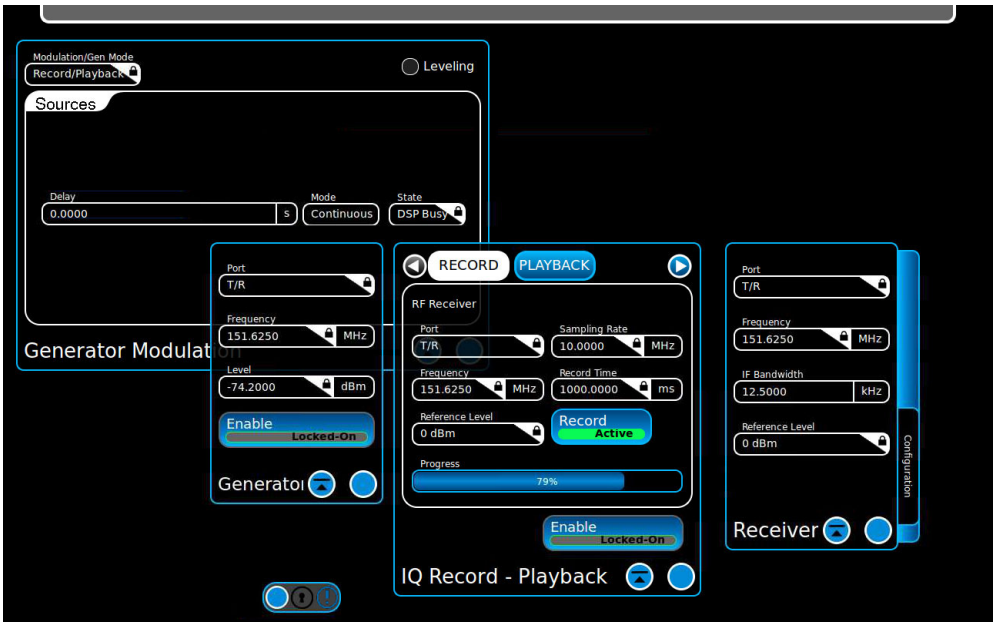


Fig. 3-30 IQ Record - In Progress

6. Wait while the Test Set processes and records the incoming signal.

> **NOTE** When Continuous Playback Mode is selected the Test Set auto-plays the recorded signal at the completion of the recording process. Refer to section 3.3.6.C, IQ Playback Mode Parameters for information about configuring Playback parameters.

3.3.6.D.2 How to Save a Recorded Signal

STEP	PROCEDURE

1. Follow procedure defined in section 3.3.6.D.1, How to Record an Incoming Signal.
2. Set Playback Mode to Stop (Idle).
3. Press the Save Button. Enter the name of the file and press the Save Button.

> **NOTE** Recorded waveforms can only be stored in the /USER/iqfiles directory or a user created sub-directory.

4. Wait while the Test Set saves the file.

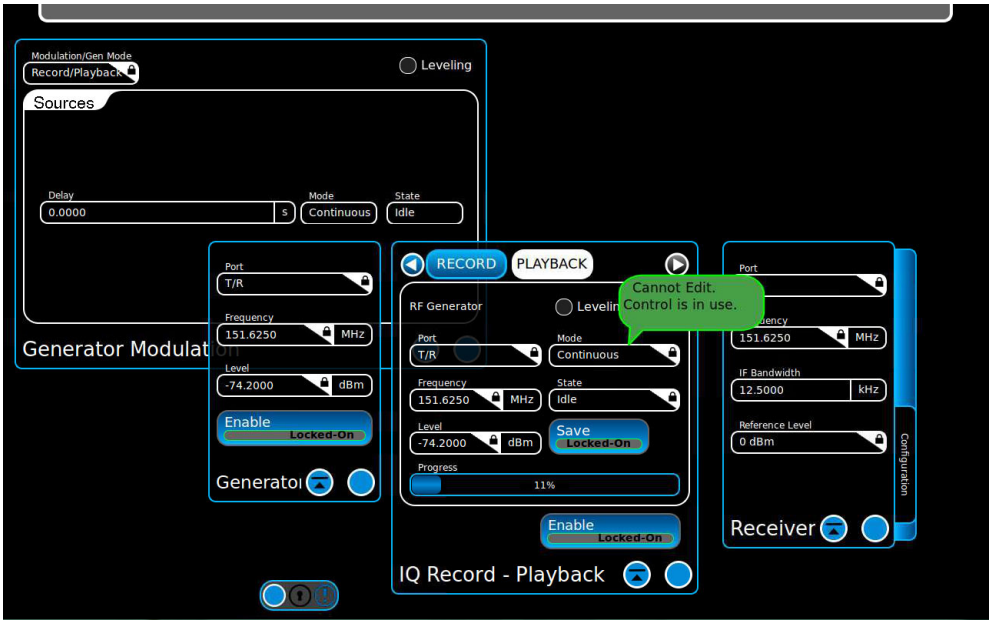


Fig. 3-31 IQ Record - File Save In Progress

5. When the save file process is complete the saved file can be transferred from the Test Set to an external device using the Test Set's File Management Window or played using the Generator Modulation IQ File Option #139270 (if enabled).

3.3.6.D.3 How to Playback a Saved Signal

A saved IQ file can be played on the Test Set when the Generator Modulation IQ File Option #139270 is enabled on the Test Set.

3.3.7 Burst Power Demod Window

The Burst Power Demod Window is obsolete. Burst Power Demod parameters are now enabled on the Receiver Configuration Window when Burst Power Modulation Type is selected.

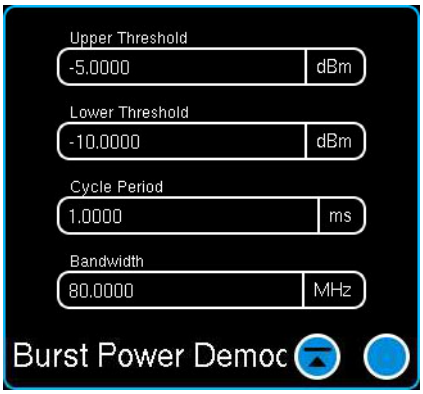


Fig. 3-32 Burst Power Demod Window

3.4 SIGNAL ROUTING

Signal routing pertains to how incoming and outgoing signals are routed through the Test Set operating system. Signal Routing functions are selected from the Systems Menu.

3.4.1 Audio Routing Window

The Audio Routing Window allows the user to configure the Input/Output functionality of the Audio Input Connectors.

With the exception of the Audio In Balanced selection, Audio 1 and Audio 2 Connectors cannot be set to the same mode of operation. The Test Set only allows for one input and one output selection.

NOTE	The Impedance settings available for Audio Meters are determined by the selected Audio Routing and Audio Source parameters. A signal source must be selected on Audio and Demod Meters to obtain valid measurements.



Fig. 3-33 Audio Routing Window

I/O Selections	Description
Audio In	Defines a connector as the source of an incoming audio signal.
AF Gen Out	Routes the defined AF Generator signal to the audio connector as an output signal. When AF Gen Out is selected an outgoing audio signal must be configured on the AF Generator Window.
Demod Out	Routes the demodulated signal from the Receiver to the audio connector as an output signal. When Demod Out is selected the Receive Modulation Type must be properly configured according to the UUT operating parameters.
DD Gen Out	This function is available when Option #139261 is enabled on the Test Set. Routes the defined Digital Data Generator signal to the audio connector as an output signal. Digital Data Generator signal must be configured on the Digital Data Generator Window when DD Gen Out is selected.
Audio In Balanced	Audio In Balanced sets the Audio 1 and Audio 2 Connectors to accept a balanced differential input audio signal. The balanced input has an impedance of 600 Ω. When Audio In Balanced is selected on either the Audio 1 or Audio 2 Connector the Test Set updates both settings to Audio In Balanced.

3.5 METERS

The measurement meters provide numerical readings and bar graph representations of data measurements. Configuration windows contain parameters to allow the user to manage measurement data by defining parameters such as average measurements and the type of measurement displayed on the meter.

3.5.1 Accessing Meter Windows

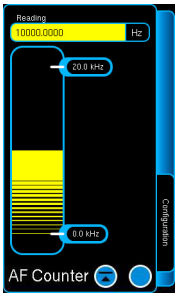
Meters are selected from the Meter drop-down menu on the Launch Bar, or from sub menus as shown in Fig. 3-34. Menu contents are dependent on the options installed in the Test Set.



Fig. 3-34 Meters Sub-Menu

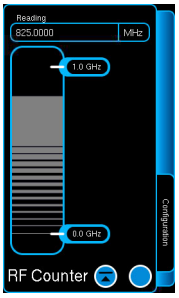
3.5.2 Meter Reading Status Indicators

The Test Set's Meters use different colors to indicate the status of the measurement data. More than one condition may occur. For example, a meter reading field may be yellow to indicate the reading is still acquiring, but the meter bar graph may be red.



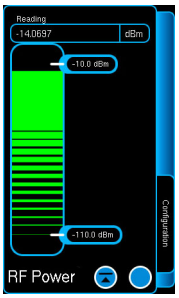
When the bar graph turns yellow it indicates measurement data is being acquired.

If this condition persists, verify the Receiver parameters are configured properly for the type of signal being received.

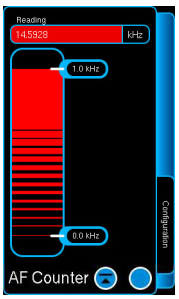


When the bar graph turns grey it indicates acquired measurement data is invalid.

Verify the Receiver parameters are configured properly for the type of signal being received (i.e., analog vs digital signal configuration).

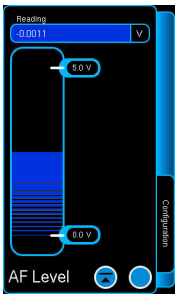


When the bar graph turns green it indicates all measurement data has been acquired and the reading is valid.



When the bar graph and reading field backgrounds turn red it indicates the meter reading exceeds the top value of the defined meter range.

When this condition occurs change the Range setting to a value appropriate for the reading.



When the bar graph and reading field backgrounds turn blue it indicates the meter reading is below the lower meter range value.

When this condition occurs change the Range setting to a value appropriate for the reading.

Fig. 3-35 Meter Reading Status Indicators

3.5.3 AF Counter

The AF Counter measures the number of oscillations present in the received audio signal. The AF Counter measurement is displayed on the AF Counter Window. Additional parameters are available by opening the Configuration Window.

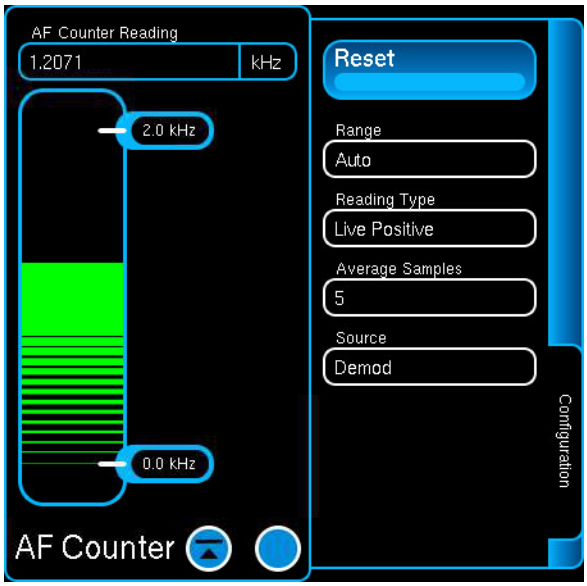


Fig. 3-36 AF Counter Window (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Source	Selects the signal source used for performing AF Counter measurements. A valid signal source must be selected to obtain valid AF Counter measurements.
NOTE	Noise meter Source settings are linked. Changing the Source setting on one noise meter updates the Source setting on all other noise meters.

3.5.4 AF Level Meter

The AF Level Meter displays the signal magnitude measurement of the input audio signal. The signal may be from an external source or from the Test Set's internal demodulator. The magnitude units is defined by the selected source (i.e., volts for external source, Hz deviation for FM Demod).

The AF Level measurement is displayed on the AF Level Meter Window. Additional parameters are available by opening the Configuration Window.

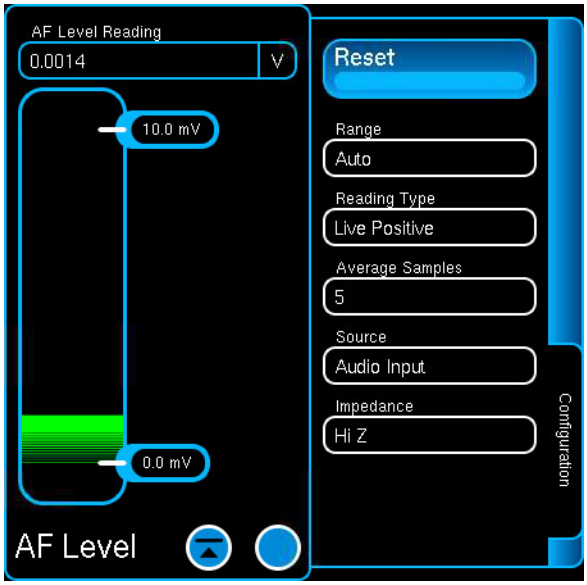


Fig. 3-37 AF Level Window (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Source	Selects signal source for AF Level measurements. A valid signal source must be selected to obtain valid AF Level measurements.
NOTE	Noise meter Source settings are linked. Changing the Source setting on one noise meter updates the Source setting on all other noise meters.
Impedance	Selects the load applied to the input signal. The available Impedance settings are defined by the selected Meter Source and Audio Routing parameters. • Demod: Impedance is not applicable to a routed demodulated signal and the Impedance field is updated to Locked State. • Audio Input: Hi Z, 150 Ohm and 300 Ohm are available. When Audio Routing is set to Audio Balanced the system auto-updates the Impedance value to 600 Ohm.

3.5.5 AM Peak Power Meter

The AM Peak Power Meter displays AM Peak Power measurements. The Receiver Modulation Type must be set to AM in order to obtain valid AM Peak Power measurements.

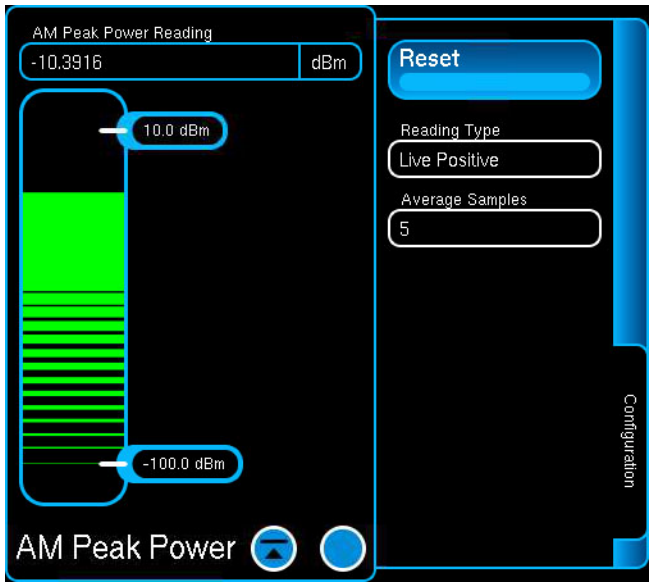


Fig. 3-38 AM Peak Power Meter (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.

3.5.6 AM RMS Power Meter

The AM RMS Power Meter displays AM Peak Power measurements. The Receiver Modulation Type must be set to AM in order to obtain valid AM RMS Power measurements.

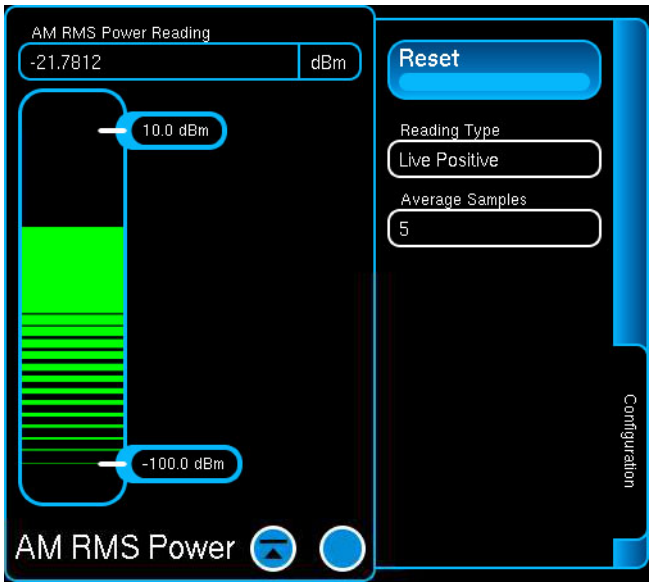


Fig. 3-39 AM RMS Power Meter (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.

3.5.7 Bit Error Rate (NRZ) Meter

This function is available when Option #139261 is enabled on the Test Set.

The BER (NRZ) Meter compares data received from an external source to a signal being transmitted by the Test Set. The BER measurement is displayed on the BER (NRZ) Meter Window. Additional parameters are available by opening the Configuration Window.

The BER (NRZ) Meter can be used in connection with the Digital Data Generator to perform a loop-back test. When performing a loop-back test, the patterns on the BER NRZ Meter and Digital Data Generator must be defined with the same pattern characteristics.

The BER (NRZ) Meter Configuration Window contains parameters for defining measurement and pattern parameters. Reading parameters are accessed by pressing the Readings tab on the Configuration Window. Pattern parameters are accessed by pressing the Pattern tab on the Configuration Window.

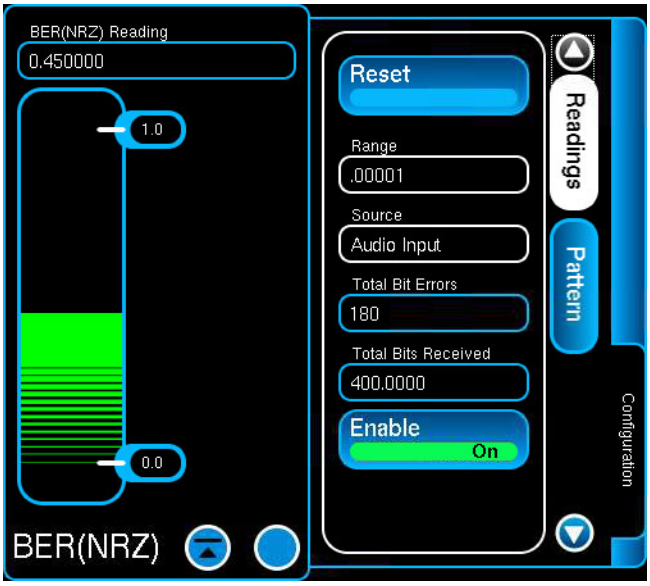


Fig. 3-40 BER (NRZ) Meter Readings Parameters

Parameter	Description
Reading	Displays meter measurement.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Source	Selects signal source for BER measurements. A valid signal source must be selected to obtain valid BER measurements.
Bit Errors	Displays the number of bits that were received in error when comparing the received signal with the defined incoming signal.
Total Bits Received	Displays the total number of bits received by the Test Set.
Measurement Type	Selects the type of BER measurement being displayed on the BER (NRZ) Meter.
Enable	Starts or stops BER (NRZ) Meter functions.

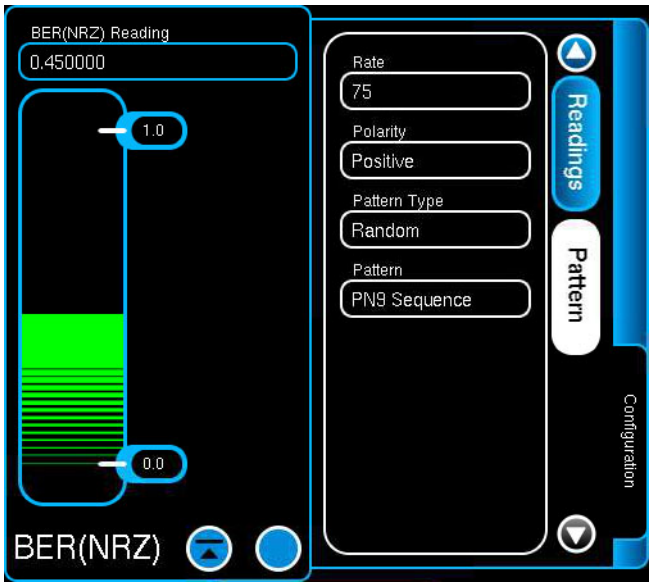


Fig. 3-41 BER (NRZ) Meter Pattern Parameters

Component	Description
Rate	Defines the data rate of the incoming signal.
Polarity	Defines the Polarity of the incoming signal in relation to the Pattern Definition. When Positive is selected the incoming signal is not altered. When Negative is selected the incoming signal is inverted in relation to the Pattern Definition.
Pattern Type	Selects the type of pattern that is expected to be in the received signal. Selecting Random populates the Pattern drop-down menu with available PNC sequence patterns. Selecting Fixed populates the Pattern drop-down menu with available standard patterns. Selecting User Defined allows the user to select a customer generated pattern file which have been transferred to and stored on the Test Set.
NOTE	User Defined Patterns must be transferred to the Test Set and placed in the /USER/BER_FILES/Fixed directory.
Pattern	This drop-down menu selects the pattern generated by Digital Data Generator. Menu contents are dependent on the selected Pattern Type.

3.5.8 Burst Power Signal Meter

This function is available when Option #139260 is enabled on the Test Set.

The Burst Power Signal Meter is designed to detect frequency hop waveforms that fail to provide a constant output power on all “hop” frequencies.

The Number of drop-outs and the accumulated number of hops are presented as a percent on the Burst Power Signal Meter. If no drop-outs are detected the reading is 0. The Burst Power Signal Meter must be configured properly in order to obtain valid measurement data. Refer to 3.5.8.A, To configure Burst Power Measurements and 3.5.8.B, Burst Power Measurement Configuration Diagrams.

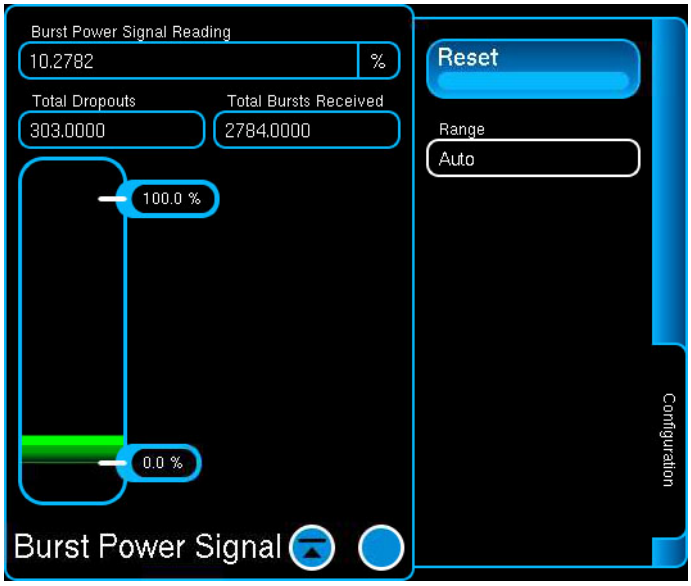


Fig. 3-42 Burst Power Signal Meter

Parameter	Description
Reading	Displays the ratio of Total Dropouts /Total Bursts.
Total Dropouts	Displays the total number of “low power” hops (fall between upper and lower threshold values, i.e., CH8 in Fig. 3-43.
Total Bursts Received	Displays the total number of frequency hops received.
Reset	Clears and resets measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.

3.5.8.A To configure Burst Power Measurements

Burst Power Signal parameters are configured on the Receiver Window. The Modulation Type on the Receiver Window must be set to Burst Power to access Burst Power Signal parameters.

STEP	PROCEDURE
1.	Select the T/R or ANT Input Connector (Receiver Window).
2.	Select Burst Power from Modulation/Rec Mode menu.
3.	Set the Receiver Frequency to the UUT transmit frequency (center of “hop” bandwidth).
4.	Set the Reference Level according to the expected receive signal.
5.	Define the Burst Power parameters according to the expected receive signal. Upper threshold (Min Burst Power) and Lower threshold (Max Non-Burst Power) parameters should be set to “window” the drop-out condition.

3.5.8.B Burst Power Measurement Configuration Diagrams

Fig. 3-43 shows upper and lower thresholds set properly according to incoming signal parameters. In this scenario the upper and lower thresholds are properly defined and the Test Set is able to correctly identify and measure Dropouts (CH8).

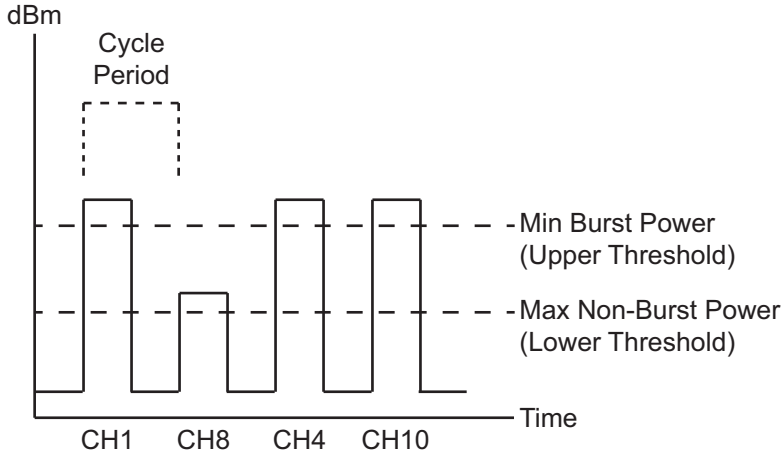


Fig. 3-43 Burst Power Measurement Diagram - Proper Adjustment

Fig. 3-44 shows upper and lower thresholds set incorrectly according to incoming signal parameters. Both upper and lower thresholds are set above the power level of the incoming signal and the Test Set is not able to identify Dropouts. In this scenario the Test Set counts and displays the Total Bursts Received but since it cannot identify Dropouts it does not display an accurate Total Dropouts reading or an accurate Burst Power reading.

Thresholds should be reviewed and adjusted as necessary when a radio changes output power levels.

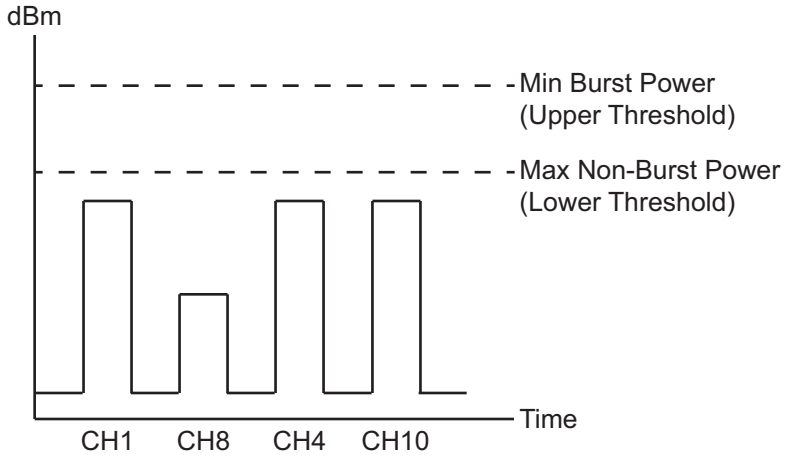


Fig. 3-44 Burst Power Measurement Diagram - Improper Adjustment

The Test Set contains a sample IQ file that when loaded generates a test signal which displays a 10% Burst Power Signal reading.

The IQ file FH20step_2Drops_Span5MHz_CW_RampSweep_CP-10MS_Fs-10MHz.aiq provides an example of how to configure Burst Power Signal parameters..

Refer to 3.2.2.F.2.a, How to Generate an IQ Modulated Signal for instructions about loading and running IQ files

3.5.9 Distortion Meter

The Distortion Meter measures the amount of distortion present on a received audio signal. The Distortion measurement is displayed on the Distortion Meter Window. Additional parameters are available by opening the Configuration Window.

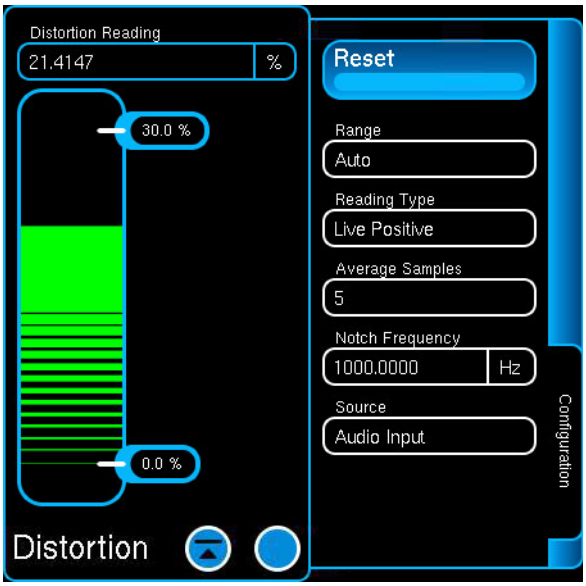


Fig. 3-45 Distortion Meter (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Notch Frequency	Defines frequency of Notch Filter included in the receive path.
NOTE	The Notch Frequency settings on the Distortion and SINAD meters are linked. Changing the Notch Frequency on one meter updates the setting on the other meter.
Source	Selects source of External Audio Input. A valid signal source must be selected to obtain valid Distortion measurements.
NOTE	Noise meter Source settings are linked. Changing the Source setting on one noise meter updates the Source setting on all other noise meters.

3.5.10 RF Counter

The RF Counter measures the number of oscillations present in the received RF signal. The RF Counter measurement is displayed on the RF Counter Window. Additional parameters are available by opening the Configuration Window.

A valid signal source must be selected from the RF Receiver Port to obtain valid RF Counter measurements.

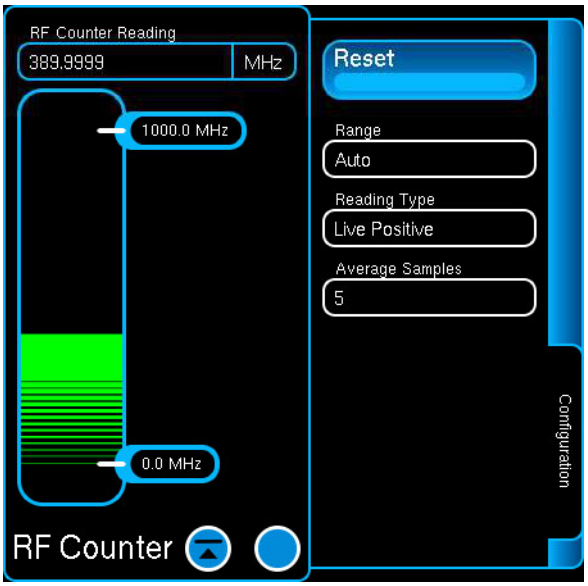


Fig. 3-46 RF Counter Window (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.

3.5.11 RF Error Meter

The RF Error Meter measures the frequency error of the received signal in relation to the defined RF Receiver Frequency.

The RF Receiver Frequency must be set to the expected transmit frequency of the UUT in order to obtain valid RF Error measurements.

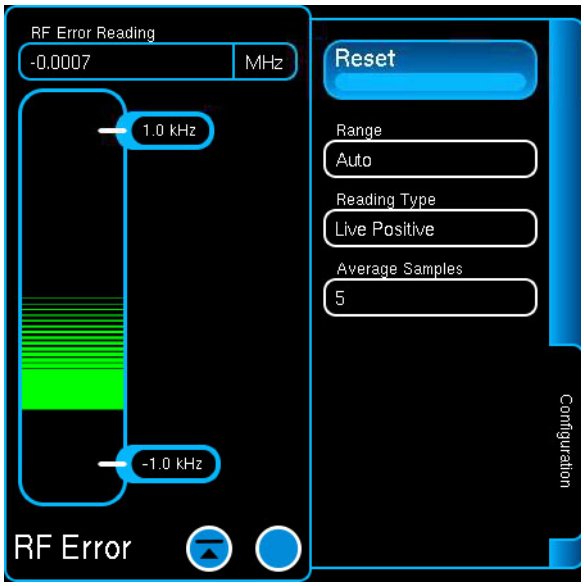


Fig. 3-47 RF Error Meter Window (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.

3.5.12 RF Power Meter

The RF Power Meter is a tuned power meter that indicates the amount of RF Energy contained within the Test Set's selected receiver bandwidth (i.e., 12.5 kHz). The RF Power Meter is tuned to a specific frequency, giving the ability to selectively measure the power of one channel when other channels are present.

The Power measurement is displayed on the RF Power Meter Window. Additional parameters are available by opening the Configuration Window.

Power can be measured at the T/R or ANT Connector. The Receiver T/R Connector should be used for high power measurements. The Receiver ANT Connector should be used for high sensitivity, low power measurements. Refer to Appendix C, Appendix C - Product Specifications for maximum input ratings for the T/R and ANT Connectors.

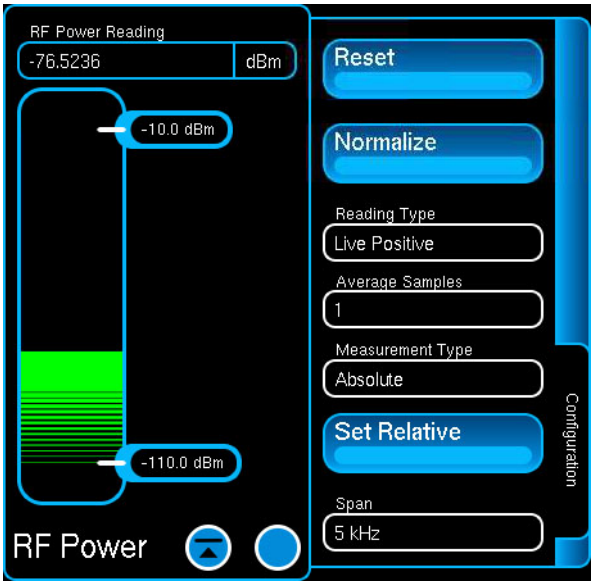


Fig. 3-48 RF Power Meter (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
NOTE	The Spectrum Analyzer "hops" the Receiver frequency when the Analyzer Span is set to a value >90 MHz. As a result the Power Meter Reading does not update when the Analyzer Span is set to a value >90 MHz.
Reset	Clears and resets peak and average measurements.
Normalize	Zeroes the RF Power Meter.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Measurement Type	Selects type of Power measurement being performed.
Set Relative	Sets value used for Relative Power measurements to current RF Power reading.
Span	Sets the frequency span used to calculate the RF Power measurement.

3.5.13 SINAD Meter

The SINAD Meter displays the ratio of the total signal power level to unwanted signal power. The SINAD Meter provides users with the ability to evaluate the degradation of the received signal and to measure the sensitivity of a radio receiver.

The SINAD measurement is displayed on the SINAD Meter Window. Additional parameters are available by opening the Configuration Window.

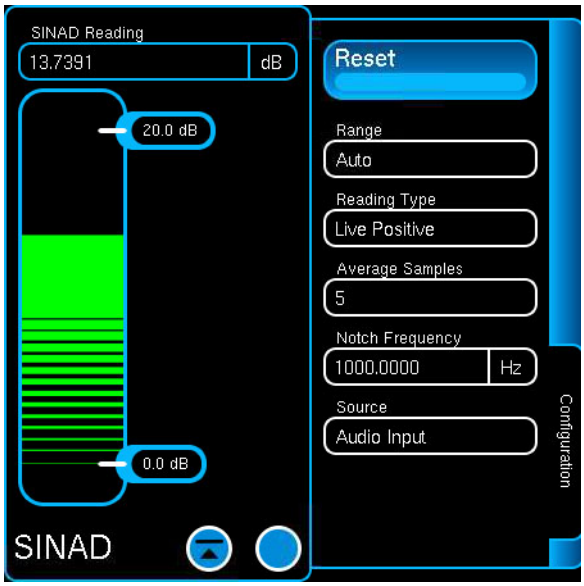


Fig. 3-49 SINAD Meter (Expanded)

Parameter	Description
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Defines vertical scale of meter bar graph. Range and unit of measurement vary according to meter.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Notch Frequency	Defines frequency of Notch Filter included in the receive path.
NOTE	The Notch Frequency settings on the Distortion and SINAD meters are linked. Changing the Notch Frequency on one meter updates the setting on the other meter.
Source	Selects source of External Audio Input. A valid signal source must be selected to obtain valid SINAD measurements.
NOTE	Noise meter Source settings are linked. Changing the Source setting on one noise meter updates the Source setting on all other noise meters.

3.6 DIGITAL MULTIMETER (DMM)

This function is available when Option #139257 is enabled on the Test Set.

The DMM (Digital Multimeter) displays the results of resistance, AC current, DC current and voltage measurements. Additional parameters are available on the Configuration Window.

3.6.1 DMM Measurement Modes

3.6.1.A AC/DC Volts

When Volts AC or Volts DC Mode is selected the DMM Meter functions as a Voltage Meter and displays the measurement of the voltage in the circuit being tested.

3.6.1.B AC/DC AMPs

When AMPS AC or AMPS DC Mode is selected the DMM Meter functions as an Ampere (AMP) Meter and displays measurement of electric current in the circuit being tested.

3.6.1.C Ohms

When Ohms Mode is selected the DMM functions as a Resistance (Ohm) Meter and displays the measurement of resistance found in the circuit being tested.

3.6.2 DMM Configuration Window

The DMM Configuration Window contains parameters for defining DMM measurements.

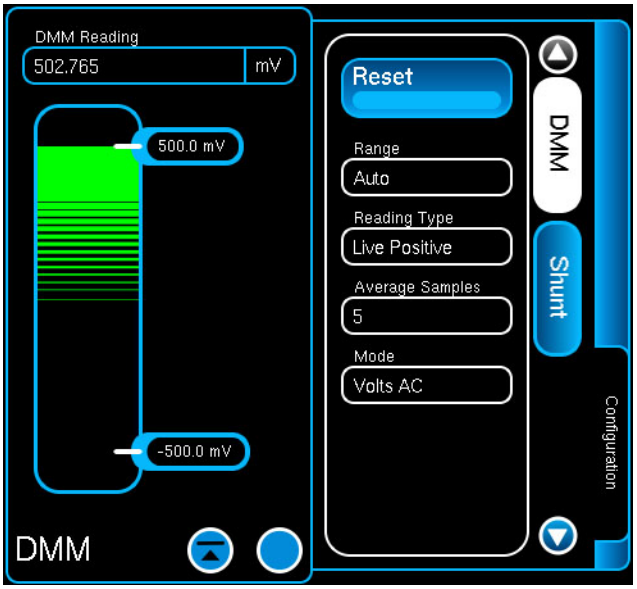


Fig. 3-50 DMM Meter Configuration Window

Parameter	DESCRIPTION
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Range	Range defines the vertical scale of the meter bar graph. Range and unit of measurement vary according to the selected Mode.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Mode	Selects the type of DMM Measurement Mode. Refer to 3.6.1, DMM Measurement Modes for additional information.

3.6.3 DMM Shunt Parameters

The DMM Shunt Window contains parameters for defining DMM Shunt measurements. The Test Set must be properly configured to perform Shunt measurements.

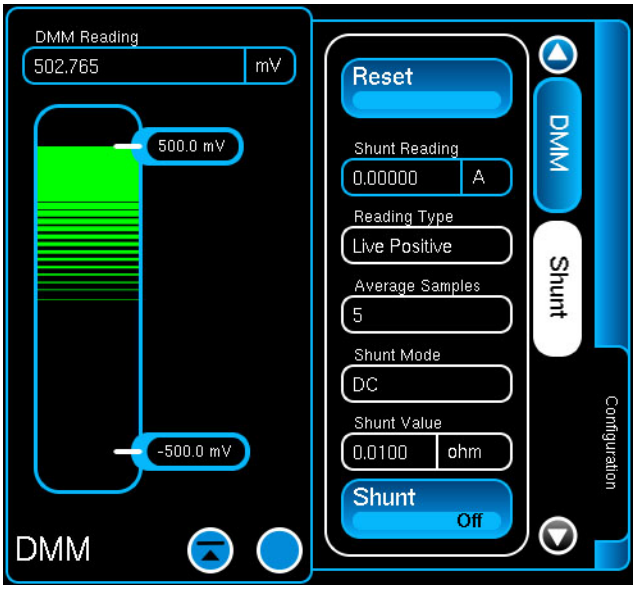


Fig. 3-51 DMM Shunt Parameters

Parameter	DESCRIPTION
Reading	Displays meter measurement. The type of measurement being displayed (Live, Average, Maximum or Minimum) is selected from the Reading Type Drop-down Menu.
Reset	Clears and resets peak and average measurements.
Shunt Reading	Displays reading value with shunt value applied.
Reading Type	Selects type of reading being displayed in the Reading field.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Shunt Mode	Selects the type of current being applied to the Shunt.
Shunt Value	Defines the Shunt value applied to the circuit.
Shunt On/Off	Enables/Disables Shunt measurements.

3.6.4 Configuring the DMM

To configure DMM Measurements:

STEP	PROCEDURE

1. Connect banana plug to Test Set DMM Connector. Use DMM Input connectors appropriate for measurement being performed.



Fig. 3-52 DMM Banana Plug Connected

2. Select Mode of operation according to type of measurement being performed.

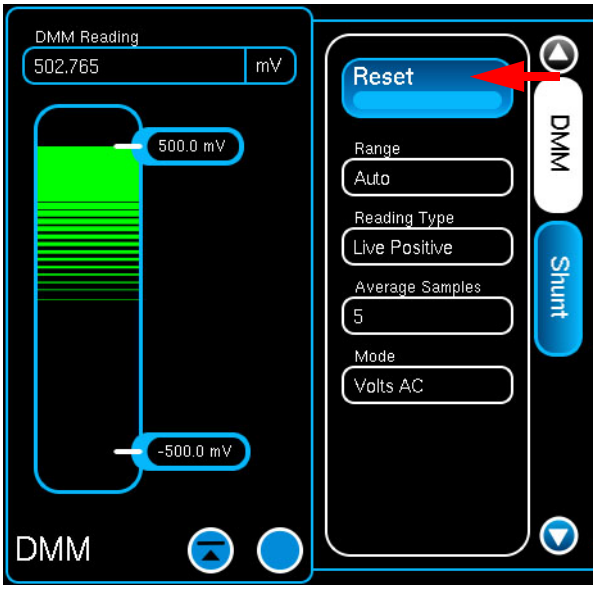


Fig. 3-53 DMM Mode Selection

3. If a Shunt is being used to measure current, configure Shunt parameters and enable Shunt measurements.

3.7 MARKERS

The Test Set supports six Markers for various test functions. Markers, when available, are housed in a Slide Out Window on the left side of the function Window. Fig. 3-54 shows the Spectrum Analyzer Markers Window.

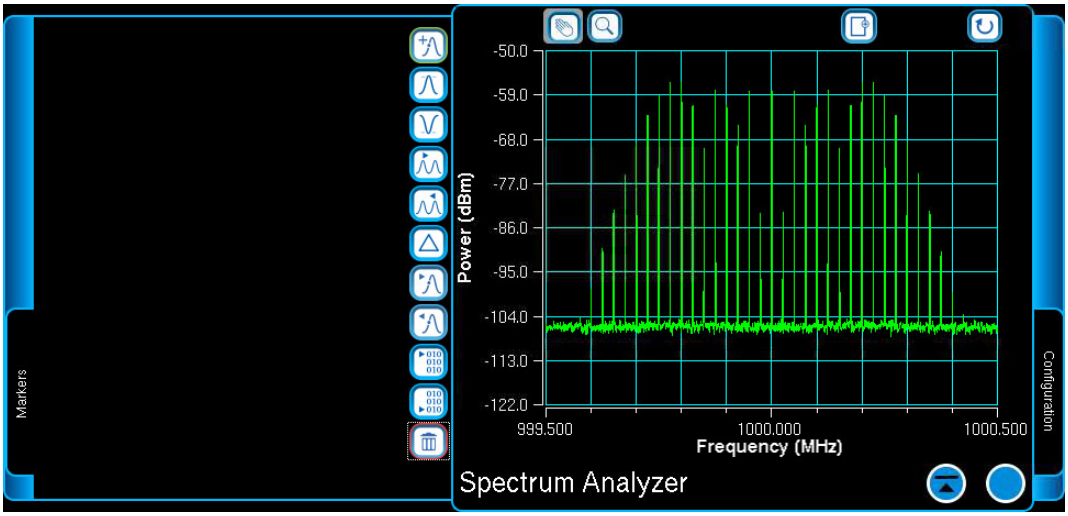


Fig. 3-54 Spectrum Analyzer Markers Window

By default, the Marker Window does not have markers enabled and appears empty as shown in Fig. 3-54. When a marker is created, the Marker Window updates to display a marker button as shown in Fig. 3-55.

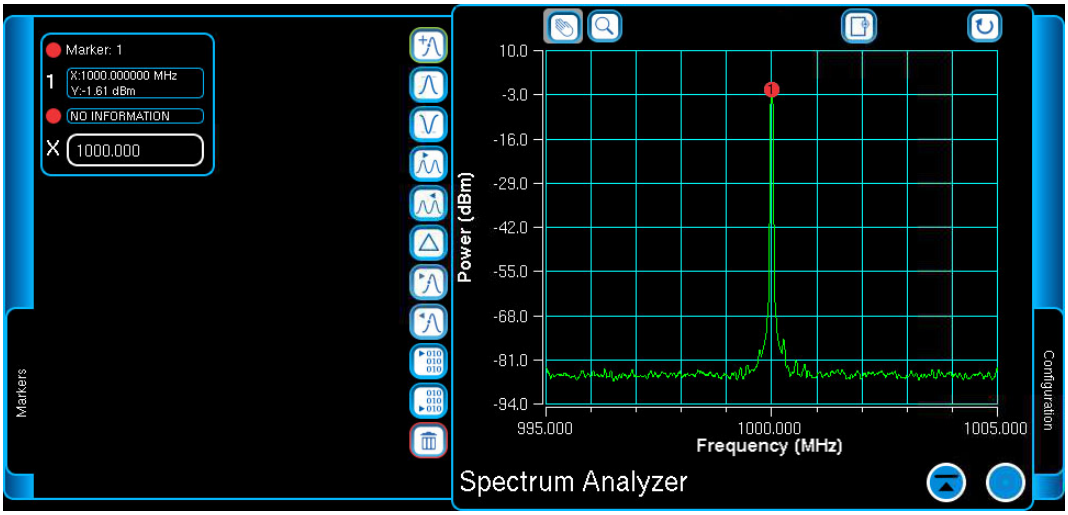


Fig. 3-55 Spectrum Analyzer with Marker

3.7.1 Managing Markers

3.7.1.A How to Add a Marker

Press the Add Marker Icon to create a marker. The Marker Window updates to display a marker as shown in Fig. 3-55. Marker position is adjusted by selecting the marker button and using the Marker Icons on the right side of the Marker Window.

3.7.1.B How to Delete a Marker

To delete a marker, select the marker button to be deleted, then press the Trash Icon.

3.7.1.C Moving Markers

Markers can be moved using the Marker Function Icons or by entering a specific position in the X Marker Position Field. Selecting the X Position Field enables the Numeric Keypad for defining a specific position along the signal trace.

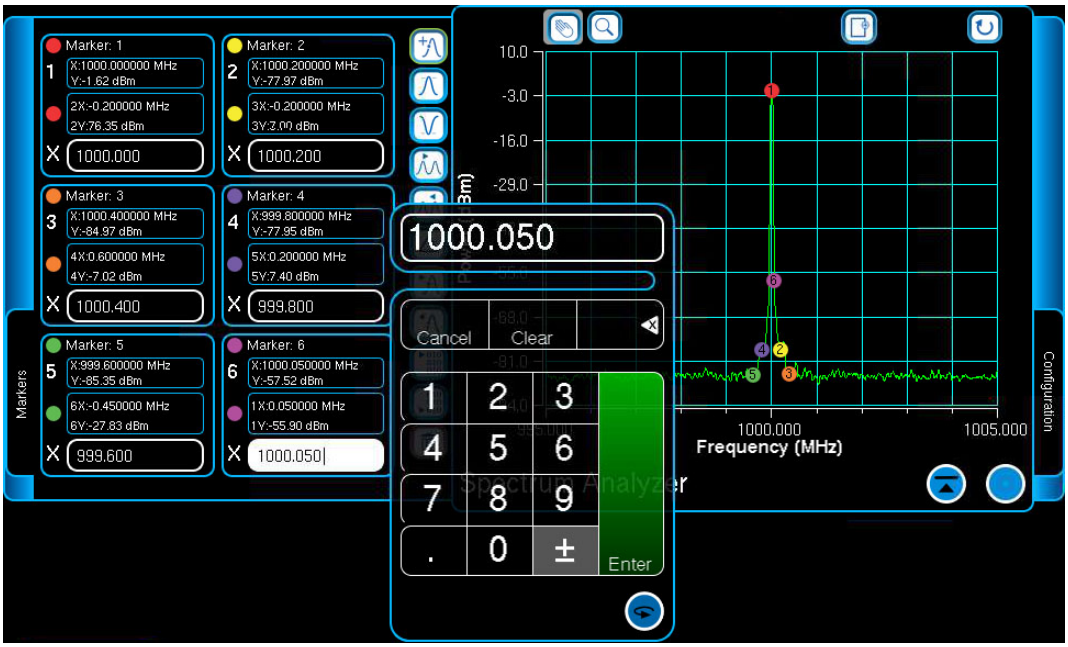


Fig. 3-56 Marker X Position Field - Selected for Editing

3.7.1.D Marker Numbering

When multiple markers are added to a blank Markers Window they are labeled sequentially in the order in which they are created. The first marker added is assigned 1, the next marker is assigned 2, and so on. Fig. 3-57 shows the Spectrum Analyzer with six markers active on the UI.

When a marker is deleted, the existing markers maintain their assigned numbering scheme. Any markers that are later added fill any open slots in the number sequence before markers are added at the end of the sequence.

For example, refer to Fig. 3-57 which has Marker 1, Marker 2, Marker 3, Marker 4 and Marker 5 active on the UI. If Marker 2 and 4 are deleted, Marker 3, 5 and 6 keep their current numbering sequence (refer to Fig. 3-58).

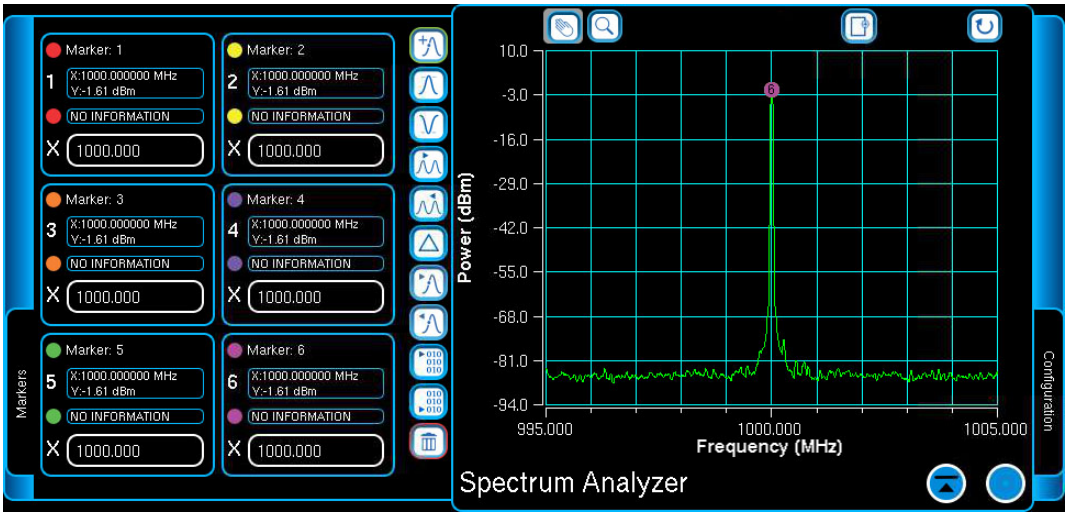


Fig. 3-57 Marker Sequence Numbering - Six Markers Active

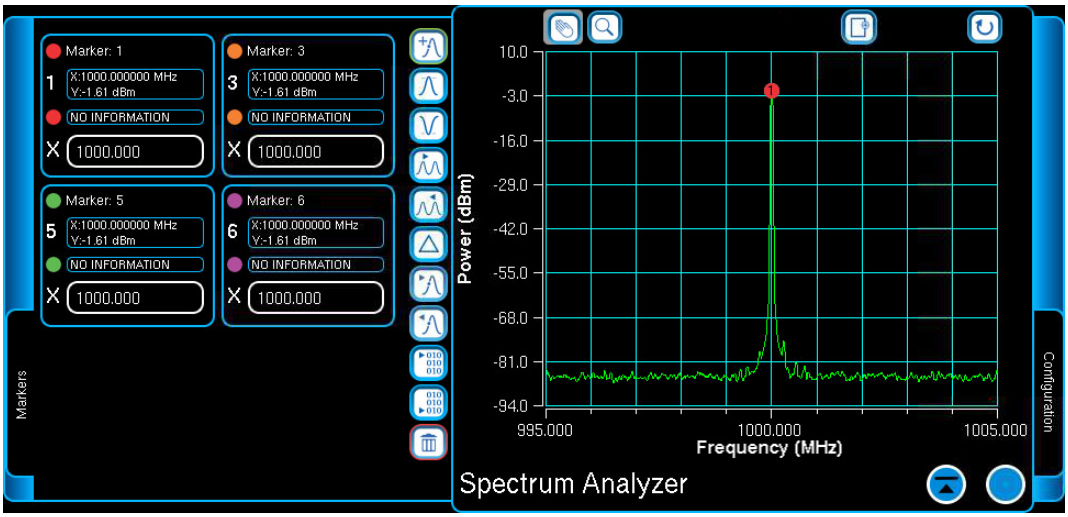


Fig. 3-58 Marker Sequence Numbering - Marker Two and Four Deleted

When the UI is configured as shown Fig. 3-58, if a new marker is added the marker is added as Marker 2 (refer to Fig. 3-59). The next marker added would be assigned Marker 4.

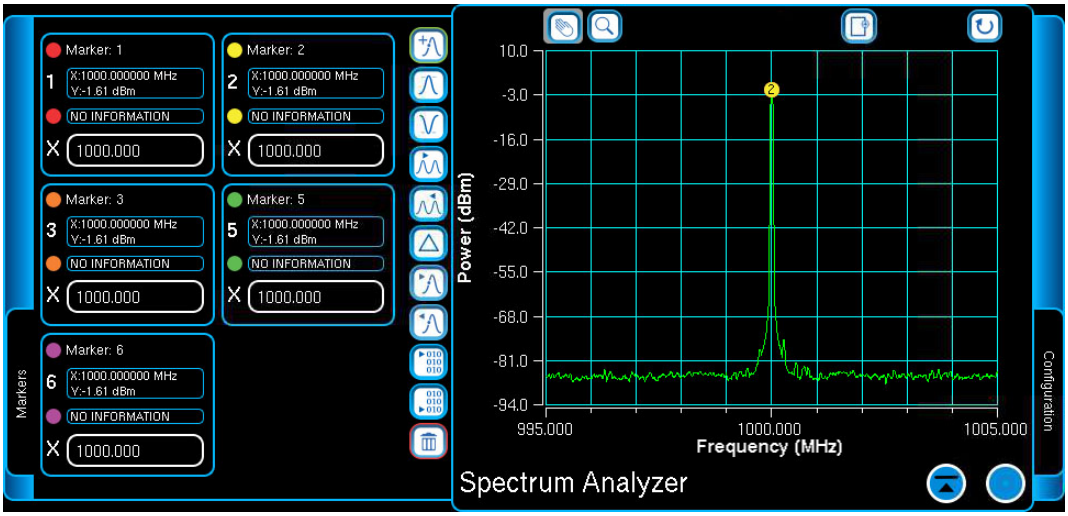


Fig. 3-59 Marker Sequence Numbering - Marker Two Re -Added

3.7.1.E Marker Selection Indicator

When a marker is selected the marker indicator on the plot field is highlighted by a white halo and the border around marker fields changes from blue to white. Fig. 3-60 shows Marker 1 highlighted, Fig. 3-60 shows Marker 5 highlighted.

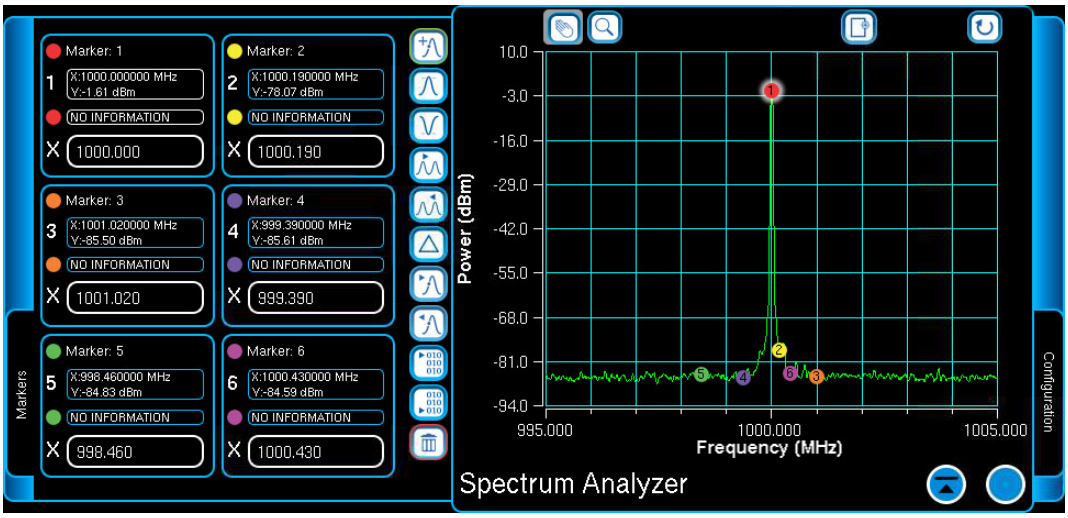


Fig. 3-60 Marker Selection Indicator - Marker 1 Selected

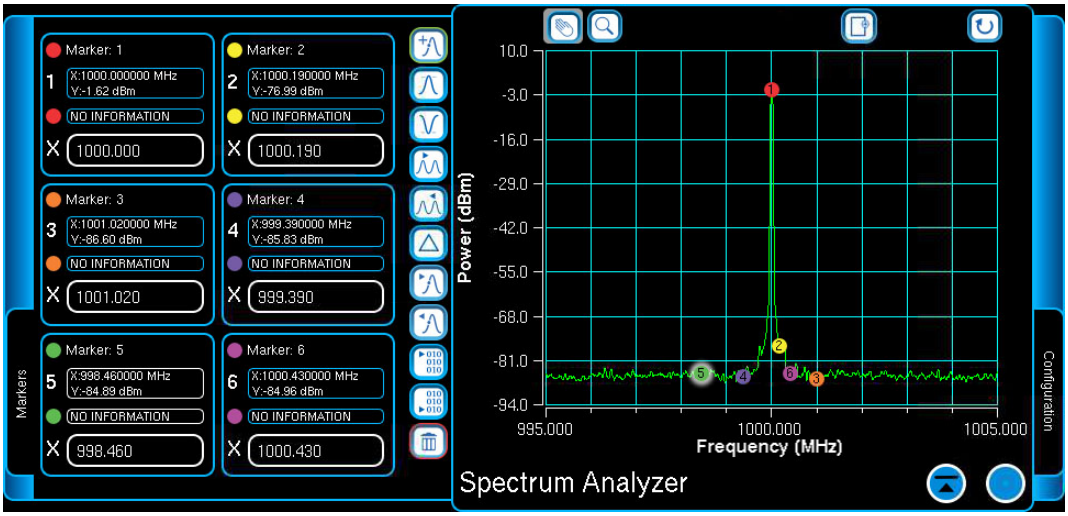


Fig. 3-61 Marker Selection Indicator - Marker 5 Selected

3.7.2 Marker Functions

The buttons on the right side of the Marker Window provide marker functions such as moving a marker to the next highest or lowest peak, or enabling marker delta measurements. A marker function is enabled by pressing the icon button. Some icon buttons support press and hold functionality as noted below.

Icon	Description
	Adds a marker to the graph.
	Moves the selected marker to highest point on signal.
	Moves the selected marker to lowest point on signal.
	Moves the selected marker right to next peak. Supports press and hold functionality.
	Moves the selected marker left to next peak. Supports press and hold functionality.
	Enables marker delta measurements for the first two enabled markers.
	Move the selected marker to the left side of the plot field.
	Move the selected marker to the right side of the plot field.
	Moves the selected marker right to the next data point. Supports press and hold functionality.
	Moves the selected marker left to the next data point. Supports press and hold functionality.
	The Trash Icon provides the user with the ability to delete an active marker from the Markers Window.

3.7.3 Marker Fields/Readings

When a Marker is added to the plot field the X: fields display the default marker position and the Y: field displays the frequency reading at the marker's position on the signal trace.

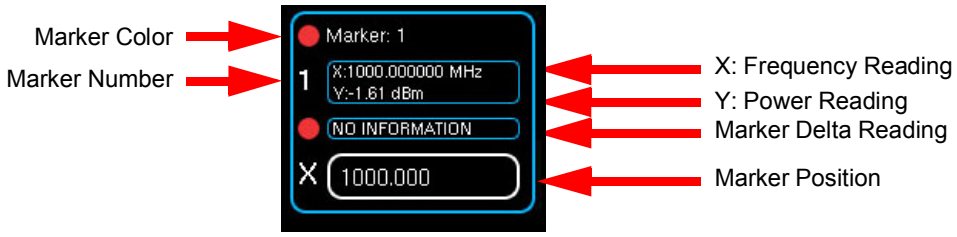


Fig. 3-62 Spectrum Analyzer Marker Reading Fields

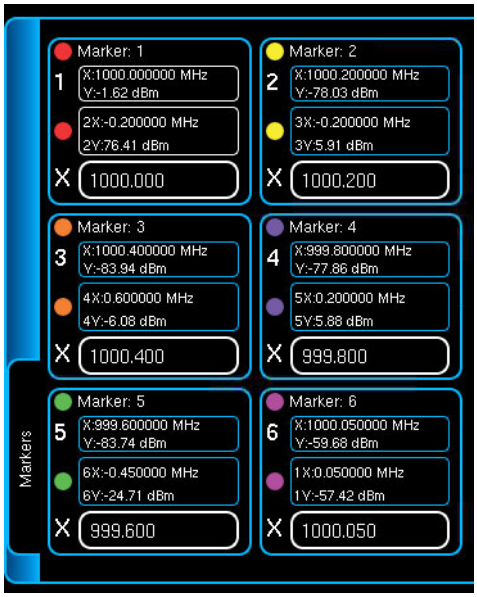
Parameter	Description
Marker Color	Color used to display marker on the UI. The marker number is displayed inside the marker indicator on the graph field.
X:	Spectrum Analyzer Frequency reading and position of the marker on the signal trace. Zero Span Analyzer Time reading.
Y:	Spectrum Analyzer Power reading at specified marker position. Zero Span Analyzer Power reading.
Marker Delta Reading	Marker Delta measurement. Field displays NO INFORMATION when Delta measurement is not enabled. Refer to section titled 3.7.3.A, Marker Delta Readings.

3.7.3.A Marker Delta Readings

Marker Delta readings can be enabled between two active markers. When creating delta pairings, the first marker in the pairing is referred to as the “parent," the second marker in the pairing is referred to as the “child". The delta reading is calculated by subtracting the child marker reading from the parent marker reading.

marker delta reading = parent marker reading - child marker reading

When Marker Delta readings are enabled, the Marker Delta measurement fields of the parent marker update to reference the number of the child marker. Refer to the example in Fig. 3-63.



Marker 1 is parent to Marker 2, indicated by 2X: and 2Y: delta readings.

Marker 2 is parent to Marker 3, indicated by 3X: and 3Y: delta readings.

Marker 3 is parent to Marker 4, indicated by 4X: and 4Y: delta readings.

Marker 4 is parent to Marker 1, indicated by 1X: and 1Y: delta readings.

Marker 5 is parent to Marker 6, indicated by 6X: and 6Y: delta readings.

Marker 6 is parent to Marker 1, indicated by 1X: and 1Y: delta readings.

Fig. 3-63 Marker Delta Readings

3.7.3.A.1 Enable Marker Delta Readings

STEP	PROCEDURE
1.	Enable markers which are to be paired.
2.	Select the parent marker of the pairing.
3.	Press the Marker Delta Icon.
4.	Select the child marker of the pairing.

3.7.3.A.2 Disable Marker Delta Reading

Marker delta pairings are removed by deleting the parent marker.

3.8 ANALYZERS

The Test Set contains a Spectrum Analyzer and Zero Span Analyzer.

3.8.1 Spectrum Analyzer

The Spectrum Analyzer is an FFT based analyzer with a maximum analysis bandwidth of 90 MHz for fast signal processing and adjustable time record for higher resolution.

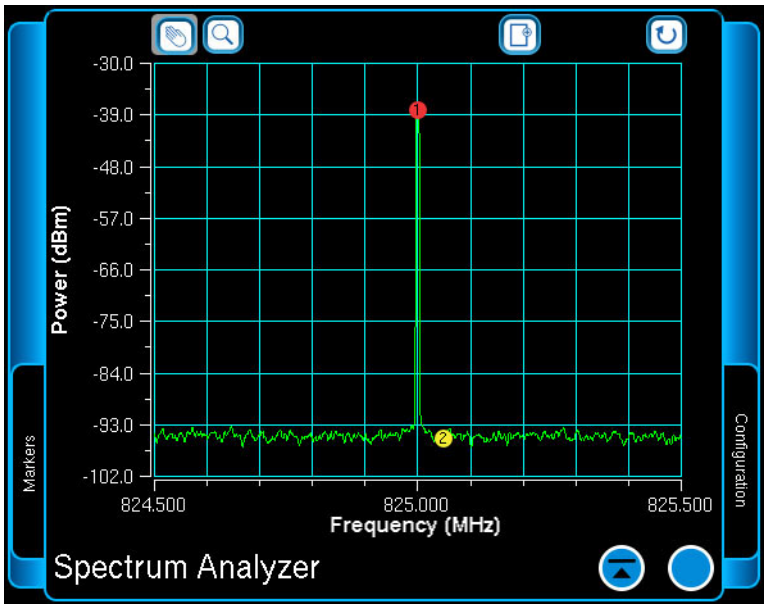


Fig. 3-64 Spectrum Analyzer Window

The Spectrum Analyzer Window houses two Slide Out Windows: the Markers Window on the left and the Configuration Window on the right.

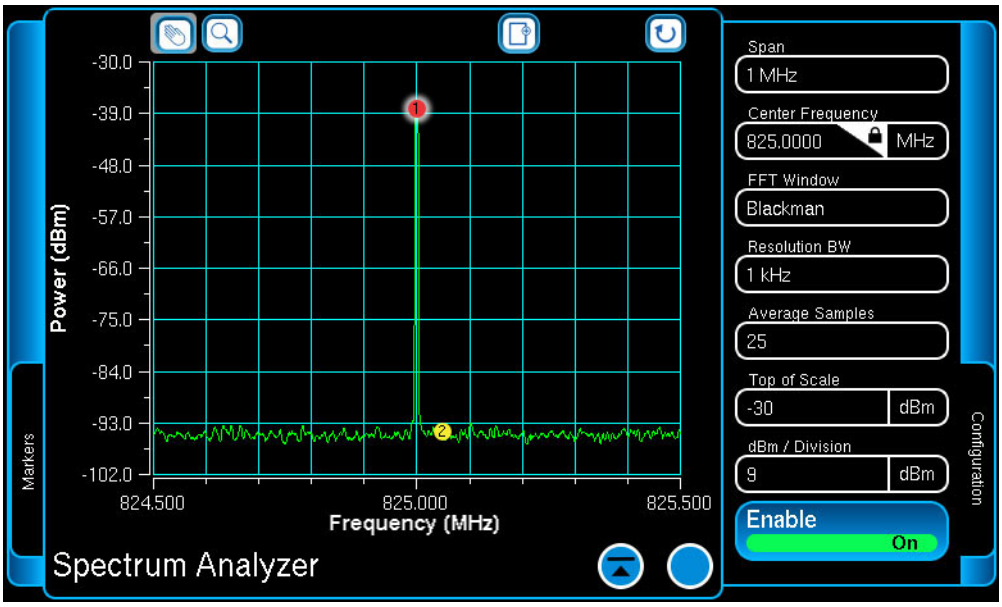


Fig. 3-65 Spectrum Analyzer Configuration Window

3.8.1.A Spectrum Analyzer Configuration Window

The Spectrum Analyzer Configuration Window contains fields for configuring trace parameters.

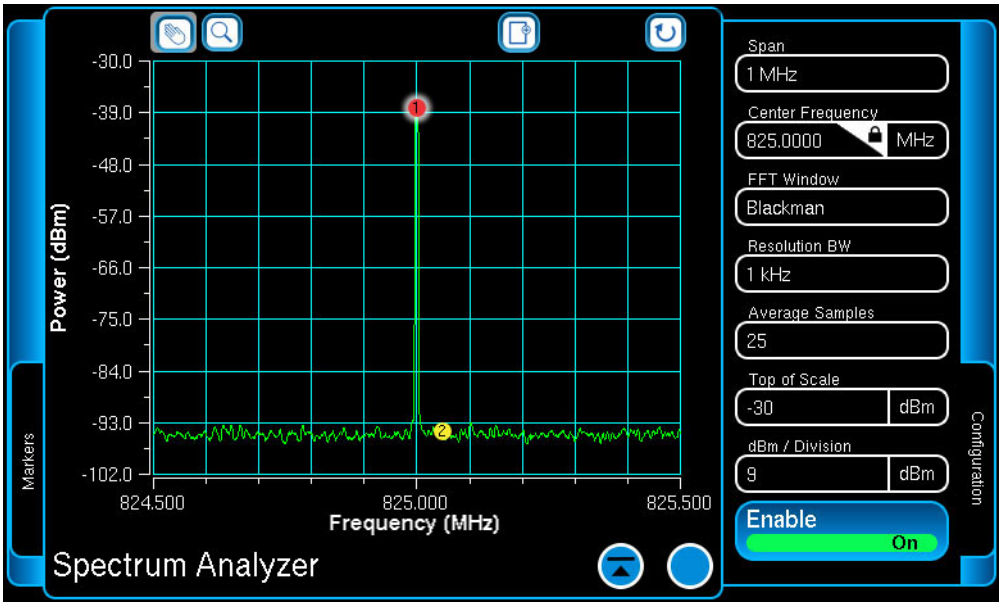


Fig. 3-66 Spectrum Analyzer Configuration Window

Parameter	Description
Span	The Span drop-down menu selects the horizontal span of received frequency. When Span is set to a value <100 MHz the Center Frequency field is Locked and the Receiver Frequency defines the Spectrum Analyzer Center Frequency.
Center Freq	Defines and displays the Spectrum Analyzer Center Frequency value. The Center Frequency field is placed in a Locked State when the Span is set to a value <100 MHz.
FFT Window	Defines the Spectrum Analyzer FFT mode of operation.
Average Samples	The Average Samples field defines the number of signal traces used to calculate average measurements.
Resolution BW	Selects the bandwidth of the IF Filter applied to the Spectrum Analyzer signal.
Top of Scale	Selects upper value of graph's vertical scale.
Vertical Scale	Defines spacing of graph's vertical scale.
Enable	Toggle button turns the Spectrum Analyzer trace on and off.

3.8.1.B Spectrum Analyzer Markers Window

The Spectrum Analyzer Markers Window contains parameters for creating, configuring and deleting markers. Refer to section 3.7, Markers for information.

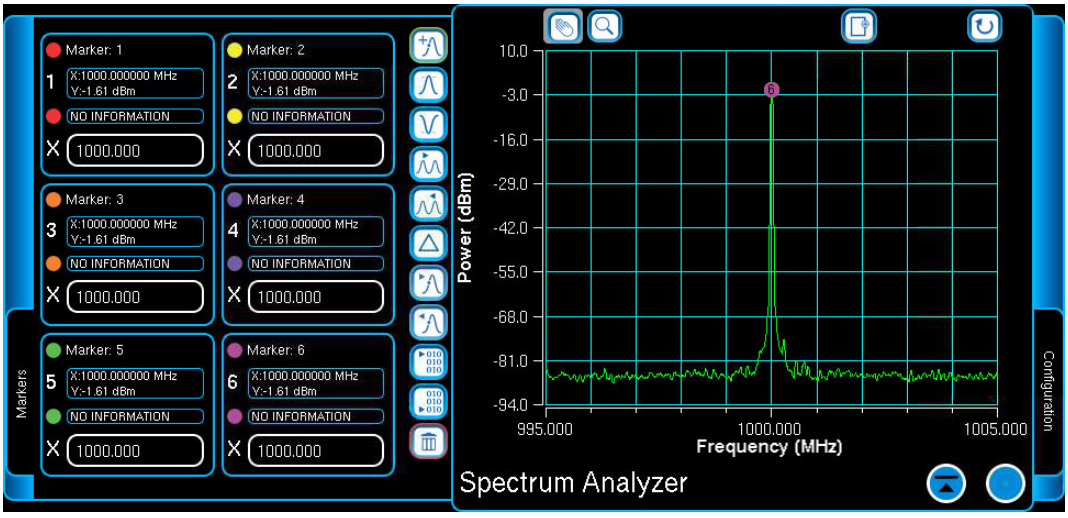


Fig. 3-67 Spectrum Analyzer Markers Window

3.8.1.C Spectrum Analyzer Trace Management

The icon buttons at the top of the Spectrum Analyzer Window access various trace functions. The Pan/Zoom Button is a dual purpose toggle button which switches between the Pan and Zoom functions.

3.8.1.C.1 Trace Autoscale



Autoscale resets the signal trace to a scale appropriate for the received signal parameters.

3.8.1.C.2 Trace Zoom



The Zoom icon activates the Zoom In and Zoom Out icons.

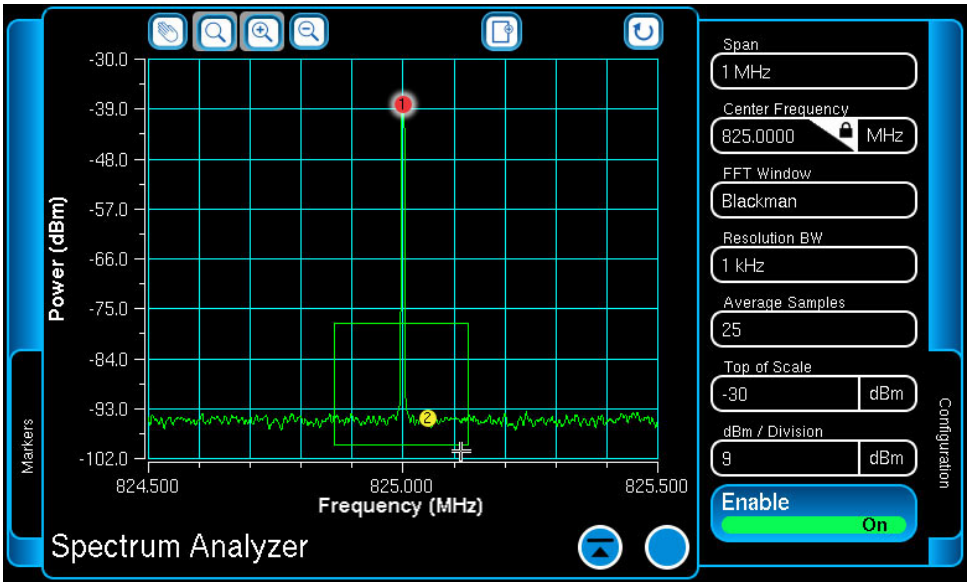


Fig. 3-68 Spectrum Analyzer - Zoom in Area Selected

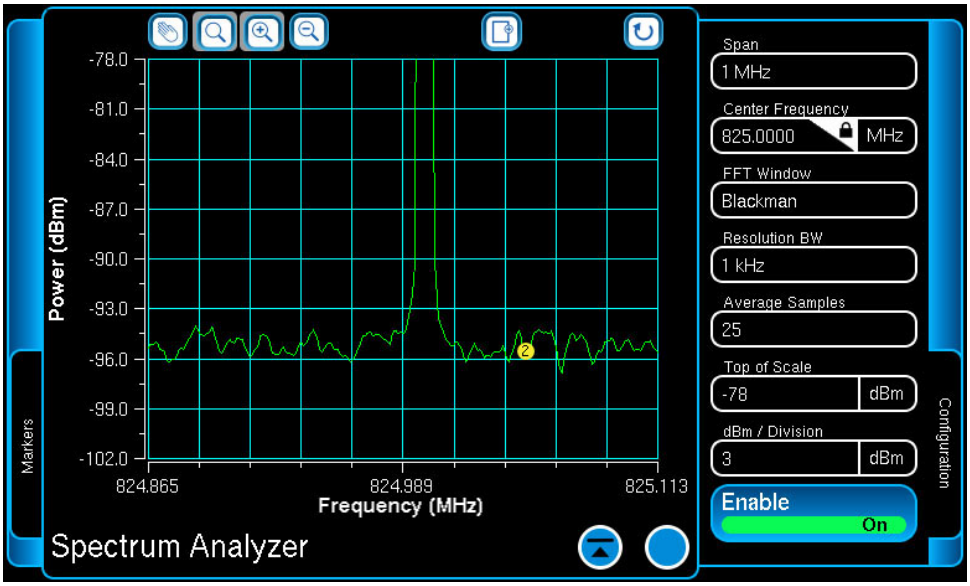


Fig. 3-69 Spectrum Analyzer - Area Magnified

3.8.1.C.3 Trace Pan



The Pan function allows the user to drag and reposition the trace anywhere on the plot field.
When selected, touching the plot field displays a target grid on the plot field which indicates the focal point of the “drag” function.

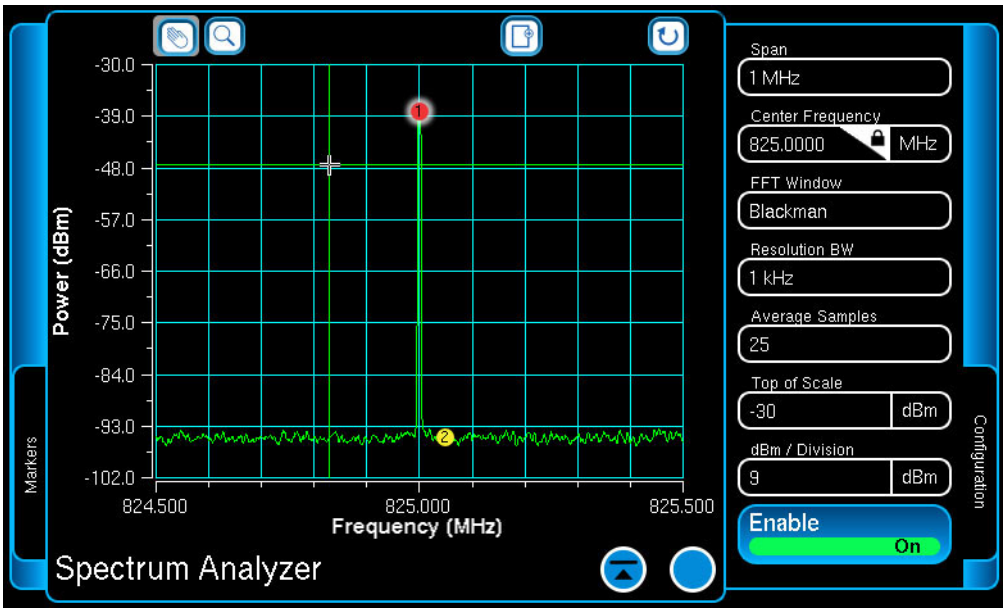


Fig. 3-70 Spectrum Analyzer Pan Grid

3.8.1.C.4 Store Button



The Store Button opens the File Store Window which allows the user to save the current trace data.

3.8.2 Zero Span Analyzer

The Zero Span Analyzer shows the power level trace of the input RF signal at the receiver frequency. The trace is plotted as power over time. The Zero Analyzer Window houses two Slide Out Windows: the Markers Window on the left and the Configuration Window on the right.

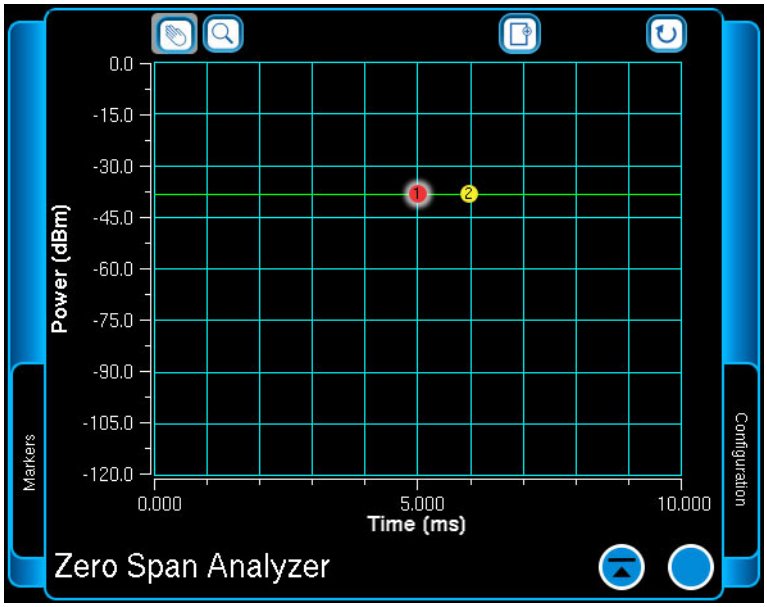


Fig. 3-71 Zero Span Analyzer Window

3.8.2.A Zero Span Analyzer Configuration Window

The Zero Span Analyzer Configuration Window contains fields for configuring trace parameters.

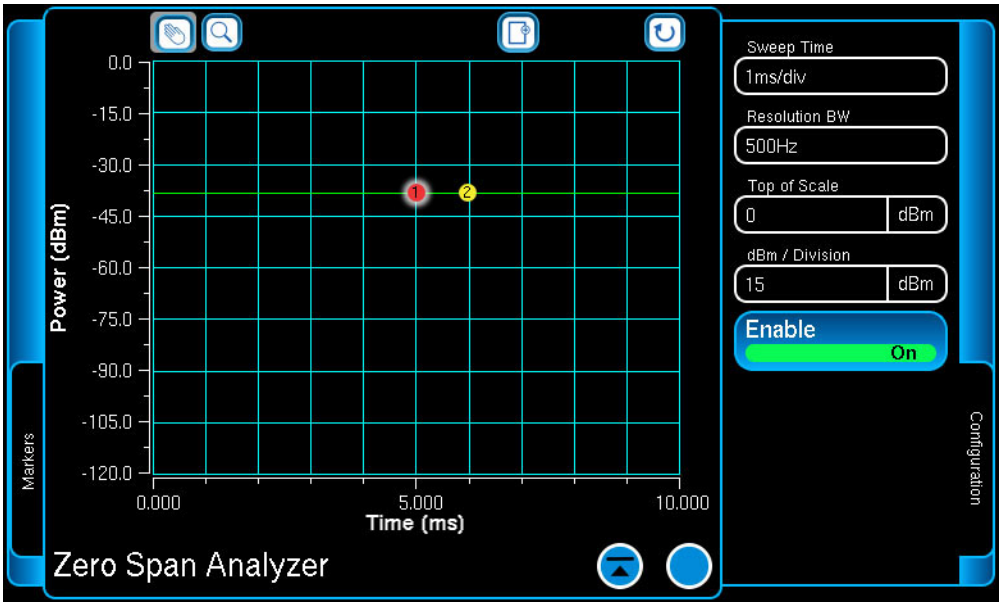


Fig. 3-72 Zero Span Analyzer Configuration Window

Parameter	Description
Sweep Time	The Sweep Time drop-down menu selects the rate at which the signal trace updates on the UI.
Resolution BW	Selects the bandwidth of the IF Filter applied to the Spectrum Analyzer signal.
Top of Scale	Selects upper value of graph's vertical scale.
Vertical Scale	Defines spacing of graph's vertical scale.
Enable	Toggle button turns the Zero Span Analyzer trace on and off.

3.8.2.B Zero Span Analyzer Markers Window

The Zero Analyzer Markers Window contains parameters for creating, configuring and deleting markers. Refer to section 3.7, Markers for information.

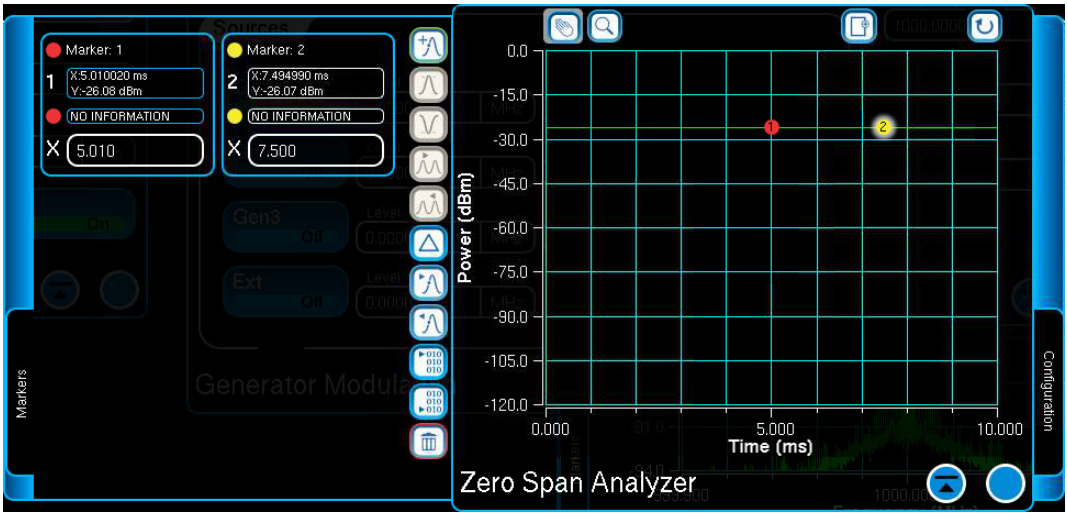


Fig. 3-73 Zero Span Analyzer Markers Window

3.8.2.C Zero Span Analyzer Trace Management

The icon buttons at the top of the Zero Span Analyzer Window access various trace functions. These buttons function the same as the buttons on the Spectrum Analyzer Window.

Refer to 3.8.1.C.1, Trace Autoscale, 3.8.1.C.2, Trace Zoom, 3.8.1.C.3, Trace Pan and 3.8.1.C.4, Store Button paragraphs for information.

3.9 OSCILLOSCOPE

This function is available when Option #139256 is enabled on the Test Set.

The Oscilloscope provides two channels for examining AF waveforms. Input signals can be routed from the CH1 and CH2 Connectors, or from the internal audio sources, to either Trace A or Trace B source options. Source and Coupling can be set differently for each trace and Auto or Normal modes of triggering can be selected and configured to respond to a rising or falling input voltage.

The Oscilloscope Window displays the signal being received by the Test Set. The Oscilloscope Window houses a Slide Out Window which contains fields for configuring Trace and Trigger parameters.

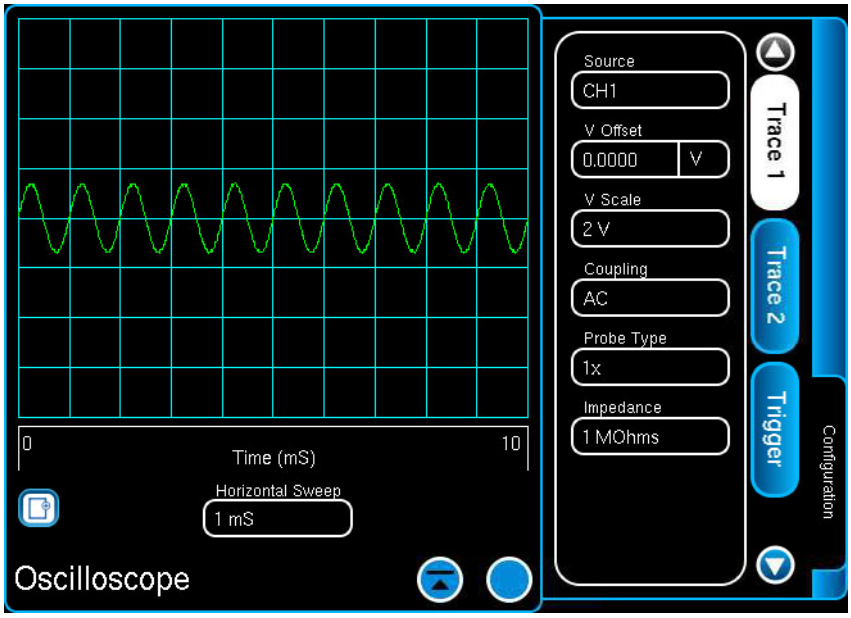


Fig. 3-74 Oscilloscope - Configuration Window Expanded

3.9.1 Oscilloscope Configuration Window

The Oscilloscope Configuration Window contains fields for configuring trace parameters.

3.9.1.A Store Button



The Store Button opens the File Store Window which allows the user to save the current trace data.

3.9.1.B Horizontal Sweep

The Horizontal Sweep field is displayed at the bottom of the Oscilloscope Window. This field defines the speed at which the signal trace is displayed on the plot field. This setting affects Channel 1 and 2 for Trace 1 and Trace 2.

3.9.1.C Oscilloscope Trace Parameters

Oscilloscope Trace parameters are accessed by opening the Oscilloscope Configuration Window and selecting the Trace 1 or Trace 2 tab. Trace 1 signal is displayed in green. Trace 2 signal is displayed in white.

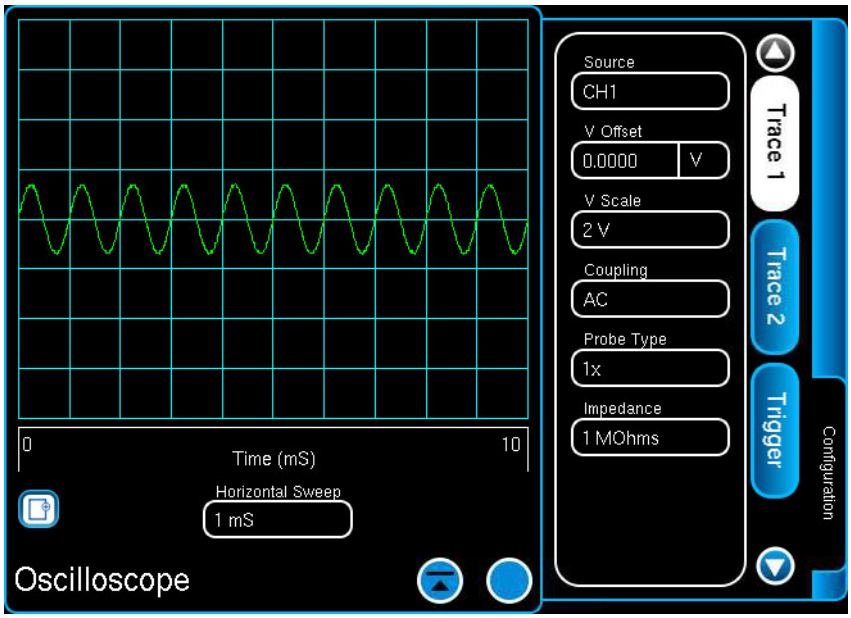


Fig. 3-75 Oscilloscope Trace Parameters

Parameter	Description
Source	Indicates the source of the signal input. Trace 1 and Trace 2 can not be set to the same input source.
Vertical Offset	Defines value by which the signal trace is offset from the center line of the graticule.
Vertical Scale	Defines the interval between the graticules of the plot field vertical scale.
Coupling	Selects how incoming signal is connected to the Test Set.
Probe Type	Selects type of probe being used.
Impedance	Selects load applied to incoming signal.

3.9.1.D Oscilloscope Trigger Parameters

The Oscilloscope Trigger parameters are accessed by opening the Oscilloscope Configuration Window and selecting the Trigger tab.

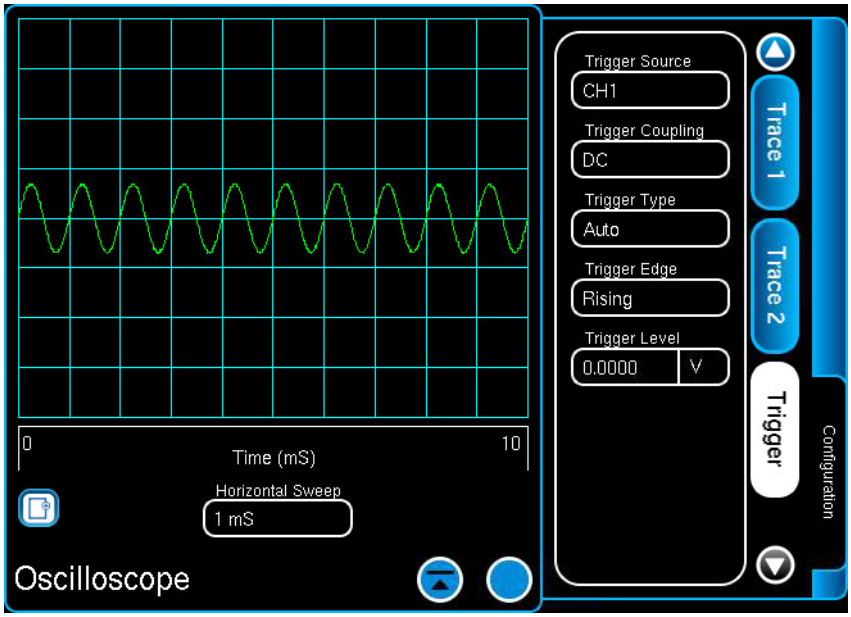


Fig. 3-76 Oscilloscope Trigger Parameters

Parameter	Description
Trigger Source	Selects the Trigger source.
Trigger Coupling	Selects type of coupling switch used to process the input signal.
Trigger Type	Selects trigger mode of operation.
Trigger Edge	Selects how the Trigger is activated.
Trigger Level	Defines Level at which Trigger is activated.

3.10 HELP FILES

The Test Set Help files provide information about Test Set functions and applications. The Help Files also contain available remote commands for various test set functions. Help files are accessed by pressing the Home Button on the Front Panel or by pressing the Help Button on the Launch Bar.

Selecting Help opens a window that allows the user to navigate available help files. The Help Window contains a horizontal scroll bar at the top of the window which contains content buttons. This horizontal scroll bar functions similarly to the UI Launch Bar.

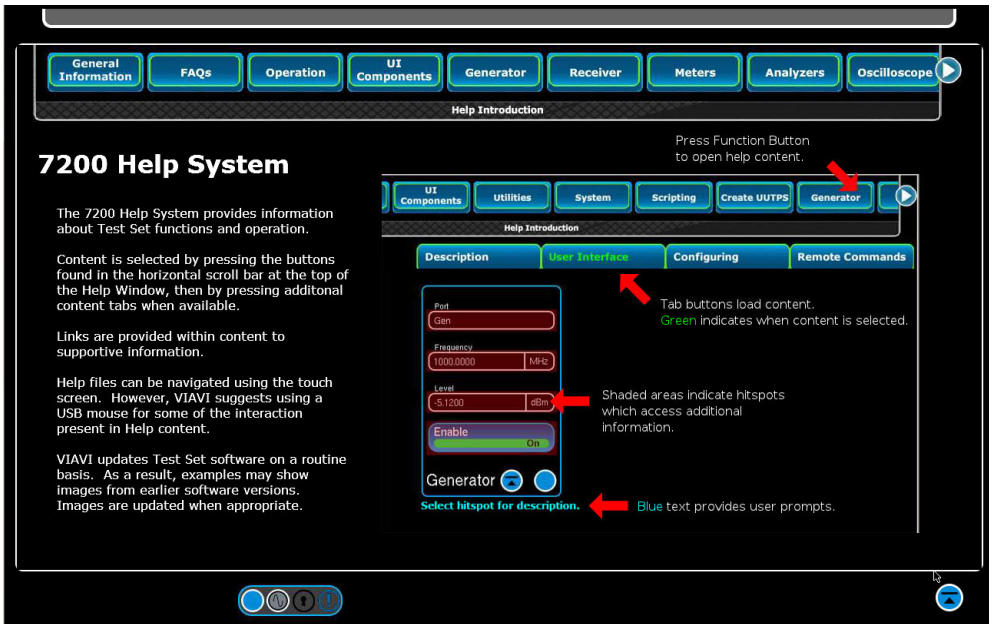


Fig. 3-77 Help Window

Fig. 3-78 shows an example of the content available in the 7200 Help Files. Content is viewed by selecting the appropriate sub-heading tab.

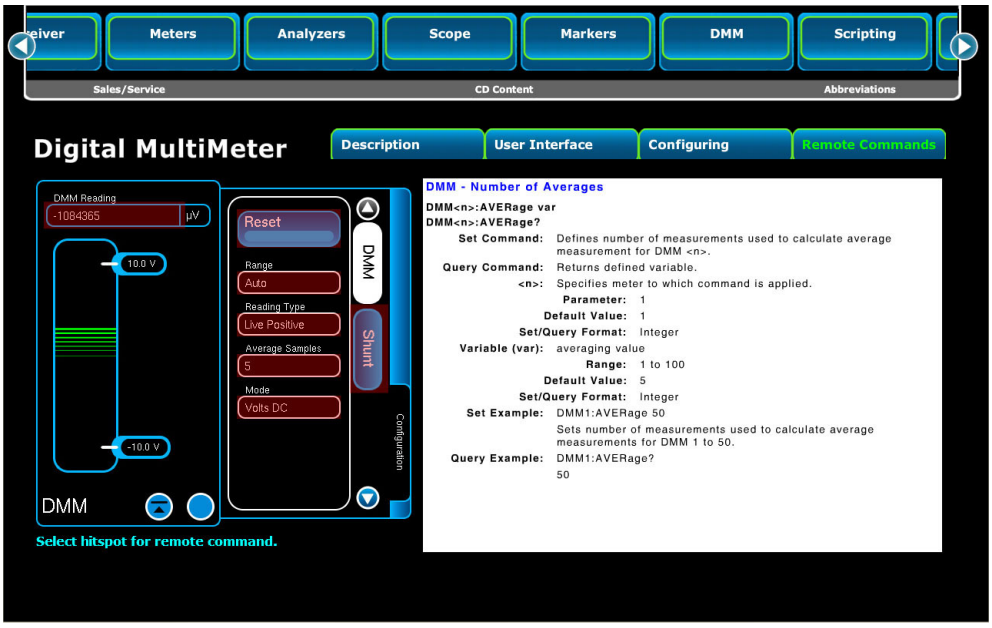


Fig. 3-78 Help File Content Example

3.11 ZIF CONNECTOR

The ZIF I/O Connector is an interface connector which is used for evaluating Devices Under Test (DUT).

3.11.1 Connecting DUT to ZIF Connector

DUT's are connected to the ZIF Connector using the ZIF Mating Connector and an adapter cable. The adapter cable and ZIF Mating Connector create the hardware interface between the Test Set and DUT. The software interface between the Test Set and the DUT is created using remote programming commands.

Adapter cables can be developed by the end user or, depending on the device to be tested, they may be available through VIAVI. Contact VIAVI Customer Service for ZIF Connector adapter cable availability.



Fig. 3-79 ZIF Mating Connector

3.11.2 DMM Ohm Measurement Compensation Value

When using the ZIF Connector to obtain DMM measurements, the signal is routed from the Front Panel Switch Matrix Assembly directly to the ZIF Connector DMM measurement pins. The signal encounters resistance when routed on the internal paths from the Front Panel Switch Matrix Assembly and the ZIF Connector.

To obtain accurate resistance measurements from the ZIF Connector DMM Pins, the Ohm meter error value must be calculated to compensate for the resistance encountered during the routing process.

To determine the Ohm meter error vector value:

STEP	PROCEDURE

1. Send the following command sequence:

```
ZIF1:GROUND MEAS5, ON      //grounds ZIF Connector Measurement 5 Pin
ZIF1:GROUND MEAS6, ON      //grounds ZIF Connector Measurement 6 Pin
ZIF1:GROUND DMM1, OFF      //ungrounded ZIF Connector DMM1 Pin
DMM1:MOD OHMS              //sets DMM to perform Ohm measurements
DMM1:READ:LIV?             //returns live DMM reading
```

2. Record the DMM reading as Ohm Meter error factor.
3. Subtract the Ohm Meter error factor from any DMM Ohm readings to calculate the actual reading.

3.11.3 ZIF Connector Signal Routing

Using the ZIF Connector requires a basic understanding of how signals are routed through the Test Set. This section describes basic signal routing scenarios.

3.11.3.A DMM Signal Routing

Fig. 3-80 shows the signal routing between the Front Panel Switch Matrix Assembly, the ZIF Connector and the DMM Assembly. The diagram shows the incoming audio signal routed through the ZIF Connector Measurement Pins to the Front Panel Switch Matrix Assembly. The Front Panel Switch Matrix Assembly processes the signal and routes the signal to the ZIF Connector DMM Pins where it is routed to the Front Panel DMM Connectors. The Test Set DMM Window can be used to evaluate the DUT signal.

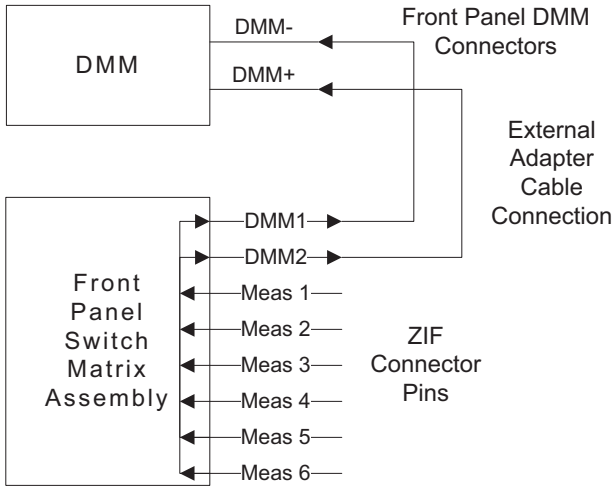


Fig. 3-80 Test Set DMM Signal Routing Diagram

DMM signal routing requires the following:

- Configuring ZIF Connector Measurement Pins to route signals to the DMM Pins.
- Configuring ZIF Connector DMM Pins to route signals to the Front Panel DMM Connectors.
- Configuring Test Set DMM parameters.

3.11.3.B Oscilloscope Signal Routing

Fig. 3-81 shows the signal routing between the Front Panel Switch Matrix Assembly, the ZIF Connector and the Oscilloscope Assembly. The diagram shows the incoming audio signal routed through the ZIF Connector Measurement Pins to the Front Panel Switch Matrix Assembly. The Front Panel Switch Matrix Assembly processes the signal and routes the signal to the ZIF Connector DMM Pins where it is routed to the Front Panel Oscilloscope CH1/CH2 Connectors. The Test Set Oscilloscope Window can be used to evaluate the DUT signal.

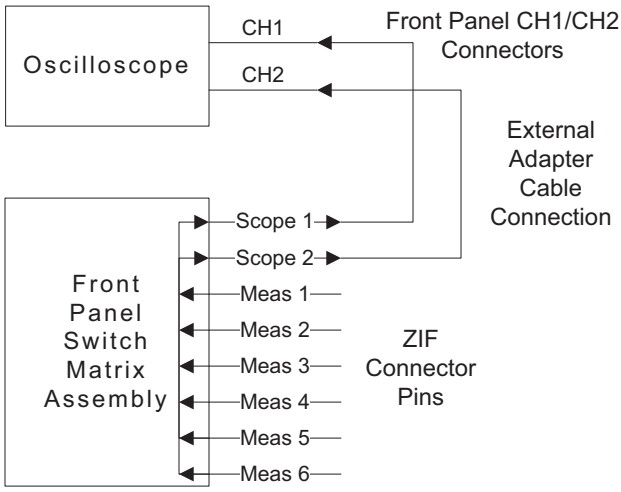


Fig. 3-81 Test Set Oscilloscope Signal Routing Diagram

Oscilloscope signal routing requires the following:

- Configuring ZIF Connector Measurement Pins to route signals to the Oscilloscope Pins.
- Configuring ZIF Connector Oscilloscope Pins to route signals to the Front Panel Oscilloscope Connectors.
- Configuring Test Set Oscilloscope parameters.

3.11.3.C Audio Input/Output Signal Routing

Fig. 3-82 shows the input and output signal routing between the Front Panel Switch Matrix Assembly, the ZIF Connector and the Audio Generator and Audio Meters.

The diagram shows the incoming audio signal routed from the ZIF Connector Measurement Pins or Front Panel Audio Connectors through the Front Panel Switch Matrix Assembly to the Audio Card. The Audio Card processes the audio signal and routes the processed signal to the Audio Meters.

Audio Input signal routing requires the following:

- Configure Test Set to route incoming signal through audio card.
- Configure ZIF Connector Measurement Pins to route incoming signal.
- Configure Test Set Audio meters.

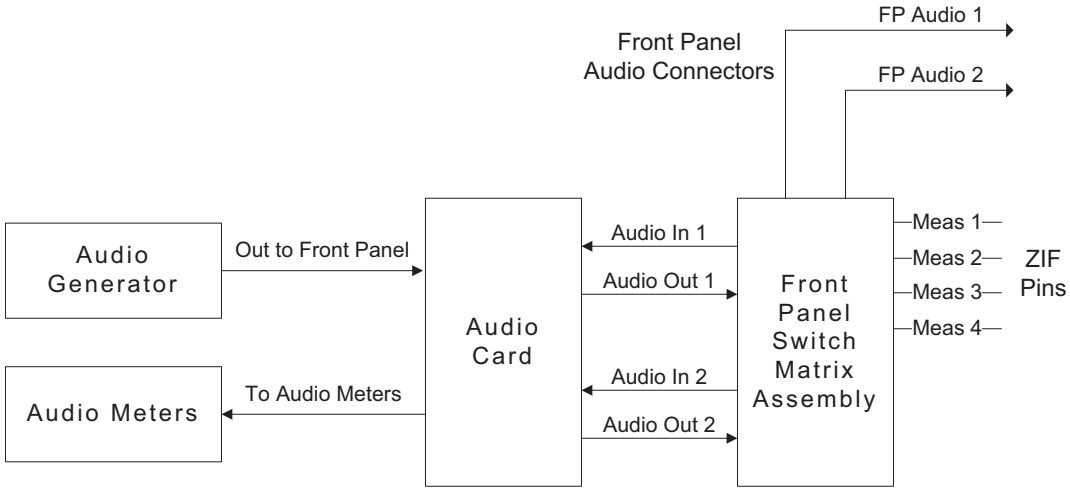


Fig. 3-82 Test Set Audio Signal Routing Diagram

The output audio signal is routed from the Audio Generator to the Audio Card which routes the signal to the Front Panel Switch Matrix Assembly. The Front Panel Switch Matrix Assembly routes the outgoing audio signal to either the ZIF Connector Measurement Pins or the Front Panel Audio Connectors.

Audio Output signal routing requires the following:

- Configure Test Set to route outgoing signal through audio card.
- Configure ZIF Connector Measurement Pins to route output signal.
- Configure Test Set AF Generator.

3.11.3.D Modulated/Demodulated Signal Routing

Fig. 3-83 shows the input and output signal routing between the Front Panel Switch Matrix Assembly, the ZIF Connector and the Audio Generator and Audio Meters.

The diagram shows the incoming audio signal routed from the ZIF Connector Measurement Pins or Front Panel Audio Connectors through the Front Panel Switch Matrix Assembly to the Audio Card. The Audio Card processes the audio signal and routes the processed signal to the RF Modulator.

Routing Audio Signal to RF Modulator requires the following:

- Configure Test Set to route incoming signal through audio card.
- Configure ZIF Connector Measurement Pins to route incoming signal to Modulation Generator.
- Configure Test Set RF and Modulation Generators.

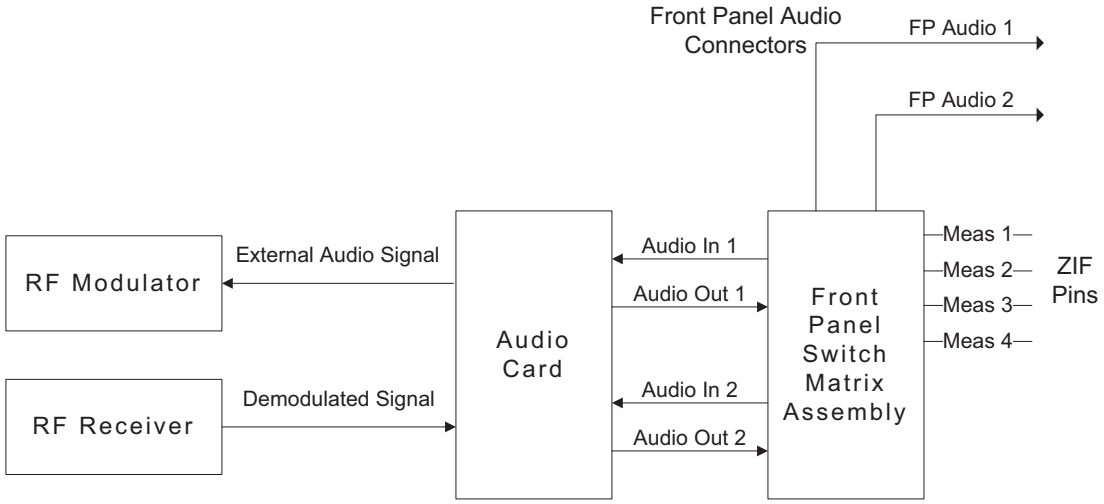


Fig. 3-83 Test Set Demodulated Signal Routing Diagram

The demodulated audio signal is routed from the RF Receiver to the Audio Card. The Audio Card processes and routes the signal to the Front Panel Switch Matrix Assembly. The Front Panel Switch Matrix Assembly routes the audio signal to either the ZIF Connector Measurement Pins or the Front Panel Audio Connectors.

Routing an outgoing demodulated signal requires the following:

- Configure Test Set to route outgoing signal through audio card.
- Configure ZIF Connector Measurement Pins to route outgoing signal.
- Configure Test Set RF Receiver to process the incoming signal.

Refer to 6.3, Intelligent Cable Assembly for additional information.

Chapter 4 - System and Utility Functions

4.1 INTRODUCTION

This chapter provides an operational description of the Test Set's System and Utility functions.

4.1.1 System Functions

Test Set System Functions are accessed by pressing the System Function Button on the Launch Bar.

- Frequency Reference . . . . . 4 - 2
- System Update . . . . . 4 - 2
- Options Window . . . . . 4 - 8
- System Configuration . . . . . 4 - 13
  - Status Window . . . . . 4 - 13
  - Security Window . . . . . 4 - 14
  - Hardware Window . . . . . 4 - 15
  - Network Window . . . . . 4 - 16
  - Date and Time Window . . . . . 4 - 18
- Calibration Window . . . . . 4 - 19
- Printing Window . . . . . 4 - 20
- USB to GPIB Adapter . . . . . 4 - 25
- Serial Window . . . . . 4 - 26

4.1.2 Utility Functions

Test Set Utility Functions are accessed by pressing the Utility Function Button on the Launch Bar.

- Store Window . . . . . 4 - 29
- Recall Window . . . . . 4 - 32
- Touchscreen Calibration . . . . . 4 - 34
- File Management . . . . . 4 - 37

4.2 FREQUENCY REFERENCE

The Frequency Reference locks the Test Set's system timing to the internal 10 MHz frequency standard or to an external 10 MHz signal from the Ext Ref I/O connection. The Frequency Reference is selected from the System Drop-down menu.

4.3 SYSTEM UPDATE

The System Update Window displays Test Set software information and allows the user to update installed software.

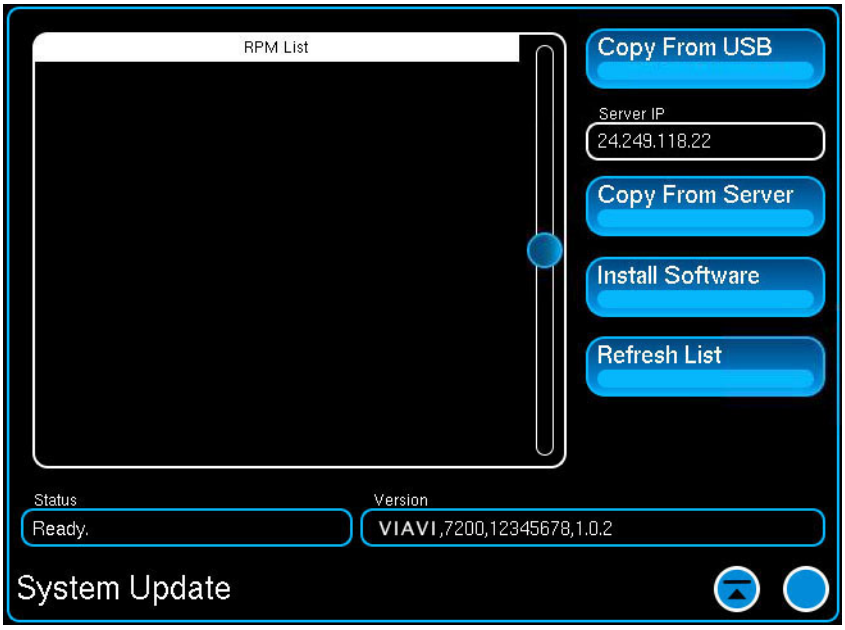


Fig. 4-1 System Update Window

Parameter	Description
RPM List	Displays a list of files copied from USB during the System Update procedure.
Install Software	Installs the copied RPM files.
Refresh List	Updates RPM list after update procedure is completed.
Copy from USB	Copies RPM files from USB device.
Server IP	IP address from which files are copied when Copy from Server Button is pressed. Field must be defined before pressing Copy from Server Button.
Copy from Server	Reserved for future use.
Status	Displays status of Test Set during the System Update procedure.
Version	Displays Test Set identification and version of software currently installed in the Test Set. Field displays updated version information following a software update.

4.3.1 System Update Procedure

The System Update procedure is a user-friendly process that has been integrated into the Test Set. The USB System Update downloads software from a USB device to the Test Set. This procedure describes how to download software to a USB device and upload the software to the Test Set.

> **NOTE**
>
> Read this procedure in it's entirety before updating software.
>
> The name of the software .zip file and .rpm files varies based on the software version. The file names shown in the examples in this section are for demonstration purposes only.

4.3.1.A Software Distribution

4.3.1.A.1 Download Software

Software updates are typically performed by downloading software from the VIAVI website to a USB storage device. Software is then updated from the USB storage device to the Test Set. If performing an update where software is being downloaded to a USB storage device, proceed to 4.3.1.B, Preliminary Procedures.

4.3.1.A.2 CD/DVD Software Distribution

In some instances software is distributed to the user on a CD/DVD. Software is updated from the CD/DVD to the Test Set using a USB to CD/DVD ROM Adapter. If performing an update where software has been distributed on a CD/DVD, proceed to section 4.3.1.C, Software Update Procedure.

4.3.1.B Preliminary Procedures

STEP	PROCEDURE

1. Download the software .zip file from the VIAVI website to a USB storage device.
2. The software .zip file contains files with .rpm extension. These are the system software files.

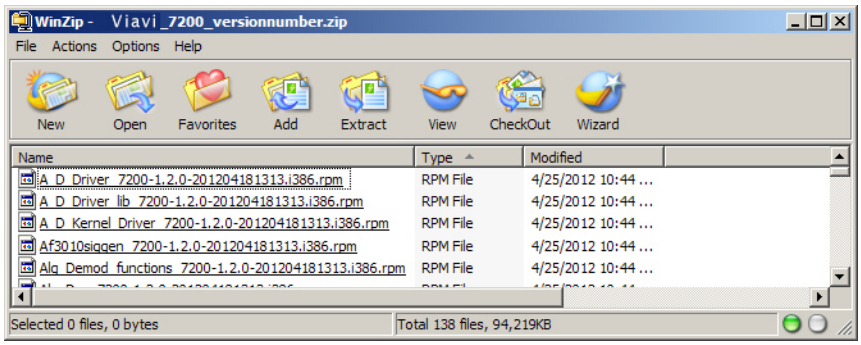


Fig. 4-2 Software .zip File Contents (Example)

3. Extract the software files from the .zip file to the top level directory of the USB storage device.
4. The extraction process creates an Instrument directory which contains a Common sub-directory (\Instrument\Common).
5. Verify the software files have been extracted to the Common sub-directory. DO NOT move files to another sub-directory or the System Update process will fail.

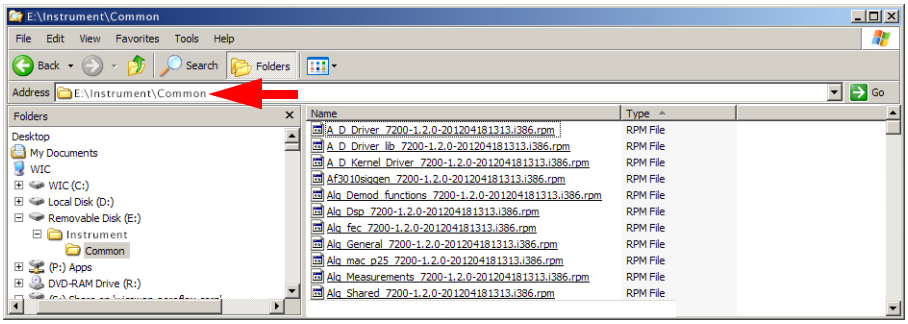


Fig. 4-3 Software .zip File - Extracted to USB

4.3.1.C Software Update Procedure

1. Connect the USB device (memory stick or USB to CD/DVD ROM Adapter) to one of the Test Set's USB Connectors.
2. Power on the Test Set. Wait while the operating system loads.
3. Press the System Button on the Launch Bar and select System Update.
4. Press the Copy from USB Button. The Status field updates to show file copy status.

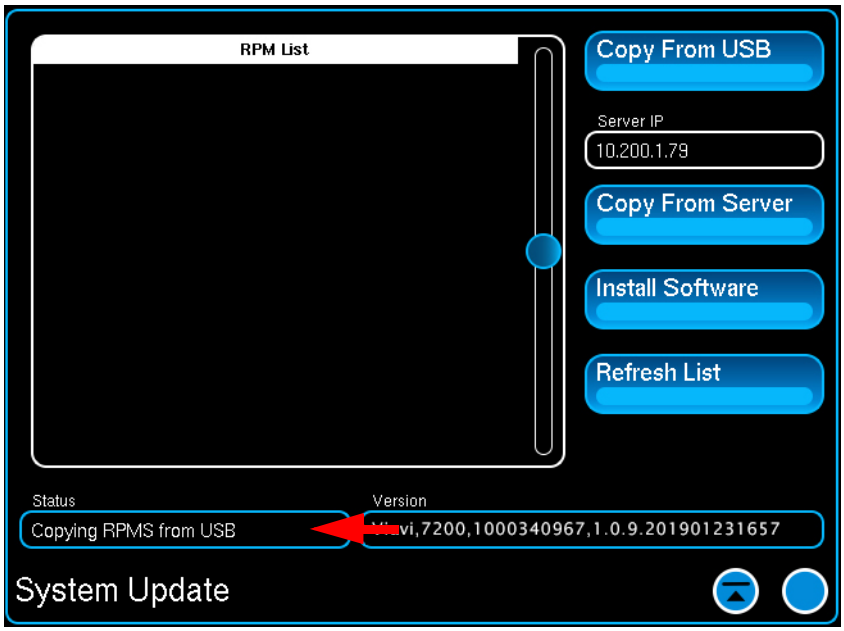


Fig. 4-4 Software Update File Copy Status

5. When the copy process is complete, the system verifies that the copied files are valid software files. During this process the Status field updates to indicate the Test Set is "Validating RPMS."

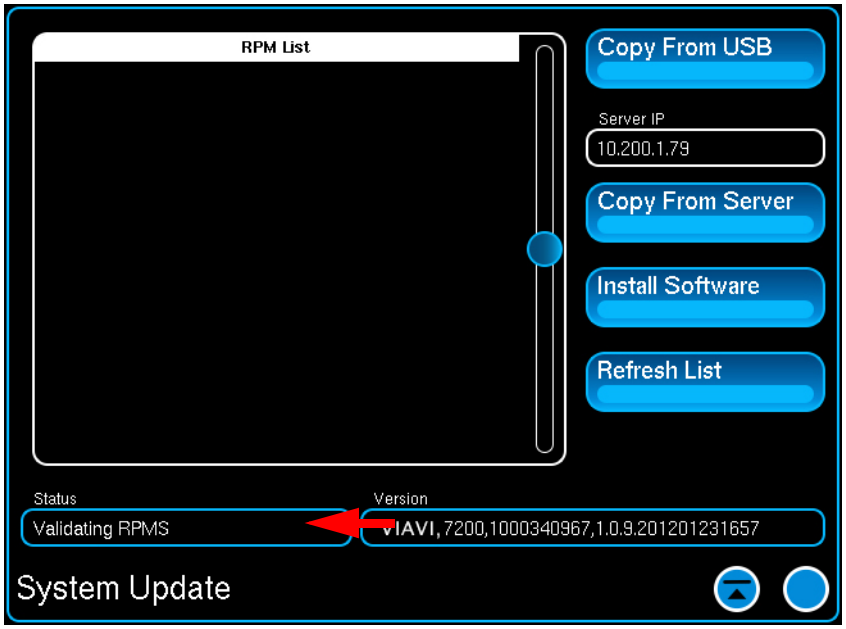


Fig. 4-5 Software Update Validating RPM's

STEP	PROCEDURE

6. When the Status field displays “RPM Validate Done” as shown in Fig. 4-6, press the Refresh List Button to update the RPM list.

7. After the RPM List updates press the Install Software Button.

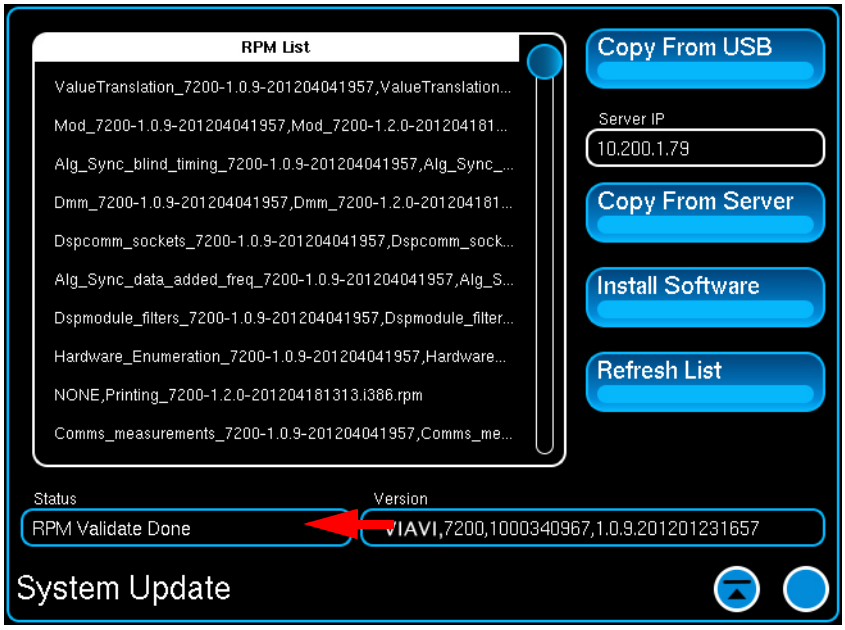


Fig. 4-6 System Update RPM’s Validated

8. Progress indicators are displayed during the System Update process. Do not interrupt the process or the update will fail.

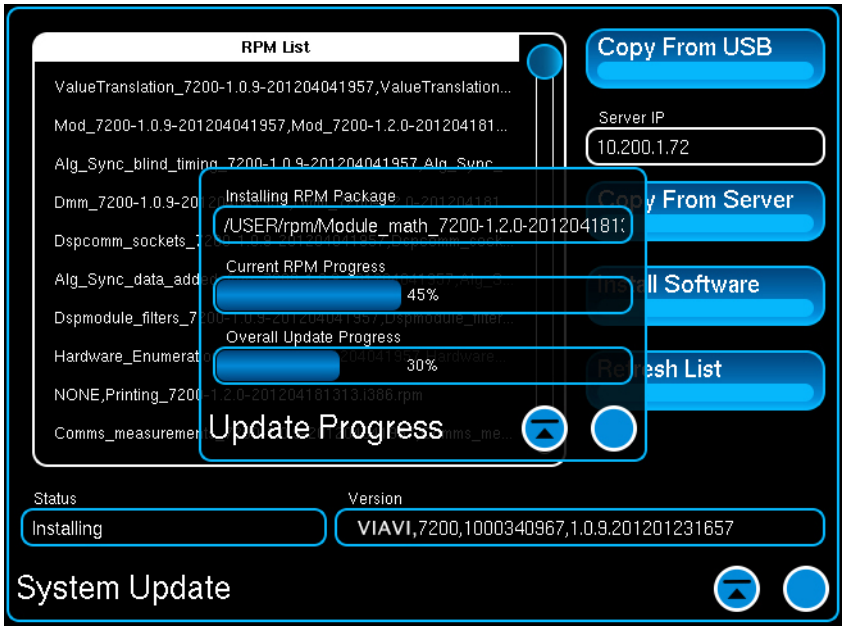


Fig. 4-7 System Update Progress Indicator

STEP	PROCEDURE

9. When the software update is complete both progress indicators display 100% and the Status field displays “Upgrade Done."

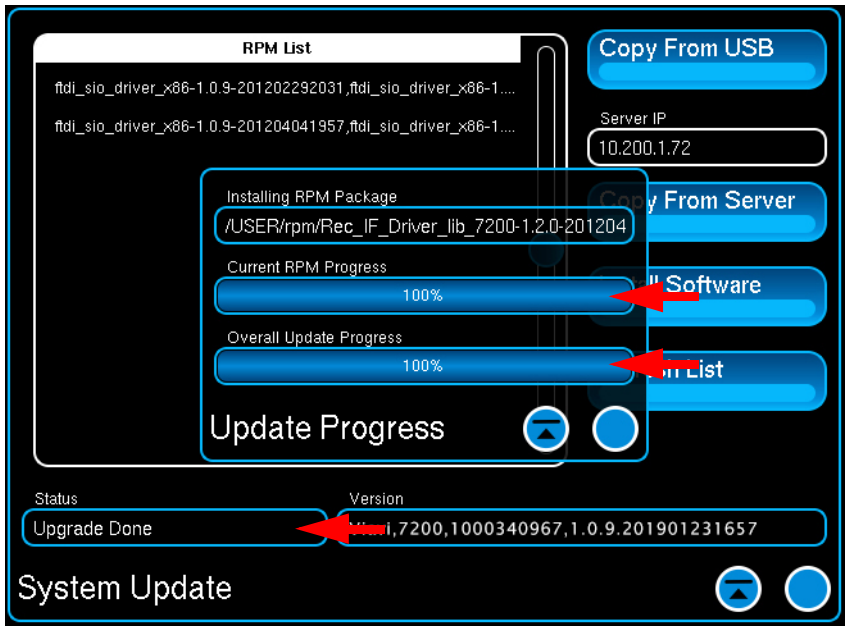


Fig. 4-8 System Update Complete

10. In some cases, when the software update is complete the system initiates a Power PC (PPC) update. Wait while the Test Set performs the Power PC update.

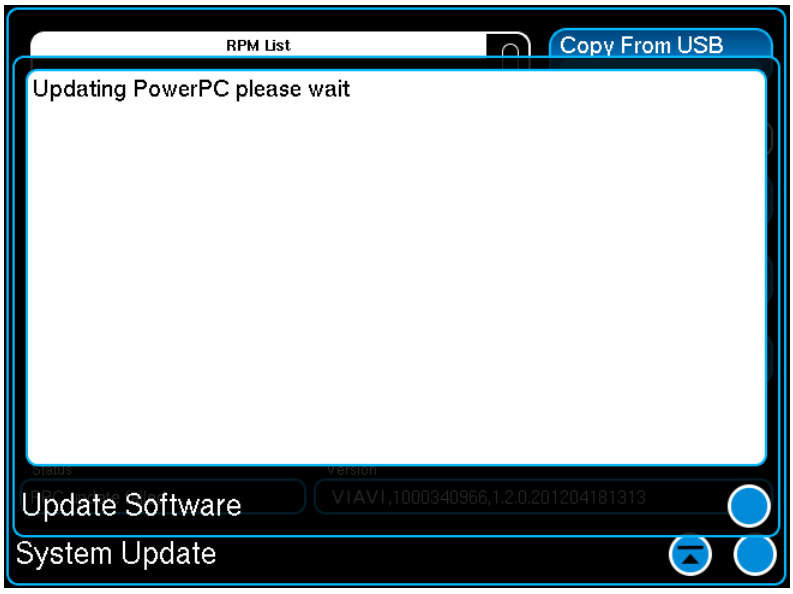


Fig. 4-9 Power PC (PPC) Update Window

11. At prompt, power-down Test Set. Wait while the power-down sequence is completed.
12. When the power-down sequence is complete, place the AC Power Switch in the OFF position.
13. When the Front Panel Power/On Standby Button LED goes OFF, place the AC Power Switch in the ON position and power on the Test Set.

4.4 OPTIONS WINDOW

The Options Window displays options currently installed in the Test Set. Displayed information includes the option name, user name, installation date and whether or not the option has an expiration date.

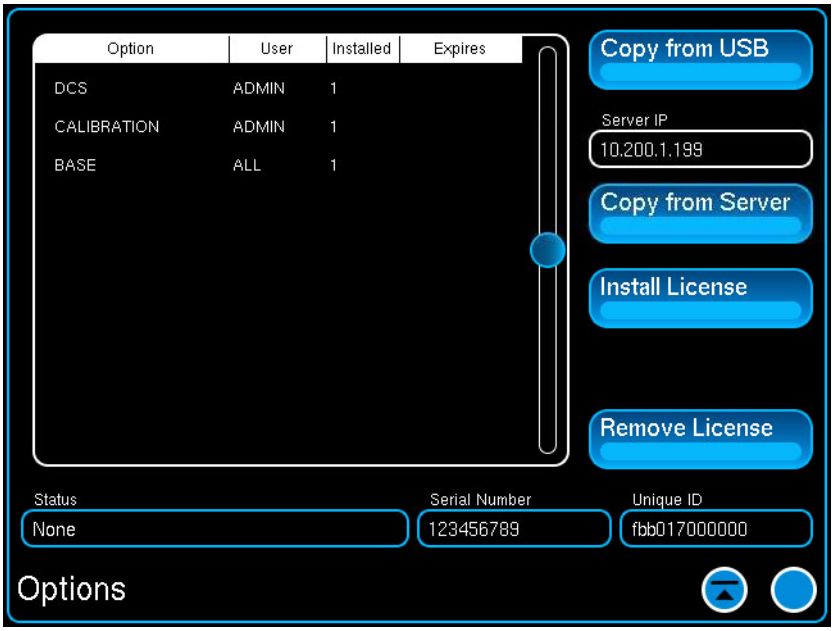


Fig. 4-10 Options Window

Parameter	Description
Option	Displays Option name.
User	Displays minimum User Role required to use the option.
Installed	Shows status of option. 0 = Option file is installed, but not enabled. Also indicates when an option has expired. 1 = Indicates an option is installed and enabled.
Expired	Purchased options do not expire. This field applies to “Try before you buy” options and indicates when an option’s trial period expires.
Copy from USB	Copies option files from USB device.
Server IP	IP from which option file(s) is being downloaded.
Copy from Server	Copies option files from network server.
Install License	Initiates option license installation procedure.
Remove License	Deletes selected licensed option.
Serial Number	Displays Test Set’s serial number.
Status	Displays option installation status.
Unique ID	Displays Test Set’s Unique Identifier which indicates Test Set hardware configuration.

4.4.1 Option Distribution

Options installed post-production are distributed to customers via email in a .zip file (option.zip). The option.zip file contains an option license (option.new file) and in some cases option software (.rpm file[s]).

One option.new file can be issued for multiple serial numbers and for multiple options. When an option (or options) has been purchased for more than one unit there will still only be one option.new file in the .zip file.

4.4.2 Option Installation Procedure

The Option Installation procedure downloads the option license file from a USB device to the Test Set. An option license file is serial number and UID specific and can only be installed in the Test Set for which it was issued. An attempt to install a license file in a Test Set other than the one for which the license was issued causes the installation to fail.

NOTE	Read this procedure in it's entirety before proceeding with Option Installation.

STEP	PROCEDURE

1. Copy the option.zip file to a USB device.
2. Open the option.zip file. Verify the option.zip file contains an options.new file (license file).

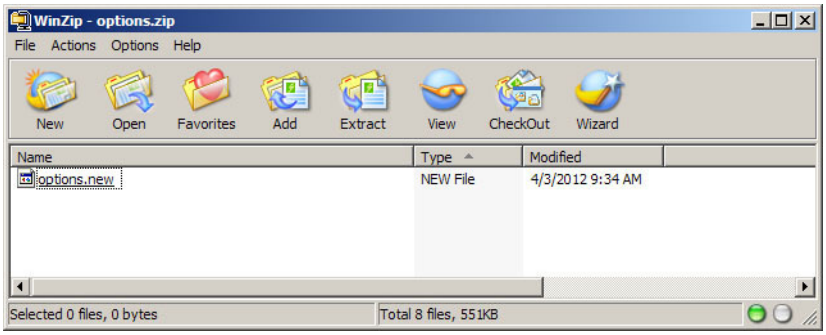


Fig. 4-11 .zip File - License File Only

3. In some cases the option.zip file contains the options.new file and software (file(s) with an .rpm extension).

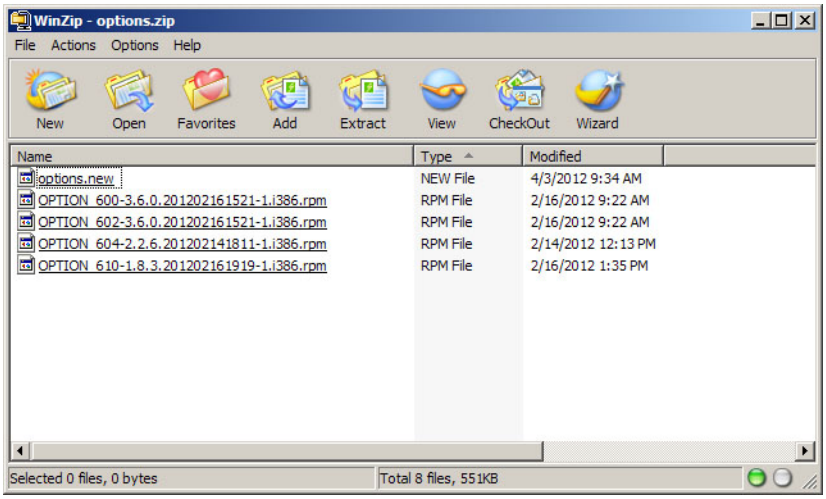


Fig. 4-12 .zip File - License and Software Files

STEP PROCEDURE

4. Extract contents of the option.zip file to the top level of the USB device.

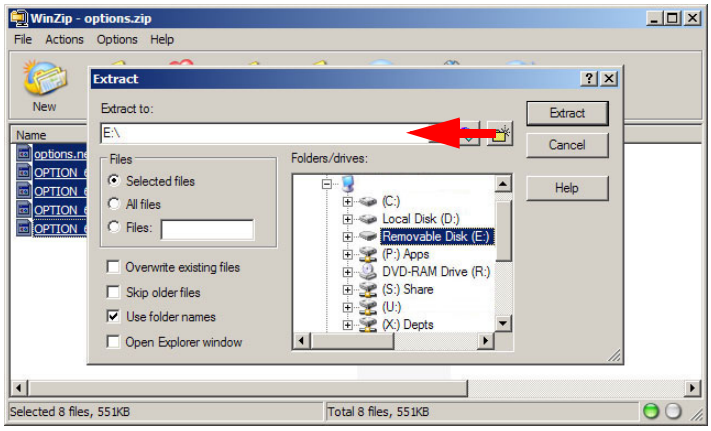


Fig. 4-13 Extract option.zip Contents to USB Device

5. The file extraction process creates an Instrument directory with a License sub-directory. If the option.zip file contained any .rpm files, the extraction process also creates a Common sub-directory.

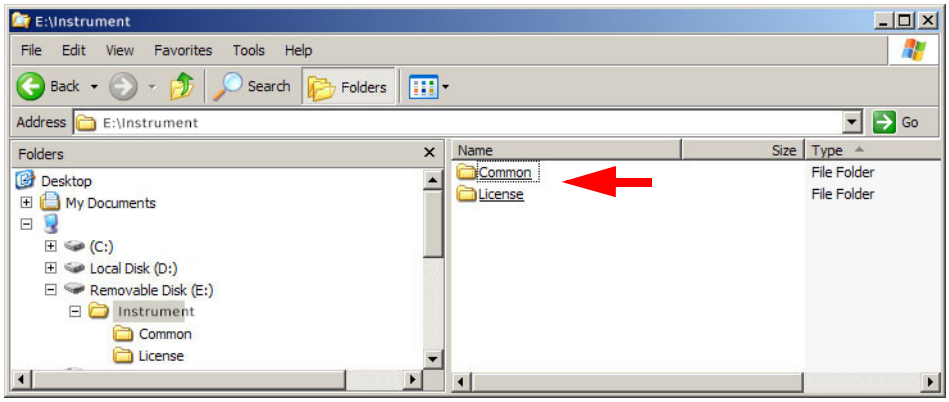


Fig. 4-14 Option File Directory Structure

6. Verify the option.new file has been placed in the USBDRIVE:\Instrument\License directory (refer to Fig. 4-15). DO NOT move the file to a sub-directory or the option installation process will fail.

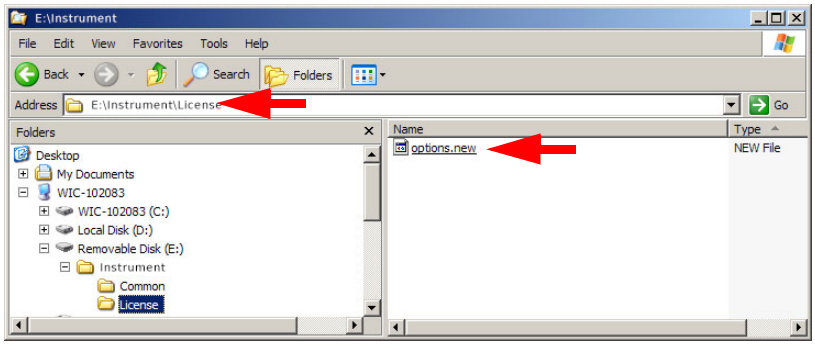


Fig. 4-15 Example option.new File Directory Structure

STEP	PROCEDURE

7. Verify the options.new file has been extracted in the License sub-directory (refer to Fig. 4-16). DO NOT move the file to another sub-directory or the option installation process will fail.

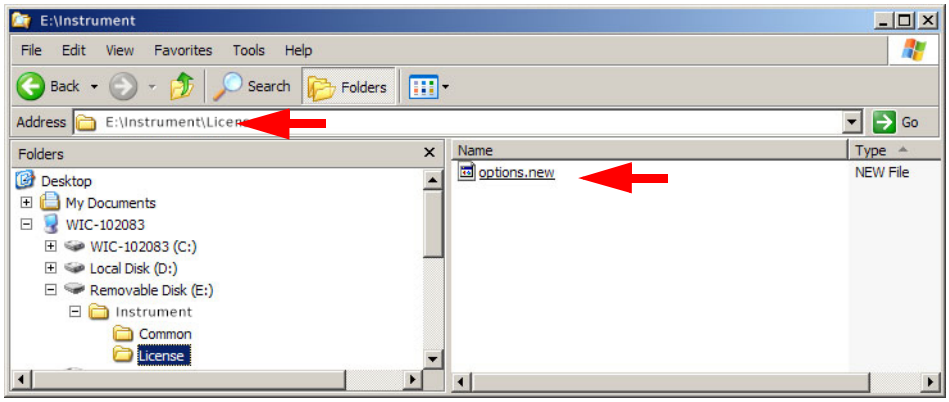


Fig. 4-16 Example License Directory Contents

8. If the option.zip file contained software, verify the .rpm file(s) was extracted to the Common sub-directory (refer to Fig. 4-17). DO NOT move the file(s) to another sub-directory or the software installation process will fail.

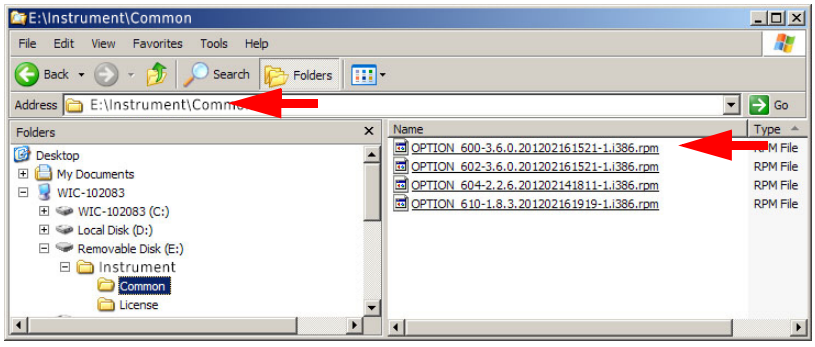


Fig. 4-17 Example Common Directory Contents

9. Connect the USB device to one of the Test Set's USB Connectors.

NOTE Verify license is being installed in the Test Set for which it was issued (verify Serial Number and UID).

10. Power on the Test Set. Wait while the operating system loads.
11. Press the System Button on the Launch Bar and select Options.
12. Press the Copy from USB Button. The Status field updates to show file copy status.
13. When the Status field displays "Copying from USB Done" press the Install License Button.

STEP	PROCEDURE

14. When the Status field displays “Installing License Done" and the Options table updates to list the license files (refer to Fig. 4-18), the option license installation is complete.

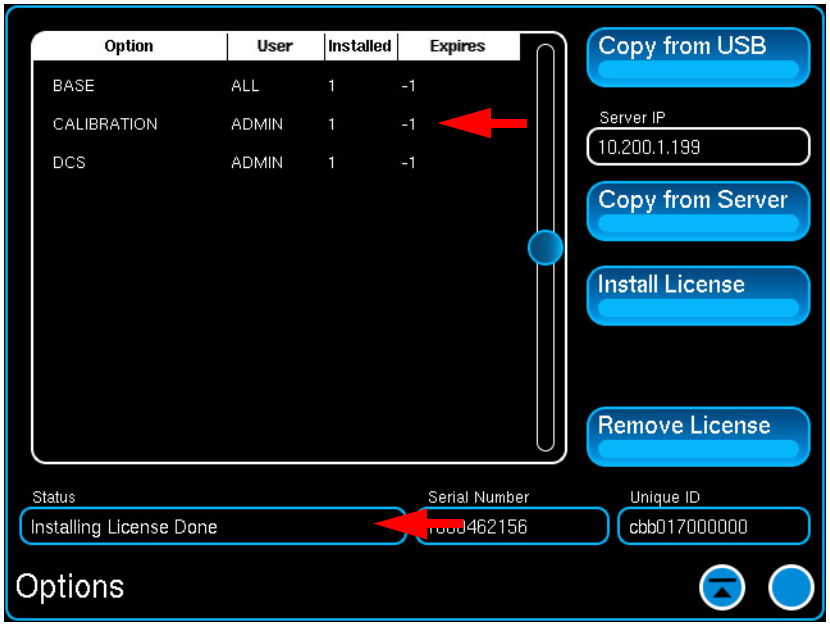


Fig. 4-18 Option Installation - Complete

If the .zip file only contained the options.new file, power down and reboot the Test Set to activate the option(s).

If the .zip file contained option software (.rpm file[s]), perform the System Update Procedure to complete the Option Installation process.

4.5 SYSTEM CONFIGURATION

The System Configuration Window organizes related system functions in groups which are accessed by selecting the tab from the horizontal menu at the top of the System Configuration Window.

4.5.1 Status Window

The Status Window displays the Test Set's operational status.

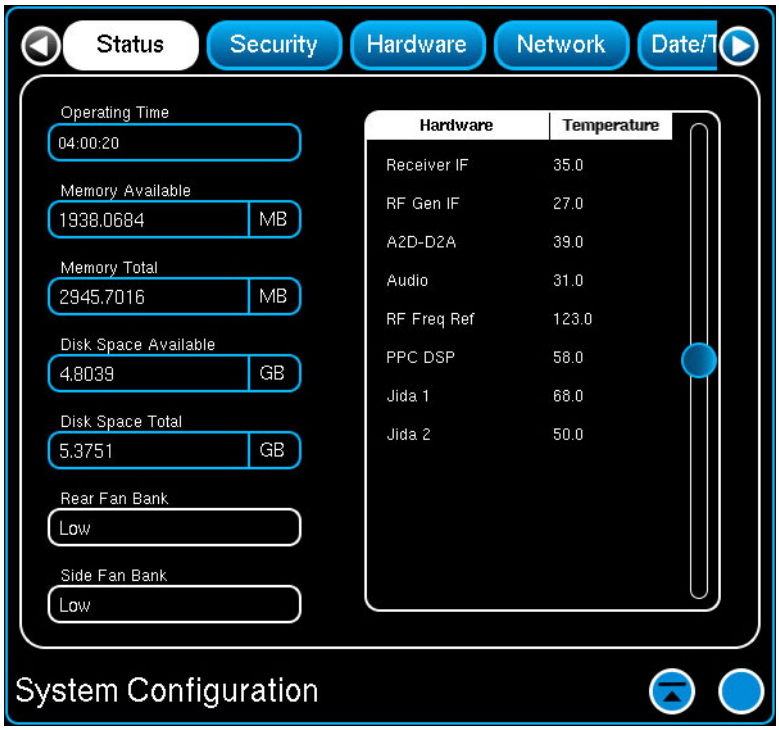


Fig. 4-19 Status Window

Parameter	Description
Operating Time	Displays the accumulated amount of time the Test Set has been operating.
Memory Available	Displays the amount of memory available on the Test Set.
Memory Total	Displays the total amount of memory on the Test Set.
Disk Space Available	Displays the amount of unused disk space available on the Test Set.
Disk Space Total	Displays the total amount of disk space on the Test Set.
Rear Fan Bank	Selects the speed of the rear group of fans.
Side Fan Bank	Selects the speed of the side group of fans.
Temperatures	Displays the temperature of the Test Set modules.

4.5.2 Security Window

The Security Window manages the anti-virus software installed in the Test Set.

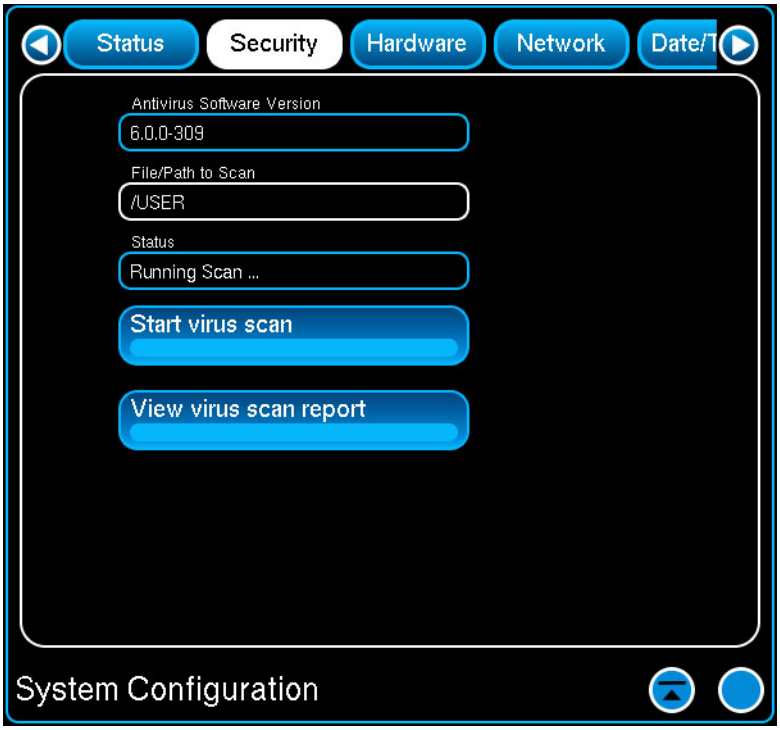


Fig. 4-20 Security Window

Parameter	Description
Antivirus Software version	Displays current version of anti-virus software installed in Test Set.
File/Path to Scan	Designates directory or file to be scanned.
Status	Displays status of virus scan.
Start Virus Scan	Initiates virus scan of executable files stored on the Test Set (i.e., MSDOS).
View Virus Scan Report	The Virus Scan Report identifies the version of the virus software, lists the files which have been scanned and shows the result of the virus scan for each file. The Virus Scan Report can be transferred from the Test Set to an external storage device using the File Management Window.

4.5.3 Hardware Window

The Hardware Window lists the hardware installed in the Test Set. Information includes a description of the hardware and any applicable hardware version information. All content on this window is read only.

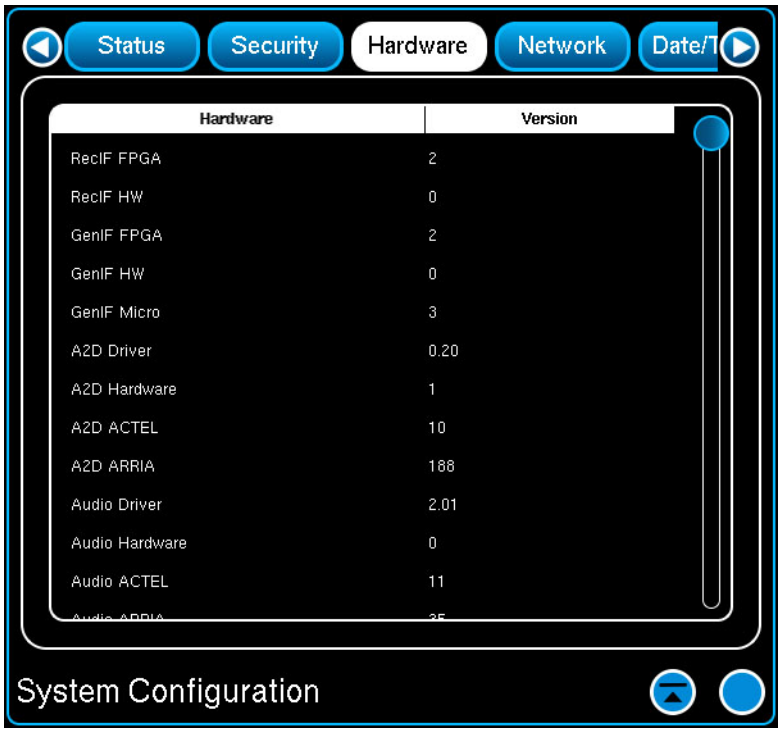


Fig. 4-21 Hardware Window

4.5.4 Network Window

Network parameters configure the Test Set for access via a network (LAN) connection. Once network access is configured the user can control the unit remotely via the UI or by using remote programming language.

The Test Set can be configured to obtain all its parameters from a DHCP (Dynamic Host Configuration Profile) server running on the network, otherwise the required information must be entered manually.

NOTE	The Test Set's TCP/IP Port is 5025.

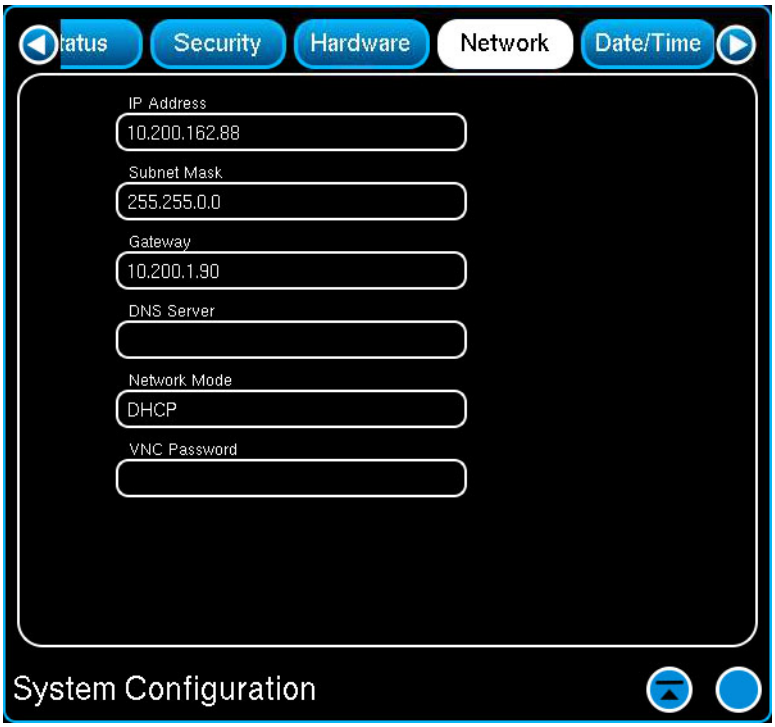


Fig. 4-22 Network Window

Parameter	Description
IP Address	Displays/defines Network IP Address assigned to the Test Set.
Subnet Mask	Displays/defines Network Subnet Mask assigned to the Test Set.
Gateway	Displays/defines Network Gateway assigned to the Test Set.
DNS Server	Displays/defines the Domain Name System assigned to the Test Set.
Network Mode	Enables/disables type of Network Access.
NOTE	If the Test Set is not connected to a network or an external device (i.e., External Power Supply) Network Mode should be set to Network Off.
VNC Password	Reserved for future development.

CAUTION	USERS WHO ARE UNFAMILIAR WITH THE PARAMETERS USED ON THIS WINDOW SHOULD SEEK TECHNICAL ASSISTANCE FROM THEIR IT DEPARTMENT. A CONFIGURATION ERROR MAY CAUSE PROBLEMS WITH LOCAL NETWORK OPERATION!

4.5.4.A Configure DHCP Network Access

STEP	PROCEDURE
1.	Power on the Test Set.
2.	Set Network Mode to Network Off to de-activate current network settings.
3.	Connect Test Set to an active LAN Connection.
4.	Set Network Mode to DHCP.
5.	Wait while the Test Set queries on the network for a DHCP server. The IP, Subnet Mask, Gateway and DNS fields update upon completion of the transaction with the server.

4.5.4.B Configure Static IP Network Access

STEP	PROCEDURE
1.	Power on the Test Set.
2.	Set Network Mode to Network Off to deactivate current network settings.
3.	Connect Test Set to an active LAN Connection.
4.	Set Network Mode to Static IP.
5.	Configure IP, Subnet Mask, Gateway and DNS values according to network settings. Settings are activated when values are entered.

4.5.5 Date and Time Window

Files created in the Test Set are date and time stamped using the values from the Test Set's internal clock. The Date and Time fields allow the user to reset the Test Set's clock when necessary.

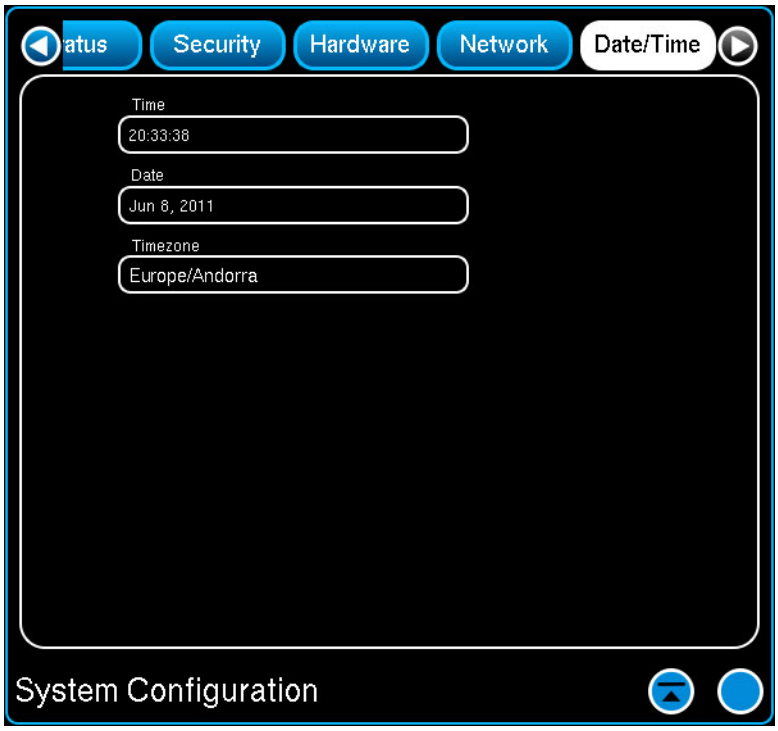


Fig. 4-23 Time and Date Window

NOTE	Resetting the Test Set's internal clock may affect expiration dates on Test Set try-before-you-buy software options.

4.6 CALIBRATIONS WINDOW

The Calibrations Window is option enabled when the Calibration Option is installed in the Test Set. The Calibrations Window lists the calibration tests and the last execution date for each test. Calibration information also indicates the Pass/Fail status of each test. Refer to the 7200 Maintenance Manual for use of the Calibration System.

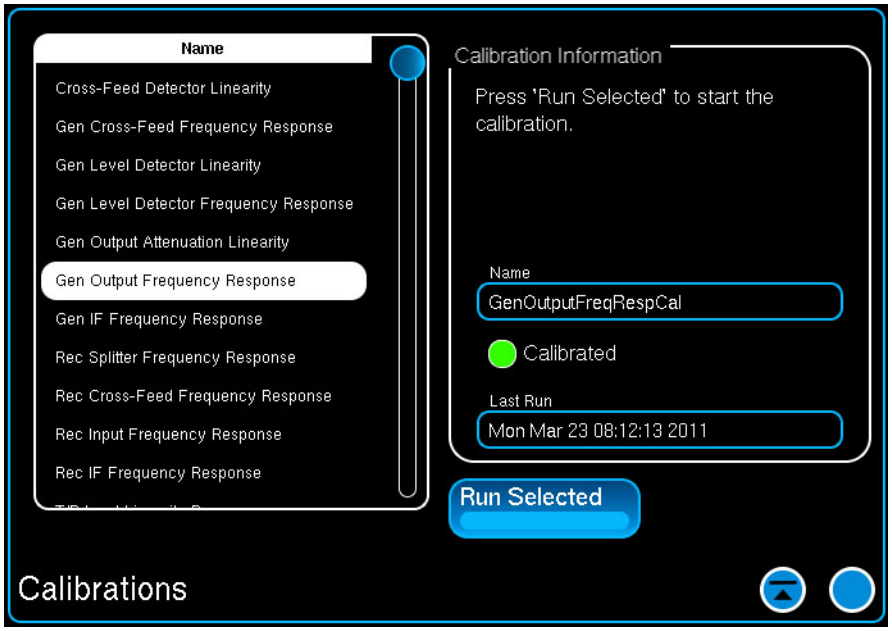


Fig. 4-24 Calibrations Window

4.7 PRINTING WINDOW

The Test Set supports Common UNIX Printing System (CUPS) for accessing local and network printers. Contact your local Network Administrator or IT department for assistance to configure your Test Set to access a printer.

> **NOTE** CUPS is supported in software version 1.3.6 or later.

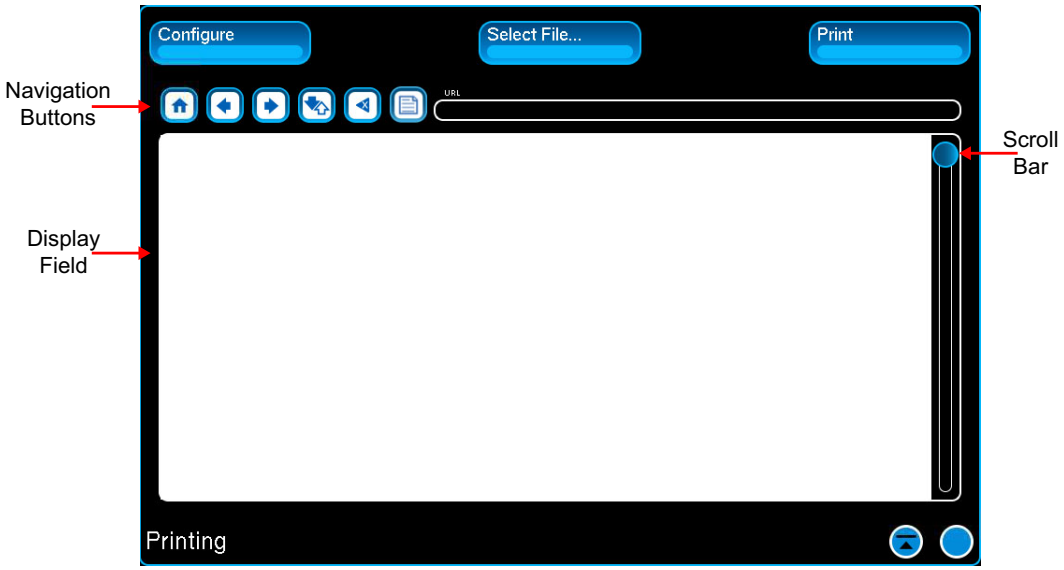


Fig. 4-25 Printing Window - Default View

Parameter	Description
Configure Button	Opens the CUPS User Interface which is used to configure a local or network printer.
Select File Button	Selects a file from Test Set's internal database to be displayed on the Display Field.
Print Button	Sends the contents of the file being displayed on the Display Field to the selected printer.
Navigation Buttons	Buttons are used to navigate content in the Display Field.
URL Field	Displays the complete path of the content being displayed on the Display Field.
Display Field	Displays the CUPS interface or contents of a file selected from the Test Set's internal database.
Scroll Bar	Navigates content in the Display Field.

4.7.1 How to Configure CUPS Printer

NOTE	The Test Set must be configured for Network Access in order to connect to a network printer. Network Access is not required if connecting to a local printer. Screen examples are provided for demonstration purposes only. Actual screen contents is determined by user printer selections.

STEP	PROCEDURE

1. Open the Printing Window and press the Configure Button. The UI updates to display the CUPS interface.

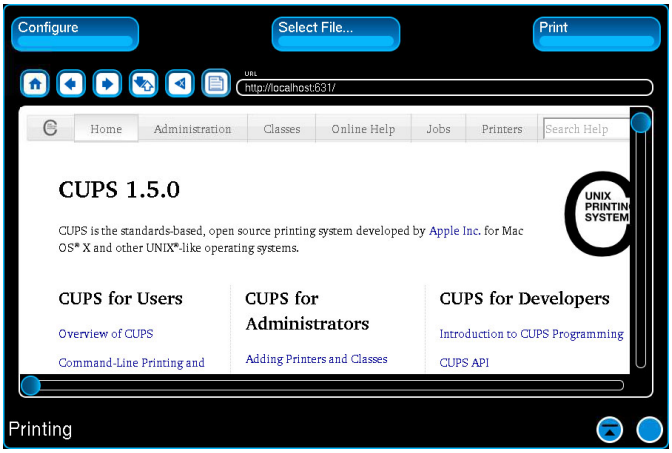


Fig. 4-26 CUPS Interface Main Screen

2. Select the Administration Tab, then select Add Printer.



Fig. 4-27 CUPS Interface Main Screen

STEP	PROCEDURE

3. Select the radio button for the desired printer and select Continue at the bottom of the screen.

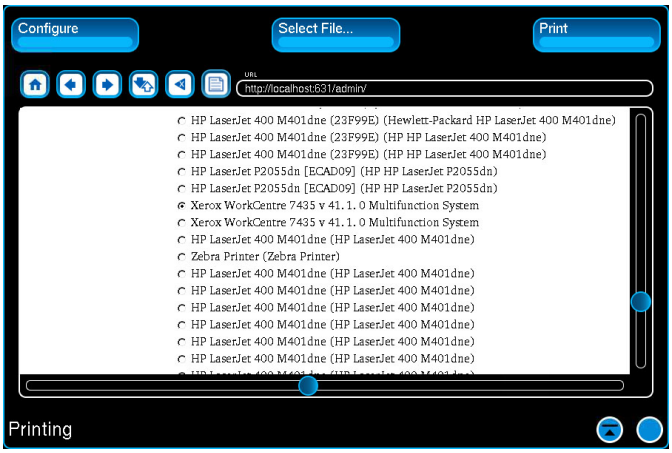


Fig. 4-28 CUPS Interface Add Printer Screen

4. Enter printer information on the next screen. When done select Continue.

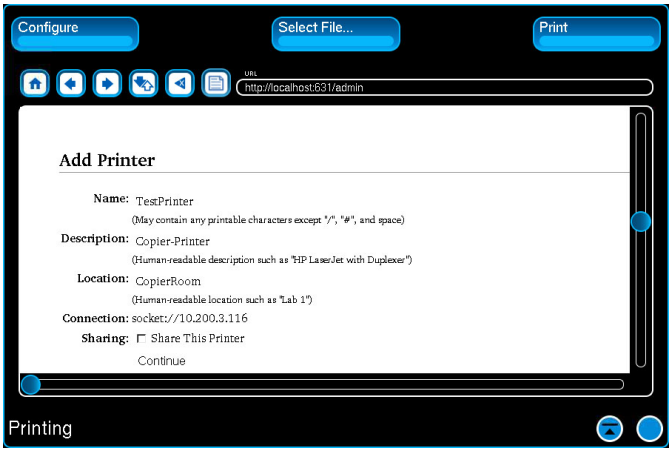


Fig. 4-29 CUPS Add Printer Information Screen

5. Select the printer manufacturer then select Add Printer.

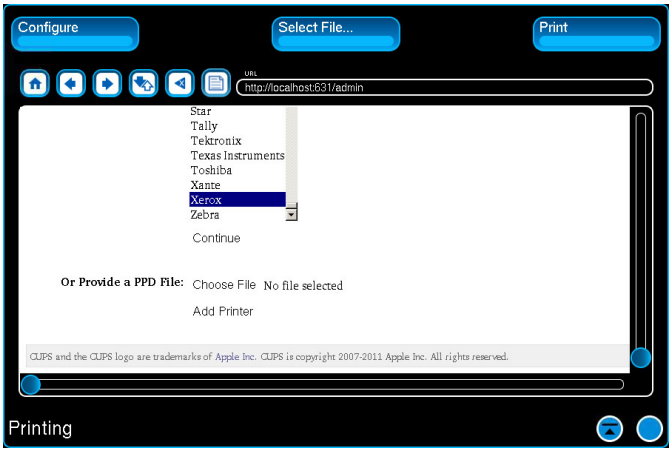


Fig. 4-30 CUPS Printer Manufacturer Selection Screen

STEP	PROCEDURE

6. Select the printer model then select Add Printer.

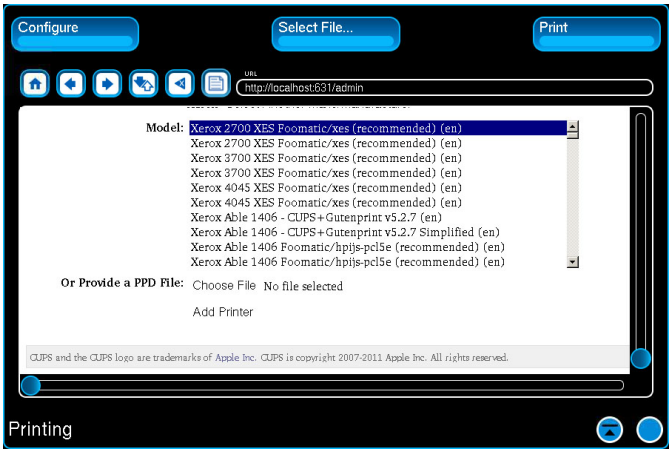


Fig. 4-31 CUPS Printer Model Selection Screen

7. The UI updates to display the Set Defaults Options screen. Configure default printing options (page size, print quality, double-sided...) then select Set Default Options at the bottom of the screen.

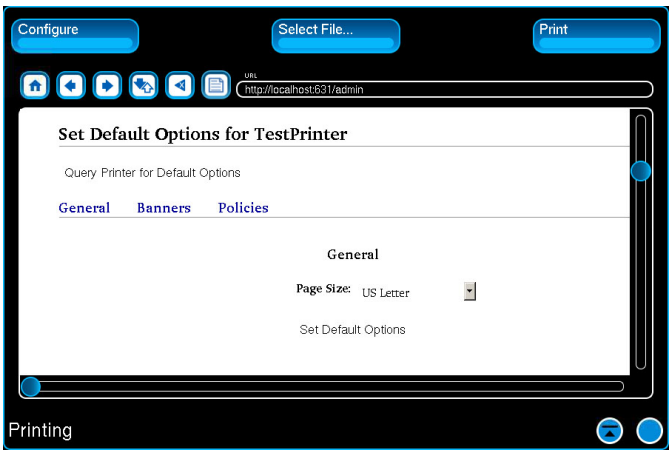


Fig. 4-32 CUPS Printer Default Settings Selection Screen

8. CUPS configuration for a desired printer is complete.

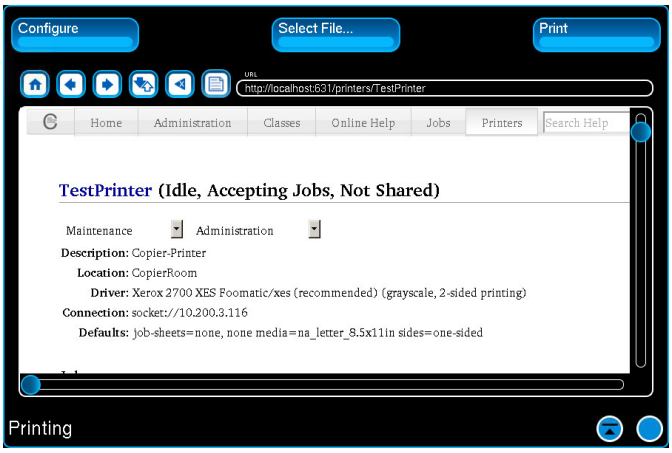


Fig. 4-33 CUPS Printer Setup Complete

9. Close the Printing window and reboot the Test Set to activate the printer settings.

4.7.2 To Print a File

STEP	PROCEDURE

1. Complete section 4.7.1, How to Configure CUPS Printer.
2. Open the Printing Window and press the Select File Button.
3. Select the file to be printed. The white field on the Printing Window updates to display the content of the selected file.



Fig. 4-34 File Selected for Printing

4. Press the Print Button to print the selected file.

4.8 USB TO GPIB ADAPTER

The USB to GPIB Adapter is used to create an interface between the Test Set and external devices. The GPIB Interface can be configured to allow for customized control setups. The USB to GPIB Adapter must be connected to the Test Set before GPIB parameters can be configured.

To configure USB to GPIB Adapter:

STEP	PROCEDURE

1. Connect a USB to GPIB Adapter to one of the Test Set's USB Connectors.
2. Power ON the Test Set.
3. Wait while the Test Set initiates the USB to GPIB Adapter.
4. When the Test Set has identified the USB to GPIB Adapter, a GPIB Function Window is displayed on the screen and the System Menu updates to display a GPIB button.
5. Configure GPIB parameters as needed.

The Test Set can now be controlled from an external device (i.e., computer) or it can be used to control a UUT using GPIB specific remote commands.

4.8.1 GPIB Window



Fig. 4-35 GPIB Window

The GPIB Window allows the user to configure the following parameters:

Parameter	Description
Device Handle	Identifies the GPIB Adapter. Content of this field is system defined from information obtained from USB to GPIB Adapter during initialization.
Mode	Selects how the Test Set operates in the test configuration. When Listener is selected the Test Set is being controlled by the external device via the USB to GPIB Adapter. When Controller is selected the Test Set is controlling the external device via the USB to GPIB Adapter.
Address	Field defines the primary address of the USB to GPIB Adapter.
Device in Charge	Selects the Test Set's internal sub-system that is controlling the external device. This field must be set to NONE in order to set Mode parameter to "Controller."

4.9 SERIAL WINDOW

The Serial Window is used to create an interface between the Test Set and external devices. The information provided in this section is intended for operators familiar with operating equipment via serial connections.

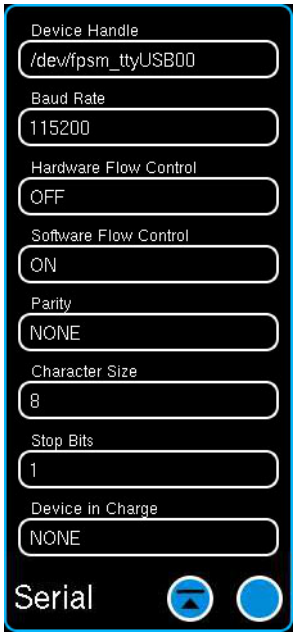


Fig. 4-36 Serial Window

Parameter	Description
Device Handle	Identifies the Serial Connector. dev/fpsm_ttyUSBn: Identifies Device Handles which are assigned to Front Panel ZIF Connector pins. dev/ttyUSBn: Indicates system assigned Device Handles which are used to identify USB to Serial Adapter devices connected to a Test Set USB Connector. • dev/fpsm_ttyUSB00: ZIF Connector RS-232 Port • dev/fpsm_ttyUSB01: ZIF Connector RS-422 Port • dev/fpsm_ttyUSB02 and USB03: Reserved for Internal Use • dev/ttyUSB*n*: The System assigns Device Handles to USB to Serial Adapters in chronological order starting with 4: dev/ttyUSB4, dev/ttyUSB5, etc...
Baud Rate	Defines the baud rate at which data is transmitted.
Hardware Flow Control	Allows communications handshaking using RTS and ATS lines.
Software Flow Control	Defines whether or not XON/XOFF is used for handshaking.
Parity	Specifies None, Even or Odd as the parity setting.
Character Size	Specifies 7 or 8 bit character data.
Stop Bits	Sets 1 or 2 stop bits.

Parameter	Description
Device in Charge	Selects the Test Set's internal sub-system that is controlling the external device. • None: Select None to configure a generic interface in which a test script controls an external device. • SCPI: Select SCPI to control the Test Set from an external device via remote programming commands sent through the Serial connection. • Scripting: Select Scripting to configure a UUT specific PPOE connection. Contact VIAVI Customer Service for information on radios currently supported.

4.9.1 Serial Connection Options

A serial interface can be established between the Test Set and an external device using the Front Panel ZIF Connector or a USB to Serial Adapter. The connection option is selected from the Device Handle Drop-down Menu.

4.9.1.A Serial ZIF Connection

The Device Handle USB00 and USB01 are used to configure the interface with the ZIF Connector.

STEP PROCEDURE

1. Power ON the Test Set. Open the Serial Function Window.
2. Select the ZIF Connector Device Handle (dev/fpsm_ttyUSB00 or dev/fpsm_ttyUSB01) from the Device Drop-down Menu.
3. Configure Serial parameters as needed.

The Test Set can now be used to control a UUT using Serial specific remote commands.

4.9.1.B USB to Serial Adapter Connection

To establish an Serial connection using a USB to Serial Adapter:

STEP	PROCEDURE

1. Connect a USB to Serial Adapter to one of the Test Set's USB Connectors.
2. Power ON the Test Set. Open the Serial Function Window.
3. Wait while the Test Set initializes the USB to Serial Adapter. When the Test Set identifies the USB to Serial Adapter a new Device Handle is added to the Device Handle Drop-down menu which identifies the serial connector (refer to Fig. 4-37).

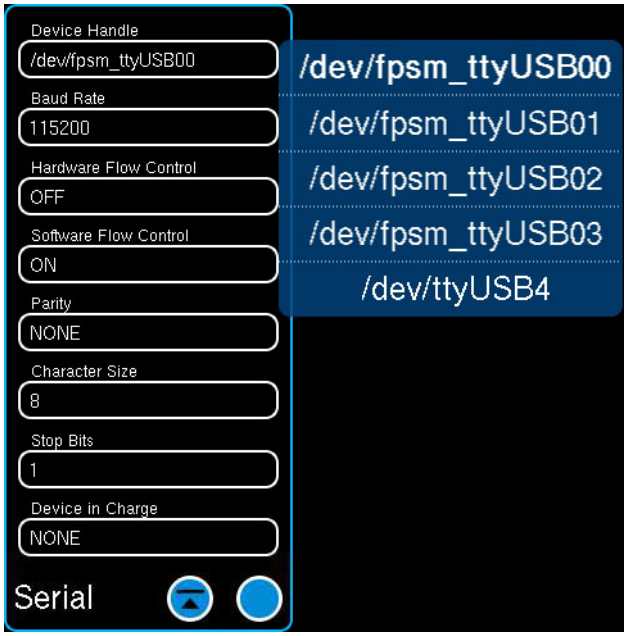


Fig. 4-37 Serial Function Button - Adapter Connector

4. Select the Device Handle assigned to the USB to Serial Adapter. In this example the Device Handle is dev/ttyUSB4.
5. Configure the Serial parameters as needed.

The Test Set can now be used to control a UUT using Serial specific remote commands.

Refer to section 3.11, ZIF Connector and A.7, ZIF I/O Connector for additional information about the ZIF Connector.

4.10 STORE WINDOW

The Store Window allows the user to save defined system components (Functions) to the Test Set's internal database. Stored settings can later be recalled using the Recall Window.

For example, if the RF Generator, Receiver and RF Power Meter parameters are defined to test a specific hand-held radio, a file can be stored to save the settings defined on these function windows. The stored settings file can then be recalled at a later date using the Recall Window.

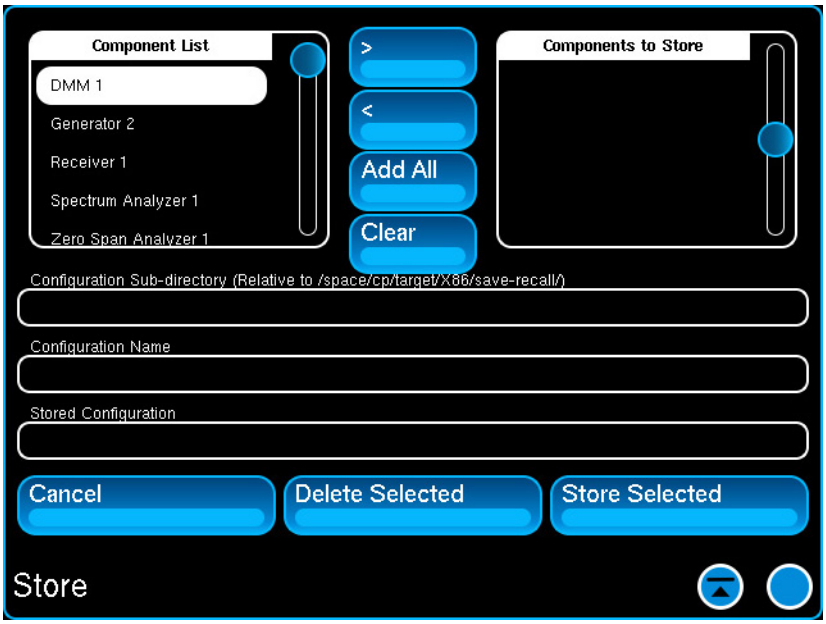


Fig. 4-38 Store Window

Parameter	Description
Component List	Lists Test Set system functions which can be stored.
Move >	Selects a component to be stored.
< Move	De-selects a component.
Add All	Copies all files in the selected window to or from the Test Set.
Clear	De-selects any file selected to be transferred.
Components to Store	Lists Components which have been selected to be stored.
Configuration Sub-directory	Field defines the directory in which the file is to be saved.
Configuration Name	Field defines name of file under which settings are stored.
Stored Configuration	Displays list of configuration files currently stored in the selected sub-directory.
Delete Selected	Deletes selected stored file. When the Delete Selected Button is pressed a dialog box is displayed which requires the user to confirm file deletion. This function is a precaution to prevent accidental deletion of stored files.
Store Selected	Stores selected files under the defined filename. Files must be selected and a filename must be defined before pressing the Store Selected Button.

4.10.1 How to Store Function Settings

To store defined Function settings:

STEP	PROCEDURE

1. Define parameter settings as desired for various UI Functions.
2. Press the Utilities button and select Store from the menu.
3. Select the Configuration Sub-directory field. Define sub-directory name.

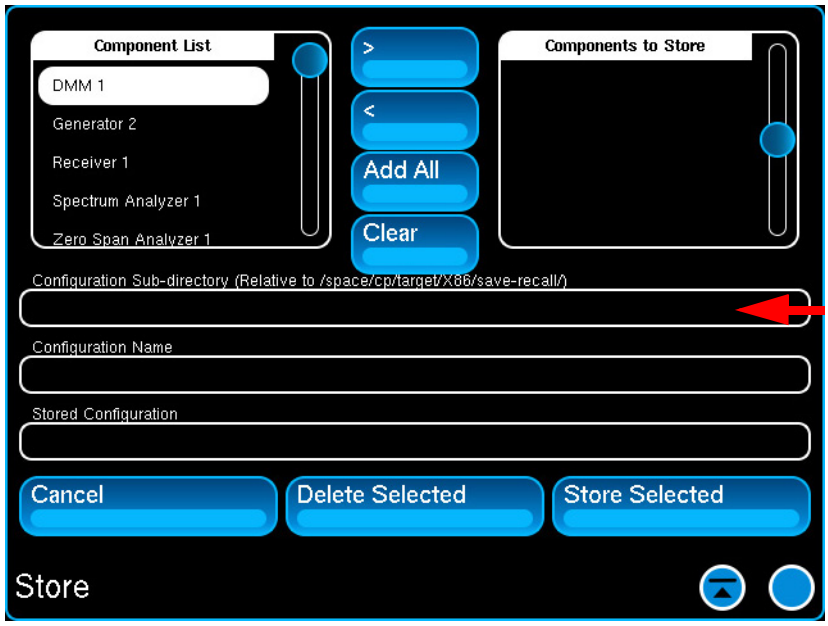


Fig. 4-39 Store Window - Configuration Sub-directory

4. Select the items from the Components List and add them to the Components to Store table. The examples shows the Generator and Receiver selected.

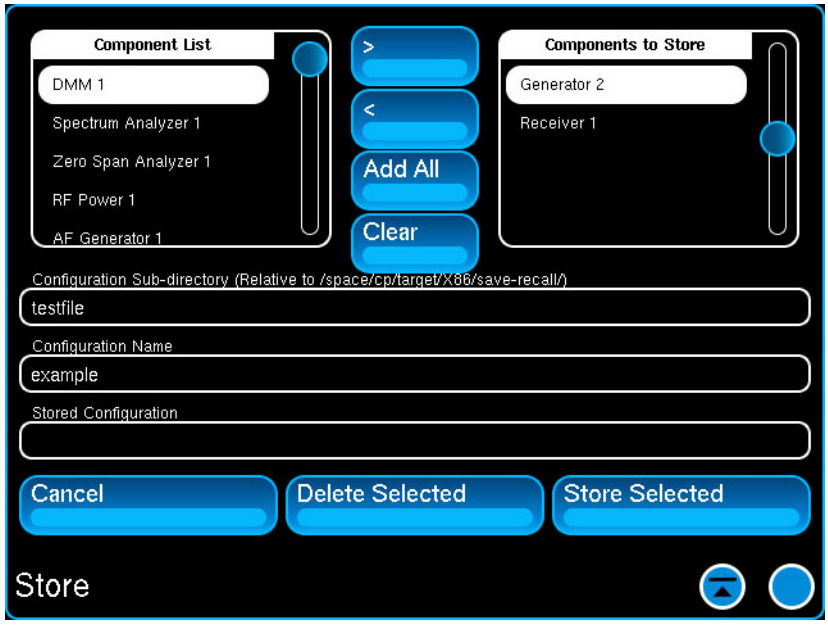


Fig. 4-40 Store Window - Components Selected

STEP PROCEDURE

5. Select the Configuration Name field. Define name under which settings are to be stored.

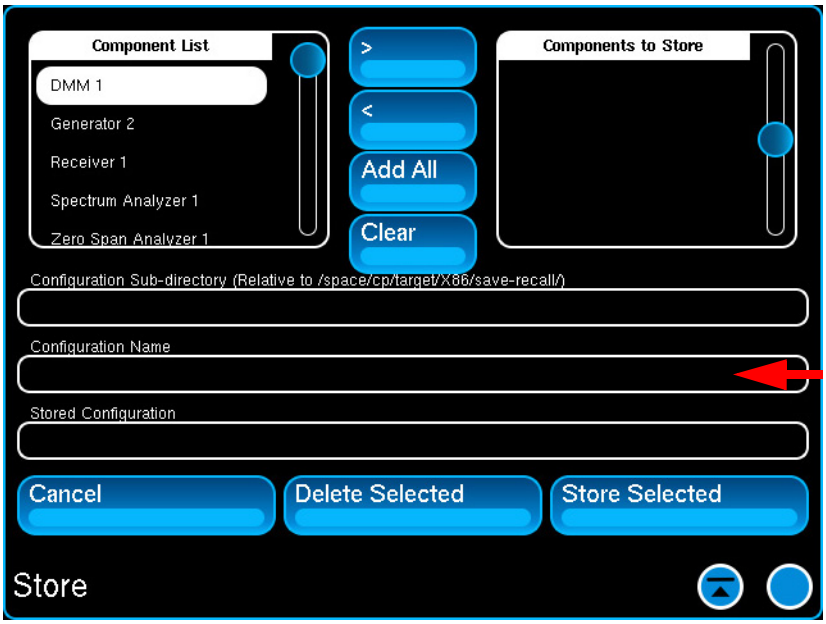


Fig. 4-41 Store Window - Configuration File

6. Press the Store Selected button to save the configuration file.
7. The stored file should now appear in the Stored Configuration list.

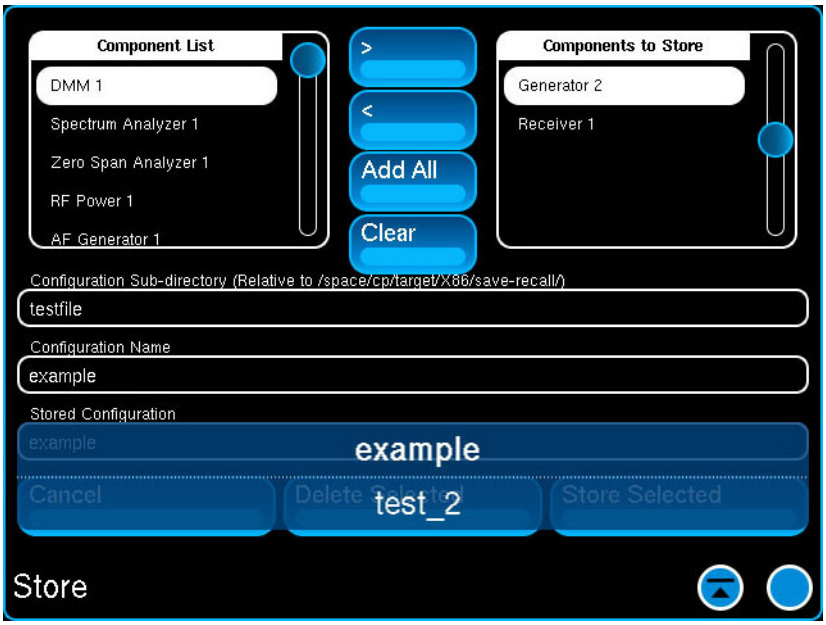


Fig. 4-42 Store Window - Stored Configuration Settings

NOTE	When a settings file is created the Test Set does not store the UI layout which was active when the file was created.

Refer to section 4.11, Recall Window for additional information.

4.11 RECALL WINDOW

The Recall Window allows the user to recall system function settings which have been stored in the Test Set's internal database using the Store function. Individual components can be selected for recall or a stored settings file can be selected for recall.

NOTE When a settings file is recalled the Test Set does not restore the UI layout which was active when the file was created.

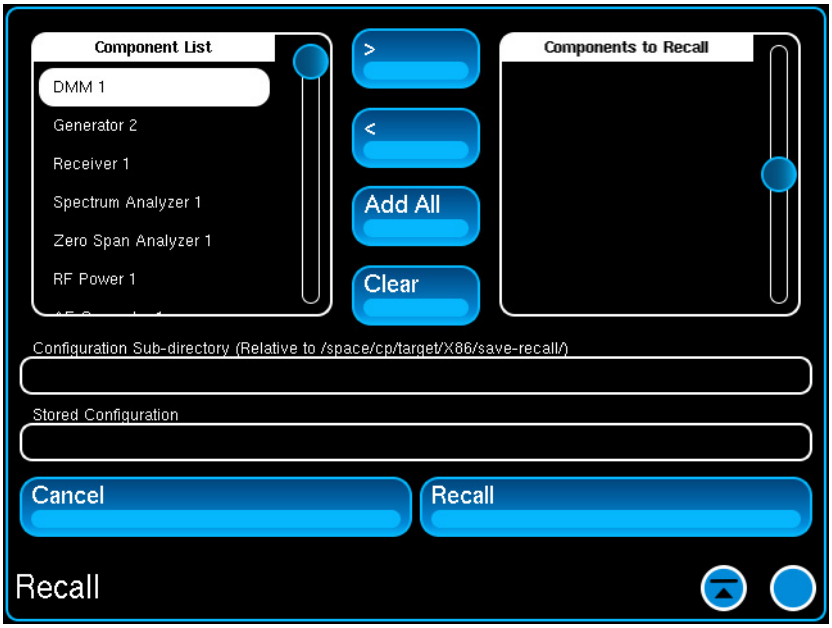


Fig. 4-43 Recall Window

Parameter	Description
Component List	Lists Test Set system components which can be recalled.
Move >	Selects a stored component to be recalled.
< Move	De-selects a component.
Add All	Copies all files in the selected table to be moved to the other table.
Clear	De-selects any file selected to be transferred.
Components to Recall	Lists Components which have been selected to be recalled.
Configuration Sub-directory	Field defines the directory in which the file is to be saved.
Stored Configuration	Select file to be recalled. Drop down menu contains a list of configuration files currently stored in the selected sub-directory.
Cancel	Aborts current recall procedure.
Recall	Initiates recall procedure. The procedure only recalls the selected components or the components which have been stored in the settings file.

4.11.1 How to Recall Stored Function Settings

To recall a stored settings file:

STEP	PROCEDURE

1. Press the Utilities button and select Recall from the menu.
2. Select the Sub-directory where file is located.

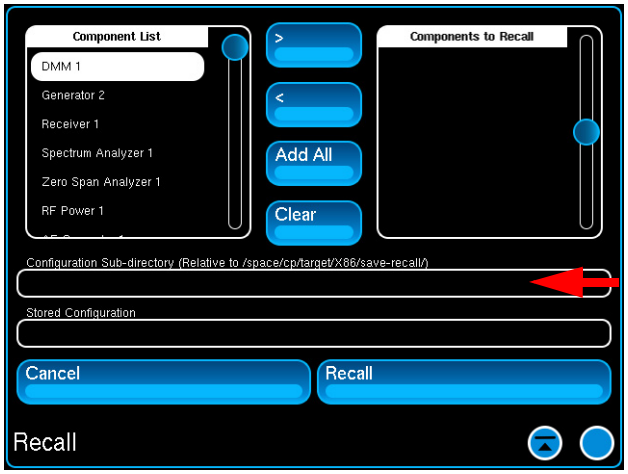


Fig. 4-44 Recall - Select Sub-directory

3. Select the settings file to be recalled from the Stored Configuration menu.

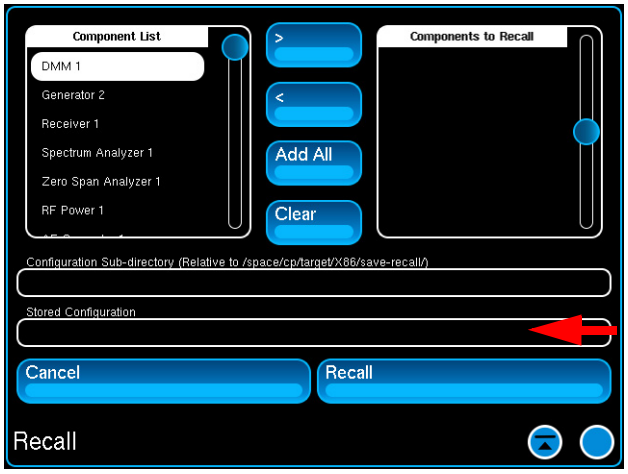


Fig. 4-45 Recall - Select File

4. Verify the selected file is displayed in the Stored Configuration menu.
5. Press the Recall button.

4.12 TOUCHSCREEN CALIBRATION

The Touchscreen Calibration Utility is an application which guides users through procedures to adjust the targeting of the UI touchscreen sensors. The Touchscreen Calibrations Window has tabs which access calibration parameters such as sound, alignment, resolution and the UI adjustment type.

Touchscreen Calibration is selected from the Utility Function Button on the Launch Bar.

4.12.1 Performing Touchscreen Calibration

To adjust UI touchscreen targeting:

STEP	PROCEDURE

1. Press the Utility Button on Launch Bar. Select Touchscreen Calibration from the menu.
2. Select the Tool tab from the Touchscreen Calibrations Window.

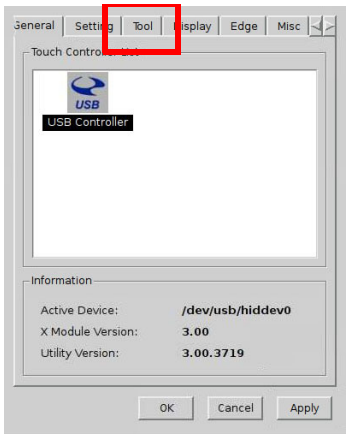


Fig. 4-46 Touchscreen Calibrations Window

3. Select the type of adjustment to be performed. This example shows 4Pts Calibration.

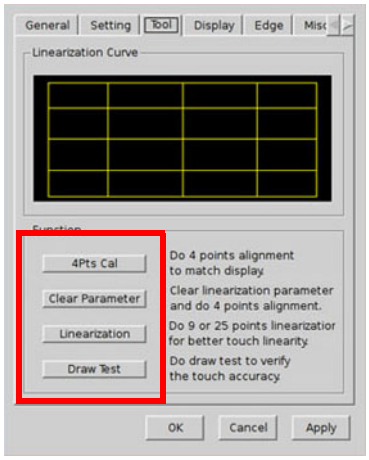


Fig. 4-47 Touchscreen Calibration Tool Window

STEP	PROCEDURE

4. The UI updates to display a preset grid. The grid displays a sequence of calibration points at each corner of the grid, starting at the lower left hand corner (shown below). A time indicator is displayed at the bottom of the UI. Each point must be calibrated in time allowed or the procedure restarts at the first point.

> **NOTE** The appearance of the grid pattern depends on the type of adjustment being performed.

5. Press and hold your finger on the center of each calibration point until the Test Set beeps to indicate that the UI touch sensors have updated.

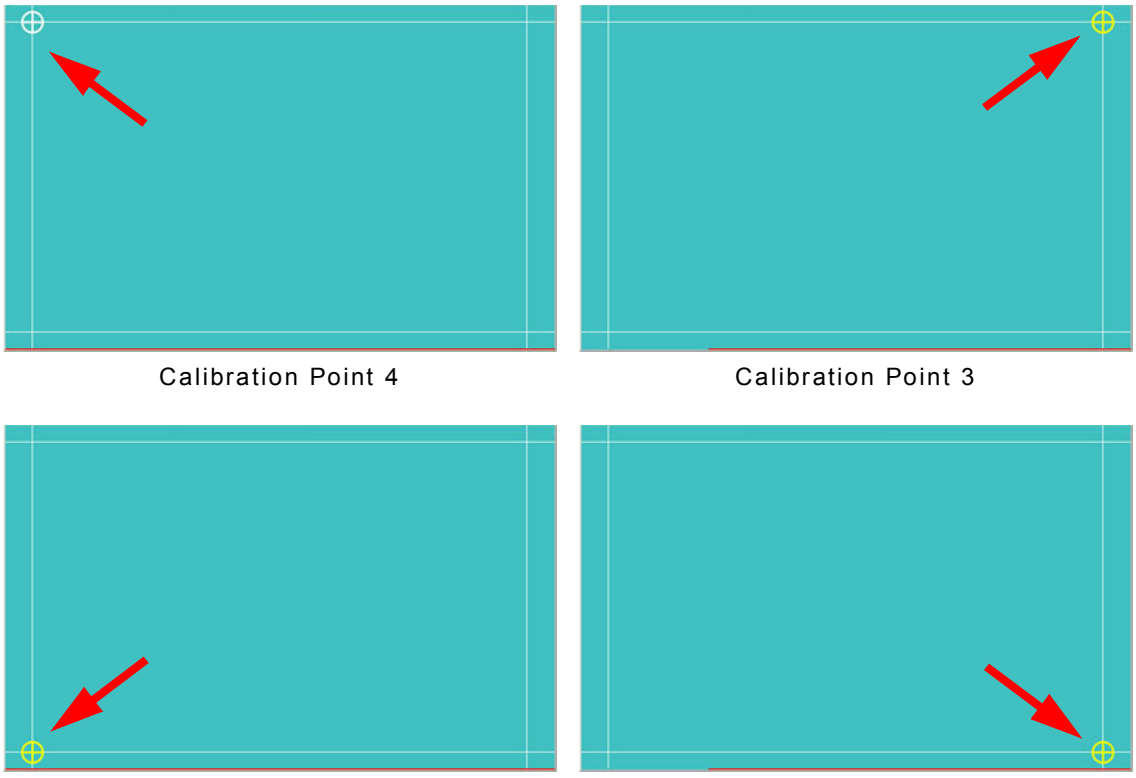


Fig. 4-48 Touchscreen Calibration - Four Points

6. Proceed through the other calibration points. When all points have been calibrated a dialog box opens which indicates the procedure is complete.
7. Press OK.
8. Press “X” to close the Touchscreen Calibrations Window.

4.12.2 Touchscreen Beep Function

The Test Set can be configured to emit a beep when the UI is touched. By default the beep function is disabled.

To enable beep:

STEP PROCEDURE

1. Press the Utilities Button on the Launch Bar.
2. Select Touchscreen Calibration from the menu.
3. Select the Misc tab on the Touchscreen Calibrations Window.
4. Select Beep from System Beep in the Function section of the window.

NOTE	Test Set does not support Beep from Sound Card.

5. Configure other beep settings (i.e., Beep on Touch, Beep on Release and sound settings).

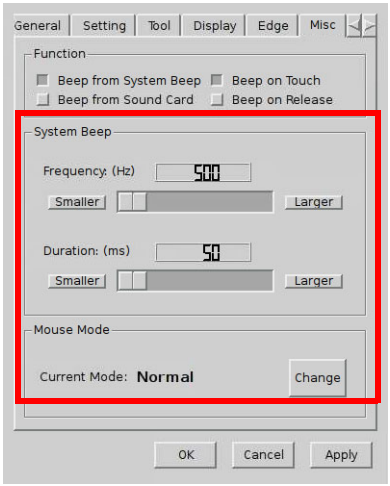


Fig. 4-49 Touchscreen Beep Settings

6. Press Apply Button to activate settings.
7. Press OK to confirm new settings.

4.13 FILE MANAGEMENT

The File Management Window is used to transfer files between the Test Set and external devices (i.e., USB device). This functionality allows a user to transfer a test script file from a USB device to the Test Set, execute the test script, then transfer stored test results from the Test Set to the USB device.



Fig. 4-50 File Management Window - Directory Structure

4.13.1 File Management Directory Structure

The Test Set's internal database contains pre-defined sub-directories which are found within the top level /USER/ directory (Fig. 4-50). Each sub-directory is used to store specific types of files (refer to Table 4-1). A file that is transferred to the Test Set must be placed in the proper directory or the Test Set will not properly execute the file.

The type of file and how the file is used determines where the file should be placed in the Test Set's database. For example, .aiq files must be placed in the /USER/iqfiles directory in order for the Test Set to properly playback the file.

FILE USAGE/TYPE	TEST SET DIRECTORY
Script Loader File (.py)	/USER/Scripting
User Script Buttons (.py)	/USER/Scripting_Menu
AutoTest Script File (.py)	/USER/auto_test3_scripts/user_defined_tests/ "subdirectory"
IQ File (.aiq)	/USER/iqfiles

Table 4-1 File Management - File Directory Structure

4.13.2 Transfer Files

The File Management Window provides users with the ability to transfer stored files to and from the Test Set.

4.13.2.A To transfer a file FROM the Test Set

STEP	PROCEDURE
1.	Attach a USB device to one of the Test Set's USB Connectors.
2.	Press the Utility Button on Launch Bar. Select File Management from the menu.
3.	Select the /USER directory where the files are located.

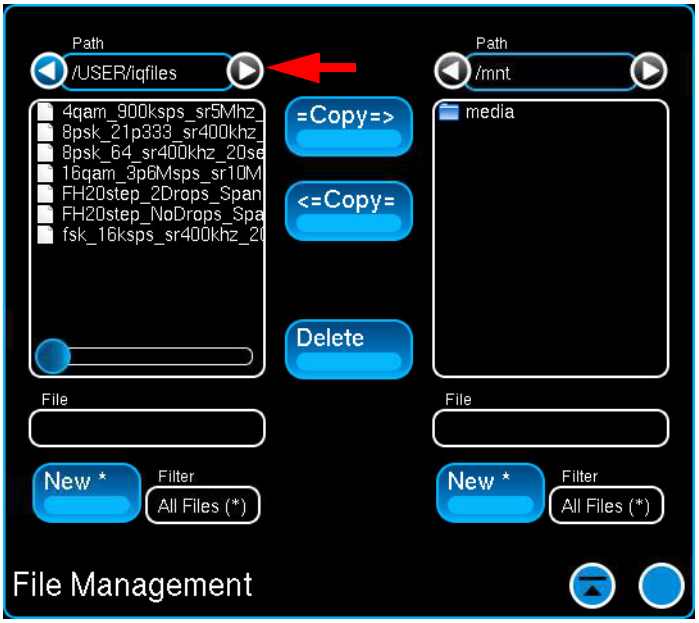


Fig. 4-51 File Management - Select Source Directory

4. Select the files or directory to be transferred.

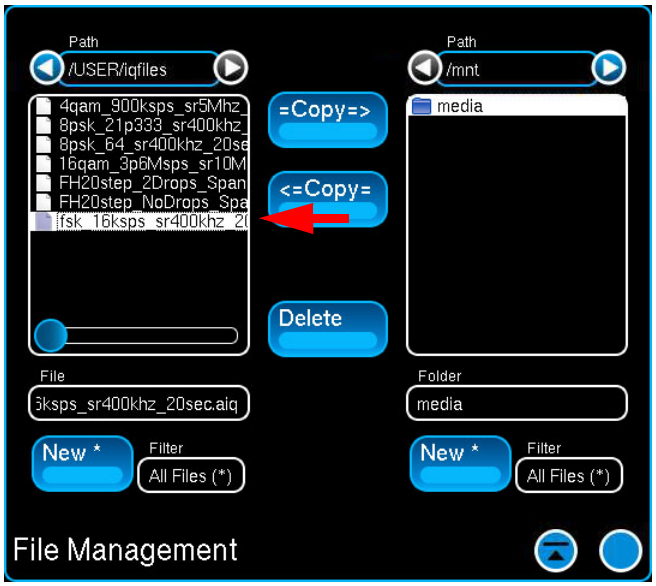


Fig. 4-52 File Management - Select File/Folder

STEP	PROCEDURE

5. Verify correct file is displayed in the Folder or File field.

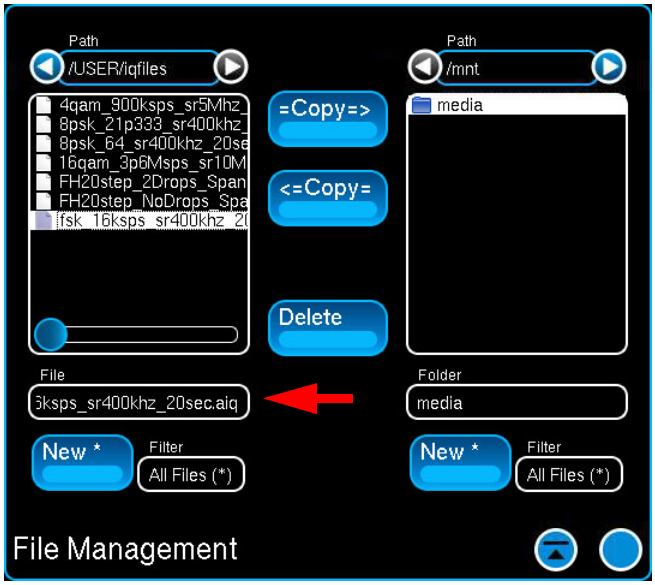


Fig. 4-53 File Management - Verify Selected File

6. Select the destination (external directory) where the file(s) are to be transferred.
7. Press the Copy => Button.

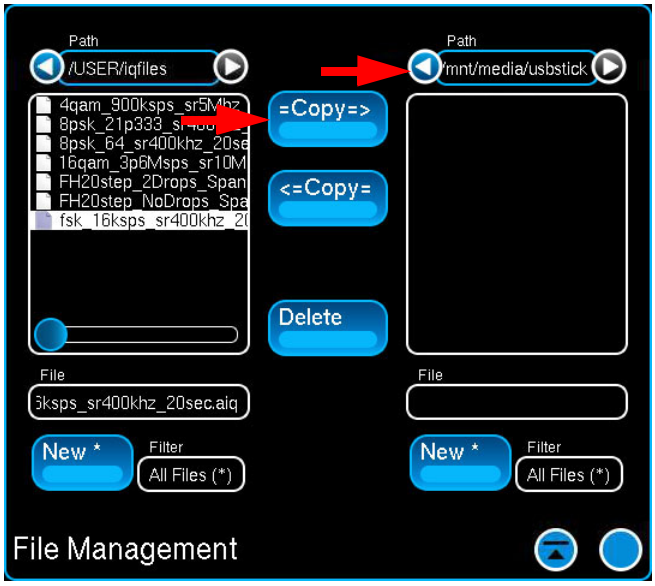


Fig. 4-54 File Management - Select Destination

STEP PROCEDURE

8. Verify the transferred file(s) are displayed in the destination Folder Field.

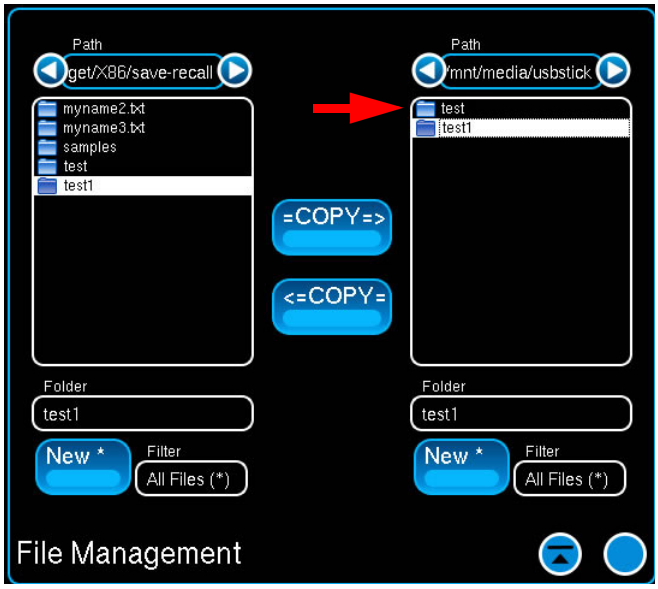


Fig. 4-55 File Management - Files Transferred

9. Navigate back to the top level /mnt in the external directory then disconnect the USB device from the Test Set.

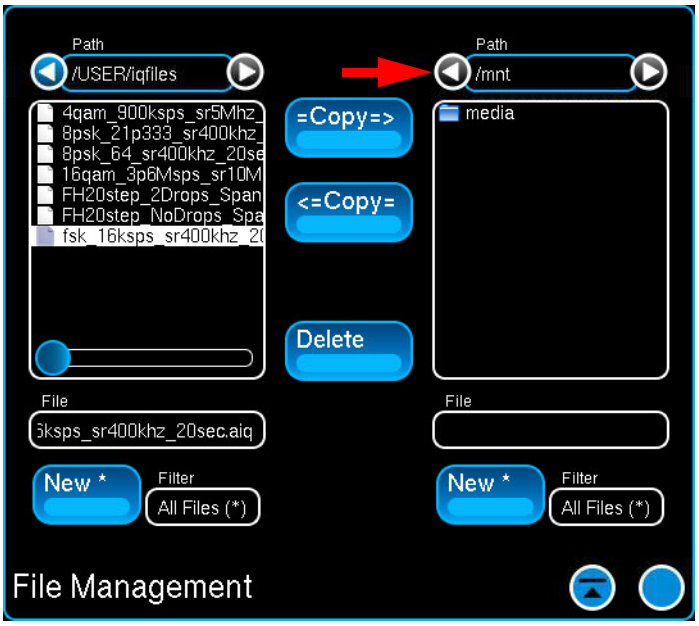


Fig. 4-56 File Management - Top Level External Directory

4.13.2.B To transfer a file TO the Test Set

STEP	PROCEDURE

1. Transfer file to be transferred to a USB device. Attach the USB device to one of the Test Set's USB Connectors.
2. Press the Utility Button on Launch Bar. Select File Management from the menu.
3. Select source where file(s) are located.

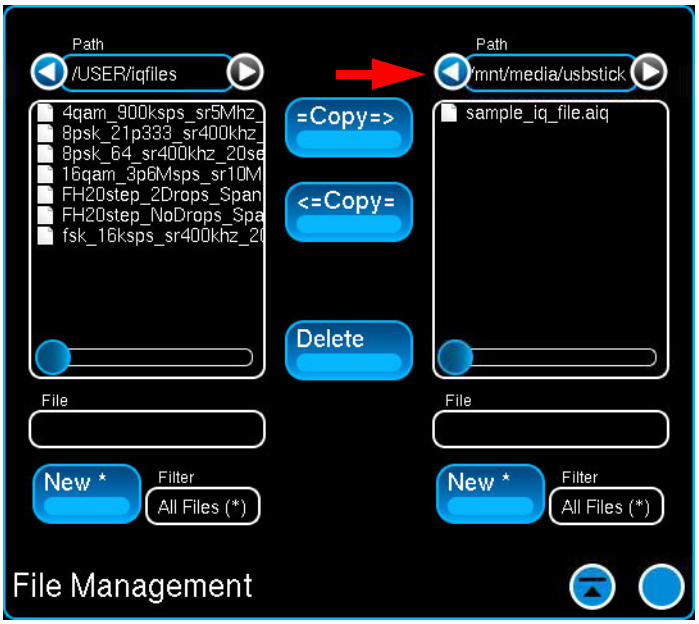


Fig. 4-57 File Management - Select File Source

4. Select file to be transferred.

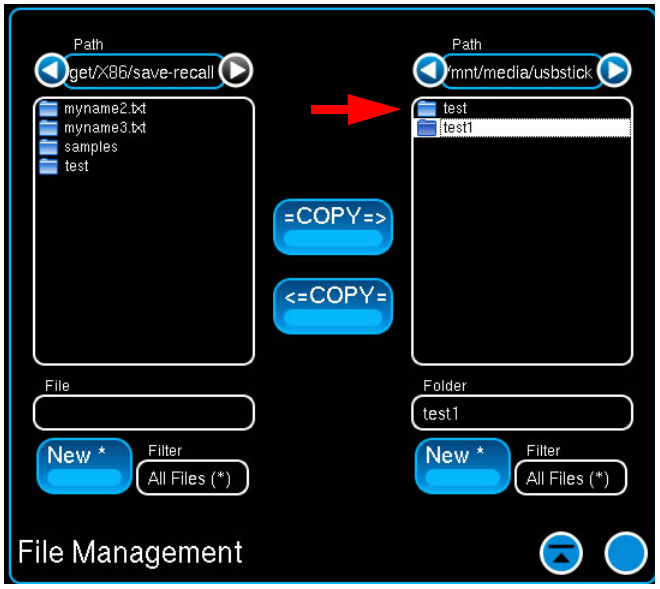


Fig. 4-58 File Management - Select File to Transfer

STEP PROCEDURE

5. Select /USER directory where file(s) are to be transferred.

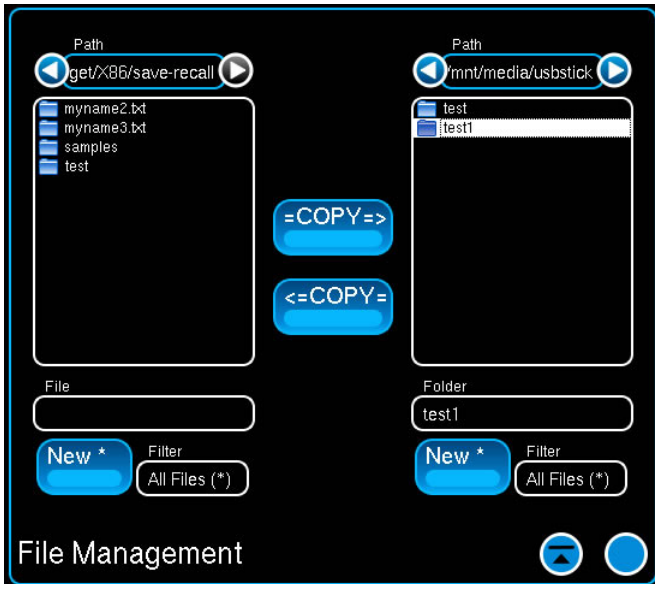


Fig. 4-59 Select Test Set Directory

6. Press the <=Copy Button.

7. Verify the transferred file(s) are displayed in the /USER directory.

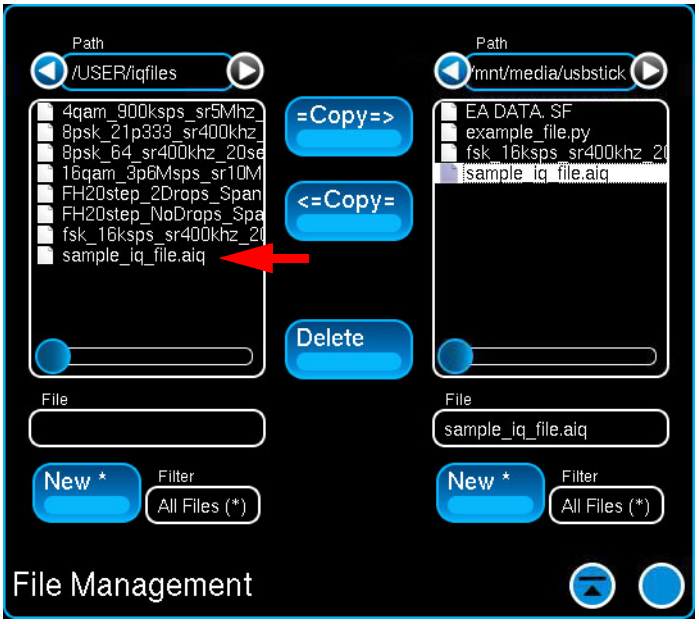


Fig. 4-60 File Management - Verify Transferred File

8. Navigate back to the top level /mnt in the external directory then disconnect the USB device from the Test Set.

Chapter 5 - 7200 Scripting Tools

5.1 INTRODUCTION

The contents of the Scripting Menu is determined by the options installed in the Test Set and whether or not executable python scripts have been placed in the Test Set's /USER/Scripting_Menu directory.

Fig. 5-1 shows the contents of the Scripting Menu when AutoTest III is enabled on the Test Set and two User Script Buttons have been created (Distortion Test and SINAD Test).

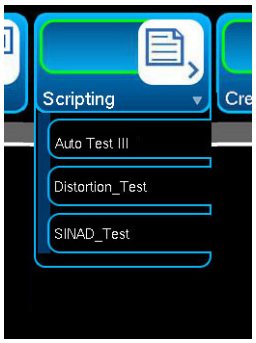


Fig. 5-1 Scripting Menu - Content Example

5.2 AUTOTEST III SCRIPTING TOOL

This function is available when Option #139264 is enabled on the Test Set.

AutoTest III is a programming tool that creates a test environment using an Application Programming Interface (API) to link Python test script content with the Test Set's internal database and user interface. The API allows AutoTest III to populate fields on the UI frame with information that is included in the test script. AutoTest III's UI frame is designed to allow customers to select a test mode and to review/edit test conditions and limits.

The Test Set's database may be viewed using external programs via Open Database Connectivity (ODBC) which allows users to manage test data and generate customized test reports.

5.2.1 AutoTest III User Skill Requirements

5.2.1.A Running Scripts

Users who are familiar with the operational capabilities of the Test Set can use AutoTest III to run test scripts.

NOTE	Conditions and limits should only be changed by personnel who are familiar with test script structure and test methodology.

5.2.1.B Writing Scripts

Writing test scripts to be used with the AutoTest III requires the following skills and knowledge:

- Users who are familiar with the operational capabilities of the Test Set for which the script is being written.
- Users who are familiar with test script structure and test methodology.
- Writing test scripts for AutoTest III requires an advanced knowledge of Python programming language.
- Knowledge of AutoTest III framework API.

5.2.2 Test Script and Directory Structure

AutoTest III API allows the Test Set to populate fields on the UI frame with information that is included in the test script. A test script must contain specific commands that allow the API to link the data in the test script with the Test Set's UI.

AutoTest III uses information from specific files to generate the Test Set's AutoTest III User Interface. An AutoTest III script must contain the following files:

- __init__.py
- uut.py
- lit_#.py (one .py file for each test file)

5.2.2.A System Defined Tests Scripts

VIAVI developed test scripts are located in a read only directory. Contents of this directory are read only.

5.2.2.B User Defined Test Scripts

User developed AutoTest III script files must be placed in the Test Set's /USER/auto_test3_scripts/user_defined_tests/ directory in order for the AutoTest III API to link Python test script content with the Test Set's internal database and user interface (refer to the example below).

/USER/auto_test3_scripts/user_defined_tests/radio-123/__init__.py

/USER/auto_test3_scripts/user_defined_tests/radio-123/uut.py

/USER/auto_test3_scripts/user_defined_tests/radio-123/lit1_gen.py

/USER/auto_test3_scripts/user_defined_tests/radio-123/lit2_rx.py

/USER/auto_test3_scripts/user_defined_tests/radio-123/lit3_meters.py

NOTE

Script files are transferred to the Test Set using the File Management Window.

The user_defined_tests directory does not appear in the LRU Selection Menu unless the directory contains test script files.

Fig. 5-2 shows an example of the directory structure of sample scripts.

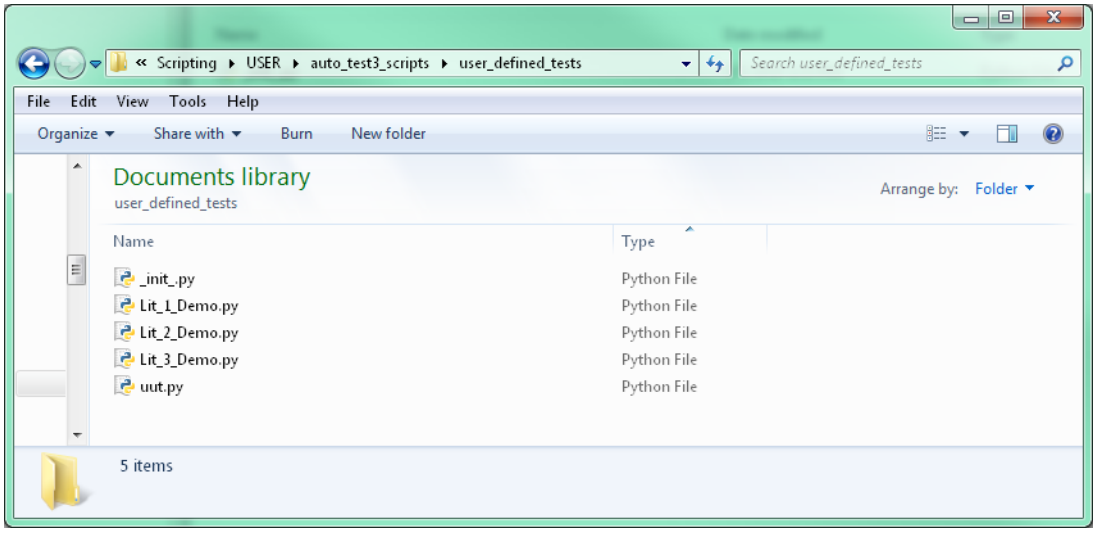


Fig. 5-2 AutoTest III Directory Structure Example

5.2.3 Transferring Scripts to Test Set

Test scripts must be written on an external device using python programming language and AutoTest III API commands. A completed test script is transferred to the Test Set using the File Management Window. Test scripts must be placed in the Test Set's /USER/auto_test3_scripts/user_defined_tests/ directory.

5.2.4 Accessing AutoTest III

To open the AutoTest III Window:

STEP	PROCEDURE
1.	Open the Scripting Menu.
2.	Select the AutoTest III Button.
3.	The AutoTest III Window opens and the system loads the first UUT script that is listed in the UUT Menu (refer to example in Fig. 5-3).

5.2.5 AutoTest III User Interface

Some of the fields on the AutoTest III Window are system defined by AutoTest III, other fields are created and populated by test script content. The presence of the Script Control and Test Information fields is defined by AutoTest III. The presence and content of Test Table fields is defined by test script content.

Fig. 5-3 shows the AutoTest III Home Window as it appears when the Radio-123 sample file is loaded.

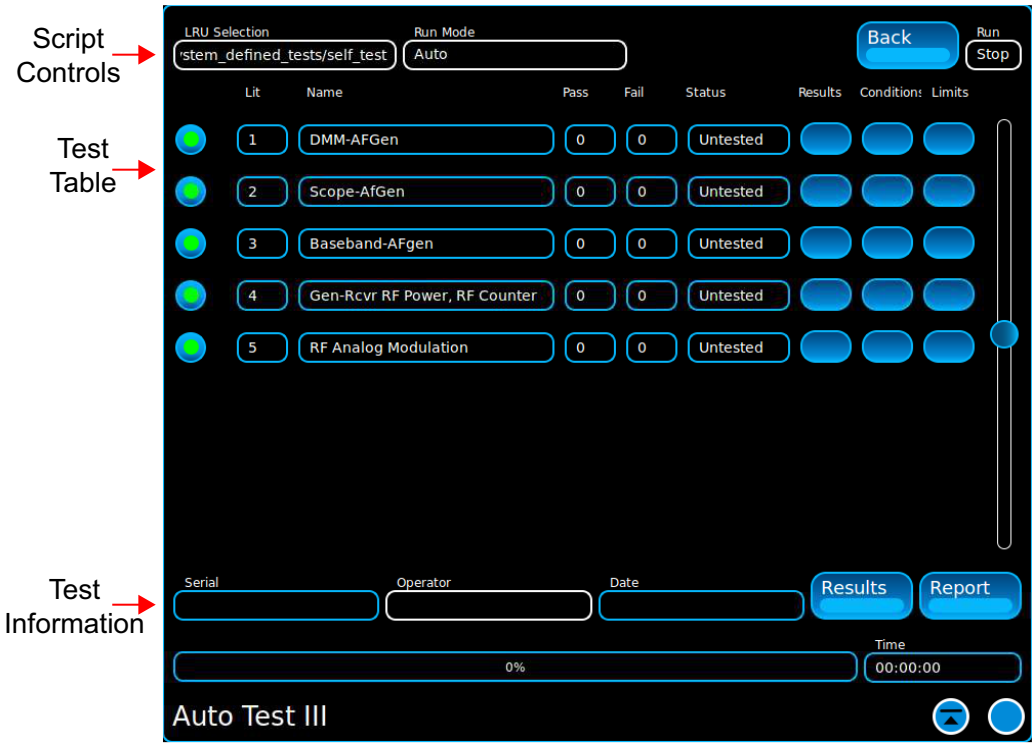


Fig. 5-3 AutoTest III Home Window - Script Example

5.2.5.A LRU Selection

The LRU Selection Menu selects the test script to be loaded in the AutoTest III Window. When a test script is selected the menu updates to display the directory structure and file name of the selected test script.

5.2.5.B Mode Menu

This is a system defined field. The Mode Menu selects the test mode of operation.

5.2.5.B.1 Auto

Auto Mode runs through all LITs in UUT Test Script in the order in which the tests are listed on the AutoTest III Window. All Test Selector buttons are system enabled when Auto Mode is selected.

NOTE	LITs cannot be disabled when in Auto Mode. Select Single-Step or Operator Mode to run user selected line item tests.

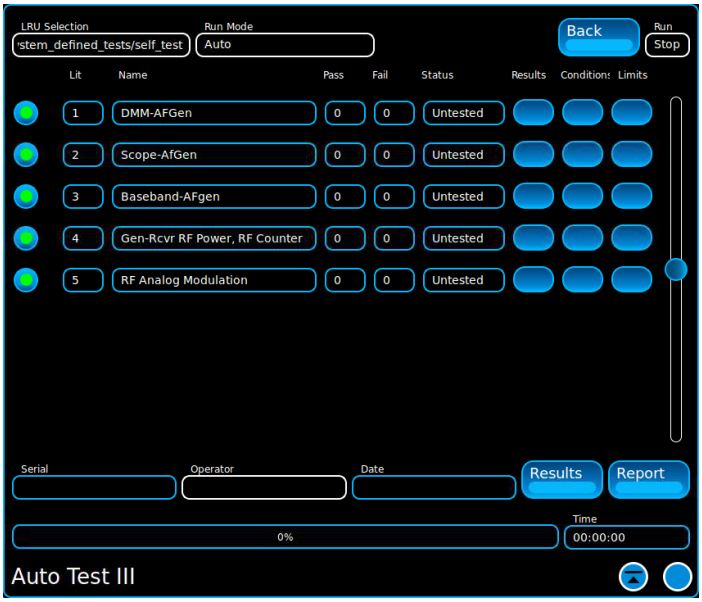


Fig. 5-4 AutoTest III Auto Mode Example

5.2.5.B.2 Looping Mode

Loop Mode runs the selected LIT(S) in a continuous looping sequence until the user stops the test sequence. When Loop Mode is selected one or more LITs can be selected.

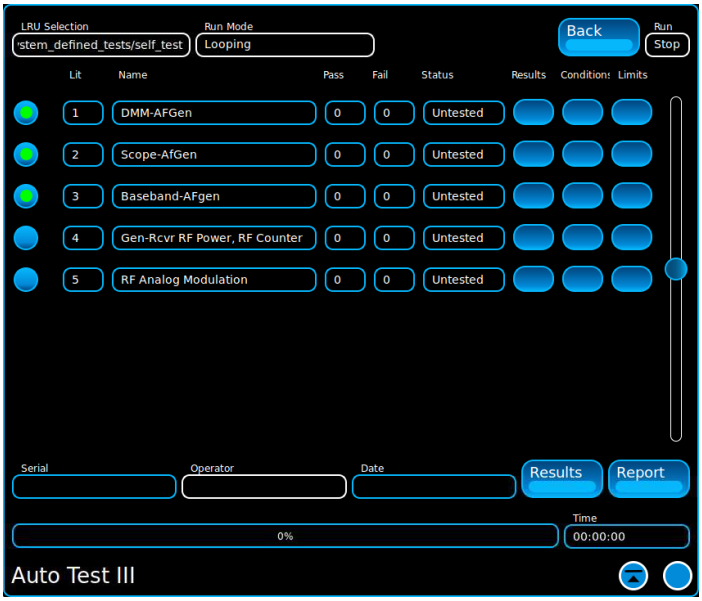


Fig. 5-5 AutoTest III Looping Mode Example

5.2.5.B.3 Single-Step (SS)

SS Mode allows the user to select and run a single test. When SS is selected from the Mode Menu, all LIT Test Selector Buttons are de-selected. The user selects a single LIT to perform. When Single Step is selected only one LIT can be selected (Fig. 5-6).

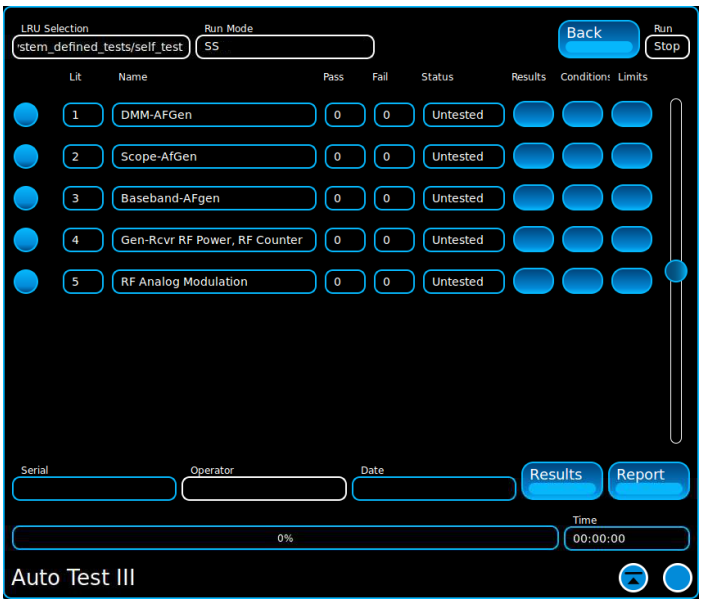


Fig. 5-6 AutoTest III Single-Step Mode Example

5.2.5.B.4 Operator (Oper)

Operator Mode allows the user to select multiple LITs to be included in the test sequence. By default all Test Selectors are enabled when Operator Mode is selected. Test selectors are de-selected to exclude an LIT from the test sequence.

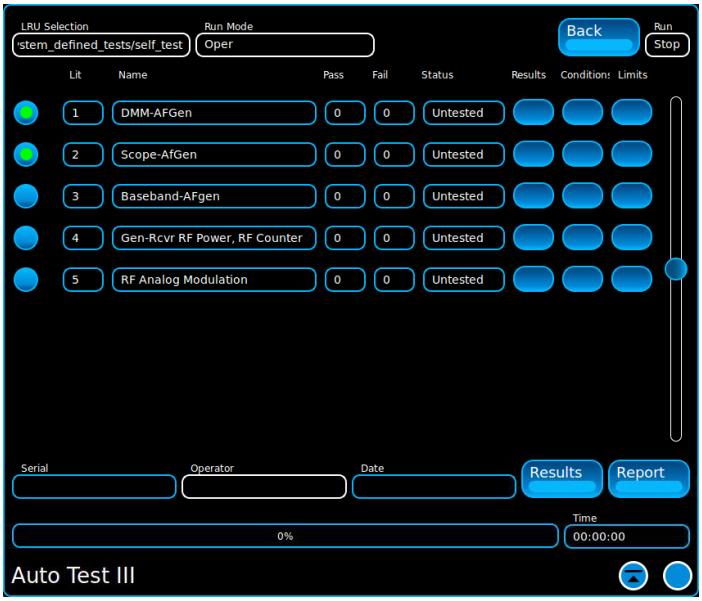


Fig. 5-7 AutoTest III Operator Mode Example

5.2.5.C Back Button

Displays the previously viewed AutoTest III Window.

5.2.5.D Home Button

Returns to the AutoTest III Home Window. The Home Button is not visible when the AutoTest III Home Window is displayed.

5.2.5.E State

Selects the operational state of the loaded test script.

5.2.5.E.1 Run

Run starts the loaded test script.

5.2.5.E.2 Pause

When Pause is selected, the test script stops at that point in the test script. Select Run to resume testing at the point at which the test script was paused.

5.2.5.E.3 Stop

Stop terminates the test sequence. When a test script is stopped it must be restarted from the beginning of the script.

5.2.5.F Test Table Fields

The Test Table lists the LITs that are included in the test script. The "#" in the file name indicates a number, beginning with 1 and increasing by increments of 1.

Each LIT requires a separate python script file (i.e., lit_1.py, lit_2.py, lit_3.py...).

Fig. 5-8 shows the LIT Test Table on the UI which is being populated by a function in the uut.py file. The Test Table is populated based on content it identifies in any lit_#.py files.

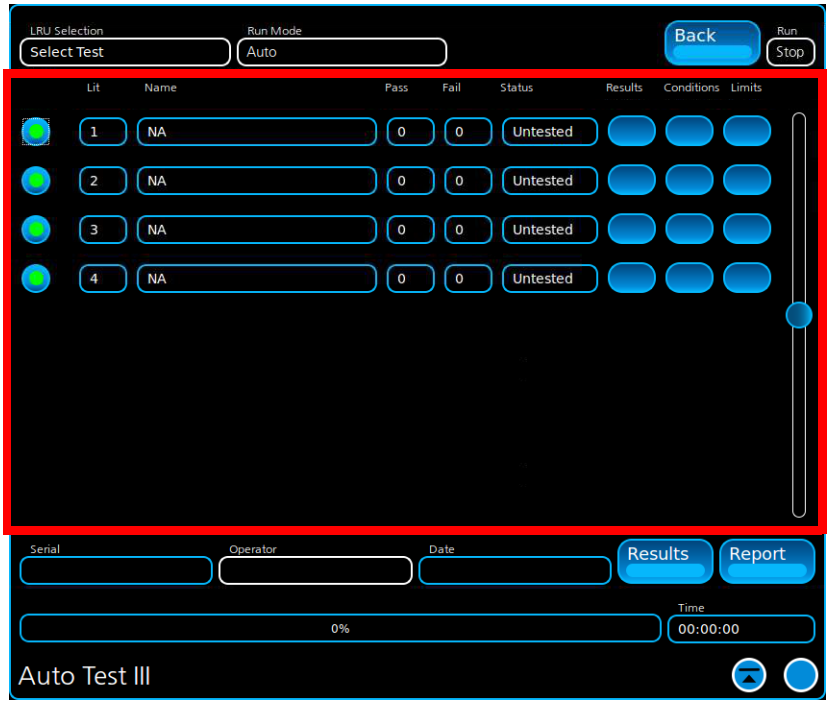


Fig. 5-8 AutoTest III LIT Test Table Parameters

5.2.5.F.1 Test Selector/Indicator

Selects/indicates the LIT to be included or excluded when either Operator Mode, SS (Single-Step) Mode or Looping Mode is selected. Indicator is highlighted when LIT is selected.

5.2.5.F.2 LIT (Line Item Test)

The LIT indicates the LIT's position in the parent test script. Note that each LIT may consist of multiple test paragraphs.

5.2.5.F.3 Name

This field displays the name of LIT.

5.2.5.F.4 Pass

Displays the number of paragraphs in the LIT which have passed.

5.2.5.F.5 Fail

Displays the number of paragraphs in the LIT which have failed.

5.2.5.F.6 Status

Indicates LIT status.

5.2.5.F.7 (LIT) Results Button

Pressing the LIT Results Button displays the test results for that line item test.

5.2.5.F.8 Conditions Button

Pressing the Conditions Button opens a window which conditional values that the user can edit. Refer to section 5.2.6, Editing Conditions for additional information.

5.2.5.F.9 Limits Button

Defines test limits for each LIT. Refer to section 5.2.7, Editing Limits for additional information.

5.2.5.G Test Information

The Test Information Fields contain information about the UUT and test script execution.

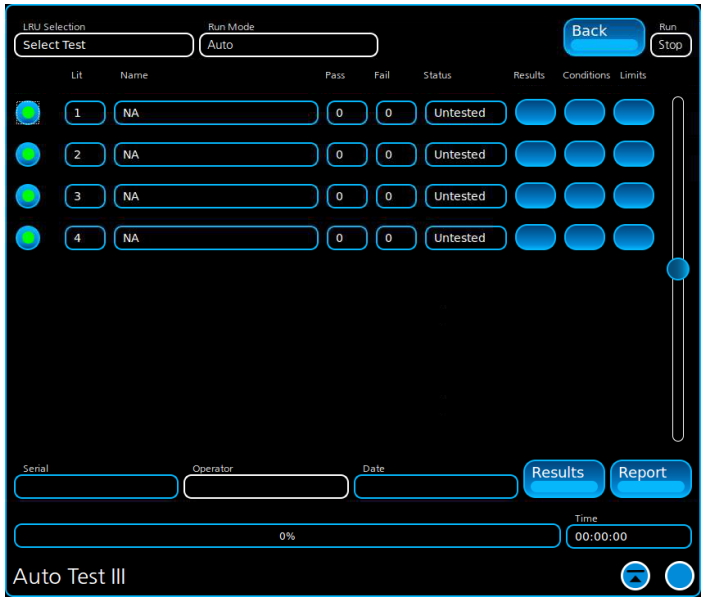


Fig. 5-9 AutoTest III Test Information

5.2.5.G.1 Serial

Indicates the UUT's serial number. The method that AutoTest III uses to obtain the serial number of the UUT is defined in the test script.

5.2.5.G.2 Operator

This field is used to manually (via GUI) enter the name of the test operator performing the UUT test. This field is optional.

5.2.5.G.3 Date

The Date Field is system defined using the Test Set's internal clock. This field is read only.

5.2.5.G.4 (Test) Results Button

Pressing the Test Results Button at the bottom right corner of the screen (Test Information section) opens a window that display the results for all of the LIT's included in the test sequence.

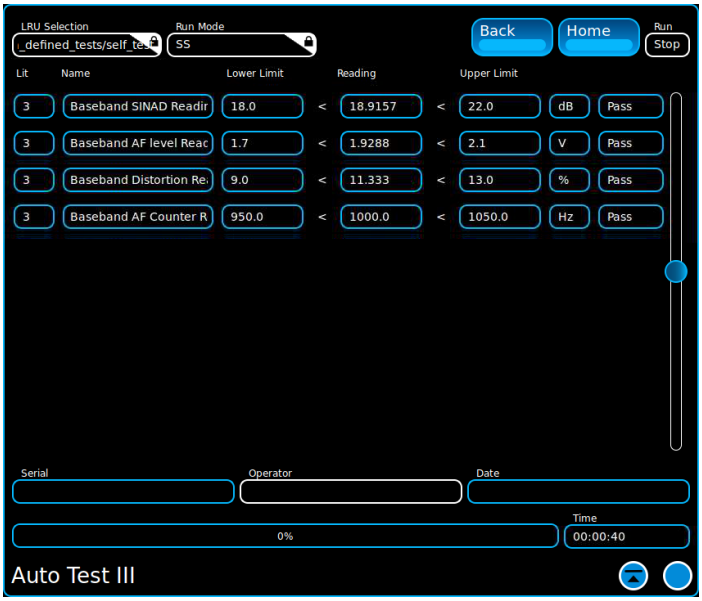


Fig. 5-10 Results Window

5.2.5.G.5 Report Button

Pressing the Report Button opens a window which allows the user to generate a test report. Refer to section Generate Reports (5.2.9) for more information.

5.2.5.G.6 Progress Bar

The Progress Bar indicates the percentage of a test that is complete. The test script must define Progress Bar functionality or the indicator will not work during script execution.

5.2.5.G.7 Time

The Time field indicates how long a test has been running.

5.2.6 Editing Conditions

Condition Parameters are used to edit the setup criteria which has been defined for an LIT. Content of the Conditions fields is defined by test script content. The Conditions fields allows the user to make changes without updating code.

Fig. 5-11 shows Conditions Parameters on the UI that is being populated by the lit_1.py test script.

NOTE	Conditions should only be edited by personnel who meet AutoTest III User Skill Requirements.

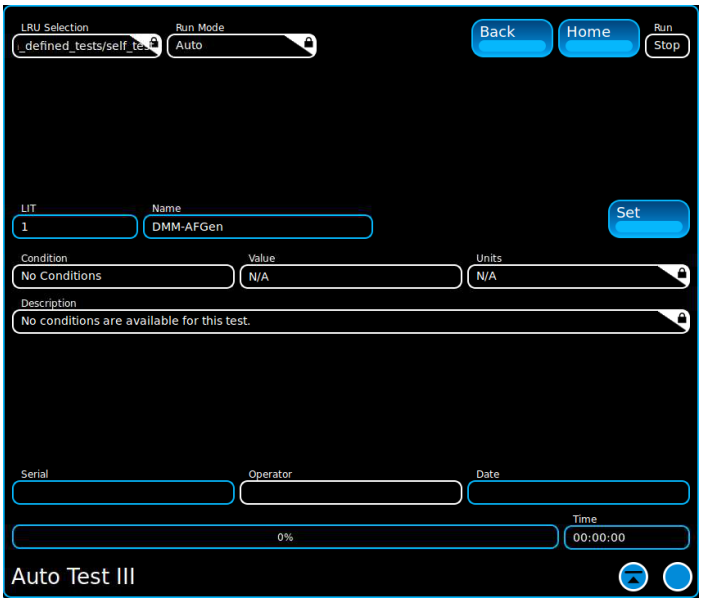


Fig. 5-11 Conditions Parameters Window - Radio-123, LIT 1

5.2.6.A LIT

This field displays the LIT for which the Condition is being defined.

5.2.6.B Name

Displays the name of the LIT for which the Condition is being defined.

5.2.6.C Condition

This field displays the name given to the Condition. This field is defined in the lit_#.py file.

5.2.6.D Value

This field defines the default value/state of the Condition. This is an editable field that is defined in the lit_#.py file.

5.2.6.E Units

Selects the unit of measure for the selected Condition. The units of measurement are defined in the lit_#.py file.

5.2.6.F Description

Describes the condition statement applied to the LIT. This field is defined in the lit_#.py file.

5.2.6.G Set Button

Pressing the Set Button activates defined Condition parameters. The Set Button must be pressed when any changes are made to Condition parameters.

5.2.7 Editing Limits

Limits Parameters are used to edit the limits which have been defined for each LIT. Content of the Limits fields is defined by the lit_#.py test script.

> **NOTE** Limits should only be edited by personnel who meet AutoTest III User Skill Requirements..

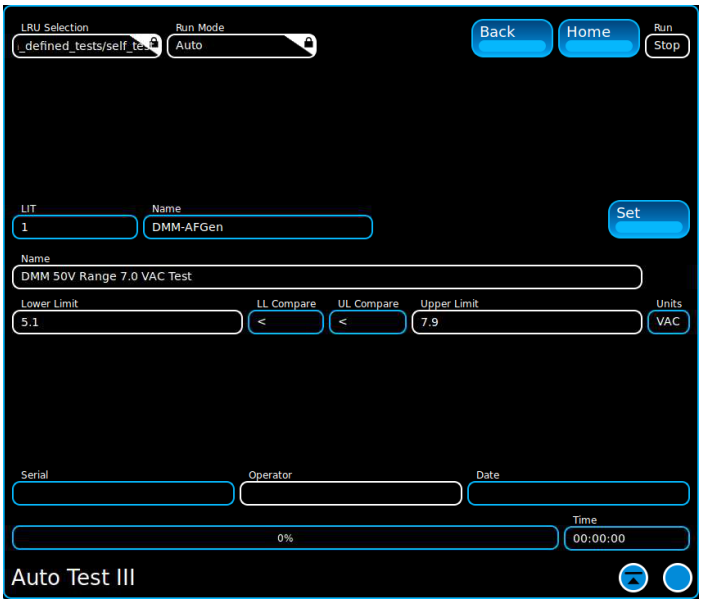


Fig. 5-12 Limits Parameters Window - Radio-123, LIT 1

5.2.7.A LIT

Read only field displays the LIT for which the limits are being defined.

5.2.7.B Name

Name of the LIT for which the limits are being defined.

5.2.7.C Name

This displays the name of the LIT paragraph to which the limits are being applied. This field is defined in the lit_#.py file.

5.2.7.D Lower Limit

This field defines a lower limit for the line item test. This is an editable field that is defined in the lit_#.py file.

5.2.7.E LL Compare

Defines the lower limit pass/fail criteria. This is an editable field that is defined in the lit_#.py file.

5.2.7.F UL Compare

Defines the upper limit pass/fail criteria. This is an editable field that is defined in the lit_#.py file.

5.2.7.G Upper Limit

This field defines a upper limit for the line item test. This is an editable field that is defined in the lit_#.py file.

5.2.7.H Set Button

Pressing the Set Button activates defined Limit parameters. The Set Button must be pressed when any changes are made to Limit parameters.

5.2.7.I Units

Defines units of measurement for lower and upper limit values. This is an editable field that is defined in the lit_#.py file.

5.2.8 Running Scripts in AutoTest III

This section describes the procedure used to load and run an AutoTest III test script. The Test Script must be transferred to the Test Set's (refer to 5.2.3, Transferring Scripts to Test Set) prior to use.

5.2.8.A Run System Level Test

To run an AutoTest III test script:

STEP	PROCEDURE
1.	Power on the Test Set. Open AutoTest III (refer to 5.2.4, Accessing AutoTest III).
2.	Select the UUT Test from the LRU Selection Menu.
3.	Select Auto from the Mode Menu.
4.	If desired, enter operator information in the Operator Field.
5.	Open the State menu and select Run.
6.	When the test script is complete refer to 5.2.9.A, To Generate a Test Report to generate a test report.

5.2.8.B Run Single Line Item Test (LIT)

To run one AutoTest III LIT:

STEP	PROCEDURE
1.	Power on the Test Set. Open AutoTest III (refer to 5.2.4, Accessing AutoTest III).
2.	Select the UUT Test from the LRU Selection Menu.
3.	If desired, enter operator information in the Operator Field.
4.	Select SS from the Mode Menu.
5.	Select the LIT to be included in the test sequence.
6.	Open the State menu and select Run.
7.	When the test script is complete refer to 5.2.9.A, To Generate a Test Report to generate a test report.

5.2.8.C Run Multiple User-Selected Line Item Test (LIT)s

To run several AutoTest III LITs:

STEP	PROCEDURE
1.	Power on the Test Set. Open AutoTest III (refer to 5.2.4, Accessing AutoTest III).
2.	Select the UUT Test from the LRU Selection Menu.
3.	If desired, enter operator information in the Operator Field.
4.	Select Oper from the Mode Menu.
5.	Select the LITs to be included in the test sequence.
6.	Open the State menu and select Run.
7.	When the test script is complete refer to 5.2.9.A, To Generate a Test Report to generate a test report.

5.2.8.D Run User Selected Line Item Test (LIT)s in Looping Mode

To run AutoTest III LIT(s) in Looping Mode:

STEP	PROCEDURE
1.	Power on the Test Set. Open AutoTest III (refer to 5.2.4, Accessing AutoTest III).
2.	Select the UUT Test from the LRU Selection Menu.
3.	If desired, enter operator information in the Operator Field.
4.	Select Looping from the Mode Menu.
5.	Select the LIT to be included in the test sequence.
6.	Open the State menu and select Run.
7.	LITs are run in sequence until stopped by the user.
8.	When the test script is complete refer to 5.2.9.A, To Generate a Test Report to generate a test report.

5.2.9 Generate Reports

The Generate Report Window allows the user to generate test reports from completed tests. Generated reports are saved to the Test Set's /USER/Report/ directory.

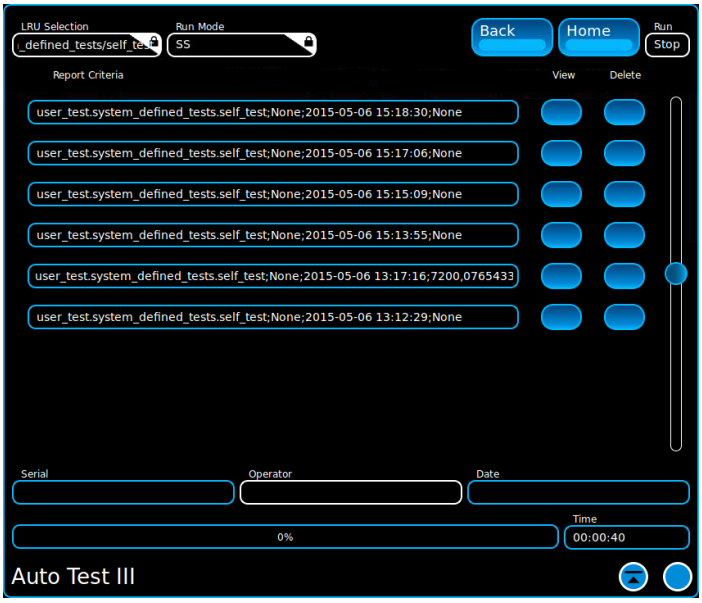


Fig. 5-13 Reports Window

Parameter	Description
Report Criteria	The Report Criteria Table contains a list of completed tests. Information in the file name identifies the content of the test report (lru,operator,date,lru serial#). Test reports are generated by pressing the View Button.
View Button	Generates a test report in the Generated Report Window (refer to 5.2.10 Generated Report Window).
Delete Report Button	Deletes the report data from the Test Set's internal database. Deleted test data cannot be restored.

5.2.9.A To Generate a Test Report

STEP	PROCEDURE
1.	When a test script is complete, press the Report Button to open the Reports Window.
2.	Press the View Button beside the file for which the report is to be generated.
3.	The Generated Report Window opens (refer to 5.2.10 Generated Report Window) which displays the test data in pdf format. The generated report file is also saved to the Test Set's /USER/Report/ directory.

5.2.9.B To Export a Test Report File

Generated test reports are exported from the Test Set using the File Management Window. AutoTest III Reports are saved to the Test Sets /USER/Report/ directory.

5.2.10 Generated Report Window

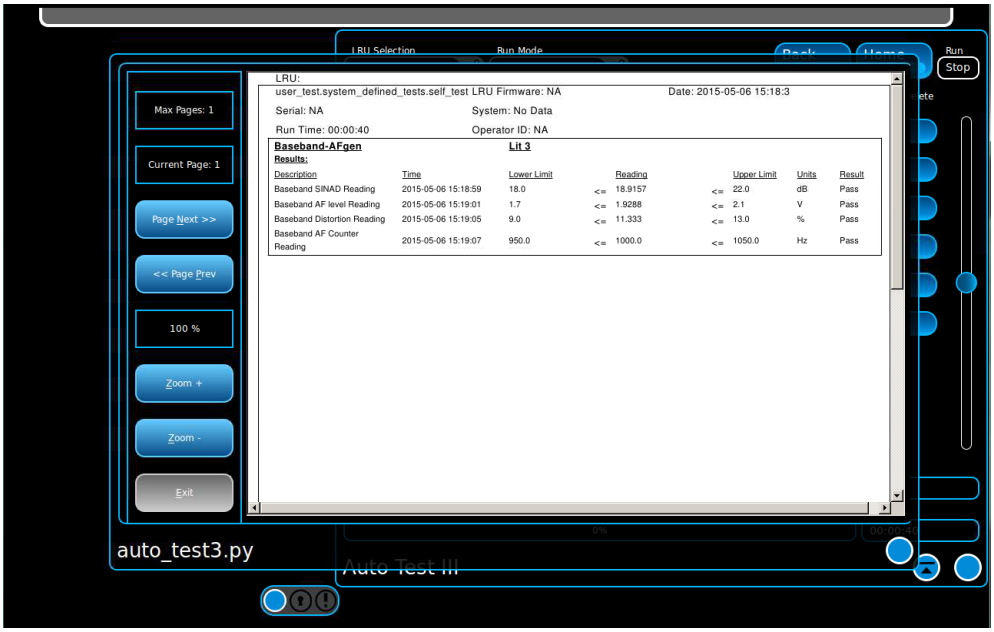


Fig. 5-14 Generated Report Window

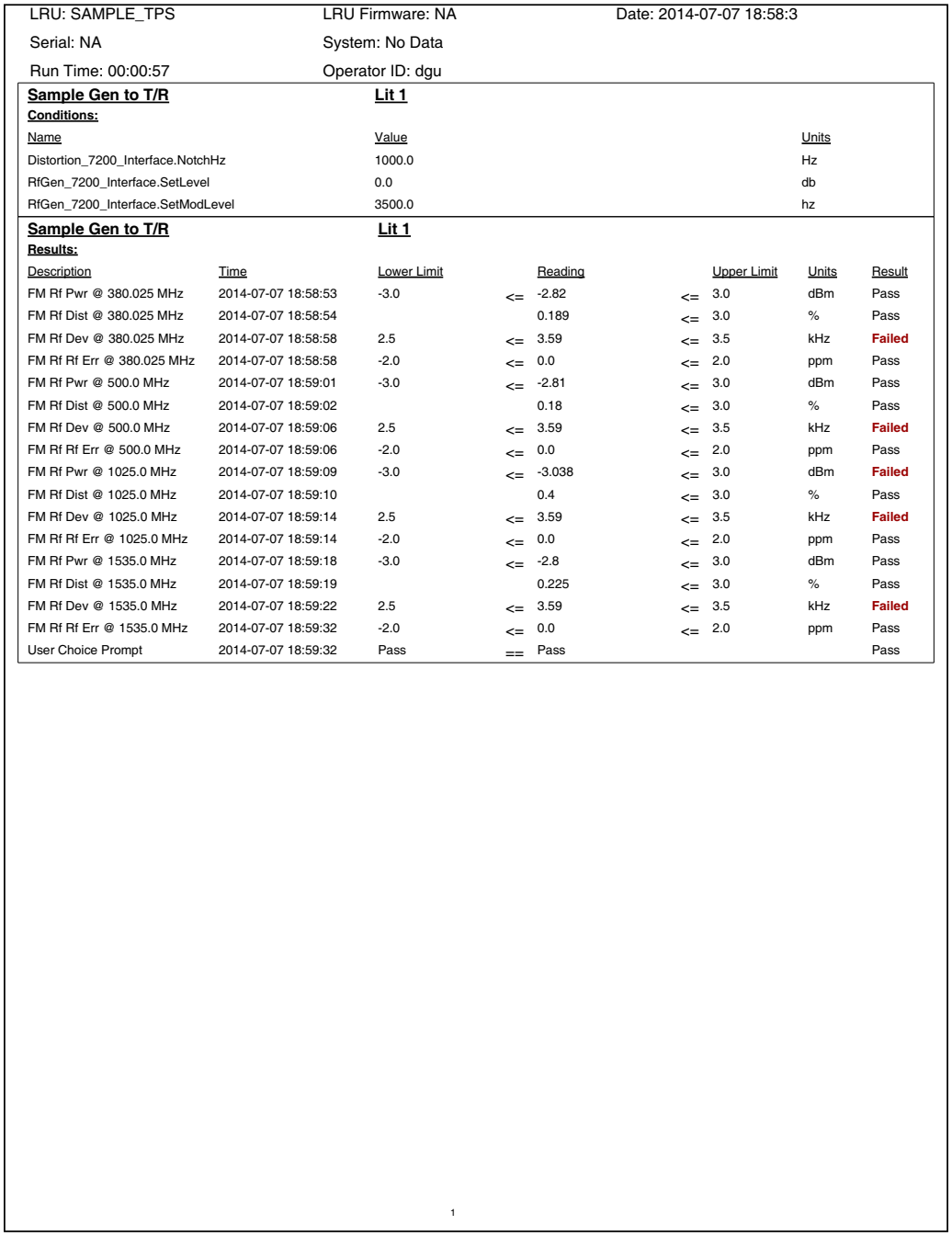
Parameter	Description
Max Page: n	Displays the total number of pages in the report.
Current Page: n	Displays the page currently being displayed.
Page Next >>	Goes to the next page in the report.
<< Page Prev	Returns to the previous page in the report.
Zoom Percent Indicator	Indicates the percent that the font size of the report has been adjusted using the Zoom+ and Zoom- Buttons.
Zoom +	Increases the font size of the report data.
Zoom -	Decreases the font size of the report data.
Exit	Closes the Generated Report Window.

5.2.11 Managing Test Data

5.2.11.A System Generated Report

Generated Test Reports are saved to the Test Set's /USER/Report/ directory in .pdf format. Fig. 5-15 shows an example of a system generated report. The system generated report lists the script name, UUT information, LIT's included in the test and test data for each LIT.

System Generated Reports can be transferred from the Test Set using the File Management Window. System Generated Reports are deleted using the Delete Report Button.



LRU: SAMPLE_TPS | LRU Firmware: NA | Date: 2014-07-07 18:58:3

Serial: NA | System: No Data

Run Time: 00:00:57 | Operator ID: dgu

Sample Gen to T/R **Lit 1**

Conditions:

Name	Value	Units
Distortion_7200_Interface.NotchHz	1000.0	Hz
RfGen_7200_Interface.SetLevel	0.0	db
RfGen_7200_Interface.SetModLevel	3500.0	hz

Sample Gen to T/R **Lit 1**

Results:

Description	Time	Lower Limit		Reading		Upper Limit	Units	Result
FM Rf Pwr @ 380.025 MHz	2014-07-07 18:58:53	-3.0	<=	-2.82	<=	3.0	dBm	Pass
FM Rf Dist @ 380.025 MHz	2014-07-07 18:58:54			0.189	<=	3.0	%	Pass
FM Rf Dev @ 380.025 MHz	2014-07-07 18:58:58	2.5	<=	3.59	<=	3.5	kHz	Failed
FM Rf Rf Err @ 380.025 MHz	2014-07-07 18:58:58	-2.0	<=	0.0	<=	2.0	ppm	Pass
FM Rf Pwr @ 500.0 MHz	2014-07-07 18:59:01	-3.0	<=	-2.81	<=	3.0	dBm	Pass
FM Rf Dist @ 500.0 MHz	2014-07-07 18:59:02			0.18	<=	3.0	%	Pass
FM Rf Dev @ 500.0 MHz	2014-07-07 18:59:06	2.5	<=	3.59	<=	3.5	kHz	Failed
FM Rf Rf Err @ 500.0 MHz	2014-07-07 18:59:06	-2.0	<=	0.0	<=	2.0	ppm	Pass
FM Rf Pwr @ 1025.0 MHz	2014-07-07 18:59:09	-3.0	<=	-3.038	<=	3.0	dBm	Failed
FM Rf Dist @ 1025.0 MHz	2014-07-07 18:59:10			0.4	<=	3.0	%	Pass
FM Rf Dev @ 1025.0 MHz	2014-07-07 18:59:14	2.5	<=	3.59	<=	3.5	kHz	Failed
FM Rf Rf Err @ 1025.0 MHz	2014-07-07 18:59:14	-2.0	<=	0.0	<=	2.0	ppm	Pass
FM Rf Pwr @ 1535.0 MHz	2014-07-07 18:59:18	-3.0	<=	-2.8	<=	3.0	dBm	Pass
FM Rf Dist @ 1535.0 MHz	2014-07-07 18:59:19			0.225	<=	3.0	%	Pass
FM Rf Dev @ 1535.0 MHz	2014-07-07 18:59:22	2.5	<=	3.59	<=	3.5	kHz	Failed
FM Rf Rf Err @ 1535.0 MHz	2014-07-07 18:59:32	-2.0	<=	0.0	<=	2.0	ppm	Pass
User Choice Prompt	2014-07-07 18:59:32	Pass	==	Pass				Pass

1

Fig. 5-15 Sample Report File

5.2.11.B Open Database Connectivity (ODBC)

The 7200 supports ODBC for extracting AutoTest III results from the Test Set's internal database.

This section is intended for users who are familiar with ODBC applications. Content in this section identifies information necessary to connect a ODBC application to the Test Set's internal database; content does not explain how to use an ODBC application.

To connect to the Test Set using an ODBC Application:

STEP	PROCEDURE

1. Configure the Test Set for Network Access. The Test Set must be on the same network as the computer on which the ODBC is running.
2. Open the ODBC application on the computer.
3. Configure the following fields on the ODBC application:

Server Type:	PostgresSQL
Port#:	5432
User ID:	user7200
Password:	Thei&too4
Database Name:	tps_database

4. Initiate connection.

5.2.12 AutoTest III API

The links below access AutoTest III API. API documentation includes python methods, classes and exceptions which are used to link python test script content with the Test Set's internal database and user interface. API documentation is provided in .html format.

code_management.context_management
code_management.tps_exceptions
communication.app_log
communication.communication_exceptions
communication.database_sql_interface
communication.raw_socket_interface
communication.rs232comm
database_interface.tps_conditions_object
database_interface.tps_limit_object
database_interface.tps_lit_object
database_interface.tps_metadata_object
database_interface.tps_reading_object
database_interface.tps_system_object
lit.tps_cableloss_object
lit.tps_display_object
lit.tps_flag_object
lit.tps_litinfo_object
lit.tps_object_manager
lru_operations.datagen
lru_operations.display_functions
lru_operations.ethernet_functions
lru_operations.gndtest_functions
lru_operations.iterable_operations
lru_operations.packetloss_interface
measurement.fixedpoint
measurement.format_reading
measurement.measurement_thread
measurement.running_stddev
measurement.student_t_table
sequencing.sequence_thread
sequencing.thread_manager
state_machine.finite_state_machine
ts7200.native_7200.afcounter_7200_interface
ts7200.native_7200.aflevel_7200_interface
ts7200.native_7200.ampower_peak_7200_interface
ts7200.native_7200.ampower_rms_7200_interface
ts7200.native_7200.ber_nrz_7200_interface
ts7200.native_7200.burst_power_7200_interface
ts7200.native_7200.configure_7200_interface
ts7200.native_7200.display_7200_interface
ts7200.native_7200.distortion_7200_interface
ts7200.native_7200.dmm_7200_interface
ts7200.native_7200.fgen_7200_interface
ts7200.native_7200.meter_base_class

ts7200.native_7200.rfcounter_7200_interface
ts7200.native_7200.rferror_7200_interface
ts7200.native_7200.rfgen_7200_interface
ts7200.native_7200.rfpower_7200_interface
ts7200.native_7200.rfrec_7200_interface
ts7200.native_7200.oscope_7200_interface
ts7200.native_7200.sinad_7200_interface
ts7200.native_7200.uutps_7200_interface
utilities.tps_time
ts7200.rim_7200.rim_adf
ts7200.rim_7200.rim_analog_base
ts7200.rim_7200.rim_analog_groundtest
ts7200.rim_7200.rim_analog_measbus
ts7200.rim_7200.rim_ethernet
ts7200.rim_7200.rim_logic_base
ts7200.rim_7200.rim_logic_gpio
ts7200.rim_7200.rim_logic_oc
ts7200.rim_7200.rim_logic_ttl
ts7200.rim_7200.rim_modem
ts7200.rim_7200.rim_register
ts7200.rim_7200.rim_serial
ts7200.rim_7200.rim_version
ts7200.rim_7200.rim_waveform_trigger
ts7200.zif_7200.zif_analog_audio
ts7200.zif_7200.zif_analog_base
ts7200.zif_7200.zif_analog_dmm
ts7200.zif_7200.zif_analog_dsp
ts7200.zif_7200.zif_analog_meas
ts7200.zif_7200.zif_analog_scope
ts7200.zif_7200.zif_logic_base
ts7200.zif_7200.zif_logic_led
ts7200.zif_7200.zif_logic_oc
ts7200.zif_7200.zif_logic_ttl
ts7200.zif_7200.zif_power_monitor
ts7200.zif_7200.zif_power_output
ts7200.zif_7200.zif_version

Refer to , Appendix A - Pin-Out Tables, section A.8, Intelligent Cable Assembly RIM Connector as needed.

Refer to Appendix A - Pin-Out Tables, section A.7, ZIF I/O Connector as needed.

5.3 USER SCRIPT BUTTONS

User Script Buttons are system generated buttons which provide quick access to executable Python files. User Script Buttons are created based on any executable Python files located in the /USER/Scripting_Menu directory (refer to Fig. 5-16). The operating system searches the /USER/Scripting_Menu directory during the power-up sequence and adds a button to the Scripting Menu for each executable Python file located in the directory (refer to 5.3.1 Add User Script Button(s)). User Script Buttons are only added for executable Python files; all other file types are ignored (i.e., sample_file.png file in Fig. 5-16).

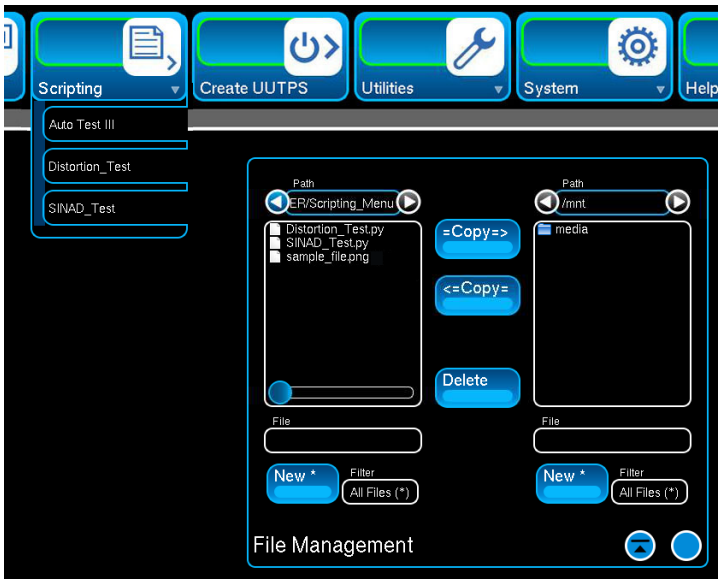


Fig. 5-16 User Script Buttons - Example

5.3.1 Add User Script Button(s)

To add a button to the Scripting Menu:

1. Place the executable Python file in the Test Set's /USER/Scripting_Menu directory.
2. Reboot the Test Set.

5.3.2 Delete User Script Button

To delete a User Script Button:

1. Remove the executable Python file from the /USER/Scripting_Menu directory.
2. Reboot the Test Set.

5.3.3 User Script Buttons Label Format

File names should use the following guidelines:

- Alphanumeric, all characters valid except (null) and (/).
- 255 maximum characters. The visible width of User Script Buttons is approximately 20 lowercase characters, depending on the characters in the file name (i.e., upper or lower case and any special characters). File names that exceed the visible width of the User Script Button are truncated.

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Chapter 6 - Test Set Options

6.1 INTRODUCTION

This chapter describes options that are available for the Test Set. Some options may be included as standard depending on the purchased hardware configuration.

6.1.1 Available Options

The Test Set currently supports the following options:

- UUT External Power Supply . . . . . 6 - 1
- Intelligent Cable Assembly . . . . . 6 - 10

6.2 UUT EXTERNAL POWER SUPPLY

This function is available when Option #139263 is enabled on the Test Set.

The Test Set supports the use of an External Power Supply which can be used to power devices under test. The Test Set is configured to act as the controller for the External Power Supply. After completing the Setup Procedure the Power Supply requires no additional configuration.

Copies of the GENESYS™ 750W/1500W Technical Manual and LAN Programming Manual are included on the Operation CD. These manuals can also be accessed at http://www.us.tdk-lambda.com/hp/product_html/genesys1u.htm.

Refer to the GENESYS™ 750W/1500W Technical Manual for complete setup and safety information for the External Power Supply.

6.2.1 Test Set and External Power Supply Setup

This section describes how to connect the External Power Supply to the Test Set in order to power units under test. Setup requires completing the following procedures in the order in which they are listed in this manual:

- 6.2.2, Test Set and External Power Supply Hardware Setup
- 6.2.3, External Power Supply IP Address Configuration
- 6.2.4, Test Set IP Configuration
- 6.2.5, Test Set's External Power Supply User Interface Setup

Refer to the Power Supply Technical Manual for additional information.

NOTE	When configured as instructed in the following sections, using the External Power Supply to power a device under test requires use of the ZIF Adapter Accessory and an accessory cable to connect the device to the Test Set's Front Panel ZIF Connector.

6.2.2 Test Set and External Power Supply Hardware Setup

6.2.2.A Direct Connection

This procedure describes how to connect the Test Set directly to the External Power Supply to create an ethernet connection.

This hardware setup can be used for the following configuration:

- 6.2.4.A, Direct Connect - Static IP Address Setup Procedure

STEP	PROCEDURE

1. Connect one end of an ethernet cable to External Power Supply LAN Connector.
2. Connect other end of ethernet cable to Test Set Ethernet Connector.
3. Connect DC Output Cable to External Power Supply (refer to Power Supply Technical Manual).
4. Connect the DC Output Cable to the Test Set's External Power Supply Connector.

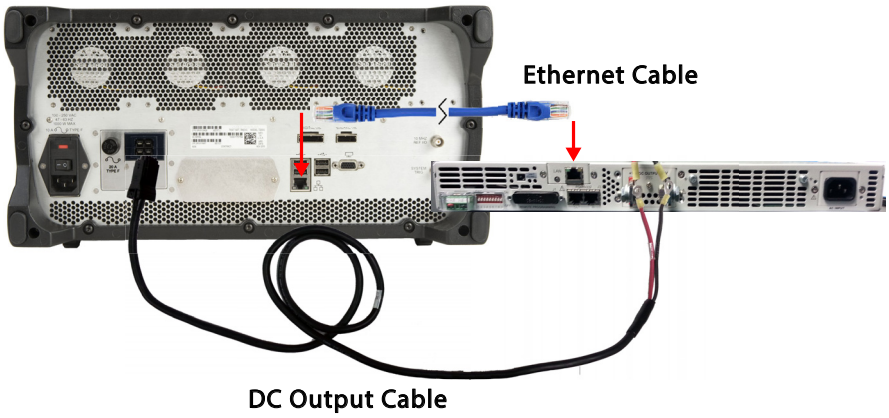


Fig. 6-1 External Power Supply Direct Connection Diagram

5. Connect the Test Set to a grounded AC Power Supply.
6. Connect the External Power Supply to a grounded AC Power Supply.

Proceed to 6.2.3, External Power Supply IP Address Configuration.

6.2.2.B Network (LAN) Connection

This procedure describes how to connect the Test Set and External Power Supply via a LAN to create an ethernet connection.

This hardware setup can be used for the following configurations:

- 6.2.4.B, Network Connection - Static IP Setup Procedure
- 6.2.4.C, Network Connection - DHCP Setup Procedure

STEP	PROCEDURE

1. Connect Test Set and External Power Supply to same active LAN.
2. Connect DC Output Cable to External Power Supply (refer to Power Supply Technical Manual).
3. Connect the DC Output Cable to the Test Set's External Power Supply Connector.

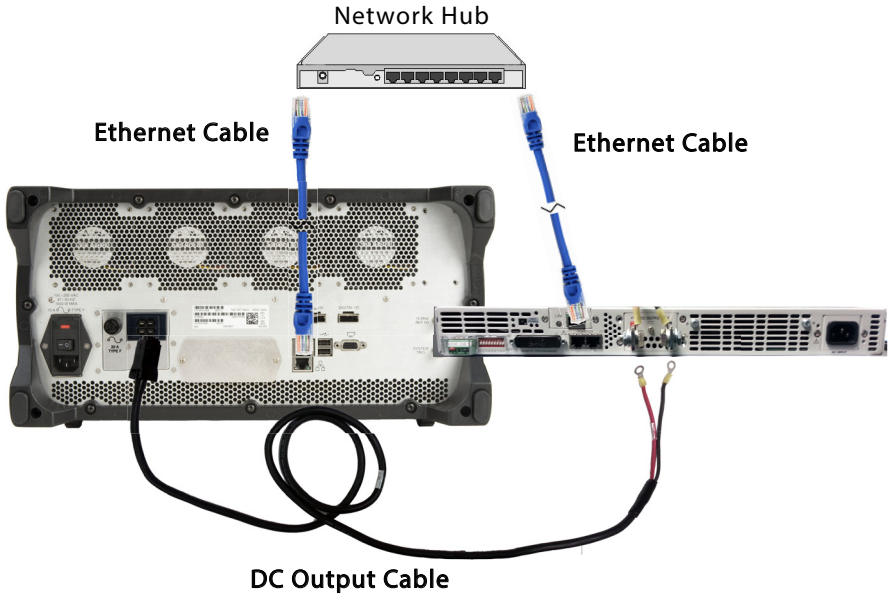


Fig. 6-2 External Power Supply Network Connection Diagram

4. Connect the Test Set to a grounded AC Power Supply.
5. Connect the External Power Supply to a grounded AC Power Supply.

Proceed to 6.2.3, External Power Supply IP Address Configuration.

6.2.3 External Power Supply IP Address Configuration

6.2.3.A Static IP Address Setup Procedure

To set the External Power Supply's Static IP to 192.168.1.10:

STEP	PROCEDURE

1. Complete the 6.2.2.A, Direct Connection or 6.2.2.B, Network (LAN) Connection procedure.
2. Power on the External Power Supply.
3. Turn REM/LOC function OFF (REM/LOC indicator LED should be off).
4. Press and hold the FOLD button until IP-1 is displayed in the first field.

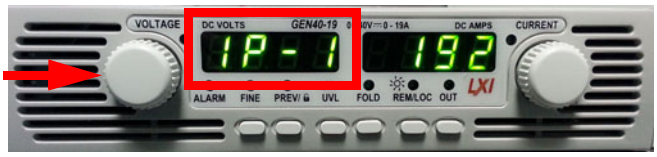


Fig. 6-3 External Power Supply - IP-1 Selected

5. Turn the Current Knob to set IP-1 value to 192.

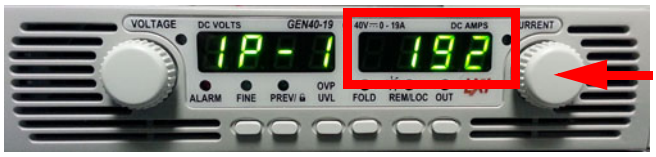


Fig. 6-4 External Power Supply - IP-1 Value

6. Turn the Voltage Knob until IP-2 is displayed in the first field.

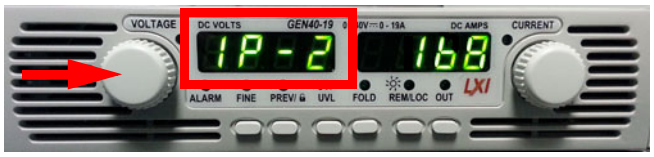


Fig. 6-5 External Power Supply - IP-2 Selected

7. Turn the Current Knob to set IP-2 value to 168.

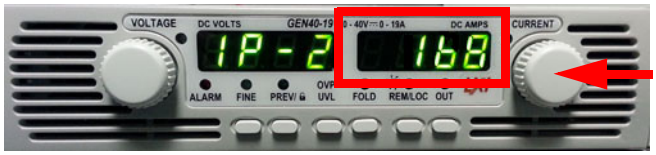


Fig. 6-6 External Power Supply - IP-2 Value

8. Turn the Voltage Knob until IP-3 is displayed in the first field.
9. Turn the Current Knob to set IP-3 value to 1.
10. Turn the Voltage Knob until IP-4 is displayed in the first field.
11. Turn the Current Knob to set IP-4 value to 10.
12. Press and hold the FOLD button until LAN Hold is displayed. Static IP is now set to 192.168.1.10.

Proceed to 6.2.4, Test Set IP Configuration.

6.2.3.B DHCP IP Address Setup Procedure

To configure the External Power Supply for DHCP Operation:

STEP	PROCEDURE

1. Complete the 6.2.2.B, Network (LAN) Connection procedure.
2. Power on the External Power Supply.
3. Press and hold the OVP/OVL button until LAn rES is displayed.



Fig. 6-7 External Power Supply - LAN Reset

4. Press and hold the FOLD button until rES 0000 is displayed.



Fig. 6-8 External Power Supply - LAN Reset

5. Wait while the External Power Supply establishes a DHCP network connection (approximately 40 seconds). Rear Panel LAN Connection LED changes to green to indicate a DHCP connection has been established.

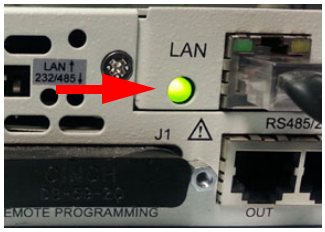


Fig. 6-9 External Power Supply - LAN LED Active

6. Press and hold the Fold Button until IP-1 value is displayed. Record value.

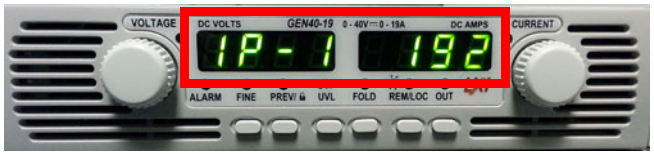


Fig. 6-10 External Power Supply - Fold Button

7. Turn the Voltage Knob until IP-2 value is displayed. Record value.

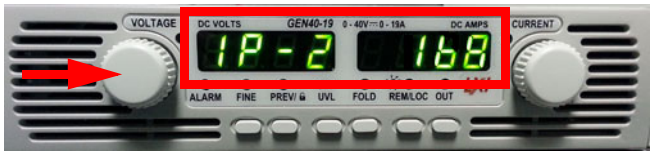


Fig. 6-11 External Power Supply - Voltage Knob

8. Turn the Voltage Knob until IP-3 value is displayed. Record value.
9. Turn the Voltage Knob until IP-4 value is displayed. Record value.

Recorded value is for 6.2.5, Test Set's External Power Supply User Interface Setup.

Proceed to 6.2.4, Test Set IP Configuration.

6.2.4 Test Set IP Configuration

The Test Set and External Power Supply can be configured for the following:

6.2.4.A Direct Connect - Static IP Address Setup Procedure

When the External Power Supply is operating in Static IP Mode it does not store it's Static IP address when it is powered down. The Static IP Address must be configured every time the External Power Supply is rebooted.

STEP	PROCEDURE
1.	Complete the 6.2.2.A, Direct Connection procedure.
2.	Complete the 6.2.3.A, Static IP Address Setup Procedure procedure.
3.	Power on the Test Set.
4.	Test Set: Open the System Configuration Window and select the Network tab.
5.	Test Set: Set the Network Mode to Static IP mode. Consult your IT department for assistance if you are not familiar with this terminology.
6.	Test Set: Set Static IP Address to 192.168.1.1.
7.	Test Set: Set the Network Mask to 255.255.255.0.
8.	Verify the External Power Supply LAN Connector LED is green to indicate an active connection with the Test Set.

Proceed to 6.2.5, Test Set's External Power Supply User Interface Setup.

6.2.4.B Network Connection - Static IP Setup Procedure

When the External Power Supply is operating in Static IP Mode it does not store it's Static IP address when it is powered down. The Static IP Address must be configured every time the External Power Supply is rebooted.

STEP	PROCEDURE
1.	Complete the 6.2.2.B, Network (LAN) Connection procedure.
2.	Complete the 6.2.3.A, Static IP Address Setup Procedure procedure.
3.	Power on the Test Set.
4.	Test Set: Open the System Configuration Window and select the Network tab.
5.	Test Set: Set the Network Mode to Static IP mode. Consult your IT department for assistance if you are not familiar with this terminology.
6.	Test Set: Set Static IP Address to 192.168.1.1.
7.	Test Set: Set the Network Mask to 255.255.255.0.
8.	Verify the External Power Supply LAN Connector LED is green to indicate an active connection with the Test Set.

Proceed to 6.2.5, Test Set's External Power Supply User Interface Setup.

6.2.4.C Network Connection - DHCP Setup Procedure

STEP	PROCEDURE
1.	Complete the 6.2.2.B, Network (LAN) Connection procedure.
2.	Complete the 6.2.3.B, DHCP IP Address Setup Procedure procedure.
3.	Power on the Test Set.
4.	Test Set: Open the System Configuration Window and select the Network tab.
5.	Test Set: Set the Network Mode to DHCP mode. Consult your IT department for assistance if you are not familiar with this terminology.
6.	Wait while Test Set acquires DHCP connection.

Proceed to 6.2.5, Test Set's External Power Supply User Interface Setup.

6.2.5 Test Set's External Power Supply User Interface Setup

STEP	PROCEDURE

1. Complete 6.2.2, Test Set and External Power Supply Hardware Setup procedure.
2. Complete 6.2.3, External Power Supply IP Address Configuration procedure.
3. Complete 6.2.4, Test Set IP Configuration procedure.
4. Test Set: press the Create UUTPS Button on the Launch Bar. The Create UUTPS Window is displayed.
5. Test Set: Set the External Power Supply IP Address field on the Create UUTPS Window to match the External Power Supply IP Address. Press the Connect Button.

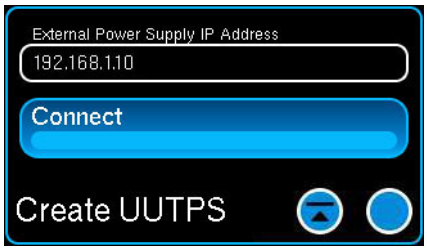


Fig. 6-12 Create Connection to External Power Supply

6. The Test Set UI updates to display the UUT Power Supply Window.

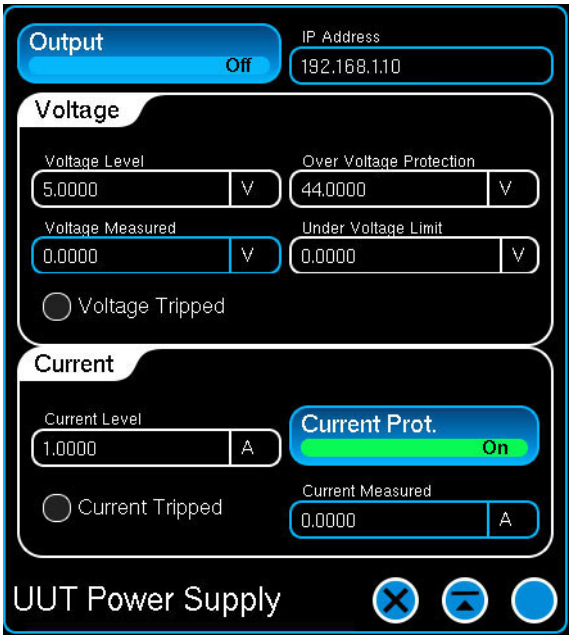


Fig. 6-13 UUT Power Supply Window

7. Configure the Test Set's Voltage and Current parameters according to UUT requirements.
8. Enable Output on the UUT Power Supply Window.
9. Verify the Output Power Level reading on the External Power Supply matches the Output Power Level on the Test Set's UUT Power Supply Window.
10. The Test Set is now controlling the External Power Supply and routing power from the External Power Supply to the Test Set ZIF Connector.

6.2.6 UUT Power Supply Window

The UUT Power Supply Window (Fig. 6-13) is not available until a connection is established between the Test Set and the External Power Supply. This section describes the Test Set fields and parameters that are available when a connection is established between the unit and the External Power Supply.

Parameter	Description
Output	Enables/disables output on External Power Supply.
Voltage Level	Defines Voltage Level output by External Power Supply.
Voltage Measured	Displays measurement of output voltage being generated by External Power Supply.
Over Voltage Protection	Defines the maximum allowed voltage output. External Power Supply disables output when this value is exceeded.
Under Voltage Limit	Defines the minimum allowed voltage output. External Power Supply disables output when the output level drops below this value.
Voltage Tripped	Over Voltage sensor indicator. When indicator is on it indicates that output power has been disabled.
Current Level	Defines the current setting for constant current supply mode.
Current Protection	Defines the current setting for maximum current level.
Current Tripped	Over current sensor indicator. When indicator is on it indicates that output power has been disabled.
Current Measured	Displays current measured at the External Power Supply output.

6.2.7 Powering Down External Power Supply

When testing is complete, change the Test Set's Network Mode to Network Off before powering down the External Power Supply.

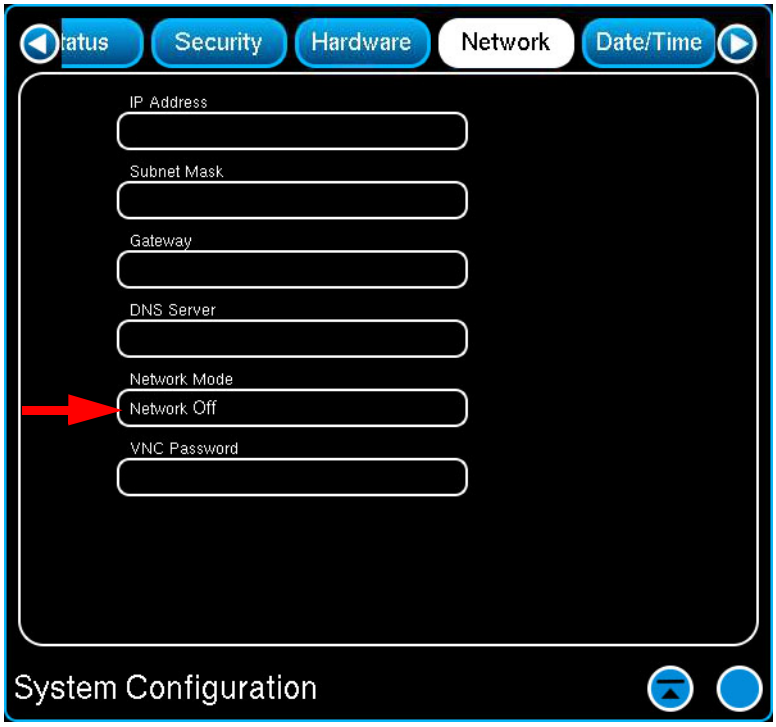


Fig. 6-14 Test Set System Configuration Window- Network Mode - None

CAUTION FAILURE TO TURN THE TEST SET'S NETWORK MODE TO "NETWORK OFF" BEFORE POWERING DOWN THE EXTERNAL POWER SUPPLY MAY RESULT IN A TEST SET MALFUNCTION THE NEXT TIME THE TEST SET IS REBOOTED.

6.3 INTELLIGENT CABLE ASSEMBLY

The Intelligent Cable Assembly is used in an automated test environment to create a hardware and software interface between the 7200 and supported radio products. The Intelligent Cable Assembly UUT I/O Connector Pins are configured using test scripts which are written using python programming language and/or remote programming commands or the AutoTest API.

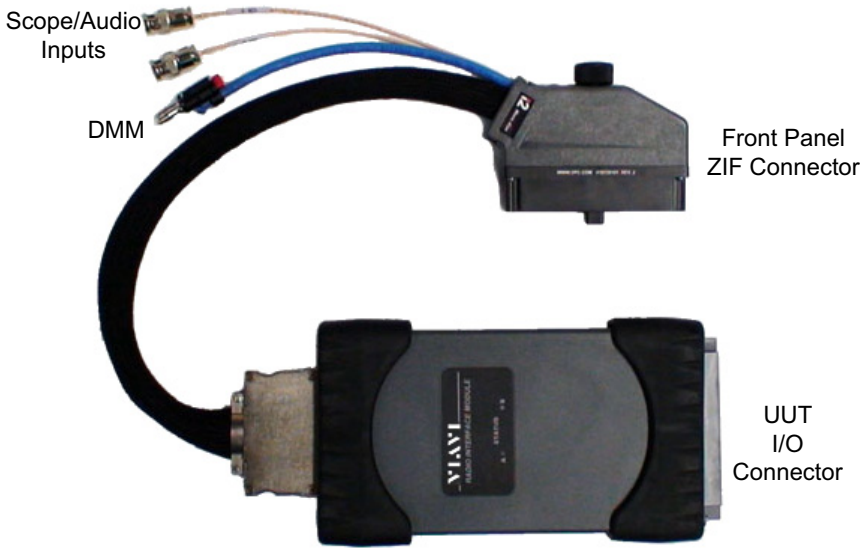


Fig. 6-15 7200 Intelligent Cable Assembly

6.3.1 Hardware Configuration

The Intelligent Cable Assembly is used to connect a UUT to the Test Set's Front Panel ZIF Connector. The Intelligent Cable Assembly must be properly connected to the Test Set to ensure full operation (Fig. 6-16). The Intelligent Cable Assembly must be connected to the Test Set's Front Panel ZIF Connector, Scope CH1 and CH2 connectors and to DMM Input Connectors.

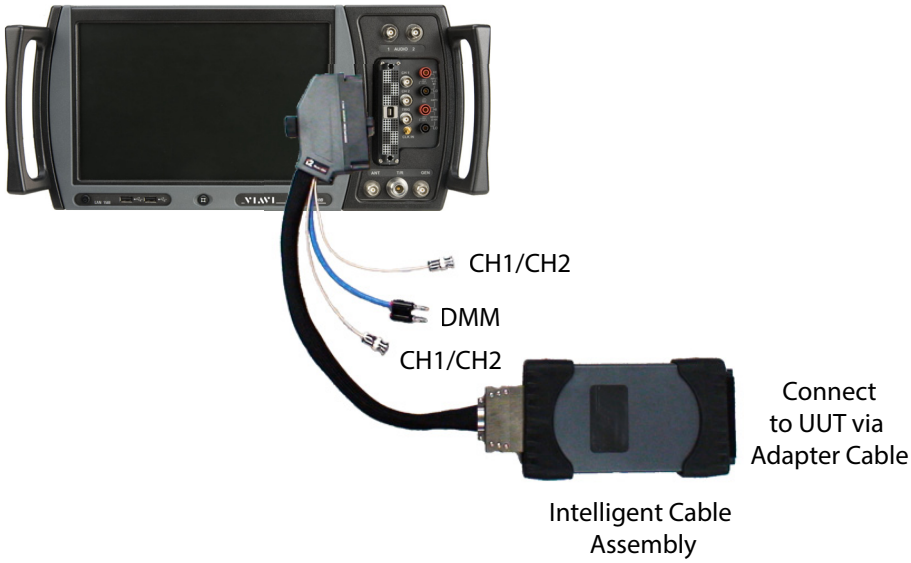


Fig. 6-16 Intelligent Cable Assembly Connection Diagram

When properly connected the Front Panel ZIF Connector routes power to the Intelligent Cable Assembly. The Intelligent Cable Assembly is configured using remote commands to route power to the UUT.

6.3.2 Supported Test Scripts

6.3.2.A Customer Developed Test Scripts

Customers can develop test scripts for use with the Intelligent Cable Assembly. Personnel developing test scripts for use with the Intelligent Cable Assembly should be familiar with the following:

- Signal routing of ZIF Connector and Intelligent Cable Assembly.
- Intelligent Cable Assembly UUT I/O Pin locations and functions.
- User skill requirements identified in Chapter 5, 7200 Scripting Tools.

6.3.2.B VIAVI Developed Test Scripts

VIAVI has developed Test Program Sets (TPS's) for use with the 7200 and Intelligent Cable Assembly. Contact VIAVI Customer Service for a list of supported radio products.

6.3.2.B.1 Software Configuration

Some VIAVI developed test scripts require the Test Set and/or Intelligent Cable Assembly to be updated with additional software.

6.3.2.B.1.a Factory Configured Software

When the 7200 and Intelligent Cable Assembly are purchased together from the factory, the Test Set and Intelligent Cable Assembly are configured with the required software and option licenses and the equipment is ready to use upon receipt.

6.3.2.B.1.b Post-Production Software Installation

When the Intelligent Cable Assembly is purchased as post-production option the software and license must be installed and activated in the Test Set. Refer to the 7200 Operation CD or system Help for option installation procedures.

NOTE	Any special installation instructions provided with TPS software supersede options installation procedures documented on the 7200 Operation CD or system Help.

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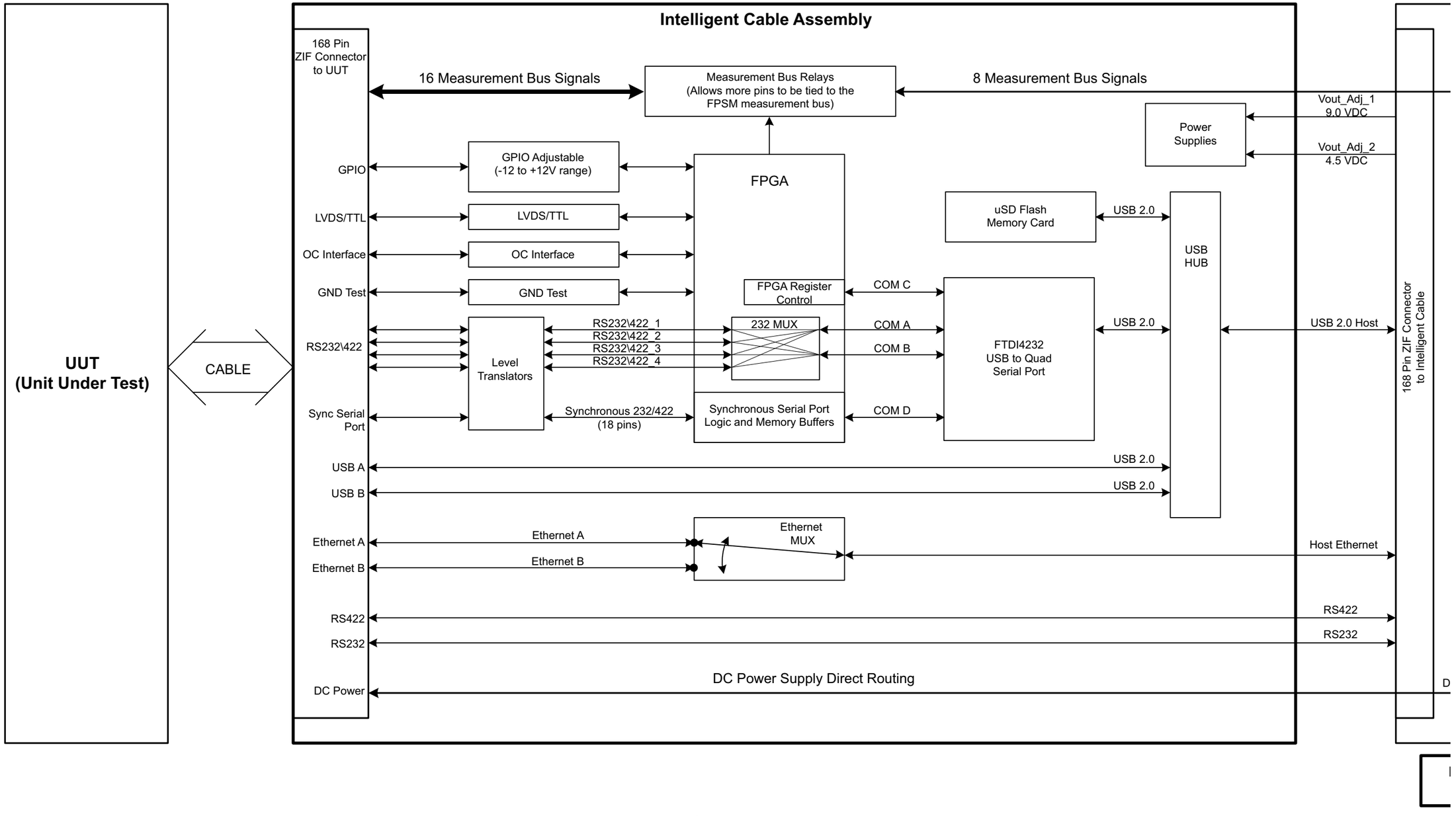


Fig. 6-17 Intelligent Cable Assembly Block Diagram

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Chapter 7 - Storage, Shipping and Maintenance

7.1 INTRODUCTION

This chapter identifies Operator Level maintenance procedures. Refer to the Maintenance Manual for additional maintenance procedures.

7.2 STORAGE AND SHIPMENT

7.2.1 Unpacking Equipment

Special design packing material inside the shipping container provides maximum protection for the Test Set. Avoid damaging the shipping container and packing material when unpacking equipment; if necessary the shipping container and packing material can be reused to ship the Test Set.

CAUTION	TO PREVENT PERSONAL INJURY OR DAMAGE TO TEST SET, VIAVI RECOMMENDS TWO PEOPLE UNPACK AND PACK THE TEST SET. USE CARE WHEN TRANSPORTING THE TEST SET TO PREVENT DAMAGE TO THE UNIT.

Use the following steps to unpack the Test Set:

STEP	PROCEDURE
1.	Cut and remove sealing tape on top of shipping container. Open shipping container and remove top packing mold.
2.	Grasp Test Set firmly while restraining shipping container. Lift Test Set and packing material vertically out of shipping container.
3.	Place Test Set and end cap packing material on a flat, clean and dry surface.
4.	Place packing materials inside shipping container.
5.	Store shipping container for possible future use.

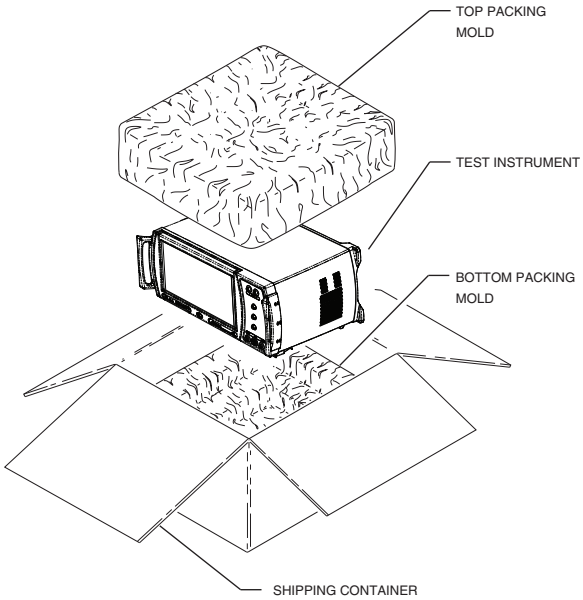


Fig. 7-1 Test Set Packaging Diagram

7.2.2 Checking Unpacked Equipment

Inspect equipment for possible damage incurred during shipment. If Test Set has been damaged, report the damage to VIAVI Customer Service.

Review packing slip to verify shipment is complete. Packing slip identifies the standard items as well as purchased options. Report all discrepancies to VIAVI.

Contact Information

VIAVI Solutions

Customer Service Dept.
10200 West York Street
Wichita, Kansas 67215

Telephone: 800-835-2350
FAX: 316-524-2623
email: AvComm.Service@viavisolutions.com

7.2.3 Storage Environment

The Test Set should be stored in a clean, dry environment. In high humidity environments, protect the Test Set from temperature variations that could cause internal condensation.

The following environmental conditions apply to both shipping and storage:

Temperature: -40 to 71°C
Relative Humidity: 5% to 95% (±5%)
75% (±5%) above 30°C
45% (±5%) above 40°C
Altitude: 4,600 m (15,092 ft)
Vibration: 5-500 Hz Random Vibrations
Shock: 30 G Shock (Functional Shock)

7.2.4 Repacking for Shipping

VIAVI Test Sets returned to factory for calibration, service or repair must be repackaged and shipped subject to the following conditions:

7.2.4.A Return Authorization (RA)

Do not return any products to factory without authorization from VIAVI Customer Service Department.

Contact Information

VIAVI Solutions

Customer Service Dept.
10200 West York Street
Wichita, Kansas 67215

Telephone: 800-835-2350
FAX: 316-524-2623
email: AvComm.Service@viavisolutions.com

7.2.4.B Tagging Test Sets

All test sets must be tagged with:

- Owner's identification and contact information.
- Nature of service or repair required.
- Model Number and Serial Number.
- Return Material Authorization (RMA) Number.

7.2.4.C Shipping Containers

Test Sets must be repackaged in original shipping containers using VIAVI packing materials. If original shipping containers and materials are not available, contact VIAVI Customer Service Department for shipping instructions.

7.2.4.D Freight Costs

All freight costs on non-warranty shipments are assumed by the customer. VIAVI recommends that customers obtain freight insurance with the freight carrier when shipping the Test Set. VIAVI is not responsible for cost of repairs for damages that occur during shipment on warranty or non-warranty items.

7.2.4.E Packing Procedure

Contact VIAVI Customer Service for Test Set shipping instructions.

CAUTION	TO PREVENT PERSONAL INJURY OR DAMAGE TO TEST SET, VIAVI RECOMMENDS TWO PEOPLE UNPACK AND PACK THE TEST SET.

STEP	PROCEDURE

Refer to Fig. 7-1.

1. Place Test Set in storage position with feet closed against case and AC Power Cord disconnected from Test Set.
2. Inspect top and bottom packing molds to ensure they are in good condition.
3. Verify bottom packing mold is seated on floor of shipping container.
4. Place Test Set into shipping container. Ensure unit is securely seated in bottom packing mold.
5. Place top packing mold over top of Test Set and press down until mold rests solidly on bottom packing mold.
6. Close shipping container lids and seal with shipping tape or an industrial stapler.

7.3 PREVENTATIVE MAINTENANCE PROCEDURES

7.3.1 Visual Inspections

Visual inspections should be performed periodically depending on operating environment, maintenance and use.

- Ensure Test Set is properly ventilated.
- Ensure that AC Power Cord and supply connector(s) are in good condition and easily accessible.
- Ensure that the AC Power Supply Switch isolates the equipment from the AC Power Supply.
- Verify the correct rating and type of supply fuses are used.
- Examine the stability and condition of covers and handles.
- Check the presence and condition of all warning labels and markings and supplied safety information.
- Check the wiring in re-wireable plugs and appliance connectors.
- Check the input connector LED indicator functionality (if applicable).

7.3.2 External Cleaning

The following procedure contains routine instructions for cleaning the exterior of the Test Set.

- Remove grease, fungus and ground-in dirt from surfaces with soft lint-free cloth dampened (not soaked) with isopropyl alcohol.
- Remove dust and dirt from connectors with soft-bristled brush.
- Cover connectors, not in use, with suitable dust cover to prevent tarnishing of connector contacts.
- Clean cables with soft lint-free cloth.
- Paint exposed metal surface to avoid corrosion.
- Clean Front Panel display with soft lint-free cloth dampened (not soaked) with non-ammonia based glass cleaner.

7.4 SELF TEST PROCEDURE

The 7200 Self Test Procedure is available when AutoTest III, Option #139264, is enabled on the Test Set.

The 7200 Self Test is a test script which evaluates the operational status of the 7200 operating system.

> **NOTE** The Self Test is intended to determine whether or not the system or component is functioning properly; the Self Test does not determine if the system or component is operating within specified parameters.

7.4.1 Required Equipment

The equipment required to perform 7200 Self Test procedures is included in the 7200 Standard Accessories Kit.

Equipment/Item	Qty
BNC T Connector Adapter	2
TNC BNC Adapter	2
S M BNC/S M BNC Coaxial Cable	4
BNC F/DBL Banana Plug Connector Adapter	1

7.4.2 Self Test Configuration

7.4.2.A Without External Power Supply

If the test setup does not include the optional External Power Supply, configure the 7200 as shown in Fig. 7-2.

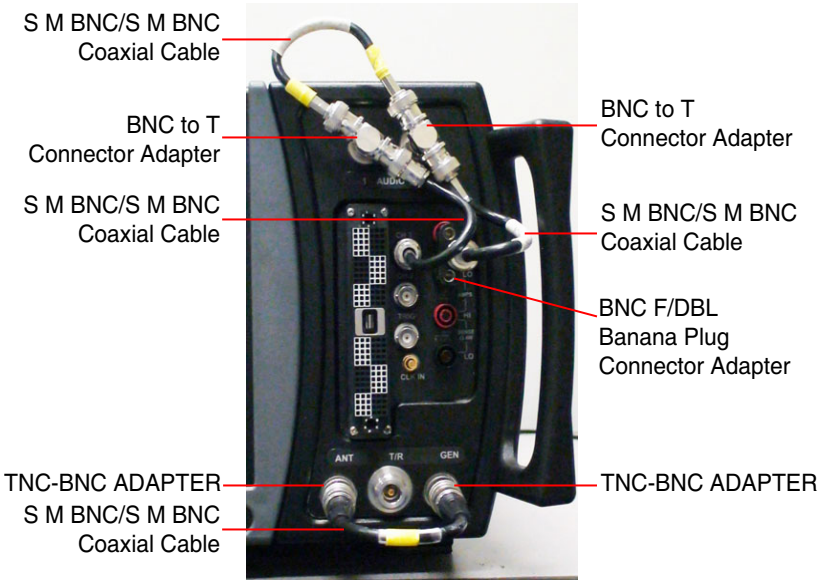


Fig. 7-2 Self Test Connector Setup

7.4.2.B With External Power Supply

If the test setup includes the optional External Power Supply:

- Configure the 7200 as shown in Fig. 7-2.
- Configure the Test Set and External Power Supply for operation (refer to 6.2.4, Test Set IP Configuration).

7.4.3 AutoTest III Self Test

This section describes the 7200 Self Test Procedure. Refer to 5.2, AutoTest III Scripting Tool for information about using the AutoTest III Scripting Tool.

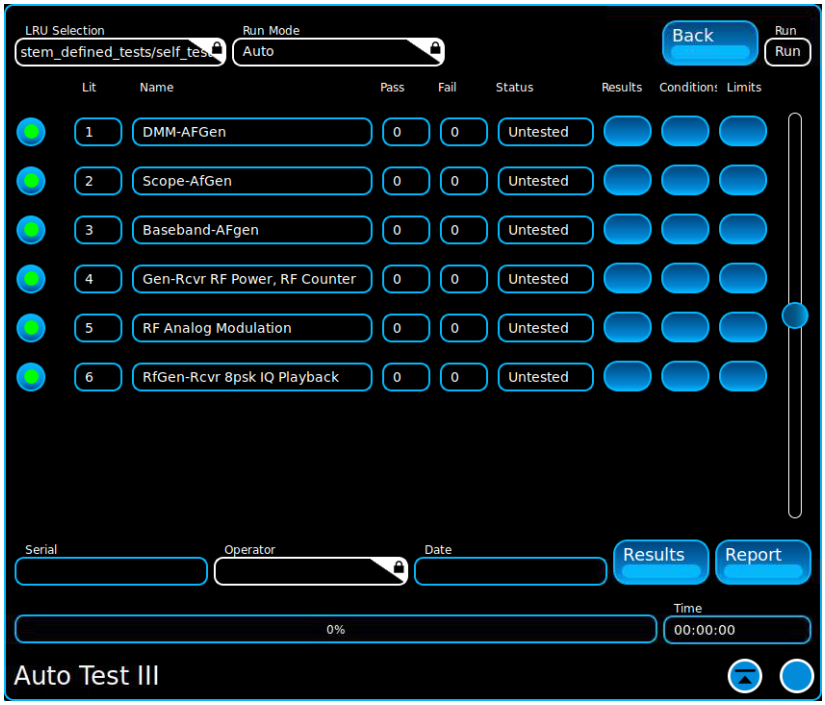


Fig. 7-3 AutoTest III Self Test Main Window

7.4.3.A System Self Test Description

The System Self Test performs all Component Self Tests in sequence.

7.4.3.B Component Self Test Descriptions

7.4.3.B.1 DMM AF Gen

The Test Set's AF Generator and Oscilloscope are used to confirm that DMM AC Volts and Ohms measurements are being performed. Confirms the Test Set's DMM Assembly, AF Generator and Oscilloscope 50Ω load are functioning normally.

Confirms the following assemblies are functioning normally:

- DMM Assembly
- Audio I/O Assembly
- Power PC Assembly
- Switch Fabric PCB Assembly
- Switch Matrix Assembly

7.4.3.B.2 Scope AF Gen

The Test Set's AF Generator is used to evaluate Oscilloscope trace type, voltage and waveform. Confirms the Test Set's AF Generator and Oscilloscope are functioning normally.

Confirms the following assemblies are functioning normally:

- Oscilloscope Assembly
- Audio I/O Assembly
- Power PC Assembly
- Switch Fabric PCB Assembly
- Switch Matrix Assembly

7.4.3.B.3 Baseband AF Gen

The Test Set's AF Generator is used to evaluate the Test Set's Audio Meters. Confirms the Test Set's AF Generator and Audio Meters are functioning normally.

Confirms the following assemblies are functioning normally:

- DMM Assembly
- Audio I/O Assembly
- Power PC Assembly
- Switch Fabric PCB Assembly
- Switch Matrix Assembly

7.4.3.B.4 Gen-Rcvr RF Power, RF Counter

The Test Set's RF Generator and RF Receiver are used to evaluate the functionality of the RF Power Meter and RF Counter. Confirms the Test Set's basic RF signal paths are functioning normally.

Confirms the following assemblies are functioning normally:

- RF Generator Assembly
- Receiver Assembly
- Attenuator Assembly
- RF Combiner Assembly
- A2D/D2A Assembly
- Frequency Reference Assembly
- 3010 and 3011 Assemblies
- Power PC Assembly

7.4.3.B.5 RF Analog Modulation

Uses the Test Set's Modulation Generators to evaluate the AM, FM and PM modulation meters. Confirms the Test Set's the Modulation Generator and Modulation Meters are functioning normally.

Confirms the following assemblies are functioning normally:

- RF Generator Assembly
- Receiver Assembly
- Attenuator Assembly
- RF Combiner Assembly
- A2D/D2A Assembly
- Frequency Reference Assembly
- 3010 and 3011 Assemblies
- Power PC Assembly

7.4.3.C Run AutoTest 3 Self Tests

Refer to 5.2.8, Running Scripts in AutoTest III for additional information.

7.4.3.C.1 Run System Self Test

STEP	PROCEDURE
1.	Open the AutoTest 3 Window (5.2.4, Accessing AutoTest III).
2.	Select Self Test from the Test Selection Menu (5.2.8, Running Scripts in AutoTest III).
3.	Follow procedure documented in section 5.2.8.A, Run System Level Test.

7.4.3.C.2 Run Line Item Test (LIT) Self Test

STEP	PROCEDURE
1.	Open the AutoTest 3 Window (5.2.4, Accessing AutoTest III).
2.	Select Self Test from the Test Selection Menu (5.2.8, Running Scripts in AutoTest III).
3.	Refer to 5.2.8.B, Run Single Line Item Test (LIT).

7.4.3.D Test Results/Reports

Refer to section 5.2.9, Generate Reports for information about how to generate and manage AutoTest 3 test results.

7.5 TROUBLESHOOTING PROCEDURES

The Troubleshooting Procedures list Operator Level corrective actions for malfunctions which may occur during normal Test Set operation. This section cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. Perform tests/inspections and corrective actions in order listed.

If a malfunction is not listed or is not corrected by listed corrective actions, refer to the Maintenance Manual for more in-depth troubleshooting procedures or contact VIAVI Customer Service.

7.5.1 Troubleshooting Symptom Index

DESCRIPTION	PAGE
Test Set does not power on.	7 - 10
Display is blank.	7 - 10
Display content is frozen and fails to update.	7 - 10
Display touchscreen is unresponsive.	7 - 10
Test Set does not power down to Standby Mode.	7 - 10
Mouse/keyboard is inoperable.	7 - 10
No receive signal at ANT or T/R Connector.	7 - 11
No generate output at GEN or T/R Connector.	7 - 11
No signal at Scope Input (CH1 or CH2) Connector.	7 - 11
No DMM measurements.	7 - 11
No signal at Audio Input.	7 - 11
No input signal received at Audio Connector.	7 - 11
No signal output at Audio Connector.	7 - 11
ZIF Connector unresponsive.	7 - 11
Network connection failure.	7 - 12
External DC Power Supply Failure.	7 - 12
Test Set blows fuse.	7 - 12
Network Software Upgrade fails.	7 - 12
USB Software Upgrade/Option Installation fails.	7 - 12

Table 7-1 Troubleshooting Symptom Index Table

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1 Test Set does not power on.

Step 1 Verify Test Set power cord is working.

Step 2 Verify Test Set is connected to an active AC Power Supply.

Step 3 Verify AC Power Cord is securely connected to Test Set.

Step 4 Verify AC Power Fuse is not blown.

Step 5 Verify AC Power Switch is in ON position.

2 Display is blank.

Step 1 Reboot Test Set.

3 Display content is frozen and fails to update.

Step 1 Reboot Test Set.

Step 2 Verify Test Set is configured for Continuous measurements (if applicable).

4 Display touchscreen is unresponsive.

Step 1 Reboot Test Set.

Step 2 If accessible using a mouse, perform Touchscreen Calibration.

Step 3 Determine if UI is operable using a mouse and/or keyboard.

5 Test Set does not power down to Standby Mode.

Step 1 Press and hold the Power On/Standby Button for approximately 7 seconds, then release to power down Test Set.

Step 2 Does Test Set initiate, but not complete, power down sequence?

- Yes, go to next step.
- No, contact VIAVI Customer Service Customer Service.

Step 3 Power down Test Set by placing Rear Panel AC Power Supply Switch to OFF position.

Step 4 After Test Set completely powers down, return AC Power Supply Switch to ON position.

Step 5 Press Power On/Standby Key to power on Test Set.

Step 6 Verify Test Set reboots to operational state.

6 Mouse/keyboard is inoperable.

Step 1 Verify mouse/keyboard is operational on another device (i.e., computer).

Step 2 Disconnect, then reconnect mouse/keyboard to Test Set USB Connector.

Step 3 Verify mouse/keyboard is operational on another Test Set USB Connector. Probable source of failure is USB Connector.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7 No receive signal at ANT or T/R Connector.

Step 1 Verify Test Set Receiver Port is set to correct input (ANT or TR).

Step 2 Verify cable is properly connected to selected connector (ANT or TR).

Step 3 Verify Test Set Receiver Frequency is set to expected receive frequency.

Step 4 Verify Test Set Receiver Bandwidth is set appropriately for input signal type.

Step 5 Verify Test Set Receiver Reference Level is set appropriately for the input signal.

Step 6 If Frequency Reference is set to Internal, remove any external source connected to the Rear Panel 10 MHz Frequency Reference Connector.

Step 7 If Frequency Reference is set to External, verify a 10 MHz external source is connected to the Test Set's Rear Panel 10 MHz Frequency Reference Connector.

8 No generate output at GEN or T/R Connector.

Step 1 Verify correct Output connector is selected on Test Set (GEN or T/R).

Step 2 Verify RF Generator is set to ON.

Step 3 Verify RF Generator Frequency is set to correct frequency.

Step 4 Verify RF Generator Level is set appropriately for UUT.

9 No signal at Scope Input (CH1 or CH2) Connector.

Step 1 Verify probe is properly connected to Scope Input Connector.

Step 2 Verify Test Set is properly configured to receive signal at selected Scope Input Connector.

10 No DMM measurements.

Step 1 Verify DMM measurements are enabled.

Step 2 Verify DMM is properly configured (i.e., Load, Shunt, Mode).

11 No signal at Audio Input.

Step 1 Verify cable is properly connected to Audio Input Connector.

Step 2 Verify Test Set is properly configured to receive signal at selected Audio Input Connector.

12 No input signal received at Audio Connector.

Step 1 Verify cable is properly connected to Audio Input Connector.

Step 2 Verify Test Set is properly configured to receive signal at selected Audio Input Connector.

13 No signal output at Audio Connector.

Step 1 Verify cable is properly connected to Audio Output Connector.

Step 2 Verify Test Set is properly configured to receive signal at selected Audio Output Connector.

14 ZIF Connector unresponsive.

Step 1 Verify UUT is properly connected to ZIF Connector.

Step 2 Verify UUT is properly configured for test.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

15 Network connection failure.

Step 1 Verify network cable is properly connected to Test Set.

Step 2 Verify Rear Panel Network LEDs are active.

Step 3 Verify Test Set is properly configured for network access.

16 External DC Power Supply Failure.

Step 1 Verify DC Power Supply is properly configured for Network interface with Test Set. Refer to DC Power Supply Technical Manual.

Step 2 Verify DC Power Supply is properly connected to power source. Refer to DC Power Supply Technical Manual.

Step 3 Verify UUT is properly connected to DC Power Supply. Refer to DC Power Supply Technical Manual.

Step 4 Verify Test Set is properly configured for using external DC Power Supply.

17 Test Set blows fuse.

Step 1 Verify specified fuse is installed in Test Set.

Step 2 Verify Test Set is connected to a grounded AC Power Supply.

18 Network Software Upgrade fails.

Step 1 Reboot Test Set.

Step 2 Verify Software Upgrade procedure was completed correctly.

19 USB Software Upgrade/Option Installation fails.

Step 1 Reboot Test Set.

Step 2 Verify USB Device is operational on another device (i.e., computer).

Step 3 Verify Software Upgrade procedure was completed correctly.

Step 4 Connect USB Device to a different USB Connector on the Test Set.

Step 5 Repeat USB Software Upgrade Procedure.

7.6 MAINTENANCE PROCEDURES

7.6.1 Introduction

This section provides instructions for replacing non-operational hardware. Procedures identified in this section are Operator Level maintenance procedures.

7.6.2 Rear Bezel

Description: This procedure covers: Remove. Install.

Preliminary Procedures: None.

7.6.2.A Remove Rear Bezel

STEP	PROCEDURE

1. Remove four screws securing Rear Bezel to Case.

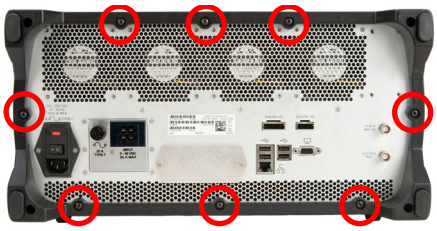


Fig. 7-4 Rear Bezel Case Screws

2. Remove eight screws securing Rear Bezel to Chassis Assembly.

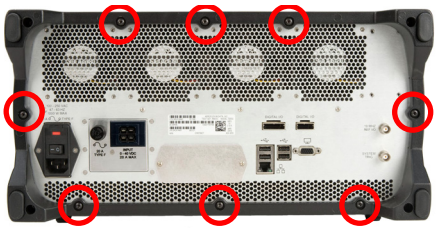


Fig. 7-5 Rear Bezel Chassis Assembly Screws

3. Remove Rear Bezel from Case.
4. Remove Plastic Oval Inserts from Rear Bezel.

7.6.2.B Install Rear Bezel

STEP	PROCEDURE

1. Install Rear Bezel on Case.

Refer to Fig. 7-4.

2. Install four screws securing Rear Bezel to Case.

Refer to Fig. 7-5.

3. Install eight screws securing Rear Bezel to Chassis Assembly.
4. Torque four Rear Bezel Case screws in stalled in Step 2 to 15 in/lbs.
5. Torque eight Rear Bezel Chassis screws installed in Step 3 to 30 in/lbs.
6. Insert Plastic Oval Inserts into Rear Bezel.

Follow-up Procedures: None.

7.6.3 Handles

Description: This procedure covers: Remove. Install.

Preliminary Procedures: None.

7.6.3.A Remove Handles

STEP	PROCEDURE

Refer to Fig. 7-6.

1. Remove six screws securing Handle to Front Panel Assembly.
2. Remove Handle from Front Panel Assembly.

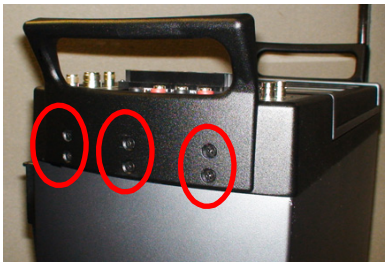


Fig. 7-6 Handle Remove/Install Diagram

Repeat Steps 1 and 2 to remove other Handle.

7.6.3.B Install Handles

STEP	PROCEDURE

Refer to Fig. 7-6.

1. Position Handle on Front Panel Assembly.
2. Install six screws securing Handle to Front Panel Assembly. Torque screws to 15 in/lbs.

Repeat Steps 1 and 2 to install other Handle.

Follow-up Procedures: None.

7.6.4 Front Feet

Description: This procedure covers: Remove. Install.

Preliminary Procedures: None.

7.6.4.A Remove Front Foot Molding

STEP	PROCEDURE

1. Remove screw and washer securing Foot Mounting Bracket to Case Assembly.

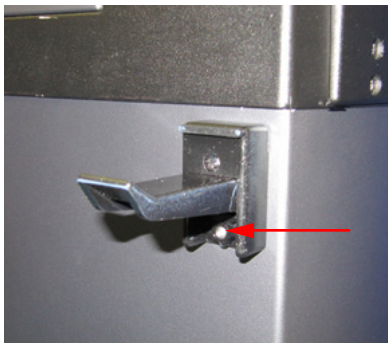


Fig. 7-7 Front Mounting Bracket Remove/Install

2. Remove screw and washer securing Front Foot and Foot Mounting Bracket to Case Assembly.

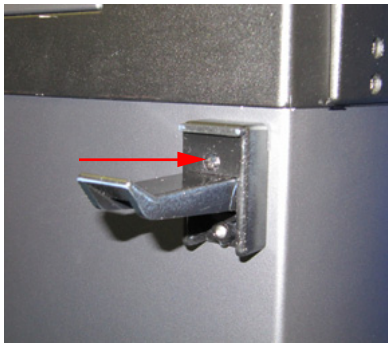


Fig. 7-8 Front Foot and Mounting Bracket Remove/Install

3. Remove Front Foot and Foot Mounting Bracket from Case Assembly.

Repeat Steps 1 through 3 to remove other Front Foot.

7.6.4.B Install Front Feet

STEP	PROCEDURE

Refer to Fig. 7-9.

1. Assemble Foot and Mounting Bracket.

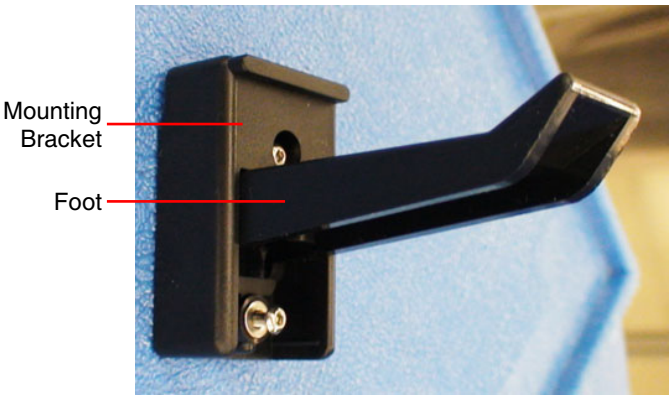


Fig. 7-9 Foot and Mounting Bracket Assembled

Refer to Fig. 7-8.

2. Install washer and screw securing Foot Assembly to Case Assembly.

Refer to Fig. 7-7.

3. Install washer and screw securing Foot Mounting Bracket to Case Assembly.
4. Torque all screws to 8.8 in/lbs.

Repeat Steps 1 through 3 to install other Front Foot.

Follow-up Procedures: None.

7.6.5 AC Power Fuse

Description: This procedure covers: Remove. Install.

Preliminary Procedures: None.

7.6.5.A Remove AC Power Fuse

STEP	PROCEDURE

1. Verify Test Set is OFF and AC Power is disconnected from Test Set.

Refer to Fig. 7-10.

2. Open AC Power Fuse Cover (1).
3. Remove AC Power Fuse Carrier (2) from FL1.
4. Remove AC Power Fuse (F1 and F2).

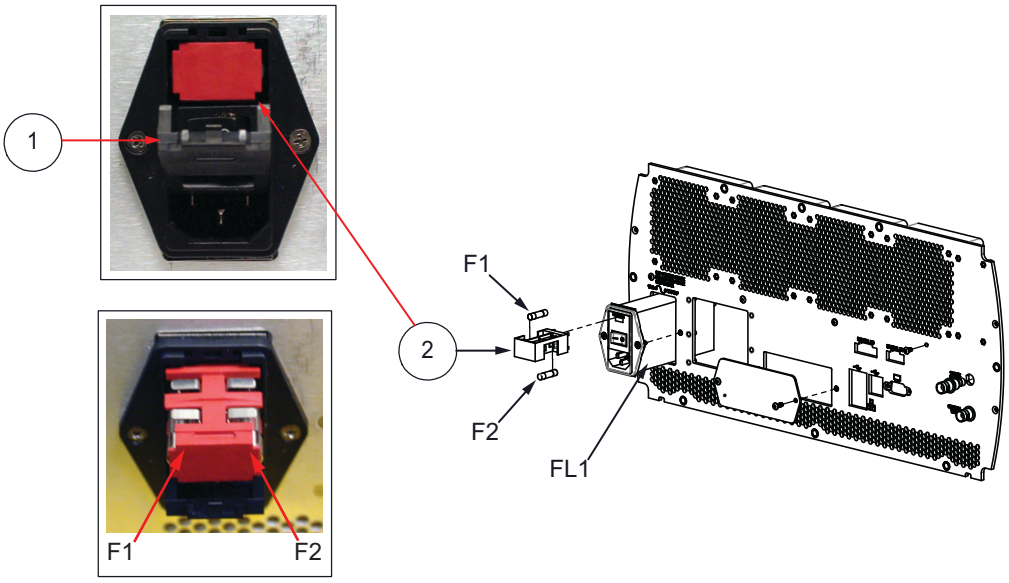


Fig. 7-10 AC Fuse Remove/Install Diagram

CAUTION	FOR CONTINUOUS PROTECTION AGAINST FIRE, REPLACE FUSE WITH FUSES OF THE SPECIFIED VOLTAGE AND CURRENT RATINGS.

7.6.5.B Install AC Power Fuse

STEP	PROCEDURE

Refer to Fig. 7-10.

1. Install AC Power Fuse (F1 and F2) in AC Power Fuse Carrier (2).
2. Install AC Power Fuse Carrier (2) into FL1.
3. Verify AC Power Fuse Carrier (2) is properly seated into FL1.
4. Close AC Power Fuse Cover (1).

Follow-up Procedures: None.

7.6.6 Rear Feet

Description: This procedure covers: Remove. Install.

Preliminary Procedures: None.

7.6.6.A Remove Rear Foot

STEP	PROCEDURE

1. Remove finishing cap from Rear Foot Bumper.

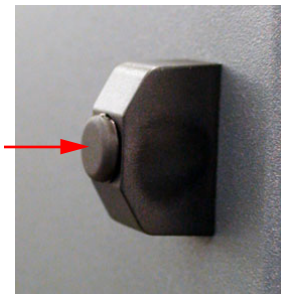


Fig. 7-11 Rear Foot Bumper Finishing Cap

2. Remove screw and washer securing Rear Foot Bumper to Case Assembly.
3. Remove Rear Foot Bumper from Case Assembly.

Repeat Steps 1 through 3 to remove other Rear Foot.

7.6.6.B Install Rear Foot

STEP	PROCEDURE

1. Position Rear Foot Bumper on Case Assembly. Align Rear Foot Bumper with holes in Case Assembly.

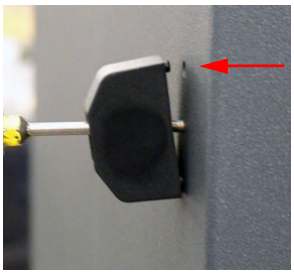


Fig. 7-12 Rear Foot Bumper Alignment

2. Install washer and screw securing Rear Foot Bumper to Case Assembly. Torque screw to 8.8 in/lbs.

Refer to Fig. 7-11.

3. Insert finishing cap into Rear Foot Bumper.

Repeat Steps 1 through 3 to install other Rear Foot.

Follow-up Procedures: None.

Appendix A - Pin-Out Tables

A.1 INTERNAL DC POWER CONNECTOR

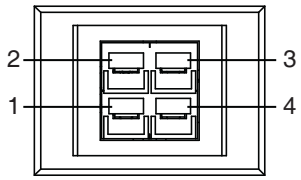


Fig. A-1 Internal DC Power Pin-Out Diagram

Pin Number	Wire Color	Function
1	Red	POS (+)
2	White/Black	NEG (-)
3	--	n/c
4	--	n/c

Table A-1 Internal DC Power Connector Pin-Out Table

A.2 ETHERNET CONNECTORS

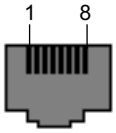


Fig. A-2 Ethernet Pin-Out Diagram

Pin Number	Signal Type	Signal Name	Function
1	DATA	BI_DA (+)	I/O
2	DATA	BI_DA (-)	I/O
3	DATA	BI_DB (+)	I/O
4	DATA	BI_DC (+)	I/O
5	DATA	BI_DC (-)	I/O
6	DATA	BI_DB (-)	I/O
7	DATA	BI_DD (+)	I/O
8	DATA	BI_DD (-)	I/O

Table A-2 Ethernet Connectors Pin-Out Table

A.3 PCIE CONNECTOR

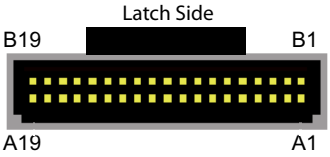


Fig. A-3 PCIe Connector Pin-Out Diagram

Pin Number	Signal Type	Signal Name	Function
A1	GND	GND	POWER
A2	DATA	Tx 0 (+)	OUT
A3	DATA	Tx 0 (-)	OUT
A4	GND	GND	POWER
A5	DATA	Tx 1 (+)	OUT
A6	DATA	Tx 1 (-)	OUT
A7	GND	GND	POWER
A8	DATA	Tx 2 (+)	OUT
A9	DATA	Tx 2 (-)	OUT
A10	GND	GND	POWER
A11	DATA	Tx 3 (+)	OUT
A12	DATA	Tx 3 (-)	OUT
A13	GND	GND	POWER
A14	DATA	REF CLK (+)	OUT
A15	DATA	REF CLK (-)	OUT
A16	GND	GND	POWER
A17	CONTROL	SB_RTN	OUT
A18	CONTROL	/CPRSNT	OUT
A19	CONTROL	CPWRON	OUT
B1	GND	GND	POWER
B2	DATA	Rx 0 (+)	IN
B3	DATA	Rx 0 (-)	IN
B4	GND	GND	POWER
B5	DATA	Rx 1 (+)	IN
B6	DATA	Rx 1 (-)	IN
B7	GND	GND	POWER
B8	DATA	Rx 2 (+)	IN
B9	DATA	Rx 2 (-)	IN
B10	GND	GND	POWER
B11	DATA	Rx 3 (+)	IN
B12	DATA	Rx 3 (-)	IN
B13	GND	GND	POWER
B14	NO CONNECT	--	--
B15	NO CONNECT	--	--
B16	NO CONNECT	--	--
B17	NO CONNECT	--	--
B18	CONTROL	/CWAKE	CONTROL
B19	CONTROL	/CPERST	CONTROL

Table A-3 PCIe Connectors Pin-Out Table

A.4 SRIO CONNECTOR

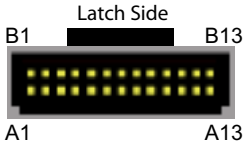


Fig. A-4 sRIO Connector Pin-Out Diagram

Pin Number	Signal Type	Signal Name	Function
A1	GND	GND	POWER
A2	DATA	Rx 0 (+)	IN
A3	DATA	Rx 0 (-)	IN
A4	GND	GND	POWER
A5	DATA	Rx 1 (+)	IN
A6	DATA	Rx 1 (-)	IN
A7	GND	GND	POWER
A8	DATA	Rx 2 (+)	IN
A9	DATA	Rx 2 (-)	IN
A10	GND	GND	POWER
A11	DATA	Rx 3 (+)	IN
A12	DATA	Rx 3 (-)	IN
A13	GND	GND	POWER
B1	GND	GND	POWER
B2	DATA	Tx 0 (+)	OUT
B3	DATA	Tx 0 (-)	OUT
B4	GND	GND	POWER
B5	DATA	Tx 1 (+)	OUT
B6	DATA	Tx 1 (-)	OUT
B7	GND	GND	POWER
B8	DATA	Tx 2 (+)	OUT
B9	DATA	Tx 2 (-)	OUT
B10	GND	GND	POWER
B11	DATA	Tx 3 (+)	OUT
B12	DATA	Tx 3 (-)	OUT
B13	GND	GND	POWER

Table A-4 sRIO Connector Pin-Out Table

A.5 USB CONNECTORS

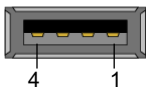


Fig. A-5 USB Pin-Out Diagram

Pin Number	Signal Type	Signal Name	Function
1	PWR	VCC	POWER
2	DATA	(-) DATA	I/O
3	DATA	(+) DATA	I/O
4	PWR	GND	POWER

Table A-5 USB Connectors Pin-Out Table

A.6 VGA CONNECTOR

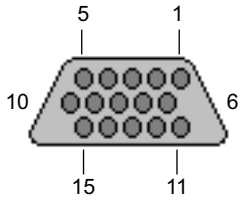


Fig. A-6 VGA Connector Pin-Out Diagram

Pin Number	Function	Pin Number	Function
1	Red Video	9	No Connection
2	Green Video	10	Sync Return
3	Blue Video	11	--
4	--	12	--
5	Ground	13	Horizontal Sync
6	Red Return	14	Vertical Sync
7	Green Return	15	--
8	Blue Return		

Table A-6 VGA Connector Pin-Out Table

A.7 ZIF I/O CONNECTOR

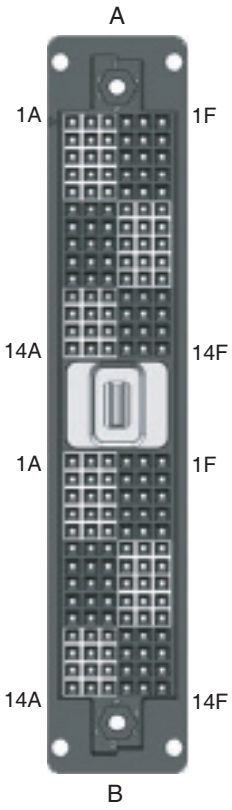


Fig. A-7 ZIF I/O Connector Pin-Out Diagram

A Connector						
Pin#	**A**	**B**	**C**	**D**	**E**	**F**
1	EXT_PWR	EXT_PWR	EXT_PWR_RTN	EXT_PWR	EXT_PWR_RTN	EXT_PWR_RTN
2	EXT_PWR	EXT_PWR	EXT_PWR_RTN	EXT_PWR	EXT_PWR_RTN	EXT_PWR_RTN
3	Scope1	Scope2	GND	DMM–(rly gnd)(DMM1)	DMM+(DMM2)	GND
4	GND	GND	GND	GND	GND	GND
5	Meas_bus_1	Meas_bus_2	Meas_bus_3	Meas_bus_4	Meas_bus_5	Meas_bus_6
6	GND	GND	Meas_bus_7	Meas_bus_8	GND	GND
7	Eth_TXP	Eth_TXN	GND	Eth_RXP	Eth_RXN	GND
8	GND	GND	USB_GND	Vout1_ADJ_PWR	GND	RS232_CTS
9	GND	USB+	USB-	GND	RS422TX+	RS232_TX
10	GND	GND	USB_5V	GND	RS422TX-	RS232_RX
11	OC_I/O [0]	OC_I/O [1]	OC_I/O [2]	Vout2_ADJ_PWR	RS422RX+	RS232_RTS
12	OC_I/O [3]	OC_I/O [4]	OC_I/O [5]	GND	RS422RX-	GND
13	OC_I/O [6]	OC_I/O [7]	5V_TTL_out [0]	5V_TTL_out [1]	5V_TTL_out [2]	5V_TTL_out [3]
14	GND	GND	3.3V_TTL_out [0]	3.3V_TTL_out [1]	3.3V_TTL_out [2]	3.3V_TTL_out [3]

B Connector						
Pin#	**A**	**B**	**C**	**D**	**E**	**F**
1	5V_TTL_in [0]	5V_TTL_in [1]	5V_TTL_in [2]	5V_TTL_in [3]	GND	GND
2	3.3V_TTL_in [0]	3.3V_TTL_in [1]	3.3V_TTL_in [2]	3.3V_TTL_in [3]	GND	GND
3	AUX_01	AUX_02	AUX_03	AUX_04	AUX_05	AUX_06
4	AUX_07	AUX_08	AUX_09	AUX_10	AUX_11	AUX_12
5	AUX_13	AUX_14	AUX_15	AUX_16	AUX_17	AUX_18
6	Test Point E19	Test Point E20	GND	Test Point E21	Test Point E22	GND
7	AUX_19	AUX_20	AUX_21	AUX_22	AUX_23	AUX_24
8	AUX_25	AUX_26	AUX_27	AUX_28	AUX_29	AUX_30
9	AUX_31	AUX_32	AUX_33	AUX_34	AUX_35	AUX_36
10	Test Point E23	Test Point E24	GND	Test Point E25	Test Point E26	GND
11	AUX_37	AUX_38	AUX_39	AUX_40	AUX_41	AUX_42
12	AUX_43	AUX_44	AUX_45	AUX_46	AUX_47	AUX_48
13	AUX_49	AUX_50	AUX_51	AUX_52	AUX_53	AUX_54
14	AUX_55	AUX_56	AUX_57	AUX_58	AUX_59	AUX_60

ZIF Connector Pin Definitions	
PCI Signal	**Function/Usage**
Scope 1 Scope 2	Each pin can be configured to route signals from ZIF Connector Scope 1 and Scope 2 pins to the Front Panel Scope CH1 and CH2 I/O Connectors. Requires use of an external ZIF to BNC Cable and routing of Measurement Bus pins to ZIF Scope pins.
DMM+ DMM-	Each pin can be configured to route signals from ZIF Connector DMM pins to the Front Panel DMM Connectors. Requires use of an external ZIF to Banana Adapter/Cable and routing of Measurement Bus pins to ZIF DMM pins.
Meas_bus_1 Meas_bus_2 Meas_bus_3 Meas_bus_4	Routes signals to one of the Test Set's four internal audio ports (Audio In 1, Audio In 2, Audio Out 1, Audio Out 2). Signals can be routed to and from the PXI Audio card through relays on the Front Panel Switch Matrix PCB with the following limitations: Ron <1Ω BW <100 kHz Voltage range ±36 V. Signals can also be routed through an Analog multiplexor to the ZIF Scope and DMM pins with the following limits: (requires use of ZIF to BNC or Banana Adapter cable and configuring Scope or DMM pins to route signal to Front Panel Scope and DMM connectors). 40Ω < Ron < 90Ω (temperature dependent) BW < 10 MHz Voltage range ±36 V
Meas_bus_5 Meas_bus_6 Meas_bus_7 Meas_bus_8	Routes signal to one of the Test Set's four internal measurement ports (Scope 1, Scope 2, DMM+, DMM-). Signals can also be routed through an Analog multiplexor to the ZIF Scope and DMM pins with the following limits: (requires use of ZIF to BNC or Banana Adapter cable and configuring Scope or DMM pins to route signal to Front Panel Scope and DMM connectors). 40Ω < Ron <90Ω (temperature dependent) BW <10 MHz Voltage range ±36 V

ZIF Connector Pin Definitions	
PCI Signal	**Function/Usage**
Eth_TXP Eth_TXN Eth_RXP Eth_RXN	Pins function together to route signal to the Front Panel Switch Matrix Assembly 10/100 Ethernet port. The Front Panel Switch Matrix Assembly contains an Ethernet transformer which contains termination resistors. This port is IEEE 802.3/802.3u compliant.
USB+ USB- USB_5V USB_GND	Pins function together to connect to an external USB device. USB_5V is current limited, capable of driving a 500 mA load. This interface is compliant with: • Universal Serial Bus Specification Revision 2.0 (Data rate 1.5/12/480 Mbps). • Open Host Controller Interface (OHCI) specification for USB Rev 1.0a. • Enhanced Host Controller Interface (EHCI) specification for USB Rev 1.0.
VOUT1_ADJ_PWR	Pin provides output power to UUT. Adjustable output range (2.5 VDC to 10 VDC) which can drive loads from 0 to 500 mA. Output can be shorted to ground momentarily without damage.
VOUT2_ADJ_PWR	Pin provides output power to UUT. Adjustable output range (1.4 VDC to 4.8 VDC) which can drive loads from 0 to 500 mA. Output can be shorted to ground momentarily without damage.
RS232TX RS232RX RS232CTS RS232RTS	Pins function together for establishing communication with external device. Supports all baud rates up to 250 kbps.
RS422TX+ RS422TX- RS422RX+ RS422RX-	Pins function together for establishing communication with external device. Supports all baud rates up to 250 kbps (only full-duplex mode is supported).
OC_I/O_0 OC_I/O_1 OC_I/O_2 OC_I/O_3 OC_I/O_4 OC_I/O_5 OC_I/O_6 OC_I/O_7	Each pin is an independent "open-collector" transistor input/output. The output transistors can tolerate 40 V max and can sink 12 mA max (at 12 mA, with the OC switch 'ON', the pin voltage <0.8 V). 10 K pullup to internal 3.3 V supply. Pins are short circuit protected in the event that 5 V or less is applied directly to the OC pin when the internal OC switch is 'ON'. Short circuit protection trip current is typically ≈80 mA. Typically, at room temperature, pin voltage is ≈0.5 V when 12 mA is pulled to ground by the OC transistor.
5.0V_TTL_out_0 5.0V_TTL_out_1 5.0V_TTL_out_2 5.0V_TTL_out_3	Each pin is an independent, 5 Volt TTL digital output. Pins will source or sink 24 mA. • VOH = 2.4 V Minimum (logic-high output) • VOL = 0.44 V Maximum (logic-low output)
3.3V_TTL_out_0 3.3V_TTL_out_1 3.3V_TTL_out_2 3.3V_TTL_out_3	Each pin is an independent, 3.3 Volt TTL digital output. Pin source or sink 12 mA. • VOH = 2.4 V Minimum (logic-high output) • VOL = 0.4 V Maximum (logic-low output)
5.0V_TTL_in_0 5.0V_TTL_in_1 5.0V_TTL_in_2 5.0V_TTL_in_3	Each pin is an independent, 5 Volt TTL digital input. • VIH = 2.0 V Minimum (to achieve a logic-high input) • VIL = 0.8 V Maximum (to achieve a logic-low input) Input to pins not to exceed 5.5 VDC.

ZIF Connector Pin Definitions	
PCI Signal	**Function/Usage**
3.3V_TTL_in_0 3.3V_TTL_in_1 3.3V_TTL_in_2 3.3V_TTL_in_3	Each pin is an independent, 3.3 Volt TTL digital input. • VIH = 2.0 V Minimum (to achieve a logic-high input) • VIL = 0.8 V Maximum (to achieve a logic-low input) Input to pins not to exceed 5.5 VDC.
GND (34)	Pins are tied to Front Panel Switch Matrix PCB Assembly ground and chassis ground.
AUX Connector (60)	Reserved for future development.
E Points (8)	Reserved for future development.
AUX Internal Power (12)	Pins can be configured to route an external power supply to provide DC power to a UUT load. Pins J4A: A1, A2, B1, B2, D1, D2 provide the Positive DC supply voltage. Pins J4A: C1, C2, E1, E2, F1, F2 provide the DC Return. This Return is tied to Chassis Ground. The Positive DC supply is routed through a current shunt on the PXI Front Panel Switch Matrix PCB Assembly that is used to monitor the current to the UUT load.

Table A-7 ZIF I/O Connector Pin-Out Table

A.8 INTELLIGENT CABLE ASSEMBLY RIM CONNECTOR

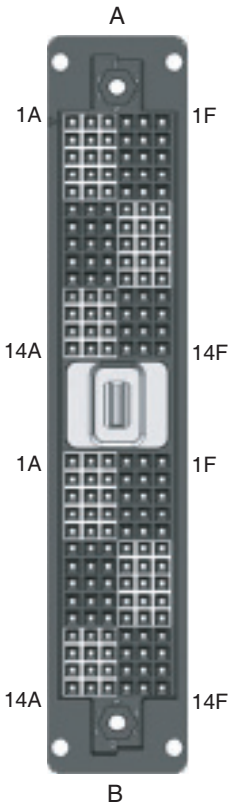


Fig. A-8 Intelligent Cable Assembly RIM Connector Pin-Out Diagram

A Connector						
Pin#	**A**	**B**	**C**	**D**	**E**	**F**
1	EXT_PWR	EXT_PWR	EXT_PWR_RTN	EXT_PWR	EXT_PWR_RTN	EXT_PWR_RTN
2	EXT_PWR	EXT_PWR	EXT_PWR_RTN	EXT_PWR	EXT_PWR_RTN	EXT_PWR_RTN
3	NOT USED	NOT USED	GND Test 1	NOT USED	NOT USED	GND Test 2
4	GND Test 3	GND Test 4	GND Test 5	GND Test 6	GND Test 7	GND Test 8
5	Meas_bus_1	Meas_bus_2	Meas_bus_3	Meas_bus_4	Meas_bus_5	Meas_bus_6
6	GND Test 9	GND Test 10	Meas_bus_7	Meas_bus_8	GND Test 11	GND Test 12
7	Eth_TXP_A	Eth_TXN_A	GND Test 13	Eth_RXP_A	Eth_RXN_A	GND Test 14
8	GND Test 15	GND (FET)	USB_GND_A GND (FET)	GPIO_0(+/-15V, I/O)	GND (FET)	RS232_0_CTS
9	GND (FET)	USB+_A	USB_A	GND (FET)	RS422_0_TX+	RS232_0_TX
10	GND (FET)	GND (FET)	USB_5V_A	GND (FET)	RS422_0_TX-	RS232_0_RX
11	OC/GND [0]	OC/GND [1]	OC/GND [2]	GPIO_1(+/-15V, I/O)	RS422_0_RX+	RS232_0_RTS
12	OC/GND [3]	OC/GND [4]	OC/GND [5]	GND (FET)	RS422_0_RX-	GND (FET)
13	OC/GND [6]	OC/GND [7]	5V_TTL_out [0]	5V_TTL_out [1]	5V_TTL_out [2]	5V_TTL_out [3]
14	GND (FET)	GND (FET)	3.3V_TTL_out [0]	3.3V_TTL_out [1]	3.3V_TTL_out [2]	3.3V_TTL_out [3]

B Connector						
Pin#	**A**	**B**	**C**	**D**	**E**	**F**
1	5V_TTL_in [0]	5V_TTL_in [1]	5V_TTL_in [2]	5V_TTL_in [3]	GND (FET)	GND (FET)
2	5V_TTL_in [4]	5V_TTL_in [5]	5V_TTL_in [6]	5V_TTL_in [7]	GND (FET)	GND (FET)
3	Meas_bus_9	Meas_bus_10	Meas_bus_11	Meas_bus_12	NOT USED	NOT USED
4	Meas_bus_13	Meas_bus_14	Meas_bus_15	Meas_bus_16	GPIO_2 (+/-15V,I/O)	GPIO_3 (+/-15V,I/O)
5	OC/GND [8] 6.8 ohm	OC/GND [9] 6.8 ohm	OC/GND [10] 6.8 ohm	OC/GND [11] 6.8 ohm	OC/GND [12] Normally GND	OC/GND [13] Normally GND
6	RS232_out_1	RS232_in_1	GND (FET)	OC/GND [14] Normally GND	OC/GND [15] Normally GND	GND (FET)
7	RS232_out_2	RS232_in_2	232/422_in_5+	232/422_in_5-	232/422_in_8+	232/422_in_8-
8	RS232_out_3	RS232_in_3	232/422_in_6+	232/422_in_6-	232/422_in_9+	232/422_in_9-
9	GP_ADC_DAC_A	GP_ADC_DAC_B	232/422_in_7+	232/422_in_7-	232/422_in_10+	232/422_in_10-
10	GPIO_4 (+/-15V,I/O	GPIO_5 (+/-15V,I/O)	GND (FET)	GPIO_6 (+/-15V,I/O)	NOT USED	GND
11	LVDS_A_RXN	LVDS_A_TXN	LVDS_B_RXN	LVDS_B_TXN	232/422_out_5+	232/422_out_5-
12	LVDS_A_RXP	LVDS_A_TXP	LVDS_B_RXP	LVDS_B_TXP	232/422_out_6+	232/422_out_6-
13	Eth_TXP_B	Eth_TXN_B	Eth_RXP_A	Eth_RXN_B	232/422_out_7+	232/422_out_7-
14	USB_ID_A	USB_GND_B	USB+_B	USB-_B	USB_5V_B	

UUT RIM Connector Pin Definitions	
PCI Signal	**Function/Usage**
Ext_Pwr_Rtn	Power return pins for the UUT. Pins should be connected to the UUT battery.
GND Test	Pins individually test the Ground connection for each UUT ground pin. Pins should be connected to the UUT ground pins. Each GND Test pin has < 200 MOhm to RIM Ground then the corresponding GND (FET) is ON.
GND (FET)	Pins allow cable shields to be tied to the Test Set System Ground. When GND FET is ON the pin is tied to the corresponding GND Test pin. GND FETS are normally ON; turn OFF during Grounding Test.
Meas_bus_1 Meas_bus_2 Meas_bus_3 Meas_bus_4 Meas_bus_9 Meas_bus_10 Meas_bus_11 Meas_bus_12 Meas_bus_13 Meas_bus_14 Meas_bus_15 Meas_bus_16	Meas_bus_1, Meas_bus_9 or Meas_bus_13 can be connected to Meas_bus_1 of the Test Set ZIF Connector with one of three relays. Meas_bus_2, Meas_bus_10 or Meas_bus_14 can be connected to Meas_bus_2 of the Test Set ZIF Connector with one of three relays. Meas_bus_3, Meas_bus_11 or Meas_bus_15 can be connected to Meas_bus_3 of the Test Set ZIF Connector with one of three relays. Meas_bus_4, Meas_bus_12 or Meas_bus_16 can be connected to Meas_bus_4 of the Test Set ZIF Connector with one of three relays. Ron <16.5Ω BW <100 kHz Voltage range ±36 V.
Meas_bus_5 Meas_bus_6 Meas_bus_7 Meas_bus_8	Meas_bus_5 and Meas_bus_6 are routed directly through the Cable Assembly to the Test Set ZIF Connector, with no muxing or switching. Meas_bus_7 is MUXED with a “Ground_test_voltage” net (for the DMM). Meas_bus_8 is MUXED with a “Ground_test_ground” net (for the DMM).

UUT RIM Connector Pin Definitions	
PCI Signal	**Function/Usage**
Eth_TXP_A/B Eth_TXN_A/B Eth_RXP_A/B Eth_RXN_A/B	Pins connect to the 10/100 Ethernet port in the Front Panel Switch Matrix Assembly which contains an Ethernet transformer with termination resistors. Only ONE of these two Ethernet ports (A or B) can be attached at any given time. The Cable Assembly controls which Ethernet Port (A or B) is connected to the Front Panel Switch Matrix Assembly ethernet port. This port is IEEE 802.3/802.3u compliant.
USB+_A/B USB-_A/B USB_5V_A/B USB_GND_A/B USB_ID_A/B	Connects to a USB 2.0 device. Interface is compliant with: • Universal Serial Bus Specification Revision 2.0 (Data rate 1.5/12/480 Mbps). • Open Host Controller Interface (OHCI) specification for USB Rev 1.0a. • Enhanced Host Controller Interface (EHCI) specification for USB Rev 1.0. USB_5V is current limited, but drives at least 500 mA. These ports can act as either a USB HOST (USB_ID output pin "Open") or USB Device (USB_ID output pin "Grounded") . When the USB_ID pin to the Radio is open, the Test Set host is the USB Host. The USB_ID pin is GROUNDED by the RIM Assembly when the "RIM Assembly is a USB peripheral. Only ONE USB port (Port A or Port B) can be active at any given time. We do NOT support the USB Accessory Charger Adapter specification.
GPIO-0 GPIO-1 GPIO-2 GPIO-3 GPIO-4 GPIO-5 GPIO-6	These pins can be individually selected as either inputs or outputs. As INPUTS, these pins are comparator inputs. The comparator threshold is adjustable between -12 to +12 VDC. One threshold applies to GPIO_0 to GPIO_3. The second threshold applies to GPIO_4 to GPIO_6. These comparator outputs are input as digital signals (up to 50 kHz) into the Cable Assembly FPGA. As OUPUTS, these pins are Digital Outputs that can drive 12 mA (~25 ohm output impedance) between any two selected DC voltage levels. These levels are programmable between -12VDC and +12VDC. The specified voltage accuracy is +/- 1.5 Volts for both outputs and inputs. One DC voltage level pair applies to GPIO_0 to GPIO_3. A second DC Voltage level pair applies to GPIO_4 and GPIO_5. A third DC Voltage level pair applies to GPIO_6 and GPIO_6. These digital outputs can operate up to 50 kHz. These digital outputs can be switched to High Impedance in less than 200 ns.
GP_ADC_DAC_A/B	General Purpose DAC outputs or ADC inputs. As ADC inputs, pins sample at 100 KSPS. Pin (full-scale) input voltage range is from -12 to +12 VDC. Accuracy is specified at +/- 1.0 Volts. As DAC outputs, pins sample at 120 KSPS. Pin (full-scale) output voltage range is from -12 to +12 VDC. Accuracy is specified at +/- 1.0 Volts.
RS232_OUT_1 RS232_OUT_2 RS232_OUT_3	RS-232 Output pins with voltage level (magnitude) range of 5 to 7.5 V, run up-to 500 kbps.

UUT RIM Connector Pin Definitions	
PCI Signal	**Function/Usage**
RS232_IN_1 RS232_IN_2 RS232_IN_3	RS-232 Inputs pins with input threshold of 2.5 V maximum, run up-to 500 kbps.
232/422_IN_5- 232/422_IN_5+ 232/422_IN_6- 232/422_IN_6+ 232/422_IN_7- 232/422_IN_7+ 232/422_IN_8- 232/422_IN_8+ 232/422_IN_9- 232/422_IN_9+ 232/422_IN_10- 232/422_IN_10+	RS-232 / RS-422 / RS-385 Inputs (software configurable) As RS-232 inputs, each pin functions as an independent RS-232 input with an input threshold of 2.5 V, run up-to 500 kbps. As RS-422 inputs, they are 6 pairs of RS-422 inputs. The RS-422/RS-485 differential input threshold is +/-200 mV, run up-to 921.6 kbps, 120 ohm termination resistors which are software programmable.
232/422_OUT_5- 232/422_OUT_5+ 232/422_OUT_6- 232/422_OUT_6+ 232/422_OUT_7- 232/422_OUT_7+	RS-232 / RS-422 / RS-385 Outputs (software configurable) As RS-232 outputs, each pin functions as an independent RS-232 outputs with a voltage level (magnitude) range of 5 to 7.5 V, run up to 500 kbps. As RS-422/RS-485 outputs, these pins form three RS-422/RS-485 pairs. The RS-232/RS485 differential voltage level is greater than 1.5 V (with 60 Ω differential load). RS-422/RS-485 outputs can run up to 921.6 kbps.
RS232TX RS232RX RS232CTS RS232RTS	This is an RS232 Serial Port. Every Baud rate up to 250kbps is supported.
RS422TX RS422RX RS422CTS RS422RTS	RS-422 Serial Port which supports Baud rate up to 250 kbps. (Only full-duplex mode is supported).
OC/GND_0 OC/GND_1 OC/GND_2 OC/GND_3 OC/GND_4 OC/GND_5 OC/GND_6 OC/GND_7 OC/GND_8 OC/GND_9 OC/GND_10 OC/GND_11	Twelve, independent “open-collector" transistor output pins • 20 V max, 24 mA maximum • (At 24 mA, with the OC switch 'ON', pin voltage will be less than 0.8 V) • 4.7 K internal pullup to 3.3 V (W/ HSMS-2805 diode) These OC I/O can also be used as inputs (with LVTTL logic thresholds). These OC I/O's are 'short circuit protected' in the event that 5 V or less is applied directly to the OC pin when the internal OC switch is 'ON'. Pins are "Normally Open". Typically, at room temperature, the pin voltage is about 200 mV when 24 mA is pulled to ground by the OC transistor. Typically, 'Short Circuit Protection' trip current is about 320 mA. Typically, 'Short Circuit Protection' hold current is about 80 mA.

UUT RIM Connector Pin Definitions	
PCI Signal	**Function/Usage**
OC/GND_12 OC/GND_13 OC/GND_14 OC/GND_15	Four, independent "open-collector" transistor output pins • 20 V max, 24 mA maximum • (At 24mA, with the OC switch 'ON', the pin voltage will be less than 0.8V) • 4.7 K internal pullup to 3.3V (W/ HSMS-2805 diode) This OC I/O can also be used as inputs. These OC I/O's are 'short circuit protected' in the event that 5 V or less is applied directly to the OC pin when the internal OC switch is 'ON'. These pins are "Normally Closed". Typically, at room temperature, the pin voltage is about 200 mV when 24 mA is pulled to ground by the OC transistor. Typically, the 'Short Circuit Protection' trip current is about 320 mA. Typically, the 'Short Circuit Protection' hold current is about 80 mA.
5.0V_TTL_out_0 5.0V_TTL_out_1 5.0V_TTL_out_2 5.0V_TTL_out_3	Each pin is an independent, 5 Volt TTL digital output. Pins will source or sink 24 mA. • VOH = 2.4 V Minimum (logic-high output) • VOL = 0.4 V Maximum (logic-low output)
3.3V_TTL_out_0 3.3V_TTL_out_1 3.3V_TTL_out_2 3.3V_TTL_out_3	Each pin is an independent, 3.3 Volt TTL digital output. Pin source or sink 12 mA. • VOH = 2.4 V Minimum (logic-high output) • VOL = 0.4 V Maximum (logic-low output)
5.0V_TTL_in_0 5.0V_TTL_in_1 5.0V_TTL_in_2 5.0V_TTL_in_3 5.0V_TTL_in_4 5.0V_TTL_in_5 5.0V_TTL_in_6 5.0V_TTL_in_7	Each pin is an independent, 5 Volt TTL digital input. • VIH = 2.0 V Minimum (to achieve a logic-high input) • VIL = 0.8 V Maximum (to achieve a logic-low input) Input to pins not to exceed 5.5 VDC.
GND (1 pin)	This pin is tied to the Front Panel Switch Matrix Assembly PC Board ground and to the Chassis Assembly ground.
AUX Internal Power (12)	These pins on the ZIF Connector allow an external power supply to provide DC power to a UUT load. Pins J4A: A1, A2, B1, B2, D1, D2 provide the Positive DC supply voltage. The Positive DC supply is routed through a current shunt on the Front Panel Switch Matrix Assembly PC Board which monitors the current to the UUT load. Pins J4A: C1, C2, E1, E2, F1, F2 provide the DC Return (DC Return is tied to Chassis Ground).

Table A-8 Intelligent Cable Assembly RIM Connector Pin-Out Table

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Appendix B - Abbreviations

A2D	Analog to Digital
AM	Amplitude Modulation
ANT	Antenna
BER	Bit Error Rate
BPF	Band Pass Filter
bps	bits per second
BW	Bandwidth
CATS	Configurable Automated Test Set
CH	Channel
CP	Common Platform
D2A	Digital to Analog
dB	decibel
dBc	decibels referenced to carrier
dBm	decibel/minute
Ext	External
FM	Frequency Modulation
GEN	Generator
GHz	giga hertz
GUI/UI	Graphic User Interface/User Interface
Hz	hertz
I/O	Input/Output
kbps	kilo bits per second
kHz	kilo hertz
LAN	Local Area Network
LIT	Line Item Test
LPF	Low Pass Filter
LSB	Lower Sideband
LRU	Line Replaceable Unit
mA	mill Amp
MHz	Mega hertz
mHz	milli hertz
Mod	Modulation
mW	mill watt
NRZ	Non-return to Zero
NTP	Network Time Protocol
PM	Phase Modulation
RA/RMA	Return Authorization/Return Material Authorization

RBW	Resolution Bandwidth
Ref	Reference
RIM	Radio Interface Module
RMS	Root Mean Square
Spec	Specifications
SSB	Single Sideband
TPS	Test Program Set
T/R	Transmit/Receive
USB	Universal Service Bus
USB	Upper Sideband
UUT	Unit Under Test
VGA	Video Graphics Array
Vrms	Volts Root Mean Square
W	Watt

Appendix C - Product Specifications

C.1 RF GENERATOR

C.1.1 RF Frequency

C.1.1.A Range:

1.0 MHz to 2.6 GHz

C.1.1.B Accuracy:

Reference Timebase

C.1.1.C Resolution:

1.0 Hz

C.1.2 RF Output Level

C.1.2.A T/R Port:

-130.0 to -30.0 dBm

C.1.2.B GEN Port:

-110.0 to +10.0 dBm

C.1.2.C Accuracy:

C.1.2.C.1 GEN Port:

±1.0 dB (>-110.0 dBm)
±3.0 dB (≤-110.0 dBm)

C.1.2.C.2 T/R Port:

±1.0 dB (>-120.0 dBm)
±2.5 dB (≤-120.0 dBm, >-130.0 dBm)

C.1.2.D Resolution:

C.1.2.D.1 Display:

0.1 dB

C.1.2.D.2 Step:

0.1 dB

C.1.3 Port VSWR 50 Ohm

C.1.3.A T/R Port:

<1.2:1, <1.05 GHz
<1.3:1, >1.05 to 2.6 GHz

C.1.3.B GEN Port:

<1.5:1, 1.0 MHz to 1.0 GHz
<1.9:1, 1.0 to 2.6 GHz (with attenuation)

C.2 RF GENERATOR (CONT)

C.2.1 SSB Phase Noise

Phase noise can be optimized for close to carrier performance (Normal Mode) or performance in the offset region 5.0 to 100.0 kHz (Narrow mode).

Typical Phase Noise (Normal Mode)	
RF Frequency	**dBc/Hz @ 20 kHz Offset**
1 MHz	-131
100 MHz	-102
500 MHz	-102
800 MHz	-100
1.2 GHz	-98
1.7 GHz	-100
2.0 GHz	-97
2.35 GHz	-96
2.6 GHz	-99

C.2.2 RF Generator Modulations

C.2.2.A Selections:

NONE, AM, FM, PM, USB, LSB, AM NRZ, FM NRZ, PM NRZ, USB NRZ, LSB NRZ, IQ FILE

NOTE

NRZ Modulations are available when Option #139261 is enabled on the Test Set.

IQ File is available when Option #139270 is enabled on the Test Set.

C.2.3 RF Generator Spurious

C.2.3.A Harmonics:

<-30.0 dBc

Exception:

Harmonic IF Cross-over

Cross-over spur = 3400 - Output Frequency

Typically <-50 dBc (Limit -40 dBc)

C.2.3.B Non-Harmonics:

<-55.0 dBc

C.2.4 RF Generator Residual

C.2.4.A FM Residual:

<15.0 Hz RMS in 300.0 Hz to 3.0 kHz BW

C.2.4.B AM Residual:

<0.1% RMS in 300.0 Hz to 3.0 kHz BW

<0.2% RMS in 300.0 Hz to 15.0 kHz BW

C.3 RF GENERATOR (CONT)

C.3.1 FM Deviation

C.3.1.A Range:

±1.0 Hz to ±150 kHz

C.3.1.B Accuracy:

±3% of setting (±1.0 to ±100.0 kHz deviation, 20.0 Hz to 15.0 kHz rate)
±5% for mod rate <20.0 Hz, >15.0 kHz

C.3.1.C Rate:

0.0 Hz to 40.0 kHz

C.3.1.D Resolution:

0.1 Hz

C.3.1.E Waveform:

SINE, SQUARE, TRIANGLE, RAMP

C.3.1.F Total Harmonic Distortion:

<1% (1.0 kHz rate, 6.0 kHz deviation, 300.0 Hz to 3.0 kHz, Sine)

C.3.2 Amplitude Modulation

C.3.2.A Range:

0.1% to 100%

C.3.2.B Accuracy:

±1% (Modulation from 10% to 90%)

C.3.2.C Rate:

0.0 Hz to 40.0 kHz

C.3.2.D Resolution:

0.1%

C.3.2.E Waveform:

SINE, SQUARE, TRIANGLE, RAMP

C.3.2.F Total Harmonic Distortion:

<1% (1.0 kHz rate, 30% to 70% AM, 300.0 Hz to 3.0 kHz, Sine)

C.4 RF GENERATOR (CONT)

C.4.1 Phase Modulation

C.4.1.A Range:

0.1 to 10 Radians

C.4.1.B Accuracy:

±5% of setting (0.5 to 10 Radians)

C.4.1.C Rate:

10.0 Hz to 40.0 kHz

C.4.1.D Resolution:

<0.1 Radians

C.4.1.E Waveform:

SINE, SQUARE, TRIANGLE, RAMP

C.4.1.F Total Harmonic Distortion:

<1%

C.4.2 Internal Single-Sideband (SSB)

C.4.2.A Range:

0.0% to 100%

C.4.2.B Rate:

300.0 Hz to 3.0 kHz

C.4.2.C Resolution:

0.1%

C.4.2.D Modulation Selection:

Upper Side-band (USB), Lower Side-band (LSB)

C.4.2.E Waveform:

SINE, SQUARE, TRIANGLE, RAMP

C.4.3 I/Q Generator

C.4.3.A Capability:

Generates arbitrary waveforms as modulation source

C.4.3.B Types:

Browse and load I/Q file (.aiq file format).

C.5 RF GENERATOR (CONT)

C.5.1 RF Generator External Modulation (External Input)

C.5.1.A Type:

AM, FM, PM

C.5.1.B Source:

Audio 1

C.5.1.C Accuracy:

Audio In: With 1 Vrms, AM/FM/PM have same characteristics as internal sources, ±10% of indicated setting. [Audio 1, Input from 20 Hz to 15 kHz (300 Hz to 3 Hz SSB), Unbalanced].

C.6 RF RECEIVER

C.6.1 RF Frequency

C.6.1.A Range:

1.0 MHz to 2.6 GHz

C.6.1.B Accuracy:

Reference Timebase

C.6.1.C Resolution:

1.0 Hz

C.6.1.D Input Reference Level Scale:

C.6.1.D.1 ANT:

-70.0, -50.0, -40.0, -20.0, -10.0, 0.0, +10.0 dBm

C.6.1.D.2 T/R:

-10.0, 0.0, +20.0, +30.0, +40.0, +50.0 dBm

C.6.2 RF Input Level

C.6.2.A Maximum Input Level:

C.6.2.A.1 ANT Port:

+10.0 dBm, damage will occur > +13.0 dBm

C.6.2.A.2 T/R Port:

T/R RF Input Power On/Off times are as follows:

Peak RF Power	Max Time ON	Min Time OFF
50W	Continuous	n/a
100W	90 seconds	3 minutes
150W	30 seconds	3 minutes
200W	15 seconds	3 minutes

T/R Input Overload Indicator activates as follows:

Alarm	Temperature
ON	>100° C
OFF	<100° C

*Remove power from Test Set immediately if Overload Indicator triggers.

C.6.2.B Sensitivity:

C.6.2.B.1 ANT Port:

-113.0 dBm (>10.0 dB SINAD, FM, 1.0 kHz rate, 6.0 kHz deviation, 25.0 kHz BW, 300.0 Hz to 3.4 kHz AF Filter)

C.7 RF RECEIVER (CONT)

C.7.1 Port VSWR 50 Ohm

C.7.1.A ANT Port:

<1.5:1, (RF Frequency <1.05 GHz)

<1.9:1, (RF Frequency >1.05 GHz to <2.6 GHz)

C.7.1.B T/R Port:

<1.2:1, <1.05 GHz

<1.3:1, >1.05 GHz to <2.6 GHz

C.7.2 RF Receiver Demodulation

C.7.2.A Selections:

None | AM | FM | PM | SSB | Burst Power

NOTE

Burst Power, IF Bandwidths preset based on modulation scheme. Burst Power is available when Option #139260 is enabled on the Test Set.

C.7.2.B FM IF BW:

250 Hz | 3 kHz | 6.25 kHz | 12.5 kHz | 25 kHz | 50 kHz | 100 kHz | 300 kHz | 500 kHz | 5 MHz

C.7.2.C PM IF BW:

250 Hz | 3 kHz | 6.25 kHz | 12.5 kHz | 25 kHz | 50 kHz | 100 kHz | 300 kHz | 500 kHz

C.7.2.D AM/SSB IF BW:

250 Hz | 3 kHz | 6.25 kHz | 12.5 kHz | 25 kHz | 50 kHz

C.7.2.E Filter Selections:

None | 300 Hz Low Pass | 5 kHz Low Pass | 3 kHz Low Pass | 15 kHz Low Pass | 20 kHz Low Pass | 40 kHz Low Pass | 0.3 to 3.0 kHz Band Pass | 0.3 to 3.4 kHz Band Pass | 0.3 to 5 kHz Band Pass | 0.3 to 15 kHz Band Pass | 0.3 to 20 kHz Band Pass | 0.3 to 40 kHz Band Pass | 300 Hz High Pass

C.8 RF RECEIVER (CONT)

C.8.1 Audio Routing and Definition

C.8.1.A Audio 1:

Audio In, Audio In Balanced, DD Gen Out

NOTE

DD Gen Out is available when Option #139261 is enabled on the Test Set.

C.8.1.B Audio 2:

AF Gen Out, Demod Out, Audio In Balanced

C.8.1.C Audio Input Definition:

Audio Input Characteristics for the following meters:
AF Counter, AF Level, SINAD, Distortion, BER

C.8.1.D Audio Inputs:

Audio 1, unbalanced, chassis reference
Audio 1 and Audio 2, balanced, 600 Ω differential input

C.8.1.E Input Impedance:

Audio 1
Hi-Z (>50 kΩ) - unbalanced input
150 Ω - unbalanced input
300 Ω - unbalanced input

C.8.1.F Frequency Range:

0.0 to 40.0 kHz

C.8.1.G Level Range:

0.15 Vrms to 30 Vrms with Hi-Z Input Impedance and 600 Ω Balanced
0.15 Vrms to 7 Vrms with 150 Ω or 300 Ω Input Impedance

C.8.2 Audio

C.8.2.A Filter Selections:

None | 300 Hz Low Pass | 5 kHz Low Pass | 3 kHz Low Pass | 15 kHz Low Pass | 20 kHz Low Pass | 0.3 to 3.0 kHz Band Pass | 0.3 to 3.4 kHz Band Pass | 0.3 to 5 kHz Band Pass | 0.3 to 15 kHz Band Pass | 0.3 to 20 kHz Band Pass | 0.3 to 40 kHz Band Pass | 300 Hz High Pass | 40 kHz Low Pass

C.9 RF RECEIVE METERS

C.9.1 AF Counter

C.9.1.A Frequency Range:

0.0 to ±90.0 kHz

C.9.1.B Resolution:

0.1 Hz

C.9.1.C Accuracy:

±1.0 Hz

C.9.1.D Source:

Audio 1 Input, Demod

C.9.2 AF Level Meter (Audio Input)

C.9.2.A Frequency Range:

20.0 Hz to 40.0 kHz

C.9.2.B Level Range:

0 to 30 Vrms

C.9.2.C Resolution:

1 mV

C.9.2.D Accuracy:

5% (Unbalanced, Hi-Z, 300.0 Hz to 3.0 kHz, 0.1 to 30 Vrms)

C.10 RF RECEIVE METERS (CONT)

C.10.1 AF Level Meter (Demod Input)

C.10.1.A Amplitude Modulation

C.10.1.A.1 Frequency Range:

0% to 100%

C.10.1.A.2 Modulation Rate Range:

20.0 Hz to 40.0 kHz

C.10.1.A.3 Resolution:

1%

C.10.1.A.4 Accuracy:

±3.0% plus source residual, from 30% to 90%

C.10.1.A.5 Sensitivity:

ANT and T/R Port: Residual AM ≤1.0% of measurement

C.10.1.B FM Deviation

C.10.1.B.1 Frequency Range:

0.0 Hz to 150.0 kHz

C.10.1.B.2 Modulation Rate Range:

20.0 Hz to 40.0 kHz

C.10.1.B.3 Resolution:

1.0 Hz

C.10.1.B.4 Accuracy:

±5% plus source residual (1.0 to 150.0 kHz FM deviation, modulation rate 1.0 to 20.0 kHz, IF BW set appropriately for the received modulation BW)

C.10.1.B.5 Sensitivity:

ANT and T/R Port: Residual FM ≤10% of measurement

C.10.1.C Phase Modulation

C.10.1.C.1 Frequency Range:

0.1 to 10 Radians

C.10.1.C.2 Rate:

100.0 Hz to 1.0 kHz

C.10.1.C.3 Resolution:

0.01 Radians

C.10.1.C.4 Accuracy:

±5.0% plus source residual (modulation rate and modulation range cannot exceed Receiver IF Bandwidth)

C.10.1.C.5 Sensitivity:

ANT and T/R Port: Residual PM ≤10% of measurement

C.11 RF RECEIVE METERS (CONT)

C.11.1 Receiver Power Meters (AM Peak and AM RMS)

C.11.1.A Measurement Port:

T/R, ANT Port

C.11.1.B Frequency Range:

1.0 MHz to 2.6 GHz

C.11.1.C Input Range:

C.11.1.C.1 T/R Port:

-60.0 to +53.0 dBm

C.11.1.C.2 ANT Port:

-100.0 to +10.0 dBm

C.11.1.D Resolution:

0.0001 dB

C.11.1.E Accuracy:

>50.1 MHz, ±1.0 dBm

<50 MHz, ±3.0 dBm

C.11.2 Bit Error Rate (BER) NRZ Meter

NOTE

This function is available when Option #139261 is enabled on the Test Set.

C.11.2.A Style:

Decodes Non Return to Zero (NRZ) style data

C.11.2.B Range:

1×10^{-1} to 1×10^{-5}

C.11.2.C Data Rates:

75 bps, 150 bps, 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 16 kbps

C.11.2.D Data Pattern Size:

100 to 100000 bits

C.11.2.E Data Pattern Type:

Random, Fixed, User Defined

C.11.2.F Accuracy:

1 x 10 -6

C.11.2.G Source:

Audio 1, Demod

C.12 RF RECEIVE METERS (CONT)

C.12.1 Burst Power Meter

NOTE

This function is available when Option #139260 is enabled on the Test Set.

C.12.1.A Measurement Port:

T/R, ANT Port

C.12.1.B Frequency Range:

1.0 MHz to 2.6 GHz

C.12.1.C Input Range:

1 to 100%

C.12.1.D Resolution:

0.0001%

C.12.1.E Accuracy:

±.2% Power envelope, 10-90% duty cycle, 1 Hz to 10 kHz, <20% drop out)

C.12.2 Distortion Meter

C.12.2.A Meter Range:

0.0% to 100%

C.12.2.B Resolution:

0.1%

C.12.2.C Accuracy:

<±0.5% (Distortion 1% to 10%, 5.0 kHz LP AF Filter)
<±1.0% (Distortion 10% to 20%, 5.0 kHz LP AF Filter)

C.12.2.D Notch Frequency Range:

10.0 Hz to 10.0 kHz

C.12.2.E Source:

Audio 1, Demod

C.12.3 RF Error Meter

C.12.3.A Frequency Range:

1.0 MHz to 2.6 GHz

C.12.3.B Meter Range:

0.0 to ±5.0 MHz from displayed Receiver Frequency

C.12.3.C Resolution:

1.0 Hz

C.12.3.D Accuracy:

Reference Timebase, ±1 count

C.12.3.E Sensitivity:

S/N >15.0 dB

C.13 RF RECEIVE METERS (CONT)

C.13.1 RF Power Meter

Power measured in Received IF Bandwidth

C.13.1.A Measurement Port:

T/R, ANT Port

C.13.1.B Frequency Range:

1.0 MHz to 2.6 GHz

C.13.1.C Input Range:

T/R Port: -60.0 to +53.0 dBm
ANT Port: -100.0 to +10.0 dBm

C.13.1.D Resolution:

4 digits for Watts, 0.01 dB for dBm measurements

C.13.1.E Span:

5 kHz to 90 MHz

C.13.1.F Accuracy:

T/R Port: >.02 mW levels, ±10% power, ±1 count
ANT Port: >-100 dBm, ±1.0 dB, ±1 count (After Normalize Function)

C.13.1.G Units:

mW, W, dBm (Absolute and Relative)

C.13.2 SINAD Meter

C.13.2.A Meter Range:

0.0 to 60.0 dB

C.13.2.B Resolution:

0.01 dB

C.13.2.C Accuracy:

±1.0 dB, 6 to 40 dB SINAD

C.13.2.D Notch Frequency Range:

10.0 Hz to 10 kHz

C.13.2.E Source:

Audio 1, Demod

C.14 AUDIO OUTPUT

C.14.1 Audio Frequency Generators

C.14.1.A Output Ports:

Audio 2

C.14.1.B Range:

0.0 Hz to 40.0 kHz (Sine only)

C.14.1.C Resolution:

0.1 Hz

C.14.1.D Frequency Accuracy:

Reference Timebase

C.14.1.E Level Accuracy:

5% of setting (10 kΩ load, 1 kHz Sine)

5% of setting (10 kΩ load, >10 mV, 50 Hz to 30 kHz, Sine)

C.14.1.F Output Level:

1 mV to 7 Vrms into a 10 kΩ load

C.14.1.G Total Harmonic Distortion:

<0.5% (1 kHz, 5 Vrms, 80 kHz BW, 10 kΩ load, Sine)

<1.0% (Typical, 20.0 Hz to 20.0 kHz, 100 mV to 5 Vrms, 80.0 kHz BW, 10 kΩ load, Sine)

C.14.1.H Waveforms:

SINE, SQUARE, TRIANGLE, RAMP

(10.0 Hz to 4 kHz, usable to 20.0 kHz)

C.15 AUDIO OUTPUT (CONT)

C.15.1 Digital Data Generator

This function is available when Option #139261 is enabled on the Test Set.

C.15.1.A Style:

Generates Non Return to Zero (NRZ) style data

C.15.1.B Data Rates:

75 bps, 150 bps, 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 16 kbps

C.15.1.C Data Production Rates:

100 to 100000 bits

C.15.1.D Data Pattern Type:

Random, Fixed, User Defined

C.15.1.E Pattern:

PN9, PN10, PN11, PN12, PN15 sequence

C.15.1.F Accuracy:

1×10^{-8}

C.15.1.G Source:

Modulation Output, Audio Output (Audio 1)

C.15.1.H Level Accuracy Range:

0.1 to 5.0 V (Digital)

C.15.1.I Level Accuracy Resolution:

0.1 V

C.15.1.J Level Accuracy:

+3%

C.16 SPECTRUM ANALYZER

C.16.1 Frequency

C.16.1.A Range:

1.0 MHz to 2.6 GHz (Usable from 100.0 kHz)

C.16.1.B Resolution:

1.0 Hz

C.16.1.C Frequency Accuracy:

Reference Timebase

C.16.1.D Display/Marker Accuracy:

Span Accuracy + Frequency Accuracy + Resolution BW

C.16.1.E Span Mode:

Center/Span | Zero Span

C.16.1.F Span Range:

5.0 kHz to Full Span in a 1, 2, 5 sequence, plus Zero Span

C.16.1.G Span Accuracy:

±1% of span width

C.16.1.H Horizontal Resolution:

Span/(sweep points-1)

C.16.2 Resolution Bandwidths

C.16.2.A Selections:

.25 Hz to 500.0 kHz in a 1, 2, 5 sequence based on Analyzer Span

C.16.3 FFT Window

C.16.3.A Selections:

Rectangle, Blackman, Hanning, Hamming, Triangle, Kaiser, Flattop

C.17 SPECTRUM ANALYZER (CONT)

C.17.1 Level

C.17.1.A Input Level Range:

Reference RF Receiver Input Level

C.17.1.B Reference Level Resolution:

1.0 dB

C.17.1.C Ref Level Units:

dBm

C.17.1.D Level Accuracy:

±1.0 dB (Input Level Scale must be set, Normalize Function)

C.17.1.E Residual Response:

≤110.0 dBm input terminated with 50 Ω load (ANT Port, Receiver Ref Level at -40.0 dBm)

C.17.1.F Harmonic Spurious:

-55.0 dBc (Input Level of -30.0 dBm, Ref Level at -20.0 dBm)

C.17.1.G Non-Harmonic Spurious:

-60.0 dBc (Input Level of -30.0 dBm, Ref Level at -20.0 dBm)

C.17.1.H 3rd Order Intermodulation:

-60.0 dBc (Input Level of -30.0 dBm, Ref Level at -20.0 dBm)

C.17.1.I Displayed Average Noise Level (DANL):

dBm/Hz, ANT Port, Receiver Ref Level - 40 dBm, 1.0 Hz RBW, averaging on, 50 Ω termination from 100.0 MHz to 2.6 GHz: -147.0 dBm, (-150.0 dBm typical)

C.17.1.J Vertical Scales:

Logarithmic 1 to 50 dB/division

C.17.1.K Digitizer Dynamic Range:

85.0 dB (maximum analysis BW 90.0 MHz, digitizer AGC resolution 14 bits)

C.17.1.L Display Range:

200.0 dB

C.18 OSCILLOSCOPE

NOTE

This function is available when Option #139256 is enabled on the Test Set.

C.18.1 Channels:

2

C.18.2 Bandwidth:

(-3.0 dB, 1X Probe)
All scales >5.0 mV/div, DC to 125.0 MHz
Scales <10.0 mV/div, DC to 100.0 MHz

C.18.3 Input Impedance:

50Ω and 1 MΩ || 26pF

C.18.4 Scale:

Range is dependent on Probe and Impedance settings

C.18.4.A 50Ω

1.0 mV to 1.0 V per division in 1,2,5 sequence

C.18.4.B 1X Probe,1MΩ

1.0 mV to 5.0 V per division in 1,2,5 sequence

C.18.4.C 10X Probe,1MΩ

1.0 mV to 50.0 V per division in 1,2,5 sequence

C.18.5 Accuracy:

(Vertical Bandwidth DC -20 MHz)

C.18.5.A DC Coupling:

(0.0 V Offset)
DC: ±(1.5% of input +0.3% of Full Scale + 200 µV)

AC: ±2.5% Full Scale

C.18.5.B AC Coupling:

Cutoff Frequency (-3 dB) 12 Hz, 1 MΩ

C.18.6 Internal Sample Clock Frequency:

250 MS/s sampling rate with decimation by n, 1 ≤n ≤65,535

C.18.7 Internal Timebase Accuracy:

±25 ppm (±0.0025%)

C.18.8 Input Coupling:

AC, DC, GND (AC coupling available on 1 MΩ only)

C.18.9 Memory/Channel:

64 MB

C.19 OSCILLOSCOPE (CONT)

C.19.1 Trigger Modes:

Auto, Normal, Single Shot

C.19.2 Trigger Sources:

CH1, CH2, External

C.19.3 Timebase System:

Reference Internal Sample Clock and Timebase Accuracy

C.20 DIGITAL MULTIMETER (DMM)

NOTE

This function is available when Option #139257 is enabled on the Test Set.

C.20.1 DC Functions

C.20.1.A DC Voltage Accuracy:

±0.1% of full scale

C.20.1.B DC Voltage Ranges:

100 mV, 1 V, 10 V, 100 V, 300 V

C.20.1.C DC Current Accuracy:

±0.35% of full scale

C.20.1.D DC Current Ranges:

20 mA, 200 mA, 1 A, (10 A with external shunt)

C.20.1.E Resistance Accuracy:

100 Ω thru 1 MΩ: ±0.05% of full scale
10 MΩ: ±0.2% of full scale
100 MΩ: <30MΩ, ±1.0%, >30 MΩ, ±1.5%,of full scale

C.20.1.F Resistance Ranges:

100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ, 100 MΩ

C.20.1.G Resolution:

6 1/2 digits

C.20.1.H Maximum Allowed Voltage:

300 V

C.20.2 AC Functions

C.20.2.A AC Voltage Accuracy:

50 mV, 500 mV scales: ±0.2% of full scale
5 V, 50 V, 300 V scales: ±0.8% of full scale
10.0 Hz to 20.0 kHz, usable to 300 kHz

C.20.2.B AC Voltage Ranges:

50 mV, 500 mV, 5 V, 50 V, 300 V

C.20.2.C AC Current Accuracy:

10 mA/100 mA scales: ±0.7% of full scale,10.0 Hz to 30.0 kHz
1A scale: ±0.7% of full scale,10.0 Hz to 10.0 kHz

C.20.2.D AC Current Ranges:

10 mA, 100 mA, 1 A (10 A with external shunt)

C.20.2.E Resolution:

6 1/2 digits

C.20.2.F Maximum Allowed Voltage:

300 V

C.21 INPUT/OUTPUT CONNECTORS

C.21.1 Front Panel Connectors

C.21.1.A Audio 1 and 2 Connector:

C.21.1.A.1 Type:

BNC

C.21.1.A.2 Function:

Audio I/O

C.21.1.B ANT Connector:

C.21.1.B.1 Type:

TNC

C.21.1.B.2 Function:

RF Input

C.21.1.C T/R Connector:

C.21.1.C.1 Type:

N-Type

C.21.1.C.2 Function:

RF Input/Output

C.21.1.D GEN Connector:

C.21.1.D.1 Type:

TNC

C.21.1.D.2 Function:

RF Output

C.21.1.E Scope CH1/CH2 Connectors:

C.21.1.E.1 Type:

BNC

C.21.1.E.2 Function:

Input

C.21.1.F Scope Trigger Connector:

C.21.1.F.1 Type:

BNC

C.21.1.F.2 Function:

Input

C.21.1.G Scope Timing Input Connector:

C.21.1.G.1 Type:

SMB

C.21.1.G.2 Function:

Input

C.22 INPUT/OUTPUT CONNECTORS (CONT)

C.22.1 Front Panel Connectors (cont)

C.22.1.A DMM Connector:

C.22.1.A.1 Type:

Banana (4)

C.22.1.A.2 Function:

Volts/ Ω /Current

C.22.1.B USB Version 2.0 Connector:

C.22.1.B.1 Type:

USB

C.22.1.B.2 Function:

500 mA per port

C.22.1.C ZIF Connector:

C.22.1.C.1 Type:

ZIF (168 pins)

C.22.1.C.2 Function:

Input/Output

C.22.2 Rear Panel Connectors

C.22.2.A DC Power Source Connector:

C.22.2.A.1 Type:

Anderson Power Pole (4)

C.22.2.A.2 Function:

External Power Supply Connector

C.22.2.B Ethernet Connector:

C.22.2.B.1 Type:

RJ-45

C.22.2.B.2 Function:

10/100/1000 Base-T

C.22.2.C External Video Port (VGA):

C.22.2.C.1 Type:

DB15

C.22.2.C.2 Function:

VGA for External Monitor

C.23 INPUT/OUTPUT CONNECTORS (CONT)

C.23.1 Rear Panel Connectors (cont)

C.23.1.A PCIe (Digital I/O) Connector:

C.23.1.A.1 Type:

iPass

C.23.1.A.2 Function:

PCIe 4 lane Connector

C.23.1.B Reference I/O Connector:

C.23.1.B.1 Type:

BNC

C.23.1.B.2 Function:

10 MHz Ref Input/Output

C.23.1.C sRIO (Digital I/O) Connector:

C.23.1.C.1 Type:

iPass

C.23.1.C.2 Function:

sRIO 4 lane Connector

C.23.1.D System Sync Connector:

C.23.1.D.1 Type:

BNC

C.23.1.D.2 Function:

5 V TTL System Trigger Input/Output

C.23.1.E USB Version 2.0 Connector:

C.23.1.E.1 Type:

USB

C.23.1.E.2 Function:

500 mA per port

C.24 POWER REQUIREMENTS

C.24.1 AC Voltage:

100 to 250 VAC at 47 to 63 Hz, 1000 W Maximum

C.24.2 Mains Supply Voltage Fluctuations:

≤10% of the nominal voltage

C.24.3 AC Fuse Requirements:

10 A, 250 V, Type F, Fast Blo

C.24.4 DC Fuse Requirements:

7.5 A, 32 V, ATO, Fast Blo

C.25 TIMEBASE (STANDARD OSCILLATOR)

C.25.1 Temperature Range:

0° to 50°C

C.25.2 Temperature Stability:

Typically better than ±0.01 ppm

C.25.3 Aging:

0.001 ppm per day, 0.1 ppm per year

C.25.4 Warm-up Time:

15 minutes

C.26 10 MHZ INTERNAL/EXTERNAL FREQUENCY REFERENCE

C.26.1 Reference Input:

10 MHz, ±1.0 kHz, >-10.0 dBm

C.26.2 Reference Output:

Same as Timebase, typical 650 mVpp into 50Ω

NOTE

An external source meeting the following requirements is needed to insure specified performance:

Close in Spurious (<10 kHz, >-120 dBc)

Phase Noise:

- -85 dBc @ 1 Hz
- -115 dBc @ 10 Hz
- -140 dBc @ 100 Hz
- -150 dBc @ 1 kHz
- -155 dBc @ 10 kHz

C.27 DIMENSIONS AND WEIGHT

C.27.1 Height:

20.32 cm, 8 inches

C.27.2 Width:

44.45 cm, 17.5 inches

C.27.3 Depth:

60.96 cm, 24 inches

C.27.4 Weight:

24 kg, 52 lbs

C.28 ENVIRONMENTAL

Tested in accordance with MIL-PRF-28800F Class 3

C.28.1 Operating Temperature:

0 to 50°C

C.28.2 Storage Temperature:

-40 to 71°C

C.28.3 Test Set Warm-up Time:

15 minutes

C.28.4 Relative Humidity:

80% up to 31ºC decreasing linearly to 50% at 40ºC

C.28.5 Altitude:

4,600 m (15,092 ft)

C.28.6 Shock and Vibrations:

30 G Shock (Functional Shock)
5-500 Hz Random Vibrations

C.28.7 Use:

Pollution Degree 2

C.28.8 EMC:

Mil-PRF-28800F
EN61326-1: Class A
EN61000-3-2
EN61000-3-3

C.28.9 Reliability:

>2500 hours

C.29 SAFETY

C.29.1 Standards:

UL 61010B-1
EN 61010-1
CSA C22.2 No. 61010-1

*Product specifications are subject to change without notice.



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