AEROFLEX

ATB-7300
Avionics Test Bench
Operation Manual

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Operation Manual

Manual Number: 89304

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Precautions

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.

Keep the equipment dry to avoid damage to the equipment. Equipment should be protected from liquids such as spills, leaks, etc. and precipitation such as rain, snow, etc. To prevent damage, never apply solvents to the equipment housing. For cleaning, wipe the equipment with a cloth that is lightly dampened with water, mild detergent, or alcohol. Do not use aromatic hydrocarbons, chlorinated solvents, or methanol-based fluids.

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.

Refer all servicing of unit to Qualified Technical Personnel. This unit contains no operator serviceable parts.

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.

SAFETY FIRST - TO ALL OPERATIONS PERSONNEL (cont)

EQUIPMENT GROUNDING PROTECTION

Improper grounding of equipment can result in electrical shock.

USE OF PROBES

Refer to Performance 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.

POWER CORDS

Power cords must not be frayed or broken, nor expose bare wiring when operating this equipment.

USE RECOMMENDED FUSES ONLY

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

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.**

SAFETY FIRST - TO ALL OPERATIONS PERSONNEL (cont)

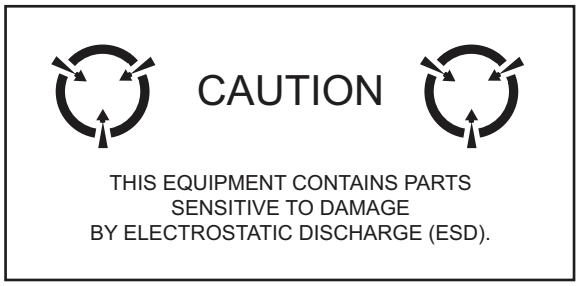
TOXIC HAZARDS

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.**

INPUT OVERLOAD

CAUTION	ON THE RF N-TYPE CONNECTOR, THE INPUT POWER SHOULD NOT EXCEED 125 W (+51 DBM). ON THE RF TNC CONNECTOR, THE INPUT POWER SHOULD NOT EXCEED 10 MW (+10 DBM).

STATIC SENSITIVE COMPONENTS



This equipment contains components sensitive to damage by Electrostatic Discharge (ESD). All personnel performing maintenance or calibration procedures should have knowledge of accepted ESD practices and/or be ESD certified.

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Preface

SCOPE

This Manual contains instructions for operating the ATB-7300. 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 an overview of Test Set functions and features. Unpacking, installation, and controls and connectors are also included.

CHAPTER 2 - TEST SET OPERATION

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 - HARDWARE SPECIFICATIONS

Provides Test Set hardware specifications and environmental requirements.

CHAPTER 4 - SOFTWARE INSTALLED

Describes the software installed in the Test Set.

CHAPTER 5 - SHIPPING

Describes requirements for shipping the Test Set.

CHAPTER 6 - STORAGE

Describes requirements for storing the Test Set.

APPENDIX A - ABBREVIATIONS AND ACRONYMS

APPENDIX B - U.S. / METRIC CONVERSION TABLE

APPENDIX C - FRONT / REAR CONNECTION PINOUTS

Chapter 1 - General Information

1.1 INTRODUCTION

This manual contains operating instructions for the ATB-7300 Avionics Test Bench Test Set. It is strongly recommended that personnel be thoroughly familiar with the contents of this manual before attempting to operate this equipment.

Refer all servicing of unit to qualified technical personnel.

1.2 ELECTROMAGNETIC COMPATIBILITY

For continued EMC compliance, all external cables must be shielded.

1.3 NOMENCLATURE STATEMENT

In this manual, the term 'Test Set' or 'ATB-7300' refers to the ATB-7300 Test Set.

1.4 DECLARATION OF CONFORMITY

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

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

1.5 ABBREVIATIONS AND ACRONYMS

For a list of abbreviations and acronyms used throughout this document, refer to APPENDIX A..

1.6 REFERENCE DOCUMENTS

RCI Manual P/N: 87666.

1.7 OPERATIONAL SAFETY

TO ALL OPERATIONS PERSONNEL - Refer all servicing of unit to qualified technical personnel. This unit contains no operator serviceable parts.

WARNING: USING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE ACCOMPANYING DOCUMENTATION MAY IMPAIR THE SAFETY PROTECTION PROVIDED BY THE EQUIPMENT.

1.7.1 Case, Cover or Panel Removal

Opening the case assembly exposes the operator to electrical hazards that can result in electrical shock or equipment damage. Do not operate this Test Set with the case assembly open.

1.7.2 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:

This term identifies conditions or activities that, if ignored, can result in equipment or property damage (e.g. fire).

WARNING:

This term identifies conditions or activities that, if ignored, can result in personal injury or death.

1.7.3 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.)

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

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

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

1.7.4 Equipment Grounding Precaution

Improper grounding of equipment can result in electrical shock.

1.7.5 Use of Probes

Check specifications for maximum voltage, current and power ratings of any connector on the Test Set before connecting a probe to a front panel terminal point or port.

There are no special cables that must be purchased from Aeroflex.

1.7.6 Power Cords

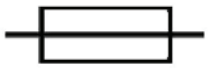
Power cords must not be frayed, broken nor expose bare wiring when operating this equipment.

Since the power cord serves as the disconnecting device, do not position the equipment so that it difficult to access.

1.7.7 Prior to Use

The Test Set should be inspected for damage prior to use. Before making connection to the Test Set, check the port for contaminants.

1.7.8 Use Recommended Fuses Only



The equipment should only be used with the following fuse:
F 10A L 250V

CAUTION

SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES.

USER OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN SPURIOUS RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.

1.8 UNPACKING

Special-design packing material inside the shipping carton provides maximum protection for the Test Set. Avoid damaging the carton and packing material during equipment unpacking.

Use the following steps for unpacking the Test Set.

- Cut and remove the sealing tape on the carton top and open the carton.
- Grasp the Test Set case firmly, while restraining the shipping carton, and lift the equipment and packing material vertically.
- Place the Test Set on a suitable flat, clean and dry surface.

- Remove the protective plastic bag from the Test Set. Place protective plastic bag packing material inside shipping carton. Store the shipping carton for future use should the Test Set need to be returned.

1.8.1 Checking Unpacked Equipment

- Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage to Aeroflex.
- Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies to Aeroflex.

1.9 DESCRIPTION

The ATB-7300 Test Set is a comprehensive, configurable test platform for navigation and communication systems and component testing. Applications include R&D, manufacturing, troubleshooting and return to service testing. The Test Set offers unparalleled flexibility for OEM's and remote repair facilities to adapt to their own unique needs.

The Test Set provides a wealth of RF test functions via a full color touch screen control display, with full remote capability. High performance spectrum analyzer capability is included as an option.

1.9.1 Main Features

- Large Touch Screen Color Display
- Over-the-Air and Return-to-Service testing
- AM, FM and Data Capability
- Tests ILS / VOR / MKR / ADF & VHF COMM functions, including SELCAL and airborne data link protocols, VHF Data link Mode 2 (VDL-2) and VHF Data Broadcast (VDB)
- SCPI compatible software driver command sets
- GPIB remote programming interface
- 100 kHz to 3 GHz RF Signal Generator range

1.9.2 Optional Features

- 250 KHz to 3 GHz spectrum analyzer, with custom analysis tools.
- 406 MHz COSPAS / SARSAT Beacon (ELT) Testing.
- VHF Comm TX & DME TX Analyzer.
- VHF Datalink Mode-2 digital communications Analyzer.

1.10 INSTALLATION

1.10.1 General

The following is a general installation process for the Test Set

STEP	PROCEDURE
1.	Place the Test Set on a suitable flat, clean and dry surface.
2.	If the Test Set is to be mounted in an equipment cabinet, attach provided instrument rack mountings.
3.	With equipment mounted or on bench top, attach interface cables to the appropriate RF ports.
4.	For remote operation, attach GPIB cable to the Test Set and external control computer bus.
5.	Furnish electrical power to the Test Set. Connect AC power cable to rear power input. Apply 100 to 240 VAC at 50 to 60 Hz.

1.10.2 Safety Precautions

Listed are several safety precautions which must be observed during installation and operation. Aeroflex assumes no liability for failure to comply with any safety precautions outlined in this manual.

Complying with Instructions

Installation/operating personnel should not attempt to install or operate the Test Set without reading and complying with all instructions contained in this manual. All procedures must be performed in exact sequence and manner described.

Grounding Requirements

To minimize shock hazard, all equipment chassis and cabinets must be connected to electrical ground. All Aeroflex test sets are equipped with a standard three-prong power cable which must be connected to a properly grounded three-prong wall receptacle.

It is the customer's responsibility to:

- Have a qualified electrician check wall receptacle(s) for proper grounding.
- Replace any standard two-prong wall receptacle(s) with properly grounded three prong receptacle(s).

WARNING: DO NOT USE A THREE PRONG TO TWO-PRONGADAPTER PLUG. DOING SO CREATES A SHOCKHAZARD BETWEEN THE CHASSIS AND EARTHGROUND.

Operating Safety

Due to the presence of potentially lethal voltages within the Test Set, operating personnel should not remove the cover with power applied.

CAUTION and WARNING Labels

Extreme care should be exercised when performing any operations preceded by a CAUTION or WARNING label. CAUTION labels appear where possibility of damage to equipment exists and WARNING labels denote conditions where bodily injury or death may result.

1.10.3 Installation and Operating Precautions

CAUTION: DO NOT APPLY ANY SIGNALS TO THE TEST SET OTHER THAN THOSE DEFINED IN THE OPERATING INSTRUCTIONS.

CAUTION: DO NOT OPERATE LCD DISPLAY WITH EXCESSIVE INTENSITY OR IN DIRECT SUNLIGHT.

CAUTION: DO NOT APPLY RF SOURCE TO RF OUT CONNECTOR.

CAUTION: TO PROVIDE MAXIMUM PROTECTION OF NON-VOLATILE INTERNAL MEMORY, DO NOT RAPIDLY CYCLE POWER ON AND OFF. ALLOW A MINIMUM OF ONE SECOND BETWEEN ON/OFF CYCLES.

1.11 CONTROLS, CONNECTORS AND DISPLAY

1.11.1 Front Panel Layout

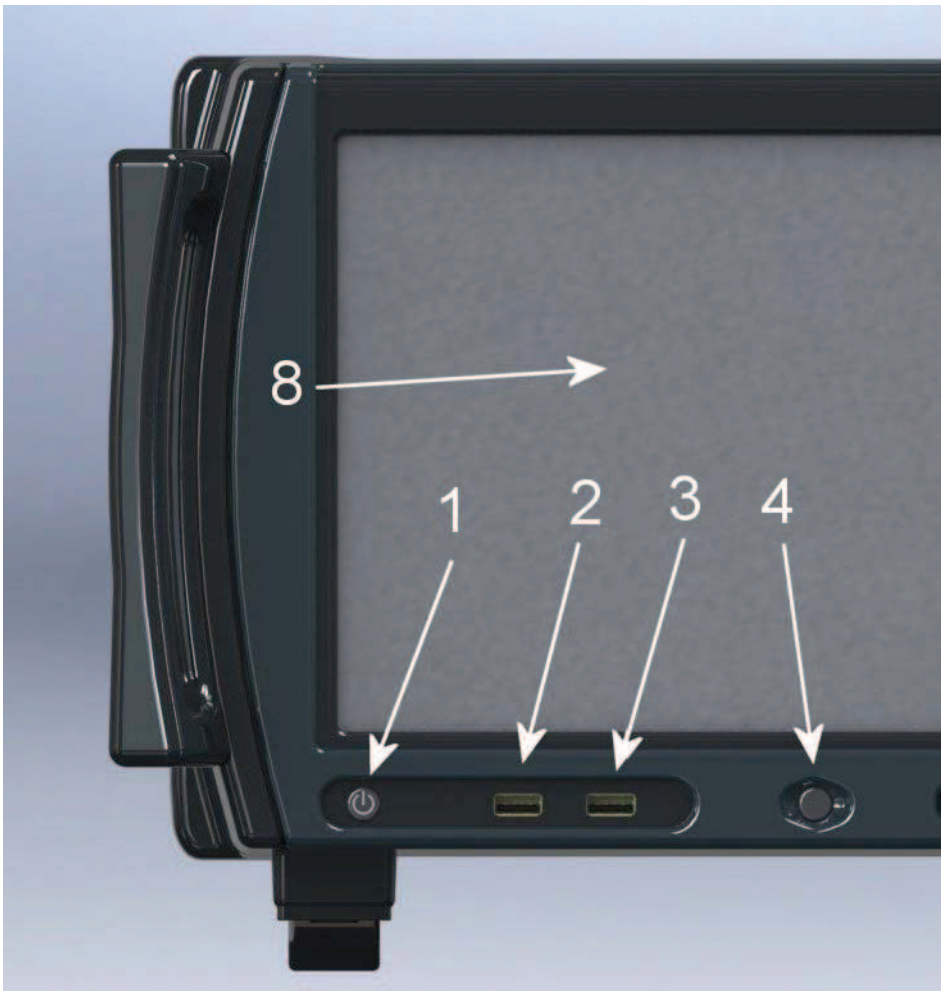


Fig. 1-1 Front Panel (Left Side)

Fig. 1-2 Front Panel (Right Side)

Location List

1. Power Switch
2. USB Port 1
3. USB Port 2
4. Unused
5. ANT Port
6. T/R Port
7. GEN Port
8. LCD Screen

1.11.2 Front Panel Description

A description of each front panel item follows:

1. Power Switch

Push-button (press on/off) applies power to the Test Set. Switch illuminates in the ON position.

2. USB Port 1

Port 1 of 2 front panel universal serial bus input/output ports for remote program loading, external keyboard or mouse.

3. USB Port 2

Port 2 of 2 front panel universal serial bus input/output ports for remote program loading, external keyboard or mouse.

NOTE: FOR PIN-OUT DIAGRAM OF USB PORTS, REFER TO APPENDIX C.

4. Unused

5. ANT Port

Input port to the internal Test Set Digitizer resource (50 ohm).

6. T/R Port

Transmit / Receive (combiner) port of the Test Set (50 ohm).

7. GEN Port

Output port for the internal Test Set RF generator resource (50 ohm).

8. Full color touch-screen LCD display.

1.11.3 Rear Panel Layout

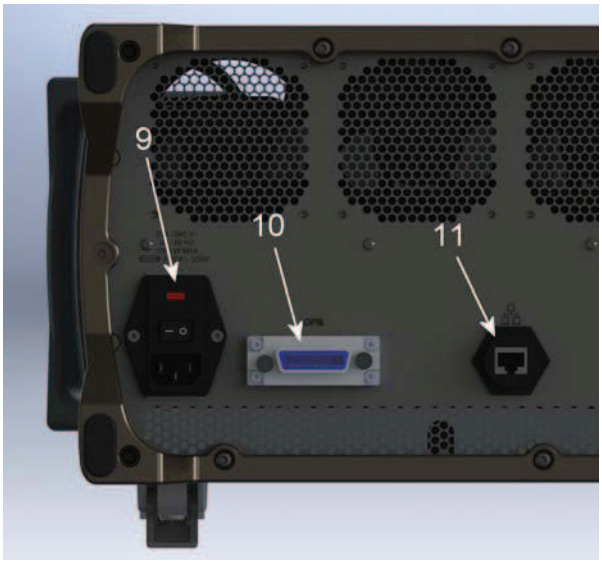


Fig. 1-3 Rear Panel (Left)

Fig. 1-4 Rear Panel (Right)

Numerical Location List

9. Power Input
10. GPIB Port
11. Ethernet Port
12. 10 Mhz I/O Port

1.11.4 Rear Panel Description

A description of each rear panel item follows:

9. Power Input

100 to 240 VAC at 50 to 60 Hz input, 1000 W max, selectable with on/off switch.

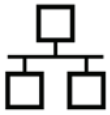
.

10. GPIB Port

Remote programming port for General Purpose Interface Bus (IEEE 488.2 Compliant).

NOTE: FOR PIN-OUT DIAGRAM OF GPIB PORT, REFER TO APPENDIX C.

11. Ethernet Port - (Future Use Only)



Remote programming port for Ethernet.

NOTE: FOR FUTURE USE ONLY. THE CURRENT CONFIGURATION INCLUDES ACCESS TO A REAR PANEL ETHERNET PORT FOR REMOTE PROGRAMMING. THIS FEATURE IS CURRENTLY NOT SUPPORTED. FOR PIN-OUT DIAGRAM OF ETHERNET PORT, REFER TO APPENDIX C.

12. 10 Mhz I/O Port

External time reference connection; input for 10 Mhz frequency standard. Requires +10dBm level.

By default, this port is configured as an output.

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Chapter 2 - Test Set Operation

This section contains operating instructions for manual control of the Test Set.

2.1 TEST SET POWER UP

- Ensure power is applied to the Test Set. Press the POWER button to power the Test Set On.
- For specified accuracy, allow the Test Set to warm up for 10 minutes.

NOTE: AFTER CYCLING POWER, WAIT AT LEAST 60 SECONDS BEFORE ESTABLISHING COMMUNICATION OR MANUALLY OPERATING THE TEST SET TO ENSURE ADEQUATE TIME FOR COMPLETING SYSTEM BOOT UP.

Fig. 2-1 Opening Screen

2.2 TOOLBAR AND (INSTRUMENT) MENU BUTTONS

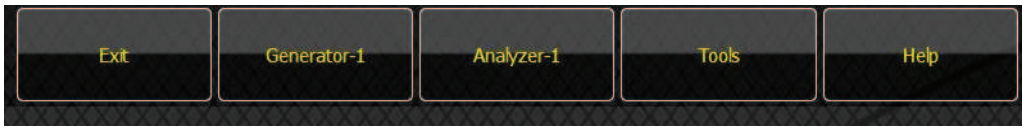

Fig. 2-2 ATS GUI Toolbar

2.2.1 Toolbar Buttons

Exit button:

Powers off the test set.

Generator-1 button:

When selected, a dropdown menu appears, providing for selection of the virtual Generator mode (ADF, ILS LOC, ILS GS, MKR, VDB, VHF and VOR). Only one mode may be functioning at a time for each generator card installed. If a Virtual Instrumentation Mode has not been registered, that particular selection will be visible, but disabled.

Analyzer-1 button (when configured with option ATB-ANL):

When selected, a dropdown menu appears, providing for selection of the virtual Analyzer mode (DME, VHF, ELT). Only one mode may be functioning at a time.

Tools button:

When selected, a dropdown menu appears, providing for selection of GPIB Bus Configuration and Generator Zero Calibration.

Help button:

When selected, a dropdown menu appears, providing for selection of extensive built in documentation. This documentation can be viewed while the test set is running or printed for future reference.

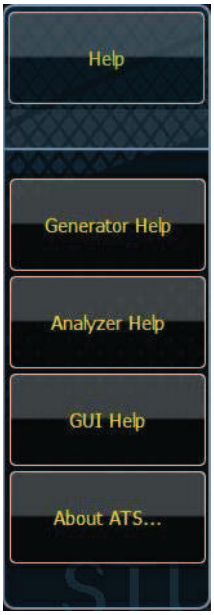

Fig. 2-3 Help button dropdown menu

The Help buttons display documentation as follows:

Generator Help

Documentation on GENERATOR DLL modules, structures and examples.

Analyzer Help

Documentation on ANALYZER DLL modules, structures and examples.

GUI Help

This button brings up the Avionics Test Studio Software Operation Manual manual in PDF format.

About ATS...

Registration status of the Avionics Test Studio installation

2.2.2 ATS GUI (Instrument) Menu Buttons

A Virtual Instrument must have been selected through the ATS GUI Toolbar prior to using the (Instrument) Menu. If no instrument has been selected, a popup appears instructing the user to "Please make a selection of the instrument window".

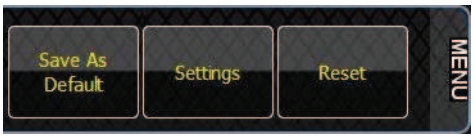

Fig. 2-4 ATS GUI (Instrument) MENU

Save As Default button:

When selected, saves the instrument control settings into a default.x file where x will be the instrument name (i.e default.adf1). This file is loaded when the instrument (i.e ADF-1) is first opened.

Settings button:

When selected, a fly up menu appears, providing for loading or saving settings of the instrument. Selection of either of these buttons pops up a standard Windows Explorer window, defaulted to the installation directory of the Avionics Test Studio application program. A previously saved setting file can then be loaded (Open) or the settings can be Saved with a user assigned name. (i.e. ADF_test_1.adf1). The file type will automatically be set for the instrument selection:

Reset button:

When selected, a fly up menu appears, providing for resetting the instrument to its default settings (Reset All) including the Ident settings if applicable, or, in the case of instruments with IDENT settings, the ability to reset ONLY the Ident setting is available. An error message that "This function is not supported in this mode" appears if this button is selected and the instrument does not have an Ident function.

Fig. 2-5 ATS GUI (Instrument) MENU Reset button Fly Up Menu

2.2.3 Common GUI Operations

2.2.3.A Popup Keypads

Instrument GUIs utilized throughout the ATS application program contain data fields which display either the instrument setting or an instrument derived value. Throughout this manual, user settable data field controls are identified by the phrase 'Displays or sets'. When selected, a user settable data field will become highlighted and a popup keypad for changing the setting will appear. It is possible to have more than one keypad open at the same time and numeric keypads will have the associated data field name at the bottom. The popup keypads should always be utilized for altering instrument settings. The PC keyboard should never be used for GUI data entry.

Popup Keypad Operation:

Settable data field values are altered by using either a numeric or text keypad depending on the data field selected. Entry begins with selection of a keypad digit. The previous field value in the parent GUI will blank and the new digit will be placed in the data field. Each successive key selection will append the new key value.

Fig. 2-6 Popup Keypad example: Numeric - Hz

Fig. 2-7 Popup Keypad example: Numeric - dBm

Fig. 2-8 Popup Keypad example: Text

Cancel button: (Numeric only)

Closes the keypad GUI without altering the original value in the data field

Clear button: (Numeric and Text)

The data field value in the parent GUI will be cleared out.

BKSP button: (Backspace, Numeric only)

Moves the cursor back one space and clears the value currently occupying that space.

Up and Down Arrow button: (Numeric only)

Used to increment (Up arrow) or decrement (Down arrow) the value in the data field by the value shown on the arrow button.

x10 and /10 button: (Numeric only)

Used to increment (x10) or decrement (/10) the value shown on the arrow button by a factor of 10.

+/- button: (Numeric only)

After numeric data entry selection, this button can be used to denote a positive or negative number.

Unit of Measure button: (Numeric only) or Done button: (Text only)

After numeric data entry is complete, whether through numeric button entry or use of the up/down arrows, the Unit of Measure button must be selected to confirm the data entry and close out the keypad. On the text keypad, the Done button is used to confirm the data entry and close out the keypad.

2.2.3.B Screen View and Close Buttons

All the instrument control GUIs (Generator and Analyzer) have BLUE and RED circular buttons in the lower right corner. The BLUE button is used to toggle the GUI between Normal view and Full Screen view. In Normal view the BLUE button is solid. In Full Screen view, the BLUE button has a BLUE outline with a black fill. The RED button is used to close the GUI. Any open popup GUIs associated with the parent GUI being closed will also be closed.

NOTE: CLOSING AN INSTRUMENT GUI DOES NOT STOP THE INSTRUMENT FROM OPERATING.

Fig. 2-9 GUI in NORMAL view

Fig. 2-10 GUI in FULL SCREEN view

2.3 ATS VIRTUAL GENERATOR INSTRUMENTATION

2.3.1 Generator button (ATS GUI Toolbar)

When the ATS GUI toolbar Generator - (1, 2, etc) button is selected, a dropdown menu appears.

Generator dropdown menu:

The Generator dropdown menu provides for PXI generator card configuration, calibration factor (Path Loss Compensation) entry, and generator instrument selection.

Scenario button:

Selects scenario mode for LOC, GS and VOR. Enables rapid changes in DDM and Bearing values.

ADF button:

Select ADF generator operation mode.

ILS LOC button:

Select ILS LOCalizer generator operation mode.

ILS GS button:

Select ILS GlideSlope generator operation mode.

MKR button:

Select MarKeR generator operation mode.

VDB button:

Select Vhf Data Broadcast generator operation mode. Provides for Arbitrary waveform file generation from user digital modulation scheme files.

VHF button:

Select VeryHighFrequency generator operation mode.

VOR button:

Select Vhf Omni-directional Range generator operation mode.

Fig. 2-11 ATS GUI TOOLBAR Generator button dropdown menu

2.3.2 Common Generator GUI Operations

All the Generator GUIs (ADF, ILS, MKR, VOR, VDB, and VHF) share common Generator Settings and Generator Control windows at the top of each GUI. The exceptions are the VDB and VHF generator GUIs, which do not have a MODulation button in the Generator Control window.

2.3.2.A Generator Settings Window

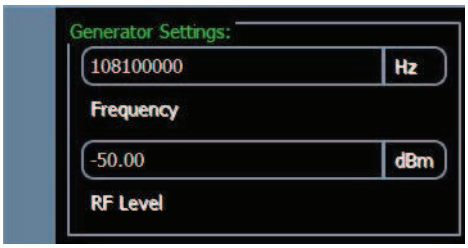

Fig. 2-12 Common Generator GUI 'Generator Settings' window

Frequency data field:

Displays or sets the generator carrier Frequency. The selectable frequency range is 100 kHz to 3 GHz. If the PXI card does not support the selected frequency, a warning will be displayed and the setting will revert to the last stored Frequency value.

RF Level data field:

Displays or sets the generator RF (output) Level. The selectable RF Level is -120 dBm to +17 dBm. If the PXI card does not support the selected RF Level, a warning will be displayed and the setting will revert to the last stored RF Level value.

2.3.2.B Generator Control Window

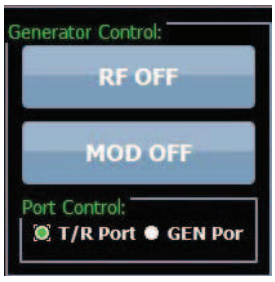

Fig. 2-13 Common Generator GUI 'Generator Control' window

RF (OFF) button:

Indicates the RF output status of the PXI card configured as the virtual generator. Can be toggled between RF OFF and RF ON. When RF OFF is indicated, the RF Output of the PXI generator card is disabled. When RF ON is indicated, the RF Output of the PXI generator card is enabled.

MOD (OFF) button: (NOT applicable to VDB and VHF generator GUIs.)

Indicates the MODulation status of the PXI card configured as the virtual generator. Can be toggled between MOD OFF and MOD ON. When MOD OFF is indicated, the PXI generator card carrier frequency modulation is disabled. When MOD ON is indicated, the PXI generator card carrier frequency modulation is enabled.

Port Control:

A filled green circle indicates the selected port.

Selecting the T/R Port will connect the generator to the front panel T/R port connector only.

Selecting the GEN Port will connect the generator to the front panel GEN port connector only.

2.3.2.C Ident Settings Button

The ADF Gen, ILS LOC Gen, and VOR Gen GUIs each have an Ident Settings button, which pops up an Ident Settings GUI. Operation of the Ident Settings GUI is the same for each of these virtual generators. By default the IDENT is OFF.

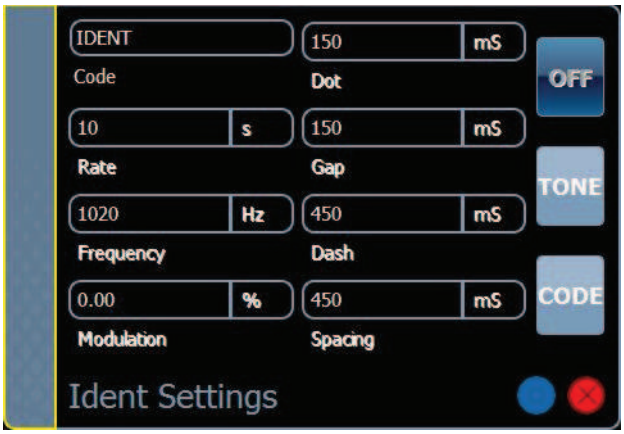

Fig. 2-14 Ident Settings GUI (ADF, ILS LOC, VOR)

IDENT SETTINGS GUI (ADF, ILS LOC, VOR)

Code data field: (Max 5 Characters)

Displays or sets the character set of the Ident (Morse) Code to be generated.

Rate data field: (1 to 65 Seconds)

Displays or sets the repetition Rate (in Seconds) of the Ident Code.

Frequency data field: (10 to 18000Hz)

Displays or sets the modulation Frequency (in Hertz) that the Ident Code or Tone are modulated at on the generator carrier frequency.

Modulation data field: (0 to 99%)

Displays or sets the percent of Modulation of the Ident Code or Tone.

Dot data field: (50 to 250 mS)

Displays or sets the tone modulation ON time representing a Morse code 'Dot'.

Gap data field: (50 to 250 mS)

Displays or sets the tone modulation OFF time or 'gap' separating each Morse code 'Dot 'or 'Dash'.

Dash data field: (150 to 750 mS)

Displays or sets the tone modulation ON time representing a Morse code 'Dash'.

Spacing data field: (150 to 750 mS)

Displays or sets the tone modulation OFF time or 'spacing' separating each Morse code character.

OFF button:

Disables Ident Code and test Tone modulation.

TONE button:

Enables constant Tone modulation on the generator carrier frequency (using the Frequency and Modulation settings).

CODE button:

Enables Ident Code modulation on the generator carrier frequency (using the Dot, Gap, Dash, Spacing, Rate, Frequency and Modulation settings).

2.3.3 ADF Gen GUI

ADF Non Directional Beacons operate in a carrier frequency range of 190 kHz to 1750 kHz, typically with either a 400 Hz or 1020 Hz AM modulated tone. All the controls and functions available on the ADF Gen GUI have been described in previous sections.

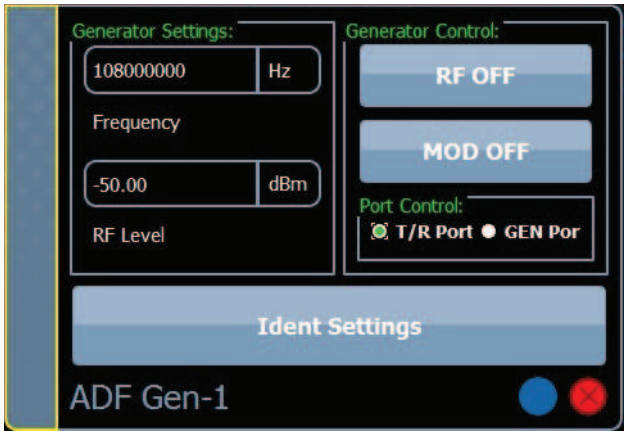

Fig. 2-15 ADF Generator Instrument

Generator Settings window:

Previously described in “Generator Settings Window” on page 2-9.

Generator Control window:

Previously described in “Generator Control Window” on page 2-9.

Ident Settings button:

Previously described in “Ident Settings Button” on page 2-10.

2.3.4 ILS Gen GUI(s)

Two tones, one at 90 Hz, the other at 150 Hz, are AM modulated on a carrier frequency range of108.10 MHz to 111.95 MHz. The Difference in the Depth of Modulation (DDM) of the 90 Hz and 150 Hz signals indicates position from centerline(Localizer) or desired altitude (Glideslope). ILS Generator controls and functions are divided into two separate GUIs. One for LOCalizer functions and another for GlideSlope functions. The following control descriptions are applicable to both GUIs unless otherwise noted. Only the Localizer function provides settings for modulating a Morse code identifier

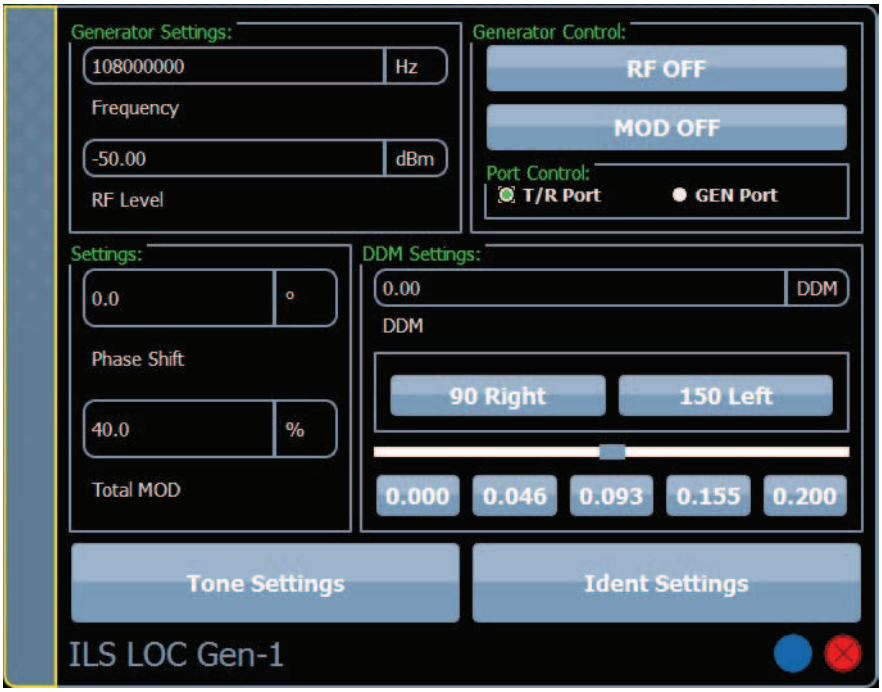

Fig. 2-16 ILS - LOCalizer generator GUI

Fig. 2-17 ILS GlideSlope generator GUI

2.3.4.A Generator Settings Window

Previously described in “Generator Settings Window” on page 2-9.

2.3.4.B Generator Control Window

Previously described in“Generator Control Window” on page 2-9.

2.3.4.C Settings Window

Phase Shift data field: (0.0 to 360.00 Degrees)

Displays or sets the setting of the 90 & 150 Hz Phase relation.

Total MOD data field: (0 to 99%)

Displays or sets the setting of the Total MODulation of the instrument including all tones currently being output. Changing this value will cause ALL active tone modulations to be changed proportionally to their values so that the sum equals the Total MOD value.

2.3.4.D DDM Settings Window

DDM data field: (LOC 0.000 to 0.4000, GS 0.000 to 0.800)

Displays or sets the setting of the Difference in Depth of Modulation value. Changing this value causes proportional changes of the Tone Settings MODulation values with respect to the DDM direction.

DDM 90 Right (Down) and 150 Left (Up) buttons:

Indicates or sets the LOC (GS) direction that has the dominate modulation level.

DDM slide bar:

Enables the user quickly set a DDM value and dominate modulation direction by sliding the control left or right.

DDM Preset buttons:

Enable the user to quickly select commonly used DDM settings with regards to the DDM direction.

2.3.4.E Tone Settings Button

Pops up a Tone Settings GUI for control of the 90 and 150Hz tones.

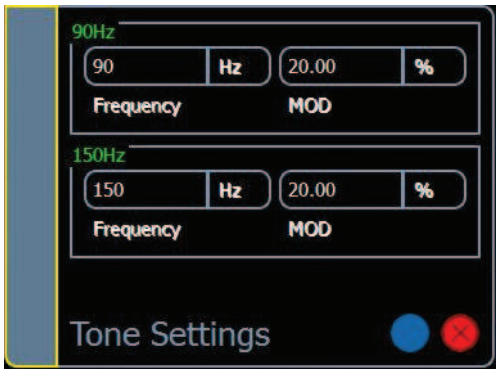

Fig. 2-18 ILS Tone Settings GUI

90 Hz window:

Frequency data field: (72Hz to 108Hz)

Displays or sets the setting of the 90 Hz tone Frequency.

MODulation data field: (0 to 99%)

Displays or sets the setting of the 90 Hz tone percent Modulation level. Total modulation not to exceed 99%

150 Hz window:

Frequency data field: (120Hz to 180Hz)

Displays or sets the setting of the 150 Hz tone Frequency.

MODulation data field: (0 to 99%)

Displays or sets the setting of the 150 Hz tone percent Modulation level. Total modulation not to exceed 99%.

2.3.4.F Ident Settings Button (ILS LOC Gen GUI)

Previously describe in “Ident Settings Button” on page 2-10.

2.3.5 VOR Gen GUI

VOR operates on a carrier frequency range of 108.0 MHz to 117.95 MHz (with 50 kHz spacing) and encodes azimuth as the phase relationship of a 30Hz VAR tone and a 30HZ REF tone. The 30 Hz REF tone is modulated on a 9960 Hz subcarrier. The 30Hz VAR tone phase angle is user settable through a Bearing data field. The phase angle by which the 30Hz VAR tone lags the 30HZ REF tone is equal to the direction in degrees from the station and is called the "radial." Settings are also provided for modulating a Morse code identifier.

Fig. 2-19 VOR generator GUI

2.3.5.A Generator Settings Window

Previously described in “Generator Settings Window” on page 2-9.

2.3.5.B Generator Control Window

Previously described in“Generator Control Window” on page 2-9.

2.3.5.C Settings Window

Total MOD data field: (0 to 99%)

Displays or sets the setting of the Total MODulation which includes all tones currently being output. Changing this value will cause ALL active tone modulations to be changed proportionally to their values so that the sum equals the Total MOD value.

2.3.5.D Direction Window

Bearing data field: (0.0 to 360.00°)

Displays or sets the setting of the VOR radial bearing in degrees.

TO and FROM Button(s):

Mutually exclusive. Sets the VOR radial bearing as either a "TO" condition or a "FROM" condition as it applies to VOR.

2.3.5.E Ident Settings Button

Previously described in “Ident Settings Button” on page 2-10.

2.3.5.F Tone Setting Button

Pops up a Tone Setting_VOR GUI for control of the 30Hz VARiable, 30Hz REFerence and 9960Hz subcarrier.

Fig. 2-20 Tone Settings_VOR GUI

30 VAR Freq. data field: (20 to 40 Hz)

Displays or sets the Frequency setting of the 30 Hz Variable tone.

30 VAR MOD data field: (0 to 99%)

Displays or sets the percent of modulation setting of the 30 Hz Variable tone. Total modulation not to exceed 99%.

30 REF Freq data field: (20 to 40 Hz)

Displays or sets the Frequency setting of the 30 Hz Reference tone modulated on the 9960 Hz subcarrier.

Freq Dev data field: (0.00 to 540.00 Hz)

Displays or sets the Frequency Deviation setting for the 9960 Hz subcarrier.

9960 Freq data field: (6640 to 13280 Hz)

Displays or sets the Frequency setting of the 9960 Hz subcarrier on which the 30 Hz Reference tone is modulated.

9960 MOD data field: (0 to 99%)

Displays or sets the percent of modulation setting of the 9660 Hz subcarrier. Total modulation not to exceed 99%.

2.3.6 MKR Gen GUI

Marker beacons operate at a carrier frequency of 75 MHz with AM modulated Morse code like tones. Outer markers operate with 400 Hz tone dashes, Middle markers operate with alternating 1.3 kHz dots and dashes, and Inner markers operate with 3 kHz tone dots. The MKR Gen GUI provides for the setting of all these parameters.

Fig. 2-21 MKR generator GUI

2.3.6.A Generator Settings Window

Previously described in “Generator Settings Window” on page 2-9.

2.3.6.B Generator Control Window

Previously described in “Generator Control Window” on page 2-9.

2.3.6.C Tone Settings Window

OUTER / MIDDLE / INNER options:

When selected, sets the marker beacon type of operation. These options are mutually exclusive.

Frequency data field: (10 to 18000 Hz)

Displays or sets the tone frequency for the selected marker option;

OUTER (400Hz)
MIDDLE (1300Hz)
INNER (3000Hz)

Modulation data field: (0 to 99%)

Displays or sets the tone frequency modulation level for the selected maker beacon.

2.3.6.D Ident Settings Button

Pops up a trimmed down Ident GUI tailored specifically for Marker Beacon operation.

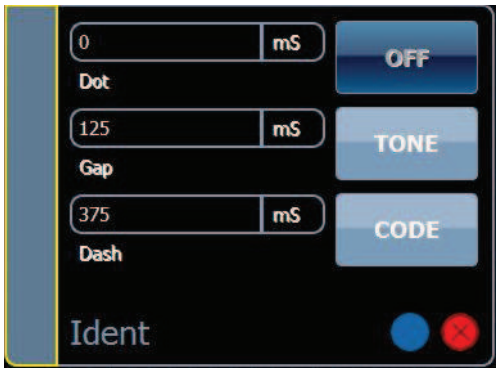

Fig. 2-22 (MKR) Ident GUI

Ident GUI (MKR):

Provides for changing the timing of the Morse code like 'Dots' and 'Dashes' of the selected marker option.

Dot data field:* (50 to 250 mS)

Displays or sets the tone modulation ON time representing a Morse code like 'Dot'

Gap data field: (50 to 250 mS)

Displays or sets the tone modulation OFF time or 'gap' separating each Morse code like 'Dot' or 'Dash'.

Dash data field:* (150 to 750 mS)

Displays or sets the tone modulation ON time representing a Morse code like 'Dash'.

OFF button:

Disables all modulation (Code and Tone).

TONE button:

Enables a constant modulated Tone on the generator carrier frequency using the Tone settings.

CODE button:

Enables a series of modulated Morse code like 'Dots' and/or 'Dashes' depending on the Tone settings, Ident settings and selected Marker option:

*OUTER - only 'Dashes' are modulated. The Dot data field is not settable.

MIDDLE - both 'Dots and 'Dashes' are modulated

*INNER - only 'Dots' are modulated. The Dash data field is not settable.

2.3.7 VDB Gen GUI

Provides for the generation and playing of Aeroflex IQ (AIQ) files containing I (in-phase) and Q (quadrature phase) waveform data from user provided digital modulation scheme text files.

Fig. 2-23 VDB generator GUI

2.3.7.A Generator Settings Window

Previously described in “Generator Settings Window” on page 2-9.

2.3.7.B Generator Control Window

Previously described in “Generator Control Window” on page 2-9.

2.3.7.C Mode Window

The options in this window are mutually exclusive.

Single File option:

With this option selected, the user can choose an existing AIQ file to be played by using the Arb File window 'File...' button, or generate an AIQ file from an existing user text file by using the 'Generate File' button. The Arb File window 'Loop Count' data field and 'Add To List' button, as well as the Play List window 'View Playlist' button are not available.

Playlist option:

With this option selected, the user can select multiple pre-existing AIQ files to be added to a playlist through the use of the Arb File window 'File...' and 'Add To List' buttons, or generate and add an AIQ file from an existing user text file by using the 'Generate File' button. All files added will be played in the order they were added to the playlist.

Generate File button:

Pops up an AIQ File Generator GUI which can be used to convert an existing user text file of a digital modulation scheme into an Aeroflex IQ File, containing I (in-phase) and Q (quadrature) waveforms.

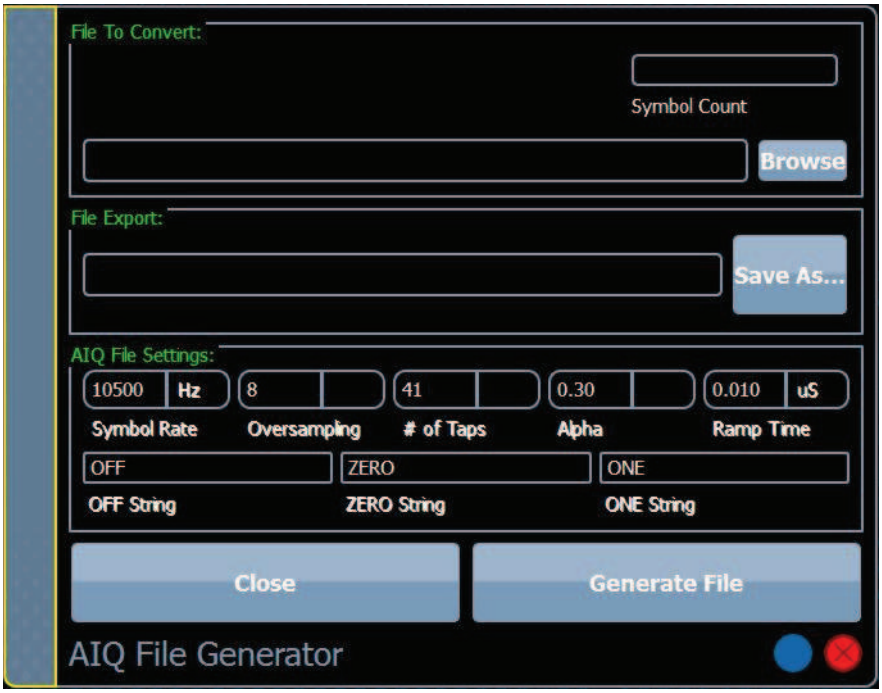

Fig. 2-24 AIQ File generator GUI

File To Convert window:

Browse button:

Provides selection (from a Windows Explorer popup) of the user-defined text file as the source for generating an AIQ target file.

Data field:

Displays the path and file name of the selected user-defined source file.

Symbol Count data field:

Displays the number of Symbols found in the selected user-defined source file.

File export window:

Save As... button:

Provides selection (from a Windows Explorer popup) of a path and filename for saving the newly created AIQ file.

Data field:

Displays the user selected path and filename in which the generated AIQ file will be saved.

AIQ File Settings window:

Symbol Rate data field:

Displays or sets the Symbol Rate to use during generation of the target AIQ file.

Oversampling data field: (2 to 16)

Displays or sets the Oversampling to use during generation of the target AIQ file.

# of Taps data field:

Displays or sets the Number of Taps to use during generation of the target AIQ file.

Alpha data field:

Displays or sets the Alpha value to use during generation of the target AIQ file.

Ramp Time data field:

Displays or sets the Ramp Time to use during generation of the target AIQ file.

OFF String data field:

Displays or sets the source file string value indicating OFF symbol generation to the target AIQ file.

ZERO String data field:

Displays or sets the source file string value indicating ZERO symbol generation to the target AIQ file.

ONE String data field:

Displays or sets the source file string value indicating ONE symbol generation to the target AIQ file.

Generate File button:

Starts conversion of the user-defined source file into a useable AIQ file using all the parameters currently set on the AIQ File Generator GUI.

Close button:

Closes the AIQ File Generator GUI.

2.3.7.D Playlist Settings Window

Arb File window:

Data field:

Displays the filename of the AIQ file selected for playback.

File... button:

Pops up a standard Windows Explorer window, defaulted to the installation directory of the Avionics Test Studio application program and with AIQ file type selected. The name of the file selected from this popup will appear in the data field.

Loop Count data field: (Playlist option selected)

Displays and sets the number of play times that the selected AIQ file is to be repeated within the Playlist.

Add To List button: (Playlist option selected)

Adds the selected AIQ file to the Playlist.

Play List window:

Loop Count data field:

Displays and sets the number of play times that the Playlist is to be repeated. The Play Mode Loop Count option must be enabled for the numeric keypad popup to be available for altering the Loop Count value.

Play button:

Starts playing (modulating) the chosen file(s) modulation scheme with the Play Mode window option selection.

Stop button:

Provides for ending play (turning off modulation) when Loop or Continuous Play Mode are selected.

View Playlist button:

Pops up a Playlist GUI which can be used to create or edit playlists. The Clear, Save and Load buttons provide for clearing or saving the playlist or loading a previously saved playlist of existing AIQ files.

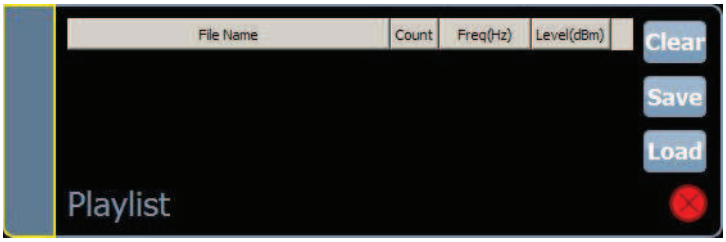

Fig. 2-25 AIQ Playlist GUI

2.3.7.E PlayMode Window

All options in this window are mutually exclusive.

Single option:

Provides playing the chosen file only once for each time the Play List window 'Play' button is pressed.

Loop Count option:

Provides repeated playing of the chosen file or playlist. Play is repeated the number of times indicated in the Play List window Loop Count data field.

Continuous option:

Provides repeated playing of the chosen file or playlist. Play is repeated until the Play List window 'Stop' button is selected.

2.3.8 VHF Gen GUI

2.3.8.A Generator Settings Window

Previously described in “Generator Settings Window” on page 2-9.

2.3.8.B Generator Control Window

Previously described in “Generator Control Window” on page 2-9.

2.3.8.C Mode Window

Provides for selection of five VHF Gen Mode options, each option selection provides different window views within the VHF Gen GUI.

AM Only option:

Opens an AM Settings window providing the user to change the frequency and modulation levels of up to three AM tones for modulation on the generator carrier frequency.

Fig. 2-26 VHF Gen GUI AM Only view

AM Settings window:

Frequency data fields: (10 to 18000Hz)

Displays or sets the Frequency setting of the associated AM tone to be modulated on the virtual generator carrier frequency.

Modulation data fields: (0 to 99%)

Displays or sets the Modulation level of the associated AM tone. Total modulation not to exceed 99%.

Enable buttons:

Enables (ON) or disables (OFF) modulation of the associated Tone.

Single File option:

Opens Single file Settings and PlayMode windows to provide for the playing of a single Aeroflex IQ (AIQ) file.

FM Settings window:

FM Rate:

Displays or sets the FM rate for the selected RF Frequency.

FM Deviation:

Displays or sets the FM Deviation for the selected RF frequency.

Fig. 2-27 VHF Gen GUI FM Only view

Fig. 2-28 VHF Gen GUI Single File Mode view

Single File Settings window:

All the controls and functions available through this window are the same as those described in the VDB Gen GUI section “Playlist Settings Window” on page 2-20.

Play Mode window:

All the controls and functions available through this window are the same as those described in the VDB Gen GUI section “PlayMode Window” on page 2-21.

Playlist option:

Opens Playlist Settings and PlayMode windows to provide for the playing of multiple Aeroflex IQ (AIQ) files.

Fig. 2-29 VHF Gen GUI Playlist Mode view

Playlist Settings window

Arb Filewindow:

All the controls and functions available through this window are the same as those described in VDB Gen GUI section “Playlist Settings Window” on page 2-20.

Play List window:

All the controls and functions available through this window are the same as those described in VDB Gen GUI section “Playlist Settings Window” on page 2-20.

Play Mode window:

All the controls and functions available through this window are the same as those described in VDB Gen GUI section “PlayMode Window” on page 2-21.

SELCAL option:

Opens a SELCALSettings window to for setting various SELective CALling controls.

Fig. 2-30 VHF Gen GUI SELCAL Mode view

SELCAL Settings window:

P1/P2 Code data fields

Displays or sets the codes that are modulated during SELCAL operation. Any two (2) valid characters (A through H, J through M, or P through S) must be entered. The associated Tone 1 and Tone 2 data fields will automatically update to the corresponding frequency values of the entered code characters. No change will be made if an invalid character is entered.

P1 Tone 1 data field: (0 to 10000 Hz)

Displays or sets the frequency of the first P1 Code character. If an entered frequency does not correspond to a valid Code Character, then a (-) dash will be set as the first P1 Code character in the P1 Code data field.

P1 Tone 2 data field: (0 to 10000 Hz)

Displays or sets the frequency of the second P1 Code character. If an entered frequency does not correspond to a valid Code Character, then a (-) dash will be set as the second P1 Code character in the P1 Code data field.

P2 Tone 1 data field: (0 to 10000 Hz)

Displays or sets the frequency of the first P2 Code character. If an entered frequency does not correspond to a valid Code Character, then a (-) dash will be set as the first P2 Code character in the P2 Code data field.

P2 Tone 2 data field: (0 to 10000 Hz)

Displays or sets the frequency of the second P2 Code character. If an entered frequency does not correspond to a valid Code Character, then a (-) dash will be set as the second P2 Code character in the P2 Code data field.

Pulse MOD data field: (0 to 99%)

Displays or sets the Modulation level of the SELCAL P1/P2 Pulses and Test Tone Pulse.

Initiate button:

Initiates the SELCAL pulse chirp. The button is disabled for the duration of the SELCAL pulse chirp.

Test Tone_Timing button:

Pops up a Tone Settings GUI to provide for setting the P1 and P2 timing values and Test Tone settings.

Fig. 2-31 VHF Gen SELCAL Tone Settings GUI

Timing window:

P1 Time data field: (0.000 to 2.000 Seconds)

Displays or sets the pulse duration time of the P1 pulse.

Gap Time data field: (0 to 999 mS)

Displays or sets the gap time between the P1 and P2 pulses.

P2 Time data field: (0.000 to 2.000 Seconds)

Displays or sets the pulse duration time of the P2 pulse.

Test Tone window:

Enable check box:

Enables (checked) or disables (unchecked) Test Tone modulation after the P1/P2 pulse chirp.

Freq data field: (10 to 18000 Hz)

Displays or sets the Test Tone Frequency.

MOD data field: (0 to 99%)

Displays or sets the percent of modulation applied to the P1/P2 Pulses and Test Tone Pulse.

2.4 ATS VIRTUAL ANALYZER INSTRUMENTATION

The ATS Virtual Analyzer is installed as option ATB-ANL. The ELT analyzer is installed as option ATES-ELT.

2.4.1 Analyzer Button (ATS GUI Toolbar)

When the ATS GUI toolbar Analyzer - (1, 2, etc) button is selected, a dropdown menu appears.

Analyzer dropdown menu:

The Analyzer dropdown menu provides for PXI generator card configuration, calibration factor input, and virtual generator instrument selection.

Fig. 2-32 ATS GUI TOOLBAR Analyzer button dropdown menu

DME button:

Select DME analyzer operation mode.

VHF button:

Select VHE Analyzer operation mode.

ELT button:

Select ELT Analyzer operation mode.

2.4.2 Common Analyzer GUI Operations

All Analyzer GUIs share a common Settings window 'Inputs' button and common Arm windows buttons.

2.4.2.A Settings Window(s)

All the analyzer GUIs have a Settings window with two buttons for setting various analyzer controls. The operation of the 'Inputs' button contained within this window is common to all analyzer GUIs and is described in the following sub section. Operation of the 'Triggers' button on the DME analyzer GUIs is described in the section “Triggers Button” on page 2-29. Operation of the 'VDL Config.' button on the VHF analyzer GUIs is described in the section “Common VHF Analyzer Controls” on page 2-33.

Inputs button:

Pops up an Input Settings GUI for controlling analyzer input settings.

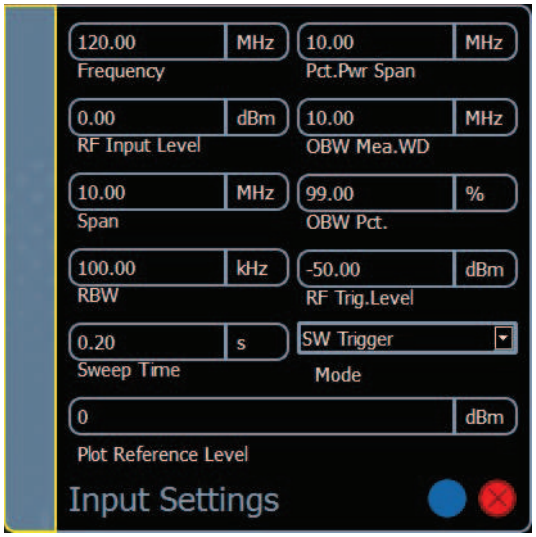

Fig. 2-33 Common Input Settings GUI

Input Settings GUI:

Frequency data field:

Displays or sets the (Center) Frequency.

RF Input Level data field:

Displays or sets the RF Input Level.

Span data field:

Displays or sets the Span width.

RBW data field:

Displays or sets the Resolution Band Width.

Sweep Time data field: (0.1 to 10.0)

Displays or sets the Sweep Time.

Pct. PWR Span data field:

Displays or sets the spectral span used in percent power measurements.

OBW Mea. WD data field:

Displays or sets the spectral span used in Occupied Band Width percent power measurements.

OBW Pct. data field:

Displays or sets the percent of total signal power to use in measuring a signal's spectral span or OBW.

RF Trigger Level data field:

Displays or sets the RF Trigger Level.

Mode selection list:

Displays or sets the trigger Mode. Selectable as either 'Software Trigger' or 'Internal Trigger' (hardware).

Plot Reference Level:

Changes the reference level for the plot screen for different amplitudes.

2.4.2.B Arm Window

Common to all analyzer GUIs is an Arm window containing a 'Single' button and a 'Cont.' button. Operations of these buttons are common to all analyzer GUIs and are described in the following sub sections.

Fig. 2-34 Common Analyzer GUI Arm window

Single button:

Triggers a single waveform capture and view.

Cont. button:

Triggers continuous waveform capture and view.

2.4.3 DME Analyzer GUI

The DME analyzer GUI has Tabs across the top for different view selections tailored specifically for analyzing DME signals. The control and measurement windows do not change with each view selection.

Fig. 2-35 DME analyzer GUI Tabs

2.4.4 Common DME Analyzer Controls:

'Settings window' and 'Arm window' controls are available in all DME analyzer tab views. The Settings window 'Inputs' button is common to ALL analyzer GUIs and is described in the section “Settings Window(s)” on page 2-28. The 'Arm window', also common to ALL analyzer GUIs, is described in the section “Arm Window” on page 2-29. Operation of the DME analyzer GUI Settings window 'Triggers.' button is common in all DME analyzer tab views and is described in the following sub section.

2.4.4.A Triggers Button

Pops up a Trigger Settings GUI for setting various Trigger controls.

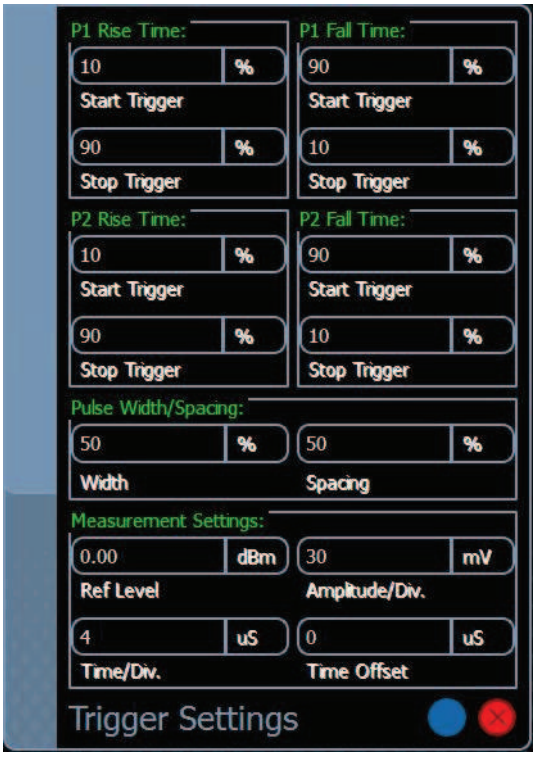

Fig. 2-36 DME Trigger Settings GUI

DME Trigger Settings GUI

P1 / P2 Rise Time window(s):

Displays or sets the Start and Stop percentage points of the pulse leading edge from which Rise Time measurements are derived.

P1 / P2 Fall Time windows(s):

Displays or sets the Start and Stop percentage of the pulse trailing edge from which Fall Time measurements are derived.

Pulse Width Spacing window:

Contains the data field parameters applied to Pulse Width and Pulse Spacing measurements.

Width:

Displays or sets the percentage point of the Pulses from which Pulse Width measurements are derived.

Spacing:

Displays or sets the percentage point of the Pulses from which Pulse Spacing measurements are derived.

Measurement Settings window:

Contains the data field parameters affecting the aspect of the viewed waveform.

RF Level :

Displays or sets the RF reference level.

Time/Div:

Displays or sets the Time per division aspect (horizontal).

Amplitude/Div:

Displays or sets the Amplitude per division aspect (vertical).

Time Offset:

Displays or sets the Trigger Time offset for positioning the waveform within the grid.

2.4.4.B Voltage vs. Time Tab

Displays the digitized waveform as captured Voltage levels (vertical) across the Time domain (horizontal).

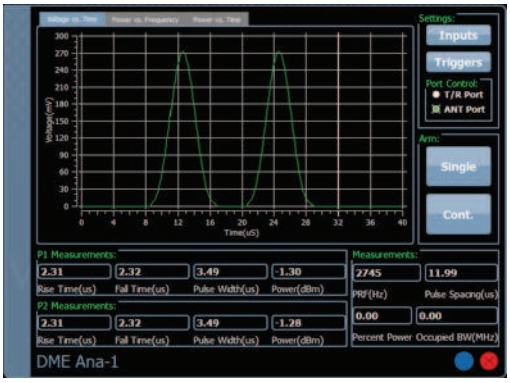

Fig. 2-37 Voltage vs. Time Tab view

2.4.4.C Power vs. Frequency Tab

Displays the digitized waveform as captured Power levels (vertical) across the Frequency domain (horizontal).

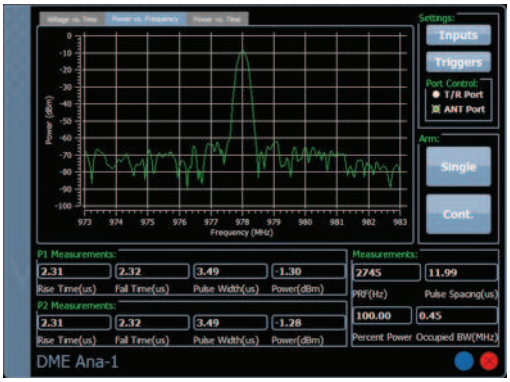

Fig. 2-38 Power vs. Frequency Tab view

2.4.4.D Power vs. Time Tab

Displays the digitized waveform as captured Power levels (vertical) across the Time domain (horizontal).

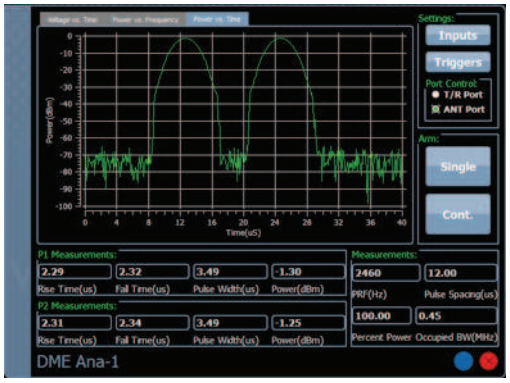

Fig. 2-39 Power vs. Time Tab view

2.4.4.E P1 / P2 Measurements Window(s)

Rise Time(us) data field:

Displays the derived (Triggers: P1/P2 Rise Time: Start/Stop Trigger) Rise Time of the captured DME pulse indicated.

Fall Time(us) data field:

Displays the derived (Triggers: P1/P2 Fall Time: Start/Stop Trigger) Fall Time of the captured DME pulse indicated.

Pulse Width(us) data field:

Displays the derived (Triggers: Pulse Width/Spacing: Width) Pulse Width time of the captured DME pulse indicated.

Power(dBm) data field:

Displays the derived Pulse Power of the captured DME pulse indicated.

2.4.4.F Measurements Window

PRF(Hz) data field:

Displays the derived Pulse Repetition Frequency of the captured DME pulse pair.

Pulse Spacing(us) data field:

Displays the derived (Triggers: Pulse Width/Spacing: Spacing) Pulse Spacing of the captured DME pulse pair.

Percent Power data field:

Displays the derived (Inputs: Pct.Pwr Span) Percent Power (within the Occupied Band Width) of the captured DME pulse pair.

Occupied Band Width(MHz) data field:

Displays the derived (Inputs: OBW Pct.) Occupied Band Width of the captured DME pulse pair.

2.4.5 VHF Analyzer GUI

Tabs across the top of the VHF Analyzer GUI provide a variety of measurements and view selections tailored specifically for analyzing VHF signals employing either simple tone or more complex digital modulation schemes.

Fig. 2-40 VHF Analyzer GUI view tabs

2.4.5.A Common VHF Analyzer Controls

'Settings window' and 'Arm window' controls are available in all VHF analyzer tab views. The Settings window 'Inputs' button is common to ALL analyzer GUIs and is described in the section “Settings Window(s)” on page 2-28. The 'Arm window', also common to ALL analyzer GUIs, is described in the section “Arm Window” on page 2-29. Operation of the VHF GUI Settings window 'VDL Config.' button is common in all VHF analyzer tab views and is described in the following sub section.

VDL Config. button:

Pops up a VDL Settings GUI.

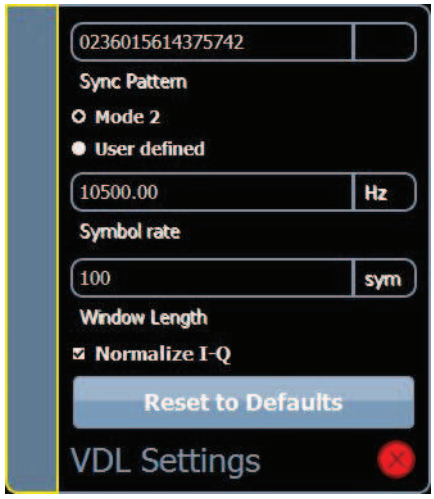

Fig. 2-41 VDL Settings GUI

VDL Settings GUI

Sync Pattern data field:

Displays or sets (when the 'User defined' option is selected) the expected Sync Pattern of the data packet of interest.

Mode 2 option:

Mutually exclusive with the 'User defined' option. Selects VDL Mode 2 as the data packet of interest. When selected, this option automatically sets the Sync Pattern data field to the expected VDL Mode 2 sync pattern.

User defined option:

Mutually exclusive with the 'Mode 2 option'. Enables the user to set the Sync Pattern data field to any user defined sync pattern.

Symbol rate data field: (10000.00 to 11000.00)

Displays or sets the expected Symbol rate of the data packet of interest.

Window Length data field:

Displays or sets the number of symbols to use in deriving VDL measurements. Setting to 0 or a number greater than the number of received symbols will use all..

Normalize I-Q check box:

If checked, the constellation points are scaled to fill in unit circle.

2.4.5.B ACP Tab

ACP (Adjacent Channel Power) measures the way a channel of interest (center frequency) distributes power across its bandwidth and its two adjacent channels. The measurements are derived from the power spectrum across the band widths of the center channel and the surrounding upper and lower channels.

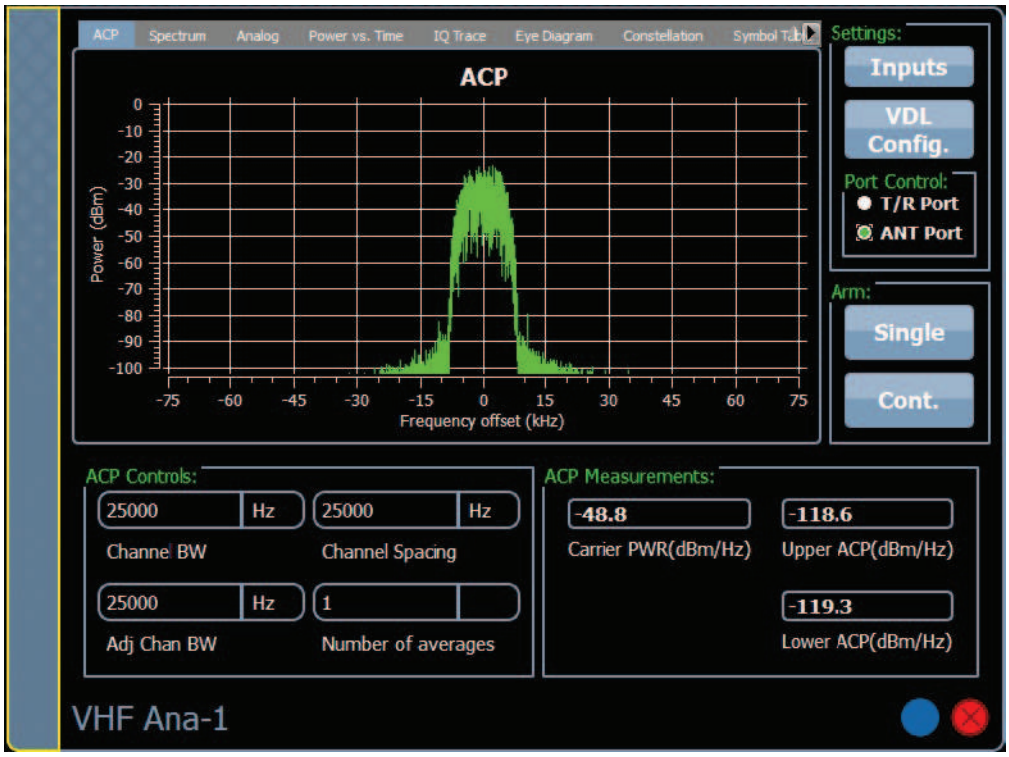

Fig. 2-42 VHF Analyzer GUI ACP Tab view

ACP Controls window:

Channel BW data field: (1000.0 to 50000.0)

Displays or sets the Band Width of the Center Channel (Inputs button: Frequency).

Channel Spacing data field: (0.0 to 50000.0)

Displays or sets the spacing of adjacent channels for determining adjacent channel center frequencies (Inputs button: Frequency +/- Channel Spacing).

Adj Chan BW data field: (1000.0 to 50000.0)

Displays or sets the Band Width of the upper and lower adjacent channels.

Number of averages data field: (1 to 1000)

Displays or sets the number of sweep samples used in deriving the measured values.

ACP Measurements window:

Carrier PWR (dBm/Hz) data field:

Displays the derived center channel Power level (dBm) across the Center Channel BW spectrum (Hz).

Upper ACP (dBm/Hz) data field:

Displays the derived channel (Center Channel + Channel Spacing) Power (dBm) in the Upper Adj Chan Band Width spectrum (Hz).

Lower ACP (dBm/Hz) data field:

Displays the derived channel (Center Channel - Channel Spacing) Power (dBm) in the Lower Adj Chan Band Width spectrum (Hz).

2.4.5.C Spectrum Tab

Provides graphical display and measurement of peak power levels across the frequency domain. Spectral analysis can be performed over a maximum span of 200 MHz with variable resolution bandwidths from1 Hz to 10 MHz (limited by span).

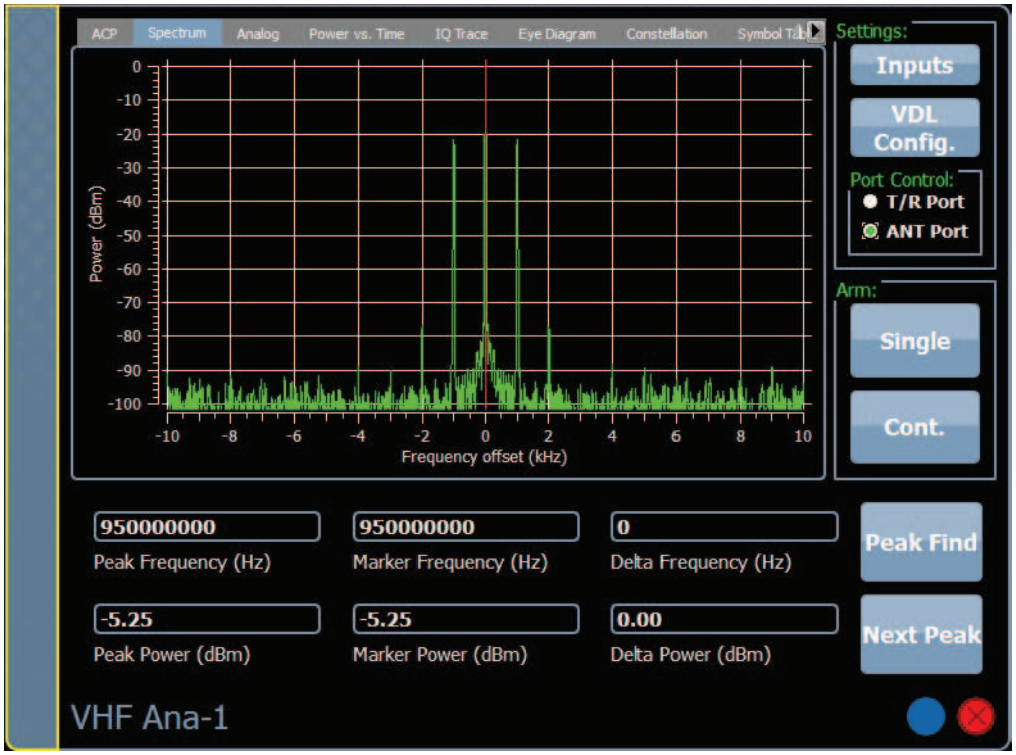

Fig. 2-43 VHF Analyzer GUI Spectrum Tab view

Peak find button:

Sets the marker at the highest peak and updates the derived measurement values

Next Peak button:

Each click moves the marker to the next highest peak and updates the derived measurement values for the current marker position.

Peak Frequency (Hz) data field:

Displays the Frequency measurement of the highest peak.

Peak Power (dBm) data field

Displays the Power measurement of the highest peak.

Marker Frequency data field

Displays the Frequency measurement of the current peak marker position.

Marker Power (dBm) data field

Displays the Power measurement of the current peak marker position.

Delta Frequency data field

Displays the Frequency difference between the highest peak frequency measurement and the current peak marker frequency measurement.

Delta Power (dBm) data field

Displays the Power level difference between the highest peak power measurement and the current peak marker power measurement.

2.4.5.D Analog Tab

Tailored primarily for measuring the quality of a single modulated IDENT tone (~1020 Hz). Accurately measures SINAD (Signal-to-noise and Distortion), Distortion, Percent of Modulation, and Tone Frequency.

Fig. 2-44 VHF Analyzer GUI Analog Tab view

Analog Measurements window:

SINAD (dB) data field:

Displays the Signal to Noise and Distortion measurement of the indicated Tone frequency signal.

Distortion (%) data field:

Displays the amount of distortion measured on the indicated Tone frequency signal.

Percent modulation(%) data field:

Displays the percent of modulation of the indicated Tone frequency signal.

Tone frequency (Hz) data field:

Displays the frequency of the detected modulated tone.

Analog Control window:

Number of sweeps data field: (1 to 20)

Displays or sets the number of sample sweeps used in deriving an average measurement.

2.4.5.E Power vs. Time Tab

Displays the digitized waveform as captured Power levels (vertical) across the Time domain (horizontal).

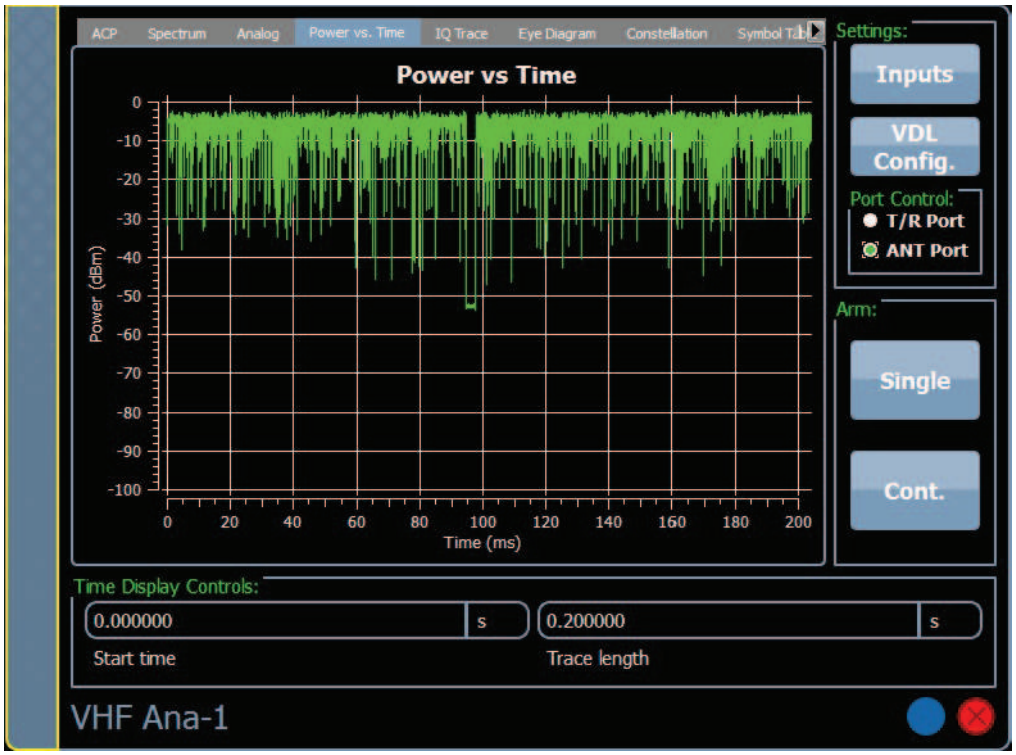

Fig. 2-45 VHF Analyzer GUI Power vs. Time Tab view

Time Display Controls window:

Start time data field:

Displays or sets the time offset used in displaying the captured digitized waveform.

Trace length data field:

Displays or sets the time span used in displaying the captured digitized waveform.

2.4.5.F IQ Trace Tab

A typical digital phase-shift keying demodulation process produces a stream of I-Q points. The I Data represents the In-phase axis and the Q Data is that of the quadrature axis.

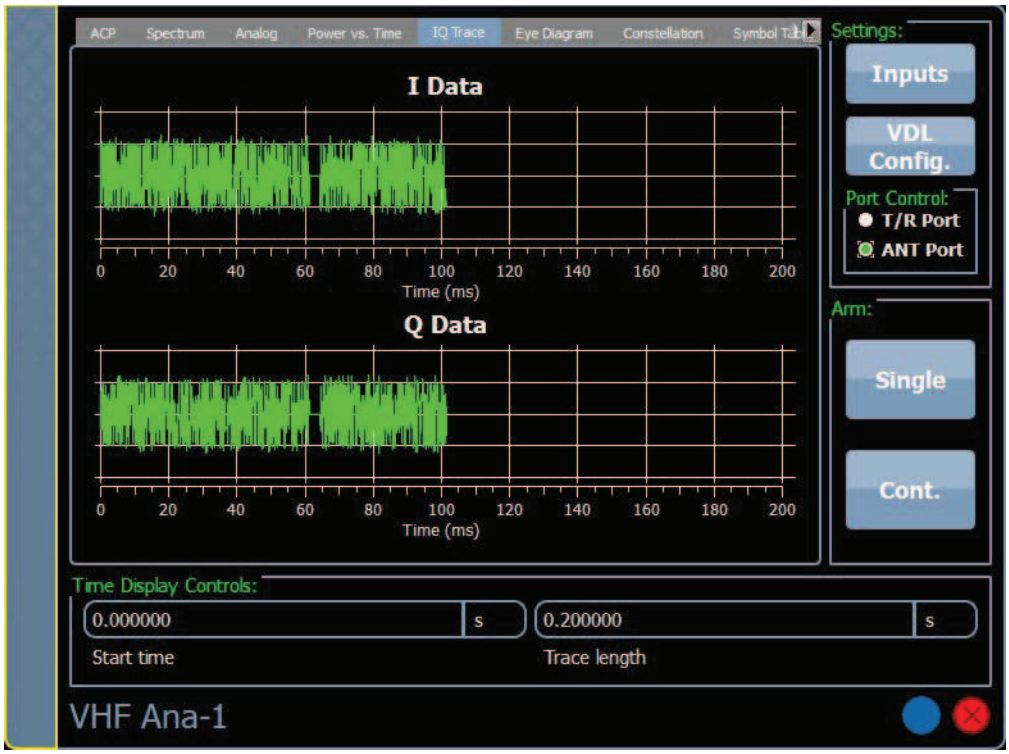

Fig. 2-46 VHF Analyzer GUI IQ Trace Tab view

Time Display Controls window:

Start time data field:

Displays or sets the time offset used in displaying the captured digitized waveform.

Trace length data field:

Displays or sets the time span used in displaying the captured digitized waveform.

2.4.5.G Eye Diagram Tab

Digital data signals are repetitively sampled (Number of Traces) and represented in the vertical axis. The data rate of the signal triggers the horizontal sweep (Number of eyes). Timing synchronization & jitter affect the width of the eye, while the height (opening) of the eye is indicative of the amount of distortion or noise in the signal.

Distortion due to intersymbol interference and noise appears as closure of the eye pattern. An open eye pattern corresponds to minimal signal distortion.

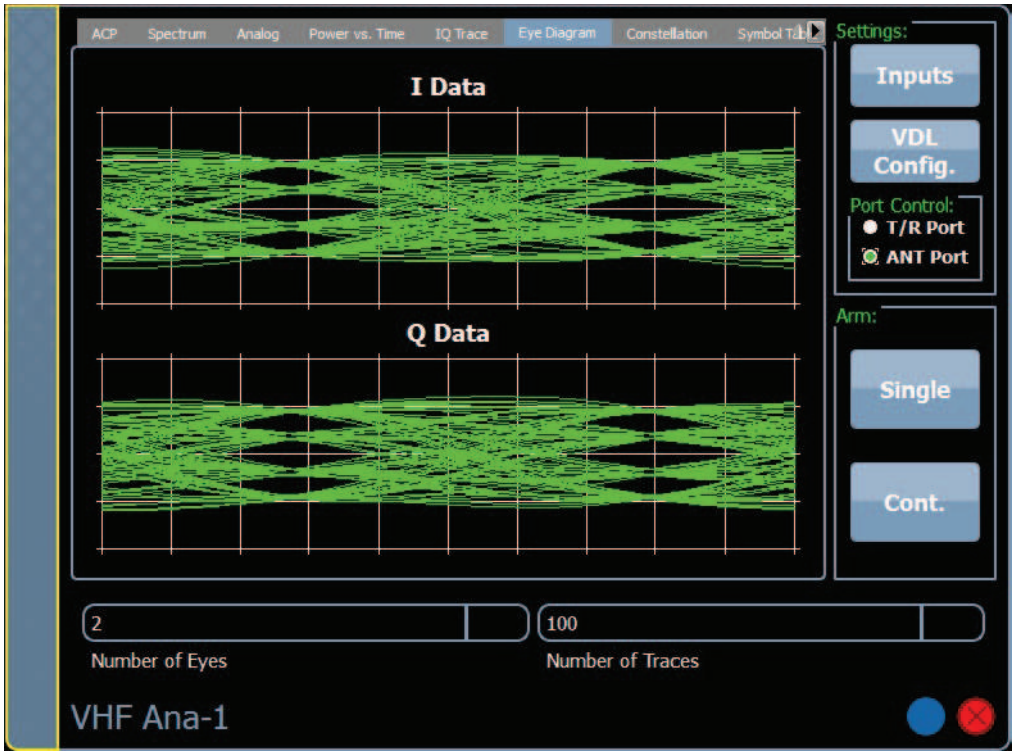

Fig. 2-47 VHF Analyzer GUI Eye Diagram Tab view

Number of Eyes data field:

Displays or sets the number of symbol intervals in a single sweep.

Number of Traces data field:

Displays or sets the number of sweeps to superimpose in the eye diagram.

2.4.5.H Constellation Tab

Provides a convenient way to represent various digital Phase-Shift Keying (PSK) schemes. The derived data variables of the sampled signal are displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis at symbol sampling instants. The Constellation plot provides a visual comparison of the two variables in the data set, to determine the relationship between the two variables. It can be used to recognize the type of interference and distortion in a signal. Error Vector Magnitude (EVM) is a vector in the I-Q plane between the ideal constellation point and the actual point received.

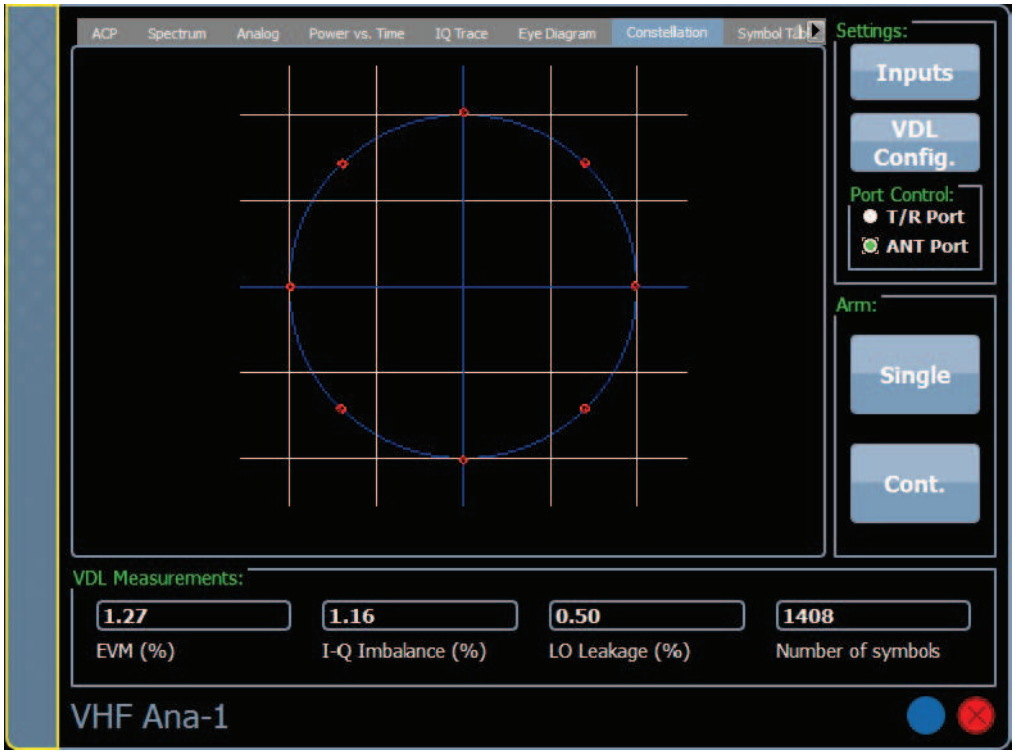

Fig. 2-48 VHF Analyzer GUI Constellation Tab view

VDL Measurements window:

EVM (%) data field:

Displays the derived Error Vector Measurement as a percentage

I-Q Imbalance (%) data field:

Displays the level of imbalance between the derived I and Q points.

LO Leakage(%) data field:

Displays the derived offset of the symbol constellation from center.

Number of symbols data field:

Displays the derived number of symbols represented in the demodulated data packet stream of I-Q points.

2.4.5.I Symbol Table Tab

Provides visualization of the actual decoded VDL data packet.

Fig. 2-49 VHF Analyzer GUI Symbol Table Tab view

VDL Display Mode window:

All options are mutually exclusive

Symbols option:

Displays the derived data packet in a representative symbol format.

Bits option:

Displays the derived data packet in a binary bit (ones and zeros) format.

Mode2 frame option:

Displays the derived data packet in a decoded text format.

VDL Measurements window:

EVM (%) data field:

Displays the derived Error Vector Measurement as a percentage

I-Q Imbalance (%) data field:

Displays the level of imbalance between the derived I and Q points.

LO Leakage(%) data field:

Displays the derived offset of the symbol constellation from center.

Number of symbols data field:

Displays the derived number of symbols represented in the demodulated data packet stream of I-Q points.

2.5 ELT MANUAL INFORMATION

ELT is only provided with option ATES-ELT.

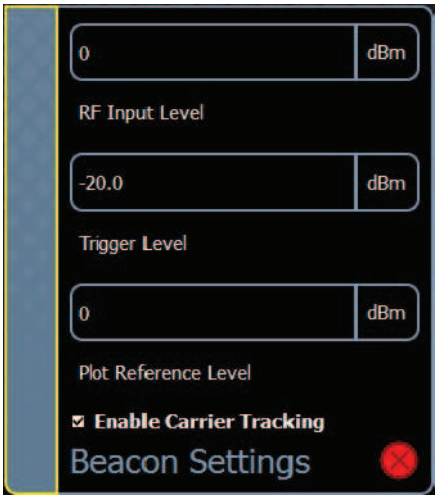

Fig. 2-50 ELT Beacon Settings

2.5.1 Beacon Spectrum Screen

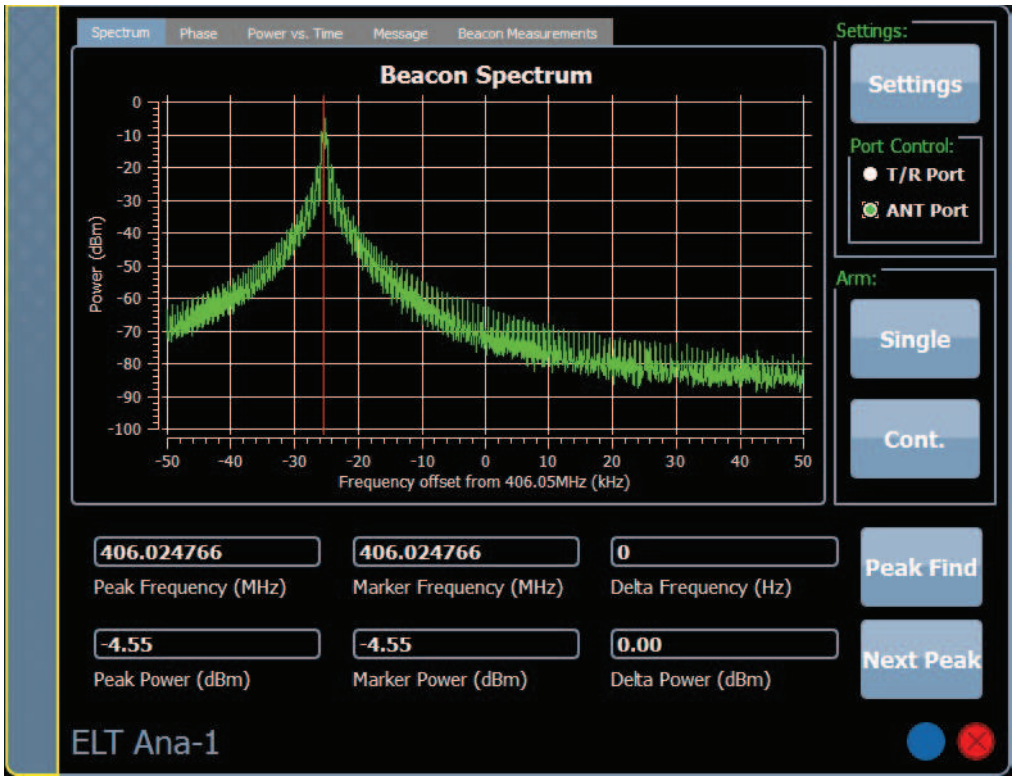

Fig. 2-51 Beacon Spectrum Screen

This plot displays the RF spectrum from 406 MHz to 406.1 MHz (ELT band).

Peak Frequency:

Frequency of highest spectral peak found in 406-406.1 MHz band

Peak Power:
The power of this peak

Marker Frequency:
The frequency of the current marker location.

Marker Power:
The spectral power at that frequency.

Delta Frequency:
The frequency offset of the current marker location from the peak frequency.

Delta Power:
The power at the current marker relative to the peak power.

After a capture, pressing the "Peak Find" button will set the marker to the peak frequency.

Pressing the "Next Peak" button will find the next highest peak after the current marker.

Pressing "Peak Find" again will reset the marker to the peak frequency. Currently you can only step through a limited number (20) of peaks with the "Next Peak" function.

Note that some external attenuation will be needed to avoid overloading the digitizer input. All power measurements from the analyzer will need to be adjusted for this to get true power values.

2.5.2 Phase Screen

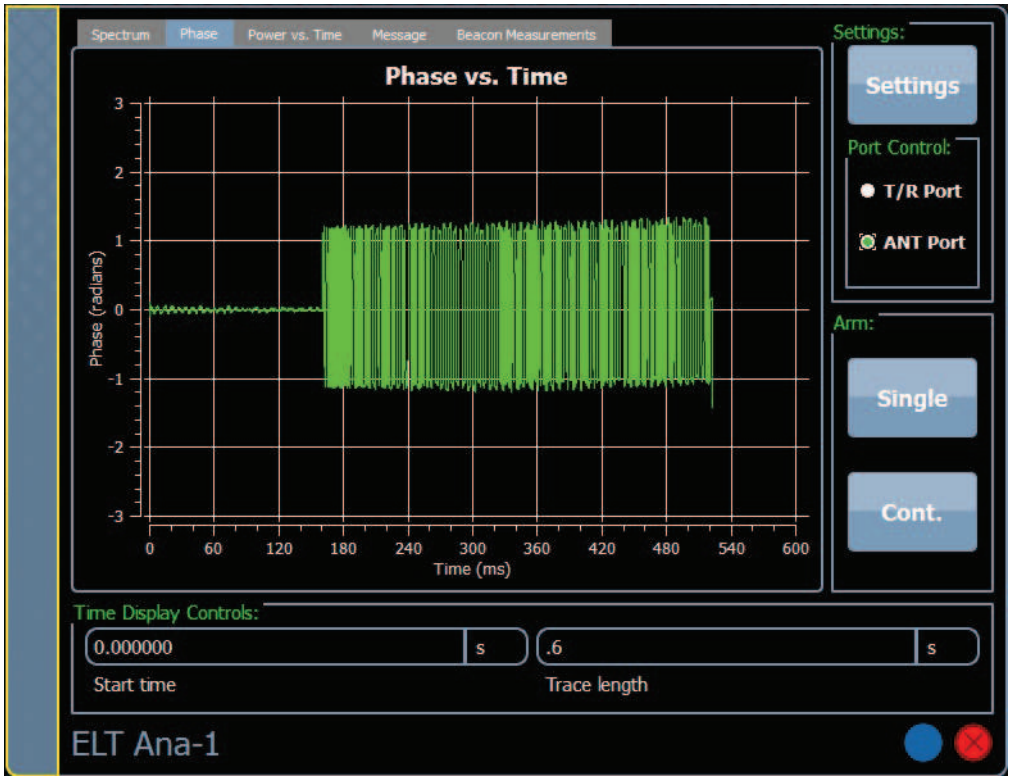

Fig. 2-52 Phase Screen

This plot shows the measured signal phase vs. time over the captured ELT signal.

Time is measured relative to the detected start of the ELT signal.

Measured phase should be zero for the first 160 ms (carrier-only signal), followed by biphase-L phase-modulated data with a modulation index of 1.1 radians.

Time controls at the bottom can be used to zoom in on specific parts of the signal.

Start time:
Sets the time (relative to the start of the ELT signal) when the plot starts.

Trace length:
Sets the length of time displayed on the plot.

Setting start time to 150 ms and trace length to 20 ms will zoom in on the beginning of the phase modulation and the first few synchronization bits.

2.5.3 Power versus Time Screen

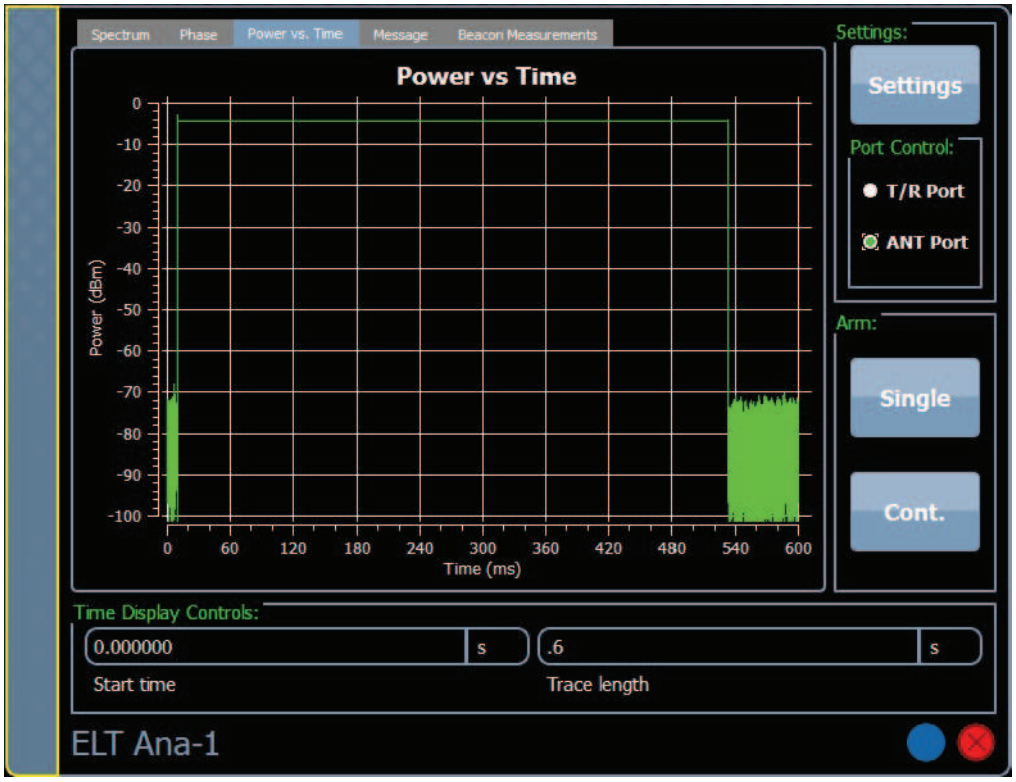

Fig. 2-53 Power versus Time Screen

This plot shows the measured signal power vs. time over the captured ELT signal.

Time controls at the bottom can be used to zoom in on specific parts of the signal.

Start time:
Sets the time (relative to the start of the captured data) when the plot starts.

Trace length:
Sets the length of time displayed on the plot.

Analyzer begins capturing data 10 ms before ELT signal is detected.

Setting start time to 0 ms and trace length to 20 ms will zoom in on power-on transients.

2.5.4 Message Screen

Fig. 2-54 Message Screen

This screen displays the decoded information from the ELT beacon signal. The specific fields displayed will depend on the beacon protocol used by the analyzed beacon.

Message:

The entire received message after the initial synchronization bits, displayed in hex. This will be 120 bits for a long format message or 88 bits for a short message.

Beacon ID:

The 15-hex digit beacon identification code. (This consists of the 60 bits following the first message bit which specifies the long or short beacon format.)

Country:

The country of origin of the beacon, displayed both in text and as the Maritime Identification Digits assigned by ITU.

Protocol:

The label of this field will change to denote whether the beacon is using a standard location protocol, national location protocol, user protocol, or user location protocol. The field contents will show the specific protocol used. For example, a "Standard location protocol" with "ELT - address" denotes an ELT beacon specifying a 24-bit aircraft address and a location.

Error Correction Fields:

BCH-1: This displays the received BCH parity bits (in hex) for the first protected data field of the beacon, and whether the error-correction code passed (VALID).

BCH-2: This displays the received BCH parity bits (in hex) for the second protected data field of the beacon (if present), and whether the error-correction code passed (VALID). This field is only present for long-format beacons and will not be displayed for a short beacon.

Aux locator type:

This shows what kind of auxiliary radio locator (if any) the beacon uses. Possible values displayed are "None", "121.5 MHz", "9 GHz SART", or "Other".

Identification Information:

The specific data fields displayed here will depend on the specific beacon protocol used. Possible identification information for an ELT include:

ELT 24-bit address:	The 24-bit aircraft address.
Aircraft Registration:	Marking: 7-character registration marking.
Operator Designator:	3-letter ICAO operator designator
Serial number:	Serial number assigned by operator
Certificate number:	C/S approval certificate number

Location Information

Location information is displayed only for long-format beacons that transmit location information.

Latitude:

Beacon latitude in degrees, minutes, seconds.

Longitude:

Beacon longitude in degrees, minutes, seconds.

Position source:

Whether the position information is provided by an external or internal navigation device.

Note that when there is no valid location information present, the default position transmitted will be all one bits, corresponding to an invalid location at 127 degrees North, 255 degrees East.

2.5.5 Beacon Measurements Screen

Fig. 2-55 Beacon Measurements Screen

This screen displays a number of measurements specified in C/S T.001 "Specification for COSPAS-SARSAT 406 MHz Distress Beacons".

Carrier Power:

The measured carrier power in dBm.

Pre-burst power:

The measured power 1 ms before the start of the ELT signal. Note that measured power levels must be corrected for any external attenuation.

Power Rise Time:

The time required for the measured signal power to rise from 10% of the ELT signal power to 90% power (in ms).

Carrier Duration:

The length of the carrier-only portion of the transmission (in ms). Nominal value is 160 ms.

Burst Duration:

The entire length of the received ELT transmission. Nominal duration is 440 ms for a short format message, or 520 ms for a long format message.

Carrier Frequency:

The measured frequency of the ELT signal.

Bit rate:

The measured bit rate of the received ELT signal in bits per second. Nominal rate is 400 bps.

Modulation Rise Time:

The measured time for the phase modulation to rise from -90% of the modulation index to +90% of the modulation index on rising edges.

Modulation Fall Time:

The measured time for the phase modulation to fall from 90% of the modulation index to -90% of the modulation index on falling edges.

Mod Symmetry:

The ratio of the difference in duration between the positive and negative parts of a bit modulation to the duration of the entire bit. Nominal value of symmetry is 0; it is specified to be less than 0.05 by C/S T.001.

Mod Index:

The measured modulation index in radians. Nominal value is 1.1 radian.

2.6 REMOTE OPERATION

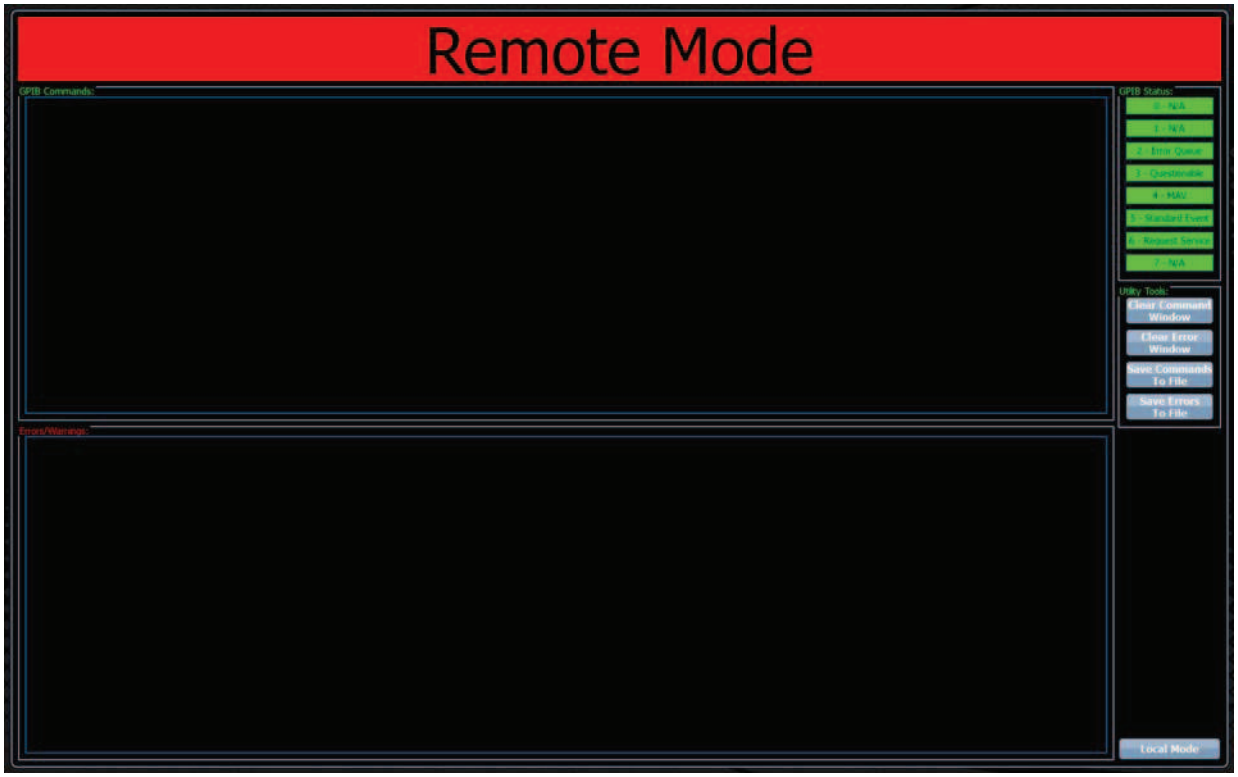

Fig. 2-56 Remote Mode

The Test Set may be operated remotely via GPIB interface standards. The command syntax and style is compliant with SCPI (Standard Commands for Programmable Instruments). Several SCPI features have been implemented in the Test Set to facilitate system integration. These features include the extended status reporting structure, the error numbering scheme, the command mnemonic derivation rules (i.e. long and short form) and many of the frequently used commands.

Some of the features included in the Test Set are not defined by the SCPI standard; but, the Test Set does meet the basic form and function to be compliant with SCPI requirements.

GPIB Status:

Each box represents the 8 bits of the GPIB STATUS byte. The boxes have the bit number followed by the description of the bit. If there is a change in the status byte data, the corresponding box will turn red in color. If the box is then pressed (clicked with a mouse) a message box will appear with the data for this event.

Utility Tools:

Clear Command Window Button:

Pressing this button will cause the top, GPIB Commands, window to clear its contents.

Clear Error Window Button:

Pressing this button will cause the bottom, Errors/Warnings, window to clear its contents.

Save Commands To File Button:

Pressing this button will cause the contents of the top, GPIB Commands, window to be saved to a file on the hard drive. The file name is created by the current timestamp and has an extension of .html. The GPIB Commands window will show what the location of the file is so the user is able to retrieve it.

Save Errors To File Button:

Pressing this button will cause the contents of the bottom, Errors/Warnings, window to be saved to a file on the hard drive. The file name is created by the current timestamp and has an extension of .html. The Errors/Warnings window will show what the location of the file is so the user is able to retrieve it.

Local Mode Button:

Pressing this button will cause the Remote Mode window to close and the main menus to become visible again for operator use.

2.6.1 GPIB Remote Operation

The Test Set may be operated remotely via an interface conforming to IEEE 488.2 standard.

Chapter 3 - Hardware Specifications

3.1 GENERAL

3.1.1 AC Power Requirements

The unit will operate over a voltage range of 100 to 240 VAC at 50 to 60 Hz, 1000 W maximum.

3.1.2 Frequency / Time Reference

Aging	0.001ppm per day
	0.01ppm per year
Temperature Stability	Typically better than ± 0.01ppm

3.1.3 External Reference Input

0.4V to 4 V peak-to-peak into 50 ohms nominal

3.1.4 Temperature and Humidity Range

Operating	0° C to +50° C
Storage	-20° C to +70° C
Humidity	5% to 95%
Ventilation	No less than 4 cm clearance on back and sides

3.1.5 Warm-up (for specified accuracy)

10 minutes

3.1.6 Size

17.5" wide, 8" high, 24" deep

3.1.7 Weight

60 lbs

3.1.8 Packaging

MIL-PRF-28800F Class 3

Manual bench or rack-mount option

3.2 USER INTERFACE

Front Panel

- Color LCD touch screen
- Power On/Off Control
- 2 - USB ports (USB 2.0 Compliant)
- Resource I/O Access

Rear Panel

- Standard GPIB remote interface (IEEE 488.2 Compliant)
- 10Mhz
- Ethernet

3.3 SIGNAL GENERATOR

3.3.1 Frequency Range

0.1 to 3000 MHz 1 Hz Resolution

3.3.2 Output Amplitude

GEN (TX) Port:	-120 dBm to +10 dBm
	0.01 dB increments
T/R Port:	-30 dBm to -120 dBm
	0.01 dB increments

3.3.3 Accuracy

GEN (TX) Port:	± 1.5 dB (> -110 dBm)
	± 3.0 dB (< -110 dBm)
T/R Port:	± 1.5 dB (> -120 dBm)
(Installed as option ATB-TR)	± 3.0 dB (< -120 dBm)

3.3.4 Spurious

Phase Noise	-105 dBc/Hz @ 20 kHz offset
Harmonics	< -25 dBc
Non-Harmonics	< -50 dBc

3.3.5 Modulation

Simple AM

Waveform	Sinusoidal, single tone
Rate	1 kHz to 50 kHz, 1 Hz resolution
Depth	0 to 99%, 1% resolution
Accuracy	±4% of set depth ± 1%
THD	< 2% (1kHz rate, < 80% mod)

Simple FM

Waveform	Sinusoidal, single tone
Rate	1 kHz to 500 kHz, 1 Hz resolution
Deviation	10 Hz to 500 kHz, 10 Hz resolution
Accuracy	±3% of set deviation
THD	< 1.5% at max deviation

Digital / Arbitrary

Waveform	I/Q arbitrary waveform generator
Bandwidth	± 20 MHz at 85 MHz carrier
Analog Input	Single ended, 100 KOhm, 0.5 Vrms

3.4 DIGITIZER / RECEIVER

- Installed as option ATB-ANL

3.4.1 Frequency Range

250 kHz to 3000 MHz 1 Hz Resolution

3.4.2 Frequency Measurement

As per frequency reference

3.4.3 RF Input Level

ANT (RX) Port	+30 dBm
T/R Port	+53 dBm Peak Power, > 50W
(Installed as option ATB-TR)	1 minute duty cycle (1 on -3 off)

3.4.4 Sensitivity

ANT (RX)Port	-100 dBm (>10dB SINAD, FM, 1kHz Rate, 6kHz Deviation, 25kHz BW, 300 Hz to 3.4kHz AF Filter, Preamp OFF)

3.4.5 Amplitude Measurement

Direct	+30 dBm max
< 500 MHz	< ±1.0 dB accuracy
500 MHz < 3 GHz	< ±0.7 dB accuracy

3.4.6 ELT (Emergency Locator) Analysis

- Installed as option ATES-ELT.

The instrument will measure the following specified beacon characteristics:

- Carrier frequency
- Carrier power
- Carrier power 1ms before start of burst.
- Bit rate
- Start time of transmission (90% power point, relative to returned samples)
- Duration of burst
- Duration of unmodulated carrier
- Modulation phase
- Modulation rise time, fall time
- Modulation symmetry

And will also provide:

- I/Q samples for examining time plots of modulation
- Spectrum from 406.0 to 406.1 MHz for evaluating spurious emissions
- All received bits, either 112 or 144 for short/long formats.
- Return bit fields broken into:
  - Protected data fields 1 and 2, BCH field 1 and 2, non-protected data field (short message has PDF-1, BCH-1, non-protected field; long message has PDF-1, BCH-1, PDF-2, BCH-2)
  - Provide calculated BCH-1, BCH-2 for comparison with received bits. (PDF-1 contains short/long flag and the 15-Hex ID number)
- Decoded protocol information from the short/long format data, including:
  - Protocol used (e.g. ELT serial user protocol, ELT national location protocol)
  - Country
  - Type of auxiliary radio locator
  - Identification data (e.g. aircraft registration, 24-bit address, call sign, etc, depending on mode)
  - Latitude/longitude (for long-format location protocols)

3.5 ADF SPECIFIC DATA

3.5.1 Modulation

Modulation Tones		
	Frequency	Adjustable from 10 Hz to 18000 Hz, Default 1020 Hz
	Resolution	1 Hz
	Accuracy	±0.01%
	Distortion	< 0.40% THD
Amplitude Modulation		
	Range (per tone)	Total % MOD not to exceed 99%
	1020 Hz IDENT	0-99%, Default 40%
	Overall accuracy	2% of setting for 5% to 90% AM
	Tone distortion	0.5% maximum

3.6 ILS SPECIFIC DATA

3.6.1 MODULATION

Modulation Tones		
	Frequencies	90 Hz, adjustable from 72 Hz to 108 Hz 150 Hz, adjustable from 120 Hz to 180 Hz 1020 Hz ident, adjustable from 10 Hz to 18000 Hz
	Resolution	1 Hz
	Accuracy	0.01%
	Distortion	< 0.40% THD
90/150 Hz Phase		
	Range	Adjustable from 0.0 to 359.9°
	Resolution	0.1°
Amplitude Modulation		
	Range (per tone)	Total % mod not to exceed 99%
	1020 Hz IDENT	0-99%, Default 20%
	90 Hz	0-99%, Default 20%
	150 Hz	0-99%, Default 20%
	Overall accuracy	2% of setting for 5% to 90% AM
	Tone Distortion	0.5% maximum
DDM		
	Default	0.000 DDM
	Variable Range	0.400 (Localizer mode) 0.800 (Glideslope mode)
	Resolution	0.001 DDM
	Total System Error	
	Localizer	0.001 DDM from 0.000 to 0.045 DDM ± 2% from 0.045 to 0.200 DDM
	Glideslope	0.001 DDM from 0.000 to 0.045 DDM ± 2% from 0.045 to 0.400 DDM

3.7 VOR SPECIFIC DATA

3.7.1 Modulation

Modulation Tones	
Frequencies	30 Hz reference, adjustable from 20 Hz to 40 Hz 30 Hz variable, adjustable from 20 Hz to 40 Hz 9960 Hz, adjustable from 9000 Hz to 11000 Hz 1020 Hz ident, adjustable from 10 Hz to 18000 Hz
Resolution	1 Hz
Accuracy	0.01%
Distortion	< 0.40% THD
9960 Hz FM	
Deviation	240 to 540 Hz
Radial Range	000.00 to 359.99 degrees
Radial Accuracy	0.05°
Amplitude Modulation	
Range (per tone)	Total % mod not to exceed 99%
1020 Hz IDENT	0-99%, Default 30%
30 Hz Variable	0-99%, Default 30%
9960 Hz	0-99%, Default 30%
Overall Accuracy	2% of setting for 5% to 90% AM
Tone Distortion	0.5% maximum

3.8 IDENT SPECIFIC MODE (ADF, ILS, AND VOR)

Ident Code:	
Range	A-Z, 0-9
Length	1 to 5 characters
Rate	1 to 65 seconds
Rate resolution	1 second
Dot Time:	
Range	Adjustable from 50 to 250 ms, Default 150 ms
Resolution	1 ms
Dash Time:	
Range	Adjustable from 150 to 750 ms, Default 450 ms
Resolution	1 ms
Dot/Dash Spacing:	
Range	Adjustable from 50 to 250 ms, Default 150 ms
Resolution	1 ms
Character Spacing:	
Range	Adjustable from 150 to 750 ms, Default 450 ms
Resolution	1 ms

3.9 VHF GENERATOR SPECIFIC DATA

3.9.1 Generator Modes

Single-File Mode:	
File play mode	Continuous or from 1 - 4095 times
Play-List Mode:	

List Play Mode	Continuous or from 1 - 4095 times
List Entries	1 to 127
Plays per Entry	1 to 4095

AM Modulation:

Frequency	Adjustable from 10 Hz to 50000 Hz, Default 1000 Hz
Modulation %	0-99%, Default 30%
Resolution	1 Hz
Freq. Accuracy	± 0.005%
Overall Accuracy	± 2% of setting for 5% to 90% AM
Distortion	< 0.40% THD

3.10 VDB GENERATOR SPECIFIC DATA

3.10.1 MODES

Single-File Mode:

File play mode	Continuous or from 1 - 4095 times

Play-List Mode:

List Play Mode	Continuous or from 1 - 4095 times
List Entries	1 to 127
Plays per Entry	1 to 4095

VDB Burst Generation:

Input Data	From a file or array
Filter ALPHA	0.0 to 1.0
Oversample Factor	2 to 16
RF Ramp Filter	Adjustable length Cosine response

3.11 DME ANALYZER SPECIFIC DATA

3.11.1 Measurements

Trigger Type	Software or RF level triggered
Sweep Time	0.1 to 10.0 seconds
Percent Power	Adjustable within spectrum analysis span

Occupied Bandwidth:

Measured Width	Adjustable within spectrum analysis span
Percent	Adjustable from 0% to 100%

Rise Time:

Start Edge Trigger	0% to 100%, Default 10 %
Stop Edge Trigger	0% to 100%, Default 90%
Resolution	10 ns steps
Accuracy	± 2% from 1.0uS to 4uS

Fall Time:

Start Edge Trigger	0% to 100%, Default 90 %
Stop Edge Trigger	0% to 100%, Default 10%
Resolution	10 ns steps
Accuracy	± 2% from 1.0uS to 4uS

Pulse Width:

Trigger	0% to 100%, Default 50 %
Range	20 ns to 2000 ns in 10 ns steps
Accuracy	± 2% from 2.0uS to 5uS

Pulse Spacing:

Trigger	0% to 100%, Default 50 %
Range	20 ns to 5000 ns in 10 ns steps
Accuracy	± 2% from 10uS to 40uS

3.12 VHF ANALYZER SPECIFIC DATA

3.12.1 Measurements

Trigger type	Software or RF level triggered
Sweep time	0.1 to 10.0 seconds
VDL:	
Symbol Clock	10000 Hz to 11000 Hz
Oversample Factor	2, 4, 8, 16, 32
Sync Pattern	Customizable from 0 (off) to 50 symbols
IQ Offset	Enabled or disabled (default)
Interpolation	Linear or cubic spline (default)
Symbol power	
Range	Measurable at any symbol in memory
EVM	
Range	Configurable from 1 to number of symbols in memory
IQ Imbalance	
Range	Configurable from 1 to the number of symbols in memory
IQ Offset	
Range	Configurable from 1 to the number of symbols in memory
Symbol Decoding	
Range	To the end of the first detected data burst
ACP:	
Channel Spacing	0 Hz to 50000 Hz
Channel Bandwidth	1000 Hz to 50000 Hz
# of Channels	Carrier, first lower, first upper
Analog Measurements:	
AM Range	900 Hz to 1100 Hz for accuracy stated (700 Hz to 3000 Hz with diminished accuracy)
Percent Modulation	
# of sweeps	1 to 20
Accuracy	± 3 %
SINAD	
# of sweeps	1 to 20
Filter Type	C-Message
Distortion	
# of sweeps	1 to 20
FM Range	10 Hz to 500 kHz
Accuracy	± 3 %

Chapter 4 - Software Installed

4.1 SOFTWARE INSTALLED

This chapter covers the test set software.

4.1.1 General

The following software has been pre-installed:

P/N:	Description:
89306	Software Package, Windows 7 Professional 32 bit
87346	ATB-7300 System Software

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Chapter 5 - Shipping

5.1 INTRODUCTION

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

5.2 AUTHORIZATION

Do not return any products to the factory without first receiving authorization from Aeroflex Customer Service Department.

5.3 CONTACT

Aeroflex Customer Service Dept.

Telephone: (800) 835-2350

FAX: (316) 524-2623

E-Mail: americas.service@aeroflex.com

5.4 TAGGING TEST SETS

All Test Sets must be tagged with:

- Identification and address of owner
- Nature of service or repair required
- Model Number
- Serial Number

5.5 SHIPPING CONTAINERS

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

5.6 FREIGHT COSTS

All freight costs on non-warranty shipments are assumed by the customer. (See "Warranty Packet" for freight charge policy on warranty claims.)

5.7 REPACKING PROCEDURE

- Make sure bottom packing mold is seated on floor of shipping container.
- Carefully wrap the Test Set with polyethylene sheeting.
- Place the Test Set into shipping container, making sure Test Set is securely seated in bottom packing mold.
- Place top packing mold over top of the Test Set and press down until top packing mold rests solidly on Test Set.
- Close shipping container lids and seal with shipping tape or an industrial stapler.
- Tie all sides of container with break resistant rope, twine or equivalent.

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Chapter 6 - Storage

6.1 STORAGE

Whenever the Test Set is stored for an extended period, always disconnect the Test Set from any electrical power source.

If you put the Test Set into storage, ensure that the following conditions are not exceeded:

- Temperature range: -20 to +70°C (-4 to +158°F)
- Humidity: 5 to 95%, non-condensing

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Appendix A - Abbreviations and Acronyms

A

A	Amperes
AC	Alternating Current
AM	Amplitude Modulation
ANT	Antenna
AP	Address Parity
ASCII	American Standard Code for Information Interchange
ATB	Avionics Test Bench
ATTN	Attenuation
AUTO	Automatic
AUX	Auxiliary

B

BAT	Battery
BCH	Bose, Chaudhuri, and Hocquenghem (developers of BCH error-correcting codes)
Bps	Bits per Second
BRG	Bearing

C

C	Celsius or Centigrade
CAL	Calibration
CCW	Counterclockwise
CDI	Course Deviation Indication
CHNL	Channel
cm	Centimeter (10^{-2} Meters)
COMM	Communication
Cont	Continued
cw	Clockwise

D

dB	Decibel
dBc	Decibels below Carrier
dBm	Decibels above one Milliwatt
DC	Direct Current
DDM	Double Depth Modulation
Deg	Degrees
DEL	Delete
DEV	Deviation

DIAGS	Diagnostics
DWN	Down
E	
ELT	Emergency Locator Transmitter
EMC	Electromagnetic Compatibility
EXT	External
F	
FM	Frequency Modulation
FREQ	Frequency
Ft	Foot/Feet
G	
GAL	Galileo
GEN	Generator or Generate
GND	Ground
GPS	Global Positioning System
G/S	Glide slope
H	
Hr	Hour
Hrs	Hours
H/W	Hardware
Hz	Hertz
I	
ILS	Instrument Landing System
I/O	Input/Output
K	
Kg	Kilogram
kHz	Kilohertz
km	Kilometer
kt	Knots (Velocity)
L	
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOC	Localizer
LRU	Line Replaceable Unit
LSB	Least Significant Bit
	Lower Sideband
M	
M	Meters
MAX	Maximum

MHz	Megahertz
Min	Minutes
MOD	Modulation
mm	Millimeter (10 -3 Meters)
M MOD	Master Modulation
ms	Millisecond (10- 3 Seconds)
MSB	Most Significant Bit
mV	Milivolt
mW	Miliwatt

N

N/A	Not Applicable
NAV	Navigation
Nmi	Nautical Miles
ns	Nanosecond (10- 9 Seconds)

O

OUT	Output

P

Para	Paragraph
PARAM	Parameter
PC	Personal Computer
PPM	Parts per Million
PREV	Previous
PSI	Pounds per Square Inch
PWR	Power

R

RAM	Random Access Memory
RCVR	Receiver
RES	Resolution
RF	Radio Frequency
RFA	RF Signal Analyzer
RFG	RF Generator
RMS	Root Mean Square
ROM	Read Only Memory
RX	Receive

S

SCPI	Standard Commands for Programmable Instruments
Sec	Seconds
SELCAL	Selective Calling
SP	Spacing
SPM	Scans per Minute
SPR	Synchronous Phase Reversal
SQTR	Squitter

SRQ	Service Request
SRS	Segment Request Subfield
SSR	Secondary Surveillance Radar
STD	Standard
SV	Satellite / Space Vehicle
SWP	Sweep
SWR	Standing Wave Ratio
SYNC	Synchronous

T

TX	Transmit

U

UHF	Ultra High Frequency
USB	Upper Sideband
UUT	Unit Under Test

V

V	Volt
VAC	Volts, Alternating Current
VAR	Variable
VHF	Very High Frequency
VOR	Very High Frequency Omni-Directional Radio Range
Vrms	Volts Root Mean Square
VSWR	Voltage Standing Wave Ratio

W

W	Watt

X

XMIT	Transmit
XMTR	Transmitter
XPNDR	Transponder

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Appendix B - U.S. / Metric Conversion Table

TO CONVERT:	INTO:	MULTIPLY BY:
cm	feet	0.03281
cm	inches	0.3937
feet	cm	30.48
feet	meters	0.3048
ft/sec	km/hr	1.097
ft/sec	knots	0.5921
ft/sec	miles/hr	0.6818
ft/sec2	cm/sec2	30.48
ft/sec2	m/sec2	0.3048
grams	ounces	0.03527
inches	cm	2.54
kg	pounds	2.205
kg/cm2	psi	0.0703
km	feet	3281
km	miles	0.6214
km	nmi	0.5396
km/hr	ft/sec	0.9113
km/hr	knots	0.5396
km/hr	miles/hr	0.6214
knots	ft/sec	1.689
knots	km/hr	1.8532
knots	miles/hr	1.1516
meters	feet	3.281
meters	inches	39.37
m/sec	ft/sec	3.281
m/sec	km/hr	3.6
m/sec	miles/hr	2.237
miles	feet	5280
miles	km	1.609
miles	meters	1609
miles	nmi	0.8684
miles/hr	ft/sec	1.467
miles/hr	km/hr	1.609
miles/hr	knots	0.8684
nmi	feet	6080.27

TO CONVERT:	INTO:	MULTIPLY BY:
nmi	km	1.8532
nmi	meters	1853.2
nmi	miles	1.1516
ounces	grams	28.3495
pounds	kg	0.4536
psi	kg/cm	2 0.0703
100 ft	km	3.048
100 ft	miles	1.894
100 ft	nmi	1.645

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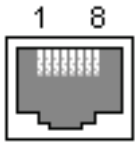
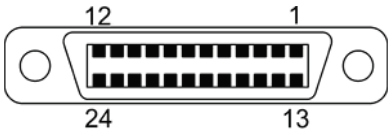
Appendix C - Front / Rear Connection Pinouts

C.1 ETHERNET



Pin	Signal Name	Signal Description
1	TX+	Transmit (+)
2	TX-	Transmit (-)
3	RX+	Receive (+)
4	NC	
5	NC	
6	RX-	Receive (-)
7	NC	
8	NC	

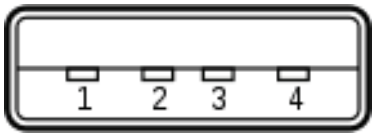
C.2 GPIB (GENERAL PURPOSE INTERFACE BUS)



Pin	Signal Name	Signal Description
1	DIO1	Data I/O Bit 1
2	DIO2	Data I/O Bit 2
3	DIO3	Data I/O Bit 3
4	DIO4	Data I/O Bit 4
5	EIO	End-Or-Identity
6	DAV	Data Valid
7	NRFD	Not Ready For Data
8	NDAC	Not Data Accepted
9	IFC	Interface Clear
10	SRQ	Service Request22
11	ATN	Attentions

12	Shield	Chassis Ground
13	DIO5	Data I/O Bit 5
14	DIO6	Data I/O Bit 6
15	DIO7	Data I/O Bit 7
16	DIO8	Data I/O Bit 8
17	REN	Remote Enable
18	Shield	Ground (DAV)
19	Shield	Ground (NRFD)
20	Shield	Ground (NDAC)
21	Shield	Ground (IFC)
22	Shield	Ground (SRQ)
23	Shield	Ground (ATN)
24	GND	Single Ground

C.3 USB (UNIVERSAL SERIAL BUS)



Pin	Signal Name	Signal Description
1	VCC	+5 VDC
2	D-	Data (-)
3	D+	Data (+)
4	GND	

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