AEROFLEX

3900 Series Radio Test Set

Getting Started Manual

1002-4400-8P0

GETTING STARTED MANUAL

3900 SERIES

RADIO TEST SET

Original Printing July 2005

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

This manual contains essential information relating to initial use of the unit.

Aeroflex recommends the operator become familiar with the Operation Manual contained on the accompanying CD-ROM.

Cable Statement

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

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

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Safety 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.

Equipment should be protected from all liquids such as spills, leaks, etc. and precipitation such as rain, snow, etc. When moving the equipment from a cold to a hot environment, it is important to 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.

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.

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 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.

Equipment Grounding Protection

Improper grounding of equipment can result in electrical shock.

Safety / Hazard 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.

Some of the components used in this equipment include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions in the disposal of these items.

Indicates item is static sensitive.

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

Use of Probes

Check the 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 be in good working condition. Do not use frayed, broken or exposed 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.

Internal Battery

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

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. Users should examine any operation that results in radiation of a signal (directly or indirectly) and should take necessary precautions to avoid potential communication interference problems.

WARNING

Electrical Hazards (AC supply voltage)

This equipment contains a protective grounding lead that conforms to 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.

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.

Fuses

Note: The internal supply fuse is in series with the live conductor of the supply lead. If connection is made to a 2-pin un-polarized supply socket, the fuse may become transposed to the neutral conductor. If this occurs equipment components could remain at supply potential even after the fuse has ruptured.

WARNING

Fire Hazard

Make sure that only fuses of the correct rating and type are used for replacement.

If an integrally fused plug is used on the supply lead, ensure that the fuse rating is commensurate with the current requirements of this equipment.

WARNING

Beryllia

Beryllia (beryllium oxide) is used in the construction of some of the components in this unit. Use care when removing and disposing of these components. Do not put them in the general industrial or domestic waste. They should be separately and securely packed and clearly identified to show the nature of the hazard and then disposed of in a safe manner by an authorized toxic waste contractor.

WARNING

Beryllium Copper

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

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

It must be disposed of as "special waste."

It must NOT be disposed of by incineration.

WARNING

Lithium

Lithium is a toxic substance. A Lithium battery is used in this equipment. The battery should in no circumstances be crushed, incinerated or disposed of in normal waste.

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

WARNING

Tilt

Do not stack other instruments on Test Set when the instrument is in the tilt position.

CAUTION

Input Overload

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).

CAUTION

Static Sensitive Components

This equipment contains static sensitive components which may be damaged by handling. Do not remove instrument covers as this may result in damage to the Test Set. There are no user-serviceable parts inside.

CAUTION

Suitability for Use

This equipment has been designed and manufactured by Aeroflex to generate, receive and analyze RF/audio signals.

If the equipment is not used in a manner specified by Aeroflex, the protection provided by the equipment may be impaired.

Aeroflex has no control over the use of this equipment and cannot be held responsible for events arising from its use other than for its intended purpose.

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Table of Contents

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Service Upon Receipt of Material

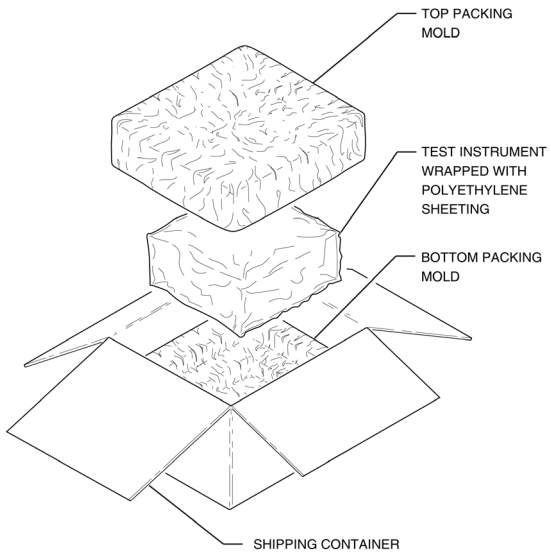
Unpacking

Special design packing material inside this shipping carton provide maximum protection for the 3900 Radio Test Set. Avoid damaging ship carton and packing material when unpacking equipment; if necessary it can be reused to ship Test Set.

CAUTION To prevent personal injury or damage to the Test Set, Aeroflex recommends two people unpack the Test Set.

Use the following steps to unpack the 3900:

STEP	PROCEDURE
1.	Cut and remove sealing tape on top of the carton.
2.	Open carton and remove top packing mold.
3.	Grasp the 3900 firmly while restraining the shipping carton. Lift the equipment and packing material vertically out of carton.
4.	Place 3900 and end cap packing on a flat, clean and dry surface.
5.	Remove protective plastic bag from the 3900.
6.	Place protective plastic bag and end cap packing materials inside shipping carton. Store shipping carton for possible future use.



Checking Unpacked Equipment

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

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

CONTACT:

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

Telephone: 800-835-2350
FAX: 316-524-2623
email: service@aeroflex.com

Description	Part Number	QTY
3901 or 3902 Ship Unit	9001-4402-200 (3901) or 9001-4402-100 (3902)	1
Cover, Lid	1414-4452-900	1
Kit, 390X Power Cords	7001-4444-800	1
Power Cord, RT IEC Recpt, BS PLG	23422/002	1
Supply Lead	23422/005	1
Power Cord, RT IEC Recpt, CNT PLG	23422/007	1
Cable Assy Mains RT-ANG	23424/159	1
3900 Series Operation Manual (CD-ROM)	1002-4400-2C0	1
Warranty Packet, 2 Year	1007-0001-000	1

Cord Configuration

23422/002 Cord configuration for use in the UK.

23422/005 Cord configuration for use in North America.

23422/007 Cord configuration for use in Continental Europe

23424/159 3-Wire (grounded) power cord

Installation

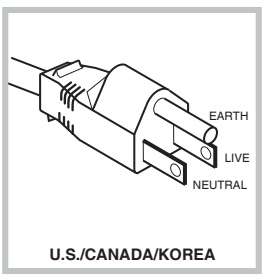
General

The 3900 Radio Test Set is a Safety Class 1 that must be grounded before use. The power cord supplied with the test set, or an appropriate replacement, should be used to connect the Test Set to a grounded AC supply outlet. Ensure that the power cord is properly connected to the AC Power Connector on the rear panel of the Test Set prior to connecting unit to AC supply outlet.

Class I Power Cords (3-core)

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

A 3-wire (grounded) power cord containing a molded IEC 320 connector is included with the 3900. The cable must be fitted with an approved plug which, when plugged into an appropriate 3-terminal socket outlet, grounds the case of the test set. Failure to ground the test set or using a damaged power cord may expose the operator to hazardous voltage levels.



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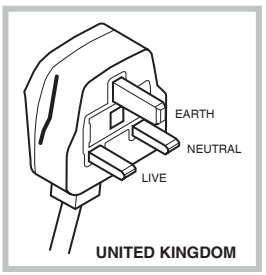

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Ventilation

The 3900 is force air-cooled by three fans that draw air through vents in the sides of the case. Do not obstruct the air vents while the instrument is in use. Avoid standing the instrument on or close to other equipment that is hot.

Specifications

Power Requirements

AC Voltage
100 V to 120 V @ 60 Hz and 220 V to 240 V @ 50 Hz

Power Consumption
Nominally 120 W
200 W Max

Mains supply voltage fluctuations
≤10% of the nominal voltage

Fuse requirements
3A, 250 V, Type F

Environmental

Operating Temperature
0 to 50°C
(Tested in accordance with MIL-PRF-28800F Class 3)

Storage Temperature
-40 to 70°C

Relative Humidity
80% up to 31°C decreasing linearly to 50% at 40°C
(Tested in accordance with MIL-PRF-28800F Class 3)

Altitude
4,000 m (13,123 ft)

Shock and Vibrations
30 G Shock
5-500 Hz random vibrations
(Tested in accordance with MIL-PRF-28800F Class 3)

Use
Pollution Degree 2

Dimensions and Weight

Height	Width	Depth
197 mm (7.75")	356 mm (14")	520 mm (20.5")

Weight
15.4 kg (34 lbs.)

External Cleaning

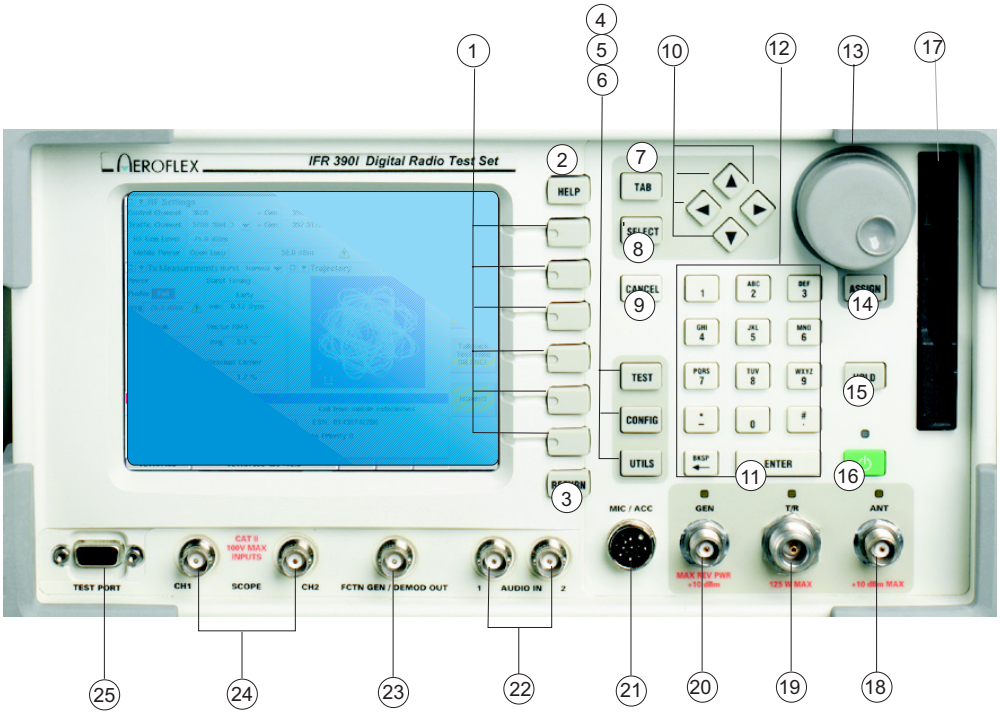
The following procedure contains routine instructions for cleaning the outside of the Test Set.

CAUTION Disconnect power from Test Set to avoid possible damage to electronic circuits.

STEP	PROCEDURE
1.	Clean front panel buttons and display face with soft lint-free cloth. If dirt is difficult to remove, dampen cloth with water and a mild liquid detergent.
2.	Remove grease, fungus and ground-in dirt from surfaces with soft lint-free cloth dampened (not soaked) with isopropyl alcohol.
3.	Remove dust and dirt from connectors with soft-bristled brush.
4.	Cover connectors, not in use, with suitable dust cover to prevent tarnishing of connector contacts.
5.	Clean cables with soft lint-free cloth.
6.	Paint exposed metal surface to avoid corrosion.

Controls, Connectors and Indicators

Front Panel



Numerical references are shown in parenthesis (nn).

Soft Keys (1)

The 3900 contains six soft keys which are only active when a label is shown on the display to the left of the soft key. The text on the label identifies the key, the outline and background color provides information about the purpose, state and type of action the key initiates.

HELP Key (2)

This key is reserved for future development.

RETURN Key (3)

This key returns the soft key menu back one level from a soft key sub-menu. Each press of the RETURN key moves back through one level.

TEST (4)

This key selects the TEST function. When the TEST function is selected, pressing the TEST key displays the TEST floating menu.

CONFIG (5)

This key selects the CONFIG (Configuration) function. When the CONFIG function is selected, pressing the CONFIG key displays the CONFIG floating menu.

UTILS (6)

This key selects the Utilities function. When the Utilities function is selected, pressing the UTILS key displays the Utilities floating menu. The UTILS function provides access to general Test Set features which are not system specific.

TAB Key (7)

When the TEST function is selected and the display tiles are minimized, each press of the TAB key sequentially moves the focus to a different tile.

When the TEST function is selected and one of the display tiles is maximized, pressing the TAB key displays a menu listing the tiles currently active on the minimized display. Selecting from the menu displays the requested tile in its maximized state.

SELECT Key (8)

When a menu item is highlighted pressing SELECT activates that item. When a settings box is highlighted pressing SELECT selects the box for editing, indicated by a gold ground.

When a button is selected pressing SELECT changes the state of the button.

CANCEL Key (9)

When a Numeric Entry Box or Text Entry Box is selected for editing, this key cancels any changes that have been made using the data input keys and restores the original setting as long as the ENTER key or the SELECT key has not been pressed. Pressing CANCEL has no effect if the setting has been changed by using the cursor keys or by using the rotary control.

While a menu is displayed, pressing this key closes the menu.

Cursor Keys: < > ∧ ∨ (10)

The Test Set contains four directional cursor keys that are used to navigate display screens.

ENTER Key (11)

This key is used to complete editing of settings boxes that have been made using the data input keys. New values are not effective until this key or the SELECT key has been pressed.

Data Input and Entry Keys (12)

Numeric/Alphabetic Keys

These keys are used to enter numeric values into selected numeric data fields or to enter text into a data entry box.

Signage Keys

– (minus), **.** (decimal point) , ***** (star/asterisk), **#** (hash).

BKSP (BACKSPACE) Key

When a numeric entry box or a text box is selected for editing, this key deletes the character or digit to the left of the position indicator.

Assignable Rotary Control (13)

The rotary control can be used to set, select or adjust features of the Test Set.

ASSIGN Key (14)

The ASSIGN key displays a soft key sub-menu for functions applicable to the current operating system. Pressing one of these sub-menu soft keys assigns the associated function to the Rotary Control knob.

Display HOLD Key (15)

This key freezes the display to allow the user to capture and save the current screen display.

Supply (power) On/Standby Key (16)

This key is used to power down the Test Set. This key is active when the associated LED is illuminated. If the LED is not illuminated, the Test Set is in an OFF condition.

If the LED is ORANGE, the Test Set is in STANDBY mode.

When the Test Set is operating the LED is GREEN.

3.5 inch Floppy Disk Drive (17)

This 3.5 inch floppy disk drive provides an interface to the Test Set for downloading data, settings and captured display files.

RF Input and Output Connectors

The routing of signals within the Test Set to and from the RF input and output connectors is controlled from the selected Test System. There is an LED above each connector that lights up when that connector is selected.

Audible and Visual Overload Warning

If the RF Signal applied to the Antenna port exceeds the safe maximum level, an audible and visual warning is triggered. The overload warning is also triggered if excessive reverse power is applied to the RF Generator Output port.

CAUTION If the warning triggers, reduce the input power immediately.

Do not power down the test set as this will not remove the overload power from the connection.

Do not disconnect the RF cable from the Test Set as this may cause burns to hands.

ANT (Antenna) (18)

The RF analyzer input is a 50 Ω TNC input, providing maximum sensitivity input to the RF analyzer of the Test Set. The rated maximum input level is +10 dBm.

T/R (19)

The combined (Duplexed) RF generator output and high power RF analyzer input is a 50 Ω 'N' type connector that provides an RF generator output connection and an RF analyzer input and broadband power meter connection. The RF generator maximum output level and the RF analyzer sensitivity are lower than when using the separate GEN and ANT ports.

The maximum permissible input power level is 125 W.

GEN (Generator) (20)

The RF generator output is a 50 Ω TNC output, providing the maximum RF output level from the RF generator. This connector is reverse power protected to a level of +10 dBm.

MIC / ACC (21)

Port can be used to connect a microphone, headset, or speaker. The port will accept a PTT (Press To Talk) microphone for testing simplex trunked radios.

Audio IN (Audio Inputs 1 and 2) (22)

AUDIO IN 1 is the primary AF input. It can be configured as High Impedance or 600 Ω unbalanced.

AUDIO IN 2/EXT MOD is the primary EXT MOD input. It can be configured as high impedance or 600 Ω unbalanced.

Function GEN / DEMOD Out (23) (Function generator and demodulated signal output)

This port is used primarily as the AF GEN output; it can also be configured as DEMOD OUT.

Scope CH1 CH2 (Oscilloscope Inputs) (24)

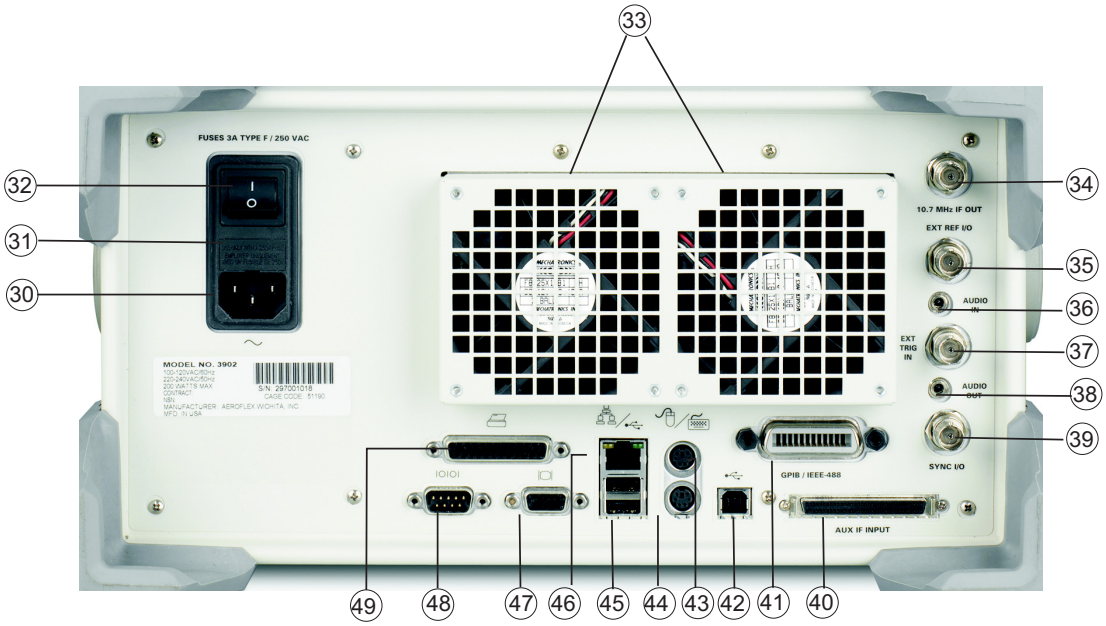
The Scope CH1 and CH2 connectors are the signal input connectors for the Oscilloscope function. These connectors provide a maximum input rating of 100 V pk-pk.

Test Port (25)

Reserved for future development.

CAUTION Do not connect a VGA monitor to this port.

Rear Panel



Numerical references are shown in parenthesis (nn).

AC Power Connector (30)

The AC Power Connector accepts an IEC 320 connector.

AC Power Fuse (31)

A 3 amp, 250 volt, Type F, 20 mm cartridge fuse (F3AL250V) is included in the unit's supply current path to the Power Supply Module. The AC Power Fuse is located in the fuse carrier located on the rear of the Test Set.

AC Power Switch (32)

This switch disconnects the 3900 from the AC power supply. This switch should not be used for powering down the Test Set because all settings and test results will be lost. The Supply (power) On/Standby key on the front panel should be used for routine powering down because it initiates the power-down procedure, ensuring all settings and test results are saved.

Rear Cooling Outlets (33)

Refer to the caution Installation Requirements; Ventilation in Chapter 2 of the Operation Manual.

IF Output Signal (34)

The IF Output Signal is a BNC connection. 10.7 MHz IF output of the RF signal received and down converted by the Test Set RF analyzer. The output level is −10 dBm typical at 10.7 MHz. (50 Ω nominal).

Ext Ref I/O (35)

The External Reference I/O is a BNC connection used to connect the Test Set to an external frequency standard, or to output the internal frequency standard from the Test Set to other equipment.

- Output: 10 MHz.
- Input: 10 MHz, 1 Vpp to 5 Vpp (sine or square wave).

Audio Input (36)

This auxiliary I/O audio connector is internally connected and ready for future development. Do not make any external connection to this connector.

External Trigger Signal Input (37)

This is the oscilloscope external trigger input, BNC connection. Input impedance 10 kΩ.

Audio Output (38)

This auxiliary I/O audio connector is internally connected ready for future development. Do not make any external connection to this connector.

Synchronization Signal Input or Output (39)

This port is a BNC connection used with the TETRA Base Station Test System for base station receivers generating a sync output signal.

Auxiliary IF Input (40)

Reserved for future development.

GPIB/IEEE-488 Interface Connection (41)

This connector is provided for interconnection to a GPIB/IEEE-488 interface bus.

Standard USB Client Port (42)

Reserved for future development.

PS/2 Mouse Interface (not used) (43)

Standard PS/2 connection. Do not use a PS/2 mouse. A USB mouse can be used as an alternative to the front panel cursor and select keys.

Keyboard Interface (44)

Standard PS/2 connection. A Standard PS/2 keyboard can be used as an alternative to the front panel data entry keys.

USB X2 (45)

Double USB standard connection. Allows connection of USB 1.1 devices.

Ethernet (46)

Standard Base T RJ45 connection.

VGA Monitor Output (47)

Standard VGA style, 15 way, D-type connection. This allows a VGA monitor or video projector to duplicate the screen display.

RS232 Serial Port (48)

Standard 9 way, D-type connection. Reserved for future development.

Parallel Printer Output (49)

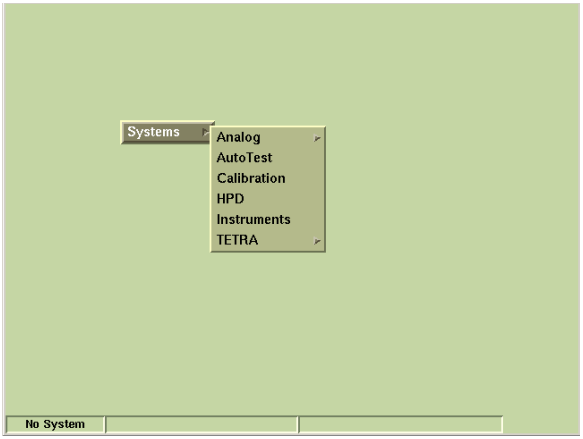
This port is a standard 25 way, D-type printer connection.

Operation

Powering On Test Set

Unless specifically mentioned, this refers to local operation of a 3900 configured with factory default settings. To power on the test set:

1. Complete Installation Instructions (refer to page 4).
2. Connect the Test Set to the AC Power Supply.
3. Turn the AC Power Switch on the rear panel to the ON position. The LED above the Supply (power) On/Standby key on the front panel turns RED.
4. Press the Supply (power) On/Standby key to power on the Test Set.
5. Verify no error messages appear on the display during power-up process. The Factory Default screen appears upon initial start-up; if the Test Set has been used the screen is displayed that was active when the Test Set was powered down.



Note: System menu contents vary according to the options installed in the Test Set.

Powering Down Test Set

The Test Set should always be powered down using the Supply (power) On/Standby key on front panel. The Supply (power) On/Standby key initiates a power-down sequence which stores all current settings and results in the test set's internal memory.

If the Radio Test Set is to be left in an unused state for an extended period of time, power down the unit using the Supply (power) On/Standby key on the front panel. After the unit has stored settings and is in the OFF state, switch the AC Power Switch on the rear panel to the OFF position. When the Test Set is next powered up it will be restored in the last saved settings state.

Floppy disk drive

When powering down, verify that floppy disk drive does not contain a disk. If there is a disk in the drive at power up the Test Set may display irrelevant error messages. If this occurs, remove the disk and restart the Test Set.

Modes of Operation

The 3900 has three primary functional modes of operation: Test, Configuration and Utilities.

TEST mode provides access to the current operating system.

CONFIG (Configuration) mode provides access to the Configuration menu and functions of the current operating System.

UTILS (Utilities) mode provides access to general Test Set functions. These functions are not specific to a particular system.

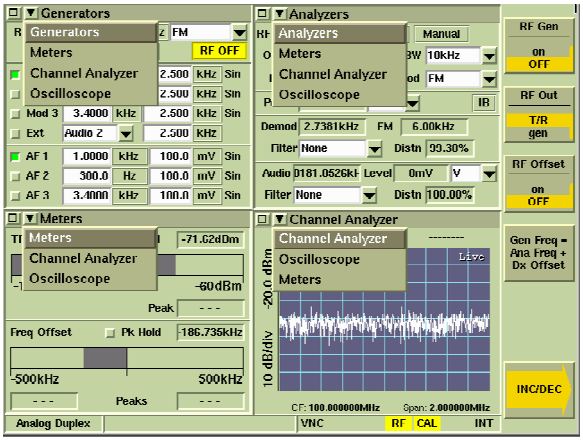
Display Layout

Display

Screen configuration is defined by the 3900 System currently selected. The screen appears as a single tile of fixed size, or a tile or group of tiles that can be minimized or maximized. The area on the right of the display shows any soft keys applicable to the active screen or tile.

Configuring Tiles

Measurement tiles are selected from the drop-down menus on each tile. Selections are limited to the current operating system and tile location.



Soft Keys

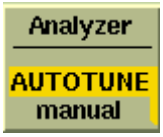
Soft keys are displayed on the right of the user screen. Soft key labels identify the key's function.

Action

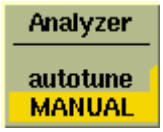
Action keys initiate immediate actions when pressed.

Toggle Soft key

Toggle Soft Keys offer a choice of two, three or four options.

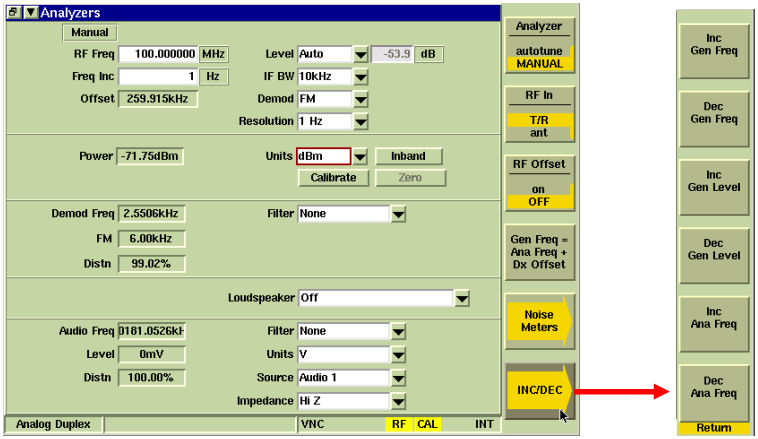


OR



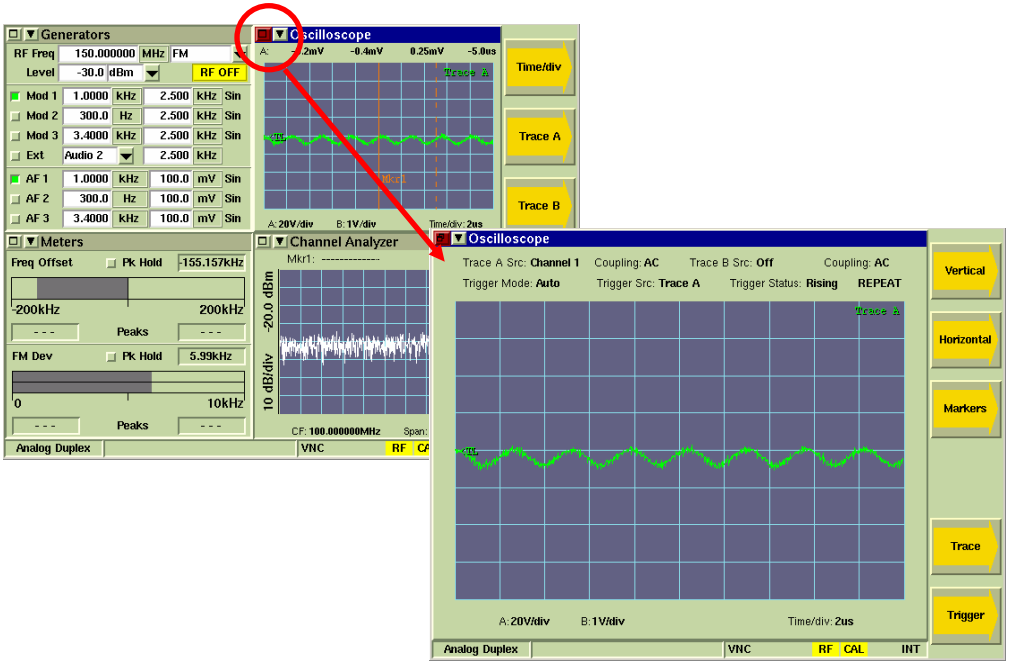
Next Level

Next Level soft keys lead to soft key sub-menus.



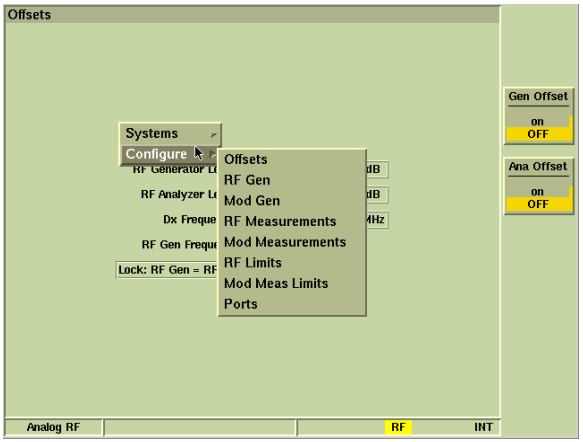
Maximized and Minimized Views

3900 tiles can be viewed in a Maximized or Minimized state.

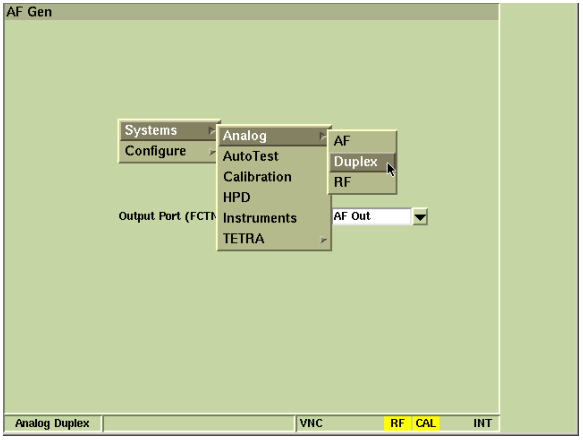


Floating Menus

Floating Menus are used throughout 3900 Systems to access information such as Configuration and Utilities screens and to change operating Systems.



Configuration Floating Menu



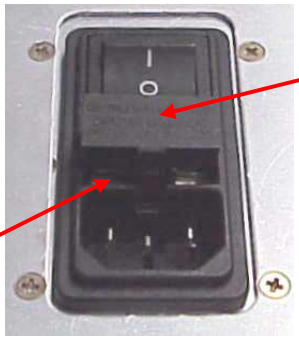
System Floating Menu

Fuse Replacement Instructions

Fuse Replacement

STEP	PROCEDURE

1. Verify 3900 is OFF and AC Power is disconnected from Test Set.
2. Press inward on pressure clip to remove Fuse Carrier.



3. Remove Fuse Carrier from Test Set.

4. Replace fuse:

3 amp, 250 volt, Type F
20 mm cartridge fuse (F3AL250V)
Aeroflex P/N: 5106-0000-055

CAUTION For continuous protection against fire, replace fuse with fuses of the specified voltage and current ratings.

5. Replace Fuse Carrier by pressing into place.
6. Replace Fuse Cover.

As we are always seeking to improve our products, the information in this document gives only a general indication of the product capacity, performance and suitability, none of which shall form part of any contract. We reserve the right to make design changes without notice.

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AEROFLEX

Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven, customer-focused.