



Agilent
L4610A PRM-34B
Radio Test Set

User's and Service Guide

Edition, October 22, 2009
L4610-90002



Agilent Technologies

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WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

WARNING

- Use the L4610A for its intended purpose only. Use in any way other than as instructed in this guide could result in a hazard.
 - Refer to the battery vendor's Material Safety Data Sheet (MSDS) for hazards and safe handling instructions related to the battery.
 - Never use a battery charger with the L4610A RTS or its non-rechargeable battery.
 - Follow the battery manufacturer's instructions for safe disposal.
-

CAUTION

- Except for the BA-5372/U battery, there are no operator serviceable parts inside.
 - Refer all servicing to qualified service personnel. Servicing is required when the device does not operate normally.
 - The L4610A L4610A RTS is not shipped with the required BA-5372/U battery. Only use the specified battery.
 - Follow battery installation instructions. Observe the polarity markings on the battery cover. Protect sensitive electronics for ESD damage: do not touch the battery contacts during replacement. Refer to ["Installing and Replacing the Battery"](#) on page 10
-

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1 Getting Started



Introduction

The L4610A PRM-34B radio test set (L4610A RTS) is simple to use and quickly performs the required operational checks to ensure a Single Channel and Airborne Radio System (SINCGARS) radio is operational. This section will help you identify the different components of the L4610A RTS, provide a brief description of the operating features, and provide step-by-step instructions on how to test a SINCGARS radio.

Shipping List

Verify that the following items were shipped with the L4610A RTS.

Description	Agilent Part Number
BNC cable, 36 inch	8121-1310
Weatherproof transit case	1540-2232
Quick start guide	L4610-90001

L4610A PRM-34B Radio Test Set Overview

This section will help you identify the different components of the L4610A RTS, and provide a description of the features.



Table 1 L4610A RTS Parts Identification

ID	Description	Function
1	Antenna Connector	Connection to the antenna, or to 50 Ω load (dummy load). Transmitter test: Used to measure the reverse power.
2	Radio Connector	Connection to the radio's antenna connector.
3	Display	Displays Selftest status and measurement results.
4	RF Connector Cover	Protects the RF connectors when not in use.
5	On / Off Button	Turns the L4610A RTS On and Off.

Installing and Replacing the Battery

NOTE

The BA-5372U is *not* supplied with the L4610A RTS. Only install or replace the battery with a BA-5372/U or equivalent battery.

Tip: The BA-5372/U battery, is the same battery used in many of the SINGARS radio for memory backup.

To replace the BA-5372/U battery, use an appropriate driver to remove the two screws securing the battery door. The battery door is located on the back of the L4610A RTS. When installing the battery, insure the polarity is correct, and reinstall the cover by securely tightening the two screws.



Powering the L4610A RTS On and Off

Press the On / Off button momentarily and then release to turn the L4610A RTS On. The L4610A RTS will perform a quick Selftest, a battery test, and then enter the Receiver Test mode.

NOTE

One of the features of the L4610A RTS is that it automatically switches between the Transmitter and Receiver Test modes depending on if a valid signal is received from the radio. If the radio being tested is keyed and transmitting a signal of 0.1 Watts or greater during power up, the L4610A RTS will switch to the Transmitter Test mode; if a signal is not detected the L4610A RTS switches to the Receiver Test mode.

The L4610A RTS has both a Manual and Automatic OFF operation mode.

Manual: Press and hold the On / Off button for a minimum of 2 seconds and then release.

Automatic: To conserve battery power the L4610A RTS turns Off automatically after 120 seconds of inactivity. The turn-off timer can be reset by momentarily pressing the On/Off button (for less than 1 second); the L4610A RTS will turn off 120 seconds after the last button press.

NOTE

You can hold the button down when you first turn the L4610A RTS on, and it will operate normally until you release the button. It may be more convenient to make a short measurement in this way, as the L4610A RTS will then turn off when you release the button.

Selftest Indications

The L4610A RTS performs several self-tests to help insure proper operation. It will warn you when you turn it on if you are trying to operate it beyond its rated temperature range, and it checks several internal parameters when it is turned on.

In normal use, you should expect to see a low-battery warning after about 50 hours of testing time. If you continue using the L4610A RTS with a low-battery warning, eventually you will see a message that the battery must be replaced.

Most irregular conditions only give a warning that the unit should be serviced as soon as possible, but allow you to continue making measurements in an emergency. A very few abnormal conditions are considered fatal, and do not allow the L4610A RTS to operate at all. All possible displays for normal and abnormal conditions are shown below. Although the selftests help assure that the L4610A RTS is operating properly, they cannot check everything. If you have reason to suspect a problem with the L4610A RTS, refer to [Chapter 2, Service](#) for more information.

```
SENDING RCU TEST  
XMT TO TEST XMTR  
SELFTEST+BATT OK
```

While in the Receiver Test mode the L4610A RTS will be outputting a 30 to 85 MHz (at 5 MHz intervals) complex FM modulated signal with 150 Hz and 900 Hz audio tones, at 3 μ V of output power. This signal is used to test the radio's squelch and receiver circuits.

```
FREQ 55.001 MHz  
FWD 22.5 WATTS  
RVS 3.7 WATTS
```

While in the Transmitter Test mode the L4610A RTS will measure the radio's output frequency and forward power as received at the L4610A RTS Radio connector, and the reflected reverse power from the antenna at the Antenna Connector

```
SENDING RCU TEST  
> BATTERY LOW <  
> REPLACE SOON <
```

When you see this message, you should replace the battery soon. Under normal conditions, you will have several hours more testing available until the battery *must* be replaced.

Refer to "[L4610A RTS Battery Test](#)" on page 14 and "[Installing and Replacing the Battery](#)" on page 10.

Hint: If you warm a cold L4610A RTS, the battery will have more power.

```
BATTERY TOO LOW
REPLACE BATT NOW
```

When you see this message, you *must* replace the battery. In an emergency, if there is still some life in the battery, you will have about two seconds after you turn the power on to make measurements, before measurements stop and this message is displayed. The display will cycle between bright and dim when this message is active. Refer to “[L4610A RTS Battery Test](#)” on page 14 and “[Installing and Replacing the Battery](#)” on page 10.

Hint: The L4610A RTS will power up in the transmitter test mode if you activate the transmitter before you turn on the L4610A RTS power. In this way, you can make a transmitter test very quickly.

```
TEMP ABOVE SPEC
OPERATING RANGE
PUSH BTN TO CONT
```

```
TEMP BELOW SPEC
OPERATING RANGE
PUSH BTN TO CONT
```

One or the other of these two messages will be displayed when you turn the L4610A RTS on and it is hotter or colder than its specified operating temperature range, -20 °C to +55 °C. You must press the On/Off button momentarily to cause the L4610A RTS to enter normal measurement operation. The L4610A RTS is not guaranteed to meet specifications when operated beyond its rated temperature range.

Hint: At cold ambient temperatures, operation will be enhanced if you warm the unit slightly before use.

```
SENDING RCU TEST
SELFTEST WARNING
> SERVICE SOON <
```

The selftests that run when you turn the L4610A RTS on have discovered an abnormal internal condition. You may continue to use the L4610A RTS, but it may not meet all of its specifications, and you should send it for service as soon as possible.

```
FATAL ERROR
INTERNAL VOLTAGE
TOO HIGH
```

```
FATAL ERROR
BAD FREQUENCY
REFERENCE
```

These two displays indicate that the self-tests found a problem that either could cause internal damage, or makes all measurements unfit for use. If an internal voltage is too high, the L4610A RTS will turn itself off in about two seconds. You should send it for service, and not try to turn it back on. The “Bad Frequency Reference” error will display for about ten seconds before the L4610A RTS turns itself off. You should send the unit for service.

L4610A RTS Battery Test

The L4610A RTS performs a Battery test during power up and in the background during the Receiver and Transmitter tests. The Battery Selftest checks to the same limits as the AN/PRM-34 with the following additional feature. When the battery voltage is less than 4.5 VDC the L4610A RTS will display a message telling you to replace the battery. This corresponds to the low battery blank display condition for the AN/PRM-34.

NOTE

In many cases, the AN/PRM-34 is being replaced with the L4610A RTS. Comparisons between the two instruments is given to assist those customers who have previously used the AN/PRM-34.

Table 2 L4610A RTS Battery Test Results

Battery Test Results	Battery Voltage	Displayed Information
Good	6.0 to 5.0 VDC	The Battery results are not displayed during the Transmitter Test mode.
Low	4.9 to 4.5 VDC	The display backlight will flash on and off while displaying the battery test results in the Receiver Test mode. In the Transmitter Test mode, the display will flash on and off, while displaying the Transmitter Measurement test results.
Fail	4.4 to 3.5 VDC	The L4610A RTS will display the Receiver or Transmitter measurement screen for ~ 2.5 seconds, then display the battery test results and flash the backlight on and off for 7 seconds before shutting down. When the battery voltage is below 4.4 V, the measurement results are not guaranteed to be accurate.
	<3.5 VDC	The L4610A RTS display will gradually fade to blank as the battery voltage fails.

Receiver Test Mode (L4610A RTS is Transmitting)

Mode Switching: The L4610A RTS automatically switches to the Receiver Test mode any time an RF signal <0.05 VDC is sensed at the Radio Connector port.

L4610A RTS Operation: While in the Receiver Test mode, the L4610A RTS will be outputting a 30 to 85 MHz (at 5 MHz intervals) complex FM modulated signal, with 150 and 900 Hz audio tones, at 3 μ V of output power. This signal is used to test the radio's squelch and receiver circuits. To test the radio's squelch and receiver circuits, ensure the radio is tuned to a channel that is between 30 to 85 MHz at a 5 MHz interval (that is, 30, 35 ... 80, 85 MHz) that can receive analog audio signals.

Test Results: For a properly operating SINGARS radio, the 150 Hz squelch tone will un-squelch the radio and output the 900 Hz audio tone to the radio's headset or handset.

NOTE

If the radio being tested is keyed and transmits a signal of 0.1 Watts or greater, the L4610A RTS will enter the Transmitter Test mode.

L4610A RTS Display Results: During the Receiver Test mode the following message will be displayed on the L4610A RTS LCD Display:

```
SENDING RCV TEST
XMT TO TEST XMTR
SELFTEST+BATT OK
```

Table 3 L4610A RTS Receiver Test Mode Information

L4610A RTS Display Message	Addition Information
SENDING RCV TEST	Sending receiver test signal. The L4610A RTS is outputting the receiver test signal on the Radio connector.
XMT TO TEST XMTR	Transmit to test the radio's transmitter. Press the radio headset's push-to-talk (PTT) switch to transmit the radio. When the radio is keyed and transmits a signal of 0.1 Watts or greater, the L4610A RTS will enter the Transmitter Test mode.
SELFTEST+BATT OK	All Selftests plus Battery tests are okay. All L4610A RTS Selftests and Battery tests pass, no problems have been detected.

Transmitter Test Mode (L4610A RTS is Receiving)

Mode Switching: The L4610A RTS automatically switches to the Transmitter Test mode when a RF Signal of 0.1 Watts or greater is detected at the Radio connector port. Note: If no signal is detected on the Radio connector, the L4610A RTS will enter the Receiver Test mode.

L4610A RTS Operation While in the Transmitter Test mode the L4610A RTS will measure the radio’s output frequency and forward power as received at the L4610A RTS Radio connector, and the reflected reverse power from the antenna at the Antenna connector.

Test Results For a properly operating SINGARS radio:

Frequency: within 2 kHz of the set frequency.

Forward Power: consult the radio’s technical manual for forward power results.

L4610A RTS Display Results: During the Transmitter Test mode the L4610A RTS will display the measured results of the radio’s transmitted output frequency, forward power, and the reflected reverse power measurement. Below is a sample display of a radio that is outputting a 55 MHz signal at approximately 22.5 Watts.

```
FREQ 55.001 MHz
FWD 22.5 WATTS
RVS 3.7 WATTS
```

The following table provides information on the Transmitter Test Mode’s measurement display.

Table 4 L4610A RTS Transmitter Test Mode Information

L4610A RTS Display	Addition information
FREQ xx.xxx MHz	Measured frequency of the radio’s transmitted output signal. <ul style="list-style-type: none"> The frequency results are displayed in MHz. 1 KHz of resolution is displayed.
FWD xx.x WATTS	Measured forward power of the radio’s transmitted output signal. <ul style="list-style-type: none"> The forward power results are displayed in Watts. 0.1 Watts of resolution is displayed.
RVS xx.x WATTS	Measured reverse power of the radio’s transmitted output signal (reflected power). <ul style="list-style-type: none"> The reverse power results are displayed in Watts. 0.1 Watts of resolution is displayed.



2 Service



Electrostatic Discharge (ESD) Information

ESD can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation using two types of static-safe workstation protection.

- conductive table - mat and wrist-strap combination
- conductive floor - mat and heel-strap combination

Both types, when used together, provide a significant level of ESD protection. Of these two, only the table with mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 M Ω of isolation from ground.

Handling of Electronic Components and ESD

The assemblies in this instrument are very susceptible to damage from ESD. Perform troubleshooting procedures only at a static-safe workstation, and wear a grounding strap.

Always handle a printed circuit board assembly by its edges. This reduces the possibility of ESD damage to components, and prevents contamination of exposed plating.

The possibility of unseen damage caused by ESD is present whenever components are transported, stored, and used. The risk of ESD damage can be greatly reduced by close attention to how all components are handled.

- Perform work on all components at a static-safe workstation.
- Keep static-generating materials at least one meter away from all components.
- Store or transport components in static-shielding containers.

Troubleshooting

NOTE

The L4610A RTS was designed as a direct replacement for the AN/PRM-34 radio test set allowing it to utilize the AN/PRM-34 General Support Maintenance instructions for maintenance and testing. The maintenance and testing differences are outlined in this chapter.

Maintenance Concept

General support maintenance is limited to replacement of the case components, two RF cables, and one PC assembly.

After replacement of the PC assembly, adjustments are not required as the PC assembly is shipped from the factory fully calibrated.

After completion of any maintenance, perform the [“L4610A RTS Performance Tests”](#) on page 29 or [“AN/PRM-34 Performance Tests”](#) on page 44 to be sure the test set meets its specified performance.

NOTE

The L4610A RTS does not include the Field Strength feature as found in the AN/PRM-34. This feature was intentionally left off the L4610A RTS as this measurement was found to no longer be used by the AN/PRM-34 user community. For this reason the AN/PRM-34 Field Strength verification and testing is not required to be run.

Check the Basics

Display Check to see that the LCD display is not cracked or severely scratched.

Antenna and Radio Connectors Check to see that connectors are not bent or damaged.

Test Set Run the built in Selftest. Remove all cables connected to the Radio and Antenna connectors, turn on the L4610A RTS and verify the results of the Selftest.

NOTE

When the L4610A RTS is turned on, it automatically performs the built-in Selftest and displays the results on the LCD display. If no abnormal conditions are detected, you will see the Receiver Test display. The third line of the display indicates that the Selftests passed and the battery voltage is normal.

Cleaning If cleaning is necessary, use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt internal cleaning.

Troubleshooting an Inoperative Instrument

The L4610A RTS is simple to troubleshoot as it contains a single PC board assembly, and two RF connector assemblies.

Selftest Error

Remove all cables connected to the Radio and Antenna connectors, turn on the L4610A RTS and verify the results of the Selftest. Note: When the L4610A RTS is turned on, it automatically performs the built-in Selftest and displays the results on the LCD display.

```
SENDING RCV TEST  
XMT TO TEST XMTR  
SELFTEST+BATT OK
```

- If the L4610A RTS fails the built-in Selftest, replace the battery and perform the Selftest again.
- If the L4610A RTS fails the Selftest with a new battery installed, replace the PRM-34B PC assembly. Refer to [“Replaceable Parts Procedure”](#) on page 21.

Forward Power Error

- Inspect the two RF cables (p/n L4610-60101) for damage and replace if necessary. Refer to item 6 in the [Figure 1](#) on page 21.
- If the forward power results are still incorrect after replacing the cables, replace the PRM-34B PC assembly. Refer to [“Replaceable Parts Procedure”](#) on page 21.

Reverse Power Error

- Inspect the two RF cables (p/n L4610-60101) for damage and replace if necessary. Refer to item 6 in the [Figure 1](#) on page 21.
- If the forward power results are still incorrect after replacing the cables, replace the PRM-34B PC assembly.

Replaceable Parts Procedure

L4610A RTS Illustrated Parts Breakdown

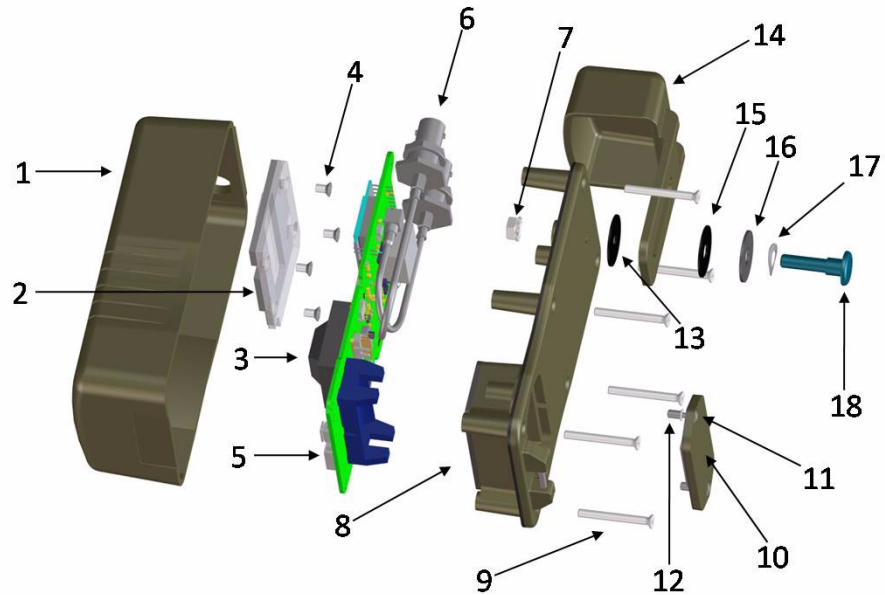


Figure 1 Figure 1 L4610A RTS Repair Parts

L4610A RTS Parts List

Item	Qty	Description	Part Number
1	1	Front case	L4610-20101
2	1	Lens with Gasket	L4610-60201
3	1	Switch, On/Off ¹	
4	4	Screw, M3 x 0.5 x 5 mm	0515-1521
5	1	PRM-34B PC assembly	L4610-60003
6	2	RF cable, BNC to MCX	L4610-60101
7	1	Locknut M5 x 0.8 mm	0535-0081
8	1	Rear case with gaskets	L4610-60202
9	6	Screw, M3 x 0.5 x 27.5 mm	0515-1862

10	1	Battery door assembly	L4610-60203
11		• Battery door screw (2), M3 x 0.5 ²	
12		• Battery door screw retainer (2) ²	
13	1	Nylon washer, 5.1 mm ID	L4610-20014
14	1	Protective cap	L4610-20104
15	1	Nylon washer, 6.5 mm ID	L4610-20013
16	1	Washer, flat 6.5 mm ID	L4610-20011
17	1	Spring washer, 6.7 mm ID	3050-2361
18	1	Shoulder screw, M5 x 0.8	L4610-20010

1 The switch is part of the PRM-34B PC assembly.

2 The battery door screws and screw retainer are part of the battery door assembly.

Removal Procedures

The following removal procedures are shown in a sequential order. That is, the first item to remove is the battery, followed by the rear cover, the BNC cable assembly, the printed circuit assembly (PCA), and finally the lens assembly.

Tools Required

- 14-mm nut driver or socket wrench
- 8-mm nut driver or socket wrench
- T10 Torx driver
- Needle nose pliers

Battery Removal

- Use an appropriate driver to remove the two screws securing the battery door. The battery door is located on the back of the L4610A RTS. Refer to [“Installing and Replacing the Battery”](#) on page 10.

Rear Cover Removal

- 1 Using the T10 driver, remove the six (p/n 0515-1862) M3 screws for the rear cover.
- 2 Slide the BNC connector protective cap all the way up and remove the cover. Refer to [Figure 2](#).

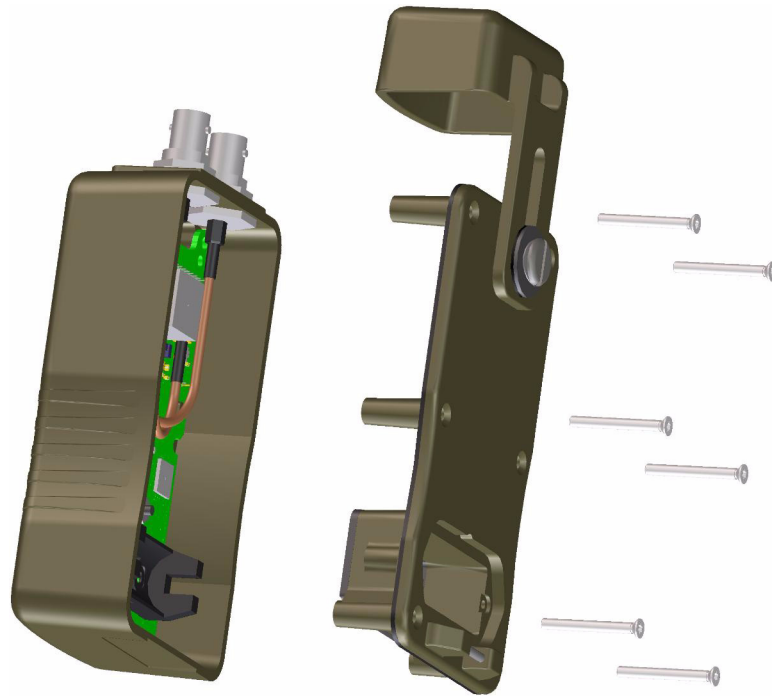


Figure 2 Rear Cover Screw Locations

Connector Assembly Removal

- 1 Use a 14-mm socket wrench or driver to remove the BNC nuts and star washers that secure the connectors to the front case.
- 2 Use a needle nose pliers to unsnap the two coax cable connectors from the PCA MCX connectors.

CAUTION

Do not pull on the cables. Use a needle nose pliers on the cable's gold plated connector. Be very careful not to damage any parts of the PCA while removing the connectors.

- 3 Remove the connector assemblies.

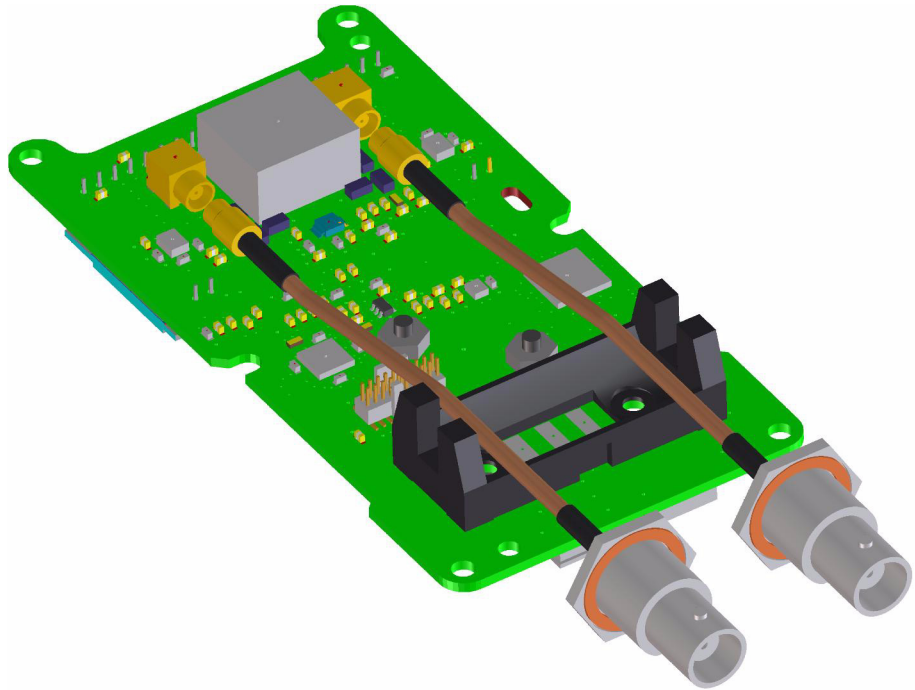


Figure 3 MCX Connector Location

PCA with On/Off Switch Removal

- The screws attaching the rear cover are also the screws used to secure the PCA to the front case. Once the rear cover and BNC connector nuts have been removed, you can carefully lift the PCA out of the enclosure.

Lens Assembly Removal

- 1 Use a T10 driver to remove the four (p/n 0515-1521) M3 screws that secure the lens assembly to the front case.

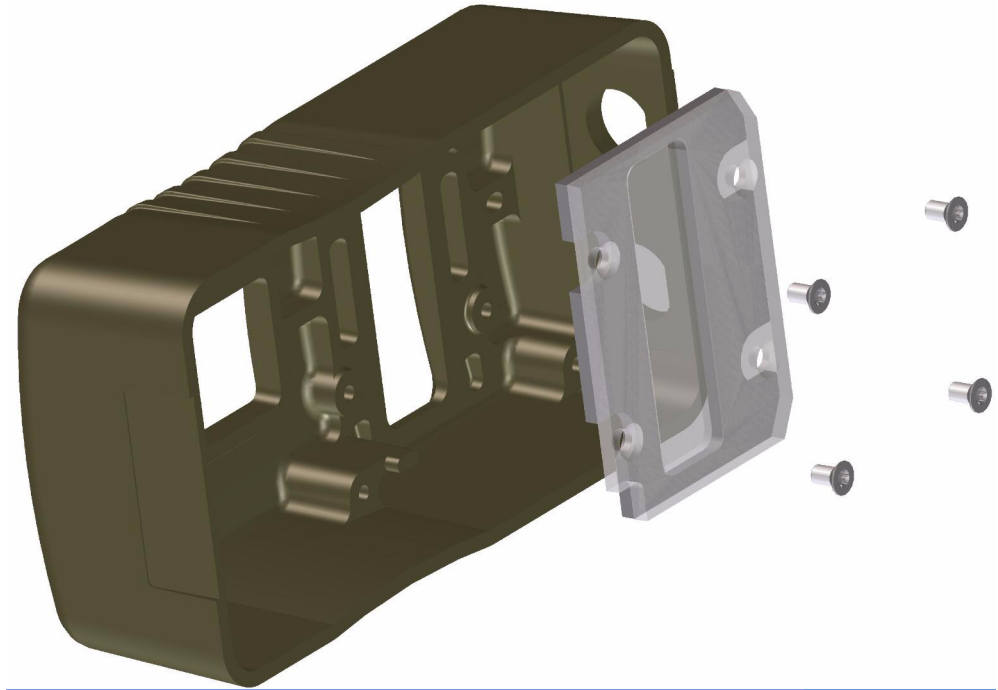


Figure 4 Lens with Gasket Removal

Replacement Procedures

The following replacement procedures are shown in reverse order from the removal procedures. For example, you will need to replace the lens assembly prior to installing the PCA, BNC connector assembly, and rear cover. Refer to the diagrams in “[Removal Procedures](#)” on page 22 as needed.

Lens Assembly Replacement

- 1 Blow out enclosure with air to remove any debris.
- 2 Install the Lens assembly inside the front cover enclosure as shown in [Figure 4](#).
- 3 Press down firmly at top and bottom of lens to compress gasket, while installing four (p/n 0515-1521) M3 screws. Use a T10 driver and torque to 8-inch pounds.

PCA with On/Off Switch Replacement

- Place the PCA into the enclosure using the slot in the board as a guide. This slot fits over the mating oval pin in the case casting.

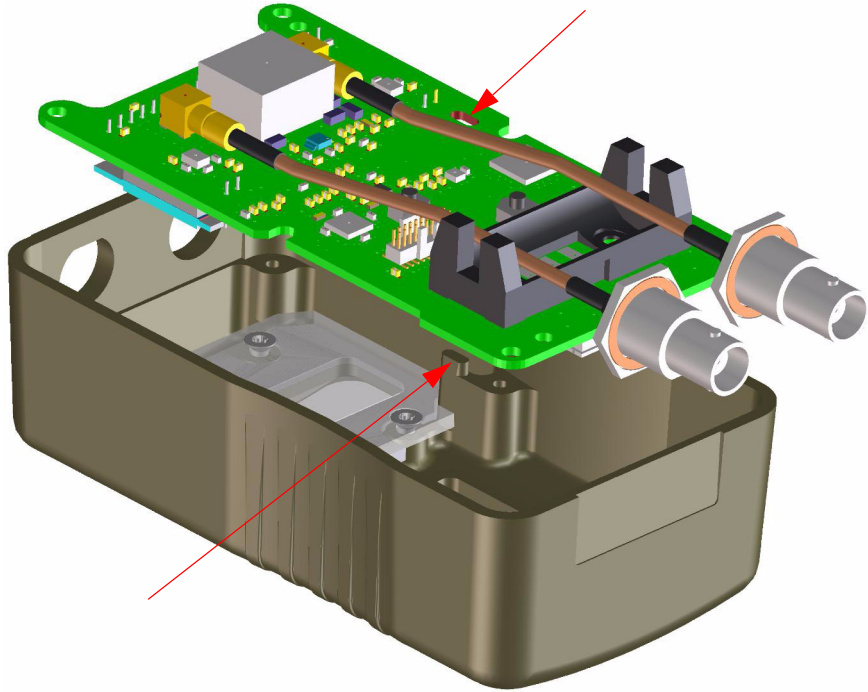


Figure 5 PCA Slot Location

Connector Assembly Replacement

- 1 Snap the two coax cable connectors from the cable assembly to the MCX connectors of the PCA.

Be careful not to damage any components on the PCA. Ensure that the cables are crossed as shown in [Figure 3](#) and the board connectors have fully engaged.

- 2 Slide BNC connectors through the D-holes crossing the cables as shown in [Figure 6](#).
- 3 Install the BNC star-washers and nuts to the BNC connectors at the top of the front case. Tighten with a 14-mm hex socket wrench. Torque to 40-inch pounds.

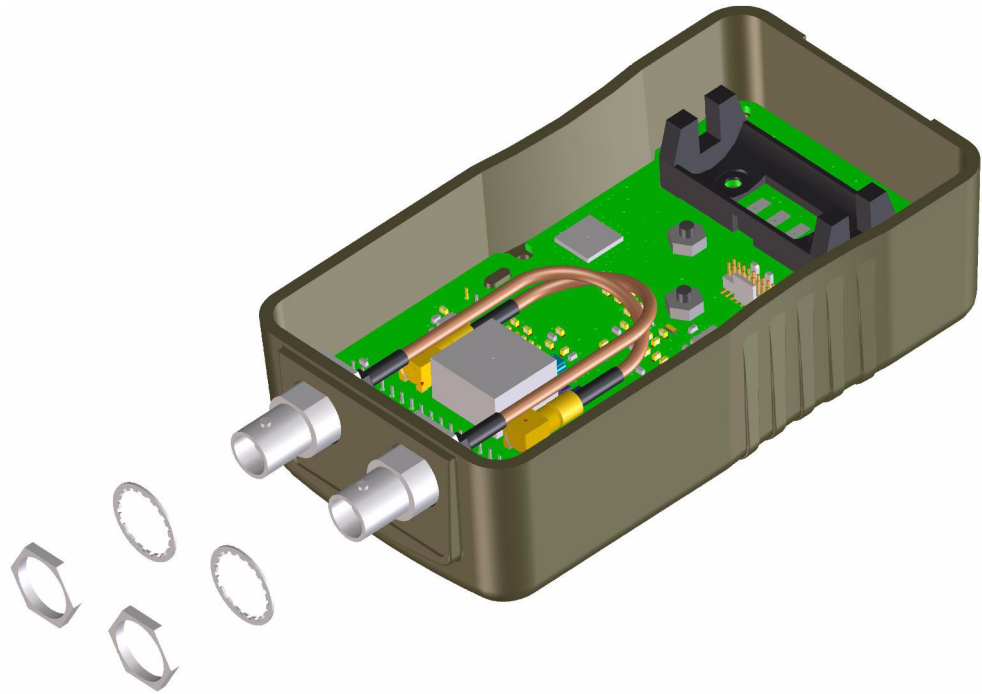


Figure 6 BNC Washer and Nut Location

Adjusting Friction on the Sliding Cap

- 1 With the rear cover off, the interior jam nut should be loosened and the shoulder screw should be tightened/loosened as necessary to achieve the desired friction on the cap slide.
- 2 Hold the screw while the jam nut is tightened to approximately 42 in-lbs.

NOTE

Once set, the nut should not need to be readjusted unless the nylon washers are excessively worn (the spring washer will keep pressure applied even with some wear to the nylon washers). If the jam nut is not tightened appropriately, or the shoulder screw is tightened further without securing the jam nut, the nut could become loosened, come free and possibly damage the PCA.

Rear Cover Replacement

- 1 Place rear cover onto the front case enclosure.
- 2 Install six (p/n 0515-1862) M3 screws and torque to 8-inch pounds using a T10 driver. Refer to [Figure 2](#) on page 23.

Battery Replacement

Refer to [“Installing and Replacing the Battery”](#) on page 10.

L4610A RTS Performance Tests

Battery Current Draw Tests

This test measures the current draw of the L4610A RTS.

Table 1 Battery Current Draw at 5.5 VDC (Typical Characteristics)

Battery current draw	All values are Typical, measured at 5.5 V
• Off	• <200 nA
• Receiver test mode	• <8 mA
• Transmitter test mode	• <15 mA

Equipment Needed

- Power supply, 6 VDC
- Digital volt meter
- RF source (frequency range of 30 to 88 MHz)
- Power amplifier (frequency range of 30 to 88 MHz, with 50 W)
- Agilent E4419B power meter
- Agilent E9304A power sensor

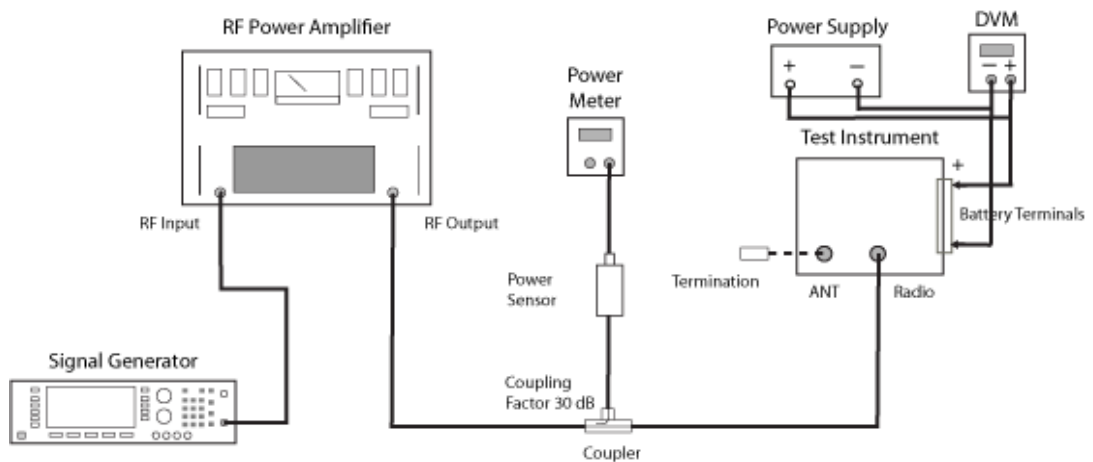


Figure 7 Battery Current Draw Test Setup

Procedure

- 1 Remove the battery from L4610A RTS. Refer to “Installing and Replacing the Battery” on page 10.
- 2 Connect the equipment as shown in Figure 7.
- 3 Connect power supply to L4610A RTS battery contacts.

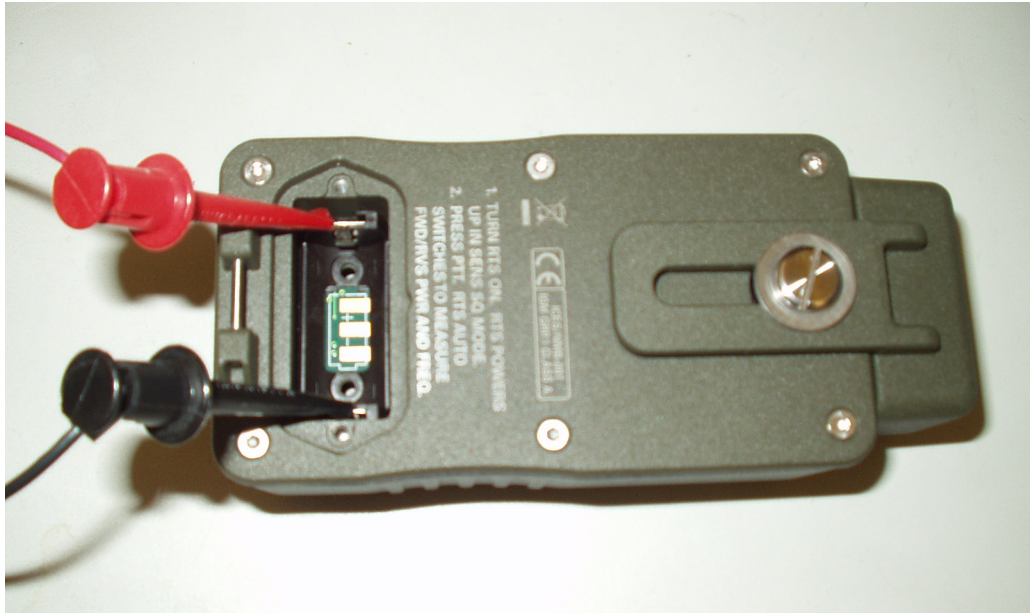


Figure 8 Battery Contact Location

- 4 Set the power supply to 5.5 VDC.
- 5 Measure the current with the L4610A RTS turned off.
- 6 Measure the current with the L4610A RTS turned on (in Receiver Test mode).
- 7 Verify that the display is easily legible and the unit passes self test.

```
SENDING RCV TEST  
XMT TO TEST XMTR  
SELFTEST+BATT OK
```

- 8 Connect Source with the power amplifier to L4610A RTS’s Radio connector.
- 9 Set the source with the power amplifier to the following conditions:
 - a Frequency to 75 MHz
 - b Power to 2 Watts (33 dBm) out. Verify this setting with the power meter.
- 10 Measure the current with L4610A RTS (in Transmitter Test mode).

L4610A RTS Settings	Measured Value	Typical Values
L4610A turned off		<200 nA
L4610A turned on in Receiver Test mode.		<8 mA
L4610A RTS turned on in Transmitter Test mode.		<15 mA

Receiver Test (L4610A RTS is Transmitting)

This test measures the signal being transmitted from the L4610A RTS.

RF output carrier frequency	30 MHz to 85 MHz in 5 MHz intervals (simultaneous)
RF output level and accuracy	$3 \mu\text{V}$ (-97.4 dBm) $\pm 1 \mu\text{V}$ (-101 to -97.4 dBm), each carrier

Equipment Needed

- Power supply, 6 VDC
- Digital volt meter
- Agilent N9020A Option 526 and P26 spectrum analyzer
- Agilent N9063A analog demodulation application

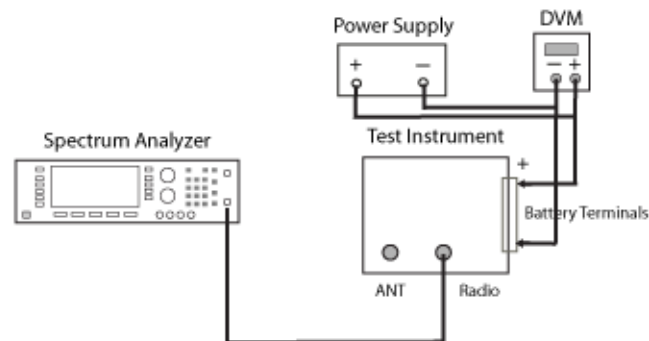


Figure 9 Receiver Test Setup

NOTE

The L4610A RTS will automatically turn off after 120 seconds. Press and hold the button to keep the RTS turned on.

Amplitude Accuracy

The L4610A RTS generates a comb of signals at a level of $-97.4 \text{ dBm} \pm 3 \text{ dBm}$ ($3 \text{ } \mu\text{V}$). This procedure will measure the output from 30 MHz to 85 MHz in 5 MHz steps to verify proper operation.

- 1 Connect the equipment as shown in [Figure 9](#).
- 2 Set the spectrum analyzer as follows:
 - a Press Preset.
 - b From the Amplitude menu, set the Internal Preamp to Low Band and Attenuation to 0 dB.
 - c Set Amplitude Reference to -40 dBm.
 - d From the Mode menu, set Analog to Demod.
 - e From the Mode Setup menu, press Restore Mode Defaults.
 - f From the Frequency menu, set Center Frequency to 30 MHz.
 - g Turn the L4610A RTS on and read the Carrier Power that is displayed on the spectrum analyzer. Enter this value in the Measured Power column below.
 - h Repeat [step f](#) for each frequency measurement.

Frequency	Measured Power
30 MHz	
35 MHz	
40 MHz	
45 MHz	
50 MHz	
55 MHz	
60 MHz	
65 MHz	
70 MHz	
75 MHz	
80 MHz	
85 MHz	

Transmitter Test Mode (The L4610A RTS is Receiving)

Frequency displayed resolution	1 kHz
RF modulation	<ul style="list-style-type: none"> • Power Measurement • Range • Accuracy
Absolute maximum input power	60 W with any load

Equipment Needed

- Power supply, 6 VDC
- Digital volt meter
- Agilent N5182A MXG signal generator
- Agilent E4419B power meter
- Agilent E9304A power sensor
- Werlatone C6165-10 dual direction coupler
- Trilithic HTF-5100-3 coaxial 100 W 50 Ω load
- MiniCircuits ZHL-100W-H1 power amplifier

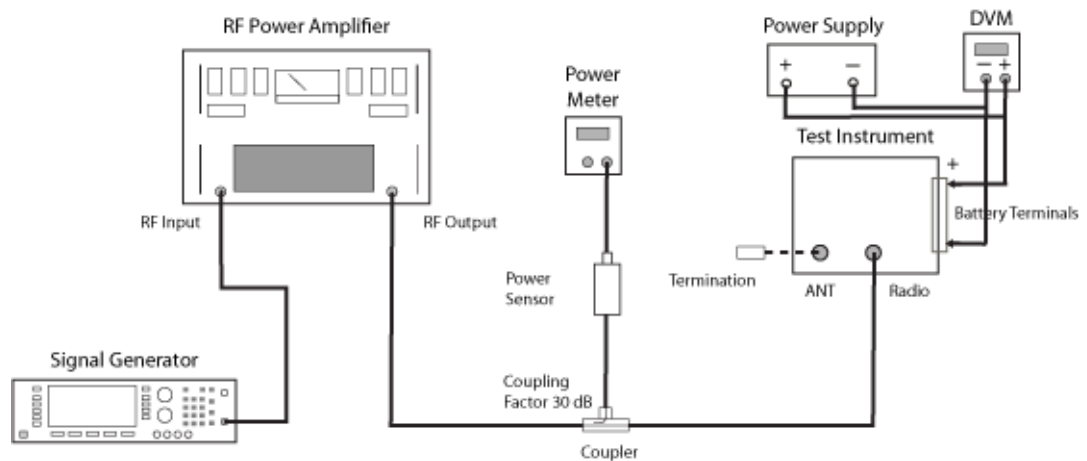


Figure 10 Transmitter Test Setup

Frequency Accuracy Test

- 1 Connect the equipment as shown in [Figure 10](#).
- 2 Turn on the L4610A RTS.

NOTE

The L4610A RTS will automatically turn off after 120 seconds. Press and hold the button to keep the RTS turned on.

- 3 Set the Agilent N5182A MXG signal generator to output the selected frequencies (30 MHz, 60 MHz, and 88 MHz) at 100 mW.
- 4 Use the power meter (connected via the coupler) to verify the signal generator output power.
- 5 For each frequency, enter the measured frequency of the L4610A RTS.

Frequency	Measured Frequency
30 MHz	
60 MHz	
88 MHz	

Amplitude Accuracy Test (Forward Power)

- 1 Set the Agilent N5182A MXG signal generator to 1, 3, 30, and 50 Watts.
- 2 Use the power meter (connected via the coupler) to verify the signal generator output power.
- 3 For each power level and frequency, enter the measured amplitude of the L4610A RTS.

Receiver Power	Frequency	Measured Forward Power
1 Watt	30 MHz	
	60 MHz	
	88 MHz	
3 Watts	30 MHz	
	60 MHz	
	88 MHz	
30 Watts	30 MHz	
	60 MHz	
	88 MHz	
50 Watts	30 MHz	
	60 MHz	
	88 MHz	

Amplitude Accuracy Test (Reverse Power)

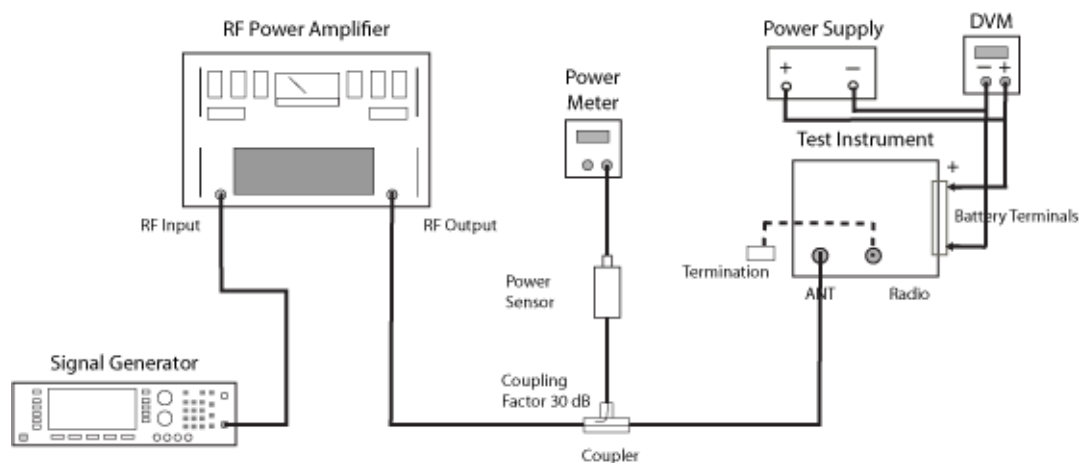


Figure 11 Reverse Power Test Setup

- 1 Connect the equipment as shown in [Figure 11](#).
- 2 Set the Agilent N5182A MXG signal generator to 1, 3, 30, and 50 Watts.
- 3 Connect the signal generator output to the L4610A RTS Antenna connector.
- 4 Connect a 50 ohm load to the Radio connector.

2 Service

- 5 Use the power meter (connected via the coupler) to verify the signal generator output power.
- 6 For each power level and frequency, enter the measured amplitude shown on the L4610A RTS.

Receiver Power	Frequency	Measured Reverse Power
1 Watt	30 MHz	
	60 MHz	
	88 MHz	
3 Watts	30 MHz	
	60 MHz	
	88 MHz	
30 Watts	30 MHz	
	60 MHz	
	88 MHz	
50 Watts	30 MHz	
	60 MHz	
	88 MHz	

Agilent Sales and Service Offices

Contacting Agilent Sales and Service Offices

Assistance with test and measurement needs, and information on finding a local Agilent office are available on the Internet at:

<http://www.agilent.com/find/contactus>

You can also purchase L4610A PRM-34B accessories or documentation items on the Internet at: <http://www.agilent.com/find/L4610A>

If you do not have access to the Internet, contact your field engineer.

In any correspondence or telephone conversation, refer to the L4610A RTS by its model number and full serial number. With this information, the Agilent representative can determine whether your unit is still within its warranty period.

Returning a L4610A RTS to Agilent Technologies

To return your instrument to Agilent Technologies for servicing, follow these steps:

Gather as much information as possible regarding the instrument's problem.

Call the phone number listed on the Internet (<http://www.agilent.com/find/contactus>) that is specific to your geographic location. If you do not have access to the Internet, contact your field engineer.

After sharing information regarding the instrument and its condition, you will receive information regarding where to ship it for repair.

Ship the L4610A RTS in the original factory packaging materials, if available, or use similar packaging to properly protect the L4610A RTS.

3 Specifications

Specifications

Specification Definitions

Agilent Technologies warrants that the following specifications will be met under the following instrument operating conditions.

Specifications describe the performance of parameters covered by the product warranty $-20\text{ }^{\circ}\text{C}$ (-4 degrees F) to $+55\text{ }^{\circ}\text{C}$ ($+131\text{ degrees F}$), unless otherwise noted.

Typical indicates performance within specification that 80% of the units exhibit with an 80% confidence level over the temperature range of 20 to $30\text{ }^{\circ}\text{C}$. Typical specifications are not covered by product warranty.

General Specifications

RF connectors	2 BNC connectors, Antenna and Radio, 50 Ω impedance
Frequency range	30 MHz to 88 MHz
Frequency accuracy	± 2 kHz at 88 MHz (± 23 ppm)
Battery current draw <ul style="list-style-type: none"> • Off • Receiver test mode • Transmitter test mode 	All values are Typical, measured at 5.5 V <ul style="list-style-type: none"> • <200 nA • <8 mA • <15 mA
Low battery indications <ul style="list-style-type: none"> • “Replace Soon” • “Replace Now” (inoperable) 	All values are Typical <ul style="list-style-type: none"> • 4.5 Vdc to 4.9 Vdc • <4.5 Vdc
Battery type	6 Vdc, BA-5372/U (user replaceable)
Environment <ul style="list-style-type: none"> • Operating temperature • Operating humidity • Storage temperature • Maximum altitude 	<ul style="list-style-type: none"> • -20 °C (-4 ° F) to $+55$ °C ($+131$ ° F) • 95% RH at 40 °C (104 ° F) maximum • -30 °C (-22 ° F) to $+70$ °C (158 ° F) • 12 km (40,000 ft)
Warm-up time	<1 second
Regulatory approval	Refer to the L4610A Declaration of Conformity (see web page: regultions.corporate.agilent.com)
Suggested calibration interval	The L4610A RTS is designed to meet published specifications throughout its expected life.
Expected life	10 years

Receiver Test Mode: L4610A Source Specifications

RF output carrier frequency	30 MHz to 85 MHz in 5 MHz intervals (simultaneous)
RF output level and accuracy	3 μ V ± 1 μ V, each carrier
RF modulation <ul style="list-style-type: none"> • FM composite signal • Tone frequency accuracy • FM deviation 	<ul style="list-style-type: none"> • 150 Hz + 900 Hz dual tones • ± 2 Hz • ≥ 3.5 kHz peak at 75 MHz

Transmitter Test Mode: L4610A Receiver Specifications

Frequency displayed resolution	1 kHz
RF modulation <ul style="list-style-type: none">• Power Measurement• Range• Accuracy	<ul style="list-style-type: none">• 1.0 W to 50 W (usable from 0.1 W to 50 W)• 0.1 W• $\pm 20\%$
<ul style="list-style-type: none">• Absolute maximum input power	<ul style="list-style-type: none">• 60 W with any load



Appendix A

AN/PRM-34 RTS Performance Tests



AN/PRM-34 Performance Tests

The L4610A RTS was designed as a direct replacement for the AN/PRM-34 radio test set allowing it to utilize the AN/PRM-34 performance tests. Consult the TM 11-6625-3015-14 Operators, Organizational, Direct Support and General Support Maintenance manual for further details.

NOTE

Note: The L4610A RTS testing differences will be outlined in this section in bold.

Built-in Selftest and Under Voltage Test

- 1 **To run the L4610A RTS built-in selftest, turn the L4610A RTS On and verify the results of the selftest. Then the L4610A RTS is turned on, it automatically performs the built-in-selftest and displays the results on the LCD display.**
- 2 Connect the test equipment.
 - a Connect a TEK PS 503A power supply to the L4610A RTS's + and - battery connectors.
 - b Connect a TEK DM 501A digital multimeter to the L4610A RTS's + and - battery connectors.
 - c Set the power supply to 5.5 Volts DC as verified by the digital multimeter.

3 Turn the Test Set on On.

The Display should indicate the battery test passed.

```
SENDING RCV TEST  
XMT TO TEST XMTR  
SELFTEST+BATT OK
```

Any other reading indicates a faulty unit. If the test set fails the built-in Selftest replace the L4610A RTS PC assembly.

4 Slowly reduce the DC power supply voltage.

The Test Set display will change from BATT OK, to BATTERY LOW REPLACE SOON at 4.7V +/- 0.2 volts indicating low voltage.

```
SENDING RCV TEST  
> BATTERY LOW <  
> REPLACE SOON <
```

When the power supply voltage drops below 4.5 volts, the Test Set display will change to:

BATTERY TOO LOW
REPLACE BATT NOW

When the power supply voltage drops below 3.5 volts, the Test Set display will become blank.

Table 1 L4610A RTS Battery Under Voltage Test

Test Result	Display	Upper Limit	Lower Limit
Good	BATTERY OK	6.0 Vdc	5.0 Vdc
Low ¹	BATTERY LOW REPLACE SOON	4.9 Vdc	4.5 Vdc
Fail	BATTERY TOO LOW REPLACE BATTERY NOW	Less than 4.5 Vdc	3.5 Vdc ²

1 When used in environments where the temperature is near the lower limit (-20 C), a good battery may provide a “low” test result when it may have several hours of operating capacity.

2 For voltages less than 3.5 Vdc, the display will be blank.

Forward Power, Frequency, and Reverse Power Tests

- 1 Connect the test equipment
 - a Connect a TEK PS 503A power supply to the L4610A RTS's + and - battery connectors.
 - b Connect a TEK DM 501A digital multimeter to the L4610A RTS's + and- battery connectors.
 - c Connect a 7916259 power standard assembly (splitter) to the L4610A RTS test set Antenna connector.
 - d Connect a HP 432A power meter to the 7916259 power standard assembly.
 - e Connect a Sierra 161A 50 ohm termination to the 7916259 power standard assembly.
 - f Connect a Micro Dot 440 power generator to the test set Radio connector.
 - g Connect a HP 5345A frequency counter to the power generator.
- 2 Set the power supply to 5.5 Vdc as verified by the digital multimeter.
- 3 Turn the L4610A RTS test set On.

- 4 Adjust the power generator frequency to 55 MHz.
- 5 Set the power generator to provide a power meter indication of 40.0 watts.

The Test Set display must indicate between 32.0 and 48 Watts for the forward power measurement (FWD).

- If the display is not within limits, inspect the two RF cables for damage and replace if necessary.
- If the forward power results are still incorrect after replacing the cables, replace the L4610A RTS PC assembly.

The Test Set display must indicate between 54.998 and 55.002 MHz for the Frequency measurement (FREQ).

- If the frequency display is not within limits, replace the L4610A RTS PC assembly.

- 6 Set the power generator to provide a power meter indication of 1.0 watts.

The Test Set display must indicate between 0.8 and 1.2 Watts for the forward power measurement (FWD).

- If the display is not within limits, inspect the two RF cables for damage and replace if necessary.
- If the Forward Power results are still incorrect after replacing the cables, replace the L4610A RTS PC assembly.
- The Test Set display must indicate between 54.998 and 55.002 MHz for the Frequency measurement (FREQ).
- If the Frequency display is not within limits, replace the L4610A RTS PC assembly.

- 7 Reverse the connections for the test set's Antenna and Radio connectors.

- 8 Set the power generator to provide a power meter indication of 20.0 watts.

The Test Set display must indicate between 16.0 and 24.0 Watts for the Reverse Power measurement (RVS).

- If the display is not within limits, inspect the two RF Cables for damage and replace if necessary.
- If the Forward Power results are still incorrect after replacing the cables, replace the L4610A RTS PC assembly.

- 9 Set the power generator to provide a power meter indication of 1.0 watts.

The Test Set display must indicate between 0.8 and 1.2 Watts for the Reverse Power measurement (RVS).

- If the display is not within limits, inspect the two RF cables for damage and replace if necessary.
- If the forward power results are still incorrect after replacing the cables, replace the L4610A RTS PC assembly.

RF Spectrum Test

- 1** Connect a TEK PS 503A power supply to the L4610A RTS's + and - battery connectors.
- 2** Connect a TEK 492 spectrum analyzer to the Test Set's Radio connector.
- 3** Set the power supply to 5.5 Volts.
- 4** Turn the L4610A RTS Test Set On.

A 30 - 75 MHz spectrum at -97 dBm +/-3 db should be observed on the Spectrum Analyzer

- If the Test Set fails the RF Spectrum test, inspect the Test Set's Radio connector for damage and replace if necessary.
- If the Test Set fails the RF Spectrum test after replacing the cable, replace the L4610A RTS PC assembly.

A AN/PRM-34 RTS Performance Tests