

Service Guide

Agilent Technologies E7495A/B

Base Station Test Set



Manufacturing Part Number: E7495-90024

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1. General Information	
Safety considerations	12
Safety Symbols	12
Safety Considerations For This Test Set	13
Lifting and Handling	15
Electrostatic Discharge (ESD) Precautions	15
Preparing the Agilent E7495A/B for Shipping	16
Contacting Agilent Technologies	18
More Information from Agilent	18
E7495A/B Base Station Test Set Product Updates	18
2. Product Information	
Agilent E7495A/B Connection Diagram	21
Working with Batteries	23
Installing Batteries	23
Viewing Battery Status	24
Charging Batteries	26
Reconditioning Batteries	28
Battery Care	31
Battery Specifications	34
3. E7495A/B Firmware Upgrades and Reinstallation	
Firmware Downgrades	38
Firmware Upgrades	39
Update via PCMCIA Card	40
Update via PCMCIA card using Recovery Script	42
Update via Load Firmware Utility	44
4. Add Hardware Options	
General Hardware Upgrade Installation Information	48
Before you install new hardware	48
E7495A/B Tools required	48
Adding Option 600: Power Meter	49
1. Install the New A2A1 Power Meter and A2A2 Power Meter Interface Boards	49
2. Update the Option Information	52
3. Verify the Test Set Functionality	52
4. Run the Performance Tests	52
Adding Option 510 Complex Source	53
1. Record the Option/Model/Serial Information	53
2. Replace the A3 RF Assembly	53
3. Regenerate and Install Vital Instrument Data	54
4. Verify the Test Set Functionality	55
5. Run the Performance Tests	55
Adding Option 700 T1 Tester	56
1. Install the New A4A2 T1 Analyzer Board and Cables	56
2. Install the New T1 Analyzer Overlay on the Case	58
3. Update the Option Information	58
4. Verify the Test Set Functionality	58

Contents

5. Run the Performance Tests	58
Adding Option 710 E1 Tester	59
1. Install the New A4A2 E1 Analyzer Board	59
2. Update the Option Information	61
3. Verify the Test Set Functionality	61
4. Run the Performance Tests	61
5. Troubleshoot the Agilent E7495A/B	
E7495A/B Repair Process	64
Accessories and Options	65
Troubleshooting Information	66
Step 1 - Verify the Test Set Will Power-Up	67
Check for a Power Supply Problem	67
Will Not Boot-Up	68
Step 2 - Measurement Loading Problems and Corrupted States	69
If no buttons work	69
If the measurement still does not function	69
Corrupted States	69
Step 3 - Verify Test Set Functionality	71
Manual Verification Procedures	72
On-board Verification Procedures	87
Agilent E7495A/B Performance Verification Software	89
Post Repair Process	90
Calibrations, Adjustments, and Data Requirements	92
6. Remove and Replace Procedures	
General information	98
Procedure Map	100
E7495A/B Tools required	101
Parts List	102
Removal and Replacement Procedures	107
Kickstand and Strap Handle	107
Batteries	108
Bumpers	109
A1 Front Panel Assembly	111
A3 RF Assembly	115
A5 Connector Panel Assembly	115
A3A1 GPS Assembly	118
A2 Power Meter Assembly (Option 600 only)	118
A4A1 Controller Board	131
A4A2 T1 or E1 Assembly	135
A4A5 Battery Controller and Housing	138
A4A3 Power Supply and A4A4 Power Supply Interface Boards	140
Speaker	144
A1 Front Panel	145
7. Functional Tests, Adjustments, and Utilities	
Before You Begin Testing — Get Customer Information	152

Recording a customer's static IP address before you begin testing	152
Configure the E7495A/B for a DHCP or Static IP Address	153
Configuring the E7495A/B to use a DHCP IP address	153
Configuring the E7495A/B to use a static IP address	154
Restoring a customer's static IP address after you complete testing	155
Procedure	155
Equipment Required	156
Functional Tests	161
Verify GPS	161
DC Bias	163
Even Second Sync Input	165
Internal and External Reference	167
T1 Functional Test (Option 700 only)	169
E1 Functional Test (Option 710 only)	171
Adjustments	173
Reference Alignment Test	173
Power Meter Reference Oscillator Level Adjustment (Option 600 only)	175
. Power Meter Reference Oscillator Frequency Adjustment (Option 600 only)	178
Utilities	180
Read-Write Model Number/Serial Number/Options	180
Validate DSP RAM	182
Serial Port Verification	183
Clear Return Loss Default Cal.	184

Contents

Contents

“Safety considerations” on page 12

“Lifting and Handling” on page 15

“Electrostatic Discharge (ESD) Precautions” on page 15

“Preparing the Agilent E7495A/B for Shipping” on page 16

“Contacting Agilent Technologies” on page 18

Safety considerations

General

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product has been designed and tested in accordance with IEC Publication 61010-1+A1+A2:1992 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use and has been supplied in a safe condition. This instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Safety Earth Ground

A uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

Chassis Ground Terminal

To prevent a potential shock hazard, always connect the rear-panel chassis ground terminal to earth ground when operating this test set from a dc power source.

Safety Symbols



Indicates test set damage can occur if indicated operating limits are exceeded. Refer to the instructions in this guide.



Indicates hazardous voltages.



Indicates earth (ground) terminal

WARNING

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

CAUTION

A CAUTION note denotes a hazard. It calls attention to an operation procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond an CAUTION note until the indicated conditions are fully understood and met.

Safety Considerations For This Test Set

WARNING

Whenever it is likely that the protection has been impaired, the test set must be made inoperative and be secured against any unintended operation.

If this test set is to be energized via an autotransformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

No operator serviceable parts in this product. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

Servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources while it is being opened.

Adjustments described in the manual are performed with power supplied to the test set while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

For Continued protection against fire hazard, replace the line fuse(s) with T 250 V 5.0 A fuse(s) or the same current rating and type. Do not use repaired fuses or short circuited fuseholders.

WARNING

This product is a Safety Class I test set (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

-
- WARNING** Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause personal injury and/or product damage.
- This product is designed for use in Installation Category II and Pollution Degree 3 per IEC 61010 and IEC 60664 respectively.
- This product has autoranging line voltage input, be sure the supply voltage is within the specified range.
- To prevent electrical shock, disconnect test set from mains (line) before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.
- Ventilation Requirements:** When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4 ° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.
-
- WARNING** If you are charging the batteries internally—even while the test set is powered off—the test set may become warm. Take care to provide proper ventilation.
-
- WARNING** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer’s instructions.
-
- WARNING** To avoid overheating, always disconnect the test set from the AC adapter before storing the test set in the soft carrying case.
- If you prefer to leave the test set connected to the AC adapter while inside the soft carrying case, you can disconnect the AC adapter from its power source to prevent overheating.
-

Lifting and Handling

When lifting and handling the Agilent E7495A/B Base Station Test Set use ergonomically correct procedures. Lift and carry the test set by the carrying strap.

Electrostatic Discharge (ESD) Precautions

This test set was constructed in an ESD (electrostatic discharge) protected environment. This is because most of the semiconductor devices used in this test set are susceptible to damage by static discharge.

Depending on the magnitude of the charge, device substrates can be punctured or destroyed by contact or mere proximity of a static charge. The result can cause degradation of device performance, early failure, or immediate destruction.

These charges are generated in numerous ways such as simple contact, separation of materials, and normal motions of persons working with static sensitive devices.

When handling or servicing equipment containing static sensitive devices, adequate precautions must be taken to prevent device damage or destruction.

Only those who are thoroughly familiar with industry accepted techniques for handling static sensitive devices should attempt to service circuitry with these devices.

Preparing the Agilent E7495A/B for Shipping

CAUTION

Cover electrical connectors to protect sensitive components from electrostatic damage. Test set damage can result from using packaging materials other than the original materials. Never use styrene pellets as packaging material. They do not adequately cushion the system or prevent it from shifting in the carton. They may also cause system damage by generating static electricity.

Step	Notes
1 Write a complete description of the failure and attach it to the system.	<p>Include any specific performance details related to the problem. The following information should be returned with the system:</p> <ul style="list-style-type: none">• Type of service required• Date system was returned for repair• Description of the problem:<ul style="list-style-type: none">• Whether problem is constant or intermittent• Whether system is temperature-sensitive• Whether system is vibration sensitive• System settings required to reproduce the problem• Error Code• Performance data• Company Name and return address• Name and phone number of technical contact person• Model number of returned system• Full serial number of returned system• List of any accessories returned with the system
2 Caution: Cover all front and rear panel connectors that were originally covered when you first received the system.	

Step	Notes
3 Pack the system in the original shipping containers. Original materials are available through Agilent Technologies office. See step 4 for more information.	
4 Wrap the system in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge.	<p>For systems weighing less than 54 kg (120 lbs.), use a double-walled, corrugated cardboard carton of 159 kg (350 lbs.) test strength.</p> <p>The carton must be large enough to allow 3 to 4 inches on all sides of the system for packing material, and strong enough to accommodate the weight of the system.</p> <p>Surround the equipment with 3 to 4 inches of packing material, to protect the system and prevent it from moving in the carton. If packing foam is not available, the best alternative is S.D-240 Air Cap™ from Sealed Air Corporation (Commerce, California 90001). Air Cap looks like a plastic sheet filled with air bubbles. Use the pink (anti-static) Air Cap to reduce static electrical damage. Wrapping the system several times in this material will protect the system and prevent it from moving in the carton.</p>
5 Seal the carton with strong nylon adhesive tape and mark it "FRAGILE, HANDLE WITH CARE".	
6 Retain copies of all shipping papers.	

Contacting Agilent Technologies

For help with product selection and configuration, technical and application assistance, consulting and integration services, rental and leasing options, refurbished equipment, product purchases, repair, calibration, education and training please go to <http://www.agilent.com/find/assist>

If you do not have access to the Internet, call the appropriate number shown in below or contact your local Agilent Technologies Sales and Service Office.

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Europe, Africa, Middle East +32 (0)2 404-9340

Singapore +1-800-375-8100

More Information from Agilent

For more information about Agilent's E7495A/B Base Station Test Set, go to <http://www.agilent.com/find/e7495b>

For more information about Agilent's solutions for the communications industry, visit our web site at <http://www.agilent.com/comms/industry>

E7495A/B Base Station Test Set Product Updates

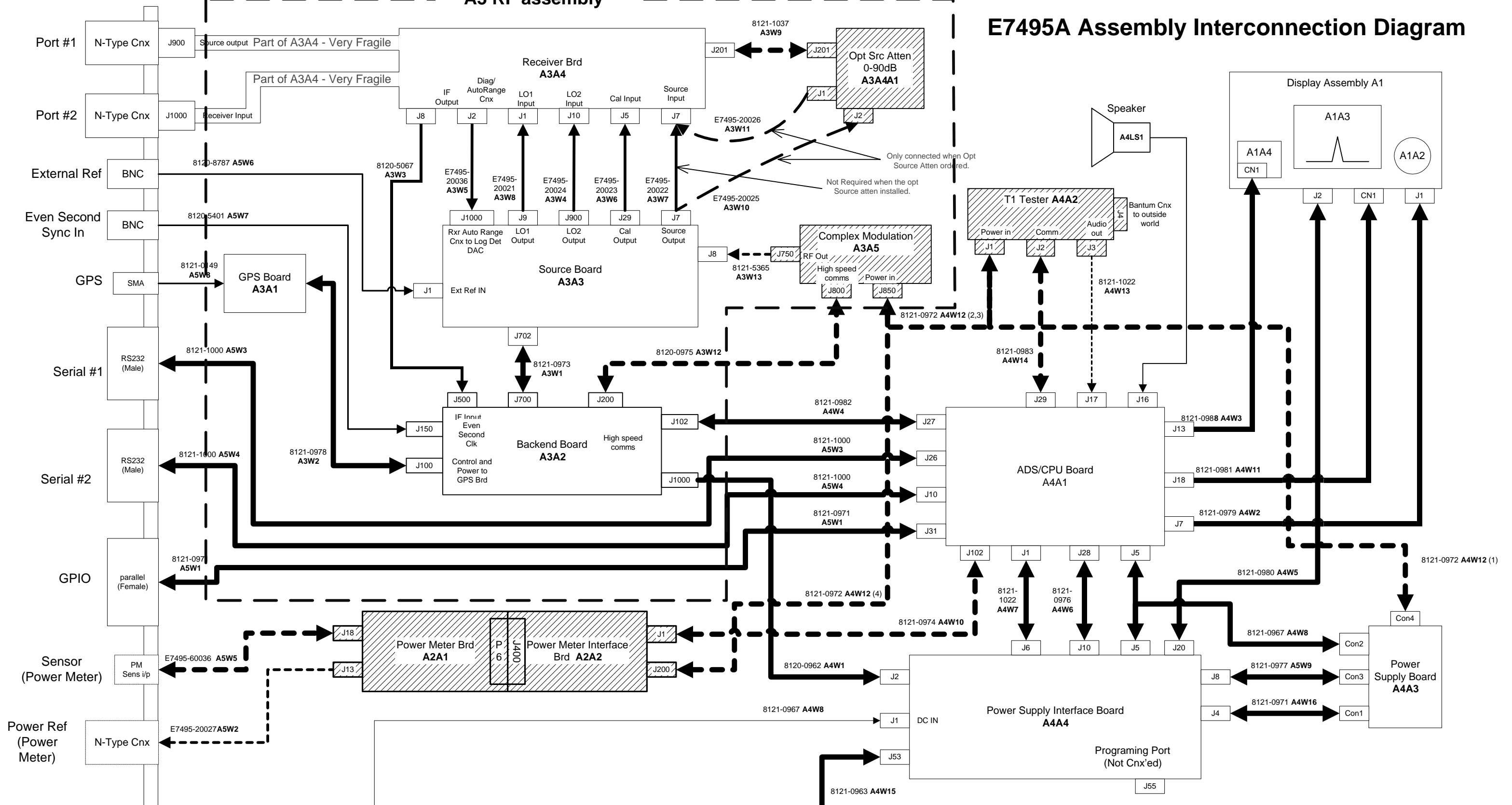
For information about E7495A/B Base Station Test Set updates, go to <http://www.agilent.com/find/e7495b>

[“Agilent E7495A/B Connection Diagram” on page 21](#)

[“Working with Batteries” on page 23](#)

A3 RF assembly

E7495A Assembly Interconnection Diagram



Cable Legend	
	Dashed cables indicate optional connection
	Ribbon cable or wiring harness
	Semi rigid RF cables
	Flexible RF cables
	Twisted pair

Working with Batteries

“Installing Batteries” on page 23

“Viewing Battery Status” on page 24

“Charging Batteries” on page 26

“Reconditioning Batteries” on page 28

“Battery Care” on page 31

“Battery Specifications” on page 34

Installing Batteries



Step	Notes
1 Open the battery door.	Turn the latch counterclockwise several times until loose. Then pull the battery door open.
2 Insert the battery.	Insert one or two batteries.
3 Close the battery door.	Turn the latch clockwise until tight to secure the battery door.

Viewing Battery Status

You can view information about battery status in four ways:

- Two battery LEDs embedded in the E7495A/B enclosure
- Icons in the lower right of the front panel screen
- System Statistics—Battery screen, available from the System menu
- LCD gauge built into each battery

Battery LEDs

LED	Charge remaining
Green	Greater than or equal to 25% charge capacity remaining
Blinking green	Battery charging
Green and red (may appear yellow or orange)	Greater than or equal to 10% and less than 25% charge capacity remaining
Red	Less than 10% charge capacity remaining

NOTE

The battery status LEDs will function only when the test set is on, in standby mode, or connected to external power.

Front Panel Icons

Icon	Status
Plug icon	Connected to external power through AC adapter converter or car adapter
2 solid batteries	2 batteries installed
1 solid battery	1 battery installed
% displayed beneath battery	Amount of charge capacity remaining for battery

System Statistics—Battery Screen

Step	Notes
1 System	
2 [More 1 of 2]	
3 [Battery]	

The Battery screen displays several kinds of information:

- **Temperature**—the internal temperature of each battery as measured by a sensor embedded in each battery
- **Voltage**—for each battery cell stack as measured by each battery’s sensor
- **Run Time to Empty**—while using external power, External DC Power is displayed; while using battery power, the predicted remaining battery run time is displayed in minutes at the present rate of discharge. If two batteries are installed, the second battery will have Not in Use displayed. The instrument mode you select affects the discharge rate, which determines the run time to empty. Antenna/Cable, Spectrum Analyzer, CDMA Tx Analyzer, and CDMA Over Air modes use the most power. Backhaul and Power Meter modes use the least power.
- **Fuel Gauge Error**—the present accuracy of each battery’s fuel gauge or remaining charge capacity. If the error exceeds 10%, you should condition the battery.
- **Percent Charged**—the predicted charge capacity of each battery in percent.
- **Battery Status**—For Battery 1 and Battery 2, Present or Missing tells you whether a battery is installed.

Built-In Battery Gauge

Each Lithium Ion battery has a five-segment LCD gauge that displays its charge status. Each segment represents 20% of the charge capacity. The gauge is active unless the battery is in shutdown mode. You can view the gauge with the door open.

Gauge	Charge Remaining
5 segments	81-100%
4 segments	61-80%
3 segments	41-60%
2 segment	21-40%
1 segment	1-20%
0 segment	Less than 1%

Charging Batteries

You can charge batteries internally or using the external battery charger (Option #820). The external charger provides much faster charging time.

CAUTION

Charge batteries internally or with the appropriate charger, a SMBus charger of level II or higher.

Never use a non-SMBus charger because the battery issues commands over the SMBus to the charger to control the charge rate and voltage.

Never use a modified or damaged charger.

Internal Charging

You can use the E7495A/B to recharge while the test set is operating or shut down. For a fully depleted battery, charging time is approximately 4 hours if the test set is shut down, 8 hours if the test set is operating.

If two batteries are installed, the test set fully charges Battery 1 before charging Battery 2. During internal charging, the charge indicator blinks to indicate which battery is being charged.

To charge a battery internally, simply attach the car adapter or AC adapter and turn on external power.

External Charging

The external battery charger (available as part of Option 820) lets you charge two batteries simultaneously. Each fully depleted battery takes up to 4 hours to recharge.

You have the option of charging batteries before they become fully depleted. Doing this does not shorten battery life. But repeatedly charging a battery before it's fully discharged will impair the accuracy of its internal charge-remaining indicator. When the fuel gauge error is greater than 10%, the battery should be reconditioned.

External Battery Charger LED	Charging Status
Green on	Fully charged
Green flashing	Fast charging
Yellow flashing	Reconditioning—the accuracy of the battery's internal LCD charge gauge is being renewed. See "Reconditioning Batteries."
Yellow/green	Battery is reconditioned
Red flashing	Error
Yellow on	Standby

Reconditioning Batteries

Each battery contains a microchip that monitors battery usage and tracks how much capacity is available. This function can become less accurate because of temperature fluctuations, aging, self-discharge, repeated partial charging, and other factors. This inaccuracy is displayed on the System Statistics—Battery screen as Fuel Gauge Error.

To ensure the accuracy of the battery's internal capacity tracking system, occasionally you need to recalibrate the battery. Reconditioning—also known as recalibrating—is done by fully charging the battery, fully discharging it, recharging it again, and then verifying that the error has been corrected.

You can recondition a battery internally or with the external charger. The charger makes the process simpler.

Determining if a Battery Needs Reconditioning

Step	Notes
1 System	
2 [More 1 of 2]	
3 [Battery]	On the Battery screen, if the error percentage for the battery is greater than 10%, the battery needs to be reconditioned.

NOTE

After reconditioning, if the battery is not fully charged or still shows more than a 10% Fuel Gauge Error reading, repeat the reconditioning procedure. If the second reconditioning does not restore a full charge and an error reading of 10% or less, the battery needs replacement. This error will affect all of the displayed battery charge indicators.

Internal Reconditioning

If you don't have the external battery charger, you can use the test set to recondition a battery. The process takes longer and requires shutting down the test set.

Step	Notes
<ol style="list-style-type: none"> 1 Fully charge the battery. <ol style="list-style-type: none"> a. Power off the test set. b. Install the battery needing reconditioning into the test set. If you have a second battery installed, remove the second battery. c. Connect the car adapter or AC adapter to the test set, and plug the other end of the adapter in the appropriate power source. 	<p>To fully charge the battery, leave the test set power off for approximately 4 hours.</p>
<ol style="list-style-type: none"> 2 Fully discharge the battery. <ol style="list-style-type: none"> a. Disconnect the external power adapter, then power on the test set. b. Confirm that the battery now has 100% of its charge by checking the Battery 1 or Battery 2 status icon in the lower right of the display or the System Statistics—Battery screen. c. Run the test set without external power until you fully deplete the battery (approximately 1.5 hours). 	
<ol style="list-style-type: none"> 3 Charge the battery and verify a full charge. <ol style="list-style-type: none"> a. Power off the test set again. b. Reconnect the external power adapter and charge the battery again for approximately 4 hours. c. Power on the test set. d. Confirm that the battery is fully charged and reconditioned by checking the System Statistics—Battery screen. 	<p>On the System Statistics—Battery screen, the battery should show 100% charge rate and less than a 10% Fuel Gauge Error.</p>

Reconditioning with the External Battery Charger

Step	Notes
1 Insert a battery into the left bay of the external battery charger.	
2 Press the blue button labeled Push to Recalibrate Left Battery Bay .	The charger will charge the battery fully, discharge it completely, then recharge it fully again. The entire process can take up to 10 hours.
3 Install the battery into the test set.	
4 On the System Statistics—Battery screen, verify that the battery is fully charged and reconditioned.	

WARNING

If you are charging the batteries internally, even while the test set is powered off, the test set may become warm. Take care to provide proper ventilation.

Battery Care

WARNING

Lithium Ion and lithium polymer cells and battery packs may get hot, explode, or ignite and cause serious injury if exposed to abuse conditions. Be sure to follow these safety warnings:

- Do not install the battery backward, so the polarity is reversed.
 - Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as wire).
 - Do not carry or store the battery with necklaces, hairpins, or other metal objects.
 - Do not pierce the battery with nails, strike the battery with a hammer, step on the battery, or otherwise subject it to strong impacts or shocks.
 - Do not solder directly onto the battery.
 - Do not expose the battery to water or salt water, or allow the battery to get wet.
 - Do not disassemble or modify the battery. The battery contains safety and protection devices, which, if damaged, may cause the battery to generate heat, explode, or ignite.
 - Do not place the battery in or near fire, on stoves, or in other high temperature locations. Do not place the battery in direct sunlight, or use or store the battery inside cars in hot weather. Doing so may cause the battery to generate heat, explode, or ignite. Using the battery in this manner may also result in a loss of performance and a shortened life expectancy.
 - Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions.
-

WARNING

Do not discharge the battery using any device except the specified device. When the battery is used in devices other than the specified device, it may damage the battery or reduce its life expectancy. If the device causes an abnormal current to flow, it may cause the battery to become hot, explode, or ignite and cause serious injury.

Maximizing Battery Life

The Lithium Ion battery used in the E7495A/B has a life span of approximately 300 charge cycles at room temperature, with normal charge and discharge rates. You can maximize the number of charge cycles with reasonable battery care:

- Clean the battery contacts occasionally, using a pencil eraser or alcohol and a cotton swab. Make sure no residue from the eraser or cotton swab is left on the contact points.
- Cycle each battery through a full charge and full discharge on a regular basis, preferably monthly. Even if you use external power most of the time, you will lengthen battery life by occasionally cycling through a full discharge/recharge cycle.
- Do not leave a battery unused for an extended period. Batteries that sit idle eventually lose their ability to hold a charge.
- Unplug the external battery charger (Option #820) when you're not using the test set.
- Store batteries in a cool, dry location, away from metal objects and corrosive gases. Extended exposure to high humidity or temperatures above 45 degrees Celsius (113 degrees Fahrenheit) can impair battery performance and shorten battery life. Storage limits are $-20\text{ }^{\circ}\text{C}$ to $60\text{ }^{\circ}\text{C}$ 80% RH.
- Allow a battery to warm to room temperature before charging it. Temperature shock can damage the battery chemistry and in some cases cause a short circuit.
- Always charge batteries at temperatures between 0 and 45 degrees Celsius (32 to 113 degrees Fahrenheit).
- Operate the test set on battery power between the temperatures of -10 and $+50$ degrees Celsius (-14 to $+122$ degrees Fahrenheit). Using the batteries at lower or higher temperatures can damage the batteries and reduce operating life. Cold temperatures affect battery chemistry, reducing charge capacity, especially below 0 degrees Celsius (32 degrees Fahrenheit).
- Batteries are shipped with a minimum of 20% charge capacity to provide at least a 6-month shelf life at room temperature, before the battery electronics go into shutdown mode. When a battery has

discharged down to a 7.1 volts, it goes into shutdown mode. When this occurs, the battery electronics self-disconnect, removing their electronic load from the cells. This provides approximately 1 year of room temperature storage before the cells self-discharge to the point beyond which they should not be recharged. Once a battery has reached shutdown mode the battery will undergo a self-test immediately upon being put into charge. The charger will then attempt to pre-charge the battery at a very low initial charge rate. If the voltage does not recover, the battery pack has been allowed to discharge beyond the point of safe recovery. The charge cycle will be terminated, and the battery pack needs to be replaced.

If the battery does recover from a shutdown mode, the fuel gauge accuracy will be reduced. Complete a battery recalibration as soon as possible to calibrate the fuel gauge.

Initial Charge Cycle

New batteries must be rapid-charged (typically to 80%), then trickle-charged (slowly charged to 100%) for 24 hours, before their first use and for the first two or three uses.

Because the batteries you receive with the E7495A/B are new, they have a minimal charge when you receive them. All batteries require a “break-in” period, so don't be alarmed if a battery doesn't hold a full charge right away. A new battery commonly will show a false full charge (voltage) as indicated on the test set or charger, and may not power up the test set upon first use. Before using a new battery, leave it charging for 24 hours.

Lithium Ion Battery Disposal

When you notice a large decrease in charge capacity after proper recharging, it's probably time to replace the battery.

Li-Ion batteries need to be disposed of properly. Contact your local waste management facility for information regarding environmentally sound collection, recycling, and disposal of the batteries. Do not throw batteries away but collect as small chemical waste.

Battery Specifications

The E7495A/B Base Station test set uses the Inspired Energy NI2040AG Smart Battery, which produces 10.8 volts DC at approximately 6000 mA. The NI2040AG is a Lithium Ion battery pack, which uses the System Management Bus (SMBus) interface to communicate with the test set and charger. To charge the batteries, use only the Agilent approved SMBus charger of Level II or higher or the E7495A/B.

External charging voltage is 18 V to 24 VDC.

The battery is designed for approximately 300 full charge/discharge cycles at room temperature and under normal rates of discharge.

The NI2040 uses electronically programmable read-only memory (EPROM) to store key data regarding the battery cells and charge capacity.

Protection Electronics

The NI2040AG SMBus battery uses several protection devices to prevent damage to the battery and test set. The battery is internally protected against excessive current draws and reduced loads (shorts), excessive voltage and temperatures.

During charging and discharging, the battery will monitor and report its voltage, current, and temperature. If any of these monitored conditions exceeded their safety limits, the battery will terminate any further charge or discharge until the error condition is corrected.

Test Set Operation: Battery Current Drain in the Off or Standby Mode

The E7495A/B provides two “powered down” modes: off and standby.

When the test set is operating from battery power, it continues to draw current in both off and standby modes. When in standby mode the test set draws 70 mA per hour, or 28% of a full battery charge in a 24-hour period. When in off mode, the test set draws 45 mA per hour, or 18% of a full battery charge in a 24-hour period. Agilent recommends that if the test set is not going to be used for an extended period of time, you periodically check and maintain the batteries’ charge, or remove the batteries from your test set. This will ensure you have sufficient battery capacity if you intend to operate the test set from battery power.

Battery Drain when in Off and Standby Modes

- Single battery off mode: 18.46% or 1.08 amps per 24 hrs.
- Single battery standby mode: 28.72% or 1.68 amps per 24 hrs.

Battery and Charger Part Numbers

Standard Supplied Accessories

Description	Part Number
AC/DC Converter	0950-4404
NI2040AG Battery	1420-0883*

Optional Accessories provided in E7495A/B Option 820

Charger 12 V at 1 A	0950-4276
AC/DC Converter	0950-4404
Auto Adapter F1455A	0950-4412
NI2040AG Battery	
E7495A	1420-0882
E7495B	1420-0883

NOTE Replace only with NI2040AG or equivalent, Agilent-approved battery. Additional batteries are also available directly from Inspired Energy, Inc. To purchase additional or replacement batteries, visit www.inspired-energy.com, or call toll free USA 1-888-5-INSPIRE (546-7747).

-
- NOTE** Regarding the battery charger and conditioner:
- Install the instrument so that the ON / OFF switch is readily identifiable and is easily reached by the operator. The ON / OFF switch or the detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.
 - Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.
-

Battery Current Drain

When in the Off mode the test set draws ~45 mA of current when the batteries) are left installed, and ~70 mA when in Standby mode.

The test set with a single battery loses ~18% of its battery charge per day in Off mode and ~28% per day in Standby mode. The following table shows how long a test set can be in Standby or Off modes until the battery is providing enough current to operate the test set.

Number of Batteries	Battery Capacity in Standby Mode	Battery Capacity in Off Mode
1	3.5 days	5.4 days
2	6.9 days	10.8 days

E7495A/B Firmware Upgrades and Reinstallation

What you'll find in this chapter

In this chapter, you'll find instructions on how to upgrade the firmware in the Agilent E7495A/B.

[“Firmware Downgrades” on page 38](#)

[“Firmware Upgrades” on page 39](#)

[“Update via PCMCIA Card” on page 40](#)

[“Update via PCMCIA card using Recovery Script” on page 42](#)

[“Update via Load Firmware Utility” on page 44](#)

Firmware Revision History

For information on major enhancements and changes to the E7495A/B firmware, go to the following URL:

http://www.agilent.com/find/e7495_firmware

Firmware Downgrades

Some E7495A/B customers require older version of firmware due to incompatibility issues with 3rd party software such as Motorola's LMF software. When changing to an older version of firmware, an extra process may be required due to changes made in the Joint File Flash System (JFFS). At firmware revision A.03.00, the Joint Flash File System (JFFS) was updated to JFFS2. When installing firmware, the appropriate JFFS must be loaded to allow the instrument to function.

CAUTION

When changing from firmware A.03.00 or higher, to any version below A.03.00, you must use one of the Downgrade cards or your E7495A/B will become corrupt and not boot up. Do not use one of the older firmware upgrade files.

If upgrading firmware, the process automatically installs the correct version of JFFS. When downgrading firmware from any A.03.xx version to any prior release, (A.02.12 or lower) you must use the appropriate firmware downgrade card to change from JFFS2 to JFFS. The following downgrade files are available on the external website at www.agilent.com/find/e7495_firmware.

- Downgrade A.03.xx to A.02.12
(downgrades to JFFS and installs A.02.12)
- Downgrade A.03.xx to A.01.60
(downgrades to JFFS and installs A.01.60)

These downgrade cards will install the proper version of JFFS needed for any firmware version from A.01.00 to A.02.12, and install firmware referenced in the title. Once you have used a downgrade card, you can then install any older or new version of firmware if needed.

As an example: If you currently have firmware A.3.00 installed and need to install A.02.12; use the Downgrade A.03.xx to A.02.12 card, DO NOT use a A.02.12 upgraded card.

If you currently have firmware A.03.00 installed and need to install A.02.00, you are required to do this in two steps.

1. First you will need to use one of the above downgrade cards to install the proper version of JFFS.
2. You can then install the A.02.00 firmware card.

Firmware Upgrades

Update via PCMCIA Card

Upgrading firmware for the E7495A/B is typically performed by customers. The normal upgrade process is documented in [“Update via PCMCIA Card” on page 40](#).

Update via PCMCIA Card using Recovery Script

If the E7495A/B will not boot up correctly but is still able to perform the firmware upgrade process, it's possible that the E7495A/B's flash memory has become corrupt. This upgrade procedure will allow the firmware to be reinstalled and update the flash memory file.

If the E7495A/B will not boot up, but is able to run the firmware upgrade process, please first try the procedure in [“Update via PCMCIA card using Recovery Script” on page 42](#).

Update via Load Firmware Utility

If it is not possible to update using the PCMCIA card and Recovery Script, the firmware can be reloaded. Manually set the Controller assembly to boot from the external PC Card, then load firmware using the Load Firmware Utility. Please refer to the procedure in [“Update via Load Firmware Utility” on page 44](#).

Update via PCMCIA Card

Requirements to install firmware

- Microsoft® Windows® based Personnel Computer with available compact flash or PCMCIA card slot
- Windows® 98, ME, 2000, or XP
- 64 MB or greater compact flash or PCMCIA Flash memory card (provided with E7495A/B or available as Agilent part number 0960-4409)
- WinZip™ or PkZip® or equivalent unzip utility program

Procedure

1. Download the firmware update files to your PC.
 - a. Open the E7495A/B Released Firmware download page (http://www.agilent.com/find/e7495_firmware).
 - b. From the Downloads section of the E7495A/B Released Firmware Versions page, click on the revision of firmware you would like to download, for example: E7495A/B Firmware Version A.02.00.
 - c. When prompted to open the file or save it to your computer, specify the temporary location on your PC's hard drive to save it to, and click Save.
2. Unzip the new firmware package to your compact flash or PCMCIA flash memory card.

NOTE

The following procedure is for WinZip™ 8.1 and 9. Other unzip utilities such as PkZip® can also be used. WinZip™ is available for download at <http://www.winzip.com>.

- a. Install WinZip™ on your PC, if it is not already installed.
 - b. Insert the blank, formatted compact flash or PCMCIA flash memory card into an open compact flash or PCMCIA card slot on your computer.
 - c. Locate the firmware update package that you have saved on your computer's hard drive and open it with WinZip™.
 - d. Click Extract and choose the drive letter that your computer has assigned for the compact flash or PCMCIA flash memory card to extract the firmware files.
 - e. Click Extract to extract the firmware files to the memory card.
3. Update the E7495A/B's firmware using the compact flash or PCMCIA flash memory card.

CAUTION

The E7495A/B must be connected to an external power source and cannot be upgraded using internal battery power. Do not remove the memory card from the E7495A/B during the firmware update process. Do not remove power to the E7495A/B during the firmware update process. Doing so may cause the E7495A/B to become unusable.

-
- a. Turn off the power on the E7495A/B by pressing the on/off button for more than 5 seconds so that the both green LED indicators above the power switch turn off. (Pressing the on/off button for less than 5 seconds places the E7495A/B into suspend mode.)
 - b. Insert the compact flash or PCMCIA flash memory card containing the unzipped firmware into the compact flash or PCMCIA card slot of the E7495A/B.
 - c. Turn on the E7495A/B.

NOTE

If you are upgrading from firmware versions before A.01.60, you must complete step d. Otherwise, skip to step e.

- d. When upgrading from firmware versions before A.01.60, you will see a white screen with a green “Yes” prompt and a red “No” prompt.
 - Press Yes. At the end of this step ignore the instructions to remove the memory card.
 - Cycle the power on the E7495A/B.
 - e. After the E7495A/B boots up, press Yes and follow the instructions on the screen
 - f. When instructed, remove the memory card from the E7495A/B. The E7495A/B will then reboot and begin running the new firmware version.
4. Set up E7495A/B to respond to correct RGB knob (for older E7495A/Bs)

NOTE

Some early manufactured E7495A Base Station Test Sets have a smooth turning front panel knob. Because the firmware defaults to the newer stepped functioning knob, it is necessary to perform the following procedure to enable the smooth knob.

- a. Press the System key on the front panel.
- b. Press the Control key.
- c. Press the Installed Knob Type key on the right menu.
- d. Select the Smooth key.

Update via PCMCIA card using Recovery Script

Requirements to install firmware

- Microsoft® Windows® based Personnel Computer with available compact flash or PCMCIA card slot
- Windows® 98, ME, 2000, or XP
- 64 MB or greater compact flash or PCMCIA Flash memory card (provided with E7495A/B or available as Agilent part number 0960-4409)
- WinZip™ or PkZip® or equivalent unzip utility program

Procedure

1. Download the firmware update files to your PC.
 - a. Open the E7495A/B Released Firmware download page (http://www.agilent.com/find/e7495_firmware).
 - b. From the Downloads section of the E7495A/B Released Firmware Versions page, click on the latest release version of firmware.

NOTE

You must use Firmware A.03.00 or later for this process to work.

- c. When prompted to open the file or save it to your computer, specify the temporary location on your PC's hard drive to save it to, and click Save.
2. Unzip the new firmware package to your compact flash or PCMCIA flash memory card.

NOTE

The following procedure is for WinZip™ 8.1 and 9. Other unzip utilities such as PkZip® can also be used. WinZip™ is available for download at <http://www.winzip.com>.

- a. Install WinZip™ on your PC, if it is not already installed.
- b. Insert the blank, formatted compact flash or PCMCIA flash memory card into an open compact flash or PCMCIA card slot on your computer.
- c. Locate the firmware update package that you have saved on your computer's hard drive and open it with WinZip™.
- d. Click Extract and choose the drive letter that your computer has assigned for the compact flash or PCMCIA flash memory card to extract the firmware files.
- e. Click Extract to extract the firmware files to the memory card.

3. Update the E7495A/B's firmware using the compact flash or PCMCIA flash memory card.

CAUTION

The E7495A/B must be connected to an external power source and cannot be upgraded using internal battery power. Do not remove the memory card from the E7495A/B during the firmware update process. Do not remove power to the E7495A/B during the firmware update process. Doing so may cause the E7495A/B to become unusable.

- a. Turn off the power on the E7495A/B by pressing the on/off button for more than 5 seconds so that the both green LED indicators above the power switch turn off. (Pressing the on/off button for less than 5 seconds places the E7495A/B into suspend mode.)
 - b. Insert the compact flash or PCMCIA flash memory card containing the unzipped firmware into the compact flash or PCMCIA card slot of the E7495A/B.
 - c. Turn on the E7495A/B.
 - d. After the E7495A/B boots up, it will prompt you to press Yes to upgrade the firmware. *You must press the lower right softkey on the right side of the display instead of the Yes softkey.* Then follow the instructions on the screen.
 - e. When instructed, remove the memory card from the E7495A/B. The E7495A/B will then reboot and begin running the new firmware version.
4. Set up E7495A/B to respond to correct RGB knob (for older E7495A/Bs)

NOTE

Some early manufactured E7495A Base Station Test Sets have a smooth turning front panel knob. Because the firmware defaults to the newer stepped functioning knob, it is necessary to perform the following procedure to enable the smooth knob.

- a. Press the System key on the front panel.
- b. Press the Control key.
- c. Press the Installed Knob Type key on the right menu.
- d. Select the Smooth key.

Update via Load Firmware Utility

Description

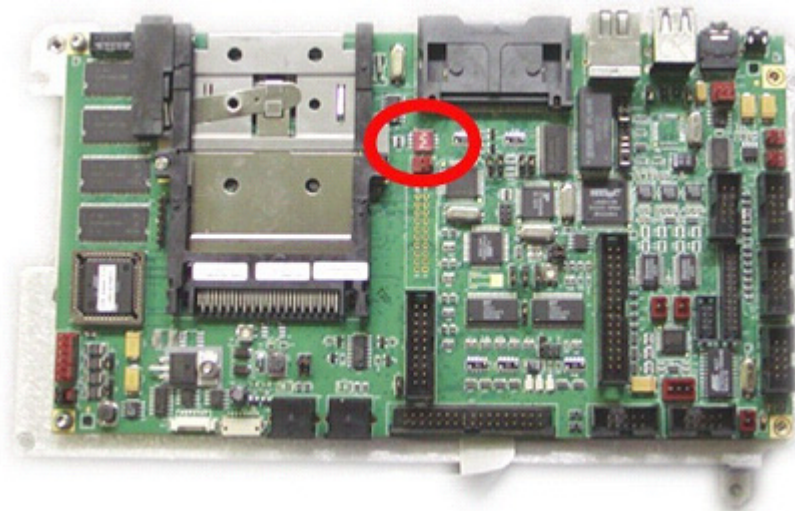
The Load Firmware Utility is used to reload firmware on an E7495A/B just as it is loaded at the factory. The utility is typically used to recover an E7495A/B to a known firmware state after the E7495A/B firmware and kernel have been corrupted and no other method can be used to reload firmware.

Software license keys must be re-entered after you load firmware using this method. (A default license key file is copied to the E7495A/B, which erases any other license key file if present on the flash.) The E7495A/B must first be physically opened and dip switches flipped on the Controller assembly so that it can boot from a PCMCIA memory card.

Procedure

1. Reconfigure the CPU assembly to boot the kernel on the PCMCIA Flash memory card.
 - a. Refer to [Chapter 6, “Remove and Replace Procedures,”](#) on page 97 to remove the following assemblies to expose the A4A1 Controller assembly:
 - Batteries
 - Bumpers
 - Front Panel Assembly
 - RF Assembly
 - b. Locate Dip Switch S1 on the A4A1 controller assembly (see [Figure 3-1](#)) and set switches 2 and 3 to ON and 1 and 4 to OFF.

Figure 3-1 Set dip switches on the A4A1 controller assembly.



- c. Connect the A4W11, A4W2, A4W3 and A4W5 cables to the front panel assembly, so that the E7495A/B can be turned on via the front panel power switch.
 - d. Connect the external DC power source to the E7495A/B.
 - e. Insert the firmware PCMCIA card into the PCMCIA card slot. Please refer to sections A and B of the Update via PCMCIA card procedure above if you do not already have a PCMCIA card with the latest firmware
 - f. Turn on the E7495A/B.
 - g. The E7495A/B will now boot the kernel from the PCMCIA card, and complete the firmware upgrade process.
2. Configure the Controller board for normal operation and reassemble the E7495A/B.
 - a. After the firmware has been loaded, turn off the E7495A/B.
 - b. Locate Dip Switch S1 on the A4A1 controller assembly and set switches 1 and 2 to ON and 3 and 4 to OFF.
 - c. Ensure that there is not a PC Card in the memory card slot and turn on E7495A/B to verify that the firmware has been reloaded.
 - d. Turn off the E7495A/B and unplug it.
 - e. Reassemble the E7495A/B.
 3. Re-enter the license keys.
 - a. Go to <http://pamirs.cos.agilent.com/license/> to access Agilent Licensing System to retrieve license keys for the E7495A/B
 - b. On the E7495A/B, press System, More, Option Manager, Install an Option
 - c. From the list, select the Options to install. Once you have selected the option from the list, press the Select button.
 - d. An information screen is displayed on the instrument. Press Install Option to continue with the installation.
 - e. Enter the license key. Use the front panel knob or up and down arrow keys to select each character and press Enter to input the supplied license key. After all twelve characters of the license key have been entered, press the OK button.
 - f. The Option Installation Results screen is displayed for the option being installed along with either a success or error message. Press the Finish button.
 - g. Repeat steps c through f until all license keys are re-entered.

What you'll find in this chapter

In this chapter, you'll find instructions on how to add hardware options to the Agilent E7495A/B.

[“General Hardware Upgrade Installation Information” on page 48](#)

[“Adding Option 600: Power Meter” on page 49](#)

[“Adding Option 510 Complex Source” on page 53](#)

[“Adding Option 700 T1 Tester” on page 56](#)

[“Adding Option 710 E1 Tester” on page 59](#)

General Hardware Upgrade Installation Information

If you have questions about the hardware upgrade installation procedures, refer to [Chapter 6, “Remove and Replace Procedures,” on page 97](#). After you have installed the hardware, use the service software to update the option string.

Before you install new hardware

1. Run the update DUT utility.
2. Add the option number to the DUT configuration string.

E7495A/B Tools required

Torx Drivers

- T8 Torx Driver
- T10 Torx Driver
- T15 Torx Driver
- T20 Torx Driver
- T30 Torx Driver

Outside snap ring pliers

5/16” open end wrench

3/8” open end wrench

6 mm open end wrench

3/4” socket wrench

7/16” socket wrench

9/16” socket wrench

Torque wrench for the following torque settings:

- 6 in-lbs
- 9 in-lbs
- 21 in-lbs
- 40 in-lbs

Adding Option 600: Power Meter

Upgrading the unit to include the Power Meter requires that you:

- Install the new A2A1 & A2A2 Power Meter boards, cables, and overlay
- Update the Option Information
- Verify the functionality of the replaced assemblies
- Run the performance tests

1. Install the New A2A1 Power Meter and A2A2 Power Meter Interface Boards

The Power Meter assembly is installed to the top of the A3 RF assembly, however the A3 RF assembly must be removed to install the power and control cables. Follow the standard Remove and Re-install instructions for this procedure. Perform the exceptions to the standard procedures noted below to install the new power distribution and control cables.

Adding the Power Meter requires that you perform the following steps:

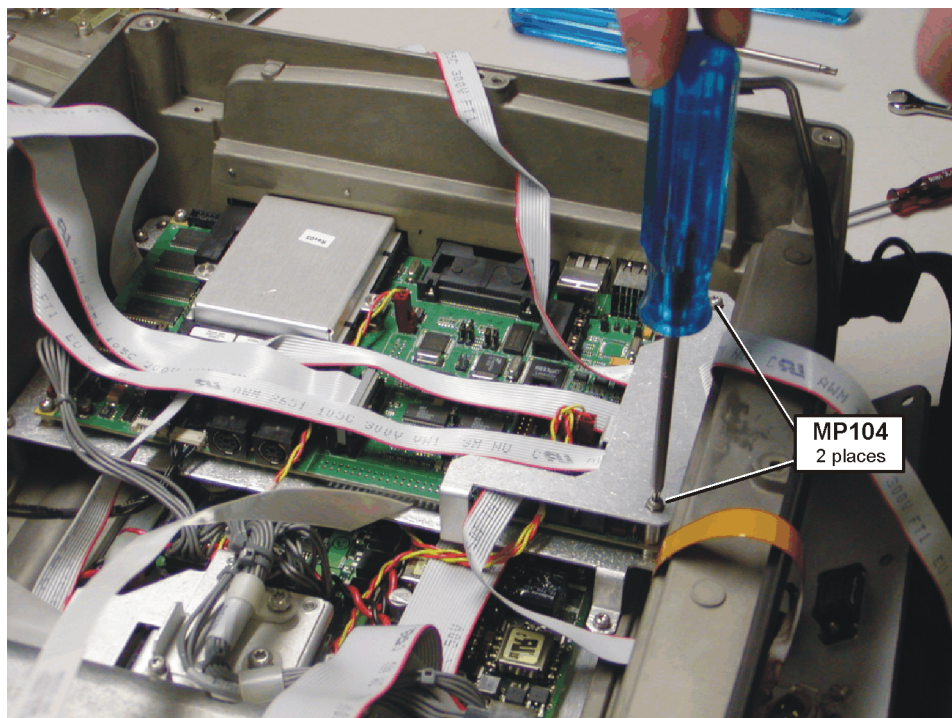
1. Remove the bumpers (see [“Bumpers” on page 109](#)).
2. Remove the A1 Front Panel assembly (see [“A1 Front Panel Assembly” on page 111](#)).
3. Remove the A3 RF assembly to install the ribbon cables (see [“Removal of A3 RF Assembly \(RFA\)” on page 117](#)).

NOTE

When removing the A3 RF assembly, follow the instructions labeled [“Steps to follow if removing the A3 RFA to gain access to other assemblies” on page 115](#).

4. Install the A4W10 Power Meter control cable to the A4A1 ADS/CPU controller board.

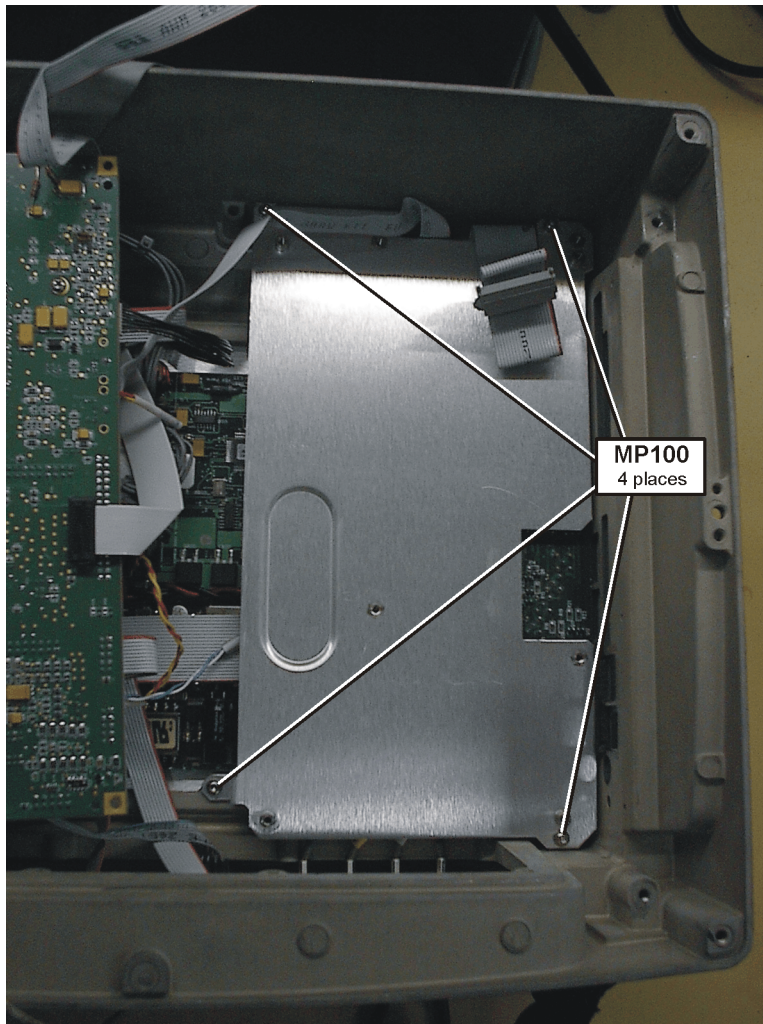
Figure 4-1 Install A4W10 Power Meter control cable



- a. Refer to [Figure 4-1](#). Remove the (2) MP104 (T-10 M3x22) screws securing the CPU connector-retaining bracket and remove the bracket.
 - b. Install ribbon cable A4W10 to the CPU board connector A4A1J102. (Refer to [Figure 6-28](#) on page 132 for connector location.)
 - c. Refer to [Figure 4-1](#). Install the CPU connector-retaining bracket and torque the (2) MP104 screws to 9 in-lbs
5. Install the A4W12 Power Meter Power Supply Cable to the A4A3 Power Supply board.

If any of the following options (510, 700, 710) are present in the Test Set, the power supply cable for the Power meter is already present and you can skip this step. If none of these options are present, you must remove the A4A1 ADS / CPU deck to install the A4W12 power distribution cable. You do not need to remove the controller from the Test Set, you are just loosening the CPU deck far enough to route the A4W12 cable under the assembly. If you prefer to remove the CPU board, see “[A4A1 Controller Board](#)” on page 131.

Figure 4-2 CPU Mounting Deck Screws



Add Hardware Options

- a. Refer to [Figure 4-2](#). Remove the (4) MP100 (T-10 M3x6) screws securing the CPU mounting deck.
 - b. Install power supply ribbon cable A4W12 and retaining clip MP125 to the power supply board connector A4A3 conn 4. (Refer to [Figure 6-36](#) on page 142 for connector location.)
 - c. Route the cable under the A4A1 ADS/CPU Deck (see [Figure 6-35](#) on page 141.)
 - d. Refer to [Figure 4-2](#). Install the (4) MP100 (T-10 M3x6) screws to secure the CPU mounting deck and torque to 9 in-lbs.
6. Install the new Power Meter overlay on the A5 connector panel.
- a. Remove all the connectors from the A5 connector panel.
 - b. With the connector panel completely removed, peel the overlay from the A5 connector panel.

Add Hardware Options

Adding Option 600: Power Meter

- c. Install the new overlay onto the A5 connector panel.
- d. Reinstall the connectors on the A5 connector panel.
7. Reinstall A3 RF assembly see [“Installation of A3 RF Assembly \(RFA\)”](#) on page 123.
8. Install the A2A1 and A2A2 Power Meter boards see [“Install A2 Power Meter Assembly \(Option 600 only\)”](#) on page 125.
9. Re-Install A1 Front Panel assembly see [“A1 Front Panel Assembly”](#) on page 111.
10. Reinstall Bumpers see [“Reinstall the Bumpers”](#) on page 114.

2. Update the Option Information

Run the update utility in the service software and add option 600 to the list of hardware options. See [“Read-Write Model Number/Serial Number/Options”](#) on page 180.

3. Verify the Test Set Functionality

See [Table 5-1, “Post Repair Requirements,”](#) on page 91 to see which verification procedures must be run.

4. Run the Performance Tests

See [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Adding Option 510 Complex Source

Upgrading the unit to include the complex source requires that you:

- Record the Option/Model/Serial information
- Replace the A3 RF assembly and install cables
- Regenerate and install vital instrument data
- Verify the functionality of the replaced assemblies
- Run the performance tests

1. Record the Option/Model/Serial Information

Prior to installing the A3 RF assembly, obtain Installed Options, Model number and Serial number information from the Option Manager system screen.

Perform the following key sequence to retrieve the needed information:

System
More 1 of 2
Option Manager
Installed Options
Record all options displayed.

System
More 1 of 2
Option Manager
Install Info
Record the Model #, Serial #, and Host ID #.

2. Replace the A3 RF Assembly

-

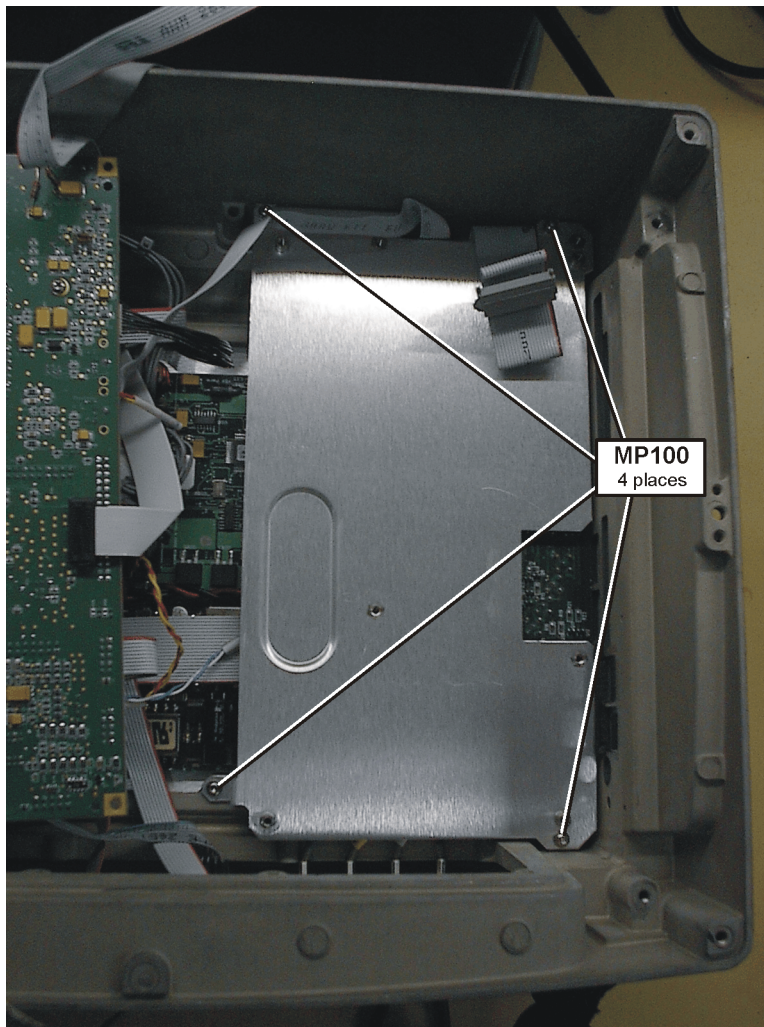
Follow the procedure for removing the A3 RF assembly (see [“Removal of A3 RF Assembly \(RFA\)”](#) on page 117).

NOTE

If any of the following options (510, 600, 700, 710) are present in the Test Set, a power supply cable for the Complex Mod is already present and you can skip this step.

If none of these options are present, you must remove the A4A1 ADS/CPU deck to install the A4W12 power distribution cable. You do not need to remove the ADS/CPU from the Test Set, you are just loosening the mounting deck far enough to route the A4W12 cable under the assembly. If you prefer to remove the ADS/CPU assembly, see [“A4A1 Controller Board”](#) on page 131.

Figure 4-3 CPU Mounting Deck Screws



- Refer to [Figure 4-3](#). Remove the (4) MP100 (T-10 M3x6) screws securing the CPU mounting deck.
- Install power supply ribbon cable A4W12 and retaining clip MP125 to the power supply board connector A4A3 conn 4. (Refer to [Figure 6-36 on page 142](#) for connector location)
- Route the cable under the A4A1 ADS/CPU Deck (Refer to [Figure 6-35 on page 141](#).)
- Refer to [Figure 4-3](#). Install the (4) MP100 (T-10 M3x6) screws to secure the CPU mounting deck and torque to 9 in-lbs.

3. Regenerate and Install Vital Instrument Data

Re-generate the Instrument data by running the necessary utilities.

After the A3 RF assembly has been replaced the following data needs to

be regenerated:

- Model Number*
- Serial Number*
- Installed Options*
- Re-install license files
- Time base Calibration
- Return Loss Calibration

Details can be found at [Table 5-1, “Post Repair Requirements,” on page 91](#).

*The Model/Serial numbers and the Installed Hardware option information is stored on the A3 assembly and must be re-installed first. Run the update utility in the service software and add option 510 and the other hardware options (500, 600, and 700 series options) already installed in the instrument. (Options were recorded in step 1). All the 200 and 300 series options are licensed enabled and must be entered during the "Re-install license files" step.

4. Verify the Test Set Functionality

See [Table 5-1, “Post Repair Requirements,” on page 91](#) to see which verification procedures must be run.

5. Run the Performance Tests

See [Chapter 7, “Functional Tests, Adjustments, and Utilities,” on page 151](#).

Adding Option 700 T1 Tester

Upgrading the unit to include the T1 Analyzer requires that you:

- Install the new A4A2 T1 Analyzer board
- Install the new T1 Analyzer overlay on the case
- Update the Option Information
- Verify the functionality of the replaced assemblies
- Run the performance tests

1. Install the New A4A2 T1 Analyzer Board and Cables

The T1 board is installed to the mounting deck on the back of the ADS/CPU board.

Follow the Remove and Re-install instructions below. Adding the T1 Analyzer requires that you remove and replace the following Assemblies:

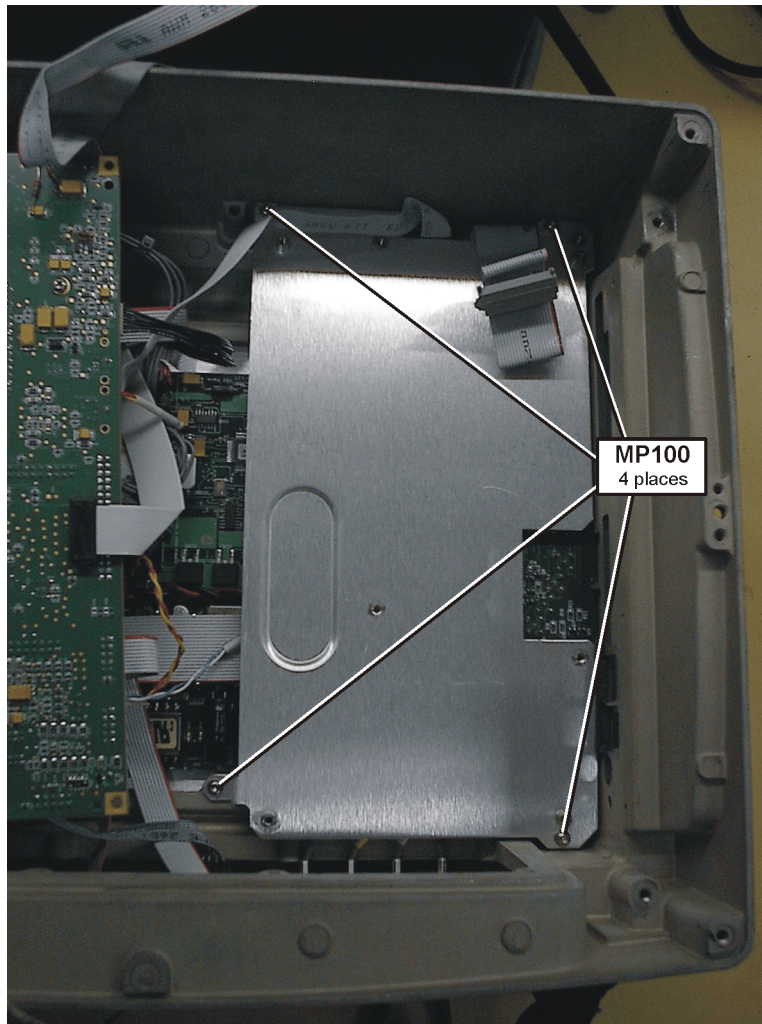
1. Remove the bumpers (see [“Bumpers” on page 109](#)).
2. Remove the A1 Front Panel assembly (see [“A1 Front Panel Assembly” on page 111](#)).
3. Remove the A3 RF assembly (see [“Removal of A3 RF Assembly \(RFA\)” on page 117](#)).

NOTE

When removing the A3 RF assembly, follow the instructions labeled [“Steps to follow if removing the A3 RFA to gain access to other assemblies” on page 115](#).

4. Refer to [Figure 4-4](#). Remove the (4) MP100 (T-10 M3x6) screws securing the CPU mounting deck.

Figure 4-4 CPU Mounting Deck Screws



Add Hardware Options

Turn the CPU Mounting Deck over to install the A4A2 T1 Board.

NOTE

If you prefer to remove the ADS/CPU assembly see [“A4A1 Controller Board” on page 131](#).

5. Remove A4A2 E1 assembly (if option 710 is installed) (see [“A4A2 T1 or E1 Assembly” on page 135](#)).
6. Install the A4W12 Power distribution cable.

If any of the following options (510, 600, 700, 710) are present in the Test Set, a power supply cable for the T1 assembly will be installed and you can skip this step.

If none of these options are present, you must install the new power distribution cable by attaching cable A4W12 to connector 4 on the A4A3 power supply board and cable clip MP125, routing the cable under the ADS/CPU Deck (see [Figure 6-35 on page 141](#)).

7. Install the A4A2 T1 assembly (see [“A4A2 T1 or E1 Assembly”](#) on page 135).
8. Refer to [Figure 4-4](#). Install the (4) MP100 (T-10 M3x6) screws to secure the CPU mounting deck and torque to 9 in-lbs.

NOTE

If you removed the ADS/CP assembly during [step 4](#), see [“A4A1 Controller Board”](#) on page 131.

9. Reinstall A3 RF assembly see [“Installation of A3 RF Assembly \(RFA\)”](#) on page 123.
10. Re-Install A1 Front Panel assembly see [“A1 Front Panel Assembly”](#) on page 111.
11. Reinstall Bumpers see [“Reinstall the Bumpers”](#) on page 114.

2. Install the New T1 Analyzer Overlay on the Case

The T1 Analyzer upgrade kit may come with a new overlay for the T1 connectors under the access doors on the left side of the Test Set. All products shipped from the factory have this overlay installed, for non-option 700 Test Sets a protective overlay label is placed over the T1 connectors. This protective label can be removed to expose the T1 connectors instead of having to install the new overlay label.

3. Update the Option Information

Run the update utility in the service software and add option 700 to the list of hardware options. See [“Read-Write Model Number/Serial Number/Options”](#) on page 180.

4. Verify the Test Set Functionality

See [Table 5-1, “Post Repair Requirements,”](#) on page 91 to see which verification procedures must be run.

5. Run the Performance Tests

See [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Adding Option 710 E1 Tester

Upgrading the unit to include the E1 Analyzer requires that you:

- Install the new A4A2 E1 Analyzer board
- Install the new E1 Analyzer overlay on the case
- Update the Option Information
- Verify the functionality of the replaced assemblies
- Run the performance tests

1. Install the New A4A2 E1 Analyzer Board

The E1 board is installed to the mounting deck on the back of the ADS/CPU board.

Follow the Remove and Re-install instructions below. Adding the E1 tester requires that you remove and replace the following assemblies:

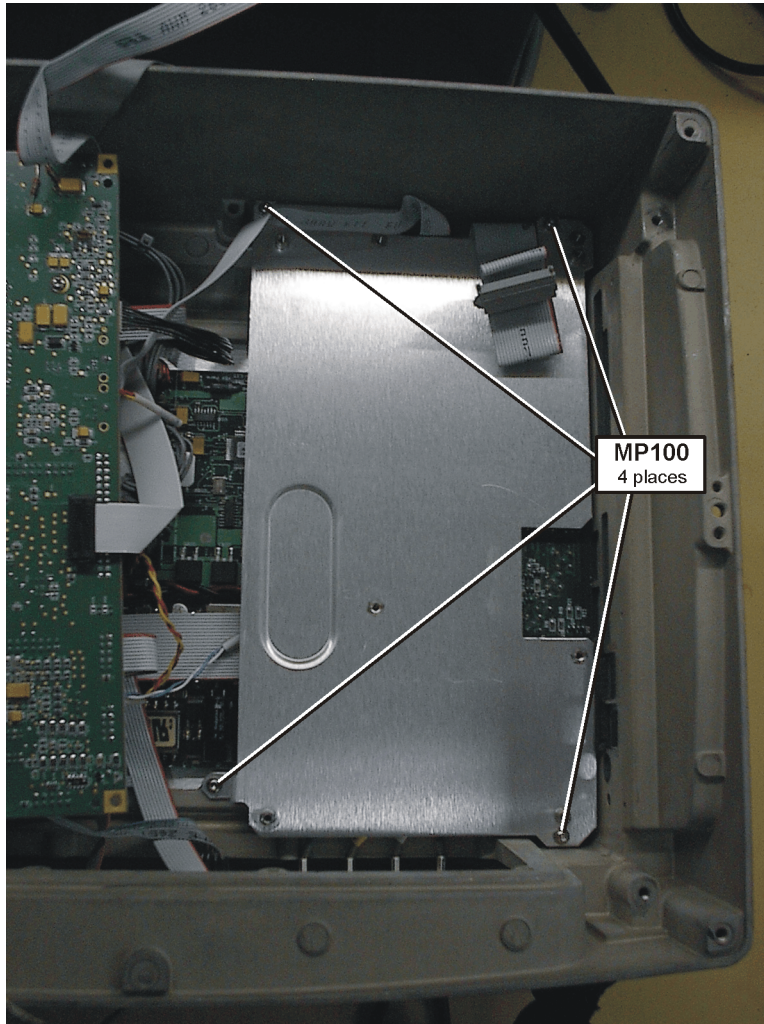
1. Remove the bumpers (see [“Bumpers” on page 109](#)).
2. Remove the A1 Front Panel assembly (see [“A1 Front Panel Assembly” on page 111](#)).
3. Remove the A3 RF assembly (see [“Removal of A3 RF Assembly \(RFA\)” on page 117](#)).

NOTE

When removing the A3 RF assembly, follow the instructions labeled [“Steps to follow if removing the A3 RFA to gain access to other assemblies” on page 115](#).

4. Refer to [Figure 4-5](#). Remove the (4) MP100 (T-10 M3x6) screws securing the CPU mounting deck.

Figure 4-5 CPU Mounting Deck Screws



Turn the CPU Mounting Deck over to install the A4A2 E1 Board.

NOTE

If you prefer to remove the ADS/CPU assembly see [“A4A1 Controller Board”](#) on page 131.

5. Remove A4A2 T1 assembly (if option 700 is installed) (see [“A4A2 T1 or E1 Assembly”](#) on page 135).
6. Install the A4W12 Power distribution cable.

If any of the following options (510, 600, 700, 710) are present in the Test Set, a power supply cable for the E1 assembly will be installed and you can skip this step.

If none of these options are present, you must install the new power distribution cable by attaching cable A4W12 to connector 4 on the A4A3 power supply board and cable clip MP125, routing the cable under the ADS/CPU Deck (see [Figure 6-35](#) on page 141).

7. Install the A4A2 E1 assembly (see [“A4A2 T1 or E1 Assembly” on page 135](#)).
8. Refer to [Figure 4-5](#). Install the (4) MP100 (T-10 M3x6) screws to secure the CPU mounting deck and torque to 9 in-lbs.

NOTE

If you removed the ADS/CP assembly during [step 4](#), see [“A4A1 Controller Board” on page 131](#).

9. Install the new E1 overlay on the connector panel.
 - a. Remove all the connectors from the connector panel.
 - b. With the connector panel completely removed, peel the overlay from the connector panel.
 - c. Install the new overlay onto the connector panel.
 - d. Reinstall the cables on the connector panel.
10. Reinstall A3 RF assembly see [“Installation of A3 RF Assembly \(RFA\)” on page 123](#).
11. Re-Install the A2A1 and A2A2 Power Meter boards see [“Install A2 Power Meter Assembly \(Option 600 only\)” on page 125](#).
12. Re-Install A1 Front Panel assembly see [“A1 Front Panel Assembly” on page 111](#).
13. Reinstall Bumpers see [“Reinstall the Bumpers” on page 114](#).

2. Update the Option Information

Run the update utility in the service software and add option 710 to the list of hardware options. See [“Read-Write Model Number/Serial Number/Options” on page 180](#).

3. Verify the Test Set Functionality

See [Table 5-1, “Post Repair Requirements,” on page 91](#) to see which verification procedures must be run.

4. Run the Performance Tests

See [Chapter 7, “Functional Tests, Adjustments, and Utilities,” on page 151](#).

Add Hardware Options
Adding Option 710 E1 Tester

Troubleshoot the Agilent E7495A/B

What you'll find in this chapter

In this chapter, you'll find instructions on how to perform various troubleshooting techniques to help you repair the Agilent E7495A/B.

- ❑ [E7495A/B Repair Process on page 64](#)
- ❑ [Accessories and Options on page 65](#)
- ❑ [Troubleshooting Information on page 66](#)
- ❑ [Step 1 - Verify the Test Set Will Power-Up](#)
 - [Check for a Power Supply Problem on page 67](#)
 - External Power Supply
 - Battery Power
 - Internal Power Supply
 - [Will Not Boot-Up on page 68](#)
 - Internal Hardware Problems
 - Firmware Problems
- ❑ [Step 2 - Measurement Loading Problems and Corrupted States on page 69](#)
- ❑ [Step 3 - Verify Test Set Functionality](#)
 - [Manual Verification Procedures on page 72](#)
 - [Testing the A3 RF Functionality on page 73](#)
 - [Testing the CW Source \(Option 500/510 only\) on page 75](#)
 - [Testing the Complex Modulation \(Option 510 only\) on page 77](#)
 - [Testing the Power Meter \(Option 600 only\) on page 78](#)
 - [Battery Management Functional Test on page 79](#)
 - [On-board Verification Procedures](#)
 - [Display Functional Test on page 87](#)
 - [Keyboard Functional Test on page 87](#)
 - [T1 Functional Test \(Option 700 only\) on page 87](#)
 - [E1 Functional Test \(Option 710 only\) on page 88](#)
 - [Agilent E7495A/B Performance Verification Software on page 89](#)
- ❑ [Post Repair Process on page 90](#)

E7495A/B Repair Process

Repairing the E7495A/B Test Set consists of the following steps:

1. Isolate the problem to a faulty assembly within the Test Set.

Refer to [“Troubleshooting Information” on page 66](#)

2. Replace the faulty assembly.

Refer to [“Remove and Replace Procedures” on page 97](#)

3. Calibrate the Test Set by regenerating calibration data.

Refer to [“Troubleshooting Information” on page 66](#)

4. Verify the performance of the Test Set.

Refer to [“Troubleshooting Information” on page 66](#)

Accessories and Options

These accessories are included with the E7495A/B and are helpful in troubleshooting:

- 50 Ohm load Agilent 909F
- Open/Short termination Agilent part number 85032-60011
- 2 - 10 dB pad Agilent part number 0955-1534
- 40 dB pad Agilent part number 0955-1599

Additionally, these Type-N pads are used:

- 6, 20, and 30 dB 8491A series, or a 1 and 10 dB step attenuator pair.

The following hardware options require you to perform additional verification procedures that are documented in the service manual:

- 300 - DC Bias Output
- 500 - CW source
- 510 – CW source and Complex modulation capability
- 600 – Power Meter
- 700 – T1 tester
- 710 – E1 tester

No procedures are required for the following licensed measurement options as these are DSP algorithms that do not contain any new or additional hardware:

- 200 – CDMA Analyzer
- 210 – Over the air Analyzer
- 220 – Channel Scanner
- 230 – GSM Analyzer
- 240 – UMTS code power
- 250 – W-CDMA Analyzer
- 270 – Interference Analysis
- 330 - 379 – NEM Test Software

Troubleshooting Information

Troubleshooting the E7495A/B can be broken down to 3 basic steps:

[“Step 1 - Verify the Test Set Will Power-Up” on page 67](#)

These checks will help you troubleshoot a Test Set which will not power up. If the Test Set powers up, proceed to step 2.

[“Step 2 - Measurement Loading Problems and Corrupted States” on page 69](#)

These sections gives you information on how to fix measurement loading problems and corrupted "Save States".

[“Step 3 - Verify Test Set Functionality” on page 71](#)

These checks will help you troubleshoot a Test Set which powers up fully but does not fully function.

Step 1 - Verify the Test Set Will Power-Up

For Test Sets which will not power-up, you will need to determine if the problem is with the Test Sets ability to power up using external power or internal battery power, the firmware, or a hardware issue.

Check for a Power Supply Problem

1. Using the external AC/DC converter, power-up the Test Set by pressing the On button.
2. After pressing the on switch, the Front Panel Power Status right LED should come on. If the LED is on, proceed to [“Will Not Boot-Up” on page 68](#).

If the LED is not on, continue with the following step.

3. Check the external AC/DC power supply for proper output voltage (~24VDC). If the output voltage is not correct, check to see if the external power supply circuit breaker is tripped. Unplug the external power supply AC cord and wait 60 seconds to reset the circuit breaker. If this does not fix the output, replace the external power supply.

If the output voltage is correct, continue with the following step.

4. Install a charged battery and verify the Power Status LED after pressing the on switch. If the LED comes on with a battery but not with a good external power supply, suspect the following:

DC input cable

Power Supply Interface

If the LED does not come on with either a good external Power Supply or good battery, suspect the following:

Loose Front Panel Cables

Internal assembly pulling the voltage low

Power Supply

Power Supply Interface

Power Supply cables

Will Not Boot-Up

If the Power Status LED does come on with both battery and external power, and the Test Set still does not boot-up, it can either be a Firmware or Internal Hardware Problem.

1. Check for any text or activity on the display. If there is some activity on the display, continue with the next step. If there is no display indication of any kind, this could indicate an internal hardware problem. Suspect the following:

- Loose Front Panel Cables

- Display assembly

- Display Inverter

- Loose power supply or signal cables

- Power Supply

- Power Supply Interface

2. If there is some activity on the front panel yet the Test Set will not boot-up, this could indicate a firmware problem. Try reinstalling the firmware. Proceed to [Chapter 3, “E7495A/B Firmware Upgrades and Reinstallation.”](#)

3. If reinstalling the firmware does not work suspect the following:

- Loose power supply or signal cables

- ADC/CPU assembly

- Display Inverter

- Power Supply

- Power Supply Interface

- other internal assembly

Step 2 - Measurement Loading Problems and Corrupted States

When you press the **[Mode]** button on the E7495A/B and select a measurement, it is loaded from flash memory into DSP RAM. Please wait while the measurement is loading is displayed. During the loading process, the controller verifies that the hardware required to perform that measurement is present. If the controller cannot communicate with the hardware, the measurement screen appears, but none of the buttons work.

If no buttons work

1. Remove the AC power and batteries, if present
2. Wait for 10 minutes.
3. Re-connect the AC power and power on the unit.

If the measurement still does not function

1. Open the unit.
2. Using the assembly interconnect diagram (see [“Agilent E7495A/B Connection Diagram” on page 21](#)), verify that the communication cables have not come loose.

Corrupted States

When a state is saved, the state of all the modes are saved. A setting in one mode may be corrupting another seemingly independent mode.

To verify the customer’s complaint

- Perform the initial checkout using the states the customer used.

If you can duplicate the customer’s complaint

1. Reset the box using **[Recall State]** Factory defaults.
2. If the condition persists, repairs are in order.

Or

- a. If not, clear memory by updating the firmware using the [Update via PCMCIA card using Recovery Script](#) procedure on [page 42](#).
- b. Inform the customer the state memory was corrupted and reset.
- c. Note this in the CSO.
- d. If this condition recurs, consult the factory.

NOTE

The customer firmware install process does not clear the user save states, or power up state. Updating the firmware using the Recovery Script utility will clear the power up state and set it back to the factory default state. If other states are found to be defective, they will need to be manually deleted using the **Delete States** Softkey located in the Save/Recall System screen. [**System, Save/Recall, Delete States**]

Step 3 - Verify Test Set Functionality

Test set functionality can be verified with a variety of tools available in the Test Set, TME Software, and in the Service Manual. Some of these tests are duplicated in the TME Software for convenience. When running a complete verification you only need to run the duplicated tests once. The following is a list of the tools available to you.:

- **Manual Verification Procedures** in this service guide
 - A3 RF Functional Test on [page 73](#).
 - CW Source Functional Test on [page 75](#).
 - Complex Modulation Functional Test on [page 77](#).
 - Power Meter Functional Test on [page 78](#).
 - Battery Management Functional Test on [page 79](#).
- **On-board Verification Tests** on the Service screen of the E7495A/B
 - Display Functional Test on [page 87](#).
 - Keyboard Functional Test on [page 87](#).
 - T1 Functional Test on [page 87](#).
 - E1 Functional Test on [page 88](#).
- **Agilent E7495A/B Performance Verification software**
 - Verify GPS
 - DC Bias
 - Even Second Sync Input
 - Internal and External Reference
 - T1 Functional Test (Option 700 only)
 - E1 Functional Test (Option 710 only)
 - Battery Management Functional Test

Manual Verification Procedures

The Manual verification procedures allow you to check out the functionality of the major sections of the hardware that do not have automated On-board Verification Tests. The following procedures are documented in the Manual Verification portion of this chapter.

[Testing the A3 RF Functionality on page 73](#)

[Testing the CW Source \(Option 500/510 only\) on page 75](#)

[Testing the Complex Modulation \(Option 510 only\) on page 77](#)

[Testing the Power Meter \(Option 600 only\) on page 78](#)

[Battery Management Functional Test on page 79](#)

Testing the A3 RF Functionality

The base product of the E7495A/B consists of two main blocks: Source and Receiver. The antenna/cable measurements use both of these blocks and, using the Insertion Loss and Return Loss measurements, verify the correct operation of both the source and receiver.

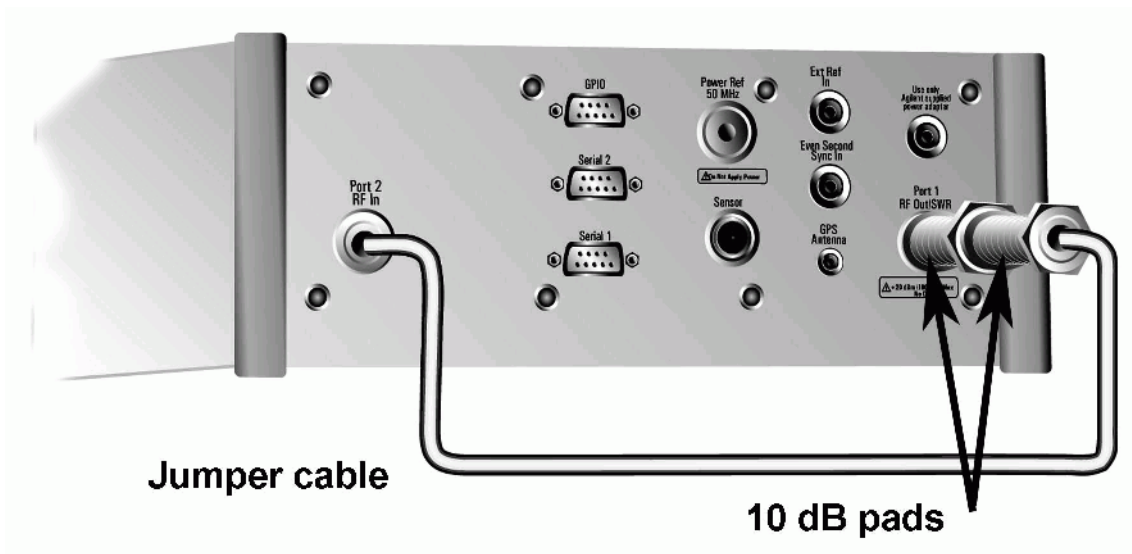
Test equipment

- 2 - 10 dB Type-N pads (Part of E7495A/B Cal kit)
- Short Type-N cable (Part of E7495A/B Cal kit)
- 6, 20, and 30 dB 849xx series Type-N pads or a 10 dB step attenuator

Insertion loss procedure

1. Press **[MODE] Antenna/Cable, Two Port Insertion Loss**.
2. Set the Start Frequency to **375 MHz**; Stop Frequency to **2500 MHz**.
3. Press **Setup, Optimize** and verify it is set to Accuracy.
4. Connect the two 10 dB pads and a short Type-N cable as shown in [Figure 5-1 on page 73](#).

Figure 5-1 Connect the 10 dB pads.



5. Press **Frequency/Normalize** and follow the instructions.

The junction of the 10 dB pads forms a calibrated plane. Measuring unknowns or standards is performed by splitting the plane and inserting the unknown or standard between the 10 dB pads.

6. Connect the 6 dB pad between the two 10 dB pads.
7. Use the marker function to verify that the measured value agrees with the pad.
8. Repeat steps 6 and 7, using different pads in order to cover the range of 6 – 60 dB.

Return Loss procedure

1. Press [**MODE**] **Antenna/Cable test; Return Loss**.
2. Set the Start Frequency to **375 MHz**, Stop Frequency to **2500 MHz**.
3. Perform the open/load and short calibration.
4. Connect a 6 dB pad to the end of the cable connected to Port 1.
5. **Average/Sweep** turn off averaging to clear the buffer.
6. Turn on averaging.

The best and worst return loss should be between 10 and 14 dB.

If you find a failure

- Double-check your attenuators! When you stack attenuators the overall insertion loss is slightly higher than the sum of the values.
- Check the Port 1 and Port 2 Type-N connectors for contamination, damage, or loose connectors.
- Reload the latest firmware.
- In the event of a performance failure, you must replace the A3 RF assembly.

Testing the CW Source (Option 500/510 only)

The optional CW source uses the same internal source as is used for the antenna cable measurements. The option adds an internal step 5 dB attenuator to increase the output range.

Test equipment

- Spectrum analyzer
- Type-N cable

Test procedure

You will connect the source directly to the spectrum analyzer's input and step the CW source in 1 dB increments while reading the spectrum analyzer's peak marker. The value should always be within 2 dB of the CW sources stated output.

1. Perform the RF Functionality test procedure on [page 73](#).
2. Verify the step attenuator's functionality.

On the E7495A/B

1. Press [**Mode**], **Spectrum/Tools**.
2. Press **Signal Generator**.
3. Set the units to **Frequency**.
4. Set the frequency to **375 MHz**.
5. Set the amplitude step to **2 dB**.
6. Set the amplitude to **-25 dBm**.
7. Turn the RF **On**.

On the Spectrum Analyzer

1. Set the frequency to **375 MHz**.
2. Set the span to **10 KHz**.
3. Increase the resolution BW to **1 KHz**, if the update rate is very slow.
4. Set the Reference Level to **-25 dBm**.
5. Press **Marker Peak Search**.
6. While you watch the marker readout on the spectrum analyzer, step the E7495A/B amplitude from -25 to -89 dBm by pressing the down arrow.

The Marker amplitude should show a 2 dB \pm .5 dB change for each press of the down arrow. Any amplitude should be within 2 dB (\pm the uncertain of the spectrum analyzer used).

If you find a failure

- Reload the latest firmware and repeat the test.

If the test results are slightly outside the stated limits

- Run the performance verification tests.
- In the event of a performance failure, you must replace the A3 RF assembly.

Testing the Complex Modulation (Option 510 only)

The Complex Modulation option adds a DSP and a special DAC in order to output complex signals such as CDMA and CDMA2000. The output of the DAC is mixed with the CW Source to set the output frequency. The CW signal is not suppressed so you can see a signal ~60 MHz away from the set frequency.

There are seven different waveforms that can be output in the Complex Modulation mode. Generally, if one works, they all will.

Test equipment

- Spectrum analyzer
- Type-N cable

Test procedure

On the E7495A/B

1. Press [**Mode**], **Spectrum/Tools**.
2. Press **Signal Generator**.
3. Set the units to **Frequency**.
4. Set the frequency to **375 MHz**.
5. Set the modulation to **CW**.
6. Set the amplitude to **-50 dBm**.
7. Turn the RF **On**.

On the Spectrum Analyzer

8. Set the frequency to **375 MHz**.
9. Set the span to **2 MHz**.
10. Set the reference level to **-45 dBm**.
11. Press **Marker Peak Search**.
12. Verify the amplitude of the CW signal is $-50 \text{ dBm} \pm 2 \text{ dB}$.
13. On the E7495A/B, change the modulation to **CDMA Forward Link Pilot Only w/o Eq**.
14. On the Spectrum Analyzer, you should see a broad spectrum signal approximately 1.23 MHz wide.
15. Check each of the modulations available. They should all look the same as the CDMA Forward link Pilot only.
16. Repeat steps 1 – 13 at **2.49 GHz**.

If you find a failure

- If one or more complex modulation types look correct but others don't, reload the latest firmware and repeat the test.
- In order to test against any limits, you must have a spectrum analyzer that can measure channel power or a device capable of demodulating and measuring complex signals. Use the performance test for a more conclusive test.
- In the event of a performance failure, you must replace the A3 RF assembly.

Testing the Power Meter (Option 600 only)

The Power Meter option uses the same measuring hardware as the E4418B Power Meter. The capabilities are modified for use with the Base Station Test market.

Test equipment

- 8482A power sensor and cable
(The customer should have returned these with the unit.)

Test procedure

- For a basic checkout, if you are able to zero and cal the sensor, the circuit is functioning correctly.

If you find a failure

If the meter does not respond to any controls or the controls are grayed out:

- Check the cables and connectors on the power meter and power meter interface boards.
- Replace the power meter interface board, A2A2.

If the meter does not zero or calibrate check or replace the following:

- Power Sensor Cable A5W5
- Power Reference Cable A5W2; check for proper output frequency and level
- Power meter board A2A1
- Power meter interface board A2A2

Battery Management Functional Test

Definition

The Battery Management Functional Test verifies the functionality of the E7495A/B battery charge/discharge circuitry, and its ability to switch between Battery and External DC Power.

The Battery Management Functional Test is a manual test. This procedure is comprised of 4 tests to check out the Power Management functionality:

- **External DC Power Test** – Verifies the Test Set’s ability to operate off of External DC Power. During the External DC Power Test, the operator will verify the status of the Display Icons and the Front Panel Battery LED’s while operating on EXT DC Power.
- **Internal Battery Power Test** – Verifies the Test Set’s ability to operate off of the Internal Battery(s). During the Internal Battery Power Test, the operator will verify the status of the Display Icons and the Front Panel Battery LED’s while operating on Battery Power.
- **Battery Charge Statistics**- Verifies the Test Set’s ability to control the charge functionality, communicate and Display the Data received from the Battery. During this test the operator will verify the status of the Display Icons, the Front Panel Battery LED’s, and the Battery Statistics Screen.
- **Battery Discharge Statistics** – Verifies the Test Set’s ability to switch between Batteries and control the discharge functions of the Battery Controller board. During this test the operator will verify the status of the Display Icons, the Front Panel Battery LED’s, and the Battery Statistics Screen.

Troubleshoot the Agilent E7495A/B
Step 3 - Verify Test Set Functionality

If any of the above tests fail:

1. Insure the External DC Power Supply is functioning properly.
2. Insure the Battery is functioning properly, a recondition of the battery may be necessary.
3. Check the cabling between the DC In Connector and A4A4 Power Supply interface.
4. Check the cabling between the A4A5 Battery board and the, A4A4 Power Supply interface.
5. Check the cabling between the A4A4 Power Supply Interface and A4A1 CPU board.
6. Replace the A4A5 Battery board.
7. Replace the A4A4 Power Supply Interface.
8. Replace the A4A1 CPU board.

Test Equipment

AC to DC Power Supply (supplied with E7495A/B)	0950-4404
NI2040AG Battery (supplied with E7495A/B)	1420-0883

Running the Battery Management Functional Test

NOTE

When connecting or removing the Ext DC Power, the E7495A/B Test Set can take up to 20 seconds for the Battery Status Indicators to update.

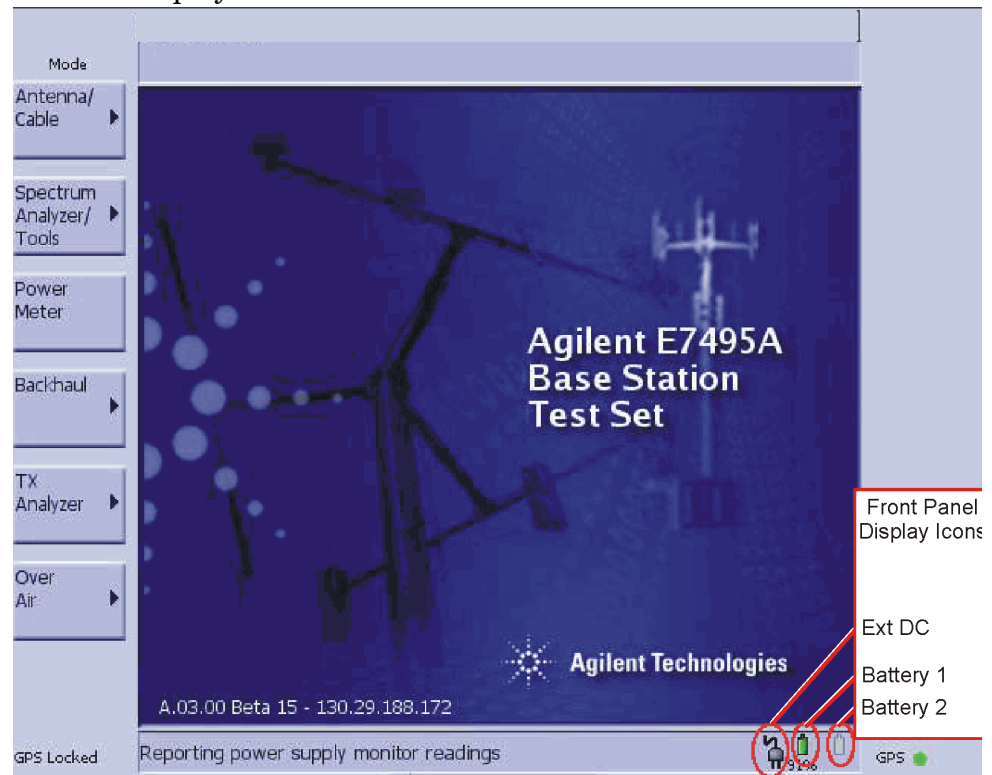
1. External DC Power Test

Setup

- Install battery into Battery Position #2 (Closest to the back of the E7495A/B case)
- Plug the Ext DC power into the E7495A/B
- Turn the Ext DC power supply's switch to on
- Turn the E7495A/B on and allow it to fully power-up

Test Results

- On the Front Panel Display, verify that the External DC icon (Plug icon) is present on the lower right hand portion of the display.



- Verify that the Battery Icons on the Front Panel Display accurately represent the condition of the installed battery.

Troubleshoot the Agilent E7495A/B
Step 3 - Verify Test Set Functionality

Battery 1:	(Light Grey: No Battery Installed)
Battery 2 should be one of the following:	(Green: Greater than 25% Charge remaining) (Yellow: 10 to 15% Charge remaining) (Red: Less than 10% Charge remaining) (Dark Grey: No Charge remaining)

- Verify that the Front Panel Battery LED's accurately indicates the correct status of the battery(s) installed in the Test Set.



Battery 1:	(Off: No Battery Installed)
Battery 2 should be one of the following:	(Blinking Green: Battery is Charging) (Solid Green: Battery in Fully Charged)

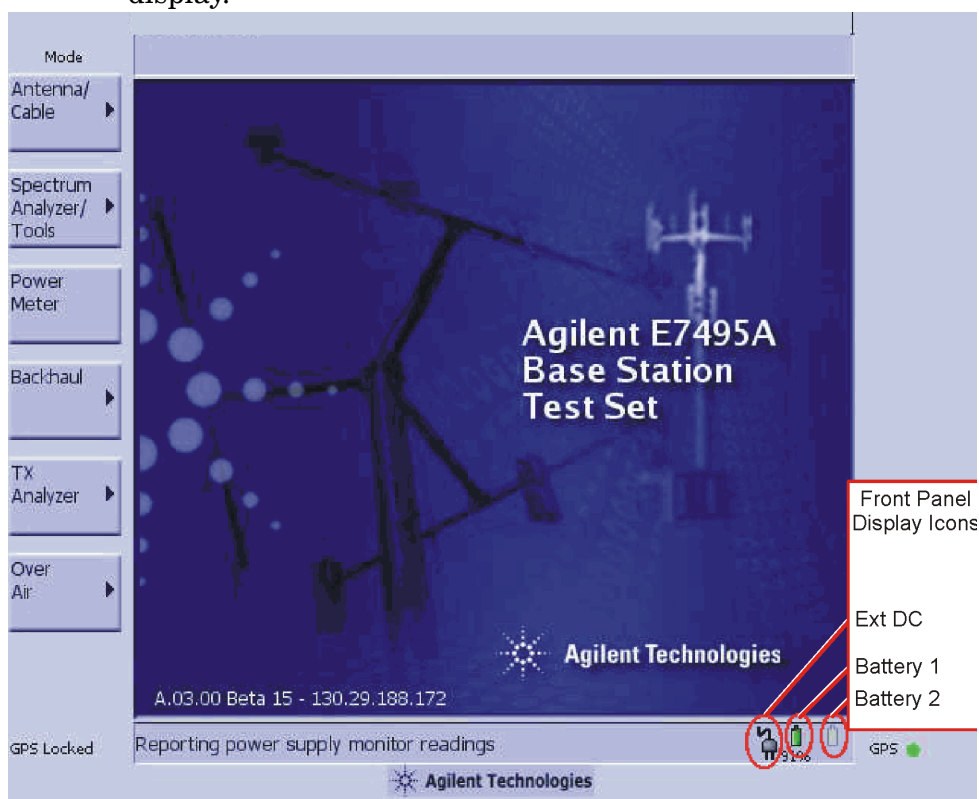
2. Internal Battery Power Test

Setup

- Insure a battery with >10% charge is installed in Battery Position #2
- Remove the Ext DC Power from the E7495A/B

Test Results

- On the Front Panel Display, verify the External DC icon (Plug icon) is NOT present on the lower right hand portion of the display.



- Verify the Battery Icons on the Front Panel Display accurately represent the condition of the installed battery.

Battery 1:	(Light Grey: No Battery Installed)
Battery 2 should be one of the following:	(Green: Greater than 25% Charge remaining) (Yellow: 10 to 15% Charge remaining) (Red: Less than 10% Charge remaining) (Dark Grey: No Charge remaining)

Troubleshoot the Agilent E7495A/B

Troubleshoot the Agilent E7495A/B
Step 3 - Verify Test Set Functionality

- Verify that the Front Panel Battery LED's accurately indicates the correct status of the battery(s) installed in the Test Set.



Battery 1:	(Off: No Battery Installed)
Battery 2 should be one of the following:	(Green: Greater than 25% charge remaining) (Yellow: 10 to 25% charge remaining) (Red: Less than 10% charge remaining)

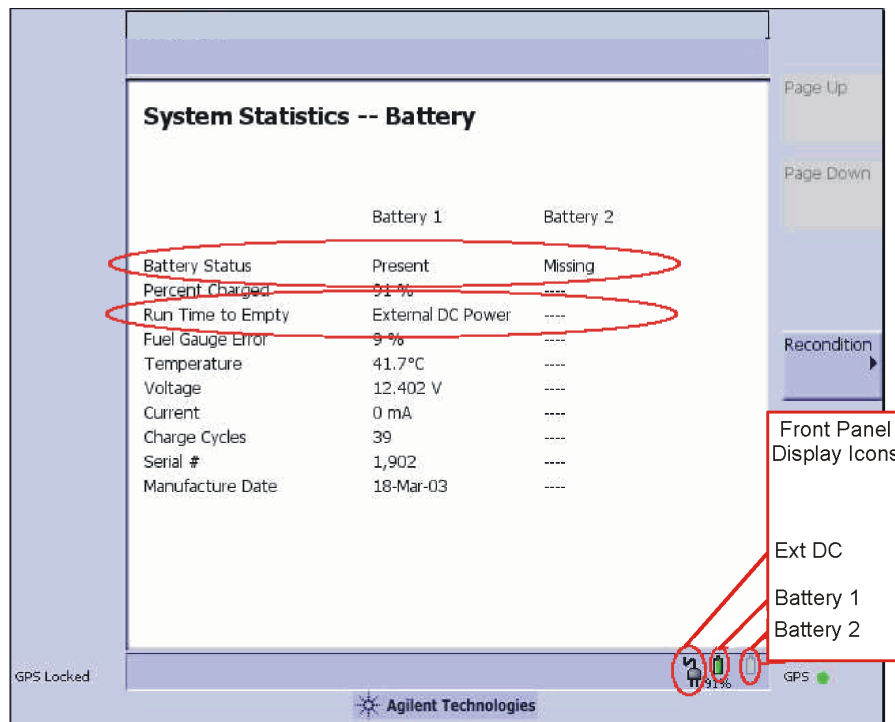
3. Battery Charge Statistics

Setup

- Reconnect the Ext DC power to the E7495A/B.
- Insure a charged battery is installed in the E7495A/B in Battery Position #2.

Test Results

- Access the Battery Statistics Screen
 - Press the [System] Key
 - Press the [More 1 of 2] Softkey
 - Press the [System Stats] Softkey
 - Press the [Battery] Softkey
- Verify the following fields on the Battery Status Screen with a Battery in Battery Position #2 only.



Battery Status

- Battery 1 field = Missing
- Battery 2 field = Present

Run Time to Empty

- Battery 1 field = ----
- Battery 2 field = External DC Power

4. Battery Discharge Statistics

Setup

- Move Battery to Battery Position #1 (closest to the Front Display)
- Remove the Ext DC Power from the E7495A/B

Test Results

- Verify the following fields on the Battery Status Screen with a Battery in Battery Position #1 only

Battery Status

- Battery 1 field = Present
- Battery 2 field = Missing

Run Time to Empty

- Battery 1 field = XXX Minutes (XXX should be 10 or greater for a battery with 10% charge)
- Battery 2 field = ----

On-board Verification Procedures

The On-board verification procedures are tests contained in the service screen of the E7495A/B allowing you to check the functionality of the following sections of the hardware.

Display Functional Test

Perform this procedure to verify the correct operation of your display.

Step	Notes
1 System	
2 More 1 of 2	
3 Service	
4 Verification	
5 Display Test	Follow directions on screen.

Keyboard Functional Test

Perform this procedure to verify the correct operation of your keyboard.

Step	Notes
1 System	
2 More 1 of 2	
3 Service	
4 Verification	
5 Keyboard Test	Press the available buttons and view the results on the screen

T1 Functional Test (Option 700 only)

The Functional tests available for T1 include:

- **RAM** - During the RAM test, the memory on the T1 measurement module is tested. Memory hardware failures are detected.
- **ROM** - The ROM test verifies the integrity of the code by performing a checksum measurement.
- **Loop back** - The loop back test is a functional test of the transmitting and receiving hardware. It attempts to send various signal patterns and levels and then to verify the measured values. It is important that this test be done using the short jumpers as even a 4 to 6 foot cable can cause a normally good board to fail.

If any of the above tests fail, contact your service center.

Troubleshoot the Agilent E7495A/B
Step 3 - Verify Test Set Functionality

Perform this procedure to verify the correct operation of your T1 assembly.

Step	Notes
1 Mode	
2 Backhaul	
3 T1 Analyzer	
4 Tests	
5 Verification	The "Connect the T1 Patch Plugs" diagram and explanation contain the information you need to set up the test.
6 Continue	The test is performed and the results are reported on the screen.

E1 Functional Test (Option 710 only)

The Functional tests available for E1 include:

- **RAM** - During the RAM test, the memory on the E1 measurement module is tested. Memory hardware failures are detected.
- **ROM** - The ROM test verifies the integrity of the code by performing a checksum measurement.
- **Loop back** - The loop back test is a functional test of the transmitting and receiving hardware. It attempts to send various signal patterns and levels and then to verify the measured values. It is important that this test be done using the short jumpers provided with the E7495A/B.

If any of the above tests fail, contact your service center.

Perform this procedure to verify the correct operation of your display.

Step	Notes
1 Mode	
2 Backhaul	
3 E1 Analyzer	
4 Tests	
5 Verification	The "Connect the E1 Loop Cables" diagram and explanation contain the information you need to set up the test.
6 Continue	The test is performed and the results are reported on the screen.

Agilent E7495A/B Performance Verification Software

The Agilent E7495A/B Performance Verification and Adjustment software contains both Functional and Performance verification tests. For troubleshooting, the following functional tests can be run to check the functionality of the listed hardware.

Verify GPS

DC Bias

Even Second Sync Input

Internal and External Reference

T1 Functional Test (Option 700 only)

E1 Functional Test (Option 710 only)

Battery Management Functional Test

Follow the information in the Functional Tests section of [Chapter 7](#), “Functional Tests, Adjustments, and Utilities,” on page 151.

Post Repair Process

The E7495A/B contains a few assemblies that may require adjustments and calibrations when repairs and upgrades are performed. Periodic adjustments and calibrations may also be required to compensate for variations in circuit performance due to age or environment. Other assemblies may require Firmware, Serial Number, Model Number, and Option information to be installed. This information and calibration data is stored into non-volatile memory on the A4A1 ADS/CPU board or the backend board in the A3 RF assembly.

For a summary of the data requirements and verification procedures required when an assembly is replaced see [Table 5-1](#).

Table 5-1 Post Repair Requirements

Reference Designator Assembly Name	Cal/Adj/Data Required ¹	Verification Procedure	Where Found
A1A1 Keypad board	Installed RPG Type	Keyboard Test Display Test	Service Manual Service Manual
A1A2 RPG	Installed RPG Type	Keyboard Test Display Test	Service Manual Service Manual
A1A3 Display		Keyboard Test Display Test	Service Manual Service Manual
A2A1 Power Meter	PM Ref. Level Adj. PM Ref. Frequency Adj.	Power Meter	Service Manual
A2A2 Power Meter Interface	PM Ref. Level Adj. PM Ref. Frequency Adj.	Power Meter	Service Manual
A3 RF assembly	Timebase Return Loss Calibration RPG Read-Write Model/Serial/Option Re-install license files	RF Functionality CW Source Complex Source Validate DSP RAM DC Bias Even Second Sync Input Internal & External Ref.	Service Manual Service Manual Service Manual TME ² Utilities TME Perf. Verify TME Perf. Verify TME Perf. Verify
A3A1 GPS assembly		Verify GPS	TME Perf. Verify
A4A1 ADS/CPU	Timebase RPG PM Ref. Level Adj. PM Ref. Frequency Adj. Load Firmware Re-install license files	Serial Port Verification	TME Utilities
A4A2 T1 assembly		T1 Functional Test	Service Screen
A4A2 E1 assembly		E1 Functional Test	Service Screen
A4A3 Power Supply		Battery Management	Service Manual
A4A4 Power Supply Interface		Battery Management	Service Manual
A4A5 Battery Controller		Battery Management	Service Manual
MP55 Type-N Connectors	Return Loss Calibration	Testing RF Functionality	Service Manual
"Service Screen" Automated verification procedures which are built-in to the E7495A/B Service Screen			
"Service Manual" Manual verification procedures which are document in the Service Manual			
"TME Utilities" Automated verification procedures located in the E7495A/B TME Utilities			
"TME Per. Verify" Automated verification procedures located in the E7495A/B TME Performance Tests.			

1. The location of the tools needed for re-generating this data is provided in the following section.
2. TME (Test Management Environment) refers to the Agilent E7495A/B Performance Verification and Adjustment software.

Calibrations, Adjustments, and Data Requirements

Timebase Reference Alignment Test

Anytime the A3 RF assembly is replaced, the internal TCXO should be adjusted for accuracy. Due to thermal aging and other effects over time, this alignment should also be run on a periodic basis to improve the frequency accuracy of the E7495AB Test Set.

There are two different procedures available to align the internal TCXO. Each procedure will provide the needed level of accuracy to properly align the TCXO, however the Reference Alignment Test in the E7495A/B Performance Verification and Adjustment software should provide a more stable reference signal.

Onboard Timebase Adjustment.

This procedure is located in the Adjustment section of the Service screen and can be accessed by pressing the following Softkeys: [System, Service, Adjustments, Timebase]

This procedure uses the internal GPS module locked to GPS time, as the reference source to adjust the E7495A/B internal TCXO. After starting the test from the Adjustment screen, follow the instructions on the display to perform this adjustment. Further information can be found on the E7495A/B onboard help file or in the E7495A/B Measurement Guide.

Reference Alignment Test

This is located in the Adjustment section of the E7495A/B Performance Verification and Adjustment software. This procedure uses an external frequency source as the reference to adjust the frequency of the E7495A/B internal TCXO. Refer to the Performance Verification and Adjustment help file or the Adjustment section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Clear Cal /Return Loss Calibration

Anytime the A3 RF assembly or the Port 1 Type-N connector is replaced, the Clear Cal / Return Loss Calibration procedures should be run. This procedure is located in the Utilities section of the E7495A/B Performance Verification and Adjustment software.

This utility removes the stored factory / default calibration data for the Return Loss measurement and then prompts the user to perform an open / short / load calibration. The calibration data created during the open / short / load calibration will be stored as the new default calibration data in a file on the A4A1 ADS / CPU assembly. If you don't run this utility after swapping RF assemblies in the E7495A/B, then when the user tries to make a Return Loss measurement without first performing an open / short / load calibration their results will not be

very meaningful.

Refer to the Performance Verification and Adjustment help file or the Utilities section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

RPG Knob

Anytime the RPG, ADS/CPU, or Firmware is changed, the RPG Knob Type needs updating to insure the correct pulses per RPG Knob rotation is achieved. This procedure is located in the Controls section of the System menu and can be accessed by pressing the following Soft keys: [**System, Control, Installed Knob Type**] After starting the test from the **System Control** screen, follow the instructions on the display to select either **Smooth** (for smooth rotating RPG's) or **Stepped** (for RPG's with stepped detents). Further information can be found in this Service Manual at the end of the ["Update via PCMCIA Card"](#) section of [Chapter 3, “E7495A/B Firmware Upgrades and Reinstallation,”](#) on page 37.

Power Meter Reference Oscillator Level Adjustment

When replacing the Power Meter, Power Meter Interface, or the Power Meter Reference cable, the Reference Oscillator Level Adjustment Utility must be run. This test checks and adjusts the output level of the 50 MHz Reference Oscillator located on the Power Meter board.

Refer to the Performance Verification and Adjustment help file or the Adjustment section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Power Meter Reference Oscillator Frequency Adjustment

When replacing the Power Meter, Power Meter Interface, or the Power Meter Reference cable, the Reference Oscillator Frequency Adjustment Utility must be run. This test checks and adjusts the frequency of the 50 MHz Reference Oscillator located on the Power Meter board.

Refer to the Performance Verification and Adjustment help file or the Adjustment section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Load Firmware

When replacing the ADS/CPU assembly the Firmware must be reloaded into the Test Set.

Refer to [Chapter 3, “E7495A/B Firmware Upgrades and Reinstallation,”](#) on page 37.

Read-Write Model Number/Serial Number/Options

When replacing the A3 RF assembly the Model Number, Serial Number and Hardware Options must be reinstalled into the E7495A/B Test Set. This procedure is located in the Utilities section of the E7495A/B Performance Verification and Adjustment Software

Refer to the Performance Verification and Adjustment help file or the Utilities section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Re-install License Files

When replacing the A3 RF assembly or the A4A1 ADS/CPU assembly, the options files must be re-installed. The following options are "License Key Enabled" and must be enabled through the front panel Option Manager by entering in the correct license key.

Option	Description
200	cdmaOne/CDMA2000 Analyzer
210	cdmaOne over-air tester
220	RF Channel Scanner
230	GSM Analyzer
240	W-CDMA (UMTS)
250	W-CDMA over-air
270	Interference Analysis
300	DC Bias Output

For the license key enabled options which were shipped new with the Test Set from the factory, or purchased later as upgrades, the License Keys can be retrieved from the license key database at the following location: <http://pamirs.cos.agilent.com/license/>

After you have retrieved the license keys use the Install an Option process located on the System Option Manager Screen to re-install the options.

Refer to the E7495A/B On-board Help File, the Performance Verification and Adjustment Help File, or the Utilities section of [Chapter 7, “Functional Tests, Adjustments, and Utilities,”](#) on page 151.

Verify the repair functionality

After the defective assembly is repaired, you should verify the functionality of the repaired section by running the individual verification procedure listed in [Table 5-1 on page 91](#). The table also lists where to find the information needed to perform the verification procedure recommended for each repaired/replaced assembly. Refer to the location listed in the table for detailed verification procedures.

Verify the Test Set Performance

After the repair is complete the Performance Verification section of the Agilent E7495A/B Performance Verification and Adjustment software should be run. The Performance Verification tests verifies that the Test Set performs to its specifications. It is also recommended that all the Functional Tests and Performance Tests be run every year at the calibration cycle.

Refer to the Agilent E7495A/B Performance Verification and Adjustment software Help Files for information on running the Performance Verification procedures.

Troubleshoot the Agilent E7495A/B
Post Repair Process

Troubleshoot the Agilent E7495A/B

What you'll find in this chapter

Procedures in this chapter enable you to remove and replace the major assemblies in your instrument. Refer to [Figure 6-1 on page 100](#) to help you identify the procedure you need. The parts list on [page 102](#) is a list of all parts you need to repair and replace items on the Agilent E7495A/B.

This chapter contains removal and replacement procedures for the following:

- [“Kickstand and Strap Handle” on page 107](#)
- [“Batteries” on page 108](#)
- [“Bumpers” on page 109](#)
- [“A1 Front Panel Assembly” on page 111](#)
- [“A5 Connector Panel Assembly” on page 115](#)
- [“A3 RF Assembly” on page 115](#)
 - [“A3A1 GPS Assembly” on page 118](#)
 - [“A2 Power Meter Assembly \(Option 600 only\)” on page 118](#)
- [“A4A1 Controller Board” on page 131](#)
- [“A4A2 T1 or E1 Assembly” on page 135](#)
- [“A4A5 Battery Controller and Housing” on page 138](#)
- [“A4A3 Power Supply and A4A4 Power Supply Interface Boards” on page 140](#)
- [“Speaker” on page 144](#)
- [“A1 Front Panel” on page 145](#)
 - [“A1A3 Display” on page 145](#)
 - [“A1A3A1 Backlight” on page 147](#)
 - [“A1A4 Display Inverter” on page 147](#)
 - [“A1A1 Keypad Board” on page 148](#)
 - [“MP26 Lower Keypad” on page 149](#)
 - [“MP25 Display Keypad” on page 149](#)
 - [“A1A2 RPG” on page 150](#)

General information

- The removal and replacement procedures are presented together. You can assume that the replacement process is the reverse of the removal process, unless otherwise noted.
- Use caution when removing assemblies so as not to disturb water-proofing or EMI gaskets.
- The removal of some assemblies may require disassembly of other assemblies to gain access. These procedures are presented in order of disassembling the complete product, consult [Figure 6-1 on page 100](#) to determine what other assemblies need to be removed.
- Most of the ribbon cables use retaining clips to prevent shock and vibrations from loosening them. Use a small flat-bladed screwdriver to remove the retaining clips.

For many of the replacement procedures, a short reference video is available to help you become familiar with the steps and procedures required to replace each assembly. These videos are job aids to be used in conjunction (not as a substitute) with the Replacement Procedures to help you gain a better understanding of the overall process. When replacing an assembly, you should use the videos for reference only and always follow the steps outline in Replacement Procedures.

The following video's can be found on the E7495A/B support website at the following address:

http://mktdev.soco.agilent.com/field/service/signal/e7495/Service_Training/

Procedure	Remove and Replacement Reference Video
Remove the Batteries	Removing the Batteries
Remove the Bumpers	Removing the Protective Bumpers
Remove the A1 Front Panel	Removing the Front Panel
Remove the A5 Connector Panel	Removing the Connector Panel Assembly
Remove the A3 RF	Preparing to Remove the RF Assembly
Remove the A3A1 GPS	Removing the GPS Assembly
Remove the A2 Power Meter	Removing the Power Meter
Remove the A3 RF	Removing the RF Assembly
Remove and Re-install the Controller board	Removing the CPU Assembly

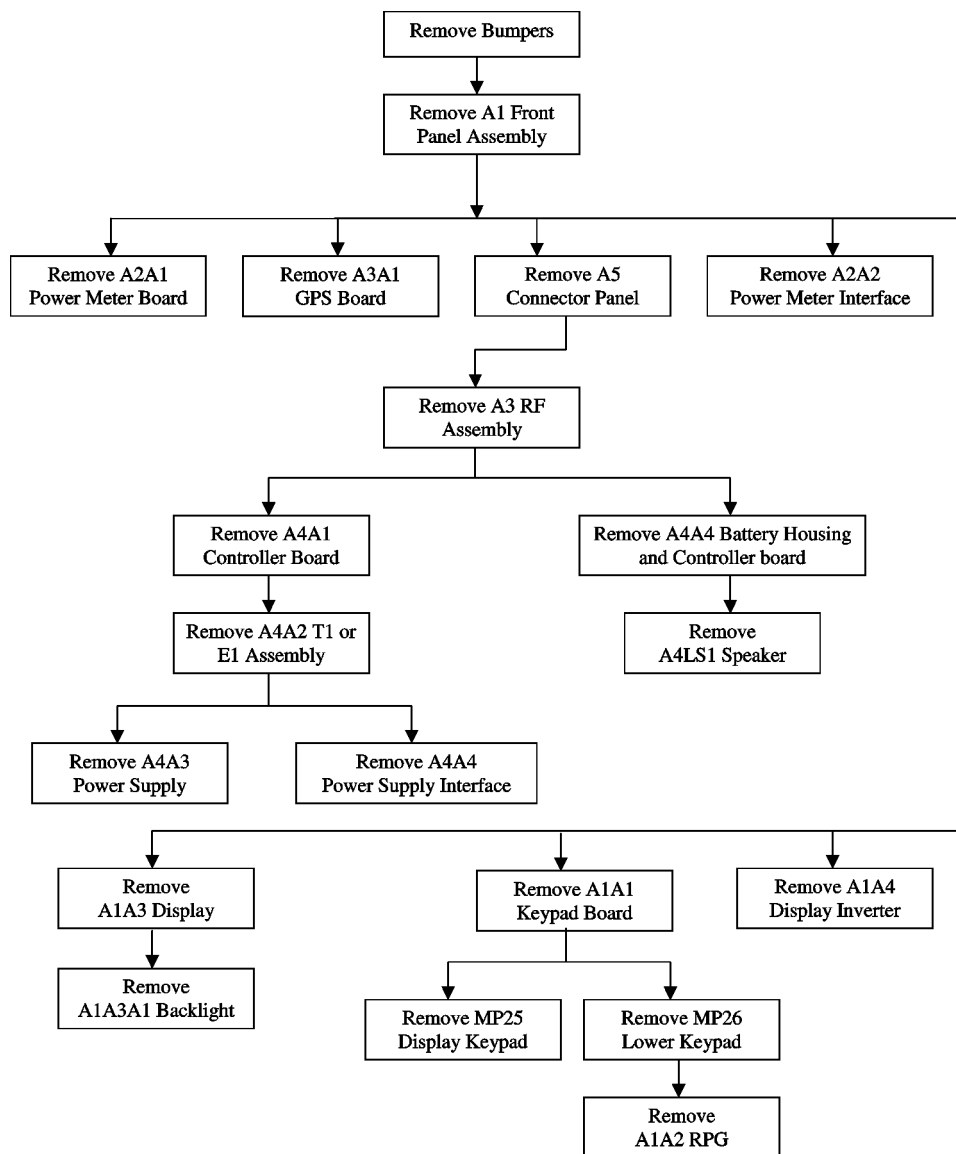
Procedure	Remove and Replacement Reference Video
Remove and Re-install the T1 A4A2 Remove and Re-install the E1 A4A2	Removing the E1/ T1 Assembly
Remove and Re-install the A4A3 Power Supply Remove and Re-install the A4A4 Power Supply Interface	Removing the Power Supply and Interface boards
Remove and Re-install the A4A5 Battery Controller and Housing	Removing Battery Controller and Housing
Remove and Re-install the A4LS1 Speaker	Removing the Speaker
Remove the A1A3 Display	Remove Front Panel Display
Remove the A1A3A1 Backlight	Remove Backlight
Remove the A1A4 Display Inverter	Remove Inverter
Remove the A1A1 Keypad board Remove the A1A2 RPG	Remove Keypad and RPG
Remove the Kickstand	Removing the Kickstand and Kickstand Mounts
Remove the Strap Handle	Removing the Strap Handle
Replace the A1A2 RPG	Install RPG, keypads and keypad board
Remove and Re-install the A4LS1 Speaker	Installing the Speaker
Remove and Re-install the A4A5 Battery Controller and Housing	Installing the Battery Controller and Housing
Remove and Re-install the A4A1 Controller board	Installing CPU Assembly
Replace the A3 RF Assembly	Installing RF Assembly
Replace the A3A1 GPS Assembly	Installing GPS Assembly
Replace the A2 Power Meter Assembly	Install the Power Meter Assembly
Installing the A5 Connector Panel	Installing the Connector Panel

Remove and Replace Procedures

Procedure Map

Use this procedure map to help you determine which procedures you need to do.

Figure 6-1



E7495A/B Tools required

Torx Drivers

- T8 Torx Driver
- T10 Torx Driver
- T15 Torx Driver
- T20 Torx Driver
- T30 Torx Driver

Outside snap ring pliers

5/16" open end wrench

3/8" open end wrench

6 mm open end wrench

3/4" socket wrench

7/16" socket wrench

9/16" socket wrench

Torque wrench for the following torque settings:

- 6 in-lbs
- 9 in-lbs
- 21 in-lbs
- 40 in-lbs

Parts List

Reference Designator	Description	Part Number	Host Assembly
A1	Front Panel Assembly	Not replaceable as a complete assembly.	A1
A1A1	Keypad board	E7495-60010	A1
A1A2	RPG	1990-1525	A1
A1A2NEW	RPG new	HRPG-AD32#11C	A1
A1A3	Display	E7495-60037	A1
A1A3A1	Back Light	2090-0895	A1
A1A4	Inverter	0950-4091	A1
A2	Power Meter Assembly	E7495-60032	A2
A2A1	Power Meter Assembly	E7495-60033	A2
A2A2	Power Meter Interface	E7495-63005	A2
A3	RF Assembly	E7495-60030, Standard E7495-60031, Option 500 E7495-60032, Option 510	A3
A3A1	GPS Assembly	E6450-60069	A3
A3A2	Measurement Assembly	E7495-63002	A3
A3A3	Source Assembly	E7495-63007	A3
A3A3A1	Optional Source Attenuator	E7495-60011	A3
A3A4	Receiver Assembly	E7495-63001	A3
A3A5	Complex Mod Assembly	E7495-63015	A3
A3X	RF Assembly		A3
A4	Rear Panel Assembly	No complete A4 assembly to be set up.	A4
A4A1	CPU Assembly	E7495-60013	A4
A4A2	T1 Test Assembly	E7495-60004	A2
A4A3	Power Supply	0950-4275	A4
A4A4	Power Supply Interface	E7495-63006	A4
A4A5	Battery Controller	E7495-60009	A4
A4LS1	Speaker Assembly	8121-1016	A4

Cables			
A4W1	A4A4J2 to A3A2J1000	8121-0962	A4
A4W10	A4A1J102 to A2A2J1	8121-0974	A2
A4W11	A4A1J18	8121-0981	A4
A4W12	A4A2J1 to A4A3J4	8121-0972	A4
A4W13	A4A2J3 to A4A1J17	8121-0999	A4
A4W14	A4A2J2 to A4A1J29	8121-0983	A4
A4W15	A4A4J53 to A4A5J53	8121-0963	A4
A4W16	CA A4A3J1 to A4A4J4	8121-0970	A4
A4W2	A4A1J7 to A1A1J1	8121-0979	A4
A4W3	A4A1J13 to A1A4J1	8121-0988	A4
A4W4	A4A1J27 to A3A2J102	8121-0982	A4
A4W5	A4A4J20 to	8121-0980	A4
A4W6	A4A1J28 to A4A4J10	8121-0976	a2
A4W7	A4A1J1 to A4A4J6	8121-1022	A4
A4W8	A4A4J5 to A4A1J5 &PSCONN2	8121-0967	A4
A4W9	A4A4J8 to A4A3J3	8121-0969	A4
A5W1	A4A1J31 to A5 GPIO	8121-1237	A5
A5W2	A2A1J13 to A5 Cal	E7495-20027	A5
A5W3	A4A1J26 to A5 serial 1	8121-1000	A5
A5W3A	A5 Serial 1	1252-3580	A5
A5W4	A4A1J10 to A5 serial 2	8121-1000	A5
A5W5	A2A1J18 to A5 Sensor	E7495-60036	A5
A5W6	A3A3J1 to J5 Ext Ref	8020-8787	A5
A5W7	A3A2J150 to A5 Even Sec	8020-5401	A5
A5W8	A3A1J1 to A5 GPS	8121-0149	A5
A5W9	A4A4J1 to A5 PS in	8121-0977	A5
MP	M3X6	0515-0430	A3
Hardware			
MP1	Front Case	E7495-20159	A1
MP10	Handle	E7495-80021	Case

Remove and Replace Procedures

Remove and Replace Procedures
Parts List

MP100	M3X6	0515-0430	A3
MP101	Screws (4) Display Mount E7495-00009	0515-1950	A1
MP102	Inverter Screws	0515-2005	A1
MP107	screws	0515-1102	A4
MP108	Bumper Screws (front)	E7495-20034	Case
MP11	Conn Panel Gasket	E7495-40017	Case
MP111	Screw	0515-0374	A4
MP112	Screw	0515-2577	A4
MP12	Bumper Top Left / Bottom R	E7495-40002	Case
MP121	Retaining Ring	0515-1644	A5
MP122	RS232 Nut	1251-2942	A5
MP123	3.0mm Nut	0535-0031	A4
MP13	Bumper Top R/ Bottom Left	E7495-40001	Case
MP14	CPU Overlay	E7495-80002	Case
MP140	Coax Washer	2190-0102	A5
MP141	Coax Nut	2950-0132	A5
MP142	PS Cap	1253-5359	A5
MP143	PS Washer/Gasket	0905-1586	A5
MP15	CPU Door	E7495-60034	Case
MP16	Battery Door	E7495-20164	A4
MP16A	Battery Door Fstn	E7495-200043	battdoor
MP16B	Battery Door washer	3050-2206	battdoor
MP16C	battery door keeper	0400-0969	battdoor
MP16D	Battery Door Pad	E7495-20032	battdoor
MP16E	Battery Door Gasket	E7495-40020	battdoor
MP17	Battery Door Pin	E7495-20029	A4
MP2	Case half gasket	E7495-40019	Case
MP21	RPG Knob	E7495-40010	A1
MP22	Nameplate	E7495-80001	A1
MP23	EMI Strip (434mm)	8160-1617	A1
MP24	EMI Strip (750mm)	8160-1616	A1

Remove and Replace Procedures

MP25	Display Keypad	E7495-40004	A1
MP26	Lower Keypad	E7495-40005	A1
MP27	Spacer	3050-2197	A1
MP28	Spacers (19)	E7495-40027	A1
MP29	Display Gasket	E7495-40023	A1
MP3	Rear Case	E7495-20160	A4
MP30	DISPLAY LENS		A1
MP31	Spacers (4)	0380-4913	A1
MP32	Display Mount	E7495-00009	A1
MP4	Case Insert Gasket	E7495-40018	A4
MP40	Digital IF top casting	E7495-20162	A3
MP41	Top Digital IF Gasket	E7495-40015	A3
MP42	Digital IF Bottom Gasket	E7495-40016	A3
MP43	Synth Top casting	E7495-20057	A3
MP44	Synth Top Gasket	E7495-40013	A3
MP45	Synth Bottom Gasket	E7495-40014	A3
MP46	Inspirioni Pads	0340-1309	A3
MP47	Center casting	E7495-20058	A3
MP48	Bottom Receiver Gasket	E7495-40012	A3
MP49	Top Receiver Gasket	E7495-40011	A3
MP4CA11	CPUJ28 to PSIJ10	8121-0976	A4
MP4CA7	CPUJ102	8121-0974	A4
MP4SCREW	screw	0515-0430	A4
MP5	Rear Case Insert	E7495-00002	a4
MP50	Receiver Casting	E7495-20056	A3
MP51	Cplx Mod Btm Casting	E7495-20066	A3
MP52	Btm Cplx Mod Gasket	E7495-20031	A3
MP53	Top Cplx Mod Gasket	E7495-20030	A3
MP54	Cplx Mod Top Casting	E7495-20055	A3
MP55	Type N to SMA con. (2)	1250-3295	A3
MP6	Rear Panel Overlay	E7495-80004	Case
MP60	CPU Shelf	E7495-00003	A4

Remove and Replace Procedures
Parts List

MP61	Speaker Gasket	E7495-40028	A4
MP62	Spring fingers	8160-1622	A4
MP63	Battery Sleeve Bracket	E7495-00010	A4
MP64	Battery Sleeves	E7495-20154	A4
MP65	EMI Strip	8160-1616	A4
MP66	EMI Strip	8160-1617	A4
MP67	Thermal Pad bottom	E7495-20039	A4
MP68	Thermal Pad top	E7495-20044	A4
MP68A	Battery Sleeve halves	E7459-20154	A4
MP69	bracket	E7495-00015	A4
MP7	Kickstand bracket (L)	E7495-40021	Case
MP70	Battery Spring Gasket	E7495-20041	A4
MP8	Kickstand bracket (R)	E7495-20022	Case
MP80	Conn Panel Overlay Std	E7495-80005	Case
MP80A	Conn Panel overlay opt 600	E7495-80003	A6
MP80B	Conn Panel Overlay opt 710	E7495-80006	Case
MP81	Connector Panel	E7495-00020	A5
MP9	Kickstand	E7495-20065	Case
MPA2CA	Power Meter Cal Cable	E7495-20027	A2
MPA3XXX	SCREW	0515-0664	A3
MPA4SCREW	M3X6	0515-0430	A4
MPCA A2	#112 PM to PS Cable	8121-0972	A2
MPSCREWA2	M2.5X6	0515-1934	A2
MPSRECWA4BS	battery sleeve screws	0515-2134	A4
MPXX3	Disp cover screws(11)	0515-0430	A1
MPXXAX	M3X10	0515-2134	A3

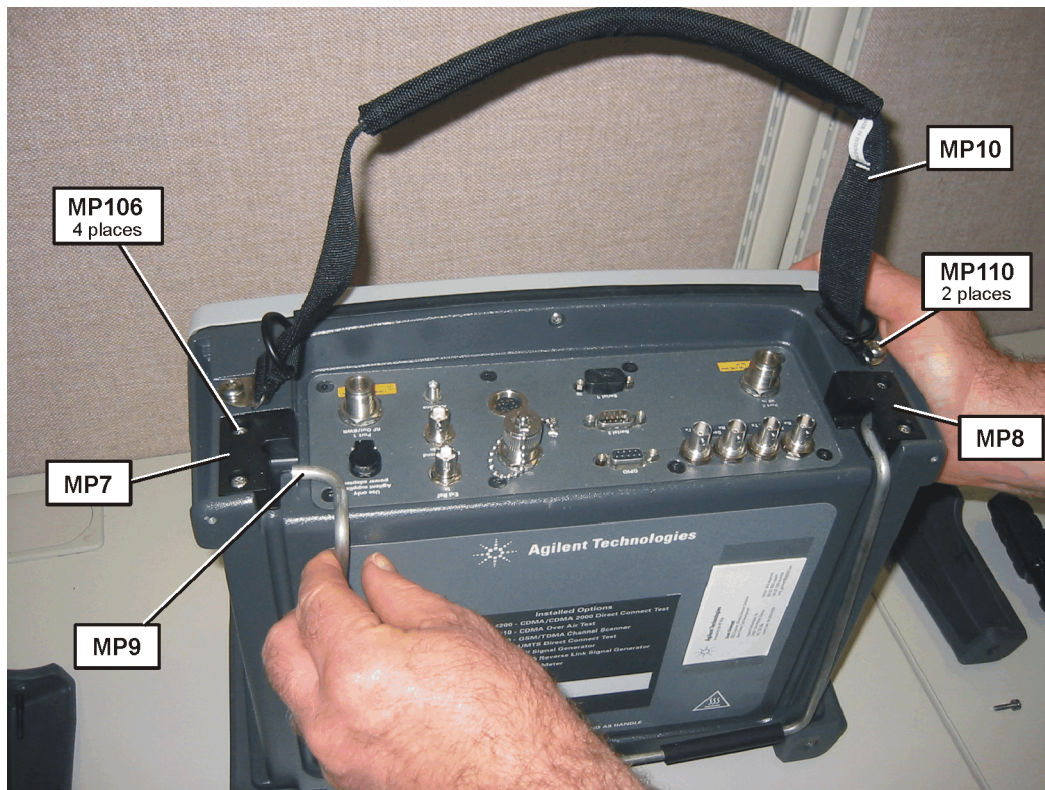
Remove and Replace Procedures

Removal and Replacement Procedures

Kickstand and Strap Handle

1. Refer to [Figure 6-2](#). With the kickstand in the closed position, bend the ends of MP9 inward and remove it from the kickstand mounts.

Figure 6-2 Kickstand and Strap Handle Removal



2. Remove the (2) MP106 screws (T-20 M4x16) from the Left Kickstand Mount MP7 and remove the mount.
3. Remove the (2) MP106 screws (T-20 M4x16) from the Right Kickstand Mount MP8 and remove the mount.
4. To remove the strap handle, remove the (2) MP110 screws (T-30 M6x12) from the Strap Handle MP10 and remove the handle.

NOTE

When installing the mounts, torque the MP106 screws to 21 in-lbs.
When installing the strap handle, torque the MP110 screws to 75 in-lbs.

Batteries

1. Refer to [Figure 6-3](#). Turn the battery door fastener counterclockwise to open the door.
2. Grasp the battery pull-tab to extract each battery.

NOTE

If batteries are difficult to remove you can use pliers to grip the battery tab. *Do not pry on the batteries.*

Figure 6-3 **Remove the Batteries**



Bumpers

1. Refer to [Figure 6-4](#). Remove the (4) MP108 (T-15 M4x16.43) screws that secure the bumpers to the front panel.

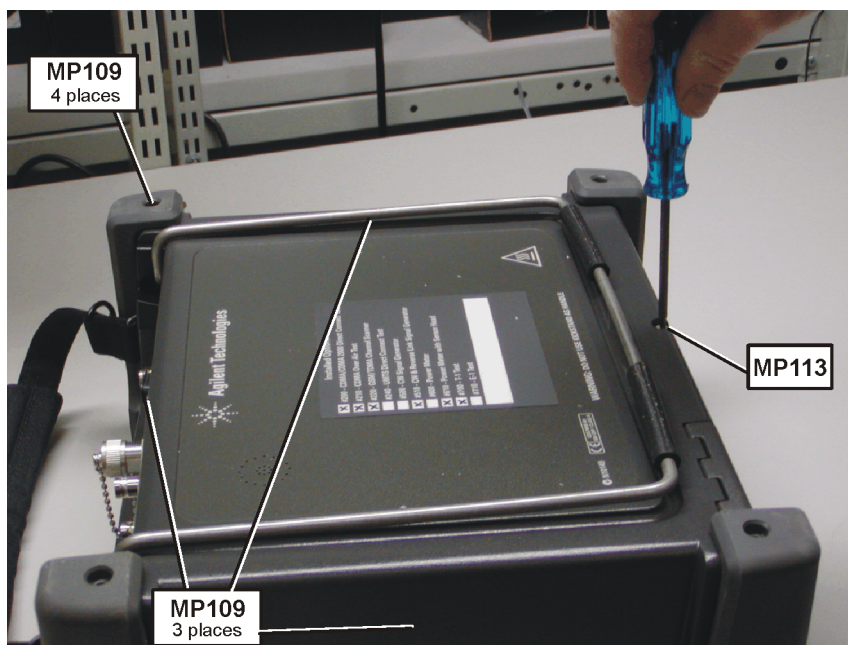
Figure 6-4 Remove the Front Panel Bumpers



Remove and Replace Procedures

2. Refer to [Figure 6-5](#). Remove the (4) MP109 (T-20 M4x16) screws that secure the bumpers to the rear case.

Figure 6-5 Remove the Rear Panel Bumpers



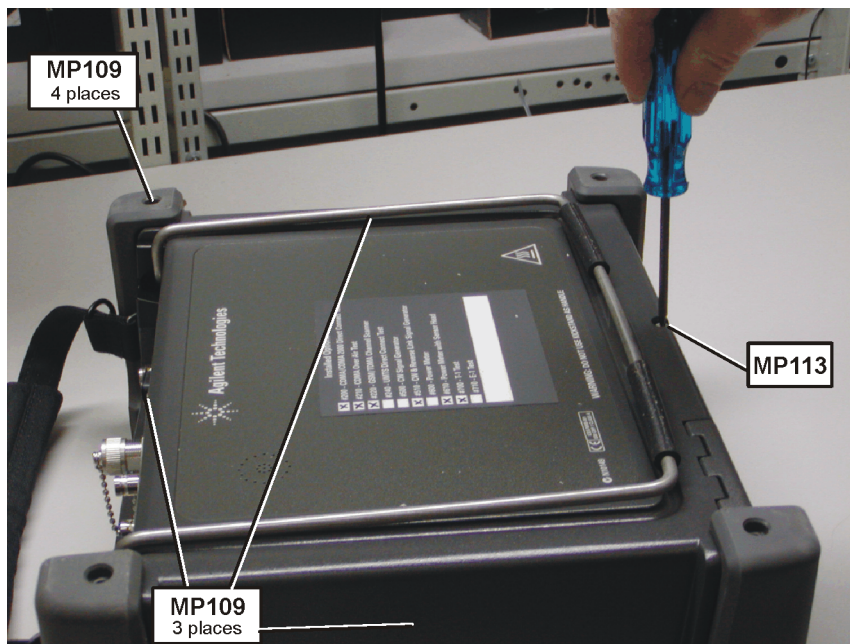
Remove and Replace Procedures
Removal and Replacement Procedures

3. Gently remove the (4) bumpers MP12 (qty 2), and MP13 (qty2) from the Test Set.
4. If you will be removing the front panel, temporarily secure the front panel to the rear case using (2) of the Front Panel Bumper Screws MP108 in the top right and bottom left corners of the front panel (finger tighten only).

A1 Front Panel Assembly

1. Refer to [Figure 6-6](#). Remove the long screw MP113 (T-15 M4x115) on the bottom rear of the case.

Figure 6-6 Front Panel Removal



Remove and Replace Procedures

2. Remove the (3) MP109 (T-20 M4x16) screws securing the front panel to the rear case.

Figure 6-7 Front Panel Removal

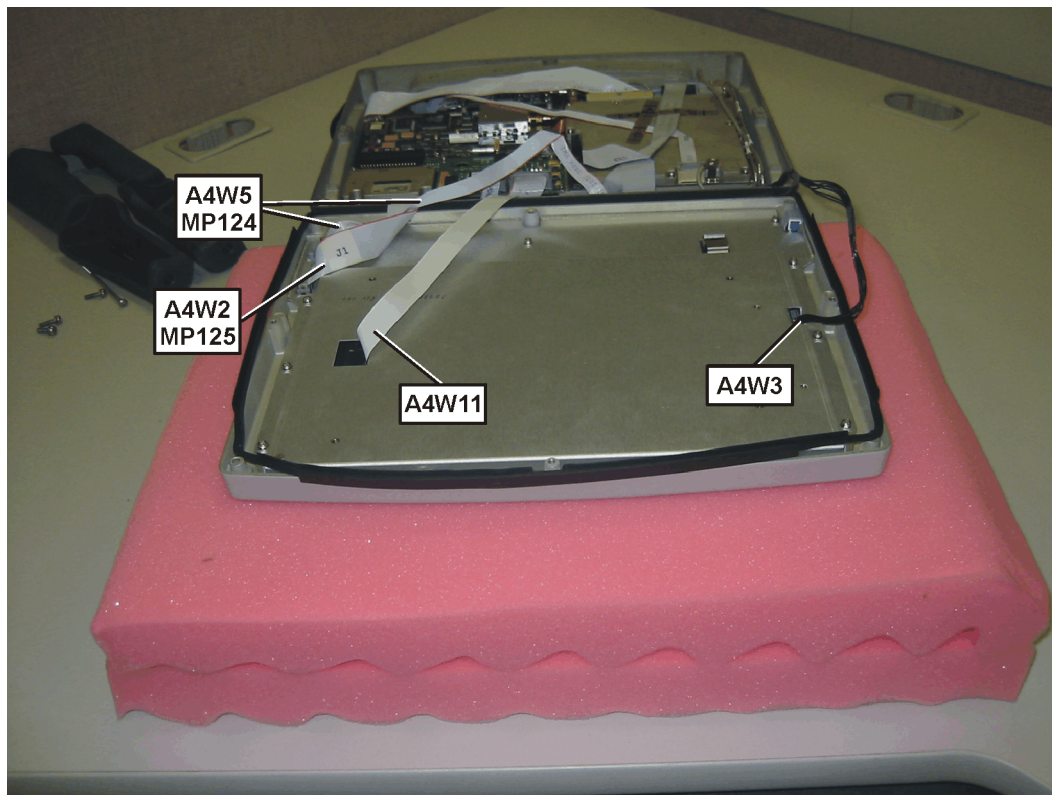


3. Lay the Test Set on its back with the battery door facing you and remove the (2) temporary MP108 screws.

Remove and Replace Procedures
Removal and Replacement Procedures

4. Refer to [Figure 6-7](#). Gently pull up the front panel assembly (FPA). As you are pulling, you may need to push the gasket MP2 down to free it from the FPA. The gasket should stay with the case.

Figure 6-8 For its protection, rest the FPA on padding.



NOTE

Place some padding, such as an ESD bag on your work surface near the bottom of the Test Set. It's helpful to have enough padding so it is just below the height of the rear case.

5. Refer to [Figure 6-8](#). Rotate the FPA like it was hinged at the bottom and lay it face down on the padding.
6. Remove the flat cable A4W11.
7. Remove the multi strand cable A4W3 (do not pull on the cable, use a small screwdriver).
8. Remove the connector clip MP124 and ribbon cable A4W5.
9. Remove the connector clip MP125 and ribbon cable A4W2.

Reinstallation Instructions:

Reverse the above steps and follow the additional steps:

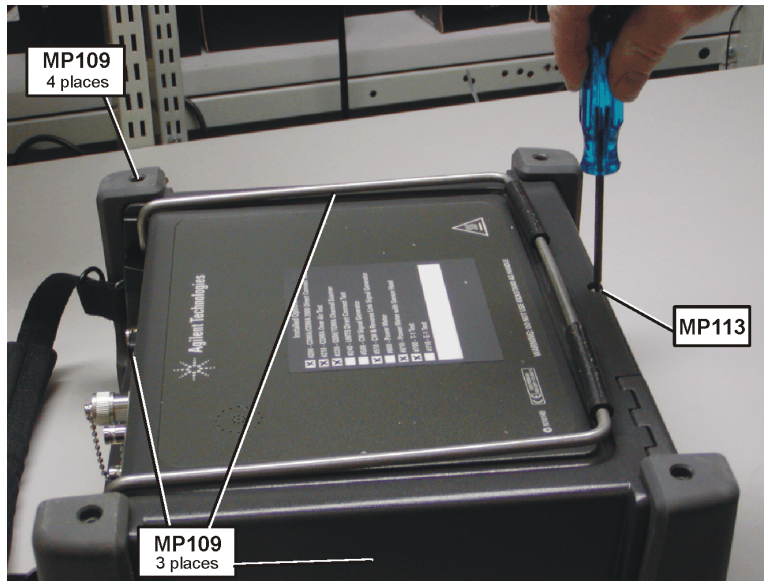
1. Install the case halves gasket MP2 by laying it over the edge of the rear case insuring to line up the notches in the gasket with the rear case.
2. Install the ribbon cable A4W5 and connector clip MP124 to connector A1J2 of the display.
3. Install the ribbon cable A4W2 and connector clip MP125 to connector A1J1 of the display.
4. Install the multi strand cable A4W3 to display inverter connector A1A4CN1.
5. Install the flat cable A4W11 to connector display connector A1CN1.

Figure 6-9 Front Panel Replacement



6. Place the Front Panel Assembly onto the Rear Case, take care to not disturb the gasket and insure cables are routed properly so as not to get pinched.
7. Temporarily install (2) of the MP108 screws finger tight to secure the front panel assembly to the rear case.

Figure 6-10 Front Panel Replacement



8. Install the (3) MP109 (T-20 M4x16) screws to securing the Front Panel to the Rear Case.
9. Install the long screw MP113 (T-20 M4x115) on the bottom rear of the case.
10. Torque all screws to 21 in-lbs.
11. Inspect the perimeter of the case halves gasket for bulges or gaps.

Reinstall the Bumpers

12. Remove the (2) MP108 screws which are temporarily securing the Front Panel to the Rear Case.
13. Install the (2) MP12 Bumpers on the top left and lower right corners of the Test Set.
14. Install the (2) MP13 Bumpers on the top right and lower left corners of the Test Set.
15. Install the (4) MP108 (T-15 M4x16.43) screws to secure the bumpers to the Front Panel.
16. Install the (4) MP109 (T-20 M4x16) screws to secure the Bumpers to the Rear Case.
17. Torque all screws to 21 in-lbs.
18. Re-torque the 4 (MP109, MP113) screws that secure the rear case to the front panel and the (4) (MP108) front bumper screws. The gasket will compress after the initial tightening changing the screw torque.
19. Again, inspect the perimeter of the case halves gasket for bulges or gaps.

A3 RF Assembly

Removing the A3 RF Assembly

There are several sub procedures required to remove the RF Assembly from the Test Set. If you are replacing the RF Assembly, complete all of the sub procedure steps. If you are removing the RF Assembly to gain access to other assemblies located under the RFA, follow the same sub procedure steps, omitting the steps where you physically remove the GPS and Power Meter boards from the A3 RF Assembly.

Steps to follow if replacing the A3 RFA	Steps to follow if removing the A3 RFA to gain access to other assemblies
<ul style="list-style-type: none"> • Remove A5 Connector Panel • Remove the A3A1 GPS • Remove the A2 Power Meter • Remove the A3 RFA from Case 	<ul style="list-style-type: none"> • Remove A5 Connector Panel • Remove the A3A1 GPS (Cables only, do not remove board) • Remove the A2 Power meter (Cables only, do not remove board) • Remove the A3 RFA from Case

A5 Connector Panel Assembly

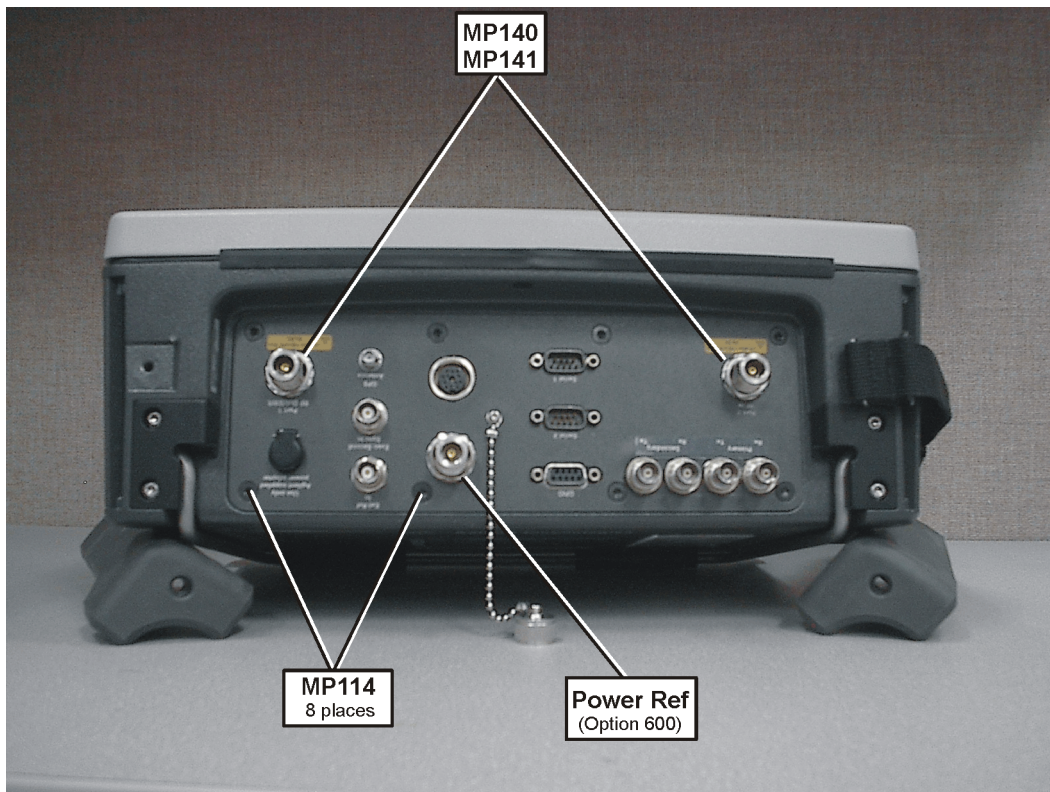
Removing the A5 Connector Panel Assembly

NOTE When removing the RF assembly, the connector panel must be loosened but not completely removed. Use this procedure to remove the connector panel when you are preparing to remove the RF assembly.

NOTE The Port 1 and Port 2 Type N connectors are attached directly to the PC board via extensions. These extensions are very easy to break. Any up or down deflection of the N connectors may crack or break the extensions.

1. Refer to [Figure 6-11](#). Remove the nuts MP141 and MP140 lock washers from the Port 1 and Port 2 Type N connectors.
2. If Option 600 is present remove the nut and washer from the Power Ref connector.

Figure 6-11 Removing the Connector Panel



3. Remove the (8) MP114 (T-20 M4x8) flathead screws on the connector panel.

CAUTION

The Port 1 and 2 Type N connectors are attached directly to the PC board via extensions. These are very easy to crack or break. Take extreme care not to bump, flex, or bend these connectors.

4. Carefully pull the connector panel away from the case. Keep the panel even (parallel) to the case until you clear the type N connectors.

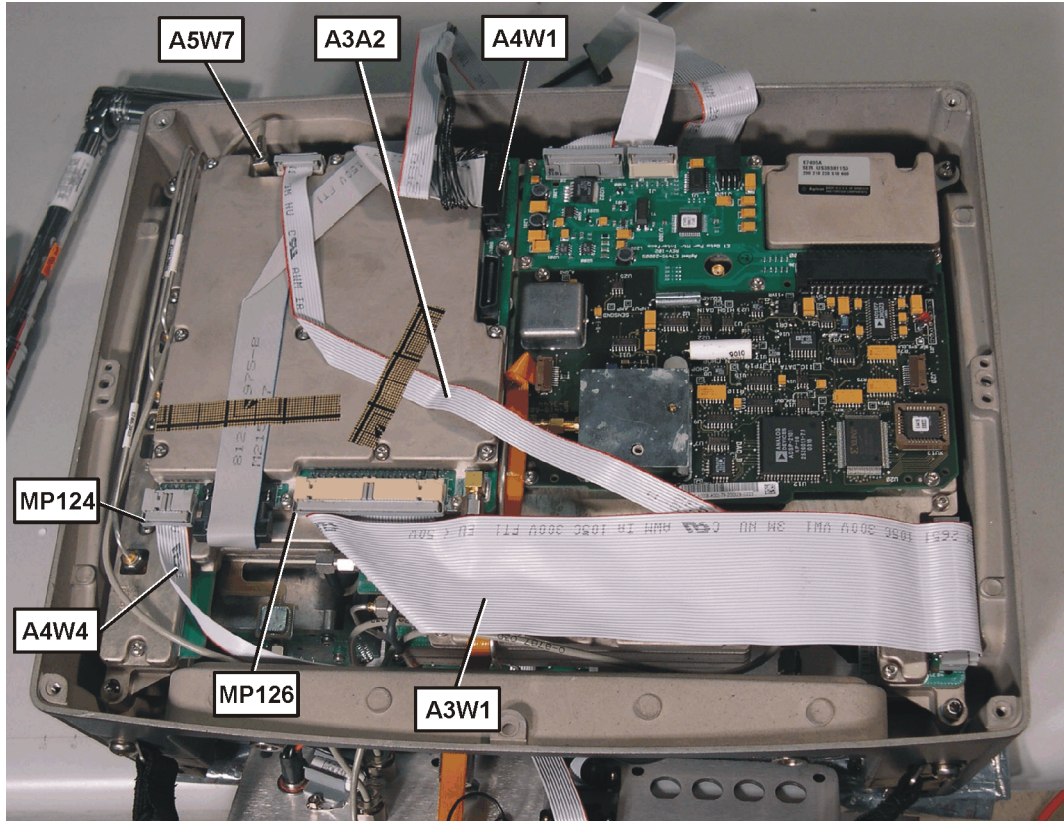
NOTE

If option 600 is present, you may need to apply slight pressure on the Power Ref connector to release it from the connector panel.

Removal of A3 RF Assembly (RFA)

1. Refer to [Figure 6-12](#). Disconnect the cable clip MP126 and A3W1 ribbon cable from the RFA. This cable is disconnected only to gain access.

Figure 6-12 RF Assembly Removal

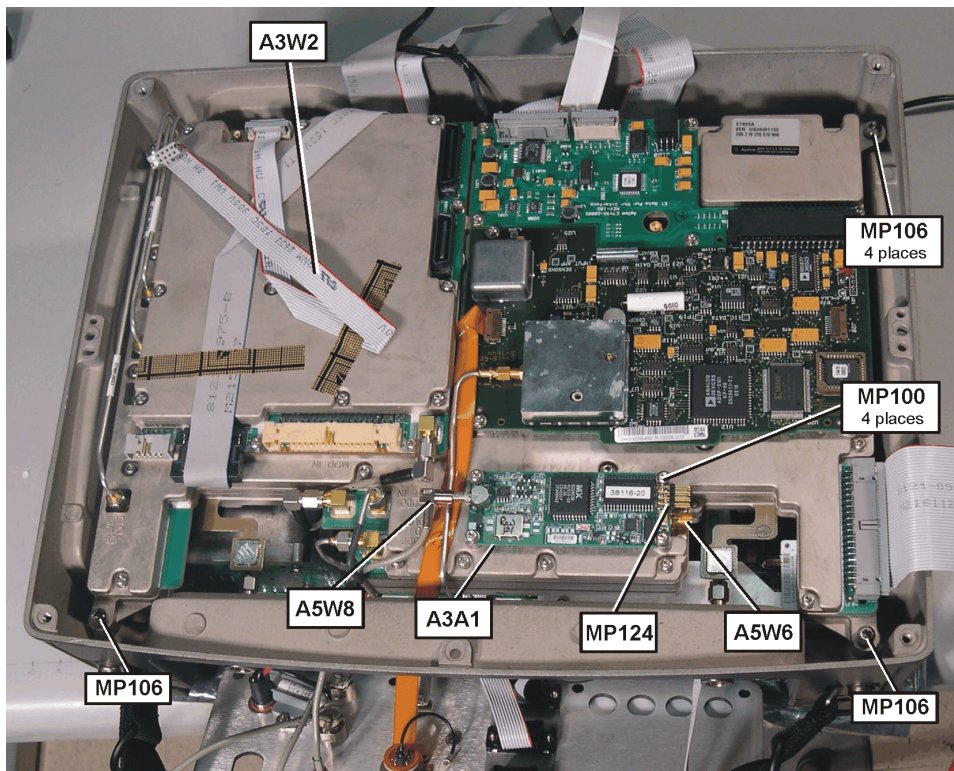


2. Disconnect the cable clip MP124 and A4W4 ribbon cable from the RFA.
3. Disconnect the A4W1 power supply cable from the RFA.
4. Disconnect the SMB even second sync cable A5W7 from the RFA and unthread it from the semi-rigid cables.

A3A1 GPS Assembly

5. Refer to [Figure 6-13](#). Disconnect the cable clip MP124 and A3W2 GPS ribbon cable from the GPS board.

Figure 6-13 GPS Assembly Removal



6. Disconnect the SMB GPS antenna cable A5W8 from the GPS board.

NOTE

If you are not replacing the RF Assembly or GPS board, skip [step 7](#) and leave the GPS board attached to the RF Assembly.

7. Remove the (4) MP100 screws (T-10 M3x6) from the GPS board and remove it from the RFA.

A2 Power Meter Assembly (Option 600 only)

If Option 600 is present complete the following steps:

NOTE

Note: The Power Meter and Power Meter Interface boards are separately replaceable but must be removed from the RF Assembly as a complete assembly

8. Refer to [Figure 6-15](#). Disconnect the power meter sensor cable A5W5 from the Power Meter board A2A1.

Figure 6-14 Power Meter Sensor Connection Diagram

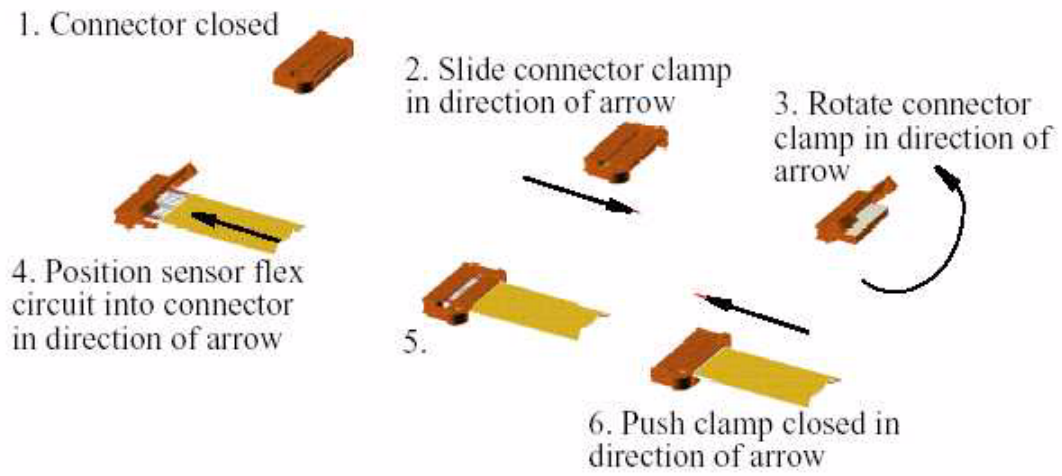
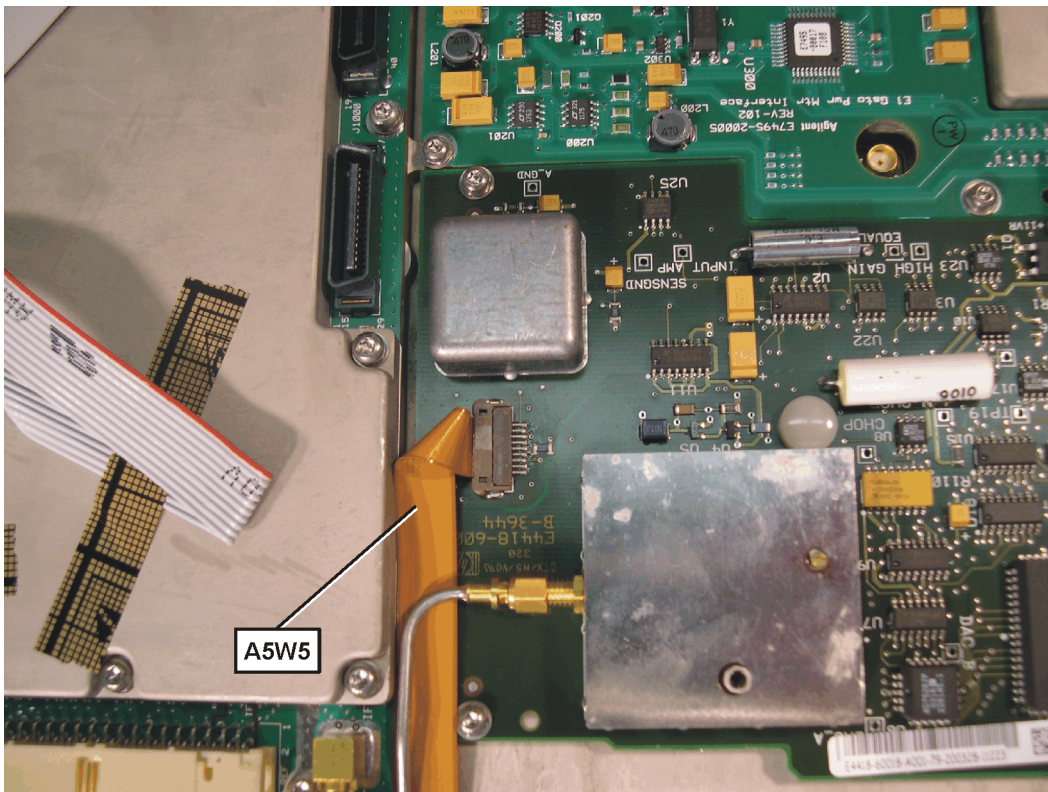
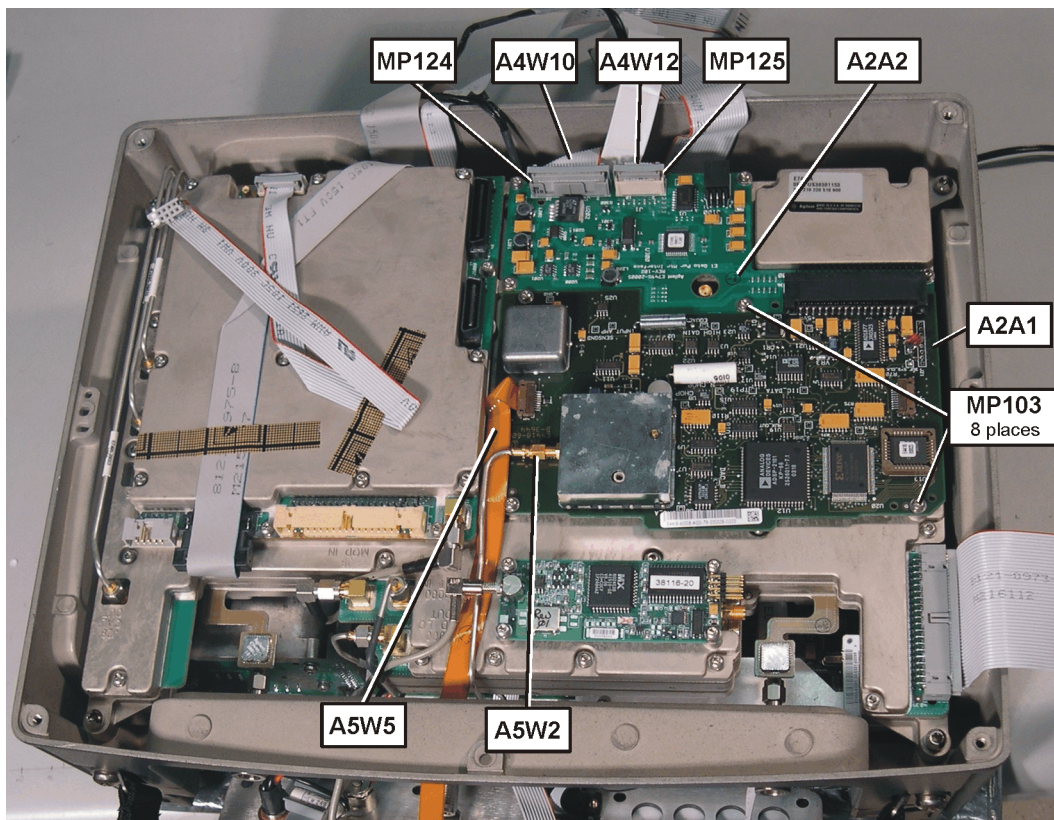


Figure 6-15 Remove Power Meter Sensor Cable A5W5



Remove and Replace Procedures

Figure 6-16 Power Meter Assembly



9. Refer to [Figure 6-16](#). Disconnect the cable clip MP124 and ribbon cable A4W10 from Power Meter Interface (PMI) A2A2.
10. Disconnect the cable clip MP125 and ribbon cable A4W12 from the PMI Figure N2.

NOTE

If you are not replacing the Power Meter or Power Meter Interface, skip [step 11](#) and [step 12](#) leaving the Power Meter Assembly attached to the RF Assembly.

11. Remove the (8) MP103 screws (T-8 M2.5x6) securing the Power Meter Assembly to the RFA and remove the assembly.
12. Disconnect the Power Meter A2A.

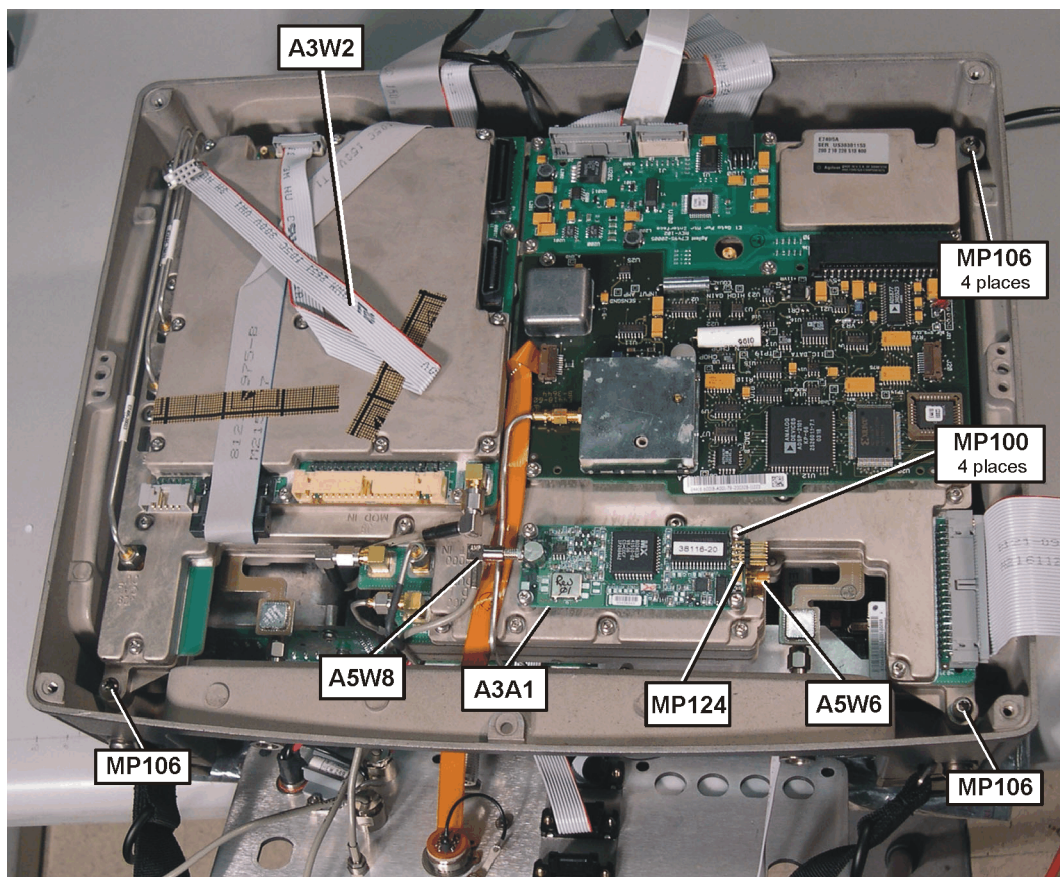
Removing the A3 RF Assembly From the Rear Case:

CAUTION

The Port 1 and 2 Type N connectors are attached directly to the PC board via extensions. These extensions are very easy to crack. Take extreme care not to bump, flex, or bend these connectors

13. Refer to [Figure 6-17](#). Disconnect the SMA Ext Ref cable A5W6 from the RFA using a 5/16 end wrench.
14. Remove the (4) MP106 screws (T-20 M4x20) securing the RFA.

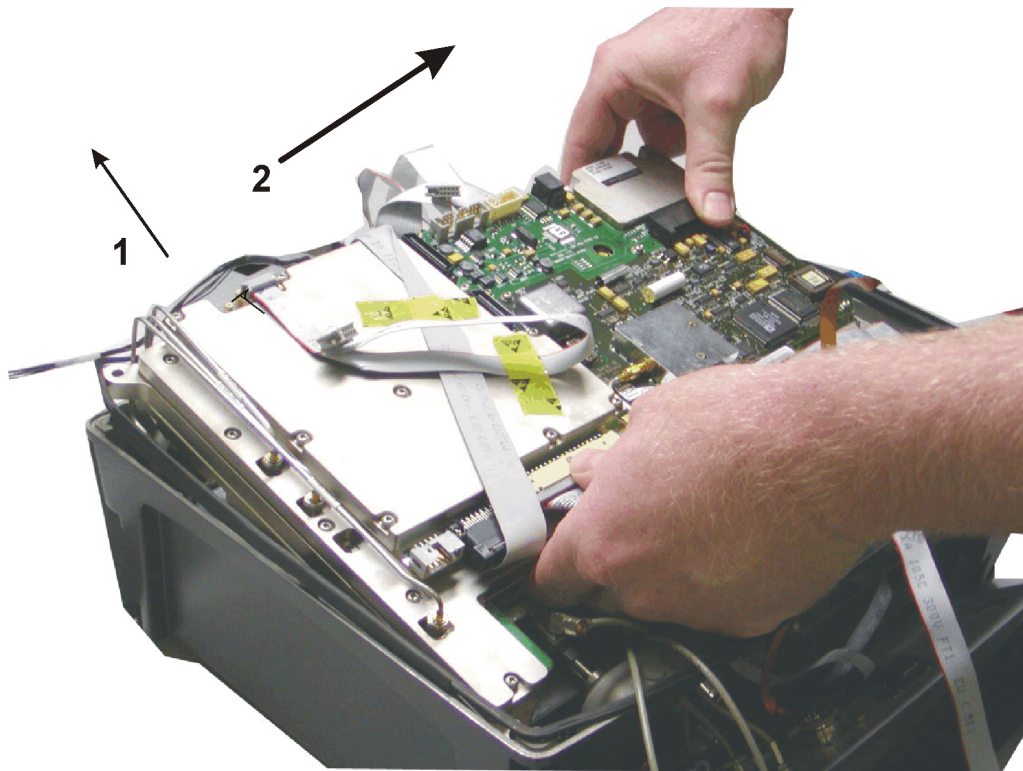
Figure 6-17 Remove RF Assembly Screws



15. Refer to [Figure 6-18](#). *WHILE CAREFULLY WATCHING THE TYPE N CONNECTORS*, raise the back edge of the RFA and slide the RFA away from the connector panel.

Remove and Replace Procedures

Figure 6-18 Removing the RF assembly.



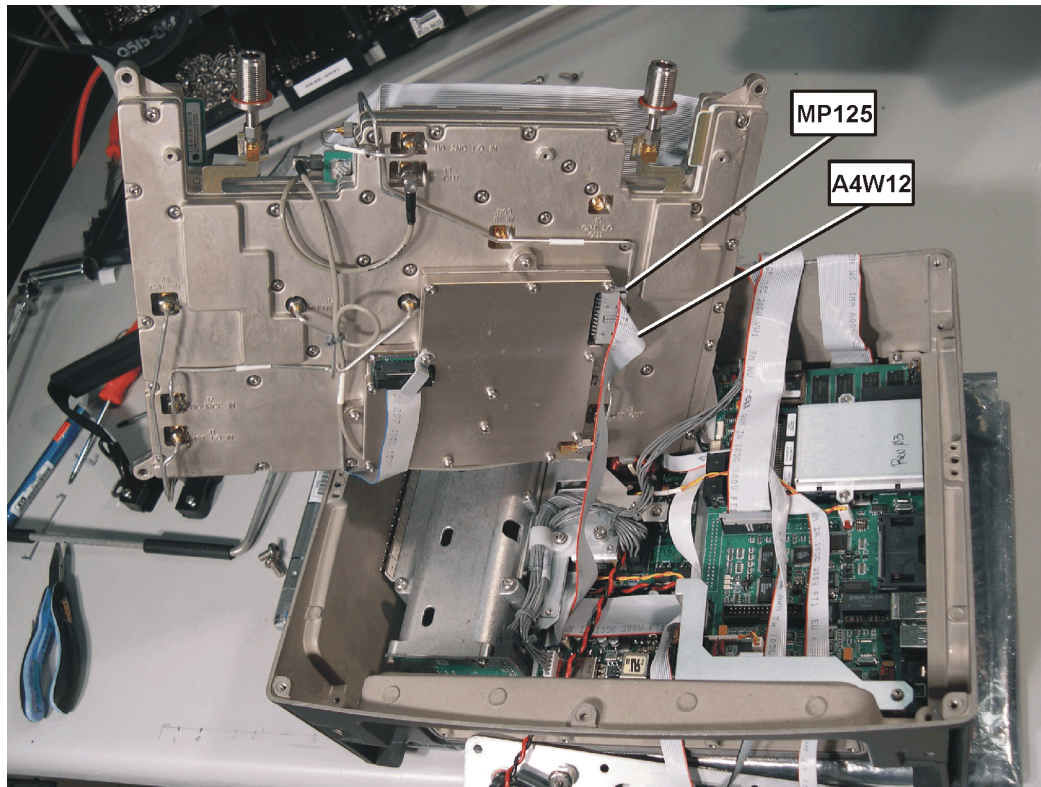
Remove and Replace Procedures

NOTE

If Option 510 is present, there is a cable attached to the back of the RFA that must be removed. If option 510 is present complete the following step:

-
16. (Option 510 only). Refer to [Figure 6-19](#). When the Type N connectors are clear, rotate the RFA clockwise and gently set the right edge of the RFA in the rear case and remove clip MP125 and ribbon cable A4W12.

Figure 6-19 Option 510 Cable



Remove and Replace Procedures

17. Remove the RFA from the rear case, flip the RFA on it's top prior to setting on your work surface.

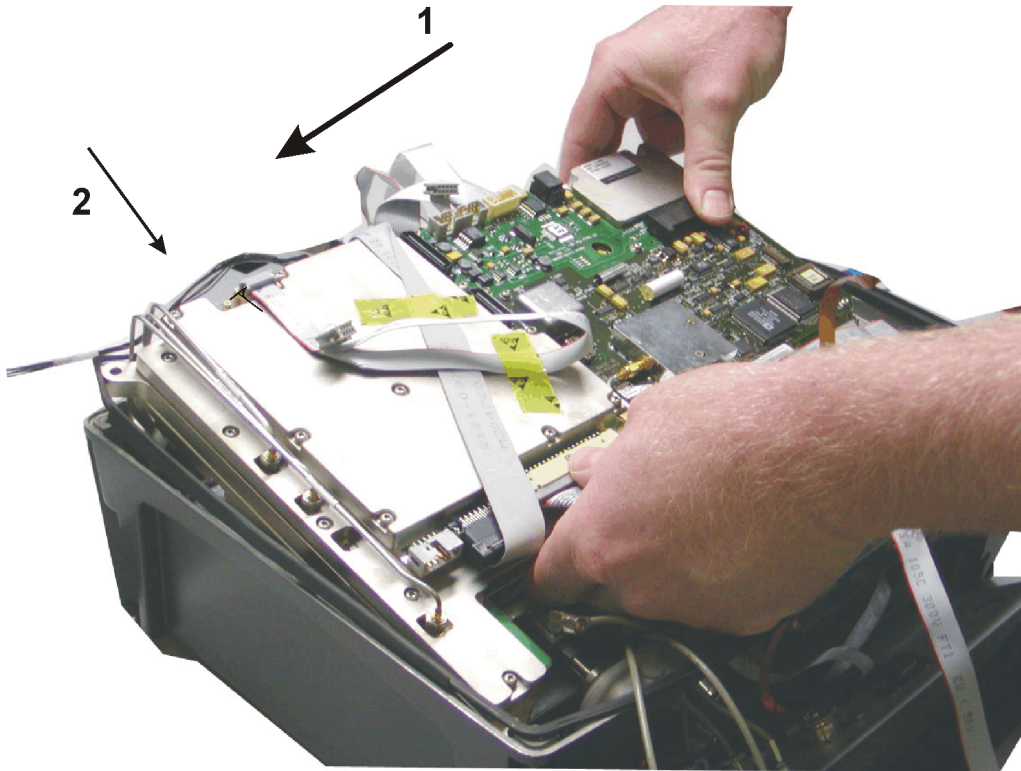
Installation of A3 RF Assembly (RFA)

CAUTION

The Port 1 and 2 Type N connectors are attached directly to the PC board via extensions. These extensions are very easy to crack. Take extreme care not to bump, flex, or bend these connectors

1. (If Option 510): Refer to [Figure 6-19](#). Gently set the right edge of the RFA in the rear case and connect ribbon cable A4W12 and MP125 clip.
2. Refer to [Figure 6-20](#). Lower the RFA into the rear case taking care not to damage the PC board extensions.

Figure 6-20 Installing the RF assembly.



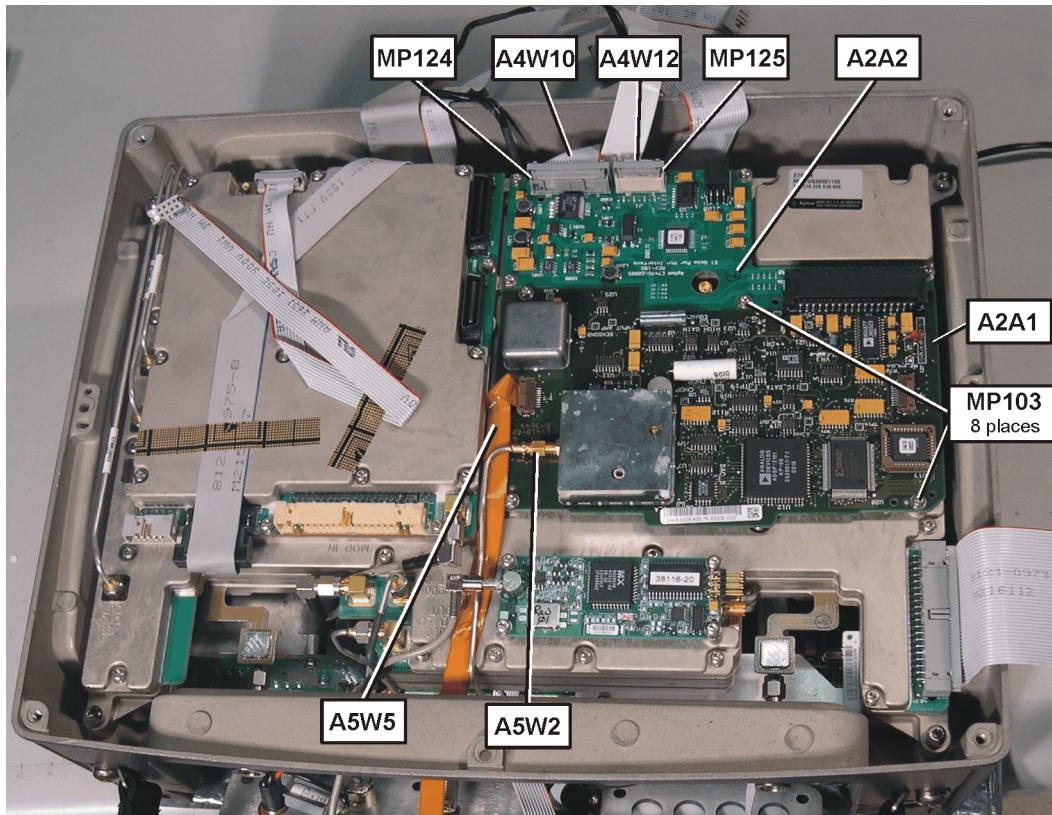
3. Temporarily secure the RFA with (4) MP106 screws (T-20 M4x20) in the following order, right rear, left rear, right front, left front.
4. If installing a new RF Assembly, disconnect cable clip MP126 and A3W1 ribbon cable from the RFA J700. Drape the cable over the side of the rear case in order to gain access to other connectors.

Install A2 Power Meter Assembly (Option 600 only)

If Option 600 is present complete the following steps.

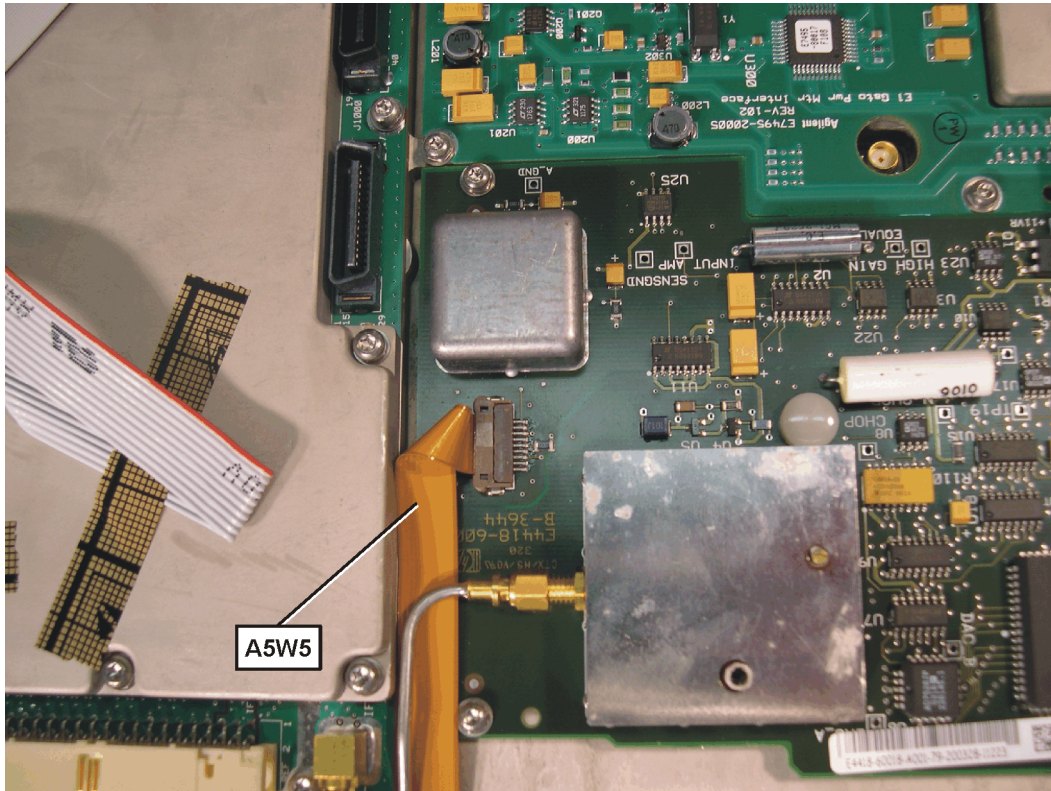
5. Refer to [Figure 6-21](#). Connect the A2A1 Power Meter board (PM) to the A2A2 PM Interface board (PMI).

Figure 6-21 Installing the A2 Power Meter Assembly



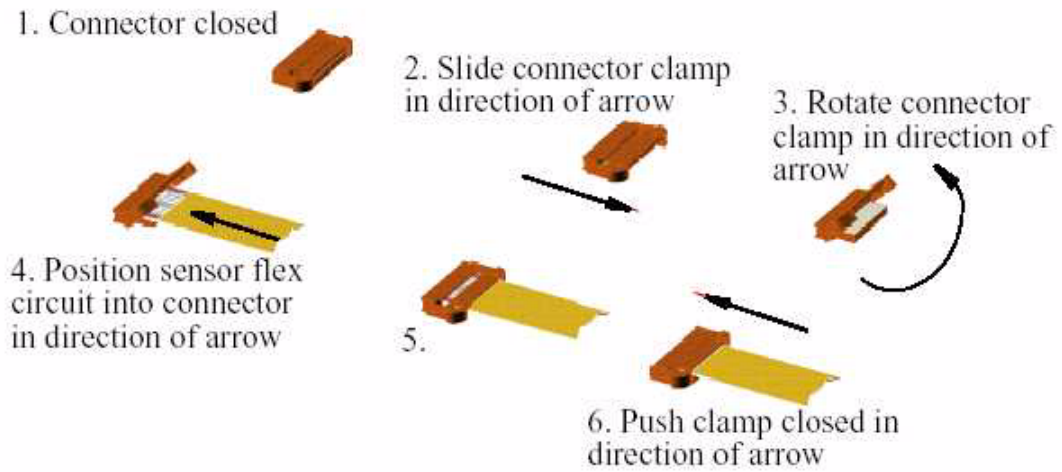
6. Loosely connect the semi-rigid Power Ref cable A5W2 to the PM A2A1.
7. Install the PM/PMI assembly onto the RFA. Secure with (8) MP103 screws (T-8 M2.5x6). Torque to 6 in-lbs.
8. Using a 6mm wrench, torque the Power Ref semi-rigid cable A5W2 to 4 in-lbs.
9. Connect ribbon cable A4W10 and clip MP124 to the PMI.
10. Connect ribbon cable A4W12 and clip MP125 to the PMI.
11. Refer to [Figure 6-22](#). Connect the flat Power Sensor cable A5W5 to the PMI.

Figure 6-22 Power Meter Sensor Cable



Remove and Replace Procedures

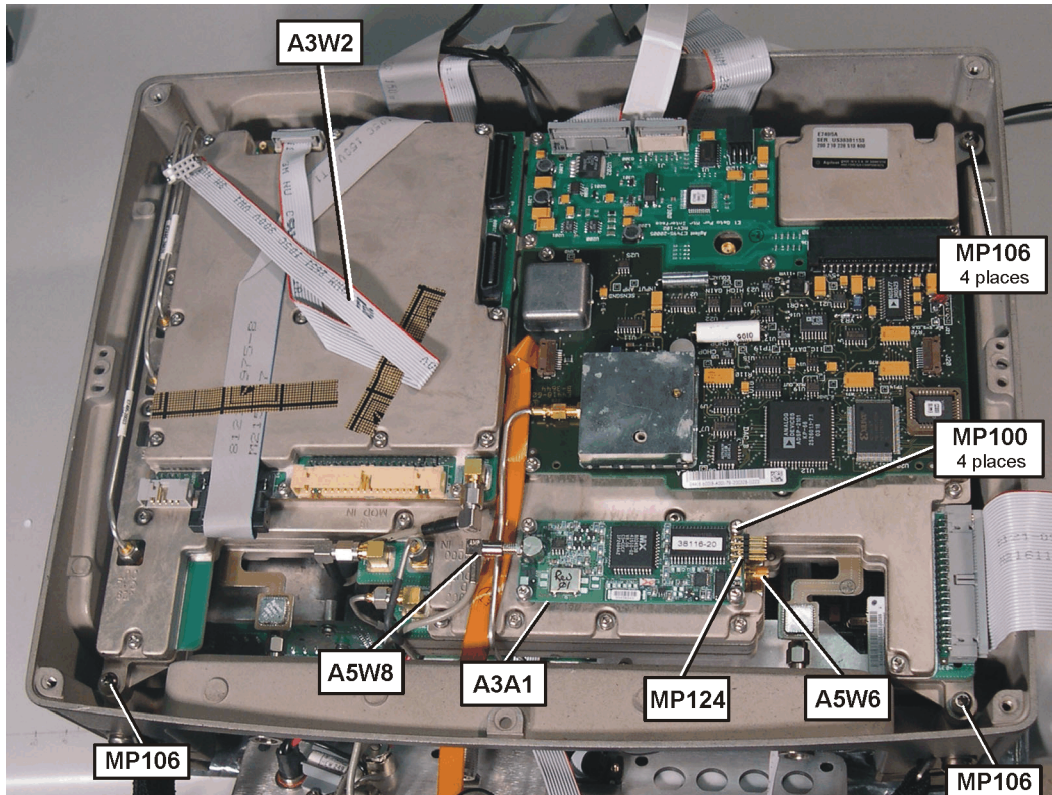
Figure 6-23 Power Meter Sensor Connection



Install A3 Cable

12. Refer to [Figure 6-24](#). Connect Ext Ref SMA cable A5W6 to RFA, torque to 10 in-lbs with a 5/16 wrench.

Figure 6-24 GPS Assembly Installation

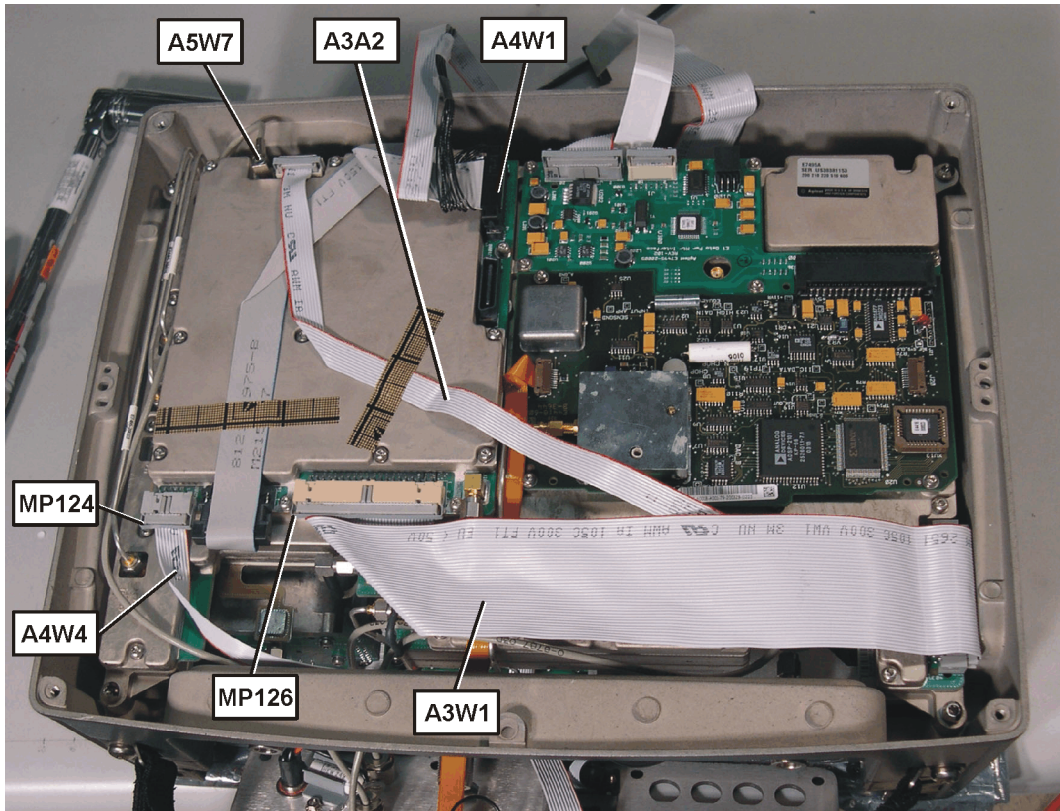


Install A3A1 GPS Assembly

13. Install the A3A1 GPS board onto the RFA. Secure with (4) MP100 screws (T-10 M3x6). Torque to 9 in-lbs.
14. Connect SMB GPS Ant cable A5W8 to GPS.
15. Connect ribbon cable A3W2 and clip MP124 to GPS board.

Continue with RFA Cabling and Installation

Figure 6-25 RF Assembly Cables



16. Refer to [Figure 6-25](#). Connect SMB Even Sec Sync cable A5W7 to RFA.
17. Connect ribbon cable A4W1 to RFA.
18. Connect ribbon cable A4W4 and clip MP124 to RFA.
19. Connect ribbon cable A3W1 and clip MP126 to RFA.

Installing the A5 Connector Panel

CAUTION

The Port 1 and 2 Type N connectors are attached directly to the PC board via extensions. These extensions are very easy to crack. Take extreme care not to bump, flex, or bend these connectors.

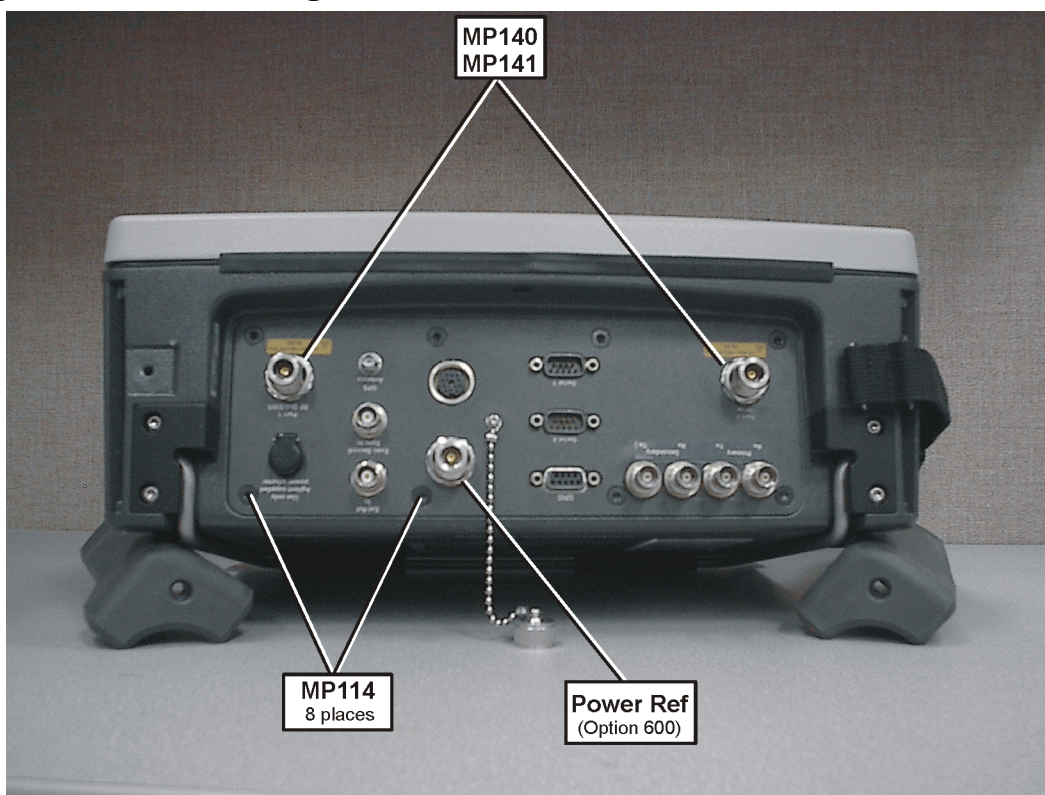
Prior to installing the connector panel, ensure the O-rings are present on the Type-N connectors.

20. Refer to [Figure 6-26](#). Slide the connector panel over the Type N connectors being careful not to damage the PC extensions or pinch any cables.

CAUTION

If Option 600 is present make sure the Power Sensor connector pins on the connector panel do not short out against the Power Ref. semi-rigid cable A5W2.

Figure 6-26 Installing the Connector Panel



21. Secure the connector panel with (8) MP114 (T-20 M4x8) screws, torque to 21 in-lbs.
22. Loosen the (4) MP106 (T-20 M4x20) screws securing the RFA to the rear case.
23. Install washers MP140 and nuts MP141 on Type N connectors. Finger tighten the nuts.

NOTE

While tightening the nuts on the Type N connectors maintain a clockwise only rotation with the torque wrench. If the torque wrench must be rotated counter-clockwise, remove the wrench from the connector first.

24. Torque the MP141 nuts to 40 in-lbs.

NOTE

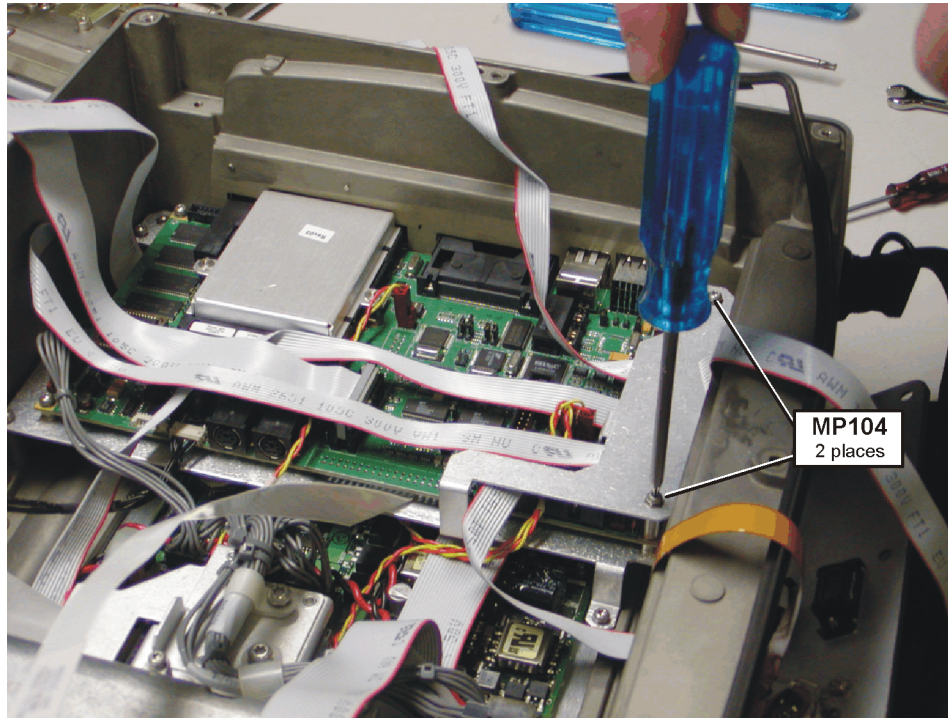
The MP106 RFA screws must be tightened in the following sequence: right rear, left rear, right front, left front.

25. Torque the (4) MP106 screws to 21 in-lbs to secure the RFA to the rear case in the following sequence: RR, LR, RF, LF.

A4A1 Controller Board

1. Refer to [Figure 6-27](#). Remove the (2) MP104 (T-10 M3x22) screws securing the CPU connector-retaining bracket and remove the bracket.

Figure 6-27 Remove the connector retaining bracket.

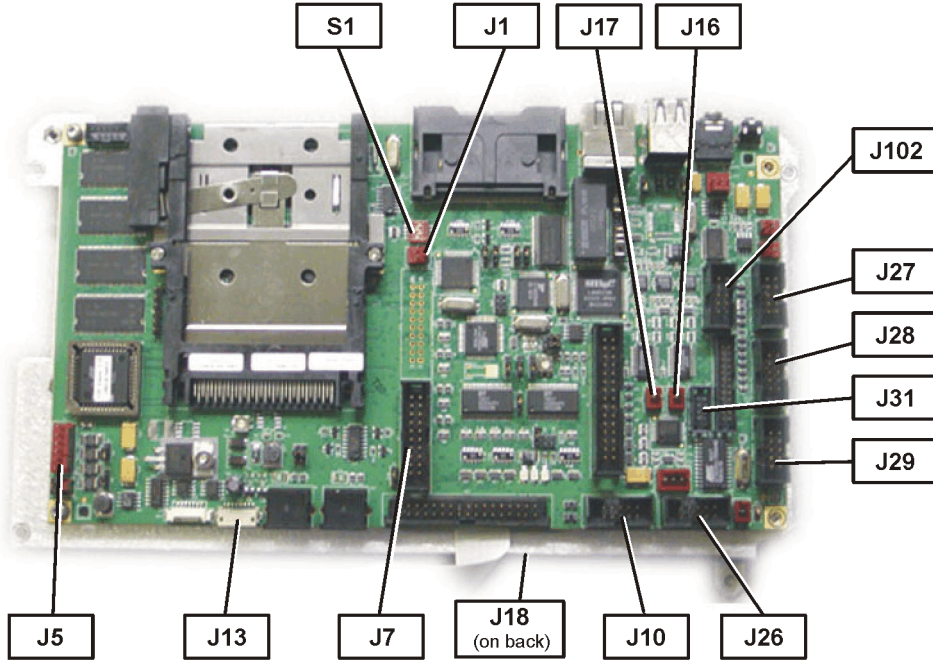


2. Disconnect the ribbon and discrete wire cables using [Figure 6-28](#) and [Figure 6-29](#) for reference.

NOTE

If you are not replacing the controller board and just removing it to gain access to other boards you do not need to remove the cables from the CPU board.

Figure 6-28 A4A1 controller board



Remove and Replace Procedures

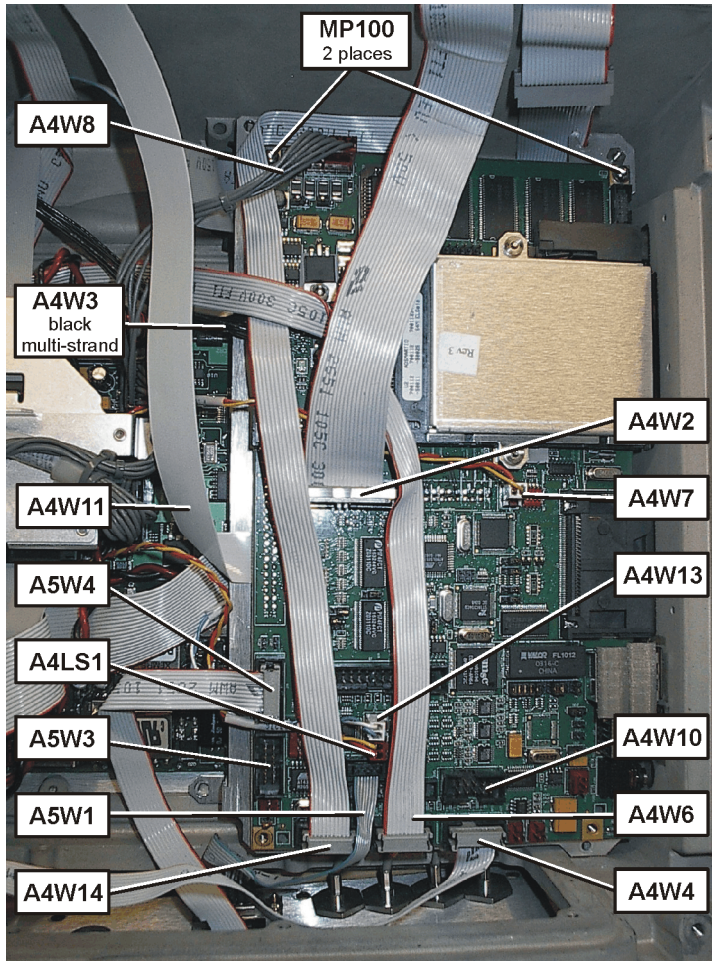
Connector	Cable
J1	A4W7
J5	A4W8
J7	A4W2
J10	A5W4
J13	A4W3
J16	A4LS1
J17	A4W13
J18	A4W11
J26	A5W3
J27	A4W4
J28	A4W6
J29	A4W14
J31	A5W1
J102	A4W10

- a. Remove discrete cable A4W8 from J5
- b. Remove ribbon cable A4W4 from J27
- c. Remove discrete cable A4W3 from J13
- d. Remove clip MP125 and ribbon cable A4W2 from J7
- e. Remove discrete cable A4LS1 from J16
- f. Remove discrete cable A4W7 from J1
- g. Remove ribbon cable A4W6 from J28
- h. Remove ribbon cable A4W10 from J102 (Opt 600 only)
- i. Remove ribbon cable A4W14 from J29 (Opt 700 & 710 only)
- j. Remove discrete cable A4W13 from J17 (Opt 700 & 710 only)
- k. Remove GPIO ribbon cable A5W1 from J31
- l. Remove Serial 2 ribbon cable A5W4 from J10
- m. Remove Serial 1 ribbon cable A5W3 from J26

NOTE

Depending on the age of the Test Set, the Serial 1 ribbon cable A5W3 may not be present or may be clipped.

Figure 6-29 Controller Cables



3. Remove the (2) MP100 (T-10 M3x6) screws securing the CPU to the mounting deck.
4. Lift the edge of the A4A1 CPU board and pull away from the case to remove the board.
5. On the backside of the CPU board remove the display ribbon cable A4W11 from J18.

Reinstallation Instructions:

Reverse the above steps and torque the MP100, and MP104 screws to 9 in-lbs.

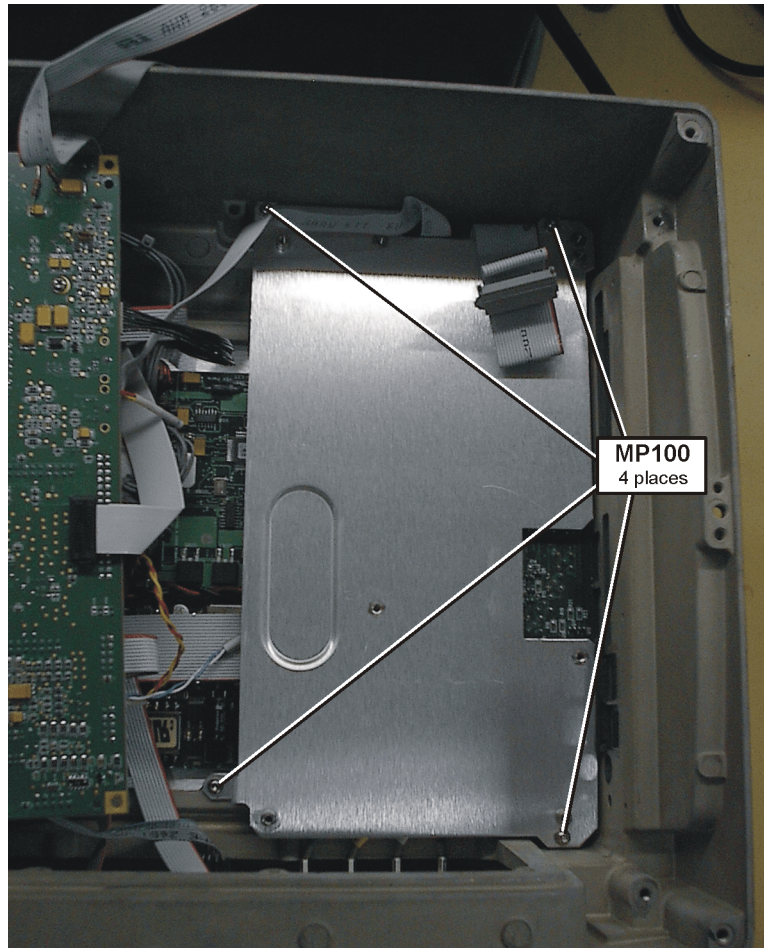
Remove and Replace Procedures

A4A2 T1 or E1 Assembly

Removal and installation of the T1 and E1 assemblies are virtually identical. If removing the E1 board, there is an additional step to remove the E1 TX/RX cables from the connector panel.

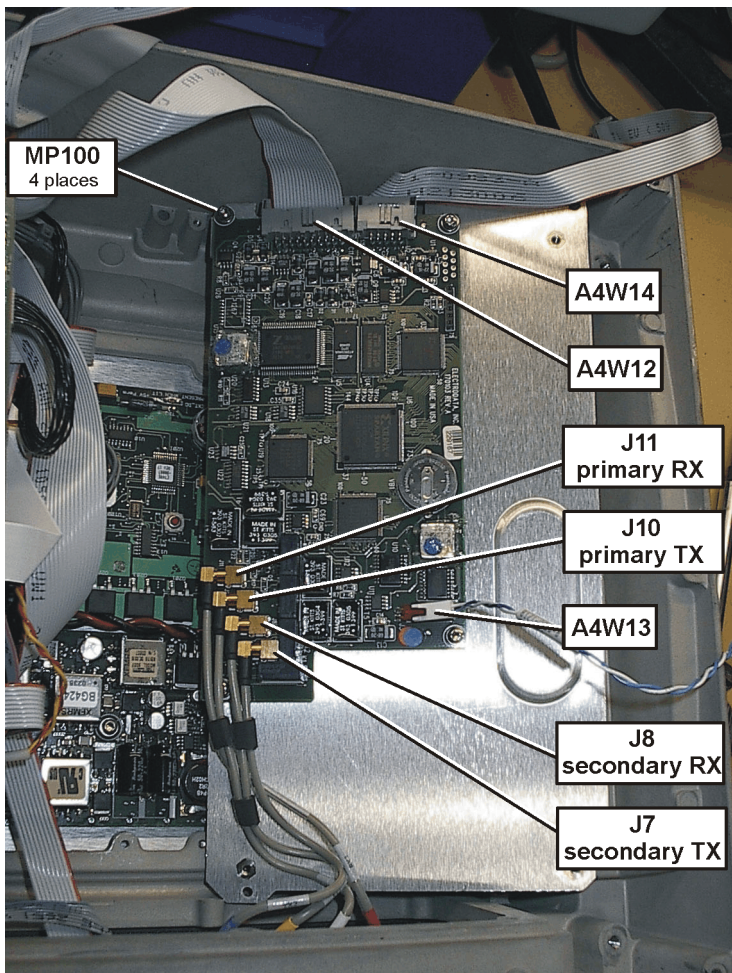
Figure 6-30

A4A2 T1 or E1 Assembly Removal



1. Refer to [Figure 6-30](#). Remove the (4) MP100 (T-10 M3x6) screws securing the CPU mounting deck.

Figure 6-31 A4A2 T1 or E1 Cables



2. Turn the CPU mounting deck over to reveal the T1 or E1 board and remove the following cables. Refer to [Figure 6-31](#).

NOTE

If you are not replacing the E1/T1 board but just removing it to gain access to other boards, you do not need to remove the cables from the board.

- a. Remove discrete cable A4W13 from J3.
- b. Remove Clip MP125 and ribbon cable A4W12 from J1.
- c. Remove Clip MP124 and ribbon cable A4W14 from J2.

3. *E1 Assembly only*: Remove the 4 SMB connectors from the cable assembly (A4W17) from the A4A2 E1 board.
 - a. Remove the Secondary TX SMB cable from J7.
 - b. Remove the Secondary RX SMB cable from J8.
 - c. Remove the Primary TX SMB cable from J10.
 - d. Remove the Primary RX SMB cable from J11.
4. Remove the (4) MP100 (T-10 M3x6) screws securing the T1/E1 board to the mounting deck.
5. Lift out the A4A2 T1/E1 board from the Test Set.

Reinstallation Instructions:

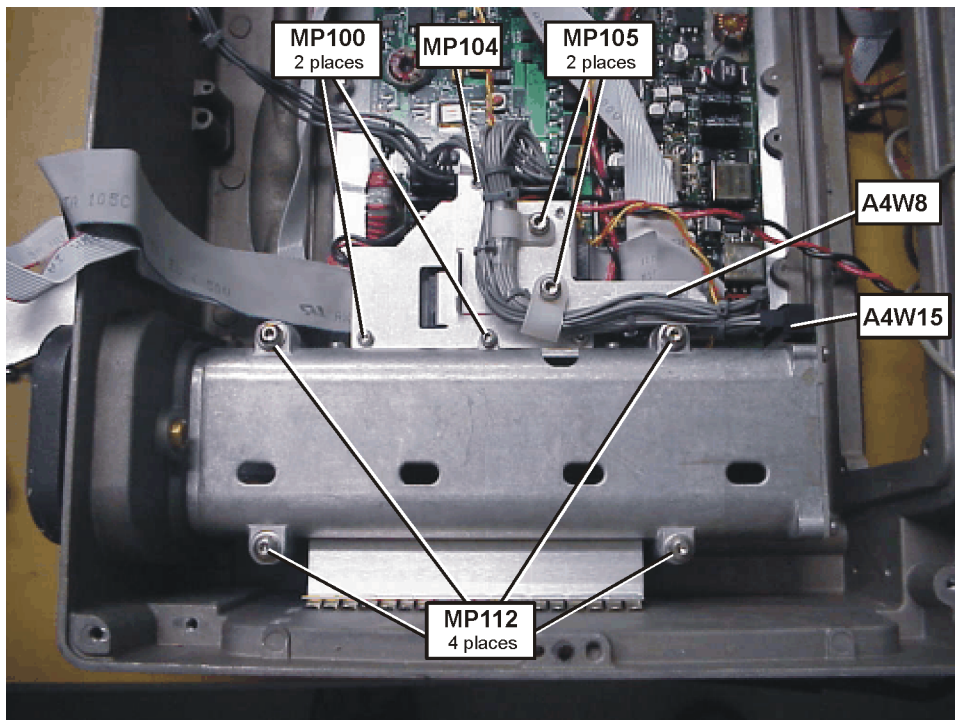
Reverse the above steps and torque the MP100 screws to 9 in-lbs.

A4A5 Battery Controller and Housing

Remove the PS Connector Cover and DC Distribution Harness

1. Refer to [Figure 6-32](#). Unplug the wire harness A4W15 from the Power Supply Interface (PSI) A4A4J53 and Battery board A4A5J53.

Figure 6-32 Wire Harness and Battery Housing Removal



2. Unplug the wire harness A4W8 from the PSI A4A4J5 and Power Supply (PS) A4A3Conn2.
3. Remove the (2) MP100 (T-10 M3x6) screws securing the PS connector cover.
4. Remove the (1) MP104 (T-10 M3x22) screw securing the PS connector cover.
5. Remove the PS connector cover with the A4W15 and A4W8 wire harnesses attached.

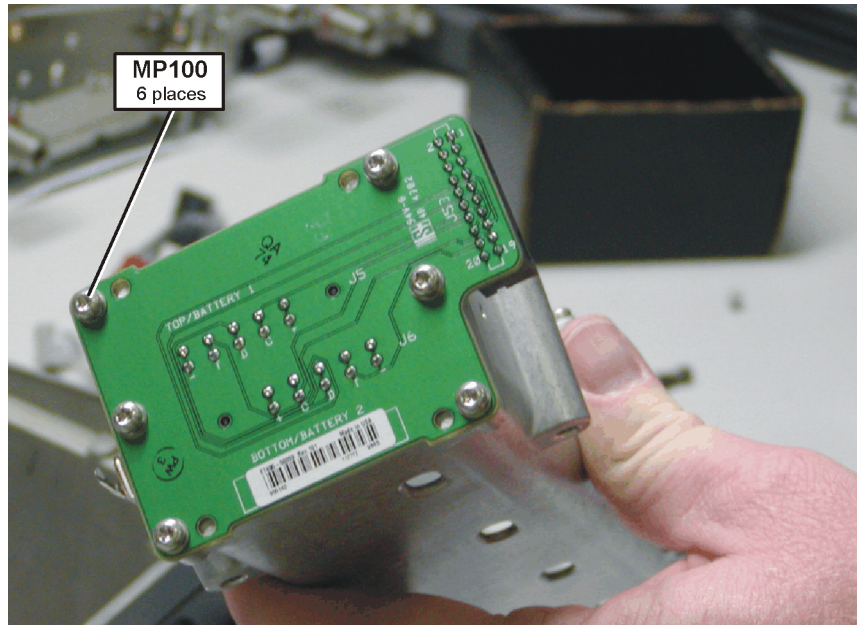
Remove the Battery Housing

6. Remove the (4) MP112 (T-20 M4x50) screws securing the battery housing.
7. Slide the battery housing away from the battery door and lift out of the case.

Remove the Battery Controller Board

8. Refer to [Figure 6-33](#). Remove the (6) MP100 (T-10 M3x6) screws securing the battery board to the housing.

Figure 6-33 Battery Controller Board Removal



9. Remove the battery board from the housing.

Reinstallation Instructions:

CAUTION

Do not pinch the speaker cable when installing the battery housing

Reverse the above steps and torque the screws to the value listed:

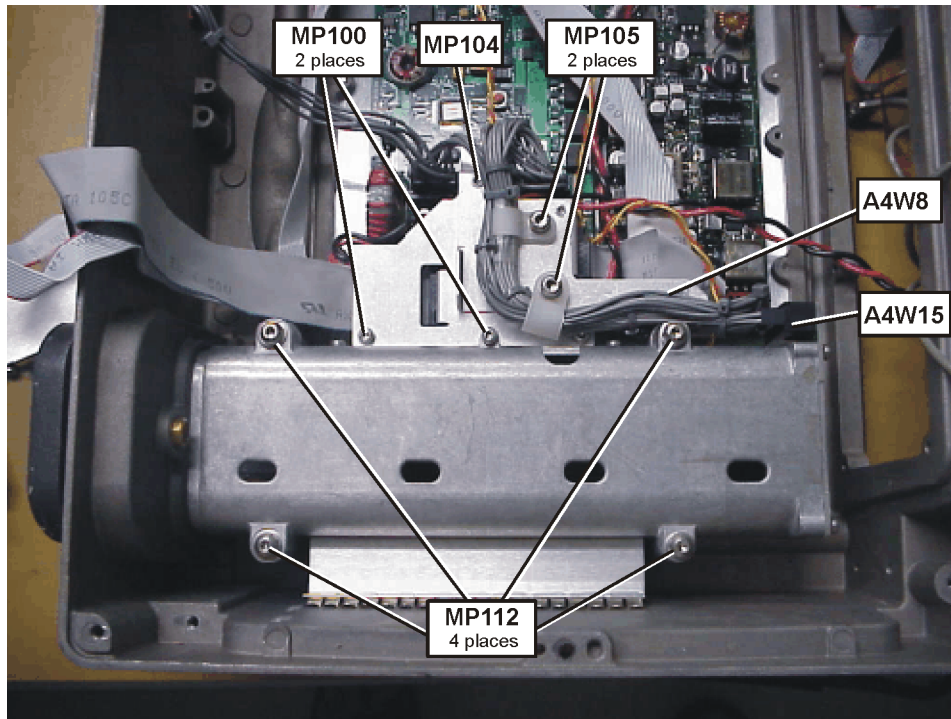
MP100	9 in-lbs
MP104	9 in-lbs
MP112	21 in-lbs
MP105	21 in-lbs

A4A3 Power Supply and A4A4 Power Supply Interface Boards

Remove the Power Supply Connector Cover and DC Distribution Harness

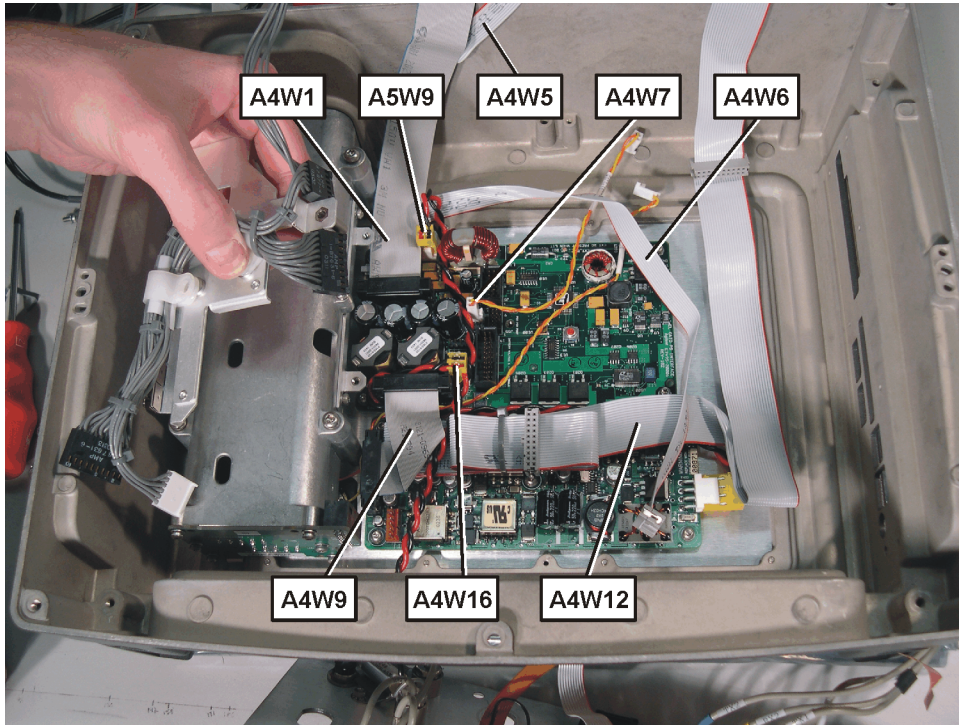
1. Refer to [Figure 6-34](#). Unplug the wire harness A4W15 from the Power Supply Interface (PSI) A4A4J53 and Battery board A4A5J53.

Figure 6-34 PS Connector Cover and DC Distribution Harness Removal



2. Unplug the wire harness A4W8 from the PSI A4A4J5 and Power Supply (PS) A4A3Conn2.
3. Remove the (2) MP100 (T-10 M3x6) screws securing the PS connector cover.
4. Remove the (1) MP104 (T-10 M3x22) screw securing the PS connector cover.
5. Remove the PS connector cover with the A4W15 and A4W8 wire harnesses attached.
6. If the wire harnesses need to be replaced remove the (2) MP105 (T-20 M4x8) screws securing cable clamps to the PS connector cover.

Figure 6-35 PS Connector Cover and DC Distribution Harness Removal



Remove and Replace Procedures

Remove the Cabling from the Power Supply Interface Board

Refer to [Figure 6-36](#) and [Figure 6-37](#) for the following steps.

Figure 6-36 Power supply interface board A4A4

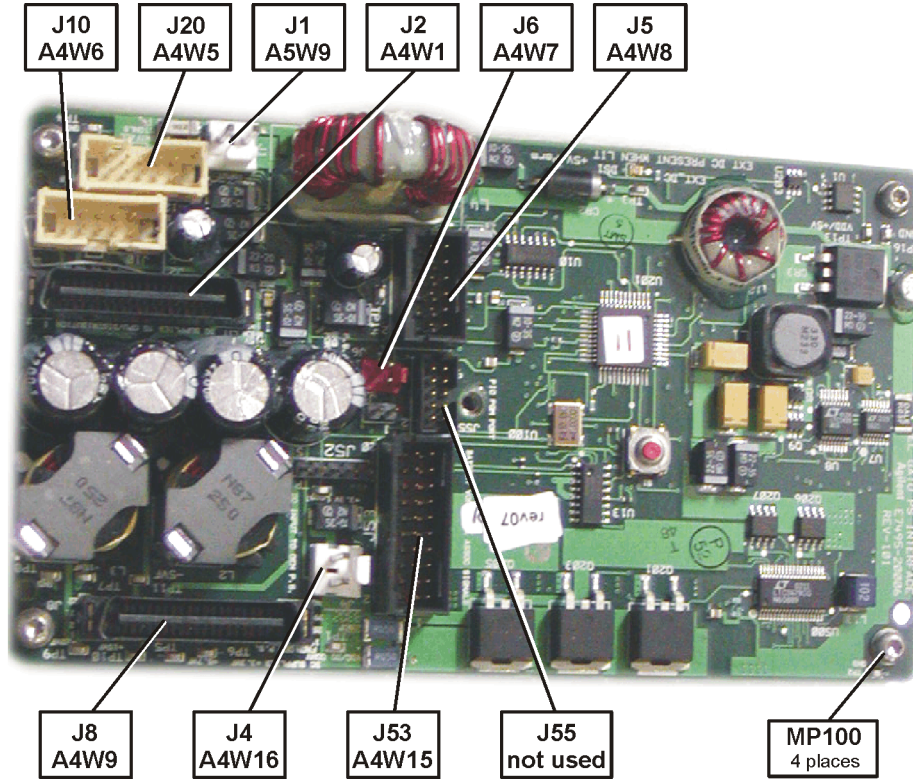
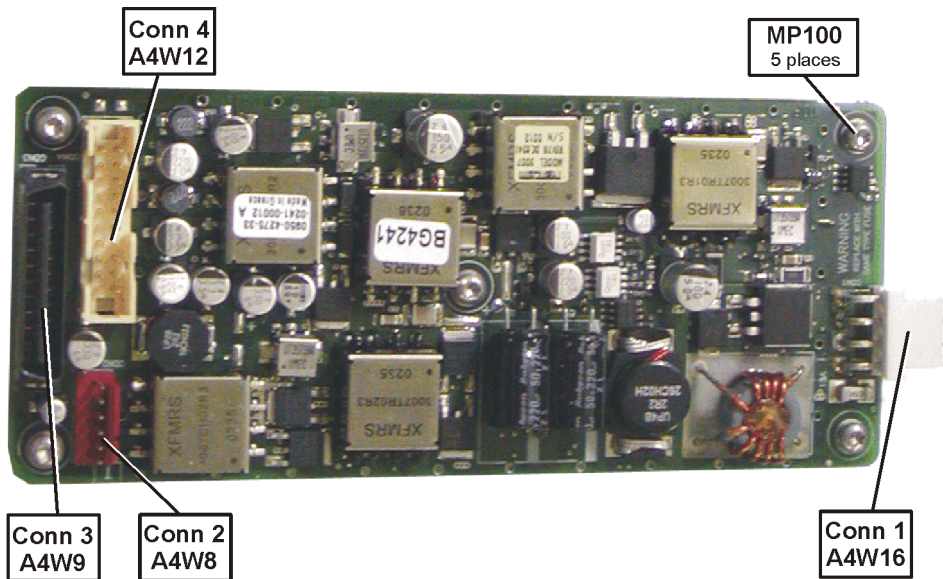


Figure 6-37 Power supply board A4A3



Remove and Replace Procedures

7. Remove ribbon cable A4W9 from PSIJ8 and PSConn3.
8. Remove 2-wire cable A4W7 from PSIJ6.
9. Remove clip MP125 and ribbon cable A4W12 from PSConn4 (only if options 600,700 or 710 are present).
10. Remove ribbon cable A4W1 from PSIJ2.
11. Remove clip MP124 and ribbon cable A4W6 from PSIJ10.
12. Remove clip MP124 and ribbon cable A4W5 from PSIJ20.
13. Remove 2-wire cable A4W16 from PSIJ4 and PSConn1.
14. Remove DC Input 2-wire cable A5W9 from PSIJ1.
15. Remove the (5) MP100 (T-10 M3x6) screws securing the A4A3 PS board and remove the board.
16. Remove the (4) MP100 (T-10 M3x6) screws securing the A4A4 PSI board and remove the board.

Reinstallation Instructions:

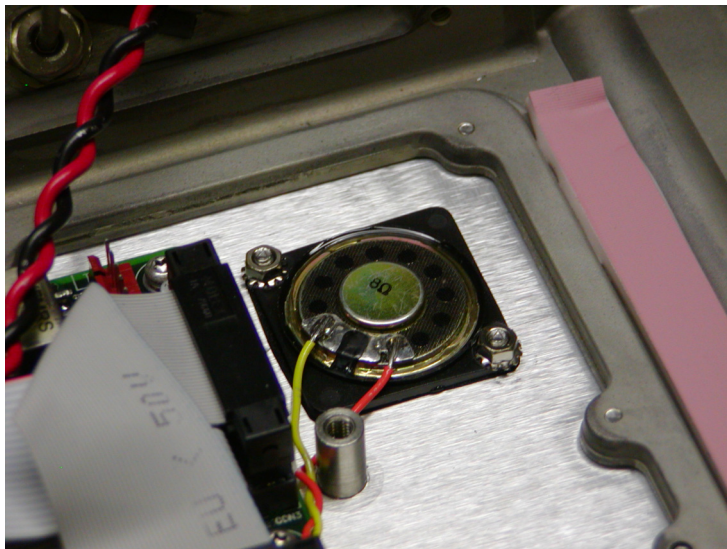
Reverse the above steps and torque the screws to the value listed:

MP100	9 in-lbs
MP104	9 in-lbs
MP105	21 in-lbs

Speaker

1. Remove the battery housing. Refer to the procedure on [page 138](#).
2. Refer to [Figure 6-38](#). Remove the two MP123 nuts using a 5.5MM socket.

Figure 6-38 Speaker Removal



3. Remove the A4LS1 Speaker taking care to leave the gasket with the rear case.

Reinstallation Instructions:

CAUTION

Do not pinch the speaker cable when installing the battery housing

Reverse the above steps and torque the screws to the value listed:

MP123 6 in-lbs

A1 Front Panel

A1A3 Display

1. Refer to [Figure 6-39](#) and [Figure 6-40](#). Remove the (11) MP100 (T-10 M3x6) screws securing the display cover.

Figure 6-39 Display Removal

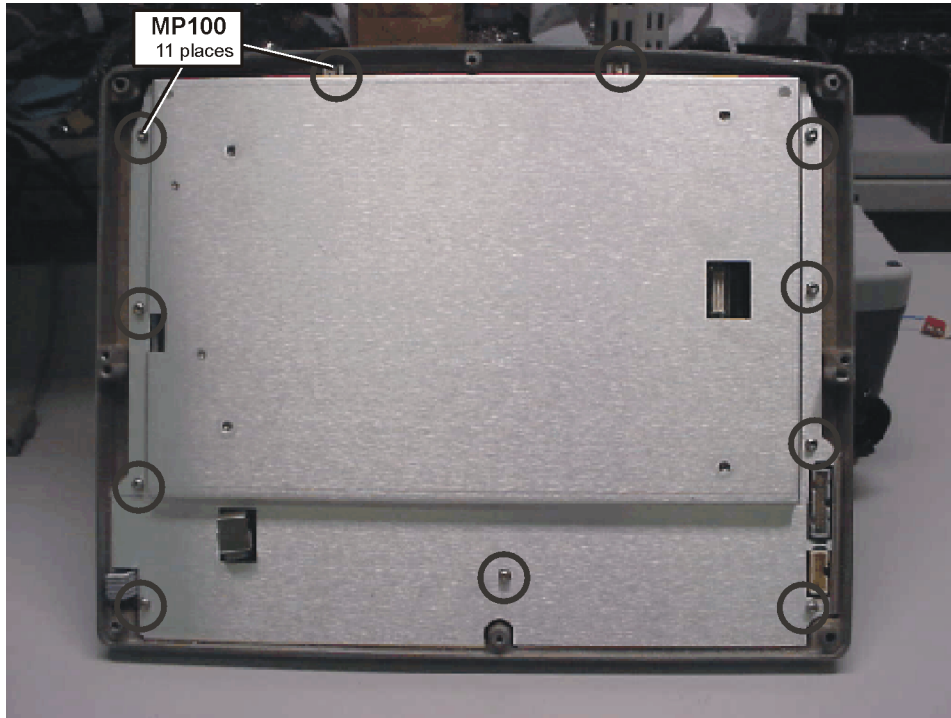
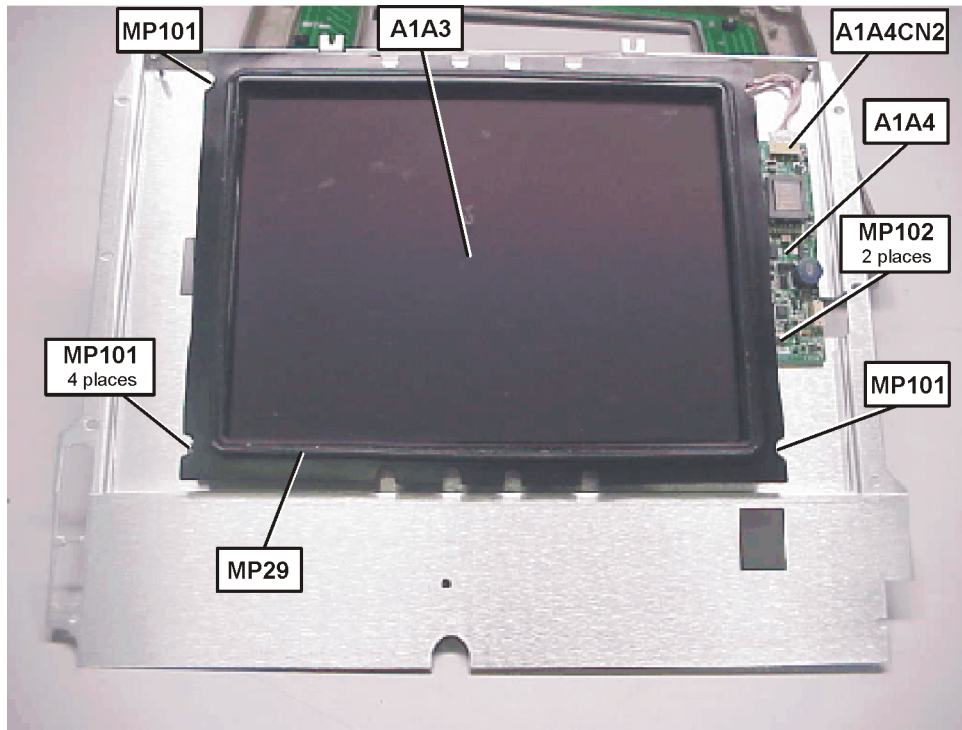


Figure 6-40 Display Gasket and A1A4 Inverter Board



2. Remove the display cover and MP29 Display Gasket.
3. Disconnect the Backlight A1A3A1 cable from the Display Inverter A1A4CN2.
4. Remove the (4) MP101 (T-10 M3x8) screws from each corner of the Display A1A3.
5. Remove the display from the display cover.

Reinstallation Instructions:

Reverse the above steps while insuring the 4 MP31 standoffs are positioned between the display and the display cover for the MP101 screws. Torque the screws to the value listed:

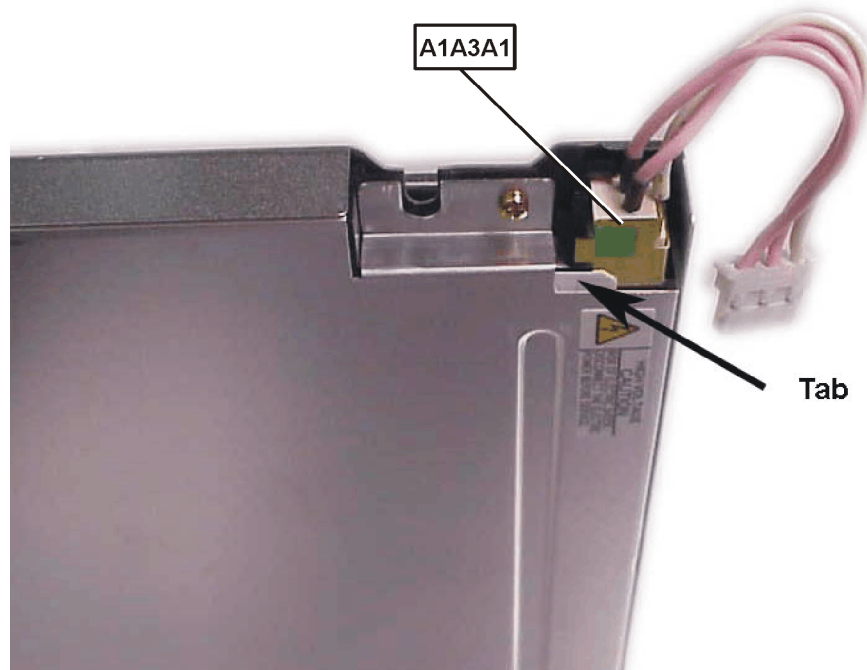
MP100	9 in-lbs
MP101	9 in-lbs

A1A3A1 Backlight

To remove the backlight you must first remove the display, follow the steps in the Disassemble the A1 Front Panel Assembly procedure.

6. Refer to [Figure 6-41](#). Press the tab to remove the A1A3A1 Backlight from the top of the Display.

Figure 6-41 A1A3A1 Backlight Removal



A1A4 Display Inverter

To remove the display inverter you must first remove the display, follow the steps in the Disassemble the A1 Front Panel Assembly procedure.

7. Refer to [Figure 6-40](#). Remove the (2) MP102 (T-8 M2.5x0.45) screws securing the display inverter.
8. Remove the A1A4 Display Inverter from the display cover.

Reinstallation Instructions:

Reverse the above steps and torque the screws to the value listed:

MP102 6 in-lbs

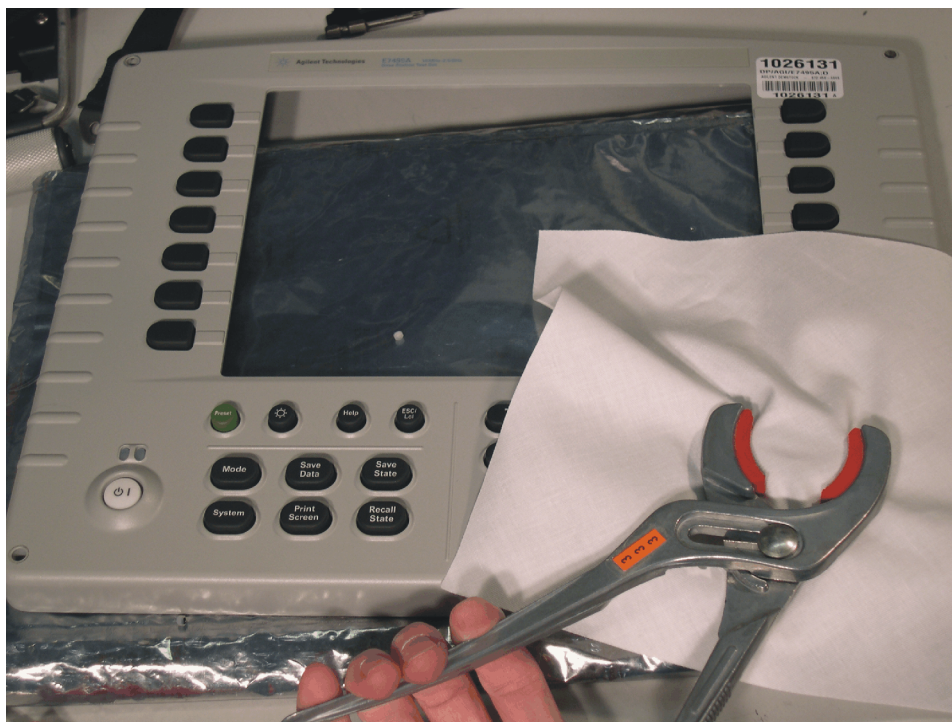
A1A1 Keypad Board

9. Remove the display. Refer to the procedure on [page 145](#).
10. Remove the RPG Knob MP21 by gripping it with pliers and pulling hard.

NOTE

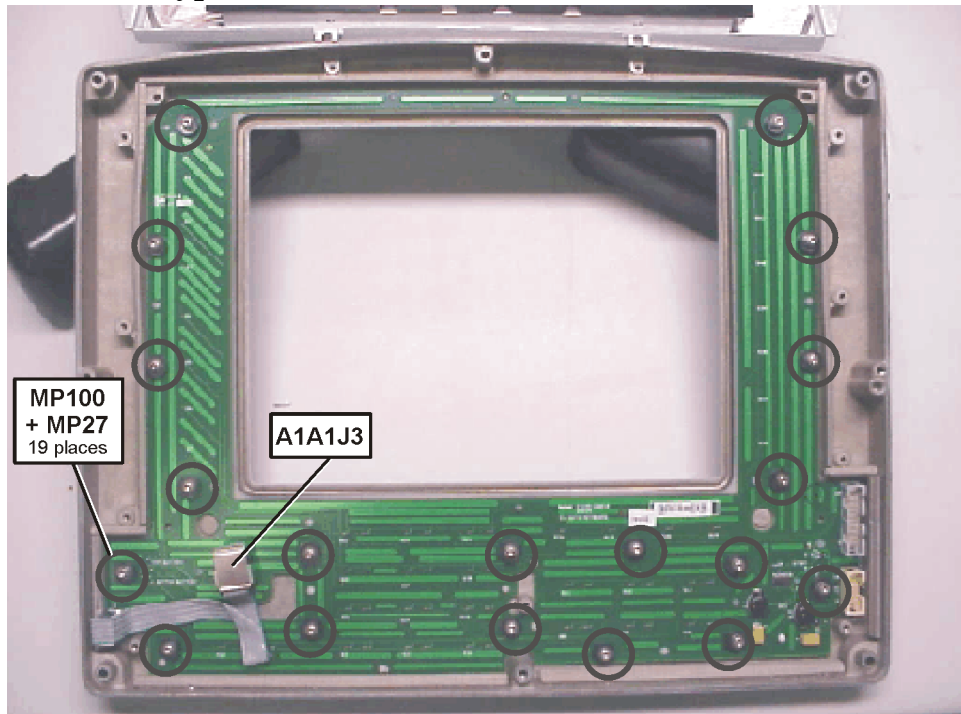
Refer to [Figure 6-42](#). Use a soft cloth on the RPG so as not to damage the knob. The RPG knob can also be removed by prying up front panel board after the screws are removed (keeps you from scarring the RGB knob. Skip [step 10](#) for this method and perform [step 13](#).

Figure 6-42 RPG Knob Removal



11. Refer to [Figure 6-43](#). Remove the (19) MP100 (T-10 M3x6) screws securing the Keypad board A1A1 to the Front Case MP1.

Figure 6-43 Keypad Board Removal



12. Remove the (19) MP27 Spacers from the front case bosses.
13. Use a screwdriver to gently pry the A1A1 Keypad board loose from the front panel around the RPG knob until the knob is loose.
14. From the front side of the display assembly, push out the keypad assembly.

MP26 Lower Keypad

15. Remove the MP26 Lower Keypad from the A1A1 Keypad board by pushing the (13) alignment nubs on the lower keypad through the board.

MP25 Display Keypad

16. Remove the MP25 Display Keypad from the A1A1 Keypad board by pushing the (9) alignment nubs on the keypad through the board.

Reinstallation Instructions

Reverse the above steps and torque the screws to the proper value.

- When installing the MP 27 Spacers, place them on the front case bosses flat side up.
- When installing the keypads use a T10 hand driver to push the keypad nubs through the holes in the keypad board.

MP100 6 in-lbs

A1A2 RPG

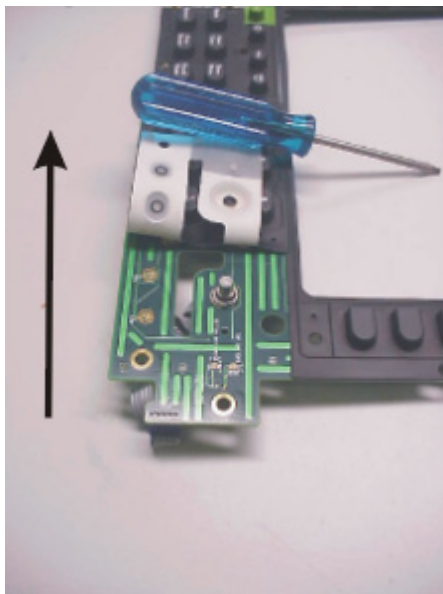
Removal

NOTE

To remove the RPG you must first remove the Front Panel, Display, Keypad board, and Lower Keypad. Refer to the procedures for Front Panel ([page 145](#)), Display ([page 145](#)), Keypad board ([page 148](#)), and Lower Keypad ([page 149](#)).

1. Refer to [Figure 6-43](#). Remove the RPG A1A2 cable from the Keypad board A1A1J3.
2. Refer to [Figure 6-44](#). Remove the 7/16" Nut from the RPG.

Figure 6-44 Remove the 7/16" nut.



3. Remove the washer from the RPG shaft and remove the RPG from the Keypad board.
4. Remove the RPG spacer MP27 from the RPG.

Replacement

1. Remove the nut and washer from the RPG.
2. Place the RPG spacer MP27 on the RPG.
3. Install the RPG into the keypad board and install the washer and 7/16" Nut on the RPG.
4. Torque the RPG nut to 21 in-lbs.
5. Connect the RPG A1A2 cable to the A1A1J3 Keypad board.

Functional Tests, Adjustments, and Utilities

What you'll find in this chapter.

Functional Tests

- “Verify GPS” on page 161
- “DC Bias” on page 163
- “Even Second Sync Input” on page 165
- “Internal and External Reference” on page 167
- “T1 Functional Test (Option 700 only)” on page 169
- “E1 Functional Test (Option 710 only)” on page 171

Adjustments

- “Reference Alignment Test” on page 173
- “Power Meter Reference Oscillator Level Adjustment (Option 600 only)” on page 175
- “Power Meter Reference Oscillator Frequency Adjustment (Option 600 only)” on page 178

Utilities

- “Read-Write Model Number/Serial Number/Options” on page 180
- “Validate DSP RAM” on page 182
- “Serial Port Verification” on page 183
- “Clear Return Loss Default Cal” on page 184

Before You Begin Testing — Get Customer Information

The following procedures should be performed before you start the testing and after you complete the tests.

Recording a customer's static IP address before you begin testing

In this procedure, you record the customer's network configuration information (if it has been previously defined by the customer). To protect the customer's work, perform this procedure before you do any other tests and **before** you connect the instrument to the LAN. It should be the **first procedure you perform** and it is done manually.

Test procedure

1. Turn the E7495A/B power switch ON by holding the button in for >1/2 second.
2. When the boot sequence is complete, press the **System** button, then press the [Controls] [IP Admin] softkeys.
3. If the [DHCP] key indicates **On**, an IP address has not been assigned by the customer. Follow the steps in [“Configure the E7495A/B for a DHCP or Static IP Address” on page 153.](#)

Or

If the [DHCP] key indicates **Off**, an IP address has been assigned by the customer (shown on the IP Address button). Record the following values displayed on the E7495A/B softkeys onto paper:

- Record the IP address displayed on the [IP Address] key, for example: 123.456.789.123
- Record the Net Mask address displayed on the [Net Mask] key, for example: 123.456.789.123
- Record the Gateway address displayed on the [Gateway] key, for example: 123.456.789.123

Keep the paper handy. You'll need to refer to it once you complete the tests.

1. After you record the values, and once testing is complete, follow the procedure in [“Restoring a customer's static IP address after you complete testing” on page 155.](#)

Next, follow the steps in [“Configure the E7495A/B for a DHCP or Static IP Address” on page 153.](#)

Configure the E7495A/B for a DHCP or Static IP Address

The service software utilizes LAN to control the E7495A/B Base Station Test Set and GPIB to control the associated test equipment.

The E7495A/B can be configured to use either a static IP address or a DHCP (Dynamic Host Configuration Protocol) address. If you wish to use a static IP address, you will need to contact your network administrator to assign an address for use. If your LAN supports DHCP, then you will simply need to configure the E7495A/B for DHCP and an IP address will be automatically assigned.

The DHCP automatic assignment of an IP address only occurs upon booting. You must have the LAN cable connected before you power on the instrument. If the unit was powered down to standby mode and it contains batteries, you may need to fully power off the instrument in order to restart the boot process.

- To turn off the instrument, press the on/off button for more than 4 (four) seconds.

Configuring the E7495A/B to use a DHCP IP address

1. Turn the E7495A/B ON.
2. Press [**System**] [**Controls**] [**IP Admin**] [**DHCP**] **On**.
3. Make sure that the E7495A/B is connected to the DHCP-enabled LAN.
4. Press [**Save**] then at the prompt, press [**Yes**].
5. Wait for the E7495A/B to reboot. Once the E7495A/B has rebooted, the assigned IP address should appear at the bottom of the E7495A/B welcome screen.
6. Enter this address in the service software.

Configuring the E7495A/B to use a static IP address

If your test station is setup to use a static or fixed IP address, obtain the following from your network administrator.

- An IP address
 - The Network Mask to use for that IP address
 - The Default Gateway to use for that IP address
 - An optional system name
1. Turn the E7495A/B on.
 2. Press **[System]** **[Controls]** **[IP Admin]** **[DHCP]** Off
 3. Press **[Sys Name]**, then using the softkeys, enter the system name then press **[Ok]**.
 4. Press **[IP Address]**, then using the softkeys, enter the IP address then press **[Ok]**.
 5. Press **[Net Mask]**, then using the softkeys, enter the Network Mask then press **[Ok]**.
 6. Press **[Gateway]**, then using the softkeys, enter the Default Gateway then press **[Ok]**
 7. Make sure that the E7495A/B is connected to LAN
 8. Press **[Save]** then at the prompt press **[Yes]**. Wait for the E7495A/B to reboot. Once the E7495A/B has rebooted, the IP address you entered should appear at the bottom of the E7495A/B welcome screen.
 9. Enter this address in the service software.

After testing is complete, restore the unit to its previous state, either by turning on the DHCP service or entering the fixed IP address information you obtained earlier (see [“Restoring a customer’s static IP address after you complete testing” on page 155](#)).

Restoring a customer's static IP address after you complete testing

When you complete testing, use this procedure to guide you through restoring the customer's network configuration information, if it had been previously defined. You'll need the paper on which you recorded the IP address information before you began testing.

Procedure

1. Turn the E7495A/B power switch ON by holding the button in for 1/2 second.
2. Select [**S**ystem] [**C**ontrols] [**I**P Admin].
3. Select [**D**HCP] **O**ff.
4. Reenter the customer's IP Address, the Net Mask, and the Gateway. Refer to the paper on which you recorded this information.
5. Press [**S**ave] [**Y**es]. The customer's network configuration information is restored.

Equipment Required

Table 7-1 Required Equipment for PBST Series

Recommended Equipment	Alternate Equipment	Description	Calibration Requirements
8648C (1E5) (1EA)	8648C 8648D 8648D (1EA) E4432B E4432B (UNB) E4433B E4433B (UNB) E4436B E4436B (UNB) E4437B E4437B (UNB) 8663A	Synthesized Source	
E4419B	E4419A	Power Meter	
E9301A		Power Sensor	Characterized from 10 MHz to 2500 MHz
11730A		Power Sensor Cable	
8491A (006)		6 dB fixed attenuator	
11713A		Attenuator/Switch Driver	
8494G		Programmable 1-dB Step Attenuator	Characterized at: 10, 375, 892, 1350, 1940 & 2500 MHz
8496G		Programmable 10-dB Step Attenuator	Characterized at: 10, 375, 892, 1350, 1940 & 2500 MHz
5071A	House Standard	Frequency Standard	Accuracy $\geq 1 \times 10^{-10}$
10503A	Equivalent cable	Cable: 50 Ω Coax with BNC (m) connectors 122 cm	

Table 7-1 Required Equipment for PBST Series

8491A (010), 2 required		10 dB fixed attenuator	
8120-8862, 2 required	Equivalent cable	Cable: Low Loss	
11001-60001	Equivalent cable	BNC (m) to Banana Cable	
10100C	A 1250-0781 BNC TEE FMF with one arm of the TEE terminated with a 1250-0207 50 Ω BNC-M load and the other arm of the TEE connected to the 33120A output.	50 Ω Feedthrough	
1250-1250	Equivalent connector	Connector N (m) to SMA (f)	
85032E or 85032B	Equivalent Load, Open & Short	Coaxial Mechanical Calibration Kit	Load: Return loss ≥ 46 dB ($\rho \leq 0.00501$) Open: Deviation from nominal phase: $\pm 0.501^\circ \pm 0.234^\circ / \text{GHz}$ Short: Deviation from nominal phase: $\pm 0.441^\circ \pm 0.444^\circ / \text{GHz}$
1250-0777		Adaptor N (f) t = N (f)	
8120-2703		Step attenuator cable	
11716A		Attenuator interconnect cable	
N6314A		RF cable N (m) to N (m)	
909A-012	00904-60002	50 Ω Terminator	Type N Male connector Frequency DC - 18 GHz
Additional Equipment Required for Functional Tests			
346B	346C	Noise source	10 MHz to 2.5 GHz

Table 7-1 Required Equipment for PBST Series

E3641A	Equivalent Power DC Power Supply to source +28 VDC @ > 500 mA	DC Power Supply	
33120A		15 MHz Function / Arbitrary	
Trimble Hardmount GPS Antenna from Trimble Navigation Limited Web: http://www.trimble.com Part #: TNC28367-70 Desc: OEM Antenna 26 dB		GPS Antenna	
Additional Equipment Required for Option 300 Only			
3458A		Digital voltmeter	
1251-2277	Equivalent Cable	Adapter, BNC (f) to Dual banana	
1250-1476	Equivalent Cable or N6314A	Adapter, BNC (f) to N (m)	
Additional Equipment Required for Option 500 and 510 Only			
E4443A, E4445A, E4440A With the following options: E444xA-B7J Digital Demodulation Hardware E444xA-BAC cdmaOne measurement personality		Spectrum Analyzer	
10503A	Equivalent Cable	Cable: 50 Ω Coax with BNC (m) connectors 122 cm	

Table 7-1 Required Equipment for PBST Series

8120-8862	Equivalent Cable or N6314A	Cable: Low Loss Type-N (m) to Type-N (m)	
Additional Equipment Required for Option 600 Only			
53131A	53132A / 53181A	Frequency Counter	
10503A, 2 required	Equivalent Cable	Cable: 50 Ω Coax with BNC (m) connectors 122 cm	
E9635A	Equivalent Connector	Connector: Type N (m) to BNC (f) 50 Ω	
3458A		Digital Volt Meter	
432A		Power Meter	
478A (H75) or (H76)		Thermistor Mount	Characterized @ 50 MHz with a cal factor uncertainty of $\leq \pm 0.38\%$
11683A		Range Calibrator	
432 option 005		Thermister mount cable	
Additional Equipment Required for Option 700 Only			
N1760A-001 or N1760-002, 2 required	Equivalent Cable	Cable: Bantam (m) to Bantam (m) 8 ft.	
54810A or 54820A		Infinium oscilloscope	
E2621A	Equivalent 100 ohm termination	100/110/120-ohm balanced termination adaptor with Bantam (f) connector	
Additional Equipment Required for Adjustments and Utilities			
F1047-80002 (part of the 34398A RS-232 cable kit)	Equivalent cable	Null modem cable, 9-pin (f) to 9-pin (f) 2.5 meters	
Agilent 0950-4409	SanDisk part number: SDP3B-64-101-80 SanDisk Website: www.sandisk.com	SanDisk PCMCIA ATA PC Card, Type II (64 Mbytes) Memory Card	

Table 7-1 Required Equipment for PBST Series

SanDisk part number: SDCFB-64-101-80 SanDisk Website: www.sandisk.com	Equivalent Compact Flash Card	SanDisk CompactFlash ATA Card (64 Mbytes)	
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Functional Tests

Verify GPS

Test Description

The E7495A/B is set to monitor the GPS display. The instrument GPS locked indications are then checked with and without the GPS signals present.

Troubleshooting

If this test fails, place the GPS antenna placed in a more open area with a sufficient metal ground plane beneath it. If the test continues to fail, suspect the internal GPS cable A5W8, the power supply cable A3W2 or the A3A1 GPS assembly.

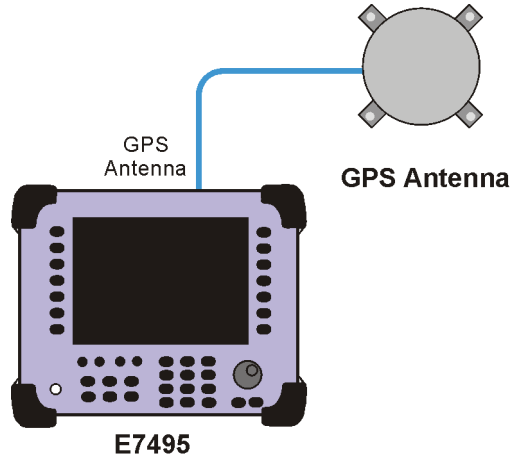
Test Equipment

Instrument	Critical Specifications (for this test)	Recommended Model
GPS Antenna	Not Applicable	Trimble Hardmount GPS Antenna from Trimble Navigation Limited Web: http://www.trimble.com/ Part #: TNC28367-70 Desc: OEM Antenna, 26 dB

Mounting the GPS Antenna

The GPS test requires the use of an active antenna made specifically for the GPS band. The factory recommends the antenna in the table above. The GPS antenna will need to be permanently mounted outdoors with a view of the sky that is greater than 90° of arc. This antenna comes with 5 meters of cable. If additional cable is needed, up to 200 feet of RG-316 or other low RF loss cable may be used. Power for the antenna is supplied through the cable, so the cable must also have a low DC resistance.

The maximum allowable DC resistance is 20 Ω
The RF loss should be < 6 dB.



7495gps

DC Bias

Definition

The DC Bias 12 volt output, option 300, provides DC power from the Agilent E7495B to an amplifier at the top of a base station tower, or at the end of a cable run. The DC voltage (12.7 volts nominally) is output on the center conductor of Port 1, RF Out, and supplies a current up to 800 mA (9.84 watts). This option enables you to test with the amplifier powered on. The DC bias output defaults to off when you select a new measurement type, which does not depend on either Port 1, or Port 2, and it must be turned on each time you want to use it. It stays on as long as you are using measurements that use RF In or Out. The DC Bias cannot be saved in the On position as a state and is turned off when the power is cycled, including the sleep state. If you do not have the option, it is grayed out on the screen.

If the measured value exceeds the maximum voltage or is lower than the minimum voltage, this will cause the message “DC Bias output Voltage is outside of normal operating range; repair is recommended.”

Test Description

The DC Bias Test simply tests the voltage of the DC Bias Source with no load connected. Port 1, RF out is connected to an N to BNC adapter. A BNC to banana plug adapter is connected to the Input (2 wire) of the 3458A. A BNC cable is connected between the BNC adapters on the E7495B and the 3458A.

To adequately test the DC Bias functionality this test should run with an optional load connected in parallel with the voltmeter in order to verify problems with the DC bias out not being able to provide the correct DC voltage while supplying current up to 800 mA. If customers comment that the DC Bias is not functioning properly, but it passes the voltage check, you need to verify that it will supply 800 ma of current. (For 12.7V DC Bias Voltage, you would need a 15.8 ohm load to source 800ma of current).

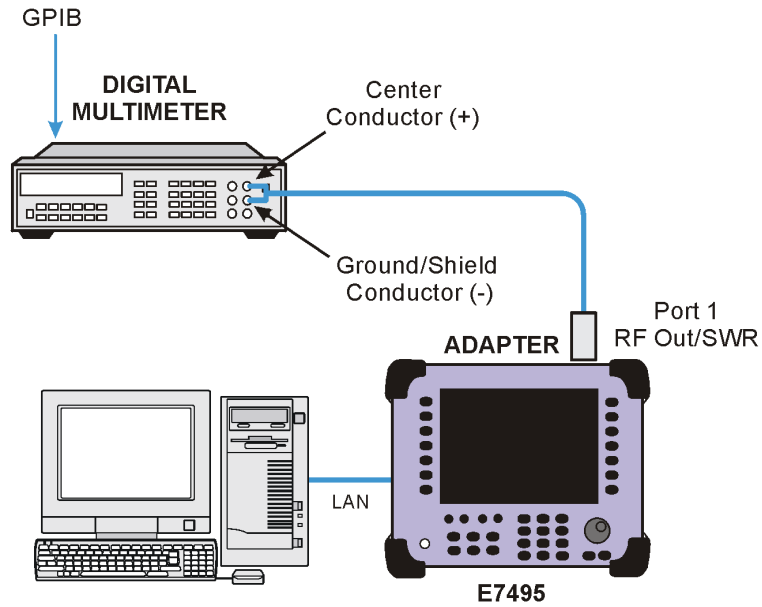
Troubleshooting

If this test fails, suspect the A3 RF assembly.

Test Equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Digital Voltmeter		3458A
Adapter	BNC (f) to Dual Banana	1250-2277
Adapter	BNC (f) to Type N (m)	1250-1476
BNC Cable	48 inch	10503A

Equipment Setup



7495dcbias

NOTE

This test measures a typical parameter. Successful completion of this test is indicated by a “pass” test result. Failure of this test, indicated by a “fail” test result, may require an instrument repair.

Even Second Sync Input

Definition

This tests that the E7495A/B can lock to TTL level pulses that occur every other second. A source is connected to the E7495A/B Even Second Sync In. The Event 1 trigger output from an ESG signal generator is applied with a period of 2 seconds to the Even Second Sync In. The E7495A/B Even Sec lock indicator is checked for a locked indication.

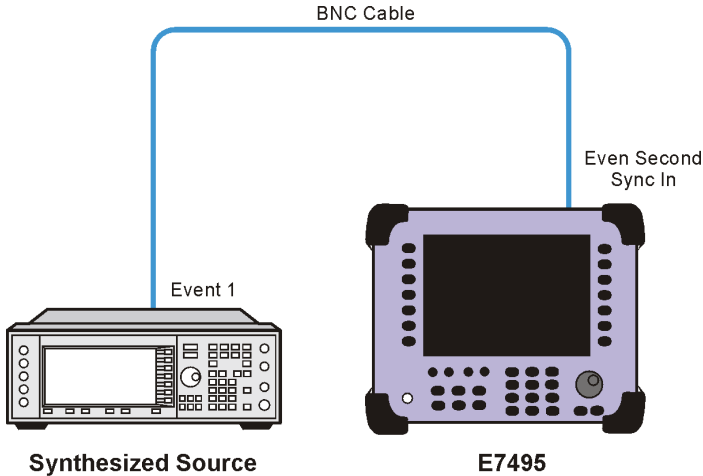
Troubleshooting

If this test fails, verify that the signal source was configured correctly and that the connection diagram was followed. Check the internal A5W7 even second sync in cable. If the test setup is correct and all internal connections are securely connected, as the even second sync input uses the same lock circuitry, verify that the GPS Functional Test passes. If it still fails to lock, suspect the A3 RF Assembly.

Test Equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Synthesized Source	IS-95A (cdmaOne) option	E4430B (UND, UN5) E4431B (UND, UN5) E4432B (UND, UN5) E4433B (UND, UN5) E4434B (UND, UN5) E4435B (UND, UN5) E4436B (UND, UN5) E4437B (UND, UN5) E4438C (401, 601) E4438C (401, 602)
BNC Cable	BNC (m) to BNC (m) Length: 122 cm	10503A
Adapter	Type N (m) to BNC (f) 50 Ω	1250-0780

Equipment setup



7495evensec

Internal and External Reference

Definition

This test checks the ability of the E7495A/B to lock to the internal reference and to lock to two different external reference frequency inputs. The status of the E7495A/B's lock indicator is checked with 3 different sources, a 19.84 MHz internal source, a 10 MHz external source, and a 19.6608 MHz external source.

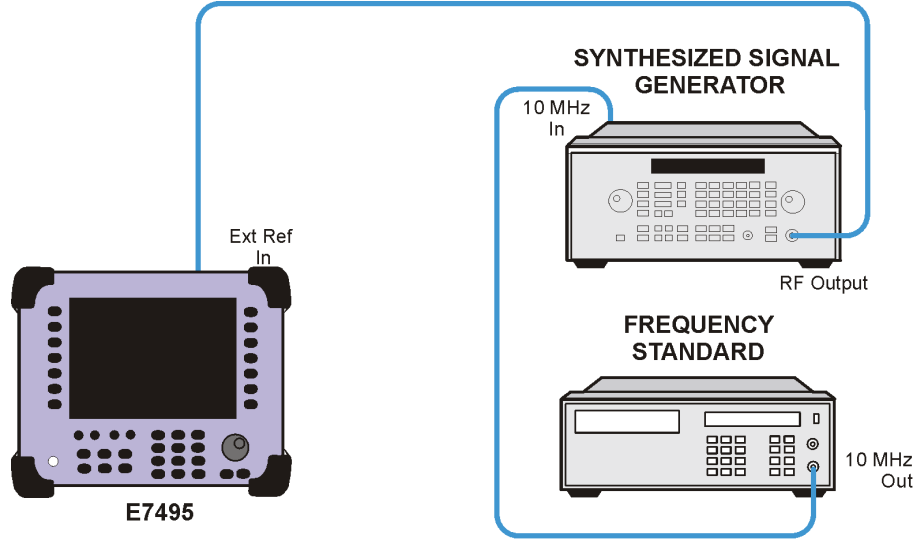
Troubleshooting

If the Internal Reference data point of the test fails, insure there is not an external reference connected to the Test Set. If it still fails, run the Reference Alignment adjustment and then re-run this test. If the External Reference data points fail, check the setup connections and rerun the test. If it continues to fail check the internal A5W6 Ext Ref In cable. If it still fails, suspect the A3 RF Assembly.

Test equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Synthesized Signal Generator		E4430B (UND, UN5) E4431B (UND, UN5) E4432B (UND, UN5) E4433B (UND, UN5) E4434B (UND, UN5) E4435B (UND, UN5) E4436B (UND, UN5) E4437B (UND, UN5) E4438C (401, 601) E4438C (401, 602)
Frequency Standard	Accuracy: $\geq 1 \times 10^{-10}$	5071A
BNC Cable	BNC (m) to BNC (m) Length: 122 cm	10503A

Equipment setup



T1 Functional Test (Option 700 only)

Definition

The Functional tests available for T1 include:

- **RAM** - During the RAM test, the memory on the T1 measurement module is tested. Memory hardware failures are detected.
- **ROM** - The ROM test verifies the integrity of the code by performing a checksum measurement.
- **Loop back** - The loop back test is a functional test of the transmitting and receiving hardware. It attempts to send various signal patterns and levels and then to verify the measured values. It is important that this test be done using the short jumpers as even a 4 to 6 foot cable can cause a normally good board to fail.

If any of the above tests fail:

Insure short jumpers are used for the loop back test.

Check the connection diagram for proper setup.

Check the connections on the A4A4 T1 Assembly.

Replace the A4A4 T1 Assembly

Test Equipment

Bantam Loop Plug (2 required)	1253-6194
-------------------------------	-----------

Running the T1 Functional Tests

The T1 Functional Tests are part of the built in verification procedures contained within the E7495A/B Test Set. The T1 Functional Tests are located in the “T1 Analyzer” screen under the “Tests” sub menu. To run the T1 Functional Tests press the following keys on the E7495A/B and follow the instructions displayed on the Test Set’s Front Panel Display.

Key Sequence

1. Access the T1 Functional Tests Mode
 - Press the [Mode] Key
 - Press the [Backhaul] Softkey
 - Press the [T1 Analyzer] Softkey
 - Press the [Tests] Softkey
 - Press the [Verification] Softkey
2. Follow the connection diagram on the E7495A/B Front Panel Display for the following connections.

Functional Tests, Adjustments, and Utilities

Functional Tests

- Connect a Bantam Loop Plug between the T1 Primary TX and RX ports.
 - Connect a Bantam Loop Plug between the T1 Secondary TX and RX ports.
3. Run the T1 Diagnostic Tests
- Press the [Continue] Softkey

The T1 Tests will start, providing Test Status information on the screen. At the conclusion of the Test, the T1 Analyzer Verification Results will be displayed along with a “Test Complete” message.

Record a Pass or Fail for the Test Results for each of the three T1 tests on the E7495A/B TME entry field.

ROM Test: Pass / Fail

RAM Test: Pass / Fail

Loop Test: Pass / Fail

To Exit the Test

Press the [Return] Softkey

To Re-run the Test

Press the [Restart Verification] Softkey

Equipment Setup



E1 Functional Test (Option 710 only)

Definition

The Functional tests available for E1 include:

- **RAM** - During the RAM test, the memory on the E1 measurement module is tested. Memory hardware failures are detected.
- **ROM** - The ROM test verifies the integrity of the code by performing a checksum measurement.
- **Loop back** - The loop back test is a functional test of the transmitting and receiving hardware. It attempts to send various signal patterns and levels and then to verify the measured values. It is important that this test be done using the short jumpers as even a 4 to 6 foot cable can cause a normally good board to fail.

If any of the above tests fail:

Insure short jumpers are used for the loop back test.

Check the connection diagram for proper setup.

Check the connections on the A4A4 E1 Assembly.

Replace the A4A4 E1 Assembly

Test Equipment

Short 75 Ω BNC Cable (2 required)
--

Running the E1 Functional Tests

The E1 Functional Tests are part of the built in verification procedures contained within the E7495A/B Test Set. The E1 Functional Tests are located in the “E1 Analyzer” screen under the “Tests” sub menu. To run the E1 Functional Tests press the following keys on the E7495A/B and follow the instructions displayed on the Test Set’s Front Panel Display.

Key Sequence

1. Access the E1 Functional Tests Mode
 - Press the [Mode] Key
 - Press the [Backhaul] Softkey
 - Press the [E1 Analyzer] Softkey
 - Press the [Tests] Softkey
 - Press the [Verification] Softkey
2. Follow the connection diagram on the E7495A/B Front Panel Display for the following connections.

Functional Tests, Adjustments, and Utilities

Functional Tests

- Connect a 15 cm E1 Loop Cable between the E1 Primary TX and RX ports.
 - Connect a 15 cm E1 Loop Cable between the E1 Secondary TX and RX ports.
3. Run the E1 Diagnostic Tests
- Press the [Continue] Softkey

The E1 Tests will start, providing Test Status information on the screen. At the conclusion of the Test, the E1 Analyzer Verification Results will be displayed along with a “Test Complete” message.

Record a Pass or Fail for the Test Results for each of the three E1 tests on the E7495A/B TME entry field.

ROM Test: Pass / Fail

RAM Test: Pass / Fail

Loop Test: Pass / Fail

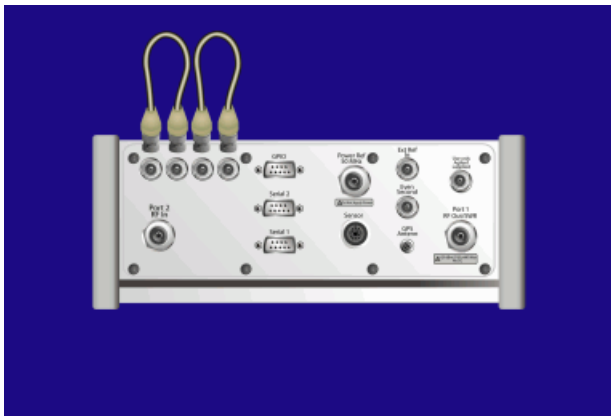
To Exit the Test

Press the [Return] Softkey

To Re-run the Test

Press the [Restart Verification] Softkey

Equipment Setup



Adjustments

Reference Alignment Test

Definition

Reference Frequency Stability – The analyzer’s reference source’s frequency varies over time due to thermal aging and other effects. The frequency stability specification describes long-term frequency drift, usually in terms of parts per million per day, often with a temperature range specified. (Short-term frequency fluctuation is specified in terms of phase noise.)

Alignment description

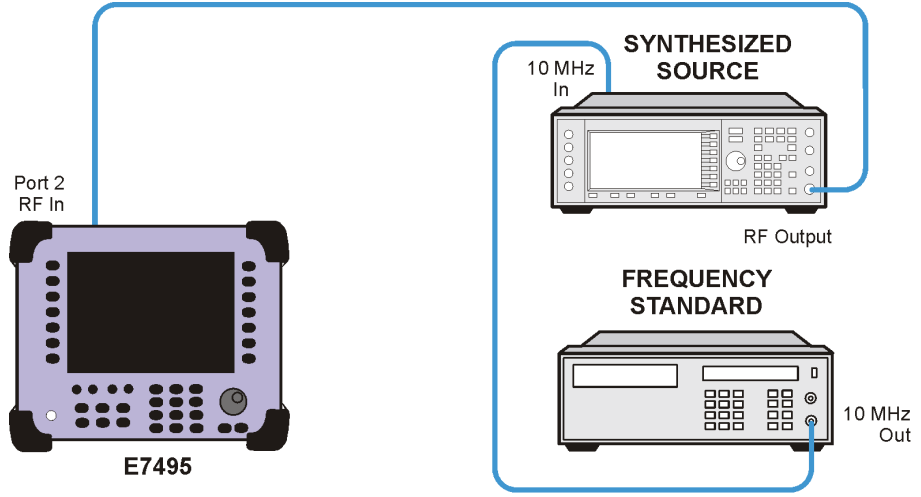
This test applies to the E7495A and E7495B. Firmware Version A.02.10 and greater is required.

This test aligns the frequency of the 19.6 MHz TCXO, located on the receiver source board, as close to 19.6 MHz as possible. The frequency of the TCXO is programmed by a 12 Bit digital-to-analogue converter, DAC. A reference signal at 1961 MHz is connected to the RF In of the E7495A/B. The received signal is down-converted to an IF frequency and then digitized by an ADC. Its position is determined by taking a Fast Fourier transform (FFT), from which a reference frequency error is determined. By adjusting the tune voltage of the TCXO, the signal measured by the FFT can be varied until it is at the correct frequency, which corresponds to a bin position in the FFT. The value of the DAC setting is then stored to a file on the instrument’s flash. Upon a reboot of the instrument, the firmware detects that the file has been updated and writes the new DAC number to the flash on the DSP backend board.

Test equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Synthesized Source Frequency Reference	Frequency: 100 - 2500 MHz Amplitude: +10 dBm leveled power out	8648C (1E5) (1EA), 8648D (1E5) (1EA), E4432B, E4433B, E4436B, or E4437B
Frequency Standard	Accuracy $\geq 1 \times 10^{-10}$	5071A
50 Ω Coax with BNC (m) connectors, 122cm		10503A
Type N cable		N6314A

Equipment setup



7495refalignadj

Power Meter Reference Oscillator Level Adjustment (Option 600 only)

Definition

Reference level accuracy is the difference between the output power of the E7495's 50 MHz reference oscillator and the specified value of 1 mW.

Test description

This test applies to the E7495A/B Option 600 only.

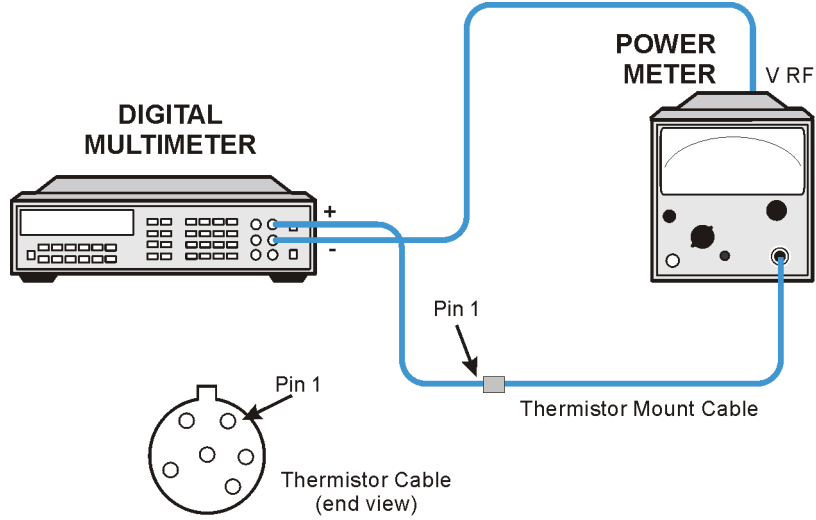
The power meter reference oscillator output level of the E7495A/B is measured with a 432A power meter, a 478A (option H75 or H76) thermistor mount and a digital voltmeter. The VRF connector on the rear of the 432A provides a voltage that is directly proportional to the RF power measured by this sensor. The VCOMP connector on the rear of the 432A provides a voltage from the compensated bridge inside the instrument.

Test equipment

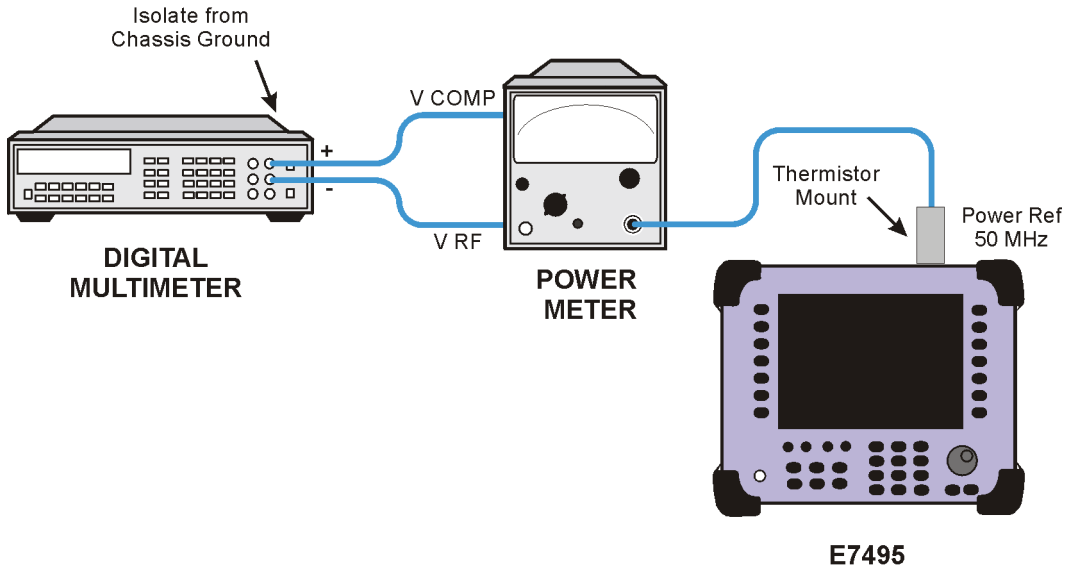
Instrument	Critical Specifications (for this test)	Recommended Model
Digital Volt Meter		3458A
Power Meter		432A
Thermistor Mount	Characterized @ 50 MHz with a cal factor uncertainty of $\leq \pm 0.38\%$	478A (H75) or (H76)
Power Sensor Cable (1.5m)		432A Opt 005

Equipment setup

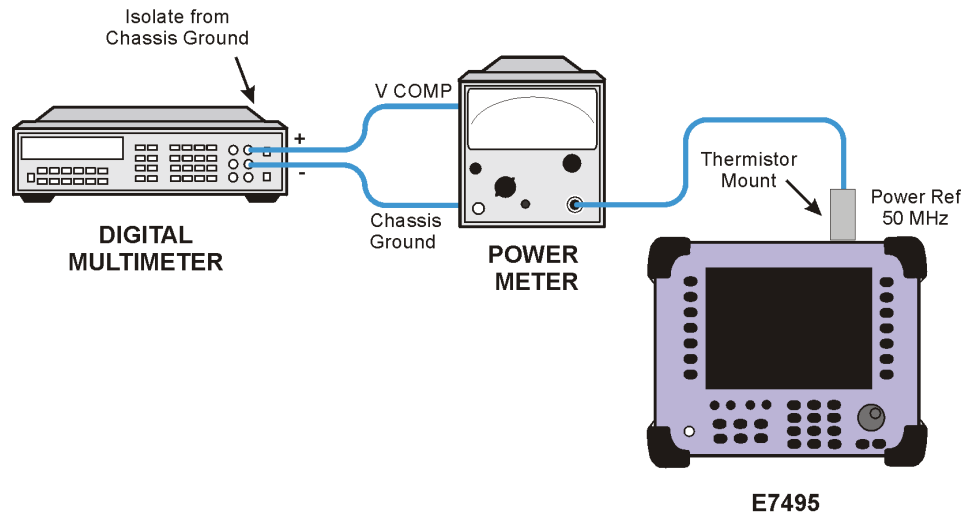
NOTE Perform a bridge resistance characterization once a month or when you change the equipment.



7495pmlevrefadj



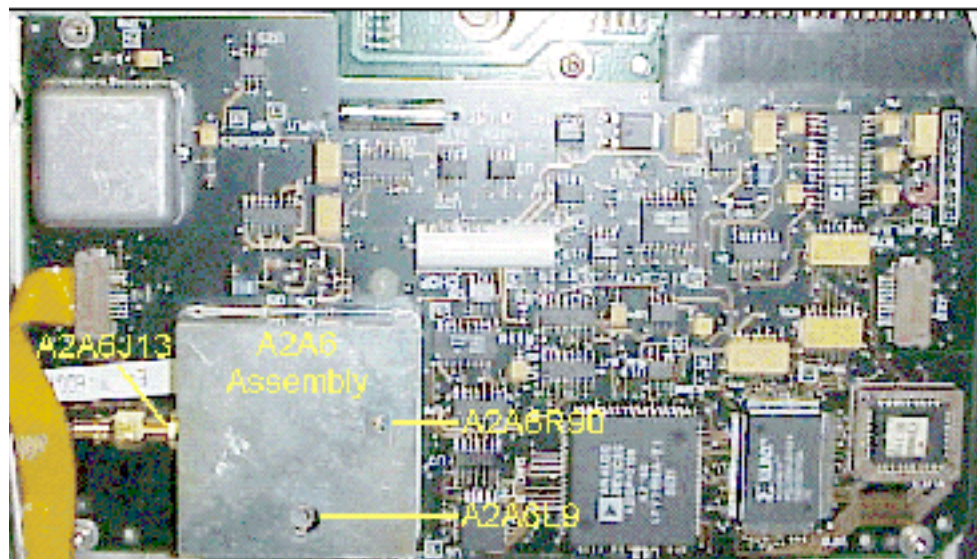
7495pmlev1adj



7495pmlev1adj

NOTE

VCOMP should be recorded with a resolution of $\geq 10^{-4}V$.



NOTE

Resolution of recorded value should be $10^{-5}V$.

Power Meter Reference Oscillator Frequency Adjustment (Option 600 only)

Definition

Reference Oscillator Frequency Accuracy is the extent to which the frequency from the E7495's 50 MHz reference oscillator differs from the specified value of 50 MHz.

Adjustment description

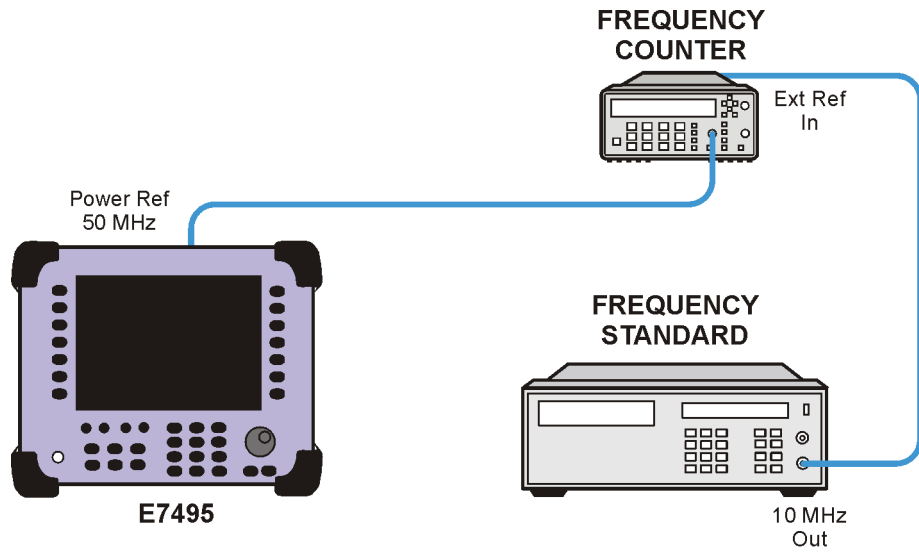
This test applies to the E7495A/B Option 600 only.

Variable inductor A2A6L9 is adjusted to set the power reference oscillator output frequency to 50 ± 0.5 MHz as measured by a frequency counter locked to a reference standard.

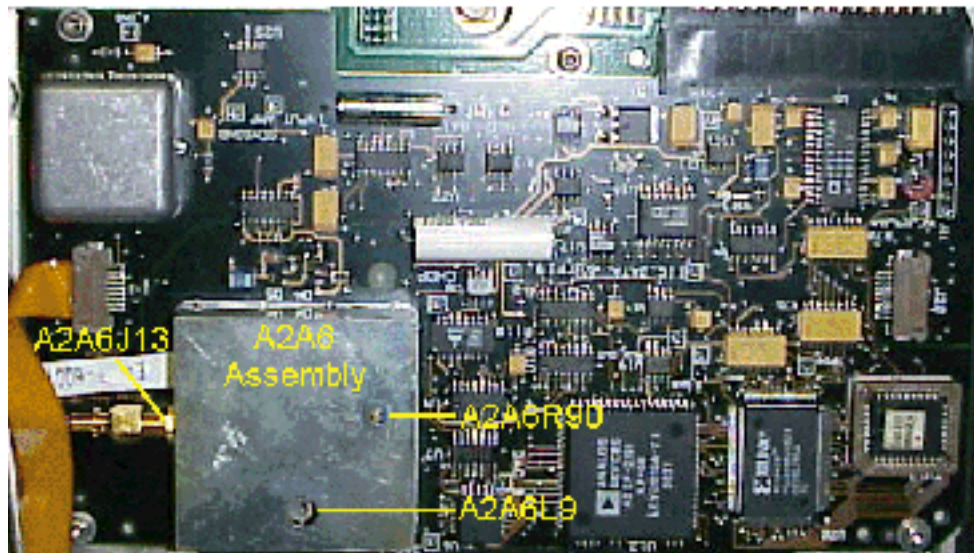
Test equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Frequency Counter	Frequency: 50 MHz Ability to measure frequency signal with 0 dBm amplitude	53131A / 53132A / 53181A
Frequency Standard	Accuracy $\geq 1 \times 10^{-10}$	5071A
50 Ω Coax with BNC (m) Connectors, 122cm (QTY 2)		10503A
Type N (m) to BNC (f) 50 Ω adaptor		E9635A

Equipment setup



7495pmfreqadj



Utilities

Read-Write Model Number/Serial Number/Options

Definition

This utility allows the operator to re-enter the Device Under Test (DUT) information or add hardware options.

Description

The main purpose of this utility is to give the operator the ability to replace an assembly and program in the applicable information. Adding hardware for an upgrade will also use this process. Licensed options will be handled independently of hardware options through the FLEXlm process. Licensed options are turned on through the System menu in the instrument firmware.

Hardware options currently supported

Option	Description
500	CW source
510	Complex Mod
600	Power meter
700	T1 tester
710	E1 tester

License Key Enabled Options

The following options are license key enabled and can only be enabled through the front panel by entering in the correct license key.

Purchased license keys can be retrieved from the license key database at the following location:

<http://pamirs.cos.agilent.com/license/>

Option	Description
200	cdmaOne/CDMA2000 Analyzer
210	cdmaOne Over-air tester
220	RF Channel Scanner
230	GSM Analyzer
240	W-CDMA (UMTS)
250	W-CDMA over-air
270	Interference Analysis

300	DC Bias Output
-----	----------------

Test equipment

No external equipment required

Validate DSP RAM

Two types of random access memory, RAM, exist on the DSP/IF board and the complex modulation board.

- DSP internal RAM, present inside the DSP chip.
- External RAM is located external to the DSP.

This test was written to guarantee that the memory locations that are infrequently accessed are tested.

Troubleshooting

If this test fails, suspect the DSP/IF board.

Test equipment

No external equipment required

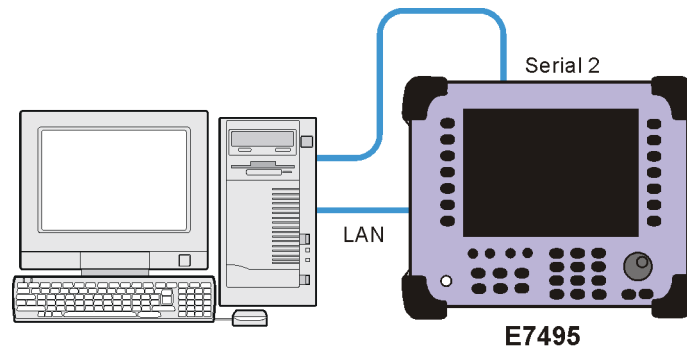
Serial Port Verification

This tests the functionality of Serial 2 by reading the IP address of the E7495A/B over the serial port.

Test equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Null modem cable, 9-pin (f) to 9-pin (f) 2.5 meters	Not Applicable	F1047-80002 or equivalent (part of the 34398A RS-232 cable kit)

Equipment setup



7495serialportver

Clear Return Loss Default Cal

Definition

This utility serves two purposes, it removes the stored factory default calibration data for the Return Loss measurement, and regenerates and stores the new default calibration data.

Purpose

The purpose of this utility is to enable the default return loss measurement calibration data to be overwritten and regenerated. This utility removes the stored factory / default calibration data for the Return Loss measurement and then prompts the user to perform an open / short / load calibration. This calibration is done across the full frequency range of 375 to 2500 MHz, with 16 averages for increased accuracy. The calibration data created during the open / short / load calibration will be stored as the new default calibration data in a file on the A4A1 ADS / CPU Assembly. This utility should be run any time you put a new A3 RF assembly inside of an E7495A/B or change the Port 1 N-type connector. This default calibration data that is stored in the instrument on the A4A1 ADS / CPU Assembly will be used any time a user makes Return Loss measurements without first doing an open / short / load recalibration. If you don't run this utility after swapping RF assemblies in the E7495A/B, then when the user tries to make a Return Loss measurement without first performing an open / short / load calibration their results will not be very meaningful.

Additional Information

The instrument must be fully assembled and allowed to warm up for 3 hours prior to the open/short/load calibration.

Take extra care to make sure that all connectors are tight when performing the open / short / load calibration to ensure the integrity of the calibration data.

If the instrument is not allowed to warm up for 3 hours, or if you feel the Return Loss open / short / load calibration integrity may be compromised, rerun this utility.

This utility will use the Diagnostic Server to communicate with the E7495A/B just as the other E7495A/B Utilities do.

A

accessories and options, 65
adjustments, 173
Agilent
customer assistance, 18
sales offices, 18

B

backlight, removal, 147
batteries, 23
built-in battery gauge, 26
caring for, 31
charger part numbers, 35
charging, 26
current drain, 36
disposal, 33
front panel icons, 24
installing, 23
LEDs, 24
maximizing battery life, 32
part numbers, 35
precautions, 31
reconditioning/recalibrating, 28
remove from instrument, 108
specifications, 34
status, 24
System Statistics - Battery
Screen, 25
battery controller and housing,
removal, 138
Battery Management functional
test, 79
bumpers, removal, 109

C

charging batteries, 26
chassis ground terminal, 12
Clear Return Loss Default Cal,
184
complex modulation,
troubleshooting, 77
connection diagram, 21
connector panel, removal, 115
controller board, removal, 131
corrupted states, 69
CW source, troubleshooting, 75

D

DC Bias functional test, 163
DHCP IP address, 153
display inverter, removal, 147
display keypad, removal, 149
display, removal, 145

E

E1 assembly, removal, 135
E1 functional test, 171
E7495A
connection diagram, 21
electrostatic discharge (ESD)
precautions, 15
equipment required, 156
Even Second Sync Input
functional test, 165

F

firmware downgrades, 38
firmware revision history, 37
firmware upgrades, 39
front panel assembly, removal,
111
front panel, removal, 145
functional tests, 161

G

GPS antenna, 162
GPS assembly, removal, 118

I

installing a battery, 23
installing hardware, 48
Internal and External Reference
functional test, 167

K

keypad board, removal, 148
kickstand, 107

L

lifting and handling the test set,
15
Load Firmware Utility, 44
lower keypad, removal, 149

O

Option 510, installing, 53
Option 600, installing, 49
Option 700, installing, 56, 59

P

parts list, 102
PCMCIA card, 40
power meter assembly, removal,
118
Power Meter Reference Oscillator
Frequency Adjustment, 178
Power Meter Reference Oscillator
Level Adjustment, 175

power meter, troubleshooting, 78
power supply interface board,
removal, 140
power supply, removal, 140
procedure map, 100

R

Read-Write Model Number/Serial
Number/Options Utility, 180
reconditioning/recalibrating
batteries, 28
recovery script, 42
Reference Alignment Test, 173
removal and replacement
procedures, 97, 107
remove
batteries, 108
bumpers, 109
connector panel, 115
controller board, 131
front panel, 145
front panel assembly, 111
power supply, 140
power supply interface board
A4A4, 140
RF assembly, 115
required equipment, 156
RF assembly, removal, 115
RF functionality, 73
RPG, removal, 150

S

safety considerations, 12
safety earth ground, 12
safety symbols, 12
sales and service offices, 18
Serial Port Verification Utility,
183
service
shipping the test set, 16
service offices, 18
shipping the test set, 16
speaker, removal, 144
static IP address, 152
strap handle, removal, 107

T

T1 assembly, removal, 135
T1 functional test, 169
test equipment, 156
troubleshooting, 66
base product checkout, 73
testing the CW source, 75

U

Utilities, 180

V

Validate DSP RAM Utility, [182](#)

Verify GPS functional test, [161](#)

verify test set functionality, [71](#)

W

Working with Batteries, [23](#)