Maintenance Manual

PIM Master™

MW82119A

Passive InterModulation Analyzer

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger

This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

Warning

This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution

This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

For Safety

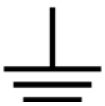
Warning

Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning

or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning

This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Warning

This equipment is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and storing the battery in a leak-proof, plastic container. Follow the environmental storage requirements specified in the product data sheet.

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Chapter 1 — General Information

Warning	The Anritsu PIM Master is capable of producing up to 40 Watts of RF power in the cellular communications bands. Users must take precautions to minimize exposure to these RF fields: • Always terminate the output port of the test equipment into a load, a loaded line, or a line that will radiate or absorb the energy before beginning a PIM test. • Confirm that the PIM Master RF power is off after a PIM test. • Always confirm that the RF power is off before disconnecting a coaxial connection, otherwise RF burns may result. Immediate burns to fingers or eyes can result from exposure to live connectors. • RF power can be immediately turned off with the Emergency Stop button. • Ensure that all antennas under test are placed so that no personnel are exposed to RF levels that exceed the maximum allowable exposure.

1-1 Introduction

This manual provides maintenance instructions for Anritsu PIM Master model MW82119A.

The information includes:

- Chapter 1, “General Information”
- Chapter 2, “PIM Analyzer Verification”
- Chapter 3, “Troubleshooting”
- Chapter 4, “Battery Information”
- Chapter 5, “Assembly Replacement”
- Appendix A, “Test Records”

Note	Anritsu recommends that you make a copy of the blank test records to document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which allows you to observe trends.

Throughout this manual, PIM Master refers to model MW82119A.

Familiarity with the basic operation of the front panel keys (for example, how to change measurement mode, preset the instrument, or the meaning of submenu button or main menu button) is assumed. Refer to the PIM Master User Guide (Anritsu part number: 10580-00285).

1-2 Product Description

The MW82119A PIM Master model is a portable passive inter-modulation analyzer featuring precise performance for the APT (700 MHz), LTE (700 MHz), LTE (800 MHz), Cellular (850 MHz), E-GSM (900 MHz), DCS (1800 MHz), PCS (1900 MHz), AWS (1700/2100 MHz), UMTS (2100 MHz), and LTE (2600 MHz) frequency bands. It is designed to accurately determine if receiver interference at a cell site is due to an inter-modulation product of two or more transmit frequencies, also known as passive inter-modulation (PIM).

The PIM Master generates two high-power tones in the transmit band of a base station, and measures the third-order, fifth-order, or seventh-order inter-modulation (IM) products in the receive band coming back down the same cable. The current standard for PIM testing offers a well-known system using two primary carriers and a calculated resulting PIM frequency, which is measured with a tuned receiver. This provides a measurement of the overall linearity of the antenna system and the surrounding environment.

In addition to PIM testing, the PIM Master also has Distance-to-PIM™ (DTP) Analyzer capability. DTP analysis offers distance information to PIM sources for cellular sites with internal PIM problems and antenna PIM problems. This DTP analysis includes the surrounding outside environment with external PIM problems. The Distance-to-PIM™ Analyzer features are displayed in the relative menus. The choice between PIM analysis and Distance-to-PIM™ analysis is made in the Measurements menu of the MW82119A.

Standard Option Features

RF Power is 25 dBm to 46 dBm for all PIM Master models.

Table 1-1. PIM Master Standard Features

Feature	Option 0700	Option 0702	Option 0800
Tx Freq Band	734 MHz to 734.5 MHz 746 MHz to 768 MHz	768 MHz to 776 MHz 788 MHz to 807 MHz	791 MHz to 795 MHz 811.5 MHz to 821 MHz
IMD Band	698 MHz to 717 MHz 777 MHz to 806 MHz	713 MHz to 738 MHz 825 MHz to 845 MHz	832 MHz to 862 MHz
IMD Orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders
Feature	**Option 0850**	**Option 0900**	**Option 0180**
Tx Freq Band	869 MHz to 871 MHz 881.5 MHz to 894 MHz	925 MHz to 937.5 MHz 951.5 MHz to 960 MHz	1805 MHz to 1837 MHz 1857.5 MHz to 1880 MHz
IMD Band	824 MHz to 849 MHz	880 MHz to 915 MHz	1710 MHz to 1785 MHz
IMD Orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders
Feature	**Option 0190**	**Option 0192**	**Option 0210**
Tx Freq Band	1930 MHz to 1932 MHz 1950 MHz to 1990 MHz	1930 MHz to 1935 MHz 2110 MHz to 2155 MHz	2110 MHz to 2112.5 MHz 2130 MHz to 2170 MHz
IMD Band	1870 MHz to 1910 MHz	1710 MHz to 1755 MHz	1920 MHz to 1980 MHz 2050 MHz to 2090 MHz
IMD Orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders
Feature	**Option 0193**		**Option 0260**
Tx Freq Band	Tx1 1930 MHz to 1940 MHz Tx2 1955 MHz to 1995 MHz	Tx1 1930 MHz to 1940 MHz Tx3 2110 MHz to 2155 MHz	2620 MHz to 2630 MHz 2650 MHz to 2690 MHz
IMD Band	1850 MHz to 1910 MHz	1710 MHz to 1755 MHz	2500 MHz to 2570 MHz
IMD Orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders	3rd, 5th, or 7th orders

Other Options

Table 1-2. Other Instrument Options

Option	Description
19	High Accuracy Power Meter (Requires USB Power Sensor sold separately)
31	GPS Receiver (Requires GPS antenna sold separately)

Optional Accessories

For a complete list of the available accessories, refer to the PIM Master MW82119A Product Brochure & Technical Data Sheet (Anritsu part number 11410-00679). You can download a PDF copy of this document at the following URL:

http://www.anritsu.com/en-US/Downloads/Brochures-Datasheets-and-Catalogs/Brochure/DWL9842.aspx

1-3 Related Documents

Other documents are available for the PIM Master at the Anritsu Web site at:

www.anritsu.com:

- PIM Master User Guide, part number: 10580-00285
- PIM Master Product Brochure, part number: 11410-00679
- Power Meter Measurement Guide, part number: 10580-00240

1-4 Anritsu Customer Service Centers

For the latest service and sales information in your area, visit the following URL:

http://www.anritsu.com/contact.asp

Choose a country for regional contact information.

1-5 Recommended Test Equipment

Table 1-3 lists the test equipment that is required for verifying and testing the PIM Master.

Table 1-3. Recommended Test Equipment for PIM Master Verification

Equipment	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 600 MHz to 3 GHz, Power Output: 0 dBm	Anritsu Model MG3691C with option 4 or option 5
Power Meter	Power Range: –70 to +20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –67 dB to +20 dB	Anritsu Model MA2442D (Quantity 1)
Spectrum Analyzer	Frequency: 3 GHz Power Range: to +20 dBm	Anritsu Model MS2712E or MT8222A
Low PIM Load	40 W Avg, 165 dBc PIM, 690 MHz to 2800 MHz, 50 Ω	Anritsu Model 2000-1724-R
PIM Standard	–80 dBm at 2 x 20 W, 1775 MHz	Anritsu Model 1091-390-R
PIM Standard	–80 dBm at 2 x 20 W, 910 MHz	Anritsu Model 1091-403-R
Fixed Attenuator	30 dB, 50 W, 50 Ω, DC-8.5 GHz	Anritsu Model 3-1010-123
Adapter	K(m) to N(f), 50 Ω	Anritsu Model 34RKNF50
Adapter	7/16 DIN(m) to 7/16 DIN(m)	Anritsu Model 1091-423-R
RF Cable	1.5 m, DC to 4 GHz, 50 Ω	Anritsu Model 15NNF50-1.5C
Torque Wrench	3/4 inch Open End at $12\ \text{lbf} \cdot \text{in}\ (1.36\ \text{N} \cdot \text{m})$	Anritsu Model 01-200
Torque Wrench	5/16 inch Open End at 8 lbf · in (0.904 N · m)	Anritsu Model 01-201 (Only for Assembly Removal and Replacement)
Torque Wrench	1 inch, 25 N·m (18.439 $\text{lbf} \cdot \text{in}$)	Anritsu Model 01-512-R
Torque Wrench	1.25 inch, 25 N·m (18.439 $\text{lbf} \cdot \text{in}$)	Anritsu Model 01-513-R
Crescent Wrench (Adjustable Spanner)	Max Width Opening: 1.375 in (34.925 mm)	Anritsu Model 01-510
Adapter	SMA to BNC(f), 50 Ω	Any or Pomona Model 4290 (Only required for Option 31)
Adapter	GPS Terminator, 93 ohms, 1 W	Any or Amphenol Model B1004A1-ND3G-93R-0.05-1W (Only required for Option 31)

1-6 Replaceable Parts and Assemblies

Table 1-4. List of Replaceable Parts

Part Number	Description
ND75345	MW82119A Main PCB Assembly
ND80833	MW82119A with Option 180 Filter Assembly
ND80891	MW82119A with Option 180 RF Module Assembly
ND80836	MW82119A with Option 190 Filter Assembly
ND75350	MW82119A with Option 190 RF Module Assembly

Part Number	Description
ND80833	MW82119A with Option 192 Filter Assembly
ND75351	MW82119A with Option 192 RF Module Assembly
ND80842	MW82119A with Option 193 Filter Assembly
ND80400	MW82119A with Option 193 RF Module Assembly
ND80841	MW82119A with Option 210 Filter Assembly
ND80198	MW82119A with Option 210 RF Module Assembly
ND80840	MW82119A with Option 260 Filter Assembly
ND80199	MW82119A with Option 260 RF Module Assembly
ND80838	MW82119A with Option 700 Filter Assembly
ND80359	MW82119A with Option 700 RF Module Assembly
ND75352	MW82119A with Option 702 Filter Assembly
ND80769	MW82119A with Option 702 RF Module Assembly
ND80839	MW82119A with Option 800 Filter Assembly
ND80197	MW82119A with Option 800 RF Module Assembly
ND80837	MW82119A with Option 850 Filter Assembly
ND80634	MW82119A with Option 850 RF Module Assembly
ND80835	MW82119A with Option 900 Filter Assembly
ND80882	MW82119A with Option 900 RF Module Assembly
ND75358	GPS Module, Option 31
1091-422-R	Adapter, 7/16 DIN(f) to 7/16 DIN(m), 50 ohm, (Connector Saver)
3-15-165	LCD Display with LED back light
ND80480	8.4 in GFG Touch Screen
2000-1712-R	Soft Carrying Case
2000-1714-R	Shoulder Strap
3-74088	Battery Door
633-75	Li-ion Battery Pack
40-187-R	AC to DC Power Converter
2000-1713-R	Handle Strap
3-74999-3	Main Numeric Keypad PCB
3-71641	Main Numeric Keypad
3-72787	Speaker
3-72496	Top Bumper
3-72497	Bottom Bumper
3-74085	Left Tilt Bail Holder
3-74084	Tilt Bail
3-74086	Right Tilt Bail Holder
3-72493-5	MW82119A-0180, 1800 MHz Model Label
3-72493-2	MW82119A-0190, 1900 MHz Model Label
3-72493-1	MW82119A-0192 or MW82119A-0193, 1900/2100 MHz Model Label
3-72493-6	MW82119A-0700, 700 MHz Model Label
3-72493-12	MW82119A-0702, 700 MHz Model Label

Part Number	Description
3-72493-3	MW82119A-0850, 850 MHz Model Label
3-72493-4	MW82119A-0900, 900 MHz Model Label
3-72493-10	MW82119A-0800, 800 MHz Model Label
3-72493-7	MW82119A-0210, 2100 MHz Model Label
3-72493-8	MW82119A-0260, 2600 MHz Model Label

Chapter 2 — PIM Analyzer Verification

Warning	The Anritsu PIM Master is capable of producing up to 40 Watts of RF power in the cellular communications bands. Users must take precautions to minimize exposure to these RF fields: • Always terminate the output port of the test equipment into a load, a loaded line, or a line that will radiate or absorb the energy before beginning a PIM test. • Confirm that the PIM Master RF power is off after a PIM test. • Always confirm that the RF power is off before disconnecting a coaxial connection, otherwise RF burns may result. Immediate burns to fingers or eyes can result from exposure to live connectors. • RF power can be immediately turned off with the Emergency Stop button. Ensure that all antennas under test are placed so that no personnel are exposed to RF levels that exceed the maximum allowable exposure.

2-1 Introduction

This chapter provides the operational verification procedures for the MW82119A PIM Master. No separate Distance-to-PIM™ (DTP) or Swept PIM measurement verification checks are used because the PIM Analyzer operational verification tests also validate these functionalities. The PIM Analyzer operational verification tests consist of the following:

- "Reference PIM Measurement" on page 2-2
- "Output Power" on page 2-4
- "Residual PIM Measurement" on page 2-8

2-2 Reference PIM Measurement

The following test is used to verify the PIM measurement functionality. A known PIM reference (standard) is used for verification.

Equipment Required

- Anritsu Model 2000-1724-R or 2000-1749-R Low PIM Load (Termination)
- Anritsu Model 1091-390-R or Anritsu Model 1091-403-R PIM Standard

Procedure

1. Confirm that all of the connectors are clean because any debris or contamination may cause incorrect PIM measurement results.
2. Press the **On/Off** key to turn on the PIM Master.
3. Press the **Shift** key and then the **Mode** (**9**) key. Use the **Up/Down** arrow keys to highlight PIM Analyzer and then press the **Enter** key to switch to PIM Analyzer mode.
4. On the PIM Master, press the **Shift** key and then the **Preset** (**1**) key. Press the Preset submenu key to set the instrument to the factory preset state.

Caution	Before continuing, allow a 5-minute warm up for the internal circuitry to stabilize.

5. Press the **Measurements** main menu key and confirm that PIM vs. Time is selected.
6. Press the **Freq** main menu key and set the Carrier F1 and Carrier F2 values as per Table 2-1.
7. Note the values from Table 2-1, and record the Option, IM3 Frequency, and the expected test results in Table A-1 on page A-2
8. Press the **Setup** main menu key and confirm that Output Power is set to 20 W (43 dBm), and that Test Duration is set to 20 s.
9. Press the **Shift** key and then the **Cal** (**2**) key. Press the START Calibration key, then follow the on-screen instructions to perform an instrument calibration.
10. After the initial Calibration phase, you will be asked to remove the PIM Standard and to install just the Low PIM Termination to the test port. The calibration will proceed with the second phase. Then you will be asked to remove the Low PIM Termination. The calibration will proceed with the third phase and, upon completion, you will see Calibration On in the lower, left-hand corner of the display.
11. Connect the PIM Standard to the PIM Master Test Port using the necessary torque wrench. Connect the Low PIM Termination to the PIM Standard using the necessary torque wrench. The sequence of connecting the components is important, and you must adhere to this sequence for accurate results.
12. Press the **Measurements** main menu key to set the instrument to display the Measurements menu.
13. In the Measurements menu, press the Test submenu key to initiate the test. The submenu key will turn red in color and will have Measure underlined when the test is in progress. The test runs for 20 seconds (as set or confirmed in Step 8). Wait until the Test submenu key changes to display Off (Off is underlined).
14. Note the values for PIM, and record the test results in Table A-1 on page A-2. Expected results are shown in Table 2-1, “PIM Standard Results” on page 2-3.

Table 2-1. PIM Standard Results

PIM Standard	MW82119A with	Carrier Frequencies	IM3 Freq	Result Expected
1091-403-R (910 MHz)	**Option 700(L)**	F1: 734 MHz F2: 757 MHz	711 MHz	–81 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 700(U)**	F1: 734 MHz F2: 757 MHz	780 MHz	–80 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 702(L)**	F1: 768 MHz F2: 803 MHz	733 MHz	–81 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 702(U)**	F1: 768 MHz F2: 803 MHz	838 MHz	–80 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 800**	F1: 791 MHz F2: 821 MHz	851 MHz	–80 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 850**	F1: 869 MHz F2: 894 MHz	844 MHz	–80 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 900**	F1: 935 MHz F2: 960 MHz	910 MHz	–80 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 180**	F1: 1805 MHz F2: 1880 MHz	1730 MHz	–74 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 190 or Option 193**	F1: 1930 MHz F2: 1990 MHz	1870 MHz	–72 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 192 or Option 193**	F1: 1930 MHz F2: 2130 MHz	1730 MHz	–74 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 210**	F1: 2110 MHz F2: 2170 MHz	2050 MHz	–72 dBm ± 3 dB
1091-403-R (910 MHz)	**Option 260**	F1: 2620 MHz F2: 2690 MHz	2550 MHz	N/A
1091-390-R (1775 MHz)	**Option 700(L)**	F1: 734 MHz F2: 757 MHz	711 MHz	–87 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 700(U)**	F1: 734 MHz F2: 757 MHz	780 MHz	–86 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 702(L)**	F1: 768 MHz F2: 803 MHz	733 MHz	–87 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 702(U)**	F1: 768 MHz F2: 803 MHz	838 MHz	–86 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 800**	F1: 791 MHz F2: 821 MHz	851 MHz	–86 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 850**	F1: 869 MHz F2: 894 MHz	844 MHz	–86 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 900**	F1: 935 MHz F2: 960 MHz	910 MHz	–86 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 180**	F1: 1805 MHz F2: 1880 MHz	1730 MHz	–80 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 190 or Option 193**	F1: 1930 MHz F2: 1990 MHz	1870 MHz	–78 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 192 or Option 193**	F1: 1930 MHz F2: 2130 MHz	1730 MHz	–80 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 210**	F1: 2110 MHz F2: 2170 MHz	2050 MHz	–78 dBm ± 3 dB
1091-390-R (1775 MHz)	**Option 260**	F1: 2620 MHz F2: 2690 MHz	2550 MHz	–75 dBm ± 3 dB

2-3 Output Power

The following test is used to verify the output power of each tone from the PIM Master. The first phase of this procedure is to characterize the *Test Component*, which consists of the Fixed Attenuator, and Test Cable.

Component Characterization

Equipment Required

- Anritsu Model MG3691C Signal Generator with Option 4 or Option 5, or equivalent
- Anritsu Model 34RKNF50 K(m) to N(f) Adapter
- Power Meter, Anritsu Model ML2438A
- Anritsu Model MA2442D Power Sensor, or equivalent
- *Test Component* from above, consisting of:
  - Anritsu Model 3-1010-123 30 dB 50 W Fixed Attenuator
  - Anritsu Model 15NNF50-1.5C RF Coaxial Cable

Procedure

Follow this entire procedure for each instrument that you test.

1. Assemble the *Test Component* by connecting the male end of the Fixed Attenuator to the female end of the RF Coaxial Cable.

Caution	Leave the two components (cable and fixed attenuator in the *Test Component*) connected to each other until all of the test procedures in this section are completed.

2. Connect the Power Sensor to the Power Meter, zero the sensor, and set the calibration factor to the Carrier F1 frequency of the appropriate model in Table 2-2, “PIM Master Tx Frequency Table” on page 2-5.

Table 2-2. PIM Master Tx Frequency Table

MW82119A PIM Master	F1 Carrier Frequencies	F2 Carrier Frequencies
Option 700	F1: 734 MHz	F2: 756 MHz
Option 700	F1: 734.5 MHz	F2: 766 MHz
Option 702	F1: 768 MHz	F2: 788 MHz
Option 702	F1: 776 MHz	F2: 807 MHz
Option 800	F1: 791 MHz	F2: 811.5 MHz
Option 800	F1: 795 MHz	F2: 821 MHz
Option 850	F1: 869 MHz	F2: 889 MHz
Option 850	F1: 871 MHz	F2: 894 MHz
Option 900	F1: 925 MHz	F2: 951.5 MHz
Option 900	F1: 937.5 MHz	F2: 960 MHz
Option 180	F1: 1805 MHz	F2: 1857.5 MHz
Option 180	F1: 1837 MHz	F2: 1880 MHz
Option 190	F1: 1930 MHz	F2: 1950 MHz
Option 190	F1: 1932 MHz	F2: 1990 MHz
Option 192	F1: 1930 MHz	F2: 2110 MHz
Option 192	F1: 1935 MHz	F2: 2155 MHz
Option 193	F1: 1930 MHz	F2: 1955 MHz
Option 193	F1: 1932 MHz	F2: 1990 MHz
Option 193	F1: 1930 MHz	F2: 2110 MHz
Option 193	F1: 1935 MHz	F2: 2155 MHz
Option 210	F1: 2110 MHz	F2: 2130 MHz
Option 210	F1: 2112.5 MHz	F2: 2170 MHz
Option 260	F1: 2620 MHz	F2: 2650 MHz
Option 260	F1: 2630 MHz	F2: 2690 MHz

3. Install the 34RKNF50 adapter to the Signal Generator RF output. Then connect the Power Sensor to the adapter.
4. Set the Signal Generator to the Carrier F1 setting and adjust the level output to show 0 dBm ± 0.2 dB on the Power Meter. Record the Frequency and Power Meter readings in the **Power Reading from Signal Generator** column of Table A-2, “Test Component F1 Characterization for MW82119A” on page A-2. Turn off the RF Output on the Signal Generator.
5. Disconnect the Power Sensor from the Signal Generator. Connect the Power Sensor to the Cable end of the *Test Component*, and connect the other end of the *Test Component* to the Signal Generator.

6. Turn on the RF Output of the Signal Generator. Record the Frequency and the Power Meter readings in the **Power Reading with Test Component** column in Table A-2. Turn off the RF Output on the Signal Generator.
7. Calculate the **Test Component Correction Factor** by subtracting the value of **Power Reading from Signal Generator** from the value of **Power Reading with Test Component**. Record the frequency and this calculation in Table A-2.
8. Calculate the **Expected Power Reading** by subtracting the value of Test Component Correction Factor in Step 7 from 33 dBm (`33 dBm – "Test Component Correction Factor" dBm`). Record the frequency and this calculation in Table A-4, "PIM Output Tone Power Accuracy" on page A-3. Calculate the **Expected Power Reading** for 43 dBm and 46 dBm and record these calculations in Table A-4, "PIM Output Tone Power Accuracy" on page A-3.
9. Repeat Step 2 through Step 8 using the next F1 Carrier as the frequency setting. Repeat for the F2 Carrier frequencies until you have all frequencies for the applicable model option. Record the frequency and calculations in Table A-3, "Test Component F2 Characterization for MW82119A" on page A-2.
10. Remove the *Test Component*, however ***keep it intact to maintain test integrity*** in order to continue with the next verification procedure.

Output Power Verification

Equipment Required

- Anritsu Model MS2712E Spectrum Analyzer or equivalent
- *Test Component* from above consisting of:
  - Anritsu Model 3-1010-123 30 dB 50 W Fixed Attenuator
  - Anritsu Model 15NN50-1.5C RF Coaxial Cable
- Anritsu Model 1091-423-R 7/16 DIN(m) to N(m) Adapter

Procedure

Follow this entire procedure for each instrument that you test.

1. Press the **On/Off** key to turn on the Spectrum Analyzer.
2. Press the **Shift** key and then the **Mode** (**9**) key. Use the rotary knob to highlight Spectrum Analyzer, and then press the **Enter** key to switch to Spectrum Analyzer mode.
3. Press the **Shift** key and then the **Preset** (**1**) key. Press the Preset submenu key to set the instrument to the factory preset state.
4. Press the **Amplitude** main menu key, then press the Reference Level submenu key. Enter 18 and then press the dBm submenu key. Press the Scale submenu key, enter 2, and then press the dB/Div submenu key. Confirm that Auto Atten is set to On.
5. Press the **BW** main menu key, then press the RBW submenu key. Enter 10 and then press the kHz submenu key. Confirm that VBW is set to 3 kHz.
6. Press the **Span** main menu, then the Span submenu key. Enter 0, then press the Hz submenu (soft) key.
7. Press the **Shift** key and then the **Sweep** (**3**) key. Press the Zero Span Time submenu key. Set the value to 20 s.
8. Press the **Shift** key and then the **Trace** (**5**) key. Press the Trace A Operations submenu key. Press the Max Hold -> A submenu key.
9. Press the **On/Off** key to turn on the PIM Master.
10. Press the **Shift** key and then the **Mode** (**9**) key. Select PIM Analyzer and then press the **Enter** key to switch to PIM Analyzer mode.

11. Press the **Shift** key and then the **Preset** (**1**) key. Press the Preset submenu key to set the PIM Master to the factory preset state.
12. Confirm that all of the connectors are clean because any debris or contamination may cause incorrect measurement results.
13. Connect the 7/16 DIN(m) to N(m) Adapter to the test port of the PIM Master using the necessary torque wrench. Connect the fixed attenuator end of the *Test Component* to the Adapter and connect the cable end of the *Test Component* to the RF Input of the Spectrum Analyzer. The sequence of connecting the components is important, and you must adhere to this sequence for accurate results.
14. On the PIM Master, press the **Setup** main key and confirm that the Output Power is set to Low (25 – 37 dBm) Output Power 33.0 dBm (2 W setting), and that Test Duration is set to 20 s.
15. On the PIM Master, press the **Freq** main menu key and verify that the values for Carrier F1 and Carrier F2 are as stated in Table 2-2, "PIM Master Tx Frequency Table" on page 2-5 for the appropriate model.
16. On the Spectrum Analyzer, press the **Freq** main menu key, then press the Center Freq submenu key. Enter the Carrier F1 and then press the MHz submenu key.
17. On the Spectrum Analyzer, press the **Shift** key and then the **Trace** (**5**) key. Press the Reset Trace submenu key. Any signal that is displayed will be removed. When the screen is cleared, continue to the next step.
18. On the PIM Master, press the **Measurements** main menu key, ensure that the PIM vs. Time measurement mode is selected, press the Test submenu key to initiate the test. The submenu key has Measure underlined when the test is in progress. The test runs for 20 seconds. Wait until the Test submenu key has Off underlined.
19. On the Spectrum Analyzer, press the **Marker** main menu key, select Marker 1 and press the On submenu key. Press the Peak Search submenu key, Marker 1 should move to the peak point of the signal displayed. Note the Marker 1 measurement results that are displayed on the Spectrum Analyzer instrument.
20. Record the test results that are reported by the Spectrum Analyzer instrument in Table A-4, "PIM Output Tone Power Accuracy" on page A-3.
21. Repeat Step 16 through Step 20, using the value of Carrier F2 as the Center Freq setting, keeping the same output power setting until all carrier frequencies are verified.
22. On the PIM Master, press the **Setup** main menu key and confirm that the Output Power is set to High (37 – 46 dBm) Output Power 43.0 dBm (20 W setting). Repeat Step 15 through Step 21, using the value of 43 dBm as the Power setting. Record the results in Table A-4.
23. On the PIM Master, press the **Setup** main menu key and confirm that the Output Power is set to High (37 – 46 dBm) Output Power 46.0 dBm (40 W setting). Repeat Step 15 through Step 21, using the value of 46 dBm as the Power setting. Record the results in Table A-4.

2-4 Residual PIM Measurement

The following test is used to verify the residual PIM of the PIM Master. The procedure measures the internal residual PIM of the PIM Master.

Equipment Required

- Anritsu Model 2000-1724-R or 2000-1749-R Low PIM Load (Termination)
- Anritsu Model 1091-390-R or Anritsu Model 1091-403-R PIM Standard

Procedure

Follow this entire procedure for each instrument that you test.

1. Press the **On/Off** key to turn on the PIM Master.
2. Press the **Shift** key and then the **Mode** (**9**) key. Use the rotary knob to highlight PIM Analyzer and then press the **Enter** key to switch to PIM Analyzer mode.
3. Press the **Shift** key and then the **Preset** (**1**) key. Press the Preset submenu key to set the instrument to the factory preset state.
4. Confirm that all the connectors are clean because any debris or contamination may cause incorrect PIM measurement results. Also ensure any DIN adapters that are used are the low PIM versions that are provided in the accessory kit.

Caution	Before continuing, allow a 5-minute warm up for the internal circuitry to stabilize.

5. Press the **Freq** main menu key. Press the Carrier F1 submenu key, enter the appropriate Carrier F1 value from Table 2-2, “PIM Master Tx Frequency Table” on page 2-5, and then press the MHz submenu key. Press the Carrier F2 submenu key, enter the appropriate Carrier F2 value from Table 2-2, and then press the MHz submenu key.
6. Press the **Setup** main menu key. Press the High (37 – 46 dBm) Output Power submenu key, enter the value 43.0 dBm, and then press the **Enter** key. Press the Test Duration submenu key, enter the value 20 s, and then press the **Enter** key.
7. Press the **Shift** key and then the **Cal** (**2**) key. Press the START Calibration submenu key.
8. Follow the on screen instructions provided in the popup dialog boxes. Connect the PIM Standard to the PIM Master Test Port and then the Low PIM Termination to the PIM Standard using the Low PIM DIN adapter and the necessary torque wrench. After the initial Cal phase, you will be asked to remove the PIM Standard and to install just the Low PIM Termination to the test port. The Cal will proceed with the second phase. Then you will be asked to remove the Low PIM Termination. The calibration will proceed with the third phase, and upon completion, you will see the Calibration On display in the lower left hand corner.
9. On the PIM Master, press the **Measurements** main menu key. Press the PIM vs. Time submenu key and then press the Test submenu key to initiate the test. The key has Measure underlined when the test is in progress. The test runs for 20 seconds.
10. While the test is running, lightly tap on the PIM termination with an instrument that will not damage the surface of the assembly, such as the rubber end of an adjustable wrench. This dynamic testing demonstrates that the PIM level remains stable after vibrational stresses have been applied.
11. Wait until the Test key has Off underlined before proceeding.
12. Note the measurement result that is displayed on the PIM Master instrument. The measured peak value result should be < –117 dBm.
13. Record the test results that are reported by the PIM Master in Table A-5, “Residual PIM Measurement” on page A-4.

2-5 Option 31, GPS Verification

The following test verifies the GPS (Option 31) in the model MW82119A PIM Master.

GPS Option Bias-Tee Voltage Verification (Option 31)

The following test verifies the GPS Antenna Bias-Tee Voltages of Option 31 in the PIM Master.

Equipment Required for MW82119A

- Pomona Model 4290 SMA to BNC(f) Adapter or equivalent
- Amphenol Model B1004A1-ND3G-93R-0.05-1W GPS Terminator or equivalent

Procedure

1. Connect the external power supply (Anritsu PN 40-187-R) to the PIM Master.
2. Press the **On/Off** key to turn on the PIM Master.
3. Set the MW82119A to PIM Analyzer mode and preset the instrument.
4. Press the **Shift** key, and then the **System** (**3**) key.

3.3 V Test

5. Connect the 4290 Adapter to the GPS Antenna SMA connector.
6. Connect the GPS Terminator to the 4290 Adapter.
7. Ensure that the 3.3 V setting on the GPS Voltage submenu key is selected (underlined).
8. Turn GPS On by toggling the GPS submenu key so that the On text is underlined.
9. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the "Measured Current Value" column of Table 2-3, "Option 31, GPS Receiver Bias-Tee Verification" on page 2-9 and verify that it is within specification.

5V Test

10. Press the **Esc** key to dismiss the GPS Info dialog box.
11. Press the GPS Voltage submenu key and select 5 V (underlined).
12. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the "Measured Current Value" column of Table 2-3 and verify that it is within the expected range.

Table 2-3. Option 31, GPS Receiver Bias-Tee Verification

Voltage	Measured Current Value	Expected Range
3.3 V	mA	32 mA ±15% (27.2 mA to 36.8 mA)
5.0 V	mA	55.6 mA ±15% (47.3 mA to 63.9 mA)

Chapter 3 — Troubleshooting

Warning	The Anritsu PIM Master is capable of producing up to 40 Watts of RF power in the cellular communications bands. Users must take precautions to minimize exposure to these RF fields: • Always terminate the output port of the test equipment into a load, a loaded line, or a line that will radiate or absorb the energy before beginning a PIM test. • Confirm that the PIM Master RF power is off after a PIM test. • Always confirm that the RF power is off before disconnecting a coaxial connection, otherwise RF burns may result. Immediate burns to fingers or eyes can result from exposure to live connectors. • RF power can be immediately turned off with the Emergency Stop button. Ensure that all antennas under test are placed so that no personnel are exposed to RF levels that exceed the maximum allowable exposure.

3-1 Introduction

This chapter describes the primary troubleshooting operations that can be performed. Perform the troubleshooting suggestions in the order in which they are listed.

Only qualified service personnel should replace internal assemblies.

3-2 Turn-on Problems

Unit Cannot Power Up

Unit cannot power up, no activity occurs when the **On/Off** key is pressed:

1. Battery may be the wrong type. Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the PIM Master, but are electrically incompatible and will not charge correctly
2. Check the battery and plug in the external power adapter (Anritsu part number: 40-187-R).
3. Battery may be fully discharged. Use an external charger (Anritsu part number 2000-1374) to charge a completely discharged battery.
4. External power supply may have failed or be the wrong type. Verify that the output of the external adapter is approximately 12 VDC. Replace the external power supply.
5. The **On/Off** button may be damaged. Replace the keypad PCB or rubber keypad.
6. Main PCB has failed. Replace the Main PCB assembly.

Unit begins the boot process, but does not complete boot-up:

1. Boot-up process gets stuck with “Application Running” in the bottom-left-hand corner of the display. Turn the instrument power Off and then press the **Esc** key while pressing the **On/Off** button. This performs a factory default restart.
2. Boot-up process gets stuck at Anritsu splash screen. Using Bootstrap mode and a USB memory device that has been prepared with the current instrument firmware, perform the Load All procedure.
3. During boot-up process, the instrument stops with the message: “Failed to load touch screen calibration data. Please reboot the instrument”. Boot up the instrument in boot strap mode. The instrument will prompt you to perform a touch screen calibration.

4. Main PCB has failed. Replace the Main PCB assembly.

Unit makes normal boot-up sounds, but the display has a problem:

1. If the display is dim, then check the brightness setting under the System Menu / System Options.
2. Replace the LCD assembly.
3. The Main PCB has failed. Replace the Main PCB assembly.

Boot-up Self Test fails:

1. Perform a Master Reset. Be advised that a Master Reset will delete all user saved setups, JPEG, and measurement files. Ensure that you have backups of these before performing a Master Reset.
2. If the message relates to the RTC battery, then replace the Main PCB.
3. The Main PCB has failed. Replace the Main PCB assembly

3-3 PIM Analyzer Warning Messages

Instrument powers up, but displays a warning message:

1. **Ref PLL Lock Error or RF PLL Lock Error**

   These indicate a potential hardware failure that could compromise measurements. If the failure persists, then contact your Anritsu Service Center.

2. **EMERGENCY Shut Down switch pressed**

   The PIM Master front panel **EMERGENCY STOP** button has been pressed. This will turn off the PIM RF power output, and measurements may be invalid. If the condition persists, then contact your Anritsu Service Center.

3. **PIM AMP(S) Exceeding Normal Temperature Range**

   The internal PIM Master amplifiers have exceeded their normal operating temperature. This could indicate a potential hardware failure that could compromise measurements. If the failure persists, then contact your Anritsu Service Center.

4. **PIM UNIT Exceeding Normal Temperature Range**

   The entire PIM Master instrument is beyond its normal operating temperature. This could lead to a potential degradation in measurements, and signal dropout could occur. If the failure persists, then contact your Anritsu Service Center.

5. **PIM EEPROM Error**

   The PIM Master cannot access its on-board EEPROM. This could indicate a potential hardware failure that could compromise measurements. If the failure persists, then contact your Anritsu Service Center.

6. **IM OVERLOAD**

   This is a warning message that the measured signal level is approaching the saturation limit of the instrument. The actual signal level may be higher than the reported signal level under this condition. This message is displayed in PIM vs Time and Swept PIM measurement modes if PIM values exceed this saturation limit.

7. **Receiver Amplitude Low**

   This message can occur if signal amplitude degrades within the instrument. It can have an impact on overall measurement accuracy and should be an indicator to sent the unit to Anritsu Service Center for repair.

3-4 Operating Problems

RF Connector cleanliness and integrity have a big impact on measurements. Anritsu recommends that the RF connectors on the instrument and the cables be cleaned and inspected. The following procedures are recommended.

- Clean the RF connectors and center pins with a lint-free wipe or cotton swab dampened with isopropyl alcohol.
- Use a non-metallic object (such as the wooden end of a cotton swab) to push the lint-free wipe into the connector RF interface to remove metal flakes.
- Visually inspect the connectors. For precision measurements, the pins of the connectors must be unbroken and uniform in appearance. If you are unsure whether the connectors are undamaged, gauge the connectors to confirm that the dimensions are correct.
- Visually inspect the test port cables. To obtain accurate readings within instrument specifications, test port cables must be: free of metal flakes, uniform in appearance, and not stretched, kinked, dented, or broken.

PIM Self Test Fails

The PIM Master instrument Self Test – PIM Self Test fails:

The Main PCB Assembly has failed. One of the internal power rails may have failed. Contact your Anritsu Service Center.

The PIM Master instrument Application Self Test – PIM Application Self Test fails:

The RF PCB Assembly has failed. One of the internal power rails may have failed. Contact your Anritsu Service Center.

Error Messages

1. **Emergency Shut Down switch pressed** – Alerts you that the PIM Master front panel **EMERGENCY STOP** button has been pressed. This will turn Off the PIM RF and cancel the measurement on the Controller. Measurement results may be invalid. The PIM Master will automatically recover.
2. **Warning! High Reflection from measurement path!** – Alerts you when connection to the test port produces large reflections back into the instrument. This can compromise measurement accuracy. To fix this error, check all junction connections, or remove the RF connection or component that is causing high reflection. If a cable or antenna is connected, then it could be an indication of poor RF transmission capability.

In the event that you see a Malfunction Error message, write it down for troubleshooting purposes.

3-5 Other Problems

Battery Pack Charging Problems: refer to Chapter 4, "Battery Information".

Touch Screen Issues:

1. The Touch Screen may have lost its calibration data. Perform a Touch Screen Calibration from the **System** (**8**) menu, and follow the on-screen instructions. If you cannot get in to the Touch Screen calibration mode from the System menu, use **Shift** (**0**) to get into the Touch Screen calibration mode directly.
2. Check the firmware version that is installed on the instrument, and ensure that it is the latest. If not, install the latest firmware, and re-do the touch screen calibration (as described previously).
3. Touch screen has been damaged or has failed. Replace the touch screen.

4. If you are in the middle of making measurements and absolutely cannot wait to replace the touch screen, then an emergency arrow mode navigation alternative is available. Select Touch Screen Calibration from the System menu and enter 1, and then enter **1** again. You can select the touch screen keys by using the **Arrow** keys. In the emergency arrow mode navigation mode, the touch screen keys are highlighted with a red border. To select that touch screen key, press the **Menu** button above the **Arrow** keys (on the keypad).

Chapter 4 — Battery Information

4-1 General Information

Warning	This equipment is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and also recommends storing the battery in a leak-proof, plastic container.

The following information relates to the care and handling of the Anritsu battery pack and Lithium-Ion batteries.

- The battery that is supplied with the PIM Master may need charging before use. Before using the PIM Master, the internal battery may be charged either in the instrument by using the AC-DC Adapter or the 12-Volt DC adapter, or separately in the optional Dual Battery Charger.
- Use only Anritsu approved battery packs.
- Recharge the battery only in the PIM Master or in an Anritsu approved charger.
- When the PIM Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours. Overcharging may shorten battery life.
- If left unused, a fully charged battery will discharge itself over time.
- Temperature extremes affect the ability of the battery to charge. Allow the battery to cool down or warm up as necessary before use or charging.
- Discharge the battery from time to time to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but it will eventually wear out.
- The battery may need to be replaced when the operating time between charges becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery in extreme hot or cold places will reduce the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate, or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.

4-2 Battery Pack Removal and Replacement

This section provides instructions for the removal and replacement of the PIM Master battery pack.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used here are representative and may show instruments other than the PIM Master.

1. The battery access door is located on the bottom of the PIM Master as illustrated in Figure 4-1.

Figure 4-1. Battery Access Door Location

2. With the PIM Master laying flat and face up on a stable surface, turn the battery access door retainer a quarter of a turn and pull the battery door down and away from the bottom of the instrument as shown in Figure 4-2.

Figure 4-2. Opening the Battery Access Door

3. Remove the battery access door by sliding it out of the slot in the case, as shown Figure 4-3.

Figure 4-3. Removing the Battery Access Door

4. With the battery access door completely removed, the battery snaps in and out of the compartment door, as illustrated in Figure 4-4. Note the battery orientation image in the cover.

Figure 4-4. Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the battery with the contacts facing the bottom of the instrument (not facing the cover plate). See Figure 4-5. The diagram inside the battery compartment is a reflected image of the battery to show how the battery connectors align with the pins inside the compartment. To avoid connector pin damage, you must not press the battery downward onto the connector pins within the battery compartment. You must position the battery door assembly so that the battery connections can slide lengthwise onto the connector pins as you seat the door assembly against the bottom of the PIM Master. The tab on the door fits into a slot located on the edge of the case, adjacent to the connector pins.

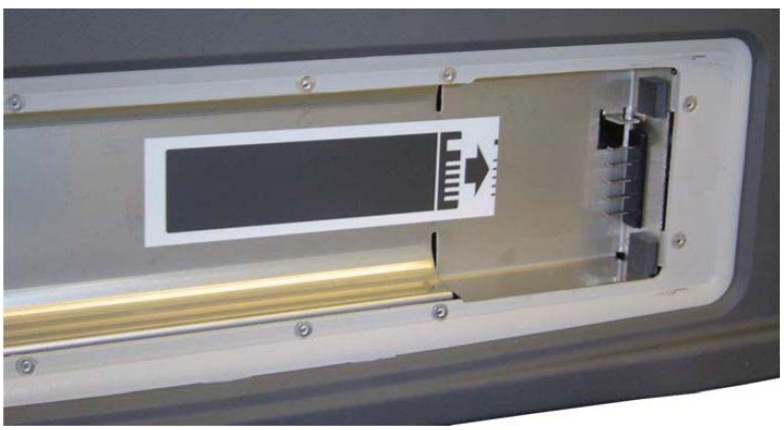


Figure 4-5. Battery Contacts and Orientation

Chapter 5 — Assembly Replacement

5-1 Introduction

This chapter describes opening and closing the PIM Master case along with basic parts replacement steps. The sections are as follows:

- "Front Panel Removal" on page 5-2
- "Front Panel Assemblies" on page 5-8
- "Chassis Assemblies " on page 5-15

5-2 Replaceable Parts List

Refer to Table 1-4, "List of Replaceable Parts" on page 1-4 for the list of replaceable parts. Refer to the following sections for basic replacement instructions.

Replacement of the Main PCB, RF Module, or Filter Assembly within the Chassis requires a full characterization with adjustments to be performed. Adjustments are not documented in this Maintenance Manual. Contact your local Anritsu Service Center for this service.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the PIM Master.

Caution	Only qualified personnel should open the case and replace internal assemblies. Assemblies shown in Table 1-4, "List of Replaceable Parts" on page 1-4 are typically the only items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without specialized training. Removing RF shields from PC boards, or adjustment of screws on or near the shields, may detune sensitive RF circuits and will result in degraded performance. All work should be performed in a static-safe work area. Do not reuse screws that have been removed. Use new screws with patch lock during assembly replacement.

5-3 Front Panel Removal

Caution	Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. The PIM Master contains components that can easily be damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 are mandatory to avoid ESD damage when handling subassemblies or components found in the instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

This procedure provides instructions for opening the PIM Master case. With the case opened, the internal assemblies can be removed and replaced, as described in this chapter.

Opening the PIM Master Case

1. Place the PIM Master on a stable work surface that will not scratch or damage the instrument.
2. Remove the Battery Door and battery as shown in Figure 5-1.

Figure 5-1. Remove Battery Door

3. Remove the bottom bumper (Figure 5-2).

The bottom bumper part number is 3-72497.

Figure 5-2. Remove the Bottom Bumper

4. Remove the 2 screws retaining the Handle Strap (Figure 5-3).

The Handle Strap part number is 2000-1713-R.

Figure 5-3. Remove the Handle Hand Strap

5. Remove the Top Bumper and Handle Hand Strap (Figure 5-4).

The top bumper part number is 3-72496.

Figure 5-4. Remove the Top Bumper

6. Remove the 8 screws retaining the Front Panel.

a. Remove the 2 screws on the top (Figure 5-5) under the stickers.

Figure 5-5. Remove the Top Screws

b. Remove the 2 screws on the bottom (under the stickers), the 2 screws on the right side, and the 2 screws on the left side (Figure 5-6).

Figure 5-6. Remove the Bottom and Side Screws

7. Carefully raise the bottom edge of the front panel and unpeel the Kapton tape on the LCD cable connector (left side under the Front Panel). Remove the connector (Figure 5-7).

Figure 5-7. LCD Cable Connector

8. Continue lifting the Front Panel and remove the longer Keypad Cable on the right side (Figure 5-8).

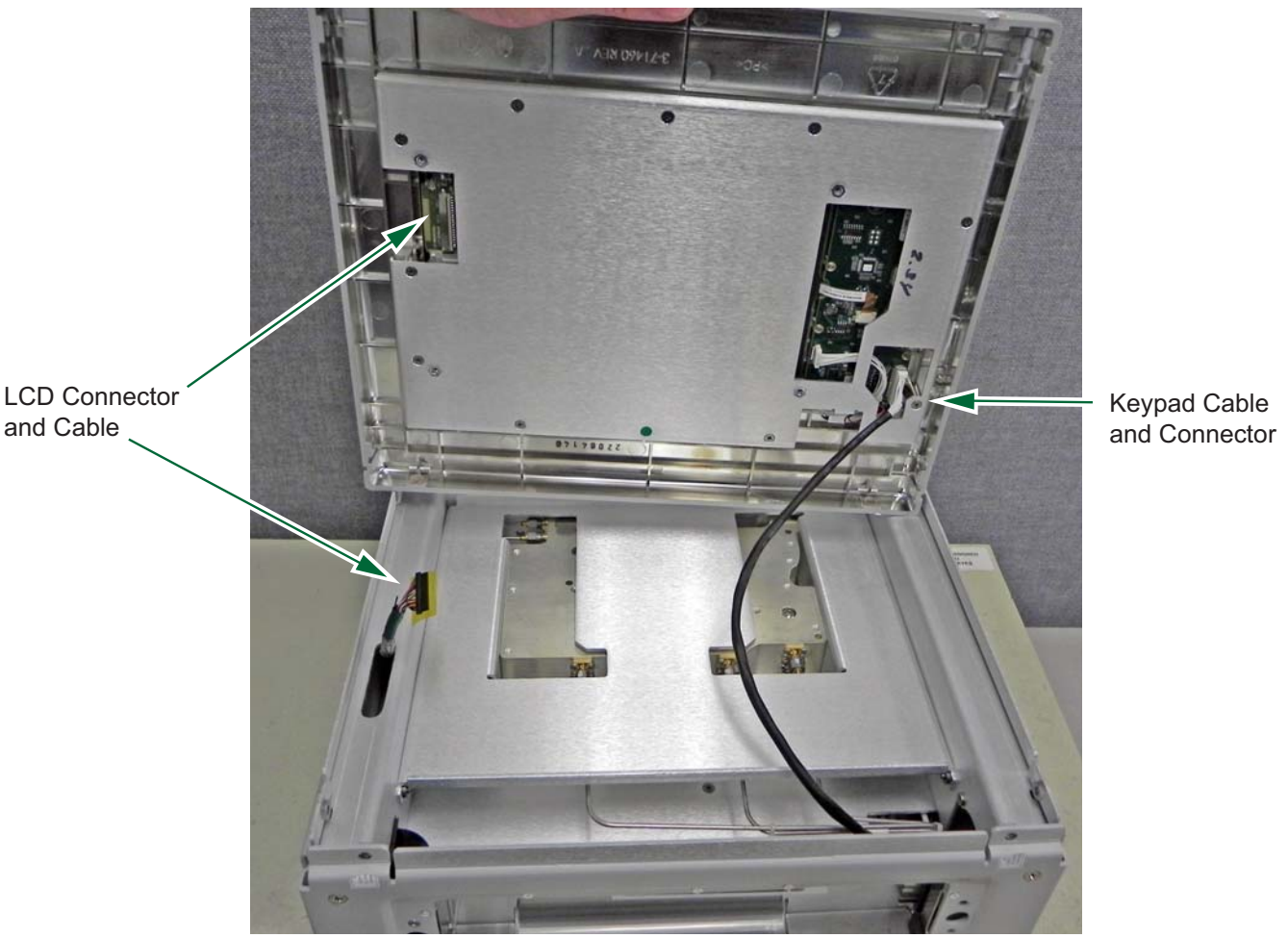


Figure 5-8. Front Panel Cable Connections

9. The Front Panel Assembly is now separated from the PIM Master body (Figure 5-9).

Figure 5-9. Top and Bottom of the Front Panel Assembly

10. Reverse the above steps to reassemble the case.

Note	New screws with patch lock must be used for reassembly.

Tilt Bail

Replaceable Parts:

- 3-74084 – Tilt Bail
- 3-74085 – Left Tilt Bail Holder
- 3-74086 – Right Tilt Bail Holder

The left and right tilt bail holders are secured to the back of the PIM Master case by 4 screws each. The tilt bail is flexed to remove it from the holders and to replace it.

Note	New screws with patch lock must be used for reassembly.

5-4 Front Panel Assemblies

These procedures allow access to the following replaceable parts and assemblies:

- 3-15-165 — LCD Display with LED Backlight
- ND80480 — 8.4 in GFG Touch Screen
- 3-74999-3 — Main Numeric Keypad PCB
- 3-71641 — Main Numeric Keypad
- 3-72787 — Speaker

The following steps describe a complete tear down of the front panel assembly. Actual required steps depend on the part being replaced.

Note	Proper routing of the cables is important for instrument performance. Note the cable routing.

1. Perform procedure in "Front Panel Removal" on page 5-2.
2. Remove the 11 screws holding the LCD bracket to the PIM Master Front Panel (Figure 5-10).

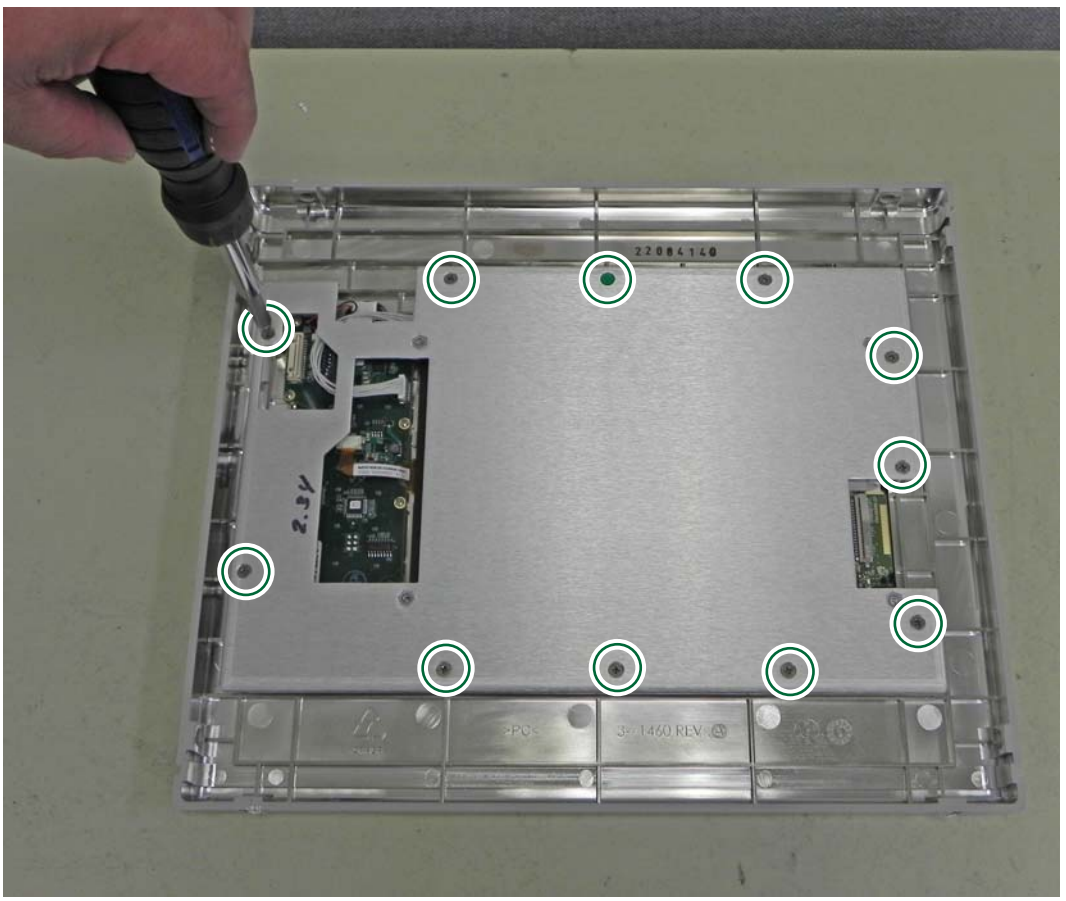


Figure 5-10. LCD Bracket Removal

3. Disconnect the LCD Backlight Cable from the Keypad PCB (Figure 5-11).

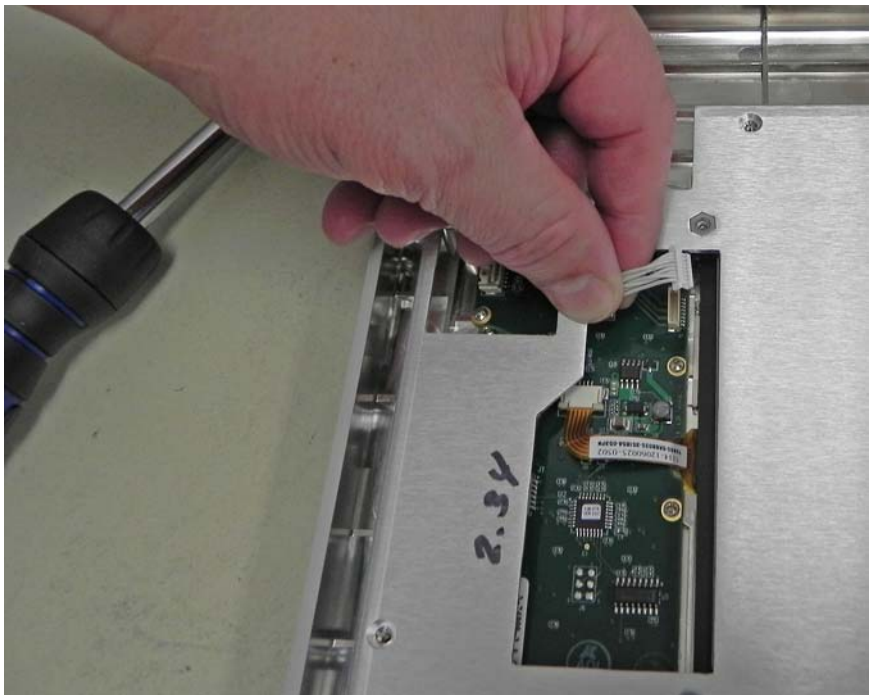


Figure 5-11. Disconnect Backlight Cable

4. Carefully lift up and remove the bracket with the LCD attached (Figure 5-12).

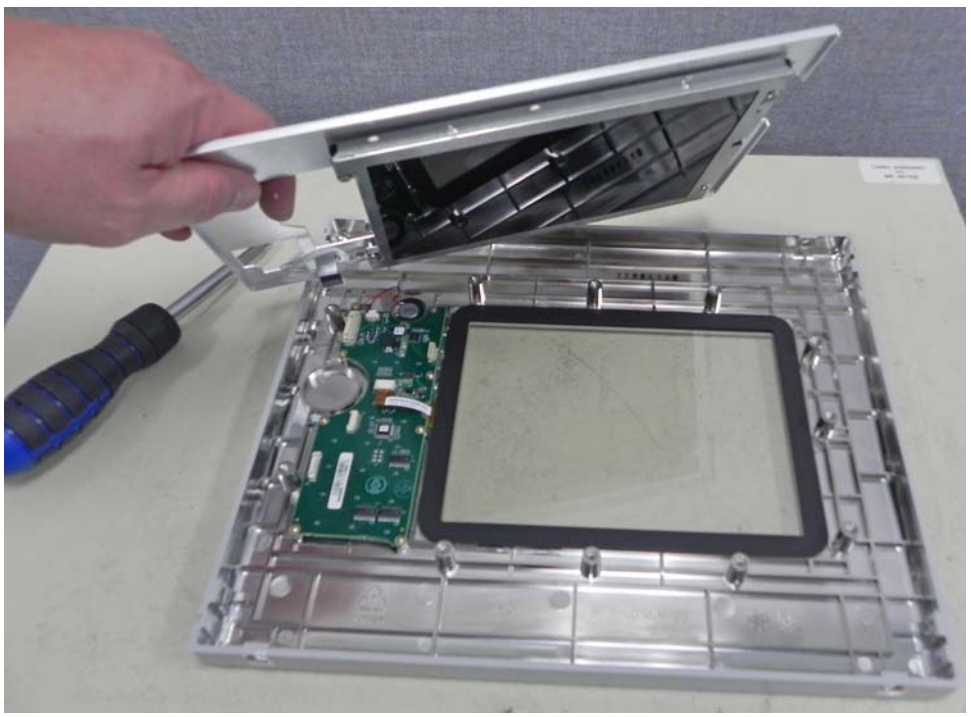
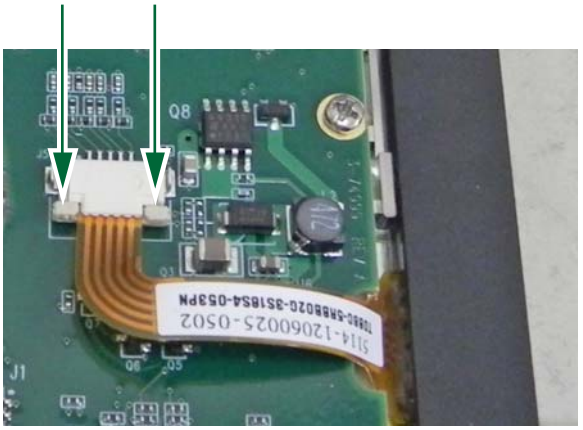


Figure 5-12. Remove LCD

5. The GFG Touchscreen is connected to the Keypad PCB with a flexi-circuit. Pull down on the side of the connector to release the flexi-circuit and then gently pull the flexi-circuit straight out(Figure 5-13).

1. Pull down on the tabs at the sides of the connector



2. Gently remove the flexture

Figure 5-13. Touchscreen Flexi-circuit Removal

6. Carefully remove the Touch Screen. Reseat the gasket on the front side of the Touchscreen if it is displaced during removal (Figure 5-14).

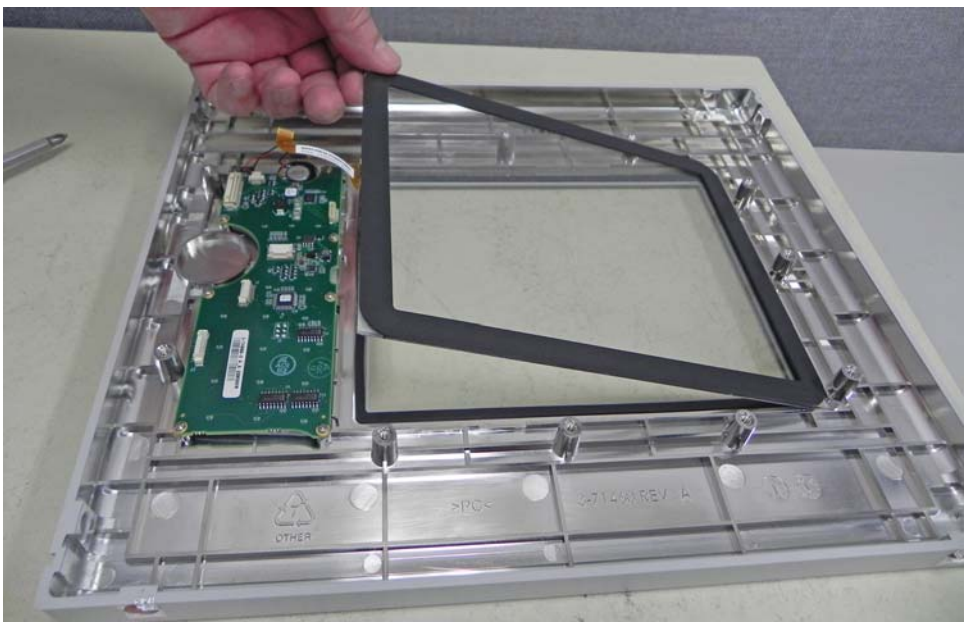


Figure 5-14. Remove Touch Screen

7. Carefully disconnect the Speaker connector and remove the 8 screws holding the Keypad PCB to the Front Panel Assembly (Figure 5-15).

Figure 5-15. Remove Keypad PCB Screws

8. Carefully remove the PCB to expose the PCB membrane (Figure 5-16).

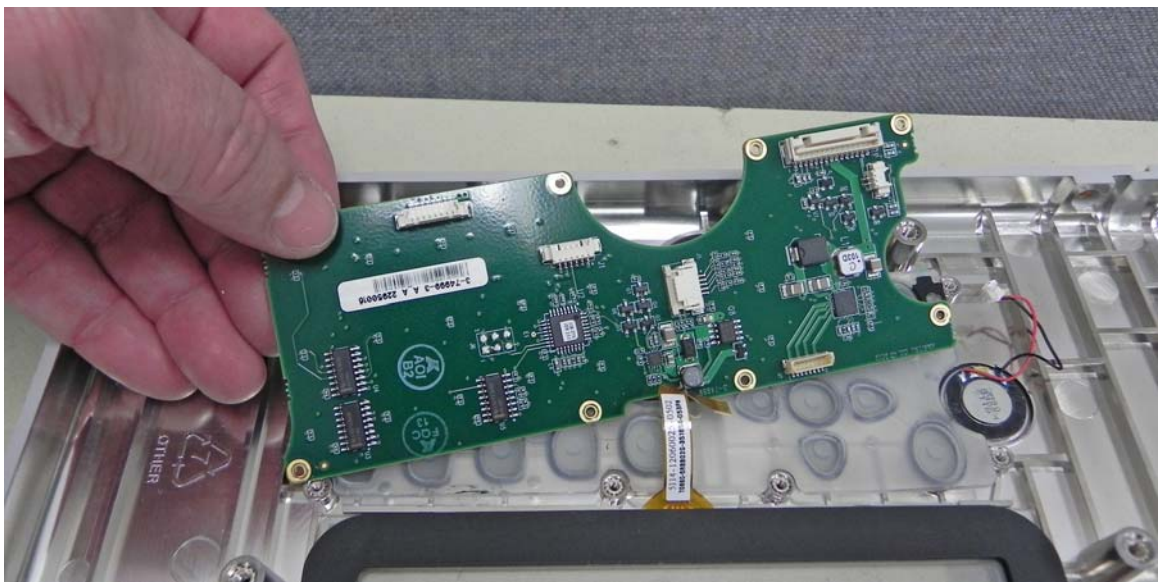


Figure 5-16. Remove Keypad PCB

9. Peal up the rubber keypad membrane (Figure 5-17).

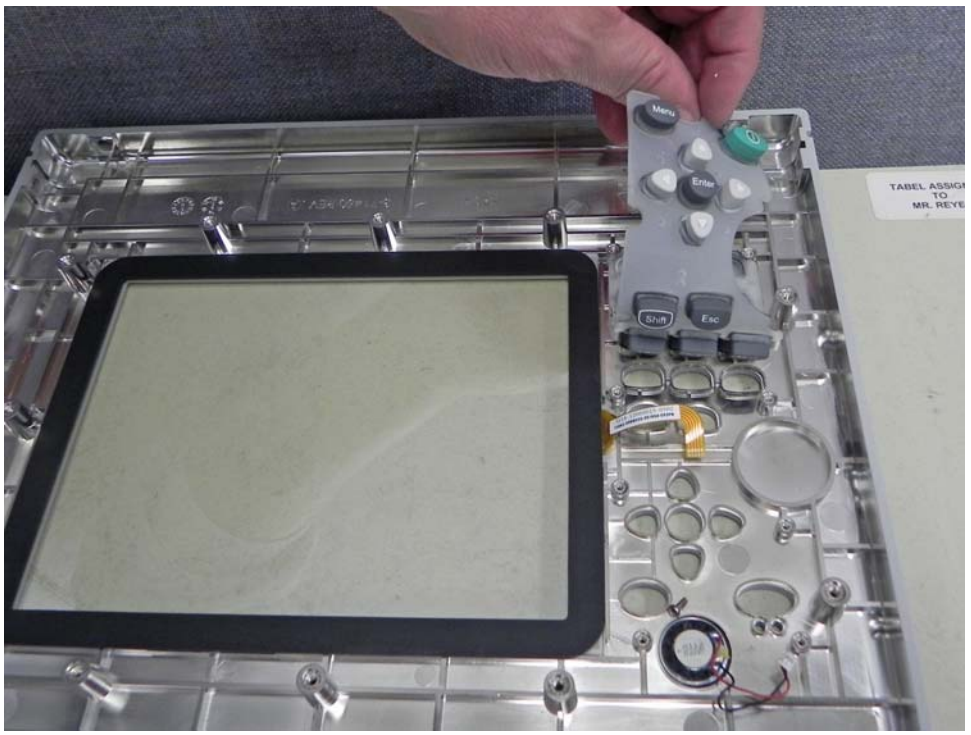


Figure 5-17. Remove Rubber Keypad Membrane

10. Carefully pry up the speaker with a stub nosed pick. Note that the front side of the speaker has a gasket (Figure 5-18).

Figure 5-18. Remove Speaker

11. Remove the 4 screws holding the LCD Display to the bracket (Figure 5-19).

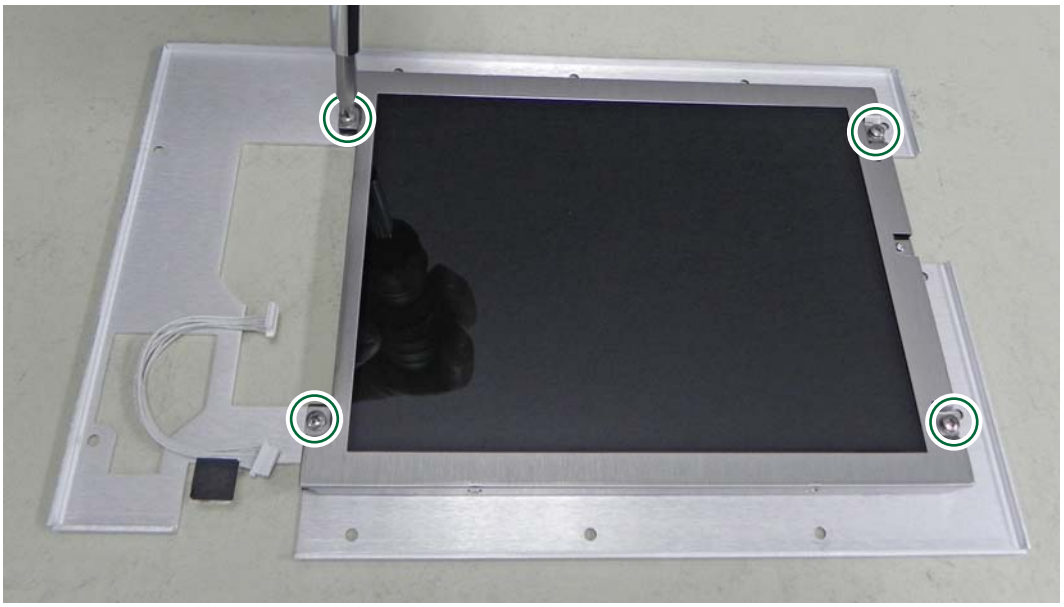


Figure 5-19. Replace LCD

12. Reverse the above steps to reassemble the Front Panel Assembly.

13. Note the correct cable path shown below when reattaching the LCD bracket to the Front Panel (Figure 5-20).

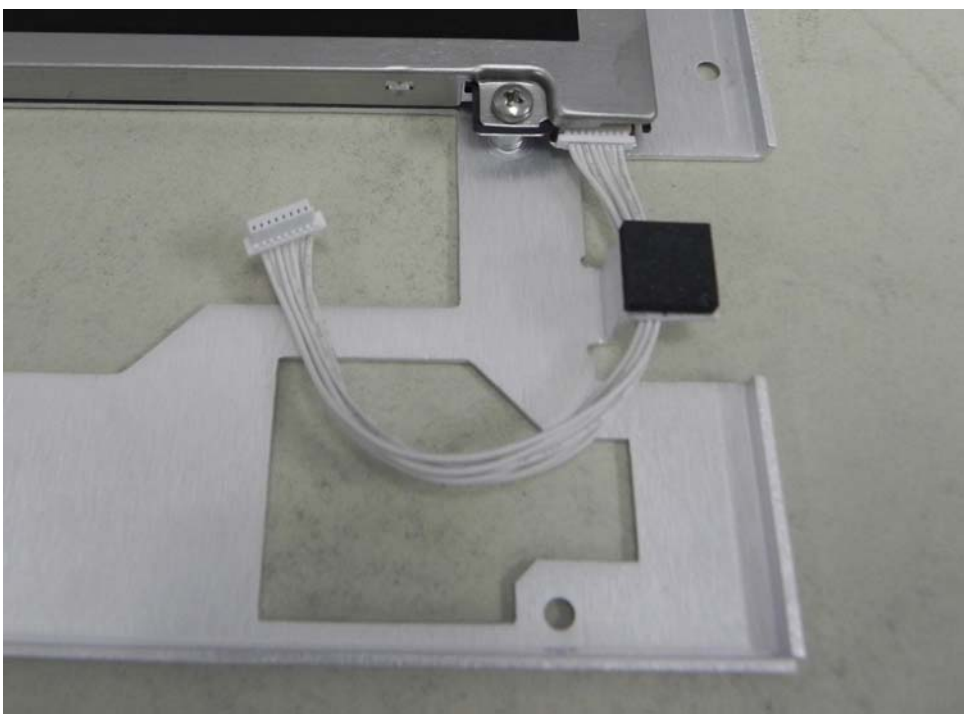


Figure 5-20. LCD Cable Path

14. Reverse the above steps to reassemble the front panel assembly.

Note	New screws with patch lock must be used for reassembly.

5-5 Chassis Assemblies

These procedures allow access to the following replaceable parts and assemblies:

- ND75345, MW82119A Main PCB Assembly
- ND75358, GPS Module, Option 31
- ND80833, MW82119A with Option 180 Filter Assembly
- ND80891, MW82119A with Option 180 RF Module Assembly
- ND80836, MW82119A with Option 190 Filter Assembly
- ND75350, MW82119A with Option 190 RF Module Assembly
- ND80833, MW82119A with Option 192 Filter Assembly
- ND75351, MW82119A with Option 192 RF Module Assembly
- ND80842, MW82119A with Option 193 Filter Assembly
- ND80400, MW82119A with Option 193 RF Module Assembly
- ND80841, MW82119A with Option 210 Filter Assembly
- ND80198, MW82119A with Option 210 RF Module Assembly
- ND80840, MW82119A with Option 260 Filter Assembly
- ND80199, MW82119A with Option 260 RF Module Assembly
- ND80838, MW82119A with Option 700 Filter Assembly
- ND80359, MW82119A with Option 700 RF Module Assembly
- ND75352, MW82119A with Option 702 Filter Assembly
- ND80769, MW82119A with Option 702 RF Module Assembly
- ND80839, MW82119A with Option 800 Filter Assembly
- ND80197, MW82119A with Option 800 RF Module Assembly
- ND80837, MW82119A with Option 850 Filter Assembly
- ND75347, MW82119A with Option 850 RF Module Assembly
- ND80835, MW82119A with Option 900 Filter Assembly
- ND80882, MW82119A with Option 900 RF Module Assembly

The steps below describe a complete tear down of the Chassis Assembly. Actual required steps depend on the part or assembly being replaced.

Note	Proper routing of the cables is important for instrument performance. Note the cable routing. Replacement of the Main PCB, RF Module or Filter Assembly requires a full characterization with adjustments to be performed. Adjustments are not documented in this Maintenance Manual. Contact your local Anritsu Service Center for this service.

1. Perform procedure in "Front Panel Removal" on page 5-2.

2. Raise the connector side panel cover door and remove the 2 screws. Remove the door and attached base plate (Figure 5-21).

Figure 5-21. Remove Door Panel

3. Remove the 6 screws from each side panel (Figure 5-22).

Figure 5-22. Remove Side Panel Screws

4. To replace or install Option 31, go to Step 9

5. Remove the 4 screws holding the bottom panel (Figure 5-23).

Figure 5-23. Remove Bottom Panel Screws

6. Lower the bottom panel and disconnect the battery cable (Figure 5-24).

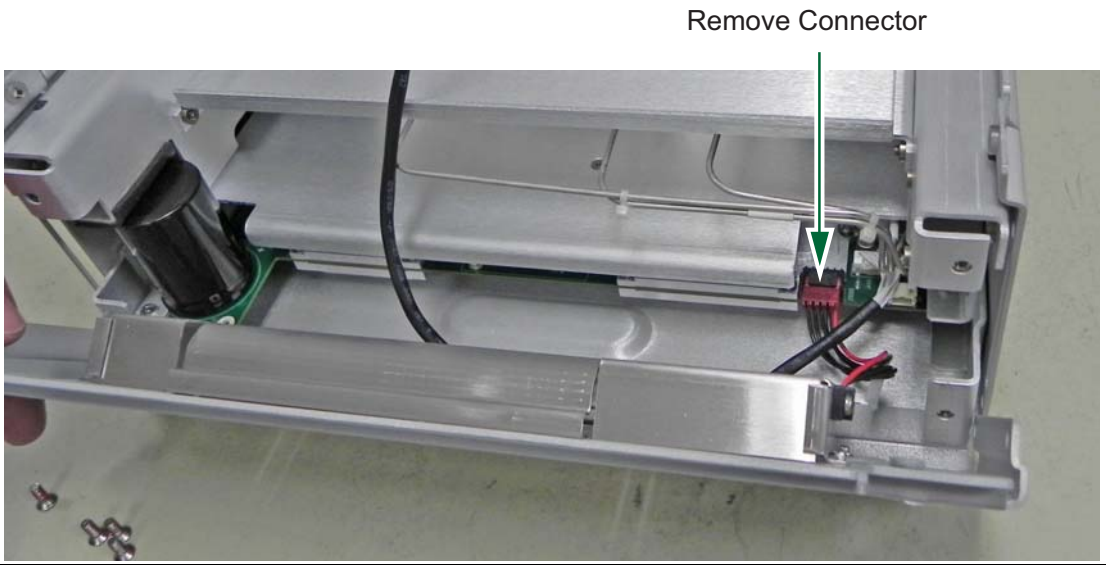


Figure 5-24. Remove Bottom Panel

7. Remove the 4 screws holding the top panel cover (Figure 5-25).

Figure 5-25. Remove Top Panel Screws

8. Slide the chassis out of the housing (Figure 5-26).

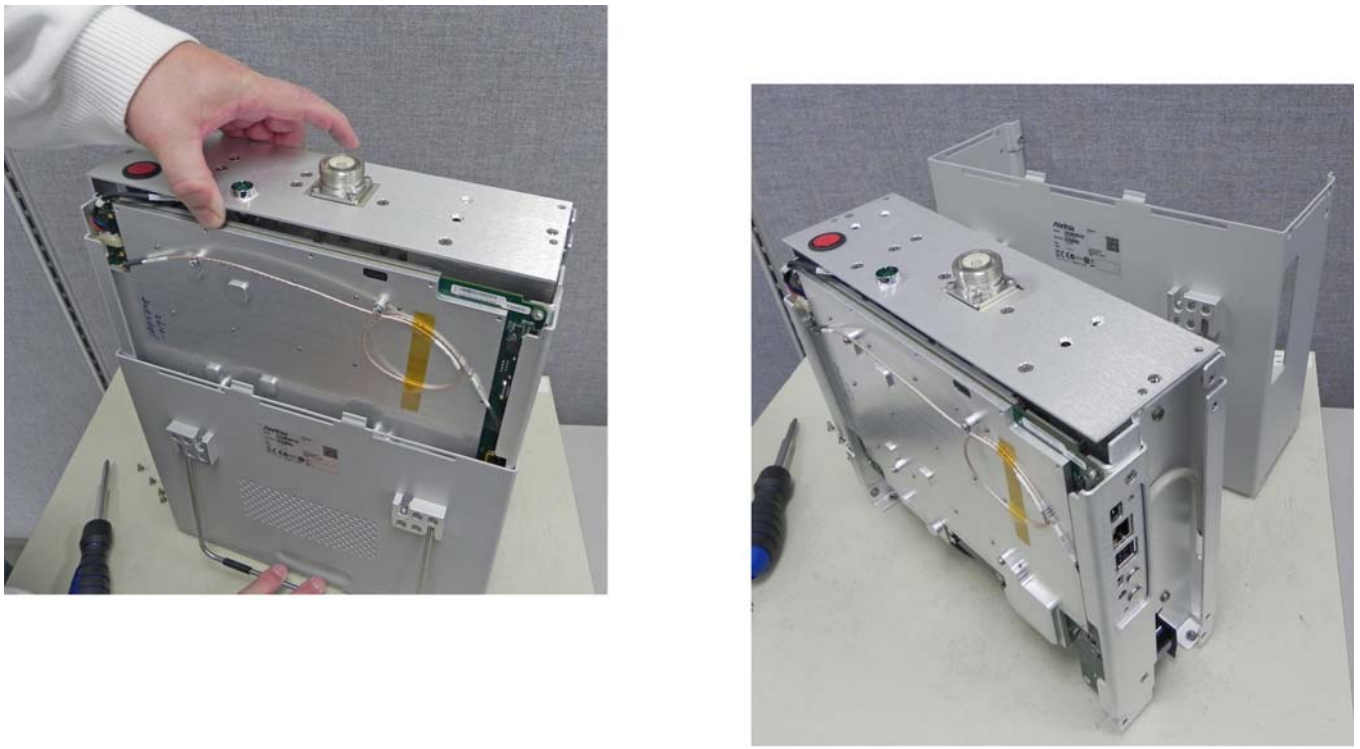


Figure 5-26. Slide Chassis Out of Housing

Note	The design and size of the filter and RF assemblies vary based on the Option number of the MW82119A. The following steps illustrate an assembly with side brackets. Some options do not have these brackets. Hole patterns also vary based on MW82119A option.

9. The GPS module is mounted onto the mother board with two screws (Figure 5-27). A cable with an MMCX(m) connector attaches to the GPS module (Figure 5-28), and an SMA(f) connector attaches the connector panel (Figure 5-29).

Figure 5-27. GPS Module (Option 31) Removal

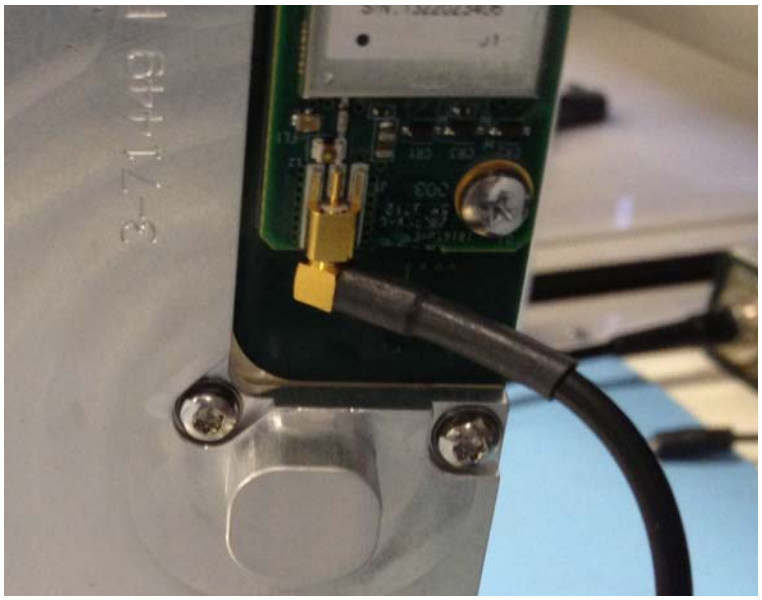


Figure 5-28. GPS Module with MMCX Cable attached

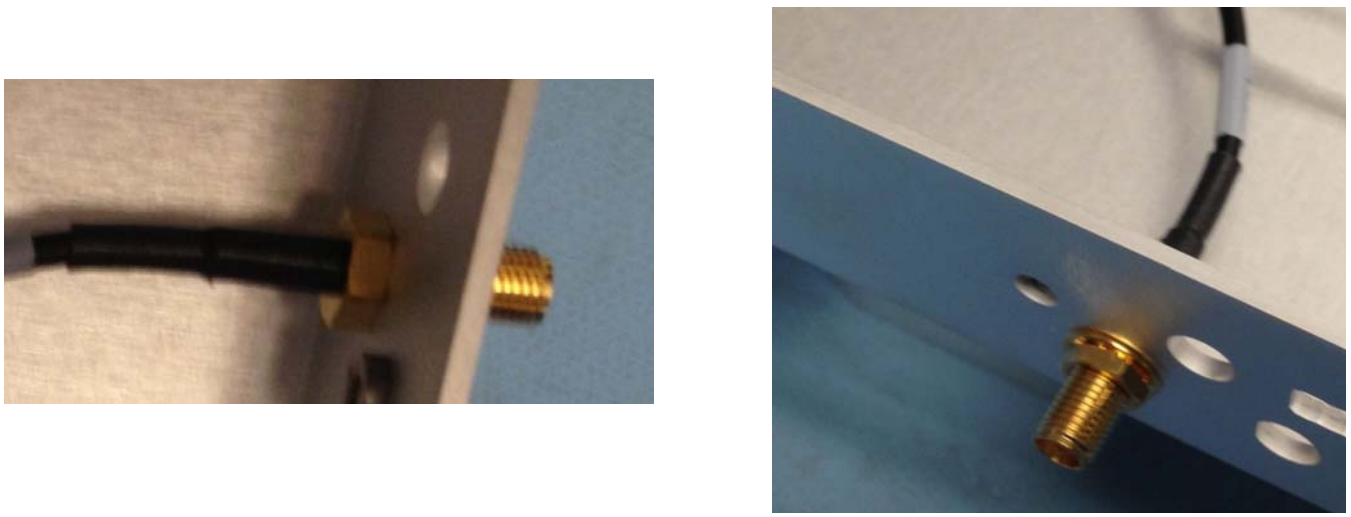


Figure 5-29. GPS SMA Connection on connector panel (inside and outside view)

10. Remove the Emergency Stop cable assembly from the Main Board assembly. Remove the screws from the top plate of the filter assembly. Between 5 and 11 screws may be used based upon the model Option (Figure 5-30).

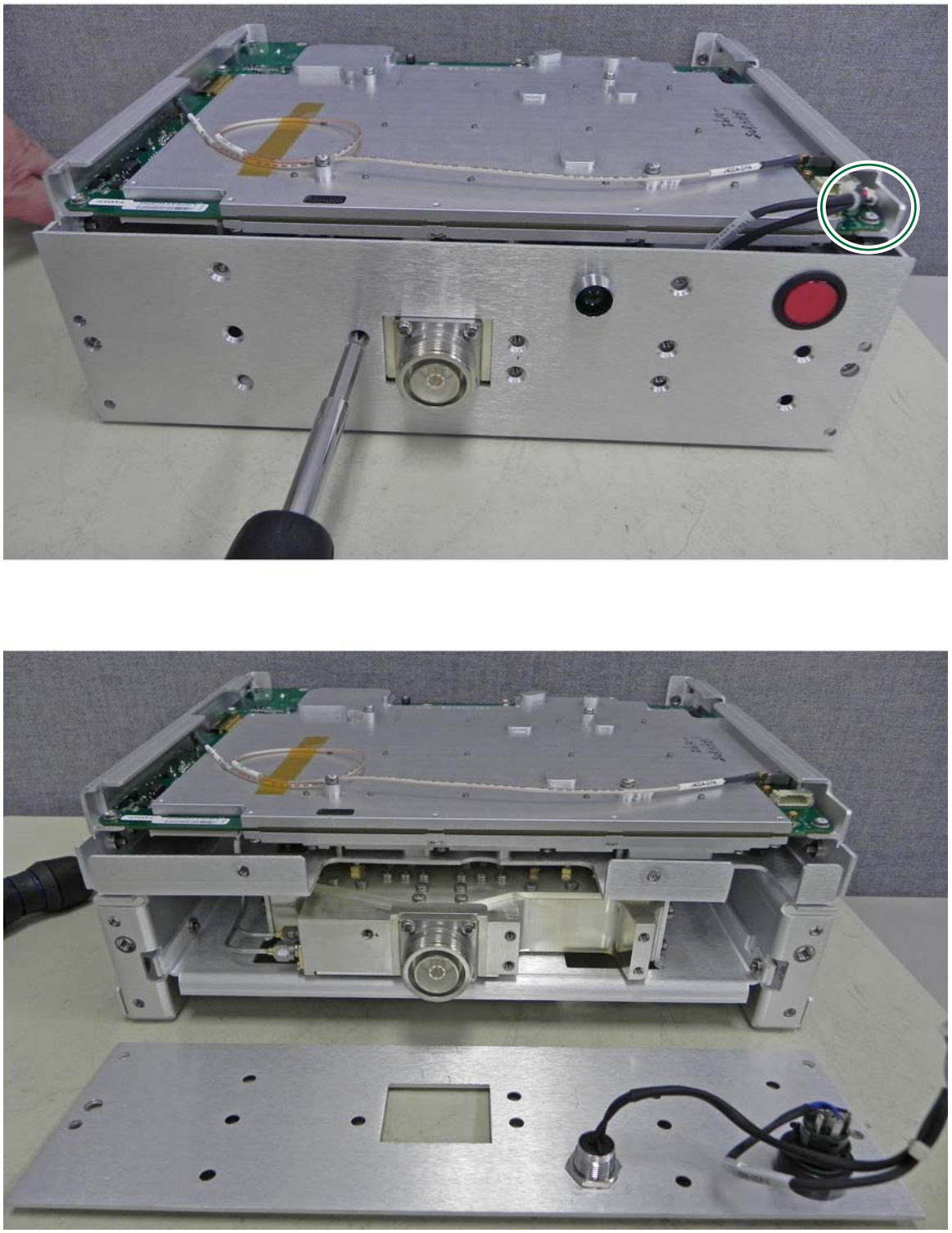


Figure 5-30. Remove Filter Assembly Top Plate

11. If applicable, remove the brackets from both sides of the filter assembly (Figure 5-31). The sample below has 4 screws on each side. On the connector panel side, slide the side bracket past the large black capacitor. Be careful to avoid damaging the capacitor while removing the side bracket.

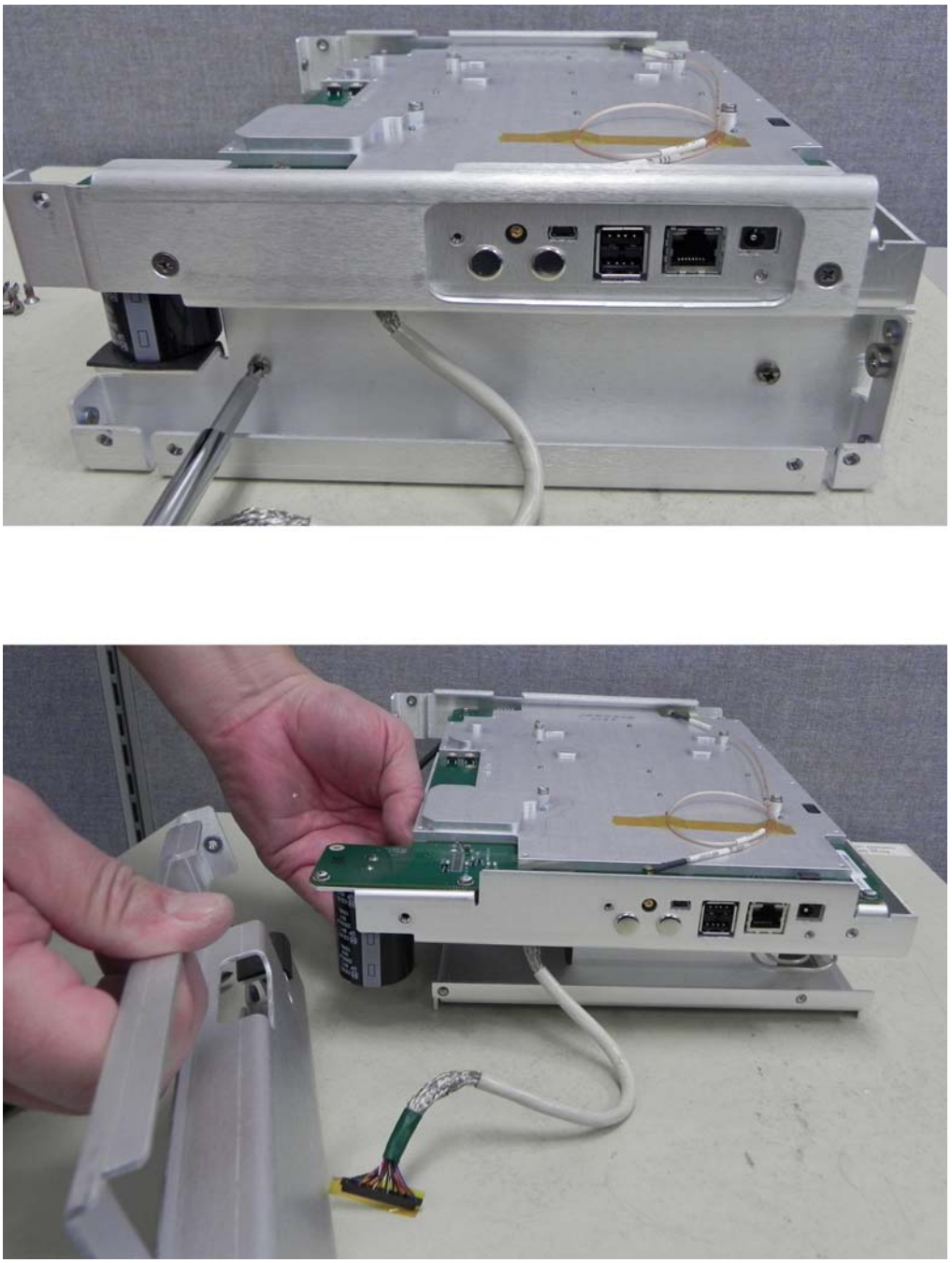


Figure 5-31. Remove Side Brackets

Note	Two different screw types may be holding the slide brackets.

12. Remove the five M3 x 6 screws on the perimeter (shown in Green) holding the motherboard to the chassis and the four M3 x 35 mm screws (shown in Red) holding the motherboard to the RF assembly (Figure 5-32). The motherboard can now be removed. Filter removal is not required if only the motherboard is being changed.

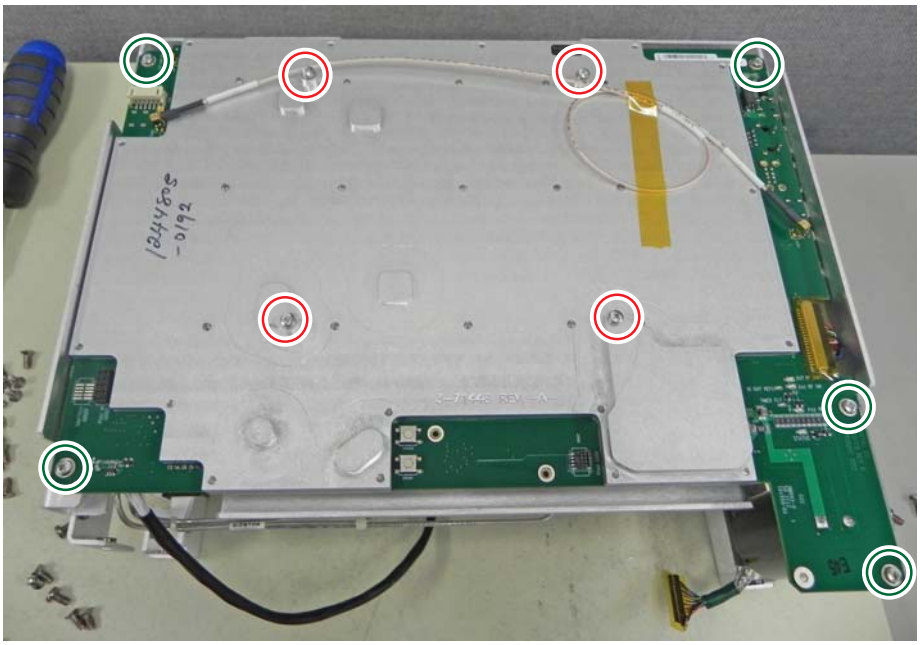


Figure 5-32. Remove Motherboard

13. If replacing the RF assembly, then remove the 2 screws and the 5 semi-rigid cables to release the RF assembly (Figure 5-33). Some earlier revisions do not have the 2 screws that are shown in red. For those revisions, refer to Figure 5-34 on page 5-24 for alternate screw location after removing the filter assembly.

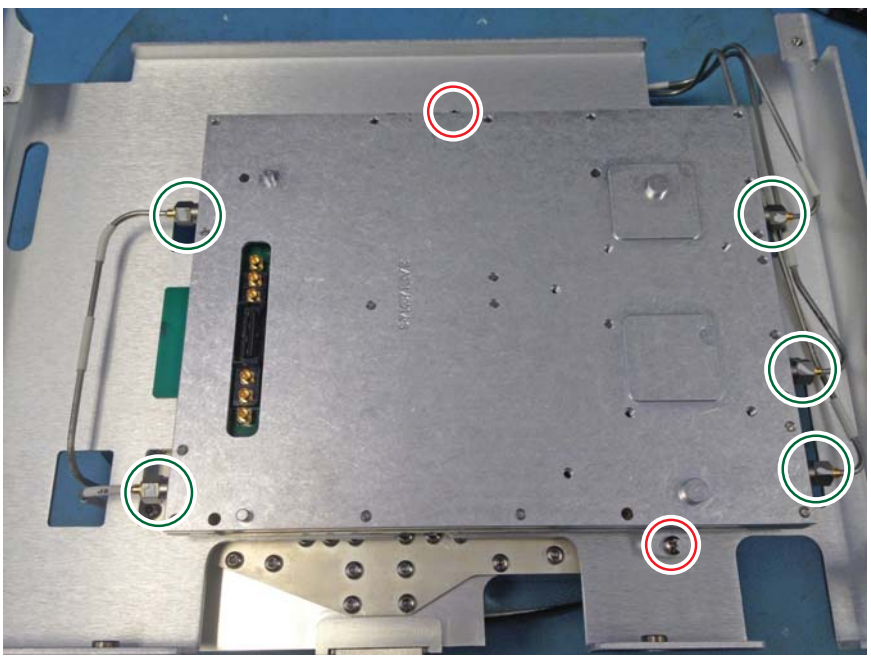


Figure 5-33. Remove RF Assembly

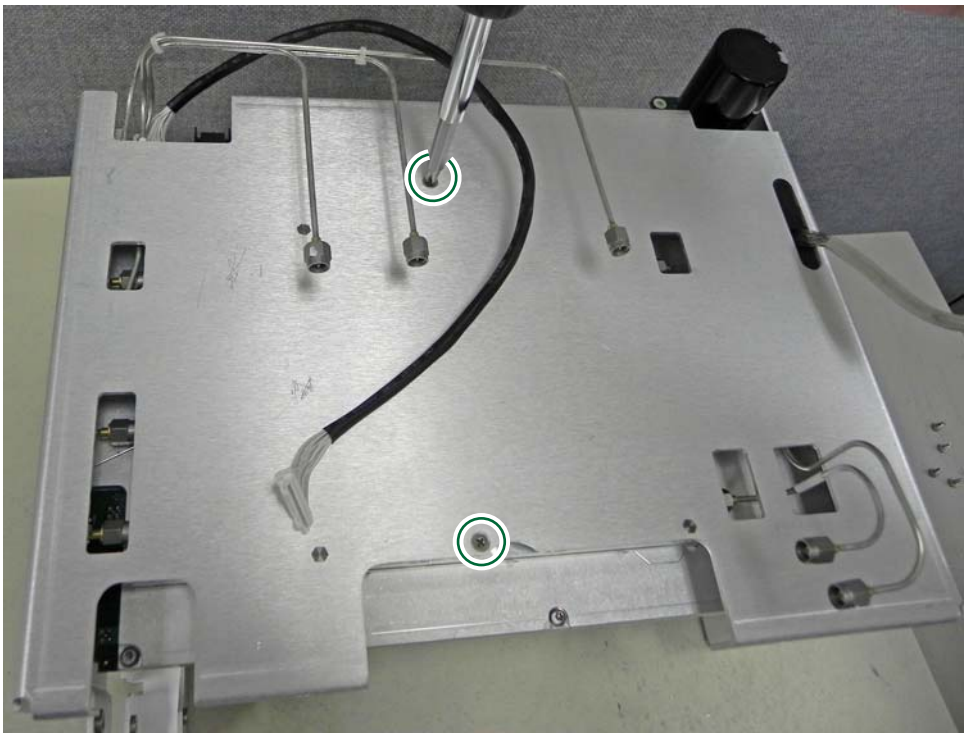


Figure 5-34. Alternate RF Assembly Screw Locations

14. If replacing the filter, then flip the assembly over so that it is resting on the Main PCB board shield. Carefully disconnect the 5 semi-rigid RF cables that are connected to the filter assembly by using the Anritsu 5/16 in torque wrench (p/n 01-201). Figure 5-35 illustrates the 5 cables.

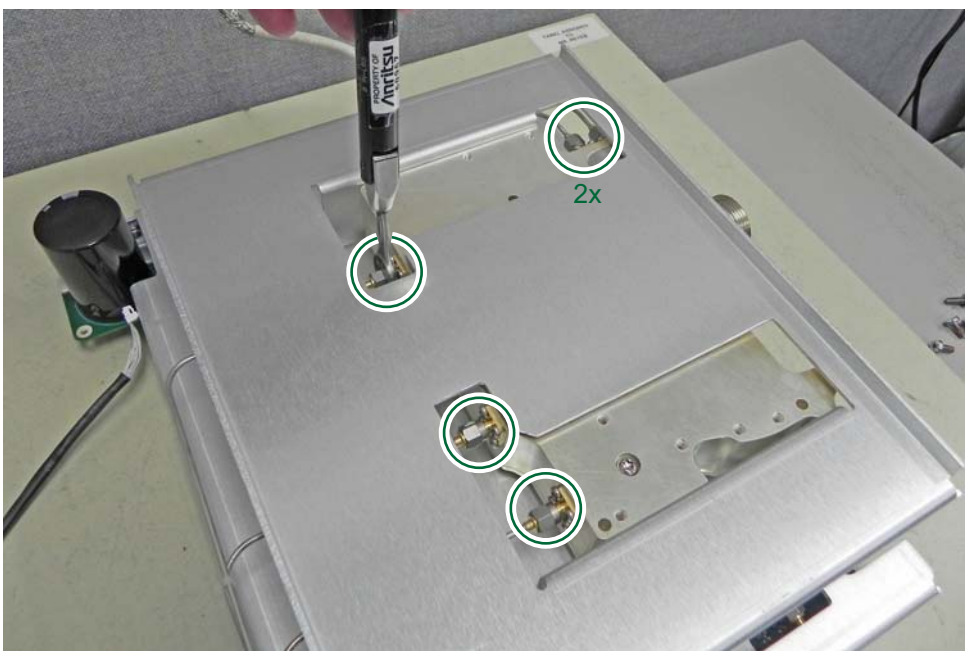


Figure 5-35. Disconnect Semi-rigid RF Cables

15. The filter assembly can now be removed (Figure 5-36).

Figure 5-36. Remove Filter Assembly

16. Note the cable routing, and then carefully remove the cover plate by sliding around the semi-rigid cables (Figure 5-37). Be careful to avoid damaging or bending the semi-rigid cables when removing the plate.

Figure 5-37. Sliding the RF Assembly Cover Plate Off the RF Assembly

17. Reverse the above steps to reassemble the chassis.

Note	New screws with patch lock must be used for reassembly.

Appendix A — Test Records

A-1 Introduction

This appendix provides test records that can be used to record the performance of the PIM Master. Make a copy of the following Test Record pages and document the measured values each time performance verification is performed. Continuing to document this process with each performance verification session provides a detailed history of the instrument performance.

Warning	The Anritsu PIM Master is capable of producing up to 40 Watts of RF power in the cellular communications bands. Users must take precautions to minimize exposure to these RF fields: • Always terminate the output port of the test equipment into a load, a loaded line, or a line that will radiate or absorb the energy before beginning a PIM test. • Confirm that the PIM Master RF power is off after a PIM test. • Always confirm that the RF power is off before disconnecting a coaxial connection, otherwise RF burns may result. Immediate burns to fingers or eyes can result from exposure to live connectors. • RF power can be immediately turned off with the Emergency Stop button. Ensure that all antennas under test are placed so that no personnel are exposed to RF levels that exceed the maximum allowable exposure.

MW82119A Firmware Rev: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-2 Reference PIM Measurement

Table A-1. Reference PIM Measurement with PIM Standard

PIM Master MW82119A	IM3 Frequency	Expected Values from Table 2-1 on page 2-3	Measurement Reading
Option _____	MHz	–_____ dBm ± 3 dB	dBm
The below entry is only for the second IM3 of Option 193			
Option _____	MHz	–_____ dBm ± 3 dB	dBm

A-3 Output Power

Table A-2. Test Component F1 Characterization for MW82119A

Test Component Correction Factor		Signal Generator Frequency and Power	Power Reading from Signal Generator	Power Reading with Test Component
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
The below entries are only for second F1 of Option 193				
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm

Table A-3. Test Component F2 Characterization for MW82119A

Test Component Correction Factor		Signal Generator Frequency and Power	Power Reading from Signal Generator	Power Reading with Test Component
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
The below entries are only for second F2 of Option 193				
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm
dBm at	MHz	MHz at 0 dBm ± 0.2 dB	dBm	dBm

MW82119A Firmware Rev: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Output Power (continued)

Output Tone Power Accuracy

Table A-4. PIM Output Tone Power Accuracy (1 of 2)

PIM Master MW82119A	Tone Frequency and Power	Expected Power Reading and Tolerance	Measured Value
F1 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
The below entries are only for the second set of carriers for Option 193			
F1 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 33 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 43 dBm	dBm ± 1.0 dB	dBm

MW82119A Firmware Rev: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-4. PIM Output Tone Power Accuracy (2 of 2)

PIM Master MW82119A	Tone Frequency and Power	Expected Power Reading and Tolerance	Measured Value
F1 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F1 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm
F2 Carrier	MHz at 46 dBm	dBm ± 1.0 dB	dBm

A-4 Residual PIM Measurement

Table A-5. Residual PIM Measurement

PIM Master MW82119A	Carrier Frequencies (F1 and F2)	Tolerance	Measurement Reading	
Option 180	1805 MHz and 1880 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 190	1930 MHz and 1990 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 192	1930 MHz and 2130 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 193	1930 MHz and 1990 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 193	1930 MHz and 2130 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 210	2110 MHz and 2170 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 260	2620 MHz and 2690 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 700	734 MHz and 757 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 702	768 MHz and 803 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 800	791 MHz and 821 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 850	869 MHz and 894 MHz	< –160 dBc and < –117 dBm	dBc and	dBm
Option 900	935 MHz and 960 MHz	< –160 dBc and < –117 dBm	dBc and	dBm

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