

Maintenance Manual

InterferenceHunter™ MA2700A

Handheld Direction Finding System
9 kHz to 6 GHz

The Anritsu logo, featuring the word "Anritsu" in a stylized, blue, sans-serif font.

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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



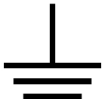
Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

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.

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Chapter 1 — General Information

1-1 Introduction

This manual provides maintenance instructions for Anritsu's **InterferenceHunter** MA2700A.

The information includes:

- [Chapter 1, “General Information”](#)
- [Chapter 2, “MA2700A Verification”](#)
- [Chapter 3, “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, the following terms apply:

- **InterferenceHunter** refers to the MA2700A.
- HH Controller refers to any of the Anritsu handheld RF Instruments capable of controlling the MA2700A which can be a S332E, S362E, MS2712E, MS2713E, MS2722C, MS2723C, MS2724C, MS2725C, MS2726C, MT8212E, MT8213E, MT8222A, MT8221B or MT8222B model.

Familiarity with the basic operation of the front panel keys (for example, how to change measurement mode, preset the unit, or the meaning of submenu button or main menu button) is assumed. Refer to the specific HH Controller model User Guide.

The MA2700A **InterferenceHunter** is a portable handheld direction finding system. It is designed to accurately determine the direction and location of a source of interference.

The MA2700A contains a GPS module, electronic compass, and a broadband pre-amp. The MA2700A has integrated functionality within the Interference Analysis mode of a HH Controller unit. Different frequency antennae can be utilized with the MA2700A for specific end user requirements.

1-2 Related Documents

Other documents are available for the MA2700A at the Anritsu web site at www.anritsu.com:

- **InterferenceHunter** MA2700A Technical Data Sheet, P/N 11410-00692
- **InterferenceHunter** MA2700A User Guide, P/N 10580-00361
- Interference Troubleshooting Guide, P/N 11410-00472
- Spectrum Analyzer Measurement Guide, P/N 10580-00244

1-3 Product Information, Compliance, and Safety

Read the Handheld Instruments Product Information, Compliance, and Safety Guide (PN: 10100-00065) for important safety, legal, and regulatory notices before operating the equipment. For additional information and literature covering your product, visit the product page of your instrument and select the Library tab.

1-4 Anritsu Customer Service Centers

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1-5 Recommended Test Equipment

Table 1-1 lists the test equipment required for verifying and testing the MA2700A InterferenceHunter.

Table 1-1. Recommended Test Equipment for InterferenceHunter Verification

Equipment	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 10 MHz to 6 GHz, Power Output: -30 dBm	Anritsu Model MG3691C with option 4 or 5
USB Power Sensor	Frequency: 10 MHz to 6 GHz Power Range: -40 dB to +20 dB	Anritsu Model MA24118A or MS24126A (Qty 1)
USB Power Sensor PC Software	Supports MA24118A or MA24126A	Anritsu PowerXpert V2.12 or later
Spectrum Analyzer	Frequency: 9 kHz to 6 GHz	Anritsu Model MS2712E or MS2722C or MT822xB with Option 25 Interference Analysis
Adapter	K(f) to N(f), 50 Ω	Anritsu Model 34NFKF50
Adapter	N(f) to N(f), 50 Ω	Anritsu Model 34NFNF50
Adapter	K(m) to K(m), 50 Ω	Anritsu Model K220B
RF Cable	6 GHz, 50 Ω	Anritsu Model 15NNF50-1.5C

1-6 Replaceable Parts and Assemblies

Table 1-2. List of Replaceable Parts

Part Number	Description
3-ND75869<R>	MA2700A GPS and Electronic Compass Assembly
3-ND75870<R>	MA2700A Main PCB Assembly
3-513-117	Adapter RF Flange N(m) to SMP(f)
3-75105	N Connector Plastic Torque Knob
3-75108	Cable Assembly, w/Trigger switch
3-75109	Cable Assembly, Interface Cable from MA2700A to Instrument Controller
3-75246	Cable Assembly, GPS to Main PCB
3-75103	Handle Housing, Left
3-75104	Handle Housing, Right
3-75112	Tripod Mount Bracket
3-75128	Label, Model ID MA2700A
3-75130	Label, Warning
3-75660-1	Handle Housing Gasket Neoprene 472.4 mm
3-75660-2	Handle Housing Gasket Neoprene 177.8 mm
3-75660-3	Handle Housing Gasket Neoprene 38.1 mm
3-75660-4	Handle Housing Gasket Neoprene 84.0 mm
3-790-742	Tripod Mounting Bracket O-Ring Gasket

Chapter 2 — MA2700A Verification

2-1 Introduction

This chapter provides the operational verification procedures for MA2700A InterferenceHunter.

2-2 Pre-Amp Gain Verification

The following test is used to verify the gain of the pre-amp within the MA2700A InterferenceHunter.

Equipment Required

- InterferenceHunter, Anritsu Model MA2700A
- HH Controller, Anritsu Model MT8221B with Option 25
- Signal Generator, Anritsu Model MG3691C with Option 4 or 5
- Adapter, N(f) to K(f), 50 Ω , Anritsu Model 34NFKF50
- Adapter, K(m) to K(m), Anritsu Model K220B
- Adapter, N(f) to N(f), Anritsu Model 34NFNF50
- RF Cable, 6 GHz, 50 Ω , Anritsu Model 15NNF50-1.5C
- USB Power Sensor, 10 MHz to 6 GHz, +20 to -40 dBm, Anritsu Model MA24118A
- PC with USB connection and Anritsu PowerXpert software

Procedure

1. Confirm that all the connectors are clean as any debris or contamination may cause incorrect measurement results.

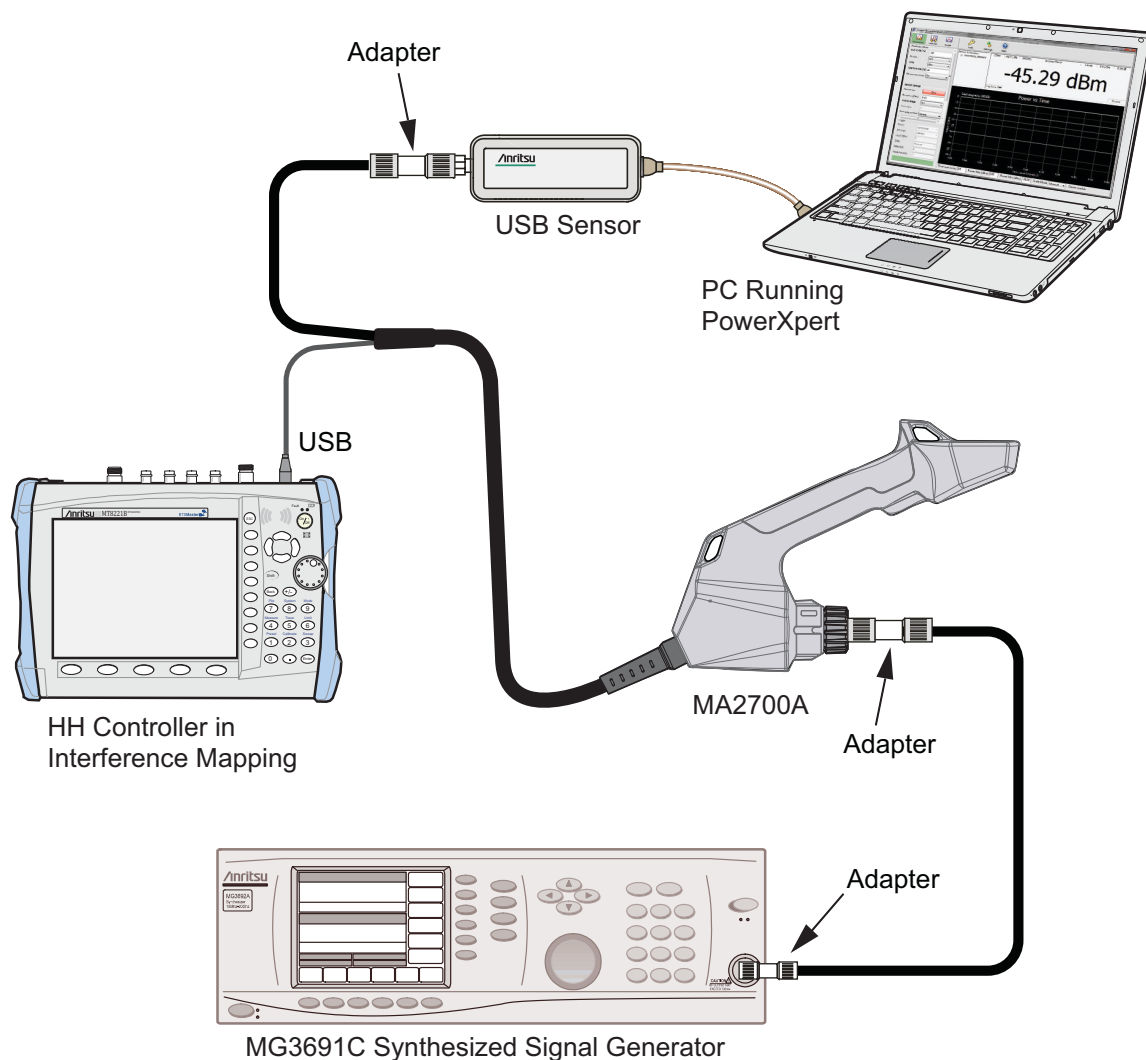


Figure 2-1. InterferenceHunter and HH Controller

2. Press the **On/Off** key to turn on the HH Controller. Wait for the instrument to finish booting up.
3. Connect the MA2700A USB connector to the Anritsu Handheld (HH) Controller as shown in [Figure 2-1](#). Do not connect the RF cable from the MA2700A to the HH Controller.
4. Press the **Shift** key and then the **Mode** (9) key. Use the rotary knob to highlight Interference Analysis and then press the **Enter** key to switch to Interference Analysis mode.
5. On the HH Controller, press the **Shift** key and then the **Preset** (1) key. Press the Preset submenu key to set the instrument to the factory preset state.
6. Connect the USB Sensor to the MA2700A RF Output Cable using the 34NFKF50 Adapter. Connect the Signal Generator Output to the MA2700A RF Input N connector using the RF cable, K220B and 34NFKF50 adapters.
7. On the HH Controller, Press the **Measure** function key, from the Measurements menu, select the **Interference Mapping** key, from the Antenna Selection menu select **MA2700A Handheld**.

8. On the HH Controller, Press the **IA Mapping** function key, from the IA Mapping menu select the **Direction Finding** key. From the Direction Finding menu we will use the **Antenna Preamp** key to toggle the MA2700A preamp On and Off.
9. On the Signal Generator, ensure the RF Output is Off (disabled). Press the **Frequency** main menu key and set the value F1 to 10 MHz and the Level (L1) value to -20 dBm.
10. On the PC, double click the **PowerXpert** icon menu key and confirm that the USB Power sensor is recognized.
11. Change the PowerXpert settings to match [Figure 2-2](#).



Figure 2-2. PowerXpert Setup

12. Ensure the RF Output is Off on the Signal Generator and then on the PC select the red Zero button. After the USB Power Sensor is Zeroed, you can turn the Signal Generator's RF Output On.
13. On the PowerXpert application window you should see a level of approximately -20 dBm, note the value and record it in [Table A-1, "Preamp Gain Verification" on page A-2](#).
14. On the HH Controller, press the **Antenna Preamp** submenu key to turn the preamp On. In the PowerXpert application window you should see a level of approximately -10 dBm, note the value and record it in [Table A-1](#).
15. Calculate the preamp gain by subtracting the Preamp Off value from the Preamp On value. Enter result in the Preamp Gain column of [Table A-1](#), verify that is within the typical value limit.
16. On the HH Controller, press the **Antenna Preamp** submenu key to turn the preamp Off. Change the Signal Generator to the next frequency value [Table A-1](#).
17. Repeat steps 13 through 16 until all the frequency and preamp values are verified.

Chapter 3 — Assembly Replacement

3-1 Introduction

This chapter describes opening and closing the InterferenceHunter MA2700A case along with basic parts replacement steps. The sections are:

- “Replaceable Parts List” on page 3-1
- “Opening the MA2700A Case” on page 3-1
- “GPS/Compass Module Assembly Replacement ” on page 3-4
- “Main PCB Module Assembly Replacement ” on page 3-5

3-2 Replaceable Parts List

Refer to [Table 1-2, “List of Replaceable Parts” on page 1-3](#) for the list of replaceable parts. Refer to the following sections for basic replacement instructions.

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 other instruments.

Caution

Only qualified personnel should open the case and replace internal assemblies. Assemblies shown in [Table 1-2](#) are typically the only items that may be replaced. As 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.

3-3 Opening the MA2700A Case

Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument.

The MA2700A 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 is 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 MA2700A case. With the case opened, the internal assemblies can be removed and replaced, as detailed in the following sections.

1. Remove any cable connections between the MA2700A and the HH Controller.

2. Place the MA2700A on a stable work surface (with the screw holes facing up) that will not scratch the case. Remove the plastic N connector torque knob by pulling it off ([Figure 3-1](#)).

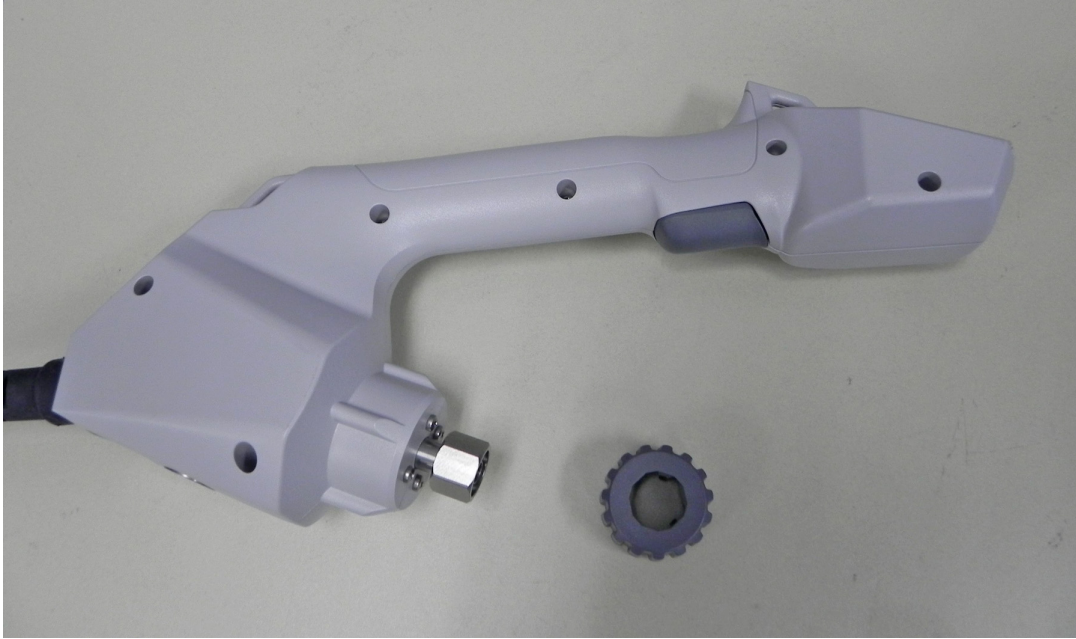


Figure 3-1. Case with N Connector knob removed

3. Use a Phillips screwdriver to remove the top two screws securing the two halves of the InterferenceHunter case to the N connector flange ([Figure 3-2](#)).



Figure 3-2. Remove the 2 Screws in the Top Half (Side with the Screw Holes) of the Case

4. After removing the six screws shown in [Figure 3-1](#) and the two screws by the N connector shown in [Figure 3-2](#), carefully lift up the top half of the case and begin to separate the two halves. Refer to [Figure 3-3](#).

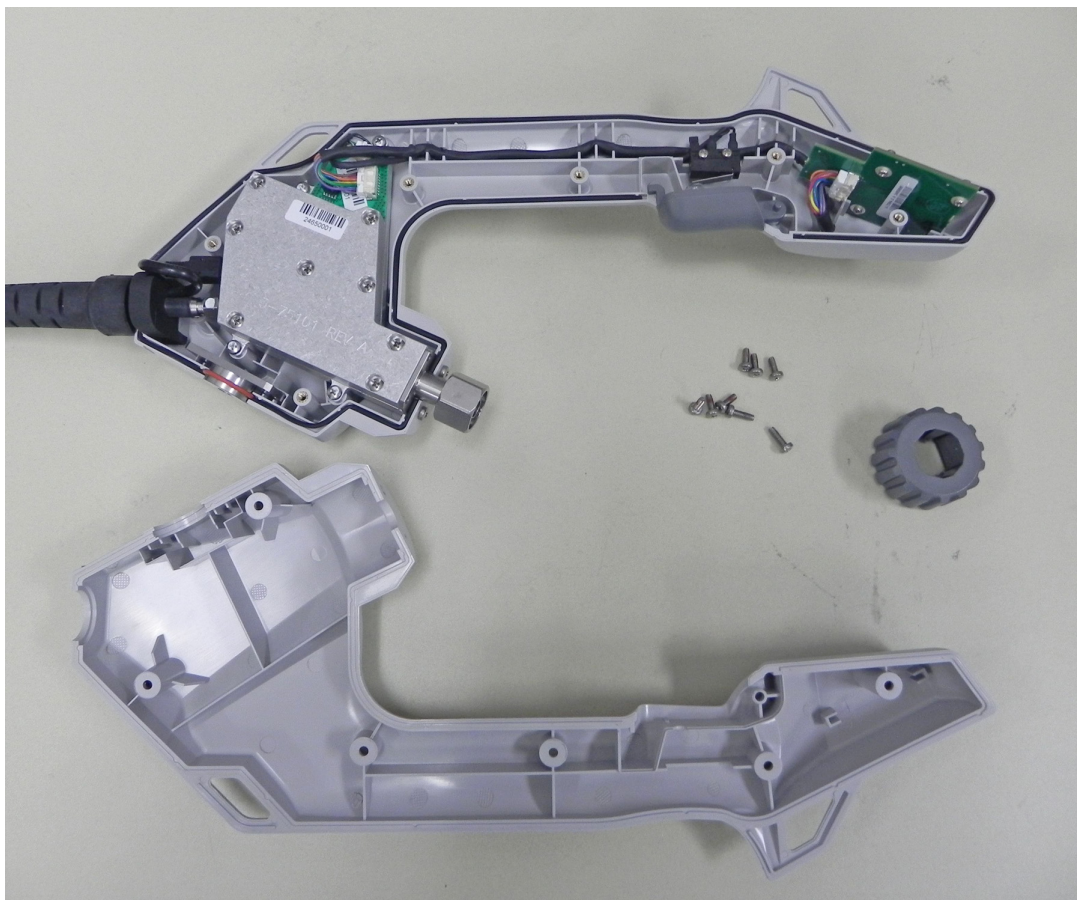


Figure 3-3. The Two Halves of the InterferenceHunter

Note There is gasket material between the two halves of the case. Take care not to remove or damage this material when opening the case, replacing assemblies, and closing the case.

5. Opening the MA2700A case allows access to all the assemblies and parts listed in [Table 1-2, “List of Replaceable Parts”](#) on [page 1-3](#). Refer to the following sections of this chapter to remove and replace specific components of the instrument.

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

6. Reverse the above steps to reassemble the case.

3-4 GPS/Compass Module Assembly Replacement

This procedure provides instructions for removing and replacing the GPS/Compass Module assembly. The GPS/Compass Module assembly is located at the top of the MA2700A Case assembly.

1. Open the case as described in [Section 3-3 “Opening the MA2700A Case”](#).
2. Pull the GPS/Compass Assembly out of the slots.
3. Remove the cable attached to the GPS/Compass assembly by depressing the locking tab in the center of the connector and sliding the connector off ([Figure 3-4](#)).
4. Remove the GPS/Compass assembly.

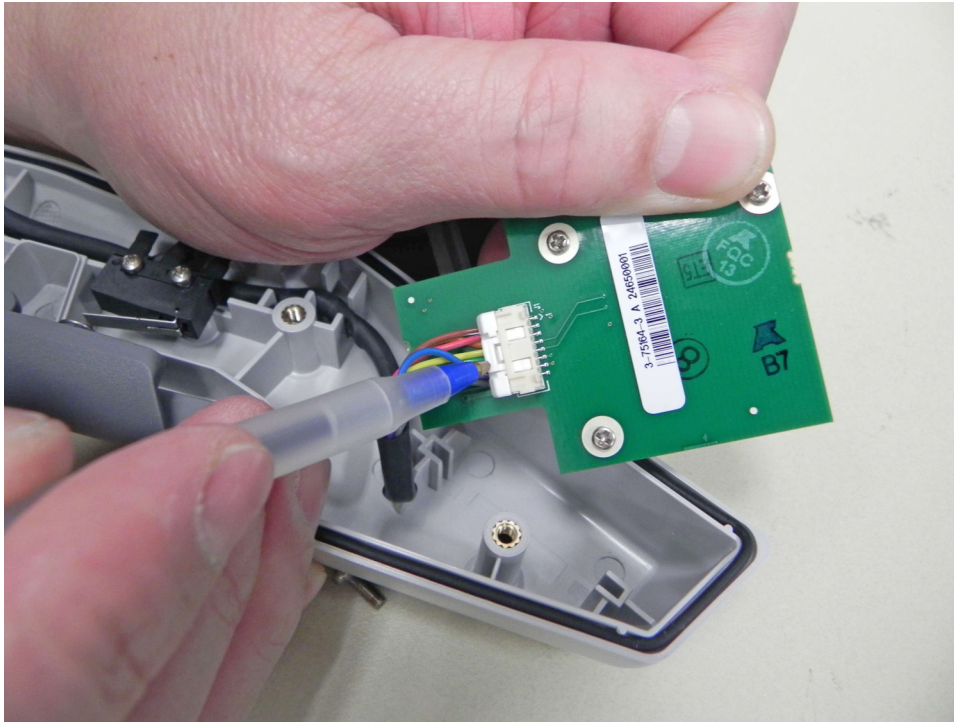


Figure 3-4. GPS/Compass Module Assembly

5. Reverse the above steps to install the new GPS/Compass assembly.

3-5 Main PCB Module Assembly Replacement

This procedure provides instructions for removing and replacing the Main PCB assembly. The Main PCB assembly is located at the bottom of the case and includes the N Connector. Additionally, you can replace the main cable harness and the N connector if required.

1. Open the case as described in [Section 3-3 “Opening the MA2700A Case”](#).
2. Use a Phillips screwdriver to remove the two screws securing the N connector flange to the bottom half of the instrument case ([Figure 3-5](#)).

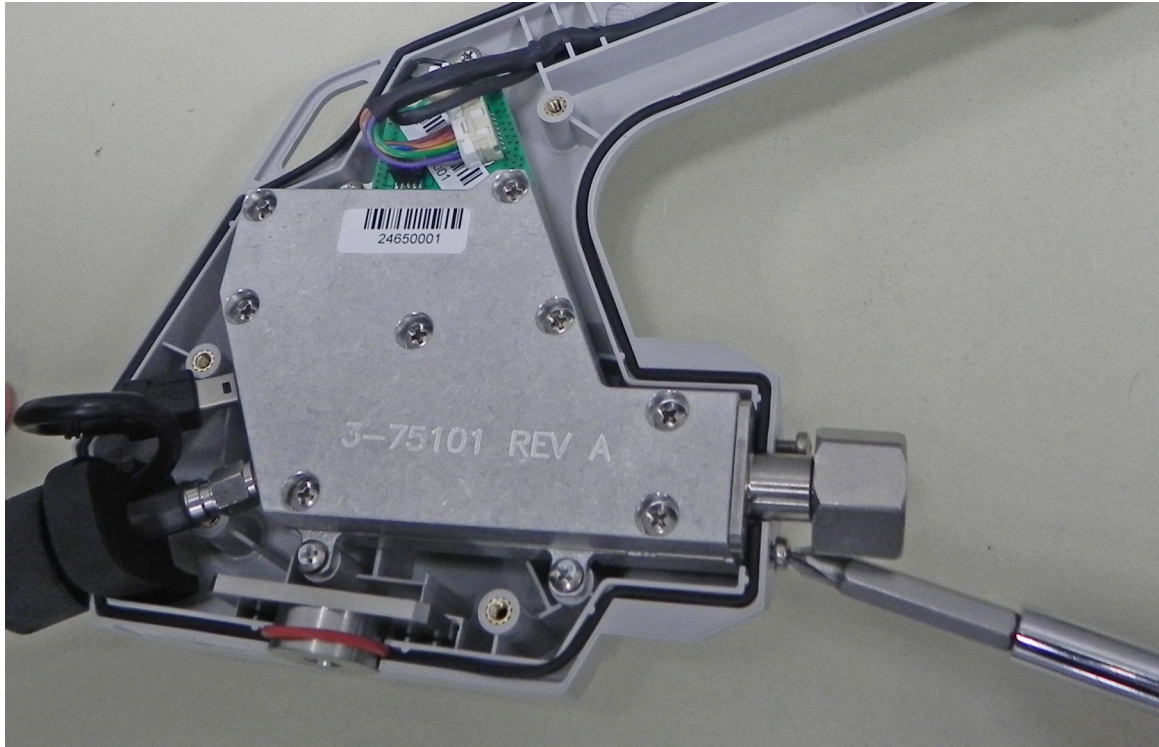


Figure 3-5. Remove 2 Screws Below N Connector Flange

3. Remove the two cable connectors (one for the trigger and one for the GPS module) by depressing the locking tab and pulling the connectors out ([Figure 3-6](#)).



Figure 3-6. Remove the Cables from the Motherboard

4. Use a Phillips screwdriver to remove the four screws securing the Main PCB Assembly to the back half of the case ([Figure 3-7](#)).

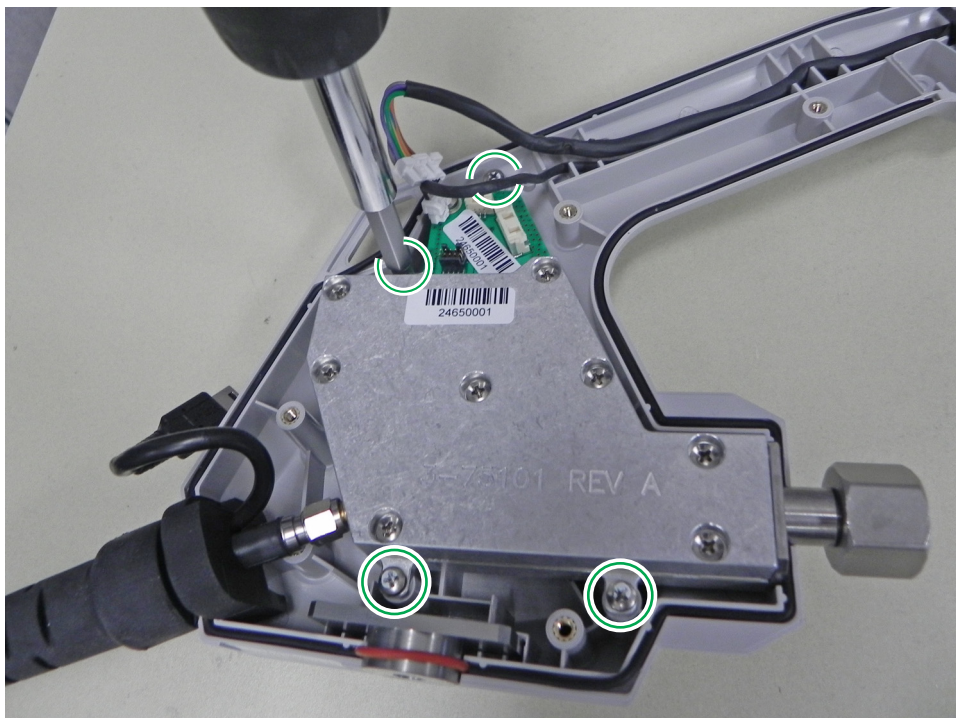


Figure 3-7. Remove the 4 screws on the Main PCB Assembly

5. Carefully lift up and remove the Main PCB assembly and the attached cable harness assembly.
6. With the Main PCB Assembly and main cable harness removed, you can now remove the SMA connector and Mini USB connector from the Main PCB assembly ([Figure 3-8](#)).

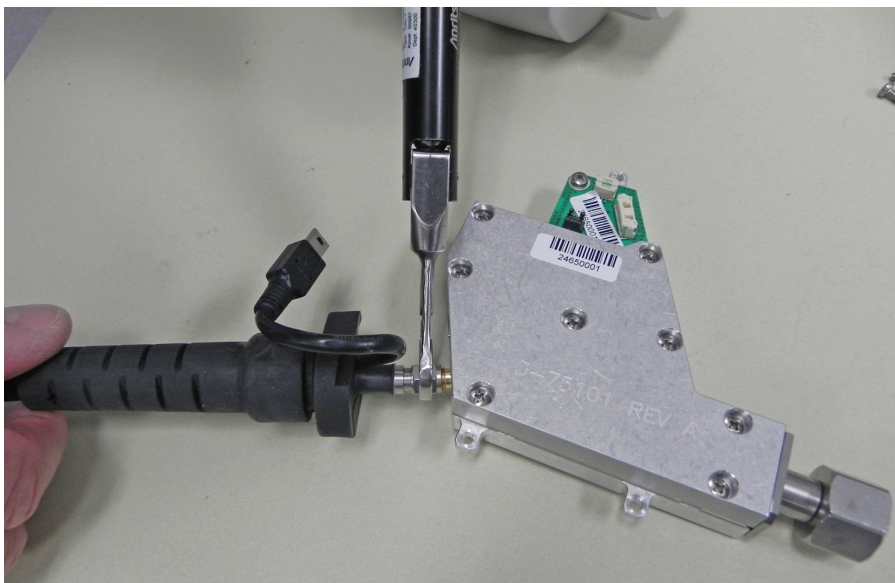


Figure 3-8. Remove the 4 screws on the Main PCB Assembly

7. From here you can replace the Main Cable harness and/or the N connector.

8. Disconnect the N connector by gently pulling the N connector away from the Main PCB Assembly.
9. Reverse the above steps to install the new Main PCB Assembly.

Note

There is gasket material between the two halves of the case. Take care not to remove or damage this material when removing or replacing the Main PCB Assembly and N connector flange.

Note

During assembly replacement procedures the plastic trigger may become dislodged. Refer to [Figure 3-9](#) for the correct reassembly.

The tension spring should be on the trigger side of the housing.

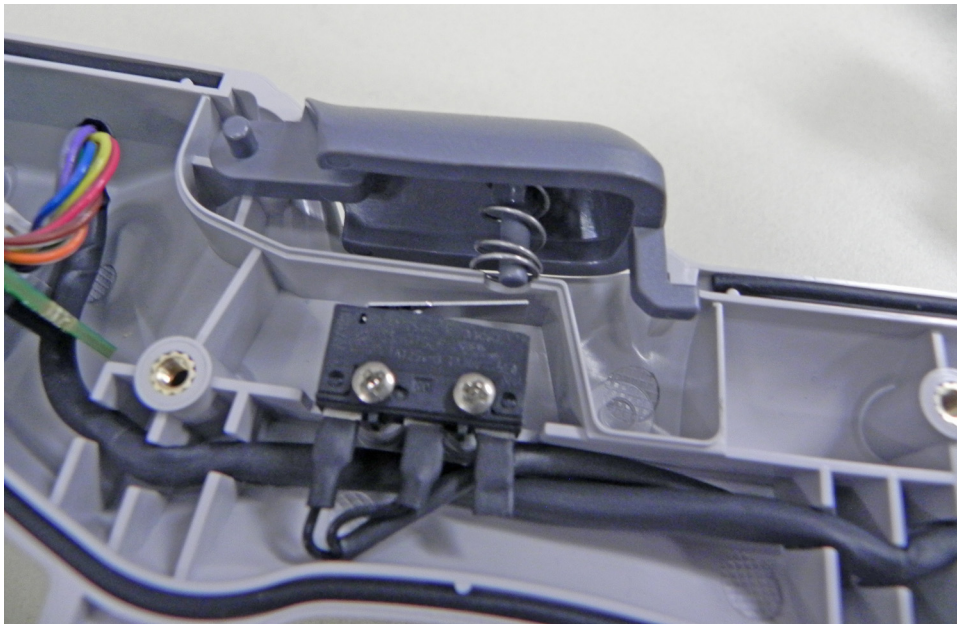


Figure 3-9. Trigger Assembly

Appendix A — Test Records

A-1 Introduction

This appendix provides test records that can be used to record the performance of the MA2700A InterferenceHunter. 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 each performance verification session provides a detailed history of the instrument's performance.

MA2700A Firmware Rev: _____ Operator: _____ Date: _____
 Serial Number: _____

Table A-1. Preamp Gain Verification

Signal Generator Frequency and Power	Power Reading with Preamp Off	Power Reading with Preamp On	Preamp Gain (Preamp On – Preamp Off)	Preamp Gain Typical Spec
10 MHz @ -20 dBm	dBm	dBm	dB	≥ 8 dB
1000 MHz @ -20 dBm	dBm	dBm	dB	≥ 8 dB
2400 MHz @ -20 dBm	dBm	dBm	dB	≥ 8 dB
2410 MHz @ -20 dBm	dBm	dBm	dB	≥ 5 dB
3000 MHz @ -20 dBm	dBm	dBm	dB	≥ 5 dB
4000 MHz @ -20 dBm	dBm	dBm	dB	≥ 5 dB
4010 MHz @ -20 dBm	dBm	dBm	dB	≥ 3 dB
5000 MHz @ -20 dBm	dBm	dBm	dB	≥ 3 dB
6000 MHz @ -20 dBm	dBm	dBm	dB	≥ 3 dB

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