

# InterferenceHunter

## MA2700A

Handheld Direction Finding System





**User Guide**

# **Interference Hunter™ MA2700A**

## **Handheld Direction Finding System**

**Includes GPS and Electronic Compass**

The Anritsu logo consists of the word "Anritsu" in a bold, sans-serif font. The letter "A" is stylized with a diagonal slash through it. The logo is positioned in the bottom right corner of the page.

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Anritsu Company  
490 Jarvis Drive  
Morgan Hill, CA 95037-2809  
USA

Part Number: 10580-00361  
Revision: C  
Published: April 2014  
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The Anritsu product listed on the title page is warranted against defects in materials and workmanship for one year from the date of shipment.

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# DECLARATION OF CONFORMITY

**Manufacturer's Name:** ANRITSU COMPANY

**Manufacturer's Address:** Microwave Measurements Division  
490 Jarvis Drive  
Morgan Hill, CA 95037-2809  
USA

declares that the product specified below:

**Product Name:** Handheld Direction Finding System

**Model Number:** MA2700A

conforms to the requirement of:

EMC Directive: 2004/108/EC  
Low Voltage Directive: 2006/95/EC

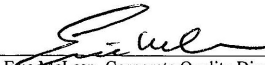
**Electromagnetic Compatibility: EN61326-1:2006**

Emissions: EN55011:2009 +A1:2010 Group 1 Class A

Immunity:	EN 61000-4-2:2009	4 kV CD, 8 kV AD
	EN 61000-4-3:2006 +A2:2010	3 V/m
	EN 61000-4-4:2004	0.5 kV S-L, 1 kV P-L
	EN 61000-4-5:2006	0.5 kV L-L, 1 kV L-E
	EN 61000-4-6: 2009	3 V
	EN 61000-4-11: 2004	100% @ 20 ms

**Electrical Safety Requirement:**

Product Safety: EN 61010-1:2010

  
Eric McLean, Corporate Quality Director

Morgan Hill, CA

1 MAR 2013

Date

European Contact: For Anritsu product CE information, contact Anritsu EMEA Limited, 200 Capability Green, Luton, Bedfordshire, LU1 3LU, England. (Telephone: +44 (0)1582 433200; Email: bert.francis@anritsu.com)

## **CE Conformity Marking**

Anritsu affixes the CE Conformity marking onto its conforming products in accordance with Council Directives of The Council Of The European Communities in order to indicate that these products conform to the EMC and LVD directive of the European Union (EU).



## **C-tick Conformity Marking**

Anritsu affixes the C-tick marking onto its conforming products in accordance with the electromagnetic compliance regulations of Australia and New Zealand in order to indicate that these products conform to the EMC regulations of Australia and New Zealand.



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Before you export this product or any of its manuals, please contact Anritsu Company to confirm whether or not these items are export-controlled.

When disposing of export-controlled items, the products and manuals need to be broken or shredded to such a degree that they cannot be unlawfully used for military purposes.

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## Safety Symbols

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

### Symbols Used in Manuals

#### Danger



This indicates a risk from a very dangerous condition or procedure that could result in serious injury or death and possible loss related to product malfunction. Follow all precautions and procedures to minimize this risk.

#### Warning



This indicates a risk from a hazardous condition or procedure that could result in light-to-severe injury or loss related to product malfunction. Follow all precautions and procedures to minimize this risk.

#### Caution



This indicates a risk from a hazardous procedure that could result in loss related to product malfunction. Follow all precautions and procedures to minimize this risk.

## Safety Symbols Used on Product and in Manuals

The following safety symbols are used inside or on the product 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 product. Some or all of the following five symbols may or may not be used on all Anritsu products. 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.



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## For Safety

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### Danger



Using the MA2700A Interference Hunter while a car is in motion could be dangerous and lead to serious accidents.

### 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 product performance may be reduced. Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

### Warning



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

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## For Safety

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### 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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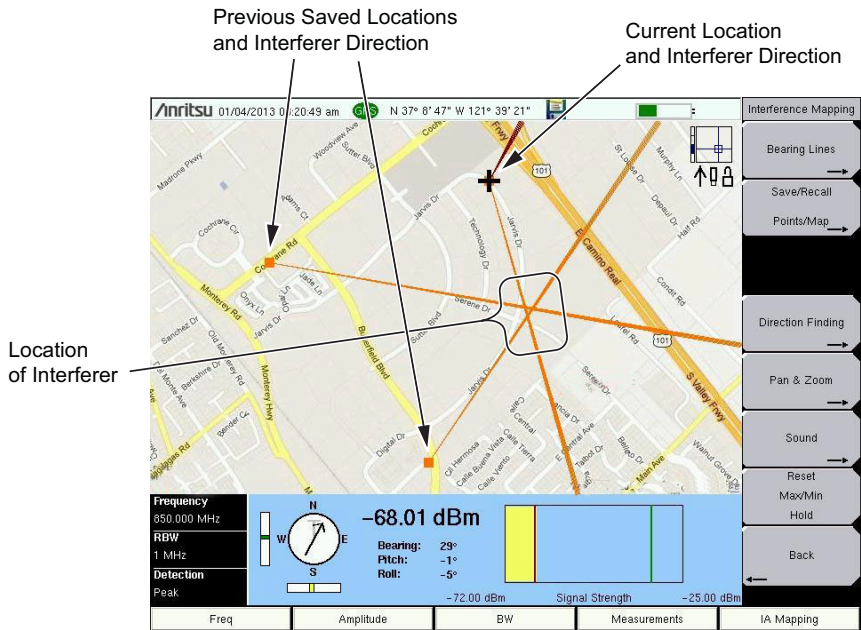
# Chapter 1 — Instrument Overview

## 1-1 Introduction

This user guide provides an overview of the Anritsu Interference Hunter MA2700A Handheld Direction Finding System.

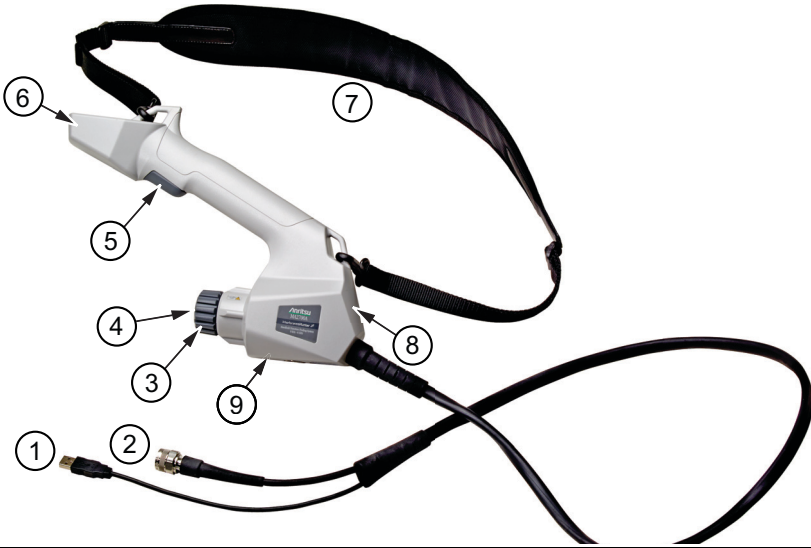
The MA2700A allows easy-to-use handheld direction finding and includes an internal preamplifier, a GPS receiver, and an electronic compass.

Connected to an Anritsu instrument, and with a directional antenna attached, the MA2700A captures location and interfering signal information when the trigger is pressed. The captured location and bearing data can be displayed on the instrument (Option 25 and SPA module V6.00 or higher required).



**Figure 1-1.** Interference Hunting Overview

## 1-2 Instrument Overview



1	USB cable, connect to Anritsu instrument.
2	Coaxial cable with type N male connector. Attach to Anritsu instrument's RF In port.
3	Coupling nut for antenna connector.
4	Antenna connector (male type N). Connect directional antenna or filter and antenna combination. Refer to <a href="#">“Antenna and Filter Selection” on page 2-4</a> for additional information.
5	<p>Pulling the MA2700A trigger will prompt the Anritsu analyzer to beep. Releasing the pulled trigger has two functions:</p> <ul style="list-style-type: none"> <li>• Release the trigger after the initial beep (&lt; 1 second) to capture location and signal data.</li> <li>• Release the trigger after the second beep (~ 2 seconds) to toggle the preamp in the MA2700A and the Anritsu analyzer's preamp On or Off.</li> </ul>
6	Internal electronic compass and GPS receiver.
7	Included shoulder strap.
8	Internal preamplifier.
9	1/4-20 UNC tripod mount.

**Figure 1-2.** MA2700A Overview

## **Standard Accessories**

The Anritsu MA2700A includes a shoulder strap and one year warranty.

## **Optional Accessories**

The MA2700A Technical Data Sheet contains a list and descriptions of available optional accessories. The data sheet is provided with the instrument and is available on the Anritsu Web site:

<http://www.anritsu.com>.

## **MA2700A Specifications**

Refer to the MA2700A Technical Data Sheet.

## 1-3 Additional Documents

The following documents provide useful additional information when using the Interference Master MA2700A Handheld Direction Finding System.

- Interference Hunter MA2700A Technical Data Sheet. Includes general specifications and available accessories.
- The User Guide for your Anritsu instrument.
- Spectrum Analyzer Measurement Guide applicable for your Anritsu Instrument.
  - The Interference Analysis chapter includes a section on “Interference Mapping” with information on setup and selecting the MA2700A as the Direction Finding Antenna.
- Anritsu easyMap Tools software Help.
  - easyMap Tools creates Geo-enabled maps which are viewed on the Anritsu instruments during interference hunting.
  - easyMap Tools maps (.azm format) allow Pan and Zoom on the instrument.
- A complete suite of computer software applications are available for download:  
<http://www.anritsu.com/en-US/Services-Support/Handheld-Tools-Tool-Box.aspx>
- Directional Antennas Technical Data Sheet lists compatible antennas in many frequency bands. Details including frequency range, gain, and pattern information are provided.

These documents and programs along with additional applications notes, white papers, and videos covering interference analysis are available from the Anritsu web site on the MA2700A product page.



## 1-4 Preventive Maintenance

MA2700A preventive maintenance consists of cleaning the unit and inspecting and cleaning the USB and RF connector on the instrument and all accessories. Clean the MA2700A with a soft, lint-free cloth dampened with water and a mild cleaning solution.

**Caution** To avoid damage, do not use solvents or abrasive cleaners.

Clean the coaxial cable connector with a cotton swab dampened with denatured alcohol. Visually inspect the connector. If you are unsure whether the connector is undamaged, gauge the connectors to confirm that the dimensions are correct.

Carefully inspect the coaxial cable. The cable should be uniform in appearance, and not stretched, kinked, dented, or broken.

## 1-5 ESD Caution

The MA2700A, like other high performance instruments, is susceptible to electrostatic discharge (ESD) damage. Coaxial cables and antennas may build up a significant static charge, which may damage the MA2700A. MA2700A users must always be aware of the potential for ESD damage and take all necessary precautions. Operators should exercise practices outlined within industry standards such as JEDEC-625 (EIA-625), MIL-HDBK-263, and MIL-STD-1686; which pertain to ESD and ESDS devices, equipment, and practices. It is important to remember that the operator may also carry a static charge that can cause damage. Following the practices outlined in the above standards will ensure a safe environment for both personnel and equipment.

## 1-6 Document Conventions

Anritsu Instrument main menus and keypad buttons are shown in the user guide using a **San Serif Bold** typeface. Main menus are the buttons displayed at the bottom of the screen. Submenus and submenu buttons are displayed on the right side of the screen display and shown in the user guide using San Serif Regular typeface.

Menu and button locations may be described in this document by their path:

**Measurement** > IA Mapping

The line above reads as “Press the Measurement main menu, then press the IA Mapping submenu button.”

**Note**

Screen captured images are provided as examples. The image and measurement details shown on your instrument may differ from the examples in this User Guide.

The actual menus on your instrument may also differ based on instrument model, firmware version, and installed options.

## 1-7 Contacting Anritsu

To contact Anritsu, please visit: <http://www.anritsu.com/contact.asp>

From here, you can select the latest sales, select service and support contact information in your country or region, provide online feedback, complete a “Talk to Anritsu” form to have your questions answered, or obtain other services offered by Anritsu.

Updated product information can be found on the Anritsu Web site: <http://www.anritsu.com/>

Search for the product model number. The latest documentation is on the product page under the Library tab.

## 1-8 Anritsu Service Centers

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

<http://www.anritsu.com/Contact.asp>

and choose a country for regional contact information.

### Danger



Using the MA2700A Interference Hunter while a car is in motion could be dangerous and lead to serious accidents.

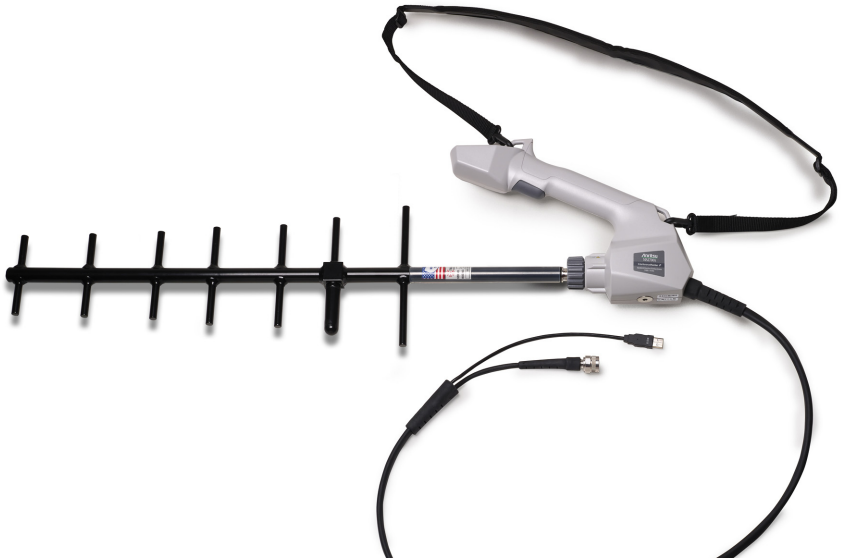


# Chapter 2 — MA2700A Operation

## 2-1 MA2700A and Anritsu Instrument Setup

### Connections

1. Connect a directional antenna to the male N-connector (inside the coupling nut).
- 



**Figure 2-1.** MA2700A with Attached Yagi Antenna

2. Connect the USB cable between the MA2700A and the Anritsu instrument.
3. Connect the coaxial cable between the MA2700A and the Anritsu instrument's RF Input connector.

## Anritsu Instrument Setup

**Note**

The Anritsu Instrument must have Interference Analysis (Option 25) and SPA module V6.00 or higher firmware to use the MA2700A and Anritsu easyMap Tools.

Option 31, GPS is not required when using the MA2700A for Interference Mapping.

1. Set the Instrument in Interference Analysis mode and select Interference Mapping measurement (**Measurements > Interference Mapping**).
  - a. The instrument will detect the connected MA2700A and display the message **MA2700 detected – Device is ready to use**. After GPS lock, the instrument will use GPS data from the MA2700A.

**Note**

Once detected, the MA2700A can be used to capture bearing and/or GPS data while in other Interference mode measurements and even other supported instrument measurement modes, including Spectrum Analyzer mode.

- b. Refer to the Spectrum Analyzer Measurement Guide, Interference Analyzer (Option 25) chapter, for additional information on setting the measurement parameters, manually connecting to the MA2700A, locating the interfering signal, and interference mapping.

### Compass Calibration

Anritsu recommends calibrating the electronic compass before the first use and afterwards if the Anritsu instrument connected to the MA2700A is displaying unexpected signal direction readings.

1. Press External Compass Calibration (**Measurements** > Interference Mapping > Direction Finding > Direction Finding Antenna Selection) and follow the onscreen instructions ([Figure 2-2](#)).

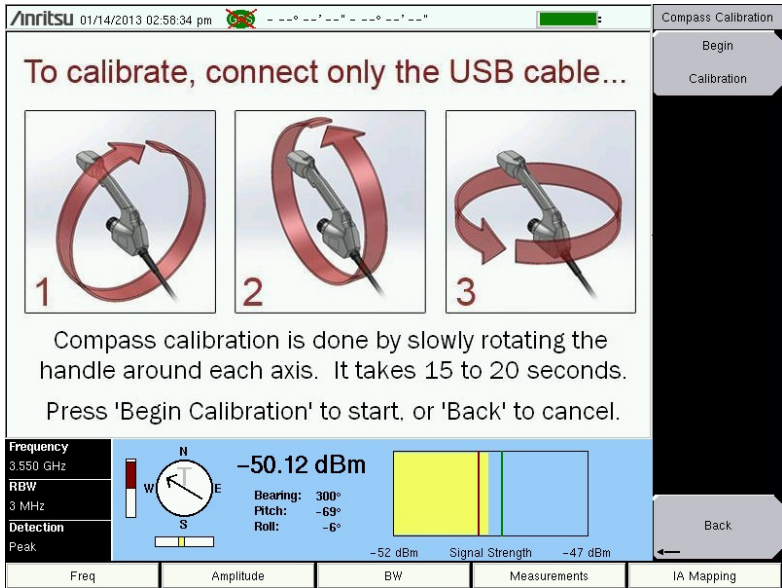


Figure 2-2. Compass Calibration

**Note** Electrical or magnetic fields can interfere with compass readings. When calibrating the compass be careful to stay well clear of electronics, high voltage power lines, magnetic devices, and masses of steel or iron.

These same precautions should be taken when mapping interference.

## 2-2 Antenna and Filter Selection

The MA2700A is designed to connect to a directional antenna that has a type N female connector at the back of the antenna's boom. To connect properly, the antenna's connector must be rigidly connected to the boom and facing toward the rear of the antenna. The connector must be at least 16 cm behind the rear-most antenna element to avoid interference between the MA2700A's body and the antenna element.

A filter can be connected between the antenna and MA2700A, to reduce the impact of high level signals at other frequencies. A short filter with male and female type N connectors will work best for this application.

## 2-3 Interference Mapping Overview

Mapping interference is a seven step process:

1. Capture a map using Anritsu easyMap Tools. Refer to software help file.
2. Copy the map file to a USB memory stick and then insert the memory stick into the Anritsu instrument's USB Type A port. Anritsu recommends copying the map file to the instrument's internal memory. Refer to Anritsu instrument User Guide.

**Note**

A small percentage of USB drives are not fully compatible with Anritsu instruments. Attempting to use one of these at the same time that a MA2700A is also connected to the instrument may disrupt USB communications. The connection may be lost to the drive, the MA2700A, or both. Should this occur, try disconnecting and reconnecting the non-communicative device. For the best performance Anritsu recommends the use of an Anritsu part number 2000-1520-R USB drive.

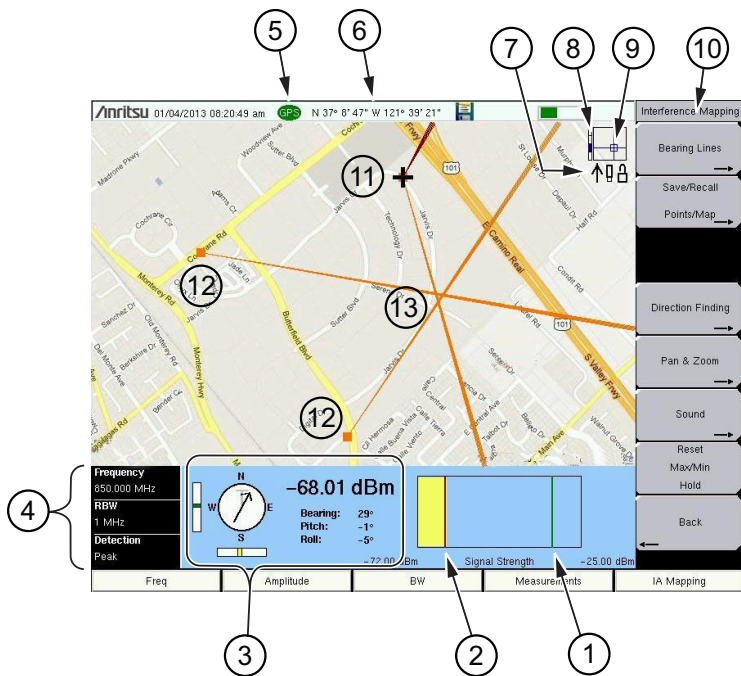
The Status Icons described in [Figure 2-3 on page 2-5](#) show which USB devices are currently connected.

3. Set the Anritsu instrument to IA mapping and configure the instrument settings.
4. Load (Recall) the map file from internal memory or from the USB memory stick. Refer to Spectrum Analyzer Measurement Guide.



5. Connect the MA2700A Handheld Interference Hunter with a directional antenna to the instrument. Refer to “Connections” on page 2-1, as well as the Spectrum Analyzer Measurement Guide.
6. Map the interfering signal. Refer to Spectrum Analyzer Measurement Guide.
7. Save the results. Refer to Spectrum Analyzer Measurement Guide.

Figure 2-3 shows an example of interference mapping where the approximate location of the interferer is determined.



- |   |                       |
|---|-----------------------|
| 1 | Maximum signal level. |
| 2 | Minimum signal level. |

**Figure 2-3.** Interference Mapping Overview (1 of 2)

## 2-3 Interference Mapping Overview Chapter 2 — MA2700A Operation

3	<p>Current readings from the MA2700A.</p> <ul style="list-style-type: none"><li>• Compass: Before GPS lock the compass displays a light gray M indicating magnetic north (no declination adjustment). With GPS lock, a declination adjustment is automatically applied based on location and the compass changes to display a light gray T indicating true north. The Arrow indicates the direction the MA2700A is pointing.</li><li>• Power level: Displays the power level at the Anritsu instrument's receiver.</li><li>• Bearing: Direction the MA2700A is pointing.</li><li>• Pitch (vertical level): Indicates the front-to-back orientation.</li><li>• Roll (horizontal level): Indicates the side-to-side orientation.</li></ul>
4	Current Anritsu instrument settings.
5	GPS lock icon.
6	Current position.
7	<p>Status Icons (left to right).</p> <ul style="list-style-type: none"><li>• MA2700A USB connection</li><li>• USB memory stick available.</li><li>• Map auto-centering mode.</li></ul>
8	Zoom level indication (when using .azm maps). Top is maximum zoomed in position. Bottom is maximum zoomed out position.
9	<p>Current tile location in base map (when using .azm maps). Move the current tile location around the base map using the arrow keys on the Anritsu analyzer.</p> <p><b>Note:</b> Panning is not functional when the instrument displayed map is at the maximum zoomed out position.</p>
10	Interference Mapping menus and submenus.
11	Plus sign indicates current position.
12	Previous saved locations and bearings.
13	Approximate location of the interfering signal.

**Figure 2-3.** Interference Mapping Overview (2 of 2)

**Note**

Refer to the Spectrum Analyzer Measurement Guide for detailed information.

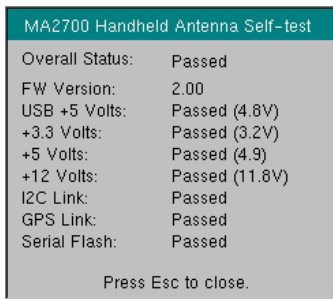
# Appendix A — Instrument Messages

## A-1 Introduction

This appendix provides additional details regarding MA2700A related messages that may be displayed on the Anritsu instrument.

## A-2 Self-Test

Perform a self-test to verify the function of the MA2700A by toggling the USB connection and pressing External Antenna Self-test.



**Figure A-1.** MA2700A Self-test

The full path from the Measurement main menu is: **Measurements** > Interference Mapping > Direction Finding > Direction Finding Antenna Selection > External Antenna Self-test.

## A-3 Error Messages

Messages are shown below and are listed in alphabetical order.

*Example Message:*

**Message Shown on Instrument:** Additional details or suggestions regarding the message.

- 1. An external antenna is not active. Cannot run self-test.**  
Disconnect and reconnect the MA2700A USB cable. Select the MA2700A, then attempt Self-test again.
- 2. Adjust Stop Frequency to 4 GHz or less to turn unit Pre Amp ON.**  
Under the **Freq** main menu, select the Stop Freq button and set the frequency under 4 GHz.
- 3. Warning: USB connection lost to MA2700 handheld antenna.**  
Confirm MA2700A USB connection. Reselect the MA2700A.  
The full path from the Measurement main menu is:  
**Measurements** > Interference Mapping > Direction Finding > Direction Finding Antenna Selection > MA2700 Handheld.
- 4. MA2700 Handheld Antenna not found.** Disconnect and reconnect the MA2700A USB cable. Select the MA2700A.
- 5. Reference Level too high for Preamp. Decrease Reference Level or Increase Attenuation.** When the MA2700A Preamp is turned on (using the trigger or the Antenna Preamp menu button) the firmware also attempts to turn on the Instrument's Pre Amp.

<b>Note</b>	Additional information is available in the Spectrum Analyzer Measurement Guide.
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# Anritsu



10580-00361



C



Anritsu utilizes recycled paper and environmentally conscious inks and toner.

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