MAINTENANCE MANUAL
Site Master™ Series
Personal SWR/RL and Fault Location Testers

1. INTRODUCTION

This manual provides maintenance instructions for the Site Master S110, S111, S112, S113, S330, S330A, S331, and S331A Personal SWR/RL and Fault Location Testers. It describes the product and provides performance verification procedures, parts replacement procedures, and a replaceable parts list.

2. DESCRIPTION

The Site Master (Figure 1) is a hand held SWR/RL (standing wave ratio/return loss) and Distance-To-Fault measurement instrument. It combines a synthesized source, VSWR Bridge, and receiver on a single printed circuit board (PCB). An optional power monitor is also available. A block diagram is shown in Figure 2.

3. PERFORMANCE VERIFICATION

Paragraphs 4 through 7 contain tests that can be used to verify the performance of the Site Master and its components. These tests support the following models of the Site Master series having any version of firmware; S110, S111, S112, S113, S330, S330A, S331, and S331A.

3.1. Initial Setup for Testing

1. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn on the Site Master. (This sets the instrument to the factory preset state.)

2. For models where there is no display contrast control on the top panel, release the ESCAPE/CLEAR key and use the Up/Down Arrow key to adjust the contrast to give a readable display.
4. CW MEASUREMENT

4.1. Firmware Version 1.10 and Below

This following test can be used to verify the CW frequency accuracy of the Site Master. The signal is not a true CW frequency signal; rather, it consists of a narrow band of frequencies, centered on the selected frequency. This “dithering” of the selected frequency enhances the rejection of interference signals when used on a live site. Measurement calibration of the Site Master is **not** required for this test.

**a. Equipment Required:**

- Spectrum Analyzer
  Anritsu Model MS2602A

**b. Procedure:**

1. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn the Site Master on. (This sets the instrument to the factory preset state).

**NOTE**

Before continuing, allow a five minute warm up for the internal circuitry to stabilize.

2. Press the **FREQ** soft key.

3. Press the **F1** soft key, set to 1000.0 MHz, then press the **ENTER** key.

4. Press the **F2** soft key, set to 1000.0 MHz, then press the **ENTER** key.

5. Connect a RF cable from the Site Master Test Port to the RF Input on the MS2602A.

6. Set up the Spectrum Analyzer as follows:

   (a) Press Preset.

   (b) Press Center and enter 1 GHz.

   (c) Press Span and enter 500 kHz.

   (d) Press RB. Use the F5 key to toggle to 30 kHz.

   (e) Press VBW. Use the F5 key to toggle to OFF.
(f) Press Ref Lvl.
(g) Enter 10.00 dBm.
(h) Press Shift and 8.
(i) Press F3 to select LOG 2dB/.
(j) Press Attn.
(k) Use the F6 key to toggle to 20dB.
(l) Press SWP T.
(m) Use the F5 key to toggle to 20s.
(n) Press Shift and 4.
(o) Use the F3 key to toggle to A-Mode MAX.

7. If the Site Master has gone into the hold mode, press the RUN/HOLD key to make the measurement.

8. Allow a few sweeps to pass to create the shape of a bandpass filter. The bandwidth of the response should be greater than 175 kHz.

9. Use the Spectrum Analyzer marker to measure the center of the response. The frequency should be 1000 Mhz ±75 kHz.

4.2. Firmware Version 2.0 and Above

Site Master Firmware Version 2.0 and above provides a Fixed CW function. This function lets you measure the accuracy of the selected CW frequency without the “dithering.” Measurement calibration of the Site Master is not required for this test.

a. Equipment Required:

- Spectrum Analyzer
  Anritsu Model MS2602A

b. Procedure:

1. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn the Site Master on. (This sets the instrument to the factory preset state.)

NOTE
Before continuing, allow a five minute warm up for the internal circuitry to stabilize.

2. Press the FREQ soft key.
3. Press the F1 soft key, set to 1000.0 MHz, then press the ENTER key.
4. Press the F2 soft key, set to 1000.0 MHz, then press the ENTER key.
5. Press the MAIN soft key to return to the Main Menu.
6. Press the OPT soft key to go to the Option Menu.
7. Press the MORE soft key to go to the Option Sub-Menu.
8. Press the B6 soft key to turn Fixed CW on.
9. Connect the RF cable from the Site Master Test Port to the RF Input on the MS2602A.
10. Set up the Spectrum Analyzer as follows:
    (a) Press Preset.
    (b) Press Center and enter 1 GHz.
11. If the Site Master has gone into the hold mode, press the RUN/HOLD key to make the measurement.
12. Use the Spectrum Analyzer marker to measure the center of the response. The frequency should be 1000 Mhz ±75 kHz.
5. **RETURN LOSS VERIFICATION**

The following test can be used to verify the accuracy of return loss measurements. Measurement calibration of the Site Master is required for this test.

**a. Equipment Required:**

- 20 dB offset, Anritsu SC5270
- 6 dB offset, Anritsu SC5237
- Open/Short, Anritsu 22N50
- 50 Ohm Termination, Anritsu 26N50 or SM/PL

**b. Procedure:**

1. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn the Site Master on. (This sets the instrument to the factory preset state.)

   **NOTE**
   Before continuing, allow a five minute warm up for the internal circuitry to stabilize.

2. Press the FREQ soft key.

3. Press the F1 key, set the Site Master to its lowest start frequency, then press the ENTER key.

4. Press the F2 key, set the Site Master to its highest stop frequency, then press the ENTER key.

5. Press the START CAL key and follow the instructions to perform a calibration using a 22N50 Open/Short and 26N50 or SM/PL Termination.

6. Connect the 20 dB offset to the Test Port and verify that the reading is:
   - S110 and S111: 20 dB ±1.7 dB
   - S112 and S113: 20 dB ±1.7 dB
   - S330 and S331: 20 dB ±1.7 dB
   - S330A and S331A: 20 dB ±1.7 dB

7. Connect the 6 dB offset to the Test Port and verify that the reading is:
   - S110 and S111: 6 dB ±1.2 dB
   - S112 and S113: 6 dB ±1.2 dB
   - S330 and S331: 6 dB ±1.2 dB
   - S330A and S331A: 6 dB ±1.2 dB

6. **POWER MONITOR MEASUREMENTS**

If the Power Monitor (Option 5) is installed in the Site Master, the following test can be used to verify the accuracy of the power measurements. Measurement calibration of the Site Master is not required for this test.

**a. Equipment Required:**

- RF Detector, 10 MHz to 20 GHz, Anritsu 560-7N50B
- 10 dB Attenuator, Weinshel 1R-10
- 30 dB Attenuator, Weinshel 1R-30
- RF Reference Source, 0.050 GHz, Anritsu MA2418A
- DC Power Supply, Anritsu 2000-933

**b. Procedure**

1. Connect the DC Power Supply to the MA2418A Reference Source. (Refer to Figure 3 on the following page.)

2. Connect the RF Detector output to the RF Detector input on the Site Master.

3. Connect the DC Power Supply to the appropriate line voltage to supply power to the MA2418A Reference Source.

4. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn the Site Master on. (This sets the instrument to the factory preset state.)

   **NOTE**
   Before continuing, allow a five minute warm up for the internal circuitry to stabilize.

5. Press the POWER soft key.
6. Press the **ZERO** soft key to zero the power monitor. When complete, **ZERO ADJ :ON** is displayed in the message area.

7. Connect the MA2418A Reference Source to the input of the 560-7N50B RF Detector.

8. Verify that the power monitor reading is 0.0 dBm ±1 dB.

9. Disconnect the MA2418A Reference Source from the 560-7N50B RF Detector input.

10. Connect the two Attenuators to the output of the MA2418A Reference Source so as to add 40 dB of attenuation (Figure 3).

11. Connect the MA2418A Reference Source with the Attenuators to the input of the 560-7N50B RF Detector.

12. Verify that the power monitor reading is now –40.0 dBm ±2 dB.

**7. TERMINATION VERIFICATION**

This test verifies the accuracy of the Site Master terminations (Part Nos. SM/STL and SM/PL) using the precision return loss mode of the 541XXA Scalar Measurement System. Measurements of terminations using this mode provide results that are traceable to the NIST (National Institute of Standards and Technology) standards for the precision airline.

**a. Equipment Required:**

- Scalar Measurement System, Anritsu 541XXA
- Offset SWR Autotester, Anritsu 560-97A50-20
- Precision Airline, Anritsu 18N50
- Open/Short, Anritsu 22N50
- 50 Ohm Termination, Anritsu 26N50
- Source Adapter, Anritsu 34NN50A
**Figure 4. 541XXA Precision Return Loss Test Setup**

**b. Procedure**

1. Connect the test equipment as shown in Figure 4.
2. Press the Power key on the 541XXA to On.
3. Press the System Menu key.
4. Using the Menu up-down keys: Highlight RESET, then press the Select key.
5. At the RESET MENU display, use the Menu up-down keys to highlight RE-SET TO FACTORY DEFAULTS, then press the Select key.
6. Set the signal source for the frequency range as follows:
   (a) Press the Frequency key.
   (b) Using the Data Entry Keypad or Data Entry Knob, set the START frequency to 0.01 GHz. Press the Enter key.
   (c) Using the Data Entry Keypad or Data Entry Knob, set the STOP frequency to 4.0 GHz. Press the Enter key.
7. Press the Channel 2 Display On/Off key to Off.
8. Press the Channel 1 Menu key.
9. Using the Menu up-down keys: Highlight PRECISION RL, then press the Select key.
10. At the PRECISION RETURN LOSS menu display, use the Menu up-down keys to highlight FINAL, then press the Select key.
11. Press the Calibration key.
12. At the CALIBRATION menu display, use the Menu up-down keys to highlight START CAL, then press the Select key.
13. At the PRECISION RETURN LOSS CALIBRATION menu display prompt, connect the Offset SWR Autotester to Input A, if you have not done so yet.
14. Connect the precision air line to the Offset SWR Autotester test port. Position the air line pointing vertically upward. Downward or horizontal positions make connector pin alignment difficult.
   **NOTE**
   Ensure that the beadless end of the precision airline is at the measurement connection point.
15. Press the Select key when ready.
16. At the PRECISION RETURN LOSS CALIBRATION menu prompt, connect the Open to the beadless end of the airline. Press the Select key to start the calibration.

17. Verify that the display resembles that shown in Figure 5.

**CAUTION**
During both calibration and measurement, be sure to properly align the beadless connector of the airline. When the connectors are mis-aligned, a spike will usually be visible on the display.

18. At the next menu prompt, remove the Open and connect the Short to the beadless end of the airline. Press the Select key to start the calibration process.

19. At the next menu prompt, remove the Short and connect the 50 Ohm Termination to the beadless end of the airline. Press the Select key to start the calibration process.

20. When the calibration is complete, remove the 50 Ohm Termination.

21. Connect the SM/STL termination to the beadless end of the airline and press the Select key to begin the measurement.

22. Observe that the waveform displayed resembles that shown in Figure 6.

23. Press the Cursor On/Off key to On.

24. Observe the CURSOR menu readout. The minimum return loss reading for the SM/STL termination should be 35 dB.

25. Press the Cursor ON/Off key to Off.

26. Remove the SM/STL termination from the airline.

27. Repeat steps 21 thru 24 for the SM/PL termination. The minimum return loss reading for the SM/PL termination should be 42 dB.
8. **BATTERY PACK REMOVAL**

This procedure provides instructions for removing the battery pack. Refer to Figure 7 (above) during this procedure.

1. Place the Site Master face up on a work surface.
2. Remove the four corner rubber bumpers (1).
3. Remove the four screws (PN 900-811) (2).
4. While holding the two halves of the Site Master together, turn it over and set it face down on the work surface.
   
   **CAUTION**
   In the next step, the Main RF PCB assembly (3) and test port panel (4) must stay with the front panel.

5. Remove the bottom half (5) and fold it over to lay upside down on the work surface.
6. Disconnect the battery connector from J 6 (6) of the Main RF PCB assembly (3).
7. Remove the four screws or push-pull connectors (7) holding the battery bracket (8) in place and lift the bracket clear.
8. Remove the battery assembly (9).

9. **BATTERY PACK REPLACEMENT**

This procedure provides instructions for replacing the battery pack. Refer to Figure 6 (page 8) during the procedure.

1. Install the new battery assembly (9).
2. Replace the battery bracket (8) and insert the four screws (7) to hold the battery bracket in place.

3. Reattach the battery connector to J 6 (6) on the main RF PCB assembly (3).

4. Set the bottom half in place.

5. While holding the two halves together, turn the Site Master over and lay it face up on the work surface.

6. Reinstall the four screws (2).

7. Install the rubber bumpers (1) on all four corners of the instrument.

10. **BATTERY DISPOSAL**

The battery used in the Site Master is a rechargeable nickel-cadmium (NiCd) battery and is covered by the Battery Directive (91/157/EEC). As such, the battery is marked as follows to indicate controlled disposal.

<table>
<thead>
<tr>
<th>Component</th>
<th>% of Cell Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>19 to 26%</td>
</tr>
<tr>
<td>Cadmium</td>
<td>17 to 22%</td>
</tr>
</tbody>
</table>

Spent nickel-cadmium batteries are valuable resources. Because they are reusable, do not throw them away. Arrange for proper return for recycling in your locality. If you do not have access to proper disposal methods, return the battery pack to your Anritsu service center. Service centers will dispose of the unit at no charge. Anritsu service centers are listed in Table 2 on page 11.

11. **KEY PAD MEMBRANE REPLACEMENT**

This procedure provides instructions for replacing the key pad membrane. Refer to Figure 7 (page 8) during the procedure.

1. Place the Site Master face up on a work surface.

2. Remove the four corner rubber bumpers (1).

3. Remove the four screws (PN 900-811) (2).

4. While holding the two halves of the Site Master together, turn it over and set it face down on the work surface.

   **CAUTION**
   In the next step, the PCB Assy (3) and test port panel (4) must stay with the front panel.

5. Remove the bottom half (5) and fold it over to lay upside down on the work surface.

6. Disconnect the battery connector from J 6 (6).

7. Remove the screw (10) located on the bottom side of the main PCB Assy next to the RF Bridge Assy.

8. Pull the PCB Assemblies clear from the top half of the case.

9. Lift the damaged keypad membrane clear from the keypad assembly.

10. Install a new membrane.

   **NOTE**
   Carefully use pliers to pull the rubber tabs tight to ensure that the membrane is flush with the PCB.
12. **LCD REPLACEMENT**

This procedure provides instructions for replacing the Liquid Crystal Display (LCD). Refer to Figure 7 (page 8) during the procedure.

1. Place the Site Master face up on a work surface.
2. Remove the four corner rubber bumpers (1).
3. Remove the four screws (PN 900-811) (2).
4. While holding the two halves of the Site Master together, turn it over and set it face down on the work surface.

**CAUTION**

In the next step, the PCB Assy (3) and test port panel (4) must stay with the front panel.

5. Remove the bottom half (5) and fold it over to lay upside down on the work surface.
6. Disconnect the battery connector from J6 (6).
7. Remove the screw (10) located on the bottom side of the main PCB Assy next to the RF Bridge Assy.
8. Pull the PCB Assemblies clear from the top half of the case.
9. Remove the grey/brown cable from the connector J8.
10. Remove the four screws from the LCD PCB assembly.
11. Carefully remove the 20-way ribbon cable from the connector on the keypad PCB assembly.
12. Install the new LCD PCB Assembly.

13. **MAIN RF PCB ASSEMBLY REPLACEMENT**

This procedure provides instructions for replacing the main RF PCB. Refer to Figure 7 (page 8) during this procedure.

1. Place the Site Master face up on a work surface.
2. Remove the four corner rubber bumpers (1).
3. Remove the four screws (PN 900-811) (2).
4. While holding the two halves of the Site Master together, turn it over and set it face down on the work surface.

**CAUTION**

In the next step, the PCB Assy (3) and test port panel (4) must stay with the front panel.

5. Remove the bottom half (5) and fold it over to lay upside down on the work surface.
6. Disconnect the battery connector from J6 (6).
7. Remove the screw (10) located on the bottom side of the main PCB Assy next to the RF Bridge Assy.
8. Pull the PCB Assemblies clear from the top half of the case.
9. Remove the four screws holding the LCD assembly, but do NOT disconnect the 20-way connector from the keypad PCB assembly.
10. While using pliers to gently squeeze the nine plastic spacer heads to release them from the Keypad PCB assembly, carefully pull the keypad PCB with the LCD from the main RF PCB assembly.
11. Remove the four standoffs.

**NOTE**

For “CE” versions of the S110/S111 remove the EMI Shield cloth and place on the new RF PCB assembly during installation.
12. Remove the three screws holding the main RF PCB assembly to the test port panel.

   **NOTE**
   Take care to not lose the mylar pad under Q5.

13. Remove the two hex standoff screws and nuts holding the serial interface connector to the test port panel.

14. Using a $5/16$ - inch wrench, loosen the SMA connector for the Test Port and remove the test port panel.

   **NOTE**
   If the Power Monitor (Option 5) is installed, remove the two screws holding the Option 5 PCB assembly to the test port panel and unsolder the wires from pins 1 through 4 of the RF Detector connector on the test port panel.

15. Reverse the above procedure to install the replacement RF PCB assembly.

14. **REPLACEABLE PARTS**

   Replaceable parts for the Site Master are listed in Table 1 on page 12.
### Table 1. Parts List

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<tr>
<th>Part Number</th>
<th>Description</th>
<th>Qty</th>
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<td><strong>Accessories</strong></td>
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<tr>
<td>10580-00005</td>
<td>User’s Guide, Site Master S110, S111, S330, S331</td>
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<td>10580-00009</td>
<td>User’s Guide, Site Master S112, S113</td>
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<td>10580-00010</td>
<td>Programming Manual</td>
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<td>2300-211</td>
<td>Software Tools, Site Master</td>
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<td>2300-223</td>
<td>Support Disk, Site Master</td>
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<td>40-115</td>
<td>Power Supply</td>
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<td>SM/STL</td>
<td>Connector, RF Termination</td>
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<td>Serial Interface Cable Assy</td>
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<td><strong>Replaceable Parts</strong></td>
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<td>ND45417</td>
<td>Battery Pack Kit</td>
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<tr>
<td>UNITED STATES</td>
<td>ANRITSU COMPANY&lt;br&gt;685 Jarvis Drive&lt;br&gt;Morgan Hill, CA 95037-2809&lt;br&gt;Telephone: (408) 776-8300&lt;br&gt;FAX: 408-776-1744</td>
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<tr>
<td></td>
<td>ANRITSU COMPANY&lt;br&gt;10 New Maple Ave., Unit 305&lt;br&gt;Pine Brook, NJ 07058&lt;br&gt;Telephone: (201) 227-8999&lt;br&gt;1-800-ANRITSU&lt;br&gt;FAX: 201-575-0092</td>
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<td>ANRITSU COMPANY&lt;br&gt;1155 E. Collins Blvd&lt;br&gt;Richardson, TX 75081&lt;br&gt;Telephone: 1-800-ANRITSU&lt;br&gt;FAX: 972-671-1877</td>
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<tr>
<td>AUSTRALIA</td>
<td>ANRITSU PTY. LTD.&lt;br&gt;Unit 3, 170 Foster Road&lt;br&gt;Mt Waverley, VIC 3149&lt;br&gt;Australia&lt;br&gt;Telephone: 09-558-8177&lt;br&gt;Fax: 09-558-8255</td>
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<td>ANRITSU ELECTRONICA LTDA.&lt;br&gt;Praia de Botafogo 440, Sala 2401&lt;br&gt;Cep 22250-040, Rio de Janeiro, RJ, Brasil&lt;br&gt;Telephone: 021-28-69-141&lt;br&gt;Fax: 021-53-71-456</td>
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<td>CANADA</td>
<td>ANRITSU INSTRUMENTS LTD.&lt;br&gt;215 Stafford Road, Unit 102&lt;br&gt;Nepean, Ontario K2H 9C1&lt;br&gt;Telephone: (613) 828-4090&lt;br&gt;FAX: (613) 828-5400</td>
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<tr>
<td>CHINA</td>
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