

MAINTENANCE MANUAL

Site Master™ S120A, S235A, S250A, S251A

Antenna and Cable Analyzers

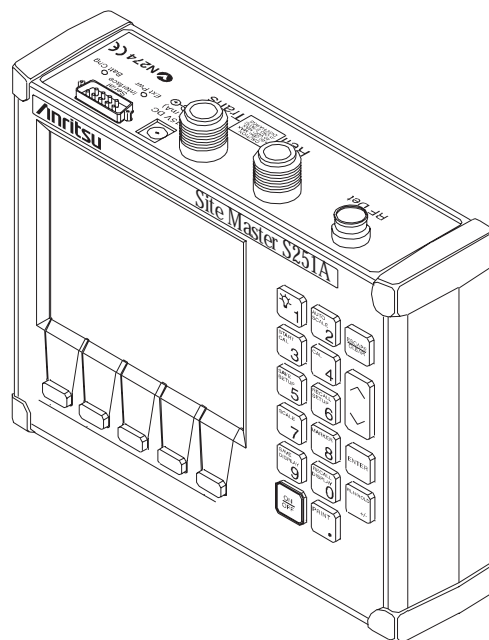


Figure 1. Site Master S251A

1. INTRODUCTION

This manual provides maintenance instructions for Site Master S120A, S235A, S250A, S251A Antenna and Cable Analyzers. 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 S₂₁ (transmission gain or loss), 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 9 contain tests that can be used to verify the performance of the Site Master models S120A, S235A, S250A, and S251A having any version of firmware.

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. Release the ESCAPE/CLEAR key and use the Up/Down Arrow key to adjust the contrast to give a readable display.

Anritsu

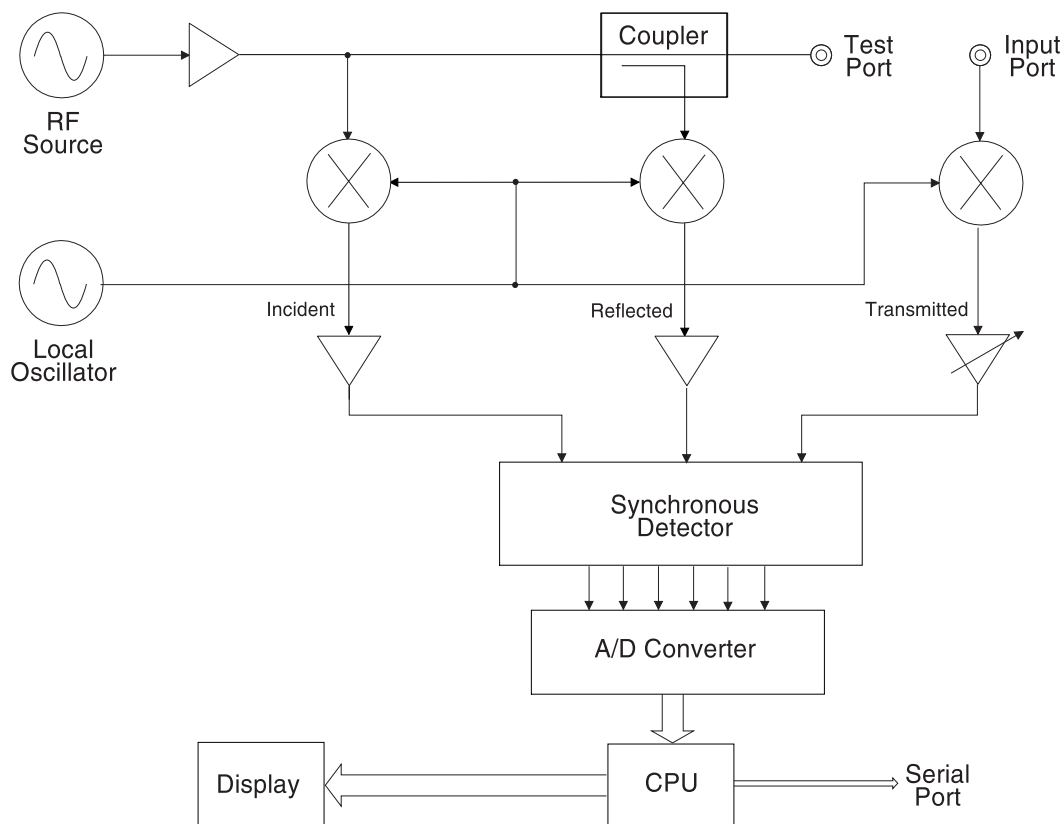


Figure 2. Site Master Block Diagram

4. FREQUENCY ACCURACY

The following test can be used to verify the CW frequency accuracy of the Site Master. 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 on the Site Master. (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 **MODE** soft key.
3. Use the Up/Down Arrow key to highlight RF SOURCE, then press ENTER.
4. Press the **FREQ** soft key.
5. Using the keypad or Up/Down Arrow key enter 1000.0 MHz (S120A and S251A) or 2000.0 MHz (S235A and S250A), then press the ENTER key.
6. Connect the RF cable from the Site Master Refl Test Port to the RF Input on the MS2602A.
7. Set up the Spectrum Analyzer as follows:
 - (a) Press Preset.
 - (b) Press Center and enter 1 GHz (S120A and S251A) or 2 GHz (S235A and S250A).
8. If the Site Master has gone into the hold mode, press the RUN/HOLD key to make the measurement.

9. Use the Spectrum Analyzer marker to measure the center of the response. The frequency should be:

- ☐ **S120A:** 1000 MHz \pm 75 kHz
- ☐ **S235A:** 2000 MHz \pm 150 kHz
- ☐ **S250A:** 2000 MHz \pm 150 kHz
- ☐ **S251A:** 1000 MHz \pm 75 kHz

5. TRANSMISSION/ISOLATION VERIFICATION

The following test can be used to verify transmission test port isolation and the accuracy of transmission measurements. Measurement calibration of the Site Master is required for this test.

a. Equipment Required:

- 10 dB Attenuator, Weinshel 1R-10
- 30 dB Attenuator, Weinshel 1R-30
- Open/Short, Anritsu 22NF50
- 50 Ohm Terminations, Anritsu SM/PL or 28NF50-2
Anritsu SM/PLNF or 28NF50-2
- Armored Test Port Extension Cable, 1.5 Meter, N(m) to N(m), Anritsu 15NN50-1.5A

b. Procedure:

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.)

NOTE

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

2. Press the **MODE** soft key.
3. Use the Up/Down Arrow key to highlight GAIN/INSERTION LOSS, then press ENTER.
4. Press the **SCALE** soft key.
5. Press the **TOP** soft key.

6. On the keypad, press "0", then press ENTER. (Verify the bottom limit is set to -120 dBm.)
7. Press the **MAIN** soft key to return to the Main Menu.
8. Press the **OPT** soft key.
9. Press the **B2** soft key to turn the limit beep ON.
10. Press the **MORE** soft key, then the **MAIN** soft key to return to the Main Menu.
11. Press the **SCALE** soft key.
12. Press the **LIMIT** soft key.
13. Use the keypad or Up/Down Arrow key set the limit to -85 dB (S120A) -80 dB (S251A) or -75 dB (S235A and S250A), then press ENTER.
14. Press the **MAIN** soft key to return to the Main Menu.
15. Press the START CAL key.
16. Follow the instructions on the display to perform a OSL-THRU-ISOL calibration using a 22NF50 Open/Short, 28NF50-2 or SM/PLNF Terminations, and 15NN50-1.5A Test Port Extension Cable (refer to Figure 3).

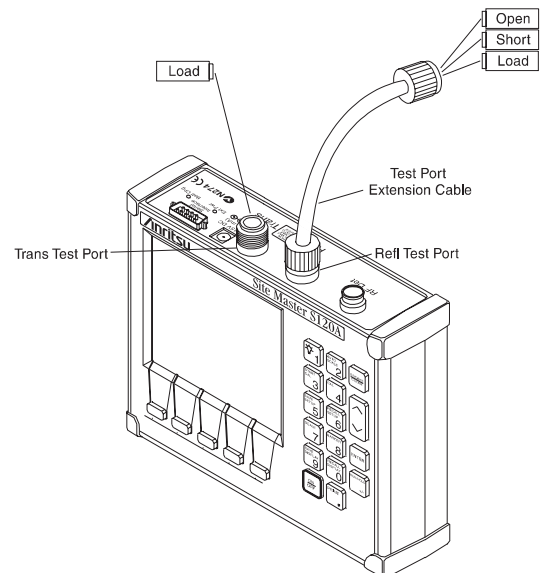


Figure 3. OSL-THRU-ISOL Calibration Setup

17. Connect a Load (28N50-2 or SM/PL) to the Trans Test Port and verify that the noise floor (isolation) is below -85 dB (S120A) -80 dB (S251A) or -75 dB (S235A and S250A).
18. Press the **MARKER** key.
19. Press the **M1** soft key, then the **EDIT** soft key.
20. Using the keypad or the Up/Down Arrow key, enter 1000.0 MHz (S120A and S251A), or 1250 MHz (S235A) or 2000.0 MHz (S250A), then press **ENTER**.
21. Press the **BACK** soft key, then the **MAIN** soft key to return to the Main Menu.

NOTE

For the following steps in the procedure, use *only* attenuators that have Type N connectors. The use of attenuators with other type connectors and adapters will cause measurement errors.

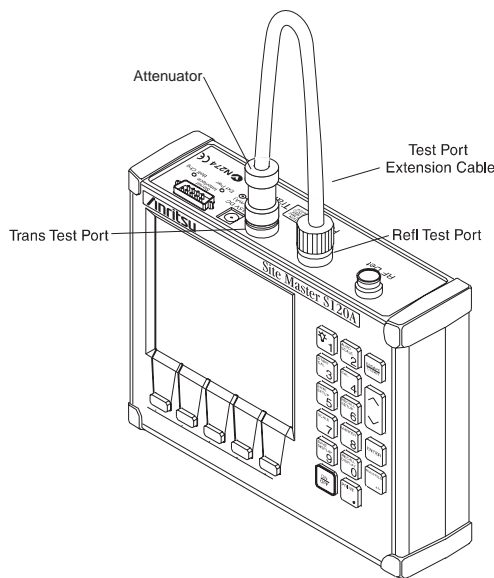


Figure 4. Test Setup

22. Connect the 10 dB attenuator to the Trans Test Port (refer to Figure 4) and verify that the reading is:
 - ☐ **S120A:** 10 dB ± 2.25 dB @1000 MHz
 - ☐ **S235A:** 10 dB ± 2.25 dB @1250 MHz
 - ☐ **S250A:** 10 dB ± 2.25 dB @2000 MHz
 - ☐ **S251A:** 10 dB ± 2.25 dB @1000 MHz
23. Connect the 10 dB and 30 dB attenuators in series to the Trans Test Port and verify that the reading is:
 - ☐ **S120A:** 40 dB ± 3.25 dB @1000 MHz
 - ☐ **S235A:** 40 dB ± 3.25 dB @1250 MHz
 - ☐ **S250A:** 40 dB ± 3.25 dB @2000 MHz
 - ☐ **S251A:** 40 dB ± 3.25 dB @1000 MHz

6. 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 28N50-2 or SM/PL

b. Procedure:

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.)

NOTE

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

2. Press the **MODE** soft key.

3. Use the Up/Down Arrow key to highlight RETURN LOSS, then press ENTER.
4. Press the START CAL key.
5. Use the Up/Down Arrow key to highlight OSL, then press ENTER.
6. Follow the instructions on the screen to perform a calibration using a 22N50 Open/Short and 28N50-2 or SM/PL Termination.
7. Connect the 20 dB offset to the Refl Test Port and verify that the reading is:
 - ❑ **S120A:** 20 dB ± 1.7 dB
 - ❑ **S235A:** 20 dB ± 1.7 dB
 - ❑ **S250A:** 20 dB ± 1.7 dB
 - ❑ **S251A:** 20 dB ± 1.7 dB
8. Connect the 6 dB offset to the Refl Test Port and verify that the reading is:
 - ❑ **S120A:** 6 dB ± 1.2 dB
 - ❑ **S235A:** 6 dB ± 1.2 dB
 - ❑ **S250A:** 6 dB ± 1.2 dB
 - ❑ **S251A:** 6 dB ± 1.2 dB

7. POWER MONITOR VERIFICATION

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 5.)
2. Connect the MA2418A Reference Source to the input of the 560-7N50B RF detector.
3. Connect the RF Detector output to the RF Detector input of the Site Master.
4. Connect the DC power supply to the appropriate line voltage to supply power to the MA2418A Reference Source.
5. 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.)
6. Press the **MODE** soft key.
7. Use the Up/Down Arrow key to highlight POWER MONITOR, then press ENTER.
8. Press the **ZERO** soft key to zero the power monitor.
When complete, ZERO ADJ:ON is displayed in the message area.
9. Verify that the power monitor reading is 0.0 dBm ± 1 dB.
10. Connect the output of the MA2418A Reference Source to the two attenuators so as to add 40 dB of attenuation (Figure 5).

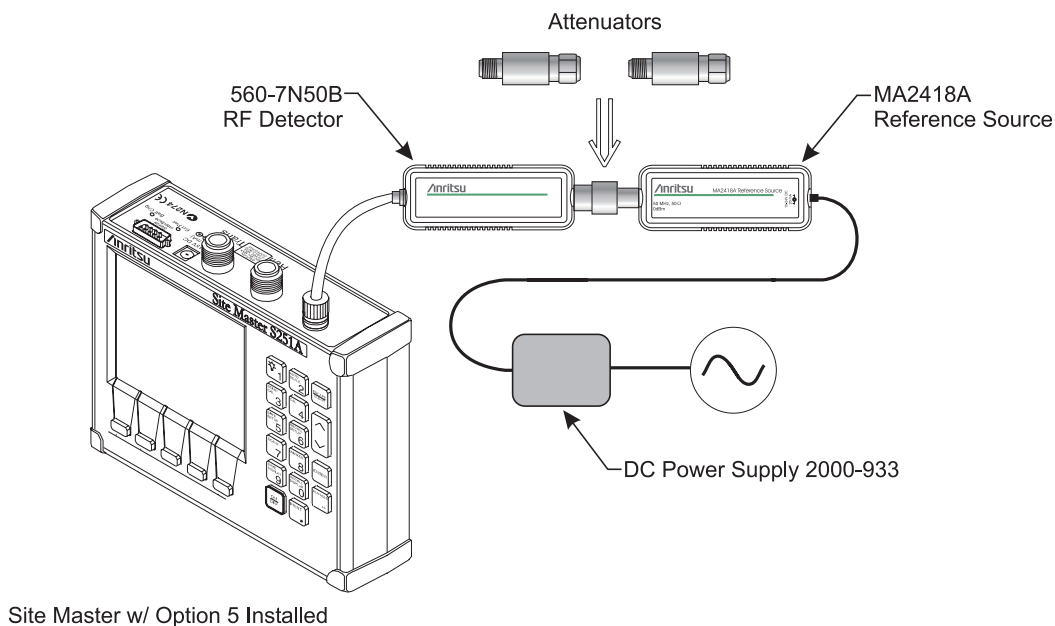


Figure 5. Power Monitor Verification

11. Connect the MA2418A Reference Source and the attenuators to the input of the 560-7N50B RF detector.
12. Verify that the power monitor reading is now $-40.0 \text{ dBm} \pm 2 \text{ dB}$.

8. BIAS T (OPTION 10) VERIFICATION

a. Equipment Required:

- AC-DC Adapter Power Supply 40-115
- Open/Short, Anritsu 22NF50
- 100 Ohm, 1 Watt load (100 Ohm, 1 Watt resistor soldered from the center pin to ground of an N-type connector.)

b. Procedure:

1. Connect the AC-DC Adapter Power Supply to the battery charging port on the Site Master (Option 10 only works with the AC-DC Adapter).
2. Apply AC power to the power supply.
3. 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.)
4. Press the **OPT** soft key.

5. Press the **B3** soft key to activate the Bias Tee option.
6. Verify that the display shows BIAS ON, 15.0 V, 0 mA.
7. Connect the 22NF50 short to the Transmission test port.
8. Verify that the display shows BIAS ON, Fault, and the test port voltage relay clicks on and off.
9. Remove the short and install the 100 Ohm load.

CAUTION

The 100 Ohm resistor will get hot. Verify the readings and remove the 100 Ohm load immediately.

10. Verify that the display shows BIAS ON, with a reading of 14.8 to 15.3 Volts, and 120 to 160 milliamps.

9. TERMINATION VERIFICATION

This test verifies the accuracy of the Site Master SM/PL termination 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

b. Procedure

1. Connect the test equipment as shown in Figure 6.

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 **RESET 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.

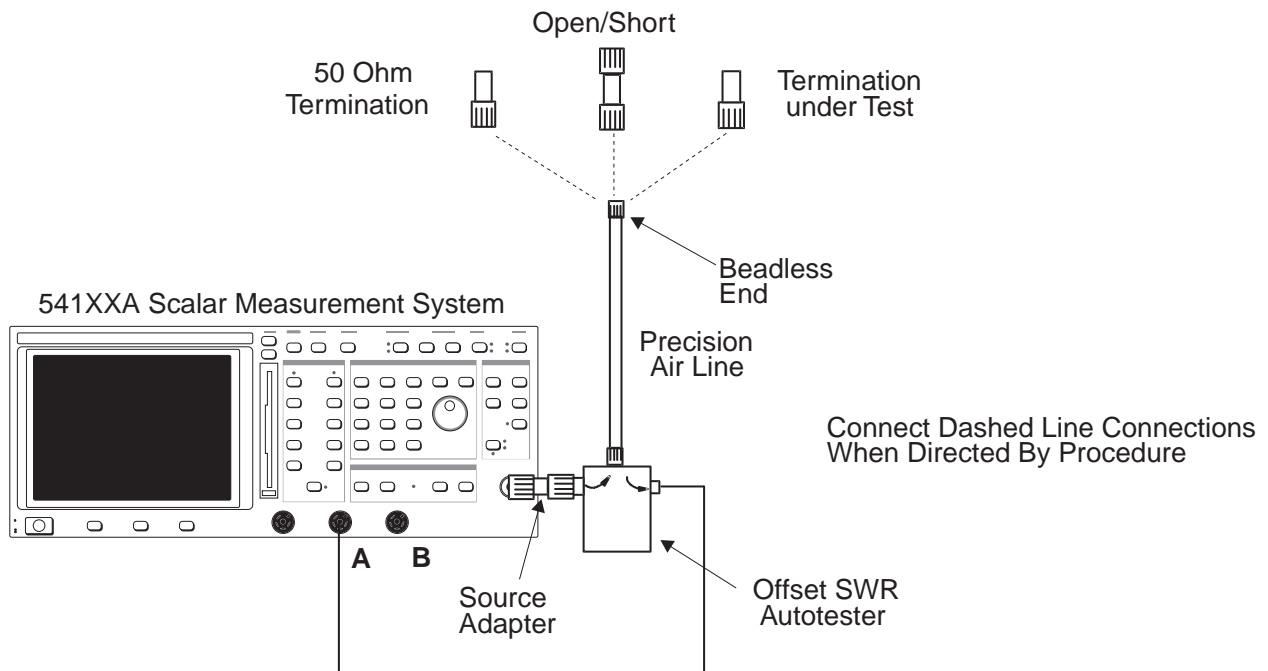


Figure 6. 541XXA Precision Return Loss Setup

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 7.

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.

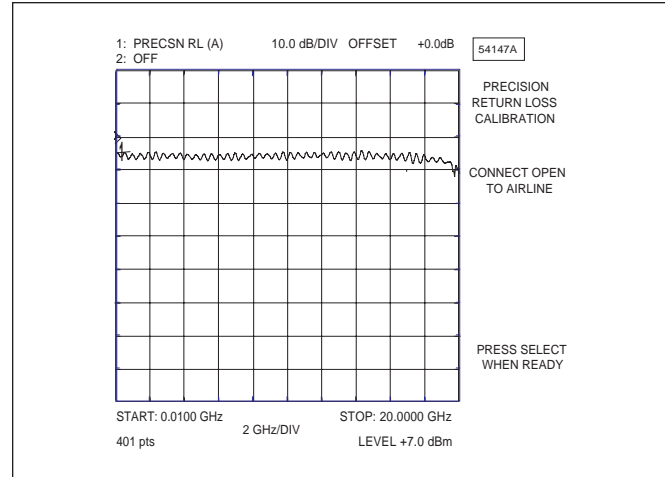


Figure 7. Example of a Good Connection

19. At the next menu prompt, remove the Short and connect the 50 Ohm Termination to the beadless end of the air line. Press the Select key to start the calibration process.
20. When the calibration is complete, remove the 50 Ohm Termination.
21. Connect the SM/PL termination to the beadless end of the air line and press the Select key to begin the measurement.
22. Observe that the waveform displayed resembles that shown in Figure 8.
23. Press the Cursor On/Off key to On.
24. Observe the CURSOR menu readout. The minimum return loss reading for the SM/PL termination should be 42 dB.

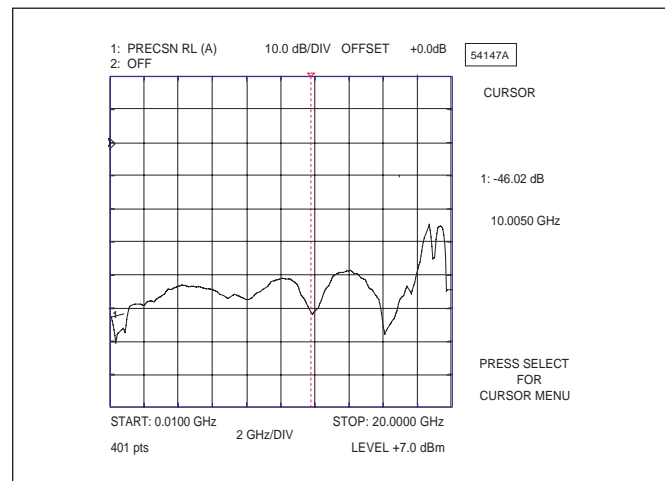


Figure 8. Direct Readout of the Precision Return Loss

10. BATTERY PACK REMOVAL

This procedure provides instructions for removing the battery pack. Refer to Figure 9 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.
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) of the Main RF PCB assembly (3).
7. Remove the four screws (7) holding the battery bracket (8) in place and lift the bracket clear.
8. Remove the battery assembly (9).

CAUTION

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

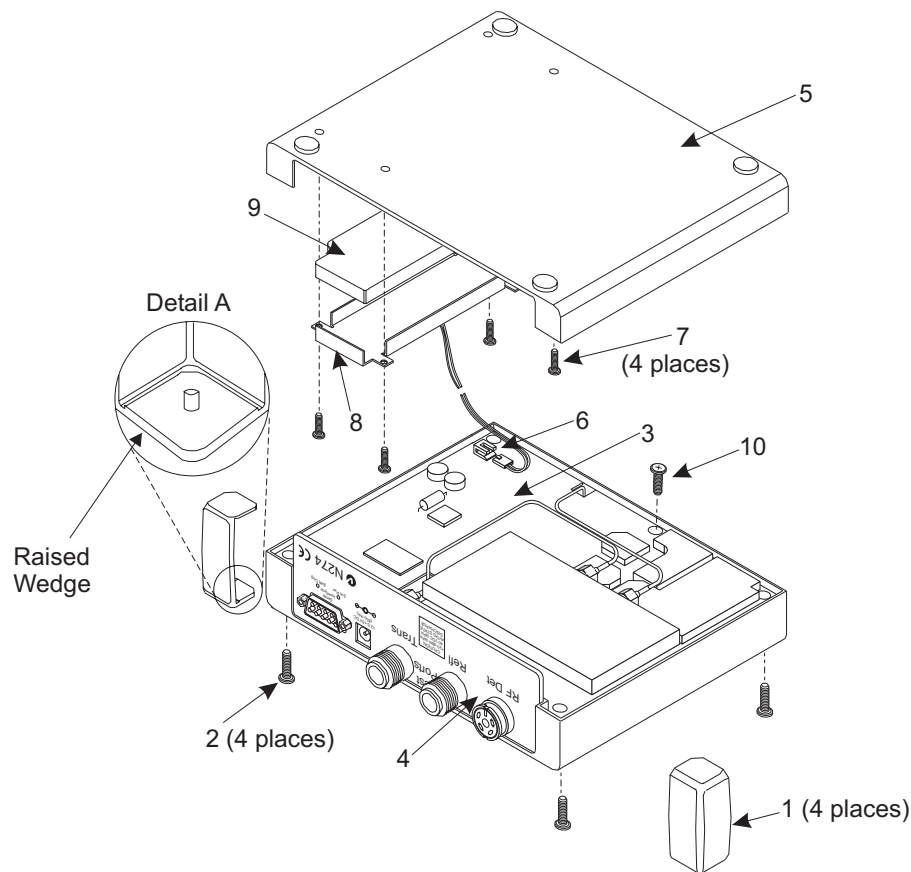


Figure 9. Site Master Battery Removal

11. BATTERY PACK REPLACEMENT

This procedure provides instructions for replacing the battery pack. Refer to Figure 9 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 J6 (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.

NOTE

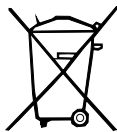
Corner bumpers can only mount one way. That is, the raised-wedged area on the bumper inside (Detail A) attaches to the front cover.

12. 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.



This marking indicates that the battery is a recyclable product.



NiCd

This marking indicates that the battery requires separate collection and shows the chemical system (Nickel/Cadmium).

Component	% of Cell Weight
Nickel	19 to 26%
Cadmium	17 to 22%

This marking indicates the heavy-metal component concentration as a percentage of battery cell weight.

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 13.

13. KEY PAD MEMBRANE REPLACEMENT

This procedure provides instructions for replacing the key pad membrane. Refer to Figure 9 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 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 J6 (6).
7. Remove the screw (10) located on the bottom side of the main PCB assembly next to the RF Bridge assembly.
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.

14. LCD REPLACEMENT

This procedure provides instructions for replacing the Liquid Crystal Display (LCD). Refer to Figure 9 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 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 J6 (6).
7. Remove the screw (10) located on the bottom side of the main PCB assembly next to the RF Bridge assembly.
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.

15. MAIN RF PCB ASSEMBLY REPLACEMENT

This procedure provides instructions for replacing the main RF PCB. Refer to Figure 9 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 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 J6 (6).
7. Remove the screw (10) located on the bottom side of the main PCB assembly next to the RF Bridge assembly.
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 and the EMI Shield cloth.
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 wrench, loosen the SMA connectors for the Refl and Trans test ports and remove the test port panel.

NOTE

If the Power Monitor (Option 5) is installed, remove the two screws holding the Power Monitor PCB assembly to the test port panel and lift it clear of the connector on the main RF PCB assembly.

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

16. REPLACEABLE PARTS

Part Number	Description	Qty
Accessories		
10580-00016	User's Guide, Site Master S120A, S235A, S250A	1
10580-00020	User's Guide, Site Master S251A	1
10580-00007	Battery Replacement and Disposal Guide	1
2300-211	Software Tools, Site Master	1
40-115	Power Supply	1
SM/STS	Connector, RF Short, N Male	1
SM/PL	Connector, RF Termination	1
806-62	Cable Assy, Cig Plug, Female	1
800-441	Serial Interface Cable Assy	1
D41955	Carrying Case	1
Replaceable Parts		
B45009-1	N-Connector, Modified	1
B45009-2	N-Connector, Modified	1
B42893	EMI Shield	1
C41761	Liquid Crystal Display Assy	1

Part Number	Description	Qty
ND45417	Battery Pack Kit	1
ND45292	Main PCB Assy, S120A with RF module and cables	1
ND45296	Main PCB Assy, S235A with RF module and cables	1
ND45353	Main PCB Assy, S250A with RF module and cables	1
ND48761	Main PCB Assy, S251A with RF module and cables	
D41766-3	Keypad PCB Assy	1
D40864-2	Membrane Keypad, Main	1
C41767	Membrane, Soft Keys	1
Hardware		
790-171	Silicon Pad	1
761-10	Cap Vinyl, Black, round, 0.625 ID	1
790-52	Washer, #4, Shoulder, Nylon	1
900-257	Pan Head Screw, 0.312	4
790-445	Spacer PCB, 0.625, Self Mount	9
900-800	Pan Head Screw, #4, 0.312	1
900-811	Pan Head Screw, #4	4
900-326	Nut, Kep, 4-40, 0.312	4
900-697	Pan Head Screw, 4-40, 0.312	3
900-138	Screw, Pan, 2-56/patchlock, 0.18	4
B41753	Gasket, LCD	1
Case Parts		
D40861-3	Case	1
C40863	Bumper	4
B45018	ID, Model S120A Label	1
B45017	ID, Model S235A Label	1
B46687	ID, Model S250A Label	1
48161	ID, Model S251A Label	1

Table 1. Anritsu Service Centers

UNITED STATES

ANRITSU COMPANY
685 Jarvis Drive
Morgan Hill, CA 95037-2809
Telephone: (408) 776-8300
1-800-ANRITSU
FAX: 408-776-1744

ANRITSU COMPANY
10 New Maple Ave., Unit 305
Pine Brook, NJ 07058
Telephone: (201) 227-8999, 1-800-ANRITSU
FAX: 201-575-0092

ANRITSU COMPANY
1155 E. Collins Blvd
Richardson, TX 75081
Telephone: 1-800-ANRITSU
FAX: 972-671-1877

AUSTRALIA

ANRITSU PTY. LTD.
Unit 3, 170 Foster Road
Mt Waverley, VIC 3149
Australia
Telephone: 03-9558-8177
FAX: 03-9558-8255

BRAZIL

ANRITSU ELECTRONICA LTDA.
Praia de Botafogo, 440, Sala 2401
CEP22250-040, Rio de Janeiro, RJ, Brasil
Telephone: 021-28-69-141
FAX: 021-53-71-456

CANADA

ANRITSU INSTRUMENTS LTD.
215 Stafford Road, Unit 102
Nepean, Ontario K2H 9C1
Telephone: (613) 828-4090
FAX: (613) 828-5400

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ANRITSU BEIJING SERVICE CENTER
Beijing Fortune Building
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Chaoyang qu, Beijing 100004, China
Telephone: 011861065909237
FAX: 011861065909236

FRANCE

ANRITSU S.A.
9 Avenue du Quebec
Zone de Courtaboeuf
91951 Les Ulis Cedex
Telephone: 016-44-66-546
FAX: 016-44-61-065

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ANRITSU GmbH
Grafenberger Allee 54-56
D-40237 Dusseldorf, Germany
Telephone: 0211-68550
FAX: 0211-68555

INDIA

MEERA AGENCIES (P) LTD.
A-23 Hauz Khas
New Delhi 110 016
Telephone: 011-685-3959
FAX: 011-686-6720

ISRAEL

TECH-CENT, LTD.
Haarad St. No. 7, Ramat Haahayal
Tel-Aviv 69701
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FAX: (03) 64-78-334

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