

**Site Master™**

**Model S331D**

**Cable and Antenna Analyzer**

**MAINTENANCE MANUAL**

**SiteMaster** 

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**Anritsu**

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## 1. Introduction

This manual provides maintenance instructions for the Site Master Model S331D Cable, Antenna and Base Station Analyzer. It describes the product and provides performance verification procedures, parts replacement procedures, and a replaceable parts list.

## 2. Description

The Site Master is a handheld SWR/RL (standing wave ratio/return loss), Distance-To-Fault and power meter (optional) measurement instrument. It combines a synthesized source, a VSWR Bridge, and receiver circuitry in a compact instrument.

The following sections contain tests that can be used to verify the performance of the Site Master Model S331D.

Throughout this manual, the term “VNA” may be used to denote Return Loss, SWR, Cable Loss and DTF modes. All other modes are referenced individually.

## 3. VNA 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 MS2665C or equivalent
- 10 MHz Reference Standard

### b. *Procedure:*

1. Connect a 10 MHz Reference signal to the 10 MHz STD Ref In of the MS2665C or equivalent.
2. 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.*

3. Press the **FREQ/DIST** key, then press the F1 soft key and set F1 to 1000 MHz, then press the **ENTER** key.
4. Press the F2 soft key, set F2 to 1000 MHz, then press the **ENTER** key.
5. Press the **MEAS/DISP** key, then press the Fixed CW soft key to turn Fixed CW On.
6. Connect the RF cable from the Site Master Reflection Test Port to the RF Input on the MS2665C or equivalent.

7. Set up the MS2665C as follows:
  - (a) Press the **Preset** key, then select **Preset All** (F1).
  - (b) Press the **Frequency** key.
  - (c) Press the **1** key and then the **GHz** key to change the Center Frequency to 1 GHz.
  - (d) Press the **Span** key.
  - (e) Press the **7, 5, 0,** and **kHz** keys sequentially to change the Frequency Span to 750 kHz.
  - (f) Press the **RBW** key.
  - (g) Press the **1, 0** and **kHz** keys sequentially to change the RBW to 10 kHz.
  - (h) Press the **VBW** key.
  - (i) Press the **Filter Off** soft key (F3) to turn the VB filter off.
  - (j) Press the **Amplitude** key.
  - (k) Press the **0,** and **dBm** keys sequentially to change the Reference Level to 0 dBm.
  - (l) Press the **Log Scale** soft key (F5)
  - (m) Select **2 dB/Div** (F3) and the press the **return** soft key.

*NOTE: If the Site Master has gone into the hold mode, press the **RUN/HOLD** key to return to normal mode.*

8. When a peak response appears on the Spectrum Analyzer, press the **Marker Peak Search** key on the Spectrum Analyzer. Verify that the marker peak readout value is 1000 MHz  $\pm$ 75 kHz.
9. On the Site Master, press the **MEAS/DISP** key then the **Fixed CW** soft key to turn Fixed CW off.

#### 4. VNA 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 SC7423
- 6 dB offset, Anritsu SC7424
- 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** key.
3. Use the Up/Down arrow key to highlight Return Loss, then press **ENTER**.
4. Press the **START CAL** key.
5. Follow the instructions on the screen to perform a calibration using a 22N50 Open/Short and 28N50-2 or SM/PL Termination.
6. Connect the 20 dB offset to the Refl Test Port and verify that the reading is 20 dB  $\pm$  1.7 dB.
7. Connect the 6 dB offset to the Refl Test Port and verify that the reading is 6 dB  $\pm$  1.2 dB.

## 5. Power Monitor Verification (Option 5)

The following test can be used to verify the accuracy of the power monitor function.

### a. Equipment Required:

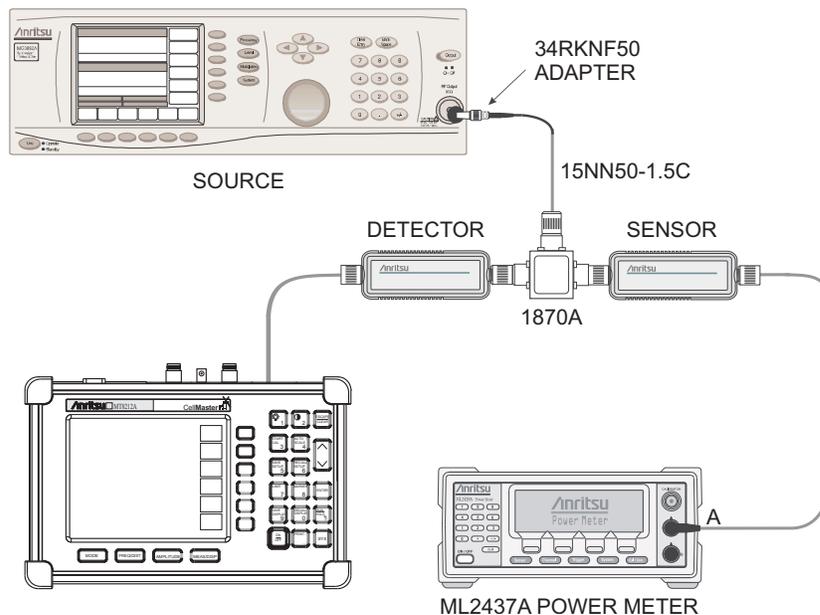
- Anritsu MG3692A Synthesized Signal Source, with options 2A, 4 and 15A
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensor or equivalent
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- Anritsu 560-7N50B N Type RF Detector
- Aeroflex/Weinschel 1870A Power Splitter

### b. Procedure:

1. Turn on the power meter and signal source.

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

2. Set the MG3692A output power level to 5 dBm.
3. Set the MG3692A output to 1 GHz CW.
4. Connect the power sensors to the power meter and calibrate the sensors.
5. On the power meter, press the Sensor key, the Cal Factor soft key, and then the FREQ soft key. Use the keypad to enter 1 GHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the SENSOR key on the power meter to display the power reading.
6. Connect MG3692A, power meter, RF detector, Power Splitter and Power Sensor as shown in Figure 1.



**Figure 1.** Power Monitor Verification Setup

7. Connect the external power supply (Anritsu part number 40-187-R) to the Site Master.
8. On the Site Master, 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.)
9. Press the **MODE** key. Use the Up/Down arrow key to highlight Power Monitor and then press **ENTER**.
10. On the MG3692A press the Level key, then use the knob to adjust the power level so that the power meter reads -40 dBm.
11. Verify that the Site Master reading is  $-40 \text{ dBm} \pm 1.0 \text{ dB}$ .
12. Repeat steps 10 and 11 for the other power level settings shown in Table 1.

**Table 1** Power Monitor Test Levels

Power In @ 1 GHz	Specification
0 dBm	$\pm 1 \text{ dB}$
-7 dBm	$\pm 1 \text{ dB}$
-21 dBm	$\pm 1 \text{ dB}$
-40 dBm	$\pm 1 \text{ dB}$

## 6. Power Meter Verification (Option 29)

The following test can be used to verify the accuracy of the power measurements.

### a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source, with options 2A, 4 and 15A
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442A High Accuracy Power Sensor or equivalent
- Anritsu N241A50 Power Splitter or equivalent
- Anritsu 34NN50A 50Ω adapter or equivalent
- Anritsu 34RSN50 50Ω adapter or equivalent
- Anritsu 34RKNF50 50Ω adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent
- Aeroflex/Weinschel Model 44-10, 10 dB Fixed Attenuator

### b. Procedure:

1. Turn on the power meter and signal source.

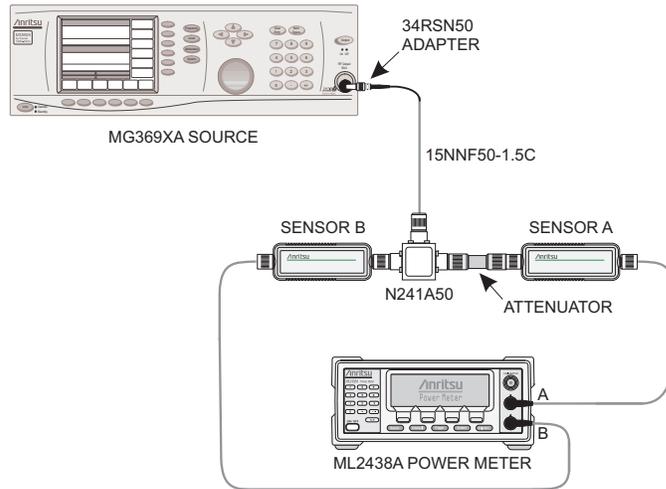
*NOTE: Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.*

2. On the power meter, press the Channel key, the Setup soft key and then the CHANNEL soft key to display Channel 2 setup menu. Press the INPUT key twice to set the input configuration to B. Press the Sensor key to display both Sensor A and Sensor B Readings.
3. Connect the power sensors to the power meter and calibrate the sensors.
4. Set the MG3692A output power level to 5 dBm.
5. Set the MG3692A output to 50 MHz CW.
6. On the power meter, press the Sensor key, the Cal Factor soft key, and then the FREQ soft key. Use the keypad to enter 50 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the SENSOR key on the power meter to display the power reading.
7. Connect sensor A to the MG3692A output, measure the output power level and record the value in column A of Table 2.

**Table 2.** Output Power Level

	A	B	C	D	E
Freq (MHz)	Sensor A Reading @ Source Output	Sensor A Reading @ end of Attenuator	Splitter/Attenuator Combined Loss	Sensor B Reading @ Power Splitter Output	Sensor B Path Power Splitter Loss
50					
1000					
2000					
2850					

8. Disconnect Sensor A from the MG3692A output.
9. Connect the power splitter to the MG3692A output and the Sensor B to one of the power splitter outputs. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator. Refer to Figure 2.



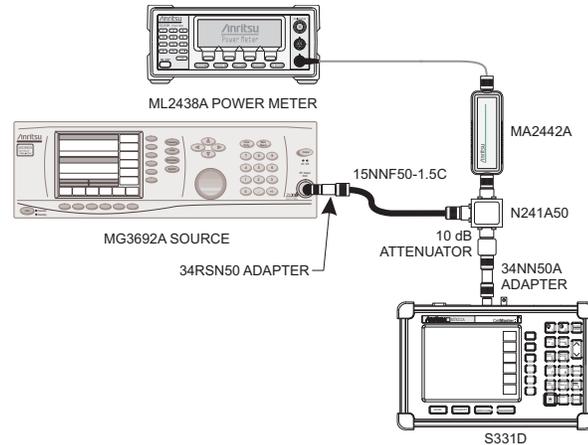
**Figure 2.** Test Setup

10. Record the new sensor A reading in column B of Table 2.
11. Record Sensor B reading in column D of Table 2.
12. Calculate the Splitter/Attenuator Combined Loss using the following formula and record the result in column C of Table 2:  $C = A - B$
13. Calculate the Sensor B path Power Splitter Loss using the following formula and record the result in column E of Table 2:  $E = A - D$
14. Repeat steps 10 through 13 for 1000 MHz, 2000 MHz and 2850 MHz.
15. Calculate the desired Sensor B Reading for  $-30$  dBm Test Power Level at the end of 10 dB attenuator using the following formula:  $\text{Desired Sensor B Reading} = \text{Test Power Level} + C - E$
16. Record the calculated results in Table 3.

**Table 3.**  $-30$  dBm Test Power Level

Freq (MHz)	Desired Sensor B Reading for $-30$ dBm Input to Site Master
50	
1000	
2000	
2850	

- Using the power splitter, coaxial cable and adapters, connect the Site Master to the signal source and the power sensor as shown in Figure 3.



**Figure 3.** Power Meter Verification Setup

- Connect the external power supply (Anritsu part number 40-187-R) to the Site Master.
- On the Site Master, 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.)
- Press the **MODE** key. Use the Up/Down arrow key to highlight Power Meter and then press **ENTER**.
- Press the Center soft key and enter 50, then press the MHz soft key to set the center frequency to 50 MHz.
- Press the Span soft key and enter 3, then press the MHz key to set the span to 3 MHz.
- On the Power Meter, press the Sensor key and then the CalFactor soft key. Select the **FREQ** soft key and enter 50 MHz for the Input Signal Frequency. This sets the power meter to the proper power sensor cal factor. Press the Sensor key to display the power reading.
- Set the MG3692A output to 50 MHz CW and adjust the power level so that the power meter displays the corresponding desired Sensor B Reading for -30 dBm as recorded in Table 3.
- Verify that the Power Meter reading is within the specifications in Table 4.

*NOTE: If the reading is unstable, turn on RMS Averaging by pressing the MEAS/DISP key, then the RMS Averaging soft key. The number of points to average can be set to low, medium or high.*

**Table 4.** Power Meter Accuracy

Freq (MHz)	Measured Value	Specification for units with S/N 405039 and below	Specification for units with S/N 405040 and above
50		-30 dBm ± 1 dB	-30 dBm ± 1.5 dB
1000		-30 dBm ± 1 dB	-30 dBm ± 1.5 dB
2000		-30 dBm ± 1 dB	-30 dBm ± 1.5 dB
2850		-30 dBm ± 1.5 dB	-30 dBm ± 1.5 dB

- Repeat steps 22 and 25 for 1000 MHz, 2000 MHz, and 2850 MHz.

## 7. T1/E1 Verification (Option 50)

This procedure verify that the T1/E1 Tester of the Site Master is functioning properly.

### a. *Equipment Required:*

- Tektronix TDS3032B Oscilloscope with option TDS 3TMT
- Tektronix AFTDS Differential Signal Adapter
- Anritsu Bantam-Plug-to-Bantam-Plug Extender Cable (P/N 806-16)

### **T1/E1 Self Test**

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 30-minute warm up for the internal circuitry to stabilize.*

2. Press the **SYS** key, then the Self Test soft key.
3. When the Site Master has passed the standard self test, press the T1/E1 Test soft key.
4. After the Site Master has passed the T1/E1 self test, press the **ESCAPE/CLEAR** key.

### **T1 Mask Test**

1. Set the Adapter switch to 100 ohms, then connect it to the scope.
2. Connect one end of the extender cable to the TRANSMIT port of the Site Master and the other end to the AFTDS at Ch1 of the oscilloscope.
3. On the Site Master, press the **MODE** key, then use Up/Down key to highlight T1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key
6. Press the **MEAS/DISP** key and select the Setup soft key.
7. Press the More soft key, then select the Clock Source soft key.
8. Press the Internal soft key, then press the Back soft key.
9. Press the Transmit Level soft key and select 0 dB, then press the Back soft key twice.
10. Press the Pattern soft key, then use the Up/Down arrow key to highlight 1 IN 8 and press the **ENTER** key.
11. Set up the scope as follows:
  - (a) Press the QUICKMENU key, then use the MENU soft key to select Telecom.
  - (b) Use the Standard arrow soft key to select G.703DS1 (ITU-T), 1.544 M b/s.
  - (c) Press the AUTOSET key. The yellow waveform should fall within the blue mask.
  - (d) Press the Waveform Threshold soft key, and use the Control/Coarse knob to set the the waveform to 400 and the Threshold to 20.
  - (e) Press the Autofit soft key and use the Control/Coarse knob to set the number to 1.
  - (f) Press the Run Test soft key.
12. Record the failed number for 400 waveforms. The failed number should be less than the selected Threshold, which is 20.

## E1 Mask Test

1. Set the Adapter switch to 120 ohms and connect it to the scope.
2. Connect the Extender cable to the Transmit port of the Site Master.
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.)

*NOTE: Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.*

4. On the Site Master, press the **MODE** key, then use Up/Down key to highlight E1 Tester and press the **ENTER** key.
5. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
6. Press the Back soft key, then press the BERT soft key.
7. Press the **MEAS/DISP** key and select the Setup soft key.
8. Press the More soft key, then press the Impedance soft key and select 120Ω.
9. Press the Back soft key, then select the Clock Source soft key.
10. Press the Internal soft key, then press the Back soft key twice.
11. Press the Pattern soft key, then use the Up/Down arrow key to highlight 1 IN 8 and press the **ENTER** key.
12. Set up the scope as follows:
  - (a) Press the **QUICKMENU** key, then use the **MENU** soft key to select Telecom.
  - (b) Use the Standard arrow soft key to select E1 Sym (ITU-T), 2.048 M b/s.
  - (c) Press the **AUTOSET** key. The yellow waveform should fall within the blue mask.
  - (d) Press the Waveform Threshold soft key, and use the Control/Coarse knob to set the the waveform to 400 and the Threshold to 20.
  - (e) Press the Autofit soft key and use the Control/Coarse knob to set the number to 1.
  - (f) Press the Run Test soft key.
13. Record the failed number for 400 waveforms. The failed number should be less than the selected Threshold, which is 20.

## T1 Transmit Level Test

1. Set the Adapter switch to 100 ohms then connect it to the scope.
2. Connect the Extender cable to the Transmit port of the Site Master.
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.)

*NOTE: Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.*

4. On the Site Master, press the **MODE** key, then use Up/Down key to highlight T1 Tester and press the **ENTER** key.
5. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
6. Press the Back soft key, then press the BERT soft key.
7. Press the **MEAS/DISP** key and select the Setup soft key.
8. Press the More soft key, then select the Clock Source soft key.

9. Press the Internal soft key, then press the Back soft key.
10. Press the Transmit Level soft key and select 0 dB, then press the Back soft key twice.
11. Press the Pattern soft key, then use the Up/Down arrow key to highlight 1 IN 8 and press the **ENTER** key.
12. Set up the oscilloscope as follows:
  - (a) Press QUICK MENU, then use the MENU soft key to select Telecom.
  - (b) Use the Standard arrow soft key to select None.
  - (c) Use the MENU soft key again to select Scope.
  - (d) Press the AUTOSET key, then set the horizontal SCALE to 2 micro seconds.
  - (e) Press the MEASURE key, then press the MORE soft key three times.
  - (f) Select the Pk-Pk soft key and record the Pk-Pk reading. The specification is 6.0 to 7.6 Vp-p.

#### **E1 Transmit Level Test**

1. Set the probe switch to 120 ohms.
2. 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 30-minute warm up for the internal circuitry to stabilize.*

3. On the Site Master, press the **MODE** key, then use Up/Down key to highlight E1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key.
6. Press the **MEAS/DISP** key and select the Setup soft key.
7. Press the More soft key, then select the Clock Source soft key.
8. Press the Internal soft key, then press the Back soft key.
9. Press the Impedance soft key and select 120Ω, then press the Back soft key twice.
10. Press the Pattern soft key, then use the Up/Down arrow key to highlight 1 IN 8 and press the **ENTER** key.
11. Set up the Oscilloscope as follows:
  - (a) Press QUICK MENU, then use the MENU soft key to select Telecom.
  - (b) Use the Standard arrow soft key to select None.
  - (c) Use the MENU soft key again to select Scope.
  - (d) Press the AUTOSET key, then set the horizontal SCALE to 1 micro second.
  - (e) Press the MEASURE key, then press the MORE soft key until pk-pk appears.
  - (f) Select the Pk-Pk soft key and record the Pk-Pk reading. The specification is 4.2 to 7.2 Vp-p.

#### **T1 Error Detection Verification**

*NOTE: During this test the both transmit and Receive cable should be disconnected.*

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. On the Site Master, press the **MODE** key, then use Up/Down key to highlight T1 Tester and press the **ENTER** key.

3. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
4. Press the Back soft key, then press the BERT soft key.
5. Press the **MEAS/DISP** key and select the Setup soft key.
6. Press the More soft key, then select the Clock Source soft key.
7. Press the Internal soft key, then press the Back soft key.
8. Press the Setup Error Insert soft key, then select the Bit soft key and the Burst soft key. Enter a number (for example, 150) and press **ENTER**.
9. Press the Back soft key, then select the Transmit Level soft key and select 0 dB.
10. Press the **MEAS/DISP** key, select BERT and select the Start/Stop Measure soft key.
11. Press the Insert Errors soft key and observe the number in the Bit Errors row. The number must match the number entered in Step 7 above. This number must increase by the number entered in Step 7 above every time the Insert Errors soft key is pressed. For example, if 150 is entered in Step 7, the first number observed will be 150. The next time the Insert Errors soft key is pressed, the number must be 300, etc.

### **E1 Error Detection Verification**

*NOTE: Disconnect all the cables from the Transmit and Receive ports during this test.*

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. On the Site Master, press the **MODE** key, then use Up/Down key to highlight E1 Tester and press the **ENTER** key.
3. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
4. Press the Back soft key, then press the BERT soft key.
5. Press the **MEAS/DISP** key and select the Setup soft key.
6. Press the More soft key, then select the Clock Source soft key.
7. Press the Internal soft key, then press the Back soft key.
8. Press the Impedance soft key and select 120Ω, then press the Back soft key.
9. Press the Setup Error Insert soft key, then select the Bit soft key then the Burst soft key. Enter a number (for example, 150) and press **ENTER**.
10. Press the Back soft key three times.
11. Press the **MEAS/DISP** key, select BERT and select the Start/Stop Measure soft key.
12. Press the Insert Errors soft key and observe the number in the Bit Errors row. The number must match the number entered in Step 8 above. This number must increase by the number entered in Step 8 above every time the Insert Errors soft key is pressed. For example, if 150 is entered in Step 8, the first number observed will be 150. The next time the Insert Errors soft key is pressed, the number must be 300, etc.

## 8. InstaCal Module Verification

This test verifies the performance of the Anritsu Site Master InstaCal Calibration Module. The InstaCal Module, part number ICN50, is an optional accessory for the S331D.

### a. *Equipment Required:*

- InstaCal Module, part number ICN50
- 20 dB offset, Anritsu SC5270
- 6 dB offset, Anritsu SC5237

### 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. The message “CONNECT OPEN or InstaCal TO RF Out PORT” will appear in the display.
5. Connect the InstaCal module to the RF Out port and press the **ENTER** key.

*NOTES: If this particular InstaCal module has been used to calibrate this Site Master before, the Site Master senses the familiar InstaCal module and automatically calibrates the unit using the OSL procedure.*

*If the Site Master senses that the characterization data for the InstaCal module connected to this Site Master is different than the one currently stored, it will display soft key options to keep or replace the InstaCal characterization data.*

*Selecting the YES soft key transfers all of the characterization data from this InstaCal module to the Site Master. The transfer may take up to three minutes. This option is preferred if this InstaCal module is to stay with this particular Site Master. Once completed, the data will not need to be transferred again for this combination of Site Master and InstaCal module.*

*Selecting the NO soft key will temporarily transfer only the portion of the characterization data necessary for this particular calibration. This transfer takes approximately 30 to 60 seconds, and will have to be repeated every time a calibration is done using this combination of Site Master and InstaCal module.*

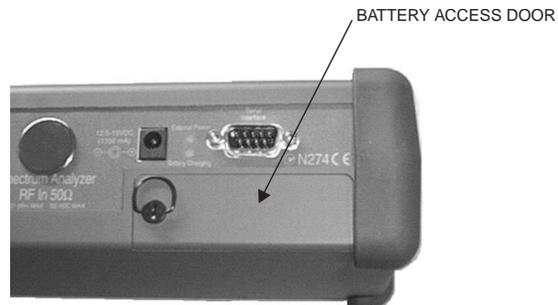
6. Verify that the calibration has been properly performed by checking that the **CAL ON!** message is displayed in the upper left corner of the display.
7. Remove the InstaCal module from the RF Out port and connect the 20 dB Offset to the RF Out port.
8. Measure the return loss of the 20 dB Offset. The level should be 20 dB,  $\pm 2$  dB across the calibrated frequency range.
9. Remove the 20 dB Offset from the RF Out port and connect the 6 dB Offset to the RF Out port.
10. Measure the return loss of the 6 dB Offset. The level should be 6 dB,  $\pm 1.2$  dB across the calibrated frequency range.

## 9. Battery Pack Removal and Replacement

This procedure provides instructions for removing and replacing the Site Master battery pack.

*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 Site Master.*

1. With the Site Master standing upright on a stable surface, locate the battery access door (Figure 4).



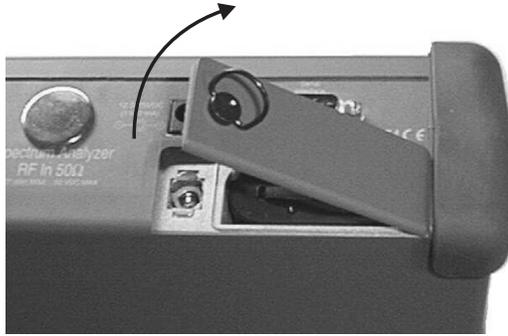
**Figure 4.** Battery Access Door Location

2. Lift up the access door handle and rotate it 90 degrees counterclockwise, as illustrated in Figure 5.



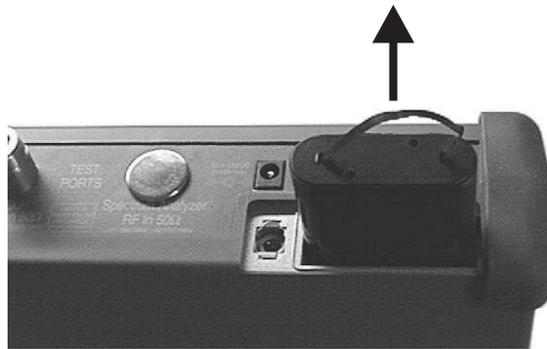
**Figure 5.** Rotate the Battery Access Door Handle

3. Lift the door and remove, as illustrated in Figure 6.



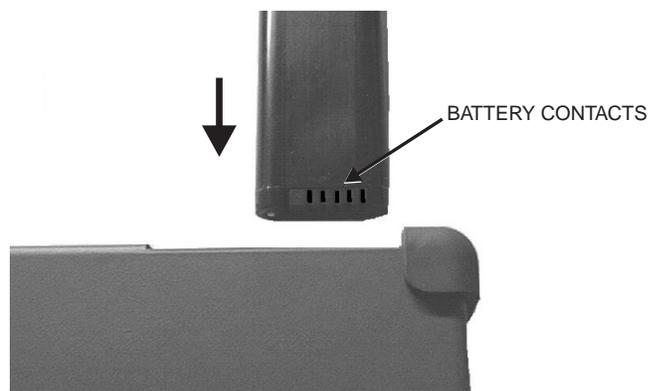
**Figure 6.** Removing the Battery Access Door

4. Grasp the battery lanyard and pull the battery straight up and out of the unit, as illustrated in Figure 7.



**Figure 7.** Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the new battery with the contacts facing the rear of the unit (Figure 8).



**Figure 8.** Battery Orientation

## 10. Battery Information

The following information relates to the care and handling of the Site Master battery, and NiMH batteries in general.

- The Nickel Metal Hydride (NiMH) battery supplied with the Site Master is shipped in a discharged state. Before using the Site Master, the internal battery must first be charged for three hours, either in the Site Master or in the optional battery charger (Anritsu part number: 2000-1029).
- Use only Anritsu approved battery packs.
- Recharge the battery only in the Site Master or in an Anritsu approved charger.
- With a new NiMH battery, full performance is achieved after three to five complete charge and discharge cycles.
- When the Site 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 will affect the ability of the battery to charge: allow the battery to cool down or warm up as necessary before use or charging.
- Discharge an NiMH 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 charging 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.

**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.*

## 10.1. Battery Testing Procedure

1. With the Site Master off and the battery installed, connect the Universal AC Adapter to the 12.5-15VDC (1350 mA) connector. The External Power LED and the Battery Charging LED will light.

*NOTES: If the Battery Charging LED does not light, the battery may be too low to immediately start full charging. Leaving the unit connected to AC power for several hours may bring the battery up to a level where full charging can begin. Turn the unit off and back on to see if the Battery Charging LED lights indicating a full charge cycle has begun.*

*Charging is inhibited below 0°C and above 45°C. If the unit is too hot, the battery will not start charging until the unit temperature has reached 43°C.*

2. Disconnect the AC-DC Adapter when the Battery Charging LED turns off, indicating the battery is fully charged.
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. Press **ENTER** when prompted to continue.
4. Press the **SYS** key, followed by the **STATUS** soft key. Verify that the indicated battery charge is  $\geq 80\%$ . If the value is 80% or above, press the **ESCAPE/CLEAR** key and continue with this procedure.

If the value is lower than 80%, a discharge/charge cycle may be needed to improve the battery capacity. Completely discharge the battery, as described in Steps 5 and 6 below, and then recharge the battery as described in Steps 1 and 2. If the battery capacity does not increase after a discharge/charge cycle, replace the battery.

5. Press the **START CAL** key (to keep the Site Master from going into HOLD mode) and make note of the test start time.
6. When the Site Master display fades and the Site Master switches itself off, make note of the test stop time.
7. The total test time (Step 5 to Step 6) should be  $\geq 1.5$  hours. If the battery charge is near 80% and the total battery test time is <70 minutes, replace the battery.

## 11. Front Panel Assembly Removal and Replacement

This procedure provides instructions for removing and replacing the Site Master front panel assembly. With the front panel assembly removed, the LCD display, keypad PCB, keypad membrane, and main PCB assemblies can be removed and replaced.

*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 Site Master.*

1. Remove the external power supply, if installed, and remove the battery from the unit.
2. Place the Site Master face up on a stable work surface.
3. Remove the four rubber corner bumpers by carefully lifting and sliding the bumpers off of the case corners (Figure 9).



**Figure 9.** Removing the Corner Bumpers

4. With the bumpers removed, the access holes for the case screws are revealed. Use a Phillips screwdriver to remove the four screws securing the two halves of the Site Master case together.
5. Carefully lift up on the right side (as viewed from the front) of the front half of the case and begin to separate the two halves.

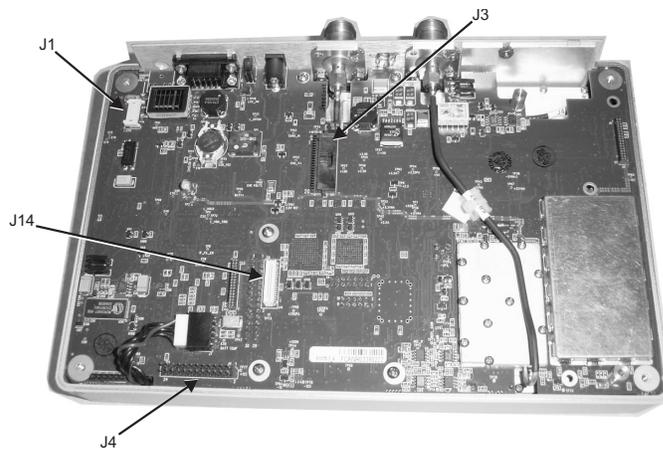
### **CAUTION**

*Do not force or pull the two halves of the case apart completely, as there are delicate cables attached between the two halves that must be disconnected first.*

6. If the unit is equipped with a monochrome display, carefully depress the latch tab and disconnect the monochrome LCD display cable from J3 on the main PCB.  
or  
If the unit is equipped with a color display, carefully disconnect the display cable from J14 on the main PCB.
7. Carefully disconnect the keypad interface cable from J4 on the main PCB.

8. Carefully disconnect the LCD display backlight cable from J1 on the main PCB.

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**Figure 11.** Site Master Front Panel Cable Connections

9. Remove the front panel assembly.

10. Reverse the above steps to replace the front panel assembly.

*NOTE: The corner bumpers only mount one way. That is, the raised area inside one end of the bumper (Figure 10) is made to conform to the contour of the front cover only.*

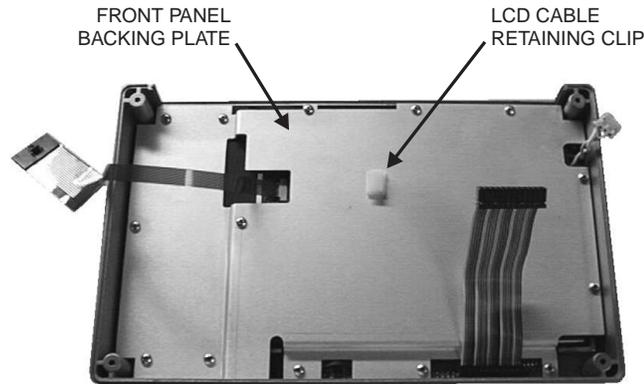


**Figure 10.** Corner Bumper Detail

## 12. LCD Assembly Replacement

This procedure provides instructions for removing and replacing the Liquid Crystal Display (LCD) once the front panel assembly has been separated from the Site Master.

1. Remove the front panel assembly as directed in section 11.
2. Place the front panel assembly face down on a protected work surface.
3. Remove the 14 Phillips screws that attach the backing plate to the front panel assembly.
4. Release the LCD display cable from the retaining clip on the front panel backing plate.



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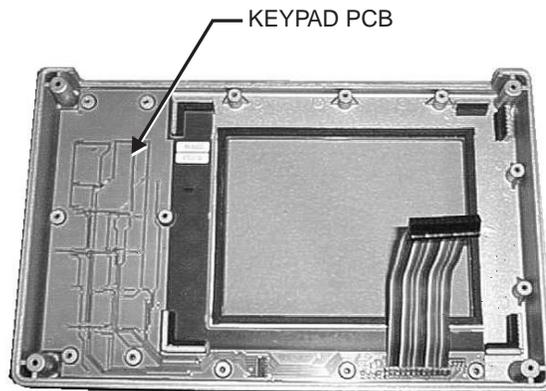
**Figure 12.** *Front Panel Backing Plate*

5. Remove the front panel backing plate, carefully feeding the LCD cable through the access hole to avoid damage to the cable or connector.
6. Remove the rubber cushion pad from the LCD assembly and remove the assembly.
7. Reverse the above steps to install the replacement assembly.

### 13. Key Pad PCB Replacement

This procedure provides instructions for removing and replacing the key pad PCB.

1. Remove the front panel assembly as directed in section 11.
2. Place the front panel assembly face down on a protected work surface.
3. Remove the 14 Phillips screws that attach the backing plate to the front panel assembly.
4. Release the LCD display cable from the retaining clip on the front panel backing plate (Figure 12).
5. Remove the front panel backing plate, carefully feeding the LCD cable through the access hole to avoid damage to the cable or connector.
6. Remove the rubber cushion pad from the key pad PCB and remove the PCB.



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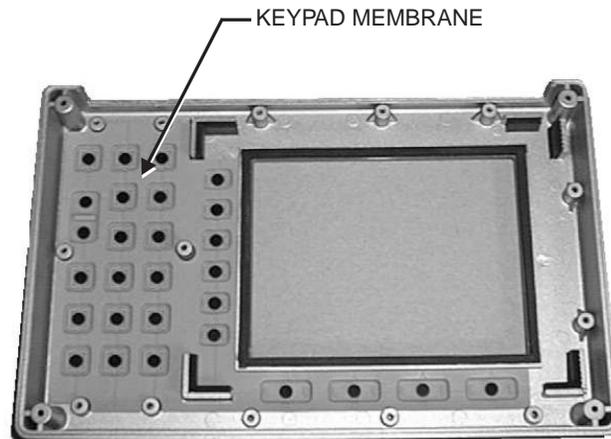
**Figure 13.** Front Panel Keypad PCB Location

7. Reverse the above steps to install the replacement assembly.

## 14. Key Pad Membrane Replacement

This procedure provides instructions for replacing the key pad membrane.

1. Remove the front panel assembly as directed in section 11.
2. Remove the key pad PCB as directed in section 13.
3. Remove the keypad membrane by gently pulling the membrane up and out of the holes in the front panel.



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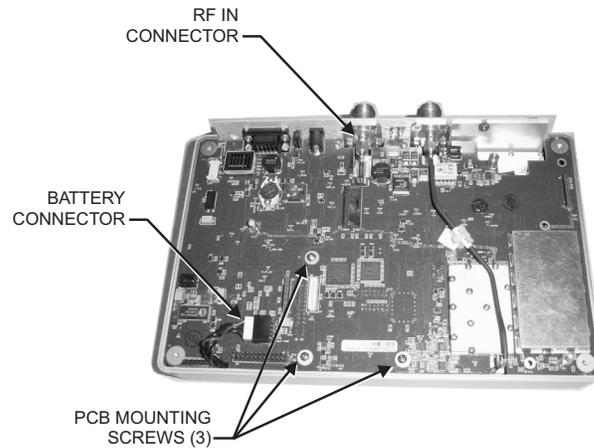
**Figure 14.** *Front Panel Keypad Membrane*

4. Reverse the above steps to install the replacement membrane.

## 15. Main PCB Assembly Replacement

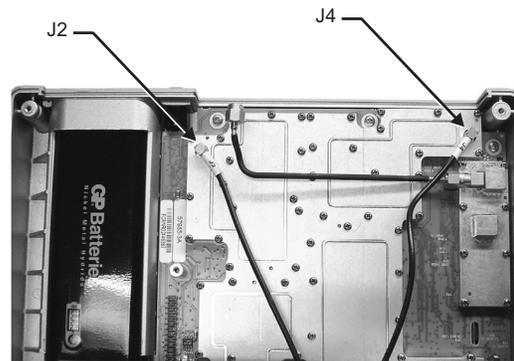
This procedure provides instructions for replacing the main PCB assembly with the connector panel attached.

1. Remove the front panel assembly as directed in section 11.
2. Disconnect the battery connector from J7 on the main PCB.
3. Disconnect the semi-rigid coaxial cable from the RF In connector on the connector panel.
4. Remove the three PCB mounting screws and lift the Control PCB assembly with the connector panel attached slightly.



**Figure 15.** Main PCB (shown with optional T1/E1 PCB installed)

5. Carefully reach between the Main PCB and the SPA PCB and disconnect the cables from J2 and J4 on the SPA PCB.



**Figure 16.** Spectrum Analyzer PCB

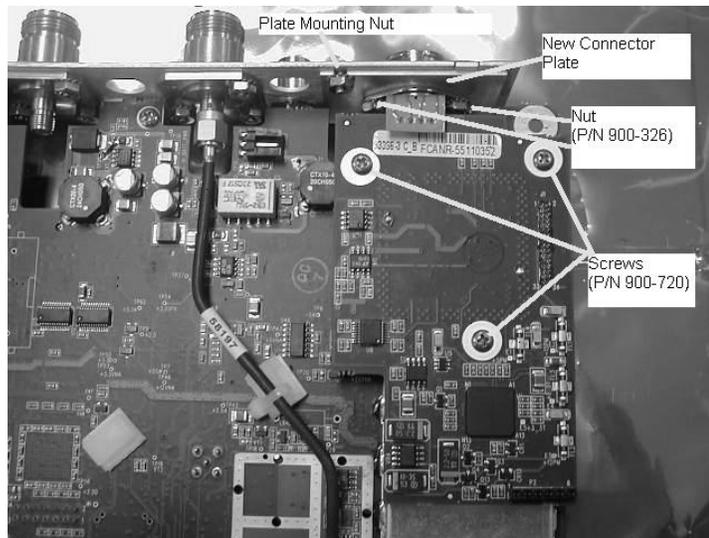
6. Remove the Main PCB.
7. Remove the three .25" standoffs and four Phillips screws and remove the Spectrum Analyzer PCB.
8. Reverse the above steps to install the new main PCB.

**NOTE:** The main PCB connector panel fits into grooves in the two halves of the case. Make sure the panel is correctly aligned with the grooves before reassembling the two halves together.

## 16. Option 5 Power Monitor PCB Assembly Replacement

This procedure provides instructions for replacing the Power Monitor PCB Assembly.

1. Remove the front panel assembly as directed in on page 17, Front Panel Assembly Removal and Replacement.
2. Remove the entire Main PCB assembly from the bottom case as directed on page 22.
3. On the upper right corner, locate and remove the nut that secures the blank plate to the connector panel.
4. Carefully remove the blank plate from the connector panel.
5. Install the new connector plate (p/n 61536) to the connector panel and secure it with the nut that was removed in step 4.
6. Use a sharp knife to cut a hole along the opening of the new connector plate.
7. Install the three standoffs (p/n 785-405) to the main board on the side that faces the Front Panel assembly and secure them with three Phillips screws (p/n 900-720) from the side that faces the bottom case.
8. Install the Option 5 PCB assembly (p/n 63066-3) to the main board. Carefully align J1 to J6 of the main board when installing. Refer to Figure 17.
9. Secure the Option 5 PCB assembly to the standoffs using the last three Phillips screws.
10. Carefully push the DIN connector through the opening on the connector panel and secure it with the nuts (p/n 900-326) supplied.

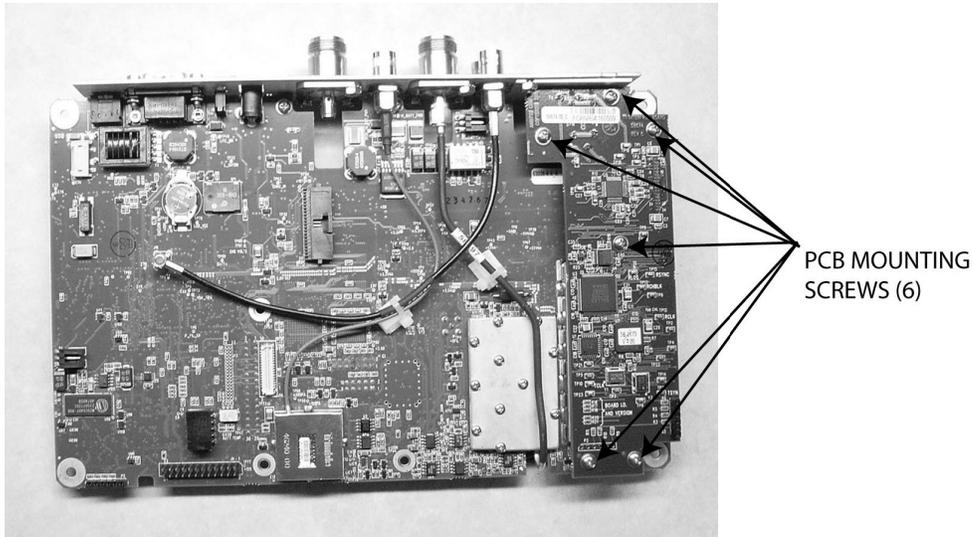


**Figure 17.** Power Monitor PCB Assembly Replacement

## 17. Option 50 T1/E1 Tester PCB Assembly Replacement

This procedure provides instructions for replacing the T1/E1 Tester PCB assembly.

1. Remove the front panel assembly as directed in on page 17, Front Panel Assembly Removal and Replacement.
2. Remove the entire Main PCB assembly from the bottom case as directed on page 22.
3. Remove the six T1/E1 PCB mounting screws and carefully lift the PCB assembly disconnecting J2 (T1/E1 PCB) from J6 (Main PCB).
4. After J2 and J6 (from the under side of the PCB) have been disconnected carefully lift up the bottom and pull out the PCB clearing the T1/E1 connector interface.
5. Reverse the above steps to install the new T1/E1 PCB.



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**Figure 18.** T1/E1 Tester PCB

## 18. Accessories and Replaceable Parts

Accessories and replaceable parts for the Site Master S331D are listed below.

### Accessories

Part Number	Description	Qty
10580-00079	User's Guide, Site Master S33xD	1
10580-00100	Programming Manual, Site Master S33xD (disk only)	1
2300-347	Handheld Software Tools	1
40-187-R	Power Supply	1
2000-1029	Battery Charger	1
22N50	Open/Short, N Male	1
SM/PL	Precision Termination, N Male	1
806-62	Automotive Power Adapter	1
806-16	Bantam Plug to Bantam Plug Cable Assembly	1
806-116	Bantam Plug to BNC Male Cable Assembly, 8 ft	1
806-117	Two Bantam Plugs to RJ48 Cable Assembly, 8 ft	1
800-441	Serial Interface Cable Assembly	1
65717	Soft Carrying Case	1

### Replaceable Parts

Part Number	Description	Qty
510-87	N Male Connector	2
15-102	Monochrome Liquid Crystal Display Assembly	1
15-123	TFT Color Liquid Crystal Display Assembly	1
633-27	Rechargeable Battery, NiMH	1
ND62289	Main PCB Assembly, S331D, Serial Number $\leq 404999$	1
ND62278	Main PCB Assembly, S331D, with Option 29, Serial Number $\leq 404999$	1
ND61829	Main PCB Assembly, S331D, Serial Number 405001 through 538117	1
ND63391	Main PCB Assembly, S331D, with Option 29, Serial Number 405001 through 538117	1
ND64435	Main PCB Assembly, S331D, with Option 31, Serial Number 405001 through 538117	1
ND64436	Main PCB Assembly, S331D, with Options 29, 31, Serial Number 405000 through 538118	1
ND65773	Main PCB Assembly, S331D, Serial Number $\geq 538118$	1
ND65774	Main PCB Assembly, S331D, with Option 29, Serial Number $\geq 538118$	1
ND65775	Main PCB Assembly, S331D, with Option 31, Serial Number $\geq 538118$	1
ND65776	Main PCB Assembly, S331D, with Options 29, 31, Serial Number $\geq 538118$	1
ND68111	Main PCB Assembly, S331D, with Options 2 and 16	1
ND68112	Main PCB Assembly, S331D, with Options 2, 16 and 29	1
ND68113	Main PCB Assembly, S331D, with Options 2, 16 and 31	1
ND68493	Main PCB Assembly, S331D, with Options 2, 16, 29 and 31	1

67199-3	Keypad PCB Assembly	1
46649-4	Membrane Keypad, Main, with Contrast symbol	1
46649-6	Membrane Keypad, Main, without Contrast symbol	1

#### Hardware

Part Number	Description	Qty
900-861	Pan Head Screw, 4-20, 0.365	15
900-791	Screw, 2-56, 0.375	77
900-720	Screw, 4-40, 0.187	5
900-326	Kep Nut, 4-40, 0.187	3
790-18	M-F Standoff, 4-40, 0.375, Hex	2
785-927	M-F Standoff, 4-40, 0.625	3
785-929	M-F Standoff, 4-40, 0.265	3
761-79	Cap Vinyl, Black, round	2

#### Case Parts

Part Number	Description	Qty
46652-3	Top Case only (for units with Monochrome LCD Display)	1
61440-1	Top Case only (for units with TFT Color LCD Display)	1
46653-3	Bottom Case only	1
48231-3	Battery Door	1
790-509 790-510 48241	Battery Door Latch (3 pieces)	1
790-511	Door Lock Receptacle	1
46655	Case Corner Bumpers	4
46662	LCD Retainer Plate	1
48241	Foam, LCD Corners	9
48278	Foam, LCD Window	1
46659	Foam, LCD Backing	1
46661	Foam, Keypad Backing	1

## **19. Customer Service**

To locate the nearest Anritsu Customer Service Center, please refer to the Anritsu web page:

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

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