

MAINTENANCE MANUAL

MS2711A

Hand Held

Spectrum Analyzer

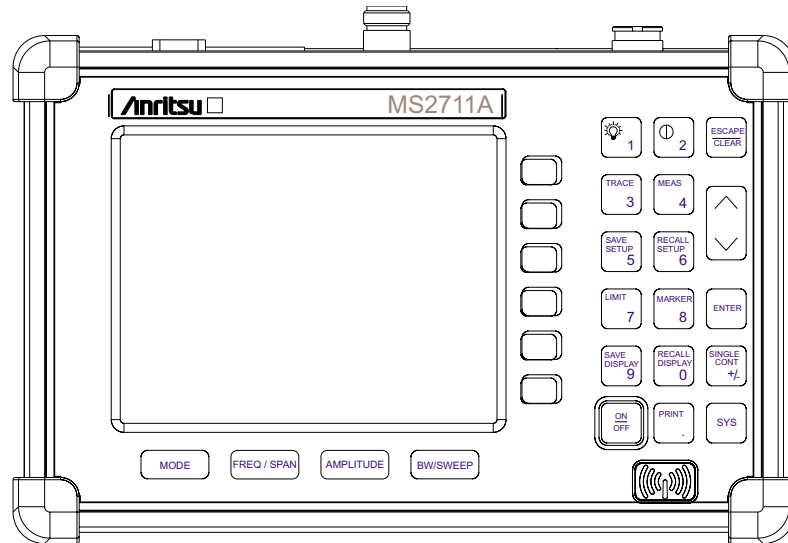


Figure 1. MS2711A Hand Held Spectrum Analyzer

1. INTRODUCTION

This manual provides maintenance instructions for the MS2711A Spectrum Analyzer. It describes the product and provides performance verification procedures, parts replacement procedures, and a replaceable parts list.

2. IDENTIFICATION NUMBER

All Anritsu instruments are assigned a six-digit serial number, such as "101001." This number appears on a decal affixed to the back panel of the instrument. Please use this identification number during any correspondence with Anritsu Service Centers about this instrument.

3. DESCRIPTION

The MS2711A Spectrum Analyzer is a synthesizer-based hand held spectrum analyzer that provides quick and accurate signal results. Measurements can be easily made using the main instrument functions: frequency, span, amplitude and bandwidth. A simplified block diagram is provided in Figure 2.

4. PERFORMANCE VERIFICATION PROCEDURES

The following procedures can be used to verify the performance of the MS2711A Spectrum Analyzer.

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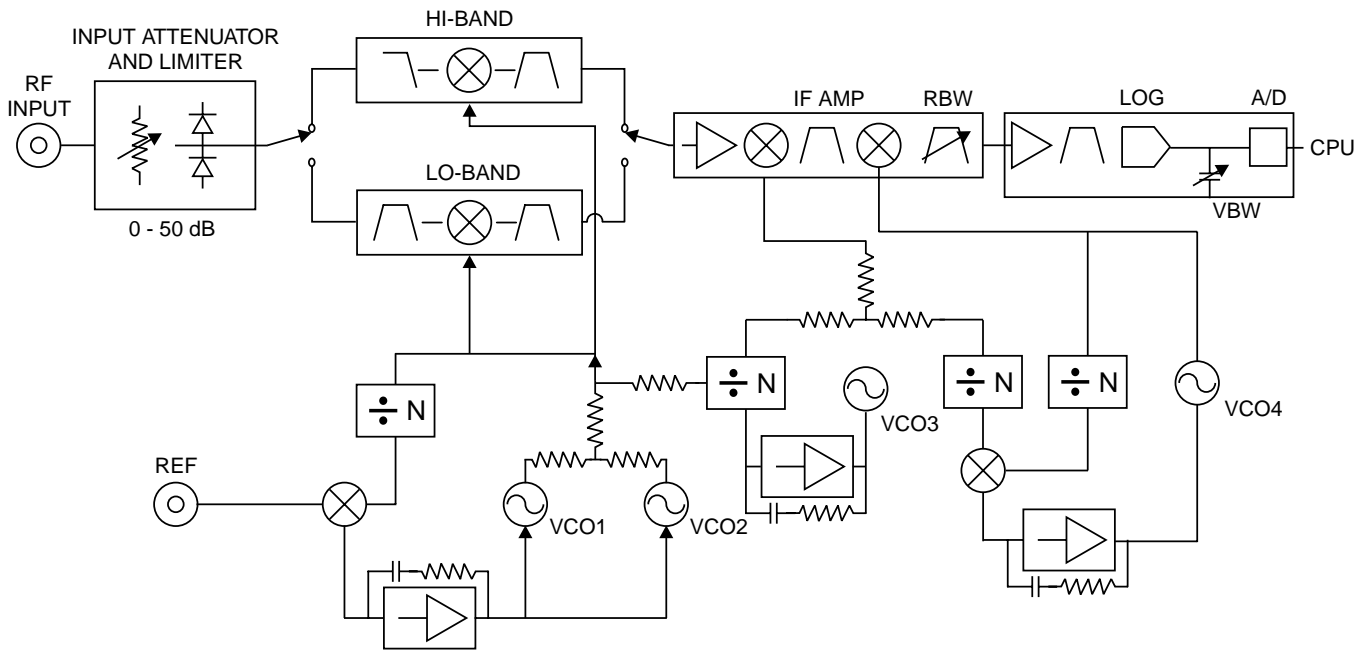


Figure 2. MS2711A Spectrum Analyzer Block Diagram

4.1. Frequency Accuracy

The following test can be used to verify the CW frequency accuracy of the Spectrum Analyzer.

a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with option 15A, or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

b. Procedure:

1. Connect the 10 MHz reference source to the Anritsu MG3692A Synthesized Signal Source.
2. Connect the output of the source to the MS2711A RF Input.

3. Connect the external power supply (Anritsu part number 40-115) to the MS2711A.
4. Press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn on the Spectrum Analyzer. (This sets the instrument to the factory preset state.)
5. Turn on the 10 MHz reference source and the Anritsu MG3692A Synthesized Signal Source.
6. Set the MG3692A output to 2000 MHz, CW with an RF output level of 0 dBm.

NOTE

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

7. On the MS2711A, press the **AMPLITUDE** key and the REF LEVEL soft key.
8. Enter 20 and press the **ENTER** key to set the Reference Level to 20 dBm.
9. Press the **FREQ/SPAN** key and the **CENTER** soft key.
10. Enter 2000 and press the **ENTER** key to set the center frequency to 2000 MHz.

11. Press the SPAN soft key and enter 50. Press the kHz soft key to set the span to 50 kHz.
12. Press the BW/SWEEP key.
13. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 10 kHz. Press ENTER to set the resolution bandwidth to 10 kHz and select BACK.
14. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 3 kHz. Press ENTER to set the video bandwidth to 3 kHz.
15. Press the **MARKER** key, then the M1 soft key.
16. Select the EDIT soft key and use the Up/down arrow key to center the marker on the waveform. Verify that the marker frequency is 2000 MHz, ± 4 kHz.
5. On the MS2711A, press the BW/SWEEP key.
6. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 10 kHz. Press ENTER to set the resolution bandwidth to 10 kHz and select BACK.
7. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 3 kHz. Press **ENTER** to set the video bandwidth to 3 kHz.
8. On the MS2711A, press the **FREQ/SPAN** key and the **CENTER** soft key.
9. Enter 1000 and press the MHz soft key to set the center frequency to 1000 MHz.
10. Press the SPAN soft key and enter 0.1. Press the MHz soft key to set the span to 0.100 MHz.

4.2. Phase Noise Verification

a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 4 and 15A, or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent

b. Procedure:

1. Connect the output of the source to the MS2711A RF Input.
2. Connect the external power supply (Anritsu part number 40-115) to the MS2711A.
3. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum Analyzer. (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. Set the MG3692A output to 1000 MHz, CW with an RF output level of -30 dBm.

11. Press the **AMPLITUDE** key.
12. Press the **REF LEVEL** soft key and enter -27 . Press the **ENTER** key to set the reference level to -27 dBm.
13. Press the **MARKER** key, then the M1 soft key.
14. Press **EDIT** and enter 1000. Press the MHz soft key to set the M1 marker frequency to 1000 MHz.
15. Press the **BACK** soft key and the M2 soft key.
16. Press **EDIT** and enter 1000.03. Press MHz to set the M2 marker frequency to 1000.030 MHz (30 kHz higher than the center frequency).
17. Press the **DELTA (M2-M1)** soft key.
18. Press the **SINGLE/CONT** key and read and record the $\Delta 2$ reading.
19. Press the **SINGLE/CONT** key to read and record five values, then calculate the average of the five recorded values.
20. Subtract 40 dB from the average value and verify that the result is ≤ -75 dBc/Hz.

(For example: -35 dBc measured -40 dB = -75 dBc/Hz.)

NOTE

The measured value is converted to dBc/Hz using the following formula:

$$dBc/Hz = - |measured\ dBc| - \left[10_{\log} \left(\frac{RBW}{1Hz} \right) \right]$$

At 10 kHz RBW, $10_{\log} \left(\frac{RBW}{1Hz} \right) = 40$, so

$$dBc/Hz = - |measured\ dBc| - 40$$

21. Press the BACK soft key and the M3 soft key.
22. Press the EDIT key and enter 999.970. Press MHz to set the M3 marker frequency to 999.970 MHz (30 kHz lower than the center frequency).
23. Press the DELTA (M3-M1) soft key.
24. Press the SINGLE/CONT key. Read and record the Δ 3 reading.
25. Press the SINGLE/CONT key to read and record five values, then calculate the average of the five recorded values.

Subtract 40 dB from the average value and verify that the result is ≤ -75 dBc/Hz. (For example: -35 dBc measured $- 40$ dB = -75 dBc/Hz.)

4.3. Second Harmonic Distortion Test

The following test can be used to verify the input related spurious response of the Spectrum Analyzer.

a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 4 and 15A, or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- 50 MHz Low Pass Filter (Anritsu part number 1030-96)
- BNC male to BNC male coaxial cable

b. Procedure:

1. Connect the 10 MHz reference source to the Anritsu MG3692A Synthesized Signal Source.

2. Connect one end of the 50 MHz Low Pass Filter to the output of the source and the other end to the Spectrum Analyzer RF Input with the RF coaxial cable.
3. Connect the external power supply (Anritsu part number 40-115) to the Site Master.
4. On the MS2711A, press and hold the ESCAPE/CLEAR key, then press the ON/OFF key to turn on the Spectrum Analyzer. (This sets the instrument to the factory preset state.)
5. Turn on the 10 MHz reference source and the Anritsu MG3692A Synthesized Signal Source.
6. Set the MG3692A output to 40 MHz CW, with an RF output level of -30 dBm.

NOTE

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

7. On the Spectrum Analyzer, press the AMPLITUDE key and the REF LEVEL soft key.
8. Enter -27 and press the ENTER key to set the Reference Level to -27 dBm.
9. Press the SCALE soft key and enter 7 then press ENTER.
10. Press the FREQ/SPAN key and then the CENTER soft key.
11. Enter 40 and press the MHz soft key to set the center frequency to 40 MHz.
12. Press the SPAN soft key and enter 0.2. Press the MHz soft key to set the span to 0.200 MHz.
13. Press the BW/SWEEP key.
14. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 10 kHz. Press ENTER to set the resolution bandwidth to 10 kHz and select BACK.
15. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 3 kHz. Press ENTER to set the video bandwidth to 3 kHz.
16. Press the MARKER key, then the M1 soft key.

17. Select the EDIT soft key, then enter 40. Press the MHz soft key to set M1 to 40 MHz .
18. On the MG3692A Synthesized Signal Source, adjust the output level so that the M1 reading of Spectrum Analyzer is -30 dBm at 40 MHz.
19. On the Spectrum Analyzer, press the **FREQ/SPAN** key and then the CENTER soft key.
20. Enter 80 and press the MHz soft key to set the center frequency to 80 MHz.
21. Press the **MARKER** key and the M1 soft key.
22. Select the EDIT soft key, then enter 80. Press the MHz soft key to set M1 to 80 MHz .
23. Record the amplitude of the signal at M1 80 MHz:

Second Harmonic Level @ 80 MHz
= ___dBm

24. Convert this measured value to dBc using the following formula:

Input Related Spurious Response (dBc) =
[Second Harmonic Level @ 80 MHz] +
30 dBm = ___ dBc

Specifications for this measurement are
-45 dBc with -30 dBm into the first mixer.

4.4. Residual Spurious Response Test

The following test can be used to verify the residual spurious response of the Spectrum Analyzer.

a. Equipment Required:

- Anritsu 28N50-2 or SM/PL 50 ohm Termination or equivalent

b. Procedure:

1. Connect the 50 ohm termination to the Spectrum Analyzer RF Input.
2. On the Spectrum Analyzer, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum Analyzer. (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 Spectrum Analyzer, press the **AMPLITUDE** key and the REF LEVEL soft key.
4. Enter -75 and press the **ENTER** key to set the Reference Level to -75 dBm.
5. Press the SCALE soft key and enter 5, then press **ENTER**.
6. Press the **BW/SWEEP** key.
7. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 10 kHz. Press **ENTER** to set the resolution bandwidth to 10 kHz and select BACK.
8. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 100 Hz and press **ENTER** to set the video bandwidth to 100 Hz.
9. Press the **FREQ/SPAN** key and the START soft key.
10. Enter 500 and press the kHz soft key to set the start frequency to 500 kHz.
11. Press the STOP soft key and enter 4, then press the MHz soft key to set the stop frequency to 4 MHz.
12. Wait until one full sweep is complete.
13. Press the **MARKER** key and then the M1 soft key.
14. Press the ON/OFF soft key and then the MARKER TO PEAK soft key.
15. Record the M1 amplitude reading and verify whether it is less than or equal to -90 dBm.

NOTE

If a spur with an amplitude larger than -90 dBm occurs, wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

16. Press the **BW/SWEEP** key.

17. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 3 kHz and press **ENTER** to set the video bandwidth to 3 kHz.
18. Press the **FREQ/SPAN** key and the **START** soft key.
19. Enter 4 and press the MHz soft key to set the start frequency to 4 MHz.
20. Press the **STOP** soft key and enter 1000, then press the MHz soft key to set the stop frequency to 1000 MHz.
21. Wait until one full sweep is complete.
22. Press the **MARKER** key and then the M1 soft key.
23. Press the **ON/OFF** soft key and then the **MARKER TO PEAK** soft key.
24. Record the M1 amplitude reading and verify it is ≤ -90 dBm.
25. Press the **FREQ/SPAN** key and the **START** soft key.
26. Enter 1000 and press the MHz soft key to set the start frequency to 1000 MHz.
27. Press the **STOP** soft key and enter 2000, then press MHz soft key to set the stop frequency to 2000 MHz..
28. Wait until one full sweep is complete.
29. Press the **MARKER** key and then the M1 soft key.
30. Press the **ON/OFF** soft key and then the **MARKER TO PEAK** soft key.
31. Record the M1 amplitude reading and verify it is ≤ -90 dBm.
32. Press the **FREQ/SPAN** key and the **START** soft key.
33. Enter 2000 and press the MHz soft key to set the start frequency to 2000 MHz.
34. Press the **STOP** soft key and enter 3000, then press the MHz soft key to set the stop frequency to 3000 MHz.
35. Wait until one full sweep is complete.
36. Press the **MARKER** key and then the M1 soft key.
37. Press the **ON/OFF** soft key and then the **MARKER TO PEAK** soft key.

38. Record the M1 amplitude reading and verify it is ≤ -90 dBm.

4.5. Resolution Bandwidth Accuracy Test

The following test can be used to verify the resolution bandwidth accuracy of the Site Master Spectrum Analyzer at four frequencies.

a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 4 and 15, or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

b. Procedure:

1. Connect the 10 MHz reference source to the Anritsu MG3692A Synthesized Signal Source.
2. Connect the output of the Anritsu MG3692A Synthesized Signal Source to the Spectrum Analyzer RF Input.
3. On the Spectrum Analyzer, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum Analyzer. (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. Set the MG3692A output to 1 GHz, with an RF output level of -30 dBm.
5. On the Spectrum Analyzer, press the **AMPLITUDE** key and the **REF LEVEL** soft key.
6. Enter -27 and press the **ENTER** key to set the Reference Level to -27 dBm.
7. Press the **SCALE** soft key and enter 3, then press **ENTER**.
8. Press the **FREQ/SPAN** key and the **CENTER** soft key.

9. Enter 1 and press the GHz soft key to set the center frequency to 1 GHz.

NOTE

The Measured Occupied BW value for each RBW setting can be recorded in Table 1.

1 MHz RBW Test

10. Press the SPAN soft key, enter 5 and press the MHz soft key to set the span to 5 MHz.
11. Press the **BW/SWEEP** key.
12. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 1 MHz. Press **ENTER** to set the resolution bandwidth to 1 MHz and select **BACK**.
13. Press the VBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 3 kHz and press **ENTER** to set the video bandwidth to 3 kHz.
14. Press the **MEAS** key, the OBW soft key, and then the dBc soft key.
15. Press the MEASURE ON/OFF soft key and read the displayed Meas Occ BW value. The Meas Occ BW value should be $\pm 20\%$ of the RBW.

100 kHz RBW Test

16. Press the **FREQ/SPAN** key.
17. Press the SPAN soft key, enter 1 and press the MHz soft key to set the span to 1 MHz.
18. Press the **BW/SWEEP** key.
19. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 100 kHz. Press **ENTER** to set the resolution bandwidth to 100 kHz and select **BACK**.
20. Press the **MEAS** key, the OBW soft key, and then the dBc soft key.
21. Press the MEASURE ON/OFF soft key and read the Meas Occ BW value. The Meas Occ BW value should be $\pm 20\%$ of the RBW.

30 kHz RBW Test

22. Press the **FREQ/SPAN** key.
23. Press the SPAN soft key, enter .1 and press the MHz soft key to set the span to 0.1 MHz.
24. Press the **BW/SWEEP** key.
25. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 30 kHz. Press **ENTER** to set the resolution bandwidth to 30 kHz and select **BACK**.
26. Press the **MEAS** key, the OBW soft key, and then the dBc soft key.
27. Press the MEASURE ON/OFF soft key and read the displayed Meas Occ BW value. The Meas Occ BW value should be $\pm 20\%$ of the RBW.

10 kHz RBW Test

28. Press the **FREQ/SPAN** key
29. Press the SPAN soft key, enter .04 and press the MHz soft key to set the span to 0.04 MHz.
30. Press the **BW/SWEEP** key.
31. Press the RBW soft key and then the EDIT soft key. Use the Up/down arrow key to select 10 kHz. Press **ENTER** to set the resolution bandwidth to 10 kHz and select **BACK**.
32. Press the **MEAS** key, the OBW soft key, and then the dBc soft key.
33. Press the MEASURE ON/OFF soft key and read the displayed Meas Occ BW value. The Meas Occ BW value should be $\pm 35\%$ of the RBW.

Table 1. RBW Check

RBW Setting	Lower Limit	Measured Value	Upper Limit
1 MHz	0.8 MHz		1.2 MHz
100 kHz	80 kHz		120 kHz
30 kHz	24 kHz		36 kHz
10 kHz	6.5 kHz		13.5 kHz

4.6. Level Accuracy Test

This test verifies the level accuracy of the Spectrum Analyzer.

a. Equipment Required:

- Anritsu MG3692A Synthesized Signal Source, with options 2A, 4 and 15A
- Anritsu ML2430A-Series Power Meter or equivalent
- Anritsu MA2442A High Accuracy Power Sensor or equivalent
- Anritsu N241A50 Power Splitter or equivalent
- Anritsu 34NN50A 50 ohm adapter or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Anritsu 15NNF50-1.5C RF Coaxial Cable or equivalent

b. Procedure:

1. Connect the power sensor to the power meter and calibrate the sensor.
2. Using the power splitter, coaxial cable and adapters, connect the Spectrum Analyzer to the signal source and the power sensor as shown in Figure 3.
3. Connect the external power supply (Anritsu part number 40-115) to the Spectrum Analyzer.
4. On the Spectrum Analyzer, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum Analyzer. (This sets the instrument to the factory preset state.)
5. Turn on the power meter and signal source.

NOTE

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

6. On the Spectrum Analyzer, press the **BW/SWEEP** key.
7. Press the **RBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to

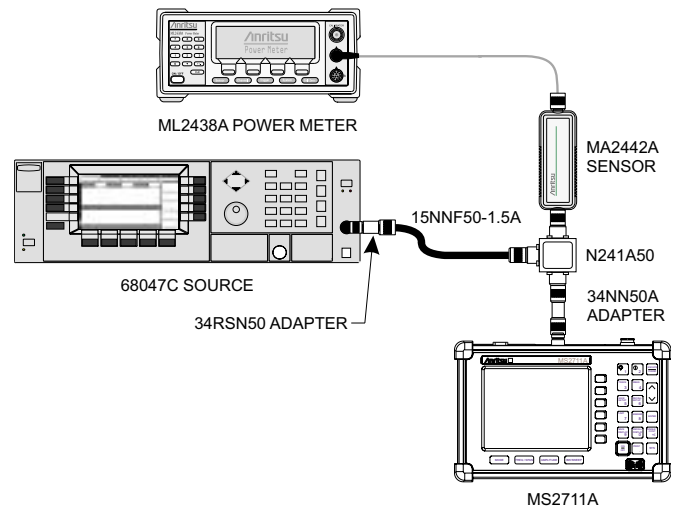


Figure 3. Measurement Accuracy Setup

select 10 kHz. Press **ENTER** to set the resolution bandwidth to 10 kHz.

8. Press **BACK**, then the **VBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to select 3 kHz. Press **ENTER** to set the video bandwidth to 3 kHz.
9. Press **BACK**, then **DETECTION**, then **AVERAGE**.
10. Press the **FREQ/SPAN** key.
11. Press the **SPAN** soft key and enter .5, then press the **MHz** key to set the span to .5 MHz.
12. Press the **AMPLITUDE** key.
13. Press the **REF LEVEL** soft key, enter 20 and press the **ENTER** key to set the reference level to +20 dBm.
14. Press the **FREQ/SPAN** key and the **CENTER** soft key.
15. Enter 50 and press the **MHz** soft key to set the center frequency to 50 MHz.
16. On the Anritsu ML2430A-Series 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.

17. Set the MG3692A output to 50 MHz CW and the power level to +10 dBm as indicated on the power meter.

NOTE

To insure accuracy, set the output of the signal source using the power meter reading. Do not rely on the signal source display.

18. Press the **MARKER** key, then the M1 soft key.
19. Select the **MARKER TO PEAK** soft key to position the marker at the center of the response for the test frequency.

NOTE

Table 2 can be used to record the results of this test for future reference.

20. Verify that the M1 reading is ± 2 dB maximum from the input signal.
21. Press the **AMPLITUDE** key.
22. Press the **REF LEVEL** soft key, enter 0 and press **ENTER** to set the reference level to 0 dBm.
23. Set the MG3692A power level to -10 dBm as indicated on the power meter.
24. Verify that the M1 reading is ± 2 dB maximum from the input signal.
25. Press the **AMPLITUDE** key.
26. Press the **REF LEVEL** soft key, enter -20 and press **ENTER** to set the reference level to -20 dBm.
27. Set the MG3692A power level to -30 dBm as indicated on the power meter.
28. Verify that the M1 reading is ± 2 dB maximum from the input signal.
29. Press the **AMPLITUDE** key.
30. Press the **REF LEVEL** soft key and enter -40. Press **ENTER** to set the reference level to -40 dBm.
31. Set the MG3692A power level to -50 dBm as indicated on the power meter.
32. Verify that the M1 reading is ± 2 dB maximum from the input signal.

Table 2. Level Accuracy Test Results

Freq (MHz)	Power Level (dBm)	Ref Level (dBm)	M1 Reading
50	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
500	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
1000	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
1500	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
2000	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
2500	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____
2950	+10	+20	_____
	-10	+20	_____
	-30	-20	_____
	-50	-40	_____

33. Repeat steps 14 through 32 for frequencies of 500 MHz, 1000 MHz, 1500 MHz, 2000 MHz, 2500 MHz and 2950 MHz.

4.7. Displayed Average Noise Level

The following test can be used to verify the displayed average noise level of the Spectrum Analyzer.

a. Equipment Required:

- Anritsu 28N50-2 or SM/PL 50 ohm Termination or equivalent

b. Procedure:

1. Connect the 50 ohm termination to the Spectrum Analyzer RF Input.
2. On the Spectrum Analyzer, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum Analyzer. (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 Spectrum Analyzer, press the **AMPLITUDE** key and the **REF LEVEL** soft key.
4. Enter -75 and press the **ENTER** key to set the Reference Level to -75 dBm.
5. Press the **SCALE** soft key and enter 5, then press **ENTER**.
6. Press the **BW/SWEEP** key.
7. Press the **DETECTION** soft key, then press the **AVERAGE** soft key, then select **BACK**.
8. Press the **RBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to select 10 kHz. Press **ENTER** to set the resolution bandwidth to 10 kHz and select **BACK**.
9. Press the **VBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to select 100 Hz and press **ENTER** to set the video bandwidth to 100 Hz.
10. Press the **FREQ/SPAN** key and the **START** soft key.
11. Enter 100 and press the kHz soft key to set the start frequency to 100 kHz.
12. Press the **STOP** soft key and enter 500, then press the kHz soft key to set the stop frequency to 500 kHz.
13. Wait until a full sweep is complete.
14. Press the **MARKER** key and then press the M1 soft key.
15. Press the **MARKER TO PEAK** soft key. Record the M1 amplitude reading and verify it is ≤ -80 dBm.
16. Press the **FREQ/SPAN** key and the **START** soft key.
17. Enter 500 and press the kHz soft key to set the start frequency to 500 kHz.
18. Press the **STOP** soft key and enter 4, then press the MHz soft key to set the stop frequency to 4 MHz.
19. Wait until a full sweep is complete.
20. Press the **MARKER** key and then press the M1 soft key.
21. Press the **MARKER TO PEAK** soft key. Record the M1 amplitude reading and verify it is ≤ -95 dBm.
22. Press the **BW/SWEEP** key.
23. Press the **VBW** soft key, and then the **EDIT** soft key. Use the Up/down arrow key to select 3 kHz, and press **ENTER** to set the video bandwidth to 3 kHz.
24. Press the **FREQ/SPAN** key and the **START** soft key.
25. Enter 4 and press the MHz soft key to set the start frequency to 4 MHz.
26. Press the **STOP** soft key and enter 1000, then press the MHz soft key to set the stop frequency to 1000 MHz.
27. Wait until a full sweep is complete.
28. Press the **MARKER** key and then press the M1 soft key.
29. Press the **MARKER TO PEAK** soft key. Record the M1 amplitude reading and verify it is ≤ -95 dBm.
30. Press the **FREQ/SPAN** key and the **START** soft key.
31. Enter 1000 and press the MHz soft key to set the start frequency to 1000 MHz.
32. Press the **STOP** soft key and enter 2000 and press the MHz soft key to set the stop frequency to 2000 MHz.
33. Wait until a full sweep is complete.

34. Press the **MARKER** key and then press the M1 soft key.
35. Press the **MARKER TO PEAK** soft key. Record the M1 amplitude reading and verify it is ≤ -95 dBm.
36. Press the **FREQ/SPAN** key and the **START** soft key.
37. Enter 2000 and press the MHz soft key to set the start frequency to 2000 MHz.
38. Press the **STOP** soft key and enter 3000, then press the MHz soft key to set the stop frequency to 3000 MHz.
39. Wait until a full sweep is complete.
40. Press the **MARKER** key and then press the M1 soft key.
41. Press the **MARKER TO PEAK** soft key. Record the M1 amplitude reading and verify it is ≤ -95 dBm.

4.8. Dynamic Range Test

This test can be used to verify the dynamic range of the Spectrum Analyzer.

a. Equipment required:

- Two Anritsu MG3692A Synthesized Signal Sources with options 2A, 4 and 15A, or equivalent
- Anritsu N241A50 Power Splitter or equivalent
- Anritsu 34NN50A 50 ohm adapter or equivalent
- Anritsu 34RSN50 50 ohm adapter or equivalent
- Two Anritsu 15NNF50-1.5C RF Coaxial Cables or equivalent

b. Procedure:

1. Connect the output of the Power Splitter to the RF In port of the Spectrum Analyzer.
2. Connect the output of both signal sources to the input of the Power Splitter and turn on both sources.
3. On the Spectrum Analyzer, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Spectrum

Analyzer. (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. Set the center frequency of the first source to 1.0 GHz, and the center frequency of the second source to 1.2 GHz.
5. On the Spectrum Analyzer, press the **FREQ/SPAN** key.
6. Press the **CENTER** soft key, enter 1100, then press the MHz soft key to set the center frequency to 1100 MHz.
7. Press the **SPAN** soft key and enter 500, then press the MHz key to set the span to 500 MHz.
8. Press the **AMPLITUDE** key and then the **REF LEVEL** soft key.
9. Enter -20 and then press the **ENTER** key to set the reference level to -20 dBm.
10. Press the **BW/SWEEP** key.
11. Press the **RBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to select 30 kHz, then press **ENTER** to set the resolution bandwidth to 30 kHz.
12. Press **BACK**, then the **VBW** soft key and then the **EDIT** soft key. Use the Up/down arrow key to select 10 kHz, then press **ENTER** to set the video bandwidth to 10 kHz.
13. Adjust the signal levels of both signal sources so that both signal peaks are at -20 dBm as indicated on the Spectrum Analyzer display.
14. Refer to Steps 10-12 above and set the **RBW** to 10 kHz and the **VBW** to 1 kHz.
15. When the sweep is complete, reduce the power level of the second source signal to below -85 dBm and verify that the signal is visible at below -85 dBm.

4.9. Power Monitor (Option 5) Verification

If the Power Monitor is installed in the Spectrum Analyzer, the following test can be used to verify the accuracy of the power measurements. Measurement calibration of the Spectrum Analyzer is *not* required for this test.

a. Equipment Required:

- RF Detector, 10 MHz to 20 GHz, Anritsu 560-7N50B
- 10 dB Attenuator, Weinschel 1-10
- 30 dB Attenuator, Weinschel 1-30
- 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 4).
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 MS2711A Spectrum Analyzer.
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 Spectrum Analyzer. (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 $0.0 \text{ dBm} \pm 1 \text{ dB}$.
10. Connect the output of the MA2418A Reference Source to the two attenuators so as to add 40 dB of attenuation (Figure 4).
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 $-40.0 \text{ dBm} \pm 2 \text{ dB}$.

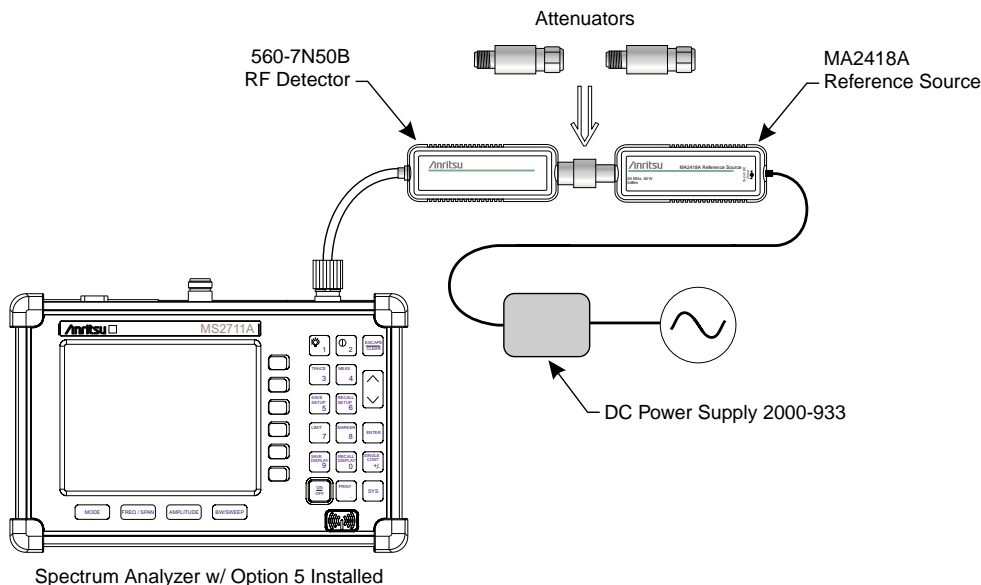


Figure 4. Power Monitor Verification

5. BATTERY PACK REMOVAL AND REPLACEMENT

This procedure provides instructions for removing and replacing the Spectrum Analyzer battery pack.

NOTE

Procedures in this manual may apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the MS2711A Spectrum Analyzer.

1. With the Spectrum Analyzer standing upright on a stable surface, locate the battery access door (Figure 5).

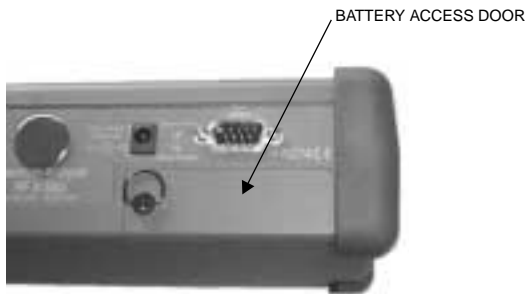


Figure 5. Battery Access Door Location

2. Lift up the access door handle and rotate it 90 degrees counterclockwise, as illustrated in Figure 6.

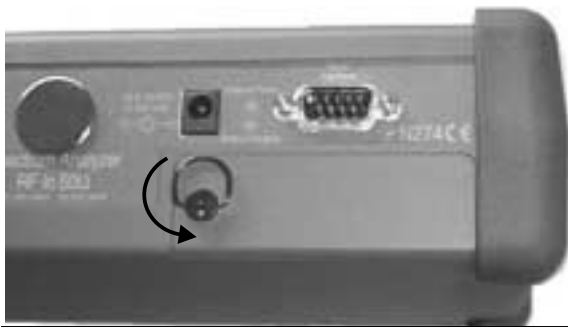


Figure 6. Rotate the Battery Access Door Handle

3. Lift the door and remove, as illustrated in Figure 7.
4. Grasp the battery lanyard and pull the battery straight up and out of the unit, as illustrated in Figure 8.

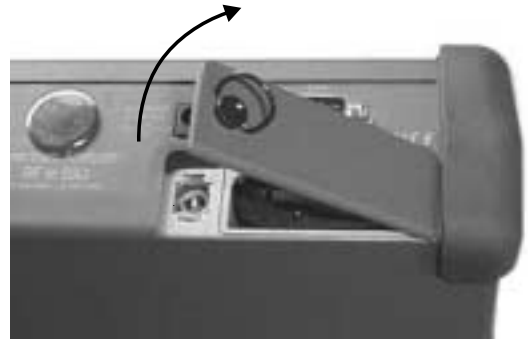


Figure 7. Removing the Battery Access Door

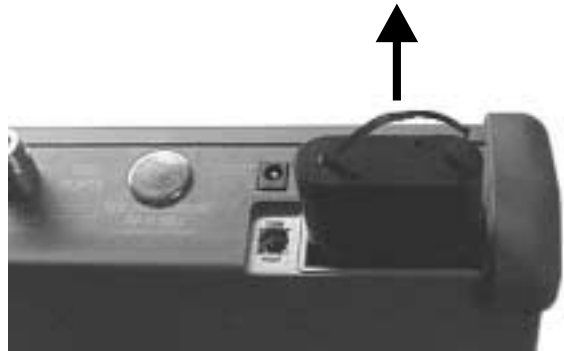


Figure 8. Removing the Battery

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 9).

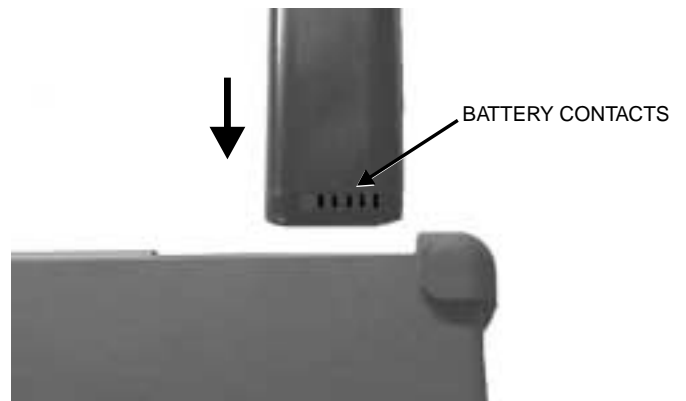


Figure 9. Battery Orientation

6. BATTERY INFORMATION

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



Figure 10. *Spectrum Analyzer Battery*

- The Nickel Metal Hydride (NiMH) battery supplied with the Spectrum Analyzer is shipped in a discharged state. Before using the Spectrum Analyzer, the internal battery must first be charged for three hours, either in the Spectrum Analyzer or in the optional battery charger (Anritsu part number: 2000-1029).
 - Use only Anritsu approved battery packs.
 - Recharge the battery only in the Spectrum Analyzer 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 Spectrum Analyzer 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.

7. FRONT PANEL ASSEMBLY REMOVAL AND REPLACEMENT

This procedure provides instructions for removing and replacing the Spectrum Analyzer 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.

1. Place the Spectrum Analyzer face up on a work surface.
2. Remove the four rubber corner bumpers by carefully sliding the bumpers off of the case corners (Figure 13).



Figure 11. Removing the Corner Bumpers

3. With the bumpers removed, the access holes for the case screws are revealed. Use a Philips screwdriver to remove the four screws securing the two halves of the Spectrum Analyzer case together.
4. 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 as there are delicate cables attached between the two halves that must be disconnected first.

5. Carefully depress the latch tab and disconnect the LCD display cable from J12 on the main PCB.
6. Carefully disconnect the keypad interface cable from J1 on the main PCB.

7. Carefully disconnect the speaker cable from J23 on the main PCB.
8. Carefully disconnect the LCD display backlight cable from J15 on the main PCB.

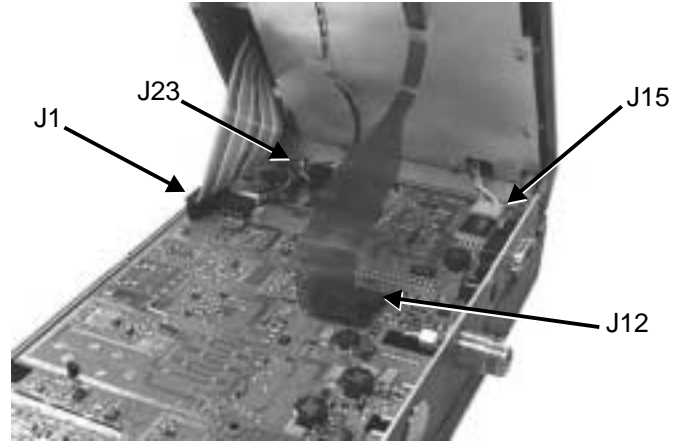


Figure 12. Spectrum Analyzer Front Panel Cable Connections

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 13) is made to conform to the contour of the front cover only.



Figure 13. Corner Bumper Detail

8. 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 Spectrum Analyzer.

1. Remove the front panel assembly as directed in section 7.
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 and speaker cable from the retaining clips on the front panel backing plate.

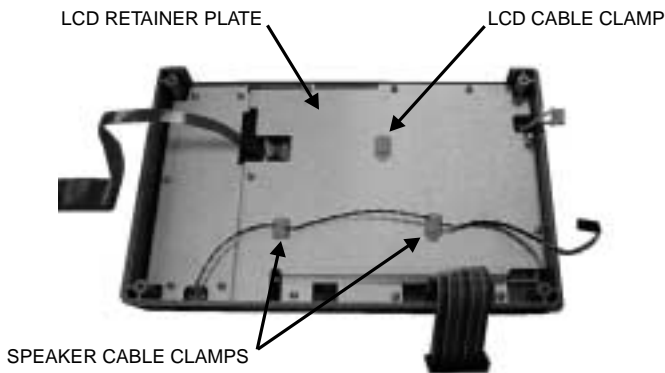


Figure 14. Front Panel Backing Plate

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.

9. 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 7.
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 and speaker cable from the retaining clips on the front panel backing plate (Figure 14).
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.

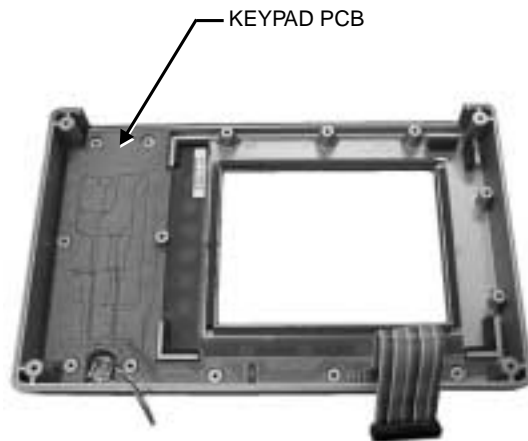


Figure 15. Front Panel Keypad PCB Location

7. Reverse the above steps to install the replacement assembly. Take care to position the speaker and speaker cable properly.

10. KEY PAD MEMBRANE REPLACEMENT

This procedure provides instructions for replacing the key pad membrane.

1. Remove the front panel assembly as directed in section 7.
2. Remove the key pad PCB as directed in section 9.
3. Remove the keypad membrane by gently pulling the membrane up and out of the holes in the front panel.

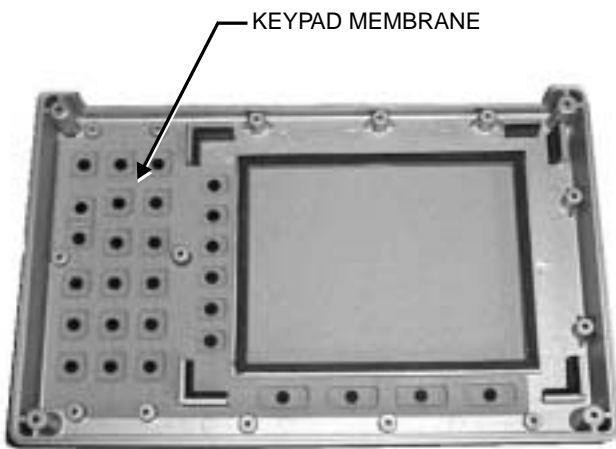


Figure 16. Front Panel Keypad Membrane

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

11. MAIN PCB ASSEMBLY REPLACEMENT

This procedure provides instructions for replacing the main PCB assembly with the connector panel attached. The assembly consist of two PCBs (Control and RF) which must be replaced together.

1. Remove the front panel assembly as directed in section 7.
2. Disconnect the battery connector from J13 on the main PCB.
3. Disconnect the semi-rigid coaxial cable from the RF connector on the connector panel.

4. Remove the three PCB mounting screws and remove the Control PCB assembly with the connector panel attached.

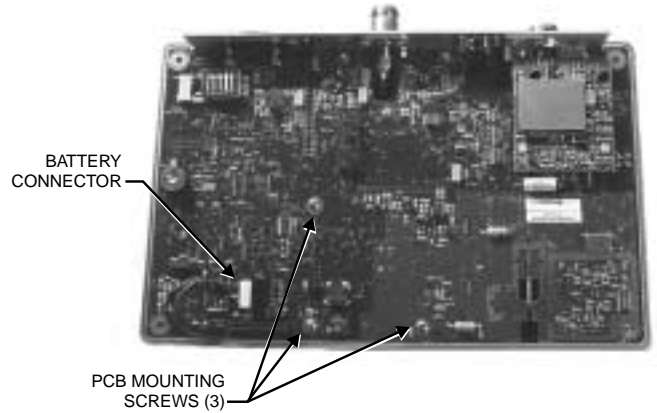


Figure 17. Control PCB

5. Remove the three .25" standoffs and four Phillips screws and remove the RF PCB.

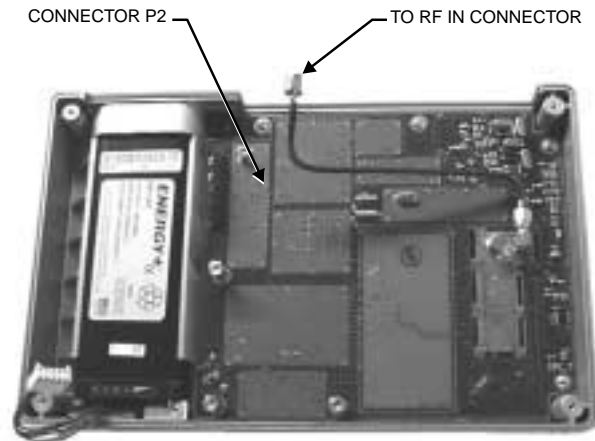


Figure 18. RF PCB

6. 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 Spectrum Analyzer case. Make sure the panel is correctly aligned with the grooves before reassembling the two halves together.

12. REPLACEABLE PARTS

Replaceable parts for the Model MS2711A Spectrum Analyzer are listed below.

Table 3. *Replaceable Parts List*

Part Number	Description	Qty
Accessories		
10580-00048	User's Guide, MS2711A Spectrum Analyzer	1
10580-00049	Programming Manual, MS2711A Spectrum Analyzer (available on disk only)	1
2300-347	Software Tools, MS2711A Spectrum Analyzer	1
40-115	Power Supply	1
2000-1029	Battery Charger	
806-62	Cable Assy, Cig Plug, Female	1
800-441	Serial Interface Cable Assy	1
48258	Soft Carrying Case	1
Replaceable Parts		
510-87	N-Connector	1
551-152	Option 05 Input Connector	1
15-102	Liquid Crystal Display Assy	1
633-27	Rechargeable Battery, NiMH	1
ND55001	MS2711A Logic, Digital Control and SA PCB Assembly	1
ND55007	MS2711A Logic and Digital Control PCB Assembly with Option 05	1
ND53250	Option 05 PCB Assembly	1
52737-3	Keypad PCB Assy	1
46649-3	Membrane Keypad, Main	1
52747	Coaxial Cable	1
ND56502	Speaker and Cable Assembly	1

Part Number	Description	Qty
Hardware		
900-861	Pan Head Screw, 4-20, 0.365	15
900-869	Screw, 4-40, 0.875	4
900-720	Screw, 4-40, 0.187	3
900-697	Screw, 4-40, 0.312	3
785-929	M-F Stand off, 4-40, 11/16	3
900-326	Kep Nut, 4-40, 0.187	8
790-516	Hole Plug, 0.6875L	1
790-42	Hole Plug, 0.625	1
761-79	Cap Vinyl, Black, round	1
Case Parts		
46652-4	Top Case only	1
52727	Top Case w/ hardware	1
46653-1	Bottom Case only	1
46664	Bottom Case w/ hardware	1
48231-1	Battery Door	1
790-509 790-510 790-511	Battery Door Latch (3 pieces)	1
46655	Case Corner Bumpers	4
46662	LCD Retainer Plate	1
48241	Foam, LCD Corners	8
48278	Foam, LCD Window	1
46659	Foam, LCD Backing	1
46661	Foam, Keypad Backing	1
48246	Foam, Battery Door	1
48271	Foam, Battery Compartment	1
720-19	Cable Clamp	1
790-515	Spring, Battery Compartment	1
52733	ID Label, Model MS2711A	1

Table 4. Anritsu Service Centers

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ANRITSU COMPANY
685 Jarvis Drive
Morgan Hill, CA 95037-2809
Telephone: (408) 776-8300
1-800-ANRITSU
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91951 Les Ulis Cedex
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FAX: 016-44-61-065

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FAX: 81-3-3448-8047

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FAX: 201-575-0092

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FAX: 0211-68555

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FAX: 65-282-2533

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FAX: 03-9558-8255

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FAX: (03) 64-78-334

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