

Model MS2717A Economy Spectrum Analyzer Maintenance Manual



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Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
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USA

declares that the product specified below:

Product Name: Economy Spectrum Analyzer

Model Number: MS2717A

conforms to the requirement of:

EMC Directive 89/336/EEC as amended by Council Directive 92/31/EEC & 93/68/EEC
Low Voltage Directive 73/23/EEC as amended by Council directive 93/68/EEC

Electromagnetic Compatibility: EN61326-1:1997 +A1:1998 +A2:2002 +A3:2003

Emissions: EN55011: 1998 +A1:1999 +A2:2002 Group 1 Class A

Immunity:	EN 61000-4-2:1995+ A1:1998+ A2:2001	- 4kV CD, 8kV AD
	EN 61000-4-3:2002+ A1:2002	- 3V/m
	EN 61000-4-4:2004	- 0.5kV SL, 1kV PL
	EN 61000-4-5:1995+ A1:2001	- 0.5kV L-L, 1kV L-E
	EN 61000-4-6:1996+ A1:2001	- 3V
	EN 61000-4-11:1994+ A1:2001	- 100% @ 20msec

Electrical Safety Requirement:

Product Safety: EN61010-1: 2001

Morgan Hill, CA



Eric McLean, Corporate Quality Director

5 July 2006
Date

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

Notes Used in Manuals

Danger

This indicates a very dangerous procedure that could result in serious injury or death, or loss related to equipment malfunction, if not performed properly.

Warning

This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution

This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Note

This indicates additional information.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This symbol indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This symbol indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This symbol indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This symbol indicates a note. The contents are described in the box.



These symbols indicate that the marked part should be recycled.

For Safety



Warning: Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.



or



Warning: When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.



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



Warning: Use two or more people to lift and move this equipment, or use an equipment cart. There is a risk of back injury if this equipment is lifted by one person.



Caution: Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

An Electrostatic Discharge (ESD) safe work area and proper ESD handling procedures (that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007) are mandatory to avoid ESD damage when handling subassemblies or components found in the MS2717A. Additional information pertaining to ESD can be found at the ESD Association Web site:

<http://www.esda.org/s2020.html>

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Chapter 1 — General Information

1-1 Introduction

This manual provides general service and preventative maintenance information for the Anritsu MS2717A Economy Spectrum Analyzer. It contains procedures for the following:

- Frequency Accuracy Verification
- SSB Phase Noise Verification
- Spurious Response
- Residual Spurious Response
- Displayed Average Noise Level (DANL)
- Input Related Spurious (IRS) Signals
- Resolution Bandwidth Accuracy
- Amplitude Accuracy
- Frequency Flatness Test
- WCDMA Absolute Power Accuracy Verification (Option 44)
- WCDMA Occupied Bandwidth (OBW) Verification (Option 44)
- WCDMA RF Channel Power Accuracy and ACLR Verification (Option 44)
- HSDPA RF Channel Power Accuracy and ACLR Verification (Option 44)
- Error Vector Magnitude (EVM) Verification (Option 45)
- Internal Reference Frequency Adjustment
- Removal and Replacement (Chapter 4)

Test Records are located in Appendix A.

Throughout this manual, the terms MS2717A, Economy Spectrum Analyzer, and Spectrum Analyzer are used interchangeably when referring to this instrument.

1-2 Description

The Anritsu Economy Spectrum Analyzer is a synthesizer-based spectrum analyzer that is designed for monitoring, measuring, and analyzing signals quickly and accurately. Measurements can be easily made by using the main instrument functions: frequency, span, amplitude, and bandwidth. Dedicated keys (for common functions) and a familiar calculator-type keypad are available for fast data entry.

Time and date stamping of measurement data is automatic. The internal memory provides for the storage and recall of more than 1000 measurement setups and more than 1000 traces. The bright, high-resolution color liquid crystal display (LCD) provides for easy viewing in a variety of lighting conditions.

A full range of marker capabilities (such as peak, center, and delta functions) are provided for faster, more comprehensive analysis of displayed signals. Upper and lower multi-segmented limit lines are available to create quick, simple pass/fail measurements. A menu option provides for an audible alert when the limit value is exceeded. The Anritsu Spectrum Analyzer can interface with Master Software Tools.

1-3 Master Software Tools Description

Anritsu Master Software Tools is a Microsoft Windows 2000 and Windows XP compatible program for transferring and editing saved measurements to a PC, along with markers and limit lines. The program provides the ability to modify display parameters, to overlay multiple traces, to upload and download traces, to print traces using local or networked printers, to create and modify language files, and also to edit and to add new cables, signal standards, antennas, and Pass/Fail files. Master Software Tools is designed to work with Windows 2000 or Windows XP. It does not function on earlier versions of the Microsoft Windows operating system.

Master Software Tools Features

- Download measurements (that are saved in an instrument memory) to a PC for storage and analysis.
- Capture live traces from the instrument in order to view them and save them on a PC.
- Upload measurements from a PC to the instrument memory.
- Compare multiple traces by using drag, drop, and trace overlay features (for Spectrum Analyzer measurements only).
- Add, delete, and modify Limit Lines and Markers.
- Modify the Cable List or add new cables to instruments by using the Cable Editor.
- Modify the Antenna List or add new antennas to instruments by using the Antenna Editor.
- Modify the Signal Standard List or add new Signal Standards to instruments by using the Signal Editor.
- Display power level, and calibration status information along with a measurement, in one report.
- Create, download, or edit existing Pass/Fail mode lists for WCDMA/HSDPA and GSM/GPRS/EDGE measurements.
- Create custom language files that can be uploaded to an instrument in order to customize the instrument soft-key labels and messages.
- Export measurement data as text files for use in spreadsheets or other documents, and create reports in HTML format for use in a variety of applications.
- Export measurements as graphic files (.jpg format).
- Export measurements as CSV (Comma Separated Value format) files.
- Easily update an instrument with the latest firmware that is available from the Anritsu Web site: <http://www.us.anritsu.com>
- Store an unlimited number of data traces to a PC, thereby easing the task of analyzing and monitoring historical performance.
- Establish a connection to a PC by using a USB, Ethernet LAN, or Direct Ethernet connection.

Measurements that are stored in internal memory can be downloaded to a PC by using the included USB or Ethernet cables. After being stored, the graphic trace can then be displayed, scaled, or enhanced with markers and limit lines. Historical graphs can be overlaid with current data using the PC mouse in a drag-and-drop fashion. The underlying data can be extracted and used in spreadsheets or for other analytical tasks.

1-4 Options

The following options are available for the MS2717A Economy Spectrum Analyzer:

Table 1-1. MS2717A Options

Option	Description
MS2717A-001	Rack Mount (no slides)
MS2717A-009	Modulation Measurement and Demodulation Hardware Upgrade
MS2717A-044	WCDMA/HSDPA RF Measurements (requires Option 009)
MS2717A-045	WCDMA Demodulator (requires Option 009)

1-5 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining the model MS2717A Spectrum Analyzer.

Table 1-2. Recommended Test Equipment

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 2 to 20 GHz	Anritsu Model MG3692A with options 2A, 4, and 15A
Vector Signal Generator	Frequency: 100 kHz to 3 GHz	Anritsu Model MG3700A with Options: MG3700A-002, MG3700A-021
Power Meter	Power Range: -70 to +20 dBm	Anritsu Dual Channel Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: -67 to +20 dB	Anritsu Model MA2442D Quantity: 2 each
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: -60 to +20 dBm	Anritsu Model MA2482D Quantity: 2 each
Frequency Reference	Frequency: 10 MHz	Symmetricon Model RubiSource T&M
Programmable Attenuator	Frequency: DC to 2 GHz Attenuation: 100 dB (in 1 dB and 10 dB steps)	Anritsu Model MN63A
Fixed Attenuator	Frequency Range: DC to 18 GHz Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10 Quantity: 2 each
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
RF Power Amplifier	Frequency: 100 to 1000 MHz, Gain: 35 dB minimum	Mini Circuits Model TIA-1000-1R8 [Two each of BNC(m) to N(f) Adapters are required.]
Low Pass Filter	Frequency: 50 MHz	Anritsu Model 1030-96
Adapter	Frequency: DC to 20 GHz N(m)-N(m), 50 Ohm	Maury Microwave Model 8828B Quantity: 2 each [Required one each only if Anritsu Coupler and Circulator are used]
Adapter	Frequency: DC to 20 GHz K(m)-N(f), 50 Ohm	Anritsu Model 34RKNF50
Adapter	Frequency: 881.5 MHz BNC(m) to N(f), 50 Ohm	Midwest Microwave Model ADT-2615-NF-BNM-02 Quantity: 2 each
Adapter	Frequency: 881.5 MHz SMA(m) to N(f), 50 Ohm	Midwest Microwave Model ADT-2582-NF-SMM-02 Quantity: 4 each [Required only if Anritsu Coupler and Circulator are used.]
Adapter	Frequency: 881.5 MHz SMA(m) to SMA(m), 50 Ohm	Midwest Microwave Model ADT-2594-MM-SMA-02 [Required only if Anritsu Coupler and Circulator are used.]
50 Ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
High Power Load	DC to 18 GHz, 10 W	Aeroflex/Weinschel Model M1418

Table 1-2. Recommended Test Equipment

Instrument	Critical Specification	Recommended Manufacturer/Model
Coupler	Frequency: 881.5 MHz Coupling Factor: 30 dB	Midwest Microwave Model CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05 Alternative: Anritsu part number 1091-307 [Two SMA(m) to N(f) adapters are required.]
Circulator	Frequency Range: 800 to 1000 MHz Isolation: 20 dB minimum	Meca Electronics, Inc. part number CN-0.900 Alternative: Anritsu part number 1000-50 [Two SMA(m) to N(f) adapter and one SMA(m) to SMA(m) Adapter are required.]
RF Coaxial Cable	Frequency: DC to 18 GHz N(m)-N(m), 50 Ohm	Anritsu Model 15NN50-1.5B Quantity: 3 each
Coaxial Cable	BNC(m) to BNC(m), 50 Ohm	Any

1-6 Service Centers

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

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

and choose a country for regional contact information.

Chapter 2 — Performance Verification

The procedures in this chapter are used to verify the performance of the Anritsu MS2717A Spectrum Analyzer.

2-1 Frequency Accuracy Verification

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

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, and 15A, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

Procedure:

1. Connect AC power to the 10 MHz Reference Standard, the Anritsu MG3692A Synthesized Signal Source and the Anritsu MS2717A Spectrum Analyzer.
2. Turn on the 10 MHz Reference Standard and the Synthesized Signal Source.
3. Connect the 10 MHz reference source to the Synthesized Signal Source.
4. Connect the output of the source to the RF Input of the Spectrum Analyzer.
5. Press and hold the **On/Off** key to turn on the Spectrum Analyzer.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
-------------	--

6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
7. Set the MG3692A output to 1 GHz CW, with an RF output level of -30 dBm.
8. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter -10 and press the dBm soft key.
9. Press the **Freq** key and press the Center Freq soft key. Then use the keypad to enter 1 and press the GHz soft key.
10. Press the **Span** key, use the keypad to enter 10, and press the kHz soft key.
11. Press the **BW** key and press the RBW soft key. Then use the keypad to enter 100 and press the Hz soft key.
12. Press the VBW soft key and use the keypad to enter 30, then press the Hz soft key.
13. Press the **Marker** key and press the Peak Search soft key.
14. Verify that the marker frequency is 1 GHz, ± 1 kHz (± 300 Hz if Option 9 is installed) and record in the test records under Spectrum Analyzer Frequency Accuracy in Appendix A, if required.
15. Repeat Steps 7 through 13 for 7 GHz.
16. Verify that the marker frequency is 7 GHz ± 7 kHz (± 2.1 kHz if Option 9 is installed) and record in the test records under Spectrum Analyzer Frequency Accuracy in Appendix A, if required.

Note

If the unit fails the Spectrum Analyzer Frequency Accuracy test, then perform the Spectrum Analyzer Internal Reference Frequency Adjustment procedure in Chapter 3, Section 3-1. If the unit continues to fail the Frequency Accuracy test after the Internal Reference Frequency adjustment has been completed, then replace the PCB assembly.

2-2 SSB Phase Noise Verification

This test can be used to verify the single side band phase noise of the Spectrum Analyzer.

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, and 15A, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- 10 MHz Reference Standard

Procedure:

1. Connect AC power to the 10 MHz reference standard, the Anritsu MG3692A Synthesized Signal Source and the Anritsu MS2717A Spectrum Analyzer.
2. Turn on the 10 MHz reference standard and the Synthesized Signal Source.
3. Connect the 10 MHz reference standard to the Synthesized Signal Source.
4. Connect the output of the Synthesized Signal Source to the RF In connector of the Spectrum Analyzer.
5. Press the **On/Off** key to turn on the Spectrum Analyzer.

Note

Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.

6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset to the default starting conditions.
7. Turn on the 10 MHz reference source and the Anritsu MG3692A Synthesized Signal Source.
8. Set the MG3692A output to 7.09 GHz CW, with an RF output level of +13 dBm.
9. Press the **Amplitude** key and press the **Reference Level** soft key. Then use the keypad to enter 0 and press the **dBm** soft key.
10. Press the **Atten Lvl** soft key, use the keypad to enter 15, and then press the **dB** soft key.
11. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 7.0905 and press the **GHz** soft key.
12. Press the **Span** key, use the keypad to enter 110, and press the **kHz** soft key.
13. Press the **BW** key and press the **RBW** soft key. Then use the keypad to enter 1 and press the **kHz** soft key.
14. Press the **VBW** soft key and use the keypad to enter 3, then press the **Hz** soft key.
15. Press the **Shift** key and then press the **Trace** (5) key. Press the **Trace A Operations** soft key.
16. Press the **# of Average** soft key, use the keypad to enter 7, then press the **Enter** key.
17. Wait until the Trace Count displays 7/7.
18. Press the **Marker** key and press the **Peak Search** soft key.
19. Press the **Delta On/Off** soft key to turn on Delta.
20. Use the keypad to enter 10 and press the **kHz** soft key.

21. Subtract 30 dB from the average value and verify that the result is ≤ -100 dBc/Hz (For example: -70 dBc measured -30 dB = -100 dBc/Hz). Record in the test records under Spectrum Analyzer SSB Phase Noise in Appendix A, if required.

Note

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

$$\text{dBc / Hz} = -|\text{measured dBc}| - [10 \log (\text{RBW}/1 \text{ Hz})]$$

At 1 kHz RBW:

$$10 \log (\text{RBW}/1 \text{ Hz}) = 30, \text{ so dBc / Hz} = -|\text{measured dBc}| - 30$$

22. Repeat Steps 20 through 21 for 20 kHz, 30 kHz, and 100 kHz.

2-3 Spurious Response

The following Spectrum Analyzer Spurious Response (Second Harmonic Distortion) test can be used to verify the input related spurious response of the Spectrum Analyzer.

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, and 15A, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- 50 MHz Low Pass Filter (Anritsu part number 1030-96)
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

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 coaxial cable.
3. Connect AC power to the 10 MHz Reference Standard, the Signal Source, and the Spectrum Analyzer.
4. Turn on the 10 MHz reference source and the Anritsu MG3692A Synthesized Signal Source.
5. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset the instrument to the default starting conditions.
7. Set the MG3692A output to 50.1 MHz CW, with an RF output level of –30 dBm.
8. Press the **Amplitude** key, then press the **Reference Level** soft key. Then use the keypad to enter –27 and press the **dBm** soft key.
9. Press the **Atten Lvl** soft key and enter 0, then press the **dB** soft key.
10. Press the **Span** key, use the keypad to enter 100, and press the **kHz** soft key.
11. Press the **Shift** key and then press the **Sweep** (3) key.
12. Press the **Detection** soft key, and then the **Peak** soft key.
13. Press the **BW** key and press the **RBW** soft key. Then use the keypad to enter 1 and press the **kHz** soft key.
14. Press the **VBW** soft key and use the keypad to enter 10, then press the **Hz** soft key.
15. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 50.0 and press the **MHz** soft key.
16. Press the **Shift** key and then press the **Trace** (5) key.
17. Press the **Trace A Operations** soft key.
18. Press the **# of Average** soft key, use the keypad to enter 5, and then press the **Enter** key.
19. Wait until the Trace Count displays 5/5.
20. Press the **Marker** key and press the **Peak Search** soft key.
21. Record the amplitude for 50.1 MHz in the test records under Spectrum Analyzer Spurious Response (Second Harmonic Distortion) in Appendix A, if required.
22. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 100.2, and press the **MHz** soft key.
23. Press the **Shift** key and then press the **Trace** (5) key.

24. Press the Trace A Operations soft key.
25. Press the # of Average soft key, use the keypad to enter 5, and then press the **Enter** key.
26. Wait until the Trace Count displays 5/5.
27. Press the **Marker** key and press the Peak Search soft key.
28. Record the amplitude for 100.2 MHz in the test records under Spectrum Analyzer Spurious Response (Second Harmonic Distortion) in Appendix A, if required.
29. Convert this measured value to dBc using the following formula:
$$\text{Second Harmonic Level (dBc)} = \text{Amplitude @ 100.2 MHz} - \text{Amplitude @ 50.1 MHz} = \text{_____ dBc}$$
30. Verify that the converted Second Harmonic Level is –50 dBc or better, and record in the test records under Spectrum Analyzer Spurious Response (Second Harmonic Distortion) in Appendix A, if required.

2-4 Residual Spurious Response

The following Spectrum Analyzer Residual Spurious Response test can be used to verify the residual spurious response of the Spectrum Analyzer. This test is performed by using the positive peak detection mode. This test has two parts:

- Residual Spurious Test with Preamp Off
- Residual Spurious Test with Preamp On

Residual Spurious Test with Preamp Off

Equipment Required:

- Anritsu 28N50-2 50 Ohm Termination or equivalent

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF Input.
2. Connect the AC power to the Spectrum Analyzer.
3. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key.

NoteBefore continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.

4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key in order to reset the instrument to the default starting conditions.
5. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter –40, and press the dBm soft key.
6. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
7. Ensure that the Pre Amp On/Off soft key is in the **Off** position. If the preamp is **On**, then press the Pre Amp On/Off soft key to turn it **Off**.
8. Press the **Shift** key and then press the **Sweep** (3) key, then press the Detection soft key, and then the Peak soft keys.
9. Press the **Freq** key and press the Start Freq soft key. Then use the keypad to enter 100, and press the kHz soft key.
10. Press the Stop Freq soft key, enter 10, and press the MHz soft key.
11. Press the **BW** key and press the RBW soft key. Then use the keypad to enter 3, and press the kHz soft key.
12. Press the VBW soft key and use the keypad to enter 300, then press the Hz soft key.
13. Wait until one sweep is completed.
14. Press the **Marker** key and press the Peak Search soft key.
15. Record the Marker 1 amplitude reading in Table A-6, *Residual Spurious (Pre Amp OFF)* on page A-3 and verify that the reading is ≤ -90 dBm in the test records, if required.

NoteIf a spur with amplitude larger than –90 dBm occurs, then 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. Repeat Steps 9 through 15 for the other Start and Stop frequencies in Table A-6, *Residual Spurious (Pre Amp OFF)* on page A-3.

NoteExceptions to the frequencies in Table A-6, *Residual Spurious (Pre Amp OFF)* are located in Table A-7, *Exceptions to Table A-6, Residual Spurious (Pre Amp OFF)* on page A-3.

Residual Spurious Test with Preamp On

Equipment Required:

- Anritsu 28N50-2 50 Ohm Termination or equivalent

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF Input.
2. Connect AC power to the Spectrum Analyzer.
3. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter -40 , and press the dBm soft key.
6. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
7. Ensure that the Pre Amp On/Off soft key is in the On position. If the preamp is Off, then press the Pre Amp On/Off soft key to turn it on.
8. Press the **Shift** key and then press the **Sweep** (3) key, then press the Detection soft key and then the Peak soft keys.
9. Press the **BW** key and press the RBW soft key. Then use the keypad to enter 10, and press the kHz soft key.
10. Press the VBW soft key and use the keypad to enter 1, then press the kHz soft key.
11. Press the **Freq** key and press the Start Freq soft key. Then use the keypad to enter 100, and press the kHz soft key.
12. Press the Stop Freq soft key, enter 10, and press the MHz soft key.
13. Wait until one sweep is completed.
14. Press the **Marker** key, and press the Peak Search soft key.
15. Verify that the Marker 1 amplitude reading is ≤ -100 dBm and record it in the test records in Table A-5, *Residual Spurious (Pre Amp ON)* on page A-3, if required.

Note	If a spur with amplitude larger than -100 dBm occurs, then 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.
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16. Repeat Steps 11 through 15 for the other Start and Stop frequencies in Table A-5, *Residual Spurious (Pre Amp ON)* on page A-3.

2-5 Displayed Average Noise Level (DANL)

The following test can be used to verify the Displayed Average Noise Level of the Spectrum Analyzer. This test is performed by using the RMS detection mode. This test has two parts:

- Displayed Average Noise Level Test with Preamp On
- Displayed Average Noise Level Test with Preamp Off

Displayed Average Noise Level Test with Preamp On

Equipment Required:

- Anritsu 28N50-2 50 Ohm Termination or equivalent

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF Input.
2. Connect AC power to the Spectrum Analyzer.
3. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter -50 , and press the dBm soft key.
6. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
7. Ensure that the Pre Amp On/Off soft key is in the On position. If the preamp is off, press the Pre Amp On/Off soft key to turn it on.
8. Press the **Shift** key and then press the **Sweep** (3) key, then press the Detection soft key and then the RMS soft key.
9. Press the **BW** key and press the RBW soft key. Then use the keypad to enter 100, and press the kHz soft key.
10. Press the VBW soft key.
11. Use the keypad to enter 1, and press the kHz soft key.
12. Press the **Freq** key and press the Start Freq soft key. Then use the keypad to enter 10, and press the MHz soft key.
13. Press the Stop Freq soft key, enter 1, and press the GHz soft key.
14. Wait until one sweep is completed.
15. Press the **Marker** key and then the Peak Search soft key.
16. The Marker reading is the Displayed Average Noise Level at 100 kHz RBW. Record the Marker reading in Measured DANL for 100 kHz RBW column of the test records in Table A-8, *Spectrum Analyzer DANL with Preamp On* on page A-4, if required.

Note	The noise floor consists of totally random signals, whereas a spur is a fixed spike of varying amplitude that is always visible. If Peak Search lands the marker on a spur, then use the rotary knob to move the marker to the next highest peak.
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17. Convert the measured DANL @ 100 kHz RBW in the previous step to DANL @ 10 Hz RBW by subtracting 40 dB from the Marker reading. Verify that it meets specification. Record the result in the corresponding field in the Calculated DANL @ 10 Hz RBW column of the test records in Table A-8, *Spectrum Analyzer DANL with Preamp On* on page A-4, if required.

$$\begin{aligned}\text{DANL @ 10 Hz RBW}^* &= [\text{Measured DANL @ 100 kHz RBW} - 10 \text{ LOG}(100 \text{ kHz}/10 \text{ Hz})] \text{ dBm} \\ &= [\text{Measured DANL @ 100 kHz RBW} - 40] \text{ dBm}\end{aligned}$$

Note

* If the calculated value of DANL @ 10 Hz RBW is ≤ -164 dBm, then record -164 dBm in the test records.

18. Repeat Steps 12 through 17 for the other frequency settings.

Displayed Average Noise Level Test with Preamp Off

Equipment Required:

- Anritsu 28N50-2 50 Ohm Termination or equivalent

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF Input.
2. Connect AC power to the Spectrum Analyzer.
3. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key.

Note

Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.

4. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter –50, and press the dBm soft key.
6. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
7. Ensure that the Pre Amp On/Off soft key is in the Off position. If the preamp is on, then press the Pre Amp On/Off soft key to turn it off.
8. Press the **Shift** key and then press the **Sweep** (3) key, then press the Detection soft key and then the RMS soft key.
9. Press the **BW** key and press the RBW soft key. Then use the keypad to enter 100, and press the kHz soft key.
10. Press the VBW soft key and use the keypad to enter 1, and then press the kHz soft key.
11. Press the **Freq** key and press the Start Freq soft key. Then use the keypad to enter 10, and press the MHz soft key.
12. Press the Stop Freq soft key, enter 1, and press the GHz soft key.
13. Wait until one sweep is completed.
14. Press the **Marker** key and the Peak Search soft key.
15. The Marker Reading is the Displayed Average Noise Level at 100 kHz RBW. Record the Marker reading in the test records in Table A-9, *Spectrum Analyzer DANL with Preamp Off* on page A-4, if required.

Note

The noise floor consists of totally random signals, whereas a spur is a fixed spike of varying amplitude that is always visible. If Peak Search lands the marker on a spur, then use the rotary knob to move the marker to the next highest peak.

16. Convert the measured DANL @ 100 kHz RBW in previous step to DANL @ 10 Hz RBW by subtracting 40 dB from the Marker Reading. Verify that it meets specification. Record the result to the corresponding cell in the Measured DANL @ 10 Hz RBW column of the test records in Table A-9, *Spectrum Analyzer DANL with Preamp Off* on page A-4, if required.

Note

DANL @ 10 Hz RBW = [Measured DANL @ 100 kHz RBW – 10 LOG(100 kHz/10 Hz)] dBm
= [Measured DANL @ 100 kHz RBW – 40] dBm

17. Repeat Steps 11 through 16 for the other frequency settings.

2-6 Input Related Spurious (IRS) Signals

The following test can be used to verify the input related spurious signals of the Spectrum Analyzer at different frequencies.

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, and 15A, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

Procedure:

1. Connect AC power to the Anritsu MG3692A Synthesized Signal Source and the Anritsu MS2717A Spectrum Analyzer. Turn on both instruments.
2. Connect the 10 MHz reference source to the Synthesized Signal Source.
3. Connect the output of the Signal Source to the Spectrum Analyzer RF In.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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4. Set the MG3692A output to 1674 MHz with an RF output level of -30 dBm.
5. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key in order to reset the instrument to the default starting conditions.

1674 MHz Input Related Spurious Check:

6. Press the **Amplitude** key and press the **Reference Level** soft key. Then use the keypad to enter -27 , and press the **dBm** soft key.
7. Press the **Atten Lvl** soft key and enter 0, then press the **dB** soft key.
8. Press the **Shift** key and then press the **Sweep** (3) key, then press the **Detection** soft key and then the **Peak** soft key.
9. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 1674 and press the **MHz** soft key.
10. Press the **Span** key, use the keypad to enter 2, and press the **MHz** soft key.
11. Press the **BW** key and press the **RBW** soft key. Then use the keypad to enter 10, and press the **kHz** soft key.
12. Press the **VBW** soft key and use the keypad to enter 1, then press the **kHz** soft key.
13. Wait until one sweep is completed.
14. Press the **Marker** key, and press the **Peak Search** soft key.
15. Record the Marker 1 amplitude reading for 1674 MHz in the test records in Table A-10, *1674 MHz Input-Related Spurious Verification* on page A-5.
16. Press the **Freq** key and press the **Start Freq** soft key. Then use the keypad to enter 100 and press the **kHz** soft key.
17. Press the **Stop Freq** soft key, enter 1673, and press the **MHz** soft key.
18. Press the **Marker** key, and press the **Peak Search** soft key.
19. Record the Marker 1 amplitude reading in the test records in Table A-10, *1674 MHz Input-Related Spurious Verification* on page A-5.

20. Calculate the input related spurious level and verify that it is ≤ -46 dBc.

Input Related Spurious = Marker 1 reading - amplitude reading for 1674 MHz

21. Repeat Steps 16 through 20, setting a start frequency of 1675 MHz and a stop frequency of 2800 MHz.

1701 MHz Input Related Spurious Check:

22. Set the MG3692A output to 1701 MHz, with an RF output level of -30 dBm.
23. On the Spectrum Analyzer, press the **Amplitude** key and then press the Reference Level soft key.
24. Use the keypad to enter -27 and press the dBm soft key.
25. Press the **Freq** key and press the Center Freq soft key. Then use the keypad to enter 1701 and press the MHz soft key.
26. Press the **Span** key, use the keypad to enter 2, and press the MHz soft key.
27. Press the **Shift** key and then press the **Trace** (5) key.
28. Press the Trace A Operations soft key.
29. Press the # of Average soft key, use the keypad to enter 5, and then press the **Enter** key.
30. Wait until the Trace Count displays 5/5.
31. Press the **Marker** key and press the Peak Search soft key.
32. Record the amplitude at 1701 MHz in the test records in Table A-11, *1701 MHz Input-Related Spurious Verification* on page A-5.
33. Press the **Freq** key and press the Start Freq soft key. Then use the keypad to enter 26 and press the MHz soft key.
34. Press Stop Freq soft key, enter 28, and press the MHz soft key.
35. Press the **Shift** key and then press the **Trace** (5) key.
36. Press the Trace A Operations soft key.
37. Press the # of Average soft key, use the keypad to enter 5, and then press the **Enter** key.
38. Wait until the Trace Count displays 5/5.
39. Press the **Marker** key and press the Peak Search soft key.
40. Record the Marker 1 amplitude reading in the test records in Table A-11, *1701 MHz Input-Related Spurious Verification* on page A-5.
41. Calculate the input related spurious level and verify that it is ≤ -50 dBc.

Input Related Spurious = Marker 1 reading - amplitude reading for 1701 MHz

2145 MHz Input Related Spurious Check:

42. Set the MG3692A output to 2145 MHz, with an RF output level of -30 dBm.
43. On the Spectrum Analyzer, press the **Amplitude** key and then press the Reference Level soft key.
44. Use the keypad to enter -27 and press the dBm soft key.
45. Press the **Freq** key and press the Center Freq soft key. Then use the keypad to enter 2145 and press the MHz soft key.
46. Press the **Span** key, use the keypad to enter 2, and press the MHz soft key.
47. Press the **Shift** key and then press the **Trace** (5) key.
48. Press the Trace A Operations soft key.
49. Press the # of Average soft key, use the keypad to enter 5, and then press the **Enter** key.
50. Wait until the Trace Count displays 5/5.
51. Press the **Marker** key and press the Peak Search soft key.

52. Record the amplitude at 2145 MHz in the test records in Table A-12, *2145 MHz Input-Related Spurious Verification* on page A-5.
53. Press the **Freq** key and press the **Start Freq** soft key. Then use the keypad to enter 470 and press the **MHz** soft key.
54. Press **Stop Freq** soft key, enter 472, and press the **MHz** soft key.
55. Press the **Shift** key and then press the **Trace** (5) key.
56. Press the **Trace A Operations** soft key.
57. Press the **# of Average** soft key, use the keypad to enter 5, and then press the **Enter** key.
58. Wait until the **Trace Count** displays 5/5.
59. Press the **Marker** key and press the **Peak Search** soft key.
60. Record the **Marker 1** amplitude reading in the test records in Table A-12, *2145 MHz Input-Related Spurious Verification* on page A-5.
61. Calculate the input related spurious level and verify that it is ≤ -60 dBc.

Input Related Spurious = Marker 1 reading - amplitude reading for 2145 MHz

2-7 Resolution Bandwidth Accuracy

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

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, 15A, and 22, or equivalent
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- BNC male to BNC male coaxial cable

Procedure:

1. Connect AC power to the Anritsu MG3692A Synthesized Signal Source and the Anritsu MS2717A Spectrum Analyzer. Turn on both instruments.
2. Connect the 10 MHz reference source to the Synthesized Signal Source.
3. Connect the output of the Signal Source to the Spectrum Analyzer RF In.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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4. On the MS2717A, press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
5. Set the MG3692A output to 1 GHz, with an RF output level of -30 dBm.
6. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter -10 and press the dBm soft key.
7. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
8. Press the Scale soft key and enter 10, then press dB/div soft key.
9. Press the **Freq** key and press the Center Freq soft key. Then use the keypad to enter 1 and press the GHz soft key.

RBW Test:

10. Press the **Span** key, then use the keypad to enter the span that is in the test records in Table A-13, *Resolution Bandwidth (RBW) Accuracy Test* on page A-6.
11. Press the **BW** key and press the RBW soft key.
12. Use the keypad to enter 3 and press the MHz soft key.
13. Set the VBW from the test records in Table A-13, *Resolution Bandwidth (RBW) Accuracy Test*.
14. Press the **Shift** key, then the **Measure** (4) key, and then press the OCC BW soft key.
15. Press the dBc soft key and insure that the value is 3, then press the **Enter** key.
16. Press the OCC BW On/Off soft key to turn On occupied bandwidth.
17. Record the OCC BW reading in the test records in Table A-13, *Resolution Bandwidth (RBW) Accuracy Test*.
18. Verify that the OCC BW reading frequency is 10% of the RBW.
19. Repeat Steps 10 through 18 for the other settings.

2-8 Amplitude Accuracy

The tests in this section verify the amplitude accuracy of the Spectrum Analyzer. This test has two parts:

- 50 MHz Amplitude Accuracy Test
- Frequency Flatness Test

50 MHz Amplitude Accuracy Test

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, 15A, and 22, or equivalent
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensor or equivalent (2)
- Anritsu ML2400A/20 Power Meter Cable (2)
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 44-10 10 dB Fixed Attenuator
- Areoflex/Weinschel 1870A Power Splitter or equivalent

Test Setup Components Characterization

Refer to Figure 2-1 and Figure 2-2 for initial test connections.

1. Turn on the power meter, the signal source, and the MS2717A.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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2. On the power meter, press the **Channel** key, the **Setup** soft key, and then the **CHANNEL** soft key in order 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, as shown in Figure 2-1.

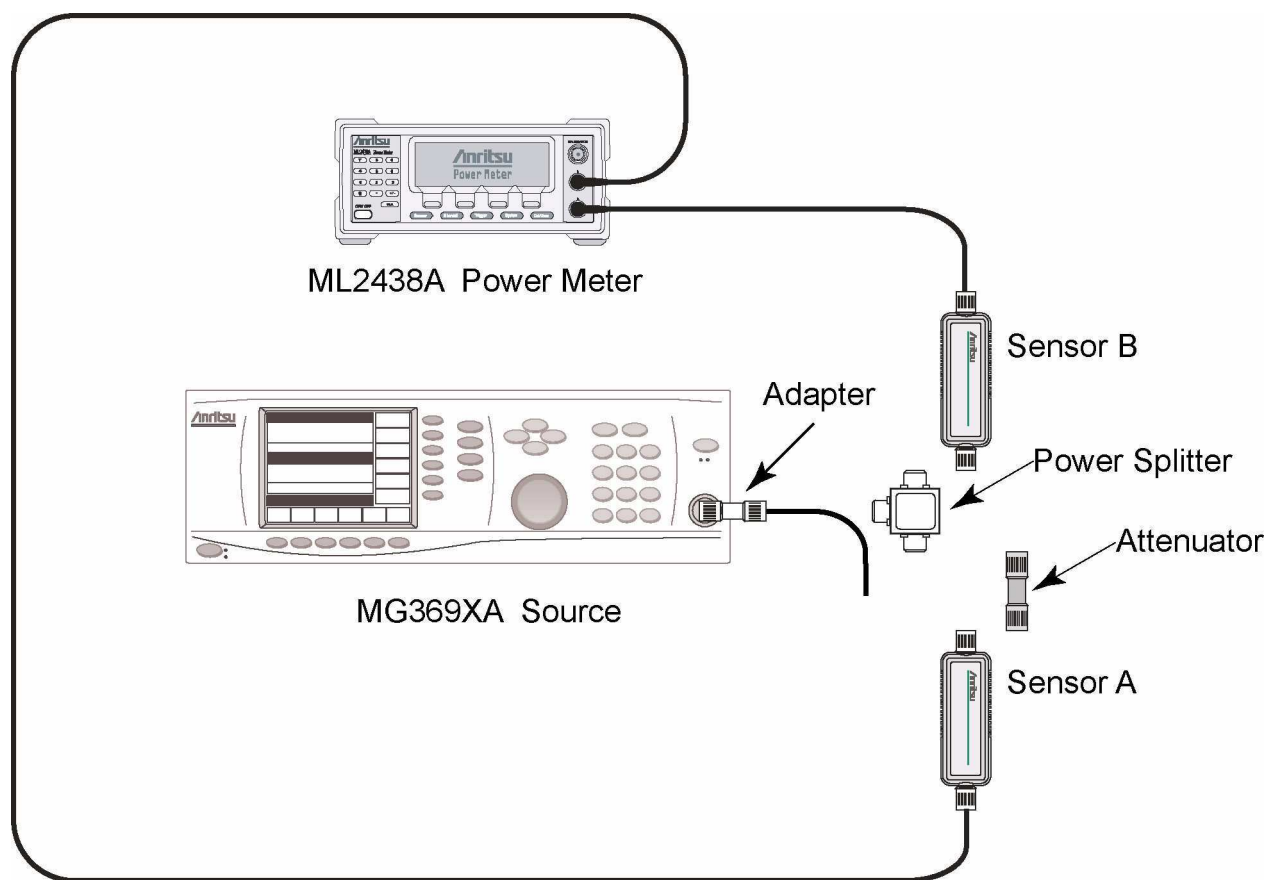


Figure 2-1. 50 MHz Amplitude Accuracy Sensor Calibration

4. Use an RF cable to connect the power splitter to the MG3692A output and to connect Sensor B to one of the power splitter outputs, as shown in Figure 2-2.
5. Install the 10 dB Fixed Attenuator to the other power splitter output, and then connect Sensor A to the end of the Attenuator, as shown in Figure 2-2.

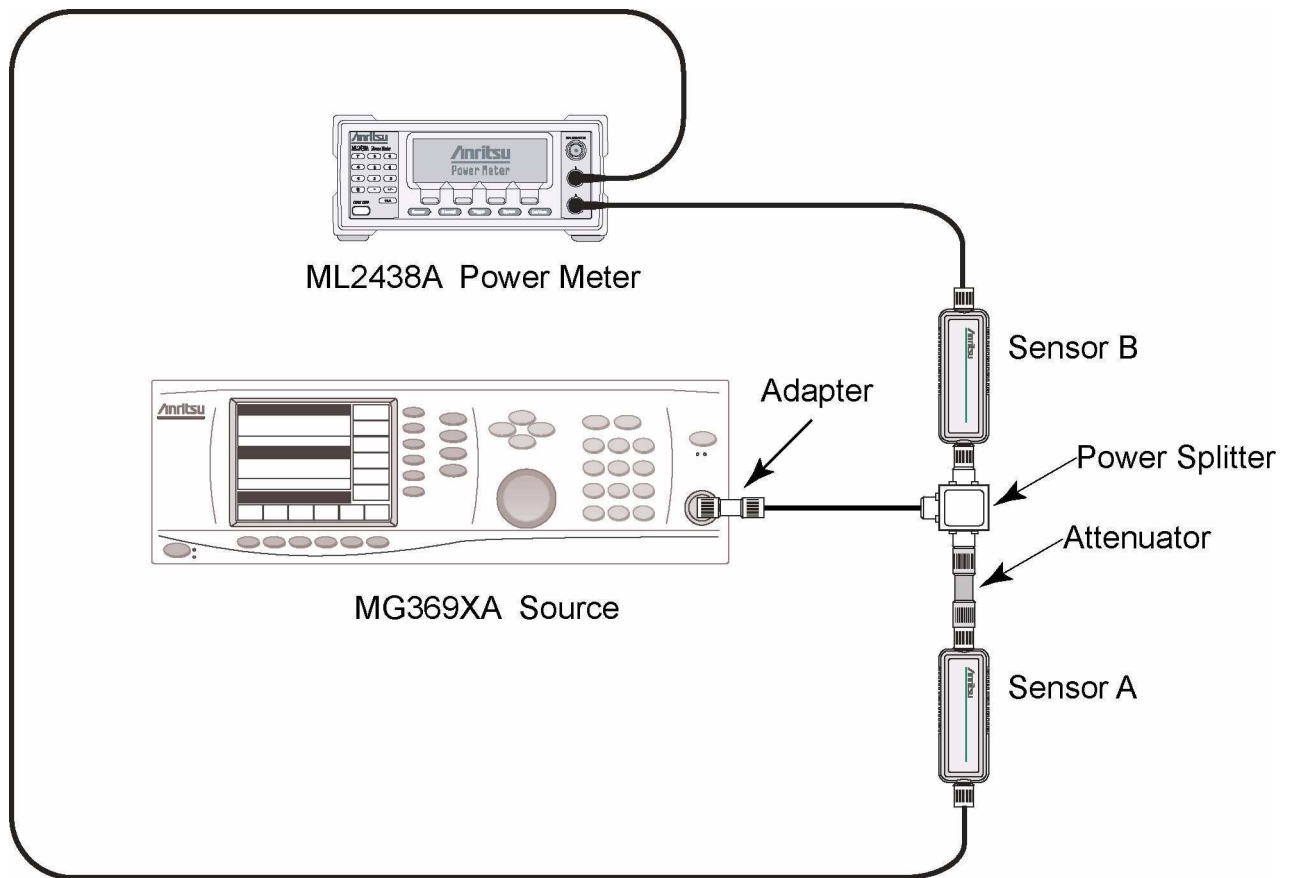


Figure 2-2. 50 MHz Amplitude Accuracy Test Setup

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. Adjust the power level of the MG3692A in order to get a reading on Sensor A that matches the test power level in Table A-14, *Component Characterization for 50 MHz Test* on page A-6, starting with -2 dBm.
8. Record the Sensor B reading in the “Required Sensor B Reading” column in Table A-14, *Component Characterization for 50 MHz Test*.
9. Repeat steps 7 and 8 for -30 dBm.

Measuring 50 MHz Amplitude Accuracy

1. Remove Sensor A, add the adapter, and connect the splitter and attenuator directly to the Spectrum Analyzer Input port on the MS2717A as shown in Figure 2-3.

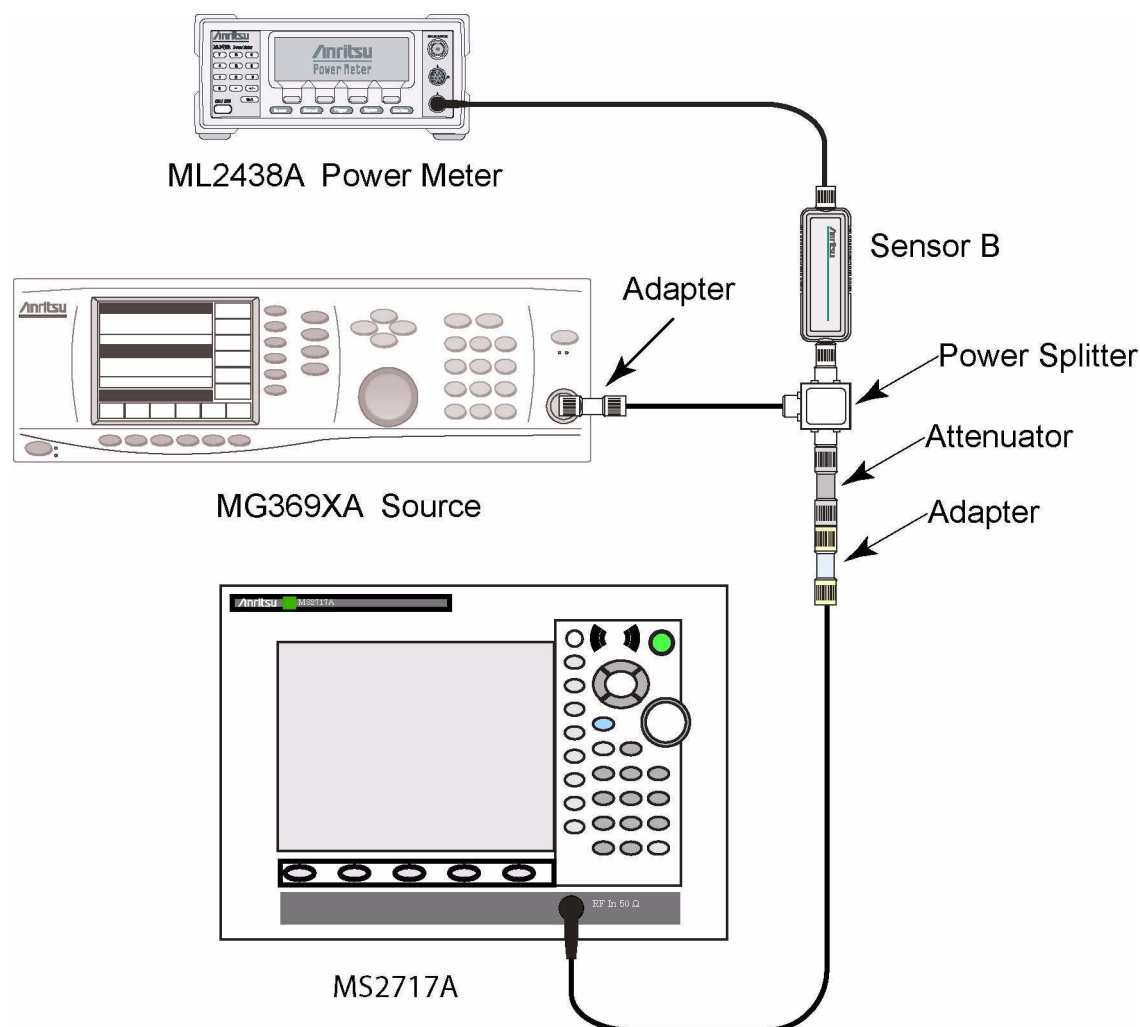


Figure 2-3. 50 MHz Amplitude Accuracy Test

2. On the MS2717A, press the **Shift** key and the **Preset** (1) key, and then the **Preset** soft key in order to reset the instrument to the default starting conditions.
3. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 50 and press the **MHz** soft key.
4. Press the **BW** soft key and then the **RBW** soft key. Then use the keypad to enter 1 and press the **kHz** soft key.
5. Press the **VBW** soft key and use the keypad to enter 10, then press the **Hz** soft key.
6. Press the **Span** key, use the keypad to enter 10, and press the **kHz** soft key.
7. Press the **Amplitude** key and press the **Reference Level** soft key. Then use the keypad to enter 10 and press the **dBm** soft key.
8. Press the **Atten Lvl** soft key and enter 60, then press the **dB** soft key.
9. Adjust the source power so that the power meter displays the corresponding desired Sensor B reading as recorded for -2 dBm in “Required Sensor B Reading” column of Table A-14, *Component Characterization for 50 MHz Test* on page A-6.

10. Press the **Marker** key and press the **Peak Search** soft key.
11. Record the Marker 1 amplitude reading in the test record in Table A-15, *50 MHz Reference Values* on page A-6.
12. Verify that the Marker 1 amplitude reading is within the specification shown the test record in Table A-14, *Component Characterization for 50 MHz Test* on page A-6.
13. Repeat steps 9 through 12 for -30 dBm, as indicated in Table A-15, *50 MHz Reference Values*.

Note

Change Reference Level and Input Attenuation Level settings as required (as shown in Table A-15, *50 MHz Reference Values*).

Frequency Flatness Test

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, 15A, and 22, or equivalent
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensors or equivalent (2)
- Anritsu ML2400A/20 Power Meter Cable (2)
- Areoflex/Weinschel 1870A Power Splitter or equivalent
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 44-10 10 dB Fixed Attenuator

Test Setup Component Characterization:

Refer to Figure 2-1 on page 2-16 and Figure 2-2 on page 2-17 for initial test connections.

1. Turn on the power meter, the signal source, and the MS2717A.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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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. Refer to Figure 2-1 on page 2-16.
4. Connect the power splitter to the MG3692A output and connect Sensor B to one of the power splitter outputs as shown in Figure 2-2 on page 2-17.
5. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator.
6. Set the MG3692A output to a frequency that is listed in Table A-16, *Frequency Flatness Component Characterization Test Settings* on page A-7, starting with 10.1 MHz CW.
7. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the FREQ soft key. Use the keypad to enter a value matching the frequency of MG3692A 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.
8. Adjust the power level reading on Sensor A to -2 dBm by adjusting the power level on the MG3692A.
9. Record the Sensor B reading in Table A-16, *Frequency Flatness Component Characterization Test Settings* on page A-7.
10. Repeat steps 6 through 9 in order to include all of the frequencies in column 1 of Table A-16, *Frequency Flatness Component Characterization Test Settings*.
11. Repeat steps 6 through 10 for a power of -30 dBm (set in Step 8) and record the results in Table A-16, *Frequency Flatness Component Characterization Test Settings*.

Note	Do not disassemble Sensor B, the power splitter, and the 10 dB attenuator, or this test setup characterization will be lost.
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Measuring Amplitude Accuracy Across Frequency

1. Remove Sensor A, add an adapter to the attenuator, and connect the MS2717A to the adapter as shown in Figure 2-3 on page 2-18.
2. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key to reset the instrument to the default starting conditions.
3. Press the **Amplitude** key and press the Reference Level soft key. Then use the keypad to enter 10 and press the dBm soft key.
4. Press the Atten Lvl soft key and enter 60, then press the dB soft key.
5. Press the BW soft key and the RBW soft key. Then use the keypad to enter 1 and press the kHz soft key.
6. Press the VBW soft key and use the keypad to enter 10, and press the Hz soft key.
7. Press the **Span** key, use the keypad to enter 10, and press the kHz soft key.
8. Press the **Freq** key and press the Center Freq soft key. Then use the keypad to enter a frequency from Table A-17, *Frequency Flatness Test Results and Specifications* on page A-7. For example, begin by entering 10.1 and pressing the MHz soft key.
9. On the Power Meter, press the **Sensor** key and then the Cal Factor soft key.
10. Press the FREQ soft key and enter the test frequency (the same frequency from column 1 of Table A-17, *Frequency Flatness Test Results and Specifications* that has been set in Step 8) for the Input Signal Frequency (10.1 MHz is the first test frequency). This sets the power meter to the proper power sensor calibration factor. Press the **Sensor** key to display the power reading.
11. Set the MG3692A output to match the frequency that has been set in Step 10.
12. Adjust the source power level (MG3692A output) so that the power meter displays the corresponding Sensor B reading for this same frequency as recorded for an input power level of -2 dBm (or later for -30 dBm) in Table A-16, *Frequency Flatness Component Characterization Test Settings* on page A-7.
13. Press the **Marker** key and press the Peak Search soft key.
14. Subtract the Marker 1 amplitude reading from the recorded 50 MHz Marker 1 amplitude reading that was recorded in Table A-15, *50 MHz Reference Values* on page A-6, and record the amplitude deviation in Table A-17, *Frequency Flatness Test Results and Specifications*.
15. Verify that the amplitude deviation value is within the specification shown in Table A-17, *Frequency Flatness Test Results and Specifications*.
16. Repeat Steps 8 through 15 for the other frequencies in column 1 of Table A-17, *Frequency Flatness Test Results and Specifications*.
17. Repeat Steps 8 through 16 for an input power level of -30 dBm.

Note

When changing the input power level to -30 dBm, remember to change the reference level to -20 dBm and the input attenuation level to 0 dB, as shown in Table A-15, *50 MHz Reference Values*.

Note

In order to maintain the reference characterization, do not disconnect anything other than the adapter.

2-9 WCDMA/HSDPA RF Measurements Verification (Option 44)

The tests in this section are used to verify the functionality of the WCDMA/HSDPA RF Measurements Option. The tests include:

WCDMA Absolute Power Accuracy Verification (Option 44)

WCDMA Occupied Bandwidth (OBW) Verification (Option 44)

WCDMA RF Channel Power Accuracy and ACLR Verification (Option 44)

HSDPA RF Channel Power Accuracy and ACLR Verification (Option 44)

WCDMA Absolute Power Accuracy Verification (Option 44)

This test verifies the absolute power accuracy in WCDMA Mode.

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 4, and 15A, or equivalent
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2482D Power Sensors (2)
- Anritsu ML2400A/20 Power Meter Cables (2)
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu Programmable Attenuator MN63A
- Anritsu 15NN50-1.5B RF Coaxial Cables or equivalent (3)
- Meca Electronics, Inc. CN-0.900 Circulator or equivalent
- Aeroflex/Weinschel M1418 High Power Load or equivalent
- Mini Circuits TIA-1000-1R8 RF Power Amplifier
- Midwest Microwave ADT-2615-NF-BNM-02 Adapters or equivalent (2)
- Midwest Microwave CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05 Coupler or equivalent

Procedure:

1. Connect the MG3700A, RF power amplifier, programmable attenuator, power meter, and sensors according to Figure 2-4.

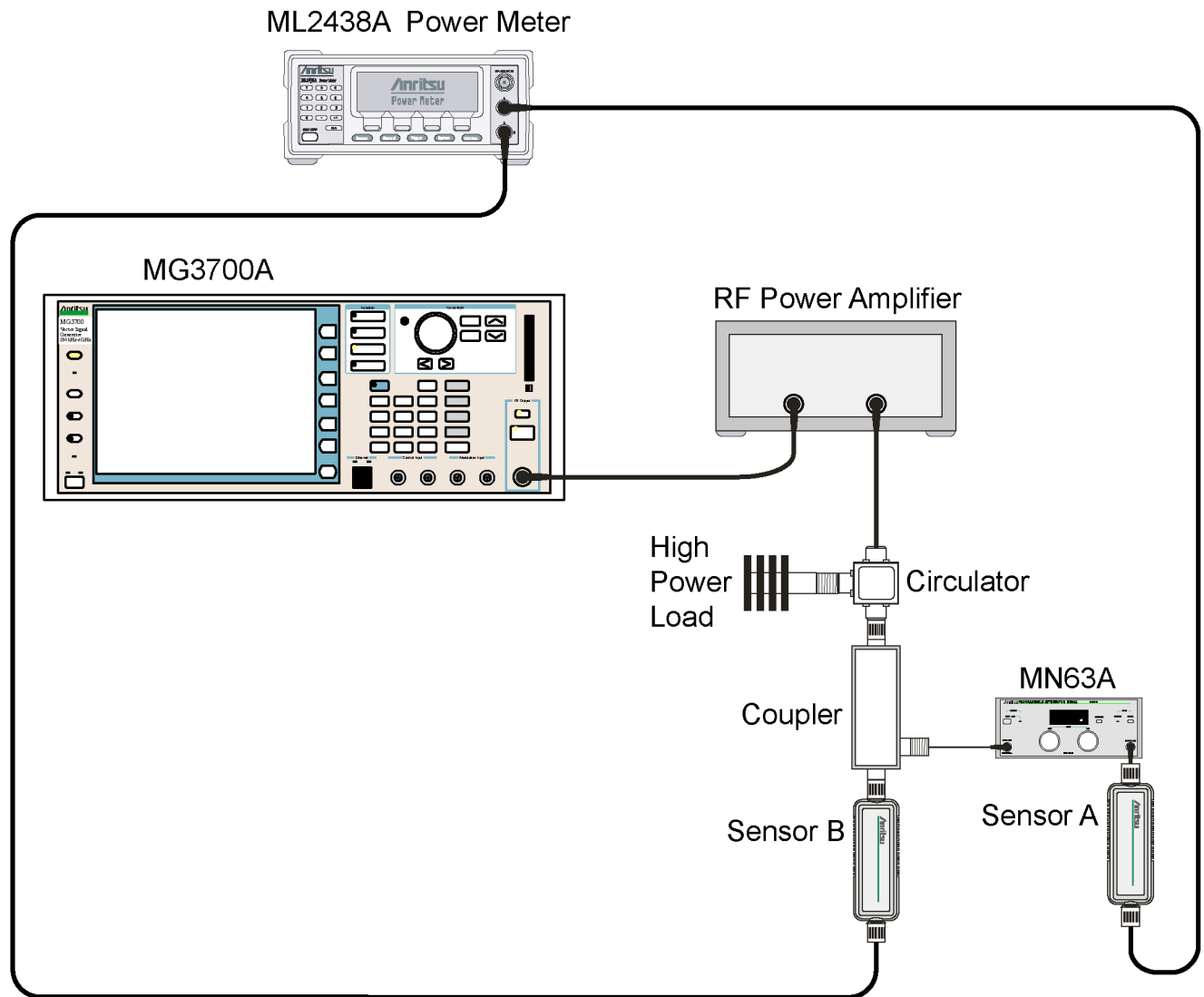


Figure 2-4. WCDMA RF Measurement Calibration Setup

2. Turn on the MG3700A, RF amplifier, programmable attenuator, and power meter.
3. Connect the power sensors to the power meter only, calibrate the sensors, and then connect them to the coupler and to the attenuator, as shown in Figure 2-4.
4. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key and wait until the measurement display appears, then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.

Note Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.

7. On the MG3700A, press the **Preset** key (the yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.

9. Press the **Set** key (Note: Two **Set** keys are available, and they both do the same thing).
10. Press the (F1) soft key to select “Load File to Memory”
11. Press the (F1) soft key again to select “Select Package”
12. Use the **Down Arrow** key to step through the selection list until the “W-CDMA(BS Tx test)” option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key to “Return”
15. Press the **Set** key.
16. Use the **Down Arrow** key to step through the selection list until the “TestModel_1_16DPCH” option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is on.
19. Press the **Frequency** key, enter 881.5 MHz, then press the MHz soft key.
20. Press the **Level** key, enter –28, and press the dBm soft key.
21. Use the rotary knob to adjust the power level so that Sensor B reads +10 dBm.
22. Set the MN63A attenuator to 0 dB.
23. Record the Sensor A reading (PMA.10) in Table A-18, *Sensor A and Sensor B Reading Components Characterization* on page A-8. This should be approximately –20 dBm.
24. Record the Sensor B reading (PMB.10) in Table A-18, *Sensor A and Sensor B Reading Components Characterization*.
25. Calculate $\Delta 1$ which is the error of the coupler output port deviation from ideal +10 dBm by using the following formula:
$$\Delta 1 \text{ (dBm)} = (10 \text{ dBm} - \text{PMB.10})$$
26. Record the $\Delta 1$ value in Table A-18.
27. Calculate the accurate value of Sensor A reading for coupler port output of +10 dBm (PMA.10C) by using the following formula:
$$\text{PMA.10C} = \text{PMA.10} + \Delta 1$$
28. Record the calculated value in Table A-18.
29. Set the MN63A attenuator to 18 dB and record Sensor A reading (PMA.18) in Table A-18.
30. Calculate the accurate attenuation value by using the following formula:
$$\text{ATT.18} = (\text{PMA.10} - \text{PMA.18})$$
31. Record the calculated value in Table A-18.
32. Turn off the RF output of the MG3700A.
33. Disconnect the coupler from Sensor B and connect the coupler to the MS2717A. Refer to Figure 2-5.

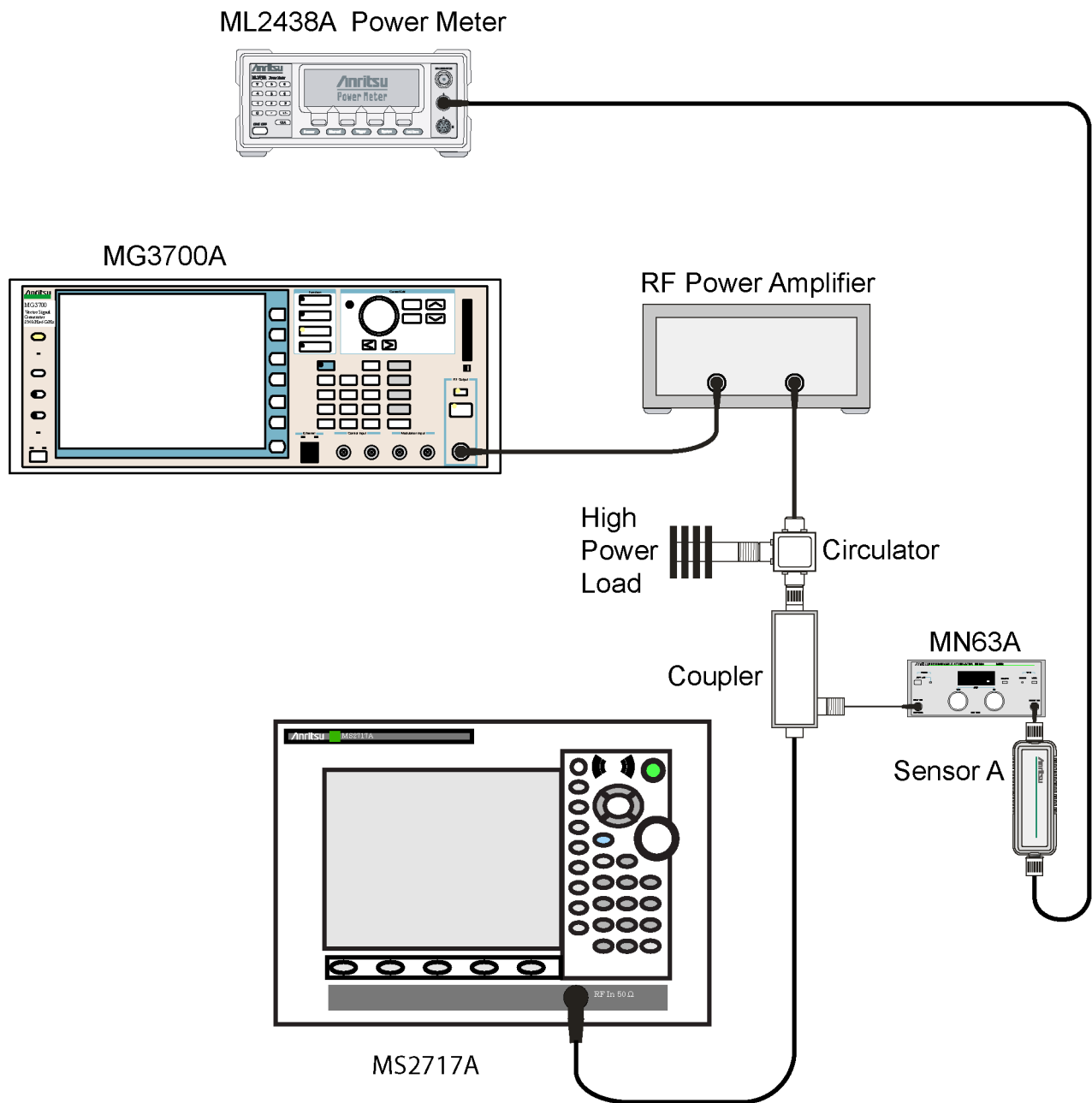


Figure 2-5. WCDMA RF Measurement Verification Setup

34. Set the MN63A attenuator to 0 dB.
35. On the MS2717A, press the Center Freq soft key, enter 881.5, and then press the **Enter** key.
36. Press the Measurements soft key, then the RF Measurement soft key, then the Spectrum soft key.
37. On the MG3700A, turn on the RF output and use the rotary knob to adjust power level to match the value of PMA.10C (from Table A-18) on Sensor A.
38. Record the MG3700A power level setting (MG3700A.10) in Table A-19, *Power Level Setting Components Characterization* on page A-8.
39. On the MS2717A, press the **Amplitude** key and then press the Adjust Range soft key.

40. Record the channel power reading in the “Measured Power” column of Table A-20, *WCDMA Absolute Power Accuracy* on page A-8.
41. Use the following formula to calculate the absolute power accuracy of the MS2717A at +10 dBm:
- $$\text{Error} = \text{Measured Power} - 10$$
42. Record the calculated value in the “Error” column of Table A-20 and verify that it is within specification.
43. Turn off the RF output of the MG3700A.
44. Set the MN63A attenuator to 18 dB.
45. Calculate the value of the MG3700A setting (MG3700A.28) for +28 dBm test level by using the following formula:
- $$\text{MG3700A.28} = \text{MG3700A.10} + \text{ATT.18}$$
46. Record the calculated value in Table A-19, *Power Level Setting Components Characterization* on page A-8.
47. On the MG3700A, turn on the RF output and use the rotary knob to adjust power level to the recorded MG3700A.28 reading in Table A-19.
48. On the MS2717A, press the **Amplitude** key and then press the **Adjust Range** soft key.
49. Record channel power reading in the “Measured Power” column of Table A-20.
50. Use the following formula to calculate the absolute power accuracy of the MS2717A at +28 dBm:
- $$\text{Error} = \text{Measured Power} - 28$$
51. Record the calculated value in the “Error” column of Table A-20, *WCDMA Absolute Power Accuracy*, and verify that it is within specification.
52. Turn off the RF output of the MG3700A.
53. Set the MN63A attenuator to 0 dB.
54. Set power level of the MG3700A to –38 dBm.
55. Calculate the value of Sensor A reading (PMA–10) for –10 dBm Test Level by using the following formula:
- $$\text{PMA-10} = \text{PMA.10C} - 20$$
56. Record the calculated value in Table A-19, *Power Level Setting Components Characterization*.
57. Turn on the RF output and use the rotary knob to adjust power level to read the value of PMA–10 on Sensor A.
58. On the MS2717A, press the **Amplitude** key and then press the **Adjust Range** soft key.
59. Record channel power reading in the “Measured Power” column of Table A-20.
60. Use the following formula to calculate the absolute power accuracy of the MS2717A at –10 dBm:
- $$\text{Error} = \text{Measured Power} - (-10)$$
61. Record the calculated value in the “Error” column of Table A-20 and verify that it is within specification.
62. Turn off the RF output of the MG3700A.
63. Set the MN63A attenuator to 0 dB.
64. Decrease power level of the MG3700A by 10 dB.
65. Calculate the value of Sensor A reading (PMA–20) for –20 dBm test level using the following formula:
- $$\text{PMA-20} = \text{PMA.10C} - 30$$
66. Record the calculated value in Table A-19, *Power Level Setting Components Characterization*.
67. Turn on the RF output and use the rotary knob to adjust power level to read the value of PMA–20 on Sensor A.

68. On the MS2717A, press the **Amplitude** key and then press the Adjust Range soft key.
69. Record channel power reading in the “Measured Power” column of Table A-20, *WCDMA Absolute Power Accuracy*.
70. Turn off the RF output of the MG3700A.
71. Use the following formula to calculate the absolute power accuracy of MS2717A at –20 dBm:
$$\text{Error} = \text{Measured Power} - (-20)$$
72. Record the calculated value in the “Error” column of Table A-20 and verify that it is within specification.

WCDMA Occupied Bandwidth (OBW) Verification (Option 44)

The tests in this section can be used to verify the occupied bandwidth in WCDMA Mode.

Equipment Required:

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2482D Power Sensor
- Anritsu ML2400A/20 Power Meter Cable
- Anritsu 34NN50A 50 Ohm adapter or equivalent (2)
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 1870A Power Splitter or equivalent
- Areoflex/Weinschel 44-10, 10 dB Attenuator (2)
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable (2)

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 2-6.

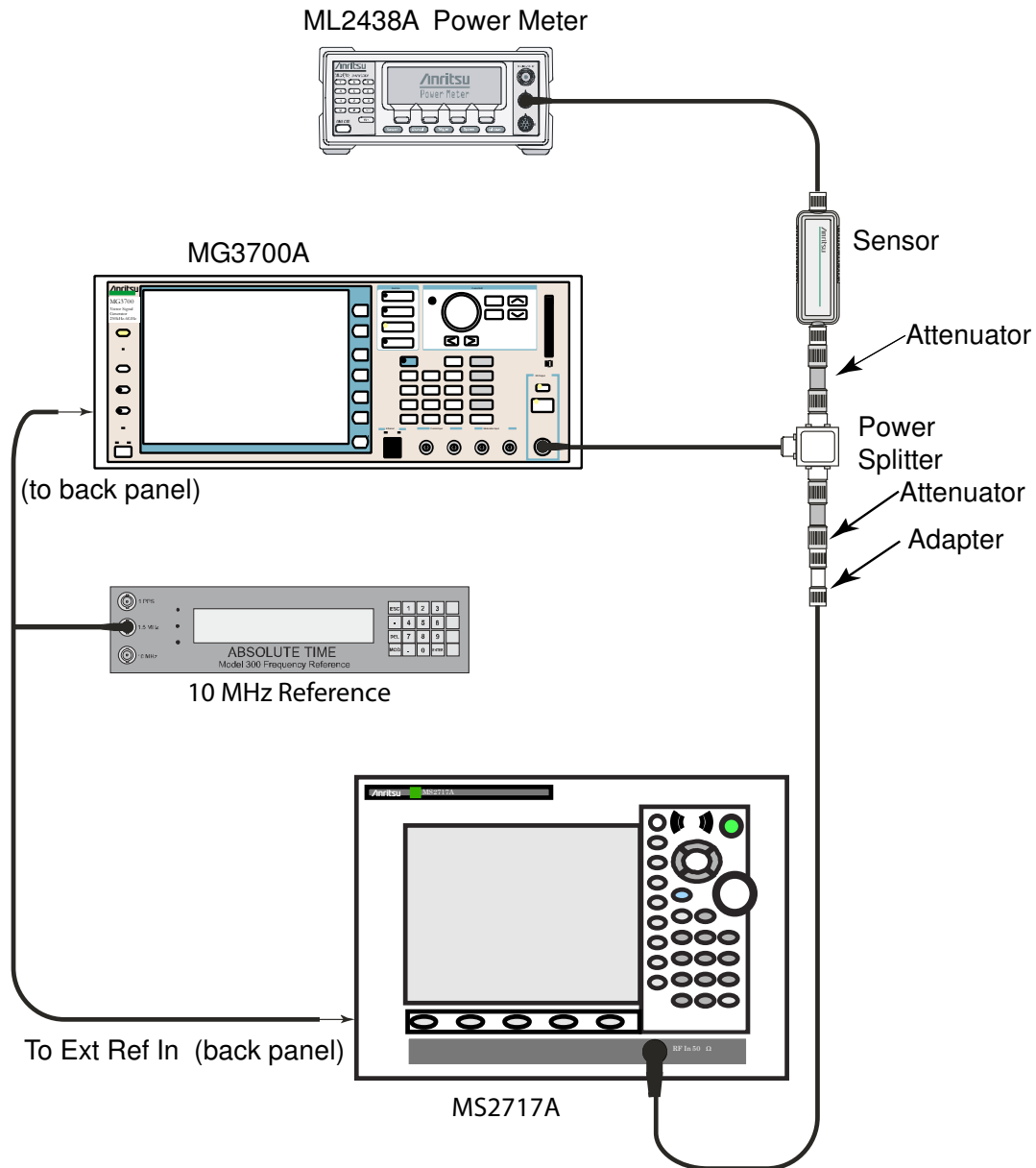


Figure 2-6. WCDMA Occupied Bandwidth Test Setup

4. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key and wait until the measurement display appears. Then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.

Note Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.

7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note: Two **Set** keys are available, and they both do the same thing).

10. Press the (F1) soft key to select “Load File to Memory”
11. Press the (F1) soft key again to select “Select Package”
12. Using the **Down Arrow** key, step through the selection list until the “W-CDMA(BS Tx test)” option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key, “Return”.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the “TestModle_1_16DPCH” option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is on.
19. Press the **Frequency** key, then enter the frequencies from Table A-21, *WCDMA Occupied Bandwidth (OBW)* on page A-8, starting with 881.5, and press the MHz soft key.
20. Press the **Level** key, then enter –2, and press the dBm key.
21. Use the rotary knob to adjust the power level so that the power meter reads –20 dBm, record the reading value in the “Power Meter Reading” column of Table A-21, *WCDMA Occupied Bandwidth (OBW)*.
22. On the MS2717A, press the Center Frequency soft key, enter frequencies from Table A-21, starting with 881.5, then press the **Enter** key.
23. Press the Measurements soft key, then the RF Measurement soft key, and press Channel Spectrum soft key.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the OBW reading in the “OBW” column of Table A-21 and verify that it is within 4.2 MHz ±100 kHz.
26. Repeat Steps 19 through 25 for all the frequencies.

WCDMA RF Channel Power Accuracy and ACLR Verification (Option 44)

The tests in this section are used to verify the RF Channel Power Accuracy and Adjacent Channel Leakage Ratio (ACLR) in WCDMA Mode.

Equipment Required:

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2482D Power Sensor
- Anritsu ML2400A/20 Power Meter Cable
- Anritsu 34NN50A 50 Ohm adapter or equivalent (2)
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 1870A Power Splitter or equivalent
- Areoflex/Weinschel 44-10, 10 dB Attenuator (2)
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable (2)

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 2-6.
4. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key and wait until the measurement display appears, then press the **Shift** key, then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA, and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select **Yes**.
9. Press the **Set** key (Note: Two **Set** keys are available, and they both do the same thing).
10. Press the (F1) soft key to select "Load File to Memory"
11. Press the (F1) soft key again to select "Select Package"
12. Using the **Down Arrow** key step through the selection list until the "W-CDMA(BS Tx test)" option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key, "Return".
15. Press the **Set** key.
16. Use the **Down Arrow** key to step through the selection list until the "TestModel_1_16DPCH" option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key, and verify that the Modulation indicator on the display is on.
19. Press the **Frequency** key, then enter 881.5, and press the **MHz** soft key.
20. Press the **Level** key, then enter -2 and press the **dBm** key.

21. Use the rotary knob to adjust the power meter to read –20 dBm and record the Power Meter reading in the “Power Meter Reading” column of Table A-22, *WCDMA RF Channel Power Accuracy* on page A-9.
22. On the MS2717A, press the Center Frequency soft key, enter 881.5, and then press the **Enter** key.
23. Press the **Measurements** soft key, then the **RF Measurement** soft key and select **ACLR**.
24. Press the **Amplitude** key, then press the **Adjust Range** soft key.
25. Record the measured CH 1 power in dBm in Table A-22, *WCDMA RF Channel Power Accuracy*.
26. Calculate the RF Channel Power Accuracy using the following formula:

$$\text{RF Channel Power Accuracy (dB)} = \text{Measured RF Channel Power} - 0.246 - \text{Power Meter reading}$$
27. Record the calculated value to the “RF CH Power Accuracy” column in Table A-22 and verify that it is within specifications (± 1.25 dB).
28. Record all four measured Residual Adjacent Channel Leakage Ratios in dB at –10 MHz Offset, –5 MHz Offset, 5 MHz Offset, and 10 MHz Offset in Table A-23, *WCDMA ACLR Accuracy* on page A-9.
29. Calculate the ACLR Accuracy at –10 and 10 MHz Offset using the following formula:

$$\text{ACLR Accuracy at } -10 \text{ or } 10 \text{ MHz Offset} = 10 \text{ LOG}_{10} (10 (-50/10) + 10 (-\text{Measured_Residual_ACLR}/10)) - (-50) \text{ dB}$$
30. Record the calculated results to the corresponding cells in the “Calculated ACLR Accuracy” column and verify that it is within specification.
31. Calculate the ACLR Accuracy at 5 MHz Offset by using the following formula:

$$\text{ACLR Accuracy at } -5 \text{ or } 5 \text{ MHz Offset} = 10 \text{ LOG}_{10} (10 (-45/10) + 10 (-\text{Measured_Residual_ACLR}/10)) - (-45) \text{ dB}$$
32. Record the calculated results to the corresponding cells in the “Calculated ACLR Accuracy” column and verify that it is within specification.
33. Repeat Steps 19 through 32 for the other frequencies.

HSDPA RF Channel Power Accuracy and ACLR Verification (Option 44)

The tests in this section are used to verify the RF Channel Power Accuracy and Adjacent Channel Leakage Ratio (ACLR) for HSDPA signals in WCDMA Mode.

Equipment Required:

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2482D Power Sensor
- Anritsu ML2400A/20 Power Meter Cable
- Anritsu 34NN50A 50 Ohm adapter or equivalent (2)
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 1870A Power Splitter or equivalent
- Areoflex/Weinschel 44-10, 10 dB Attenuator (2)
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable (2)

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 2-6 on page 2-29.
4. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key and wait until the measurement display appears, then press the **Shift** key, then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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7. On the MG3700A, press the **Preset** key (Yellow key on the upper left-hand side).
8. Press the **Down Arrow** key to select **Yes**.
9. Press the **Set** key (Note: Two **Set** keys are available, and they both do the same thing).
10. Press the (F1) soft key to select "Load File to Memory"
11. Press the (F1) soft key again to select "Select Package"
12. Use the **Down Arrow** key to step through the selection list until the "W-CDMA(BS Tx test)" option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key, "Return".
15. Press the **Set** key.
16. Using the **Down Arrow** key step through the selection list until the "TestModel_5_8HSPDSCH" option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is on.
19. Press the **Frequency** key, then enter 2680.5 and press the MHz soft key.
20. Press the **Level** key, then enter -2 and press the **dBm** key.

21. Use the rotary knob to adjust the power meter to read -20 dBm and record the Power Meter reading in the “Power Meter Reading” column of Table A-24, *HSDPA RF Channel Power Accuracy* on page A-9.
22. On the MS2717A, press the Center Frequency soft key, enter 2680.5, and then press the **Enter** key.
23. Press the Measurements soft key, then the RF Measurement soft key, and select ACLR.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the measured CH 1 power in dBm in the Measured RF Channel Power column of Table A-24, *HSDPA RF Channel Power Accuracy*.
26. Calculate the RF Channel Power Accuracy by using the following formula:

$$\text{RF Channel Power Accuracy (dB)} = \text{Measured RF Channel Power} - 0.246 - \text{Power Meter reading}$$
27. Record the calculated value to the “RF CH Power Accuracy” column in Table A-24 and verify that it is within specifications (± 1.25 dB).
28. Record all four measured Residual Adjacent Channel Leakage Ratios in dB at -10 MHz Offset, -5 MHz Offset, 5 MHz Offset, and 10 MHz Offset in Table A-25, *HSDPA ACLR Accuracy* on page A-9.
29. Calculate the ACLR Accuracy at -10 and 10 MHz Offset by using the following formula:

$$\text{ACLR Accuracy at } -10 \text{ or } 10 \text{ MHz Offset} = 10 \text{ LOG}_{10} (10 (-50/10) + 10 (-\text{Measured_Residual_ACLR}/10)) - (-50) \text{ dB}$$
30. Record the calculated results in the corresponding cells in the “Calculated ACLR Accuracy” column in Table A-25 and verify that they are within specification.
31. Calculate the ACLR Accuracy at -5 MHz and 5 MHz Offset by using the following formula:

$$\text{ACLR Accuracy at } -5 \text{ or } 5 \text{ MHz Offset} = 10 \text{ LOG}_{10} (10 (-45/10) + 10 (-\text{Measured_Residual_ACLR}/10)) - (-45) \text{ dB}$$
32. Record the calculated results in the corresponding cells in the “Calculated ACLR Accuracy” column in Table A-25, *HSDPA ACLR Accuracy* and verify that they are within specification.
33. Repeat Steps 19 through 32 for the other frequencies.

2-10 Error Vector Magnitude (EVM) Verification (Option 45)

The tests in this section can be used to verify the functionality of the WCDMA Demodulation Option.

Equipment Required:

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2482D Power Sensor
- Anritsu ML2400A/20 Power Meter Cable
- Anritsu 34NN50A 50 Ohm adapter or equivalent (2)
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- Areoflex/Weinschel 1870A Power Splitter or equivalent
- Areoflex/Weinschel 44-10, 10 dB Attenuator (2)
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable (2)

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 2-6 on page 2-29.
4. To turn on the MS2717A Spectrum Analyzer, press the **On/Off** key and wait until the measurement display appears. Then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
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7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note: Two **Set** keys are available, and they both do the same thing).
10. Press the (F1) soft key to select "Load File to Memory".
11. Press the (F1) soft key again to select "Select Package".
12. Use the **Down Arrow** key to step through the selection list until the "W-CDMA(BS Tx test)" option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key, "Return".
15. Press the **Set** key.
16. Use the **Down Arrow** key to step through the selection list until the "TestModel_4_opt" option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is on.
19. Press the **Frequency** key, then enter 1962.5 and press the **MHz** soft key.
20. Press the **Level** key, then enter -2 and press the **dBm** key.

21. Use the rotary knob to adjust the power meter to read -20 dBm.
22. On the MS2717A, press the Center Frequency soft key, enter 1962.5, and then press the MHz soft key.
23. Press the Measurements soft key, then press the Demodulator soft key, and press the Modulation Summary soft key.
24. Press the Setup soft key, then press the Auto Scrambling soft key to turn on Auto Scrambling.
25. Press the Max Spreading Factor soft key to set it to 512.
26. Press the **Amplitude** key, then press the Adjust Range soft key.
27. Record the EVM reading in Table A-26, *Error Vector Magnitude (EVM)* on page A-10 and verify that it is $<2.5\%$.

Chapter 3 — Adjustment

Introduction

This chapter contains the adjustment procedure for calibrating the MS2717A Economy Spectrum Analyzer if the results of any verification tests are not within specifications.

3-1 Internal Reference Frequency Adjustment

Use this procedure to adjust the frequency if the MS2717A fails the Frequency Accuracy Verification test in Chapter 2.

Equipment Required:

- Anritsu MG3692A Synthesized Signal Source with options 2A, 3, 4, 15A, and 22, or equivalent
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5B RF Coaxial Cable or equivalent
- BNC male to BNC male coaxial cable

Procedure:

1. Connect AC power to the 10 MHz reference standard, to the Anritsu MG3692A Synthesized Signal Source, and to the Anritsu MS2717A Spectrum Analyzer.
2. Turn on the 10 MHz reference standard and turn on the Synthesized Signal Source.
3. Connect the 10 MHz reference standard to the Synthesized Signal Source.
4. Connect the output of the source to the RF Input of the Spectrum Analyzer.
5. Press the **On/Off** key to turn on the MS2717A Spectrum Analyzer.

Note	Before continuing, wait 30 minutes so that the internal circuitry can warm up and stabilize.
-------------	--

6. Press the **Shift** key, the **Preset** (1) key, and then the **Preset** soft key to reset the MS2717A to the default starting conditions.
7. Set the MG3692A output to 7 GHz with an RF output level of –30 dBm.
8. Press the **Amplitude** key, and press the **Reference Level** soft key. Then use the keypad to enter –10 and press the **dBm** soft key.
9. Press the **Atten Lvl** soft key, use the keypad to enter 0, and press the **dB** soft key.
10. Press the **Freq** key and press the **Center Freq** soft key. Then use the keypad to enter 7 and then press the **GHz** soft key.
11. Press the **Span** key, use the keypad to enter 10, and press the **kHz** soft key.
12. Press the **BW** key and press the **RBW** soft key. Then use the keypad to enter 100 and press the **Hz** soft key.
13. Press the **VBW** soft key and use the keypad to enter 30, then press the **Hz** soft key.
14. Press and hold the **Shift** key and press three soft keys together (from the top, the 4th, 6th, and 8th unmarked vertical keys) in order to enter into the Spectrum Analyzer Service Mode.
15. Press the **Service Menu** soft key, then press the **App Service** soft key.

16. Press the Calibration soft key, then press the 10 MHz Ref soft key.
17. Use the **Up/Down** arrow keys or the rotary knob to slowly adjust the displayed signal to the center of the display. Allow the signal to stabilize between adjustments, and repeat as necessary.
18. Turn the Spectrum Analyzer Off and then back On in order to exit Service Mode.

Chapter 4 — Removal and Replacement

4-1 Removal and Replacement Introduction

Only qualified personnel should open the case and replace internal assemblies. Assemblies that are shown in the replaceable parts list are typically the only items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without specialized training. Removing RF shields from PC boards or adjusting screws on or near the shields may detune sensitive RF circuits and will result in degraded instrument performance.

Caution

An Electrostatic Discharge (ESD) safe work area and proper ESD handling procedures (that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007) are mandatory to avoid ESD damage when handling subassemblies or components found in the MS2717A.

Additional information pertaining to ESD can be found at the ESD Association Web site:

<http://www.esda.org/s2020.html>

4-2 Fuse Replacement

This procedure describes removing and replacing the power line fuses. The fuses are located within the power input module. The fuses can be replaced without opening the enclosure. The MS2717A line fuse value is printed on the rear panel next to the power connector. Refer to Table 4-1 on page 4-23 for the replacement part number.

Caution

Before changing the fuse, always remove the power cord from the power outlet. There is a risk of receiving a fatal electric shock if the fuse is replaced with the power cord connected. Always use a new fuse of the type and rating specified by the fuse markings on the rear panel of the instrument.

1. Before replacing the line fuse, turn off the rear panel power switch and disconnect the MS2717A from the power source.
2. Using a small flat-blade screwdriver, carefully pry under the tab above the rear panel power switch to open the cover and gain access to the fuse holders as shown in the Figure 4-1.

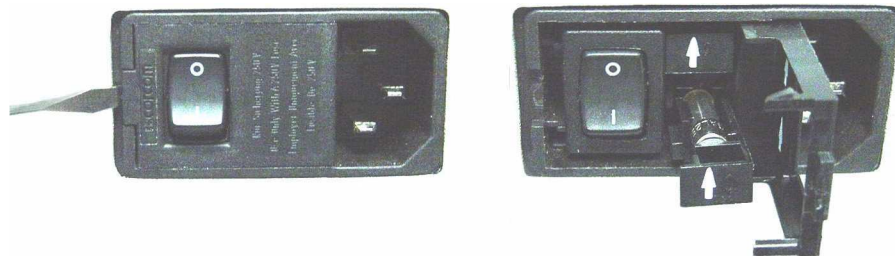


Figure 4-1. Fuse Holder within Input Module

3. Slide the fuse holder straight out of the power input module, then remove the fuse from the fuse holder as shown in Figure 4-2.

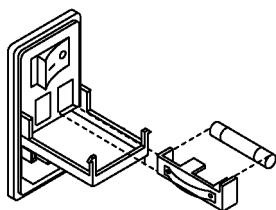


Figure 4-2. Removing Fuse from Fuse Holder

4. If the fuse is defective, replace the fuse with a new fuse of the type and rating specified by the fuse markings on the rear panel of the instrument.
5. Reinstall the fuse holder in the rear panel power input module.
6. Close the cover to secure the fuse holder in place. The cover will close with an audible snap.

4-3 Opening the MS2717A Enclosure

This procedure provides instructions for opening the enclosure (case). Except for fuse replacement, all maintenance operations require opening the outer enclosure.

Ensure that all work is performed at a static-safe work area. Part numbers for all replaceable parts are found in Table 4-1 on page 4-23.

Before opening the case, Anritsu Company strongly recommends that all internally saved files be saved to a PC by using the Master Software Tools utility program or that they be copied to an external CF card on the MS2717A. In the event that the Main PCB needs to be replaced, this will prevent permanent loss of these internally saved files.

The handles and feet must be removed before the outer enclosure (case) can be separated from the chassis.



Figure 4-3. Benchtop and Rack-Mount

Rack-mounted instruments have two mounting brackets, each held by two screws. These mounting brackets may be left attached to the front panel bezel.



Figure 4-4. Rack-Mounting Brackets

1. Remove the feet (2 screws each) and the handles (2 screws each) to release the outer enclosure from the chassis. The front panel bezel (metal ring) slides off.

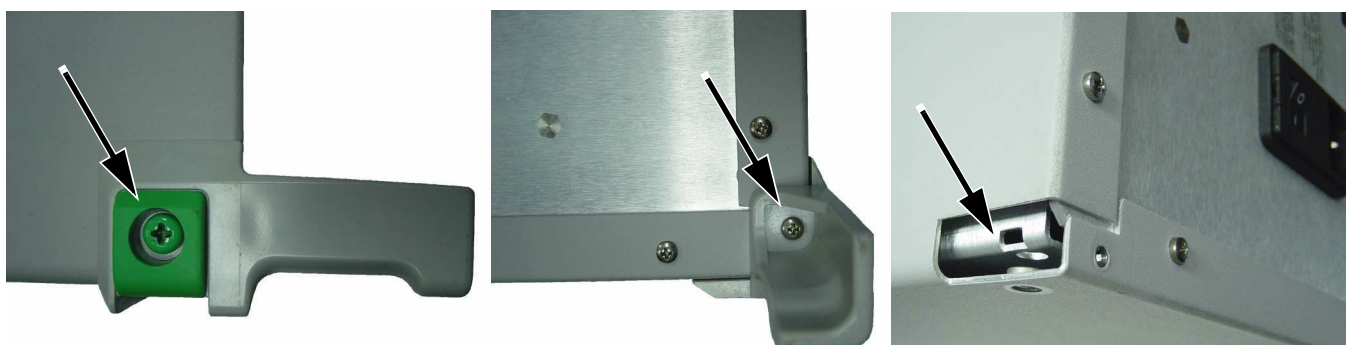


Figure 4-5. Foot Screws



Figure 4-6. Handle Screws

2. Remove the 4 screws from the bottom of the outer enclosure and the 10 screws from the back panel, as shown in Figure 4-7.



Figure 4-7. Screws that Hold Chassis within Outer Enclosure

3. Slide the chassis from the outer enclosure.

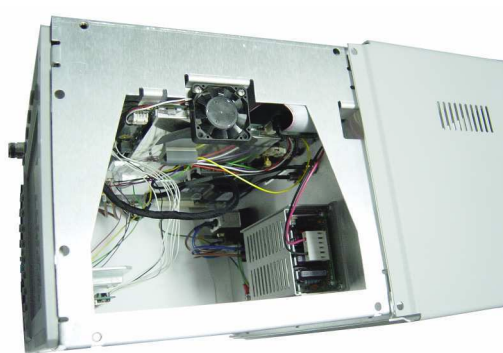


Figure 4-8. Removing Chassis from Outer Enclosure

4-4 Main PCB Real Time Clock (RTC) Battery Removal and Replacement

This procedure describes removing and replacing the RTC battery on the Main PCB.

Refer to Figure 4-9 for the location of this battery. Refer to Table 4-1 on page 4-23 for the replacement part number.

The chassis must be removed from the outer enclosure in order to gain access to the battery. Refer to section Opening the MS2717A Enclosure on page 4-2. The battery is located on the Main PCB near the external memory Compact Flash (CF) card.

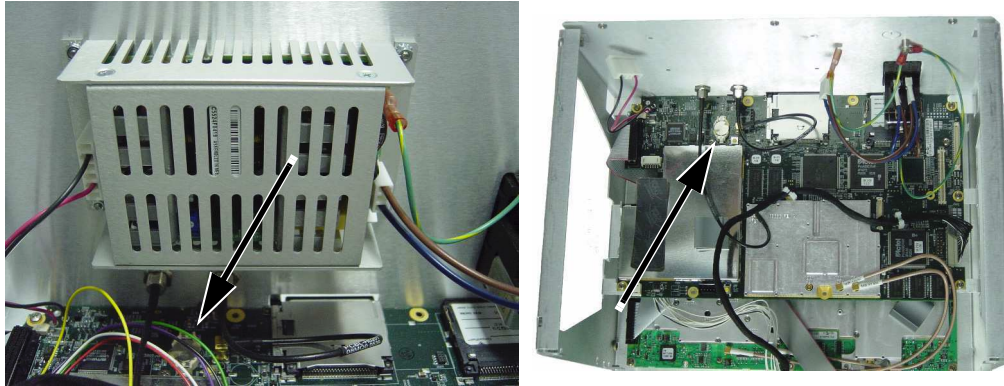


Figure 4-9. RTC Battery on Main PCB

1. Remove the old battery and clean away any remaining RTV compound.
2. Install the new battery with the positive side (+) facing up. Apply 2 small drops of RTV compound bridging the top of the battery and the holder as an extra precaution to hold the battery securely in place.

4-5 Power Input Module with Switch

This procedure describes removing and replacing the power input module, which contains a receptacle, switch, EMI filter, and fuses. The power input module is found in the replacement parts list as “EMI filter”. Refer to Table 4-1 on page 4-23 for the replacement part number.

The chassis must be removed from the outer enclosure in order to remove and replace the power input module. Refer to section Opening the MS2717A Enclosure on page 4-2. The input module is mounted to the rear panel with two screws. The inside portion contains a grounding lead and a plug for the internal power supply.

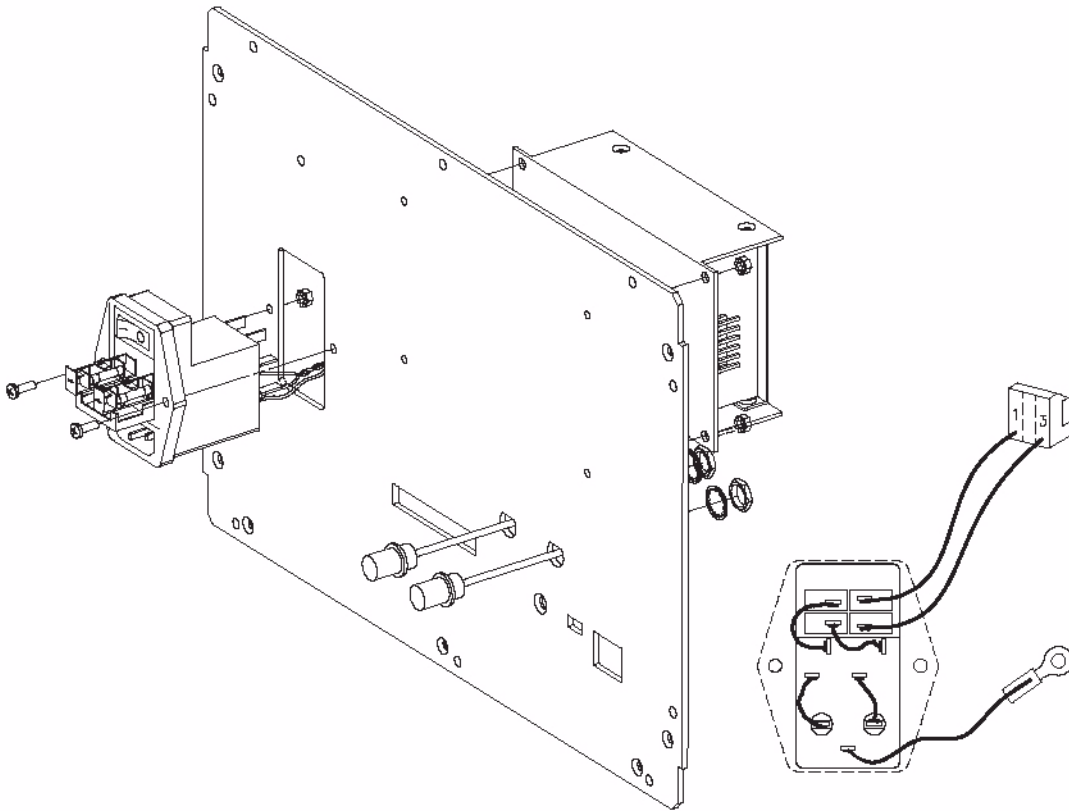


Figure 4-10. Power Input Module Mounting Details

1. Disconnect the power cord from the power input module.
2. Remove the outer enclosure as described in Section 4-3.
3. Disconnect the internal power plug from the power supply and disconnect the ground lead from the grounding post (refer to Figure 4-11).
4. Remove the mounting nuts and screws and withdraw the input module from the rear panel.
5. Install the new power input module, tightening the nuts, and connect the ground lead and the internal power plug for the power supply.

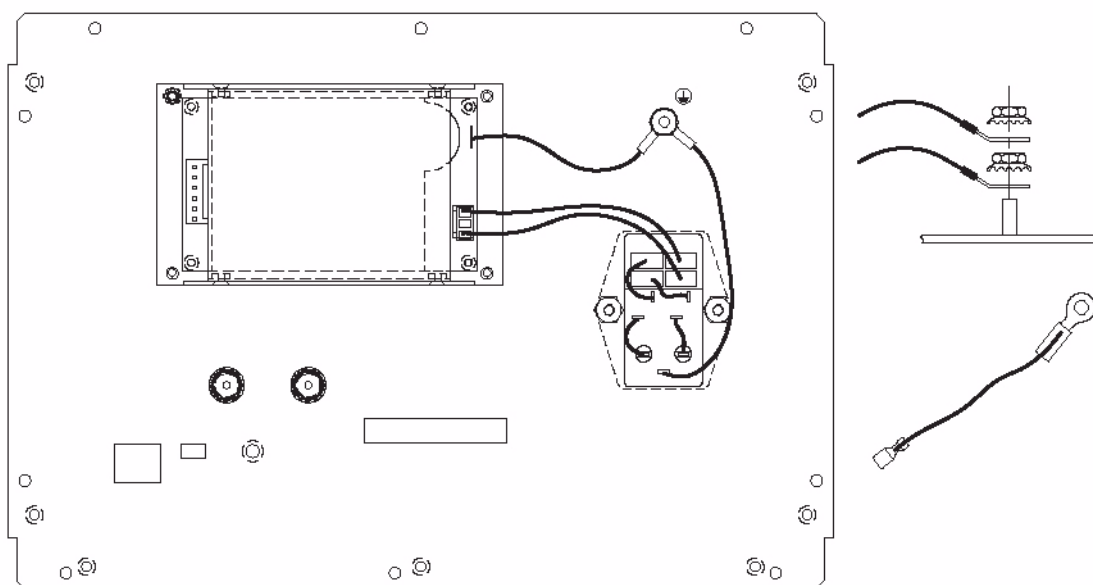


Figure 4-11. Power Input Module, Connections

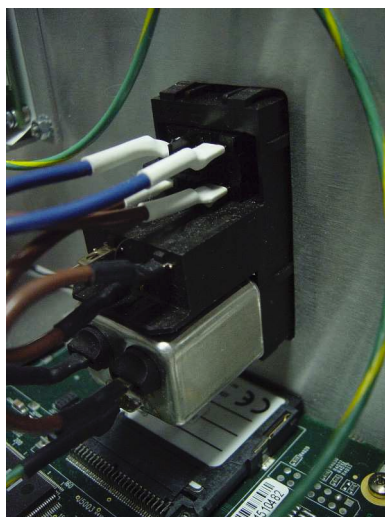


Figure 4-12. Power Input Module, Interior view

Note

The power input module shown in Figure 4-12 is an early model that snapped into place without mounting screws. This style is released from the back panel by depressing spring tabs on the molded module body.

4-6 Fan

This procedure describes removing and replacing the fan assembly. To gain access to the fan, the chassis must be removed from the outer enclosure, as described in Section 4-3. Refer to Table 4-1 on page 4-23 for the replacement part number.

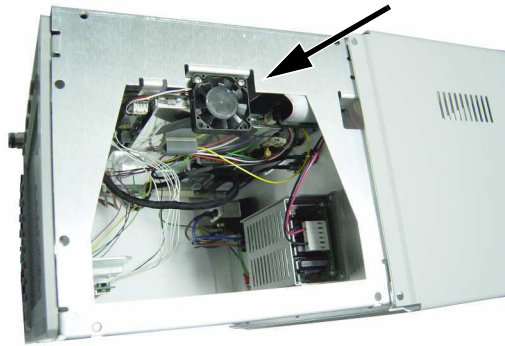


Figure 4-13. Fan on Left Side of Chassis

1. Disconnect the fan power plug from the Main PCB. Refer to the arrow in Figure 4-14.
2. Remove the 2 screws that secure the bottom edge of the fan to the chassis and withdraw the fan assembly.
3. Replace the fan by attaching the new fan to the chassis and connecting the power plug to the Main PCB.

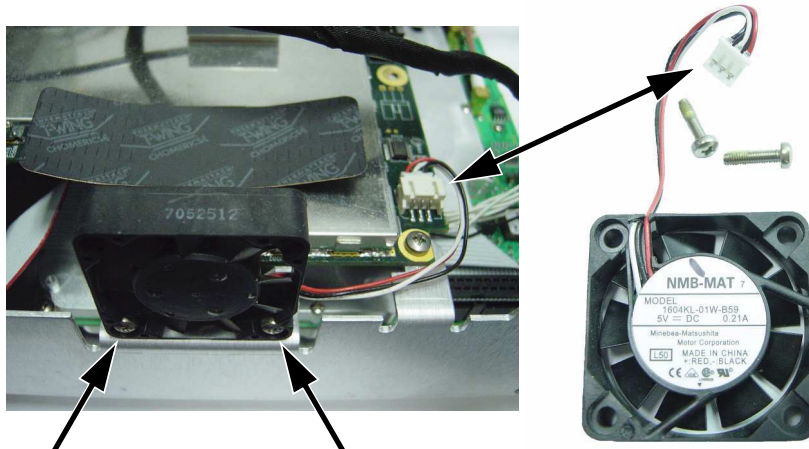


Figure 4-14. Fan Assembly, Mounted and Removed

4-7 Power Supply

This procedure describes removing and replacing the internal power supply. To gain access to the power supply, the chassis must be removed from the outer enclosure, as described in Section 4-3. Refer to Table 4-1 on page 4-23 for the replacement part number.

The power supply is mounted on rear panel with 4 screws and 4 nuts.

1. Disconnect the power outlet plug from the left side of the power supply, and disconnect the power inlet plug and the grounding wire from the right side. Refer to Figure 4-15.

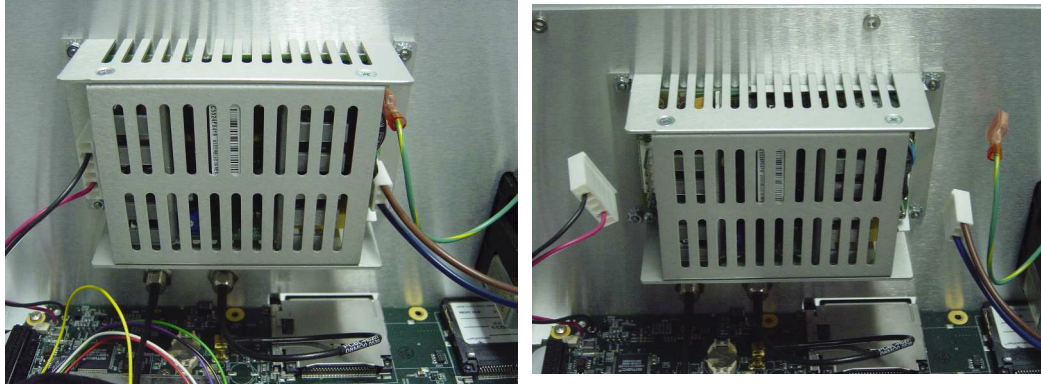


Figure 4-15. Power Supply Mounted on Rear Panel

2. Remove the 4 nuts and screws and withdraw the power supply from the chassis.



Figure 4-16. Power Supply Removed

3. Replace the power supply as a unit, do not attempt repair.
4. Install the new power supply with the 4 screws and nuts.
5. Attach the power outlet and power inlet plugs and the grounding wire.

4-8 Removing the LCD Backlight Driver PCB

This procedure describes removing the backlight driver PCB. To gain access to this PCB, the chassis must be removed from the outer enclosure, as described in Section 4-3. Refer to Table 4-1 on page 4-23 for the replacement part number.

1. Unplug the backlight inverter cable connector from the backlight driver PCB. This connector is on the left edge of the PCB.
2. Using a tool such as tweezers or a knife blade, gently unplug the cable from the center of the backlight PCB. This connector is under the PCB. Access is restricted by the PCB mounting bracket. Use care when disconnecting.
3. Remove the 2 screws that hold the PCB to the mounting bracket.

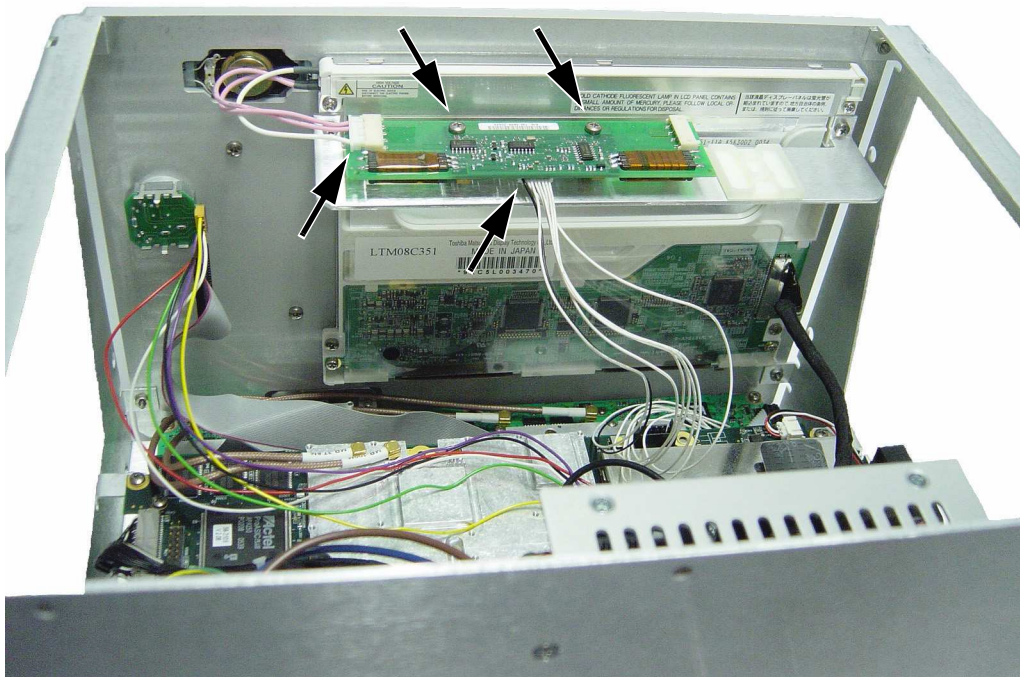


Figure 4-17. Backlight Driver PCB

4. Replace the PCB, tighten the 2 screws, and plug in the connectors.

4-9 Removing the Front Panel Assembly

This procedure describes removing the front panel from the chassis. Before removing the front panel, the chassis must be removed from the outer enclosure, as described in Section 4-3.

The instrument front panel is held by 4 screws (refer to Figure 4-18). It must be removed in order to remove the Main PCB (mother board) or the LCD Display.

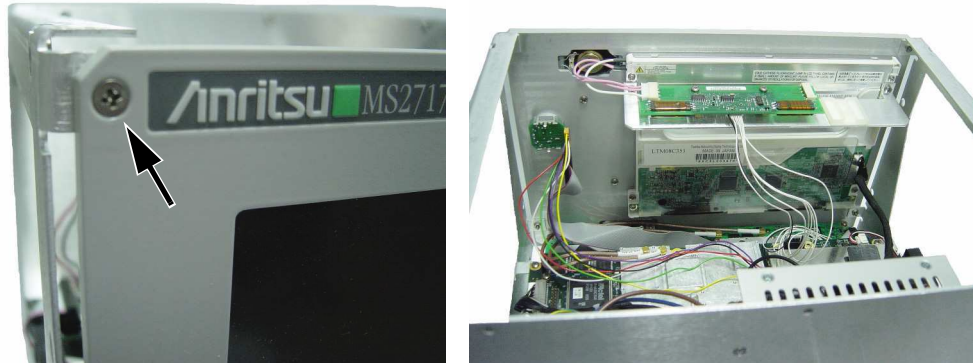


Figure 4-18. Exterior and Interior of Faceplate

1. Remove the 4 screws from the corners of the front panel and support the front panel without straining the cables that are still connected within the chassis.

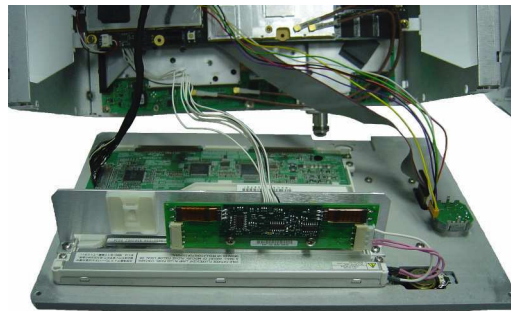


Figure 4-19. Front Panel with Cables Attached

2. Disconnect the following 4 cables before separating the front panel from the chassis:

- a. The cable from the backlight PCB to the Main PCB.

Using a tool such as tweezers or a knife blade, gently unplug the cable from the center of the backlight PCB. The other end is on the bottom of the Main PCB. This connector is under the PCB. Access is restricted by the PCB mounting bracket. Use care when disconnecting.

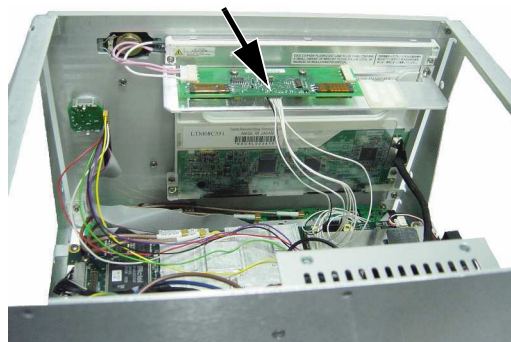


Figure 4-20. Backlight Cable Connector

- b. The cable from the Rotary Knob to the Main PCB.

Disconnect the end at the left-rear corner of the Main PCB. Refer to Figure 4-21.

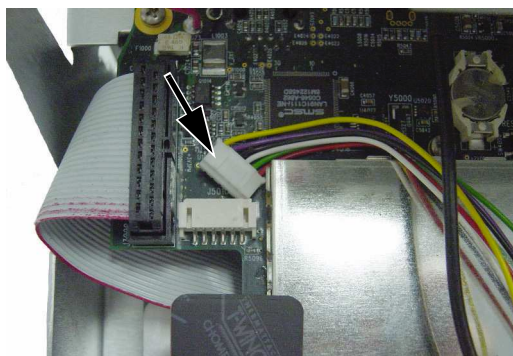


Figure 4-21. Rotary Knob Connector at Main PCB

- c. The cable from the keypad to the Main PCB.

Disconnect the end behind the keypad. The other end is on the bottom of the Main PCB. Refer to Figure 4-22.

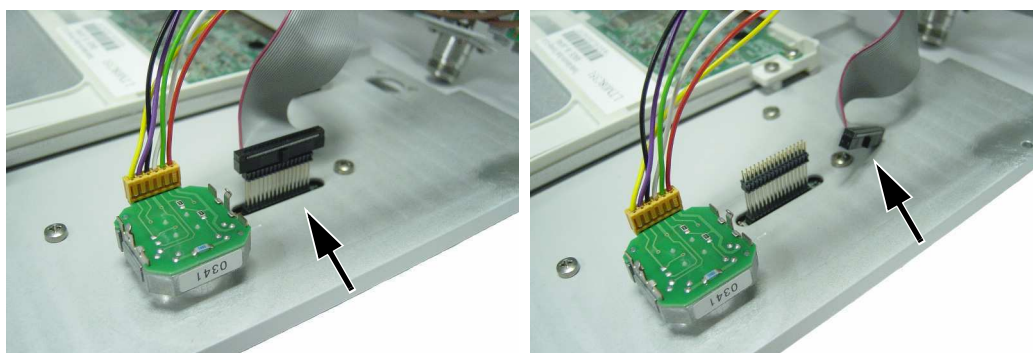


Figure 4-22. Keypad Cable Connector

- d. The cable from the LCD to the Main PCB.

Note The LCD is static sensitive.

Disconnect either end.

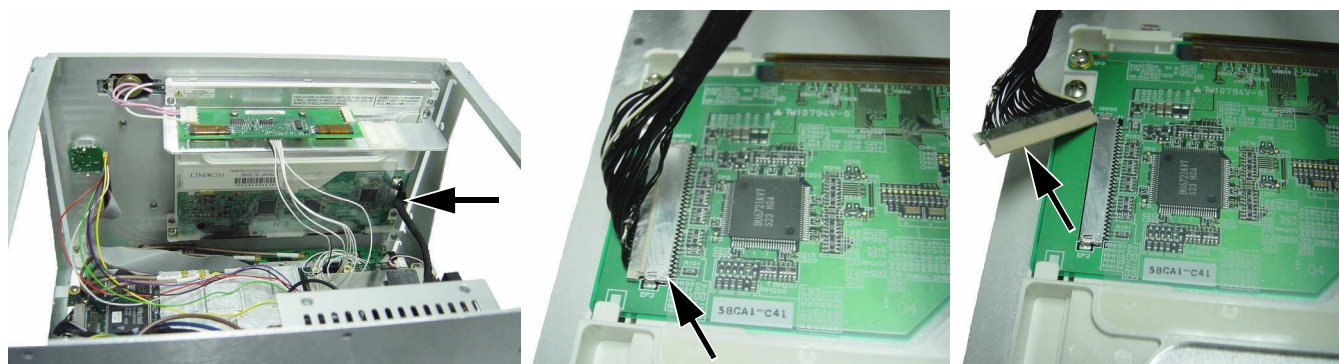


Figure 4-23. LCD Cable Connector at LCD

3. The front panel can now be separated from the chassis. Installation is the reverse of removal.

4-10 Removing the Color LCD Display

This procedure describes removing the color LCD display from the front panel. The front panel must be removed from the chassis before removing the LCD display. Refer to Section 4-9. Refer to Table 4-1 on page 4-23 for the replacement part number.

Note The LCD is static sensitive.

1. Unplug the backlight inverter cable from the end of the backlight driver PCB.
2. Place the front panel face down and remove the upper 2 screws that attach the backlight driver PCB support bracket to the front panel. These 2 screws also attach the LCD to the front panel. Lift out the backlight driver PCB and its support bracket.
3. Remove the 2 screws that attach the lower edge of the LCD to the front panel (refer to Figure 4-24).

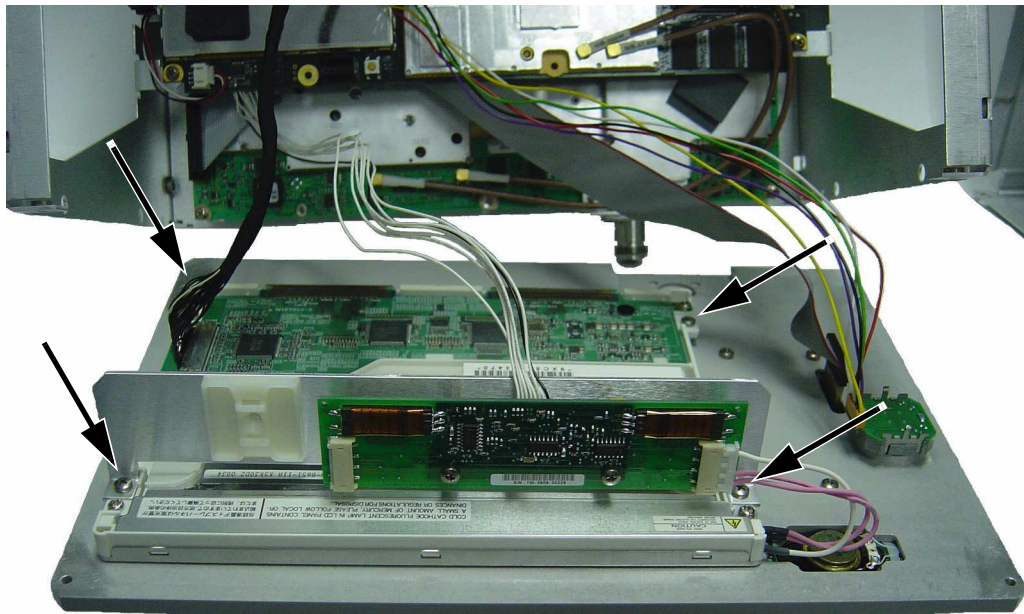


Figure 4-24. Front Panel – Interior Connections

4. With the front panel face down, lift off the LCD and backlight together. Take care to leave the plastic LCD protective cover and surrounding gaskets undisturbed.



Figure 4-25. LCD Display with Backlight Attached

Replacing the LCD display requires removal of the backlight assembly.

5. To separate the backlight from the LCD, remove the screw from the backlight metal retaining plate at the end with the power cable. Refer to Figure 4-26 to see the location of the screw and the foil tape that hold the backlight to the LCD display. Figure 4-26 is used to provide an unobstructed view. Lift the edge of the foil tape from the LCD and gently lift the backlight assembly away from the LCD display.

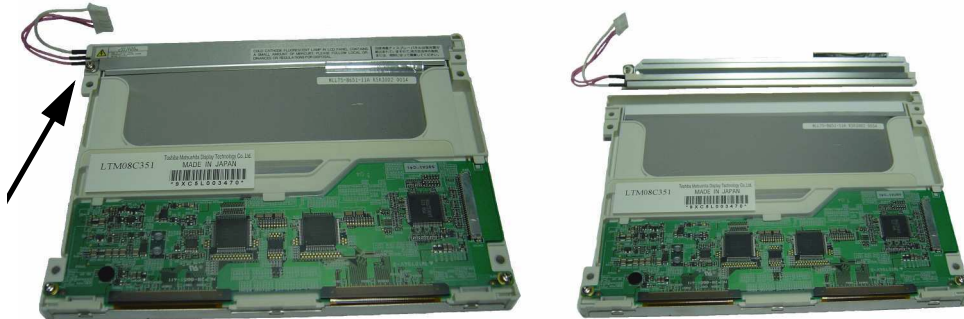


Figure 4-26. Separating Backlight from LCD

6. The metal retaining ring remains with the LCD display to protect the flexible circuit.

Installation

7. When installing a new LCD display, ensure that the rubber gasket strips (as shown in Figure 4-27) are properly aligned in the front panel gasket channels (grooves) that surround the plastic protective cover for the LCD.

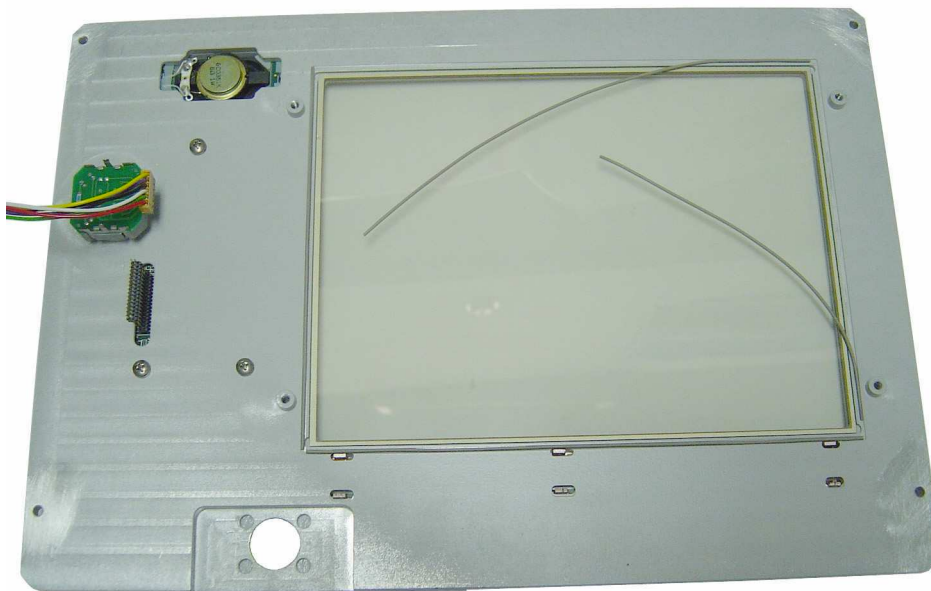


Figure 4-27. Front Panel Gaskets for LCD Display

8. Align the new LCD display carefully to start the 2 lower screws. Then attach the backlight driver PCB and its mounting bracket with the 2 upper screws.
9. Reconnect cables and complete the installation in the reverse order of removal.

4-11 Numeric Keypad Rubber Membrane and PCB Replacement

This procedure provides instructions for removing and replacing the numeric keypad rubber membrane and PCB. To gain access to these parts, the chassis must be removed from the outer enclosure, as described in Section 4-3. The keypad assembly is supplied as a single part. Refer to Table 4-1 on page 4-23 for the replacement part number.

1. Place the chassis upright and unplug the cable connector from the keypad to the Main PCB.

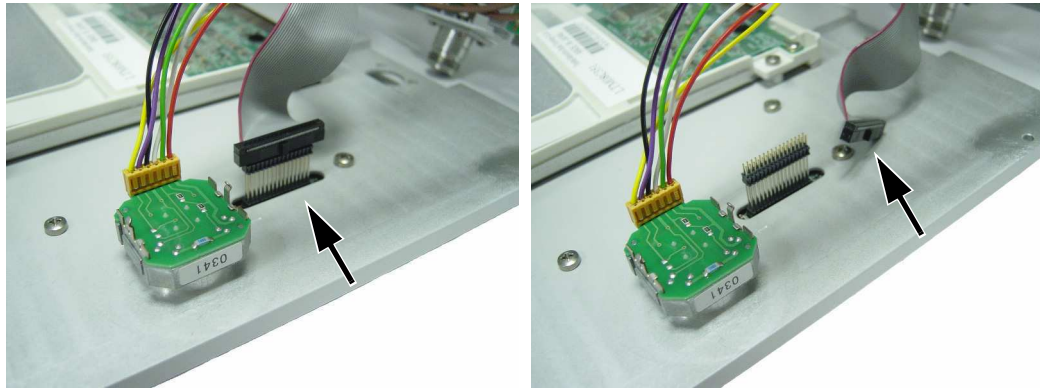


Figure 4-28. Keypad Cable Connector

2. Place the chassis face up on a protected work surface.
3. The keypad bezel is held to the case with 3 screws on the inside (visible in Figure 4-28). Using a screwdriver, remove the screws while supporting the metal keypad bezel, and then carefully remove the bezel. This exposes the keypad rubber membrane.

Caution

The numeric keypad PCB is held in place by the rubber membrane and the bezel that was just removed. To avoid stress on the mode keypad PCB assembly, ensure that the numeric keypad PCB assembly is supported until the connector at J2 (lower left corner) has been disconnected.

4. Skip to step 6 if you are replacing the numeric keypad PCB. If replacing only the keypad rubber membrane, then the connector at J2 is not disconnected. Carefully lift the speaker enough to pull away the keypad rubber membrane.
5. Replacement is the reverse of removal, with the following cautions:
 - a. Insert the membrane over the keypad PCB and under the speaker.
 - b. Take care to properly orient the membrane so that the rubber pins are aligned with the keypad switches on the PCB.
6. If replacing the PCB, then disconnect the Mode key flexible switchpad from J2 of the numeric keypad PCB (lower left corner) by carefully lifting the locking tab on connector J2 to release the flexible switchpad. This type of connector typically has non-corrosive RTV adhesive on the connector to maintain the connection securely. Refer to Figure 4-29.



Figure 4-29. Connector J2

7. The numeric keypad may now be removed from the MS2717A.
8. Remove the numeric keypad rubber membrane by carefully lifting the speaker and pulling the membrane off the keypad PCB.

Caution

The speaker is held to the PCB by only the fragile connecting wires. Use care not to damage the speaker wires when removing or replacing the keypad rubber membrane or PCB.



Figure 4-30. Numeric Keypad Rubber Membrane

9. Replacement of the PCB is the reverse of removal, with the following cautions:
 - a. Use care when adjusting the keypad rubber membrane under the speaker and aligning the rubber buttons to the PCB switches.
 - b. Apply non-corrosive RTV adhesive on connector J2 to maintain the connection securely.

4-12 Replacement of the Mode Function Keypad

This procedure provides instructions for removing and replacing the Mode function keypad, which is a flexible switchpad. To gain access to this keypad, the bezel must be removed from the front panel, as described in Section 4-11. The keypad assembly is supplied as a single part. Refer to Table 4-1 on page 4-23 for the replacement part number.



Figure 4-31. Front Panel Keypads

1. After the metal bezel has been removed, disconnect the function key flexible switchpad from J2 of the keypad PCB by carefully lifting the locking tab on connector J2 (refer to Figure 4-29).
2. The plastic bezel that surrounds the Mode function keypad is held in place by 6 locking tabs. Remove the plastic bezel by using a small flat blade screwdriver or knife blade to press gently on the plastic spring tabs and lift the bezel. The bezel has 3 tabs on the top edge and 3 tabs on the bottom edge. Begin with either top or bottom.



Figure 4-32. Keypads and Bezels, Front Panel

3. Lift off the Mode keypad rubber membrane.
4. Gently lift the flexible switchpad to expose the attachment strip, which is held to the front panel by tape. Pull off the tape to release the flexible switchpad.
5. Reverse the above steps to install the replacement assembly, with the following cautions:
 - a. Take care to properly orient the rubber membrane so that the rubber pins are aligned with the flexible switchpad switches.
 - b. Verify that all 6 locking tabs are fully seated into the main body of the front panel when reinstalling the Mode keypad plastic bezel.

4-13 Removing the Main PCB and SPA PCB

Note The Main PCB assembly and the Spectrum Analyzer module (SPA PCB assembly) are always replaced as a set.

This part of the procedure provides instructions for removing and replacing the Main PCB. To gain access to both the Main PCB and the SPA PCB, the chassis must be removed from the outer enclosure, as described in Section 4-3 and the front panel must be removed. Refer to Section 4-9, Removing the Front Panel Assembly. Refer to Table 4-1 on page 4-23 for the replacement part number.

Main PCB

1. Push the external CF card ejector button to the IN position. Disconnect the following cables before removing the front panel screws:
 - a. The cable from the backlight PCB to the Main PCB.

Disconnect the end at the backlight PCB. The other end is on the bottom of the Main PCB.

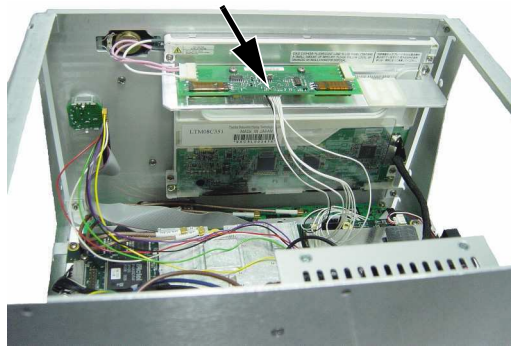


Figure 4-33. Backlight Cable Connector

- b. The cable from the Rotary Knob to the Main PCB.

Caution The rotary switch is Static Sensitive.

Disconnect the end at the left-rear corner of the Main PCB (Refer to Figure 4-34).

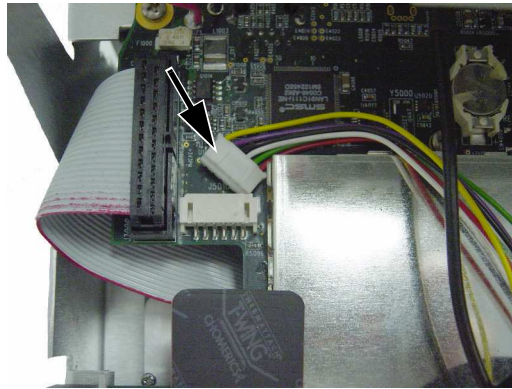


Figure 4-34. Rotary Knob Connector at Main PCB

- c. The cable from the keypad to the Main PCB.

Disconnect the end behind the keypad. The other end is on the bottom of the Main PCB.

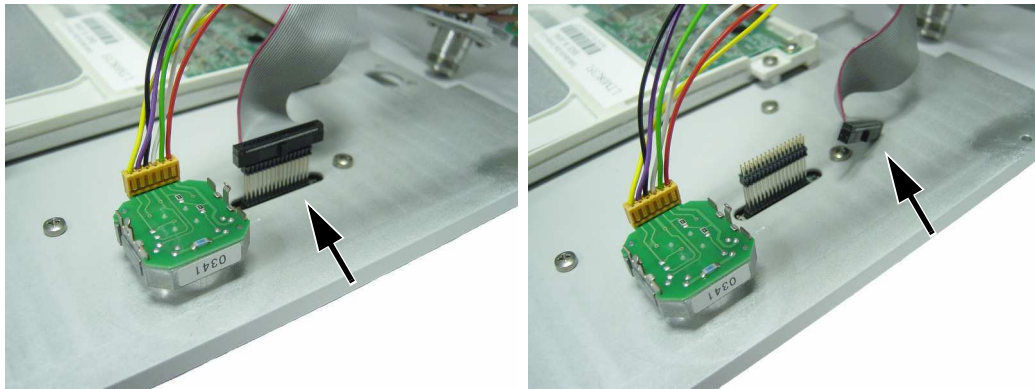


Figure 4-35. Keypad Cable Connector

- d. The cable from the LCD to the Main PCB.

Disconnect either end.

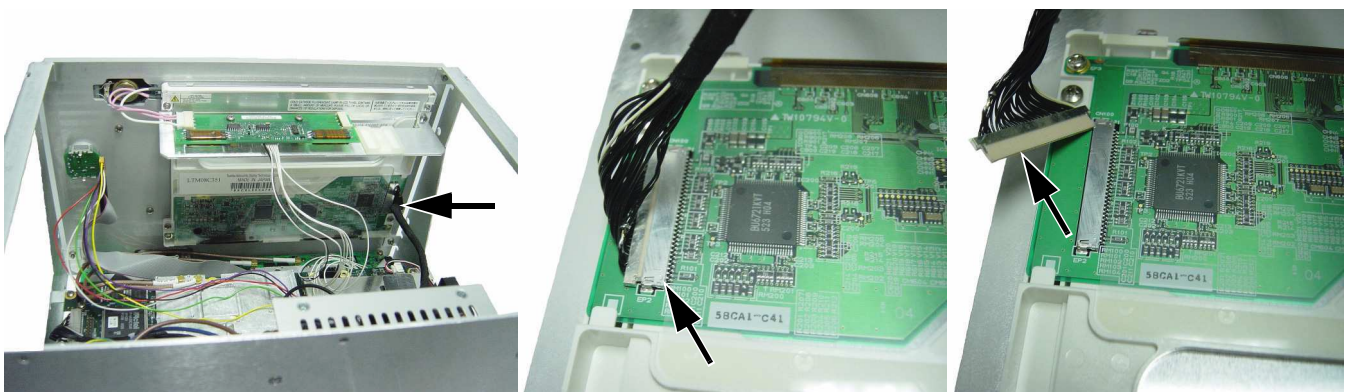


Figure 4-36. LCD Cable Connector at LCD

- e. The cable that connects the Main PCB to the Spectrum Analyzer (SPA) PCB.

Disconnect the cable that connects the Main PCB to the SPA PCB. The connector is at the left-rear corner of the Main PCB. Refer to Figure 4-37.

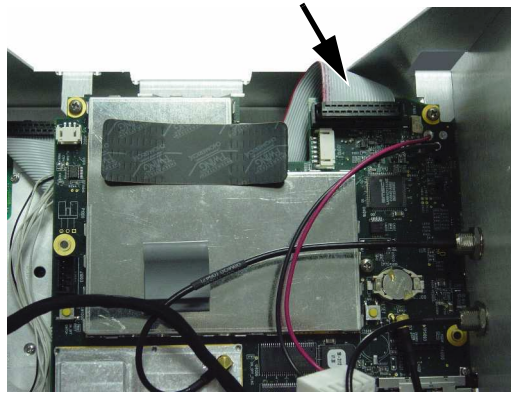


Figure 4-37. Cable Connector from Main PCB to SPA PCB

- f. Unplug (from the Main PCB) the two RF cables that come from the SPA PCB. These two cables are plugged into the top of the Main PCB with snap-in MCX connectors. Unplug the Ext Ref In and the Ext Trigger In cables (with MCX connectors) from the Main PCB.

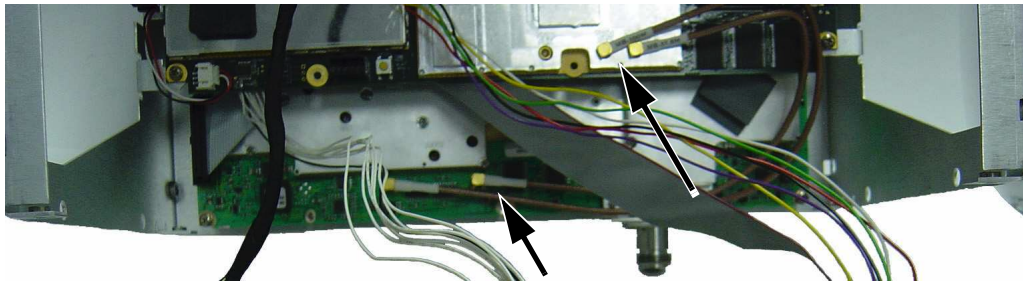


Figure 4-38. MCX Connectors from SPA PCB to Main PCB

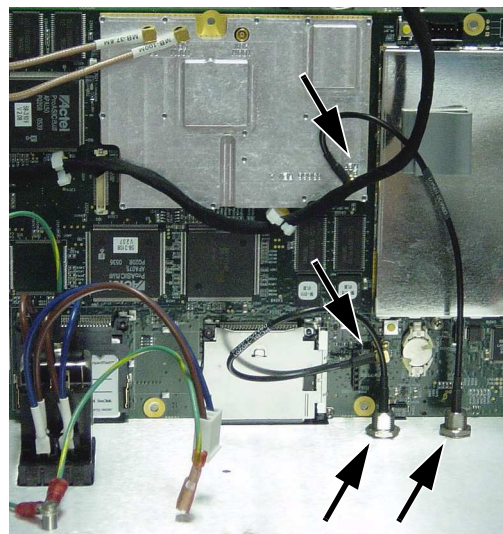


Figure 4-39. MCX Connectors for Ext Trigger In and Ext Ref In

2. Remove the 5 screws around the edge of the Main PCB to release the board from the chassis. Do not remove or adjust any smaller screws that pass through the RF shields.

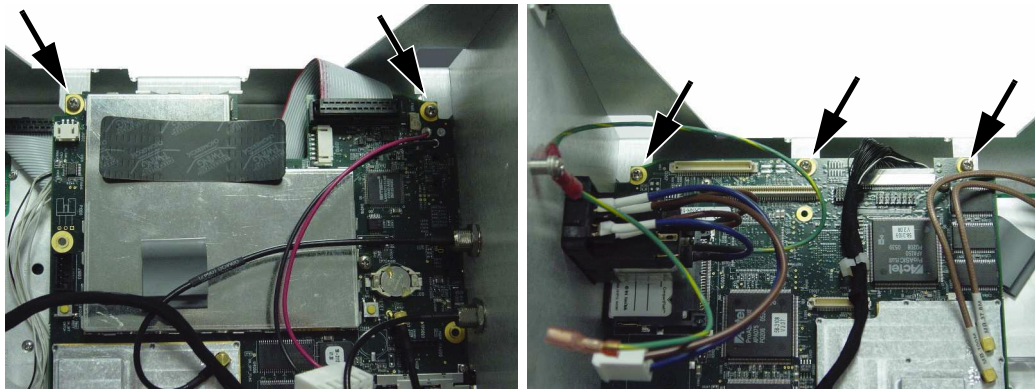


Figure 4-40. Main PCB Mounting Screws – Left and Right Edges

3. Carefully lift the main PCB from the chassis. Avoid contact with other components.
4. Installation is the reverse of removal.

SPA PCB

1. When the Main PCB has been removed, remove the 4 corner screws that attach the SPA PCB to the chassis. The RF In connector is attached to the SPA PCB.

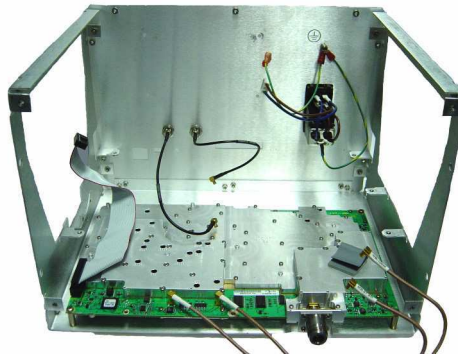


Figure 4-41. SPA PCB in Chassis

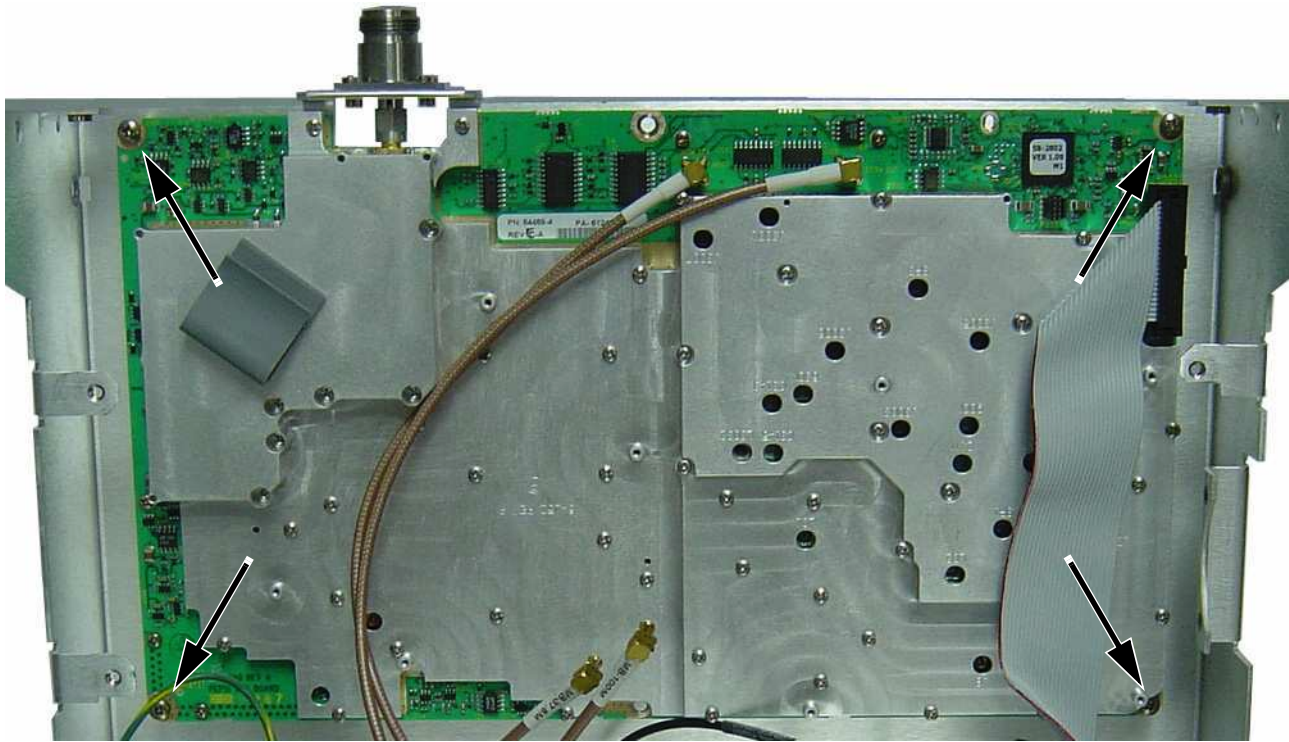


Figure 4-42. Remove 4 Screws to Release SPA PCB

2. Replacement of the Main PCB and the Spectrum Analyzer PCB is the opposite of removal, with the following precautions:

Important Notes Regarding Reassembly:

- a. Ensure that gasket material around the edge of the unit is in good condition and pressed securely into the grooves in the covers before reassembling the unit. If necessary, replace damaged gasket material.
- b. After replacement of the Main PCB and Spectrum Analyzer PCB, the instrument serial number (which is found on the outside of the rear panel) should be electronically saved to the Main PCB. To save the serial number, perform the following:
 - Press and hold the **Shift** key and press three soft keys together (from the top, the 4th, 6th, and 8th unmarked vertical keys) in order to enter into the Spectrum Analyzer Service Mode.
 - Press the Service Menu soft key.
 - Press the Set External Serial # soft key.
 - Using the keypad, enter the 7 digit serial number, then press **Enter**.
 - Turn the Spectrum Analyzer Off and then back On in order to exit Service Mode.

4-14 Replacement Parts List

Table 4-1. Replacement Parts

Part Number	Description
ND66435	Main/SPA PCB Assembly, MS2717A
ND66436	Main/SPA PCB Assembly, MS2717A with Option 9 ^a
61333-3	Mode Keypad PCB Assembly
65027-3	Numeric Keypad PCB Assembly
3-66549-3	Back Light PCB Assembly
3-15-118	Color LCD Display
61361	Mode Rubber Keypad
61362	Numeric Rubber keypad
65340	Numeric Keypad bezel
61378-1	Mode Keypad bezel
61360-2	Rotary knob
65688	MS2717A Model ID Label
ND66437	Fan Assembly
3-410-102	Rotary Switch
40-170	Power Supply
260-50	EMI Filter
631-81	Fuse, 1.6A Slow Blow
633-27	Lithium Coin Battery (Real Time Clock)
61370-3	Back Light PCB Interconnect Cable
61371-3	LCD Display Interconnect Cable
61466-1	100 MHz Coax Cable
61466-2	37.8 MHz Coax Cable

a. Must provide the option configuration of the instrument at the time the order is placed. Software based options (for example, Option 44 and Option 45) are enabled prior to shipment of the exchange assembly.

Appendix A Test Records

This appendix provides test records that can be used to record the performance of the MS2717A. Anritsu Company recommends that you make a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed will provide a detailed history of the instrument performance.

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Frequency Accuracy

Table A-1. Frequency Accuracy

Frequency	Measured Value	Error	Specification
1 GHz	GHz	Hz	± 1 kHz
7 GHz	GHz	Hz	± 7 kHz

Table A-2. Frequency Accuracy for Unit with Option 9

Frequency	Measured Value	Error	Specification
1 GHz	GHz	Hz	± 300 Hz
7 GHz	GHz	Hz	± 2.1 kHz

Table A-3. SSB Phase Noise Verification

Frequency	Measured Value	Specification
10 kHz	dBc/Hz	-100 dBc/Hz
20 kHz	dBc/Hz	-100 dBc/Hz
30 kHz	dBc/Hz	-100 dBc/Hz
100 kHz	dBc/Hz	-102 dBc/Hz
1 MHz	dBc/Hz	-100 dBc/Hz
10 MHz	dBc/Hz	-100 dBc/Hz

Table A-4. Second Harmonic Distortion

Frequency	Measured Value	2nd Harmonic Distortion	Specification
50.1 MHz	dBm		
100.2 MHz	dBm	dBc	-50 dBc max

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Residual Spurious Response

Table A-5. Residual Spurious (Pre Amp ON)

Start Freq	Stop Freq	Measured Values (dBm)	Specification
100 kHz	10 MHz		–100 dBm
10 MHz	1.0 GHz		–100 dBm
1.0 GHz	2.0 GHz		–100 dBm
2.0 GHz	3.0 GHz		–100 dBm
3.0 GHz	4.0 GHz		–100 dBm
4.0 GHz	5.0 GHz		–100 dBm
5.0 GHz	6.0 GHz		–100 dBm
6.0 GHz	7.1 GHz		–100 dBm

Table A-6. Residual Spurious (Pre Amp OFF)

Start Freq	Stop Freq	RBW	VBW	Measured Values	Specification
100 kHz	10 MHz	3 kHz	300 Hz	dBm	–90 dBm
10 MHz	1 GHz	30 kHz	1 kHz	dBm	–90 dBm
1 GHz	2.2 GHz	10 kHz	300 Hz	dBm	–90 dBm
2.2 GHz	2.7 GHz	1 kHz	300 Hz	dBm	–90 dBm
2.7 GHz	2.8 GHz	1 kHz	100 Hz	dBm	–90 dBm
2.8 GHz	3.2 GHz	10 kHz	300 Hz	dBm	–90 dBm
3.2 GHz	4.009 GHz	30 kHz	1 kHz	dBm	–84 dBm
4.009 GHz	5.083 GHz	10 kHz	300 Hz	dBm	–84 dBm
5.083 GHz	5.895 GHz	10 kHz	100 Hz	dBm	–84 dBm
5.895 GHz	7.1 GHz	10 kHz	100 Hz	dBm	–84 dBm

Table A-7. Exceptions to Table A-6, *Residual Spurious (Pre Amp OFF)*

Frequency	Spur Level
250, 300, and 350 MHz	–85 dBm max
–4010 MHz	–80 dBm max
–5084 MHz	–70 dBm max
–5894 MHz	–75 dBm max
–7028 MHz	–80 dBm max

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Displayed Average Noise Level (DANL)

Table A-8. Spectrum Analyzer DANL with Preamp On

Frequency	RBW	VBW	Measured DANL for 100 kHz RBW	Calculated DANL for 10 Hz RBW	Specifications
10 MHz to 1.0 GHz	100 kHz	1 kHz			–151 dBm
1 GHz to 2.2 GHz	100 kHz	1 kHz			–149 dBm
2.2 GHz to 2.8 GHz	100 kHz	300 Hz			–143 dBm
2.8 GHz to 4.0 GHz	100 kHz	1 kHz			–149 dBm
4.0 GHz to 7.1 GHz	100 kHz	300 Hz			–144 dBm

Table A-9. Spectrum Analyzer DANL with Preamp Off

Frequency	RBW	VBW	Measured DANL for 100 kHz RBW	Calculated DANL for 10 Hz RBW	Specifications
10 MHz to 1.0 GHz	100 kHz	1 kHz			–127 dBm
1 GHz to 2.2 GHz	100 kHz	1 kHz			–123 dBm
2.2 GHz to 2.8 GHz	100 kHz	300 Hz			–116 dBm
2.8 GHz to 4.0 GHz	100 kHz	1 kHz			–126 dBm
4.0 GHz to 7.1 GHz	100 kHz	300 Hz			–117 dBm

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Input-Related Spurious Verification

A. Input-Related Spurious for –30 dBm input at 1674 MHz

Measured Input signal level at 1674 MHz _____ dBm

Table A-10. 1674 MHz Input-Related Spurious Verification

Frequency	Measured Spur Level	Calculated IRS	Specification
100 kHz – 1673 MHz	dBm	dBc	–46 dBc max
1675 MHz – 2800 MHz	dBm	dBc	–46 dBc max

B. Input-Related Spurious for –30 dBm input at 1701 MHz

Measured Input signal level at 1701 MHz _____ dBm

Table A-11. 1701 MHz Input-Related Spurious Verification

Frequency	Measured Spur Level	Calculated IRS	Specification
	dBm	dBc	–50 dBc max

C. Input-Related Spurious for –30 dBm input at 2145 MHz

Measured Input signal level at 2145 MHz _____ dBm

Table A-12. 2145 MHz Input-Related Spurious Verification

Frequency	Measured Spur Level	Calculated IRS	Specification
	dBm	dBc	–60 dBc max

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Resolution Bandwidth Accuracy

Table A-13. Resolution Bandwidth (RBW) Accuracy Test

RBW Setting	Span	VBW	Lower Limit	Measured Values	Upper Limit
3 MHz	4.5 MHz	Auto	2.7 MHz		3.3 MHz
1 MHz	1.5 MHz	Auto	900 kHz		1.1 MHz
300 kHz	450 kHz	Auto	270 kHz		330 kHz
100 kHz	150 kHz	Auto	90 kHz		110 kHz
30 kHz	45 kHz	Auto	27 kHz		33 kHz
10 kHz	15 kHz	Auto	9 kHz		11 kHz
3 kHz	4.5 kHz	Auto	2.7 kHz		3.3 kHz
1 kHz	2 kHz	Auto	900 Hz		1.1 kHz
300 Hz	450 Hz	Auto	270 Hz		330 Hz
100 Hz	150 Hz	Auto	90 Hz		110 Hz
30 Hz	50 Hz	3 Hz	27 Hz		33 Hz
10 Hz	30 Hz	3 Hz	9 Hz		11 Hz

Amplitude Accuracy Verification

A. Component Characterization for 50 MHz Test

Table A-14. Component Characterization for 50 MHz Test

Test Power Level at 50 MHz	Required Sensor B Reading
-2 dBm	
-30 dBm	

B. 50MHz Amplitude Accuracy Verification

Table A-15. 50 MHz Reference Values

Input Power Level	Reference Level	Input Attenuation Level	Marker 1 Amplitude Reading	Specification
-2 dBm	+10 dBm	60 dB	dBm	±0.8 dB
-30 dBm	-20 dBm	0 dB	dBm	±0.8 dB

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Frequency Flatness

Table A-16. Frequency Flatness Component Characterization Test Settings

Frequency	Required Sensor B Reading for –2 dBm at Attenuator Output	Required Sensor B Reading for –30 dBm at Attenuator Output
10.1 MHz		
100 MHz		
500 MHz		
1000 MHz		
2000 MHz		
3000 MHz		
4000 MHz		
5000 MHz		
6000 MHz		
7000 MHz		

Amplitude Accuracy Across Frequency Verification

Table A-17. Frequency Flatness Test Results and Specifications

Frequency	Amplitude Deviation from 50 MHz at –2 dBm	Amplitude Deviation from 50 MHz at –30 dBm	Specification
10.1 MHz			±0.5 dB
100 MHz			±0.5 dB
500 MHz			±0.5 dB
1000 MHz			±0.5 dB
2000 MHz			±0.5 dB
3000 MHz			±0.5 dB
4000 MHz			±0.5 dB
5000 MHz			±0.5 dB
6000 MHz			±0.5 dB
7000 MHz			±0.5 dB

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Option 44 WCDMA and HSDPA RF Measurements

A. WCDMA Absolute Power Accuracy Verification

Table A-18. Sensor A and Sensor B Reading Components Characterization

Frequency	PMA.10 (dBm)	PMB.10 (dBm)	$\Delta 1$ (dBm)	PMA.10C (dBm)	PMA.18 (dBm)	ATT.18 (dB)
881.5 MHz						

Table A-19. Power Level Setting Components Characterization

Frequency	MG3700A.10 Setting (dBm)	MG3700A.28 Setting (dBm)	PMA-10 (dBm)	PMA-20 (dBm)
881.5 MHz				

Table A-20. WCDMA Absolute Power Accuracy

Test Level	Measured Power	Error	Specification
+28 dBm	dBm	dB	± 1.25 dB
+10 dBm	dBm	dB	± 1.25 dB
-10 dBm	dBm	dB	± 1.25 dB
-20 dBm	dBm	dB	± 1.25 dB

B. WCDMA Occupied Bandwidth (OBW) Verification

Table A-21. WCDMA Occupied Bandwidth (OBW)

Frequency	Power Meter Reading	OBW	Specification
881.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz
1962.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz
2680.5 MHz	dBm		4.2 MHz $\pm$ 100 kHz

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

C. WCDMA RF Channel Power Accuracy and ACLR Verification

Table A-22. WCDMA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF CH Power Error	Specification
881.5 MHz	dBm			±1.25 dB max
1962.5 MHz	dBm			±1.25 dB max
2680.5 MHz	dBm			±1.25 dB max

Table A-23. WCDMA ACLR Accuracy

Frequency / Offset	Measured ACLR	Calculated ACLR Error	Specification
881.5/–10 MHz			±0.8 dB
881.5/–5 MHz			±0.8 dB
881.5/5 MHz			±0.8 dB
881.5/10 MHz			±0.8 dB
1962.5/–10 MHz			±0.8 dB
1962.5/–5 MHz			±0.8 dB
1962.5/5 MHz			±0.8 dB
1962.5/10 MHz			±0.8 dB
2680.5/–10 MHz			±1.0 dB
2680.5/–5 MHz			±1.0 dB
2680.5/5 MHz			±1.0 dB
2680.5/10 MHz			±1.0 dB

Table A-24. HSDPA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF CH Power Accuracy	Specification
2680.5 MHz	dBm			±1.25 dB max

Table A-25. HSDPA ACLR Accuracy

Frequency / Offset	Measured ACLR	Calculated ACLR Error	Specification
2680.5/–10 MHz			±1.0 dB
2680.5/–5 MHz			±1.0 dB
2680.5/5 MHz			±1.0 dB
2680.5/10 MHz			±1.0 dB

MS2717A Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Option 45 WCDMA Demodulator and Option 65 WCDMA/HSDPA Demodulator Error Vector Magnitude (Test Model 4, Option 45 or Option 65)

Table A-26. Error Vector Magnitude (EVM)

Frequency	EVM	Specification
1962.5 MHz	%	$\leq \pm 2.5\%$

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