Maintenance Manual

Cell Master™ Model MT8212B

Cable, Antenna, and Base Station Analyzer

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809

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DECLARATION OF CONFORMITY

Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

declares that the product specified below:

Product Name: Cell Master

Model Number: MT8212B

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 Interference:

Emissions:
CISPR 11:1990/EN55011: 1991 Group 1 Class A
EN 61000-3-2:1995 Class A
EN 61000-3-3:1995 Class A

Immunity:
EN 61000-4-2:1995/EN50082-1: 1997 - 4kV CD, 8kV AD
EN 61000-4-3:1997/EN50082-1: 1997 - 3V/m
ENV 50204/EN50082-1: 1997 – 3V/m
EN 61000-4-4:1995/EN50082-1: 1997 - 0.5kV SL, 1kV PL
EN 61000-4-5:1995/EN50082-1: 1997 - 1kV L-L, 2kV L-E
EN 61000-4-6:1994/EN61326: 1998 – 3V
EN 61000-4-11:1994/EN61326: 1998 – 1 cycle@100%

Electrical Safety Requirement:

Product Safety: The Product Complies when used with Company supplied Power Supply (tested to EN 60950)

Corporate Quality Director

Morgan Hill, CA

9/16/04
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

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Anritsu affixes the CE Conformity marking onto its conforming products in accordance with Council Directives of The Council Of The European Communities in order to indicate that these products conform to the EMC and LVD directive of the European Union (EU).

CE

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N274

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Mercury Notification

This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance (www.eiae.org) for disposal or recycling information.

Equipment marked with the Crossed-out Wheelie Bin symbol complies with the European Parliament and Council Directive 2002/96/EC (the "WEEE Directive") in the European Union.

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产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only　YLYB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他（电缆、风扇、连接器等）(Appended goods)	×	○	×	×	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

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注）电池的环保使用期限是 5 年。生产日期标于产品序号的前四码
(如 S/N 0728XXXX 为07 年第 28 周生产)。

Safety Symbols

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.

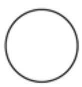
Symbols Used in Manuals

Symbol	Description
Danger 	This indicates a very dangerous procedure that could result in serious injury or death, and possible 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.

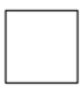
Safety Symbols Used on Equipment and in Manuals

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


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


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


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


These indicate that the marked part should be recycled.

For Safety

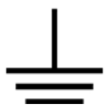
Warning

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.

Warning

or



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.

Table of Contents

Chapter 1 — General Information

1-1 Introduction

This manual provides maintenance instructions for the Cell Master Model MT8212B Cable, Antenna and Base Station Analyzer. It describes the product and provides performance verification procedures, parts replacement procedures, and a replaceable parts list.

1-2 Description

The Cell Master MT8212B is a comprehensive, one-box base station test tool for deploying, maintaining and troubleshooting wireless base stations. Combining the functionality of a cable and antenna analyzer (25 MHz to 4,000 MHz), spectrum analyzer (100 kHz to 3.0 GHz), power meter (4.5 MHz to 3.0 GHz), transmitter analyzer (CDMA and GSM), transmission analyzer for 2-port devices, interference analyzer, channel scanner, GPS receiver, and T1/E1 analyzer into one lightweight, handheld test set eliminates the need for field engineer and field technician to carry, manage and learn multiple test sets. The MT8212B measurement capabilities includes precision return loss, VSWR, cable loss, distance-to-fault, signal identification, interference analysis, channel power, adjacent channel power ratio, field strength, transmitter power, code domain power (CDP), burst power, two port measurement, multiple transmitted signals, power measurement, and T1/E1 measurements including DS0/VF channel monitoring.

1-3 Anritsu Customer Service Centers

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

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

Choose a country for regional contact information.

1-4 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining the Cell Master.

Note Verify that the test equipment is operating properly before it is used.

Table 1-1. Recommended Test Equipment (Sheet 1 of 2)

Instrument	Critical Specification	Recommended Manufacturer / Model
Synthesized Signal Generator	Frequency: 10 MHz to 10 GHz Low Phase Noise	Anritsu Model MG3691B with options 2A, 3 and 4
Vector Signal Generator	Frequency: 100 kHz to 3 GHz	Anritsu Model MG3700A with Options: MG3700A-002, MG3700A-021(1)
Power Meter	Power Range: –70 to +20 dBm Dual Channel	Anritsu Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –67 to +20 dB Quantity: 2 each	Anritsu Model MA2442D
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –60 to +20 dBm	Anritsu Model MA2482D with Option 01

(1)Note that the MG3700A must also have several test pattern files installed into memory at the factory.

Table 1-1. Recommended Test Equipment (Sheet 2 of 2)

Instrument	Critical Specification	Recommended Manufacturer / Model
Frequency Reference	Frequency: 10 MHz	Symmetricom Model RubiSource T&M
Spectrum Analyzer	Frequency: 9 kHz to 8.1 GHz	Anritsu Model MS2663C with Option 01
Open/Short		Anritsu Model 22N50
Termination	Frequency: DC to 18 GHz Impedance: 50 Ohm Return Loss: 40 dB min.	Anritsu Model 28N50-2
Offset Termination	Frequency: DC to 4 GHz Return Loss: 6 dB	Anritsu Model SC5237
Offset Termination	Frequency: DC to 4 GHz Return Loss: 20 dB	Anritsu Model SC5270
Fixed Attenuator	Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10
Fixed Attenuator	Attenuation: 30 dB	Aeroflex/Weinschel Model 44-30
Power Splitter	Frequency: DC to 8 GHz Amplitude Tracking: 0.15 dB max.	Aeroflex/Weinschel Model 1870A
Adapter	Impedance: 50 Ohm N(m) to N(m)	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz Impedance: 50 Ohm K(m) to N(f)	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 6 GHz Impedance: 50 Ohm N(m) to N(m)	Anritsu Model 15NN50-1.5C
RF Coaxial Cable	Impedance: 50 Ohm BNC(m) to BNC(m) Quantity: 2 each	Any
Extender Cable (for Option 50)	Bantam-Plug-to-Bantam-Plug	Anritsu PN 806-16
Oscilloscope (for Option 50)	Application Module: Telecom Mask	Tektronix Model TDS3032B with option TDS 3TMT
Differential Signal Adapter (for Option 50)		Tektronix Model AFTDS
Low Pass Filter	Frequency: 50 MHz	Anritsu PN 1030-96
RF Detector (for Option 5)	10 MHz to 20 GHz	Anritsu Model 560-7N50B
105 Ohm Load (for Option 10 and 10A)	1 watt	Anritsu PN T3377
40 Ohm Load (for Option 10A)	5 watt	Anritsu PN T2904

Chapter 2 — Battery Information

2-1 General Information

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

- The Nickel Metal Hydride (NiMH) battery supplied with the Cell Master is shipped in a discharged state. Before using the Cell Master, the internal battery must first be charged for three hours, either in the Cell Master or in the optional battery charger (Anritsu part number: 2000-1029).
- Use only Anritsu approved battery packs.
- Recharge the battery only in the Cell Master or in an Anritsu approved charger.
- With a new NiMH battery, full performance is achieved after three to five complete charge and discharge cycles.
- When the Cell Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours; overcharging may shorten battery life.
- If left unused a fully charged battery discharges itself over time.
- Temperature extremes affect the ability of the battery to charge: allow the battery to cool down or warm up as necessary before use or charging.
- Discharge an NiMH battery from time to time to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but eventually wears out.
- The battery may need to be replaced when the operating time between charging becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery at extreme hot or cold temperatures reduces the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.

2-2 Battery Testing

1. With the Cell Master off and the battery installed, connect the Universal AC Adapter to the 12.5–15 Vdc (1350 mA) connector. The External Power LED and the Battery Charging LED turn on.

Note	If the Battery Charging LED does not light, the battery may be too low to immediately start full charging. Leaving the unit connected to AC power for several hours may bring the battery up to a level where full charging can begin. Turn the unit off and back on to see if the Battery Charging LED lights indicating a full charge cycle has begun. Charging is inhibited below 0°C and above 45°C. If the unit is too hot, the battery does not start charging until the unit temperature has reached 43°C.

2. Disconnect the AC-DC Adapter when the Battery Charging LED turns off, indicating the battery is fully charged.
3. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state. Press the **ENTER** key when prompted to continue.
4. Press the **SYS** key, followed by the Status soft key. Verify that the indicated battery charge is 80%. If the value is 80% or above, press the **ESCAPE/CLEAR** key and continue with this procedure. If the value is lower than 80%, a discharge/charge cycle may be needed to improve the battery capacity. Completely discharge the battery, as described in steps 5 and 6 below, and then recharge the battery as described in steps 1 and 2. If the battery capacity does not increase after a discharge/charge cycle, replace the battery.
5. Press the **START CAL** key (to keep the Cell Master from going into HOLD mode) and make note of the test start time.
6. When the Cell Master display fades and the Cell Master switches itself off, make note of the test stop time.
7. The total test time (step 5 to step 6) should be 90 minutes. If the battery charge is near 80% and the total battery test time is < 70 minutes, replace the battery.

2-3 Battery Pack Removal and Replacement

This section provides procedures for the removal and replacement of the MT8212B Cell Master battery pack.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the Cell Master.

1. With the Cell Master standing upright on a stable surface, locate the battery access door, as illustrated in Figure 2-1.

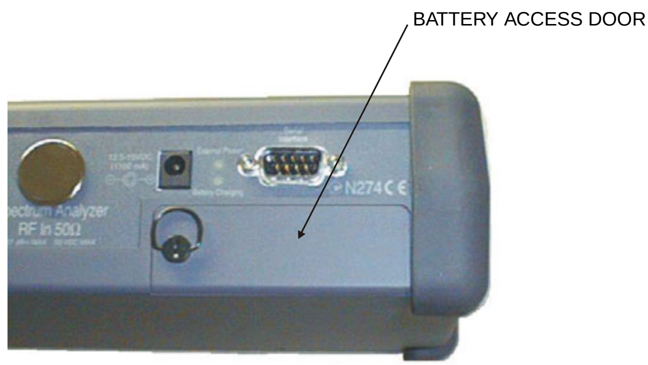


Figure 2-1. Battery Access Door Location

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

Figure 2-2. Rotate the Battery Access Door Handle

3. Lift the door and remove, as illustrated in Figure 2-3.

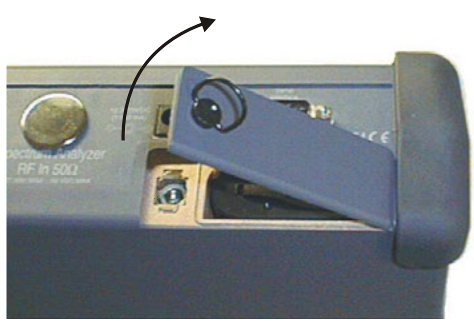


Figure 2-3. Removing the Battery Access Door

4. Grasp the battery lanyard and pull the battery straight up and out of the unit, as illustrated in Figure 2-4.

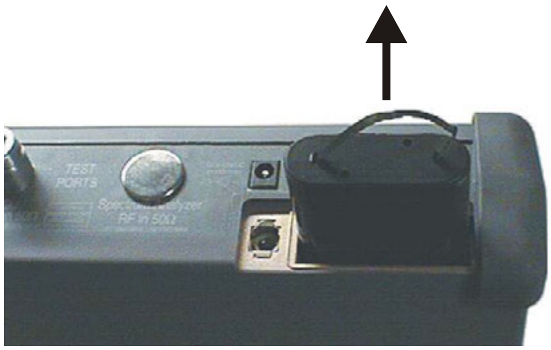


Figure 2-4. Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the new battery with the contacts facing the rear of the unit, as illustrated in Figure 2-5.

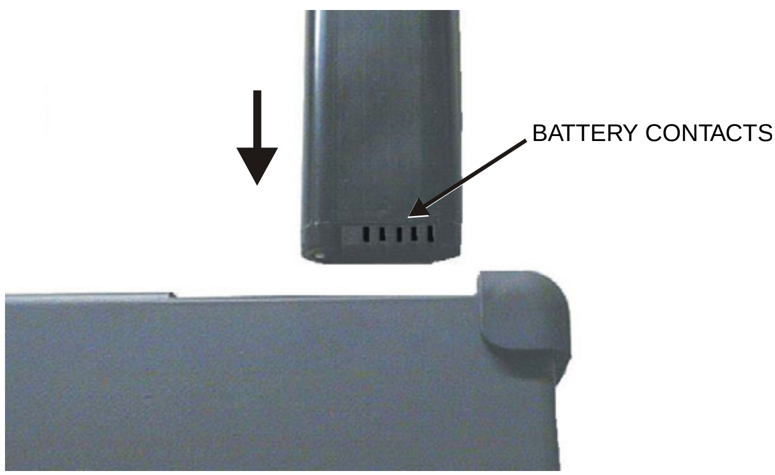


Figure 2-5. Battery Orientation/Contacts

Chapter 3 — Performance Verification

The procedures listed below contain tests that can be used to verify the performance of the Cell Master Model MT8212B and the model ICN50 InstalCal module. Throughout this manual, the term "VNA" denotes Return Loss, SWR, Cable Loss and DTF modes, and the term "SPA" denotes Spectrum Analyzer mode. All other modes are referenced individually. Before making any measurements, ensure all equipment has warmed up for a minimum of 30 minutes.

The performance verification test records are provided in Appendix A, "Test Records".

Note	Using an AC/DC power adapter during performance verification of the MT8212B is recommended.

3-1 VNA Frequency Accuracy

The following test can be used to verify the CW frequency accuracy of the Cell Master. Measurement calibration of the Cell Master is not required for this test.

Equipment Required:

- Spectrum Analyzer Anritsu Model MS2663C or equivalent
- 10 MHz Reference Standard

Procedure:

1. Connect a 10 MHz Reference signal to the 10 MHz STD Ref In of the MS2663C or equivalent.
2. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.

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

3. Press the **FREQ/DIST** key, then press the F1 soft key and set F1 to 1000 MHz, then press the **ENTER** key.
4. Press the F2 soft key, set F2 to 1000 MHz, then press the **ENTER** key.
5. Press the **MEAS/DISP** key, then press the Fixed CW soft key to turn Fixed CW On.
6. Connect the RF cable from the Cell Master RF Out/Reflection Port to the RF Input on the MS2663C or equivalent.
7. Set up the MS2663C as follows:
   a. Press the **Preset** key, then select **Preset All** (F1).
   b. Press the **Frequency** key.
   c. Press the **1** key and then the **GHz** key to change the center frequency to 1 GHz.
   d. Press the **Span** key.
   e. Press the **3, 7, 5** and **kHz** keys sequentially to change the frequency span to 375 kHz.
   f. Press the **RBW** key.
   g. Press the **1**, **0** and **kHz** keys sequentially to change the RBW to 10 kHz.
   h. Press the **VBW** key.
   i. Press the Filter Off soft key (F3) to turn the VB filter Off.
   j. Press the **Amplitude** key.

k. Press the **0**, and **dBm** keys sequentially to change the reference level to 0 dBm.

l. Press the Log Scale soft key (F5)

m. Select **2 dB/Div** (F3) and the press the return soft key.

Note	If the Cell Master has gone into the hold mode, press the **RUN/HOLD** key to return to normal mode.

8. When a peak response appears on the spectrum analyzer, press the **Marker Peak Search** key. Verify that the marker peak readout value is 1000 MHz ± 75 kHz and record in Table A-1 "VNA Frequency Accuracy" on page A-2.

9. On the Cell Master, press the **MEAS/DISP** key then the Fixed CW soft key to turn Fixed CW Off.

3-2 VNA Return Loss Verification

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

Equipment Required:

- 6 dB offset, Anritsu SC5237
- 20 dB offset, Anritsu SC5270
- Open/Short, Anritsu 22N50
- 50 Ohm Termination, Anritsu 28N50-2

Procedure:

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

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

2. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Return Loss, then press the **ENTER** key.
3. Press the **START CAL** key.
4. Follow the instructions on the screen to perform a calibration using a 22N50 Open/Short and 28N50-2 Termination.
5. Connect the 6 dB offset termination to the RF Out/Reflection Port and verify that the reading is 6 dB ± 1.2 dB.
6. Remove the 6 dB offset termination.
7. Connect the 20 dB offset termination to the RF Out/Reflection Port.
8. Verify that the reading is 20 dB ± 1.7 dB and record in Table A-2 "VNA Return Loss Verification" on page A-2.

3-3 Spectrum Analyzer Frequency Accuracy

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

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cable

Procedure:

1. Connect the 10 MHz reference source to the Anritsu MG3691B Synthesized Signal Source.
2. Connect the output of the source to the RF Input of the Cell Master.
3. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
4. Turn on the 10 MHz reference source and the Anritsu MG3691B Synthesized Signal Source.
5. Set the MG3691B output to 2000 MHz CW, with an RF output level of 0 dBm.

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

6. On the Cell Master, press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer and press the **ENTER** key to select spectrum analyzer mode.
7. Press the **Amplitude** key and the Ref Level soft key.
8. Enter 20 and press the **ENTER** key to set the reference level to 20 dBm.
9. Press the **FREQ/DIST** key and the Center soft key.
10. Enter 2000 and press the **ENTER** key to set the center frequency to 2000 MHz.
11. Press the Span soft key, enter 20, and press the kHz soft key to set the span to 20 kHz.
12. Confirm that the RBW is 100 Hz, and that the VBW is 30 Hz. If adjustment of the RBW and VBW are required:
    a. Press the **MEAS/DISP** key and then the Bandwidth soft key.
    b. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 100 Hz. Press the **ENTER** key to set the resolution bandwidth to 100 Hz.
    c. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 30 Hz. Press the **ENTER** key to set the video bandwidth to 30 Hz.
13. Press the **MARKER** key, then the M1 soft key.
14. Press the Marker To Peak soft key.
15. Press the Edit soft key to display all the digits of the marker.
16. Verify that the marker frequency is 2000 MHz ± 4 kHz and record in Table A-3 "Spectrum Analyzer Frequency Accuracy" on page A-2.

3-4 Spectrum Analyzer SSB Phase Noise Verification

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

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source, with Option 2A, Option 3, and Option 4, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent

Procedure:

1. Connect the output of the source to the Cell Master RF Input.
2. Press and hold the **ESCAPE/CLEAR** key, then press the ON/OFF key to turn on the Cell Master. This sets the instrument to the factory preset state.

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

3. Set the MG3691B output to 1000 MHz CW, with an RF output level of –30 dBm.
4. On the Cell Master, press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer, then, press the **ENTER** key to select spectrum analyzer mode.
5. Press the **MEAS/DISP** key and the Bandwidth soft key.
6. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 1 kHz. press the **ENTER** key to set the resolution bandwidth to 1 kHz.
7. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 30 Hz. press the **ENTER** key to set the video bandwidth to 30 Hz.
8. Press the **FREQ/DIST** key and the Center soft key.
9. Enter 1000 and press the **ENTER** key to set the center frequency to 1000 MHz.
10. Press the Span soft key and enter 0.1. Press the **ENTER** key to set the span to 0.100 MHz.
11. Press the **Amplitude** key.
12. Press the Ref Level soft key and enter –27. Press the **ENTER** key to set the reference level to –27 dBm.
13. Press the **MARKER** key, then the M1 soft key.
14. Press Edit soft key and enter 1000. Press the **ENTER** key to set the M1 marker frequency to 1000 MHz.
15. Press the Back soft key and the M2 soft key.
16. Press Edit soft key and enter 1000.03. Press the **ENTER** key to set the M2 marker frequency to 1000.03 MHz (30 kHz higher than the center frequency).
17. Press the Delta (M2–M1) soft key.
18. Press the **RUN/HOLD** key, read and record the Δ2 reading.
19. Press the **RUN/HOLD** key four more times to read and record the Δ2 readings.
20. Calculate the average of the five measured Δ2 readings.

21. Subtract 30 dB from the average value, verify that the result is ≤ –75 dBc/Hz, and then record in Table A-4 "Spectrum Analyzer SSB Phase Noise Verification" on page A-2. (For example: –45 dBc measured – 30 dB = –75 dBc/Hz).

Note	The measured value is converted to dBc/Hz by using the following formula:
	`dBc/Hz = –|measured dBc| – [10`$_{log}$`(RBW/1 Hz)]`
	`At 1 kHz RBW, 10`$_{log}$`((RBW/1 Hz) = 30, so dBc/Hz = –|measured dBc| – 30`

22. Press the Back soft key and the M3 soft key.
23. Press the Edit soft key and enter 999.97. Press the MHz soft key to set the M3 marker frequency to 999.97 MHz (30 kHz lower than the center frequency).
24. Press the Delta (M3–M1) soft key.
25. Press the **RUN/HOLD** key, read and record the Δ3 reading.
26. Press the **RUN/HOLD** key four more times to read and record the Δ3 readings.
27. Calculate the average of the five measured Δ3 readings.
28. Subtract 30 dB from the average value, verify that the result is ≤ –75 dBc/Hz, and then record in Table A-4. (For example: –45 dBc measured – 30 dB = –75 dBc/Hz.)

3-5 Spectrum Analyzer Spurious Response (Second Harmonic Distortion)

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

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source with Option 2A and Option 4, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- 50 MHz Low Pass Filter (Anritsu part number 1030-96)
- BNC male to BNC male coaxial cable

Procedure:

1. Turn on the 10 MHz reference source and the Anritsu MG3691B Synthesized Signal Source.

Note	Allow both instruments to warm up per manufacturer's recommendation.

2. Connect the 10 MHz reference source to the Anritsu MG3691B Synthesized Signal Source.
3. Connect one end of the 50 MHz Low Pass Filter to the output of the source and the other end to the Cell Master Spectrum Analyzer RF Input with the coaxial cable.
4. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
5. Set the MG3691B output to 40 MHz CW, with an RF output level of –30 dBm.
6. On the Cell Master, press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer, then, press the **ENTER** key to select spectrum analyzer mode.
7. Press the **AMPLITUDE** key and the Ref Level soft key.
8. Enter –27 and press the **ENTER** key to set the reference level to –27 dBm.
9. Press the Scale soft key and enter 7, then press the **ENTER** key.
10. Press the **FREQ/DIST** key and then the Center soft key.
11. Enter 40 and press the MHz soft key to set the center frequency to 40 MHz.
12. Press the Span soft key and enter 0.2. Press the MHz soft key to set the span to 0.200 MHz.
13. Press the **MEAS/DISP** key and the Bandwidth soft key.
14. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 10 kHz. Press the **ENTER** key to set the resolution bandwidth to 10 kHz.
15. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 3 kHz. Press the **ENTER** key to set the video bandwidth to 3 kHz.
16. Press the **MARKER** key, then the M1 soft key.
17. Select the Edit soft key, then enter 40. Press the MHz soft key to set M1 to 40 MHz.
18. On the MG3691B Synthesized Signal Source, adjust the output level so that the M1 reading of Cell Master Spectrum Analyzer is –30 dBm at 40 MHz.
19. On the Cell Master, press the **FREQ/DIST** key and then the Center soft key.
20. Enter 80 and press the MHz soft key to set the center frequency to 80 MHz.
21. Press the **MARKER** key and the M1 soft key.
22. Select the Edit soft key, then enter 80. Press the MHz soft key to set M1 to 80 MHz.

23. Note the amplitude of the signal at M1:

`Second Harmonic Level at 80 MHz = ________ dBm.`

24. Convert this measured value to dBc by using the following formula, and record in Table A-5 "Spectrum Analyzer Spurious Response (Second Harmonic Distortion)" on page A-2:

`Input Related Spurious Response (dBc) =`

`[Second Harmonic Level at 80 MHz] + 30 dBm = _____ dBc.`

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

25. Record in Table A-5.

3-6 Spectrum Analyzer Residual Spurious Response

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

Equipment Required:

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

Procedure:

1. Connect the 50 Ohm termination to the Cell Master RF Input.
2. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.

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

3. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer, then, press the **ENTER** key to select spectrum analyzer mode.
4. Press the **AMPLITUDE** key and the Ref Level soft key.
5. Enter –75 and press the **ENTER** key to set the reference level to –75 dBm.
6. Press the Scale soft key and enter 5, then press the **ENTER** key.
7. Press the **MEAS/DISP** key and the Bandwidth soft key.
8. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 10 kHz. Press the **ENTER** key to set the resolution bandwidth to 10 kHz.
9. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 3 kHz and press the **ENTER** key to set the video bandwidth to 3 kHz.
10. Press the **FREQ/DIST** key and the Start soft key.
11. Enter 100 and press the kHz soft key to set the start frequency to 100 kHz.
12. Press the Stop soft key and enter 10, then press the MHz soft key to set the stop frequency to 10 MHz.
13. Wait until one full sweep is complete.
14. Press the **MARKER** key and then the M1 soft key.
15. Press the Marker To Peak soft key.
16. Record the M1 amplitude reading (0.1 MHz to 10 MHz) and verify whether it is less than or equal to –80 dBm in Table A-6 "Spectrum Analyzer Residual Spurious Response" on page A-2.

Note	If a spur with an amplitude larger than –80 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 does not cause the test to fail.

17. Press the **FREQ/DIST** key and the Start soft key.
18. Enter 10 and press the MHz soft key to set the start frequency to 10 MHz.
19. Press the Stop soft key and enter 1000, then press the MHz soft key to set the stop frequency to 1000 MHz.
20. Wait until one full sweep is complete.
21. Press the **MARKER** key and then the M1 soft key.
22. Press the On/Off soft key and then the Marker To Peak soft key.

23. Record the M1 amplitude reading (10 MHz to 1 GHz) and verify whether it is less than or equal to –90 dBm in Table A-6 "Spectrum Analyzer Residual Spurious Response" on page A-2.

Note	If a spur with an 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 does not cause the test to fail.

24. Press the **FREQ/DIST** key and the Start soft key.
25. Enter 1000 and press the MHz soft key to set the start frequency to 1000 MHz.
26. Press the Stop soft key and enter 2000, then press the MHz soft key to set the stop frequency to 2000 MHz.
27. Wait until one full sweep is complete.
28. Press the **MARKER** key and then the M1 soft key.
29. Press the On/Off soft key and then the Marker To Peak soft key.
30. Record the M1 amplitude reading (1 GHz to 2 GHz) and verify it is ≤ –90 dBm in Table A-6.
31. Press the **FREQ/DIST** key and the Start soft key.
32. Enter 2000 and press the MHz soft key to set the start frequency to 2000 MHz.
33. Press the Stop soft key and enter 3000, then press the MHz soft key to set the stop frequency to 3000 MHz.
34. Wait until one full sweep is complete.
35. Press the **MARKER** key and then the M1 soft key.
36. Press the On/Off soft key and then the Marker To Peak soft key.
37. Record the M1 amplitude reading (2 GHz to 3 GHz) and verify it is ≤ –90 dBm in Table A-6.

3-7 Spectrum Analyzer Displayed Average Noise Level

The following test can be used to verify the Displayed Average Noise Level of the Cell Master's Spectrum Analyzer mode.

Equipment Required:

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

Procedure:

1. Connect the 50 Ohm termination to the Cell Master RF Input.
2. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.

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

3. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer, then, press the **ENTER** key to select spectrum analyzer mode.
4. Press the **AMPLITUDE** key and the Ref Level soft key.
5. Enter –75 and press the **ENTER** key to set the reference level to –75 dBm.
6. Press the Scale soft key and enter 5, then press the **ENTER** key.
7. Press the **MEAS/DISP** key and the Bandwidth soft key.
8. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 10 kHz. Press the **ENTER** key to set the resolution bandwidth to 10 kHz.
9. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 3 kHz and press the **ENTER** key to set the video bandwidth to 3 kHz.
10. Press the Back soft key and then the Trace soft key.
11. Press the Detection soft key and then the RMS Average soft key.
12. Press the **FREQ/DIST** key and the Start soft key.
13. Enter 100 and press the kHz soft key to set the start frequency to 100 kHz.
14. Press the Stop soft key and enter 10, then press the MHz soft key to set the stop frequency to 10 MHz.
15. Wait until one full sweep is complete.
16. Press the **MARKER** key and then the M1 soft key.
17. Press the Marker To Peak soft key.
18. Record the M1 amplitude reading (0.1 MHz to 10 MHz) and verify whether it is less than or equal to –95 dBm in Table A-8 "Spectrum Analyzer Displayed Average Noise Level" on page A-3.
19. Press the **FREQ/DIST** key and the Start soft key.
20. Enter 10 and press the MHz soft key to set the start frequency to 10 MHz.
21. Press the Stop soft key and enter 1000, then press the MHz soft key to set the stop frequency to 1000 MHz.
22. Wait until one full sweep is complete.
23. Press the **MARKER** key and then the M1 soft key.
24. Press the On/Off soft key and then the Marker To Peak soft key.
25. Record the M1 amplitude reading (10 MHz to 1 GHz) and verify whether it is less than or equal to –115 dBm in Table A-8.

26. Press the **FREQ/DIST** key and the Start soft key.
27. Enter 1000 and press the MHz soft key to set the start frequency to 1000 MHz.
28. Press the Stop soft key and enter 2000, then press the MHz soft key to set the stop frequency to 2000 MHz.
29. Wait until one full sweep is complete.
30. Press the **MARKER** key and then the M1 soft key.
31. Press the On/Off soft key and then the Marker To Peak soft key.
32. Record the M1 amplitude reading (1 GHz to 2 GHz) and verify it is ≤ −115 dBm in Appendix A, Test Records, Table A-8 "Spectrum Analyzer Displayed Average Noise Level" on page A-3.
33. Press the **FREQ/DIST** key and the Start soft key.
34. Enter 2000 and press the MHz soft key to set the start frequency to 2000 MHz.
35. Press the Stop soft key and enter 3000, then press the MHz soft key to set the stop frequency to 3000 MHz.
36. Wait until one full sweep is complete.
37. Press the **MARKER** key and then the M1 soft key.
38. Press the On/Off soft key and then the Marker To Peak soft key.
39. Record the M1 amplitude reading (2 GHz to 3 GHz) and verify that it is ≤ −115 dBm in Table A-8.

3-8 Spectrum Analyzer Resolution Bandwidth Accuracy

The following test can be used to verify the resolution bandwidth accuracy of the Cell Master's Spectrum Analyzer mode.

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source with options 2A and 4, or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- 10 MHz Reference Standard
- BNC male to BNC male coaxial cables

Procedure:

1. Turn on the MG3691B.
2. Set the MG3691B output to 1 GHz, with an RF output level of –30 dBm.
3. Connect the 10 MHz reference source to the Anritsu MG3691B Synthesized Signal Source and the 10 MHz REF Out of the source to the Ext Freq Ref/Ext. Trigger Input of the Cell Master.
4. Connect the output of the Anritsu MG3691B Synthesized Signal Source to the Cell Master Spectrum Analyzer RF Input.
5. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.

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

6. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer, then, press the **ENTER** key to select spectrum analyzer mode.
7. Press the **SYS** key and then the System Options soft key.
8. Press the External Ref Freq soft key and then the **ENTER** key.
9. Press the **AMPLITUDE** key and the Ref Level soft key.
10. Enter –27 and press the **ENTER** key to set the reference level to –27 dBm.
11. Press the Scale soft key and enter 3, then press the **ENTER** key.
12. Press the **FREQ/DIST** key and the Center soft key.
13. Enter 1 and press the GHz soft key to set the center frequency to 1 GHz.

1 MHz RBW Test

1. Press the Span soft key, enter 1.5 and press the MHz soft key to set the span to 1.5 MHz.
2. Press the **MEAS/DISP** key and the Bandwidth soft key.
3. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 1 MHz. Press the **ENTER** key to set the resolution bandwidth to 1 MHz.
4. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 3 kHz and press the **ENTER** key to set the video bandwidth to 3 kHz, press the Back soft key.
5. Press the Measure soft key, the OBW soft key, the dBc soft key, and then the **ENTER** key to accept 3 dBc.
6. Press the Measure soft key. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Appendix A, Test Records, Table A-9 "Spectrum Analyzer Resolution Bandwidth Accuracy" on page A-3.

300 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 450 and press the kHz soft key to set the span to 450 kHz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 300 kHz. Press the **ENTER** key to set the resolution bandwidth to 300 kHz, press the Back soft key.
5. Press the Measure soft key to measure the bandwidth.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9 "Spectrum Analyzer Resolution Bandwidth Accuracy" on page A-3.

100 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 150 and press the kHz soft key to set the span to 150 kHz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 100 kHz. Press the **ENTER** key to set the resolution bandwidth to 100 kHz, press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

30 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 45 and press the kHz soft key to set the span to 45 kHz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 30 kHz. Press the **ENTER** key to set the resolution bandwidth to 30 kHz, press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

10 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 15 and press the kHz soft key to set the span to 15 kHz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 10 kHz. Press the **ENTER** key to set the resolution bandwidth to 10 kHz then press the Back soft key.
5. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 30 Hz. Press the **ENTER** key to set the video bandwidth to 30 Hz then press the Back soft key.
6. Press the Measure soft key.
7. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

3 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 4.5 and press the kHz soft key to set the span to 4.5 kHz.

3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 3 kHz. Press the **ENTER** key to set the resolution bandwidth to 3 kHz then press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9 "Spectrum Analyzer Resolution Bandwidth Accuracy" on page A-3.

1 kHz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 1.5 and press the kHz soft key to set the span to 1.5 kHz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 1 kHz. Press the **ENTER** key to set the resolution bandwidth to 1 kHz then press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

300 Hz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 450 and press the Hz soft key to set the span to 450 Hz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 300 Hz. Press the **ENTER** key to set the resolution bandwidth to 300 Hz then press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

100 Hz RBW Test

1. Press the **FREQ/DIST** key.
2. Press the Span soft key, enter 150 and press the Hz soft key to set the span to 150 Hz.
3. Press the **MEAS/DISP** key and the Bandwidth soft key.
4. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 100 Hz. Press the **ENTER** key to set the resolution bandwidth to 100 Hz then press the Back soft key.
5. Press the Measure soft key.
6. Verify that the Meas Occ BW reading is within ± 5% of the RBW and record in Table A-9.

3-9 Spectrum Analyzer Measurement Accuracy

The tests in this section verify the level accuracy of the Cell Master's Spectrum Analyzer mode. This test has two parts:

- "Spectrum Analyzer Level Accuracy Across Frequency"
- "Spectrum Analyzer Level Accuracy Through Power"

Spectrum Analyzer Level Accuracy Across Frequency

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source, with Option 2A and Option 4
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensors or equivalent (2)
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator
- Aeroflex/Weinschel 1870A Power Splitter or equivalent

Procedure:

1. Connect both MA2442D power sensors to the ML2438A power meter.
2. On the power meter, press the **Channel** key, the Setup soft key and then the Channel soft key to display Channel 2 setup menu. Press the **INPUT** key twice to set the Input Configuration to B. Press the **Sensor** key to display both Sensor A and Sensor B readings.
3. Connect the power sensors to the power meter and calibrate the sensors.
4. Connect the power splitter to the MG3691B output and Sensor B to one of the power splitter outputs.
5. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator (Refer to Figure 3-1).

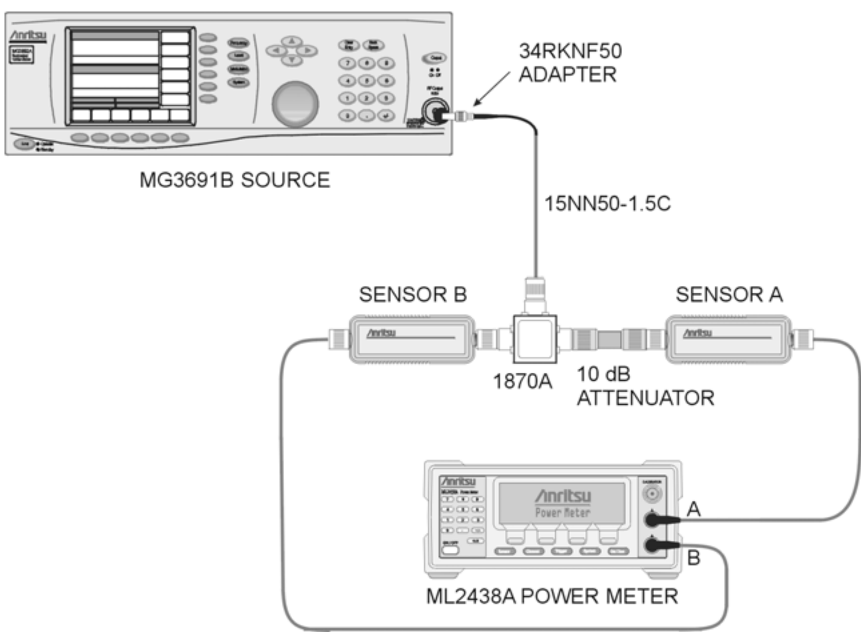


Figure 3-1. Level Accuracy Across Frequency Test Pre-test Setup

6. Set the MG3691B output to the frequency listed in Table A-10 "Spectrum Analyzer Level Accuracy Across Frequency, Setup Power Levels" on page A-4, starting with 30 MHz.
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 30 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key on the power meter to display the power reading.
8. Adjust the power level reading on Sensor A to 0 dBm by adjusting the power level on the MG3691B.
9. Record the Sensor B reading in column 2 of Table A-10
10. Repeat Step 6 through Step 9 for all the frequencies in column 1 of Table A-10.
11. Repeat Step 6 through Step 10 for a power level of –39 dBm and record the results in column 3 of Table A-10.

Note	To maintain test setup integrity, do not disconnect Sensor B, the power splitter, or the fixed attenuator.

12. Remove Sensor A, install the 34NN50A adapter to the end of the Attenuator, and connect to the MT8212B as shown in Figure 3-2.

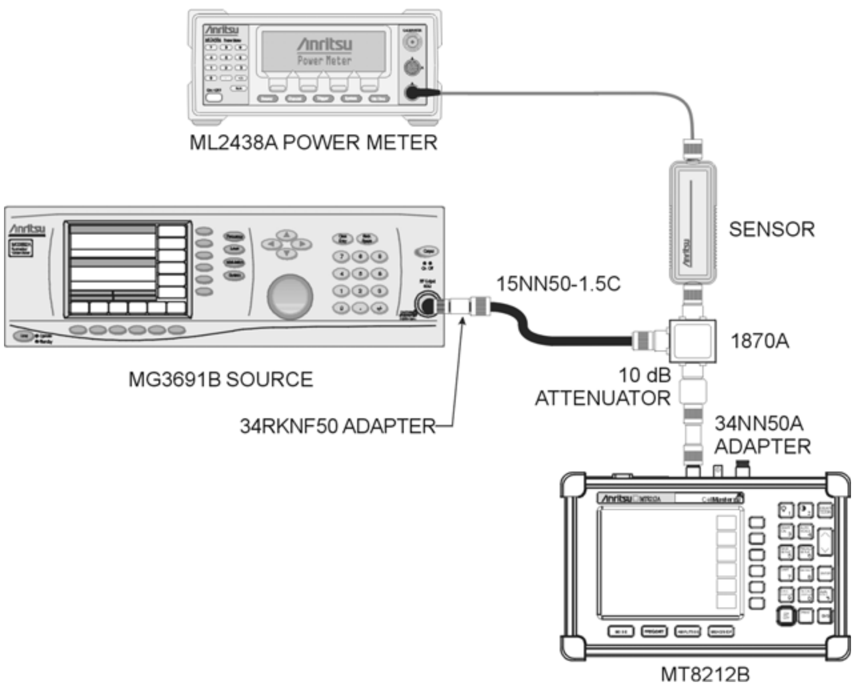


Figure 3-2. Level Accuracy Across Frequency Test Setup

13. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
14. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer and press the **ENTER** key to select spectrum analyzer mode.
15. Press the **MEAS/DISP** key and the Bandwidth soft key.
16. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 1 kHz. Press the **ENTER** key to set the resolution bandwidth to 1 kHz.
17. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 100 Hz. Press the **ENTER** key to set the video bandwidth to 100 Hz.
18. Press the **FREQ/DIST** key.

19. Press the Span soft key and enter 0.10, then press the MHz soft key to set the span to 0.10 MHz.
20. Press the **AMPLITUDE** key.
21. Press the Ref Level soft key, enter 10 and press the **ENTER** key to set the reference level to +10 dBm.
22. Press the **FREQ/DIST** key and the Center soft key.
23. Enter 30 and press the MHz soft key to set the center frequency to 30 MHz.
24. On the Power Meter, press the **Sensor** key and then the CalFactor soft key. Press the Freq soft key and enter 30 MHz for the input signal frequency. This sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
25. Set the MG3691B output to 30 MHz CW. Adjust the source power level so that the power meter displays the corresponding Sensor B reading in column 2 for 0 dBm (as recorded in Table A-10 "Spectrum Analyzer Level Accuracy Across Frequency, Setup Power Levels" on page A-4).
26. On the Cell Master, press the **MARKER** key, then the M1 soft key.
27. Select the Marker To Peak soft key to position the marker at the center of the response for the test frequency.
28. Verify that the M1 reading is within ± 1.5 dB of the input power level and record to column 2 in Table A-11 "Spectrum Analyzer Level Accuracy Across Frequency, Measurements" on page A-4.
29. Repeat Step 25 through Step 28 for 550.33 MHz, 1000 MHz, 1243.5 MHz, 1410.5 MHz, 2000 MHz, 2511.5 MHz, and 2925 MHz.
30. Change the reference level to –30 dBm. Repeat Step 25 through Step 29 for a power level of –39 dBm and record in column 3 of Table A-11.

Spectrum Analyzer Level Accuracy Through Power

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source, with Option 2A and Option 4
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensors or equivalent (2)
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator
- Aeroflex/Weinschel 44-30 30 dB Fixed Attenuator
- Aeroflex/Weinschel 1870A Power Splitter or equivalent

Procedure:

1. Connect both MA2442D power sensors to the ML2438A power meter.

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

2. On the power meter, press the Channel soft key, the Setup soft key, and then the Channel soft key to display Channel 2 setup menu. Press the **Input** key twice to set the Input Configuration to B. Press the **Sensor** key to display both Sensor A and Sensor B readings.
3. Connect the power sensors to the power meter and calibrate the sensors.
4. Set the MG3691B output power level to 5 dBm.
5. Set the MG3691B output to 50 MHz CW.

6. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 50 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key on the power meter to display the power reading.
7. Connect Sensor A to the MG3691B output, measure the output power level, and record the value in column A of Table A-12 "Pre-Test Data with 10 dB Fixed Attenuator" on page A-4.
8. Disconnect Sensor A from the MG3691B output.
9. Connect the power splitter to the MG3691B output and Sensor B to one of the power splitter outputs. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator. Refer to Figure 3-1.
10. Record the new Sensor A reading in column B of Table A-12.
11. Record the Sensor B reading in column D of Table A-12.
12. Calculate the Splitter/Attenuator Combined Loss using the following formula, and record the result in column C of Table A-12:

    `C = A – B`

13. Calculate the Sensor B path Power Splitter Loss using the following formula, and record the result in column E of Table A-12:

    `E = A – D`

14. Calculate the desired Sensor B reading for the Test Power Levels that are > –50 dBm by using the following formulas:

    `Desired Sensor B reading = Test Power Level + C – E`

15. Record the calculated results for +3 dBm in Table A-13 "Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels" on page A-5.
16. Remove Sensor A, install the 34NN50A adapter to the end of the Attenuator, and connect to the MT8212B as shown in Figure 3-2.
17. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
18. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Spectrum Analyzer and press the **ENTER** key to select spectrum analyzer mode.
19. Press the **MEAS/DISP** key and the Bandwidth soft key.
20. Press the RBW Manual soft key and use the **Up/Down** arrow key to select 1 kHz. Press the **ENTER** key to set the resolution bandwidth to 1 kHz.
21. Press the VBW Manual soft key and use the **Up/Down** arrow key to select 100 Hz. Press the **ENTER** key to set the video bandwidth to 100 Hz.
22. Press the **FREQ/DIST** key.
23. Press the Span soft key and enter 0.10, then press the MHz soft key to set the span to 0.10 MHz.
24. Press the **AMPLITUDE** key.
25. Press the Ref Level soft key, enter 10 and press the **ENTER** key to set the reference level to +10 dBm.
26. Press the **FREQ/DIST** key and the Center soft key.
27. Enter 50 and press the MHz soft key to set the center frequency to 50 MHz.
28. Adjust the MG3691B output power so that the power meter displays the corresponding desired Sensor B Reading for +3 dBm (as recorded in Table A-13 "Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels" on page A-5).
29. Press the **MARKER** key, then the M1 soft key.
30. Select the Marker To Peak soft key to position the marker at the center of the response for the test frequency.

31. Verify that the M1 reading for +3 dBm is within ± 1.5 dB from the input signal power level and record in Table A-14 "Spectrum Analyzer Level Accuracy Through Power, Measurements" on page A-5.
32. Change the reference level as indicated in Table 3-1, and repeat Step 27 through Step 31 for input levels of 0 dBm, –11 dBm, –13 dBm, –19 dBm, –27 dBm, –32 dBm, –39 dBm, and –49 dBm.

Table 3-1. Reference Level Setting

Input Power Level (dBm)	Reference Level (dBm)
+3	+10
0	+10
-11	-10
-13	-10
-19	-10
-27	-20
-32	-30
-39	-30
-49	-40
-51	-40
-53	-50
-60	-50

33. Disconnect the power splitter and attenuator from the Cell Master.
34. Set the MG3691B output power level to 5 dBm.
35. Connect Sensor A to the MG3691B output, measure the output power level, and record the value in column A of Table A-15 "Pre-Test Data with 30 dB Fixed Attenuator" on page A-6.
36. Disconnect Sensor A from the MG3691B output.
37. Connect the power splitter to the MG3691B output and connect Sensor B to one of the power splitter outputs. Install the 30 dB fixed attenuator to the other power splitter output, and connect Sensor A to the attenuator. Refer to Figure 3-1.
38. Record the new Sensor A reading in column B of Table A-15.
39. Record the Sensor B reading in column D of Table A-15.
40. Calculate the Splitter/Attenuator Combined Loss by using the following formula, and record the result in column C of Table A-15:

    `C = A – B.`

41. Calculate the Sensor B path Power Splitter Loss by using the following formula, and record the result in column E of Table A-15:

    `E = A – D.`

42. Calculate the desired Sensor B reading for the Test Power Levels that are < –50 dBm by using the following formula:

    `Desired Sensor B reading = Test Power Level + C – E`

43. Record the calculated results for < –50 dBm in Table A-13 "Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels" on page A-5.

44. Remove Sensor A, install the 34NN50A adapter to the end of the Attenuator, and connect to the MT8212B as shown in Figure 3-3.

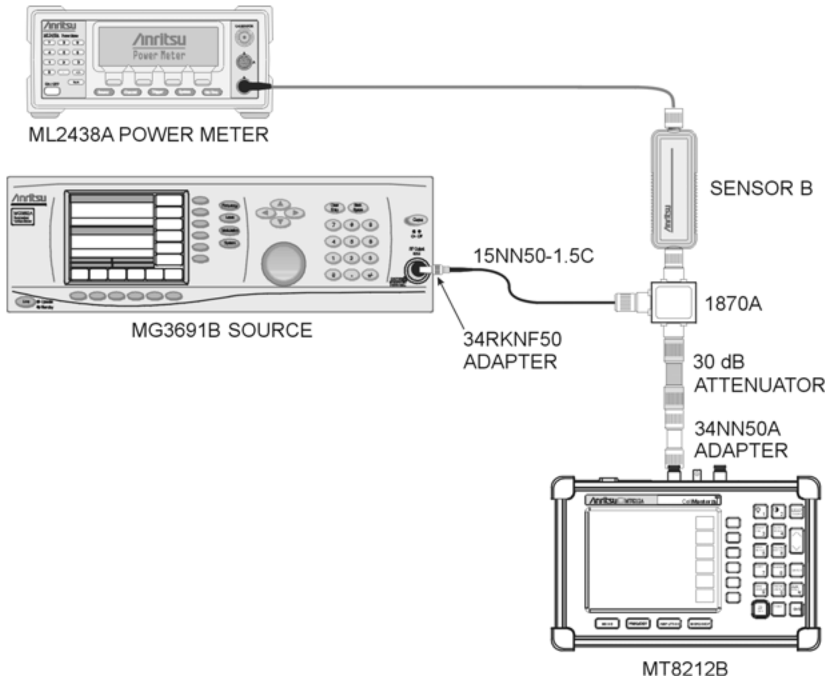


Figure 3-3. Level Accuracy Test through Power Setup

45. Adjust the MG3691B output power level so that the power meter displays the corresponding desired Sensor B reading for –51 dBm (as recorded in Table A-13 "Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels" on page A-5).
46. Press the **MARKER** key, then the M1 soft key.
47. Select the Marker To Peak soft key to position the marker at the center of the response.
48. Verify that the M1 reading for –51 dBm is within ± 1.5 dB from the input signal, and record in Table A-14 "Spectrum Analyzer Level Accuracy Through Power, Measurements" on page A-5.
49. Set the Reference levels as show in Table 3-1 and repeat Step 45 through Step 48 for Test Power Levels of –53 dBm and –60 dBm.

3-10 Power Meter Accuracy

The following test can be used to verify the accuracy of the power measurements in the Internal Power Meter mode of the Cell Master.

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source, with Option 2A and Option 4
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensors or equivalent (2)
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator
- Aeroflex/Weinschel 1870A Power Splitter or equivalent

Procedure:

1. Connect both MA2442D power sensors to the ML2428A power meter.
2. On the power meter, press the **Channel** key, the Setup soft key and then the Channel soft key to display Channel 2 setup menu. Press the **INPUT** key twice to set the Input Configuration to B. Press the **Sensor** key to display both Sensor A and Sensor B readings.
3. Connect the power sensors to the power meter and calibrate the sensors.
4. Connect the power splitter to the MG3691B output and Sensor B to one of the power splitter outputs.
5. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect Sensor A to the end of the Attenuator (Refer to Figure 3-4).

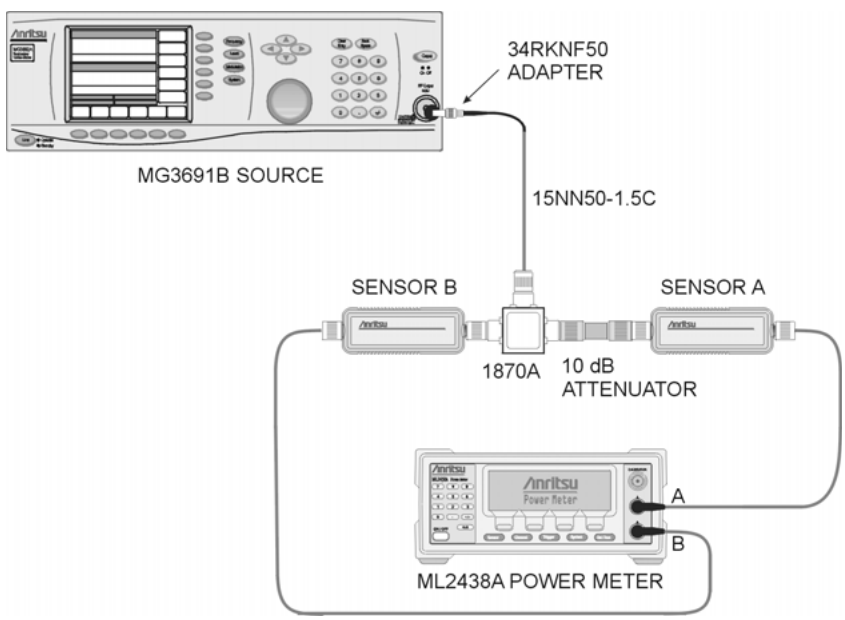


Figure 3-4. Power Meter Verification Pre-test Setup

6. Set the MG3691B output to the frequency listed in Table A-16 "Power Meter Accuracy, Setup" on page A-6 starting with 50 MHz.
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 50 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key on the power meter to display the power reading.

8. Adjust the power level reading on Sensor A to –30 dBm by adjusting the power level on the MG3691B.
9. Record the Sensor B reading in column B of Table A-16.
10. Repeat Step 6 through Step 9 for the other frequencies.

Note	To maintain test setup integrity, do not disconnect Sensor B, the power splitter or the fixed attenuator.

11. Remove Sensor A, install the 34NN50A adapter to the end of the Attenuator, and connect to the MT8212B as shown in Figure 3-5.

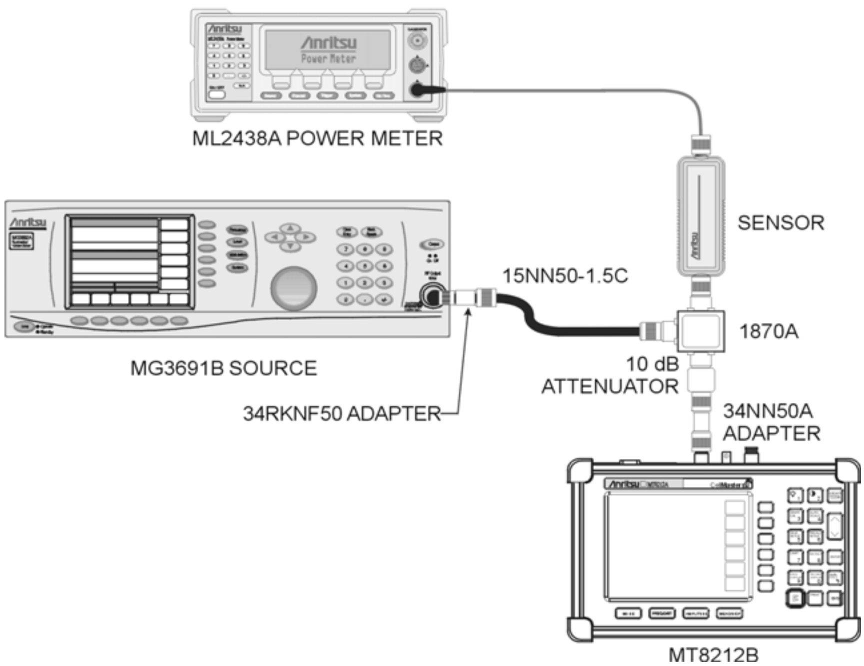


Figure 3-5. Power Meter Verification Setup

12. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
13. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Power Meter and then press the **ENTER** key.
14. Press the Center soft key and enter 50, then press the MHz soft key to set the center frequency to 50 MHz.
15. Press the Span soft key and enter 3, then press the MHz key to set the span to 3 MHz.
16. On the Power Meter, press the **Sensor** key and then the CalFactor soft key. Select the Freq soft key and enter 50 MHz for the Input Signal Frequency. This sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
17. Set the MG3691B output to 50 MHz CW and adjust the power level so that the power meter displays the corresponding desired Sensor B Reading for –30 dBm as recorded in Table A-16.
18. Verify that the Power Meter reading is within ± 1.5 dB of the input power level and record in Table A-17 "Power Meter Accuracy, Measurements" on page A-6.

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

19. Repeat Step 16 through Step 18 for 1,000 MHz, 2,000 MHz, and 2,850 MHz.

3-11 Power Monitor Option Verification (Option 5)

The following test can be used to verify the amplitude accuracy of the power monitor mode in the Cell Master. This test is only used for units equipped with Option 21.

Equipment Required:

- Anritsu MG3691B Synthesized Signal Source, with Option 2A and Option 4
- Anritsu ML2438A Dual Channel Power Meter or equivalent
- Anritsu MA2442D High Accuracy Power Sensor or equivalent
- Anritsu 34NN50A 50 Ohm adapter or equivalent
- Anritsu 34RKNF50 50 Ohm adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- Anritsu 560-7N50B N Type RF Detector
- Aeroflex/Weinschel 1870A Power Splitter

Procedure:

1. Set the MG3691B output to 1 GHz CW.
2. Connect the power sensors to the power meter and calibrate the sensors.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the FREQ soft key. Use the keypad to enter 1 GHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key on the power meter to display the power reading.
4. Connect MG3691B, power meter, 560-7N50B detector, power splitter and power sensor as shown in Figure 3-6.

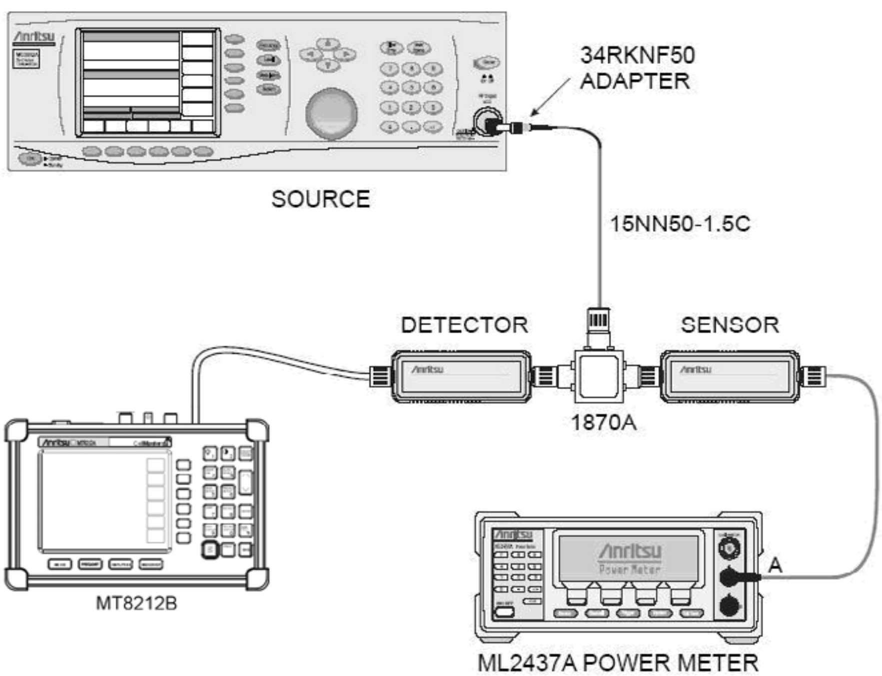


Figure 3-6. Option 5 Test Setup

5. Turn off the Cell Master. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
6. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Power Monitor and then press **ENTER**.

7. On the MG3691B, press the **Level** key and then use the knob to adjust the power level so that the power meter reads –40 dBm.
8. Verify that the power reading on the Cell Master is –40 dBm ± 1.0 dB.
9. Repeat Step 7 and Step 8 for the other power level settings shown in Table A-18 "Power Monitor Accuracy (Option 5)" on page A-6.

3-12 Bias Tee Option Verification (Option 10)

The test in this section is used to verify the functionality of the internal bias tee circuitry of the Cell Master. This test is only used for MT8212B units equipped with Option 10.

Note	The Cell Master must be powered by the external power supply during this test.

Equipment Required:

- 105 Ohm, 1 Watt, Low Current Load, Anritsu T3377

Procedure:

1. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
2. Press the **MODE** key. Use the **Down Arrow** key to select Spectrum Analyzer and then press the **ENTER** key.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

3. Press the **SYS** key and then select the Application Options soft key.
4. Connect the 105 Ohm load to the Spectrum Analyzer RF In test port.
5. Press the Bias Tee (On/Off) soft key to turn the Bias Tee On.
6. Verify the voltage and current readings displayed on the upper left side of the screen are within the specifications shown in Table 3-2.

Table 3-2. Bias Tee Verification, 105 Ohm Load

Voltage Setting (V)	Voltage Specification (V)	Current Specification (mA)
18	± 1.0	120–220

7. Press the Bias Tee (On/Off) soft key to turn the Bias Tee Off.

3-13 Variable Bias Tee Option Verification (Option 10A)

The tests in this section are used to verify the functionality of the internal bias tee circuitry of the Cell Master. This test is only used for MT8212B units equipped with Option 10A.

Note	The Cell Master must be powered by the external power supply during this test.

Equipment Required:

- 105 Ohm, 1 Watt, Low Current Load, Anritsu T3377
- 40 Ohm, 5 Watt, High Current Load, Anritsu T2904

Procedure:

1. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. (This sets the instrument to the factory preset state.).
2. Press the **MODE** key. Use the **Down Arrow** key to select Spectrum Analyzer and then press the **ENTER** key.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

Bias Tee Load Test

1. Press the **SYS** key, then select the Application Options soft key and then select the Bias Tee soft key.
2. Select the Bias Tee Voltage soft key and enter 12, then press the **ENTER** key.
3. Connect the T3377 (105 Ohm load) to the Spectrum Analyzer RF In port.
4. Press the Bias Tee On/Off soft key to turn on the Bias Tee.
5. Verify the voltage and current readings displayed on the top left side of the screen are within the specifications shown in Table 3-3.
6. Press the Bias Tee On/Off soft key to turn off the Bias Tee.
7. Select each of the voltage settings and verify the voltage and current readings displayed on the top left side of the screen are within the specifications shown in Table 3-3.

Table 3-3. Bias Tee Verification Using T3377

Voltage Setting (V)	Voltage Specification (V)	Current Specification (mA)
12	± 0.5	85–145
15	± 0.6	113–173
18	± 0.7	142–202
21	± 0.8	172–230
24	± 1.0	199–259

Fault Test

1. Disconnect the T3377 and connect the T2904 (40 Ohm load) to the Spectrum Analyzer RF In port.
2. Select the Bias Tee Voltage soft key and enter 17, then press the **ENTER** key.
3. Press the Bias Tee On/Off soft key to turn the Bias Tee On.
4. Verify that the instrument makes a clicking sound and the Bias Tee Error/Fault dialog appears on the screen.
5. Press the Bias Tee On/Off soft key to turn off the Bias Tee.

3-14 Transmission Measurement Dynamic Range Verification (Option 21)

The test in this section can be used to verify the transmission measurement dynamic range. This test is only used for MT8212B units equipped with Option 21.

Equipment Required:

- Anritsu 28N50-2 or SM/PL 50 Ohm Termination
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent

Procedure:

1. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
2. Press the **MODE** key. Use the **Up/Down** arrow key to highlight Transmission Measurement and press the **ENTER** key to select Transmission Measurement mode.
3. Press the **MEAS/DISP** key and then press the Calibrate TM soft key.
4. Use the 15NN50-1.5C RF Coaxial Cable to connect the Spectrum Analyzer RF In port of the Cell Master to the RF Out/Reflection port. Press the **ENTER** key on the Cell Master to calibrate. The Cell Master beeps when one sweep is completed.
5. Disconnect the RF cable from the Spectrum Analyzer RF In Port and connect the 50 Ohm Termination.
6. Press the **LIMIT** key and select the Multiple Upper Limits soft key.
7. Press the Segment 1 soft key and select the Edit soft key. Use the keypad to enter 25 and press the **ENTER** key to set the start frequency to 25 MHz.
8. Use the keypad to enter –80 and press the **ENTER** key to set the start limit to –80 dB.
9. Use the keypad to enter 1 and press the GHz soft key to set the end frequency to 1 GHz.
10. Use the keypad to enter –80 and press the **ENTER** key to set the end limit to –80 dB.
11. Press the Next Segment soft key. Verify that “Segment: 2 Upper” appears at the bottom left corner of the display, record in Table A-19 "Transmission Measurement Dynamic Range Verification (Option 21)" on page A-7.
12. Press the Edit soft key. Use the keypad to enter 1 and press the GHz soft key to set the start frequency to 1 GHz.
13. Use the keypad to enter –80 and press the **ENTER** key to set the start limit to –80 dB.

Note	For instruments with serial number 524999 and below, set the start limit to –60 dB.

14. Use the keypad to enter 2 and press the GHz soft key to set the end frequency to 2 GHz.
15. Use the keypad to enter –80 and press the **ENTER** key to set the end limit to –80 dB.

Note	For instruments with serial number 524999 and below, set the start limit to –60 dB.

16. Verify that the trace is below the limit lines, record in Table A-19.
17. Press the Edit soft key. Use the keypad to enter 2 and press the GHz soft key to set the start frequency to 2 GHz.
18. Use the keypad to enter –60 and press the **ENTER** key to set the start limit to –60 dB.
19. Use the keypad to enter 3 and press the GHz soft key to set the end frequency to 3 GHz.
20. Use the keypad to enter –60 and press the **ENTER** key to set the end limit to –60 dB.
21. Verify that the trace is below the limit lines and record in Table A-19.

3-15 EVDO Signal Analyzer Option Verification (Option 34, Option 62, and Option 63)

The tests in this section are used to verify the functionality of the EVDO Signal Analyzer in the Cell Master. These tests are only used for MT8212B units equipped with Option 34, Option 62, or Option 63.

Note	Skip to "GSM RF Measurements Option Verification (Option 40)" on page 3-39 if the Cell Master is not equipped with Option 34, Option 62, or Option 63.

Equipment Required:

- Anritsu MG3700A Vector Signal Analyzer with Options MG3700A-002, MG3700A-021
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor with Option 1
- Anritsu 34NN50A N(m) to N(m) Adapter
- Anritsu 15NN50-1.5C Cable
- Aeroflex/Wienschel 1870A Power Splitter
- 10 MHz Reference
- 50 Ohm BNC(m) to BNC(m) cables (3)

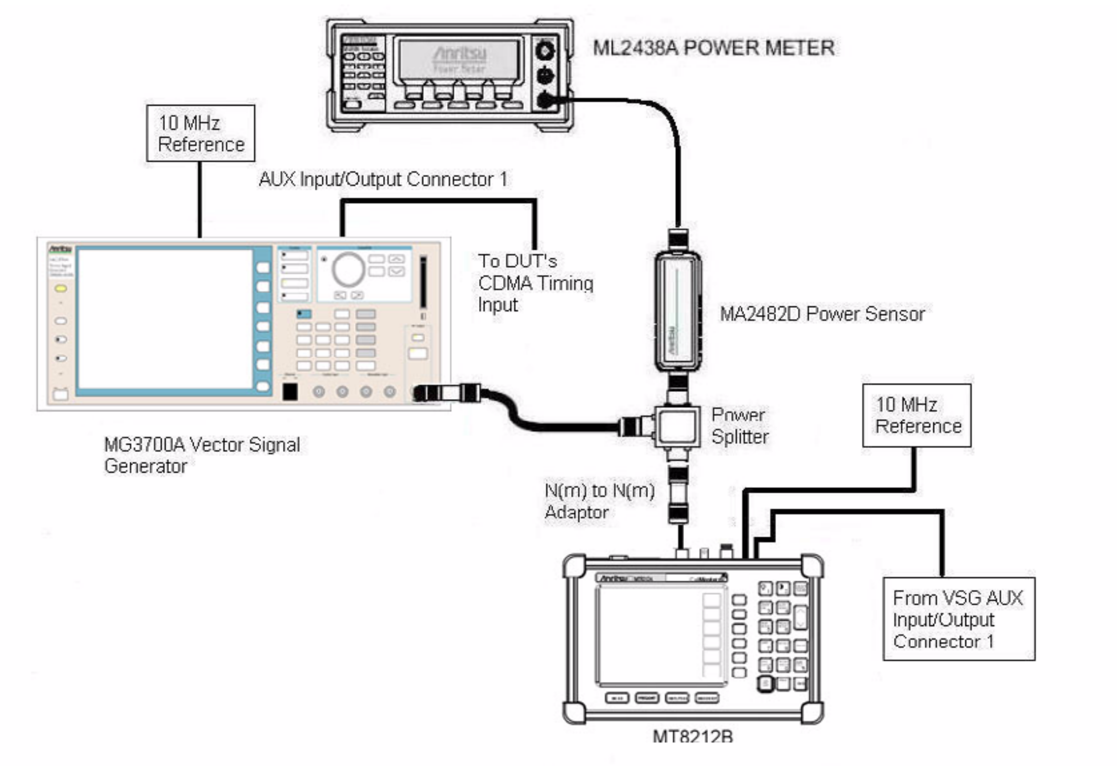


Figure 3-7. EVDO Signal Analyzer Option Verification

Procedure:

1. Connect the equipment as shown in Figure 3-7. Confirm that the external 10 MHz Reference is connected to both the 10 MHz Ref input of the MG3700A and the Ext Freq Ref input of the MT8212B.
2. Calibrate the power sensor prior to connecting to the power splitter.

16-QAM Modulation Tests (870.03 MHz, 0 dBm)

1. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
2. Press the down arrow key or turn the knob to select Yes.
3. Press the **Set** key.

Note	Both **Set** keys on the MG3700A have the same function.

4. Press the F1 (Load File to Memory) soft key
5. Press the F1 (Select Package) soft key again.
6. Using the down arrow key step through the selection list until the CDMA2000_1xEV-DO option is highlighted.
7. Press the **Set** key.
8. Press the F6 (Return) soft key.
9. Press the **Set** key. The Select Package box will appear. Again select CDMA2000_1xEV-DO and press **Set**.
10. Another file list will appear. Select FWD_1228_8kbps_2slot.
11. Press the **Set** key.
12. Press the **MOD On/Off** key to turn on the Modulation LED and verify the “Playing” indicator is flashing.
13. On the Cell Master, press and hold the **Escape/Clear** key, then press the **On/Off** key to turn on the Cell Master. This sets the instrument to the factory preset state.
14. Press the **MODE** key. Use the **Down Arrow** key to select EVDO and then press the **ENTER** key.
15. Press the External Ref Freq soft key and then the **ENTER** key to accept the External 10 MHz Reference.
16. Press the **MEAS/DISP** key and then select the Setup soft key.
17. Press the PN Search soft key and then press the External Auto soft key.
18. Press the Back soft key.
19. Press the Data Modulation Type soft key and ensure that Auto is selected.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

20. On the MG3700A, press the **Frequency** key and enter 870.03 MHz.
21. Press the **Level** key, enter 0 dBm.
22. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 870 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
23. Adjust the MG3700A output so that the power meter reads 0 dBm ± 0.2 dB. Record the power meter reading in Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.
24. On the Cell Master, press the **FREQ/DIST** key and set the center frequency to 870.03 MHz.

25. Option 34, 1xEV-DO Over The Air Test

a. Press the Over the Air Meas soft key.

b. Allow the Cell Master to update its display.

c. Record the PN 0 Tau value in Table A-20 "1xEV-DO Over The Air (Option 34)" on page A-7.

d. Verify the value is ≤ ± 1 μs.

26. Option 62, 1xEV-DO RF Measurements

a. Press the RF Meas soft key and then the Active soft key.

b. Allow the Cell Master to update its display.

c. Record the Ch Power(rms) (dBm) and Freq Error value in Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.

d. Use the following formula to calculate the Channel Power error and record the result to the error column in Table A-25.

```
Channel Power error =
[Power Meter value in Step 23] – [Ch Power(rms)(dBm)] + 0.1 dB
```

e. Verify that the Channel Power error is ≤ ± 1.5 dB.

f. Verify that the frequency error is ≤ ± 50 Hz.

27. Option 63, 1xEV-DO Demodulation

a. Press the CDP soft key.

b. Press the MAC Code Power soft key.

c. Record the Pilot&Mac Pwr (dBm) and Rho Pilot values to the test records in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11.

d. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26

```
Pilot and MAC Power error =
[Power Meter value in Step 23] – [Pilot&Mac Pwr (dBm)] + 0.1 dB
```

e. Verify that the Pilot and MAC Power error is ≤ ± 1.5 dB.

f. Verify that the Rho Pilot value is ≥ 0.985.

g. Press the Data Code Power soft key.

h. Record the Active Data (dBm) value in Table A-26.

i. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

```
Data Power error =
[Power Meter value in Step 23] – [Active Data (dBm)] + 0.1 dB
```

j. Verify that the Data Power error is ≤ ± 1.0 dB.

16-QAM Modulation Tests (1930.05 MHz, –50 dBm)

1. On the MG3700A, change the selected pattern to FWD_2457_6kbps_1slot and the frequency to 1930.05 MHz.
2. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the input signal frequency (for example, 1930 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB. Record the power meter reading in Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.
4. On the Cell Master, press the **FREQ/DIST** key.
5. Press the Center soft key and change the frequency to 1930.05 MHz.
6. Option 34, 1xEV-DO Over The Air Test
    a. Press the Over the Air Meas soft key.
    b. Allow the Cell Master to update its display.
    c. Record the PN 0 Tau value in Table A-20 "1xEV-DO Over The Air (Option 34)" on page A-7.
    d. Verify the value is ≤ ± 1 μs.
7. Option 62, 1xEV-DO RF Measurements
    a. Press the RF Meas soft key and then the Active soft key.
    b. Allow the Cell Master to update its display.
    c. Record the Ch Power(rms) (dBm) and Freq Error value to the test records in Table A-25.
    d. Use the following formula to calculate the channel power error and record the result to the error column in Table A-25.

    ```
    Channel Power error =
    [Power Meter value in Step 3] – [Ch Power(rms)(dBm)] + 0.1 dB
    ```

    e. Verify that the Channel Power error is ≤ ± 1.5 dB.
    f. Verify that the frequency error is ≤ ± 50 Hz.
8. Option 63, 1xEV-DO Demodulation
    a. Press the CDP soft key.
    b. Press the MAC Code Power soft key.
    c. Record the Pilot&Mac Pwr (dBm) and Rho Pilot values in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11.
    d. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

    ```
    Pilot and MAC Power error =
    [Power Meter value in Step 3] – [Pilot&Mac Pwr (dBm)] + 0.1 dB
    ```

    e. Verify that the Pilot and MAC Power error is ≤ ± 1.5 dB.
    f. Verify that the Rho Pilot value is ≥ 0.985.
    g. Press the Data Code Power soft key.
    h. Record the Active Data (dBm) value to the test records in Table A-26.

i. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

```
Data Power error =
[Power Meter value in Step 49] – [Active Data (dBm)] + 0.1 dB
```

j. Verify that the Data Power error is ≤ ± 1.0 dB.

8-PSK Modulation Tests

1. On the MG3700A, change the selected pattern to FWD_921_6kbps_2slot and the frequency to 870.03 MHz.
2. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the input signal frequency (for example, 870 MHz), which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB. Record the power meter reading to the test records of Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.
4. Option 34, 1xEV-DO Over The Air Test
    a. Press the Over the Air Meas Soft key.
    b. Allow the Cell Master to update its display.
    c. Record the PN 0 Tau value to the test record in Table A-20 "1xEV-DO Over The Air (Option 34)" on page A-7.
    d. Verify the value is ≤ ± 1 µs.
5. Option 62, 1xEV-DO RF Measurements
    a. Press the RF Meas soft key and then the Active soft key.
    b. Allow the Cell Master to update its display.
    c. Record the Ch Power(rms) (dBm) and Freq Error value in Table A-25.
    d. Use the following formula to calculate the Channel Power error and record the result to the error column of the test record in Table A-25.

    ```
    Channel Power error =
    [Power Meter value in Step 3] – [Ch Power(rms)(dBm)] + 0.1 dB
    ```

    e. Verify that the Channel Power error is ≤ ± 1.5 dB.
    f. Verify that the frequency error is ≤ ± 50 Hz.
6. Option 63, 1xEV-DO Demodulation
    a. Press the CDP soft key.
    b. Press the MAC Code Power soft key.
    c. Record the Pilot&Mac Pwr (dBm) and Rho Pilot values in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11..
    d. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

    ```
    Pilot and MAC Power error =
    [Power Meter value in Step 3] – [Pilot&Mac Pwr (dBm)] + 0.1 dB
    ```

    e. Verify that the Pilot and MAC Power error is ≤ ± 1.5 dB.
    f. Verify that the Rho Pilot value is ≥ 0.985.
    g. Press the Data Code Power soft key.

h. Record the Active Data (dBm) value to the test records in Table A-26.

i. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

```
Data Power error =
[Power Meter value in Step 3] – [Active Data (dBm)] + 0.1 dB
```

j. Verify that the Data Power error is $\leq \pm$ 1.0 dB.

QPSK Modulation Tests

1. On the MG3700A, change the selected pattern to FWD_38_4kbps_16slot and the frequency to 1930.05 MHz.
2. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 1930 MHz), which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
3. Adjust the MG3700A output so that the power meter reads 0 dBm ± 0.2 dB. Record the power meter reading to the test records of Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.
4. On the Cell Master, press the **FREQ/DIST** key.
5. Press the Center soft key and change the frequency to 1930.05 MHz.
6. Option 34, 1xEV-DO Over The Air Test
   a. Press the Over the Air Meas Soft key.
   b. Allow the Cell Master to update its display.
   c. Record the PN 0 Tau value to the test record in Table A-20 "1xEV-DO Over The Air (Option 34)" on page A-7.
   d. Verify the value is ≤ ± 1 µs.
7. Option 62, 1xEV-DO RF Measurements
   a. Press the RF Meas soft key and then the Active soft key.
   b. Allow the Cell Master to update its display.
   c. Record the Ch Power(rms) (dBm) and Freq Error value to the test records in Table A-25.
   d. Use the following formula to calculate the Channel Power error and record the result to the error column in Table A-25.

      `Channel Power error =`

      `[Power Meter value in Step 3] – [Ch Power(rms)(dBm)] + 0.1 dB`
   e. Verify that the Channel Power error is ≤ ± 1.5 dB.
   f. Verify that the frequency error is ≤ ± 50 Hz.
8. Option 63, 1xEV-DO RF Measurements
   a. Press the CDP soft key.
   b. Press the MAC Code Power soft key.
   c. Record the Pilot&Mac Pwr (dBm) and Rho Pilot values in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11"1xEV-DO Demodulation (Option 63)" on page A-11.
   d. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

      `Pilot and MAC Power error =`

      `[Power Meter value in Step 3] – [Pilot&Mac Pwr (dBm)] + 0.1 dB`
   e. Verify that the Pilot and MAC Power error is ≤ ± 1.5 dB.
   f. Verify that the Rho Pilot value is ≥ 0.985.
   g. Press the Data Code Power soft key.
   h. Record the Active Data (dBm) value to the test records in Table A-26.

i. Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11.

```
Data Power error =
[Power Meter value in Step 3] – [Active Data (dBm)] + 0.1 dB
```

j. Verify that the Data Power error is ≤ ± 1.0 dB.

Idle Slot Tests

1. On the MG3700A, change the selected pattern to FWD_Idle and frequency to 870.03 MHz.
2. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 870 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
3. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB. Record the power meter reading to the test records of Table A-25 "1xEV-DO RF Measurements (Option 62)" on page A-10.
4. Option 34, 1xEV-DO Over The Air Test
   - **a.** Press the Over the Air Meas soft key.
   - **b.** Allow the Cell Master to update its display.
   - **c.** Record the PN 0 Tau value in Table A-20 "1xEV-DO Over The Air (Option 34)" on page A-7.
   - **d.** Verify the value is ≤ ± 1 μs.
5. Option 62, 1xEV-DO RF Measurements
   - **a.** Press the RF Meas soft key and then the Idle soft key.
   - **b.** Allow the Cell Master to update its display.
   - **c.** Record the Ch Power(rms) (dBm) and Freq Error value in Table A-25.
   - **d.** Use the following formula to calculate the Channel Power error and record the result to the error column of Table A-25.

     ```
     Channel Power error =
     [Power Meter value in Step 3] – [Ch Power(rms)(dBm)] + 0.1 dB
     ```
   - **e.** Verify that the channel power error is ≤ ± 1.5 dB.
   - **f.** Verify that the frequency error is ≤ ± 50 Hz.
6. Option 63, 1xEV-DO RF Measurements
   - **a.** Press the CDP soft key.
   - **b.** Press the MAC Code Power soft key.
   - **c.** Record the Pilot&Mac Pwr (dBm) and Rho Pilot values to the test records in Table A-26 "1xEV-DO Demodulation (Option 63)" on page A-11.
   - **d.** Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column in Table A-26.

     ```
     Pilot and MAC Power error =
     [Power Meter value in Step 3] – [Pilot&Mac Pwr (dBm)] + 0.1 dB
     ```
   - **e.** Verify that the Pilot and MAC Power error is ≤ ± 1.5 dB.
   - **f.** Verify that the Rho Pilot value is ≥ 0.985.
   - **g.** Press the Data Code Power soft key.
   - **h.** Record the Active Data (dBm) value in Table A-26.
   - **i.** Use the following formula to calculate the Pilot and MAC Power error and record the result to the error column of the test record in Table A-26.

     ```
     Data Power error =
     [Power Meter value in Step 3] – [Active Data (dBm)] + 0.1 dB
     ```
   - **j.** Verify that the Data Power error is ≤ ± 1.0 dB.

3-16 GSM RF Measurements Option Verification (Option 40)

The test in this section is used to verify the functionality of the GSM Analyzer in the Cell Master. This test is only used for MT8212B units equipped with Option 40.

Equipment Required:

- Anritsu MG3700A Vector Signal Analyzer with Options MG3700A-002, MG3700A-021
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor with Option 1
- Anritsu 34NN50A N(m) to N(m) Adapter
- Anritsu 15NN50-1.5C Cable
- Aeroflex/Wienschel 1870A Power Splitter
- 10 MHz Reference
- 50 Ohm BNC(m) to BNC(m) cables (2)

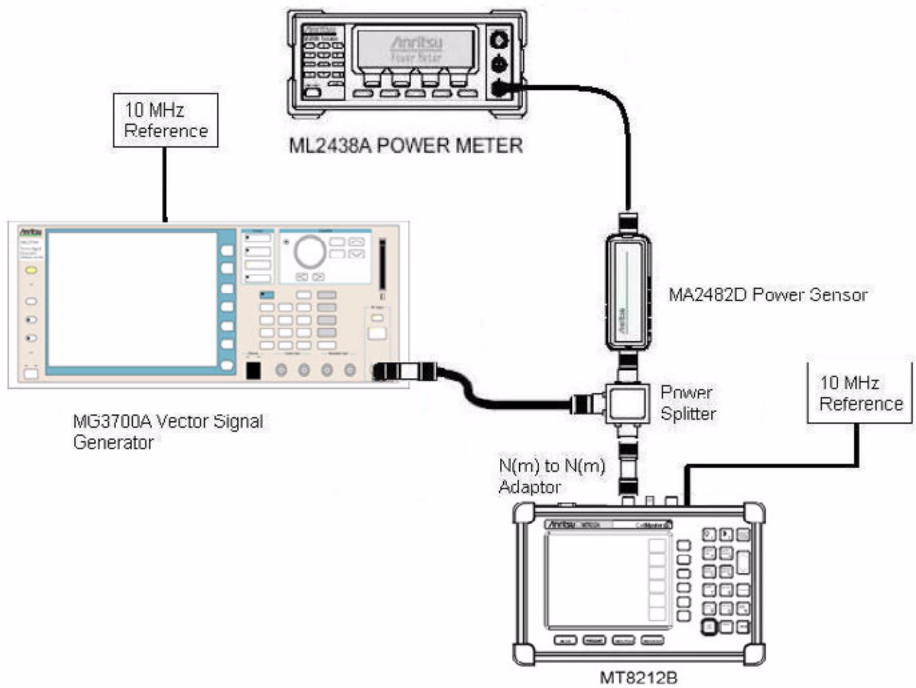


Figure 3-8. GSM RF Measurement Test Setup

Procedure:

1. Connect the equipment a shown in Figure 3-8. Confirm that the external 10 MHz reference is connected to both the 10 MHz Ref input of the MG3700A and the Ext Freq Ref input of the MT8212B.
2. Calibrate the power sensor prior to connecting to the power splitter.
3. On the MG3700A, press the **Preset** key (yellow key on the upper-left hand side).
4. Press the **Down Arrow** key or turn the knob to select Yes.
5. Press the **Set** key.

Note	Both **Set** keys on the MG3700A have the same function.

6. Press the F1 (Load File to Memory) soft key.

7. Press the F1 (Select Package) soft key again.
8. Using the **Down Arrow** key step through the selection list until the GSM option is highlighted.
9. Press the **Set** key.
10. Press the F6 (Return) soft key.
11. Press the Set key. The Select Package box will appear. Again select GSM and press the **Set** key.
12. Another file list will appear. Select GsmBurst_1slot.
13. Press the **Set** key.
14. Press the **MOD On/Off** key to turn the Modulation LED on and verify the “Playing” indicator is flashing.
15. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
16. Press the **MODE** key. Use the down arrow key to select GSM and then press the **ENTER** key.
17. Press the **SYS** key and then the Application Options soft key.
18. Press the **ENTER** key to accept the external 10 MHz reference.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

Channel Power, Burst Power and Frequency Error Tests

1. On the Cell Master, press the **FREQ/DIST** key and set the center frequency to 935 MHz.
2. On the MG3700A, press the **Frequency** key and enter 935 MHz.
3. Press the **Level** key, enter –15 dBm.
4. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 935 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
5. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the power meter reading in Table A-21 "GSM RF Measurements (Option 40)" on page A-8.
6. Allow the Cell Master to update its display.
7. Record the values of Ch Pwr, Burst Power and Freq Error (Hz) in Table A-21.
8. Verify the Frequency error is ≤ ± 10 Hz.
9. Subtract the Ch Pwr reading from the power meter reading recorded in Step 4 and record the calculated value in Table A-21. Verify that the difference is ± 1.5 dB.
10. Calculate the burst power error using the following formula:

    `Burst power error = power meter reading – burst power reading + 9.21`
11. Verify that the burst power error is ≤ ± 2.0 dB.
12. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB. Record the power meter reading in Table A-21.
13. Repeat Step 5 through Step 9 for signal level of –10 dBm. Verify that the burst power error is ≤ ± 1.5 dB.
14. On the MG3700A, change the selected signal pattern to GsmBurst_8slot.
15. Repeat Step 3 through Step 12. Use the following formula when calculate the burst power error:

    `Burst power error = power meter reading – burst power reading + 0.2`
16. On the MG3700A, press the **Frequency** key and enter 1805.2 MHz.
17. Change the selected signal pattern back to GsmBurst_1slot.
18. Repeat Step 2 to Step 13 for signal frequency of 1805.2 MHz.

3-17 CDMA Signal Analyzer Options Verification (Option 42 and Option 43)

The test in this section is used to verify the functionality of the CDMA Signal Analyzer in the Cell Master. This test is only used for MT8212B units equipped with Option 42 and Option 43.

Equipment Required:

- Anritsu MG3700A Vector Signal Analyzer with Options MG3700A-002, MG3700A-021
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor with Option 1
- Anritsu 34NN50A N(m) to N(m) Adapter
- Anritsu 15NN50-1.5C Cable
- Aeroflex/Wienschel 1870A Power Splitter
- 10 MHz Reference
- 50 Ohm BNC(m) to BNC(m) cables (3)

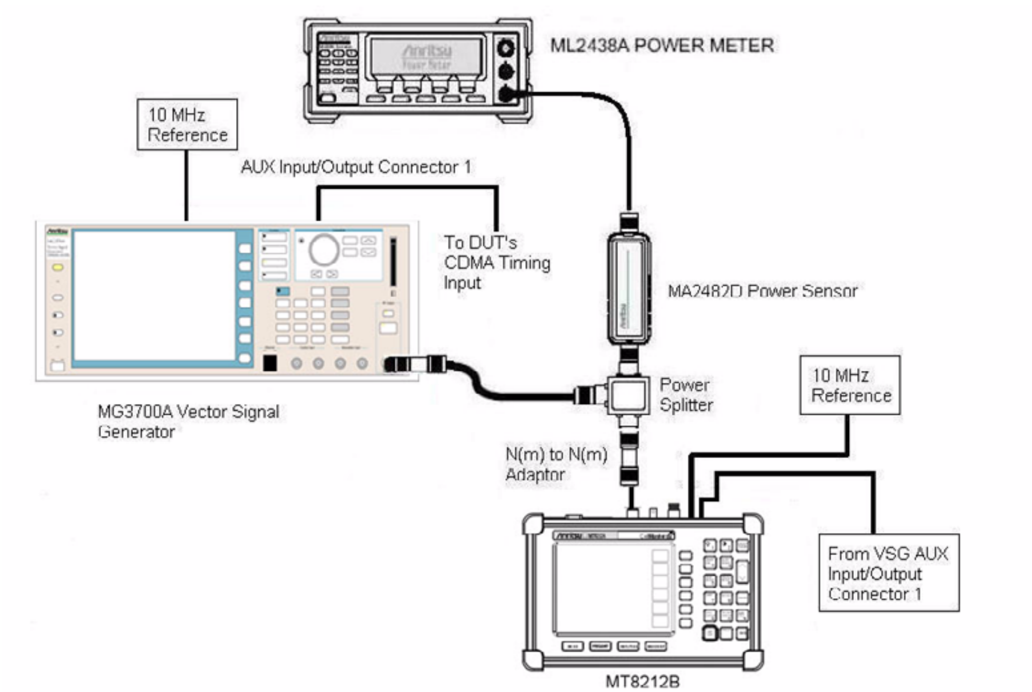


Figure 3-9. CDMA Signal Analyzer Setup

Procedure:

1. Connect the equipment as shown in Figure 3-9. Ensure that the external 10 MHz reference is connected to both the 10 MHz Ref input of the MG3700A and the Ext Freq Ref input of the MT8212B.
2. Calibrate the power sensor prior to connecting to the power splitter.
3. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
4. Press the **Down Arrow** key or turn the knob to select Yes.
5. Press the **Set** key.

Note	Both **Set** keys on the MG3700A have the same function.

6. Press the F1 (Load File to Memory) soft key.
7. Press the F1 (Select Package) soft key again.

8. Using the **Down Arrow** key step through the selection list until the CDMA2000 option is highlighted.
9. Press the **Set** key.
10. Press the F6 (Return) soft key.
11. Press the **Set** key. The Select Package box will appear. Again select CDMA2000 and press **Set**.
12. Another file list will appear. Select FWD_RC1-2_9Channel.
13. Press the **Set** key.
14. Press the **MOD On/Off** key to turn the Modulation LED on and verify the "Playing" indicator is flashing.
15. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
16. Press the **MODE** key. Use the **Down Arrow** key to select CDMA and then press the **ENTER** key.
17. Press the External Ref Freq soft key and then press the **ENTER** key to accept external 10 MHz reference.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

18. On the MG3700A, press the **Frequency** key and enter 870.03 MHz.
19. Press the **Level** key, enter –15 dBm.
20. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 870 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
21. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the power meter reading in Table A-22 "CDMA RF Measurements (Option 42)" on page A-9.
22. On the Cell Master, press the **FREQ/DIST** key and set Center Frequency to 870.03 MHz.
23. Press the **MEAS/DISP** key and then select the Setup soft key.
24. Press the PN Search soft key and then press the External Auto soft key.
25. Allow the Cell Master to update its display.
26. Record the values of Ch Power(rms) (dBm) and Freq Error (Hz) in Table A-22"CDMA RF Measurements (Option 42)" on page A-9.
27. Verify that the Freq Error is ≤ ±50 Hz.
28. Subtract the Ch Power value from the power meter value recorded in Step 21. Verify that the difference is ≤ ± 1.5 dB.
29. For units equipped with Option 43, record the value of Rho in Table A-23 "cdmaOne and CDMA2000 1xRTT Demodulation (Option 43)" on page A-9.
30. Verify that the Rho value is ≥ 0.98.
31. On the MG3700A, change the frequency to 1930.05 MHz.
32. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 1930 MHz), which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
33. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the power meter reading in Table A-22.
34. On the Cell Master, press the **FREQ/DIST** key and set the center frequency to 1930.05 MHz.
35. Repeat Step 25 through Step 30. Subtract the Ch Power value from the power meter value recorded in Step 33.
36. On the MG3700A, change the select signal pattern to FWD_RC3-5_9Channel.
37. Repeat Step 18 through Step 35.

3-18 T1/E1 Verification (Option 50)

This procedure verifies that the T1/E1 Tester of the Cell Master is functioning properly. This test is only used for MT8212B equipped with Option 50.

Equipment Required:

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

Procedures:

T1/E1 Self Test

1. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
2. Press the **SYS** key, then the Self Test soft key.
3. When the Cell Master has passed the standard self test, press the T1/E1 Test soft key.
4. Connect both the Transmit and Receive ports with the Bantam-Plug-to-Bantam-Plug Extender Cable, then press the **ENTER** key.
5. When the Cell Master has passed the T1/E1 self test, press the **ESCAPE/CLEAR** key.

T1 Mask Test

1. Set the Differential Signal Adapter switch to 100 Ohms and connect it to CH1 of the oscilloscope.
2. Connect one end of the extender cable to the TRANSMIT port of the Cell Master and the other end to the Differential Signal Adapter.
3. On the Cell Master, press the **MODE** key, then use **Up/Down** key to highlight T1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key.
6. Press **MEAS/DISP** again and select the Setup soft key.
7. Press the More soft key, then select the Clock Source soft key.
8. Press the Internal soft key, then press the Back soft key.
9. Press the Transmit Level soft key and select 0 dB, then press the Back soft key twice.
10. Press the Pattern soft key, then use the **Up/Down** arrow key to highlight 1 IN 8 and press the **ENTER** key.
11. Set up the oscilloscope as follows:
    a. Press the **Quick Menu** key, then use the Menu soft key to select Telecom.
    b. Use the Standard arrow soft key to select G.703DS1 (ITU-T), 1.544 M b/s.
    c. Press the **Autoset** key. The yellow waveform should fall within the blue mask.
    d. Press the Waveform Threshold soft key, and use the Control/Coarse knob to set the waveform to 400 and the threshold to 20.
    e. Press the Autofit soft key and use the control/coarse knob to set the number to 1.
    f. Press the Run Test soft key.
12. Note the failed number for 400 waveforms. The failed number should be less than the selected threshold, which is 20.

E1 Mask Test

1. Set the Differential Signal Adapter switch to 120 Ohms and connect it to CH1 input of the oscilloscope.
2. Connect one end of the extender cable to the TRANSMIT port of the Cell Master and the other end to the Differential Signal Adapter.
3. On the Cell Master, press the **MODE** key, then use **Up/Down** key to highlight E1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key.
6. Press **MEAS/DISP** again and select the Setup soft key.
7. Press the More soft key, then press the Impedance soft key and select 120 Ω.
8. Press the Back soft key, then select the Clock Source soft key.
9. Press the Internal soft key, then press the Back soft key twice.
10. Press the Pattern soft key, then use the **Up/Down** arrow key to highlight 1 IN 8 and press the **ENTER** key.
11. Set up the oscilloscope as follows:
    a. Press the **QUICKMENU** key, then use the Menu soft key to select Telecom.
    b. Use the Standard arrow soft key to select E1 Sym (ITU-T), 2.048 Mb/s.
    c. Press the **AUTOSET** key. The yellow waveform should fall within the blue mask.
    d. Press the Waveform Threshold soft key, and use the Control/Coarse knob to set the waveform to 400 and the Threshold to 20.
    e. Press the Run Test soft key.
12. Note the failed number for 400 waveforms. The failed number should be less than the selected threshold, which is 20.

T1 Transmit Level Test

1. Set the Differential Signal Adapter switch to 100 Ohms and connect it to CH1 input of the oscilloscope.
2. Connect one end of the extender cable to the TRANSMIT port of the Cell Master and the other end to the Differential Signal Adapter.
3. Turn off the Cell Master.
4. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
5. Press the **MODE** key, then use **Up/Down** key to highlight T1 Tester and press the **ENTER** key.
6. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
7. Press the Back soft key, then press the BERT soft key.
8. Press **MEAS/DISP** again and select the Setup soft key.
9. Press the More soft key, then select the Clock Source soft key.
10. Press the Internal soft key, then press the Back soft key.
11. Press the Transmit Level soft key and select 0 dB, then press the Back soft key twice.
12. Press the Pattern soft key, then use the **Up/Down** arrow key to highlight 1 IN 8 and press the **ENTER** key.

13. Set up the oscilloscope as follows:
    a. Press **QUICK MENU**, then use the Menu soft key to select Telecom.
    b. Use the Standard arrow soft key to select None.
    c. Use the Menu soft key again to select Scope.
    d. Press the **AUTOSET** key, then set the horizontal SCALE to 2 micro seconds.
    e. Press the **MEASURE** key, then press the More soft key until pk-pk appears.
    f. Select the Pk-Pk soft key and record the Pk-Pk measurement in Table A-24 "T1/E1 Transmit Level (Option 50)" on page A-10.

E1 Transmit Level Test

1. Set the Differential Signal Adapter switch to 120 Ohms and connect it to CH1 input of the oscilloscope.
2. Turn off the Cell Master.
3. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
4. Press the **MODE** key, then use **Up/Down** key to highlight E1 Tester and press the **ENTER** key.
5. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select terminate at the bottom of the display.
6. Press the Back soft key, then press the BERT soft key.
7. Press **MEAS/DISP** again and select the Setup soft key.
8. Press the More soft key, then select the Clock Source soft key.
9. Press the Internal soft key, then press the Back soft key.
10. Press the Impedance soft key and select 120 Ω, then press the Back soft key twice.
11. Press the Pattern soft key, then use the **Up/Down** arrow key to highlight 1 IN 8 and press the **ENTER** key.
12. Set up the oscilloscope as follows:
    a. Press **QUICK MENU**, then use the Menu soft key to select Telecom.
    b. Use the Standard arrow soft key to select None.
    c. Use the Menu soft key again to select Scope.
    d. Press the **AUTOSET** key, then set the horizontal SCALE to 1 micro second.
    e. Press the **MEASURE** key, then press the More soft key until pk-pk appears.
    f. Select the Pk-Pk soft key and record the Pk-Pk measurement in Table A-24.

T1 Error Detection Verification

1. Turn off the Cell Master.
2. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
3. Press the **MODE** key, then use **Up/Down** key to highlight T1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key.
6. Press **MEAS/DISP** again and select the Setup soft key.
7. Press the More soft key, then select the Clock Source soft key.

8. Press the Internal soft key, then press the Back soft key.
9. Press the Setup Error Insert soft key, then select the Bit soft key. Select the Burst soft key. Enter a number (for example, 150) and press the **ENTER** key.
10. Press the Back soft key, then select the Transmit Level soft key and select 0 dB.
11. Connect both the Transmit and Receive ports with the Bantam-Plug-to-Bantam-Plug Extender Cable.
12. Press the **MEAS/DISP** key, then press the BERT soft key. Select the Start/Stop Measure soft key.
13. Press the Insert Errors soft key and observe the number in the Bit Errors row. The number must match the number entered in Step 9 above. This number must increase by the number entered in Step 9 above every time the Insert Errors soft key is pressed. For example, if 150 is entered in Step 9, the first number observed is 150. The next time the Insert Errors soft key is pressed, the number must be 300, and so forth.

E1 Error Detection Verification

1. Turn off the Cell Master.
2. Press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
3. Press the **MODE** key, then use **Up/Down** key to highlight E1 Tester and press the **ENTER** key.
4. Press the **MEAS/DISP** key and the Vpp soft key, and use the Terminate/Bridged soft key to select Terminate at the bottom of the display.
5. Press the Back soft key, then press the BERT soft key and select the Setup BERT soft key.
6. Press the More soft key, then select the Clock Source soft key.
7. Press the Internal soft key, then press the Back soft key.
8. Press the Impedance soft key and select 120 Ω, then press the Back soft key twice.
9. Press the Setup Error Insert soft key, then select the Bit soft key, then the Burst soft key. Enter a number (for example, 150) and press the **ENTER** key.
10. Press the Back soft key three times.
11. Connect both the Transmit and Receive ports with the Bantam-Plug-to-Bantam-Plug Extender Cable.
12. Press the **MEAS/DISP** key. Select the BERT soft key, then select the Start/Stop Measure soft key.
13. Press the Insert Errors soft key and observe the number in the Bit Errors row. The number must match the number entered in Step 9 above. This number must increase by the number entered in Step 9 above every time the Insert Errors soft key is pressed. For example, if 150 is entered in Step 9, the first number observed is 150. The next time the Insert Errors soft key is pressed, the number must be 300, and so forth.

3-19 iDEN Signal Analyzer Option Verification (Option 68)

The test in this section is used to verify the functionality of the iDEN Signal Analyzer in the Cell Master. This test is only used for MT8212B units equipped with Option 68.

Equipment Required:

- Anritsu MG3700A Vector Signal Analyzer with Options MG3700A-002, MG3700A-021
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor with Option 1
- Anritsu 34NN50A N(m) to N(m) Adapter
- Anritsu 15NN50-1.5C Cable
- Aeroflex/Wienschel 1870A Power Splitter
- 10 MHz Reference
- 50 Ohm BNC(m) to BNC(m) cables (2)

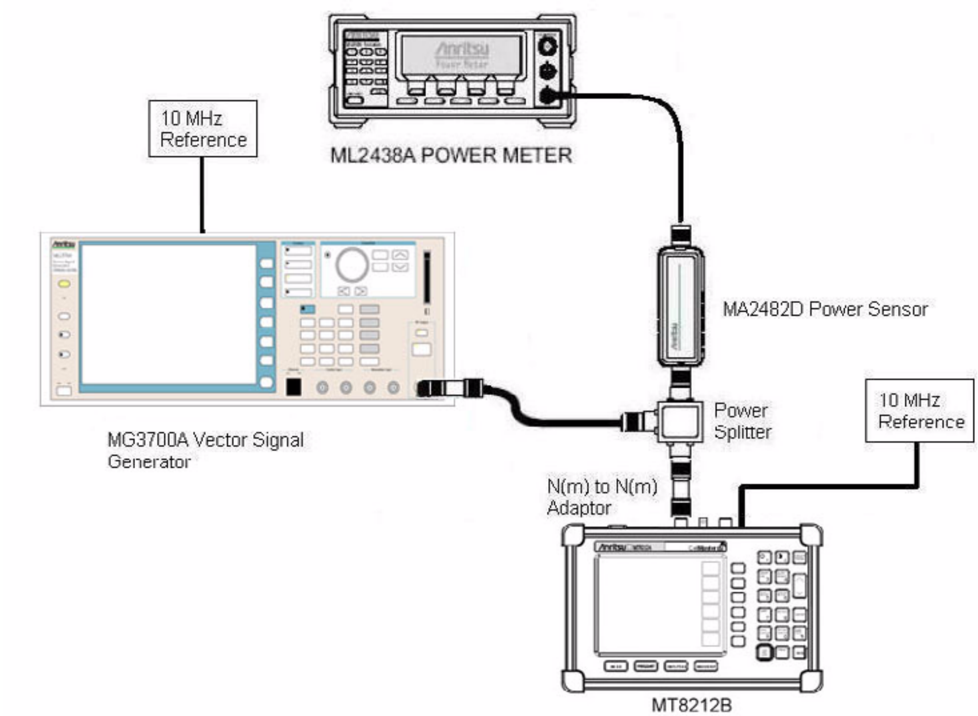


Figure 3-10. iDEN Signal Analyzer Setup

Procedure:

1. Connect the equipment a shown in Figure 3-10. Ensure that the external 10 MHz reference is connected to both the 10 MHz Ref input of the MG3700A and the Ext Freq Ref input of the MT8212B.
2. Calibrate the power sensor prior to connecting it to the power splitter.
3. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
4. Press the down arrow key or turn the knob to select Yes.
5. Press the **Set** key.

Note	Both **Set** keys on the MG3700A have the same function.

6. Press the F1 (Load File to Memory) soft key.
7. Press the F1 (Select Package) soft key again.
8. Using the down arrow key step through the selection list until the Convert_IQproducer option is highlighted.
9. Press the **Set** key.
10. Press the F6 (Return) soft key.
11. Press the **Set** key. The Select Package box will appear. Again select Convert_IQproducer and press **Set**.
12. Another file list will appear. Select iDEN_AMS.
13. Press the **Set** key.
14. Press the **MOD On/Off** key to turn on the Modulation LED and verify the “Playing” indicator is flashing.
15. Press the **Frequency** key and set the frequency to 858.50 MHz.
16. On the Cell Master, press and hold the **ESCAPE/CLEAR** key, then press the **ON/OFF** key to turn on the Cell Master. This sets the instrument to the factory preset state.
17. Press the **MODE** key. Use the **Down Arrow** key to select GSM and then press the **ENTER** key.
18. Press the **SYS** key and then the Application Options soft key.
19. Press the **ENTER** key to accept the external 10 MHz reference.

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

20. On the MG3700A, set the frequency to 858.50 MHz.
21. On the power meter, press the **Sensor** key, the Cal Factor soft key, and the Freq soft key. Use the keypad to enter the input signal frequency (for example, 858.5 MHz), which sets the power meter to the proper power sensor cal factor. Press the System key to display the power reading.
22. Adjust the MG3700A output so that the power meter reads –20 dBm ± 0.2 dB. Record the power meter reading in Table A-27 "iDEN Signal Analyzer (Option 68)" on page A-12.
23. .On the Cell Master, press the **FREQ/DIST** key.
24. Press the Center soft key and change the frequency to 858.50 MHz.
25. Press the **MEAS/DISP** key and then the Spectrum soft key.
26. Allow the Cell Master to update its measurement display.
27. Record the Freq Error (Hz) and Main Ch Power (dBm) values to the test records in Table A-27.
28. Verify that the Freq Error value is ≤ ± 43 Hz.
29. Use the following formula to calculate the channel power error and record the result to the error column of the test record in Table A-27.

```
Channel power error =
[power meter value in step 22] – [Main Ch Power (dBm)] + 0.1 dB
```

30. Verify that the channel power error is ≤ ± 1.5 dB.

3-20 Model ICN50 InstaCal Module Verification

This test verifies the performance of the Anritsu Cell Master InstaCal Calibration Module. The InstaCal Module, part number ICN50, is an optional accessory for the MT8212B.

Equipment Required:

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

Procedure:

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

Note	Before continuing, allow a 5 minute warm up for the internal circuitry to stabilize.

2. Press the **MODE** key.
3. Use the **Up/Down** arrow key to highlight RETURN LOSS, then press the **ENTER** key.
4. Press the **START CAL** key. The message "CONNECT OPEN or InstaCal TO RF Out PORT" appears in the display.
5. Connect the InstaCal module to the RF Out port and press the **ENTER** key.

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

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

Note	Selecting the YES (option to replace InstaCal data) soft key transfers all of the characterization data from this InstaCal module to the Cell Master. The transfer may take up to three minutes. This option is preferred if this InstaCal module is to stay with this particular Cell Master. Once completed, the data does not need to be transferred again for this combination of Cell Master and InstaCal module. Selecting the NO (option to replace InstaCal data) soft key temporarily transfers, the portion of the characterization data necessary for this particular calibration. This transfer takes approximately 30 seconds to 60 seconds, and has to be repeated every time a calibration is done using this combination of Cell Master and InstaCal module.

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

Chapter 4 — Assembly Replacement

This chapter describes the removal and replacement procedures for the various assemblies. Table 4-1 lists the replaceable parts. The following removal and replacement procedures are included in this chapter:

- "Front Panel Assembly Replacement"
- "LCD Assembly Replacement"
- "Keypad PCB Replacement"
- "Keypad Membrane Replacement"
- "Main PCB Assembly Replacement"
- "T1/E1 Tester PCB Assembly Replacement"

Caution	Only qualified personnel should open the case and replace internal assemblies. Assemblies shown in Table 4-1, "Replacement Parts" 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 adjustment of screws on or near the shields may detune sensitive RF circuits and will result in degraded instrument performance. All work should be performed in a static-safe work area.

Table 4-1. Replacement Parts

Part Number	Description
15-123	Color TFT Liquid Crystal Display Assembly
3-633-26	RTC Lithium Coin Battery
633-27	Rechargeable Battery, Lithium
ND65229	MT8212B Main/SPA PCB Assembly(2)
ND66015	T1/E1 PCB Exchange Assembly
ND64376	Power Monitor PCB Exchange Assembly
40-168-R	AC Power Converter
52737-3	Keypad PCB Assembly
46649-4	Membrane Keypad, Main
61440-1	Top Case only
61441-3	LCD Interface Cable
46653-3	Bottom Case only
48231-3	Battery Door
46655-1	Case Corner Bumper
61502	MT8212B Model Label

(2)When ordering the Main/SPA PCB Assembly the options that are to be installed on the board must be defined. The options of the Cell Master are listed on a tag at the top of the MT8212B.

4-1 Front Panel Assembly Replacement

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

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the Cell Master.

Caution	The MT8212B contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the MT8212B instrument.

1. Place the Cell Master face up on a stable work surface.
2. Remove the four rubber corner bumpers by carefully lifting and sliding the bumpers off of the case corners (Figure 4-1).

Figure 4-1. Removing the Corner Bumpers

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

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

5. Carefully depress the latch tab and disconnect the LCD display cable from J3 on the main PCB (Figure 4-2).

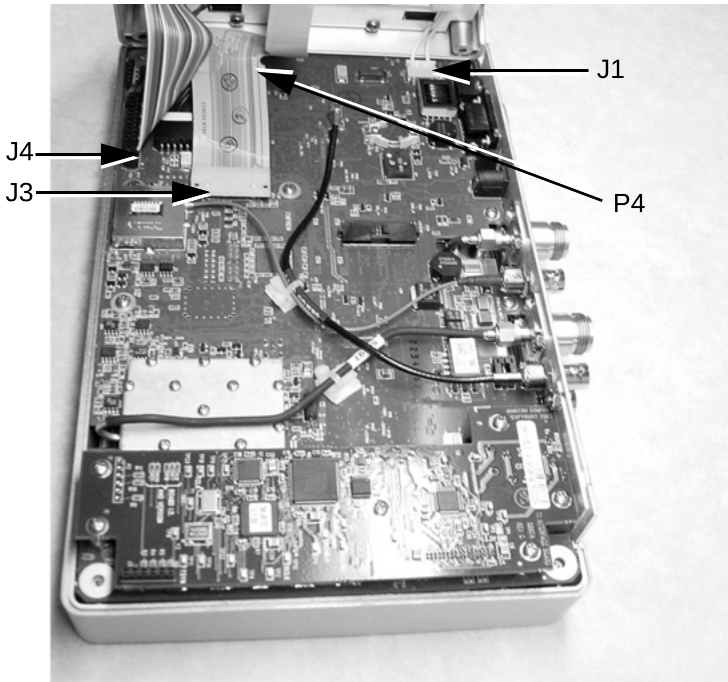


Figure 4-2. Cell Master Front Panel Cable Connections

6. Carefully disconnect the keypad interface cable from J4 on the main PCB.
7. Carefully disconnect the LCD display backlight cable from J1 on the main PCB.
8. Carefully disconnect the speaker cable from P4 on the main PCB.
9. Remove the front panel assembly.
10. Reverse the above steps to replace the front panel assembly.

Note	The corner bumpers only mount one way. That is, the raised area inside one end of the bumper (Figure 4-3) is made to conform to the contour of the front cover only.

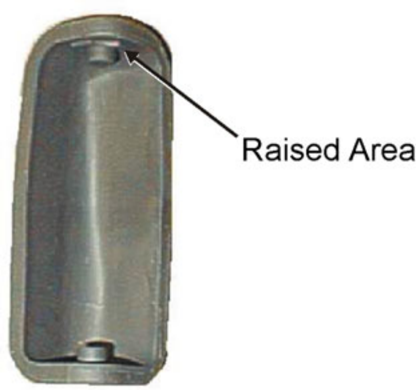


Figure 4-3. Corner Bumper Detail

4-2 LCD Assembly Replacement

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

Caution	All work should be performed in a static-safe work area.

1. Remove the front panel assembly as directed in "Front Panel Assembly Replacement" on page 4-2.
2. Place the front panel assembly face down on a protected work surface.
3. Remove the 14 Phillips screws that attach the backing plate to the front panel assembly (Figure 4-4).

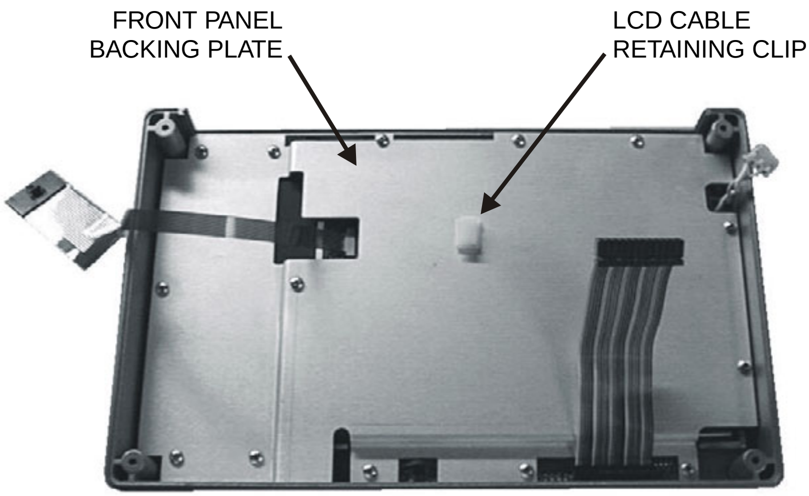


Figure 4-4. Front Panel Backing Plate

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

4-3 Keypad PCB Replacement

This procedure provides instructions for removing and replacing the keypad PCB.

Caution	All work should be performed in a static-safe work area.

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

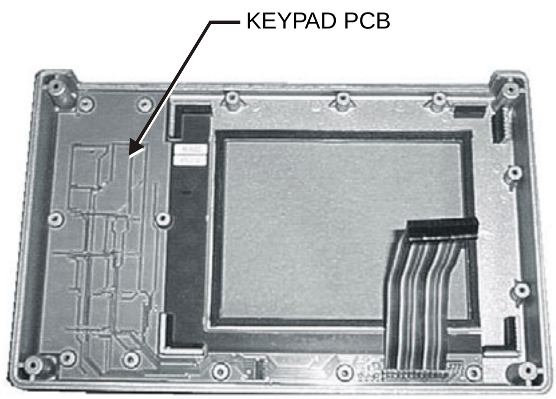


Figure 4-5. Front Panel Keypad PCB Location

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

4-4 Keypad Membrane Replacement

This procedure provides instructions for replacing the keypad membrane.

1. Remove the front panel assembly as directed in "Front Panel Assembly Replacement" on page 4-2.
2. Remove the keypad PCB as directed in "Keypad PCB Replacement" on page 4-5.
3. Remove the keypad membrane by gently pulling the membrane up and out of the holes in the front panel (Figure 4-6).

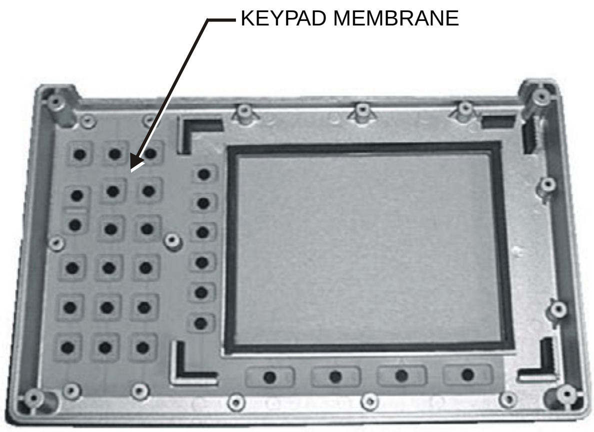


Figure 4-6. Front Panel Keypad Membrane

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

4-5 Main PCB Assembly Replacement

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

Caution	All work should be performed in a static-safe work area.

1. Remove the front panel assembly as directed in "Front Panel Assembly Replacement" on page 4-2.
2. Disconnect the battery connector from J7 on the main PCB.
3. Disconnect the semi-rigid coaxial cable from the RF In connector on the connector panel.
4. Remove the three PCB mounting screws and lift the Control PCB assembly with the connector panel attached slightly (Figure 4-7).

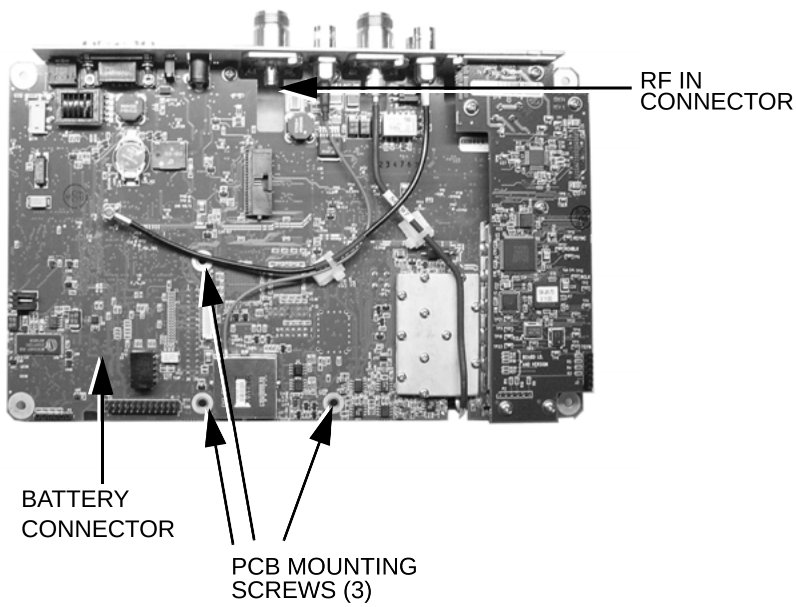


Figure 4-7. Main PCB (shown with T1/E1 PCB installed)

5. Carefully reach between the Main PCB and the SPA PCB and disconnect the cables from J2 and J4 on the SPA PCB (Figure 4-8).

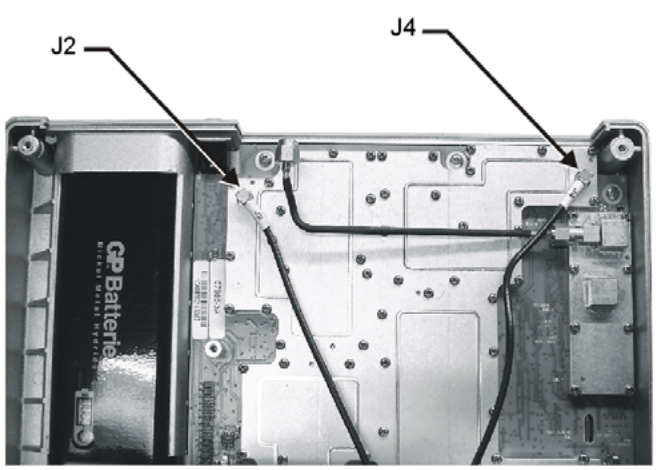


Figure 4-8. Spectrum Analyzer PCB

6. Remove the Main PCB.

7. Remove the three .25" standoffs and four Phillips screws and remove the Spectrum Analyzer PCB.

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

8. Reverse the above steps to install the new main PCB.

4-6 Option 5 Power Monitor PCB Assembly Replacement

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

1. Remove the front panel assembly as directed in “Front Panel Assembly Replacement” on page 4-2.
2. Remove the entire Main PCB assembly from the bottom case as directed in “Main PCB Assembly Replacement” on page 4-7.
3. On the upper right corner, locate and remove the nut that secures the blank plate to the connector panel.
4. Carefully remove the blank plate from the connector panel.
5. Install the new connector plate (PN 61536) to the connector panel and secure it with the nut that was removed in step 4.
6. Peel off the rectangular portion from the overlay (PN 61503) and stick it to the connector plate.
7. Install the three standoffs (PN 785-405) to the main board on the side that faces the front panel assembly and secure them with three Phillips screws (PN 900-720) from the side that faces the bottom case.
8. Install the Option 5 PCB assembly (PN 63066-3) to the main board. Carefully align J1 to J6 of the main board when installing. Refer to Figure 4-9.
9. Secure the Option 5 PCB assembly to the standoffs using the last three Phillips screws.
10. Carefully push the DIN connector through the opening on the connector panel and secure it with the nuts (PN 900-326) supplied.

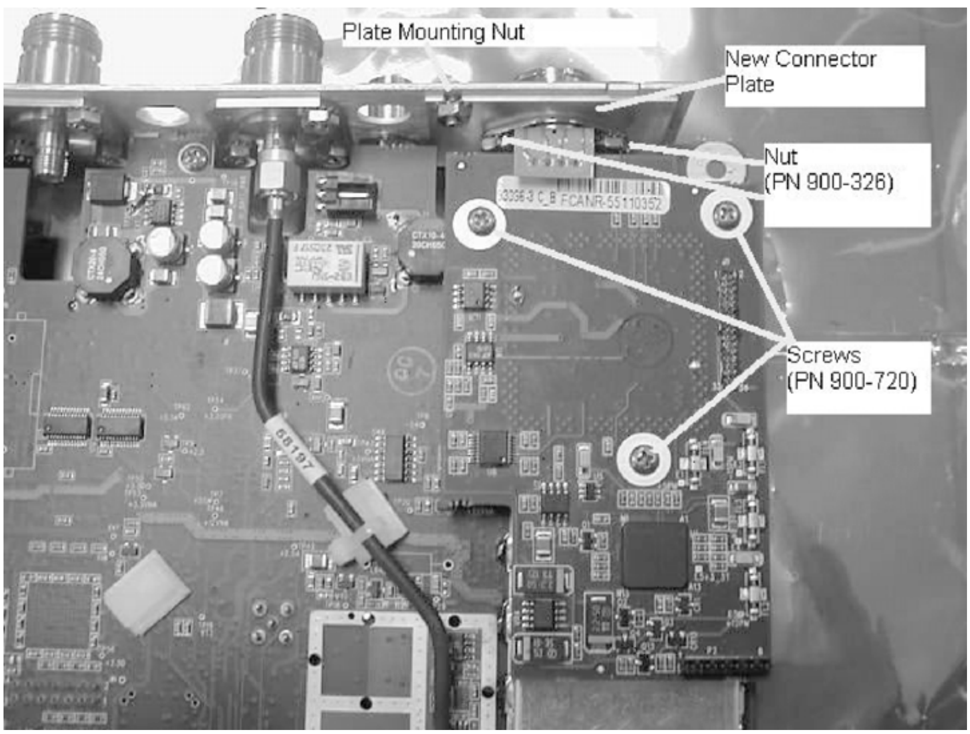


Figure 4-9. Power Monitor PCB Assembly Replacement

4-7 T1/E1 Tester PCB Assembly Replacement

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

Caution	All work should be performed in a static-safe work area.

1. Remove the front panel assembly as directed in "Front Panel Assembly Replacement" on page 4-2.
2. Remove the main PCB assembly as directed in "Main PCB Assembly Replacement" on page 4-7.
3. Remove the six T1/E1 PCB mounting screws and carefully lift the PCB assembly disconnecting J2 (T1/E1 PCB) from J6 (main PCB) (Figure 4-10).

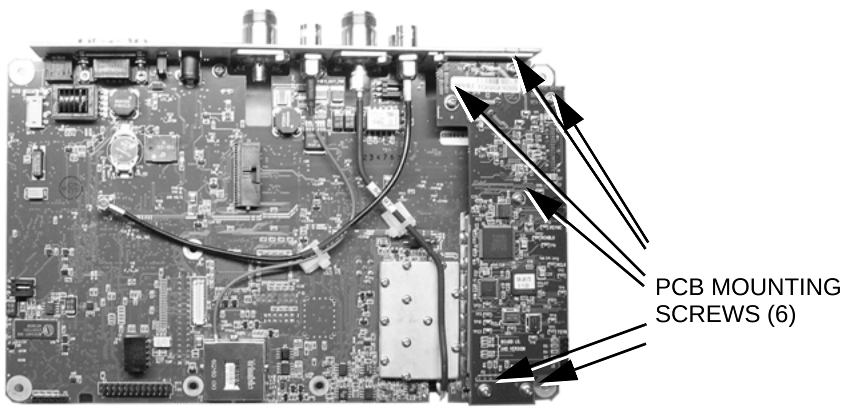


Figure 4-10. T1/E1 Tester PCB

4. After J2 and J6 (from the under side of the PCB) have been disconnected carefully lift up the bottom and pull out the PCB clearing the T1/E1 connector interface.
5. Reverse the above steps to install the new T1/E1 PCB.

Appendix A — Test Records

This appendix provides test records that can be used to record the performance of the MT8212B. Please make a copy of the following Test Record pages and document the measured values each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of the instrument's performance.

MT8212B **Firmware Revision: ________________** **Operator: ________________** **Date: ______________**

Serial Number: ________________ **Options: ____**

Table A-1. VNA Frequency Accuracy

VNA Frequency Accuracy		
Frequency (CW Mode On)	**Measured Value**	**Specification**
1000 MHz	kHz	±75 kHz

Table A-2. VNA Return Loss Verification

VNA Return Loss Verification		
Return Loss	**Measured Value**	**Specification**
6 dB Offset	dB	6 ±1.2 dB
20 dB Offset	dB	20 ±1.7 dB

Table A-3. Spectrum Analyzer Frequency Accuracy

Spectrum Analyzer Frequency Accuracy		
Frequency	**Measured Value**	**Specification**
2000 MHz	kHz	±4 kHz

Table A-4. Spectrum Analyzer SSB Phase Noise Verification

Spectrum Analyzer SSB Phase Noise Verification			
Frequency	**1000.03 MHz Calculated Value**	**999.97 MHz Calculated Value**	**Specification**
1000 MHz	dBc/Hz	dBc/Hz	≤ –75 dBc/Hz @ 30 kHz Offset and 1 kHz RBW

Table A-5. Spectrum Analyzer Spurious Response (Second Harmonic Distortion)

Spectrum Analyzer Spurious Response (Second Harmonic Distortion)		
Frequency	**Measured Value**	**Specification**
40 MHz	dBc	≤ –45 dBc @ 80 MHz

Table A-6. Spectrum Analyzer Residual Spurious Response

Spectrum Analyzer Residual Spurious Response		
Frequency	**Measured Value**	**Specification**
0.1 MHz to 10 MHz	dBm	≤ –80 dBm
10 MHz to 1 GHz	dBm	≤ –90 dBm
1 GHz to 2 GHz	dBm	≤ –90 dBm
2 GHz to 3 GHz	dBm	≤ –90 dBm

MT8212B Firmware Revision: ________________ Operator: ________________ Date: ______________

Serial Number: ________________ Options: ____

Table A-7. Spectrum Analyzer Residual Spurious Response

Spectrum Analyzer Residual Spurious Response		
Frequency	**Measured Value**	**Specification**
0.1 MHz to 10 MHz	dBm	≤ –80 dBm
10 MHz to 1 GHz	dBm	≤ –90 dBm
1 GHz to 2 GHz	dBm	≤ –90 dBm
2 GHz to 3 GHz	dBm	≤ –90 dBm

Table A-8. Spectrum Analyzer Displayed Average Noise Level

Spectrum Analyzer Displayed Average Noise Level		
Frequency	**Measured Value**	**Specification**
0.1 MHz to 10 MHz	dBm	≤ –95 dBm
10 MHz to 1 GHz	dBm	≤ –115 dBm
1 GHz to 2 GHz	dBm	≤ –115 dBm
2 GHz to 3 GHz	dBm	≤ –115 dBm

Table A-9. Spectrum Analyzer Resolution Bandwidth Accuracy

Spectrum Analyzer Resolution Bandwidth Accuracy			
Resolution Bandwidth	**Lower Limit**	**Measured Value**	**Upper Limit**
1 MHz	0.95 MHz		1.05 MHz
300 kHz	285 kHz		315 kHz
100 kHz	95 kHz		105 kHz
30 kHz	28.5 kHz		31.5 kHz
10 kHz	9.5 kHz		10.5 kHz
3 kHz	2.85 kHz		3.15 kHz
1 kHz	0.95 kHz		1.05 kHz
300 Hz	285 Hz		315 Hz
100 Hz	95 Hz		105 Hz

MT8212B **Firmware Revision:** ________________ **Operator:** ________________ **Date:** ______________

Serial Number: ________________ **Options:** ____

Table A-10. Spectrum Analyzer Level Accuracy Across Frequency, Setup Power Levels

Spectrum Analyzer Level Accuracy Across Frequency, Setup Power Levels		
Frequency	**Measured Sensor B Reading for 0 dBm @ Atten. Out**	**Measured Sensor B Reading for 39 dBm @ Atten. Out**
30 MHz	dBm	dBm
550.33 MHz	dBm	dBm
1000 MHz	dBm	dBm
1243.5 MHz	dBm	dBm
1410.5 MHz	dBm	dBm
2000 MHz	dBm	dBm
2511.5 MHz	dBm	dBm
2925 MHz	dBm	dBm

Table A-11. Spectrum Analyzer Level Accuracy Across Frequency, Measurements

Spectrum Analyzer Level Accuracy Across Frequency, Measurements			
Frequency	**Measured Value (0 dBm)**	**Measured Value (–39 dBm)**	**Specification**
30 MHz	dBm	dBm	±1.5 dB
550.33 MHz	dBm	dBm	±1.5 dB
1000 MHz	dBm	dBm	±1.5 dB
1243.5 MHz	dBm	dBm	±1.5 dB
1410.5 MHz	dBm	dBm	±1.5 dB
2000 MHz	dBm	dBm	±1.5 dB
2511.5 MHz	dBm	dBm	±1.5 dB
2925 MHz	dBm	dBm	±1.5 dB

Table A-12. Pre-Test Data with 10 dB Fixed Attenuator

Pre-Test Data with 10 dB Fixed Attenuator					
	A	**B**	**C**	**D**	**E**
Freq.	**Sensor A Reading @ Source Output**	**Sensor A Reading @ End of Attenuator**	**Splitter/Attenuator Combined Loss**	**Sensor B Reading @ Power Splitter Output**	**Sensor B Path Power Splitter Loss**
50 MHz					

MT8212B Firmware Revision: ________________ Operator: ________________ Date: ______________

Serial Number: ________________ Options: ____

Table A-13. Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels

Spectrum Analyzer Level Accuracy Through Power, Setup Power Levels	
Input Power Level @ 50 MHz	**Desired Sensor B Reading**
+3 dBm	dBm
0 dBm	dBm
–11 dBm	dBm
–13 dBm	dBm
–19 dBm	dBm
–27 dBm	dBm
–32 dBm	dBm
–39 dBm	dBm
–49 dBm	dBm
–51 dBm	dBm
–53 dBm	dBm
–60 dBm	dBm

Table A-14. Spectrum Analyzer Level Accuracy Through Power, Measurements

Spectrum Analyzer Level Accuracy Through Power, Measurements		
Input Power Level @ 50 MHz	**Marker M1**	**Specification**
+3 dBm	dBm	±1.5 dB
0 dBm	dBm	±1.5 dB
–11 dBm	dBm	±1.5 dB
–13 dBm	dBm	±1.5 dB
–19 dBm	dBm	±1.5 dB
–27 dBm	dBm	±1.5 dB
–32 dBm	dBm	±1.5 dB
–39 dBm	dBm	±1.5 dB
–49 dBm	dBm	±1.5 dB
–51 dBm	dBm	±1.5 dB
–53 dBm	dBm	±1.5 dB
–60 dBm	dBm	±1.5 dB

MT8212B **Firmware Revision:** ________________ **Operator:** ________________ **Date:** ______________

Serial Number: ________________ **Options:** ____

Table A-15. Pre-Test Data with 30 dB Fixed Attenuator

Pre-Test Data with 30 dB Fixed Attenuator					
	A	**B**	**C**	**D**	**E**
Freq.	**Sensor A Reading @ Source Output**	**Sensor A Reading @ End of Attenuator**	**Splitter/ Attenuator Combined Loss**	**Sensor B Reading @ Power Splitter Output**	**Sensor B Path Power Splitter Loss**
50 MHz					

Table A-16. Power Meter Accuracy, Setup

Power Meter Accuracy, Setup	
Frequency	**Sensor B Reading for –30 dBm**
50 MHz	dBm
1000 MHz	dBm
2000 MHz	dBm
2850 MHz	dBm

Table A-17. Power Meter Accuracy, Measurements

Power Meter Accuracy, Measurements		
Frequency	**Measurement for –30 dBm**	**Specification**
50 MHz		±1.5 dB
1000 MHz		±1.5 dB
2000 MHz		±1.5 dB
2850 MHz		±1.5 dB

Table A-18. Power Monitor Accuracy (Option 5)

Power Monitor Accuracy (Option 5)				
Test Level	**Measured Value on Power Meter**	**Measured Value on MT8212B**	**Error**	**Specification**
0.0 dBm	dBm	dBm	dB	±1.0 dB
–7.0 dBm	dBm	dBm	dB	±1.0 dB
–21.0 dBm	dBm	dBm	dB	±1.0 dB
–40.0 dBm	dBm	dBm	dB	±1.0 dB

MT8212B **Firmware Revision:** ________________ **Operator:** ________________ **Date:** ______________

Serial Number: ________________ **Options:** ____

Table A-19. Transmission Measurement Dynamic Range Verification (Option 21)

Transmission Measurement Dynamic Range Verification (Option 21)		
Frequency	**Measured Value**	**Specification**
25 MHz to 1 GHz		≤ –80 dB
1 GHz to 2 GHz		≤ –80 dB(3)
2 GHz to 3 GHz		≤ –60 dB

(3)Specification for instruments with serial number 524999 and below is –60 dB.

Table A-20. 1xEV-DO Over The Air (Option 34)

1xEV-DO Over The Air (Option 34)			
Tau			
Frequency	**Modulation**	**Measured Tau**	**Specification**
870.03 MHz	16-QAM	µs	≤ ±1 µs
1930.05 MHz	16-QAM	µs	≤ ±1 µs
870.03 MHz	8-PSK	µs	≤ ±1 µs
1930.05 MHz	QPSK	µs	≤ ±1 µs
870.03 MHz	Idle Slot	µs	≤ ±1 µs

MT8212B Firmware Revision: ________________ Operator: ________________ Date: ______________

Serial Number: ________________ Options: ____

Table A-21. GSM RF Measurements (Option 40)

GSM RF Measurements (Option 40)				
Measurement	**Measured Value on Power Meter**	**Measured Value on MT8212B**	**Error**	**Specification**
TCH Pattern (GsmBurst_1slot) at 935 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Burst Power Error	dBm	dBm	dB	≤ ±2.0 dB
Frequency Error		Hz		≤ ±10 Hz
TCH Pattern (GsmBurst_1slot) at 1805.2 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Burst Power Error	dBm	dBm	dB	≤ ±2.0 dB
Frequency Error		Hz		≤ ±10 Hz
TCH All Pattern (GsmBurst_8slot) at 935 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Burst Power Error	dBm	dBm	dB	≤ ±2.0 dB
Frequency Error		Hz		≤ ±10 Hz
TCH All Pattern (GsmBurst_8slot) at 1805.2 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Burst Power Error	dBm	dBm	dB	≤ ±2.0 dB
Frequency Error		Hz		≤ ±10 Hz

MT8212B Firmware Revision: ________________ Operator: ________________ Date: ______________

Serial Number: ________________ Options: ____

Table A-22. CDMA RF Measurements (Option 42)

CDMA RF Measurements (Option 42)				
Measurement	**Measured Value on Power Meter**	**Measured Value on MT8212B**	**Error**	**Specification**
cdmaOne (FWD_RC1-2_9Channel) at 870.03 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Frequency Error		Hz		≤ ±50 Hz
cdmaOne (FWD_RC1-2_9Channel) at 1930.05 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Frequency Error		Hz		≤ ±50 Hz
CDMA2000 (FWD_RC3-5_9Channel) at 870.03 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Frequency Error		Hz		≤ ±50 Hz
CDMA2000 (FWD_RC3-5_9Channel) at 1930.05 MHz, –30 dBm Level				
Channel Power Error	dBm	dBm	dB	≤ ±1.5 dB
Frequency Error		Hz		≤ ±50 Hz

Table A-23. cdmaOne and CDMA2000 1xRTT Demodulation (Option 43)

cdmaOne and CDMA2000 1xRTT Demodulation (Option 43)		
Measurement	**Measured Value**	**Specification**
cdmaOne (FWD_RC1-2_9Channel) at 870.03 MHz, –30 dBm Level		
Residual Rho		≥ 0.98
cdmaOne (FWD_RC1-2_9Channel) at 1930.05 MHz, –30 dBm Level		
Residual Rho		≥ 0.98
CDMA2000 (FWD_RC3-5_9Channel) at 870.03 MHz, –30 dBm Level		
Residual Rho		≥ 0.98
CDMA2000 (FWD_RC3-5_9Channel) at 1930.05 MHz, –30 dBm Level		
Residual Rho		≥ 0.98

MT8212B **Firmware Revision:** ________________ **Operator:** ________________ **Date:** ______________

Serial Number: ________________ **Options:** ____

Table A-24. T1/E1 Transmit Level (Option 50)

T1/E1 Transmit Level (Option 50)		
Transmitted Level	**Measured Value**	**Specification**
T1		6 to 7.6 Vp-p
E1		4.2 to 7.2 Vp-p

Table A-25. 1xEV-DO RF Measurements (Option 62)

1xEV-DO RF Measurements (Option 62)			
Frequency Error			
Frequency	**Modulation**	**Measured Frequency Error**	**Specification**
870.03 MHz	16-QAM	µs	≤ ±50 Hz
1930.05 MHz	16-QAM	µs	≤ ±50 Hz
870.03 MHz	8-PSK	µs	≤ ±50 Hz
1930.05 MHz	QPSK	µs	≤ ±50 Hz
870.03 MHz	Idle Slot	µs	≤ ±50 Hz

Channel Power Error					
Frequency	**Modulation**	**Power Meter Reading**	**Ch Power(rms)**	**Error**	**Specification**
870.03 MHz	16-QAM	dBm	dBm	dB	≤ ±1.5 dB
1930.05 MHz	16-QAM	dBm	dBm	dB	≤ ±1.5 dB
870.03 MHz	8-PSK	dBm	dBm	dB	≤ ±1.5 dB
1930.05 MHz	QPSK	dBm	dBm	dB	≤ ±1.5 dB
870.03 MHz	Idle Slot	dBm	dBm	dB	≤ ±1.5 dB

MT8212B Firmware Revision: _______________ **Operator:** _______________ **Date:** _____________

Serial Number: _______________ **Options:** ____

Table A-26. 1xEV-DO Demodulation (Option 63)

1xEV-DO Demodulation (Option 63)

Rho Pilot

Frequency	Modulation	Measured Rho Pilot	Specification
870.03 MHz	16-QAM		≥ 0.98
1930.05 MHz	16-QAM		≥ 0.98
870.03 MHz	8-PSK		≥ 0.98
1930.05 MHz	QPSK		≥ 0.98
870.03 MHz	Idle Slot		≥ 0.98

Pilot and MAC Power Error

Frequency	Modulation	Power Meter Reading	Pilot&Mac Pwr	Error	Specification
870.03 MHz	16-QAM	dBm	dBm	dB	≤ ±1.5 dB
1930.05 MHz	16-QAM	dBm	dBm	dB	≤ ±1.5 dB
870.03 MHz	8-PSK	dBm	dBm	dB	≤ ±1.5 dB
1930.05 MHz	QPSK	dBm	dBm	dB	≤ ±1.5 dB
870.03 MHz	Idle Slot	dBm	dBm	dB	≤ ±1.5 dB

Data Power Error

Frequency	Modulation	Power Meter Reading	Active Data	Error	Specification
870.03 MHz	16-QAM	dBm	dBm	dB	≤ ±1.0 dB
1930.05 MHz	16-QAM	dBm	dBm	dB	≤ ±1.0 dB
870.03 MHz	8-PSK	dBm	dBm	dB	≤ ±1.0 dB
1930.05 MHz	QPSK	dBm	dBm	dB	≤ ±1.0 dB
870.03 MHz	Idle Slot	dBm	dBm	dB	≤ ±1.0 dB

MT8212B Firmware Revision: ________________ **Operator:** ________________ **Date:** ______________

Serial Number: ________________ **Options:** ____

Table A-27. iDEN Signal Analyzer (Option 68)

iDEN Signal Analyzer (Option 68)					
Measured Frequency Error			**Specification**		
Hz			≤ ± 43Hz		
Main Channel Power Error					
Frequency	**Input Power**	**Power Meter Reading**	**Main Ch Power**	**Error**	**Specification**
858.5 MHz	–20 dBm	dBm	dBm	dB	≤ ±1.5 dB

Appendix B — Test Fixture Schematics

The following schematics are provided for those wishing to build their own test fixtures for the Option 10 verification test. The part numbers referenced in the schematics are Anritsu part numbers.

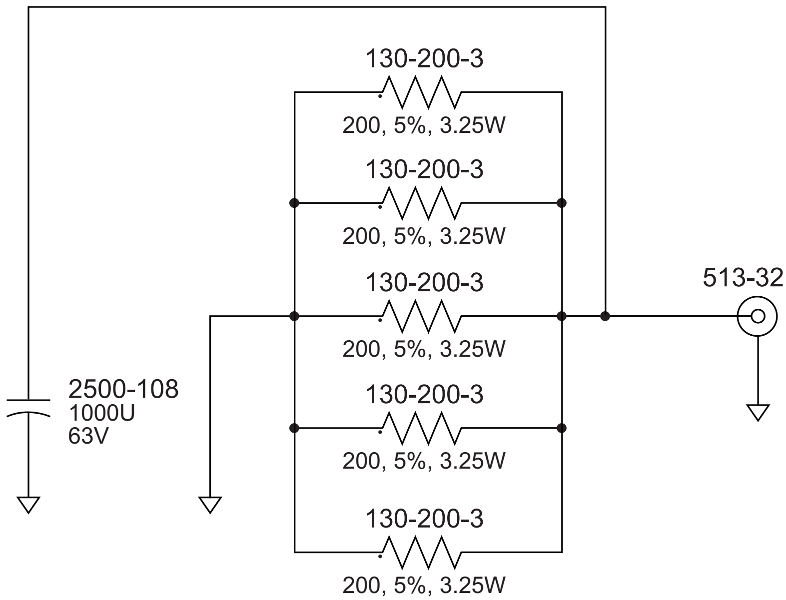


Figure B-1. Anritsu Model T2904 High Current Test Fixture (for Option 10A)

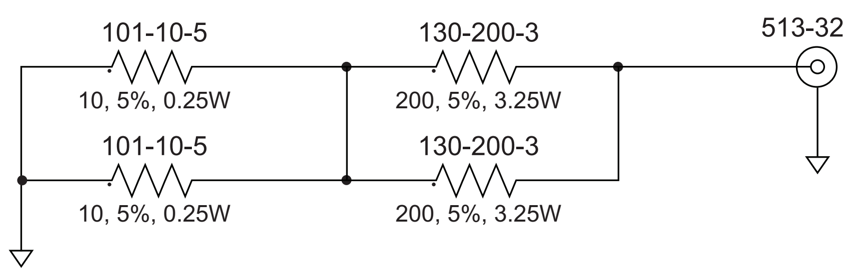


Figure B-2. Anritsu Model T3377 Low Current Test Fixture (for Option 10 and 10A)

Notes

Notes

Printed on Recycled Paper with Vegetable Soybean Oil Ink

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