E5515C-08B

S E R V I C E N O T E

Supersedes:
E5515C-08A

E5515C Wireless Communications Test Set (8960 Series)

Serial Numbers: ALL

Power Measurement Accuracy Degradation Requires Replacement of RF Interface (Includes Thermal Power Detector and Amplifier Gain Stage Defects

Parts Required:

P/N	Description	Qty.
E5515-61892	RFIO Repair Kit	1

ADMINISTRATIVE INFORMATION

SERVICE NOTE CLASSIFICATION:

MODIFICATION RECOMMENDED

ACTION CATEGORY: XX ON SPECIFIED FAILURE [[]] AGREEABLE TIME	STANDARDS LABOR: 2.0 Hours	
LOCATION CATEGORY: [[]] CUSTOMER INSTALLABLE XX ON-SITE XX SERVICE CENTER [[]] CHANNEL PARTNER	SERVICE INVENTORY: XX RETURN [[]] SCRAP [[]] SEE TEXT	USED PARTS: XX RETURN [[]] SCRAP [[]] SEE TEXT
AVAILABILITY: PRODUCT'S SUPPORT LIFE	NO CHARGE AVAILABLE UNTIL: 30 OCTOBER 2010	
AUTHOR: SW	PRODUCT LINE: 13	
ADDITIONAL INFORMATION: PL13 is setting up an RFIO refurbishment kit – this will be available approximately Feb 2010.		

September 28, 2009

Agilent Technologies

Situation:
The Test Set's RF Interface may require replacement to resolve inaccurate power measurements. Two separate failure mechanisms can occur which requires separate detection methods:

- **Digital Average (DAP) & Thermal Power measurements:**
  DAP is used in cdma2000 and 1xEV-DO applications. Thermal Power is used in WCDMA applications. Both Test Applications (TA) and Lab Applications (LA) may be affected (Only specific TAs & LAs have DAP or Thermal Power measurement capability. Refer to the table below). A faulty thermal power detector, with an RF signal applied to the RF IN/OUT connector, will display measured power above or below the level of the input signal. A second failure mode, which can be used for fault detection, occurs with no signal applied to the RF IN/OUT connector. Procedure 1, which detects the latter failure mode, should be used to determine if the RF Interface should be replaced due to a defective thermal power detector.

Test Application	Technology	Power Measurement
E1962B	cdma2000	DAP
E1963A	W-CDMA	Thermal Power
E1966A	1xEV-DO	DAP
E1985B	W-CDMA	Thermal Power
E1985C	cdma2000	DAP
E1985E	cdma2000, 1xEV-DO	DAP
E1987A	cdma2000, 1xEV-DO, W-CDMA	DAP and Thermal
Lab Application	**Technology**	**Power Measurement**
E6702C	cdma2000	DAP
E6703F	W-CDMA	Thermal Power
E6706C	1xEV-DO	DAP
E6785F	W-CDMA	Thermal Power

- **Peak Power or Fast Detector measurements:**
  This measurement is used in IS-95 (CDMA), GSM, TDMA, and AMPS applications. Both Test Applications (TA) and Lab Applications (LA) may be affected. Defective amplifiers will cause power measurement readings to drift from 1-5 dB over time. Procedure 2, which detects this amplifier drift, should be used to determine if the RF Interface should be replaced.

Solution/Action:
Use the following two procedures to determine if the RFIO (RF Interface) should be replaced. The RFIO should be replaced if **either** procedure fails.

Procedure 1: Manual procedure for Digital Average (DAP) & Thermal Power Detector Verification (No external test equipment is required)

Allow the Test Set to warm up for 30 minutes before proceeding:

- Ensure that no RF signal is applied to the RF IN/OUT connector
- Set the RF IN/OUT Amplitude Offset State to "OFF" (from the **SYSTEM CONFIG** screen)
- Press the "**CALL SETUP**" key
- Press the F7 "**Cell Power**" key, then Press the "**OFF**" key
- Press the "**Measurement Selection**" key
- Select:
  - "**Digital Average Power**" for cdma2000 or 1xEV-DO
  - "**Thermal Power**" for WCDMA
- Press:
  - The F1 "**Digital Average Power Setup**" key for cdma2000 or 1xEV-DO
  - The F1 "**Thermal Power Setup**" key for WCDMA
- Select "**Multi-Measurement Count**", then set value to 100
- Select "**Trigger Arm**", then select "**Single**"
- Press the "**START SINGLE**" key

Pass condition: Displayed value $\leq$ **-32 dBm**
Fail condition: Displayed value **> -32 dBm**
Execution time: Approximately 20 seconds
Turn the "RF IN/OUT Amptd Offset" state to "On"

Procedure 2: Manual procedure for Amplifier Gain Stage Drift Verification

Verify the performance of the RF Interface using the procedure below. Replace it if it does not meet specifications (refer to the ***Specifications Table*** for specific values). Verify that the replacement RF Interface also meets these specifications. Use proper anti-static protection to remove and replace this assembly. Upgrade of the Test Application(s) may be required.

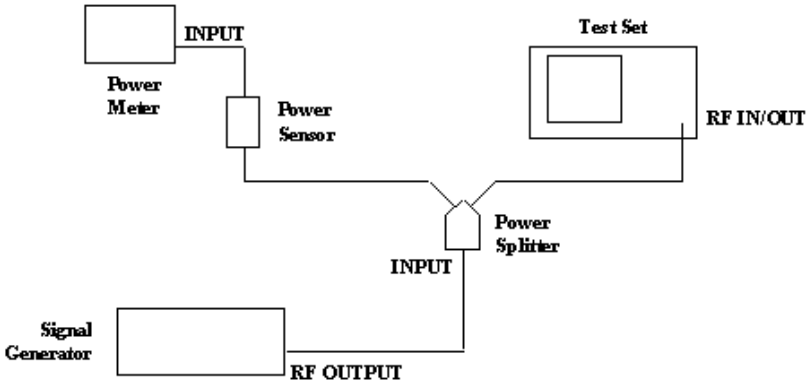
Required Test Equipment:

Instrument	Critical Specifications	Recommended Agilent Model
Signal Generator	850 MHz Frequency >+10 dBm maximum power	ESG Series
Power Meter	±0.02 dB Instrument Accuracy	EPM Series or 438A
Power Sensor	850 MHz Frequency >+14 dBm maximum input ±4% linearity	E-Series or 8482A
Power Splitter	850 MHz frequency ±0.05 dB tracking	11667A

Additional Equipment:
Male-to-Male Type-N adapter (qty 1)
2-3 foot Type-N RF coaxial cable (qty 1)

Procedure:

1. If necessary, enter the power sensor calibration factors into the power meter.
2. Zero and calibrate the power meter and power sensor.
3. Connect the equipment as follows:



   a. Connect the signal generator to the input of the power splitter with the coaxial cable.
   b. Connect one arm of the power splitter to the Test Set RF IN/OUT connector **directly** through a Male-to-Male Type-N adapter.
   c. Connect the power sensor **directly** to the other arm of the power splitter.
4. On the power meter, set the power sensor calibration factor for 850 MHz.
5. On the signal generator set the frequency to 850 MHz.
6. On the Test Set:
   a. Perform a full preset (SHIFT, Preset).
   b. For E1960A Test Application:
      i. On Call Parms Menu 1 set Cell Power to Off.
      ii. On Call Parms Menu 3 set Receiver Control to Manual and Manual Freq to 850 MHz.
      iii. Push the MEASUREMENT SELECTION key and select Transmit Power.
   c. For E1961A Test Application:
      i. On Call Control Menu set Active Cell to CW
      ii. On Control Parms Menu set Cell Power to Off.
      iii. On Control Parms Menu select Receiver Control and set Expected CW Power to each level specified in the ***Results Table***. Set Measurement Frequency and Uplink Frequency to 850 MHz.
      iv. Push the MEASUREMENT SELECTION key and select Analog Transmit Power.
   d. For E1962B Test Application:
      i. On the Call Control Menu set Sys Type to AMPS
      ii. On Call Parms Menu 1 set Cell Power to Off.
      iii. On Call Parms Menu 3 set Rcvr Power Ctrl to Manual and Meas Frequency to 850 MHz.
      iv. Push the MEASUREMENT SELECTION key and select Analog Transmit Power.
7. For both level settings in the ***Results Table*** below, do the following:
   a. On the Test Set, set the Expected Power (E1960A) **or** Receiver Power (E1962B) to the level being tested. Note: For E1961A the Expected CW Power is set in step 6c-iii.
   b. On the signal generator, adjust the output so that the power meter displays the level shown in the ***Results Table*** below. This compensates for splitter and cable losses (approx 6dB).

c. Subtract the reading of the power meter from the reading of the Test Set and enter the calculated value in the ***Results Table***. The calculated value should not exceed the values listed in the ***Specifications Table*** (below):

Specifications Table

Test Application	RF Power (CW) Measurement Accuracy Specification
E1960A (GSM)	±0.27 dB
E1961A (AMPS/136)	±0.27 dB
E1962B (cdma2000/IS-95/AMPS)	±0.32 dB
E1963A (W-CDMA)	Not Applicable
E1964A (GPRS)	Not Applicable

Test Set Serial Number: _____

RF Interface Part Number: _____

Results Table

Frequency	Level Setting (dBm)	
	+ 4.0	**-20.0**
850 MHz (initial performance)		
850 MHz (after replacement)		

NOTE: Include a copy of these results with the defective RF Interface being returned **OR** E-mail them to spokane_service@agilent.com.